Mountain High E&S Co. USA

MH

Aviation
Oxygen Systems
Since 1985

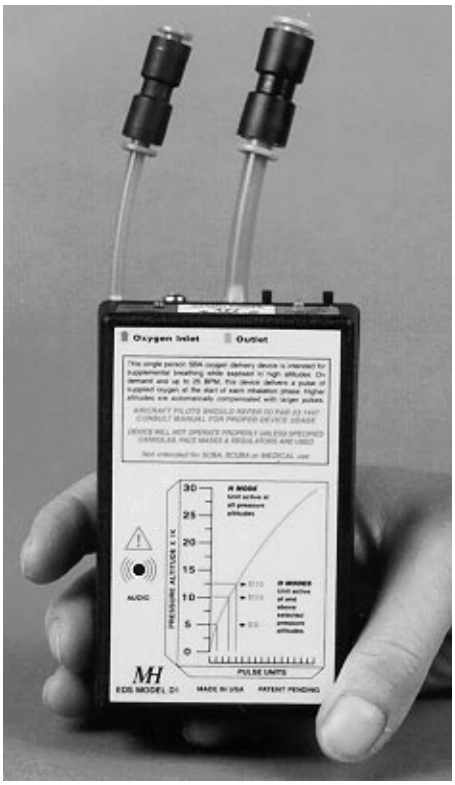
800-468-8185 • MHoxygen.com • 541-923-4100

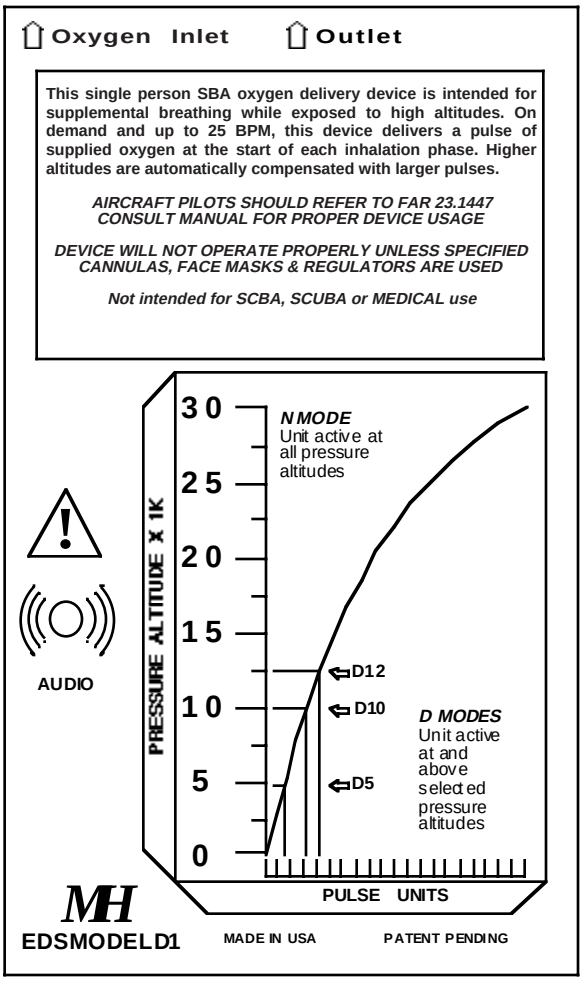
OPERATING MANUAL

for the

EDS Model D1

Electronic oxygen Delivery System
Featuring our Pulse-Demand technology
Patent Pending
R 1.7





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W a r r a n t y

Mountain High Equipment & Supply Co. warranties your EDS-D1 unit/system against defects from materials and workmanship for long as you own and use it. The conditions are simple; should any part of the system become defective, ship it to us and we will repair or replace it free of charge (you pay only shipping). This warrantey is only valid if Mountain High Equipment & Supply Co. has determined that the system or any of its components have not been damaged from being used improperly, submerged in fluids, dismantled or used in an abusive or unsafe manner. Mountain High E&S Co. reserves the right to determine if repairs are to be done under warranty or at a nominal charge. Before this warrantey can be valid Mountain High Equipment & Supply Co. must have your owners guarantee & registration form properly filled out and in our files.

Mountain High Equipment & Supply Co. is not liable for any property or personal damage caused by misuse of the system or cylinder. Operating conditions including, but not limited to cylinder and system pressure and ambient conditions must be considered when refilling cylinder and using the system. Improper use could possibly cause cylinder failure and lead to possible property damage and personal injury.

* *

NOTICE OF NON LIABILITY

This device/equipment is classified as, and only suitable for use as, a supplementary breathing apparatus (**SBA**) or a component/part thereof. It is intended to help supply the needed amount of oxygen for persons during excursions at high altitudes where supplemental oxygen is advised or needed. This device/equipment **is not suitable for any type of life support** operations. This device/equipment **is not suitable** for **SCBA** (Self Contained Breathing Apparatus) or **SCUBA** (Self Contained Underwater Breathing Apparatus) or any **Medical** operations.

It is the responsibility of the user, who will use this device/equipment and who is of sound mind and body with good judgment, to become familiar with the operation and safety aspects of this device/equipment, through the supplied manuals and documentation, before it is put to use.

Mountain High E&S Company assumes no responsibly for any accidents, injury or death that may result from the misuse of this device/equipment. This includes any usage of this device/equipment outside the scope of common sense and detailed in the operations and safety manuals, inserts and other related documentation.

Basic Safety

The EDS Oxygen system is intended to deliver pure oxygen for the purpose of supplemental breathing and not intended for medical use. Pure oxygen is a highly oxidizing gas in nature and can vigorously accelerate 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.*

INTRODUCTION

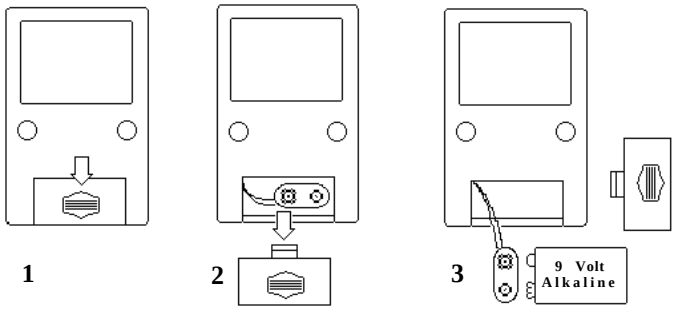
Like our original **EDS-A1** Electronic oxygen Delivery System (Analog Computer) the **EDS-D1** (Digital Computer) oxygen system with our Pulse-Demand technology is a single person aviation oxygen delivery system designed to maximize the administration of oxygen into the human body in the most efficient, comfortable and convenient way. With new user selectable settings, total apnea alarm and smaller size the new **EDS-D1** provides the same reliable operation that users of the **EDS-A1** have come to rely upon and more. The **EDS-D1** operates on known physiological facts that the breathing cycle of a healthy, non-smoking person is such that about one-third of the time is spent inhaling while two-thirds is spent exhaling and pausing. In addition, between 2/3 to 3/4 of the volume of air holding oxygen inhaled is not used but is simply exhaled. The human lungs, for their size, are relatively inefficient compared to other life-support organs. Lungs have to be the most adaptable and are most easily stressed at altitudes resulting in a reduced efficiency effecting the entire body within seconds. This is partly because only a fraction of inhaled air, holding oxygen, actually gets to the oxygen absorbing alveolar of the lungs. The rest is spent in the so-called dead-spaces, i.e. trachea, bronchus, and other areas not directly contributing to oxygen absorption, where it simply goes unused. Only about 25% to 30% of the oxygen inhaled in a given volume of air is actually absorbed into the bloodstream. The rest is simply exhaled back out. Studies have shown that oxygen being delivered only at the very beginning of inhalation cycles acts better than a constant-flow system. This is because the **EDS-D1** provides oxygen as a bolus at a slightly higher pressure than ambient that is first to lead into the most functional part of the lungs, allowing optimum oxygen absorption during times of high altitude excursions where oxygen is less per volume of air and the absolute (atmospheric) pressure is lower.

HOW IT WORKS

The **EDS-D1** monitors micro-pressures induced from inspiration efforts. In turn it delivers a precisely metered pulse of oxygen at the instant inspirations are detected but not during exhalation, pausing or talking. Ongoing tests are showing that 90% of the oxygen the **EDS-D1** provides to the lungs goes directly into the blood. The **EDS-D1** "synchronous inhalation pulse-demand technique" is currently the most efficient way known by respiratory physiologists to saturate the blood to well over 90% while using as little as one-tenth the oxygen over standard constant-flow systems. Field tests with soaring flights have yielded savings of up to ten times over the conventional delivery protocol of 1 liter/min. per 10,000 feet. The average user should, however, see an average of 4 to 6 times savings over constant-flow systems. The **EDS-D1** utilizes well known physiological facts providing the smallest, lightest yet most efficient aviation oxygen system available. Precious oxygen is simply wasted with constant flow systems. Because of this, many pilots wait until some sort of indication of hypoxia is detected before they begin to use their limited supply. That is, if the person recognized his indications for hypoxia in the first place. This almost always results in being well behind the oxygen saturation curve from the start. The **EDS-D1** will allow one to use oxygen at the point where it is needed without the worry of running out before higher altitudes are achieved. The **EDS-D1** is intended to be used with regulators and cylinders provided by Mtn. High. Any other cylinder with a near-compatible fixed-flow or adjustable oxygen regulator may be used. Pilots who intend to fly with the **EDS-D1** are advised to become familiar with the system. The cannula can be used for flight operations up to 18,000 ft. MSL. which takes advantage of the natural moisturizing exchange mechanism the sinus membranes provide. This will help prevent so-called "dry-mouth or cotton-mouth" that is associated with diluter demand delivery units or standard constant-flow delivery protocols. Although the **EDS-D1** has shown that it can provide the needed oxygen with a cannula at pressure altitudes well over 32,000 ft. the user will need to comply with FAA FAR 23.1447 and use the face mask for flight operations at and above 18,000 ft. MSL. This is because at altitudes where oxygen is needed it is important that the pilot get the proper amount through either the mouth or nose. A cannula alone can't provide this assurance. A cannula and face mask is provided with the unit. Face masks, with microphones, may be adapted or modified to work with he **EDS-D1**.

Replacing the battery in the EDS unit

Remove the battery door by holding the unit with both hands and pressing in with your thumbs at the point of the arrow pushing in while pushing door outwards (fig 1.) This is best done if the unit is held with the battery door facing up at you and out. The EDS-D1 unit uses a standard 9 (nine) volt alkaline battery connector system. This is a very positive-connecting type connector that requires a bit more force to connect and disconnect to the battery. This is a superior type connector for equipment subjected to rough out-door treatment. Therefore, please take extra care in removing and replacing the battery making sure not to pull on the wires. Use only ***alkaline*** type batteries with the EDS-D1 unit.



Color-coded 4 mm.
RED
inlet Quick-Connect union connects to the primary reducing regulator

Color-coded 6 mm.
BLUE
outlet Quick-Connect union connects to the cannula or face mask

Static ports
DO NOT COVER

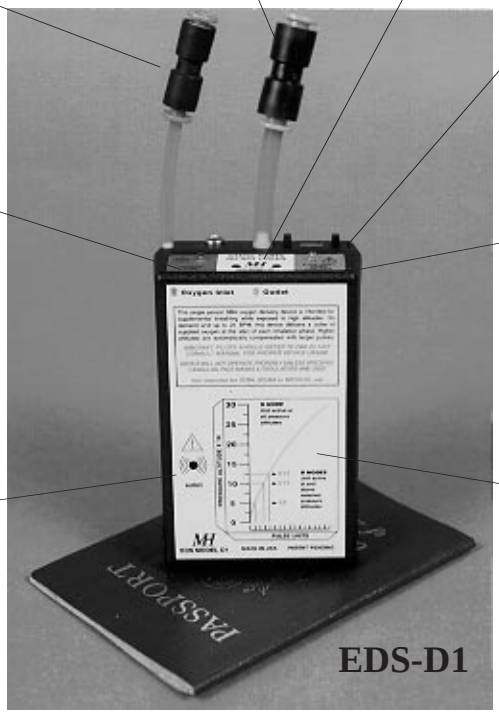
Power On/Off and Control Switch

High brightness green LED for indication of positive flow of oxygen for each inspiration effort.

High brightness red LED for indication of oxygen flow-faults, apnea and low battery condition.

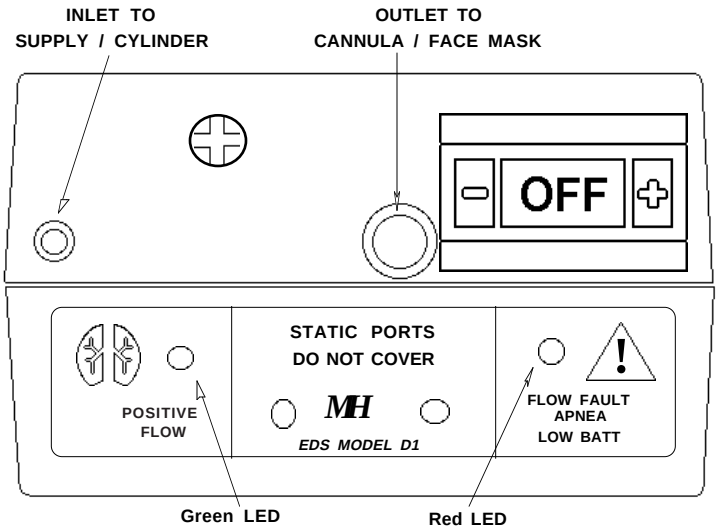
Audio port. Sound from flow-fault and apnea conditions only

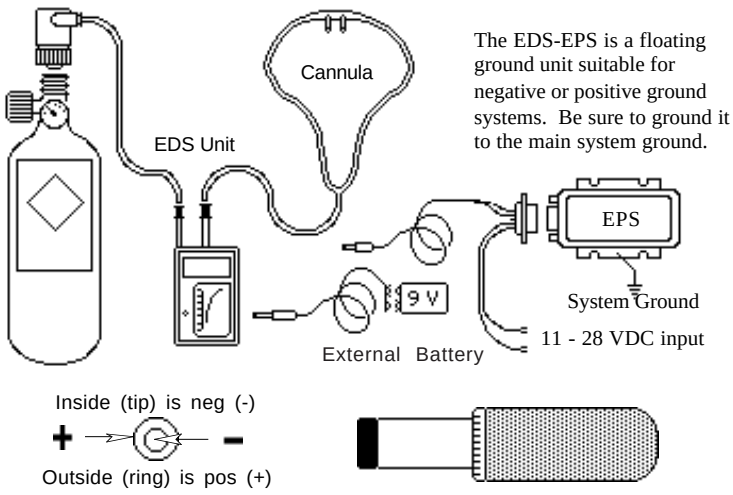
Operational and precautionary front face-place



If the EDS -D1 unit will be operating outside in very cold temperatures, premature battery depletion may be likely. An external battery connector can be wired up to use an external 9 volt battery placed somewhere warmer such as your flight suit. It can also be used as an emergency backup, electronically replacing the internal battery with the external battery that is plugged in the external jack..

Up to (8) eight EDS-D1 units can be powered from our optional **EPS** (External Power Supply) unit if it is desirable to use the power system from an aircraft. The **EPS** is a 10 volt @ 500 ma. low-drop-out voltage regulator and filter unit that operates from 11 to 28 volts. It filters out glitches caused by hydraulic pumps, strobe lights and other high-energy devices. It works



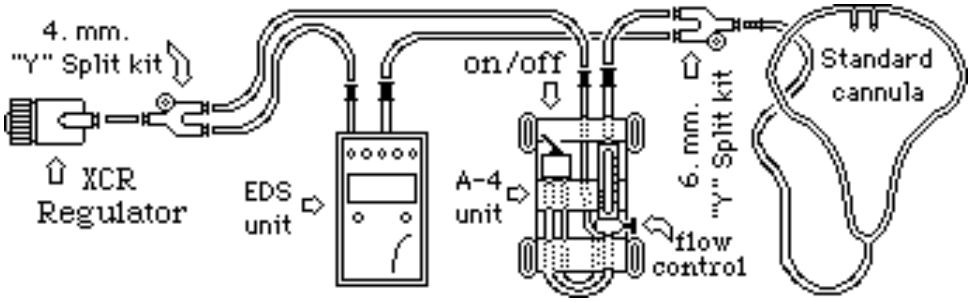


The EDS-EPS is a floating ground unit suitable for negative or positive ground systems. Be sure to ground it to the main system ground.

FEATURES

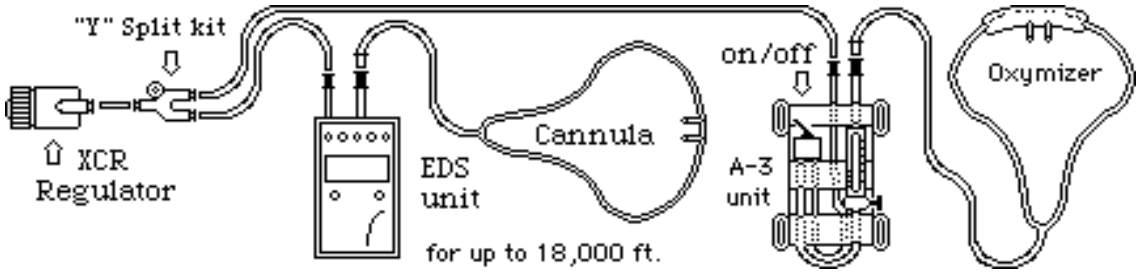
- Easy to use two-button control, small size and light weight.
- Automatically will adjust oxygen flow for different altitudes.
- Allows operation for different oxygen delivery protocols and variable flow regulators.
- Multi-mode push-button control switch allows the setting of various automatic altitude trip points, Night & Day flight operations and over-ride high flow settings for special or emergency purposes.
- Positive GRN / RED indicators for FLOW / NO-FLOW oxygen delivery status.
- Provides Apnea alarm to inform user of kinked, pinched, disconnected lines or holding breath too long.
- Saves existing oxygen supply by as much as 8 times over standard constant-flow delivery protocols.
- Much less dry-mouth and associated discomfort over standard constant-flow delivery protocols.
- The EDS pulse-demand technology has been recognized by the FAA as having the equivalent level of safety per FAR. 23.1447 operating with a cannula or face mask.

The EDS-D1 has proven to be very reliable and has been used by many pilots for several years in various types of aviation. The EDS-D1 unit and has no means inside itself to provide a by pass of oxygen in the event of a total failure. If this should become desirable, here are a few oxygen bypassing methods you can implement with optional equipment



The most common emergency bypassing method is with the A-4 flowmeter/regulator control unit that couples the outlets of the EDS unit and the A-4 unit together into one standard cannula. This allows the pilot to simply throw an on/off switch to bypass the EDS unit, then having the ability to adjust the flowmeter for the altitude.

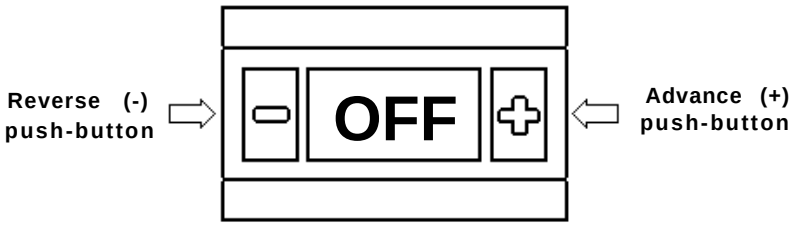
Because many pilots fly with passengers only part of the time, the A-3 or A4 flowmeter/regulator and an Oxymizer® cannula can be setup for the bypass station and for the passenger.



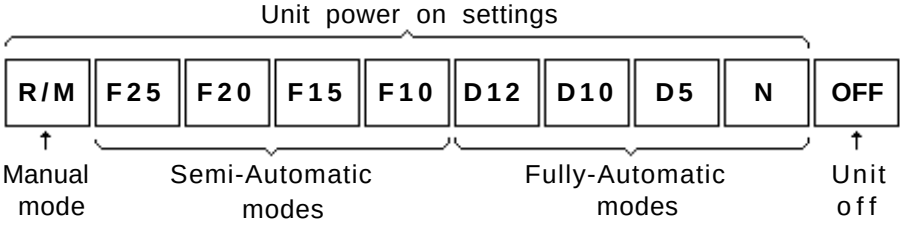
Oxymizer is a trade mark of Chad Theruputics, inc.

Control switch settings and modes of operation

The EDS-D1 unit is user controlled by a windowed push button control switch. The switch has two push buttons, one for advancing through the modes, the other for reversing through the modes. A stop is provided inside the selector switch stopping at the most forward setting "**R/M**" and most reversed setting "**OFF**".



Control switch settings (windows) for each of the positions



The EDS-D1 has three main modes of user controlled operation as seen and described in the text and figures.

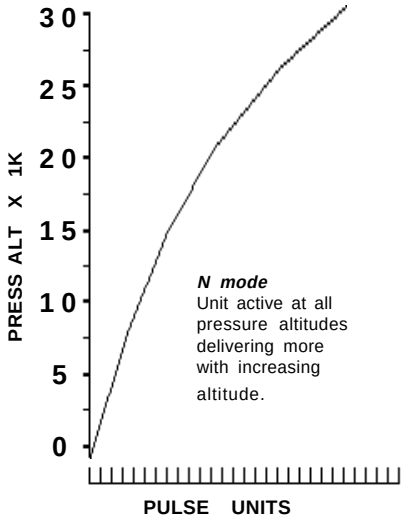
They are:
1. Fully-Automatic
2. Semi-Automatic
3. Manual

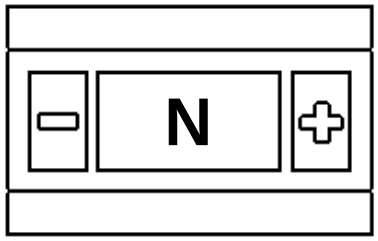
N MODE *"Night" or "Now" mode*

The first power on setting advanced from off is the **N** for "**Night**" or "**Now**" setting. At this setting the EDS-D1 will respond to breathing actions at all altitudes with the standard delivery protocol. The EDS-D1 will deliver pulses of oxygen at the effective flow rate of 1.0 liter/min. per 10,000 ft. for **pressure altitudes** up to about 34,000 ft.

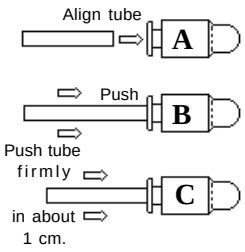
NOTICE

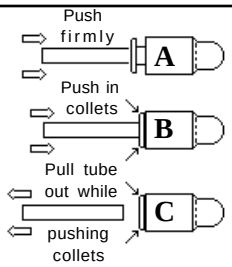
Using any of the on settings will result in the correct (or more) amount of oxygen for any given altitude. None of the on settings will inadvertently result in inadequate amounts of oxygen for any given altitude in which the EDS operates.



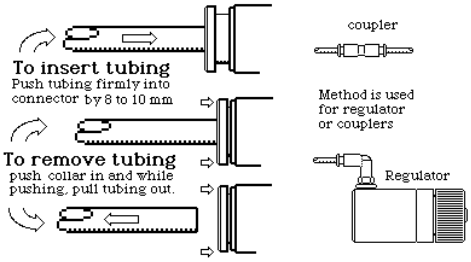


Switch as seen set to "Night" or "Now" mode



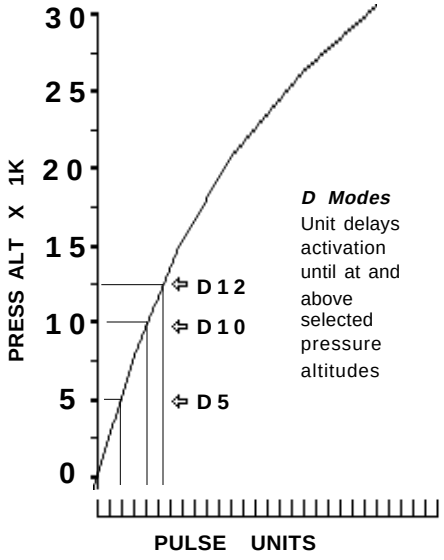


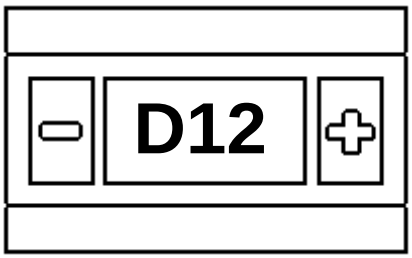
To remove the polyurethane service line you must push in the connector collar while you pull on the polyurethane line. Do not pull the polyurethane line without pushing in the collar. It will damage the connector rendering it useless.



D MODES *"Day" or "Delayed" modes*

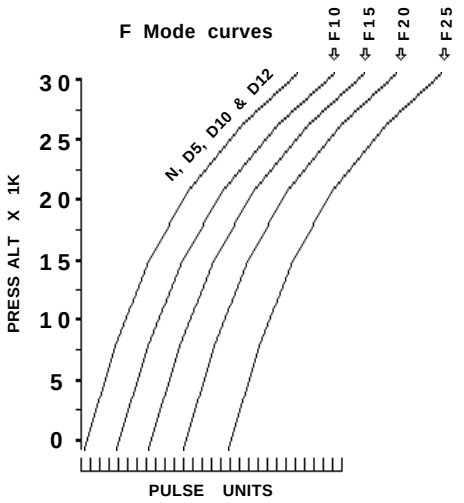
The next three advancing settings are the **D5**, **D10** and **D12**. These are the **D** for "**Day**" or "**Delayed**" modes. The **D5** setting will cause the EDS-D1 unit to delay responding to breathing actions until it senses a **pressure altitude** of 5,000 ft. and above. The **D10** setting operates respectively. The **D12** setting is calibrated to start operation at a **pressure altitude** of about 11,000 ft. ±250 ft. This lower trip-point setting is intentional so the unit will comply per FAR part 23.1447 throughout a wide range of barometric pressures. For example, because the EDS-D1 unit has no user adjustments for changes in barometric pressure, it operates simply from **pressure altitudes** such as your body does. Therefore, if the unit is being used while the barometric pressure is low, it will start operation sooner (at a lower MSL flight altitude) than it will if the barometric pressure is high. Therefore, the EDS-D1 is calibrated to trip a bit low to keep the **D12** setting from never violating the current FAR 23.1447 for oxygen use at 12,500 ft. MSL. The **D5** is calibrated for a **pressure altitude** of 5,000 ft. and **D10** is calibrated for a **pressure altitude** of 10,000 ft.

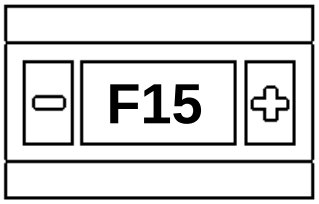




Switch as seen in one of the "Day" or "Delay" settings.

F MODES *Floor & Face Mask*



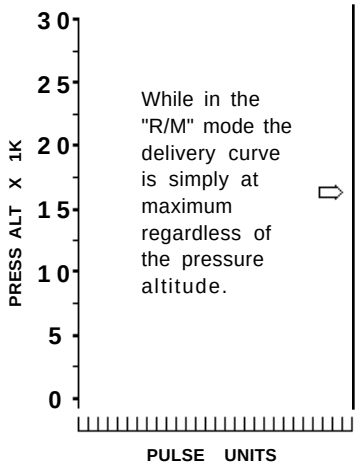


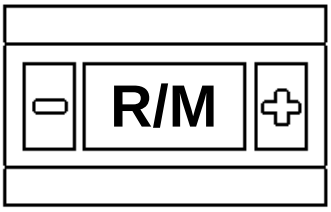
Switch as seen in the Floor mode. The F15 setting provides 15,000 ft. amount of oxygen referenced to sea level or that respective additional amount throughout the pressure altitide curve

These next four settings deserve your attention. The **F-Mode** settings are **F10**, **F15**, **F20** and **F25**, called the floor or facemask settings. These settings cause the EDS-D1 unit to add additional oxygen equivalent to the indicated setting, thus raising the floor by that much. For instance, if you are at a **pressure altitude** of 10,000 ft, and you set the unit to the **F10** setting you will get an additional (1.0 liter/min.) or 10,000 ft. worth of oxygen added to the **pressure altitude** your are currently at. This results in an effective flow rate of 2.0 liter/min. or a total of 20,000 ft. worth of oxygen. However, near sea level the settings will simply add in the effective flow rate of 1.0 liter/min. for the **F10**, 1.5 liter/min. for the **F15**, 2.0 liter/min. for the **F20** and 2.5 liters/min. for the **F25** settings. The **F10** or **F15** settings are suitable for use with most facemasks.

Changes in pressures altitudes cause the unit to deliver the additional (over and above the floor setting) amount of oxygen for that pressure altitude. Once again, for example, if you are at a pressure altitude of 5,000 ft. and you select the **F10** setting you will then receive (for each breath up to 25 per min.) the effective flow rate of 5,000 + 10,000 = 15,000 ft. or 1.5 liters/min. The unit will be active at all altitudes (like "**N**" mode) while in any of the "F mode" settings. The "**F**" modes are very useful in situations where you may wish to pre-charge yourself with oxygen before a long-term high ascent or as needed for losses associated with a facemask. The "**F**" modes enable you to ensure proper oxygenation after you have descended from long-term high altitude flights, even after having descended to flight levels not legally requiring oxygen.

R/M *Reserve/Manual*





Switch as seen in the Reserve/Manual setting. 100% delivery or for use with regulators that are flow-rate adjustable.

This last, most positive switch setting causes the EDS-D1 unit to respond to breathing actions with a fixed 1/2 second long pulse regardless of the actual cabin pressure altitude. This would equate to a 100% oxygen flow setting for a conventional delivery oxygen device. The effective (or equivalent) flow rate at this setting is about 10 liters per min. This setting is intended to be used as an emergency setting while still providing a wide conserving margin. This setting is intended for situations where the user can indulge in deep (reserve) inspiration cycles. This setting should provide the primary respiration system (lungs and blood) a better than 90% utilization of the oxygen supplied during most reserve (deep) inspiration cycles.

The **R/M** setting should be used while oxygen is supplied by adjustable regulators. Aircraft with built-in oxygen systems that may have an ACR (Altitude Compensating Regulator) that does not exceed an outlet pressure of 35 psig. By using the EDS-D1 with systems that have an ACR (Altitude Compensating Regulator) the operator will benefit from a much greater duration in oxygen usage without any modification to the existing system. If the EDS-D1 unit is used with one of our standard regulators, such as our **XCP**, **XCR**, **RCV/RCR** the **R/M** setting is intended for times when you may desire to receive oxygen during the (near) full reserve inspiration cycle to manage possible acute dyspnea (shortness of breath) and/or anxiety while under stressful and/or demanding flying conditions. In addition, this setting can be used as a "full-on" mode to pre-charge yourself with oxygen or for emergency purposes.

Display Information
There are two high brightness LEDs on the EDS model D1. The green LED indicates positive oxygen flow for every breath. The red LED indicates any flow fault or apnea conditions and blinks for low battery conditions.

FLOW FAULT ALARM
The EDS model D1 will produce an optical (red LED) and audible flow fault alarm from the following reasons:
1. The oxygen supply has been removed.
2. The supply line has become pinched closed, is plugged up or has come off.
3. The battery no longer has the power to energize the valve while under pressure or the valve or line has become plugged

APNEA ALARM
The EDS model D1 will produce an optical (red LED) and audible apnea alarm for the following reasons.
1. The user has quit breathing over a 45 second period.
2. The outlet (cannula) tube has become disconnected.
3. The outlet (cannula) tubing has become pinched closed or is plugged off.

NOTE:
The audio portion of these alarms can be disabled by momentarily (about 1/3 of a second) selecting the "OFF" setting from the "N" setting and back on to any on settings. The audio alarm will be re-enabled any time the unit turned off for more that two (2) seconds before it is turned back on.

Low Battery:
The EDS model D-1 unit continuously monitors the condition of the battery during operation. The unit flashes the red LED once every two seconds to warn that the battery has dropped to about 6 volts. The unit will, however, continue to operate properly for about four (4) hours @ 25° C after the indicator starts to flash. It will flash the red LED once per second to warn that the battery has dropped to about 5 volts and should then be replaced ASAP. The EDS model D1 will operate for 60 to 80 hours with a fresh alkaline battery under normal operation. However, because a very small amount of current (≈1 µa.) is drawn by the unit while turned off, the battery life is about 4 to 6 months. Therefore, during long term storage the battery should be removed. Once the battery drops below 5 volts the unit will stop operating and the red LED will remain on.

External Power:
The EDS model D-1 unit has an external power coaxial type connector (jack). It allows the unit to operate from an external power supply that provides 7 to 10 volts @ 100 ma. peak current with less than 150 mv. ripple and filters spikes from the primary power bus such as the EDS-EPS (External Power Supply). The connector is reversed from that of our EDS model A unit. That is, with the EDS model D the inside pin "tip" is negative (-) and the outside ring is positive (+). A reverse polarity diode 1. A. in the EDS unit helps prevent damage from accidental short term reverse voltage occurrences.

Misc. notes:
The EDS model D1 has a basic (total) apnea detector. It will only respond with an apnea alarm for total apnea (no event) conditions and will not consider or respond to any partial apnea conditions. That is, the EDS D1 unit will only produce the apnea alarm if it has not detected any respiration actions for a period of 45 seconds. Any respiration events within this time will reset the 45 second "time-out" apnea detector. This type of apnea detection is usually sufficient for aircraft and high altitude (non medical) applications. The apnea alarm can be used as a "put-your-oxygen-on" alarm once you get to the preset D1 mode altitude. The apnea alarm will not sound if you already have the cannula or face mask properly on.

The EDS unit is calibrated to deliver just over 2 times more than the equivalent flow-rate of 1 liter/min. per 10,000 ft. This is the standard FAR protocol as detailed in 23.1447. It can only do this if the regulator feeding the EDS unit can deliver a flow-rate of 25 liters/min. as measured at the regulator's outlet or a pressure of 1 bar (≈15 psig.) during flow (dynamic) and not during no-flow (static) conditions. This flow-rate is required to compensate for normal flow losses in the lines, valve and cannula. A flow-rate of 10 liters/min. is needed at the end of the cannula. EDS delivery calibration augmentations can be done by adjusting the inlet dynamic pressures of the regulator feeding the unit. Lower pressures result in lower amounts of oxygen. Higher pressures result in higher amounts. Adjustable flow-rate regulators can be used while the unit is in the R/M setting. Static (no-flow) pressures can be as high as 35 psig. without the user becoming aware of the increase. Higher inlet pressures will demand more from the battery. Therefore, a low battery that operates the unit sufficiently at 15 psig. may have trouble opening the valve at an inlet pressure at 35 psig., thus causing an occasional flow-fault alarm. Simply replace the battery to remedy this. If the inlet pressure is too high the valve may not open at all and cause the flow-fault alarm for every inspiration effort.

Do not store the EDS unit while the inlet is under pressure. Remove all sources of oxygen pressure and secure the unit to ensure it will not become damaged. If the lines are disconnected they must be covered so that debris, dust or dirt can't get in. If the supply line is left hooked to the system, make sure that it is first purged with clean dry air or oxygen before the EDS unit is connected.

Service, Maintenance & Care
of the EDS-D1 unit

Life expectancy

With the exception of the electromechanical valve and mechanically operated control switch, there are no parts or sensors inside the EDS-D1 that will age, cure or become out of tolerance in time and use. Therefore, EDS-D1 unit does not require any regular or periodical maintenance or calibration.

The electromechanical valve has a service life of well over 150 million pulsing cycles. The respiration sensor has a service life of well over 500 million pulsing cycles. At this time the valve and sensor may need replacing.

If the unit is used in an application where dirt and dust are present, the electromechanical valve may become clogged with debris that may cause the flow to decrease or not allow it to shut off completely. If this happens you can usually remedy the problem by back-flushing the valve. This is done by supplying a small amount of air or oxygen pressure into the large (6mm) outlet line while the electromechanical valve is placed in open state.

To clear a clogged valve follow these steps:

1 Remove the 6mm blue union from the outlet side of the EDS-D1 unit and replace it with a 4mm to 6mm reducing union.

2. Connect the 4mm line from the regulator (source) into the reducing union. *If a reducing union is not available, connection can be done by pressing (sliding) the 4mm tubing into the inside diameter of the 6mm outlet tube on the EDS-D1 unit.*

2 With the EDS-D1 unit initially off, turn on the cylinder valve slowly to allow gas from the regulator to back-charge the outlet side of the EDS-D1 unit. Next turn the EDS-D1 unit on. During the time the EDS-D1 unit initializes the valve will open for about 1/2 second. Do this several times over to purge any particles that may be clogging the inlet side of the valve.

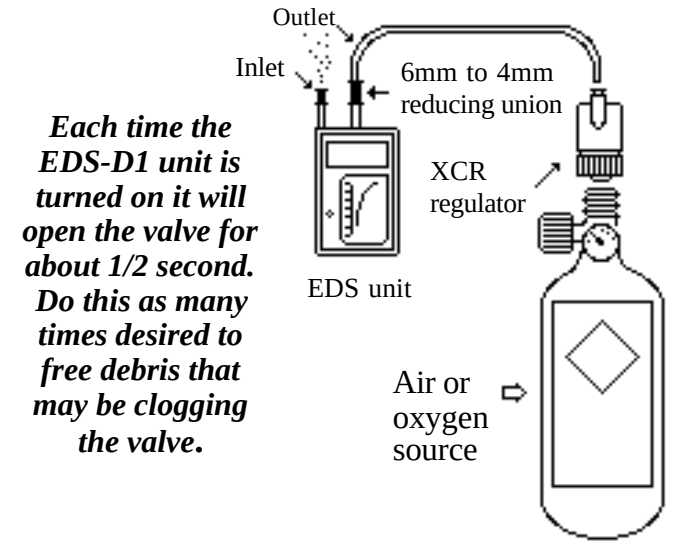
If the above steps do not correct the described problem, the EDS-D1 unit is not functioning correctly or if you would like it checked out for calibration you can send it to Mtn. High E&S Co. for diagnosis and repair.

Stowage

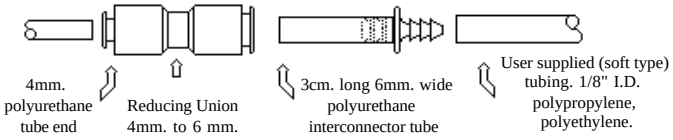
While not being used the EDS-D1 unit should be stored in a secure manner to ensure that dirt and debris do not enter and become lodged in the inlet and outlet tubes.

The battery should be removed from the EDS-D1 unit if it is to be stored for an extended period of time.

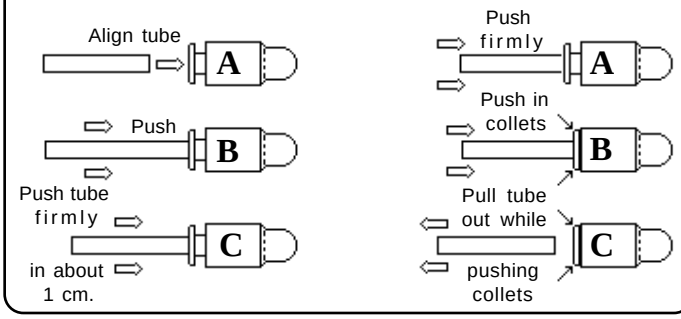
Each time the EDS-D1 unit is turned on it will open the valve for about 1/2 second. Do this as many times desired to free debris that may be clogging the valve.



4 mm. to 6 mm. reducing union kit



Inserting and removing the polyurethane tubing



CAUTION

If the back-flush purging will not be done with an XCR regulator do not apply pressures over 35 psig into the outlet of the EDS-D1 for this may cause the breathing sensor to rupture.

General Specifications

*This is a list of specification parameters for the **EDS model D-1**. These specifications are operational and performance standards or limits against which the unit was tested or calculated. Specifications are subject to change without notice.*

Max. respiration rate allowed (triggered hold-off time): Fixed @ 30 BPM in R/M mode
Higher altitudes allow slightly higher maximum respiration rates (BPM):
0-10K ft. = 20 BPM, 12-20K ft. = 22 BPM, 21 - 25 = 25 BPM and 26+ = 30 BPM

Apnea time-out envelope: Fixed @ 45 sec.
The apnea alarm does not respond if in any of the "D" modes and while below that pressure altitude threshold

Operating inlet pressures: 1 bar (15 psig.) **DYNAMIC** (flowing) through cannula and 1.5 meters (5 ft.) of 4 mm. inlet tubing
2 bar (30 psig.) **STATIC** (non-flowing) 2.2 bar (35 psig) MAX.

Operating Voltage & Current @ 25° C. @ 25% RH. (measured in "N" mode setting @ 15 RESP/ typical.):

Low-v. cut-out:	5.00 VDC+0 mv. -250 mv. (red LED on steady)	
Min.:	5.50 VDC @ 2.25 ma. idle (100 ma. peak, 3.25 ma. mean)	(Low batt. red LED winking 1/sec.)
Low:	6.50 VDC @ 2.25 ma. idle (100 ma. peak, 3.25 ma. mean)	(Low batt. red LED winking 2/sec.)
Nom.:	7.85 VDC @ 2.25 ma. idle (100 ma. peak, 3.25 ma. mean)	
Max.:	11.0 VDC @ 4.30 ma. idle (100 ma. peak, 3.25 ma. mean)	(EPS provides 10 VDC)

Reverse voltage protection:
Diode shunt (1 amp peak max., no internal fuse or over voltage protection provided)
External Power is provided via a 3.5 mm. coaxial power-jack system. Inside (tip) is negative (-) Outside (ring) is positive (+)

Battery Life:

Operating:	40 to 60 Hr's @ 25° C. @ 25% R.H. Measured from mean, assuming fresh alkaline battery operating under normal operating conditions.
Storage:	Approx. 4-6 months while in the off setting. (battery drain is about 1 µa. in the off setting) Make sure that the battery is removed from the unit during long-term storage.

Battery type:
Standard 9 volt alkaline DURACELL type MN1604 or equivalent.

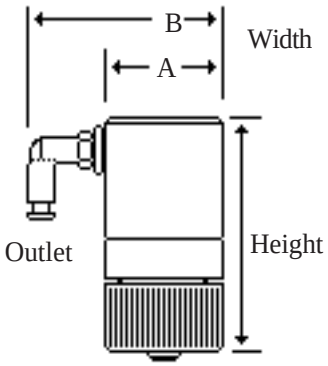
Operating temperature and humidity (assumes nominal operating voltage):

Min.:	0% RH @ -55° C to +80° C.
Nom.:	25% RH @ +25° C.
Max.:	100% RH @ +50° C. near condensing

Allowable vibration during operation:
Random vibration 5 to 500 Hz, 15 minutes per axis @ 2.5 g. (rms.) sin wave;

Physical characteristics (EDS-D1 unit only):

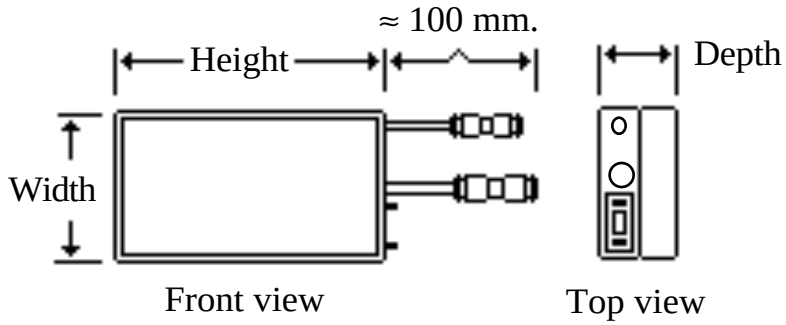
Width:	2.60" (6.60 cm.)
Height A:	4.10" (10.41 cm.) enclosure only
Height B:	6.25" (15.87 cm.) enclosure and inlet/outlet tubes with connectors
Depth:	1.50" (3.81 cm.)
Weight:	8.0 Oz. (0.227 kg.) with battery



CGA-540 or DIN 477
cylinder inlet

Physical characteristics Regulator only (XCR type standard issue):

Width A:	1.25" (3.17 cm.)
Width B:	2.10" (5.33 cm.)
Height:	2.25" (5.71 cm.)
Weight:	4.0 Oz. (0.113 kg.)



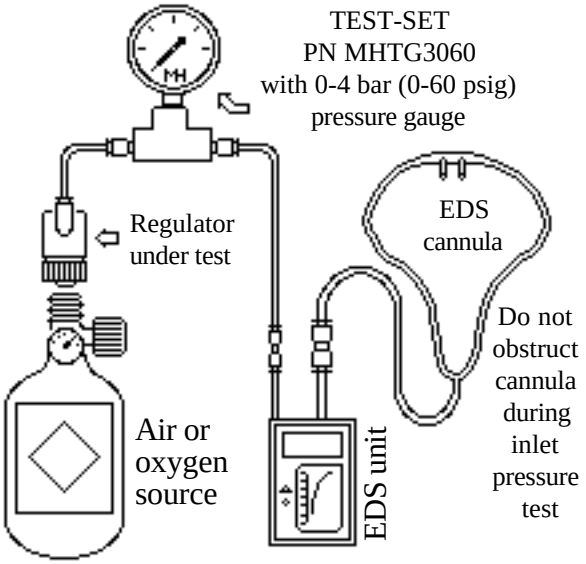
Testing and characterization was done under normal operating conditions i.e. EDS at 25°C and responding to a respiration rate of about 16 breaths per minute without any flow fault or apnea detection's.

NOTICE

IMPORTANT EDS INLET PRESSURE NOTICE

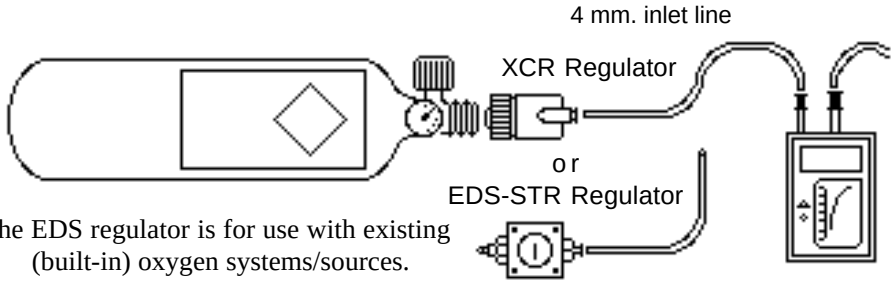
If The **EDS-D1** unit(s) will not be used with the **XCR**, **XCP**, **micro-lite system** or **EDS-STR** regulator the alternate regulator must be able to deliver a dynamic (flowing) pressure of 1 bar (15 psig. +0.0 - 2.5 psig.) and a static, no flow, pressure between 1 and 2 bars (15 and 30 psig.) This is the inlet pressure measured directly at the inlet of an EDS unit while the valve is open and an EDS cannula is connected to the outlet or left open. If the above listed pressure specifications are not met the it may compromise the operation and ability of the EDS-D1 unit(s) to deliver the correct amount of oxygen at altitudes. ***Lower that specified inlet dynamic pressures will result in lower than needed volume of oxygen pulses. Higher pressures will result in higher than needed volume of oxygen pulses.*** Uncalibrated, dysfunctional or undesirable operation of and/or damage to the EDS unit(s) may result from operating with dynamic inlet pressures above 2 bars (30 psig). and static inlet pressures above 3 bars (43 psig.). Inlet pressures above those listed herein cause the valve to automatically relive inlet pressures through the outlet, not allowing the EDS unit to detect any inspiration efforts.

Acceptance testing the dynamic (flowing) and static (not flowing) outlet pressure performance of a regulator for use with an EDS unit



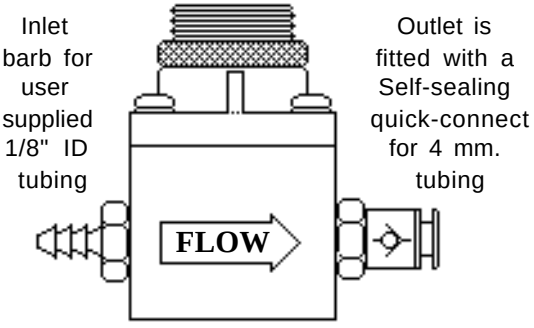
Test-sets are available directly from Mountain High E&S Co.

If the XCR regulator will not or can not be used the EDS-STR regulator should then be used.



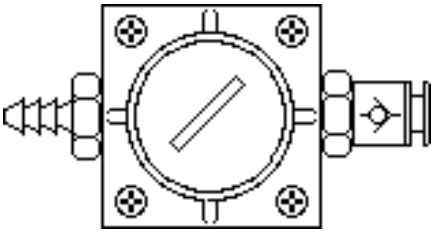
The EDS regulator is for use with existing (built-in) oxygen systems/sources.

The EDS regulator has a self-sealing 4mm. outlet for interconnecting the EDS unit(s) via the 4 mm. service line.



Side view

The EDS regulator stabilizer unit is designed to allow up to six EDS units to be operated from a built-in oxygen system where the pressure is 20 to 125 psig. thus replacing the standard issue XCR regulator.



Top view of EDS-STR regulator.

Complete single and multi-place carry-on EDS system packages are available along with padded fabric carry/strap-down harnesses for most of our kevlar-fiber and aluminum cylinders

For size and weight critical applications our µ-lite (micro-lite) valve and regulator system with our new light-weight and small 'S' series cylinders offer compactness and capability never offered before.

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