1 Safety-related information

- 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 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.
- Use only genuine Dräger spare parts and accessories, or the functional integrity 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.
- Use of the breathing apparatus should be consistent with NFPA 1500 – Standard on Fire Department Occupational Safety and Health Program.
- All approved respiratory equipment shall be selected, fitted, used, and maintained in accordance with MSHA (Mine Safety and Health Administration), OSHA (Occupational Safety and Health Administration), and other applicable regulations.
- The air supply shall meet the requirements for breathing air according to CGA G – 7.1, Grade D or higher quality and, where appropriate, be in accordance with: NFPA 1989 Standard on Breathing Air Quality for Emergency Services Respiratory Protection.
- Before occupational use of this respirator a written respiratory protection program must be implemented meeting all the local government requirements. In the United States employers must comply with OSHA 29 CFR 1910.134 which includes medical evaluation, training, and fit testing.
- This device has been tested and complies with the FCC (Federal Communications Commission) and IC (Industrial Commission) rules. Changes or modifications to the product may render it non-compliant.

2 Conventions used in this document

2.1 Definitions of alert icons

Alert icons are used in this document to provide and highlight text that requires 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. It may also be used to alert against unsafe practices.

NOTICE
Indicates a situation which, if not avoided, could result in damage to the product or environment.

2.2 Trademarks

FPS® is a registered trademark of Dräger in the United States and/or other countries. Contact Dräger for details.

Procell® and Duracell® are registered trademarks of Duracell U.S. Operations, Inc. in the United States and/or other countries.

Panasonic® is a registered trademark of Panasonic Corporation, Japan in the United States and/or other countries.

Dow Corning® and Molykote® are registered trademarks of Dow Corning Corporation in the United States and/or other countries.

3 Description

The Dräger PSS 7000 Series is a breathing apparatus that provides the wearer with respiratory protection using an open-circuit, pressure-demand, compressed-air system. The apparatus can be used as a self-contained system, or with an independent air supply for supplied-air respirator (SAR) operations. The series is compatible with Dräger compressed air cylinders and the FPS® 7000 face mask. The product includes the following electronic monitoring systems:

- A Dräger Sentinel 7000 electronic monitoring system, with integral PASS (personal alert safety system).
- A Dräger FPS® 7000 wireless HUD (head-up display) unit.

3.1 Feature description

The carrying system has a carbon-composite backplate, with adjustable shoulder harness and waist belt connected using quick release connectors. The height of the backplate can be adjusted to one of three preset heights to suit the body length of the wearer (short (S), medium (M) and long (L)). The waist pad is connected at a flexible joint to compensate for the twisting and bending of the user.

All variants use the same first-stage regulator (Fig A, Item 5) fitted with a whistle that sounds at the end-of-service time (see Section 10 for the end-of-service time indicator (EOSTI) activation pressures). The regulator supplies medium-pressure breathing air through a medium-pressure hose (Fig A, Item 6) and a quick coupling (Fig A, Item 2) to an attached lung demand valve (second-stage regulator). Incorporated in the first-stage regulator is a RIC UAC (rapid intervention crew universal air connection) (Fig A, Item 4), which is a male coupling that allows emergency refilling of the compressed air cylinder while wearer is breathing from the apparatus.

The electronic system is the Sentinel 7000, which is a multi-function system that continuously monitors the breathing apparatus status, including cylinder pressure, movement of the wearer, and battery condition. It provides visual indications of system status and audible and
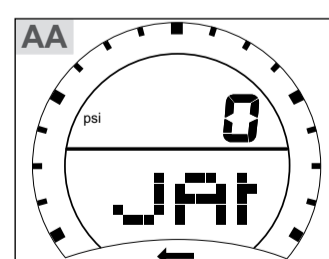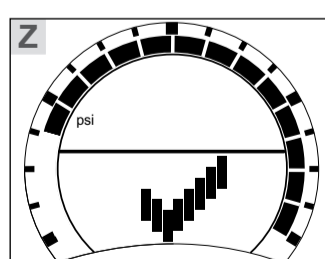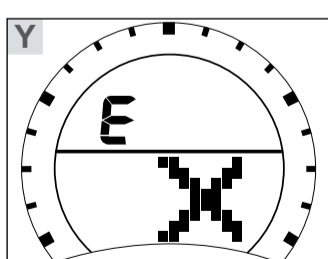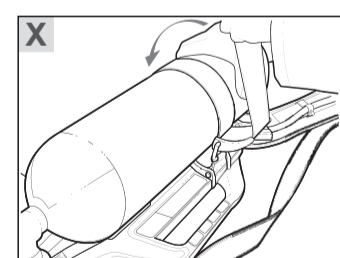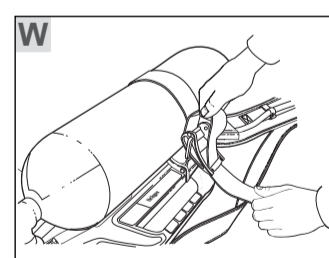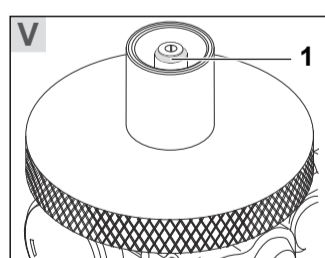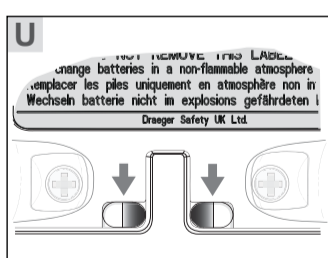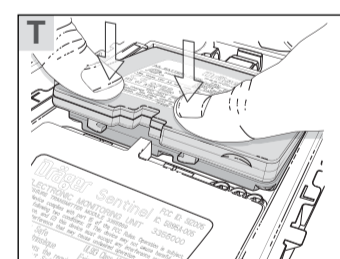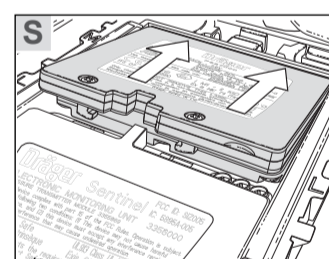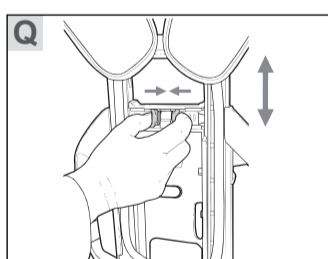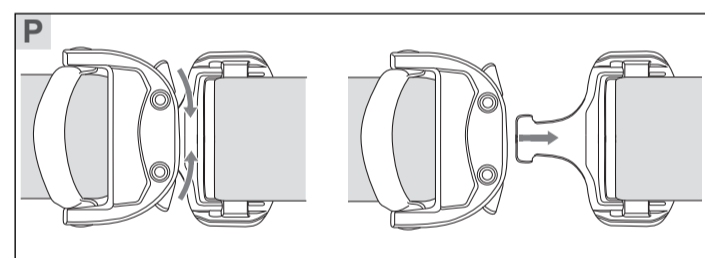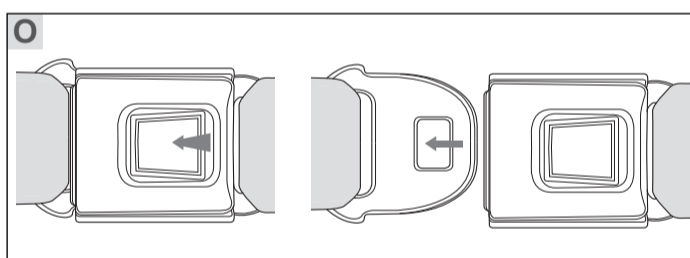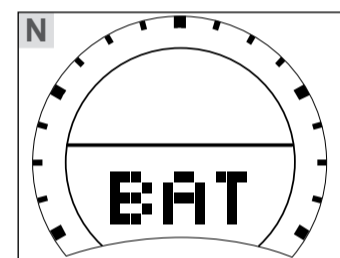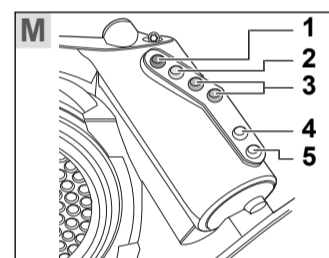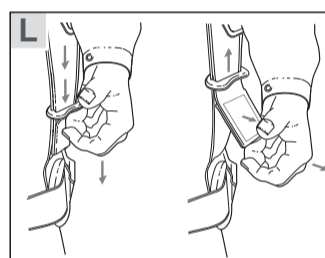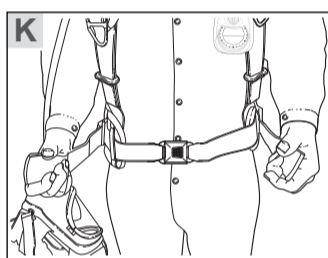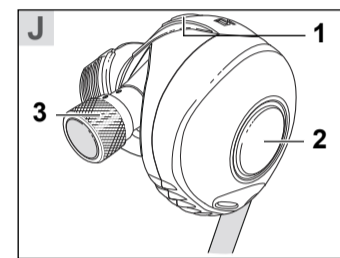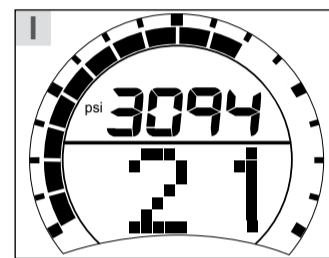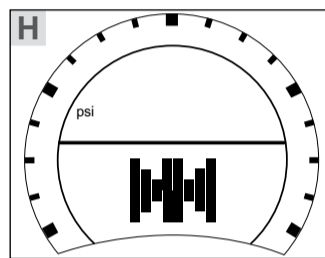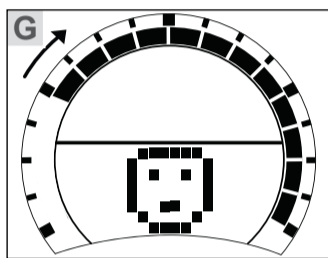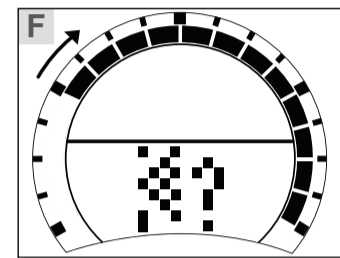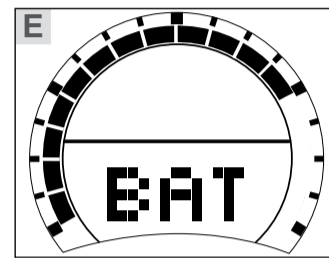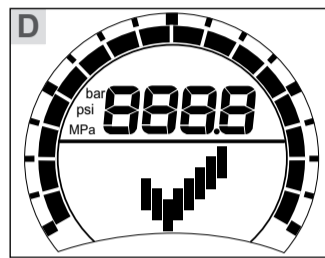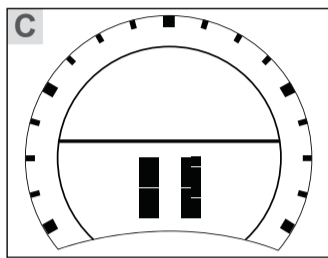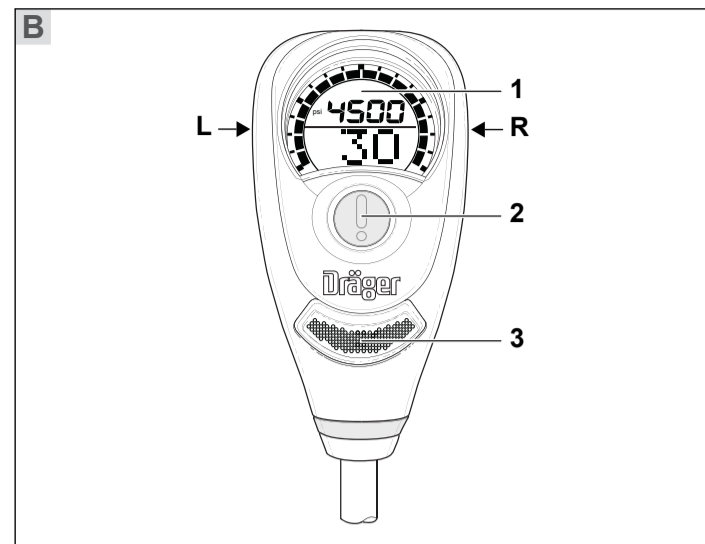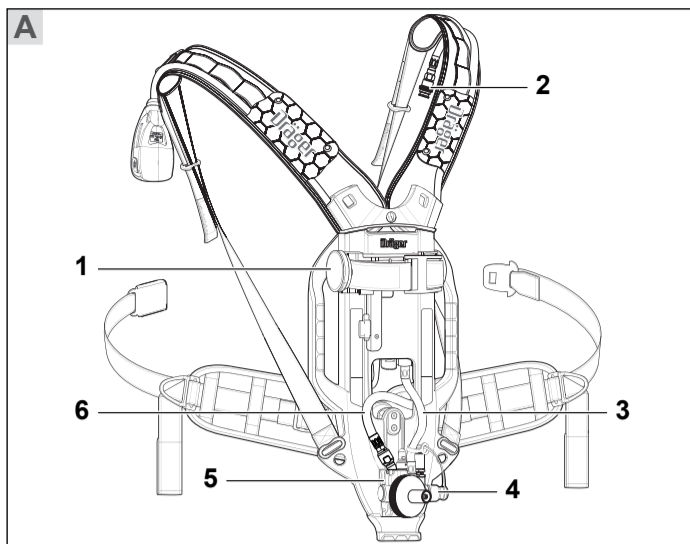
visual alarms in warning conditions. The user interface has an electronic LCD (liquid crystal display) screen (Fig B, Item 1), left (L) and right (R) operating buttons, a manual alarm button (Fig B, Item 2), an LED panel (Fig B, Item 3), and an internal alarm sounder. A backlight illuminates the user interface display when required. An additional alarm sounder (Fig A, Item 1), referred to as the "second sounder", is mounted

on the backplate, with warning activation LEDs top and bottom. The second sounder operates only during PASS alarms.

Personal identity information (e.g. user name, brigade name, station number) can be stored in the user interface memory of the Sentinel 7000. Once stored, the information can be scrolled across the screen by pressing the right button of the user interface (Fig B) during use.

A — 4963

B — 3381

C — 2330

D — 2191

E — 3384

F — 2279

G — 2373

H — 3385

I — 3383

J — 4909

K — 3382

L — 3088

M — 2189

N — 2580

O — 4959

P — 5001

Q — 2006

R — 2804

S — 2797

T — 2798

U — 2743

V — 3379

W — 3094

X — 3095

Y — 2201

Z — 3386

AA — 3387

The system is switched on by pressing the left and right buttons on the user interface (Fig B), or by cylinder pressure detected at a pressure module in the backplate, with pressure transmitted to the pressure module through a high-pressure hose (Fig A, Item 3) when the cylinder is opened. At switch-on, the unit performs a self-test (see Section 3.1.1), and once the self-test is passed, the system adopts the active mode where the electronic functions are operational.

The PASS alarm can be activated manually or automatically. The manual alarm is activated by pressing the manual alarm button on the user interface (Fig B, Item 2). The automatic alarm uses a motion sensor to detect movement and activates a pre-alarm and main alarm at timed intervals when no movement is sensed. The pre-alarm activates after 21-25 seconds without movement, and the main alarm activates after approximately a further 10 seconds without movement.

The HUD is fitted in the face mask to provide visual indications of system conditions (see the HUD instructions for use for full details). Signals from the Sentinel 7000 are transmitted to the HUD from a pressure transducer/transmitter incorporated into the pressure module.

System power supplies are the main battery in the backplate, the backup battery in the pressure module and the HUD battery in the HUD.

Dräger PC Link is an optional accessory that allows reading and reprogramming of the Sentinel 7000. PC Link can reprogram settings and parameters, including configuration, firmware and identification, and download event record (datalog) information. Contact Dräger for full details. The functions and parameters described in this document are the default settings for the Sentinel 7000.

3.1.1 Sentinel 7000 start-up sequence and self-test

Each time the Sentinel 7000 switches on (with or without a compressed air cylinder fitted), the Sentinel 7000 runs the self-test. During the self-test sequence, the display scrolls through a series of screens and provides start-up information and options, including:

- The main battery charge state.
- The electronic leak test option.
- The personal identity (scrolling data) option.
- If the system fails the self-test, the unit provides fail signal at the end of the sequence.

The start-up sequence is:

1. The device emits a single tone from the user interface and the second sounder, and the wait icon (Fig C) displays.
2. The tick icon (Fig D) displays and the blue, red, and green LEDs illuminate.
3. The battery icon (Fig E) displays. The segments around the screen indicate the condition of the main battery (all segments filled indicates full battery).
4. The leak test icon (Fig F) displays. Pressing the left button (Fig B) starts the optional electronic leak test procedure (see Section 4.6.5).
5. The personal identity icon (Fig G) displays. Pressing the left button (Fig B) starts the procedure to read personal identity information from a user ID card (see Section 4.6.6).
6. The automatic alarm icon (Fig H) displays and alarm tones sound.
7. End of sequence: the normal operating screen (Fig I) displays and the green LED flashes at one second intervals.

3.1.2 Compressed air cylinders, lung demand valves, and face masks

The PSS 7000 Series is compatible with composite material cylinders of 30 to 60 minute capacity, and is available in 2216 psi or 4500 psi versions. Full descriptions and user instructions are contained in separate instructions supplied with the cylinder, face mask, or lung demand valve.

3.2 Intended use

When the PSS 7000 Series is used with an approved lung demand valve, face mask and compressed air cylinder, the breathing apparatus provides a wearer with respiratory protection for working in contaminated or oxygen-deficient conditions.

The compressed air cylinder, lung demand valve, face mask, and other accessories used with this product must be certified Dräger components, assembled in an approved configuration, otherwise the operation of the device may be impaired. Contact Dräger for further information.

3.3 Limitations

A limitation of the PASS automatic distress alarm is that the motion sensor detects movement or vibration to which the wearer is subjected, and may not activate if the wearer is motionless on a moving platform (for example on moving or vibrating machinery).

3.4 Approvals

The PSS 7000 Series is certified by NIOSH to 42 CFR Part 84. In certain combinations, the series is certified by NIOSH to provide respiratory protection from military grade chemical, biological, radiological, and nuclear hazards (CBRN). The series is also certified by SEI to meet the requirements of NFPA 1981:2018 and NFPA 1982:2018. The apparatus must only be used with compressed air cylinders approved by NIOSH and in an approved configuration (see Section 4.1).

This device (model: Sentinel 7000) complies with part 15 of the FCC Rules. Operation is subject to the following 2 conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.

This device (model: Sentinel 7000) complies with RSS-310 of Industry Canada. Operation is subject to the condition that this device does not cause harmful interference.

3.5 Explanation of type-identifying marking and symbols

NOTICE
The equipment may be damaged, or approvals invalidated, by engraving it, or by applying chemical marking or paint.
► Do not use marker pens or apply paint, and do not scratch or engrave the equipment.
► Dräger recommend using adhesive labels to add personal marking to the equipment.

Refer to the relevant authority for explanation of approval body symbols and marking on the equipment. Examples of other marking on component parts of the breathing apparatus are:

BRAC-1359	–	Dräger serial number
08/09	–	Month and year of manufacture
3356812 or R21034	–	Dräger part number
SF	–	Standard force coupling
LF	–	Low force coupling

4 Use

⚠ **WARNING**
Only trained and competent users are permitted to prepare and use this equipment.
► Ensure that any accessories, ancillary equipment, and other protective clothing items do not interfere with the breathing apparatus and do not create a safety hazard.

The effective working duration of the apparatus depends on the initial air supply available and the breathing rate of the wearer.
► Fill compressed air cylinders to their full rated pressure before use.
► Do not commence any operation (including supplied-air respirator (SAR) operations) using a cylinder that is less than 90 percent full.

⚠ **CAUTION**
Equipment damage may cause the release of high-pressure air.
► Do not apply excessive force or use tools to open or close a cylinder valve.
► Do not drop or throw down the breathing apparatus.

4.1 Prerequisites

Refer to the following additional information before preparing or using the breathing apparatus:

- The special instructions (see Section 11).
- For non-CBRN use, see the separate NIOSH approval table 3367123 for approved configurations.
- For CBRN use, see the separate NIOSH CBRN approval table 3367124 for approved configurations. For CBRN use, the user must also refer to the CBRN special instructions in the lung demand valve instructions for use.

4.2 Preparation for use

Remove the thin flexible protective covering from the display before using the device for the first time.

Replace the batteries if the device fails to operate, or if a low battery alarm activates.

1. Carry out a visual inspection of the apparatus (see Section 4.6.1).
2. Install the main battery and the backup battery if necessary (see Section 4.6.3).
3. Fit the compressed air cylinder (see Section 4.6.4).
4. Adjust the backplate height to the position required by the wearer (see Section 4.6.2).
5. Disconnect and then reconnect the male coupling of the lung demand valve hose. 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 Section 5.
6. Press the reset button (Fig J, Item 1) to switch off the positive pressure. Press and rotate the bypass button (Fig J, Item 3) to align the red spots and then release the button to switch off the bypass.
7. Install the HUD into the face mask if necessary (see the HUD instructions for use).
8. Carry out a full functional test of the apparatus (see Section 4.6.5).
9. Align and push the lung demand valve into face mask port until it latches in position, and check the attachment by gently attempting to pull the coupling apart.

4.3 Putting on the breathing apparatus

1. Fully loosen the shoulder harness and waist belt and put on the breathing apparatus.
2. Check that the shoulder pads are not twisted and take the weight of the system on the shoulders by pulling the shoulder harness. Do not fully tighten at this stage.
3. Close the waist belt buckle and pull the ends of the waist belt forward until the strap padding fits securely and comfortably over the hips (Fig K). Tuck the belt ends behind the waist pad.
4. Pull the shoulder harness until the breathing apparatus rests securely and comfortably on the hips. Do not over tighten. Pull the strap retainers down to secure the strap ends (Fig L).
5. Fully loosen the head straps of the face mask and place the neck strap over the back of the neck.
6. Press the reset button (Fig J, Item 1) to switch off the positive pressure.
7. Open the cylinder valve (counterclockwise) slowly, but fully, to pressurize system. The Sentinel 7000 and HUD systems activate.
- After storage at temperatures below 32 °F (0 °C) leakage may be observed when the cylinder valve is initially opened due to ice formation.
  ○ If leakage is observed from the lung demand valve, press the front button (Fig J, Item 2) to allow a rush of air to pass through the lung demand valve and then quickly press the reset button (Fig J, Item 1) to switch off the positive pressure. Resume normal operation.
  ○ If leakage is observed from the quick connect coupling, close the cylinder valve and vent the system. Disconnect then reconnect the cylinder to the breathing apparatus (see the quick connect coupling instructions for use), then reopen the cylinder valve slowly, but fully, to pressurize the system. Resume normal operation.
  ○ If leakage still occurs, remove the breathing apparatus from service and report the fault to trained service personnel or contact Dräger.

⚠ **WARNING**
If there is not a good seal between the mask and the face of the wearer, the mask may leak inward or outward during use.
► In a CBRN environment, use only face mask sizes that have been confirmed by a quantitative fit test (QNFT).

8. Put on the face mask and check the seal between the mask and face of the wearer (for non-CBRN use see the Dräger FPS® 7000 face mask instructions for use; for CBRN use see the CBRN special instructions in the lung demand valve instructions for use).

4.4 During use

⚠ **WARNING**
Users should be in a safe area before the whistle or end-of-service-time warnings commence.
► Fully open all cylinder valves and ensure that they remain open during use.
► Evacuate to a safe area immediately if warnings commence during an operation.

- Regularly check the user interface display to confirm the exact cylinder pressure and the remaining time until to the end-of-service time (EOSTI) alarm activates (see Section 10 for the EOSTI activation pressures). Both are shown numerically on the normal operating screen (Fig I). Cylinder pressure is also shown as follows:
  ○ The HUD LEDs show the approximate cylinder pressure (see Section 4.4.1).
  ○ The segments on the user interface screen show the approximate cylinder pressure (Fig I).
- To call for emergency help or assistance, press the manual alarm button in the center of the user interface (Fig B, Item 2) to activate the manual alarm.
- To illuminate the display backlight, press and release the left or right button of the user interface (Fig B).
  ○ Pressing the right button (Fig B) displays any programmed personal identity information (see Section 3.1).
- React to the following alarm and warning signals as necessary:
  ○ EOSTI – The user interface emits an audible alarm tone, and red and blue LEDs flash and part of the display flashes red. The red LED (Fig M, Item 1) on the HUD flashes. The mechanical whistle on the first-stage regulator sounds.
  ○ PASS pre-alarm – If no movement is detected for 21-25 seconds, a repeating audible alarm tone is emitted from the user interface and the second sounder. Move the user interface within 10 seconds to cancel the alarm (do not attempt to use the buttons to switch off the pre-alarm).
  ○ PASS main alarm – If no movement is detected after approximately 10 seconds of pre-alarm, a high-level sweeping alarm is emitted from the user interface and the second sounder. Red and blue LEDs on the user interface and the top and bottom of the second sounder flash intermittently. The user interface displays the automatic alarm icon (◄►). To cancel the alarm, simultaneously press and hold the left and right buttons of the user interface (Fig B) until the alarm stops.
  ○ Low main battery – A low battery icon displays on the user interface (Fig N), and the battery LED (Fig M, Item 5) on the HUD flashes yellow.
  ○ Low HUD battery – The battery LED (Fig M, Item 5) flashes green.
  ○ Loss of HUD communication – The blue communication LED (Fig M, Item 4) flashes.

⚠ **WARNING**
Using the bypass button (Fig J, Item 3) uses air from the cylinder and may rapidly reduce the working duration of the apparatus.
► Do not use the bypass button unless absolutely necessary.

- If additional air is required, briefly press and release the bypass button (Fig J, Item 3) to deliver a single jet of air into the face mask.

⚠ **WARNING**
The following emergency air flow procedures may greatly reduce the operating duration of the air supply.
► When activated the user must immediately evacuate to a safe area.
► The reason for using the procedure must be investigated and repaired before reusing the breathing apparatus.

- Additional air flow required (emergency procedure only used in the unlikely condition of low or blocked airflow) – Press and rotate the bypass button (Fig J, Item 3) to deliver a sustained air supply (85 to 130 liters/minute) into the face mask.
- Excessive or loss of air flow (emergency procedure only used in the unlikely condition of high or loss of airflow) – Close the cylinder valve then immediately begin to slowly reopen the valve. Use the cylinder valve as a regulating valve to set the air flow to meet the user requirement. This procedure can be used with screw-type and ratchet-type cylinder valves.

4.4.1 HUD LEDs

The LEDs, red (Fig M, Item 1), amber (2), and two green (3), indicate the cylinder pressure range and provide alert signals at critical pressures. The following table shows the cylinder pressures indicated by the LEDs.

Table key: ● – On

* – Flashing

Approximate cylinder pressure	LED			
	Red	Amber	Green	Green
100 % to 75 %	●	●	●	●
75 % to 50 %	●	●	●	
50% content alert (amber flashes for 20 seconds)	●	*		
50 % to 35 %	●	●		
35 % to 100 psi (red flashes continuously)	*			
Below 100 psi		HUD logs off		

4.5 After use

⚠ **WARNING**
Removing the breathing apparatus in a hazardous breathing environment is unsafe.
► Do not remove the breathing apparatus until in a safe breathing environment.

NOTICE
The equipment can be damaged if removed incorrectly.
► Do not remove the face mask by pulling on the lung demand valve.

1. Loosen the face mask straps. At the point when the seal between the face mask and the face is broken, press the reset button (Fig J, Item 1) to switch off the positive pressure. Fully remove the face mask and extend all the straps of the head harness.
2. Close the cylinder valve.
3. Press the front button (Fig J, Item 2) to vent system and then press the reset button (Fig J, Item 1) to switch off the positive pressure.
4. Release the waist belt buckle (Fig O or Fig P).
5. Lift the shoulder harness ends to release the strap retainers (Fig L) and then lift the shoulder harness buckles to loosen the straps.
6. Remove the breathing apparatus and face mask.
7. If the lung demand valve has been set to bypass, press and rotate the bypass button (Fig J, Item 3) to align the red spots and then release to switch off the bypass.
8. Press and hold the left and right buttons of the user interface (Fig B) until the display clears, then immediately release the buttons. After approximately 180 seconds, all six HUD LEDs will flash twice to indicate that the unit has logged off.
9. Carry out the after use tasks in the maintenance table (see Section 6.1).
10. Remove the compressed air cylinder if necessary (see Section 4.6.4).
11. Pass the breathing apparatus to the service department with details of any faults or damage that occurred during use.

4.6 Common user tasks

4.6.1 Visual inspection

A visual inspection must check the full breathing apparatus including all component parts and accessories. Check that the equipment is clean and undamaged, paying particular attention to pneumatic system components, connectors, and elastomeric components such as hoses. Typical signs of damage that may affect the operation of the breathing apparatus include impact, abrasion, cutting, corrosion, and discoloration. Report damage to service personnel and do not use the apparatus until faults are rectified.

4.6.2 Adjusting the backplate height

1. Lift the apparatus into the vertical position.
2. Simultaneously press the two spring-loaded buttons (Fig Q) to unlock the shoulder yoke. Slide the yoke in the required direction then release the buttons. Continue sliding the yoke until the buttons engage and lock the yoke in the required position.

4.6.3 Fitting or replacing the batteries

⚠️ **WARNING**

Improper handling and use of batteries may cause an explosion, a fire, or a chemical hazard.
► Do not remove or install the batteries in a flammable atmosphere.
► Do not expose the batteries to heat sources.
► Do not attempt to recharge any non-rechargeable battery.
► Do not short out the battery terminals.
► Use only the recommended battery type.
► Replace batteries as a matched set and do not mix new and used batteries.

NOTICE

Batteries that are not correctly disposed of may cause an environmental hazard.
► Dispose of used batteries in accordance with national or local regulations.

The backup battery only supplies power when the main battery is disconnected or discharged. When this occurs, the backup battery only supplies power for HUD functions.

If the display switches off and the functionality of the HUD is powered by the backup battery during use, Dräger recommend that the backup battery is replaced after use.

General battery information

● The normal operating life of the batteries depends on operating time, frequency of alarms and ambient temperature.
● Remove discharged batteries from the product.

System batteries:

● Main battery: 7.5 V (5 x 1.5 V AA alkaline batteries).
● Backup battery: 3 V (CR123 lithium battery).
● HUD battery: 3 V (CR123 lithium battery).

Use only the following approved battery types:

● Procell® by Duracell® LR6 (1.5 V).
● Duracell® Plus LR6 (1.5 V).
● Panasonic® CR123AL/1BP (3 V).

Backup battery

1. Orientate the apparatus to access the battery compartment.
2. Unscrew and remove the battery cap (Fig R, Item 1) using a suitable coin.
3. Insert the battery, positive terminal end first, into the battery compartment.
4. Refit and secure the battery cap. Do not over tighten.

Main battery pack

1. Inspect the sealing rim around the battery terminals. Ensure that the terminals of the battery and the pressure module are clean and undamaged.
2. Lift and turn over the apparatus to access the pressure module.
3. Insert the battery pack into the backplate recess (Fig S).
4. Position thumbs on top of the two screws and push down firmly to lock the battery pack (Fig T).
5. While pushing down, confirm the two sliding locks move to their locked position viewed through the two keyholes as illustrated (Fig U).
6. The Sentinel 7000 emits a single tone and commences the self-test sequence (described in Section 3.1.1).
7. Switch off the unit if necessary once the unit has passed the self-test. To switch off, press and hold the left and right buttons of the user interface (Fig B) until the display clears, then immediately release the buttons.

To remove the main battery insert and press the battery pack release key (supplied with the breathing apparatus) into the two keyholes at the base of the battery. This opens the locking latch allowing the battery to be

removed. To preserve the datalog clock, install a new battery pack within 3 minutes of removing the discharged battery pack.

Replacing the cell in the main battery pack

1. Remove the eight screws using a 2.5 mm hexagon key, and remove the battery cover.
2. Remove the discharged batteries and install a new set observing the polarity marked inside the pack.
3. Check the sealing ring and refit the battery cover and screws. Do not over tighten the screws: Dräger recommend torque of 0.5 lbf ft (0.7 Nm).

4.6.4 Fitting or removing the compressed air cylinder

⚠️ **WARNING**

High-pressure air release may cause injury to the user or other personnel near the breathing apparatus.
► Close the cylinder valve and fully vent the system before attempting to disconnect a compressed air cylinder.

Impact damage to the cylinder valve or first-stage regulator connector may prevent valve connection or cause an air leak.
► Handle the compressed air cylinder and breathing apparatus with care.

The following instructions are for a threaded cylinder coupling. See the quick connect coupling instructions for use for details of fitting and removing a quick connect coupling.

Fitting the cylinder

1. Set the backplate to position S.
2. Check the threads of the cylinder valve port and the first-stage regulator. Ensure that the O-ring seal (Fig V, Item 1) in the first-stage regulator is clean and undamaged.
3. Lay the backplate horizontal, with the first-stage regulator uppermost, and fully extend the cylinder strap.
4. Insert the cylinder through the loop of the strap, and align the valve with the regulator.
5. Lift the cylinder and backplate into the vertical position (supported on the end of the cylinder opposite the valve).
6. Tighten the hand wheel of the regulator, using only the thumb and index finger, until a definite metal-to-metal contact is felt. Do not use tools or over tighten.
7. Place the unit back into the horizontal position.
8. Take up the slack in the cylinder strap (Fig W)
9. Pull the strap over the cylinder to operate the cam-lock buckle (Fig X) and secure using the hook-and-loop fastener.

Removing the cylinder

1. Close the cylinder valve and press the front button (Fig J, Item 2) to fully vent the system.
2. Set the backplate to position S.
3. Lay the backplate horizontal, with the cylinder uppermost.
4. Remove the free end of the cylinder strap from the hook-and-loop fastener.
5. Lift the strap against the cam-lock buckle to release the buckle tension and loosen the strap.
6. Disconnect the cylinder valve from the first-stage regulator.
7. Lift the cylinder away from the first-stage regulator and remove the cylinder.

4.6.5 Functional testing

⚠️ **WARNING**

Failure of the equipment to meet any of the standards or parameters in the functional test, or any visible signs of damage, indicates a possible system fault.
► Do not use the equipment and report the fault to trained maintenance personnel or contact Dräger.

Self-test

1. Press the left and right buttons of the user interface (Fig B) to activate the self-test sequence:
   a. The unit commences the self-test. During the sequence, the system checks alarms and indicators and the display scrolls through a series of startup screens. For a full description of the start-up sequence and options, see Section 3.1.1.
   b. At the end of the sequence, the normal operating screen is displayed, and the green LED flashes at approximately one second intervals to indicate that the Sentinel 7000 has passed the self-test and is in the active mode.

If the battery voltage is below a minimum preset voltage the backlight illuminates, the low battery icon (Fig N) displays, the unit emits a series of tones and then switches off. If this occurs, or the unit fails to switch on, replace the battery (see Section 4.6.3).

If the cross icon with a fault code displays (Fig Y), the Sentinel 7000 has failed the self-test. Record the fault code and contact Dräger for repair.

PASS check

1. Press the manual alarm button in the center of the user interface (Fig B, Item 2). The distress alarm sounds, the manual alarm icon (👤) displays and the red and blue LEDs flash intermittently.
2. Simultaneously press and hold the left and right buttons (Fig B) until the alarm stops.
3. Immobilize the user interface. After 21 to 25 seconds the pre-alarm sounds and the backlight flashes. Immediately move the unit to cancel the alarm.
4. Immobilize the user interface again and do not cancel the pre-alarm. After approximately 10 seconds of pre-alarm, the main alarm sounds, the alarm icon (🔊) displays, and all the user interface LEDs flash intermittently.
5. Simultaneously press and hold the left and right buttons (Fig B) to cancel the alarm.
6. To switch off, again press and hold the left and right buttons (Fig B) until the display clears, then immediately release the buttons.

High-pressure leak test

The high-pressure leak test is not intended as a functional test of the HUD. See the HUD instructions for use if the HUD does not operate as described.

1. Place the face mask next to the breathing apparatus (within three feet of the pressure module).
2. Press the reset button (Fig J, Item 1) to switch off the positive pressure. Press and rotate the bypass button (Fig J, Item 3) to align the red spots and then release the button to switch off the bypass.
3. Open the cylinder valve (counterclockwise) slowly, but fully, to pressurize system. The Sentinel 7000 and HUD systems activate as follows:
   a. The Sentinel 7000 emits a single tone and commences a self-test sequence (refer to Section 3.1.1).
   b. Up to approximately 45 seconds after the start of the self-test, all six HUD LEDs (Fig M) will flash twice to indicate that the Sentinel 7000 is communicating with the HUD.
   c. Depending on cylinder pressure, some of the four HUD LEDs (red/amber/green/green) flash (on for 15 seconds/off for 45 seconds).
4. Close the cylinder valve and observe the user interface display. The pressure reading shall not decrease more than 300 psi over 20 seconds.

If the breathing apparatus fails this test, or an immediate leak is evident, do not continue with the test. Vent the pressure, switch off the system and contact Dräger for repair.

Optional electronic leak test

The optional electronic leak test is not intended as a functional test of the HUD. See the HUD instructions for use if the HUD does not operate as described.

1. Place the face mask next to the breathing apparatus (within three feet of the pressure module).
2. Press the reset button (Fig J, Item 1) to switch off the positive pressure. Press and rotate the bypass button (Fig J, Item 3) to align the red spots and then release the button to switch off the bypass.
3. Press the left and right buttons of the user interface (Fig B) to activate the self-test sequence.
   ○ Up to approximately 45 seconds after the start of the self-test, all six HUD LEDs (Fig M) will flash twice to indicate that the Sentinel 7000 is communicating with the HUD. The cylinder contents LEDs then flash on for 15 seconds and off for 45 seconds continuously (the number of LEDs depends on the cylinder pressure).
4. When the perform leak test icon (⚙) displays, press the left button (Fig B).
5. The open valve icon (⬭) displays and the radial segments begin to switch off clockwise.
   ○ Open the cylinder valve before the last segment switches off or the low-pressure icon (🛢) displays briefly and the self-test restarts.
   ○ If the cylinder pressure is low and falls below a preset threshold during pressure stabilization, the low-pressure icon (🛢) displays briefly and the self-test restarts.
6. Immediately open the cylinder valve. A single tone sounds and the screen alternates between the close cylinder valve icon (⬭) and press right button icon (🔘).
7. Immediately close the cylinder valve and then press the right button (Fig B). Pressure stabilizing starts, the wait icon (⏸) displays, and the radial segments switch off clockwise.
8. When stabilizing is complete a single tone sounds, the leak test timing icon (⏱) displays, and the radial segments switch off clockwise.
9. When timing is complete a single tone sounds and the test result is shown:
   a. The leak test passed icon (⚙✓) indicates a passed leak test. Observe the notice below and continue to the EOSTI/whistle test.
   b. The leak test failed icon (⚙✗) indicates a leak test fail. Investigate and repair the fault (see Section 5), and then repeat the leak test.

The leak test passed icon (⚙✓) displays for up to three minutes. The EOSTI/whistle test must be completed within that time or the unit resets and the self-test restarts.

EOSTI/Whistle test

1. Cover the outlet port of the lung demand valve with the palm of the hand and press the front button (Fig J, Item 2).
2. Carefully lift the palm of the hand to slowly vent the system until the EOSTI alarms activate, and observe the pressure displayed on the user interface.
   ○ The whistle and electronic EOSTI must activate within the preset pressure range (see EOSTI Alarms in Section 10). Due to the activation tolerance, they may not activate at exactly the same time.
3. Allow the system to vent fully. The display shows zero pressure and all user interface LEDs (Fig J, Item 3) flashes at approximately one second intervals.
4. Press and hold the left and right buttons of the user interface (Fig B) until the display clears, then immediately release the buttons.
   ○ After approximately 180 seconds all six HUD LEDs flash twice to indicate that it has logged off from the Sentinel 7000.
5. Press the reset button (Fig J, Item 1) to switch off the positive pressure.

4.6.6 Changing the Sentinel 7000 personal identity information

Upload information from a user ID card into the user interface as follows:

1. Locate and hold the user ID card on to the back of the user interface, directly behind the screen.
2. Press the left and right buttons of the user interface (Fig B) to start the self-test sequence.
3. When the personal identity screen (Fig G) displays, immediately press the left button (Fig B). The screen briefly illuminates and the radial segments begin to switch off clockwise.
4. The system copies the data from the transponder embedded in the card to the memory in the user interface. When the full data upload is complete, the screen displays the tick icon (Fig Z).
5. Press and release the right button (Fig B) of the user interface to check that the uploaded data is correct. The user details scroll from right to left across the screen (Fig AA). Repeat the procedure if the information is incomplete or inaccurate.
6. If necessary, switch off by pressing and holding the left and right buttons of the user interface (Fig B) until the display clears, then immediately release the buttons.

Further options for personal identity information and more scrolling options are available using Dräger PC Link. Contact Dräger for full details.

5 Troubleshooting

The troubleshooting guide shows fault diagnosis and repair information applicable to breathing apparatus users. Further troubleshooting and

repair information is available in instructions for use supplied with associated equipment.

Where the troubleshooting guide shows more than one fault or remedy, carry out repair actions in the order that they appear in the table.

Contact service personnel or Dräger when the remedy information indicates a service task, or if the symptom remains after all remedy actions have been attempted.

Symptom	Fault	Remedy
Face mask air leak	Lung demand valve O-ring leaking	Replace or lubricate O-ring
	Head straps not tight	Tighten
	Exhalation valve leaking	Service task
	Speech diaphragm defective	Service task
Unsatisfactory communication	Speech diaphragm defective	Service task
High-pressure air leak or failed leak test	Loose or dirty connector	Disconnect, clean, and reconnect couplings, and retest
	Faulty hose or component	Substitute user replaceable accessories and retest
Air leak from medium-pressure hose connection at the first-stage regulator (excess flow valve)	Faulty O-ring, retainer, spring, or first-stage regulator	Service task
Air leak from lung demand valve	Ice particles on sealing elements	Press the front button (Fig J, Item 2), allow a rush of air to pass through the valve, then quickly press the reset button (Fig J, Item 1) to switch off the positive pressure.
Air leak from quick connect coupling	Ice particles on sealing elements	Disconnect then reconnect the cylinder to the breathing apparatus (see the quick connect coupling instructions for use) and retest.
Lung demand valve allowing constant air flow into the face mask	Bypass button engaged	Turn off the bypass button (Fig J, Item 3)
	Internal fault	Service task
High or low medium-pressure	First-stage regulator fault	Service task
Poor sounding whistle	Whistle dirty	Clean whistle flute and retest
Whistle not functioning correctly	Activation mechanism fault	Service task
Difficulty connecting or disconnecting the medium-pressure quick coupling	Dirty connector	Disconnect, clean and reconnect couplings and retest
	Burring of the male coupling	Replace the hose with the male coupling
Low battery indication on the user interface (Fig N)	Low main battery	Replace the main battery
Fault code indication on the user interface (Fig Y)	Sentinel 7000 failure	Service task
Unable to switch Sentinel 7000 on	Low main battery	Replace the main battery
	Low cylinder pressure	Recharge cylinder to maximum working pressure
	Unknown	Service task
HUD green/yellow LED flashing green	Low HUD battery	Replace the HUD battery
HUD green/yellow LED flashing yellow	Low main battery	Replace the main battery
HUD will not log on to the Sentinel 7000	HUD out of range	More the HUD to within three feet (approximately 900 mm) of the pressure module
	Low HUD battery	Replace the HUD battery
	Low cylinder pressure	Recharge the cylinder to maximum working pressure
Battery pack sliding locks not moving to the locked position	Dirty, damaged, or faulty components	Attempt remedy actions in this order: 1. Push down firmly on the battery pack 2. Remove and clean the battery pack and backplate recess and retry 3. Replace the battery pack and retry 4. Contact Dräger
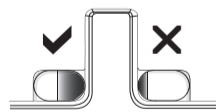
6   Maintenance

6.1   Maintenance table

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.

Component/ system	Task	After use	Every month	Every year
Complete apparatus	Visual inspection (see Note 1 Section 4.6.1)	O		
	Functional testing (see Section 4.6.5)	O	O	
	Breathing cycle and static tests (see Note 2)			O
Lung demand valve	Check connector for lubricant (see Note 3)	O		
	Check the male element of the quick coupling for burring (see Step 5 in Section 4.2)			O
Backup battery	Replace			O
First-stage regulator	Medium-pressure check (see Note 2)			O
	Inspect the high-pressure O-ring (see Note 2 and Note 4)			O

Component/ system	Task	After use	Every month	Every year
Cylinder	Charge cylinder to correct working pressure	O		
	Check charged pressure (stored cylinders only)		O	
	Check test date of cylinder (carbon composite cylinders over 15 years old must be retired)			O
	Recertification			According to national regulations in the country of use
Cylinder valve	Overhaul			At the time of cylinder recertification

Notes

O   Dräger recommendations

1   Clean the equipment if it is dirty. If 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   Check the O-ring 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 high-pressure connector O-ring if it is found to leak during functional testing or if the O-ring is visibly damaged.

6.2   Cleaning and disinfecting

⚠️ **CAUTION**

Trapped water and ice inside the pneumatic system (such as the lung demand valve) may impair the operation of the breathing apparatus.
► Prevent any liquid from entering the pneumatic system, and thoroughly dry the breathing apparatus after cleaning and disinfecting.

NOTICE

Using cleaning and disinfecting methods not described in this section may damage the equipment.
► Do not exceed 140 °F (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.

 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.

1.   Clean the breathing apparatus manually using a cloth moistened with cleaning solution to remove excess dirt. Remove and clean the following if necessary:
○   The removable window from the user interface screen. Clean the window and the screen below.
○   The battery pack. Clean the battery and battery compartment, and ensure that the battery contacts and locking mechanism are clean, dry and undamaged.
2.   Apply disinfecting solution to all internal and external surfaces.
3.   Rinse all components thoroughly with clean water to remove all cleaning and disinfecting agents.
4.   Dry all components using a dry cloth, in a heated dryer or in air.
5.   Contact service personnel or Dräger if disassembly of the pneumatic system or electronic components is required.

6.2.1   Carrying harness – Thorough cleaning

NOTICE

Untrained personnel are not permitted to disassemble the breathing apparatus as they could inadvertently damage the equipment.
► Thorough cleaning may only be carried out by suitably trained personnel.

1.   Remove the harness from the carrying system and clean using one of the following methods:
a.   Clean manually in a bath containing recommended cleaning or disinfecting agents.
b.   Machine wash (at 86 °F (30 °C)) using a proprietary brand washing solution (do not use biological washing powder).
2.   Rinse the harness thoroughly with clean water to remove all cleaning and disinfecting agents.
3.   Dry all components including internal parts.

6.3   Maintenance work

6.3.1   Compressed air cylinder charging

⚠️ **WARNING**

Air quality for compressed air cylinders must conform to the minimum grade requirements for Type 1 gaseous air as defined in the CGA Commodity Specification for Air, G-7.1 (Grade D or higher quality) and, where appropriate, be in accordance with: NFPA 1989 Standard on Breathing Air Quality for Emergency Services Respiratory Protection.
► Ensure that the air supply meets these requirements.

Refer to the instructions supplied with the cylinder and the charging apparatus for recharging a compressed air cylinder.

7   Transport

Transport the product in its original packaging.

8   Storage

8.1   Storage preparation

● Extend the shoulder harness, 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 pneumatic hoses in such a way that the bend radius is not too acute and the hose is not stretched, compressed, or twisted.
● With the system switched off, a small amount of battery power is consumed. If the system is not to be used for a long period, remove the batteries (see Section 4.6.3).

8.2   Storage conditions

● Store the equipment between 5 °F to 77 °F (-15 °C to +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.
● If storing the equipment in a vehicle, ensure that the breathing apparatus is securely retained and does not interfere with the operation of the vehicle.

9   Disposal

Dispose of the product in accordance with the applicable rules and regulations.

9.1   Service life

● All components are designed to last the lifetime of the equipment if they are regularly inspected and maintained as described in Section 6.1.
● Retire equipment in accordance with NFPA 1852 if it can no longer be repaired to a fully serviceable condition.
● Carbon composite cylinders over 15 years old must be retired.

10   Technical data

Compressed air cylinders:

● 30 minutes to 60 minutes capacity.
● 2216 psi or 4500 psi pressure.
● Composite materials.

Cylinder high-pressure connectors:

● 2216 psi connector to CGA 346.
● 4500 psi connector to CGA 347.
● Quick connect coupling (2216 psi or 4500 psi).

Power supplies:

● Main battery: 7.5 V.
● Backup battery: 3 V.
● Head-up display battery: 3 V.

RIC UAC Connector:

● 2216 psi or 4500 psi, male, quick coupling with relief valve.

Lung demand valve to face mask connector:

● Dräger push-in connector.

EOSTI Alarms – Activation commencement range (mechanical and electronic):

● 2216 psi cylinder: 819 psi to 732 psi.
● 4500 psi cylinder: 1665 psi to 1485 psi.

11   Special instructions

11.1   Use of an independent air supply (supplied airline respirator (SAR) connection)

⚠️ **WARNING**

Air quality must conform to the statutory requirements.
The time required for the wearer to escape to a safe area must be within the remaining breathing time of the cylinder, taking into account the remaining air content in the cylinder and the breathing rate of the wearer.

Independent air supplies must meet the following standards:

● Type-1 gaseous air as defined in: CGA Commodity Specification for Air, G-71 (grade D or higher).
● NFPA 1989 Standard on Breathing Air Quality for Fire and Emergency Services Respiratory Protection.
● Air supply pressure: 87 psi to 125 psi.
● Airline hose length: 5 feet to 300 feet (maximum working hose length must not exceed 12 individual hose lengths).
● Airline flow rate: 550 liters/minute.
● Minimum ambient temperature of operation: -25 °F (-31.7 °C).

Sentinel 7000 alarms and warning signals will operate as normal. The user interface display will show cylinder pressure when the cylinder valve is open.

1.   Turn on the independent air supply.
2.   Connect the independent air supply coupling to the secondary supply hose (see the UEBSS/SAR connection instructions for use) and breathe normally.
3.   Close the cylinder valve (if the whistle sounds, silence it by taking several short deep breaths or momentarily operating the lung demand valve bypass button (Fig J, Item 3).
4.   If any air supply problems are encountered, proceed as follows:
a.   Open the cylinder valve to return to breathing from the attached cylinder.
b.   Disconnect the independent air supply coupling.
c.   Leave the hazardous area by the shortest and safest escape route, if necessary.

11.2   CBRN use

The Dräger PSS 7000 Series is certified by National Institute for Occupational Safety and Health (NIOSH), for chemical, biological,

radiological or nuclear (CBRN) use and by the Safety Equipment Institute (SEI) to meet the requirements of NFPA 1981. Approvals are only valid when the apparatus is used with compressed-air cylinders approved by NIOSH. Equipment configurations for CBRN use are detailed in a CBRN approval table (see CBRN approval table 3367124).

Dräger recommend that a quantitative fit test (QNFT) be performed on the face mask before use in a CBRN environment. The fit test must be conducted strictly in accordance with the requirements outlined in the OSHA Respiratory Protection Standard 29 CFR, Section 1910.134.

11.3   Cautions and limitations

CAUTIONS AND LIMITATIONS

D – Air-line respirators can be used only when the respirators are supplied with respirable air meeting the requirements of CGA G – 7.1, Grade D or higher quality.

E – Use only the pressure ranges and hose lengths specified in the USER'S INSTRUCTIONS.

I – Contains electrical parts that may cause an ignition in flammable or explosive atmospheres.

J – Failure to properly use and maintain this product could result in injury or death.

M – All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.

N – Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.

O – Refer to User's Instructions and/or maintenance manuals for information on use and maintenance of these respirators.

S – Special or critical user's Instructions and/or specific use limitations apply. Refer to User's Instructions before donning.

CAUTIONS AND LIMITATIONS – CBRN

Q – Use in conjunction with personal protective ensembles that provide appropriate levels of protection against dermal hazards.

R – Some CBRN agents may not present immediate effects from exposure, but can result in delayed impairment, illness or death.

T – Direct contact with CBRN agents requires proper handling of the SCBA after each use and between multiple entries during the same use. Decontamination and disposal procedures must be followed. If contaminated with liquid chemical warfare agents, dispose of the SCBA after decontamination.

U – The respirator should not be used beyond 6 hours after initial exposure to chemical warfare agents to avoid possibility of agent permeation.

EBSS – EBSS Activation or engagement of EBSS in either the donor or receiver mode changes the SCBA use to Escape-Only, approved service time for either the donor, or the receiver is no longer applicable. Additional critical cautions and limitations apply. Refer to the section EBSS in the users' instructions.

11.4   S – Special or critical users' instructions

- The EOSTI alarm set point of this SCBA is 35 ± 2 % of the rated cylinder pressure. For the activation range see Section 10 (technical data).
- Minimum ambient temperature of operation: -25 °F (-31.7 °C).
- When used as a combination supplied-air respirator/self-contained breathing apparatus (SAR/SCBA), not more than 20 percent of the air supply can be used during entry.
- During supplied air use, the cylinder valve must remain closed. If the supplied air fails, open the cylinder valve and immediately proceed to fresh air.
- Supplied air source must meet the following criteria: pressure 87 psi to 125 psi, air flow rate at least 550 liters/minute.

Important Note: If it is decided to exit the working area with the airline disconnected or, in an emergency, if the air supply fails, breathe normally and immediately proceed as follows:

- Open the cylinder valve (counterclockwise) slowly, but fully, and breathe normally.
- Disconnect the hose of the independent air supply from the male coupling of the airline hose connection. Breathe normally and immediately leave the hazardous area by the shortest and safest route.

The remaining duration begins from the time of opening the cylinder valve and disconnecting the independent air supply. The time required to allow the wearer to escape to a safe area must be within the remaining air capacity (volume) of the cylinder taking into account the breathing rate of the wearer.

- Use of the RIC UAC should be by trained and competent personnel only.
- The RIC UAC must only be used to recharge a cylinder in emergency situations as defined in NFPA 1981.
- The RIC UAC filling hose is a component of the NFPA 1981 certification. Only use a filling hose which has been certified to NFPA 1981 for use in immediately dangerous to life or health (IDLH) atmospheres.
- Can not use the RIC UAC connection for second person (UEBSS).
- Can not use the RIC UAC to transfer air from one compressed-air breathing apparatus to another.
- Do not allow oil, grease or other contaminants to contact the RIC UAC connection.
- Do not attempt to disassemble or repair the RIC UAC connection.
- Caution: The secondary air supply pressure to the RIC UAC must not exceed maximum rated working pressure of the cylinder(s) being filled.
- Caution: If the pressure relief valve of the RIC UAC is activated, the SCBA must be returned to the nearest Dräger branch or agent.
- Caution: If a leak is detected while refilling in a contaminated or oxygen-deficient gaseous atmosphere, stop refilling and immediately leave the hazardous area.

11.5   UEBSS – Special or critical users' instructions

Safety Warning: Use of a Universal Emergency Breathing Support System (UEBSS) must comply with NIOSH and NFPA 1981 requirements.

Refer also to the instructions for use for the UEBSS.

- UEBSS may not be engaged or activated in donor mode after the donor End-of-Service-Time-Indicator (EOSTI) has activated.
- Users must be fully trained in the operation of UEBSS in accordance with a training program conforming to the requirements of NFPA Standards 1404, Fire Service Respiratory Protection Training and 1500, Fire Department Occupational Safety and Health Program.

- Simultaneous connection of more than two users (one donor, and one receiver) is not permitted.
- Immediately after the UEBSS connection has been completed, the cylinder valve of the receiving SCBA shall be closed.

The time required to allow the wearers to escape to a safe area must be within the remaining air capacity (volume) of the cylinder taking into account the breathing rate of the wearers.

12   Warranty information

Unless otherwise agreed between Dräger and the customer, the following shall apply in the event of defects of the product in material or workmanship: The customer shall contact the company where he bought the product ("Seller"). The warranty conditions agreed between the customer and the Seller shall apply. The product must be used in strict accordance with the instructions for use. Any use disregarding the instructions for use may void warranty.

13   Contact details

Any issues with the equipment, including damage, malfunction, or failure of the breathing apparatus that may present a hazard to the user should be reported to Dräger US Customer Service – Phone 1-800-437-2437.

Contact with the certification organizations may be reached at:

- NIOSH, NPPTL – Phone 1-412-386-4000
- SEI (NFPA) – 1307 Dolley Madison Blvd, Suite 3A, McLean, VA 22101, Phone 1-703-442-5732