XCP

Instruction & Safety Manual

XCP (Cross Country Pilot) Multi-Place, Carry-On Aviation Oxygen System

Using Nasal Cannulas In Aviation

The cannula type breathing device can be used up to 18,000 ft MSL. Pilots should refer to FAR 23.1447 to see if any restrictions apply for their use of cannula type breathing devices in the operation of their aircraft.

Basic Safety

The XCP Oxygen system delivers pure oxygen for the purpose of supplemental breathing and is not intended for medical use. The administration of oxygen should be done by a doctor or emergency medical technician with equipment made for that use. Pure oxygen is a highly oxidizing gas in nature and vigorously accelerates combustion. It can provide a catalyst for spontaneous combustion and may cause personal injury or death if not used properly and with caution. DO NOT use any type of oil or grease on any of the fittings, valves or cylinders. DO NOT use the system while smoking or near an open flame.

MH
Aviation Oxygen Systems
MOUNTAIN HIGH
Equipment & Supply Company

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The XCP System

The XCP is an economical, high-duration, multi-place, carry-on aircraft oxygen system. With the **MH-3** flowmeter and **Oxymizer** cannula, each person will typically use about 0.75 [¾] liter/minute (or at most 1.0 liter/minute) at 18,000 ft. Assuming 1.0 liter/min as a worst-case scenario makes it easy to calculate cylinder duration. For example: if you have 415 liters of oxygen and four people, you would divide 415 by 4 which gives (at least) 103 minutes per person cruising at 18,000 ft.

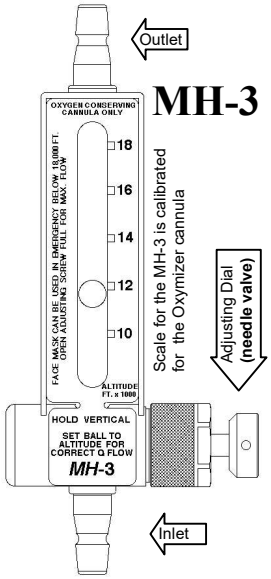
For flight operations above 18,000 ft., the **MH-4** flowmeter is calibrated to provide 1.0 liter/minute per 10,000 ft., and these numbers must then be taken into account for cylinder duration calculations.

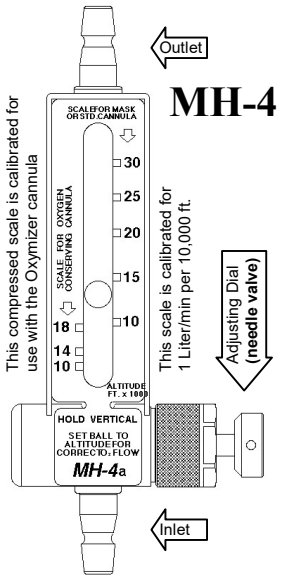
The XCP-4p system package consists of the following items:

1x Light-weight aluminum oxygen cylinder with padded GoreTex Full-Pack
1x XCP-4p quad-port regulator with self-sealing outlets
4x Mountain High MH-3 or MH-4 flowmeters with 1 meter of high-quality tubing with CPC quick-connect fittings
4x Oxymizer® type "M" nasal cannulas
4x XCP face masks (for use with the MH-4 flowmeter or nasal congestion)

The XCP system may be purchased with either MH-3 or MH-4 flowmeters. The **MH-3** has an altitude/flow scale calibrated for the Oxymizer oxygen-conserving cannula and is marked in 2,000 ft. increments for flight levels up to 18,000 ft. To receive the proper amount of oxygen, simply adjust the flow of the **MH-3** so that the scale reads the same as the altitude you are flying at. For example: if you are at 15,000 ft. you would hold the meter vertically and adjust the needle valve on the **MH-3** so that the ball reads between the 14 and 16 on the scale. Turning the adjusting knob counter clock-wise increases oxygen flow; turning it clock-wise decreases flow. The flow of the **MH-3** can be adjusted well beyond the limits of the scale for emergency purposes.

The needle valve should NOT be used to shut off a device. Disconnect the device from the XCP regulator.

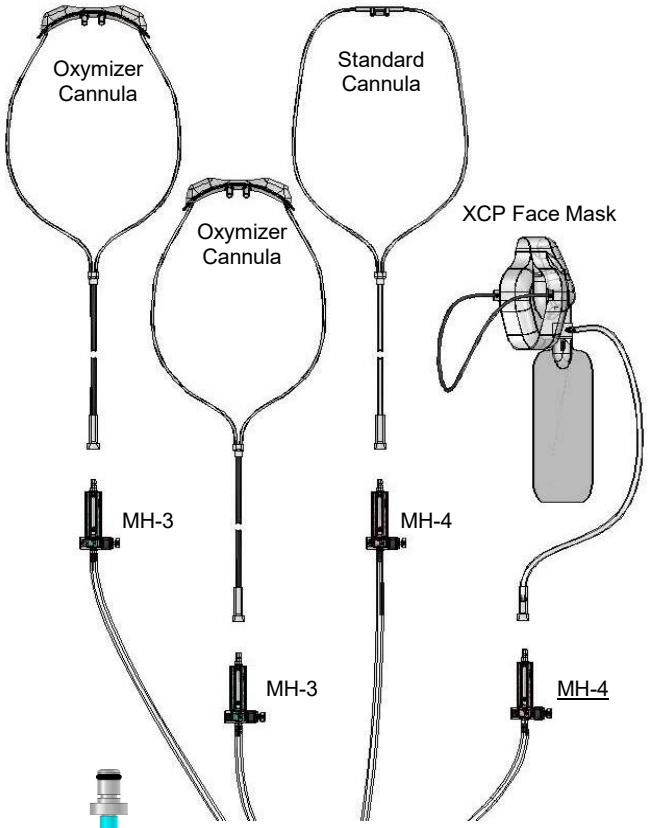


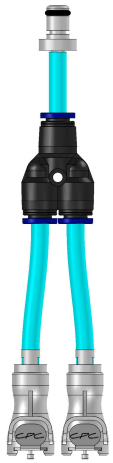


At flight levels above 18,000 ft. the XCP system can be operated with **MH-4** flowmeters and the associated XCP face masks. However, this configuration will use more oxygen in comparison with the Oxymizer cannula.

The **MH-4** has two altitude/flow scales. The right-hand scale is calibrated to provide 1 liter/min of oxygen per 10,000 ft. for use with the XCP face mask, XCP standard cannula, or XCP EZ-Breath boom-mount cannula. The left-hand (compressed) scale is calibrated for the Oxymizer cannula and is limited to 18,000 ft.

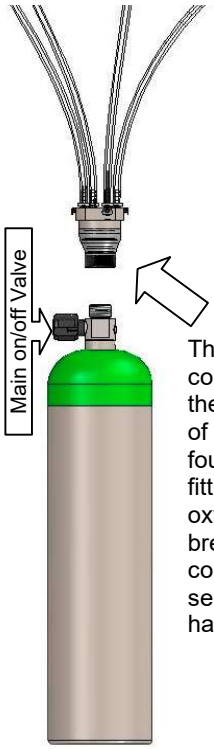
The flow of the **MH-4** can be adjusted well beyond the limits of the scale for emergency purposes.





XCP Split Kit
MH p/n 00XCP-1048-00

The XCP system can easily be expanded to provide oxygen for more than four people by simply adding more breathing stations with the use of the XCP Split Kit.



1 meter of high-grade tubing is supplied with each MH-3 or MH-4

The XCP regulator connects directly to the refill/service port of the cylinder. It has four check valve fittings that admit oxygen only when a breathing device is connected and re-seals tight once it has been removed.

The XCP delivery system can operate with any of our aluminum or fiber-wrapped cylinders or any other oxygen cylinder that has a CGA-540 valve port.

Securing the Cylinder Safely for Flight

You must take all necessary steps to assure the proper installation of the XCP system cylinder. If a cylinder is not tied down or otherwise mounted it may become a deadly missile in the event of turbulence.

Full-Pack Cylinder Harness Kit

Use the supplied Full-Pack cylinder harness to hold and mount the cylinder to an appropriate place. A seat-back seems to be a favorite spot with pilots.

Description and use of the XCP Delivery System

The XCP oxygen system includes a light-weight non-adjustable aluminum regulator. Oxygen flow is controlled with the Mountain High MH-3 or MH-4 flowmeters which can be placed close to the pilot for convenient viewing and adjustment.

The XCP regulator connects by hand directly to any oxygen cylinder with an industry standard CGA-540 service connection. CPC quick-connect fittings connect breathing devices to the regulator, and mechanically activated check-valves assure that oxygen flows only when a device is connected. The outlet ports self-seal when a device is disconnected. The XCP regulator delivers a dynamic service pressure of 15 psig, which is suitable for use with the MH-3 or MH-4 flowmeters, as well as EDS units.

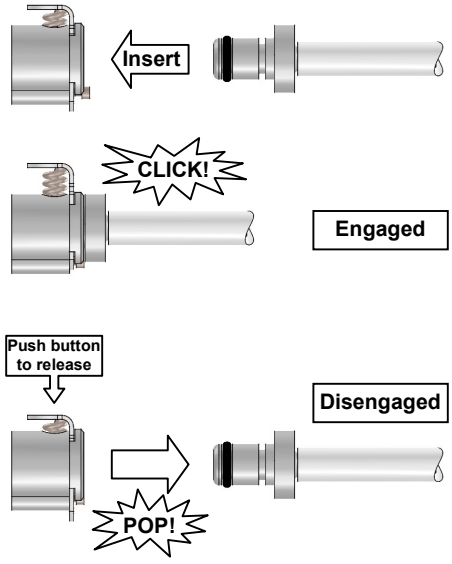
The MH-4 flowmeter with a *standard cannula*, when properly adjusted, will deliver the minimum of 1.0 liter/minute of oxygen per 10,000 ft pressure altitude per standard. In contrast, the MH-3 flowmeter with an *Oxymizer® nasal cannula* requires significantly less oxygen to maintain the same blood oxygen saturation level. The Oxymizer® nasal cannula operates somewhat like a diluter-demand regulator by conserving oxygen in a reservoir in the cannula between breaths, enabling maximum use of your oxygen. The MH-3 should *only* be used with the Oxymizer® nasal cannula and *only* up to 18,000 ft pressure altitude.

CAUTION

Do not attempt to remove the XCP regulator from the cylinder while under pressure!

Doing so may destroy the O-ring on the inlet nipple of the regulator. The grip-ring of the XCP regulator will be difficult to turn while under pressure, reminding you to bleed-off the cylinder pressure first following these steps:

1. Close the main cylinder valve (fully clockwise). Not much force is needed to fully close the valve.
2. Connect at least one MH-3 or MH-4 flowmeter to the XCP regulator outlets.
3. Let the remaining oxygen bleed via the flowmeters still connected.



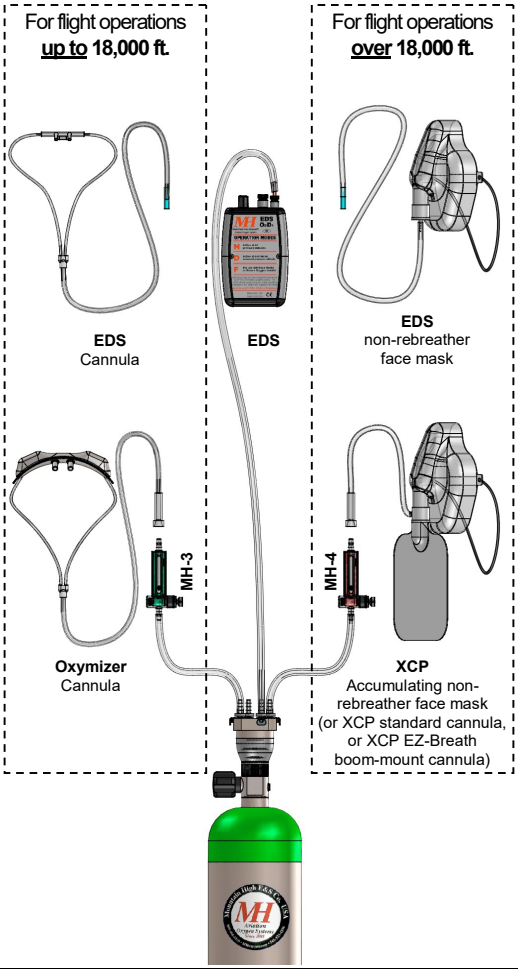
CPC Quick-connect Fittings

To insert:

Simply insert the male connector into the female outlet on the XCP regulator. Push in firmly until the connector engages with a "**CLICK**" sound. You now have a secure air-tight connection.

To remove:

Push in the side release button and the male connector will disengage with a "**POP**". The internal check valve will close to stop the flow of oxygen.



A word about oxygen in general

Oxygen is oxygen. There is no specific grade or purity for oxygen under pressure that has been produced by liquefaction. Therefore, oxygen under pressure, regardless of the cylinder's claim, must be 99.9% pure or the cylinder will be prematurely damaged by rust or corrosion. All utility oxygen cylinders for welding, aviation and medical purposes will (must) have a service fitting of type CGA-540. Oxygen specifically intended for medical purposes will most likely have a service valve fitting of type CGA-870 (sometimes referred to as a post valve) which helps to distinguish it as being for medical application. Oxygen for medical purposes has a specific protocol for hygiene and transport, but the oxygen itself is no different. There are, however, various mixtures of air that may be used strictly for medical or industrial purposes and is not interchangeable and may be the reason many think there are different grades or purities of oxygen. Vessels holding these air mixtures will have a CGA-346 type service fitting that is not compatible with the CGA-540 fitting for oxygen. Once again oxygen is oxygen. It can't be under pressure without any adverse reaction if it is not as pure and dry as possible. The Compressed Gas Association (CGA) has adopted and helped develop almost all of the standards for compressed gasses used in the USA and which in turn have been adopted by the FDA, DOT and other government agencies as well as many foreign governments. They have a variety of documents about compressed gases, vessels and fittings. To receive specific information, contact the CGA:

Compressed Gas Association, inc.
1235 Jefferson Davis Highway
Arlington, VA. 22202.
(as of 1994)

Hazards of high pressure oxygen and transfilling

Refilling your cylinder

Transfilling of gaseous oxygen from one cylinder to another involves hazards associated with the handling of oxygen under pressure. A hazardous condition exists if high pressure oxygen equipment becomes contaminated with hydrocarbons such as oil, grease or other combustible materials and which may include oil from a person's hands or contaminated tools.

A cylinder will heat-up as it is filled from a high pressure source. The more rapidly the cylinder is filled, the higher the temperature rise in the cylinder resulting from the heat of compression of the gas. Excessive temperature may result in the ignition of any combustible materials that may be present in the system. Refill the cylinder at a flow rate that reduces heating of the cylinder. Use only equipment designed for refilling and transfilling.

Although oxygen itself is nonflammable, materials which burn in air, which is 21% oxygen, will burn much more vigorously and at higher temperatures in an oxygen enriched atmosphere. If ignited, some combustible materials such as oil will burn in oxygen with explosive violence. Many other materials which do not burn in air will burn vigorously in oxygen-enriched atmospheres. Ignition temperatures are reduced in oxygen-enriched atmospheres. Compressed oxygen presents a hazard in the form of stored energy. Open the cylinder valve slowly. The rapid release of high pressure oxygen through orifices, control valves, etc. in the presence of foreign particles may cause friction or impact resulting in temperatures which may be sufficient to ignite any combustible materials that may be present in the system. You can have your cylinder refilled by any industrial gas supply facility, airport and at some medical equipment companies. Each cylinder has been hydrostatically tested and stamped with the date of the test. This is good for 5 years. After this time frame, it will need to be tested again and certified before it can be filled and used. Again, almost any industrial gas and welding supply facility that services and/or refills oxygen cylinders can do this.

Cleaning for dirt, oil and greases

Basic hygiene for oxygen equipment

If any part of the system should become contaminated or you suspect so, you can clean it with hot water and detergent. Do not use the system if it has become contaminated with oil or grease. If the contamination is mild a liquid form of automatic dishwasher detergent or the cleaning product "Formula 409" has been shown to work well for this purpose. This type of detergent is able to cut and remove almost all types of oils or greases and will rinse off without any detectable residue.

To test for contamination, take a clean cotton swab "Q-Tip" and wipe the suspected area with it. With a cup or bowl of CLEAN water, do this test. While observing a clear reflection of light on the water's calm surface, place the tip of the cotton swab into the water. You should not detect any oil what-so-ever bleed from the cotton tip fanning out over the water's surface. This is an accepted method for oil contamination detection. An oil clean surface will pass this visual test without any doubt.

If the service line should become contaminated internally by oil or grease it can be cleaned by soaking the entire line in a vat of hot water and a liquid form of automatic dishwasher detergent. Rinse the line in hot water and inspect. If contaminants are still present repeat soaking. Dry the line by hanging it vertically in direct sunlight or a hot air environment. However, if the contamination is more severe, you may have to perform the cleaning process several times or use a solvent such as type "111 trichloroethane".