



Operating Manual

MSA SavOx / MSA SavOx Industry

EN 13794 K/30/S



Order No. 10112005/04



The Safety Company

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1 Safety Regulations

1.1 Correct Use

The SavOx or SavOx Industry self-rescuer are respiratory protection devices [chemical oxygen apparatus] for self-rescuing which is independent of the ambient atmosphere. It protects the wearer of the devices during escape from a dangerous ambient atmosphere or whilst waiting for rescue from poisonous gases, toxic particles and oxygen depletion. It is to be used exclusively for self-rescue under dangerous conditions and is not intended for long-term use.

The SavOx is carried at the belt. The SavOx Industry is carried over the shoulder.

The device described in this operating manual complies with Directive 89/686 EEC or Regulation (EU) 2016/425, respectively.

The device has been tested and certified by DEKRA Testing and Certification GmbH, Dinnendahlstrasse 9, 44809 Bochum (Germany), Notified Body 0158.

The device is developed for one mission, used devices must always be replaced, reuse is not permitted.



WARNING

The device may only be used once and must never be reused. Used or opened devices must be replaced by new devices.

It is imperative that this operating manual be read and observed when using the device. In particular, the safety instructions, as well as the information for the use and operation of the device, must be carefully read and observed. Furthermore, the national regulations applicable in the user's country must be taken into account for a safe use.



WARNING

This product is supporting life and health. Inappropriate use, maintenance or servicing may affect the function of the device and thereby seriously compromise the user's life.

Before use the product operability must be verified. The product must not be used if the function test is unsuccessful, it is damaged, a competent servicing/maintenance has not been made, genuine MSA spare parts have not been used.

Alternative use, or use outside this specification will be considered as non-compliance. This also applies especially to unauthorised alterations to the product and to commissioning work that has not been carried out by MSA or authorised persons.

1.2 Liability Information

MSA accepts no liability in cases where the device has been used inappropriately or not as intended. The selection and use of the device are the exclusive responsibility of the individual operator.

Product liability claims, warranties and guarantees made by MSA with respect to the device are voided, if it is not used, serviced or maintained in accordance with the instructions in this manual.

1.3 Safety and Precautionary Measures



Attention!

Chemical Oxygen Escape Devices used in mining may be subject to particular Mining-Regulations that are to be observed.

There is an ignition danger in case the device is destroyed and the oxygen generating chemical comes into contact with combustible substances, e.g. coal.

Also observe official regulations applicable in the country of use.



Attention!

Defective devices must not be used!

Removed defect devices from service and return them to MSA for inspection.

2 Description

2.1 Overview

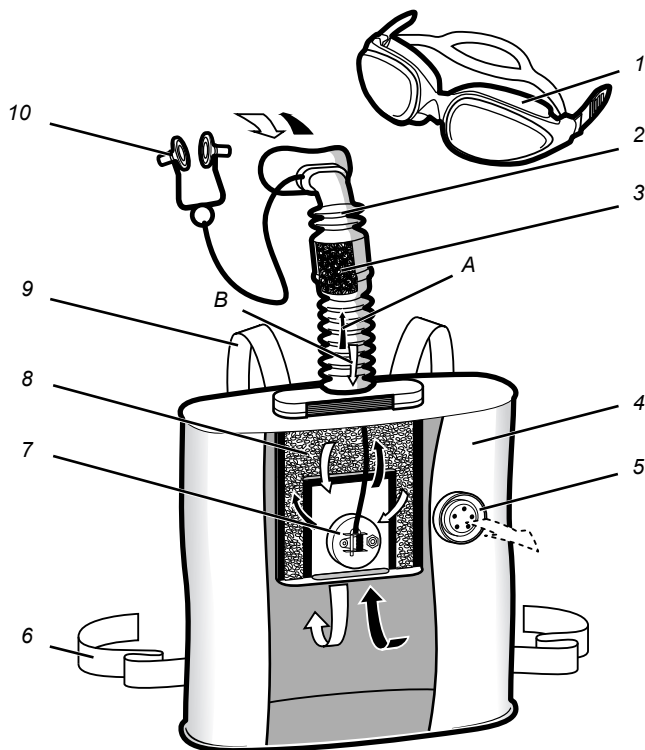


Fig. 1 Design of the device

A	Inhalation	5	Pressure relief valve
B	Exhalation	6	Waist belt
1	Gas protective goggles	7	Starter
2	Breathing tube with mouthpiece	8	KO ₂ -canister
3	Heat exchanger	9	Neck strap
4	Breathing bag	10	Nose clip

The device is contained in an enclosed and sealed sturdy stainless steel container.

The device includes a chemical canister with potassium hyperoxide [KO₂], which is required for the regeneration of the exhaled air.

After starting the device by pulling out the breathing tube the device it is directly ready for use. During the escape, the device supplies the wearer with breathable air which is prepared in the KO₂ canister. Normally the SavOx is carried at the belt. The SavOx Industry is carried over the shoulder. Both devices can be stored on vehicles.

2.2 Function

The device supplies the wearer with oxygen which is created from the chemical potassium hyperoxide [KO₂]. In an emergency, the container is opened and the respiratory protection device is taken out.

The device has a closed breathing circuit. When in operation, the exhaled air is transferred into the chemical canister with the potassium hyperoxide. The potassium hyperoxide reacts with the humidity and the carbon dioxide of the exhaled air and, at the same time, creates oxygen and heat. The air for inhalation prepared in this way is fed into the breathing bag and is then inhaled again.

The amount of resulting oxygen depends on the intensity of respiration. Increased respiration [more carbon dioxide, more humidity] increases the formation of oxygen or vice versa.

When the device is used for breathing, the KO₂ canister warms up, as does the inhalation air, gradually. This is normal and indicates the correct operation of the device.

The end of oxygen supply is indicated by increase of the inhalation resistance.

The device is equipped with a starter which starts automatically when the breathing tube is pulled. After starting it fills additional oxygen into the breathing bag.



WARNING

The device must only be opened for use!

Otherwise humidity from the ambient air can penetrate the open device and affect the performance.

Used or opened devices must be replaced by new devices.

2.3 Marking/Certification

The devices are classified according to EN 13794 and marked with the type [code letter] and nominal duration [minutes]. The type, nominal duration and referenced standard are marked on the device. The device is marked as follows:

Device	Marking	
	upper side	bottom side
MSA SavOx	MSA	Serial No. Date of manufacture SavOx EN 13794 K/30/S
MSA SavOx Industry	MSA	Serial No. Date of manufacture SavOx Industry EN 13794 K/30/S

The Declaration of Conformity can be found under the following link: <https://MSAsafety.com/DoC>

2.4 Demonstration and Training Device

There are different demonstration and training devices for the SavOx Industry TR and SavOx TR. The demonstration and training device can be used for demonstration and practise of wearing and breathing without using a chemical canister. The inhalation air is taken from the ambient air and the exhalation air is expelled outside. The demonstration and training device is comparable in size, weight, external construction, handling and breathing resistance to the emergency use devices. To distinguish it from the emergency use devices, the demonstration and training device has marked blue.



For the demonstration and training device the breathing air is taken from the ambient atmosphere, i.e. training must be made in environments free from contamination.

3 Use

3.1 Important Escape Rules

The device protects the wearer during escape from a dangerous ambient atmosphere. During the escape, the following rules must always be observed:

1. Stay calm!
2. Choose the shortest route to safe ambient air!
3. Breathe calmly! Extra air will be consumed if breathing is fast and irregular.
4. Do not damage or compress the breathing bag, otherwise lifesaving oxygen may be lost!
5. The mouthpiece must be tight between teeth and lips and be tightly enclosed with the lips.



The device must always be available for emergencies. The device can be put into operation with a few simple hand movements in about 20 seconds.

3.2 Carrying the Device

Carrying the SavOx

- (1) Pull the waist belt through the belt loops.
- (2) Close the belt.

Carrying the SavOx Industry

- (1) Clip the snap hook of the shoulder strap into the lifting eye.
- (2) Close the neck strap.

3.3 Donning the Device

Donning the SavOx



Opening the Container

- (1) Push the locking lever in the direction of the arrow until the seal breaks and locking device falls off.



Removing the Device

- (2) Grasp container cover with one hand.
- (3) Pull out the device by the neck strap with the other hand.
- (4) Discard container cover.



Donning the Neck Strap

- (5) Take off the protective helmet, if used.
- (6) Place the neck strap around the neck.
 - ▷ The valve of the bag must be visible on the front of the bag.
 - ▷ Do not adjust neck strap!
- (7) Put the protective helmet on.



Detaching the Device

- (8) Detach device from mouthpiece plug.



Activating the Device

- (9) Grasp breathing tube at the mouthpiece.
 (10) Fully extend the breathing tube to activate the starter.
 ▷ A drop in pull resistance indicates the starter is initiated.



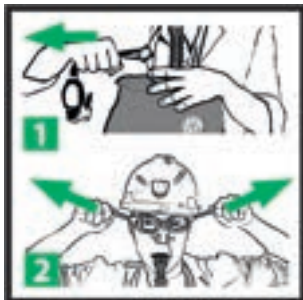
Inserting the Mouthpiece

- (11) Place mouthpiece into mouth with flange of mouthpiece between teeth and lips.
 (12) Bite down on the two lugs.
 (13) Exhale into the device.
 ▷ So the breathing bag is inflated.
 ▷ It might be necessary to unfold the breathing bag by hand.



Fit the Nose Clip

- (14) Grasp nose clip by rubber pads, pull nose pads apart and fit them onto nose.

**Removing and Fitting the Goggle**

Note: Goggle is on the right side of the neck strap.

- (15) Grasp the goggle strap and pull to remove the goggle from neck strap.
- (16) Fit the goggle.
- (17) Tighten goggle straps.

**Adjusting the Neck Strap**

- (18) Adjust neck strap.
 - ▷ Ensure that the head is able to move freely.

**Tying the Waist Belt**

- (19) Tie waist belt and tighten with knot.

Donning the SavOx Industry

**Opening the Container**

- (1) Push the locking lever in the direction of the arrow until the seal breaks and locking device falls off.

**Removing the Device**

- (2) Grasp container cover with one hand.
- (3) Pull out the device by the neck strap with the other hand.
- (4) Discard container cover.

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- (5) Take off the protective helmet, if used.
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 - ▷ The valve of the bag must be visible on the front of the bag.
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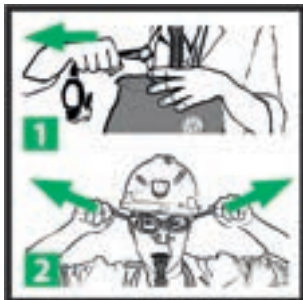
Inserting the Mouthpiece

- (11) Place mouthpiece into mouth with flange of mouthpiece between teeth and lips.
 (12) Bite down on the two lugs.
 (13) Exhale into the device.
 ▷ So the breathing bag is inflated.
 ▷ It might be necessary to unfold the breathing bag by hand.



Fit the Nose Clip

- (14) Grasp nose clip by rubber pads, pull nose pads apart and fit them onto nose.

**Removing and Fitting the Goggle**

Note: Goggle is on the right side of the neck strap.

- (15) Grasp the goggle strap and pull to remove the goggle from neck strap.
- (16) Fit the goggle.
- (17) Tighten goggle straps.

**Adjusting the Neck Strap**

- (18) Adjust neck strap.
 - ▷ Ensure that the head is able to move freely.

**Tying the Waist Belt**

- (19) Tie waist belt and tighten with knot.

4 Maintenance and Cleaning

4.1 Maintenance Instructions

To maintain readiness for use, the device must be inspected regularly, checked for integrity, tightness and, if necessary, cleaned [do not use metal brushes!].

As the device contains a chemical which is sensitive to moisture, it is packed in an airtight container and is sealed at the factory.

The frequency of inspection depends on the device load [→ chapter 4.5].

For used and/or opened devices, the chemical canister must always be replaced, reuse is not permitted. Internal checks and any repairs to the devices are to be carried out by the MSA Customer Service or authorized service centers.

4.2 Return of Used Device

For return of used or opened devices, observe the following:

- Pack the device and components in the device containers only after they have cooled down and are dry.
- No organic substances must enter the chemical canisters [e.g. solvents, oils, etc.].
- Observe transport regulations [→ chapter 5].

If the complete device cannot be packed in the container, the following procedure is required:

- Remove the chemical canister from the device:
 - (1) Therefor loosen the clamp and remove the breathing bag and breathing tube.
 - (2) Pack the chemical canister inside the container and seal with the original locking assembly of the container.
 - ▷ Do not use finely cutted filling material.
- Place the other components of the device with the closed container in a carefully packed package.
- The components must be complete and undamaged.

4.3 Tightness Test

The tightness test of the device is carried out using the MSA tightness tester for chemical oxygen breathing protection apparatus. Detailed descriptions of the structure, function, use and maintenance of the tightness tester can be taken from the relevant operating manual of the tightness tester [→ chapter 8].

The tightness test of the device is carried out as follows:

- (1) Push the device without any straps into the tightness tester in such a way that the cover points towards the door.
- (2) Close the door and lock.
- (3) Set timer to 90 s.
- (4) Create overpressure with the lever, i.e. push the lever downwards until it engages and start the timer at the same time.
- (5) After 30 seconds, cover the black pointer with the red pointer.
- (6) After a further 60 seconds, the timer signals the end of the test period. Then read the pressure difference between the red and the black pointers.

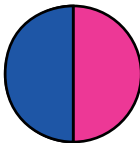
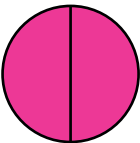
The device is tight if the black pointer remains in the prescribed pressure range and if the pressure difference is no more than 5 mbar.

If the pressure drop is more than 5 mbar, the unit must be replaced.

4.4 Indicator - applies only for SavOx

Perform an indicator check to controll if the device must be replaced. The indicator is a circle with two semi-circles, the left side is the indicator, on the right side a comparison colour is shown.

A blue colour on the left side indicates a functionable device. A pink colour or colourless indicator on the left side indicates, the device must be replaced. To verify the colours, a comparison colour in pink on the right side is shown.

		<ol style="list-style-type: none"> (1) Check the indicator on the left side. (2) Compare the left side with the right side. <ul style="list-style-type: none"> ▷ The colour of the left side must be blue. ▷ Otherwise replace the device.
Blue / Pink	Pink / Pink	

4.5 Maintenance Intervals



WARNING

The product must be inspected per the instructions of this section and removed from service if it does not pass the inspection. Use of product that has not passed inspection may result in over-pressurization of the product, an ignition danger or other condition thereby seriously compromising the user's life.



National regulation must be observed, e.g. control interval according German Mining Regulation.

User specific conditions may require shorter intervals.

The service life depends on the type and kind of treatment to which the device were subjected.

The intervals below apply for devices used in a single shift operation of 8 hours during a normal work week of 5 days. Increased use requires the intervals to be shortened.

For example, working in a double shift (2 x 8 hours per day and 5 days per week) will reduce the expected lifetime by 50% to 5 years.

Intervals ¹	Inspection
Before and after carrying	External visual check: Check, that the seal is intact and that there are no external damages on the device. Damage includes dents, deformations and signs of heat, but is not limited to. If any damage is found, immediately remove the unit from service <i>for further investigation by qualified personnel</i> .
Annually ^{2 3}	Tightness check ⁴
After 3 years ^{5, 6}	Tightness check ² and complete check ⁷ of 3% of the representative population of devices which are carried along or stored on vehicles.
After 5 years ³	Tightness check and complete check ⁵ of 3% of the population.
After 7 years ³	Tightness check ² and complete check ⁵ of 3% of the population.
After 9 years	Tightness check ² and complete check ⁵ of 3% of the population.
After 10 years	Replace device, use no longer permitted.

- 1 The intervals are based on the date of manufacture [month/year] on the container. Devices manufactured in the same year are considered as "population" and should be combined for inspection.
- 2 Perform the tightness check every 6 months for all devices used more than in a single shift operation.
- 3 Perform a complete check of 2% of the population after 1 year, for devices exposed to high mechanical stress, sustained vibration and/or elevated temperature (e.g. stored next to engines).
- 4 Tightness test with tightness tester D1118845 or by MSA Customer Service.
- 5 It is recommended that a service contract with MSA Customer Service is made.
- 6 If the inventory of devices is less than ten devices the inspection after 3 years is not necessary. A complete inspection of the whole inventory of devices is necessary after 5 years.
- 7 Complete check = Internal inspection and check. The result will decide whether the device can be used further.

4.6 Documentation

MSA recommends keeping a file for each device where the serial numbers, the dates of manufacture and the dates and results of the inspections are recorded.

5 Transport regulations

Chemical oxygen devices are classified as Dangerous Goods under Class 5.1 with the designation and hazard label "5.1, 3356, oxygen generator, chemical". Regard packing group II.

Undamaged and unopened devices can be transported in the packing material supplied with the device or in a different approved method of packing.

Damaged and/or opened devices should be welded into a plastic bag and packaged as described in chapter 4.1.

Notes concerning the various transport methods can be taken from the EU safety data sheet.

6 Disposal

The chemical canister contains strong alkaline and oxidizing substances [potassium hydroxide, potassium carbonate and potassium hyperoxide].

For disposal local regulations are to be observed.

7 Technical Data

SavOx / SavOx Industry	
Weight [total]	approx. 2.5 kg
Weight [ready for use]	approx. 1.5 kg
Dimensions	height: approx. 220 mm width: approx. 160 mm depth: approx. 110 mm
Carrying mode	on belt or with carrying strap
Carrying mode [during use]	in front of chest
Storage conditions	Normal climate, temperature: -20°C to 40°C
Temperature at start	-10°C to 50°C
Ambient temperature in use	-20°C to 50°C
Temperature class	T1 to T4
Service life	max. 10 years
Breathing resistance	Inhalation: 3 mbar Exhalation: 6 mbar
Oxygen content	more than 21% by volume
Carbon dioxide content	less than 1% by volume
Temperature of inhalation air	+30°C to +50°C
Service time	
at escape conditions	30 min [breathing volume 35 l/min]
waiting for rescue ¹	up to 3 h [breathing volume 10 l/min]

- 1 The actual duration time may deviate from the service time in dependency on the breathing air volume. As such the duration time in relation to a breathing air volume of only 10 l/min [e.g. sitting and waiting for rescue while breathing from the device] extends up to 3 hours.

8 Ordering Information

Description	Article No.
SavOx	10023263
SavOx Industry	10107704
Demonstration and Training Device SavOx TR	10024538
Demonstration and Training Device SavOx Industry TR	10110086
Waist belt - SavOx	D1123958
Shoulder strap - SavOx	10029099
Antistatic bag [3 Pcs] - SavOx	10120084
Antistatic bag [3 Pcs] - SavOx Industry	10120086
Carrying strap [5 Pcs] - SavOx Industry	10111722
Tightness Tester for closed devices	D1118845
Leak-test Module for Tightness Tester SavOx	10029195
Replacement Pictogram	10110641

