



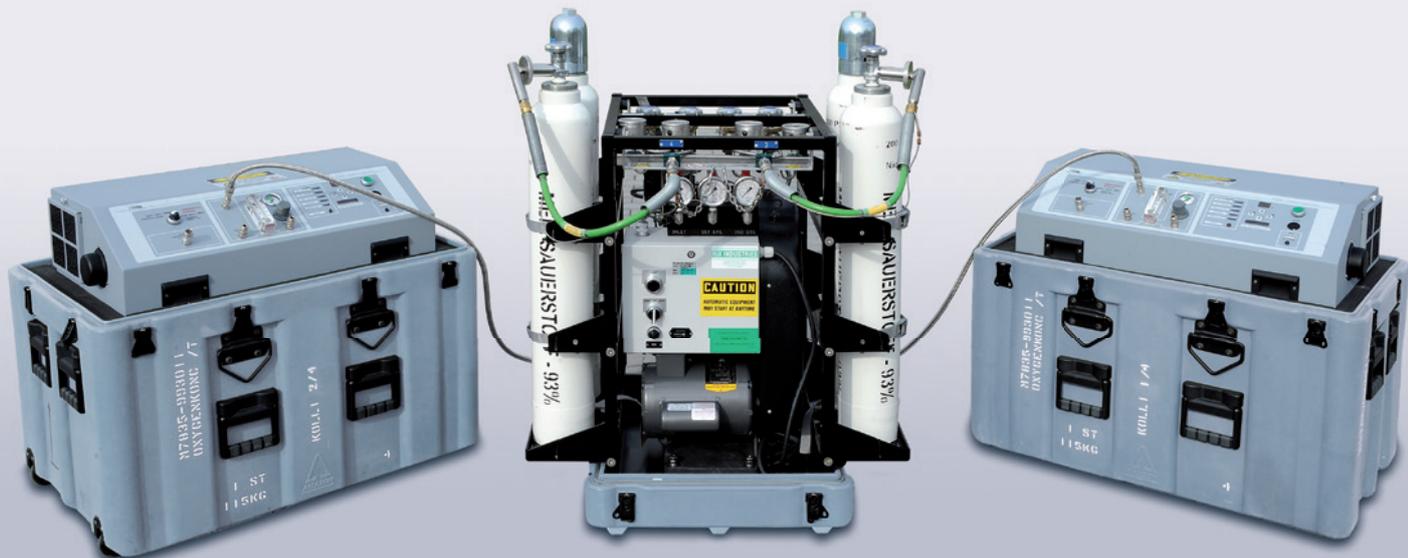
Oxygen Supply

Clinical Experience
+ Technical Competence



FS O₂ SYSTEMS

Medical + Emergency/Disaster Relief + Military/Defence
Multi-Modular Systems for On-site Medical Oxygen Supply



FS Oxygen Supply Systems

The Concentrator-based Alternative Medical Oxygen Supply

Traditional Supply

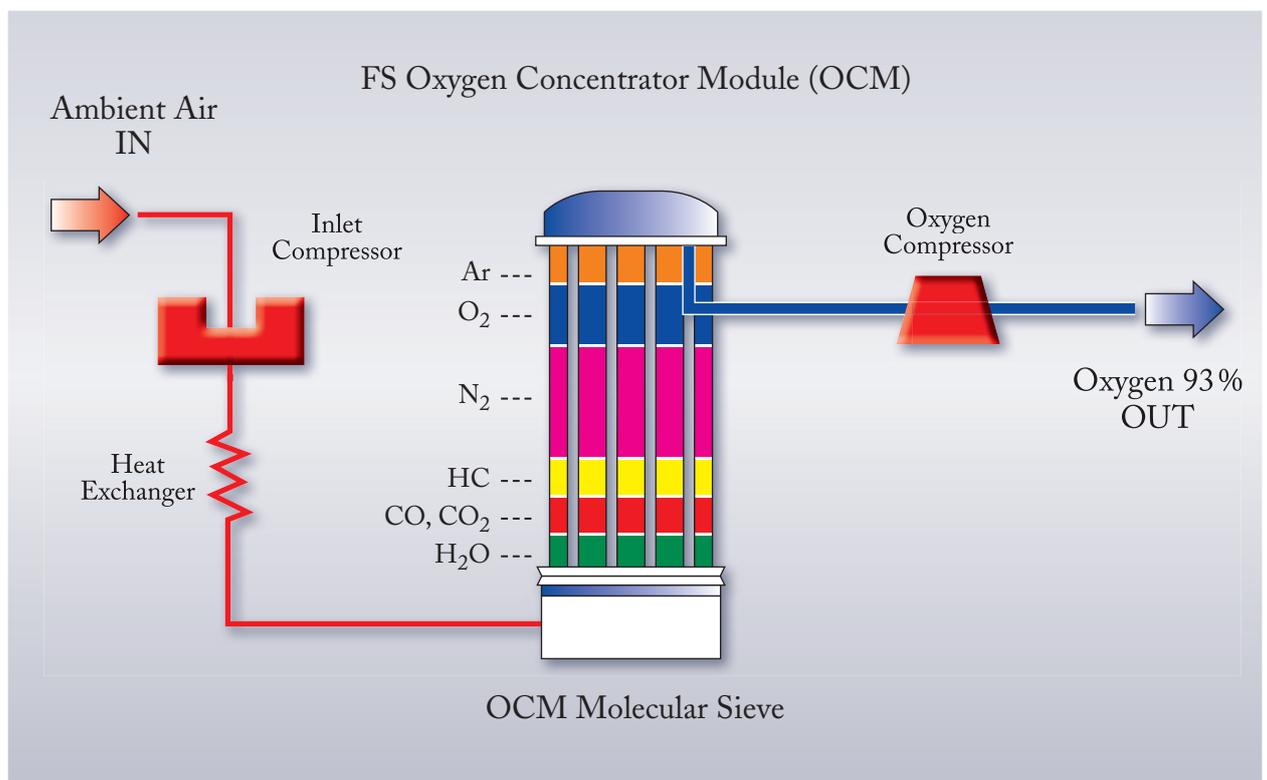
In the past concentrated oxygen for medical use was obtained from centralised large scale industrial production processes making bespoke logistics organisation a prerequisite for supply security. Further advancement of zeolite-based oxygen concentration PSA (Pressure Swing Adsorption) technology has allowed on-site production from ambient air to become the reliable and economic alternative.

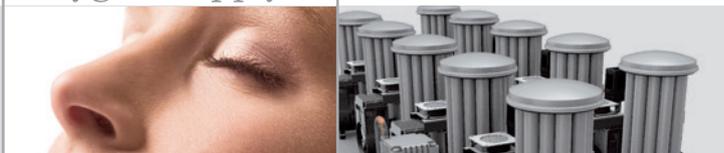
Medical Experience

Broad medical acceptance and experience, the definition Oxygen 93% in European / US Pharmacopoeias and internationally recognised standards for the structure of on-site systems have rendered further discussion of the medical and technical necessity for higher concentrations of oxygen obsolete. Decades of proven successful patient treatment with Oxygen 93% throughout the world are the living evidence.

The Independent Solution

Concentrator-based systems are today's economic alternative independent source of independent medical-grade oxygen without the supply chain problems and risks associated with centralised supply.





FS Oxygen Supply Systems

Oxygen 93%

Clinical Relevance

International standards presently define two types of oxygen for medical use. The sole difference between Oxygen 93% and Oxygen 99.5% is the concentration of the oxygen itself, types and levels of permitted contaminants are identical.

In the past, specialists in anaesthesiology, emergency and intensive care assumed that the higher the concentration of oxygen administered, the better the clinical outcome. With the more widespread use of Oxygen 93%, especially in the military context, the clinical relevance of this conjecture is now being questioned. Leading German experts come to the conclusion that “Oxygen 93% can be used in all (German) hospitals, there are no medical reasons why this should not be the case.”*¹. There is no clinical evidence to show that significant improvements in treatment outcomes are to be gained by administering oxygen of higher concentrations. International acknowledgement of decades of successful clinical experience is confirmed in current WHO/UNICEF purchasing guidelines*² and product information*³.



Clinical Experience

Broad reliance on Oxygen 93% around the world has led to a number of publications outlining the clinical (and economic) consequences of use in medicine. A comprehensive survey evaluating ten years of experience and the treatment of well over a third of a million patients in Canada concludes that “An Oxygen Concentrator installation ... provides safe, reliable, cost efficient primary hospital source of oxygen” *⁴. A recent study of ventilator oxygen delivery found that “..., there were no clinically significant differences between machine settings and actual measured oxygen concentration when using an Oxygen Concentrator as a primary source of supply.” *⁵ High altitude clinical experience is also well documented.*⁶

*¹ Prien T. et al. Sauerstoff 93 – eine neue Option auch für deutsche Krankenhäuser. *Anästhesiologie* 2013;54:466-472

*² Guide to Infrastructure and Supplies at Various Levels of Healthcare Facilities Emergency and essential surgical and anaesthesia procedures: WHO/EHT/ CPR/2005 form 2009.

*³ Product Information Sheet; Section A1 & A2: Equipment for the case management of acute respiratory infections: WHO/EPI/LHIS/97.01.

*⁴ Friesen R.M. et al. Equipment. Oxygen Concentrators: a primary oxygen supply source. *Canadian Journal of Anesthesia* 1999 / 46:12 / pp 1185-1190.

*⁵ Walker L. et al. Effects of oxygen concentrators on ventilator oxygen delivery. *Canadian Journal of Anesthesia* 2010 / 57:708-709 / Correspondence.

*⁶ Shrestha et al. The oxygen concentrator is a suitable alternative to oxygen cylinders in Nepal. *Canadian Journal of Anesthesia* 2002 / 45:1 / pp 8-12.

FS Oxygen Supply Systems

Optimised Modus Operandi

FS20COMPACT



FS120PLATFORM



Oxygen Supply when Needed

The FS Oxygen Supply Systems are of completely automated demand driven design. Ambient air is compressed through multiple oxygen concentrator modules. Part of this oxygen is compressed into an integrated buffer tank for clinical use, the remainder is directed back through the sieve-beds purging them for the next concentration phase. Once the oxygen reaches specified pressure, the system switches to stand-by mode. When oxygen is consumed, pressure drops and the system automatically restarts concentration, bringing it back up to the specified pressure. Uninterrupted oxygen supply at the required pressure is secured.



FSCONTROL



FS Oxygen Supply Systems

Multi Modular Solutions for all Oxygen Requirements

FS160RACK



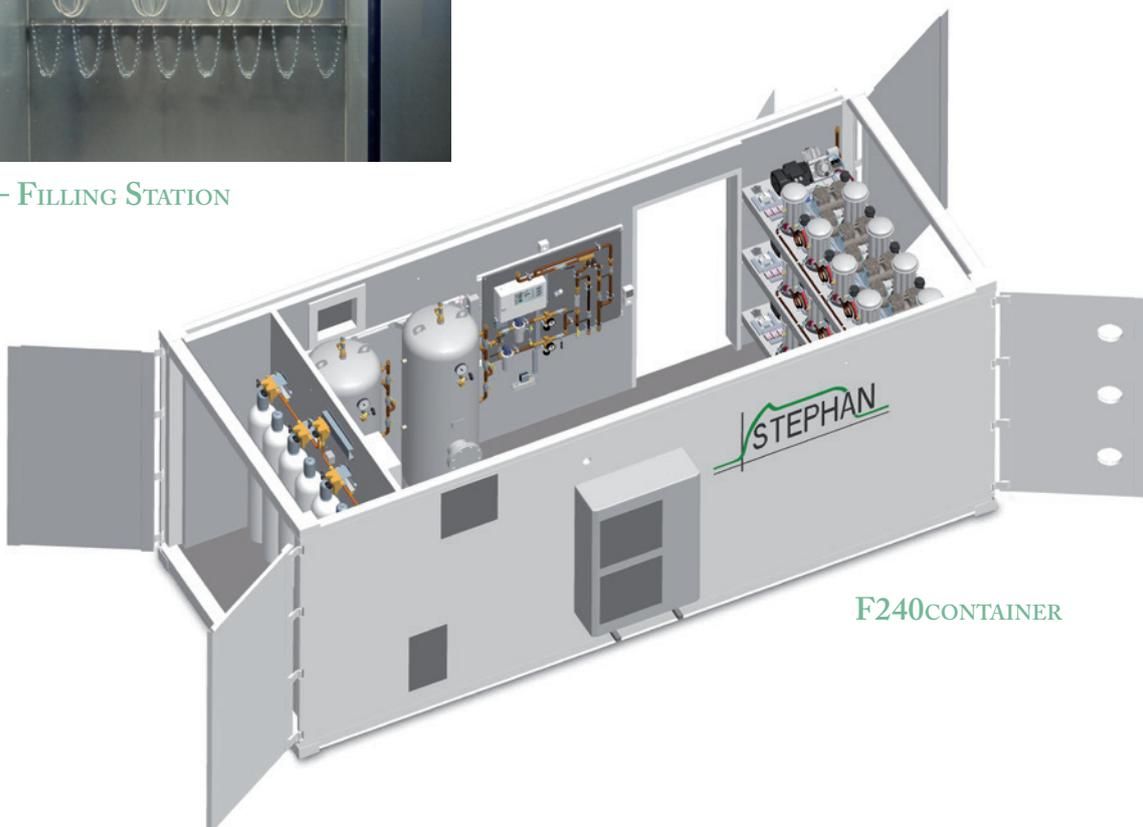
- + Oxygen as and when required, consumption driven supply on demand
- + Minimal ramp-up time (90 seconds)
- + Fail-safe redundant operation
- + Constant concentration independent of consumption

- + Oil-free operation, no danger of contamination
- + Low pressure system, minimises potential condensation
- + Minimised service, alternating platform operation
- + Part-system maintenance possible

- + Reduced power consumption, multi-modular operation
- + Adaptable to client requirements and available space
- + Simplified increase in system capacity possible
- + Similar mode of operation, fewer components than conventional PSA.



CYLINDER - FILLING STATION



F240CONTAINER

FS Oxygen Supply Systems

Innovative Independent Oxygen Supply Security



The FS Oxygen Supply Systems (OSS) are a further development of the conventional PSA concentration procedure employing patented cutting-edge multi-modular technology. Major advantages are:

Secure – No supply chain risk

The FS OSS concentrators secure oxygen supply for medical use through on-site production. Multi-modular technology permits complete demand driven supply, saving money through reduction of service requirements, increase in economic life expectancy and a reduction in power usage. Oxygen is available in the required amounts, as and when needed.

Autonomous – Eliminate logistic danger/effort

The FS OSS on-site oxygen concentration permits complete independence from an external gas supply thus eliminating all supply chain risk. Problems of recurrent supply chain organisation, the physical movement of challenging heavy cylinders and dangers of cryogenic storage. Complete independence of external gas supply sources ends the ever increasing financial and environmental cost of haulage.

Flexible – Space saving

The rack and platform structure make the FS OSS adaptable to client capacity requirements and available space. The integration of increased system capacity at a later date is possible. Mobile and portable “Plug and Play” FS OSS and other customised supply solutions are available.

Economic – Increase supply security / reduce costs

Multiple redundancy of all FS OSS permits unique differentiated system operation. Maximum supply security and therefore patient safety is accomplished whilst reducing power consumption and maintenance requirements thus ultimately increasing the economic service life of the complete systems.

Reliable – Oxygen when needed

FS OSS multi-modular technology delivers the greatest possible reliability of systems operation through proven, robust, tried and tested solutions. Oxygen is made available in the required amounts as and when needed. Automatic alternating platform operation makes part systems servicing during continued operation possible and therefore eliminates down-time required with conventional PSA systems.



FS Oxygen Supply Systems

In Operation throughout the World



Fritz Stephan GmbH has manufactured Oxygen Supply Systems for medical use for over two decades. The use of patented cutting-edge multi-modular technology offers maximum supply security whilst reducing running and maintenance cost. This tried and trusted technology is currently in operation with healthcare facilities, emergency and disaster relief organisations and military/defence forces throughout the world. Contact references are available on request.



FS Oxygen Supply Systems

Technical Data

General specifications	
Oxygen Quality	Oxygen 93 % compliant Ph. Eur. (#2455) / USP: CO ₂ < 300 ppm, CO < 5 ppm, NO < 2 ppm, NO ₂ < 2 ppm, SO ₂ < 1 ppm, Oil < 0.1 mg/m ³ , Water < 67 ppm Oil-free compression
Filtration Efficiency	99.99999 % @ 0.01 µm particle (Oxygen to Pipeline System)
Control Unit	Fully automated, pressure driven, integrated sensors
Oxygen Tank	Volumes 250 l, 500 l, 1000 l

OSS RACK	OCU FS60RACK*	OCU FS120RACK*	OCU FS240RACK*
Oxygen Output:	60 l/min (3.6 m ³ /h) @ 5 bar	120 l/min (7.2 m ³ /h) @ 5 bar	240 l/min (14.4 m ³ /h) @ 5 bar
Platforms:	3 x FS20PLATFORM	3 x FS40PLATFORM	3 x FS80PLATFORM
Dimensions (WxHxD):	960 x 2300 x 850 mm	1400 x 2300 x 850 mm	2400 x 2300 x 850 mm
Weight:	approx. 350 kg	approx. 600 kg	approx. 950 kg
Power Supply:	230 V / 50 Hz / 4.5 kW	230 V / 50 Hz / 9.0 kW	400 V / 50 Hz / 16.0 kW
Ventilation:	700 m ³ /h	1400 m ³ /h	2650 m ³ /h

OSSCOMPACT	FS20COMPACT**	FS40COMPACT**	FS – CFCOMPACT**
Oxygen Output:	20 l/min (1.2 m ³ /h) @ 5 bar	40 l/min (2.4 m ³ /h) @ 5 bar	30 l/min (1.8 m ³ /h) @ 200 bar
Dimensions (WxHxD):	900 x 600 x 800 mm	950 x 1350 x 1100 mm	685 x 585 x 925 mm
Weight:	115 kg	220 kg	146 kg
Power Supply:	230 V / 50 Hz / 1.4 kW	230 V / 50 Hz / 2.8 kW	230 V / 50 Hz / 1.1 kW
Ventilation:	230 m ³ /h	470 m ³ /h	n. a.

* Oxygen Concentrator Unit (OCU) only – Does not include, Control / Filter system, Tanks, Reserve system.

Examples of system specifications; other capacities available on request.

** Complete “Plug and Play” systems.

FSO₂ SYSTEMS

Complete Solutions for your Medical Oxygen Requirements.

Secure. Autonomous. Flexible. Economic. Reliable.