



## CHAPTER OVERVIEW

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<b>Operating Instructions</b> .....	<b>A</b>
<b>ECC - Electronic Compressor Control (if equipped)</b> .....	<b>B</b>
<b>Spare Parts Lists</b> .....	<b>C</b>
<b>Options (if equipped)</b> .....	<b>D</b>
<b>Attachment</b> .....	<b>E</b>

### 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](mailto:service@lw-compressors.com)

Internet: [www.lw-compressors.com](http://www.lw-compressors.com)





## SERVICE INFORMATION / WARRANTY

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### 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.

# Operating Instructions

Breathing Air Compressor

LW 320 E AL Nautic





## TABLE OF CONTENTS

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### General Information and Technical Data

General Information / Description of Warning Symbols .....	4
Scope of Delivery .....	5
Technical Data .....	6
Unit Assembly .....	7
Switchboard .....	8
Flow chart .....	9

### Safety Precautions

Intended Use / Operators .....	11
Safety instructions on the unit .....	12
General Safety Precautions .....	13
Unit customised safety notices .....	14
Maintenance instructions .....	15
Transportation instructions / Safety regulations .....	16

### Installation

Installation in closed rooms .....	18
Dimensions .....	19
Minimum distances .....	20
Ventilation .....	21
Electrical Installation .....	22 - 23

### Operation

Important operation instructions .....	25
First commissioning .....	26 - 28
Daily commissioning .....	29
Filling procedure .....	30
Switch off the compressor .....	31

<b>Remedying faults</b> .....	32 - 36
-------------------------------	---------

### Maintenance and Service

Service, Repair and Maintenance .....	38
Maintenance Lists / Maintenance Intervals .....	39 - 42
Service Kits .....	43
Check V-belt tension / Tension V-belt .....	44
Check oil level .....	45
Oil change .....	46
Oil filter maintenance .....	47
Manual condensation dump system .....	48

A





## TABLE OF CONTENTS

---

### **Maintenance and Service**

Oil / Water separators 1st and 2nd stage - Maintenance .....	49
Filter housing / Filter cartridge .....	50
Filter cartridge change.....	51
Filter housing - Maintenance .....	52
Inlet filters / Inlet filter cartridge change .....	53
Cylinder heads and valves .....	54
Replace inlet and outlet valve 1st stage .....	55 - 56
Replace inlet and outlet valves 2nd and 3rd stage .....	57
Safety valves .....	58
Pressure maintaining / non return valve .....	59
Pressure gas vessel test .....	60
Maintenance records .....	61 - 66

### **Storage**

Conservation / storage of the compressor .....	67
De-conservation, commissioning .....	67
Transportation instructions / Disposal .....	68

A



## GENERAL INFORMATION

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### 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.

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### 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.

## DESCRIPTION

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### Scope of Delivery

Compressors are provided in different equipped versions.

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### Versions

#### Filling pressure versions:

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

### Specifications

- Electro motor
- Seawater resistant aluminum-frame (Colour: RAL 7004)
- Crash frame c/w 4 carrying handles and sling eyes
- Hour counter and integrated pressure gauge
- Manual condensate drain
- 4x Filling hose c/w filling valve
- Pressure maintaining and non return valve
- All pistons c/w steel piston rings
- Low pressure oil pump
- Oil- / Water separators in stainless steel
- Safety valves after each stage
- Filling pressure to your choice (200 or 300 bar)
- Connections to your choice (DIN 200 bar or 300 bar, CGA 200 bar or 300 bar and INT)

### Options

- Automatic condensate drain
- Automatic stop at final pressure
- Auto start system
- 200 and 300 bar parallel filling pressures
- Additional high pressure outlet
- Oil pressure gauge
- Wheel set

## DESCRIPTION

### Technical Data



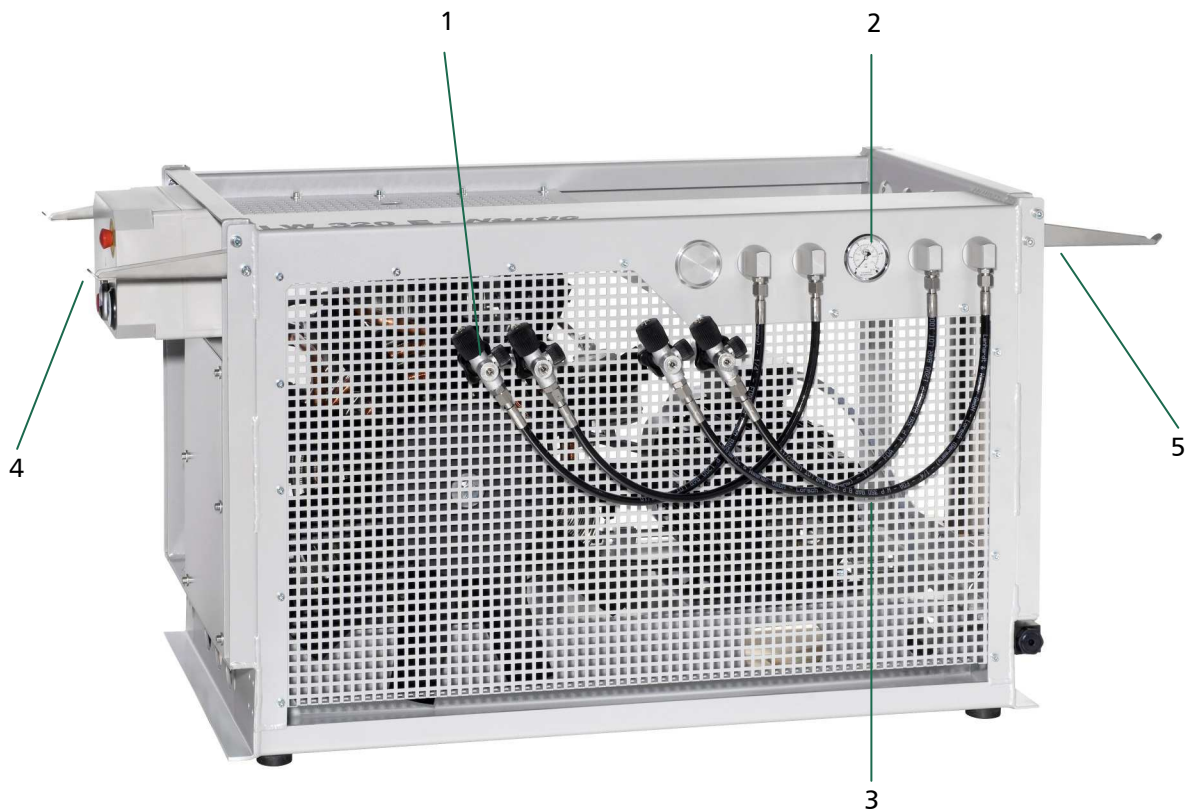
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Technical Data	LW 320 E AL Nautic
Capacity [l/min]:	320
Max. Operating Pressure [bar]:	350
RPM [min <sup>-1</sup> ]:	1580
Number of Pressure Stages:	3
Cylinder Bore 1st Stage [mm]:	Ø 95
Cylinder Bore 2nd Stage [mm]:	Ø 40
Cylinder Bore 3rd Stage [mm]:	Ø 18
Medium:	Compressed Air / Breathing Air
Intake Pressure:	atmospheric
Oil Pressure [bar]:	+0.6 to +4.0
Oil Capacity [l]:	1.8
Intake Temperature [°C]:	0 < +45
Ambient Temperature [°C]:	+5 < +45
Cooling Air Volume [m <sup>3</sup> /h]:	> 2250
Voltage:	400 V / 3 phase / 50 Hz
Protection Class Drive Motor:	IP 54
Drive Power [kW]:	7.5
RPM Motor [min <sup>-1</sup> ]:	2890
Start:	Star/Delta
Noise level [dB(A)]:	83
Dimensions W x D x H [mm]:	1290 x 740 x 600
Weight [kg]:	approx. 175
Content Volume Filter housing [l]:	1.7

## DESCRIPTION

### Unit Assembly

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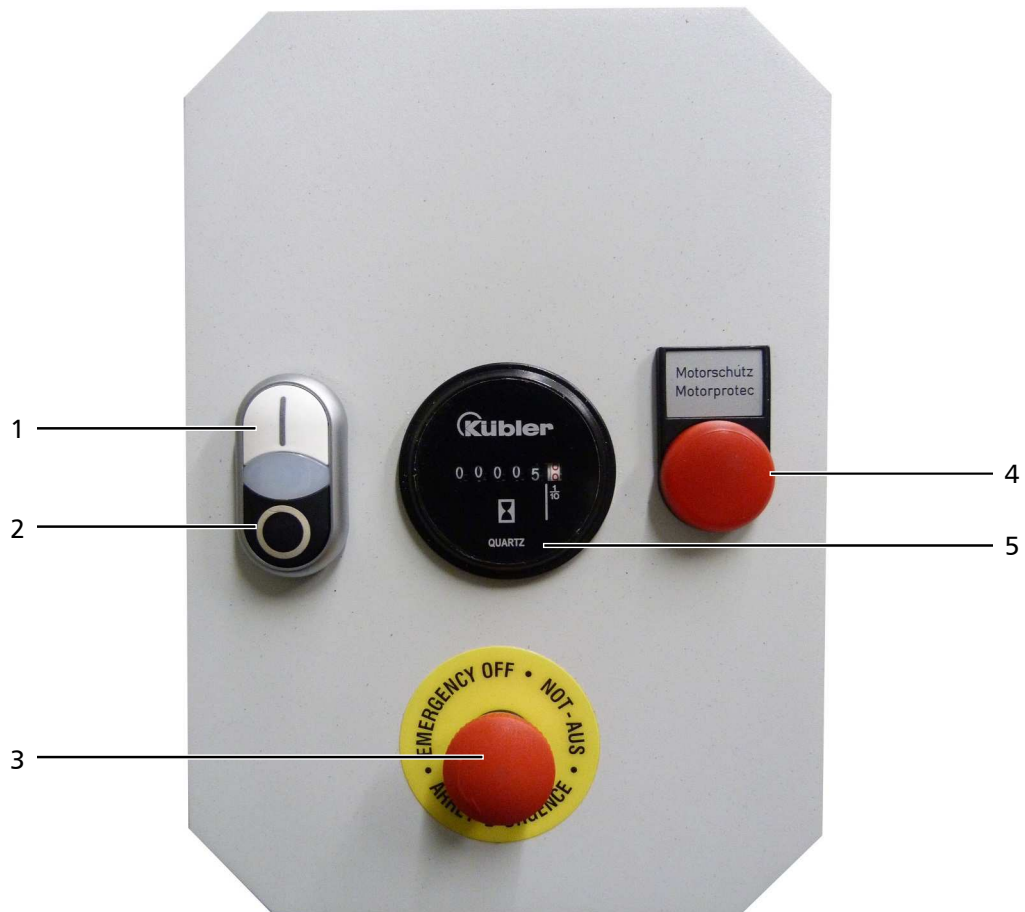


No.	Designation
1	Filling valves
2	Filling pressure gauge
3	Filling hoses
4	Switch box
5	Carrying handles

## DESCRIPTION

### Switchboard

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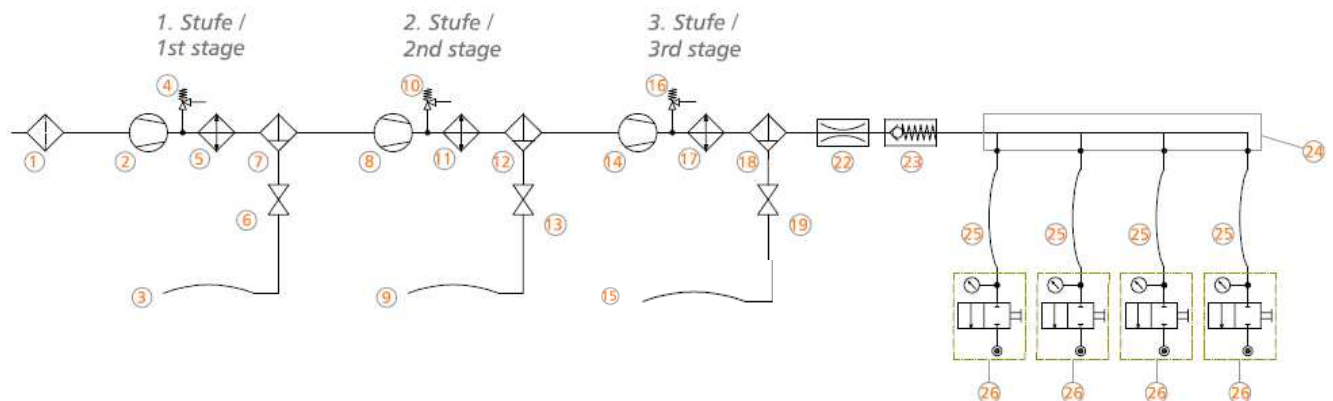


No.	Designation
1	ON button
2	OFF button
3	Emergency shut-off switch
4	Motor protection warning light
5	Hour counter

## DESCRIPTION

### Flow chart

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- |   |   |
|---|---|
| 1. Ansaugfilter / Air Intake Filter                     | 14. 3. Verdichterstufe / 3rd Pressure Stage             |
| 2. 1. Verdichterstufe / 1st Pressure Stage              | 15. Kondensatablaßschlauch / Condensate Release Hose    |
| 3. Kondensatablaßschlauch / Condensate Release Hose     | 16. Sicherheitsventil 3. Stufe / Safety Valve 3rd Stage |
| 4. Sicherheitsventil 1. Stufe / Safety Valve 1st Stage  | 17. Wärmetauscher / Heat Exchanger                      |
| 5. Wärmetauscher / Heat Exchanger                       | 18. Öl-/Wasserabscheider / Oil-/Water Separator         |
| 6. Kondensatablasshahn / Condensate Drain Valve         | 19. Kondensatablasshahn / Condensate Drain Valve        |
| 7. Öl-/Wasserabscheider / Oil-/Water Separator          | 22. Druckhalteventil / Pressure Maintaining Valve       |
| 8. 2. Verdichterstufe / 2nd Pressure Stage              | 23. Rückschlagventil / Non-Return Valve                 |
| 9. Kondensatablaßschlauch / Condensate Release Hose     | 24. Verrohrung / Piping                                 |
| 10. Sicherheitsventil 2. Stufe / Safety Valve 2nd Stage | 25. Hochdruckschlauch / HP-Hose                         |
| 11. Wärmetauscher / Heat Exchanger                      | 26. Füllventil / Filling valve                          |
| 12. Öl-/Wasserabscheider / Oil-/Water Separator         |   |
| 13. Kondensatablasshahn / Condensate Drain Valve        |   |



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# SAFETY PRECAUTIONS





## SAFETY PRECAUTIONS

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### 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 unauthorized 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 PRECAUTIONS**

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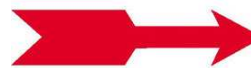
### **Safety instructions on the unit**

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

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**Warning**  
High voltage!



**Note**  
Ensure correct direction of rotation!



## **SAFETY PRECAUTIONS**

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### **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.

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## **SAFETY PRECAUTIONS**

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### **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 it 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.



## SAFETY PRECAUTIONS

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### 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.

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## **SAFETY PRECAUTIONS**

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### **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.

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# INSTALLATION

## INSTALLATION

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### 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<sup>3</sup> 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")!



# INSTALLATION

## Dimensions

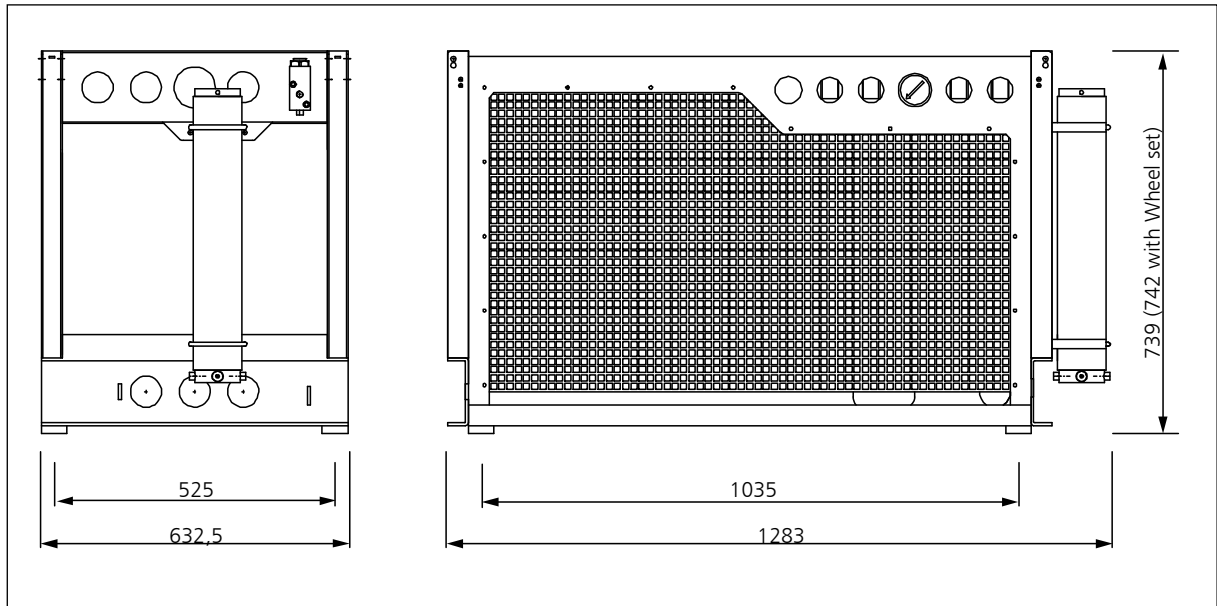


Fig. Dimensions

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## INSTALLATION

### 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 min. 500 mm, rear side min. 500 mm.  
Avoid anything in this area which can restrict the cooling air flow.

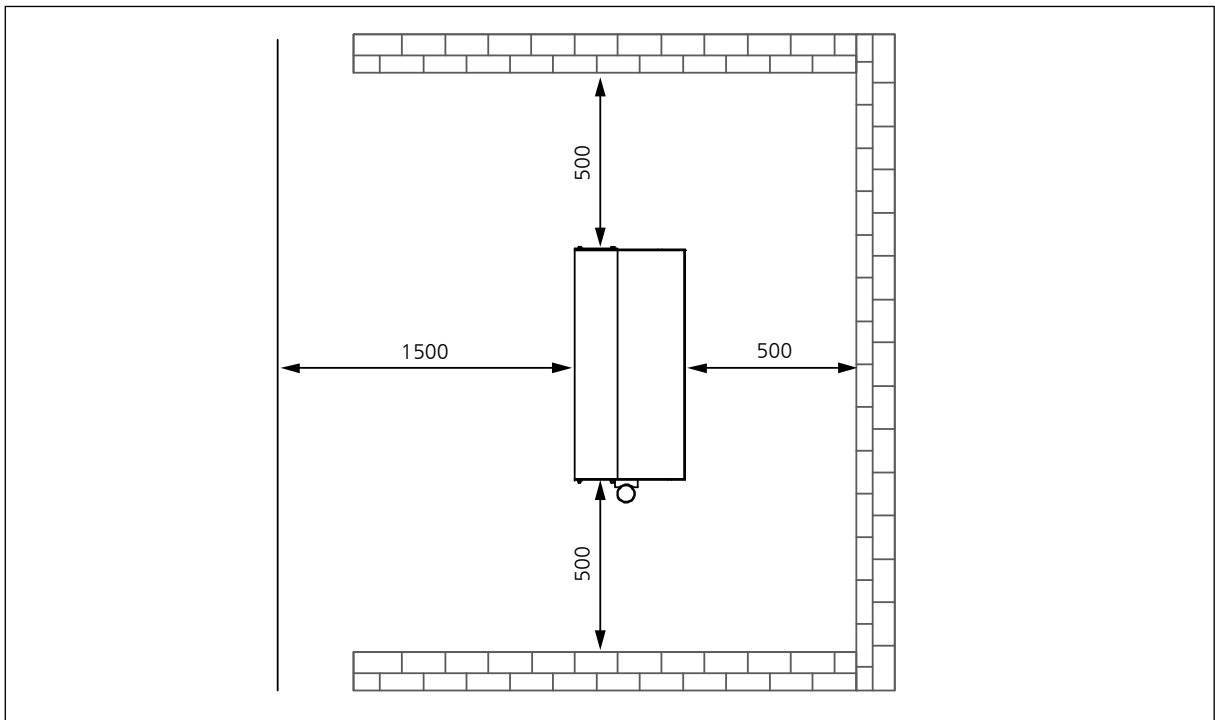


Fig. Minimum distances

## INSTALLATION

### 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:  
 $300 \times \text{drive power [kW]} = \text{required cooling air flow [m}^3/\text{h]}$   
 Example 11kW motor:  $300 \times 11\text{kW} = 3300 \text{ m}^3/\text{h} = \text{required cooling air flow.}$
- 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.

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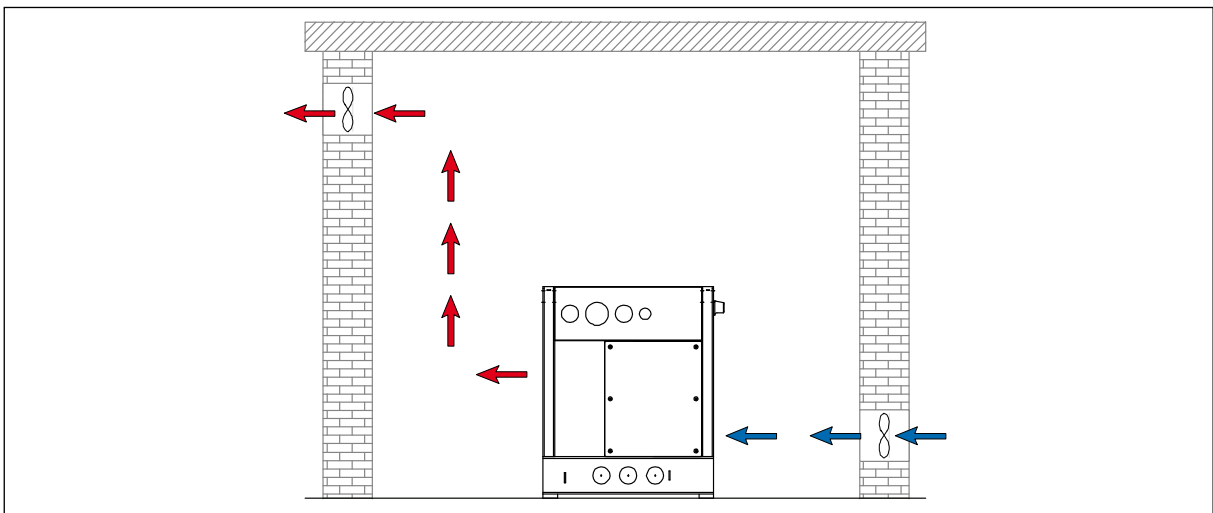


Fig. Ventilation through facade

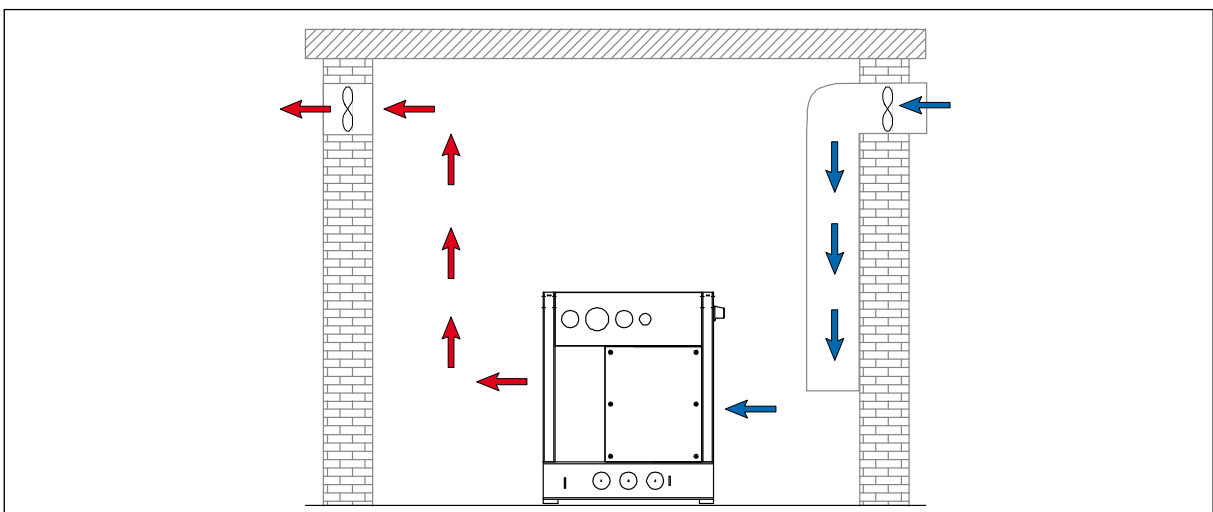


Fig. Ventilation via ventilation stack

## INSTALLATION

### 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).

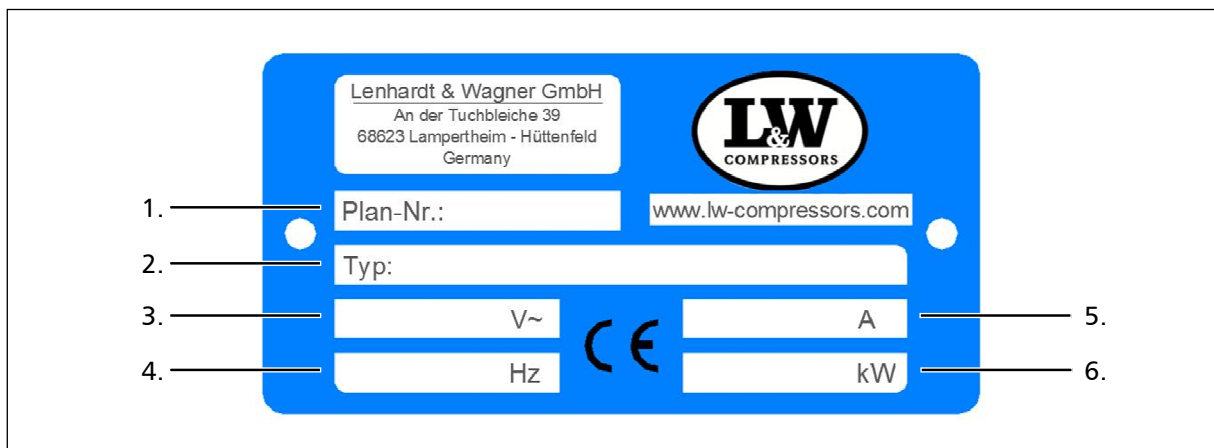


Fig. Compressor name plate

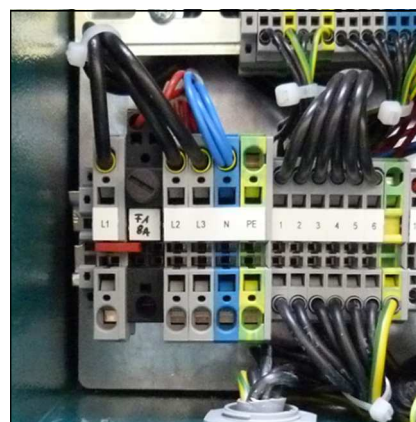
No.	Designation
1.	Circuit diagram number
2.	Compressor type
3.	Power supply
4.	Frequency
5.	Motor current consumption
6.	Nominal motor power

## INSTALLATION

### 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



A

### Recommended fuses for 360 - 500 V operating voltage

Nominal motor power		Fusing start A		Connection in mm <sup>2</sup>	
[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 mm <sup>2</sup>	
[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



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# OPERATION



## OPERATION

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### 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.

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## FIRST COMMISSIONING

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### 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).
- Check if all filling valves are closed. Open one filling valve and hold tight manually!

### 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. Close the open filling valve carefully.
6. Run the compressor up to maximum pressure and check if the safety valve opens at the adjusted set pressure. (The set pressure value is engraved on the knurled screw of the safety valve.) If this function can not be ensured, the unit must be immediately taken out of service. -> Change safety valve!
7. Stop the compressor by pushing the OFF button.
8. Check the compressor unit for leaks (little smoke emission and release noises from the inlet filter housing can be ignored).
9. Now check the condensate drain valves:
  - Fix the black condensate hoses
  - Open manual condensate drain valves
  - If correct, air escapes
10. Open all filling valves carefully to vent.



## FIRST COMMISSIONING

### 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 the oil level before each operation of the unit by using the oil dipstick.

#### Oil level check as follows:

- Unscrew oil dipstick
- Wipe off oil residues
- Insert the oil dipstick back into its tube and screw it until stop
- Unscrew oil dipstick again

The oil level should be between the notch and the end of the oil dipstick. If there is no oil between the notch and the end of the oil dipstick, refill immediately new full synthetic compressor oil.



Oil dipstick

### Check V-belt tension

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

#### Tension V-belts

To tighten V-belt tension, loosen 4 mounting nuts of the drive motor. Use the tensioning screw to move the electric motor until the V-belt tension is sufficient. Then, tighten mounting nuts and check V-belt tension.

We recommend using a V-belt tension gauge.

#### Correct V-belt tension

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

### Settings

Motor Type	Initial Installation	Operation after running in
Electric motors 50Hz	500 N	400 N
Electric motors 60Hz	400 N	300 N

## FIRST COMMISSIONING

### 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

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## DAILY COMMISSIONING

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### **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.

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## OPERATION

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### 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 must be stopped manually when final pressure is reached. No serial auto shut down. The unit must also be started manually.

**Caution**

Vent condensate drain valves every 15-30 minutes manually.

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



## OPERATION

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### Switch off the compressor

The compressor unit is equipped as standard with a pressure switch, which automatically switches from filling gas to idle operation when the corresponding final pressure is reached. The compressor continues running in idle operation until switching it off manually or when the fuel is completely combusted.

The unit can be shut down at any time during filling procedure by the key switch.



#### Note

After switching to idle operation or switching off manually, all pressure vessels and filter housings of the compressor will be automatically vented.

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# REMEDYING FAULTS

## 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"



## REMEDYING FAULTS

### Compressor overheated

Cause of fault	Remedy
Inlet filter cartridge contaminated	Replace
Ambient temperature too high	Improve room ventilation /
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,
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



## REMEDYING FAULTS

### 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



## REMEDYING FAULTS

### 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

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# MAINTENANCE AND SERVICE

## MAINTENANCE AND SERVICE

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### 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.



## MAINTENANCE AND SERVICE

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### 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	-	1,8	000001

### Every 3 months or as required

Maintenance work	Type	Quantity	Order No.
Check automatic condensate drain, open manual condensate taps	-	-	-
Check/Retorque all connections and bolts	-	-	-

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## MAINTENANCE AND SERVICE

### Annually

Maintenance work	Type	Quantity	Order No.
Oil change, if less than 1000 operating hours	-	1.8	000001
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)	-	-	-
Clean oil filter element, if less than 1000 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	-	-	-



## MAINTENANCE AND SERVICE

### Every 1000 operating hours

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Maintenance work	Type	Quantity	Order No.
Replace V-belt	LW 320 E (50Hz)	2	006747
	LW 320 E (60Hz)	2	006286
Replace sintered metal filter element of water separators	1st and 2nd stage	2	002123
Replace o-rings of water separators	1st and 2nd stage	2	001255
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 o-rings of the final filter housing	-	2	001287
Replace back-up rings of the final filter housing	-	2	001285
Replace sintered metal filter of oil filter	-	1	000184
Replace o-ring of oil filter	-	1	000435
Oil change	-	1,8	000001



## MAINTENANCE AND SERVICE

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### Every 2000 operating hours

Maintenance work	Type	Quantity	Order No.
Replace all inlet and outlet valves incl. Gaskets	1st stage	1	002093
	2nd stage	1	000542
	3rd stage	1	000543
	Upper gasket 1st	1	000257
	Lower gasket 1st	1	000258

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## MAINTENANCE AND SERVICE

### 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, V-Belts, Silencers, In-&Outlet Valve, Valve Seals and Compressor oil.



Service Kits

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### Service Kits LW 320 E AL Nautic for 50 Hz

Compressor	Frequency	Operating Hours	Order No.
LW 320 E AL Nautic	50 Hz	1000 h	006753
LW 320 E AL Nautic	50 Hz	2000 h	006754

### Service Kits LW 320 E AL Nautic for 60 Hz

Compressor	Frequency	Operating Hours	Order No.
LW 320 E AL Nautic	60 Hz	1000 h	006755
LW 320 E AL Nautic	60 Hz	2000 h	006756



## MAINTENANCE AND SERVICE

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### 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

To tighten V-belt tension, loosen 4 mounting nuts of the drive motor. Use the tensioning screw to move the electric motor until the V-belt tension is sufficient. Then, tighten mounting nuts and check V-belt tension.

We recommend using a V-belt tension gauge.

### 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.

### Settings

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

## MAINTENANCE AND SERVICE

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### 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 the oil level before each operation of the unit by using the oil dipstick.

#### Oil level check as follows:

- Unscrew oil dipstick
- Wipe off oil residues
- Insert the oil dipstick back into its tube and screw it until stop
- Unscrew oil dipstick again

The oil level should be between the notch and the end of the oil dipstick. If there is no oil between the notch and the end of the oil dipstick, refill immediately new full synthetic compressor oil.



Oil dipstick

### Oil change



#### Note

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

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#### 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. 1800 ml synthetic compressor oil is necessary for one oil change. Only use synthetic compressor oil which is recommended as suitable from L&W.

## MAINTENANCE AND SERVICE

### Oil filter maintenance



#### Caution

Oil filter housing is filled with oil. Take all necessary protection measures.



#### Note

Clean all parts thoroughly before assembly.

#### Oil filter maintenance as follows:

- Loosen pipe connections
- Loosen mounting screws (Fig. 1) and remove oil filter
- Loosen mounting screws of the filter cover (Fig. 2).
- Change o-ring, previously grease new o-ring (Fig. 3)
- Loosen mounting nuts and remove filter washer (Fig. 4)
- Change sinter filter (Fig. 4).
- Place filter washer and washer (Fig. 5) and tighten nut.
- Place filter cover, fix and tighten mounting screws of the filter cover (Fig. 2).
- Screw and tighten mounting screws of the oil filter (Fig. 1).
- Connect pipe connections and tighten.

The oil filter maintenance is now completed.



Fig. 1 - Loosen mounting screws

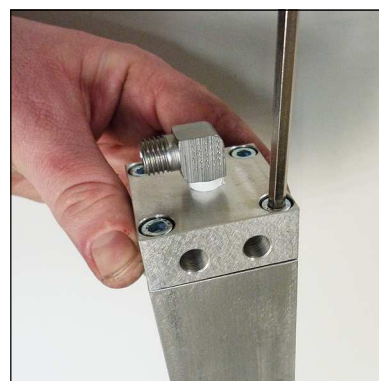


Fig. 2 - Loosen mounting screws of the filter cover

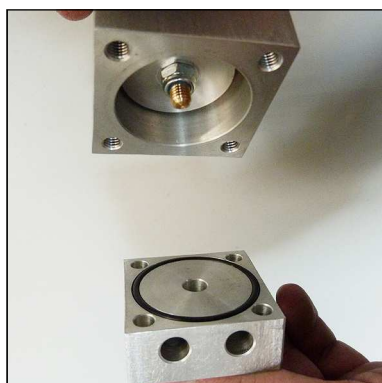


Fig. 3 - Change o-ring

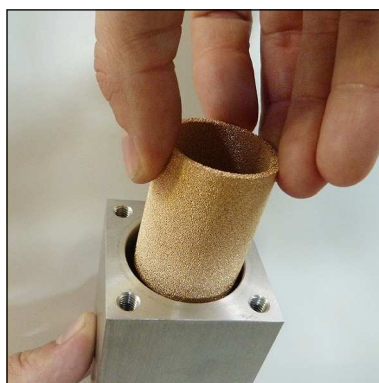


Fig. 4 - Change sinter filter



Fig. 5 - Place filter washer and washer

## MAINTENANCE AND SERVICE

### Manual condensation dump system



#### Note

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

### Oil- / water separators

The compressor comes as standard without an automatic condensation dump system. Drain condensate separators every 15 minutes.

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

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

### Manual drain



#### Warning

Open valve spindle max. 1.5 turns.  
The pressure in the housing can shoot out the valve spindles at high speed.

To drain manually, open the condensate drain valves of the 1st and the 2nd stage of the oil / water separators.

Open valve spindle max. 1.5 turns anti-clockwise.

The condensate will be drained.

Then close valve spindle clockwise.

The condensate of final filter housing gets drained with help of the ball valve (Fig. 2).

### 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.

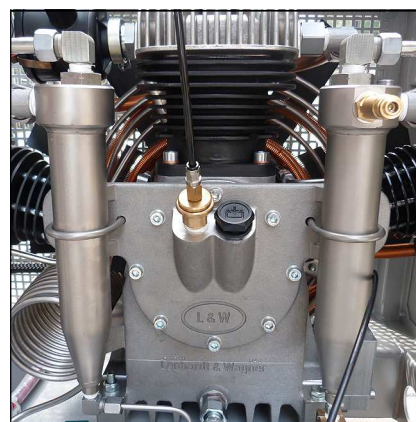


Fig. 1 Oil / water separators 1st and 2nd stage with automatic condensate drain system



Fig. 2 - Condensate drain valve



Fig. 3 - Condensate drain valve

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### Oil / Water separators 1st and 2nd stage - Maintenance



#### Note

Clean all parts thoroughly before assembly.

#### Maintain oil / water separators 1st and 2nd stage as follows:

- Loosen pipe connections (Fig. 1)
- Loosen screw connection at the water separator (sinter filter holder)
- Remove sinter filter holder (Fig. 2).
- Change sinter filter (Fig. 3), screw-in new sinter filter by using a suitable screwdriver.
- Change o-ring, previously grease new o-ring (Fig. 4)
- Place sinter filter holder into the water separator and tighten
- Connect pipe connections and tighten.

The oil / water separator maintenance is now completed.

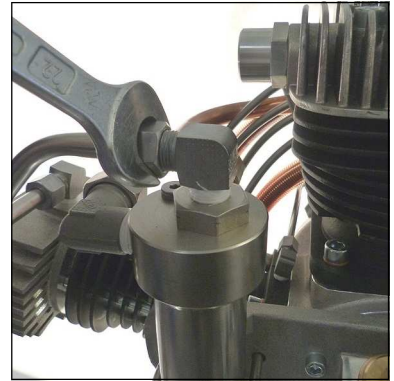


Fig. 1 - Loosen pipe connections

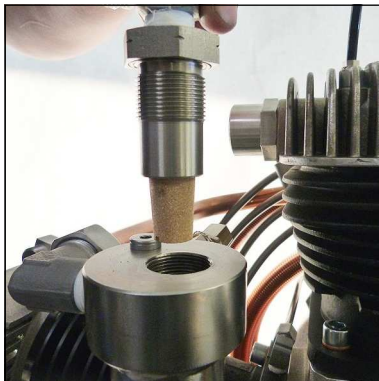


Fig. 2 - Remove sinter filter holder

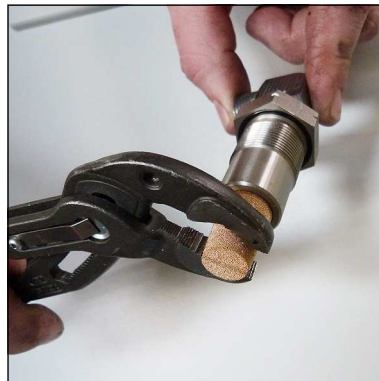


Fig. 3 - Change sinter filter



Fig. 4 - Change o-ring

## MAINTENANCE AND SERVICE

### 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

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### 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. 1.7 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.

Order number	Filtration	Filter housing
000002 000003	Breathing air in accordance with EN 12021	1.7 liter housing 2.3 liter housing
001459 001461	Breathing air in accordance with EN 12021 and additional CO/CO <sub>2</sub> filtration	1.7 liter housing 2.3 liter housing
001466 001467	Oil / odour removal (<0,1mg/m <sup>3</sup> )	1.7 liter housing 2.3 liter housing
001460 001462	Drying only (<15mg/m <sup>3</sup> )	1.7 liter housing 2.3 liter housing
001468	CNG Filter (drying and oil removal)	2.3 liter housing

### Maintenance intervals

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

- 46 hours for LW 320 E AL Nautic



## MAINTENANCE AND SERVICE

### 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.

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### 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.

#### 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. 1 - Open Filter cover

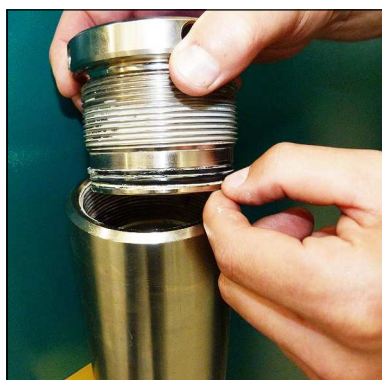


Fig. 2 - Change o-ring and back-up rings

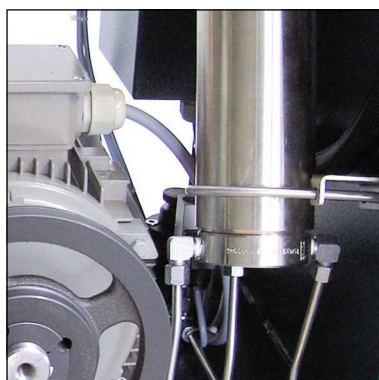


Fig. 3 - Loosen pipe connections and nuts



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

## MAINTENANCE AND SERVICE

### 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.

### Maintenance intervals

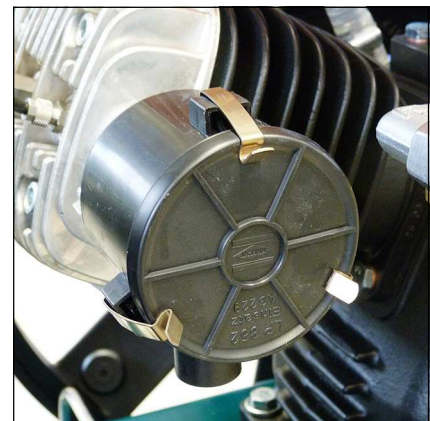
We recommend that the filter cartridge should be replaced every 500 working hours (depending on pollution grade).

### Inlet filter cartridge change

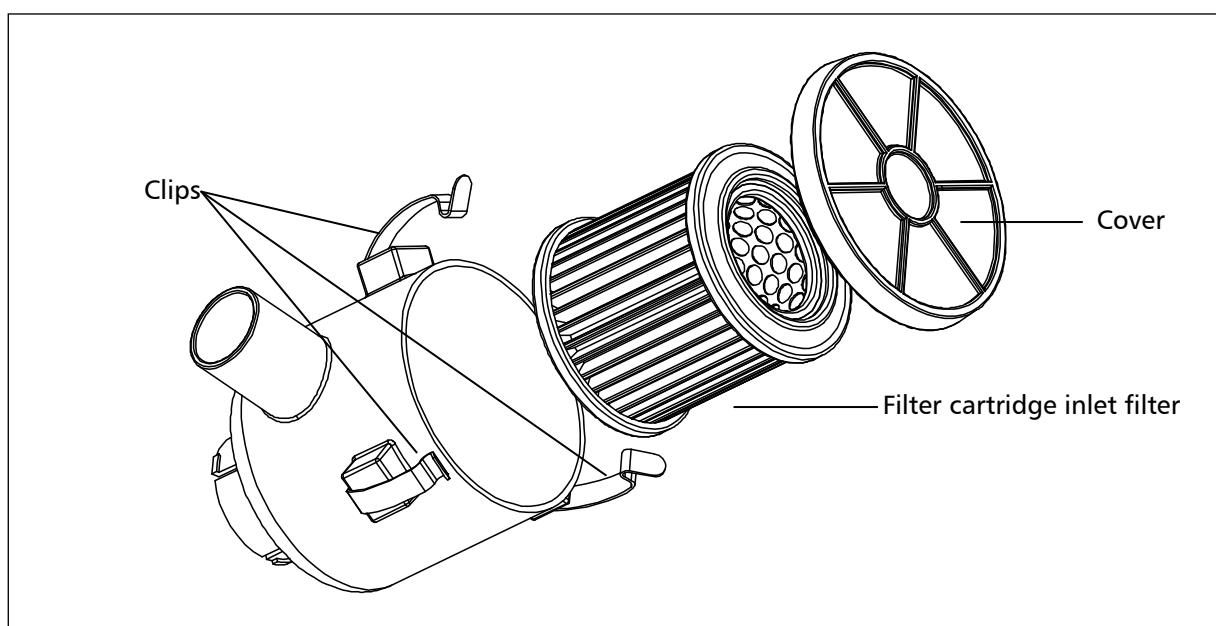
Inlet filter cartridge change as follows:

- 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.



Air filters



Filter cartridge inlet filter

## MAINTENANCE AND SERVICE

### 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 stage is a plate valve. The stages two and three are made of a spring operated piston which acts inside a bronze cylinder.



Inlet and outlet valve incl. gaskets of the 3rd stage

### Maintenance intervals

All valves should be replaced after 2000 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

## MAINTENANCE AND SERVICE

### Replace inlet and outlet valve 1st stage



#### Note

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

Replace the inlet and outlet valve 1st stage as follows:

#### Remove Inlet / Outlet Valve

- Loosen pipe connections
- Loosen screw connections of the crankcase ventilation hose (Fig. 1)
- Remove hose
- Loosen valve head screws
- 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 (Fig. 3).
- Check valve head if defective

Install Inlet / Outlet Valve - see following page

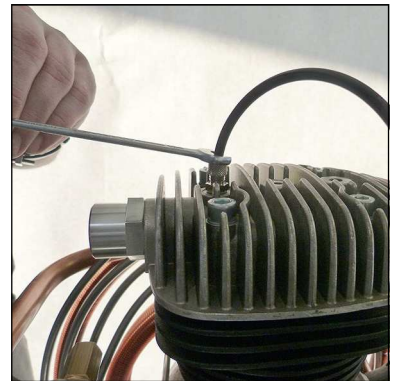


Fig. 1 - Loosen valve head screws



Fig. 2 - Pull out inlet and outlet valve

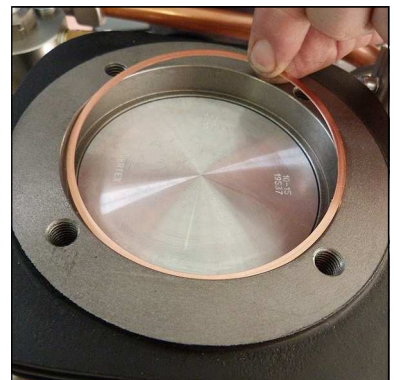


Fig. 3 - Copper valve ring



### Replace inlet and outlet valve 1st stage - continued from previous page



#### Warning

The exact alignment of upper and lower valve gasket is very important. Inlet and outlet channels have to be exactly centred.

#### Install Inlet / Outlet Valve

- Grease new lower valve gasket and place into the cylinder.  
CAUTION: Ensure the correct mounting position of the copper valve ring (position the burr-free side in direction of the cylinder).
- Place the new inlet and outlet valve on the cylinder and align upper valve gasket (paper gasket) (Fig. 4).  
CAUTION: Do not turn the inlet and outlet valve inside the cylinder! The paper gasket could cover inlet channels!
- Refit the valve head and tighten the valve head screws crosswise. (Fig. 5)
- Torques: 1st stage 40 Nm
- Fit crankcase ventilation hose and tighten screw connection
- Connect pipe connections and tighten (Fig. 6).

**Inlet and outlet valves change 1st stage is now completed.**



Fig. 4 - Place and align upper valve gasket

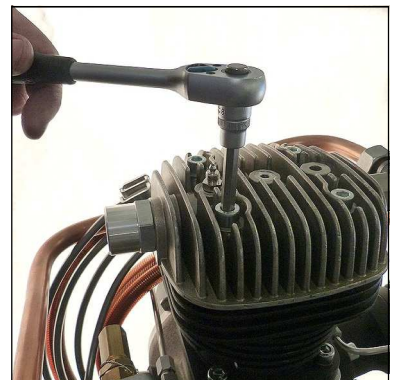


Fig. 5 - Screw valve head screws in



Fig. 6 - Connect pipe connections and tighten

## MAINTENANCE AND SERVICE

### Replace inlet and outlet valves 2nd and 3rd stage



#### Note

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

#### Inlet and outlet valves change as follows:

- Loosen pipe connections (Fig. 1).
- Loosen valve head screws (Fig. 2).
- Remove lower valve gasket (Fig. 3).
- Dismount inlet and outlet valve (Fig. 4).  
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. 5).
- Insert new inlet and outlet valve into valve head  
**CAUTION:** Observe correct position between valve centre hole and valve head centre pin.
- Place lower valve gasket
- Place valve head with the new inlet and outlet valve. Tighten valve head screws crosswise (tightening torque 35 Nm).
- Connect pipe connections and tighten.

The inlet and outlet valves change is now completed.



Fig. 1 - Loosen pipe connections



Fig. 2 - Loosen valve head screws

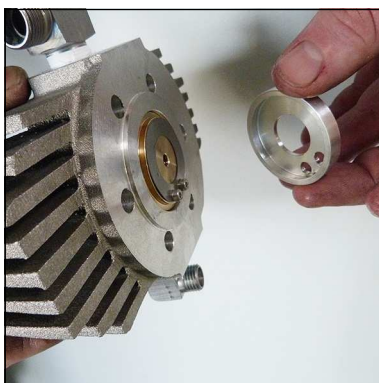


Fig. 3 - Remove lower valve gasket



Fig. 4 - Remove inlet and outlet valve



Fig. 5 - Ensure correct mounting position of the upper valve gasket

## MAINTENANCE AND SERVICE

### 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

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.

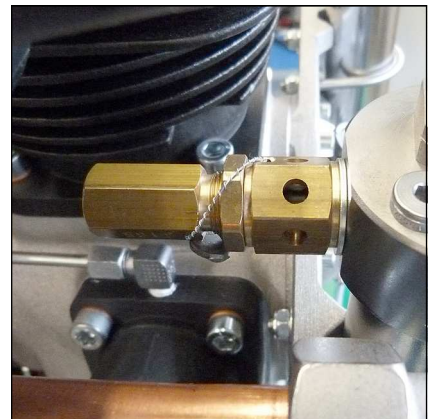
Turning the knurled screw clockwise could vent the valve completely and therefore the final filter housing.

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 1st 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 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 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.



Pressure maintaining/non-return valve

## MAINTENANCE AND SERVICE

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### 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

$350 \text{ bar} \times 1.7 \text{ litres} = 595$

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

$350 \text{ bar} \times 2.3 \text{ litres} = 805$

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.



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# MAINTENANCE RECORDS













## STORAGE

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### 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 happen automatically). Remove top cap of final filter housing: clean throat, grease o-ring. and throat 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.

## STORAGE

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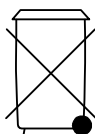
### Transportation instructions

- 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.

# Operating Instructions

## ECC - Electronic compressor control





## TABLE OF CONTENTS

---

### General Information

General Information .....	3
Description of Warning Symbols .....	3

### Description

Specifications / Options .....	4
Switchboard .....	5

### Operation and Function

Main Menu .....	6
Selection Menu (M100) .....	7
Display Menu (M200) .....	8
Inter-Stage Pressure Display.....	8
Display II (M270) .....	9
Settings Menu (M300).....	10
Set Stop Pressure - automatic mode (M320).....	11
Set Restart Pressure - automatic mode (M330).....	11
Set Stop Pressure - semi-automatic mode (M340) .....	11
Test Menu (M400) .....	12
Test Solenoids (M420) .....	12
Test safety valve (M430) .....	13
Test stop without venting (M440) .....	13
Statistics Menu (M500).....	14
Maintenance Menu (M600) .....	15
Confirm Maintenance (M680).....	16
Operation Mode (M700).....	17
Language Menu (M750) .....	17
Adjusting Display Backlight.....	18
Software Update .....	18
Spare part lists.....	19
Manufacturer in terms of 97/23/EC.....	20

B



## GENERAL INFORMATION

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### 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.

B

### 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.



## DESCRIPTION

---

### 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)

## DESCRIPTION

### Switchboard



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



## OPERATION AND FUNCTION

### Main Menu

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

Charging	0 min
Total	0,0 h
Start : 1	Stop : 0
Help: *	OFF
Final Press	<b>0</b> bar

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

**B**

### 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.





## OPERATION AND FUNCTION

---

### 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!

## OPERATION AND FUNCTION

### 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 current 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
1 <sup>st</sup> 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".



## OPERATION AND FUNCTION

---

### 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"

**B**

## OPERATION AND FUNCTION

---

### Settings Menu (M300)

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

<b>Settings:</b>	
<b>Automatic</b>	
2	Stop pressure
3	Restart Press.
<b>Semi-Automatic</b>	
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"

**B**

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).



## OPERATION AND FUNCTION

---

### Set Stop Pressure - automatic mode (M320)

Only valid in automatic mode, see menu M700.

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

Current restart pressure  
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"

**B**

### Set Restart Pressure - automatic mode (M330)

Only valid in automatic mode, see menu M700.

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

Current restart pressure  
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  
7 New Value:  
>> XXX bar  
4 (030,, 310)  
8 Confirm  
(M340) Return : #

Current stop pressure  
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"



## OPERATION AND FUNCTION

### Test Menu (M400)

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

Test:	
2	Solenoids
3	Safety Valve
4	Test-Stop
9	Close
(M400)	Return : #

Key 2 leads to submenu "Test Solenoids"

Key 3 leads to submenu "Test Safety Valve"

Key 4 leads to submenu "Test Stop without Venting"

Key 9 leads back to submenu "Selection"

Key # leads back to "Main Menu"

**B**

### Test Solenoids (M420)

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

Test Solenoids	
3	open
7	close
9	Close
(M420)	Return : #

Key 3 opens solenoids

Key 7 closes solenoids

Key 9 leads back to submenu „Test“

Key # leads back to "Main Menu"



#### Note

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

## OPERATION AND FUNCTION

### 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.

B

**Test**

**Safety Valve**

Close Filling Valves!

5 Start	0 Stop
9 Close	
(M430) Return : #	

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.

**Test**

**stop without venting:**

5 Stop	
6 Vent	
Pressure	0
	bar
9 Close	
(M440) Return : #	

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"



## OPERATION AND FUNCTION

---

### Statistics Menu (M500)

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

Statistics	
Operation Hours:	0,0 h
Start cycles:	00
Max Press	000 bar
9 Close	
(M500) Return : #	

Total operation hours of compressor unit

Total number of compressor starts

Maximum working pressure of unit (set by safety valve test)

Key 9 leads back to submenu „Selection“

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.

**B**



## OPERATION AND FUNCTION

---

### Maintenance Menu (M600)

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

Hours remaining		
Oil change	14 h	Shows remaining hours of listed components (i.e. next oil change in 14 hours,...)
Sinter filt	989 h	
Silencer	4989 h	
Valves	5989 h	
Oil filter	1000 h	
8 Change done		Key 8 leads to submenu "Receipt Maintenance"
9 Close		Key 9 leads back to submenu „Selection“
(M600)      Return : #		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).



## OPERATION AND FUNCTION

---

### Confirm Maintenance (M680)

Confirm Maintenance	
2	Oil change
3	Sinter filters
4	Silencer
5	Valves
6	Oil filter
(M680)	Return : #

Key 2 receipts oil change

Key 3 receipts change of sinter filters

Key 4 receipts change of silencer

Key 5 receipts change of valves

Key 6 receipts oil filter

Key # leads back to "Main Menu"

**B**

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

Confirm Maintenance	
Operation Hours Meter Set	
9	Close
(M680)	Return : #

Key 9 leads back to submenu "Hours remaining"

Key # leads back to "Main Menu"

## OPERATION AND FUNCTION

---

### 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).

**B**

Betriebsart:	
2	Automatic
3	<b>Semi-Automatic</b>
4	bar /mpa
5	Sprache
9	Close
(M700)	Return : #

Key 2 activates automatic mode

Key 3 activates semi-automatic mode

Key 4 selects between bar and MPa (optional)

Key 5 leads to the "Language Menu"

Key 9 leads back to submenu „Selection“

Key # leads back to "Main Menu"

### Language Menu (M750)

Language Menu	
2	German
3	English
4	French
5	Spanish
6	Dutch
7	Language II
(M750)	Return : #

Key 7 optional language (e.g. Chinese)

Key # leads back to "Main Menu"

## OPERATION AND FUNCTION

---

### Adjusting Display Backlight

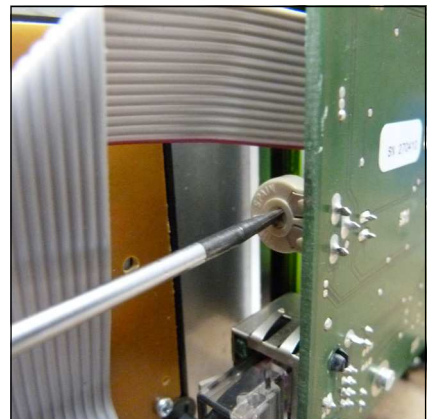
The brightness of the display can be adjusted with an adjusting screw on the back of the control.

### 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



Adjust brightness

## SPARE PART LISTS

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

B



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



**LENHARDT & WAGNER GMBH**

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**B**

**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](mailto:service@lw-compressors.com)

Internet: [www.lw-compressors.com](http://www.lw-compressors.com)





**ERSATZTEILLISTEN / SPARE PARTS LISTS  
DETAILANSICHTEN / DETAILED VIEWS**

C



## **Inhaltsverzeichnis - Table of Contents**

---

Komplette Einheit - Complete Unit .....	2
Schalttafel - Control Board.....	4
Kompressorblock - Compressor Block .....	6
Öl-Wasserabscheider 1.+2. Stufe - Oil-Water Separator 1st+2nd Stage .....	10
Filtergehäuse 1,7l - Filter Housing 1.7ltr .....	12
Ansaugfilter - Air Intake Filter .....	14
Sicherheitsventil - Safety Valve .....	16
Druckhalteventil - Pressure Maintaining Valve.....	18
Ölfilter - Oil Filter.....	20
Ölpumpe - Oil Pump.....	22
Kolben 1. Stufe - Piston 1st Stage.....	24
Kolben 2. Stufe - Piston 2nd Stage.....	26
Kolben 3. Stufe - Piston 3rd Stage .....	28
Kurbelwelle - Crankshaft.....	30
Kühlrohre - Cooling Pipes.....	32
Kühlrohr 3. Stufe - Cooler 3rd Stage .....	34
Lüfterrad - Fan Wheel.....	36
Motor .....	38
Saug+Druckventil 1. Stufe - In+Outlet Valve 1st stage.....	40
Saug+Druckventile 2.+3. Stufe - In+Outlet Valves 2nd+3rd Stage .....	41
Ölablassschlauch - Oil Drainage Tube .....	42
Fülleinrichtung - Filling Device .....	44
Füllventile - Filling Valves .....	46
Manometer - Pressure Gauge.....	48

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## ERSATZTEILLISTE / SPARE PART LIST

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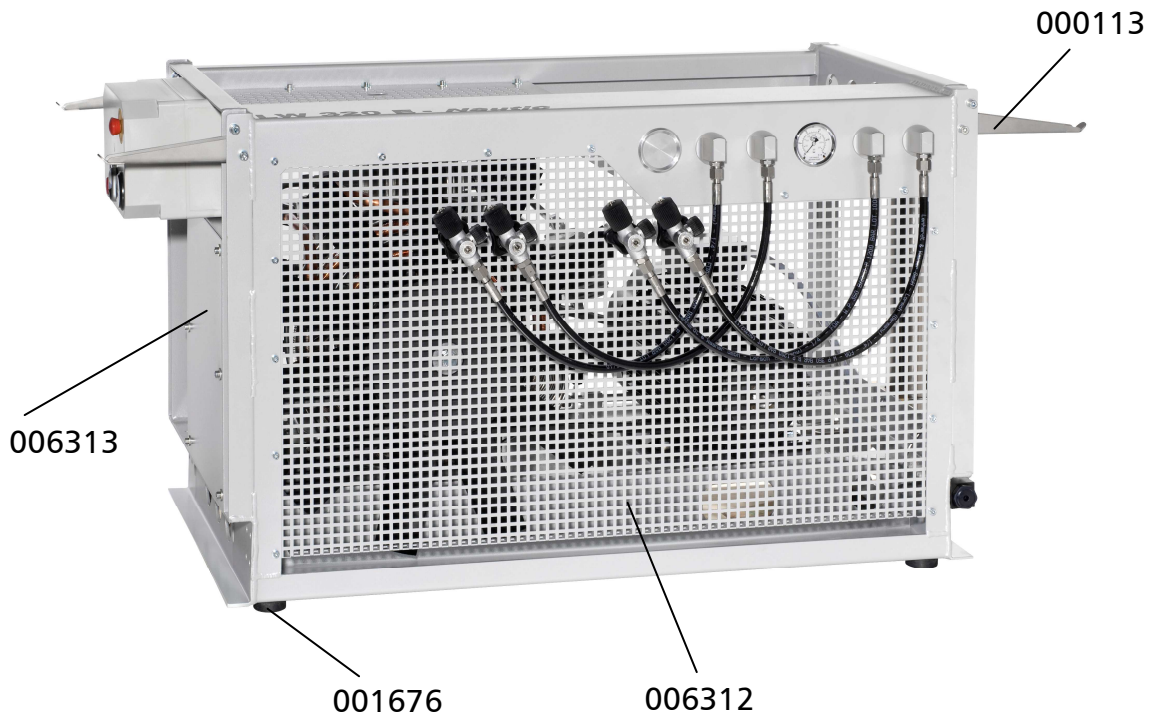
### Baugruppe: Schalttafel / Control Board

Best.-Nr. / Order No.	Benennung	Description
000113	Tragegriff	Carrying Handle
000592	Kugelhahn	Ball Valve
000738	Verschraubung (Kugelhahn)	Connection (Ball Valve)
001676	Standfuss	Stand Foot
004303	Kondensatschlauchsatz (3 Stück)	Set of Condensate Hoses (3 pieces)
006312	Frontgitter	Front Guard
006313	Wartungsdeckel	Service Cover

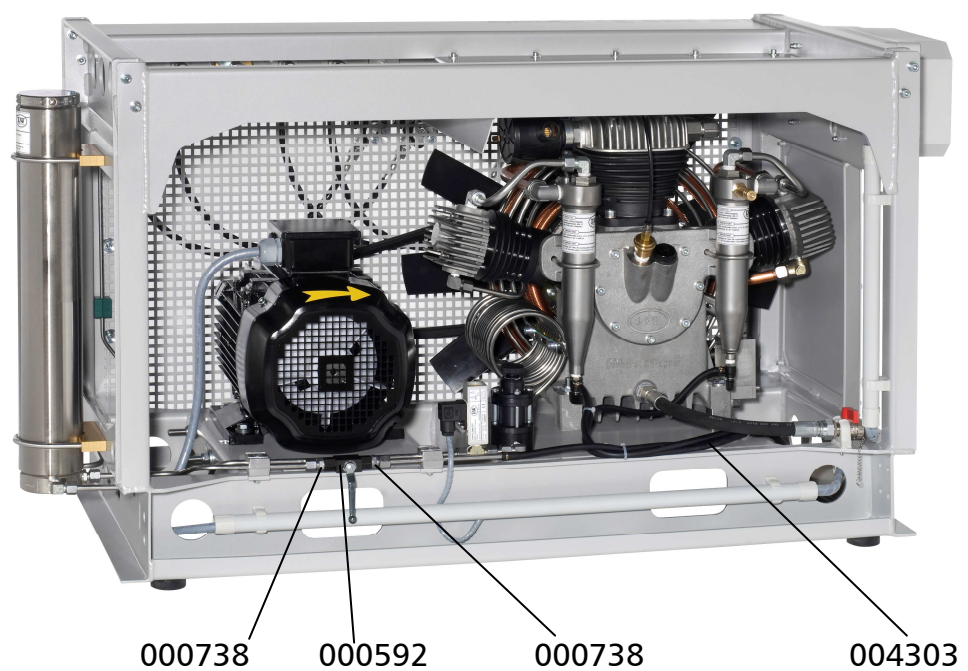
C

**DETAILANSICHT / DETAILED VIEW**

**Komplette Einheit / Complete Unit**



C





## ERSATZTEILLISTE / SPARE PART LIST

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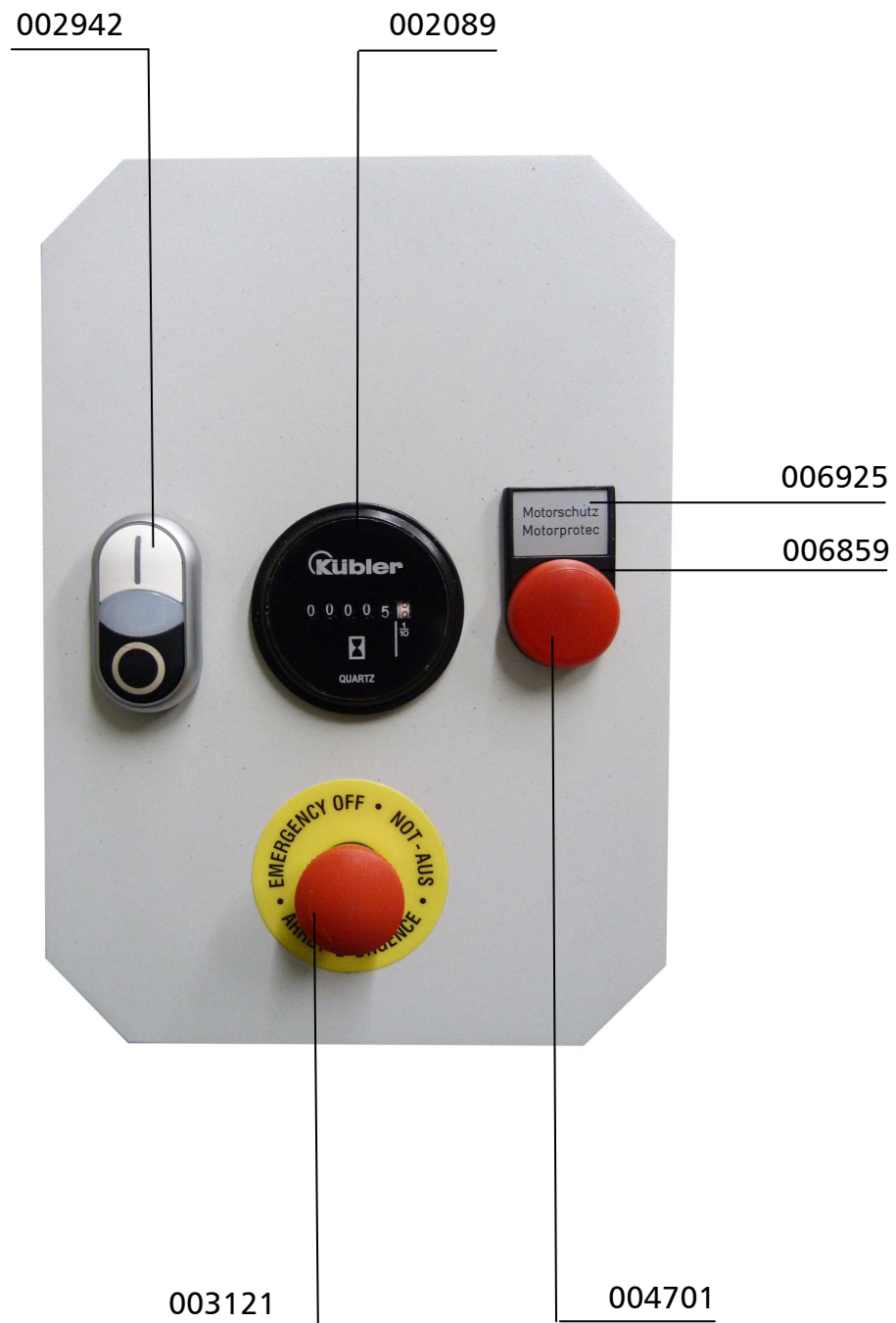
### Baugruppe: Schalttafel / Control Board

Best.-Nr. / Order No.	Benennung	Description
002089	Betriebsstunderzähler 230V	Hour Counter 230V
002942	Start/Stop Schaltelement	Start / Stop Button
003121	Not-Halt Schalter	Emergency switch
004701	Warnlampe	Warning lamp
006859	Schildträger	Label holder
006925	Einlegeschild	Label

C

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Schalttafel / Control Board**



C



## ERSATZTEILLISTE / SPARE PART LIST

### Baugruppe: Kompressorblock / Assembly: Compressor Block

Best.-Nr. / Order No.	Benennung	Description
000205	Kurbelgehäuseentlüftungsventil	Crankcase Breather Valve
000257	Obere Ventildichtung, 1. Stufe	Upper Valve Gasket, Paper, 1st
000258	Untere Ventildichtung	Lower Valve Gasket, Copper
000432	Ölmesstab	Oil Dip Stick LW 280
000542	Saug- & Druckventil, 2. Stufe komplett	In- & Outlet Valve, 2nd Stage
000543	Saug-Druckventil kompl.mit Aludichtungen	In- & Outlet Valve, 3rd Stage
000761	Verschraubung	Elbow Connection
000765	Schneidring	Olive Seal
000766	Mutter	Nut
000783	Verschraubung	Straight Connection
000811	Verschraubung	Elbow Connection WE3/8"/12L
000863	Winkelverschraubung 90°	Elbow Connection
000967	Zylinderschraube	Allen Bolt
001041	Zylinderschraube	Allen Screw
001069	Zylinderschraube	Allen Bolt
001088	Zylinderschraube	Hexagon Bolt
001164	Stopfmutter	Lock Nut M10
001181	U-Scheibe A8	Washer A8
001186	U-Scheibe A10	Washer A10
001189	Schnorr-Scheibe S10	Clamp Washer S10
001275	O-Ring	O-Ring guide cylinder 280
001284	O-Ring	O-Ring 60x4
001310	O-Ring,	O-Ring 105x4
001314	O-Ring	O-Ring
001315	O-Ring	O-Ring
001323	CU-Ring	Copper Seal Ring
001384	Kompressorblock LW280 mit Testlauf	Compressor Block LW280
001623	Zylinder 3. Stufe	Cylinder 3rd Stage
001650	Gehäusedeckel	Crankcase Cover

C



## ERSATZTEILLISTE / SPARE PART LIST

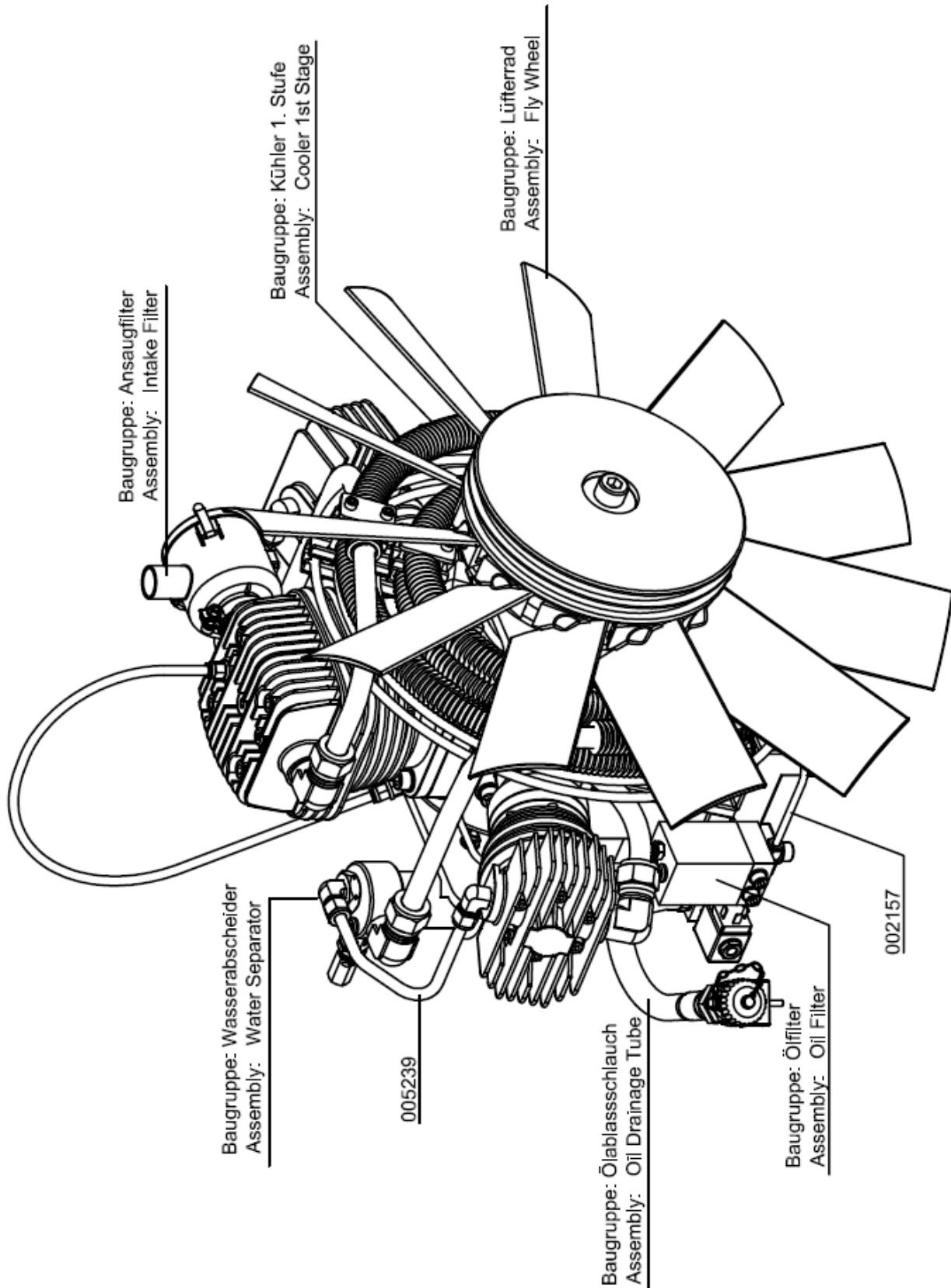
### Baugruppe: Kompressorblock / Assembly: Compressor Block

Best.-Nr. / Order No.	Benennung	Description
001660	Winkelverschraubung mit Düse	Elbow Connection c/w Jet
002093	Saug-und Druckventil, 1. Stufe	In & Outlet Valve 1st Stage
002096	Zylinder 1. Stufe	Cylinder, 1st Stage
002107	Zylinder 2. Stufe	Cylinder, 2nd Stage
002108	Führungszylinder 2. + 3. Stufe	Guide cylinder 2nd+3rd Stage
002121	Ventilkopf, 2. Stufe	Valve head 2nd Stage
002124	Ventilkopf 3. Stufe	Valve head 3rd Stage
002154	T-Stück mit Düse (lang)	T-piece with injector (long)
002155	T-Stück mit Düse (kurz)	T-piece with injector (short)
002158	Ölrohr (Lagerflansch - 3. Stufe)	Oil Pipe (Flange - 3rd Stage)
002159	Ölrohr (Ölpumpe - Ölfilter)	Oil pipe (oil pump-oil filter)
002160	Ölrohr (Ölfilter - 2. Stufe)	Oil pipe (oil filt.-2nd Stage)
003583	Öldruckleitung 2. Stufe	Oil pipe 2nd stage
004982	Dichtring für Peilstab	Gasket seal for oil dipstick
005837	6-kant Schraube m. Schaft	Hexagon Bolt
005859	Gerade Einschraubverschraubung 6 mm	Straight Hose Connection 6 mm
006518	Ventilkopf für Ventil, 1. Stufe	Valve Head for Valve 1st Stage
007434	Entlüftungsschlauch Kurbelgehäuse	Crankcase Breather Hose

C

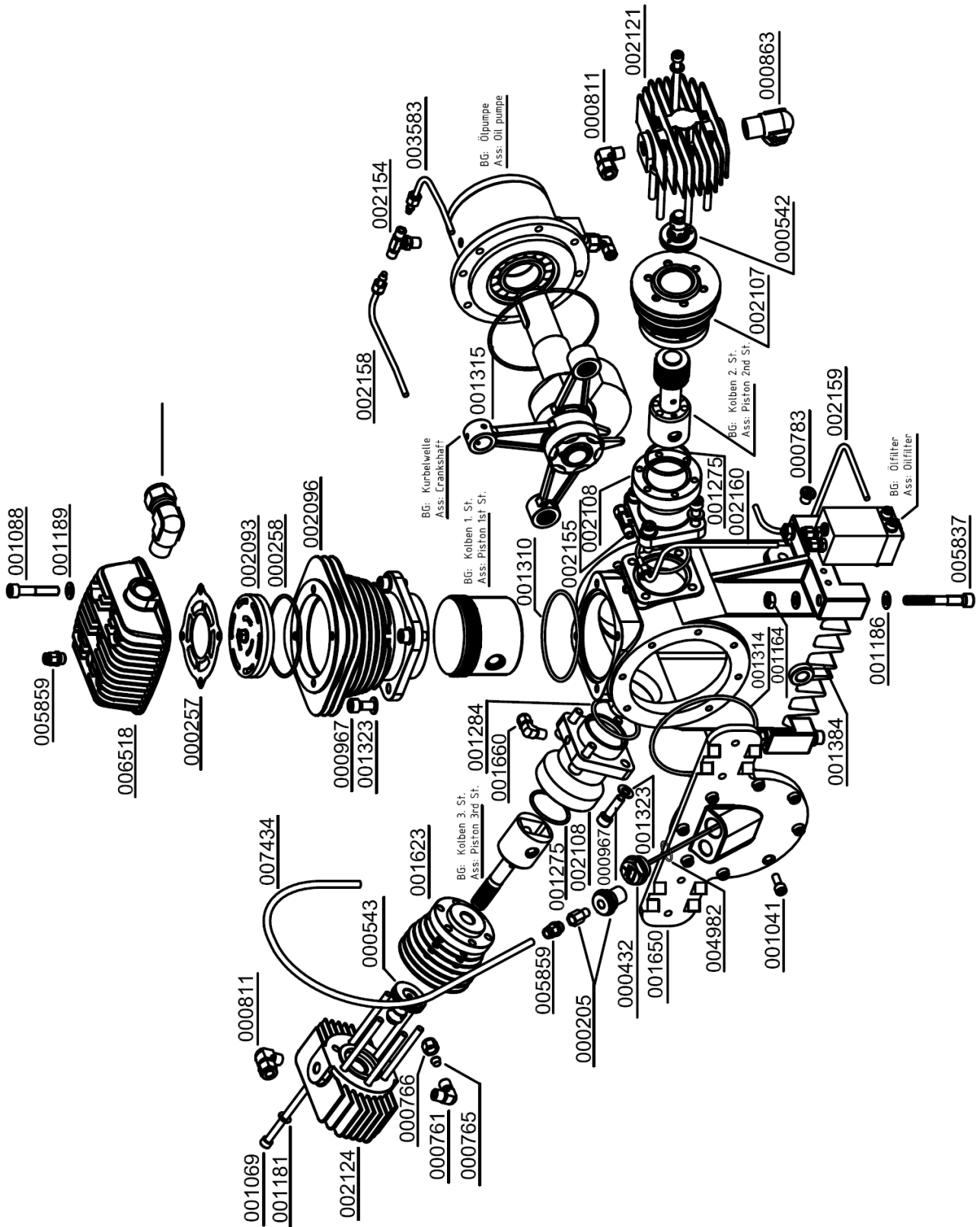
**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kompressorblock / Assembly: Compressor Block**





**Baugruppe: Kompressorblock / Assembly: Compressor Block**







## ERSATZTEILLISTE / SPARE PART LIST

### Baugruppe: Wasserabscheider 1. und 2. Stufe

### Assembly: Water Separator 1st and 2nd Stage

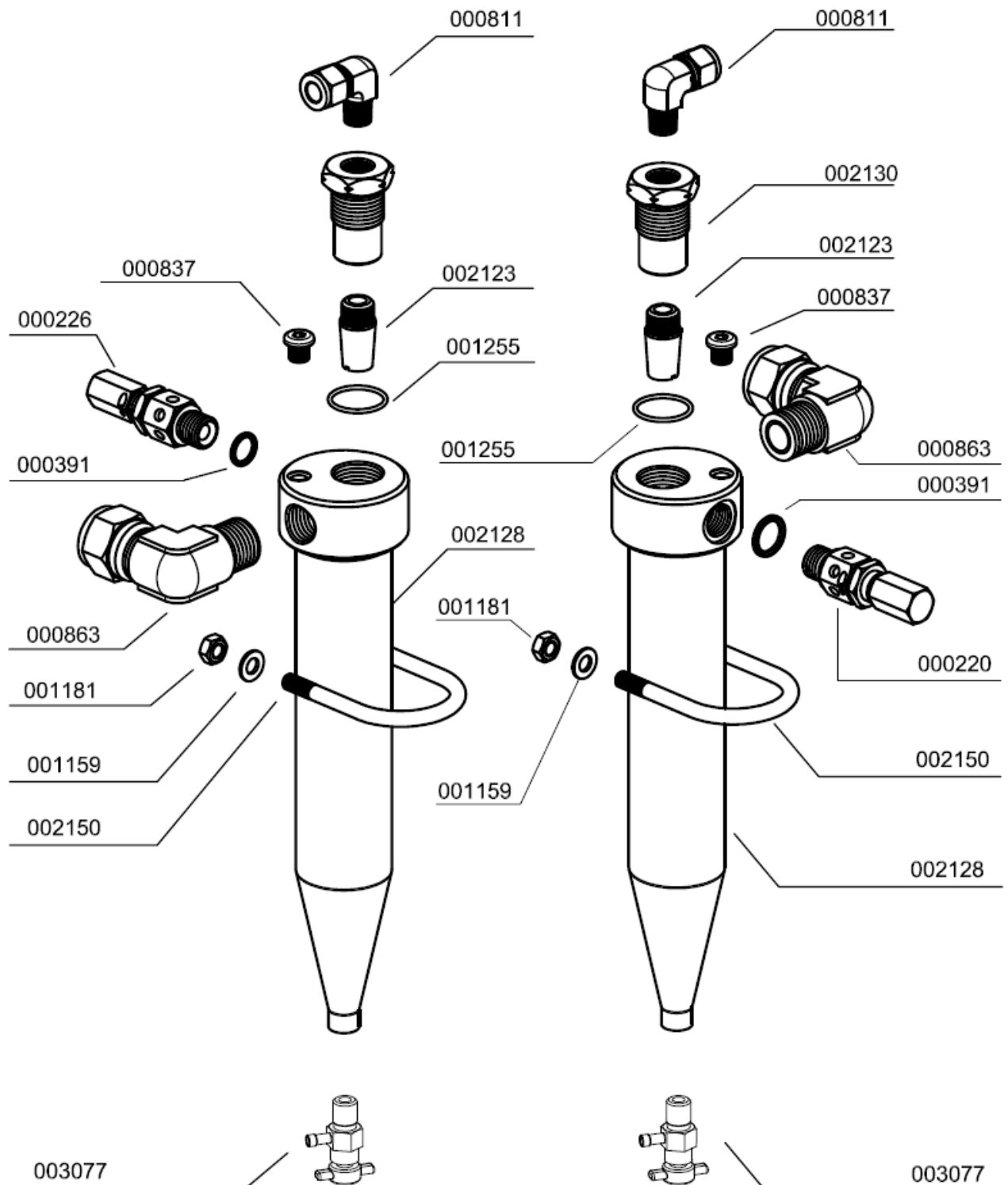
Best.-Nr. / Order No.	Benennung	Description
000220	Sicherheitsventil G3/8"	Safety Valve G3/8" 8 bar
000226	Sicherheitsventil G3/8"	Safety Valve G3/8" 60 bar
000391	U-Sit Ring,	Seal Ring U-Sit
000811	Verschraubung	Elbow Connection WE3/8"/12L
000837	Verschlussstopfen	Plug
000863	Winkelverschraubung 90°	Elbow Connection
001159	Stopfmutter	Lock Nut M8
001181	U-Scheibe A8	Washer A8
001255	O-Ring	O-Ring
002123	Sinterfilter G3/8" AG, 1. + 2. Stufe	Sinterfilter G3/8" 1st+2nd St.
002128	Wasserabscheider, 1. und 2. Stufe	Water separa. 1st + 2nd Stage
002130	Halter für Sinterfilter G3/8"	Holder for Sinterfilter G3/8"
002150	Haltebügel für Wasserabweiser LW280	U-Clamp Water Separator
003077	Entwässerungsventil G1/4"	Drain Valve G1/4"

C

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Wasserabscheider 1. und 2. Stufe**

**Assembly: Water Separator 1st and 2nd Stage**





## ERSATZTEILLISTE / SPARE PART LIST

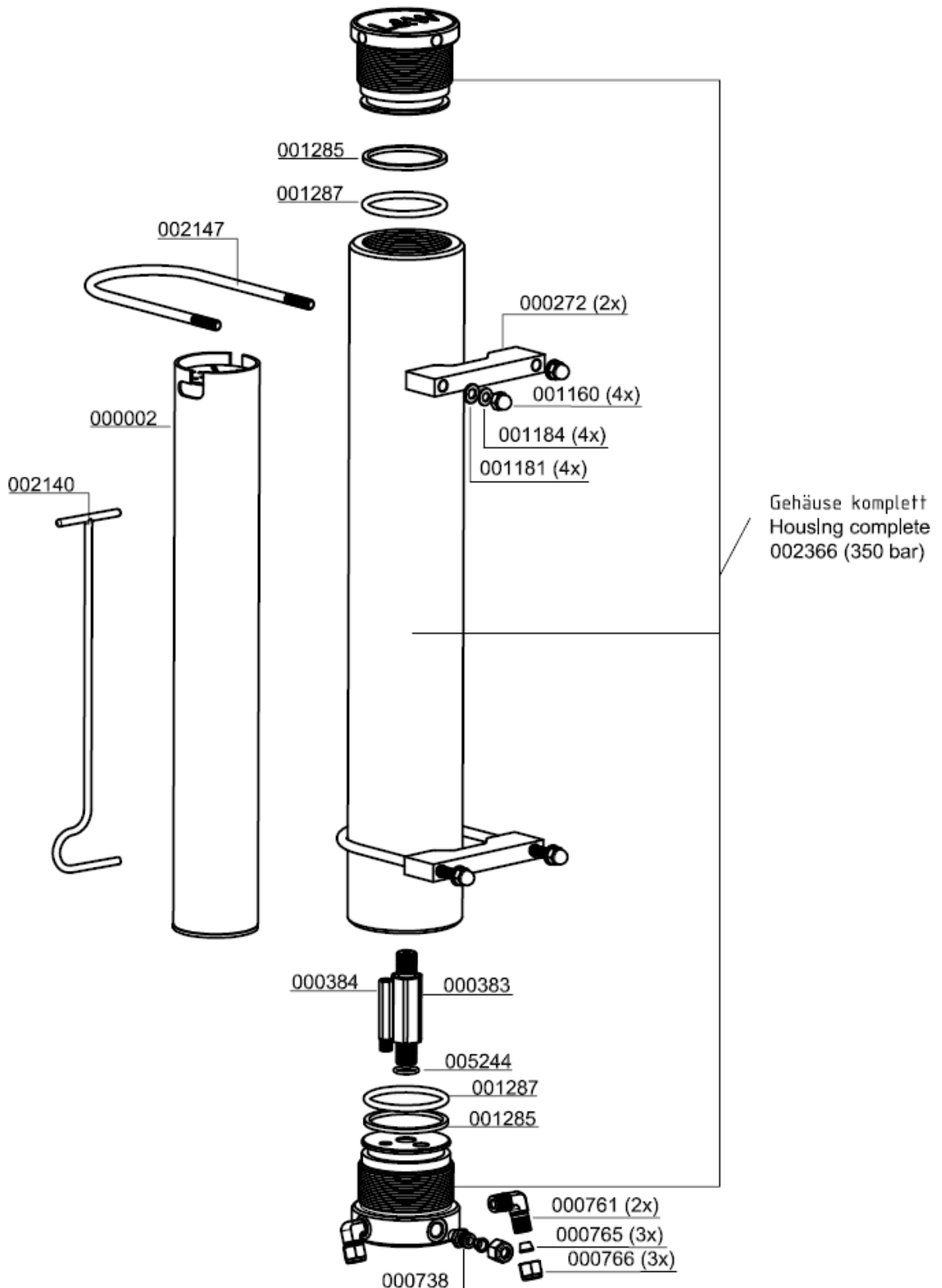
### Baugruppe: Filtergehäuse 1,7 l / Assembly: Filter housing 1.7 ltr

Best.-Nr. / Order No.	Benennung	Description
000002	Filterpatrone 1,7 Liter	Filter Cartridge 1.7 ltr BA
000272	Abstandshalter für Filtergehäuse	Spacer Bracket for Filtertower
000383	Messing Adapter für Filterpatrone	Brass Filter Adapter
000384	Düse für Filtergehäuse	Jet Filter Housing
000738	Verschraubung	Connection
000761	Verschraubung	Elbow Connection
000765	Schneidring	Olive Seal
000766	Mutter	Nut
001160	Hutmutter	Domed Nut M8
001181	U-Scheibe A8	Washer A8
001184	Schnorr-Scheibe	Clamp Washer S8
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 ( ES )	U-Clamp for filter housing ES
002366	Filtergehäuse	Filter housing
005244	O-Ring	O-Ring

C

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Filtergehäuse 1,7 l / Assembly: Filter housing 1.7 ltr**



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## ERSATZTEILLISTE / SPARE PART LIST

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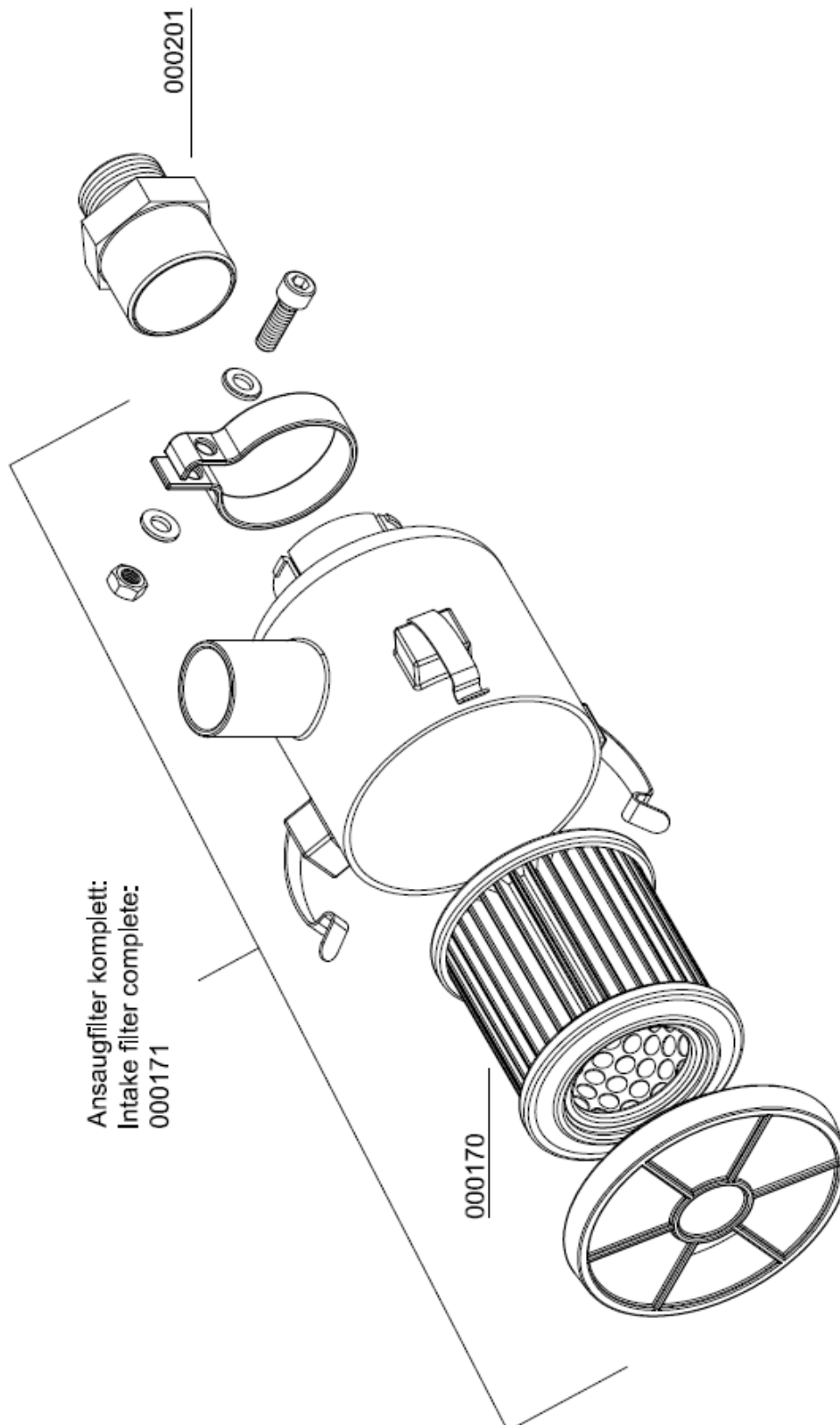
### Baugruppe: Ansaugfilter / Intake Filter

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

C

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Ansaugfilter / Intake Filter**





## ERSATZTEILLISTE / SPARE PART LIST

### Baugruppe: Sicherheitsventil / Assembly: Safety Valve

Best.-Nr. / Order No.	Benennung	Description
000165	Gehäuse Rückschlagventil	Body Non-Return Valve
000233	Sockel für Sicherheitsventil mit TÜV/CE	Base f. Safety Valve TÜV type
000553	Sicherheitsventil - Bauteilgeprüft	Safety Valve TÜV 225 bar
000554	Sicherheitsventil - Bauteilgeprüft	Safety Valve TÜV 250 bar
000555	Sicherheitsventil - Bauteilgeprüft	Safety Valve TÜV 300 bar
000556	Sicherheitsventil - Bauteilgeprüft	Safety Valve TÜV 330 bar
000557	Sicherheitsventil - Bauteilgeprüft	Safety Valve TÜV 350 bar
000738	Verschraubung	Connection
000762	Verschraubung	Elbow Connection
000765	Schneidring	Olive Seal
000766	Mutter	Nut
001044	Zylinderschraube	Allen Screw
001058	Zylinderschraube	Allen Bolt
001158	Mutter	Nut M8
001181	U-Scheibe A8	Washer A8
001244	O-Ring	O-Ring, flange safety valve
001814	Sicherheitsventil - Bauteilgeprüft	Safety Valve
001815	Sicherheitsventil - Bauteilgeprüft	Safety Valve
001816	Sicherheitsventil - Bauteilgeprüft	Safety Valve
001817	Sicherheitsventil - Bauteilgeprüft	Safety Valve

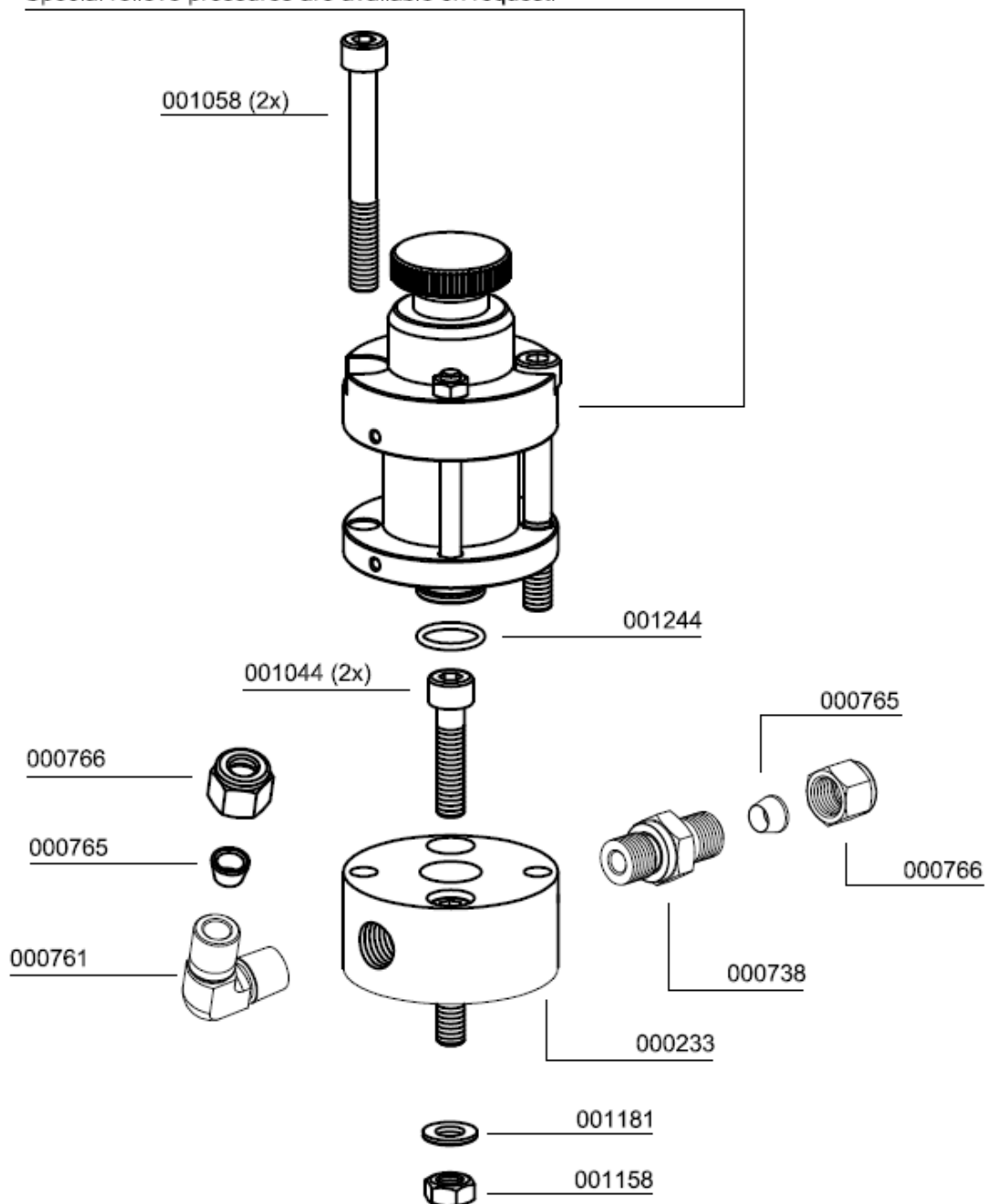
## ERSATZTEILLISTE / SPARE PART LIST

### Baugruppe: Sicherheitsventil / Assembly: 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!







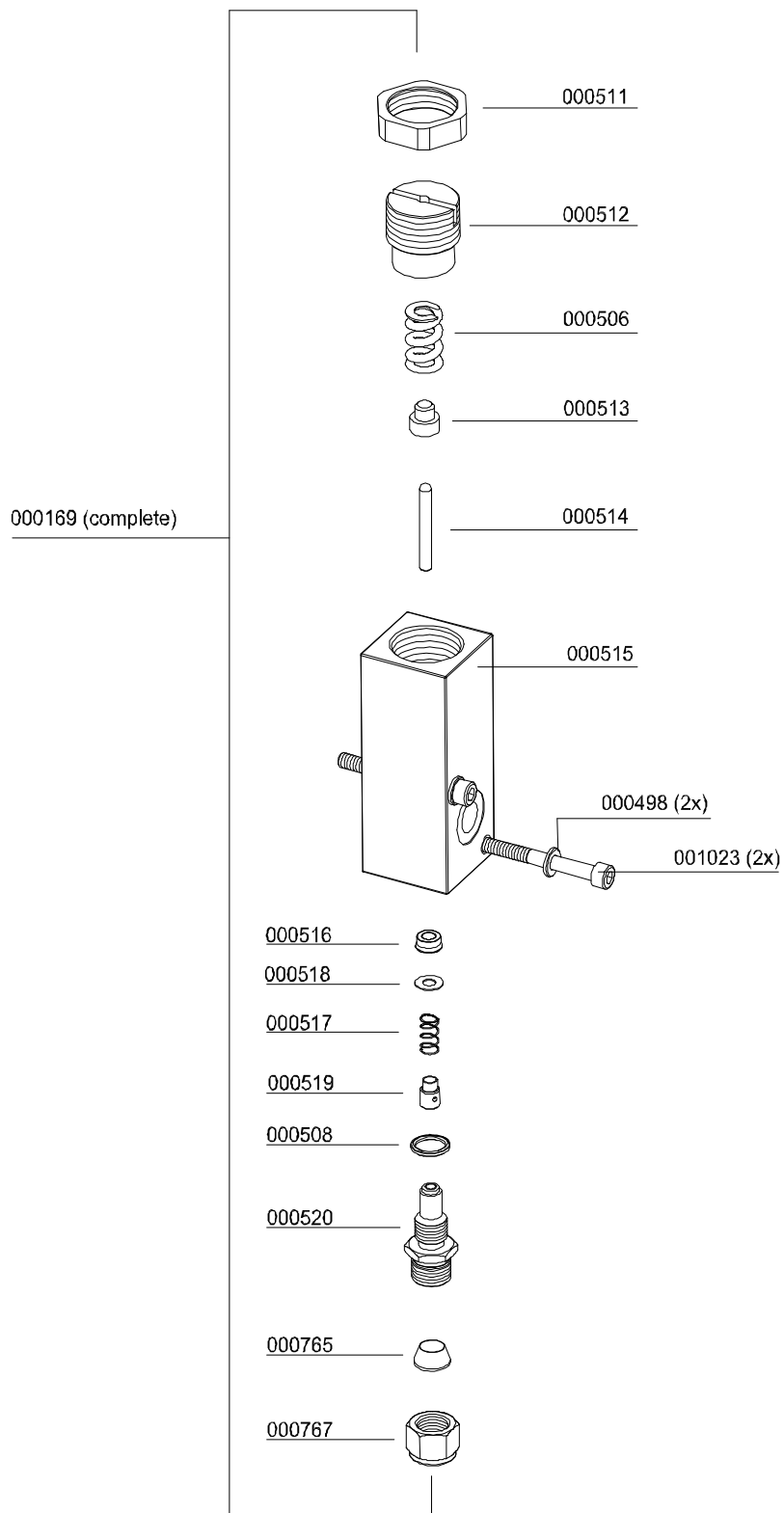
## ERSATZTEILLISTE / SPARE PART LIST

### 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, 10 x 6 x 1, Messing	Washer, 10 x 6 x 1, 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

**DETAILANSICHT / DETAILED VIEW**

**Druckhalteventil / Pressure Maintaining Valve**



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## ERSATZTEILLISTE / SPARE PART LIST

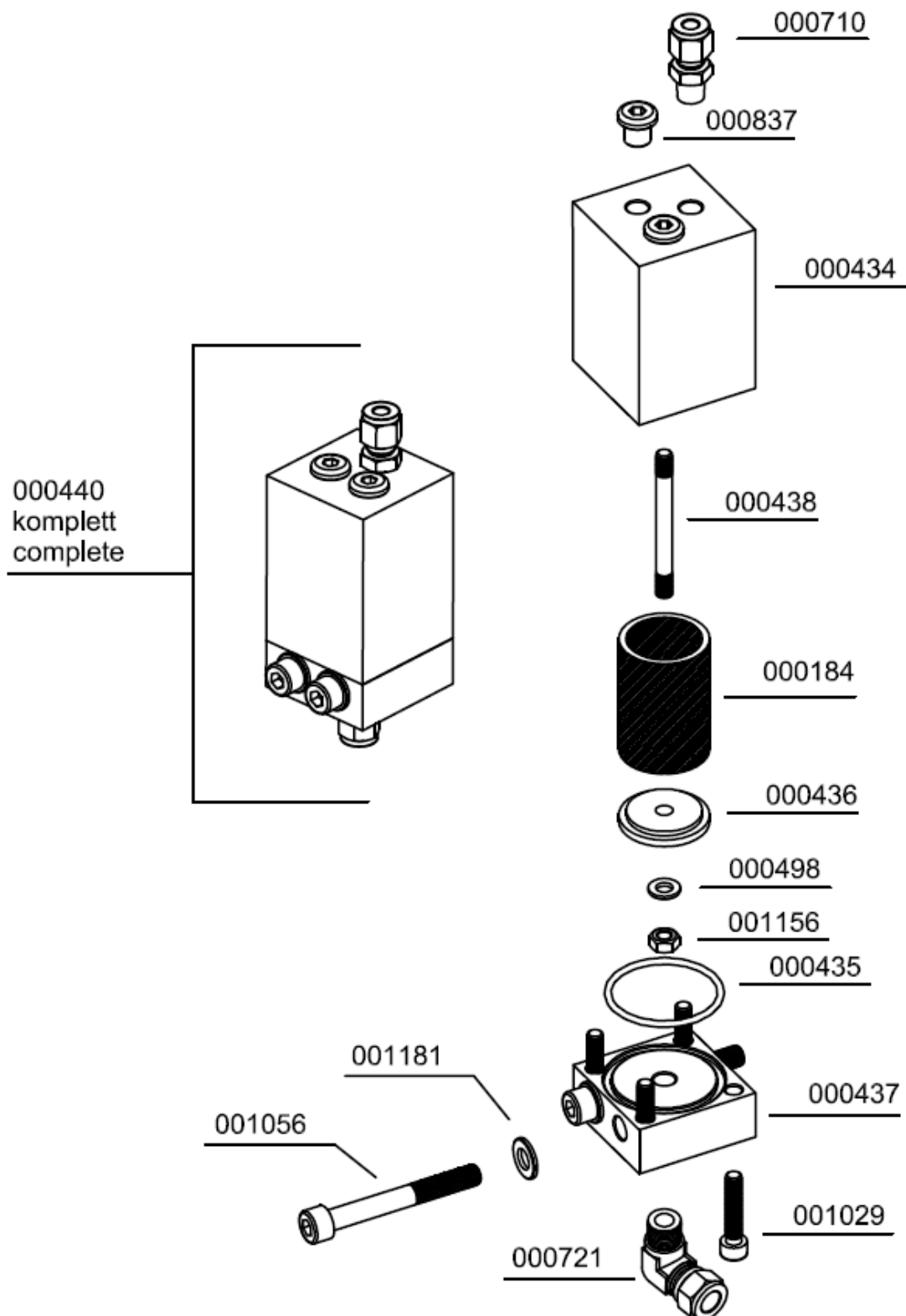
### Baugruppe: Ölfilter / Assembly: Oil Filter

Best.-Nr. / Order No.	Benennung	Description
000184	Sinterfilter Wasserabscheider	Siltered Filter, Oil Filter
000434	Gehäuse (Ölfiltergehäuse)	Body Oil Filter Housing
000435	O-Ring, Ölfiltergehäuse	O-Ring
000436	Filterscheibe Ölfiltergehäuse	Filter Disk (oil filter assy)
000437	Filterdeckel Ölfiltergehäuse	Filter Cover (oil filter assy)
000438	Stiftschraube Ölfiltergehäuse	Threaded Bolt, oil filter assy
000440	Ölfilter kompl.	Oil Filter Unit LW 280
000498	U-Scheibe A6	Washer A6
000710	Verschraubung	Connection w/o nut& olive seal
000721	Verschraubung	Connection
000837	Verschlussstopfen	Plug
001029	Zylinderschraube	Allen Bolt
001056	Zylinderschraube	Allen Bolt
001156	Stopfmutter	Lock Nut M6
001181	U-Scheibe A8	Washer A8

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Ölfilter / Assembly: Oil Filter**



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## ERSATZTEILLISTE / SPARE PART LIST

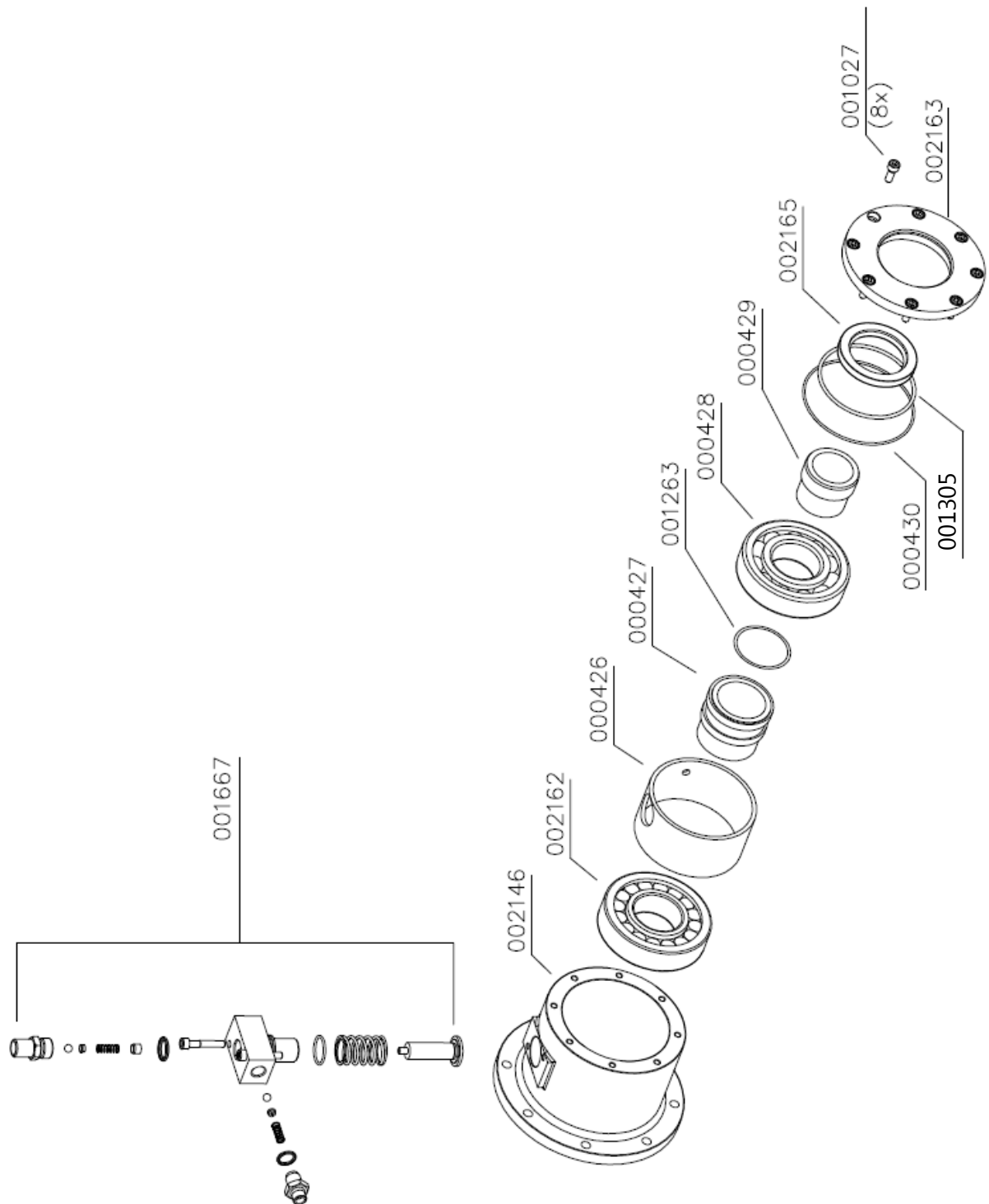
### Baugruppe: Ölpumpe / Assembly: Oil Pump

Best.-Nr. / Order No.	Benennung	Description
000426	Distanzbuchse, ( Hauptlager )	Spacer Tube
000427	Nocke, ( Hauptlager )	Cam Bush
000428	Hauptlager, ( Kugellager )	Main Ball Bearing
000429	Buchse für Wellendichtring	Sleeve for Seal Ring
000430	O-Ring	O-Ring
001027	Zylinderschraube	Allen Bolt
001263	O-Ring	O-Ring
001305	O-Ring	O-Ring Viton
001667	Ölpumpe kompl.	Oil Pump, compl. Assembly
002146	Lagerflansch	Bearing flange
002162	Hauptlager	Main bearing
002163	Simmerringdeckel	Cover Shaft Seal
002165	Radial-Wellendichtring	Radial shaft seal

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Ölpumpe / Assembly: Oil Pump**





## ERSATZTEILLISTE / SPARE PART LIST

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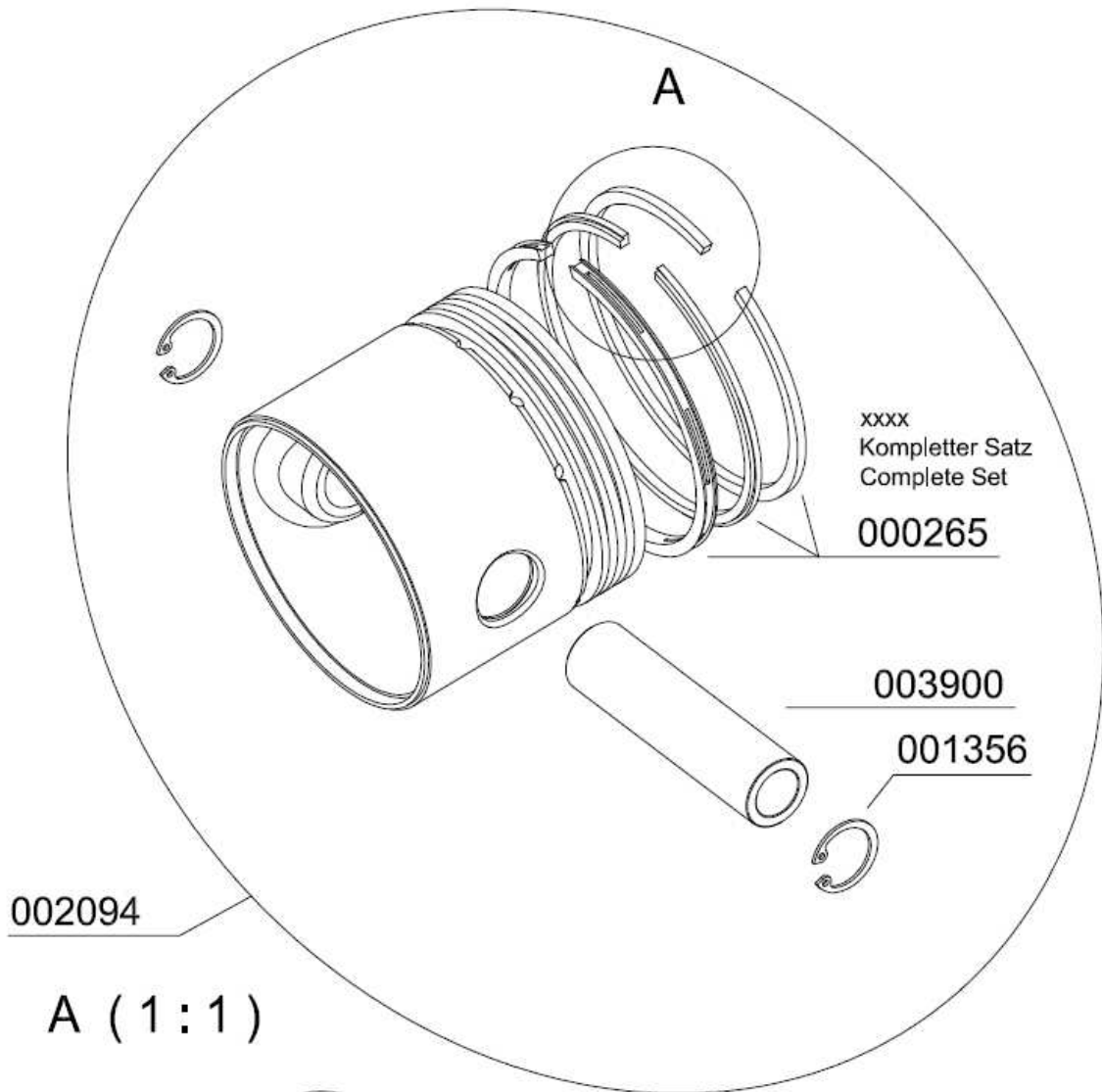
### Baugruppe: Kolben 1. Stufe / Assembly: Piston 1st Stage

Best.-Nr. / Order No.	Benennung	Description
000265	Kolbenringe 1. Stufe, Satz/3 Stk.	Piston Ring Set 3 pcs
001356	Sicherungsring	Circlip I22
002094	Kolben kompl. mit Ringen,Bolzen 1. Stufe	Piston, compl. 1st Stage
003900	Kolbenbolzen, 1. Stufe	Piston pin, 1st stage

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kolben 1. Stufe / Assembly: Piston 1st Stage**



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## ERSATZTEILLISTE / SPARE PART LIST

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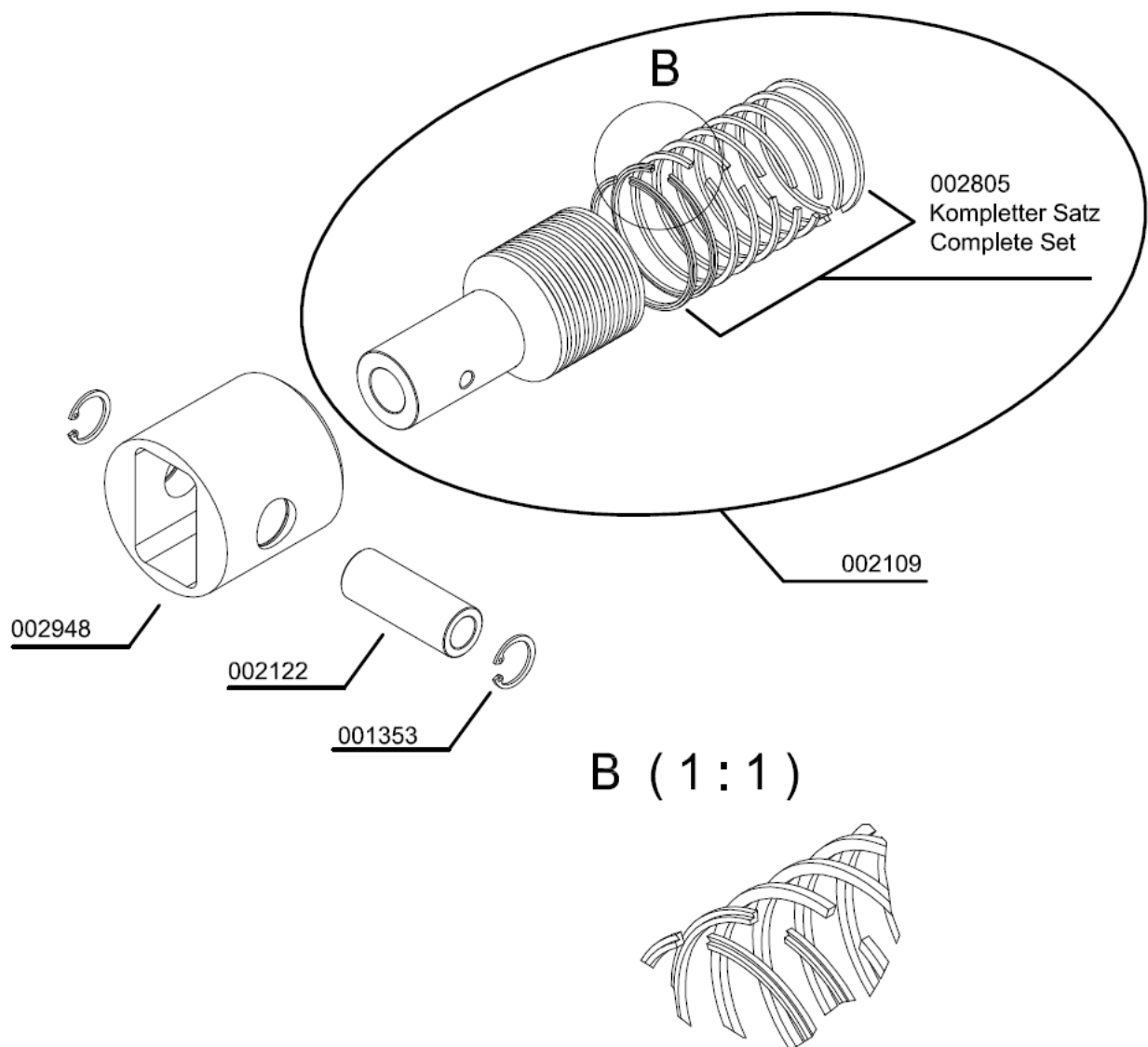
### Baugruppe: Kolben 2. Stufe / Assembly: Piston 2nd Stage

Best.-Nr. / Order No.	Benennung	Description
001353	Sicherungsring	Circlip I16
002109	Kolben 2. Stufe, kompl. mit Kolbenringe	Piston (c/w) rings 2nd Stage
002122	Kolbenbolzen, 2. + 3. Stufe	Piston pin, 2nd + 3rd Stage
002805	Kolbenringe 2. Stufe Satz	Set of piston rings 2nd stage
002948	Führungskolben 2. / 3. Stufe	Guide piston 2nd + 3rd stage

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kolben 2. Stufe / Assembly: Piston 2nd Stage**





## ERSATZTEILLISTE / SPARE PART LIST

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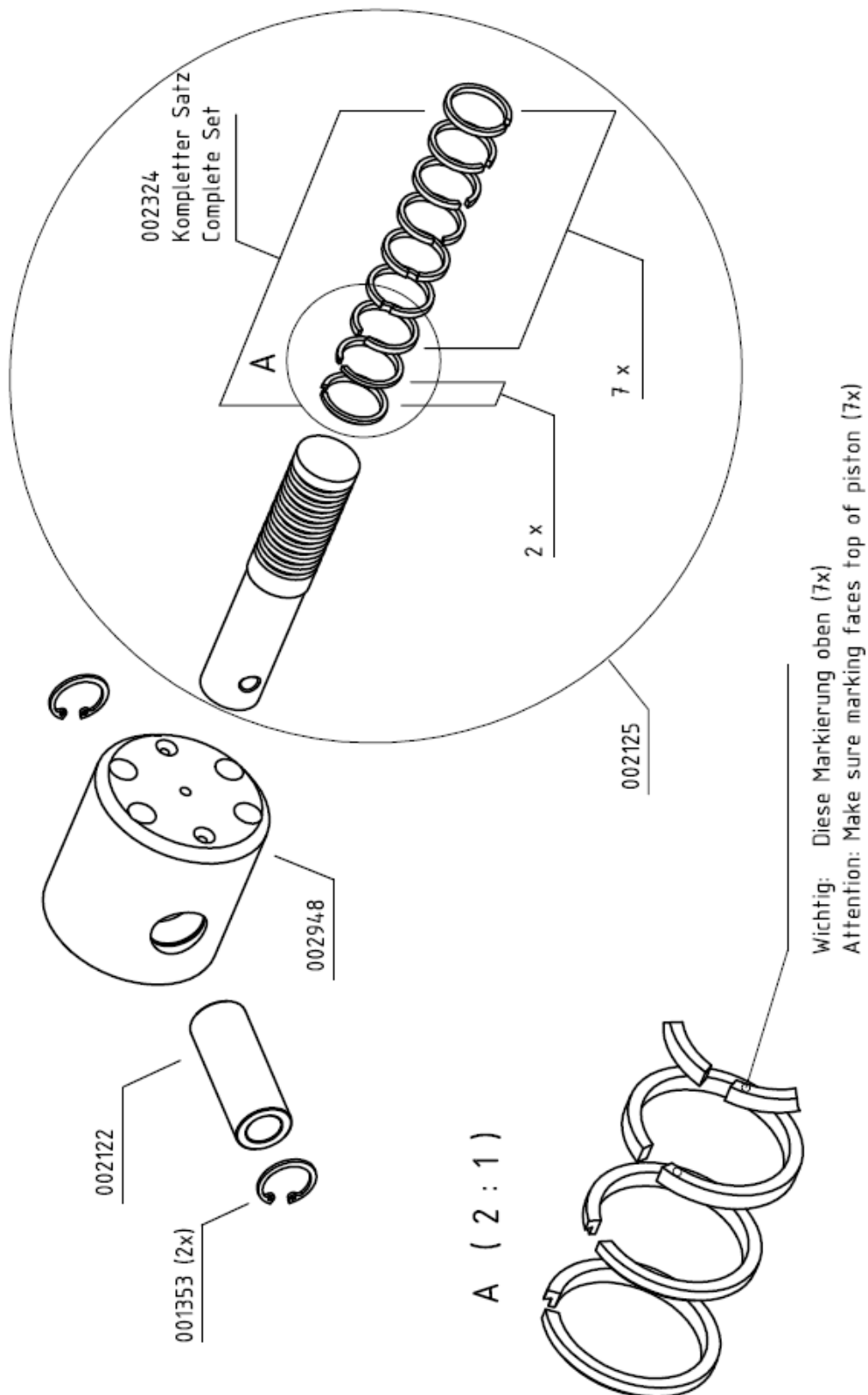
### Baugruppe: Kolben 3. Stufe / Assembly: Piston 3rd Stage

Best.-Nr. / Order No.	Benennung	Description
001353	Sicherungsring	Circlip I16
002122	Kolbenbolzen, 2. + 3. Stufe	Piston pin, 2nd + 3rd Stage
002125	Kolben inkl. Kolbenringe, 3. Stufe	Piston c/w rings 3rd Stage
002324	Kolbenringe 3. Stufe Satz/9Stk.	Piston rings, 3rd Stage
002948	Führungskolben 2. / 3. Stufe	Guide piston 2nd + 3rd stage

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kolben 3. Stufe / Assembly: Piston 3rd Stage**



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## ERSATZTEILLISTE / SPARE PART LIST

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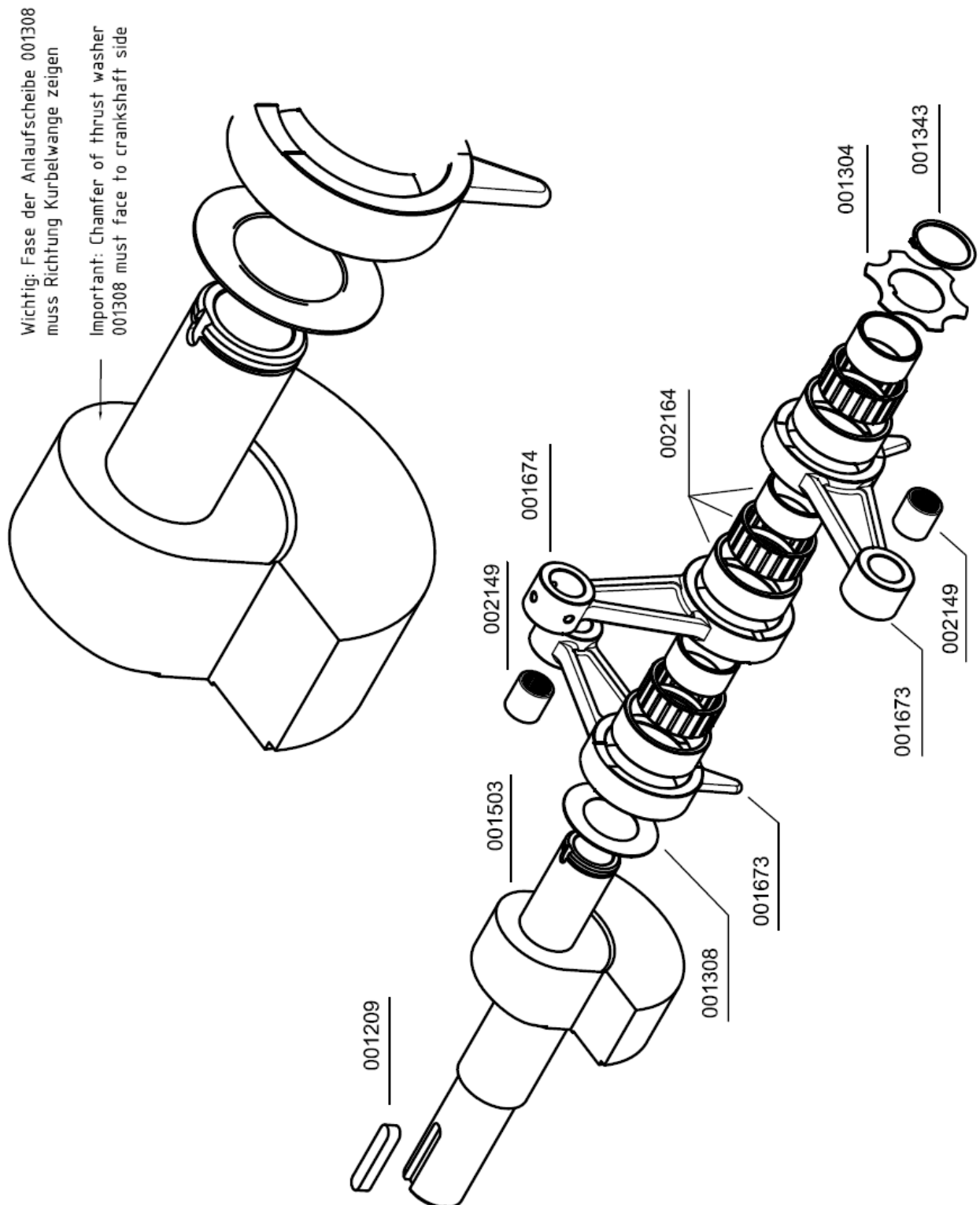
### Baugruppe: Kurbelwelle / Assembly: Crankshaft

Best.-Nr. / Order No.	Benennung	Description
001209	Passfeder	Woodruff Key
001304	Anlaufscheibe vordere (sternförmig)	Thrust Washer, Star shaped
001308	Anlaufscheibe hintere	Thrust Washer - rear side
001343	Sicherungsring	Circlip A35
001503	Kurbelwelle	Crank Shaft
001673	Pleuel 2.+3. Stufe	Connecting Rod 2nd/3rd Stage
001674	Pleuel 1. Stufe	Connecting Rod 1st Stage
002149	Pleuellager oberes	Small end bearing
002164	Pleuellager unteres	Big end bearing

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kurbelwelle / Assembly: Crankshaft**





## ERSATZTEILLISTE / SPARE PART LIST

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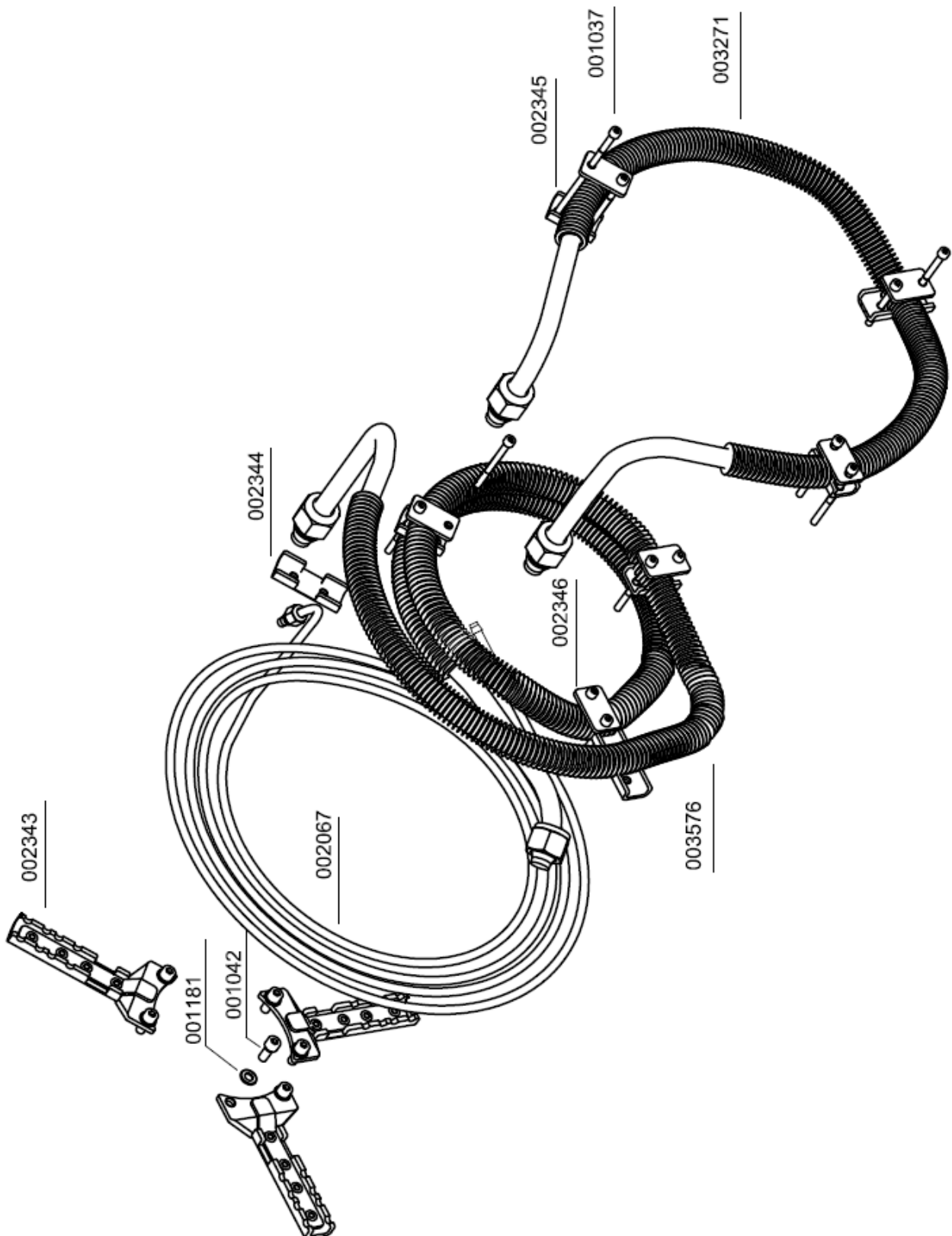
### Baugruppe: Kühlrohre / Assembly: Cooling Pipes

Best.-Nr. / Order No.	Benennung	Description
001037	Schlossschraube	Carriage Bolt
001042	Zylinderschraube	Allen Screw
001181	U-Scheibe A8	Washer A8
002067	Kühlrohr 3. Stufe (E / ES)	Cooling pipe 3rd Stage (E/ES)
002343	Kühlrohr-Haltearm	Cooling pipe, bracket s/s
002344	Kühlrohr-Halteplatte	Plate
002345	Kühlrohr-Oberplatte	Upper plate
002346	Kühlrohr Klemmdeckel	Cooling pipe bracket cap
003271	Kühlspirale 1. Stufe	Cooling coil, 1st stage
003576	Kühlspirale, 2. Stufe	Cooling coil, 2nd stage

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kühlrohre / Assembly: Cooling Pipes**



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## ERSATZTEILLISTE / SPARE PART LIST

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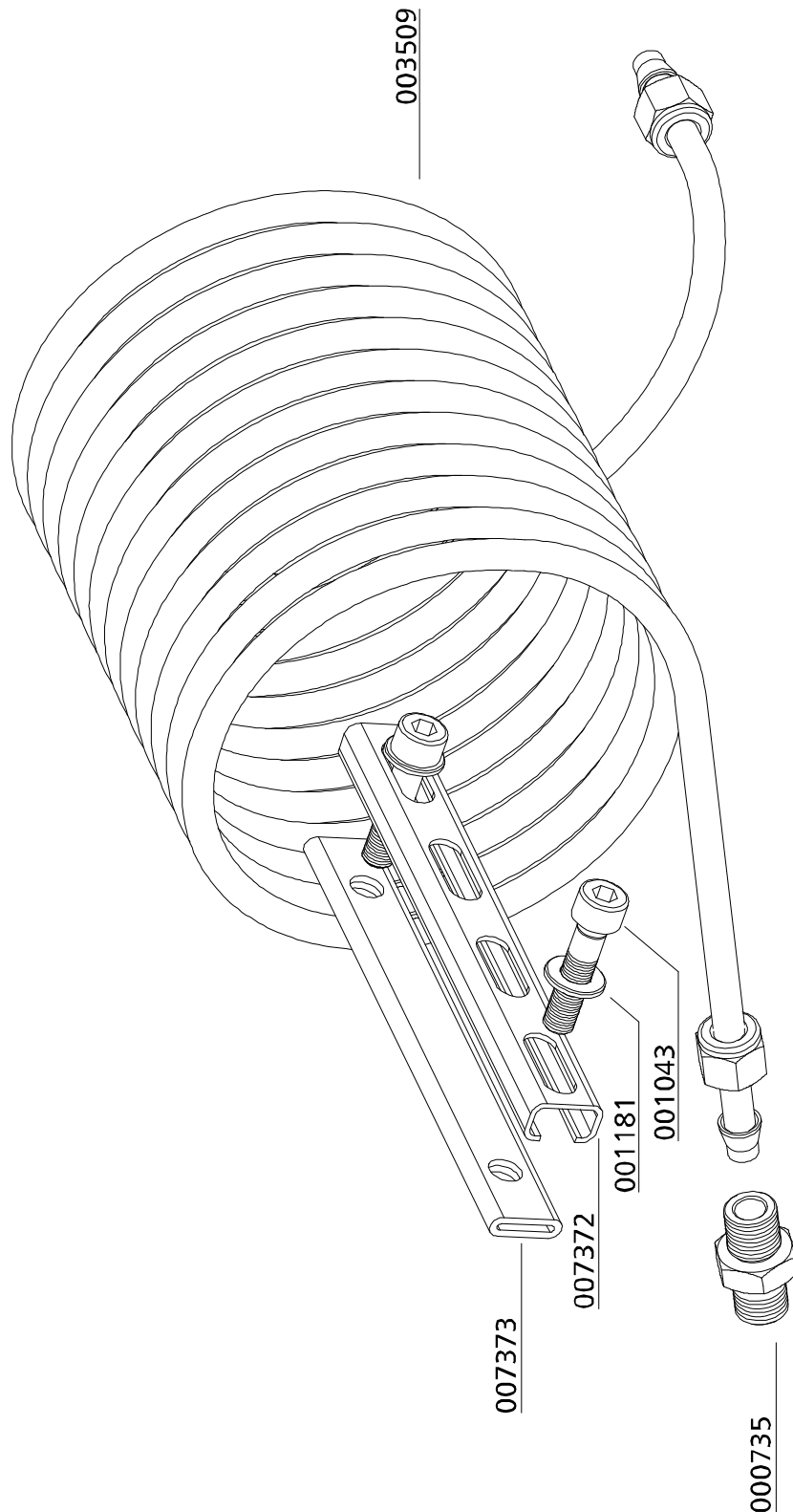
### Kühlrohr 3. Stufe / Cooler 3rd Stage

Best.-Nr. / Order No.	Benennung	Description
000735	Verschraubung, G08LCFX	Connection, G08LCFX
001043	Zylinderschraube, M8x35mm DIN912	Allen Screw, M8x35mm DIN912 8.8 ZN
001181	U-Scheibe A8 DIN125 ZN	Washer A8
003509	Kühlspirale 3. Stufe	Cooler 3rd Stage
007372	Klemmschiene Wärmetauscher,	Metal Bar for Cooler, 160 mm
007373	PVC Schlauch für Kühlwendelhalter,	PVC Hose for Bracket, 160 mm

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**DETAILANSICHT / DETAILED VIEW**

**Kühlrohr 3. Stufe / Cooler 3rd Stage**



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## ERSATZTEILLISTE / SPARE PART LIST

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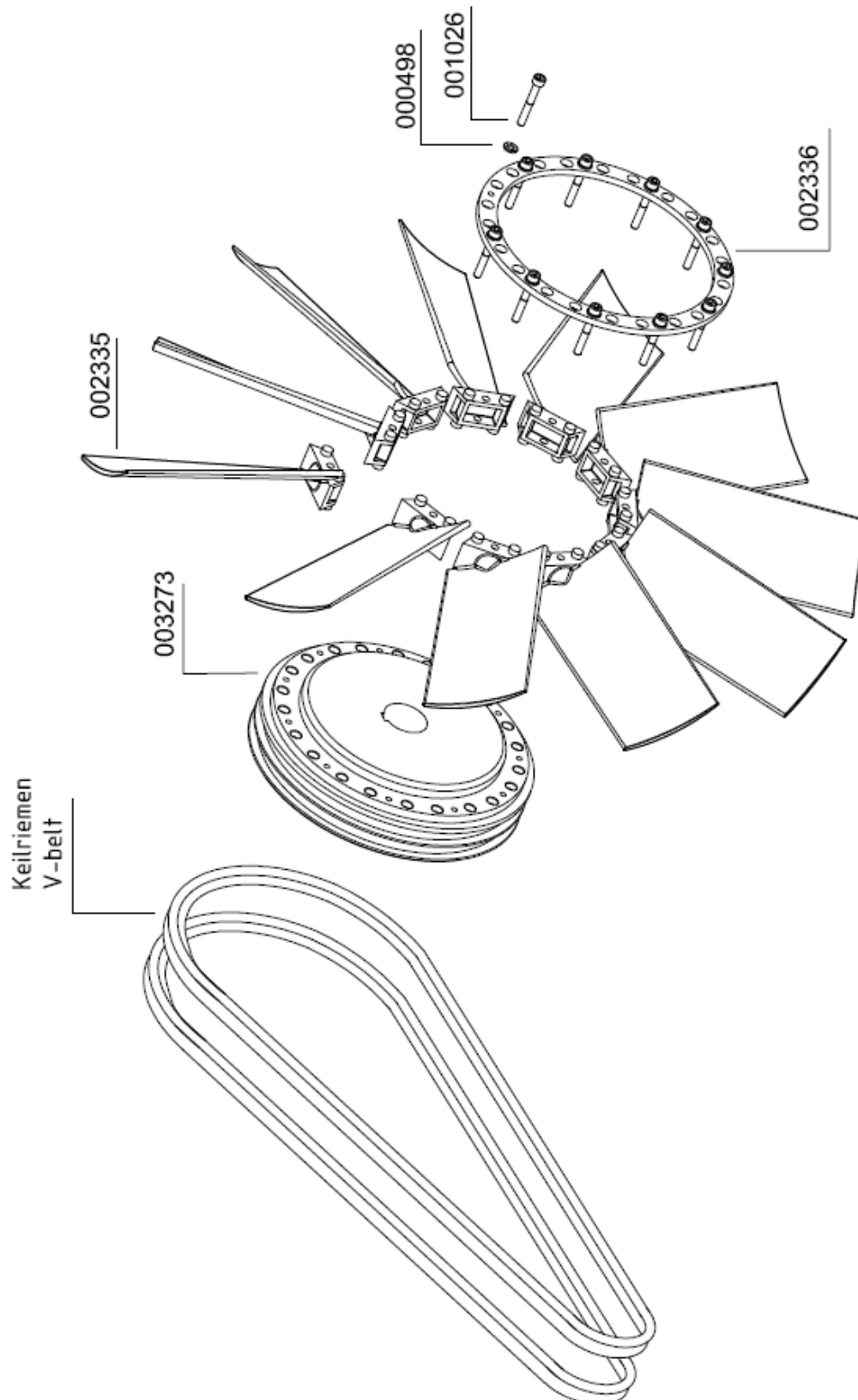
### Baugruppe: Lüfterrad / Assembly: Fan Wheel

Best.-Nr. / Order No.	Benennung	Description
000498	U-Scheibe A6	Washer A6
001026	Zylinderschraube	Allen Bolt
002335	Ventilatorflügelblatt, schwarz	Fan blade, black, new version
002336	Haltering Ventilatorflügel	Fan blade holder
003273	Schwungrad, inkl. Schrauben & Haltering	Flywheel c/w bolts & clamping

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Lüfterrad / Assembly: Fan Wheel**



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## ERSATZTEILLISTE / SPARE PART LIST

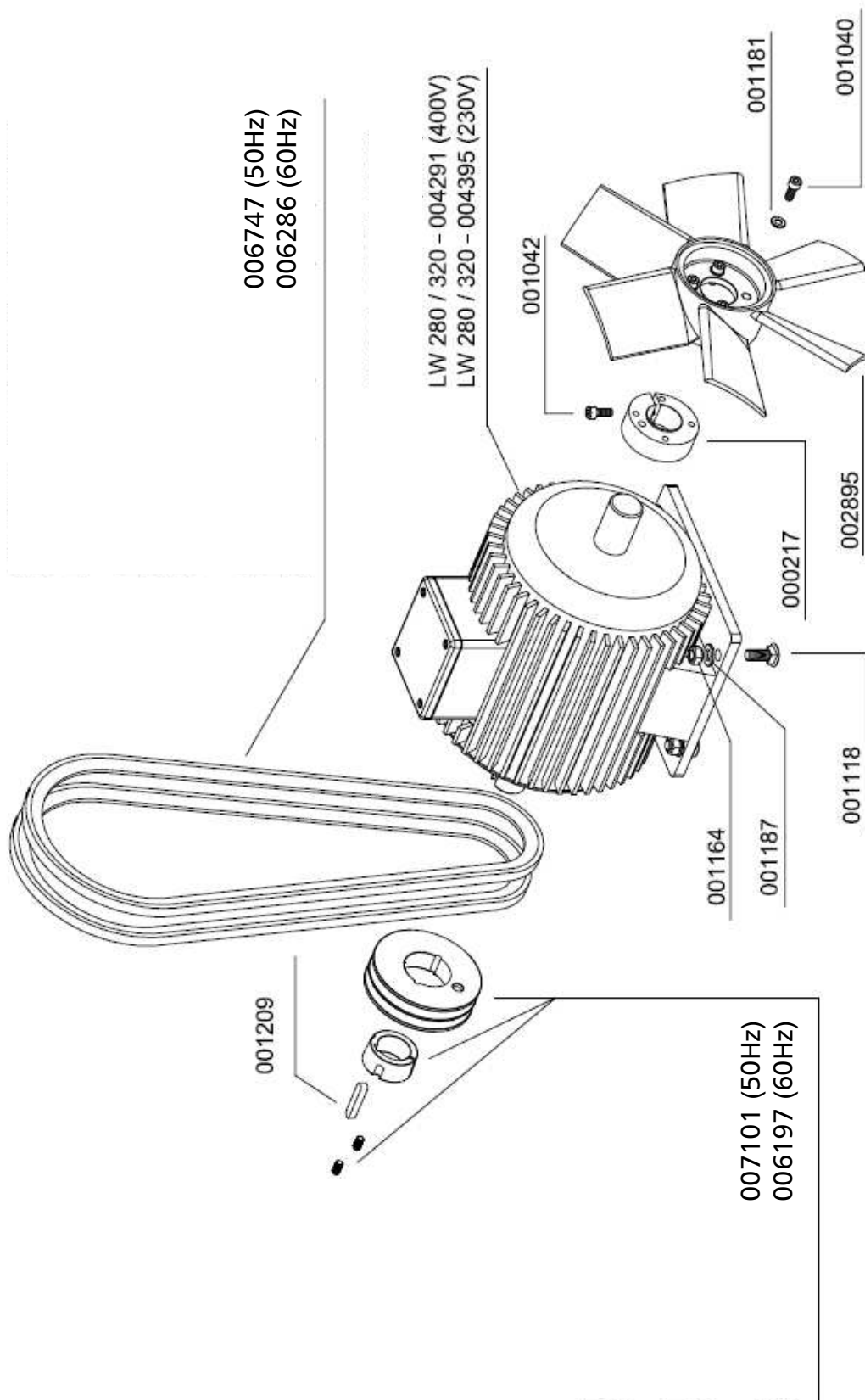
### Baugruppe: E-Motor / Assembly: E-Motor

Best.-Nr. / Order No.	Benennung	Description
000217	Ventilatorflansch, Zusatzlüfter	Cooling Fan Adapter Flange
001040	Zylinderschraube	Allen Screw
001042	Zylinderschraube	Allen Screw
001118	Schlossschraube	Carriage Screw
001164	Stopfmutter	Lock Nut M10
001181	U-Scheibe A8	Washer A8
001187	U-Scheibe A10	Washer A10
001209	Passfeder	Woodruff Key
002895	Zusatzventilator Silent	Additional Fan SILENT
004291	Antriebsmotor 400V	Drive motor 400V
004395	Antriebsmotor 230V	Drive motor 230V
006197	Riemenscheibe mit Spannsatz 60Hz	Pulley c/w bushing 60Hz
006286	Keilriemen 60Hz	V-Belt 60Hz
006747	Keilriemen 50Hz	V-Belt 50Hz
007107	Riemenscheibe mit Spannsatz 50Hz	Pulley c/w bushing 50Hz

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: E-Motor / Assembly: E-Motor**



**ERSATZTEILLISTE / SPARE PART LIST**

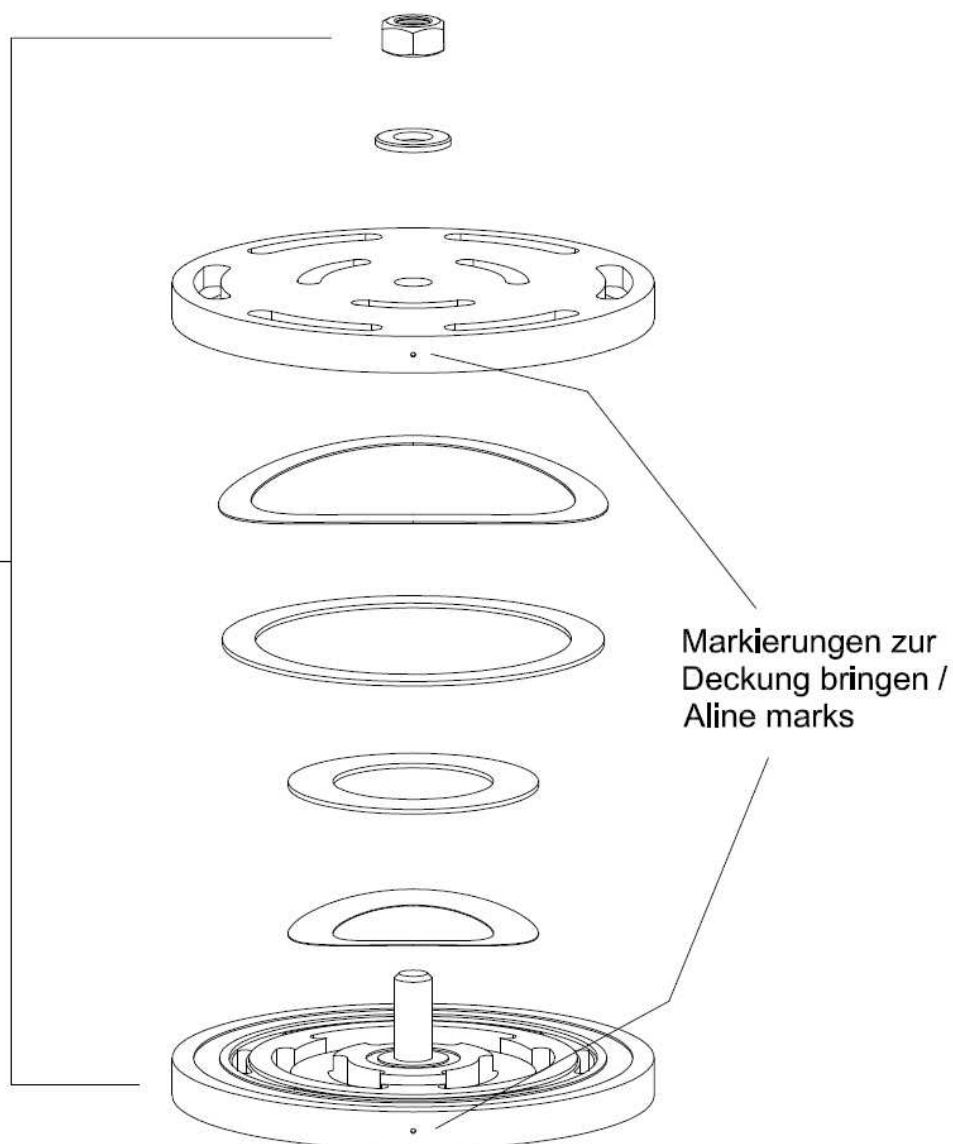
**Baugruppe: Saug und Druckventil 1. Stufe /**

**Assembly: In and outlet valve 1st stage**

Best.-Nr. / Order No.	Benennung	Description
002093	Saug-und Druckventil, 1. Stufe	In & Outlet Valve 1st Stage

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002093  
komplett /  
complete

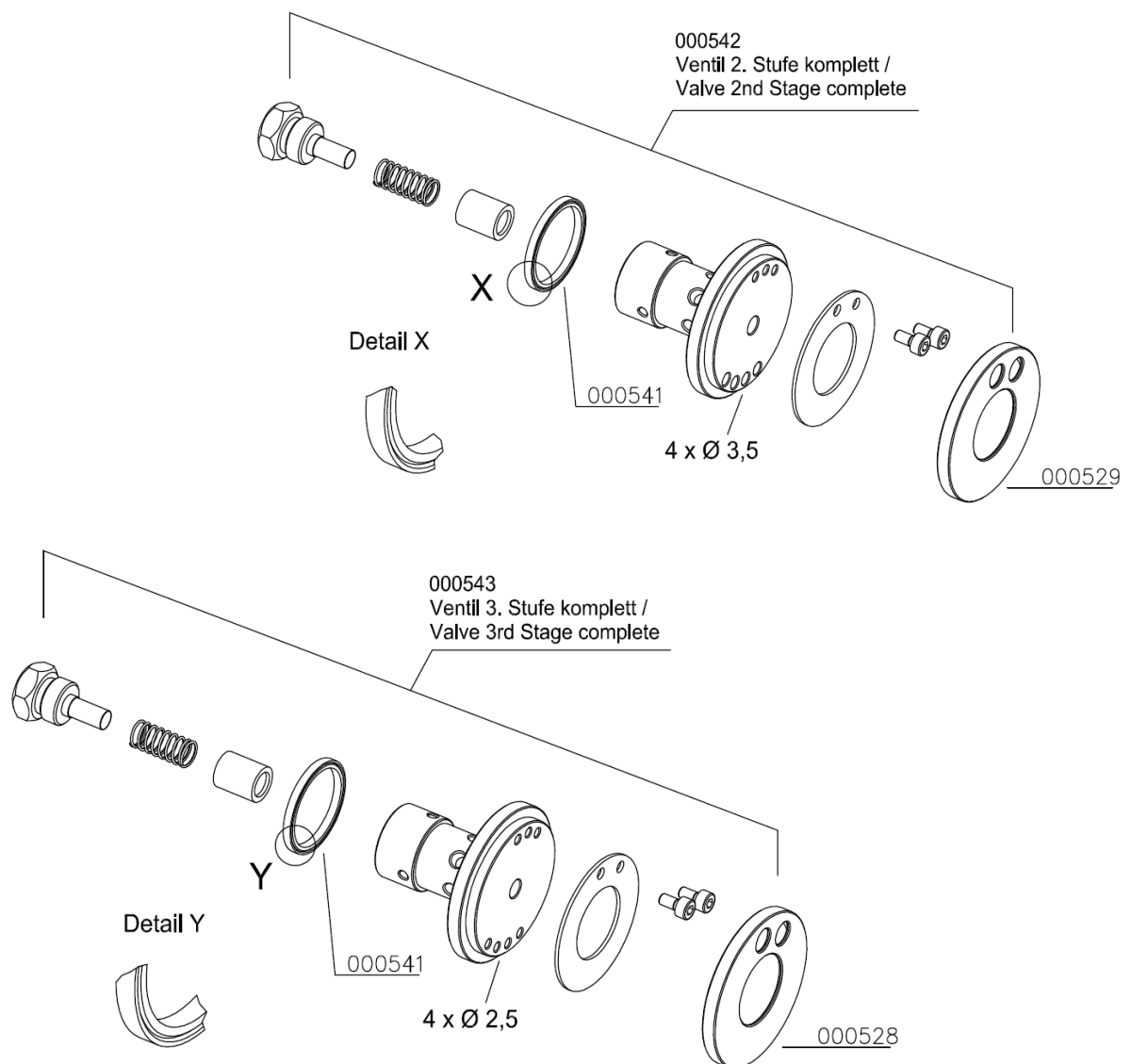


## ERSATZTEILLISTE / SPARE PART LIST

### Baugruppe: Saug und Druckventile 2. und 3. Stufe /

### Assembly: In and outlet valves 2nd and 3rd stage

Best.-Nr. / Order No.	Benennung	Description
000528	Ventildichtung, Saug- & Druckventil unten	Lower Valve Gasket, 3rd St.
000529	Ventildichtung, Saug- & Druckventil unten	Lower Valve Gasket, 2nd St.
000541	Dichtring / Dichtung Ventil	Upper Alloy Seal Ring
000542	Saug- & Druckventil, 2. Stufe komplett	In- & Outlet Valve, 2nd Stage
000543	Saug-Druckventil, 3. Stufe	In- & Outlet Valve, 3rd Stage







## ERSATZTEILLISTE / SPARE PART LIST

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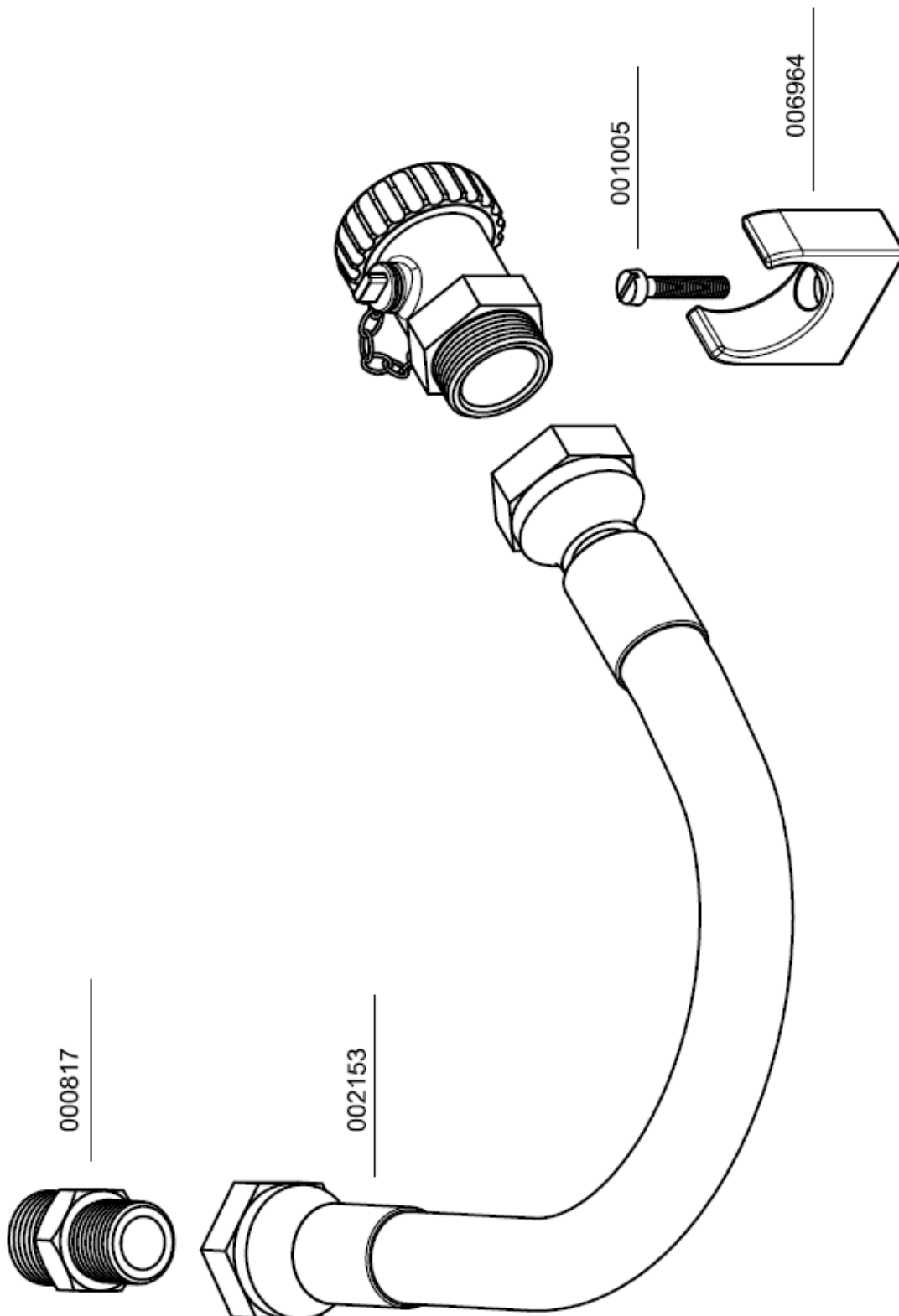
### Baugruppe: Ölablassschlauch / Assembly: Oil Drainage Tube

Best.-Nr. / Order No.	Benennung	Description
000817	Verschraubung	Connection
001005	Zylinderschraube	Allen Screw
002153	Ölablassschlauch	Oil drain hose
006964	Klemmhalter Ölablassschlauch	Clamp Oil Drain Hose

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Ölablassschlauch / Assembly: Oil Drainage Tube**



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## ERSATZTEILLISTE / SPARE PART LIST

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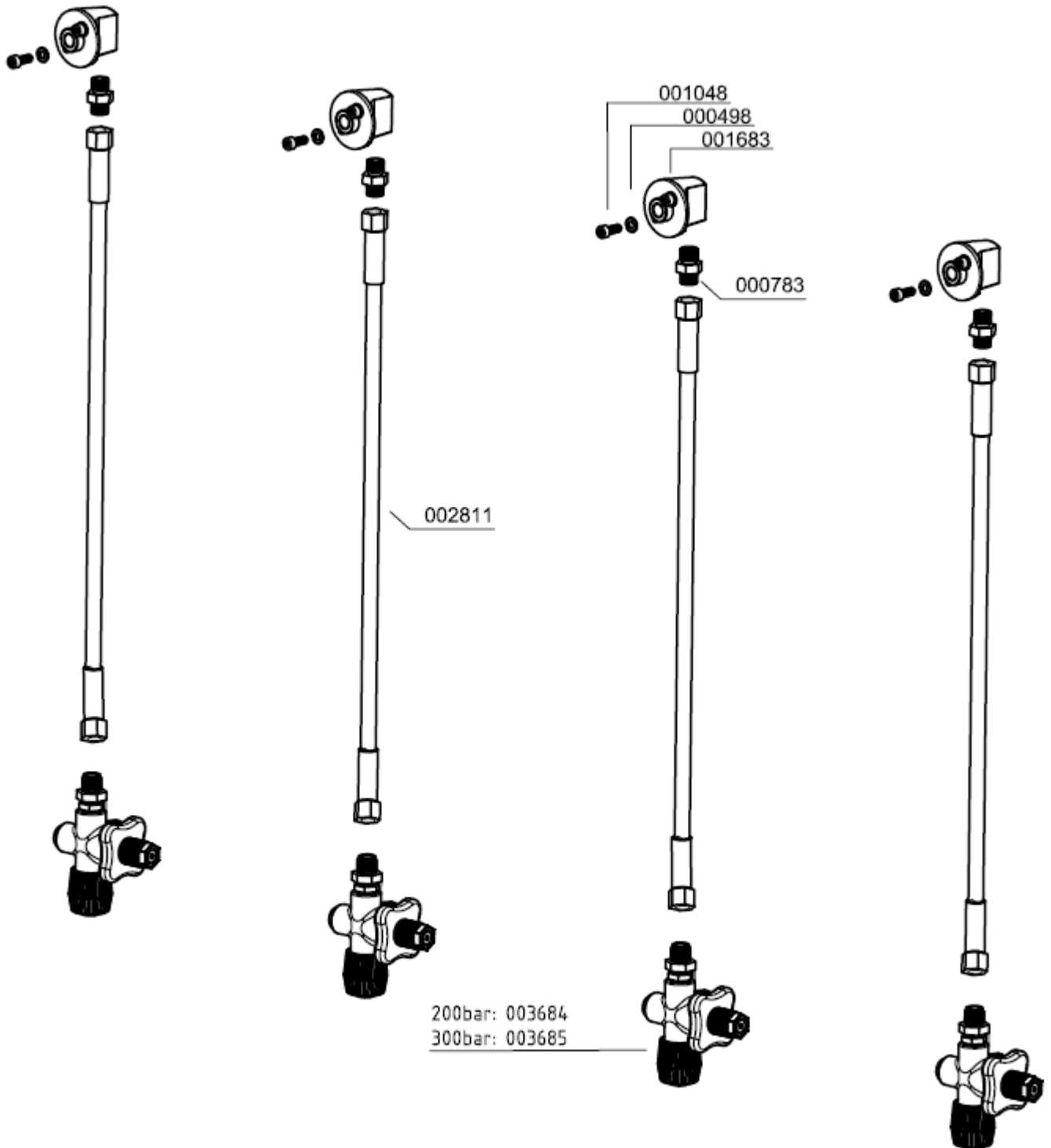
### Baugruppe: Füllrichtung / Assembly: Filling Device

Best.-Nr. / Order No.	Benennung	Description
000498	U-Scheibe A6	Washer A6
000783	Verschraubung	Straight Connection
001048	Zylinderschraube	Allen Screw
001683	Schlauchanschlussstück, Alu	Alloy Hose Connector G1/4"
002811	Hochdruckschlauch 1000mm	HP-Hose 1000mm
003684	Füllventil Kreuzbauweise	Filling Valve cross
003685	Füllventil Kreuzbauweise	Filling Valve cross

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**ERSATZTEILLISTE / SPARE PART LIST**

**Baugruppe: Fülleinrichtung / Assembly: Filling Device**



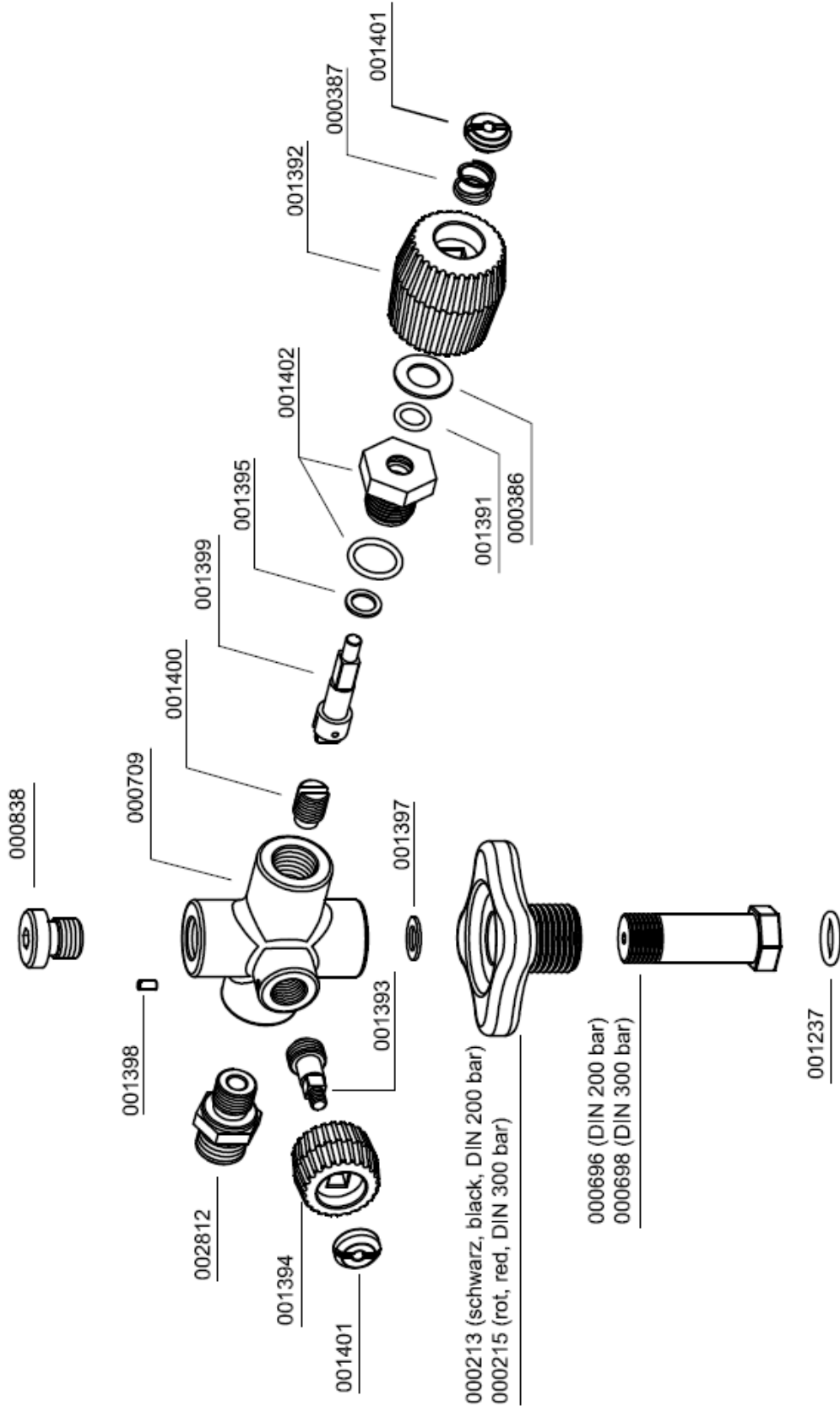
**Füllventil / Filling valve**

Best.-Nr. / Order No.	Benennung	Description
000213	Handrad, schwarz DIN	Hand Wheel, black
000215	Handrad rot DIN	Hand Wheel, red
000386	Gleitscheibe, Kreuzventil	Slide Washer
000387	Feder ( Kreuzventil )	Coil Spring, cross d. valve
000696	Füllanschluss o. Handrad 200bar	Filling Connect. w/o handwheel 200bar
000698	Füllanschluss o. Handrad 300bar	Filling Conne. w/o handwheel 300bar
000709	Füllventil Kreuzbauweise	Filling Valve cross design
000838	Verschlussstopfen	Plug
001237	O-Ring DIN Flaschenanschluss	O-Ring DIN filling connector
001391	O-Ring	O-Ring
001392	Füllhandrad Kreuzventil	Hand Wheel Filling Valve cross
001393	Entlüftungsspindel	Vent Spindle
001394	Entlüftungshandrad	Vent Hand Wheel
001395	Gleitscheibe, schwarz, Kreuzventil	Slide Washer, plastic black
001397	Kupferdichtung	Copper Seal Ring
001398	Madenschraube	Worm Screw
001399	Oberspindel	Adapter Shaft
001400	Dichtspindel, Kreuzventil	Seal Spindle Filling Valve
001401	Schlitzmutter	Slotted Nut
001402	Gehäuseverschraubung kompl. m. O-Ringen	Filling Spindle Body
002812	Verschraubung, Edelstahl	Connection, S/S

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Füllventil / Assembly: Filling valve**





## ERSATZTEILLISTE / SPARE PART LIST

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### Baugruppe: Manometer / Pressure Gauge

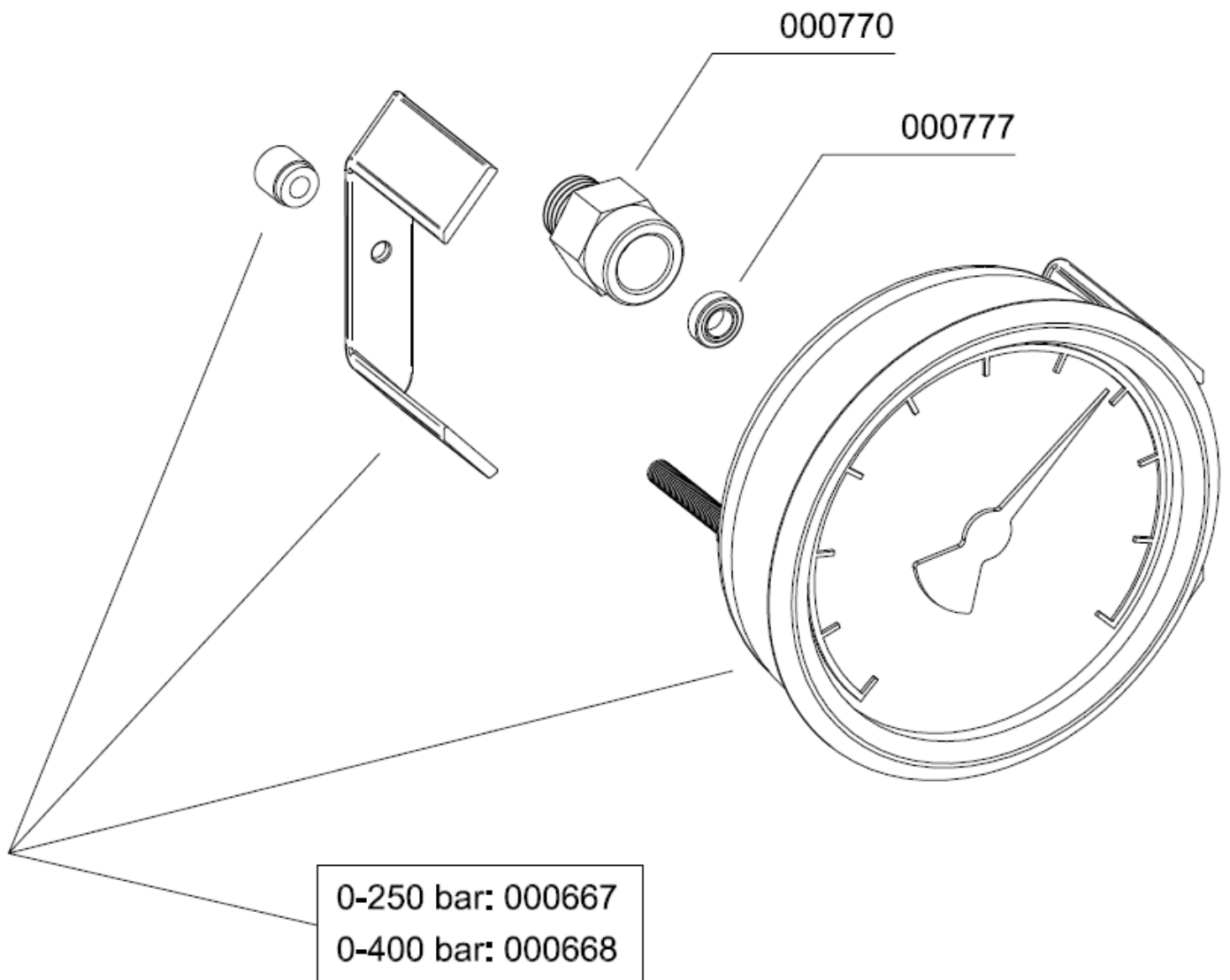
Best.-Nr. / Order No.	Benennung	Description
000667	Manometer 0-250 bar	Pressure Gauge 0-250 bar
000668	Manometer 0-400 bar	Pressure Gauge 0-400 bar
000770	Manometerverschraubung	Connection Pressure Gauge
000777	Dichtring Manometerverschraubung	Seal Ring for Pressure Gauge

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**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Manometer / Pressure Gauge**

C







# ATTACHMENT

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**

<b>Set pressure:</b>	see mark (hand wheel on top of valve)
<b>Maximum outflow:</b>	Set pressure 100-159 bar: 750 l / min Set pressure 160-350 bar: 1.100 l / min
<b>Suitable media:</b>	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.



- 1) **Identification of set pressure**
- 2) **Seal**
- 3) **Fixing screws<sup>1</sup>**
- 4) **Venting screw (hand wheel)**
- 5) **Identification serial number**
- 6) **Socket for safety valve**

Safety valve with socket

<sup>1</sup> und die Anforderungen des AD 2000 Merkblatts W7 erfüllen. Schaftlänge 70mm. 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 before further use to the manufacturer for repair / adjustment.

In addition, the safety valve has a venting device (hand wheel).

In the rotation direction clockwise, the safety valve and herewith also the filter housing of the final stage could be completely vented.

During normal operation, the screw is unscrewed to the upper stop anticlockwise, an integrated safety ring prevents that the screw can be completely unscrewed.

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

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 blowoff 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 6mm 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

**Kontakt:** E-Mail: [service@lw-compressors.com](mailto:service@lw-compressors.com)  
Web: [www.lw-compressors.com](http://www.lw-compressors.com)  
Tel.: +49 (0) 6256 – 85880 0  
Fax: +49 (0) 6256 – 85880 14

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**Note:**

*Use the safety valve only in a technically perfect condition, for its intended purpose, safety and danger awareness, in compliance with the operating instructions!  
Especially disorders which could affect safety must be remedied 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:

- The safety valve is periodically - in accordance with the currently valid Pressure Equipment Directives - to check on 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.

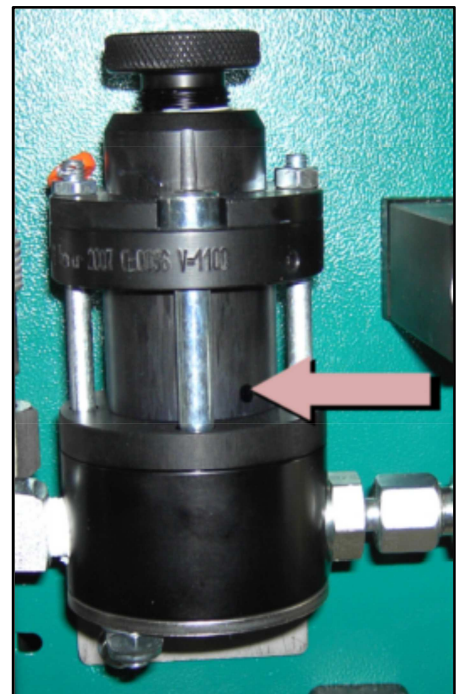


Figure 1: Position for oil refill

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

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