



Maintenance Specialist Manual

AutoMaXX-N

Normal Pressure Lung Governed Demand Valves



Order No.: 10028715/04

MSA manufactures respiratory equipment for work and rescue. Maintenance specialists who regularly maintain and check this equipment are trained by MSA. MSA recommends to take a repeat training course every 3 years. Another precondition for correct work is a properly equipped maintenance shop with the required measuring and test equipment.

This maintenance specialist manual refers to the proper use of the product and serves to prevent hazards. It must be read and observed by all persons who use, care for, maintain and control this product. The lung governed demand valve will do the job it is designed to do only if it is used and serviced according to the instructions from MSA. The warranties made by MSA are voided if it is not used according to this manual. Before choosing and using the lung governed demand valve, it is required to assess whether it is suitable for the intended application. Choice and use are beyond the control of MSA. Therefore the liability covers only the consistent quality of the product. The above does not alter statements regarding the warranties and conditions of sale and deliveries of MSA.



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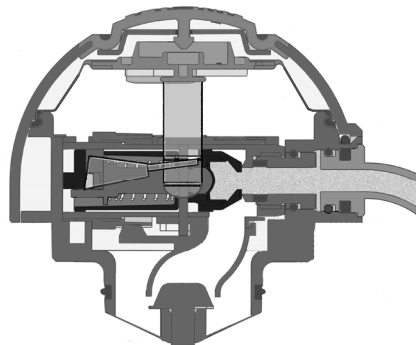
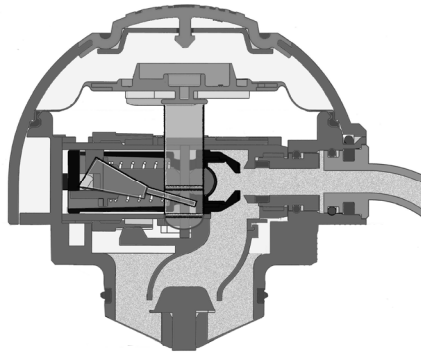
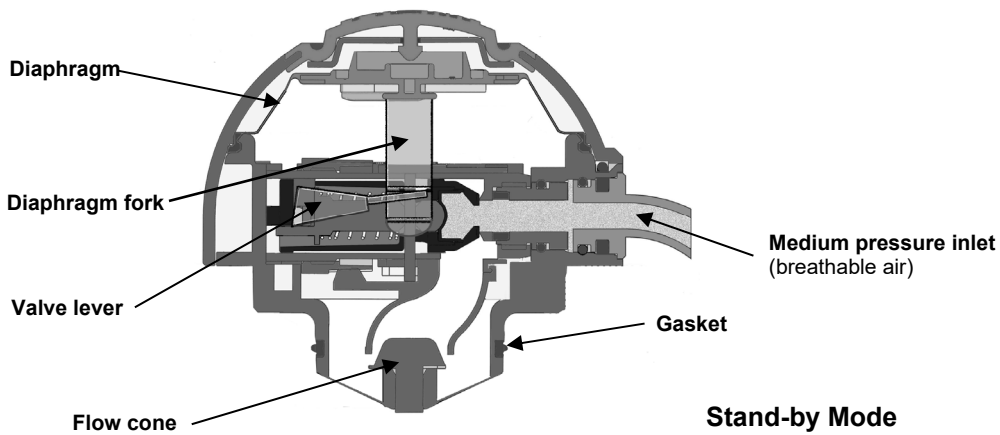
1.	Description of the AutoMaXX	4
1.1	Apparatus System	4
1.2	Figure	4
1.3	Stand-by mode	5
1.4	Inhaling and Exhaling	5
1.5	Flushing, Venting	5
2.	Assembly, Disassembly	6
2.1	Figure	6
2.2	Handwheel	6
2.2.1	Disassembly	6
2.2.2	Assembly	6
2.3	Protective Cap	7
2.3.1	Disassembly	7
2.3.2	Assembly	7
2.4	Medium Pressure Line	7
2.4.1	Disassembly	7
2.4.2	Assembly	7
2.5	Diaphragm	7
2.5.1	Disassembly	7
2.5.2	Assembly	7
2.6	Valve System	8
2.6.1	Figure	8
2.6.2	Disassembly	8
2.6.3	Assembly	8
2.7	Operating Buttons	8
2.7.1	Figure	8
2.7.2	Disassembly	8
2.7.3	Assembly	8
3.	Maintenance, Checks, Repair, Settings	9
3.1	Care and Maintenance Intervals	9
3.2	Care	9
3.2.1	Cleaning, Disinfection	9
3.2.2	Storage	9
3.3	Checks, Repair, Settings	10
3.3.1	Test Equipment	10
3.3.2	Tightness	10
3.3.3	Opening Pressure	10
3.3.4	Diaphragm	10
3.3.5	Securing clamp	11
3.3.6	Valve System	12
3.3.7	Flow Cone	12
3.3.8	Operating Buttons	12
3.3.9	Lever Height	12
3.3.10	Gasket	13
3.3.11	Overhaul	13
3.3.12	Checklist	14
3.3.13	Check and Setting Values, Test Set-Ups	15
4.	Fault Detection	16
5.	Ordering Information	17

1 Description of the AutoMaXX

1.1 Apparatus System

The positive pressure lung governed demand valves of the AutoMaXX range are breath-controlled dosing systems. They consist mainly of a plastic housing with integrated diaphragm control. They are connected to the pressure reducer with a swiveling, highly elastic 'Superflex' medium pressure line. The functioning of the lung governed demand valves are generally identical and are covered together in this manual. The differences are mentioned in the text.

1.2 Figure



1.3 Stand-by Mode

By connecting the lung governed demand valve to the medium pressure, breathable air of approx. 7 bar medium pressure flows into the lung governed demand valve. The pressure spring keeps the valve closed.

1.4 Inhaling and Exhaling

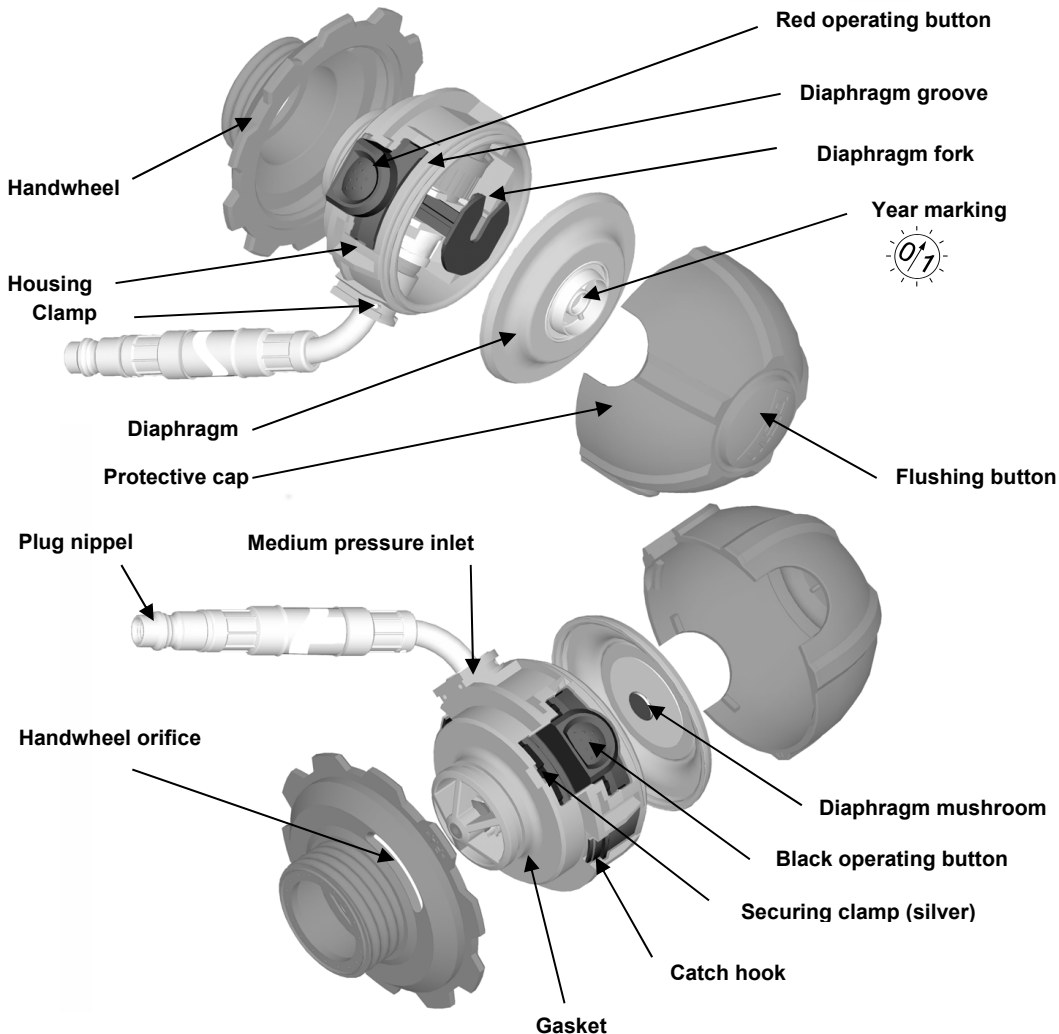
Before inhaling the lung governed demand valve is in stand-by mode where no breathable air is released. When air is inhaled from the facepiece, a negative pressure is created inside the lung governed demand valve which draws the diaphragm downward. This opens the valve through the valve lever. When the breath of air is finished, pressure builds up again in the lung governed demand valve, raising the diaphragm and closing the valve.

1.5 Flushing, Venting

With dosed pushing of the flushing button, the diaphragm is pushed downward and opens the valve through the valve lever. Thus breathable air flows into the mask through finger force. The deeper the flushing button is pushed, the more air flows.

2 Assembly, Disassembly

2.1 Figure



2.2 Handwheel

- Required tool: small, commercially available screwdriver

2.2.1 Disassembly

- Turn handwheel until the silver colored securing clamp underneath the operating button is visible
- Depress securing clamp with the screwdriver, then holding down both operating buttons at the same time pull off the handwheel.



Danger!

If you do not follow accurately this procedure above, you may deteriorate the clamp and it might not be able to keep the handwheel and demand valve connected in a situation when the demand valve is pulled.
Replace securing clamp, if damaged.

2.2.2 Assembly

- Depress securing clamp with the screwdriver holding down both operating buttons at the same time
- Push on handwheel till stop still holding down both operating buttons.

2.3 Protective Cap

- Required tool: small, commercially available screwdriver

2.3.1 Disassembly

- Depress securing clamp underneath the operating button with the screwdriver, holding down both operating buttons at the same time with one hand
- With two fingers of the other hand push together both catch hooks of the housing and push off the protective cap

2.3.2 Assembly

- Depress securing clamp with the screwdriver, holding down both operating buttons at the same time with one hand
- With the other hand push the protective cap onto the housing until it catches visibly and audibly

2.4 Medium Pressure Line

2.4.1 Disassembly

- With the protective cap disassembled, pull the silver colored clamp out of the housing
- Pull medium pressure line out of housing

2.4.2 Assembly

- Check O-ring on bend for visible damage and replace if required
- Push medium pressure line into housing till stop
- Push clamp from the diaphragm side into holes of housing til it stopps. The medium pressure line is secured

2.5 Diaphragm

2.5.1 Disassembly

- Disassemble handwheel and protective cap
- Unbutton diaphragm from diaphragm groove of housing
- Double the diaphragm over until the slot in the diaphragm fork is visible
- Pull diaphragm out of diaphragm fork in direction of the slot

2.5.2 Assembly

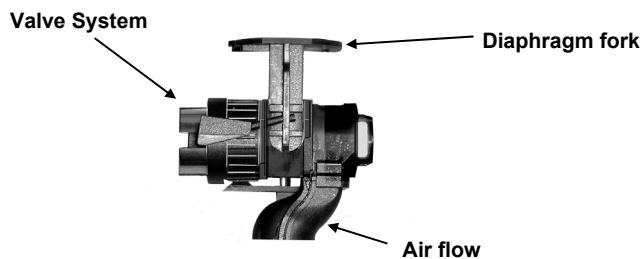
- Push diaphragm mushroom of the diaphragm into the slot of the diaphragm fork
- Button diaphragm into diaphragm groove of housing

➔ **Perform test for tightness (see 3.3.2) and opening pressure (see 3.3.3)**

2.6 Valve System

- Required tool: Screwdriver 10x1.6 for slotted screws, Torque wrench suitable for 2 Nm

2.6.1 Figure



2.6.2 Disassembly

- Disassemble handwheel, protective cap and medium pressure line
- Loosen valve screw in medium pressure line inlet of housing with screwdriver and let screw fall out downward
- Take valve system out of housing

2.6.3 Assembly

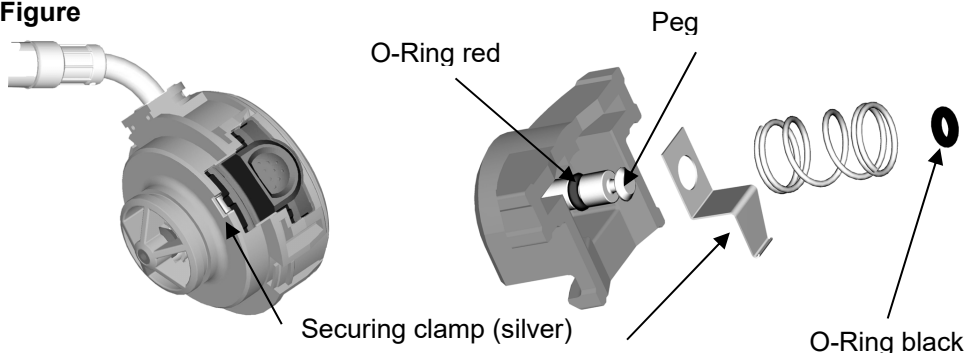
- Check lever height and adjust if required (see 3.3.9)
- Check O-ring of valve screw for visible damage and replace if required
- Insert valve screw into medium pressure inlet and tighten with the screwdriver or the torque wrench to 2 Nm

→ When changing the valve system the flow cone has to be changed and tuned

2.7 Operating buttons

- Required tool: wire kook

2.7.1 Figure



2.7.2 Disassembly

- Disassemble handwheel, protective cap and medium pressure line and valve system
- Push down operating button
- Pull off black O-ring from peg with wire hook
- Take operating button out of housing

2.7.3 Assembly

- Slightly lubricate red O-ring with lubricant (Part No. 10032084)
- Push securing clamp onto peg
- Assemble red O-ring with assembly tool.
- Place spring over peg
- Insert operating button into housing

→ Insert operating button on side of housing which has the orifice for the securing clamp

- Push down operating button
- Push black O-ring onto peg until it catches in the groove

3 Maintenance

3.1 Maintenance Intervals¹ (Specified by MSA)

→ Do not use organic solvents like nitro dilution, alcohol, spirit, gasoline, etc.

→ Record all work and checks in a checklist (see 3.3.12)

The maintenance intervals are recommended by MSA.

Applicable national regulations must be observed.

If required, the local conditions during use must be considered for the work to be performed. In case of doubt, the local MSA representative should be consulted and the applicable national regulations be checked.

See Sect.	Work to be performed	After Use	Annually	Every 3 Years	Every 9 Years ²⁾
3.2.1	Cleaning ¹⁾	X		X	
3.3.2	Visual-,function- and tightness check	X ³⁾	X		
3.3.4	Diaphragm replacement			X	
3.3.11	Overhaul				X

1) Disinfection if necessary

2) For SCBA with a high frequency of use we recommend an overhaul after approx. 540 hours already.
(540 h signifies 1080 applications with a use period of 30 minutes)

3) Only after use in aggressive media or under extreme conditions

The indicated intervals represent maximum periods under optimal storage conditions. If necessary and according to conditions of use (e.g. in aggressive media), the work listed in the table can also be carried out earlier than the specified intervals.

3.2 Care

3.2.1 Cleaning, Disinfection Please refer to the following separate documents for cleaning and disinfection instructions:

- 10201392 OPM LGDV Cleaning & Disinfection by hand RM
- 10156921 OPM LGDV Cleaning & Disinfection TopCleanM

3.2.2 Storage

- Store lung governed demand valve with fitted cap (Part No. 10016012) in a dry room that is free from dust and dirt at preferably approx. 20°C

3.3 Checks, Repair, Settings

3.3.1 Test Equipment

In order to carry out the described checks, MSA offers a large range of various test equipment for purely static tests, as well as combined apparatus for static and dynamic tests. Computer supported models are also available that can be extended to test networks. For technical information please refer to the following:

Multitest plus (only for static tests)	ID 01-743.2
Multicheck II	ID 01-747.2
Multicheck eco	ID 01-748.2
Proficheck SD	ID 01-749.2

Information is also available from the sales representatives and the customer service.

3.3.2 Tightness

- Care and maintenance intervals: see 3.1

→ **The lung governed demand valve should be checked completely assembled with, as well as without medium pressure**

Without Medium Pressure

To check the tightness of housing and diaphragm:

- Connect lung governed demand valve to a test device
- Create a positive pressure of +7.5 mbar as well as negative pressure of -7,5 mbar for 60 seconds and observe pressure change

→ **The pressure change within 60 seconds must not exceed 0.3 mbar**

With Medium Pressure

To check the tightness of the valve system:

- Connect lung governed demand valve to the medium pressure
- Connect lung governed demand valve to a test device and observe pressure change

→ **The pressure increase must not exceed 1 mbar within 60 seconds**

3.3.3 Opening Pressure

- Care and maintenance intervals: see 3.1

→ **In order to prevent damage to the test device, observe its Instructions for Use**

- Connect completely assembled lung governed demand valve to the medium pressure
- Connect lung governed demand valve to a test device
- Through the vent mode of the test device release a volume flow of 10 l/min
- Close vent mode
- Slowly increase negative pressure and observe opening pressure

→ **The opening pressure of the AutoMaXX must not exceed -3.5 mbar (negative pressure)**

3.3.4 Diaphragm

- Care and maintenance intervals: see 3.1
- Unbutton diaphragm from diaphragm groove of housing and pull out of diaphragm fork (see 2.5.1)
- Check diaphragm for hair line cracks and tears by stretching slightly and replace in case of damage
- Check diaphragm for expiration (see Figure 2.1: Year marking) and replace if required
- Perform tightness check (see 3.3.2) and opening pressure test (see 3.3.3)

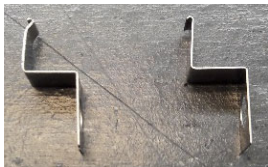
3.3.5 Securing clamp



- Disassemble operating buttons from housing (see 2.7.2).



- Remove securing clamp from the button. If necessary, remove red O-ring.



- Check if securing clamp is deformed.



- Assemble new securing clamp, if required.



- Assemble operating buttons to the housing (see 2.7.3).

- Perform tightness check (see 3.3.2) and opening pressure test (see 3.3.3).

3.3.6 Valve System

- Disassemble valve system from housing (see 2.6.2)
- Check valve system for visible damage, replace system if required

→ When changing the valve system the flow cone has to be changed and tuned

3.3.7 Flow Cone

- Maintenance intervals: after changing the valve; Required tool: 3 mm inbuss spanner
- Remove the flow cone with the aid of the inbuss spanner and clean the thread
- Screw in a new flow cone using minimum effort until it stops
- Perform breathing test 25x2 l/min and 40x2,5 l/min as well as positive pressure check in eye area of the mask (see 3.3.12)
- In the case of insufficient air flow screw in the flow cone from the outside in the direction of the valve system
- In the case of too much air flow screw in the flow cone away from the valve system
- If the tuning is correct then the threading that is to say the indentation has to be sealed by using a common screw varnish

3.3.8 Operating Buttons

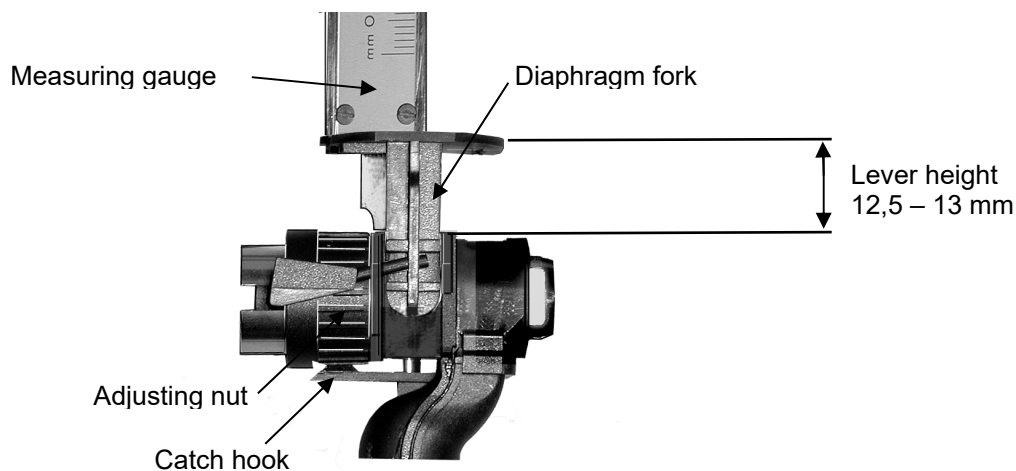
- Disassemble operating buttons from housing (see 2.7.2)
- Check visually for soilage or damage, e.g. defect O-ring, bent securing clamp
- Clean in case of soilage; in case of damage, replace operating button

3.3.9 Lever Height

→ This instruction only applies to the Type Series AutoMaXX from manufacturing month 04/2005. For older regulator applies the lever height 13,5 mm to 14 mm.

- Required tool: commercially available measuring gauge, alternative: caliper, red, lever height 10064103 (before manufacturing month 04/2005: 10035369)

Figure of valve system disassembled from housing



Check in Assembled Condition

- With disassembled protective cap and diaphragm, measure the height between the upper edge of the diaphragm fork and the level surface of the valve
- If the height deviates from <12.5 or >13mm resp. outside the area between the lower and the upper mark of the caliper, the valve system must be disassembled from the housing and the correct height must be set

Check and Setting in Disassembled Condition

- Valve system must be disassembled from housing
- Push down catch hook
- Turn adjusting nut to correct setting

3.3.10 Gasket



- In case the adapter or handwheel of the lung governed demand valve is hard to turn, take gasket out of housing groove and slightly lubricate the inside with lubricant (Part No. 10032084)
- In case of visible damage, replace the gasket

3.3.11 Overhaul

- Maintenance intervals: see 3.1
- During the overhaul the following components or systems are replaced:

Component or System	See Sect.
Diaphragm	2.5 + 3.3.4
Valve system	2.6 + 3.3.6
O-rings operating buttons	2.7 + 3.3.8
Securing clamp	3.3.5
Gasket	3.3.10
O-ring bend of medium pressure line	2.4
O-rings valve screw	2.6.3

3.3.12 Checklist

Gerätekarte Normaldruck-Lungenautomat / Checklist of Lung Governed Demand Valve

Lungenautomat / Lung Governed Demand Valve

Bezeichnung/Type:

Bestell-Nr./Part No.:

Geräte-Nr./Serial No.:

Prüfung / Inspection	Sollwert / Nominal value	Geprüft / Checked
Desinfektion / Reinigung Disinfection / Cleaning		
Prüfung der Membran Check of Diaphragm		
Wechsel der Membran Replacement of Diaphragm		
Grundüberholung Overhaul		
Dichtprüfung ohne Mitteldruck Tightness test without medium pressure Druckänderung in 1 min bei 7,5 mbar Prüfdruck Deviation of pressure in 1 min at 7,5 mbar test pressure	≤ 0,3 mbar	
Dichtprüfung mit Mitteldruck Tightness test with medium pressure Druckänderung in 1 min Deviation of pressure in 1 min	≤ 1,0 mbar	
Öffnungsdruck bei konst. Absaugung von 10 l/min Opening pressure at constant suction of 10 l/min	≥ 3,5 mbar ≤ 0,5 mbar	
Einatemwiderstand bei Veratmung 25x2,0 l/min bei > 10 bar Vordruck Inhalation resistance at breathing rate of 25x2,0 l/min at > 10 bar prepressure	≥ 4,5 mbar	
Einatemwiderstand bei Veratmung 40x2,5 l/min bei > 20 bar Vordruck Inhalation resistance at breathing rate of 40x2,5 l/min at > 20 bar prepressure	≥ 10 mbar	

Hinweis: Innerhalb des Sollwertes liegende Prüfergebnisse werden mit "OK" bestätigt.

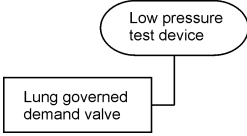
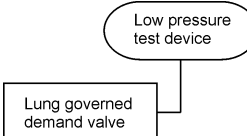
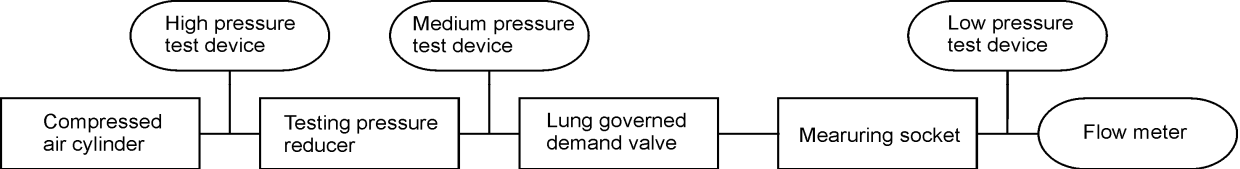
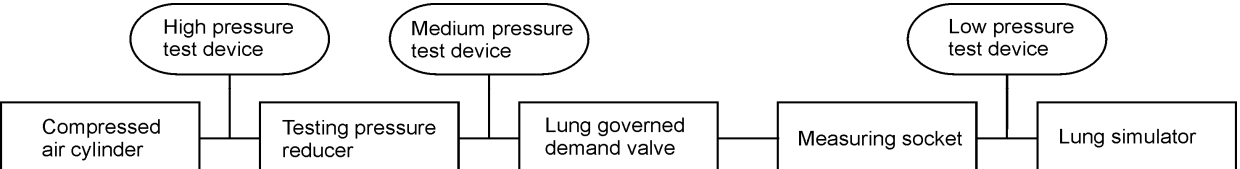
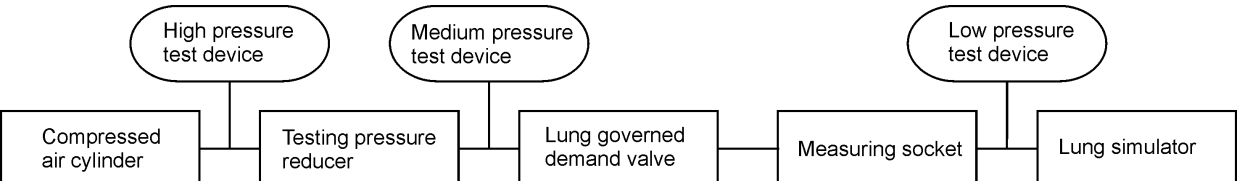
Note: Test results within the tolerances get an "OK".

Datum / Date

Prüfer / Checked by

3.3.13 Check and Setting Values

The low pressure test device shown in the test set-ups corresponds to the test devices described in the text.

Tests	Connection of the AutoMaXX	Test Conditions	Requirements / Settings	Notes
Tightness Check Without Medium Pressure See Sect. 3.3.2	Medium pressure pressure-free	+7,5 mbar positive pressure i.e. -7,5 mbar negativ pressure at low pressure device	Pressure drop ≤ 0,3 mbar in 1 min	
 Test Set-up				
Tightness Check With Medium Pressure See Sect. 3.3.2	Medium pressure approx. 7 bar		Pressure increase ≤ 1,0 mbar in 1 min	
 Test Set-up				
Flush and Venting Mode	Medium pressure approx. 7 bar at mask and test head connected	Slightly depress flushing button Release flushing button	Flushing takes place in relation to force exerted onto button AutoMaXX closes	
Opening Pressure See Sect. 3.3.3 Test Set-up	Medium pressure approx. 7 bar	Check of opening pressure at constant suction of 10l/min	Pressure measuring socket ≥ -3,5 mbar ≤ -0,5 mbar	
				
Breathing 25x2 l/min at Mask Test Set-up	Medium pressure approx. 7 bar	Breathing at lung simulator at high pressure > 10 bar	Inhalation resistance > -4,5mbar	
				
Breathing 40x2,5 l/min at Mask Test Set-up	Medium pressure approx. 7 bar	Breathing at lung simulator at high pressure > 20 bar	Inhalation resistance > -10 mbar	
				

4 Fault Detection

→ In case faults cannot be rectified, please contact the MSA Customer Service.

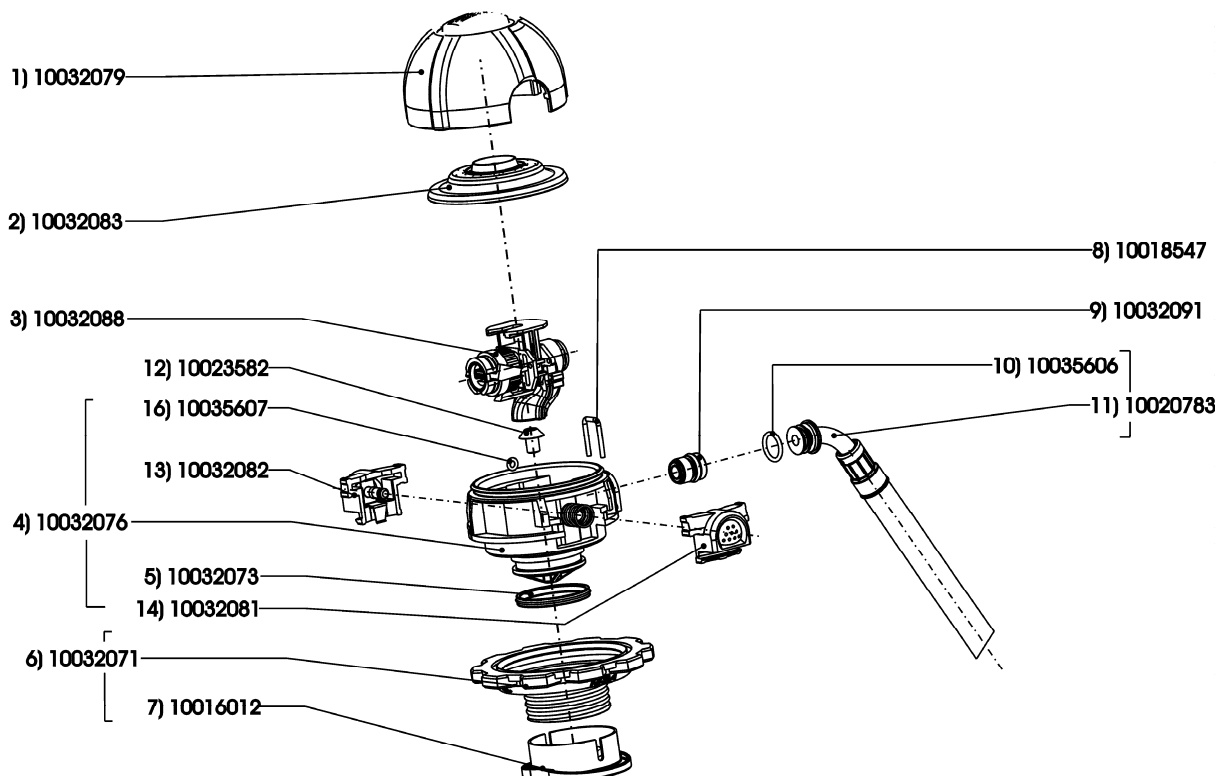
Check / Fault	Cause	Remedy	Sect.
Tightness Check Without Medium Pressure Pressure change >0,3 mbar/min	O-rings (red) on button socket defective	Replace operating buttons	2.7
	Gasket on housing defective	Replace gasket, check gasket groove and clean	3.3.10
	O-ring of medium pressure line defective	Replace O-ring	2.4
	Diaphragm is not properly inserted, resp. dirty or defective	Reassemble diaphragm, clean or replace, check diaphragm groove and clean	2.5
	Housing defective	Check housing for tears, replace if required	
Tightness Check With Medium Pressure Pressure change >1,0 mbar/min	Valve not tight	Replace valve system	2.6
	Diaphragm fork set too high	Disassemble valve system and set lever height of diaphragm fork	3.3.9
Opening Pressure Opening pressure of lung governed demand valve > -3,5 mbar	Valve closing forces too low	Replace valve system	2.6
	Diaphragm hardened due chemical influences	Replace diaphragm	2.5
Air Supply	Air supply from lung governed demand valve	Check medium pressure level	
		Adjust flow cone in air flow	3.3.7
		Check lever height of diaphragm	3.3.9
Flushing Mode Does Not Stop When Flushing Button Is Released	Flow cone is positioned too low in flow channel	Adjust position of flow cone	3.3.7
	Diaphragm fork is set too high	Adjust lever height of diaphragm fork	3.3.9
Black Operating Button Without Securing Clamp Cannot Be Depressed	Path of operating button is blocked	Disassemble operating button and clean	2.7
		Check valve system for damage	2.6

5 Ordering Information

see Spare Parts List lung governed demand valve AutoMaXX

01-150.4

No. Spare Part	Part. No.
1 Protective cap, assembly, spare, AutoMaXX	10032079
2 Diaphragm, pack. of 5, spare, AutoMaXX	10032083
3 Valve system N, spare, AutoMaXX	10032088
4 Housing N, assembly, spare, AutoMaXX	10032076
5 Gasket, pack. of 5, spare, AutoMaXX	10032073
6 Handwheel N	10032071
7 Cap	10016012
8 Clamp	10018547
9 Valve screw	10032091
10 O-Ring 10.82x1.78, pack. of 5	10035606
11 Medium pressure line incl. O-Ring	10020783
12 Flow cone N	10023582
13 Operating button black, AE/N	10032082
14 Operating button black, AS/N	10032081
16 Hold ring 3x1,5 pack of 10, for Button	10035607
19 Overhaul set N, AutoMaXX Consists of Valve system N O-Ring 10.82x1.78, silicone, blue O-Ring 7x1,2 O-Ring 9,52x1,78 O-Ring 2,5x1,5 O-Ring 3x1,5 Gasket	10034632
20 Grease	10032084
Accessories regulator	
21 Check adapter line	10034364
22 Test adapter	10031901
23 Caliper lever height, red	10064103



Notes

Note
