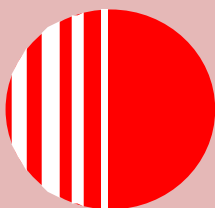


INSTRUCTION MANUAL AIR COMPRESSOR

GB

HLF2/77



SPERRE

PREFACE

Sperre has produced this instruction manual in order to provide users of its compressor equipment with information about the compressor's construction and operation, as well as basic information about inspection and maintenance.

It is important that the operator should familiarise himself with the contents of this instruction manual, so as to ensure that installation, use and maintenance work is carried out in a correct and safe manner from the outset.

The maintenance intervals and individual technical data are average values based on experience, and may vary, depending on the compressor's operational parameters.

The supplier accepts no responsibility for damage resulting from careless operation or inadequate maintenance. Keep the compressor in good mechanical condition, and remember that preventive maintenance of the equipment reduces the danger of damage and unnecessary operational interruptions.

Sperre reserves the right to modify details without prior warning.

Ellingsøy, January 2010
Sperre Industri AS

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PERSONAL SAFETY

The installation, operation and maintenance of the compressor should be carried out by trained personnel who are familiar with the contents of this instruction manual.

The compressor must only be used to compress air.

Unauthorised remodelling or modification of the compressor may result in a safety hazard, and are not permitted.

Before any form of work is commenced on the compressor the electrical power must be turned off at the starter panel and at the main switchboard, and the switch on the main switchboard must be marked with a notice indicating that repair work is in progress. The discharge valve of the compressor must be closed, and the pressure must be released in all pressurised parts of the compressor.

The safety valves for LP and HP air and any other safety equipment must be inspected regularly. Damaged components should be replaced with new, original parts. Adjustment of the safety valves shall only be carried out by authorised personnel. The compressor must never be used if the safety equipment is defective.

GENERAL DESCRIPTION

This is a two cylinder, two stage compressor. The cylinders are fitted in a V-shape at 90° angle to each other. Cylinders and compressed air coolers are air-cooled by a built in fan. Supply pressure is determined by adjusting the safety valve.

The compressor and motor are normally supplied fitted together as a single unit. The compressor and motor are connected by means of a heavy duty flexible coupling.

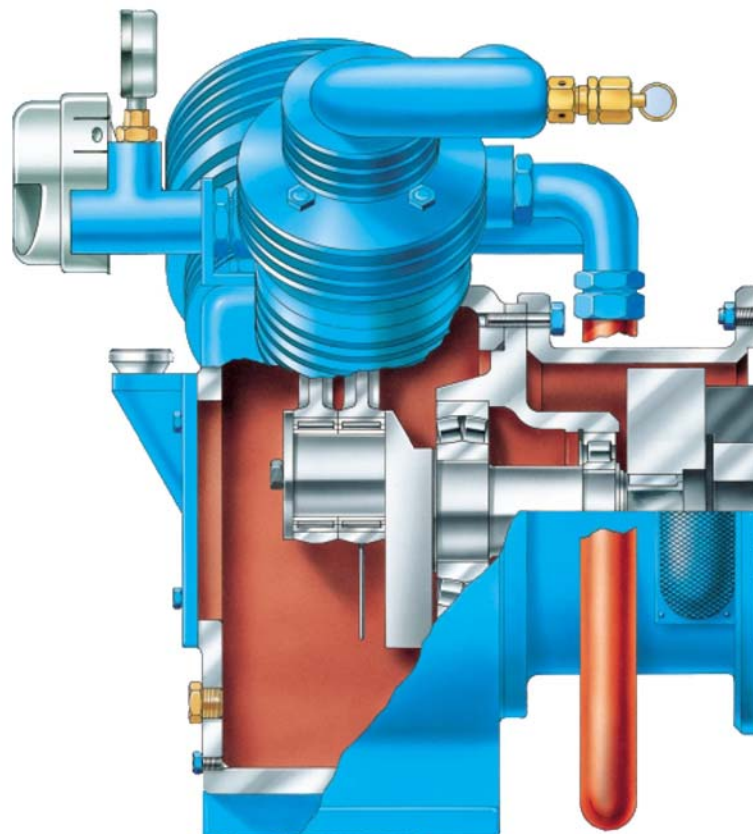
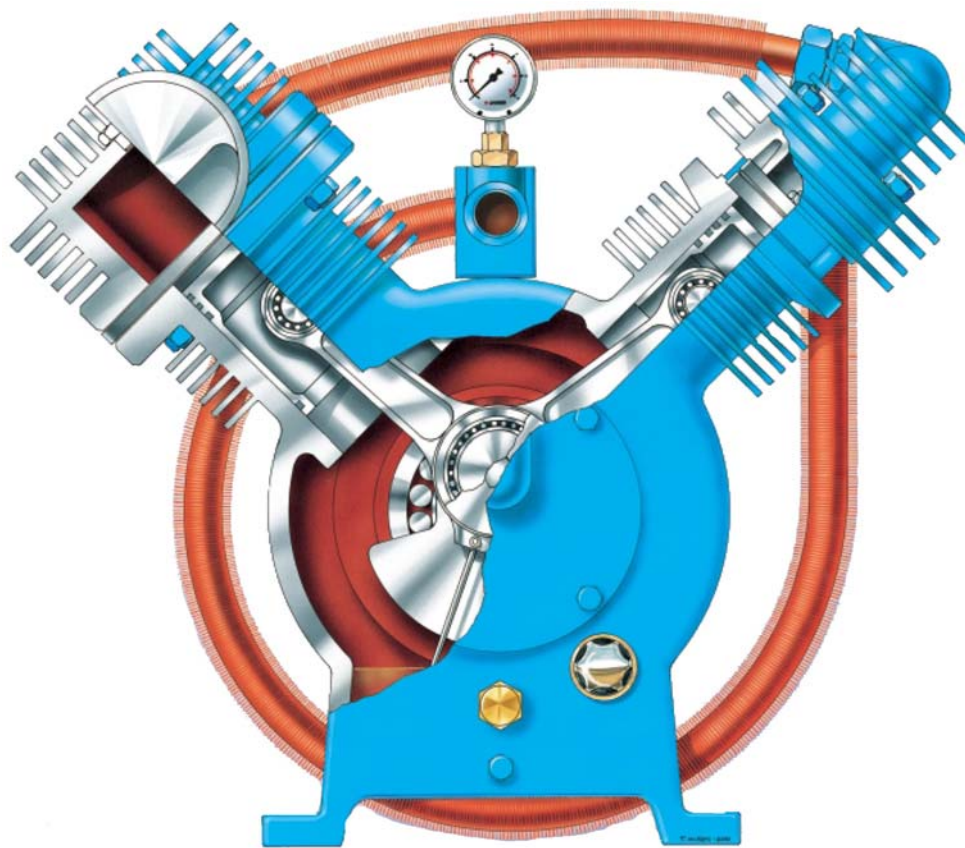
All the materials used are of first class quality, thoroughly tested and in accordance with the requirements of the classification societies.

Instrumentation is supplied in accordance with classification society requirements and if desired the compressor can be fitted with equipment for fully automatic operation.

Bearings and cylinder walls are splash lubricated. The oil level in the sump can be checked through a sight glass. An automatic low oil level alarm can be supplied as an optional extra.

The compressor is normally supplied without a relief mechanism for the LP cylinder suction valve. However, a relief mechanism can be ordered from SPERRE if required.

The compressor unit can be supplied either for bolting directly to the foundation, or for flexible installation by means of resilient mountings fitted under the bedplate.



INSTALLATION

The compressor and el. motor are normally connected by a flanged connection piece, and not by the means of a separate baseplate. In this assembly it is not necessary to take any special measures to align the motor and compressor.

If the compressor is delivered as an assembly with compressor and engine mounted on a common baseplate, it is very important to ensure that the alignment of the compressor and motor shafts are within the required limits.

Alignment should be carried out as follows:

1. Use vernier callipers to check that the distance between the coupling halves is equal around the whole circumference. The distance between the coupling halves should be 33 ± 1 mm. The exact distance is not important, but it must be the same all around the coupling.
2. When angular alignment has been checked as described above, check for parallel displacement, using a dial gauge mounted on a magnetic base. Measure the parallel displacement around the circumference. Displacement must not exceed $\pm 0,05$ mm.

In order to ensure trouble-free operation it is important that the foundation is well stiffened and free from vibrations from other installed machinery. This applies to rigid mounting and flexible mounting alike.

A well-dimensioned fresh air duct must be provided to the location where the compressor is installed. The mouth of the duct should be as close as practically possible to the suction side of the cooling fan.
The ambient temperature should not exceed 45°C.

In principle the pipe from the compressor to the air reservoir should be arranged as shown in the installation diagram supplied with the compressor. A non-return valve of strong construction and little air resistance should be installed between oil and water separator and air receiver.

If the compressor unit is installed with resilient mountings, a flexible hose must be installed in the compressed air pipe. An oil and water separator should be fitted at some distance from the compressor, and arranged so that the line slopes downwards from the compressor to the separator. It is recommended to provide the oil and water separator with both manual and automatic draining. Equipment for automatic draining is available as an optional extra.

If the pipe from compressor to reservoir is longer than about 10 meters, the dimensions shown in the installation diagram supplied with compressor should be somewhat increased to ensure the lowest possible air resistance.

Arrange the piping so that condensate cannot collect in pockets.

All piping must be well clamped and free from vibration.

STARTING UP

Before initial starting up and after long periods out of use, carry out the following operations in the sequence given:

1. Check the oil level (sight glass).
2. If the compressor has been out of service for more than 6 months, remove valves and lubricate cylinder walls.
3. Open valves on compressed air line, and start the unit.
4. Check that all components are running normally. Inspect instruments, check for air leaks.

OPERATION

During operation, pressures and temperatures must be within the recommended limits. Any deviation is abnormal and its cause should be ascertained by means of the fault tracing chart. In the case of pressure or temperature deviations, it is recommended first to check the values with new thermometers and pressure gauges in order to ensure that the fault is not to be found in the instruments.

STOPPING

If the compressor is to remain unused for a long period, lubricate valves and cylinder walls with oil. The compressor should be turned over from time to time.

MAINTENANCE – OVERHAUL – REPAIRS

Only Sperre original spare parts should be used for overhauls and repairs. Before ordering spare parts, please read the instructions given in chapter: "Ordering spare parts".

Valves

LP valve

To dismantle the valve, proceed as follows:

1. Loosen pipe connections.
2. Loosen and remove cylinder head.
3. Loosen the bolts holding the valve in place on the cylinder head.

Carefully separate the upper and lower sections of the valve body to remove the valve insert with valve plates.

Important: There are milled slots in the upper and lower sections of the valve body. When the valve is correctly assembled these slots correspond.

It is important that the valve is be correctly fitted under the cylinder head. The valves suction side should be turned towards the suction air filter and the pressure side must face towards the fan/electric motor. Press the valve (3036) against the cylinder head (1283) by means of a hydraulic press or vice. Force approx. 2T. Tighten the screws (4401) to a torque of 24 Nm. The screws 4401 must be locked so that they cannot come loose. The edge of each screw head has a notch. After tightening the screws, lock them by putting a punch mark in the valve at each notch.

HP valve

To dismantle the valve, proceed as follows:

1. Loosen pipe connections at cylinder head.
2. Loosen cylinder head nuts and lift off cylinder head.
3. The valve is now free and can be removed.

Valve assembly sequence is the opposite of the above.

Worn and damaged parts should be replaced. Always replace valve gaskets.

Valve overhaul: Release the lock at the top of the valve, loosen the nuts and carefully open the valve.

Note the location of the parts, so that they can be correctly refitted.

Clean the valve parts, carbon deposits can best be removed by means of a good solvent, carbon remover or similar, then flush with hot water.

Important: The valves are an essential part of the compressor and it is important for operational safety that all parts have the correct material specifications and machining tolerances. Even the smallest defect in a valve component may lead to overheating and consequent damage. The supplier accepts no responsibility for damage to the compressor resulting from the use of non-original parts.

Only original Sperre copper gaskets can be used as valve seating gaskets. Exact dimensions and correct hardness are of great importance for trouble free operation.

Cylinder head nuts should be tightened a little at a time, in sequence, to prevent unsymmetrical load on the valve.

Piston and connection Rod

The procedure for dismantling and assembling the piston and connecting rod is as follows:

1. Dismantle the electric motor, coupling, and intermediate piece from the compressor.
2. Remove the LP cylinder head.
3. Remove the crankcase cover and remove the counterbalance at the end of the crankpin.
4. Loosen the bearing housing and pull it axially together with the crankshaft, far enough to bring the connecting rods clear of the crankpin.
5. Pull the LP piston with the connecting rod out of the top of the cylinder.
6. Pull down the HP piston with connecting rod out through the crankcase.

Assembly sequence is the opposite order.

Bearings - Dismantling and Assembly

Important: Work on bearings requires great care and scrupulous cleanliness.

Worn or damaged crankshaft bearings should be replaced complete. Replacement of parts of the bearings is not satisfactory. Bearings dismantled from shaft and/or connecting rod should always be replaced with new bearings.

Crankshaft bearings

Dismantle as follows:

1. Remove the outer ring from the connecting rod, using a hydraulic press.
2. Remove the inner ring from the crankpin by heating it rapidly with a welding torch, then push it off the pin by means of a screwdriver or the like. If necessary, grind a notch in it to reduce its tension.
3. Fit a new outer ring to the connecting rod by using a hydraulic press.
4. To fit the inner ring, heat it in an oil bath or on an electric hotplate to 80 – 100 °C before sliding it onto the pin.

Gudgeon pin bearings

Dismantle as follows:

1. Remove seeger rings.
2. Press out the gudgeon pin. If necessary, heat the piston slightly.
3. Use a hydraulic press to remove and re-install the gudgeon pin bearing in the connecting rod.

Important: Check that there is axial play between connecting rod and piston after installation.

Main bearings

Dismantle as follows:

1. Remove the crankcase cover and detach the counterbalance at the end of the crankpin.
2. Dismantle the electric motor, coupling piece, coolers and flywheel.
3. Dismantle cylinder heads, pistons and connecting rods as described under "Piston and connection Rod".
4. Pull the bearing housing and crankshaft clear of the crankcase.
5. Remove seeger ring and pull the crankshaft out of the bearing housing. Carefully tap the bearings off the shaft and bearing housing respectively.

Before fitting the bearings, heat them in an oil bath to about 100°C. Ensure that the seeger rings are correctly placed in their respective slots.

Assembly is done in the opposite order.

Coolers

To ensure trouble-free operation it is of the greatest importance to ensure that the coolers are kept clean and free of foreign matter at all times. If the coolers are not kept properly clean, high air temperatures will result, with a consequent reduction of working life of valves and cylinders.

The coolers can be externally cleaned by spraying on a good grease solvent and then blowing them clean with compressed air.

In the case of heavy deposits of dirt the coolers should be dismantled for external and internal cleaning.

Any carbon deposits in the tubes can be removed by placing them in a bath of carbon remover or similar solvent overnight, and then flushing with hot fresh water.

Important: Make sure that the cleaning products are suitable for use on copper pipes.

Gaskets

In order to achieve satisfactory operation it is recommended to replace gaskets at every overhaul. Worn or damaged gaskets will reduce compressor capacity and cause faulty operation.

Use only original SPERRE gaskets.

LUBRICATING OIL

The lubrication oil volume in the crank case is 1,8 litres.

The following lubricating oil brands are recommended:

Synthetic oil	Mineral oil
ANDEROL 555	BP ENERGOL RC 68
BP ENERSYN RX 100	CASTROL AIRCOL PD 100
CASTROL AIRCOL SN 100	CALTEX RPM COMPR. OIL 68
COSMO RECIPRO SX 100	ESSO / EXXON EXXCOLUMB 77
DAPHNE MARINE COMPR. 100	COSMO RECIPRO 100
ESSO / EXXON ZERICE S 100	FAMM COMPRESSOR OIL EP VDL 100
ESSO / EXXON SYNNESTIC 68	GENERAL COMPOL A 100
FAMM CETUS DE 100	MITSUBISHI COMPR. OIL 100
MOBIL RARUS 827	MOBIL RARUS 427
NIPPON OIL CO. FAIRCOL SA 100	PHILLIPS COMPR. OIL 68
SHELL CORENA AP 68	SHELL CORENA P 68
STATOIL FRIDGEWAY S 100	STATOIL COMPWAY 68
TOTAL LUBMARINE BARELF AL 100	TOTAL DACNIS P
STATOIL COMPWAY SX68	

Ask SPERRE for advice before using lubricating oil of any other type.

TABLE OF NORMAL PRESSURES AND TEMPERATURES

Temperatures in service, with shaft speed 1450 rpm. The values are valid for ambient temperature 40°C and delivery pressure 30 bar.

Pressure after LP cylinder:	2 - 3 bar
Temperature after LP cylinder:	125°C
Temperature after LP cooler:	115°C
Temperature after HP cylinder:	210°C
Temperature after HP cooler:	80°C

At lower or higher ambient temperatures, the compressed air temperatures at the points indicated above will be approximately an equal number of degrees lower or higher.

Temperatures will be lower at lower shaft speeds.

MAINTENANCE ROUTINES

The following is a guideline for a normal maintenance schedule. However, the compressors operating conditions vary widely from installation to installation and it is therefore important to adapt the maintenance schedule to the experience of the individual operator.
The following schedule applies to automatically monitored and manually operated installations alike.

After the first 200 hour operation:

Change lubricating oil. Drain the sump while the oil is warm. Clean the sump thoroughly before filling with fresh oil.

Daily inspection:

Make a quick general inspection of the whole compressor (in normal operation) and specially check the following:

1. Lubricating oil level.
2. Compressed air temperature and pressure.
3. Automatic equipment.

Overhaul routine A (1.000 running hours or every 2 years):

Make sure that overhaul kit no. 3036MK2 and 3037MK2 are in stock before starting overhaul of compressor according to Routine A - 1.000 hour service. Please follow installation instructions included in the kit.

1. Replace lubricating oil.
2. Remove the valves from both cylinders. Check for carbon deposits. Dismantle the valve for cleaning and repair if necessary. **Use spare part kit no. 3036MK2 and 3037MK2 to overhaul valves.** All valve gaskets should be replaced with new parts at assembly.
3. Inspect the flexible coupling between compressor and motor.
4. Check all bolts and nuts for proper tightness. Also check vibration dampers and hose connections if the unit is flexibly mounted. Check that no oil has come in contact with the rubber elements in the vibration dampers.
5. Function-test the safety valve. Start the compressor, and slowly close the stop valve on the compressed air line. The air pressure should not exceed max. working pressure + 10%. The safety valves are sealed and the setting should not be adjusted. If the valves are malfunctioning or open at wrong pressure, the safety valves should be replaced.
6. Check all pipe connections (compressor running).
7. Check that all automatic equipment is functioning correctly.
8. Change suction air filter, insert (Part no. 8451).

Overhaul routine B (5.000 running hours):

Make sure that overhaul kit no. 7933 are in stock before starting overhaul of compressor according to Routine B - 5.000 hour service. Please follow installation instructions included in the kit.

1. Change lubricating oil.
2. Remove the valves from both cylinders. Check for carbon deposits. Overhaul valves. **Use spare part kit no. 3036MK2 and 3037MK2 to overhaul valves.** All valve gaskets should be replaced with new parts at assembly.
3. Replace the flexible coupling between compressor and motor.
4. Check all bolts and nuts for proper tightness. Also check vibration dampers and hose connections if the unit is flexibly mounted. Check that no oil has come in contact with the rubber elements in the vibration dampers.
5. Function-test the safety valve. Start the compressor, and slowly close the stop valve on the compressed air line. The air pressure should not exceed max. working pressure + 10%. The safety valves are sealed and the setting should not be adjusted. If the valves are malfunctioning or open at wrong pressure, the safety valves should be replaced.
6. Check all pipe connections (compressor running).
7. Check that all automatic equipment is functioning correctly.
8. Change suction air filter, insert (Part no. 8451).
9. Remove the compressors cooler tubes and clean the outside and inside. Spray the outside with a good grease solvent, and wash clean with warm water. The inside is cleaned by letting the cooler tube soak in a bath of carbon remover, and then flushing the tube with warm water. Make sure that cleaning products suitable for copper tubes are used.
10. Remove cylinders, pistons and connecting rods. Inspect cylinder walls and piston. Replace the piston rings (use a piston ring expander tool to fit the rings on the piston). Clean all parts. Replace gudgeon pins with bearings and crank bearings. Rotate the shaft by hand, and check that the main bearings are rotating smoothly and without any signs of excessive wear. **Use overhaul kit no. 7933.**

Overhaul routine C (10.000 running hours):

Make sure that overhaul kit no. 7963 are in stock before starting overhaul of compressor according to Routine C - 10.000 hour service. Please follow installation instructions included in the kit.

1. Change lubricating oil.
 2. Replace the LP and HP valves. **Use spare part kit no. 3036MK and 3037MK.** All valve gaskets should be replaced with new parts at assembly.
 3. Replace the flexible coupling between compressor and motor.
 4. Check all bolts and nuts for proper tightness. Also check vibration dampers and hose connections if the unit is flexibly mounted. Check that no oil has come in contact with the rubber elements in the vibration dampers.
 5. Function-test the safety valve. Start the compressor, and slowly close the stop valve on the compressed air line. The air pressure should not exceed max. working pressure + 10%. The safety valves are sealed and the setting should not be adjusted. If the valves are malfunctioning or open at wrong pressure, the safety valves should be replaced.
 6. Check all pipe connections (compressor running).
 7. Check that all automatic equipment is functioning correctly.
 8. Change suction air filter, insert (Part no. 8451). Replace crank case breather valve.
 9. Remove the compressors cooler tubes and clean the outside and inside. Spray the outside with a good grease solvent, and wash clean with warm water. The inside is cleaned by letting the cooler tube soak in a bath of carbon remover, and then flushing the tube with warm water. Make sure that cleaning products suitable for copper tubes are used.
 10. Remove cylinders, pistons and connecting rods. Inspect cylinder walls and piston. Replace the piston rings (use a piston ring expander tool to fit the rings on the piston). Clean all parts. Replace gudgeon pins with bearings, crank bearings and main bearings. **Use overhaul kit no. 7963.**
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FAULT TRACING CHART

1. Compressor capacity is low, or the compressor is not delivering full pressure

Possible causes	Remedy
Dirty, damaged or worn valves.	Clean and check all valve plates, springs and gaskets. Replace defective parts.
Carbon deposits on valves.	Piston rings are worn. Replace. Unsuitable lubricating oil. Change oil brand.
Piston rings are stuck.	Loosen and remove piston rings. Clean piston ring grooves and rings.
Air filter clogged.	Clean filter.
Air leaking to surroundings or leaking inside the compressor through valve gaskets and valve plates.	Check for external leakages with soapy water. Check valve gaskets and valves.
Faulty automatic control equipment.	Inspect components and circuits.

2. Safety valve blows

Possible causes	Remedy
Closed air line valve.	Open the valve.
Carbon deposits in non-return valve.	Clean the valve.
Faulty adjustment of automatic system. Compressor does not stop when air reservoir is full.	Check pressure switch and automatic circuitry.
Safety valve damaged or defective (causing it to open at lower pressure).	Replace safety valve.

3. Valves require maintenance too frequently

Possible causes	Remedy
Overheating.	High ambient temperature. Improve fresh air supply. Carbon deposits in coolers. Clean coolers.
Dirt or foreign matter in intake air.	Air filter damaged. Improve suction air quality.
Cooler tubes dirty.	Clean.

4. Bearings and bearing housings running hot. Lub. oil overheating. Noise from bearings

Possible causes	Remedy
Damaged or worn bearings.	Replace bearings.
Uneven wear on crankshaft bearings.	Check crankshaft for straightness.
Low oil level.	Refill lub. oil.

5. Piston running hot

Possible causes	Remedy
Worn bearing on flywheel end.	Check little end bearing, piston rings and piston clearance.
Piston and/or rings binding in cylinder.	Ensure cool fresh air supply to cooling fan and suction air filter. If the piston has completely seized, wait a while before turning over the compressor. Clean cylinder and piston, fit new piston if necessary.

TOLERANCES - WEAR LIMITS

1. End tolerances for piston rings

Push a piston without piston rings halfway into the cylinder, and place the piston ring in the cylinder so that it presses against the top of the piston. Withdraw the piston and using a feeler gauge, measure the clearance between the piston ring ends.

Piston diameter	Clearance for new rings in new cylinder	Maximum Permissible clearance
50 mm	0,2 - 0,35 mm	0,7 mm
77 mm	0,3 - 0,45 mm	0,8 mm

2. Height clearance in piston ring grooves

Clean piston rings and ring grooves. Fit ring in groove and measure the height clearance of the ring in the groove using a feeler gauge.

	Clearance for new rings in new piston	Maximum Permissible clearance
Top ring	0,015 - 0,04 mm	0,06 mm
All other rings	0,00 - 0,025 mm	0,04 mm

These values apply to both piston diameters.

3. Clearance between piston and cylinder

Measure the clearance by means of a dial gauge, measuring the cylinder and piston separately. Alternatively the piston can be placed in the cylinder and the clearance measured with thickness gauges. The piston clearance should be measured in the area above the upper ring groove.

The clearance listed in the table below is the difference in diameter for the two parts.

Piston diameter	Clearance for new piston in new cylinder	Maximum Permissible clearance
50 mm	0,20 mm	0,60 mm
77 mm	0,25 mm	0,65 mm

4. Clearance between piston top and cylinder head/valve.

The clearance between the piston crown and the cylinder head (valve) should be not less than 0,75 mm. The normal gasket thickness is approx. 1,0 mm, and the piston crown may project a maximum of 0,25 mm above the cylinder at top dead centre.

ORDERING SPARE PARTS

The following information must be given when ordering spares:

- (A) Compressor type
- (B) Compressor number
- (C) Quantity, parts number and description of the spare parts required

(A) and (B) are stamped on the compressor rating plate, which is fixed to the side of the crankcase and (C) will be found in the spare parts list in this instruction book.

SPERRE INDUSTRI AS reserves the right to amend technical specifications without prior notice and disclaims all legal liability in connection with such amendments.

Address for ordering parts:

**SPERRE INDUSTRI AS
6057 ELLINGSØY
NORWAY**

**Phone: + 47 70 16 11 00
Fax: + 47 70 16 11 10
E-mail: industri@sperre.com
www.sperre.com**

Original parts can also be ordered from:

Sperre Rotterdam BV
Glasblazerstraat 12B
NL-2984 BL Ridderkerk
NETHERLANDS
Tel. : +31 180 463 299
Fax : +31 180 463 264
E-mail : rotterdam@sperre.com

Sperre Asia Pte. Ltd.
63 Hillview Avenue # 09-13
Lam Soon Industrial Building
SINGAPORE 669569
Tel. : +65 763 6300
Fax : +65 763 1811
E-mail : asia@sperre.com

Sperre China
Room 16E, No.257 Siping Road
Hongkuo District
200081 Shanghai, China
Tel. : +86 216 5070436
Fax : +86 216 5070402
E-mail : china@sperre.com

SPARE PART LIST

Qty	Description	Part no.	Qty	Description	Part no.
1	Crankcase	1022	1	Ball bearing.....	3881
1	Crankcase cover	1070	1	Valve sealing ring	3918
1	Cylinder head H.P.	1281	2	Valve sealing ring	3919
1	Cylinder head L.P.....	1283	1	Copper gasket	3925
1	Drive coupling.....	1371	1	Copper gasket	3926
2	Piston rod	1428	2	Copper gasket	3929
1	Crankshaft	1436	8	Copper gasket	3930
1	Flywheel	1444	1	Spring washer.....	3937
1	Bearing housing	1446	1	Serrated washer	3939
1	Counterbalance	1520	5	Bolt.....	3946
1	Spacer	1991	1	Gasket	3998
1	Bracket	2046	1	Gasket	4075
1	Valve, L.P.	3036	1	Gasket	4095
1	Valve, H.P.	3037	1	Gasket	4096
1	Valve plate, L.P.	3122	1	Set of gaskets	4127
1	Valve plate, H.P.....	3123	2	Lock nut	4133
1	Valve plate, H.P.....	3124	1	Stud bolt.....	4189
1	Washer	3131	4	Stud bolt.....	4193
1	Valve nut	3236	4	Stud bolt.....	4194
2	Valve spring H.P.....	3279	4	Stud bolt.....	4199
2	Valve spring H.P.....	3280	12	Nuts.....	4238
1	Guide ring.....	3298	2	Set screw	4268
1	Plain nipple.....	3345	1	Nipple muff.....	4283
1	Oil scoop	3347	1	Threaded plug.....	4297
2	Tubular pin	3350	2	Bolt.....	4401
1	Piston, H.P.	3352	1	Safety valve, H.P.	4420
1	Piston, L.P.	3354	1	Safety valve, L.P.....	4421
1	Valve part, upper.....	3430	3	Unbraco screws	4445
1	Valve part, lower.....	3431	3	Double male end union.....	4457
1	Catch plate, lower H.P.	3432	3	Double male end union.....	4460
1	Catch plate, upper H.P.	3433	1	Elbow	4466
1	Gudgeon pin, H.P.....	3451	1	Tee piece	4472
1	Gudgeon pin, L.P.	3452	1	Tee piece	4473
2	Compression ring, stepped, H.P. ...	3487	3	Connecting bolt.....	4484
2	Compression ring, stepped, L.P.....	3488	1	Flexible coupling insert	4519
1	Compression ring, plain, H.P.	3501	1	Male/female nipple.....	4590
1	Oil ring, H.P.	3528	1	Bolt.....	4618
2	Oil ring, L.P.....	3529	1	Air filter, insert.....	8451
1	Inspection glass.....	3634			
1	Intercooler, complete.....	3657			
1	After cooler, complete	3658			
1	Key	3682			
1	Air relief valve.....	3700			
1	Air filter	3711			
1	Pressure gauge, H.P.	3773			
1	Nipple	3783			
1	Seeger ring.....	3806			
4	Seeger ring.....	3813			
1	Seeger ring.....	3815			
1	Ball bearing	3872			
2	Needle bearing	3877			
2	Needle bearing	3878			

SPARE-PART & MAINTENANCE KITS

SPERRE's kits of genuine spare-parts include the wear parts you must change when you overhaul the compressor. For example, if you replace a valve, it is strongly recommended to replace the valve gaskets at the same time. With a spare-part kit available, all necessary parts are at hand together with clear installation instructions.

For model HLF2/77 following kits are available:

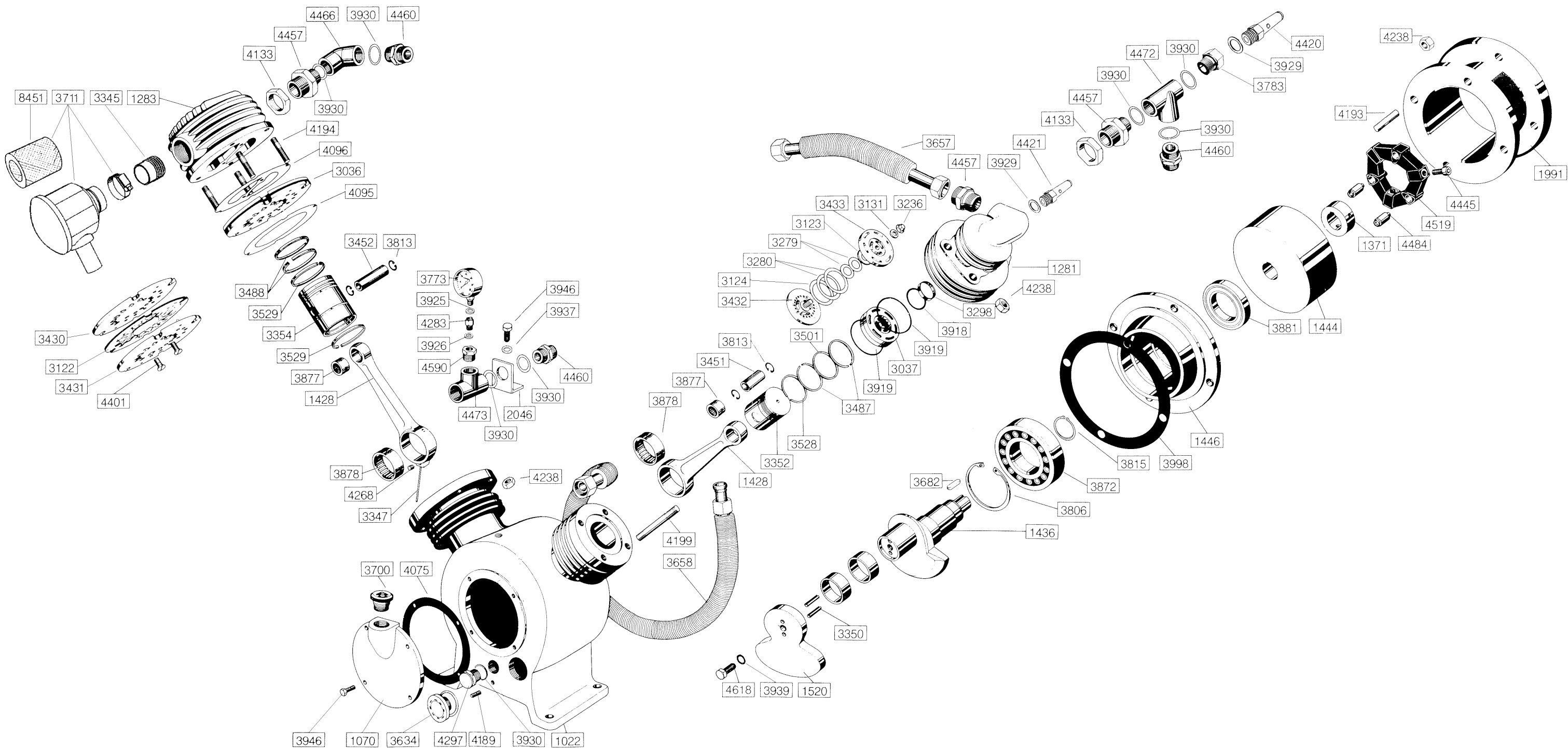
Description	Part no.	Content of kit
Gasket kit	4127	All flat gaskets, O-rings, sealing rings, and valve gaskets.
Crankshaft	1436MK	Crankshaft with all bearings, flywheel key and nut, Seeger-rings, endplate and screw.
Valve LP	3036MK	Valve and necessary copper rings and/or gaskets.
Valve HP	3037MK	Valve and necessary copper rings and/or gaskets.
Overhaul kit - LP valve	3036MK2	Valve springs, plates and gaskets.
Overhaul kit - HP valve	3037MK2	Valve springs, plates and gaskets.
Piston LP	3354MK	Piston, gudgeon pin with Seeger-rings and piston rings.
Piston HP	3352MK	Piston, gudgeon pin with Seeger-rings and piston rings.
Connecting rod	1428MK	Connecting rod with small- and big-end bearings, oil scoop with set screw.
Flexible coupling	4519MK	Rubber coupling with bolts.
Overhaul kit Routine B	7933	All parts needed for 5 000-hours' maintenance: Overhaul kits for valves complete with gaskets and guide rings, piston rings, connecting rod bearings, gudgeon pins, Seeger-rings, gaskets and ventilator.
Overhaul kit Routine C	7963	All parts needed for 10 000-hours' maintenance: Same as kit B, plus complete valves, crankshaft bearings and seal ring.

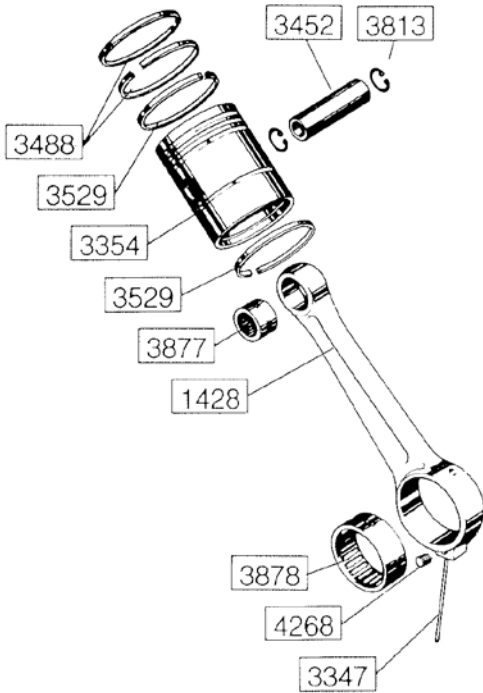
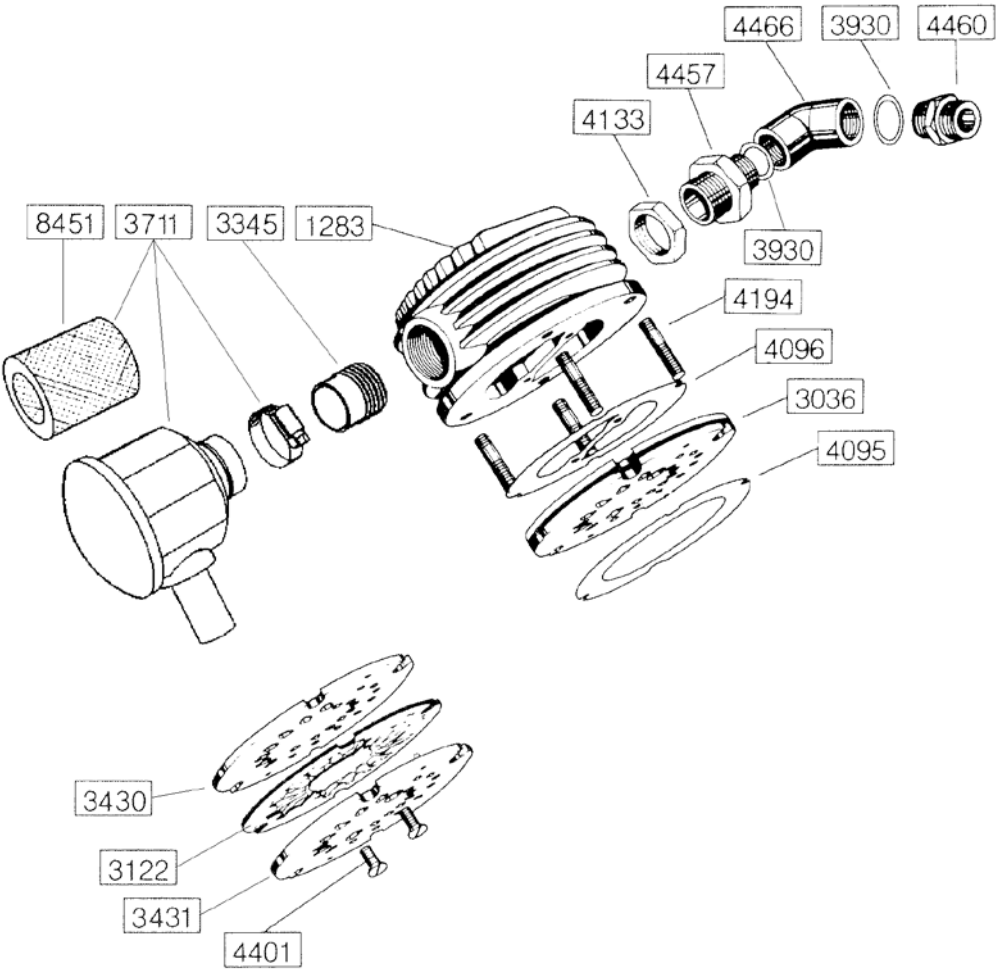
Maintenance kits:

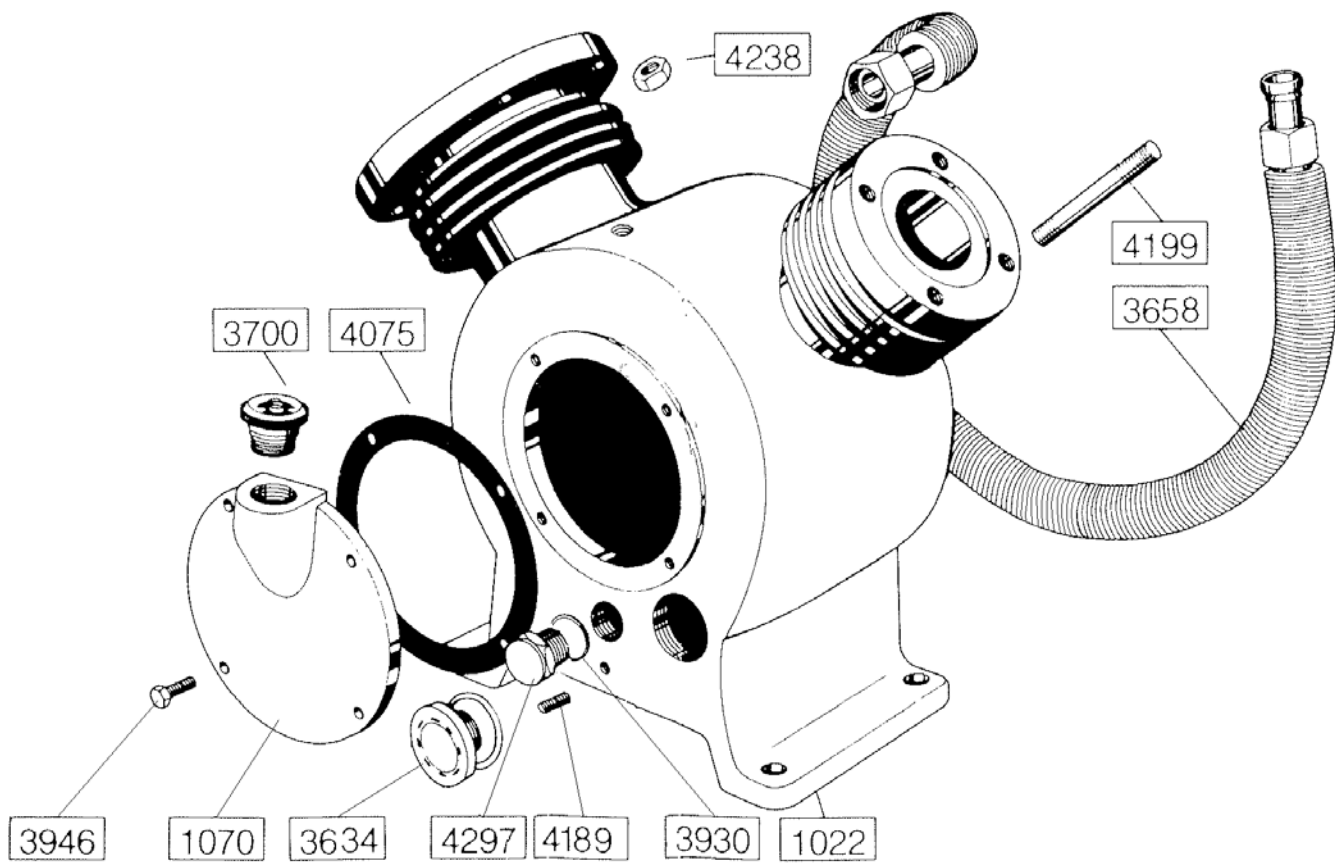
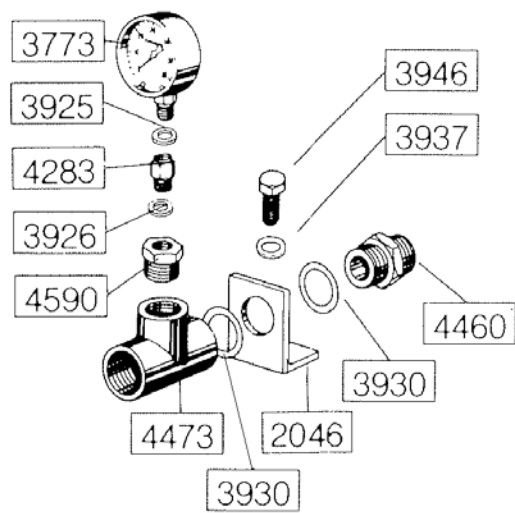
- **All necessary parts at hand when you need them**
- **With clear installation instructions enclosed**

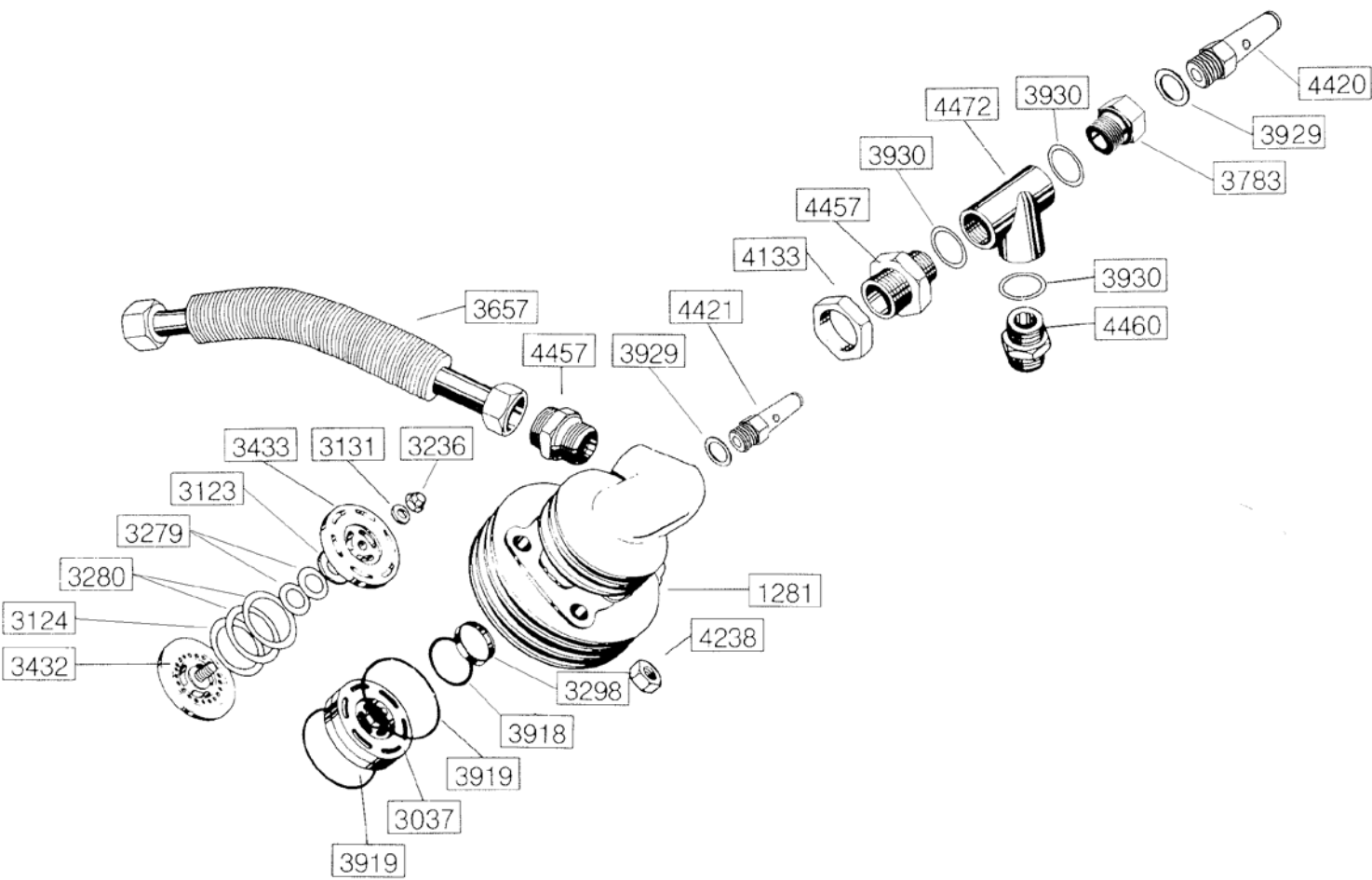
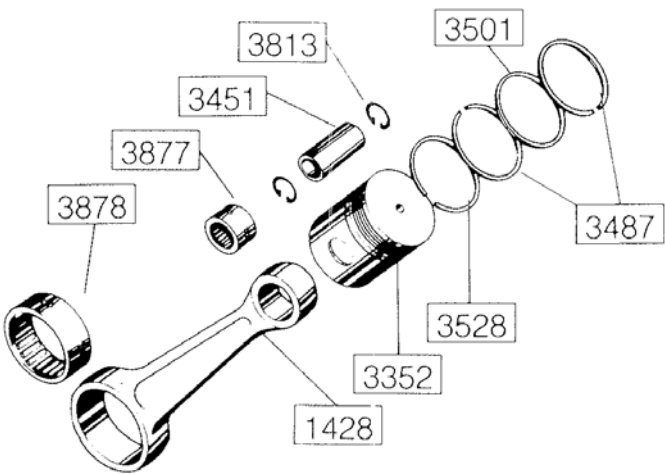
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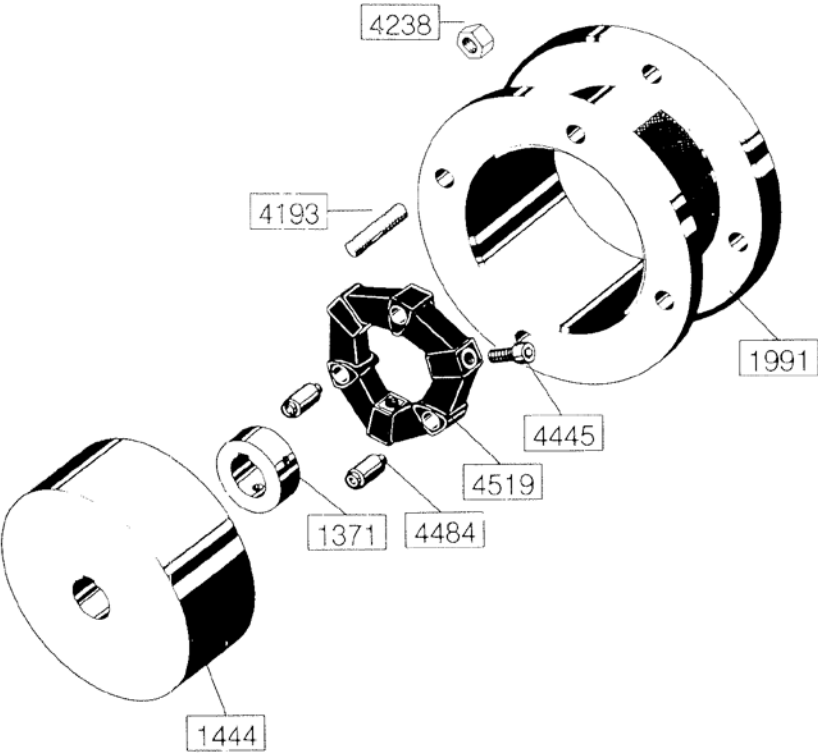
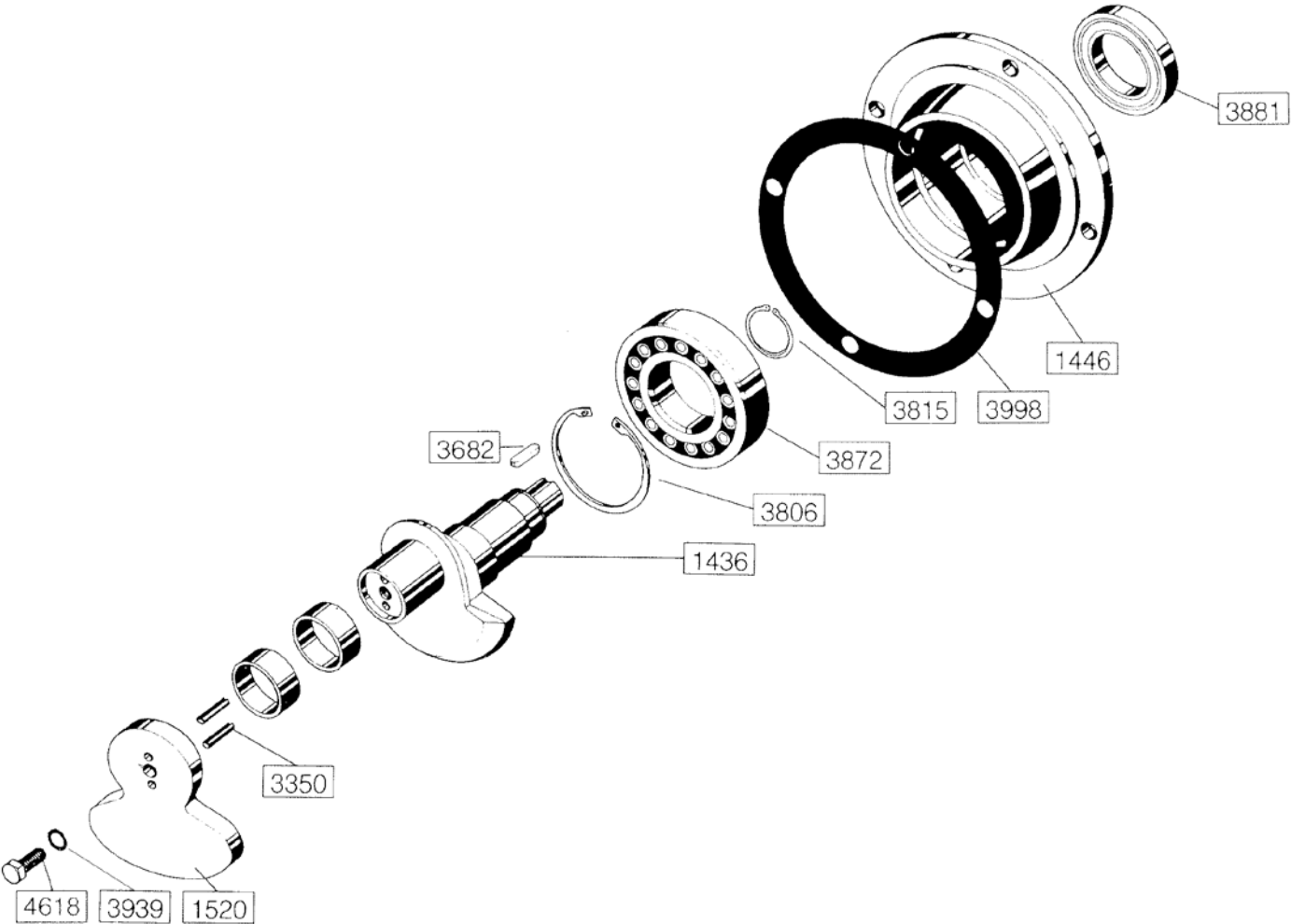
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