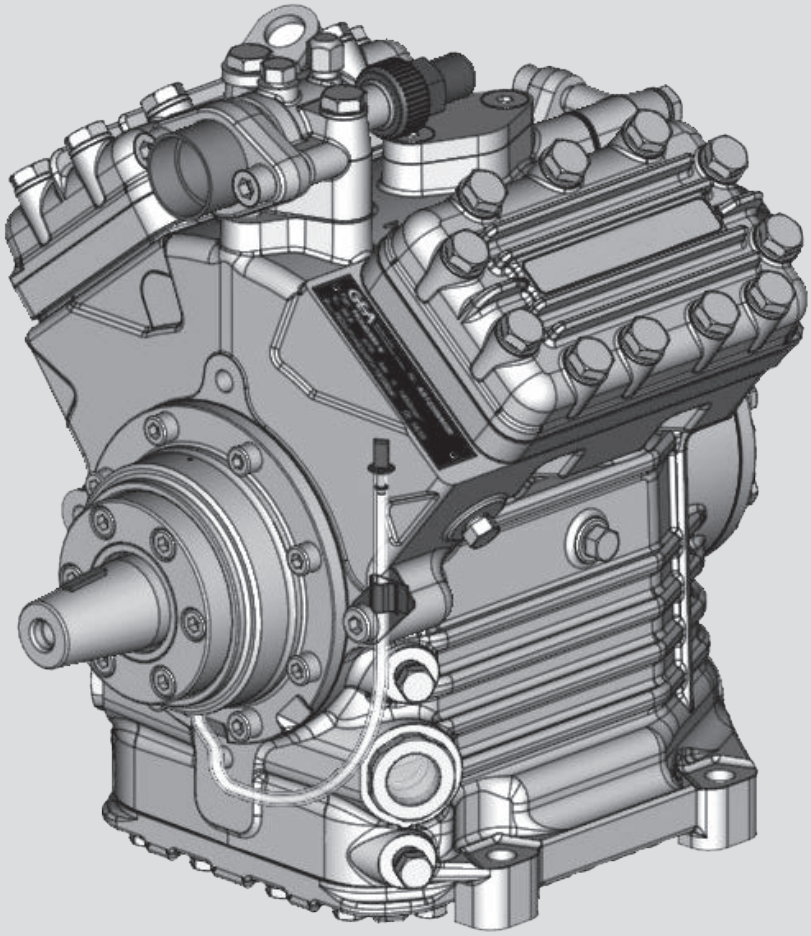

FK40

Maintenance manual

FK40/390 K	FK40/470 K	FK40/560 K	FK40/655 K
FK40/390 N	FK40/470 N	FK40/560 N	FK40/655 N
FK40/390 TK	FK40/470 TK	FK40/560 TK	FK40/655 TK

engineering for a better world

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 inserious 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

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Contents

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1 I Introduction

This maintenance manual is intended to make the repair and maintenance of the FK40 easier for the servicing personnel. The maintenance manual contains a complete description of each work step for the disassembly and assembly of the compressor components. Each step must be carefully adhered to in order tu ensure a reliable repair.

Note:

- For replacing components GEA Bock provides suitable spare part kits. Yet assembly jobs which go beyond the replacement of the shaft seal, the valve plates and - if there is one - the capacity regulator (accessory) should be checked carefully for their economic efficiency beforehand.
- The maintenance manual describes the standard type of the FK40 compressor which we deliver. Because of different system conceptions, some passages in this service manual may differ from the unit which you have come across. In these cases the present manual should be used in analogous fashion.

2 I 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.**

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

- **Refrigerating compressors are pressurised machines and therefore require particular caution and care in handling.**
- **Only qualified personnel are allowed to perform any work on refrigeration compressors.**
- **The national safety regulations, accident prevention regulations, technical rules and specific regulations (EN 378 and others) must be taken into account absolutely.**
- **Never put the safety switch out of action!**
- **Prior to commissioning, check whether all the components installed by the user have been fastened expertly and connected pressure-tight with the compressor (e.g. piping, plugs, union nuts, replaced components etc.).**
- **Before commissioning, evacuate the refrigerant systems carefully including the compressor and afterwards charge refrigerant.**
- **Prior to starting the compressor open discharge shut-off valve and suction shut-off valve.**
- **Do not start the compressor in vacuum. Operate the compressor only when the system is charged.**
- **Risk of burns! Depending on the operating conditions, surface temperatures of over 60 °C on the pressure side or below 0 °C on the suction side can be reached.**
- **The maximum permissible overpressure must not be exceeded, even for testing purposes.**
- **Danger of injury! Never grab rotating parts during operation!**

3 I Product description

Product description

Series FK40 vehicle compressors are designed for mobile applications.

Short description

Three design variations are available for different areas of application:

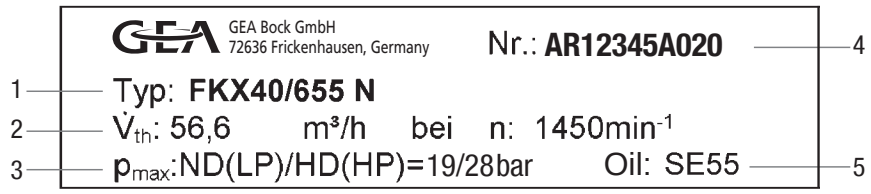
> For air conditioning	**the K design**
> For air conditioning or normal cooling	**the N design**
> For deep freezing	**the TK design**

The differences are mostly associated with the valve plate version which is adapted to each application range where operational safety and efficiency are concerned.

More features:

- Compact 4-cylinder compressor in V design
- Wear resistant and long-lasting engine
- Four sizes as regards capacity
- Aluminium light-weight construction
- Crankshaft supported in roller bearings on both sides
- Bidirectional lubricating oil pump with relief valve
- Variable arrangement shut-off valves
- Ideally equipped with valve plates for each application
- Integrated pulsation damper for especially quiet running

Name plate (example)



1. Type designation
2. Displacement at 1450 rpm
3. ND(LP): max. permissible operating pressure low pressure side
   HD(HP): max. permissible operating pressure high pressure side
4. Machine number
5. Factory-filled oil type

} **Observe the limits of application diagrams!**

Type code (example)

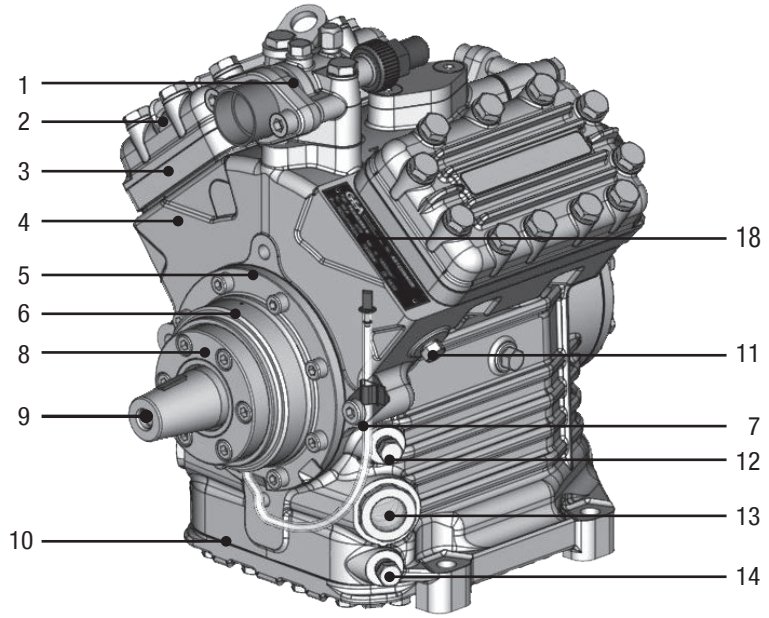
Explanation of the type designation

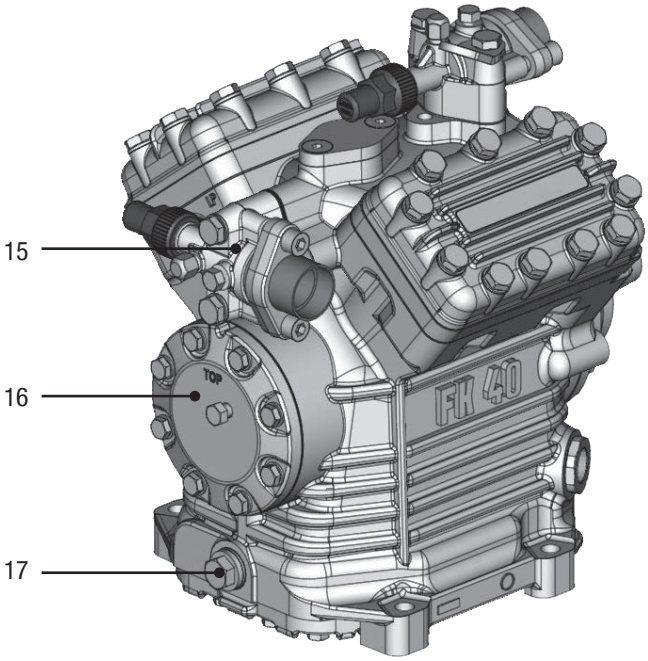
FK X 40 / 655 N

- N — Designs
- 655 — Swept volume
- 40 — Size
- X — Ester oil charge (HFC refrigerant, e.g. R134a, R407C)
- FK — Series

3 I Product description

Main and functional parts





1. Discharge shut-off valve
2. Cylinder cover
3. Valve plate
4. Compressor housing
5. Location hole for fitting magnetic coupling
6. Integrated leak oil collector
7. Leak oil drain hose
8. Shaft seal
9. Shaft end
10. Baseplate
11. Connection thermal protection thermostat
12. Oil filling plug
13. Oil sight glasses (2x)
14. Oil drain plug
15. Suction line valve
16. Oil pump
17. Oil drain plug / Oil filter
18. Name plate

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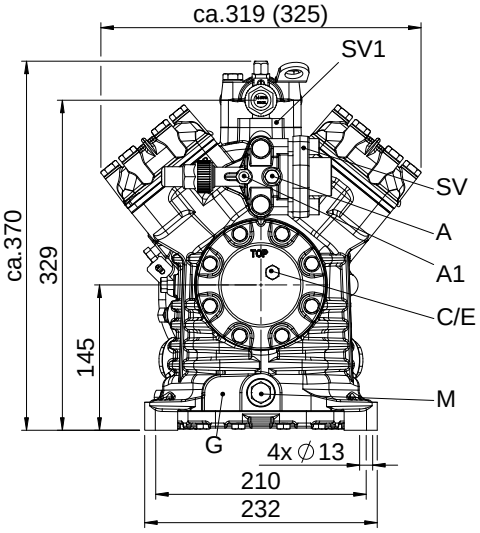
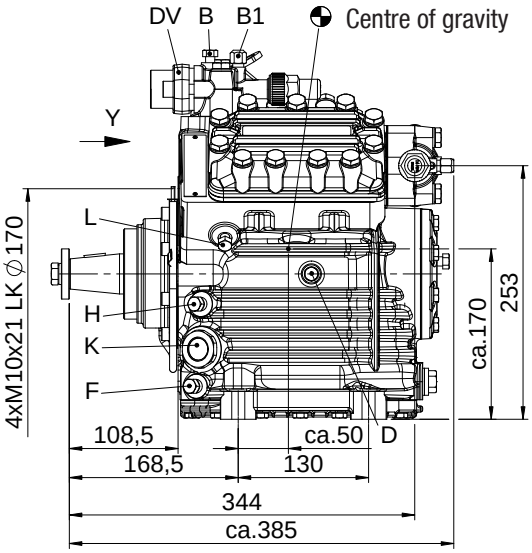
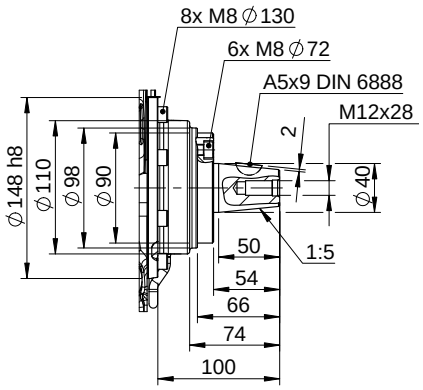
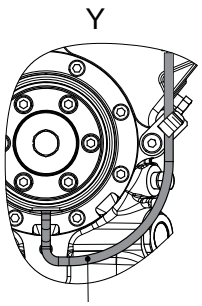
Dimension drawing









Dimensions in mm

Shaft end

Leak oil drain hose

Connections

A	Connection suction side, not lockable	1/8“ NPTF
A1	Connection suction side, lockable	7/16“ UNF
B	Connection discharge side, not lockable	1/8“ NPTF
B1	Connection discharge side, lockable	7/16“ UNF
C	Connection oil pressure safety switch OIL	1/8“ NPTF
D	Connection oil pressure safety switch LP	1/8“ NPTF
E	Connection oil pressure gauge	1/8“ NPTF
F	Oil drain	1/4“ NPTF
G	Opt. connection for oil sump heater [1)]	- -
H	Oil charge plug	1/4“ NPTF
K	Sight glass	2 x 1 1/8“ NPTF
L	Connection thermal protection thermostat	1/8“ NPTF
M	Oil filter	M22x1.5
SV1	Optional connection for suction line valve	- -

[1)] = No connection available as standard.
Available on request (Connection M22 x 1,5)

Type	No. of Cyl.	Displace-ment	Swept volume (1450 rpm)	Weight	Connections		Oil charge	Inertia moment of the driving unit	Lubrication	Oil pump
					Discharge line DV	Suction line SV				
		cm^3	m^3/h	kg	mm / inch	mm/inch	Ltr.	[kgm^2]		
FK40/390	4	385	33.5	34.0	22 / $^7/_8$	28 / 1 $^1/_8$	2.0	0.0043	Forced lubrication	Rotation-independent
FK40/470		466	40.5	33.0	28 / 1 $^1/_8$	35 / 1 $^3/_8$				
FK40/560		554	48.3	33.0	28 / 1 $^1/_8$	35 / 1 $^3/_8$				
FK40/655		650	56.6	31.0	35 / 1 $^3/_8$	35 / 1 $^3/_8$				

The technical data for the different designs K, N and TK are identical.
The compressor type data therefore do not mention these additions.

Maintenance

Service intervals

Practically no maintenance is required. However, for an optimal operating safety and service life of the compressor **we recommend** to carry out the necessary maintenance work regulary according to the specifications of the manufacturer of the refrigerating plant.

Function checks to be carried out once a year

- Leak test of the plant
- Checking the running noise of compressor
- Checking pressures and temperatures of the plant
- Checking the tensioner for orderly seating
- Checking the V belts for tension and condition
- Checking the oil level in the cranckcase
- Checking the fixing screws for tightening
- Checking the function of the ancillary units
- Checking the electrical connections for clean, firmly fixed contacts and the leads for chaing points

Oil level check

After starting the compressor, the oil level has to be checked. For this:

- The driving engine should be in the „High idle“ operating condition (elevated idling speed)
- Compressor running time at least 10 min.
- The plant should have reached the operating point
- The oil level must be visible in the sight glass

Changing oil

In case of orderly manufactured and operated plants an oil change is in principle not absolutely necessary.

Yet, based on decades-long experience we recommend to carry out the following oil change and servicing.

- First oil change at the first maintenance of the vehicle.
- After that, changing the oil every 5000 operating hours, but at the latest after 3 years.
  At the same time the oil filter and the suction filter should be cleaned and the oil collecting ring from the shaft seal replaced.

Lubricants

The oil type charged as standard in the factory is marked on the **name plate. This oil type should be used as a preference.**
Alternatives are stated in the extract from our lubricants table below:

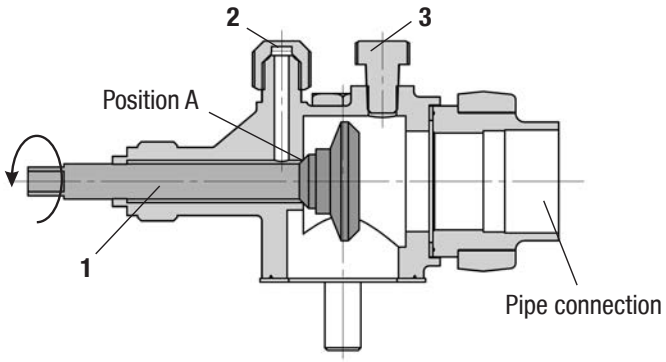
Standard oil type used by GEA Bock	Recommended alternatives	
For HCFC (e.g. R22)		
Fuchs Reniso SP 46	BP Energol LPT 46	SUNOCO Suniso 3.5GS TEXACO Capella WF 46
For HFC (e.g. R134a, R404A, R407C)		
Fuchs Reniso Triton SE 55	FUCHS SEZ 32 / 68 / 80	ESSO / Mobil EAL Arctic 46

Information about other suitable oils should be taken from GEA Bock lubricant tables.
Information may also be retrieved from www.gea.com.

Operating of the shut-off valves

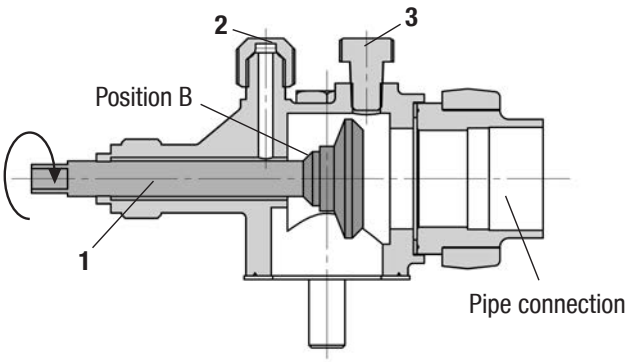
Opening the shut-off valve:

a) Spindle 1: turn to the left (counter-clockwise) as far as it will go.
—> Shut-off valve fully opened / service connection 2 closed (position A), Fig.

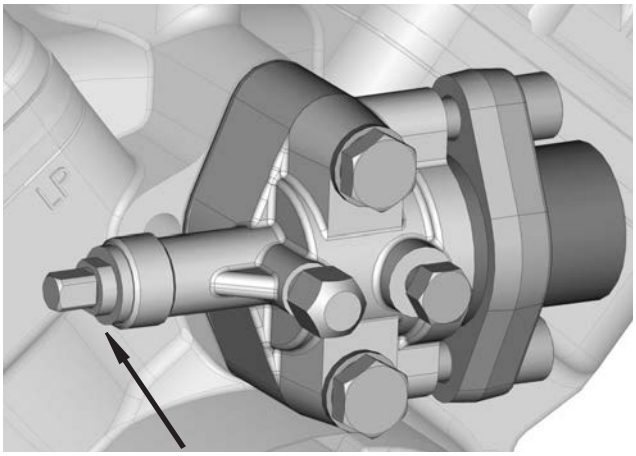


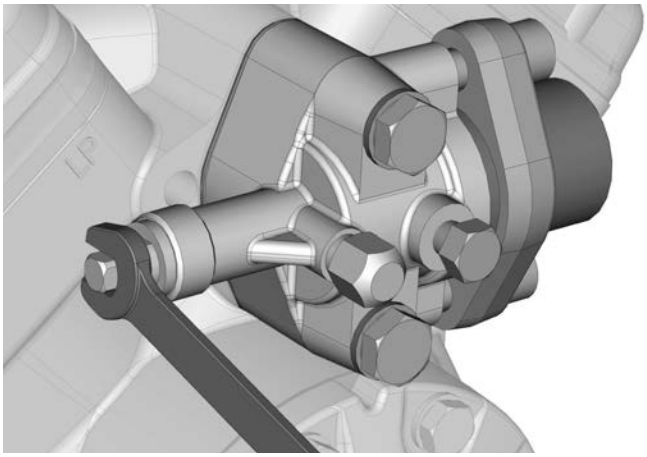
Opening the service connection (2)

b) Spindle 1: Turn 1/2 -1 rotation to the right.
—> Service connection 2 opened / shut-off valve opened (position B), Fig.
Connection 3 is provided for safety devices and is not lockable.



INFO **Before opening or closing the shut-off valve, loosen the valve spindle seal (Fig. left) by 1/4 turn. After operating the shut-off valve, tighten the valve spindle seal carefully again (Fig. right).**





6 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. Further information is available on our failure analysis slide that can be downloaded on www.gea.com.

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	Replace fuse Determine and remove the cause
	Cut off through: - Low pressure switch - High pressure switch - Heat protection thermostat - Control thermostat - Other safety elements	Locate the interruption in the circuit and remove
Malfunction of electromagnetic coupling	- see also page 14 "Malfunction of electromagnetic coupling"	Checking

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

6 I Fault diagnosis

Problem	Possible cause	Remedy
Cutoff through high pressure 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 heatprotection thermostat (accessory)	**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
	- Suction gas overheating	- Check expansion valve / check insulation on the suction side
	- Valve plate damage	- Replace valve plate
	- Internal decompression valve has opened	- Replace decompression valve -> Check compressor and refrigeration plant Determine and remove the cause for the inadmissible high pressure in the high-pressure side
Cutoff through control thermostat	Temperature over / below the desired range	Check operating points

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

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6 I Fault diagnosis

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 heat-protection thermostat“
	- 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
	- Internal decompression valve has opened	- Replace decompression valve (see the section-on Disassembly / Assembly of Compressor)

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 the 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

6 I Fault diagnosis

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
Electromagnetic coupling slipping	- see also p. 14 „Malfunction of electromagnetic coupling“	- Checking
V belt drive, increased noise generation	- Belts vibrating excessively	- Check belt tension Use tensioning roller / guidance roller
	- Incorrect alignment of compressor and motor	- Check alignment and adjust anew

Malfunction of the electromagnetic coupling

Problem	Possible cause	Remedy
Coupling not switching	- No voltage applied	- Apply voltage and check
Coupling slipping too long, getting hot, smoking and squeaking	- Voltage too low	- Keep the voltage at 12 or 24 Volts (check vehicle network)
	- Driving power too high	- Check operating conditions
	- Rotor rubbing at the magnetic field	- Check the seating of the magnet possibly to high belt tension
Coupling not separating	- Voltage still being applied to the magnet	- Check switch / relay
	- Coupling is stuck	- Disconnect the armature disc from the rotor mechanically
	- Coupling overloaded, Armature disc is deformed	- Install new rotor ans armature disc

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7 I Installation of service kits

Disassembly and assembly of the compressor

WARNING **Before starting any work on the compressor:**

- **Switch of the compressor and guard it against switching on**
- **Close the discharge and suction shut-off valves**
- **Relieve the compressor from system pressure**
- **Prevent air from infiltrating the system**
- **Move and transport the compressor using an appropriate hoist**
- **Use only genuine GEA Bock spare parts**

After the work is finished:

- **Connect the safety switch and check its function**
- **Evacuate the compressor**
- **Before commissioning, check whether all the components installed by the user have been mounted expertly and are connected pressure-tight to the compressor**
- **Open the pressure and suction shut-off valves**
- **Set off the switching-on lock**

For changing components in the framework of customary service works we recommend the kits described on the following pages.

Important Notes

INFO

- **Use only new gaskets for assembly**
- **The following illustrations show a FK40 compressor in standard design. Components of other designs can differ from these illustrations. However, the procedure for disassembly and assembly of the compressor is identical.**

7 I Installation of service kits

Shaft seal (Item No. 80023)

Removal:

- Dismount the drive/magnetic coupling from the compressor.
- Remove the woodruff key from seat at the shaft end.
- Remove the clamping ring (10) and the oil felt (9) (for this see Fig. 3 on page 17).
- Unscrew the screws (8) from the shaft seal cover (6) .
- Remove the gasket residues and the shaft seal cover gasket (5) from the bearing flange.

ATTENTION **The shaft seal cover (6) is under spring tension. The remaining oil may run out of the shaft seal chamber. Keep a suitable collection container ready!**

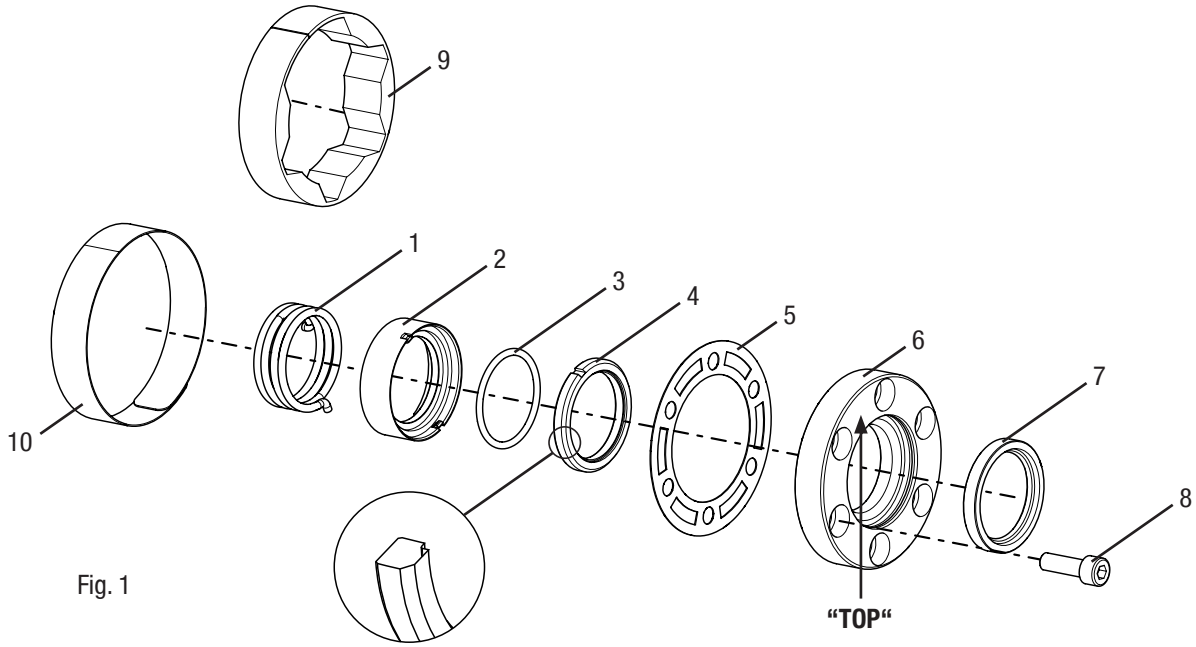


Fig. 1

Installation:

- Work with utmost cleanliness.
- Always replace the shaft seals complete, never individual parts thereof.
- Do not use used parts.
- Prior to installation, check the sliding and sealing surfaces for cleanliness and damages.
- Apply **a thin film of oil** on the sealing surfaces of the sliding ring (4), shaft seal cover (6), O-ring (3) and the compressor shaft (use compressor oil).
- Assemble the sliding ring (4), O-ring (3) and the guide ring (2) together as a unit. The large chamfer on the sliding ring (4) should show in the direction of the shaft seal cover (6).
- During the assembly the compression spring (1) must engage audibly in the drive slot of the crankshaft and of the guide ring (2).
- Install the shaft seal cover gasket (5) dry, don't impregnate it with oil.
- Install the shaft seal cover (6) with the inscription „TOP" upwards. Insert the sealing ring (7). Tighten the fixing screws (8) evenly, crosswise tightening torque = 34 Nm.
- After installing the shaft seal, turn the compressor shaft a few turns by hand and then carry out the leak test.
- Install the clamping ring, if available (see section on clamping ring with oil felt, page 17).
- Insert the Woodruff key into the seat at the compressor shaft end.
- Mount the drive/coupling.

7 I Installation of service kits

Clamping ring with oil felt (Item No. 80129)

Procedure:

- Remove the clamping ring (1) and the oil felt (2) (see Fig. 3)
- Insert the oil felt (2) included in the repair kit and mount the clamping ring (1).

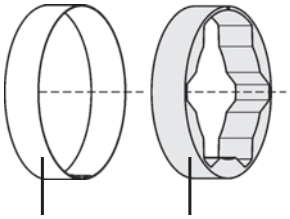


Fig. 2

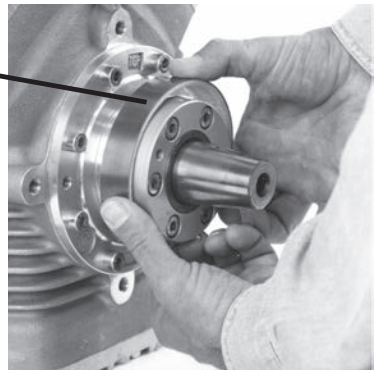


Fig. 3

Type code **007 - 014**

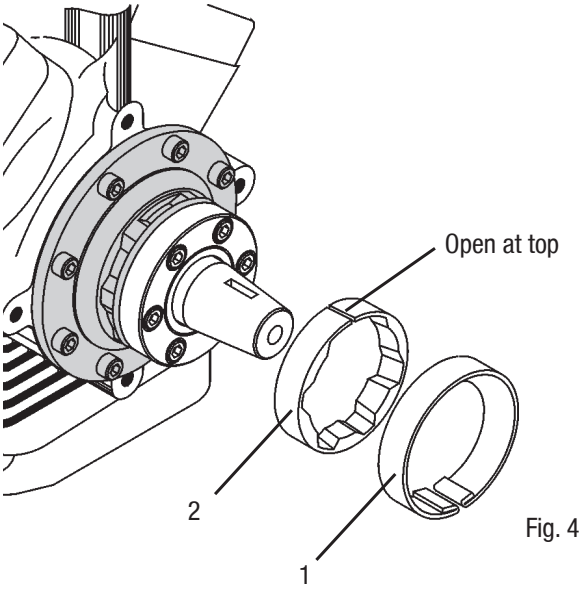
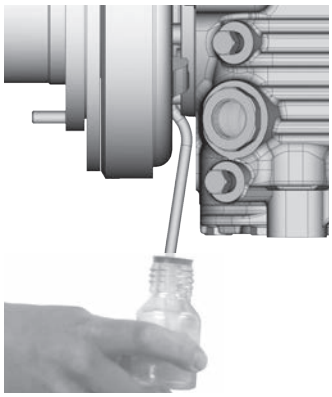


Fig. 4

Starting from type code **015-** (starting from 4th quarter 2005)

Emptying the oil reservoir: The oil reservoir can be emptied very simply without having to dismantle the coupling and/or belt drive. It is recommended that this is done at the same time as the air-conditioning maintenance and motor service. Proceed by removing the oil hose from the bracket, remove the sealing plug and drain the oil into a collecting vessel. After emptying, the bracket. Dispose of used oil in accordance with the regulations applicable in the country of use.



7 I Installation of service kits

Capacity regulation

The capacity regulation takes place through the turning off of the suction gas flows by means of a solenoid valve on the cylinder cover. For this, the valve is activated electrically by a thermostat or pressostat.

- During normal operation the solenoid is de-energized and the suction gas channel in the valve plate and in the cylinder cover is open.
- During regulated operation the solenoid is energized and the suction gas flow is closed through the shut-off piston of the solenoid valve. The compressor pistons of the cylinder bank which is regulated down run idle. The capacity of the compressor is still approx. 50%.

Further information together the description of the working principle of the solenoid valve is contained in the publication „Capacity regulation“ (Item No. 09900).

Capacity regulation valve (Item No. 07541)

(Only for the capacity regulation which is an accessory)

Removal:

- De-energize the solenoid (4).
- Screw on the fixing nut (3), pull out the solenoid (4) with the washer (5).
- Unscrew the valve body (2).
- Check the valve body (2) for damages and whether the piston moves freely. If necessary, replace the complete valve body (2).

Installation:

- Screw on the valve body (2) with the enclosed new O-ring (1) and tighten it. Observe the screw tightening torque!
- Push on the washer (5) and the solenoid (4) and fasten them with the fixing nut (3).
- Put the compressor into operation and check the functioning of the capacity regulation.

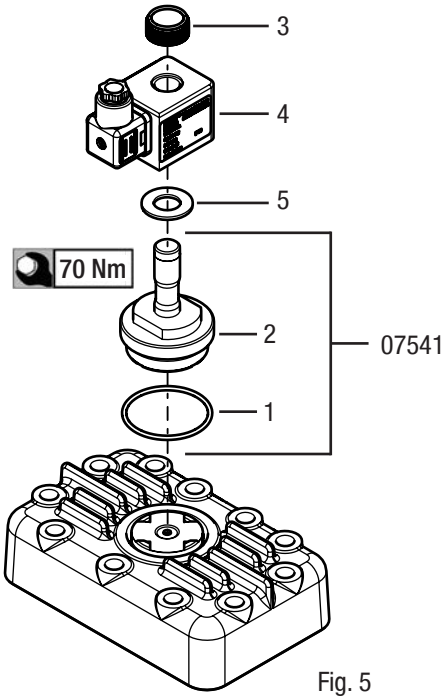


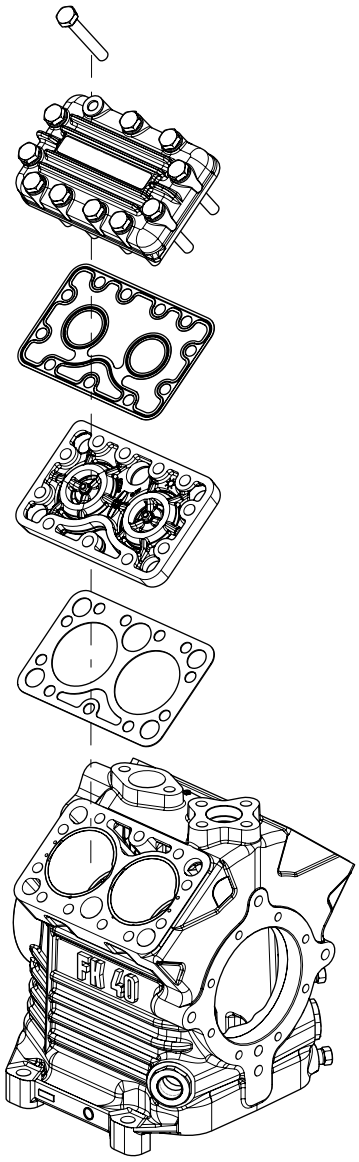
Fig. 5

7 I Installation of service kits

Valve plate

Compressor type	Kit (Item No.)	Compressor type	Kit (Item No.)
FK40/390 N	80240	FK40/390 TK	80240
FK40/470 N	80240	FK40/470 TK	80240
FK40/560 N	80241	FK40/560 TK	80241
FK40/655 N	80241	FK40/655 TK	80241
FK40/390 K to FK40/655 K	80010		

K type valve plate



N type and TK type Valve plate

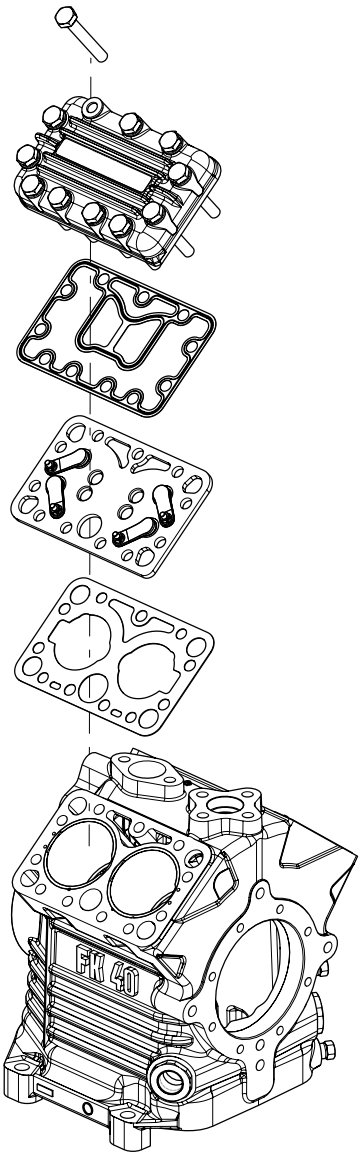


Fig. 6

7 I Installation of service kits

Removal (see Fig. 6)**:**

- Unscrew the screws (1) from the cylinder cover (2) and dismount cylinder cover (2) with valve plate (4).
- Remove the gasket residues from the body of the compressor.

INFO **Don‘t let any gasket residues fall into the compressor**

Installation (see Fig. 6)**:**

ATTENTION **The conversion of the compressor from one type of valve plate to another is not possible!**

- Apply a little oil to the lower valve plate gasket (5) install the upper valve plate gasket (3) (metallic gasket) dry.
- Pay attention to the correct installation position of the gaskets (3, 5) of the valve plate (4) and of the cylinder cover (2).

ATTENTION **Install the K type valve plate (Item No. 80010) only with the inscription „TOP“ facing upwards (see Fig. 6).**

- Tighten the cylinder cover screws (Pos. 1 in Fig. 6) according to the sequence shown in Fig. 7!

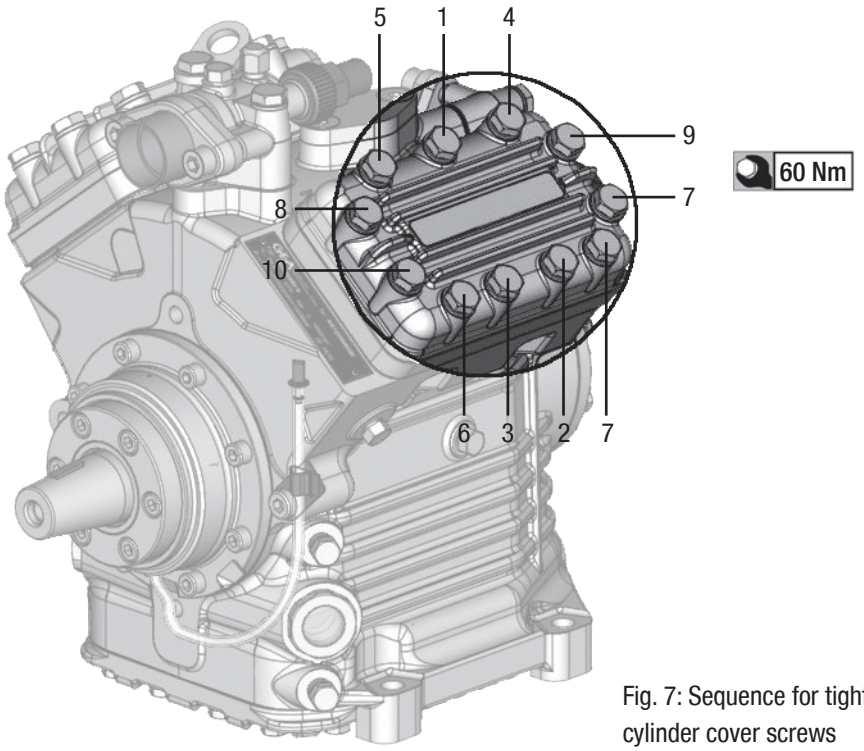


Fig. 7: Sequence for tightening the cylinder cover screws

8 I Electromagnetic coupling

Assembly instruction for electromagnetic coupling

For the drive of A/C compressors in buses, mainly electromagnetic couplings are used. The followings assembly instructions for coupling type LA 16 is representative for couplings which are mounted onto the front bearing flange of the compressor.

Assembly instruction for electromagnetic coupling type LA 16

- The front bearing flange has a location face Ø 148 h8 for fitting the solenoid of the electromagnetic coupling (see Fig. 8).

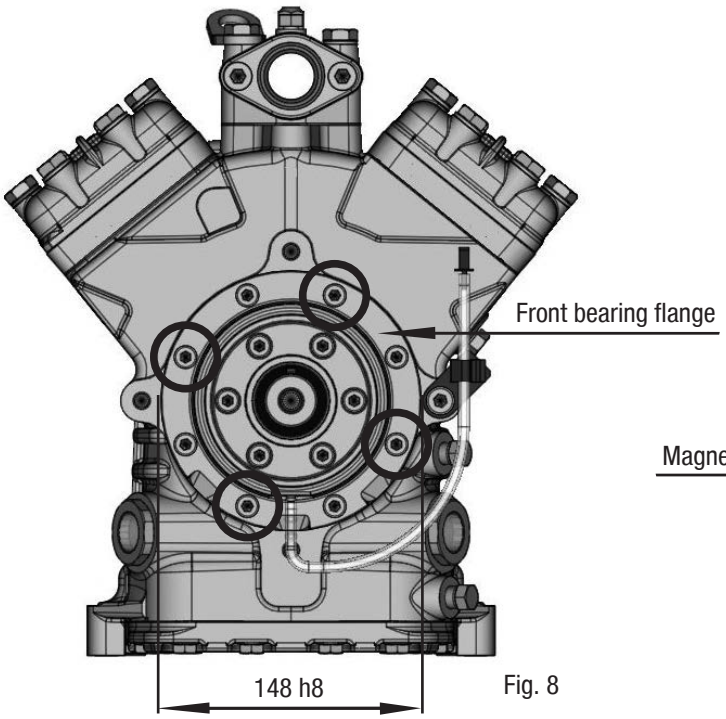


Fig. 8

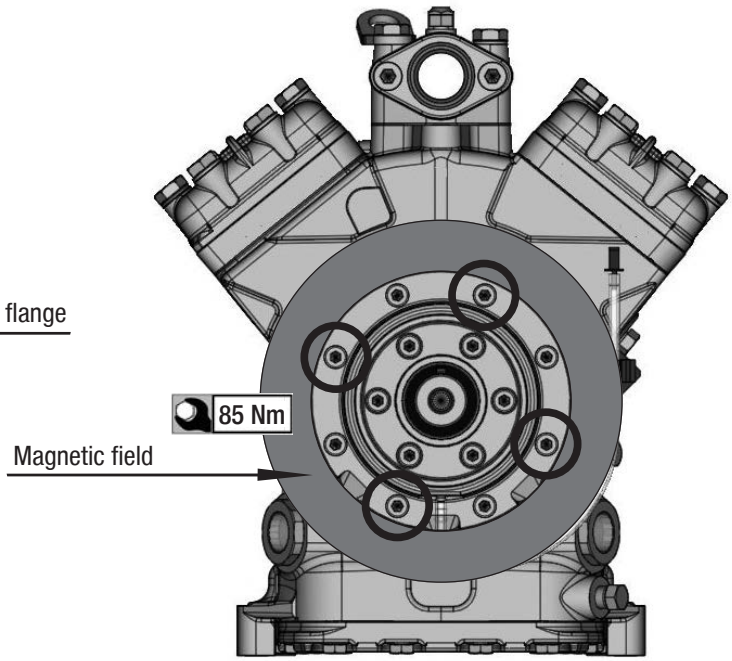


Fig. 9

- For fitting the solenoid (1) remove the four M8x25 cylinder screws (2) on the bearing flange (indicated with circles and arrows, Fig. 8 page 21 and Fig. 10 page 22).
- Fit the solenoid onto the location seat and fasten it again with the four M8x25 cylinder screws (Fig. 9).

ATTENTION **Use only M8x25 screws! Otherwise, serious damages may occur on the electromagnetic coupling and the compressor. Observe the screw tightening torque!**

8 I Electromagnetic coupling

INFO **Arrange the cable (8) so that it doesn‘t touch hot parts (e.g. protection pipe).**
t_{max} = 105°C!

- Remove the K-circlip (5) and the clamping screw (4) from the rotor assembly (3). Looking through the rotor hole, pay attention to the correct seating of the Woodruff key in the rotor slot. It should be possible to turn the rotor by hand without the rotor touching the solenoid. Pay attention to the checking projection! Screw on the clamping screw (4) and tighten it. Screw tightening torque: 85 Nm. Install the K-circlip (5).
- Push the sheave (6) over the studs (9) and fasten it with zinc-coated M8 DIN 934-8 nuts (7).
- Connect the cable (8). The connection is polarity-independent. Voltage ± 10% of nominal voltage.

INFO **For dismounting the coupling apply grease to the K-circlip and turn the clamping screw (4) to the left for unscrewing.**

ATTENTION **With all other methods of removal (pressing, hammering) there is risk of damage to the coupling.**

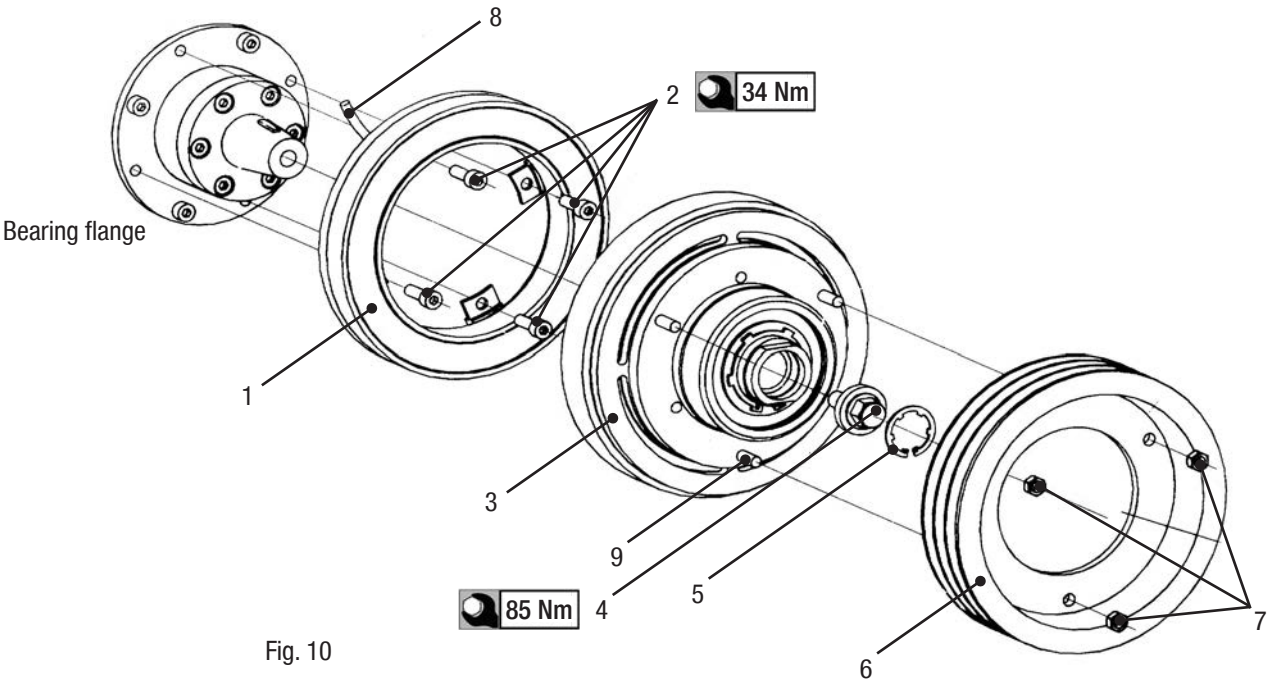


Fig. 10

9 I Compressor defects

Compressor defects

Compressor defects may have various causes. The table below is meant to aid you while analysing the cause of the breakdown by means of the defective compressor parts found. Thus, the specific remedying of the cause of the breakdown is facilitated.

Compressor part	Possible causes / Symptom	Remedy
Valve plates	- Liquid shocks because of liquid refrigerant or oil	
	- Overheating of compressor	- Check the operating conditions
Shaft seal leaking	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Standstill time too long	
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Too frequent starting of the compressor	
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
	- Belt vibrating excessively	
	- Alignment of compressor and motor incorrect	
Oil pump	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
Bearings	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
	- Überlastung des Verdichters	- Compare the operating conditions with the application limits
Pistons / Connecting rods	- Lack of oil - Dirt in the system	- Change oil, clean the system; install a suction line filter, if necessary
	- Moisture in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions
Copper plating	- Moisture in the system - Acid formation in the system	- Dry the system trough changing refrigerant and oil, replace the drier; install a suction line filter, if necessary
Formation of oil-carbon	- Overheating of compressor (Heat protection thermostat switches off)	- Check the operating conditions

10 I 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, 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 with stoppers
- Relieve the pressure before dismounting the compressor

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
- Evacuate the compressor
- Cut off the vacuum
- Remove the compressor from the system
- Close the suction and discharge shut-off ports on the compressor with stoppers

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.gea.com.
You can find the exploded drawing at the end of the maintenance manual.

Preparation: Necessary tools

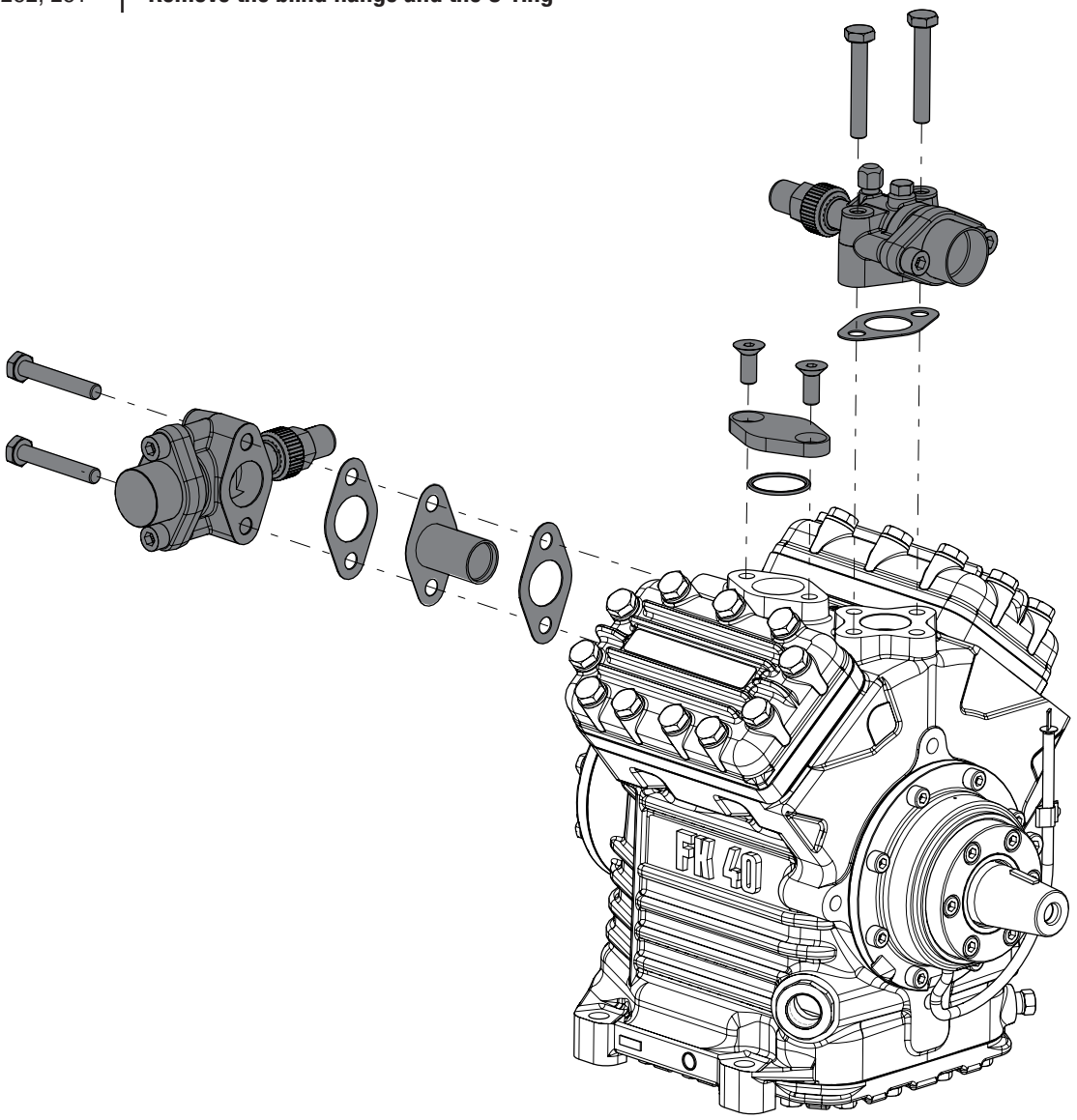
INFO **For the removal and installation of the internal decompression valve the GEA Bock special too Item No. 09524 is necessary (up to type code 015)!**

Pos.	Tool	Size
1	Oil collection container	> 2 liter
2	Spanner	SW 10, 13, 14, 17, 19, 22, 30, 36
3	Allen key	6 mm, 10 mm
4	Needle-nosed plier	
5	Pulling apparatus	
6	Pressing apparatus	
7	Piston ring pliers	
8	Dial gage	
9	GEA Bock special tool, Item No. 09524	

INFO **With compressors starting from year of construction 2008/09 the oil pump, the shut-off valves, the valve plate and the cylinder covers are bolted with washers.**
In the individual work sections separately with these washers does not deal.
When assembling the washers must be used again on the installation!

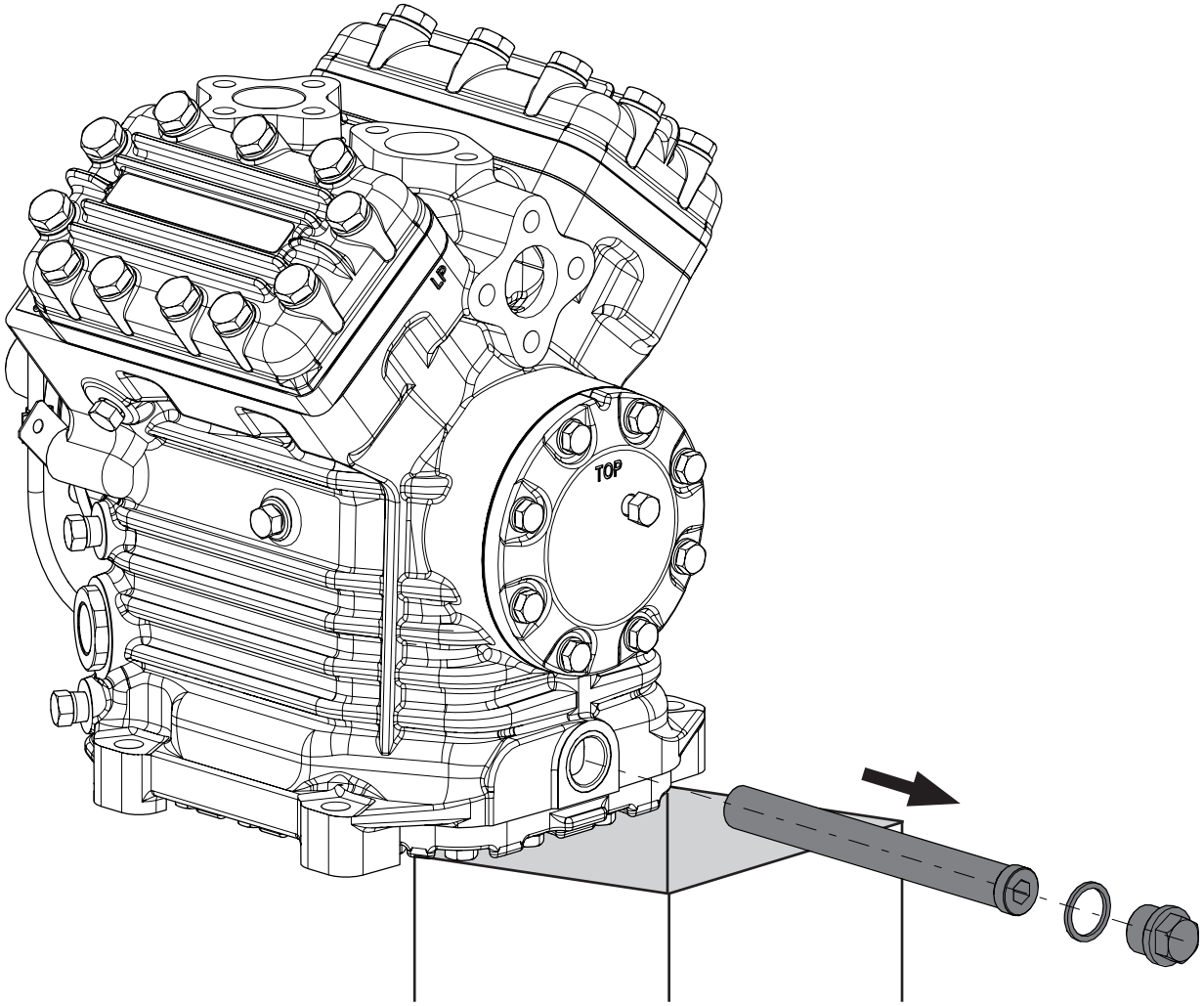
1 Removal of all shut-off valves and blind flanges

Position in parts list	
	Parts list position: 2060, 2070, 232
	Tools: Spanner SW 17, allen key 6 mm
	Working course
	- The compressor has to be depressurized
220	**- Unscrew the fixing screws of shut-off valves**
330, 210	**- Remove the shut-off valves and the gaskets**
230, 210	**- Remove the suction filter and the gasket**
233	**- Remove the screws from the blind flange**
232, 231	**- Remove the blind flange and the O-ring**



2 Removal of the oil filter

Position in parts list	Parts list position: 2130
	Tools: Container > 2 liter for colection oil, spanner SW 19, allen key 10 mm
	Working course
	- Drain the oil from the compressor into a suitable container
510	**- Unscrew the plug**
500	**- Remove the gasket**
490	**- Unscrew the oil filter**



3 Removal of the cylinder cover and valve plates

Position in parts list

Parts list position: 170, 2000 (N / TK versions), 1940, 2900 (K version)

Tools: Spanner SW 17

Working course

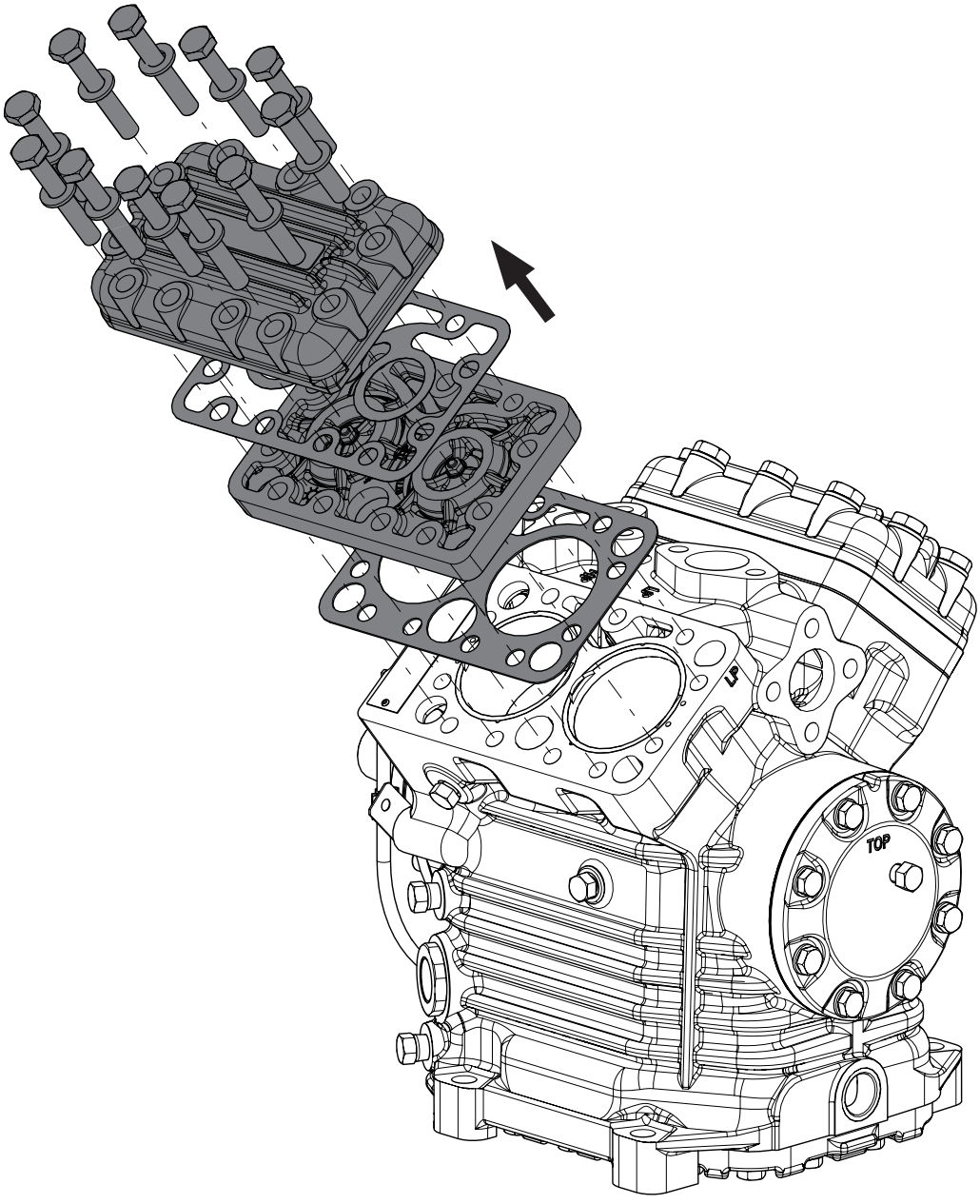
ATTENTION **In order to prevent any mix-up during reassembly, mark the cylinder cover and the valve plates belonging together clearly and in a wipe-resistant fashion!**

N / TK	K
180, 181	1950, 180
170, 70	1940, 1430
60, 50	1920, 1910

- Losen screws at the cylinder cover and unscrew, remove the washers

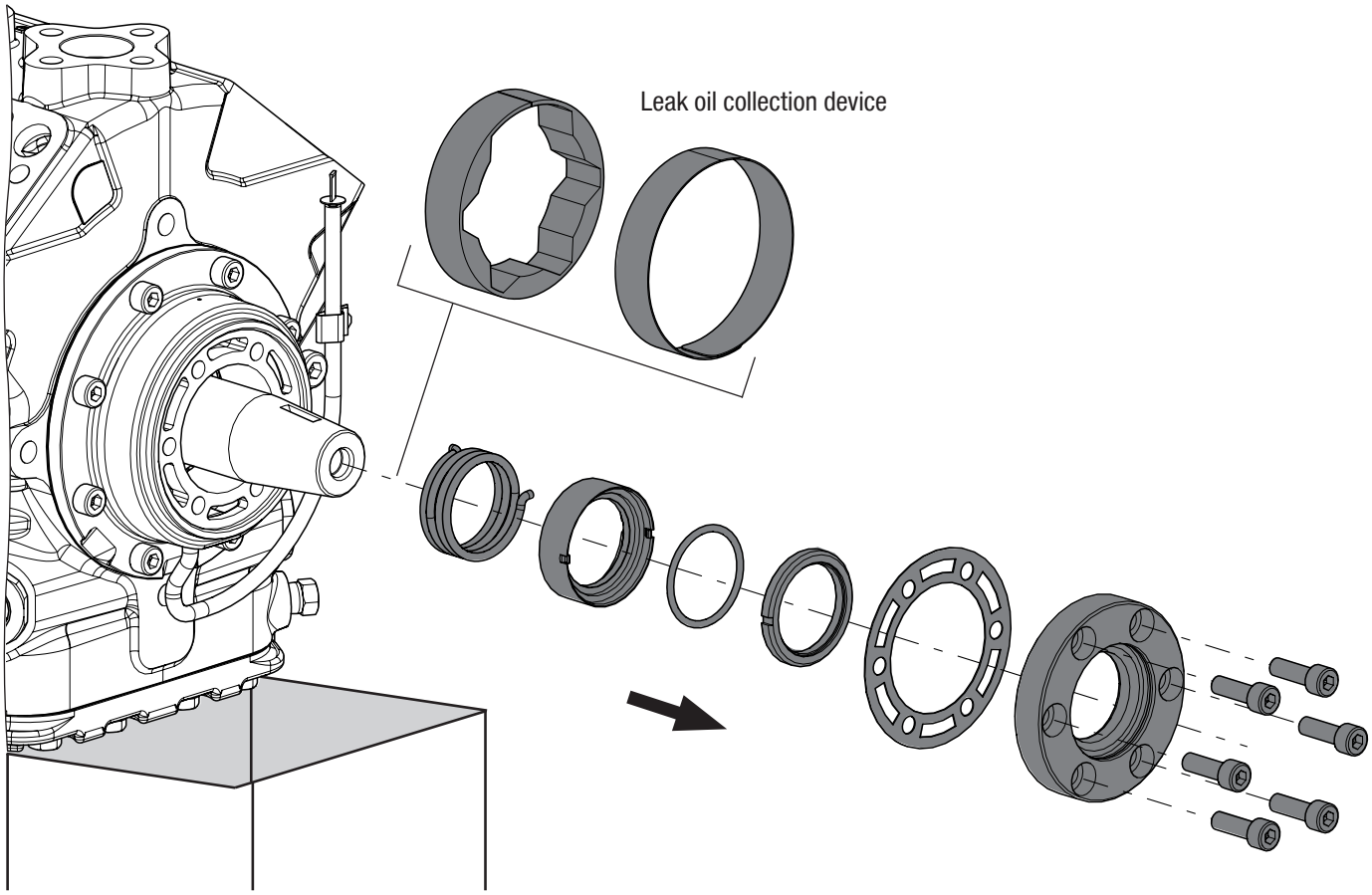
- Remove the cylinder cover and the upper gasket of the valve plate

- Remove the valve plate and the lower gasket of the valve plate



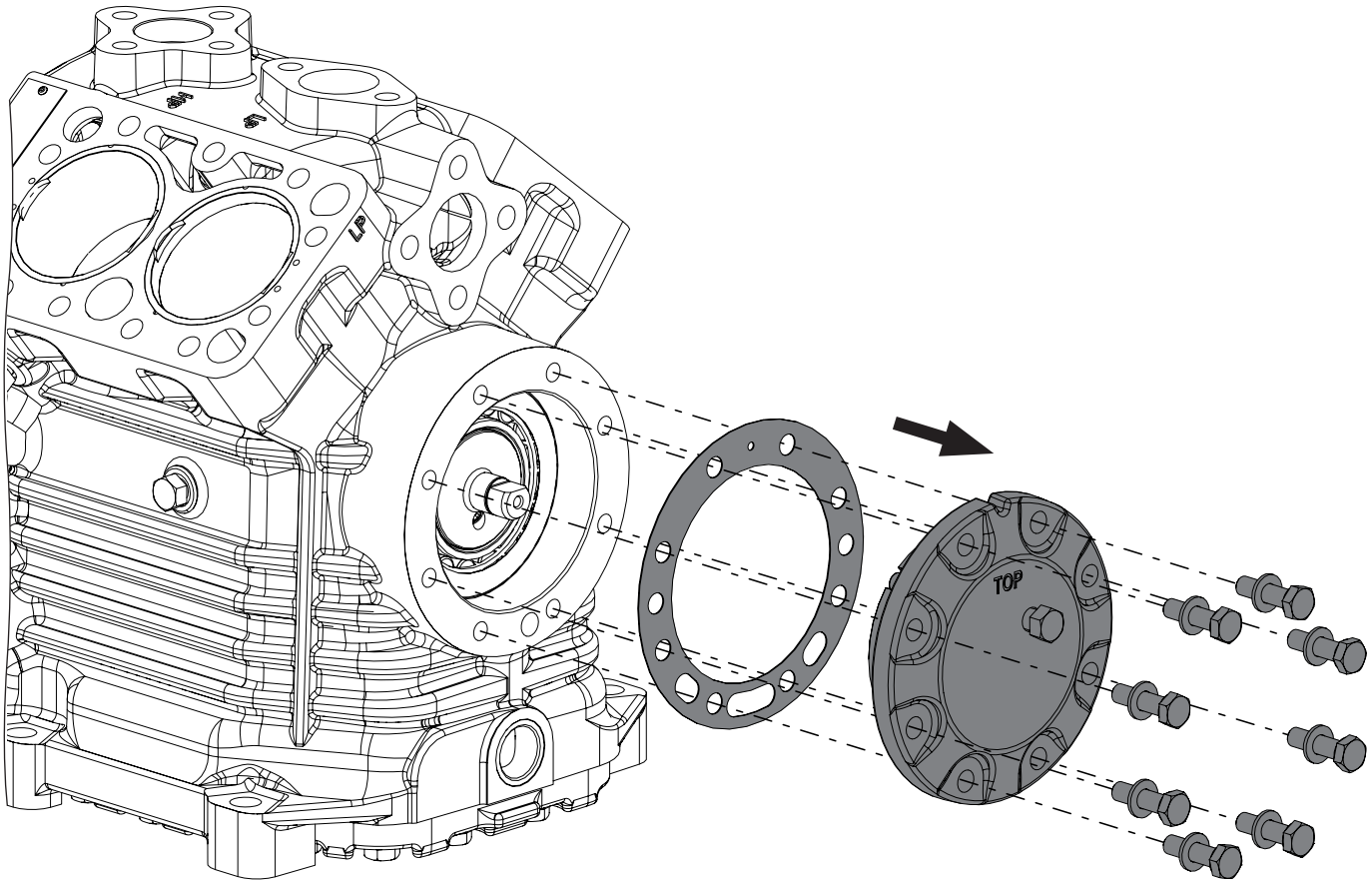
4 Removal of the shaft seal

Position in parts list	Parts list position: 2010
	Tools: Allen key 6 mm
	Working course
	INFO **For a detailed description for the old version (until type code 014) see also the section on the removal of the shaft seal on page 16!**
	- Place the oil collection container under the shaft seal area
2110	**- Remove the leak oil collection device from the bearing flange (until type code 014)**
750	**- Unscrew the cylinder screws**
	CAUTION **Danger of injury!** **The shaft seal cover is under spring tension! It may jump out by itself.**
2010	**- Remove the shaft seal cover, the guide ring, the O-ring and the spring**



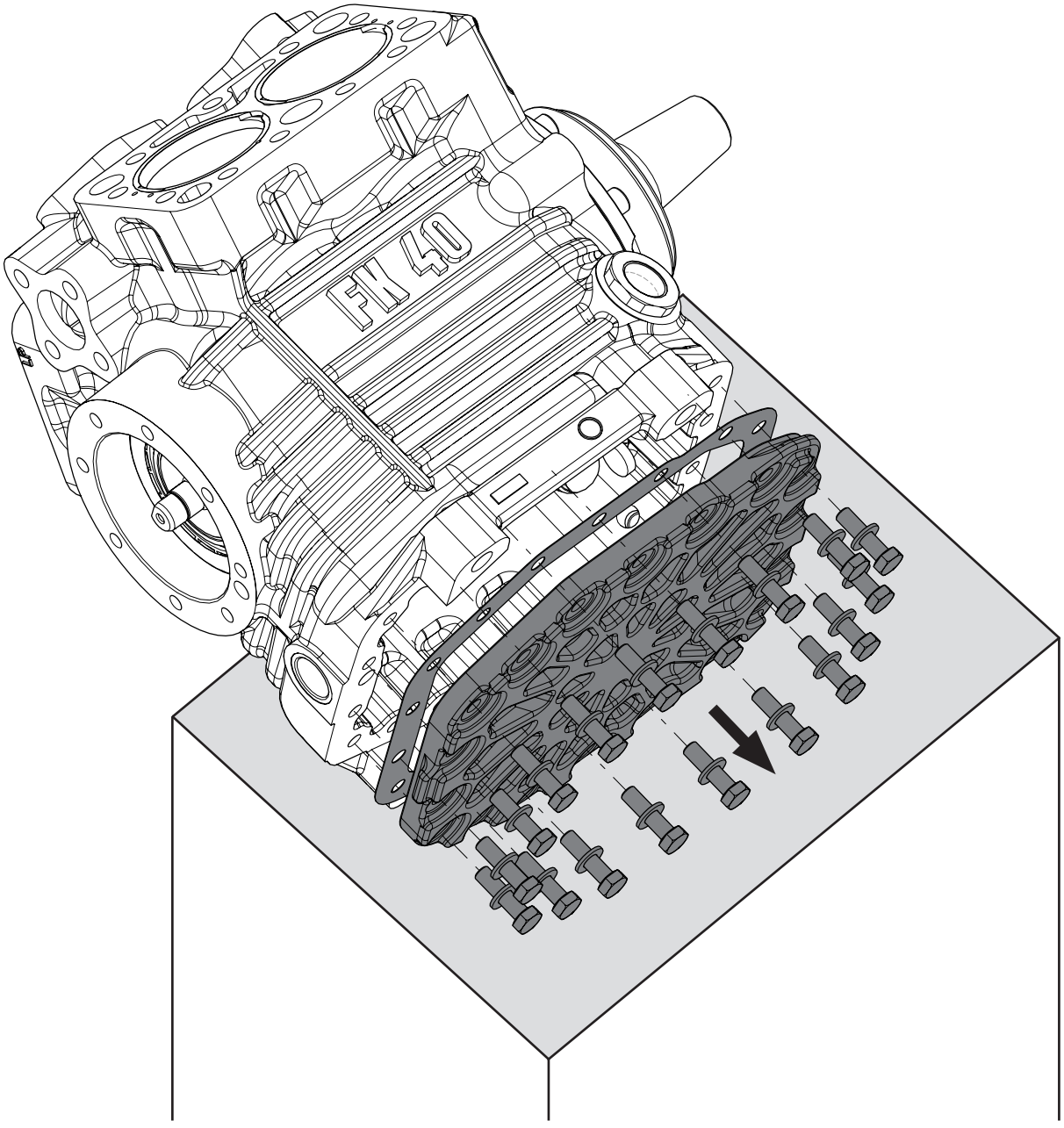
5 Removal of the oil pump

Position in parts list	Parts list position: 2020
	Tools: Spanner SW 13
	Working course
40, 41	**- Losen screws on the oil pump and unscrew**
460, 470	**- Remove the oil pump and gasket**



6 Removal of the baseplate

Position in parts list	
	Parts list position: 20, 30, 40, 41
	Tools: Container for colection oil, spanner SW 13
	Working course
	- Place the compressor into the oil collection pan and turn it sideways
40, 41	**- Unscrew the screws with the washer from the baseplate**
20, 30	**- Remove the baseplate and the gasket**



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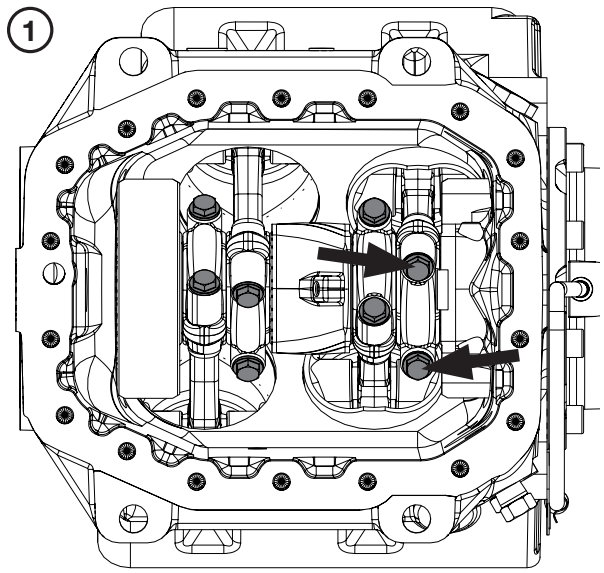
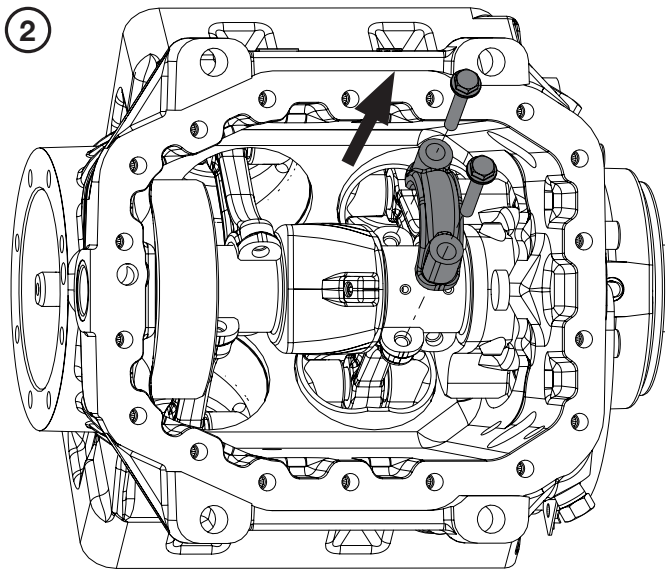
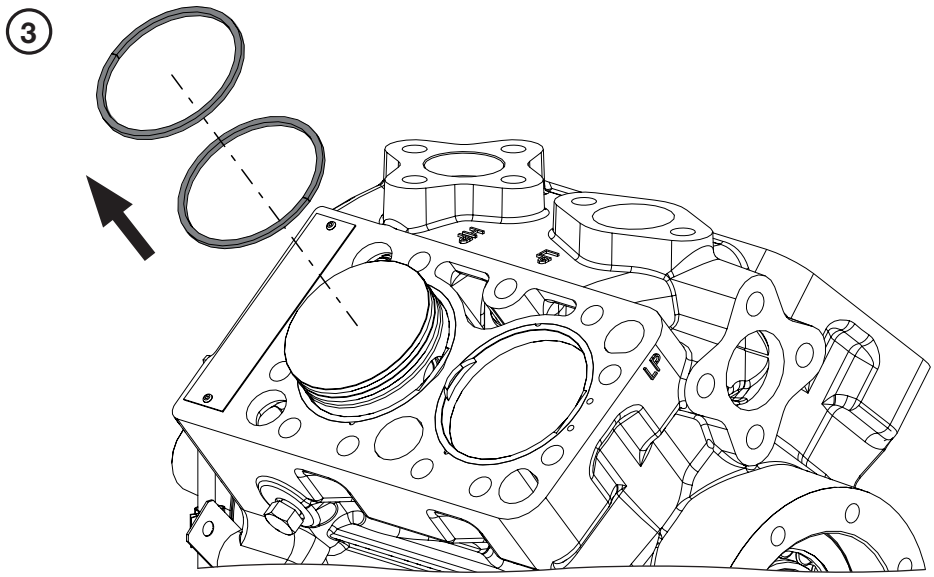
7 Disassembly of the compressor rods from the crankshaft

Position in parts list	Parts list position: 2040
	Tools: Spanner SW 10
	Working course
	INFO **In order to prevent any mix-up during reassembly, mark the connecting rods and caps belonging together clearly and in a wipe-resistant fashion!**
2100	**- Unscrew the hexagon head screws from the connecting rod cap**
2100	**- Mark the connecting rod cap and remove it**
2040	**- Push the piston and connecting rod upwards until the shop**
300, 290	**- Remove the piston rings**
	- The same procedure should be applied for the remaining connecting rods

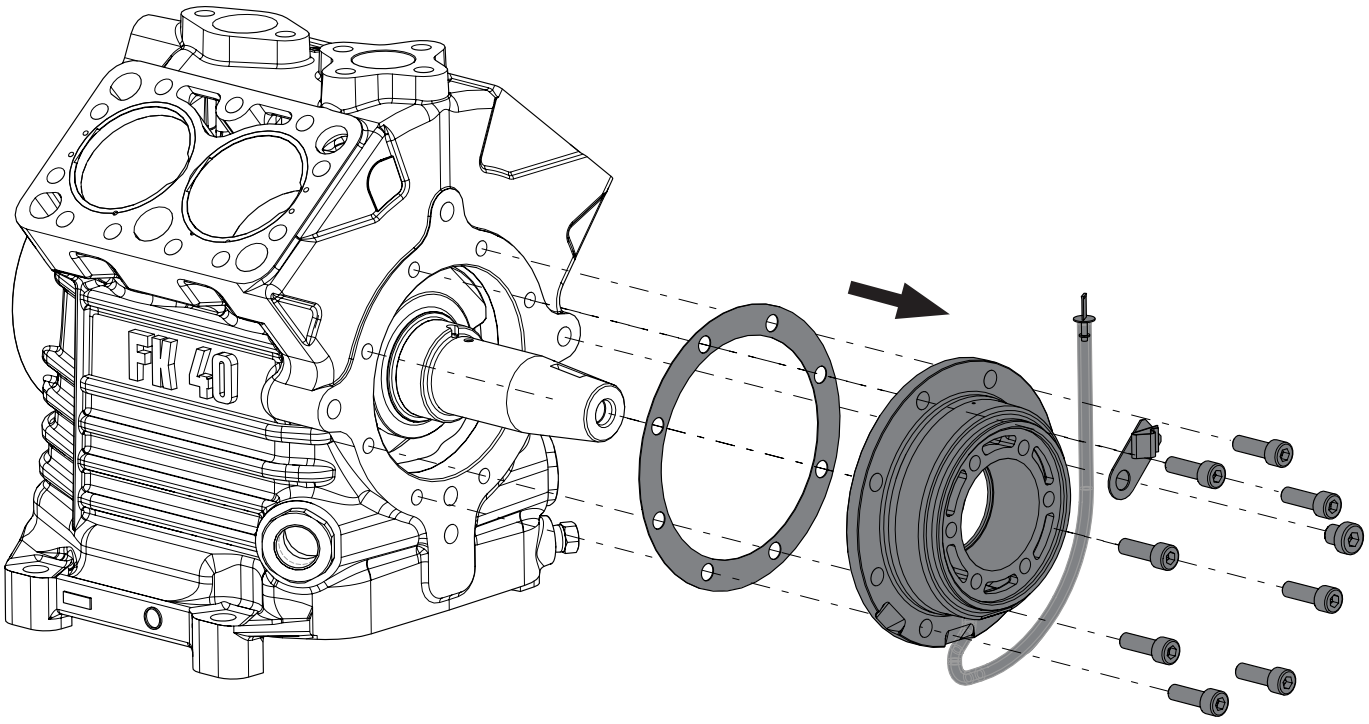






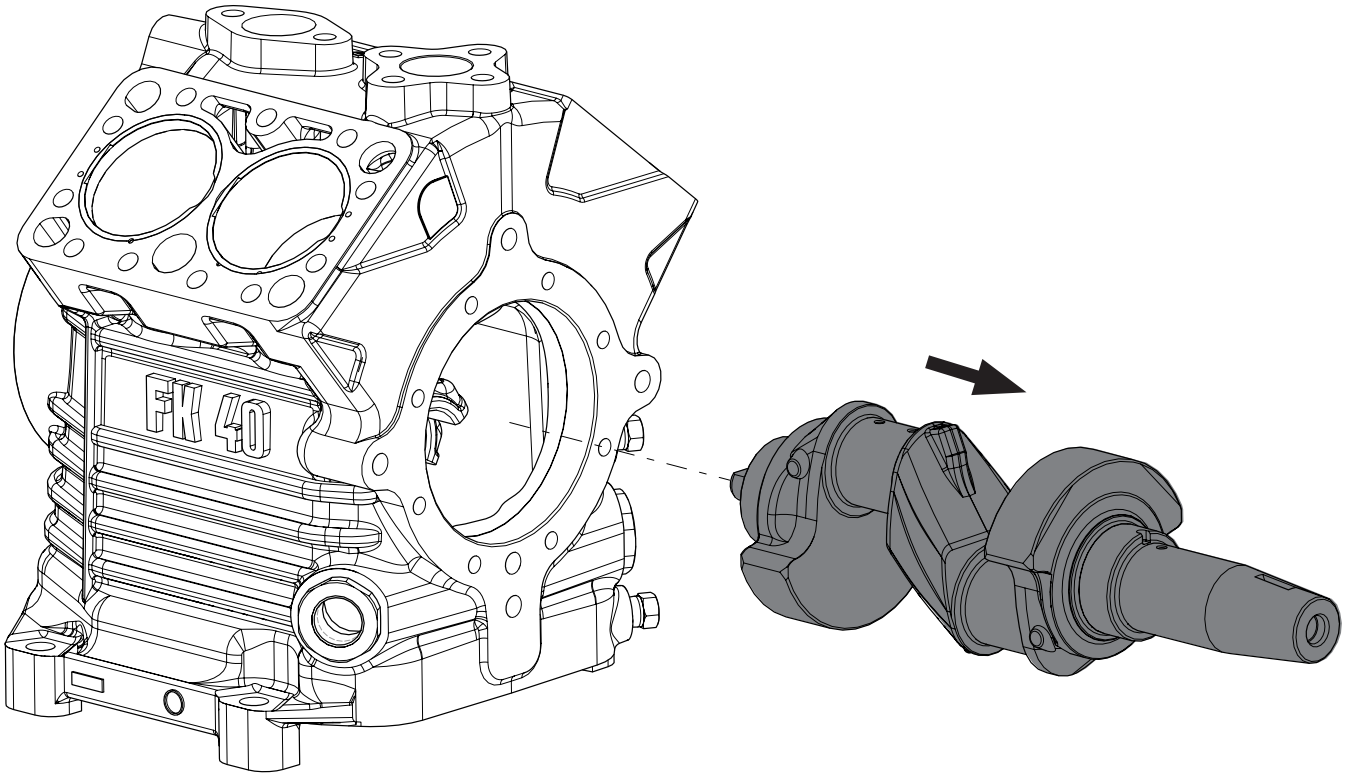
8 Removal of the front bearing

Position in parts list	Parts list position: 2140
	Tools: Allen key 6 mm
	Working course
750	**- Losen the screws at the front bearing and unscrew**
730, 740, 745	**- Remove the front bearing flange, gasket, and O-ring**



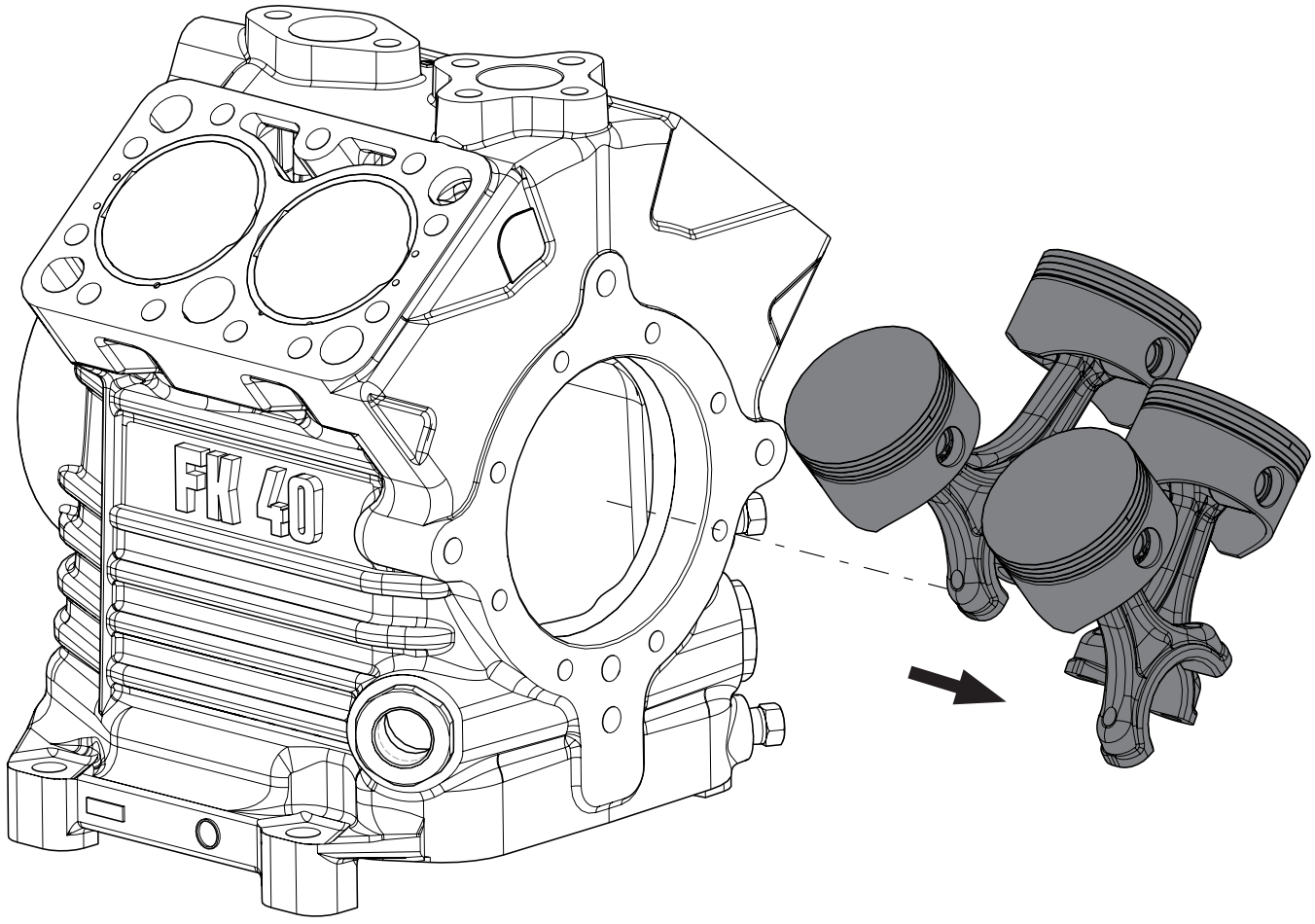
9 Removal of the crankshaft

Position in parts list	Parts list position: 2050
	Tools: -
	Working course
2050	**- Pull out the crankshaft carefully in direction of the front bearing flange**



10 Remove pistons and connecting rods

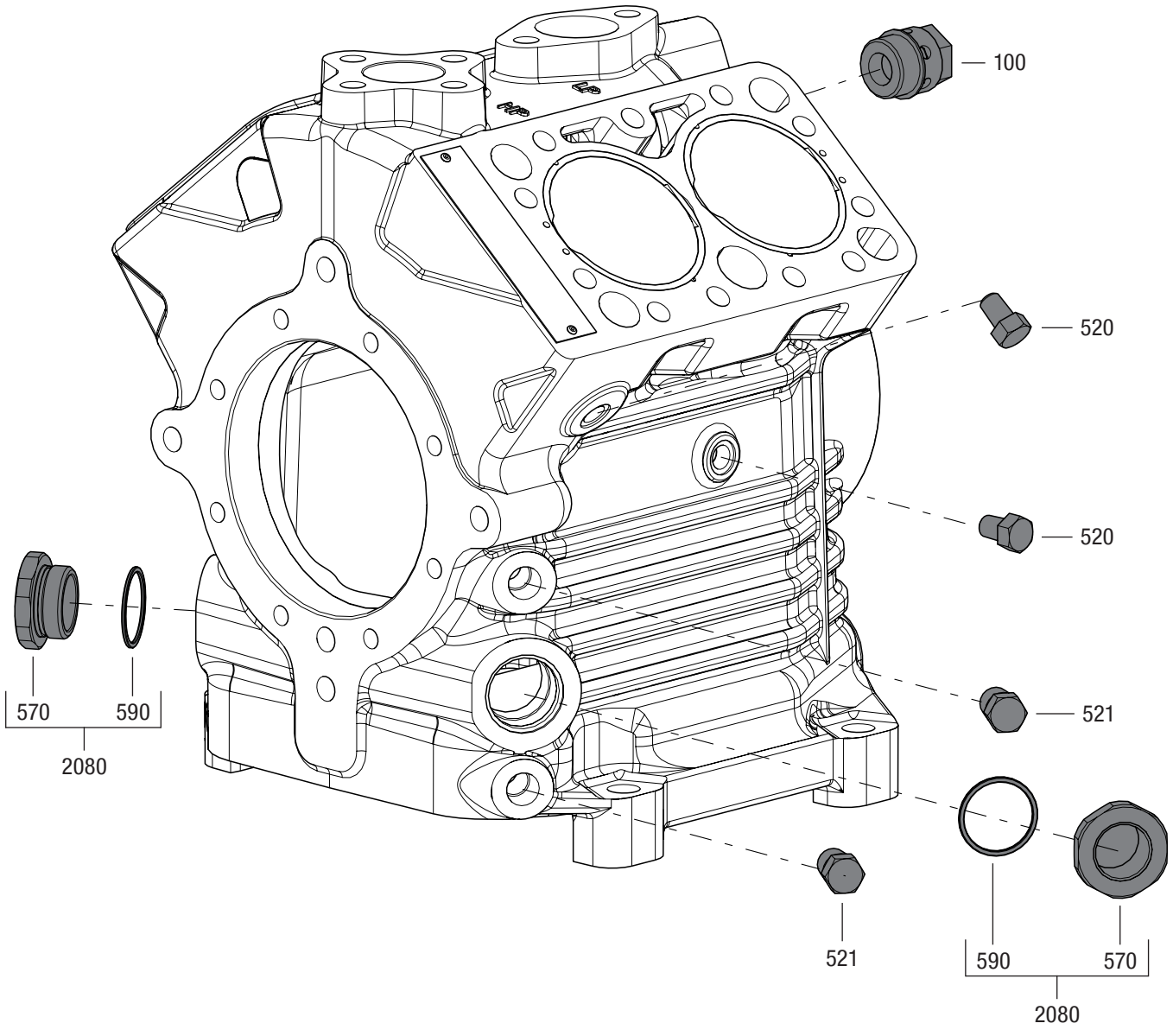
Position in parts list	Parts list position: 2040
	Tools: Needle-nosed pliers
	Working course
	- Mark corresponding pistons of cylinder bore
2100, 2030	**- Remove the piston / connecting rod in direction of baseplate**
280	**- Remove circlips of the piston pins with needle-nosed plier**
270	**- Push the piston pins out of the pistons and remove pistons**
2100	**- In order to prevent mix-ups, fasten the connecting rod caps to the connecting rods again**



11 Removal of the remaining parts

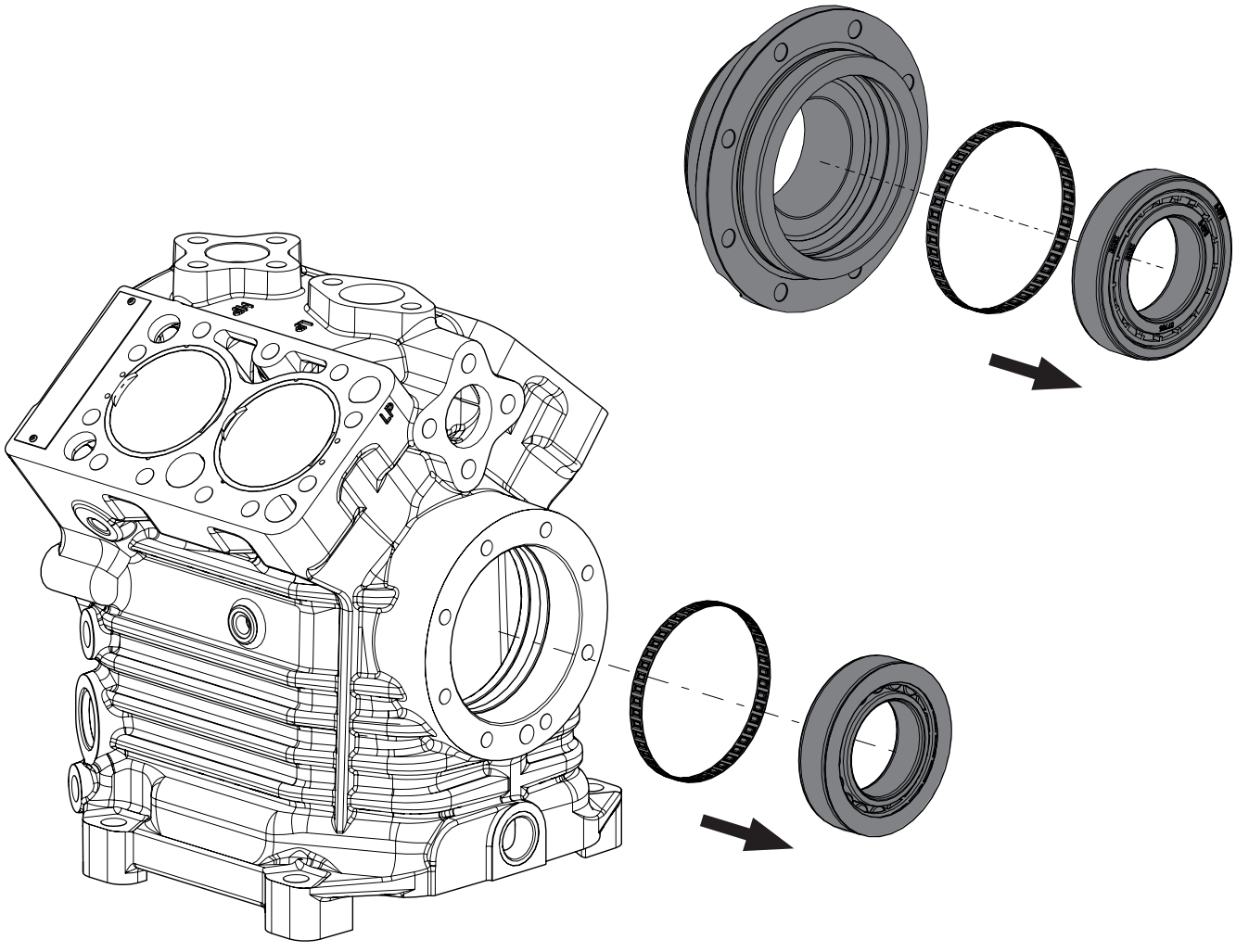
Position in parts list	
	Parts list position: -
	Tools: Spanner SW 13, 14, 30 or 36. For the decompression valve: GEA Bock special tool item No. 09524 (up to A015*), socket wrench SW 22 (from A017*)
	Working course
570	**- Dismount the sight glass**
590	**- Remove O-ring**
520	**- Remove the 1/8“ NPTF plugs**
521	**- Remove the 1/4“ NPTF plugs**
100	**- Unscrew the decompression valve**

*) see the last four sites of the machine number



12 Removal of the roller bearings

Position in parts list	
	Parts list position: 2150
	Tools: Pulling apparatus
	Working course
2150, 730	**- With the pulling apparatus pull out the roller bearing from the front bearing flange**
	INFO **Use oil, if necessary!**
	If a pulling apparatus is not available, the front bearing flange may be heated for approx. 15 minutes in a pre-heated (220°C) baking oven. Afterwards the roller bearing can be pressed out by hand.
	CAUTION **Risk of burns!** **Parts are hot! Use protective gloves!**
2150	**- Press out the roller bearing from the compressor body**
312	**- Take out the tolerance ring, if there is any**
	INFO **Use oil, if necessary!**

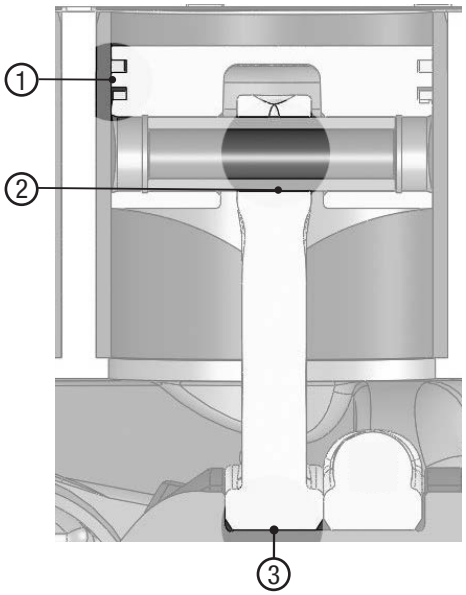


11 I Checking the compressor parts

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 - cylindre 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**

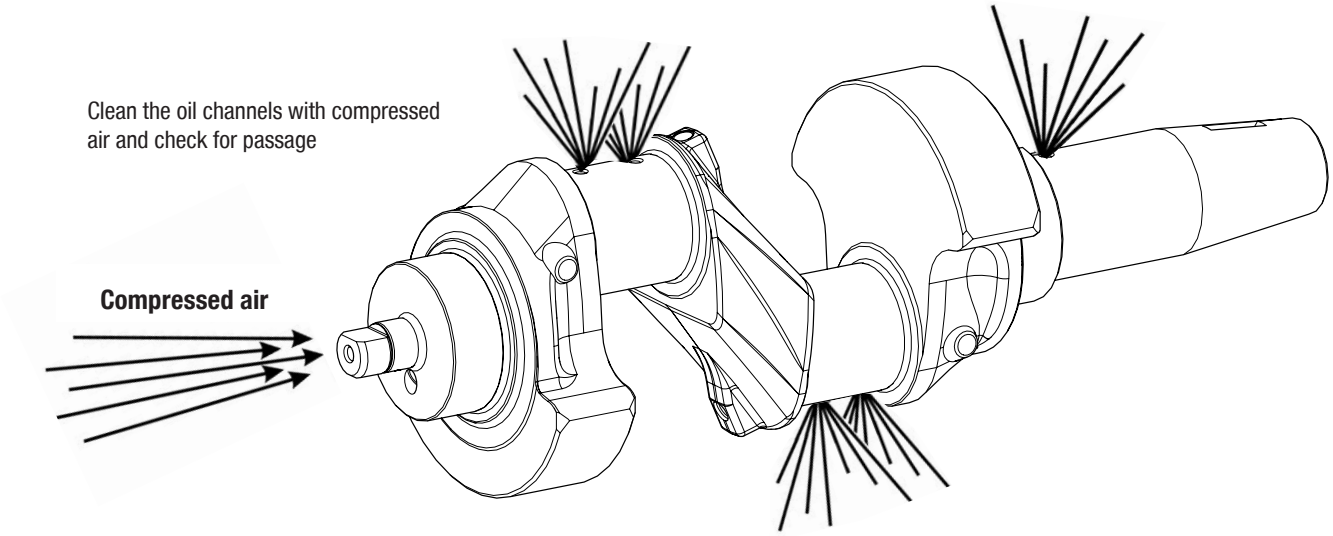
  The cylinder liners should not have any visible damages in the piston movement area.
  If there is fluting, the casing should be replaced.

- **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 googles.



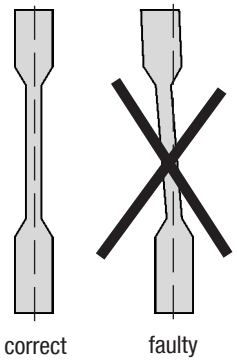
11 I Checking the compressor parts

- **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.

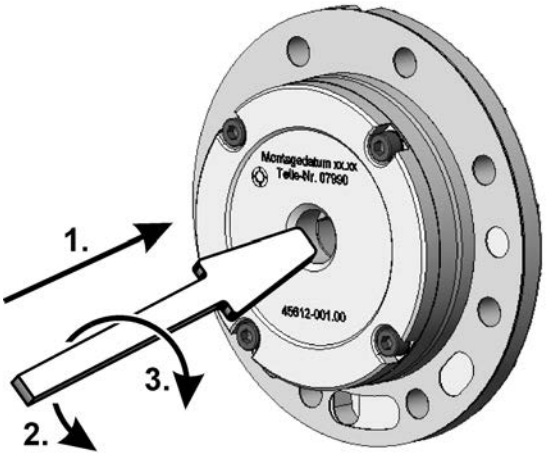


- **Valve plates**

  Suction and pressure lamella must be undamaged and un-deformed. 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.

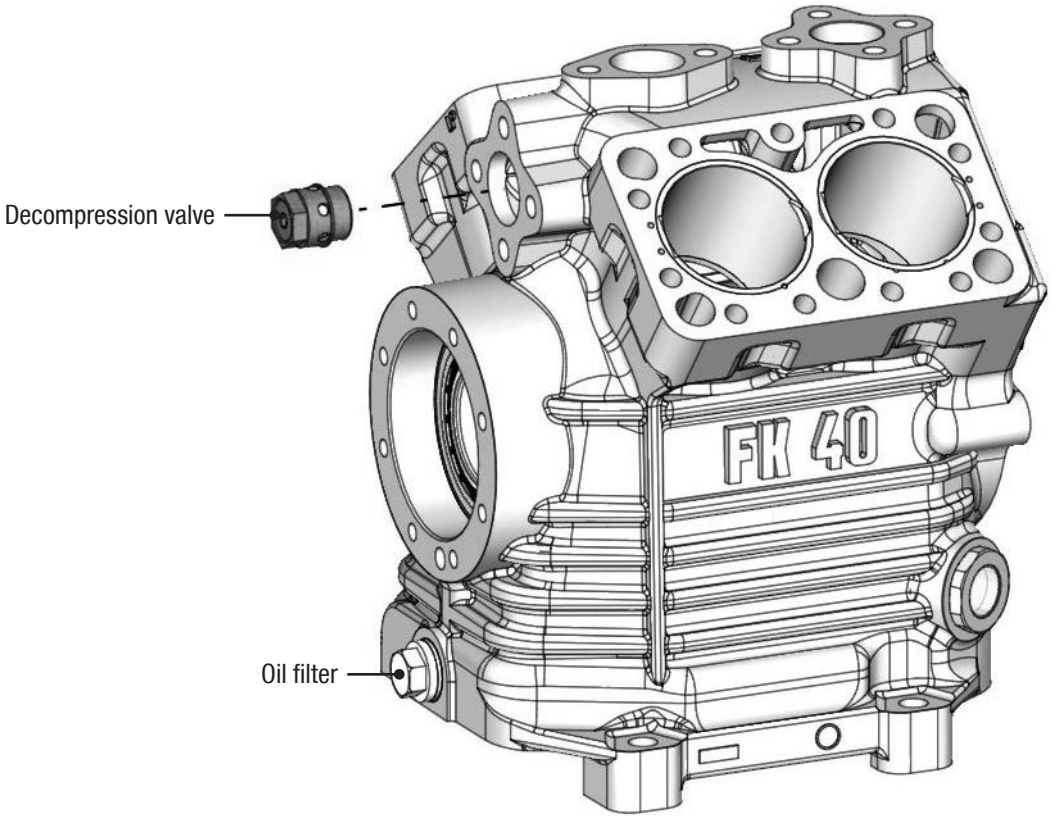


11 I Checking the compressor parts

- **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 cleanded with compressed air or replaced with new ones.

- **Internal decompression valve (use GEA Bock special tool item No. 09524 up to A015, socket wrench SW 22 from A017).**
  The internal decompression valve must be replaced after it has operated.



INFO **In case of larger compressor damages which necessitate a complete disassembly of the compressor, we recommend in principle the replacement of the following assemblies**

- **Valve plates**
- **Piston rings**
- **Shaft seals**
- **Roller bearings**

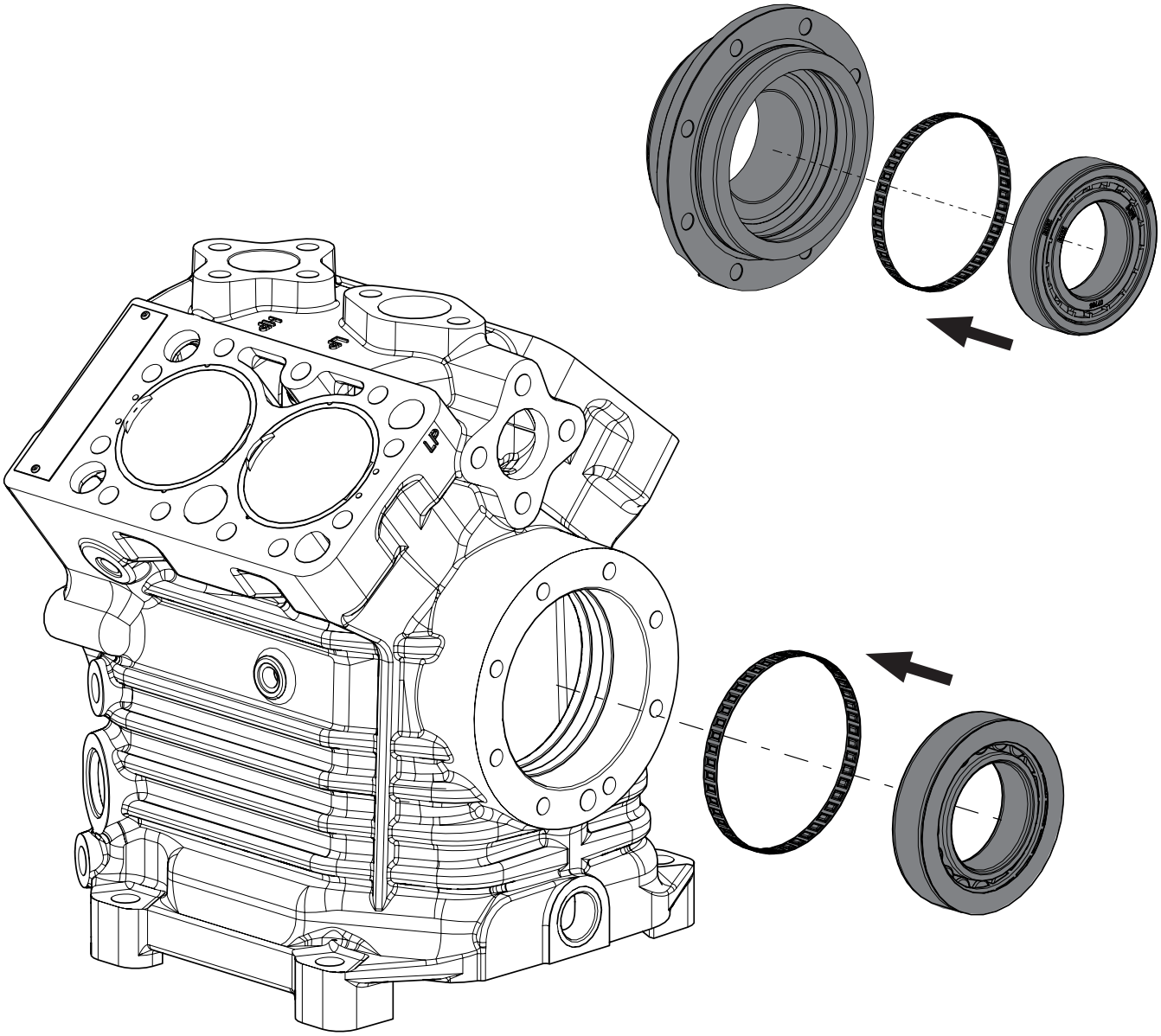
Thus, concealed defects of parts which have been in operation may be prevented.

1 Fitting the roller bearings

Position in parts list	
	Parts list position: 2150
	Tools: Pressing apparatus
	Working course
730	**- Heat the bearing flange / compressor casing for approx. 20 minutes in a pre-heated (120°C) baking oven**
312	**- Insert tolerance ring into the roller bearing, if available**
2150	**- Press the roller bearings onto the compressor casing and the front bearing flange**

CAUTION **Risk of burns!**
Parts are hot! Use protective gloves!

INFO **Use tolerance ring if the bearing seat has a groove!**



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2 Fitting the sight glass, plugs and decompression valve

Position in parts list

Parts list position: -

Tools: Spanner SW 13, 14, 30 or 36. For the decompression valve: GEA Bock special tool item No. 09524 (up to A015), socket wrench SW 22 (from A017)

Working course

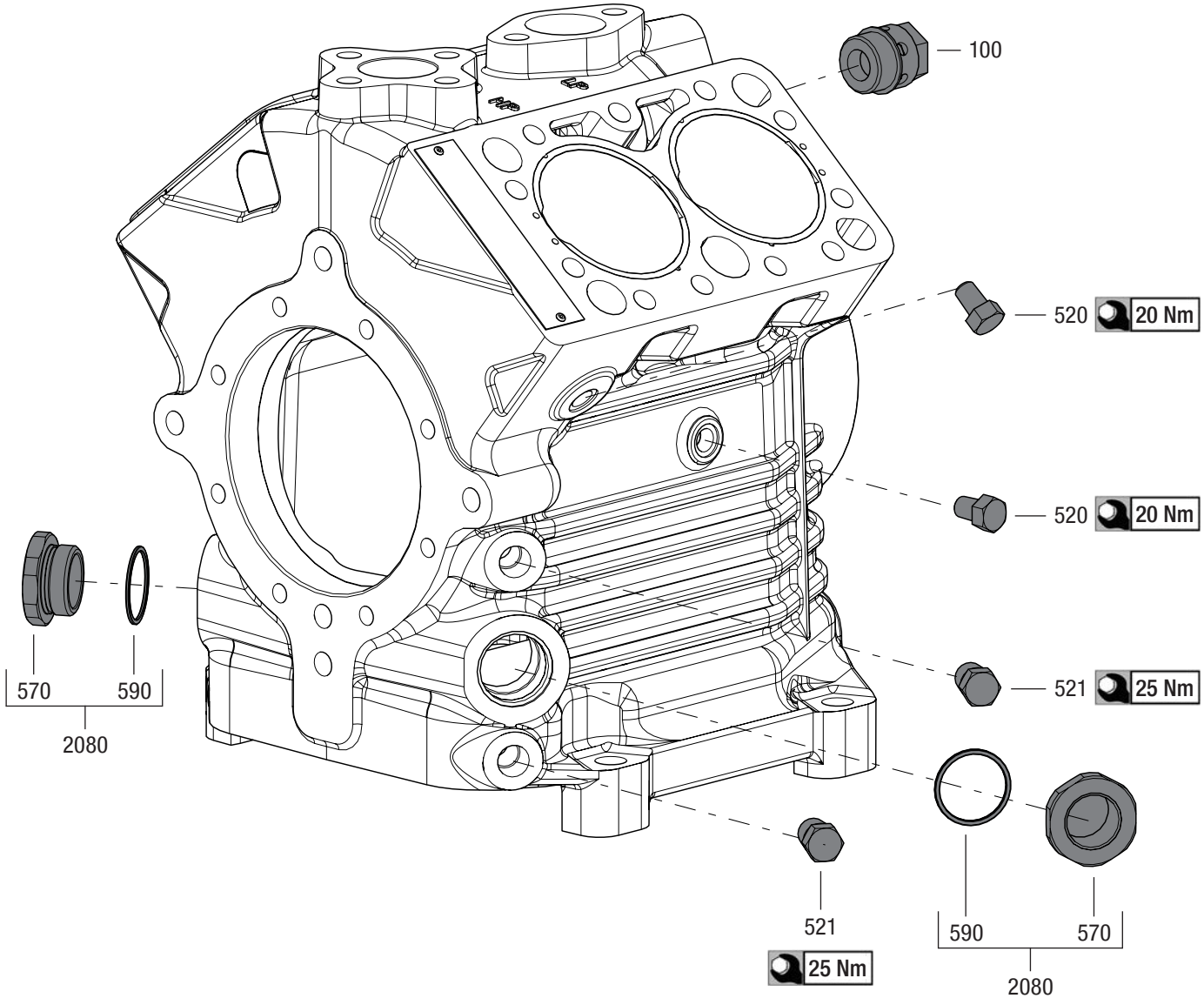
INFO **Observe the screw tightening torques!**

570, 590 **- Screw on the sight glass with oiled O-ring to the compressor body**

520 **- Screw in the 1/8“ NPTF screw plugs**

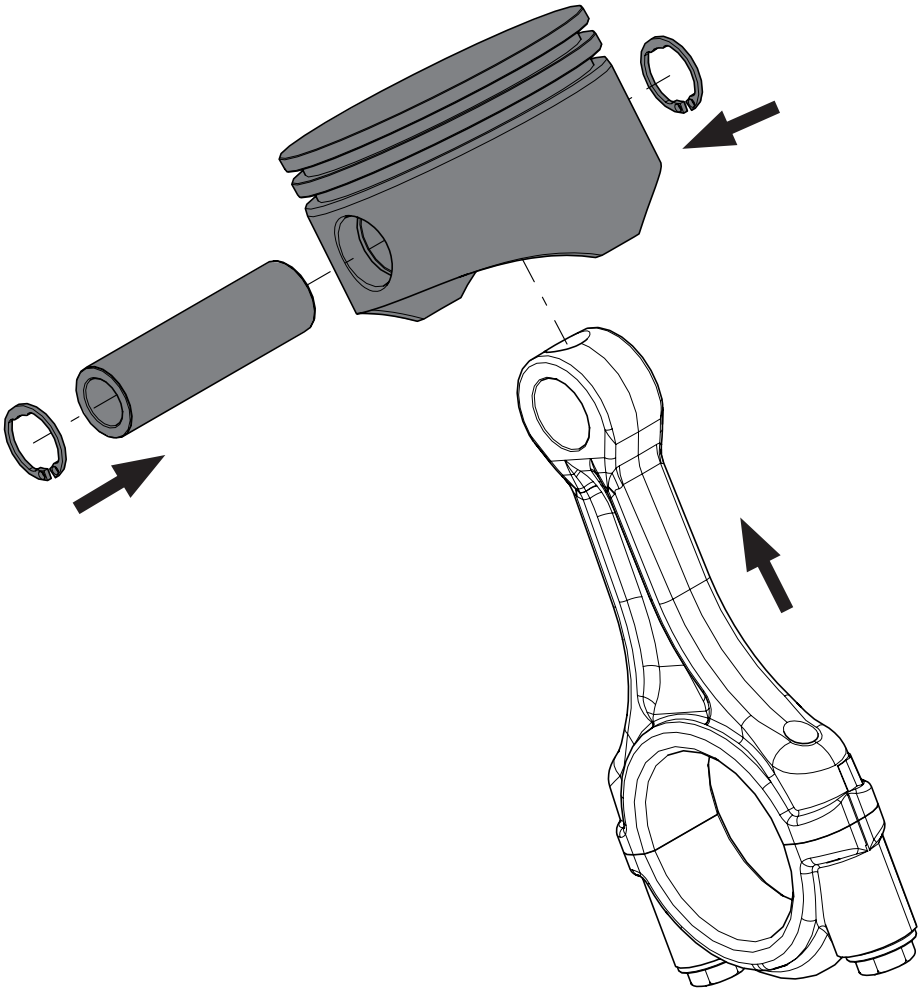
521 **- Screw in the 1/4“ NPTF screw plugs**

100 **- Screws on the decompression valve to screw into the suction channel**



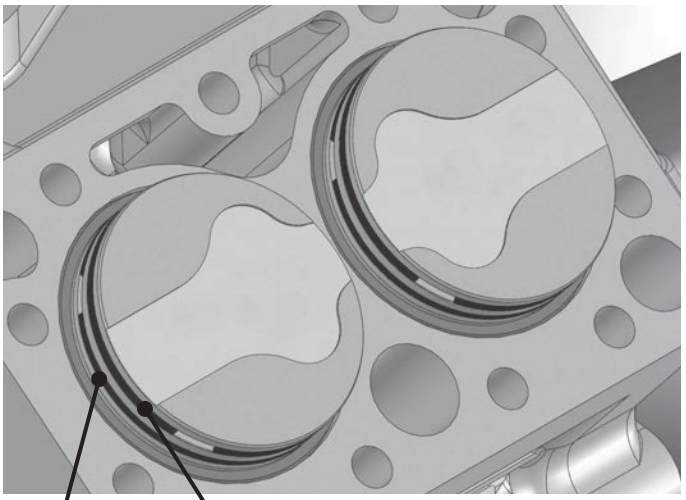
3 Assembly of the pistons / connecting rods

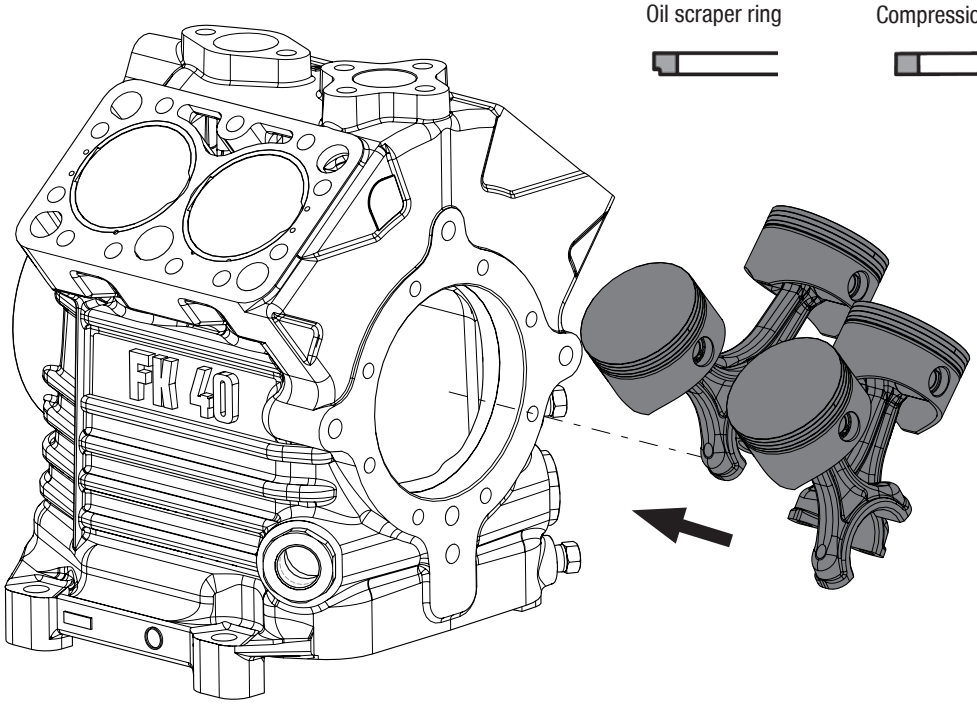
Position in parts list	
	Parts list position: 2040
	Tools: Needle-nosed pliers
	Working course
270	**- Assemble piston and connecting rod with piston pin, use some oil for easier assembly**
280	**- Mount circlips with pliers on both sides of the piston pins**



4 Fitting the piston / connecting rods

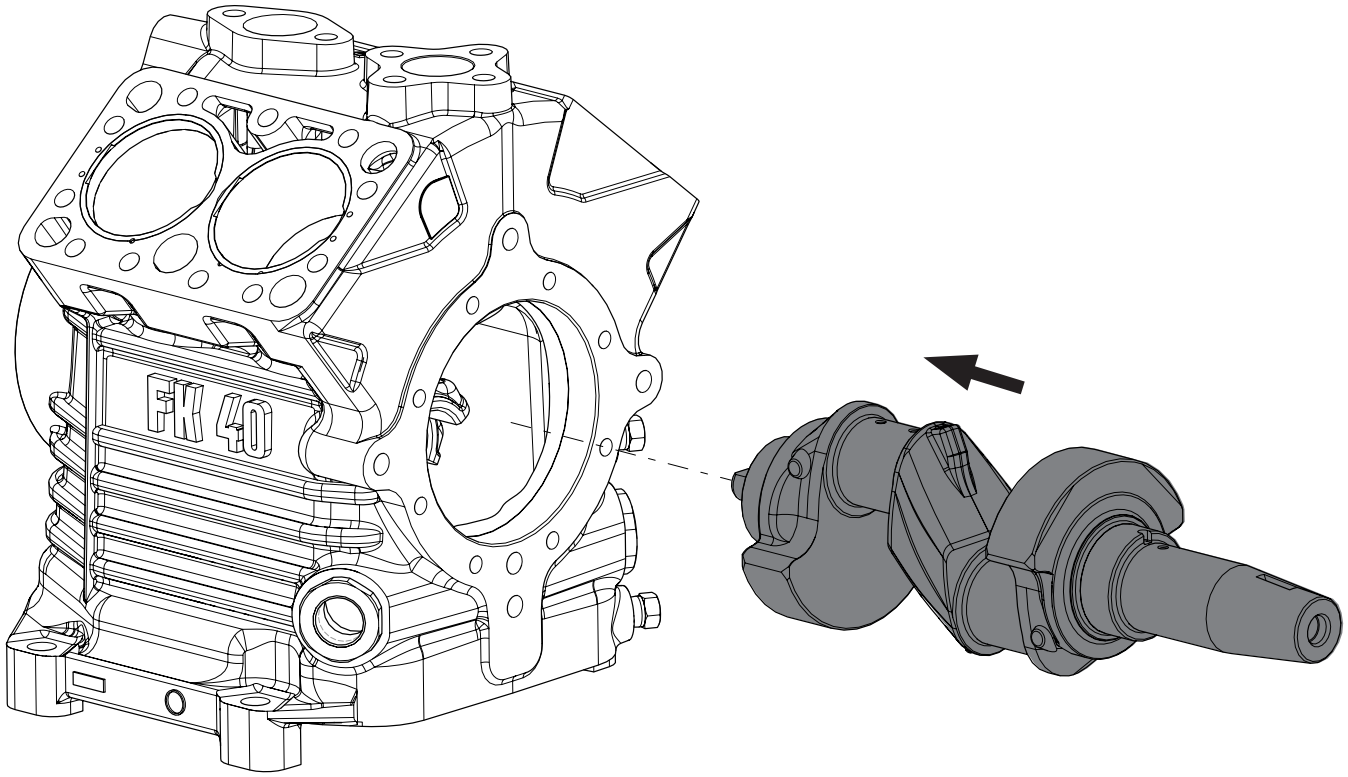
Position in parts list	
	Parts list position: 2040
	Tools: Spanner SW 10, piston ring plier
	Working course
	We recommend, cleaning the housing from the inside before assembly
2100	**- Remove the connecting rod cap from the preassembled connecting rod assembly and mark it**
	- Apply a little oil to the cylinder bore
2040	**- Insert pistons/connecting rods from below into the cylinder liners**
290, 300	**-> In the case of TK compressors pay attention to the correct assembly position of the pistons (suction fin grooves, see figure)**
	- Install oil scraper rings in the lower groove and compression rings in the upper groove
	-> Fit with 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





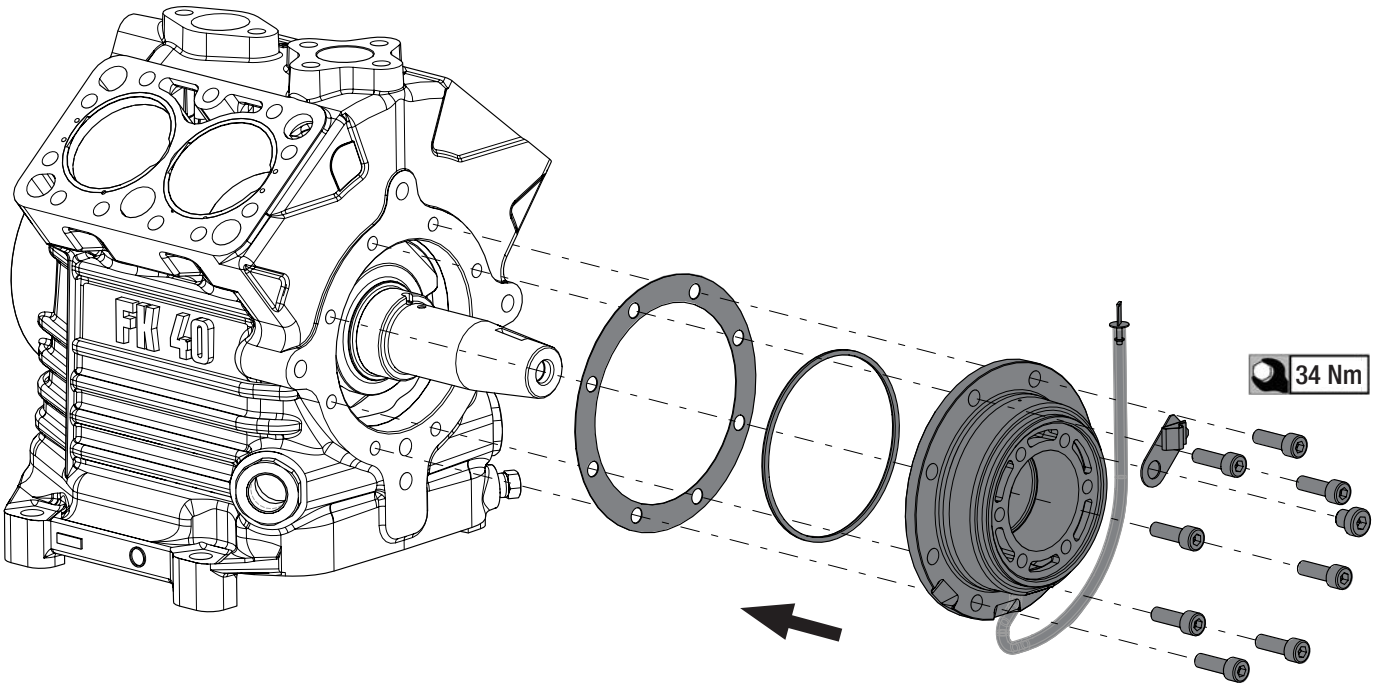
5 Fitting the crankshaft

Position in parts list	Parts list position: 2050
	Tools: -
	Working course
2050	**- Fit the crankshaft so that the drive journal engeges into the gump gear**
	- Apply bearing position with oil



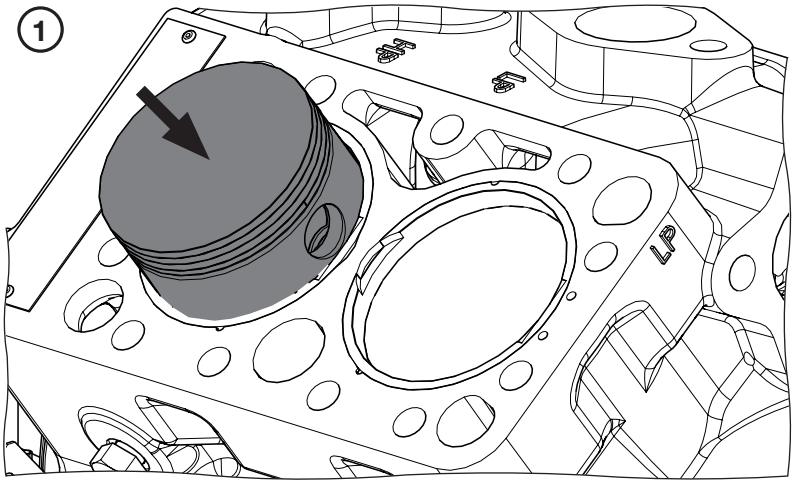
6 Installation of the front bearing flange

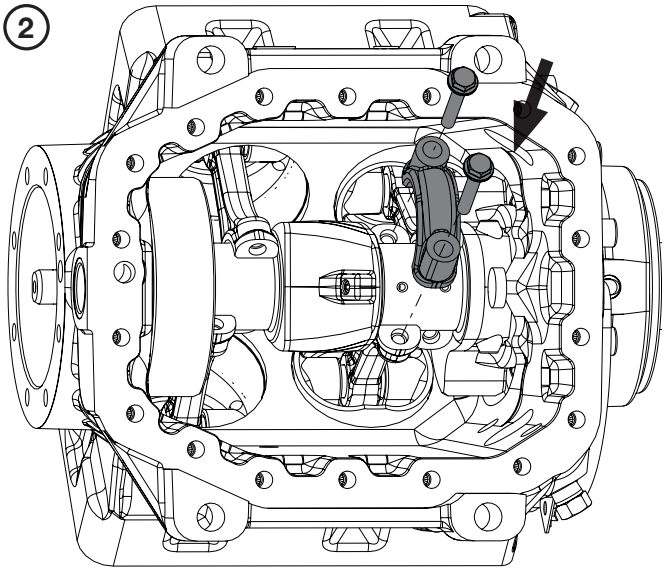
Position in parts list	
	Parts list position: 2140
	Tools: Allen key 6 mm
	Working course
	INFO Observe the tightening torques!
745	**- Apply oil to the O-ring and place it into the groove in the bearing flange**
740	**- The sealing surfaces have to be clean. Slightly oil seals**
730, 740	**- Install the front bearing flange with gasket to the body so that the hole for the clamping ring faces upwards**
750	**- Tighten the screws (M8x25) crosswise**

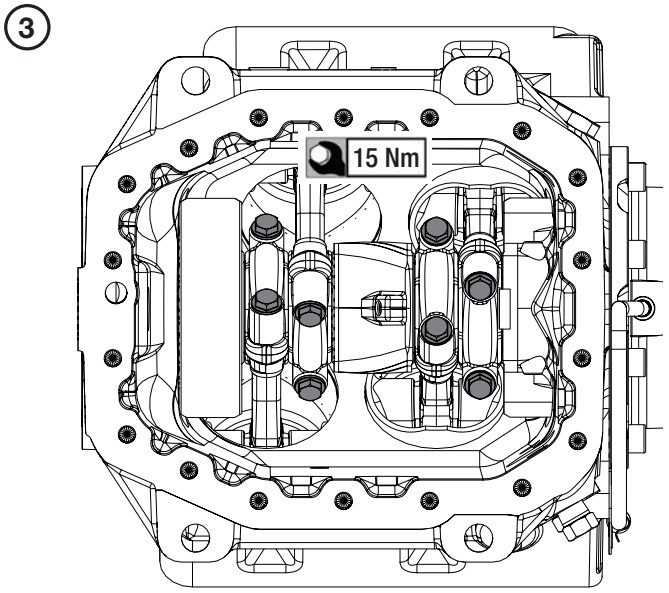


7 Assembly of the inserted connecting rods and pistons

Position in parts list	
	Parts list position: 2040
	Tools: Piston ring plier, spanner SW 10
	Working course
	INFO **Pay attention to the correct pairing of connecting rods and connecting rod caps!** **Replace connecting rod cap screws or in the case of reusing put on a sticker!**
290, 300	**- Compress the oil scraper ring and compression ring with the piston ring plier and insert the piston into the cylinder liner**
2100	**- Place the marked connecting rod caps onto the related connecting rods**
	- Screw on the connecting rod caps and tighten
2050	**- Turn the crankshaft by hand. In case the crankshaft does not rotate freely check the seating of the connecting rods; if necessary, disassemble the connecting rods and carry out this step once more**







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8 Install of the oil pump

Position in parts list

Parts list position: 2020

Tools: Spanner SW 13

Working course

INFO **Observe the tightening torques!**

Pay attention to the tightening sequence of the screws!

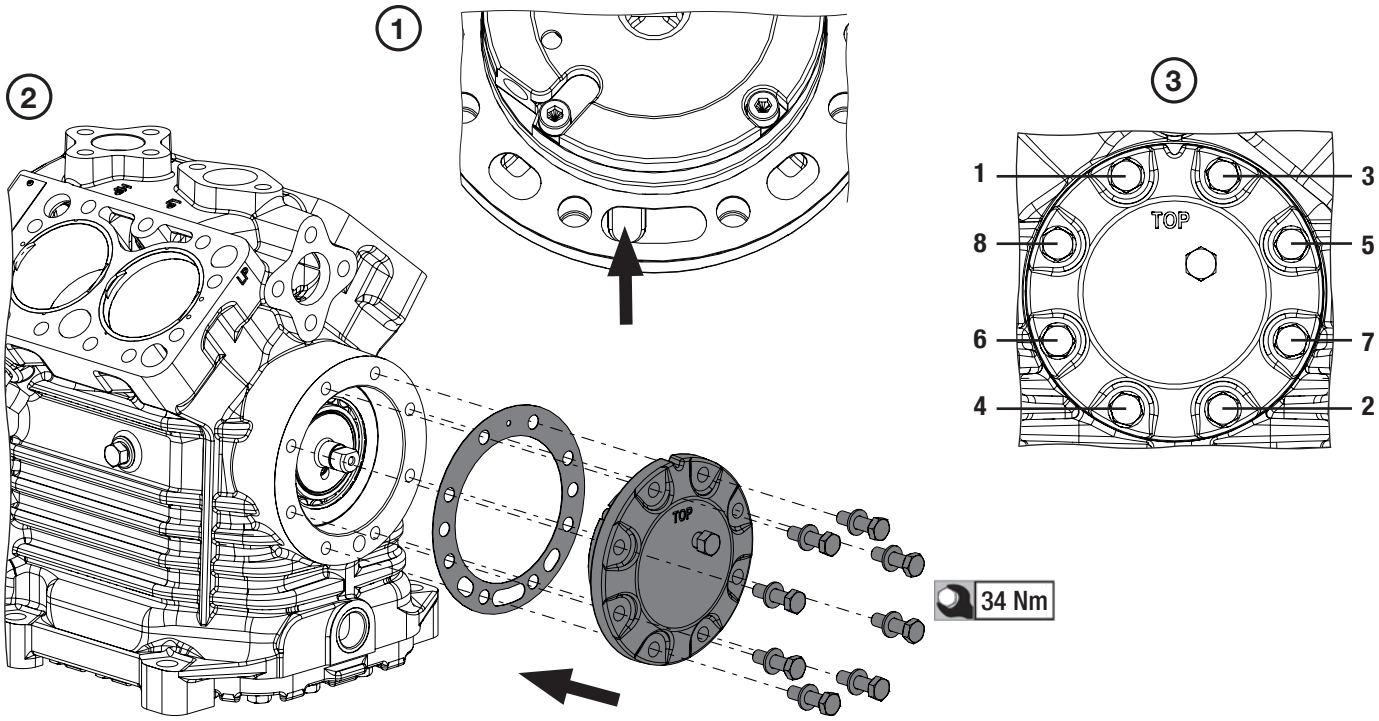
40, 41
460, 470

- The sealing surfaces have to be clean. Slightly oil seals

- Install the oil pump with gasket into the body with the inscription „TOP“ facing upwards!

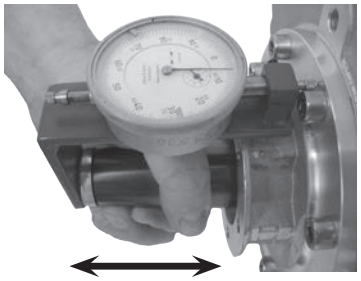
INFO **Pay attention to the position of the holes in the gasket!**

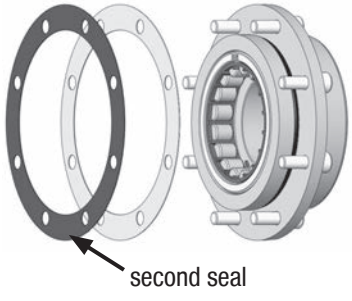
- Screw oil pump tightly. Tighten the screws (M8x30) crosswise



INFO **Adjust axial clearance!**

The axial clearance of the crankshaft must be at least 0.15 mm. 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 has to be at the disassembly shaft seal cover. If the axial clearance is less than 0.15 mm, the bearing flange must be disassembled and a second seal must inserted.





9 Fitting the shaft seal

Position in parts list

Parts list position: 2010

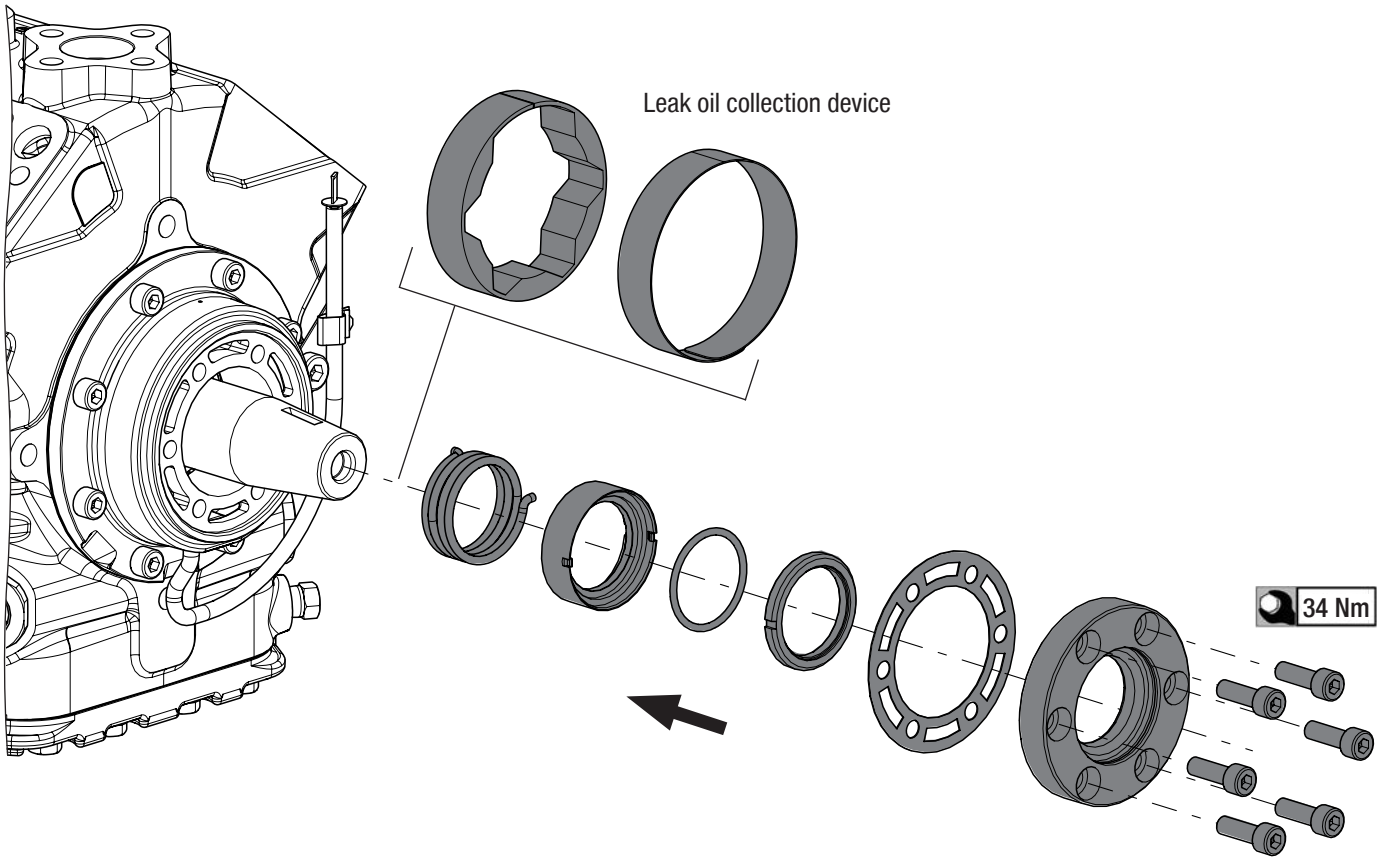
Tools: Allen key 6 mm

Working course

INFO **Caution! Avoid damages! Pay attention to the markings! ly a little oil to the parts! Observe tightening torques!**

880
750
2050
2110

- **Push the compression spring onto the crankshaft. Rotate the spring until the driving catch is engaged in the crankshaft**
- **Push the guide ring with O-ring and sliding ring onto the crankshaft. Rotate all parts until the spring is engaged in the guide ring. Avoid scratches on the sliding ring!**
- **Install the shaft seal cover with the gasket. The inscription „TOP“ must be at the top**
- **Press the shaft seal cover onto the bearing flange and tighten the screws**
- **Turn the crankshaft by hand**
- **Install the leak oil collection device (only up to type code 014 and see also under service-kits: clamping ring with oil felt)**



10 Installation of the baseplate

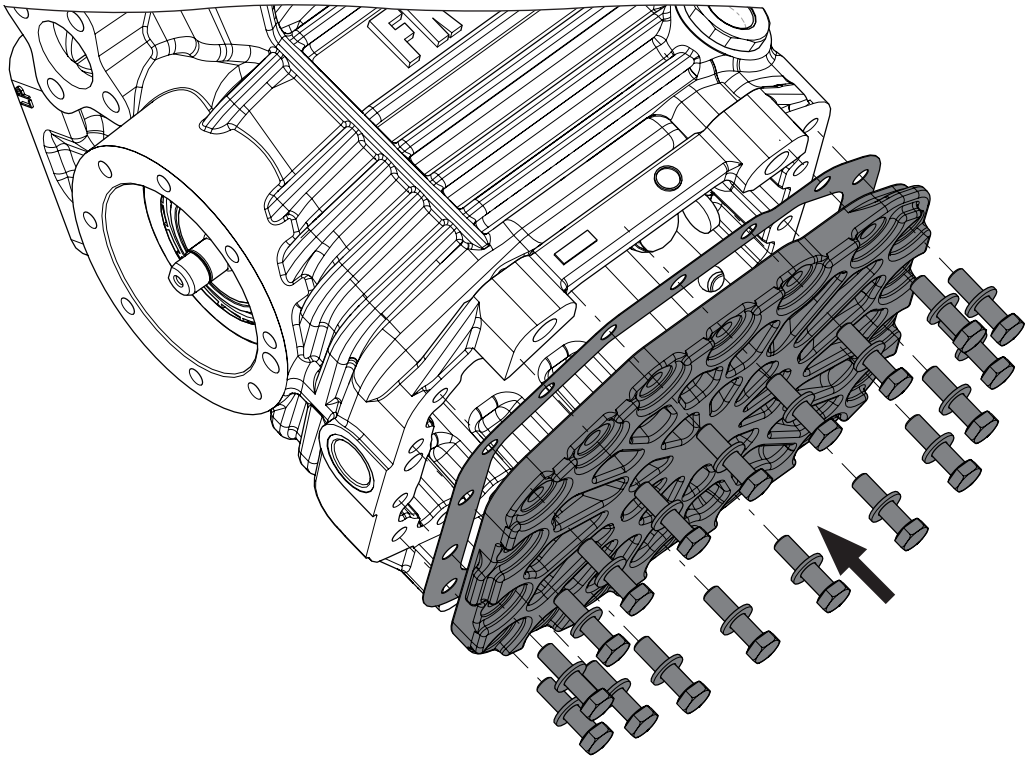
Position in parts list	Parts list position: 20, 30, 40, 41
	Tools: Spanner SW 13
	Working course

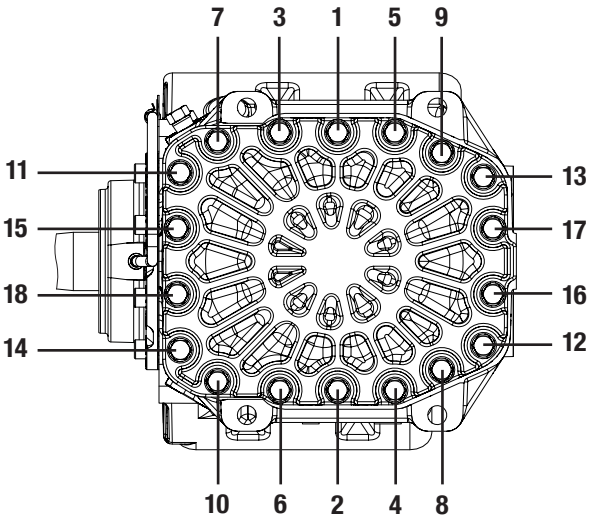
INFO **Observe the tightening torques!**

Pay attention to the tightening sequence of the screws!

20, 30 **- Install the baseplate with gasket**

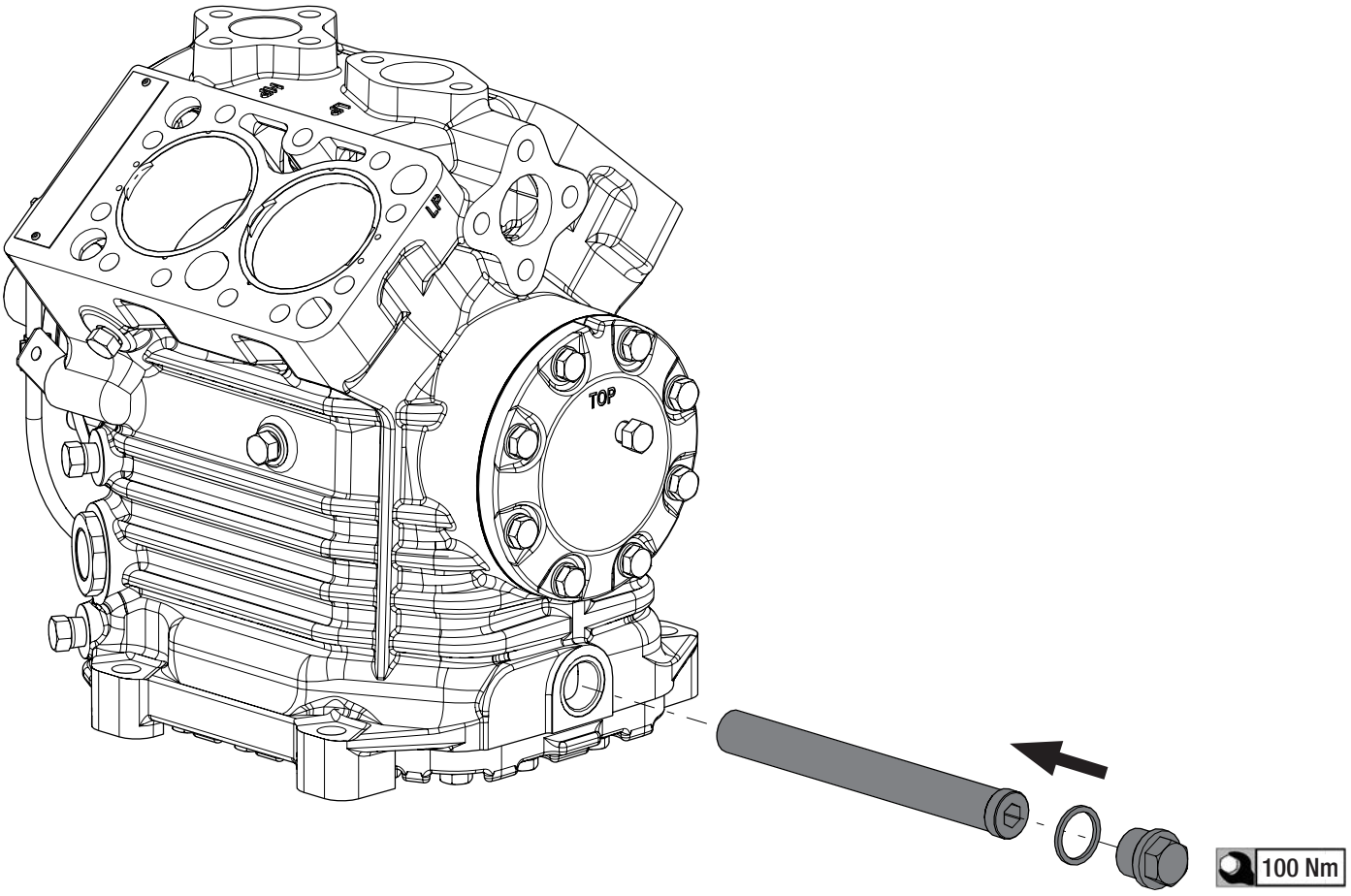
40, 41 **- Tighten the screws with the washers (M8x30) crosswise**





11 Installation of the oil filter

Position in parts list	
	Parts list position: 2130
	Tools: Allen key 10 mm, spanner SW 19
	Working course
	INFO **Observe the tightening torques!**
490	**- With the allen key, screw on the filter into the hole in the body and tighten it**
500	**- Install gasket**
510	**- Screw on the M22x1.5 mm plug and tighten it**



12 Installation of the cylinder covers and valve plates

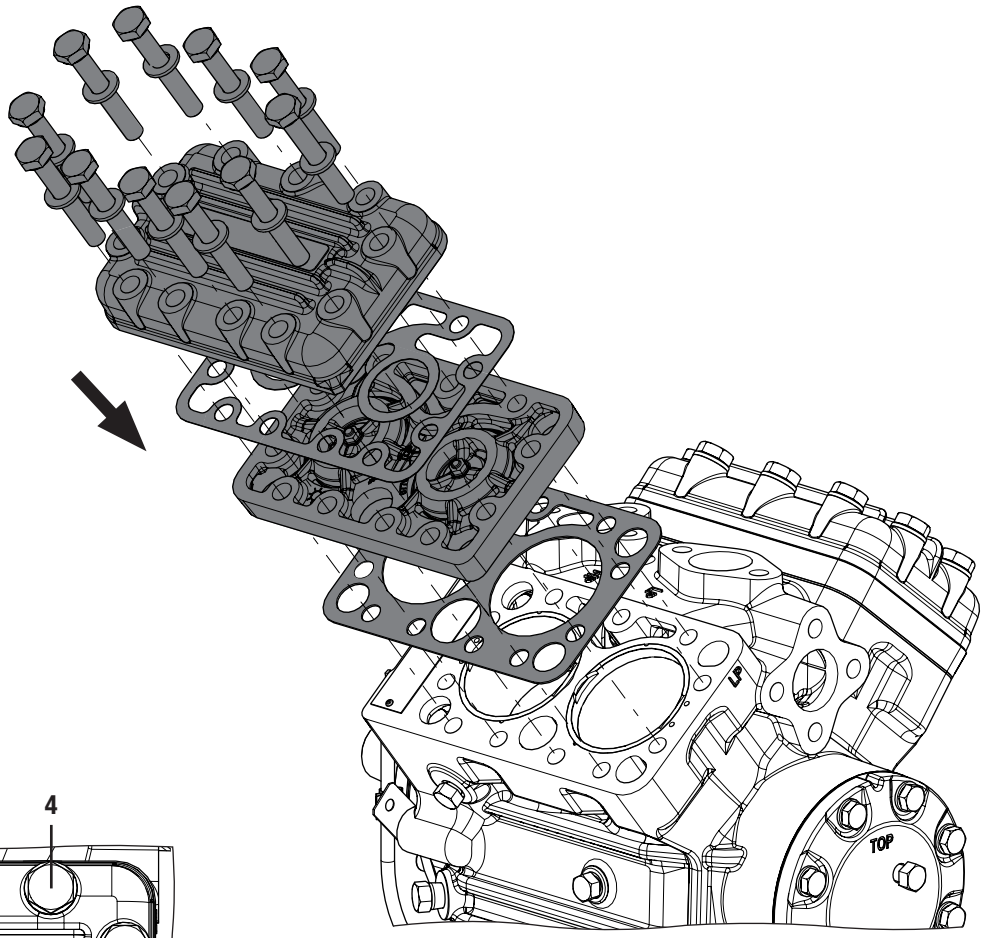
Position in parts list

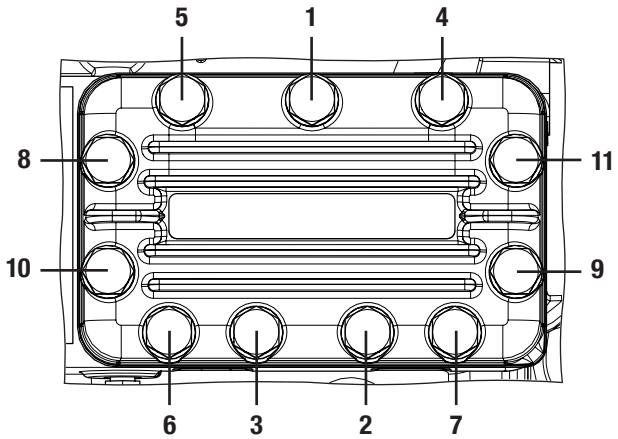
Parts list position: 170, 2000 (N / TK versions), 1940, 2900 (K version)

Tools: Spanner SW 17

Working course

N / TK	K	
		ATTENTION **Install only the cylinder covers and valve plates which belong together, avoid mix-ups! Observe the tightening torques!**
60, 50	1920, 1910	**- Mount the valve plate with the lower valve plate gasket onto the body**
170, 70	1940, 1930	**- Mount the cylinder cover with the upper valve plate gasket on the valve plate**
		INFO **Mount the K type plate with the marking „TOP“ facing upwards!**
180, 181	1950, 181	**- Tighten the screws and washers cross-wise in at least two steps**





13 Installation of all shut-off valves and blind flanges

Position in parts list

Parts list position: 2060, 2070, 232

Tools: Spanner SW 17, allen key 6 mm

Working course

INFO **Observe tightening torques!**

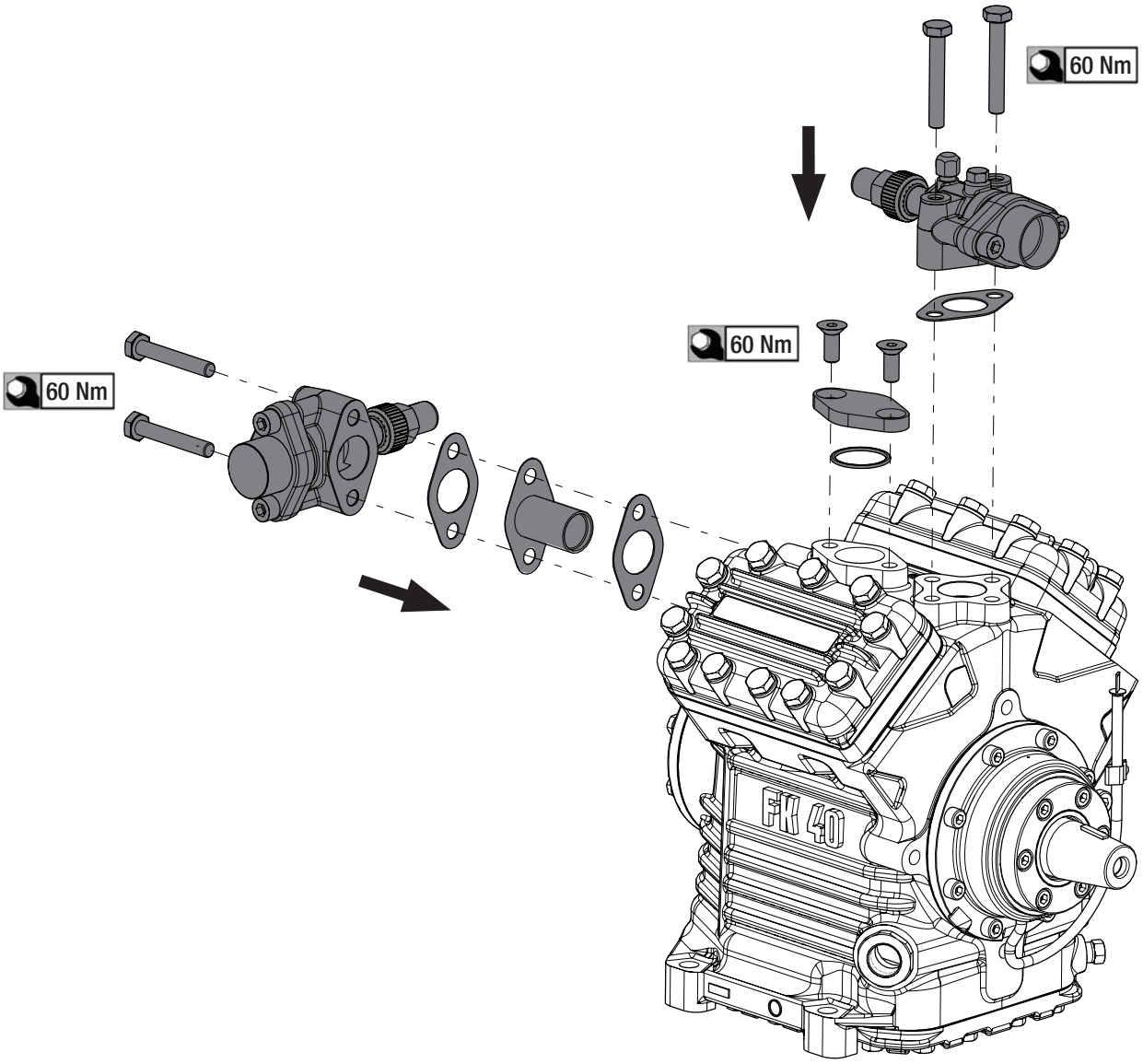
Use screws of correct length for the installation of the intermediate flanges!

230, 210 **- Put in the suction filter with the gasket**

2060 **- Install the shut-off valves (on the discharge and suction side) with gaskets and screws**

233, 232, 231 **- Install the blind flange with O-ring and screws**

- Tighten all screws



12 I Assembly of compressor

Checking the compressor

Working course

1. Evacuation / leak check of compressor

- Connect the discharge and suction sides of the compressor to a vacuum pump
- Evacuate the compressor from both sides; vacuum < 1.5 mbar. Check increase in pressure
- In case there is an increase in pressure, check the compressor for leaks and evacuate again
- Fill in the stipulated amount of oil (2.0 liters)

2. Carrying out the function test

- Install the compressor in the system
- Carry out a leak test with refrigerant
- Make a test run. During this, check the oil level, the leak-tightness of the compressor, the running noise, pressure, temperatures and the functioning of additional devices such as the capacity regulation

Remark: If the compressor is going to remain in the warehouse, charge it with nitrogen (at about 3 bar pressure) for protection.

ATTENTION Take the reminders for commissioning in the assembly instruction for FK40 into account!

Torques for screwed connections

General connections with flat seal in fibre or metal design

Screw size	Tightening torque
M8	34 Nm
M10	60 Nm

Note: Tighten the screws cross-wise in at least two stages (tightening torque 50 / 100%) .

Special connections

Designation	Screw size	Tightening torque
Shaft seal cover	M8	34 Nm
Connecting rod screws	M6	15 Nm
Oil drain plug	M22x1.5 [1)]	100 Nm
Oil intake plug	1/4“ NPTF	25 Nm
Sight glass	1 1/8“-18 NPTF	25 Nm
Flange connection Soldering gland-shut-off valves	M10	60 Nm
Screw plugs Plug	1/8“ NPTF	25 Nm
Electromagnetic coupling	M12	85 Nm
Decompression valve	M24	100 Nm

[1)] = Screw with aluminium sealing ring

Spare parts list

Pos.	Designation	Version	Piece	FK(X)40/ ...			
				390	**470**	**560**	**655**
20	Baseplate	N, K, TK	1	03876	03876	03876	03876
30	Baseplate gasket	N, K, TK	1	06721	06721	06721	06721
40	Hexagon head screw M8x30	N, K, TK	26	06244	06244	06244	06244
41	Disc A8.4	N, K, TK	26	05644	05644	05644	05644
50	Lower valve plate gasket Ø 55	N, TK	2	05695	05695	-	-
50	Lower valve plate gasket Ø 60	N, TK	2	-	-	05696	-
50	Lower valve plate gasket Ø 65	N, TK	2	-	-	-	05697
60	Valve plate, complete Ø 50 / 55	N, TK	2	07117	07117	-	-
60	Valve plate, complete Ø 60 / 65	N, TK	2	-	-	07118	07118
70	Upper valve plate gasket	N, TK	2	06730	06730	06730	06730
100	Decompression valve for 28bar operation	N, K, TK	1	07940	07940	07940	07940
170	Cylinder cover	N, TK	2	03384	03384	03384	03384
180	Hexagon head screw M10x65	N, TK	22	06034	06034	06034	06034
181	Disc A10.5	N, K, TK	22	05646	05646	05646	05646
199	Transport angle	N, K, TK	1	50435	50435	50435	50435
210	Valve flange gasket	N, K, TK	3	50636	50636	50636	50636
220	Hexagon head screw M10x65	N, K, TK	4	06034	06034	06034	06034
221	Disc B10.5	N, K, TK	3	05646	05646	05646	05646
230	Filter suction side	N, K, TK	1	03370	03370	03370	03370
231	O-Ring Ø 34.59x2.62	N, K, TK	1	05153	05153	05153	05153
232	Blind flange 9 mm	N, K, TK	1	04715	04715	04715	04715
233	Countersunk screw M10x25	N, K, TK	2	05075	05075	05075	05075
270	Piston pin Ø 15x10x41	N, K, TK	4	07211	-	-	-
270	Piston pin Ø 15x10x46	N, K, TK	4	-	07212	-	-
270	Piston pin Ø 15x10x50	N, K, TK	4	-	-	07857	07857
280	Seeger circlip 15x1, DIN 472	N, K, TK	8	05551	05551	05551	05551
290	Oil scraper ring piston 50	N, K, TK	4	05389	-	-	-
290	Oil scraper ring piston 55	N, K, TK	4	-	05390	-	-
290	Oil scraper ring piston 60	N, K, TK	4	-	-	06562	-
290	Oil scraper ring piston 65	N, K, TK	4	-	-	-	06572
300	Tapered compression ring piston 50	N, K, TK	4	05379	-	-	-
300	Tapered compression ring piston 55	N, K, TK	4	-	05380	-	-
300	Tapered compression ring piston 60	N, K, TK	4	-	-	06563	-
300	Tapered compression ring piston 65	N, K, TK	4	-	-	-	06564
312	Tolerance ring for bearing Ø 90	N, K, TK	1	05280	05280	05280	05280
320	Cap nut M22x1.5	N, K, TK	2	05784	05784	05784	05784
321	Cap nut 7/16“ UNF	N, K, TK	2	05789	05789	05789	05789
322	Screw plug 1/8“ NPTF	N, K, TK	2	05514	05514	05514	05514
330	Shut-off valve (AL)	N, K, TK	2	07128	07128	07128	07128
340	Gasket ring 42x34x1	N, K, TK	2	05067	05067	05067	05067
350	Soldered bush Ø 22	N, K, TK	1	04366	-	-	-
350	Soldered bush Ø 28	N, K, TK	1	-	04367	04367	-
350	Soldered bush Ø 35	N, K, TK	1	-	-	-	05313
355	Flange oval 16 mm	N, K, TK	1	04329	04329	04329	04329
360	Flange oval 16 mm	N, K, TK	1	04329	04329	04329	04329
370	Hexagon head screw M10x35	N, K, TK	2	05447	-	-	-
370	Cylinder screw M10x35	N, K, TK	2	-	05489	05489	05489

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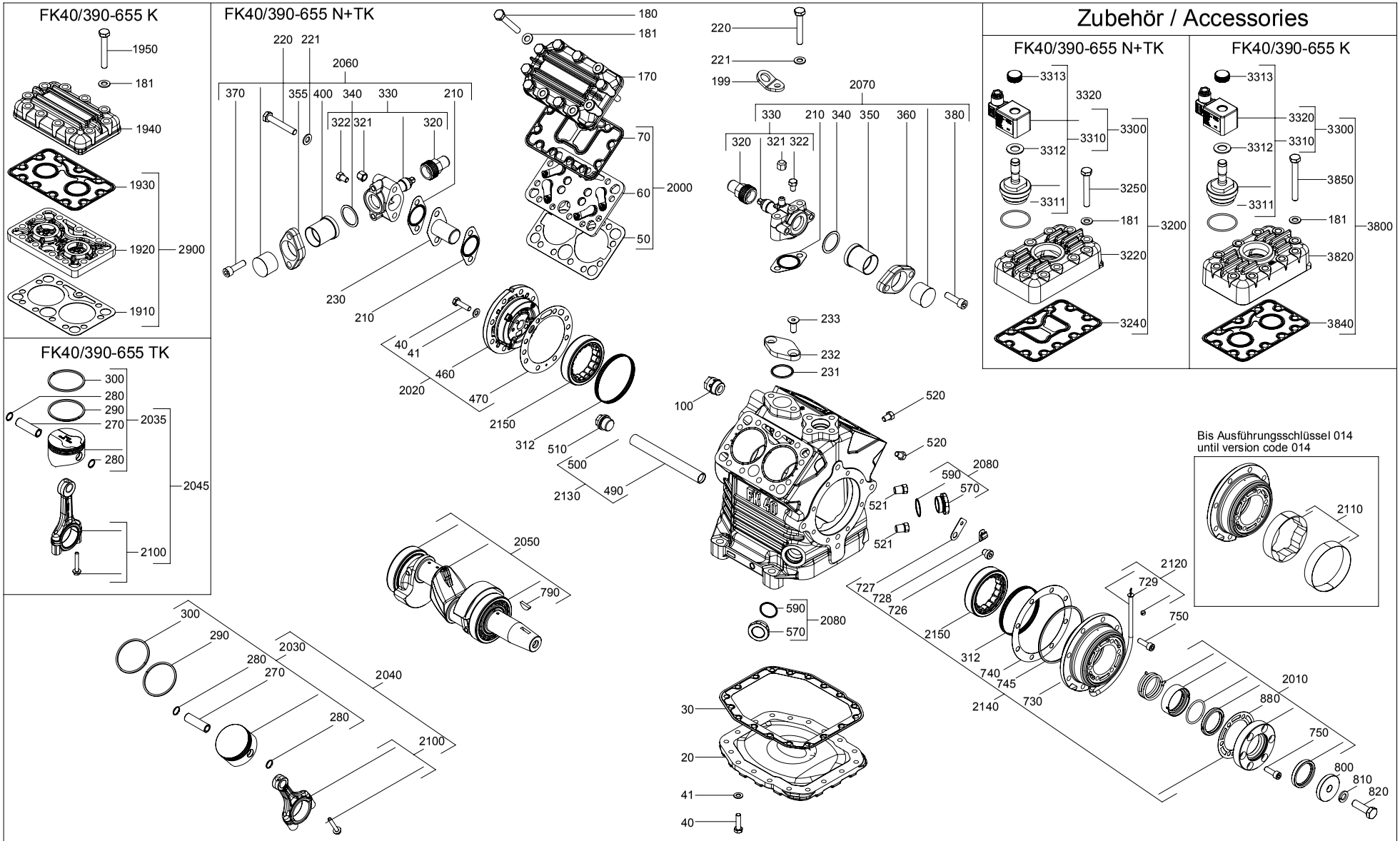
Pos.	Designation	Version	Piece	FK(X)40/ ...			
				390	**470**	**560**	**655**
380	Hexagon head screw M10x35	N, K, TK	2	05447	05447	05447	-
380	Cylinder screw M10x35	N, K, TK	2	-	-	-	05489
400	Soldered bush Ø 28	N, K, TK	1	04367	-	-	-
400	Soldered bush Ø 35	N, K, TK	1	-	05313	05313	05313
460	Oil pump complete	N, K, TK	1	07990	07990	07990	07990
470	Gasket for oil pump + rear bearing flange	N, K, TK	1	05094	05094	05094	05094
490	Oil filter	N, K, TK	1	06723	06723	06723	06723
500	Seal ring 27x22x2	N, K, TK	1	05342	05342	05342	05342
510	Screw plug M22x1,5	N, K, TK	1	06400	06400	06400	06400
520	Screw plug 1/8“ NPTF	N, K, TK	2	05514	05514	05514	05514
521	Screw plug 1/4“ NPTF	N, K, TK	2	05801	05801	05801	05801
570	Sight glass - insert Ø 18 up to type code 012	N, K, TK	2	06026	06026	06026	06026
570	Sight glass - insert Ø 22 from type code 013	N, K, TK	2	05361	05361	05361	05361
590	O-Ring Ø 23.52x1.87 up to type code 012	N, K, TK	2	05142	05142	05142	05142
590	O-Ring Ø 28.30x1.87 from type code 013	N, K, TK	2	06352	06352	06352	06352
726	Cylinder screw M10x10	N, K, TK	1	06169	06169	06169	06169
727	Cable / hose holder	N, K, TK	1	03860	03860	03860	03860
728	Cable / hose clamp	N, K, TK	1	03861	03861	03861	03861
729	Haft plug Ø 5 (PHT, SCHW.)	N, K, TK	1	50184	50184	50184	50184
730	Front bearing flange	N, K, TK	1	06726	06726	06726	06726
740	Front bearing flange gasket	N, K, TK	1	06165	06165	06165	06165
745	O-Ring Ø 101.19x3.53	N, K, TK	1	05169	05169	05169	05169
750	Cylinder screw M8x25	N, K, TK	14	06067	06067	06067	06067
790	Woodruff key A5x9 DIN 6888	N, K, TK	1	05673	05673	05673	05673
800	Disc Ø 50x12.5x8	N, K, TK	1	04425	04425	04425	04425
810	Spring washer B12	N, K, TK	1	05666	05666	05666	05666
820	Hexagon head screw M12x40	N, K, TK	1	05462	05462	05462	05462
880	Shaft seal cover gasket	N, K, TK	1	05063	05063	05063	05063
1910	Lower valve plate gasket Ø 50	K	2	06178	-	-	-
1910	Lower valve plate gasket Ø 55	K	2	-	06161	-	-
1910	Lower valve plate gasket Ø 60	K	2	-	-	06641	-
1910	Lower valve plate gasket Ø 65	K	2	-	-	-	06642
1920	Valve plate complete	K	2	07700	07700	07700	07700
1930	Upper valve plate gasket	K	2	06162	06162	06162	06162
1940	Cylinder cover	K	2	03381	03381	03381	03381
1950	Hexagon head screw M10x70	K	22	05457	05457	05457	05457
	Only for FK compressors:						
3999	Mach. oil SP46 / 1 ltr. can	N, K, TK	1	02279	02279	02279	02279
3999	Mach. oil SP46 / 5 ltr. can	N, K, TK	1	02280	02280	02280	02280
3999	Mach. oil SP46 / 20 ltr. can	N, K, TK	1	02281	02281	02281	02281
	Only for FK**X** compressors:						
3999	Mach. oil SE55 / 1 ltr. can	N, K, TK	1	02282	02282	02282	02282
3999	Mach. oil SE55 / 5 ltr. can	N, K, TK	1	02283	02283	02283	02283
3999	Mach. oil SE55 / 10 ltr. can	N, K, TK	1	02284	02284	02284	02284

Repair set parts list

Pos.	Designation	Version	Piece	FK(X)40/ ...			
				390	**470**	**560**	**655**
2000	Set valve plate	N, TK	2	80240	80240	80241	80241
2010	Set shaft seal with mineral oil charge	N, K, TK	1	80682	80682	80682	80682
2010	Set shaft seal with ester oil charge	N, K, TK	1	80023	80023	80023	80023
2020	Set oil pump	N, K, TK	1	80017	80017	80017	80017
2030	Set piston Ø 50 optimized	N, K	4	80102	-	-	-
2030	Set piston Ø 55 optimized	N, K	4	-	80103	-	-
2030	Set piston Ø 60 optimized	N, K	4	-	-	80104	-
2030	Set piston Ø 65 optimized	N, K	4	-	-	-	80105
2035	Set piston Ø 50 rilled, optimized	TK	4	80220	-	-	-
2035	Set piston Ø 55 rilled, optimized	TK	4	-	80107	-	-
2035	Set piston Ø 60 rilled, optimized	TK	4	-	-	80210	-
2035	Set piston Ø 65 rilled, optimized	TK	4	-	-	-	80225
2040	Set piston connecting rod with 2 rings Ø 50	N, K	4	80108	-	-	-
2040	Set piston connecting rod with 2 rings Ø 55	N, K	4	-	80109	-	-
2040	Set piston connecting rod with 2 rings Ø 60	N, K	4	-	-	80110	-
2040	Set piston connecting rod with 2 rings Ø 65	N, K	4	-	-	-	80111
2045	Set piston con. rod Ø 50 rilled, optimized	TK	4	80249	-	-	-
2045	Set piston con. rod Ø 55 rilled, optimized	TK	4	-	80250	-	-
2045	Set piston con. rod Ø 60 rilled, optimized	TK	4	-	-	80251	-
2045	Set piston con. rod Ø 65 rilled, optimized	TK	4	-	-	-	80226
2050	Set crankshaft 49 stroke, optimized	N, K, TK	1	80154	80154	80154	80154
2060	Set shut-off valve NW25 (AL)	N, K, TK	1	08084	-	-	-
2060	Set shut-off valve NW32 (AL)	N, K, TK	1	-	08082	08082	08082
2070	Set shut-off valve NW20 (AL)	N, K, TK	1	08100	-	-	-
2070	Set shut-off valve NW25 (AL)	N, K, TK	1	-	08084	08084	-
2070	Set shut-off valve NW32 (AL)	N, K, TK	1	-	-	-	08082
2080	Set sight glass Ø 18 up to type code 012	N, K, TK	2	08698	08698	08698	08698
2080	Set sight glass Ø 22 from type code 013	N, K, TK	2	08552	08552	08552	08552
2090	Set gaskets (not shown)	N, TK	1	80230	80230	80230	80230
2090	Set gaskets (not shown)	K	1	80001	80001	80001	80001
2100	Set connecting rod	N, K, TK	4	08449	08449	08449	08449
2110	Set clamping ring with oil felt up to type code 014	N, K, TK	1	80129	80129	80129	80129
2130	Set oil filter	N, K, TK	1	80076	80076	80076	80076
2140	Set front bearing flange	N, K, TK	1	80081	80081	80081	80081
2150	Set cylinder roller bearing	N, K, TK	2	80118	80118	80118	80118
2900	Set valve plate	K	2	80010	80010	80010	80010

Parts list, optional accessories

Pos.	Designation	Version	Piece	FK(X)40/ ...			
				390	**470**	**560**	**655**
3200	Set capacity regulator LR87, 24V DC with cylinder cover	N, TK	1	08704	08704	08704	08704
3220	Cylinder cover for CR, with bush	N, TK	1	03383	03383	03383	03383
3240	Upper valve plate gasket	N, TK	1	06730	06730	06730	06730
3250	Hexagonal head screw M10x70	N, TK	11	05457	05457	05457	05457
3300	Set capacity regulator LR87, 24V DC	N, K, TK	1	08418	08418	08418	08418
3310	Valve body LR87	N, K, TK	1	07541	07541	07541	07541
3311	O-Ring Ø 48.0x2.5 green	N, K, TK	1	05987	05987	05987	05987
3312	Disc Ø30x16x2.0	N, K, TK	1	05143	05143	05143	05143
3313	Milled nut M15x1 with O-Ring	N, K, TK	1	05885	05885	05885	05885
3320	Solenoid coil 24V DC	N, K, TK	1	07526	07526	07526	07526
3600	Set replacement adapter set the same shut-off valve positioning similar to FK4/467 (not shown)	N, K, TK	1	80022	80022	80022	80022
3800	Set capacity regulator LR87 24V DC with cylinder cover	K	1	08709	08709	08709	08709
3820	Cylinder cover for CR, with bush	K	1	03323	03323	03323	03323
3840	Upper valve plate gasket	K	1	06162	06162	06162	06162
3850	Hexagonal head screw M10x85	K	11	06338	06338	06338	06338



GEA

Fahrzeugverdichter / Vehicle Compressor

Typ / type	Teile-Nr. / part-no.	Typ / type	Teile-Nr. / part-no.	Typ / type	Teile-Nr. / part-no.
FK(X)40/390 N	13977 (13985)	FK(X)40/390 K	13978 (13986)	FK(X)40/390 TK	14339 (14343)
FK(X)40/470 N	13979 (13987)	FK(X)40/470 K	13980 (13988)	FK(X)40/470 TK	14340 (14344)
FK(X)40/560 N	13981 (13989)	FK(X)40/560 K	13982 (13990)	FK(X)40/560 TK	14341 (14345)
FK(X)40/655 N	13983 (13991)	FK(X)40/655 K	13984 (13992)	FK(X)40/655 TK	14342 (14346)

Zeichn.-Nr. / Drawing no.:

1.0851-13983.0 0g

Stand / As of date: 01.16

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GEA Group is a global engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881, the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX® Europe 600 index.

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