CHAPTER OVERVIEW

A

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C

D

E

Manufacturer in terms of 97/23/EC

The full name and address of the manufacturer is:

Lenhardt & Wagner GmbH

An der Tuchbleiche 39
68623 Hüttenfeld / Germany

Phone: +49 (0) 62 56 - 85 88 0 - 0
Fax: +49 (0) 62 56 - 85 88 0 - 14

E-Mail: service@lw-compressors.com
Internet: www.lw-compressors.com

CE

Compressor information

Type designation

Serial number

Date of construction

Purchase information

Purchase date

First commissioned on

Warranty period

Dealer's stamp

Warranty

L&W will uphold warranty claims made during a period of 12 months from the invoice date.
If the compressor was purchased from an official L&W dealer, the date on the dealer's invoice is valid. Warranty claims can only be made on presentation of the original invoice.
Should verifiably defective parts have been delivered, we will decide to either replace the parts or repair them. The resulting transport and assembly costs will be invoiced.
No reduction of the purchase price or changes to the contract can be made. The parts for which a claim is being made should be kept safe by the purchaser and, when requested, sent to us at their cost. Replaced parts become the property of L&W. If maintenance work is carried out without our knowledge or permission by the purchaser or a third party, we are absolved from any liability for warranty claims. As a matter of principle, warranty claims can only be made by the initial purchaser.

A

Operating Instructions

Breathing Air Compressor

LW 300 ES / LW 450 ES

www.uebler.net

Version: 12/19-D

Maintenance and Service

Storage

General Information

We strongly recommend reading this manual thoroughly prior to operation and follow all the safety precautions precisely. Damage resulting from any deviation from these instructions is excluded from warranty and liability for this product. Carry out other commissioning steps only if you have fully understood the following contents.

Before commissioning and using the unit, carry out all the essential preliminary work and measures concerning legal regulations and safety. These are described on the following pages of this operation manual.

Description of marks and warning signs

The following warning signs are used in this document to identify the corresponding warning notes which require particular attention by the user. The warning signs are defined as follows:

Caution
Indicates an imminently hazardous situation which, if not avoided, could result in serious injury, physical injury or death.

Warning
Indicates a potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment.

Note
Indicates additional information on how to use the unit.

Scope of Delivery

Compressors are provided in different equipped versions.

Versions

Filling pressure versions:

- PN 225 bar
- PN 330 bar
- PN 225 / 330 bar

Specifications

- Sound insulated housing
- Automatic dump system
- Automatic stop at final pressure
- Hour counter
- Start/Stop and emergency stop switch, condensate test buttons
- Motor protection switch, emergency stop switch
- Pressure maintaining and non-return valve
- All pistons c/w steel piston rings
- Low pressure oil pump and filter
- Oil / water separators after each stage
- Safety valves after each stage
- 3 concentric suction/pressure valves
- HP outlet

Options

- Auto start system
- Up to 6 additional hoses available (front door mounting)
- 200 and 300 bar parallel filling operation
- Oil pressure display
- Inter stage pressure monitoring
- Oil pressure monitoring c/w auto shut down
- Cylinder head temperature monitoring with auto shut down
- Oil temperature display with auto shut down
- Puracon filter monitoring
- ECC control in remote control box
- Direction of rotation monitoring
- Power cable and plug

Technical Data

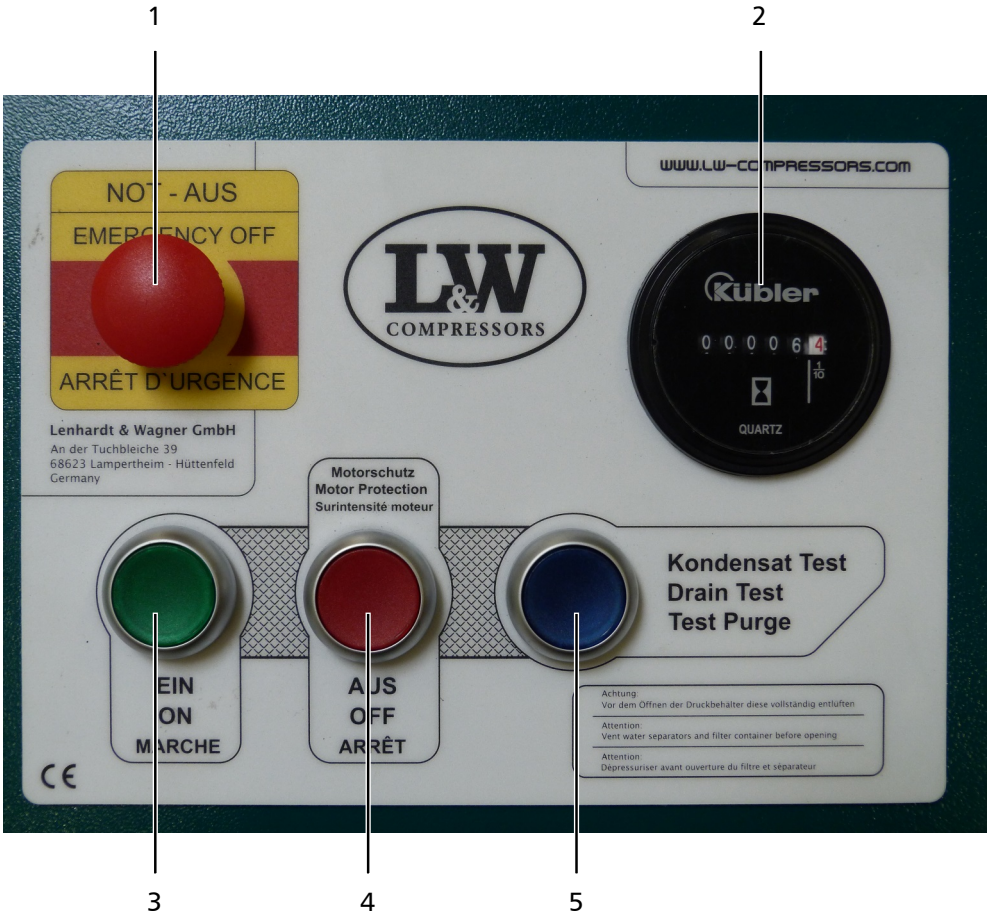
Technical Data	LW 300 ES	LW 450 ES
Capacity [l/min]:	300	450
Max. Operating Pressure [bar]:	350	350
RPM [min^{-1}]:	730	1,100
Number of Pressure Stages:	3	3
Cylinder Bore 1st Stage [mm]:	Ø 95	Ø 95
Cylinder Bore 2nd Stage [mm]:	Ø 42	Ø 42
Cylinder Bore 3rd Stage [mm]:	Ø 18	Ø 18
Medium:	Compressed Air / Breathing Air	Compressed Air / Breathing Air
Intake Pressure:	atmospheric	atmospheric
Oil Pressure (at operating temperature) [bar]:	+1.5 (-0,2)	+1.5 (-0,2)
Oil Capacity [l]:	2.2	2.2
Intake Temperature [°C]:	0 < +45	0 < +45
Ambient Temperature [°C]:	+5 < +45	+5 < +45
Cooling Air Volume [m^3/h]:	> 2,250	> 3,300
Voltage:	400 V / 3 phase / 50 Hz	400 V / 3 phase / 50 Hz
Protection Class Drive Motor:	IP 54	IP 54
Drive Power [kW]:	7.5	11
RPM Motor [min^{-1}]:	2,890	2,890
Start:	Star/Delta	Star/Delta
Noise level [dB(A)]:	63 from a distance of 1 m	64 from a distance of 1 m
Dimensions W x D x H [mm]:	810 x 1100 x 1680	810 x 1100 x 1680
Weight [kg]:	ca. 390	ca. 390
Content Volume Filter housing [l]:	2.3	2.3

Unit Assembly

No.	Designation
1	Filling pressure gauge
2	Switchboard
3	Filter Housing
4	Pressure maintaining / non return valve

A

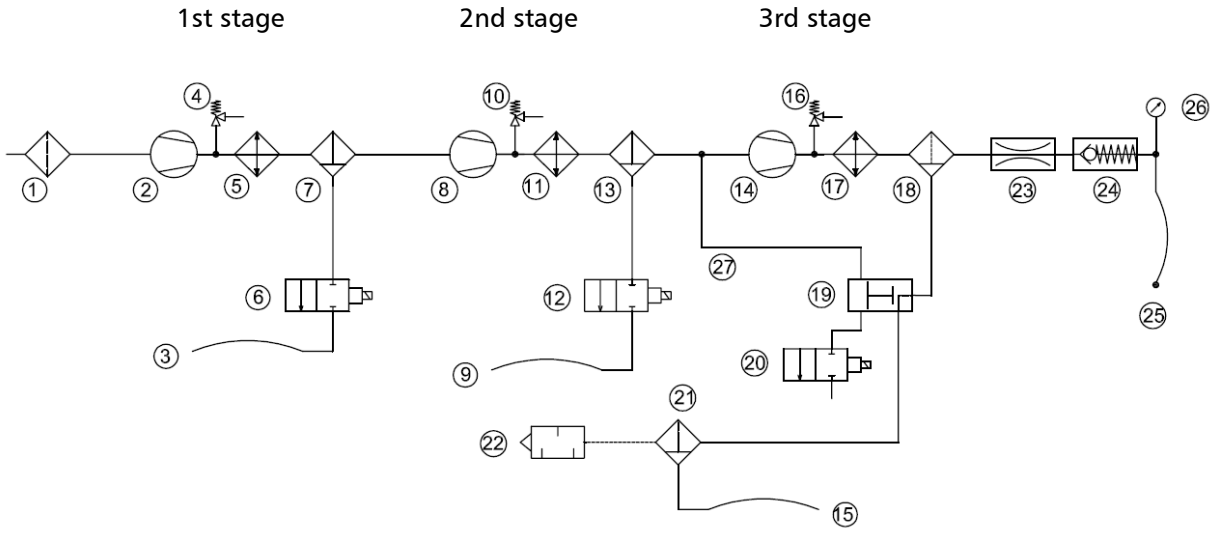
Switchboard



No.	Designation
1	Emergency shut-off switch
2	Hour counter
3	ON button
4	OFF button
5	Drain test button

A

Flow chart



1. Ansaugfilter / Air Intake Filter
2. 1. Verdichterstufe / 1st Pressure Stage
3. Kondensatablassschlauch / Condensate Release Hose
4. Sicherheitsventil 1.Stufe / Safety Valve 1st Stage
5. Wärmetauscher / Heat Exchanger
6. Kondensatventil / Condensate Valve
7. Öl-/Wasserabscheider / Oil Water Separator
8. 2. Verdichterstufe / 2nd Pressure Stage
9. Kondensatablassschlauch / Condensate Release Hose
10. Sicherheitsventil 2.Stufe / Safety Valve 2nd Stage
11. Wärmetauscher / Heat Exchanger
12. Kondensatventil / Condensate Valve
13. Öl-/Wasserabscheider / Oil-/Water Separator
14. 3. Verdichterstufe / 3rd Pressure Stage
15. Kondensatablassschlauch / Condensate Release Hose
16. Sicherheitsventil 3.Stufe / Safety Valve 3rd Stage
17. Wärmetauscher / Heat Exchanger
18. Öl-/Wasserabscheider / Oil-/Water Separator
19. Pneum. Kondensatventil / Pneumatic Condensate Valve
20. Magnetventil / Solenoid Valve
21. Kondensatabscheider Endstufe / Condensate Separator
22. Schalldämpfer / Silencer
23. Druckhalteventil / Pressure Maintaining Valve
24. Rückschlagventil / Non-Return Valve
25. Hochdruckschläuche / HP Hose
26. Druckmanometer / Pressure Gauge
27. Steuerleitung 2.Stufe / Control Cable 2nd Stage

SAFETY PRECAUTIONS

Intended Use

Only use the unit in perfect condition for its intended purpose, safety and intended use and observe the operating instructions! In particular disorders that may affect safety have to be eliminated immediately!

Use the unit exclusively for the determined medium (see "Technical Data"). Any other use that is not specified is not authorized. The manufacturer/supplier shall not be liable for any damages resulting from such use. Such risk lies entirely with the user. Authorization for use is also under the condition that the instruction manual is complied with and inspection and maintenance requirements are enforced.

No change and modification to the unit can be made without the written agreement of the manufacturer. The manufacturer is not liable for damage to persons or property resulting from unauthorised modifications.

Operators

Target groups in these instructions;

Operators

Operators are persons who are authorized and briefed for the use of the compressor.

Qualified personnel

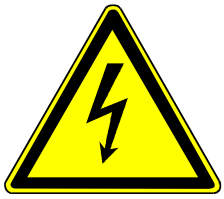
Qualified personnel are persons who are entitled to repair, service, modify and maintain the system.

Warning
Only trained personnel are permitted to work on the unit!

Warning
Work on the electrical equipment on / with the machine / unit may only be carried out by qualified electricians.

Safety instructions on the unit

Importance of notes and warning signs that are affixed to the compressor according to the application or its equipment.



Warning

High voltage!

Note

Ensure correct direction of rotation!

General Safety Precautions

- Read the Operating Instructions of this product carefully prior to use.
- Strictly follow the instructions. The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the intended use section of this document.
- Do not dispose the operating instructions. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent personnel are permitted to use this product.
- Comply with all local and national rules and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product.
- Only authentic L&W parts and accessories may be used for maintenance work. Otherwise, the proper functioning of the product may be impaired.
- Do not use faulty or incomplete products. Do not modify the product.
- Inform L&W in the event of any product or component fault or failure.
- The quality of the air supply must meet EN 12021 specifications for breathing air.
- Do not use the product in areas prone to explosion or in the presence of flammable gases. The product is not designed for these applications. An explosion might be the result if certain conditions apply.

Unit customised safety notices

Organisational measures

- In addition to the instruction manual, observe and comply with universally valid legal and other obligatory regulations regarding accident prevention and environment protection.
- In addition to the instruction manual, provide supplementary instructions for supervision and monitoring duties taking into consideration exceptional factors e.g. with regard to organisation of work, production, personnel employed.
- Supervise personnel's work in accordance with the instruction manual, taking into account safety and danger factors.
- Observe all safety and danger notices on the compressor and check readability and completeness.

Safety instructions operation

- Take measures to ensure that the machine is only taken into operation under safe and functional conditions. Only operate the compressor if all protective and safety equipment, e.g. detachable protective equipment, are provided and in good working order.
- Check the compressor at least once per day for obvious damage and defects. Inform the responsible department / person immediately if anything is not as is should be (including operation performance). Shut down the machine immediately if necessary and lock it.
- In case of malfunction, stop the compressor immediately and lock it. Repair malfunctions immediately.
- If there is a failure in the electric energy supply, shut the machine / unit down immediately.
- Ensure safe and environmentally friendly disposal of consumables and old parts.
- The stipulated hearing protectors must be worn.
- Soundproofing equipment on the compressor has to be activated in safety function during operation.
- When handling with fats, oils and other chemical agents, observe the note for the product-related safety.

Maintenance instructions

- Hoses have to be checked by the operator (pressure and visual inspection) at reasonable intervals, even if no safety-related defects have been detected.
- Immediately repair any damage. Escaping compressed air can cause injury.
- Depressurise system and pressure lines before beginning repair work.
- Pressurised air lines must be laid and mounted by qualified personnel. Connections must not be mixed up. Fittings, length and quality of the piping must correspond to requirements.
- Adjustment, maintenance and inspection activities and keep appointments, including information on replacement parts / equipment, prescribed in the operating instructions have to be respected.
- If the machine / equipment is completely off during maintenance and repair work, it must be protected against unexpected restart. Turn off main control device and remove the key and/or display a warning sign on the main switch.
- The machine and especially the connections and fittings should be cleaned from oil, fuel and maintenance products at the beginning of the maintenance / repair. Do not use aggressive cleaning agents. Use fibre-free cleaning cloths.
- Switch off compressor and clean with a slightly damp cloth. Remove dirt from cooling pipes by using a brush.
- After cleaning, examine all pipes for leaks, loose connections, chafing and damage. Immediately eliminate any faults.
- Always retighten any screw connections loosened for maintenance or repair work.
- If it is necessary to remove safety devices for maintenance and repair work, these must be replaced and checked immediately after completion of the maintenance or repair work.
- The electrical equipment of the compressor must be regularly checked. Defects, such as loose screw connections or burnt wires, must be immediately rectified by electrically skilled personnel.
- Only personnel with particular knowledge and experience with pneumatics may carry out work on pneumatic equipment.
- Only personnel with particular knowledge and experience in gas equipment may carry out work on gas equipment.

Transportation instructions

- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- The transport may only be carried out by trained personnel.
- For transportation, only use lifting devices and equipment with sufficient lifting power.
- Do not stand or work under suspended loads.
- Also separate from minor relocation machinery / system of any external energy supply. Before recommissioning, reconnect the machine to the mains according to regulations.
- When recommissioning, proceed according to the operating instructions..

Safety regulations

- Inspections according to legal and local obligatory regulations regarding accident prevention are carried out by the manufacturer or by authorised expert personnel. No guarantees whatsoever are valid for damage caused or favoured by the non-consideration of these directions for use.

INSTALLATION

Installation in closed rooms

Danger
No operation in explosion-hazard areas.
The unit is not approved for operation in areas prone to explosion.

For installation in closed rooms, observe the following:

- Install the unit horizontally and level. The floor must be vibration-free and capable of taking the load of the system weight.
- The compressor room must be clean, dry, dust free and as cool as possible. Avoid direct exposure to sunlight. If possible, install unit in such a manner that the compressor fan can intake fresh air from outside. Ensure adequate ventilation and exhaust air opening.
- When locating the compressor in rooms of less than 30 m^3 space where natural ventilation is not ensured or other systems having high radiation are operating in the same room, measures must be taken to provide artificial ventilation.
- Intake air must be free from noxious gas e.g. smoke, solvent vapours, exhaust fumes etc.
- Observe the specified operating temperature (see "Technical Data")!

Dimensions

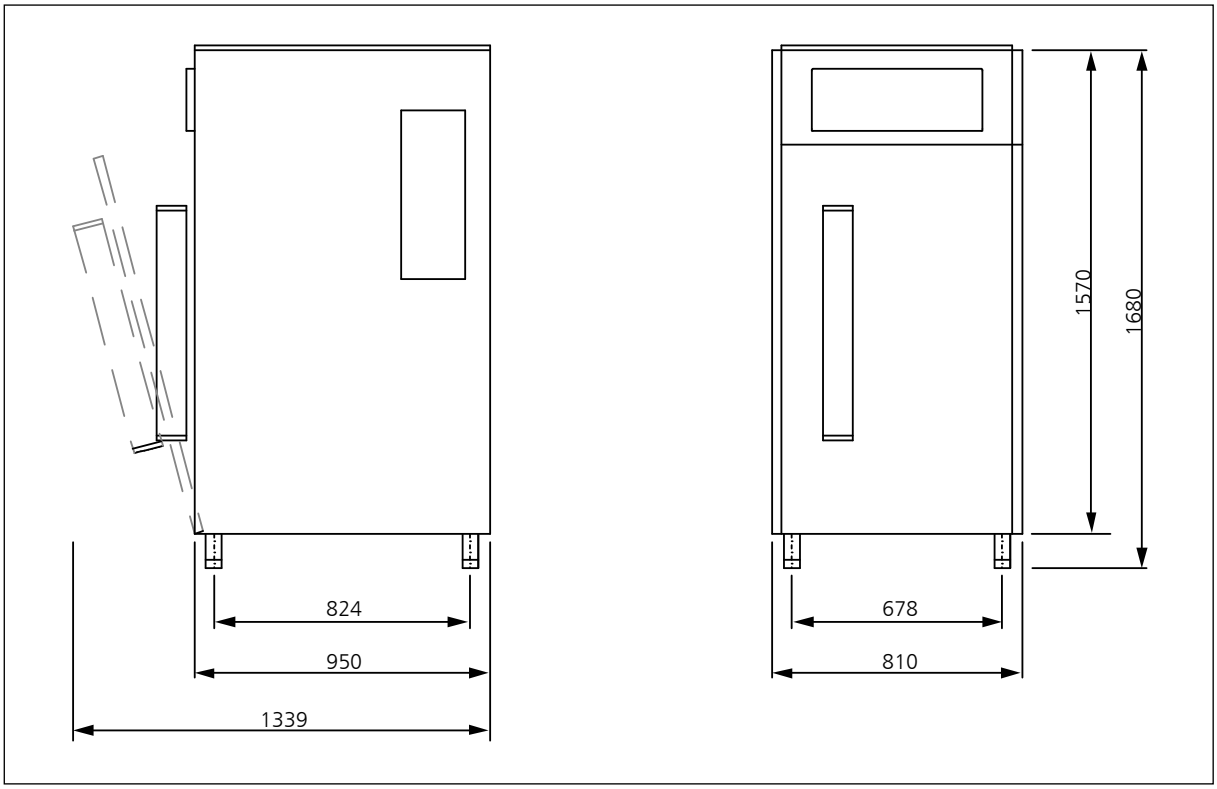


Fig. Dimensions

Minimum distances

Note
Minimum distances must be adhered!

- Make sure that the compressor always has a sufficient amount of fresh air available.
- To prevent serious damage, ensure that the cooling air flow can flow freely.
- The following minimum distances must be adhered:
  Front side min. 1500 mm, sides and rear side min. 500 mm, distance to the ceiling min. 500 mm.
  Avoid anything in this area which can restrict the cooling air flow.

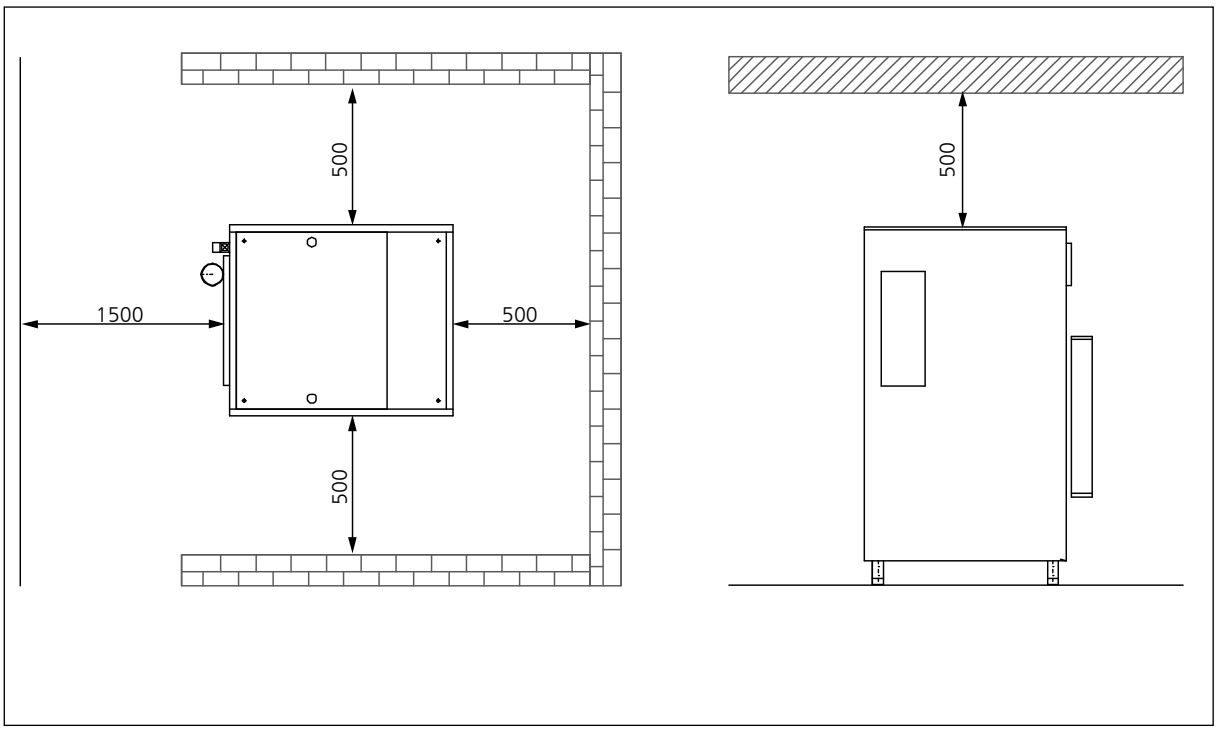


Fig. Minimum distances

Ventilation

- Make sure that the compressor always has a sufficient amount of fresh air available for cooling.
- To prevent serious damage, ensure that the cooling air flow can flow freely.
- The necessary cooling air flow can be calculated by using the following formula:
  300 x drive power [kW] = required cooling air flow [m³/h]
  Example 11kW motor: 300 x 11kW = 3300 m³/h = required cooling air flow.
- The fan capacity for fresh air and warm air must meet at least the required cooling air flow.
  The fans must have the same capacity.

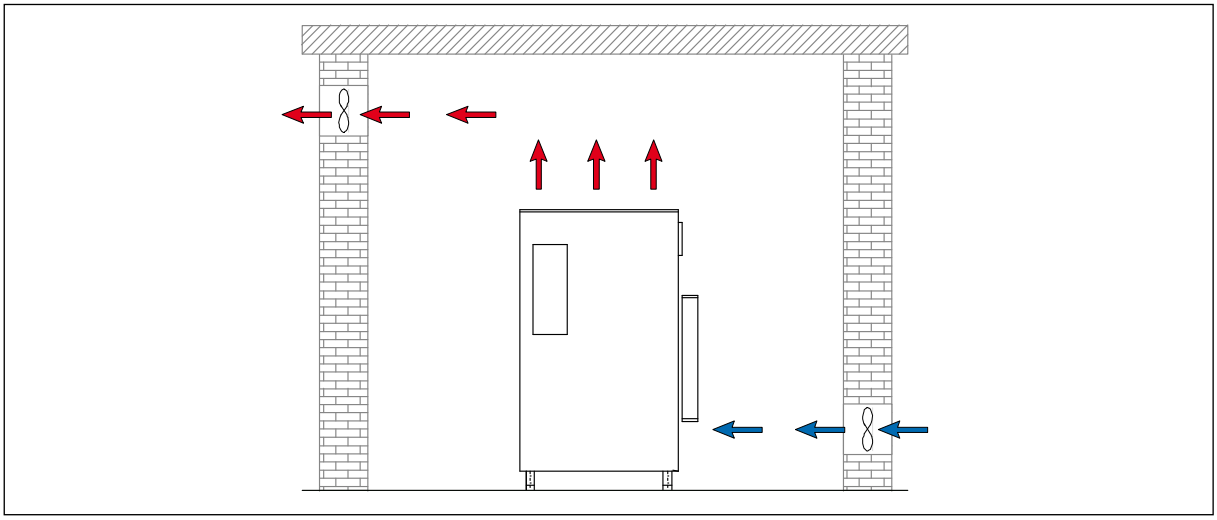


Fig. Ventilation through facade

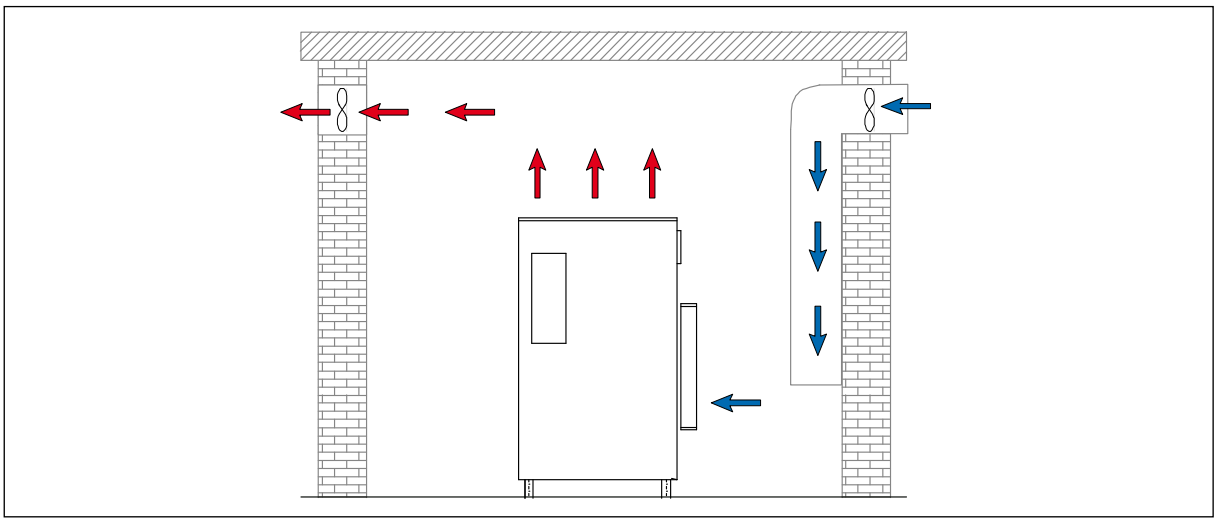


Fig. Ventilation via ventilation stack

Electrical Installation

Warning
Work on the electrical equipment on / with the machine / unit may only be carried out by qualified electricians.

For installation of electrical equipment, observe the following:

- If control devices are delivered by the factory, refer to the appropriate wiring diagram.
- Ensure correct installation of protective conductors.
- Check conformity of motor and control device tension and frequency with those of the electric network (see name plate on the compressor).
- The fusing should be done in accordance with the valid regulations of the responsible electricity supply company.
- When connecting the unit to the electrical supply, check the compressor direction of rotation (see chapter "Maintenance" -> Check turning direction).
- Fuse the motor correctly (see table; use slow-blow fuses).

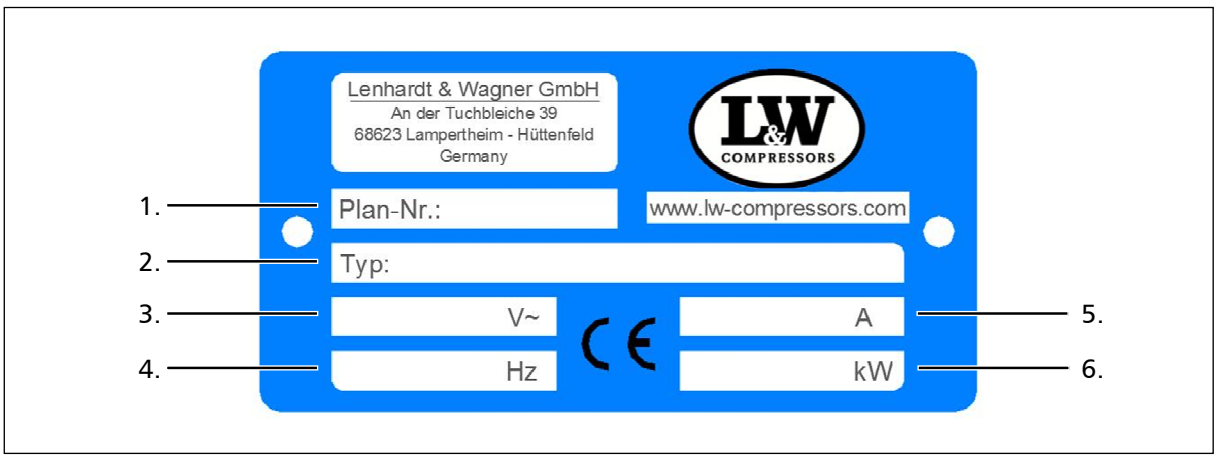


Fig. Compressor name plate

No.	Designation
1.	Circuit diagram number
2.	Compressor type
3.	Power supply
4.	Frequency
5.	Motor current consumption
6.	Nominal motor power

Electrical Installation

The standard compressor version is prepared for the connection to three phases (brown, black, grey), neutral conductor (blue) and protective earth conductor (green/yellow).

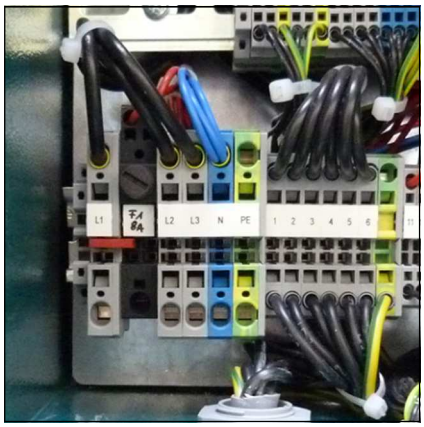


Fig. - Connection to the switch box

Recommended fuses for 360 - 500 V operating voltage

Nominal motor power		Fusing start A		Connection in mm²	
[kw]	[A]	Direct	Star/Delta	Contactor supply	Motor S/D
2.2	5	10	-	1.5	1.5
4	8.5	20	-	2.5	1.5
5.5	11.3	25	20	2.5	1.5
7.5	15.2	30	25	2.5	1.5
11	21.7	-	35	4	2.5
15	29.9	-	35	6	4
18.5	36	-	50	6	4
22	41	-	50	10	4
30	55	-	63	10	6

Recommended fuses for 220 - 240 V operating voltage

Nominal motor power		Fusing start A		Connection in mm²	
[kw]	[A]	Direct	Star/Delta	Contactor supply	Motor S/D
2.2	8.7	20	-	1.5	1.5
4	14.8	25	-	2.5	1.5
5.5	19.6	35	25	4	2.5
7.5	26.4	50	35	6	4
11	38	-	50	6	4
15	51	-	63	10	4
18.5	63	-	80	16	6
22	71	-	80	16	6
30	96	-	125	25	10

OPERATION

Important operation instructions

Note
Ensure that all persons handling the compressor are familiar with function and operation of the unit.

Wear hearing protection
When working on a running machine, always wear hearing protection.

Prior to first commissioning, observe the following:

Necessary steps are described on the next page.

- Ensure that cooling air can flow freely.
- Check compressor oil level by the oil sight glass (see next page).
- Check all connections and retighten if necessary.
- Check if the filter cartridge is in place (see "Service and Maintenance").
- Check the V-belt tension (see next page).
- The compressor is delivered as standard with HP outlet!
  Caution: When optionally equipped with filling hoses, ensure that all lever filling valves are closed. Hold tight one filling valve manually and open the corresponding lever filling valve!

Start the compressor

1. Start the compressor by pushing the ON button.
2. Check turning direction - see the rotary direction arrow on the housing of the electric motor (see next pages). If the turning direction is wrong, immediately stop the compressor by pushing the OFF button and contact an authorised electrician.

Warning
Wrong impeller rotation direction!
Immediately after switching the compressor on, check the rotation direction. Depending on the place of installation, the phase sequence can influence the rotation direction.

3. Check oil pressure (if oil pressure gauge is installed).
4. Run the compressor for about 2 minutes.
5. Caution: When optionally equipped with filling hoses, close the opened lever filling valve carefully!
6. Run the compressor up to maximum pressure and check if the final pressure switch shuts off the compressor. If the final pressure switch does not shut off, switch off the compressor with the OFF button (see chapter "REMEDYING FAULTS").
7. Check the compressor unit for leaks (see "SERVICE AND MAINTENANCE")
8. Now check the condensate drain valves:
   - Fix the black condensate hoses
   - Drain test - press the test button
   - If correct, air escapes
9. Stop the compressor by pushing the OFF button.

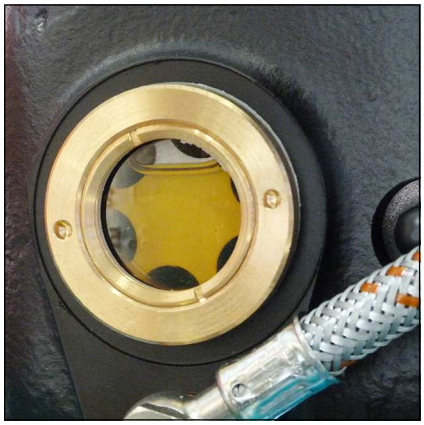
Check oil level

Warning
Check oil level daily. Never start the compressor with a too low oil level. Risk of accidental loss, destruction or deterioration.

Check oil before each operation of the system!

The oil level should be between the middle and upper end of the oil sight glass. Never start the compressor with a too low oil level.

Refill new compressor oil at least when the oil level reached the middle of the indicated area.



Oil sight glass

Check V-belt tension

The V-belt could lose tension during transportation. Please check the V-belt tension before starting the compressor.

Tension V-belt / Correct V-belt tension

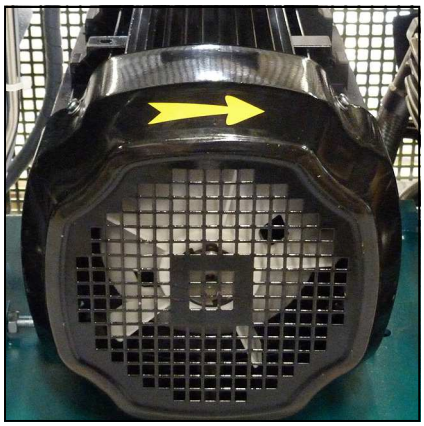
See chapter "Service and Maintenance" -> "Tension V-belts"

Check turning direction

Warning
Wrong impeller rotation direction!
Immediately after switching the compressor on, check rotation direction. Depending on the place of installation, the phase sequence can influence the rotation direction.

Before starting the compressor for the first time, check rotation direction (see the rotary direction arrow on the housing of the electric motor).

If the direction of rotation is wrong, the guide pistons of the 2nd and 3rd stages can not be sufficiently lubricated, with the consequence that the pistons will be damaged. Furthermore, cooling air flow will not be sufficient.



Rotation direction arrow

Prior to daily operation observe the following:

- Ensure cooling air can flow freely.
- Check compressor oil level by the oil sight glass.
- Check if filter cartridge is in place / observe filter cartridge life!
- Ensure toxic-free, pure intake air.

Filling procedure

Caution! Fill only cylinders which:
- are marked with the test mark and the test stamp of the expert.
- have been hydrostatic tested (check last test date).
- are rated for the final pressure.
- are free from humidity.

Note
The unit shuts down when final pressure is reached. Thus, the unit always has to be restarted manually.

1. Close all filling valves.
2. Connect the closed compressed air cylinders.
3. Open cylinder valves.
4. Start compressor by pushing the ON button.
5. When the filling pressure gauge increases, open the filling valves slowly.
6. Fill compressed air cylinders to the desired pressure, subsequently close the filling valves slowly.
7. Close and vent all filling valves.
8. Disconnect all compressed air cylinders from filling valves.

Switch off the compressor

The compressor unit is equipped as standard with a pressure switch which automatically shuts down the system when the corresponding final pressure is reached.

During filling process, you can shut down the system at any time by pushing the red button (OFF) or the emergency stop (only in case of emergency!).

Note
After automatic or manual switching off, all pressure vessels and filter housings of the compressor will be automatically vented.

REMEDYING FAULTS

Final pressure can not be reached

Cause of fault	Remedy
Connections leaky	Retighten or clean/replace if necessary
Final pressure safety valve leaky	Replace
Pipes / heat exchanger broken	Replace
Condensate drain valves leaky	Unscrew valves, check sealing surfaces, clean, replace if necessary
Final pressure switch stop unit	Verify settings, replace if necessary
Piston of pneumatic condensate valve sticks	Clean pneumatic condensate valve and restore function, check/replace o-rings, replace valve completely if necessary

Strong compressor vibration

Cause of fault	Remedy
V-belt tension too loose	Tension V-belt
Drive motor / Compressor unit loosely	Retighten mounting screws
Anti vibration mounts used up	Replace
Ground not levelled	Ensure a solid and level ground

Air supply too low

Cause of fault	Remedy
Inlet and outlet valves contaminated / defective	Clean, replace if necessary
Cylinder(s), piston(s) or piston ring(s) used up	Replace
V-belt slips	Tension V-belt
See chapter "Final pressure can not be reached"	See chapter "Final pressure can not be reached"

Compressor overheated

Cause of fault	Remedy
Inlet filter cartridge contaminated	Replace
Ambient temperature too high	Improve room ventilation / Reduce operation times
Cooling air inlet and outlet insufficient	Observe minimum distances (see Installation Instructions)
Air intake hose too long	Reduce length of the air intake hose
Air intake hose diameter too small	Use a larger diameter
Wrong compressor rotation direction	Ensure correct phase rotation, observe rotation direction arrow!
Inlet and outlet valves contaminated / defective	Clean, replace if necessary

Safety valve leaks

Cause of fault	Remedy
Inlet and outlet valves of the following pressure stage defective	Clean, replace if necessary
Sinter filter of the following water separator blocked	Replace
Safety valve leaky	Replace

Oil taste in the air

Cause of fault	Remedy
Mole carbon filter cartridge saturated	Replace
Compressor oil unsuitable	Use prescribed oil quality
Filter cartridge unsuitable	Use prescribed filter type
Cylinder(s), piston(s) or piston ring(s) defective	Replace

Automatic condensate drain defective

Cause of fault	Remedy
Solenoid coils defective	Replace
Cable / supply cable defective	Repair, replace if necessary
Timer / relais defective	Replace
Sinter filter of pneumatic condensate valve blocked	Replace
Piston of pneumatic condensate valve sticks	Clean pneumatic condensate valve and restore function, check/replace o-rings, replace valve complete if necessary

Condensate drain starts before reaching final pressure

Cause of fault	Remedy
Pressure stages are not as prescribed, control pressure of pneumatic condensate valve too low	Check corresponding inlet and outlet valve, replace if necessary.
Piston sealing of pneumatic condensate valve contaminated / used up	Clean, replace if necessary
Timer / relais settings not correct	Adjust as prescribed
Timer / relais defective	Replace

Compressor stops before final pressure

Cause of fault	Remedy
Final pressure switch settings not correct	Correct settings
Opening pressure of the pressure maintaining valve too high	Correct settings
Fuse / circuit breaker has tripped Valid only for E models	Check fusing of the power supply / observe regulations
Emergency stop switch has tripped	Unlock emergency stop switch, close compressor housing door correctly

Filter life not sufficient

Cause of fault	Remedy
Pressure maintaining valve settings not correct	Adjust as prescribed
Filter cartridge unsuitable	Replace by a prescribed filter cartridge type
Filter cartridge too old	Observe expiration date
Filter cartridge packaging incorrect / damaged / already opened. Filter cartridge already partly saturated before change	Store filter cartridges properly, dispose defective cartridges
Operating temperature too high	Ensure sufficient ventilation
Cylinder(s), piston(s) or piston ring(s) defective	Replace

Oil consumption too high

Cause of fault	Remedy
Cylinder(s), piston(s) or piston ring(s) defective	Replace
Compressor oil unsuitable	Use prescribed oil quality
Operating temperature too high	Observe prescribed operating temperatures
Oil leak at the compressor block	Tighten corresponding mounting screws, if necessary replace corresponding paper sealing / o-ring / shaft seal

MAINTENANCE AND SERVICE

Service, Repair and Maintenance

Carry out service and maintenance work exclusively when the compressor is stopped and depressurised. The unit should be leak-checked regularly. Leaks can be preferably localised by using a leak detector spray (if necessary, brush pipes with soapy water).

We recommend that only authorised L&W service technicians carry out service work on the bearing of the compressor (crankshaft and connecting rods).

We urgently recommend that all maintenance, repair and installation work must only be carried out by trained personnel. This is necessary because all maintenance work can not be explained exactly and detailed in this manual.

Only use authentic spare parts for service work.

Danger
Components under pressure, such as hose ends, can quickly come loose when manipulated and can cause potentially fatal injuries due to the pressure surge. Any work on system parts may only be performed in a pressure-compensated state.

Warning
The use of accessories that have not been tested can lead to death or serious injury or damage to the unit. Only use authentic spare parts for service work.

Warning
Carry out maintenance or service work when the unit is switched off and protected against unexpected restart.

Warning
Risk of burns!
Carry out maintenance or service work when the unit has cooled down.

Daily before taking unit into operation

Maintenance work	Type	Quantity	Order No.
Check oil level	-	-	000001
Check condition of all filling hoses	-	-	-
Check filter cartridge lifetime	-	-	-
Operate unit to final pressure and check function of final pressure switch	-	-	-

At 25 operation hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	2,2	000001

Every 3 months or as required

Maintenance work	Type	Quantity	Order No.
Check/Retorque all connections and bolts	-	-	-

Annually

Maintenance work	Type	Quantity	Order No.
Oil change, if less than 1000 operating hours	-	2.2	000001
Check V-belt tension and condition	LW 300 E (50Hz)	1	001453
	LW 300 E (60Hz)	1	-
	LW 450 E (50Hz)	1	001409
	LW 450 E (60Hz)	1	001453
Check opening pressure of final safety valve	-	-	-
Clean coolers	-	-	-
Clean all oil/water separators, if less than 500 operating hours	-	-	-
Service intake filter (depends on condition - if less than 500 operating hours)	-	-	-
Check all connections for leakage	-	-	-

Every 500 operating hours

Maintenance work	Type	Quantity	Order No.
Change intake filter *	-	1	000170
Check pressure maintaining/non-return valve	-	-	-
Check V-belt tension and condition	see above	see above	see above

*** Note**
Article is part of our 1000h and 2000h service kits.

Every 1000 operating hours

Maintenance work	Type	Quantity	Order No.
Replace sintered metal filter element of water separators	1st stage	1	000184
	2nd stage	1	000173
Replace o-rings of water separators	1st stage	1	001294
	2nd stage	3	001272
Replace o-ring of oil separator	-	1	001294
Replace silencer	-	1	000178
Replace sintered metal filter of oil separators	-	1	000184
Replace sintered metal filter of pneumatic condensate valve	-	1	000188
Replace oil sieve / oil pump cover gasket	-	1	002569
Oil change	-	2.2	000001
Replace o-rings of the final filter housing	-	2	001287
Replace back-up rings of the final filter housing	-	2	001285

Note
All stated quantities are parts of our 1000h and 4000h service kits. You can find an overview on page Service Kits.

Every 4000 operating hours (Latest in 10 years)

Maintenance work	Type	Quantity	Order No.
Replace all o-rings and gaskets of 1st, 2nd and 3rd stage	gasket	3	000240
	o-ring	1	001274
Replace all inlet and outlet valves incl. gaskets	1st stage	1	000259
	2nd stage	1	000256
	3rd stage	1	010165
	Upper gasket 1st	1	000257
	Upper gasket 2nd	1	000254
	Lower gasket 1st	1	000258
	Lower gasket 2nd	1	000253
Replace oil intake hose	-	1	000376
Replace needle bearings for conrod 2nd and 3rd stage	-	2	003836
CU-Ring (Ø10 x 16 x 2mm)	-	1	001323
CU-Ring (Ø10,4 X 13,4 X 1mm)	-	1	001324
CU-Ring (Ø13,5 x 18 x 1,5mm)	-	1	001327
CU-Ring (Ø14,5 X 20 X 1,5mm)	-	1	001329

Note
All stated quantities are parts of our 1000h and 4000h service kits. You can find an overview on page Service Kits.

Service Kits

The service kits contain parts for maintenance according to the factory requirements.

The use of the service kits ensures that all required parts are ordered and replaced and gives assurance that all parts are included in the order. Depending on the model and interval, the service kits include parts such as O-Rings, Sinter Filter, Inlet Filter, Silencers, In-&Outlet Valve, Valve Seals and Compressor oil.

Service Kits

Service Kits LW 300 ES / LW 450 ES for 50 Hz

Compressor	Operating Hours	Order No.
LW 300 ES	1000 h	003841
LW 300 ES	4000 h	up to 06.2016: 003834 from 07.2016 up to 08.2017 (up to compressor block-no. 858): 009677
LW 450 ES	1000 h	003841
LW 450 ES	4000 h	up to 06.2016: 003834 from 07.2016 up to 08.2017 (up to compressor block-no. 858): 009677

Note
V-belts are not included in our 1000h and 4000h service kits.

Tension V-belt

Tension V-belt as follows:

- Loosen counternut (A)
- Tension / relieve V-belt
- Tighten counternut (A)

Tension V-belt
Turn clamp nut (B) in direction of the spring

Relieve V-belt
Turn clamp nut (B) in direction of the motor

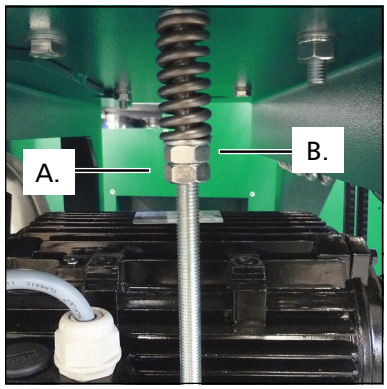


Fig. 1 - Counternut (A) and clamp nut (B)

Correct V-belt tension

Do not tension V-belt too tight. This damages bearings of compressor and motor. The V-belt should only be tensioned until there is no noise caused by slipping during start.

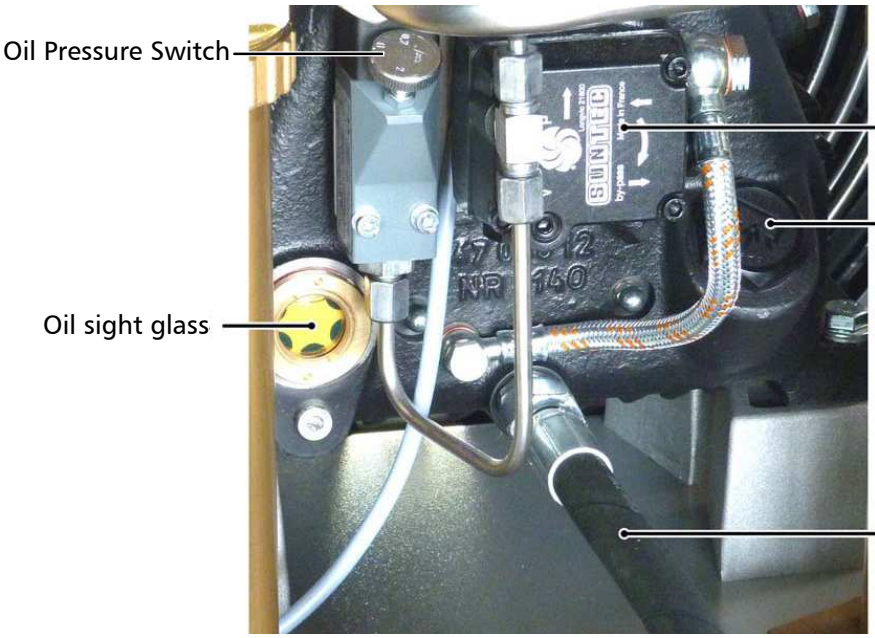
We recommend using a V-belt tension gauge.

Settings

Motor Type	Initial Installation	Operation after running in
Electric motors 50Hz	600 N	450 N
Electric motors 60Hz	500 N	400 N

Compressor lubrication

Crankshaft bearings of the 1st and 2nd stage get lubrication by an oil slinger. In addition, 1st and 2nd stage are lubricated by spray oil. The guide cylinder of the 3rd stage is lubricated by a mechanical oil pump.



Lubricating System

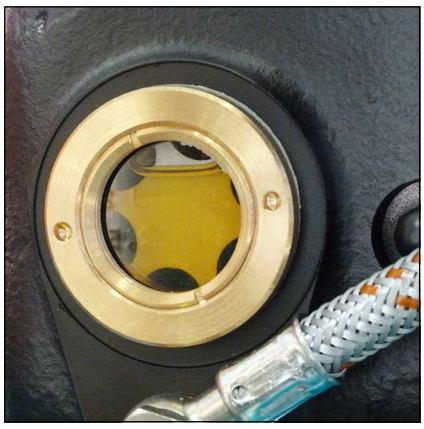
Check oil level

Warning
Check oil level daily. Never start the compressor with a too low oil level. Risk of accidental loss, destruction or deterioration.

Check oil before each operation of the system!

The oil level should be between the middle and upper end of the oil sight glass. Never start the compressor with a too low oil level.

Refill new compressor oil at least when the oil level reached the middle of the indicated area.



Oil sight glass

Oil change

Note
We recommend oil change at least once a year - depending on total operating hours.

Oil change as follows:

- Run compressor warm for approx. 2 min.
- Switch off and vent compressor.
- Place a suitable oil drain tray under the drain hose.
- Open carefully oil drain valve and drain oil completely.
- Close oil drain valve.
- Loosen oil fill port with an appropriate adjustable wrench (AF 0-40 mm) and unscrew manually.
- Fill oil by using a funnel.
- Check oil level. The oil level should be between the middle and upper end of the oil sight glass.
- Screw oil fill port manually in and tighten with the adjustable wrench.

The oil change is now completed.

Maintenance intervals

- First oil change after 25 operating hours (total hours).
- All further changes after each 1,000 operating hours.

Oil and oil capacity

Approx. 2,200 ml synthetic compressor oil is necessary for one oil change. Only use synthetic compressor oil which is recommended as suitable from L&W.

Oil sieve change

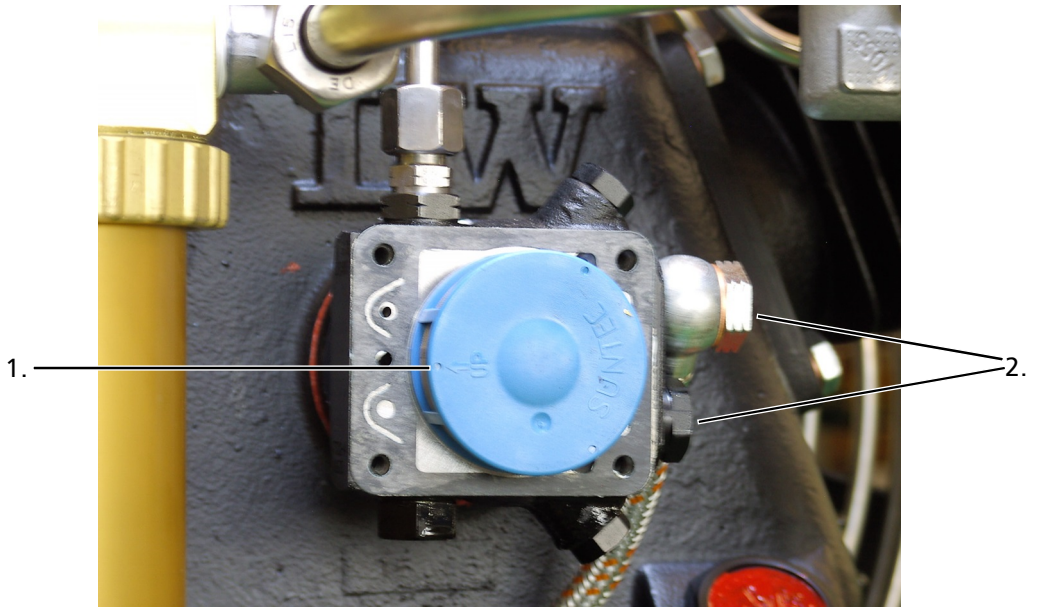
Oil sieve change as follows:

- Loosen cover screws (4 pcs).
- Remove the cover, the cover gasket and the oil sieve.
- Clean the oil sieve with petroleum-ether or replace the defective oil sieve.
- Replace the gaskets.
- Soak the gaskets with oil before placing (respect mounting direction).
- Be sure to position the arrow (see Fig., Pos. 1) from the new oil sieve opposite to inlet and return ports of the pump (see Fig., Pos. 2).
- Remount the cover with the 4 cover screws. Tightening torque: 4.5 - 8 N.

The oil sieve change is now completed.

Maintenance intervals

- We recommend cleaning or replacing the oil sieve every 1,000 working hours.
- Service Kit oil pump (002569). Consists of: 000798—Oil sieve + 000672—oil pump cover gasket

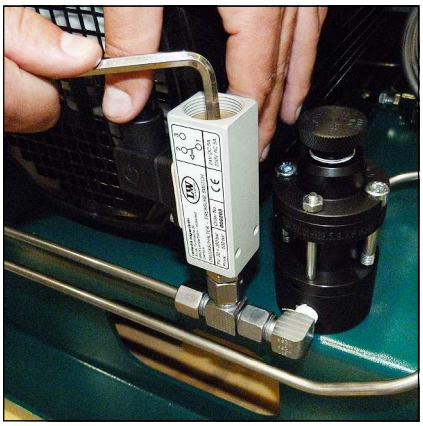


Correct oil sieve mounting direction

Final pressure switch

Note
Do not adjust the final pressure switch to the safety valve pressure. The final pressure switch has to be adjusted to min. 10 bar below the safety valve pressure. Otherwise, the safety valve can open during operation. This considerably reduces the life of the safety valve.

The pressure switch shuts off the compressor automatically when the selected final pressure is reached. The final pressure switch is already adjusted to the corresponding cut-out pressure.


Final pressure switch

The pressure can be adjusted with the upper adjusting screw as follows:

Increasing cut-out pressure:

Turn the adjusting screw clockwise

Reducing cut-out pressure:

Turn the adjusting screw anti-clockwise

Adjust the pressure switch in steps of a quarter turn. Restart the compressor after every adjustment step to verify the actual cut-out pressure.

Example settings:

Safety valve	Max. Operating Pressure
225 bar	215 bar
250 bar	240 bar
330 bar	320 bar

Automatic condensation dump system

Note
The collected condensate can contain oil and has to be disposed according to regulations.

The LW 450 ES comes as standard with an automatic condensation dump system. Solenoids drain all condensate separators every 15 minutes.

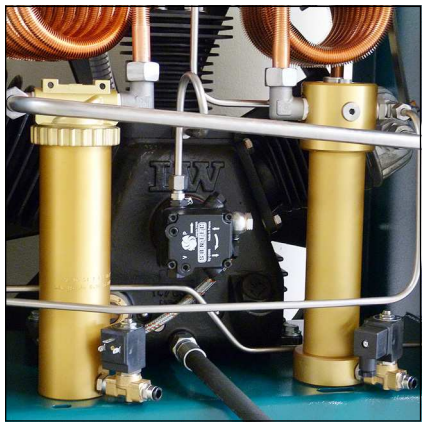
To test the system, press the blue condensate test drain button on the operating panel.

Oil / water separators

Condensate is separated after every stage of compression. All three oil / water separators are equipped with electronic timer controlled solenoids. The timer is located in the switch box and activates the dump valves about every 15 minutes.

To release the complete condensate through the black plastic hoses, we recommend using an 20 l container at least.

The drain noise can be kept to a minimum by using a silencer.



Oil / water separators 1st and 2nd stage

Maintenance intervals

We recommend to clean oil and water separators every 500 operating hours or at least once a year, to check for corrosion damage and to replace o-rings if necessary.

All oil / water separators have an integrated sinter filter which has to be replaced every 1,000 operating hours.

Oil / water separators final stage

Oil / water separator 1st stage - maintenance

Note
Clean all parts thoroughly before assembly.

Change / clean oil / water separators 1st stage as follows:

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Open ring nut and remove separator top (Fig. 1).
- Open nut and remove separator top (Fig. 2).
- Change sinter filter (Fig. 3).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 4).
- Place separator top and tighten ring nut manually.
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

Oil / water separator maintenance is now completed.

Fig. 1 - Open ring nut and remove separator top

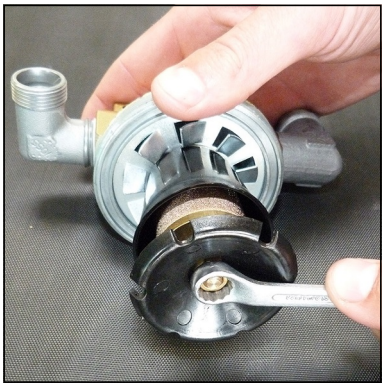


Fig. 2 - Loosen nut at the separator top

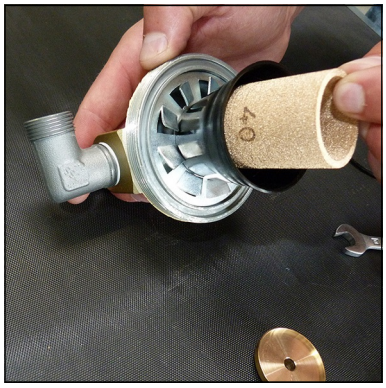


Fig. 3 - Change sinter filter

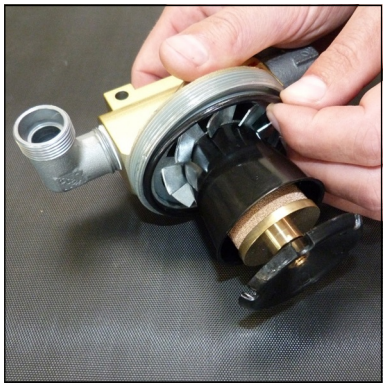


Fig. 4 - Change o-ring

Oil / water separators 2nd stage - maintenance

Note
Clean all parts thoroughly before assembly.

Maintenance / cleaning of oil / water separators 2nd stage as follows:

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Unscrew and remove filter top (Fig. 1).
- Open nut and remove separator top (Fig. 2).
- Change sinter filter (Fig. 3).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 4).
- Place separator top and tighten manually.
- Remove bottom part (Fig. 5)
- Change o-ring, previously grease new o-ring
- Press in bottom part
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

The oil / water separator maintenance is now completed.

Fig. 1 - Unscrew and remove filter top

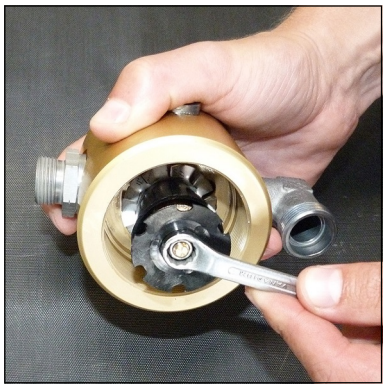


Fig. 2 - Loosen nut at the separator top

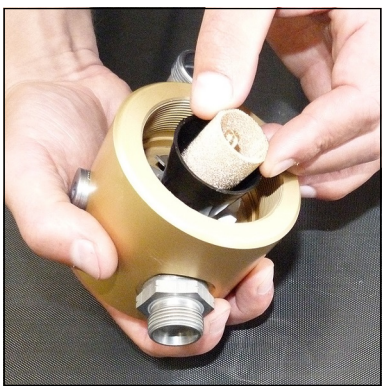


Fig. 3 - Change sinter filter

Fig. 4 - Change o-ring

Fig. 5 - Bottom part

Oil / water separators final stage - maintenance

Note
Clean all parts thoroughly before assembly.

Change/clean oil / water separators final stage as follows:

Oil / water separators final stage

- Loosen pipe connections and mounting screws.
- Remove oil / water separators.
- Open ring nut and remove separator top (Fig. 1).
- Loosen nut at the separator top.
- Change sinter filter (Fig. 2).
- Reassemble all parts and tighten nut.
- Change o-ring, previously grease new o-ring (Fig. 3).
- Place separator top and tighten ring nut manually.
- Replace silencer.
- Mount oil / water separators.
- Tighten pipe connections and mounting screws.

The oil / water separator maintenance is now completed.

Fig. 1 - Loosen ring nut

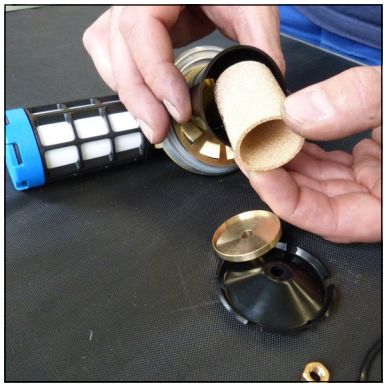


Fig. 2 - Change sinter filter

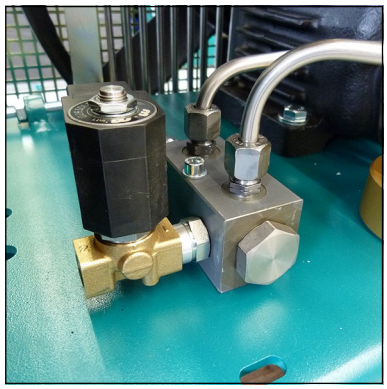
Fig. 3 - Change o-ring

Pneumatic condensate valve - maintenance

Note
Clean all parts thoroughly before assembly.

Pneumatic condensate valve change as follows:

- Loosen pipe connections and mounting screws.
- Remove pneumatic condensate valve.
- Loosen connection (Fig. 2).
- Change sinter filter (Fig. 3).
- Tighten horizontal screw.
- Mount pneumatic condensate valve.
- Tighten pipe connections and mounting screws.



Pneumatic Condensate Valve

Pneumatic condensate valve maintenance is now completed.

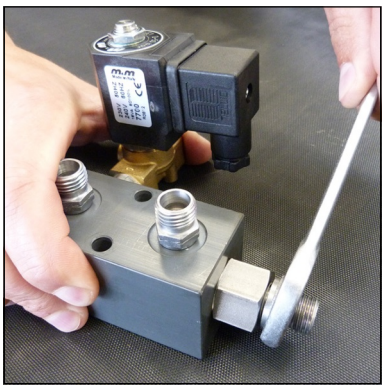


Fig. 2 - Loosen connection

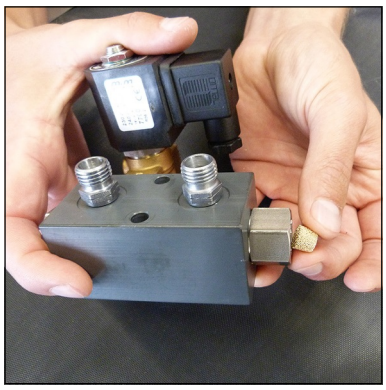


Fig. 3 - Change sinter filter

Filter housing

The mole carbon filter housing is installed on the right hand side of the compressor housing.

Inside the filter housing a jet blows air on to the housing wall. Condensation water and oil are led by centrifugal force to the bottom of the housing. Air flows through the mole carbon filter cartridge, which purifies the air from residual moisture and odours.

•

Filter housing

Filter cartridge

The high-pressure compressor is equipped with an integrated breathing air purification system. Air is compressed up to 330 bar, dried and odour- and tasteless purified. Oil residues are bounded. The breathing air filter cartridge consists of a molecular sieve and activated-carbon filter.

Cartridge capacity: approx. 2.3 l

All breathing air filter cartridges are factory vacuum sealed.

We recommend unpacking the filter cartridges just before installation. Filter cartridges which are exposed too long could be saturated with moisture and become unusable.

•

Maintenance intervals

Filter cartridges should be changed at the following intervals, at +20°C or more often, depending on humidity and ambient temperature:

- 67 hours for LW 300 ES
- 44 hours for LW 450 ES

Filter cartridge change

Filter cartridge change as follows:

- Run the compressor up to a pressure of 100 bar.
- Stop compressor.
- Open filling valve.
- Unscrew filter housing cover by using the special filter tool (Fig. 1).
- Place the T-piece end of the filter tool in the recess of the filter cartridge (Fig. 2).
- Unscrew the filter cartridge anti-clockwise and pull the cartridge out of the housing (Fig. 3).
- Open the packing of the new filter cartridge and place it with the filter tool in the filter housing.
- Screw the new filter cartridge hand tight in by using the filter tool.
- Screw the cover of the filter housing first manually in.
- After it has been completely screwed in, turn cover anticlockwise for 90°. This avoids tightening of the cover due to vibration..

The filter cartridge change is now completed.

Note
Ensure that the old filter cartridge is disposed correctly at an approved waste point.

Fig. 1 - Unscrew the filter housing cover.

Fig. 2 - Place the T-piece end of the filter key in the top of the filter cartridge.

Fig. 3 - Pull the cartridge out of the housing.

Filter housing - maintenance

Note
Clean all parts thoroughly before assembly.

Filter housing maintenance as follows:

- Open Filter Cover (Fig. 1).
- Change o-ring and back-up ring, previously grease both (Fig. 2).
- Grease filter cover thread and close.

Fig. 1 - Open Filter cover

Dismount filter housing

- Loosen pipe connections and nuts (Fig. 3).
- Remove filter housing.
- Dismount filter housing base.
- Change o-ring and back-up ring, previously grease both (Fig. 4).
- Screw filter base tight in.

Mount filter housing

- Connect pipe connections and tighten.
- Adjust holding clamp and tighten nuts.

The filter housing maintenance is now completed.

Fig. 2 - Change o-ring and back-up rings

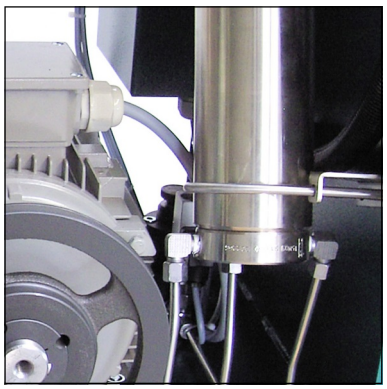


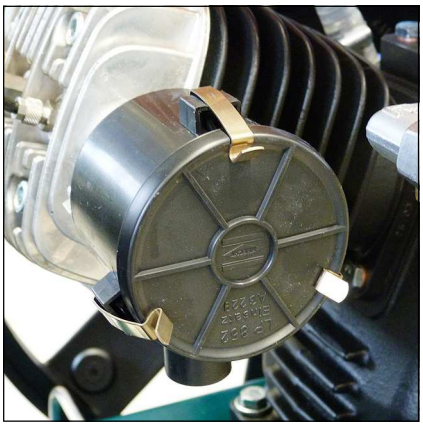
Fig. 3 - Loosen pipe connections and nuts

Fig. 4 - Change o-ring and back-up rings

Inlet filters

Note
Dirty filters make intaking air difficult and reduce delivery capacity. Risk of compressor overheating.

A micro filter cartridge is used as an air inlet filter. Check air inlet filter regularly or replace it. Defective air inlet filters should be immediately replaced with a corresponding filter.



Air filters

Maintenance intervals

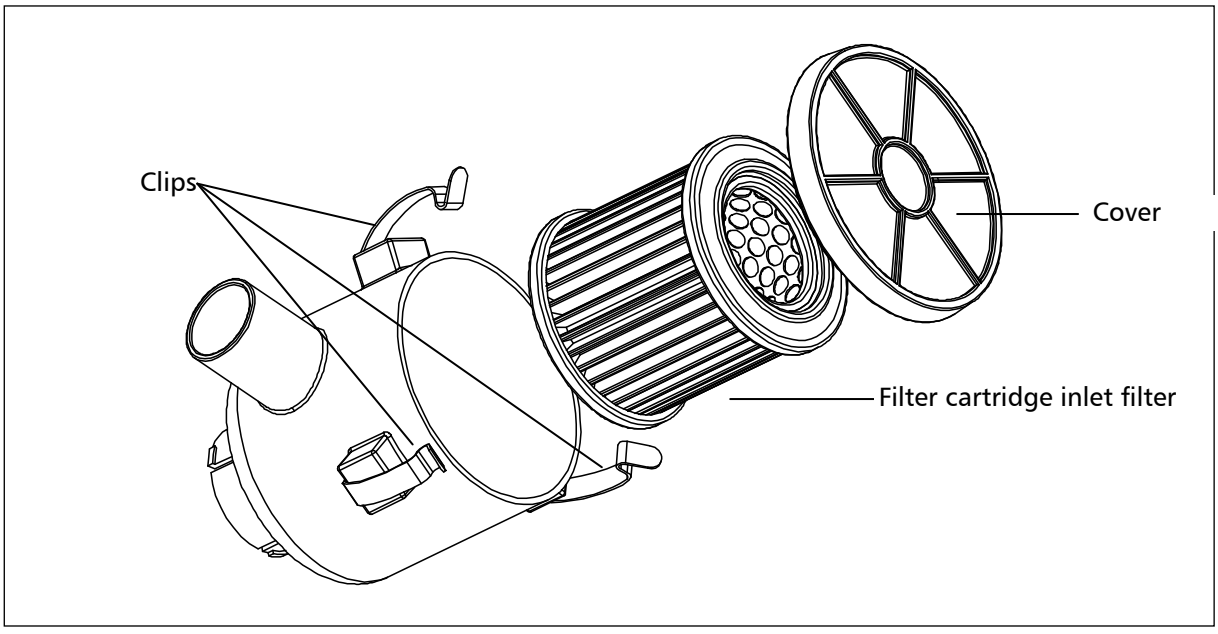
We recommend that the filter cartridge should be replaced every 1,000 working hours (depending on pollution grade).

Inlet filter cartridge change

Inlet filter cartridge change as follows:

- Loosen cover by pushing the three clips apart.
- Remove inlet filter cartridge and replace it by a new one.
- Refit cover and snap the three clips until a loud ‘click’ can be heard.

The inlet filter cartridge change is now completed.



Filter cartridge inlet filter

Cylinder heads and valves

Inlet and outlet valves of the specific compressor stages are located between valve head and cylinder. Outlet valves open while piston downstroke, inlet valves open while upstroke or compression stroke.

Valves are subject to normal wear and tear and have to be replaced at certain intervals (depending on specific operating conditions). Dismount valve heads to change valves. The three valves are combined inlet and outlet valves. The first and second stage valves are plate valves. The third stage contains a spring operated piston which acts inside a bronze cylinder.

Valve head 3rd stage

Maintenance intervals

All valves should be replaced after 4,000 working hours due to normal wear and tear. To replace valves the cylinder heads have to be removed. There are no special tools required to replace these valves.

Available special tools

Special tools are not necessary for dismounting inlet and outlet valves but make work easier.

Order number: 006847

Special tool

Replace inlet and outlet valves 1st and 2nd stage

Note
The figures of the parts can differ due to the different stages.

Change inlet and outlet valves 1st and 2nd stage as follows:

Remove Inlet / Outlet Valve

- Loosen pipe connections
- Loosen valve head screws (Fig. 1)
- Remove valve head
- Pull out inlet and outlet valve (Fig. 2). CAUTION: Observe that the lower copper valve ring is also pulled out. (It can still stick inside the cylinder)
- Check valve head if defective

Install Inlet / Outlet Valve - see following page

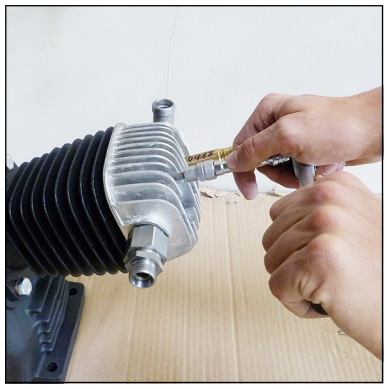


Fig. 1 - Loosen valve head screws

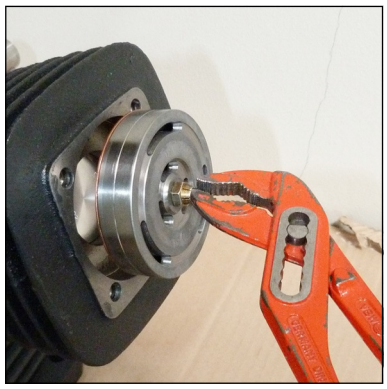


Fig. 2 - Pull out inlet and outlet valve

Replace inlet and outlet valves 1st and 2nd stage - continued from previous page

Caution
The exact alignment of upper and lower valve gasket is very important. Inlet and outlet channels have to be exactly centred. Do not turn inlet and outlet valve after insertion. The copper valve ring could cover outlet channels.

Install Inlet / Outlet Valve

- Grease the lower valve gasket slightly and place on the new inlet and outlet valve.
  CAUTION: Observe correct copper valve ring position (centre inlet and outlet channels).
- Place the new inlet and outlet valve straightly into the cylinder (Fig. 3).
  CAUTION: Do not turn the inlet and outlet valve inside the cylinder! The copper valve ring could cover outlet channels!
- Place the upper valve gasket on the inlet and outlet valve.
  CAUTION: Observe the correct paper gasket position (centre inlet and outlet channels). (Fig. 4)
  Note: Valve head screws can be inserted into the valve head to secure the upper valve gasket.
- Refit the valve head and tighten the valve head screws crosswise.

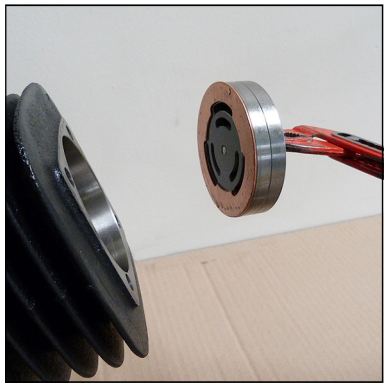


Fig. 3 - Place new inlet and outlet valve straightly into cylinder

Starting torques:
1. nd Stage 45 Nm
2. nd Stage 30 Nm

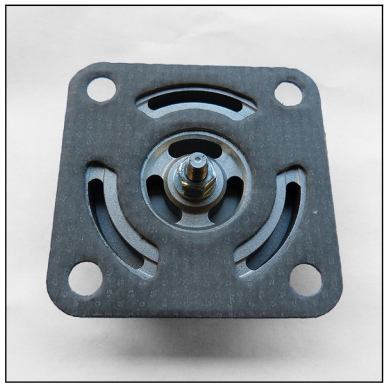


Fig. 4 - Ensure the correct mounting position of the paper gasket

The replacement inlet and outlet valves 1st and 2nd stage is now completed.

Replacement inlet and outlet valves 3rd stage

Replacement inlet and outlet valves 3rd stage as follows:

- Loosen pipe connections
- Loosen valve head screws (Fig. 1)
- Remove lower valve gasket (Fig. 2)
- Dismount inlet and outlet valve (Fig. 3). Observe that the upper valve gasket is also pulled out. (It can still stick inside the cylinder head)
- Check valve head if defective (check centre pin)
- Mount valve gasket on inlet and outlet valve.
  CAUTION: Ensure correct mounting position of the upper valve gasket (Fig. 4).
- Insert new inlet and outlet valve into valve head.
  CAUTION: Observe correct position between valve centre hole and valve head centre pin.
- Place bottom valve gasket
- Place valve head with the new inlet and outlet valve. Tighten valve head screws crosswise (tightening torque 30 Nm).

Replacement inlet and outlet valves 3rd stage complete.

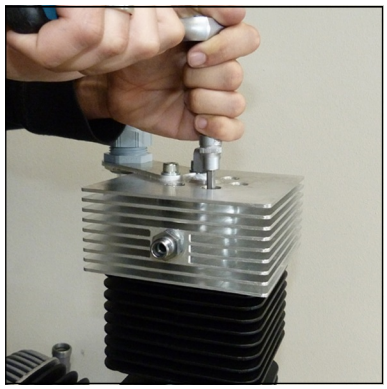


Fig. 1 - Loosen valve head screws

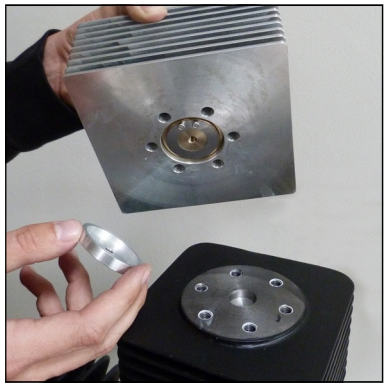


Fig. 2 - Remove lower valve gasket

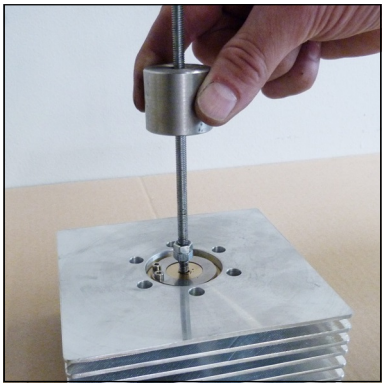


Fig. 3 - Remove inlet and outlet valve

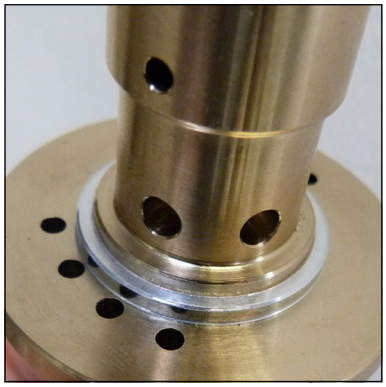


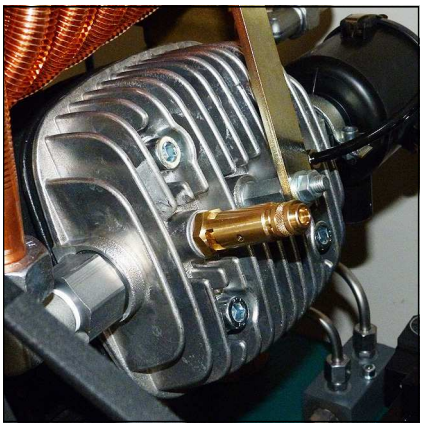
Fig. 4 - Ensure correct mounting position of the upper valve gasket

Safety valves

Every pressure stage is equipped with a separate over pressure safety valve. Safety Valves avoid a non permissible high pressure at the specific pressure stages and limit maximum operation pressure of the compressor.

Safety valves are adjusted to:

- 1st Stage: 8 bar
- 2nd Stage: 50 bar
- 3rd Stage: max. final pressure



Safety valve 1st stage

The adjusted blow-off pressure [bar] of the safety valves is indicated on their housings.

All safety valves are factory sealed with special L&W safety seals to avoid manipulation of the limit value settings.

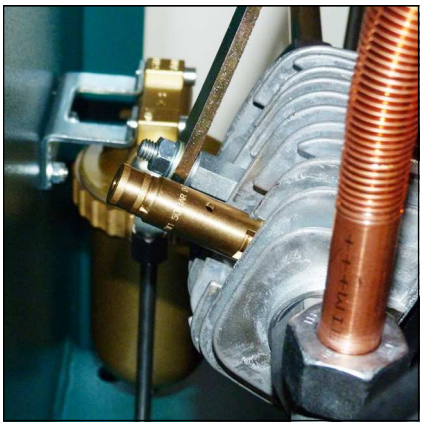
Safety valves with removed seals have to be immediately checked for the prescribed settings and replaced if necessary.

The safety valve of the final stage is furthermore equipped with a knurled screw to be activated once.

Turning the knurled screw clockwise could vent the valve completely and therefore the final filter housing.

During normal operation conditions, the knurled screw has to be turned anti-clockwise up to the upper stop. An integrated circlip avoids complete unscrewing.

If a safety valve blows off, it indicates problems with either inlet or outlet valve of the following stage.



Safety valve 2nd stage

Safety valve 3rd stage

Note
Replace defective safety valves immediately!

Pressure maintaining / non return valve

Note
If the adjusted opening pressure of the pressure maintaining valve is higher than the final pressure of the compressor, the final pressure safety valve blows off before pressure maintaining valve opens (final pressure = 0 bar). When valve settings are not clear (e.g. after disassembly / repair), start the adjustment with a low basic setting (turn adjusting screw approx. 3 times in).

A pressure maintaining / non return valve is installed after the mole carbon filter housing. It maintains a pressure of at least 150 bar inside the filter housing - this optimises filter efficiency.

Pressure maintaining/non-return valve

Pressure maintaining valve

The pressure maintaining valve drains a large part of the water content of the compressed air mechanically by ensuring the minimum outlet pressure. This guarantees optimal drying and purification of the breathing air.

After starting the compressor, the pressure inside the final filter housing constantly increases. The pressure maintaining the valve prevents the compressed air from blowing off (final pressure gauge = 0 bar).

When the adjusted opening pressure is reached (150 and 180 bar), the purified compressed air flows via pressure maintaining and non return valve to the filling valve.

The value of the opening pressure of the pressure maintaining valve can be read at the final pressure gauge. When opening pressure is reached, the pressure gauge value increases within a few seconds.

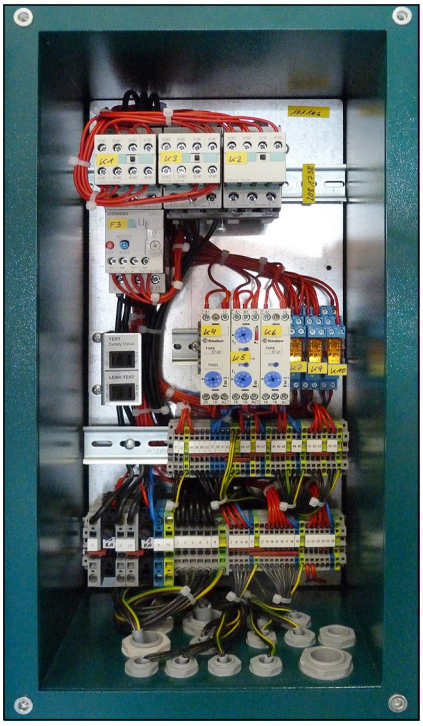
Safety valve test

Note
Do not fill any tank during test phase!

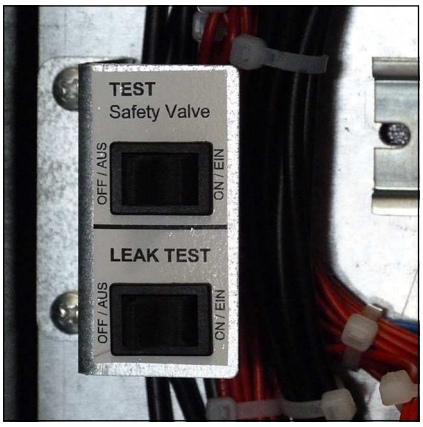
Safety valve test as follows:

- Disconnect compressor from the electrical power supply and protect against unexpected restart.
- Remove the cover of the switch box.
- Switch on the "Test Safety Valve" switch (pressure switch will be deactivated!).
- Mount the cover of the switch box.
- Connect the compressor to the electrical power supply.
- Close filling valves.
- Start the compressor.
- Watch the final pressure gauge. The safety valve should open when reaching working pressure of the compressor. If not, switch off the unit and take out of service until the safety valve has been replaced.
- Switch off the compressor.
- Disconnect the compressor from the electrical power supply and protect against unexpected restart.
- Remove the cover of the switch box.
- Switch off the "Test Safety Valve" switch (pressure switch will be activated!).
- Mount the cover of the switch box.
- Connect the compressor to the electrical power supply.

The safety valve test is now completed.



Switch box



Safety valve test switch (up)

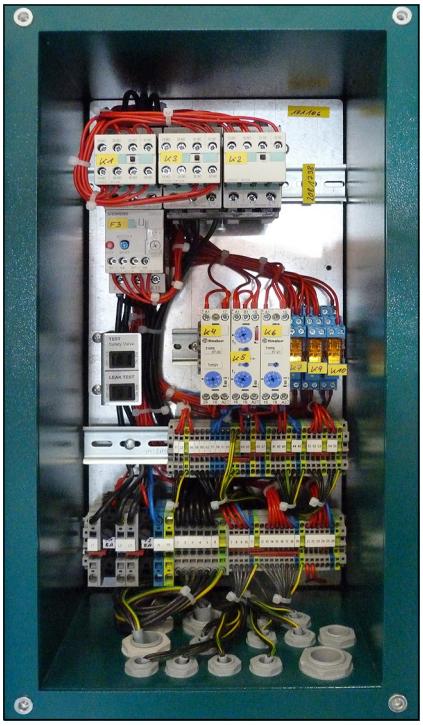
Leak test

Note
Do not fill any tank during test phase!

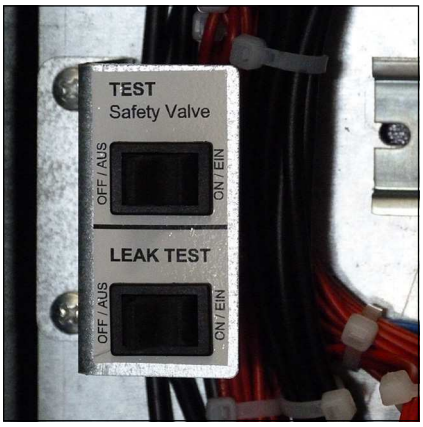
Leak test as follows:

- Disconnect the compressor from the electrical power supply and protect against unexpected restart.
- Remove the cover of the switch box.
- Switch on the leak test switch (solenoid valves will be deactivated!).
- Mount the cover of the switch box.
- Connect the compressor to the electrical power supply.
- Close filling valves.
- Start the compressor.
- Switch off the compressor at a pressure of approx. 150 bar.
- Verify the compressor for release noises. (A slight hiss of the air inlet filter nozzle can be ignored). If release noises occur, localise blow off position(s).
- Switch off the compressor.
- Disconnect the compressor from the electrical power supply and protect against unexpected restart.
- Remove the cover of the switch box.
- Switch off the leak test switch (solenoids will be activated!).
- Mount the cover of the switch box.
- Connect the compressor to the electrical power supply.

The leak test is now completed.



Switch box



Leak test switch (lower)

Test of pressure equipment

According to the Pressure Equipment Directive (PED 97/23/EC) and TÜV Darmstadt (German supervising authorities). State: 10th of December, 2005

Subject: pressure equipment with a product permissible operating pressure [bar] x content volume [litres] from 200 up to 1000.

Example: Filter housing 1.7 l

Maximum operating pressure: 350 bar

Content volume: 1.7 litres

350 bar x 1.7 litres = 595

595 is smaller than 1000 -> result: Test is applicable!!

Example: Filter housing 2.3 l

Maximum operating pressure: 350 bar

Content volume: 2.3 litres

350 bar x 2.3 litres = 805

805 is smaller than 1000 -> result: Test is applicable!!

Pressure equipment from 200 up to 1000 have to be tested as follows:

1. Examination after 5 years by a qualified person or authorized organisations.

Visual inspection, inside and outside.

2. Examination after 10 years by a qualified person or authorized organisations.

Visual inspection, inside and outside.

In addition, a water pressure test is carried out at 1.5 times of the permissible vessel operating pressure.

MAINTENANCE RECORDS

Introduction form for the Operator

No.	Surname, Name	Date	Place	Signature	Instructor

By adding themselves to this list, the person that signs it confirms having been given a yearly introduction/instruction about the function and operation of the compressor unit.Furthermore, they have be informed about the relevant safety rules and regualtions (TRG, DGRL, BetrSichV, GSG, GSGV).

Top up oil, oil change

Date	Operating hours	Oil quantity [l]	Name

Cartridge change

Date	Operating hours	Difference	Name

Maintenance work

Description	Date, signature

Replaced Parts

Designation	Part number	Date, signature

Conservation / storage of the compressor

If the compressor unit is not to be used for an extended period of time, we recommend to carry out the following work before storage time:

- Run the compressor at 200 bar filling pressure for approximately ten minutes (control the flow with the filling valve to maintain constant pressure).
- Replace compressor oil, open filling valve(s) and run compressor for a few minutes.
- Stop compressor and open drain valves (depending on the compressor type, this may happens automatically). Remove top cap of final filter housing: clean threat, grease o-ring. and threat with a food grade grease or silicone grease. Close filter housing.
- Remove intake filter cartridge and undo intake pipes on all valve heads.
- Start compressor unit. Spray a few drops of compressor oil into intake connectors.
- Stop compressor unit and insert intake filter cartridge. Bring intake pipes back in position and fix connections and nuts. Close filling- and drain valves.
- Store the compressor in a cool dry place free from dust and contamination. A dust cover is recommended as long as condensation can be avoided.
- If compressor unit should be stored for a period of more than one year, an oil change is strongly recommended before it's been re-used.
- Fuel driven units only: fill up fuel tank to top level to avoid corrosion.

De-conservation, commissioning

After the compressor has been stored, the following steps are to be taken:

- If compressor hasn't been used for longer than 12 months, we strongly recommend an oil change before any use.
- Replace intake filter cartridge and check oil level.
- Clean compressor unit, check for foreign objects. Check condition and tension of V-belts, replace if necessary. Check condition of filling hoses, replace if necessary.
- Secure hoses against whipping and open filling valves and run compressor for approximately 10 minutes.
- Check condition of final filter cartridge, replace if necessary.
- Close filling valves and run compressor up to final pressure.
- Check safety valve relief pressure of final stage and/or pressure switch setting.
- Check all connections and pipe work for leaks.

Once all above steps are completed, compressor unit is now ready for use.

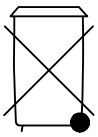
Transportation instructions

- Parts which need to be dismantled for transport purposes must be carefully replaced and secured before taking into operation.
- The transport may only be carried out by trained personnel.
- For transportation, only use lifting devices and equipment with sufficient lifting power.
- Do not stand or work under suspended loads.
- Also separate from minor relocation machinery / system of any external energy supply. Before recommissioning, reconnect the machine to the mains according to regulations.
- When recommissioning, proceed according to the operating instructions..

Disposal

The product must be disposed in accordance with national waste disposal regulations and by an appropriate waste disposal company.

Electric and electronic components



EU-wide regulations for the disposal of electric and electronic appliances which have been defined in the EU Directive 2002/96/EC and in national laws are effective from August 2005 and apply to this device.

Common household appliances can be disposed by using special collecting and recycling facilities. However, as this device has not been registered for household usage, it must not be disposed of through these means.

The device can be returned to L&W. Please do not hesitate to contact us if you have any further questions on this issue.

B

Operating Instructions

ECC - Electronic compressor control

www.uebler.net

Version: 11/12-E

TABLE OF CONTENTS

B

General Information

We strongly recommend reading this manual thoroughly prior to operation and follow all the safety precautions precisely. Damage resulting from any deviation from these instructions is excluded from warranty and liability for this product. Carry out other commissioning steps only if you have fully understood the following contents.

Before commissioning and using the unit, carry out all the essential preliminary work and measures concerning legal regulations and safety. These are described on the following pages of this operation manual.

Description of marks and warning signs

The following warning signs are used in this document to identify the corresponding warning notes which require particular attention by the user. The warning signs are defined as follows:

Caution
Indicates an imminently hazardous situation which, if not avoided, could result in serious injury, physical injury or death.

Warning
Indicates a potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment.

Note
Indicates additional information on how to use the unit.

Specifications and Options

All L&W compressors can be optionally equipped with the all-electrical computer supported control system "ECC". It is easy to operate and allows multiple and individual settings.

Specifications

- LCD-Display with key pad
- Automatic & semi-automatic operation mode
- Automatic dump system
- Integrated counter for operation hours
- Integrated counter for load cycles
- Maintenance intervals automatically displayed
- Required service part numbers automatically displayed
- Fully adjustable pressure ranges for start and stop
- Warning messages (“Housing Open” / “Emergency Switch”)
- Check of end-pressure safety valve possible
- Auto switch-off when system is not running
- Extendable by additional modules (e.g. external filling panel)
- Easy to operate menu
- Door position switch (housing open message)
- Load-free or depressurised start cycles

Options

- Oil pressure control
- Oil temperature control
- Cylinder head temperature control
- Inter stage pressure monitoring
- PIN controlled access
- Master / slave option (if more than one ECC equipped compressors are combined)

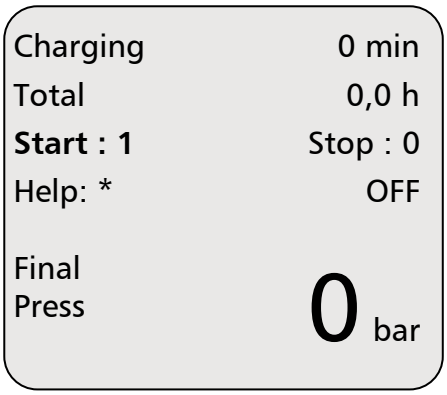
B

Switchboard

No.	Description
1	LCD Display
2	Key Pad
3	LED Display (Compressor OFF)
4	LED Display (Power)
5	LED Display (Compressor ON)

Main Menu

Immediately after the compressor has been connected to power, the ECC-display shows the following Main Menu::



Present filling time in minutes

Total operation hours

Key 1 to start compressor / Key 0 to stop compressor

* Key leads to submenus Current operation state = Off

Present filling pressure

The following keys can now be used:

Key	Function / Description
1	Start - Starts the compressor
0	Stop - Stops the compressor
*	Leads to the submenus

After typing the * key the following Selection Menu appears.

Selection Menu (M100)

After typing the * key in the Main Menu the following Selection Menu appears.

	Selection:	
2	Display	Key 2 leads to submenu “Display”
3	Settings	Key 3 leads to submenu “Settings”
4	Test	Key 4 leads to submenu “Test”
5	Statistics	Key 5 leads to submenu “Statistics”
6	Maintenance	Key 6 leads to submenu “Maintenance”
7	Operation Mode	Key 7 leads to submenu “Operation mode”
(M100)	Return : #	Key # leads back to “Main Menu”

(M100) tells that you are currently on menu page 100.

Note
At any time, the unit can be started with key 1 or shut down with key 0.
Caution: Risk of accident during maintenance work!

Display Menu (M200)

Pushing key 2 in the Selection Menu leads to Submenu “Display”.

	Display I:
2	Press. Stage 1
3	Press. Stage 2
4	Press. Stage 3
5	Cyl. Head Temp.
6	Oil Temp.
7	Display II
(M200)	Return : #

Key 2 shows current pressure of the 1st stage*

Key 3 shows current pressure of the 2nd stage

Key 4 shows curent pressure of the 3rd stage

Key 5 shows temperature of the final stage cylinder head

Key 6 shows the oil temperature

Key 7 shows Display II

Key # leads back to “Main Menu”

(M200) tells that you are currently on menu page 200.

By pushing key 2 (inter-stage pressure 1) the following Display appears.

Inter-Stage Pressure Display

Pushing key 2 in the Display Menu leads to the Inter-Stage Pressure 1 Display Menu.

Charging	0 min
Total	0,0 h
Start: 1	Stop: 0
Help:*	OFF
Press.	0 bar
1st Stage	0,0 bar

Use keys 3 to 6 in the Menu "Display I" to change between the displayed values.

Note
Pushing key 8 in the display menu "Display II" leads to the option "Pressure200/300" for compressors with 2 filling pressures. Displayed in field 3 of the display menu "Display I".

Display II (M270)

Pushing key 7 in the Selection Menu leads to Menu “Display II”.

Display II:	
Press.	Temp.
4: 0	C: 0
5: 0	D: 0
6: 0	E: 0
7: 0	F: 0
bar	°C
(M270)	Return : #

This display shows further customer specific pressure and temperature values.

Key # leads back to “Main Menu”

Settings Menu (M300)

Pushing key 3 in the Selection Menu leads to the Settings Menu.

	Settings:
	Automatic
2	Stop pressure
3	Restart Press.
	Semi-Automatic
4	Stop Pressure
9	Close
(M300)	Return : #

Key 2 leads to submenu „Set Stop Pressure“

Key 3 leads to submenu „Set Restart Pressure“

Key 4 leads to submenu „Set Stop Pressure“

Key 9 leads back to submenu "Selection"

Key # leads back to “Main Menu“

Use menu M700 to change between “Automatic” and “Semi-Automatic” mode.

Restart pressure can only be set in “Automatic Mode”.

Prior to setting the pressure, start the safety valve test.

Attention during maintenance
During automatic mode, the compressor can automatically start by itself at any time, depending on the selected restart pressure (see "Set Restart Pressure" M330).

Set Stop Pressure - automatic mode (M320)

Only valid in automatic mode, see menu M700.

	Set
	Stop Pressure:
Actual: 330 bar	Current restart pressure
7	New Value:
	>> XXX bar
4	(050,, 333)
8	Confirm
(M320)	Return : #

Key 7 if restart pressure should be changed
XXX indicates modified stop pressure
Chooseable pressure range for restart pressure
Key 8 confirms new restart pressure
Key # leads back to “Main Menu”

Set Restart Pressure - automatic mode (M330)

Only valid in automatic mode, see menu M700.

	Set
	Restart Pressure:
Actual: 180 bar	Current restart pressure
7	New Value:
	>> XXX bar
4	(030,, 310)
8	Confirm
(M330)	Return : #

Key 7 if restart pressure should be changed
XXX indicates modified restart pressure
Chooseable pressure range for restart pressure
Key 8 confirms new restart pressure
Key # leads back to “Main Menu”

Set Stop Pressure - semi-automatic mode (M340)

Only valid in semi-automatic mode, see menu M700.

	Set
	Stop Pressure:
Actual: 180 bar	Current stop pressure
7	New Value:
	>> XXX bar
4	(030,, 310)
8	Confirm
(M340)	Return : #

Key 7 if stop pressure should be changed
XXX indicates modified stop pressure
Chooseable pressure range for stop pressure
Key 8 confirms new restart pressure
Key # leads back to “Main Menu”

Test Menu (M400)

Pushing key 4 in the Selection Menu leads to the Test Menu.

Test:		
2	Solenoids	Key 2 leads to submenu “Test Solenoids”
3	Safety Valve	Key 3 leads to submenu “Test Safety Valve”
4	Test-Stopp	Key 4 leads to submenu “Test Stop without Venting”
9	Close	Key 9 leads back to submenu “Selection”
(M400)	Return : #	Key # leads back to “Main Menu”

Test Solenoids (M420)

Pushing key 2 in the Selection Menu leads to Submenu “Test Solenoids”.

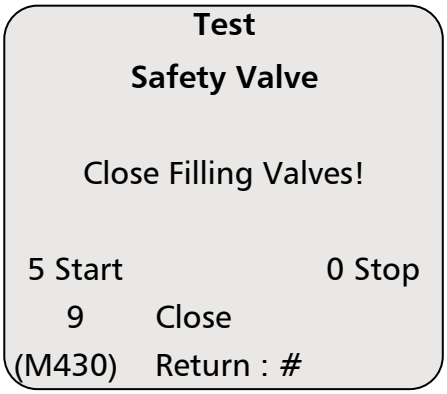
Test Solenoids		
3	open	Key 3 opens solenoids
7	close	Key 7 closes solenoids
9	Close	Key 9 leads back to submenu „Test“
(M420)	Return : #	Key # leads back to “Main Menu”

Note
This menu can not be left unless solenoids have been closed by key 7.

Test safety valve (M430)

Pushing key 3 in the Test Menu leads to Submenu “Test Safety Valve”.

Note
Prior to starting the Test, close all filling connections (also connected filling panels if necessary). During this test, the compressor passes the selected stop pressure (see Menu M320) to test the correct function of the final pressure safety valve. This would limit the maximum operating over pressure of the unit in case of malfunction.

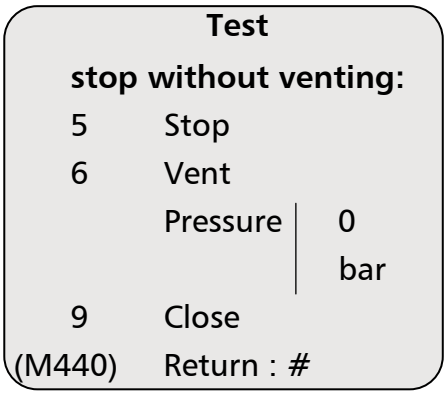


Key 5 to start test Key 0 to stop test
Key 9 leads back to submenu „Test“
Key # leads back to “Main Menu”

Test stop without venting (M440)

Pushing key 4 in the Test Menu leads to Menu “Test Stop without Venting”.

Note
This test is only operable when the compressor has been started with key 1. This test mainly checks the leak tightness of pressure vessels, pressurised pipes, safety valves and the compressor block.



Key 5 stops compressor during test run
Key 6 vents compressor after leak search has been finished
Shows current filling pressure

Key 9 leads back to submenu „Test“
Key # leads back to “Main Menu”

Statistics Menu (M500)

Pushing key 5 in the Selection Menu leads to Submenu “Statistics”.

Statistics	
Operation Hours:	
0,0 h	Total operation hours of compressor unit
Start cycles:	
00	Total number of compressor starts
Max Press 000 bar	Maximum working pressure of unit (set by safety valve test)
9 Close	Key 9 leads back to submenu „Selection“
(M500) Return : #	Key # leads back to “Main Menu”

Push key 5 to get information on which ECC software version is currently installed on your system (M505), i.e.: By pushing key 2, the total load cycles of the filter housing are being indicated.

Maintenance Menu (M600)

Pushing key 6 in the Selection Menu leads to the "Maintenance Menu".

Hours remaining	
Oil change	14 h
Sinter filt	989 h
Silencer	4989 h
Valves	5989 h
Oil filter	1000 h
8 Change done	
9 Close	
(M600)	Return : #

Shows remaining hours of listed components
(i.e. next oil change in 14 hours,...)

Key 8 leads to submenu “Receipt Maintenance”
Key 9 leads back to submenu „Selection“
Key # leads back to “Main Menu”

Remaining hours depend on the type. At the end of any remaining hours, the display indicates a warning message. Furthermore, the display informs about any possibly necessary spare parts with the corresponding L&W service part number.

Attention during maintenance
During automatic mode, the compressor can automatically start by itself at any time, depending on the selected restart pressure (see "Set Restart Pressure" M330).

Confirm Maintenance (M680)

Confirm Maintenance		
2	Oil change	Key 2 receipts oil change
3	Sinter filters	Key 3 receipts change of sinter filters
4	Silencer	Key 4 receipts change of silencer
5	Valves	Key 5 receipts change of valves
6	Oil filter	Key 6 receipts oil filter
(M680)	Return : #	Key # leads back to “Main Menu”

Display confirms any reset of "Hours remaining" with the following message:

Confirm Maintenance		
	Operation Hours Meter Set	
9	Close	Key 9 leads back to submenu “Hours remaining”
(M680)	Return : #	Key # leads back to “Main Menu”

Operation Mode (M700)

Pushing key 7 in the Selection Menu leads to the menu "Operation Mode".

Activated modes are always displayed in bolt letters (above example: **Semi-Automatic**).

Further settings can be made in the Settings Menu (M300).

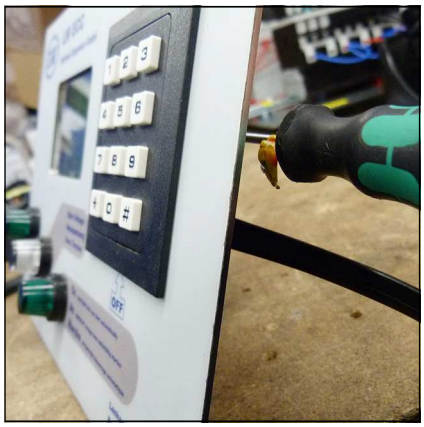
	Betriebsart:	
2	Automatic	Key 2 activates automatic mode
3	**Semi-Automatic**	Key 3 activates semi-automatic mode
4	bar /mpa	Key 4 selects between bar and MPa (optional)
5	Sprache	Key 5 leads to the "Language Menu"
9	Close	Key 9 leads back to submenu „Selection“
(M700)	Return : #	Key # leads back to “Main Menu”

Language Menu (M750)

	Language Menu	
2	German	
3	English	
4	French	
5	Spanish	
6	Dutch	
7	Language II	Key 7 optional language (e.g. Chinese)
(M750)	Return : #	Key # leads back to “Main Menu”

Adjusting Display Backlight

The brightness of the display can be adjusted with an adjusting screw on the back of the control.



Adjust brightness

Software Update

Software updates can only be carried out by L&W. To carry out an update, the device has to be send to the L&W service.

Adjust brightness

Best.-Nr. / Order No.	Benennung	Description
002141	1. Stufe Druckaufnehmer 0-10 bar	1st stage pressure sensor 0-10 bar
002142	2. Stufe Druckaufnehmer 0-60 bar	2nd stage pressure sensor 0-60 bar
002143	Endstufe Druckaufnehmer 0-400 bar	Final stage pressure sensor 0-400 bar
006890	Druckaufnehmer 420 bar Version 0-600 bar	Pressure sensor 420 bar version 0-600 bar
004840	Öldruckaufnehmer 0-6 bar	Oil pressure sensor 0-6 bar
006912	Öltemperatursensor	Oil temperature sensor
003501	Zylinderkopf - Temperatursensor	Cylinderhead temperature sensor

002141 / 002142 / 002143 / 004840
Druckaufnehmer / Pressure sensor

006890 - Druckaufnehmer 420 bar /
Pressure sensor 420 bar

006912 - Öltemperatursensor
Oil temperature sensor

003501 - Zylinderkopf - Temperatursensor
Cylinderhead temperature sensor

Manufacturer in terms of 97/23/EC

The full name and address of the manufacturer is:

Lenhardt & Wagner GmbH

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68623 Hüttenfeld / Germany

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www.uebler.net

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DETAILANSICHTEN / DETAILED VIEWS

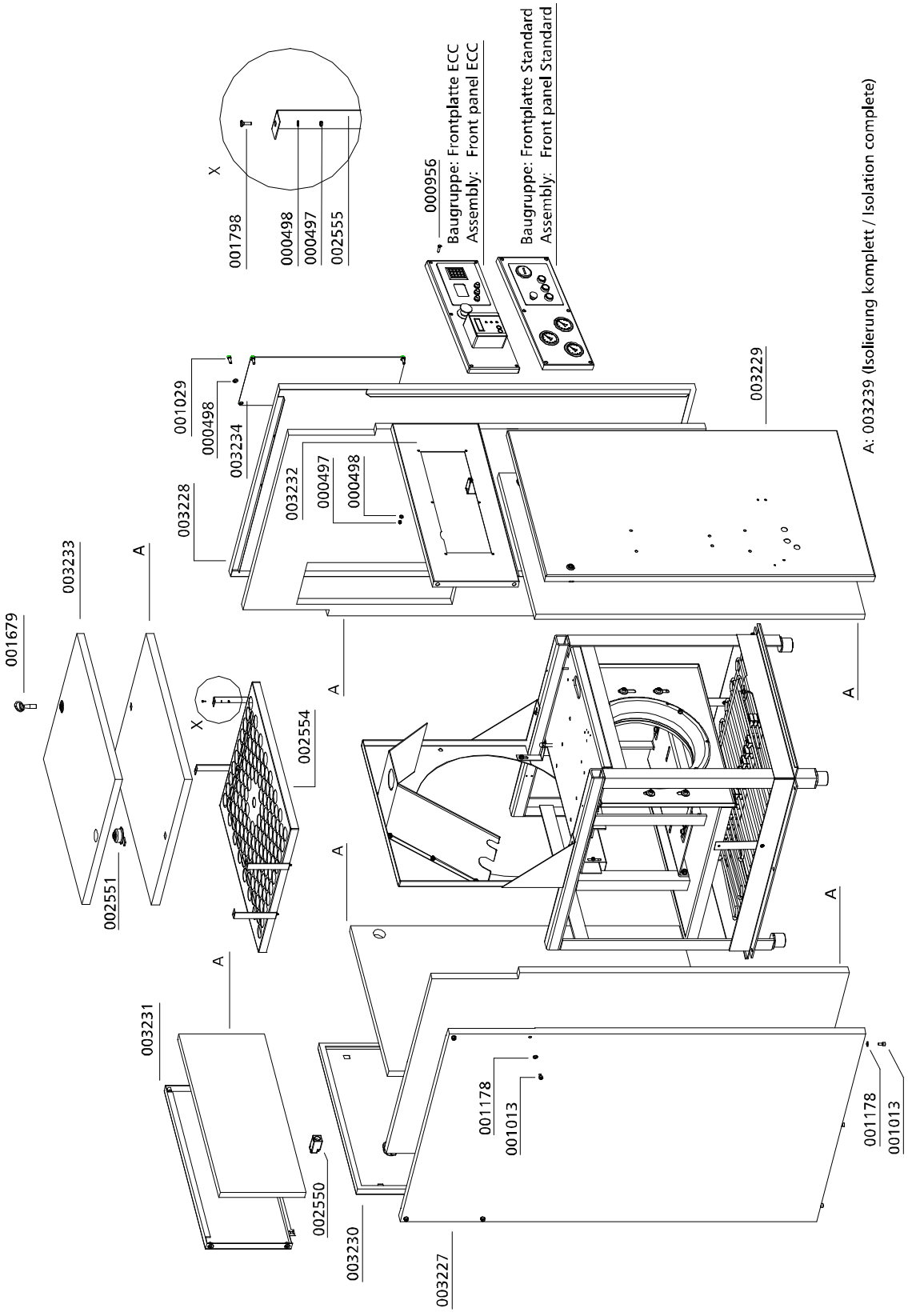
C

Inhaltsverzeichnis

Baugruppe: Gehäuse / Assembly: Housing

Best.-Nr. / Order No.	Benennung	Description
000497	Mutter DIN 934 M6	Nut DIN 934 M6
000498	U-Scheibe DIN 125 A6	Washer DIN 125 A6
000956	Linsenkopfschraube M6X35mm, NB601, 8.8	Rounded Head Screw M6X35mm, NB601, 8.8
001013	Zylinderschraube M6x45mm DIN912 8.8 ZN	Allen Bolt M6x45mm DIN912 8.8 ZN
001029	Zylinderschraube M6x20mm DIN912 8.8 ZN	Allen Bolt M6x20mm DIN912 8.8 ZN
001178	U-Scheibe A6 DIN 902 ZN	Washer A6 DIN 902 ZN
001679	Schlüssel für Vorreiber ES 001678	Key for Lock assembly 001678
001798	Senkschraube M6X16mmlg, DIN7991 ZN	Counter Sunk Screw M6X16mm lg, DIN7991 ZN
002550	Türschalter Sicherheitsschalter	Door switch, safety switch
002551	Vorreiber komplett	Housing Lock (ES Models)
002554	Oberer Zwischenboden, verzinkt	Upper intermediate floor, zinc-plated
002555	Haltewinkel für oberen Zwischenboden	Bracket for upper inter. floor
003227	Seitenteil rechts	Panel right-hand
003228	Seitenteil links	Panel left-hand
003229	Tür vorne	Front Door
003230	Tür hinten	Rear Door
003231	Abdeckung hinten	Rear Cover
003232	Rahmen Bedienpanel	Frame Control Panel
003233	Deckel oben	Top Cover
003234	Wartungsdeckel	Service Cover
003239	Isolierung komplett	Isolation complete

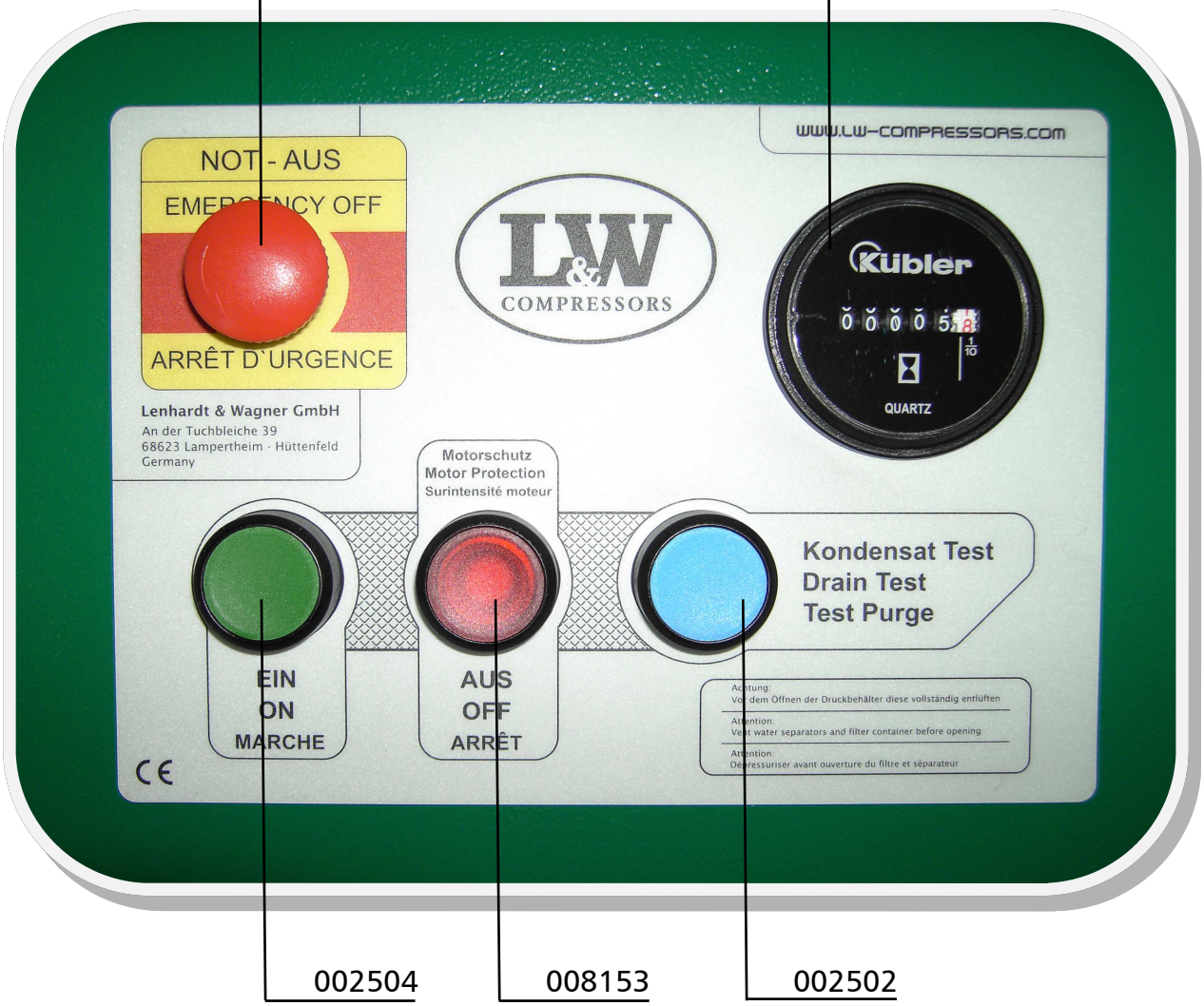
Baugruppe: Gehäuse / Assembly: Housing



Baugruppe: Schalttafel / Control Board

Best.-Nr. / Order No.	Benennung	Description
002089	Betriebsstunderzähler 230V	Hour Counter 230V
002502	Taster blau (komplett inkl. Halterung und Schließer)	Blue button (complete with braket and closing contact)
002504	Taster grün (komplett inkl. Halterung und Schließer)	Green button (complete with braket and closing contact)
003121	Not-Halt Schalter	Emergency switch
008153	Taster rot (komplett inkl. Halterung, Schließer und LED)	Red button (complete with braket, closing contact and LED)

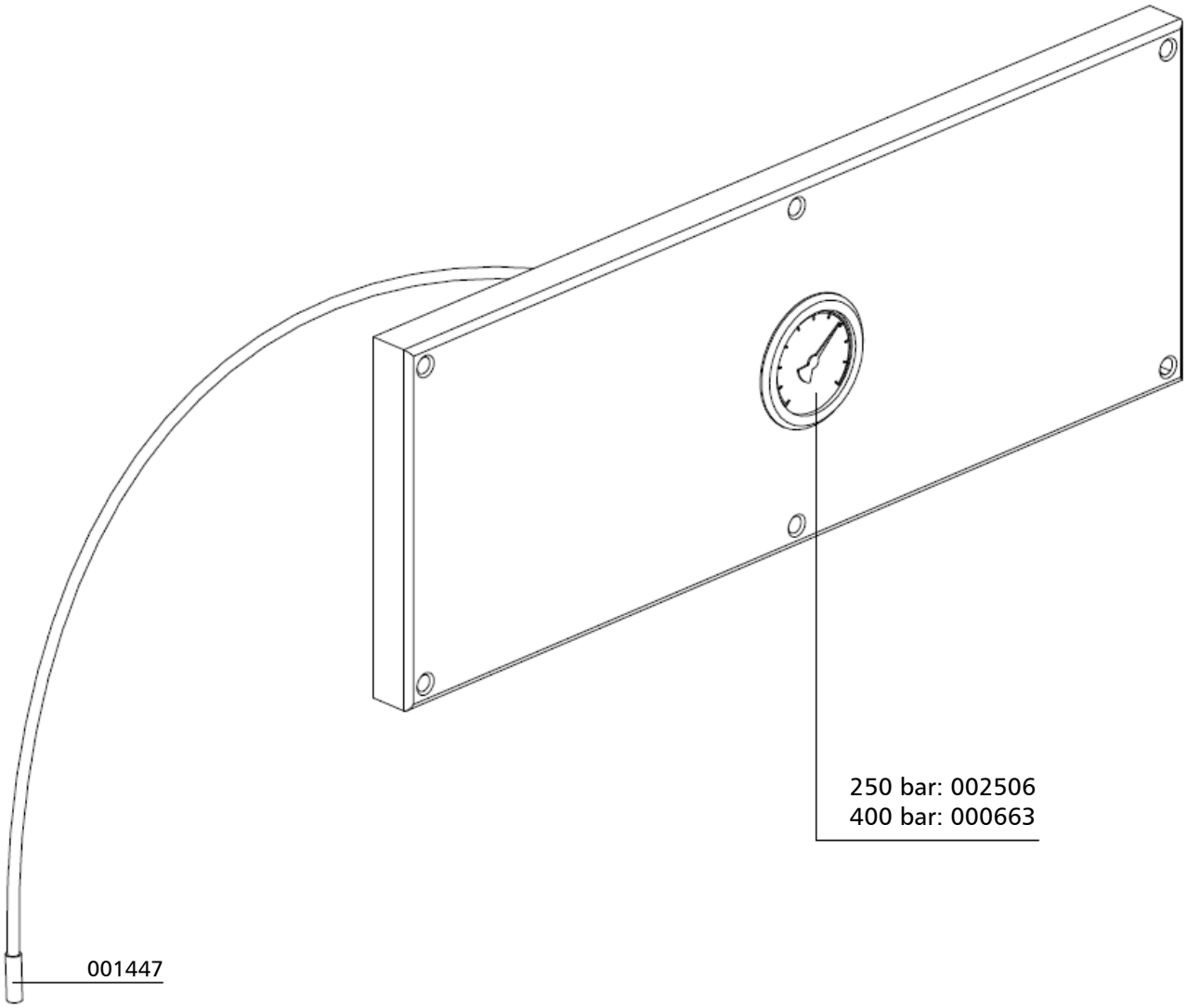
Baugruppe: Schalttafel / Control Board



Baugruppe: Fülldruckmanometer & Schlauch / Filling Pressure Gauge & Hose

Best.-Nr. / Order No.	Benennung	Description
000663	Manometer 0-400 bar	Pressure Gauge 0-400 bar
001447	Hochdruckschlauch 800mm	High Pressure Hose 800mm
002506	Manometer 0-250 bar	Pressure Gauge 0-250 bar

Baugruppe: Fülldruckmanometer & Schlauch / Filling Pressure Gauge & Hose



Baugruppe: Kompressorblock / Assembly: Compressor Block

Best.-Nr. / Order No.	Benennung	Description
000180	Ölschlauchstutzen	Oil hose clip
000209	Öleinfüllstopfen	Oil Filler Plug
000220	Sicherheitsventil G3/8", 8bar	Safety valve G3/8", 8bar
000225	Sicherheitsventil G3/8", 50bar	Safety valve G3/8", 50bar
000239	Kugellager 450/570, 6308 C3	Ball Bearing 6308 C3
000240	Dichtung Zylinderflansch / Block	Paper Gasket Cylinder Flange
000241	Dichtung Lagerflansch	Gasket bearing flange
000243	Lagerring	Bearing bush
000244	Wellendichtung 40x72x10mm	Shaft Seal 40x72x10mm
000250	CU-Ring Ø6,2 x 10 x 1,5mm DIN7603A	Copper Washer Ø6,2 x 10 x 1,5mm DIN7603A
000253	Untere Ventildichtung 2.Stufe	Lower valve gasket 2nd stage
000254	Obere Ventildichtung 2.Stufe	Upper valve gasket 2nd stage
000257	Obere Ventildichtung 1.Stufe	Upper valve gasket 1st stage
000258	Untere Ventildichtung 1.Stufe, Kupfer	Lower valve gasket 1st stage, copper
000270	Ventilkopf 2.Stufe	Valve head 2nd stage
000271	Ventilkopf 1.Stufe	Valve head 1st stage
000273	Lagerdeckel	Main Bearing Flange
000274	Zylinder Æ42mm	Cylinder Æ42mm
000344	Führungszylinder Ø50mm	Guide Cylinder Ø50mm
000711	Verschraubung GE 06L R1/8"	Connection GE 06L R1/8"
000738	Verschraubung GE 08 PLR 1/4"	Connection GE 08 PLR 1/4"
000761	Verschraubung WE 08 PLR CFX 1/4"	Elbow Connection WE 08 PLR CFX 1/4"
000765	Schneidring 8mm PSR 08 LX	Olive Seal PSR 08 LX
000767	Mutter 08 S M16x1,5 IG	Union Nut 08 S M16x1,5 IG
000818	Verschraubung GE 15L R1/2"	Connection GE 15L R1/2"
000863	Verschraubung WE 18L R A3C	Elbow Connection WE 18L R A3C
000919	Reduzierung RI3/4X1/2CFX	Reducer RI3/4X1/2CFX
000951	Sechskantschraube M6x16 DIN 933 8.8	Hexagon screw M6x16 DIN 933 8.8
000961	Stiftschraube M8x25mm DIN939	Threaded Stud M8x25mm DIN939
001056	Zylinderschraube M8x60 DIN 912 8.8 ZN	Allen bolt M8x60 DIN 912 8.8 ZN

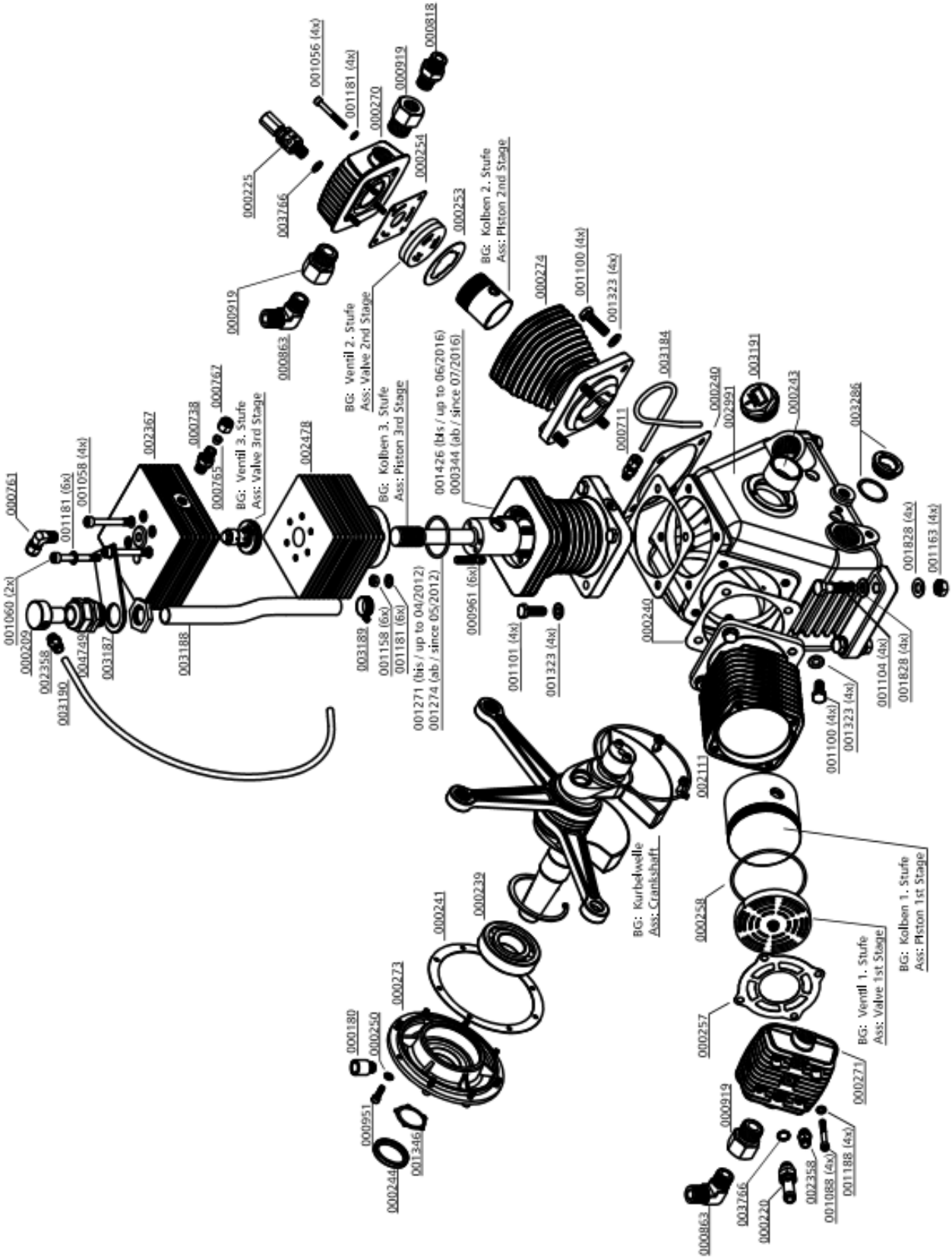
Baugruppe: Kompressorblock / Assembly: Compressor Block

Best.-Nr. / Order No.	Benennung	Description
001058	Zylinderschraube M8x70 DIN 912 8.8 ZN	Allen bolt M8x70 DIN 912 8.8 ZN
001060	Zylinderschraube M8x80 DIN 912 8.8 ZN	Allen bolt M8x80 DIN 912 8.8 ZN
001088	Zylinderschraube M10x60 DIN 912 8.8 ZN	Allen bolt M10x60 DIN 912 8.8 ZN
001100	Sechskantschraube M10x25 DIN 933 8.8 ZN	Hexagon screw M10x25 DIN 933 8.8 ZN
001101	Sechskantschraube M10x35 DIN933 8.8 ZN	Hexagon Screw M10x35 DIN933 8.8 ZN
001104	Sechskantschraube M10x50 DIN933 8.8 ZN	Hexagon screw M10x50 DIN933 8.8 ZN
001158	Mutter M8 DIN 934 ZN	Nut M8 DIN 934 ZN
001163	Mutter M10 DIN 934 ZN	Nut M10 DIN 934 ZN
001181	U-Scheibe A8 DIN 125 ZN	Washer A8 DIN 125 ZN
001188	U-Scheibe A10 DIN 125 ZN	Washer A10 DIN 125 ZN
001271	O-Ring 47x2,5 NBR 70, bis 04/2012	O-Ring 47x2.5 NBR 70, up to 04/2012
001274	O-Ring 50 x 2,5 NBR70, ab 05/2012	O-Ring 50 x 2,5 NBR70, since 05/2012
001323	Kupferring Ø10x16x2 DIN7603A	Copper seal ring Ø10x16x2 DIN7603A
001346	Sicherungsring, A40 DIN471	Circlip, A40 DIN471
001426	Führungszylinder Ø42mm	Guide Cylinder Ø42mm
001828	U-Scheibe A10 DIN 6340 ZN	Washer A10 DIN6340 ZN
002111	Zylinder Æ95, 1.Stufe	Cylinder 1st stage
002358	Schnellkupplung gerade G1/8"- 6mm	Quick Release Coupling G1/8"- 6mm
002367	Ventilkopf 3.Stufe	Valve head 3rd stage
002478	Zylinder 3.Stufe, Æ18	Cylinder 3rd stage
002991	Kurbelgehäuse mit Bleibronze Lagerbuchse	Bearing sleeve in leaded bronze
003184	Oeldruckleitung kompl.	Oil pressure pipe compl.
003187	Halteblech Öleinfüllschlauch, Aluminium	Bracket oil filter hose, alloy
003188	Öleinfüllschlauch Ø18	Oil filler hose Ø18
003189	Schlauchschelle	Hose Clip
003190	Entlüftungsschlauch	Ventilation Hose
003191	Öleinfüllstopfen	Oil filter plug
003286	Ölschauglas	Oil gauge glass
003766	Aludichtring für G3/8"	Alloy Seal Ring for G3/8"
004749	PG Schlauchdurchführung, PVC	PVC hose c/w connection

Baugruppe: Kompressorblock / Assembly: Compressor Block

Best.-Nr. / Order No.	Benennung	Description
	BG Kurbelwelle	Ass: Crankshaft
	BG: Ventil 1.Stufe	Ass: Valve 1st stage
	BG: Ventil 2.Stufe	ASS: Valve 2nd stage
	BG: Ventil 3.Stufe	ASS: Valve 3rd stage
	BG: Kolben 1.Stufe	Ass: Piston 1st stage
	BG: Kolben 2.Stufe	ASS: Piston 2nd stage
	BG: Kolben 3.Stufe	ASS: Piston 3rd stage

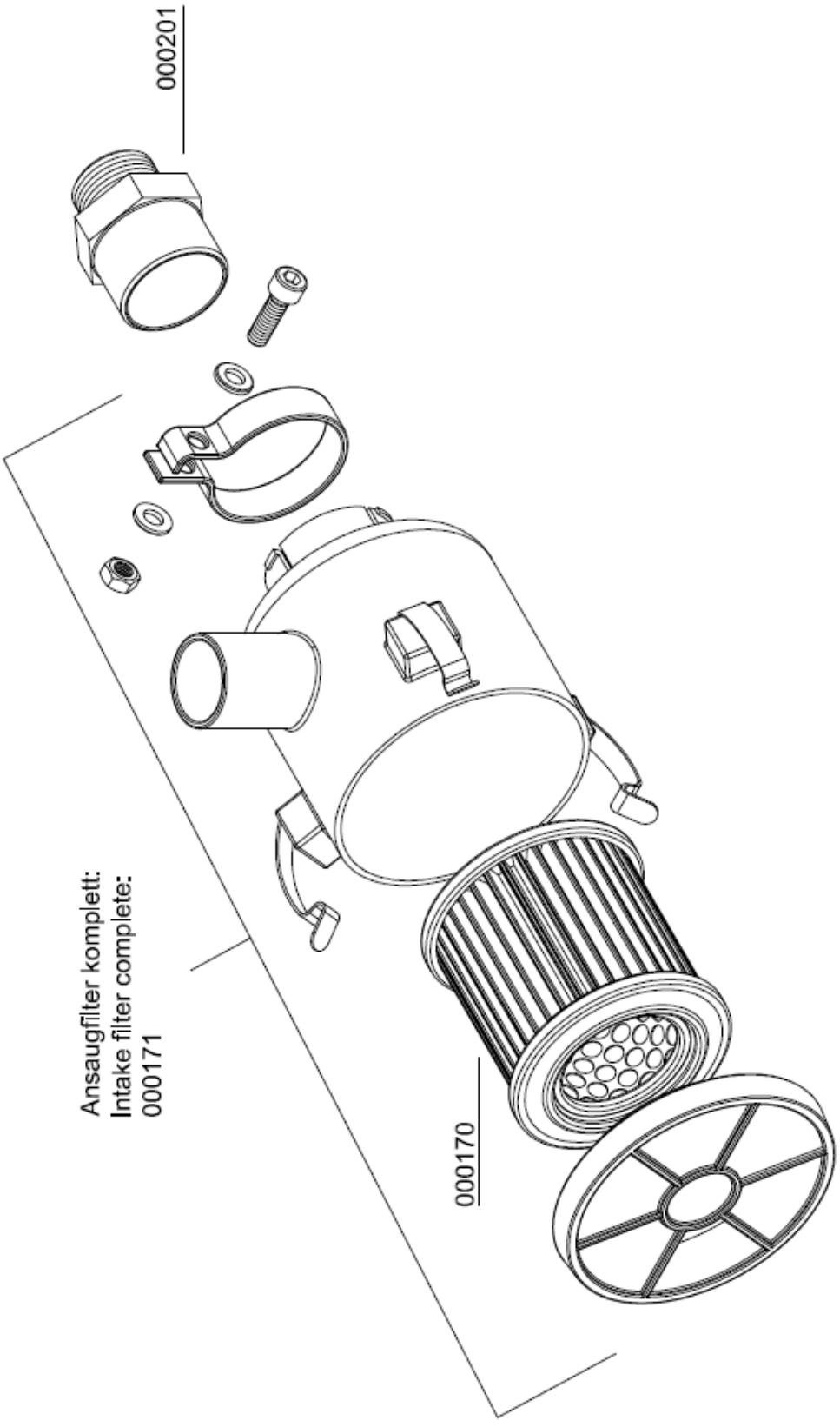
Baugruppe: Kompressorblock / Assembly: Compressor Block



Baugruppe: Ansaugfilter / Intake Filter

Best.-Nr. / Order No.	Benennung	Description
000170	Ansaugfilterpatrone	Air Intake Filter Cartridge
000171	Ansaugfiltergehäuse inkl. Patrone, kompl	Int. Filter Housing c/w filter
000201	Einschraubadapter Ansaugfilter	Adapter Inlet Filter Housing

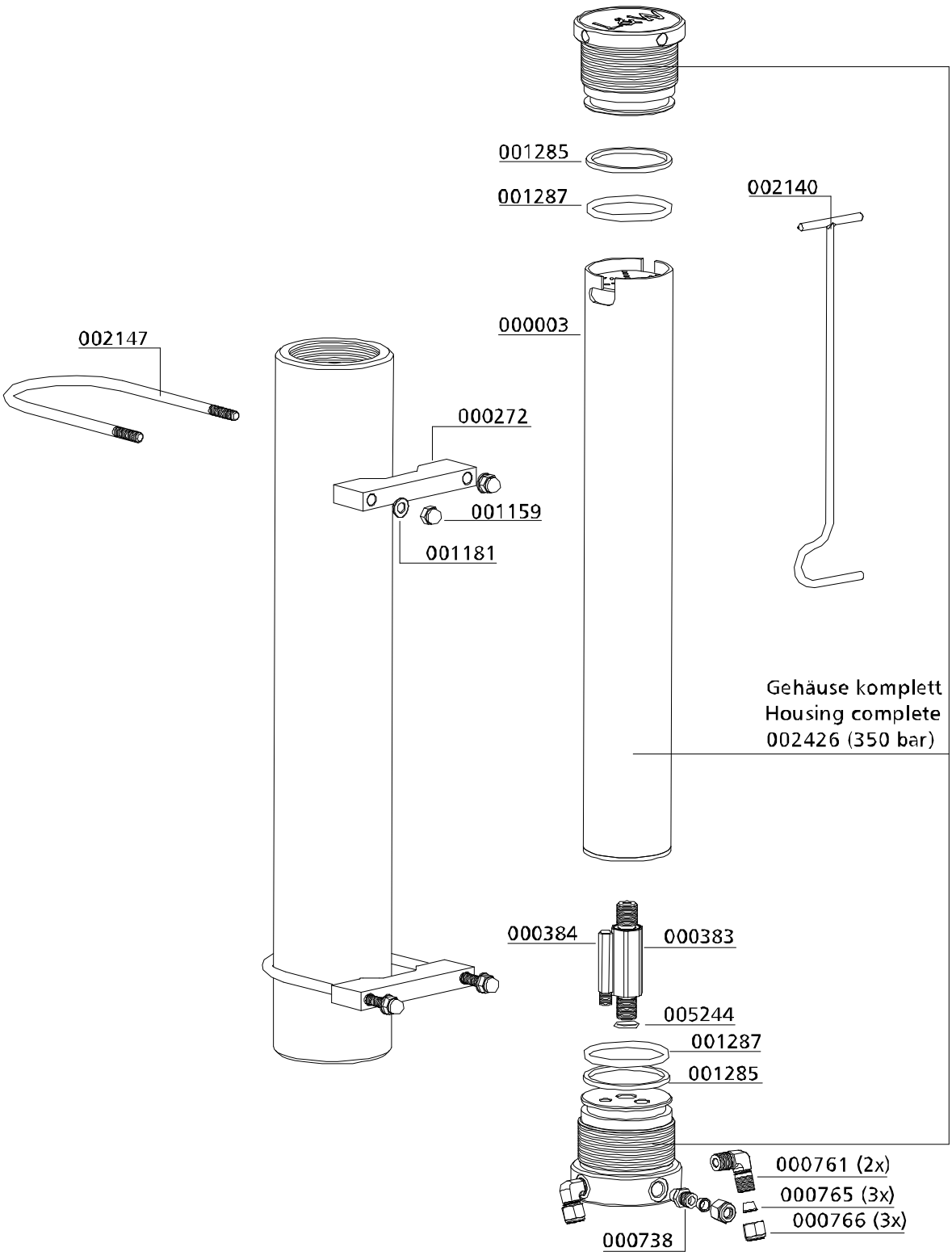
Baugruppe: Ansaugfilter / Intake Filter



Filtergehäuse 2,3l / Filter Housing 2.3ltr

Best.-Nr. / Order No.	Benennung	Description
000003	Filterpatrone 2,3l	Filter Cartridge 2.3ltr BA
000272	Abstandshalter für Filtergehäuse	Spacer Bracket for Filtertower
000383	Messing Adapter für Filterpatrone	Brass Filter Adapter
000384	Düse Filtergehäuse	Jet Filter Housing
000738	Verschraubung GE 08 PLR 1/4"	Connection GE 08 PLR 1/4"
000761	Verschraubung WE 08 PLR CFX 1/4"	Elbow Connection WE 08 PLR CFX 1/4"
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter M08LCFX	Union Nut M08LCFX
001159	StoppmutterM8 DIN985 ZN	Lock Nut M8 DIN985 ZN
001181	U-Scheibe A8 DIN125 ZN	Washer A8 DIN125 ZN
001285	Stützring, Filtergehäuse	Back-up Ring Filter Housing
001287	O-Ring, Filtergehäuse	O-Ring filter housing
002140	Filterschlüssel 1,7 & 2,3 Liter Behälter	Filter tool 1,7 & 2,3 Litre
002147	Haltebügel für Filtergehäuse, beidseitig M8X35mm	Holder for filter housing, M8X35mm (both sides)
002426	Filtergehäuse, 2,3l	Filter housing 2.3ltr
005244	O-Ring	O-Ring

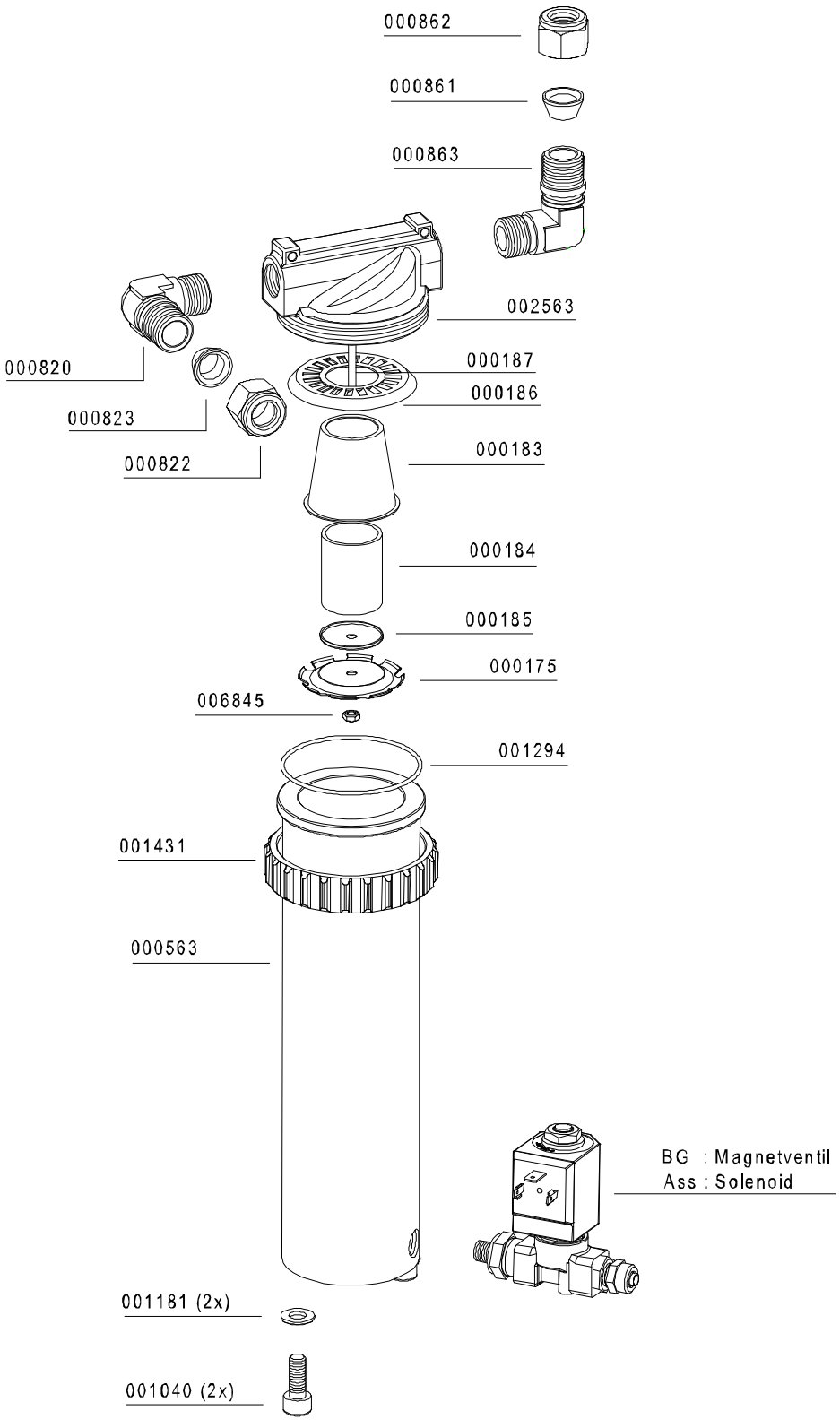
Filtergehäuse 2,3l / Filter Housing 2.3 ltr



Öl- / Wasserabscheider 1. Stufe / Oil- / Water Separator 1st Stage

Best.-Nr. / Order No.	Benennung	Description
000175	Deckel, Wasserabscheider	Cover Water Separator
000183	Wasserabweiser	Filter Protector
000184	Sinterfilter Wasserabscheider	Sintered Filter, Oil Filter
000185	Halteteller	Plate
000186	Drallscheibe	Twist Disk
000187	Stiftschraube	Threaded Stud
000563	Wasserabscheider - Behälter	Container Water Separator
000820	Verschraubung WE 15L RX	Ellbow Connection
000822	Mutter 15L	Nut 15L
000823	Schneidring PSR 15 LX	Olive Seal 15mm
000861	Schneidring PSR 18 LX	Olive Seal 18mm
000862	Mutter M18L	Nut 18L
000863	Verschraubung WE 18L	Elbow Connection
001040	Zylinderschraube M8x20mm DIN912 8.8 ZN	Allen Screw M8x20mm DIN912 8.8 ZN
001181	U-Scheibe A8 DIN125 ZN	Washer A8
001294	O-Ring 68x3 NBR90	O-Ring 68x3
001431	Befestigungsring Wasserabscheider LW 450	Lock Ring Water Seperator LW 450
002563	Wasserabscheider Oberteil	Water Separator Top
006845	Stoppmutter, Edelstahl, M6 DIN985	Lock Nut, s/s, M6 DIN985

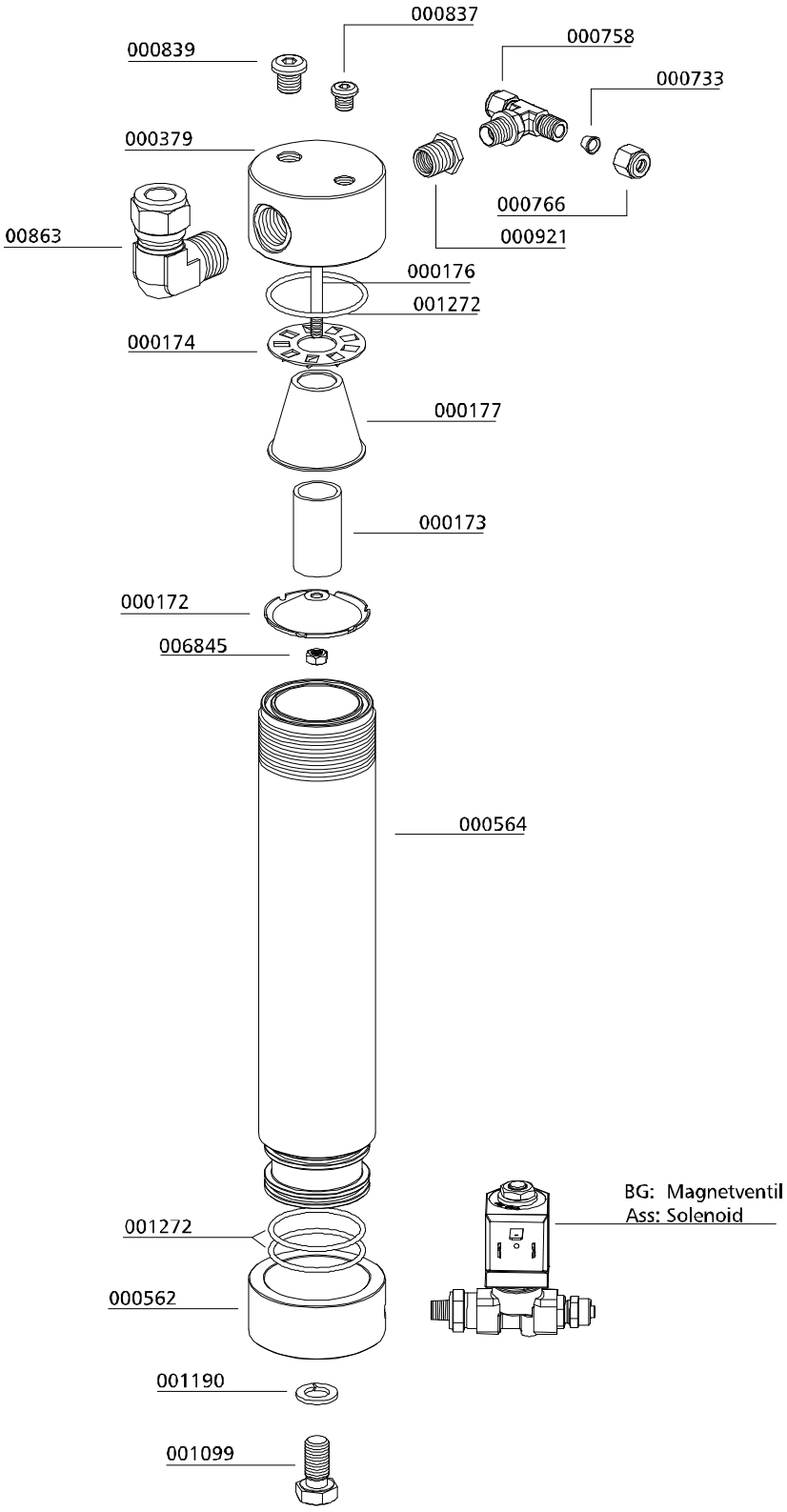
Öl- / Wasserabscheider 1. Stufe / Oil- / Water Separator 1st Stage



Öl- / Wasserabscheider 2. Stufe / Oil- / Water Separator 2nd Stage

Best.-Nr. / Order No.	Benennung	Description
000172	Halteteller Wasserabscheider	Plastc Air Deflector
000173	Sinterfilter Wasserabscheider	Sintered Filter
000174	Drallscheibe, Wasserabscheider	Twist Disk
000176	Stiftschraube, Wasserabscheider	Treaded Stud
000177	Wasserabweiser, Wasserabscheider	Water Deflector, Plastic
000379	Wasserabscheider - Oberteil	Top ap Water Separator
000562	Wasserabscheider - Ring	Ring Water Separator
000564	Wasserabscheider – Behälter 2.Stufe LW450	Container Water Separator
000599	Klemmmutter	Lock nut
000607	Magnetspule	Solenoid coil
000616	Magnetventil komplett	Solenoid comlete
000733	Schneidring SR06	Olive seal SR06
000758	Verschraubung T 1/4" seitlich	T-connection with 1/4" radial
000766	Mutter L08	Nut L08
000837	Verschlussstopfen, VSTI R1/4"ED CFX	Plug
000839	Verschlussstopfen, VSTI R3/8"ED CFX	Plug
000863	Verschraubung	Elbow Connection
000892	Doppelnippel	Double nibble
000921	Reduzierung RI1/2X1/4CFX	Reducer RI1/2X1/4CFX
001099	6-kant Schraube	Hexagon Screw
001190	Federring A10	Spring Washer A10
001272	O-Ring Wasserabscheider 47x3 NBR70	O-Ring 47x3
002356	Schnellkupplung gerade G1/4"- 8 mm	Quick Release Coupling
006845	Stoppmutter, Edelstahl, M6 DIN985	Lock Nut, s/s, M6 DIN985

Öl- / Wasserabscheider 2. Stufe / Oil- / Water Separator 2nd Stage



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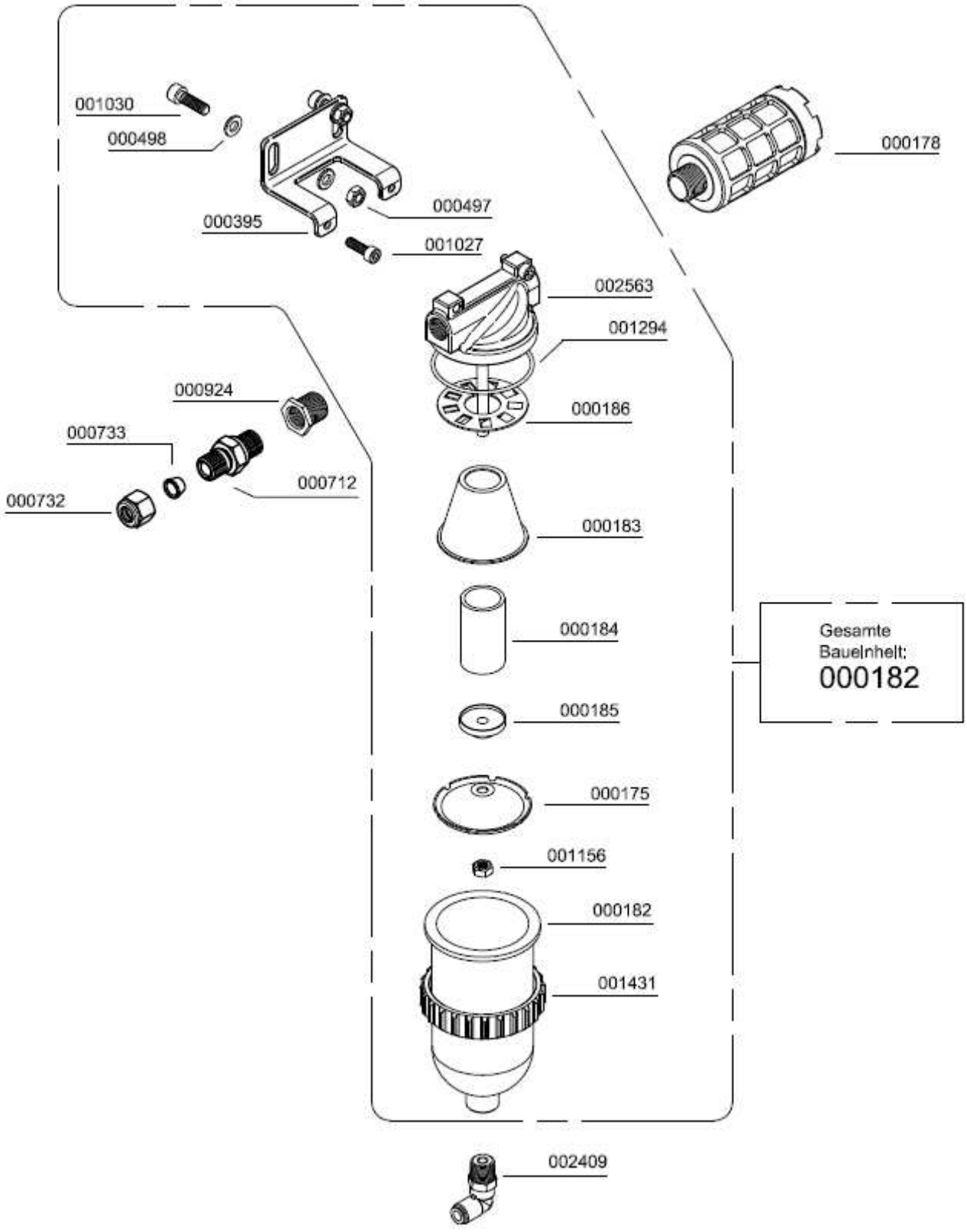
Öl- / Wasserabscheider Endstufe / Oil- / Water Separator Final Stage

Best.-Nr. / Order No.	Benennung	Description
000175	Deckel, Wasserabscheider	Cap
000178	Schalldämpfer G1/2“	Silencer G1/2“
000182	Endstufe Wasserabscheider (PN 15 bar)	Water Separator c/W bracket
000183	Wasserabweiser	Filter Protecor
000184	Sinterfilter Wasserabscheider	Siltered Filter, Oil Filter
000185	Halteteller	Plate
000186	Drallscheibe	Twist Disk
000395	Blechhalter Kondensatabscheider	Bracket water separator
000497	Mutter M6	Nut M6
000498	Unterlegscheibe	Washer A6
000712	Verschraubung	Connection
000732	Mutter 6L	Nut 6L
000733	Schneidring 6mm	Olive Seal 6mm
000921	Reduzierung 1/2"-1/4"	Reducer 1/2"-1/4"
000948	Flachkopfzylinderschraube M6x16mm DIN6912 8.8 ZN	Pan Head Bolt M6x16mm DIN6912 8.8 ZN
001027	Zylinderschraube M6x30	Allen Bolt M6x30
001156	Stoppmutter M6 DIN985 ZN	Lock Nut M6
001294	O-Ring 68x3 NBR90	O-Ring 68x3
001431	Befestigungsring Wasserabscheider LW 450	Lock Ring Water Seperator
002409	Winkelschnellkupplung G1/8"-8mm	Quick release coupling elbow
002466	Kondensatbehälter für Abscheider	Condensate bowl
002563	Wasserabscheider Oberteil PN 15 bar	Water Separator, upper comp. PN15 bar

Öl- / Wasserabscheider Endstufe / Oil- / Water Separator Final Stage



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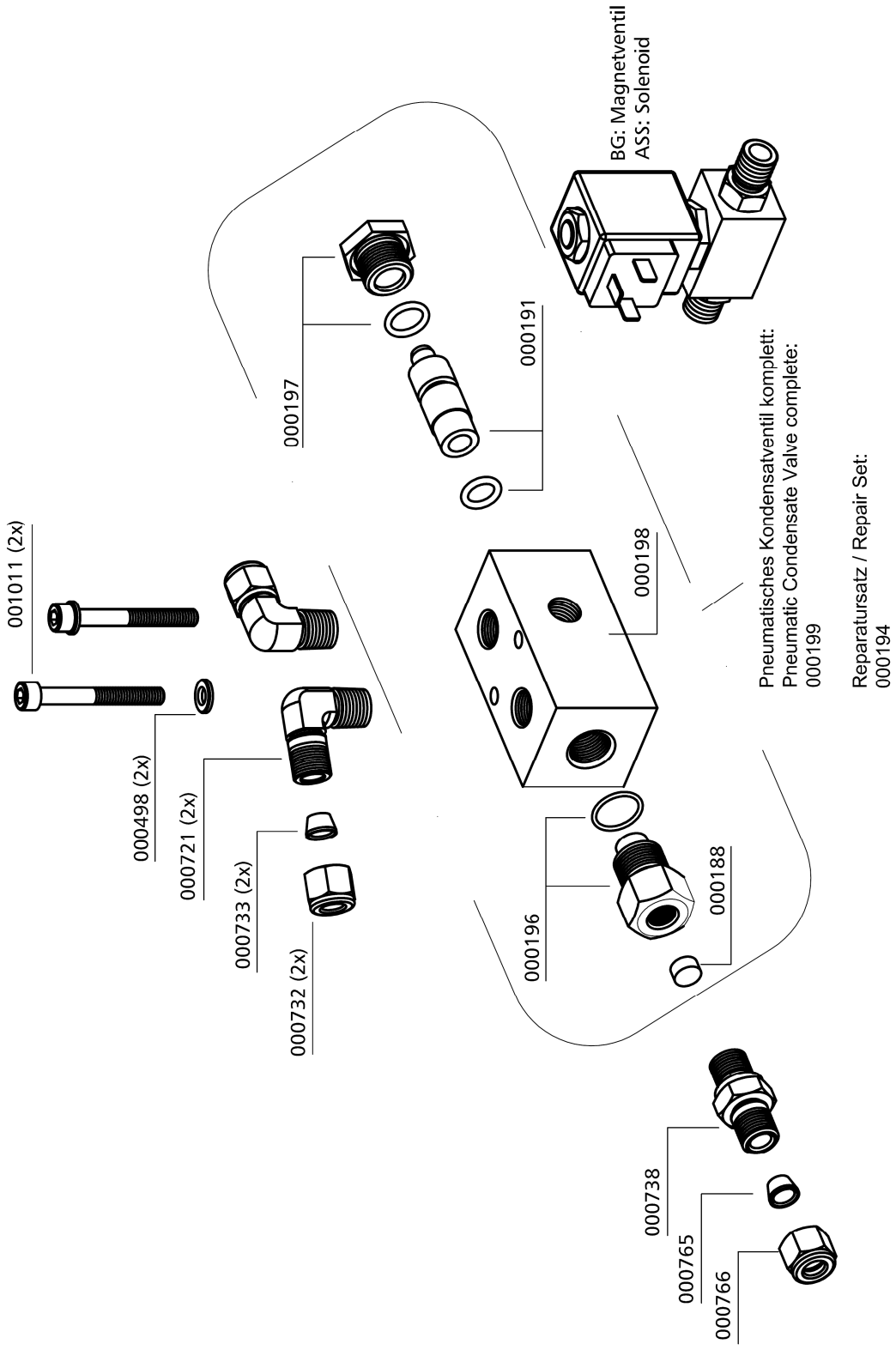
Pneum. Kondensat-Ablassventil / Pneumatic Condensate Valve

Best.-Nr. / Order No.	Benennung	Description
000188	Sinterfilter	Sintered Filter
000191	Steuerkolben, pneum. Kondensatventil	Piston
000194	Reparatursatz pneum. Kondensatventil	Repair Kit Condensate Valve
000196	Düsenschraube, pneum. Kondensatventil	Inlet Jet Screw
000197	Stopfen, pneum. Kondensatventil	Plug
000198	Gehäuse, pneum. Kondensatventil	Body PCV
000199	Pneum. Kondensatventil	Pneumatic Condensate Valve
000498	U-Scheibe DIN 125 A6	Washer DIN 125 A6
000721	Winkelverschraubung 6L	Elbow Connection 6L
000732	Mutter 6L	Union Nut 6L
000733	Schneidring 6mm	Olive Seal 6mm
000738	Verschraubung GE08LRCFX	Connection GE08LRCFX
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter M08LCFX	Union Nut M08LCFX
001011	Zylinderschraube M6x60mm	Allen Bolt M6x60mm

C

Pneum. Kondensat-Ablassventil / Pneumatic Condensate Valve



Druckhalteventil / Pressure Maintaining Valve

Best.-Nr. / Order No.	Benennung	Description
000169	Druckhalterückschlagventil, schwarz	Pressure Maint. Valve black
000498	U-Scheibe DIN 125 A6	Washer DIN 125 A6
000506	Feder	Spring
000508	USIT Ring 13,7 x Ø20 x 1,5	Gasket Ring U-Sit 13,7 x Ø20 x 1,5
000511	Mutter, Druckhalterückschlagventil	Lock Nut PMV
000512	Schraube, Druckhalte-Rückschlagventil	Set Bolt PMV
000513	Druckstück für Druckhalteventil,	Spring Adapter PMV, spring adapter
000514	Stift Druckhalte-/Rückschlagventil	Stud PMV
000515	Gehäuse, Druckhalte-Rückschlagventil	Main Body PMV
000516	Nutring, Druckhalterückschlagventil 5 x 10 x 5/2,5 90° Blau	Seal Ring PMV 5 x 10 x 5/2,5 90° blue
000517	Feder, Druckhalterückschlagventil	Coil Spring PMV
000518	Unterlegscheibe, Messing	Washer, Brass
000519	Dichtkappe, Druckhalte Rückschlagventil, schwarz	Plastic Seal Piston PMV, black
000520	Hohlschraube, DHRV	Inlet Jet PMV
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000767	Mutter 08 S	Union Nut 08 S
001023	Zylinderschraube	Allen Bolt

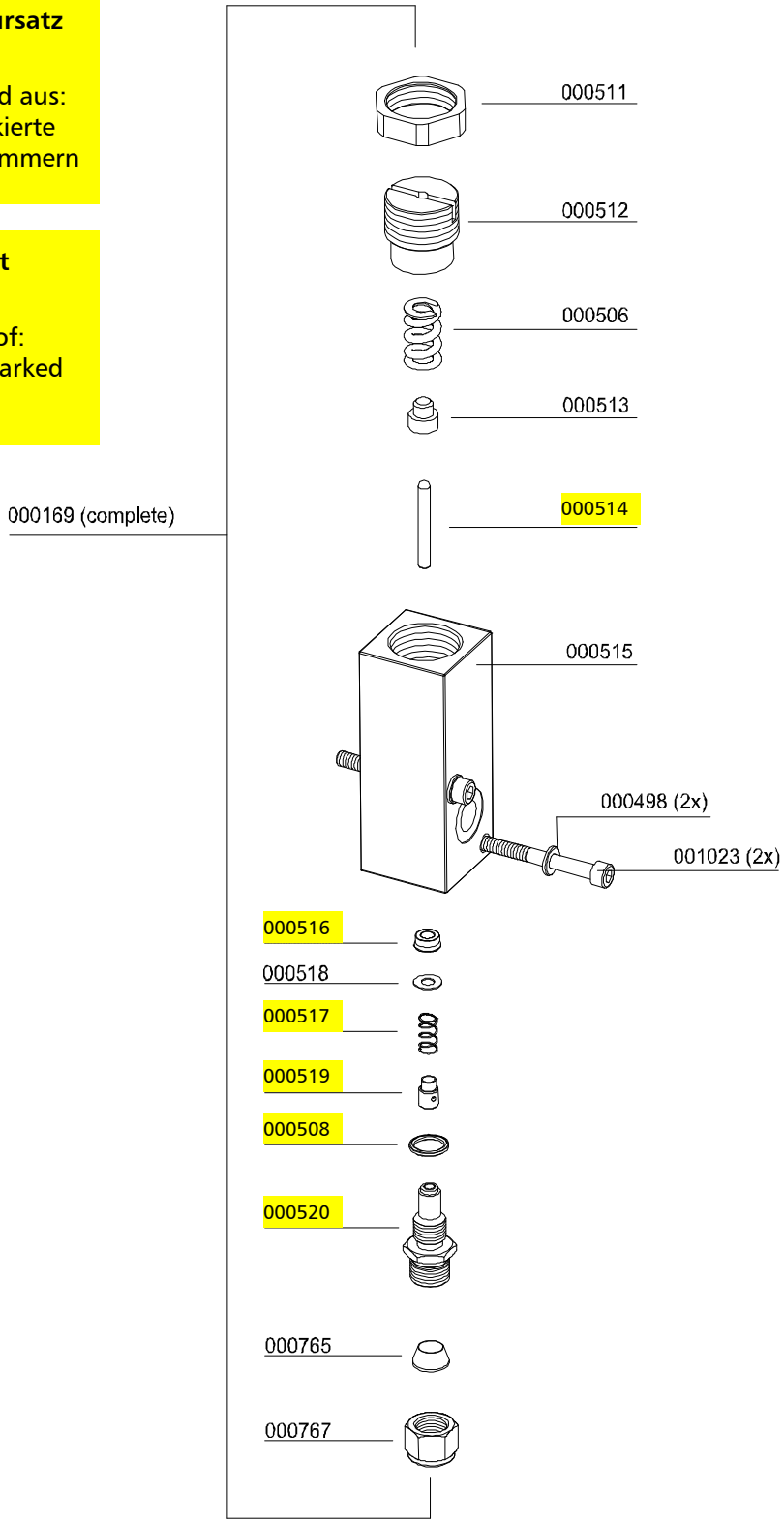
Druckhalteventil / Pressure Maintaining Valve

Reparatursatz 003548:

Bestehend aus: Gelbmarkierte Bestellnummern

Repair kit 003548:

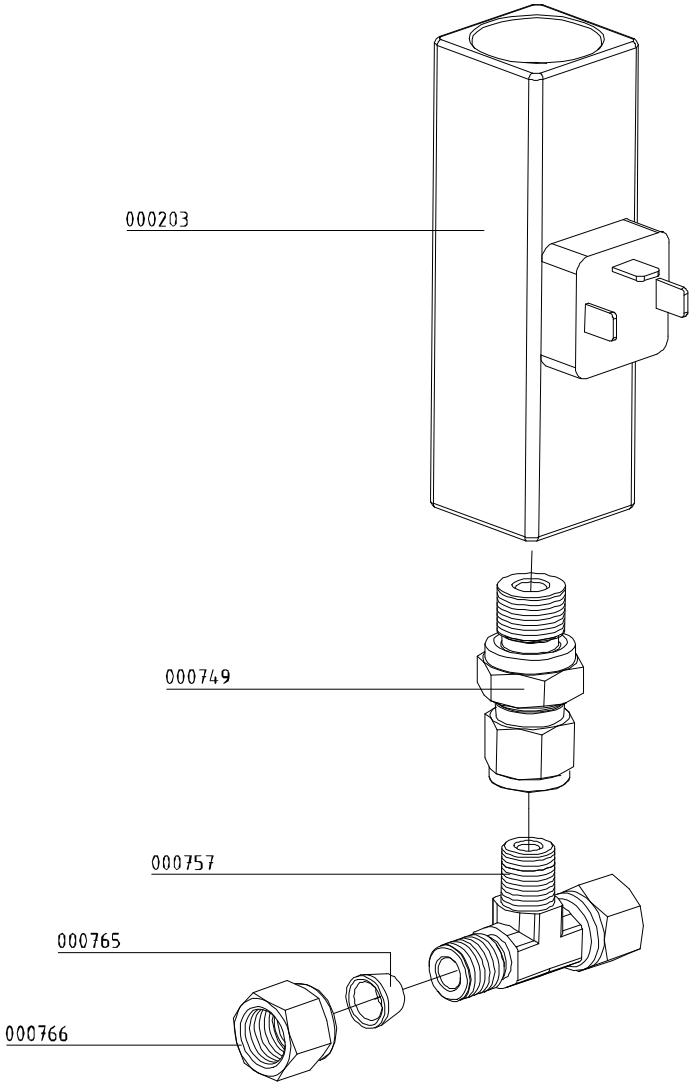
Consists of: Yellow marked P/N´s



Druckschalter / Pressure Switch

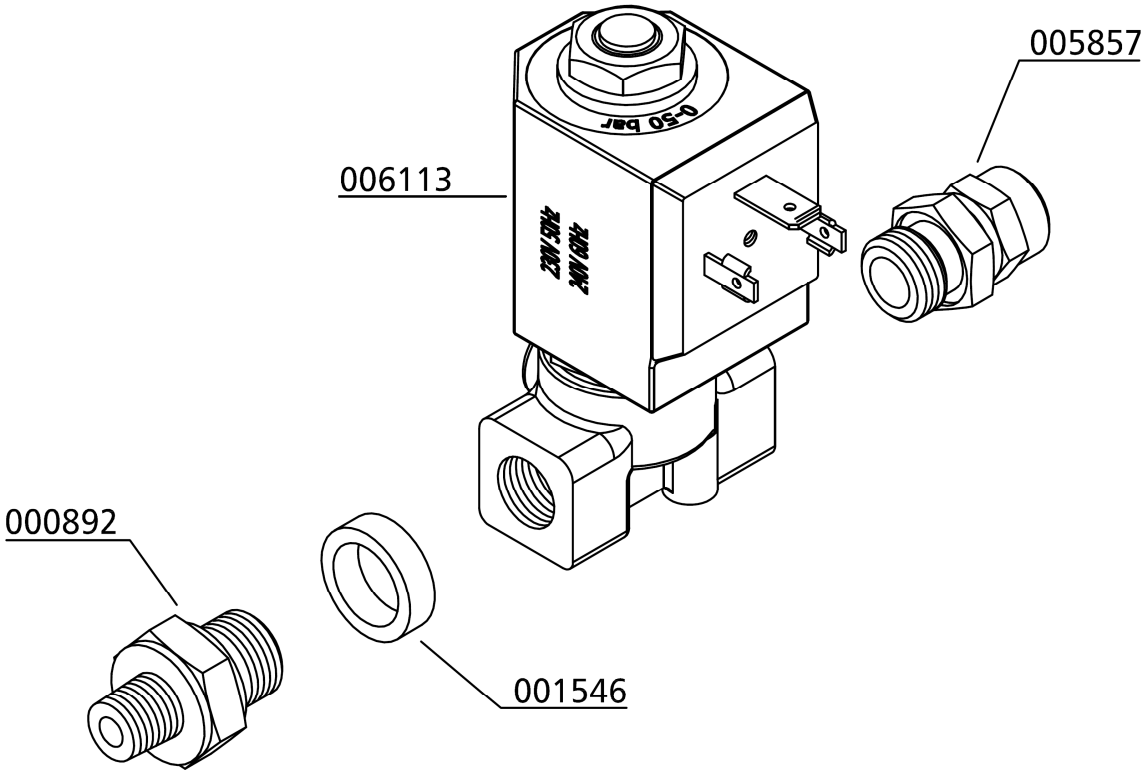
Best.-Nr. / Order No.	Benennung	Description
000203	Druckschalter 50-350 bar	Pressure Switch 50-350 bar
000749	Verschraubung, mit fester Mutter	Connection with fixed nut
000757	T-Verschraubung mit fester Mutter seitl. EL 08 L	T-Connection with fixed nut EL 08 L
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter 08L CFX	Nut 08L CFX

Druckschalter / Pressure Switch



Magnetventile / Solenoid Valves

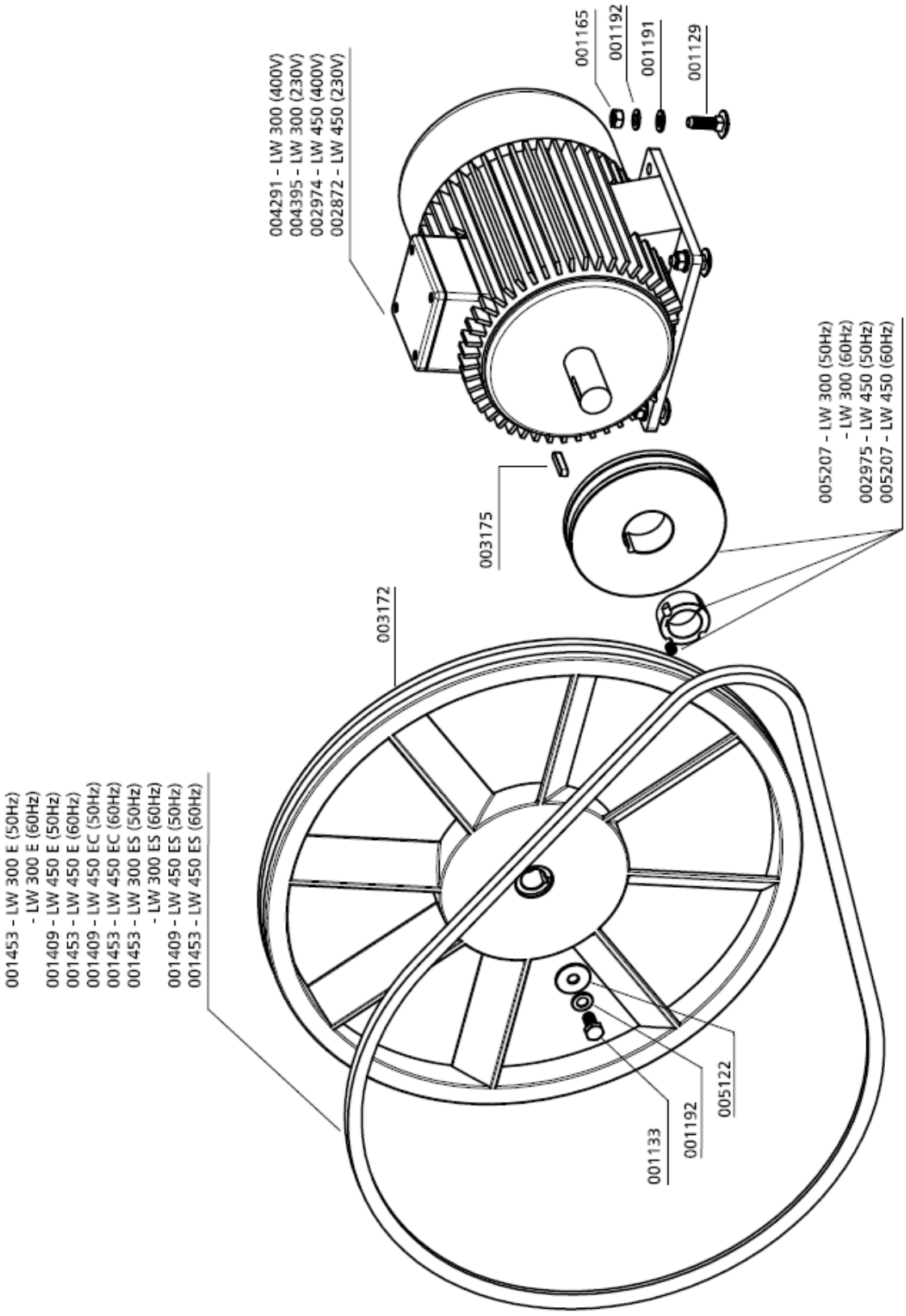
Best.-Nr. / Order No.	Benennung	Description
000892	Doppelnippel 4F3MK4S G1/8"-1/4"	Double Nipple 4F3MK4S G1/8"-1/4"
001546	Aludichtring für Magnetventile G1/4", 18 x 13,2 x 2,5mm	Alloy Seal Ring for solenoid G1/4", 18 x 13,2 x 2,5mm
005857	Gerade Einschraubverschraubung, G1/4" - 8 mm	Straight Hose Connection, G1/4" - 8 mm
006113	Magnetventil 0-55bar, komplett mit Spule	Solenoid 0-55bar, c/w coil



Motor / Motor

Best.-Nr. / Order No.	Benennung	Description
001133	Sechskantschraube	Hexagon Bolt
001165	Mutter M12	Nut M12
001191	U-Scheibe A12	Washer A12
001192	Federring A12	Spring Washer A12
001409	Keilriemen	V-Belt
001453	Keilriemen	V-Belt
002872	Antriebsmotor 11 kW 230 V 50/60 Hz	Drive motor 11kW 230V(50/60Hz)
002974	Antriebsmotor 11 kW / 400V 50/60Hz	Drive Motor 11kW 400V 50/60Hz
002975	Riemenscheibe, kompl. mit Buchse	Pulley, c/w hub
003172	Schwungrad / Lüfterrad	Flywheel
003175	Passfeder (Motor) LW 300/450	Woodruff Key (motor)
004291	Antriebsmotor 7,5 kW / 400 V - 50/60 Hz	Motor 7,5kW, 400V, 50/60Hz
004395	Antriebsmotor 7,5kW / 230V / 50/60 Hz	Motor, 7,5kW, 230V, 50/60 Hz
005122	U-Scheibe Kurbelwelle	Washer, crank shaft
005207	Riemenscheibe, inkl. Spannbuchse	Pulley c/w taper bush

Motor / Motor



C

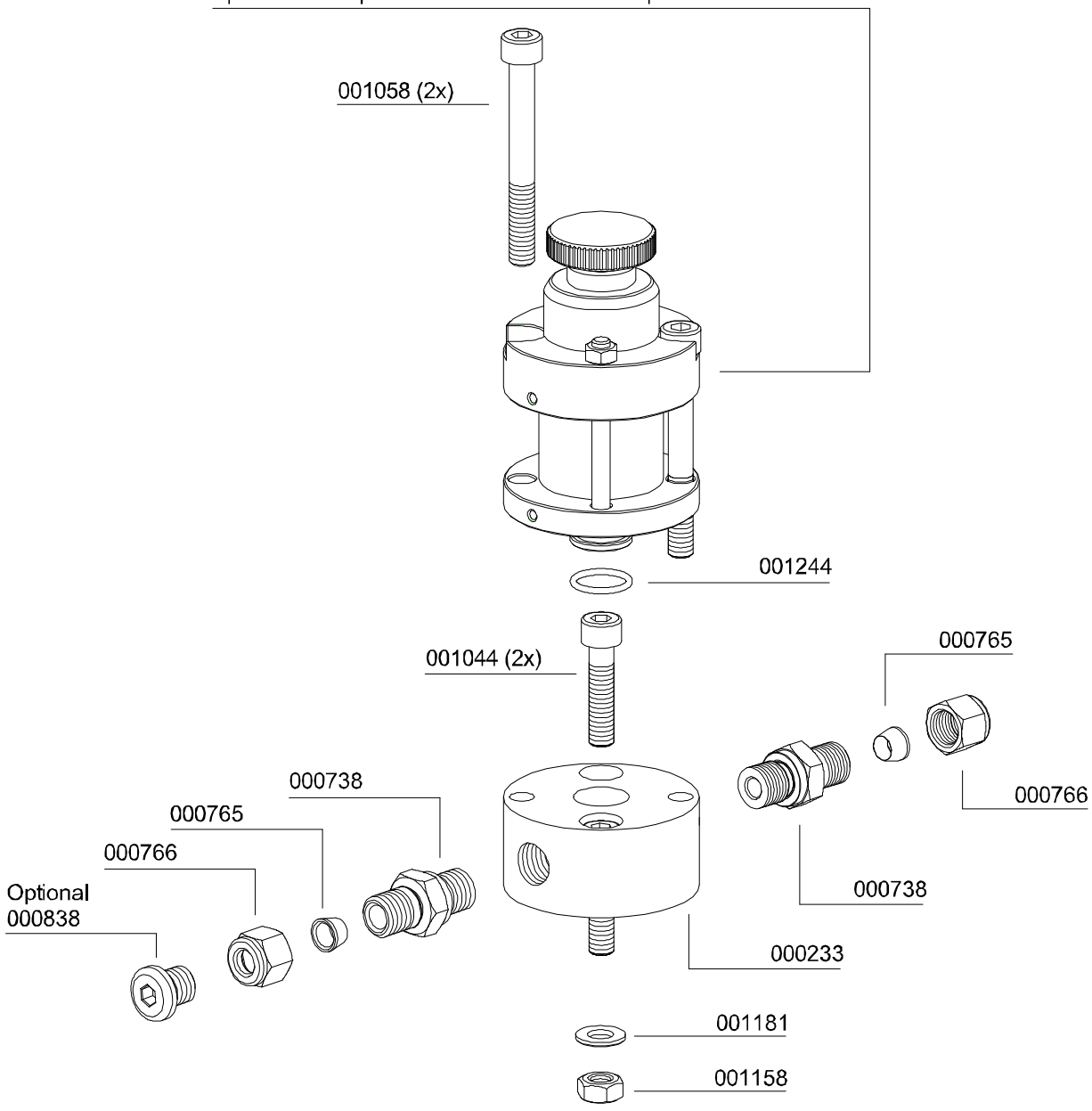
Sicherheitsventil / Safety Valve

Best.-Nr. / Order No.	Benennung	Description
000233	Sockel für Sicherheitsventil mit TÜV, x G1/4“ seitlich 180°	Base for Safety Valve TÜV type
000553	Sicherheitsventil 225bar mit TÜV	Safety Valve 225bar c/w TÜV
000554	Sicherheitsventil 250bar mit TÜV	Safety Valve 250bar c/w TÜV
000555	Sicherheitsventil 300bar mit TÜV	Safety Valve 300bar c/w TÜV
000556	Sicherheitsventil 330bar mit TÜV	Safety Valve 330bar c/w TÜV
000557	Sicherheitsventil 350bar mit TÜV	Safety Valve 350bar c/w TÜV
000738	Verschraubung GE08LRCFX	Connection GE08LRCFX
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter M08LCFX	Nut M08LCFX
000838	Verschlussstopfen VSTIR1/4EDCF	Plug VSTIR1/4EDCF
001044	Zylinderschraube	Allen Bolt
001058	Zylinderschraube	Allen Bolt
001158	Mutter	Nut
001181	U-Scheibe	Washer
001244	O-Ring, Flansch Sicherheitsventil	O-Ring, Flange Safety Valve
001814	Sicherheitsventil 225bar mit CE	Safety Valve 225bar with CE
001815	Sicherheitsventil 250bar mit CE	Safety Valve 250bar with CE
001816	Sicherheitsventil 330bar mit CE	Safety Valve 330bar with CE
001817	Sicherheitsventil 350bar mit CE	Safety Valve 350bar with CE

Sicherheitsventil / Safety Valve

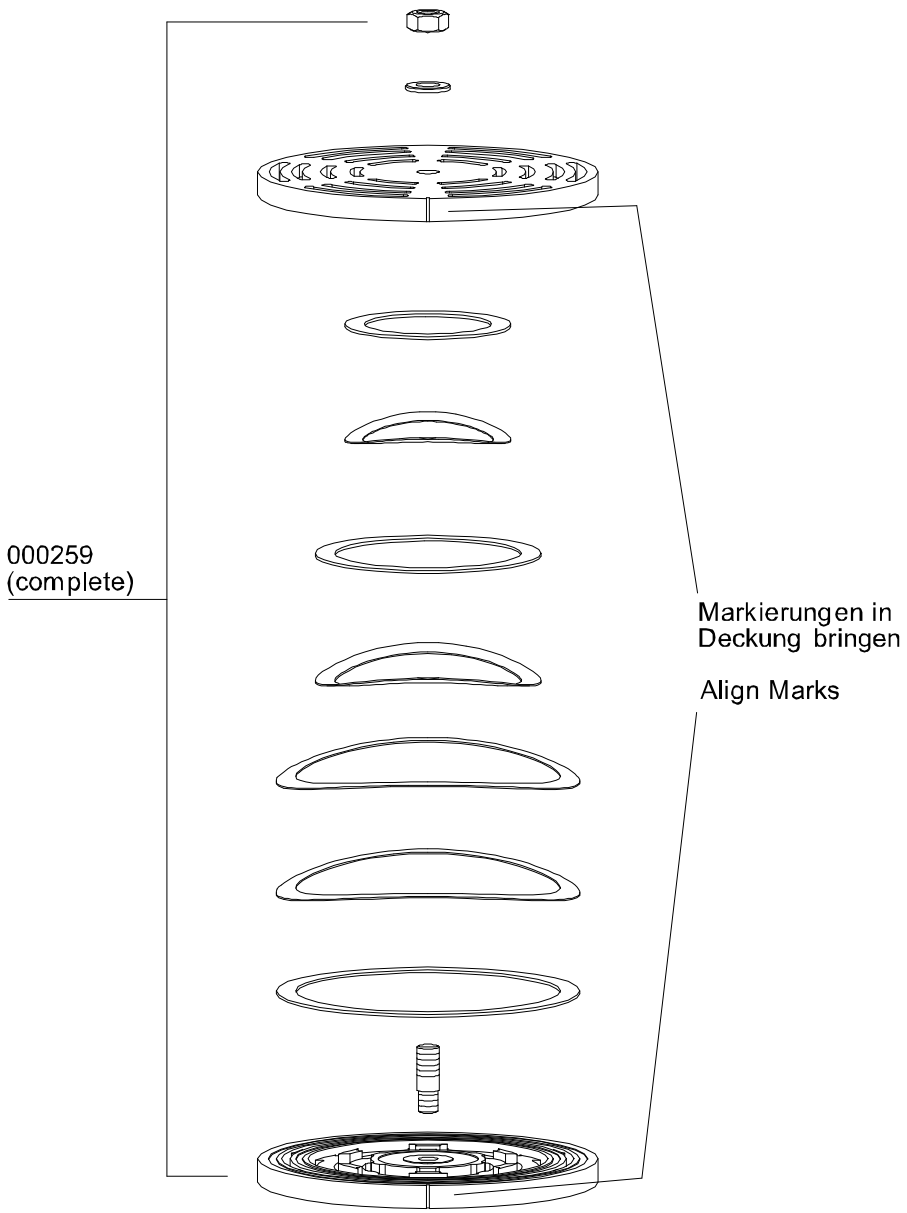
Druck/ Pressure	SV-Ventil mit CE-Prüfung/ Safety Valve with CE	SV-Ventil mit TÜV-Prüfung/ Safety Valve with TÜV
225 bar	001814	000553
250 bar	001815	000554
285/300 bar	--------	000555
330 bar	001816	000556
350 bar	001817	000557

Sonder-Einstelldrücke auf Anfrage! /
Special relieve pressures are available on request!



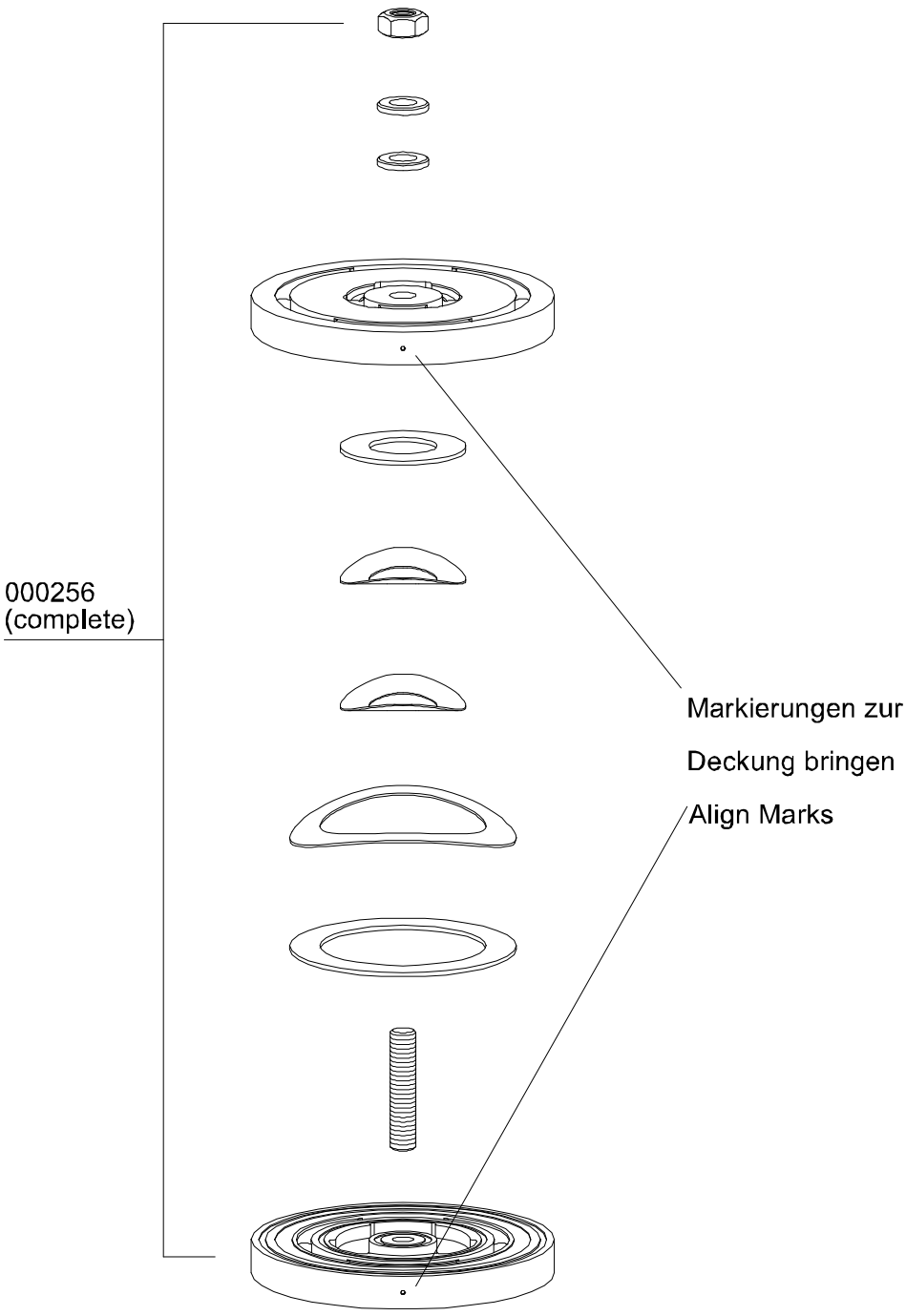
Saug– und Druckventil 1. Stufe / In– and Outlet Valve 1st Stage

Best.-Nr. / Order No.	Benennung	Description
000259	Saug- Druckventil, 1. Stufe	In-&Outlet Valve, 1st Stage



Saug– und Druckventil 2. Stufe / In– and Outlet Valve 2nd Stage

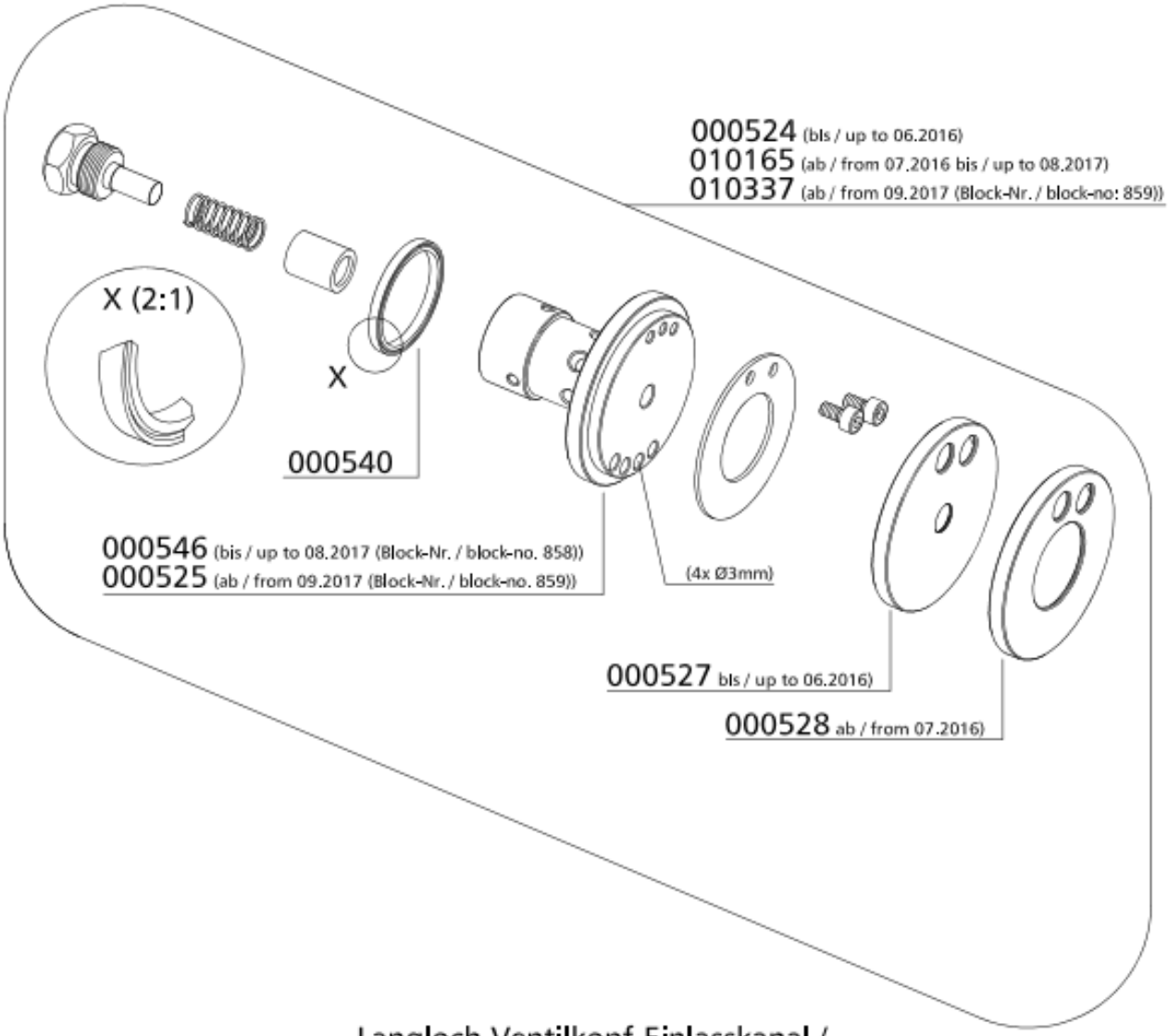
Best.-Nr. / Order No.	Benennung	Description
000256	Saug- und Druckventil 2. Stufe	In- & Outlet Valve comp.2nd Stage

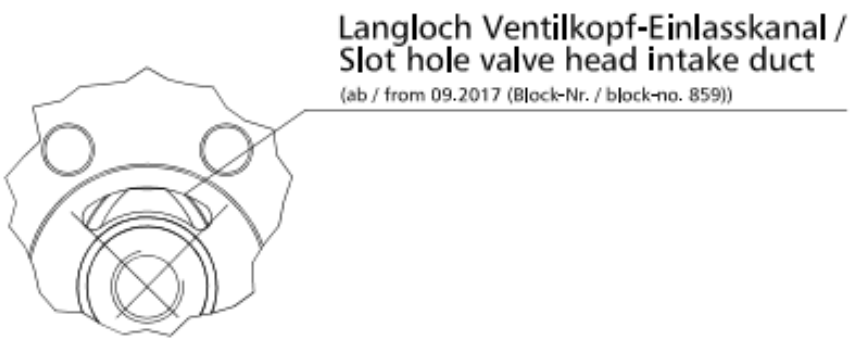


Baugruppe: Ventil 3. Stufe / Assembly: Valve 3rd Stage

Best.-Nr. / Order No.	Benennung	Description
000524	Saug-Druckventil kompl. mit Dichtungen	In-& Outlet Valve c/w gaskets
000525	Saug-Druckventil, ohne Dichtungen, 4 x Ø3,0mm, ab Kompressorblock-Nr. 859	In- & Outlet Valve, without gaskets, 4 x Ø3.0mm, from compressor block no. 859
000527	Ventildichtung, Saug-& Druckventil unten (Ø44/Ø5,5), bis 06.2016	Lower Valve Gasket (Ø44/Ø5,5), up to 06.2016
000528	Ventildichtung, Saug-& Druckventil unten (Ø44/Ø19), ab 07.2016	Lower Valve Gasket (Ø44/Ø19), from 07.2016
000540	Dichtring / Dichtung , Saug- u. Druckventil oben, Alu	Upper Alloy Seal Ring
000546	Saug-Druckventil, ohne Dichtungen, 4 x Ø3,0mm, bis Kompressorblock-Nr. 858	In- & Outlet Valve, without gaskets, 4 x Ø3.0mm, up to compressor block no. 858
010165	Saug-Druckventil kompl. mit Dichtungen, ab 07.2016 bis 08.2017	In-& Outlet Valve c/w gaskets, from 07.2016 up to 08.2017
010337	Saug-Druckventil kompl. mit Dichtungen, ab Kompressorblock-Nr. 859	In-& Outlet Valve c/w gaskets, from compressor block no. 859

Baugruppe: Ventil 3. Stufe / Assembly: Valve 3rd Stage

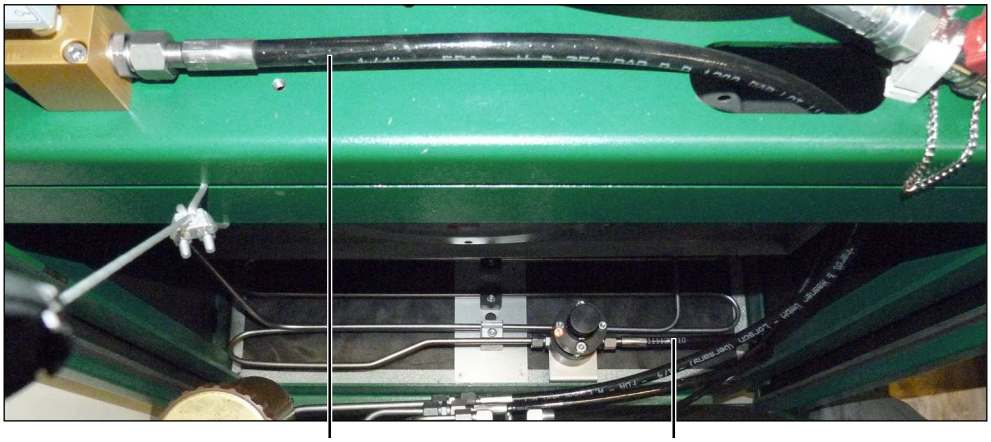


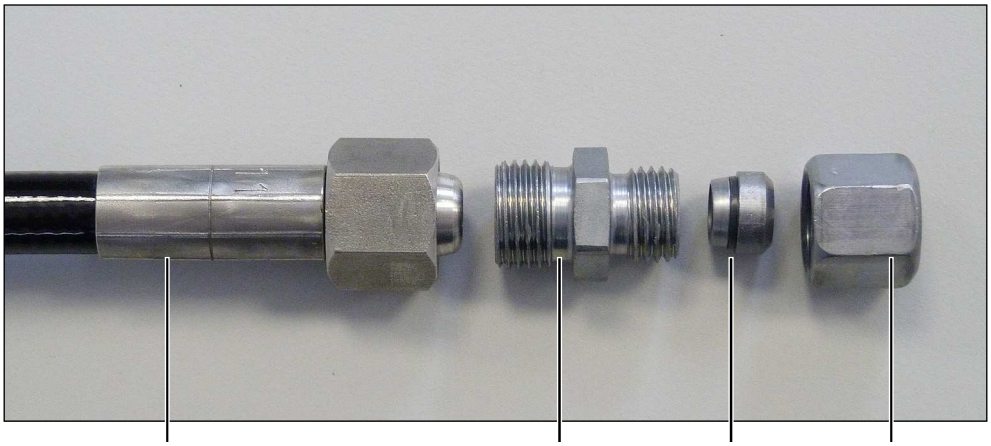


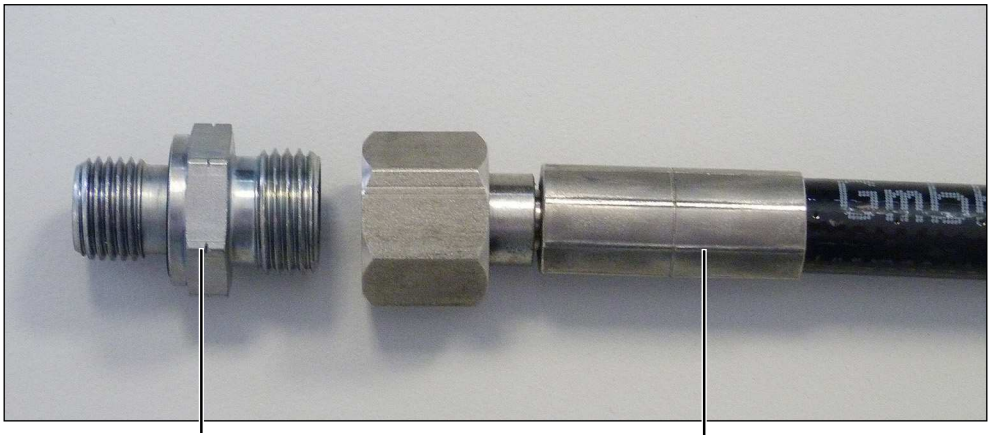
HD Schläuche im Kompressor / HP Hoses in Compressor

Best.-Nr. / Order No.	Benennung	Description
000385	Hochdruckschlauch, 650 mm, beidseitig 10L	HP-Hose 10L, 650 mm, beidseitig 10L
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter M08LCFX	Nut M08LCFX
000783	Verschraubung GE10L - R1/4"	Straight Connection GE10L - R1/4"
000851	Reduzierung GR10/08L	Reducer GR10/08L
001435	Hochdruckschlauch, 1000 mm, beidseitig 10L	HP Hose, 1000 mm, both sides 10L

Hochdruckschläuche / High Pressure Hoses



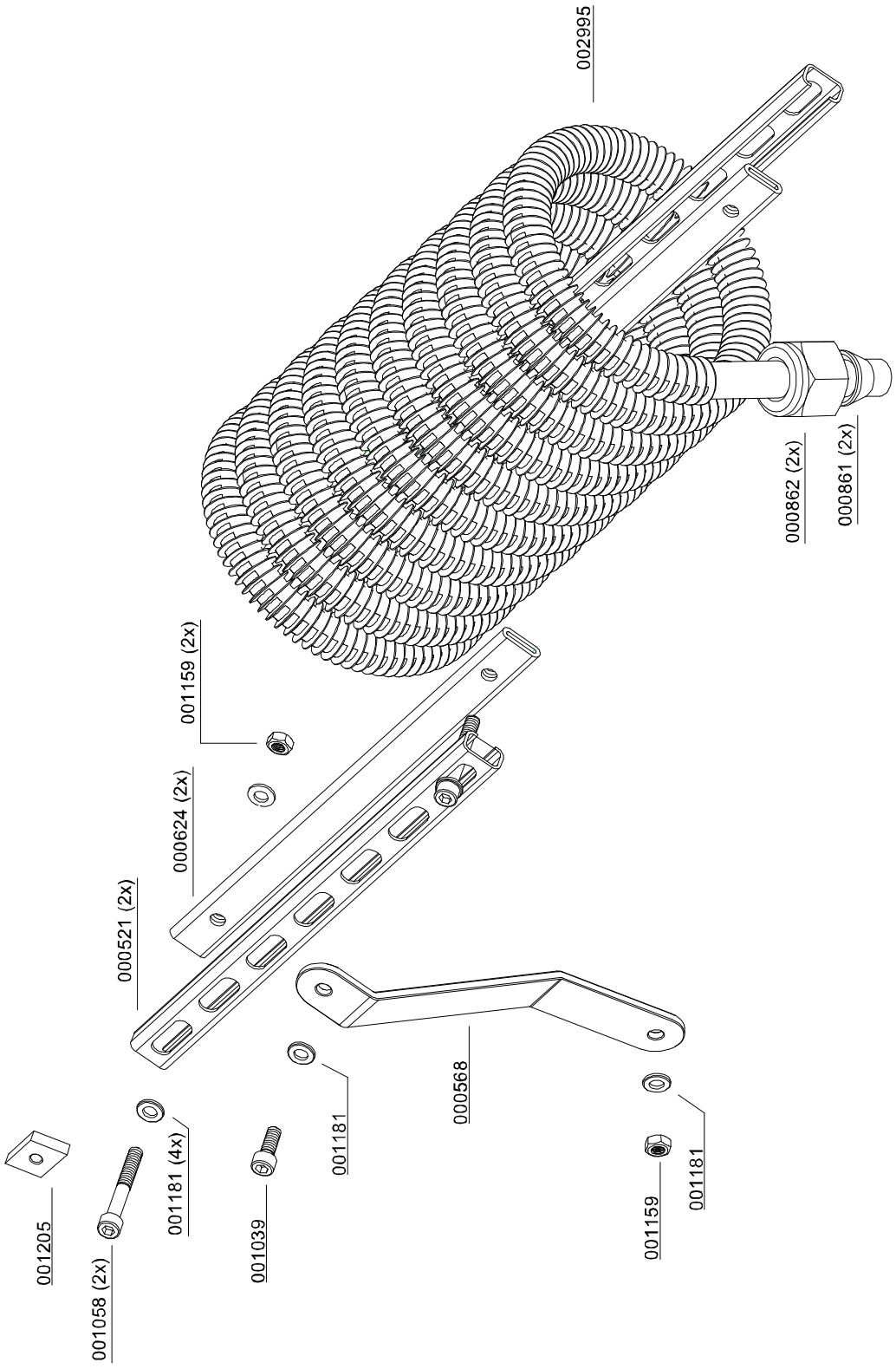




Kühler 1. und 2. Stufe / Cooler 1st and 2nd stage

Best.-Nr. / Order No.	Benennung	Description
000521	Schiene 340mm	Metal Bar 340 mm
000568	Halterung	Bracket
000624	PVC Schlauch, transparent	PVC Hose for Bracket
000861	Schneidring PSR 18 LX	Oliver Seal 18mm
000862	Mutter M18L	Nut 18L
001039	Zylinderschraube	Allen Screw
001058	Zylinderschraube M8x70mm DIN912 8.8 ZN	Allen Bolt
001159	Stoppmutter	Lock Nut M8
001181	U-Scheibe A8 DIN125 ZN	Washer A8
001205	4-kant Mutter	Square Nut M8
002995	Wärmetauscher 2.Stufe LW 450 D/E/ES	Heat Exchanger 2nd Stage LW 450 D/E/ES

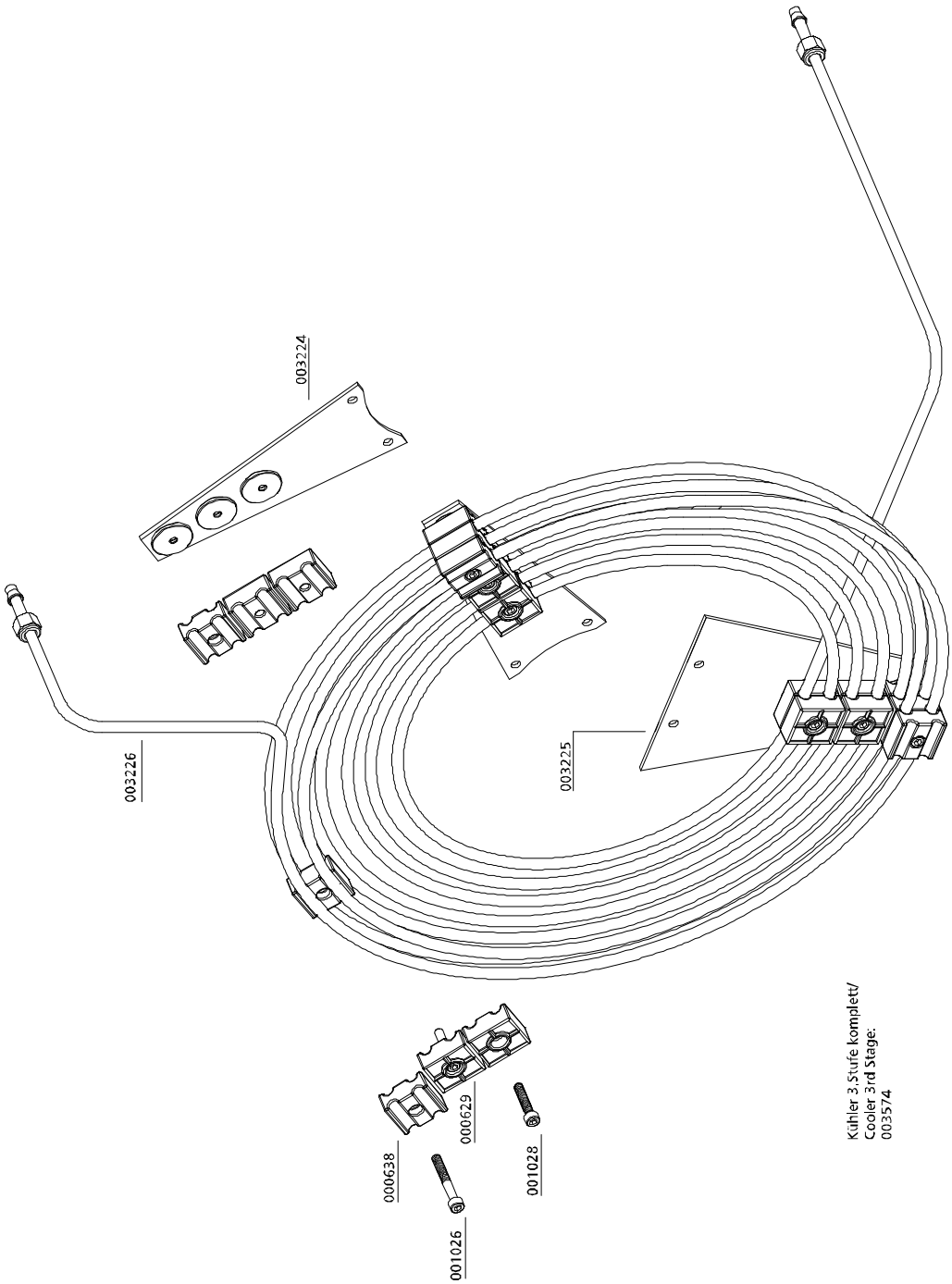
Kühler 1. und 2. Stufe / Cooler 1st and 2nd stage



Kühler 3. Stufe / Cooler 3rd Stage

Best.-Nr. / Order No.	Benennung	Description
000629	Doppelschelle 2 x 8mm 1 Paar	Pipe Clamp 2x8mm - 1 pair
000638	Doppelschelle 2 x 8 mm 1 Paar	Pipe Clamp 2x8mm 1pair
001026	Zylinderschraube M6x40mm DIN912 8.8 ZN	Allen Bolt M6x40mm DIN912 8.8 ZN
001028	Zylinderschraube M6x25mm DIN912 8.8 ZN	Allen Bolt M6x25mm DIN912 8.8 ZN
003224	Kühlerhalteblech	Bracket, Cooler Stage 3
003225	Kühlerhalteblech	Bracket, Cooler Stage 3
003226	Kühlrohr 3te Stufe kompl.	Cooler, 3rd stage kompl.
003574	Kühlspirale komplett inkl. Haltearme	Cooling coil (complete) incl. bracket

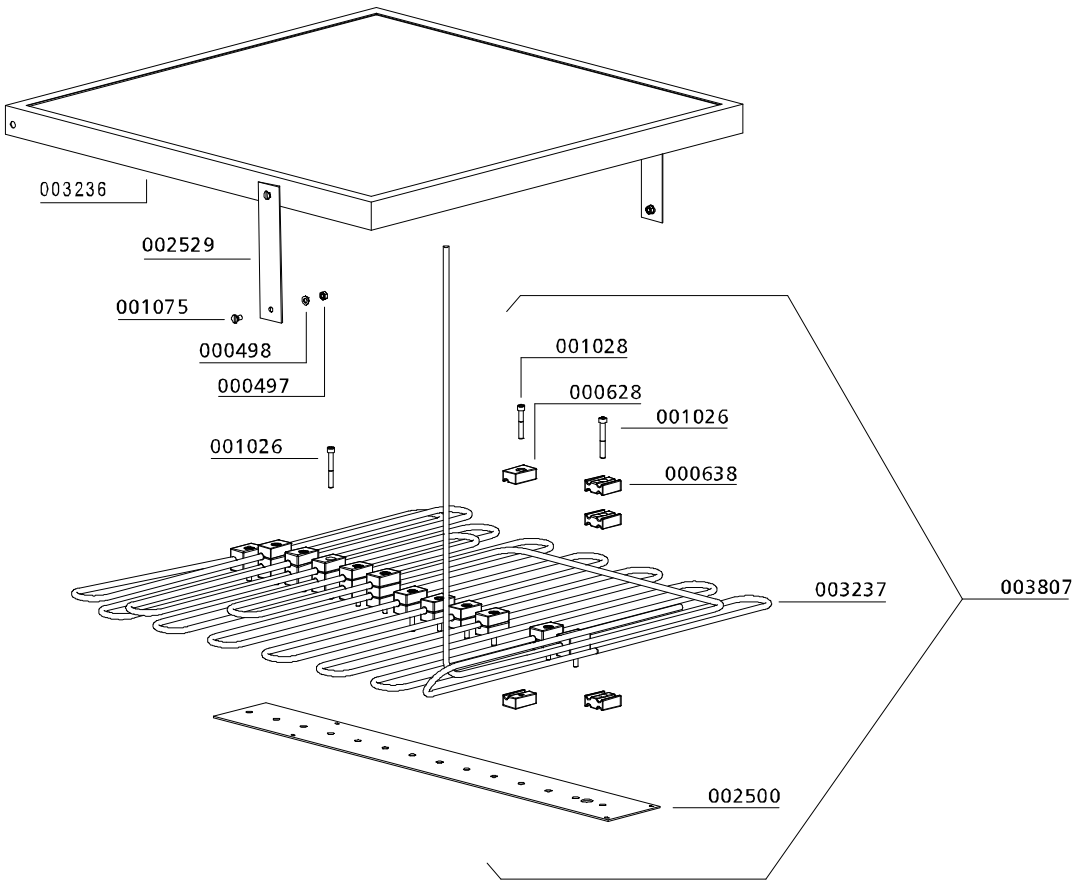
Kühler 3. Stufe / Cooler 3rd Stage



Zusatzkühler 3. Stufe / Additional Cooler 3rd Stage

Best.-Nr. / Order No.	Benennung	Description
000497	Mutter DIN 934 M6	Nut DIN 934 M6
000498	U-Scheibe A6	Washer A6
000628	Einfachschelle 1 x 8mm 1 Paar	Pipe Clamp 1x8mm 1pair PVC
000638	Doppelschelle 2 x 8 mm 1 Paar	Pipe Clamp 2x8mm 1pair
001026	Zylinderschraube M6x40mm DIN912 8.8 ZN	Allen Bolt M6x40mm DIN912 8.8 ZN
001028	Zylinderschraube M6x25mm DIN912 8.8 ZN	Allen Bolt M6x25mm DIN912 8.8 ZN
001075	Senkschraube M6x20mm DIN7991 10.9	Counter Sunk Screw M6x20mm DIN7991 10.9
002500	Befestigungsblech für Kühlrohr-klemmen, verzinkt	Mounting sheet for clamps, zinc plated
002529	Halteblech Unterer Zwischenboden	Holding sheet for lower intermediate floor
003236	Querboden unten	Transverse Bottom
003237	Kühlerrohr Zusatzkühler	Cooling Pipe Additional Cooler
003807	Zusatzkühler, 3. Stufe, kompl.	Additional cooler, 3rd stage

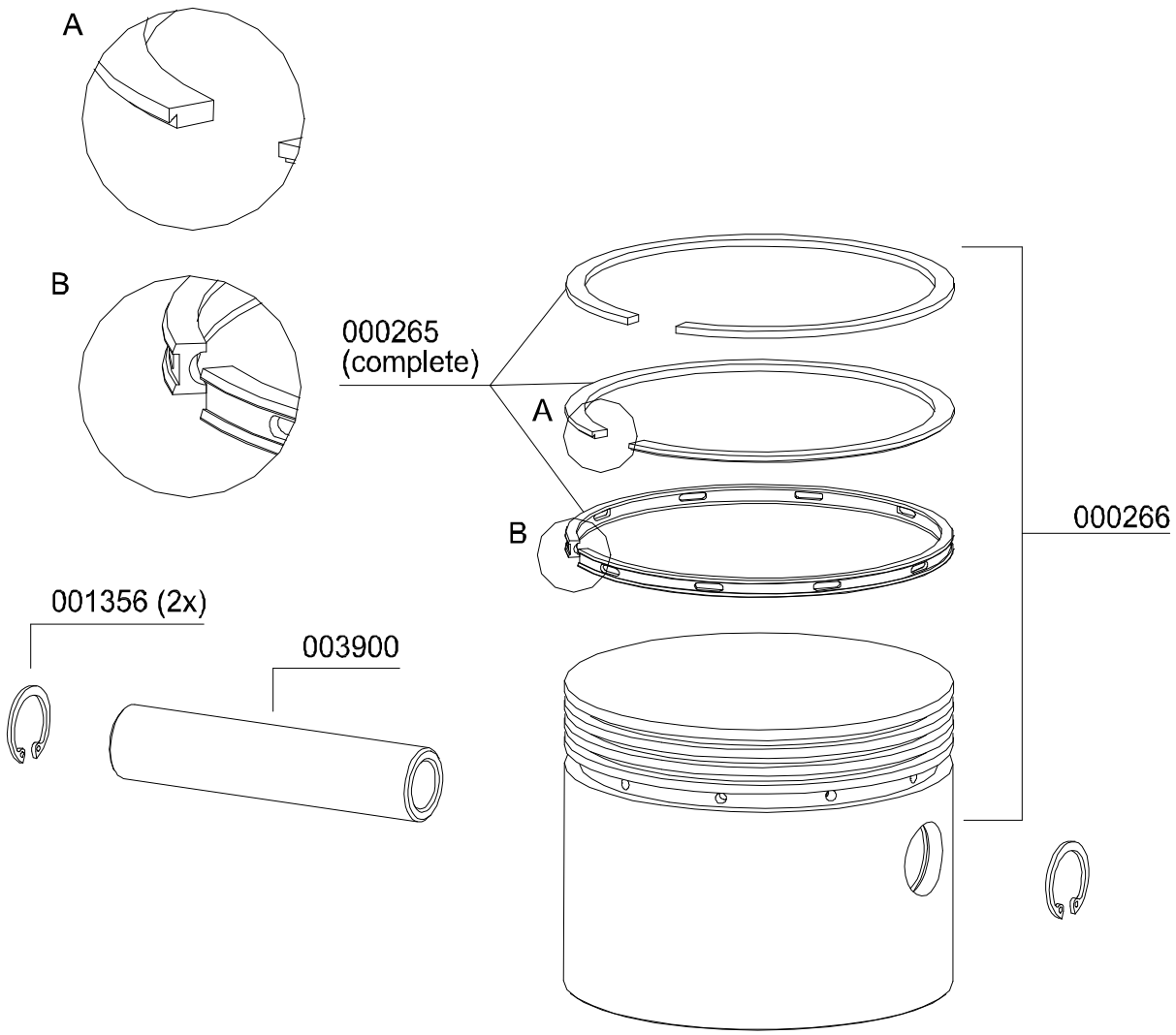
Zusatzkühler 3. Stufe / Additional Cooler 3rd Stage



Kolben 1. Stufe / Piston 1st Stage

Best.-Nr. / Order No.	Benennung	Description
000265	Kolbenringsatz 1.Stufe, ∅ 95mm	Piston Ring Set 3pcs
000266	Kolben komplett 1.Stufe, ∅ 95mm	Piston complete 1.Stage, ∅ 95mm
001356	Sicherungsring, I22 DIN472	Circlip I22 DIN472
003900	Kolbenbolzen 1.Stufe, ∅ 22x85mm	Piston Pin, 1.Stage, ∅ 22x85mm

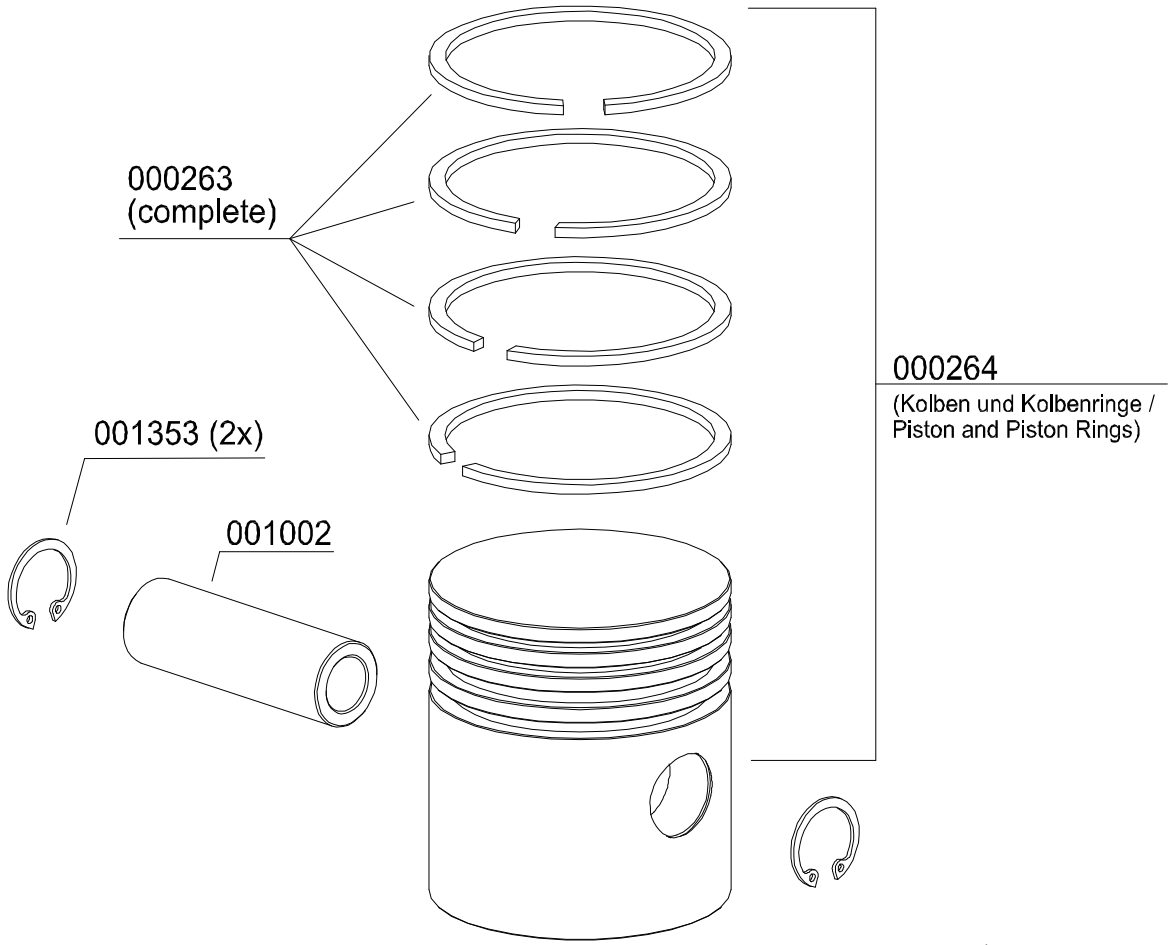
Kolben 1. Stufe / Piston 1st Stage



Kolben 2. Stufe / Piston 2nd Stage

Best.-Nr. / Order No.	Benennung	Description
000263	Kolbenringsatz 2.Stufe, 4 Stk.,Ø42 mm	Piston Ring Set 2.Stage, 4pcs, Ø42mm
000264	Kolben kompl. mit Kolbenringen, 2.Stufe, Ø42x70mm	Piston c/w Rings, 2.Stage, Ø42x70mm
001002	Kolbenbolzen 2.+ 3.Stufe, Æ16x33mm	Piston Pin 2.+3.Stage, Æ16x33mm
001353	Sicherungsring, I 16 DIN472	Circlip I 16

Kolben 2. Stufe / Piston 2nd Stage



Kolben 3. Stufe Ø18/42mm (bis 06.2016) / Piston 3rd Stage Ø18/42mm (up to 06.2016)

Best.-Nr. / Order No.	Benennung	Description
001002	Kolbenbolzen 2.+3.Stufe	Piston Pin 2.+3.Stage
001353	Sicherungsring, I 16 DIN472	Circlip I 16 DIN472
002126	Kolben kompl. mit Kolbeningen, Bolzen u. Sicherungsringen, 3.Stufe	Piston c/w Piston Rings, Piston Pin
002324	Kolbenringsatz 3.Stufe,	Piston Rings 3.Stage
003285	Spezialwerkzeugsatz zur	Special Tool Kit 3.Stage

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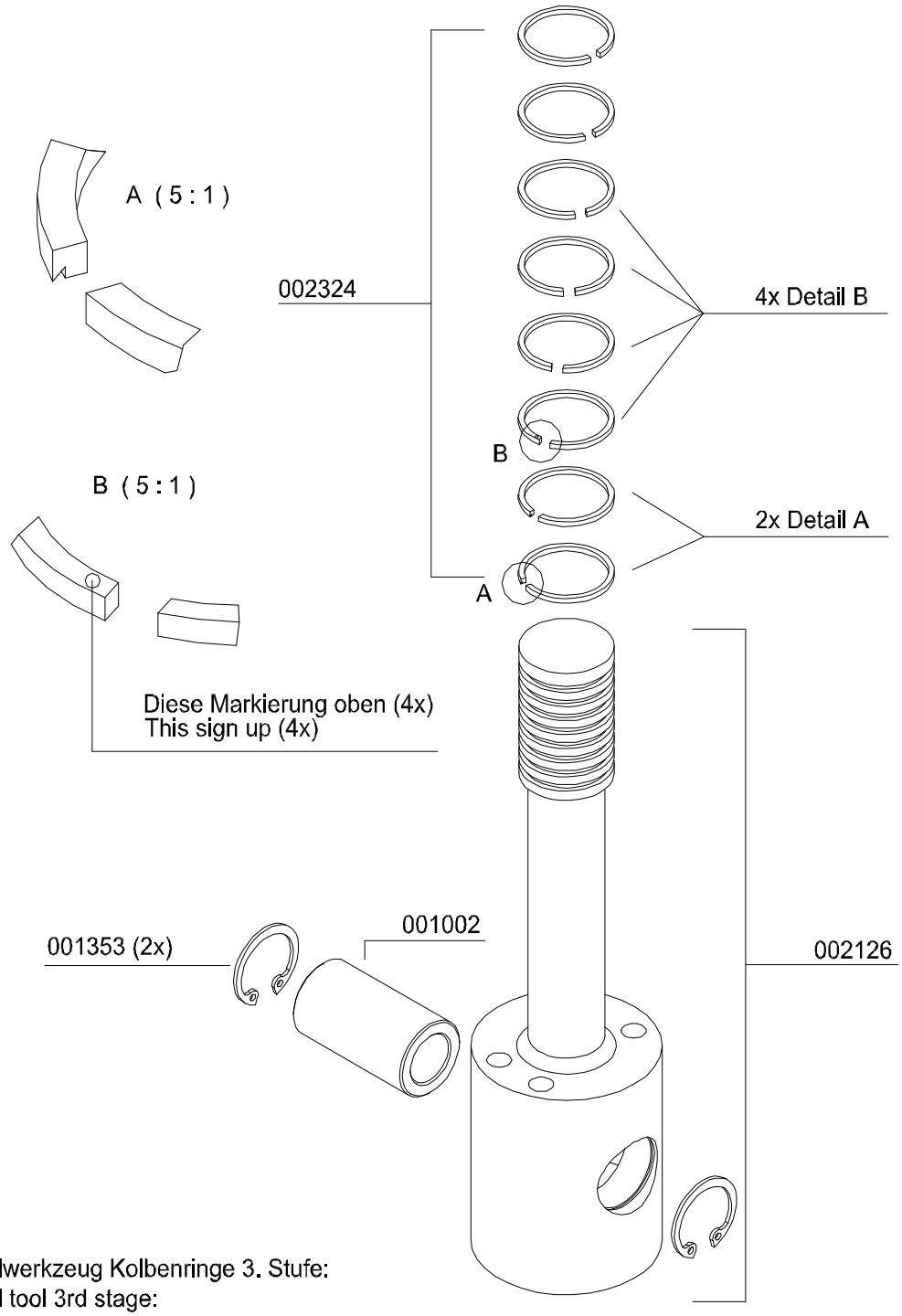
Kolben 3. Stufe Ø18/42mm (bis 06.2016) / Piston 3rd Stage Ø18/42mm (up to 06.2016)



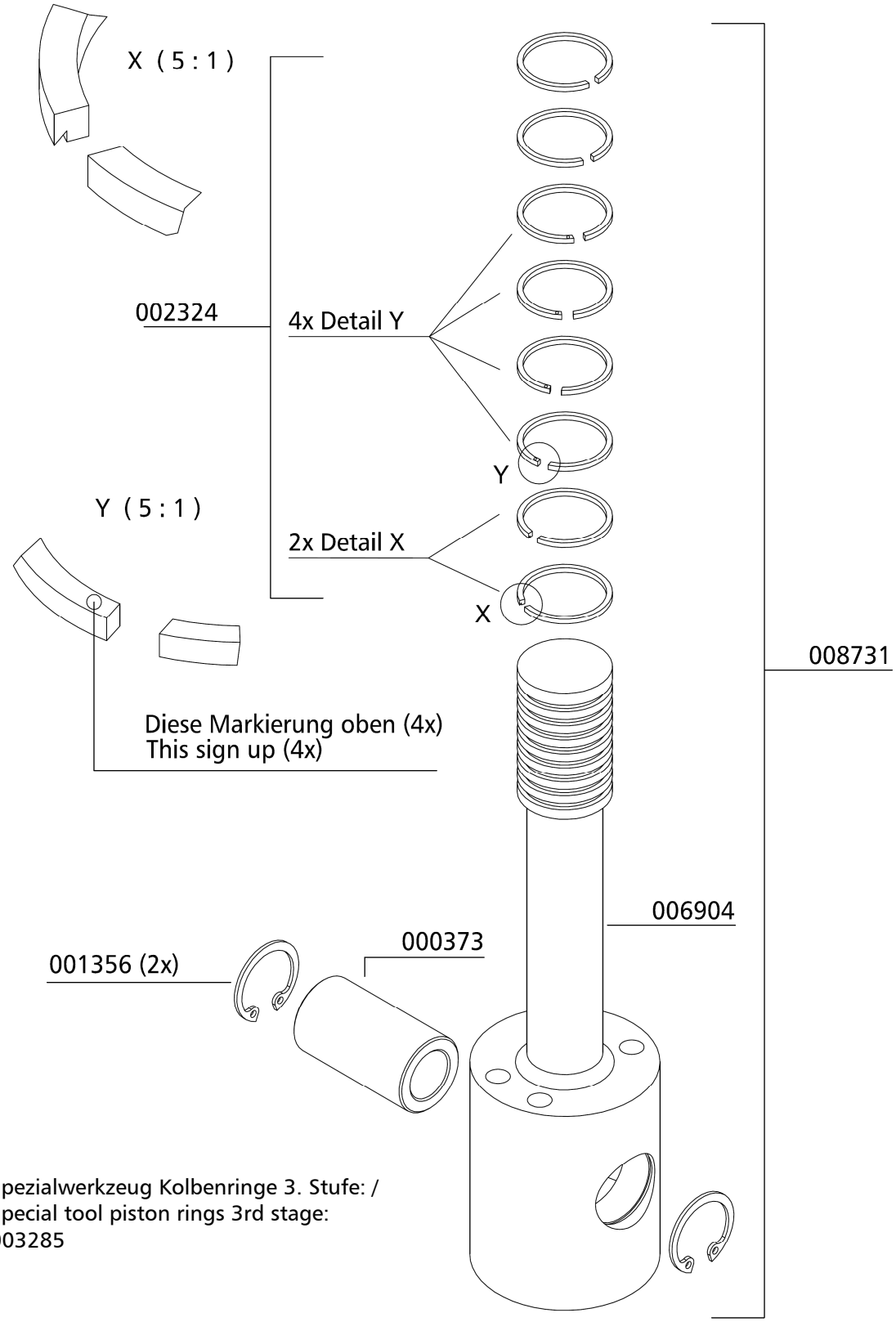
Spezialwerkzeug Kolbenringe 3. Stufe:
Special tool 3rd stage:
003285

Kolben 3. Stufe Ø18/50mm (ab 07.2016) / Piston 3rd Stage Ø18/50mm (since 07.2016)

Best.-Nr. / Order No.	Benennung	Description
000373	Kolbenbolzen Ø22 x 40 mm	Piston Pin Ø22 x 40 mm
001356	Sicherungsring, I 22 DIN472	Circlip I 16 DIN472
002324	Kolbenringsatz Ø18mm	Piston Rings Ø18mm
003285	Spezialwerkzeugsatz zur Kolbenring- u. Kolbenmontage	Special Tool Kit 3.Stage
006904	Kolben Piston Ø18mm/Ø50mm	Piston Ø18mm/Ø50mm
008731	Kolben Ø18mm/50mm mit Kolbenringen, Kolbenbolzen u. Seegerringen	Piston Ø18mm/50mm c/w piston rings, piston pin and circlips

C

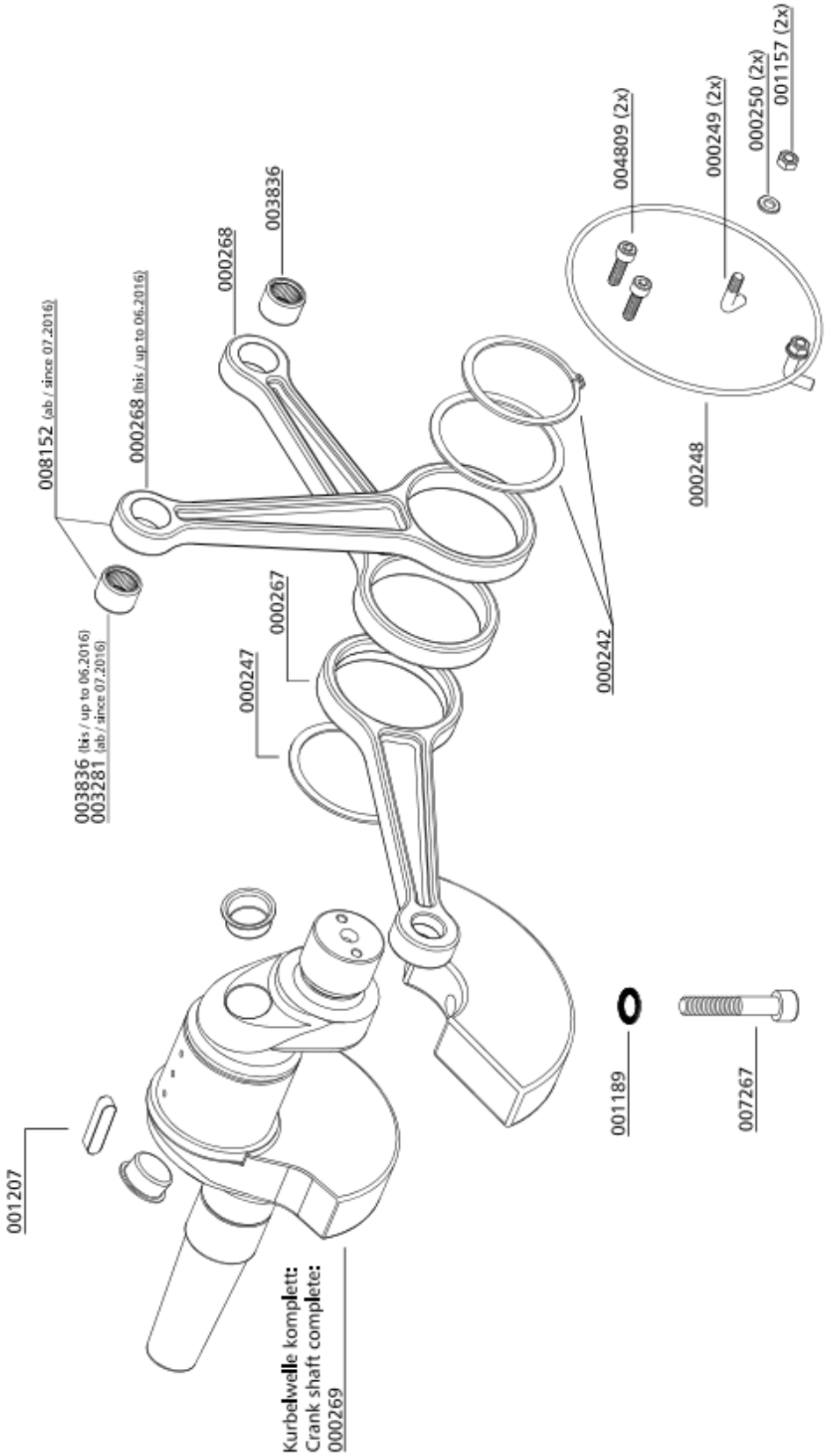
Kolben 3. Stufe Ø18/50mm (ab 07.2016) / Piston 3rd Stage Ø18/50mm (since 07.2016)



Kurbelwelle / Crankshaft

Best.-Nr. / Order No.	Benennung	Description
000242	Sicherung und Scheibe 450	Thrust Washer & Circlip
000247	Anlaufscheibe Kurbelwelle, mit Innenfase	Thrust Washer, chamfered version
000248	Ölschleuderring	Oil Splash Ring
000249	Gewindebügel M6x34x25	Threated Elbow M6x34x25
000250	CU-Ring Æ6,2x10x1,5mm	Copper Washer
000267	Pleuel LW 450 1.Stufe	Conrod 1st Stage LW 450
000268	Pleuel LW 450 2.&3.Stufe	Conrod c/w Needle Bearing
000269	Kurbelwelle komplett LW 450	Crankshaft c/w Counter Weight
001157	Hutmutter M6 DIN 1587 ZN	Domed Nut M6 DIN 1587 ZN
001189	Schnorrscheibe S10 N0110 ZN	Clamp Washer S10 N0110 ZN
001207	Passfeder, A8x7x35mm DIN6885	Woodruff Key
003281	Nadellager Pleuel Ø28xØ22x20mm	Needle bearing, con-rod Ø28xØ22x20 mm
003836	Nadellager Pleuel Ø22x Ø16x16mm	Needle Bearing, conrod Ø22xØ16x16mm
004809	Konischer Schraubenkopf M6x8mm	Drive bolt M6x8mm
007267	Zylinderschraube M10x45mm DIN912 10.9	Allen Bolt M10x45mm DIN912 10.9
008152	Pleuel inkl. Nadellager Ø28xØ22x20mm	Conrod c/w Needle Bearing Ø28xØ22x20mm

Kurbelwelle / Crankshaft

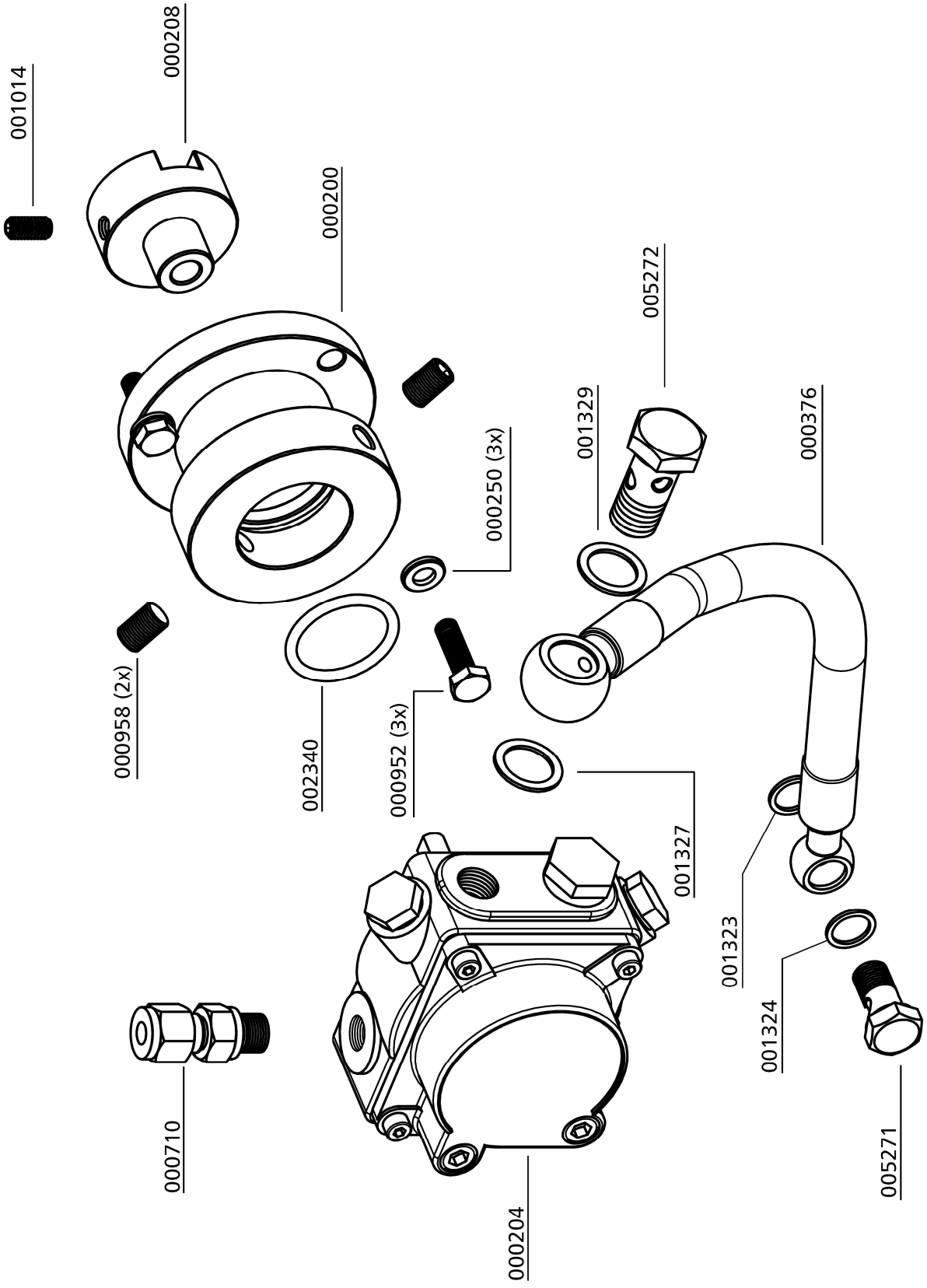


Ölpumpe / Oil Pump

Best.-Nr. / Order No.	Benennung	Description
000200	Ölpumpenhalteflansch	Adapter Flange Oil Pump
000204	Ölpumpe, kompl.	Oil Pump compl.
000208	Ölpumpenantriebsflansch	Drive Flange Oil Pump
000250	CU-Ring Ø6,2 x 10 x 1,5mm DIN7603A	Copper Washer Ø6,2 x 10 x 1,5mm DIN7603A
000376	Ölansaugschlauch	Oil Hose
000710	Verschraubung GE06LRCFX	Connection GE06LRCFX
000952	Sechskantschraube M6X20mm, DIN933, 8.8	Hexagon Bolt M6X20mm DIN933, 8.8
000958	Gewindestift M8x16mm DIN914, 5.8 ZN	Worm Screw M8x16mm DIN914 5.8 ZN
001014	Gewindestift mit Zapfen M6X14mm DIN915	Allen Screw with Pin M6X14mm DIN915
001323	CU-Ring, Ø10 x 16 x 2mm, DIN7603A	Copper Seal Ring, Ø10 x 16 x 2mm, DIN7603A
001324	CU-Ring, Ø10,4 X 13,4 X 1mm, DIN7603A	Copper Seal Ring, Ø10,4 X 13,4 X 1mm,
001327	CU-Ring,m Ø 13 x 18 x 1,5mm DIN7603A	Copper Seal Ring, Ø 13 x 18 x 1,5mm
001329	CU-Ring, Ø14,5 X 20 X 1,5mm, DIN7603A	Copper Seal Ring, Ø14,5 X 20 X 1,5mm,
002340	O-Ring Ölpumpenflansch 32,2x3 NBR70	O-Ring, oil pump flange 32,2x3 NBR70
005271	Hohlschraube Ölansaugschlauch G1/8"	Banjo Bolt oil intake hose G1/8"
005272	Hohlschraube Ölansaugschlauch G1/4"	Banjo Bolt oil intake hose G1/4"

C

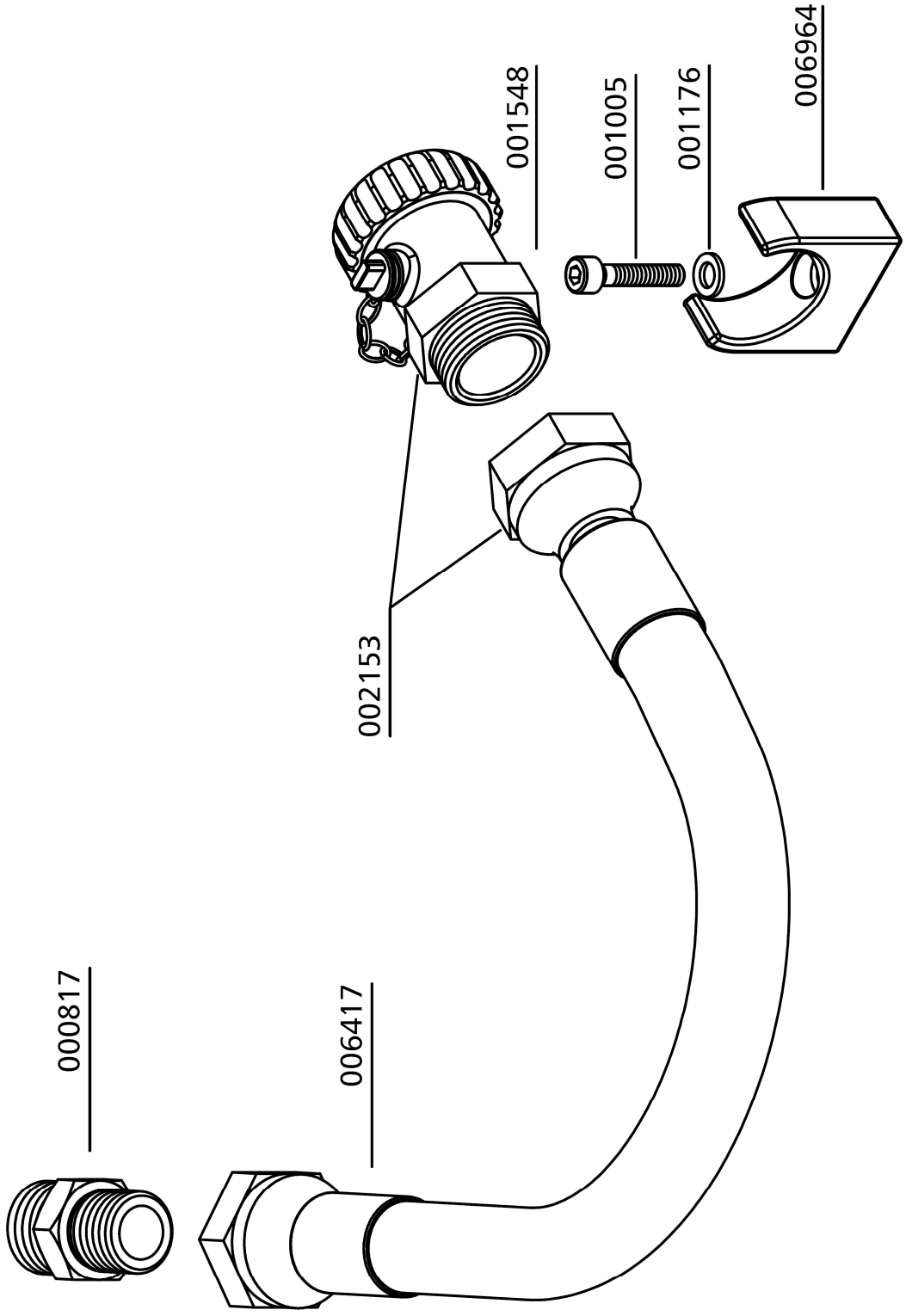
Ölpumpe / Oil Pump



Baugruppe: Ölablassschlauch / Assembly: Oil Drainage Tube

Best.-Nr. / Order No.	Benennung	Description
000817	Verschraubung	Connection
001005	Zylinderschraube, M5x16mm DIN912 8.8 ZN	Allen Screw, M5x16mm DIN912 8.8 ZN
001176	U-Scheibe, A5 DIN125 ZN	Washer, A5 DIN125 ZN
001548	Ölablassventil (Kugelhahn)	Oil Drain Valve - ball valve
002153	Ölablassschlauch inkl. Kugelhahn	Oil drain hose c/w ball valve
006417	Ölablassschlauch	Oil Drain Hose
006964	Klemmhalter Ölablassschlauch	Clamp Oil Drain Hose

Baugruppe: Ölablassschlauch / Assembly: Oil Drainage Tube



OPTIONS

D

Table of Contents

AUTO START FUNCTION

D

Auto Start Function

The auto start function allows operating the compressor optionally in automatic or semi-automatic mode by turning the selector switch.

Selector switch auto start function

Semi-automatic operation:

Start the compressor by pushing the Start button. The compressor automatically shuts off when final pressure is reached. To restart the compressor, push the Start button again. The unit can be shut down at any time during operation by pushing the Stop button.

Automatic operation:

Start the compressor only once by pushing the Start button. The Start button lights up and the unit automatically shuts off when final pressure is reached. If outlet pressure decreases below the selected minimum pressure, the unit automatically restarts.

Note
The compressor can not be manually started during automatic operation.

To enable a manual start, shut off automatic operation by pushing the Stop button (Start button lamp goes out). Now turn selector switch to semi-automatic mode and start the compressor with the Start button.

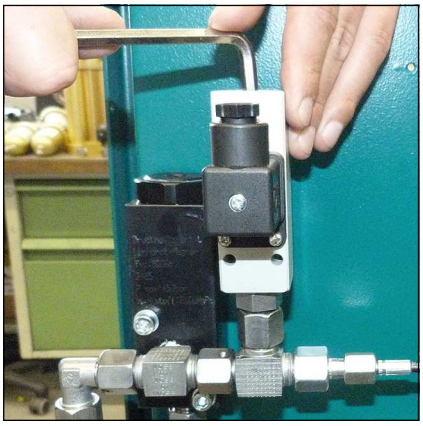
Adjust re-start pressure (minimum filling pressure)

The pressure switch for start pressure is located after the pressure maintaining valve. The pressure can be adjusted with the upper adjusting screw.

Increasing re-start pressure: turn adjusting screw clockwise

Reducing re-start pressure: turn adjusting screw anti-clockwise

Adjust pressure switch in steps of a quarter turn. Check settings after every adjustment step.


Adjust re-start pressure

Filling procedure semi-automatic operation

Caution! Only fill cylinders which:
- are marked with the test mark and the test stamp of the expert.
- have been hydro static tested (check last test date).
- are rated for the final pressure.
- are free from humidity.

Note
The unit shuts down when final pressure is reached. Thus, the unit always has to be restarted manually.

1. Turn selector switch to semi-automatic mode.
2. Close all filling valves.
3. Connect closed compressed air cylinders.
4. Open filling valves.
5. Start compressor by pushing the ON button.
6. When filling pressure gauge increases, open filling valves slowly.
7. Fill compressed air cylinders to the desired pressure, subsequently close filling valves slowly.
8. Close and vent all filling valves.
9. Disconnect all compressed air cylinders from filling valves.

Filling procedure automatic operation

Caution! Only fill cylinders which:
- are marked with the test mark and the test stamp of the expert.
- have been hydro static tested (check last test date).
- are rated for the final pressure.
- are free from humidity.

Note
The unit shuts down when final pressure is reached. Thus, the unit always has to be restarted manually.

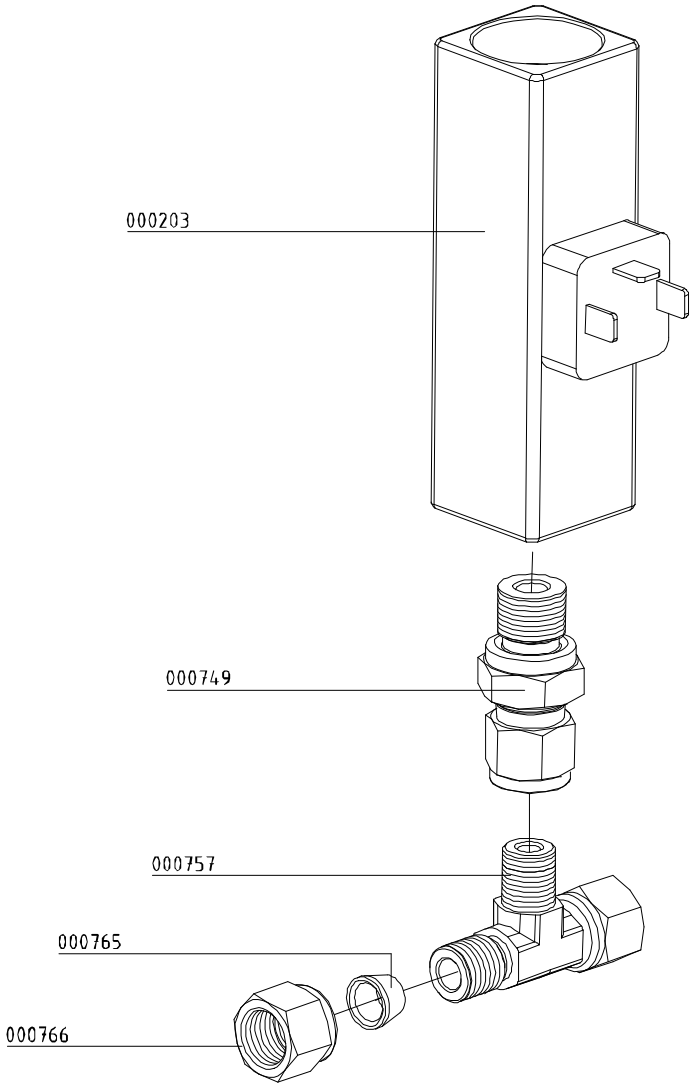
1. Turn selector switch to automatic mode.
2. Close all filling valves.
3. Connect closed compressed air cylinders.
4. Open filling valves.
5. Start compressor by pushing the ON button.
6. When filling pressure gauge increases, open filling valves slowly.
7. Fill compressed air cylinders to the desired pressure, subsequently close filling valves slowly.
8. Close and vent all filling valves.
9. Disconnect all compressed air cylinders from filling valves.
10. If automatic operation is interrupted by:
    - pushing the OFF button
    - turning the selector switch
    - tripping the emergency shut-off switch
    - opening of the doors or the cover

    the unit has to be restarted.

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000203	Druckschalter 50-350 bar	Pressure Switch 50-350 bar
000749	Verschraubung, mit fester Mutter	Connection with fixed nut
000757	T-Verschraubung mit fester Mutter seitl. EL 08 L	T-Connection with fixed nut EL 08 L
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter 08L CFX	Nut 08L CFX
004691	Wahlschalter	Selector switch
005663	Einlegeschild	Label
006859	Schildträger	Label holder

Spare part lists



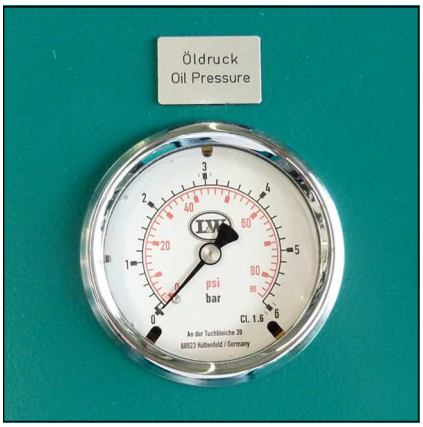
D

OIL PRESSURE GAUGE

Oil pressure gauge

The oil pressure gauge shows the compressor oil pressure during operation. Oil pressure values at operating temperature should remain between:

- min. + 1.3 bar
- max. + 1.5 bar



Oil pressure gauge

If oil pressure value stays below the minimum value:

- Wrong compressor rotation direction (see rotation direction arrow)
- Oil level too low, not enough oil in the compressor
- Oil pump sieve contaminated
- Oil intake hose damaged / defective
- Oil temperature below +5 °C - lubrication not possible
- Oil temperature higher than +120 °C - oil viscosity too low
- Oil pump defective

If oil pressure value stays above the maximum value:

- Low oil temperature, between +5 °C and +10 °C
- Should stay within the range of tolerance when operation temperature is reached..

Oil pressure control

If oil pressure remains outside the range of tolerance, it can be adjusted at the oil pump.

Increasing oil pressure

- Turn adjusting screw clockwise

Reduce oil pressure

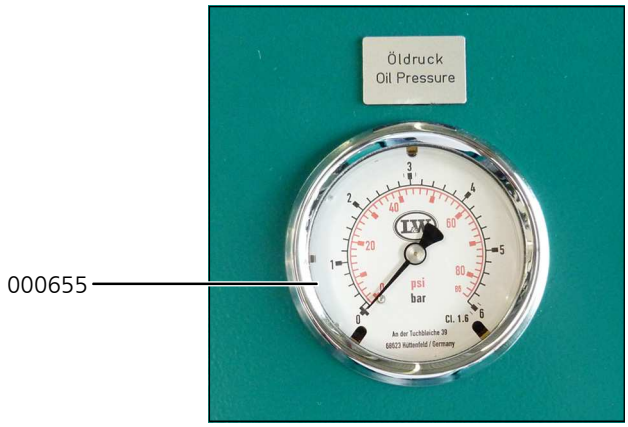
- Turn adjusting screw anti-clockwise

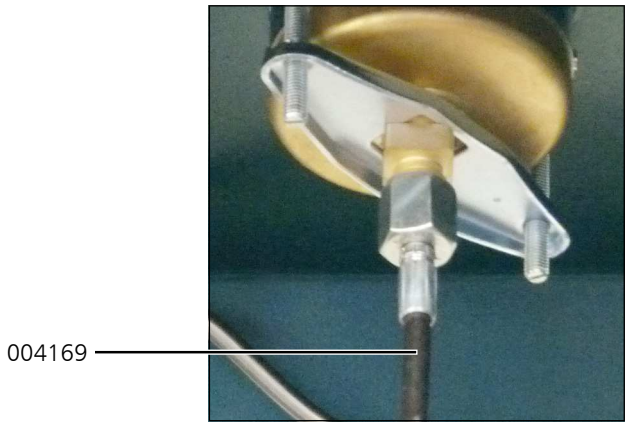
Warning
Only adjust the oil pressure at operating temperature!


Adjusting the oil pressure

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000655	Öldruckmanometer	Oil Pressure Gauge
004169	Manometerschlauch	Hose for Pressure Gauge





OIL PRESSURE MONITORING

D

Oil pressure monitoring

The oil pressure is maintained by a pressure switch during operation. The compressor automatically shuts off when oil pressure decreases below the minimum pressure of +0.5 bar. The red warning lamp "Oil Pressure Monitoring" lights up.

Oil Pressure Monitoring

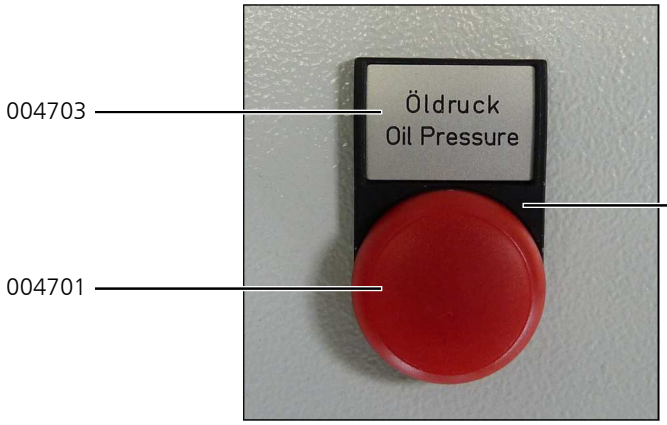
Possible causes of fault:

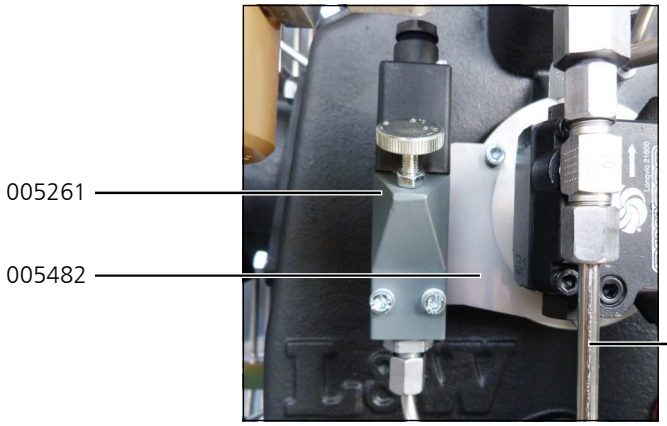
- Wrong compressor rotation direction (see rotation direction arrow)
- Oil level too low, not enough oil in the compressor
- Oil pump sieve contaminated
- Oil intake hose damaged / defective
- Oil temperature below +5 °C - lubrication not possible
- Oil temperature higher than +120 °C - oil viscosity too low
- Oil pump defective

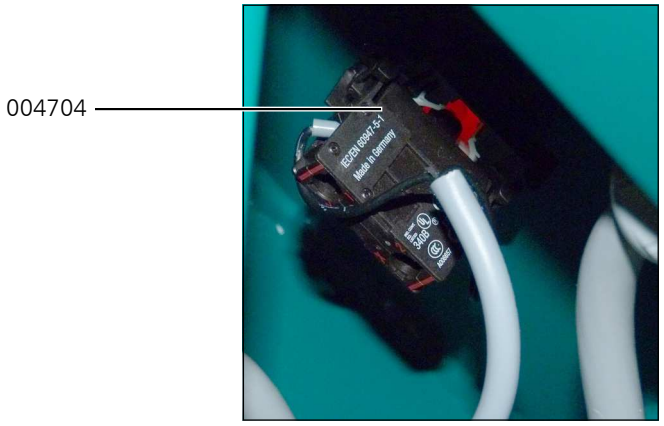
Spare part lists

Best.-Nr. / Order No.	Benennung	Description
004701	Warnlampe	Warning Lamp
004703	Schild	Label
004704	Relais für Warnlampe	Relais for warning lamp
005261	Öldruckschalter	Oil Pressure Switch
005482	Halteblech Öldruckschalter	Bracket Oil Pressure Switch
005483	Rohrleitung	Pipe
006859	Schildträger	Label holder

Spare part lists







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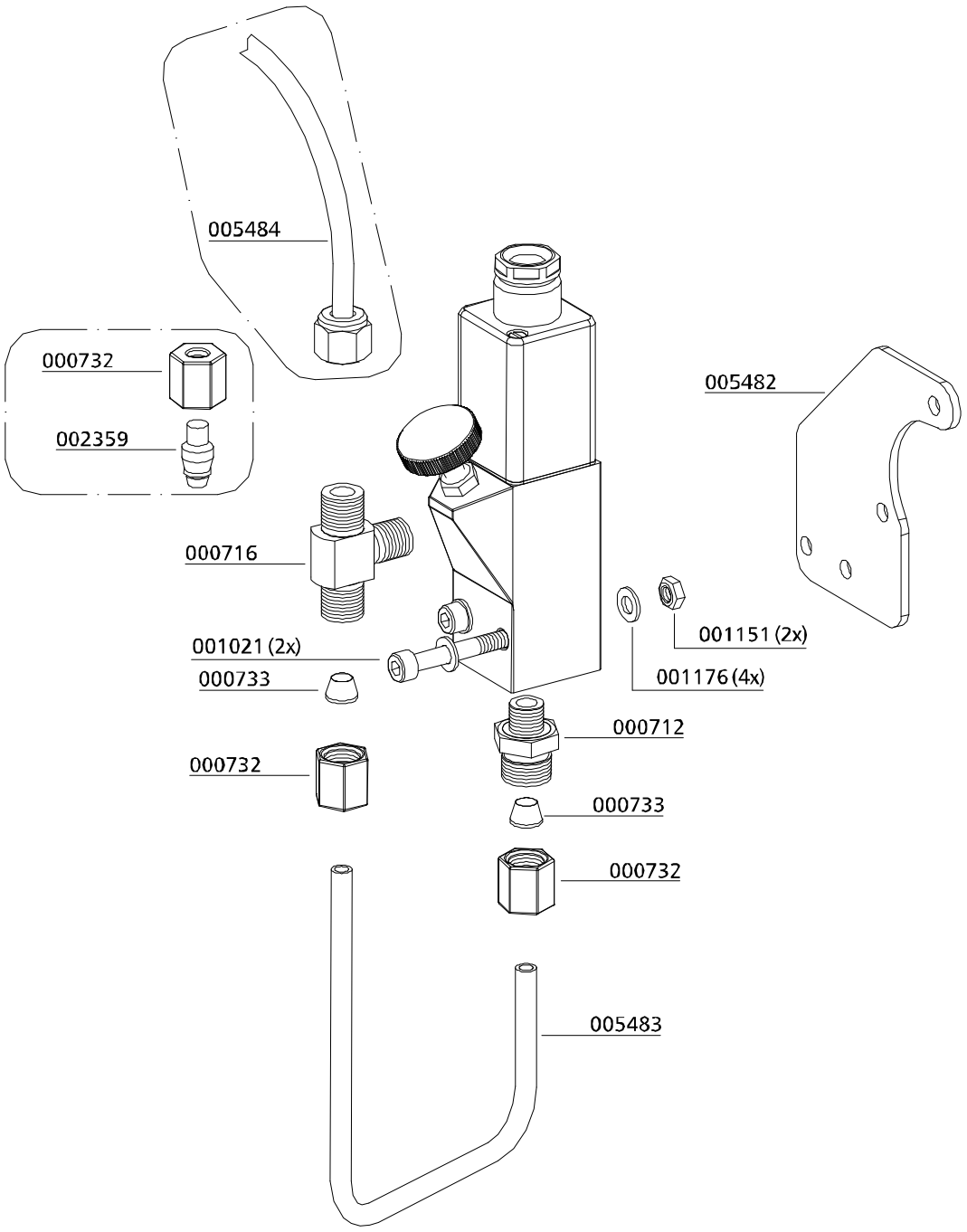
Baugruppe: Öldrucküberwachung / Assembly: Oil Pressure Monitoring

Best.-Nr. / Order No.	Benennung	Description
000712	Verschraubung GE06LR1/4CFX	Connection GE06LR1/4CFX
000716	Verschraubung TE G1/8" / 6L	Connection TE G1/8" / 6L
000732	Mutter 06L	Nut 06L
000733	Schneidring SR 06	Olive Seal SR 06
001021	Zylinderschraube M5x40 mm DIN912 8.8 ZN	Allen Bolt M5x40 mm DIN912 8.8 ZN
001151	Mutter M5 DIN934 ZN	Nut M5 M5 DIN934 ZN
001176	U-Scheibe A5 DIN125 ZN	Washer A5 DIN125 ZN
002395	Verschlusskegel 06mm	Locking cone 06mm
005482	Halteblech Öldruckschalter	Bracket Oil Pressure Switch
005483	Rohrleitung Ø6mm, Edelstahl	Pipe Ø6mm, s/s
005484	Minimessschlauch 5000mm	Pressure Gauge Hose 5000mm

Baugruppe: Öldrucküberwachung / Assembly: Oil Pressure Monitoring



D

OIL TEMPERATURE MONITORING

Oil temperature monitoring

Oil temperature monitoring

The oil temperature is maintained by a temperature sensor inside the compressor block during operation.

The compressor automatically shuts off when oil temperature exceeds the maximum pressure of +100 °C. The red warning lamp "Oil Temperature Monitoring" lights up.

Oil Pressure Monitoring

Possible causes of fault:

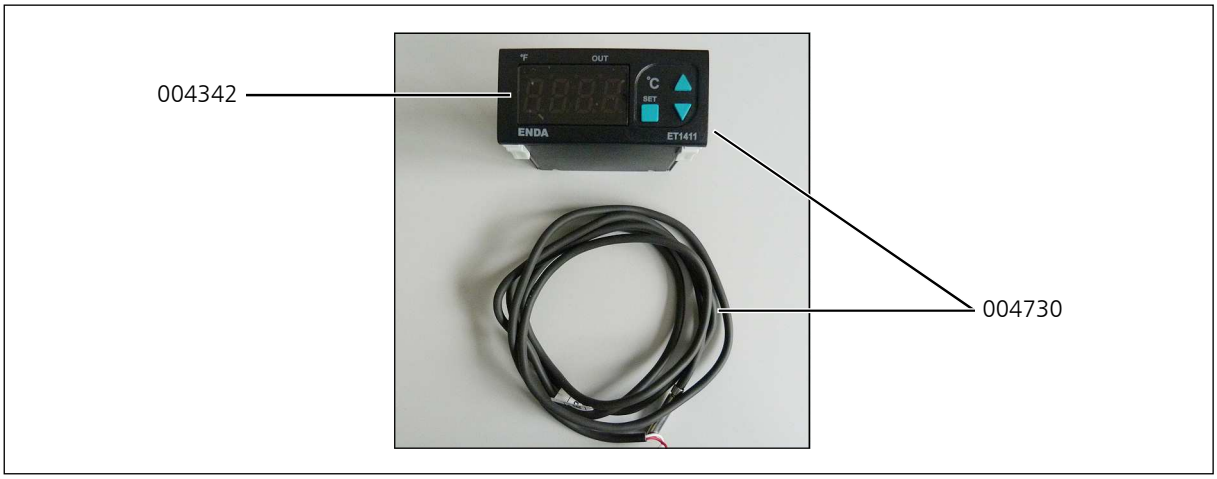
- Ambient temperature too high
- Cooling air flow not sufficient
- Oil level too low
- Cooling pipes contaminated

Warning
Risk of burns!
Allow the unit to cool before beginning troubleshooting.

D

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
004342	Display	Display
004730	Display und Sensor	Display and Sensor



CYLINDER HEAD TEMPERATURE MONITORING

Cylinder head temperature monitoring

The cylinder head temperature is maintained by a temperature sensor at the cylinder head of the high pressure stage during operation. The compressor shuts off automatically when cylinder head temperature exceeds the maximum pressure of +120° C. The red warning lamp "Cylinder Head Temperature Monitoring" lights up.

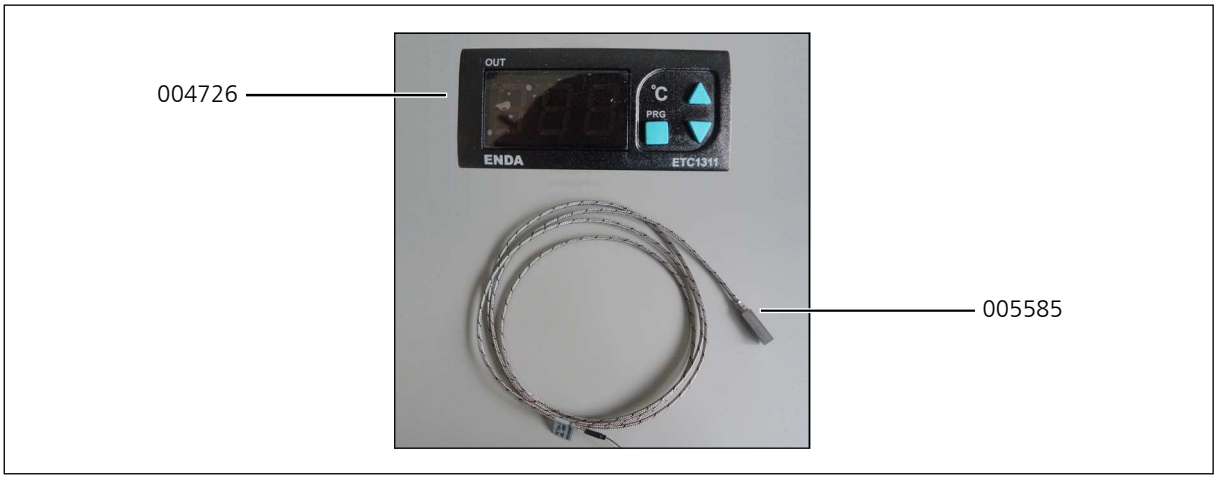
Possible causes of fault:

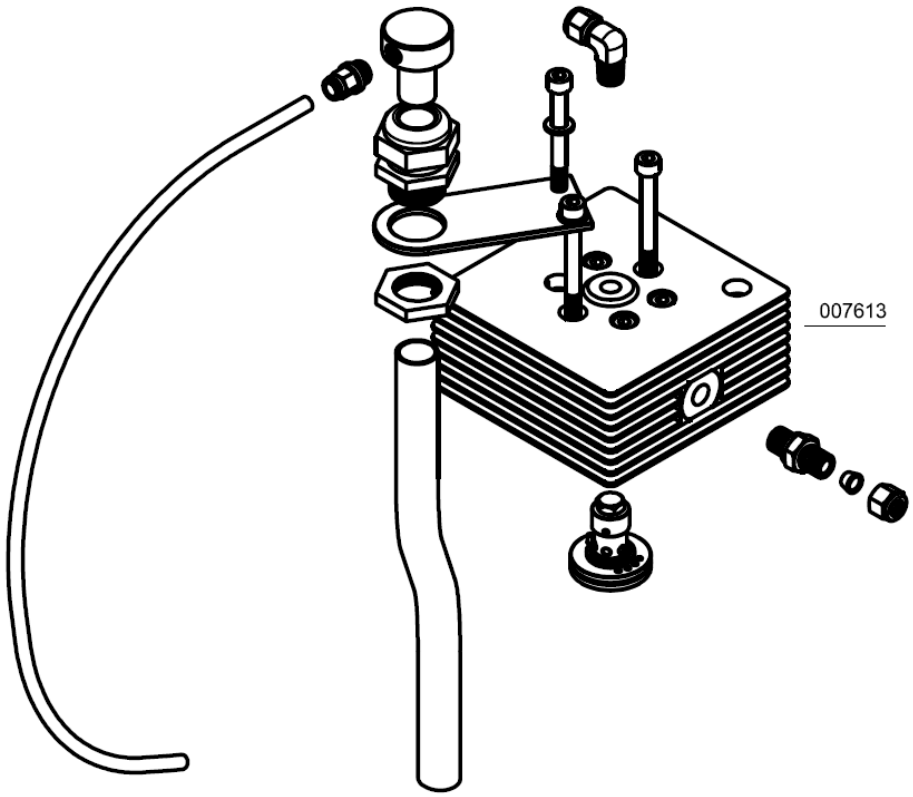
- Ventilation of the compressor room is not sufficient
- Cooling air flow not sufficient
- Cooling pipes contaminated

Warning
Risk of burns!
Allow the unit to cool before beginning troubleshooting.

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
004726	Display	Display
005585	Sensor	Sensor
007613	Ventilkopf (Spezielle Version)	Valve Head (special version)





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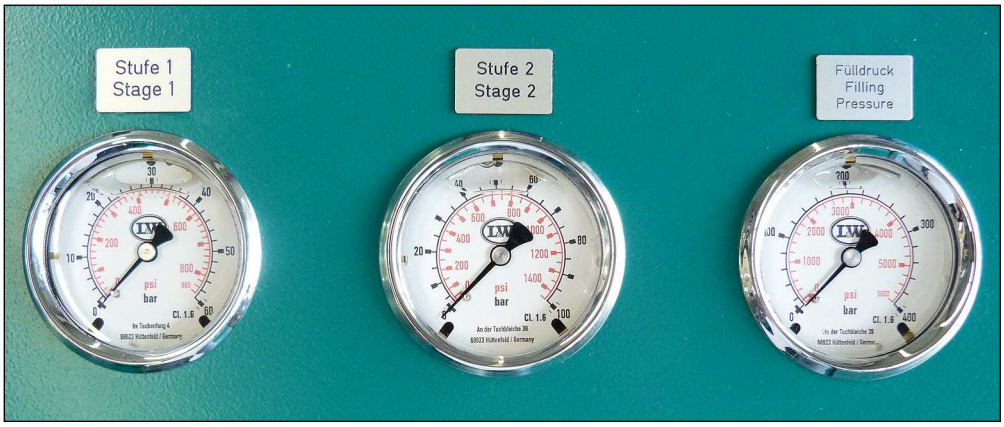
INTERSTAGE PRESSURE GAUGE

Interstage pressure gauge

Each of the 3 pressure stages is monitored by a single pressure gauge. This is serviceable for troubleshooting and allows detecting faults at an early stage.



Indicated interstage pressures depend on final pressure settings.

The pressure gauges should show the following values at a final pressure of 300 bar:

1st stage: approx. 4.2 bar

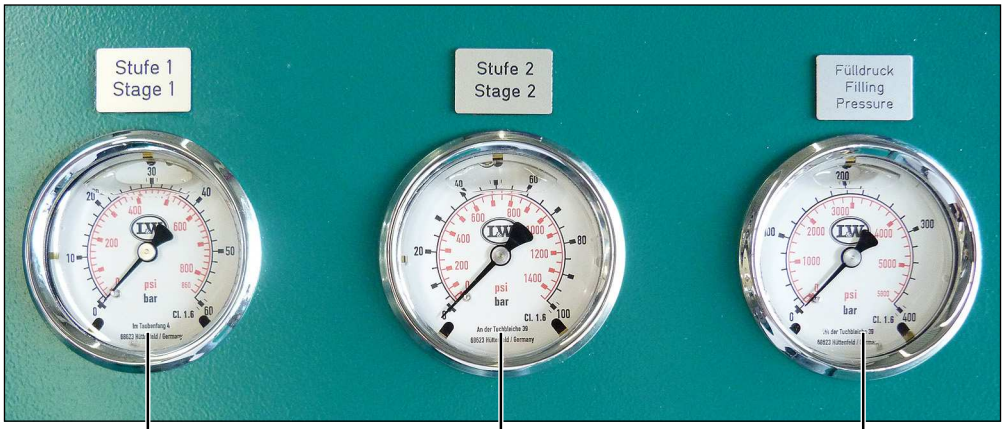
2nd stage: approx. 42 bar

3rd stage: approx. 300 bar

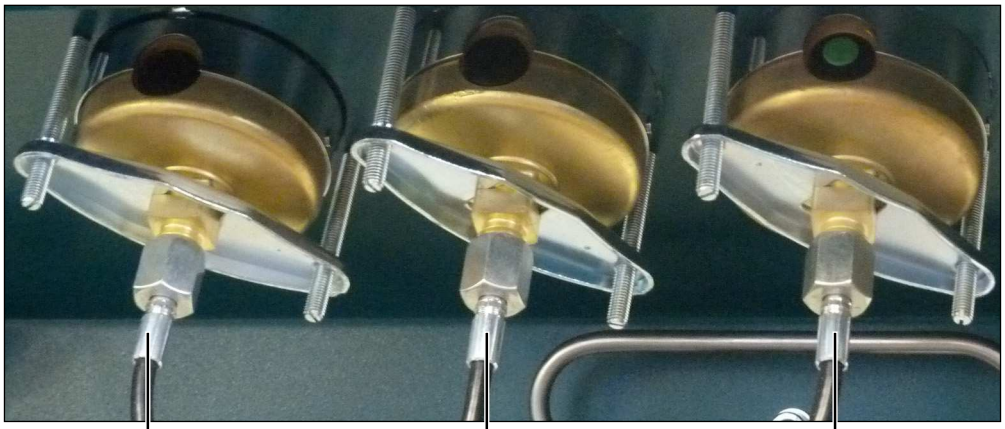
Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000660	Manometer 0-60 bar	Pressure Gauge 0-60 bar
000663	Manometer 0-400 bar	Pressure Gauge 0-400 bar
000710	Verschraubung	Connection
001446	Manometerschlauch 700 mm 2. Stufe und Fülldruck	Hose for Pressure Gauge 700 mm 2nd stage and filling pressure
001447	Manometerschlauch 800 mm, 1. Stufe	Hose for Pressure Gauge 800 mm 1st stage
002507	Manometer 0-10 bar	Pressure Gauge 0-10 bar

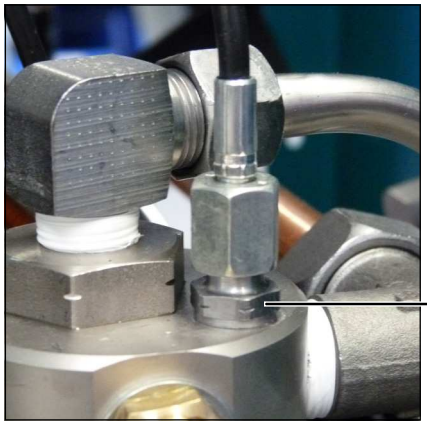
Spare part lists



002507 000660 000663



001446 001446 001447



000710

D

FILLING DEVICE AT THE COMPRESSOR

Filling device at the compressor

Allows the filling of cylinders directly at the compressor.

Up to six lever filing valves with filling hoses can be mounted at the front door.

The maximum pressure can be chosen between 200 bar and 300 bar.

A differentiation can be made by the colours of the bellows at the lever filing valves:

Black: 200 bar

Red: 300 bar

Filling device at the compressor

Open the lever filing valve by moving the lever downwards. Stop or interrupt the filling procedure by moving the lever upwards. The corresponding filling hose and connector will be automatically vented at the same time.

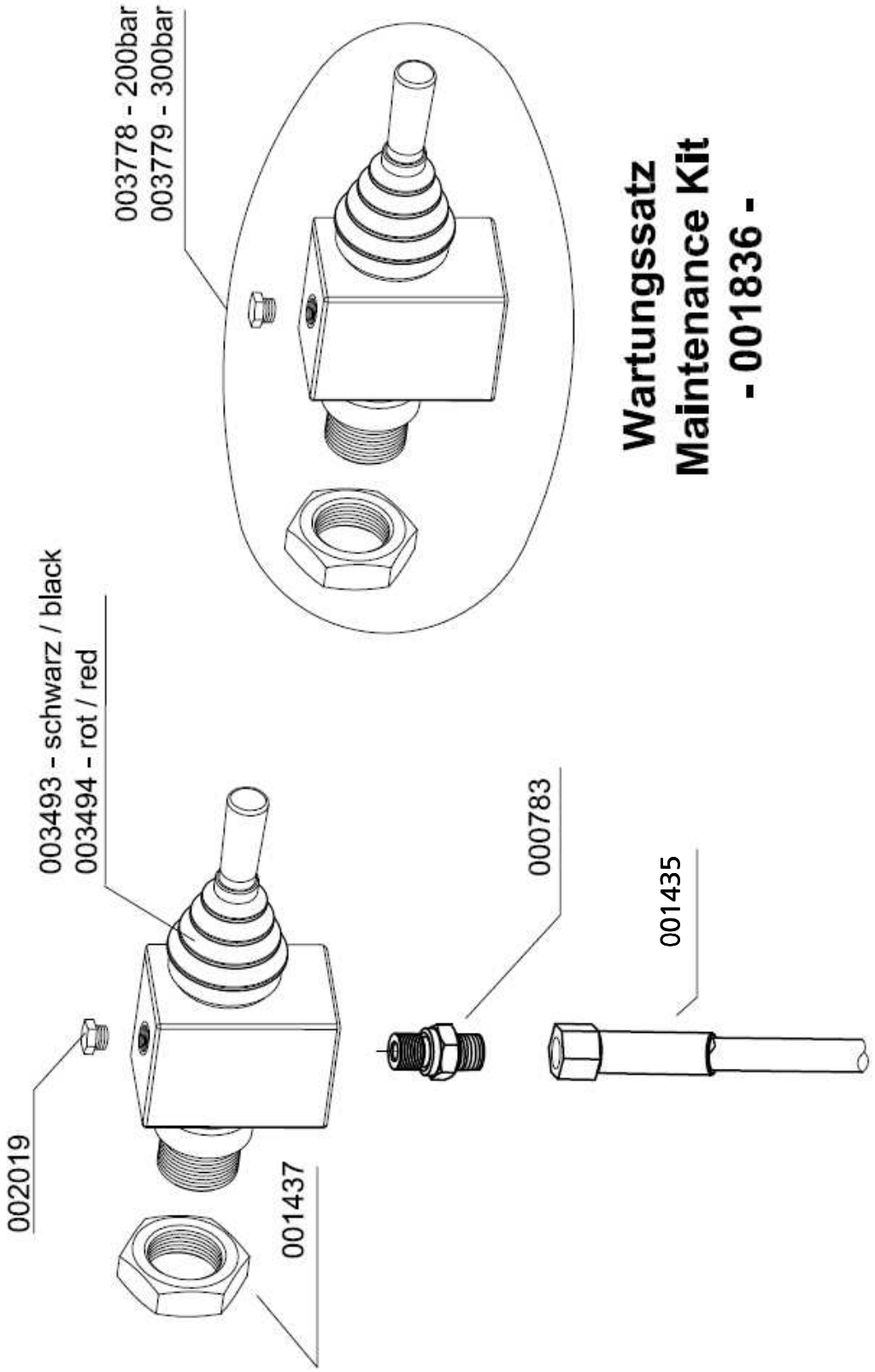
Caution

Open lever filing valves only when the filling hose is connected to the cylinder and when it is secured against whipping around wildly.

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000783	Verschraubung	Straight Connection
001435	Hochdruckschlauch 1000mm	HP Hose 1000mm
001836	RepSatz für Kipphebelventil	Repair Kit Lever valve
002019	Schalldämpfer, Kipphebelventil G1/8"	Silencer Lever Filling Valve G1/8"
003493	Faltenbalg Kipphebelventil schwarz	Gaiter, lever valve, black
003494	Faltenbalg, Kipphebelventil rot	Gaiter, lever valve, red
003778	Kipphebelventil 200bar Kompressor	Lever filling valve compressor 200bar
003779	Kipphebelventil 300 bar Kompressor	Lever fill. valves compressor 300bar

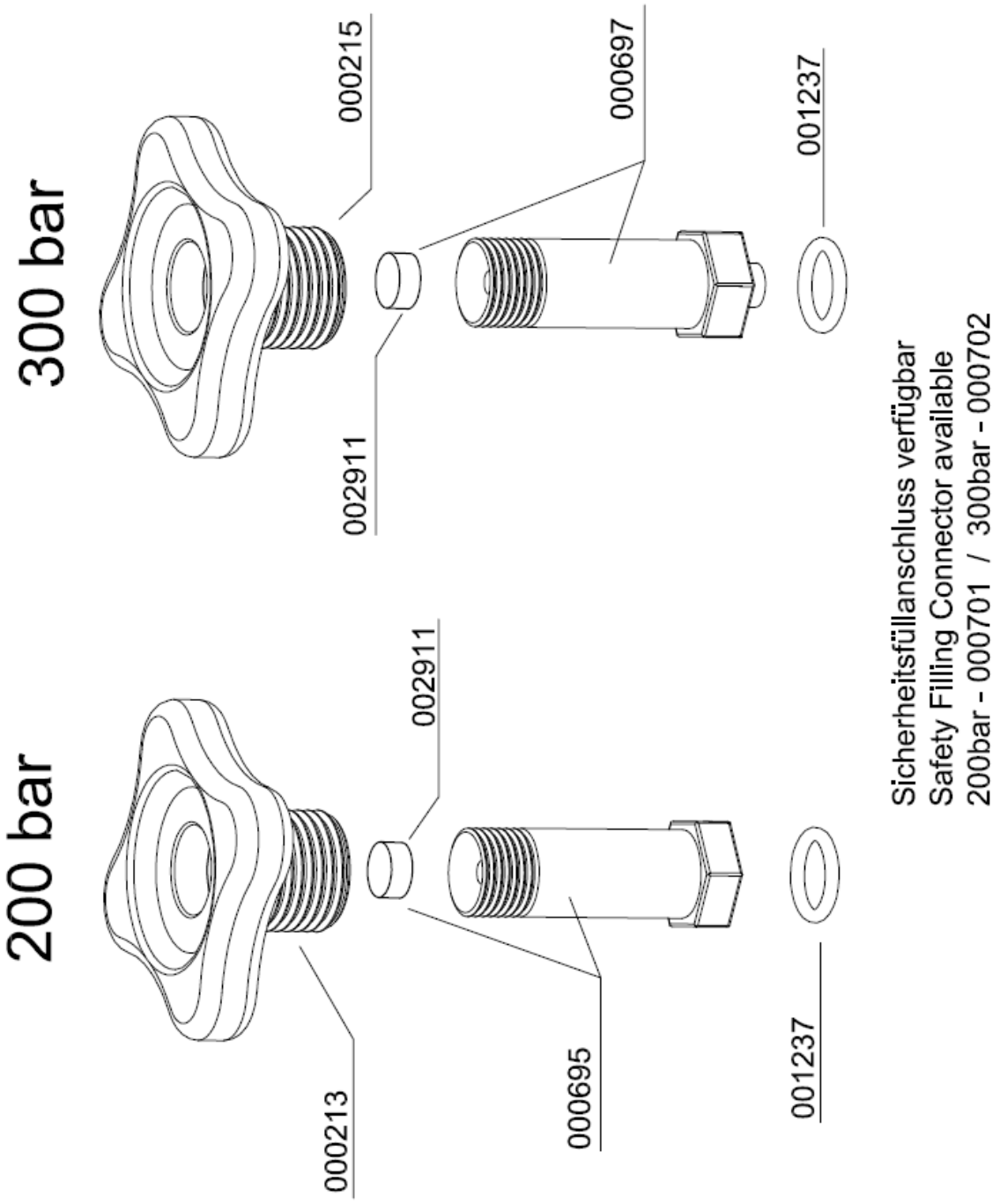
Spare part lists



Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000213	Handrad, schwarz DIN	Hand Wheel, black
000215	Handrad rot DIN	Hand Wheel, red
000695	Füllanschluss o. Handrad, 200bar	Filling Connector w/o handwheel 200bar
000697	Füllanschluss o. Handrad, 300bar	Filling Connector w/o handwheel 300bar
000701	Sicherheitsfüllanschluss, ohne Handrad,	Anti Whip Connector w/o handwheel, 200bar
000702	Sicherheitsfüllanschluss, ohne Handrad,	Anti Whip Connector w/o handwheel, 300bar
001237	O-Ring DIN Flaschenanschluss	O-Ring DIN filling connector
002911	Sinterfilter DIN Flaschenanschluß	Sintered filter, DIN filling connector

Spare part lists



D

200 / 300 BAR
PARALLEL FILLING
PRESSURE OPERATION

D

200 bar / 300 bar parallel filling pressure operation

This option allows the filling of 200 bar and 300 bar at once.

In this case, the compressor is equipped with a pressure reducer, a second final pressure safety valve and a second filling pressure gauge.

The handwheels (or bellows) are colour-coded to allow an optical differentiation:

- 200 bar: black
- 300 bar: red

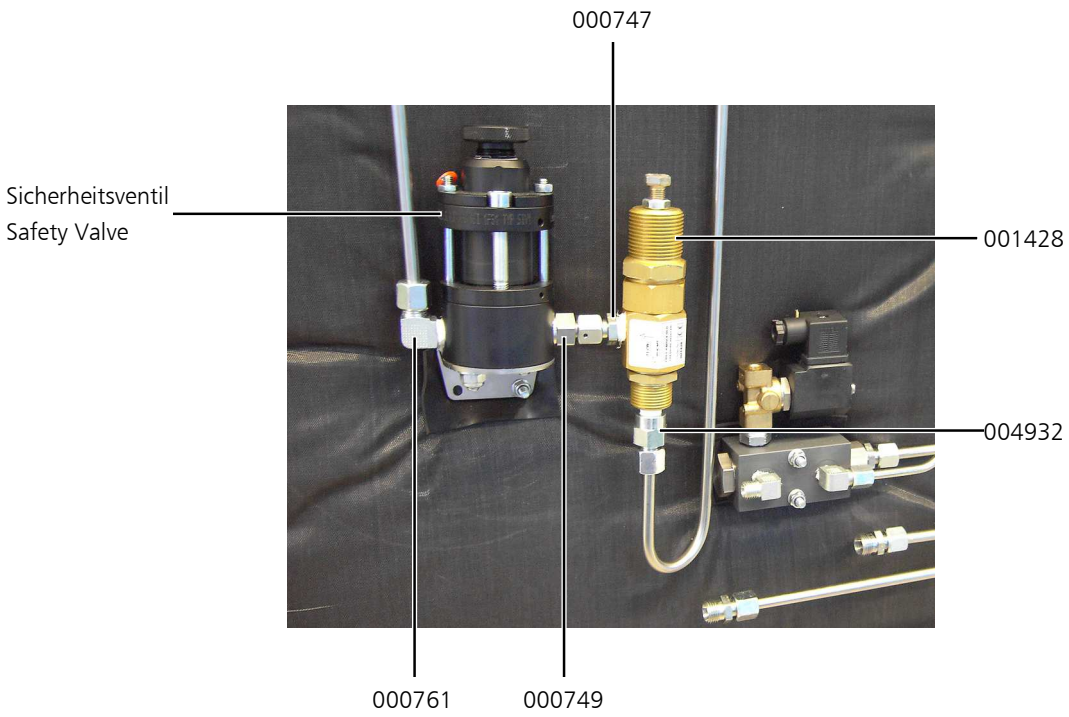
Furthermore, the corresponding filling pressures at the compressor are marked with labels.

DIN handwheels 200 bar and 300 bar

Fig. Safety valve: 225 bar (left),
pressure reducer: 330 / 225 bar (right)

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000747	Verschraubung	Connection
000749	Verschraubung	Connection
000761	Winkelverschraubung	Elbow connection
001428	Druckminderer	Pressure Reducer
004932	Adapter Verschraubung	Adapter Connection



Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000751	T-Verschraubung	T-connection
000849	Reduzierung	Reducer
000851	Gerade Reduzierung	Straight reducer
001437	Hochdruckschlauch	HP-hose
004169	Hochdruckschlauch	HP-hose

AIR COOLER CONNECTION KIT

D

Air cooler connection kit

The Air Cooler Connection Kit provides an easy connection and a simple and time-saving installation or backfitting.

The piping inside the compressor is completely installed. Just disconnect the U-connection at the outside and connect the air cooler according to the connection designation (inlet/ outlet).

To operate the unit without air cooler, reinstall the U-connection and the compressor is ready for use.

Air cooler connection kit

All length of high pressure hoses available

The Air Cooler Connection Kit does not include the high pressure hoses. So you can´t find any part numbers of our hoses in this chapter. We have a wide range of high pressure hoses in our product range. Please ask if you need special lengths.

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000902	Schottverschraubung	Elbow Bulkhead Fitting
006860	Rohrbogen	U-Connection

CONDENSATE TANK 60 LTR.

D

CONDENSATE TANK 60 LTR.

The 60 ltr. tank is equipped with an active carbon filter to collect condensate odourlessly and quietly. The condensate can be easily transported in the collecting tank and disposed environmentally sound.

The flexible connection hoses are fitted with quick-couplings, to allow easy separation from the compressor. The tank is equipped with a level gauge to indicate max. filling level. Two sturdy carrying handles ensure a safe transportation.

Technical Data:

- Dimensions: Ø 400 mm x 800 mm
- Weight: 20 kg

Maintenance and service

How to change the activated carbon and the metal filter insert

- Shut down the unit
- Plug out the condensate hoses
- Remove the protector cap, the nut and the allen bolts (Fig. 1)
- Take down the cover plate and the upper felt. Tip out the activated carbon and replace the lower felt
- Fill up the activated carbon and cover it with a new felt
- Put on the cover plate, screw the allen bolts and the nut and plug on the protector cap
- Unscrew the filter housing
- Remove the floater and the lower cover plate (Fig. 2)
- Take a pliers and pull the metal filter out of the metal case
- Insert the metal filter
- Install the cover plate and the floater
- Screw the filter housing onto the tank
- Plug in the condensate hoses

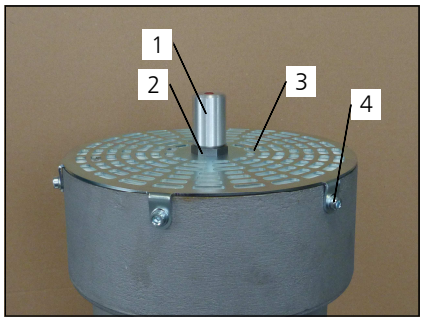


Fig. 1
1 Protector cap
2 Nut
3 Cover plate
4 Allen bolts (6x)

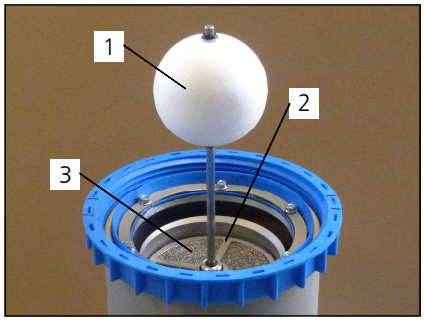


Fig. 2
1 Floater
2 Lower cover plate
3 Metal filter

Maintanance intervals

We recommend to change the activated carbon if it has reached the saturation level (smell of oil).

D

Spare part lists

Best.-Nr. / Order No.	Benennung	Description
003091	Kondensatbehälter 60 Liter	Condensate Tank 60L
004056	Kondensatschläuche Kondensatbehälter 60L, für 3-	Set of condensate hoses, 3 stages
004057	Kondensatschläuche Kondensatbehälter 60L, für 4-	Set of condensate hoses, 4 stages

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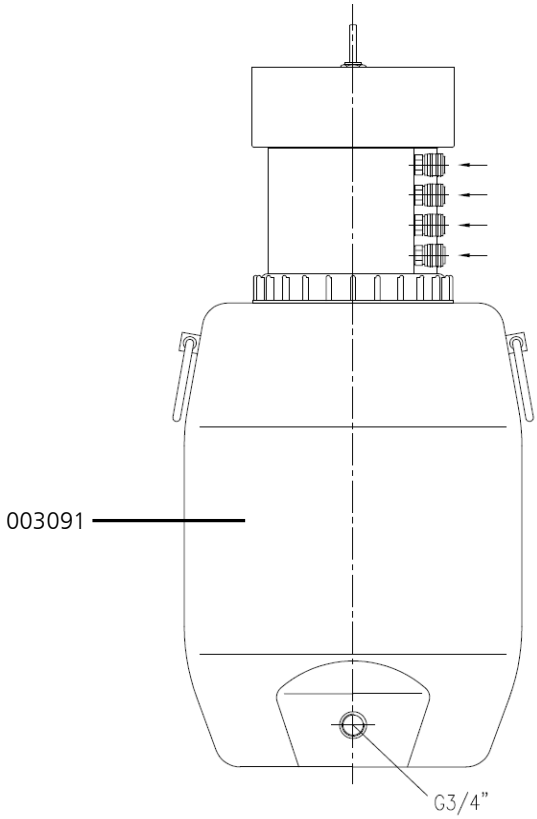
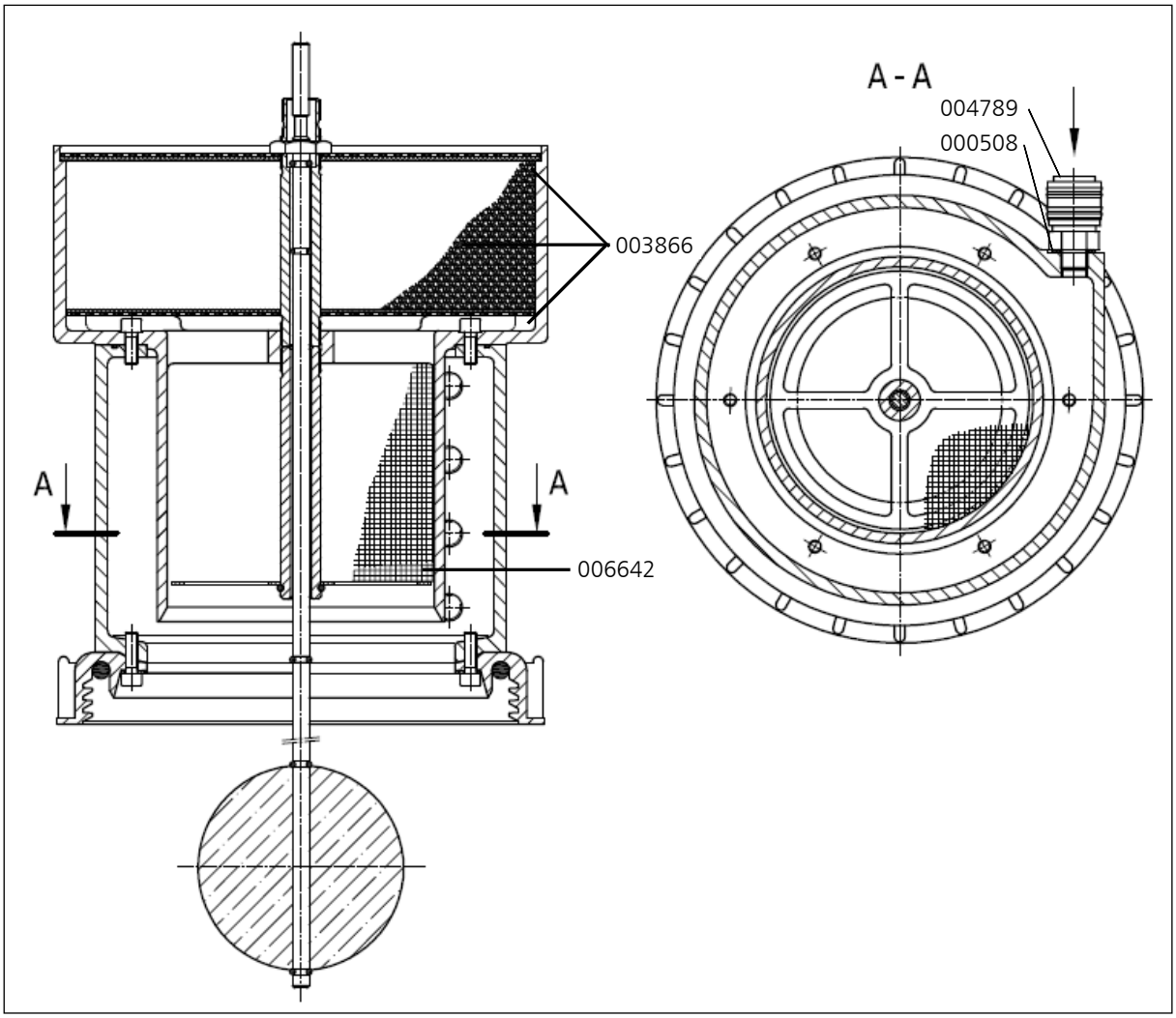


Spare part lists

Best.-Nr. / Order No.	Benennung	Description
000508	USIT-Ring 13,7 x Ø20 x 1,5	Gasket Ring U-Sit 13,7 x Ø20 x 1,5
003866	Filter Nachfüllset für 60 Liter	Filter refill set 60 ltr
004789	Schnellkupplung G1/4", DN 7,2	Quick connector G1/4",DN 7,2
006642	Metallgestrick für Kondensatbehälter 60 ltr	Metal filter insert 60 ltr tank



D

ATTACHMENT

E

Version: 11/12-E

Lenhardt & Wagner GmbH

An der Tuchbleiche 39
D-68623 Lampertheim – Hüttenfeld

www.lw-compressors.com

Operating Instruction

Safety valve

Typ:

SiV2 BKZ 989 TÜV.SV.12-989.5.G.V.P CE 0091 AlMgSi1 F31 1100* Lenhardt & Wagner

SiV BKZ TÜV.SV.14-1140.5.G.V.p CE 0091 AlMgSi1 F31 1100* Lenhardt & Wagner

Set pressure:	**see mark (hand wheel on top of valve)**
Maximum outflow:	**Set pressure 100-159 bar: 750 l / min** **Set pressure 160-350 bar: 1.100 l / min**
Suitable media:	**Media-resistant, non-corrosive gases**

The safety valve is used for protection of pressurized components, eg pipelines, pressure vessels, or the compressor itself.

The hand wheel on the top of the safety valve is marked with the adjusted set pressure.

Safety valve with socket

1) ***Identification of set pressure***
2) ***Seal***
3) ***Fixing screws***[1]
4) ***Venting srew (hand wheel)***
5) ***Identification serial number***
6) ***Socket for safety valve***

[1] und die Anforderungen des AD 2000 Merkblatts W7 erfüllen. The fixing screws M8 must be strength class 8.8 and meet the requirements of Merkblatt AD 2000 leaflet W7. Shaft length 70mm.

In order to prevent manipulation of the set pressure, all safety valves are factory fitted with a seal.

A safety valve on which the seal has been removed, must be returned to the manufacturer for repair / adjustment before further use.

In addition, the safety valve has a venting device (hand wheel).
When rotated clockwise, the safety valve and the filter housing of the final stage are completely vented.

During normal operation, the screw is unscrewed to the upper stop anticlockwise; an integrated safety ring prevents the screw from being removed.

If a safety valve blows off, the system must be switched off immediately and the cause of the error, investigated.

There are two possible reasons:
1. The safety valve is defective and blows off before the set pressure.
In this case the safety valve should be submitted immediately to the manufacturer for repair or replaced with a new one.

2. The safety valve opens properly, the problem is on the system.
A constant blowing of the safety valve is not permitted, the sealing seat of the valve can be damaged.
The error on the system must be detected and repaired before further filling operations.

The safety valve may only be used if it is ensured that the maximum flowrate of the system does not exceed the blow-off rate of the safety valve.

The safety valve may only be used with the approved media.
Repair work on compressors must only be performed by trained personnel.

Dismantling of the safety valve

Ensure that on the safety valve is no pressure.

Loosen and remove the two M8 fixing bolts with a 6 mm Allen key.

The safety valve can now be removed by turning and simultaneously pulling out of the socket.

Mounting
1. Clean the safety valve socket.
2. Oil the insert pin of the safety valve including the O-ring with 1 to 2 drops of oil.
3. Press the safety valve pin complete into the socket.
4. Fasten the safety valve with the two 8 mm allen screws into the socket
   (Tightening torque: 10 Nm)
5. Screw the venting screw (hand wheel) anticlockwise to its upper limit.
6. Start the System (Compressor), check installation for leaks and proper function.

Manufacturer: **Lenhardt & Wagner GmbH**
An der Tuchbleiche 39
D-68623 Lampertheim – Hüttenfeld

Contact: **E-Mail: service@lw-compressors.com**
Web: www.lw-compressors.com
Tel.: +49 (0) 6256 – 85880 0
Fax: +49 (0) 6256 – 85880 14

Note:
Only use safety valves which are in a technically perfect condition, for its intended purpose, safety and danger awareness, in compliance with the operating instructions!
Faults which could affect safety must be rectified immediately!

Notes:
- The safety valve must be installed directly on the protected pressure vessel and / or the plant.
- The safety valve must be installed in an upright position.
- The flow area of the port must be greater than the valve opening.
- Protect valve against splashes

Maintenance:

- In accordance with current Pressure Equipment Directives, the safety valve must be periodically checked for operation and reliability.

- Refill annually lubricating oil:
  Oil filling position:
  Hole on the spacer (see arrow, Figure 1)

- Oil level: Fill oil into the hole until oil comes out of the hole.

Figure 1: Position for oil refill

To be used lubricating oil for the safety valve: L&W Article N°.: 008500 (content: 30 ml)

INFORMATIONON THE SERVICE LIFE OF L&W HIGH PRESSURE HOSES

CONTENTS

Testing hose lines

An essential factor in ensuring operational safety when handling L&W compressors is the proper testing of the hose lines used.
Tests are necessary:

- After assembly and before commissioning the hose line.
- After accidents, changes (modifications) to the compressor system, longer periods of non-use and damage due to, for example, collisions or natural phenomena (extraordinary test).
- After carrying out repair work on the compressor system that could compromise safety.
- Recurrently at fixed, regular intervals.

The proprietor must determine the type, scope and deadlines for the tests according to his or her individual operating conditions and on the basis of a risk assessment. **The specifications and recommendations of the manufacturer must be observed.** The specifications made regarding type, scope and deadlines (as well as the replacement intervals) must be documented in writing as occupational health and safety measures.
The results of the tests must also be recorded, e.g. together with the test report of the machine, and kept at least until the next test.
The above-mentioned tests may only be carried out by persons who are qualified to do so and who are authorized by the company (employer).

Testing after assembly and before commissioning

In the test after assembly and before commissioning, factors relating to assembly or factors that can only be evaluated on the fully assembled machine must be assessed.
The assembled hose lines must also be assessed.
Some test points can already be assessed during a visual inspection when the machine is switched off.
An overview of the recommended scope of testing for a visual inspection of hose lines is given in the appendix.
Further test points included in the test of hose lines before commissioning, require a functional test with the machine running.
A recommendation for the scope of testing is given in the appendix.

Recurring test

Since hose lines are subject to influences that cause damage during operation and can lead to dangerous situations, they must be tested recurrently at fixed intervals. The aim of recurring tests is to detect and repair damage in good time.
The objective is to ensure that the system remains in a safe condition.

Procedure for hose lines found to be "defective"

If defects are found during the testing of the hose line that impair the safe condition of the work equipment, these must be rectified immediately. If this is not possible, suitable measures must be taken to ensure that the machine cannot be used further before it is repaired. Defective hose lines must be replaced before the machine can be used further.
It is not permitted to repair or reassemble damaged hose lines with old, previously used parts!
If several hose lines are replaced at the same time, precautions must be taken to prevent mix-ups of the connections or the installation points.

Test intervals

Deadlines for the recurring tests of the hose lines should already be set before commissioning. Otherwise, there is a risk that work equipment will continue to be used or operated for too long without being tested.
The intervals between the recurring tests must be selected in such a way that deviations from the safe operating condition of work equipment can be detected and eliminated in good time.
The intervals for recurring tests specified here are guidelines and based on experience. Shorter test intervals may have to be specified on the basis of the risk assessment; special operating conditions; or according to the manufacturer's specific instructions in the machine operating manual. Longer test intervals may also be specified, provided that this is justifiable and tenable from a safety point of view.
The determination of the test intervals should be documented.

Type of test	**Recommended test intervals**
Visual inspection	Before commissioning the system
Functional test	Annually with previous visual inspection

Persons qualified to test hose lines

A qualified person is a person who, through his or her professional training, professional experience and recent professional activity, has the necessary specialist knowledge required for testing work equipment - in this case for testing hose lines.
These requirements are defined in the Technical Rules for Industrial Safety TRBS 1203
"Qualified persons - general requirements" fulfilled if:

- the qualified person has completed a professional training that enables his or her professional knowledge to be determined in a comprehensible manner, i.e. based on professional qualifications or comparable evidence. For the testing of hose lines, the person concerned must have completed a technical professional training or another technical qualification sufficient for the intended testing tasks. The object is to guarantee that the tests will be carried out properly.
- proof of practical use at work of the equipment to be tested as well as the associated professional experience is provided. The qualified person must be sufficiently familiar with the conditions that demand the performance of tests, such as the result of the risk assessment or observations during the working day.
- there is proof of recent professional activity in the area of the upcoming tests and appropriate further training. The qualified person must also have gained experience with regard to the tests to be performed or comparable tests. He or she must also have knowledge of the state of the art with regard to the work equipment or components to be tested as well as the hazards to be considered. This also includes knowledge of the relevant technical regulations and the updating of this knowledge, e.g. through participation in training courses/instruction.

The qualified person is not subject to any technical instruction during the course of his or her testing activity and must not be disadvantaged because of this.
Experts who have carried out tests on the hose lines up to now and who meet the three criteria mentioned above and who have familiarized themselves with the contents of the German Ordinance on Industrial Safety and Health and the changes associated with it are also considered qualified persons to whom the tests can continue to be assigned.
See also:

⇒ § 2 para. 7 of the German Ordinance on Industrial Safety and Health,

⇒ Technical Rules for Operational Safety TRBS 1203.

Replacing hose lines

As a general rule, even when stored properly and subjected to permissible stress during use, all hose lines are subject to natural aging, which changes the material and composite properties and reduces the performance of the hose lines.
This limits the service life of a hose line and the operator must ensure that hose lines are replaced at appropriate intervals.

Immediate replacement of hose lines

Hose lines must be replaced immediately in the event of the following defects:

- External visible damage to the hose line or fittings.
- Internal damage to the tube or the reinforcement.
- Leakage from the hose line or the fittings.
- Deformation of the hose line or the fittings.

Service life of L&W high pressure hoses

When determining the service life or the replacement interval of the individual hose lines, the concrete specifications and recommendations of the hose line or machine manufacturer must be observed. Furthermore, empirical values resulting from previous tests done under the prevailing operating conditions on site are also relevant.
Guideline values for recommended replacement intervals of hose lines which have proven themselves in practice are summarized below.

Hose line requirements	**Recommended replacement intervals**
Standard requirements	6 years (Service life including a maximum of 2 years storage time)
Increased requirements, e.g. due to - increased operating time, e.g. multi-shift operation, or short machine or pressure pulse cycle times - strong external and internal influences (due to the medium), which greatly reduce the service life of the hose line	2 years (service life)

The guideline given above for a replacement interval of six years for hose lines meeting normal requirements includes a maximum storage period of two years. The guideline value of two years for hose lines meeting increased requirements represents the maximum permissible service life.

A prolongation of the guideline values given above for replacement intervals is possible if

- appropriate test values and empirical values are available from the operator of the machine which permit safe continued use beyond the recommended maximum service period,
- a hazard or risk assessment, documented in writing, has been carried out by the operator, which also takes into account protective measures in the event of failure of hose lines, and
- tests for safe working conditions are carried out by qualified persons at appropriately set, if necessary reduced, intervals.

It must be ensured that the prolongation of the replacement intervals does not result in a dangerous situation that could injure employees or other persons.
If hose lines fail during operation or if damage or defects are frequently detected during the recurring tests, then, in addition to investigating the causes, the test and replacement intervals must be shortened.

Storing hose lines

When storing hose lines, storage conditions must be aimed at minimizing the natural aging that occurs over time and the associated change in material and composite properties.
For this purpose, the following information must be provided:

- Store in a cool, dry and low-dust place.
  Low-dust storage can be achieved, for example, by wrapping the hoses in plastic film.
- Avoid direct sun or UV radiation.
- Shield from nearby heat sources.
- Avoid storage temperatures below -10 °C for elastomers.
- Do not use ozone-generating light fittings or electrical devices that may produce sparks in the immediate vicinity.
  (Ozone-generating light fittings are, for example, fluorescent light sources, mercury vapor lamps).

The most favorable storage conditions are temperatures between +15 °C and +25 °C, as well a relative humidity below 65 %.
During storage, hose lines must not come into contact with substances that could cause damage, e.g. acids, alkalis, solvents. Penetration of ozone or other harmful air constituents can be prevented by sealing the ends or by wrapping the hoses in plastic film. They must be stored flat and free of tension.
The storage period for hose lines should not exceed two years.

ANNEX

Recommended scope of testing "visual inspection" (before initial commissioning or recommissioning)

- Is all user information required for safe operation of the system available (e.g. flow chart, operating instructions)?
- Do the hose lines comply with the flow chart or parts list?
- Are there protective measures in place, such as pressure relief valves, for cases of unusually high pressure pulses or pressure amplifications?
- Are the hose lines marked with the name or abbreviation of the manufacturer, maximum permissible operating pressure, nominal diameter, quarter/year of manufacture?
- Are the hose lines installed in such a way that, in accordance with DIN 20 066
  - the natural position does not hinder movement?
  - turning or twisting of the hose is prevented, likewise tensile load caused by a line that is too short and a bending radii that is too small?
  - the hose is routed via a kink protector (if necessary on the connecting element)?
  - sufficient clearance prevents external mechanical influences or abrasion on the edges?
  - hose bridges prevent damage being caused by driving over the hose line?
  - hose guides (such as hose saddles and sufficiently wide hose brackets) protect loosely laid hose lines and
  - a heat shield protects against high temperature exposure?
- Are suitable protective measures, such as fixtures, safety gear or shielding provided for hose lines that, in the event of failure, pose a risk of whipping?
  A risk is to be assumed if persons are generally present in the immediate vicinity of the hose lines, for example.
- Do the hose lines of newly commissioned or re-commissioned machines already show signs of damage?
- Are the installed hose lines still within the storage/use period recommended by the relevant manufacturer?
- Are the hose lines free of paint?
- Are the hose lines free of chafe marks?
- Does the operating manual contain information on test intervals? If so, what?

Note:
The installed hose lines should not be made from used hoses or used press fittings that have already been in use as part of a hose assembly!

Recommended scope of testing "Functional test" (before initial or recommissioning)

Note:
Visual inspection must be carried out before the functional test

- All parts of the system must be tested at least at the maximum working pressure that could be achieved taking into account all intended applications:
  - Are the hose lines and connecting elements free of leakage?
  - Have all hose lines withstood the pressure?

Note:
The installed hose lines should not be made from used hoses or used press fittings which have already been in use as part of a hose assembly!