1 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 For Your Safety

This variant of the Dräger PAS® Micro Series of equipment incorporates a preset and sealed pressure reducer. The associated lung demand Valve (LDV) has a preset and sealed balanced piston unit assembly. The Dräger guarantee is void should original sealing caps of these units be tampered with, removed, or broken. Correct operational condition is only valid if Dräger service and re-seals the pressure reducer and balanced piston unit.

- Use of this equipment requires wearer training and observance of these Instructions for Use.
- Use the equipment for the purpose specified in this instruction, or as confirmed in writing by Dräger.
- Use and maintenance of this equipment requires knowledge and compliance with National Regulations, Laws and Standards governing the use of respiratory equipment in the country of use.
- Only trained competent personnel should inspect and service the equipment at regular intervals and a record kept of such inspections and service.
- Only trained and competent personnel should carry out the charging of the compressed air cylinders.
- Dräger recommends a Service Contract be obtained from your Dräger Branch or Agent.
- Contact Dräger for details of Service Contracts and Service Training Courses.
- Use only original Dräger Spare Parts for service and maintenance.
- Use only original Dräger Test Equipment for service and maintenance.
- Notify Dräger if there is a component fault or failure.

3 Liability Statement

Terms and Conditions of warranty for the Dräger PAS® Micro Series of equipment can be obtained from Dräger on request. Responsibility for reliable function of the equipment transfers to the owner or operator when serviced or repaired by untrained personnel, (not employed or authorised by Dräger), or when used in a manner not conforming to its intended use.

4 Description and Intended Use

The Dräger PAS® Micro Series of Short Duration/Airline equipment consists of:

- Back Carrying Harness with Cylinder Strap, Shoulder Straps and Waist belt.
- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and integral Lung Demand Valve (LDV).

Alternatively:

- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and medium pressure hose with Quick Release Coupling (QRC).
- Airline Manifold Connection.
- Valved Cylinder Assembly.

The equipment is available in either 10 minute or 15 minute nominal duration versions.

This series of equipment is compatible with a range of lung demand valves, face mask and compressed air cylinders. When used in approved carrying system, valved cylinder assembly, LDV and face mask combinations, the equipment provides the wearer with respiratory protection when working in a contaminated or oxygen deficient gaseous atmosphere.

The effective duration of the equipment is dependant on the capacity (volume) of the cylinder selected and the breathing rate of the wearer.

Details of the equipment variants, accessories, and any approved independent air supply source configurations are available from Dräger on request.

5 Technical Data

5.1 High Pressure Connections

Standard G5/8 as per EN 144-2.
200bar or 300bar

Other connections are available to national standards.

5.2 Whistle Setting

Preset by Dräger to 55bar +/-5bar
(60bar to 50bar)

5.3 LDV to Face mask Connection

Three variants of integral LDV are available:

- Push-In Type A - Positive Pressure (PP).
- Screw-In Type AE - Positive Pressure (PP).
- Screw-In Type N – Normal Demand (ND).

Refer to the Instructions for Use supplied with the face mask.

5.4 Compressed Air Cylinders

Cylinders are available in either steel, or composite materials. Contact Dräger for details.

Cylinders supplied by Dräger are charged at an ambient temperature of 15º C and to the nominal cylinder pressure.

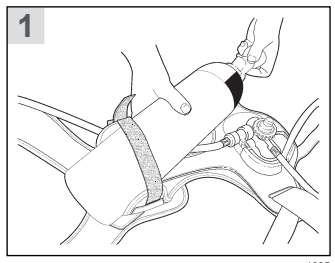
5.5 Airline Manifold Connection

A Male Coupling is incorporated on the airline manifold for the connection of a hose coupling from an independent air supply.

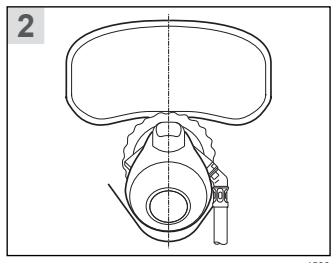
5.6 Airline Operating Pressures and Flow

The selected low pressure independent air supply must meet the following parameters.

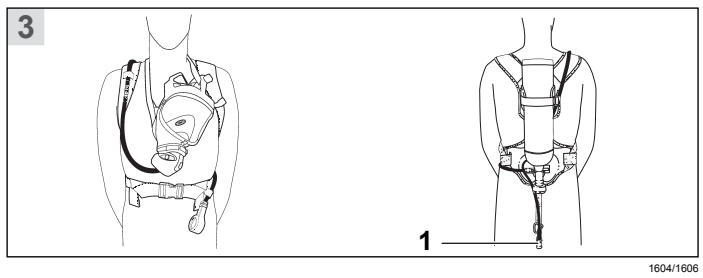
- One User – 6bar to 10bar - airflow rate of at least 550 Litres/minute.
- Two Users – 7bar to 10bar - airflow rate of at least 550 Litres/minute.



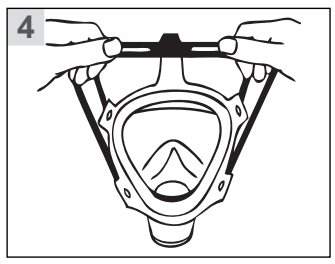
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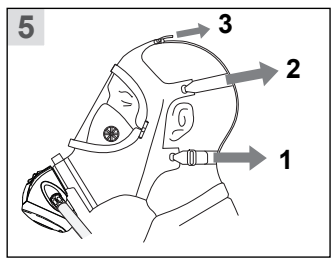
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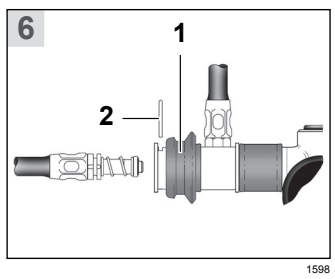
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Safety Warning: Air quality for compressed air breathing systems must conform to the requirements of EN12021. Do Not use oxygen or oxygen enriched air.

6 Preparation for Use

A trained and competent person must perform the following checks and preparation procedures before release of the equipment to a potential wearer for operational use.

6.1 Visual Inspection

Check the integrity of,

- Back Carrying Harness with Cylinder Strap, Shoulder Straps and Waist belt.
- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and integral Lung Demand Valve (LDV).

Alternatively:

- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and medium pressure hose with Quick Release Coupling (QRC).
- Airline Manifold Connection and Hose.
- LDV – refer to the relevant Instructions for Use.
- Face mask – refer to the relevant Instructions for Use.
- Valved Cylinder Assembly.

6.2 Fitting Cylinder

- Place the Carrying Harness on a clean flat surface. Extend the cylinder strap, shoulder straps and waist belt.
- Refer to Fig. 1. Slide the fully pressurised cylinder through the strap locating the valve port to the reducer hand wheel.

Caution: To prevent damage, ensure that the hand wheel of the pressure reducer remains clear of the cylinder.

- Align the cylinder centrally with the Carrying Harness and then screw the hand wheel of the pressure reducer (clockwise) to the port of the valve. Do Not tighten.
- Take up the slack on the cylinder strap to tighten around the cylinder and then pull the strap through the buckle to secure. Insert loose end of strap into the guide loop. Finally tighten the hand wheel – hand tight. Do Not use tools.

6.3 Connecting LDV to QRC

This instruction refers to equipment with medium pressure hose with Quick Release Coupling (QRC).

- Insert the male coupling of the LDV into the female coupling (QRC) of the equipment medium pressure hose. Check the security of the connection. Refer also to the Instructions for Use provided with the LDV.

Important Note: The following test will verify the integrity of the complete assembly. The pressure leak test described should also be carried out following the reassembly of any of the component parts of the pneumatic assembly (spares etc.).

6.4 HP Leak and WWU Test

- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.
- Open the cylinder valve slowly, but fully, to pressurise the system then 'Close' the valve and observe the gauge.

Test Parameter – Indicated pressure on gauge should not decrease more than 10bar in 1 minute.

- Proceed to test the whistle warning unit.
- Type PP LDV's – Cover and seal the outlet of the LDV with the ball of the hand. Press carefully the centre of the rubber cover then lift the hand to slowly vent pressure.
  Type N – Carefully press the centre of the rubber cover to and slowly vent pressure.
- Observe the gauge during venting. The whistle should sound at the preset pressure of 55bar +/- 5bar.
- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.
- Should the whistle not sound at the preset pressure, refer to Dräger Service.

6.5 Leak Test and LP Flow Test - Airline Connection

Refer to Technical Data.

Important Note: If using a works airline to perform the following tests, then connect the isolation valve (3353449) to the female coupling of the airline outlet.

- Connect the male coupling (1) Fig. 4 to the female QRC of the independent air supply.
- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.
- 'Open' the valve of the independent air supply to pressurise the system.

Test Parameter - Check for no audible leak.

- 'Open' the cylinder valve of the breathing equipment to pressurise the system, then disconnect the male coupling (1) Fig. 3 from the female QRC of the hose from the independent air supply.

Test Parameter - Non-return valve check - Check for no audible leak from the female QRC.

- 'Close' the cylinder valve of the breathing equipment, then re-connect the male coupling (1) Fig. 3 to the female QRC of the independent air supply.
- Firmly press the centre of the rubber cover of the LDV to activate the airflow from the LDV. See Safety Warning.

Safety Warning: Do Not direct the airflow onto the face, eyes or skin.

Test Parameters – An unobstructed airflow should vent from the outlet of the LDV. This test should take a minimum of 3 to 5 seconds.

- 'Close' the valve of the independent air supply and observe the LP gauge, or the HP gauge, if fitted.

6.6 Test Parameters

LP Gauge - Indicated pressure should not decrease more than 1bar in 1 minute.
HP Gauge - Indicated pressure should not decrease more than 10bar in 1 minute.

- Disconnect the male coupling (1) Fig. 3 from the female QRC of the independent air supply. Press carefully the centre of the rubber cover of the LDV to vent pressure.
- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.

6.7 Fitting LDV to Face mask

- Inspect the face mask as defined in the relevant Instructions for Use.
- Fully extend (open) the straps of the head harness.

Type A

- Check that the face mask port and the connector O ring of the LDV are clean and undamaged.
- Push the connector of the LDV into the port of the face mask until it 'clicks' in position.
- Check that the attachment is secure by pulling the LDV away from the face mask – there should be no axial movement.

Types AE and N

- Check that the face mask port and sealing ring are clean and undamaged.
- Screw the hand wheel of the LDV into the port of the face mask, align the LDV as shown in Fig. 2 then finally tighten.
- Having 'passed' the test, and the LDV fitted to the face mask, the equipment is now available for use.

7 Use

7.1 Putting on equipment

- Extend the shoulder straps. Open the buckle of the waist belt and extend the straps.
- While supporting the face mask, put on the equipment taking the weight on the shoulders by pulling evenly on the shoulder adjusting straps. Put the neck strap of the face mask over the neck then insert the neck strap stud into the hole in the centre strap of the head harness. Face mask is now in the ready position.
- Loop the waist belt around the waist and fasten the buckle. Pull the ends of the waist belt strap until secure and comfortable. Do Not overtighten. Make any final adjustment necessary to the shoulder adjusting straps.

  Figure 3 shows the correct wearing position.

7.2 Pre Operational Checks

- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.
- 'Open' the cylinder valve.

Note: Refer to Instructions for Use provided with the Face mask.

Safety Warning: Facial hair, beard stubble, side-whiskers, and the wearing of spectacles will adversely affect and interfere with face mask seal. Correct fit of face mask only ensured if face mask seal makes close contact with skin.

- Detach the neck strap stud from the centre strap of the head harness.
- Spread the head harness (Fig. 4), place chin into the face mask then position the harness over the head, locating the centre plate with the back of the head.
- Tighten both lower (1), then upper straps (2) evenly towards back of head. Fig. 5. Tighten the centre strap (3) only if necessary.

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- On achieving a face seal and on taking first breath inhalation the Type PP LDV's will automatically switch to positive pressure starting the air supply to the face mask.
- Breathe normally, and before use perform Function Check.

7.3 Function Check

- 'Close' the cylinder valve. Breathe normally to vent the system of air. When vented, the face mask should hold onto the face indicating a positive seal. Immediately turn 'Open' the cylinder valve and breathe normally.

Note: If a leak is detected, readjust the head harness and retest.

- Inhale and hold breath. Unit must balance, i.e. no audible leak.
- Continue breathing normally. The expired air should flow easily out of the exhalation valve of the face mask.
- Press the centre of the rubber cover of the LDV to activate and check supplementary airflow from the LDV then release the button.
- Continue breathing and proceed to the working area, alternatively refer to Airline Use.

Safety Warning: The duration starts from the time of opening the cylinder valve and fitting the face mask. The effective duration is dependant on the capacity (volume) of the cylinder selected and the breathing rate of the wearer.

- When not connected to the independent air supply, take gauge reading regularly. The WWU will sound at the preset pressure. Go on to a safe area at least when the whistle sounds, by the shortest and safest route.

7.4 Airline Use

Safety Warning: Before using the airline manifold connection to the equipment, 'check' that the independent air supply to be used complies with air quality, pressure and flow requirements (see Technical Data) and that a 'Permit for Use' has been issued. The respirable breathable air supply source connection to the wearer must be located in, or positioned in a safe and uncontaminated area. Dräger recommend that a 'Controller' must be present at all times at the air source connection to monitor and maintain the air supply to the wearer of the Dräger PAS® Micro Series Airline equipment.

The Controller
- 'Close' any relief valves that may be fitted to the independent air supply and then slowly, but fully, 'Open' the valve of the independent air supply to pressurise the system.

The Wearer
- Put On the equipment and perform pre-operational and functional checks as already described.
- Before entering, or when in the working area, connect the male coupling (1) Fig. 3 to the female QRC of the 'Open' independent air supply. Breathe normally then immediately 'Close' the cylinder valve of the equipment. The air supply to the wearer is now from the independent air supply.

The Wearer – Evacuation
- Breathe normally.
- When the task is completed, or when advised by the 'Controller' - proceed to the safe area (Controller). During evacuation take care to hold and carefully withdraw the airline supply hose. See After Use.

Important Note: If it is decided to evacuate the working area without the airline connected, then proceed as follows:

- 'Open' the cylinder valve of the equipment (anticlockwise) slowly, but fully. Breathe normally and then disconnect the male coupling (1) Fig. 3 from the female QRC of the hose from the independent air supply. Breathe normally and immediately leave the hazardous area by the shortest and safest route.

Safety Warning: The remaining duration starts from the time of opening the cylinder valve and disconnecting the independent air supply. The time required to allow the wearer to evacuate to a safe area must be within the remaining capacity (volume) of air in cylinder selected taking into account the breathing rate of the wearer. When in an evacuation scenario Dräger strongly advise that the supplementary supply facility is not used.

- Take gauge reading regularly. The WWU will sound at the preset pressure.

After Use

Safety Warning: Do Not remove equipment until in safe area, clear of hazard.

SDBA Mode
- Release the side straps of the head harness.
- Remove the face mask then 'Close' the cylinder valve.

Airline Mode - The Wearer
- Release the side straps of the head harness.
- Type P and PE - Press the reset button of the LDV to switch 'Off' positive pressure then remove the face mask.

Airline Mode - The Controller
- Following removal of the face mask by the wearer, 'Close' the valve of the independent air supply.

Airline Mode - The Wearer
- Firmly press the centre of the rubber cover of the LDV to activate the airflow from the LDV to vent pressure from the system.

Safety Warning: Do Not direct the airflow onto the face, eyes or skin.

- Following venting, disconnect the male coupling (1) Fig. 3 from the female QRC of the hose from the independent air supply.

Airline Mode - The Controller
- Refer to the After Use section of the Instructions for Use relevant to the independent air supply.

SDBA and Airline Mode
- Following venting of the equipment, unbuckle the waist belt, lift the buckles of the shoulder straps to loosen the harness then remove the equipment.

Note: Do Not drop or throw down equipment as damage could occur.

- Type PP LDV's - Press the reset button of the LDV to switch 'Off' positive pressure.
- Pass equipment to Service Department.

8 Routine Maintenance

To be performed after use of equipment.
See also Maintenance and Test Intervals Chart.

8.1 Removal of Cylinder

Safety Warning: Cylinder valve should be closed and system vented.

- Unscrew the hand wheel of the reducer from the cylinder valve and carefully remove the valved cylinder assembly from the carrying pouch. To prevent damage, ensure that the hand wheel of the pressure reducer remains clear of the cylinder.
- Recharge the cylinder.

8.2 Charging Cylinders

Refer to 'For Your Safety'

Safety Warning: Air quality for compressed air breathing systems must conform to the requirements of EN12021.

Only charge compressed air cylinders which:

- Conform to National Standards.
- Feature the original manufacturers test date and test mark.
- Have not exceeded the test date indicated on the cylinder by the last testing station.
- Do Not used damaged cylinders.

Recharge to the rated pressure indicated on the label or stamped on the neck or shoulder of cylinder. Dräger recommend a charge rate of 27bar/ minute. Rapid charging will induce an increase in temperature resulting in an incomplete charge - check pressure at ambient and if required 'Top Up' charge.

To prevent overcharging of the selected cylinder Dräger recommend that a pressure-limiting device is fitted to the charging compressor.

8.3 Visual Inspection

Check the integrity of,
- Back Carrying Harness with Cylinder Strap, Shoulder Straps and Waist belt.
- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and integral Lung Demand Valve (LDV).

Alternatively,

- Pressure Reducer with HP Gauge, Whistle Warning Unit (WWU) and medium pressure hose with Quick Release Coupling (QRC).
- LDV – refer to the relevant Instructions for Use.
- Airline Manifold Connection and Hose.
- Face mask – refer to the relevant Instructions for Use.
- Valved Cylinder Assembly.

9 Cleaning, Disinfecting, Drying

Safety note: 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.

Safety note: Do not immerse pneumatic or electronic components in cleaning solutions or water.

Safety note: If water is trapped and then freezes inside the pneumatic system of the breathing apparatus (such as the lung demand valve), operation will be impaired. Prevent any liquid from entering, and thoroughly dry the breathing apparatus after cleaning to prevent this from occurring.

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 lung demand valve, face mask and other associated equipment.

- Use only clean lint-free cloths

- Clean the breathing apparatus manually using a cloth moistened with cleaning solution to remove excess dirt.
- Apply disinfecting solution to all internal and external surfaces.
- Rinse all components thoroughly with clean water to remove all cleaning and disinfecting agents.
- Dry all components using a dry cloth, in a heated dryer or in air.
- Contact service personnel or Dräger if disassembly of pneumatic or electronic components is required.

9.1 Lung Demand Valve (LDV)

External cleaning of the LDV may be carried out as required using a cloth dampened in the above cleaning solution.

Important Note: When cleaning using a dampened cloth, take care to prevent any fluid residue entering the demand valve.

When however the user considers it necessary to internally disinfect the LDV then these instructions should be followed:

Note: 1 Detach demand Valves (fitted with male coupling) from the female coupling of the medium pressure hose of equipment.

- Refer also to the Instructions for Use provided with the LDV

Note: 2 If necessary, this variant of the Dräger PAS® Micro Series of equipment requires the demand valves (integral LDV) to be removed from the manifold of the airline manifold connection to the reducer. For details of removal refer to the following section.

9.2 Integral LDV

Refer to Figure 6.

- Roll back the rubber sleeve (1) to access the retention staple (2). Insert a flat blade screwdriver under the retention staple and while pressing the end of the hose into the hose connection of the reducer – remove the retention staple. Remove hose from the airline manifold.
- Remove component parts of the relief valve, i.e. the spring, O ring retainer and O ring from the nozzle of the medium pressure hose. If required, remove the LDV from the front port of the face mask.

Important Note: Cleaning, disinfecting and drying of the LDV must be carried out in line with the Instructions for Use. Refer to the LDV Instructions for Use supplied with the equipment.

- Reverse the above instructions to reassemble the LDV to the equipment and perform Pre Operational Checks as detailed in Instructions for Use for equipment.

9.3 Replacing Diaphragm of the LDV

Refer also to the Instructions for Use provided with the LDV, or the equipment.
Face mask
Refer to Instructions for Use provided with Face mask.

10 Storage - Ready for Use

10.1 Storage preparation

- Extend the shoulder straps, waist belt and the straps of the face mask.
- For storage, place the face mask in a protective bag (contact Dräger for supply of a suitable bag).
- Route rubber hoses in such a way that the bend radius is not too acute and the hose is not stretched, compressed or twisted.

10.2 Storage conditions

- 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.
- Fix the breathing apparatus securely to any raised mounting point to prevent it from falling.

11 Fault, Cause, Remedy

Refer to any associated Instructions for Use supplied with this product, e.g. face mask.

Fault	Possible Cause	Remedy
High pressure leak	Check security of all connections/seals	Tighten or replace seals as necessary
Leak from pressure relief valve of MP hose	1 Damaged O-ring 2 Weak Spring 3 Damaged O-ring retainer	Replace O-ring Replace spring Replace retainer
Leak from pressure relief valve of MP hose Relief valve component satisfactory	Reducer failure	Contact Dräger Service
High or Low medium pressure	Reducer out of specification	Contact Dräger Service
Poor sounding whistle (if fitted)	Dirt	Clean and retest
Whistle not functioning correctly	Defective activation mechanism	Contact Dräger Service

12 Miscellaneous

Description	Order Code
Dow Corning® Molykote® 111	3331247

13 Maintenance and Test Intervals

Service and test the breathing apparatus, including out-of-use apparatus, in accordance with the maintenance table. Record all service details and testing. Refer also to the Instructions for Use for the lung demand valve, face mask and other associated equipment.

Additional inspection and testing may be required in the country of use to ensure compliance with national regulations.

	Description	Before Use	After Use	Every Month	Every Year	Every 6 Years
Complete Equipment	Visual inspection (see Note 1)	❍	❍	❍		
	Functional testing	❍	❍	❍		
	Breathing cycle and static tests (see Note 2)				❍	
Demand Valve	Check push-in type connectors for lubricant (see Note 3)	❍				
Pressure Reducer	Medium-pressure check (see Note 2)				❍	
	Inspect the sintered filter (see Note 2 and Note 4)				❍	
	Inspect the high-pressure connector O-ring (see Note 2 and Note 5)				❍	
	Overhaul. Contact Dräger for the Repair Exchange (REX) service (see Note 6)					❍
Cylinder	Charge cylinder to correct working pressure	❍	❍			
	Check charged pressure (stored cylinders only)			❍		
	Check test date of cylinder			❍		
	Recertification	According to national regulations in the country of use				
Cylinder Valve	Overhaul	At the time of cylinder recertification				

❍ Dräger recommendations

1. Clean the equipment if it is dirty. If it the equipment has been exposed to contaminants, disinfect any components that come into direct and prolonged contact with the skin.

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.

3. 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).

4. Replace the sintered filter if a drop in reducer performance is observed during a flow check or if it is visibly damaged.

5. Replace the high-pressure connector O-ring if it is found to leak during functional testing or if the O-ring is visibly damaged.

6. Where the breathing apparatus is subjected to a high level of use (in training establishments etc.), reduce the overhaul period for the pressure reducer. In these circumstances, Dräger recommend that the overhaul frequency should be less than 5,000 applications of use. An application of use is defined as a single use of the fully assembled breathing apparatus, where the user breathes from the air cylinder. It does not include system pressurization for pre-operational checks.

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