CAPE DIVING (PTY) LIMITED
QUALITY MANAGEMENT SYSTEM

TECHNICAL DATA SHEET
SATURATION SYSTEM SAT-09

MAIN PARTICULARS

Year Built	2009
Classification Society	ABS
Classification Standard	ABS A1, Diving System
Certification / Audit Standard	IMCA D018/D024
Depth Rating	21 bar 200 msw

MAIN SKID

A Frame & Bell Trolley

9 Man Living Chamber c/w 9 x Bunk Beds with Mattresses

9 x BIBS, 4 x HCU, Carbon Dioxide Scrubbers, Medical Lock & Communications Transfer

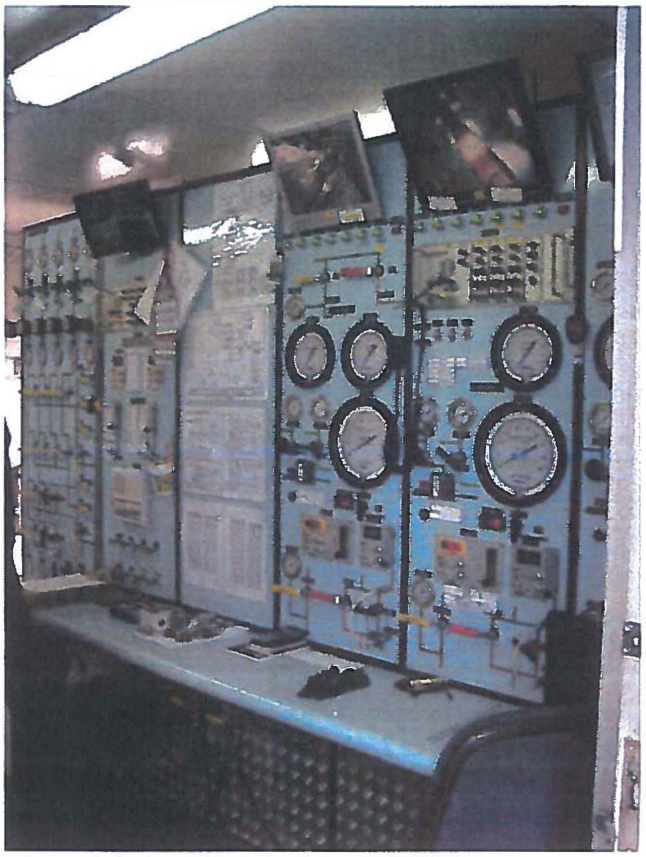
TUP

3 x BIBS complete with dump

1 x Toilet, Shower, Wash Basin, 1 x HCU

Carbon Dioxide Scrubber & Communications

TECHNICAL DATA SHEET
SATURATION SYSTEM SAT-09



DIVE & SATURATION CONTROL UNIT

Dive / Bell control Panels comprising:

- Diver gas reclaim control panel

Bell services controls:

- Electrics, Communications & Analysers, Hot water temp monitoring,
- Carbon dioxide & oxygen analysis of divers gases
- Through Water emergency communications,
- Diver colour hat camera and video recording system controls
- Bell internal video monitoring and controls

Chamber life support control panels DDC 1, TUP, HRC comprising:

- Unscrambler communications sets
- Chamber depth & atmosphere monitoring and analysis
- Chamber CCTV video monitoring & Gas distribution panel

MAIN CHAMBER INCLUDING BELL & SKID

Length (m)	12.8
Width (m)	3.7
Height (m)	7
Weight (kgs)	68000

TECHNICAL DATA SHEET
SATURATION SYSTEM SAT-09

WINCH SKID

Main Bell Winch (Hydraulic 10 T Man Riding)

Guide Wire Winch (Hydraulic 6 T Double Sheaved Man Riding

Recovery To Bell Catcher Hooks

Umbilical Sheave (Hydraulic)

OTHER EQUIPMENT

20 ft ISO Store / Workshop Container

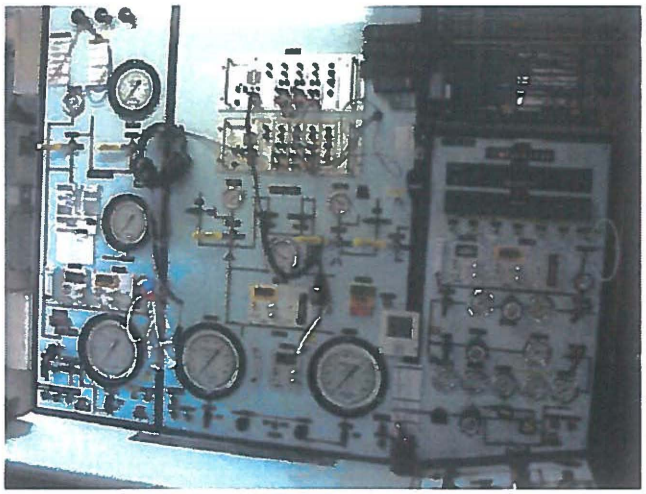
260 m Bell Umbilical With Basket

3 x Jewel 601 Reclaim hats

2 x KMB 18B Band Mask

Deck Electrical / Gas Leads

Spreader Bar & Lifting Slings



POWER REQUIREMENT

Power Requirement	440 50/60Hz
Emergency Generator	250kVA
Compressed Air	400 cfm @ 90 psi
Seawater	25 gpm
Fresh Water	3 gpm

HYPERBARIC RESCUE CHAMBER WITH BASE

Length (m)	7.2
Width (m)	3.1
Height (m)	3.2
Weight (kgs)	18560

UMBILICAL BASKET

Length (m)	2.4
Width (m)	2.4
Height (m)	1.3
Weight (kgs)	5000

DIVE CONTROL VAN

Length (m)	7.6
Width (m)	3
Height (m)	2.8
Weight (kgs)	12700

LIFE SUPPORT MACHINERY VAN

Length (m)	6.1
Width (m)	2.45
Height (m)	2.6
Weight (kgs)	8180

TECHNICAL DATA SHEET
SATURATION SYSTEM SAT-09

HYPERBARIC RESCUE CHAMBER 12 MAN

Onboard emergency gas and battery power for 72 hrs

12 man HRC c/w 12 x Full Seat Harness & approved Safety Helmets

1 x Toilet, Shower, Wash Basin

4 x HCU, 12 x BIBS complete with dump, Carbon dioxide scrubbers,

Medical Lock & Communications Transfer, 6 x Bunk Beds

Lifting Frame & Rigging, Towing Bridle

LIFE SUPPORT MACHINERY UNIT

Electric Main / Emergency Distribution System

Dual Diver Hot Water Unit (100% Redundancy)

Environmental Control Unit (100% Redundancy)

Chamber Potable Water Unit (Hot/Cold)

Divex Air Driven Gas Reclaim Surface Unit

Aircon environment

DIVING BELL 3 MAN

3 x Diver Excursion Umbilicals complete with reclaim hose

3 x Diver Helmet Mounted Colour Cameras & Lights

2 x Bell Carbon Dioxide Scrubber

1 x Bell Heater (Hot Water Unit)

2 x Diver Gas Reclaim (DGRS) Panel

Bell / Diver Communications Systems

Onboard Emergency Gas Cylinders & Power Battery

ABBF Air ration Bell Bump Frame, to assist bell through splash zone

Thru Water Communications

Telescopic Stand-off Frame

Hydraulic Bottom Door System

Internal & External Lights

HRC EMERGENCY CONTROL UNIT

Control Panel

Communications & Analyzers

Environmental Control Heating & Cooling

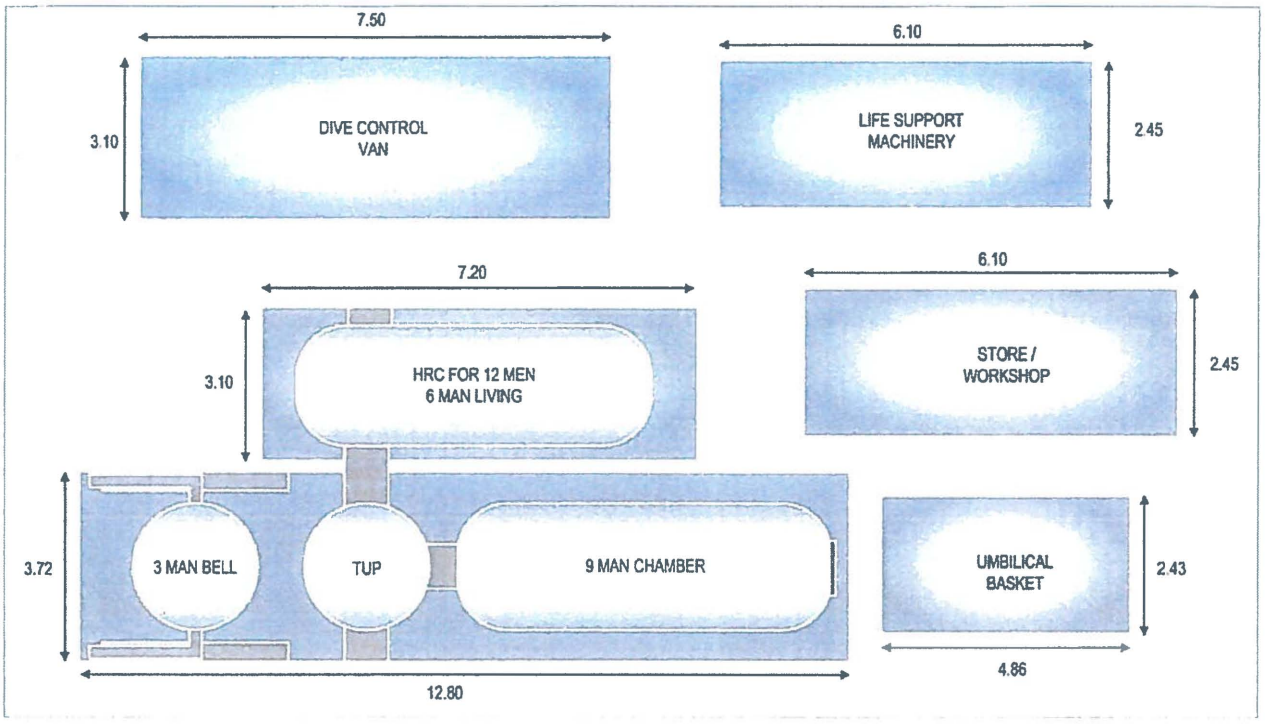
Supplied with Emergency Gas

Supplied with Emergency Hook Up Umbilical

CHAMBER VOLUMES

Main DDC	21.40 m3
TUP	5.80 m3
HRC	19.26 m3
Bell	5.00 m3
DDC 2	Optional

TECHNICAL DATA SHEET
SATURATION SYSTEM SAT-09



AMERICAN BUREAU OF SHIPPING

CHARTERED
1862

NUMBER
09203535

CERTIFICATE OF CLASSIFICATION

SAT 09

Description SATURATION DIVING SYSTEM

Owner CAPE SUBSEA (PTY) LIMITED

Manufacturer HALLIN MANUFACTURING SERVICES PTE. LTD.

Year of Build 22 April 2009

Vessel on Which the Diving System is Fitted

Name of Vessel PACIFIC ASKARI

Vessel IMO No. 9358137

This is to Certify that the above has been surveyed in accordance with the Rules of this Bureau and entered in the Record with the Class and based upon certified components listed on page 3.

***A1, Diving System**

13 July 2015	21 April 2018
Issue Date	Expiration Date
Chief Surveyor	Assistant Secretary

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. The classification certificate is a representation only that the vessel, structure, item of material, equipment or machinery or any other item covered by this certificate has met one or more of the Rules of American Bureau of Shipping. The certificate is governed by the terms and conditions on the reverse side hereof, and governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof.

AIR DIVING/ MIXED GAS SPREAD (NITROX)

BUILT: 2014

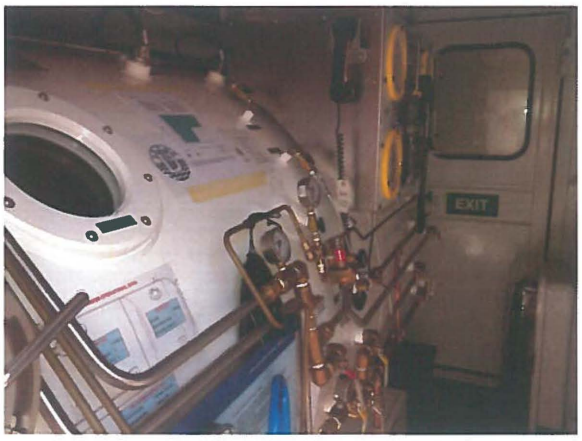
CLASS APPROVAL: DNV (DET NORSKE VERITAS)

The Cape Diving air diving/ mixed gas system is a system made up of four main components

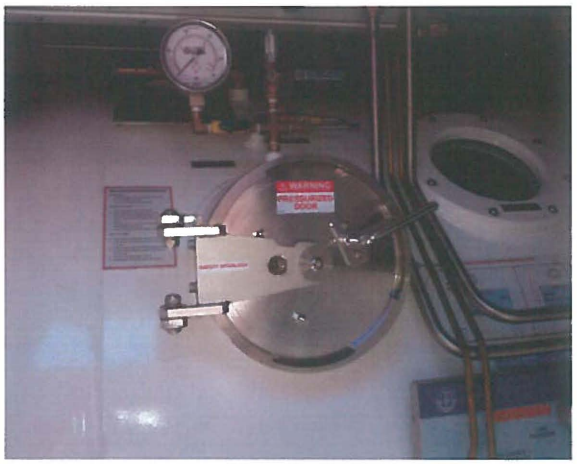
- DDC and Gas Bank Container
- Dive Control and Client area Container
- Machinery and Workshop Container
- LARS (Launch and Recovery System)

DDC AND GAS BANK CONTAINER

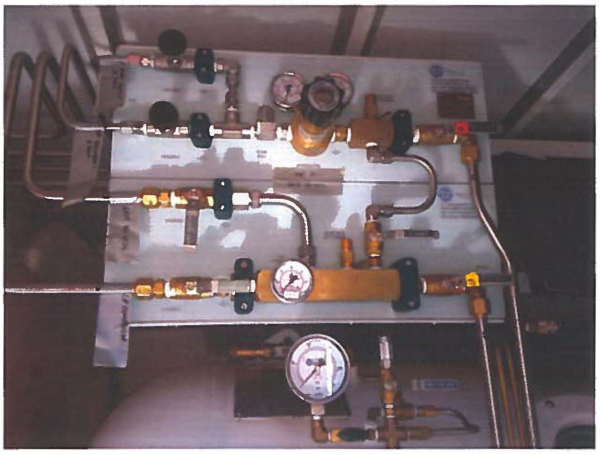
- 1500 Twin Lock Decompression Chamber rated to 100m



- 4.1m³ main lock and 1.8m³ entry lock total 5.9m³
- 3603mm in length
- 1990mm in height
- 1702mm in width
- Medical Lock 250mm bayonet-type enclosure with safety interlocks

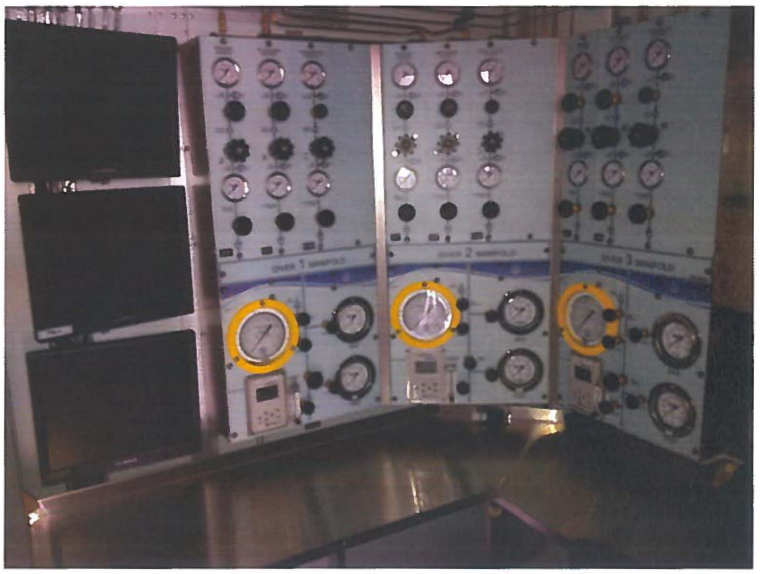


- Chamber Panel
- Indicating Gauges
- Dive Safe O2 Analyser
- Amron 11 Comms set
- Sound powered Phone
- HP 200bar and LP 17bar control rack
- Main Air Supply
- Emergency Air Supply
- O2 Supply for BIBS
- BIBS panel



- Carbon Dioxide Scrubber Unit
- BIRNS Lighting
- Firefighting Equipment
- BA Sets
- 2 x 16 cyl gas quads 200bar

DIVE CONTROL AND CLIENT AREA CONTAINER



- 3 Diver Air and Mixed Gas1800 WPN Panel (NITROX)
- Comms changeover unit
- Remote control for HPU unit
- Remote welding unit
- 4 Zone fire alarm rack
- 4 Deck camera power control rack
- 2 Diver hat light and camera control unit
- Gas analyser
- VDU for client
- UPS
- Tescom regulators
- 3 D Instruments Depth Gauge
- Clear Comms KB 702 Deck Comms
- Clear Comms KB 704 Deck Comms
- Dive Safe o2 Analyser
- Bosch 17" Screens
- Bosch 32" Screen for Camera feeds
- HIK Vision Video Recorder
- AMX Optima Video Multiplexer
- Samsung DVR
- Video Quad Clients side
- BA Sets
- Firefighting Equipment
- Rack Mounted PC
- 3 x 200m umbilical's with light and camera cables
- 2 x Kirby Morgan 37 Hats
- 1 X Kirby Morgan 18 band mask

MACHINERY AND WORKSHOP CONTAINER

- Hydraulic power pack
- Compressor control DB board
- LP Manifold
- HP Manifold
- Bailout cylinder charging station
- Pressure Relief Valves
- Safe Dive O2 Analyser
- Assorted spares

LARS

- Hydraulic LARS
- HPU
- Diver Cage
- Standby Diver Cage
- Standby air supply with 1ST stage and 2nd stage regulator
- 2 x 50L Air Cylinders

MOHICAN Inspection ROV System

Our Mohican Inspection Class ROV system incorporates an enhanced propulsion system allowing it to continue working in high current conditions when other systems have to return to surface, providing a customer benefit of reduced vessel time and costs.

- **Ultra-High Thrust Greater Than 100 kgf / 220 lbf Both Axial and Lateral**
- **Six Brushless DC Thrusters with Sub-Atlantic's Statorshield™ Technology and Dynamic Vectoring**
- **3000 Volt, 400 Hz Power System**
- **Long, Small Diameter, Low Drag Tether**
- **2,000 Metre / 6,500 Feet Standard Rating**
- **35 kg / 77 lbs Standard Payload (Options)**
- **Auto-Functions**
- **Multiple Video Channels**
- **Deep Live Boat, Tunnel or TMS Operation**
- **Manipulator Options**
- **Integral High Pressure Cleaning System Option**
- **Various Skid Options**

The Mohican ROV features a small diameter tether and high output brushless DC thrusters operating on Sub-Atlantic's 'Dynamic Vectoring™ system. The Mohican comes with three or six simultaneous video channels transmitted through a fibre-optic telemetry system for sharp, high quality video inspections. The ROV is also equipped with additional power sources for attachment of manipulator and tools such as our high pressure jetting and cleaning skid used in platform inspections.

Mohican uses a 3000 Volt, 400 Hz power transmission system from surface to ROV resulting in a small tether, main lift cable and launch & recovery system. This transmission system makes Mohican particularly suited for long tunnel inspections and deep live-boating operations.

---

sub-Atlantic

A MEMBER OF THE TRITON GROUP

www.sub-atlantic.com

Live Boat or TMS Operation

The Mohican can be free-flown in 'live boating' mode or with our cage type TMS systems (see TMS data sheet). We also offer a range of Launch and Recovery Systems (LARS)

Compact Control

Surface equipment consists three basic units:

- Surface Control Unit (SCU) in an 8U x 19" rack mount configuration.
- Transformer Power Unit (TPU) incorporating transformer in a floor mounted cabinet
- Hand Control Unit (HCU) which is lightweight and portable.

The components are generally installed in a ISO control cabin supplied by customer or Sub-Atlantic.

The HCU (top), SCU (left) and TPU (right) are compact for operation in small control spaces. The three units are linked by interconnecting cables with plugs and sockets

As an alternative, the HCU and SCU can be supplied mounted in a 19 in. rack mount flight case complete with two 9" colour monitors. An additional spare slot can accommodate a video recorder. The rear case panel fixes to the base during operation to locate the HCU.

Mohican System Specification

ROV General Specification

Depth Rating	2000 msw (6560 fsw) standard (deeper options)
Payload:	35 kg (77 lb) lead ballast
Height	800 mm (25.5 in.)
Length	1150 mm (45.3 in)
Width	770 mm (30.3 in)
Mass in Air	340 kg (749 lb)
Max. Thrust @ 0 Knots with zero voltage losses:	
Forward	110 kgf (242 lbf)
Reverse	110 kgf (242 lbf)
Lateral	110 kgf (242 lbf)
Vertical	75 kgf (165 lbf)
Max.Velocity/Operational Current (zero tether excursion):	
Forward	1.75 m/s (3.5 Kt)
Reverse	1.75 m/s (3.5 Kt)
Lateral	1.75 m/s (3.5 Kt)
Vertical	1.0 m/s (2.0 Kt)
Turning Rate	180 Degrees per Second (approx)
ROV Power Requirements	440 Vac 3ph 50/60 Hz 15k VA

Surface Equipment General Specification

SCU

Height	355 mm (14.0 in.)
Width	483 mm (19.0 In.)
Depth	450 mm (17.7 In.)
Mass	12 kg (27 lb)
SCU Power Requirements	220/240 Vac 50/60 Hz 2 kVA

TPU

Height	650 mm (25.6 in.)
Width	630 mm (24.8 In.)
Depth	505 mm (19.9 In.)
Mass	(approx.)50 kg (330 lb)

HCU

Height	160 mm (6.3 in.)
Width	480 mm (18.9 In.)
Depth	230 mm (9.1 In.)
Mass	1.5 kg (3 lb)

Flight Case Option with 2 x 9" monitors & 8U control module

Height (operation)	980 mm (38.6 in.)
Height (transport)	800 mm (31.5 in.)
Width	520 mm (20.5 In.)
Depth (operation)	720 mm (28.3 In.)
Depth (transport)	550 mm (21.7 In.)
Mass	66 kg (145 lb)
SCU Power Requirements	220/240 Vac 50/60 Hz 2 kVA

Tether and Main Lift Cable Dimensions

Tether (standard)	16.5 mm / 0.65 in. diameter
Main Lift Umbilical (up to 4000 msw)	25.5 mm / 1.0 in. diameter

sub-Atlantic

www.sub-atlantic.com

Reliable Thrusters

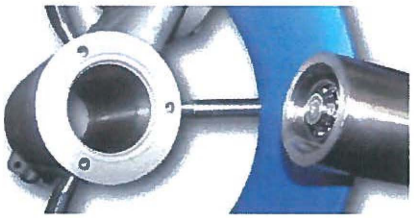
Mohican uses a 6 thruster configuration to provide maximum horizontal and vertical capability.

- 4 x SPE180 horizontal thrusters in a vectored configuration producing very high all round thrust utilising Sub-Atlantic's 'Dynamic Vectoring' system.
- 2 x SPE180 vertical thrusters vectored outward to clear the vehicle lower deck leaving it free of cut-outs in way of tools and skids.

Sub-Atlantic's SPE-180 high-reliability brushless DC thruster develops 45 kgf (100 lbf) of static thrust in both directions.

Statorshield™ Technology Equates to Reliability

Subsea thrusters are prone to water entering through the shaft seals and causing short circuit failure of the stator windings . Statorshield™ technology eliminates this



problem by the introduction of an internal sealed diaphragm located between the rotor and stator, creating two separate isolated and sealed volumes (Rotor cavity and Stator cavity). Water cannot reach the stator and electronics through the shaft seal preventing a catastrophic failure due to shaft seal leakage. Operation can continue until the machine is recovered when the rotor cavity can be flushed, seals replaced and refilled with oil.

Dynamic Vectoring™

- This allows the thruster vector angle to be adjusted remotely to the optimum thrust setup to suit changing current direction.
- Vector angle is actuated using a 2nd camera tilt unit and is displayed on the video overlay.

Lighting

- 4 x 250-Watt halogen lamps, dimmer controlled on 2 circuits

Camera Facilities

- Tilting bracket for mounting two cameras (SIT size) and lamp.
- Tilt position angle on video overlay.

Electronic Pod and Telemetry

- Fibre-Optic telemetry system providing 3/6 x video, 4 x RS232 & 2 x RS485 and optional Ethernet
- Vehicle Communication utilises 1 x RS485 channel. Uplink/Downlink includes 8 analogue channels and 16 digital switch channels all with 12 bit resolution.
- All electronics are located in a single aluminium alloy housing rated to 2000 msw / 6560 fsw.
- Housing end cap incorporates all the electrical connectors for the various ROV components and optional sensors.
- Vacuum and water ingress alarms.

Frame

- High impact resistance & buoyant polypropylene.
- Optional bullet for live boating.

Buoyancy

- Three easily lifted modules with closed cell micro-spheres rated to 2000 msw (6560 fsw).

Transformer/Junction Box

- The 3000 Volt transformer box serves as the junction box for the tether and the power outlet

Vehicle Power Outlet

- The transformer box provides a 320 Vdc power outlet to drive external equipment up to 7.5 kW (10 hp).
- Optional drive block can be supplied to drive AC motors.

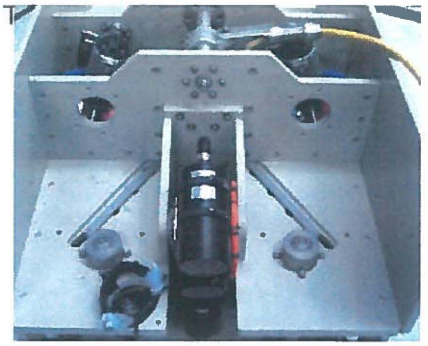
Surface Equipment

SCU (Surface Control Unit)

- 2 x 15" Colour monitors
- Light dimmers
- Automatic depth & heading control (altitude optional)
- Tether/Umbilical turns counter
- Video overlay system
- Earth leakage protection system

HCU (Hand Control Unit)

- 2 x control joysticks
- Light dimmer controls
- Camera and Tilt controls
- Digital switches
- Dynamic Vectoring control
- Auto-function control
- Joystick trims
- Thruster power trims and isolations
- TMS tether pay in/out



Mohican features Dynamic Vectoring™ that allows remote adjustment of the standard 45 degree thruster vector angle between 25 and 65 degrees. (see mechanism in image above, image also shows Live boating umbilical termination)

- 400 Hz, Power Inverter and filtering
- 3000 Volt transformer
- Line insulation current monitor
- Main lift cable entry gland

Tether

The Mohican uses a 16.5 mm / 0.65 in. diameter tether. A neutral tether is also available.

Main Lift Umbilical

Sub-Atlantic ROVs use a common 25.5 mm / 1.0 in. diameter umbilical suitable for all our open frame vehicles, simplifying spares and interchangeability between systems.

Sensors & Equipment

The Mohican ROV system will support a range of sensors and equipment, typically:-

- Cameras, Sonar's, Oceanographic Sensors,
- Small hydraulic and electric manipulators
- Tool skids, torque tools, FMD tools, cleaning and jetting tools, inspection equipment.
- Various sizes and configurations available

Mohican can be fitted with a range of standard and custom tooling packages and underslung skids to serve customer requirements. These include manipulators, torque tools and survey.

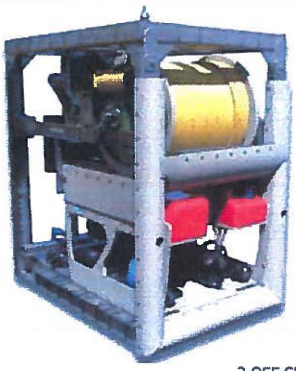
sub-Atlantic

www.sub-atlantic.com

Tether Management System

Sub-Atlantic's cage type TMS is reknown in the industry for ruggedness,, reliability and simplicity.

- Size 1 suitable for Mohican
- 350 metres capacity of 16.5 mm diameter tether
- Stainless steel telescopic frame allowing underslung tool skids on ROV
- Fully electric, single drive motor
- Refer to TMS data sheet.

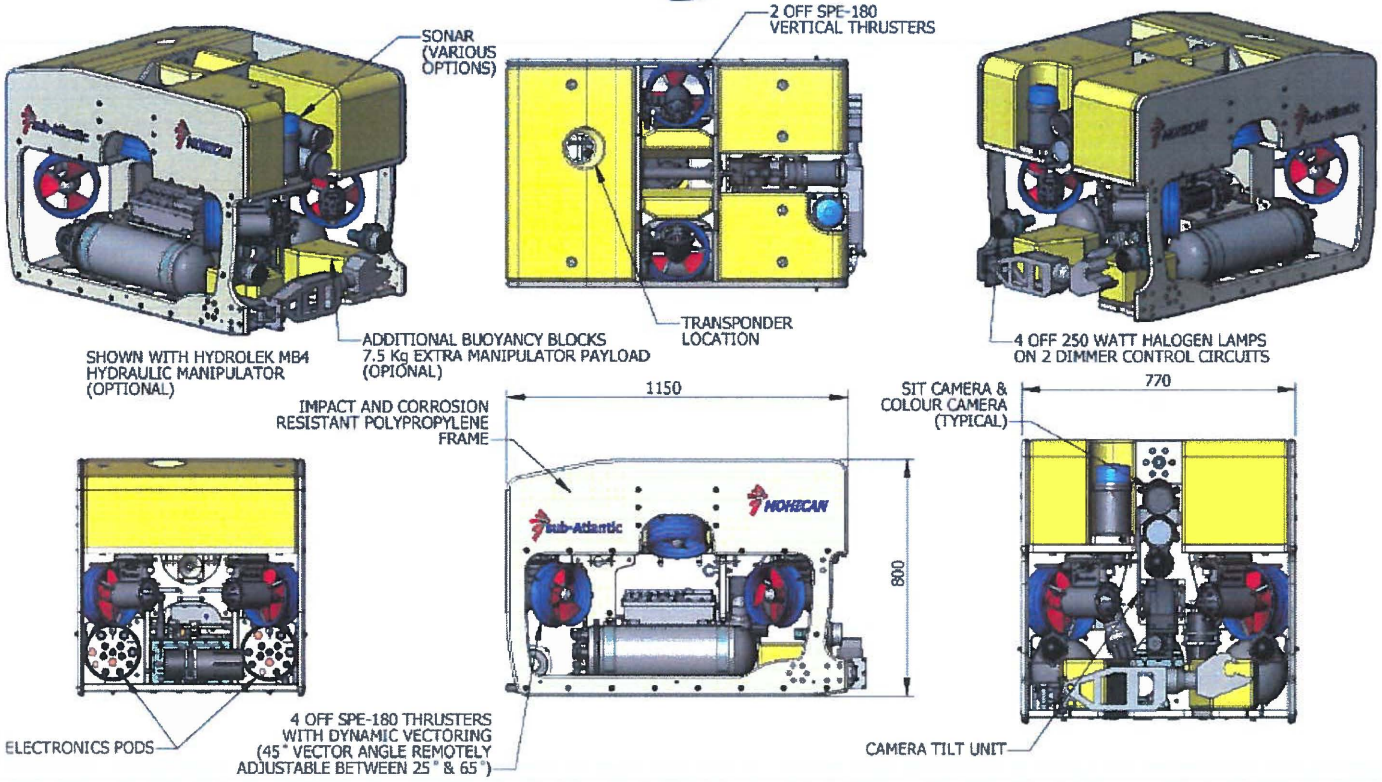


Launch & Recovery Systems

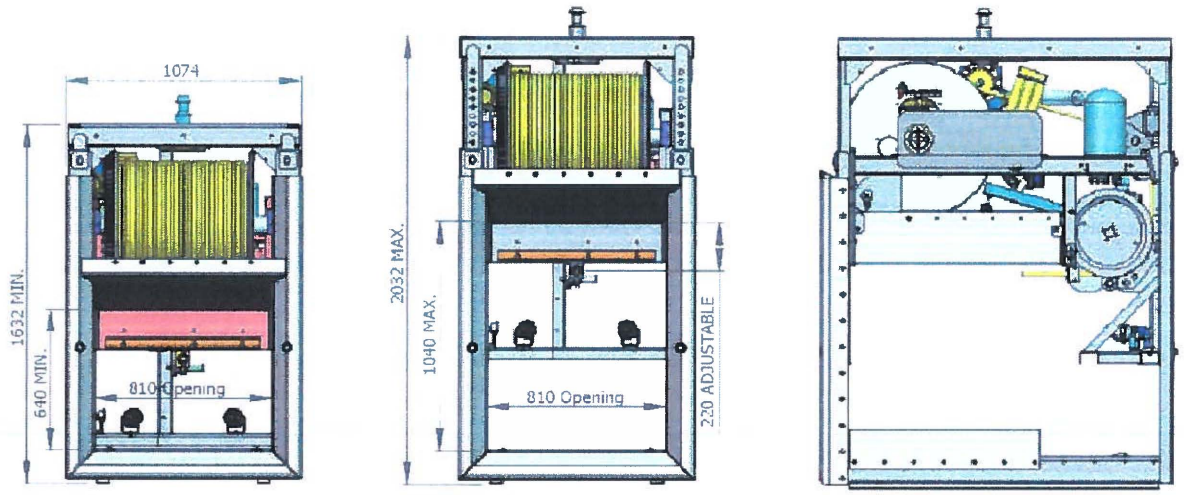
Launch and recovery systems can be supplied to different depth requirements and formats such as A-frame or jib crane.

Control Cabins

- Various sizes and configurations available
- A60 and Zoned specifications
- Workshop options



Mohican ROV Dimensions



Size 1 TMS Dimensions

The specification details are illustrative for marketing purposes only. Actual equipment may be different as a result of product improvement or other reasons. Specific interface and performance information should be reconfirmed at time of order placement.

sub-Atlantic

Sub-Atlantic Ltd. Woodburn Road, Blackburn Business Park, Blackburn, Aberdeen. AB21 0PS. UK
T: +44 1224 798660 **F:** +44 1224 798661 **E:** sales@sub-atlantic.co.uk

Sub-Atlantic Inc. 10642 West Little York, Suite 100, Houston, TX 77041-4014-USA
T: +1 713 329 8730 **F:** +1 713 329 8299 **E:** sales@sub-atlantic.com