



## CHAPTER OVERVIEW

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**Operating Instructions** .....

**A**

**Spare Parts Lists** .....

**B**

**Options (if equipped)**.....

**C**

**Attachment** .....

**D**

### Manufacturer in terms of 97/23/EC

The full name and address of the manufacturer is:

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





## SERVICE INFORMATION / WARRANTY

---

### 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 160 E / LW 160 E1

LW 190 B





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## 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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### Drive motors

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#### LW 160 E

4 kW e-motor / 400V / 3 phase / 50 Hz (or 60 Hz), fully wired with cable and 16A CEE plug.



#### LW 160 E1

4 kW e-motor / 230V / 1 phase / 50 Hz (or 60 Hz), fully wired with cable and two-pin earthed plug 230V.



#### LW 190 B

High performance 4 gear motor (6 kW) with integrated fuel tank. Pull start, auto cut off at low oil level.



## DESCRIPTION

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### Scope of Delivery LW 160 E / LW 160 E1

The user-friendly LW 160 E with electric drive is ideal for mobile applications or occasional filling operations. It comes wired with power cable, plug and phase selector.

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### Versions

#### Filling pressure versions:

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

### Specifications

- LW 160 E: Electro Motor (Standard: 400V, 3 phase, 50Hz)  
LW 160 E1: Electro Motor (Standard: 230V, 1 phase, 50Hz)
- LW 160E: Power cable with plug and phase selector  
LW 160 E1: Cable and two-pin earthed plug 230V
- Start/Stop Switch
- Steel frame c/w carrying handles
- Manual condensate drain
- Pressure maintaining and non return valve
- 1x Filling hose c/w filling valve and pressure gauge
- Intermediate coolers
- Stainless steel pipes
- Oil- / Water separators after 2nd and 3rd stage
- 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

- Additional filling hose c/w filling valve
- Hour counter
- Automatic stop at final pressure
- Automatic start system
- Switch over device for 200 or 300 bar
- Motor protection switch
- Special voltages / frequencies on request
- Conversion set: Petrol-/electro version





## DESCRIPTION

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### Scope of Delivery LW 190 B

The user-friendly compressor with 4-stroke power in a compact design is a popular alternative for expeditions and safaris. The LW 190 B is portable and therefore ideal for mobile applications or occasional filling operations.

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### Versions

#### Filling pressure versions:

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

### Specifications

- High performance 4 gear motor (6 kW) with integrated fuel tank. Pull start, auto cut off at low oil level
- Stainless steel frame
- Manual condensate drain
- Pressure maintaining and non return valve
- 1x Filling hose c/w filling valve and pressure gauge
- Intermediate coolers
- Stainless steel pipes
- Oil- / Water separators after 2nd and 3rd stage
- 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)
- Breathing air purification an accordance to EN 12021

### Options

- Additional filling hose c/w filling valve
- Hour counter
- Automatic stop at final pressure
- Switch over device for 200 or 300 bar
- Motor protection switch
- Conversion set: Petrol-/electro version

## DESCRIPTION

### Technical Data

A

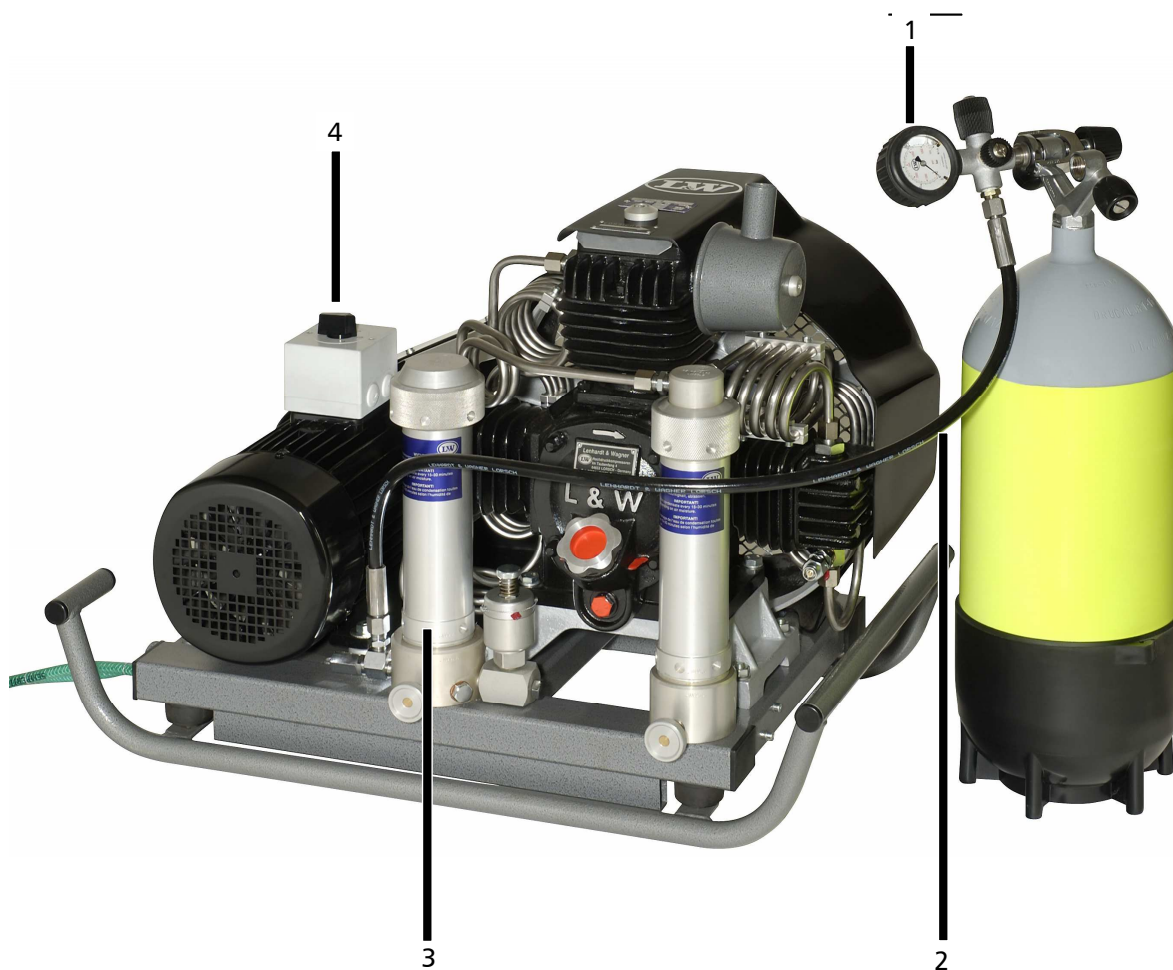


Technical Data	LW 160 E	LW 160 E1	LW 190 B
Capacity [l/min]:	160	160	190
Max. Operating Pressure [bar]:	330	330	330
RPM [min <sup>-1</sup> ]:	1450	1450	1800
Number of Pressure Stages:	3	3	3
Cylinder Bore 1st Stage [mm]:	Ø 72	Ø 72	Ø 72
Cylinder Bore 2nd Stage [mm]:	Ø 28	Ø 28	Ø 28
Cylinder Bore 3rd Stage [mm]:	Ø 14	Ø 14	Ø 14
Medium:	Industrial Air / Breathing Air		
Intake Pressure:	atmosphaeric		
Oil Capacity [l]:	0.8	0.8	0.8
Intake Temperature [°C]:	0 < +45	0 < +45	0 < +45
Ambient Temperature [°C]:	+5 < +45	+5 < +45	+5 < +45
Cooling Air Volume [m <sup>3</sup> /h]:	> 1200	> 1200	> 1800
Voltage:	400V / 3 phase / 50 Hz	230V / 1 phase / 50 Hz	-
Protection Class Drive Motor:	IP 54	IP 54	-
Drive Power [kW]:	4	4	6
RPM Motor [min <sup>-1</sup> ]:	2,890	2,890	2,890
Start:	Start / Stop switch		Hand start
Noise level [dB(A)]:	84	84	93
Dimensions W x D x H [mm]:	780 x 420 x 560	780 x 420 x 560	920 x 430 x 560
Weight [kg]:	approx 90	approx 90	approx 99
Content Volume Filter housing [l]:	0.5	0.5	0.5

## DESCRIPTION

### Unit Assembly LW 160 E / LW 160 E1

A

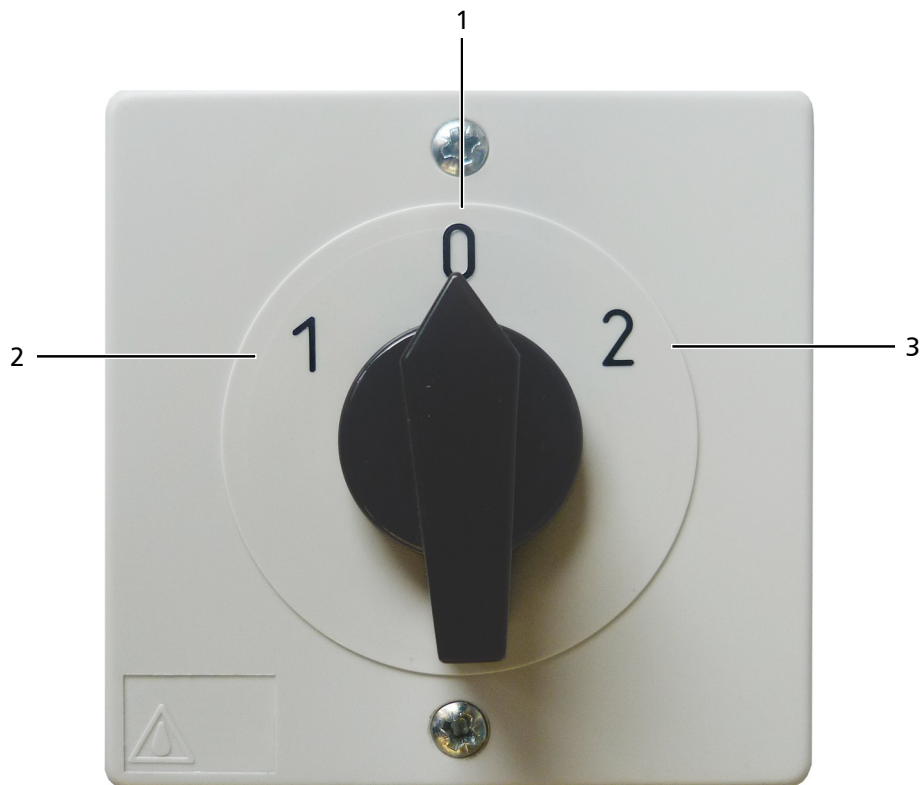


No.	Designation
1	Pressure gauge
2	Filling hose with filling valve
3	Filter housing
4	E-Motor / 400V / 3-Phasen / 50 Hz or E-Motor / 230V / single Phase / 50 Hz

## DESCRIPTION

### Phase selector switch LW 160 E

A



No.	Designation
1	Switch position 0 - OFF
2	Switch position 1 - ON - Rotation 1
3	Switch position 2 - ON - Rotation 2

## DESCRIPTION

### Unit Assembly LW 190 B

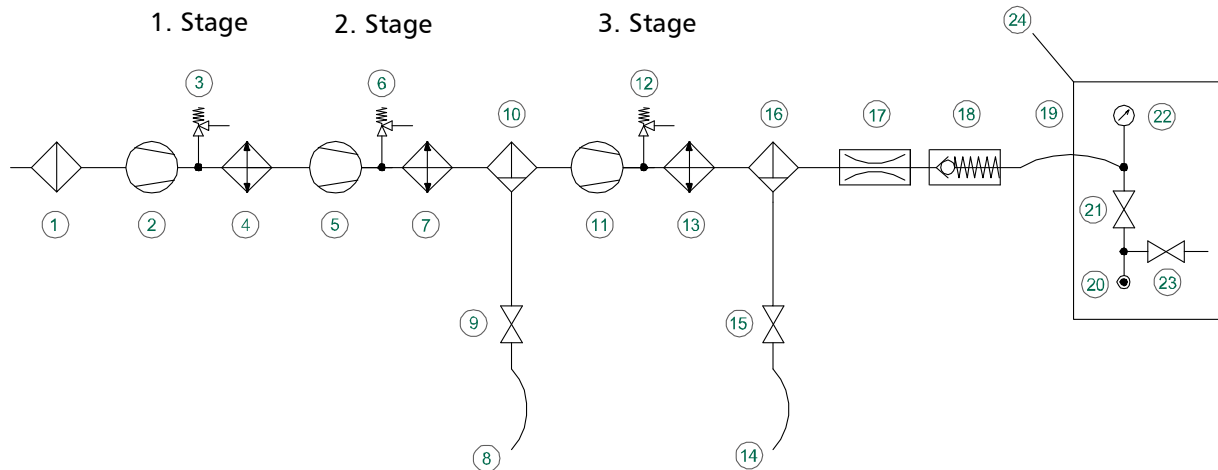
A



No.	Designation
1	Pressure gauge
2	Filling hose with filling valve
3	Filter housing
4	Hand start

## DESCRIPTION

### Flow chart



- |                                 |                                       |
|---------------------------------|---------------------------------------|
| 1. Air Intake Filter            | 13. Cooling Pipe Final Stage          |
| 2. 1st Pressure Stage           | 14. Condensate Release Hose           |
| 3. Safety Valve 1st Stage       | 15. Condensate Release Valve          |
| 4. Cooling Pipe 1st Stage       | 16. Oil-/Water Separator              |
| 5. 2nd Pressure Stage           | 17. Pressure Maintaining Valve        |
| 6. Safety Valve 2nd Stage       | 18. Non-Return Valve                  |
| 7. Cooling Pipe 2nd Stage       | 19. Filling Hose                      |
| 8. Condensate Release Hose      | 20. Filling Connector                 |
| 9. Condensate Release Valve     | 21. Filling Valve                     |
| 10. Oil-/Water Separator        | 22. Pressure Gauge (Filling Pressure) |
| 11. 3rd Pressure Stage          | 23. Vent Valve                        |
| 12. Final pressure-Safety Valve | 24. Unit Filling Valve "Cross Design" |



A

# SAFETY PRECAUTIONS



## SAFETY PRECAUTIONS

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A

### 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.

**A**



**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.
- Read the Operating Instructions of the petrol engine carefully prior to use. (LW 190 B Versions)
- 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.

**A**

## **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.
- Check all additional safety notices for the petrol engine in the specific handbook (LW 190 B Versions)



## 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.
- Any work on the petrol engine should be done in accordance with its specific handbook. (LW 190 B Versions)

A



## **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.
- Even minor relocation please disconnect the machine / system from 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.

**A**



A

# INSTALLATION

## INSTALLATION

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### Installation in closed rooms - LW 160 E



#### **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")!

A

## INSTALLATION

### Installation LW 190 B

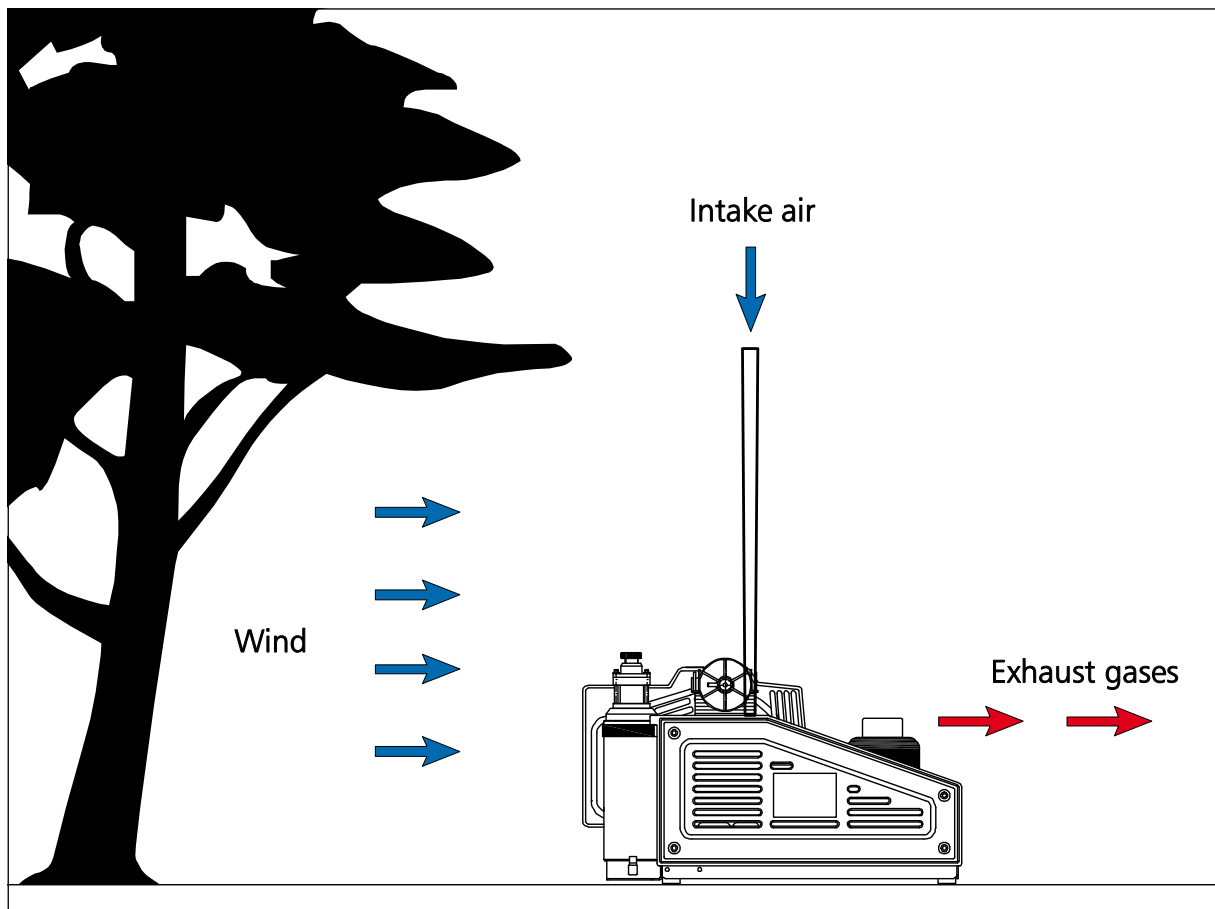


#### Danger

Compressors with petrol or diesel motors must only be located outdoors, never indoors, not even in partially closed rooms however large they may be.

#### For outside installation 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.
- On units employing petrol or diesel motors, it is most important that only clean air is used. Position compressor in direction of wind so that exhaust fumes are blown away from the unit.
- 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 LW 160 E / LW 160 E1

A

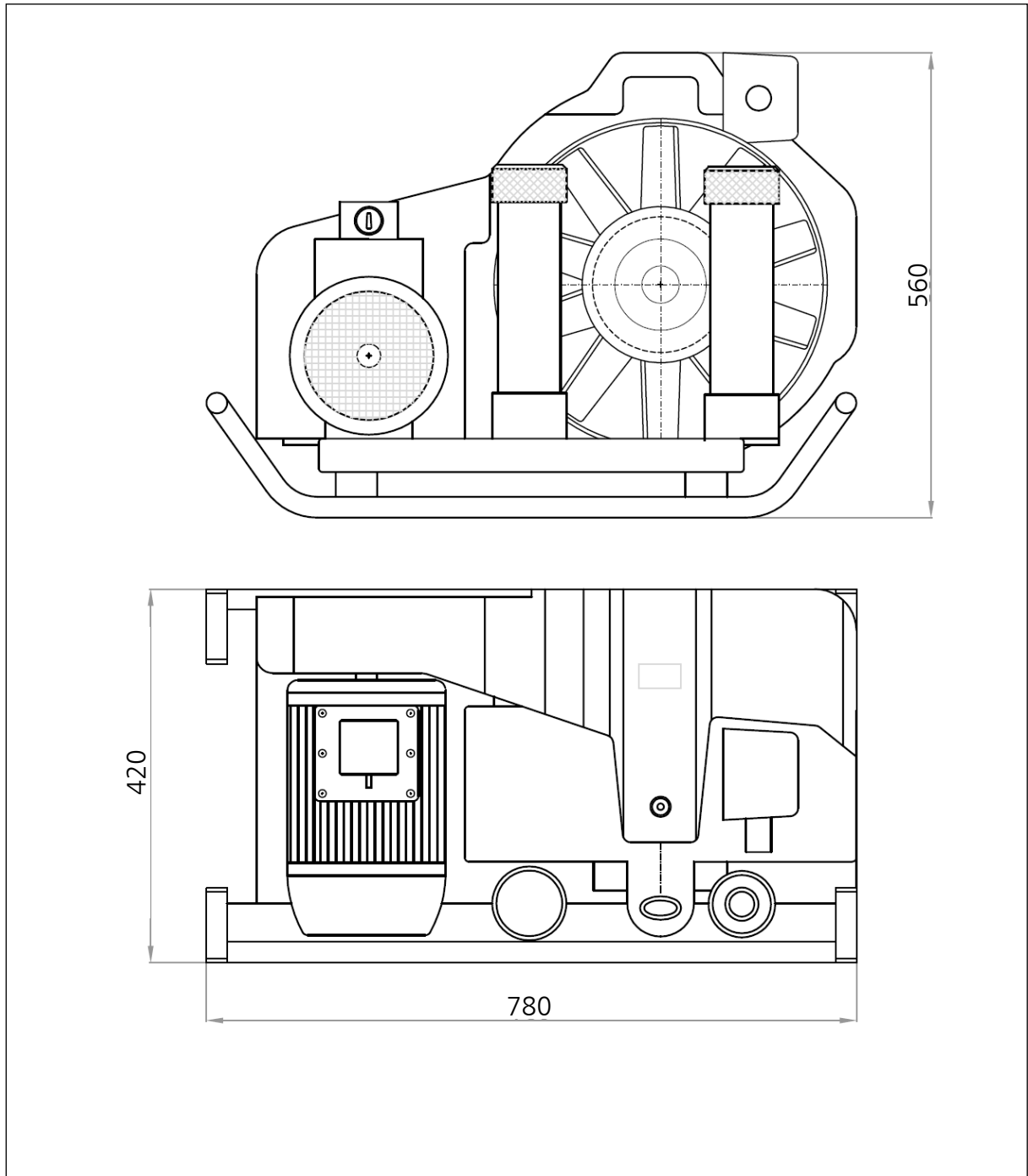


Fig. Dimensions

## INSTALLATION

### Dimensions LW 190 B

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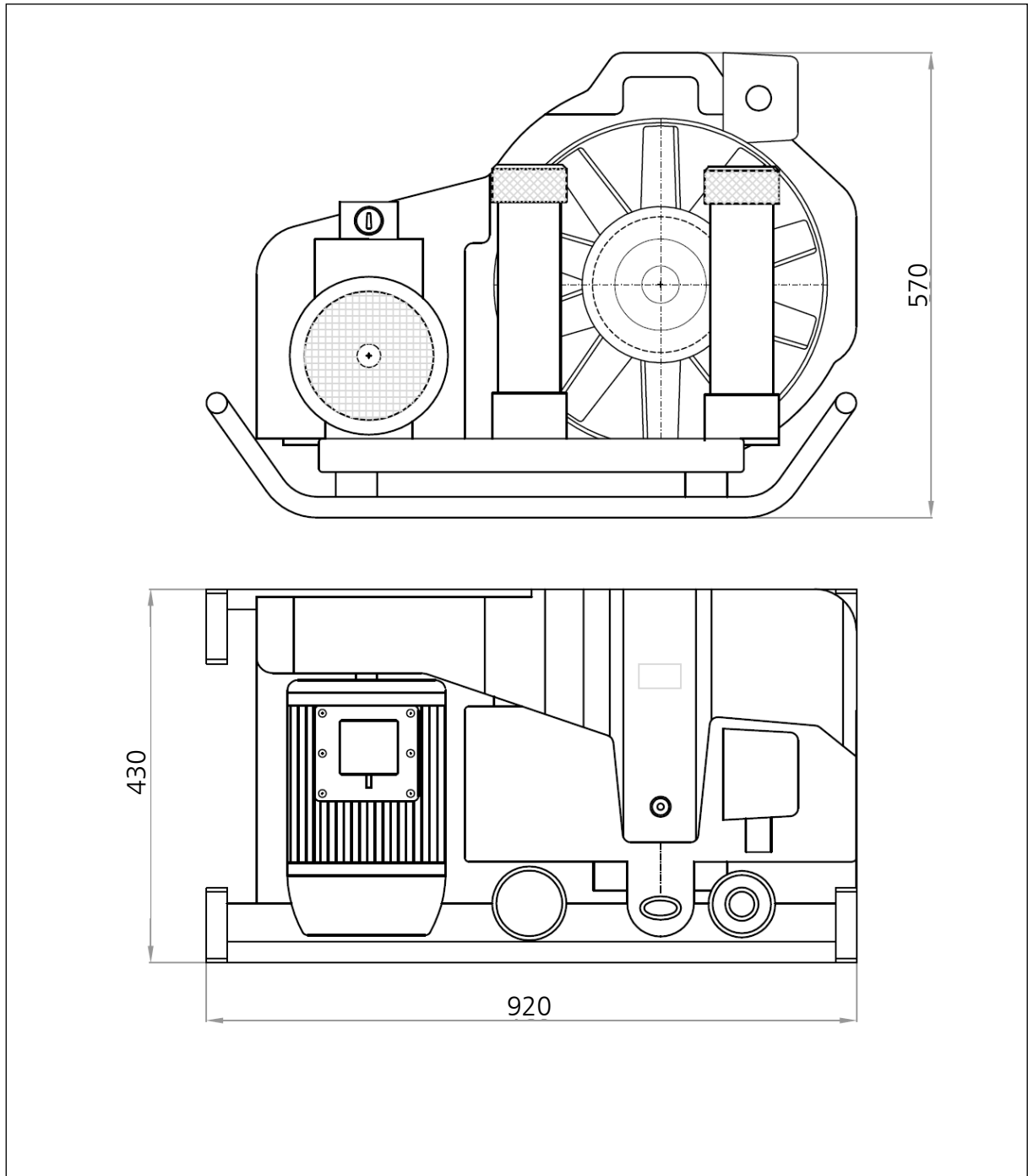


Fig. Dimensions

## 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. 300 mm, rear side min. 300 mm. Avoid anything in this area which can restrict the cooling air flow.
- No minimum distances are required at the side panels.

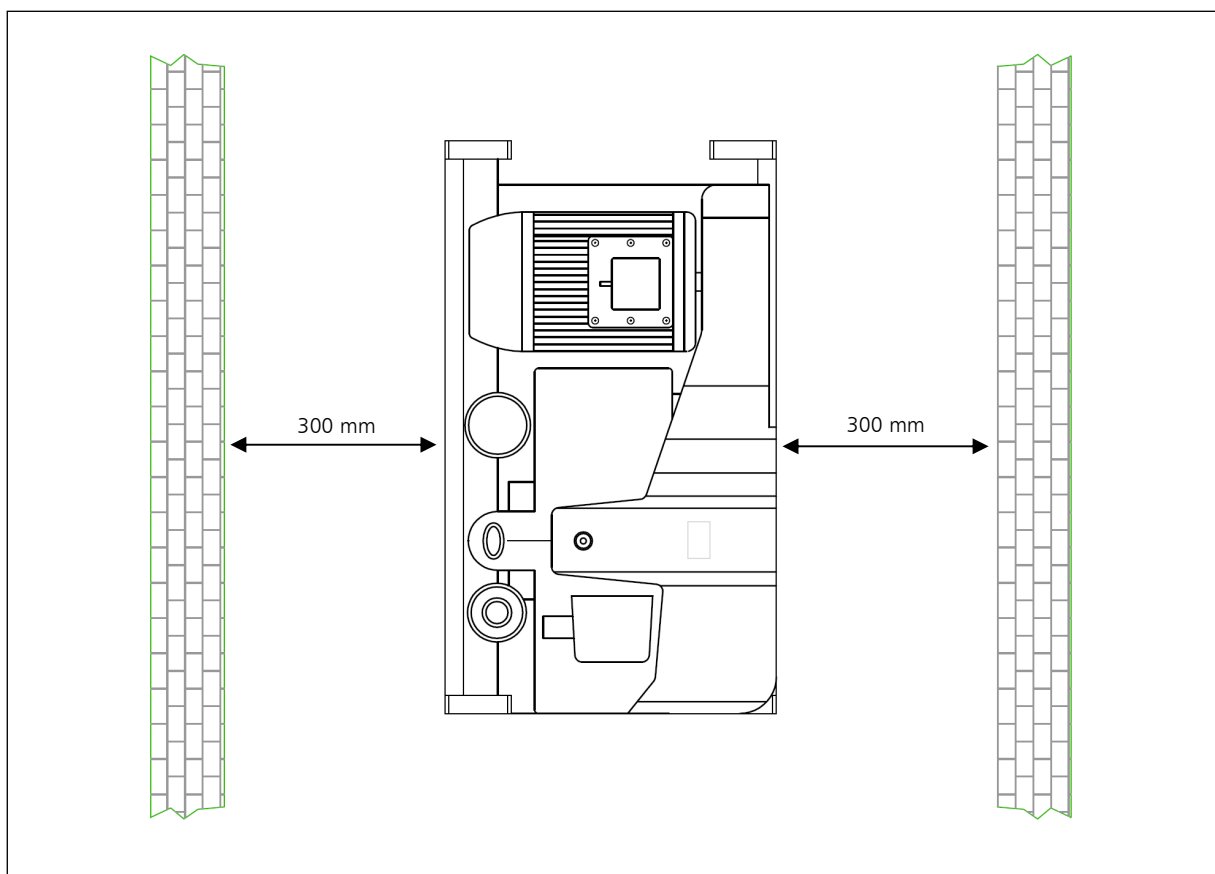


Fig. Minimum distances LW 160 E / LW 160 E1



#### Hinweis

Do not use LW 190 B in closed rooms!

## INSTALLATION

### Ventilation LW 160 E / LW 160 E1

- 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.

A

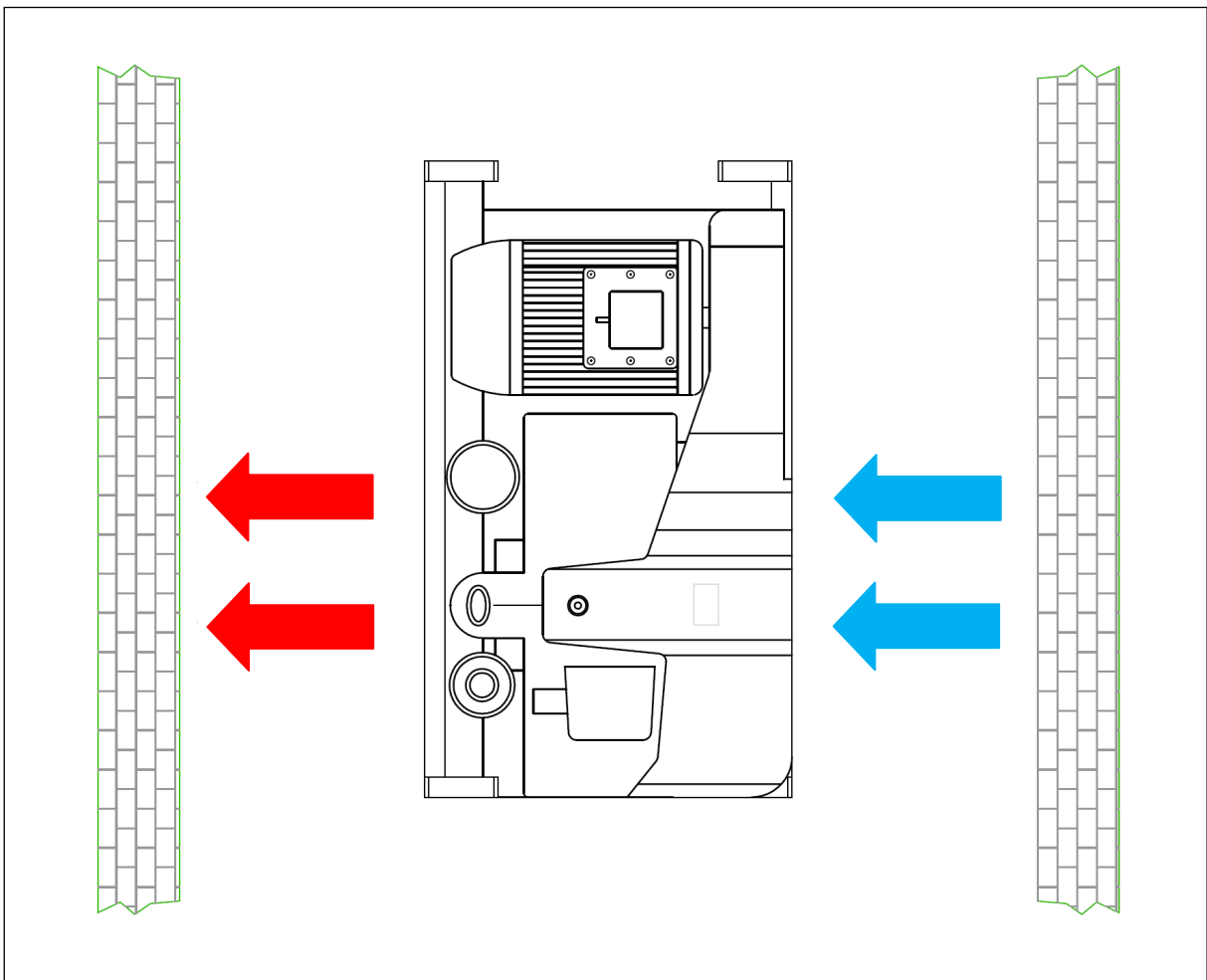


Fig. Ventilation via ventilation stack

## INSTALLATION

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### Electrical Installation LW 160 E / LW 160 E1



#### 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 "Operation -> First commissioning - LW 160 E/E1).
- Fuse the motor correctly (see table; use slow-blow fuses).

A



## INSTALLATION

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### Electrical Installation LW 160 E / LW 160 E1

The compressor comes fully wired with cable and plug. An installation is not necessary.

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	S/D* to Motor
2.2	5	10	-	1.5	1.5
4	8.5	20	-	2.5	1.5

### 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	S/D* to Motor
2.2	8.7	20	-	1.5	1.5
4	14.8	25	-	2.5	1.5

\* S/D - Star / Delta.



A

# OPERATION

## OPERATION

---

### Important operation instructions



#### **Danger**

On petrol or diesel engines, operation unit must only be located outdoors, never indoors, not even in partially closed rooms however large they may be.



#### **Note**

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



#### **Wear hearing protection**

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



### Prior to first commissioning, observe the following:

- Ensure that cooling air can flow freely.
- Check compressor oil level (see "Service and Maintenance").
- 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 "Service and Maintenance").
- Check if all filling valves are closed. Open one filling valve and hold tight manually!

### Kompressor starten

1. Start the compressor by switching position 1 of phase selector switch.
2. Check turning direction - see the rotary direction arrow on the compressor block (see next pages). If the turning direction is wrong, immediately stop the compressor by switching in position 0 and start the compressor by switching in position 2.



#### 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. Run the compressor for about 2 minutes.
4. Close the open filling valve carefully.
5. Run the compressor up to maximum pressure and check the function of the final pressure safety valve. If the compressor is equipped with an automatic stop system please check the automatic shut down at final pressure. If the final pressure switch does not shut off, switch off the compressor by placing the switch at position 0 (see chapter "Remedying faults").
6. Check the compressor unit for leaks (see "Service and Maintenance").
7. Check the condensate drain valves:  
Standard: Open the condensate drain valves carefully (see "Service and Maintenance").  
Option: Automatic condensate drain:
  - Fix the black condensate hoses
  - Drain test - press the test button
  - If correct, air escapes
8. Stop the compressor by switching in position 0.
9. Open all filling valves carefully to vent.

### Check turning direction - LW 160 E



#### Warning

Wrong 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 compressor block).

If the direction of rotation is wrong, the cooling air flow will not be sufficient, with the consequence that the pistons will be damaged.



Rotation direction arrow on the compressor block

### Rotation direction change - LW 160 E



#### Warning

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

In case of a wrong rotation direction there is the possibility to change the switching position of the phase selector switch. In case of wrong rotation direction in switching position 1, start the compressor in switching position 2. In case of wrong rotation direction in switching position 2, start the compressor in switching position 1.

### Prior to first commissioning, observe the following:

- Ensure that cooling air can flow freely.
- Position compressor in direction of wind so that exhaust fumes are blown away from the unit.
- Take protection measures to avoid damages or injury by exhaust gases/exhaust pipe.
- Check fuel capacity.
- Check drive motor oil level.
- Check the oil level of the compressor.
- Check all connections and tighten if necessary.
- Check if a filter cartridge is in place. (see "Service and Maintenance")
- Check V-belt tension. (see "Service and Maintenance")
- Read carefully the handbook of the petrol engine.
- Ensure that all filling valves are closed. Open one filling valve and hold tight manually!

### Start the compressor

1. Open fuel valve (Fig. 1)
2. Switch motor switch in position 1
3. Pull start (Fig. 2)
4. Close condensate valves
5. Run the compressor for about 2 minutes
6. Close the open filling valve carefully
7. Run the compressor up to maximum pressure and check the function of the final pressure safety valve. If the compressor is equipped with an automatic stop system please check the automatic shut down at final pressure. If the final pressure switch does not shut off, stop the compressor the toggle switch, and close the fuel shut-off valve. (see chapter "Remedying faults").
8. Check the compressor for leaks.
9. Standard: Check the manual condensate drain valves. Option: Check automatic Condensate Drain.
  - Fix the black condensate hoses
  - Drain test - press the test button
  - If correct, air escapes
10. Stop the compressor by the toggle switch (position 0), and close the fuel shut-off valve.
11. Open all filling valves carefully to vent the unit.



Fig. 1 - Fuel valve



Fig. 2 - Speed control and pull start



## DAILY COMMISSIONING

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**Prior to daily operation observe the following:**

### **LW 160 E / LW 160 E1**

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

### **LW 190 B**

- Ensure cooling air can flow freely.
- Position compressor in direction of wind so that exhaust fumes are blown away from the unit.  
(see Installation -> Installation LW 190 B)
- Take protection measures to avoid damages or injury by exhaust gases/exhaust pipe.
- Check the compressor oil level.
- Check if filter cartridge is in place / observe filter cartridge life!
- Check fuel capacity.
- Check drive motor oil level.
- 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
5. When filling pressure gauge increases, open filling valves slowly.
6. Fill the compressed air cylinders to the desired pressure; close slowly the valves of the cylinders.
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

---

### Switch off the compressor



#### Note

After switching off, open condensate drain valves manually to vent the unit.

The compressor unit is not equipped as standard with an auto shut down. The unit must always be stopped manually when final pressure is reached.

During filling process, the system can be shut down at any time by switching the phase selector switch in position 0.

### Switch off the compressor unit LW 160 E / LW 160 E1

- Stop compressor by switching the phase selector switch in position 0.

### Switch off the compressor unit LW 190 B

- Stop compressor by the toggle switch.
- Close fuel shut-off valve.



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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 / Reduce operation times
Cooling air inlet and outlet insufficient	Observe minimum distances (see Installation Instructions)
Air intake hose too long	Reduce length of the air intake hose
Air intake hose diameter too small	Use a larger diameter
Wrong compressor rotation direction	Ensure correct phase rotation,
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

#### Only valid with the option - Automatic Condensate Drain

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

#### Only valid with the option - Automatic Condensate Drain

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

#### Only valid with the option - Automatic Condensate Drain

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



## 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

### 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.

Any work on the petrol engine should be done in accordance with its specific handbook.

**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

### 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	LW 160 E	1	001375
	LW 190 B	1	001463
Operate unit to final pressure and check function of final pressure switch	-	-	-

### Weekly or as needed

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

### Annually

Maintenance work	Type	Quantity	Order No.
Oil change, if less than 250 operating hours	-	0.8	000001
Check opening pressure of final safety valve	-	-	-
Clean coolers	-	-	-
Clean all oil/water separators, if less than 250 operating hours	-	-	-
Service intake filter (depends on condition - if less than 500 operating hours)	-	-	-



## MAINTENANCE AND SERVICE

### At 10 operating hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	0.8	000001

### At 30 operating hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	0.8	000001

### At 100 operating hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	0.8	000001

### Every 100 operating hours

Maintenance work	Type	Quantity	Order No.
Oil change	-	0.8	000001

### Every 250 operating hours

Maintenance work	Type	Quantity	Order No.
Clean oil/water separators	-	-	-
Check V-belt tension and condition	LW 160 E (50Hz)	2	000124
	LW 160 E (60Hz)	2	006153
	LW 160 E1 (50Hz) Baldor	2	006153
	LW 160 E1 (50Hz) Gibbons	2	000124
	LW 190 B	2	000125

## MAINTENANCE AND SERVICE

### Every 500 operating hours

Maintenance work	Type	Quantity	Order No.
Replace o-ring of the DIN filling connector	-	1	001237
Replace o-ring of the revolvable filling hose	-	1	001224
Change intake filter	-	1	000119
Change o-ring of intake filter housing	-	1	000012
Replace o-ring of the water separator	O-Ring	2	000016
	O-Ring	2	003099
Replace o-ring of the condensate drain vlave	-	2	000043
Replace o-ring of the final filter housing	-	2	000016
Check pressure maintaining / non-return valve	-	-	-
Check all connections for leaks	-	-	-



#### Note

All stated quantities are parts of our 500h and 1000h service kits. You can find an overview on page Service Kits.



## MAINTENANCE AND SERVICE

### Every 1000 operating hours

Maintenance work	Type	Quantity	Order No.
Replace o-rings and gaskets of 1st, 2nd and 3rd stage	Silicon gasket (1. Stufe)	2	000033
	o-ring valve (2nd stage)	1	000035
	o-ring valve (3rd stage)	1	000034
Replace all inlet and outlet valves incl. Gaskets	1st stage inlet valve	1	000026
	1st stage outlet valve	1	000029
	2nd stage (incl. gasket)	1	000031
	3rd stage (incl. gasket)	1	000032



#### Note

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

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



Service Kits

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### Service Kits LW 160 E for 50 Hz

Compressor	Operating Hours	Order No.
LW 160 E / LW 160 E1	500 h	006766
LW 160 E / LW 160 E1	1000 h	003963

### Service Kits LW 190 B

Compressor	Operating Hours	Order No.
LW 160 B	500 h	006766
LW 160 B	1000 h	003963



#### Note

V-belts are not included in our 500h and 1000h service kits.

## MAINTENANCE AND SERVICE

### Check V-belt tension

The compressors of LW 160 E and LW 190 B are driven by V-belts. Check correct V-belt tension regularly, adjust if necessary. The V-belt could lose tension during transportation. Please check the V-belt tension before starting the compressor.

### Tension V-belts

- Switch off the compressor unit, pull the plug if necessary.
- Tilt the compressor slightly aside.
- Loosen mounting screws of the motor flange (Fig. 1 +2).
- Turn clamp nut until correct V-belt tension (Fig. 3).

Rotation direction clockwise: increase V-belt tension.

Rotation direction anti-clockwise: reduce V-belt tension.

- Tighten mounting screws of the motor flange.
- Check V-belt tension and adjust if necessary.

### 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 Instal-	Operation after run-
E-motor 50Hz	400 N	300 N
E-motor 60Hz	350 N	250 N
Bencine	400 N	300 N

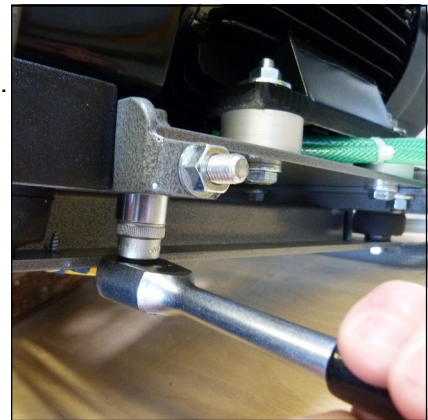


Fig. 1 - Loosen mounting screws of the motor flange

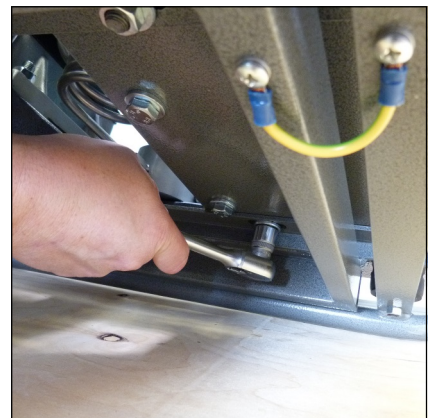


Fig. 2 - Loosen mounting screws of the motor flange

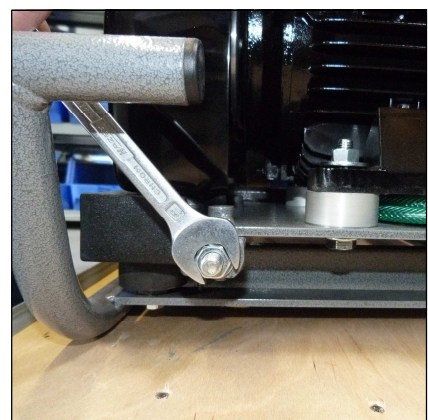


Fig. 3 - Turn clamp nut until correct V-belt tension

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## MAINTENANCE AND SERVICE

### Compressor Lubrication

Pistons, cylinders, crankshaft and connecting rods are provided with oil by splash lubrication.

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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.

#### Oil level check as follows:

- Pull out oil cover.
- The oil level should reach the upper edge of the threaded hole. For better realize just use a tool.
- Insert the oil cover.

In case of the oil level should not reach the upper maximum, please do refill new compressor oil.



Oil cover



Oil level

## MAINTENANCE AND SERVICE

### Oil change



#### Note

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

#### Oil change as follows:

- Run compressor warm for about 2 minutes.
- Switch off and vent compressor.
- Tilt the compressor aside.
- Place a suitable oil drain tray under the drain plug (red marked hexagon bolt).
- Screw off red oil drain plug carefully.
- Drain oil.
- Screw in red oil drain plug and tighten.
- Pull out oil cover (Fig. 1) and fill with oil. (Fig. 2)
- Check oil level.
- Check condition of oil cover o-ring and insert the oil cover.

The oil change is now completed.

#### Maintenance intervals

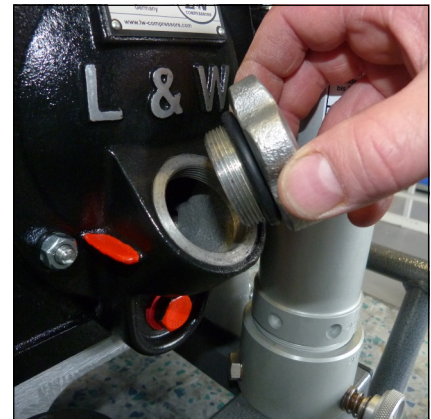
- First oil change at 10 operating hours (total hours).
- Second oil change at 30 operating hours (total hours).
- Third oil change at 100 operating hours (total hours).
- All further changes after each 100 operating hours.

#### Oil and oil capacity

Approx. 800 ml synthetic compressor oil is necessary for one oil change. Only use synthetic compressor oil which is recommended as suitable from L&W. (P/N: 000001)

#### Only LW 190 B

Drive motor oil change intervals: see manufacturer's specification for the drive motor.  
(L&W P/N: 000004)



(Fig.1) Oil cover



(Fig.2) Fill with oil

### 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 with a manual condensation dump system. Drain condensate separators every 15 to 30 minutes, depending to air moisture.

Option Automatic Condensate Drain: To release the complete condensate through the black plastic hoses we recommend using a 10 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 valve of the 2nd stage oil / water separator (Fig. 1) and the condensate drain valve of the filter housing (Fig. 2). Open valve spindle max. 1.5 turns anti-clockwise. The condensate will be drained. Then close valve spindle clockwise.

### Maintenance intervals

We recommend to clean oil and water separators inside every 250 operating hours or at least once a year, to check for corrosion damage and to replace o-rings if necessary (not the o-ring of the valve spindle).

All oil / water separators have integrated o-rings which need to be replaced every 500 operating hours (incl. o-ring of the valve spindle).

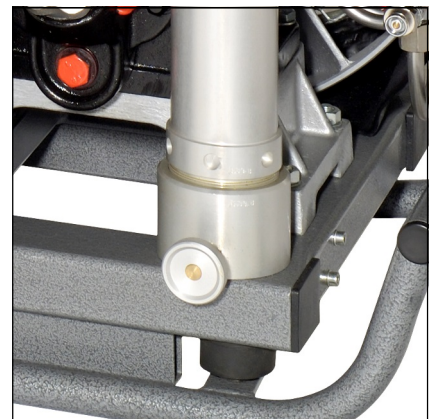


Fig. 1 - Condensate drain valve 2nd stage

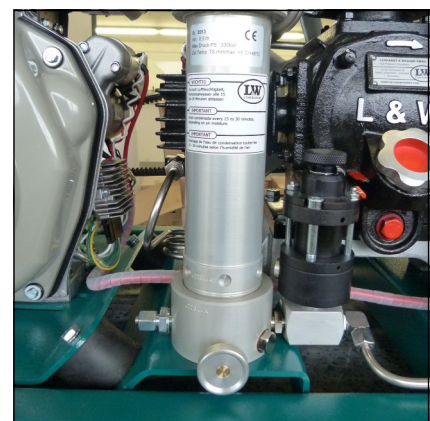


Fig. 2 - Oil- / water separator 3rd stage

### Oil- / water separator 2nd stage - maintenance



#### Note

Clean all parts thoroughly before assembly.

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

- Loosen mounting screws of the cooler bracket (Fig. 1) and pipe connections (Fig. 2+3), extract cooler afterwards.
- Open lock ring with the filter key and remove it (Fig. 4), change o-ring afterwards.
- Screw lock ring slightly, place cooler and screw pipe connections slightly.
- Tighten mounting screws of the cooler bracket (Fig. 1) and pipe connections (Fig. 2+3).
- Tighten lock ring with the filter key (Fig. 5).
- Turn off condensate drain valve, change o-ring and turn in condensate drain valve completely (Fig. 6).

The oil / water separator maintenance is now completed.

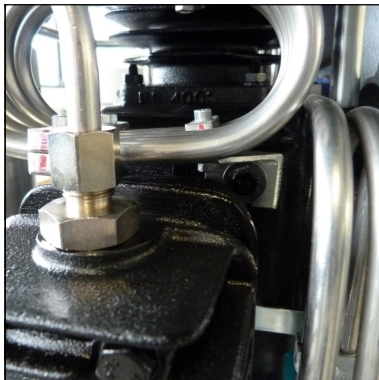


Abb. 1 - Mounting screw

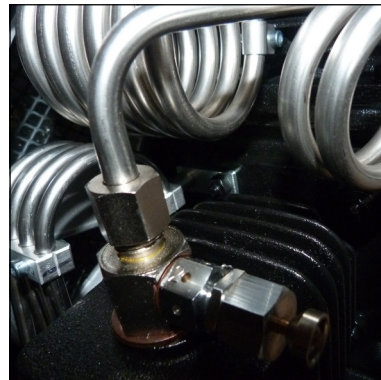


Abb. 2 - Pipe connection

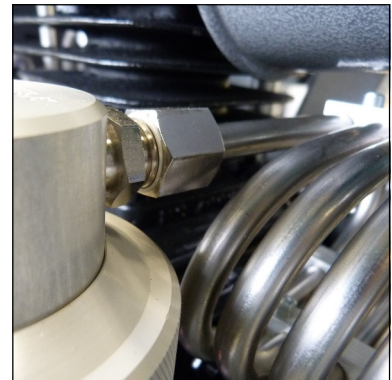


Abb. 3 - Pipe connection



Abb. 4 - Remove lock ring and change o-ring



Abb. 5 - Tighten lock ring



Abb. 6 - O-ring, condensate drain valve

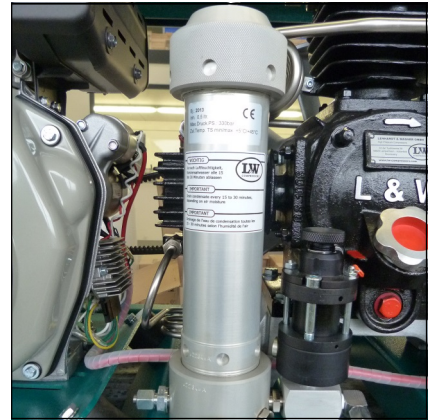
## MAINTENANCE AND SERVICE

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### Filter housing

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

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



Filter housing

### Filter cartridge

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

The cartridges of petrol-driven versions are equipped with additional CO/CO<sub>2</sub> filters.

All breathing air filter cartridges are factory vacuum sealed.

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

### Maintenance Intervals

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

- 19 hours for LW 160 E / E1 (P/N: 001375)
- 13 hours for LW 190 B (P/N: 001463)



## MAINTENANCE AND SERVICE

### Filter cartridge change

Filter cartridge change as follows:

- Stop the compressor and open carefully the drain valves. Please wait till the filter housing is completely vented; this procedure takes approx. 1 - 2 minutes.
- When no air discharges from the condensate release hoses, the pressure vessels are depressurized.
- Remove the end filter cover (Fig. 1 / Fig. 2). Remove the filter cover by using the filter tool. The housing can not be opened when it is still under pressure.
- After opening the housing, pull out spring and filter cartridge (Fig. 3).
- Check the condition of the o-ring, and replace if necessary.
- Open the packaging of the new filter cartridge and place it into the filter housing (press slightly).
- Put on the spring (Fig. 3).
- Screw in the filter cover with help of the filter tool.

The filter cartridge change is now completed.



#### Note

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

P/N	Filtering	Models
001375	DIN EN 12021 (Breathing air)	LW 160 E / E1
001463	DIN EN 12021 (Breathing air) incl. CO/CO2	LW 190 B

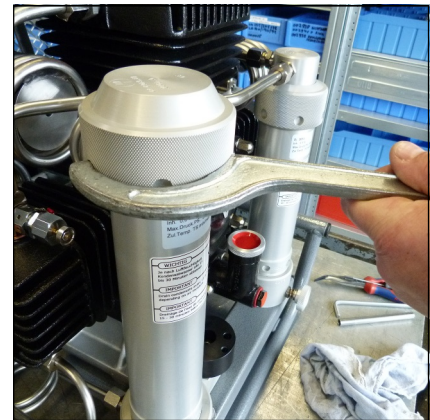


Fig. 1 - Filter housing with filter tool



Fig. 2 - Filter housing without filter cover



Fig. 3 - Filter cartridge and spring

### Filter housing - maintenance



#### Note

Grease all o-rings and clean all parts thoroughly before assembly.

#### Filter housing maintenance as follows:

- Open filter cover with the filter key, extract it (Fig. 1) and pull out spring and filter cartridge (Fig. 2).
- Change o-ring and turn off the filter housing with the filter key (Fig. 3).
- Change o-ring (Fig 4), remove duct collar and also change the other o-rings (Fig. 5).
- Push in duct collar, place filter housing and tighten with the filter key.
- Insert filter cartridge, place spring and tighten filter cover with the filter tool.
- Turn off condensate drain valve completely, change o-ring and turn in condensate drain valve completely (Fig. 6).

The oil / water separator maintenance is now completed.



Abb. 1 - Open filter cover



Abb. 2 - Remove filter cartridge

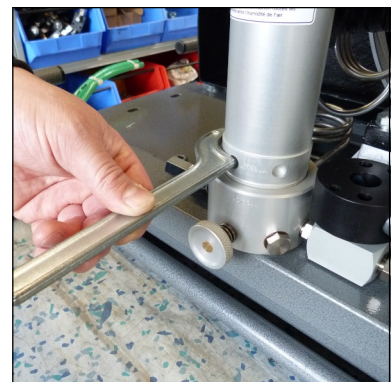


Abb. 3 - Turn off filter housing



Abb. 4 - Remove lock ring



Abb. 5 - Remove duct collar and change o-rings



Abb. 6 - Change o-ring

## MAINTENANCE AND SERVICE

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### Inlet Filter



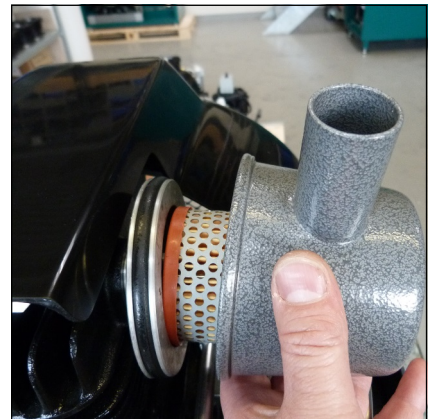
#### Note

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

A paper dry filter is used for the inlet filter. Check air inlet filter regularly or replace it. Depending on the degree of contamination, the filter inlet can be cleaned by compressed air. 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).



Intake filter

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## MAINTENANCE AND SERVICE

### Check or change filter inlet



#### Note

Clean all parts thoroughly before assembly.

To properly change the filter inlet, proceed as follows:

- Loosen mounting screw (Fig.1).
- Remove intake filter housing cover (Fig.2).
- Change O-Ring.
- Change intake filter (Fig. 3).
- Put on the intake filter housing cover (Fig. 2).
- Tighten mounting screws (Fig.1).

The filter inlet change is now completed.

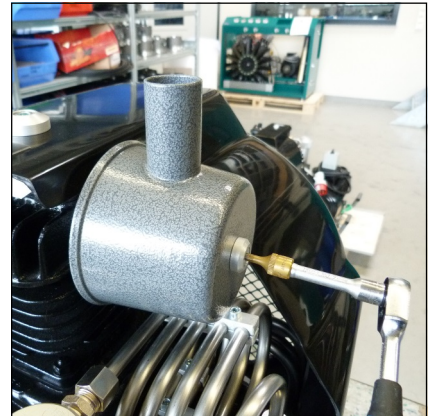


Fig. 1 - Iloosen mounting screw



Fig. 2 - Remove intake filter housing cover



Fig. 3 - Change intake filter

## MAINTENANCE AND SERVICE

### Valve heads and valves

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

Valves are subject to normal wear and tear and have to be replaced at specified intervals (depending on specific operating conditions). Dismount valve heads to change valves. In 1st stage there is an inlet valve and an outlet valve in use. The valves of 2nd and 3rd stage are combined valves; inlet and outlet valves are a single unit.

To change the inlet- and outlet valves it is necessary to remove the fan protection cover!

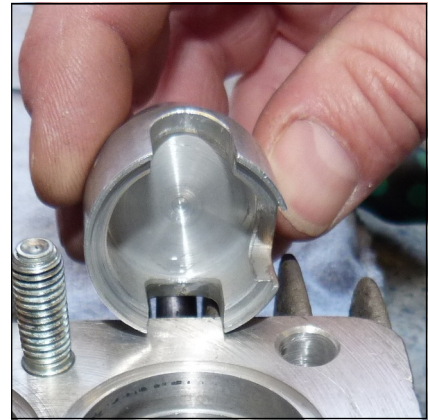


Fig. 1 - Outlet valve holder 1st. stage



Fig. 2 - In – and outlet valve c/w gaskets  
2nd stage (top) und 3. Stufe (below)

### Fan protection cover dismantling

Dismantle the fan protection cover as follows:

- Remove top mounting screw (Fig. 1).
- Remove protection plate (Fig. 2).
- Tilt the compressor aside.
- Loosen both bottom mounting screws (Fig. 3).
- Remove fan protection cover.

The fan protection cover dismantling is now completed.

### Mounting the fan protection cover

Mount the fan protection cover as follows:

- Tilt the compressor aside.
- Place the fan protection cover.
- Tighten both bottom mounting screws.
- Position the compressor upright.
- Adjust the protection plate between cylinder head and cover.
- Tighten top mounting screw (Fig. 1).

The fan protection cover mounting is now completed.



Fig. 1 - Remove top mounting screws



Fig. 2 - Remove protection plate



Fig. 3 - Loosen both bottom mounting screws

## MAINTENANCE AND SERVICE

### Replace inlet and outlet valve 1st stage



#### Note

The figures can differ from the delivered parts.

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

- Remove spring wire clamp of the crankcase ventilation hose (Fig. 1) remove hose.
- Loosen pipe connections (Fig. 2).
- Remove valve head and valve head cover screws (Fig.3+4).
- Remove valve head and check if defective (Fig. 5).
- Spring plate (Fig. 5), remove inlet and outlet valve bracket (Fig. 6).
- Remove inlet and outlet valve.

#### Install inlet / outlet valve - see following page

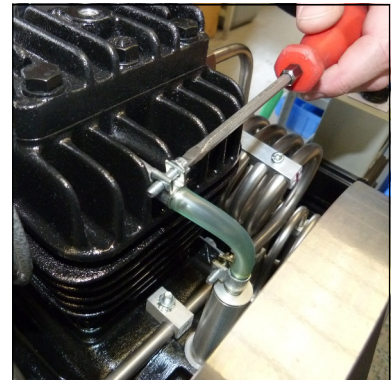


Fig. 1 - Spring wire clamp

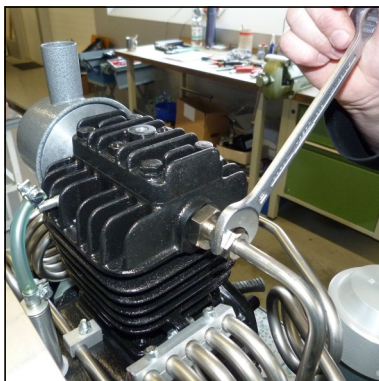


Fig. 2 - Pipe connection

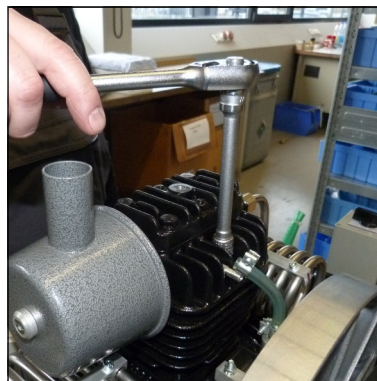


Fig. 3 - Valve head screws



Fig. 4 - Valve head cover screws



Fig. 5 - Spring plate inside the valve head

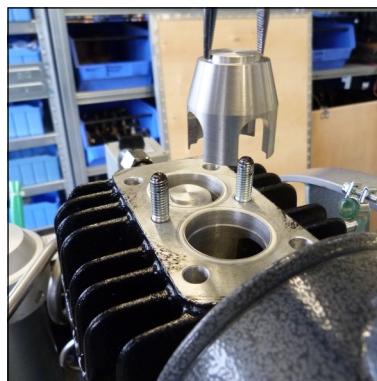


Fig. 6 - Inlet valve bracket

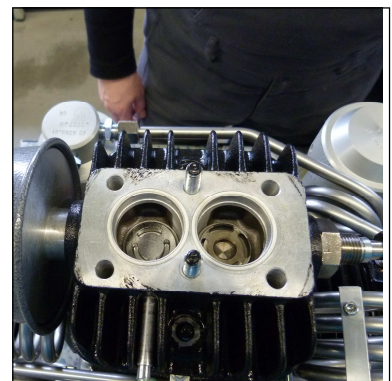


Fig. 7 - Inlet and outlet valve inside the valve head

## MAINTENANCE AND SERVICE

### Replace inlet and outlet valve 1st stage



#### Note

The figures can differ from the delivered parts.

#### Install inlet and outlet valve 1st stage as follows:

- Place the inlet and outlet valve. Ensure the correct position of the valve (Fig. 1+2).
- Insert inlet and outlet valve bracket and place valve head cover. Ensure the correct position of the valve (Fig. 3).
- Change valve gaskets (Fig. 4) and spring plate. Ensure the correct position of the spring plate (Fig. 5).
- Tighten valve head and cover screws crosswise (Fig. 6).
- Tighten pipe connections. (Fig. 7)
- Fix hose and spring wire clamp.

The inlet and outlet valve change is now completed.

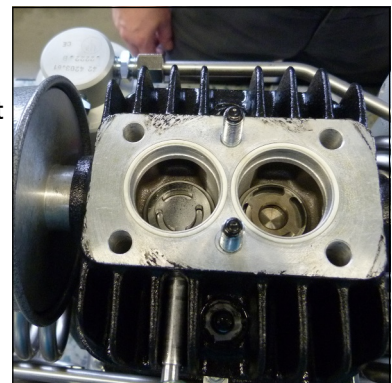


Fig. 1 - Positioning from above

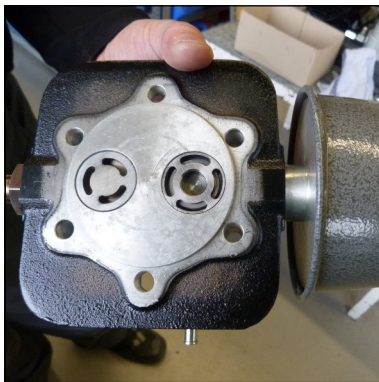


Fig. 2 - Positioning from the bottom

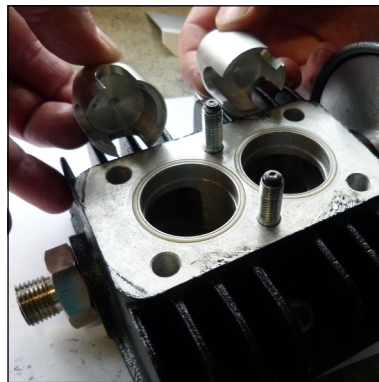


Fig. 3 - Valve bracket positioning

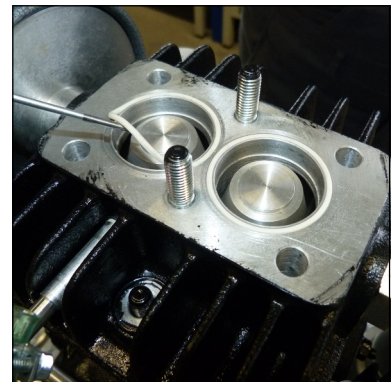


Fig. 4 - Change valve gasket

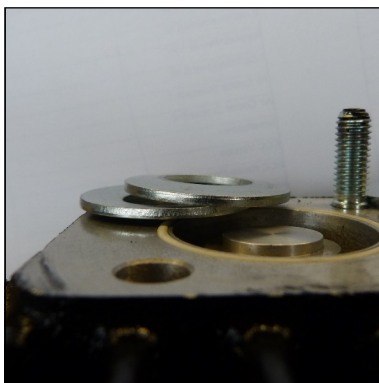


Fig. 5 - Spring plate positioning



Fig. 6 - Tighten valve head

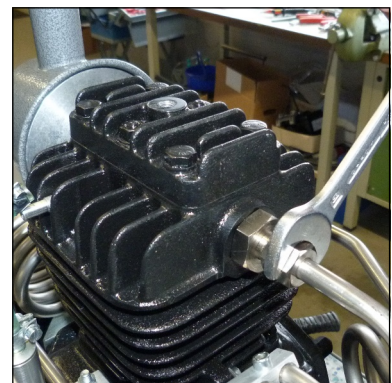


Fig. 7 - Tighten pipe connections



## MAINTENANCE AND SERVICE

### Replace inlet and outlet valve 2nd stage

Replace the inlet and outlet valve 2nd stage as follows:

- Loosen pipe connections (Fig. 1).
- Loosen valve head screws (Fig. 2).
- Remove valve head (Fig. 3) Observe that the lower valve gasket is also pulled out. It can still stick inside the cylinder head.
- Remove inlet / outlet valve.
- Check valve head if defective (check centre pin).
- Change upper valve gasket (o-ring).
- Change lower valve gasket (aluminium gasket).
- Insert new inlet and outlet valve into the valve head (Fig. 4). CAUTION: Observe correct position between valve centre hole and valve head centre pin.
- Place the valve head with the new inlet and outlet valve.
- Place pipe connections.
- Tighten valve head screws crosswise (Fig. 2).
- Tighten pipe connections (Fig. 1).

Inlet and outlet valves change 2nd stage is now completed.

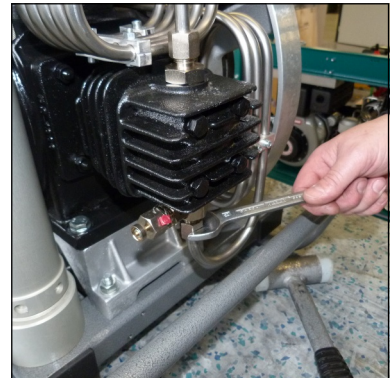


Fig. 1 - Loosen pipe connections

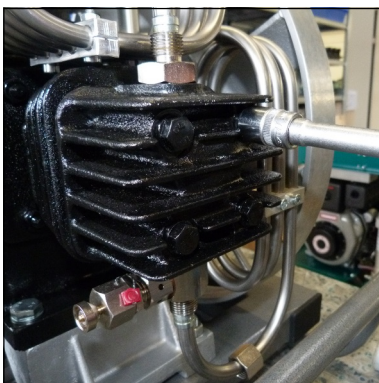


Fig. 2 - Loosen valve head screws

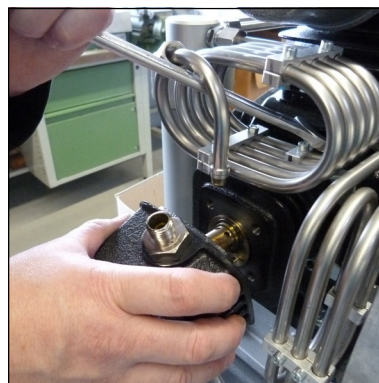


Fig. 3 - Remove valve head



Fig. 4 - Ensure correct valve position (centre pin)

## MAINTENANCE AND SERVICE

### Replace inlet and outlet valve 3rd stage

Replace the inlet and outlet valve 3rd stage as follows:

- Loosen pipe connections of the water separator 2nd stage and the filter housing (Fig. 1+2).
- Remove mounting screws from the cooling pipe bracket (Fig. 3).
- Loosen valve head screws.
- Remove valve head (Fig. 4) Observe that the lower valve gasket is also pulled out. It can still stick inside the compressor.
- Remove inlet / outlet valve.
- Check valve head if defective (check locating pin).
- Change upper valve gasket (o-ring).
- Change lower valve gasket (aluminium gasket).
- Insert new inlet and outlet valve into the valve head (Fig. 5).  
CAUTION: Observe correct position between valve centre hole and valve head locating pin.
- Place the valve head with the new inlet and outlet valve.
- Tighten pipe connections.
- Tighten valve head screws crosswise (Fig. 2).
- Tighten mounting screws of the cooling pipe bracket (Fig. 3).
- Tighten pipe connections (Fig. 1+2).

**Inlet and outlet valves change 3rd stage is now completed.**

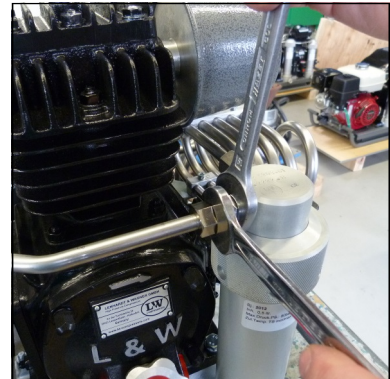


Fig. 1 - Loosen pipe connections of the water separator

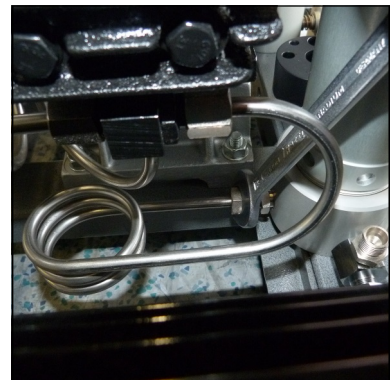


Fig. 2 - Loosen pipe connections of the filter housing

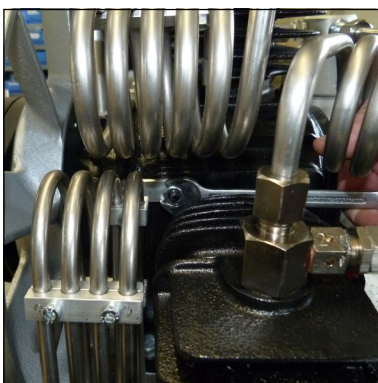


Fig. 3 - Remove mounting screws from the cooling pipe bracket



Fig. 4 - Remove valve head with inlet and outlet valve



Fig. 5 - Ensure correct valve position (centre pin)

## 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: 14 bar
- 2nd Stage: 80 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.

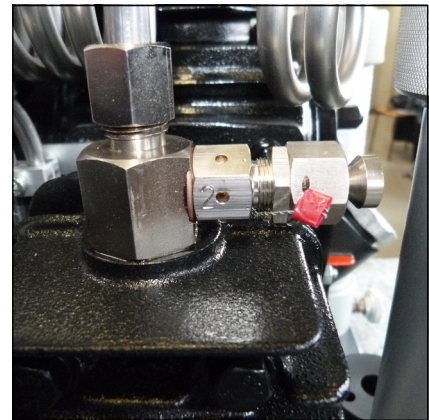


Fig. 1 - Safety valve 2nd stage



Fig. 2 - Safety valve 3rd stage



#### Note

Replace defective safety valves immediately!

## MAINTENANCE AND SERVICE

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### Pressure maintaining / non return valve

The pressure maintaining / non return valve combination is placed in the flow direction after the final filter housing.

#### 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.

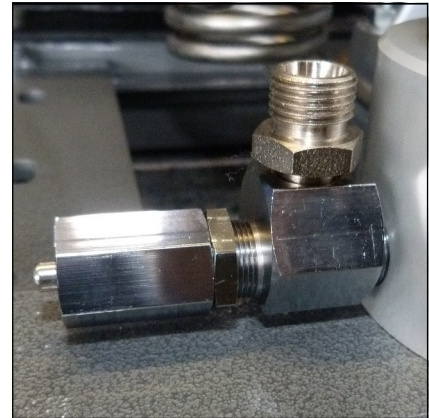
The value of the opening pressure of the pressure maintaining valve can be read at the final pressure gauge. When opening pressure is reached, the pressure gauge value increases within a few seconds.

**Adjust pressure maintaining valve see next page.**

#### Non return valve

The non return valve which is placed after the pressure maintaining valve, prevents the purified breathing air from flowing back into the filter housing / condensate drain valves.

After compressor stop, the indicated filling pressure remains constant, if the non return valve is working correctly.



Pressure maintaining / non return valve

A

### Adjust pressure maintaining valve

- Vent filling valve and close afterwards (filling pressure gauge 0 bar)
- Start the compressor
- Observe filling pressure gauge
- When the opening pressure of the pressure maintaining valve is reached, the indicated filling pressure increases within some seconds from 0 bar up to the adjusted opening pressure.

If the opening pressure does not reach a value between 150 and 180 bar, adjust the pressure maintaining valve as follows:

#### Increase opening pressure:

- Vent filling valve (filling pressure 0 bar)
- Loosen clamp nut
- Turn adjusting screw clockwise by using a suitable slotted screwdriver
- Start compressor and check opening pressure, adjust if necessary
- Tighten clamp nut
- Check opening pressure again

#### Reduce opening pressure:

- Vent filling valve (filling pressure 0 bar)
- Loosen clamp nut
- Turn adjusting screw anti-clockwise by using a suitable slotted screwdriver
- Start compressor and check opening pressure, adjust if necessary
- Tighten clamp nut
- Check opening pressure again



#### 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 bolt 3 full turns in).

## MAINTENANCE AND SERVICE

### O-rings - filling valve and filling hose

Check o-rings from filling valve and filling hose regularly and change if necessary.



#### Note

Clean all parts thoroughly before assembly.

#### O-ring at the filling valve

- Change o-ring, previously grease new o-ring (Fig. 1)

#### O-ring at the filling hose

- Remove filling hose from the filling valve (Fig. 2)
- Change o-ring, previously grease new o-ring
- Connect filling hose to the filling valve and tighten



Fig. 1 - O-ring at the filling valve



Fig. 2 - O-ring at the filling hose

## MAINTENANCE AND SERVICE

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### Motor change

The drive motors of the LW 160 and LW 190 are generally interchangeable.



#### Warning

Do not carry out modifications when the unit is hot.

#### Motor change as follows:

- Switch off the compressor unit, pull the plug if necessary
- Remove V-belt cover
- Remove mounting screws of the motor flange
- Remove motor tensioner bolt
- Remove V-belt
- Remove motor v-belt pulley
- Remove motor carefully
- Place new motor
- Mount motor v-belt pulley
- Mount flange mounting screws and tighten nuts slightly
- Insert motor tensioner bolt
- Check/Ensure the alignment of both key slots (motor & compressor)
- Tension V-belt
- Tighten flange mounting screws
- Place V-belt cover and tighten mounting screws
- Ensure clearance of the V-belt cover

## MAINTENANCE AND SERVICE

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### Test of pressure equipment

According to the German Industrial Safety Ordinance 2015, pressure equipment is subject to regular inspection.

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

#### Example: Filter housing 0.5 l

Maximum operating pressure: 330 bar

Content volume: 0.5 litres

$330 \text{ bar} \times 0.5 \text{ litres} = 165$

165 is smaller than the minimum of 200 -> result: Test is not 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.



#### Caution

The filter container (P/N: 000161) has to be replaced after 15 years!





A

# MAINTENANCE RECORDS



**MAINTENANCE RECORDS**

**Introduction form for the Operator**

A

No.	Surname, Name	Date	Place	Signature	Instructor

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



## MAINTENANCE RECORDS

### Top up oil, oil change

A

Date	Operating hours	Oil quantity [l]	Name



# MAINTENANCE RECORDS

## Cartridge change

Date	Operating hours	Difference	Name

A



## MAINTENANCE RECORDS

---

### Maintenance work

A

Description	Date, signature



# MAINTENANCE RECORDS

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## Replaced Parts

Designation	Part number	Date, signature

A

## STORAGE

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### Note

Please check the specific handbook of the petrol engine regarding conservation / storage, de-conservation and commissioning of the LW 100 B compressors.

A

### 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.

## STORAGE

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### Note

Please check the specific handbook of the petrol engine regarding conservation / storage, de-conservation and commissioning of the LW 100 B compressors.

A

### 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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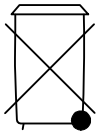
### Transportation instructions

- 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.



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

C



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## ERSATZTEILLISTE / SPARE PART LIST

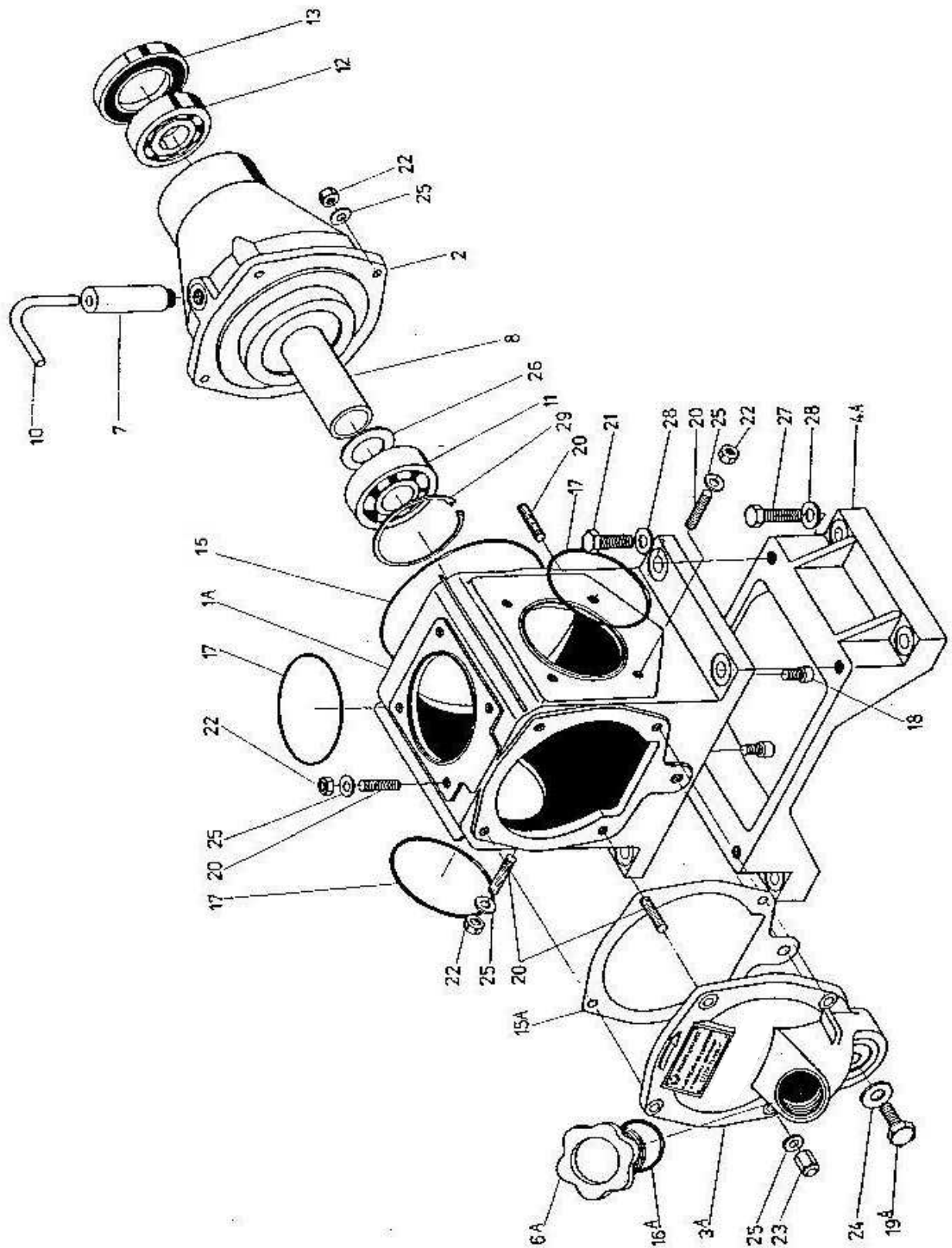
### Kurbelgehäuse / Crankcase

Pos.	Best.-Nr. / P/N.	Benennung	Description
1	008164	Kurbelgehäuse	Crankcase
2	006676	Lagerflansch, Aluminium	Main Bearing Flange, alloy
3A	002867	Gehäusedeckel	Housing Cover
4	000132	Staender für Block	Alloy Block Stand, casted
6A	004553	Oeleinfüllschraube	Oil Filler Screw
7	000073	Öldampfabscheider	Oil Steam Separator
8	000080	Distanzrohr	Spacer Tube
10	004856	Schlauch Kurbelgehäuseentlüftung	Hose (crankcase ventilation)
11	000060	Kugellager	Ball Bearing
12	000059	Kugellager	Ball Bearing
13	000018	Radial-Wellendichtung	Shaft Seal
15	000013	O-Ring 130 x 3 NBR70	O-Ring 130 x 3 NBR70
15A	005297	Papierdichtung Kurbelgehäuse	Paper Gasket Crankcase Cover
16A	003692	O-Ring	O-Ring
17	000014	O-Ring 85 x 2	O-Ring 85 x 2
18	001042	Zylinderschraube	Allen Screw
19A	001131	Sechskantschraube	Hexagon Screw
20	000960	Stiftschraube	Threaded Stud
21	001101	Sechskantschraube	Hexagon Screw
22	001158	Mutter M8	Nut M8
23	008162	Hutmutter M8, vernickelt	Domed Nut M8
24	000019	Dichtscheibe	Seal Washer
25	001181	U-Scheibe A8	Washer A8
26	000081	Unterlegscheibe	Washer
27	001102	Sechskantschraube	Hexagon Screw
28	001186	U-Scheibe A10	Washer A10
29	000024	Seegering	Circlip

B

**DETAILANSICHT / DETAILED VIEW**

**Kurbelgehäuse / Crankcase**



**B**



## ERSATZTEILLISTE / SPARE PART LIST

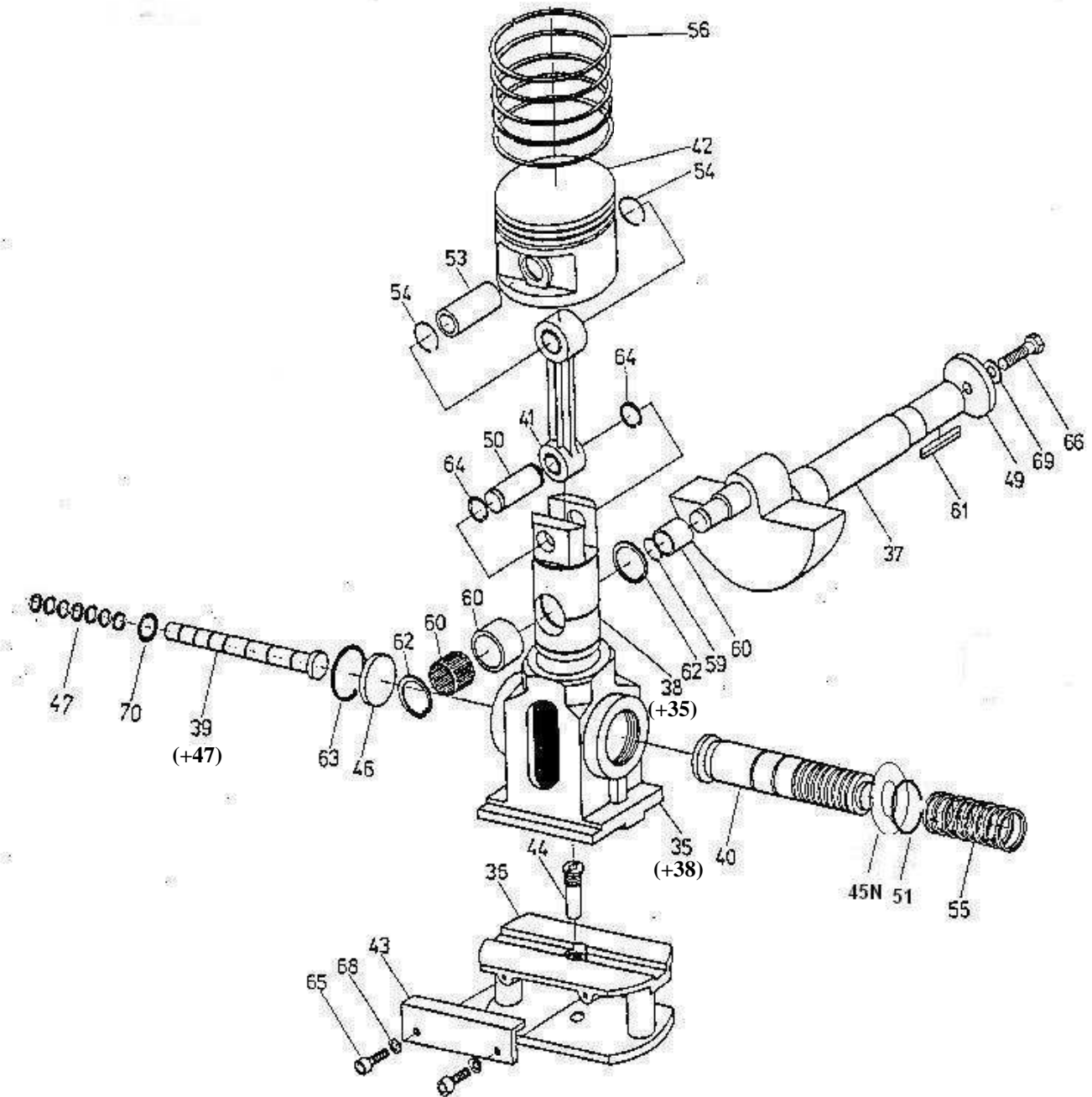
### Kurbeltrieb / Crank Drive

Pos.	Best.-Nr. / P/N.	Benennung	Description
35	000097	Kreuzkopf und Kulisse	Slider & Plunger Assembly
36	000095	Gleitbrücke	Sliding Bridge
37	000062	Kurbelwelle	Crankshaft
38	000097	Kreuzkopf und Kulisse	Slider & Plunger Assembly
39	000045	Kolben 3. Stufe inkl. Kolbenringe	Piston 3rd stage incl. Piston Rings
40	000052	Kolben 2. Stufe	Piston 2nd stage
41	000057	Pleuel 1. Stufe	Conrod 1st Stage
42	000050	Kolben 1. Stufe	Piston 1st stage
43	000096	Gleitleiste	Guide Bar
44	000098	Öldüse	Oil Jet
45N	008166	Haltescheibe für Kolben	Holding Disc for Piston
46	000055	Kolbenstossplatte 3. Stufe	Piston Push Pad 3nd stage
47	000056	Kolbenringe 3. Stufe (Kompletter Satz)	Piston Rings 3rd Stage (Complete Set)
49	003983	Anlaufscheibe Schwungrad	Washer, Flywheel
50	000049	Unterer Pleuelbolzen 1. Stufe	Lower Gudgeon Pin 1st stage
51	008165	Sicherungsring I40	Circlip I40
53	001429	Kolbenbolzen 1. Stufe	Piston Pin, 1st Stage
54	001355	Sicherungsring I20	Circlip I20
55	000053	Kolbenringe 2. Stufe (Kompletter Satz)	Piston Rings 2nd Stage (Complete Set)
56	000051	Kolbenringe 1. Stufe (Kompletter Satz)	Piston Rings 1st Stage (Complete Set)
59	000021	Seegering	Circlip
60	000061	Nadellager (komplett)	Needle Bearing (Complete)
61	000079	Passfeder	Woodruff Key
62	000022	Seegering	Circlip
63	000023	Seegering	Circlip
64	000020	Seegering	Circlip
65	001029	Zylinderschraube	Allen Screw
66	001083	Sechskantschraube	Hexagon Screw
68	001148	Unterlegscheibe	Washer
69	001181	Unterlegscheibe	Washer
70	002065	O-Ring	O-Ring

**DETAILANSICHT / DETAILED VIEW**

**Kurbeltrieb / Crank Drive**

**B**





## ERSATZTEILLISTE / SPARE PART LIST

### Zylinder & Ventilköpfe / Cylinders & Valve Heads

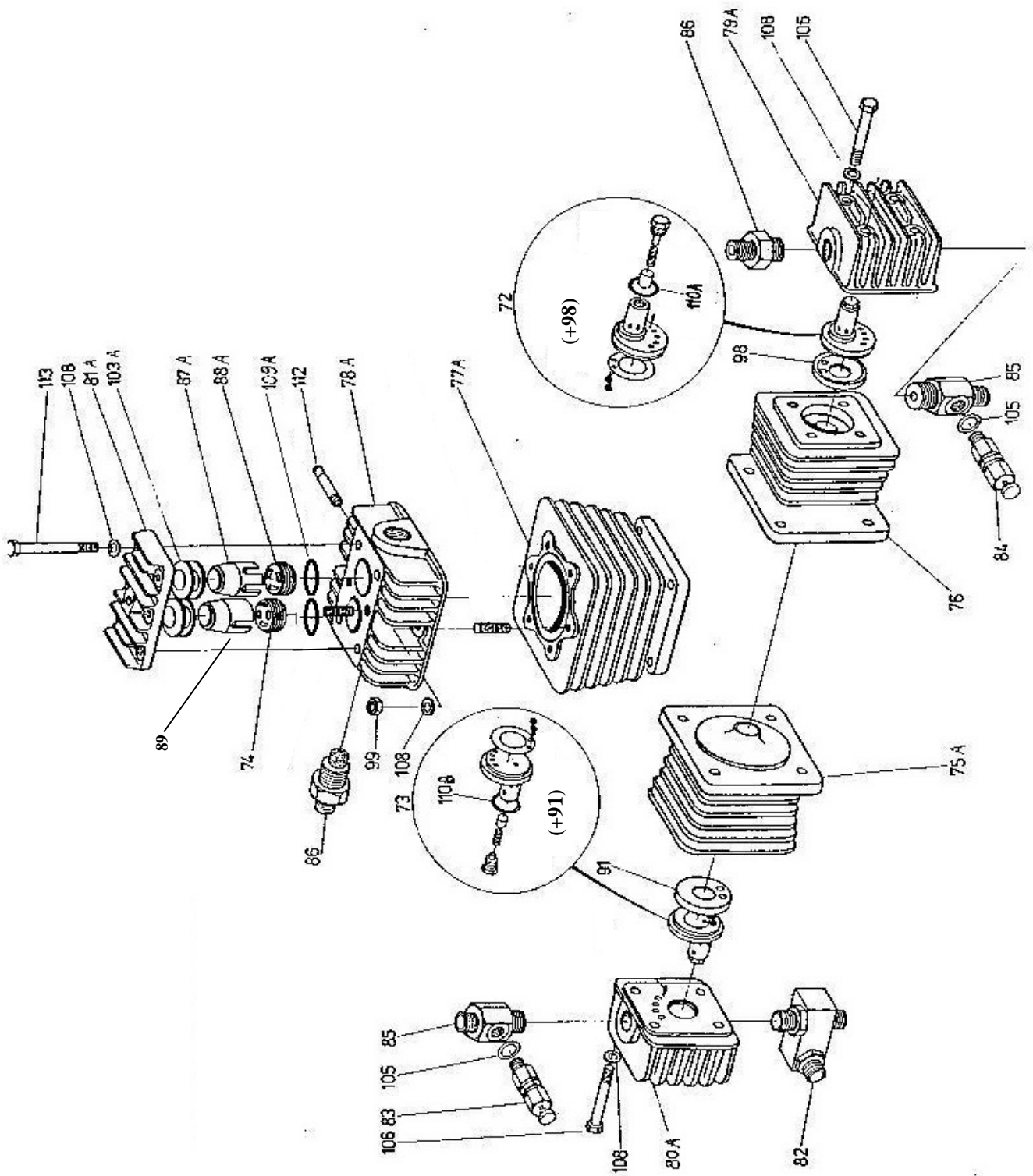
Pos.	Best.-Nr. / P/N.	Benennung	Description
72	000031	Saug-Druckventil 2. Stufe inkl. Dichtung und O-Ring	In-& Outlet Valve 2nd Stage incl. Gasket and O-Ring
73	000032	Saug-Druckventil 3. Stufe inkl. Dichtung und O-Ring	In-& Outlet Valve 3rd Stage incl. Gasket and O-Ring
74	000029	Auslassventil 1. Stufe	Outlet Valve 1st Stage
75A	004740	Zylinder 3. Stufe	Cylinder, 3rd stage
76	000138	Zylinder 2. Stufe	Cylinder 2nd Stage
77A	000146	Zylinder 1. Stufe	Cylinder 1st Stage
78A	000141	Ventilkopf 1. Stufe	Valve Head 1st Stage
79A	000139	Ventilkopf 2. Stufe	Valve Head 2nd Stage
80A	000142	Ventilkopf 3. Stufe	Valve Head 3rd Stage
81A	000140	Ventildeckel 1. Stufe	Valve Cover 1st Stage
82	000092	Verschraubung Kreuzverschr. 3. Stufe	Connection Cross Block 3rd Stage
83	000041	Sicherheitsventil 2. Stufe	Safety Valve 2nd Stage
84	000039	Sicherheitsventil 1. Stufe	Safety Valve 1st Stage
85	000091	Verschraubung Einlass 2. Stufe	Connection Inlet 2nd Stage
86	000093	Verschraubung Auslass 1. Stufe	Connection Outlet 1st Stage
87A	000036	Einlassventilhalter	Alloy Valve Holder
88A	000026	Einlassventil 1. Stufe	Inlet Valve 1st Stage
89	000037	Auslassventilhalter	Alloy Valve Holder
91	003063	Ventildichtung unten, 3. Stufe, Alu	Lower Valve Gasket, 3rd stage, Alloy
98	003062	Ventildichtung unten, 2. Stufe, Alu	Lower Valve Gasket, 2nd stage, Alloy
99	001158	Mutter M8	Nut M8
103A	000030	Federteller, 1. Stufe	Spring washer 1st stage
105	001329	CU-Ring	Copper Seal Ring
106	001084	Sechskantschraube	Hexagon Screw
108	001181	U-Scheibe A8	Washer A8
109A	000033	O-Ring 36 x 2 Silicon	O-Ring 36 x 2 Silicon
110A	000035	O-Ring Ventildichtring 25 x 2, Viton 90	O-Ring Valve seal ring 25 x 2, Viton 90
110B	000034	O-Ring Ventildichtring 24 x 2,5, Viton 90	O-Ring Valve seal ring 24 x 2,5, Viton 90
112	002939	Entlüftungsröhrchen Eingang 1. Stufe	Ventilation pipe 1st stage
113	001060	Zylinderschraube	Allen Bolt



**DETAILANSICHT / DETAILED VIEW**

**Zylinder & Ventilköpfe / Cylinders & Valve Heads**

**B**





## ERSATZTEILLISTE / SPARE PART LIST

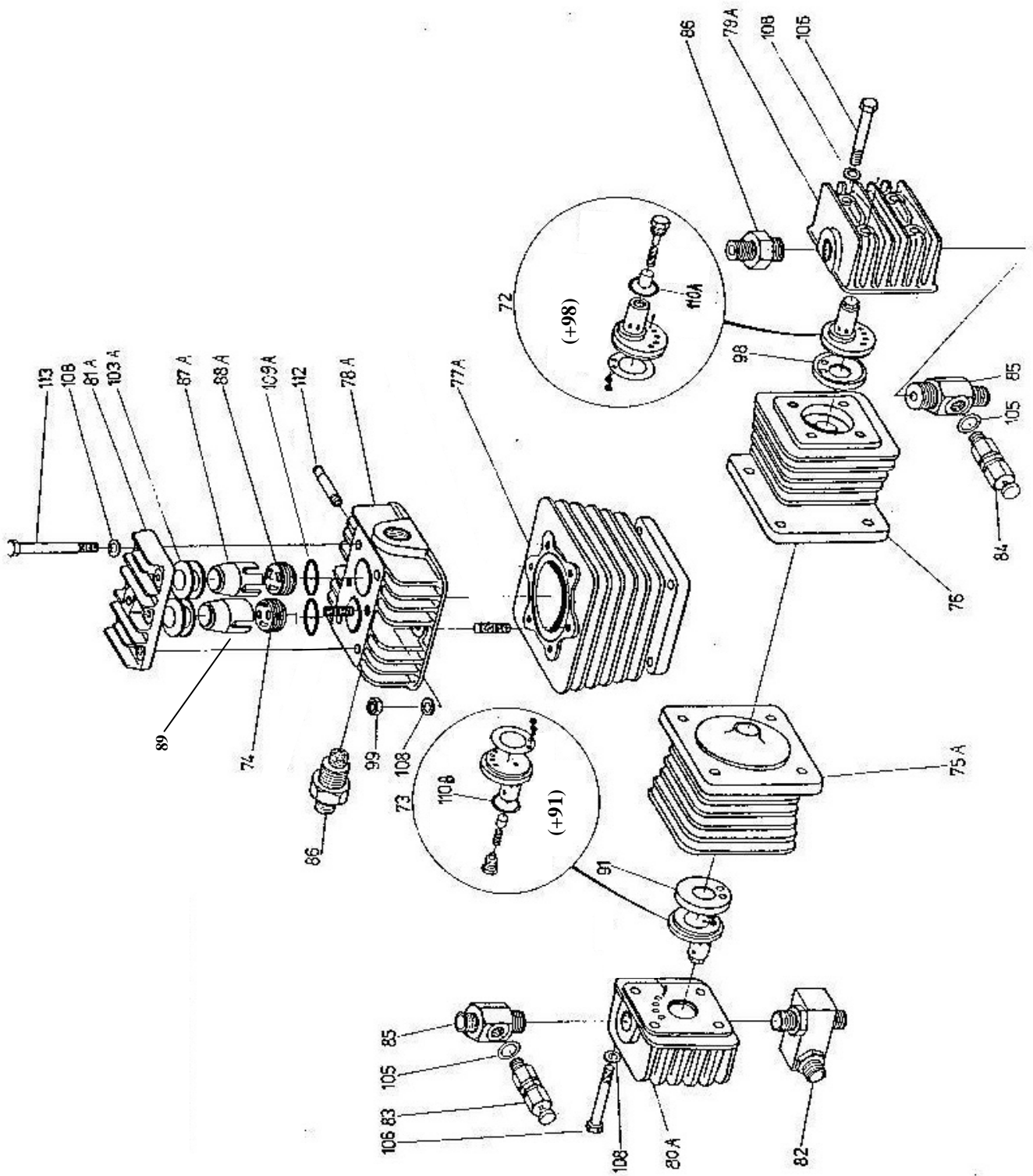
### Zylinder & Ventilköpfe / Cylinders & Valve Heads

Pos.	Best.-Nr. / P/N.	Benennung	Description
72	000031	Saug-Druckventil 2. Stufe inkl. Dichtung und O-Ring	In-& Outlet Valve 2nd Stage incl. Gasket and O-Ring
73	000032	Saug-Druckventil 3. Stufe inkl. Dichtung und O-Ring	In-& Outlet Valve 3rd Stage incl. Gasket and O-Ring
74	000029	Auslassventil 1. Stufe	Outlet Valve 1st Stage
75A	004740	Zylinder 3. Stufe	Cylinder, 3rd stage
76	000138	Zylinder 2. Stufe	Cylinder 2nd Stage
77A	000146	Zylinder 1. Stufe	Cylinder 1st Stage
78A	000141	Ventilkopf 1. Stufe	Valve Head 1st Stage
79A	000139	Ventilkopf 2. Stufe	Valve Head 2nd Stage
80A	000142	Ventilkopf 3. Stufe	Valve Head 3rd Stage
81A	000140	Ventildeckel 1. Stufe	Valve Cover 1st Stage
82	000092	Verschraubung Kreuzverschr. 3. Stufe	Connection Cross Block 3rd Stage
83	000041	Sicherheitsventil 2. Stufe	Safety Valve 2nd Stage
84	000039	Sicherheitsventil 1. Stufe	Safety Valve 1st Stage
85	000091	Verschraubung Einlass 2. Stufe	Connection Inlet 2nd Stage
86	000093	Verschraubung Auslass 1. Stufe	Connection Outlet 1st Stage
87A	000036	Einlassventilhalter	Alloy Valve Holder
88A	000026	Einlassventil 1. Stufe	Inlet Valve 1st Stage
89	000037	Auslassventilhalter	Alloy Valve Holder
91	003063	Ventildichtung unten, 3. Stufe, Alu	Lower Valve Gasket, 3rd stage, Alloy
98	003062	Ventildichtung unten, 2. Stufe, Alu	Lower Valve Gasket, 2nd stage, Alloy
99	001158	Mutter M8	Nut M8
103A	000030	Federteller, 1. Stufe	Spring washer 1st stage
105	001329	CU-Ring	Copper Seal Ring
106	001084	Sechskantschraube	Hexagon Screw
108	001181	U-Scheibe A8	Washer A8
109A	000033	O-Ring 36 x 2 Silicon	O-Ring 36 x 2 Silicon
110A	000035	O-Ring Ventildichtring 25 x 2, Viton 90	O-Ring Valve seal ring 25 x 2, Viton 90
110B	000034	O-Ring Ventildichtring 24 x 2,5, Viton 90	O-Ring Valve seal ring 24 x 2,5, Viton 90
112	002939	Entlüftungsröhrchen Eingang 1. Stufe	Ventilation pipe 1st stage
113	001060	Zylinderschraube	Allen Bolt

**DETAILANSICHT / DETAILED VIEW**

**Zylinder & Ventilköpfe / Cylinders & Valve Heads**

**B**





## ERSATZTEILLISTE / SPARE PART LIST

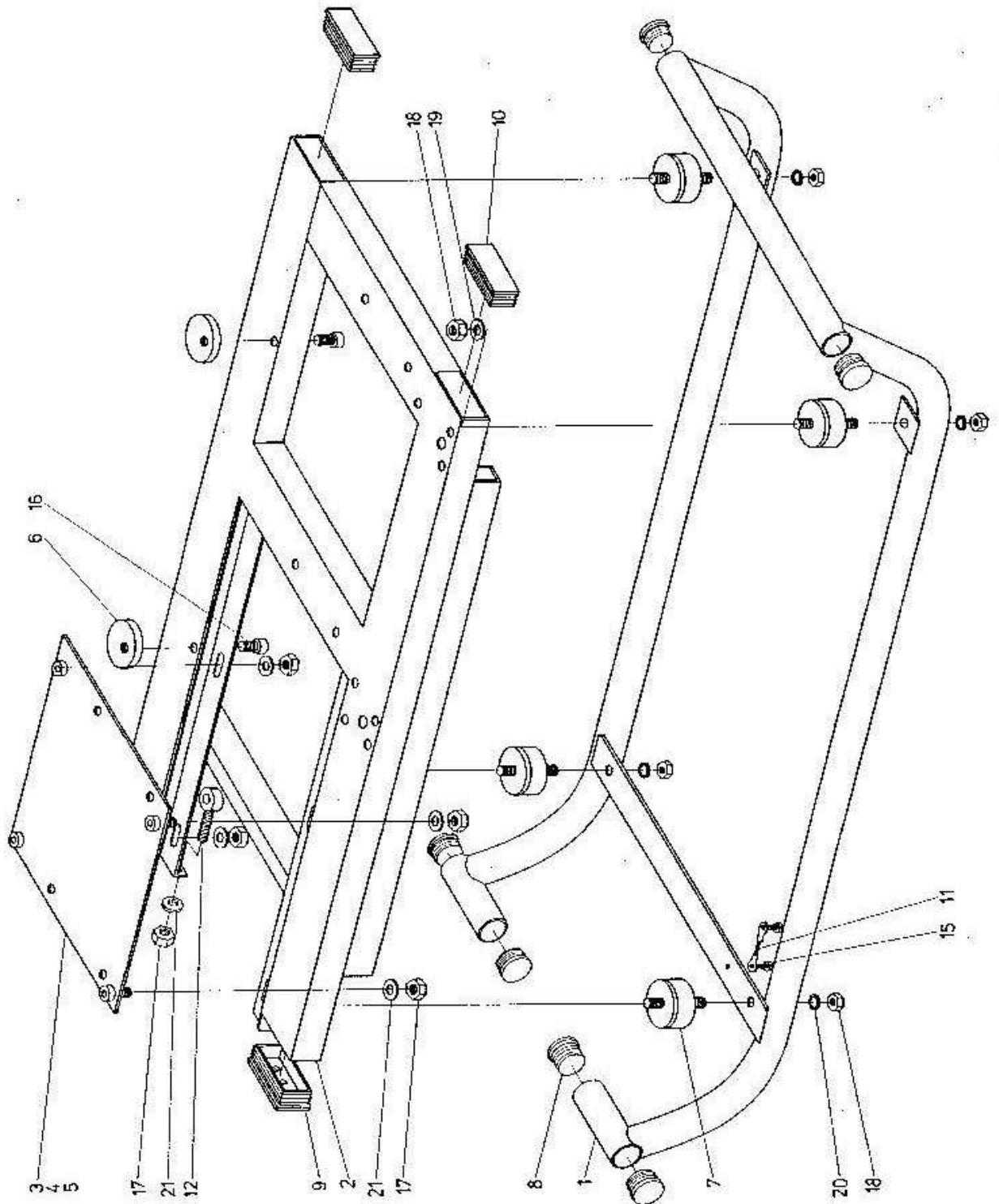
### Tragrahmen / Carrying Frame

Pos.	Best.-Nr. / P/N.	Benennung	Description
1	004085	Tragrahmen	Carrying Frame
2	004086	Befestigungsrahmen Kompressor	Frame Compressor
3	000120	Motorplatte Komplett LW 160 E	Motor Mounting Plate LW 160 E
4	000121	Motorplatte Komplett LW 225 E	Motor Mounting Plate LW 225 E
5	000122	Motorplatte Komplett LW 190 / 245 B	Motor Mounting Plate LW 190 / 245 B
6	000074	Klemmscheibe Abdeckung	Alloy Clamp Washer - Cover
7	004087	Gummilager Rahmen	Rubber bearing, frame
8	004088	Verschlussstopfen Rund	Plug, round
9	000103	Verschlussstopfen Eckig mit Bohrung	Square Plastic Caps Frame
10	004090	Verschlussstopfen Eckig	Plug, angular
11	004091	Massekabel	Earth cable
12	004092	Spannschraube für Keilriemen	Clamp screw for v-belt
15	004093	Blechschraube	Sheet metal screw
16	004094	Inbusschraube	Allen screw
17	001163	Mutter M10	Nut M10
18	004089	Mutter M8	Nut M8
19	004096	Unterlegscheibe für M8	Washer for M8
20	004096	Unterlegscheibe für M8	Washer for M8
21	004097	Unterlegscheibe für M10	Washer for M10

B

**DETAILANSICHT / DETAILED VIEW**

**Tragrahmen / Carrying Frame**



**B**



## ERSATZTEILLISTE / SPARE PART LIST

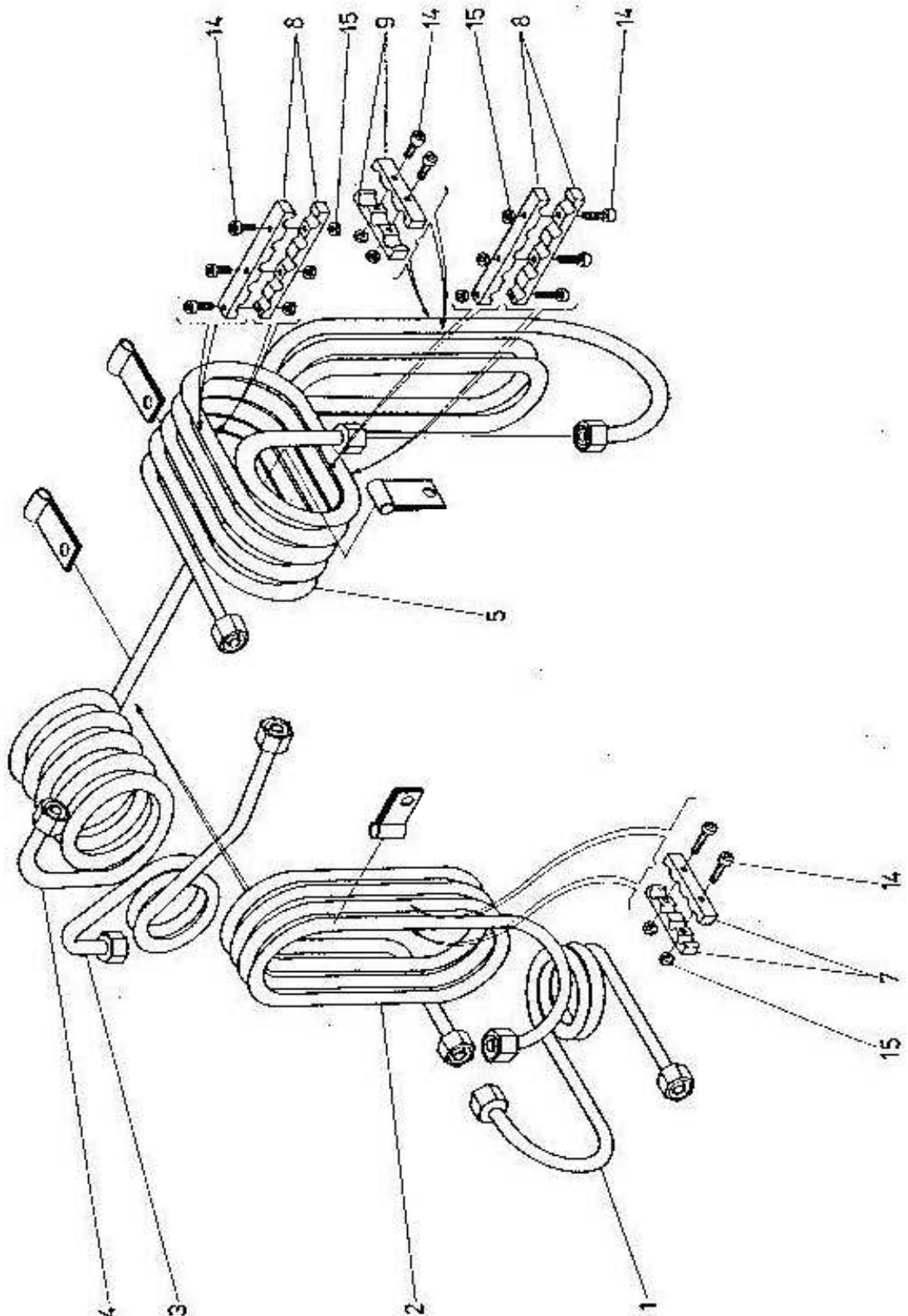
### Kühlrohre / Cooling Pipes

Pos.	Best.-Nr. / P/N.	Benennung	Description
1	000010	Filtergehäuse Kühlrohr 3. Stufe	Final Cooling Pipe 3rd Stage
2	000009	Kühlrohr komplett 3. Stufe	Cooling Pipe 3rd Stage
3	000011	Kühlrohr 2. zu 3. Stufe Wasserabscheider	Cooling Pipe 2nd to 3rd stage
4	000008	Kühlrohr 1. Stufe zu 2. Stufe	Cooling Pipe 1st to 2nd Stage
5	000007	Kühlrohr komplett 2. Stufe Wasserabscheider	Cooling Pipe 2nd Stage Water Separator
7	006677	Alu Kühlrohrhalteklammern (1 Paar)	Alloy clamp for cooling pipe (1 Pair)
8	006726	Alu Kühlrohrhalteklammern (1 Paar)	Alloy clamp for cooling pipe (1 Pair)
9	005111	Alu Kühlrohrhalteklammern (1 Paar)	Alloy clamp for cooling pipe (1 Pair)
14	001006	Zylinderschraube	Allen Screw
15	001151	Mutter M5	Nut M5

**B**

**DETAILANSICHT / DETAILED VIEW**

**Kühlrohre / Cooling Pipes**



**B**



## ERSATZTEILLISTE / SPARE PART LIST

### E - Motor

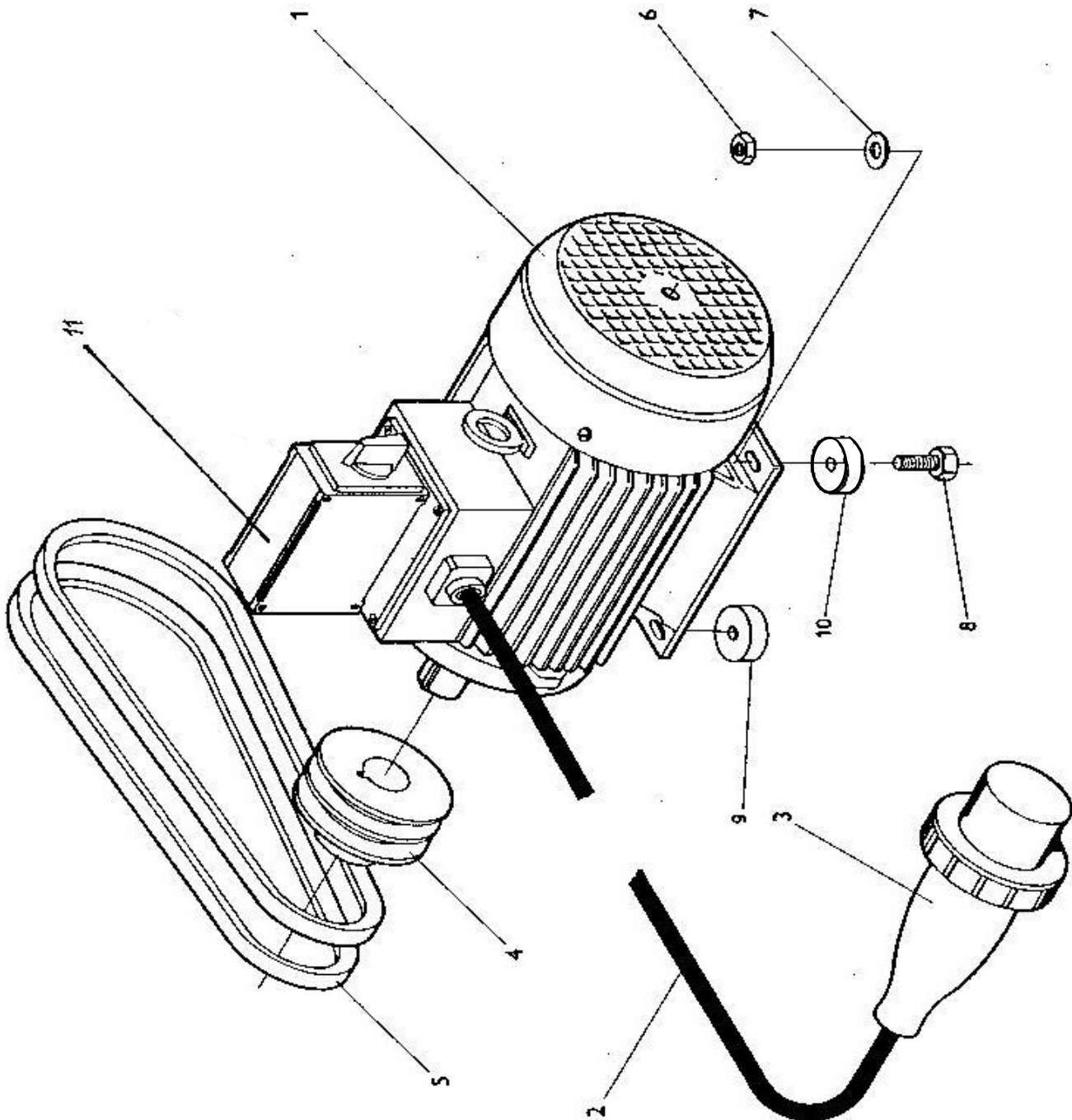
Pos.	Best.-Nr. / P/N.	Benennung	Description
1	004081	Motor LW160 (400V – 50/60Hz – 3~)	Motor LW160 (400V—50/60Hz—3~)
	005543	Motor LW160 (230V – 50/60Hz – 3~)	Motor LW160 (230V – 50/60Hz – 3~)
	006135	Motor, LW160E1 (Baldor, 230V – 50Hz – 1~)	Motor, LW160E1 (Baldor, 230V – 50Hz – 1~)
	010223	Motor, LW160E1 (Gibbons, 230V – 50Hz – 1~)	Motor, LW160E1 (Gibbons, 230V – 50Hz – 1~)
2	003680	Anschlusskabel 2,5m	Cable 2.5m
3	002084	Stecker 16A	Plug 16A
4	000163	Riemenscheibe (50Hz, 3~)	Pulley (50Hz, 3~)
	003799	Riemenscheibe (60Hz, 3~)	Pulley (60Hz, 3~)
	006152	Riemenscheibe (Baldor, 50Hz, 1~)	Pulley (Baldor, 50Hz, 1~)
	009290	Riemenscheibe (Gibbons, 50Hz, 1~)	Pulley (Gibbons, 50Hz, 1~)
5	000124	Keilriemen (50Hz, 3~)	V-belt (50Hz, 3~)
	006153	Keilriemen (60Hz, 3~)	V-belt (60Hz, 3~)
	006153	Keilriemen (Baldor, 50Hz, 1~)	V-belt (Baldor, 50Hz, 1~)
	000124	Keilriemen (Gibbons, 50Hz, 1~)	V-belt (Gibbons, 50Hz, 1~)
6	001164	Stopfmutter M10	Lock Nut M10
7	001186	U-Scheibe A10	Washer A10
8	001104	Sechskantschraube	Hexagon Screw
9	008160	Distanzscheibe E-Motor, standard Version	Spacer Motor, standard version
10	008160	Distanzscheibe E-Motor, standard Version	Spacer Motor, standard version
11	000153	Ein/Aus Schalter m. Phasenwender	ON/OFF Switch with phase changer

B



**DETAILANSICHT / DETAILED VIEW**

**E - Motor**



**B**



## ERSATZTEILLISTE / SPARE PART LIST

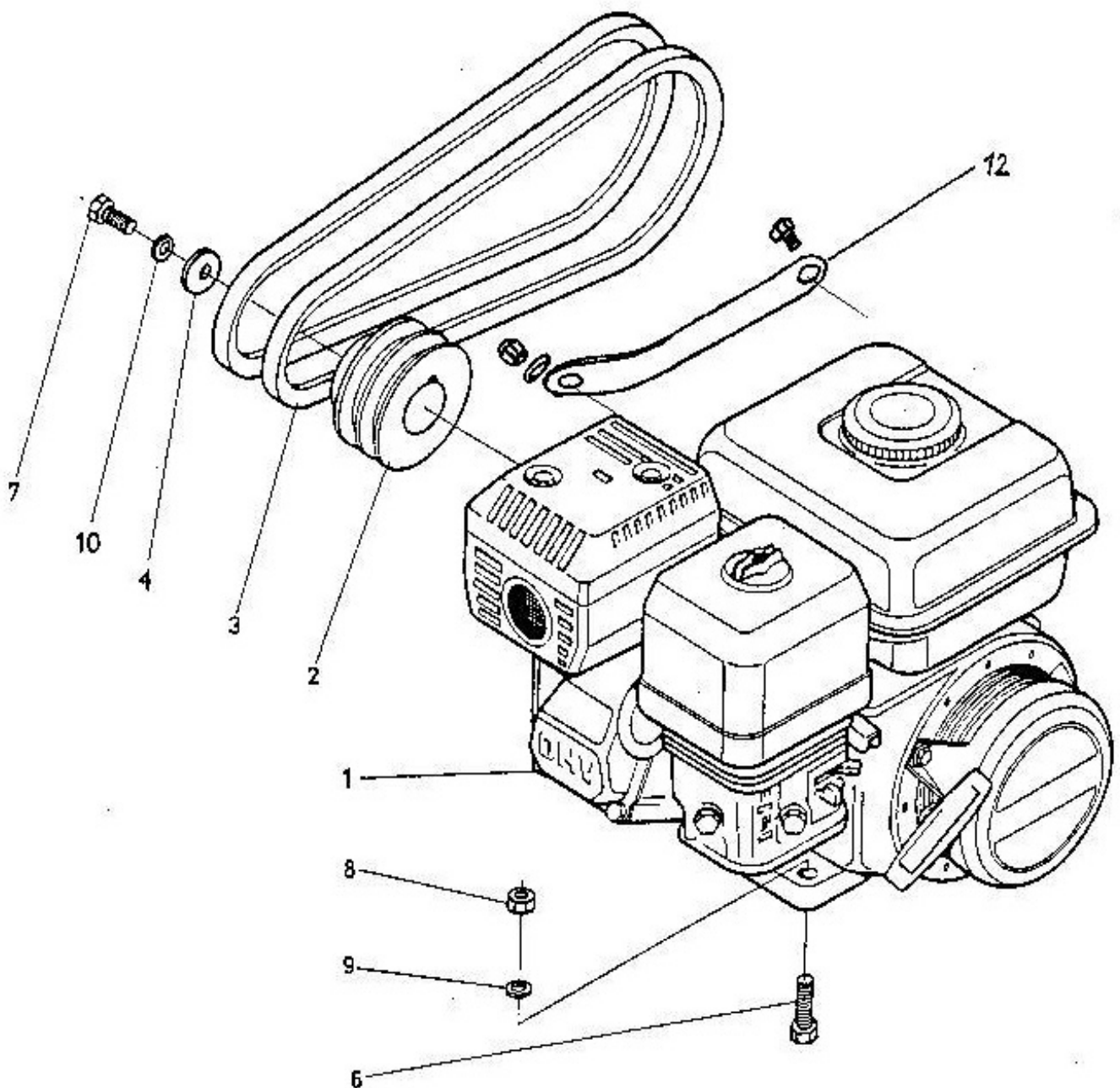
### Benzin - Motor / Bencine - Motor

Pos.	Best.-Nr. / P/N.	Benennung	Description
1	002238	Motor LW 190 B / LW 245 B	Motor LW 190 B / LW 245 B
2	000159	Riemenscheibe LW 190 B	Pulley LW 190 B
	000160	Riemenscheibe LW 245 B	Pulley LW 245 B
3	000125	Keilriemen LW 190 B	V-belt LW 190 B
	000123	Keilriemen LW 245 B	V-belt LW 245 B
4	008161	Unterlegscheibe, Motorriemenscheibe	Washer Engine Pulley
6	001103	Sechskantschraube	Hexagon Screw
7	001082	Sechskantschraube	Hexagon Screw
8	001164	Stopmutter M10	Lock Nut M10
9	001186	U-Scheibe A10	Washer A10
10	001184	Schnorr-Scheibe	Clamp Washer
12	006674	Auspuffhalterung Krümmer/Block	Exhaust bracket
13	001081	Sechskantschraube	Hexagon Screw
14	001186	U-Scheibe A10	Washer A10
15	008117	Spezielle Hutmutter M8, Auspuffhaltestrebe	Special Domed Nut M8, Exhaust Bracket

**B**

**DETAILANSICHT / DETAILED VIEW**

**Benzin - Motor / Bencine - Motor**



**B**



## ERSATZTEILLISTE / SPARE PART LIST

### Öl-Wasserabscheider 2. Stufe / Oil-Water Separator 2nd stage

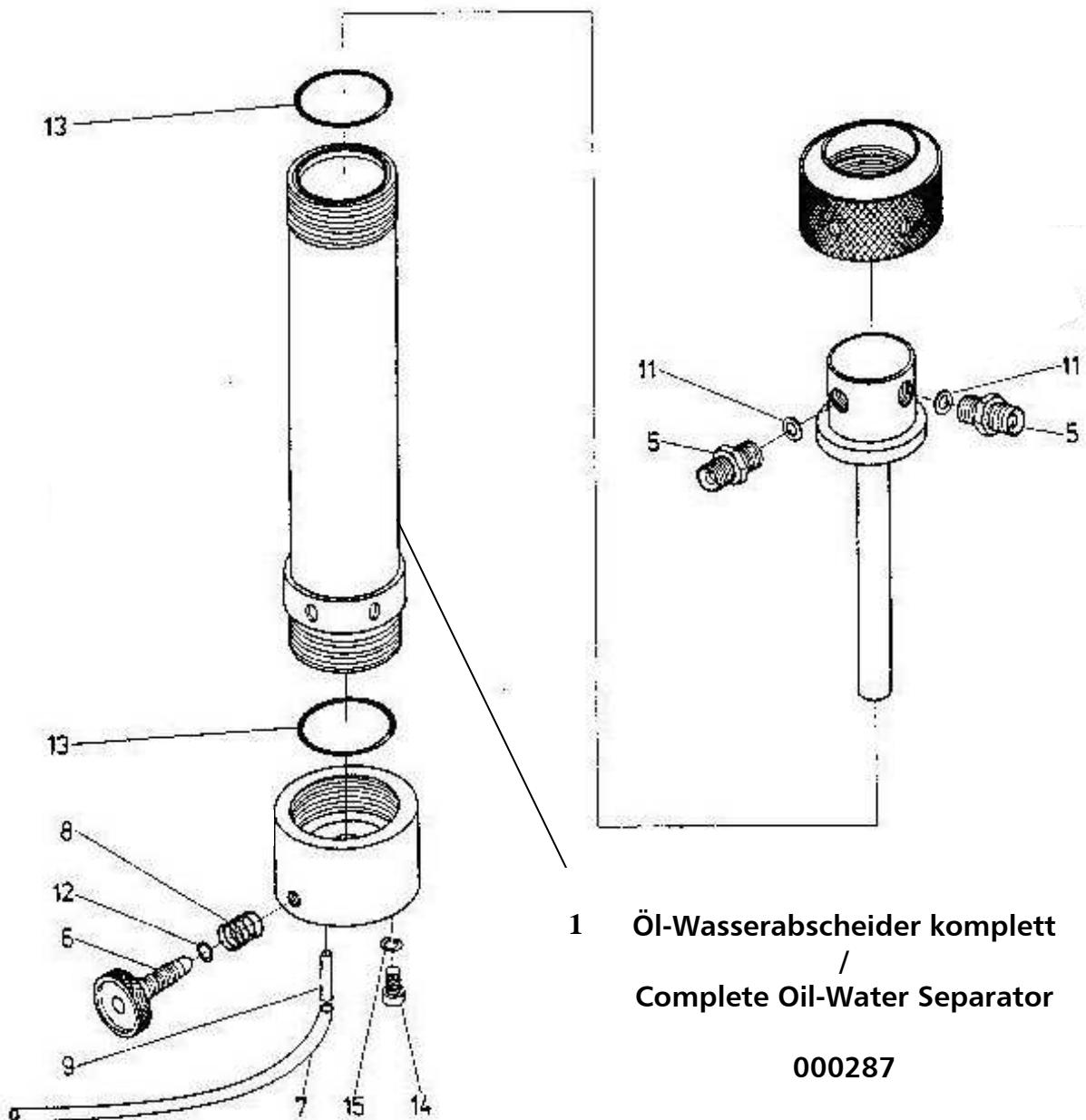
Pos.	Best.-Nr. / P/N.	Benennung	Description
1	000287	Öl-Wasserabscheider komplett	Complete Oil-Water Separator
5	000786	Verschraubung	Connection
6	000040	Entwässerungsspindel	Condensate Drain Spindle
7	003000	Kondensatschläuche (2Stk.)	Condensate Hoses (2pcs)
8	000042	Feder, Entwässerungsspindel	Spring, Condensate Drain Spindle
9	004398	Kondensatablaßstutzen	Condensate Outlet Sleeve
11	001321	Kupferring	Copper ring
12	000043	O-Ring Ø7,5 x 2,3 NBR90, Entwässerungsspindel	O-Ring Ø7,5 x 2,3 NBR90, Condensate Drain Spindle
13	000016	O-Ring Ø54 x 3,0 NBR90, Gehäuse	O-Ring Ø54 x 3,0 NBR90, Housing
14	001039	Zylinderschraube	Allen Screw
15	004104	Federscheibe	Lock Washer

**B**

**DETAILANSICHT / DETAILED VIEW**

**Öl-Wasserabscheider 2. Stufe / Oil-Water Separator 2nd stage**

**B**





## ERSATZTEILLISTE / SPARE PART LIST

### Filtergehäuse / Filter Housing

Pos.	Best.-Nr. / P/N.	Benennung	Description
1	000161	Filtergehäuse komplett	Filter Housing Complete
4	000072	Stutzen inkl. O-Ring Filtergehäuse	Inner Manifold & O-Ring
5	001375	Filterpatrone ohne CO/CO2 Filterung	Filter Cartridge w/o CO/CO2 filtration
	001463	Filterpatrone inkl. CO/CO2 Filterung	Filter Cartridge incl. CO/CO2 filtration
6	000147	Halteklötz Sicherheitsventil (3/8" IG)	Mounting Base Safety Valve (3/8inch female)
7	000086	Druckhalteventil	Pressure Maintaining Valve
9	000040	Entwässerungsspindel	Condensate Drain Spindle
10	000087	Verschraubung Druckhalteventil	Connection Pressure Maintaining Valve
11	000090	Verschraubung	Connection
12	000070	Verbindungsstutzen, Wasserabscheider	Coupler Water Separator
13	004398	Kondensatablaßstutzen	Condensate Outlet Sleeve
14	003000	Kondensatschläuche (2Stk.)	Condensate Hoses (2pcs)
24	000042	Feder, Entwässerungsspindel	Spring Drain Spindle
25	000094	Dichtscheibe (Kupfer)	Seal Washer (Copper)
26	002809	CU-Ring (Kupfer)	CU-Ring (Copper)
27	000088	Kupferdichtung	Copper Washer
30	003099	O-Ring Ø7 x 2 NBR70	O-Ring Ø7 x 2 NBR70
31	003692	O-Ring Ø39 x 5,8 NBR70, Patronenhalte- sockel	O-Ring Ø39 x 5,8 NBR70, Cartridge Base
32	000043	O-Ring Ø7,5 x 2,3 NBR90, Entwässerungsspindel	O-Ring Ø7,5 x 2,3 NBR90, Spring Drain Spindle
33	000016	O-Ring Ø54 x 3,0 NBR90, Filtergehäuse	O-Ring Ø54 x 3,0 NBR90, Filter Housing
34	004103	Inbusschraube	Allen screw
35	004104	Federscheibe	Lock washer
36	000069	Düse, Wasserabscheider	Jet Water Separator
37	008453	Dichtsatz Druckhalteventil	Seal Kit Pressure Maintaining Valve

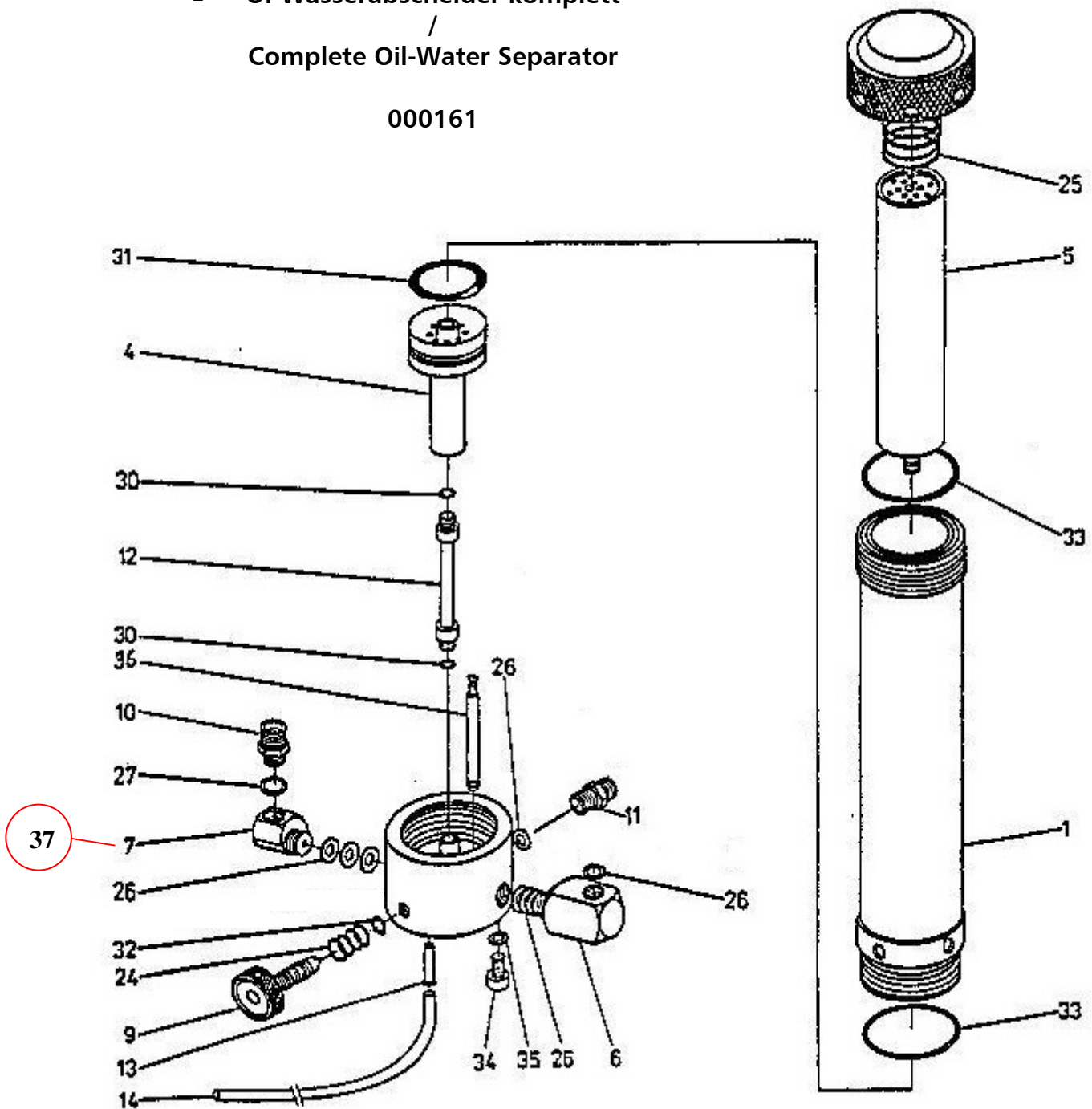
B

**DETAILANSICHT / DETAILED VIEW**

**Filtergehäuse / Filter Housing**

1 Öl-Wasserabscheider komplett  
/ Complete Oil-Water Separator

000161



**B**



## ERSATZTEILLISTE / SPARE PART LIST

---

### Lüfterrad / Cooling Fan Wheel

Pos.	Best.-Nr. / P/N.	Benennung	Description
115	000027	Lüfterrad	Cooling Fan Wheel
116	002802	Keilriemenscheibe	V-belt pulley
117	001082	Sechskantschraube	Hexagon screw
118	004096	Unterlegscheibe	Washer

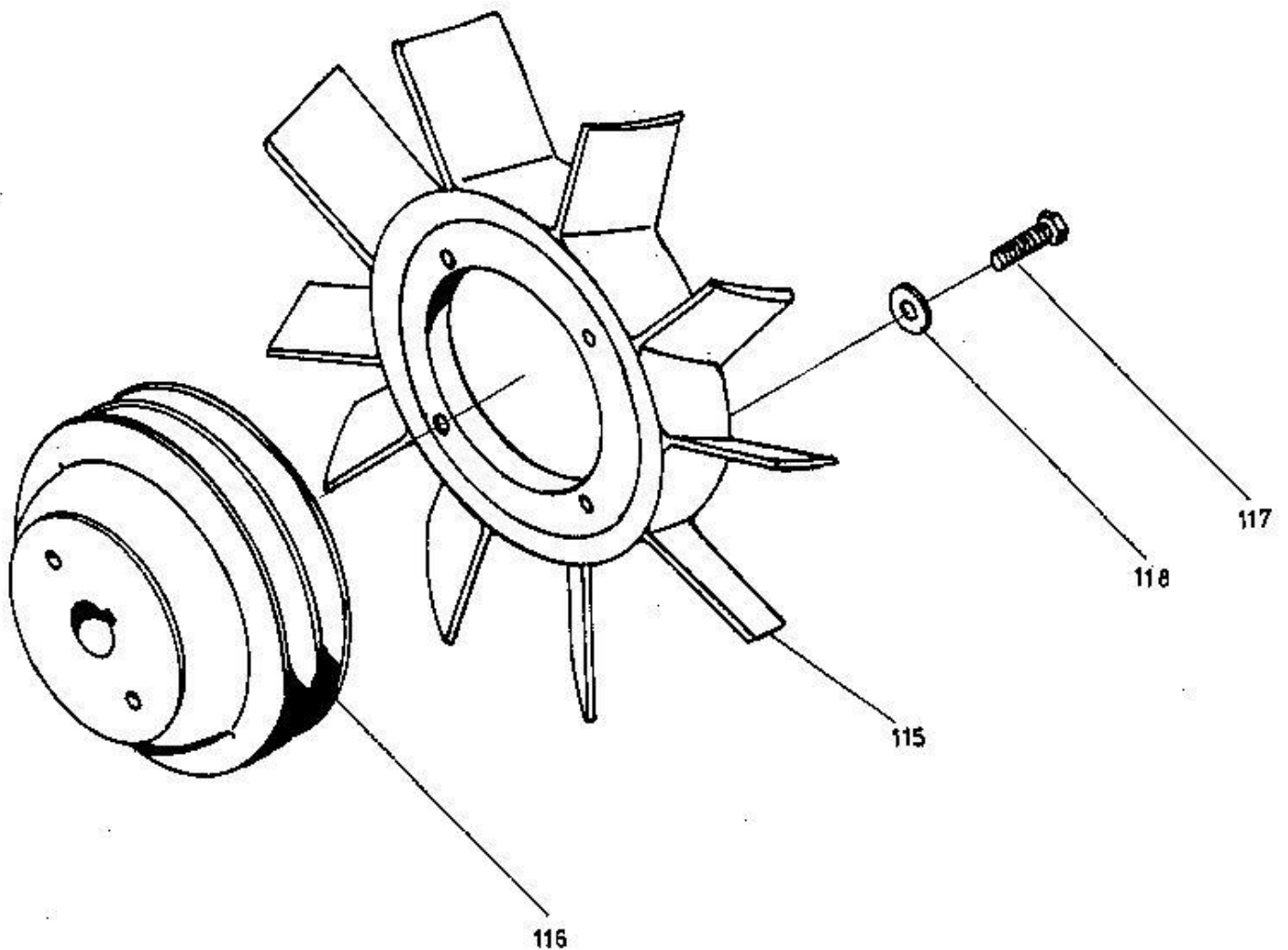
**B**



**DETAILANSICHT / DETAILED VIEW**

**Lüfterrad / Cooling Fan Wheel**

**B**





## ERSATZTEILLISTE / SPARE PART LIST

### Sicherheitsventil / Safety Valve

Best.-Nr. / Order No.	Benennung	Description
000234	Sockel für Sicherheitsventil mit TÜV/CE	Base f. Safety Valve TÜV
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
000838	Verschlussstopfen 1/4"	Plug 1/4"
000893	Doppelnippel 3/8X1/4FF33MS	Double Nipple 3/8X1/4FF33MS
001058	Zylinderschraube	Allen Bolt
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
007569	Kupferring	Copper Ring

**B**

## DETAILANSICHT / DETAILED VIEW

### Sicherheitsventil / Safety Valve

SV-Ventil mit CE-Prüfung

Safety Valve with CE

225 bar 001814

250 bar 001815

285/300 bar -----

330 bar 001816

350 bar 001817

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

SV-Ventil mit TÜV-Prüfung/

Safety Valve with TÜV

225 bar 000553

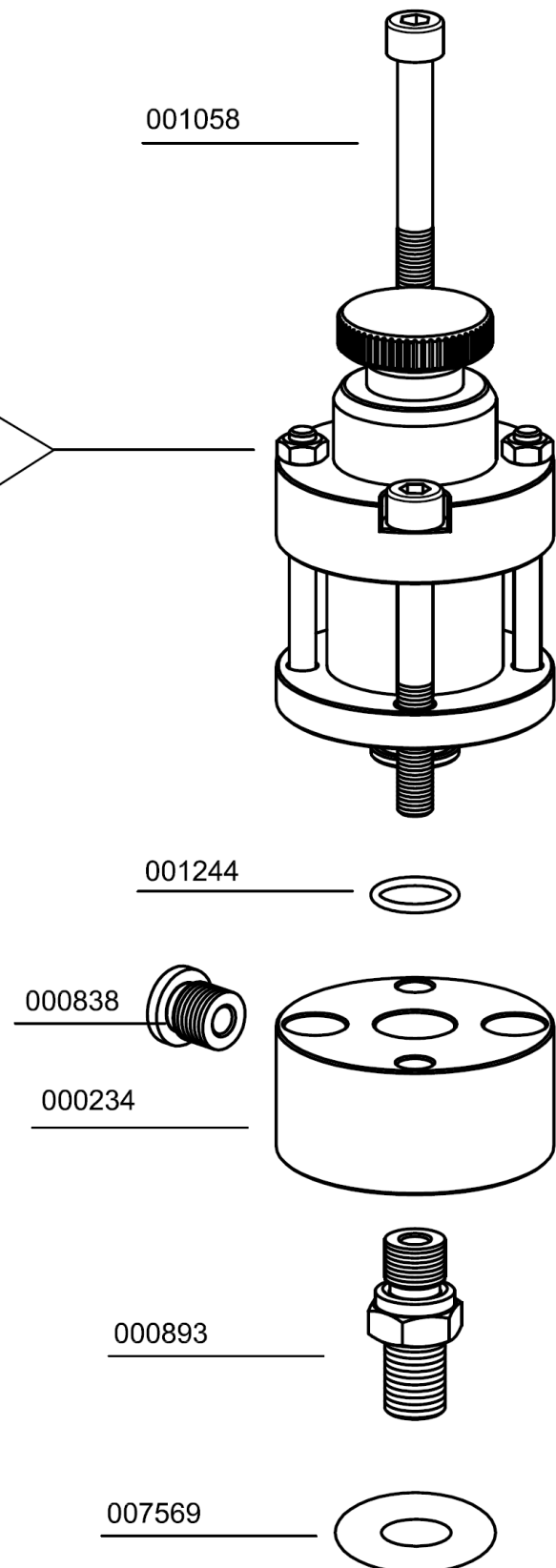
250 bar 000554

285/300 bar 000555

330 bar 000556

350 bar 000557

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



B



## ERSATZTEILLISTE / SPARE PART LIST

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### Baugruppe: Ansaugfilter / Assembly: Intake Filter

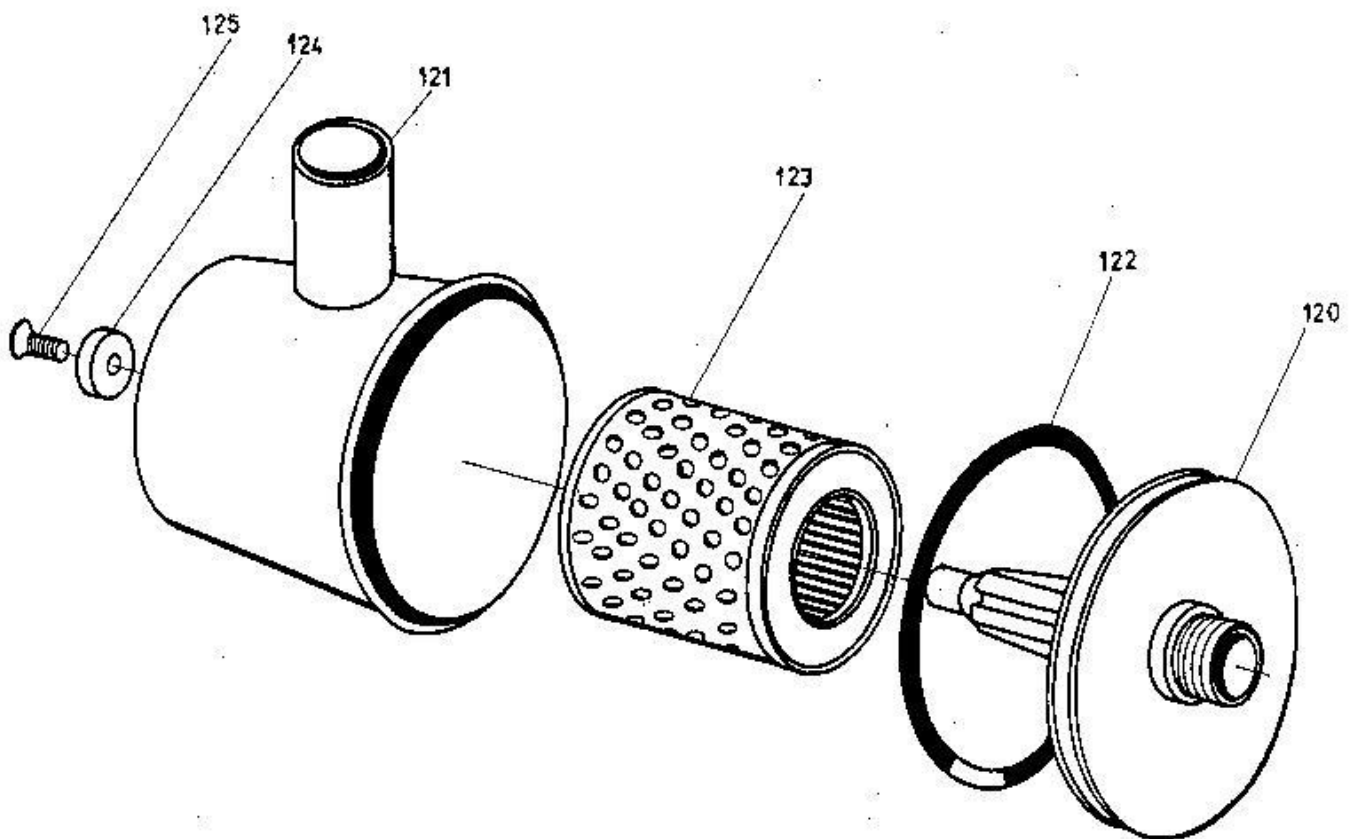
Pos.	Best.-Nr. / P/N.	Benennung	Description
120	000084	Flansch Ansaugfilter	Air Intake Flange
121	000068	Blechgehäuse, Ansaugfilter	Metal intake filter housing
122	000012	Dichtring Ansaugfiltergehäuse	Sealing Rubber Intake Filter housing
123	000119	Ansaugfilter	Intake Filter
124	000083	Unterlegscheibe	Washer
125	000082	Senkkopfschraube	Counter sunk screw

B

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Ansaugfilter / Assembly: Intake Filter**

**B**

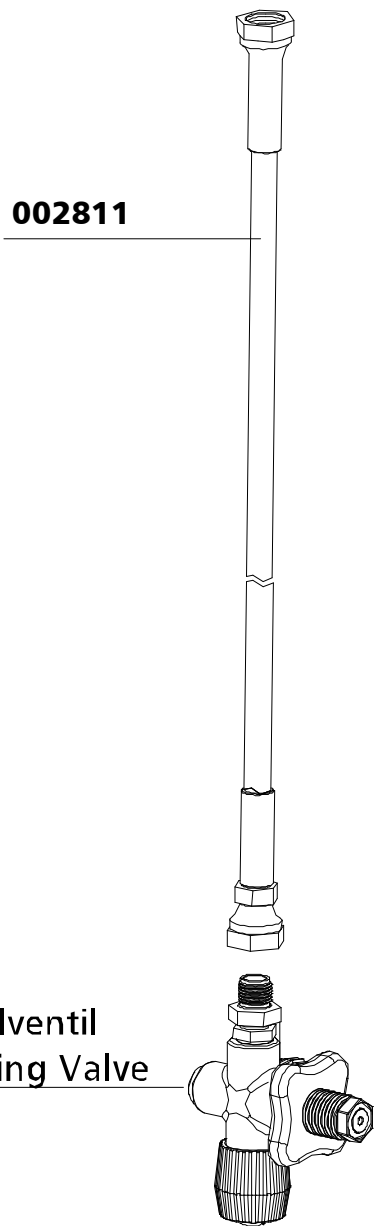


**ERSATZTEILLISTE / SPARE PART LIST**

**Füllschlauch / Filling Hose**

Best.-Nr. / Order No.	Benennung	Description
002811	Hochdruckschlauch 10L, 1000 mm, drehbar	HP-Hose 10L 1000 mm, rotatable

**B**





## ERSATZTEILLISTE / SPARE PART LIST

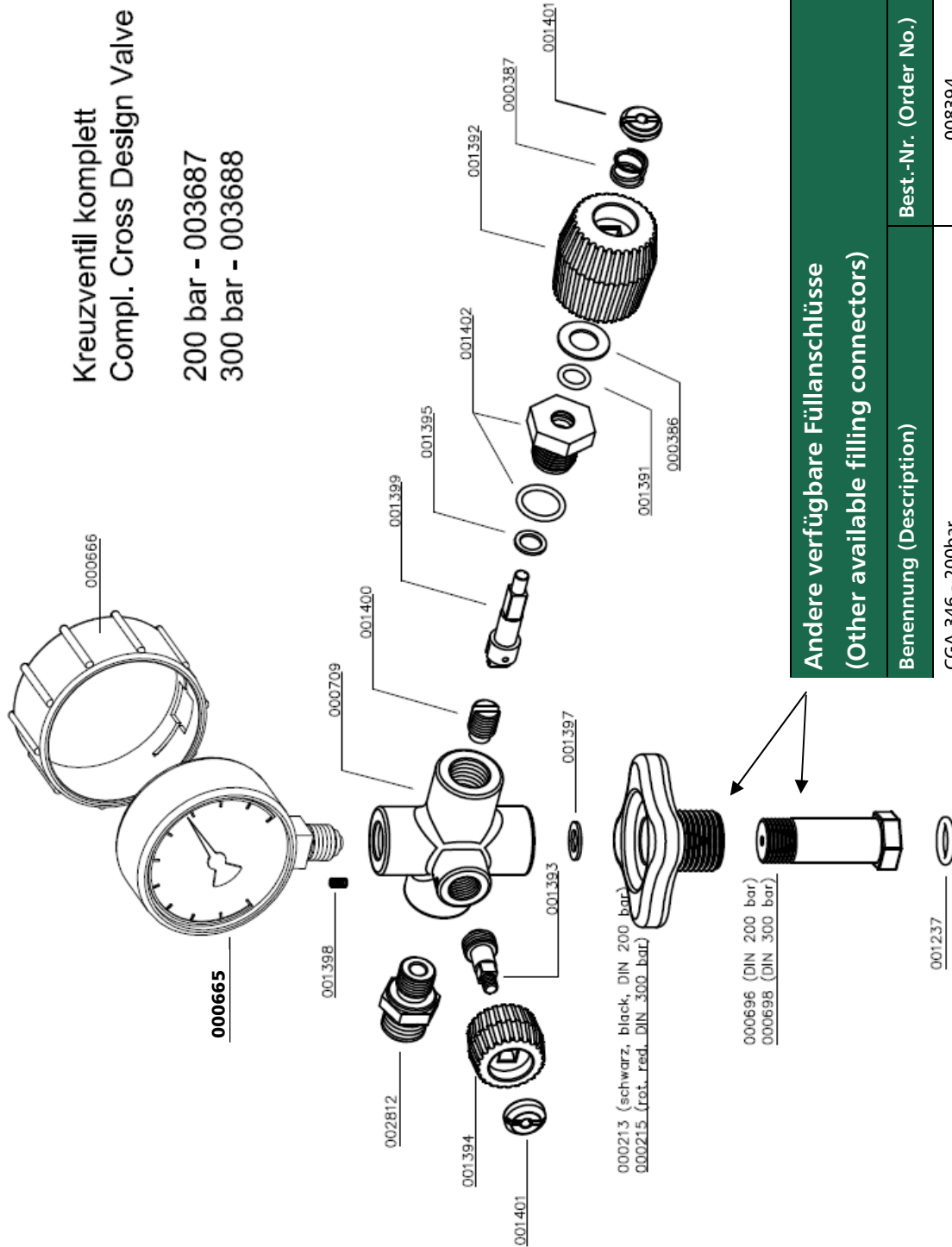
### Baugruppe: Kreuzventil / Assembly: Cross Design Valve

Best.-Nr. / Order No.	Benennung	Description
000213	Handrad, schwarz DIN 200bar	Hand Wheel DIN 200 bar, black
000215	Handrad rot DIN 300bar	Hand Wheel DIN 300 bar, red
000386	Gleitscheibe, Kreuzventil	Slide Washer
000387	Feder ( Kreuzventil )	Coil Spring, cross d. valve
000665	Manometer Messing	Pressure Gauge, brass
000666	Manometerschutzkappe Ø63mm	Protector Pressure Gauge Ø63mm
000696	Füllanschluss o. Handrad 200bar	Filling Connector w/o handwheel 200bar
000698	Füllanschluss o. Handrad 300bar	Filling Connector w/o handwheel 300bar
000709	Füllventil Kreuzbauweise, kompl.	Filling Valve cross design
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 komplett mit O-Ringen	Filling Spindle Body c/w O-Rings
002812	Verschraubung, Edelstahl	Connection, S/S
003687	Füllventil Kreuzbauweise komplett 200bar	Filling Valve cross complete unit 200bar
003688	Füllventil Kreuzbauweise komplett 300bar	Filling Valve cross complete unit 300bar

**B**

**DETAILANSICHT / DETAILED VIEW**

**Baugruppe: Kreuzventil / Assembly: Cross Design Valve**



Andere verfügbare Füllanschlüsse (Other available filling connectors)	
Benennung (Description)	Best.-Nr. (Order No.)
CGA 346 - 200bar	008394
CGA 347 - 300bar	006842
INT / Yoke - 200/232 bar	002307





# OPTIONS

C



## Table of Contents

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Auto Shut Down.....	1
Automatic Condensation Drain.....	4
Switch Over Device 200+300bar.....	6
Additional Filling Hose LW100 .....	9



# AUTO SHUT DOWN

C

## AUTO SHUT DOWN

### Operation:

The compressor has a control box with an integrated hour counter.

Before starting the compressor, press the blue condensate button for 5 seconds. This needs to be done to vent the residual pressure and the condensate. There's none blue condensate button? So the compressor isn't equipped with an automatic condensate drain. Please open the manual condensate drain valves carefully.

After this you can start the compressor by pushing the power button [1].



Remote control box c/w hour counter

### Final pressure switch

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

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

#### Increasing cut-out pressure:

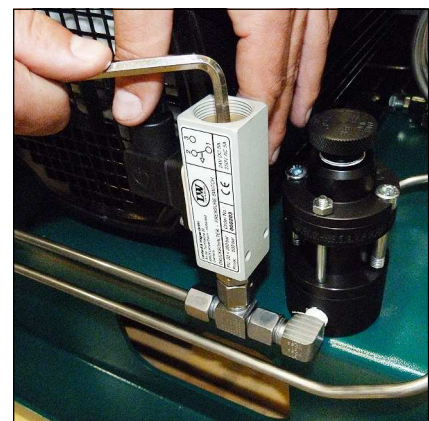
Turn the adjusting screw clockwise

#### Reducing cut-out pressure:

Turn the adjusting screw anti-clockwise

Adjust the pressure switch in steps of a quarter turn.

Restart the compressor after every adjustment step to verify the actual cut-out pressure.



Final pressure switch



#### Note

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

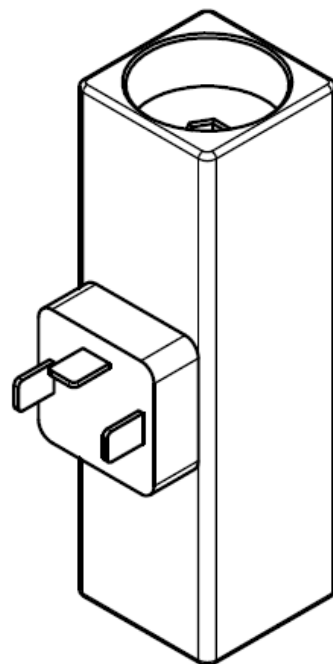
### Setting Examples:

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

## AUTO SHUT DOWN

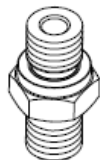
### Druckschalter / Pressure Switch

Best.-Nr. / Order No.	Benennung	Description
000203	Druckschalter 50-350 bar	Pressure Switch 50-350 bar
000712	Verschraubung	Connection
000722	Winkelverschraubung	Elbow Connection



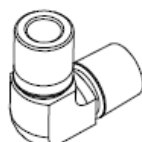
000203

Nur Abschaltautomatik  
Only Auto-Stop



000712

Kondensatablassautomatik und Abschaltautomatik  
Auto Drain and Auto-Stop



000722



# AUTOMATIC CONDENSATION DRAIN

C

## AUTOMATIC CONDENSATION DRAIN

### Automatic condensation dump system



#### Note

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

The LW 100 compressor can be optional equipped with an automatic condensation dump system.

A solenoid valve drains the 2nd and 3rd condensate separators every 20 minutes.

To test the system, press the blue condensate test drain button on the control box.

### Oil / water separators

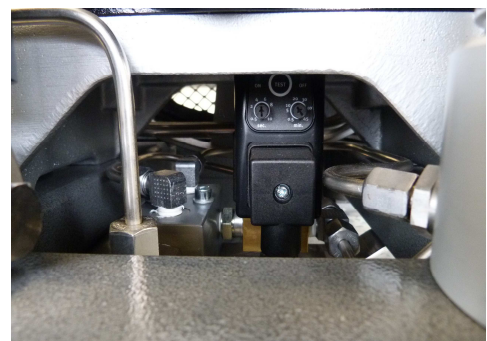
Condensate is separated after the 2nd and 3rd stage of compression. An electronic timer controlled the solenoid valve. The timer is located sideways at a small condensate valveblock and activates the dump valves about every 20 minutes.

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

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



Additional Separator



Timer below the compressor block

### Maintenance intervals

We recommend to clean oil and water separators every 250 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 500 operating hours.



# SWITCH OVER DEVICE 200/300 BAR

C



## SWITCH OVER DEVICE 200/300BAR

### 200 bar / 300 bar

This option allows the filling of 200 bar or 300 bar.

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

When opening the ball valve the second final stage safety valve is then approached, which directly lowers the pressure to 200 bar. So the system pressure will be reduced to 200 bar and so the 300 bar filling outlet does also only provide 200 bar.

The handwheels are colour-coded to allow an optical differentiation:

- 200 bar: black
- 300 bar: red



DIN handwheels 200 bar and 300 bar



Ball valve

## SWITCH OVER DEVICE 200/300BAR

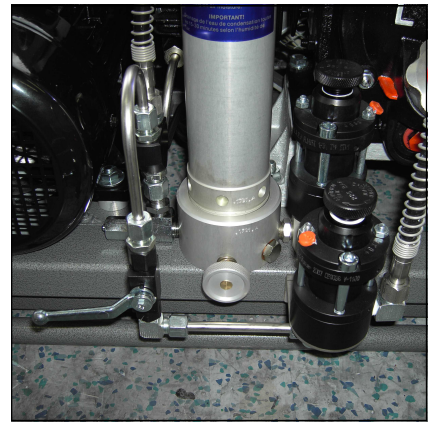
### Operation:

#### 300 bar

The ball valve should be fully closed to ensure the final pressure will be 300bar.

#### 200 bar

The ball valve should be completely opened to reduce the pressure to 200 bar. The opened ball valve ensures an air flow to the 200 bar fill connector.

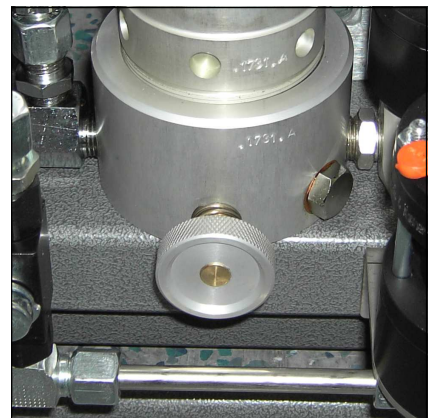


Switch over device system



#### ATTENTION

Operate ball valve only if filterhousing has been vented by using the drainage valve.



Drainage valve



## ADDITIONAL FILLING HOSE

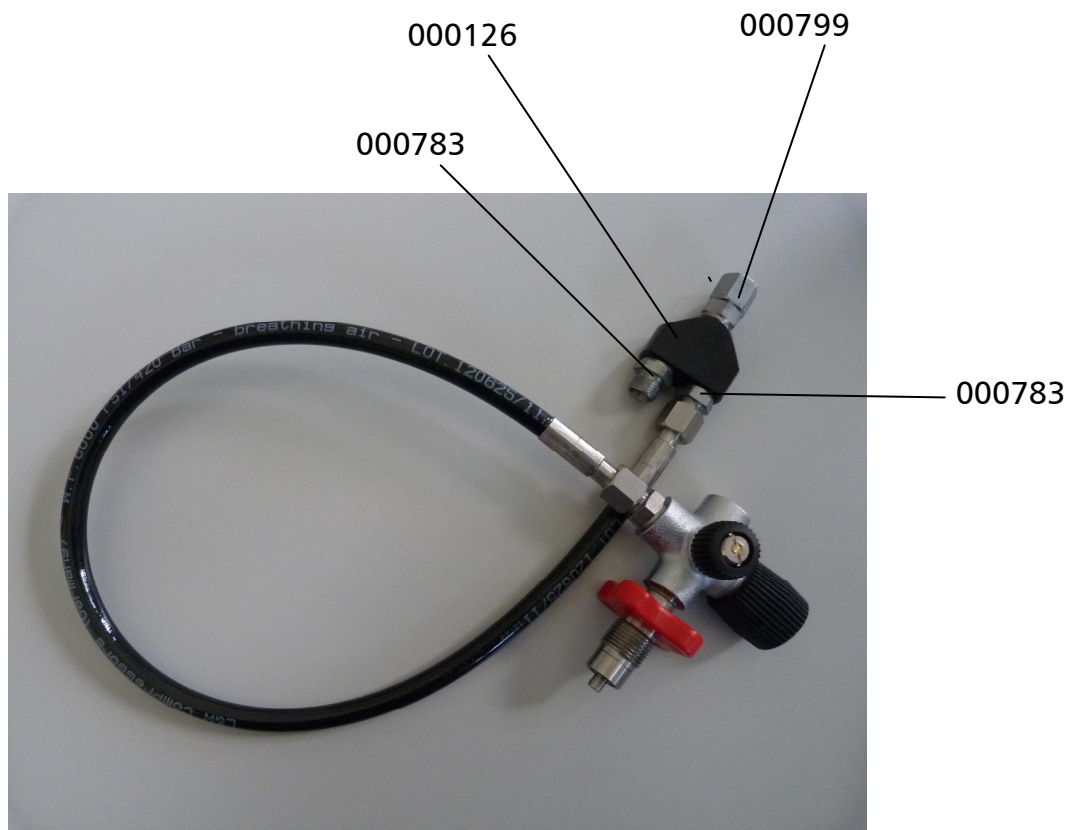
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## ADDITIONAL FILLING HOSE

The additional hose with filling valve allows to fill two bottles simultaneously. The hose with filling valve is available in 200 and 300 bar version.

Please refer to Chapter A for all information about the filling process.

Best.-Nr. / Order No.	Benennung	Description
000126	Y-Verteiler	Y-Connector
000783	Verschraubung	Connection
000799	Verschraubung mit fester Mutter	Connection with fixed nut





# ATTACHMENT

D

**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. The fixing screws M8 must be strength class 8.8 and meet the requirements of Merkblatt AD 2000 leaflet W7. Shaft length 70mm.

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

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

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

When rotated clockwise, the safety valve and the filter housing of the final stage are completely vented.

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

---

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

There are two possible reasons:

1. The safety valve is defective and blows off before the set pressure.

In this case the safety valve should be submitted immediately to the manufacturer for repair or replaced with a new one.

2. The safety valve opens properly, the problem is on the system.

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

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

The safety valve may only be used with the approved media.

Repair work on compressors must only be performed by trained personnel.

### **Dismantling of the safety valve**

Ensure that on the safety valve is no pressure.

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

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

### **Mounting**

1. Clean the safety valve socket.

2. Oil the insert pin of the safety valve including the O-ring with 1 to 2 drops of oil.

3. Press the safety valve pin complete into the socket.

4. Fasten the safety valve with the two 8 mm allen screws into the socket

(Tightening torque: 10 Nm)

5. Screw the venting screw (hand wheel) anticlockwise to its upper limit.

6. Start the System (Compressor), check installation for leaks and proper function.

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

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Tel.: +49 (0) 6256 – 85880 0  
Fax: +49 (0) 6256 – 85880 14

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**Note:**

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

Notes:

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

Maintenance:

- In accordance with current Pressure Equipment Directives, the safety valve must be periodically checked for operation and reliability.
- Refill annually lubricating oil:  
Oil filling position:  
Hole on the spacer (see arrow, Figure 1)
- Oil level: Fill oil into the hole until oil comes out of the hole.

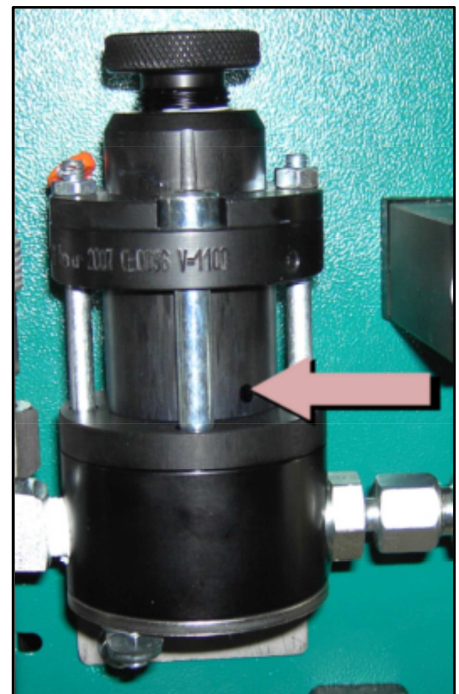


Figure 1: Position for oil refill

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

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INFORMATION ON THE  
SERVICE LIFE OF  
L&W HIGH PRESSURE HOSES





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## TESTING HOSE LINES

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### **Testing hose lines**

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

Tests are necessary:

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

The proprietor must determine the type, scope and deadlines for the tests according to his or her individual operating conditions and on the basis of a risk assessment. **The specifications and recommendations of the manufacturer must be observed.** The specifications made regarding type, scope and deadlines (as well as the replacement intervals) must be documented in writing as occupational health and safety measures.

The results of the tests must also be recorded, e.g. together with the test report of the machine, and kept at least until the next test.

The above-mentioned tests may only be carried out by persons who are qualified to do so and who are authorized by the company (employer).

### **Testing after assembly and before commissioning**

In the test after assembly and before commissioning, factors relating to assembly or factors that can only be evaluated on the fully assembled machine must be assessed.

The assembled hose lines must also be assessed.

Some test points can already be assessed during a visual inspection when the machine is switched off.

An overview of the recommended scope of testing for a visual inspection of hose lines is given in the appendix.

Further test points included in the test of hose lines before commissioning, require a functional test with the machine running.

A recommendation for the scope of testing is given in the appendix.



## TESTING HOSE LINES

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### **Recurring test**

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

The objective is to ensure that the system remains in a safe condition.

### **Procedure for hose lines found to be "defective"**

If defects are found during the testing of the hose line that impair the safe condition of the work equipment, these must be rectified immediately. If this is not possible, suitable measures must be taken to ensure that the machine cannot be used further before it is repaired. Defective hose lines must be replaced before the machine can be used further.

It is not permitted to repair or reassemble damaged hose lines with old, previously used parts!

If several hose lines are replaced at the same time, precautions must be taken to prevent mix-ups of the connections or the installation points.

### **Test intervals**

Deadlines for the recurring tests of the hose lines should already be set before commissioning.

Otherwise, there is a risk that work equipment will continue to be used or operated for too long without being tested.

The intervals between the recurring tests must be selected in such a way that deviations from the safe operating condition of work equipment can be detected and eliminated in good time.

The intervals for recurring tests specified here are guidelines and based on experience. Shorter test intervals may have to be specified on the basis of the risk assessment; special operating conditions; or according to the manufacturer's specific instructions in the machine operating manual. Longer test intervals may also be specified, provided that this is justifiable and tenable from a safety point of view. The determination of the test intervals should be documented.

<b>Type of test</b>	<b>Recommended test intervals</b>
Visual inspection	Before commissioning the system
Functional test	Annually with previous visual inspection

### **Persons qualified to test hose lines**

A qualified person is a person who, through his or her professional training, professional experience and recent professional activity, has the necessary specialist knowledge required for testing work equipment - in this case for testing hose lines.

These requirements are defined in the Technical Rules for Industrial Safety TRBS 1203

"Qualified persons - general requirements" fulfilled if:

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

The qualified person is not subject to any technical instruction during the course of his or her testing activity and must not be disadvantaged because of this.

Experts who have carried out tests on the hose lines up to now and who meet the three criteria mentioned above and who have familiarized themselves with the contents of the German Ordinance on Industrial Safety and Health and the changes associated with it are also considered qualified persons to whom the tests can continue to be assigned.

See also:

- ⇒ § 2 para. 7 of the German Ordinance on Industrial Safety and Health,
- ⇒ Technical Rules for Operational Safety TRBS 1203.



### **Replacing hose lines**

As a general rule, even when stored properly and subjected to permissible stress during use, all hose lines are subject to natural aging, which changes the material and composite properties and reduces the performance of the hose lines.

This limits the service life of a hose line and the operator must ensure that hose lines are replaced at appropriate intervals.

### **Immediate replacement of hose lines**

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

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



## SERVICE LIFE

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### **Service life of L&W high pressure hoses**

When determining the service life or the replacement interval of the individual hose lines, the concrete specifications and recommendations of the hose line or machine manufacturer must be observed. Furthermore, empirical values resulting from previous tests done under the prevailing operating conditions on site are also relevant.

Guideline values for recommended replacement intervals of hose lines which have proven themselves in practice are summarized below.

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

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

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

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

It must be ensured that the prolongation of the replacement intervals does not result in a dangerous situation that could injure employees or other persons.

If hose lines fail during operation or if damage or defects are frequently detected during the recurring tests, then, in addition to investigating the causes, the test and replacement intervals must be shortened.



## STORAGE

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### **Storing hose lines**

When storing hose lines, storage conditions must be aimed at minimizing the natural aging that occurs over time and the associated change in material and composite properties.

For this purpose, the following information must be provided:

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

The most favorable storage conditions are temperatures between +15 °C and +25 °C, as well as a relative humidity below 65 %.

During storage, hose lines must not come into contact with substances that could cause damage, e.g. acids, alkalis, solvents. Penetration of ozone or other harmful air constituents can be prevented by sealing the ends or by wrapping the hoses in plastic film. They must be stored flat and free of tension.

The storage period for hose lines should not exceed two years.





# ANNEX

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

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

Note:

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



## ANNEX SCOPE OF TESTING; TEST CRITERIA

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

Note:

Visual inspection must be carried out before the functional test

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

Note:

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