CHAPTER OVERVIEW

A

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C

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

Unit information

Type designation

Serial number

Date of construction

Purchase information

Purchase date

First commissioned on

Warranty period

Dealer's stamp

Warranty

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

A

Operating Instructions

Safety Filling Cabinet

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A

General Information and Technical Data

Safety Precautions

Installation

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Maintenance and Service

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.

Armoured Safety Filling Cabinet

With the L&W safety filling cabinet, the filling process is completely safe and without danger. The fear of decrepit or defective bottles has already implemented in ma ny countries a provision for the explosion as a result.

The L&W safety filling cabinet is the affordable alternative to an explosion-proof hopper.
In the case of exploding bottle our solid steel armor protects you against the lethal shrapnel.

Our Safety Filling Cabinet are teste and approved by the American Organization UL.

Specifications

- Max. inlet pressure 350 bar
- Adjustable flow restrictor
- Inlet pressure gauge, 0-400 bar, Ø63 mm
- Filling pressure gauge(s), 0-400 bar, Ø63 mm
- Self-venting lever filling valves for each outlet
- Emergency cut-off switch
- High pressure solenoid / 230 V
- Safetydoor and locking bar are controlled by position switch
- Start / Stop buttons

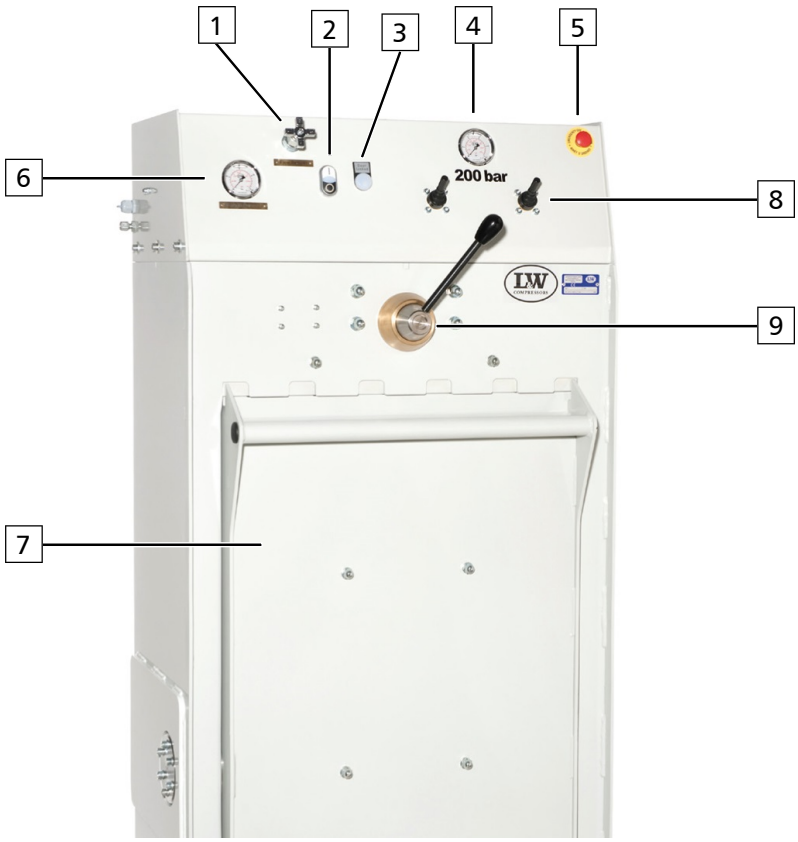
Options

- Silencer for noise reduction
- Storage inlet/outlet with rotary valve and pressure gauge for storage pressure display
- Inlet-side pressure reducer plus safety valve
- Inlet-side pressure reducer plus safety valve Custom-made products on request

Technical Data

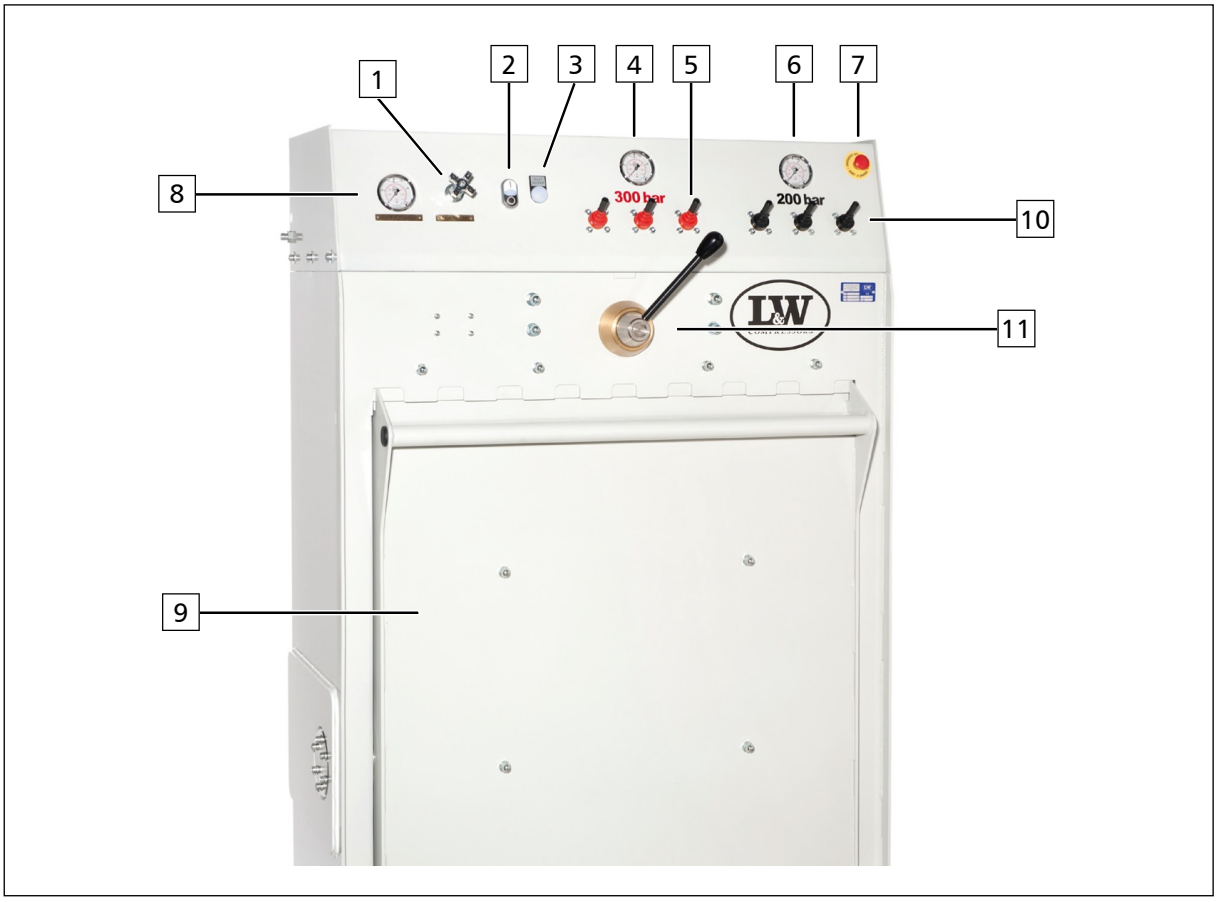
Technical Data	2 tanks	3 tanks	5 tanks	7 tanks
Max. Number of Bottles per Filling Procedure	2	3	5	7
Max. Tank Diameter [Ø]:	220	220	163	163
Medium:	Pressluft / Atemluft			
Max. Opeating Pressure [bar]:	350			
Opeating Temperature [°C]:	+5 < + 45			
Opeating Voltage:	230 V / 1-Phase / 50 Hz			
Width [mm]:	780	1050	780	1050
Depht [mm]:	535	535	535	535
Height [mm]:	1640	1640	1640	1640
Weight [kg]:	435	530	440	535

Unit Assembly - for one pressure range



No.	Designation
1	Flow Control Valve
2	Start/Stop Button
3	Control Light
4	Filling Pressure Gauge
5	Emergency Switch
6	Inlet Pressure Gauge
7	Door with Tank Basket
8	Lever Filling Valve
9	Locking Device

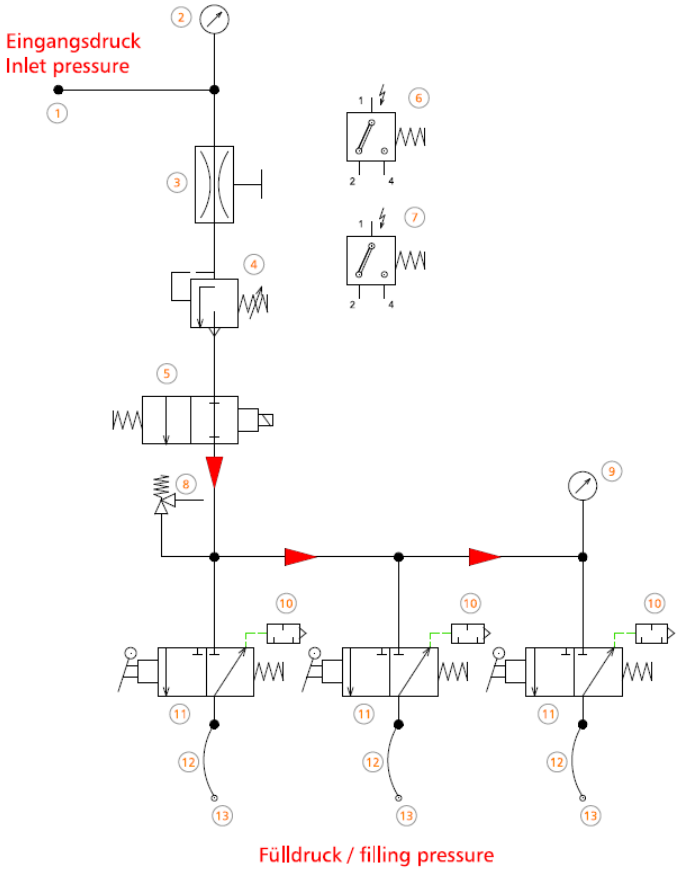
Unit Assembly - for two pressure ranges



No.	Designation
1	Flow Control Valve
2	Start/Stop Button
3	Control Light
4	Filling Pressure Gauge 1st Pressure Range
5	Lever Filling Valve 1st Pressure Range
6	Filling Pressure Gauge 2nd Pressure Range
7	Emergency Switch
8	Inlet Pressure Gauge
9	Door with Tank Basket
10	Lever Filling Valve 2nd Pressure Range
11	Locking Device

Flow chart - for one pressure range

Sicherheitsfüllbox - für ein Druckbereich (200 oder 300 bar)
Safety filling cabinet - for one pressure range (200 or 300 bar)



Fließdiagramm

1 Anschlussverschraubung 8L (M14 x 1,5mm)
2 Druckmanometer
3 Durchflussreduzierventil - regelbar
4 Druckminderer (Option)
5 Magnetventil
6 Sicherheitsschalter Tür
7 Sicherheitsschalter Verriegelung
8 Sicherheitsventil
9 Manometer
10 Schalldämpfer (Option)
11 Kipphebel-Füllventil (selbstentlüftend)
12 HD-Schlauch
13 Flaschenanschluss , G5/8" DIN 477

Flow diagramm

1 Inlet connection 8L (M14 x 1,5mm)
2 Pressure gauge
3 Floe reducer - adjustable
4 Pressure reducer (Option)
5 Solenoid
6 Safety switch (cabinet front door)
7 Safety switch (cabinet lock bar)
8 Safety valve
9 Pressure gauge
10 Silencer (Option)
11 Filling valve (self venting type)
12 HP-filling hose
13 Filling connector , G5/8" DIN 477

Darstellung kann variieren - je nach Ausführung
Representation may vary - depending on implementation

A

Flow chart - for two pressure ranges

Sicherheitsfüllbox - für zwei Druckbereiche
Safety filling cabinet - for two pressure ranges

Fließdiagramm

1 Anschlussverschraubung 8L (M14 x 1,5mm)
2 Druckmanometer
3 Durchflussreduzierventil - regelbar
4 Druckminderer (Option)
5 Magnetventil
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15 Sicherheitsventil
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Flow diagramm

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12 HP-filling hose
13 Filling connector , G5/8" DIN 477
14 Pressure reducer (Option)
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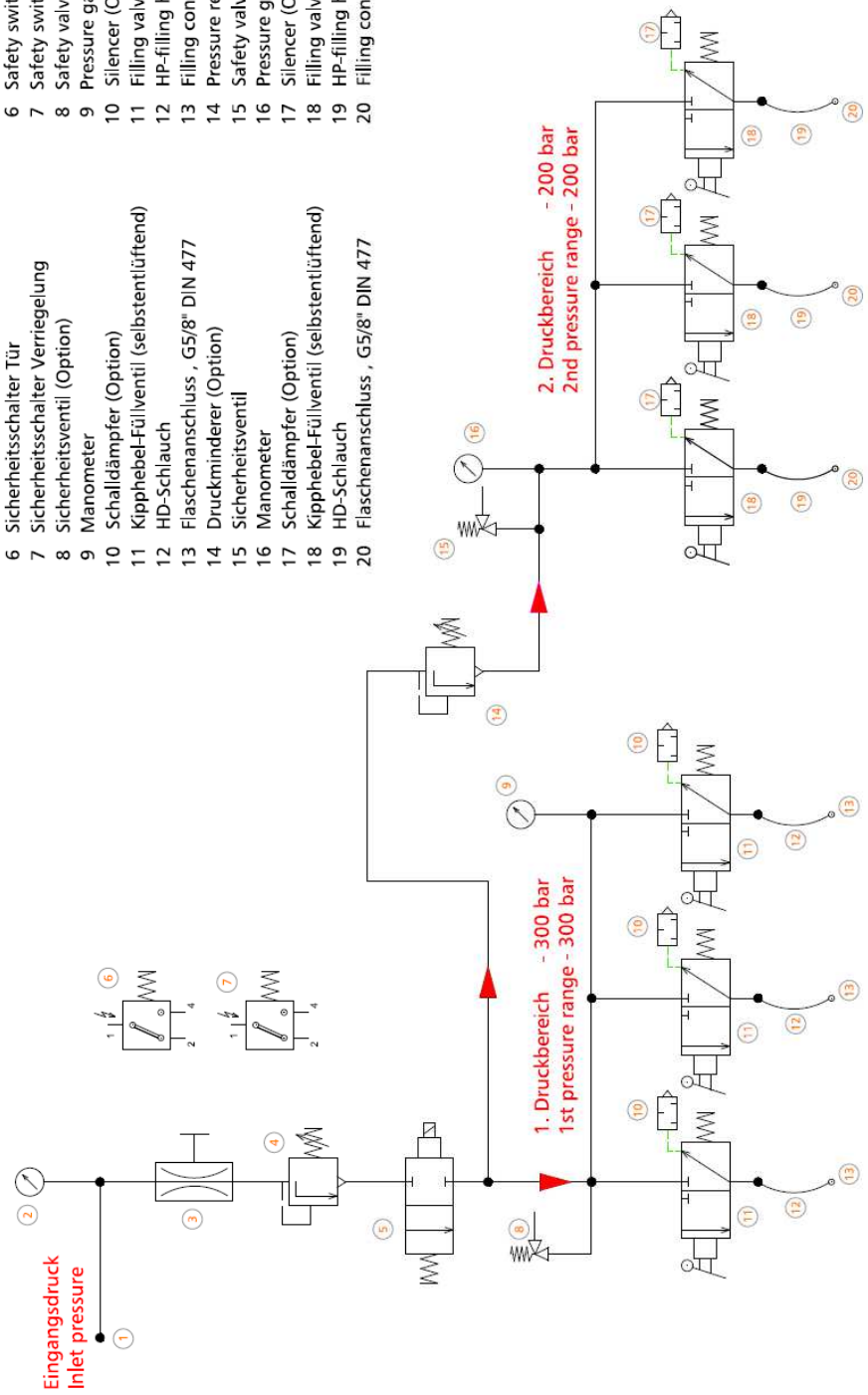


Darstellung kann variieren - je nach Ausführung
Representation may vary - depending on implementation

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 compressor at least once per day for obvious damage and defects. Inform the responsible department / person immediately if anything is not as is should be (including operation performance). Shut down the machine immediately if necessary and lock it.
- In case of malfunction, stop the compressor immediately and lock it. Repair malfunctions immediately.
- 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.

INSTALLATION

Installation in closed rooms

- The unit may be operated in a clean, dry location.
- Expose the unit horizontally, the substrate must be suitable for the system weight and vibration-free.
- The safety filling cabinet must be fixed with it in the ground and in the rear wall fixing holes and secured against tipping forward
- Observe the specified operating temperature (see "Technical Data")!

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

Warning
The safety filling cabinet must be secured against tipping forward

Note
Only appropriate and proper lifting equipment with sufficient capacity
be used for transport.

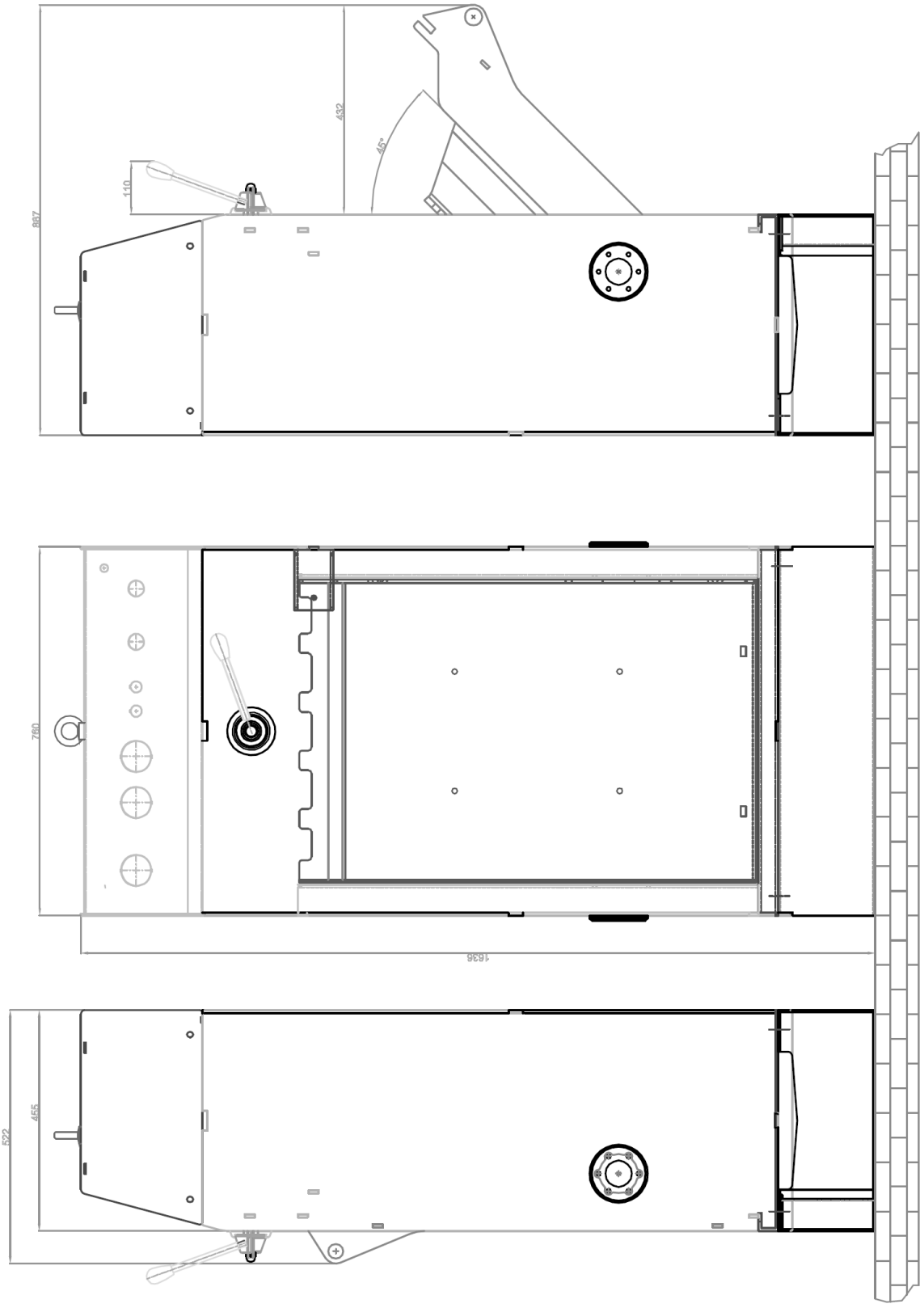
Electrical Installation

- The Sicherheitsfüllbox can be directly connected to a 230V / 50Hz / 1 ~ Connection
- The unit is capable of operating with continuous voltage

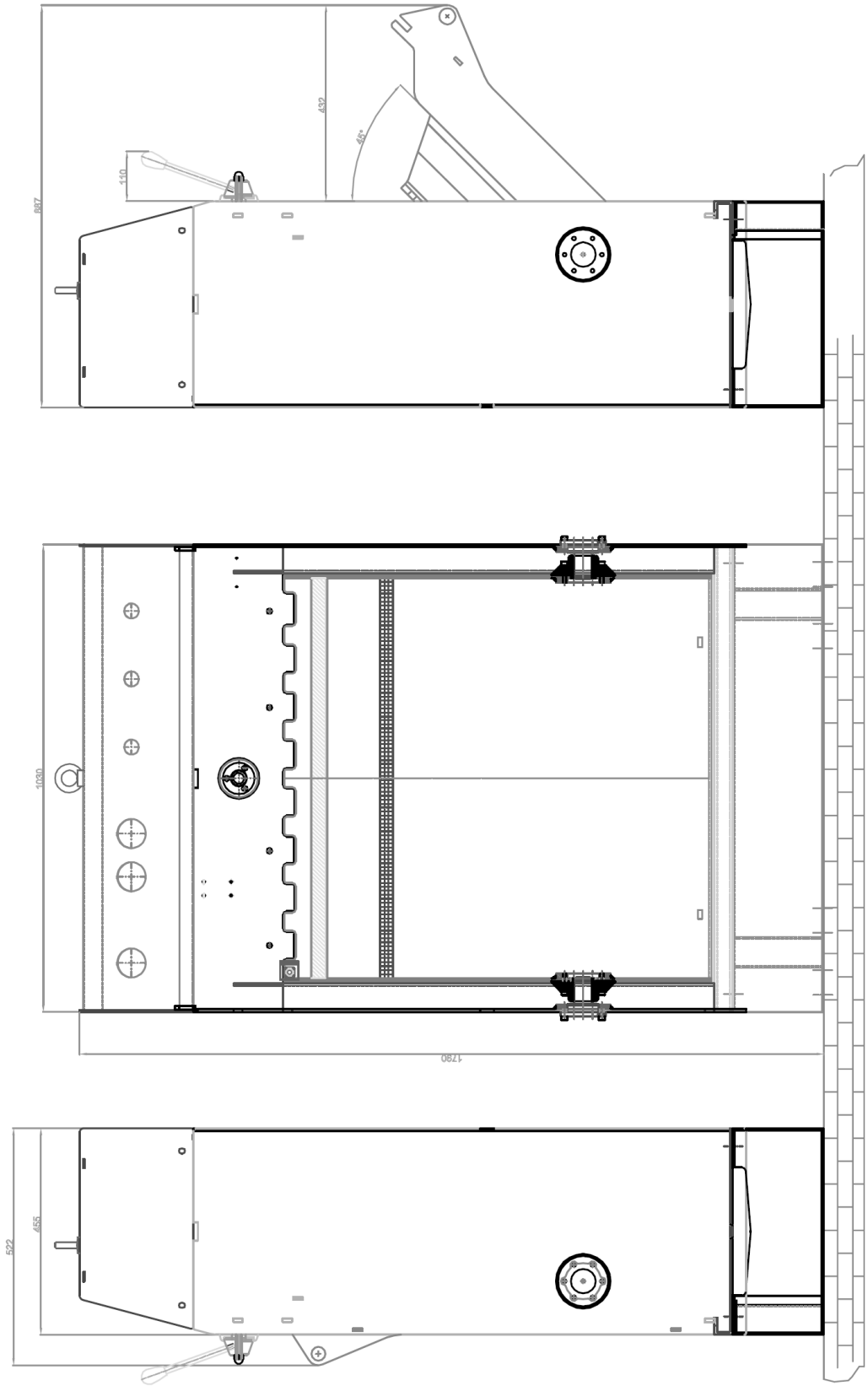
Warning
Work on the electrical equipment on / with the machine / unit may only be carried out by qualified electricians.

A

Dimensions: 2 / 5 fold safety filling cabinet



Dimensions: 3 / 7 fold safety filling cabinet



OPERATION

Safety filling cabinet for single pressure

This safety filling cabinet it is possible to fill 200 bar or 300 bar. The filling pressure can be identified by the color code. (Fig. black filling connection in safety filling cabinet)

The respective DIN handwheels have the following color coding:

- 200 bar: black
- 300 bar: red

Also flag sticker and gaiter corrosponding the filling area on the safety filling cabinet.

2 x 200 bar filling connections

Safety filling cabinet for dual pressure

200 bar / 300 bar parallel operation

This safety filling cabinet it is possible to fill in parallel with 200 bar and 300 bar. For this purpose, a pressure reducer, a final stage safety valve and a second filling pressure gauge is installed in the safety filling cabinet.

For visual distinction of filling pressure the DIN handwheels have the following color coding:

- 200 bar: black
- 300 bar: red

Also flag sticker and gaiter corrosponding the filling area on the safety filling cabinet.

3 x 200 bar and 3 x 300 bar filling connections

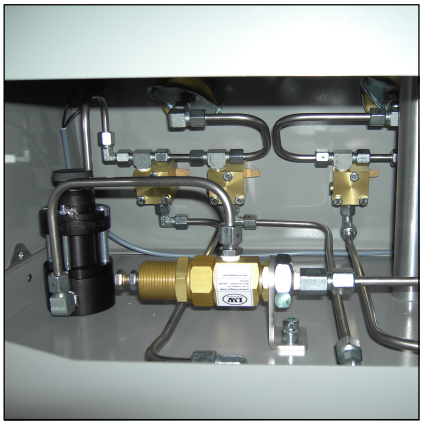


Fig. Safety valve on the left: 225 bar, pressure reducer on the right: 330 / 225 bar

First commissioning

- Connect high pressure supply line with bulkhead fitting
- Connect the power supply (230V / 50Hz / 1~)
- Close filling valves, put the unit under pressure and check for leaks
- Verification of the safety device

  Emergency stop buitton: When activating the emergency stop button, the red indicator light goes out, the filling process can not be started

  Door lock: When activating the door lock safety switch are separated, the red indicator light goes out, the filling process can not be started

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

Filling procedure

1. Open the safety filling cabinet
2. Insert the closed compressed air cylinders in safety filling cabinet and connect it to filling connections
3. Open cylinder valves
4. Close and lock the safety filling cabinet (red indicator lights)
5. Confirm released with start bustton (intatke solenoid valve opens)
6. Press the lever of the connected lever filling valves to bottom
7. The filling speed can be regulated by the flow control valve
8. Press the stop button after the desired filling pressure has reached
9. Unlock and open the safety filling cabinet
10. Close cylinder valves
11. Close lever filling valves. The filling hoses vent automatically
12. Disconnect compressed air cylinders of the filling hoses and remove

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.

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

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

Only use authentic spare parts for service work.

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

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

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

Maintanance overview

Maintenance work	Interval	Quantity	Order No
Check/Retorque all connections and bolts	1st after 15 working hours thereafter once a year	-	-
Check filling hoses for damage	at least once a year	once for each filling connection	0104741
Check opening pressure of safety valve	at least once a year	-	-
Check pressure pipes for leaks	at least once a year	-	-
Check the condition of the gas spring	at least once a year	1	004938
Check safety devices	at least once a year	-	-
Check lever valves	at least once a year	Rep. smalll Rep. big	012891 012889
Clean pressure pipes	Depends on degree of pollution - but at least once a year	-	-
Change o-rings DIN filling connection	every 2 jears	once for each filling connection	001237
Sintered filter DIN filling connection (Option)	every 2 jears	once for each filling connection	002911

Note
The repair instructions for lever filling valves can be found in the “Attachtents“ chapter.

MAINTENANCE RECORDS

Maintenance work

Description	Date, signature

Replaced Parts

Designation	Part number	Date, signature

ERSATZTEILLISTEN / SPARE PARTS LISTS
DETAILANSICHTEN / DETAILED VIEWS

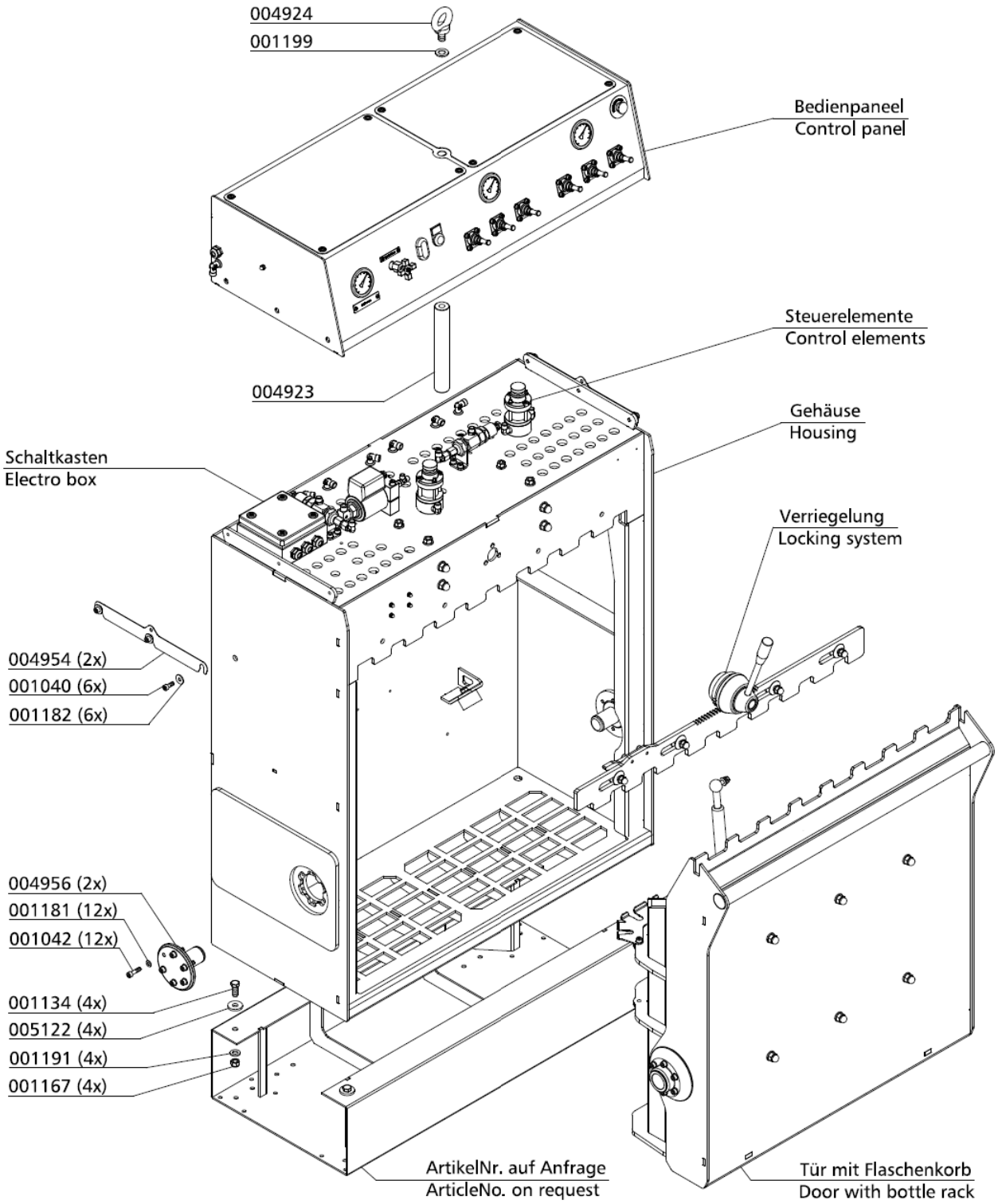
B

Version: 26.08.2024

Füllbox komplett / Filling box complete

Best.-Nr. / Order No.	Benennung	Description
001040	Zylinderschraube, M8x20mm DIN912	Allen Screw
001042	Zylinderschraube, M8x30mm DIN912	Allen Screw
001134	6-kant Schraube, M12x35 DIN 933	Hexagon Screw
001167	Stoppmutter, M12 DIN985	Lock Nut M12
001181	U-Scheibe A8, DIN125	Washer A8
001182	U-Scheibe A8, DIN9021	Washer A8
001191	U-Scheibe A12, DIN125	Washer A12
001199	U-Scheibe A17, DIN125	Washer A17
004923	Distanzstück Füllbox Ø35x240 mm	Alloy Spacer M16
004924	Ringschraube M16 DIN580 C15	Ring bolt
004954	Ausgleichsblech Füllaufsatz	Shim, dasboard
004956	Lagerbolzen Füllbox	Bearing pin
005122	U-Scheibe Kurbelwelle	Washer, crank shaft

Füllbox komplett / Filling box complete

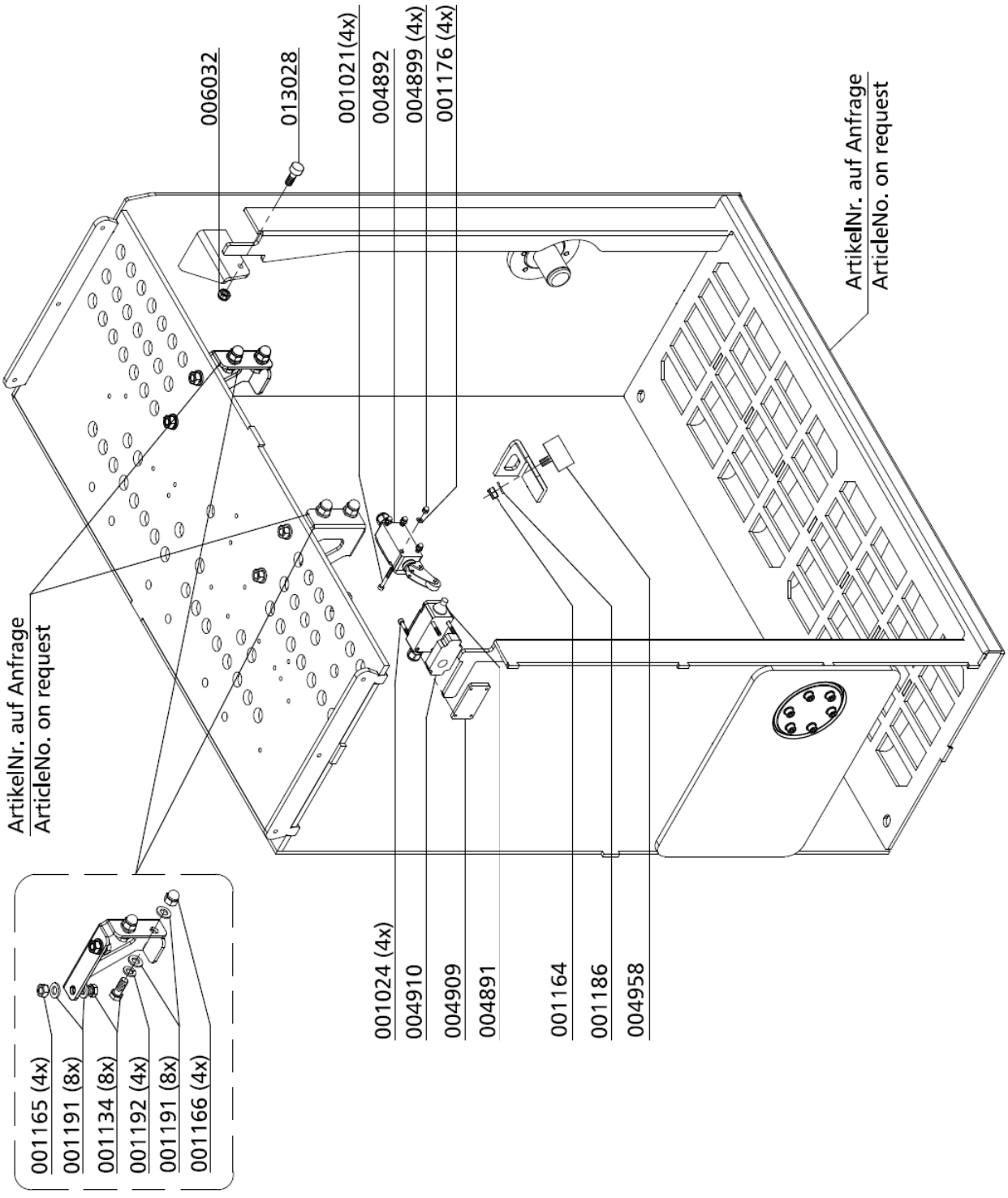


Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Gehäuse / Housing

Best.-Nr. / Order No.	Benennung	Description
001021	Zylinderschraube, M5x40mm DIN912	Allen Bolt
001024	Zylinderschraube, M5x55mm DIN912	Allen Bolt
001134	6-kant Schraube, M12x35 DIN 933	Hexagon Screw
001164	Stoppmutter, M10 DIN985	Lock Nut M10
001165	Mutter, M12 DIN934	Nut M12
001166	Hutmutter, M12 DIN1587	Domed Nut M12
001176	U-Scheibe A5, DIN125	Washer A5
001186	U-Scheibe A10, DIN125	Washer A10
001191	U-Scheibe A12, DIN125	Washer A12
001192	Federring A12, DIN 127	Spring Washer A12
004891	Sicherheitsschalter Schieber	Security switch, slide valve
004892	Sicherheitsschalter Tür	Safety Switch - door
004899	Hutmutter, M5 DIN1587	Domed Nut M5
004909	Gewindeplatte Sicherheitsschalter	Threaded plate,security switch
004910	Distanzplatte Sicherheitsschalter	Spacer, security switch
004958	Anschlagpuffer Füllbox	Rubber Bumb Stop SFC
006032	6-kant Hutmutter M12 DIN985	Hexagon Domed Cap Nut M12
013028	Gummipuffer Ø20x10mm, M10 x 28mm	Rubber Stop Front Door SFC

Gehäuse / Housing

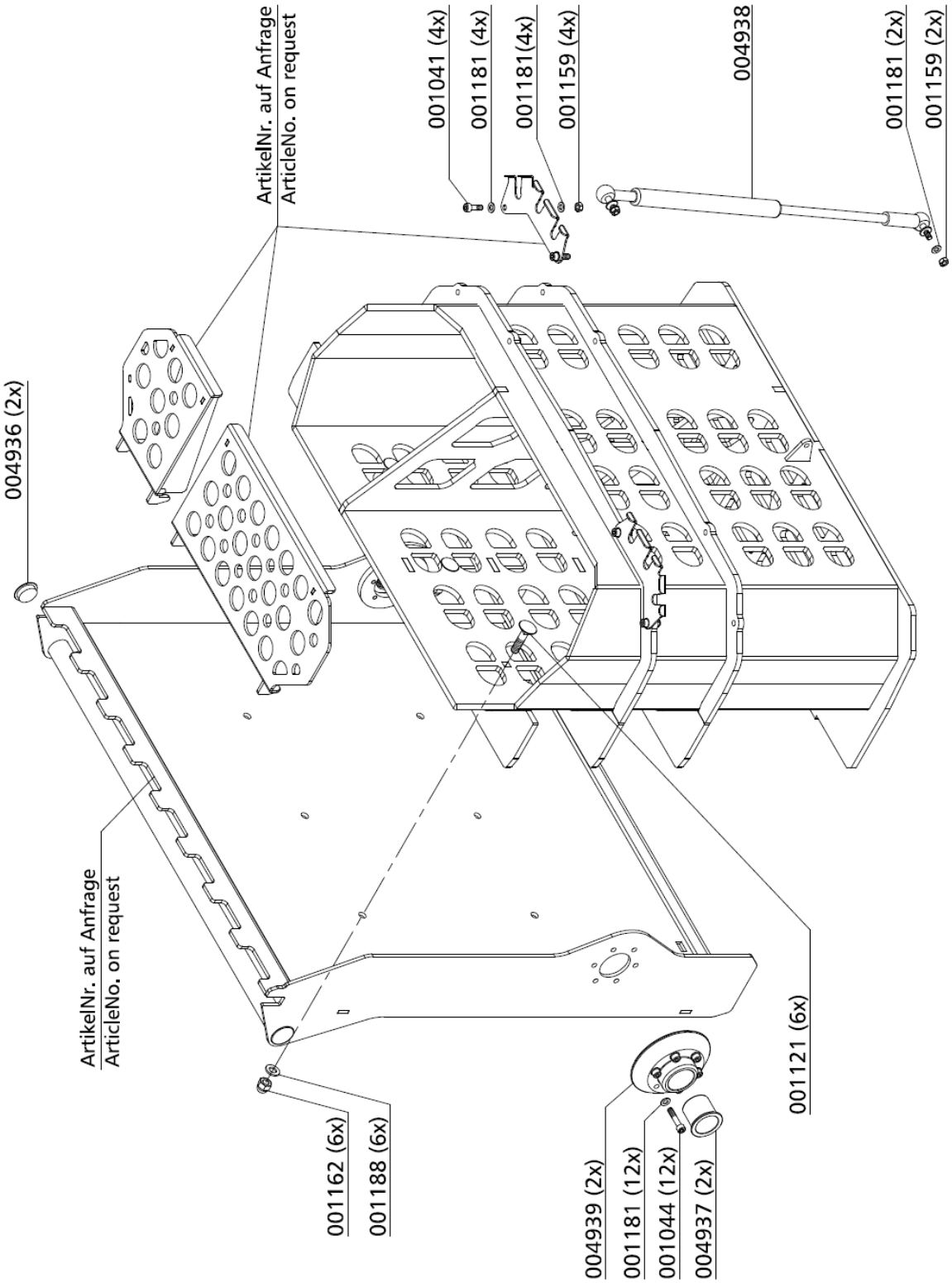


Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Tür mit Flaschenkorb / Door with bottle rack

Best.-Nr. / Order No.	Benennung	Description
001041	Zylinderschraube, M8x25mm DIN912	Allen Screw
001044	Zylinderschraube, M8x40mm DIN912	Allen Screw
001121	Schlossschraube, M10x55mm DIN603	Carriage Bolt
001159	Stoppmutter, M8 DIN985	Lock Nut M8
001162	Hutmutter, M10 DIN1587	Domed Nut M10
001181	U-Scheibe A8, DIN125	Washer A8
001188	U-Scheibe A10, DIN125	Washer A10
004936	Rohrstopfen Füllbox	Tube Plug - Filling Box
004937	Gleitlagerbuchse Füllbox	Plain bearing bush
004938	Gasdruck Stossdämpfer Füllbox	Gas pressure damper
004939	Lagerflansch Füllbox	Bearing flange

Tür mit Flaschenkorb / Door with bottle rack

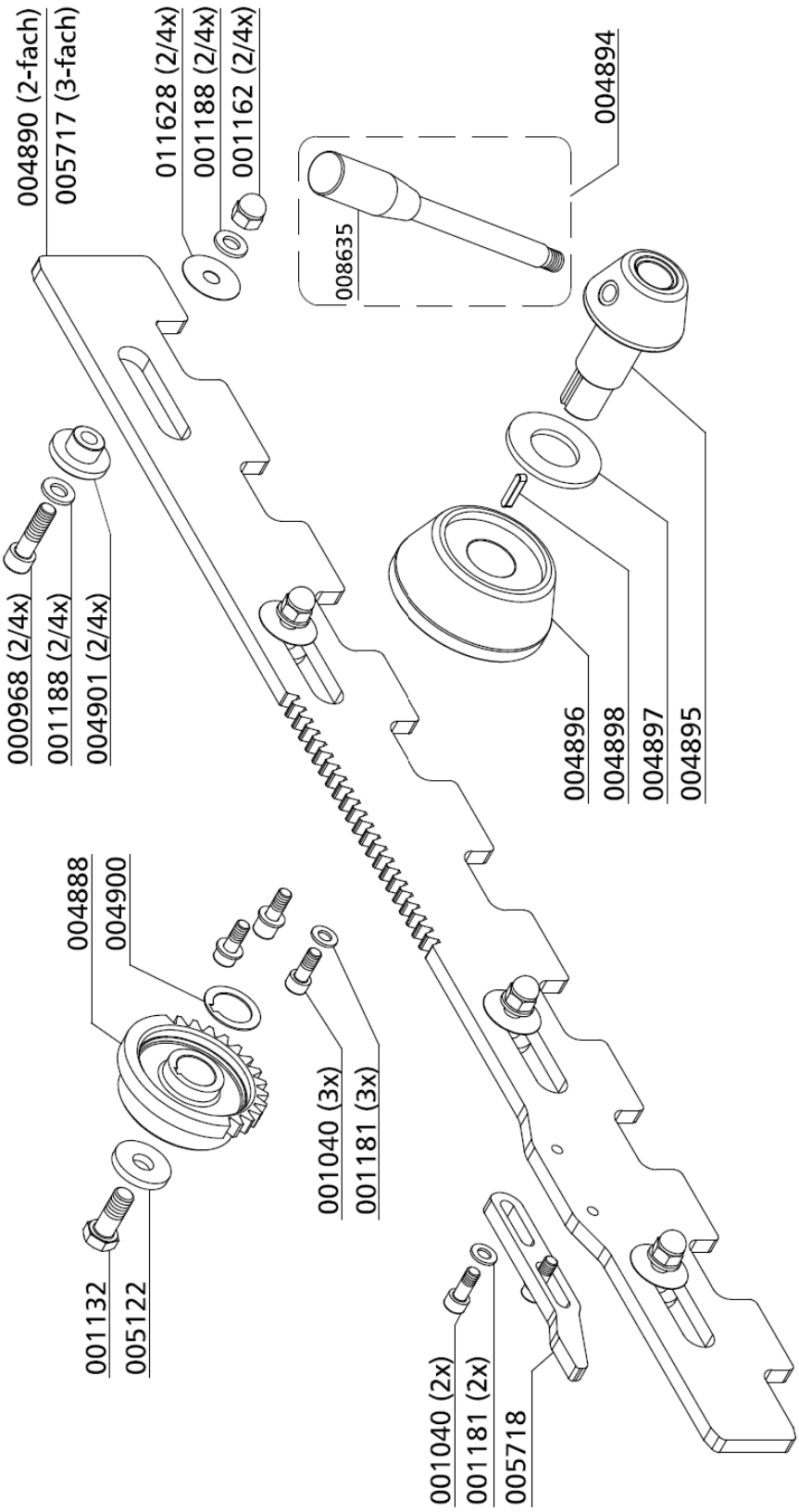


Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Verriegelung / Locking system

Best.-Nr. / Order No.	Benennung	Description
000968	Zylinderschraube, M10x35mm, DIN 912	Allen Bolt
001040	Zylinderschraube, M8x20mm DIN912	Allen Screw
001132	6-kant Schraube, M12x25mm DIN933	Hexagon Screw
001162	Hutmutter, M10 DIN1587	Domed Nut M10
001181	U-Scheibe A8, DIN125	Washer A8
001188	U-Scheibe A10, DIN125	Washer A10
004888	Zahnrad	Gear
004890	Schieber 2-fach Füllbox	Slide valve 2-fold
004894	Verriegelungshebel Füllbox	Lock Lever s/s
004895	Welle	Shaft for interlock
004896	Lagergehäuse Verriegelung - Fremm	Bearing case, interlock Fremm
004897	Anlaufscheibe PVC grau Welle	Thrust washer, PVC grey shaft
004898	Passfeder, A5x2x25 mm DIN6885	Woodruff Key
004900	Anlaufscheibe Zahnrad	Thrust washer, gear
004901	Führungshülse Verriegelungsschieber	Guide bush
005122	U-Scheibe Kurbelwelle, 12,5x34,5x4,5mm, DIN 6340	Washer, crank shaft
005717	Schieber 3-fach Füllbox	Slide valve 3-fold
005718	Nocken 3-fach Füllbox	Cam 3-fold
008635	Kunststoffgriff für Hebel	Kunststoffgriff für Hebel
011628	Distanzscheibe 0,5 mm	Distanzscheibe 0,5 mm

Verriegelung / Locking system

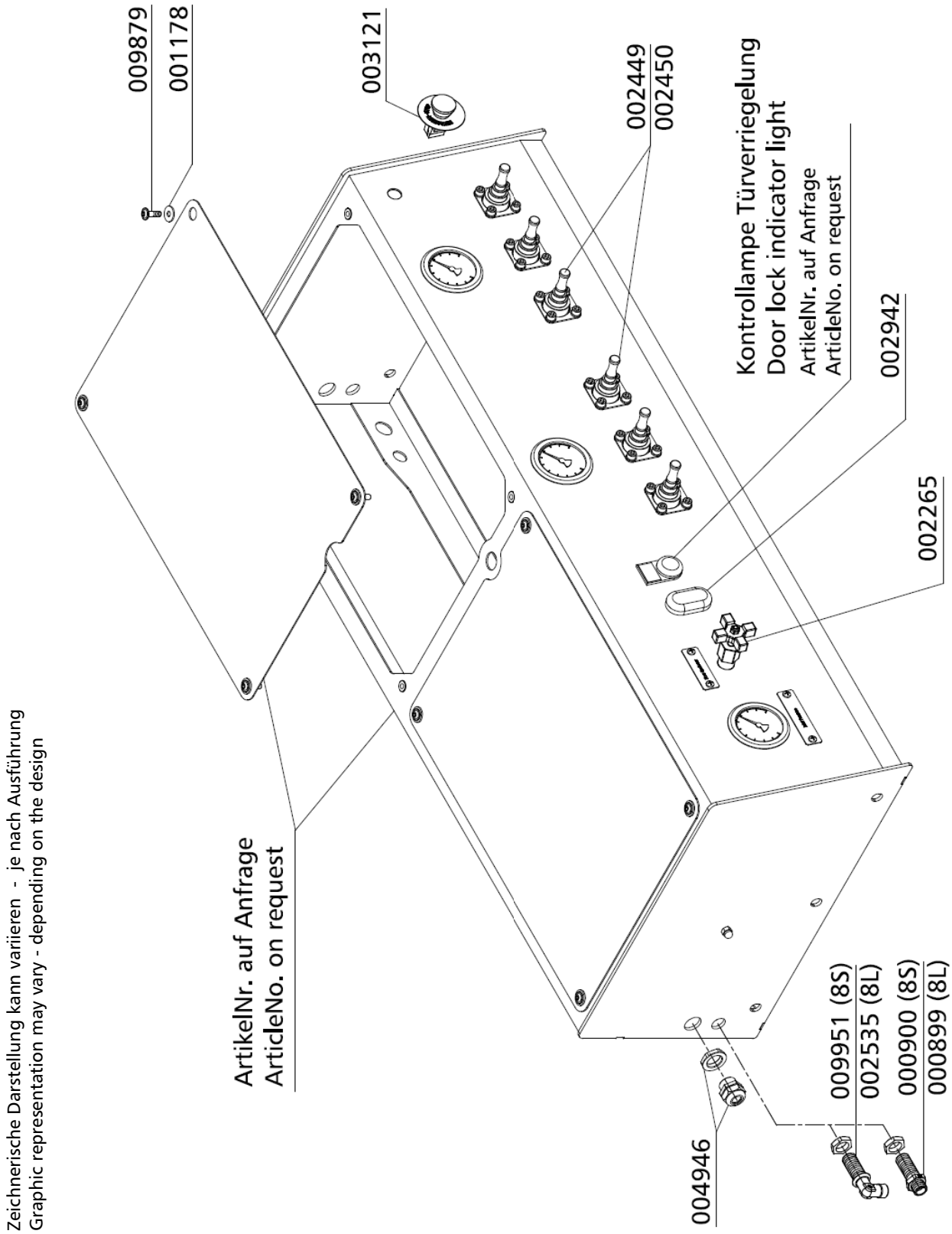


Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Bedienpaneel / Control panel

Best.-Nr. / Order No.	Benennung	Description
000899	Schottverschraubung 8L , M14x1,5	Bulkhead Fitting 8L
000900	Schottverschraubung 8S, M16x1,5	Bulkhead Fitting 8S
001178	U-Scheibe A6, DIN9021	Washer A6
002265	Drosselventil / Nadelventil	Throttle valve, w/o mount kit
002449	Kipphebelventil / Füllleiste 200 bar	Lever Valve - 200 bar, panel
002450	Kipphebelventil / Füllleiste 300 bar	Lever Valve - 300 bar, panel
002535	Winkelschottverschraubung 8L, M14x1,5	Elbow Bulkhead Fitting 8L
002942	Start / Stopp Schalterelemente	START / STOP Buttons compl.
003121	Not-Aus Schalter komplett	Emergency switch compl.
004946	PG Verschraubung M20	Bulkhead Cable Gland
009879	Linsenflanschschraube, M6x20mm, ISO 7380F	Lens Head Screw
009951	Winkelschottverschraubung 8S, M16x1,5	Elbow Bulkhead Fitting 8S

Bedienpaneel / Control panel



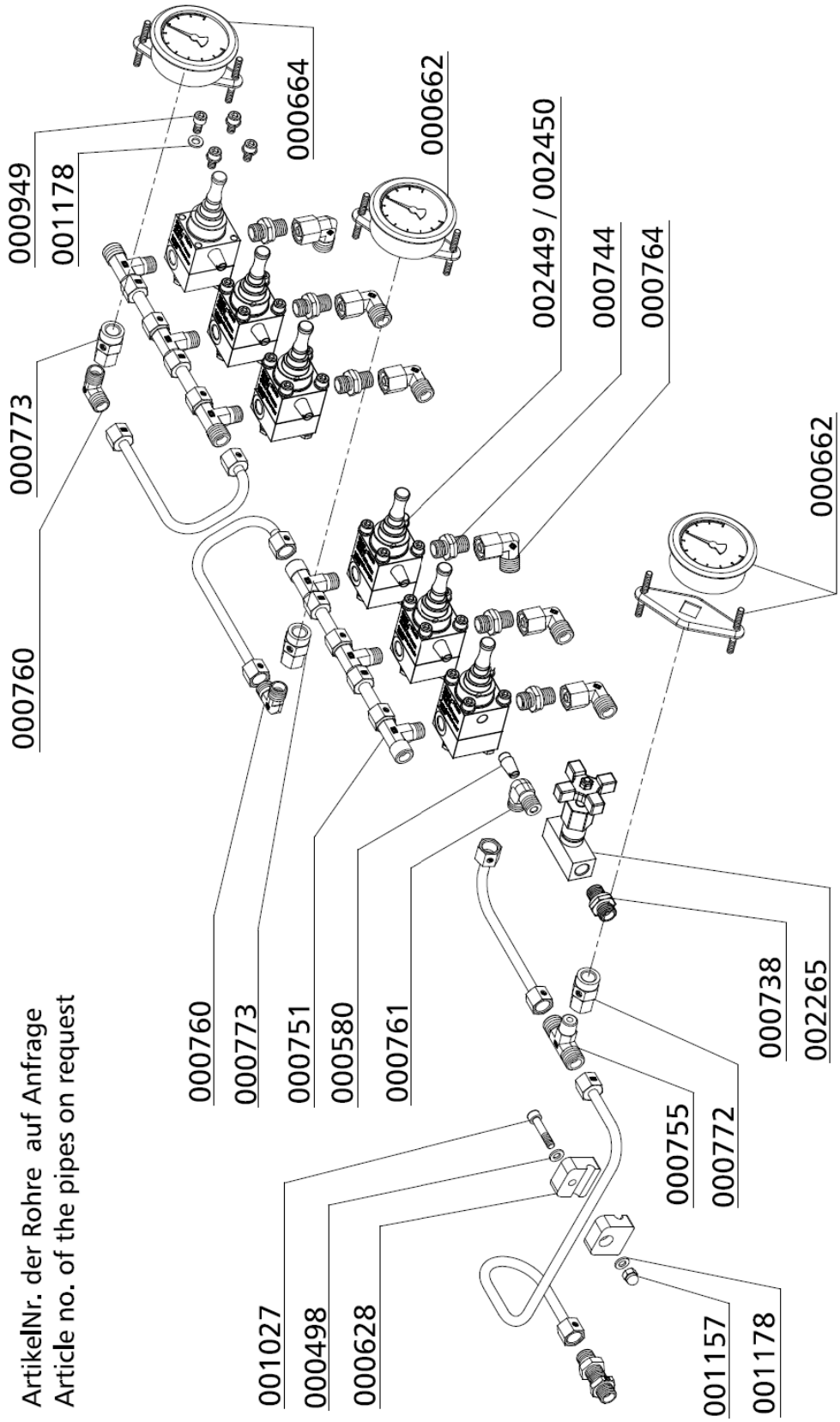
Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

B

Bedienpaneel Anbauteile / Control panel attachments

Best.-Nr. / Order No.	Benennung	Description
000498	U-Scheibe A6	Washer A6
000580	Schalldämpfer für Kipphebelventil, G1/8"	Silencer Lever Filling Valve
000628	Einfachschelle 1 x 8mm 1 Paar	Pipe Clamp 1x8mm 1pair PVC
000662	Einbaumanometer mit Befestigungsbügel , 0-400 bar	Press. Gauge c/w fixing strap
000664	Einbaumanometer mit Befestigungsbügel , 0-250 bar	Press. Gauge c/w fixing strap
000738	Gerade Verschraubung, GE08L 1/4	Straight Connection
000744	Verschraubung, GE08LM16X1.5CFX	Connection
000751	Verschraubung,Mutter & Schneidring TE08LRCFX	Connection incl nut&olive seal
000755	T-Verschraubung mit fester Mutter, ET08PLX	T-Connection with fixed nut
000760	Verschraubung, W08LCFX	Elbow Connection
000761	Winkelverschraubung, WE08L 1/4"	Elbow Connection
000764	Winkelverschraubung mit fester Mutter, EW08LOMDCF	Elbow Connection c/w fixed nut
000772	Verschraubung für Manometer, MAV08LROMDCF	Connection Pressure Gauge
000773	Manometerverschraubung G1/4"/08L	Connection Pressure Gauge
000949	Flachkopfzylinderschraube M6x12mm DIN6912	Pan Head Bolt
001027	Zylinderschraube M6x30mm DIN912	Allen Bolt
001157	Hutmutter M6 DIN1587 ZN	Domed Nut M6
001178	U-Scheibe A6	Washer A6
002265	Drosselventil / Nadelventil G1/4"	Throttle valve, w/o mount kit
002449	Kipphebelventil / Füllleiste 200 bar	Lever Valve - 200 bar, panel
002450	Kipphebelventil / Füllleiste 300 bar	Lever Valve - 300 bar, panel

Bedienpaneel Anbauteile / Control panel attachments



ArtikelNr. der Rohre auf Anfrage
Article no. of the pipes on request

Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Steuerelemente / Control elements

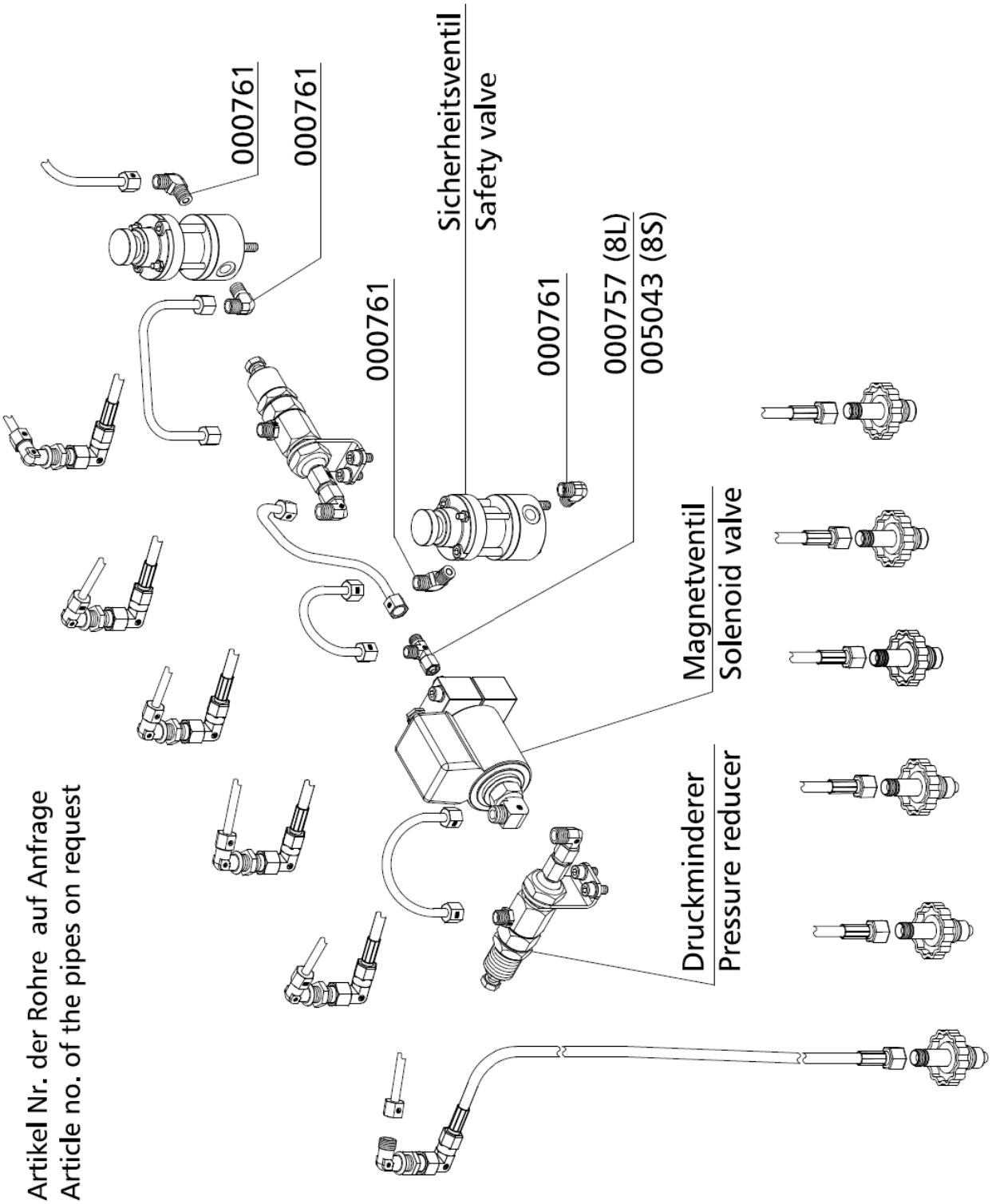
Best.-Nr. / Order No.	Benennung	Description
000213	Handrad, schwarz DIN 477	Hand Wheel DIN 200 bar, black
000215	Handrad, rot DIN 477	Hand Wheel DIN 300 bar, red
000233	Sockel für Sicherheitsventil mit TÜV/CE	Base Safety Valve CE/TÜV type
000553	Sicherheitsventil - TÜV 225 bar	Safety Valve TÜV 225 bar
000554	Sicherheitsventil - TÜV 250 bar	Safety Valve TÜV 250 bar
000555	Sicherheitsventil - TÜV 300 bar	Safety Valve TÜV 300 bar
000556	Sicherheitsventil - TÜV 330 bar	Safety Valve TÜV 330 bar
000557	Sicherheitsventil - TÜV 350 bar	Safety Valve TÜV 350 bar
000570	Klemmhalter für Magnetventil 300 bar (000610)	Bracket Solenoid 300 bar
000594	Reparatursatz Magnetventil	Repair Kit Solenoid 350 bar
000610	Magnetventil 0-400 bar	Solenoid NC 400 bar G3/8" 230V
000695	Füllanschluss ohne Handrad, (ab 2005)	Filling Connec. w/o handwheel
000697	Füllanschluss ohne Handrad, (ab 2005)	Filling Connec. w/o handwheel
000701	Sicherheitsfüllanschluss, ohne Handrad	Anti Whip Connec.w/o handwheel
000702	Sicherheitsfüllanschluss, ohne Handrad	Anti Whip Connec.w/o handwheel
000741	Verschraubung, GE08LR3/8EDOMDA3C	Connection
000747	Gerade Verschraubung, GE08L1/4NPTCFX	Straight Connection
000757	T-Verschraubung mit fester Mutter, EVL08LOMDCF	T-Connection with fixed nut
000761	Winkelverschraubung, WE08L/1/4"	Elbow Connection
000763	Winkelverschraubung, WE08LR3/8CFX	Elbow Connection
000797	Verschraubung mit fester Mutter, EVW10LCFX	Elbow Connection
001039	Zylinderschraube M8x16mm DIN912	Allen Bolt
001044	Zylinderschraube M8x40mm DIN912	Allen Screw
001058	Zylinderschraube M8x70mm DIN912	Allen Bolt
001181	U-Scheibe A8	Washer A8
001237	O-Ring DIN Flaschenanschluss 11,91 x 2,62	O-Ring DIN filling connector
001238	O-Ring Füllstutzen zu Kipphebelventil 12,42 x 1,78	O-Ring

Steuerelemente / Control elements

Best.-Nr. / Order No.	Benennung	Description
001244	O-Ring 16 x 2	O-Ring
001427	Reparatursatz für Druckminderer (001428)	Repair Kit Reducer 001428
001428	Druckminderer "High Flow" einstellbar	Pressure Reducer-Bolt version
001814	Sicherheitsventil - TÜV 225 bar	Safety Valve, CE certified
001815	Sicherheitsventil - TÜV 250 bar	Safety Valve - 250 bar
001816	Sicherheitsventil - TÜV 330 bar	Safety Valve 330 bar CE
001817	Sicherheitsventil - TÜV 350 bar	Safety Valve
002283	Winkelverschraubung mit fester Mutter EW08SOMDCF	Elbow Connection w. fixed nut
002535	Winkelschottverschraubung , WSV08L A3C	Bulkhead connection
002911	Sinterfilter DIN Flaschenanschluß	Sintered filt.,DIN fill. conn.
004925	Halterung für Druckminderer (001428)	Bracket Pressure Reducer HF
004932	Verschraubung für Druckminderer (001428), GAI 1/4"NPT / 8S	Connection for 001428
005043	T-Verschraubung mit fester Mutter, EL08S OMDCF	T-Connection
010474	Hochdruckschlauch, 1000mm, 8L - 10L	HP-Hose

B

Steuerelemente / Control elements

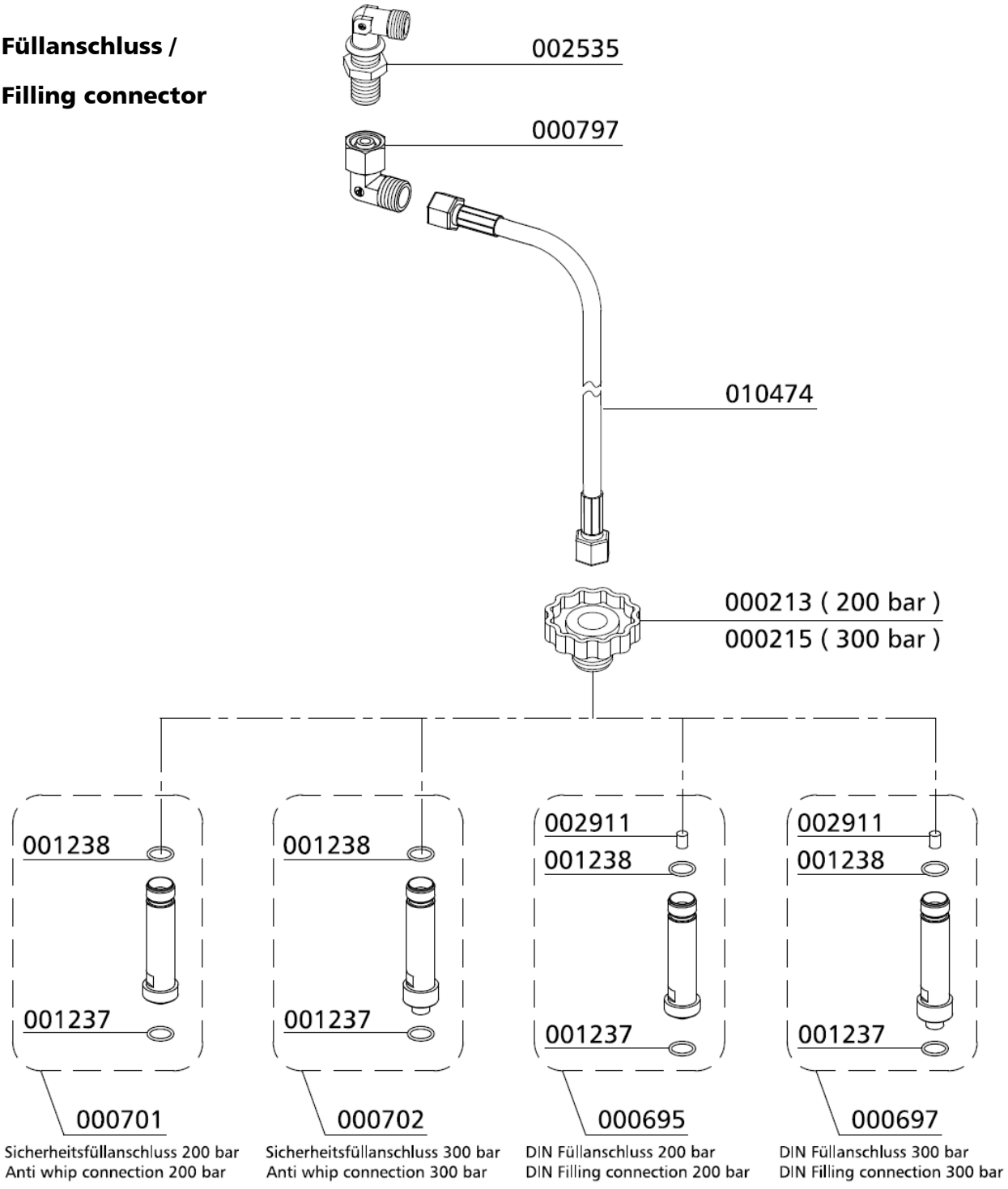


Zeichnerische Darstellung kann variieren - je nach Ausführung
Graphic representation may vary - depending on the design

Steuerelemente / Control elements

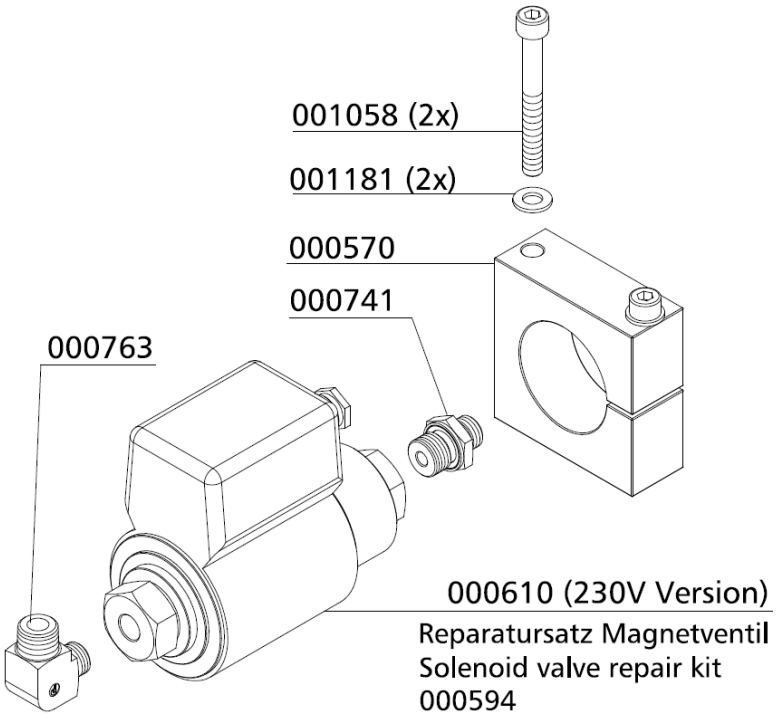
Füllanschluss /

Filling connector

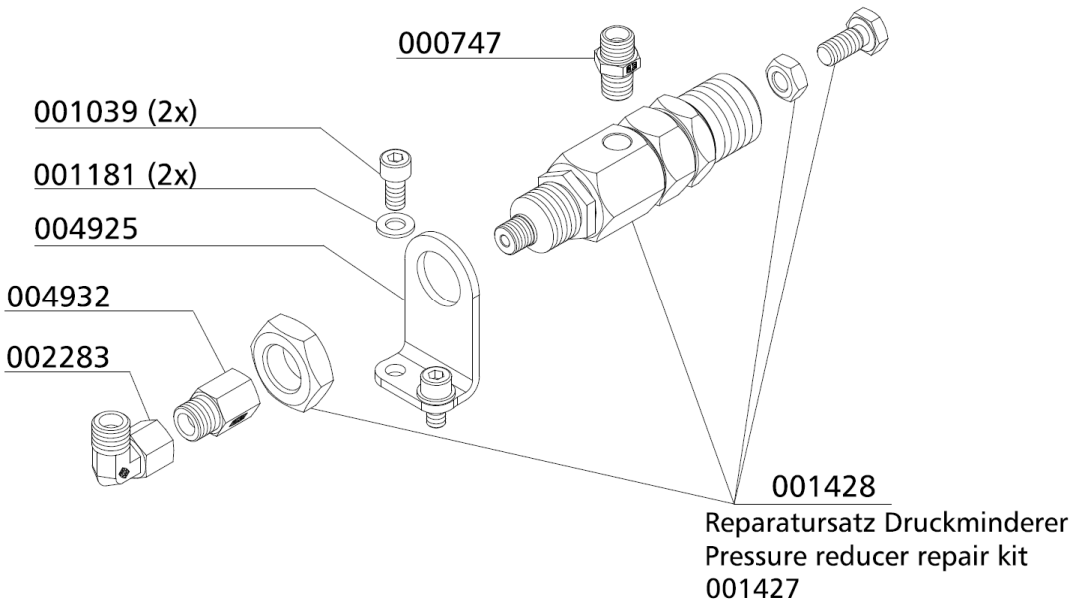


Steuerelemente / Control elements

Magnetventil / Solenoid valve



Druckminderer (Option) / Pressure reducer (Option)



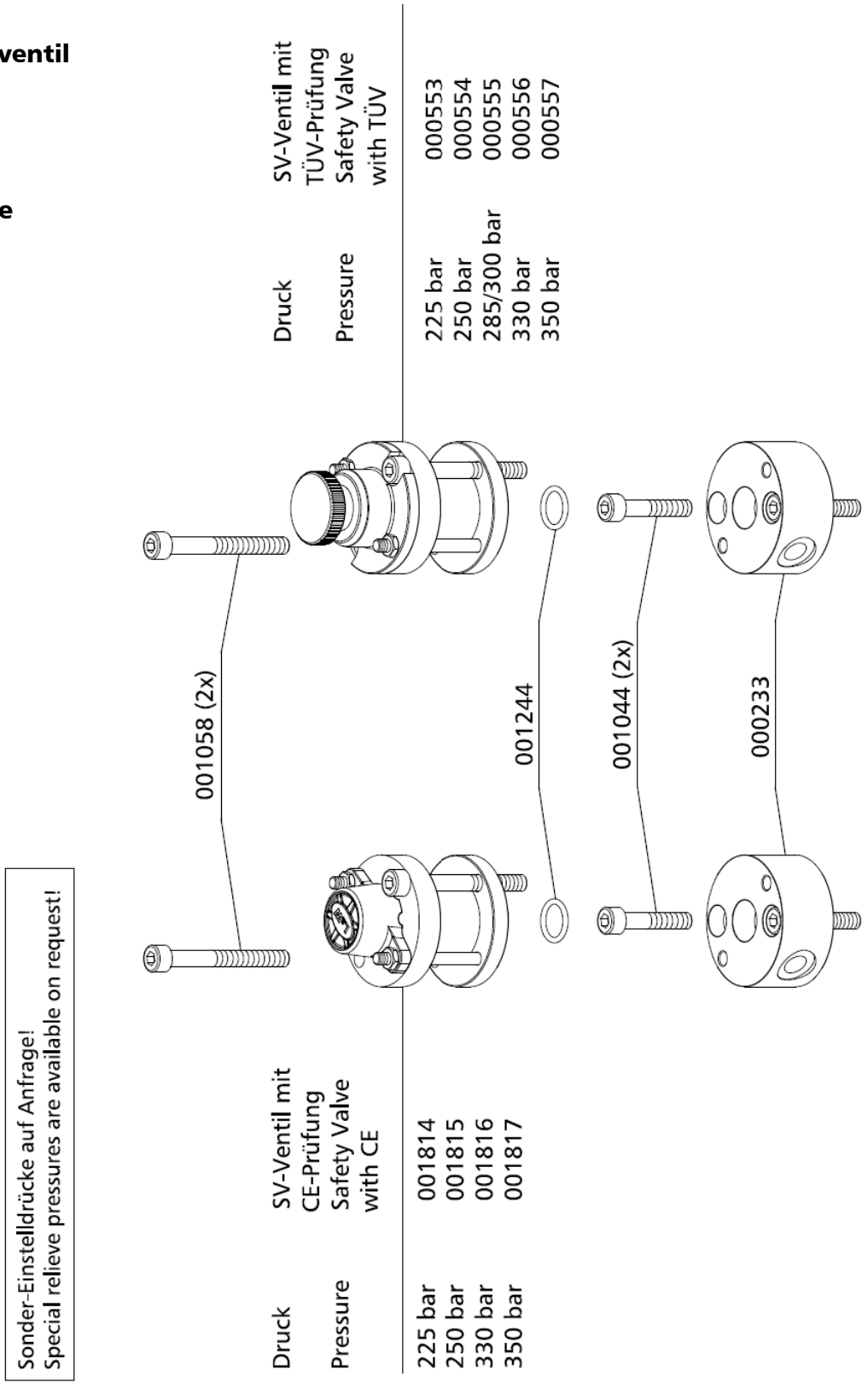
Steuerelemente / Control elements

Sicherheitsventil

(Option) /

Safety valve

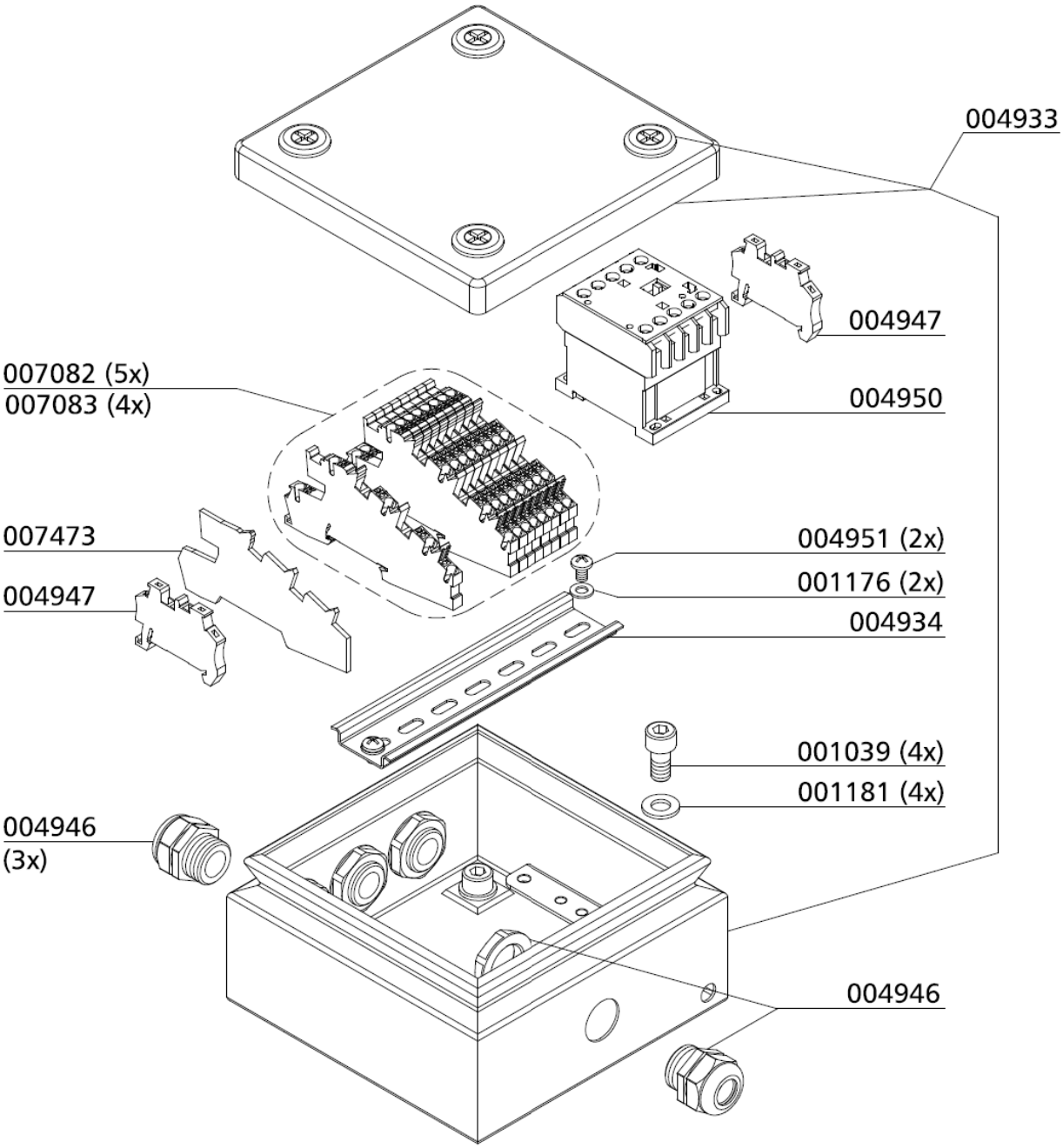
(Option)



Schaltkasten / Electro box

Best.-Nr. / Order No.	Benennung	Description
001039	Zylinderschraube, M8x16mm DIN912	Allen Bolt
001176	U-Scheibe A5 DIN125	Washer A5
001181	U-Scheibe A8 DIN125	Washer A8
004933	Schaltkastengehäuse Füllbox	Terminal Box, Sheet Metal
004934	Hutschiene Füllbox	Cap rail
004946	PG Verschraubung M20, kompl. m. Klemmmutter	Bulkhead Cable Gland
004947	Endhalter Hutschiene	Holder, cap rail
004950	Leistungsschütz	Contactor CWC07.10E
004951	Blechschraube 4,8x13	Sheet metal screw
007082	Phoenix Installationsetagenklemme	Phoenix clamp
007083	Phoenix Installationsetagenklemme	Phoenix clamp

Schaltkasten / Electro box



ATTACHMENT

C

Reconditioning for Lever Filling Valve 002449 (200 bar) and 002450 (300 bar)

with valve body made from Aluminium

Note on Safety

Special attention should be paid to statements preceded by the following signs:

⚠ **WARNING** Indicates a strong possibility of severe personal injury or death if instructions are not followed.

⚠ **CAUTION** Indicates that equipment or property damage can result if instructions are not followed.

⚠ **NOTE** Gives helpful information.

These overhaul instructions describe the dismantling and assembly of the toggle filling valve without inlet fitting and without filling tube or outlet fitting.

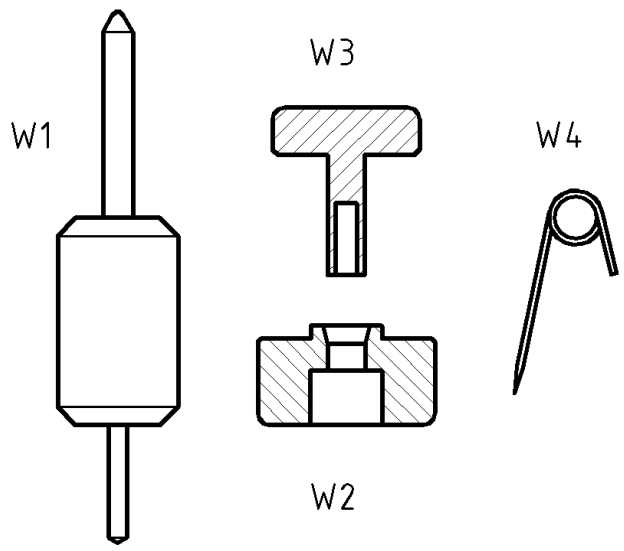
For overhaul and repair are available
- Gasket kit **012891** - Therein included all O-rings as used
- Maintenance kit **012889** - Therein included all wear parts and O-rings as used.
- Lubricant (grease) e.g. 003953.

Available are furthermore all parts according to parts list on page 12 and 13.
Except the parts which are included in the maintenance and gasket kit.

⚠ **NOTE**

Before disassembling, the valve must be thoroughly cleaned on the outside, especially the inlet and outlet threads. After disassembling, clean all individual parts. Use normal mild, grease-dissolving cleaning agents. No alkalis or acids.

When assembling, observe the instructions for greasing O-rings and sliding parts with special grease (e.g. 003953) as well as the tightening torque specifications



1. Tools, necessary

1.1 Standard Tools

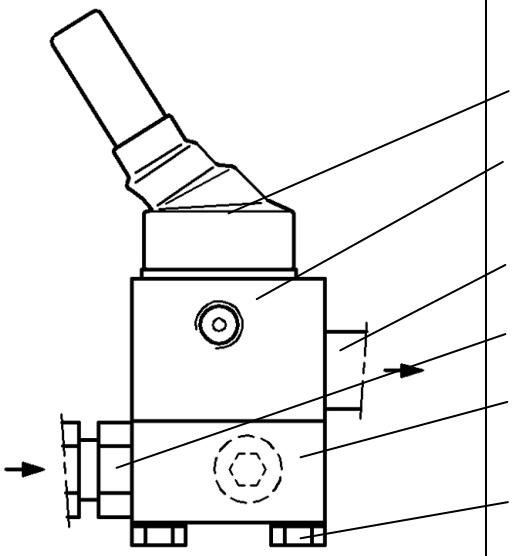
1 x open ended or ring spanner, jaw size 10 mm
1 x hexagon key L-wrench, hexagon 5 mm
1 x pin punch Ø 5mm
1 x hammer, light, 200 till 300 g
1 x torque wrench up to 20 Nm (2 kpm)
with 1 x hexagon socket jaw width 10 mm
1 x hexagon bit , hexagon 5 mm

1.2 Special Tools

1 x W1 centering pin Ø 5mm combined with drift Ø 3 mm
1 x W2 retainer
1 x W3 plunger
1 x W4 safety pin DIN 7404 size 3, 48 mm long

Reconditioning for Lever Filling Valve 002449 (200 bar) and 002450 (300 bar)

with valve body made from Aluminium



2. Designation, main parts

Lever bar, gaiter

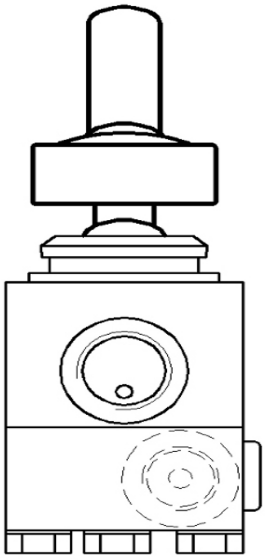
body top lever valve with :
valve seat, valve stem, thrust insert

(filling tube)

(inlet fitting)

Lower body llever valve housing with :
coil spring, sealing cone, filter and plug screw

hexagon screw M6 x 30 mm



3. Valve dismantling

NOTE

Numbers stated behind the parts designation are related to the parts list at page 12 and 13.

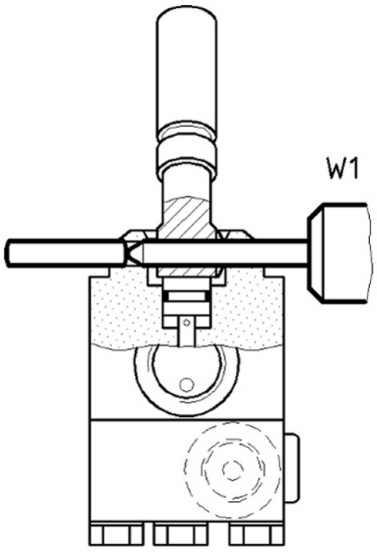
3.1 remove gaiter (1)

Detach the gaiter (1) from the body top lever valve (7) and slide it over the lever bar (2).

Check the gaiter (1) for damage (cracks or holes). If any are present, replace the gaiter !

NOTE

Valve may be kept by hand for the above.



3.2 Remove lever bar (2)

Remove cylinder pin (3) with W1 (centering pin Ø 5 mm) as shown.

NOTE

Valve may be kept by hand for the above.

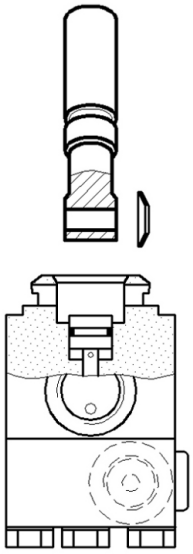
If the cylinder pin (3) is too tight in the body top lever valve (7), drive it out using a pin punch Ø 5mm and a light hammer.

CAUTION

For this fix the valve in a vice with smooth vice jaws or a firm cloth.

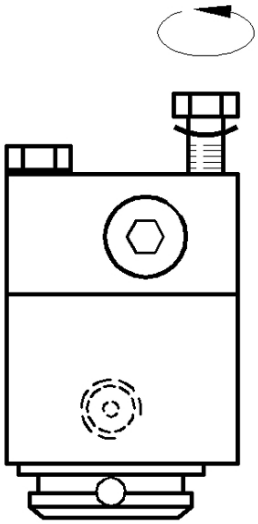
Reconditioning for Lever Filling Valve 002449 (200 bar) and 002450 (300 bar)

with valve body made from Aluminium



… 3.2

Remove lever bar (2) and spring washer (4) .



3.3 Separate body top lever part (7) and lower body lever valve (15)

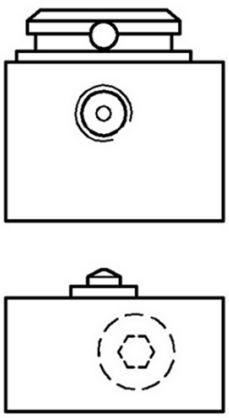
⚠ CAUTION

For this fix the valve in a vice with smooth vice jaws or a firm cloth.

Unscrew the 3 pcs hexagon screws (21) with an open ended or ring spanner jaw size 10 mm.

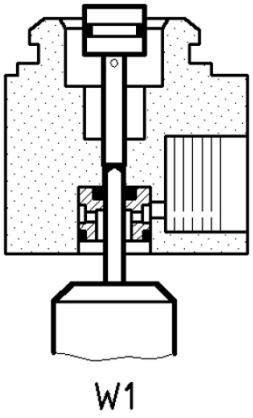
⚠ CAUTION

Press the body top lever part (7) and the lower body lever valve (15) together by hand at remove from the vice, to avoid the pop out of internal valve parts.



… 3.3

Place lower body lever valve (15) onto a clean worktop and remove body top lever part (7).



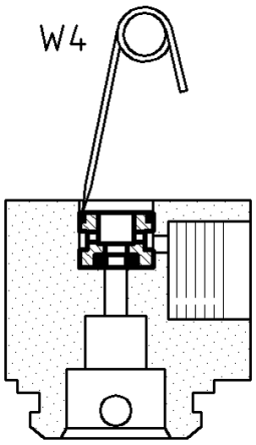
3.4 Remove valve stem (8) and thrust insert (6)

Remove valve stem (8) and thrust insert (6) by W1 (centering pin) as shown.

⚠ CAUTION

Act carefully to avoid damage on the seal seat of the valve stem (8).

Remove O-ring (5) Ø 7 x Ø 1.5 mm from thrust insert (6).

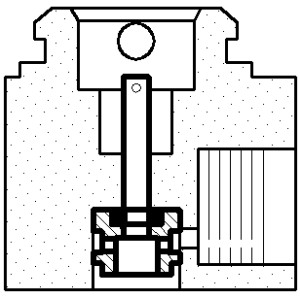


3.5 Remove O-Ring (11)

Remove O-ring (11) Ø 9 x Ø 1.5 mm with W4 (safety pin).

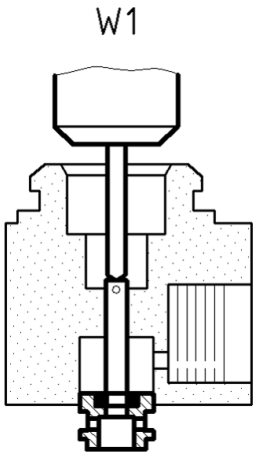
⚠ CAUTION

Throw away O-ring (11) Ø 9 x Ø 1.5 mm.
It is impaired by the above described procedure.



3.6 Remove valve seat (10)

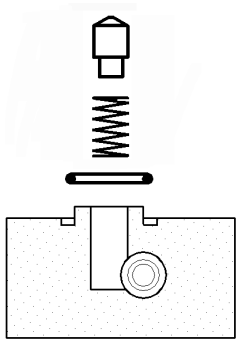
Put valve stem (8), with venting bore on top, into body top lever part (7) as shown.



… 3.6

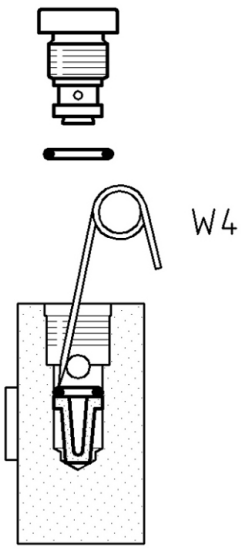
Remove valve seat (10) with W1 (centering pin) via valve stem (8) as shown.

Remove O-ring (9) Ø 3.68 x Ø 1.78 mm, from valve seat (10).



3.7 Remove sealing cone (12), coil spring (13) and O-ring (14)

Remove sealing cone (12) , coil spring (13) and O-ring (14) Ø 10.82 x Ø 1.78 mm from lower body lever valve (15).



3.8 Remove plug screw (19), O-rings (18) and (17), filter (16)

⚠ CAUTION

For this fix lower body lever valve (15) with its narrow sides in a vice with smooth vice jaws or a firm cloth.

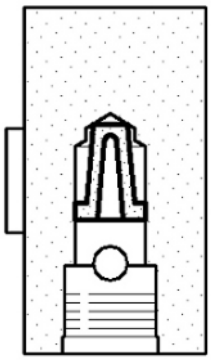
Remove plug screw (19) by a hexagon key L-wrench, hexagon 5 mm.

Remove O-ring (18) Ø 8 x Ø 1.5 mm from plug screw (19).

Remove O-ring (17) Ø 4.47 x Ø 1.78 mm with W4 (safety pin) .

⚠ CAUTION

Throw away O-ring (17) Ø 4.47 x Ø 1.78 mm.
It is impaired by the above described procedure.



... 3.8

Remove filter (16), for this take lower body lever valve (15), with filter chamber showing down and tap the lower body lever valve (15) on a clean surface until the filter (16) falls out.

4. Assemble valve

NOTE

Numbers stated behind the parts designation are related to the parts list at page 12 and 13.

NOTE

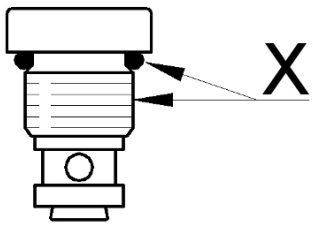
Check all single parts for wear.
Replace all worn or faulty parts.

Always replace sealing cone (12) !

Always replace all O-rings !
Use gasket kit 012891.

Use maintenance kit 012889.

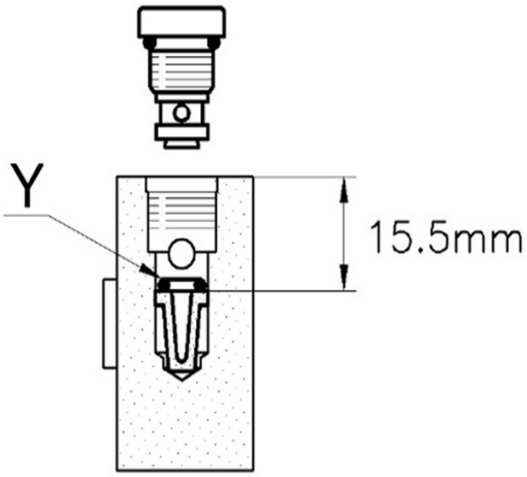
Lightly grease threads and O-rings with a suitable lubricant; e.g. 003953.



4.1 Plug screw (19) and O-ring (18)

Put O-ring (18) Ø 8 x Ø 1.5 mm on plug screw (19).

X - Lubricate O-ring (18) and thread of plug screw (19).



4.2 Assemble filter (16), O-ring (17), plug screw (19) with O-Ring (18)

⚠ CAUTION

For this fix lower body lever valve (15) with its narrow sides in a vice with smooth vice jaws or a firm cloth.

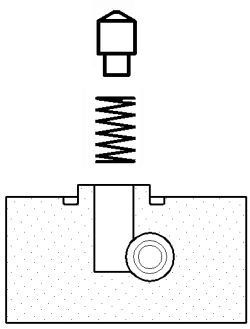
Insert filter (16), thereby do not tilt it. Move filter (16) down against block. Check mounting depth 15.5 mm.

Y - Put O-ring (17) Ø 4.47 x Ø1.78 mm **not lubricated** onto filter (16).

Screw in plug screw (19) with a hexagon key L-wrench, hexagon 5 mm .

⚠ CAUTION

Fasten plug screw (19) by a torque wrench with 8.5 Nm (0.85 kpm).

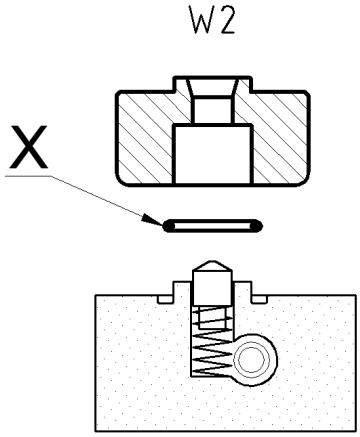


4.3 Assemble coil spring (13) and sealing cone (12)

Insert coil pring (13) and sealing cone (12) in lower body lever valve (15).

⚠ CAUTION

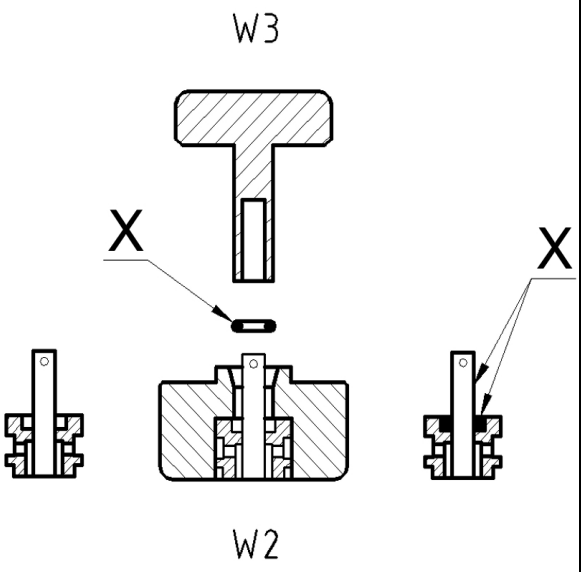
Check sealing cone (12) for mobility with fingertip.



4.4 Assemble O-Ring (14)

X - Lubricate O-ring (14) Ø 10.82 x Ø 1.78 mm.

Press O-ring (14) into groove of lower body lever valve (15) with W2 (retainer).



4.5 Assemble valve stem (8) and O-ring (9) in valve seat (10)

Put valve stem (8), with venting bore on top, into valve seat (10).
Put W2 (retainer) over both parts as shown.

X - Lubricate O-ring (9) Ø 3.68 x Ø 1.78.

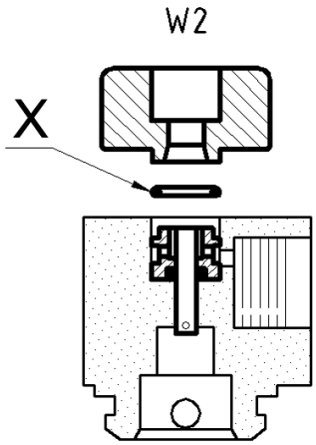
Press O-Ring (9) with W3 (plunger) in valve seat (10).

Remove W2 (retainer).

X - Lubricate projecting part of the valve stem (8) and face of the valve seat (10).

⚠ CAUTION

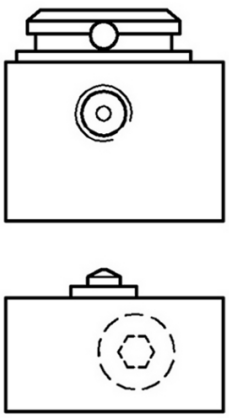
In this connection do not move valve stem (8) to avoid that O-Ring (9) will be pushed out of valve seat (10).



4.6 Assemple valve seat (10) with valve stem (8) and O-ring (9)

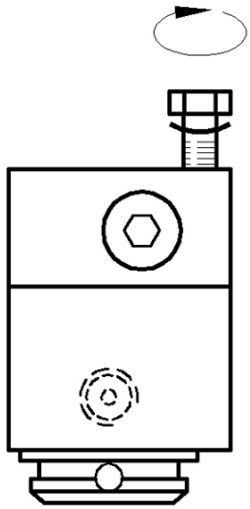
Insert valve seat (10) with mentioned parts into body top lever part (7).

X - Lubricate O-ring (11) Ø 9 x Ø 1.5 mm and push it with W2 (retainer) into body top lever part(7).



4.7 Unite valve body upper part (7) with lower body lever valve (15)

Place body top lever part (7) on lower body lever valve (15).



… 4.7

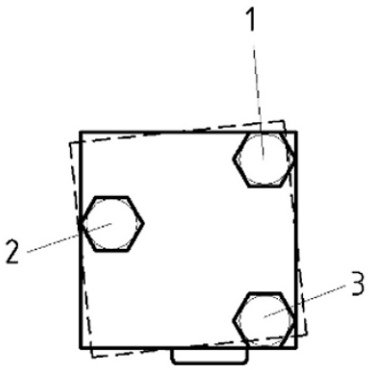
Press body top lever part (7) and lower body lever valve (15) together by hand as shown.

Screw in by hand or with an open ended or ring spanner, jaw size 10 mm, only 1 pcs hexagon screw (21) with curved spring washer (20) as shown.

⚠ CAUTION

For this fix only body top lever part (7) in a vice with smooth vice jaws or a firm cloth.

Valve body lower part (15) should be still moveable.



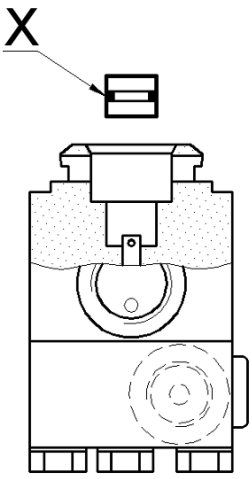
… 4.7

Align the sides of body top lever part (7) with the sides of lower body lever valve (15).

Screw in by hand or with a open ended or ring spanner, jaw size 10 mm, the remaining 2 pcs hexagon screws (21) with curved spring washers (20).

⚠ CAUTION

Tighten hexagon screws (21) in sequence 1-2-3 by torque wrench with 8.5 Nm (0.85 kpm).

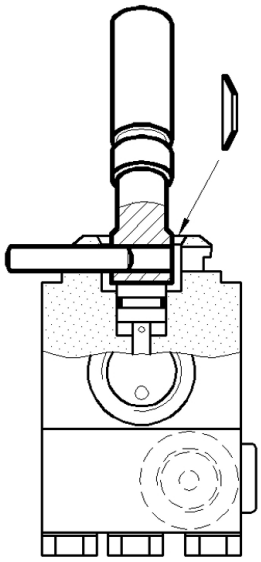


4.8 Assemble thrust insert (6) and O-ring (5)

X - Lubricate O-Ring (5) Ø 7 x Ø 1.5 mm and put it on thrust insert (6).

Push thrust insert (6) with O-ring (5) into valve body upper part (7).

Move thrust insert (6) with W1 (drift Ø 5mm) two to three times down.



4.9 Assemble lever bar (2)

⚠ CAUTION

For this fix the valve in a vice with smooth vice jaws or a firm cloth.

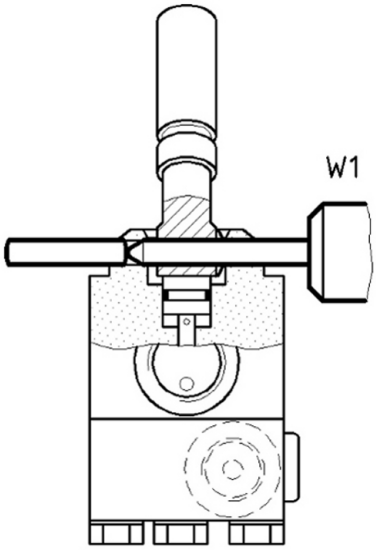
Lightly lubricate bore in lever bar (2).

Place lever bar (2) in the valve that it points backward, related to the valve outlet.

The bore in the body top lever part (7) and in the lever bar (2) should align.

Insert cylinder pin (3) to the middle of the valve and insert the spring washer (4) as shown.

If cylinder pin (3) cannot be moved by hand, push it in with a pin punch Ø 5mm and a light hammer.

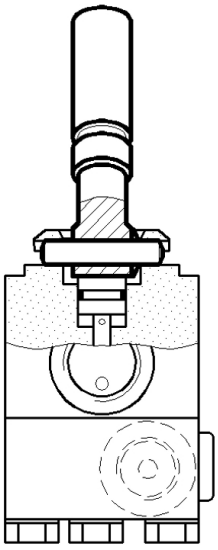


… 4.9

Center spring washer(4) with W1 (drift Ø 5mm) .

⚠ CAUTION

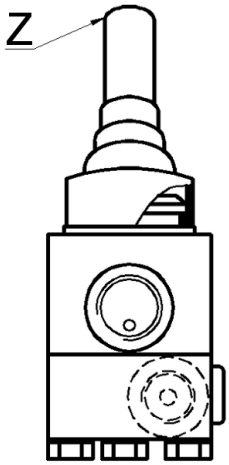
Thereby do not push out cylinder pin (3).



… 4.9

Fully push in cylinder pin (3).

If cylinder pin (3) cannot be moved by hand, push it in with a pin punch Ø 5mm and a light hammer.



4.10 Attach gaiter (1)

Z - Moisten lever bar (2) with a little soap water.

Slide the gaiter (1) over lever bar (2) and fix it at body top lever part(7).

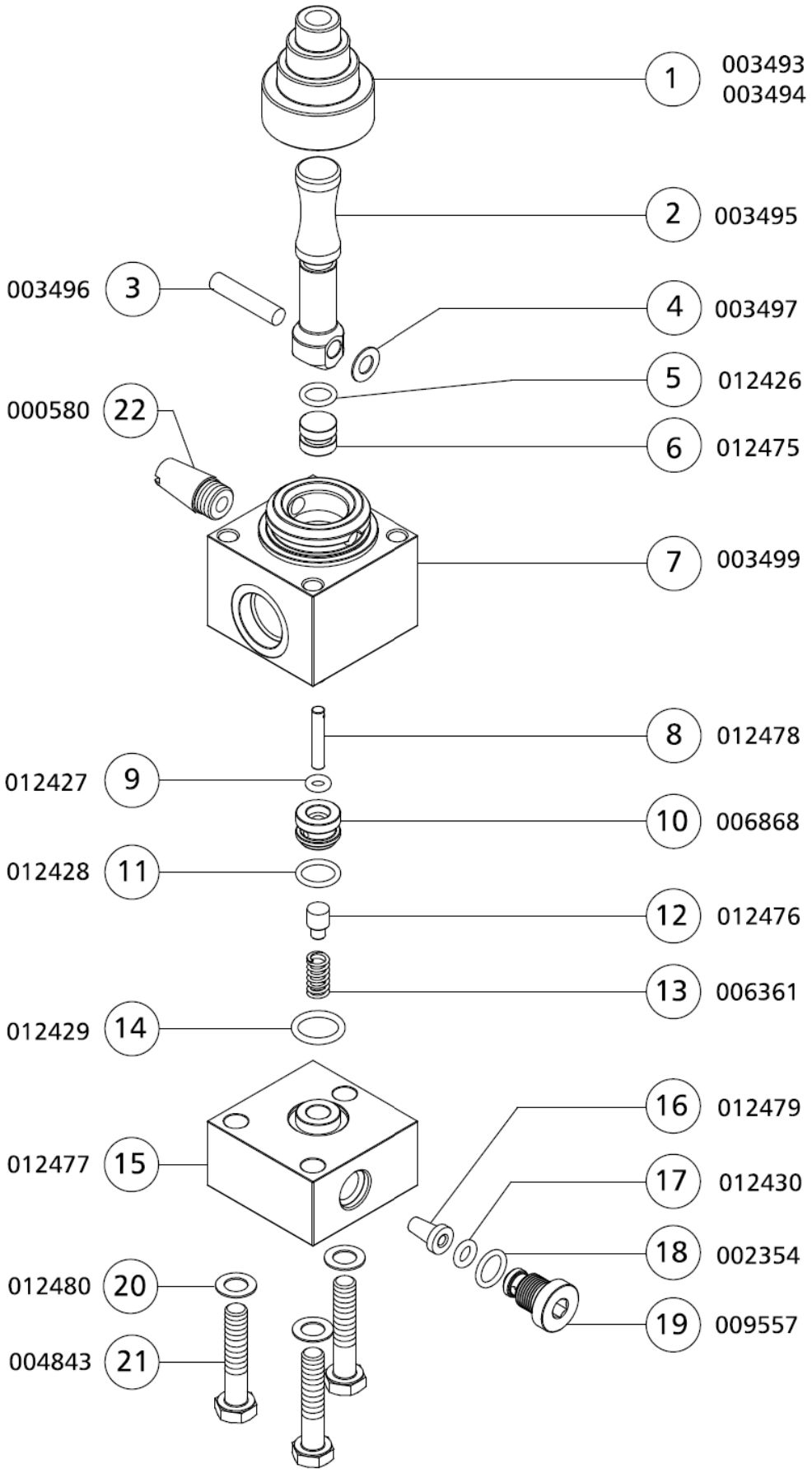
Ensure that the bead at the bottom of the gaiter (1) engages correctly in the groove body top lever part (7) and check that the gaiter (1) is not twisted in itself.

Operate the lever bar (2) several times and check that the gaiter (1) is working properly. Correct the installation of gaiter (1) if necessary.

The assembly of the toggle filling valve is thereby completed.

Reconditioning for Lever Filling Valve 002449 (200 bar) and 002450 (300 bar)

with valve body made from Aluminium



Reconditioning for Lever Filling Valve 002449 (200 bar) and 002450 (300 bar)

with valve body made from Aluminium

Best.-Nr. / Order No.	Benennung	Description
002449	Kipphebelventil / Füllleiste 200 bar Material Alu	Lever filling valve / filling panel 200 bar
002450	Kipphebelventil / Füllleiste 300 bar Material Alu	Lever filling valve / filling panel 300 bar

Teil-Nr. / Part No.	Anzahl / Quantity	Best.-Nr. / Order No.	Benennung	Description
1	1	003493	Faltenbalg (Kipphebelventil) schwarz	Gaiter, lever valve, black
1	1	003494	Faltenbalg (Kipphebelventil) rot	Gaiter, lever valve, red
2	1	003495	Kipphebel verchromt	Lever bar s/s, toggle valve
3	1	003496	Zylinder Stift für Kipphebelventil, ø5x24	Cylinder pin lever valve (new)
4	1	003497 #	Tellerfeder Kipphebelventil	Spring washer, toggle valve
5	1 *	012426 #	O-Ring, 7 x 1,5 NBR70	O-Ring
6	1 *	012475 #	Druckstück Kipphebelventil	Thrust insert lever valve
7	1	003499 #	Ventilkörper Oberteil	Body top lever valve
8	1 *	012478 #	Ventilstange Kipphebelventil	Valve stem - lever valve
9	1 *	012427 #	O-Ring, 3,35 x 1,78 NBR 90	O-Ring
10	1 *	006868 #	Ventilsitz Kipphebelventil	Valve seat, lever valve
11	1 *	012428 #	O-Ring, 9 x 1,5 NBR70	O-Ring
12	1 *	012476 #	Dichtkegel Kipphebelventil	Sealing Cone - lever valve
13	1	006361 #	Ventilfeder Kipphebelventil, ø6x11	Coil Spring lever valve
14	1 *	012429 #	O-Ring, 10,82 x 1,78 NBR70	O-Ring
15	1	012477 #	Ventilkörper Unterteil	Lower body lever valve housing
16	1 *	012479 #	Sinterfilter Kipphebelventil	Sinter filter lever valve
17	1 *	012430 #	O-Ring, 4,47 x 1,78 NBR70	O-Ring
18	1 *	002354 #	O-Ring, 8 x 1,5 NBR90	O-Ring
19	1	009557 #	Halteschraube G1/8 - Kipphebelventil	Plug screw, lever valve
20	3	012480 #	Federscheibe 6 mm	Spring washer 6 mm
21	3	004843	6-kant Schraube, M8x30 DIN931	Screw
22	1	000580	Schalldämpfer für Kipphebelventil, G1/8"	Silencer lever filling valve

= not available separately

* = included in the seal kit (012891) and maintenance kit (012889)

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Lenhardt & Wagner GmbH

An der Tuchbleiche 39
D-68623 Lampertheim – Hüttenfeld

www.lw-compressors.com

Operating Instruction

Safety valve

Typ:
SiV2 BKZ TÜV.SV.19-1140.5.G.V.P CE 0091 AlMgSi1 F31 1100* Lenhardt & Wagner

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

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

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

Safety valve with socket

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

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

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

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

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

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

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

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

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

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

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

Dismantling of the safety valve

Ensure that on the safety valve is no pressure.

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

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

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

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

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

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

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

Maintenance:

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

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

- Oil quantity: 5-10 drops

Figure 1: Position for oil refill

To be used lubricating oil for the safety valve: L&W Article N°.: 008500

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

E

CONTENTS

E

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 appendix.

Recurring test

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

Procedure for hose lines found to be "defective"

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

Test intervals

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.

Auswechseln 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

Unverzüglicher 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.

ANNEX

E

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!