

Operating Instructions

Nitrox Trimix Classic

Nitrox Trimix Pro





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GENERAL INFORMATION

General Information

We strongly recommend to read this manual thoroughly prior to operation and follow all 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.



DESCRIPTION

Gas blending panel Nitrox Trimix Classic / Nitrox Trimix Pro

Using the partial pressure method, Nitrox and/or Trimix can be mixed and filled safely, easily and accurately using our Pro or Classic filling panels. The panels are tested and certified for 100% oxygen and/or helium mixing for all your breathing gas requirements. Practical valve and gauge layout makes operation easy to learn and use.

For pure oxygen compatible air (OCA), we recommend using the Puracon air controller and/or an extra filter mounted on the panel.

Wall mounted panels for safe and easy partial pressure gas blending. All gas inlets are fitted with isolation valves, non return valves and flow restrictors. The oxygen/helium gas pressure can be read on individual pressure gauges without the need to open the valves which makes efficient gas cascading quick and simple. The design of the panels has been approved by the stringent German TÜV authorities as suitable for use in Nitrox, Trimix and Heliox applications.

The Panels have a removable rear cover which makes wall mounting very simple and are powder coated in RAL 6026. All the pipework and the connections are stainless steel providing years of trouble free service and safe gas flow. The valves are industrial quality.



Risk of explosion

All parts that come into contact with Nitrox must be clean and free of oil and grease. Open fire or smoking in the vicinity of the filling station is strictly prohibited. Always follow the same safety precautions as when handling oxygen.

Specifications Nitrox Trimix Classic

- 2 inlets for oxygen/helium with pressure gauges, 6 mm pipe connections
- 1 inlet for OCA, 8 mm pipe connection
- 1 outlet for vented gas, 6 mm pipe connection
- Main pressure gauge Ø 160 mm class 1.0, 0-250 bar
- Integrated socket for oxygen sensor (O2 meter not included)
- Gas for analysis is reduced in pressure
- 1 filling hose with cylinder connection of your choice
- Up to 3 extra filling hoses can be fitted

Options

Nitrox Trimix Classic / Nitrox Trimix Pro
Stainless Steel Console



DESCRIPTION

Specifications Nitrox Trimix Classic

- 3 inlets for oxygen/helium with pressure gauges, 6 mm pipe connection
- Alpha 1 Oxygen Analyzer
- 1 inlet for OCA with pressure gauge, 8 mm pipe connection
- 1 outlet for vented gas, 6 mm pipe connection
- Main pressure gauge Ø 160 mm class 1.0, 0-250 bar in 2 bar increments
- Alpha 1 oxygen analyser
- 1 filling hose with cylinder connection of your choice
- Up to 2 extra filling hoses can be fitted

Options

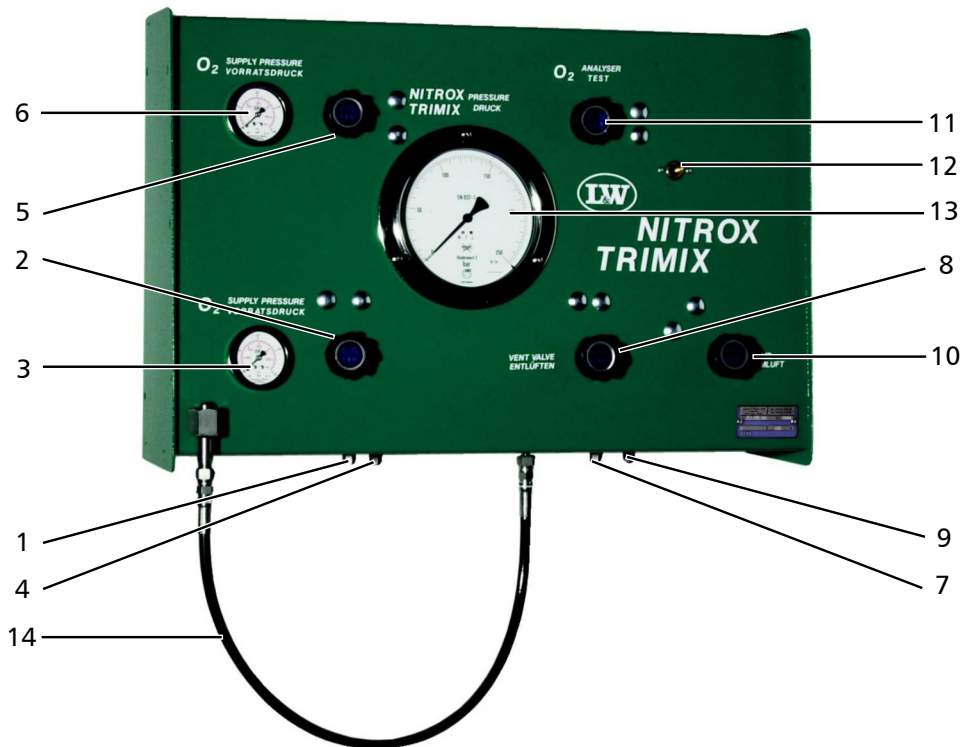
- Inlet purification filter
- Alpha 1 analyser (for Nitrox Classic Panel)
- Additional filling hose(s)
- Helium/Oxygen analyser
- Helium/Sauerstoff Analysegerät

Technical data

	W x D x H [mm]	Weight [kg]	Max. Intake Pressure OCA [bar]	Max. Intake Pressure O ₂ /He [bar]
Nitrox Trimix Classic	710 x 480 x 220	29	200	200
Nitrox Trimix Pro	810 x 580 x 220	38	200	200

DESCRIPTION

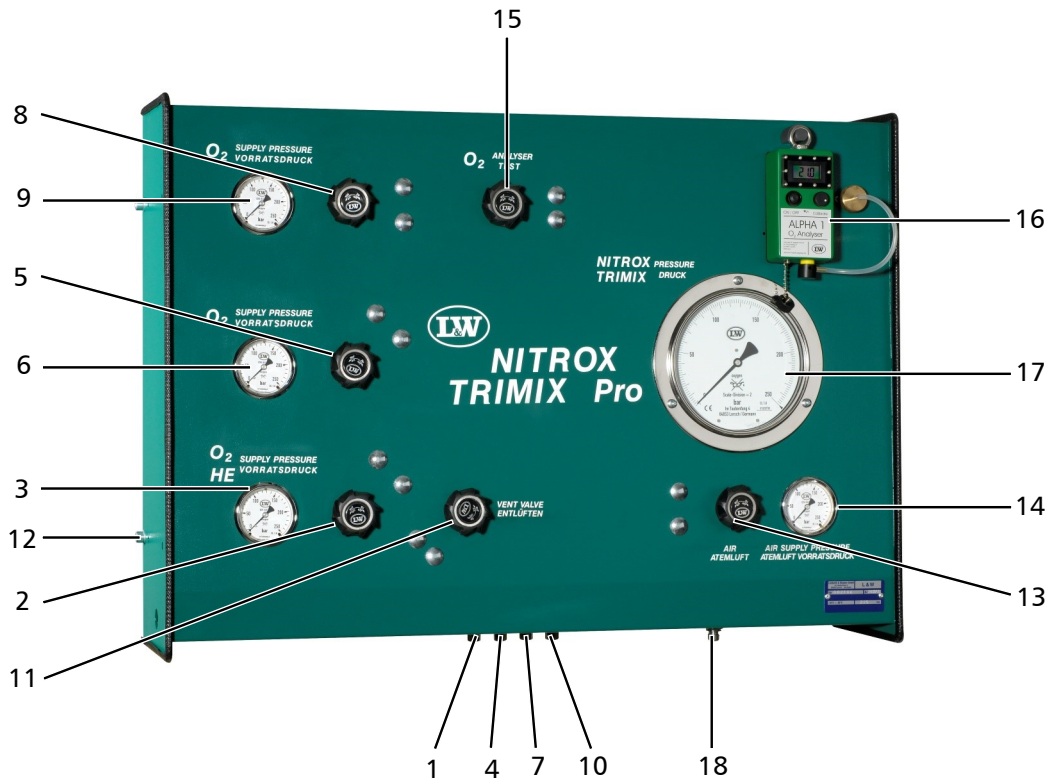
Unit Assembly Nitrox Trimix Classic



No.	Designation	No.	Designation
1	Connection O ₂ /He storage 1	11	Shut off valve Oxygen analyser
2	Shut off valve storage 1	12	Connection Oxygen analyser
3	Pressure gauge storage 1 (0 < 250 bar)	13	Pressure gauge storage 2 (0 < 250 bar)
4	Connection O ₂ /He storage 2	14	HP-Filling hose
5	Shut off valve storage 2		
6	Pressure gauge storage 2 (0 < 250 bar)		
7	Connection ventilation line		
8	Shut off valve ventilation line		
9	Connection storage breathing air /		
10	Shut off valve storage breathing air / compressor		

DESCRIPTION

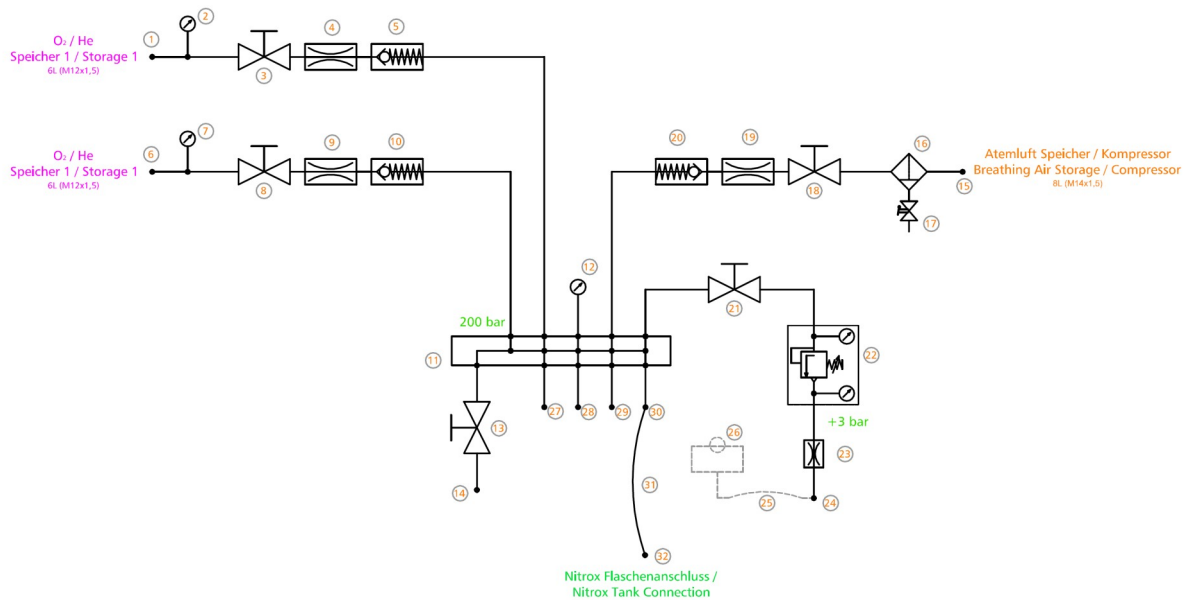
Unit Assembly Nitrox Trimix Pro



No.	Designation	No.	Designation
1	Connection O ₂ /He storage 1	11	Shut off valve ventilation line
2	Shut off valve storage 1	12	Connection storage breathing air / compressor
3	Pressure gauge storage 1 (0 < 250 bar)	13	Shut off valve storage breathing air / compressor
4	Connection O ₂ /He storage 2	14	Pressure gauge breathing air / compressor (0 < 250 bar)
5	Shut off valve storage 2	15	Shut off valve Oxygen analyser
6	Pressure gauge storage 2 (0 < 250 bar)	16	Oxygen analyser
7	Connection O ₂ storage 3	17	Pressure gauge (0 < 250 bar)
8	Shut off valve storage 2	18	Connection HP-filling hose
9	Pressure gauge storage 3 (0 < 250 bar)		
10	Connection ventilation line		

GENERAL INFORMATION

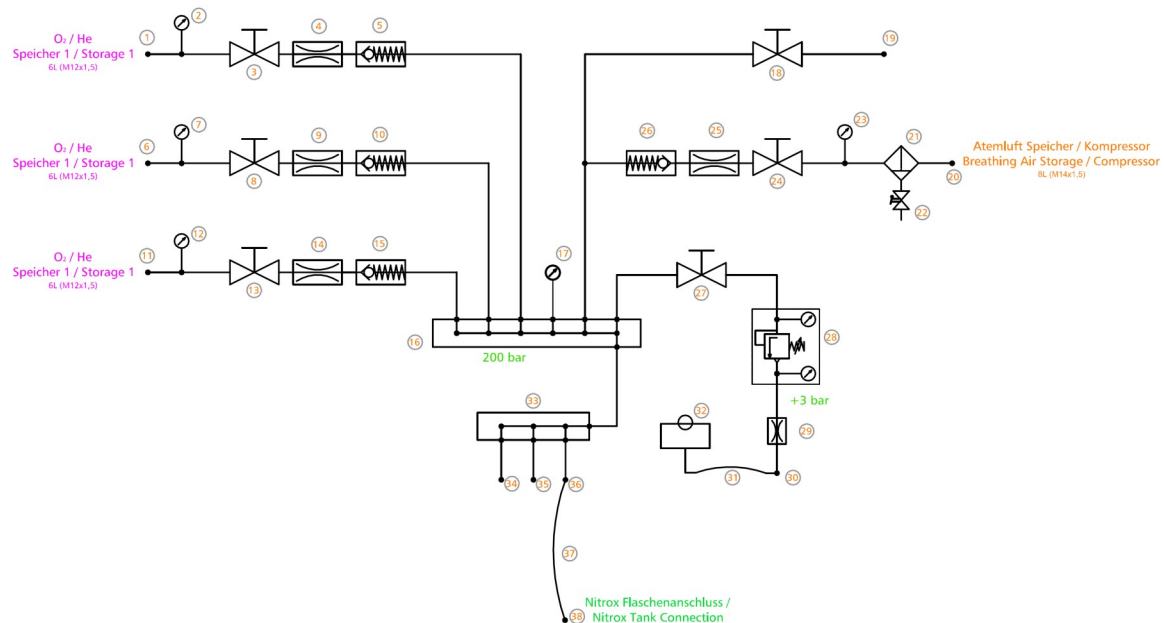
Flow Chart Nitrox Trimix Classic



- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Anschluss O₂/He Speicher 1 (G1/4") / O₂/He HP-Inlet Connection Storage 1 (G1/4" female) 2. Manometer (0-250bar) / Pressure Gauge (0-250bar) 3. Absperrventil / Shut Off Valve 4. Durchflussregulierung / Flow regulation 5. Rückschlagventil / Non Return Valve 6. Anschluss O₂/He Speicher 2 (G1/4") / O₂/He HP-Inlet Connection Storage 2 (G1/4" female) 7. Manometer (0-250bar) / Pressure Gauge (0-250bar) 8. Absperrventil / Shut Off Valve 9. Durchflussregulierung / Flow Regulation 10. Rückschlagventil / Non Return Valve 11. Verteilerblock / Distribution Block 12. Manometer (0-250bar) / Pressure Gauge (0-250bar) 13. Absperrventil / Shut Off Valve 14. Anschluss Entlüftungsleitung (6L - M12x1,5) / Connection Ventilation Line (6L M12x1,4) 15. Anschluss Speicher / Kompressor (8L - M14x1,5) / Inlet Connection Storage / Kompressor (8L - M14x1,5) 16. Filterbehälter 1,7/2,3l (Option) / Filter Housing 1.7/2.3l (Option) 17. Kondensatablassventil (Option) / Condensate Release Hose (Option) | <ol style="list-style-type: none"> 18. Absperrventil / Shut Off Valve 19. Durchflussregulierung / Flow Regulation 20. Rückschlagventil / Non Return Valve 21. Absperrventil / Shut Off Valve 22. Flaschendruckminderer / Cylinder Pressure Reducer 23. Durchflussregulierung / Flow Regulation 24. Anschluss Sauerstoffanalysegerät / Connection Oxygen Analyzer 25. Anschlussschlauch Sauerstoffanalysegerät (Option) / Connection Hose Oxygen Analyzer (Option) 26. Sauerstoffanalysegerät (Option) / Oxygen Analyzer (Option) 27. Anschluss G1/4" (zusätzlicher Füllanschluss) / Connection G1/4" (Additional Filling Connection) 28. Anschluss G1/4" (zusätzlicher Füllanschluss) / Connection G1/4" (Additional Filling Connection) 29. Anschluss G1/4" (zusätzlicher Füllanschluss) / Connection G1/4" (Additional Filling Connection) 30. Anschluss G1/4" Füllanschluss / Connection G1/4" Filling Connection 31. HD-Füllschlauch / HD-Filling Connection 32. Nitrox Flaschenanschluss (je nach Kundenwunsch) / Nitrox Tank Connection (According to Customer Requirements) |
|---|---|

GENERAL INFORMATION

Flow Chart Nitrox Trimix Pro



- | | |
|---|---|
| 1. Anschluss O ₂ /He Speicher 1 (G1/4") / O ₂ /He HP-Inlet Connection Storage 1 (G1/4" female) | 21. Filterbehälter 1,7l/2,3l (Option) / Filter Housing 1.7l/2.3l (Option) |
| 2. Manometer (0-250bar) / Pressure Gauge (0-250bar) | 22. Kondensatablassventil (Option) / Condensate Release Hose (Option) |
| 3. Absperrventil / Shut Off Valve | 23. Manometer (0-250bar) / Pressure Gauge (0-250bar) |
| 4. Durchflussregulierung / Flow regulation | 24. Absperrventil / Shut Off Valve |
| 5. Rückschlagventil / Non Return Valve | 25. Durchflussregulierung / Flow Regulation |
| 6. Anschluss O ₂ /He Speicher 2 (G1/4") / O ₂ /He HP-Inlet Connection Storage 2 (G1/4" female) | 26. Rückschlagventil / Non Return Valve |
| 7. Manometer (0-250bar) / Pressure Gauge (0-250bar) | 27. Absperrventil / Shut Off Valve |
| 8. Absperrventil / Shut Off Valve | 28. Flaschendruckminderer / Cylinder Pressure Reducer |
| 9. Durchflussregulierung / Flow regulation | 29. Durchflussregulierung / Flow Regulation |
| 10. Rückschlagventil / Non Return Valve | 30. Anschluss Sauerstoffanalysegerät / Connection Oxygen Analyzer |
| 11. Anschluss O ₂ /He Speicher 3 (G1/4") / O ₂ /He HP-Inlet Connection Storage 3 (G1/4" female) | 31. Anschlussschlauch Sauerstoffanalysegerät / Connection Hose Oxygen Analyzer |
| 12. Manometer (0-250bar) / Pressure Gauge (0-250bar) | 32. Sauerstoffanalysegerät / Oxygen Analyzer |
| 13. Absperrventil / Shut Off Valve | 33. Verteilerblock / Distribution Block |
| 14. Durchflussregulierung / Flow regulation | 34. Anschluss G1/4" (zusätzlicher Füllanschluss) / Connection G1/4" (Additional Filling Connection) |
| 15. Rückschlagventil / Non Return Valve | 35. Anschluss G1/4" (zusätzlicher Füllanschluss) / Connection G1/4" (Additional Filling Connection) |
| 16. Verteilerblock / Distribution Block | 36. Anschluss G1/4" Füllanschluss / Connection G1/4" Filling Connection |
| 17. Manometer (0-250bar) / Pressure Gauge (0-250bar) | 37. HD-Füllschlauch / HD-Filling Hose |
| 18. Absperrventil / Shut Off Valve | 38. Nitrox Flaschenanschluss (je nach Kundenwunsch) / Nitrox Tank Connection (According to Customer Requirements) |
| 19. Anschluss Entlüftungsleitung (6L - M12x1,5) / Connection Ventilation Line (6L M12x1,4) | |
| 20. Anschluss Speicher / Kompressor (8L - M14x1,5) / Inlet Connection Storage / Kompressor (8L - M14x1,5) | |



SAFETY PRECAUTIONS



SAFETY PRECAUTIONS

Intended Use

Only use this unit when 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:

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.



Risk of explosion

All parts that come into contact with Nitrox must be clean and free of oil and grease. Open fire or smoking in the vicinity of the filling station is strictly prohibited. Always follow the same safety precautions as when handling oxygen.



SAFETY PRECAUTIONS

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.



Risk of explosion

All parts that come into contact with Nitrox must be clean and free of oil and grease. Open fire or smoking in the vicinity of the filling station is strictly prohibited. Always follow the same safety precautions as when handling oxygen.



SAFETY PRECAUTIONS

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 and check readability and completeness.

Safety Instruction Operation

- Take measures to ensure that the machine is only taken into operation under safe and functional conditions. Only operate the unit if all protective and safety equipment, e.g. detachable protective equipment, are provided and in good working order.
- Check the unit 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, lock it. Repair malfunctions immediately.
- Ensure safe and environmentally friendly disposal of consumables and old parts.
- Wear required personal hearing protection.
- When handling fats, oils and other chemical agents, observe the safety regulations applicable to the product.



SAFETY PRECAUTIONS

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.
- 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.
- 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.



SAFETY PRECAUTIONS

Transportation Instructions

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

Safety Regulations

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



INSTALLATION

INSTALLATION

Installation in closed rooms

The fill bar should be placed in a favorable position to the HP compressor, HP storage line and fill station. The panel must be mounted using sturdy wall brackets, the panel is ideally mounted at a height that will put the oxygen analyzer at eye level and allow easy access to the flow control valve and analyzer (must be removed daily for calibration).



Note

Please note that the local regulations for filling Nitrox / Trimix systems are adhered to.



Risk of explosion

All parts that come into contact with Nitrox must be clean and free of oil and grease. Open fire or smoking in the vicinity of the filling station is strictly prohibited. Always follow the same safety precautions as when handling oxygen.

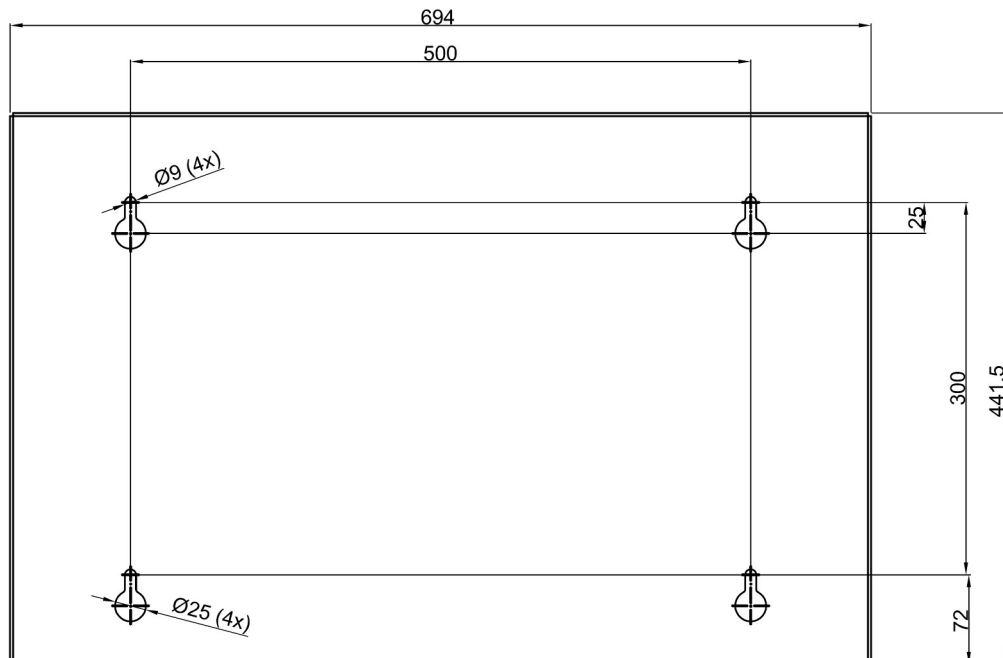
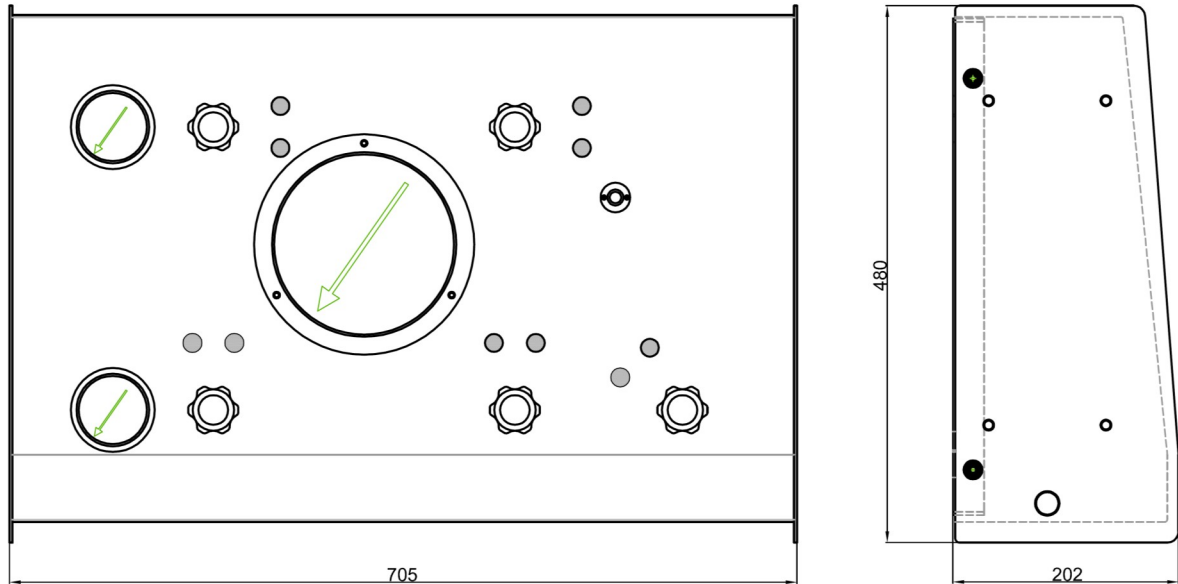


Danger

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

INSTALLATION

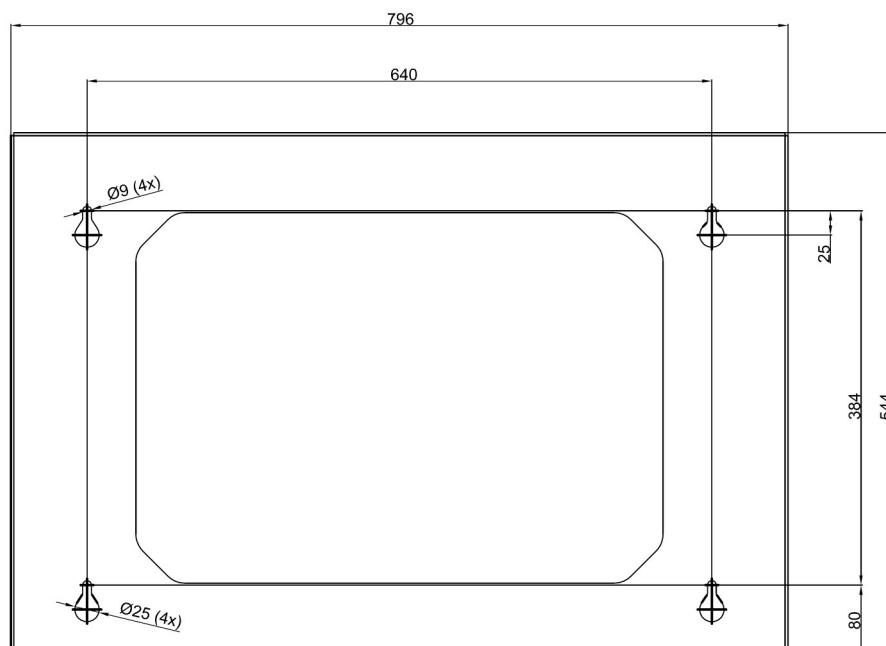
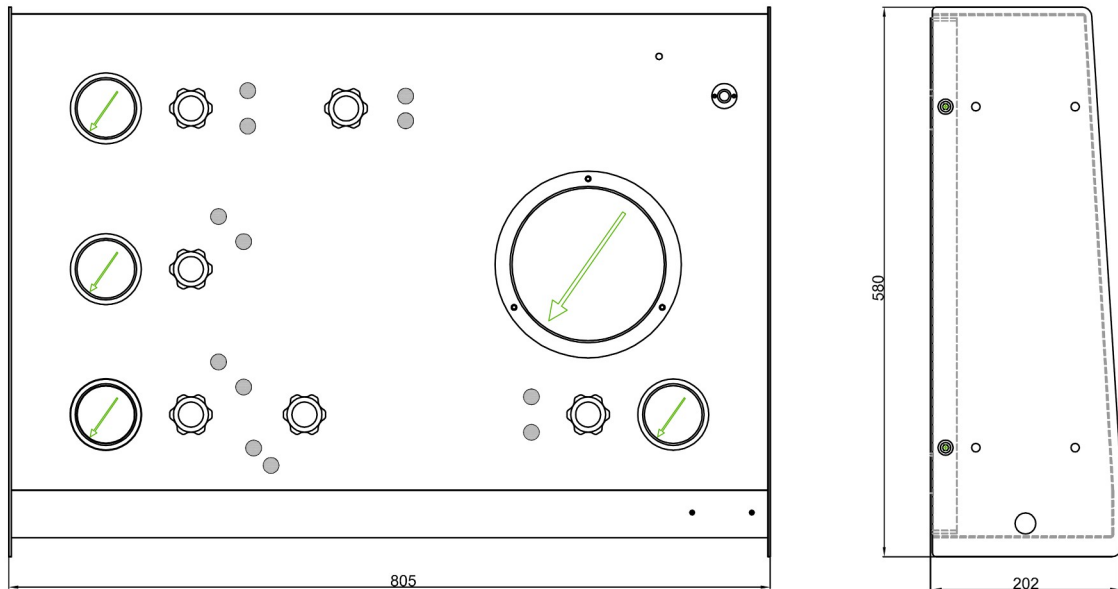
Dimensions Nitrox Trimix Classic



Attachment points Nitrox Trimix Classic

INSTALLATION

Dimensions Nitrox Trimix Pro



Attachment points Nitrox Trimix Pro



OPERATION

OPERATION

Important Operation Instructions



Note

Ensure that all persons handling the Mixmaster are familiar with safety regulations and operation of the unit.



Risk of explosion

All parts that come into contact with Nitrox must be clean and free of oil and grease. Open fire or smoking in the vicinity of the filling station is strictly prohibited. Always follow the same safety precautions as when handling oxygen.

Remarks:

The operator is responsible for both the condition of the filling equipment and the accuracy & quality of the mixtures.

OPERATION

Filling procedure of Nitrox cylinders



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

During filling the scuba tanks heat is being generated. Once the tank is filled up it starts cooling down. This results in a drop of filling pressure.
After completion of the filling process, the bottles need to be lying stored for 1-2 hours. This is to be ensure a homogeneous gas mixture. Then, the percentage of oxygen need to be checked by O2 analyzer.

- Close all valves of the panel
- Connect the filling hose to the Nitrox bottle
- Open the vent valve momentarily and flush piping of the filling rig. Then close the vent valve.
- Determine which mixture is present in the Nitrox bottle. For this purpose, open the analyzer test valve, wait until the meter sets a constant value, read the value and close test valve.
- Define the desired gas composition and calculate the mixing oxygen or compressed air quantities.
- Open the oxygen bottles. You can see the present pressure of the bottles in the two/three pressure gauges.
- You can see the pressure of the nitrox bottle in the biggest pressure gauge of the panel
- Start with filling by opening the oxygen valve. Please use the oxygen valve which has the next highest pressure in relation to the nitrox bottle. Let oxygen flow to the desired pressure. After this close the oxygen valve. When filling pressure is not sufficient, please open the next oxygen valve with the next higher pressure. After reaching the filling pressure close the oxygen valve. If necessary, please use the third bottle as described above.
- The remaining missing filling pressure need to be filled with breathing air. For this open the breathing air bottle or start the compressor. Once the breathing air pressure gauge indicates a higher pressure than the nitrox bottle (see larger gauge), open the breathing air valve and fill the nitrox bottle to the desired pressure ($P_{max} = 200 \text{ bar}$).
- Close breathing valve air. Close the nitrox bottle. Open the vent valve to reconnect the nitrox bottle.

OPERATION

Examination of the oxygen content of the mixed breathing gas

- Close all valves
- Turn on the analyzer
- Connect the filling hose to the nitrox bottle
- Open the nitrox bottle
- Open the vent valve momentarily and flush piping of the filling rig with compressed air.
- Then close the vent valve
- Open the analyzer test valve until the display of the oxygen analyzer is set in a constant value. You can read the value now.
- Close the analyzer test valve and nitrox bottle after the measurement.
- Open the vent valve and disconnect the nitrox bottle.

Calibration of oxygen analyzer

- a) The calibration should be checked every day and may have to be readjusted. We recommended it to perform the calibration with standard air. The display should stable show 20.9% oxygen.
- b) Procedure for verification:
 - Turn on the analyzer
 - Connect the filling hose to the nitrox bottle
(BUT DON ´T OPEN THE BOTTLE!)
 - Let flow the compressed air from buffer tank or compressor with help of the breathing air valve
 - Open the vent valve momentarily and flush piping of the filling rig with compressed air. Then close the vent valve.
 - Open the analyzer test valve until the display of the oxygen analyzer is set in a constant value
 - If there is a deviates (measured value of 20,9%), the analyzer must be readjusted.
 - Close the analyzer test valve and the breathing air valve after the calibration
 -
 - Messgerät einschalten
 - Nitroxflasche an den Füllschlauch anschließen, jedoch nicht öffnen
 - Pressluft aus Pufferflaschen oder Kompressor über das Atemluftventil einströmen lassen
 - Entlüftungsventil kurz öffnen und Rohrleitungen der Füllleiste mit Pressluft durchspülen. Anschließend Entlüftungsventil wieder schließen
 - Testventil öffnen bis sich an der Anzeige des Sauerstoff-Analysators ein konstanter Wert einstellt
 - Falls bei der Eichung mit Pressluft der Messwert von 20,9% abweicht muß nachjustiert werden
 - Nach der Eichung Testventil und Atemluft-Ventil schließen



MAINTENANCE AND SERVICE



MAINTENANCE AND SERVICE

Service, Repair and Maintenance

Carry out service and maintenance work only when the unit depressurised.

The unit should be leak-checked regularly.

Leaks can be preferably localised by using leak detector spray.

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

Only use original L&W 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 only when the unit is switched off and protected against unexpected restart.



MAINTENANCE AND SERVICE

Maintenance Overview

Maintenance Work	Interval	Qty.	Part. No.
Check pipes and connetions for air / gas leaks	Every 200 operating hours	-	-
Clean pressure lines from contaminations	Depending on contamination, at least once a year	-	-
Drain filter housing (Option)	Daily	-	-
Replace filter cartridge (Option)	When initial weight of active carbon filter cartridge has increased by more than 142 grams. (Initial weight is stated on the cartridge)	1	1.7 l: 000002 2.3 l: 000003
Clean filter housing and check for corrosion and damage (Option)	Every 1000 operating hours - by qualified person	-	-
Replace filter housing o-rings (Option)	Every 1000 operating hours	2	001287
Replace filter housing back-up rings (Option)	Every 1000 operating hours	2	001285

MAINTENANCE AND SERVICE

Function filter housing (Option)

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 cartridge

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

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.

Filter life

The filter life is very much influenced by the inlet temperature and the contamination of the medium to be filtered. The indicated values refer to +20°C and an oil and water amount when the system is running properly. The pressure maintaining valve must be adjusted to a minimum opening pressure of 170 (+/- 10) bar.

Total service life per filter housing at +20°C:

Typ	Each 1.7 ltr. [m ³]	Each 2.3 ltr. [m ³]	Each 10 ltr. [m ³]
Breathing air (mole carbon)	900	1200	8400
Drying (molecular sieve)	1200	1600	11200
Oil removal (activated-carbon)	3600	4800	33600

Filter change at least when breathing air residual water content > 25mg/m³!

We recommend using a moisture measuring device to control the saturation degree.



Nitrox Trimix Classic c/w Filter housing

MAINTENANCE AND SERVICE

Drain filter housing (Option)



Note

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



Warning

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

Filter housing drain as follows:

- Start with the left drain valve by opening max. 1.5 turns and let it remain open until no more condensate comes out.
- Close valve.
- Repeat procedure for the right drain valve.

Filter housing drain is now completed.

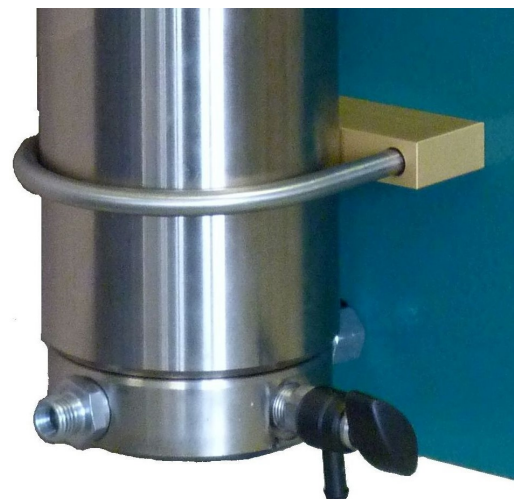
We recommend using a condensate tank to collect the complete condensate.

Maintenance intervals

Timing of the condensate drain interval mainly depends on the following facts:
water content of the medium, temperature and flow rate of the compressor unit.

When operating the condensate valve, make sure to open it slowly and - after the collected liquid has been drained - to close it again.

Always follow applicable national hazard and waste disposal regulations when disposing any condensate.



Drain valve

MAINTENANCE AND SERVICE

Filter cartridge change (Option)



Note

The filter cartridges are vacuum sealed with metal foil. Do not use filter cartridges when packaging is damaged. Observe the expiry date.

Filter cartridge change as follows:

- Run the compressor up to a pressure of 100 bar.
- Stop compressor.
- Open drain valves and depressurise housings completely.
- Unscrew filter housing cover by using the special filter tool (Fig. 1).
- Place the T-piece end of the filter tool in the recess of the filter cartridge (Fig. 2).
- Unscrew the filter cartridge anti-clockwise and pull the cartridge out of the housing (Fig. 3).
- Open the packaging of the new filter cartridge and place it with the filter tool in the filter housing.
- Screw the new filter cartridge hand tight in by using the filter tool.
- Grease thread and o-ring of the closing screw lightly with silicone grease.
- Screw the cover of the filter housing first manually in.
- After it has been completely screwed in, turn cover anticlockwise for 90°. This avoids tightening of the cover due to vibration.

The filter cartridge change is now completed.



Note

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



Fig. 1 - Unscrew the filter housing cover



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



Fig. 3 - Pull the cartridge out of the housing

MAINTENANCE AND SERVICE

Filter housing - maintenance (Option)



Note

Clean all parts thoroughly before assembly.

Filter housing maintenance as follows:

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

Dismount filter housing

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

Mount filter housing

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

The filter housing maintenance is now completed.

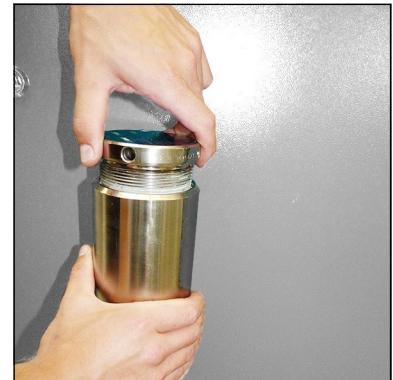


Fig. 1 - Open Filter cover

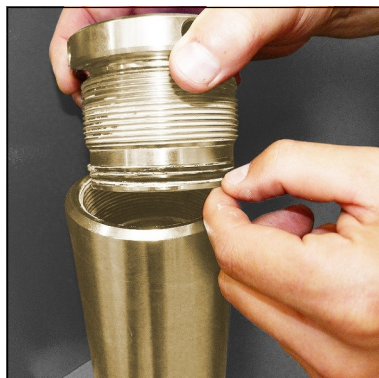


Fig. 2 - Change o-ring and back-up rings

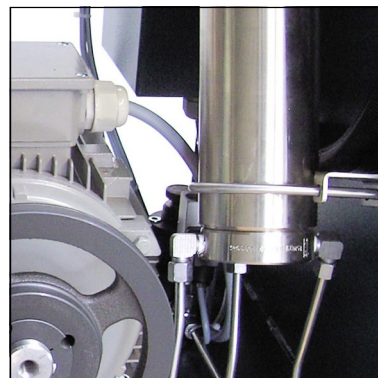


Fig. 3 - Loosen pipe connections and nuts



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

MAINTENANCE AND SERVICE

Test of pressure equipment (Option)

According to the Pressure Equipment Directive 2014/68/EU and TÜV Darmstadt (German supervising authorities).

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

Example: Filter housing 1.7 l

Maximum operating pressure: 350 bar

Content volume: 1.7 litres

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

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

Example: Filter housing 2.3 l

Maximum operating pressure: 350 bar

Content volume: 2.3 litres

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

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

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

- **Every 2 years by a qualified person or authorized organisations:**
Visual inspection, outside.
- **Every 5 years by a qualified person or authorized organisations:**
Visual inspection, inside and outside.
- **Every 10 years by a qualified person or authorized organisations:**
Visual inspection, inside and outside.

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



MAINTENANCE RECORDS



ATTACHMENT



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





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TESTING HOSE LINES

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

Recurring test

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

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

Procedure for hose lines found to be "defective"

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

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

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

Test intervals

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

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

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

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

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

Persons qualified to test hose lines

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

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

"Qualified persons - general requirements" fulfilled if:

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

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

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

See also:

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



Replacing hose lines

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

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

Immediate replacement of hose lines

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

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



SERVICE LIFE

Service life of L&W high pressure hoses

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

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

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

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

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

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

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

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



STORAGE

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

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!