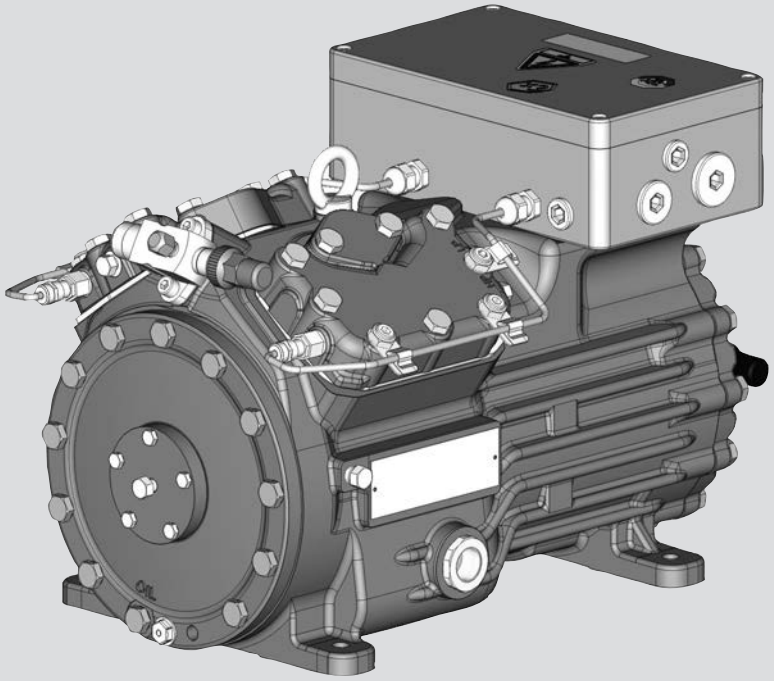


Bock EX-HG12P, EX-HG22P/e, EX-HG34P/e

Maintenance manual

96529-05.2021-Gb

Translation of the original instructions

BOCK®

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.

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

Contact

Bock GmbH
Benzstraße 7
72636 Frickenhausen
Germany

Telephone +49 7022 9454-0
Fax +49 7022 9454-137
service@bock.de
www.bock.de

Contents

96529-05.2021-Gb

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 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 "O" (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, EC Directive 1999/92 / EC, 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!**

2 I Fault diagnosis

Fault diagnosis

In case of malfunctions during compressor operation we recommend to prepare a measurement record for aiding the fault search:

- Pressure measurement: Discharge side, suction side, oil pressure
- Temperature measurement: Compressor casing, discharge end temperature, suction gas overheating

According to the expected cause of the fault it may be necessary to check the electrical systems for faults in the control.
In order to localize the causes of operating malfunctions as easy as possible we have compiled the following table with suggestion for remedying compressor malfunctions.

Function faults - Symptoms

Function faults arising most frequently and their symptoms are:

- Compressor stoppage, compressor cutoff
  - Compressor does not start
  - Compressor starts and then stops again
- Refrigerant performance too low
- Too high compressor temperature
- Oil problems
- Abnormal compressor running noise

Compressor stand still

Compressor does not start

Problem	Possible cause	Remedy
Control circuit is interrupted	**Main- or control fuse is switched off or tripped** - Setting / selection incorrect - Motor overloaded - Undervoltage - Starter contacts / shorted contacts / earthed contacts	Replace fuse Determine and remove the cause
	Cut off through: - Low pressure switch - High pressure switch - Thermal protection thermostat - Control thermostat - Other safety elements	Locate the interruption in the circuit and remove
Main- or ontrol circuit is switched off		Switch on
Main- or control circuit is wired incorrectly	Connecting cable incorrectly connected in the terminal box	Wiring correctly in the documentation according to the wiring diagram
	Forget the jumper	Check the position of the transverse jumper for star point on terminal blocks according to the documentation
Incorrect voltage		Connect to correct voltage
Phase or neutral is missing		Connect
Overload / motor safety is switched off	Setting / selection incorrect	Check design
	Function / drive not working	Check cable, electronic system
	Motor overloaded	Check operating conditions
	Undervoltage	Determine and remove the cause
	Short circuit ON / OFF	Check control
	Starter contacts / shorted contacts / earthed contacts	Check motor for winding damages / check shorted contacts

96529-05.2021-Gb

Problem	Possible cause	Remedy
Overload / Motor safety switch is tripped	Two phase run	Ensure three phase run
	Very unequal phase runs	Determine and remove the cause

Compressor cutoff

Compressor starts and stops again

Problem	Possible cause	Remedy
Cutoff through lowpressure switch	**Suction pressure too low:** - Check the setting of the low pressure switch	- Adjust the switching points or replace switch
	- Suction valve of the compressor closed	- Open suction valve
	- Capacity of compressor too large	- Check operating conditions
	- Refrigerant deficiency	- Leak test / add refrigerant
	- Filter / dryer in the liquid line blocked	- Replace filter / dryer
	- Expansion valve not functioning properly	- Check the setting of the expansion valve
	- Solenoid valve on the liquid line not opening	- Check the control / function
Cutoff through highpressure switch	**Condensing pressure too high:** - Check the setting of the high-pressure switch	- Adjust the switching points or replace switch
	- Pressure valve of the compressor closed	- Open the pressure valve
	- Condenser fan not functioning	- Check the control / replace motor
	- Condenser fan is dirty	- Cleaning of condenser
	- Excessive refrigerant filling	- Extract refrigerant to normal filling
	- Non-condensible gases in refrigerant	- Extract refrigerant and evacuate the refrigeration plant / refill refrigerant
Cutoff through thermal protection thermostat	**Discharge end temperatures is too high** - Operating limits of compressor exceeded	- Adapt the operating conditions to the operating range
	- Suction gas overheating	- Check expansion valve / check insulation on the suction side
	- Refrigerant of the condenser insufficient	- Check fan motors / Clean the condenser
	- Valve plate damage	- Replace valve plate
	- Internal safety valve has opened	- Replace safety valve -> Check compressor and refrigeration plant Determine and remove the cause for the inadmissible high pressure in the highpressure side
Cutoff through control thermostat	Temperature over / below the desired range	Check operating points
Cooling control or other switch / control devices are switched off	Setting / selection incorrect	- Check control design - Change control
	Function / drive incorrect	- Check drive / function - Check cables, contacts etc.

Problem	Possible cause	Remedy
MP10 or INT69 EX2 cutting off the compressor (MP10 or INT69 EX2 in the control cabinet outside the explosion-endangered area)	Function / drive incorrect	Function / check drive
	Motor overloaded	Check operating conditions
	Undervoltage	Determine and remove the cause
	Short circuit ON / OFF	Check control
	Starter contacts / shorted contacts / earthed contacts	Check motor for winding damage / check shorted contacts
	Two-phase run	Ensure three phase run
	Very unequal phase runs	Determine and remove the cause

Refrigerant performance too low

Problem	Possible cause	Remedy
Suction pressure too high	- Evaporator iced up	- Remove the cause
	- Expansion valve not functioning properly	- Check expansion valve setting; replace valve, if necessary
	- Lack of compressor capacity	- Check the function of the compressor by evacuating to vacuum. Check function of capacity regulator (accessory)
	- Shortage of refrigerant	- Run leakage test / refill refrigerant
Suction pressure too low	- See „Cutoff through low-pressure switch“	- Checking
High-pressure too high	- See „Cutoff through high-pressure switch“	- Checking
High-pressure too low	- Condenser being cooled to much	- Adjust the control of condenser cooling
	- Lack of compressor capacity	- Check compressor / Check the functioning of capacity regulator
	- Pressure laminations of valve plate leaking	- Replace valve plate
	- By-pass between suction and discharge side	- Localize leak between the discharge and suction side and repair it

Refrigerant temperature too high

Problem	Possible cause	Remedy
Suction gas temperature too high	- Suction gas overheating	- Adjust expansion valve Insulate the gas suction line
	- Too little refrigerant filling	- Establish the operating filling (see Operating Instruction for the refrigeration plant) Localize leak
	- Liquid filter blocked	- Clean / replace filter / dryer
	- Shortage of refrigerant	- Run leakage test / refill refrigerant
Discharge pipe temperature too high	- Suction gas temperature too high (Condensing pressure too high)	- Adjust expansion valve, insulate the gas suction line - see „Cutoff through high-pressure switch“
	- Operating limits of compressor exceeded	- see „Cutoff through thermal protection thermostat"

96529-05.2021-Gb

Problem	Possible cause	Remedy
Discharge pipe temperature too high	- Cooling insufficient	- Check refrigerant filling - Adjust expansion valve
	- Short circuit between the discharge and the suction side of the compressor	- Check gaskets on valve plate / change
	- Valve plate damage	- Replace valve plate

Oil problems

Problem	Possible cause	Remedy
Oil pressure too low	- Refrigerant in oil	- see „Oil foams“
	- Too little oil in compressor	- Add oil and search for the cause of oil loss
	- Oil filter dirty / blocked	- Clean / replace oil filter Change oil
Oil foams during start-up phase	- Liquid refrigerant has moved into the oil sump	- Check the laying of pipes - Installation of the check valve in the discharge line - Installation of the solenoid valve in the liquid line - Check the control
Oil foams during operating	- Expansion valve not functioning	- Adjust / replace expansion valve
Oil level decreases	- During start-up, a portion of the oil is carried to the refrigeration plant with the refrigerant	- Refrigerant and oil get mixed. After some time oil level should stabilize. Add oil, if necessary.
	- Refrigerant in oil	- see „Oil foams during start-up phase“
	- Piston rings worn	- Replace piston rings
	- Suction / discharge laminations of the valve plate leaking	- Replace valve plate

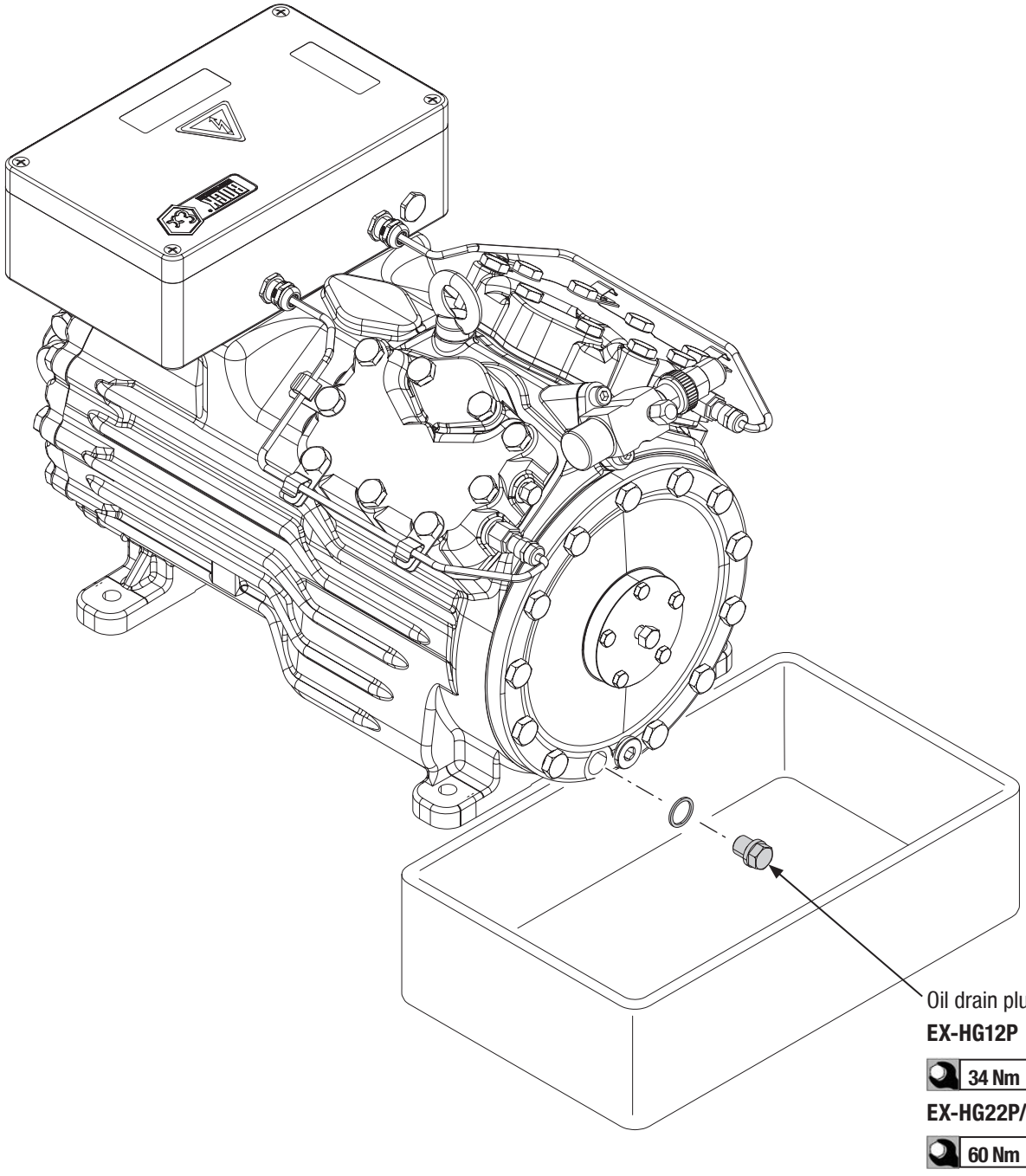
Abnormal running noise from compressor

Problem	Possible cause	Remedy
Fixation of compressor is loose	- Screwed connections have become loose - Securing elements for screwed connections missing	- Tighten the screwed connections and secure them anew
	- Vibration metals defective	- Replace vibrations metals
Liquid shock	- Liquid refrigerant reaching the compressor	- Adjust / check expansion valve Check refrigerant filling Check evaporator fan - Icing-up of the evaporator
	- Oil shocks because of too much oil	- Check oil level Check the dimensioning of pipes (gas velocity) Replace worn piston rings
Capacity regulator (accessory)	- Switching on and off constantly / oscillating	- Check the control
	- Defective	- Replace capacity regulator valve

1 Removal

Up to design key (DK)
056

Position in parts list	Tools: Spanner SW 13, 17
2900	**Before starting any work on the compressor observe the safety instructions page 3-5!**
	Working course
	- Place the oil collection tray.
480	**- Remove oil drain plug and drain oil out, do not reuse the seal ring.**
	- Dispose of used oil in accordance with environmental regulations.



96529-05.2021-Gb

1 Removal

From design key (DK)
057

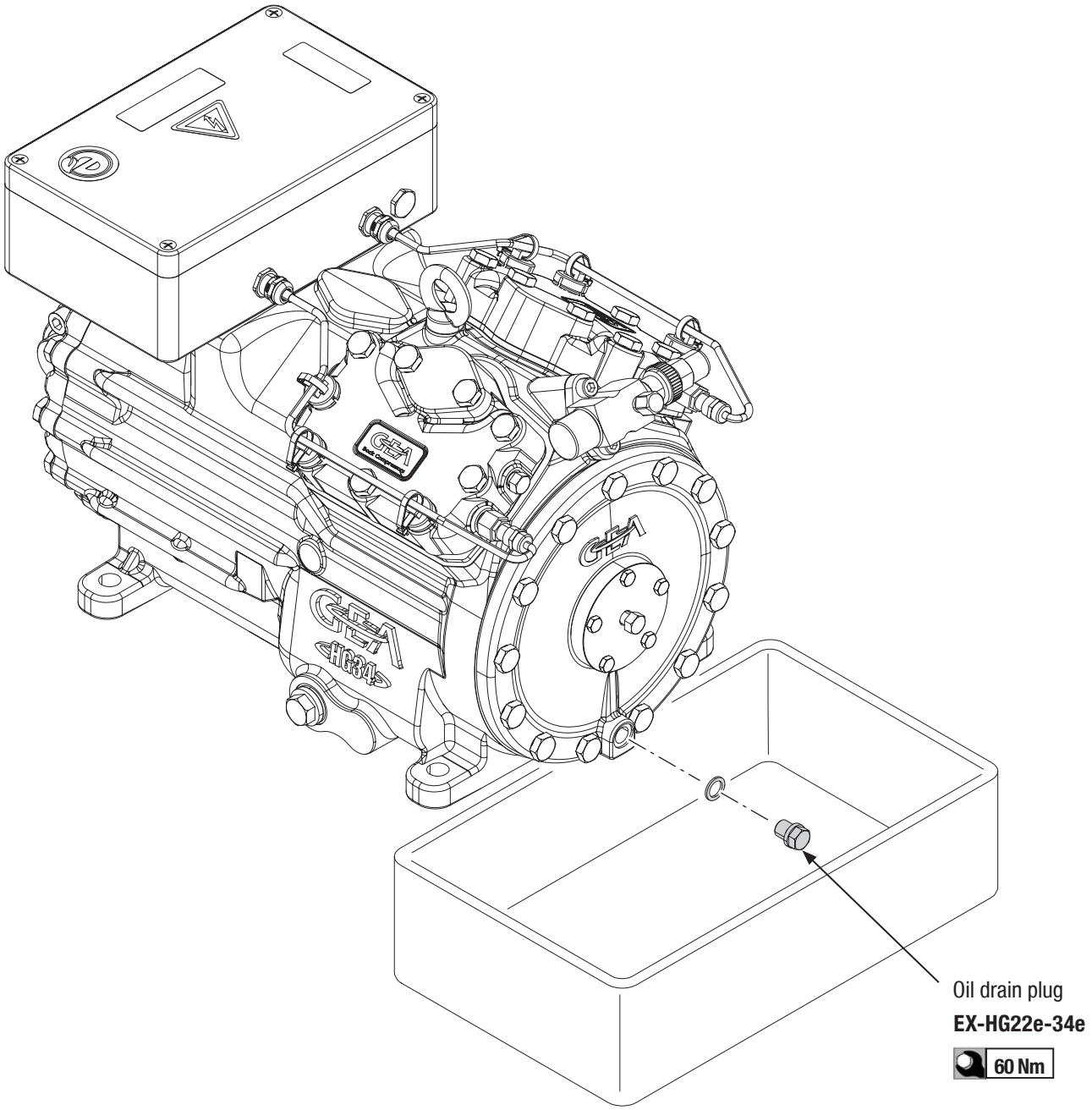
Position in parts list
2220

Tools: Spanner SW 13

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

Working course

- **Place the oil collection tray.**
- **Remove oil drain plug and drain oil out, do not reuse the seal ring.**
- **Dispose of used oil in accordance with environmental regulations.**



2 Installation

Position in parts list 2900 / 2220	Tools: Spanner SW 14, 17
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
480	**- Screw in oil drain plug with new seal ring and tighten.** **- Observe the notes on the oil change and the approved lubricants in the assembly instructions compressor.** **- Oil filling via connection H. Observe the notes on the filling quantity and level in the assembly instructions compressor and check it by means of the oil sight glass.** **- Carry out the leak test.**

1 Removal

Up to design key (DK)
056

Position in parts list 2160, 2165 2170

Tools: Cross-recess screwdrivers PH 3, allen key SW 5, Spanner SW 10

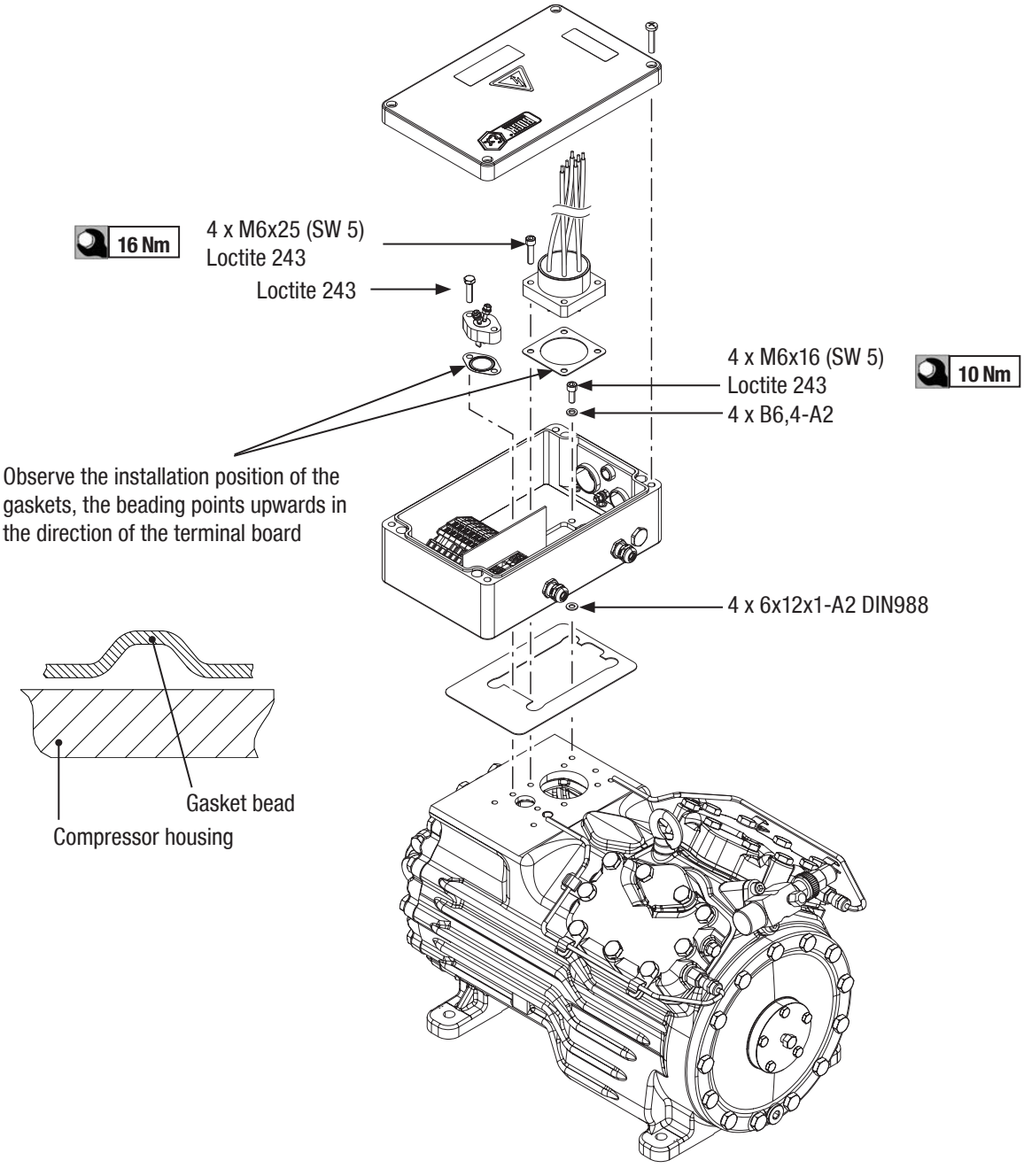
Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- **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.**
- **Disconnect the PTC sensor connections on the PTC terminal board.**
- **Loosen the cores of the terminal board at the terminal blocks.**
- **Release screw connection of terminal box, remove terminal box and gasket.**

1070, 1071 - **Release screw connection of terminal board and PTC terminal board (two-part, winding and PTC connection separated).**

1060, 1065 - **Remove the terminal board and the gaskets and loosen the winding connections as well as the connections of PTC sensors from the respective underside of the terminal board (flat plug connection).**



1 Removal

From design key (DK)
057

Position in parts list 2160, 2170

Tools: Allen key SW 5, cross-recess screwdrivers PH 3

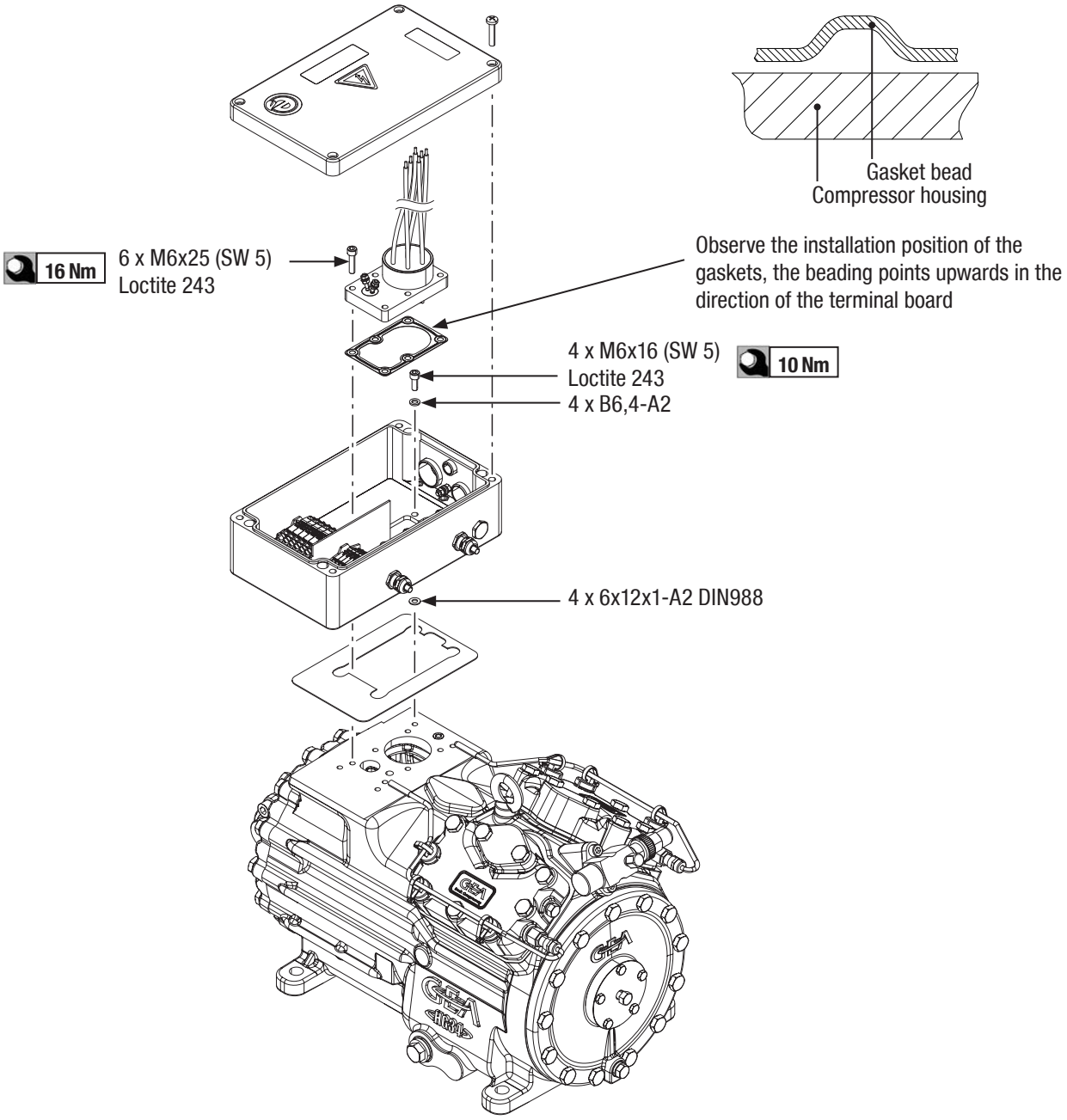
Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- **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.**
- **Disconnect the PTC sensor connections on the PTC terminal board.**
- **Loosen the cores of the terminal board at the terminal blocks.**
- **Release screw connection of terminal box, remove terminal box and gasket**

1070 - **Release screw connection of terminal board (one-part, winding and PTC connection combined).**

1060 - **Remove the terminal board and the gasket. Loosen the connections from the underside of the terminal board (flat plug connection).**



96529-05.2021-Gb

2 Installation

Up to design key (DK)
056

Position in parts list 2160, 2165, 2170

Tools: Allen key SW 5, cross-recess screwdrivers PH 3, Spanner SW 10

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

Working course

1060, 1065
1070, 1071

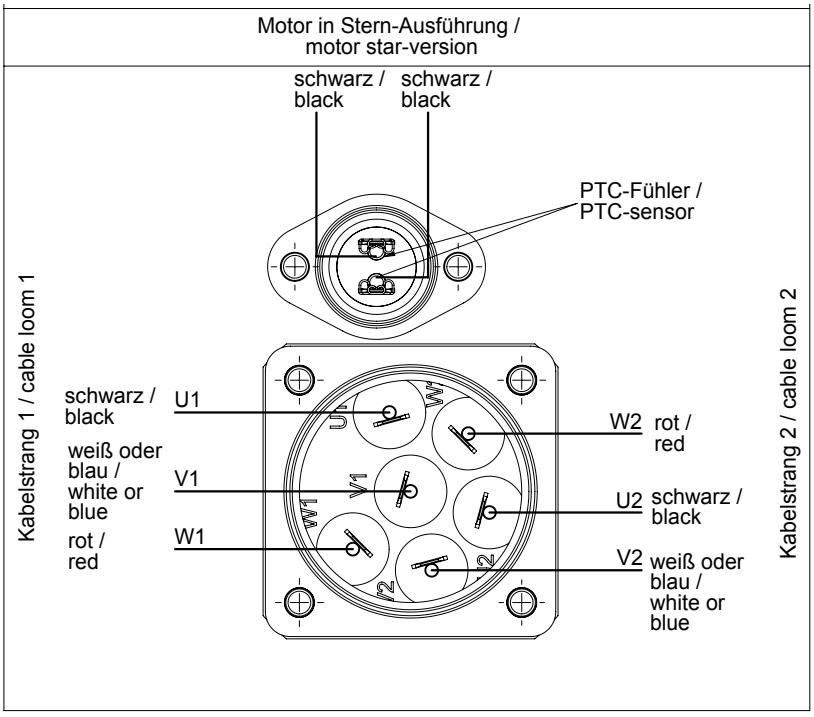
- **Guide the gaskets for the terminal board and PTC terminal board over the winding connections and hang up.**
- **Attach winding connections to underside of terminal board. Plug PTC wires into PTC terminal board.**
- **Screw the terminal board and the PTC terminal board. Secure the screws with Loctite 243.**
- **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 (see below).**
- **Reconnect all cores according to the circuit diagram.**
- **Insert main and control circuit cables into terminal box and connect according to circuit diagram.**
- **After connecting, check all phases with a measuring instrument for their function. Insulation and dielectric strength test according to explosion protection regulations.**
- **Before commissioning, carry out a leak test in accordance with EN 378-2.**

INFO!

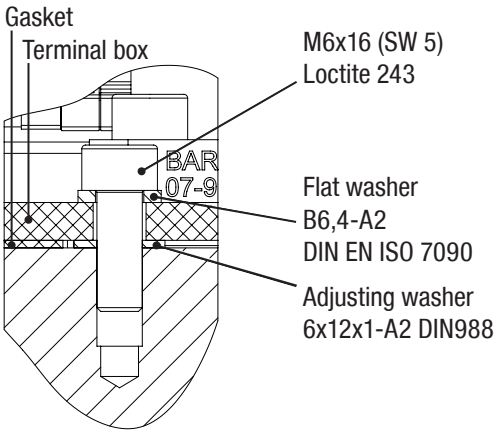
- **Execution of all works according to EN 60079-14, EN 60079-17 and EN 60079-19. Make sure that the IP protection level is restored (gasket installation, tightening torque of the cable glands).**

EX-HG12P
EX-HG22P/e
EX-HG34P/e

Connection motor-terminal board, view bottom side



Sequence of flat washers and adjusting washers



2 Installation

From design key (DK) **057**

Tools: Allen key SW 5, cross-recess screwdrivers PH 3

Position in parts list 2160, 2170

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

Working course

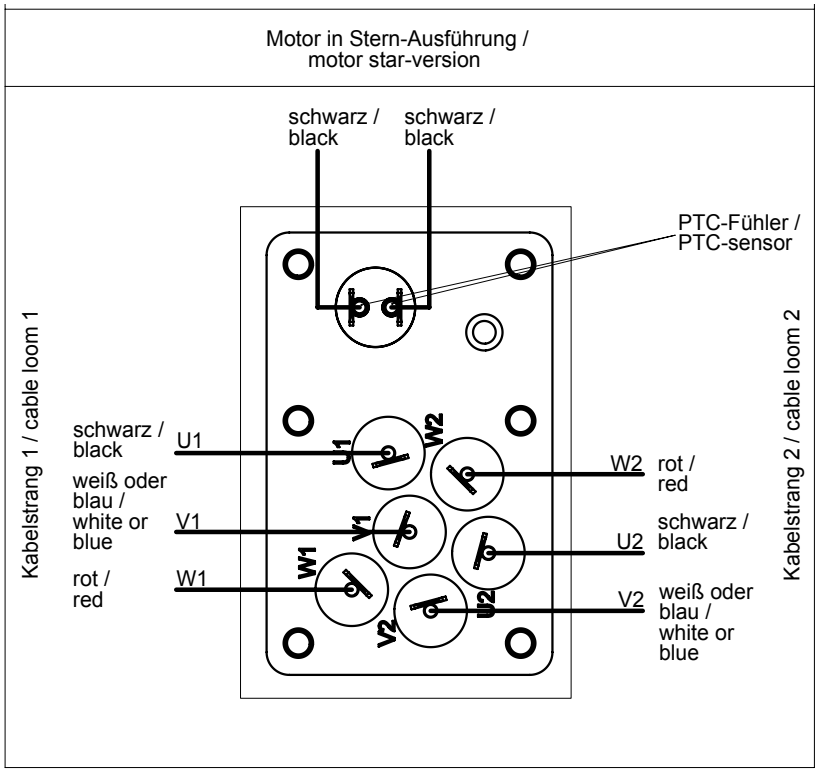
1060 - **Guide the gaskets for the terminal board over the winding connections and hang up.**
- **Attach winding connections and PTC connections to underside of terminal board.**

1070 - **Screw the terminal board, secure the screws with Loctite 243.**
- **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 (see below).**
- **Reconnect all cores according to the circuit diagram.**
- **Insert main and control circuit cables into terminal box and connect according to circuit diagram.**
- **After connecting, check all phases with a measuring instrument for their function. Insulation and dielectric strength test according to explosion protection regulations.**
- **Before commissioning, carry out a leak test in accordance with EN 378-2.**

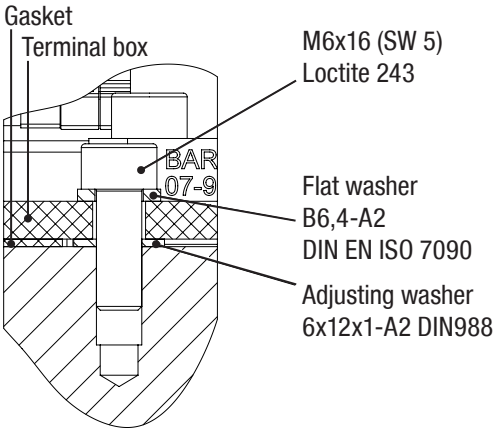
INFO! • **Execution of all works according to EN 60079-14, EN 60079-17 and EN 60079-19. Make sure that the IP protection level is restored (gasket installation, tightening torque of the cable glands).**

EX-HG22e
EX-HG34e

Connection motor-terminal board, view bottom side



Sequence of flat washers and adjusting washers



96529-05.2021-Gb

1 Removal

Up to design key (DK)
056

Position in parts list 2070

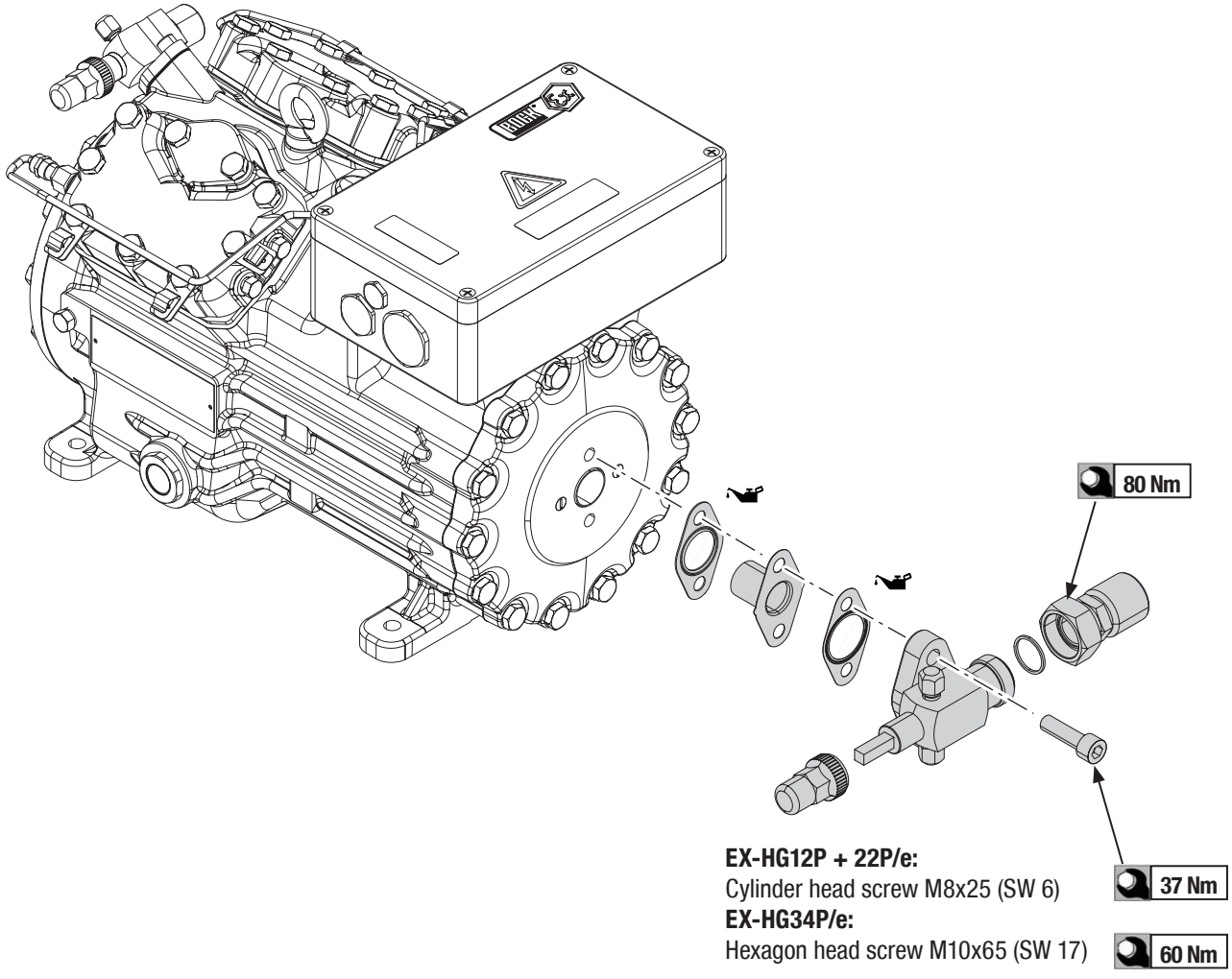
Tools: Spanner SW 8, 10, 14, 17, 20, 24, Innensechskantschl. SW 6

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

Carry out soldering work only under exclusion of explosive atmosphere. Observe important information on the use of hydrocarbons in the assembly instructions compressor!

Working course

- **In the case of shut-off valves with detachable soldered bush, loosen screw connection and move suction line to one side.**
- **Release the flange screw connection of the shut-off valve. Take off shut-off valve, gasket and suction filter. For direct solder connection unsolder suction line.**
- **Carefully clean the sealing surface from old flat gasket material, making sure that no gasket residues gets into the compressor.**



EX-HG12P + 22P/e:
Cylinder head screw M8x25 (SW 6)
EX-HG34P/e:
Hexagon head screw M10x65 (SW 17)

1 Removal

From design key (DK)
057

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

Position in parts list 2070

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

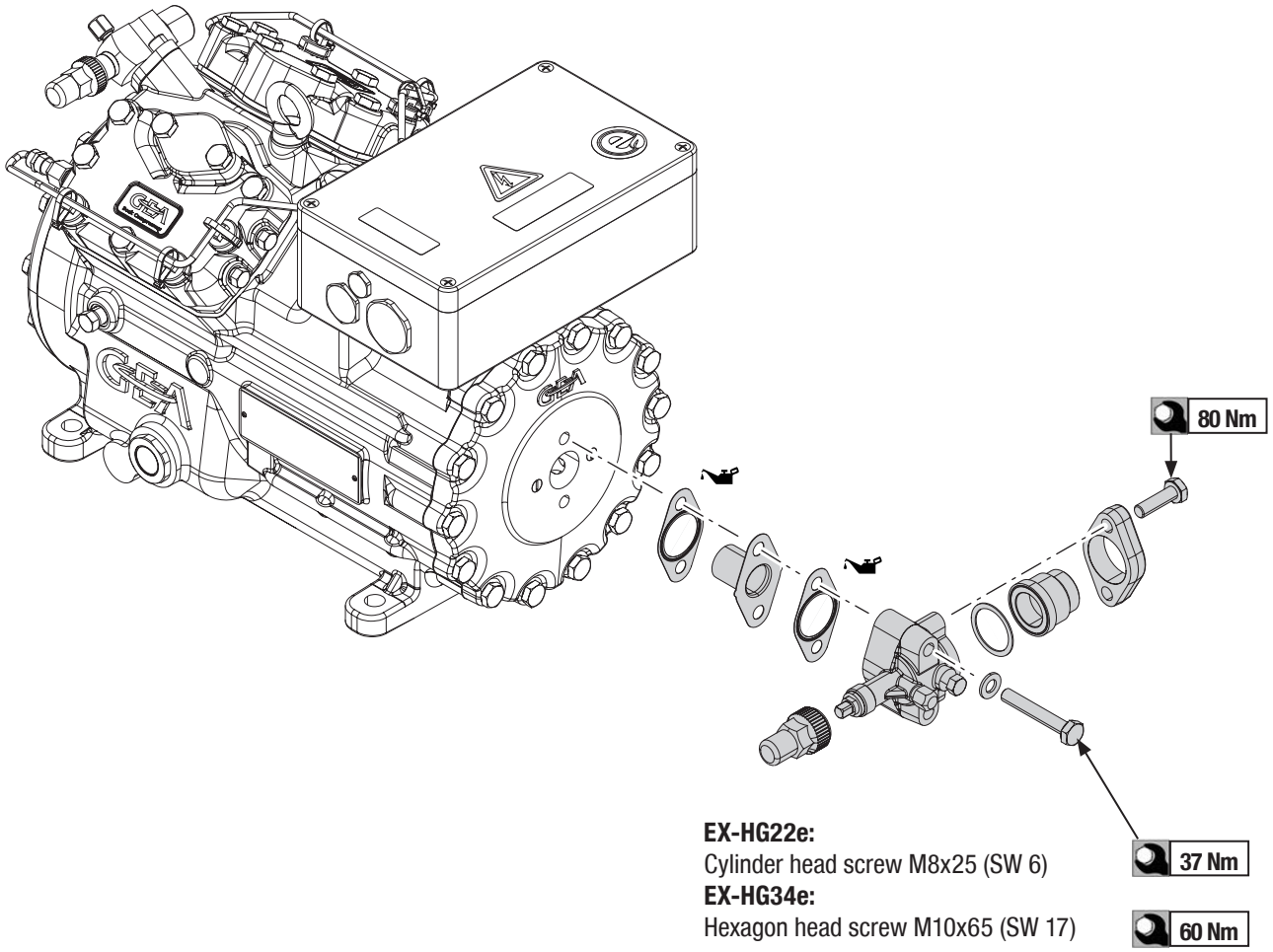
Carry out soldering work only under exclusion of explosive atmosphere. Observe important information on the use of hydrocarbons in the assembly instructions compressor!

Working course

1230, 1220 - **In the case of shut-off valves with detachable soldered bush, loosen screw connection and move suction line to one side.**

1210, 1190 EX-HG34e: 1240, 1244 1260, 1221 - **Release the flange screw connection of the shut-off valve. Take off shut-off valve, gasket and suction filter. For direct solder connection unsolder suction line.**

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



EX-HG22e:
Cylinder head screw M8x25 (SW 6)
EX-HG34e:
Hexagon head screw M10x65 (SW 17)

2 Installation

Position in parts list 2070

Tools: Spanner SW 8, 10, 14, 17, 20, 24, allen key SW 6

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

Carry out soldering work only under exclusion of explosive atmosphere. Observe important information on the use of hydrocarbons in the assembly instructions compressor!

Working course

- Remove the soldered bush from the valve during soldering! Risk of damage the shut-off valve.

1190
1210
1220
1230

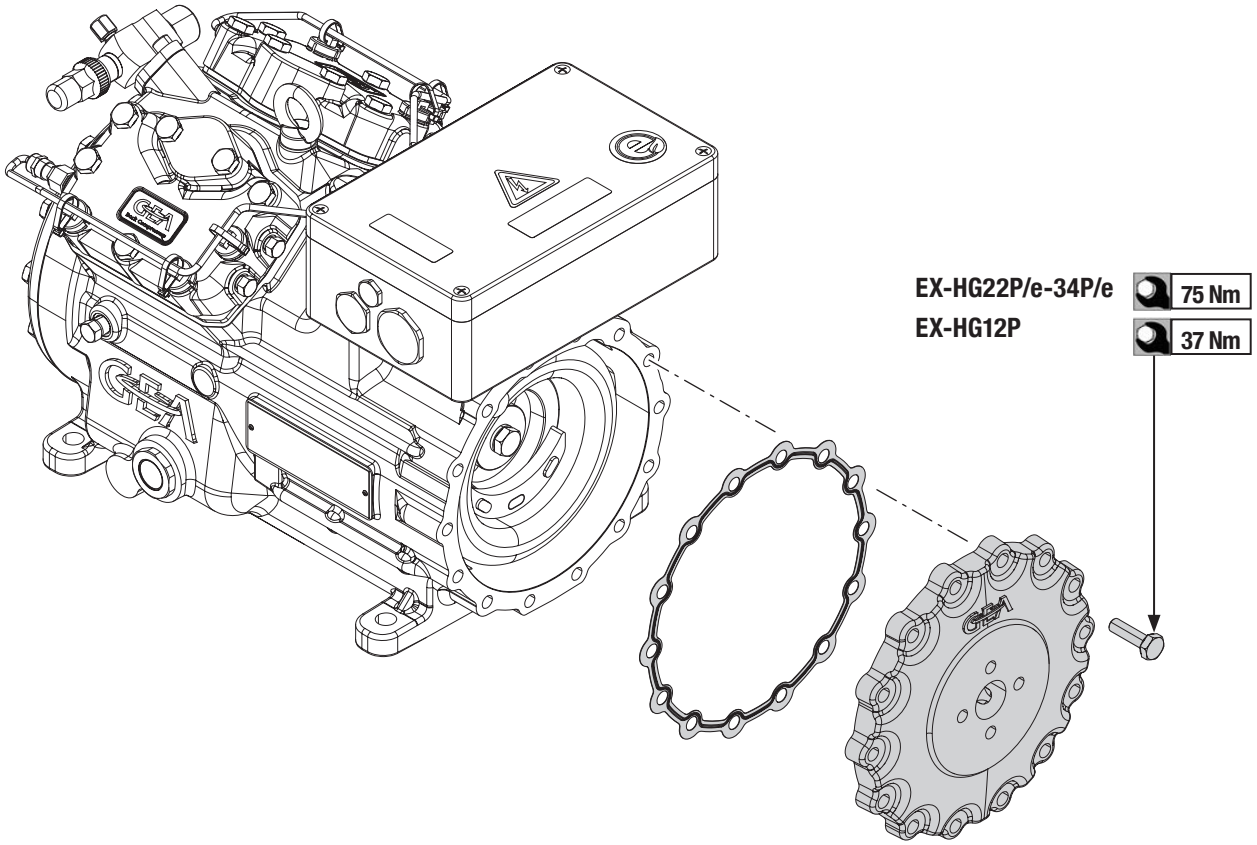
- In case of shut-off valves without removable soldered bush, solder the suction line. For this, first hand-tighten the valve without gaskets for fixing the position.
- In case of shut-off valves without removable soldered bush, be sure to cool the valve body during soldering (e. g. with a wet cloth). Remove the gasket of valve flange from the valve body during soldering first and insert it only afterwards!

EX-HG34e:
1240, 1244
1260, 1221

- Install shut-off valve mit new gasket and suction filter.
- In case of removable soldered bush screw up suction line with new gasket again.
- Before commissioning, carry out a leak test in accordance with EN 378-2.

1 Removal

Position in parts list 2300	Tools: Spanner SW 13 or 17
	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.
740	**- Losen the hexagon head screws, unscrew and take off cover.**
721	**- Take off gasket and dispose, if necessary remove gasket residues.**

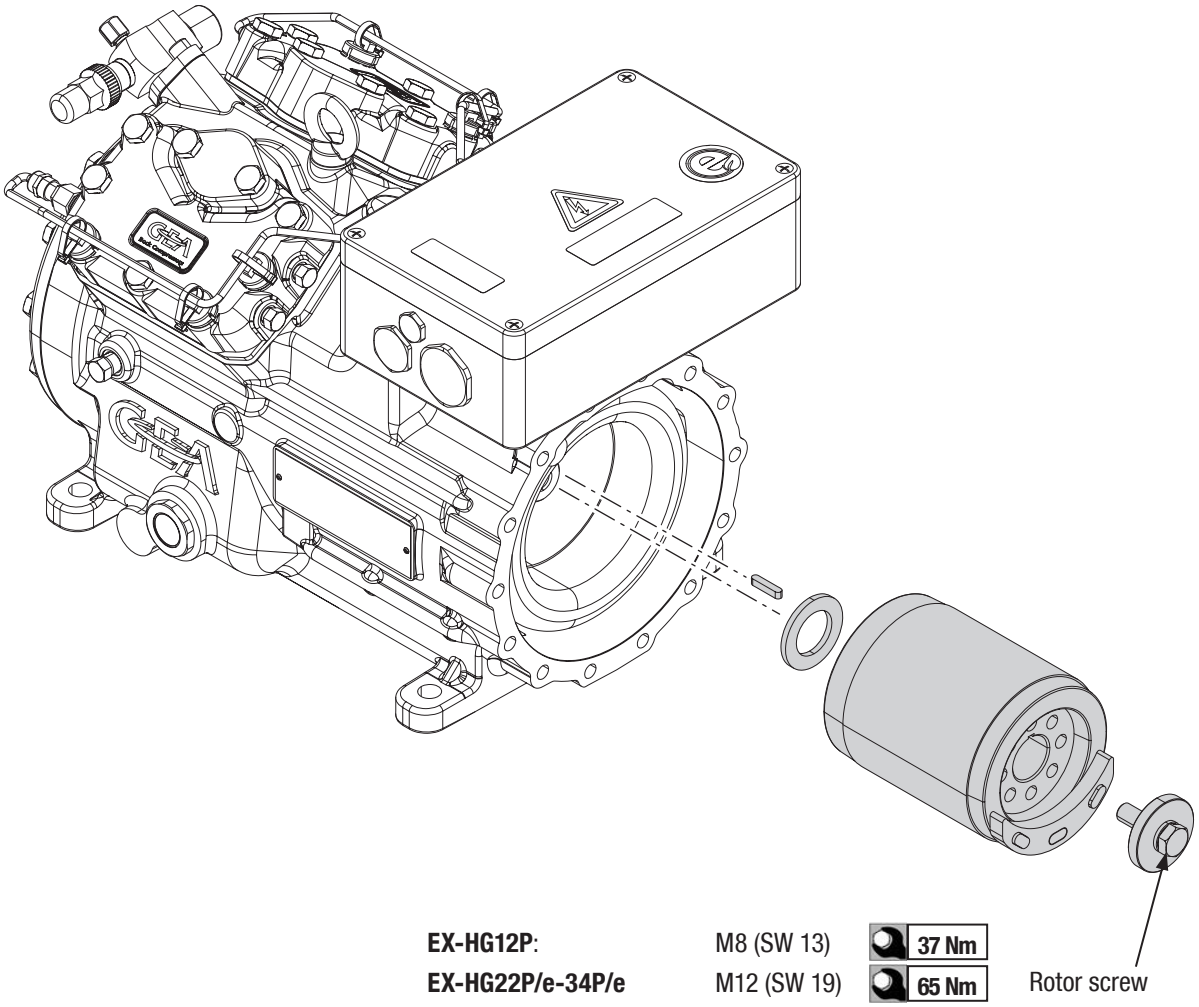


2 Installation

Position in parts list 2300	Tools: Torque spanner, spanner SW 13 or 17
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
721 740	**- Position gasket on cover by using two of the screws. Make sure that the bead tip points towards the motor cover.** **- Place cover with gasket and secure with both screws, then screw in all other screws hand-tight.** **- Tighten the screws crosswise.** **- Before commissioning, carry out a leak test in accordance with EN 378-2.**

1 Removal

Position in parts list 2130	Tools: Spanner SW 13 or 19
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
820, 810 800	- **Loosen rotor screw with disc and spring washer, if available (EX-HG34e) remove spacer sleeve and flat washer.**
790	- **Pull off rotor from crankshaft.**
EX-HG34e: 1177, 901	- **Take off feather key of crankshaft.** - **Pull of flat washer between rotor and crankshaft.**



EX-HG12P:	M8 (SW 13)	**37 Nm**	Rotor screw
EX-HG22P/e-34P/e	M12 (SW 19)	**65 Nm**	

2 Installation

Position in parts list 2130	Tools: Spanner SW 13 or 19
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
790	**- Push the disc onto the crankshaft up to the stop.** **- Insert feather key into the crankshaft.** **- Push the rotor on the crankshaft. If available, insert flat washer and spacer sleeve.**
800, 810 820 EX-HG34e: 1177, 901	**- Screw in the rotor screw with disc and spring washer and hand-tighten it. 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. Caution, do not damage winding head or balancing plates.** **- Alternatively tighten the rotor screw with disc and spring washer manually. It is to prevent rotation of the rotor by blocking the driving unit.**

1 Removal

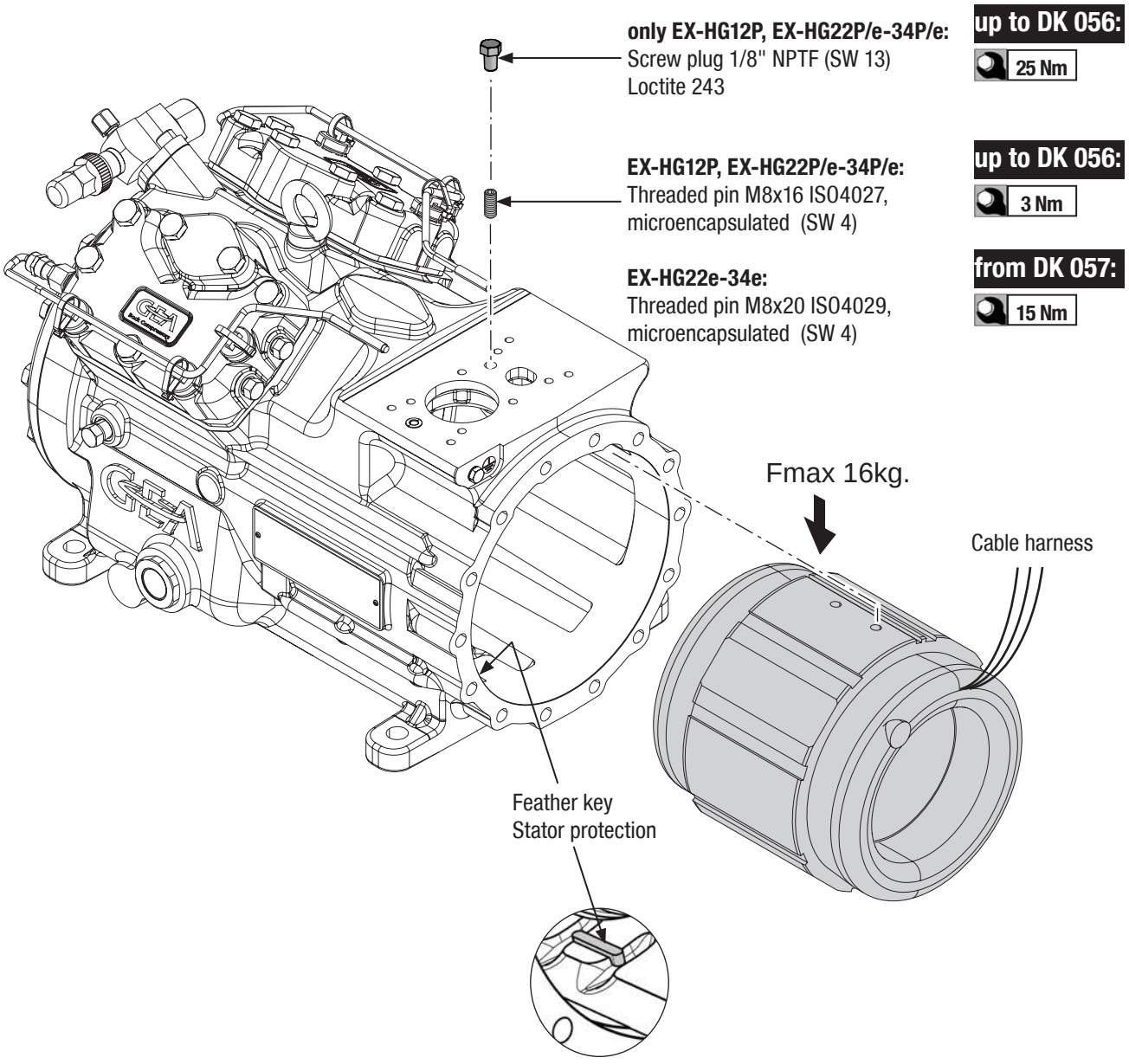
Position in parts list 2130, 2280

Tools: Spanner SW 13, allen key SW 4

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

Working course

- **Loosen and remove locking screw (available up to DK 056) and the underlying stator screw. Heat up it if necessary, so that thread coating dissolves (ca. 100 °C), attention, avoid unnecessarily heating the stator winding!**
- **pull the stator out, avoid jamming.**
- **Attention, observe the weight! Lay aside the feather key.**



96529-05.2021-Gb

2 Installation

Up to design key (DK)
056

Position in parts list 2130, 2280

Tools: Allen key SW 4, spanner SW 13, needle-nose pliers

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

Working course

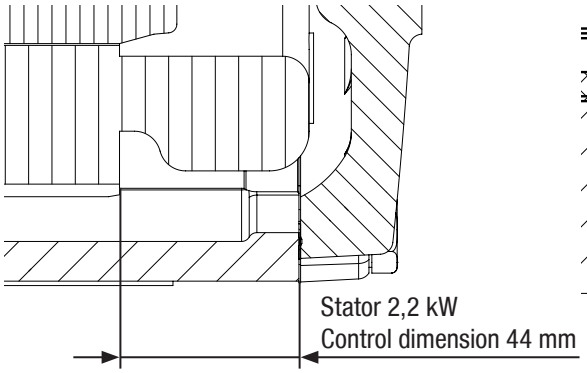
- **Check seat of feather key for stator protection.**
- **Note the direction of the feather key to stator, you must align the parts in order to install them.**
- **Push the stator into the motor housing, avoid jamming. Make sure that the cable harness points in the direction of the motor cover.**
- **Lead the winding connections through the large terminal board opening after inserting the stator. Lead the PTC connections through the smaller terminal board opening. Do not damage core insulation when passing through, do not bend the core.**

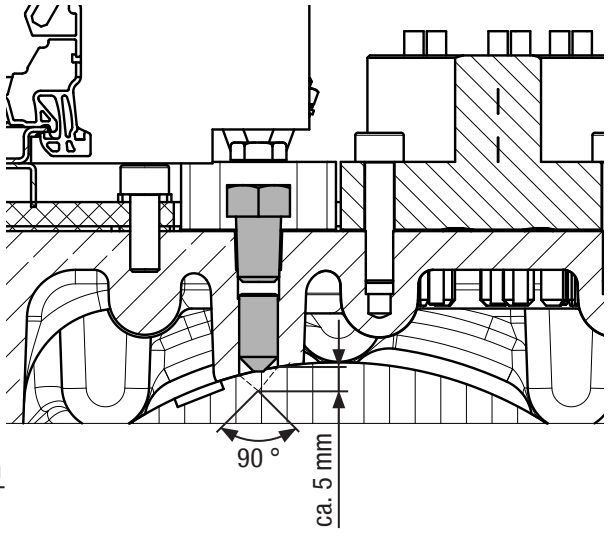
Stator alignment and fixation:

- **EX-HG12P, EX-HG22P/e-34P/e: Push the stator into the motor housing until the stop, pre-drill stator for threaded pin with point angle 90 °, screw in threaded pin M8. Screw in locking screw, seal with Loctite 243. Partially exist versions with two threaded pins for stator fixation. In this case, secure the upper threaded pin with Loctite 243.**

Exception :

- **EX-HG22P/e with Motor 2,2 kW: Insert stator and align according to control dimension, further steps see above.**





2 Installation

From design key (DK)
057

Position in parts list 2130, 2280

Tools: Allen key SW 4, spanner SW 13, needle-nose pliers

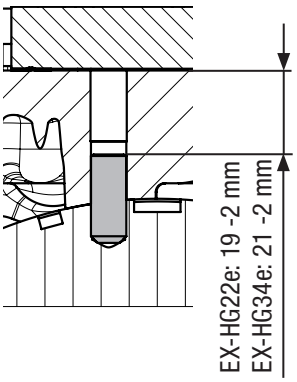
Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- **Check seat of feather key for stator protection.**
- **Note the direction of the feather key to stator, you must align the parts in order to install them.**
- **Push the stator into the motor housing, avoid jamming. Make sure that the cable harness points in the direction of the motor cover.**
- **Lead the winding connections through the large terminal board opening after inserting the stator. Lead the PTC connections through the smaller terminal board opening. Do not damage core insulation when passing through, do not bend the core.**

Stator alignment and fixation:

- **EX-HG22e-34e: Push the stator, until the hole on the stator for the threaded pin is aligned with the housing bore. Screw in stator screw (threaded pin) according to the figure. The hardening time of the thread coating is 6 hours. Use stator screw only once.**



1 Removal

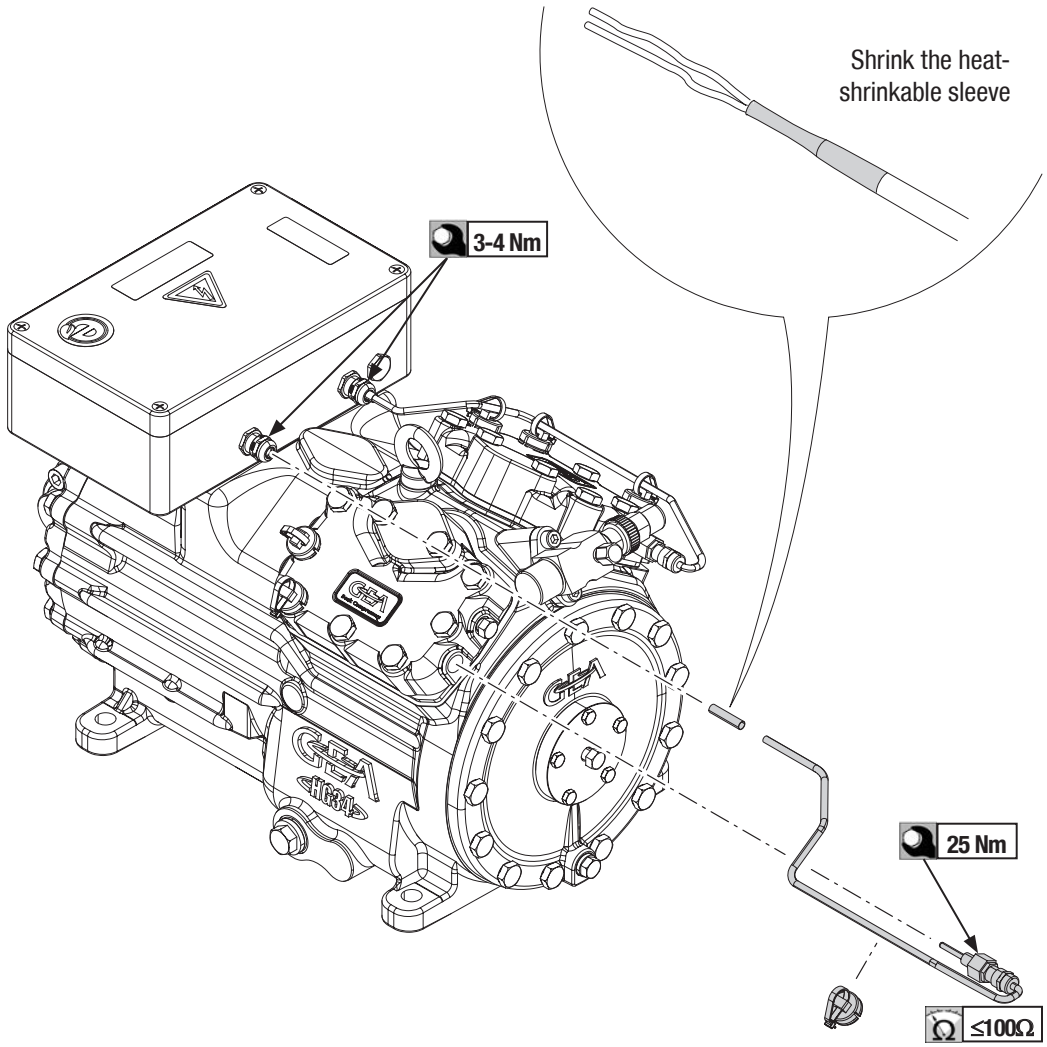
Position in parts list 2800

Tools: Spanner SW 17, 19

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

Working course

- **Disconnect the cable of the thermal protection thermostat in the terminal box, loosen the cap nut of the cable gland (SW 17) and disconnect the cable from the cable holders.**
- **Unscrew thermal protection thermostat from cylinder cover.**



2 Installation

Position in parts list 2800

Tools: Spanner SW 17, 19

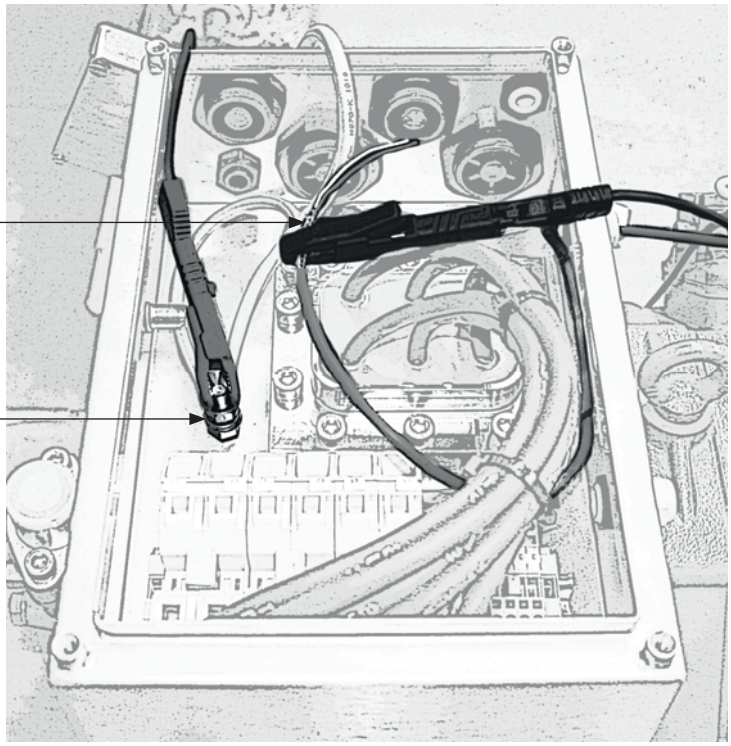
Before starting any work on the compressor observe the safety instructions page 3-5!

Working course

- **Screw the thermal protection thermostat into the cylinder cover. Seal the taper thread with Loctite 566, do not use teflon tape.**
- **Carry out the leak test.**

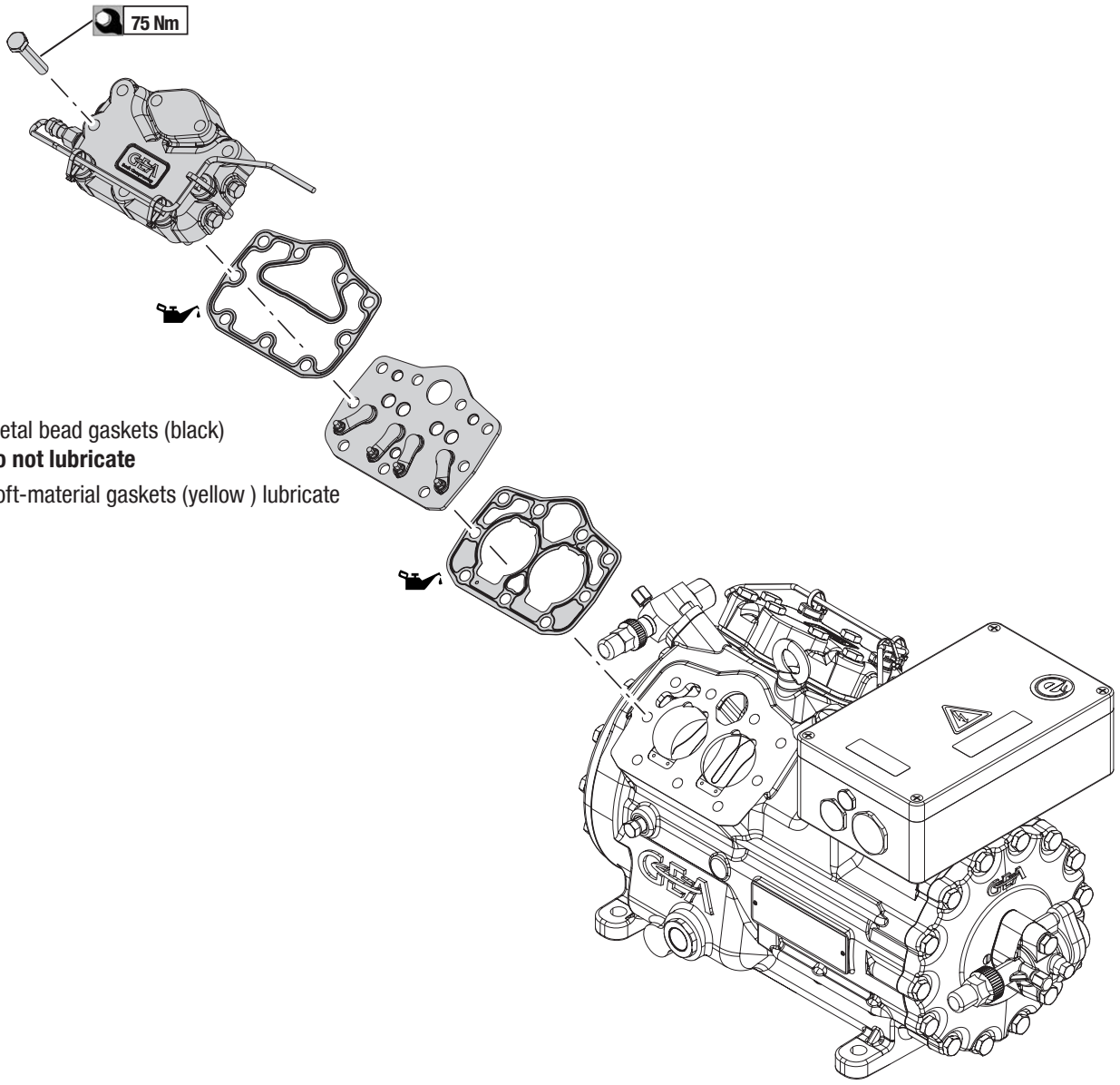
- **Insert cable through cable gland into terminal box, tightening torque 3-4 Nm. Guide the cable through the cable holder / fasten with cable holder. Connect the cores (ferrules are pre-assembled) according to the assembly instructions compressor.**
- **A functional test of the thermal protection thermostats and the electronic motor protection MP10 or INT69 EX2 must be carried out as follows:**
- **Electrical resistance test of thermal protection thermostats: Measuring point at the feed-through terminal 3 and 4 in the terminal box. Cold resistance of thermal protection thermostat ≤ 100 Ω (Rcold at 25 °C).**
- **Functional test of the electronic motor protection MP10 or 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 PTC sensor lead.**
- **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 intrinsically safe!**

Figure similar



1 Removal

Position in parts list 2000	Tools: Spanner SW 17
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
170	- **Cylinder cover will be re-used. Thermal protection thermostat must not be disassembled.**
	up to DK 056:
	- **Cable holders can remain on the line.**
	from DK 057:
	- **Remove the cable holder for the thermal protection thermostat; if necessary, spread the circlip slightly (reuse possible).**
180, 185	- **Loosen screws for cylinder cover, remove cylinder cover.**
50, 70	- **Take off top gasket, valve plate and lower gasket.**
	- **Carefully clean the sealing surface from old flat gasket material. Do not drop any gasket residues into the compressor.**



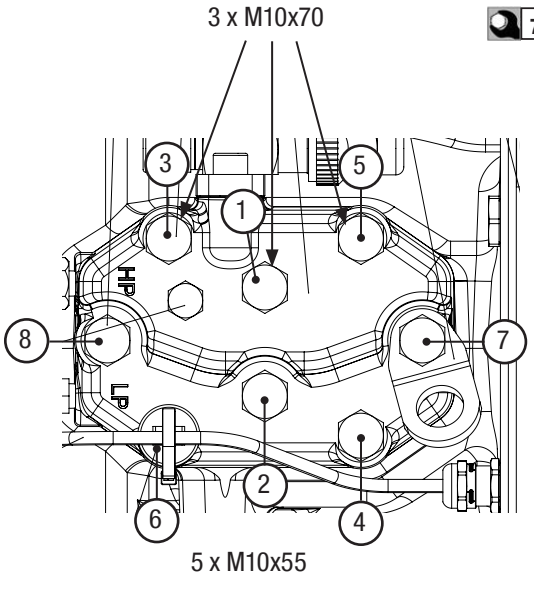
Metal bead gaskets (black)
do not lubricate
Soft-material gaskets (yellow) lubricate

2 Installation

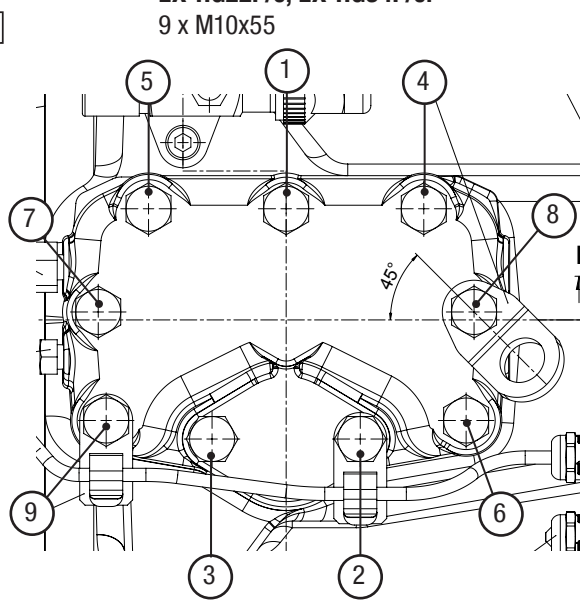
Position in parts list	Tools: Torque spanner, spanner SW 17
2000	**Before starting any work on the compressor observe the safety instructions page 3-5!**
	Working course
50, 70	**- Apply lower valve plate gasket, valve plate and top valve plate gasket. Lightly lubricate soft-material gasket. Observe the correct position. For metal bead gaskets, the bead points to the cylinder cover. When selecting the valve plate gasket, observe the correct allocation to the compressor's piston diameter. The bore diameter of the compressor must be identical to the piston diameter indicated on the valve plate gasket.**
170, 180, 185	**- Place cylinder cover and tighten. Tighten the cylinder head bolts in the order shown, observe the tightening torques. For EX-HG12P, make sure that the two different screw lengths are mounted in the correct position.** **- Carry out the leak test.**
⚠	**- A functional test of the thermal protection thermostats and the electronic motor protection MP10 or INT69 EX2 must be carried out as follows:** **- Electrical resistance test of thermal protection thermostats: Measuring point at the feed-through terminal 3 and 4 in the terminal box. Cold resistance of thermal protection thermostat ≤ 100 Ω (Rcold at 25 °C).** **- Functional test of the electronic motor protection MP10 or INT69 EX2 according to the assembly instructions for the compressor.**

Tightening sequence:

EX-HG12P:



EX-HG22P/e, EX-HG34P/e:



Screw transport eyelet together (only for EX-HG12P and EX-HG22P/e)

EX-HG12P, EX-HG22P/e-34P/e: Cable holder made of metal for screwing, cable clamp (spring clip)
EX-HG22e-34e: Cable holder made of plastic for attaching, calbe tie

1 Removal

Compressor approval
TPS 05 ATEX 1127 X

Position in parts list 3300, 3305	Tools: Spanner SW 17, 32, allen key SW 8 **Working course**
3320	**- Open the terminal box of the solenoid coil and disconnect the connecting cable. Unscrew knurled nut and remove magnet coil with washers.**
3310	**- Unscrew capacity regulator valve.** **- When changing the cylinder cover, loosen the screw connection and remove the cylinder cover with gasket.** **- Carefully clean the sealing surface from old flat gasket material.**

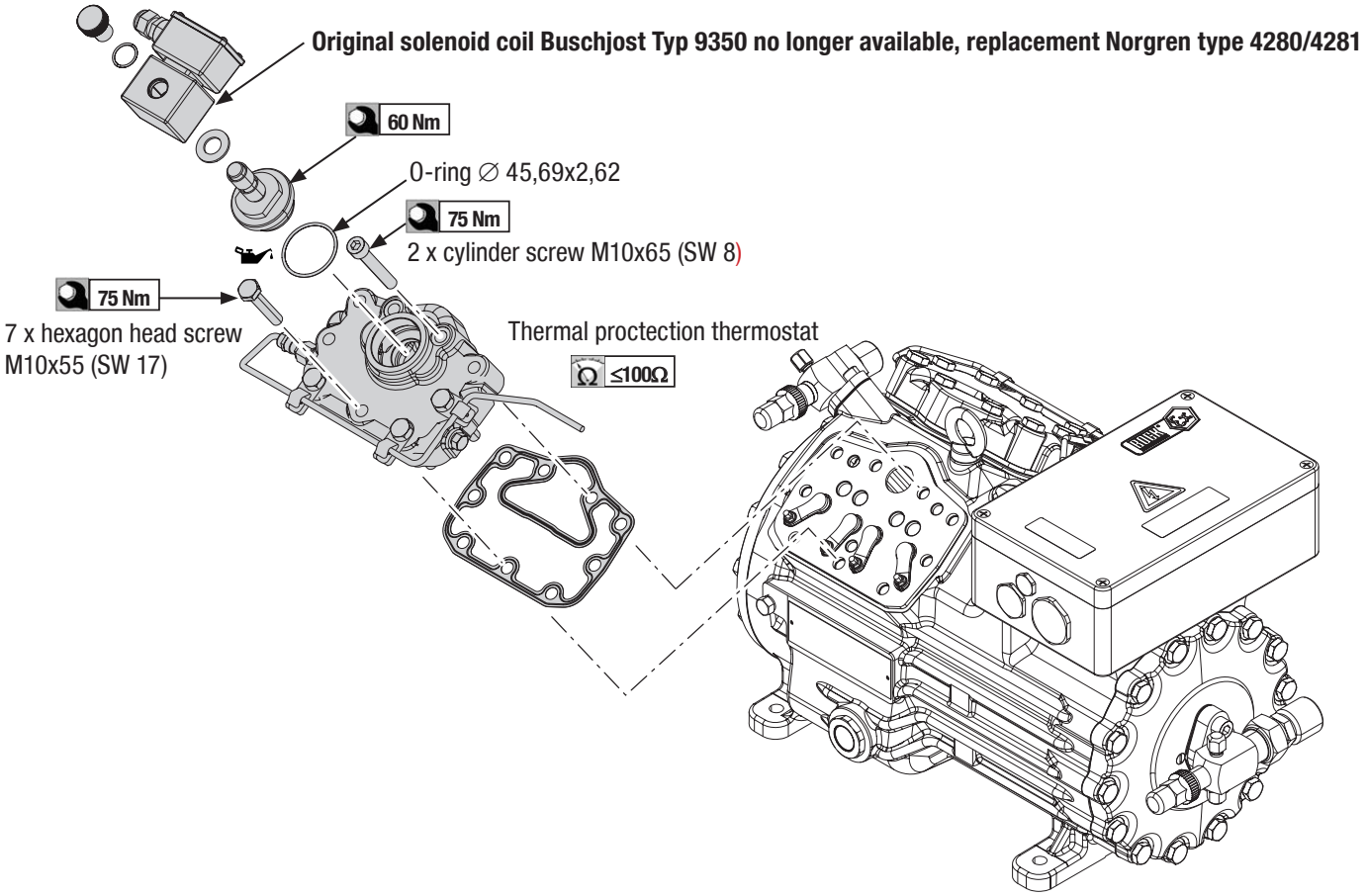
Capacity regulator removal/installation

ATTENTION! Before starting any work on the compressor observe the safety instructions page 3-5!
The "special conditions" of the EC-Type Examination Certificate must be observed!
(see enclosed assembly instructions compressor)

Important information

INFO!

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



96529-05.2021-Gb

1 Removal

Compressor approval
TPS 13 ATEX 55283 008 X
EPS 16 ATEX 1095 X

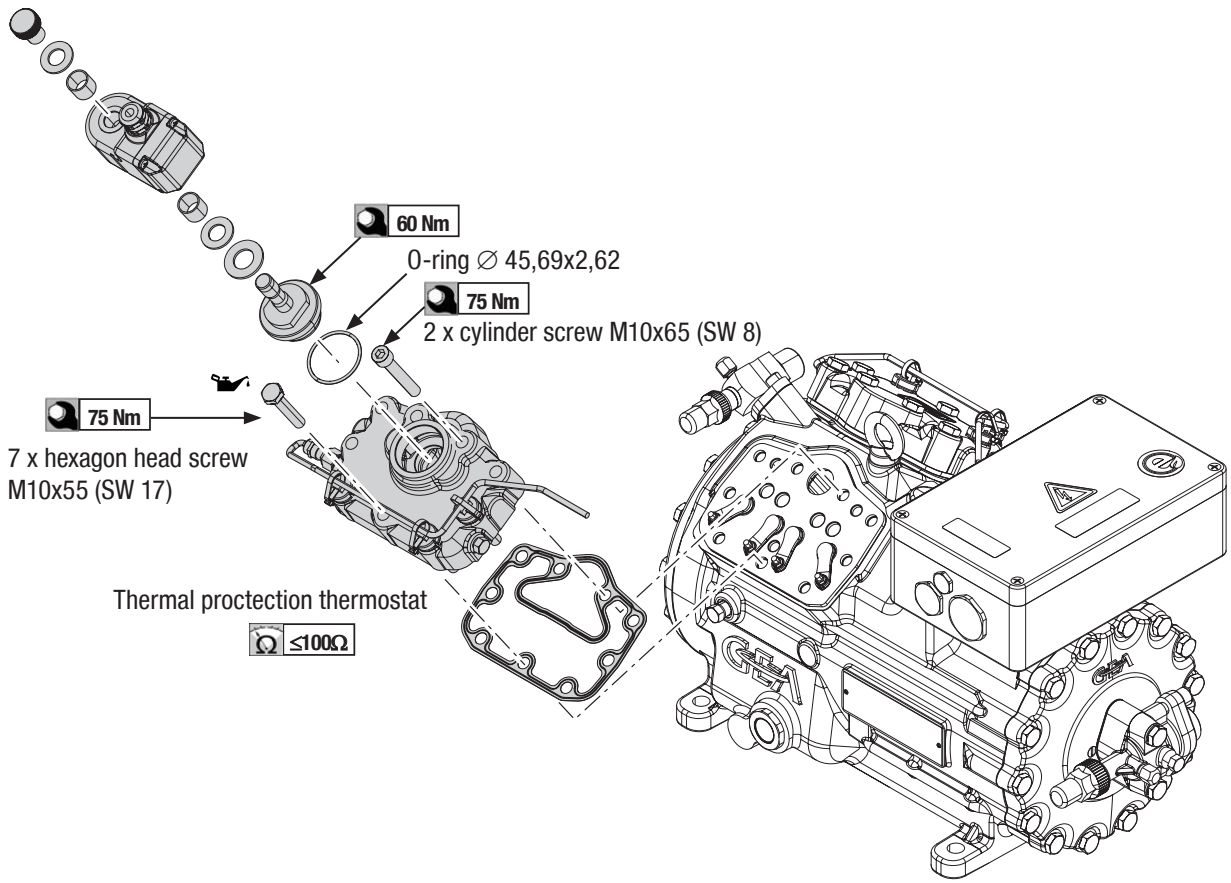
Position in parts list 3300, 3305	Tools: Spanner SW 17, 32, allen key SW 8 **Working course**
3320	**- Open the terminal box of the solenoid coil and disconnect the connecting cable. Unscrew knurled nut and remove magnet coil with washers and dowel pins.**
3310	**- Unscrew capacity regulator valve.** **- When changing the cylinder cover, loosen the screw connection and remove the cylinder cover with gasket.** **- Carefully clean the sealing surface from old flat gasket material.**

Capacity regulator removal/installation

ATTENTION! Before starting any work on the compressor observe the safety instructions page 3-5!
The "special conditions" of the EC-Type Examination Certificate must be observed!
(see enclosed assembly instructions compressor)

Important information

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



2 Installation

Position in parts list 3300, 3305

Tools: Spanner SW 17, 32, allen key SW 8

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

Working course

- **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.**

- **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!**

3310
3320

- **Install cylinder cover for capacity regulator with new gasket.**
- **Tighten the cylinder head bolts in the order shown (see chapter 10), observe the tightening torques.**
- **Screw in the capacity regulator valve with O-ring, observe the tightening torques.**
- **Place magnet coil with washers and gaskets and dowel pins in accordance with the enclosed documentation and secure with knurled nut.**
- **Connect the magnet coil, paying attention to restore the IP protection level!**

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

- **Electrical installation of the preassembled thermal protection thermostat in accordance with the enclosed assembly instructions compressor (chapter electric) make in the terminal box and check.**
- **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).**

The electrical connection within the potentially explosive area must be carried out by means of a separate terminal box, which is designed in a recognized type of protection!

- **Carry out electrical installation in accordance with the enclosed assembly instructions.**

- **Carry out the leak test.**

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

12 I Shut-off valve (HP)

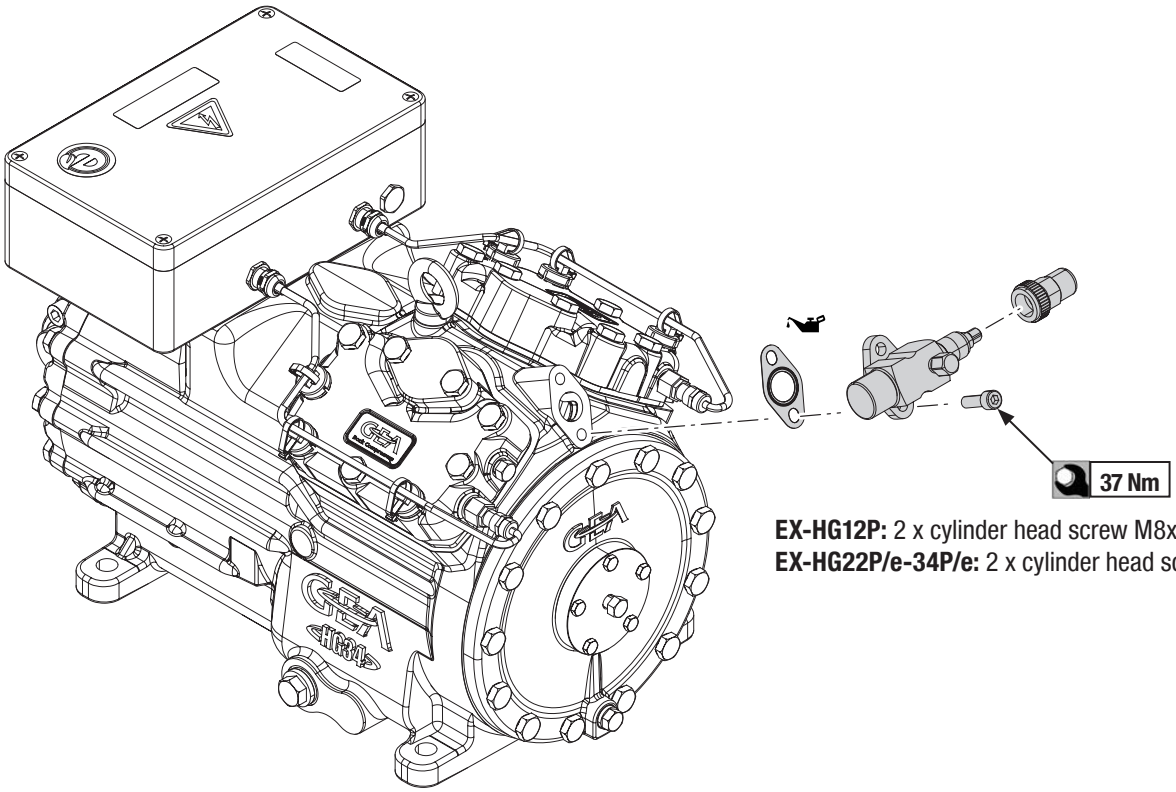
Shut-off valve (HP) Removal/Installation

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

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!

1 Removal

Position in parts list 2060	Tools: Spanner SW 8, 14, 20, allen key SW 6
	Working course
	- In the case of shut-off valves with detachable soldered bush, loosen screw connection and move suction line to one side.
330 220, 210	**- Release the flange screw connection of the shut-off valve. Shut-off valve, take off gasket. For direct solder connection unsolder discharge line.**
	- Carefully clean the sealing surface from old flat gasket material.



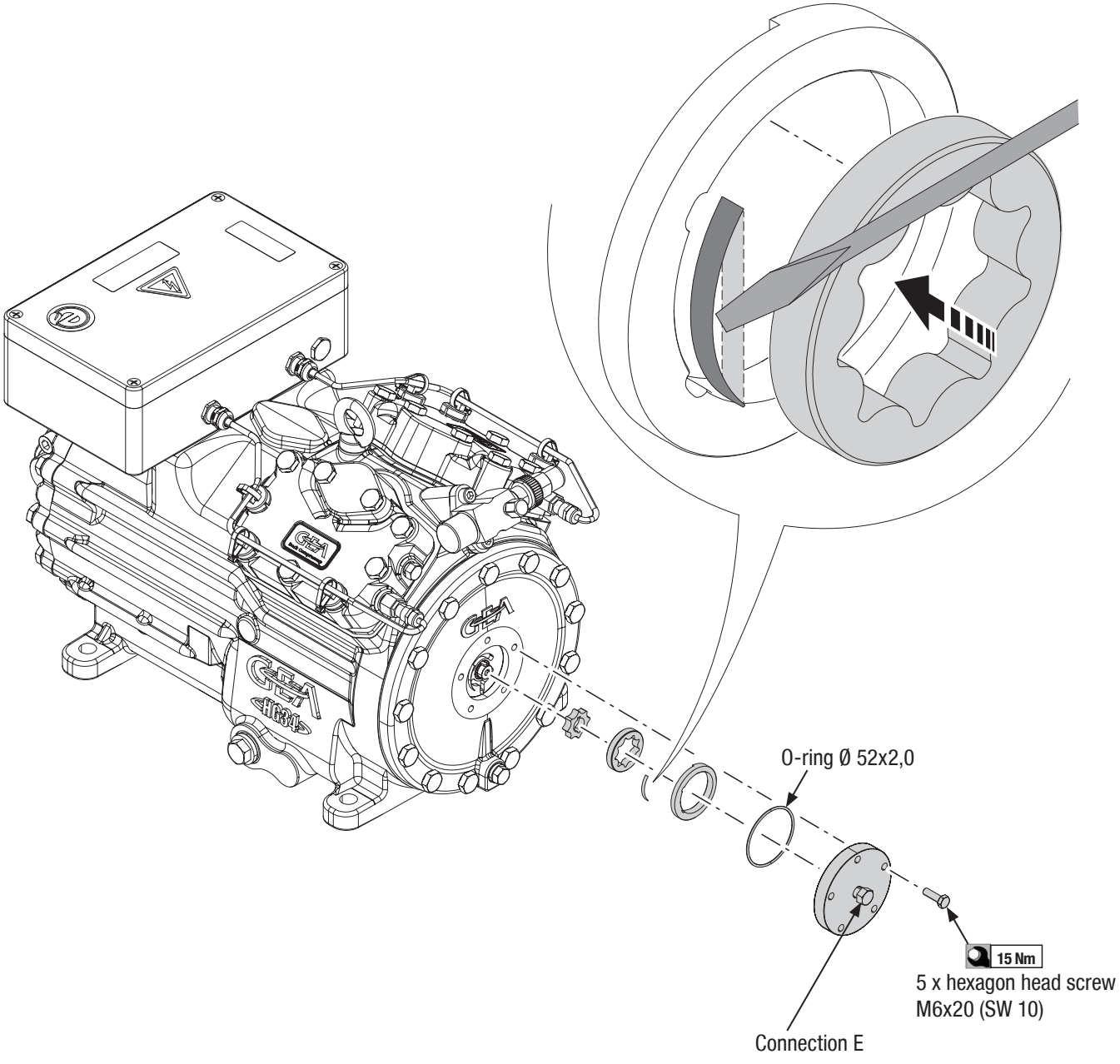
EX-HG12P: 2 x cylinder head screw M8x20 (SW 6)
EX-HG22P/e-34P/e: 2 x cylinder head screw M8x25 (SW 6)

2 Installation

Position in parts list 2060	Tools: Spanner SW 8, 14, 20, allen key SW 6
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
330	**- In case of shut-off valves without removable soldered bush, solder the discharge line. For this, first hand-tighten the valve without gaskets for fixing the position. solder the discharge line, Vbe sure to cool the valve body during soldering (e. g. with a wet cloth).**
220, 210	**- Install shut-off valve mit new gasket.**
	- In case of removable soldered bush screw up discharge line with new gasket again.
	- Carry out the leak test.

1 Removal

Position in parts list	Tools: Spanner SW 10, magnet
2020	**Before starting any work on the compressor observe the safety instructions page 3-5!**
	Working course
312	**- 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.** **- If heavy wear or abrasion of foreign parts can be detected, the cause must be determined or the compressor optionally repaired at the factory.** **- For heavy soiling, change the oil and replace the oil strainer. If necessary, carefully clean oil sump from foreign particles.**



2 Installation

Position in parts list

Tools: Torque spanner, spanner SW 10, flat screwdriver

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

2020

Working course

- **Pre-assemble spring steel sheet with excentric ring and outer rotor.**
- **Push the internal rotor on the crankshaft, Pay attention to the correct position of the feather key.**
- **Insert the preassembled excentric ring into the chamber so that it is flush with the bearing flange.**

312

- **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.**
- **Carry out the leak test.**

Risk of damage compressor!

- **Verify oil pressure (connection E / 1/8" NPTF). During restart the oilpressure must set up immediately. Oil differential pressure to suction pressure compressor at operating temperature 1,5-3 bar.**

1 Removal

Up to design key (DK)
056

Position in parts list 2110 , 2020, 2220

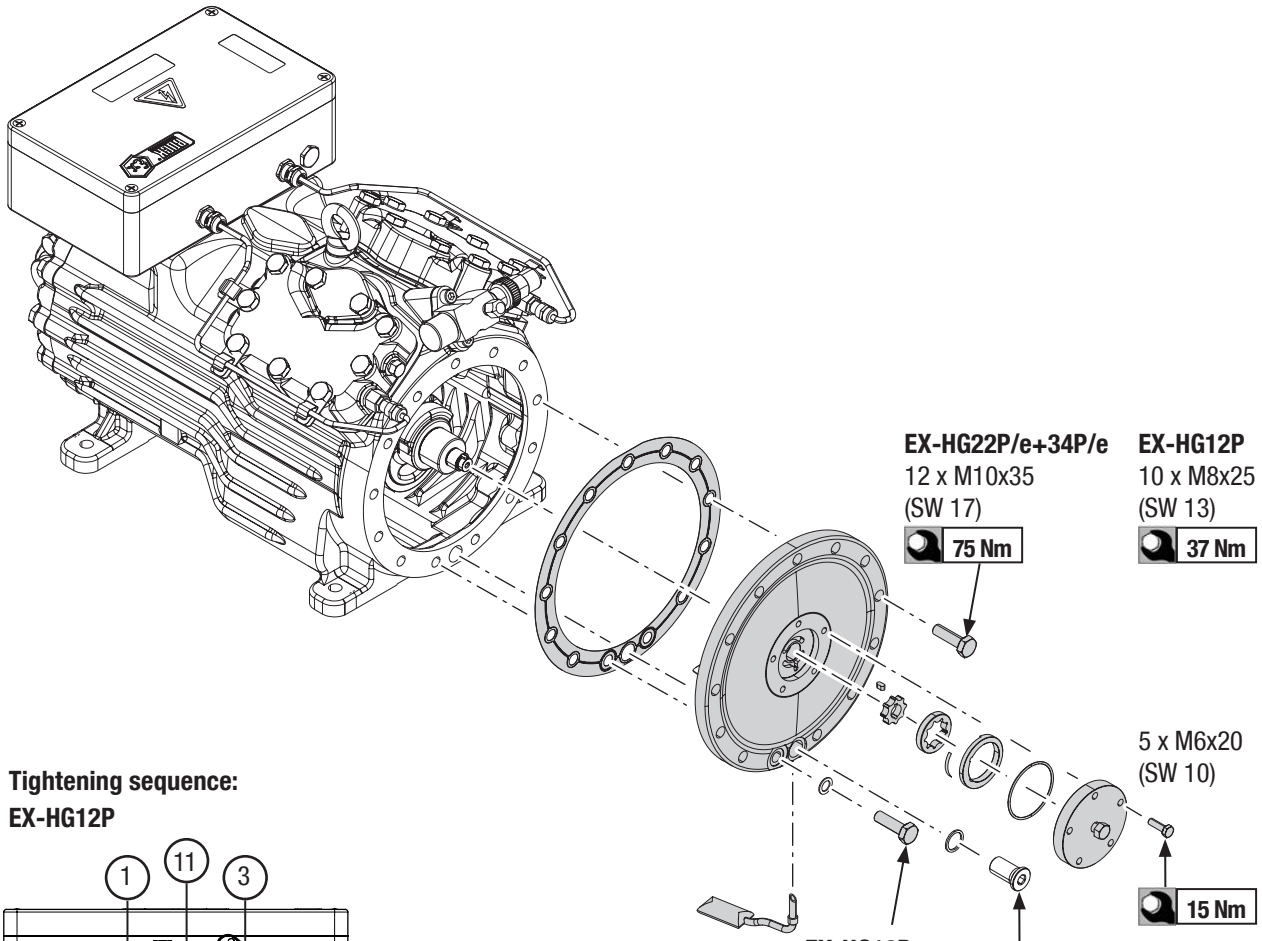
Tools: Spanner SW 10, 13, 17; allen key SW 8

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

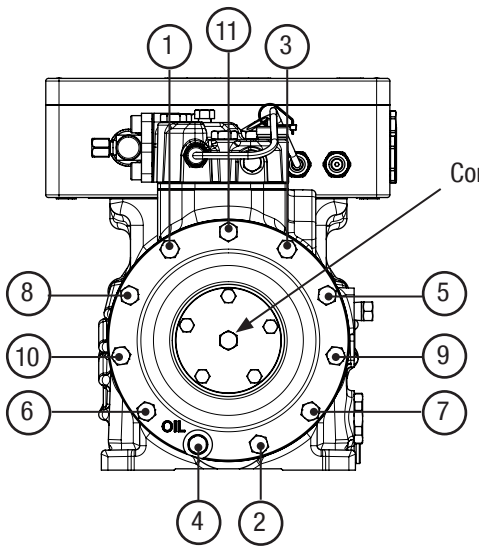
Working course

312
470, 480

- **Drain oil from the compressor according to chapter 3.**
- **Remove oil pump according to chapter 13, loosen cover and remove.**
- **Loosen screw connection of bearing flange and remove bearing flange, remove gasket.**
- **Remove oil strainer from guide in bearing flange.**
- **Carefully clean the sealing surface from old flat gasket material.**
- **Carefully remove dirt and deposits on the oil strainer.**



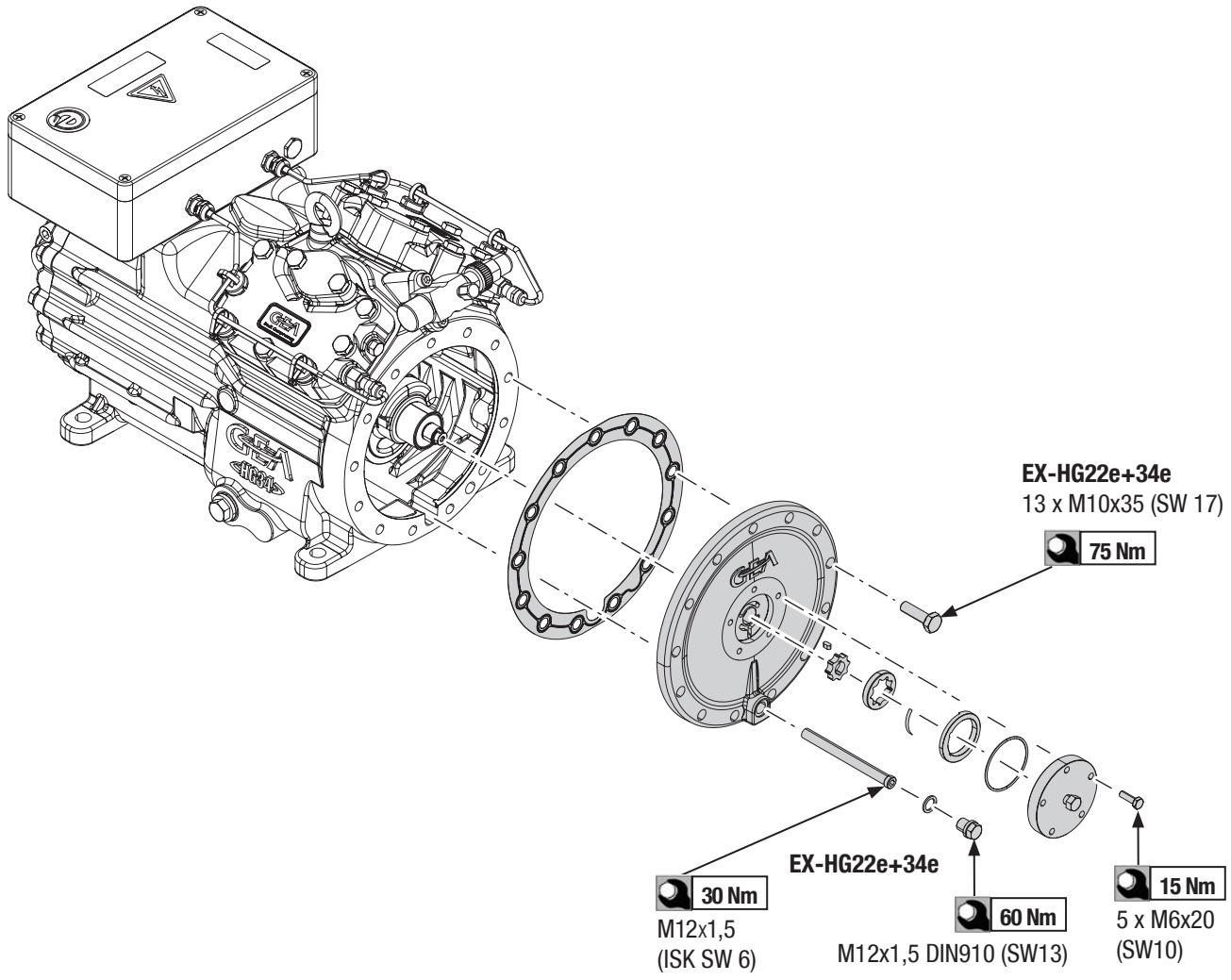
Tightening sequence:
EX-HG12P



1 Removal

From design key (DK)
057

Position in parts list 2110 , 2020, 2220	Tools: 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
	- Drain oil from the compressor according to chapter 3.
312	**- Remove oil pump according to chapter 13, loosen cover and remove.**
	- Loosen the screw plug and unscrew the oil strainer.
470, 480	**- Loosen screw connection of bearing flange and remove bearing flange, remove gasket.**
	- Carefully clean the sealing surface from old flat gasket material.
	- Carefully remove dirt and deposits on the oil strainer.



96529-05.2021-Gb

2 Installation

Up to design key (DK)
056

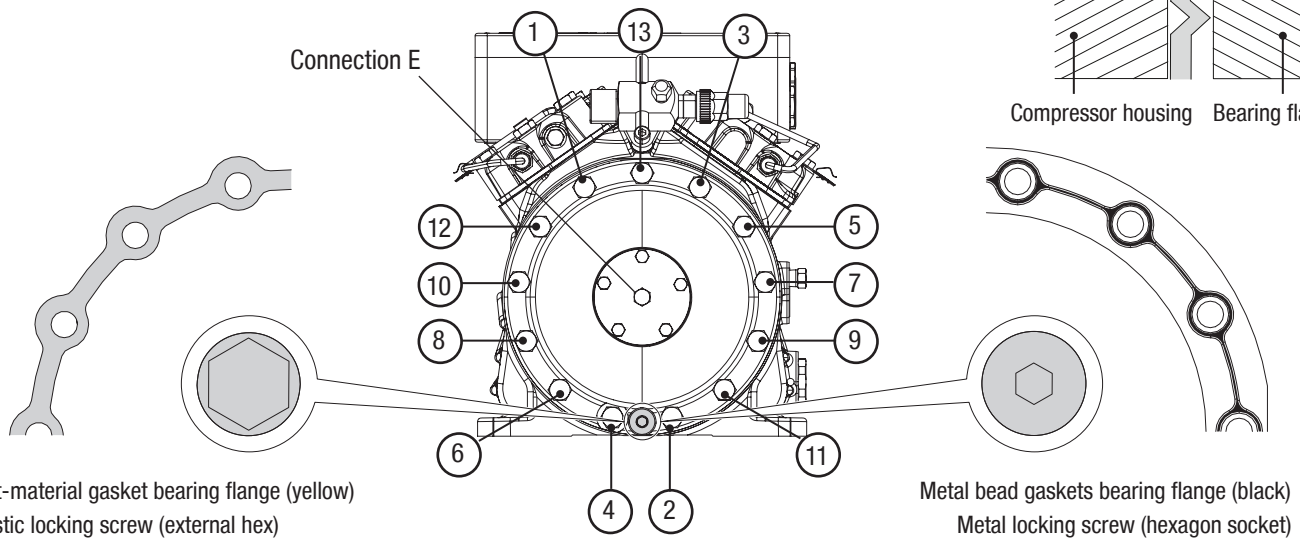
Position in parts list 2110 , 2020, 2220	Tools: Torque spanner, spanner SW 10, 13, 17; Allen key SW 8
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
	- Clean oil sump if required.
470, 480	**- Insert the oil strainer in the guide of the bearing flange. Position the gasket with the aid of two screws on the bearing flange, mount the bearing flange with the gasket.**
	- After attaching the bearing flange to the compressor housing, make sure that the through-hole in the bearing flange for receiving the screw plug M16x1.5 and the gasket are aligned with the bore of the compressor housing. Before tightening the fixing screws, check that the screw plug can be easily screwed in.
312	**- Tighten the screws of the bearing flange after fitting in order (1 to 13 respectively 1 to 11 page 37).**
	- Mounting oil pump in accordance with chapter 13.
	- For information on oil filling, please refer to the chapter 3 "Oil drain / Oil change".
	- Carry out the leak test.
⚠	**Risk of damage compressor!** **- Verify oil pressure (connection E / 1/8" NPTF). During restart the oilpressure must set up immediately. Oil differential pressure to suction pressure compressor at operating temperature 1,5-3 bar.**

Important Notes

INFO!

- **Do not drop any gasket residues into the compressor!**
- **Pay attention to the use of the gasket rear bearing flange depending on the compressor version.**
  - **a) Compressor with plastic locking screw**
    = Soft-material gasket (yellow)
  - **b) Compressor with metal locking screw**
    = Metal bead gaskets (black)

Tightening sequence:
EX-HG22P/e-34P/e



Positioning of metal bead gaskets

Soft-material gasket bearing flange (yellow)
Plastic locking screw (external hex)

Metal bead gaskets bearing flange (black)
Metal locking screw (hexagon socket)

2 Installation

From design key (DK)
057

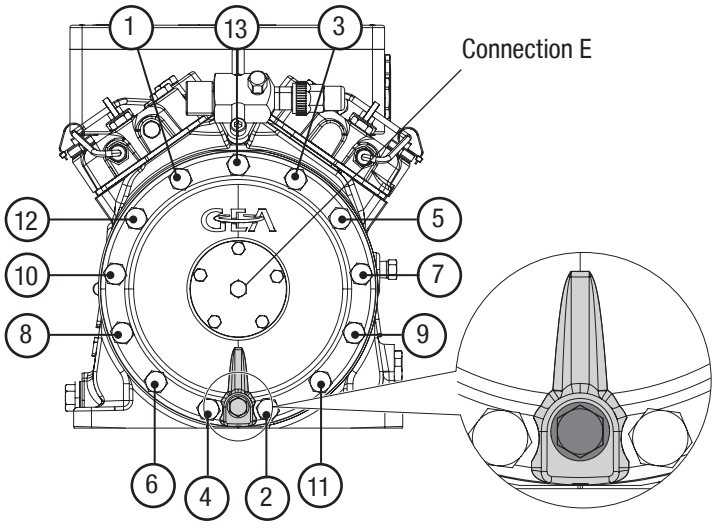
Position in parts list 2110 , 2020, 2220	Tools: Torque spanner, spanner SW 10, 13, 17; Allen key SW 6
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
	- Clean oil sump if required.
470, 480	**- Position the gasket with the aid of two screws on the bearing flange, mount the bearing flange with the gasket.**
	- Tighten the screws of the bearing flange after fitting in order (1 to 13).
312	**- Insert oil strainer, screw tight and close with screw plug.**
	- Mounting oil pump in accordance with chapter 13.
	- For information on oil filling, please refer to the chapter 3 "Oil drain / Oil change".
	- Carry out the leak test.
⚠	**Risk of damage compressor!** **- Verify oil pressure (connection E / 1/8" NPTF). During restart the oilpressure must set up immediately. Oil differential pressure to suction pressure compressor at operating temperature 1,5-3 bar.**

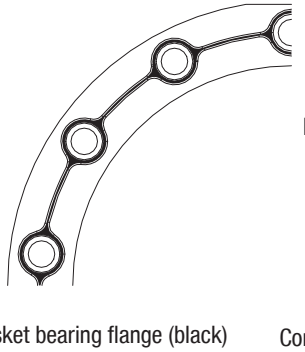
Important Notes

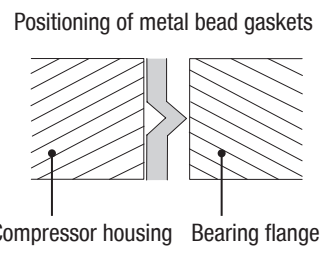
INFO!

- **Do not drop any gasket residues into the compressor!**
- **Pay attention to the use of the gasket rear bearing flange depending on the compressor version.**
  - **a) Compressor with plastic locking screw**
    = Soft-material gasket (yellow)
  - **b) Compressor with metal locking screw**
    = Metal bead gaskets (black)

Tightening sequence:
EX-HG22e-34e



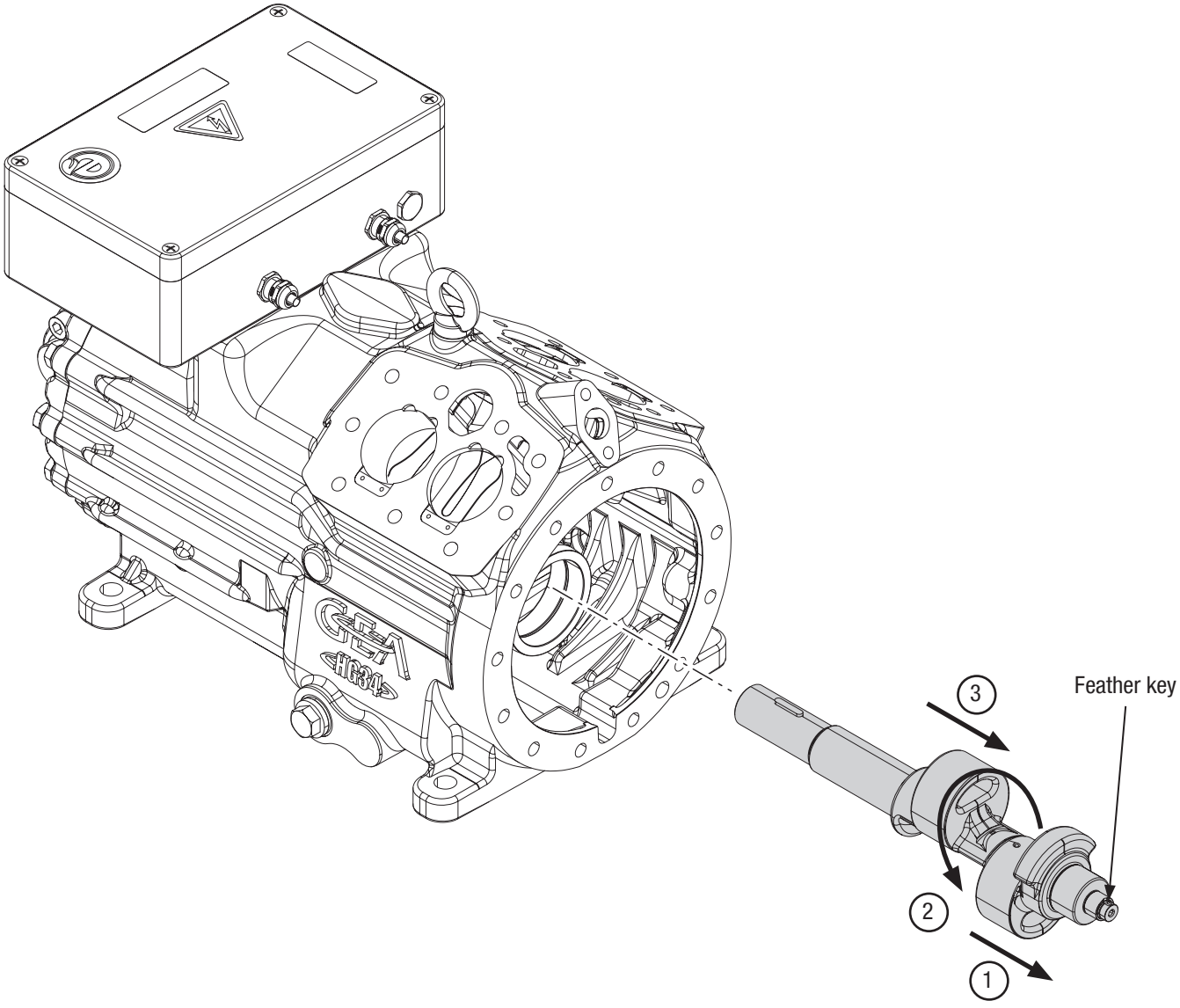




96529-05.2021-Gb

1 Removal

Position in parts list 2050	Tools: -
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
320	**- Removal is only possible if previously rotor (see chapter 7) has been removed!**
	- Remove feather key on oil pump side from crankshaft.
790	**- Release crankshaft from connecting rod and remove.**
	1 Pull out the crankshaft, until the leading crankpin (connecting rod bearing) is exposed.
	2 Turn the crankshaft approx. 180 degrees and move the connecting rod so, that the rear crankpin can be pulled through the connecting rod eyes of the connecting rods located in front of it (2 cylinder/4 cylinder compressor).
	3 Pull the crankshaft out completely, take care to the feather key on the rotor side.

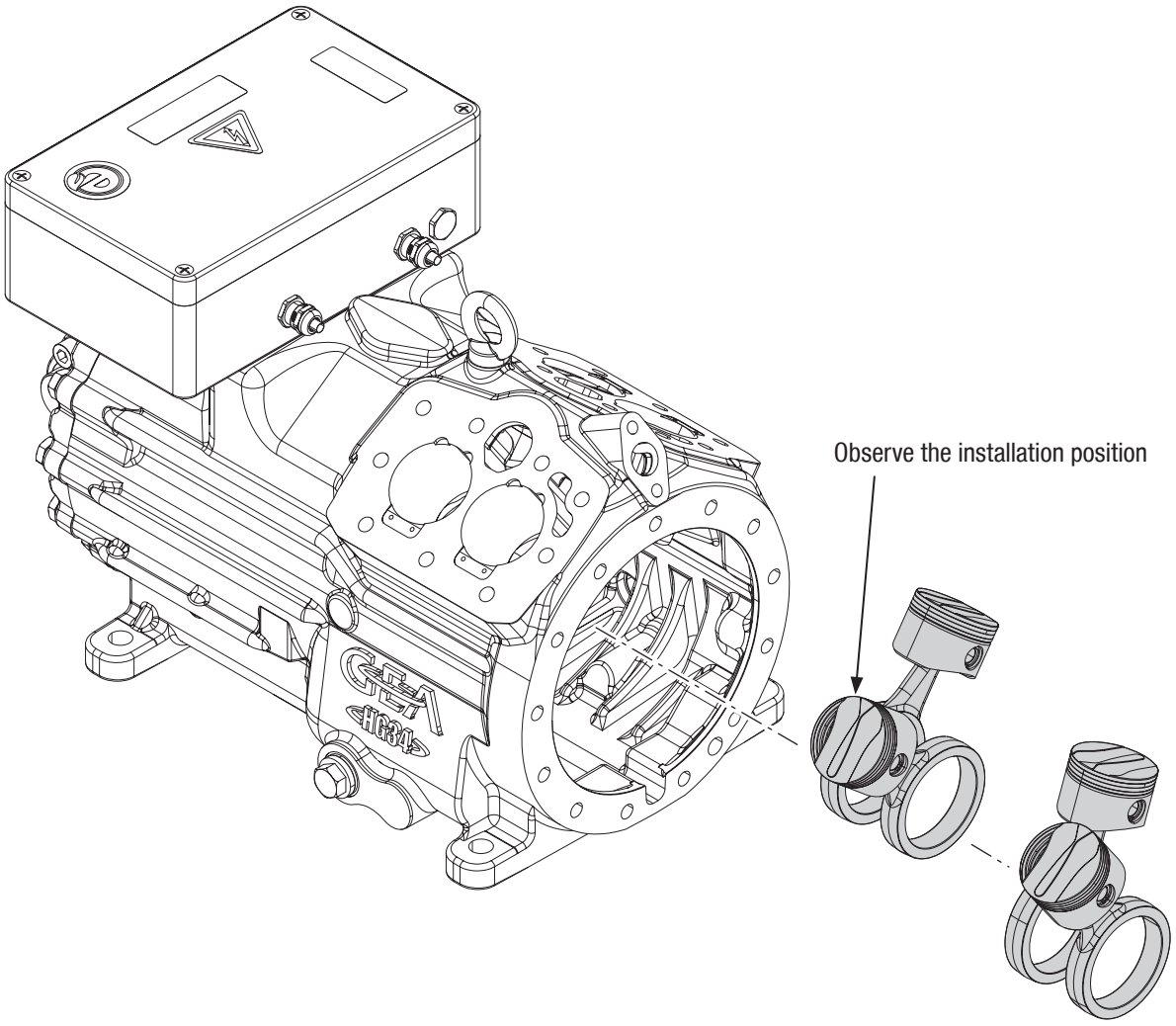


2 Installation

Position in parts list 2050	Tools:
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
	- Lubricate running surfaces of connecting rods with oil. Lubricate bearing surfaces of crankshaft with oil.
	- Insert crankshaft. Guide crankshaft through connecting rod eyes and insert into rear bearing bush until it stops. Thereby remain cautious and avoid jamming. Important: All connecting rods must be able to move axially and radially on the crankshaft. Turn the crankshaft by hand for checking easy motion.
320, 790	**- Insert feather key on oil pump side and rotor side.**

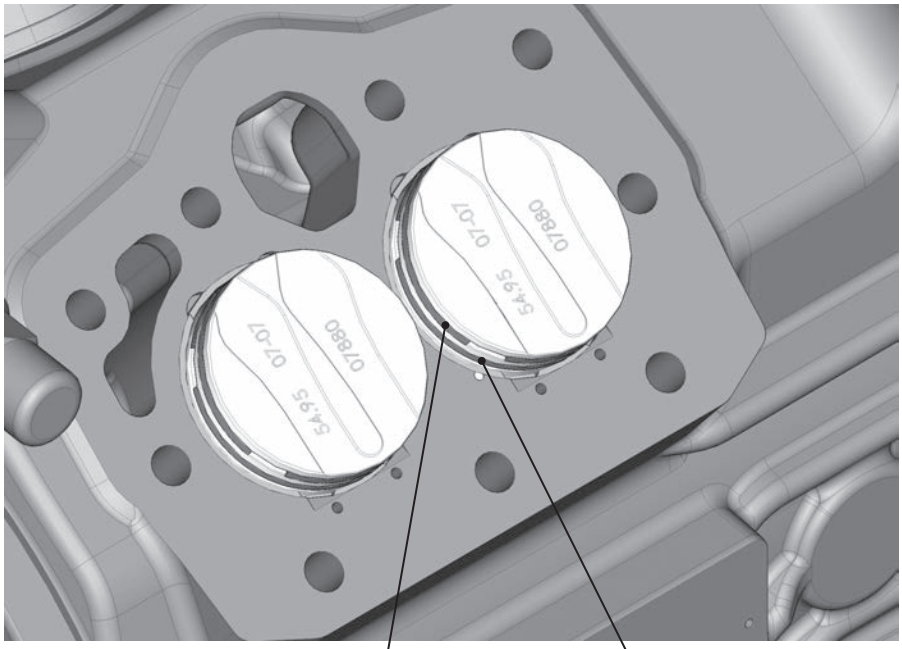
1 Removal

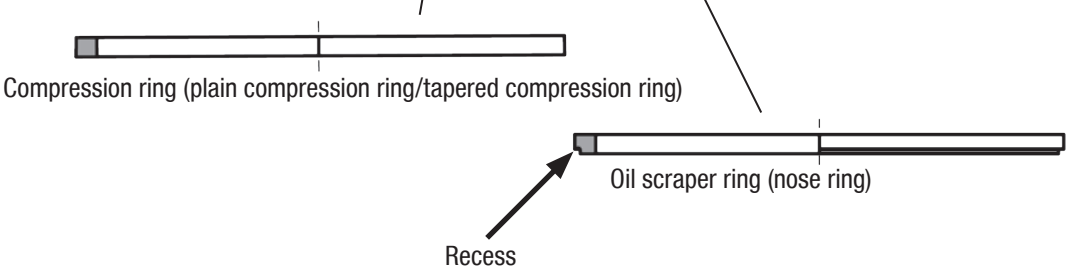
Position in parts list 2040	Tools: Needle-nose pliers
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
2030, 2100	**- Mark corresponding pistons of cylinder bore.**
	- Slide pistons/connecting rods out in the direction of cylinder cover until it stops.
290, 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, 275	**- Remove circlips of the piston pins with needle-nose pliers.**
270	**- Push the piston pins out of the pistons.**



2 Installation

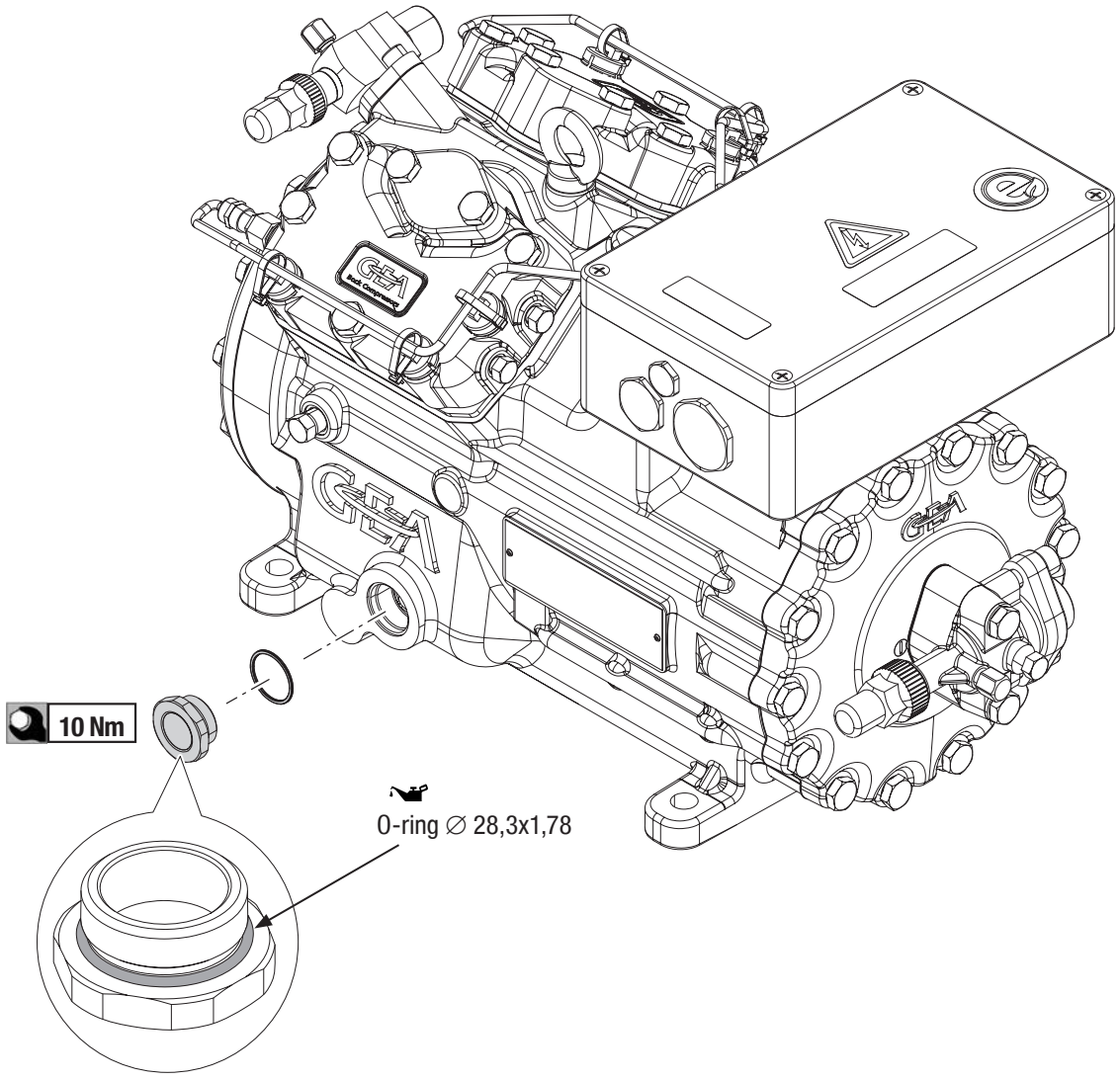
Position in parts list 2040	Tools: Piston ring plier, needle-nose pliers
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
2030	**- We recommend cleaning the housing from the inside before assembly.**
2100	**- Apply a little oil to the cylinder bore.**
270, 275	**- Clean the piston ring grooves carefully. Premount pistons and connecting rods, insert the circlips for piston pins.**
280	**- Insert pistons/connecting rods from below into the cylinder liners up to the stop.**
	- Pay attention to the correct assembly position (suction fin grooves).
290, 300	**- Install oil scraper rings in the lower groove and pressure rings in the upper groove. Spread piston rings carefully and only as far as necessary (risk of deformation or breakage).**
	- Install piston rings the marking "TOP" facing upwards.
	- The butt joints of the piston rings have to be installed min. 30° twisted to each other and may not be lying
	- upon each other.
	- Press the piston rings with the piston ring pliers into the piston ring grooves and push the piston back into the cylinder bore.





1 Removal

Position in parts list 2080	Tools: Spanner SW 36
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
590	- **Unscrew oil sight glass from compressor housing.**



2 Installation

Position in parts list 2080	Tools: Spanner SW 36
	Before starting any work on the compressor observe the safety instructions page 3-5!
	Working course
590	**- Lubricate O-ring with refrigeration oil and pull on the collar on the oil sight glass.** **- Screw oil sight glass into the compressor housing. Observe the tightening torques.** **- Carry out the leak test.**

Oil sump heater removal/installation

ATTENTION! Before starting any work on the compressor observe the safety instructions page 3-5!
The "special conditions" of the EC-Type Examination Certificate must be observed!
(see enclosed assembly instructions compressor)

1 Removal

Up to design key (DK)
056

Position in parts list 3950

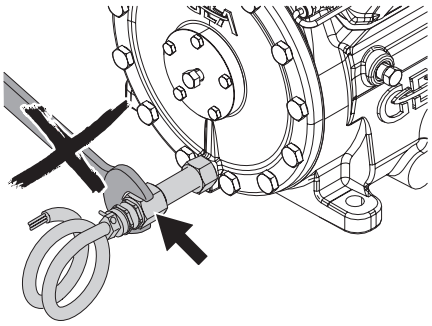
Tools: Spanner SW 24

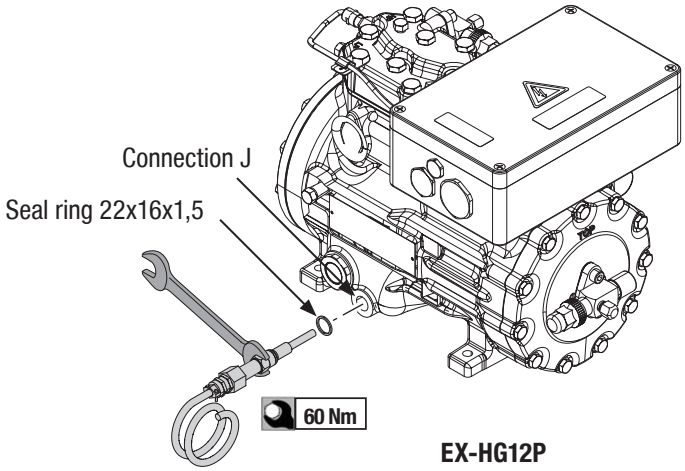
Working course

- **Disconnect the electrical supply line of the heating element from the terminals in the terminal box, release the fixations of the supply line.**

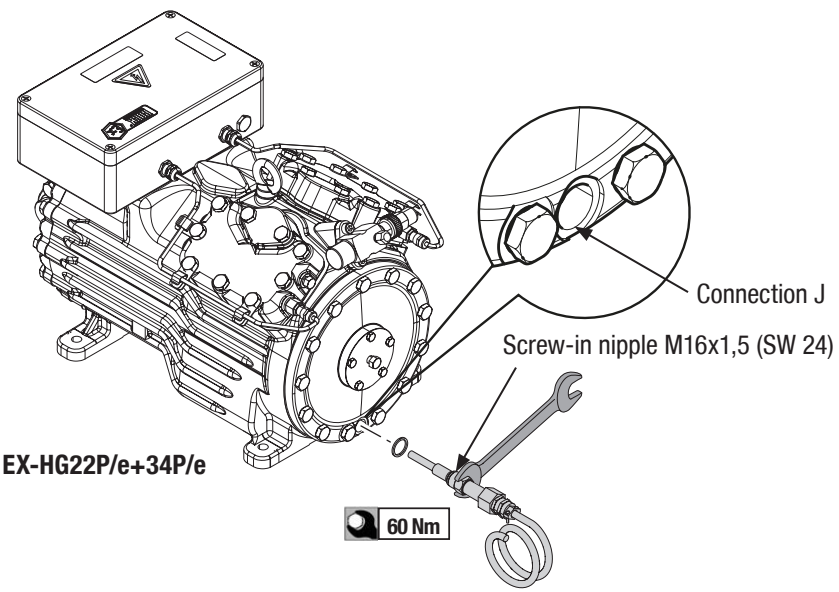
3952

- **Use open-end wrench to loosen the heating element anticlockwise. Do not attach the tool to the end of the heating element, only at the screw-in nipple.**
- **If no heating element is installed, screw in the plug (connection J) firmly incl. seal ring to protect the mounting hole.**





EX-HG12P



EX-HG22P/e+34P/e

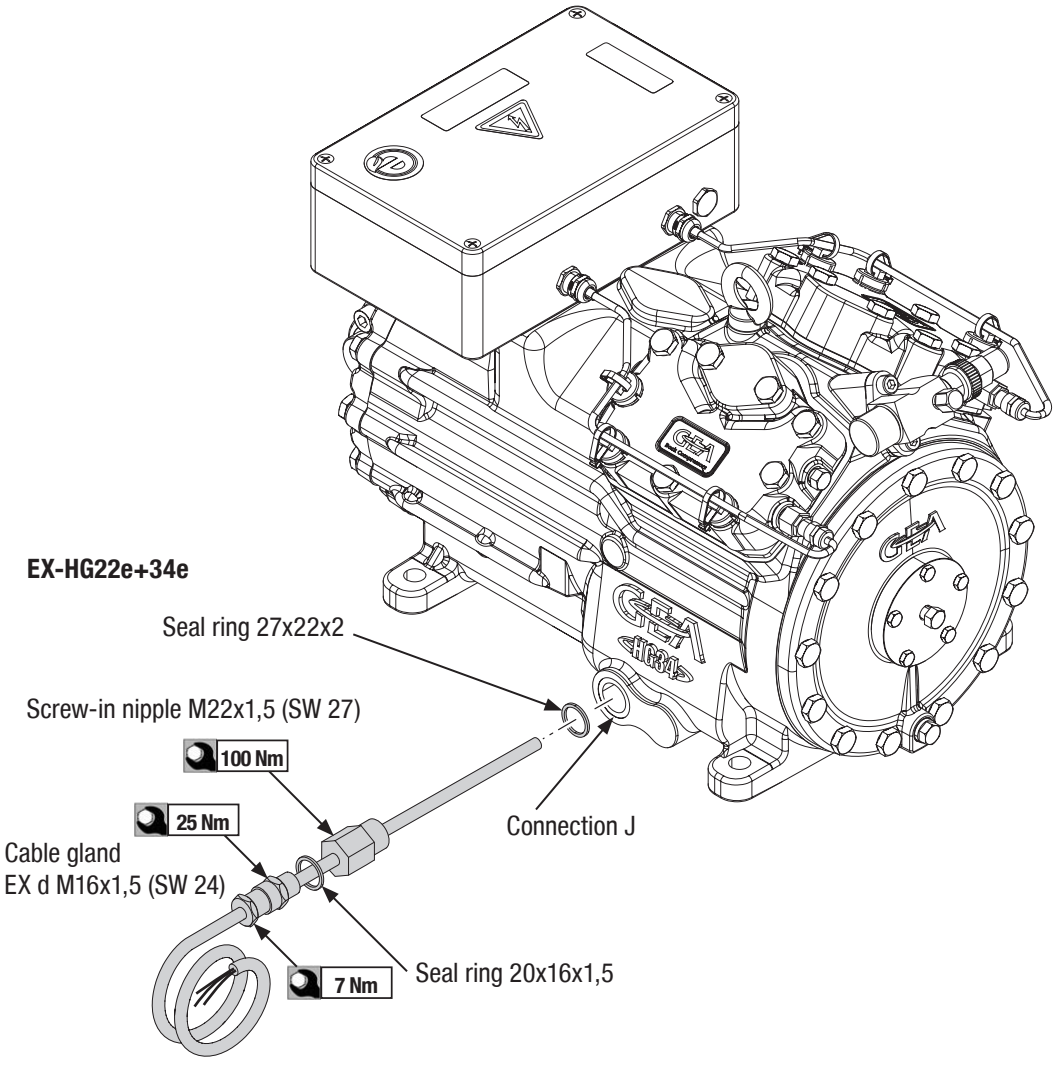
Oil sump heater removal/installation

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

1 Removal

From design key (DK)
057

Position in parts list 3950	Tools: Spanner SW 24, 27
	Working course
	- Drain oil from the compressor according to chapter 3.
3958	**- Disconnect the electrical supply line of the heating element from the terminals in the terminal box, release the fixations of the supply line.**
3952 3954 3956	**- Loosen the cable gland. Use open-end wrench to loosen the heating element anticlockwise. Place the key on the screw-in nipple.**
	- If no heating element is installed, screw in the plug (connection J) firmly incl. seal ring to protect the mounting hole.



96529-05.2021-Gb

2 Installation

Up to design key (DK)
056

Position in parts list 3950

Tools: Spanner SW 24

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

Working course

- **The electrical equipment may only be operated within the permissible range according to the name plate designation.**
- **Remove plug J (standard version), carefully clean the stepped bore and check for damage or corrosion.**

3952

- **Screw heating element with seal ring firmly and captively into mounting hole, tightening torques 60 Nm.**
- **Only apply the tightening torque to the screw-in nipple.**

- **The heating element may only be put into operation if it has been firmly and captively screwed into the mounting hole.**

- **Lay the supply line of the heating element to the external terminal box.**
- **Within the explosion-endangered area, the connection must be made in an external terminal box, which is designed in a suitable type of protection!**
- **Carry out electrical protection in accordance with the enclosed assembly instructions!**
- **Observe EC-type-examination certificate and installation instructions of the manufacturer!**
- **Carry out the leak test.**

2 Installation

From design key (DK)
057

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

- **Remove plug J (standard version), carefully clean the stepped bore and check for damage or corrosion.**

3952

- **Screw heating element with seal ring firmly and captively into mounting hole, tightening torques 100 Nm.**

3954
3956

- **Mount cable gland with seal ring, tightening torques 25 Nm. Tighten the cap nut of the cable gland after laying the cable to 7 Nm.**
- **If necessary, fill the compressor with oil. For information on oil filling, please refer to the chapter 3 "Oil drain / Oil change".**

3958

- **Lay the supply line of the heating element to the external terminal box.**
- **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!**
- **Carry out electrical protection in accordance with the enclosed assembly instructions!**

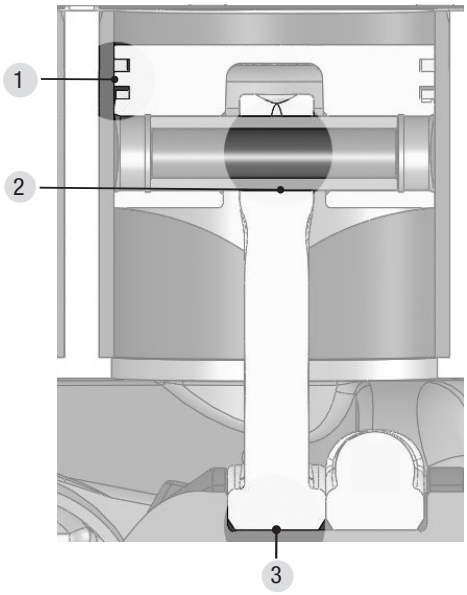
- **The heating element may only be put into operation if it has been firmly and captively screwed into the mounting hole.**

19 I Checking the compressor parts

Checking compressor parts for damages and wear

Before re-using removed compressor parts we recommend that they be checked for usability.
The wear limits listed below should be taken into consideration:

1	Piston - cylinder bore	0,13 mm
2	Connecting rod - piston pin	0,03 mm
3	Crankshaft - connecting rod	0,08 mm



Other components have to be examined according to the following criteria:

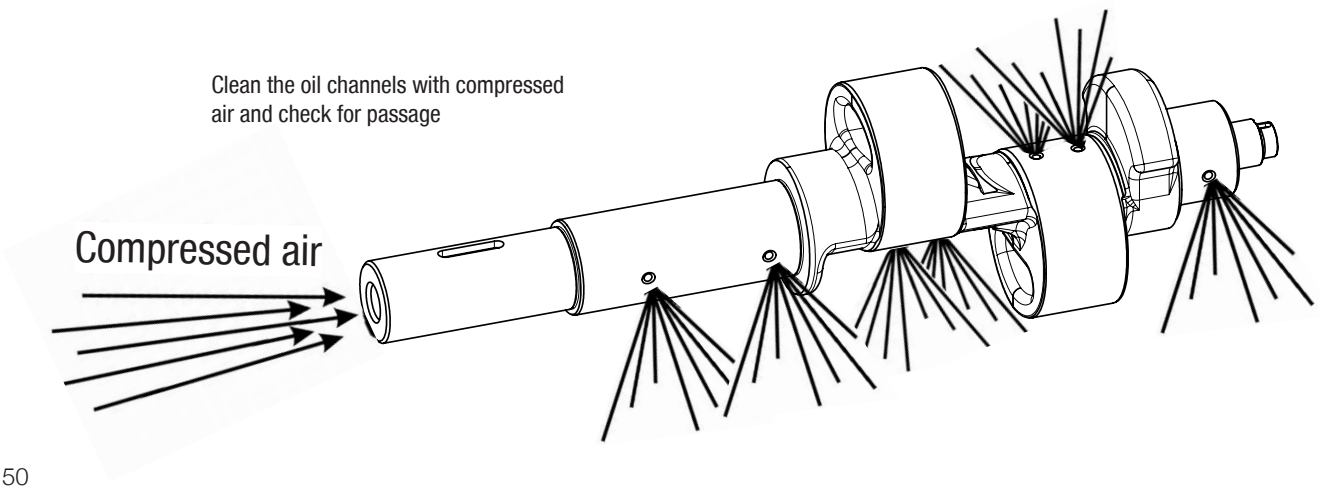
- **Cylinder liners**

  The cylinder liners should not have any visible damages in the piston movement area.
  If there is fluting, the casing should be replaced.

- **Crankshaft**

  The bearing surfaces should not have any damages. The oil channels should be clean so that an unhindered oil flow is ensured.

CAUTION! **Remaining oil can cause eye injury!**
When compressed air is used, remaining oil can splash out of the oil channels.
Wear protective goggles.



96529-05.2021-Gb

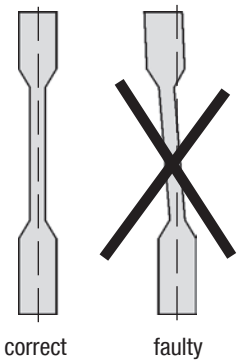
19 I Checking the compressor parts

- **Pistons**

  There should be no visible damages on the piston crown and the piston walls. The grooves for the piston rings must be clean and undamaged. Check the condition of the piston rings for wear, fractures and other irregularities

- **Connecting rods**

  There should be no damages on bearing surfaces.
  The connecting rod shank must be straight.

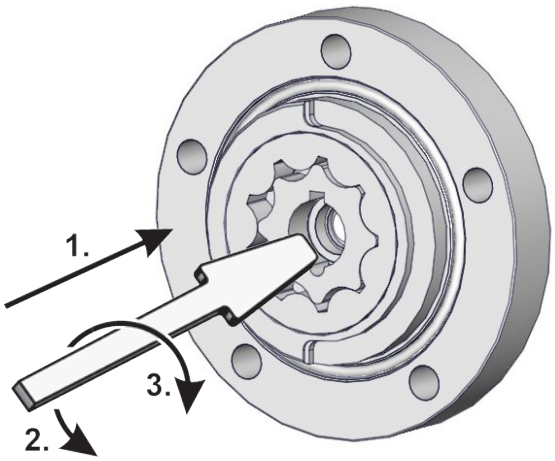


- **Valve plates**

  Suction and pressure lamella must be undamaged and undeformed. The sealing surfaces must be clean and undamaged, between lamellas and valve plates there should not be any pollution (dirt, swarfs etc.). In case of a damage the valve plate must be replaced completely. Single lamella are not available.

- **Oil pump**

  It must be possible to turn the oil pump by hand (turning to the left and to the right).
  In the removed conditioning the reversing device of the oil pump must switch over audibly.



- **Oil filter / suction filter**

  The filter screen must be in an undamaged condition. Dirt and residues have to be removed.
  If necessary, the filter have to be cleaned with compressed air or replaced with new ones.

  In case of larger compressor damages which necessitate a complete disassembly of the compressor, we recommend in principle the replacement of the valve plates, the piston rings and all gaskets. Thus, concealed defects of parts which have been in operation may be prevented.

BOCK®

Bock GmbH
Benzstraße 7
72636 Frickenhausen
Germany
Tel +49 7022 9454-0
Fax +49 7022 9454-137
www.bock.de