Operating Instructions

Cascade Filling Panels

1-fold

2-fold

3-fold

4-fold

Illustration 3-fold Caskade

Version: 14.08.2025

Product 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 product 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.

Manufacturer in terms of 2014/68/EU

The full name and address of the manufacturer is:

Lenhardt & Wagner GmbH

An der Tuchbleiche 39
68623 Hüttenfeld / Germany

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

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

CE

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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.

Description of marks and warning signs

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

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

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

Note
Indicates additional information on how to use the unit.

Scope of Delivery

For overflow in stages from the storage cylinders via the filling panel or directly to the application. Thus, the gas storage in the storage cylinders can be used more effectively. This makes it possible to fill many more bottles to the final pressure until the compressor system has to be started.
The cascade filling bar is installed upstream of the filling panel as a manual control unit for 1, 2, 3 and 4 stage filling.

Die Kaskadenfüllleiste wird der Füllleiste als manuelle Steuereinheit vorgeschaltet für 1, 2, 3 und 4 stufiges Abfüllen.

Specifications

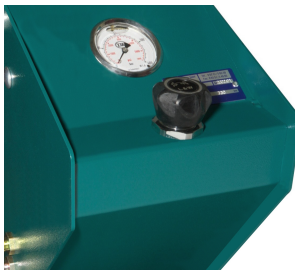
- Powder coated (RAL 6026)
- 1-, 2-, 3- or 4-stages
- Inlet, valve and pressure gauge for each stage
- Inlet of the compressor
- Outlet to the filling panel
- Fully piped

Options

- TÜV approval possible

Technical Data

Order no	No of stages	W x D x H [mm]	Gewicht [kg]
002957	1	210 x 230 x 330	6,5
002935	2	390 x 230 x 330	10
002329	3	580 x 230 x 330	13
002816	4	780 x 230 x 330	16



1-stage cascade filling panel

A cylinder bundle (or a storage cylinder) can be connected here. The length of the cascade filling panel is: 210mm.

2-stage cascade filling panel

Two cylinder bundles (or two storage cylinders) can be connected here. The length of the cascade filling panel is: 390mm.

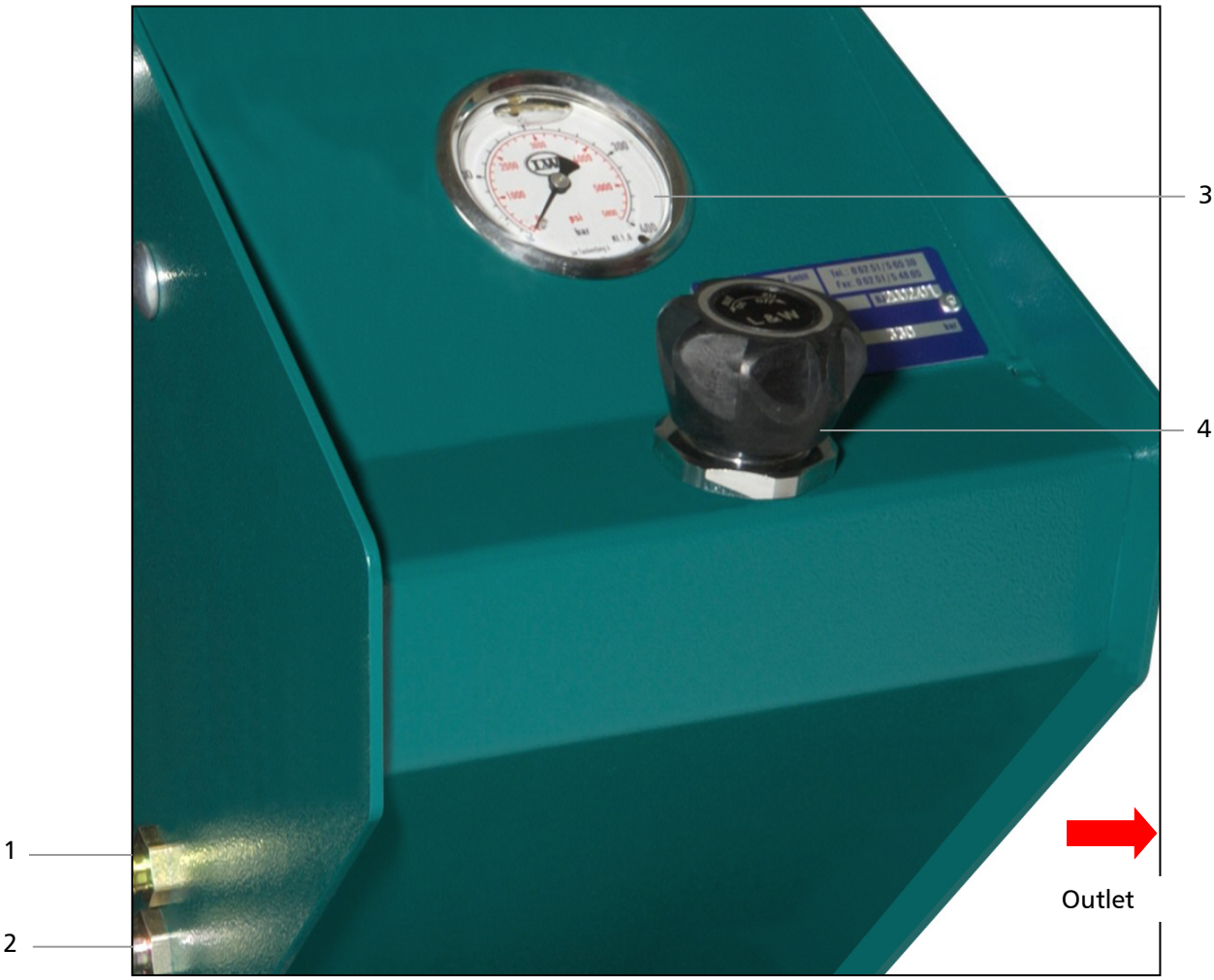
3-stage cascade filling panel

Three cylinder bundles (or three storage cylinders) can be connected here. The length of the cascade filling panel is: 580mm.

4-stage cascade filling panel

Four cylinder bundles (or four storage cylinders) can be connected here. The length of the cascade filling panel is: 780mm.

Unit Assemlby (1-stage cascade filling panel)



No	Designation
1	Storage Inlet 8L
2	Compressor Inlet 8L
3	Filling Pressure Gauge
4	Hand Wheel Valve

Unit Assembly (2-stage cascade filling panel)

No	Designation
1	1st Storage Inlet 8L
2	2nd Storage Inlet 8L
3	Compressor Inlet 8L
4	Filling Pressure Gauge
5	Hand Wheel Valve

Unit Assembly (3-stage cascade filling panel)

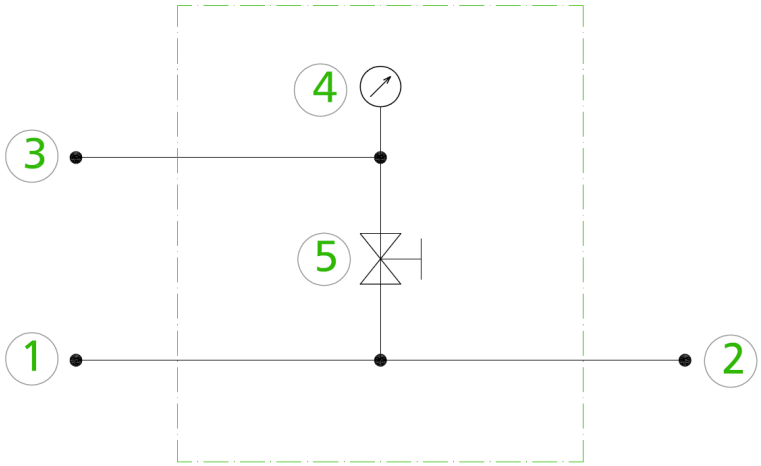
No	Designation
1	1st Storage Inlet 8L
2	2nd Storage Inlet 8L
3	3rd Storage Inlet 8L
4	Compressor Inlet 8L
5	Filling Pressure Gauge
6	Hand Wheel Valve

Unit Assembly (4-stage cascade filling panel)

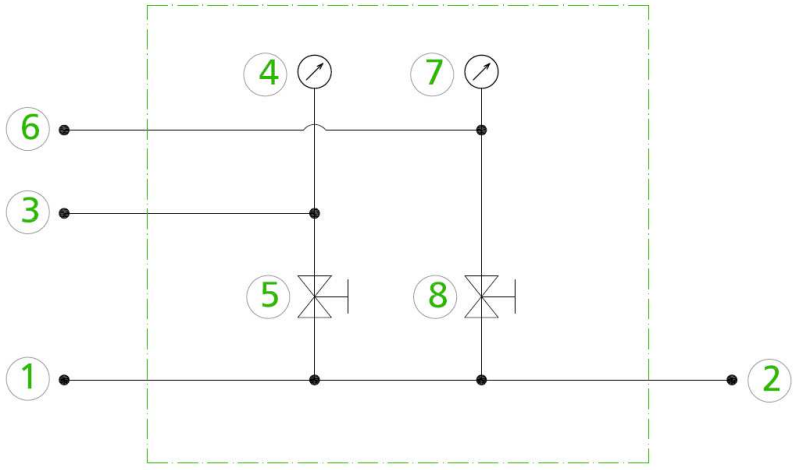
No	Designation
1	1st Storage Inlet 8L
2	2nd Storage Inlet 8L
3	3rd Storage Inlet 8L
4	4th Storage Inlet 8L
5	Compressor Inlet 8L
6	Filling Pressure Gauge
7	Hand Wheel Valve

Flow Charts

1-stage cascade filling panel:



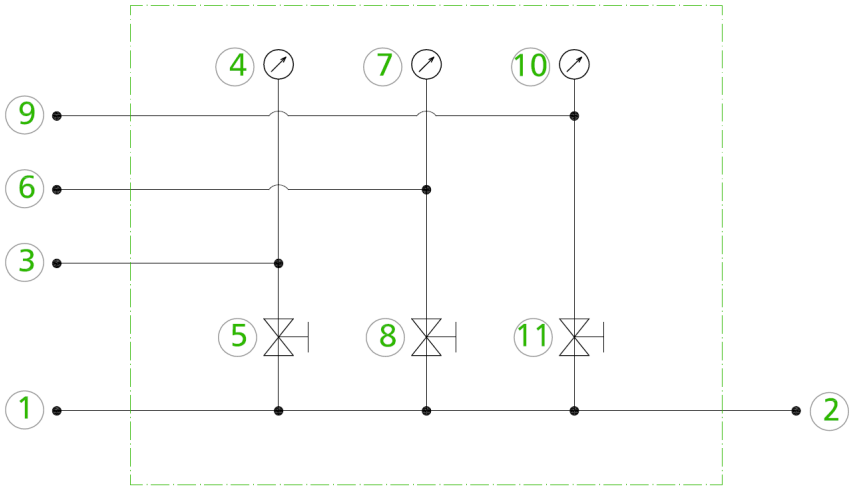
2-stage cascade filling panel:



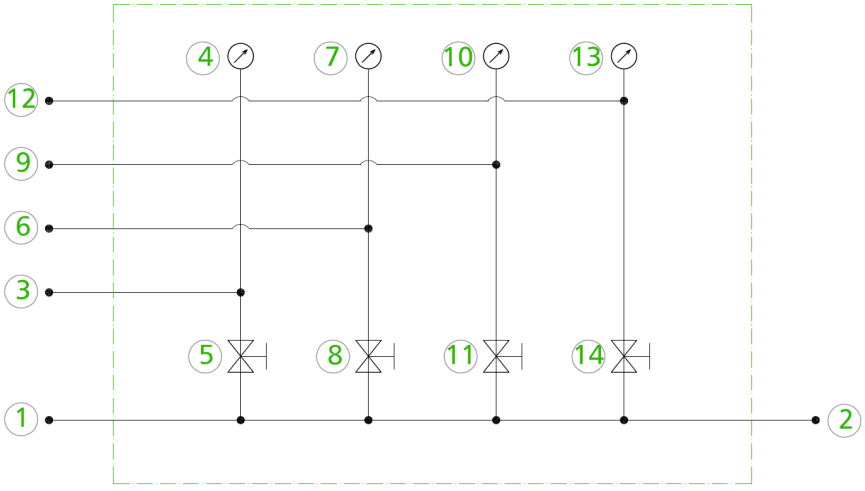
1. Compressor Inlet (8L)
2. Outlet (8L)
3. 1st Storage Inlet (8L)
4. Pressure Gauge 1st Storage Inlet (8L)
5. Hand Wheel Valve 1st Storage Inlet
6. 2nd Storage Inlet (8L)
7. Pressure Gauge 2nd Storage Inlet (8L)
8. Hand Wheel Valve 2nd Storage Inlet

Fließdiagramme

3-stage cascade filling panel:



4-stage cascade filling panel:



1. Compressor Inlet (8L)
2. Outlet (8L)
3. 1st Storage Inlet (8L)
4. Pressure Gauge 1st Storage Inlet (8L)
5. Hand Wheel Valve 1st Storage Inlet
6. 2nd Storage Inlet (8L)
7. Pressure Gauge 2nd Storage Inlet (8L)
8. Hand Wheel Valve 2nd Storage Inlet
9. 3rd Storage Inlet (8L)
10. Pressure Gauge 3rd Storage Inlet (8L)
11. Hand Wheel Valve 3rd Storage Inlet
12. 4th Storage Inlet (8L)
13. Pressure Gauge 4th Storage Inlet (8L)
14. Hand Wheel Valve 4th Storage Inlet

SAFETY PRECAUTIONS

Intended Use

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

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

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

Operators

Target groups in these instructions;

Operators

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

Qualified personnel

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

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

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

General Safety Precautions

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

Unit customised safety notices

Organisational measures

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

Safety instructions operation

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

Maintenance instructions

- Hoses have to be checked by the operator (pressure and visual inspection) at reasonable intervals, even if no safety-related defects have been detected.
- Immediately repair any damage. Escaping compressed air can cause injury.
- Depressurise system and pressure lines before beginning repair work.
- Pressurised air lines must be laid and mounted by qualified personnel. Connections must not be mixed up. Fittings, length and quality of the piping must correspond to requirements.
- Adjustment, maintenance and inspection activities and keep appointments, including information on replacement parts / equipment, prescribed in the operating instructions have to be respected.
- 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.
- 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.
- Only personnel with particular knowledge and experience with pneumatics may carry out work on pneumatic equipment.
- Only personnel with particular knowledge and experience in gas equipment may carry out work on gas equipment.

Transportation instructions

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

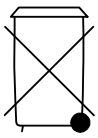
Safety regulations

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

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.

OPERATION

Important operation instructions

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

Prior to first commissioning, observe the following:

- Check all connections and retighten if necessary.
- Check that the hand wheel valves open properly.
- Check that the hand wheel valves close properly.
- Leak test of the cascade management panel.

Before daily commissioning, please note the following:

- No daily checks are necessary!

Operation

To gradually overflow, proceed as follows:

- Make sure the storage tank valves are open.
- Use the pressure gauges to locate the storage tank with the lowest pressure (Fig. 1).
- Open the rotary valve by turning the black handwheel (Fig. 2).
- The overflow begins.

  (If the stored pressure is not sufficient, open the rotary valve with the next highest pressure.)

  ATTENTION: Only possible with 2-way, 3-way and 4-way cascade filling strip!
- After the overflow process is completed, the hand wheel valve must be closed.
- If necessary, close the valves on the storage bottles.

The gradual overflow is now complete.

Fig. 1 - Hand wheel valve and pressure gauge

Fig. 2 - Black hand wheel

Hand wheel valve

Open the hand wheel valve:

- Turn the black handwheel counterclockwise.

Close the hand wheel valve:

- Turn the black handwheel clockwise.

Maintenance intervals

Maintenance of the rotary valves is not required. In case of leaks, it is possible to order new rotary valves or spare parts. The order numbers of the hand wheel valves or the corresponding spare parts can be found in the Maintenance and Servicing chapter.

MAINTENANCE AND SERVICE

Service, Repair and Maintenance

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

Only use authentic spare parts for service work.

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

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

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

Daily before commissioning

Maintenance work	Type	Quantity	Order No.
No daily checks are necessary!	-	-	-

Every 6 month

Maintenance work	Type	Quantity	Order No.
Check all connections and retighten if necessary	-	-	-
Check that the hand wheel valves open properly	-	-	-
Check that the hand wheel valves close properly	-	-	-
Leak test of the cascade management panel			

Spin valve

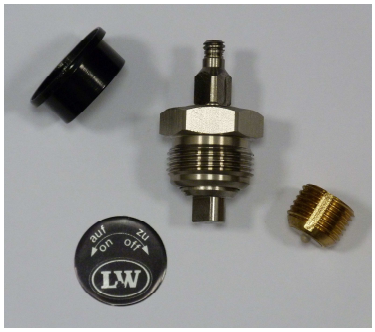
The rotary valve is maintenance-free.
Spare parts are in stock at L&W and can be reordered at any time.

Best.-Nr. / Order No.	Benennung / Description
001477	Complete unit

Rubber hand wheel

Best.-Nr. / Order No.	Benennung / Description
006748	Complete unit
Beinhaltet / Contains:	
-	Rubber handwheel
002389	Cap for spin valve
005010	Sticker for rubber handwheel

Upper part assemly & spindle



Best.-Nr. / Order No.	Benennung / Description
012945	Complete unit
Beinhaltet / Contains:	
-	Upper part assembly
-	Spindle
002389	Cap for spin valve
005010	Sticker for rubber handwheel

MAINTENANCE RECORDS

Introduction form for the Operator

No.	Surname, Name	Date	Place	Signature	Instructor

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

Maintemance Work

Description	Date, signature

Replaced Parts

Designation	Part number	Date, signature

STORAGE

Conservation / storage of the unit

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:

- Store the unit in a dry and dust-free place (the use of a tarpaulin is only recommended if the system is to be protected from condensation during storage).

De-conservation, commissioning

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

- Free pressure lines from external contamination .
- Check all connections and retighten if necessary.
- Check that the hand wheel valves open properly.
- Check that the hand wheel valves close properly.
- Leak test of the cascade management panel.

SPARE PARTS LISTS / DETAILED VIEWS

Verschraubungen und Manometer / Connections & pressure gauge

Best.-Nr. / Order No.	Benennung	Description
000662	Manometer 0-400 bar	Pressure Gauge 0-400 bar
000765	Schneidring PSR 08 LX	Olive Seal PSR 08 LX
000766	Mutter M08LCFX	Nut M08LCFX
000899	Schottverschraubung 8L	Bulkhead Fitting 8L

Verschraubungen und Manometer / Connections & Pressure Gauges

A	
Mutter 8L / Nut 8L	000766
Schneidring / Olive seal	000765

Drehventil / Hand Wheel Valve

Best.-Nr. / Order No.	Benennung	Description
001477	Komplette Einheit	Complete Unit

Gummihandrad / Rubber handwheel

Best.-Nr. / Order No.	Benennung	Description
006748	Komplette Einheit	Complete Unit
	Beinhaltet:	Consists of:
-	Gummihandrad	Rubber handwheel
002389	Obere Abdeckkappe	Upper Cap
005010	Aufkleber für Kappe Drehventil	Sticker for Hand Wheel Valve

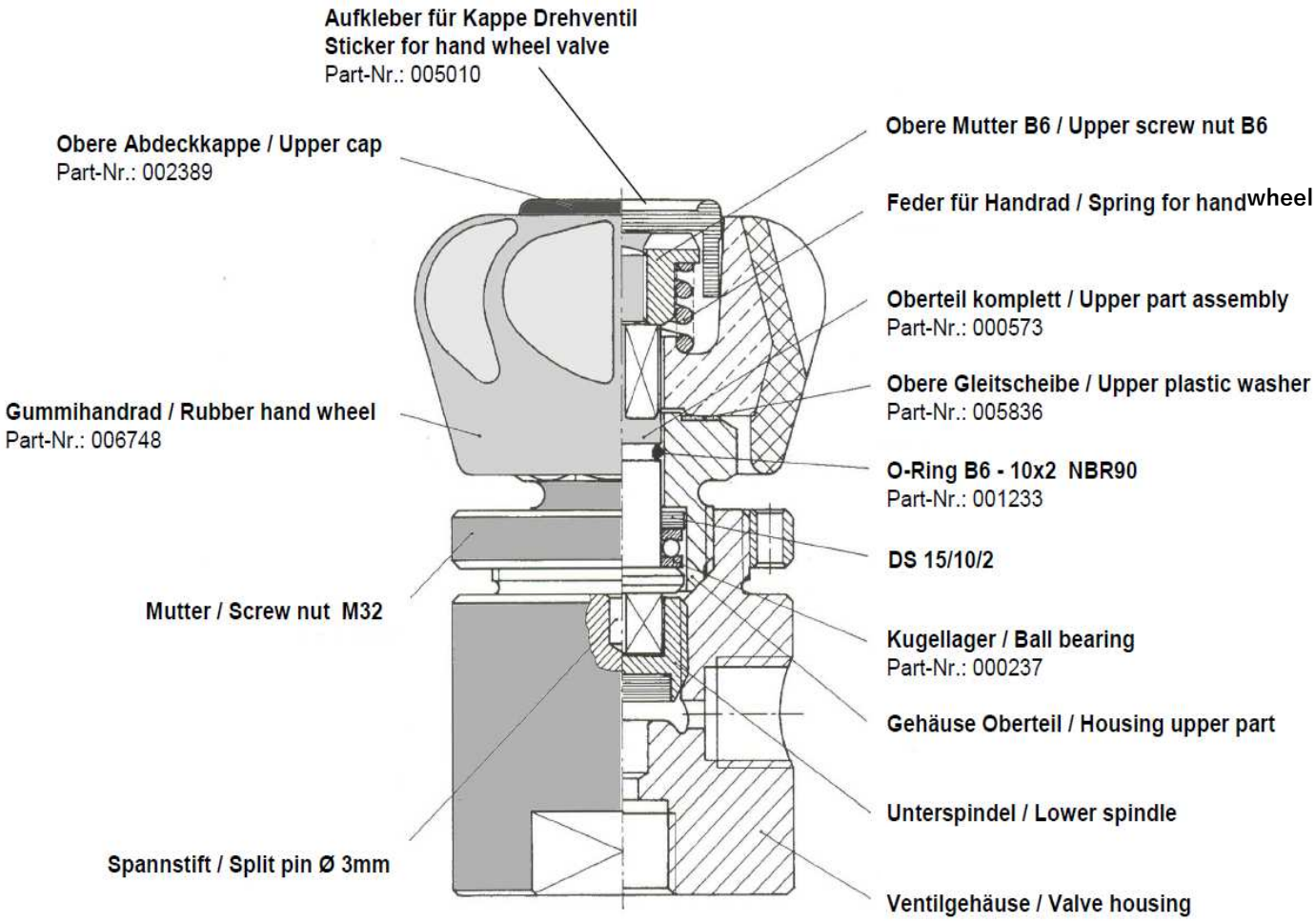
Oberteil mit Spindel / Upper part assembly & spindle

Best.-Nr. / Order No.	Benennung	Description
012945	Komplette Einheit	Complete Unit
	Beinhaltet:	Consists of:
-	Gehäuse Oberteil	Housing Upper Part
-	Spindel	Upper Cap
002389	Obere Abdeckkappe	Upper Cap
005010	Aufkleber für Kappe Drehventil	Sticker for Hand Wheel Valve
000237	Kugellager	Ball Bearing

Weitere Ersatzteile / Additional spare parts

Best.-Nr. / Order No.	Benennung	Description
000237	Kugellager	Ball Bearing
001233	O-Ring 10 x 2 NBR90	O-ring 10 x 2 NBR90
005836	Obere Gleitscheibe	Upper plastic washer

Drehventil / Hand Wheel Valve



Best.-Nr. / Order No.	Benennung	Description
001477	Komplette Einheit	Complete Unit

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

Testing hose lines

Ein 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 annex.

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

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

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

Persons qualified to test hose lines

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

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

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

See also:

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

⇒ Technical Rules for Operational Safety TRBS 1203.

Replacing hose lines

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

Immediate replacement of hose lines

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

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

Service life of L&W high pressure hoses

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

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

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

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

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

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

Storing hose lines

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

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

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

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

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

Note:

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

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

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

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

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