Plus Series and PSS® Series Lung Demand Valve
Types A, AE, ESA and N

Instructions for Use

Dräger

1 For your safety

1.1 General safety statements

- Before using this product, carefully read the Instructions for Use.
- Strictly follow the Instructions for Use. 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 of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only fully trained and competent users 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. Dräger recommend a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.
- Properly trained service personnel must inspect and service this product as detailed in the Maintenance section of this document.
- Use only genuine Dräger spare parts and accessories, or the proper functioning of the product may be impaired.
- Do not use a faulty or incomplete product, and do not modify the product.
- Notify Dräger in the event of any component fault or failure.

1.2 Definitions of alert icons

Alert icons are used in this document to provide and highlight text that requires a greater awareness by the user. A definition of the meaning of each icon is as follows:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in physical injury or damage to the product or environment. It may also be used to alert against unsafe practices.

2 Description

2.1 Product overview

Dräger lung demand valves are high-performance valves that control the breathing air supplied into the mask of a breathing apparatus wearer. The lung demand valve connects the medium-pressure supply from the breathing apparatus to the mask, and a sealed and balanced piston unit inside the valve controls the quantity of air flow through the valve in response to the wearer's breathing demand.

Lung demand valves are either integral or removable. Integral variants have a medium-pressure hose with a pneumatic end fitting that connects to the breathing apparatus pressure reducer. Removable variants have a male quick coupling that connects to a female quick coupling on the breathing apparatus medium-pressure hose.

Lung demand valves are positive-pressure or negative-pressure (see Section 2.1.2), and some variants have a manually operated supplementary air supply (see Section 2.1.4).

2.1.1 Lung demand valve to face mask coupling

The lung demand valve to face mask coupling types are shown in the table below:

Lung demand valve coupling	Face mask coupling	Apparatus type	Coupling type
N	RA	Negative-pressure	Screw-in – 40 mm round thread to EN 148-1
AE	PE	Positive-pressure	Screw-in – M45 × 3 to EN 148-3
A	P	Positive-pressure	Push-in – Dräger specific
ESA	ESA	Positive-pressure	Push-in – DIN 58600 and EN 136/137

Lung demand valve couplings have a swivel feature at the face mask to allow radial movement of the valve without leaking during head and body movement of the wearer.

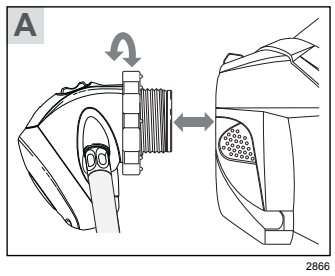
Lung demand valve connection and disconnection methods

- N-type connect/disconnect (see Fig A)
- AE-type connect/disconnect (see Fig B)
- A-type connect (see Fig C)
- A-type disconnect (see Fig D)
- ESA-type connect (see Fig E)
- ESA-type disconnect (see Fig F)

2.1.2 Positive-and negative-pressure valves

Negative-pressure

A negative-pressure valve allows air to flow through the lung demand valve when a negative-pressure occurs inside the mask during wearer inhalation. The pressure in the mask is at times less than external (atmospheric) pressure.



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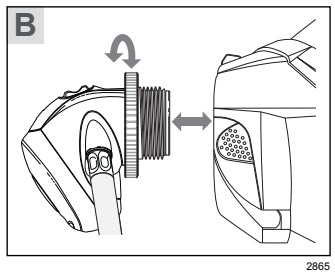

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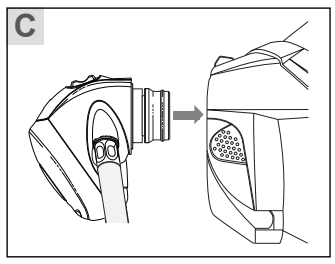

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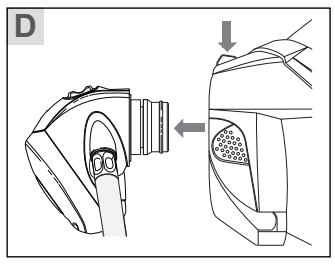

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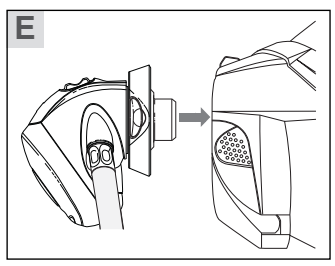

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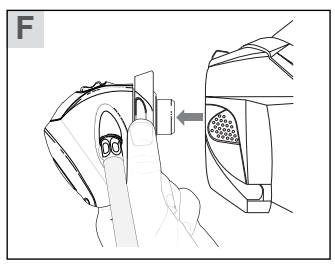

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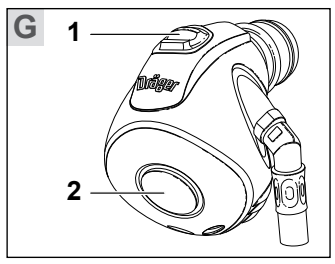

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A negative-pressure lung demand valve is activated on each breath (each inhalation from the breathing apparatus by the wearer).

Positive-pressure

A positive-pressure valve maintains a greater pressure than atmospheric inside the mask. Although the pressure drops as the wearer inhales, the pressure inside the mask remains above atmospheric.

A positive-pressure lung demand valve is activated by first breath (first inhalation from the breathing apparatus by the wearer) or by pressing the front button (Fig G, Item 2). Once activated, positive-pressure valves have a reset button (Fig G, Item 1) to switch off the flow of air through the valve to prevent exhausting the cylinder air when not being worn.

2.1.3 Special use lung demand valves

Lung demand valves with a green rubber cover at the reset button (Fig G, Item 1) indicate that the valve contains a non-silicone diaphragm. The non-silicone diaphragm has a greater permeation resistance than a silicone diaphragm. This is suitable for use in environments containing vapours and gases such as H_2S – hydrogen sulphide.

Contact Dräger for further details about diaphragm types and operating environments.

2.1.4 Supplementary air flow

Some lung demand valve variants are able to provide supplementary air flow into the face mask to clear a misted visor or to provide a temporary increased air supply. The supplementary air flow can be activated by pressing the front button (Fig G, Item 2).

This functionality is not present in lung demand valves used with dedicated escape breathing apparatus.

WARNING

Do not use the supplementary air flow with self-contained breathing apparatus that are not connected to an airline unless it is essential. The supplementary air flow decreases the breathing time from the air cylinder.

2.2 Intended use

Dräger lung demand valves are used with Dräger breathing apparatus to protect the wearer when working in a contaminated or oxygen-deficient atmosphere.

Dräger recommend that only Dräger face masks be used with Dräger lung demand valves to guarantee trouble-free operation.

2.3 Approvals

The European standards, guidelines, and directives according to which this product is approved are specified in the declaration of conformity (see declaration of conformity or www.draeger.com/product-certificates).

2.4 Explanation of marking and symbols

Examples of marking on the lung demand valve:

BRCD-1461	Dräger serial number
P	Positive-pressure
N	Negative-pressure
09/09	Month and year of manufacture
3356812 or R21034	Dräger part number
	Barcode of serial number

The reset button cover (Fig G, Item 1) is colour-coded to indicate the lung demand valve properties:

- Blue – silicone diaphragm, negative-pressure
- Red – silicone diaphragm, positive-pressure
- Green– non-silicone diaphragm

3 Use

The preparation for use and during use instructions are detailed in the breathing apparatus instructions for use.

3.1 Before use

For breathing apparatus with a medium-pressure coupling, disconnect and then reconnect the male coupling. To connect, press the male coupling into the female coupling until an audible click is heard. If there is any difficulty disconnecting or connecting, see the troubleshooting information in the breathing apparatus instructions for use.

3.2 Connecting lung demand valve to face mask

1. Ensure the lung demand valve coupling and face mask connection are clean and undamaged.
2. Connect the lung demand valve to the face mask:
   - Types N and AE: screw the lung demand valve into the face mask connection hand tight.
   - Types A and ESA: push the lung demand valve into the face mask connection, rotating the lung demand valve slightly if necessary, until it clicks into place.
3. Check that the lung demand valve is securely retained by attempting to gently pull the coupling apart.
4. If required by local regulations, have a second person verify that the connection is firm and correct.

4 Troubleshooting

See the breathing apparatus Instructions for Use.

5 Maintenance

5.1 Maintenance table

Dräger recommend that regular inspection, testing and servicing of the lung demand valve is carried out in accordance with the table below.

Additional maintenance may be required in the country of use to ensure compliance with national regulations governing the use, maintenance, examination and testing of this product.

Component	Task	After use	Every month	Every year
Lung demand valve	Check push-in type connectors for lubricant (see Note 1)	O		
	Visual inspection (see Section 5.3)	O	O	
	Functional test (see Section 5.4)	O	O	
	Breathing cycle and static tests (see Note 2)			O
	Check the male element of the quick coupling for burring (see Section 3.1)			O

Notes

O Dräger recommendations

1 For type A check the O-ring on the lung demand valve; and for type ESA check the outer surface of the male part of the push-in connector on the lung demand valve. As a guide, lubricant should be felt on the fingers but not seen. If relubrication is required, lightly apply Dow Corning® Molykote® 111 (other lubricants are not tested and may damage the equipment).

2 These maintenance tasks may only be carried out by Dräger or trained service personnel. Details of the tests are contained in the technical manual which is issued to service personnel that have attended a relevant Dräger maintenance course.

5.2 Cleaning

CAUTION

Do not exceed 60 °C for drying, and remove components from the drying facility immediately when dry. Drying time in a heated dryer must not exceed 30 minutes.

Do not immerse pneumatic or electronic components in cleaning solutions or water unless following the internal cleaning procedure in Section 5.2.2.

Thoroughly dry the lung demand valve after cleaning and disinfecting.

For information about suitable cleaning and disinfecting agents and their specifications refer to document 9100081 on www.draeger.com/IFU.

Refer also to the instructions for use for the face mask and other associated equipment.

- Use only clean lint-free cloths

5.2.1 External cleaning

1. Clean the lung demand valve manually using a cloth moistened with cleaning solution to remove excess dirt.
2. Rinse all components thoroughly with a cloth moistened with clean water to remove all cleaning and disinfecting agents.
3. Dry all components using a dry cloth, in a heated dryer or in air.
4. Contact service personnel or Dräger if disassembly of the lung demand valve is required.

5.2.2 Internal cleaning and disinfecting

CAUTION

Internal cleaning and disinfecting may only be carried out by properly trained personnel. Disassembly of the lung demand valve by untrained personnel is not permitted and may damage the equipment.

Ultrasonic cleaning will damage the diaphragm. Dräger recommend that ultrasonic cleaning methods are not used for any part of the lung demand valve.

Cleaning solutions will eventually remove lubricants from moving parts. Carry out functional tests following cleaning, disinfecting and drying. Re-lubricate moving parts as required.

1. Disassemble the lung demand valve as follows:
   a. Remove the rubber cover (Fig H, Item 1) from the front of the lung demand valve housing. Twist the bayonet cap (2) anticlockwise to remove it (a plate spanner is available from Dräger for this task – see Section 9). Do not attempt to remove the spring from the bayonet cap, and do not stretch, compress or damage the spring during cleaning and disinfecting (note that the spring is not fitted on negative-pressure (N-type) lung demand valves).
   b. Carefully grip the slip ring (Fig H, Item 3). If required, rotate the slip ring until the external lugs are free from the retaining lugs of the housing (Fig I). Remove the slip ring from the housing.
   c. Carefully grip the centre of the diaphragm (Fig H, Item 4) between the thumb and forefinger. Tilt and remove the diaphragm from the housing.
   d. Replace the rubber cover on the front of the lung demand valve to protect the balanced piston lever (6).
2. Immerse and manually agitate the lung demand valve, diaphragm, slip ring and bayonet cap in a cleaning solution.
3. Rinse all parts in clean water.
4. Immerse and manually agitate all parts in a disinfecting solution.
5. Remove the rubber cover from the front of the lung demand valve and rinse all parts in clean water, taking care not to damage the balanced piston lever.
6. Press the reset button (5) to switch off the lung demand valve and then connect the demand valve hose to a medium-pressure breathing air supply (minimum of 4 bar).

WARNING

Do not direct the airflow on to the face, eyes or skin.

7. Lightly press the balanced piston lever to blow away any moisture.
8. Disconnect the air supply and dry all parts using a clean lint-free cloth or a dedicated drying facility.
9. If re-lubrication of the moving parts is required, position the main lever (Fig J, Item 1) and secondary lever (2) as shown. Apply two short squirts of lubricant (Silkospray silicone lubricant) to the circled area in the direction indicated by the arrow.
10. Reassemble the lung demand valve as follows:
    a. Carefully install the diaphragm into the lung demand valve housing.
    b. Carefully insert the profiled side of the slip ring into the housing, ensuring that it sits inside the exterior bead of the diaphragm.
    c. Position the bayonet cap spring in the middle of the diaphragm. Twist the bayonet cap clockwise to fit it to the lung demand valve housing.
    d. Replace the rubber cover on the front of the lung demand valve.

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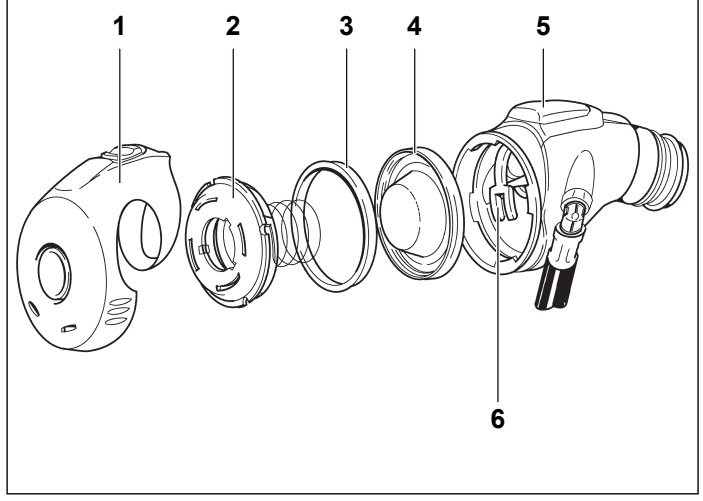

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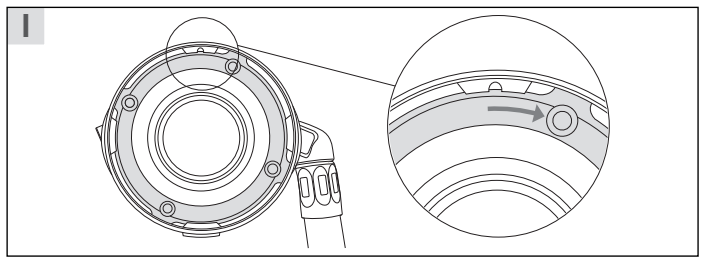

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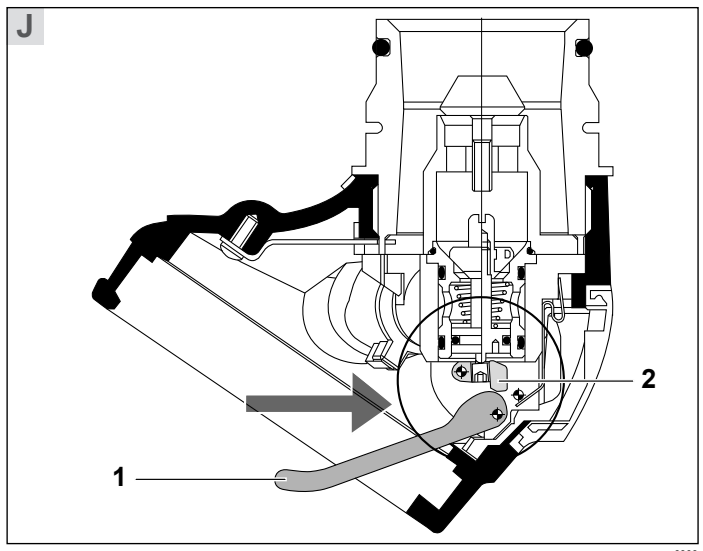

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11. Press the reset button to switch off the valve.
12. Carry out a full functional test of the lung demand valve (see Section 5.4).

5.3 Visual inspection

Check that the lung demand valve is clean and undamaged. Pay particular attention to levers, diaphragm, spring, hoses and connectors. Typical signs of damage that may affect the operation of the lung demand valve include impact, abrasion, cutting and discolouration.

Report damage to trained service personnel or Dräger. Do not use the lung demand valve until the faults are rectified.

5.4 Functional test

Test the lung demand valve as described in the functional and leak test procedure in the breathing apparatus Instructions for Use.

WARNING

Failure of the breathing apparatus to meet any of the standards or parameters described in the functional tests indicates a system fault. Report the fault to trained service personnel or contact Dräger. Do not use the breathing apparatus until the fault condition is rectified.

5.5 Replacing the diaphragm

1. Remove the defective diaphragm and install the replacement. Instructions for replacing the diaphragm are contained in the internal cleaning procedure (see Section 5.2.2).
2. Carry out a full functional test of the lung demand valve (see Section 5.4).

6 Storage

Store the equipment between -15 °C and +25 °C. Ensure that the environment is dry, free from dust and dirt, and does not subject the equipment to wear or damage due to abrasion. Do not store the equipment in direct sunlight.

Route the medium-pressure hose in such a way that the bend radius is not too small and the hose is not stretched, compressed or twisted.

7 Disposal

When required, dispose of the lung demand valve in accordance with national or local regulations for waste disposal.

8 Technical data

Technical data is available from Dräger.

9 Order list

Description	Quantity	Order code
Dow Corning® Molykote® 111	100 grams	3331247
Plate spanner	1	R26817
Silicone lubricant	500 ml	1563343

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Edition 05 – January 2019 (Edition 01 – June 2012)
Subject to alteration

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