

Bock EX-HG44e (HC), EX-HG56e (HC), EX-HG66e (HC)

Maintenance manual

96530-04.2021-Gb

Translation of the original instructions

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colour the world
of tomorrow

About these instructions

Read these instructions before assembly and before using the compressor. This will avoid misunderstandings and prevent damage. Improper assembly and use of the compressor can result in serious or fatal injury. Observe the safety instructions contained in these instructions.

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Liability and warranty

Manufacturer's liability and warranty are excluded if

- Alterations and functional modifications have been carried out
- No original replacement parts have been used

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1 | Safety

Safety instructions

Target group of these instructions

- Work on the compressor may only be carried out by persons whose technical training, skills and experience along with their knowledge of pertinent regulations and documentation means that they are capable of assessing the work to be carried out and detecting any possible dangers.
- Specialist can mean a refrigeration technician for example. Note that electrical work may only be carried out by a qualified electrician. Alternatively, on a country-specific basis, persons who have undergone electrotechnical instruction and who have proof of their qualification are also permitted to carry out the work.

Identification of safety instructions



DANGER Indicates a dangerous situation which, if not avoided, will cause immediate fatal or serious injury.



DANGER Indicates a dangerous situation which by electrical current, if not avoided, will cause immediate fatal or serious injury.



WARNING Indicates a dangerous situation which, if not avoided, may cause fatal or serious injury.



CAUTION Indicates a dangerous situation which, if not avoided, may cause fairly severe or minor injury.



ATTENTION Indicates a situation which, if not avoided, may cause property damage.



INFO Important information / tips on simplifying work.

Explanation of the symbols



This symbol indicates that parts with refrigerating machine oil (type of oil see compressor name plate) must be lubricated before assembly.



This symbol indicates that parts must be wetted with a suitable adhesive before assembly.



This symbol indicates the permitted tightening torque for the relevant screw.



This symbol indicates the permissible electrical resistance for the resistance measurement of the thermal protection thermostats.

General safety instructions



DANGER

Risk of electric shock

- Before you carry out any repair work, disconnect the compressor from the electricity network.
- Turn the main switch to "0" (OFF).
- Secure the main switch against an unauthorised restart.



WARNING

- Any handling of the compressor is only permitted by personnel who have the necessary specialist knowledge (qualified person) due to their vocational training, professional experience and their timely professional activity.
- Observe national safety regulations, accident prevention regulations, generally recognized technical rules and specific regulations (EN 378, EN 60204, EN 60335, EN 60079-14, EN 60079-17, EN 60079-19, EG Directive 1999/92/EG, Operational Safety Ordinance etc.).
- No work may be performed when an explosive atmosphere is present!
- Smoking, fire and open flame are strictly prohibited! Mobile telephones must be switched off!
- Strongly charge-generating processes must be excluded within 2 meters. The contact of rapidly moving particles with the surface of the compressor must be avoided with certainty.
- Only transport compressors with lifting gear of sufficient capacity.
- Operate compressor only in refrigeration systems with approved refrigerants and refrigeration oils.
- Hydrocarbons (combustible refrigerants) may be used in the compressors only if all relevant and applicable regulations, standards and technical rules are followed. National safety regulations must be observed.
In addition, we refer to the following applicable standards and regulations:
EN 378, EC Directives 1999/92/EC and 2014/34/EU.
Please also see the section "Important notes when using hydrocarbons" in the assembly instructions of the compressor.
- Maximum permissible overpressure – even for testing purposes – must not be exceeded.
- Perform reconnection of the compressor only if no damage, leaks and/or appearances of corrosion can be recognized.
- Before commissioning, evacuate the refrigerant systems carefully including the compressor and afterwards charge refrigerant.
- Never put the safety switch out of action!
- Depending on the operating conditions, surface temperatures of over 100 °C occur on the pressure side and below 0 °C on the suction side.
- Observe work safety rules! e.g. TRGS 727; protective shoes, clothing etc.).

Safety instructions removal/installation



ATTENTION Refrigerating compressors are pressurised machines and therefore require particular caution and care in handling.

Before starting any work on the compressor:

- Obtain written work release.
- Use only tools permitted for explosion-protected systems.
- When working on electrical circuits, these must be disconnected and secured against reclosing. Determine the absence of voltage before starting any work.
- Close the pressure and suction shut-off valves.



CAUTION • Relieve pressure of compressor before repairs. Avoid possible injuries to skin and eyes. Wear goggles!

- Extract the refrigerant and dispose environmentally.
- Only use original Bock spare parts.

After the work is finished:

- After interventions in the refrigeration cycle/ carry out the compressor leak test in accordance with EN 1779.
- Check that the safety and protection devices (pressure switch, motor protection, electrical contact protection measures, etc.) are functioning properly.
- Before commissioning, check that all user-mounted components are properly mounted and pressure-tight connected to the compressor (piping, plugs, union nuts, replaced components, etc.).
- Evacuate the compressor.
- Prior to starting the compressor open discharge shut-off valve and suction shut-off valve.
- Release switch-on lock.
- Do not start the compressor in vacuum! Operate the compressor only when the system is charged.
- The instructions in the chapter “Commissioning” in the assembly instructions of the compressor must be observed!
- After reaching the steady state (continuous operating conditions), check the system for compliance with the permissible operating conditions (see installation instructions and technical information).
- Maintenance, repairs and maintenance must be documented in writing.

Important notes



INFO

- The compressor may be operated only if it is free of defects!
- Only use new seals during assembly.
- If heavy wear is evident, the cause must be determined.
- Dispose of the refrigerating machine oil in accordance with the regulations, observing the applicable national regulations.
- Always observe the compressor assembly instructions when carrying out maintenance or repair work.

2 | Disassembly of the compressor

Removal of the compressor from the refrigerant system

Removal of the compressor from the system, shut-off valves remaining on the compressor

- Extract the refrigerant from the system into a container which may be used for this refrigerant
- Evacuate the systems including the compressor
- Cut off the vacuum with nitrogen, humid air should not get into the system
- Close the shut-off valves on the suction and discharge side, remove the compressor
- Close the suction and discharge line connection points on the system

Removal of the compressor from the system, shut-off valves for compressor remaining at the system

- Close shut-off valves on the suction and discharge side
- Extract the refrigerant from the compressor into a container which may be used for this refrigerant
- Disconnect the compressor from the piping and remove it from the unit
- Close openings on the compressor
- Evacuate the compressor and fill with nitrogen

Disassembly of compressor

The disassembly of the compressor is explained in separate steps on the following pages. The indicated parts list positions refer to the spare parts lists, repair set lists, special accessories part lists and are available online at www.bock.de.

You can also find exploded drawings on the Internet at www.bock.de.

Preparation: Necessary tools

Pos.	Tool	Size
1	Oil collection container	> 5 liter
2	Spanner	SW 10, 13, 14, 17, 19, 20, 24, 27
3	Screwdriver cross recess	PH 3
4	Socket spanner	SW 10
5	Allen key	6 mm, 8 mm
6	Extraction tool	
7	Magnet	
8	Offset screwdriver with nut	SW 10, 13
9	Circler pliers	
10	Scraper with nut	SW 22
11	Auxiliary thorn	
12	Circlip pliers	
13	Piston ring pliers	
14	Needle nose pliers	
15	Torque spanner	
17	Impact wrench / impulse wrench	

2 | Disassembly of the compressor

2.1 Draining the oil / oil change

Position in
parts list
2220

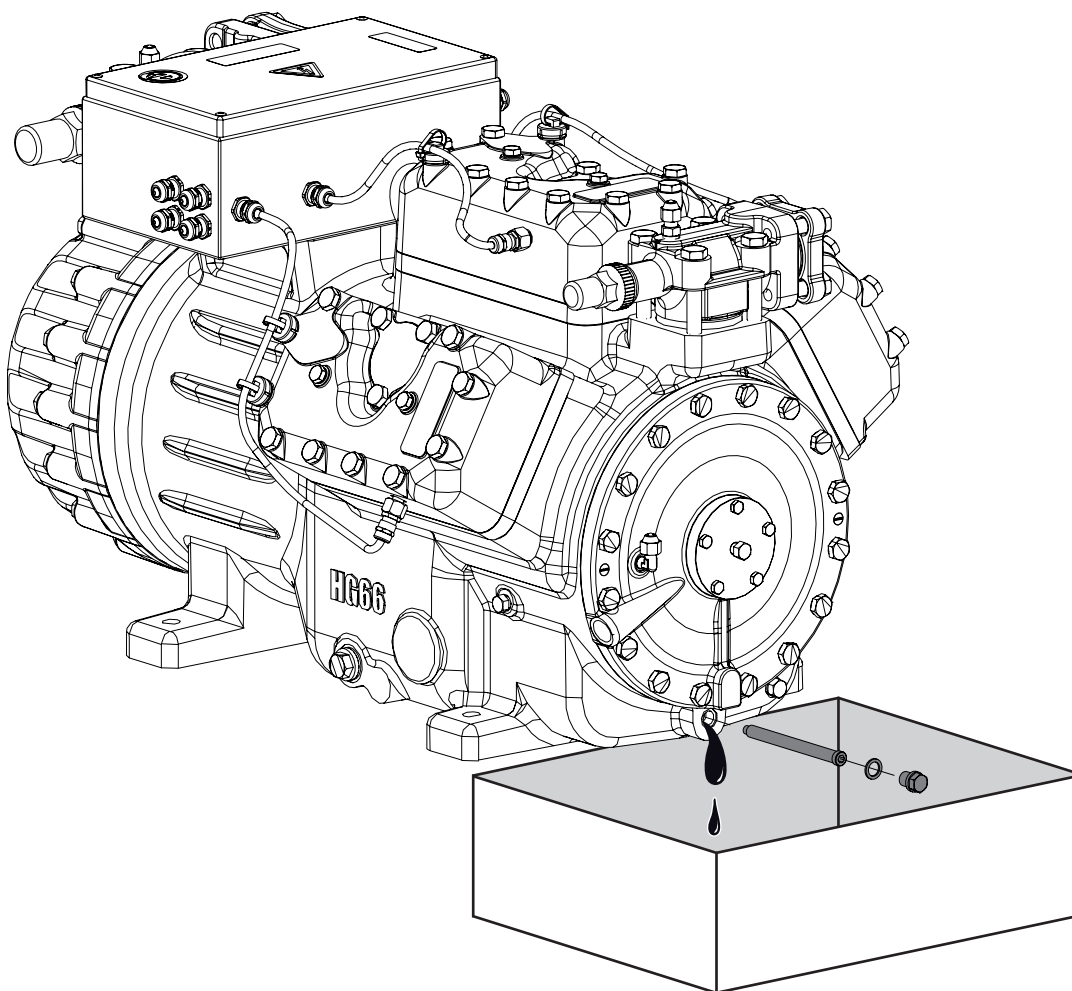
Tools: Spanner SW 17, allen key 8 mm, container > 5 liter to collect oil

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- The compressor has to be depressurized.
- Place the container in a way that the oil can flow into it.
- Loosen oil drain screw and unscrew.
- Unscrew the oil strainer. Carefully remove dirt and deposits.
- Drain off oil.

2220



2 | Disassembly of the compressor

2.2 Terminal board and terminal box

Position in
parts list
2160, 2170

Tools: Cross-recess screwdrivers PH 3, socket spanner SW 10, spanner SW 10, allen key SW 6

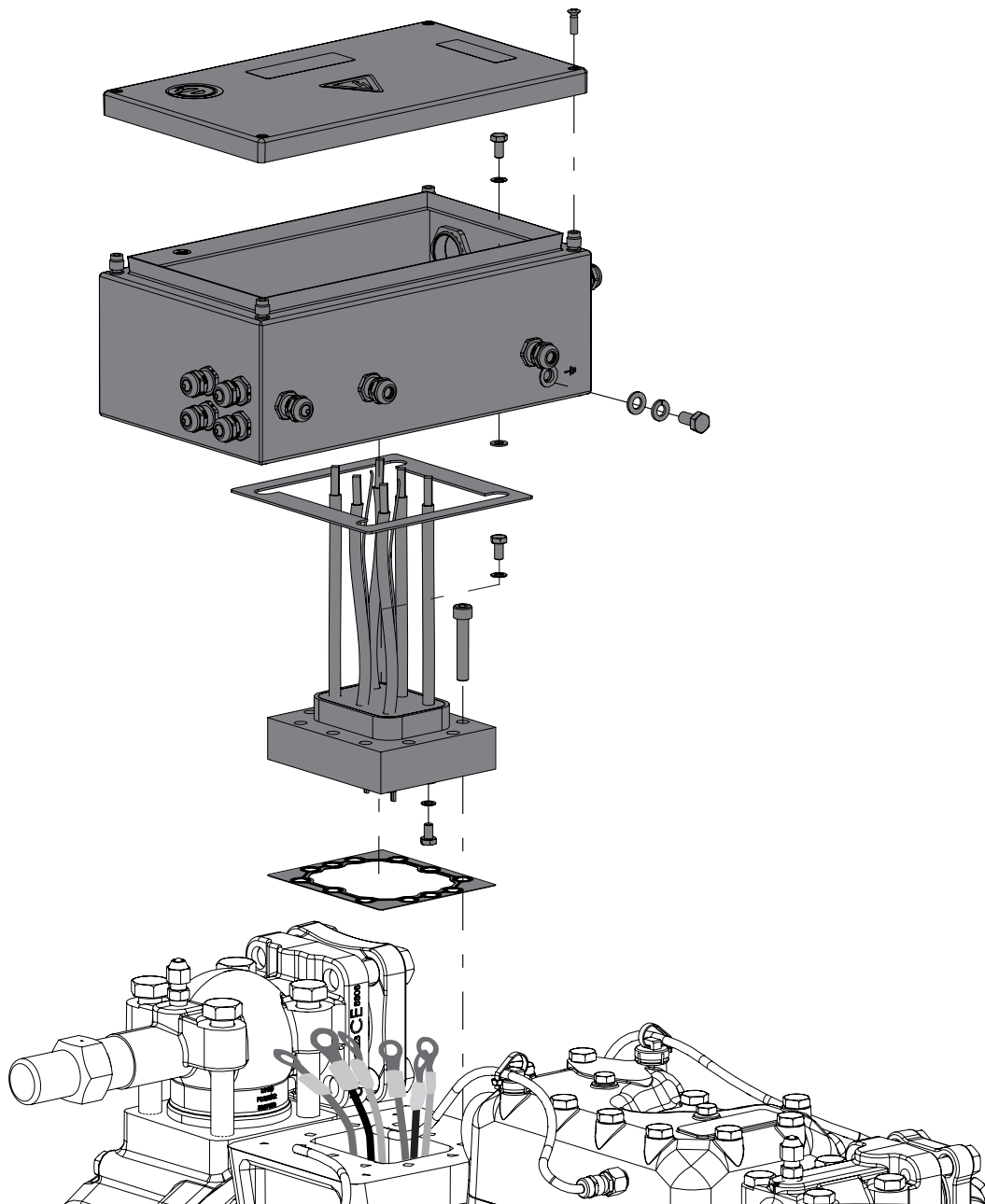
Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Loosen potential equalisation.
- Open the terminal box and loosen the cable glands on the terminal box.
- Disconnect the conductor of main circuit and control circuit onto the terminal blocks.
- Remove supply lines from the cable glands.
- Loosen the screw on the lower part of the terminal box and remove the terminal box from the motor housing.
- Loosen the screw connection of the clamping board, lift it carefully and place it on the side of the motor housing.
- Loosen the screws of the motor supply line at the motor-side terminal board connection and remove the supply lines from the terminal board.

2170

2160



2 | Disassembly of the compressor

2.3 Shut-off valve (LP)

Position in parts list 2070

Tools: Spanner SW 17, 20, 24, allen key SW 6

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

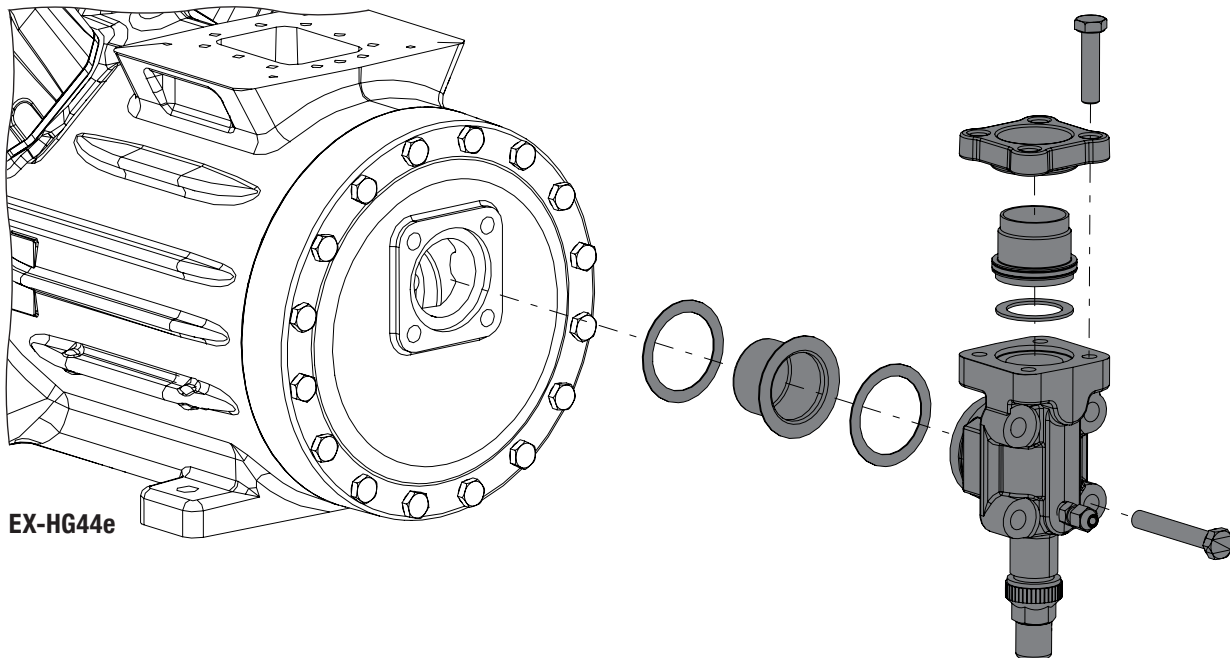
1220, 2070,
1210, 1230,
1190

- Release the flange screw connection of the shut-off valve. Take off shut-off valve, gasket and suction filter.

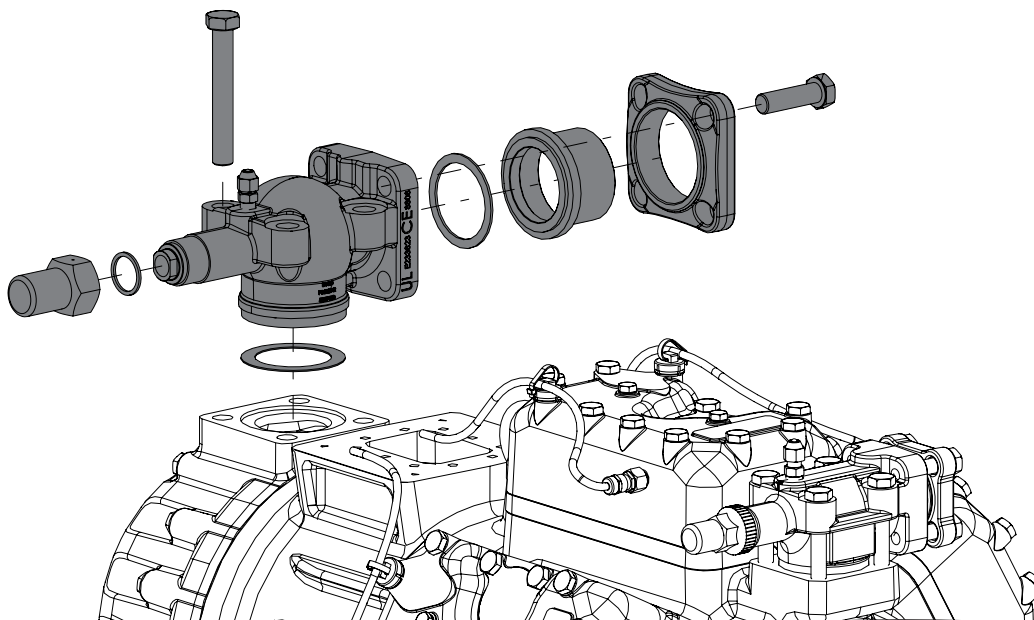
- Clean the suction filter carefully if necessary.

1210, 1230

- Carefully clean the sealing surface from old flat gasket material, making sure that no gasket residues gets into the compressor.



EX-HG44e



EX-HG56e, EX-HG66e

2 | Disassembly of the compressor

2.4 Motor cover

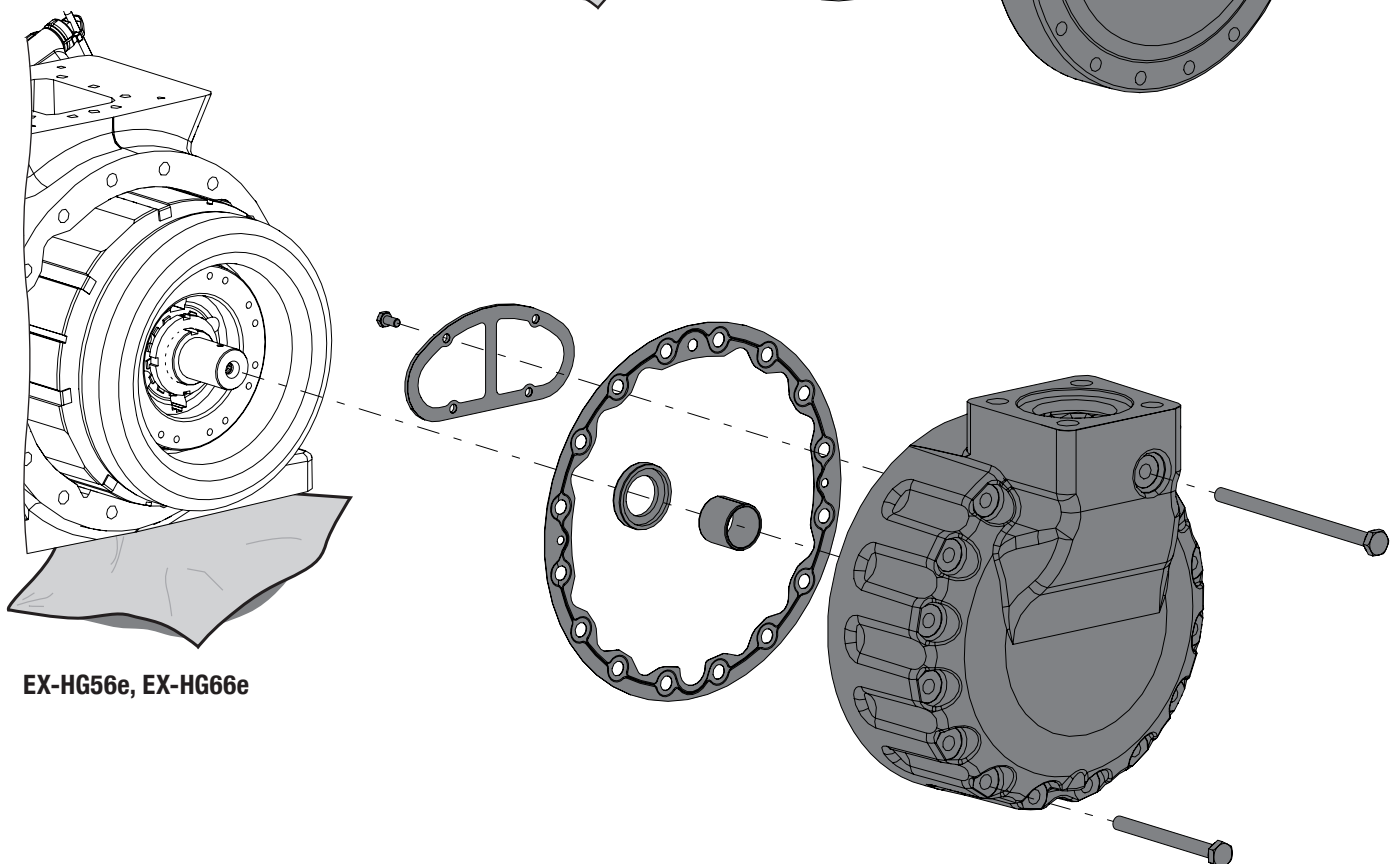
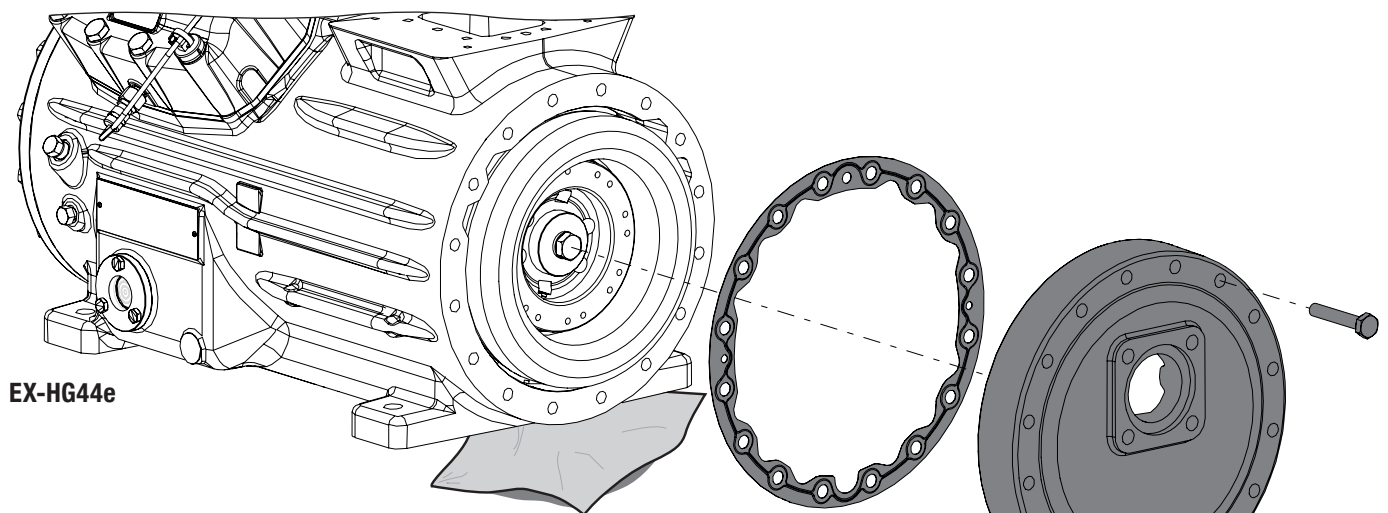
Position in
parts list
2520

Tools: Spanner SW 10, 17, extraction tool

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Place absorbent material / cloth underneath, to collect oil residues. Dispose of the material environmentally.
- 1010, 1015 - Loosen the hexagon head screws, unscrew and take off cover.
- 1017 - Take off gasket and dispose, if necessary remove gasket residues.
- 1190, 1191 - Loosen the hexagonal screws, unscrew them and remove the suction filter. Clean the suction filter carefully if necessary.
- 2122 - Pull off bearing bush and seal disc with suitable extraction tool (only for EX-HG56e).



2 | Disassembly of the compressor

2.5 Stator

Position in
parts list
2130

Tools: Allen key 6 mm

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

2280

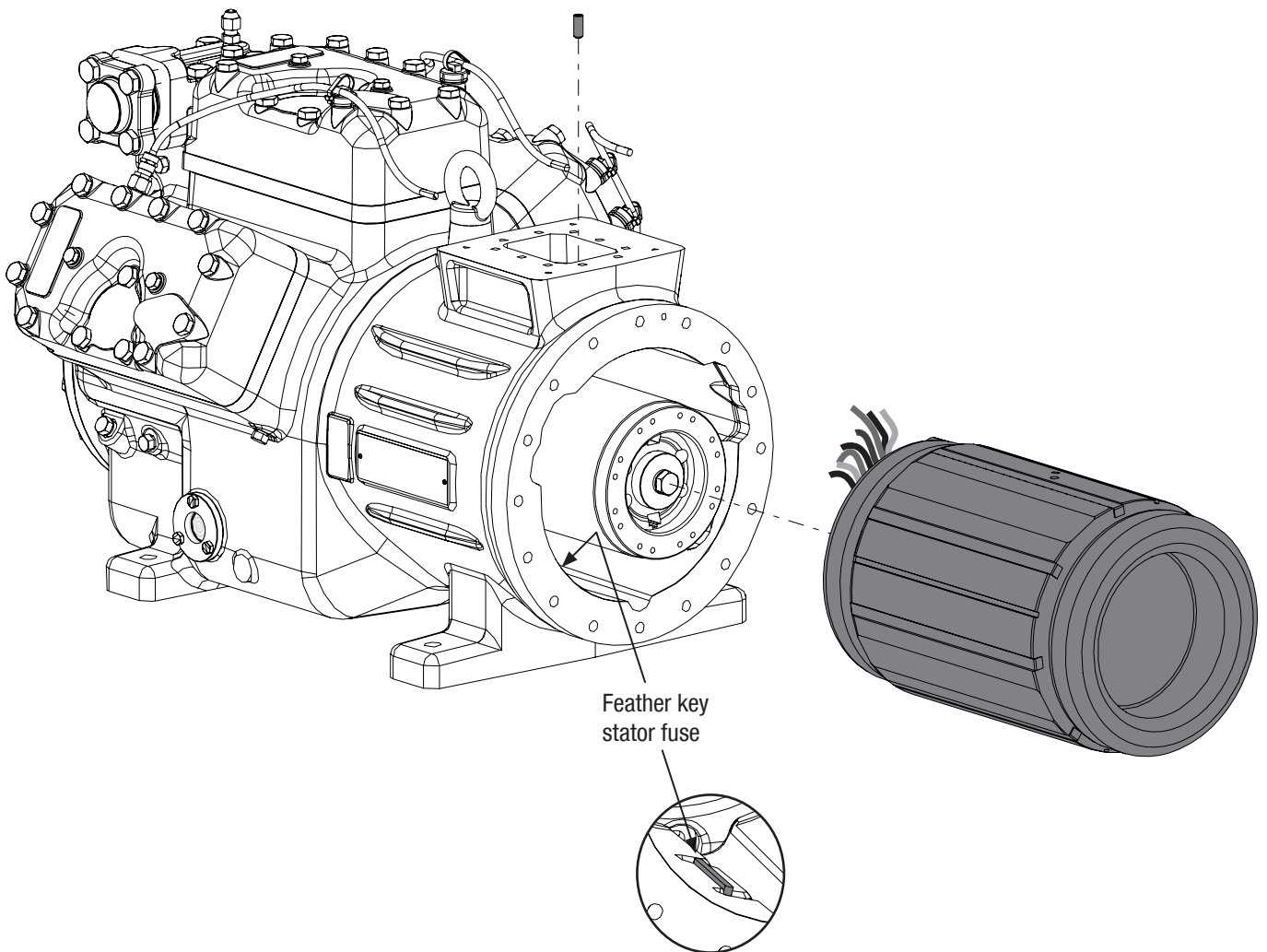
- Loosen and remove the threaded pin for axial stator securing. For easier disassembly, heat the threaded pin for axial stator securing with a hot air blower - Attention, protect electrical cables from heating!

- Pull out the stator and pay attention to the tracking of the cables, avoid jamming.

- Attention, observe the weight!

1179

- Remove feather key.



2 | Disassembly of the compressor

2.6 Rotor

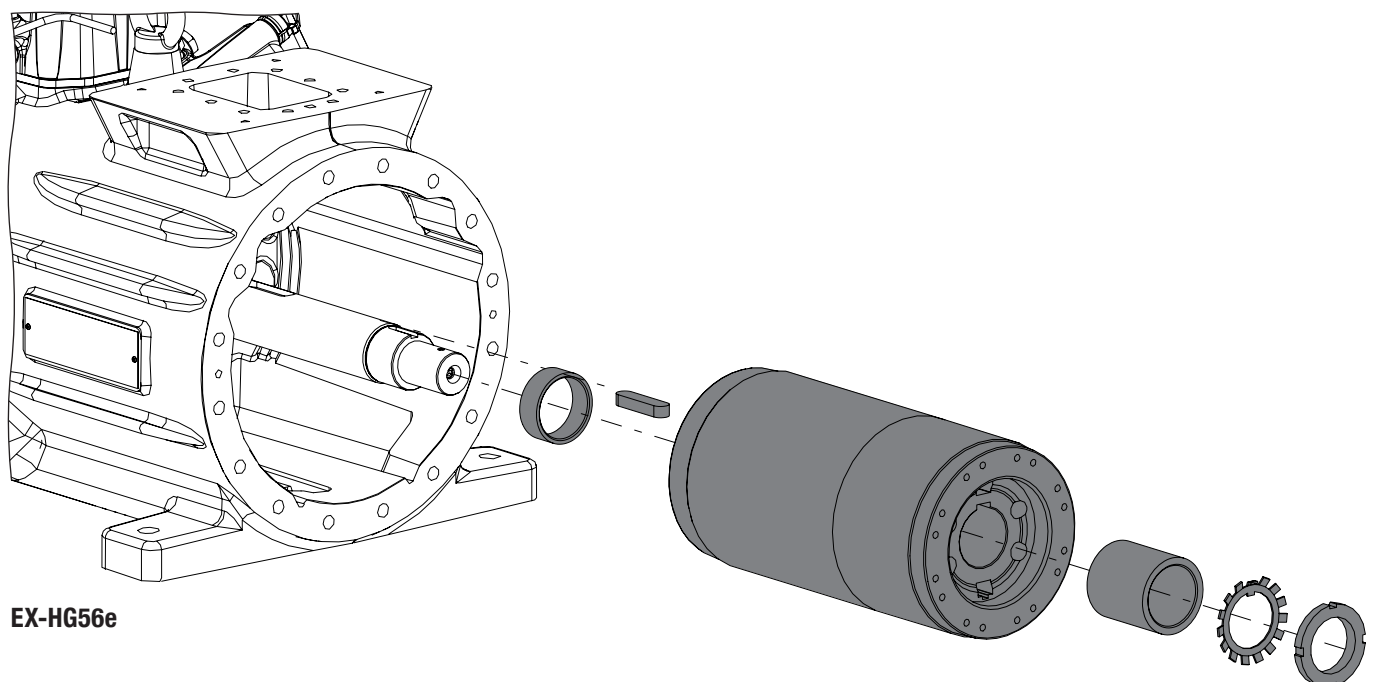
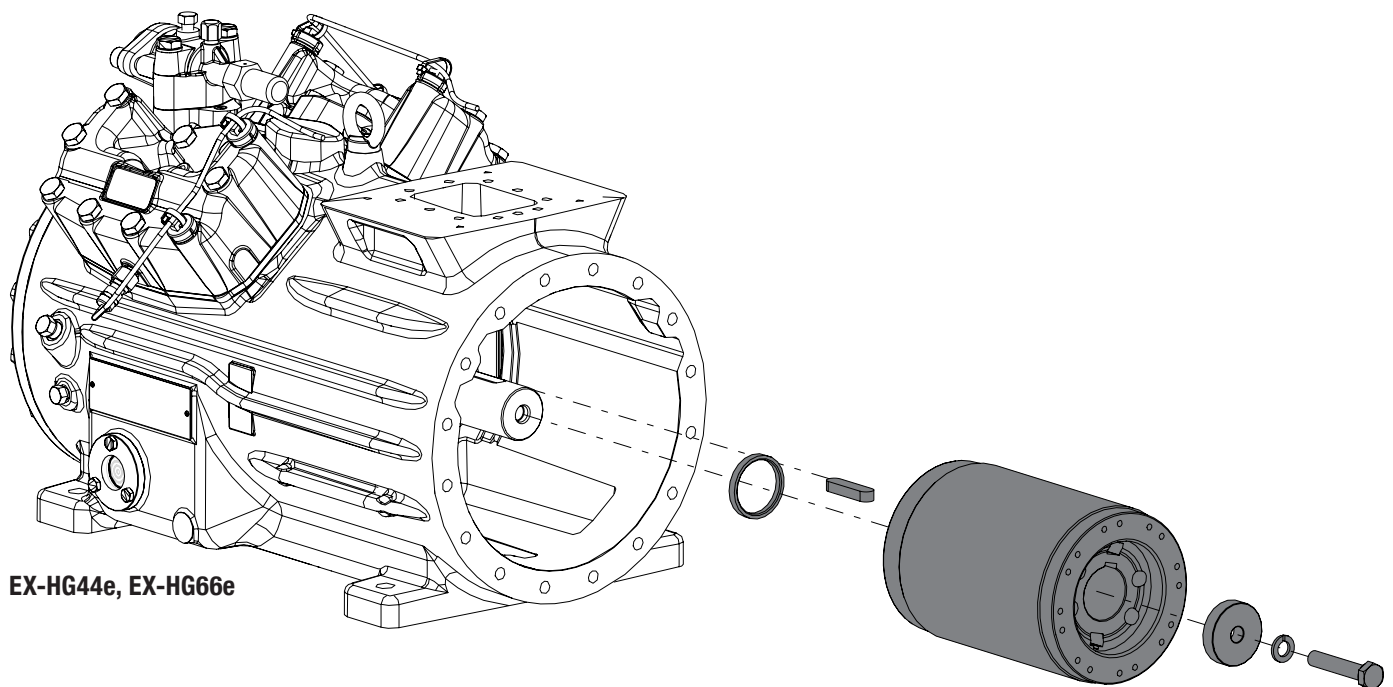
Position in
parts list
2130

Tools: Spanner SW 19

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- 800, 810, 820 - Loosen and remove rotor screw with disc and spring washer.
- 800, 810, 1177 - Remove groove nut, safety sheet und spacer sleeve if available.
- 1179 - Pull off rotor from crankshaft. In case of sluggishness, use a puller.
- Take off feather key from crankshaft. Remove spacer sleeve if available.



2 | Disassembly of the compressor

2.7 Thermal protection thermostat

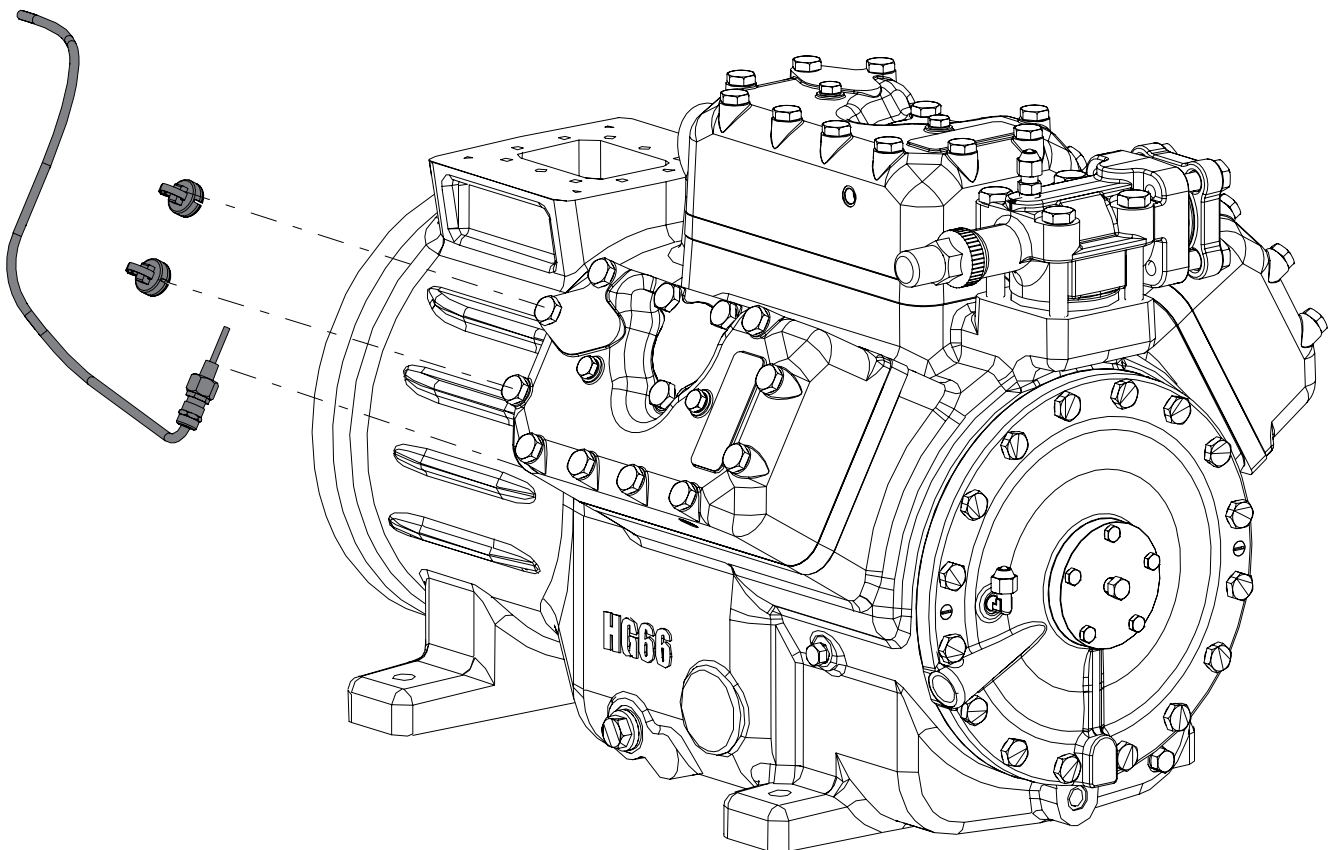
Position in
parts list
2800

Tools: Spanner SW 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Release cable from cable holders.
- Remove the cable holder for the thermal protection thermostat, if necessary by slightly spreading the circlip (reuse possible).
- Unscrew thermal protection thermostat from cylinder cover.



2 | Disassembly of the compressor

2.8 Cylinder cover and valve plate

Position in
parts list
2000, 2005

Tools: Spanner SW 13, 17, 22, allen key 6 mm

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

160 165, 180,
185, 186 170

- **Losen screws at the cylinder cover, remove cylinder cover.**

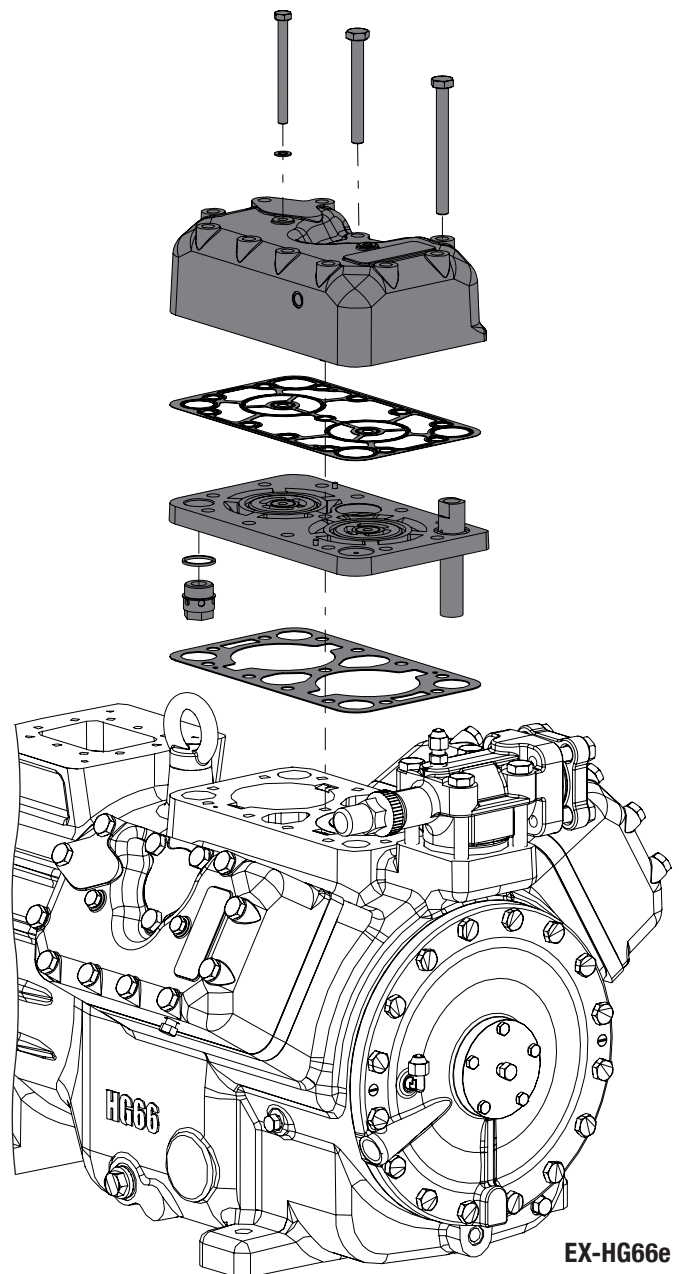
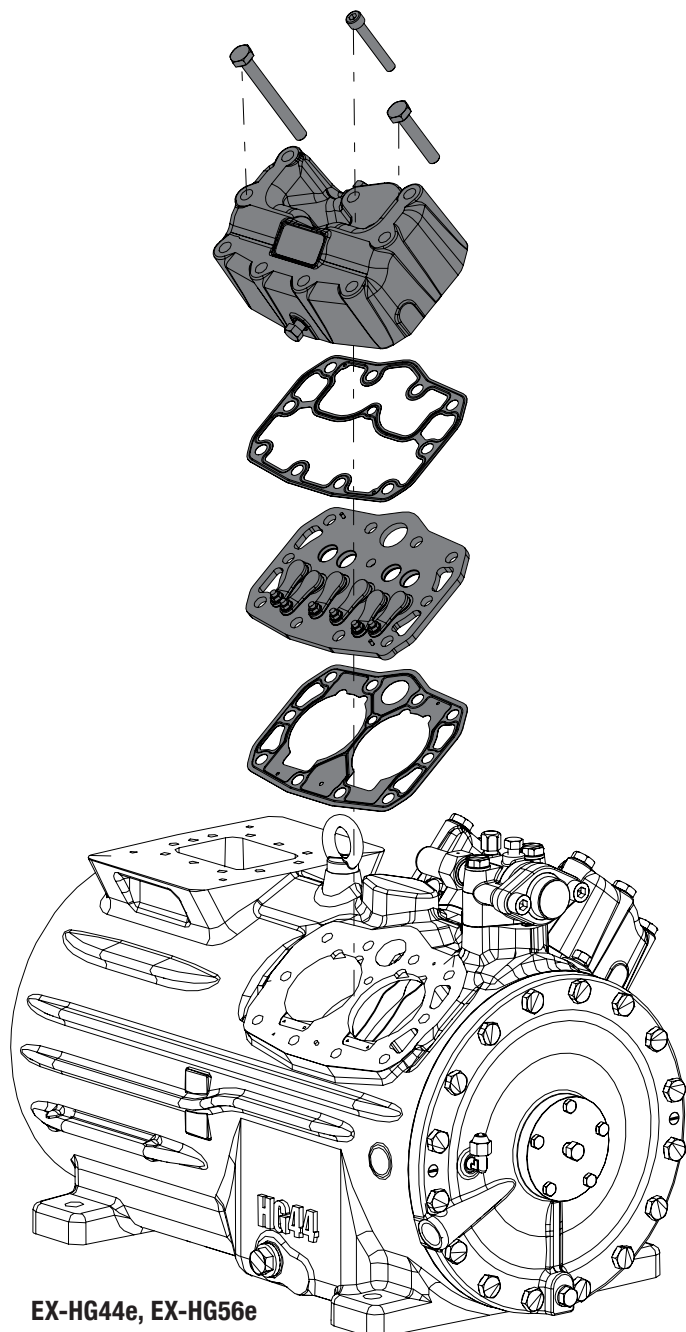
2000

- **Take off top gasket, valve plate and lower gasket.**

2002

- **Remove pressure relief valve with seal. Only for EX-HG66e.**

- **Carefully clean the sealing surface from old flat gasket material. Do not drop any gasket residues into the compressor.**



2 | Disassembly of the compressor

2.9 Shut-off valve (HP)

Position in
parts list
2060

Tools: Allen key 8 mm, spanner SW 17, 19, 22

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

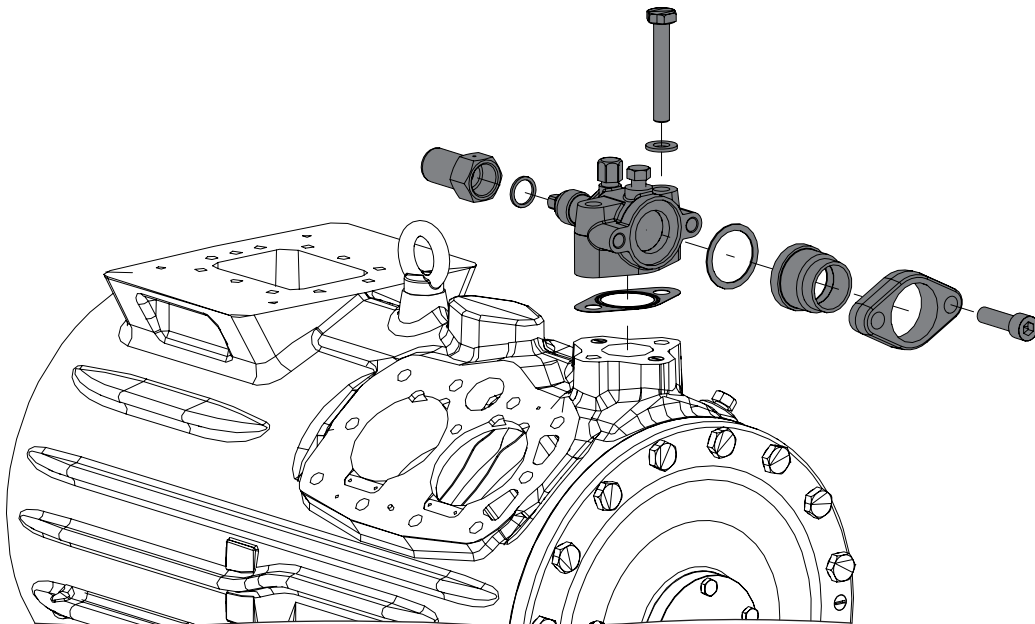


CAUTION Carry out soldering work only under exclusion of explosive atmosphere. Observe important information on the use of hydrocarbons (combustible refrigerants) in the assembly instructions compressor

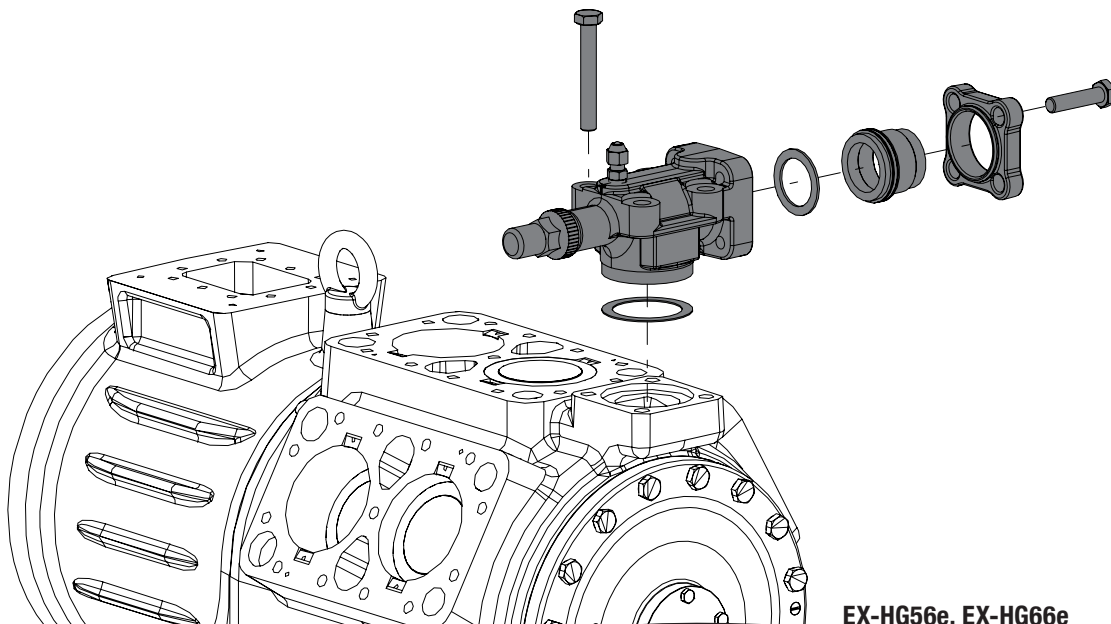
220, 221,
210

- Release the flange screw connection of the shut-off valve. Remove the shut-off valve and gaskets.

- Carefully clean the sealing surfaces old flat gasket material and make sure that no gasket residues get into the compressor.



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EX-HG56e, EX-HG66e

2 | Disassembly of the compressor

2.10 Oil pump

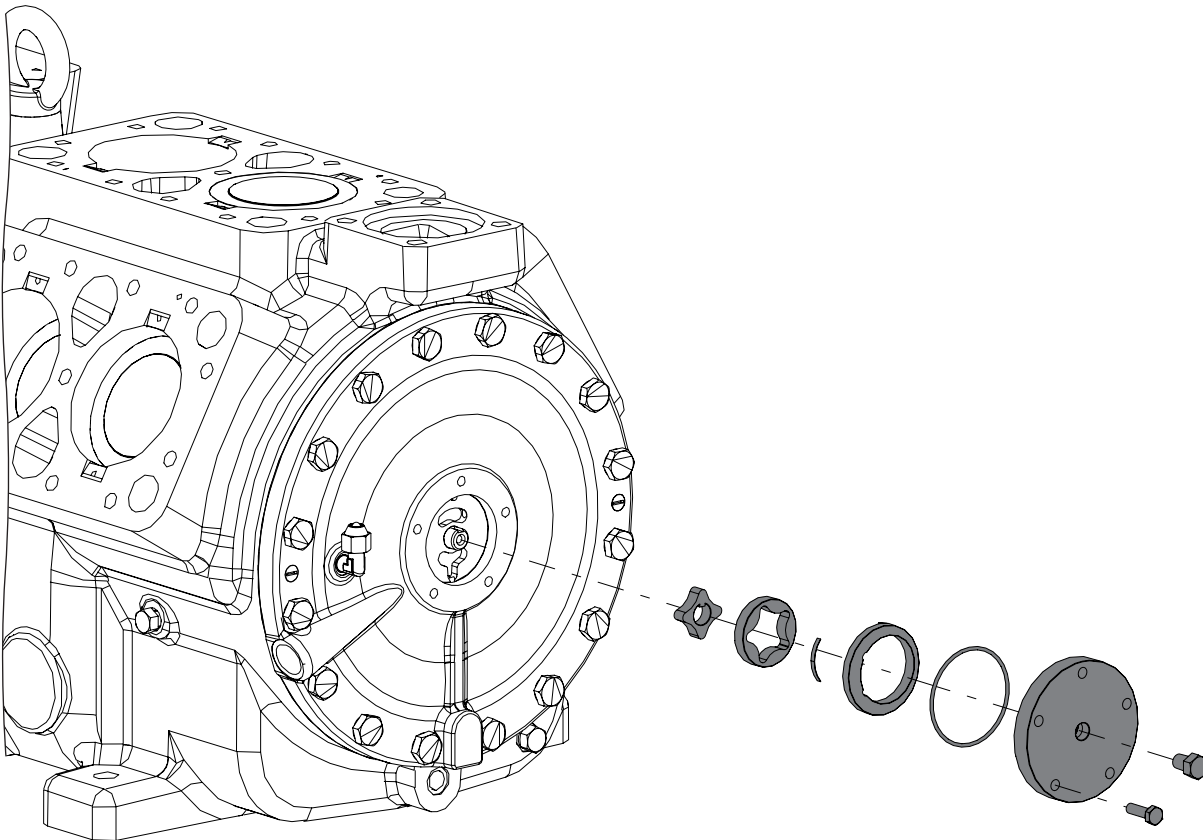
Position in
parts list
2020

Tools: Spanner SW 10, magnet

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Loosen cover joint, take off cover plate.
- Remove rotor set by means of magnet.
- Installation space and, if possible, carefully clean the suction channel of the oil pump.
- For heavy soiling, change the oil and replace or clean the oil strainer.



2 | Disassembly of the compressor

2.11 Bearing flange

Position in
parts list
2110, 2220

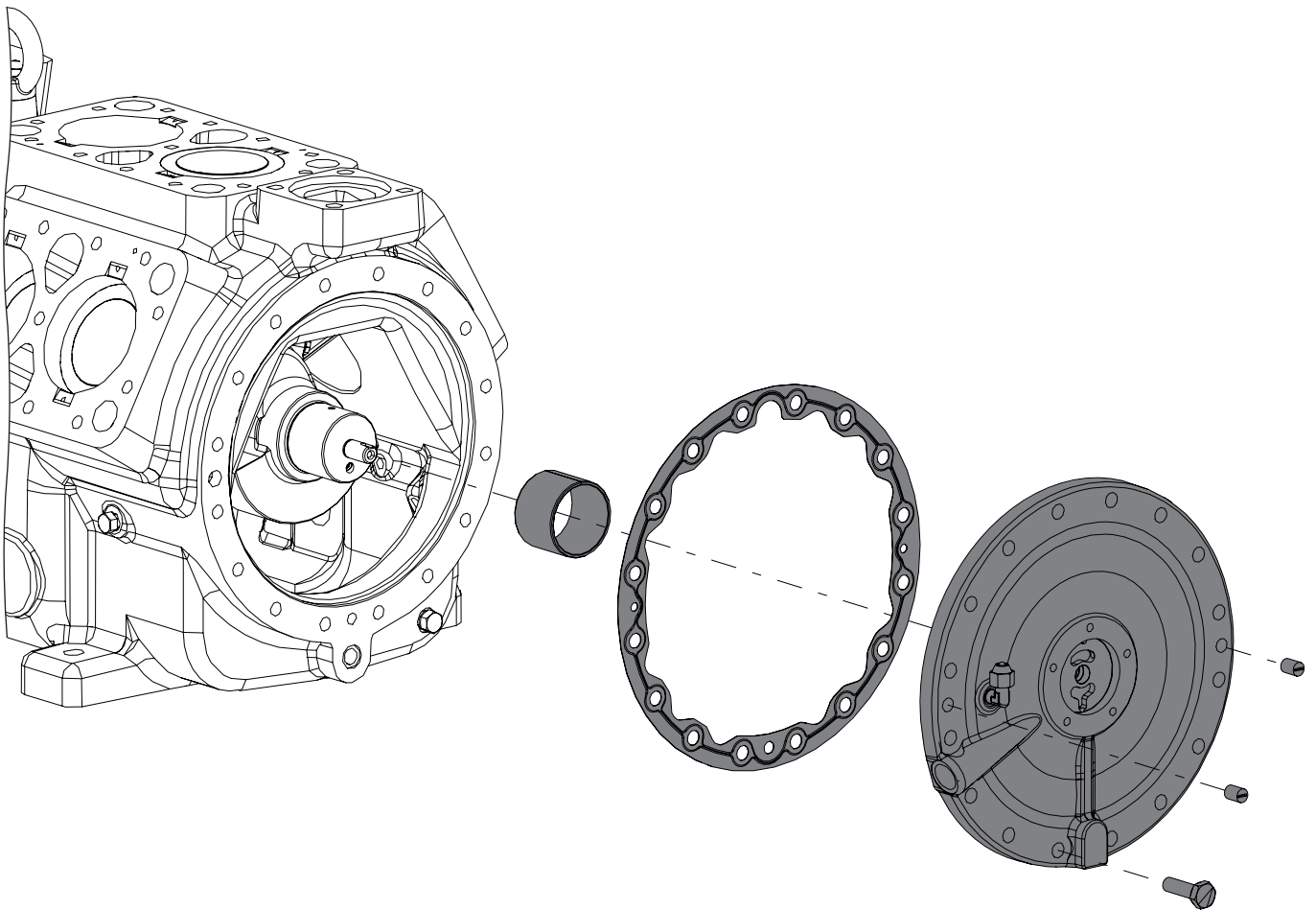
Tools: Spanner SW 17, allen key 8 mm, extraction tool

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

750, 760
2125

- Loosen the screw connection of the bearing flange and press off the bearing flange. To do this, screw two suitable screws (M10) into the two opposite threads evenly to push off the bearing flange. Remove the gasket.
- Pull off the bearing bush with a suitable extension tool.
- Carefully clean the sealing surface from old flat gasket material.



2 | Disassembly of the compressor

2.12 Connecting rods

Position in
parts list
2040

Tools: Offset screwdriver with nut SW 10, 13

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Mark the matching connecting rods and connecting rod shells clearly and indelibly, including the bearing shell assignment (top/bottom) in the case of the HC version, in order to prevent confusion later when reassembling!

2100

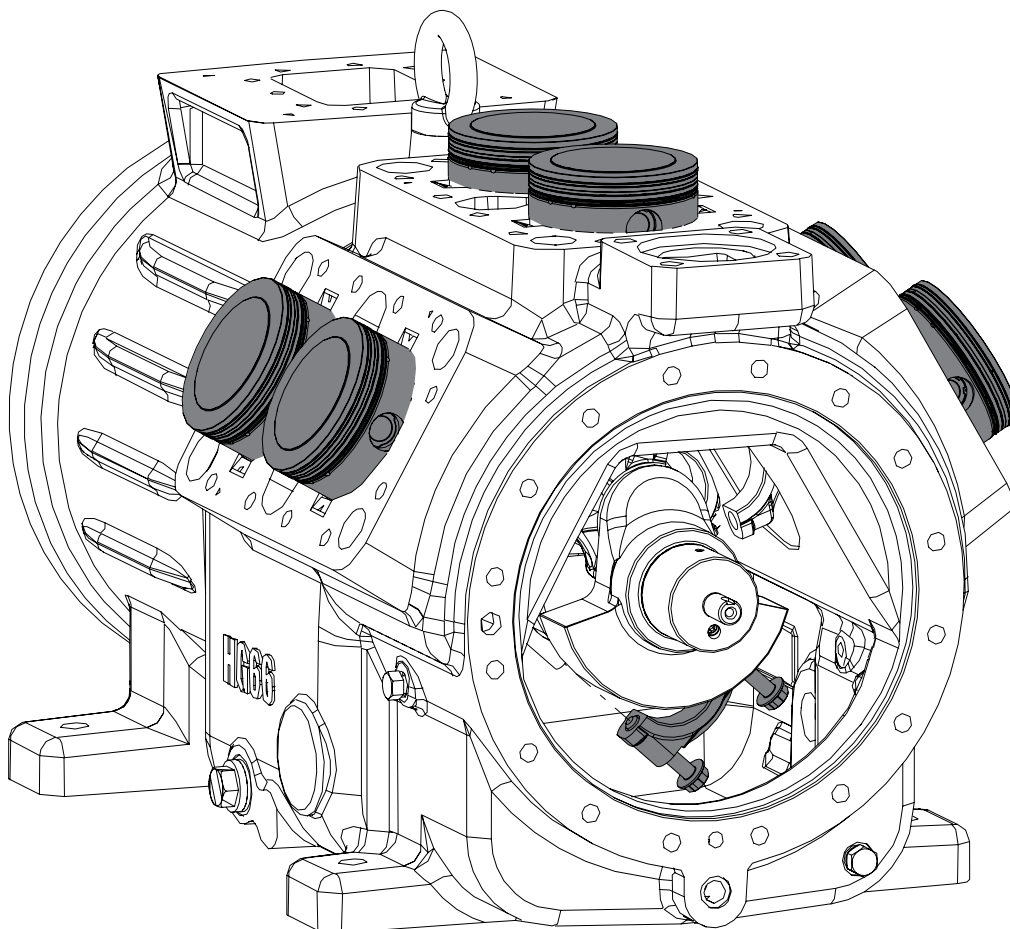
- Unscrew the hexagon head screws from the lower connecting rod shell.

- Remove lower connecting rod shell.

- Same procedure for the remaining connecting rods.

2030

- Detach the remaining connecting rod parts from the crankshaft journals and push them into the cylinder bore as far as possible. All piston rings must now protrude from the cylinder bore on the cylinder cover side.



2 | Disassembly of the compressor

2.13 Crankshaft

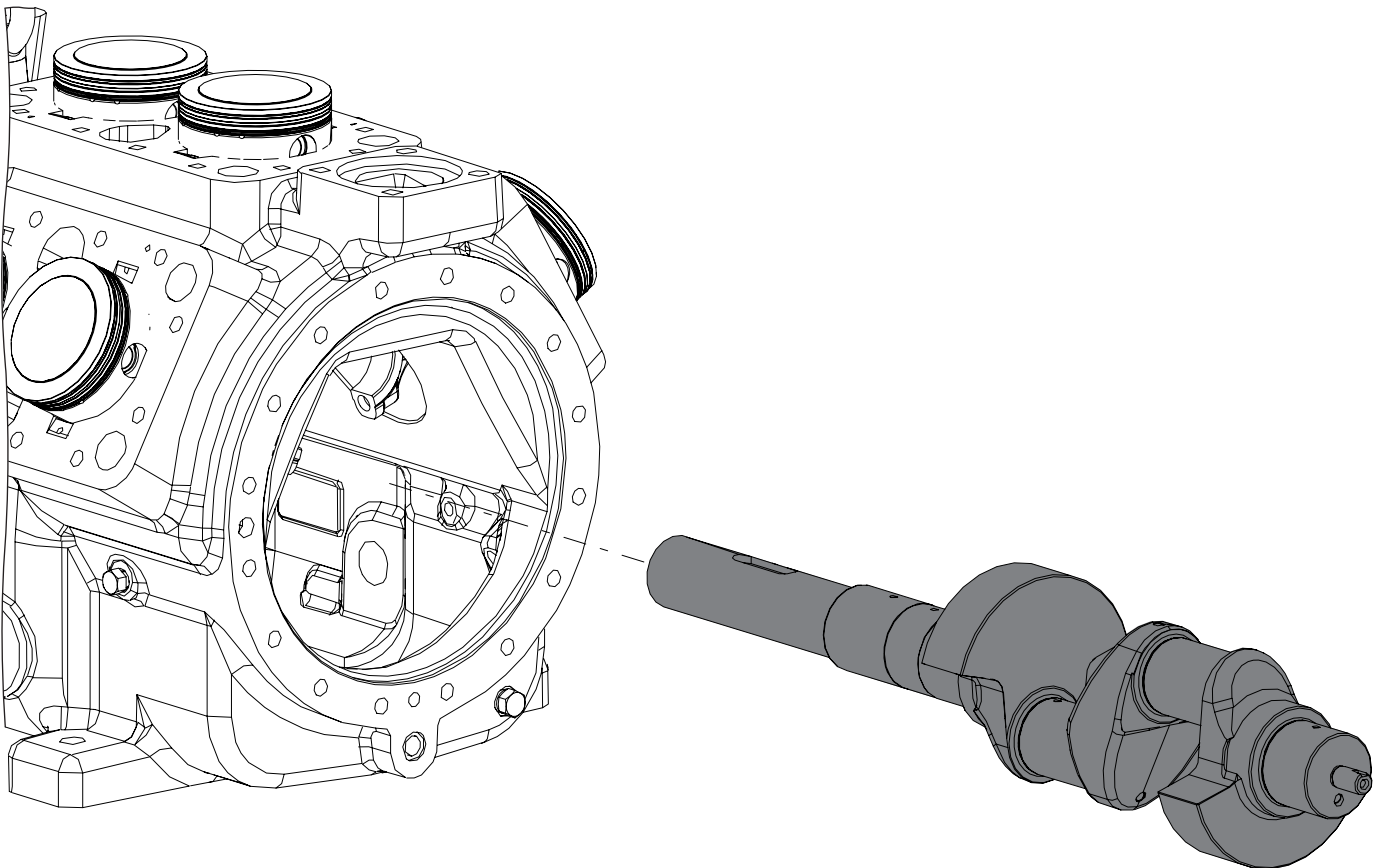
Position in
parts list
2050

Tools: -

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Carefully pull out the crankshaft in the axial direction.



2 | Disassembly of the compressor

2.14 Pistons and connecting rods

Position in parts list 2040

Tools: Circlip pliers

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Mark the matching pistons to the cylinder bore clearly and indelibly to prevent confusion when reassembling later!

290, 295, 300

- Remove piston rings. Spread piston rings only as far as necessary (risk of deformation or breakage).

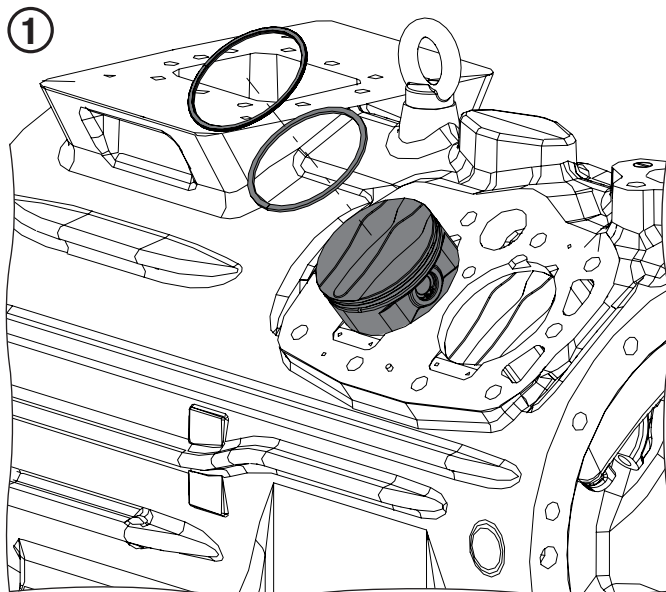
- Remove the piston in the direction of the crankcase.

280

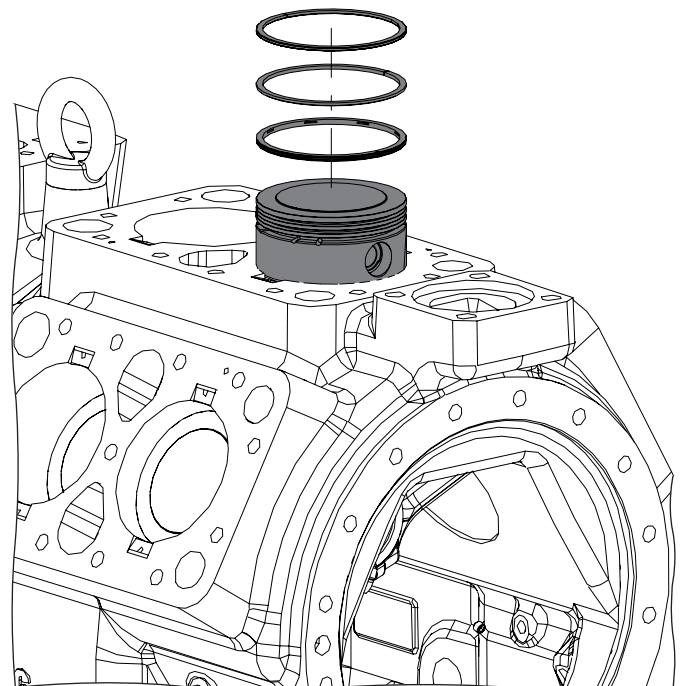
- Remove circlips of the piston pins with circlip pliers.

270

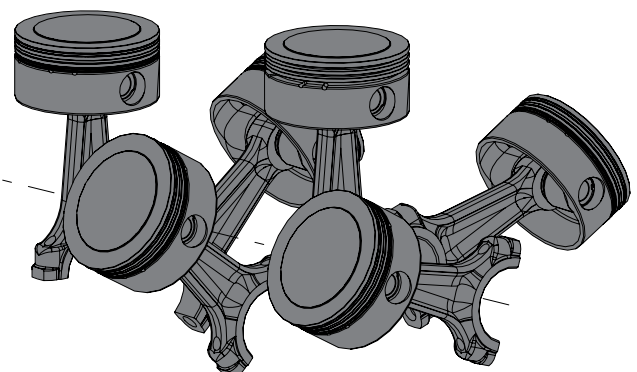
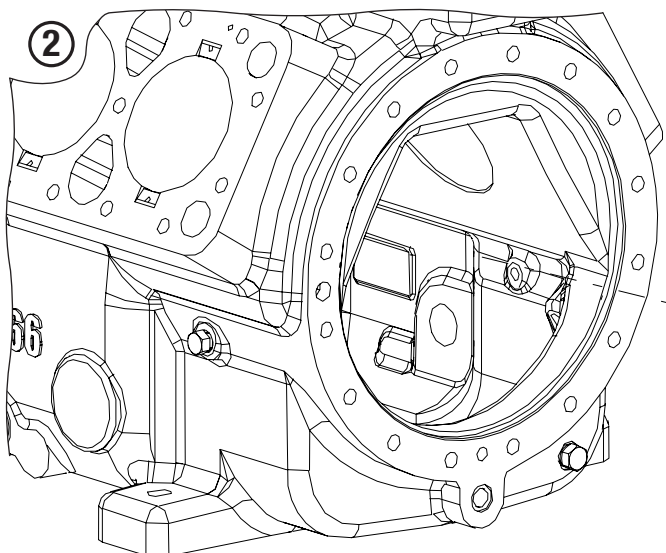
- Push the piston pins out of the piston.



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EX-HG66e



2 | Disassembly of the compressor

2.15 Compressor housing attachments

Position in parts list

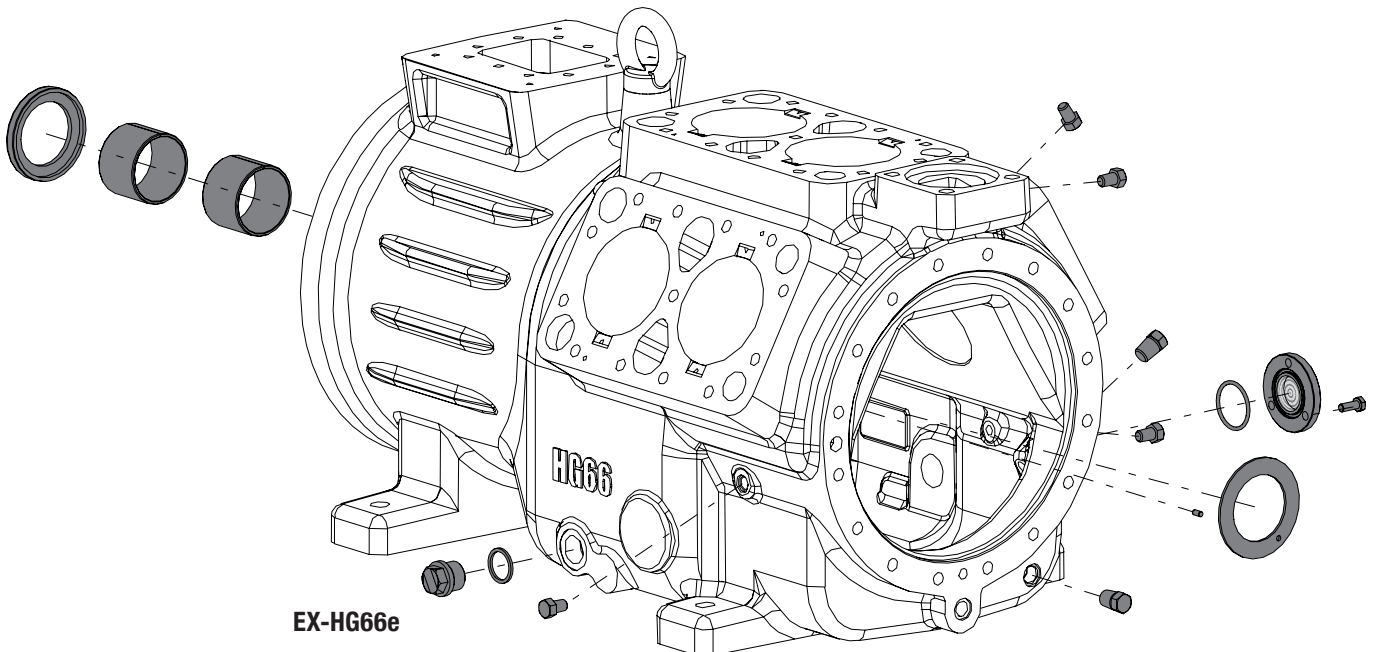
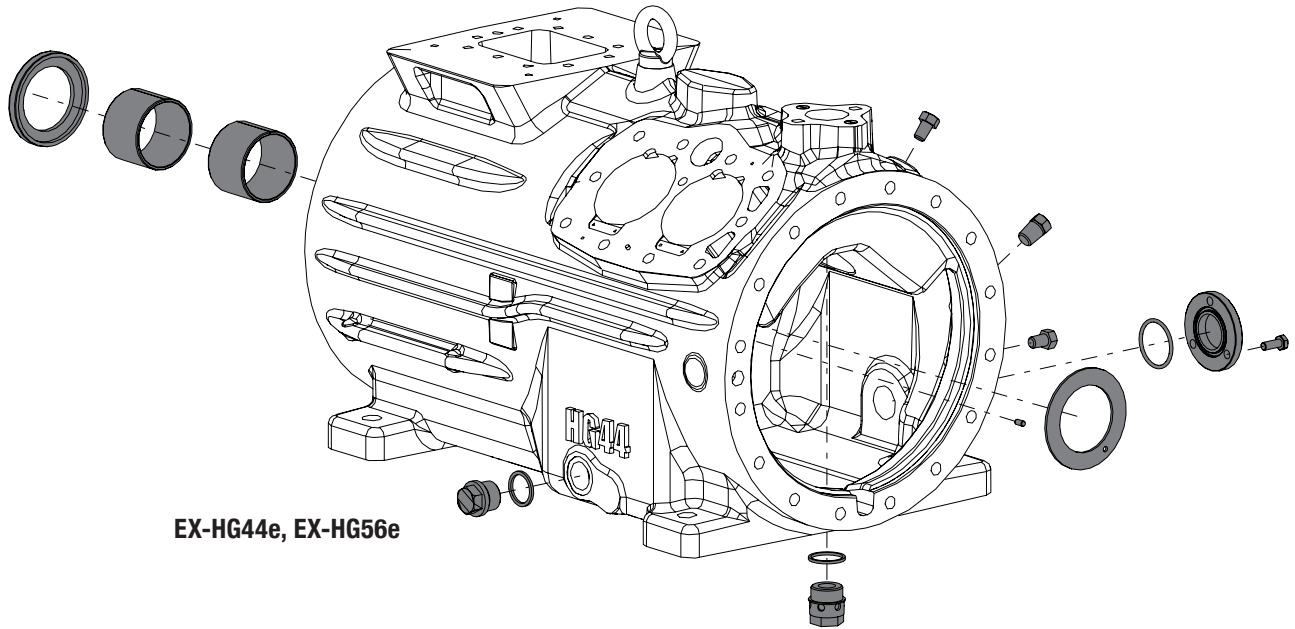
2120
500, 505
520
508, 510
2250
2080, 580
2005

Tools: Spanner SW 10, 13, 14, 19, scraper with nut SW 22

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Dismantle the seal disc and bearing bushes with a suitable tool.
- Remove locking screw M22x1.5 and seal ring.
- Remove locking screws 1/8" NPTF.
- Remove locking screws 1/4" NPTF.
- Remove thrust washer and fixing pin.
- Dismantle the sight glass and remove the O-ring.
- Remove decompression valve with seal ring.



3 | Assembly of compressor

3.1 Installation of sight glass and locking screws

Position in parts list

Tools: Spanner SW 10, 13, 14, 19, 22

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



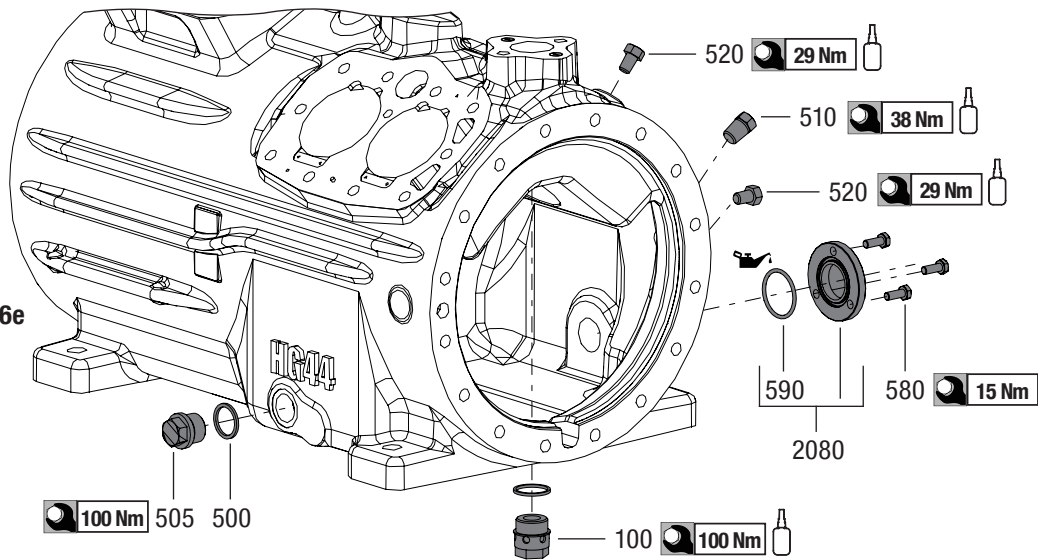
INFO

Observe screw tightening torques!

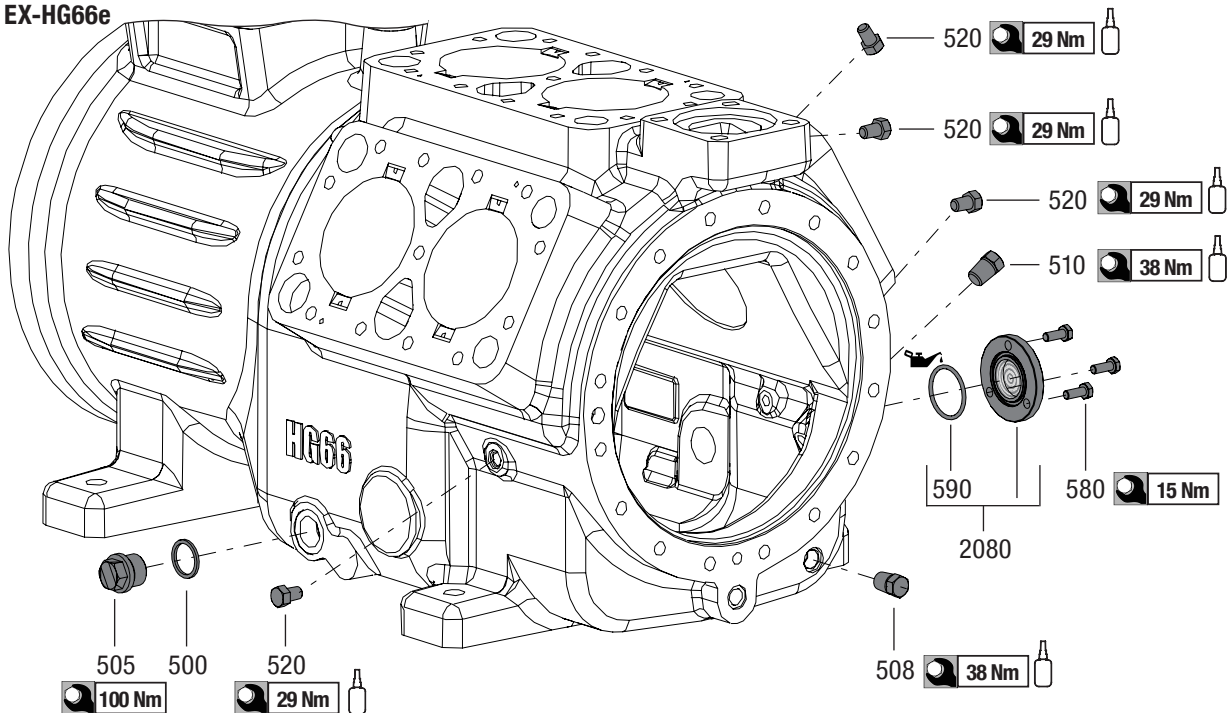
2080, 580
508
510, 520
500, 505
2005

- We recommend cleaning the inside of the housing before assembly.
- Screw oil sight glass to compressor housing.
- Screw in 1/4" NPTF locking screws.
- Screw in 1/8" NPTF locking screws.
- Screw in locking screw M22x1,5 with seal ring.
- Screw in decompression valve M24x1,5 with seal ring.

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EX-HG66e



3 | Assembly of compressor

3.2 Assembly bearing bushes main bearing

Position in parts list 2120

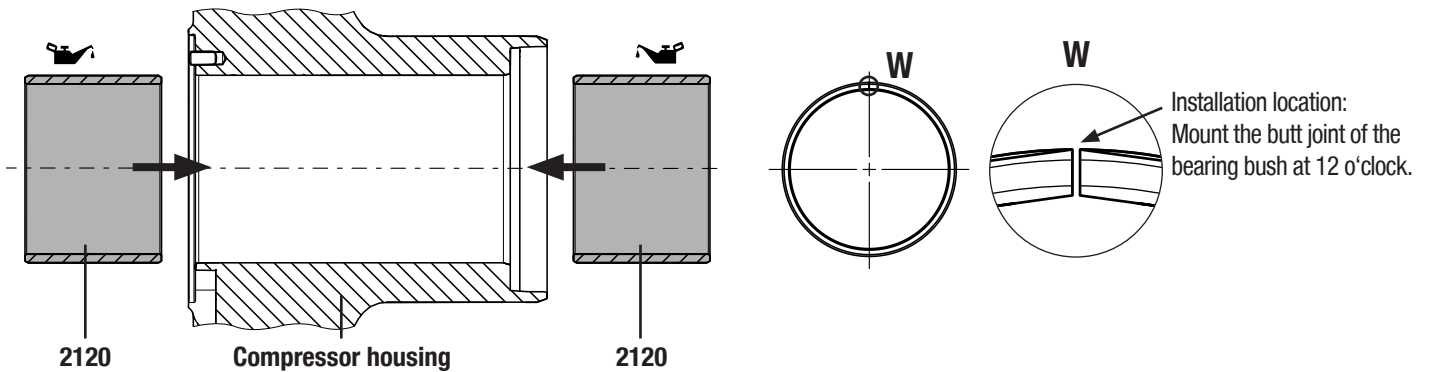
Tools: Auxiliary thorn

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

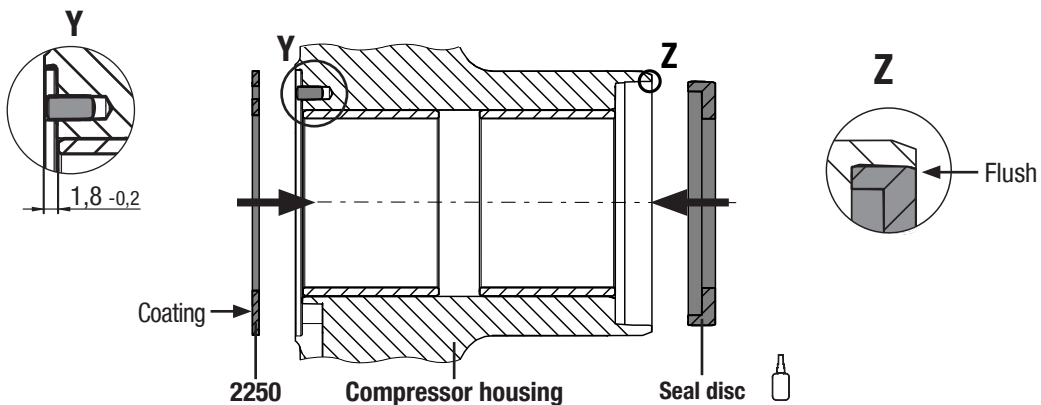
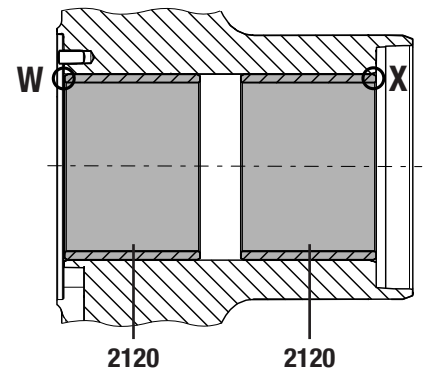
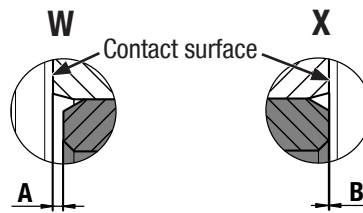
- Wet bearing bushes on the circumference with oil. Pay attention to the installation location of the butt joint!
- Press-in the bearing bushes evenly onto dimensions A and B using a suitable tool (e.g. auxiliary thorn).
- Install thrust washer. Pay attention to the correct installation location, coated surface in direction of crankshaft!
- Press in the seal disc in flush with an adhesive lock.

2250



Compressor	Dimensions	
	A	B
EX-HG44e	0,5 ±0,3 mm	0 mm ²⁾
EX-HG56e	0,5 ±0,3 mm	- ¹⁾
EX-HG66e	0,5 ±0,3 mm	0 mm ²⁾

- ¹⁾ Bearing bush not available
- ²⁾ Flush with the contact surface



3 | Assembly of compressor

3.3 Pistons and connecting rods

Position in
parts list
2040

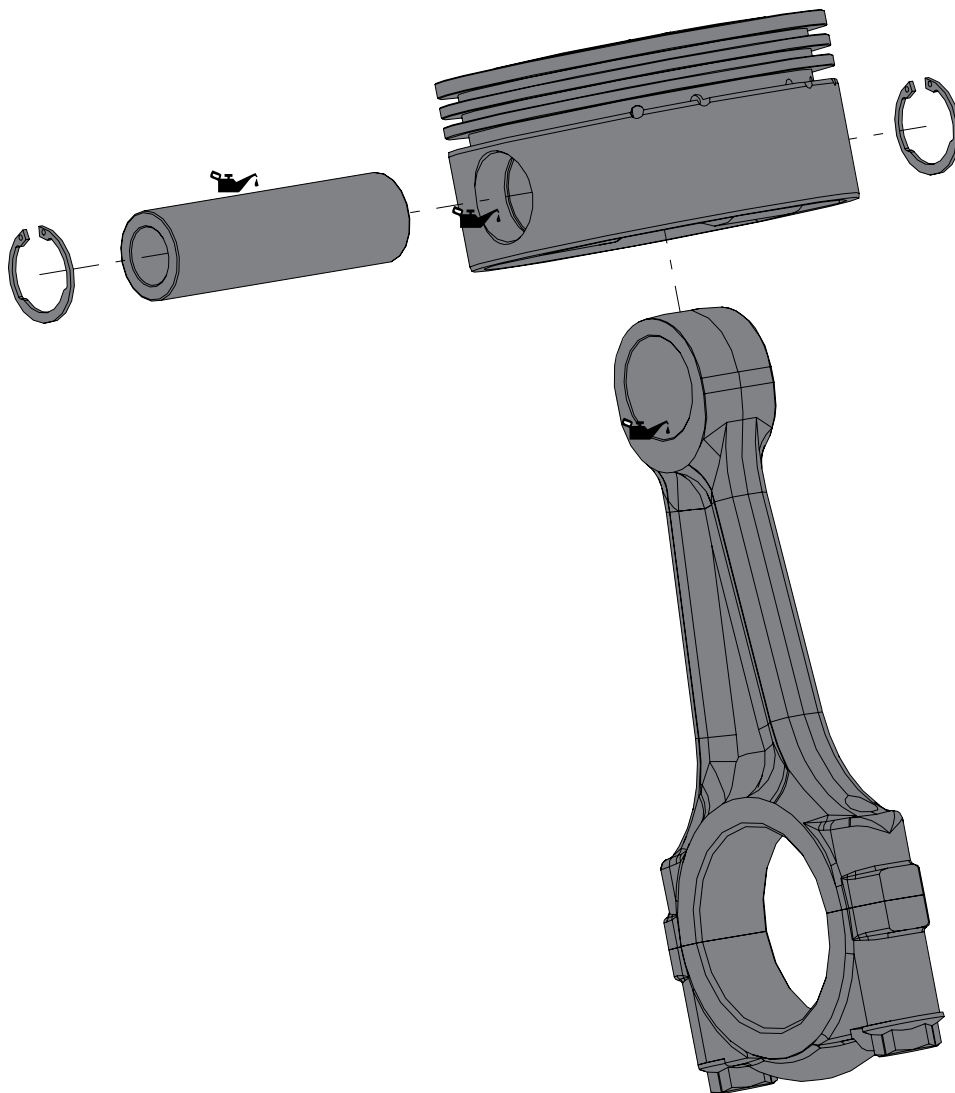
Tools: Circlip pliers

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

270, 2100
280

- Assemble the piston and connecting rod with the piston pin, use a little oil for easier assembly.
- Fit circlips on both sides of the piston pins with the circlip pliers.
- > Ensure that the circlips are correctly seated.



3 | Assembly of compressor

3.3 Pistons and connecting rods

Position in parts list 2040

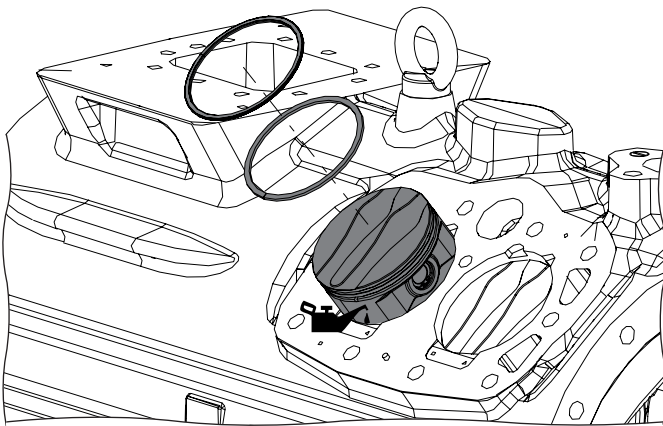
Tools: Piston ring plier, needle nose pliers

Before starting any work on the compressor observe the safety instructions page 3-5!

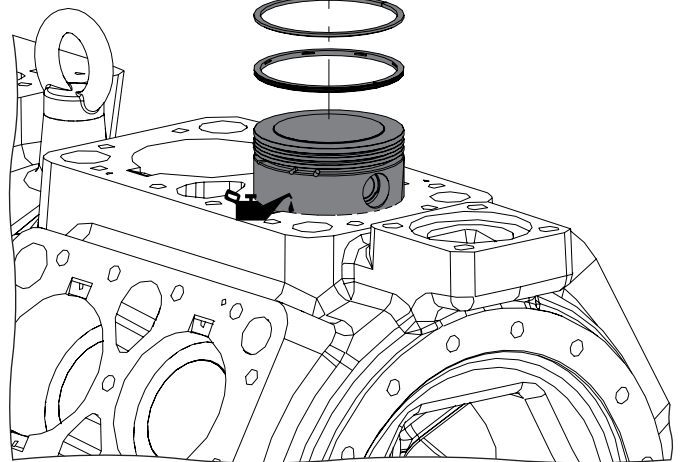
Working course

- Apply a little oil to the cylinder bores.
- For HC version, insert the upper bearing shell into the connecting rod, see chapter 3.5.
- Insert pistons/connecting rods from below into the cylinder liners up to the stop.
- > Pay attention to the correct assembly position (suction fin grooves).
- Note the assembly view of the piston rings. Spread the piston rings carefully and only as far as necessary (risk of deformation or breakage).
- Fit the piston rings with the „TOP“ marking facing upwards, in the direction of the piston crown.
- The butt joints of the piston rings have to be installed 30° twisted to each other and may not be lying upon each other.


EX-HG44e, EX-HG56e



EX-HG66e



Assembly views piston rings

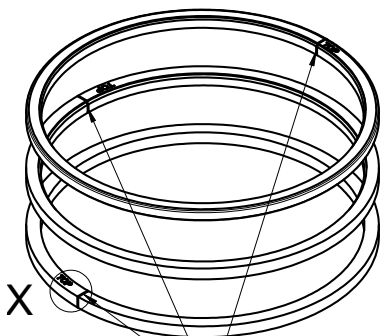
Plain compression ring — 

Piston ring — 

Piston ring — 

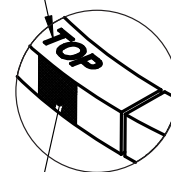
Oil scraper ring — 

Double bevel oil content ring — 



Mount the joints of the piston rings staggered every 90°.

X "TOP" at the top of all pistons



Alternative identification for "TOP" marking: yellow stripe left of the joint

3 | Assembly of compressor

3.4 Crankshaft

Position in
parts list
2050

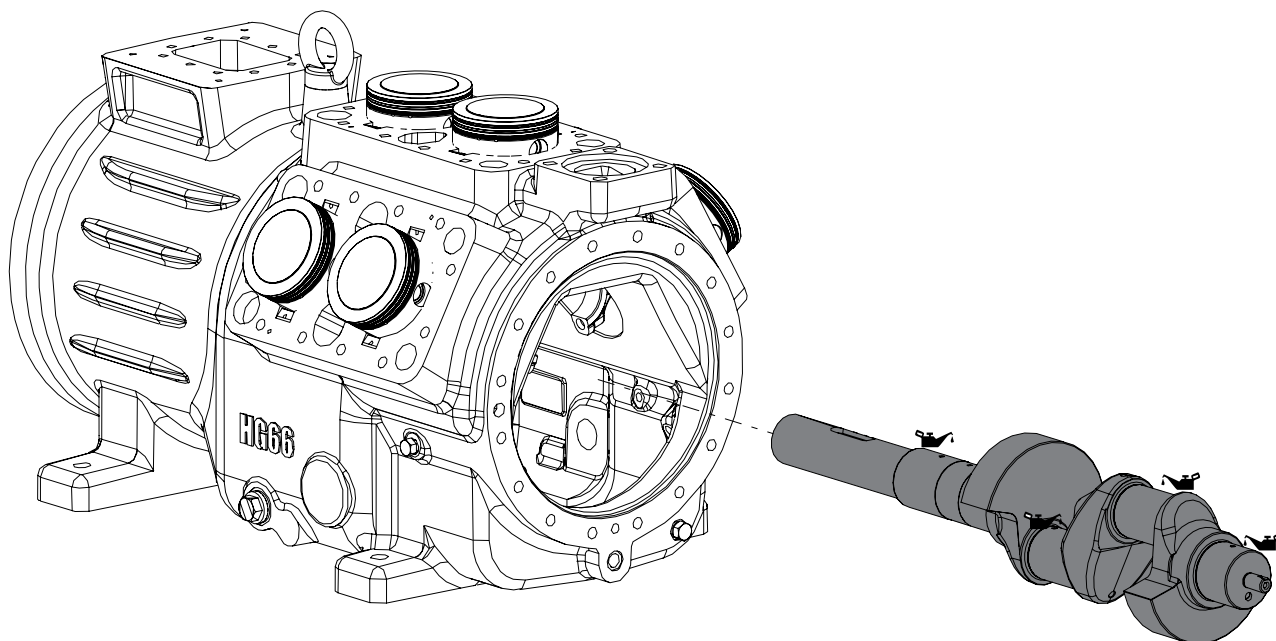
Tools: -

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Coat the running surfaces for connecting rods with oil. Oil bearing surfaces of crankshaft.
- Insert crankshaft.

2050



3 | Assembly of compressor

3.5 Connecting rods and pistons

Position in parts list 2040

Tools: Offset screwdriver with nut SW 10, 13, piston ring plier

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

2030

- Compress the piston rings on the piston with the piston ring pliers and push them back into the cylinder bore.

- Mount the connecting rods on the crankpins by hand and align them in parallel.

241, 242

- Insert lower bearing shells in connecting rod shells (for HC version).

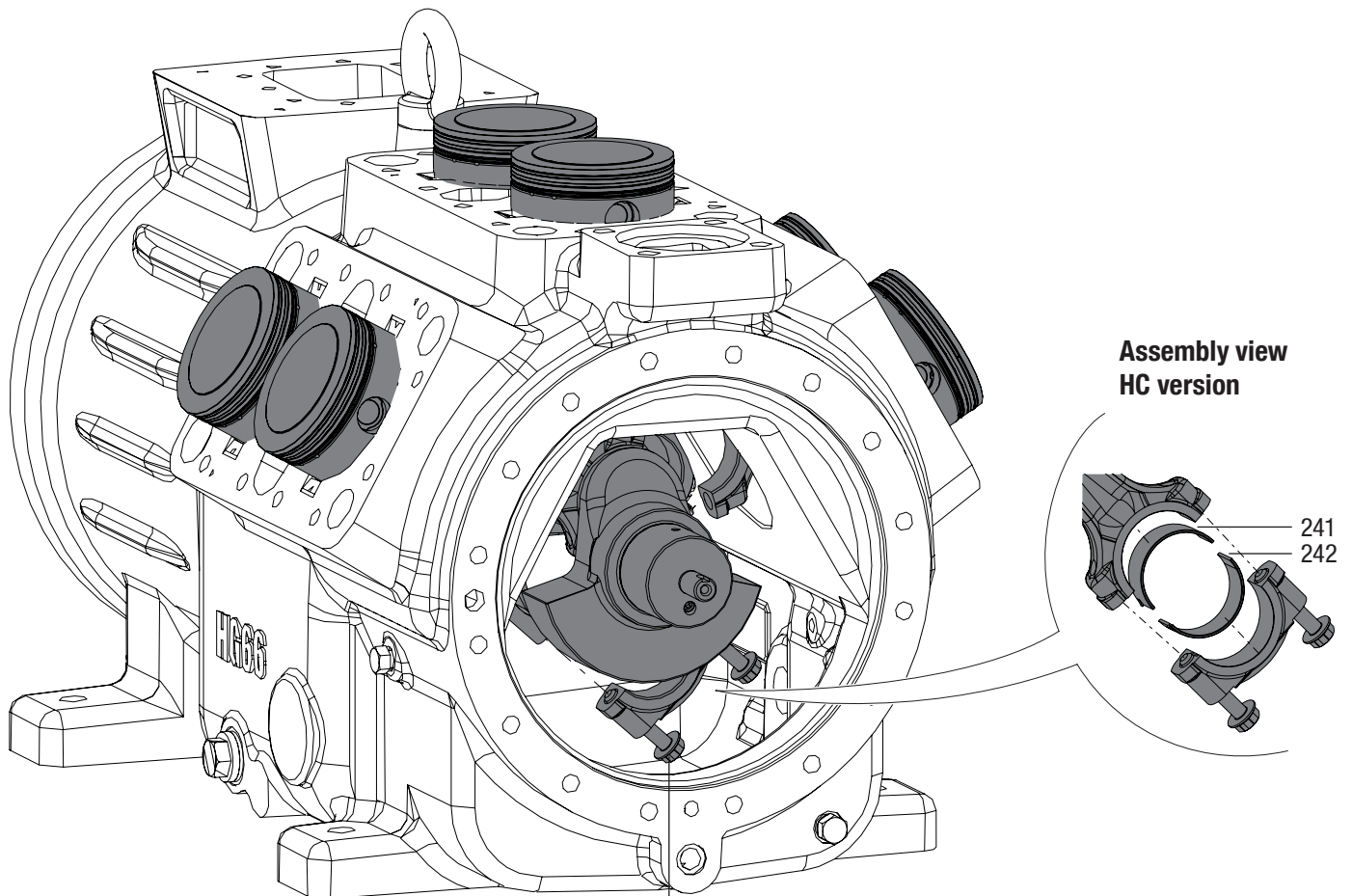
2100

- Place the marked lower connecting rod shell on the corresponding connecting rods.


- Tighten connecting rod screws.

2050

- Turn the crankshaft by hand. In case of sluggishness, check the fit of the connecting rods, if necessary, dismantle the connecting rods and carry out the work step again.



2100  15 Nm EX-HG44e, EX-HG56e

 29 Nm EX-HG66e

3 | Assembly of compressor

3.6 Assembly bearing flange oil pump

Position in parts list
2120

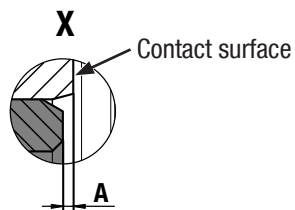
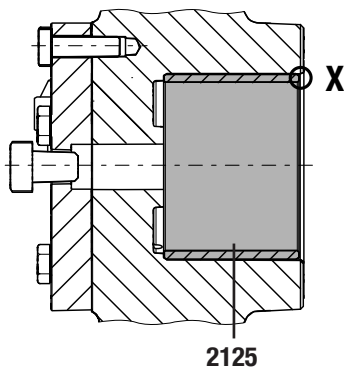
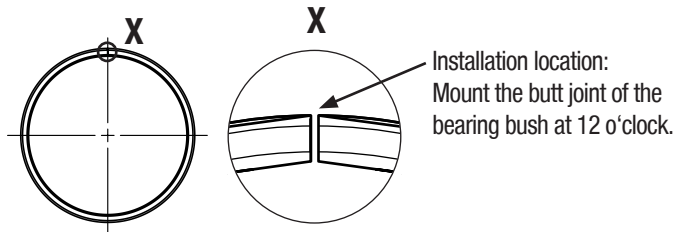
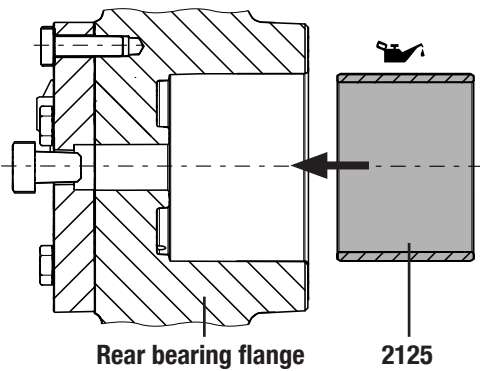
Tools: Auxiliary thorn

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

2125

- Wet the bearing bushes on the circumference with oil. Pay attention to the installation position of the butt joints!
- Press in the bearing bushes evenly, using a suitable tool (e.g. auxiliary thorn) to the dimensions.



Compressor	Dimensions A
EX-HG44e	0,5 ±0,3 mm
EX-HG56e	0,5 ±0,3 mm
EX-HG66e	0,5 ±0,3 mm

3 | Assembly of compressor

3.7 Oil strainer and bearing flange

Position in parts list
2110, 2220

Tools: Torque spanner, spanner SW 14, 17; allen key SW 6

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

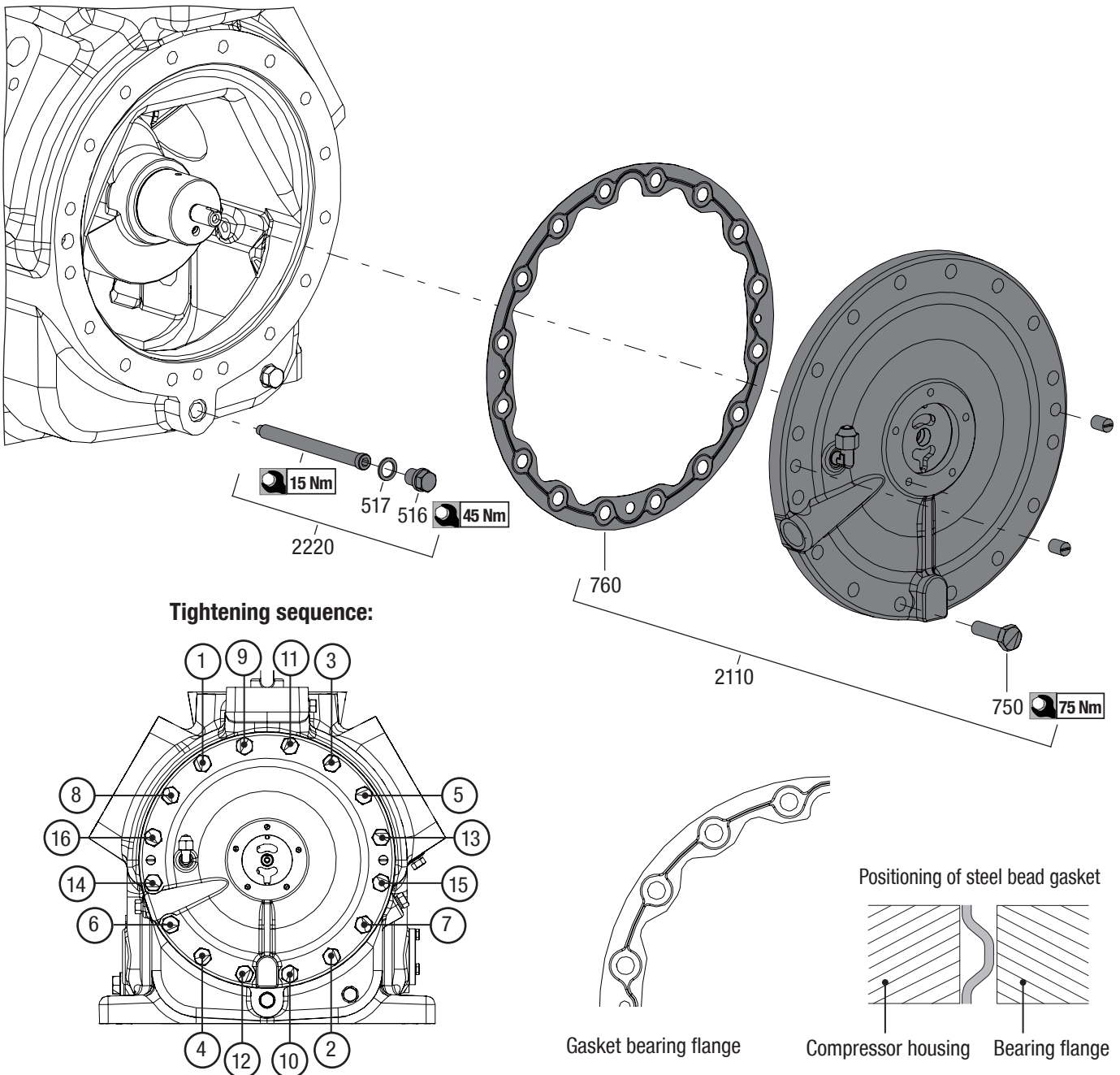


INFO

Observe screw tightening torques!

2110

- Mount bearing flange with gasket.
- Tighten the screws of the bearing flange according to the tightening sequence (1 to 16) after they have been applied.
- Insert oil strainer, screw in to stop and close with screw plug.
- Measure axial clearance, see chapter 3.8.



3 | Assembly of compressor

3.8 Oil pump

Position in parts list
2020, 2110, 2220

Tools: Torque spanner, spanner SW 10, 13, 17; allen key SW 6

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

2020

- Pre-assemble spring steel sheet with excentric ring and outer rotor.

- Push the internal rotor on the crankshaft.

- Insert the preassembled excentric ring into the chamber so that it is flush with the bearing flange.

2020, 470, 480

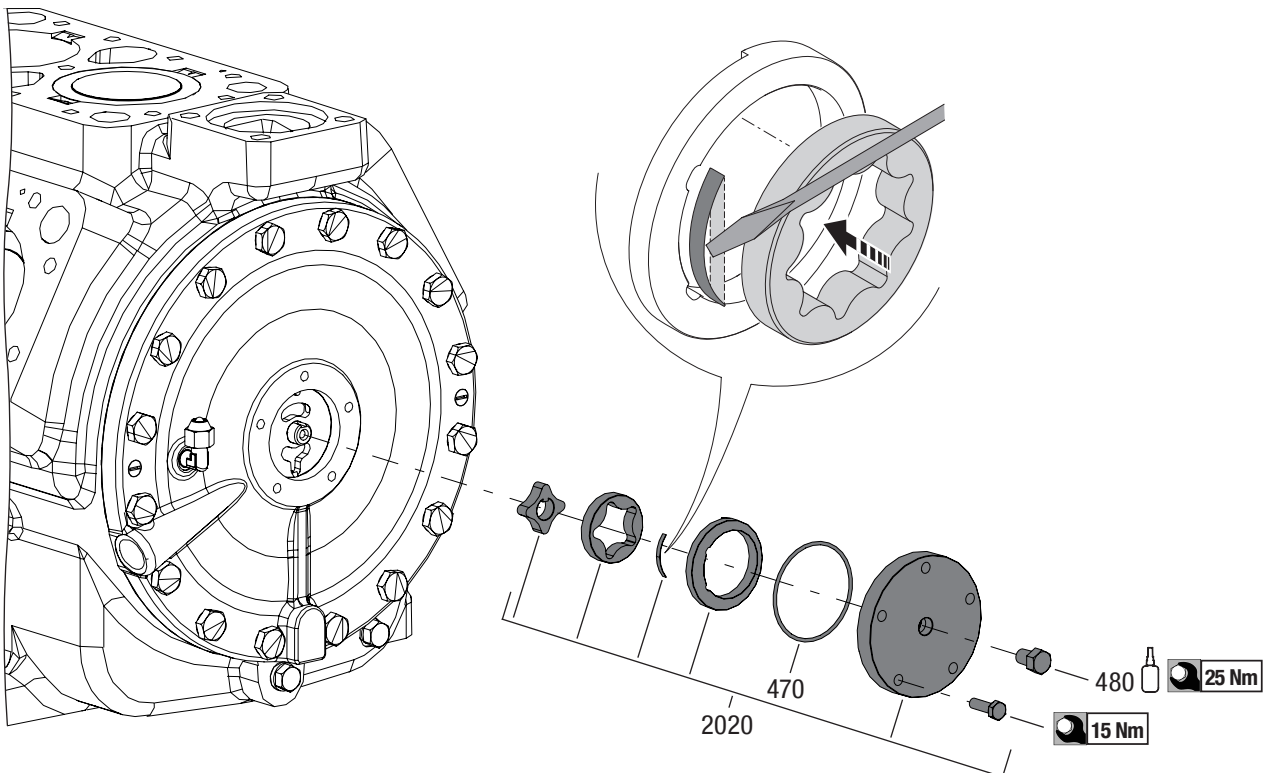
- Fill oil pump chamber with refrigeration machine oil (see compressor name plate). Mount the cover plate and O-ring with the hexagon head screws. O-ring must be placed exactly in the annular groove of the cover plate.



ATTENTION

Risk of damage compressor!

Check the oil differential pressure on recommissioning.



INFO

Measure axial clearance!

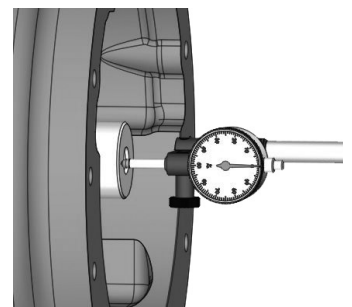
When parts of the driving unit of the compressor have been repaired or replaced, an accurate measurement of the axial clearance is necessary. The measurement must be carried out with the bearing flange mounted but before mounting the oil pump.

Axial clearance crankshaft

EX-HG44e min. 0,4 mm - max. 0,8 mm

EX-HG56e min. 0,4 mm - max. 0,6 mm

EX-HG66e min. 0,4 mm - max. 0,75 mm



3 | Assembly of compressor

3.9 Shut-off valve (HP)

Position in parts list 2060

Tools: Allen key 8 mm, spanner SW 17, 19

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

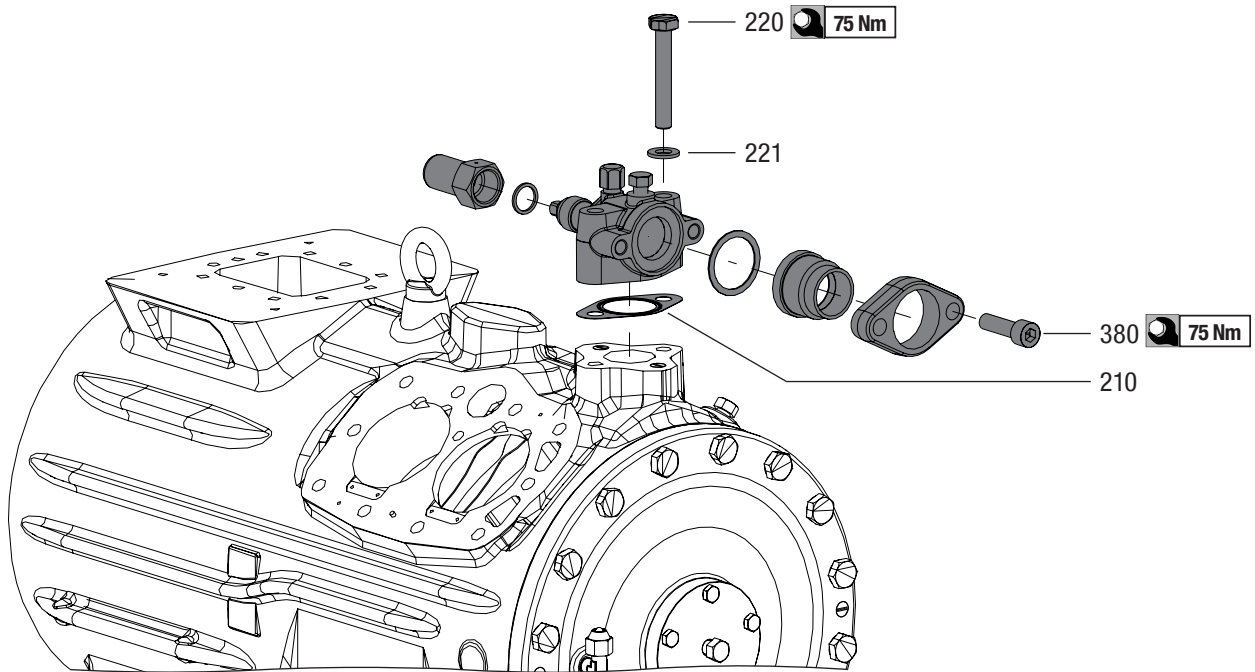


INFO

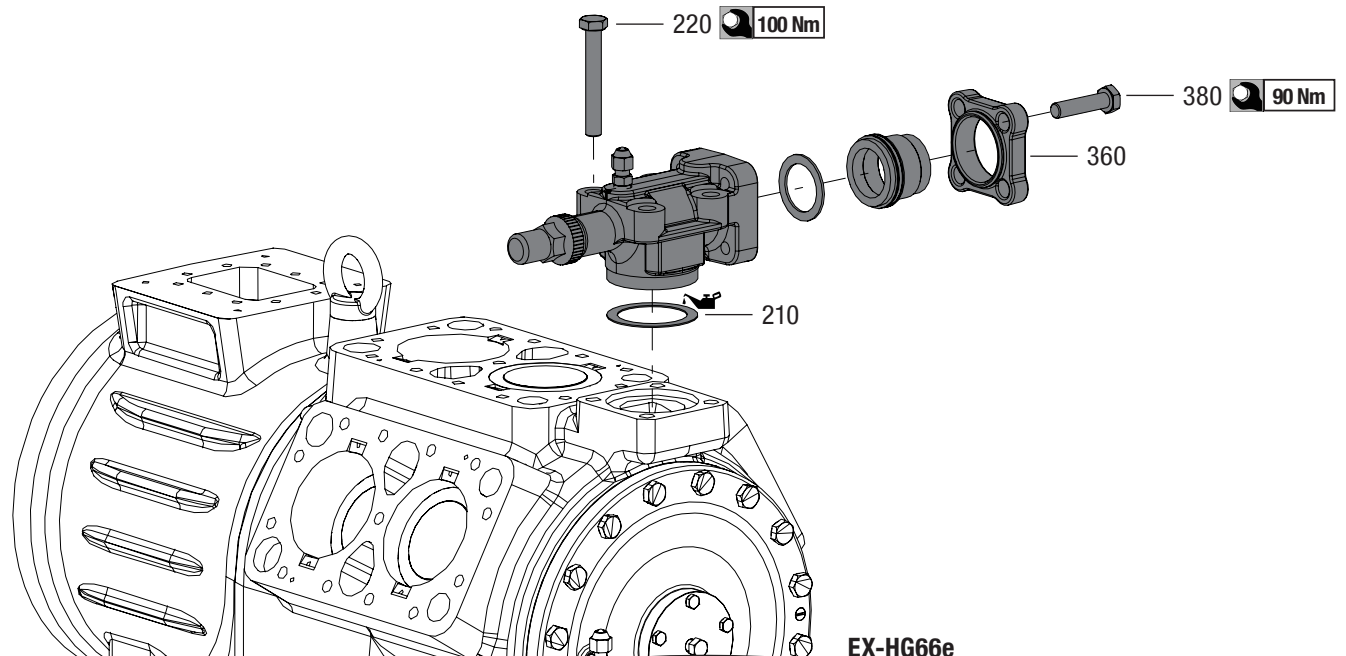
Observe screw tightening torques!

2060

- Install shut-off valve mit new gasket.



EX-HG44e, EX-HG56e



EX-HG66e

3 | Assembly of compressor

3.10 Cylinder cover and valve plate EX-HG44e + EX-HG56e

Position in parts list 2000

Tools: Allen key 6 mm, spanner SW 13, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

Tighten the screws crosswise in at least two steps (50 / 100 %)!

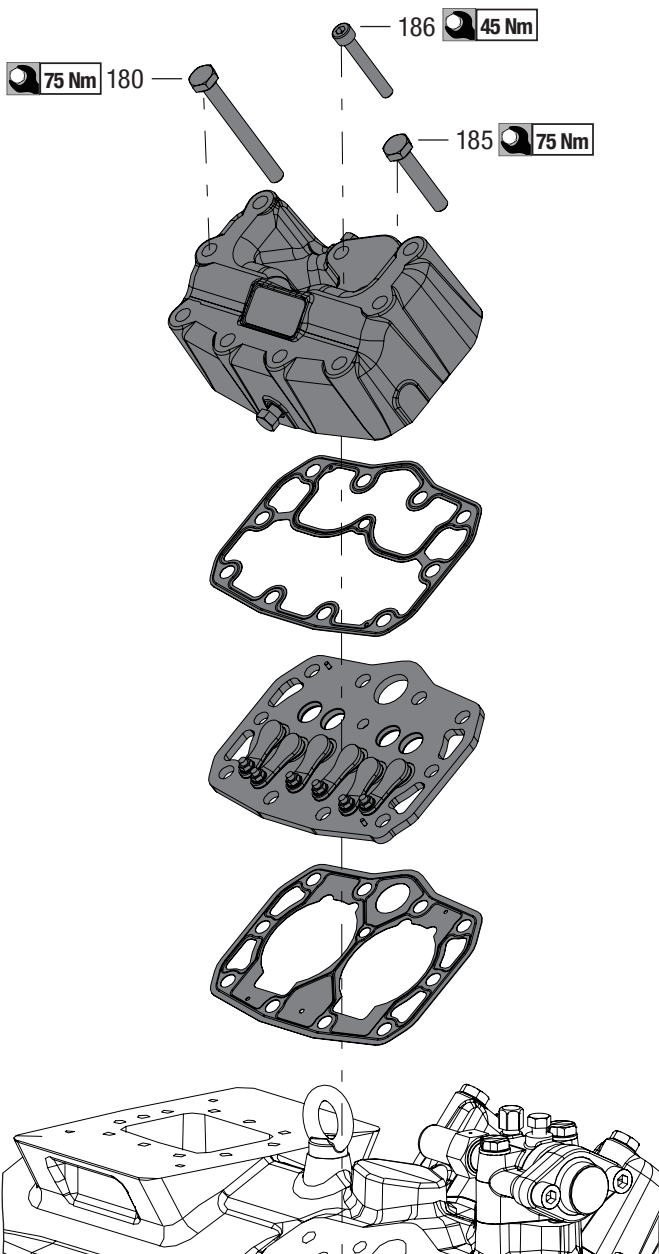
2000

- Apply lower valve plate gasket, valve plate and top valve plate gasket. Observe the correct position. Note the positioning of the steel bead seal. When selecting the valve plate gasket, observe the correct allocation to the compressor's piston diameter.

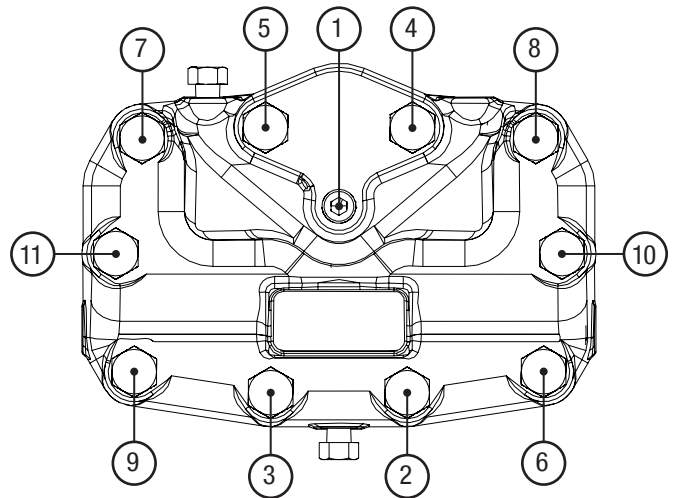
170, 180, 185, 186

- Place cylinder cover and tighten. Tighten the cylinder head bolts in the order shown, observe the tightening torques.

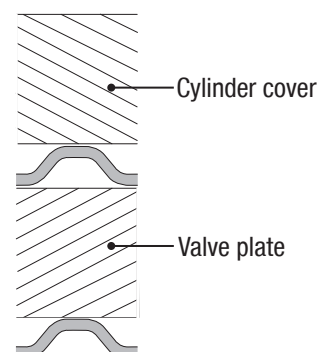
- Hot gas sensor must be mounted in the cylinder cover. Please also refer to the section „Electronic trigger unit INT69 EX2“ in the compressor assembly instructions.



Tightening sequence



Positioning of steel bead gasket



3 | Assembly of compressor

3.10 Cylinder cover and valve plate EX-HG66e

Position in parts list
2000, 2005

Tools: Spanner SW 13, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

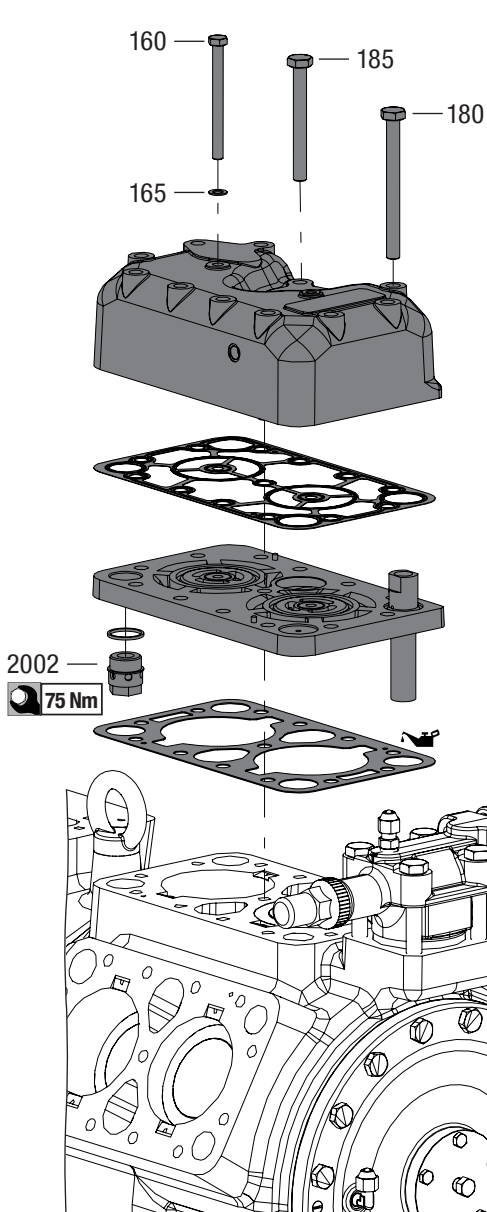
Tighten the screws crosswise in at least two steps (50 / 100 %)!

2002
2000

- Fit pressure relief valve with sealing ring.
- Remove the suction fin grooves from the valve plate, coat with oil and put them back on the valve plate.
- When selecting the valve plate gasket, observe the correct allocation to the compressor's piston diameter.
- Apply lower valve plate gasket (lightly oil), valve plate and top valve plate gasket. Observe the correct position. Note positioning of the steel bead seal, see page 32.

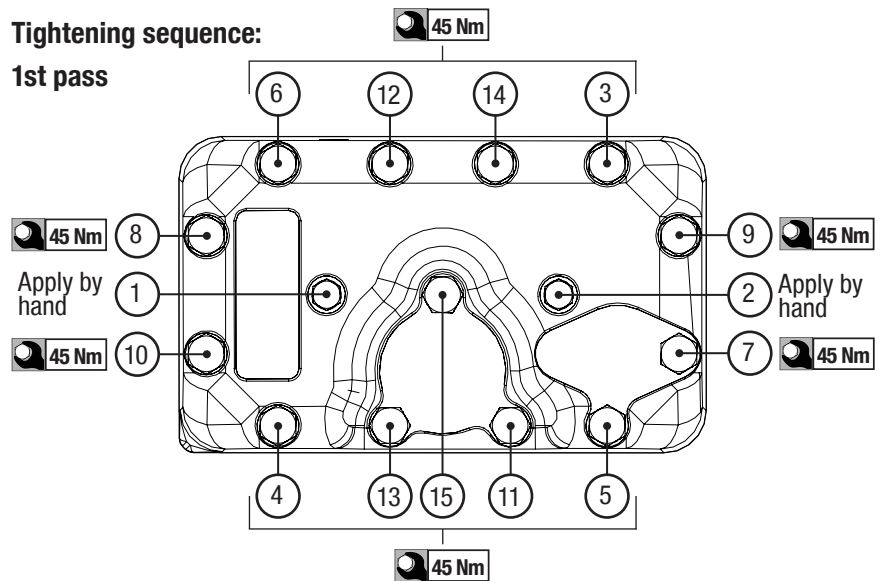
2005

- Place cylinder cover and tighten. Tighten the cylinder head bolts in the order shown, observe the tightening torques.
- Hot gas sensor must be mounted in the cylinder cover. Please also refer to the section „Electronic trigger unit INT69 EX2“ in the compressor assembly instructions.



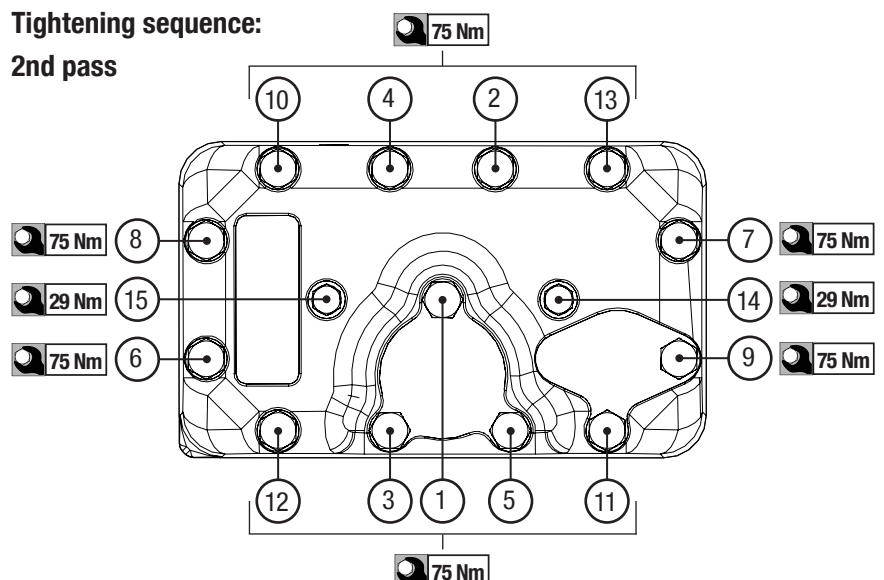
Tightening sequence:

1st pass



Tightening sequence:

2nd pass



3 | Assembly of compressor

3.11 Stator

Position in
parts list
2130

Tools: Allen key 6 mm

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



WARNING The heavy weight of the stator can potentially be dangerous; risk of falling, danger of crushing!

1139

- Insert feather key to protect stator.

- Note the direction of the stator to feather key, you must align the parts in order to install them.

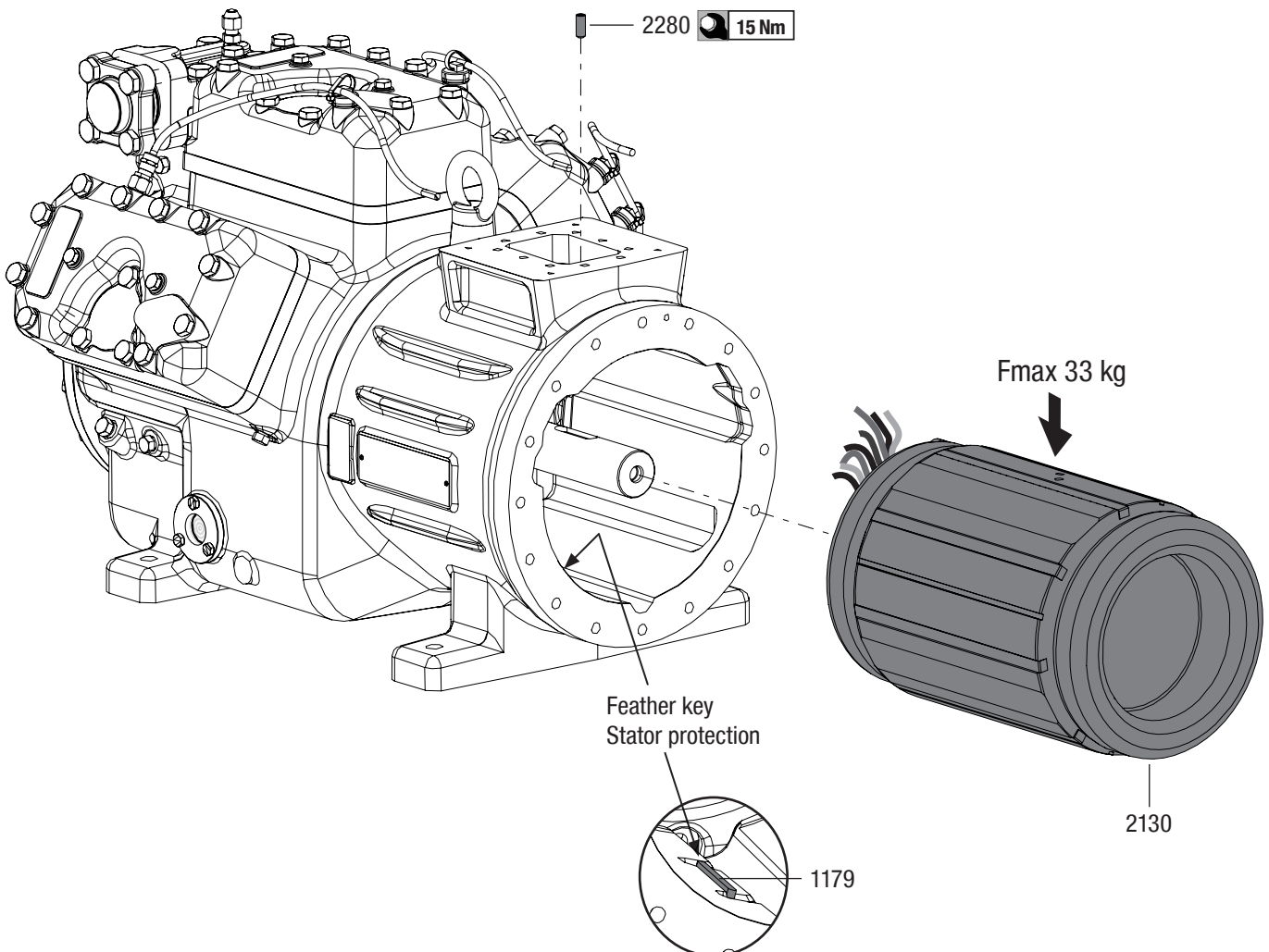
- Lead the winding connections through the terminal board opening after inserting the stator. Do not damage core insulation when passing through, do not bend the core.

2130

- Push the stator into the housing and pre-align it according to the check dimension, see page 35.

2280

- Screw in threaded pin M8x20 for axial stator securing. The hardening time of the thread coating is 6 hours. Use threaded pin for axial stator securing only once.



3 | Assembly of compressor

3.11 Stator

Position in
parts list
2000

Tools: -

Before starting any work on the compressor observe the safety instructions page 3-5!

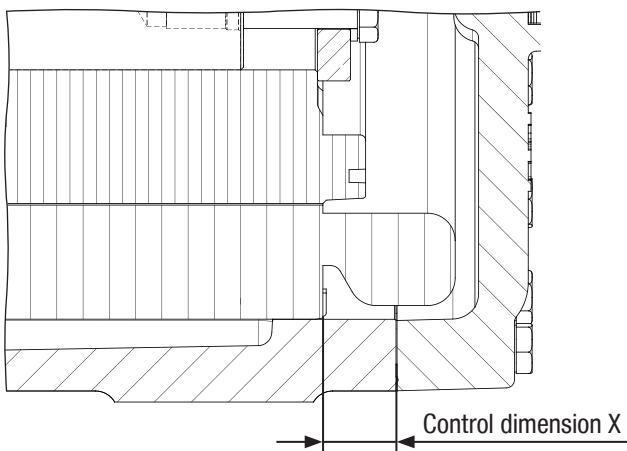
Working course



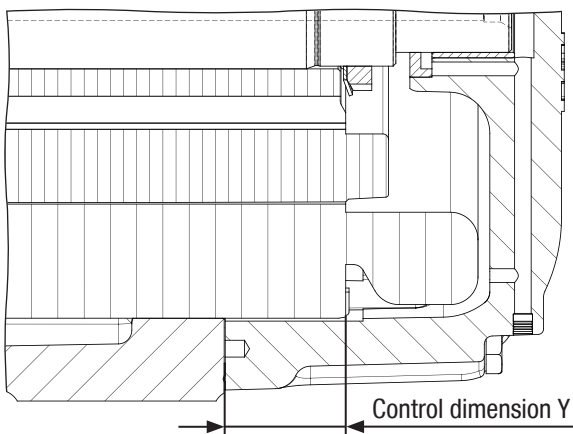
WARNING

The heavy weight of the stator can potentially be dangerous; risk of falling, danger of crushing!

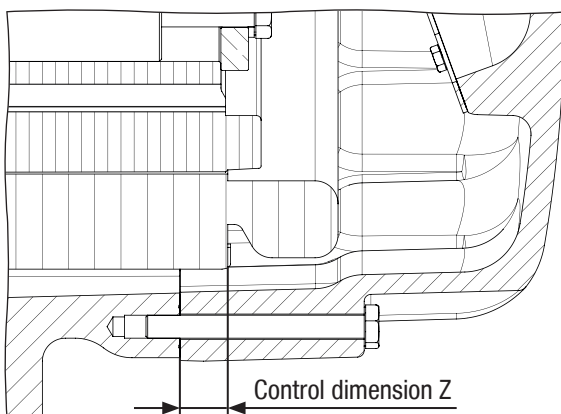
- Control dimensions for stator alignment



Type	Control dimension X in mm
EX-HG(X)44e/475-4 (HC)	30,0 ±1,5
EX-HG(X)44e/475-4 S (HC)	34,0 ±1,5
EX-HG(X)44e/565-4 (HC)	30,0 ±1,5
EX-HG(X)44e/565-4 S (HC)	25,7 ±1,5
EX-HG(X)44e/665-4 (HC)	34,0 ±1,5
EX-HG(X)44e/665-4 S (HC)	25,7 ±1,5
EX-HG(X)44e/770-4 (HC)	25,7 ±1,5
EX-HG(X)44e/770-4 S (HC)	25,7 ±1,5



Type	Control dimension Y in mm
EX-HG(X)56e/850-4 (HC)	-13,2 ±1,5
EX-HG(X)56e/850-4 S (HC)	+0,4 ±1,5
EX-HG(X)56e/995-4 (HC)	+0,4 ±1,5
EX-HG(X)56e/995-4 S (HC)	+13,1 ±1,5
EX-HG(X)56e/1155-4 (HC)	+13,1 ±1,5
EX-HG(X)56e/1155-4 S (HC)	+44,9 ±1,5



Type	Control dimension Z in mm
EX-HG(X)66e/1340-4 (HC)	1,7 ±1,5
EX-HG(X)66e/1340-4 S (HC)	11 ±1,5
EX-HG(X)66e/1540-4 (HC)	1,7 ±1,5
EX-HG(X)66e/1540-4 S (HC)	11 ±1,5
EX-HG(X)66e/1750-4 (HC)	11 ±1,5
EX-HG(X)66e/1750-4 S (HC)	21 ±1,5
EX-HG(X)66e/2070-4 (HC)	11 ±1,5
EX-HG(X)66e/2070-4 S (HC)	21 ±1,5

3 | Assembly of compressor

3.12 Rotor

Position in parts list 2130

Tools: Spanner SW 19, impact wrench / impulse wrench

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

1178
790, 2130

- Push the distance disc (if available) onto the crankshaft as far as it will go.
- Insert the feather key into the crankshaft and push the rotor onto the crankshaft.

800, 810,
820

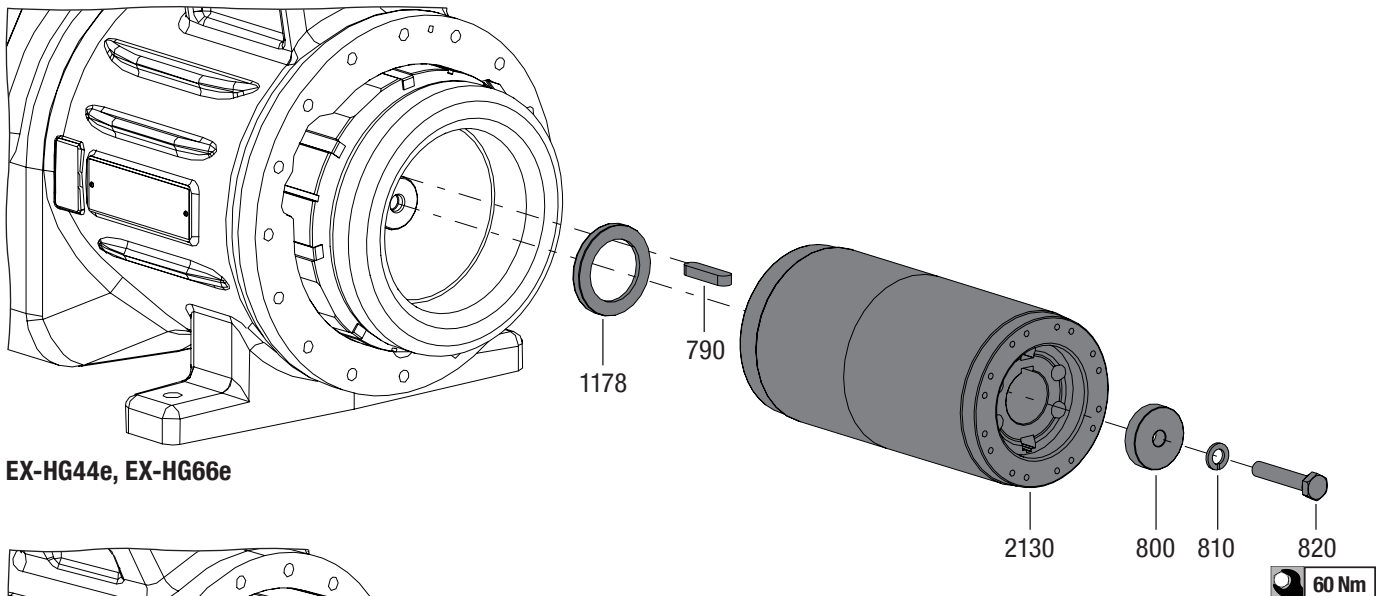
EX-HG44e und EX-HG66e

- Insert the feather key into the crankshaft and push the rotor onto the crankshaft. The safest rotor bolt assembly is expediently carried out with an appropriately adjusted impact wrench / impulse wrench. Then the rotor does not have to be secured against twisting.
- Alternatively tighten the rotor screw with disc and spring washer manually. It is to prevent rotation of the rotor by blocking the driving unit.

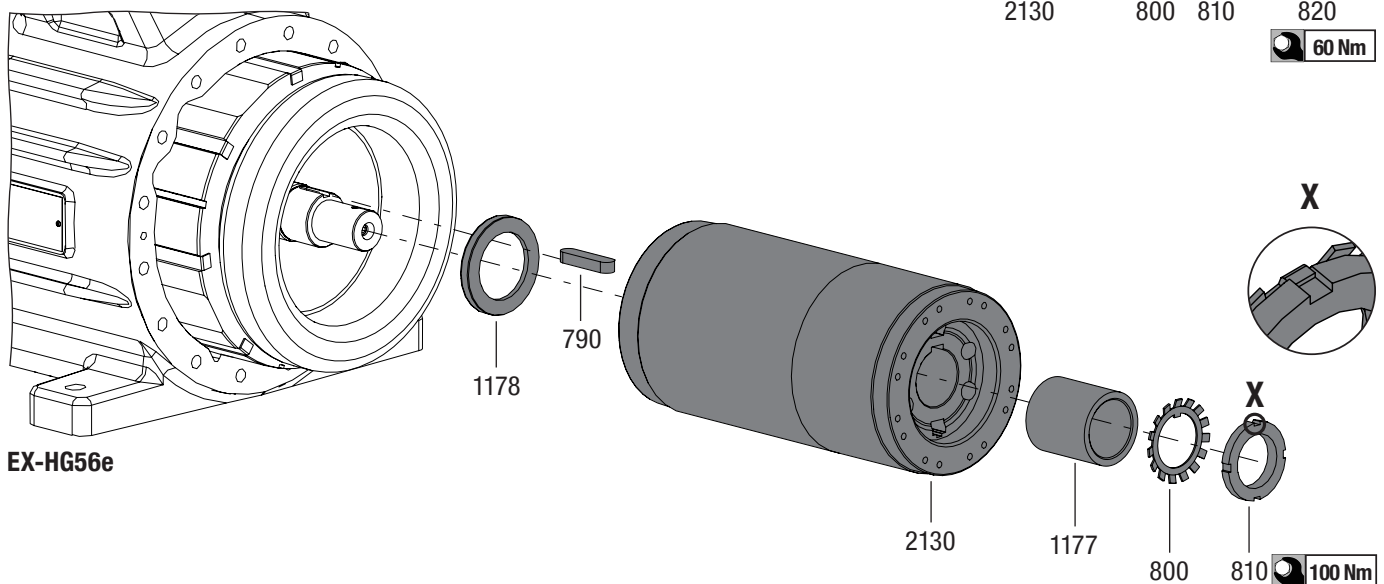
1177
800, 810

EX-HG56e

- Slide the spacer sleeve (if available) onto the crankshaft.
- Slide the safety sheet onto the crankshaft and fit the groove nut.
- Tighten the groove nut with a suitable tool until the locking lug fits into the groove nut. Then bend the locking lugs over. See figure X.



EX-HG44e, EX-HG66e



EX-HG56e

3 | Assembly of compressor

3.13 Motor cover EX-HG44e

Position in
parts list
2300

Tools: Spanner SW 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

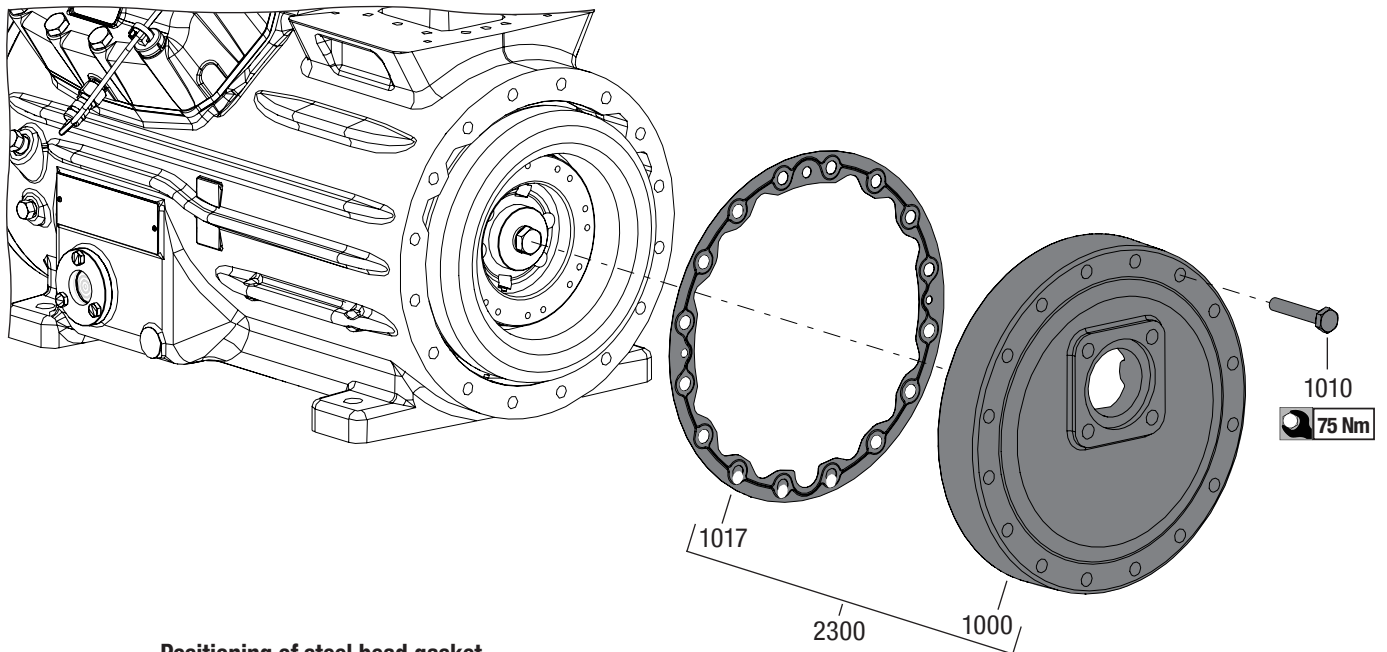
Observe screw tightening torques!

1017, 1010
2300, 1010
1010

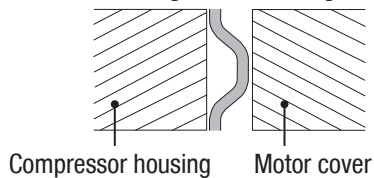
- Position gasket on cover by using two of the screws. Note the positioning of the steel bead seal.

- Place cover with gasket and secure with both screws, then screw in all other screws hand-tight.

- Tighten the screws crosswise.



Positioning of steel bead gasket



3 | Assembly of compressor

3.13 Motor cover EX-HG56e

Position in parts list
2300, 2122

Tools: Auxiliary thorn, spanner SW 10, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

Observe screw tightening torques!

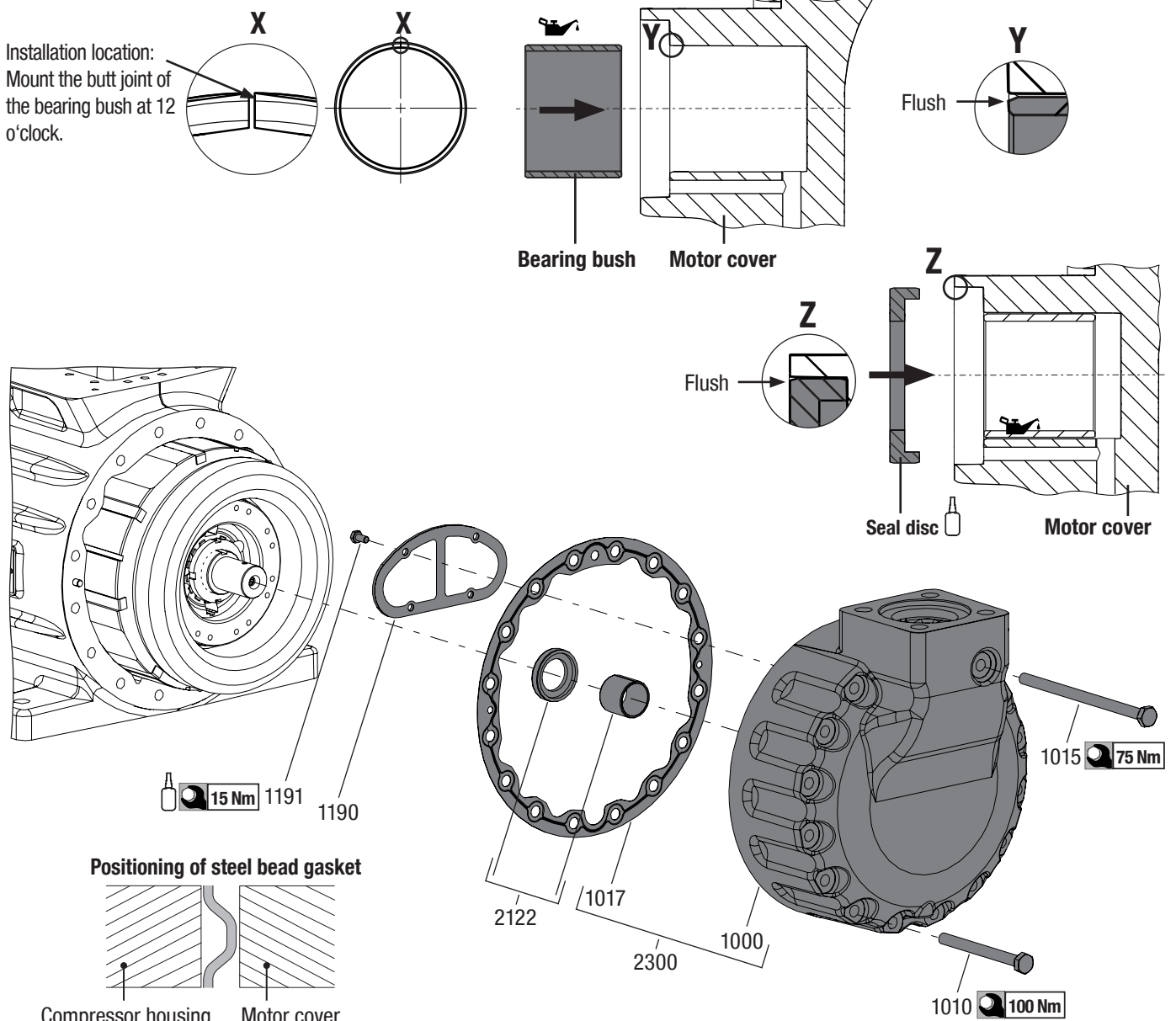
1190, 1191

1017

2300, 1010

1010, 1015

- Wet bearing bush on the circumference with oil. Pay attention to the installation location of the butt joint!
- Press in the bearing bush evenly, flush with a suitable tool (e.g. auxiliary thorn).
- Wet the circumference of the seal disc with adhesive, then press it in flush.
- Screw the suction filter to the motor cover with screws. Note the installation position of the suction filter: The sieve mesh must point in the direction of the motor cover.
- Position the gasket on the compressor housing using two dowel pins. Note the positioning of the steel bead seal.
- Oil the bearing journals of the crankshaft. Carefully fit the bearing pairing crankshaft/motorcover into each other.
- Tighten the screws crosswise.



3 | Assembly of compressor

3.13 Motor cover EX-HG66e

Position in parts list
2520

Tools: Spanner SW 10, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

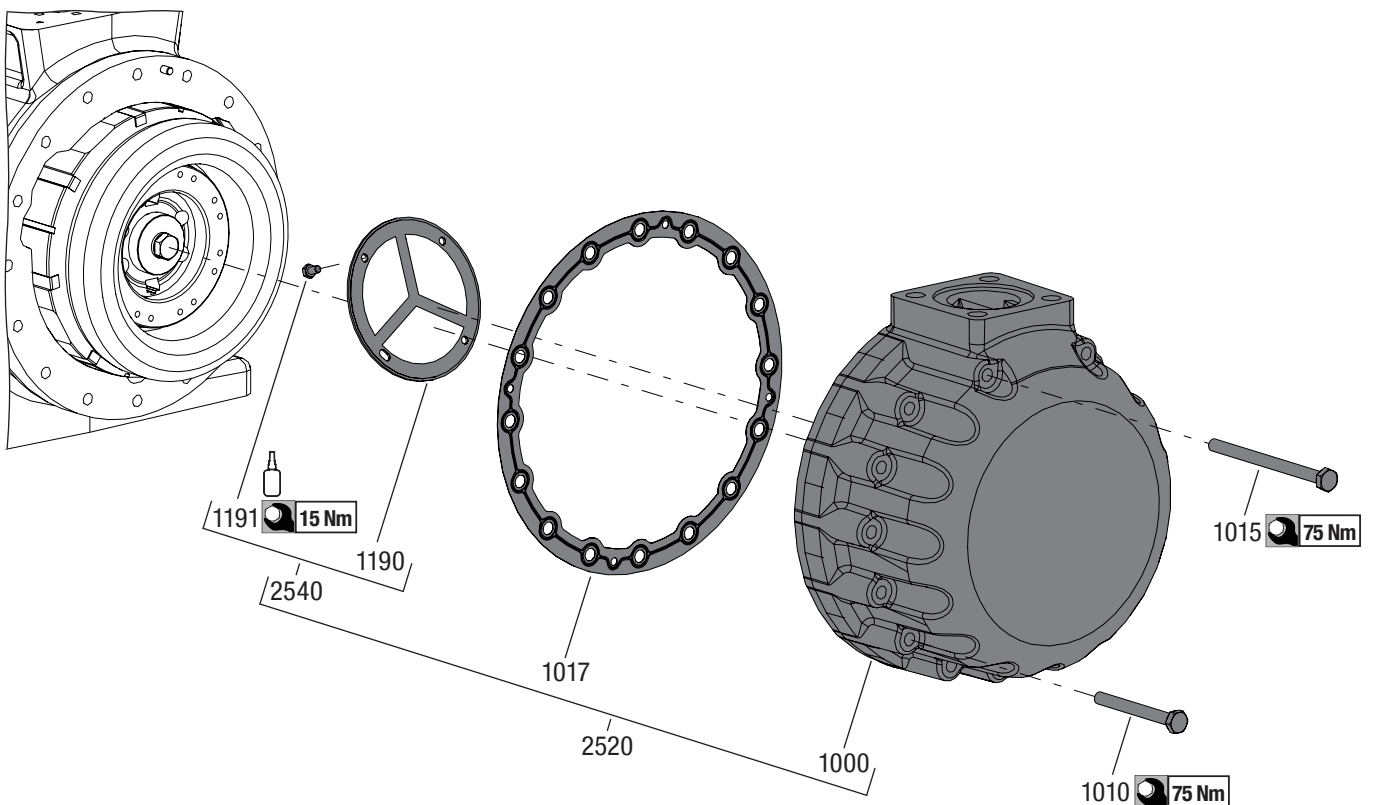


INFO

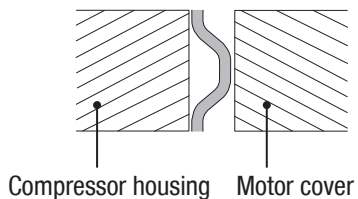
Observe screw tightening torques!

2540
1017, 1119
2520, 1010
1010, 1015

- Screw the suction filter to the motor cover with screws. Note the installation position of the suction filter: The sieve mesh must point in the direction of the motor cover.
- Position the gasket on the compressor housing using dowel pin. Note the positioning of the steel bead seal.
- Place the motor cover with the gasket and screw it in hand-tight with the screws.
- Tighten the screws crosswise.



Positioning of steel bead gasket



3 | Assembly of compressor

3.14 Shut-off valve (LP)

Position in parts list 2070

Tools: Spanner SW 17, 20, 24, allen key SW 6

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

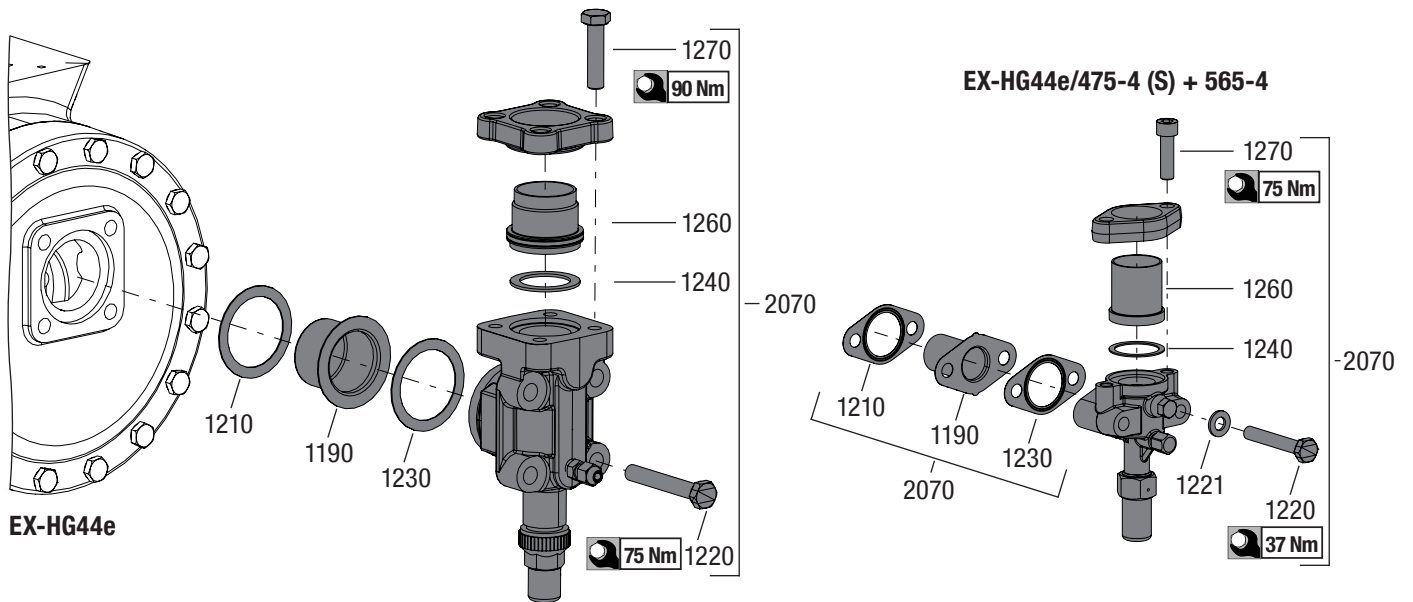


INFO

Observe screw tightening torques!

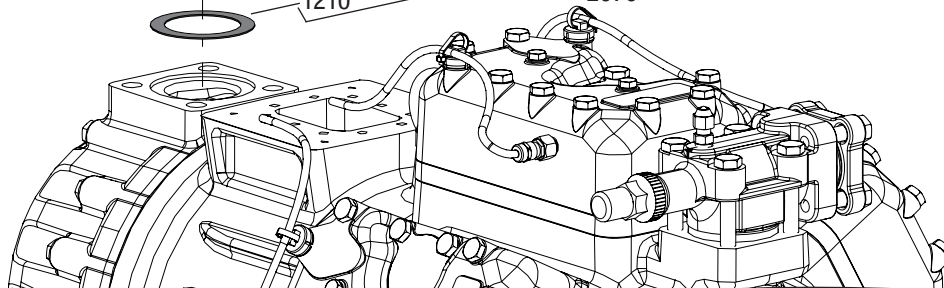
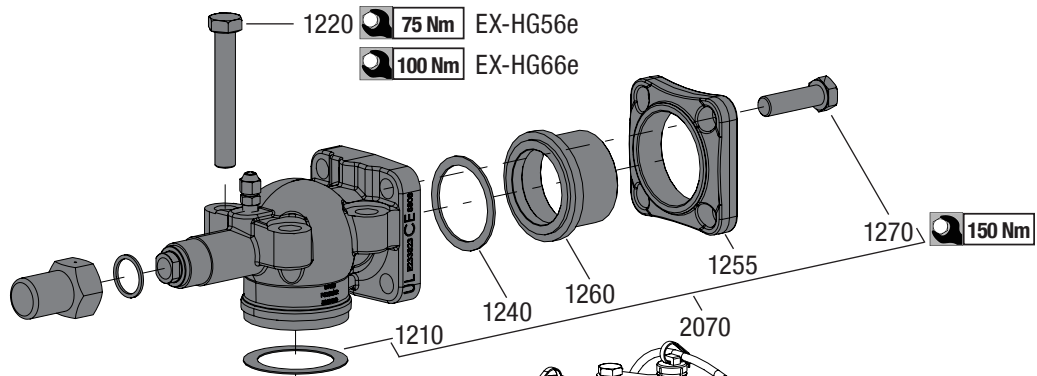
2070

- Install shut-off valve mit new gasket and suction filter.



EX-HG44e

EX-HG44e/475-4 (S) + 565-4



EX-HG56e, EX-HG66e

3 | Assembly of compressor

3.15 Terminal board and terminal box

Position in parts list 2160, 2170

Tools: Cross-recess screwdrivers PH 3, spanner SW 10, allen key SW 6

Before starting any work on the compressor observe the safety instructions page 3-5!

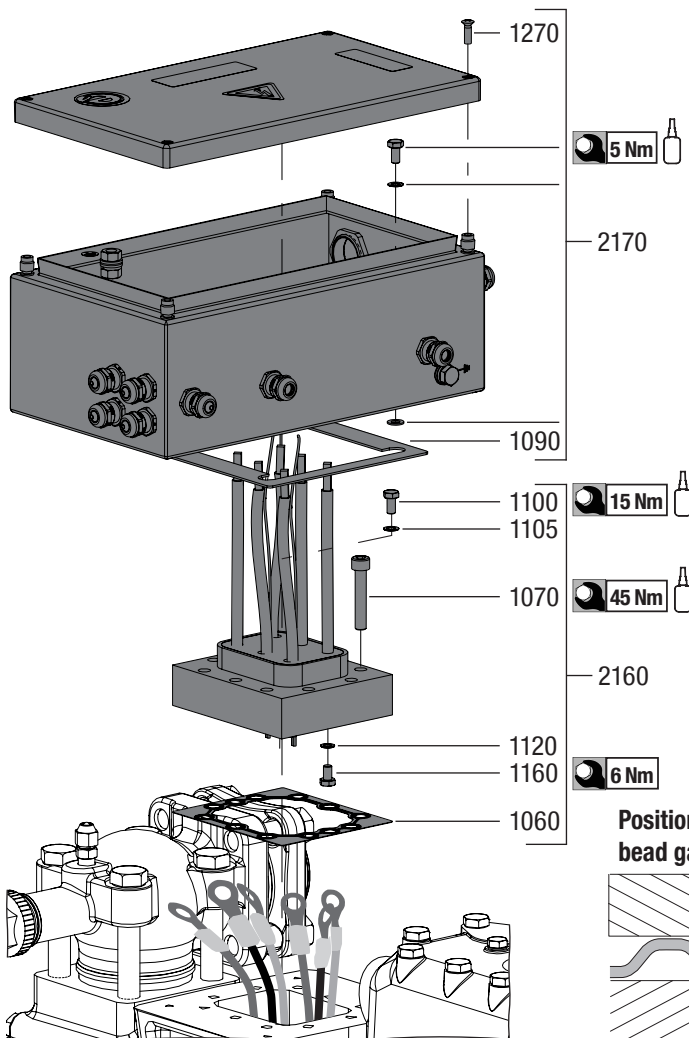
Working course



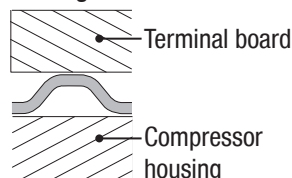
INFO

- Observe screw tightening torques!
- Execution of all works according to EN 60079-14, EN 60079-17 and EN 60079-19. Make sure that the IP protection level is restored (gasket installation, tightening torque of the cable glands).
- Also observe the compressor assembly instructions.

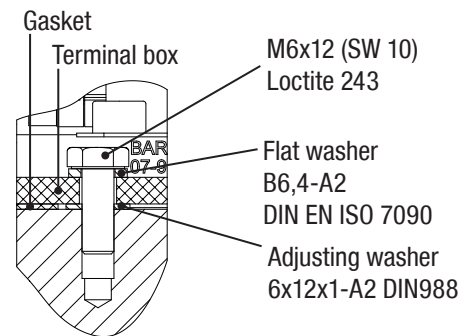
- 1060 - Guide the gaskets for the terminal board over the winding connections and hang up. Observe the correct positioning. Note the positioning of the steel beaded gasket.
- 2160 - Attach or screw PTC connections and winding connections to the underside of the terminal board or screw on the ring cable lugs in the orientation shown and bend 90°.
- 1090 - Screw the terminal board. Secure the screws with a medium-strength threadlocker. Note the positioning of the terminal board. The earth connection on the terminal board is on the name plate side of the compressor.
- 2170 - Place gasket for terminal box. (If necessary, clean the surface first).
- Position terminal box and tighten it. Observe correct sequence of flat washers and adjusting washers.
- Insert the supply lines through the cable glands into the terminal box. Carry out the electrical wiring according to the wiring diagram in the compressor assembly instructions.
- After completion of the assembly work, carry out an insulation resistance or high-voltage test in accordance with national regulations.



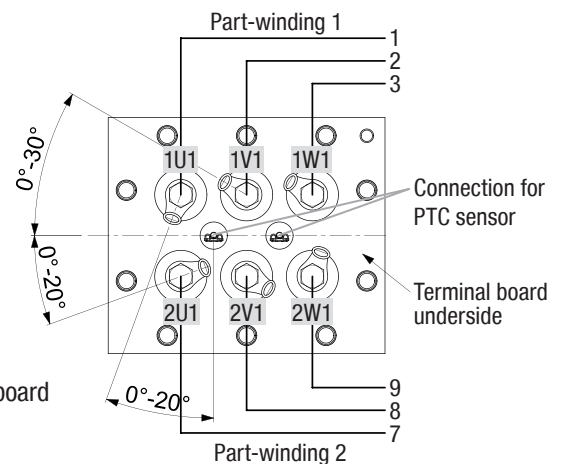
Positioning of steel bead gasket



Sequence of flat washers and adjusting washers



Terminal assignment on the terminal board



3 | Assembly of compressor

3.16 Thermal protection thermostat

Position in
parts list
2800

Tools: Spanner SW 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

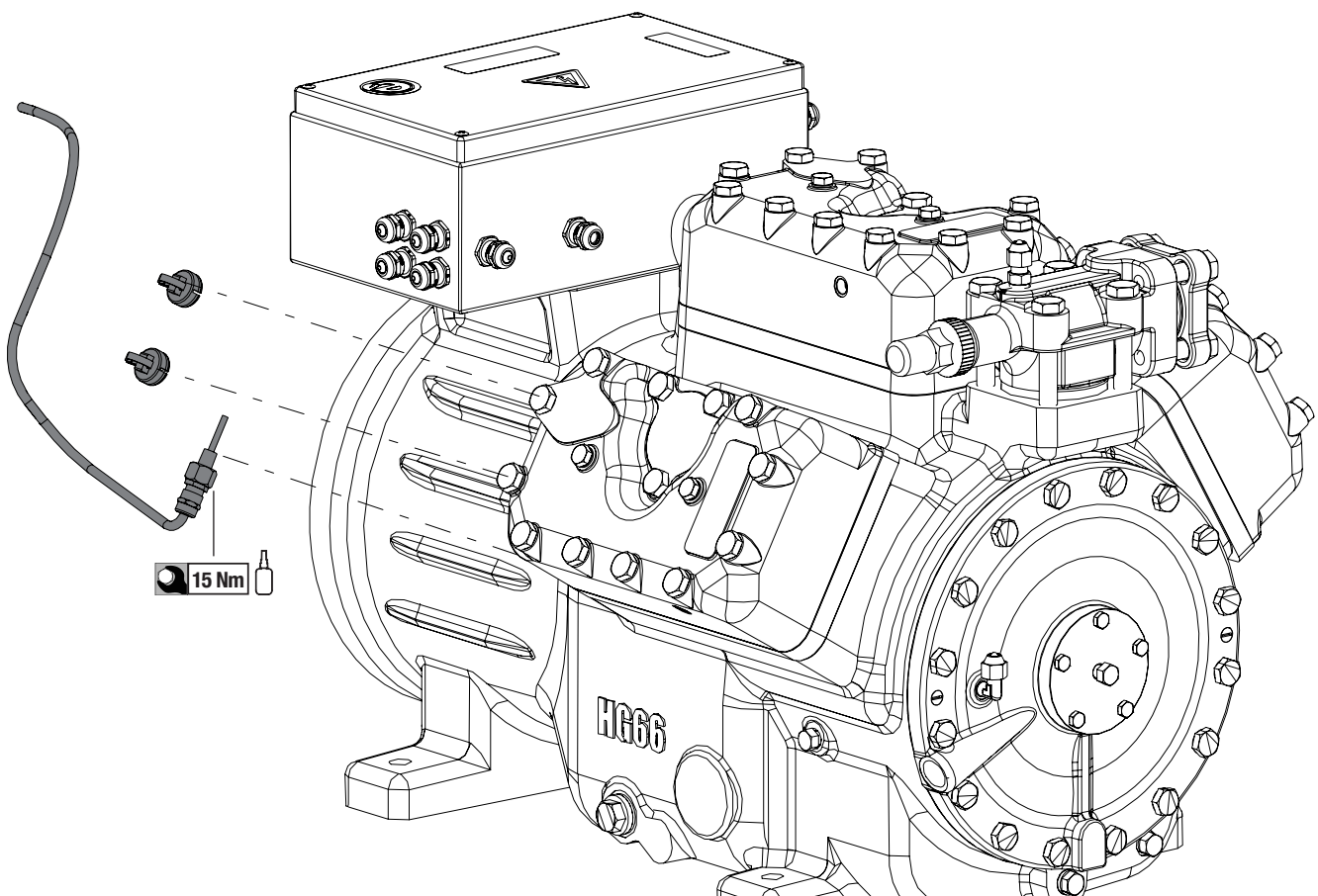


INFO

Observe screw tightening torques!

Please also observe the assembly instructions for the compressor.

- Screw the thermal protection thermostats into the cylinder covers. Seal the taper thread with a thread sealant.
- Put the cable holder on the screws.
- Insert cable through cable gland into terminal box, tightening torque 3-4 Nm. Fix cable to cable holder. Connect the cores (ferrules are pre-assembled) to the terminal strip according to the assembly instructions compressor.
- A functional test of the thermal protection thermostats and the electronic motor protection INT69 EX2 must be carried out as follows:
 - Electrical resistance test of thermal protection thermostats: asuring point at the feed-through in the terminal box. Cold resistance of thermal protection thermostat $\leq 100 \Omega$ (Rcold at 25 °C).
 - Functional test of the electronic motor protection INT69 EX2 according to the assembly instructions for the compressor.
 - The low impedance of the protective conductor system between the cable shield and the central PE connection on the compressor must be checked in accordance with EN 60204-1!
 - Shrink the heat-shrinkable sleeve onto the open shielding braid of the PTC sensor.
 - Close all openings on the terminal box properly again so that protection class according to the name plate of the compressor is achieved.
- Establish the electrical circuit in an intrinsically safe in accordance with the compressor assembly instructions!



3 | Assembly of compressor

3.17 Preparation for commissioning

Position in parts list

Tools: -

Before starting any work on the compressor observe the safety instructions page 3-5!

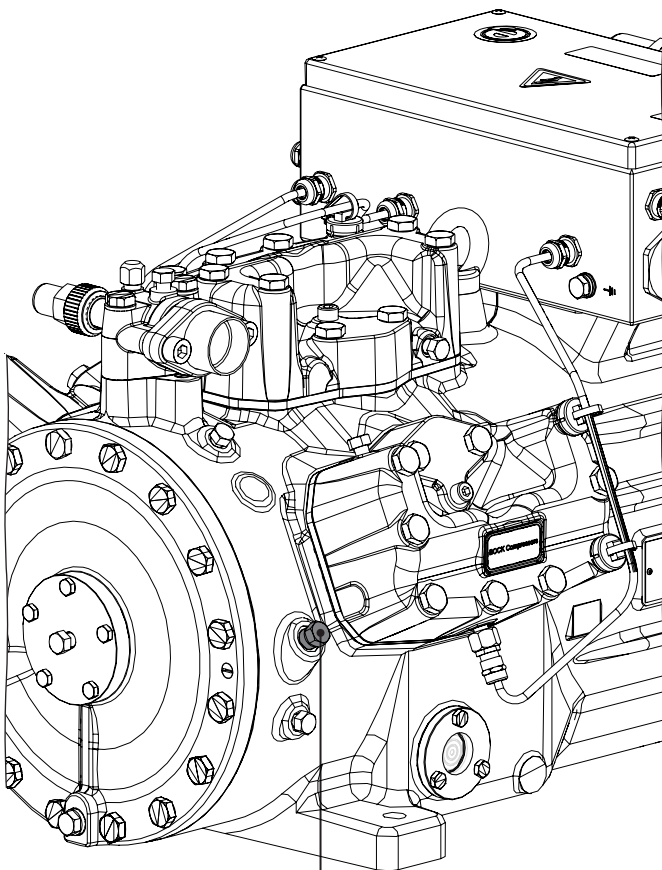
Working course



INFO

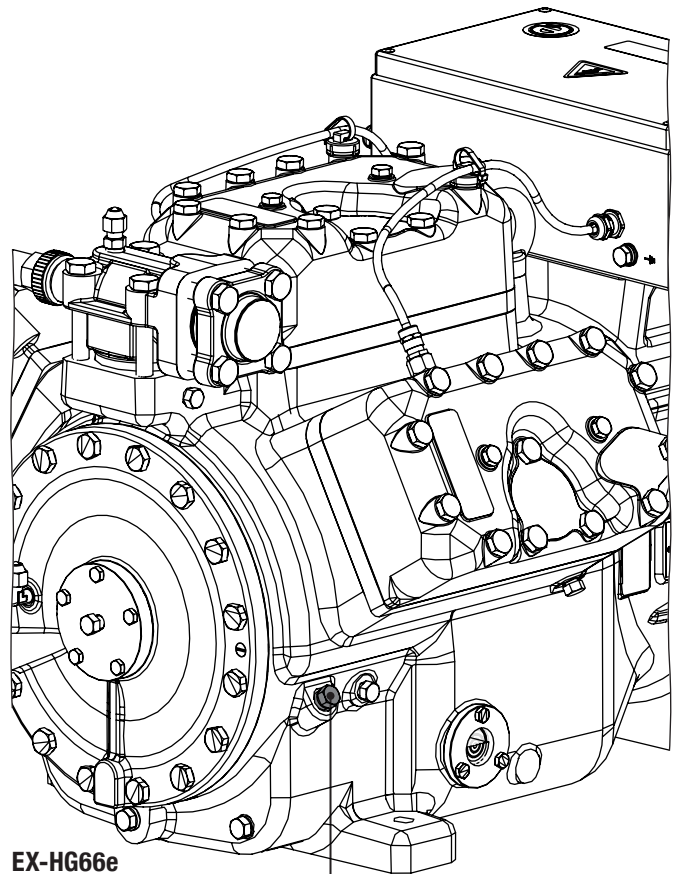
- Observe screw tightening torques!
- Observe the instructions for changing the oil and the approved lubricants in the compressor assembly instructions.
- For further instructions on commissioning, please refer to the compressor assembly instructions.

- Observe the instructions for changing the oil and the approved lubricants in the assembly instructions compressor.
- Fill with oil via connection H. Observe the information on the filling quantity and level in the assembly instructions compressor and check it using the oil sight glass.
- Evacuate compressor and fill with inert gas (nitrogen).
- For further information on commissioning, please refer to the assembly instructions compressor.



EX-HG44e, EX-HG56e

Connection H



EX-HG66e

Connection H

4 | Compressor accessories

3.1 Capacity regulator removal

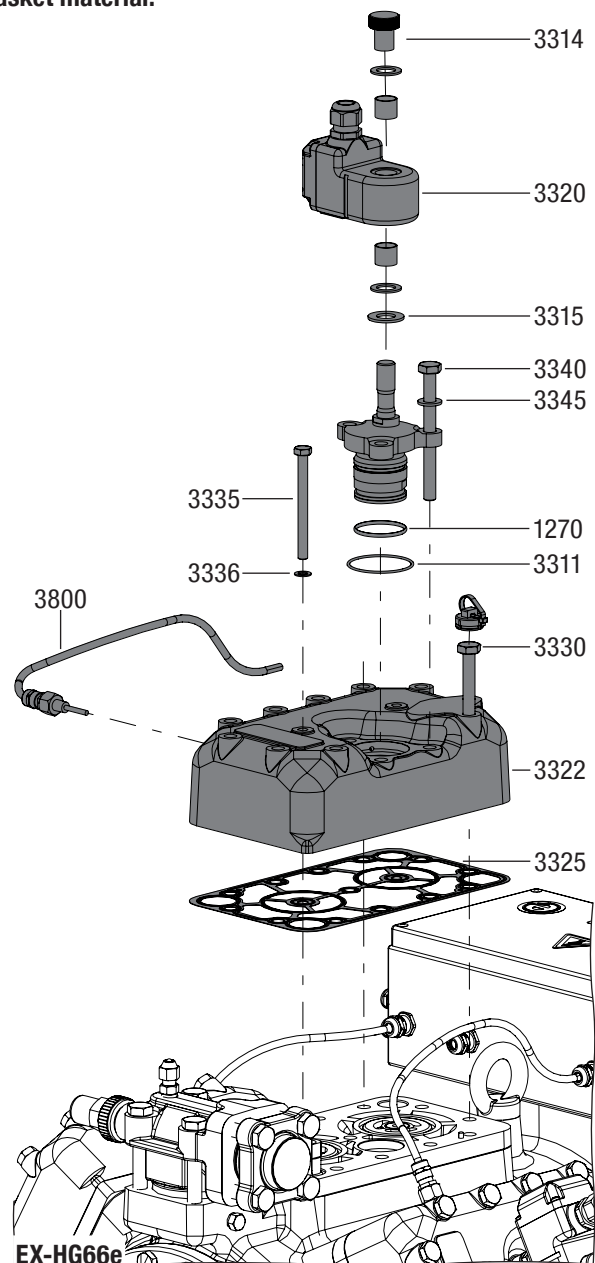
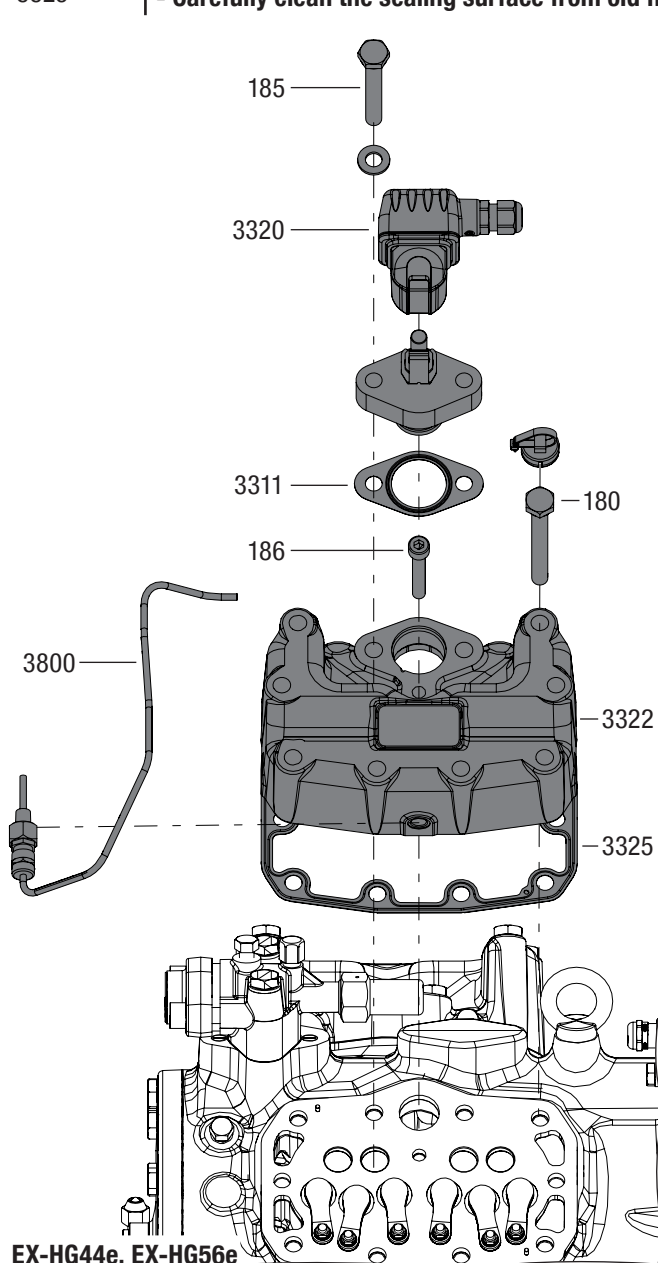
Position in parts list 3305

Tools: Allen key 6 mm, spanner SW 13, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- 3800 - Open the terminal box of the solenoid coil and disconnect the connecting cable.
- EX-HG44e, EX-HG56e
- 3320 - Loosen spring clip and remove solenoid coil.
- EX-HG66e
- 3314 - Unscrew knurled nut.
- Dismantle solenoid coil with washers and shims.
- Dismantle valve body capacity regulator.
- Disconnect thermal protection thermostat in terminal box and remove cable.
- 3322, 3325 - When changing the cylinder cover, loosen the screws and remove the cylinder cover with gasket.
- 3325 - Carefully clean the sealing surface from old flat gasket material.



EX-HG44e, EX-HG56e

EX-HG66e

4 | Compressor accessories

4.1 Capacity regulator installation

Position in
parts list
3305

Tools: Allen key 6 mm, spanner SW 13, 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course,



INFO

Observe screw tightening torques, (see chapter 3.10)!

Tighten the cylinder cover screws crosswise in at least two steps (50 / 100 %)!



ATTENTION

- For the installation, use heat-resistant lines with a temperature resistance of at least 140 °C.
- Wiring of the magnetic coil has to be static. The cable entry must be protected against the effects of mechanical hazard.



INFO

- To ensure a secure seal, the area of the sealing surface on the cylinder cover must be carefully freed from paint residues before mounting the valve body.
- Do not allow contaminants to enter the compressor!

3320, 3325

- Install cylinder cover for capacity regulator with new gasket. Note the positioning of the steel bead seal, see chapter 3.10.

- Tighten the cylinder cover screws in the order shown (see chapter 3.10).

- Mount the capacity regulator valve with O-ring/flat seal, observe the screw tightening torque.

- Place magnet coil with washers and gaskets in accordance with the enclosed documentation and secure with knurled nut (if available).

- Connect the magnet coil, paying attention to restore the IP protection level!

3330 ,
3335, 3336
3320



ATTENTION

In accordance with the EC Type Examination Certificate, each cylinder cover must be monitored with a thermal protection thermostat.

- Install and check the thermal protection thermostats in the terminal box according to the assembly instructions for the compressor (chapter electric) and chapter 3.16!
- Shrink the heat-shrinkable sleeve onto the PTC sensor lead.

- Carry out electrical installation of the magnet coil according to the enclosed documentation and the assembly instructions for the compressor (chapter electric).



ATTENTION

The „special conditions“ of the EC type-examination certificates must be observed!

- Carry out the leak test.



INFO

For information on the operation of compressors with capacity regulator, please refer to the information sheet „CR capacity regulator“.

Important information for EX-HG66e



INFO

- Using the Norgren magnetic coil, ID no. 4280/4281 (Bock part no.: 70123, 70124, 70125, 70149) effectively reduces the permissible ambient temperature of the compressor to (-20 °C) – (+50 °C). Observe the type plate on the magnetic coil.

4 | Compressor accessories

4.2 Oil sump heater removal

Position in
parts list
3950

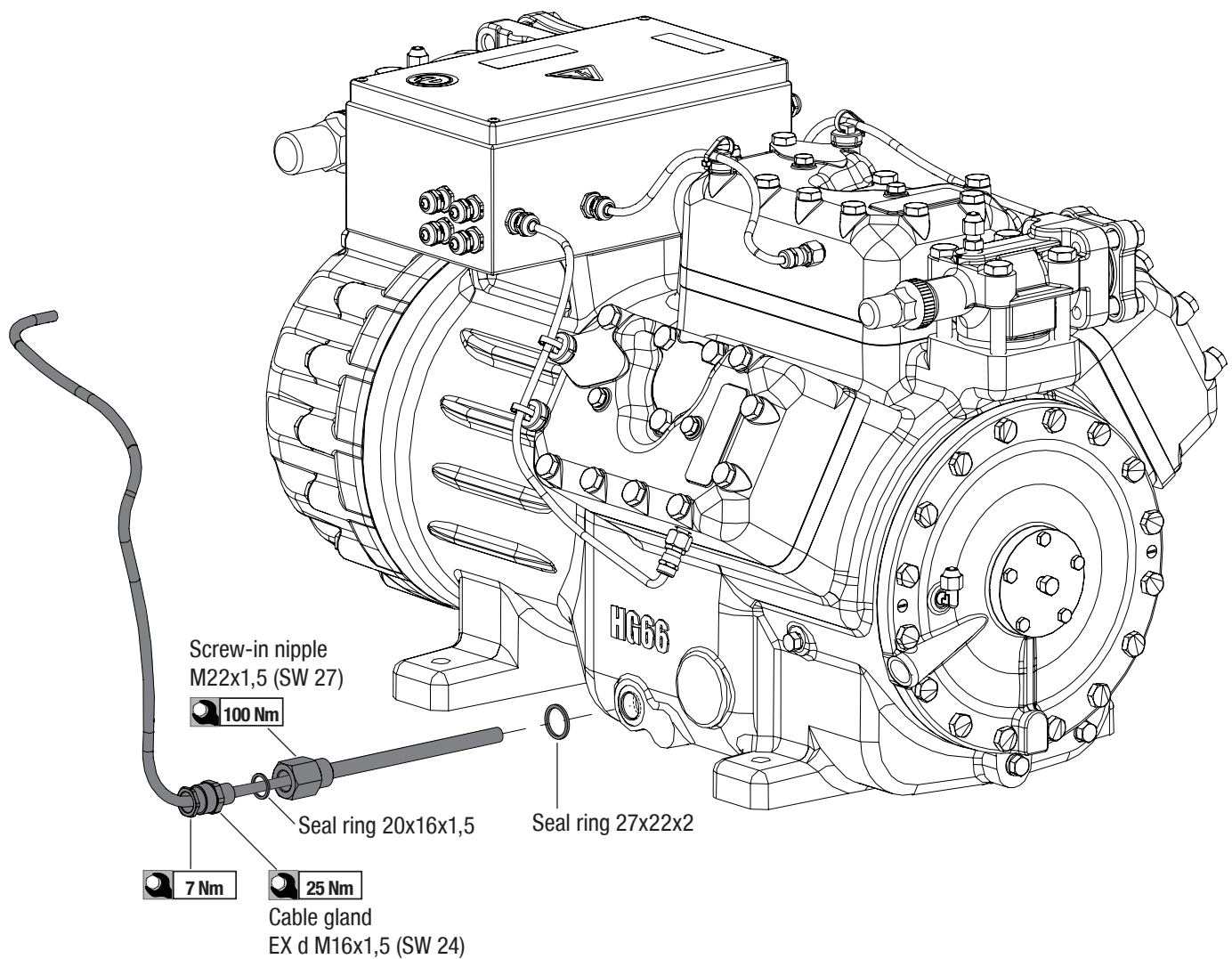
Tools: Spanner SW 27

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

3958

- Drain oil from the compressor according to chapter 3.1.
- Disconnect the electrical supply line of the heating element from the terminals in the terminal box, release the fixations of the supply line.
- Use spanner to loosen the heating element anticlockwise. Place the key on the screw-in nipple.



4 | Compressor accessories

4.2 Oil sump heater installation

Position in
parts list
3950

Tools: Spanner SW 24, 27

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

3958

- Screw heating element with seal ring, tightening torques 100 Nm.
- Mount EX d cable gland with seal ring, tightening torques 25 Nm. Tighten the union nut of the cable gland after laying the cable to 7 Nm.
- Lay the supply line of the heating element to the compressor terminal box and connect it in the terminal box according to the assembly instructions compressor.
- Do not shorten the length of the heating element!

- Within the explosion-endangered area, the connection must be made in an external terminal box, which is designed in a suitable type of protection!



INFO

Please also observe the assembly instructions for the compressor.

- Carry out the leak test.
- Fill the compressor with oil. For information on oil filling, please refer to chapter 3.17.



ATTENTION The heating element may only be put into operation if it has been firmly screwed into the mounting hole of the compressor.

4 | Compressor accessories

4.3 Oil differential pressure sensor removal/retrofit

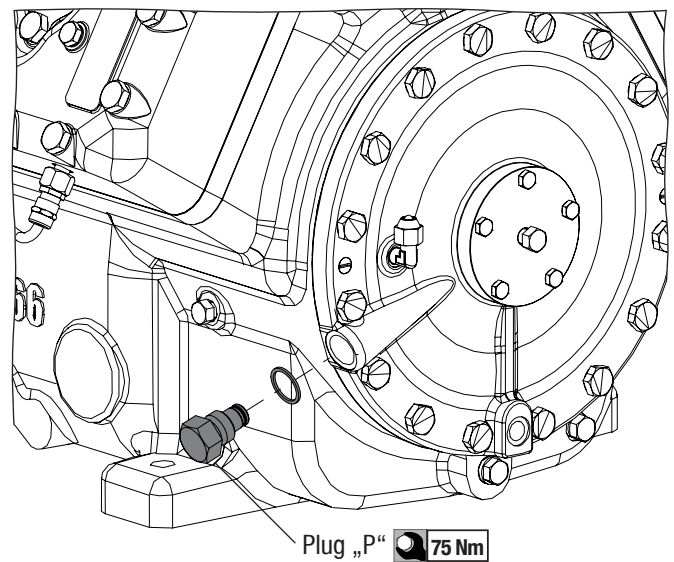
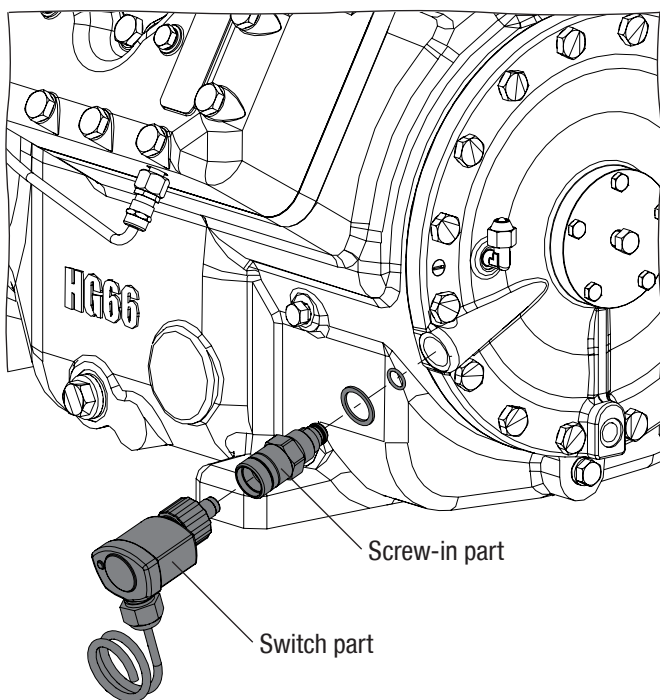
Position in
parts list
3650

Tools: Spanner SW 17

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- Disconnect the electrical supply cable from the terminals in the terminal box, loosen the fixings of the supply cable.
- Unscrew the screw-in part from the bearing flange.
- Alternatively, remove plug P „Connection oil differential pressure sensor“.
- If plug „P“ is not available, replacement of the bearing flange is necessary, see chapter 2.11 removal and chapter 3.7 installation.



4 | Compressor accessories

4.3 Oil differential pressure sensor installation

Position in parts list 3650

Tools: Torque spanner, spanner SW 10, 13, 17, 24

Before starting any work on the compressor observe the safety instructions page 3-5!

Working course



INFO

- Observe screw tightening sequence and torques!
- Please also observe the assembly instructions for the compressor.
- Observe the EC type-examination certificate and the manufacturer's installation instructions!

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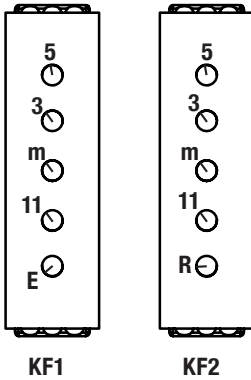
3730, 3740

3720, 3710

3715

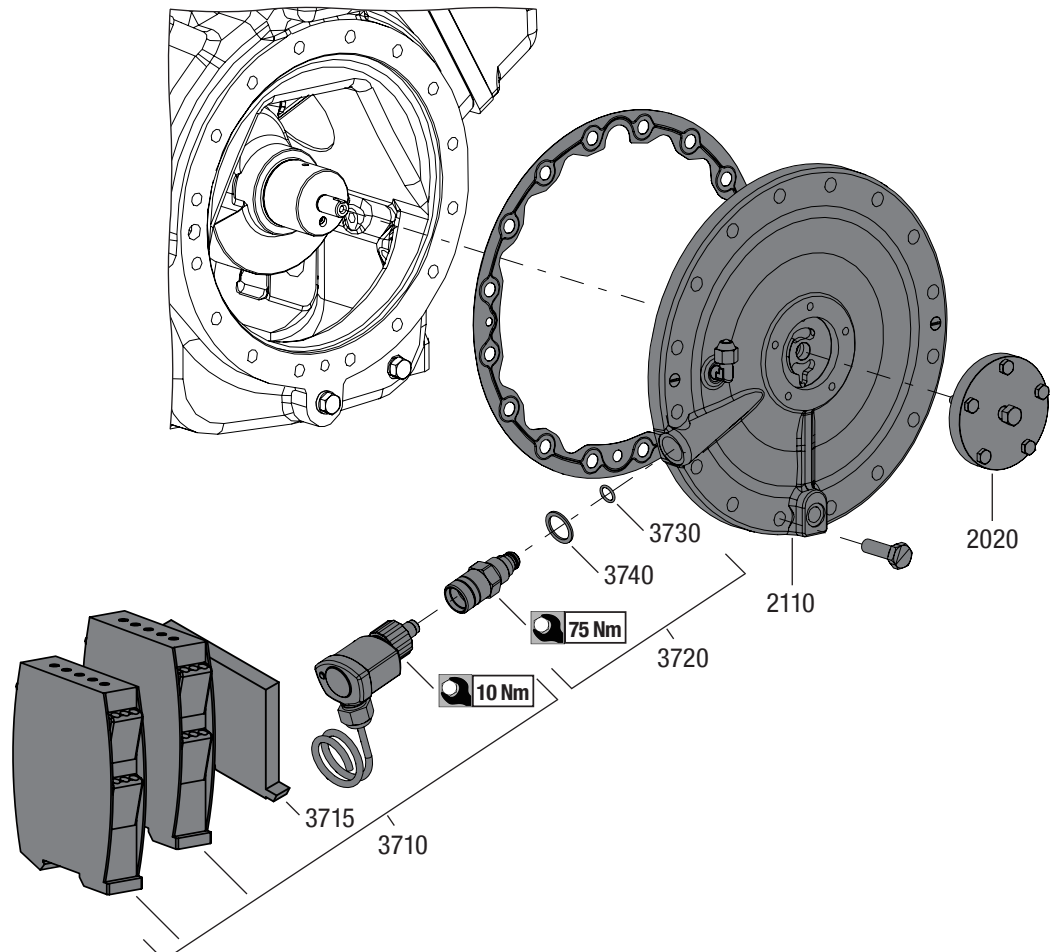
- If necessary, install bearing flange with connection option for oil differential pressure sensor, see chapter 3.7.
- Mount the oil pump according to chapter 3.8.
- Mount the O-ring according to the documentation, screw in the new sealing ring with the screw-in part.
- Screw circuit part with union nut on screw-in part handtight, cable outlet adjusted downwards. Firmly lay the supply line of the control unit to the compressor terminal box. Connect the supply line according to the wiring diagram in the assembly instructions compressor to the terminal points provided for this purpose.
- Set up the electrical circuit with the enclosed switching amplifier in an intrinsically safe manner.
- Integrate the multifunction relays into the safety chain according to the wiring diagram in the assembly instructions compressor and install them outside each zone in a control cabinet. The multifunction relays must be set as shown in the illustration.

Multifunction relay setting



KF1 (Response delay)
The setting shown corresponds to a response delay of 90 seconds

KF2 (Drop-out delayed)
The setting shown corresponds to a drop-out delay of 90 seconds





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