



**ANALOX**  
Military Systems

GAS DETECTION  
SOLUTIONS  
FOR HOSTILE  
ENVIRONMENTS

[analoxmilitarysystems.co.uk](http://analoxmilitarysystems.co.uk)

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# INTRODUCTION

Analox Military Systems (AMS) is part of the Analox Group, a specialist producer of gas monitoring solutions for hostile environments. AMS was created in 2011 specifically to serve the military market. Our team are dedicated to ensuring you receive the best customer service and the highest quality gas analysis products.

Our sole purpose is to maximise the operational effectiveness of our customers across the full range of military theatres: land, sea and air. One of our major strengths is the naval sector – specifically submarine escape and rescue and dive operations, where AMS monitors are used for life support. Our manufacturing and service centre is compliant with export licensing and International Traffic in Arms Regulations (ITAR).

AMS is wholly committed to pushing the boundaries of what can be achieved in hostile, safety critical environments. Our latest innovations offer monitoring solutions for toxic gases, oxygen depleting gases and volatile organic compounds. Not only do we offer a standard range of cutting-edge gas monitors, we can also provide bespoke solutions to meet your specific needs. Just speak to a member of the AMS team.

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Military Systems



# SUBMARINE ATMOSPHERES

A submarine is a sealed environment in which the crew live and work for up to 90 days. The atmosphere must be carefully managed – not only to ensure the boat is capable of supporting life while submerged, but also to limit exposure to potentially harmful substances. We understand the complexities of environmental pressure, temperature and humidity variations and are committed to using our expertise to remain the first choice for atmosphere monitoring for the world's submarine nations. Using our unique pressure-correction technology we can ensure that our gas analysers provide accurate readings of the essential life gases in the dynamic submarine environment. We supply both fixed and portable analysers and our solutions include:

## CENTRAL ATMOSPHERE MONITORING

The AMS Atmosphere Analyser is a central, sample line, monitoring system designed to sample up to 30 different gases from up to 20 locations around the boat. It offers the following features:

- real-time continuous monitoring of life-support gases and trace gases
- automatic sampling that can be over-ridden to check a specific compartment
- digital output to submarine platform management system via RS485
- linking of multiple Atmosphere Analyser systems to provide system redundancy
- capability for routine maintenance to be done in the dockyard



## DISTRIBUTED SENSOR NETWORK

Analog's distributed sensor network uses discrete gas sensors or sensor blocks which are located around the boat connected to a PLC and central display.

This type of system offers the following benefits:

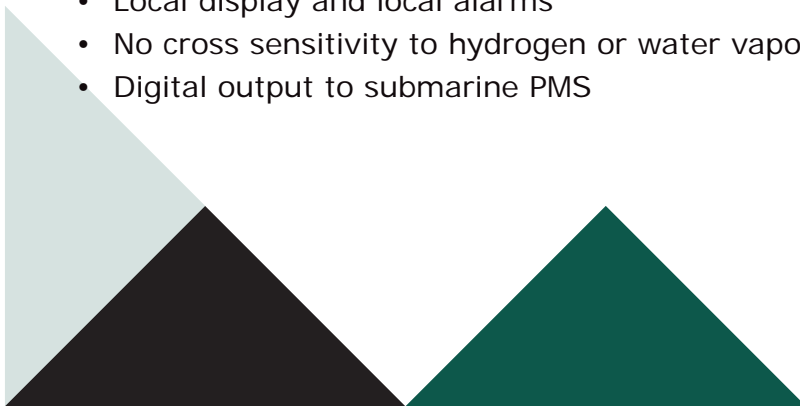
- central display of information from all remote sensors
- flexible architecture – sensors can be added or removed through the boats operational life
- integration of any number of sensors or sensor blocks with the central display
- repeater displays can be provided in different locations around the boat
- digital output to the submarine platform management system (PMS)
- designed to be maintained on the boat and in the dockyard

## CARBON MONOXIDE MONITORING

The submarine environment poses a unique set of challenges to accurate CO measurement, in particular the presence of hydrogen and pressure changes on board limit the choice of appropriate sensor technology. Coupled with this are the low detection limits and the elevated temperatures that can occur on board.

In order to overcome these challenges Analog has developed COSAMS (CO Submarine Atmosphere Monitoring System) an infra-red based system which offers the following advantages:

- Real time continuous monitoring of CO in the areas where the CO risk occurs
- Local display and local alarms
- No cross sensitivity to hydrogen or water vapour
- Digital output to submarine PMS





## PORTABLE ANALYSERS

AMS portable analysers are ideal for confined space entry or for use as an emergency back-up to the main atmosphere monitoring system.

### *SUB ASPIDA*

The Sub Aspida is a compact, portable, partial pressure O<sub>2</sub>/CO<sub>2</sub> monitor for routine checks of the submarine atmosphere. It contains a pressure sensor to compensate for pressure variations caused by the submarine snorkelling, thus helping to avoid spurious alarms. The device has a straightforward user interface, flexible battery technology, audio-visual and vibration alarms and can be fully maintained by the customer.

### *HYP*

The HYP is a compact, portable partial pressure oxygen monitor. It's an easy-to-use cost effective back up for O<sub>2</sub> monitoring.



# SUBMARINE ESCAPE AND RESCUE

AMS has been an active supplier to the submarine escape and rescue community since 1997. Our success in this market stems from innovative developments such as our miniaturised, lower power infra-red sensors capable of performing accurately at hyperbaric pressures. We have extensive experience in designing and manufacturing both commercial-off-the-shelf (COTS) and bespoke atmosphere monitoring systems for Submarine Rescue Systems and have supplied analysers to over 80% of the world's submarine rescue systems. The AMS portable multi-gas monitor, Sub MkIIP, is the market-leading gas analyser for operation in a distressed submarine (DISSUB).

## SUB MkIIP

The Sub MkIIP is currently the only continuous analyser capable of meeting the requirements of the NATO standard, STANAG 1320 Ed 4 Minimum Requirements for Atmospheric Monitoring Equipment located in submarines with escape capability. The Sub MkIIP provides critical information on the state of the DISSUB atmosphere to the senior survivor and crew enabling them to make the all-important decision of 'wait for rescue or commence emergency escape'.

Over 700 units are in active service with more than 20 nations.

## SUB MkIIIF

The Sub MkIIIF is designed for use in hyperbaric environments like submarine rescue vessels and decompression chambers, where it will continuously monitor the partial pressure of oxygen, carbon dioxide, pressure, temperature and relative humidity.





## SRDRS

SRDRS is the US Navy's submarine rescue system, AMS designed and manufactured the atmosphere monitoring system for PRM (the tethered pressurised rescue module). The PRM has successfully mated with submarines in numerous exercises including the Bold Monarch and Chilemar exercise's in 2011.

## NSRS

For NSRS, Analox provided a functionally safe atmosphere monitoring and control system, for both the Submarine Rescue Vehicle (SRV) and the Transfer Under Pressure (TUP) systems. The suite of analysers monitors oxygen, carbon dioxide, pressure, temperature and humidity, over a 0.8 to 6.5BarA pressure range. It was designed according to Lloyds Register Rules and Regulations for the construction and classification of submersibles, and has been used extensively on international exercises.

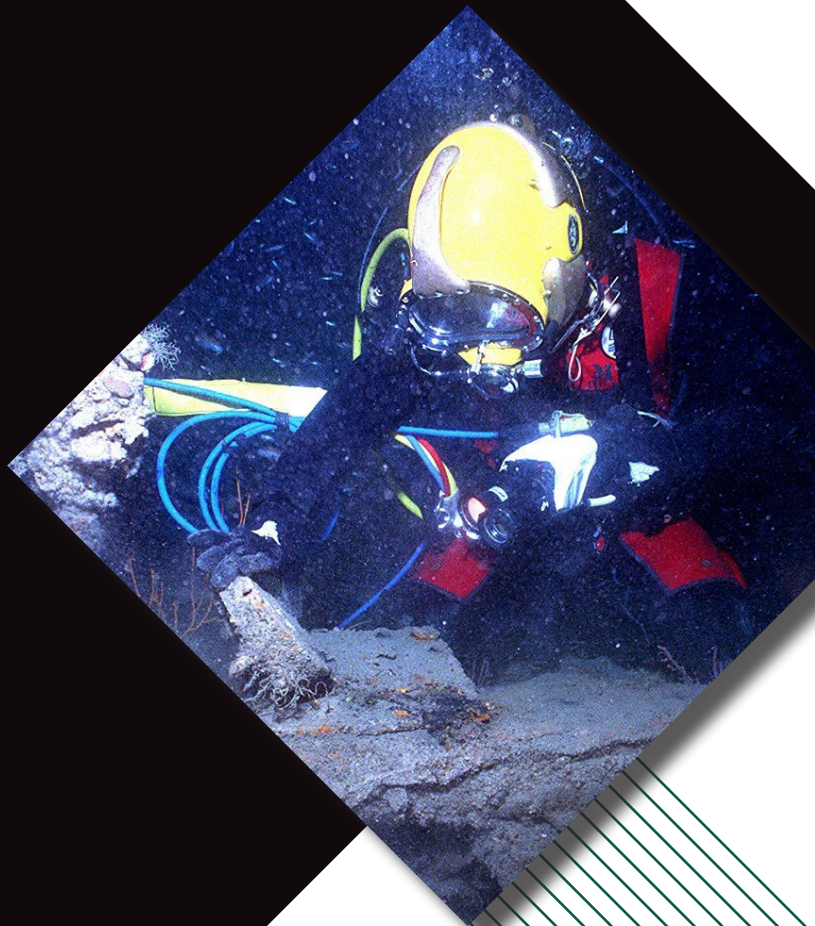


# NAVY DIVING AND SURFACE SHIPS

## MILITARY DIVING

AMS has supplied gas monitoring equipment to military divers for more than 30 years. From surface supplied air and mixed gas diving to saturation dive systems, our analysers are guaranteed to look after the air you breathe. AMS has successfully designed, developed and delivered gas monitoring and control systems capable of working at pressures up to 60 BarA, reliably and accurately, while conforming to Lloyds and DNV requirements for material selection and electrical safety in enriched oxygen environments.

We also offer off-the-shelf solutions for decompression chambers – these solutions monitor oxygen, carbon dioxide, carbon monoxide, helium, pressure, temperature, humidity and hydrocarbons. The range includes in-chamber hyperbaric analysers and traditional external chamber analysers. Our portable oxygen and trimix analysers are ideal for checking the oxygen content of dive cylinders prior to diving. At AMS we are continually adding to our diving range.



Recent additions include:

### *SDA*

This series of external chamber analysers offers the latest in digital technology combined with flexibility to enable full, in-field maintenance. The standard display is coupled with an intelligent sensor to provide the full suite of monitoring including oxygen, carbon dioxide, carbon monoxide, pressure, temperature and humidity. An O<sub>2</sub> controller version is also available.

### *ACG+*

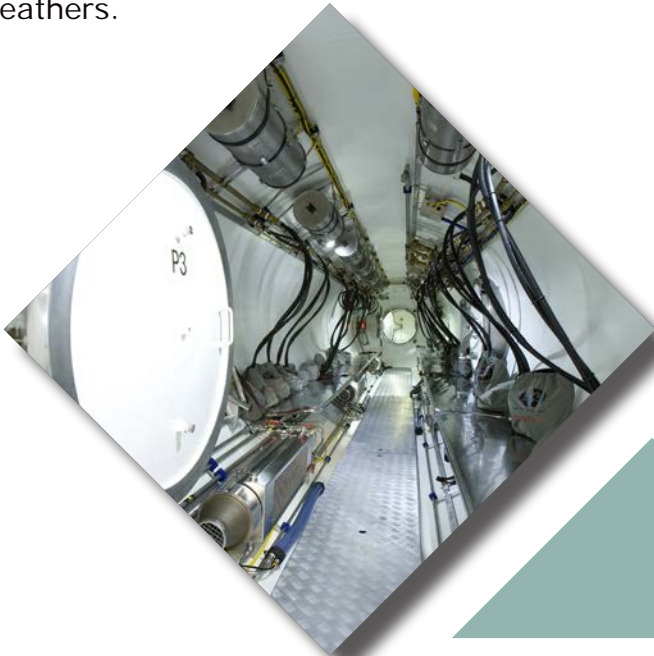
The ACG+ multi-gas analyser is designed for continuous analysis of contaminants in compressed breathing air, including CO, CO<sub>2</sub>, O<sub>2</sub>, hydrocarbons and dew point, setting a new standard in breathing air monitoring.

### *HBOT ASPIDA*

The HBOT Aspida is a unique analyser designed for use inside the HBOT chamber to provide a continuous partial pressure display of oxygen and carbon dioxide.

## **SENSORS FOR REBREATHERS**

AMS supply O<sub>2</sub> and CO<sub>2</sub> sensors for use within closed and semi-closed circuit rebreathers.



## FIRE SUPPRESSION

Gas fire suppression systems can pose a risk to personnel if they are triggered accidentally. AMS can offer various sensors that can accompany your fire suppression system to alert you to such an incident including:

### MIR SENSOR MODULE

This low-power, miniature infra-red CO<sub>2</sub> sensor offers long operation life, making it a cost-effective solution for gases such as IG541.

### MEC O<sub>2</sub> SENSOR

The MEC O<sub>2</sub> sensor detects O<sub>2</sub> depletion making it ideal for inert gas systems such as IG01, IG55 and IG100.





# AIR MONITORING FOR LAND VEHICLES

Armoured vehicles can be in a lock-down situation for periods exceeding 24 hours. During a lock-down period, an armoured vehicle is a sealed environment in which service personnel spend prolonged periods of time working and living. Two gases pose the biggest risk for armoured vehicle personnel, these are:

## CARBON MONOXIDE

Not only is CO generated by exhaust fumes, it is also generated inside armoured vehicles when weapons are being fired.

## CARBON DIOXIDE

As service personnel consume oxygen they also release carbon dioxide into the sealed environment; the longer the lock-down period the greater the build-up of CO<sub>2</sub> inside the armoured vehicle. As the lock-down period increases, personnel may feel tired and will have a reduced state of alertness which could potentially cost lives. AMS can offer various sensor solutions which will aid life support, including:

### *MEC SENSOR RANGE*

The MEC range includes electrochemical sensors and photo-ionisation detectors which are gas specific and field maintainable.

### *MIR SENSOR*

The miniaturised infra-red (MIR) sensor offers low power consumption and long operational life. With numerous ranges available, the MIR sensor is the perfect choice for carbon dioxide detection.



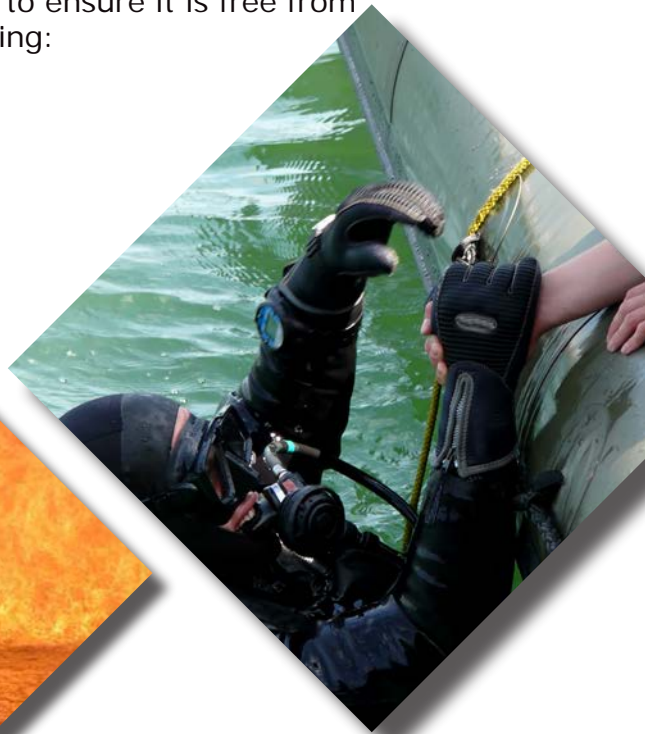
# BREATHING AIR MONITORS

Compressed breathing air is used in a variety of military applications including firefighting, diving, medical decompression and emergency breathing air. Firefighters commonly depend on self-contained breathing apparatus to deal with fires in buildings, aircraft and ships. It is vital that the compressed breathing air they use is free from contaminants. Navy and Army divers use compressed breathing air systems whilst carrying out dive operations; this mixture must be free from contaminants. Compressed breathing air is delivered to patients in medical decompression chambers that are used for treating decompression sickness or HBOT. Checking for contaminants in the breathing air is vital to ensure the patient is treated correctly and safely.

Emergency breathing air systems on submarines are essential to the survivability of the crew in the event of a fire or DISSUB. This air must be free from contaminants such as CO, CO<sub>2</sub>, oil mist and water vapour.

Knowing the quality of compressed breathing air is vital to ensure it is free from contaminants and help to comply with standards, including:

- BS EN 12021
- BS 8478
- DEF STAN 68-284
- US Navy Dive Manual
- Navsea SS521-AK-HBK-010





AMS offers a range of fixed and portable analysers which can monitor compressed breathing air and help you to adhere to these standards. One of which is:

### **ACG+**

The ACG+ is available as either a fixed or a portable monitor commonly used 'inline' on air compressors (i.e. before the cylinder or diver). It provides continuous monitoring of O<sub>2</sub>, CO<sub>2</sub>, CO, VOC and dew point and it has a separate port to facilitate an oil mist test. The ACG+ provides an effective alternative to colorimetric tubes, and can be used to shut down the compressor if it detects contamination.



# BESPOKE DESIGN SERVICE

AMS can offer you the successful delivery of a complete gas monitoring system. Working as an extension of your internal design department we would offer:

- gas sensing and detection solutions
- gas management solutions
- bespoke software design
- bespoke hardware and mechanical design
- standards compliance

AMS are able to work with you as a systems supplier or system integrator, ensuring that you and your customer receive a product to meet and exceed expectations.

Our design team are experienced in delivering functionally safe systems to IEC 61508.

Visit [www.analoxmilitarysystems.co.uk](http://www.analoxmilitarysystems.co.uk) for more information or call: **+44 (0)1642 711400** to discuss your requirements in detail.

*"Turning great ideas into reality"*

**System Design**



**Integrated Logistic Support**

**Software**

**Standards Compliance**



**Sensors**

**Hardware**

# FUNCTIONALLY SAFE DESIGN

AMS are proud to offer functionally safe designs for sensors and systems. In the late 1990s we began to supply functionally safe equipment as we worked on the development of the TMCC system for the RN Minesweepers. We developed an Atmosphere Control Breathing System to meet SIL3 requirements to DEF STAN 00-56 (safety management requirements for defence systems). Further functional safety design work which we have been involved with include:

## NSRS SYSTEM

As a sub-contractor to Perry Slingsby and Divex, AMS were awarded contracts to supply analysis equipment for the rescue vehicle and topside treatment chambers. Both the SRV and the TUP systems have been certified to IEC61508 SIL 2.

## HMS ASTUTE

As a sub-contractor to BAE Systems, AMS supplied systems for HMS Astute to SIL2 certification.

## COMMERCIAL SYSTEMS

Analox have also provided functionally safe systems to the commercial diving sector for vessels including Skandi Artic and Seven Atlantic.

In addition to the design of safety critical analogue based O<sub>2</sub> monitoring systems for use in the manufacture of nuclear material.

# AFTERSALES SUPPORT

At AMS we pride ourselves in the high level of support that we offer to all customers. Support commences with pre-sales advice and ongoing support through the purchasing process from our trained sales team and then continues with aftersales care. Care and support functions that we offer include:

- Training packages. AMS are able to assist with training for your new system and provide quotations on bespoke training packages should they be needed
- Onsite technical support for installation and commissioning
- Maintenance contracts. AMS can provide annual maintenance contracts, availability contracts and offer through life support contracts
- Technical Consultancy. AMS can assist in the specification and design of your system and provide support and assistance with your latest projects on a consultancy basis

Talk to our representatives with your specific requirements to see how AMS can help you.



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