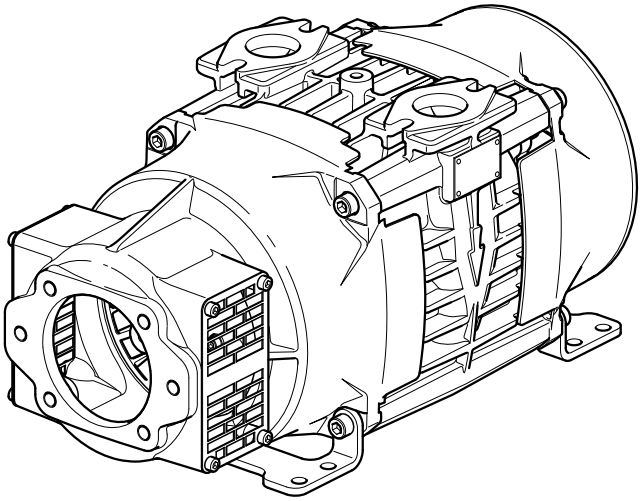
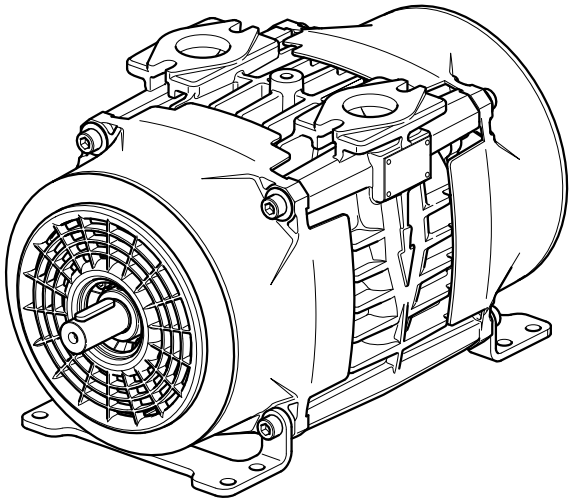
SV200

Installation and Service Instructions

(Translation of the Original Instructions)





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Ingersoll Rand

Introduction

Carefully read these Installation and Service Instructions prior to the installation and start of operation of the SV200 rotary valve compressor. These Installation and Service Instructions describe the structure and the first start of operations of the rotary valve compressor / compressor kits as well as the service work that needs to be carried out for maintenance/reconditioning.

Make sure that these Installation and Service Instructions are available to the staff and that work is performed in accordance with the instructions therein.

Scope of application of the Installation and Service Instructions

The Installation and Service Instructions exclusively contain information for the installation, start of operation and for the maintenance (service) of the SV200 rotary valve compressor in connection with the SV200 D and SV200 H compressor kits respectively.

The Installation and Service Instructions do not apply for the installation and the service of third party components through a third party installer.

Target group

These Installation and Service Instructions are limited exclusively to the utilization through trained specialists.

Notes and safety instructions

The following notes and safety instructions serve as a warning about hazards that may lead to operating errors, injuries and material damage.

Explanation of the signal words

⚠ DANGER

Identifies an immediately impending hazardous situation which may lead to death or serious injuries if it is not averted.

⚠ WARNING

Identifies a potential hazardous situation which may lead to death or serious injuries if it is not averted.

⚠ CAUTION

Identifies a potential hazardous situation which may lead to minor or moderately severe injuries if it is not averted.

NOTICE

Identifies information or company policies that relate directly or indirectly to the safety of the staff or the protection of material assets.

Table of Contents

1 General

1.1 Application

GHH RAND builds and delivers the SV200 rotary valve compressor in the form of the SV200 D (Direct Drive) model as well as the SV200 H (Hydraulic Drive) model, including the respective accessories as kits for the installation on tank vehicles for a unit that is connection-ready.

Due to the oil-free compression of atmospheric air and the weight-to-power ratio, the compressor sets are used for the installation on tank vehicles for the compression-supported emptying of liquids when the utilization of feed pumps would be difficult or impossible, due to the fact that the direct contact of liquid/pump would cause problems.

The products built and supplied by GHH RAND are only designed for the operation at and on utility vehicles that exclusively drive on paved roads.
A different use requires the consultation with the manufacturing plant.

1.2 Manufacturer's address

GHH RAND
Schraubenkompressoren GmbH
Max-Planck-Ring 27
46049 Oberhausen

Germany

1.3 Machine data

The machine data is located on the type plate of the rotary valve compressor.

NOTICE
The entire identification has certificate value and may not be changed or rendered illegible.

1.4 Information for enquiries and orders

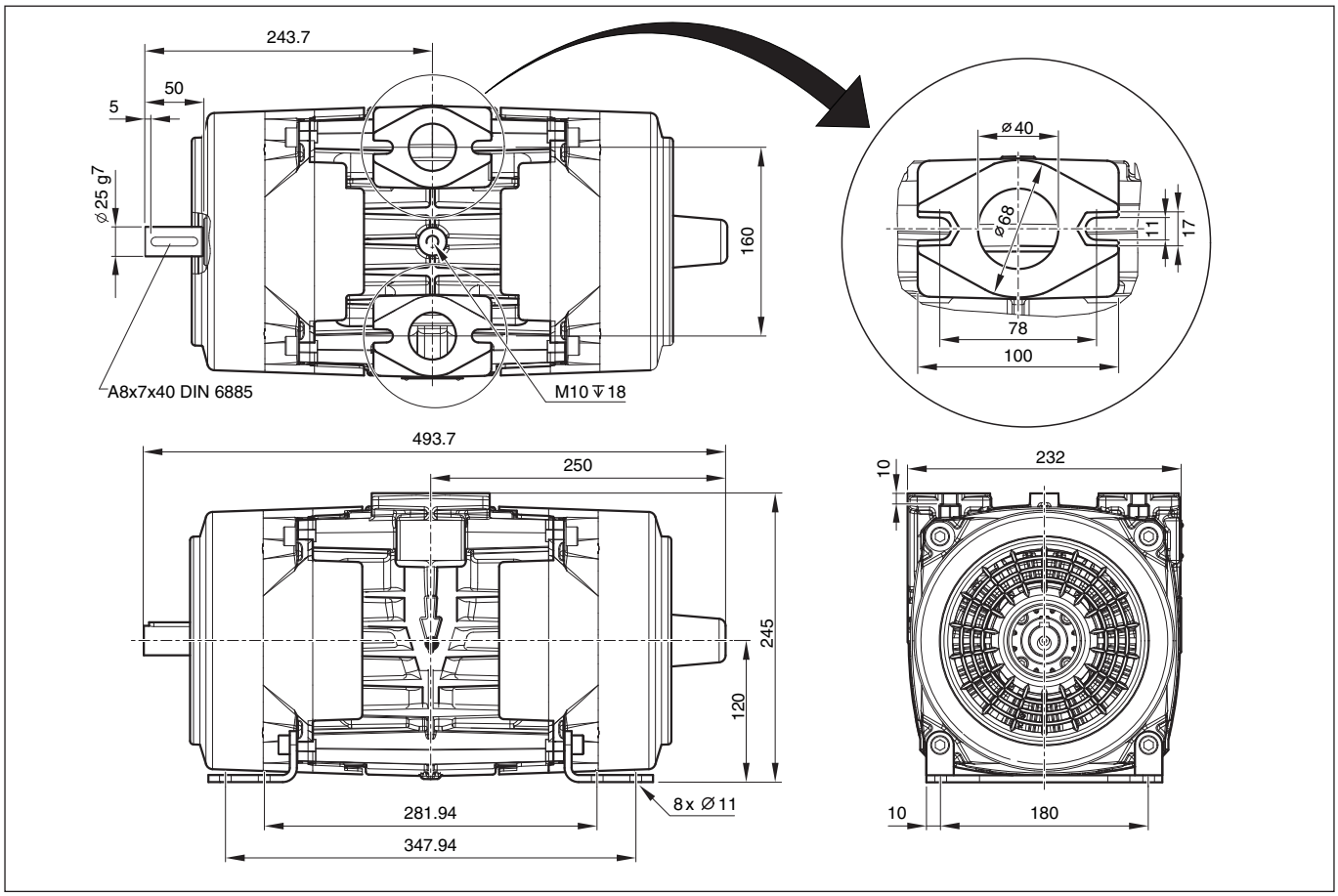
In conjunction with inquiries and orders of replacement parts and accessories, the exact type identification and the machine number of the compressor for which the replacement part or accessory is intended must be indicated.

⚠WARNING
Original replacement parts and accessories that are authorized by the manufacturer represent safety factors.
The use of non-original or non-authorized replacement parts and accessories may void the liability for the resulting consequences.

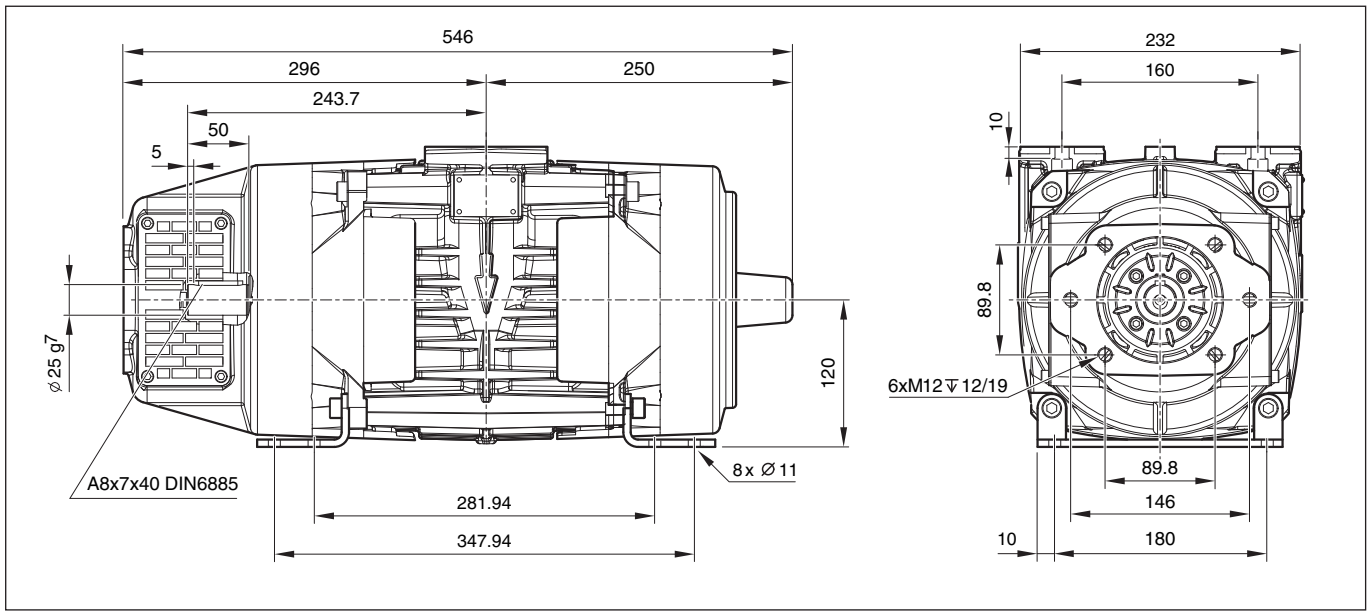
1.5 Service locations

Addresses of the service locations can be found on the last page of these installation instructions or on the Internet page:
http://www.ghhrand.com

1.6 Technical data of the SV200 rotary valve compressor



Model: SV200 **D** (direct drive) All measurements are approximate specifications.



Model: SV200 **H** (hydraulic drive) All measurements are approximate specifications.
Flange dimensions refer to SV200 D model

Dimensions & weight

SV200…		…D	…H
Length (approx.)	mm	494	546
Width (approx.)	mm	232	232
Height (approx.)	mm	245	245
Weight (approx.)	kg	37	39

Rotational speed range

SV200	
min. min^{-1}/rpm	1000
max. min^{-1}/rpm	1800

Connection dimensions

Intake-/pressure flange:	DN40 / Ø68 - 2 x M10
Articulated shaft:	Only articulated shafts with two joints are permitted. Only balanced articulated shafts with a balancing quality of G 6.3 in accordance with DIN ISO 1940 with length compensation may be used.

Performance data

	Unit	SV200		
Rotary valve compressor	min^{-1} [rpm]	1000	1400	1800
Working gage pressure	**bar (g) [psig]**		**1.5 [15.0]**	
Intake volume	m^3/h [cfm]	75 [50]	119 [76]	163 [102]
Coupling output	kW [hp]	5.0 [5.5]	7.1 [8.1]	9.8 [11.1]
Final temperature	°C [°F]	136 [229]	133 [231]	142 [247]
Intake temperature max.	°C [°F]	46 [115]	46 [115]	46 [115]
Working gage pressure	**bar (g) [psig]**		**2.0 [25.0]**	
Intake volume	m^3/h [cfm]	65 [42]	109 [67]	152 [93]
Coupling output	kW [hp]	6.0 [7.3]	8.2 [10.1]	11.3 [14.0]
Final temperature	°C [°F]	164 [299]	157 [290]	166 [306]
Intake temperature max.	°C [°F]	46 [115]	46 [115]	46 [115]
Working gage pressure	**bar (g) [psig]**		**2.5 [36.0]**	
Intake volume	m^3/h [cfm]	55 [32]	98 [58]	140 [83]
Coupling output	kW [hp]	7.0 [9.3]	9.3 [12.4]	12.9 [17.2]
Final temperature	°C [°F]	192 [375]	181 [356]	190 [372]
Intake temperature max.	°C [°F]	46 [115]	46 [115]	46 [115]
Final temperature with max. intake temperature	°C [°F]	240 [464]	227 [441]	238 [460]

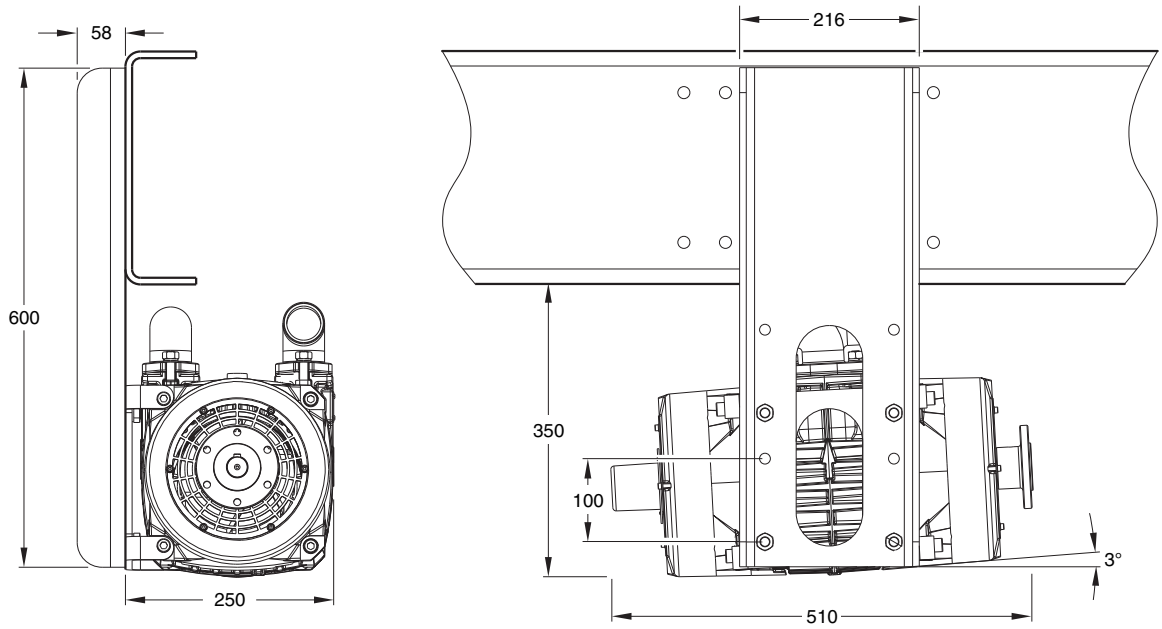
All information for:	
Feed medium:	atmospheric air
Intake pressure:	1 bar (abs.) [14.504 psia]
Intake temperature:	20 °C [68 °F]
Technical data without intake or pressure losses	

Maximum operating pressure:
2.5 bar (rel.) [36 psig]

Environmental conditions

Environmental temperature:
–25 to +46 °C [-13 to +111.8 °F]

1.7 Dimensions with the utilization of the optional installation console



Sample illustration for SV200 D model

All measurements are approximate specifications.

Dimensions

SV200 D/H with kit...		**...D**	**...H**
Length (approx.)	mm	510	546*
Width (approx.)	mm	250 (+58)	
Height (approx.)	mm	358**	
*	Length without hydraulic motor (optional)		
**	Measurement from bottom edge of vehicle frame (with use of the optionally deliverable installation console; console can be shortened on the top)		

1.8 Scope of delivery

Scope of delivery SV200 D kit

- SV200 D compressor
- 2 flange seals for intake and pressure flange at the compressor
- 1 articulated shaft flange (DIN or SAE)
- Air intake filter kit
  (intake filter with rain cap, mounting rubber pipe elbow [90°], pipe piece (aluminum), 4 hose clamps, service gage and hose connection fitting DN50 [straight / optional: 90° ungulate and pivotable])
- Spiral hose (length: approx. 1.5 m)
- Drive-side flange (pipe connection flange / weld flange)
- 1 check valve and 1 safety valve or 1 combined check/ safety valve

Optional:

- Overload coupling with shear bolt, usable for DIN and SAE-articulated shaft flange (incl. 2 shear bolt as backup)
- Installation console with compressor mount and mounting material
- Micro filter (for drive-side installation)

Scope of delivery SV200 H kit

- SV200 H compressor
- 2 flange seals for intake and pressure flange at the compressor
- 1 flexible shaft connection (coupling)
- Air intake filter kit
  (intake filter with rain cap, mounting rubber pipe elbow [90°], pipe piece (aluminum), 4 hose clamps, service gage and hose connection fitting DN50 [straight / optional: 90° ungulate and pivotable])
- Spiral hose (length: approx. 1.5 m)
- Drive-side flange (pipe connection flange / weld flange)
- 1 non-return valve and 1 safety valve or 1 combined non-return/ safety valve

Optional:

- Installation console with compressor mount and mounting material
- Hydraulic motor
- Micro filter (for drive-side installation)

2 Safety

2.1 General

These Installation and Service Instructions include basic notes that must be followed during the assembly, installation, and service. Therefore, these Installation and Service Instructions must be read in their entirely by the responsible specialized staff prior to the start of work.

2.2 Authorised personnel, training and qualification

⚠WARNING

Installation work on the compressor / compressor kit may only be carried out by authorized, trained and qualified persons who are familiar with the applicable safety regulations.

Repair work or modifications may only be performed by authorized personnel. The staff is available at anytime at the service sites or at GHH RAND.

2.3 Safety-conscious work

The safety-related regulations that are relevant for the installation, operation and maintenance of air compressors can be found in the following publications:

Standards, in particular:

DIN EN ISO 12100	Safety of machinery
DIN EN 1012-01	Compressors and vacuum pumps, safety requirements

In addition, the following regulations and guidelines must be adhered to

– Product-related safety data sheets, especially in regard to explosion hazards, handling and storage

– Technical rules for hazardous materials (TRHM)

– Technical rules for operational safety (TROS)

In this context, the respectively last applicable versions of these regulations shall be authoritative.

⚠WARNING

Special legal provisions and regulations, particularly safety regulations, that may apply in your company or due to local conditions must also be adhered to.

In case of competing regulations, the more restrictive provisions shall be applied.
Also adhere to the national regulations that apply in the respective country in which the installation takes place.

2.4 Unauthorised conversions and spare parts

Modification and changes on the compressor / compressor kit are prohibited.
Damage to the seal will void any warranty claims.
Original replacement parts and accessories that are authorized by the manufacturer represent safety factors.
The use of non-original or unauthorized replacement and accessory parts may void the liability for resulting consequences.

2.5 Incorrect operating methods

Without the approval of GHH RAND, compressors / compressor kits may not be operated under any other conditions than those listed in Chapter 1.6 "Technical data".

⚠WARNING

The operation of compressors / compressor kits under conditions that are not intended may lead to serious injuries and significant material damage.

2.6 Disposal

NOTICE

Properly dispose of operating materials and components in an environmentally-safe way.

3 Installation guidelines

NOTICE
In principle, the installation guidelines of the manufacturer for the respective vehicle must be adhered to in addition to the specifications of this Installation and Service Instruction.

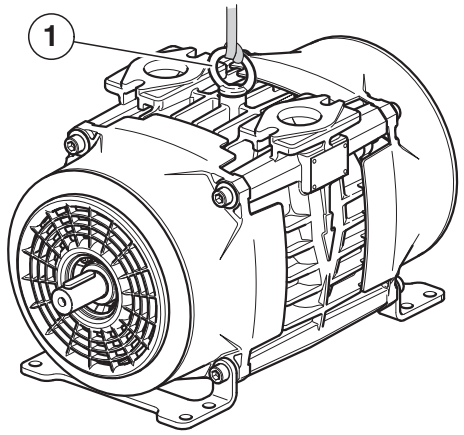
3.1 Internal transportation

The rotary valve compressor and the accessories are delivered separately.

The rotary valve compressor sits on a pallet and is fastened with tension straps.
The additional parts of the kit are delivered in a separate box.

⚠WARNING

Use a sufficiently dimensioned lift truck or forklift for the internal transport.



To transport the compressor with a crane, it is possible to screw an eye bolt (1) into the threaded drill hole between the connection flanges on the top of the compressor.

⚠WARNING

Use sufficiently dimensioned lifting accessories.

Do not lift the compressor by the plastic covers that are attached to the sides.

3.2 Drive options

⚠CAUTION

No radial forces may be transmitted to the drive shaft of the compressor; actuation with a V-belt drive is therefore prohibited.

To avoid damage to the compressor, it must be ensured that the required operating speed is achieved promptly.

SV200 D kit (D: direct drive)

The SV200 D rotary valve compressor that is supplied with the kit is intended for a direct actuation from a power take-off via a articulated shaft.

The installation of a safety coupling is recommended for the protection of the drive (gear unit).
An overload coupling with shear bolt can be supplied as an option (refer to Chapter 1.8).

SV200 H kit (H: hydraulic drive)

The SV200 H rotary valve compressor that comes with the kit is intended for an actuation through a hydraulic motor via a flexible coupling.
It is possible to attach a hydraulic motor, which can be supplied as an option, through a flange at the cover on the drive side of the compressor; the drive shafts are connected with each other via the flexible coupling.

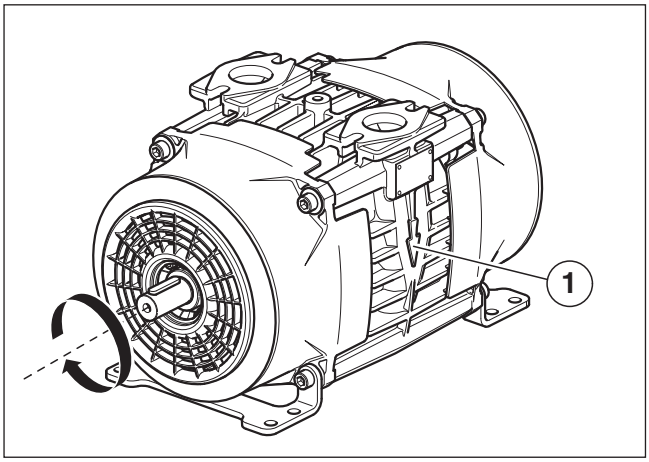
3.3 Preparing installation

3.3.1 Rotation direction control / change of rotation direction

⚠ CAUTION

The rotary valve compressor may only be turned in the direction as indicated by the arrow (1) on the casing.

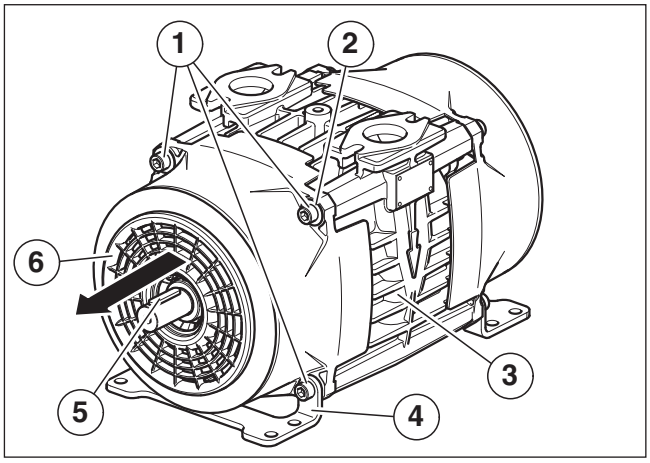
Even short-term turning against the stipulated rotation direction can result in major damage to the compressor.



- Check the rotation direction of the drive:
  The arrow (1) in the compressor casing indicates the required rotation direction of the drive shaft.

If the rotation direction of the compressor is not the same as the rotation direction of the drive, the rotation direction of the compressor must be changed by switching the covers to the respective other side.

Exchanging of the covers:



- Unscrew the hexagon socket screws (1) [total of 4], take footer (4) and cover (6) off the compressor (3).
- Take fitted key (5) out of the shaft and insert it into the slot at the other end of the shaft.

⚠ CAUTION

The fitted key slot in the shaft has sharp edges. Wear appropriate protective gloves.

- Reinstall the covers on the opposite ends.
  Apply installation paste (ceramic based, heat resistant up to +250°C) to the hexagon socket screws (1), insert them and tighten them with the specified torque.

  Tightening torque (M10 10.9):
  58 Nm/42.8 lbf ft

⚠ CAUTION

Do not use washers on the cover for the hydraulic drive (only SV200 H).

Do not tighten hexagon socket screws applying more than the specified torque, because the compressor housing may otherwise be damaged.

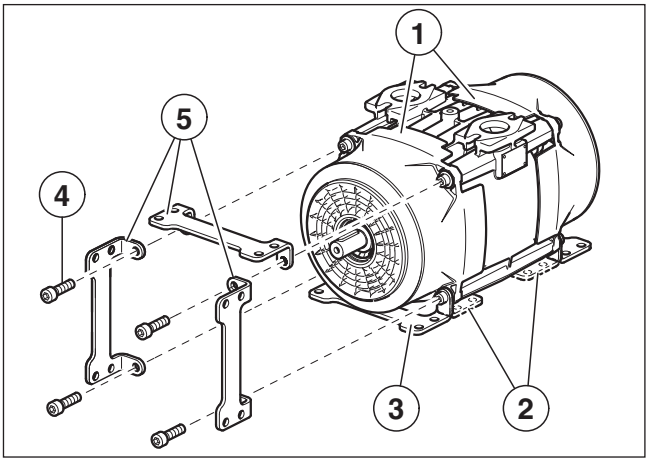
The powering now takes place at the other end of the shaft of the compressor, the drive rotation direction is running counter-clockwise.

NOTICE

Prior to the reattachment of the footers it needs to be determined which direction the connection flanges of the compressor should point to in the installed condition, because the footers can optionally be installed so that they are off-set on the compressor by 90° respectively, see Section 3.3.2.

in conjunction with a change of the drive rotation direction it needs to be ensured that afterwards the flanges for the installation of the vacuum and the pressure line are located on the respectively opposite side.

3.3.2 Installation options for the footers / Orientation of the compressor connections



The attachment footers (3) can be installed so that they are offset respectively by 90° between 2 fastening screws (4) of the covers (1) (installation position see Pos. 5).
If necessary, the footers can also be installed on the compressor so that they are turned by 180° (see Pos. 2) to achieve a closer spacing of the mounting drill holes on the vehicle.

⚠ CAUTION

Do not use washers at the mounting points of the footers.

No washers are used either for the other two mounting screws on the cover for the hydraulic drive (only SV200 H).

NOTICE

If the optional installation console is used, a mounting plate is installed in lieu of the footers. The mounting plate is screwed to the installation console which is attached to the vehicle, see Chapter 3.6.

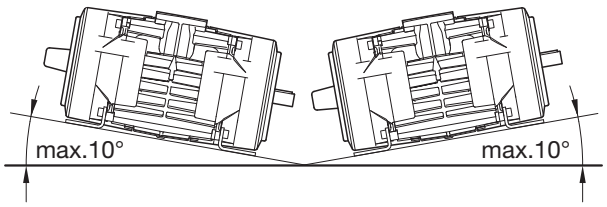
3.3.3 Installation site

The approximate position of the compressor on the vehicle must be determined prior to the installation considering the following framework conditions.

Required space conditions

- Check required space on the vehicle considering the respective dimensions (see Chapter 1.6 "Technical data for SV200 rotary valve compressor" and Chapter 1.7).
- To ensure sufficient cooling of the compressor, the space between the front covers and other parts should measure at least 20 cm.
- Consider the orientation of the compressor and the respective space requirement for the connection of the intake and the pressure line.

Orientation / flange parallelism



NOTICE

The maximum permissible inclined position of the rotary valve compressor in longitudinal direction during the operation is +/– 10°.

For the SV200 D compressor, plan, if possible, for an installation and orientation on the side of the power take-off in a right angle to the vehicle.
The optional installation console already comes with a flange fitting of 3° to achieve flange parallelism (see illustration in Chapter 1.7 "Measurements in conjunction with the use of the optional installation console").

3.3.4 Selecting the articulated shaft (only SV200 D kit)

Consider the following items during the determination of the articulated shaft:

- Choose the appropriate length for the jointed shaft taking into consideration the fitting dimensions and observing the maximum extension length.

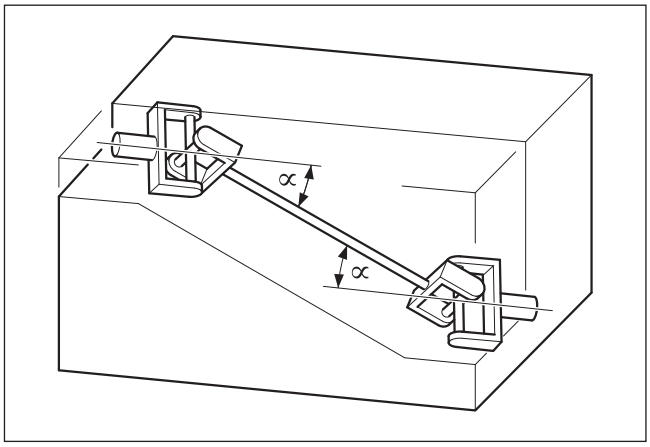
⚠ CAUTION

The maximum permissible expansion length of the articulated shaft must be looked up in the operating instructions of the articulated shaft manufacturer and must be adhered to during the installation.

⚠ WARNING

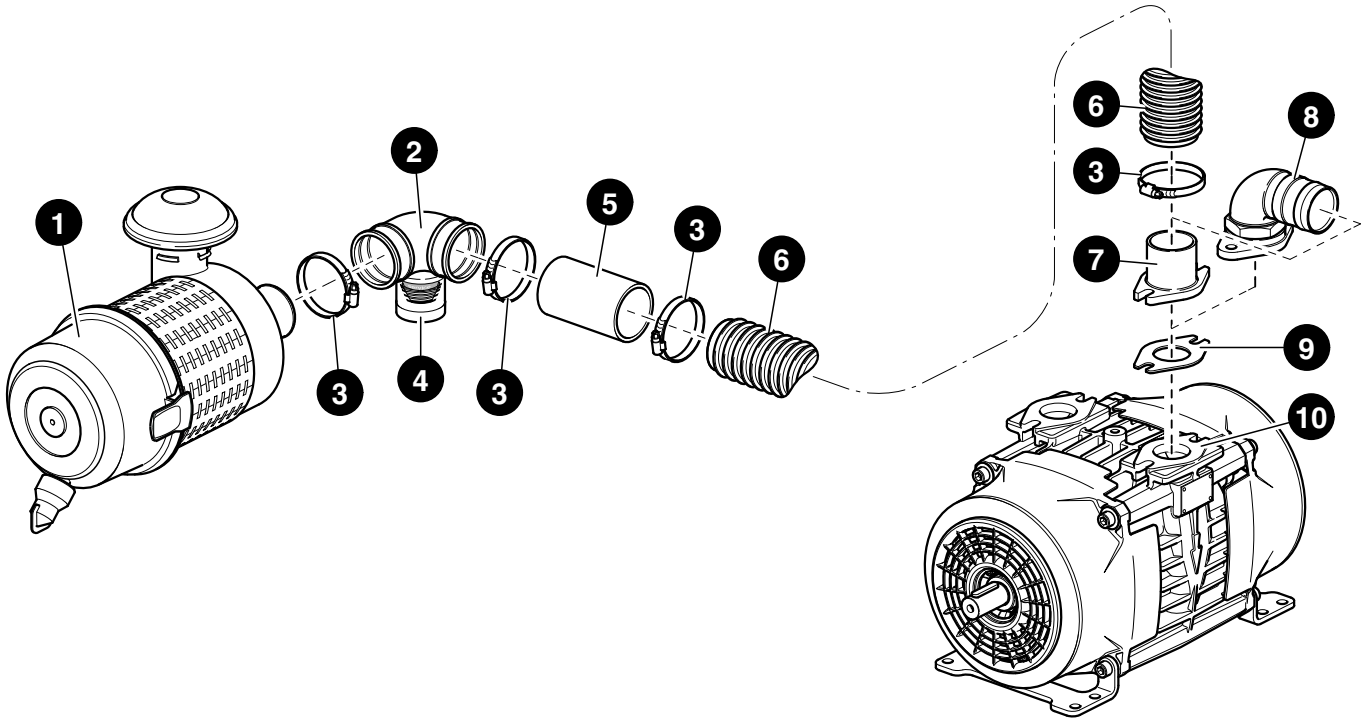
As a matter of principal, the manufacturer's structural guidelines for the respective vehicle and the technical information provided by the articulated shaft manufacturer in regard to the mounting, flange parallelism and inclination angle of the articulated shaft must be adhered to.

The total inclination angle α of the articulated shaft shall not exceed 12°. 15° are permissible in exceptional cases.



3.4 Air intake

Component overview



❶	Air filter
❷	Rubber pipe angle (90°)
❸	Hose clamp
❹	Service gage
❺	Pipe piece
❻	Spiral hose
❼	Hose connection fittings, straight
❽	Hose connection fittings, 90°, pivotable (optional, instead of Pos. 7)
❾	Flange seal
❿	Intake flange on the compressor

The intake air must be cleaned through the air filter that is included in the kit. A paper filter should be chosen as the filter material.

Air flow / filter installation location

⚠ CAUTION

The air intake must not be located in the area of warm air or emitted hot exhaust fumes. If necessary, the exhaust system of the vehicle or the installation location of the air filter must be moved.
Temperature damage may be caused to the compressor in case of non-adherence.

Connection line, service gage

The air intake line (spiral hose included in the kit) is connected to the air filter via a 90° elbow fitting which the intake service gage is mounted onto.

NOTICE
Consider the accessibility and readability of the service gage when determining the installation location of the air filter.

The connection of the air intake line at the compressor takes place via a hose connector fitting (straight or with 90° angle and pivotable).

NOTICE
To prevent a loss of pressure, the nominal width (DN 50) of the connection line for the air intake filter may not be reduced, and the length of the connection line should be kept as short as possible.

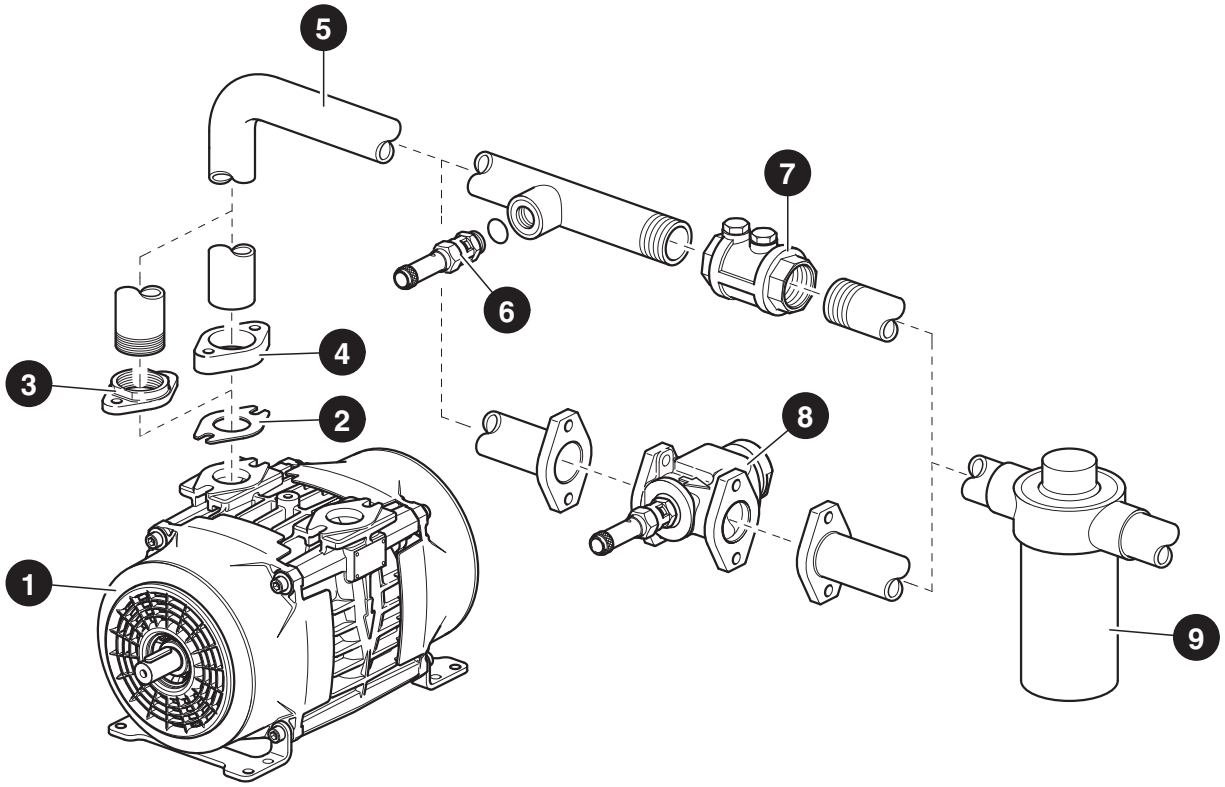
⚠ CAUTION

If a fixed piping is intended in lieu of the spiral hose, it needs to be ensured that only pipes made of non-corroding material (e.g. aluminum) are used.
Otherwise there is a risk that rust germs may enter the compressor and that the rotor may start to rust.

Only the non-electricity conductive flange seals that come with the kit may be used on the compressor flanges - risk of corrosion!

3.5 Drive-side facilities

Component overview



❶ SV200 Rotary valve compressor
❷ Flange seal
❸ Pipe connection flange
❹ Weld flange
❺ Pressure line
(not included in the total price)
❻ Safety valve
❼ Non-return valve
❽ Combined non-return valve and safety valve (in lieu of Pos. 6 and 7)
❾ Micro filter (optional)

The connection of the pressure line at the compressor takes place via the pipe connection flange that came with the kit of the welding flange (optional)

3.5.1 Non-return valve

The non-return valve that is included in the kit must be installed in the pressure line to the tank as a means of protection for the compressor.
The non-return valve is to prevent a reverse motion of the rotary valve compressor.
It is not used to prevent material rebounds; for that, respective features must exist on the vehicle side.

⚠WARNING

Adhere to the flow direction of the non-return valve (arrow in the casing). Do not mount the safety valve facing downwards.

NOTICE

The non-return valve that is installed in the compressor kit has the purpose to prevent a longer fast reverse motion of the compressor after shut-off that is due to an existing residual pressure in the air pressure lines of the pneumatic system as well as in the tank.

NOTICE

To prevent an unintended material rebound, an additional non-return valve (or a non-return flap) is mandatory to be intended in the pneumatic system of the silo construction.

3.5.2 Safety valve

To secure the compressor and the safety valve that comes with the kit must be installed between the compressor and the non-return valve.

⚠WARNING

To ensure a proper function, the safety valves must not be installed facing downwards. The length of the pressure line to the safety valve may measure no more than 1 m [3.3 ft].

The pressure line to the safety valve should be kept as short as possible.

⚠WARNING

The safety valve must be the first component in the pressure line behind the compressor.

The improper placement of the safety valve my lead to the total damage of the compressor as well as to personal injury.

The safety valve that comes with the compressor kit is only used to protect the compressor against exceeding the permissible pressure. The tank/ pressure container must be secured separately.

⚠CAUTION

The release of the safety valve may lead to injuries or damage due to emerging hot air.

Install the safety valve so that potentially emerging hot air is not directed toward operating personnel or sensitive machine components.

It is not permitted to use the safety valve as an exhaust regulation valve.

3.5.3 Non-return valves and safety valve combination

As an alternative to the individual valves, there is also a combined non-return valve and safety valve.
The explanations and notes in the sections for the individual valves (refer to Chapter 3.5.1 and 3.5.2) must also be adhered to.

3.5.4 Micro filter

In cases when the product that is to be transported may not come in contact with dust particles from the compressor (abrasion of the separation valve), a micro filter must be installed in the pressure line behind the non-return valve (available as optional delivery).

3.5.5 Ball valve

A ball valve should be installed in the pressure line before the non-return valve (not part of scope of delivery, diameter at least 1/2"), so that the compressor can be started and turned off without potential back-pressure.

3.5.6 Pressure line

The pressure line must be mounted on the vehicle with elastic fasteners to prevent tension as well as the transmission of vibrations as much as possible.
Flexible elements should be intended in the pressure line, so that the torsions of the vehicle frame as well as the thermal expansion of the pressure lines can be compensated.

⚠CAUTION

The pressure line will become very hot during the operation of the compressor!
Lay the pressure line preferably in such a way that it cannot be accidentally touched.
Respective safety stickers can be affixed on the pressure line (see Chapter 4).

Easily flammable materials may not get in contact with the pressure line.

⚠CAUTION

Only the non-electricity conductive flange seals that come with the kit may be used on the compressor flanges - risk of corrosion!

3.6 Mounting

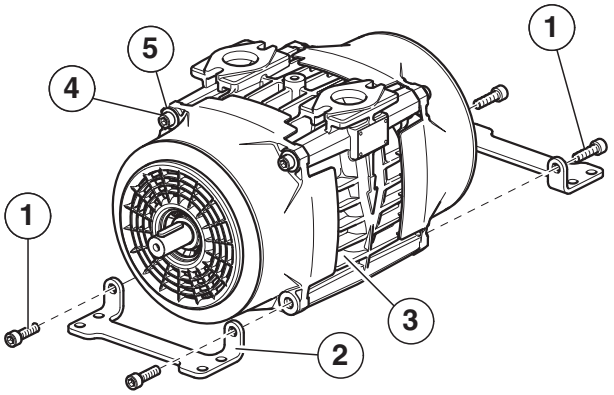
NOTICE

The installation is shown through the example of the installation console that can be delivered as an option.

⚠WARNING

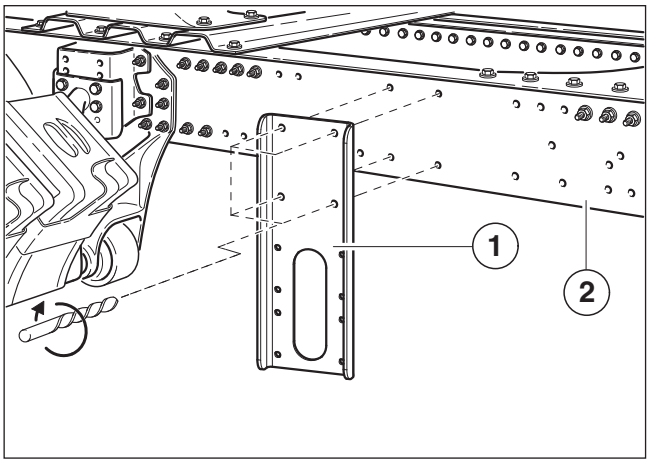
If not indicated otherwise, installation paste (ceramic base, heat-resistant up to a min. of +250°C/482°F) must be applied to all fastening screws on the compressor before they are re-inserted.
Therefore the following work steps therefore waive this notice.

- Specify compressor installation based on the space requirement (see Chapter 1.6 and 1.7); adhere to max. angle for the articulated shaft and space requirements for the installation of the hydraulic drive (only SV200 H).
- Determine direction of the compressor (position of the connecting flanges) and modify footers respectively (see Chapter 3.3.2), or if the compressor is to be attached to the optional installation console, you must detach the footers from the compressor. In this respect:



- Loosen Fastening screws (1, 4 pieces) of the feet (2).
- Attach fastening screws (4) with discs (5) in the other fastening points at the compressor (3), so that the two sides remain open for the installation at the installation console (or the holding plate) remain open.

  Tightening torque (M10x40 10.9):
  58 Nm / 42.8 lbf ft



- Position installation console (1) at the vehicle frame (2), so that the drive flanges are parallel.

NOTICE

The installation console features a flange adjustment of 3° (see Chapter 1.6).
To achieve flange parallelism, the installation console must be positioned respectively with regard to the vehicle frame in conjunction with different slopes of the power take-off flange.

If the installation console is to be mounted at a height where it protrudes beyond the vehicle frame, the installation console can be respectively reduced at the top.

- Installation location and drilling holes in the console.
  For a pre-drilled vehicle frame, transpose the drill pattern of the vehicle frame to the backside of the installation console.

⚠WARNING

Fit the installation console with at least 4 drill holes Ø 14.5 mm (min. screw size: M14 10.9, hexagonal bolt screws with shaft.)

The placement of the hole pattern can be different based on the respective vehicle frame. Use the largest hole spaces.

- If the vehicle frame was not drilled (sufficiently) at the factory, initially drill holes according to the vehicle manufacturer's installation guidelines and the dimensions of the mounting console on the vehicle frame. Transpose the hole patterns of the vehicle frame onto the backside of the installation console.

⚠WARNING

Some vehicle frames must be reinforced in the area that is to receive the installation console in accordance with the construction guidelines of the manufacturer.

NOTICE

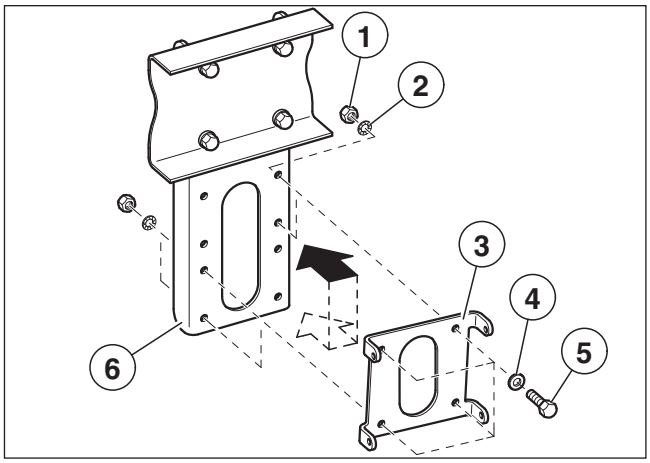
Compensate for potentially existing slopes of the frame, an off-set frame or auxiliary frame by using a base plate or wedges.

⚠WARNING

No welding work must be carried out on the vehicle frame

- Drill holes for the fastening screws according to the markings on the mounting console.
- Fasten installation console with hexagon screws M14 10.9 with shaft with the vehicle frame.

  Tightening torque (M14 10.9):
  180 Nm / 133 lbf ft

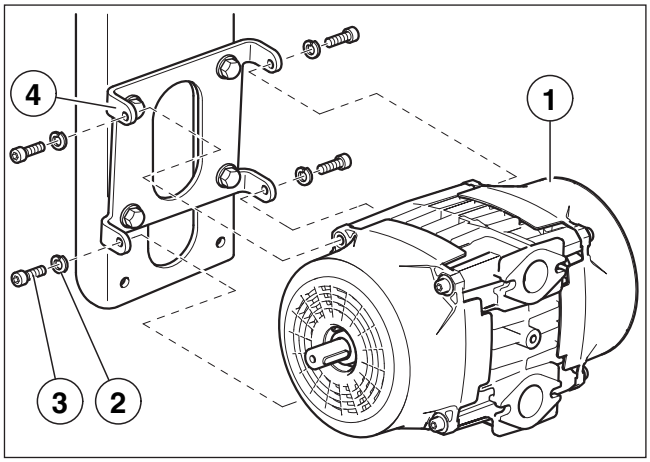


- Attach fastening plate (3) with screws M12×35 (5), plates (4), wedge locking washers (2) and screw nuts (1) on the installation console (6).

  Tightening torque (M12x35 8.8):
  82 Nm / 60.5 lbf ft

NOTICE

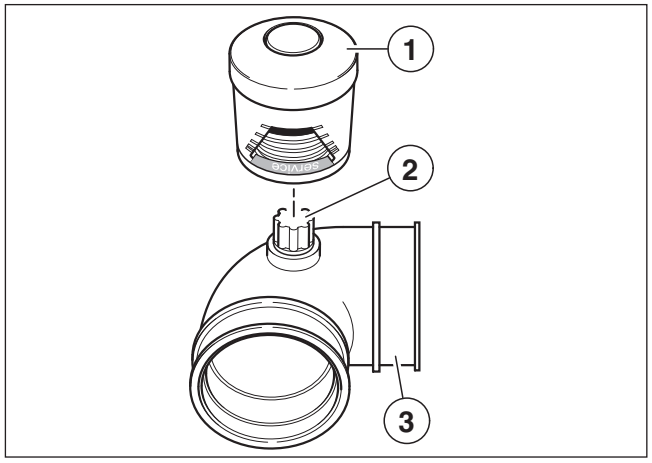
As shown in the illustration with the double arrow, the fastening plate can be attached on the installation console at two different heights. The dashed lines respectively show the upper and lower installation position of the fittings.



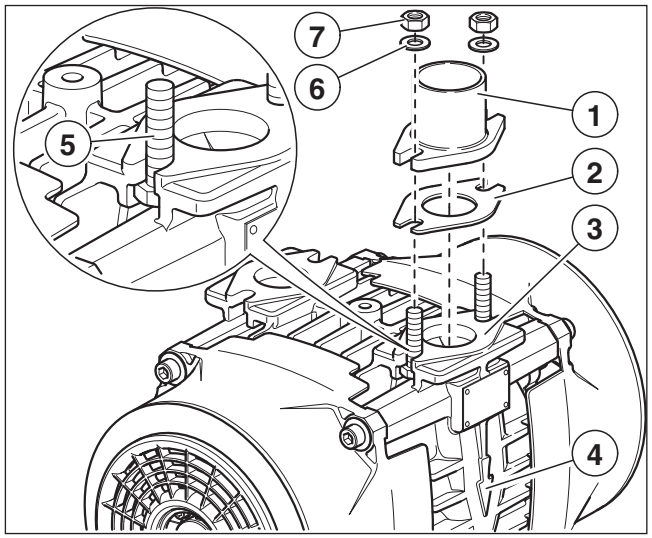
- Attach compressor (1) with spring washers (2) as well as the screws M10×40 10.9 (3), which were previously used to attach the footers, onto the fastening plate (4).

  Tightening torque (M10x40 10.9):
  58 Nm / 42.8 lbf ft

- Install intake air filter with mounting on the vehicle.



- Take off screw cap (2) at the rubber elbow piece (3) and screw in service gage (1).
- Put rubber elbow piece onto the hose connector fitting on the air filter casing and fasten with hose clamp.
- Insert an included pipe piece on the other side of the rubber elbow piece and fasten with hose clamp.
  (Install pipe piece on the vehicle.)



- Remove foil at the intake flange (3) of the compressor. Install hose connector fitting (1) and flange seal (2) with screws M10x40 (5), spring washers (6) and nuts (7) onto the compressor.

⚠ CAUTION

Always insert screw head into slot on the compressor as shown. An incorrect installation can damage the compressor.

NOTICE

The intake side (the intake fitting) can be identified by the arrow marking (4) in the casing which points away from the flange on the respective side.

- Install intake line (spiral hose) in an as straight a line as possible on the vehicle and fasten the ends on the hose connector fitting as well as on the pipe piece using hose clamps.

NOTICE

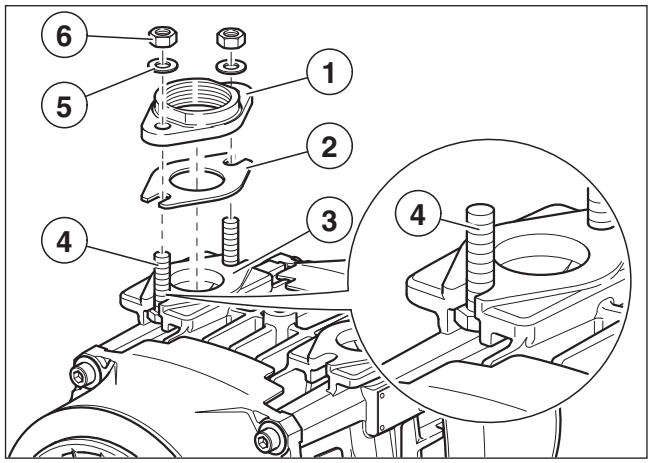
Keep intake hose as short as possible, shorten the hose if necessary.

- Install pressure line to the tank with safety and non-return valve (or combined safety and non-return valve) and if necessary also micro filter and relieve ball valve on the vehicle in accordance with Chapter 3.5.

⚠ WARNING

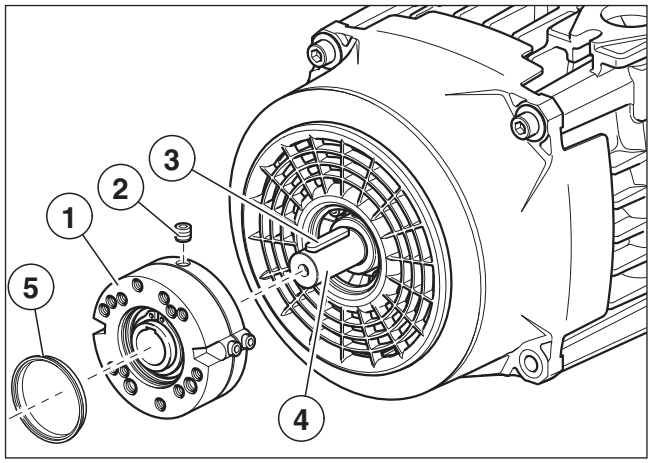
The length of the pressure line from the compressor to the safety valve may not exceed 1 meter.

It must be ensured that it is not possible for liquids from the tank to enter the pressure line and to reach the compressor.



- Remove foil at the pressure flange (3) of the compressor, attach pipe connection flange (1) of the pressure line with flange seal (2) and fasten with screws (4) M10×40, spring washers (5) and nuts (6) on the pressure flange.

SV200 D kit only:



- Install overload coupling with shear bolt (1, optional) or drive flange on the compressor drive shaft (4).
  Slide component over the feather key (3) on the drive shaft and secure hexagon-socket head bolt (2).

NOTICE

The inner ring (5) in the overload coupling (1) can be taken out and inserted the other way around.
A switching of the inside/outside alignment enables the installation of the following DIN and SAE flanges on the coupling:

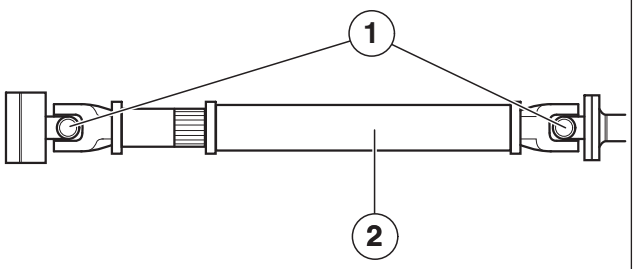
- DIN 100-6
- SAE 1100
- SAE 1310

- Screw in articulated shaft at the overload coupling as well as on the power take-off flange of the vehicle.

⚠WARNING

Follow the instructions in Chapter 3.3.4 for the installation of the articulated shaft.

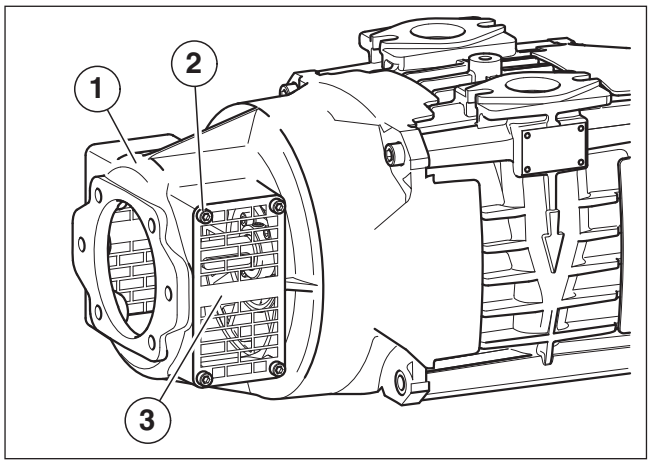
The cardan joints (1) of the articulated shaft (2) must point into the same direction.



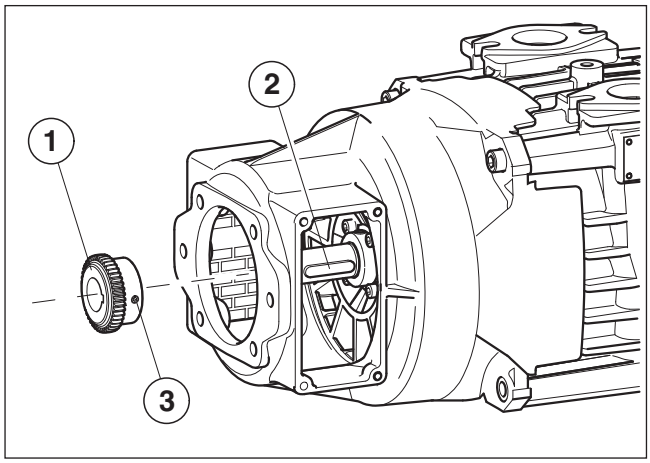
NOTICE

Provide cover plate for the articulated shaft in accordance with accident prevention regulations if necessary.

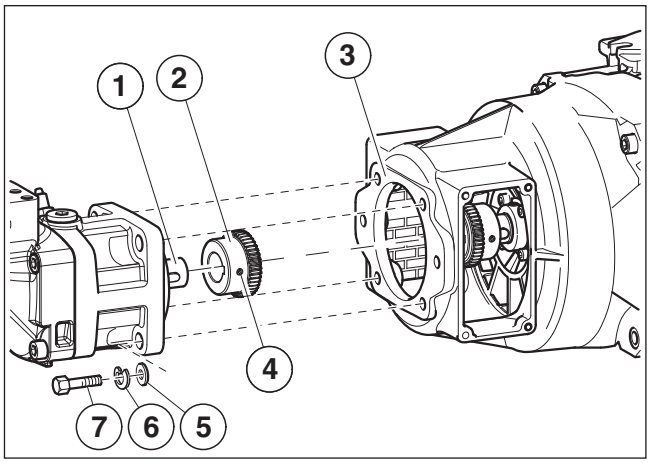
SV200 H kit only:



- Loosen screws (2) [4 pieces] at the drive cover (1) of the compressor and take of finger guard (3).



- Unscrew setscrew (3) of a hub (1) of the flexible coupling. Slide hub over feather key (2) onto the drive shaft and fasten with headless pin; initially only tighten headless pin into a finger-tight position.

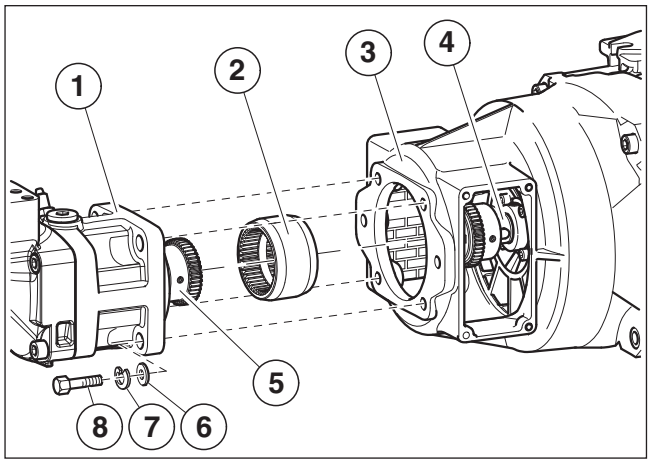


- Slide the second hub (2) of the flexible coupling onto the shaft (1) of the hydraulic motor and tighten headless pin (4) into a finger-tight position.
- Tentatively install the hydraulic motor with screws M12 (7), spring washers (6) and washers (5) on the drive cover (3) of the compressor.
- Measure space between the two hubs.
- If the measured space between the does not match the target value of 4 mm, move the hub(s) respectively and tighten the headless pins.

NOTICE

The two hubs should be pushed onto the shafts, approximately the same length of the way.

- Uninstall the hydraulic motor again from the compressor covering.



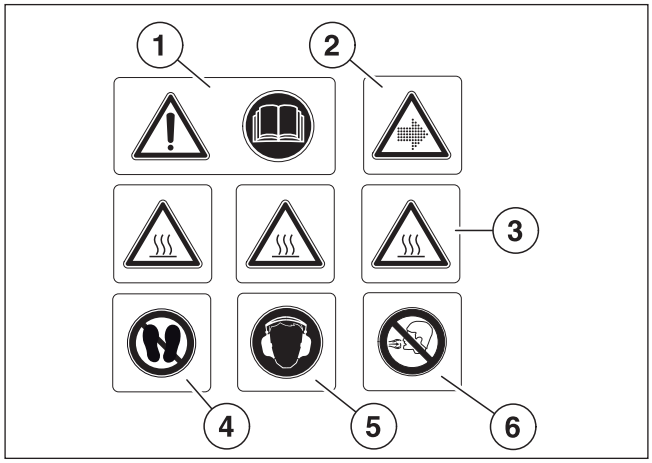
- Place coupling sleeve (2) onto the hub of the compressor drive shaft (4) and install hydraulic motor (1) again onto the drive cover (3); at the same time push hub (5) onto the shaft of the hydraulic motor into the coupling sleeve (2). Cross-wise screw hydraulic motor with screws (8) [4xM12 or 2xM14], spring washers (7) and washers (6) into the threaded drill holes of the drive cover and tighten with the specified torque.

  Tightening torque:
  (M12 8.8): 52 Nm / 38.4 lbf ft
  (M14 8.8): 80 Nm / 59 lbf ft

- Reinstall finger guard onto the drive cover.
- Install connecting lines of the hydraulic motor on the vehicle.

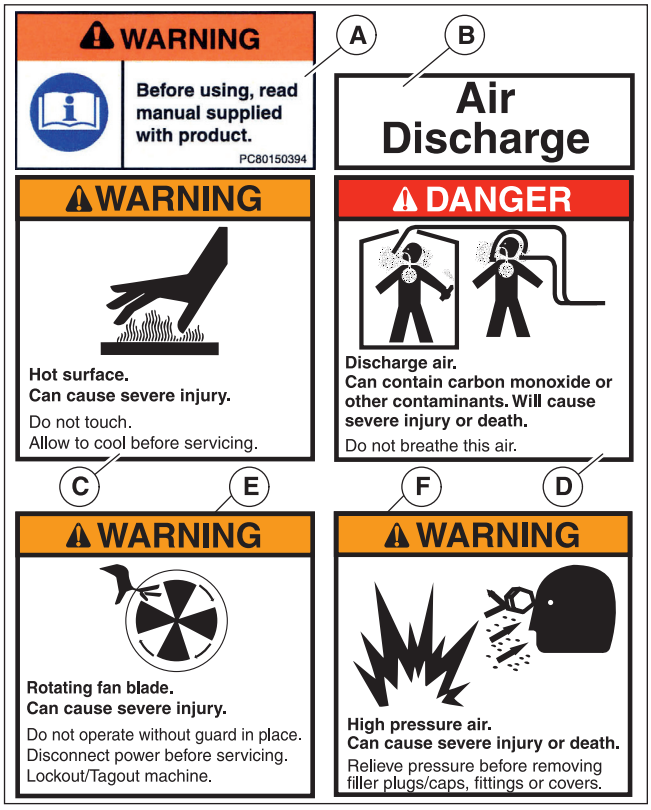
4 Safety labels

Sticker in compliance with ISO (European market)



1 Read and follow the safety notes and operating instructions before starting operation.
2 Pressurized air outlet/direction of flow
3 Burn hazard! Hot surface
4 Keep out
5 Wear hearing protection
6 Caution! No breathable air

Sticker in compliance with ANSI (North-American market)



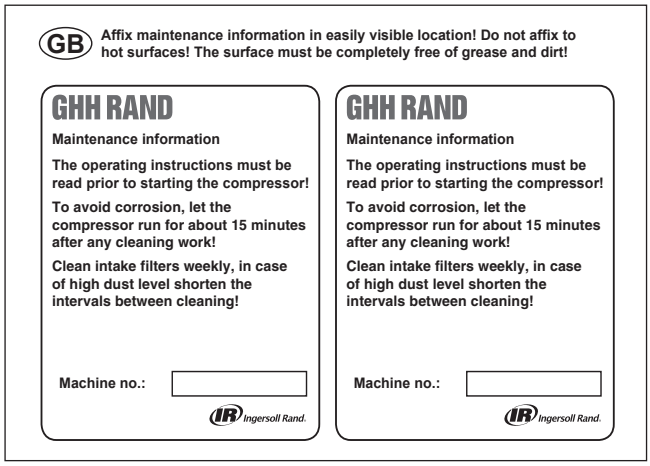
Positioning of the stickers

Position the safety and maintenance notices as follows:

- Read Operating Instructions (**1/A**): In the driver's cab right next to the control of the power take-off which starts the compressor.
- Exhaust air (**2/B**): Look for optimal position in immediate proximity to drain line and pay attention to good visibility.
- Hot surface (**3/C**): As close as possible next to the compressor casing, the drain sound suppressor and the drain line. Do not affix directly to hot surface.
- Do not step here (**4**): As close as possible to the compressor casing so that it will not used as an unintended stepping platform.
- Wear hearing protection (**5**): Easily visible on the vehicle frame, close to the installed compressor.
- No breathable air (**6/D**): On each line outlet of the system where exhaust air can be extracted.
- Rotating ventilation panel (**E**): At the plastic covers and at the aluminum drive cover (only hydraulic drive) of the compressor step.
- Pressurized air (**F**): If possible on any feature in the pressure line behind the non-return valve.

NOTICE

The areas that are to receive the stickers must be completely free of grease and dust!



- Apply service notice (in the for the operator local language version)!
- Attach the second maintenance instruction where it can be clearly seen, e. g. in the driver's cab.
- Enter machine no. with waterproof pen.

5 Initial commissioning

5.1 General

The first start of operation of the compressor kit takes place at the site of the system installer.

It includes the rotation direction control and a test run with pressure test.
If in exceptional cases the first start of operation is carried out by the customer, the following work has to be carried out:

Work	See Section
• Rotation direction control	3.3.1
• Test run	5.2

NOTICE

The further operation of the completed compressor exclusively falls under the responsibility of the operator.

⚠WARNING

It is absolutely necessary to adhere to the operating values of the rotary valve compressor specified in Chapter 1.6 Technical data of SV200 rotary valve compressor.

5.2 Test run

⚠WARNING

Prior to the test run check all safety-relevant screw connections for a tight fit.

Vehicle motors with EDC control must potentially be re-parameterized prior to the start of operations.

The rotation direction, the rotational speed and the flawless function of the safety equipment must be checked during the test run.

Only start compressor without any load. Never go into operation against a potentially existing counter pressure.

Rotation direction control

When look onto the compressor drive shaft, the compressor step must turn corresponding to the arrow marking on the compressor casing (see Chapter 3.3.1).

Compressor drive rotation speed

The rotational speed range of the rotary valve compressor stated in the technical data must not be exceeded or undercut.

Reliable rotational speed range of the rotary valve compressor:

SV200	
Min.	1000 min^{-1}/rpm
Max.	1800 min^{-1}/rpm

⚠WARNING

Ensure that the compressor is only operated within its permissible rotational speed range.

5.3 Switching Compressor Off

⚠CAUTION

Do not turn compressor off if there is counter pressure!

If there is counter pressure, take appropriate measures to reduce pressure before turning compressor off.

⚠CAUTION

Do not turn vehicle motor off while power take-off is running.

6 Repair/service

6.1 General

GHH RAND points out that damage on the seal will void the warranty.

6.2 Personnel and qualification

The repair and service work on the compressor / compressor kit described in this Chapter may only be carried out by trained or educated personnel who are familiar with the applicable safety regulations.
The staff of the Service Center or of GHH RAND is also available to carry out this work.

6.3 Safety

Adhere to all safety instructions to prevent injuries and damage to the compressor / compressor kit.

⚠WARNING

The rotor as well as the feather key groove may have sharp edges.
As a prevention against injuries caused by cuts, wear protect gloves while carrying out respective work.

Turn vehicle motor off prior to work relating to the dismantling / installation, remove key and secure vehicle against rolling away; use wedges.

⚠CAUTION

Ensure that no foreign parts enter the compressor or remain in the compressor, because this may damage / destroy the compressor.

6.4 Repair time and scope

If it is determined during a scheduled inspection of the separation valves (see Operating Instructions for SV200 D/H), that the separation valves must be replaced, the compressor requires repair.
in addition to the separation valves, the shaft bearings and the shaft seals will also be replaced during the repair.

NOTICE

The required replacement parts come together in one repair kit which can be obtained as a replacement part from GHH RAND or through authorized service partners.

The tools that are required to carry out the repair work are listed in Chapter 6.7.

⚠WARNING

The continued operation of the compressor with worn separation valves may damage the rotor and the compressor casing; this in turn will lead to an increased wear and tear / a shortened lifespan of new separation valves.

An insufficient or neglected cleaning of the parts that are to be reinstalled can also lead to an increased wear and tear and therefore to a premature failure of the compressor.

In conjunction with broken separation valves, the following additional work must be carried out:

– Cleaning of the air filter / replacement of the air filter cartridge
– Cleaning of the intake and pressure lines
– Check and potentially replacement of safety and non-return valve.

6.5 Preparatory work

Prior to the dismantling of the compressor from the vehicle or the reinstallation of the compressor on the vehicle, the compressor as well as the area surrounding the vehicle must be cleaned to prevent the entry of dirt/foreign particles into the compressor.

⚠WARNING

Compressor and pressure line become hot. Let parts cool down prior to working on or cleaning the compressor.

If a pressure washer is used, make sure to keep a distance of at least 0.5 m/1.7 ft.

While cleaning the outside and the inside with pressurized air, ensure that flying dust is not breathed in; remove more extensive accumulation of dust by washing the outside and the inside or by wiping it off with a moist rag.

⚠ CAUTION

Do not use cleaning products/ solutions with a high PH level (strong alkaline solution) - corrosion hazard. Always rinse with clean water afterwards.

6.6 Repair work

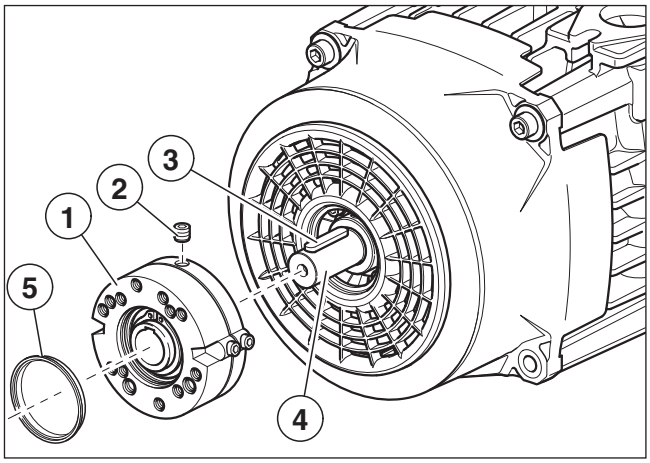
6.6.1 De-installation / dismantling

- Deinstall the compressor from the vehicle and place on a work bench.

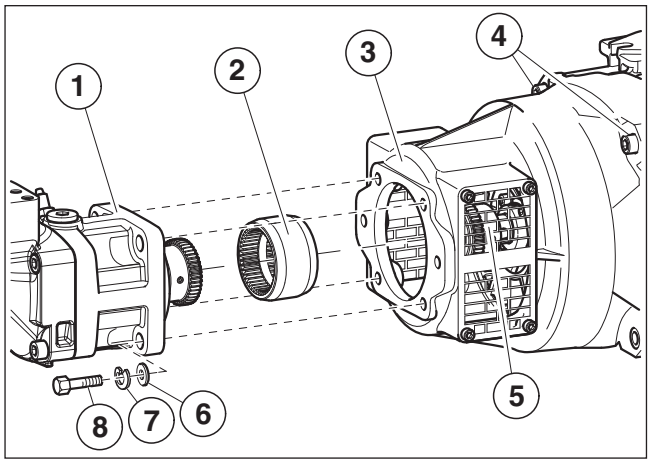
⚠WARNING

Do not hold / lift the compressor by the plastic covers that are attached to the sides.

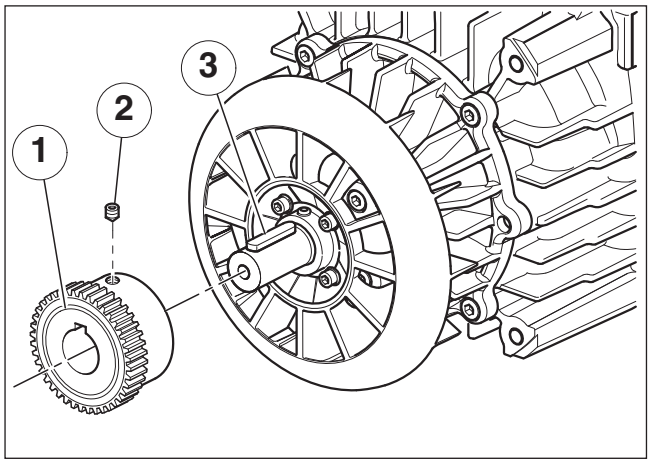
- Loosen fastening screws of the fastening plate (or the footers) and take off fastening plate (footers).



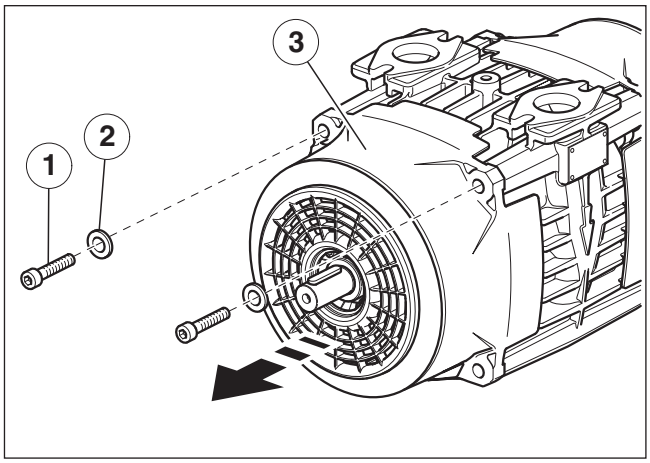
- Only SV200 D:
  Loosen the headless pin (2) for the fastening of the overload coupling (1) (or the drive flange) and pull of overload coupling with inner ring (5) (or drive flange) from the the compressor drive shaft (4). Take feather key (3) out of the groove in the compressor shaft.



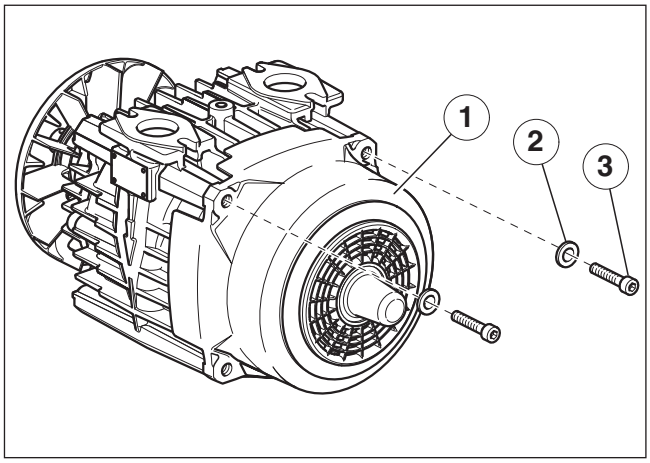
- Only SV200 H:
  Loosen fastening screws (8) and together with spring washers (7) and disc washers (6) take them off the hydraulic drive (1).
  Take hydraulic drive off the drive cover (3) and put aside.
  Pull coupling sleeve (2) off the hub (5) on the compressor shaft.
- Only SV200 H:
  Loosen the two remaining fastening screws (4) of the drive covering (3) and pull the drive covering in longitudinal direction off the compressor.



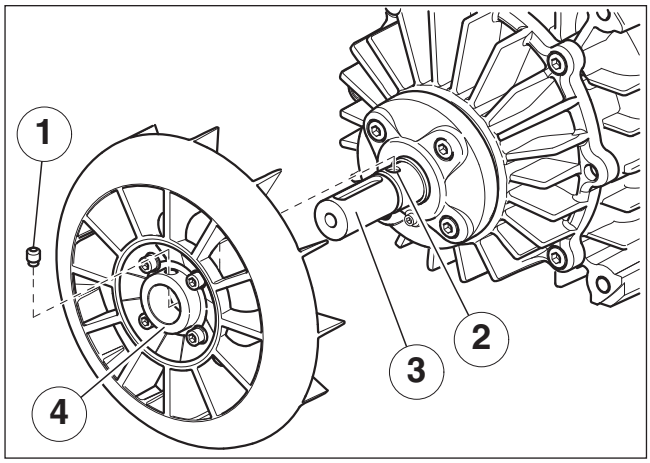
- Only SV200 H:
  Loosen headless pin (2) of the coupling hub (1) on the compressor shaft and pull coupling hub from the compressor shaft.
  Take feather key (3) out of the groove in the compressor shaft.



- Only SV200 D:
  Loosen fastening screws (1) and take them off the drive covering (3) together with disc washers (2). Pull drive covering from compressor in longitudinal direction of the shaft.



- Take off cover (1) on the side opposite to the drive. Loosen screws (3) and take them off the cover together with disc washers (2). Pull cover from compressor in longitudinal direction of the shaft.

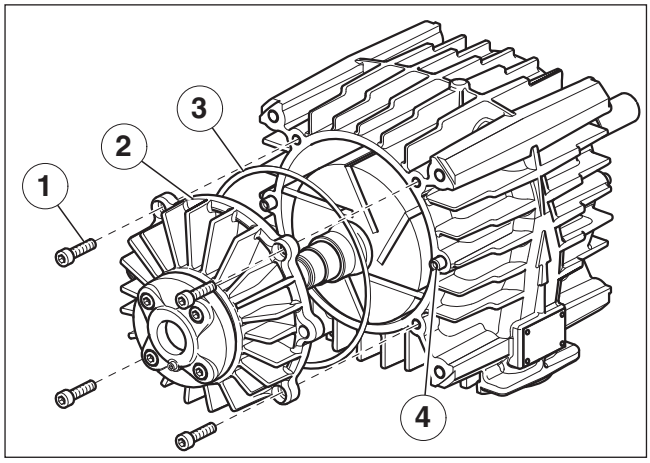


- Unscrew headless pin (1) from the fan hub (4) and pull fan hub off the compressor shaft (3) together with installed fan wheel.

NOTICE

Due to the counterbore (2) in the rotor shaft, it may not be possible to pull the fan hub off the shaft if the headless pin (1) is only slightly loosened.

- Put compressor on the side with the connecting flanges.



- Loosen fastening screws (1) of the side cover (2) on one compressor side and carefully pull the side cover in longitudinal direction to the rotor shaft off the alignment dowel pins (4) in the compressor casing.

  Remove and dispose of O-rings (3).

⚠ CAUTION

When pulling the side cover off, carefully place the rotor into the casing, do not let it drop! The surface of the casing drilling may otherwise get damaged.

NOTICE

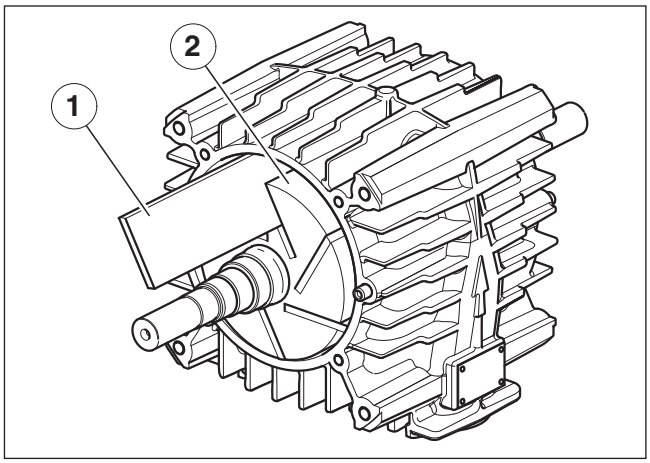
During the subsequent reassembly, install the side again on the respective side; if necessary mark the side cover.

NOTICE

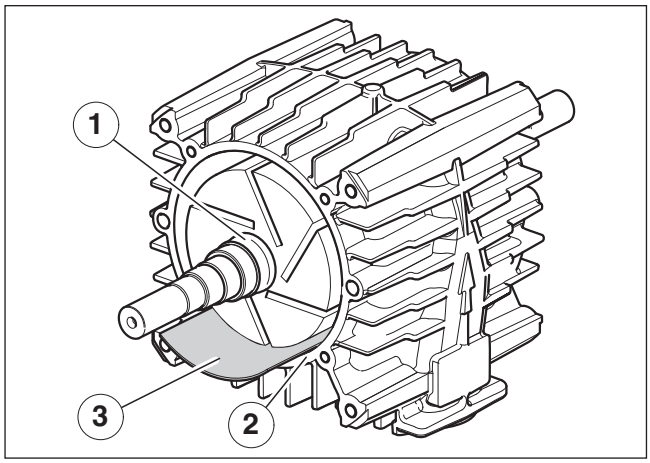
To loosen a tight-fitting side cover, you may use a rubber hammer to lightly tap against the side of the side cover.

The 2 cylinder pins (4) ensure that the side covers cannot be attached on the wrong side during the installation.

- Take off second side cover off the casing as described above.



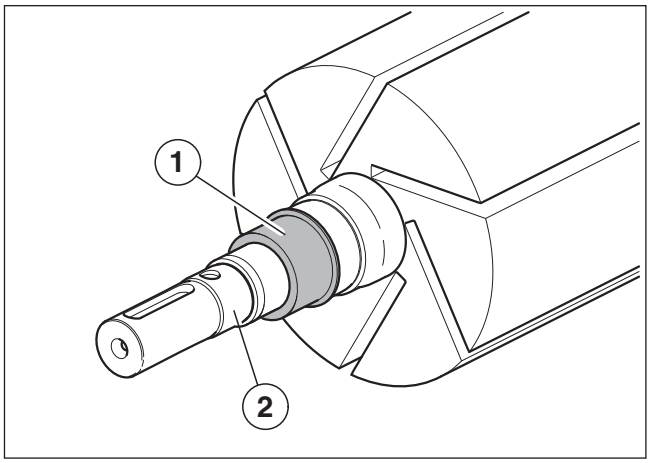
- Pull out separating valve (1, total of 6 units) out of the slots in the rotor (2).



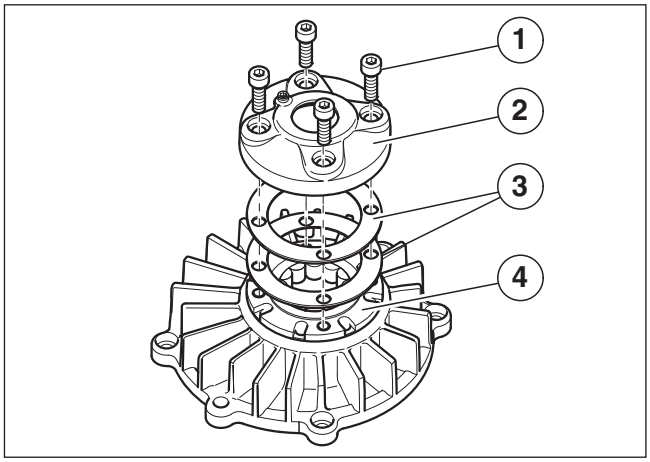
- Carefully lift rotor (1) and insert paper or something similar (3) between the rotor and the casing (2); ensure that the paper covers the entire length of the casing.
- Carefully lift rotor, take it out of the casino and place it on a clean surface. Remove paper from the casing.

⚠ CAUTION

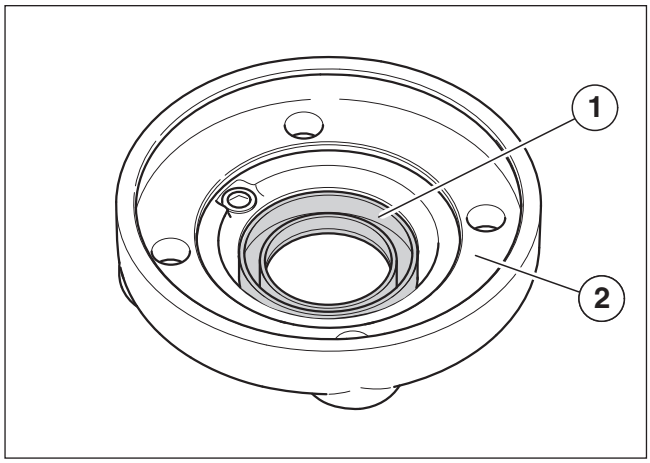
When lifting the rotor out of (back into) the case, ensure that the rotor does not touch the casing.



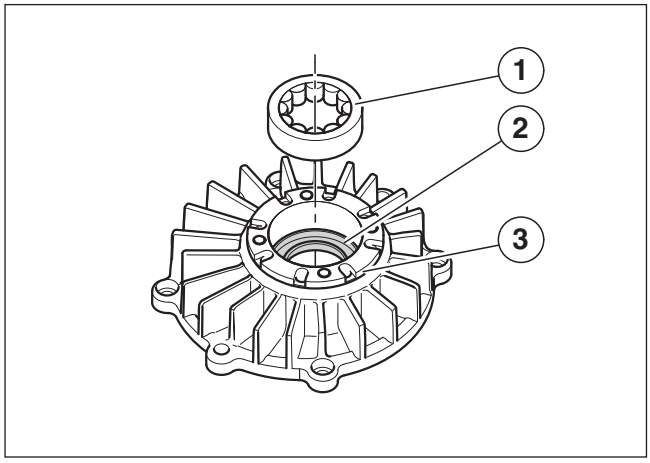
- Briefly heat up the inner ring of the bearing (1) with a burner on both sides of the rotor shaft (2) and immediately thereafter pull it off the rotor shaft while wearing an appropriate protective glove.
  Dispose of bearing ring.
- Carefully clean rotor.



- Take off bearing cover from both side covers: Loosen screws (1) and bearing cover (2) as well as shim ring(s) (3) from the side cover (4). Dispose of dismantled shim rings.



- Remove and dispose of rotary shaft seal (1) from the two bearing covers (2).

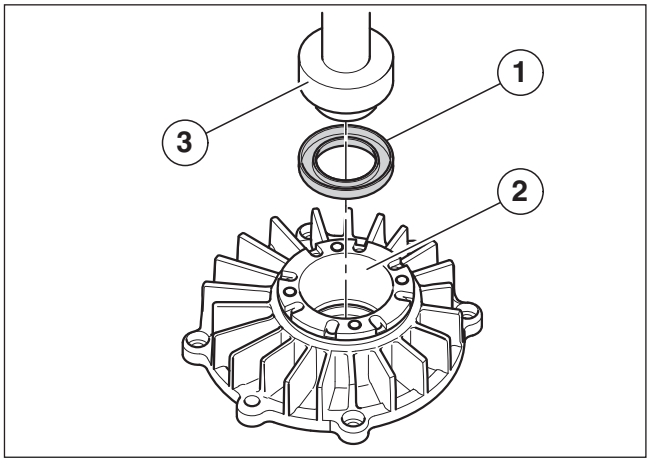


- Remove and dispose of exterior bearing ring including rolling element (1) as well as rotary shaft seal (2) from the two side covers (3).
- Carefully clean compressor casing, rotor as well as side cover and bearing cover.

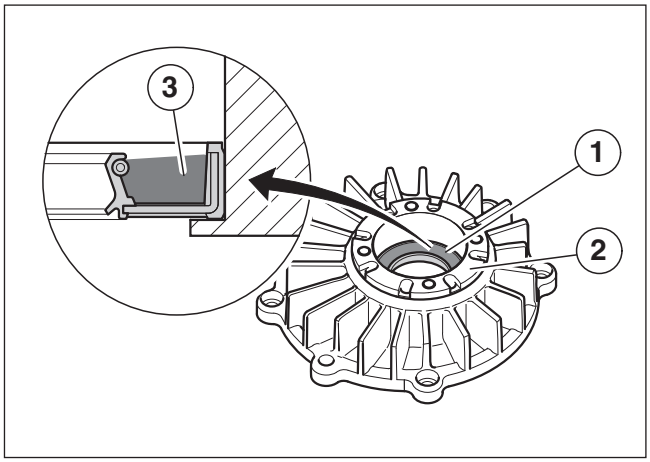
ATTENTION

An insufficient or neglected cleaning of the parts that are to be reinstalled can lead to an increased wear and tear and therefore to a premature failure of the compressor.

6.6.2 Assembly / installation

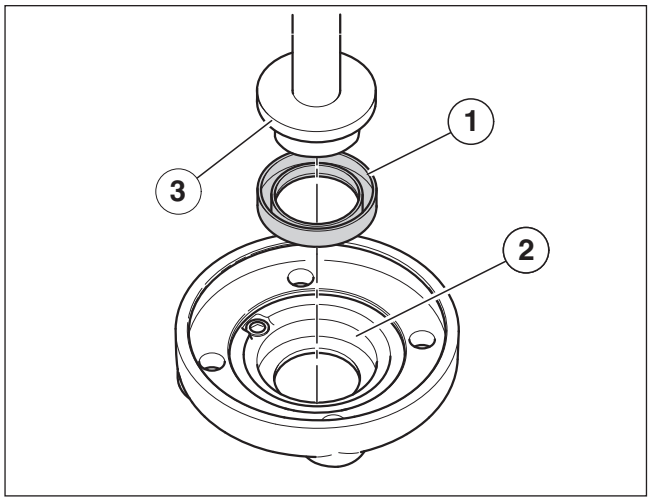


- Insert rotary shaft seal (ø45/62×7) (1) onto a respective installation pin (3) and afterwards push it into the side cover (2) as shown.

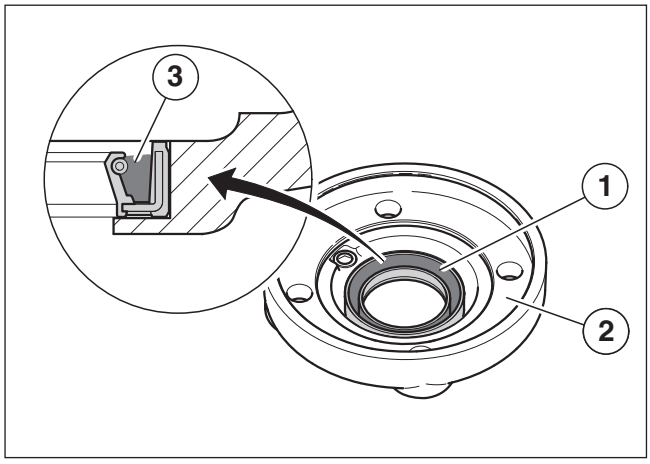


- Fill inside space of the rotary shaft seal (1, see magnifying glass) in side cover (2) with specified grease (3).

  Grease: SV120 Bearing Grease

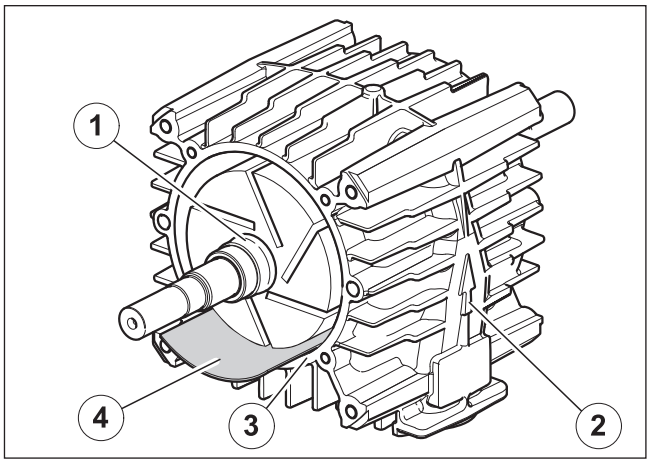


- Slide rotary shaft seal (ø30/42×6) (1) onto a respective installation pin (3) and then push it into the bearing lid (2) as shown.



- Fill interior room of the rotary shaft seal (1) in the bearing cover (2) with a specific grease (3).

  Grease: SV200 Bearing Grease

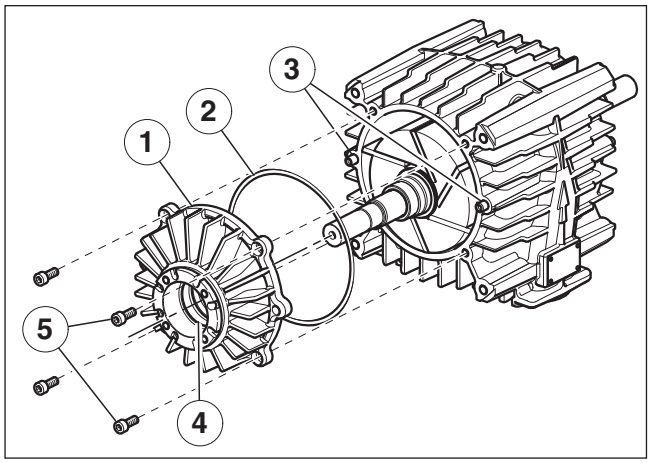


- Place paper or similar (4) place into the compressor casing (3); ensure that the entire length of the casing is covered with paper.
- Carefully place rotor (1) on the paper in the compressor casing.
  Ensure that the rotation direction of the rotor matches the arrow (2) on the casing; if necessary place rotor in the casing in opposite direction.

⚠ CAUTION

The fitted key slot in the shaft has sharp edges. Wear appropriate protective gloves.

- Lift the rotor slightly and remove paper or similar with any traces. Carefully put down rotor.



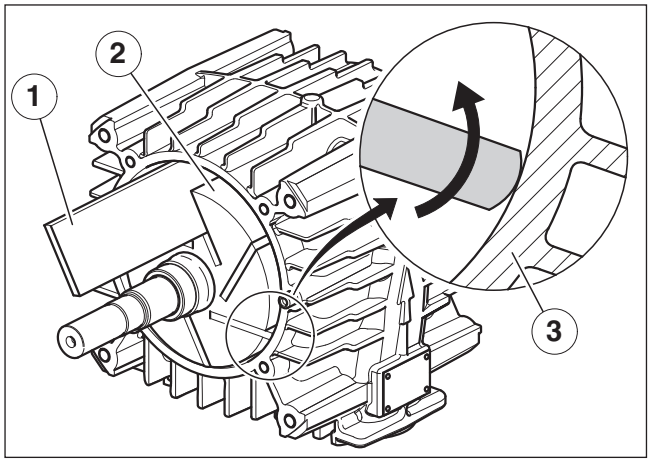
- Insert O-ring (2) on one side into the groove int he since cover (1) and carefully slide side cover with installed shaft seal (4) over the rotor shaft; use a respective cone shaped sleeve. Place side cover onto the alignment pins (3) on the casing and fasten to the casing with srews M8 (5).

  Tightening torque (M8x20 10.9):
  28 Nm/20.7 lbf ft

⚠ CAUTION

Ensure that the seals are clean during the installation.

Side covers must reinstalled on the original casing side.



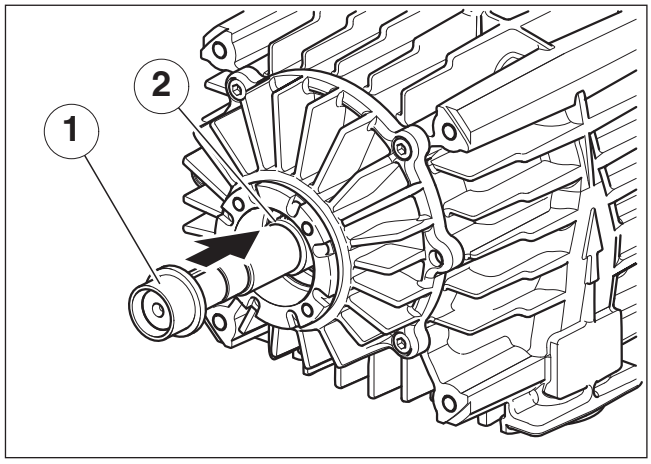
- On the other compressor side, insert new separating valves (1) into the grooves in the rotor (2); ensure at the same time that the slanted edge points to the casing and that the sharp edge points in rotor direction (see magnifying class)

⚠ CAUTION

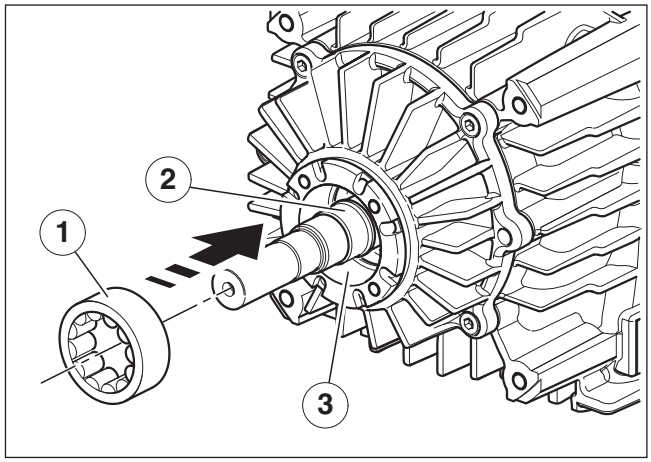
Prior to inserting the separating valve into the rotor, if necessary clean separating valve from attached dirt/grease that are a result from touching them.

Only touch separating valves with clean fingers at the corners.

- Install second side cover as previously described.



- Shrink fit new bearing inner rings onto the rotor shaft. Warm bearing interior rings (1) to 120°C/248°F. While wearing an appropriate protective glove quickly push bearing rings with the smooth side toward the the rotor until they sit flush (2) on the rotor shaft. Wait a few seconds before letting so that the bearing ring will no longer be able to move.

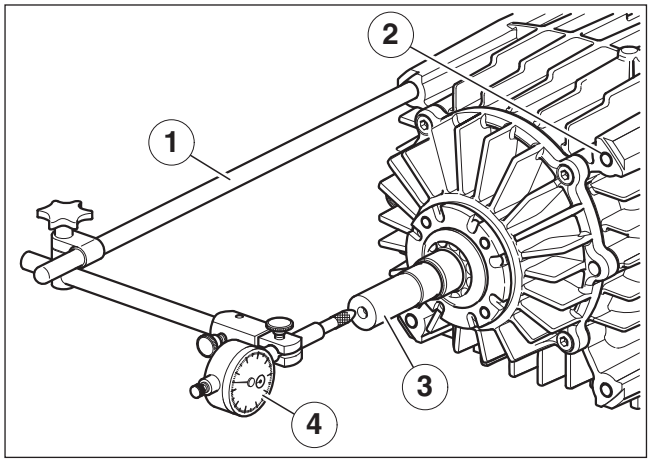


- Insert bearing exterior ring (1) on both sides into the side cover (3), while carefully pushing the rolling elements onto the interior ring (2).

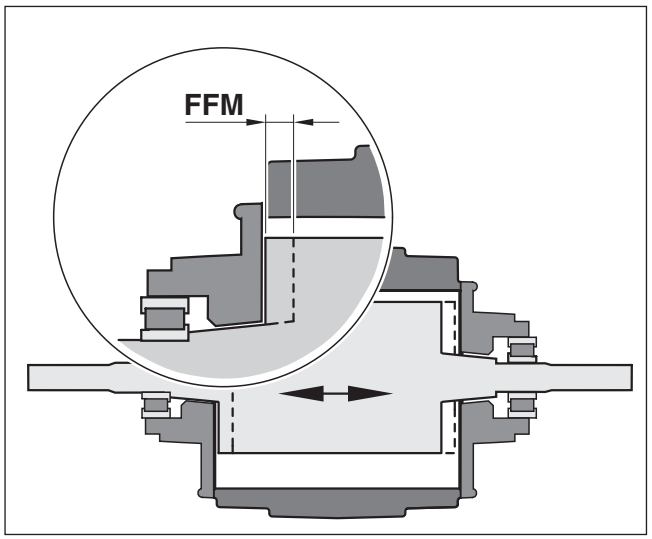
6.6.3 Measuring / calibration of the bearing float

NOTICE

Only carry out float measuring with cold compressor and grease-free bearings.

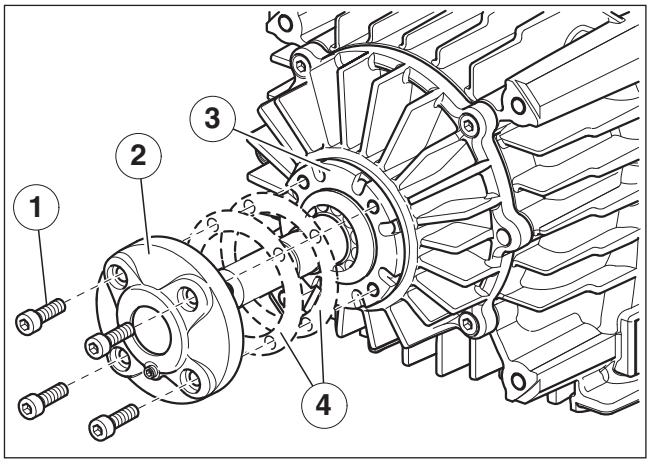


- Screw measuring stand (1) into a threaded drill M10 (2) for the side covers and place sensors of the dial gage (4) onto the end of the rotor shaft (3).
- Push rotor shaft fully against the side cover on one side and set dial gage to zero.
- Push rotor shaft onto the other side until it sits flush on the side cover and record the value "free float measured" FFM; the value must fall in to the range of 0.49 to 0.59 mm.



Example:

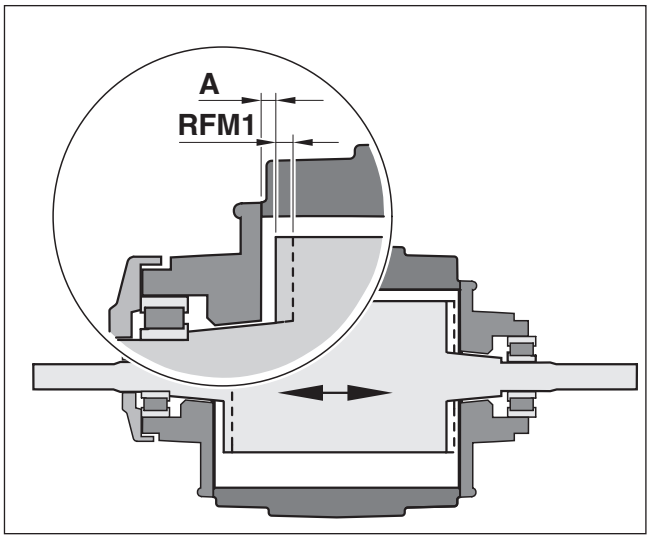
Measured free float (FFM) = 0.540 mm



- Install bearing cover (2) on one side with screws M8x20 (1) onto the side cover (3); at this time do **not** insert shim rings (4) yet!

  Tightening torque (M8x20 10.9):
  28 Nm/20.7 lbf ft

- Remaining axial tolerance RFM1 (Remaining Float Measured) as previously described. Record measured value.



Example:

Remaining float measured (RFM1) = 0.320 mm

The difference between free float and the remaining float is the fixed float (minimal spacing A) between rotor and side cover.

A = FFM – RFM1

The float should fall into the range between 0.150 to 0.180 mm and can be adjusted by respective shim rings between bearing cover and side cover.

NOTICE

The use of shim rings increases the spacing between the bearing cover and the side cover, the minimal spacing between the rotor and the side cover is therefore reduced by the same value.

Example:

Spacing A = 0.54 – 0.32 mm = 0.22 mm

To set the spacing between the rotor and the side cover to the target value of 0.15 to 0.18 mm, you therefore need to use shim rings with a total thickness of 0.04 to 0.07 mm.

NOTICE

Select shim rings so that the required thickness is achieved with the least number of shim rings.

No more than 3 shim rings should be used on one bearing cover.

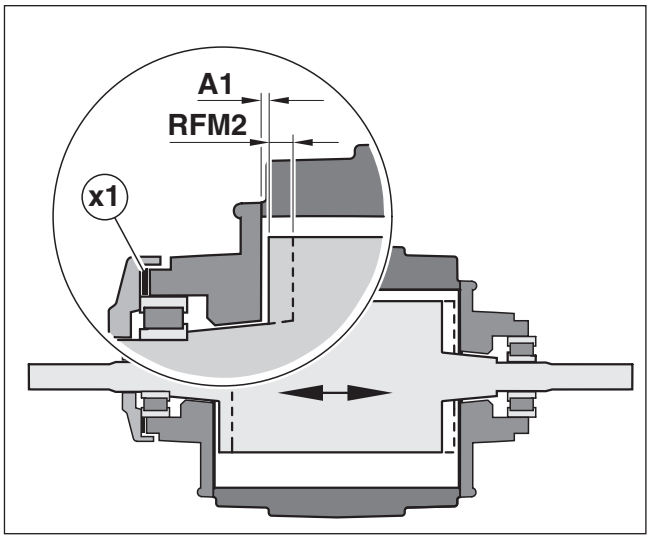
The shim rings that came with the delivery feature the following thickness: 0.05 / 0.08 / 0.13 / 0.25 mm

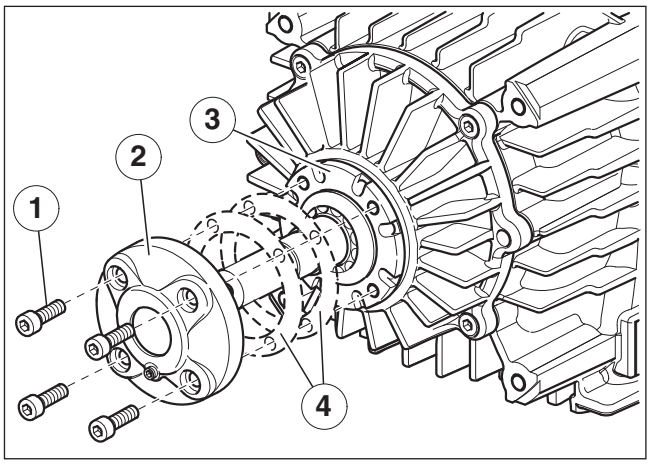
Example:

A shim ring with a thickness (= X1) of 0.05 mm is used.

The spacing A1 (= Spacing 1st side after shim ring installation) is therefore reduced by 0.05 mm and is therefore set to

A1 = A – X1 = 0.22 mm – 0.05 mm = 0.17 mm. (This corresponds with the target range.)





- Loosen screws (1) and take off bearing cover (2). Reinstall bearing cover with the determined shim ring(s) (4) on the side cover (3).

The remaining float RFM2 after the installation of the bearing cover and the shim ring(s) is increased by the implemented thickness of the shim rings.
RFM2 = RFM1 + A1

Example:

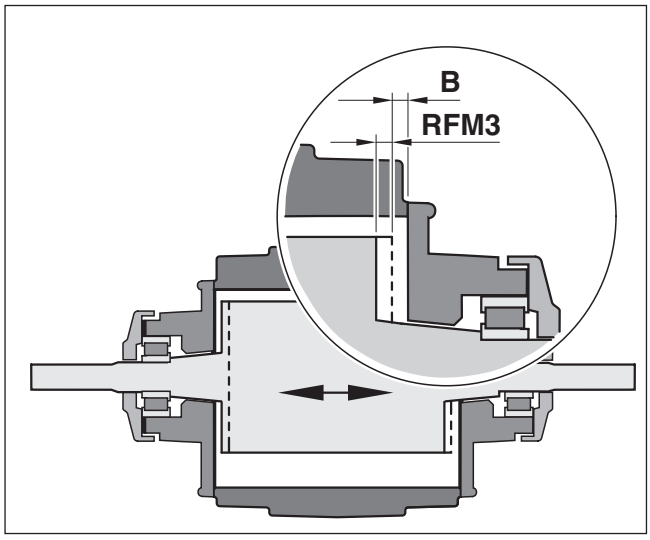
Remaining float RFM1 previously: 0.32 mm; utilized shim ring thickness X1: 0.05 mm; remaining float RFM2:

RFM2 = 0.32 mm + 0.05 mm = 0.37 mm

- Install second bearing cover on the opposite side without shim rings, tighten fastening screws with specified torque.

  Tightening torque (M8x20 10.9):
  28 Nm/20.7 lbf ft

- Measure and record remaining axial float of the rotor shaft after installation of the second bearing cover (= RFM3).



The difference from RFM2 (without installed bearing cover) and the measured value for RFM3 is the minimal spacing between rotor and second bearing cover B.

B = RFM2 – RFM3

Example:

value float RFM2: 0.37 mm;
measured float RFM3: 0.13 mm
spacing B (2nd side) therefore:

B = RFM2 – RFM3 = 0.37 mm – 0.13 mm
= 0.24 mm

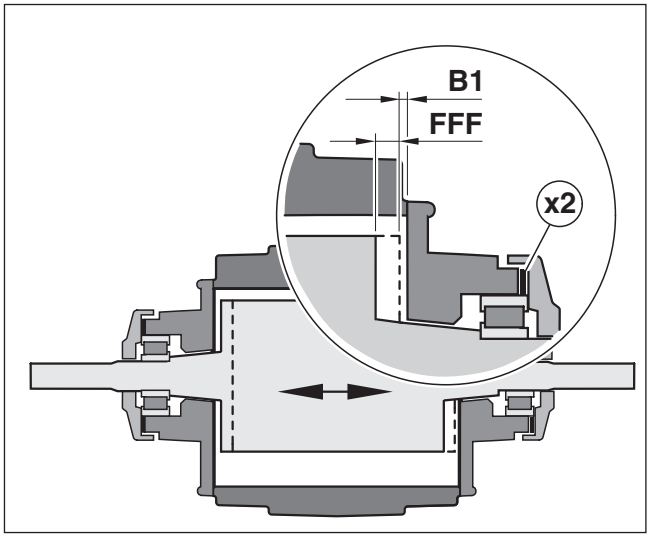
To set the spacing B of the rotor to the side cover on the second side to the target value of 0.15 to 0.18 mm, shim rings have to be used with a strength of 0.06 to 009 mm.

NOTICE

The shim rings that came with the delivery feature the following thickness: 0.05 / 0.08 / 0.13 / 0.25 mm

Example:

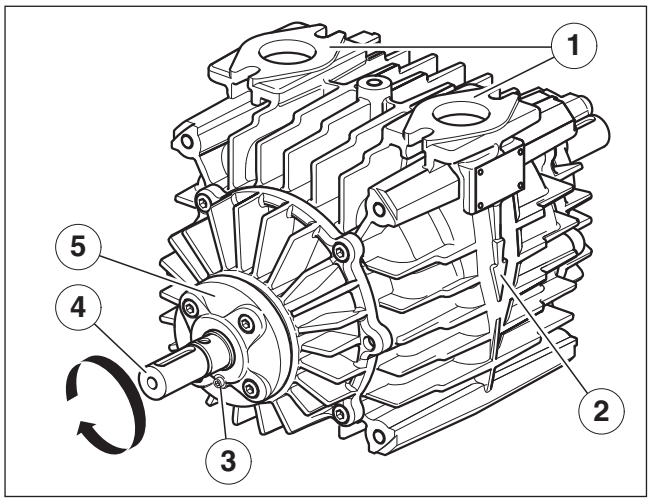
A shim ring with a thickness (= X2) of 0.08 mm is used.
The spacing B1 (= Spacing 2nd side after shim ring installation) is therefore reduced by 0.08 mm and is therefore set to
B1 = B – X2 = 0.24 mm – 0.08 mm = 0.16 mm
(This corresponds with the target range.)



- Unscrew second bearing cover and reinstall it on the side cover with the determined shim rings.
- Measure axial float "Fixed Free Float" (FFF: Fixed Free Float) and check whether the float falls into the target area.

  Target value "Fixed Free Float":
  0.19 to 0.35 mm

6.6.4 Final work



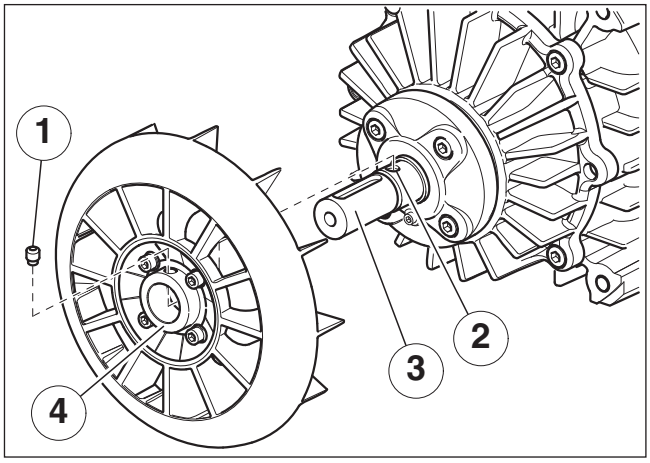
- Turn compressor around (the connecting flanges (1) must point upwards). Tape / cover connecting flanges to prevent that dirt or something similar enter the compressor.
- Check flexibility of the separating valve:
  Slowly turn shaft in the specified rotation direction - see arrow (2) and listen whether you can hear 6 "clicking sounds" with a full turn of the shaft.
  (The clicking occurs the the separating valves hit the casing when the separating valves slide down from the rotor slots.)
- Unscrew locking screw (3) on both compressor sides and through the opening pressure fit 8 cm^3 of the specified grease while turning the shaft (4) to achieve an even filing of the ball bearing.

  Grease: SV120 Bearing Grease

⚠ CAUTION

Do not fill more than the specified amount of grease into the bearings, because it may otherwise lead to a failure of the bearing due to an excessive warming of the bearings. Use a suitable measuring device to determine the exact filling amount of grease.

- Fit locking screws with screw retention (e.g. Loctife 243, Loxeal 55.03 or similar) and screw them back into the bearing cover (5).



- Insert fans with fan hubs (4) onto the shaft (3) on both sides and position them so that the headless pin (1) comes to rest on the counterbore (2) in the shaft when it is screwed into the fan hub. Tighten headless pin.
- Install covers back into the original position / orientation to the connection flanges (see Chapter 6.6.1), pay attention to the correct rotation direction at the free shaft end. Do not screw in screws to attach the fastening plate or footers yet.
- Re-insert feather key into the rotor shaft and install the drive flange / overload coupling (SV120 D) or coupling hub (SV120 H) onto the compressor shaft.

- Install compressor on the vehicle and attach drive shaft or hydraulic drive on the compressor.

⚠ CAUTION

Only SV200 H:
When the hydraulic drive is reattached to the compressor, the spacing of the hubs of the flexible coupling must be checked again and set to the specified volume, see Chapter 3.6.

- Install intake and pressure line with new flange seals on the compressor.

⚠ CAUTION

Only the non-electricity conductive flange seals that come with the repair kit may be used on the compressor flanges - risk of corrosion!

NOTICE

After the repair and the reattachment on the vehicle the proper function of the compressor has to be checked and the connections have to be checked for leaks in a test run.

6.7 Required tools

The tools required for the service / repair of the SV200 rotary valve compressor can be found in the following table.

Pos.	Name
1	Installation pin Ø 30/42 mm
2	Installation pin Ø 40/62 mm
3	Grease volume measuring device

You can obtain these tools from GHH RAND if necessary.
For that please contact GHH RAND or a GHH RAND service partner.

7 Replacement parts and ordering

The components required for the repair of the rotary valve compressor (bearing, separating valve, sealings, O-rings and shim rings) are combined in a special repair kit.
This kit includes all components that are required for a new bearing and/or sealing including the replacement of the separating valves. The required special grease must be ordered separately.

Name	GHH RAND order number
SV200 repair kit	23523012
SV200 Bearing Grease	23537509

The address or telephone number for ordering replacement parts can be found on the last inside cover of this instruction.

Service

GHH RAND Schraubenkompressoren GmbH
Max-Planck-Ring 27
46049 Oberhausen, Germany

SILU Service Hotline	Tel.	(+49) 208 / 99 94 - 177
Service	Tel.	(+49) 208 / 99 94 - 170
Spare parts	Tel.	(+49) 208 / 99 94 - 171
	Fax	(+49) 208 / 99 94 - 179
E-Mail		info@ghhrand.com
Internet		www.ghhrand.com

OEM Systems
Ingersoll Rand Industrial Technologies
800-B Beaty Street
Davidson, NC 28036, USA

Service / Spare Parts	Tel.	(+1) 704 655 - 4715
	Fax	(+1) 704 655 - 4725

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