



Diving and Hyperbaric Systems

日本国内取扱い



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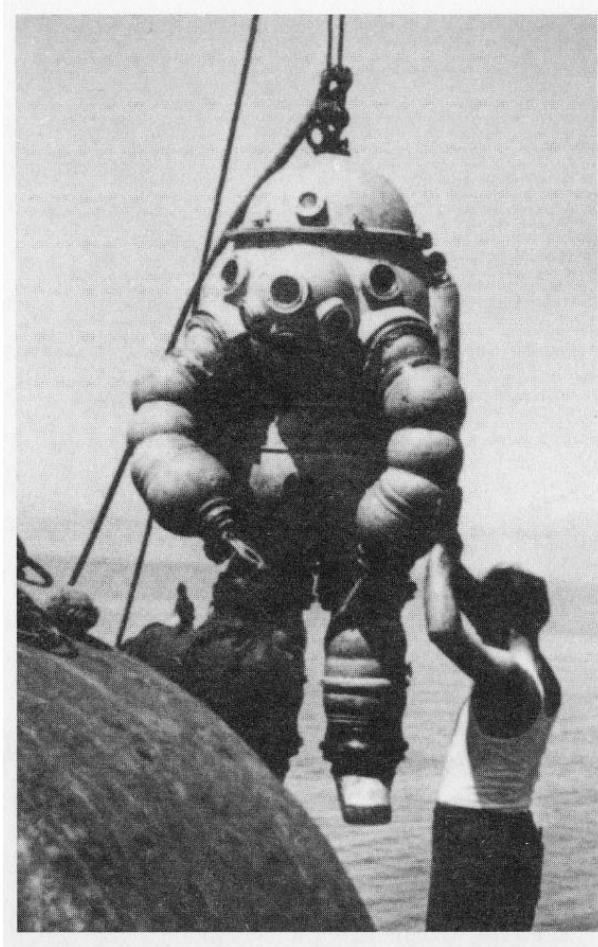
History

DRASS, founded in 1927, has delivered over 600 hyperbaric systems and is the world leader in Midget Submarines, hyperbaric and diving systems.

In the nineties DRASS designed the new and most advanced model of the Submarine Rescue Vehicle (SRV 300) which was successfully delivered to the Italian Navy.



Drass



- ❑ Drass is the historic leader in the deep diving industry.
- ❑ Following the restart of the saturation diving industry in '00s, Drass has built more than half of the certified saturation diving systems in the world.

Company Profile

Drass designs and manufactures diving systems since 1927 and currently has the largest developing business and ongoing projects.

Drass 100 Series is the only recognized, standard and complete package of industrialized equipment of serial production in the industry. Most of the diving components and equipment are developed in house granting the best delivery time and the maximum level of quality.

Thanks to the intense R&D activity, Drass holds key patents covering important solutions applicable to the saturation diving.

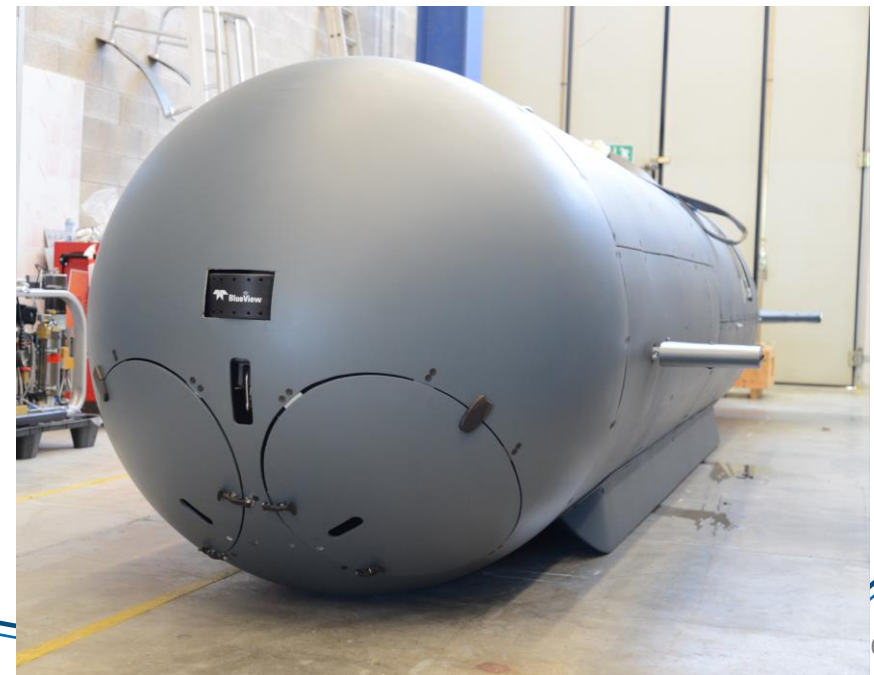
Drass is deeply involved in the vessel integration of the diving spread offering a turnkey engineering to the ship designers, and a complete support to the ship builders during the commissioning and testing.

Facilities

- ☐ Offices 2300 sqm (1300 in Italy and 1000 in Romania).
- ☐ Stores 2800 sqm (1500 in Italy and 1300 in Romania).
- ☐ Workshop 8400 sqm (2400 in Italy and 6000 in Romania).

Drass Companies are placed in two main locations, Livorno (Italy) and Timisoara (Romania).

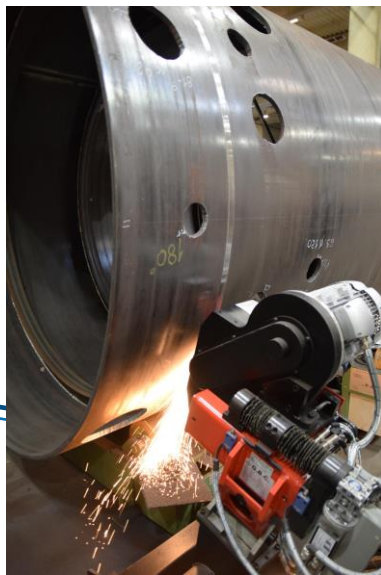
Drass Facility in Livorno, Italy



Drass Workshop Tools & Machinery in Livorno



Drass Facility in Timisoara, Romania



Drass Facility in Timisoara, Romania

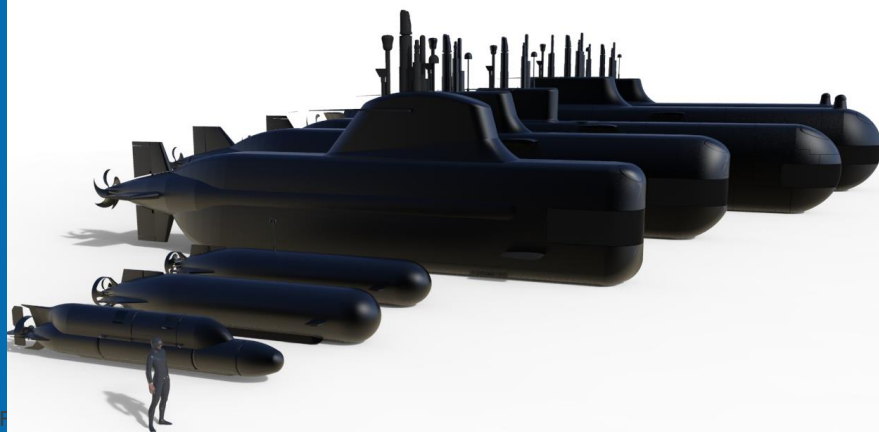


Design Criteria

Drass owns the largest engineering department completely dedicated to Diving, Hyperbaric and Defence technology, consisting in more than 45 engineers.

Thanks to the background of the management in the defense industry and to the experience in engineering in globalization programs, particular importance is given to:

- ☐ Design to cost, effectiveness, reliability.
- ☐ Design to transportability.
- ☐ Design to life support.
- ☐ Configuration Control and Track Changes Management.
- ☐ Engineering Management Software Solutions.



Completeness of Production Range



Drass designs and manufactures in house the entirety of the complex systems, with the exclusion of OEM items such as, mainly, compressors, electric and hydraulic motors.

The product range includes pressure vessels, certified flexible hoses, underwater electrical and electronic components, atmosphere analyzers, communications systems, breathing apparatus.

Vessel Integration



- Ready off the shelf integrated engineering of the DSV and Submarine Rescue Ship thanks to extensive and repeated cooperation with the most recognized vessel designers.



- Preliminary Design Approval of Vessel and Systems available on demand with DNV-GL, ABS, LR or RINA.

Industrialized Product



Thanks to the vision of enforcing a serial production, Drass products are deeply engineered in terms of logistic support, documentation and reliability analysis.



The feedback received by the Client is looped back via technical bulletins to the existing installations in a continuous improvement cycle.

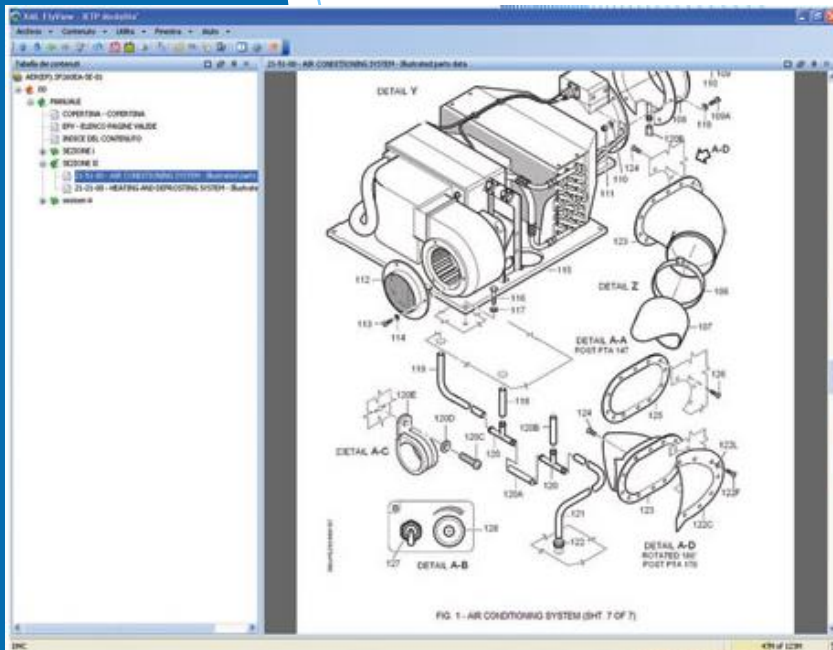


The choice of preferring a serial production can benefit the Clients in terms of smaller dimensions of the own logistic support and availability of the existing store in Drass for immediate delivery of spares and components.

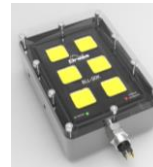
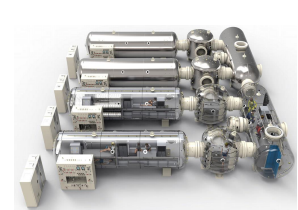
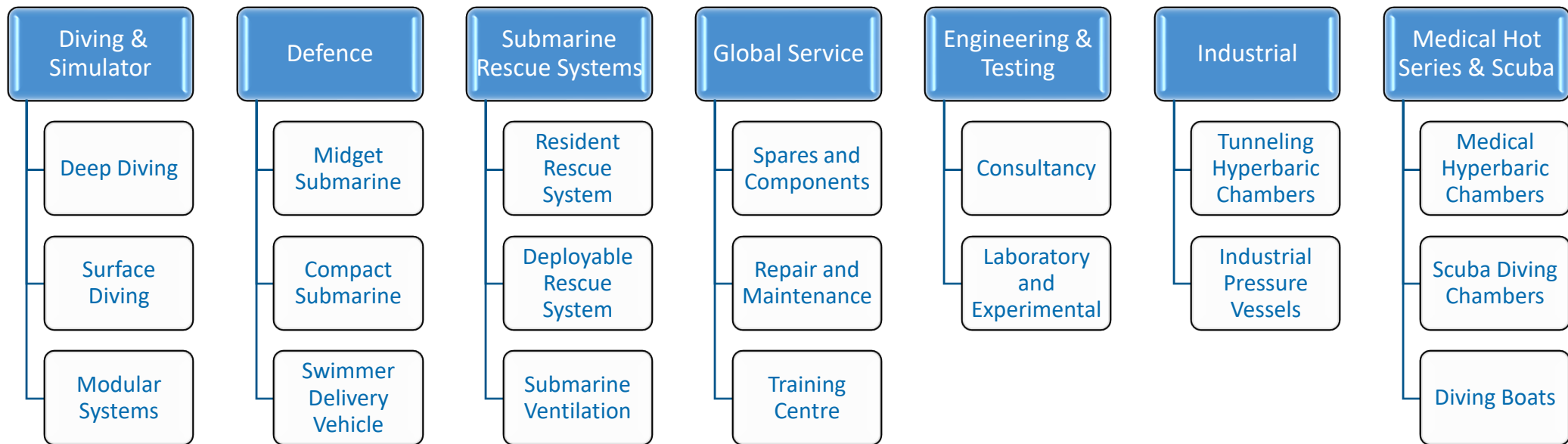
Documentation

Drass issues in house with own personnel the complete documentation set for systems and equipment, including and not limited to:

- ☐ Technical Manuals and Maintenance Procedures.
- ☐ Safety Procedures, QCP, QAP.
- ☐ Long Term Storage Instructions, Installation and Commissioning Procedures.
- ☐ Matrixes of Compliance to Rules and Regulations.
- ☐ Reliability Analysis, FMEA, FMECA, Integrated Logistic Support Plans.



Complete Range of Drass Products



Topics covered in the following slides:

- ☐ 100 Series Saturation Diving Systems
- ☐ Recent Track Record of Diving/Rescue Vessels
- ☐ 900 Series Saturation Diving System
- ☐ 700 Series Surface Diving System
- ☐ Drass Support Boat
- ☐ Diving Technology / Components
- ☐ Personal Diver Equipment
- ☐ MiniSat: Shallow Water Saturation Systems
- ☐ MiniDSV: Shallow Water Saturation Vessels
- ☐ Hyperbaric and Diving Simulators
- ☐ Medical Hyperbaric Chambers
- ☐ Scuba Chambers

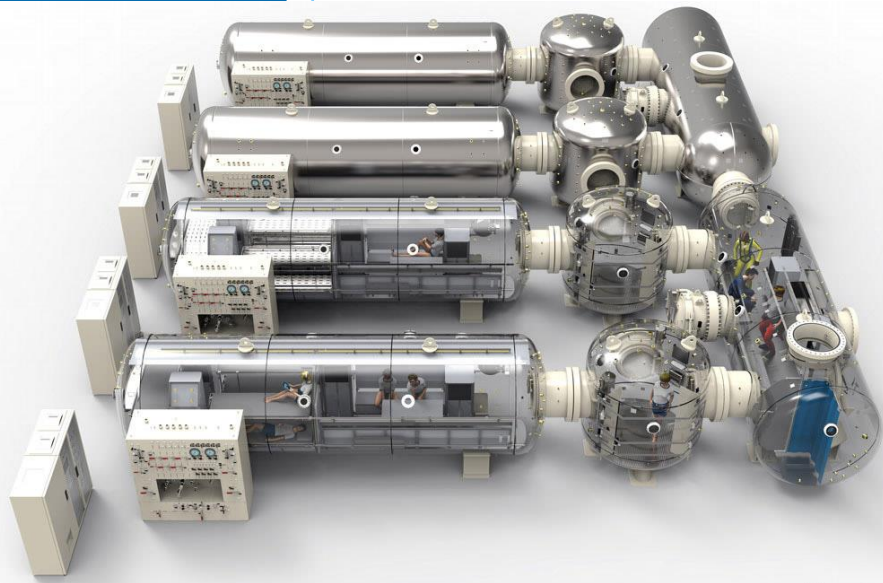
100 Series Saturation Diving Systems

The 100 Series Saturation Diving system is consolidated in the market, with the largest number of systems successfully delivered since 2005.

Different chamber complex configurations are available, from 12 to 24 diver occupancy and a single or twin diving bell configuration.

The system is provided as a turnkey solution and includes all the necessary equipment for the diving operation.

The equipment is fully standardized and interchangeable in all the different configurations.



100 Series Saturation Diving System



Recent Track Record of Diving/Rescue Vessels

- ☐ Bibby Sapphire
- ☐ Toisa Pegasus now Seven Pegasus
- ☐ Helix Well Enhancer
- ☐ Gulmar (now Boskalis) Nor Da Vinci
- ☐ Gulmar (now Boskalis) Boka Atlantis
- ☐ Impresub Hera
- ☐ SBM Installer
- ☐ Korean Navy Rescue Ship ATS2 Vessel 1
- ☐ Korean Navy Rescue Ship ATS2 Vessel 2
- ☐ Technip (HRF)
- ☐ Subsea 7 Kestrel
- ☐ Harkand Haldane now Technip Deep Discover
- ☐ Kreuz Challenger
- ☐ Jumeirah Oriental Dragon

Completed
since 2005



In Progress

- ☐ Toisa Pelagic
- ☐ Korean Navy Rescue Ship ASR2 Vessel 1
- ☐ MMI SDO SuRS Rescue Systems

Drass Diving Vessels



900 Series Saturation Diving System



900 Series Saturation Diving System

The 900 Series Modular Saturation system is rated 300 MSW in accordance with the Class certificate and can also be configured with minimum variations to operate with 6, 9, 12, 15 divers, granting the maximum optimization of the space available on the deck.



700 Series Surface Diving System

The 700 Series Surface Diving System is a complete range of equipment which provides the widest solution for air and gas mix diving.

The trolley and A-Frame recovery systems are designed to cover a 10" and 20" feet footprint.

All the components are available in the stand alone or containerized version, fully certified with DNV and ABS and compliant with IMCA regulations.



700 Series Surface Diving System

Drass 700 Series is the favorite choice of Special Forces and Navies, thanks to the high level of reliability and robustness.

- ☐ Failure Mode Effect Analysis
- ☐ PLC Controls
- ☐ Monitoring of decompression and diver parameters
- ☐ New generation gas analysis with self calibration and multi gas reading
- ☐ Integration in compact Diver Support Boat



Drass Support Boat

The Drass Diving Support Boat (DSB) is a class of uniquely designed boats embedding a hyperbaric diver decompression chamber (DDC) for treatment and prevention of decompression sickness. Drass DSB houses the DDC just above the keel level, giving the boat a much better stability when compared to vessels of similar dimensions. This ingenious solution enables a boat of limited dimensions to operate a DDC, whilst also leaving most of the open deck available for routine operations and safe navigation in high seas, thereby enhancing the boat's effectiveness.

DSB48



DSB60



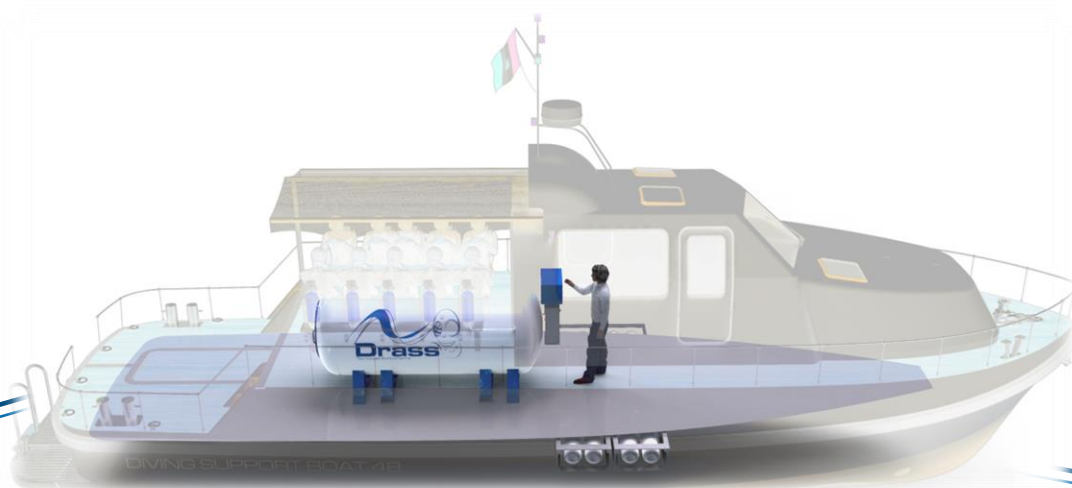
Drass DSB comes fully equipped with a complete hyperbaric unit, including DDC, control panel, air storage, HP air compressors, filters and diver panels where required. Thanks to these combined features, Drass DSB is a multi-application rescue vessel that can be specifically configured for use by coastguard, navies, governmental emergency response teams, commercial and recreational diving companies.

Support Boat 48

Drass DSB48 doubles up as an ideal mother vessel/rescue vessel for recreational scuba. It offers dive operators, divers onboard and those in the locality, the safety of a hyperbaric chamber in remote diving locations. Thanks to its limited dimensions, DSB48 is also the perfect boat for commercial diving in shallow waters of harbors or coastal areas, offering increased safety during prolonged diving operations.

The use of a rescue boat in touristic areas makes it possible to provide a decompression facility as a first aid emergency response, significantly increasing the chances of saving human lives at sea when encountering incidences of decompression illness.

The vessel can comfortably accommodate 14 divers plus the marine crew, and the DDC is designed for 2-men occupancy.



Total external length	14.85 m
Length at waterline	12.70 m
Beam	4.05 m
Height at main deck	3.10 m
Maximum immersion	1.20 m
Weight vessel empty & dry	~ 11.500 kg

Support Boat 60

Drass DSB60 is a state-of-the-art multipurpose patrol boat, designed for prolonged endurance at sea and capable of supporting governmental and commercial diving operations up to 50 msw. The deck's ample width allows transportation of a rubber boat and an observation ROV. The vessel has bunks for a crew of up to 10 (6 permanent plus 4 temporary) and can accommodate more than double for daily operations. On stern, the hull has a central passageway to permit entry of a stretcher into the 1600mm DDC. The DDC is IMCA and RINA compliant, and the pressure vessel is designed and built according to EN 13445. PED (Pressure Equipment Device) certification is provided. Thanks to the diving room's wide dimensions, the vessel can comfortably host a large control station for underwater operations. Due to its enhanced stability, DSB60 is particularly suitable for maintenance of littoral or shallow water installations such as underwater structures or wind farms.



Total external length	18.50 m
Length at waterline	16.70 m
Beam	5.80 m
Height at main deck	3.30 m
Maximum immersion	1.50 m
Displacement at full load:	~ 25 Tonn
Gross Tonnage	~ 20 Tonn
G.T.	~ 35 Tonn

Diving Technology (1)



iAN-MULTI
Environmental Analyzer

(ref. Brochure FP04-02-02-01)

Specifically tailored to the submarine/hyperbaric industry, where a turnkey solution is required to monitor the key environmental parameters of a confined submerged/hyperbaric space.



BIBS MASK

(ref. Brochure FP04-02-02-07)

Designed, developed and tested to an operational depth of up to 400 msw in accordance with international technical and safety standards set by NORSOK.



DRASS KOMMS

(ref. Brochure FP04-02-02-16)

Wired communication system that incorporates the latest advancements in technology and design, and complies with DNV GL, ABS and LR classification bodies.



D-ONE DIVING HELMET

(ref. Brochure FP04-02-02-30)

The D-ONE represents the highest echelon of product which DRASS proudly offers in the marketplace.

The proposed innovations will maximize Diver safety and comfort while providing ergonomic implementation and usage practicability, D-ONE can greatly serve the interests of the Operators in this technological and demanding sector. This Helmet has been tested for air use up to -50 msw.

Diving Technology (2)



PENETRATORS

(ref. Brochure FP04-02-02-03 and FP04-02-02-02)

For example, 12-WAY DDC power penetrator and 18-WAY DDC signal penetrator 300 msw have been designed for use on electrical paths through pressure vessels and equipment. They have been specifically designed to withstand both gas and hydrostatic pressure, in line with the requirements of DNV rules for classification of diving systems.



DRASS CO2 SCRUBBER

(ref. Brochure FP04-02-02-08)

The Drass CO2 Scrubber is used as a CO2 removal system in the hyperbaric environment, in chambers and diving bells.

Thanks to its compact size and its efficiency, the installation of the Drass CO2 scrubber on board hyperbaric chambers is recommended either as main or as emergency scrubbing system.



HYPERBARIC LIGHTING

(ref. Brochure FP04-02-02-14)

Drass brings to the market a series of lighting solutions for use in hyperbaric compartments at depths of up to 300msw.

This series has been developed specifically for ambient (ceiling) lighting and private (bunk) lighting.



UNDERWATER CONNECTORS

DRASS has developed a wide range of connectors and cables (e.g. Polyurethanes, Epoxies and Polyethylenes) under a Temperature & Pressure Control System, using dedicated equipment and detailed manufacturing procedures which control the temperature through the complete Encapsulation/Over-molding process.

Diving Technology (3)



GAS ANALYZER

(ref. Brochure FP04-02-02-15)

The newly iAN4 GAS ANALYZER is specifically tailored to the saturation and surface diving industry and for application in the medical industry also. This advanced solution a superior measuring accuracy and a robust hardware that consists of a Display and Remote Sensor Box, and comes completed with an embedded flowmeter, meaning the external one is not necessary for the correct operation of the system.



DRASS FLOW FUSE

(ref. Brochure FP04-02-02-19)

The Drass 2" Flow Fuses are a safety device intended to protect any PVHO (Pressure Vessel for Human Occupancy) from rapid unwanted decompression. One of its unique features is the integrated silencer and flow diffuser features which resolve the problem of unwanted noise on inlet and outlet lines, even in case of higher flow rates.



HYPERBARIC FLAME SENSOR

(ref. Brochure FP04-02-02-24)

Pressure tested up to 50 bar and able to detect a flame at 10 times the distance of standard flame detectors, its fine-tuned configuration ensures the detection of small flame inside a DDC or TUP within a few milliseconds. This product thereby provides ultimate reassurance for those working in safety-critical environments.



INTERLOCKING MECHANISM

(ref. Brochure FP04-02-02-24)

The Interlocking Mechanism is a safety device intended to protect any pressure vessel subject to be opened during routine operation procedures - this also includes soda lime pots, food and material locks, and diving bell mating clamps.

Personal Diver Equipment



- ☐ Regulator Kit
- ☐ Rebreather
- ☐ Full face mask and diver communication
- ☐ Diving Wear and Accessories
- ☐ Drysuit Undergarment
- ☐ Buoyancy control device
- ☐ Diving Computer
- ☐ ADV Scooter

MiniSat: Shallow Water Saturation Systems

Drass Minisat is the most compact and effective saturation diving system for shallow water:

- ☐ 6 man occupancy
- ☐ Diving Bell
- ☐ 120 meters depth rating
- ☐ In built rescue System
- ☐ Automation



MiniDSV: Shallow Water Saturation Vessels

Drass designs compact saturation diving vessels for extended underwater operation in shallow water.

The Vessel is equipped with in built or modular Drass Minisat saturation diving system.

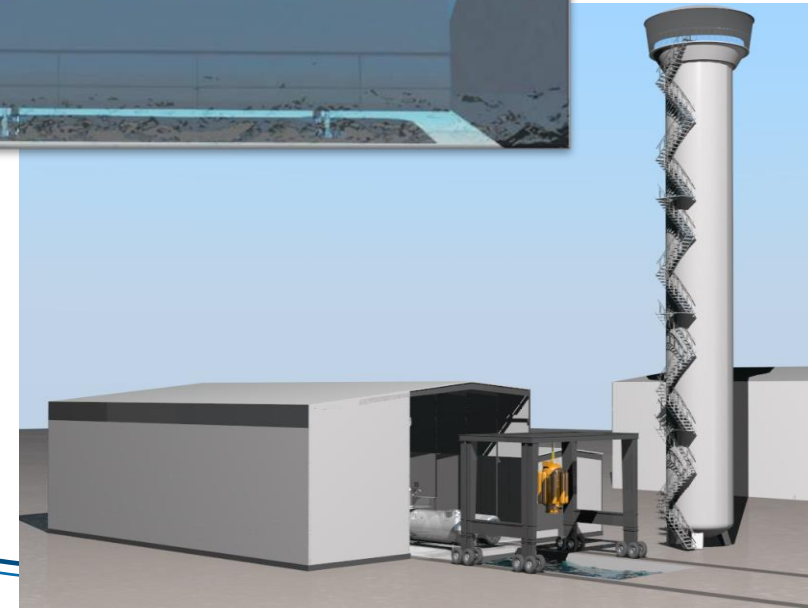
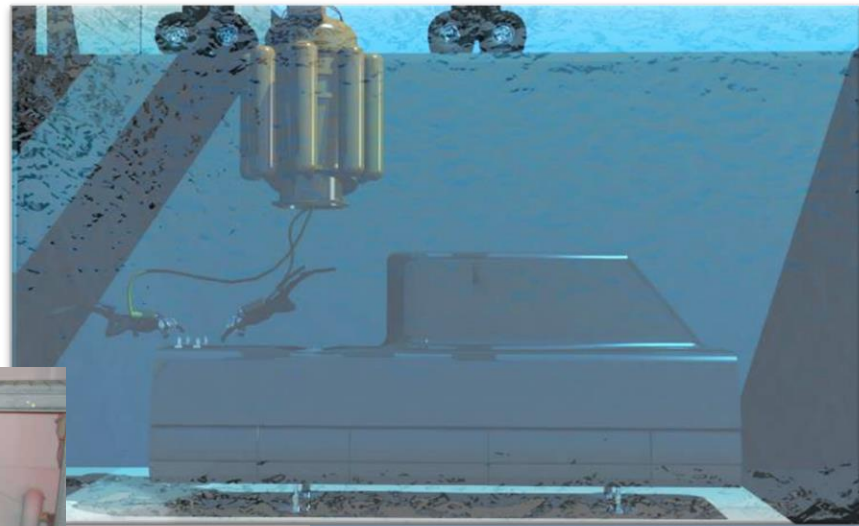
Ship Design	ST-230
Length O.A.	64.4 m
Beam	14.5 m
Depth	7.2 m



Hyperbaric and Diving Simulators

Drass offers turn key solutions for:

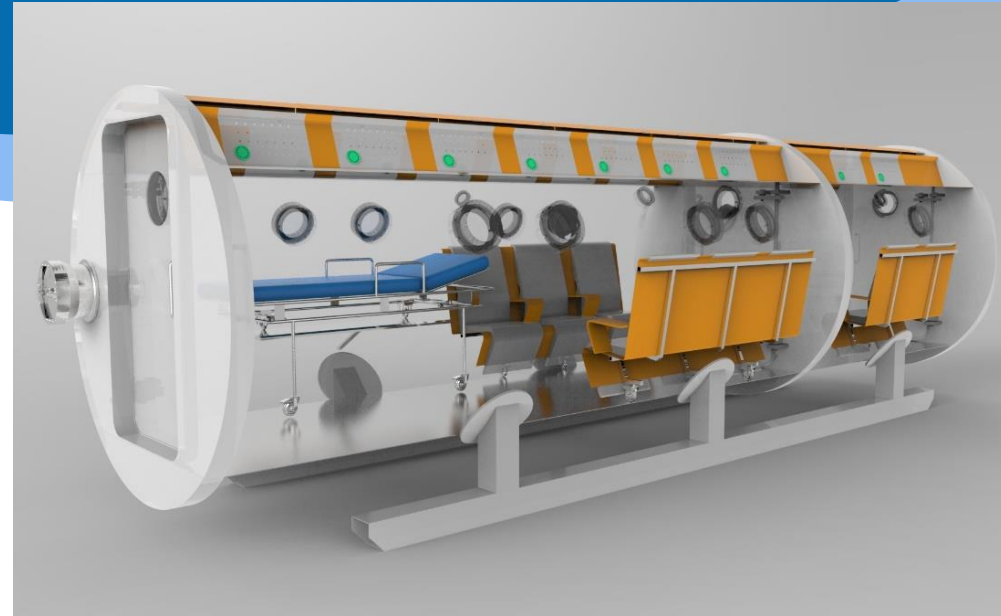
- ❑ Divers and Special Forces Training
- ❑ Submariners Training
- ❑ Submarine Rescue Solutions



Medical Hyperbaric Chambers

Drass Medical Hyperbaric Chambers for Oxygen Therapy are the most technologically advanced thanks to:

- ❑ Fail Safe PLC Control System
- ❑ Patient Monitoring System
- ❑ Hyperbaric Multimedia System
- ❑ Hyperbaric Flame Sensors

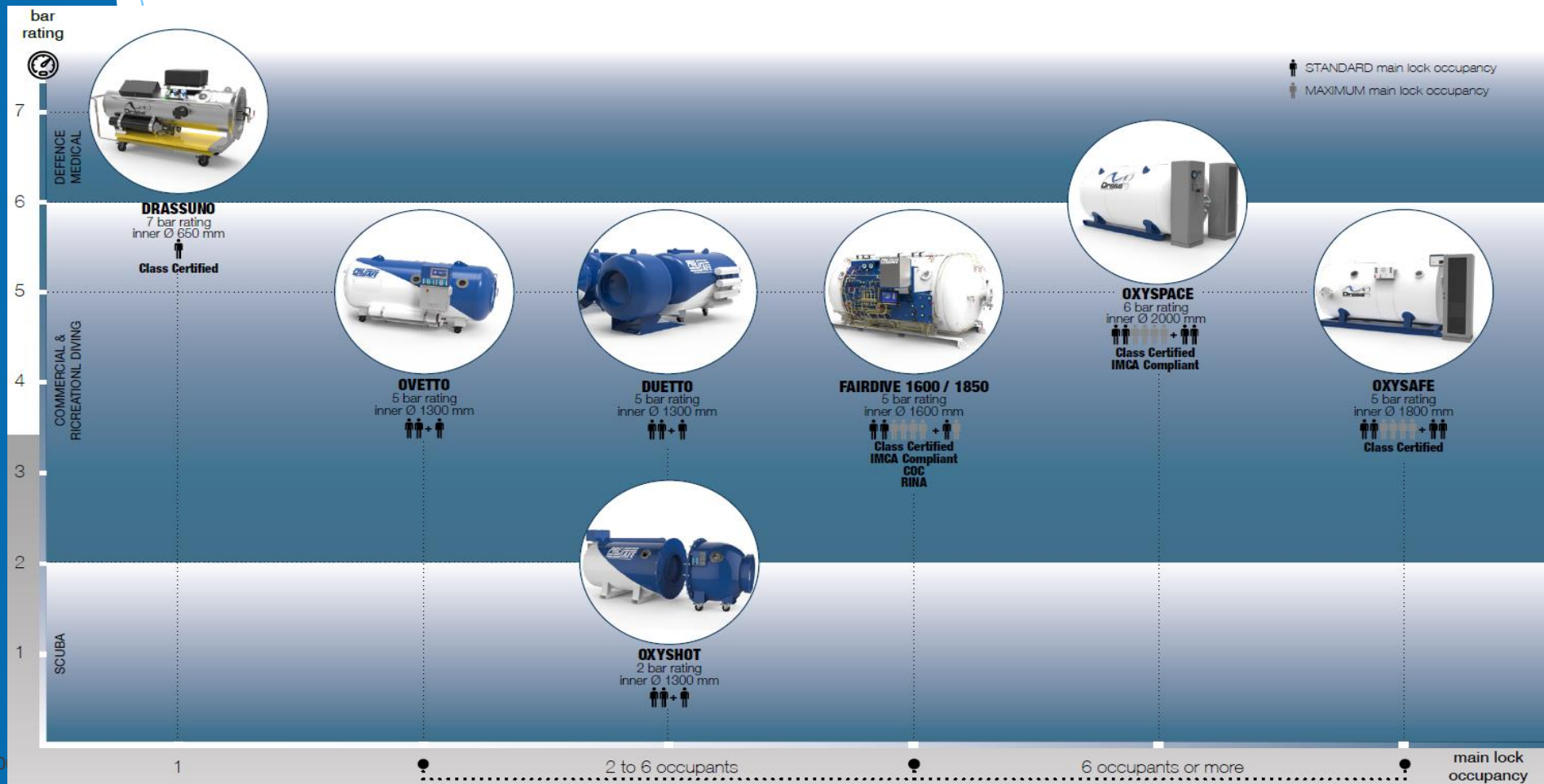


Scuba Chambers

The Scuba Decompression chambers are relatively small chambers which are easy to use.

They are designed to guarantee an immediate on site recompression on site of divers in order to prevent decompression sickness.

Drass produces various models with a wide range of occupancy and working pressure options.





DRASS[®]

UNDERWATER TECHNOLOGY

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**Thank you for your
kind attention**