

Operators Manual COBRA Mark 2

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Obsolescence

JFD undertakes to guard against obsolescence by maintaining spares supply for a minimum of 5 years from purchase date of COBRA.

Packaging

The COBRA Backpack and Helmet are supplied with bespoke cases to prevent damage during transit.

Delivery packaging may be stowed following delivery as it is not required for end user transportation of COBRA.

European Declaration of Conformity

E DOC European Declaration of Conformity can be found within Related Documents at:

<https://www.jfdglobal.com/products/commercial-divers-equipment/rebreathers/cobra-compact-bailout-rebreathing-apparatus/>



Warnings and Cautions

Warnings, Cautions and Notes where used within this manual are placed prior to the text to which they are pertinent. Their uses are as follows;



DANGER

INFORMS THE READER OF AN OPERATION OR STATE WHICH INVOLVES RISK TO LIFE.



WARNING

INFORMS THE READER OF AN OPERATION OR STATE WITH POTENTIAL FOR PERSONNEL INJURY.



CAUTION

Warns the reader of an operation or state with potential for damage to equipment.

Note *Informs the user of additional information for clarification or to assist with an operation.*

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1 Scope

This document describes the operation and user maintenance for the COBRA emergency breathing system.

Table 1 details the top-level assemblies covered by this document.

Table 1 COBRA Top-level Assemblies

Part No.	Description
DB5002044	Backpack, COBRA Mk 2, 3 Litre Steel Cylinders
DB5002045	Backpack, COBRA Mk 2, 2 Litre Stainless Steel lined Composite Cylinders
DB5002046	Backpack, COBRA Mk2, Standard Build
DB500HD	Helmet, COBRA Mk2
DB500HY	Helmet, COBRA Mk 2, Greco Comms

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Note Model DB5002043, COBRA Mk2 Backpack with Aluminium Lined Composite Cylinders will no longer be supplied.

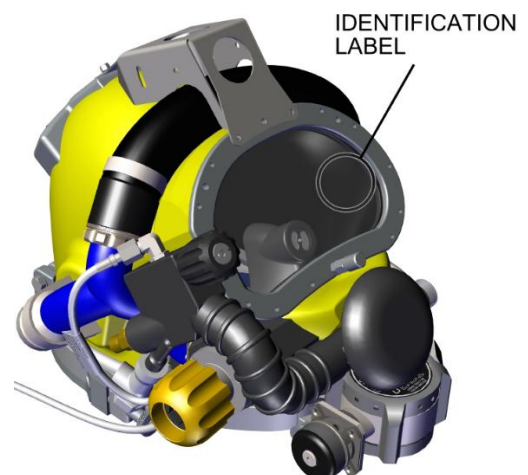
1.1 Identification of Top-level Assemblies

1.1.1 Each top-level assembly is identified by a label, locations of identifying labels are shown in Figure 1 and 2.

Figure 1 Backpack Identification Label



Figure 2 Standalone Helmet Identification Label



1.2 Accessories

1.2.1 BCJ, COBRA

- 1.2.1.1 A Buoyancy Control Jacket for use with COBRA is available for mid-water operations. See Operating and Maintenance Manual DB500-OM-6751 for more information.

Part No.	Description
DB5002070	BCJ, COBRA

1.2.2 Anode Kit

- 1.2.2.1 A retrofit anode kit is available for COBRA comprising; a US Mil Spec 18001K zinc anode, connecting cable, terminal bracket and associated fittings. The anode kit is designed to protect aluminium, steel and stainless steel cylinder lined composite cylinders from corrosion.

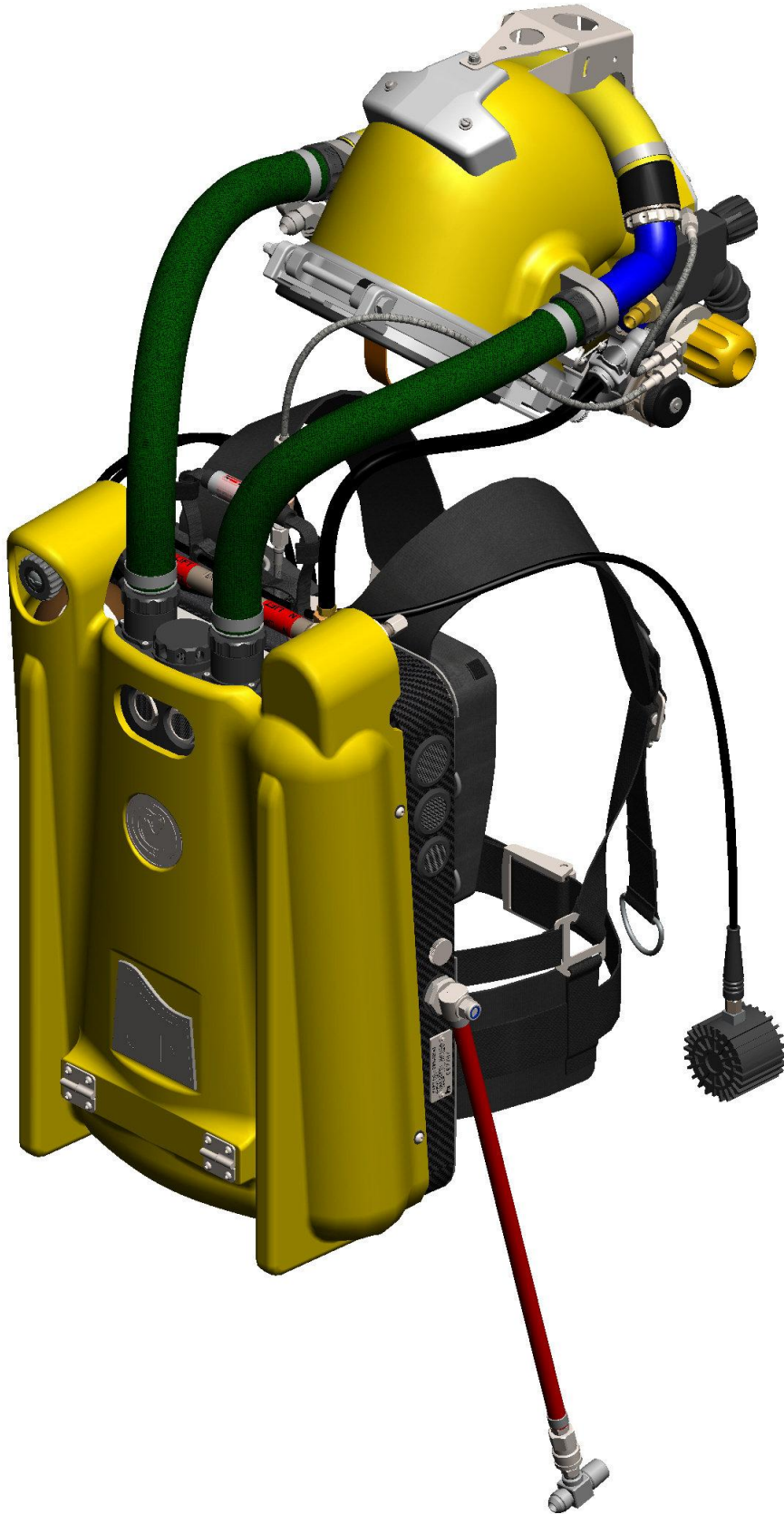
Part No.	Description
DB5002958	Anode Kit

1.2.3 Stainless Steel Cylinder Conversion Kit

- 1.2.3.1 Two stainless steel lined cylinder conversion kits are available to fit the Mk 2 COBRA, one with a back cover and one without. Due to the increased size of lined composite cylinders a larger cover is required. Eventually all new sets will be fitted with the larger cover to facilitate conversion to stainless steel lined cylinders. The larger cover is identified with a vertical black line on the inside of the cover.

Part No.	Description
DB50090006	SS Cylinder Conversion Kit, COBRA Mk 2
DB50090008	SS Cylinder Conversion Kit, COBRA Mk 2, No Cover

2 System Overview



2.1 Purpose of Equipment

- 2.1.1 COBRA is an emergency breathing system designed for use by professional saturation divers operating from a diving bell. It will provide warm breathing gas to a conscious diver in the event of a failure of the diver's primary life support system. COBRA consists of an adapted 17C reclaim helmet, backpack and harness system that allows normal diving operations to be undertaken without any additional burden to the diver. The COBRA equipment is suitable for use in all conditions normally experienced by a commercial saturation diver. COBRA Mk 2 incorporates feedback from users. It features lockable quick connects and an improved back cover.
- 2.1.2 The system is fundamentally a semi-closed rebreather and provides complete independence from the diver's primary system but can be activated and deactivated as required by a single turn handle mounted on the helmet. It meets breathing performance requirements as defined in NORSOK U101 'Diving Respiratory Equipment' and significantly exceeds the current industry standard U100 which requires a minimum 10 minutes of breathing gas at 62.5 l/min in order to return to the safety of the diving bell.

2.1.3 Risk Designed To Protect Against

- 2.1.3.1 The risk against which the PPE is intended to protect is that of a conscious saturation diver having zero, insufficient or unbreathable gas supplied to him via his main umbilical for any reason at depths down to 300 msw.

2.1.4 European Standards

- 2.1.4.1 This COBRA rebreather is CE marked and is classed as Personal Protective Equipment (PPE) by the European Regulation 2016/425 as a "CATEGORY III DEVICE".
- 2.1.5 Equipment referenced to Harmonised standard BS EN 14143:2013 & Standard Norsok U101:2013.

DANGER

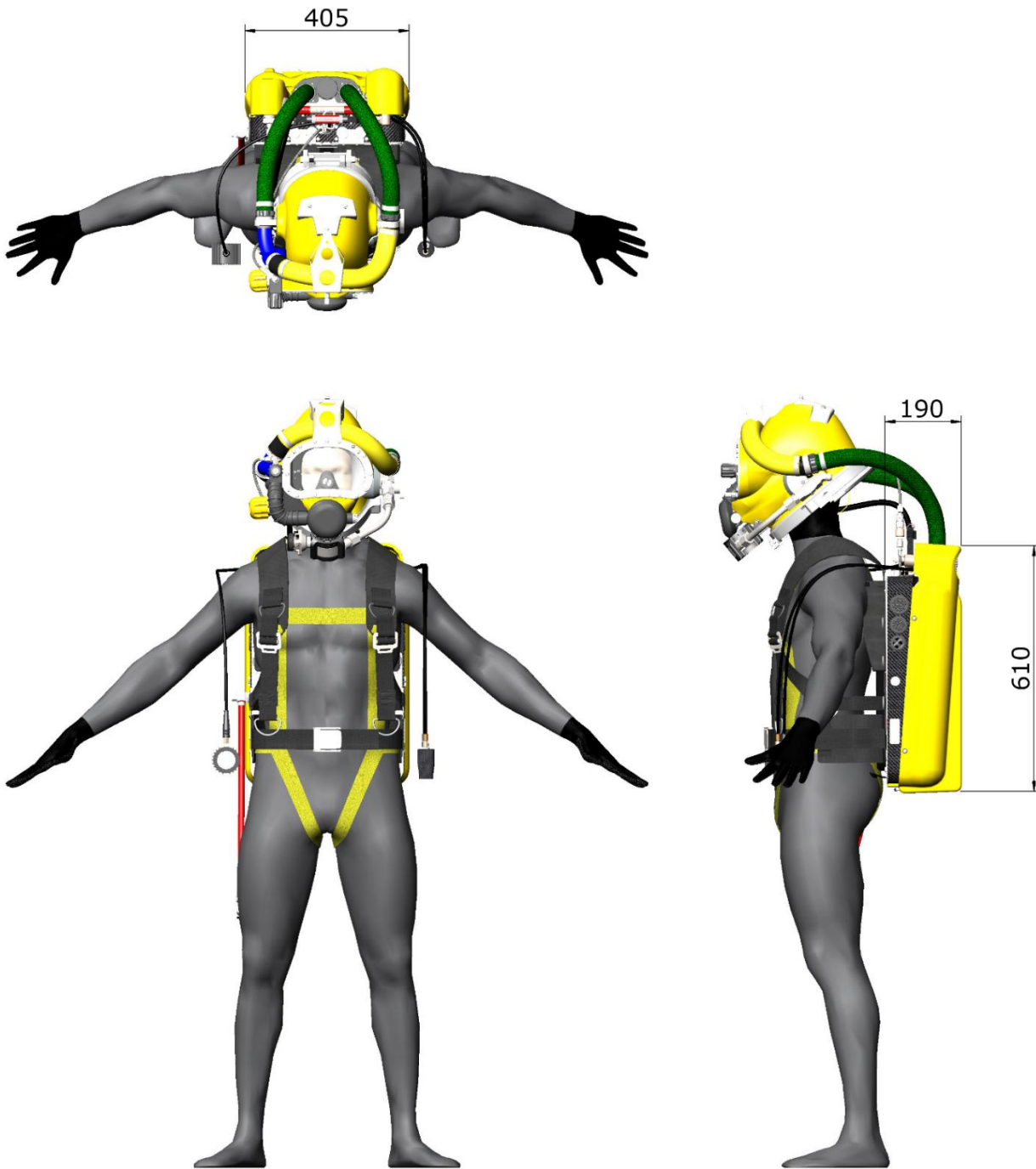
THE COBRA EQUIPMENT, BACKPACK AND HELMET ARE INTENDED FOR USE TOGETHER. THEY MUST NOT BE USED WITH ANY OTHER BAILOUT SYSTEMS.

2.2 Operational Parameters

Maximum Operating Depth	300 msw
Breathing Gas Mixture	Oxygen or Heliox (dependant on depth)
Operating Temperature	+2°C to +34°C (seawater) +2°C to +34°C (freshwater)
Storage Temperature	-30°C to +70°C (fully dried)

2.3 Backpack Dimensions

Figure 3 Dimensions



2.4 General Technical Overview

2.4.1 Semi-closed Rebreather

2.4.2 COBRA is a semi-closed rebreather designed to perform under the arduous conditions experienced in saturation diving where levels of pressure, gas mixture and extreme environmental conditions require a very robust and reliable life support solution. The underlying system however is based on well-established rebreather fundamentals to provide a system with numerous benefits over open circuit SCUBA type emergency systems with breathing duration being the key benefit.

2.4.3 In its simplest form COBRA functions as a semi-closed rebreather, the basic building blocks are:-

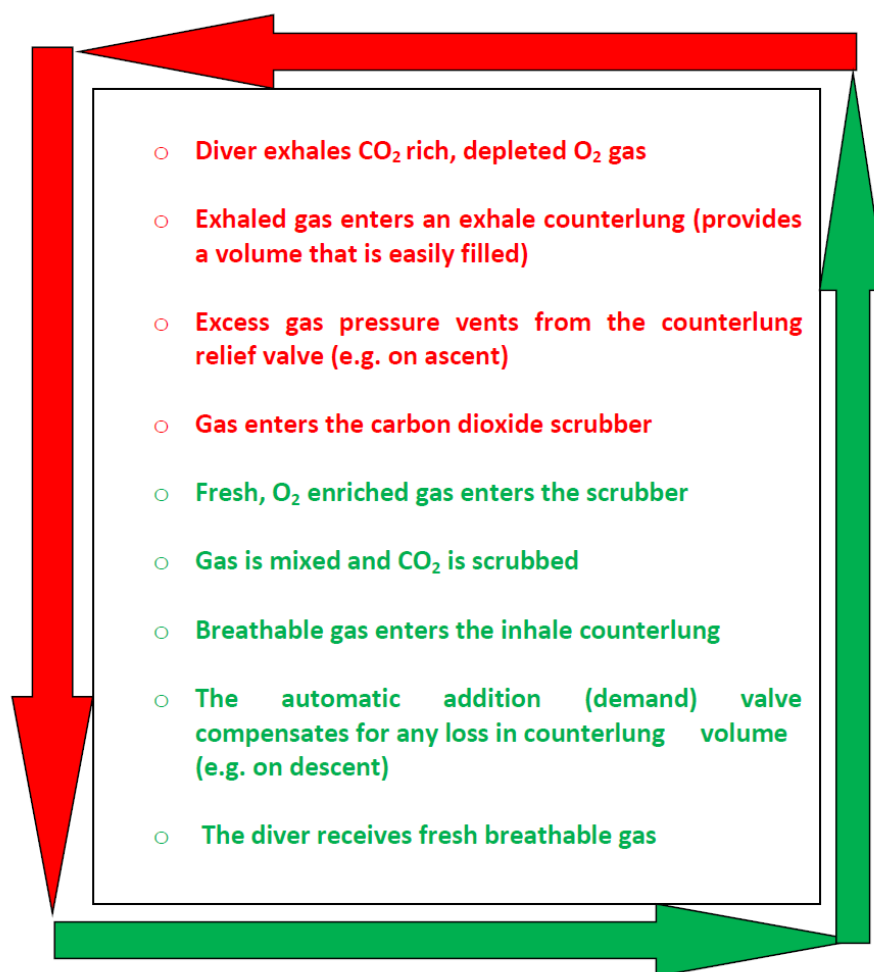
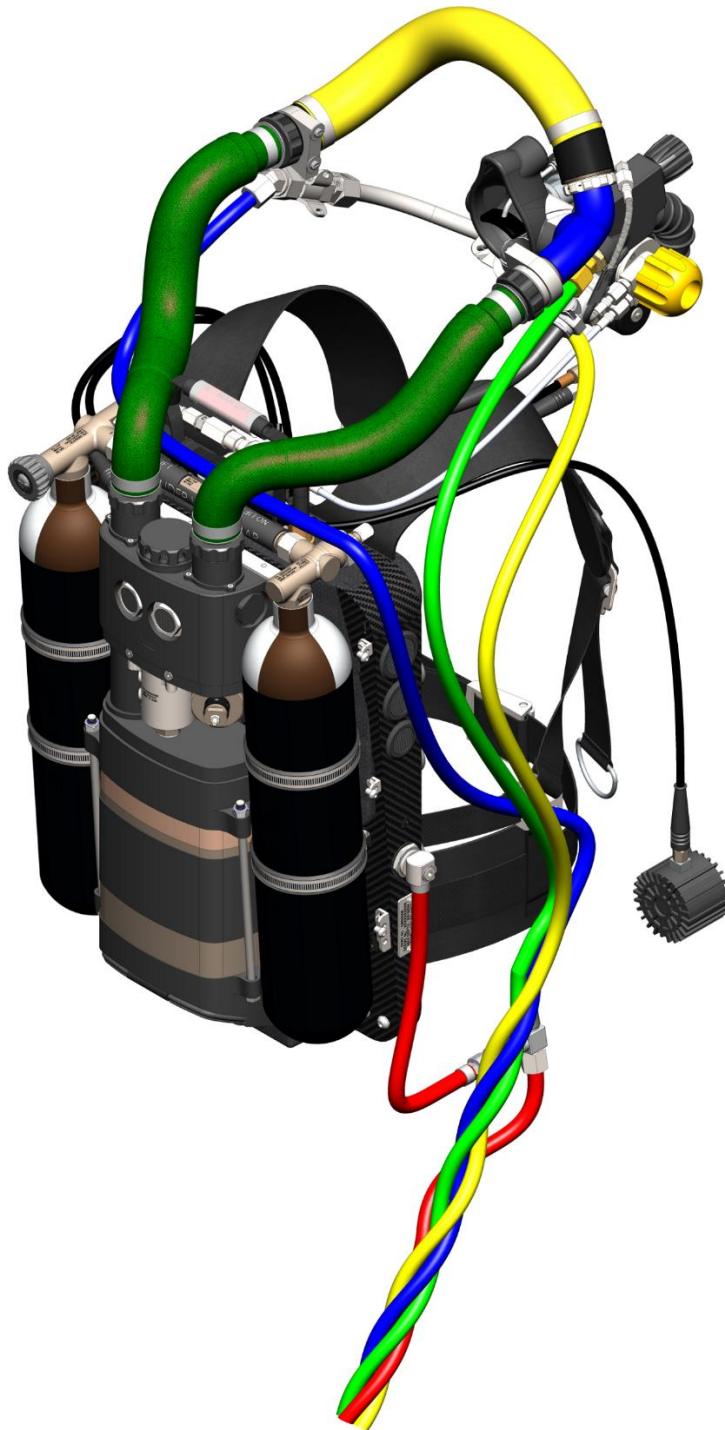


Figure 4 System Overview



2.4.4 Additional Features

2.4.5 To meet the needs of saturation diving the system has been developed with further key features to ensure a high performance, safe, reliable life support system:-

- Simple, single turn helmet actuation for COBRA activation and deactivation.
- System can be activated for testing purposes then deactivated to return to primary gas.
- Offline system positive pressure to maintain breathing loop integrity unaffected by rapid diver descent.
- Positive pressure indicator to provide assurance of breathing loop integrity.
- Counterlungs fully inflated but encapsulated into backpack chassis for complete protection but in a 'ready to breathe' status.
- Pre-heated carbon dioxide scrubber system to provide optimum scrubbing duration at all times.
- Rapid re-charge capability of scrubber absorbent and gas supply.
- Automatic activation of semi-closed injection upon umbilical pressure drop (still requires diver mouthpiece deployment).
- Compact back mounted design keeping the diver's chest area clear when passive and on activation.
- A chassis mounted lifting handle is provided for ease of handling.

WARNING

THE LIFTING HANDLE MUST NOT BE USED AS A DIVER RECOVERY POINT. IT MAY NOT SUPPORT THE WEIGHT OF DIVER AND APPAREL.

2.5 System Performance

2.5.1 When charged with the correct gas for the current working range (as specified in section 6.1) and new softlime, the COBRA system will provide breathable gas for the duration specified in section 6.2 at breathing rates up to 75 RMV. As the COBRA set is a semi-closed circuit rebreather with constant mass flow addition (at the current depth), the ppO_2 in the breathing gas will vary with the diver's workrate. The ppO_2 range provided by COBRA is wider than would normally be expected from a primary gas supply in order to maximise the duration of the emergency gas supply. The ppO_2 received by the diver will range from 0.16 bar to 2 bar within the stated duration.

2.6 Expected ppO₂ at Various Depths and Workrates

Figure 5 ppO₂ Received by Diver Over Time at 100 m Using 13.9% Heliox

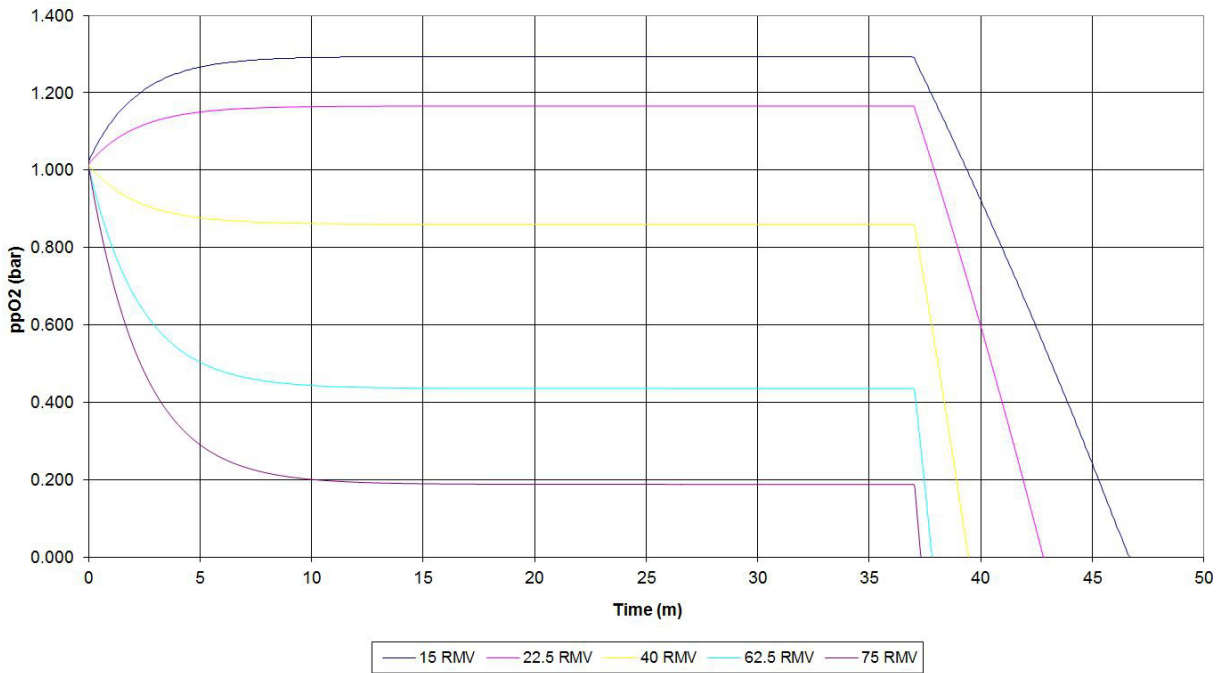


Figure 6 ppO₂ Received by Diver Over Time at 100 m Using 18.3% Heliox

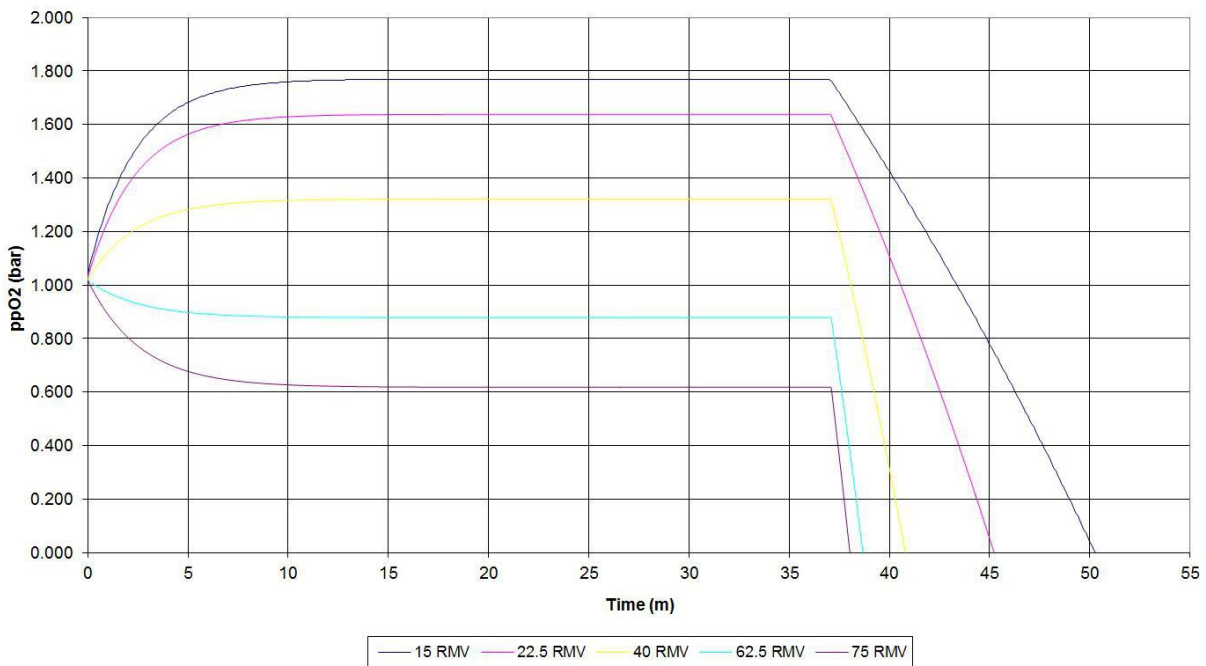


Figure 7 ppO₂ Received by Diver Over Time at 200 m Using 9.5% Heliox

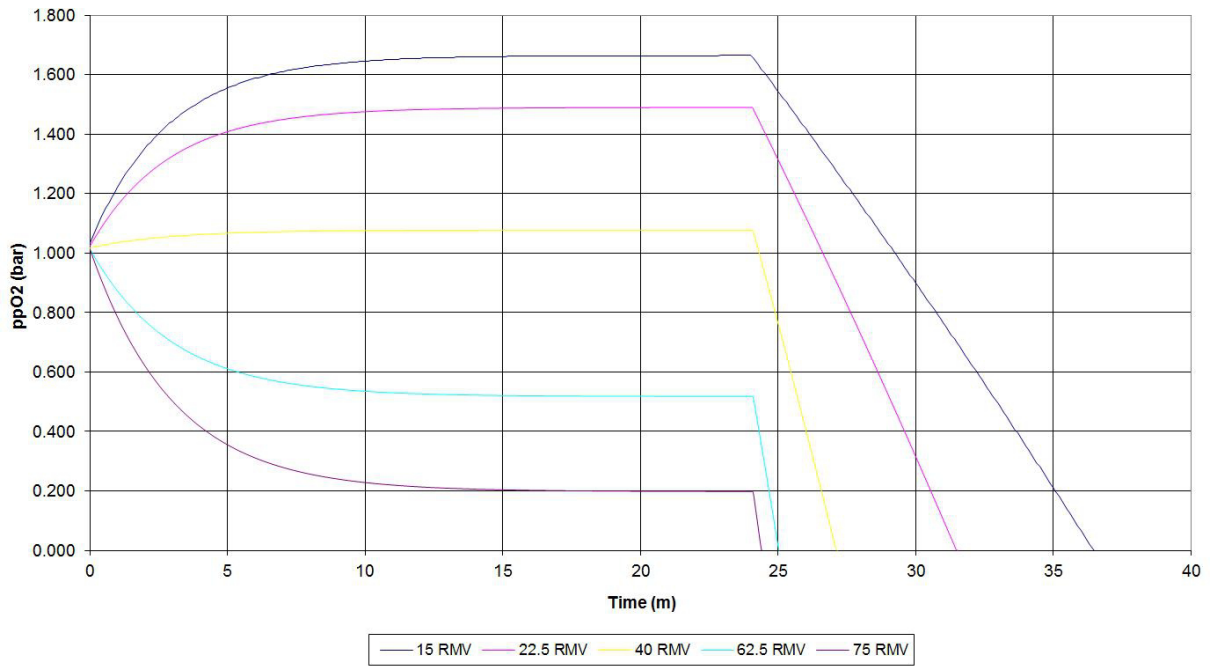


Figure 8 ppO₂ Received by Diver Over Time at 200 m Using 11% Heliox

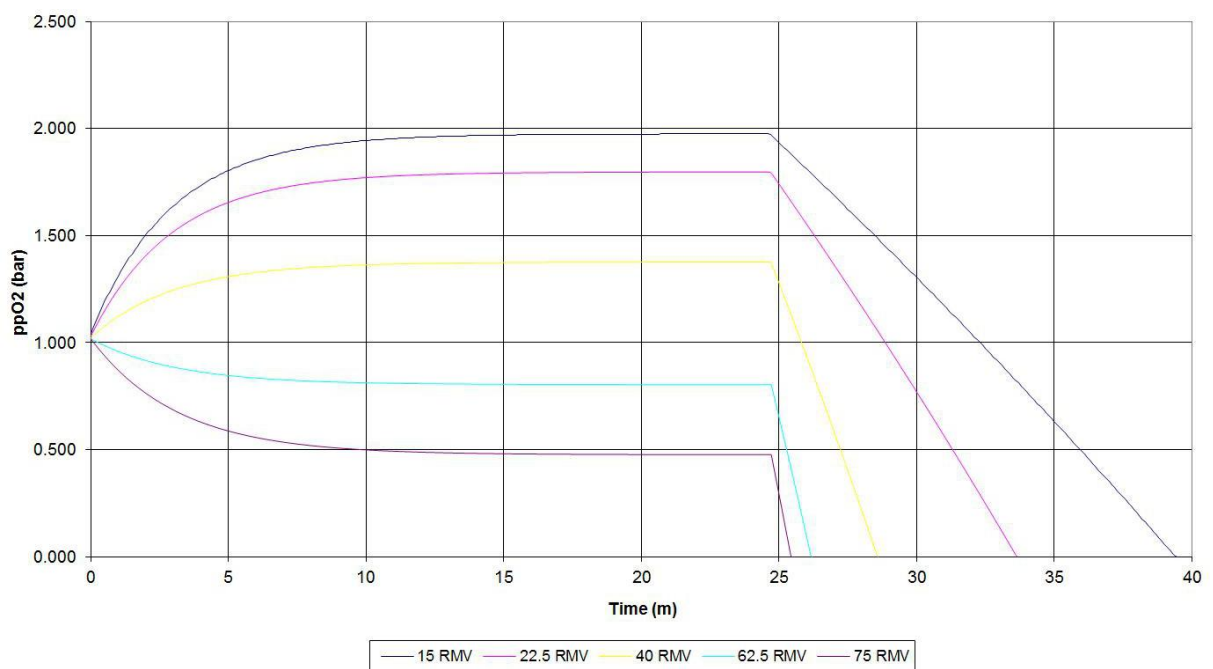


Figure 9 ppO₂ Received by Diver Over Time at 300 m Using 6.9% Heliox

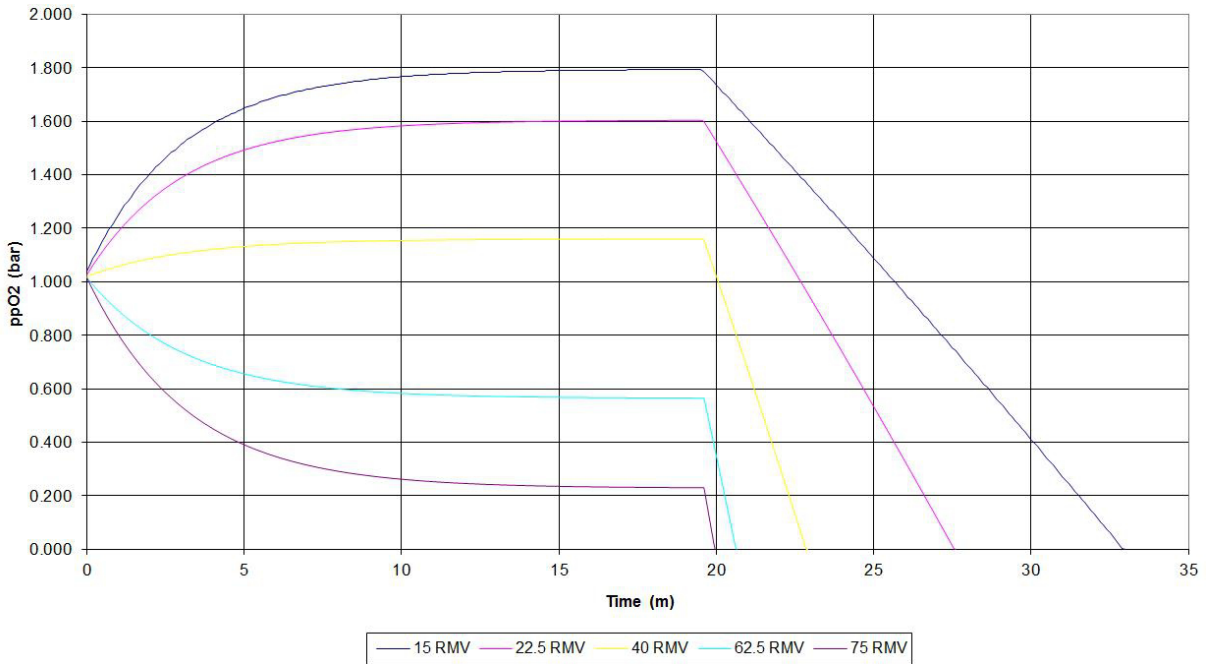
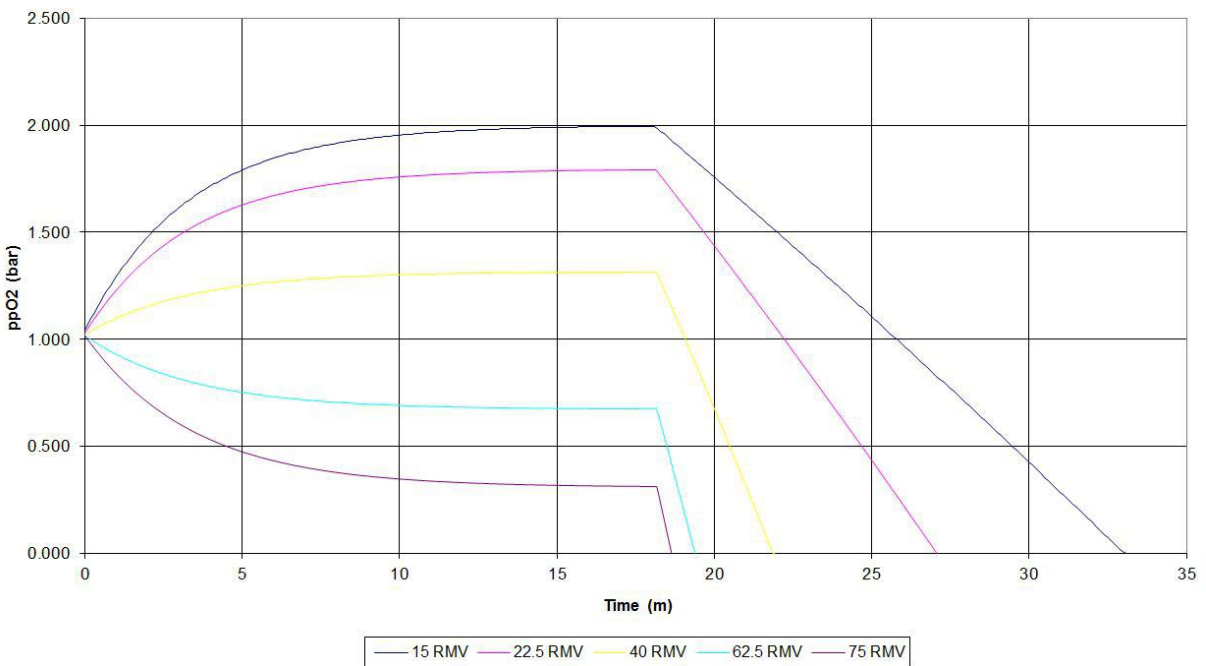


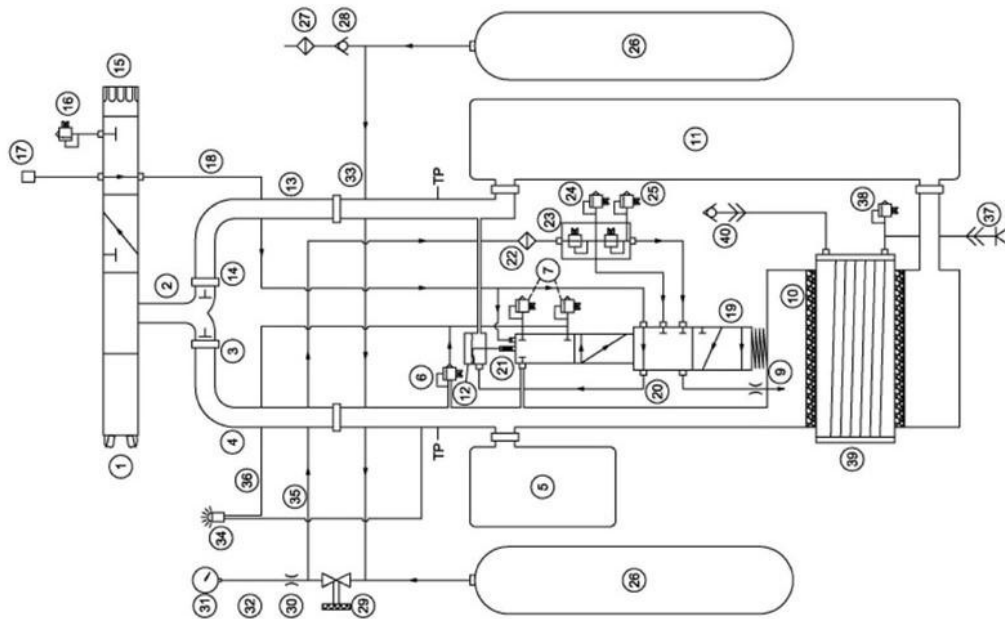
Figure 10 ppO₂ Received by Diver Over Time at 300 m Using 7.7% Heliox



3 COBRA Step by Step Operation

A basic step by step explanation of system operation follows and refers to Figure 11 and the adjacent legend.

Figure 11 System Schematic

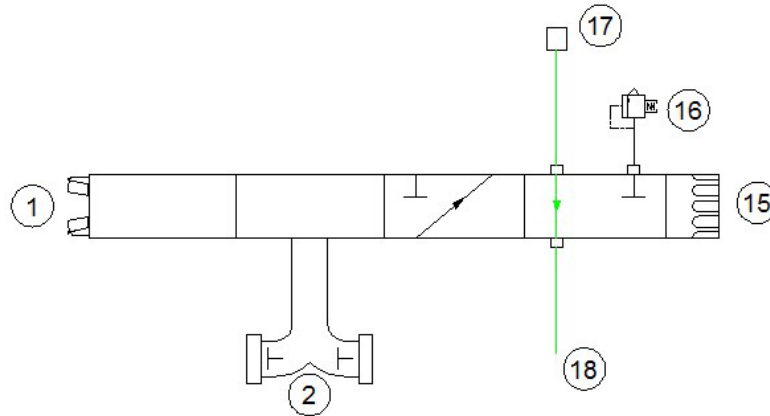


- | | |
|--|--|
| <ul style="list-style-type: none"> FILTER TRACKING PRESSURE REGULATOR RELIEF VALVE HAND CONTROL SHUT OFF/CONTROL VALVE DIRECTION OF FLOW QUICK CONNECT | <ul style="list-style-type: none"> MUSHROOM NON-RETURN VALVE NON-RETURN VALVE PRESSURE INDICATOR PT PRESSURE TRANSDUCER CONNECTION TP TEST POINT |
|--|--|
-
- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Bite Mouthpiece 2 Helmet Y-Piece 3 Exhale Mushroom Valve 4 Exhale Breathing Hose 5 Exhale Counterlung 6 Internal Relief Valve 7 External Relief Valves (2) 8 Not used 9 Leeljet Injection Port 10 CO2 Scrubber 11 Inhale Counterlung 12 Automatic Addition Valve 13 Inhale Breathing Hose 14 Inhale Mushroom Valve 15 Actuation Handle 16 Actuation Relief 17 Hose - Sideblock to Actuation 18 Hose - Actuation to Backpack 19 Piston Assembly 20 Hose - Piston to AAV | <ul style="list-style-type: none"> 21 AAV Biasing Spring 22 Filter - 2 Stage Regulator 23 2-Stage Regulator 24 1st Stage Relief Valve 25 2nd Stage Relief Valve 26 Cylinder (2) 27 Filter - HP Charge 28 One way charging valve 29 HP Shut-off Valve 30 HP Snubber 31 HP Gauge 32 Hose - HP Gauge 33 HP Manifold Bar 34 Rotowink 35 Hose - Rotowink Loop Line 36 Hose - Rotowink Reference Line 37 Hose - Hot Water Inlet 38 Hot water Relief Valve 39 Hot water Spiral Jacket 40 Hose - Hot Water Outlet |
|---|---|

3.1 Ambient Pressure Circuit – Activation

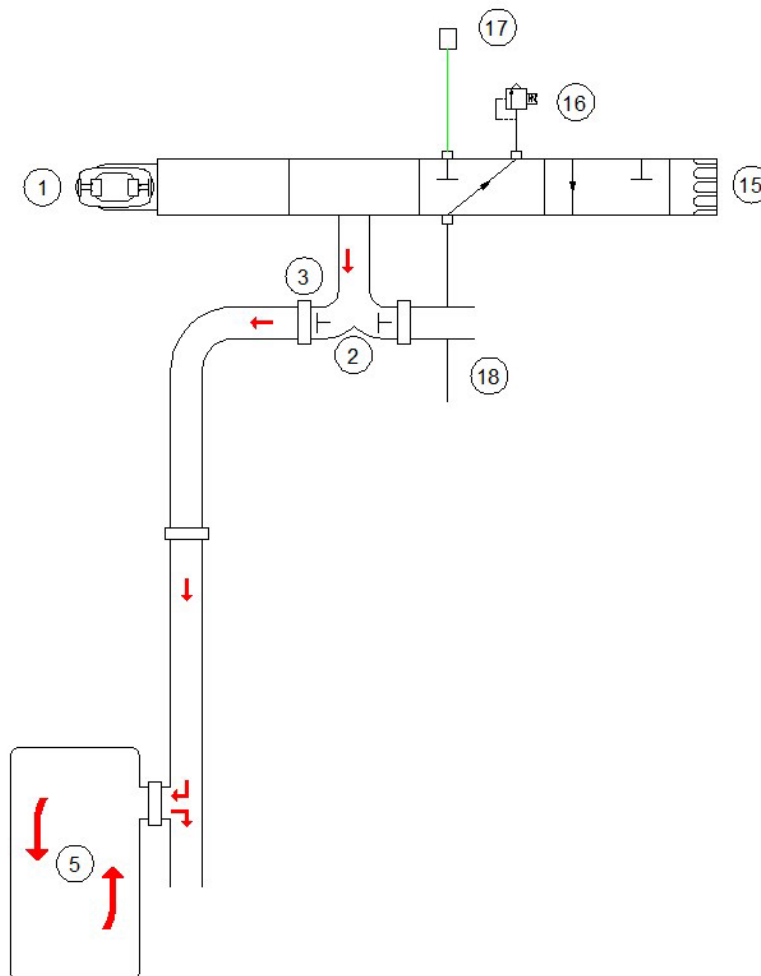
3.1.1 In offline mode (Figure 12) the COBRA mouthpiece (1) is stowed in the helmet away from the divers' gas path, clear of the primary gas supply demand valve. In this mode the umbilical gas feeds from the helmet side block (17) to the COBRA actuation handle assembly (15) which in turn supplies this gas pressure to the COBRA backpack (18) holding it in standby mode. In this mode the divers' breathing path is isolated from the rebreather breathing loop circuit.

Figure 12 System Offline



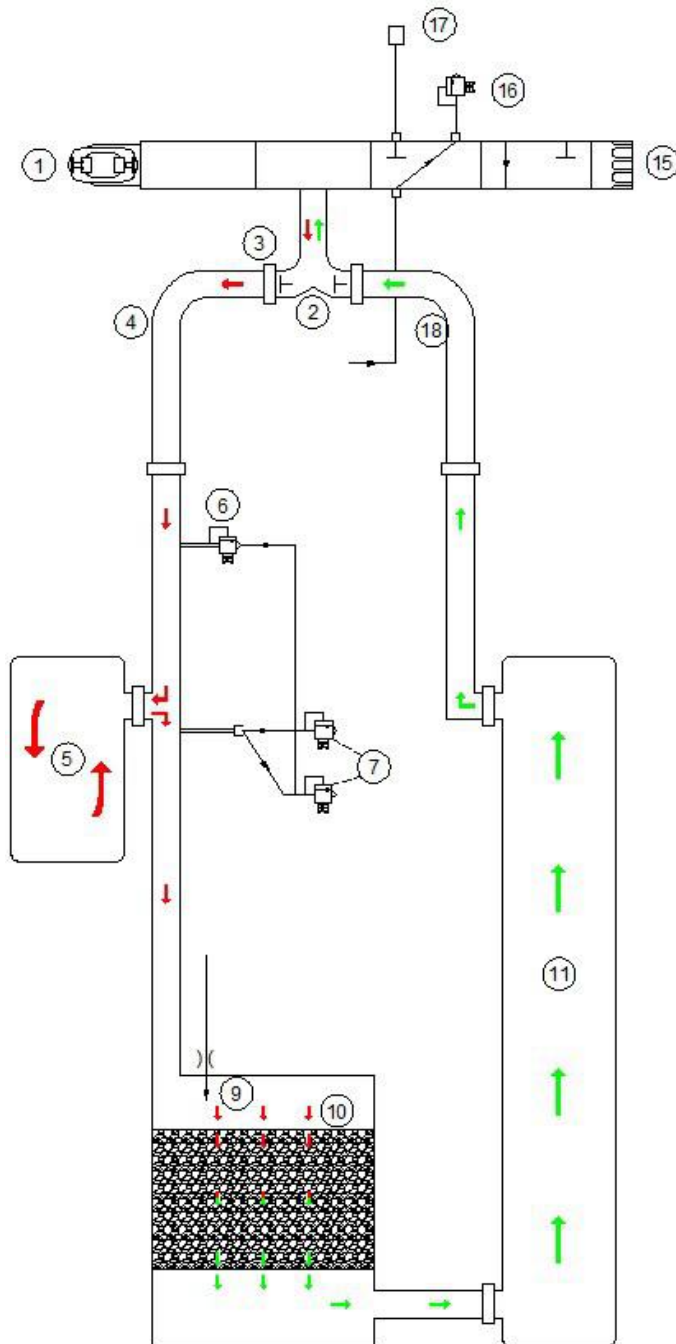
3.1.2 When the system is activated (Figure 13), the actuation handle (15) is turned on the helmet mouthpiece (1) is deployed, and the diver can bite on the mouthpiece to immediately access safe COBRA breathing gas. During activation, rotation of the handle (15) also isolates the side block umbilical gas pressure (17) from the feed to the backpack (18) and in turn vents the line to the backpack via the actuation relief (16) which brings the backpack online. The divers exhaled gas which contains carbon dioxide and depleted oxygen enters the COBRA breathing loop via the one-way valve (3) mounted in the helmet Y-piece (2). The gas then travels from the exhale breathing hose to the backpack and at this point some gas will travel to the exhale counterlung (5).

Figure 13 System Activated



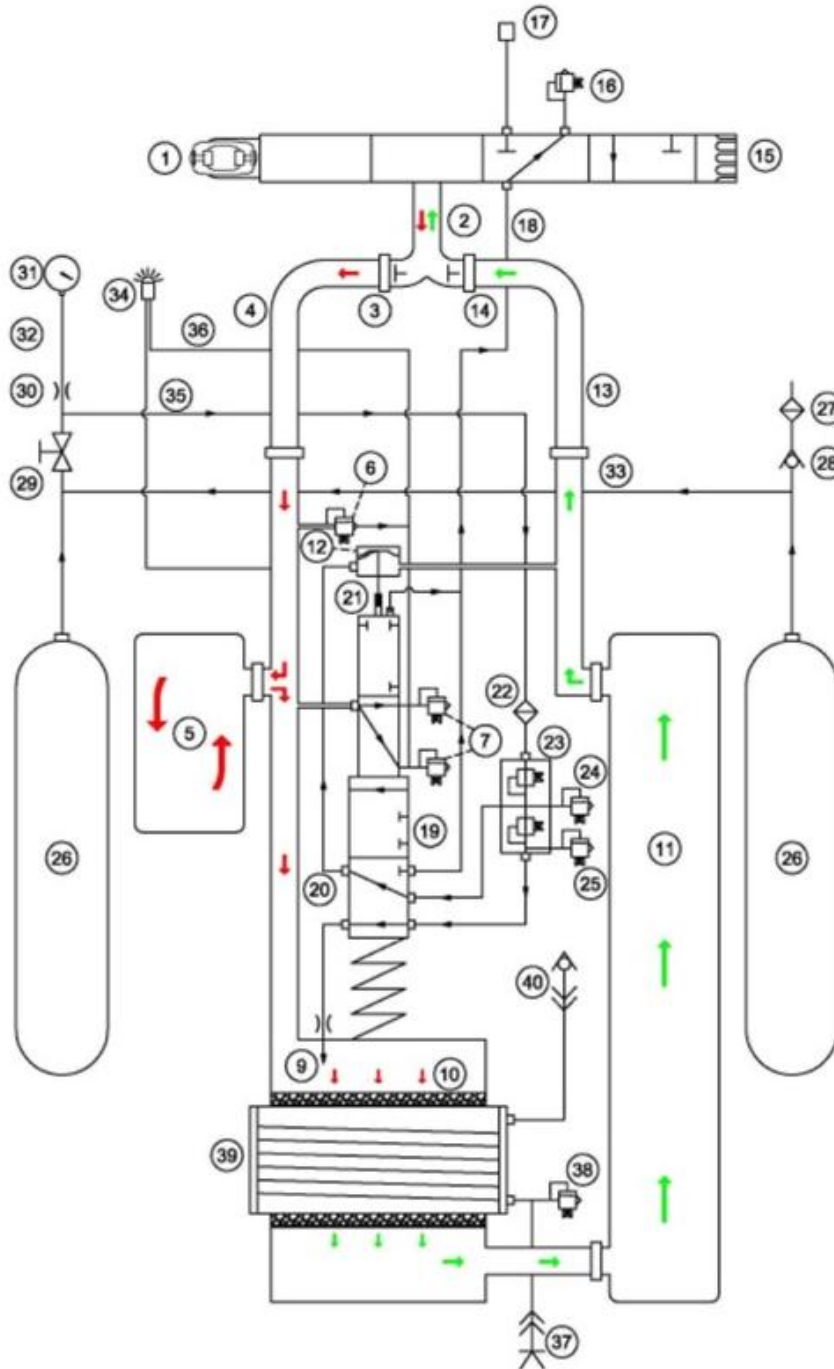
3.1.4 The gas then travels down through the scrubber absorbent (10) removing all CO₂ and exiting at the scrubber base. At this point the gas now has a safe oxygen level from the semi-closed injection and no CO₂ from the scrubber reaction hence is safe to breathe. The gas then travels up the inhale counterlung (11), back to the diver via the inhale breathing hose (18) and one-way mushroom valve located on the inlet of the helmet y-piece (2). Any loss in volume of the breathing loop (e.g. descent) is automatically compensated by the automatic addition valve which provides additional onboard gas top-up (Figure 15).

Figure 15 Returning to diver on inhale



3.1.5 Onboard gas is supplied to the breathing loop by the HP supply system (Figure 16), it comprises two high pressure cylinders which are connected via a common manifold, single shut-off valve and high-pressure gauge to indicate onboard capacity. The high pressure from this manifold supplies the 2-stage regulator, the first stage of this regulator supplies approximately 11 bar to the automatic addition valve and the second stage of the regulator which reduces the pressure further to 1.5 bar over ambient which is then supplied to the Lee Jet which supplies the correct flow into the breathing loop. Both stages of the 2-stage regulator are protected by relief valves that vent to the surrounding environment.

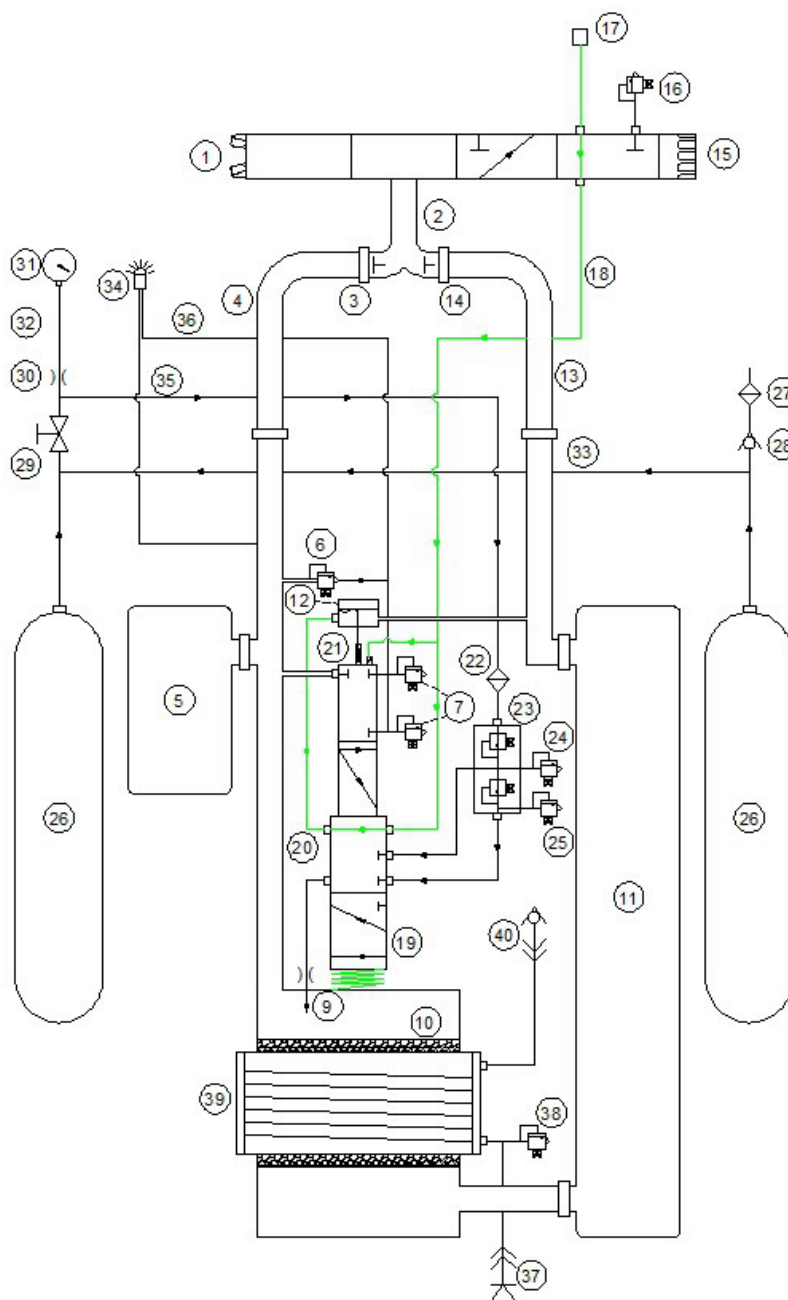
Figure 16 HP Supply System



3.2 Offline Mode

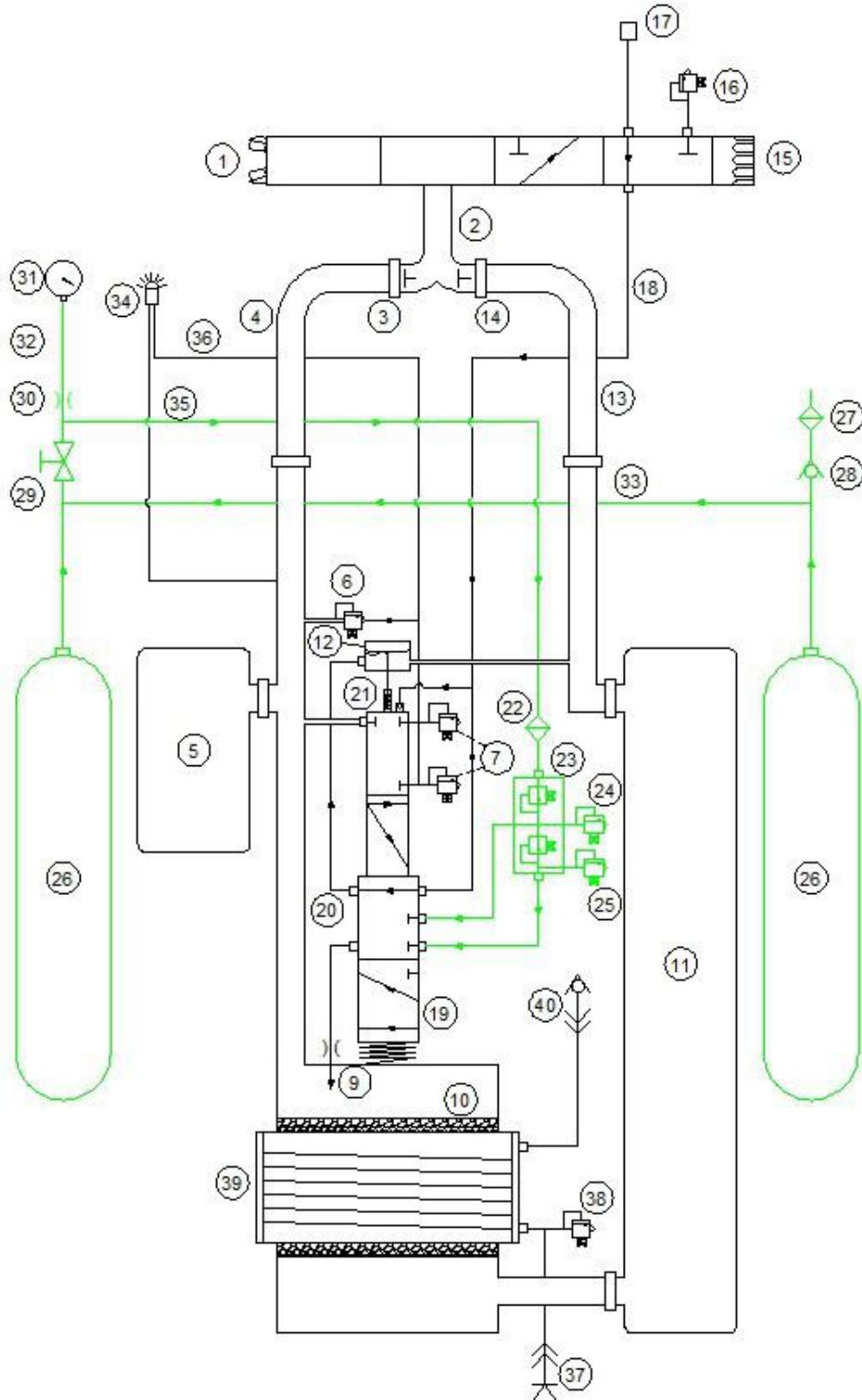
3.2.1 In offline (Figure 17) mode umbilical pressure that is supplied to the helmet side block (17) feeds into the COBRA actuation system and through to a hose connected to the backpack (18). The umbilical pressure is used to hold COBRA in offline mode by applying pressure to the backpack piston (19) holding it downwards which creates two active conditions of supplying umbilical gas to the automatic addition valve (12) and applying a biasing spring force (21) to the automatic addition valve such that a positive breathing loop pressure is maintained.

Figure 17 Full System Offline



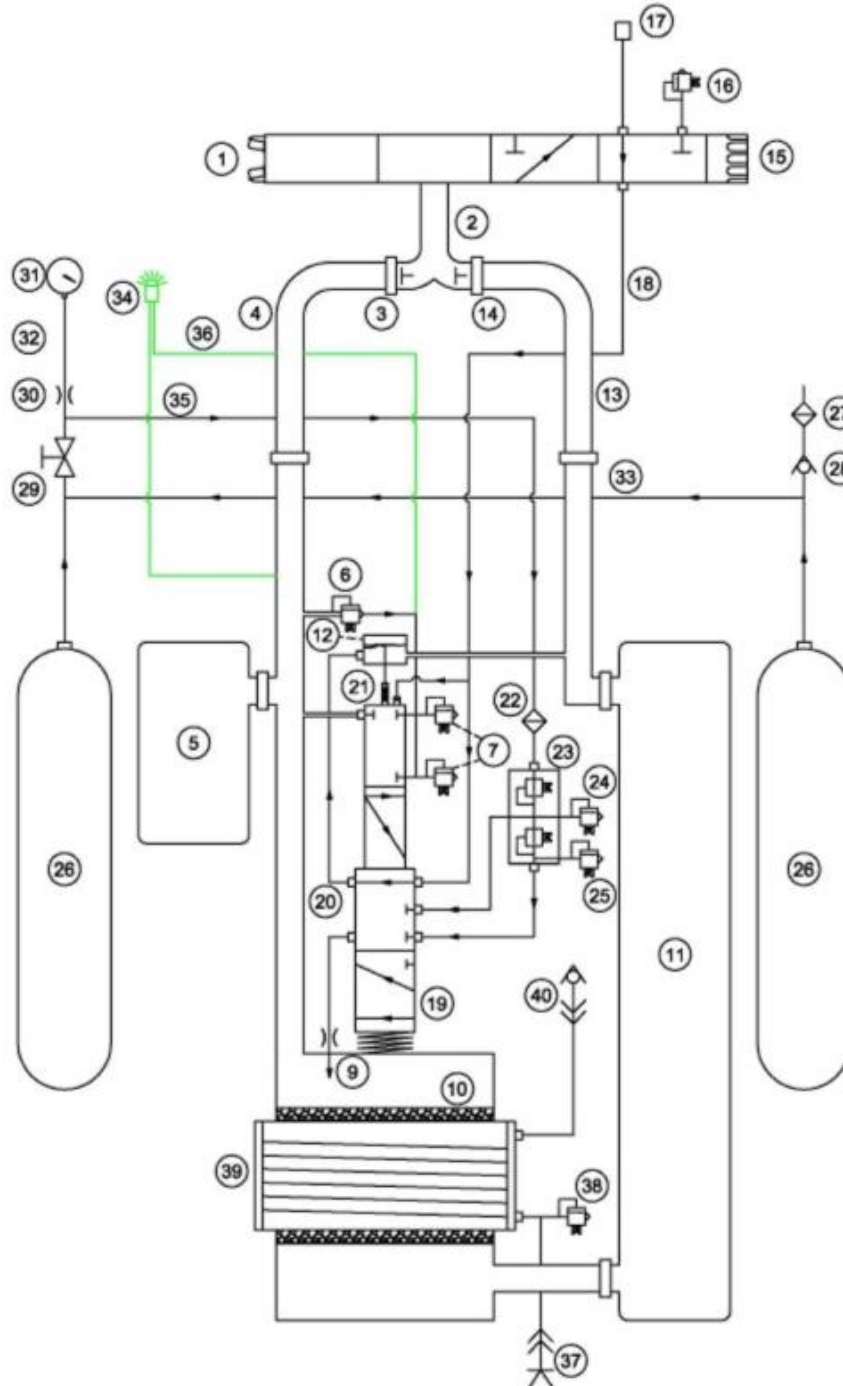
3.2.2 While in offline mode the piston (19) also functions as isolation for the 2-stage regulator (23) first and second stage supplies hence isolating the onboard gas supply (35) and the two external breathing loop relief valves (7) which otherwise would constantly vent due to the offline positive pressure level. Note, the breathing loop is always protected by the higher pressure set internal relief valve (6) which cannot be isolated and vents to the environment via the external relief valves (7).

Figure 18 Full System Offline - HP System



3.2.3 The Rotowink indicator (34) provides an indication of breathing loop pressure integrity by indicating green if positive pressure is present or red if it falls below a predetermined level. The Rotowink references the pressure difference between the ambient breathing loop pressure and the pressure at the reference point at the exit to the internal relief valve. This provides a dry reference area protected from the environment by the external dual reliefs.

Figure 19 Rotowink



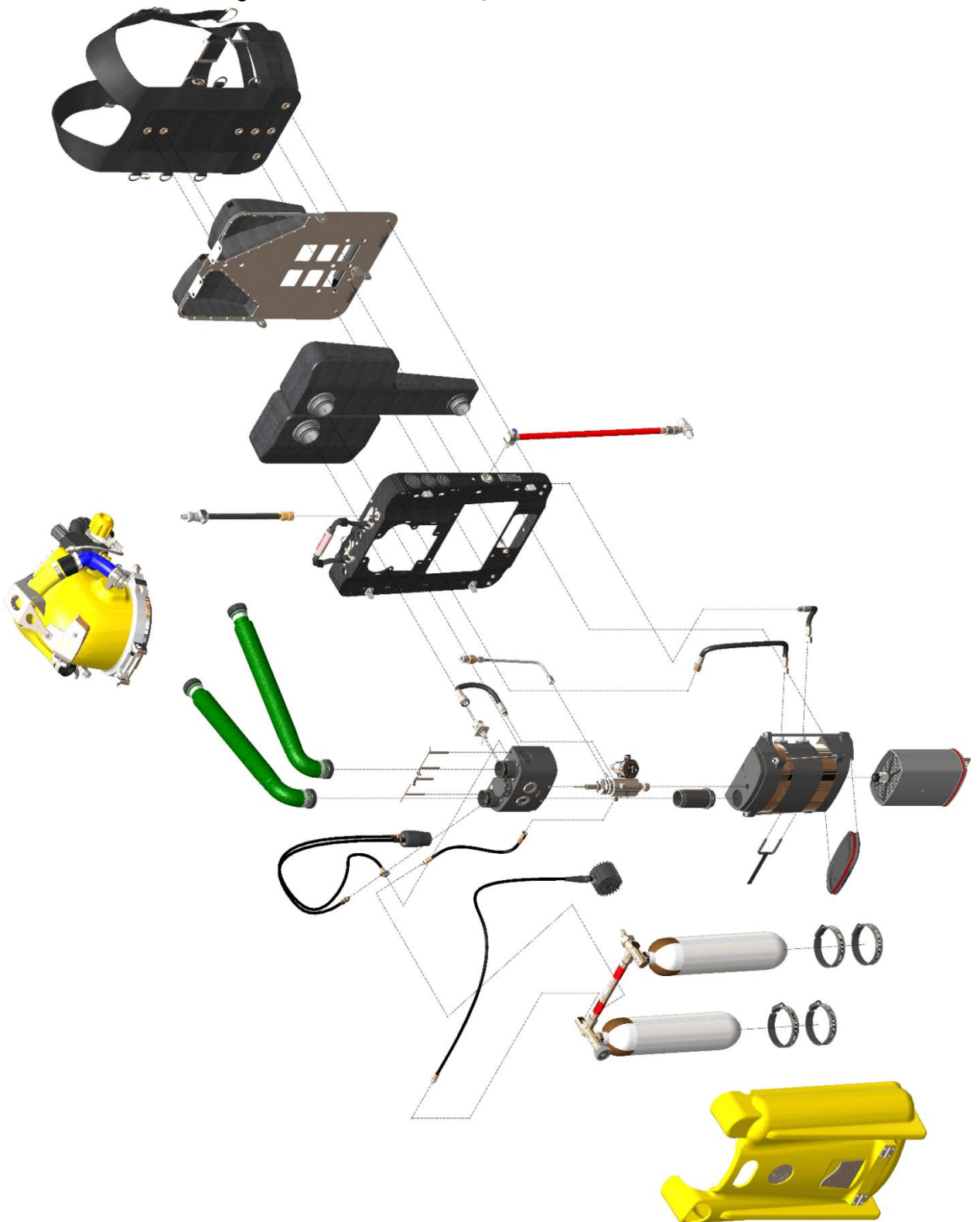
4 Sub-assemblies Description

4.1 Location of Sub-assemblies

4.1.1 COBRA comprises a Helmet, Backpack and Harness system (Figure 20), and is broken down into the following key sub-assemblies: -

- COBRA Reclaim Helmet
- Inhale / Exhale Hoses
- Head
- Inhale / Exhale Counterlungs
- Hot Water Housing
- Sodalime Canister
- High Pressure Cylinders and Manifold
- Back Cover
- Backplate and Harness
- Chassis
- Rotowink
- High Pressure Gauge and Hose

Figure 20 COBRA Top Level Sub-assemblies



4.2 COBRA Helmets

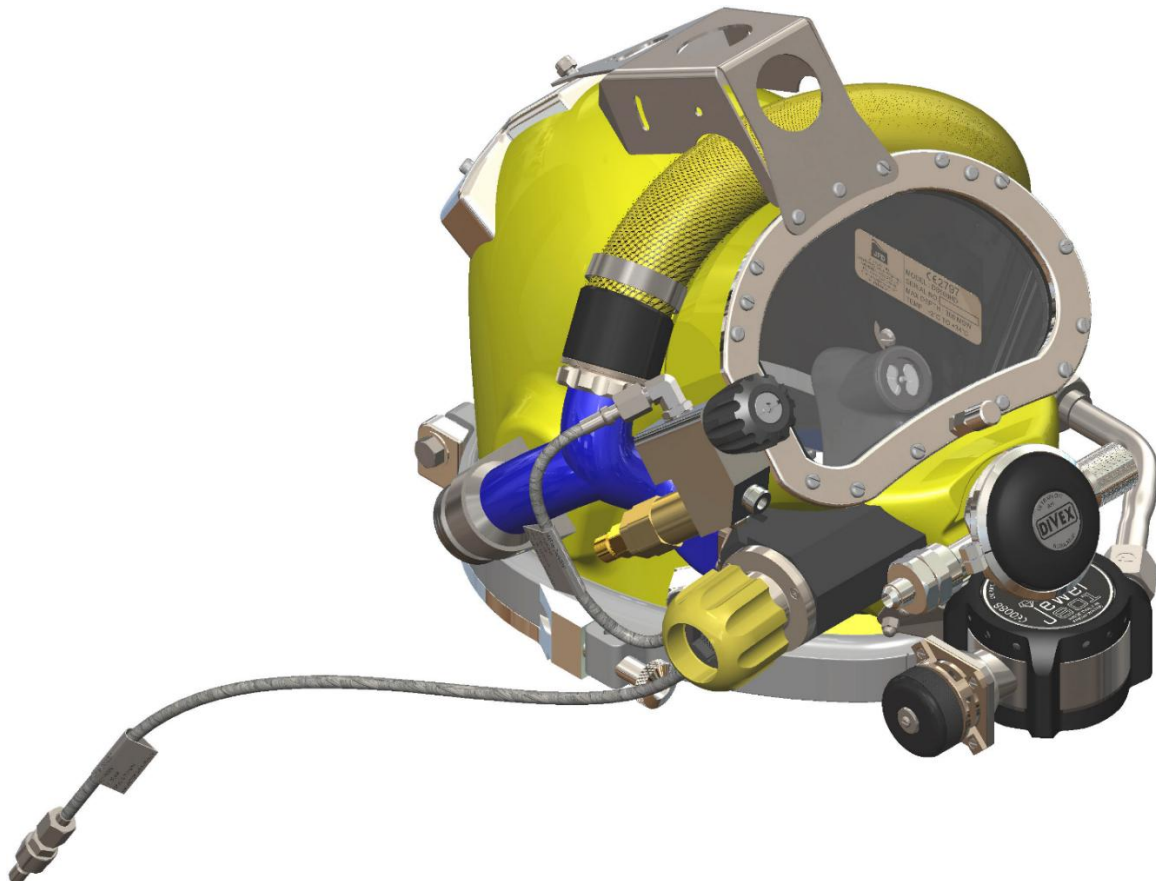
DANGER

HELMETS BUILT FOR USE WITH THE COBRA BACKPACK MUST NOT BE USED WITH ANY OTHER BAILOUT SYSTEMS INCLUDING DIVEX SLS.

- 4.2.1 COBRA Helmets allow primary gas supply on reclaim or open circuit as is standard on the Ultrajewel. With a single turn on the helmet activation knob COBRA is activated, presenting a mouthpiece to the diver, bringing the rebreather online to the helmet and also activating the gas injection system on the backpack. Camera and light brackets are incorporated in the design and are suitable for lights and cameras up to 1 kg each.
- 4.2.2 Any Mk 2 helmet variant may be used with any Mk 2 COBRA backpack variant.

4.2.3 COBRA Mk 2 Reclaim Helmet

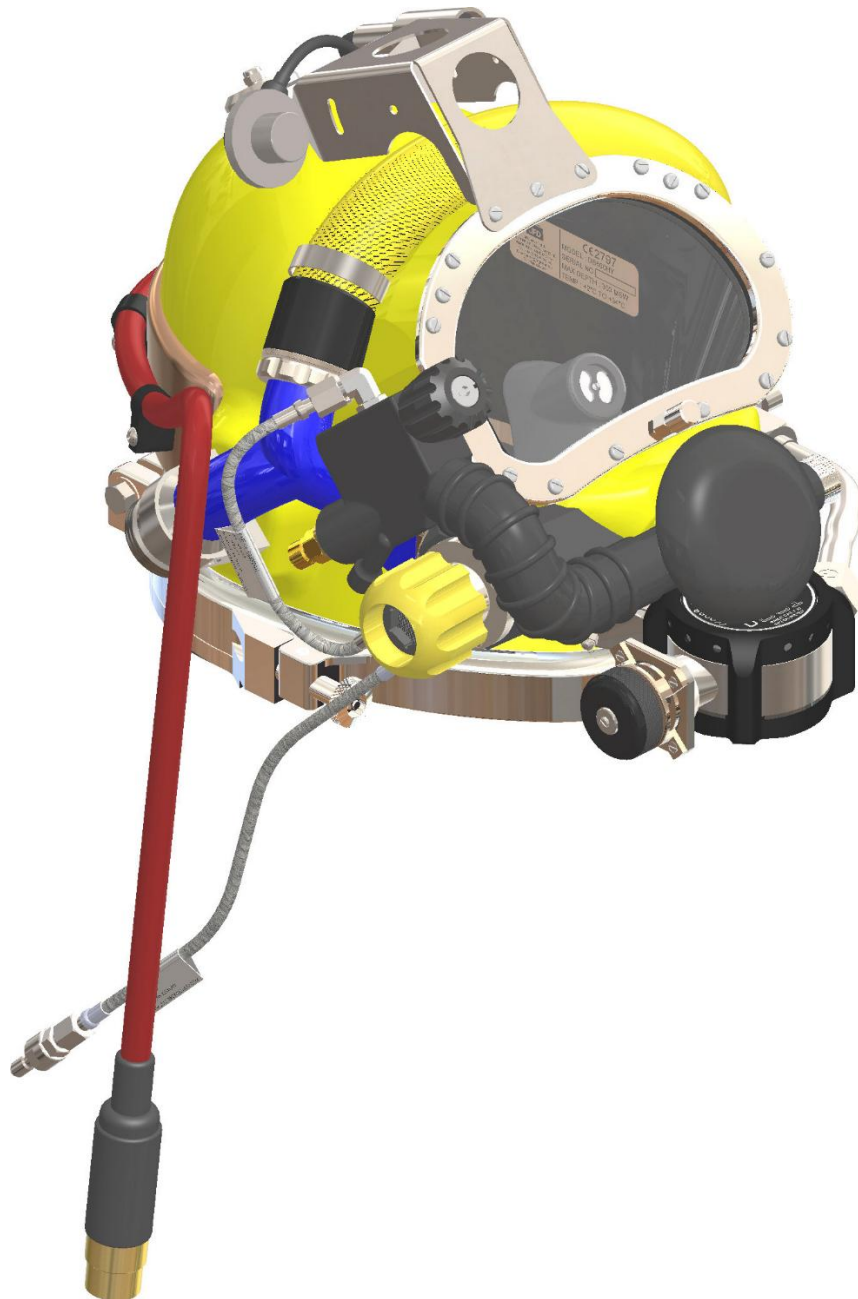
Figure 21 COBRA Mk 2 Reclaim Helmet



- 4.2.4 The standard COBRA Mk 2 helmet is a Divex 17C Ultrajewel reclaim helmet with COBRA activation system fitted.

4.2.5 COBRA Mk 2 Greco Comms Helmet

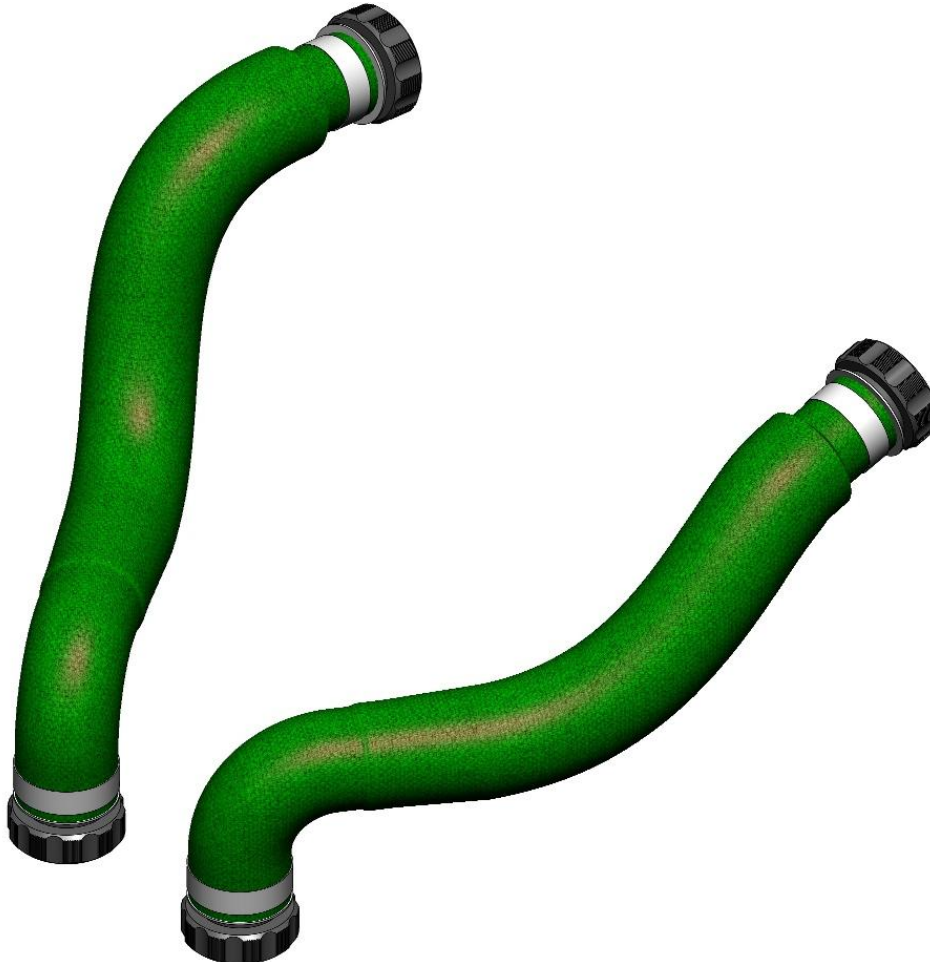
Figure 22 COBRA Mk 2 Greco Comms Helmet



- 4.2.6 The COBRA Mk 2 Greco Comms Helmet is based on a variant of the standard Ultrajewel helmet with COBRA activation system fitted.

4.3 Inhale / Exhale Breathing Hoses

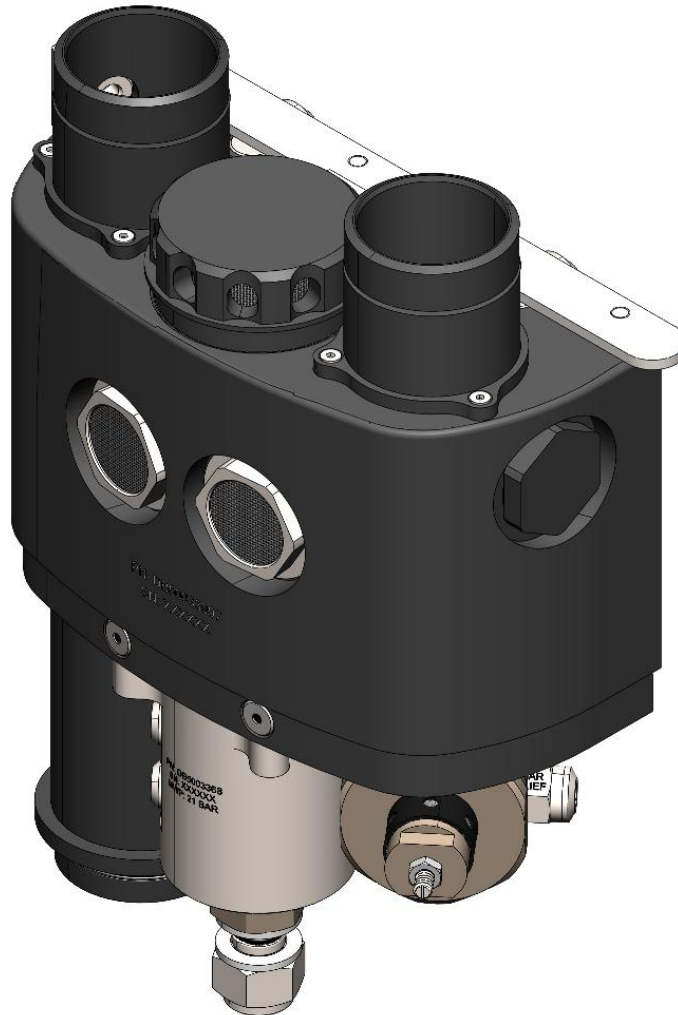
Figure 23 Inhale / Exhale Breathing Hoses



- 4.3.1 The inhale / Exhale Breathing hoses are identical and connect the breathing circuit between the COBRA helmet and backpack. The hoses are large bore to reduce breathing resistance and can be quickly connected/disconnect by hand and feature a rigid bend at the backpack end to reduce the hose profile off the backpack hence reducing snag hazards.

4.4 Head

Figure 24 Head



- 4.4.1 The head provides primary gas control to the breathing circuit in the form of positive pressure in offline mode to ensure breathing circuit integrity and fresh gas supply / demand top-up in COBRA mode. The head also features an offline relief system and a dual online relief system in COBRA mode.

4.5 Inhale / Exhale Counterlungs

Figure 25 Inhale / Exhale Counterlungs



- 4.5.1 The inhale and exhale counterlungs provide compliant volume to the circuit to provide easy breathing and assist in reducing gas velocity through the CO₂ scrubber bed to optimise CO₂ scrubbing durations. The counterlungs feature a simple but effective staple connection system for easy removal for replacement or cleaning.

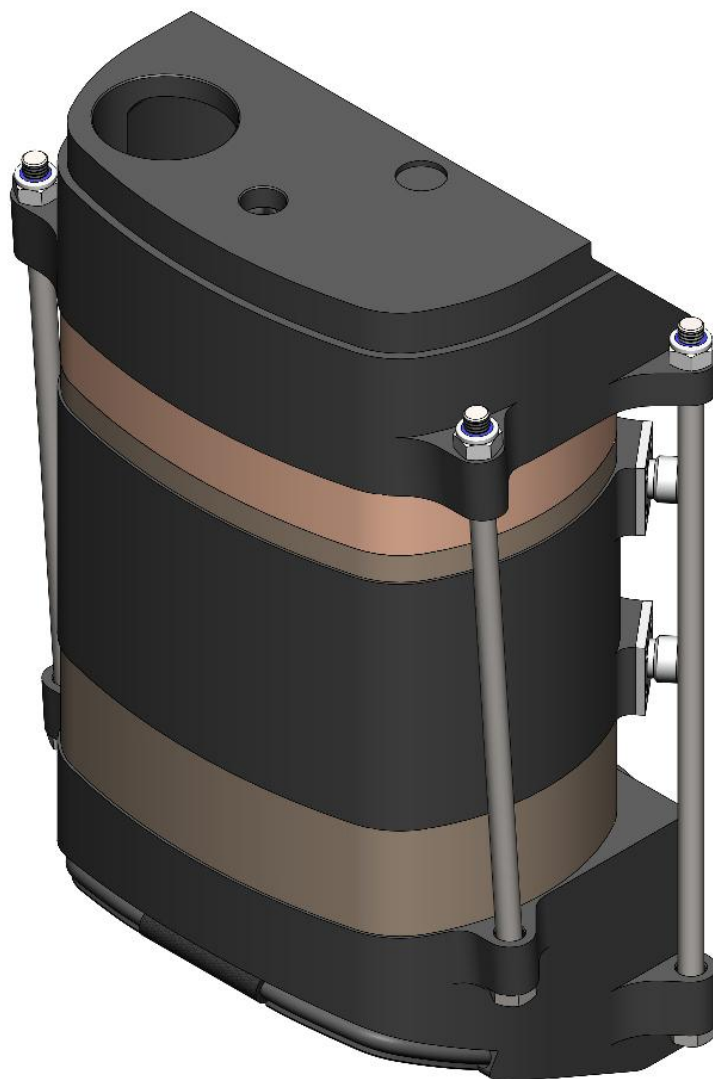
4.6 Hot Water Housing

4.6.1 The hot water housing provides a reservoir to flow through hot water from the diver's umbilical supply and provides heat to the scrubber canister located inside where pre-heating of the sodalime granules contained within optimises CO₂ scrubbing duration.

4.6.2 Obsolete Hot Water Housing

4.6.2.1 The originally fitted hot water housing must not be used after 17 November 2020, refer to section 4.6.3 for revised hot water housing.

Figure 26 **Obsolete Hot Water Housing**



4.6.3 Revised Hot Water Housing

Figure 27 Revised Hot Water Housing



IN Q1/2021 A REVISED HOT WATER HOUSING WAS RELEASED AND MUST BE RETRO-FITTED TO ALL COBRA SETS IN ACCORDANCE WITH DB500-PGN-13 AVAILABLE AT THE FOLLOWING LINK:

<https://www.jfdglobal.com/products/commercial-divers-equipment/rebreathers/cobra-compact-bailout-rebreathing-apparatus/>



4.7 Sodalime Canister

Figure 28 Sodalime Canister



- 4.7.1 The sodalime canister is a refillable canister for Molecular Products 797 grade Sofnolime used to scrub out CO₂ in the rebreather circuit and features a spring-loaded mesh screen to maintain a good granule pack in the event of system vibration / movement.

4.8 High Pressure Cylinders and Manifold

CAUTION

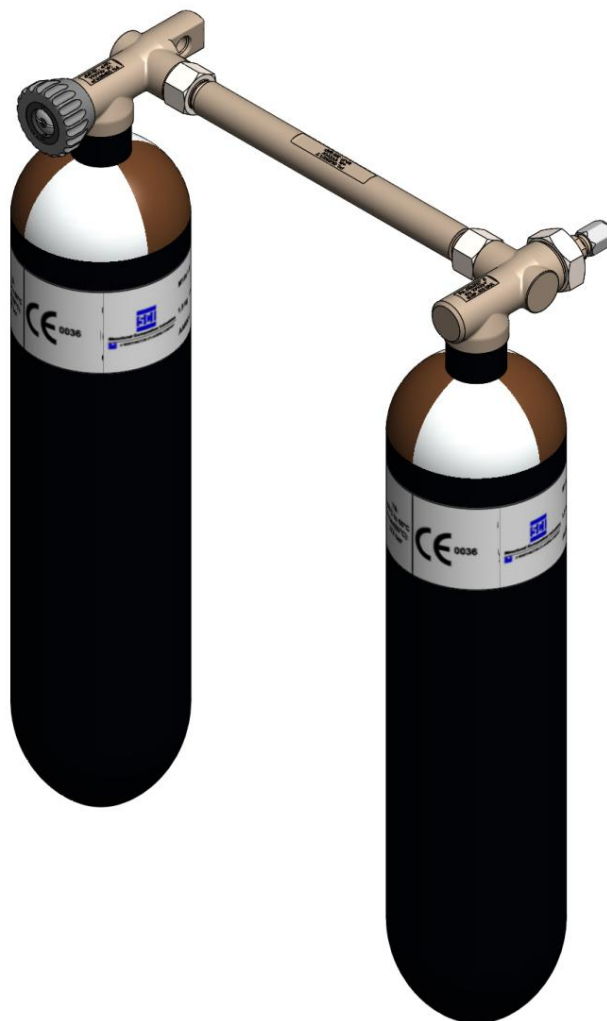
The operating torque for the handwheel must not exceed 4.5 Nm

- 4.8.1 There are two cylinders within the backpack connected via a high pressure manifold which contains a single high pressure charging point with integral check valve and a single shut-off valve to isolate the backpack gas supply. Depending on build state (refer to Table 1 COBRA Top-level Assemblies on page 1) the backpack will be fitted with either aluminium lined composite, stainless steel lined composite or steel cylinders.

4.8.2 Aluminium Lined Composite Cylinders

- 4.8.3 The aluminium lined composite cylinders shown in Figure 29 are 2 litre capacity and have a maximum working pressure of 300 bar.

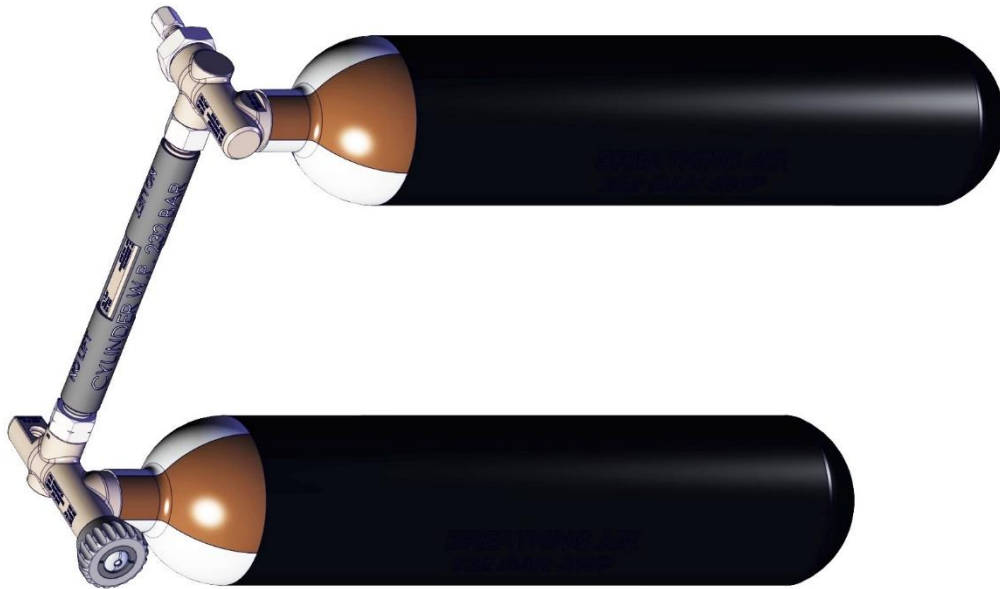
Figure 29 Composite Cylinders and Manifold



4.8.4 Steel Cylinders

4.8.5 The steel cylinders shown in Figure 30 are 3 litre capacity and have a maximum working pressure of 232 bar.

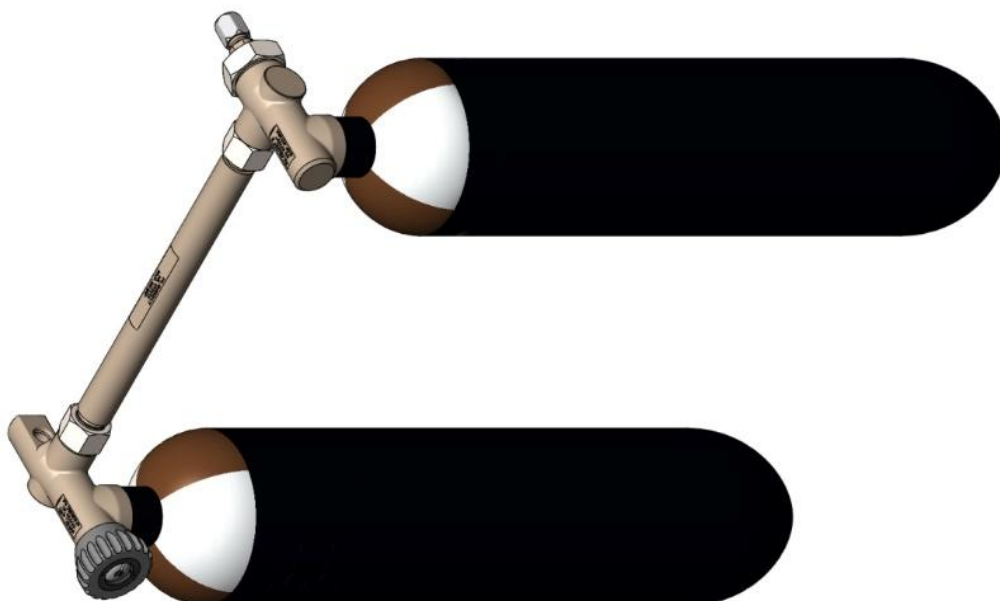
Figure 30 Steel Cylinders and Manifold



4.8.6 Stainless Steel Lined Composite Cylinders

4.8.7 The stainless steel lined composite cylinders shown in Figure 31 are 2 litre capacity and have a maximum working pressure of 300 bar.

Figure 31 Stainless Steel Lined Composite Cylinders and Manifold



4.9 Backplate and Harness

Figure 32 Backplate and Harness DB5002060



- 4.9.1 The harness system DB5002060 features an Apeks sports diving harness ruggedised to meet needs of a commercial diving environment (Figure 32).

Figure 33 Backplate and Harness DB5002072



Rev 8

- 4.9.2 The harness system DB5002072 features the addition of leg loops (Figure 33).
- 4.9.3 Both harness designs are bolted to a stainless backplate which in turn is bolted to the COBRA chassis. The backplate connections to the chassis are secured by hand to allow easy, quick removal for access to the counterlungs.

4.10 Back Cover

- 4.10.1 The back cover shown in Figure 34 is permanently fixed to the backpack, It is of gel coated fibreglass construction and is fitted with a hinged removable hatch to allow access to the scrubber for sodalime change out.

Figure 34 Back Cover



- 4.10.2 The Steel Cylinders (DB5002044 variant) and stainless steel lined cylinders (DB5002045 and DB5003046 variants) could not be accommodated in the original cover. A slightly larger cover was developed for these variants. This cover is identified by two vertical black stripes on the interior of the cover. Functionality of the back cover is the same regardless which back cover is fitted.

4.11 Chassis

Figure 35 Chassis



- 4.11.1 The chassis provides the main structure all sub-assemblies are mounted to and is made from carbon fibre to provide the necessary strength and durability while also being lightweight to reduce the burden on the diver out of the water. The hot water inlet and outlet connections are mounted to the chassis.
- 4.11.2 A lifting handle is mounted to the top of the chassis which may be used for manual handling of the set. The handle is designed to safely support the full weight of the assembled set and may be used to support the set for maintenance or stowage.

WARNING

THE LIFTING HANDLE MUST NOT BE USED AS A DIVER RECOVERY POINT. IT MAY NOT SUPPORT THE WEIGHT OF DIVER AND APPAREL.

4.12 Rotowink

Figure 36 Rotowink



- 4.12.1 The Rotowink is a mechanical pressure indicator providing the diver with status of the rebreather loop in offline, positive pressure mode to indicate if positive pressure has been maintained (green) or not (red).

4.13 High Pressure Gauge and Hose

Figure 37 High Pressure Gauge and Hose



- 4.13.1 The high pressure gauge and hose provide the diver with the onboard gas pressure and includes a red section to indicate when the gas supply is low.

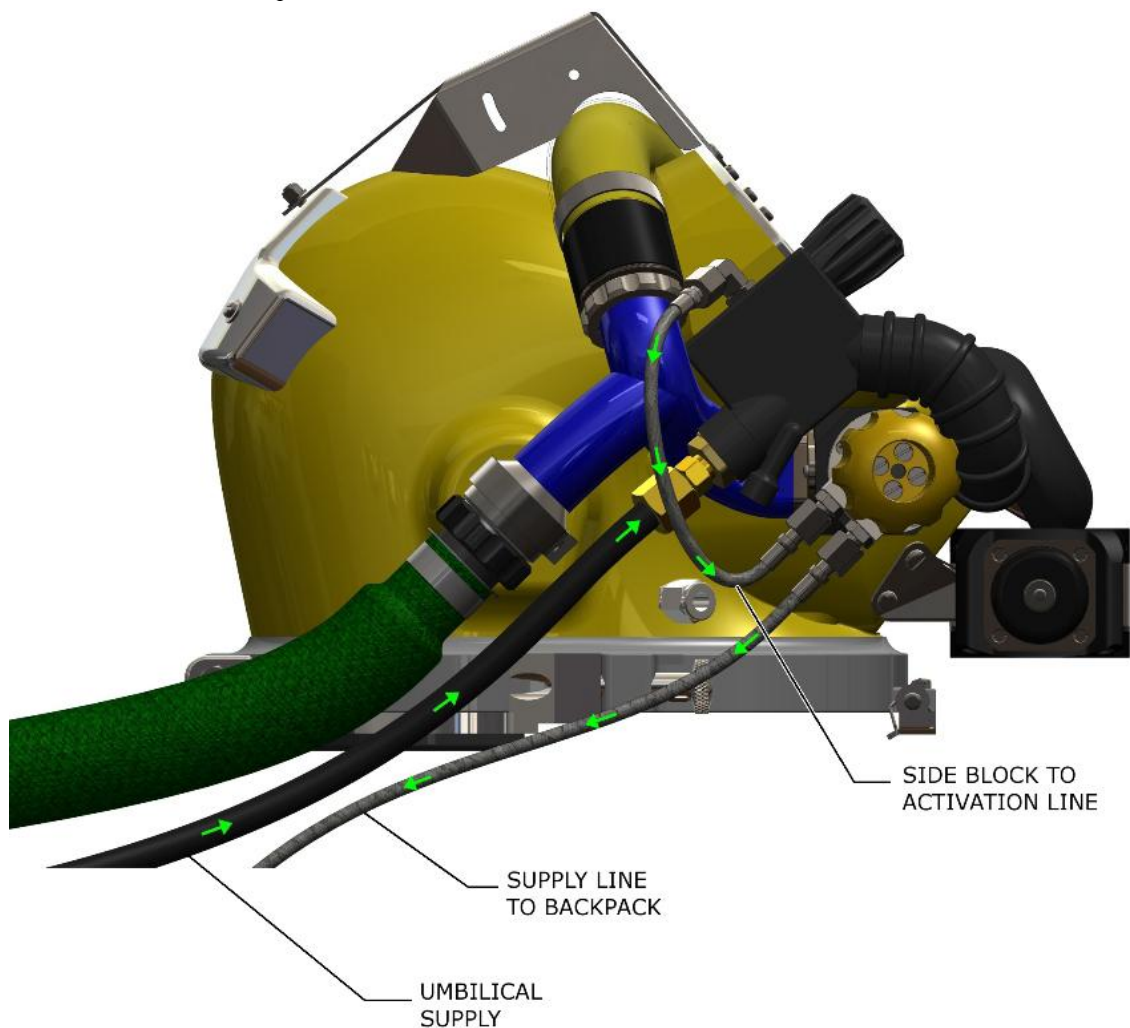
5 Technical Overview

Each COBRA sub-assembly plays a key part in the overall system operation, the function of each is detailed as follows: -

5.1 Helmet Activation

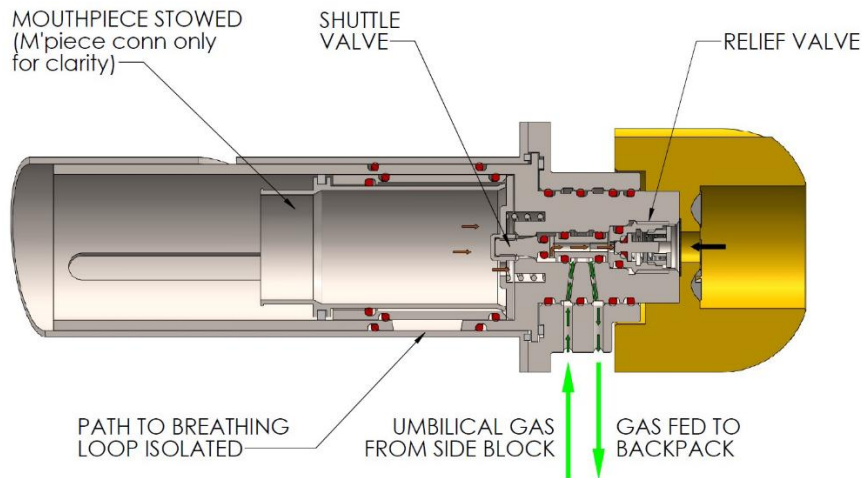
- 5.1.1 When COBRA is offline and the diver is breathing from the primary system the mouthpiece remains stowed within the activation tube, umbilical gas is fed to the helmet side block which supplies the activation manifold which in turn feeds the COBRA backpack where gas pressure holds the system in standby mode, as shown in Figure 38.

Figure 38 COBRA Helmet on Primary Supply



- 5.1.2 In the stowed position the COBRA breathing loop is isolated from the helmet by the telescopic sleeve arrangement which also holds the shuttle valve outwards allowing umbilical gas from the side block to be supplied to the backpack while ensuring the handle relief valve remains isolated from the gas supply as shown in Figure 39.

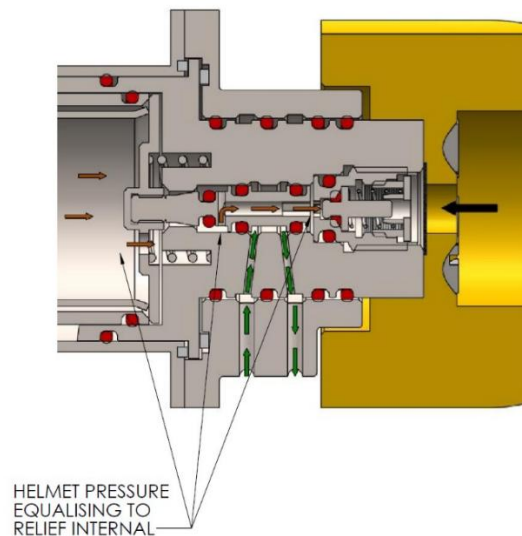
Figure 39 Activation Sleeve - COBRA Offline



5.1.3 As the relief valve mounted in the handle at this point is isolated from the gas supply it can be subjected to significant differential pressure hence the gas space internal to the relief is equalised to ambient via the shuttle valve which opens a gas path from the helmet ambient pressure to the inside of the relief as shown in Figure 40. This allows only a minimal differential pressure to build-up between the external seawater pressure and helmet pressure and avoids the danger of the relief o-ring being forced back into the relief internal by high external pressures.

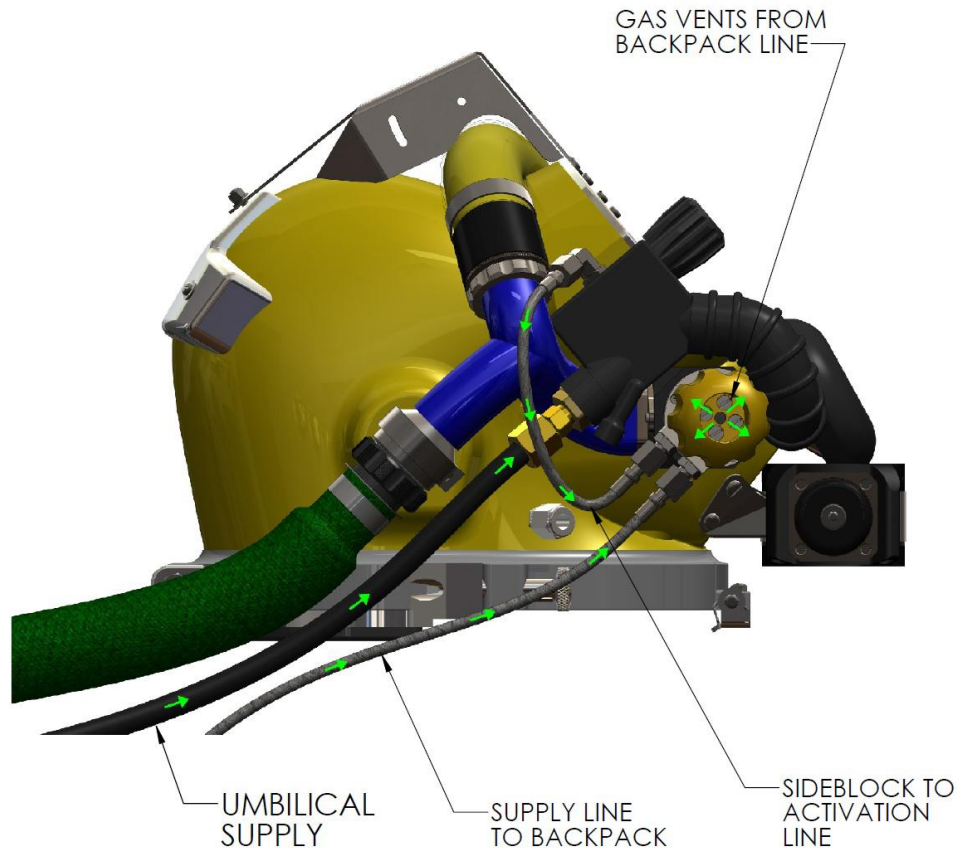
Note The relief valve does not vent at this point, only pressure equalisation occurs.

Figure 40 Activation Sleeve - Pressure Activation



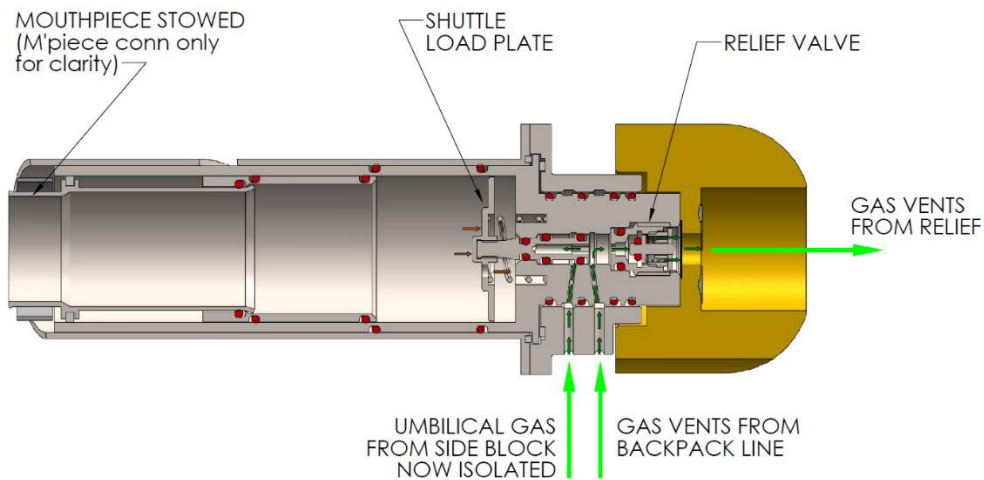
5.1.4 When COBRA is activated (handle rotated anti-clockwise) the gas pressure inside the activation manifold, supplied by the side block umbilical gas is isolated and the backpack supply line is opened to the activation relief valve mounted on the COBRA handle. This vents the pressure in the backpack line to the surrounding environment which in turns brings the backpack online in COBRA mode, as shown in Figure 41. The handle rotation also deploys the mouthpiece for the diver to engage with and breathe COBRA gas.

Figure 41 COBRA Helmet Activated



- 5.1.5 When the actuation handle is turned the telescopic sleeve moves to the left by a scroll detail on the sleeve, this deploys the mouthpiece to the diver and opens the COBRA breathing loop to the helmet. As the telescopic sleeve moves to the left the shuttle load plate also moves to the left by the force of the connecting spring, this in turn moves the shuttle valve to the left which isolates the side block umbilical gas and vents the backpack line via the handle relief valve as shown in Figure 42. At this point the shuttle also isolates the equalisation path between the helmet and the relief internal to ensure relieved gas pressure is isolated from the helmet ambient pressure. The loss of pressure at the backpack line hence brings the COBRA backpack online.

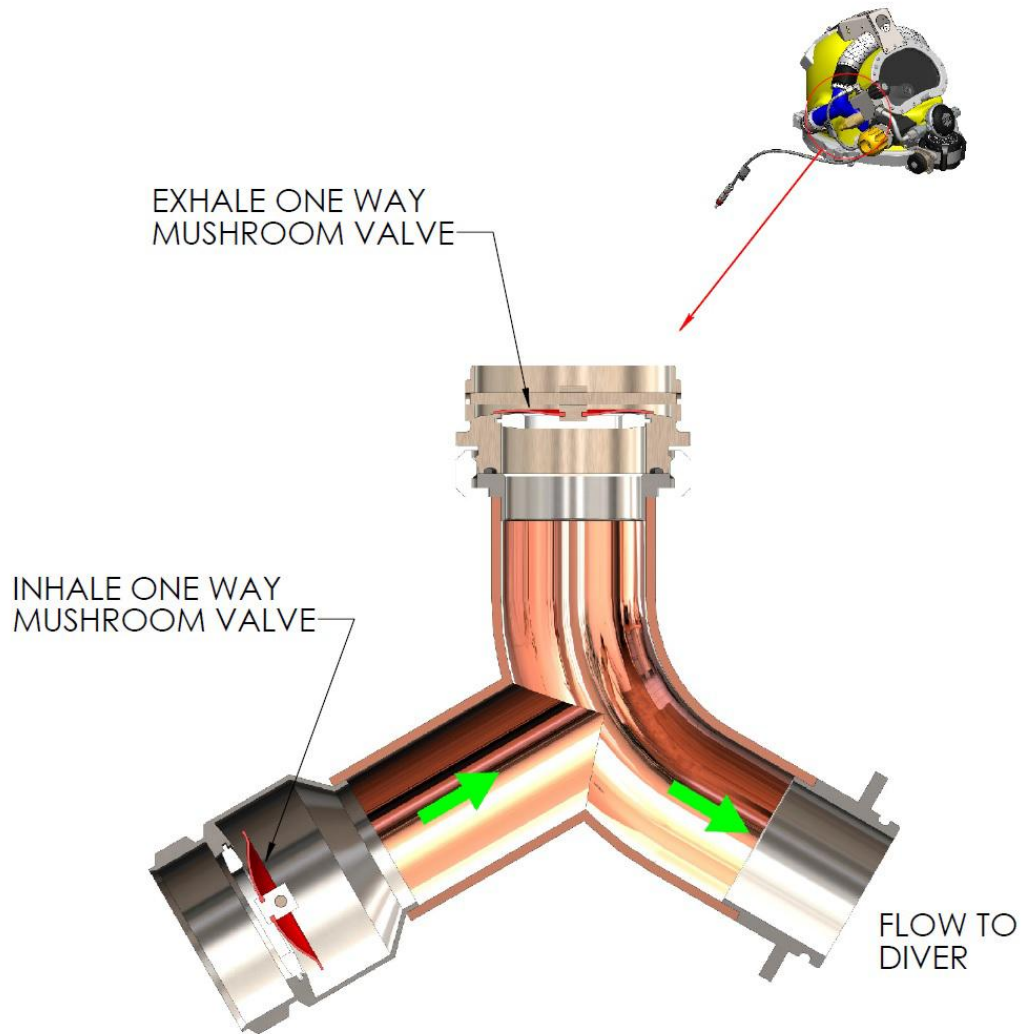
Figure 42 Activation Sleeve - Mouthpiece Deployed



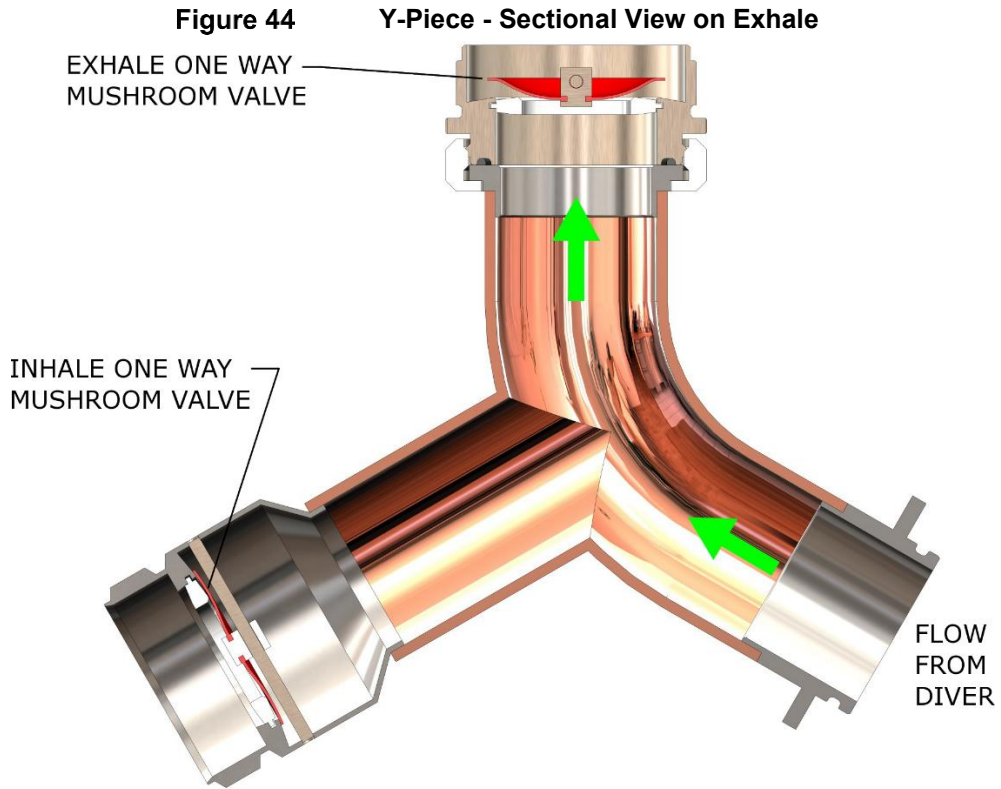
5.2 Helmet Y-Piece

5.2.1 When COBRA is activated and the breathing circuit brought online to the helmet the direction of gas flow through the breathing circuit is controlled by inhale and exhale mushroom one-way valves housed in a Y-piece mounted on the right side of the helmet as shown in the sectional view in Figure 43. The inhale flow path is shown in Figure 44 where diver inhale negative pressure opens the inhale mushroom to flow fresh gas to the diver which consequently ensures the exhale mushroom is pulled downward and seals the exhale side of the breathing loop.

Figure 43 Y-Piece - Sectional View on Inhale



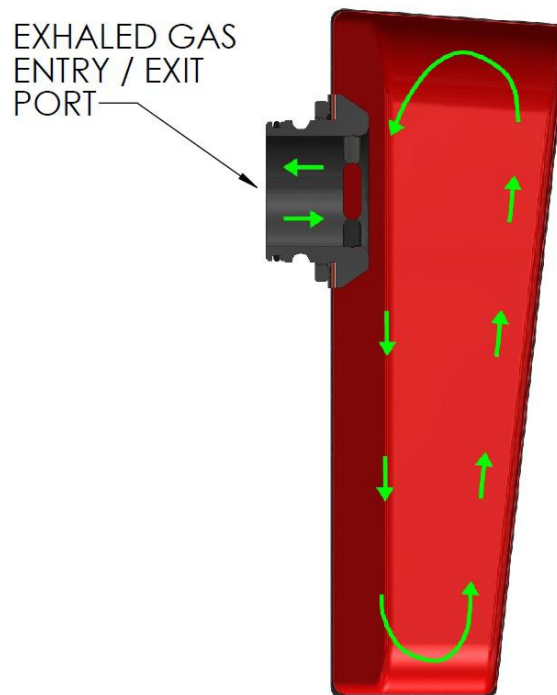
- 5.2.2 Similarly on the exhale phase the positive pressure exhaled gas opens the exhale mushroom valve to flow exhaled gas to the rebreather while ensuring the inhale mushroom valve remains sealed.



5.3 Exhale Counterlung

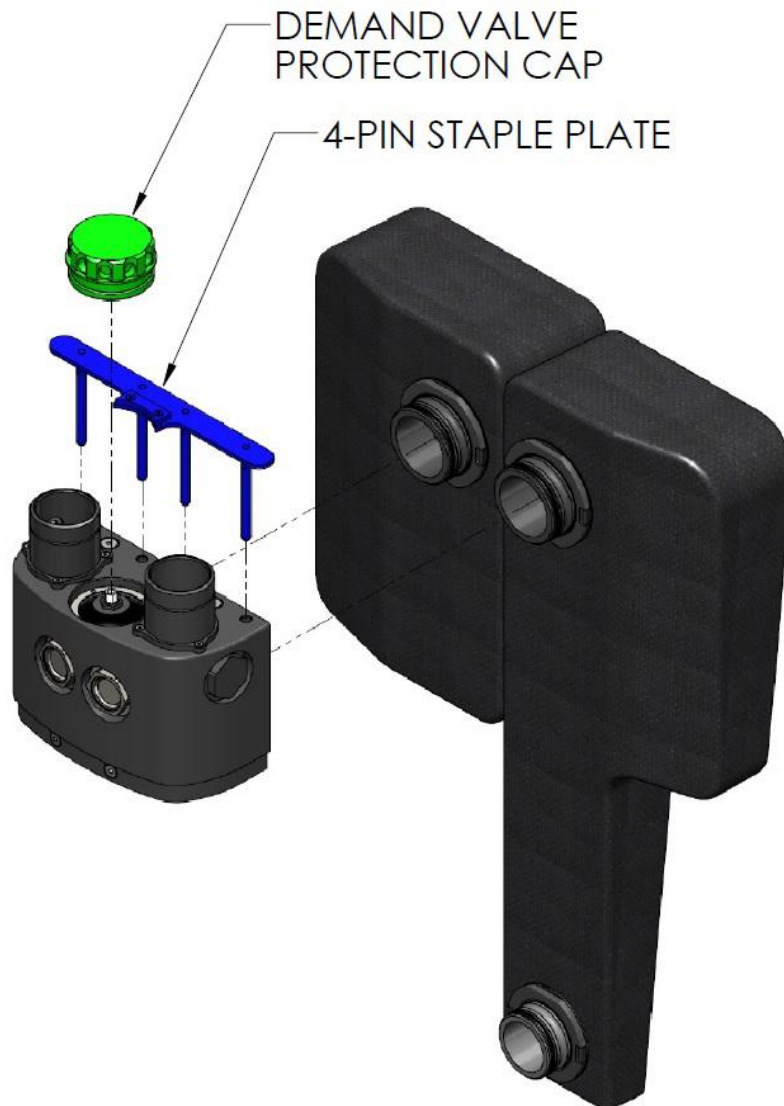
- 5.3.1 Upon exhalation gas travels through the y-piece exhale mushroom valve, across the helmet mounted hose, through the exhale breathing hose to the backpack. At this point the gas can either travel towards the carbon dioxide scrubber or circulate in the exhale counterlung. The exhale counterlung has a single entry/exit point as shown in Figure 45 and acts as a compliant volume to reduce exhale pressure in the system and reduce gas velocity through the carbon dioxide bed to provide sufficient gas dwell for efficient CO₂ scrubbing.

Figure 45 Exhale Counterlung



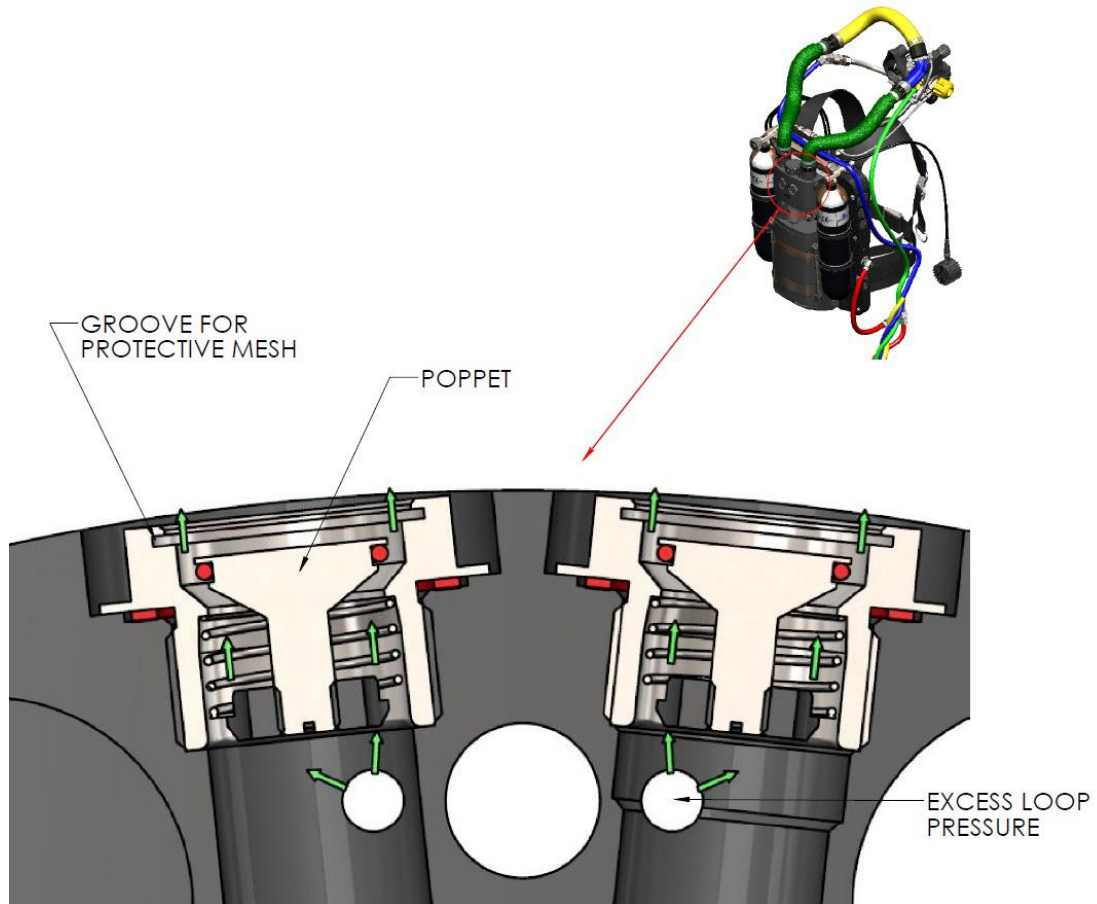
- 5.3.2 The top ports of both the exhale and inhale counterlungs are locked in place by way of a 4-pin staple plate integrated into the head to allow fast removal of the counterlungs for cleaning purposes. The staple plate is locked in place by the automatic demand valve protection cap as show in Figure 46. A single staple locks the lower portion of the inhale counterlung.

Figure 46 Securing Counterlung Top Ports



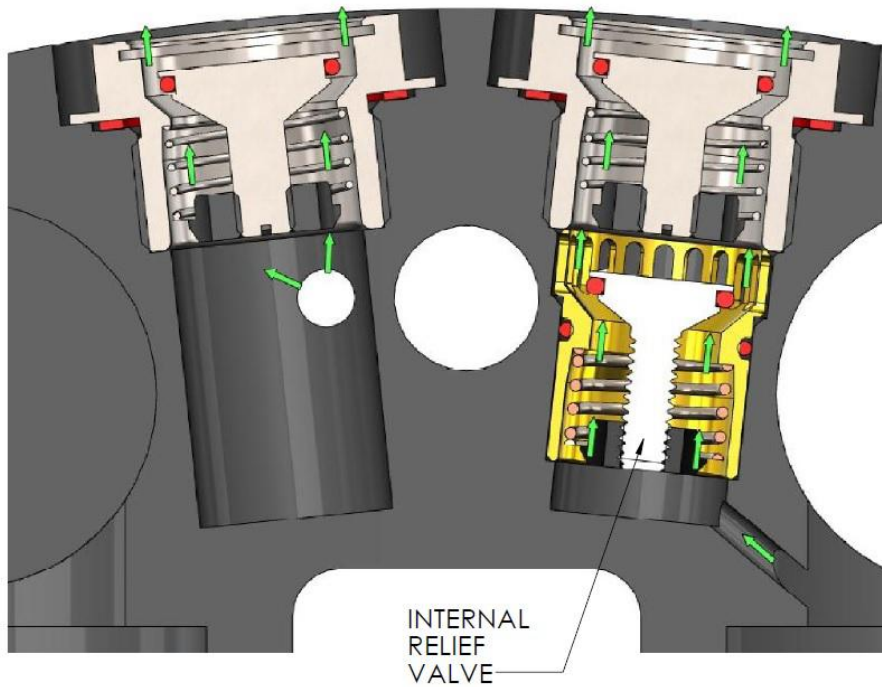
- 5.3.3 When COBRA is online the two external exhaust valves mounted on the head are also active and relieve any excess pressure within the breathing loop typical in semi-closed systems where a portion of gas must be exhausted to compensate for the semi-closed gas injection in the circuit along with other occurrences of excess loop pressure such as diver ascent. The valves activate when the internal pressure in the system is sufficient to overcome the adjustable springs holding the poppet o-ring seals in place. The valves are protected from grit, silt, etc. by a mesh disc held in a groove external to the poppet. The valves are located on the exhale side of the breathing loop which is preferred where gas content in this area is depleted of O₂ and contains CO₂ from the diver's exhaled breath.

Figure 47 Gas Relieving From External Exhaust Valves



- 5.3.4 When COBRA is offline the two external reliefs are isolated from the breathing loop to prevent relief of the higher offline system positive pressure. In offline mode the breathing circuit remains protected by an internal relief valve set at a higher pressure which allows the positive offline pressure to be held but will relieve in higher pressure situations to protect the breathing circuit, such as diver ascent. The internal relief also provides a secondary protection of equalising the inner part of the external reliefs during phases of increased external pressure to ensure the poppet o-rings do not invert, a similar mechanism to the shuttle equalisation on the helmet relief. The internal relief has a good level of protection from the surrounding environment as any gas relieving enters a dry area in-between the internal and external relief valves, hence a 2-stage relieving function, as shown in Figure 48.

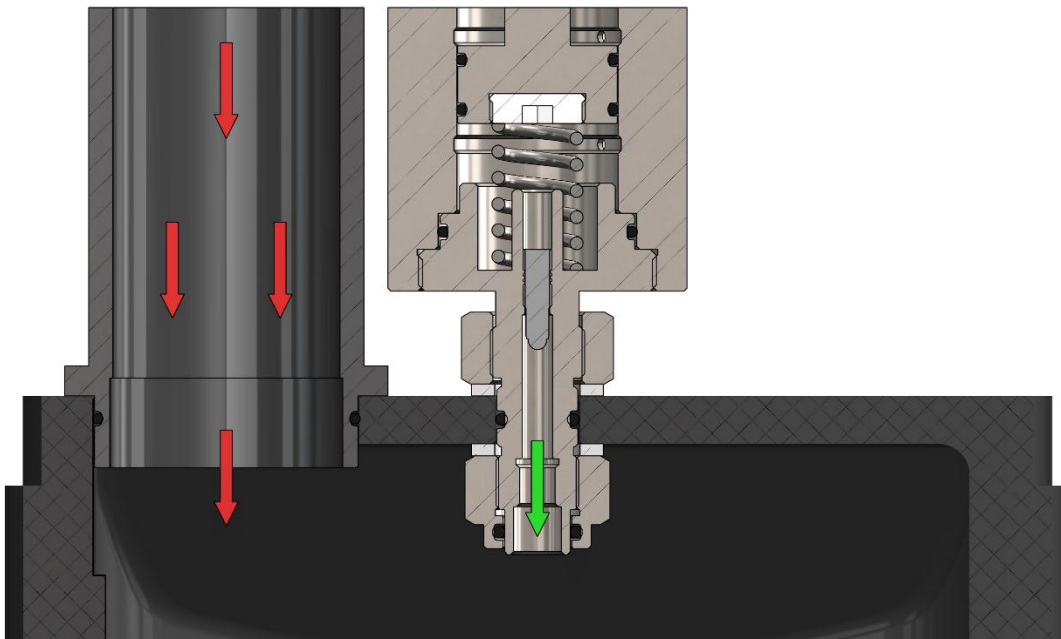
Figure 48 Gas Relieving From the Internal then External Relief Valves



5.4 Exhale Tube

- 5.4.1 The exhaled gas then moves from the head, down the exhale tube to the carbon dioxide scrubber and the semi-closed gas injection point.

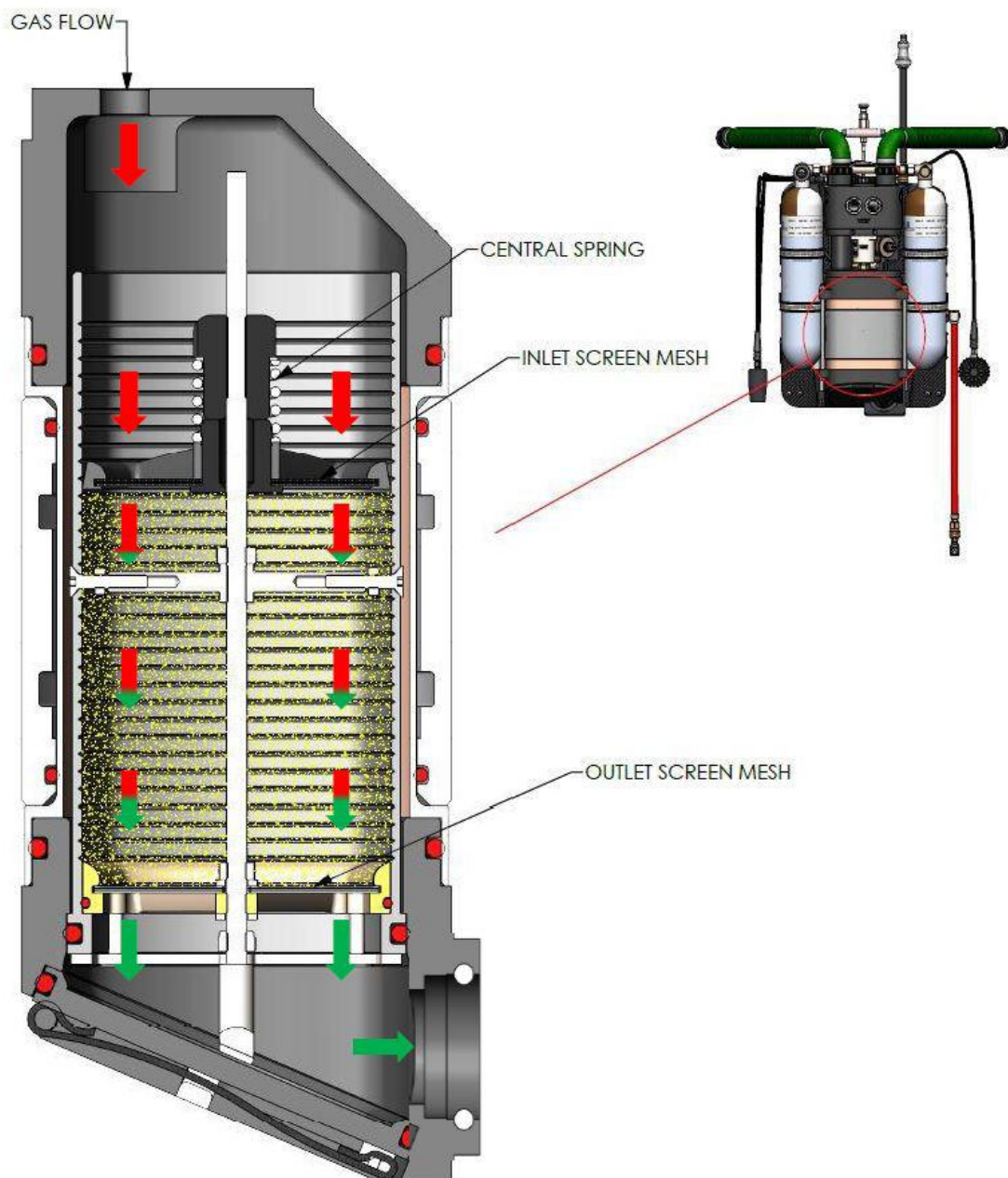
Figure 49 Exhale Tube



5.5 Scrubber System

5.5.1 The scrubber system is a granule filled canister which features top and bottom mesh screens, each with a single fine mesh sandwiched between two coarse meshes to retain the granules, prevent sodalime dust migration through the breathing loop but maintain good flow and hence breathing performance. Any settlement of the granules and hence potential gas channeling is addressed by a central spring which loads the top mesh screen and compensates for any granule bed movement maintaining a tight scrubber granule pack throughout operation. The granule bed is filled with approximately 1.3 kg of Molecular Products 797 grade Sofnolime.

Figure 50 Gas Flow Through Scrubber System



5.6 Hot Water System

5.6.1 To ensure optimum CO₂ scrubbing performance COBRA features a hot water jacket system Figure 51 which utilises the available hot water from the divers umbilical used for the divers hot water suit to also supply the COBRA backpack with hot water and maintain optimum heat for the scrubber canister in offline mode. The hot water is supplied via a hose from the splitter block to the backpack, through a jacket which acts as an external housing to the scrubber canister Figure 52, then exiting via a hose to a bulkhead QC connection to the top of the backpack which then feeds to the helmet shroud.

Note The purpose of the hot water system is to maintain the scrubber at a temperature that allows it to operate at full efficiency as soon as it is activated. once in use, the scrubber generates heat and the hot water supply is not required for continued operation.

Note The user's dive procedure should require the dive to be aborted on loss of hot water supply. If the main gas subsequently fails while the diver is returning to the bell, the COBRA set will function adequately, the scrubber having previously been heated.

Figure 51 Hot Water System

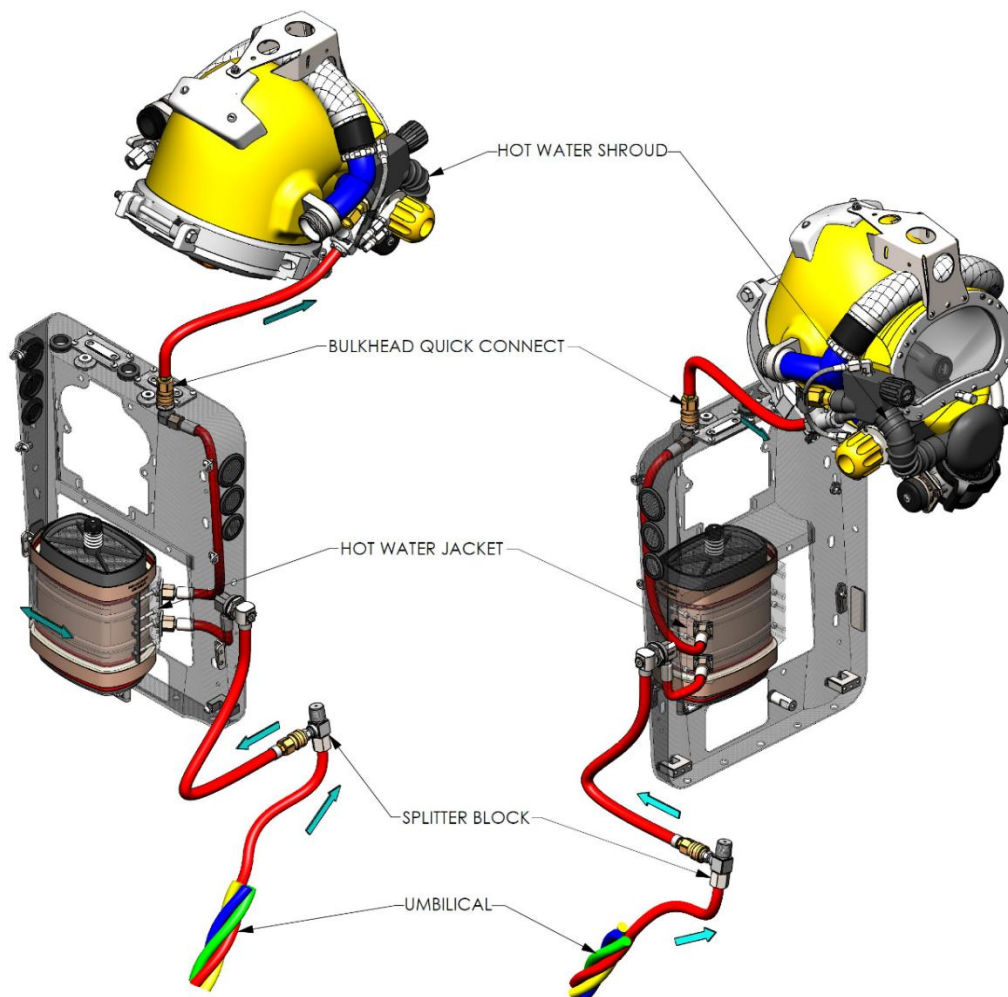
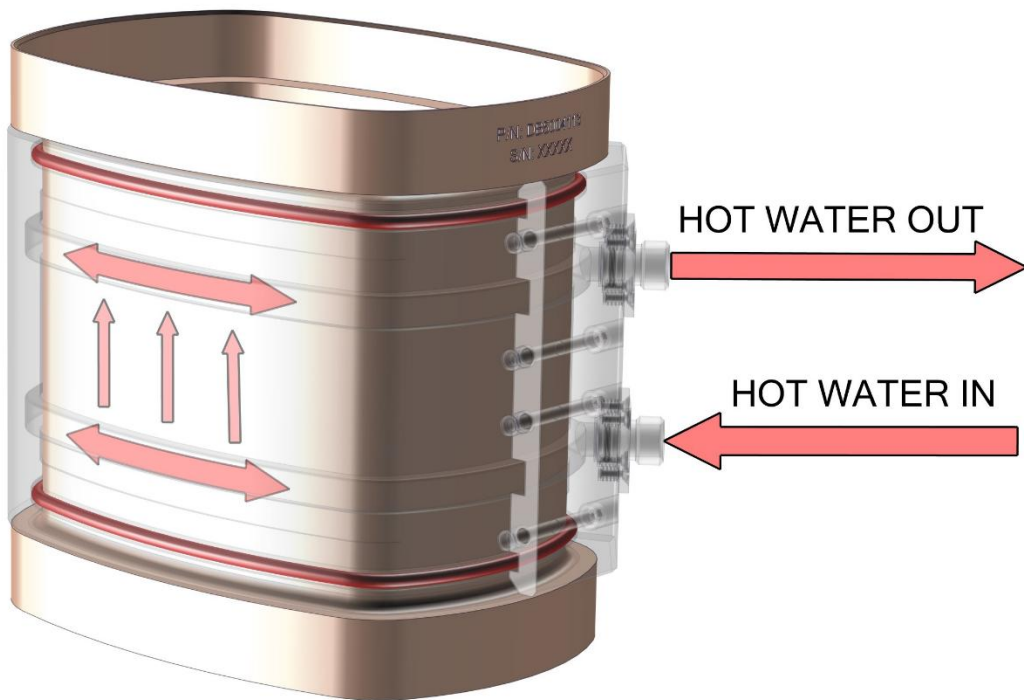
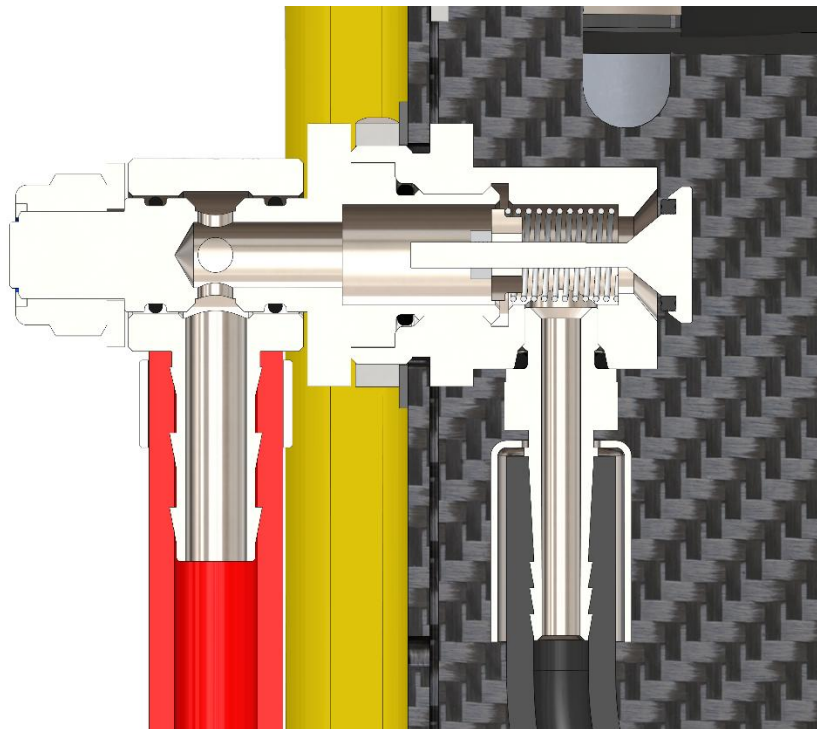


Figure 52 Hot Water Flow



- 5.6.2 The backpack hot water system is protected from any excess supply pressures by a 3 psi relief valve located on a bulkhead as hot water enters the backpack chassis hence ensuring pressure is relieved before entering the system, as show in Figure 53.

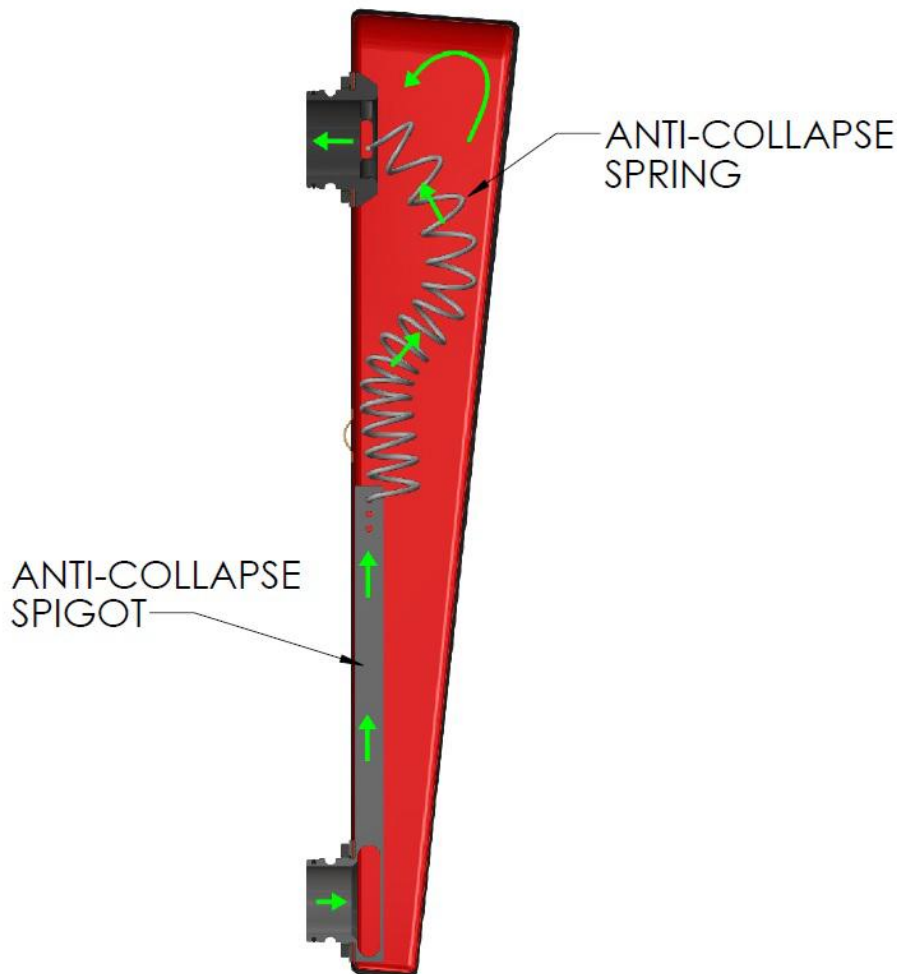
Figure 53 Hot Water Relief



5.7 Inhale Counterlung

- 5.7.1 After the gas has passed through the scrubber system it returns up the backpack to the head via the inhale counterlung. Like the exhale counterlung, the inhale provides a compliant volume to reduce inhale negative pressure and reduces gas velocity through the scrubber bed by creating a gas reservoir on inhale and hence assisting CO₂ scrubbing performance. The counterlung also contains a lower anti-collapse spigot and connecting anti-collapse spring to ensure gas flow is always maintained, even on phases of rapid descent.

Figure 54 Inhale Counterlung



5.8 High Pressure Supply System

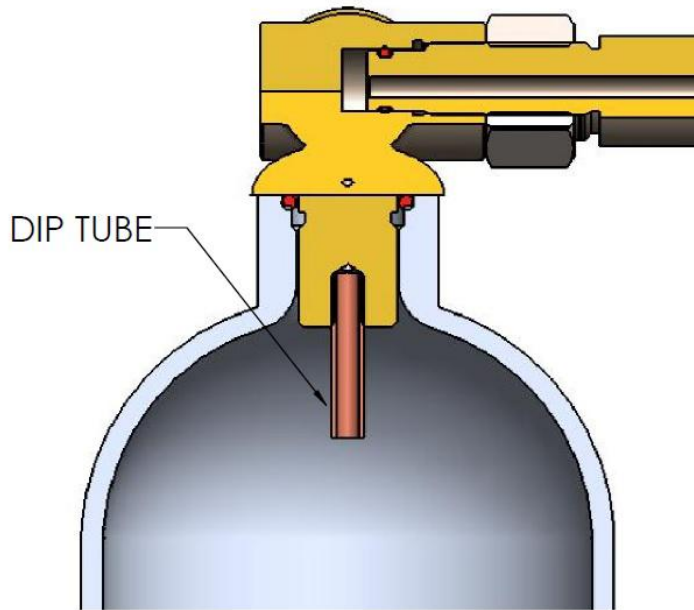
- 5.8.1 The high pressure supply system consists of two, heliox cylinders manifolded together with a single shut-off valve and a 4 JIC charging port with internal check valve.
- 5.8.2 Depending on build state (refer to Table 1 COBRA Top-level Assemblies on page 1) the backpack will be fitted with either 2 litre 300 bar aluminium lined composite cylinders or 3 litre 232 bar steel cylinders or 2 litre 300 bar stainless steel lined composite.

Figure 55 High Pressure Supply System



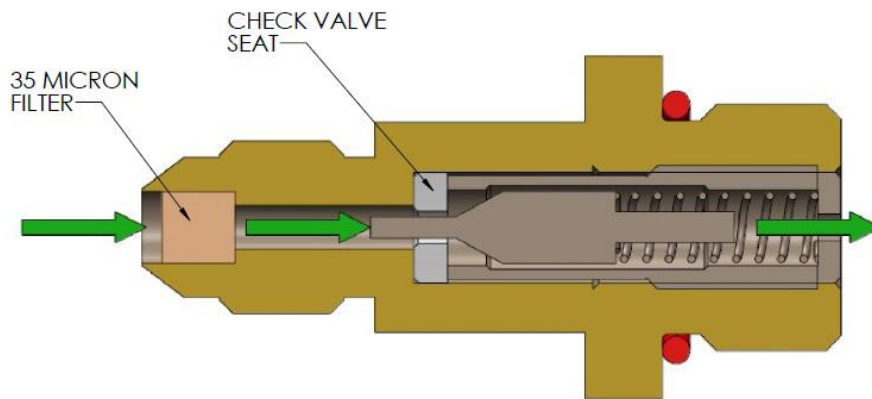
- 5.8.3 Each cylinder has a dip tube as shown in Figure 56 to provide protection in the unlikely event that moisture / water ingress into the cylinder occurs and hence prevents transfer downstream of the cylinders.

Figure 56 Cylinder Dip Tube



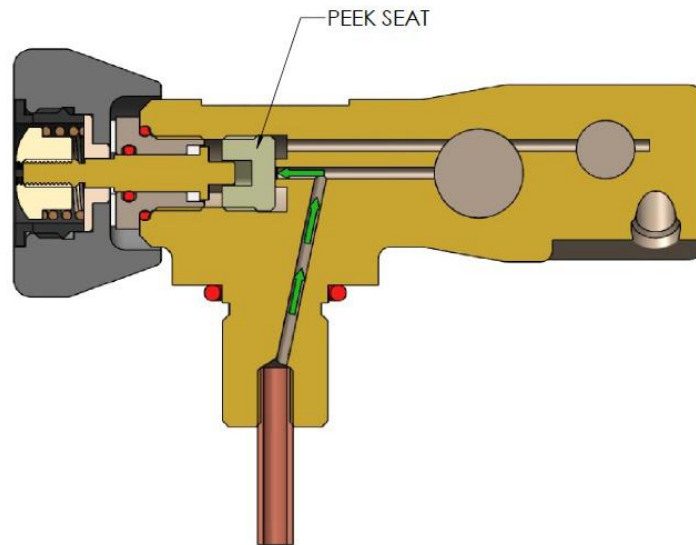
- 5.8.4 The cylinders are charged at a single 4 JIC connection, when not being charged this connection is protected by a 4 JIC cap. The charging point features a 35 micron filter to protect from any particle ingress and an internal check valve as shown in Figure 57.

Figure 57 Check Valve



- 5.8.5 The backpack gas supply is turned on / off by a single shut-off valve on the divers left hand side and this controls the gas supply from both cylinders to the breathing system. The gas supply is sealed by a PEEK seat which creates a seal in the plated brass face as shown in Figure 58.

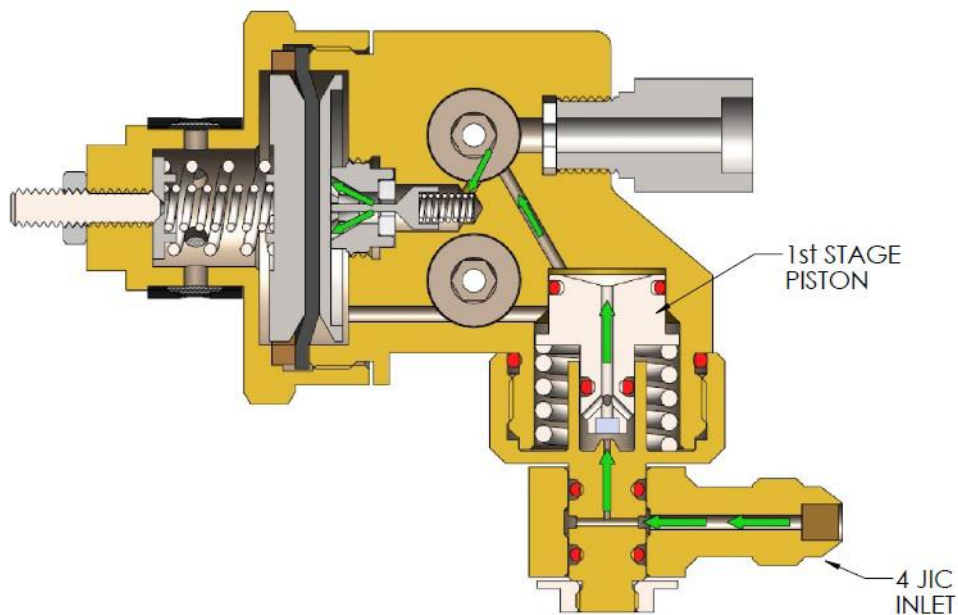
Figure 58 Shut-off Valve



5.9 Two Stage Regulator

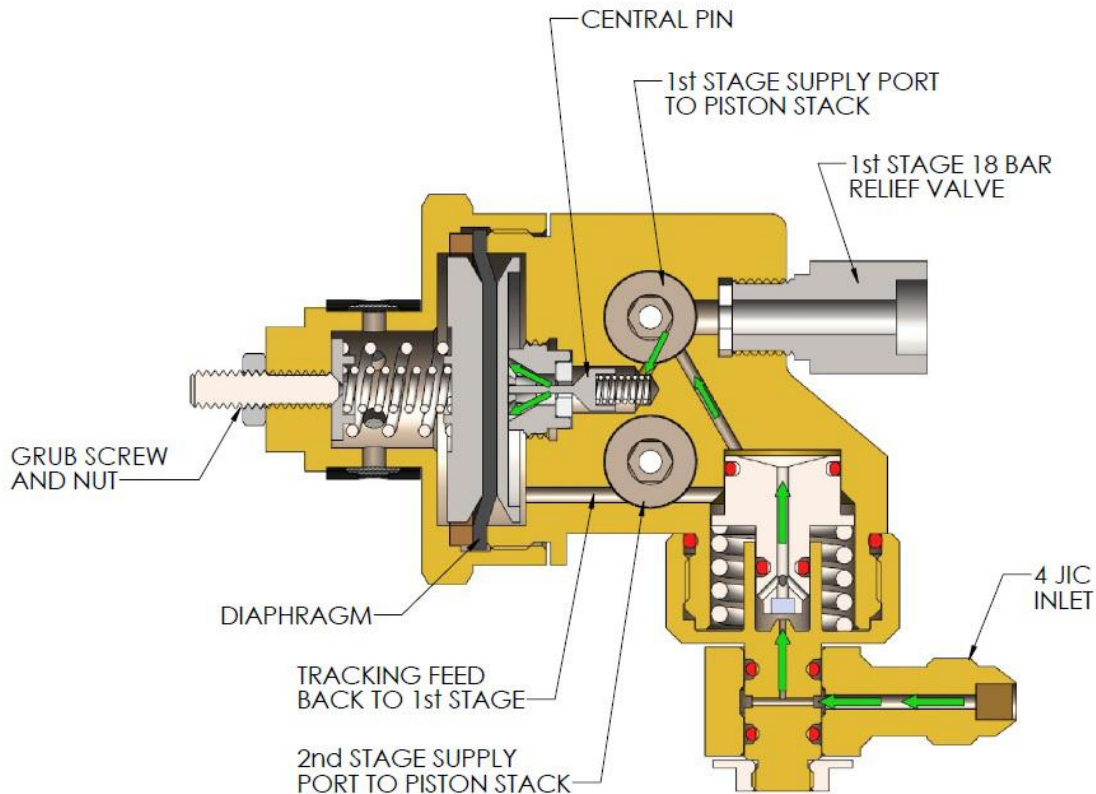
- 5.9.1 The two stage regulator provides two key functions to the system, the primary function being to supply a 1.5 bar over bottom pressure to the Lee Jet orifice system which in turn provides the correct gas flow into the rebreather circuit. The 2-stage mode of the regulator is necessary to provide the accurate pressure supply. A further function of the regulator is to supply the COBRA automatic demand valve with a gas supply when online, this ensures the demand is fed with approximately 11 bar over bottom to allow demand operation when loop volume reduces in situations such as diver descent.

Figure 59 2 Stage Regulator - 1st Stage



- 5.9.2 High pressure gas from the backpack cylinders are supplied to the 2-stage regulator 4 JIC swivel connection via a supply hose from the HP manifold. The 1st stage piston is initially held off the seat by the piston spring as shown in Figure 59. Gas flows past the seat and then along the hole in the centre of the piston into the chamber above the piston. The pressure in this chamber rises until it is sufficient to overcome the force exerted by the spring, the piston then moves across to seal the regulator port. At this point the gas is regulated at approximately 11 bar and available for the next stage but also feeds to the port in the piston stack ready to supply the demand valve in COBRA online mode.
- 5.9.3 Gas moves to the second stage which is regulated by diaphragm movement when the central pin is held off the seat by the diaphragm and support plate under the action of the spring. As pressure in the space to the right of the diaphragm increases, the diaphragm and hence pin moves to the left, sealing off the seat fully at the pre-set outlet pressure.
- 5.9.4 The outlet pressure is adjusted by varying the tension of the external spring by slackening the nut and adjusting the grub screw until the desired outlet pressure is achieved. The diaphragm is subject to external water pressure as well as spring force hence provides a tracked pressure output relative to depth which is also fed back to the first stage to provide a tracking function there too, as shown in Figure 60. The first stage is protected by an 18 bar relief valve, the 2nd stage is protected by a 4 bar relief valve, both mounted to the 2-stage regulator assembly.

Figure 60 Stage Regulator - 2nd Stage



5.10 Piston Stack / Demand / Positive Pressure

5.10.1 The piston stack conducts several functions within the COBRA system and is the key switch-over feature between offline / online modes. In offline mode the gas pressure from the umbilical supplied to the piston stack via the helmet actuation holds the piston down, overcoming the force of the lower piston spring, in this position the piston achieves the following conditions: -

- Supplies umbilical gas to the automatic demand valve to ensure any demand gas used in offline mode is not from the backpack supply.
- Isolates the two head mounted external relief valves from the breathing loop which in offline mode is positively pressurised. (Note: the internal relief valve always remains active for safety)
- Isolates the 1st and 2nd stage supplies from the piston stack.
- Creates a biasing force on the automatic demand valve by compressing the spring between the demand valve and piston linkage such that it becomes a positive pressure demand.

Figure 61 Location of Piston Stack / Demand Valve

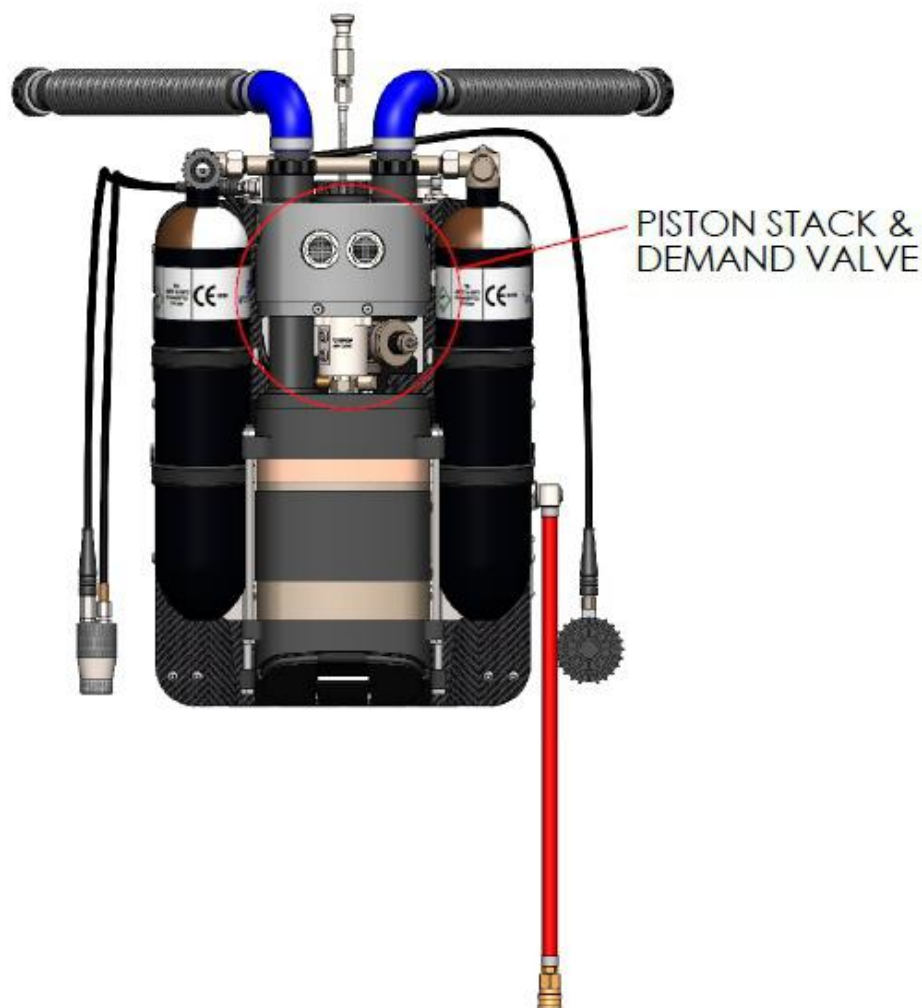
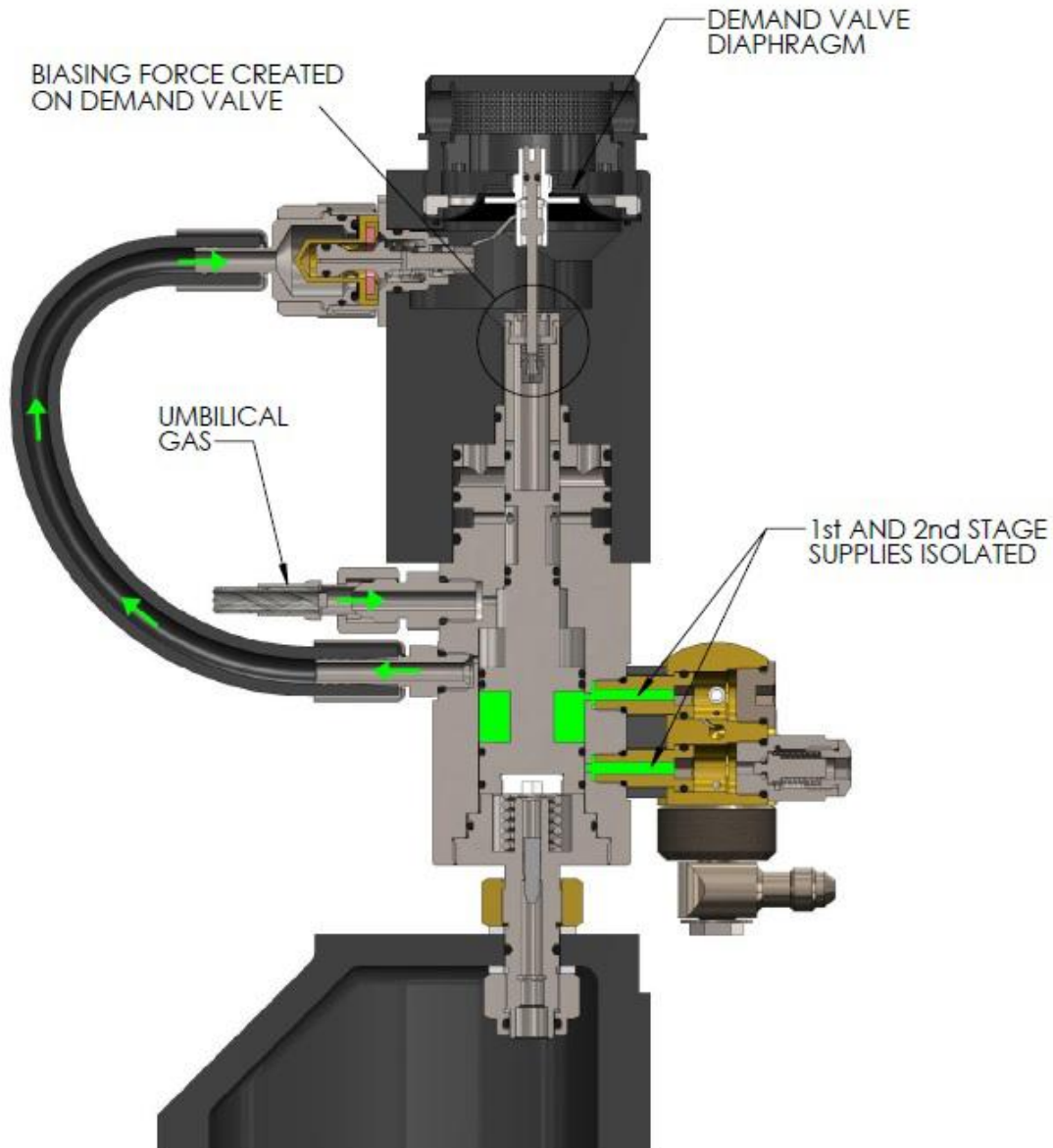
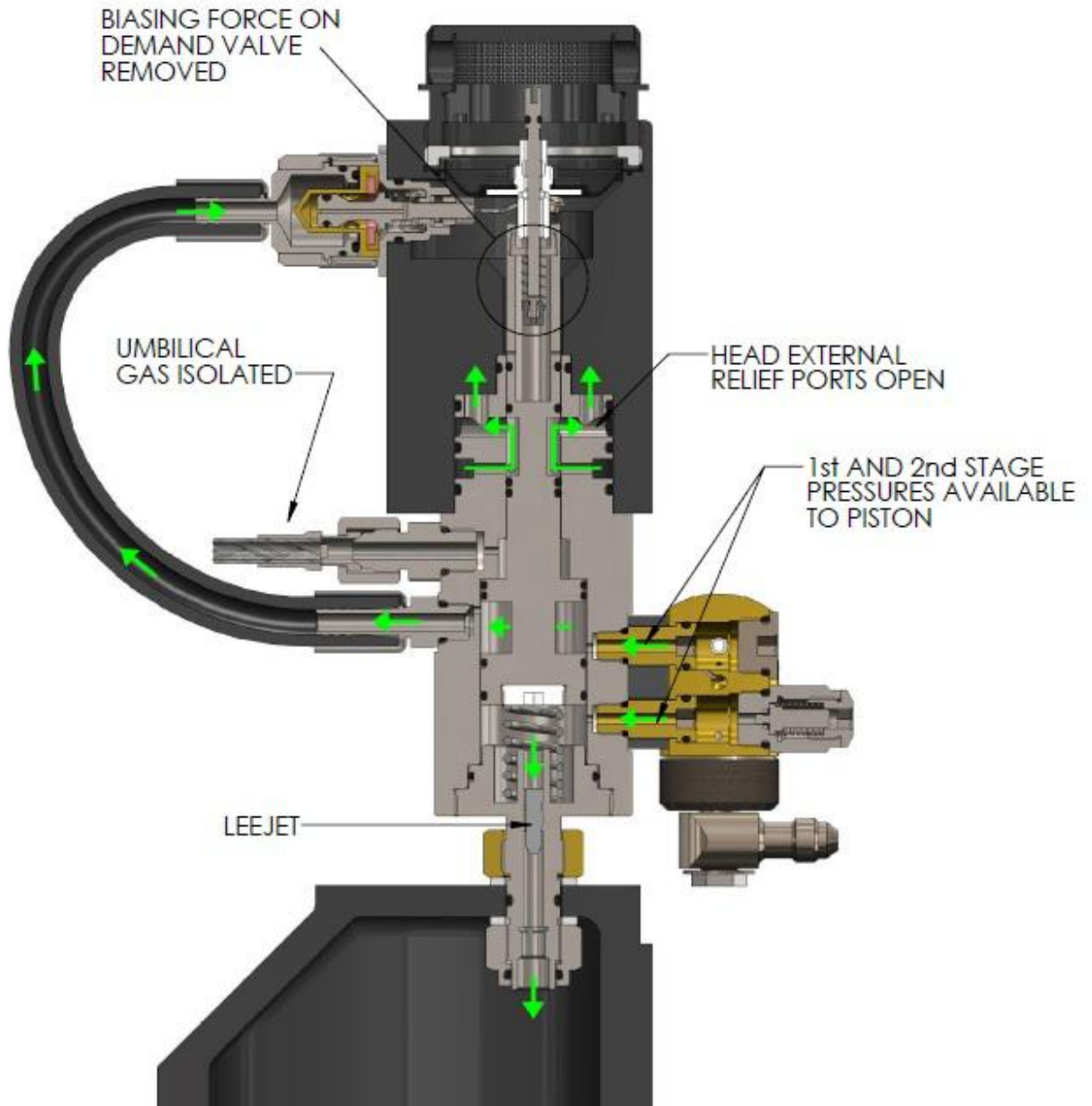


Figure 62 Piston Stack / Demand Valve Section – Offline



- 5.10.2 Upon loss of umbilical pressure or activation of COBRA by turning the handle the piston moves upwards as the spring force overcomes the loss of gas pressure. With this piston movement several functions occur: -
- The gas supply to the demand valve switches from umbilical to 1st stage pressure from the 2 stage regulator.
 - The two head mounted external relief valves become online to the breathing loop as the ports open.
 - The 1st and 2nd stage supplies from the 2-stage regulator become active in the piston stack.
 - The 2nd stage supplies the Lee Jet which in turn flow gas into the breathing circuit.
 - The biasing force is removed from the demand valve which returns to a conventional rebreather demand operating under negative pressure demands.

Figure 63 Piston Stack / Demand Valve Section – Online



5.11 Rotowink

5.11.1 The Rotowink is a mechanical pressure indicator that provides a simple green is good / red is bad indication of breathing loop pressure while COBRA is offline. The indicator senses differential pressure between the breathing loop internal pressure and a reference point sited in-between the internal and external head relief valves. The indicator displays green at a differential pressure of 30 mbar and greater and hence will indicate red at pressures below this indicating the positive pressure system has reduced below its preset value. The Rotowink is a completely sealed system with reference pressure taken from a dry pressure area hence reduces exposure to particulate and seawater to provide a very reliable pressure indicating system.

Figure 64 Rotowink – Red

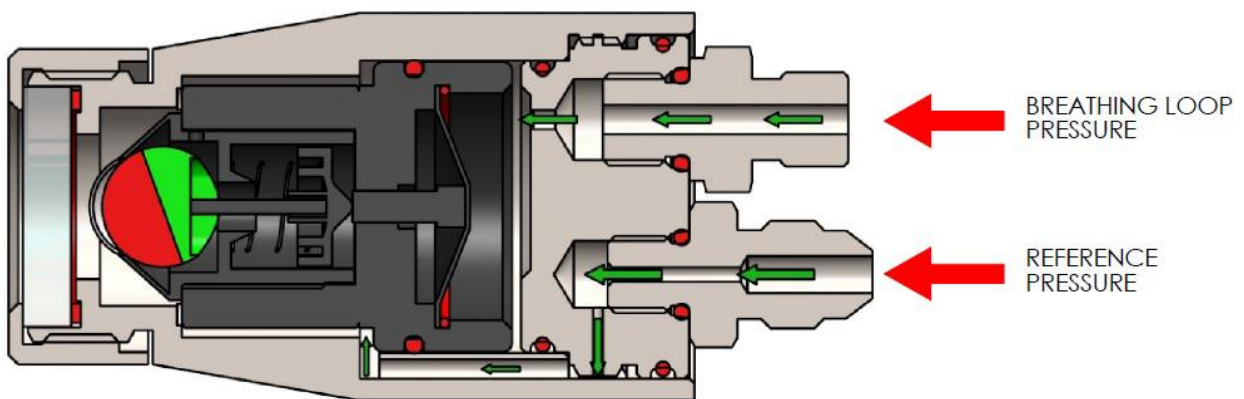
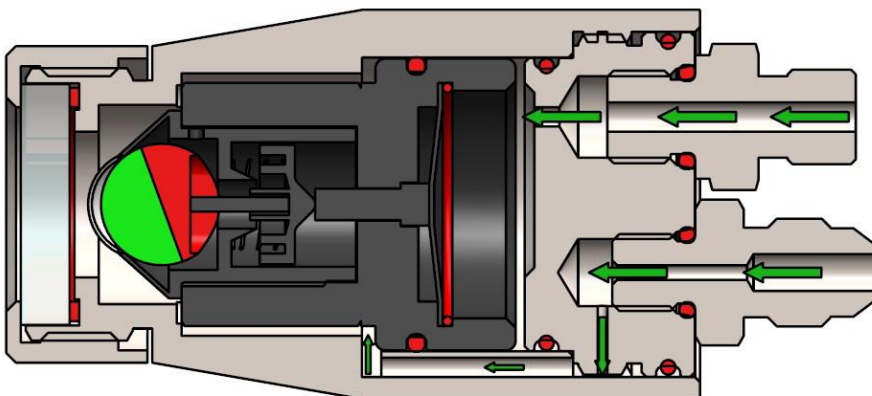


Figure 65 Rotowink – Green



6 Operating Information

6.1 Preparation for Use

6.1.1 Gas Selection

DANGER

IT IS ESSENTIAL THAT THE GAS CYLINDERS BE COMPLETELY EMPTY BEFORE FILLING AND THAT THE CORRECT GAS MIX IS USED FOR THE DIVING DEPTH. FAILURE TO DO THIS COULD RESULT IN EXTREME HAZARD TO THE DIVER.

6.1.1.1 The following table provides the limits of the gas mixtures, which should be used within the cylinders of the COBRA unit at various diving depths.

Table 2 COBRA Required Gas Mixtures

Depth (msw)	Gas mix (max %)	Gas mix (min %)	Depth (msw)	Gas mix (max %)	Gas mix (min %)
300	7.7	6.9	140	15.4	12.1
290	8.0	7.1	130	16.1	12.6
280	8.4	7.4	120	16.8	13.0
270	8.7	7.6	110	17.6	13.5
260	9.0	7.9	100	18.3	13.9
250	9.4	8.2	90	22.6	16.0
240	9.7	8.4	80	26.9	18.1
230	10.0	8.7	70	31.1	20.1
220	10.3	8.9	60	35.4	22.2
210	10.7	9.2	50	39.7	24.3
200	11.0	9.5	40	43.9	26.4
190	11.7	9.9	30	48.2	28.5
180	12.4	10.3	20	60.0	37.0
170	13.2	10.8	10	80.0	52.0
160	13.9	11.2	0	100.0	67.0
150	14.6	11.7			

DANGER

**THE COBRA SET MUST BE CHARGED ONLY WITH DIVING QUALITY GAS,
THE MIXTURE OF WHICH MUST COMPLY WITH TABLE 2.**

DANGER

**DO NOT CHARGE THE COBRA SET WITH AIR OR NITROX FOR ANY
DIVING PURPOSES. AIR MAY BE USED FOR BENCH TESTING ONLY.**

6.1.2 Example

Use of Table 2 COBRA Required Gas Mixtures.

1. A saturation dive is to be conducted at a working depth from 195 to 205 msw.
2. The divers will be living in Saturation at a depth of 190 msw.
3. The bell will normally be launched to a depth of around 190 msw.
4. Divers will be required to excurt down to the job site.
5. From Table 2 COBRA Required Gas Mixtures, check the Heliox mix required for the proposed working depth.
6. At 190 msw a heliox mix containing between 9.9 and 11.7% oxygen should be used in the COBRA set.
7. If a 10.3% heliox mix is available onboard the vessel.
8. From Table 2 COBRA Required Gas Mixtures, check that this Heliox mix will be acceptable for the complete working depth range (Include a safety factor to allow excursions outside the basic depth range).
9. This mix will allow the diver a maximum downward excursion to 220 msw.
10. This mix will allow the diver a maximum upward excursion to 180 msw.
11. Both these depths are beyond the proposed working depth range.
12. The proposed mix is therefore acceptable.

Note A warning label is attached to the chassis on the diver's left.

Figure 66 Gas Mixture Warning Sign



WARNING

COBRA SETS ARE DELIVERED O₂ CLEAN. O₂ CLEANLINESS MUST BE MAINTAINED, OR SETS MUST BE RE-CLEANED BEFORE USE WITH > 21% O₂.

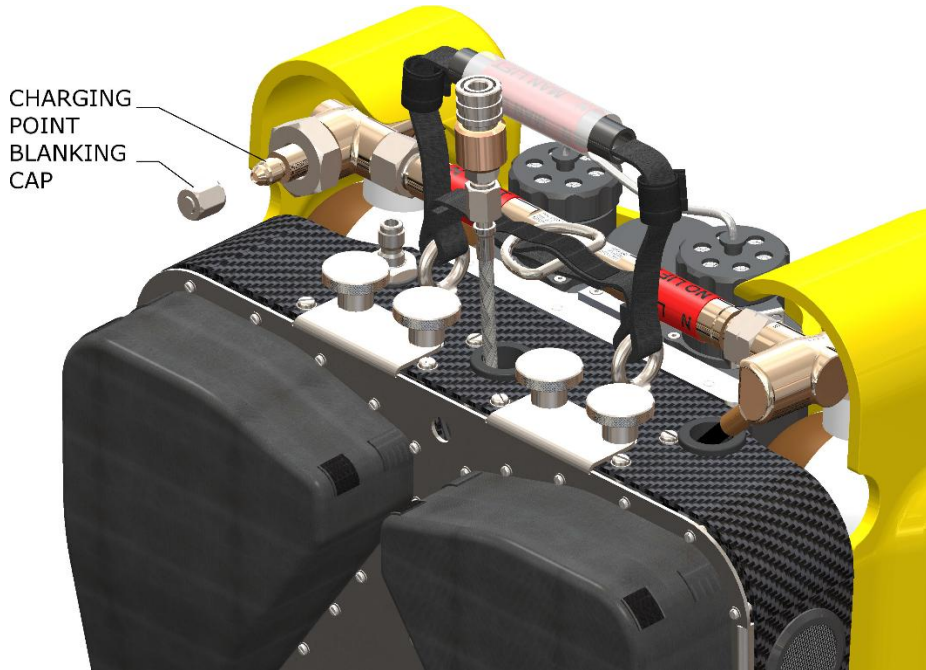
WARNING

NORMAL INDUSTRY PRECAUTIONS MUST BE TAKEN WHEN HANDLING GASES > 21% O₂.

6.2 Cylinder Charging

1. Ensure the COBRA Cylinder Shut off Valve is closed.
2. Identify the charging fitting, the connection is No.4 JIC.

Figure 67 Charging Point



3. Remove the blanking cap.
4. Connect a suitable gas supply.
5. Slowly charge the COBRA set to the required pressure (refer to Table 3 or Table 4 below).
6. Ensure charge pressure is sufficient after the cylinders have cooled.
7. Vent the charging whip and disconnect.
8. Replace the blanking cap on the charging point.

Note If the COBRA set has been used for training purposes and has been filled with oxygen or oxygen rich gas, it may be necessary to empty the set, fill with heliox and vent the set again before finally filling with heliox for diving purposes. Users must always ensure that the resulting mix in the COBRA cylinders is appropriate for the dive depth.

Note When analysing the cylinder contents, the flow adaptor and tube from the tool kit can be used to direct gas to the analyser.

Table 3 COBRA Duration (minutes) 2 x 2 Litre 300 bar Cylinders

Depth (m)	Cylinder Pressure (bar)																				
	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300
10	30	35	39	43	47	52	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
20	22	25	28	32	35	38	41	44	47	50	53	53	53	53	53	53	53	53	53	53	53
30	18	20	23	25	28	30	33	35	38	40	43	45	48	51	53	53	53	53	53	53	53
40	15	17	20	22	24	26	28	31	33	35	37	40	42	44	46	48	51	53	53	53	53
50	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53
60	12	14	15	17	19	21	23	24	26	28	30	32	33	35	37	39	41	42	44	46	48
70	11	12	14	16	17	19	20	22	24	25	27	29	30	32	34	35	37	39	40	42	44
80	10	12	14	15	17	19	20	22	24	25	27	29	30	32	34	35	37	39	40	42	44
90	9	11	13	14	16	17	19	20	22	23	25	26	28	29	31	33	34	36	37	39	40
100	9	10	11	13	14	16	17	19	20	21	23	24	26	27	29	30	31	33	34	36	37
110	8	9	11	12	13	15	16	18	19	20	22	23	24	26	27	28	30	31	32	34	35
120	8	9	10	11	13	14	15	17	18	19	20	22	23	24	26	27	28	30	31	32	33
130	7	8	10	11	12	13	15	16	17	18	19	21	22	23	24	26	27	28	29	31	32
140	7	8	9	10	11	13	14	15	16	17	19	20	21	22	23	24	26	27	28	29	30
150	6	7	9	10	11	12	13	14	15	17	17	19	20	21	22	23	25	26	27	28	29
160	6	7	8	9	10	11	13	14	15	16	17	18	19	20	21	22	24	25	26	27	28
170	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
180	5	6	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25	26
190	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
200	5	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24
210	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	21	22	23
220	4	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23
230	4	5	6	7	8	9	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22
240	4	5	6	6	7	8	9	10	11	12	13	13	14	15	16	17	18	19	20	20	21
250	4	5	5	6	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	21
260	3	4	5	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	19	20	20
270	3	4	5	6	7	7	8	9	10	11	11	12	13	14	15	15	16	17	18	19	20
280	3	4	5	6	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19
290	3	4	5	5	6	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19
300	3	4	4	5	6	7	7	8	9	10	11	11	12	13	14	14	15	16	17	17	18

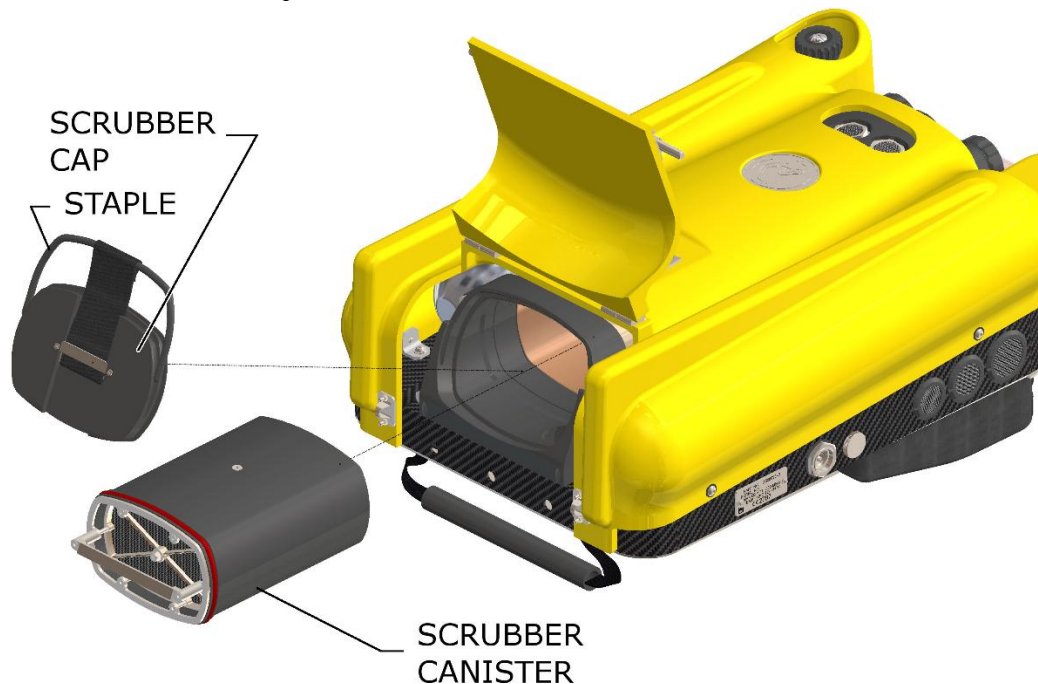
Table 4 COBRA Duration (minutes) 2 x 3 Litre 232 bar Cylinders

Depth (m)	Cylinder Pressure (bar)													
	100	110	120	130	140	150	160	170	180	190	200	210	220	230
10	47	53	53	53	53	53	53	53	53	53	53	53	53	53
20	34	39	43	48	53	53	53	53	53	53	53	53	53	53
30	27	31	35	38	42	46	50	53	53	53	53	53	53	53
40	23	27	30	33	37	40	43	47	50	53	53	53	53	53
50	20	23	26	29	32	35	38	42	45	48	51	53	53	53
60	18	21	24	26	29	32	35	37	40	43	46	48	51	53
70	16	19	21	24	26	29	31	34	36	39	41	44	46	49
80	15	17	19	22	24	26	29	31	33	35	38	40	42	45
90	13	15	18	20	22	24	26	28	30	33	35	37	39	41
100	12	14	16	18	20	22	24	26	28	30	32	34	36	37
110	11	13	15	17	19	21	23	25	26	28	30	32	34	36
120	11	12	14	16	18	20	21	23	25	27	29	30	32	34
130	10	12	13	15	17	19	20	22	24	26	27	29	31	32
140	9	11	13	14	16	18	19	21	23	24	26	28	29	31
150	9	10	12	14	15	17	18	20	22	23	25	26	28	29
160	8	10	11	13	15	16	18	19	21	22	24	25	27	28
170	8	9	11	12	14	15	17	18	20	21	23	24	26	27
180	8	9	10	12	13	15	16	18	19	20	22	23	25	26
190	7	8	10	11	13	14	15	17	18	20	21	22	24	25
200	7	8	9	11	12	13	15	16	17	19	20	22	23	24
210	6	8	9	10	12	13	14	16	17	18	19	21	22	23
220	6	7	9	10	11	12	14	15	16	18	19	20	21	23
230	6	7	8	10	11	12	13	14	16	17	18	19	21	22
240	6	7	8	9	10	12	13	14	15	16	18	19	20	21
250	5	6	8	9	10	11	12	14	15	16	17	18	19	21
260	5	6	7	8	10	11	12	13	14	15	17	18	19	20
270	5	6	7	8	9	10	12	13	14	15	16	17	18	19
280	5	6	7	8	9	10	11	12	13	14	16	17	18	19
290	4	5	7	8	9	10	11	12	13	14	15	16	17	18
300	4	5	6	7	8	9	10	12	13	14	15	16	17	18

6.3 CO₂ Scrubber Canister Replacement

- 6.3.1 The CO₂ Scrubber canister must be replaced following every occasion that COBRA is activated and breathed.
- 6.3.2 Users who do not carry out a 'pre-breathing test' before every dive must replace the scrubber canister in line with their operating procedures or if the COBRA set is breathed.
- 6.3.3 Using the following procedure to replace the scrubber canister.

Figure 68 Scrubber Canister Access



DANGER

THERE IS NOTHING INHERENT IN COBRA THAT FORCES THE USER TO INSERT A SCRUBBER CARTRIDGE. THIS TASK MUST BE MANAGED BY THE USER'S PROCEDURE.

WARNING

IRRESPECTIVE OF USER PROCEDURES IN RELATION TO SCRUBBER CANISTER REPLACEMENT, JFD STRONGLY ADVISE THAT THE SCRUBBER DOOR AND SCRUBBER CANISTER ARE REMOVED AND THE INTERIOR OF THE SET IS INSPECTED BEFORE EVERY DIVE.

1. Open the hatch on the bottom of the cover, remove if necessary.
2. Withdraw the Staple from the Scrubber Cap.
3. Remove the Scrubber Cap from the Scrubber Housing.

4. Pull the Scrubber Canister out from the Scrubber Housing.
5. Check the O-ring on a freshly charged scrubber for damage, replace if required. Insert the freshly charged Scrubber Canister.
6. Replace the Cap Assembly and Staple. Refit and close the hatch.

Note JFD recommends securing the staple in position with a cable tie.

Note A correctly charged scrubber weighs approximately 2.3 kg.

CAUTION

Do not pressurise or depressurise the Scrubber Canister too rapidly when transferring in or out of the dive system or damage may result.

Note Ensure the Scrubber Canister is not in a sealed bag or container during transfer.

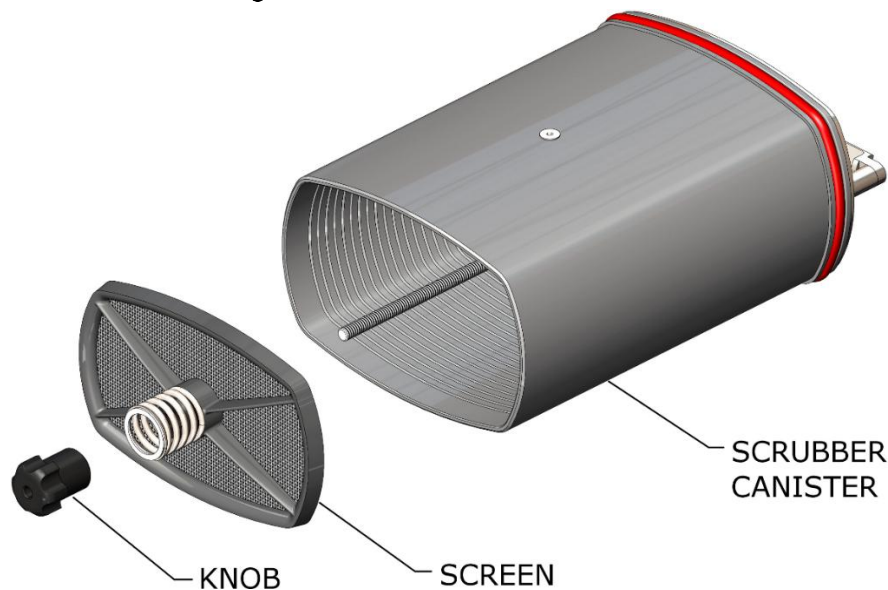
6.4 CO₂ Scrubber Canister Filling

Note To obtain the stated CO₂ endurance and work of breathing performance, it is essential that the correct CO₂ absorbent is used, the only approved absorbent for use in the COBRA system is Molecular Products 797 grade Sofnolime.

Note Care should be taken to avoid the Scrubber Canister becoming wet at any time.

1. Remove the Scrubber Canister from the COBRA set as described in Para 6.3.

Figure 69 Scrubber Canister



2. Remove the Knob and the Screen Assembly.
3. Half fill the canister with sodalime.

4. Tap the canister until the sodalime settles.
5. Fill the canister until the sodalime is 50 mm down from the top of the canister.
6. Tap the canister until the sodalime settles.
7. Top up sodalime if necessary
8. Tap the canister until the sodalime settles.
9. Fit the screen assembly.
10. Fit and tighten the knob until the spring is compressed.

6.5 Pre-Dive Bell Checks

Bellman Checks

1. Ensure that the scrubber canister is fitted in accordance with user procedure.
2. Connect the Inhale and Exhale hoses between the backpack and helmet.

DANGER

IF THE COBRA CYLINDERS ARE TURNED ON, THEN TURNED OFF (FOR ANY REASON), THE CONTENTS GAUGE WILL CONTINUE TO SHOW THE CYLINDER PRESSURE UNTIL THE SET IS ACTIVATED, WHEN THE INDICATED PRESSURE WILL DROP QUICKLY.

USERS MUST NOT TAKE A HIGH READING ON THE CONTENTS GAUGE TO INDICATE THAT THE CYLINDERS ARE TURNED ON. THIS TASK MUST BE MANAGED BY THE USER'S PROCEDURE.

DANGER

BACKPACK:

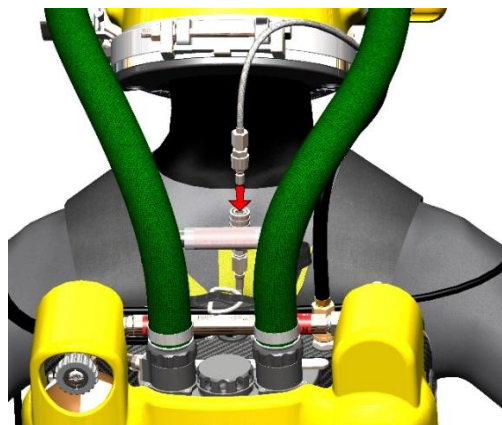
THE NUT WILL TURN 3.5 FULL TURNS AFTER ENGAGING WITH THE ADAPTOR ON THE BACKPACK. FAILURE TO PROPERLY ENGAGE NUT CAN LEAD TO UNEXPECTED DISCONNECTION OF HOSE. NO THREAD SHOULD BE VISIBLE ON THE BACKPACK CONNECTOR AFTER CORRECT FITMENT.

DANGER

HELMET:

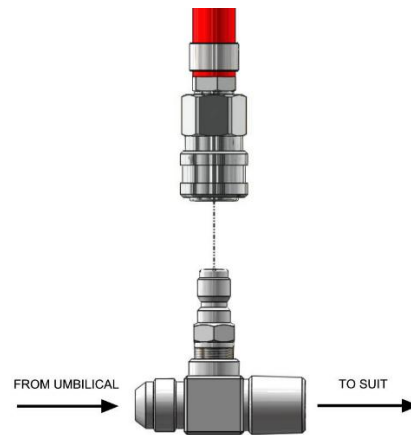
THE NUT WILL TURN 2 FULL TURNS AFTER ENGAGING WITH THE ADAPTOR ON THE HELMET. FAILURE TO PROPERLY ENGAGE NUT CAN LEAD TO UNEXPECTED DISCONNECTION OF HOSE. NO THREAD SHOULD BE VISIBLE ON THE HELMET CONNECTOR AFTER CORRECT FITMENT.

3. Connect the small braided hose between the backpack and the helmet. Secure the quick connect with the locking collar.



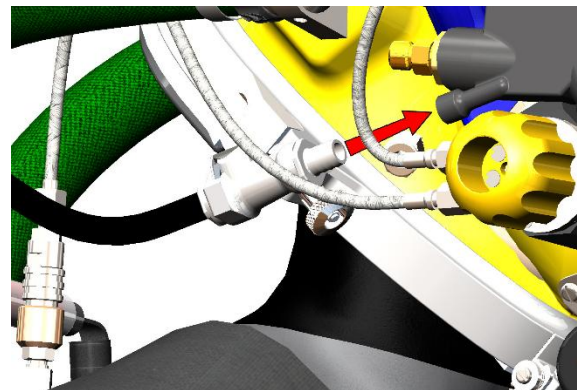
Note Do not turn on the COBRA cylinders prior to connecting the braided hose between the backpack and the helmet. This will cause the set to activate and waste bailout gas.

4. Connect the COBRA hot water supply hose to the splitter block.



5. Connect the gas heating hose from the COBRA set to the shroud if required by procedure or conditions.

Note Right hand breathing hose not shown for clarity.



6. Turn helmet gas supply on and confirm gas flow.
7. Stow mouthpiece.
8. Check Rotowink is indicating green.
9. Turn COBRA cylinders on and check cylinder pressure.

DANGER

THE ONLY THING THAT IS INDICATED BY A GREEN ROTOWINK IS THAT THE SET IS POSITIVELY PRESSURISED (WITH UMBILICAL GAS). IT DOES NOT INDICATE THAT THERE IS GAS IN THE CYLINDERS, THAT A SCRUBBER IS FITTED OR THAT THE SET WILL ACTIVATE.

10. Bellman to activate the COBRA set. Confirm that an initial rush of gas followed by a small constant flow is detected and that the Rotowink turns red.
11. Stow the COBRA mouthpiece, confirm that the Rotowink turns green and check the cylinder pressure.
12. Bellman checks are now complete.

Diver Checks

13. Confirm Helmet gas supply
14. Confirm the Rotowink is green and check the cylinder pressure.

15. Don the Backpack, adjust the straps and fasten the belt.



16. Don the Helmet.
17. Enter the trunking for in-water leak checks.
18. Activate the COBRA set but do not engage mouthpiece.

Note External relief valves will not vent when mouthpiece is not engaged. COBRA gas will discharge into helmet.

19. When activated, the Rotowink will turn to red.
20. Check the cylinder pressure.
21. Deactivate COBRA mode and stow the mouthpiece FULLY.

22. Confirm Rotowink has changed to green.
23. Perform leak check.
24. Confirm cylinder pressure.



DANGER

**DO NOT DIVE A COBRA SET EXHIBITING UNEXPLAINED LEAKAGE.
ANY LEAKAGE MUST BE INVESTIGATED AND EXPLAINED**

6.6 Post Use Procedures

6.6.1 Post Dive / Duty Cycle

6.6.1.1 The following describes the actions necessary after the COBRA set has been in use but **NOT** breathed from, before the set may be returned to duty. User procedure will determine which of these actions are performed in the dive system and which require the set or component to be locked out

1. If the set has been breathed from follow the procedure at section 6.6.2
2. Check whether the set requires re-charging. Top-up the COBRA cylinders if necessary.
3. Disconnect the helmet from the COBRA backpack.
4. Disinfect the helmet in accordance with normal procedures.
5. Remove the Scrubber Canister as described in Para 6.3.
6. Inspect the interior of the scrubber canister housing and verify it is dry.
7. User dive policy will determine at which point the fresh Scrubber Canister is fitted.

6.6.2 After Breathing From the Set

*Note JFD recommends that the hygiene routine detailed in section 6.6.3 is performed any time the set is breathed.
Users that choose not to perform hygiene at this time should take the opportunity to do this any time the equipment is removed from the dive system for any reason.*

6.6.2.1 The following describes the actions recommended by JFD after the COBRA set has been activated and breathed from, before diving the set again. User procedure will determine which of these actions are performed in the dive system and which require the set or component to be locked out.

1. Check whether the set requires re-charging. Top-up the COBRA cylinders if necessary.
2. Perform hygiene routines as per company policy or as detailed in 6.6.3.
3. Fit new scrubber canister.

6.6.2.2 If a COBRA set is removed from the dive system after activation for hygiene purposes only, it is not necessary to vent the cylinders and fill with air as for a full bench dive. The following test should be performed before putting back into service.

1. Check Positive Pressure Settings, ref 10.2.



DANGER

**CARE MUST BE TAKEN NOT TO INHALE HYPOXIC GAS DURING
DEMAND VALVE CRACKING PRESSURE TESTING**

2. Check the Demand Valve Cracking Pressure, ref 10.7.
3. Loop Integrity Test, ref 10.11.
4. Check Rotowink, ref 10.8.

6.6.3 Cleaning and Disinfection

Note The following procedure is recommended by JFD Ltd. Users may develop their own procedures for example substituting Chemgene wipes for spray bottle.

6.6.3.1 JFD recommend using 10% Chemgene solution (max 40°C) for cleaning and disinfection purposes. This is one possible procedure. Users may develop their own procedure. One common variation is the use of Chemgene wipes in place of a spray bottle.

6.6.3.2 Required resources:

- Spray bottle containing 10-1 Chemgene solution.
- 2 litre jug containing 10-1 Chemgene solution.
- Spray bottle containing potable water.
- 2 litre jug containing potable water.

6.6.3.3 Hat

1. Hold the hat upside down to gain access to the inside.
2. Deploy the mouthpiece
3. Spray the mouthpiece, oral nasal and nose block with Chemgene solution.
4. Move the mouthpiece to half deployed position.
5. Spray any previously inaccessible areas.
6. Close the mouthpiece.
7. Pour Chemgene solution into the inhale and exhale ports on the helmet.
8. Leave to soak for 10 minutes.
9. Tip the hat to pour out the Chemgene solution.
10. Place the hat on the ball valve side and deploy the mouthpiece, a small volume of Chemgene solution may run into the hat.
11. Close the mouthpiece.
12. Repeat the above procedure excluding the 10 minute soak using potable water to rinse out the Chemgene solution.

6.6.3.4 Set

1. Remove the counterlungs and breathing hoses.
2. Spray the breathing hose connections and counterlung ports with Chemgene solution.
3. Remove the scrubber door and scrubber
4. Spray the inside of the scrubber housing including scrubber door interior face.
5. Spray the exterior of the removable scrubber and also the handle.

6. Leave for 10 minutes.
7. Use spray bottle filled with potable water to rinse all the areas previously sprayed with Chemgene solution
8. Dry these areas using lint free cloths.

6.6.3.5 Hoses

Note The following procedure may be substituted by submerging and agitating the hoses in dilute Chemgene solution.

1. For each hose, form the hose into a U shape.
2. Pour Chemgene solution into the hose.
3. Rock the hose to ensure all internal surfaces are coated with Chemgene solution.
4. Pour out Chemgene solution and leave for 10 minutes.
5. Rinse in the same way with potable water, hoses are sufficiently rinsed once no foam or froth is observed.

6.6.3.6 Counterlungs

Note The following procedure may be substituted by submerging and agitating the counterlungs in dilute Chemgene solution.

1. For each counterlung, part fill with Chemgene solution.
2. Manipulate the lung to ensure all internal surfaces are coated with Chemgene solution.
3. Pour out the liquid.
4. Leave for 10 minutes.
5. Rinse in the same way with potable water, counterlungs are sufficiently rinsed once no foam or froth is observed.
6. Care should be taken to adequately empty and rinse the long counterlung.
7. Although it is not necessary for the counterlungs to be fully dried before re-use, dampness can encourage bacterial growth. Before long-term use or storage it is recommended the counterlungs be completely dried.

6.6.4 Cylinder Pressure Top-up

6.6.4.1 If a COBRA set is removed from the dive system outwith a planned maintenance period, only for the purpose of topping up the cylinders, it is not necessary to perform a full bench dive before putting back into service. The following tests are to be performed.

1. Check Positive Pressure Settings, ref 10.2



DANGER

CARE MUST BE TAKEN NOT TO INHALE HYPOXIC GAS DURING DEMAND VALVE CRACKING PRESSURE TESTING

2. Check the Demand Valve Cracking Pressure, ref 10.7.
3. Loop Integrity Test, ref 10.11.
4. Check Rotowink, ref 10.8

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7 Operational Procedures

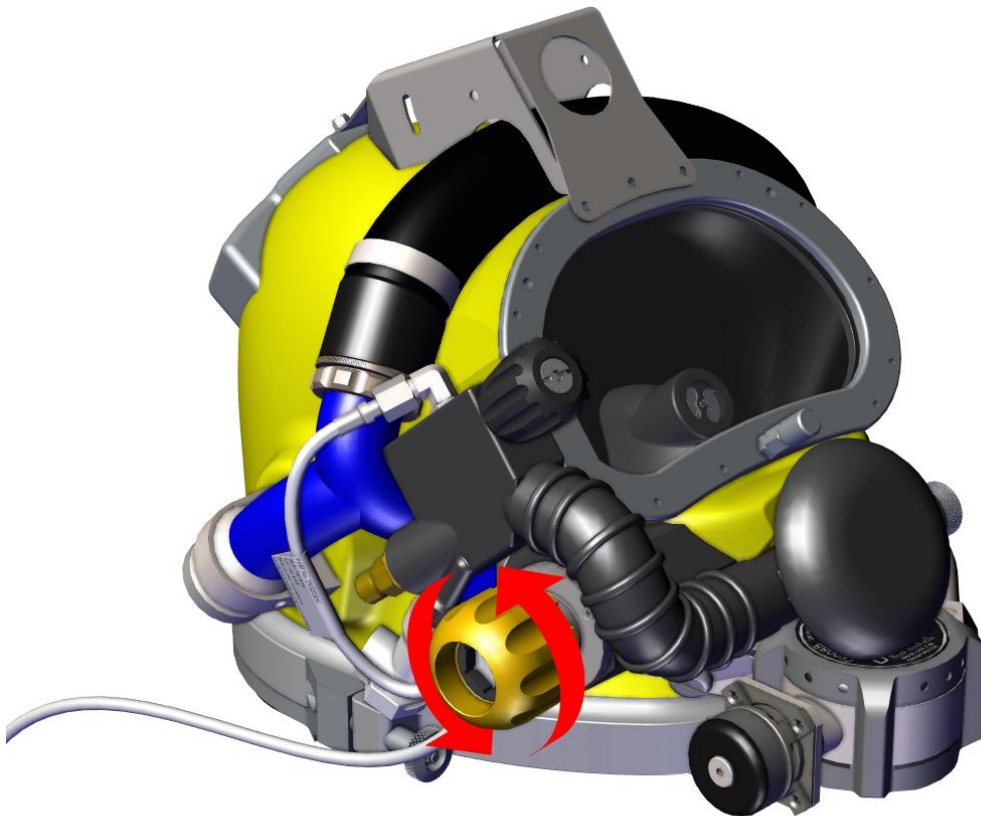
7.1 Actuation

7.1.1 The COBRA system may be actuated in the event of:

- Loss of primary gas supply.
- Contamination or other problem with the primary gas supply.
- Loss of primary gas heating.
- Incorrect gas mix connected to primary gas supply.
- Loss of Helmet integrity, e.g. flooding.
- Other situations requiring that the diver resort to his bailout procedure.

7.1.2 The COBRA System is actuated by rotating the interface handle on the helmet anti-clockwise and grasping the mouthpiece in the mouth.

Figure 70 **Helmet Actuation**



7.1.3 Following actuation, the diver should breathe normally through the mouthpiece. He should avoid breathing through his nose. The nose block device in the helmet may be helpful for this purpose.

7.2 Equipment Lock Transfer Procedures

- 7.2.1 The COBRA Backpack must be disconnected from the Helmet prior to locking the System in or out of a chamber complex or prior to compression/de-compression of a diving bell/chamber with the COBRA System inside. Disconnection must be carried out to prevent external compression which could result in damage to the COBRA System.
- 7.2.2 Gas cylinders should be charged prior to compression of the Backpack to prevent the possibility that external pressure could be applied to the cylinders and pipework.

Note Always use the supplied hose connector protection caps (Divex Part No. D311) when moving the Helmet or Backpack. These should be kept in pairs on a lanyard in the bell.

CAUTION

Do not rapidly pressurise or de-pressurise the COBRA system in equipment-locks or medi-lock. This will permit gas spaces and voids to equalize safely and not damage the equipment.

7.3 Compression (Lock In) Procedure for the CO₂ Scrubber Canister

1. Place the refilled CO₂ scrubber canister into the equipment lock and compress it.
2. Once inside, place the CO₂ scrubber canister into a plastic bag for storage prior to use. This will keep the sodalime dry.
3. Care must be taken to ensure spare canisters are kept dry at all times.

CAUTION

Do not fit the CO₂ scrubber canister inside a plastic bag or other sealed containers before locking it into the complex as the pressurisation will destroy the canister wire mesh during compression if the bag is sealed.

8 Tool and Test Kit (DB5002091)

8.1 Top Layer

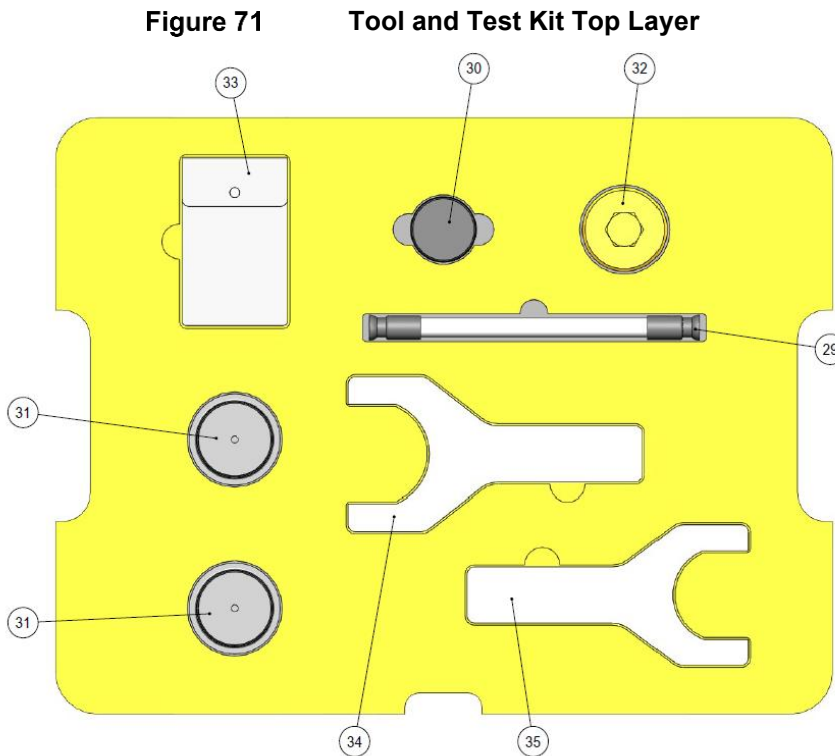


Table 5 COBRA Tool and Test Kit

Item No	Part Number	Description	No.Off
29	E16649	TOOL,VALVE GRINDING	1
30	DB5002627	PLUG, TEST, COMPLETE, BOTTOM PLENUM, COBRA	1
31	DB5002628	PLUG, TEST, COMPLETE, HEAD, COBRA	2
32	DB5004034	TOOL, TORQUING, MANIFOLD ELBOW, COBRA	1
33	TA61559	SPANNER SET, SMALL, ANGLED, 4-7.5MM	1
34	DB5003530	SPANNER, LARGE, LUNG, COBRA	1
35	DB5003531	SPANNER, SMALL, LUNG, COBRA	1

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8.2 Middle Layer

Figure 72 Tool and Test Kit Middle Layer

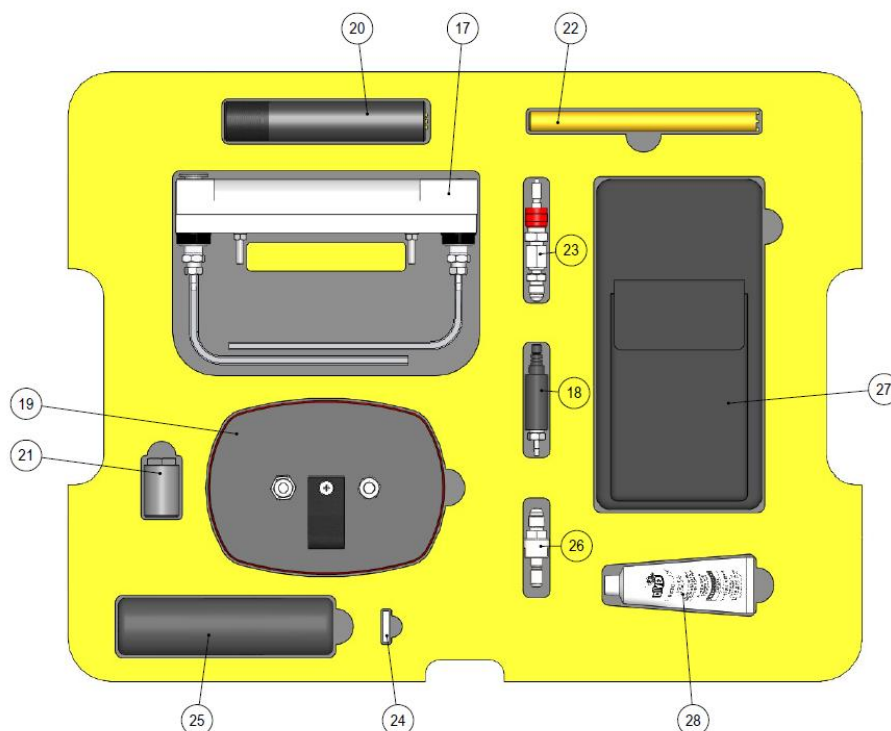


Table 6 COBRA Tool and Test Kit

Item No	Part Number	Description	No.Off
17	DB5002587	FLOWMETER ASSEMBLY, COBRA TTK	1
18	DB5002589	ADAPTOR ASSEMBLY, EXTENDED, LEE JET, TTK, COBRA	1
19	DB5002916	CAP, TEST, ASSEMBLY, SCRUBBER, COBRA	1
20	DB5002917	TOOL, FLANGE, HELMET ACTIVATION, COBRA	1
21	DB5003284	TOOL, MESH HOLDER, SET ACTIVATION, COBRA	1
22	DB5003849	TOOL, CAP, PISTON, COBRA	1
23	DB5003979	QUICK CONNECT STEM, O2 CLEANED, COBRA	1
24	DB5004057	INSERT, PISTON TOOL, COBRA	1
25	DB5004058	PIN, PISTON TOOL, COBRA	1
26	DB5004080	QC STEM, COBRA ACTIVATION	1
27	E15777	PORTABLE PRESSURE GAUGE & HOSE 0-200 MBAR	1
28	SM034	GREASE, CHRISTO-LUBE MCG-111, 2.OZ TUBE	1

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8.3 Bottom Layer

Figure 73 Tool and Test Kit Bottom Layer

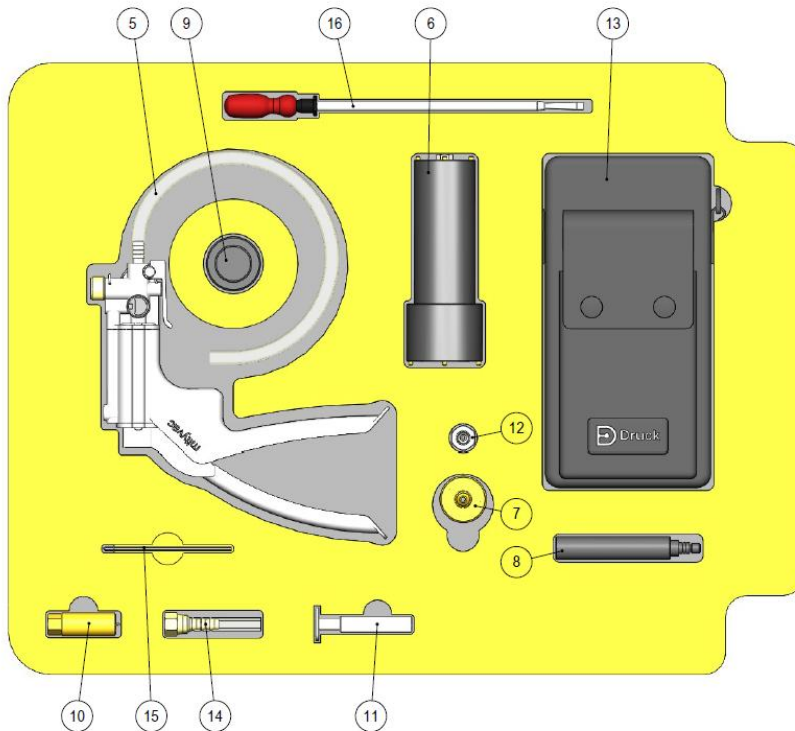


Table 7 COBRA Tool and Test Kit

Item No	Part Number	Description	No.Off
5	DB1002239	PUMP, VACUUM/PRESSURE, HAND W/ BLANK & TUBING	1
6	DB5002586	TOOL ASSY, RING, DIAPHRAGM, DEMAND VALVE, COBRA	1
7	DB5002588	ADAPTER, TESTING, HOT WATER RELIEF, COBRA	1
8	DB5002590	ADAPTOR ASSEMBLY, BLANKING, LEE JET, TTK, COBRA	1
9	DB5002917	TOOL, FLANGE, HELMET ACTIVATION, COBRA	1
10	DB5003256	PLUG, BLANKING, RELIEF, EXTERNAL, COBRA	1
11	DB5004032	TOOL, ROTOWINK REMOVAL, COBRA	1
12	E16133	ADAPTOR FITTING, C/W O-RING, TOOL AND TEST KIT	1
13	E16696	PORTABLE PRESSURE GAUGE & HOSE ASSY 0-20 BAR	1
14	DB5002591	ADAPTOR ASSEMBLY, 4 JIC, FLOWMETER, COBRA	1
15	TA224	TOOL, ALLEN KEY, 3/32"	1
16	TA61545	SCREWDRIVER, FLAT, GRIPPING, 0.02" TIP	1

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9 Torque Settings

Part No.	Description	Torque	
General			
	M3 screw in Tappex Insert (unless noted otherwise)	3 lbf/in (0.34 Nm)	
	M8 screw in Tappex Insert	25 lbf/in (2.8 Nm)	
HP Manifold			
DB5002101, DB5002102	M18 Elbow– cylinder	50-55 lbf/ft (67-74 Nm)	
DB5003497, DB5003738	Manifold Lock Nuts	20 lbf/ft (27 Nm)	
DB5002403	Charging Assembly	20 lbf/ft (27 Nm)	
DB5003419	Charge Adaptor Check Valve	20 lbf/in (2.2 Nm)	
DB5003724	Charging Assembly Lock Nut	20 lbf/ft (27 Nm)	
E13548	Valve Spindle Retaining Nut	10 lbf/ft (13.5 Nm)	
DB5002195	HP Gauge Connection	40 lbf/in (4.5 Nm)	
Scrubber / Hot Water Housing			
FB55561, FB55562	M8 Tie Bolts	20 lbf/in (2.2 Nm)	
FB78929	M4 x 35 Water Jacket Shell Screws	12 lbf/in 1.35 Nm	
Head			
DB5002131	External Relief Valve	50 lbf/in (5.6 Nm)	
Charge Point Check Valve			
DB5003419	Check Valve, Charge Adaptor, Twin Cyl Manifold	10 lbf/ft (13.5 Nm)	
Items Requiring Loctite		Torque	Loctite
DB5003198	Nut, Retaining, Swivel, Two Stage Regulator, Cobra	5 lbf/in (0.56 Nm)	222
DB5003360	Nut, Spring, Positive Pressure, Cobra	Finger Tight	222
FB263	Screw, M/C, Csk, Slotted, M4 X 12mm Long, SS 316 (Activation Handle Fixing)	5 lbf/in (0.56 Nm)	222
DB5003905	Screw, M3, Telescopic Sleeve Assy, Cobra	5 lbf/in (0.56 Nm)	222
D2815A	Screw, 10 UNC	5 lbf/in (0.56 Nm)	222
FB509	Activation Assembly securing screws (3 off)	8 lbf/in (0.90 Nm)	222 (on countersink only)

10 Bench Test Procedure

The following procedure should be undertaken before putting the set into service, periodically as dictated by the users maintenance schedule and anytime there is any doubt about the performance of the set.

All test fittings are included in the COBRA Tool and Test Kit (DB5002091).

Note Unless stated otherwise all COBRA tests are carried out with the COBRA breathing hose adaptors linked using a standard COBRA breathing hose.

DANGER

THE FOLLOWING PROCEDURE IS PERFORMED WITH THE SET CHARGED WITH BREATHING QUALITY AIR. IT IS IMPERATIVE THAT ALL AIR IS DRAINED FROM THE CYLINDERS AND THE SET IS FILLED WITH AN APPROPRIATE GAS BEFORE DIVING. AIR IS NEVER A SUITABLE GAS FOR DIVING USE IN THE COBRA SET. VENT ALL AIR FROM THE COBRA SET IMMEDIATELY AFTER PERFORMING THIS PROCEDURE. DO NOT LEAVE A COBRA SET CHARGED WITH AIR UNDER ANY CIRCUMSTANCES.

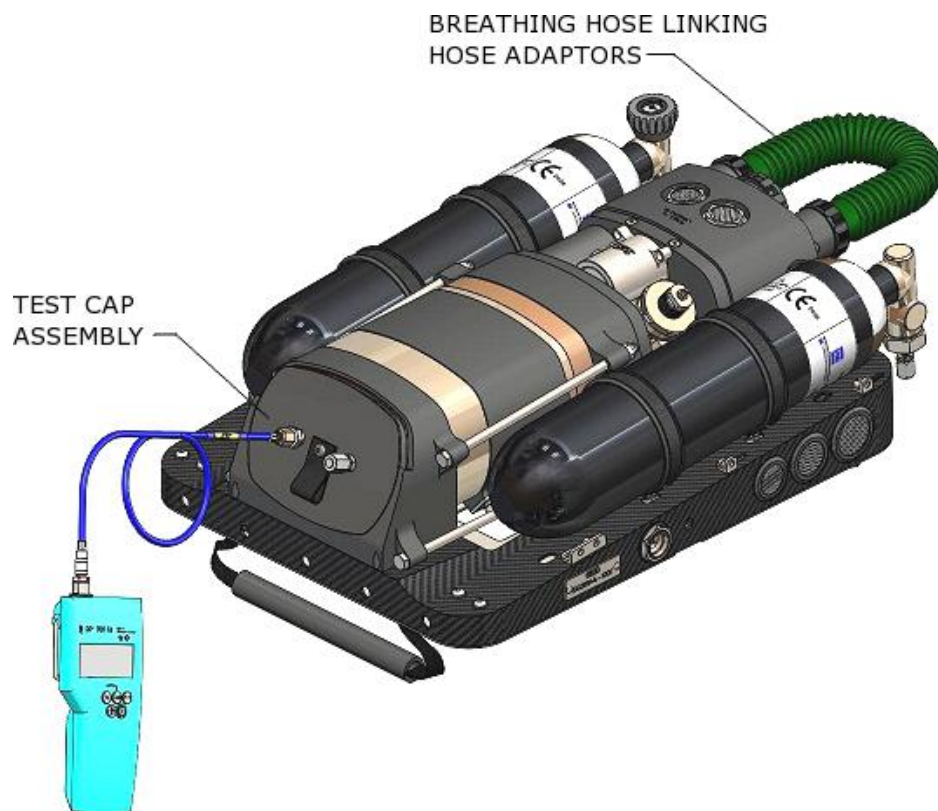
10.1 Charge the COBRA Cylinders

1. Charge the COBRA cylinders with 100 bar breathing quality air. See section 6.2 Cylinder Charging for charging instructions.

10.2 Check Positive Pressure Settings

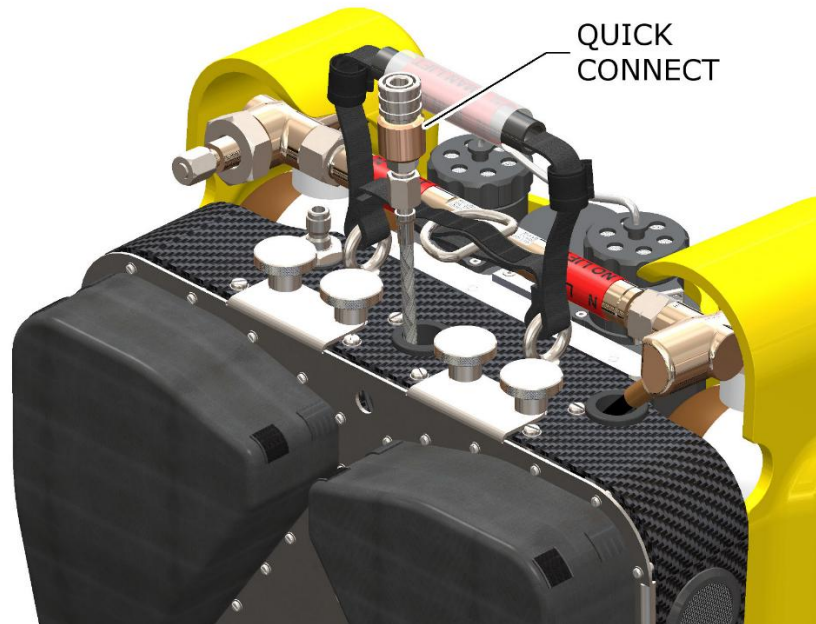
1. Remove the cap assembly and scrubber canister from the scrubber/hot water housing and fit the test cap assembly (DB5002916).
2. Connect a 200 mbar Druck pressure indicator (E15777) to the 1/8" BSP adaptor. Blank the 4 JIC adaptor.
3. Link the COBRA breathing hose adaptors using a standard COBRA breathing hose.

Figure 74 Loop Integrity Test



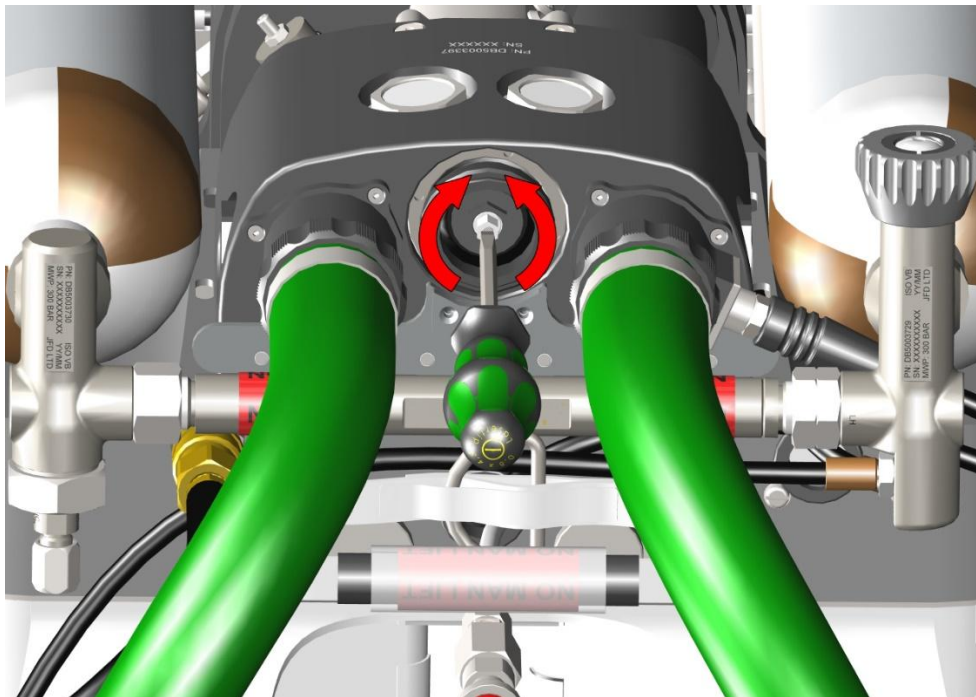
4. Connect a clean air supply to the COBRA backpack via the quick connect and slowly apply 15 bar pressure.
5. Confirm positive pressure setting remains acceptable if the 15 bar supply is applied rapidly.

Figure 75 Quick Connect



6. Open the COBRA cylinder shut-off valve.
7. Remove the demand valve cover and adjust the positive pressure rod until 50 ± 5 mbar is achieved.

Figure 76 Adjusting Positive Pressure Rod



10.3 Check Internal Exhaust Valve Settings

Note Ensure the COBRA backpack is placed on a bench in the horizontal position with the exhaust valves facing up.

1. Gently press the demand valve diaphragm to slow purge the demand valve. Continue until gas vents from the relief valve.
2. Verify that the set is venting gas at 80 to 100 mbar. This value should be achieved while venting through both internal and external valves.
3. If the correct settings cannot be achieved replace the exhaust valve in accordance with 13.4 Internal Exhaust Valve Replacement, then re-commence this test.

10.4 Check External Exhaust Valve Settings

1. Remove one of the external exhaust valves, and fit the test blank (DB5003256).
2. Remove the 15 bar supply to the COBRA set. The COBRA set will operate and begin to fill with gas.

Figure 77 Fit Test Blank DB5003298

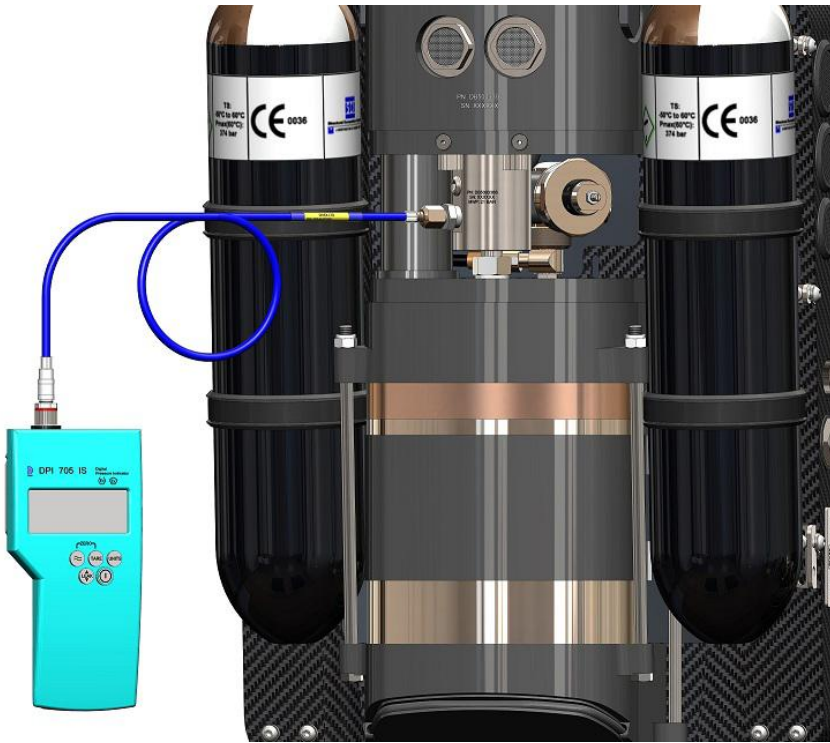


3. Verify the set vents gas at 19 ± 3 mbar.
4. If the correct settings cannot be achieved replace the exhaust valve in accordance with 13.1 Backpack Disassembly, then re-commence this test.
5. Repeat for the second exhaust valve.

10.5 Check Lee-Jet Supply Flow and Pressure

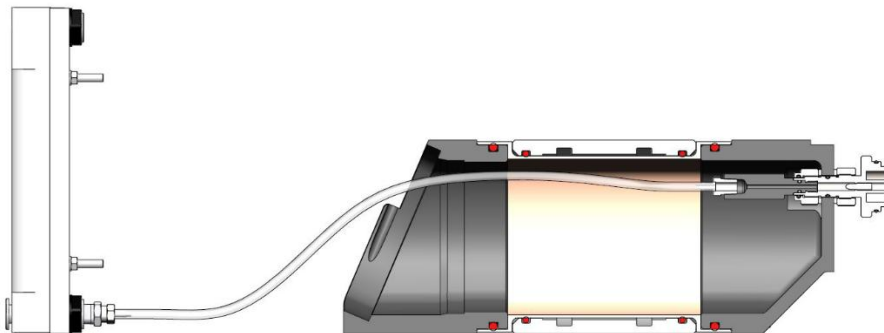
1. Disconnect the 200 mbar Druck from the adapter on the scrubber test cap. Blank the 1/8" BSP adapter.
2. Remove the lower 3/8" UNF plug from the piston housing and fit a 3/8" UNF – 1/8" BSP adapter (E16133). Connect the 20 bar Druck (E16996).

Figure 78 Druck Connection



3. Fit the Flow Adaptor (DB5002589) to the lee-jet outlet. Fit the Flowmeter (DB5002587)

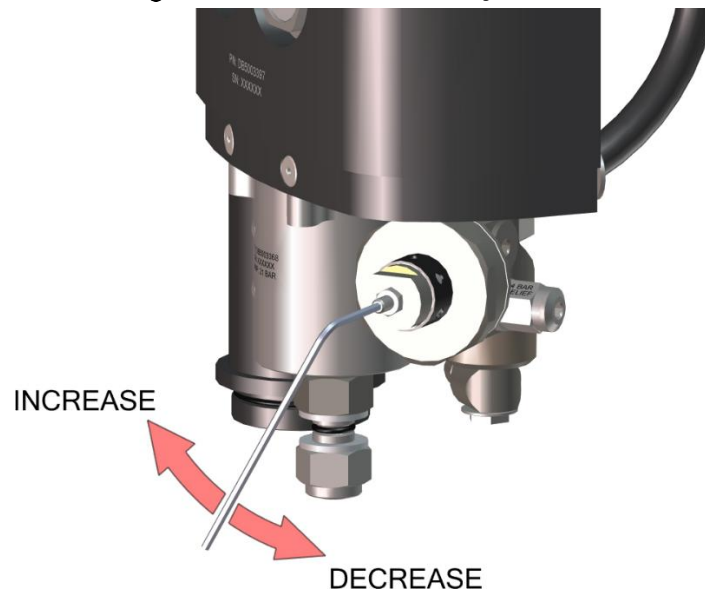
Figure 79 Lee Jet with Flow Meter



4. Open the COBRA cylinder shut off valve and verify the lee-jet supply pressure is between 1.50 and 1.55 bar (21.75 psi -22.48 psi) and a flow of between 5.5 and 5.7 l/min.

5. If necessary adjust the setting as follows using the 3/32" allen key (TA224) and 8 mm spanner.
6. Loosen the locking nut and adjust the setting with the allen key.

Figure 80 Pressure Adjustment



7. Ensure that the setting has not changed following tightening of the locking nut.
8. Close the cylinder shut off valve and allow any residual pressure to vent.
9. Replace the 3/8" UNF test plug.

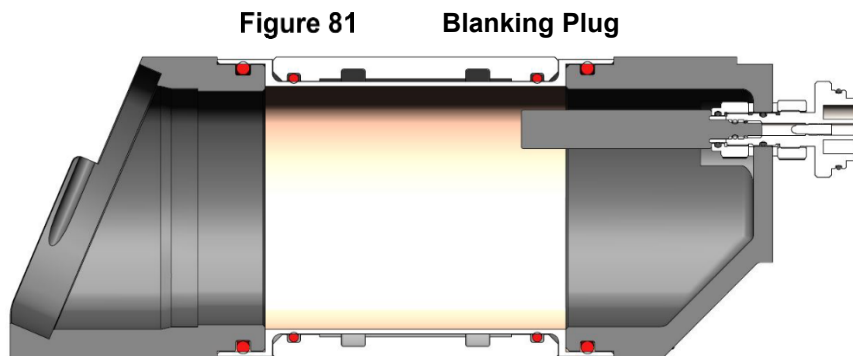
DANGER

ON REMOVAL OF THE FLOW ADAPTOR, ENSURE IT IS COMPLETE. AND THAT NO PORTION OF THE TOOL REMAINS IN THE PORT.

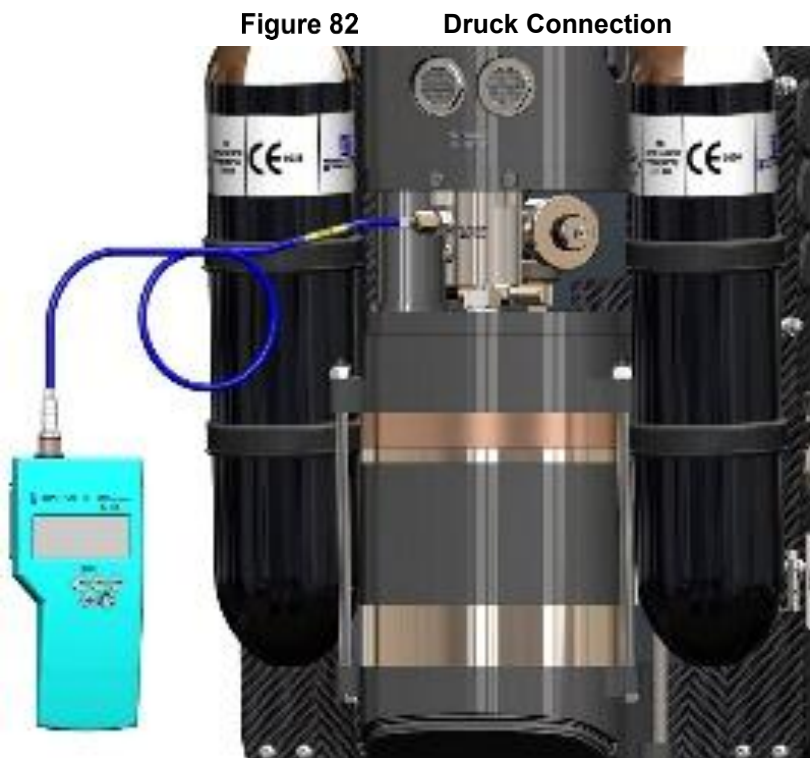
10. Remove the Flowmeter (DB5002587) and Flow Adaptor (DB5002589).

10.6 Check the Two-Stage Regulator Intermediate Pressure

1. Fit the blanking plug (DB5002590) to the lee-jet outlet inside the scrubber housing.



2. Remove the upper 3/8" UNF plug from the piston housing and fit a 3/8" UNF – 1/8" BSP adapter (E16133). Connect the 20 bar Druck (E16996 or E16577).



3. Open the COBRA cylinder shut-off valve.
4. Verify that the two-stage intermediate pressure is 10-15 bar.
5. If the correct settings cannot be achieved replace the first stage piston and spring in accordance with 13.11 Change 1st stage piston and/or spring, then re-commence this test.
6. Listen for the regulator 18 bar relief valve relieving, this can indicate a 1st or 2nd stage fault.creep. If creep is detected replace the 2nd stage seat and valve pin in accordance with 13.12 then re-commence this test.

CAUTION

Inlet Cap DB5003503 shall be hand-tightened only. Do not over-tighten as this can cause distortion.

7. Close the cylinder shut-off valve.

DANGER

ON REMOVAL OF THE BLANKING PLUG, ENSURE IT IS COMPLETE. AND THAT NO PORTION OF THE TOOL REMAINS IN THE PORT.

8. Remove the test blank to vent the set.

10.7 Check the Demand Valve Cracking Pressure

1. Fit the test blank (DB5002590) to the lee-jet as described in the previous step.
2. Refit the Test Cap (DB5002916) to the Scrubber Housing.
3. Connect the 200 mbar Druck (E15777) and Flowmeter (DB5002587) as shown below with 4 JIC adaptor (DB5002591).

Figure 83 Test Setup



4. Open the cylinder shut-off valve.

Note It is acceptable to use a vacuum pump for the following procedure.

5. Suck on the hose, then reduce the flow until the flowmeter is reading 2-3 L/min, verify the reading on the Druck is -22 to -25 mbar.
6. If the Demand Valve Cracking Pressure is not within tolerance correct in accordance with Corrective Maintenance, 13.9, then recommence this test.
7. Remove the test blank.

10.8 Check Rotowink

1. Re-fit the Test Cap (DB5002916) to the Scrubber Housing. Blank both adaptors on the test cap to seal the breathing loop.
2. Connect a clean air supply to the COBRA backpack via the quick connect and slowly apply 15 bar pressure.
3. Verify Rotowink turns green.
4. Remove the air supply and vent activation hose.
5. Verify Rotowink turns red.
6. If the Rotowink does not operate correctly, replace in accordance with 13.10 Rotowink Indicator Replacement.

10.9 Hot Water PRV Test

1. Using a 17 mm spanner disconnect the hot water hose from the hot water relief valve spigot.
2. Using an 18 mm spanner disconnect the hot water inlet hose from the hot water jacket.
3. Using a 13 mm spanner disconnect the hot water inlet hose from the hot water relief valve.
4. Using a 30 mm spanner disconnect the hot water hose connector spigot from the hot water relief valve.
5. Using a 30 mm spanner disconnect the hot water relief valve from the chassis.
6. Fit the test tools DB5003843 with O-ring E13330 and DB5003844 to the hot water relief valve.
7. Attach an LP air supply to the connector on the test tool DB5003843.

CAUTION

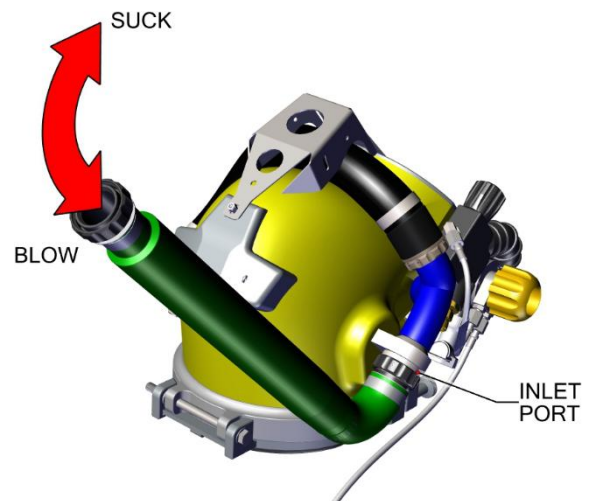
Ensure that the 3/8 UNF - 1/8 BSP adaptor connection to the hot water relief valve does not penetrate the valve far enough to touch the valve spring.

8. Using a 3/8 UNF - 1/8 BSP adaptor attach the 0 - 20 bar Druck to the outlet connection of the hot water relief valve. Set the Druck to read in psi.

9. Place the hot water relief valve in a bowl of water, just deep enough to cover the valve.
10. Gradually increase the air supply pressure while watching for bubbles at the hot water relief valve.
11. When bubbles start to appear from the hot water relief valve the reading on the Druck must be 3 ± 0.2 psi. If the reading is out with these parameters reset the hot water relief valve in accordance with maintenance procedure section 13.6.
12. Reassemble the hot water system parts on the set.

10.10 Mushroom Test

1. Deploy the mouthpiece.
2. Connect a breathing hose to the helmet inlet connection.
3. Lightly suck and blow on the open end of the breathing hose, no flow on sucking and easy flow on blowing indicates a correctly operating inlet mushroom.

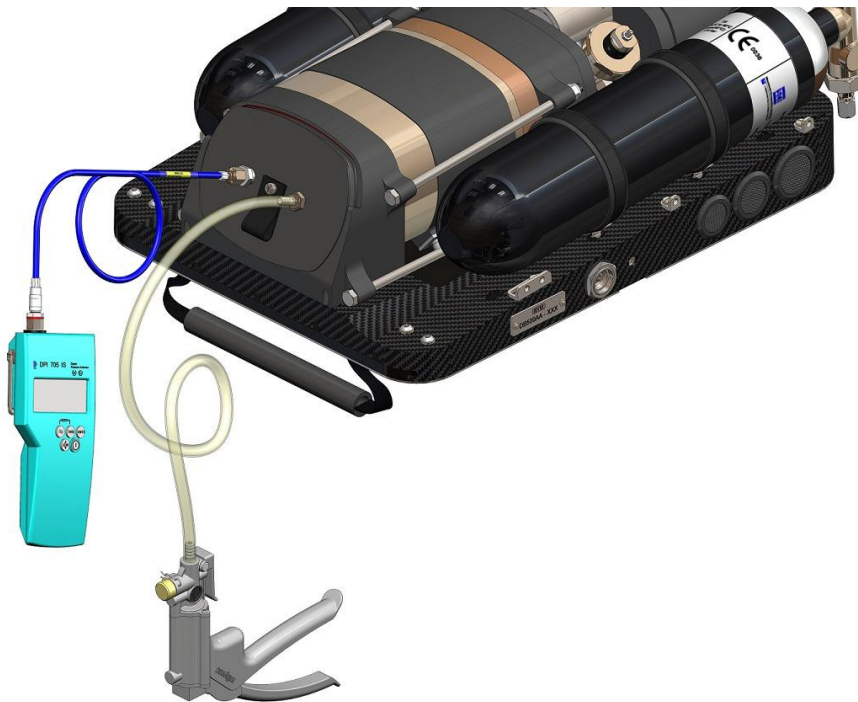


4. Repeat the test on the outlet side of the helmet, this time, easy flow on sucking and no flow on blowing indicates a correctly operating outlet mushroom.
5. If either test fails, replace the mushroom in accordance with section 12.2, Helmet Inhale Mushroom Replacement or section 12.3, Helmet Exhale Mushroom Replacement.

10.11 Loop Integrity Test

1. Ensure 15 bar supply is disconnected and COBRA cylinders are shut-off.
2. Connect the 200 mbar Druck to the 1/8" BSP adaptor on the Scrubber Housing Test Cap.
3. Connect a hand vacuum pump (DB1002239) or powered vacuum pump to the 4 JIC adaptor (DB5002591) on the test cap (DB5002916). Check the integrity of the pump and that it is set to vacuum prior to attempting this test.

Figure 84 Loop Integrity Test



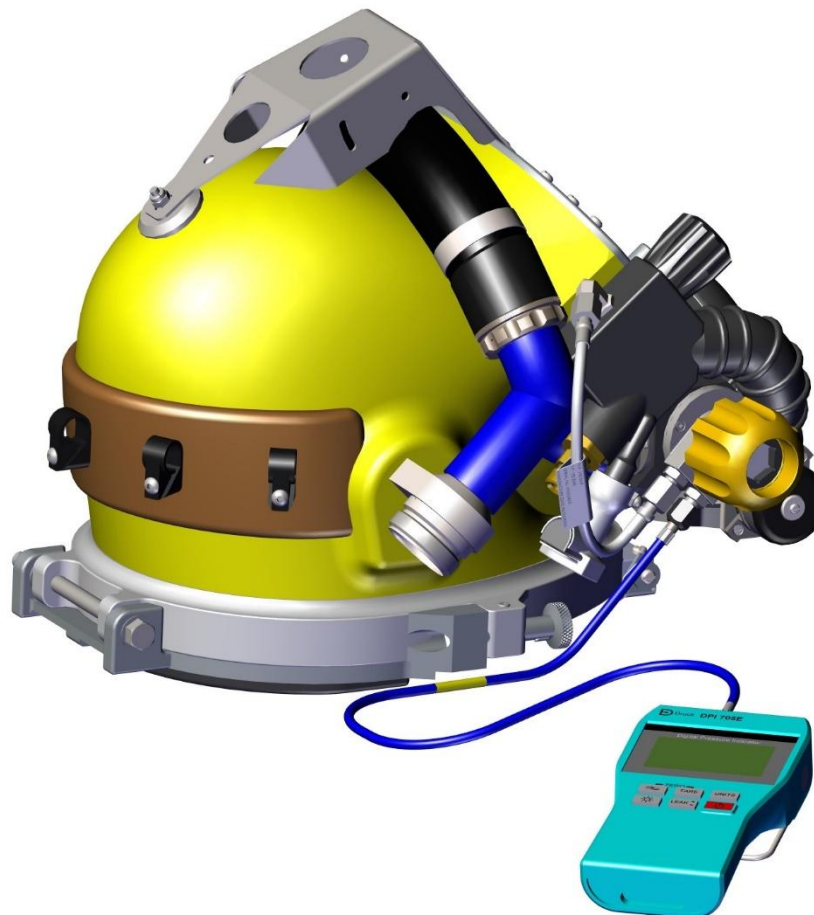
4. Decrease the set pressure to -20 mbar and isolate the vacuum pump.
5. Verify the set pressure does not rise beyond -15 mbar over 3 minutes.
6. Remove scrubber test cap and fit standard door.
7. Reconnect 15 bar supply then turn cylinders on.
8. Disconnect 15 bar Quick Connect and wait 10 minutes.
9. Verify that set does not self-activate during this time.

10.12 Helmet Relief Valve Test

1. Disconnect the supply line and fitting from the activation block and fit a 3/8" UNF – 1/8" BSP adapter (E16133).
2. Connect the 20 bar Druck (E16996) to the adaptor.
3. Connect hose to the hat supply.

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Figure 85 **Helmet Relief Valve Test**



4. Supply 15 bar to the COBRA helmet.
5. If necessary, rotate the activation handle on the COBRA helmet clockwise to stow the mouthpiece.
6. Confirm that 15 bar pressure is shown on the Druck gauge.
7. Activate the mouthpiece and record the pressure. Acceptable pressure is between 0.5 and 0.8 bar.
8. After initially holding between 0.5 and 0.8 bar, the pressure may slowly start to drop. This is still acceptable.

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10.13 Activation Test

1. Connect the breathing hoses to the helmet and backpack.
2. Connect a 15 bar supply to the COBRA helmet.
3. Connect the small braided hose between the backpack and the helmet, and open the cylinder shut-off valve. Ensure the Rotowink is green.
4. Rotate the activation handle on the COBRA helmet anti-clockwise to activate the set.
5. Check that operation is smooth and that there are no gas leaks from the activation handle other than the expected gas release at the relief valve. If leakage is suspected or operation is not smooth replace the spool valve O-rings in accordance with 12.6 Replace Spool Valve O-rings.
6. Ensure the bite mouthpiece is presented to the diver and that gas can be heard flowing at the set.
7. Inspect the helmet mouthpiece, if there is any damage replace the telescopic sleeve assembly in accordance with section 12.7 or 12.8

10.14 Vent All Air from COBRA Cylinders

DANGER

**ENSURE ALL AIR IS VENTED FROM THE COBRA SET PRIOR TO DIVING.
AIR IS NEVER A SUITABLE DIVING GAS FOR THE COBRA SYSTEM.**

1. Ensure 15 bar supply is not connected
2. Turn on COBRA cylinders
3. Close cylinder valve when the COBRA set is fully vented

CAUTION

If this process is accelerated by purging the demand valve, care must be taken not to damage the positive pressure rod.

Intentionally blank

11 User Maintenance

CAUTION

EQUIPMENT DAMAGE

Only Christolube is approved for use on the COBRA set. Do not use Silicon Grease

11.1 Maintenance Philosophy

11.1.1 Due to the specialised nature of the equipment, user maintenance of COBRA is limited to replacement of assemblies as listed at 11.2 Spare Parts Catalog below, and described at sections 12 and 0.

CAUTION

EQUIPMENT DAMAGE

Only suitably trained and qualified personnel are to conduct COBRA maintenance.

11.2 Periodic Maintenance

11.2.1 JFD recommends that COBRA be maintained periodically in accordance with the procedures set out in this document at the periods defined in Table 8 below.

Table 8 Periodic Maintenance Matrix

Procedure	Periodicity / Reference Procedure		
	Monthly	3 Monthly	Annual
Bench Dive	10		
Inspect the Piston O-rings*		13.14	
Water Jacket Test			13.7.1
Piston Assembly Service			13.14
2 Stage Regulator Service			13.11
Demand Valve Service			13.8
Helmet Activation Spring Replacement			12.9
Replace all other soft seals			•

* Recommendation only. Users are free to extend the inspection interval as they see fit.

11.3 Spare Parts Catalogue

11.3.1 Helmet Parts

Description	Part Number
Helmet Quick Connect Hose	DB5002500
COBRA Supply Hose	DB5003041

11.3.2 Helmet Service Items

Description	Part Number
Helmet Relief Valve	DB5002410
Spool Valve O-rings	E14230 x2 RN004-7 x1
Sleeve Assembly (Mouthpiece)	DB5002318
Sleeve Assembly, Serviceable (conversion part)	DB5002495
Replacement Mouthpiece	DB5002967
Spring, Helmet Activation, COBRA	DB5003946

11.3.3 Backpack Parts

Description	Part Number
External Exhaust Valve	DB5002131
Internal Exhaust Valve	DB5002133
Demand Cap	DB5002112
Scrubber External O-ring	RS0861-7
Scrubber Inlet Screen	DB5002035
Scrubber Loading Knob	DB2003017
Scrubber Loading Knob Washer	DB5003227
Scrubber Cap Staple	DB5003157
Scrubber Cap O-ring	RS0357-7
Manifold Charging Adaptor	DB5002403
Charging Adaptor Retaining Nut	DB5003724
Head c/w Inserts, COBRA	DB5002954
Swivel c/w Filter, 2 Stage Regulator, COBRA	DB5002953
Lever, Complete, Demand Valve, COBRA	DB5002952
Lee Jet c/w Housing, COBRA	DB5002951
Adaptor, Breathing Hose, Exhale, c/w Inserts	DB5002950
Plenum, Inlet, Complete, COBRA	DB5002957
Plenum, Outlet, Complete, COBRA	DB5002960
Vent, Chassis, Large, COBRA	DB5002961

Description	Part Number
Vent, Chassis, Medium, COBRA	DB5002962
Vent, Chassis, Small, COBRA	DB5002963

11.3.4 Backpack Service Items

Description	Part Number	Qty
Charging Adaptor O-ring	RV015-7	1
Charging Adaptor Seat	RK221	1
Piston	D2203E	1
Regulator 1st stage piston spring	RK225	1
Regulator 1st stage piston O-ring	RV0801-7	1
Regulator 1st stage piston O-ring	RN806-7	1
Regulator 2nd stage seat	RK221	1
Regulator 2nd stage pin	D2260F	1
Regulator 2nd stage spring	RK223	1

12 Maintenance Procedures Helmet

Note For general helmet maintenance refer to Operation and Maintenance Manual for the 17C Ultrajewel 601 Helmet, P1884-OM-0056.

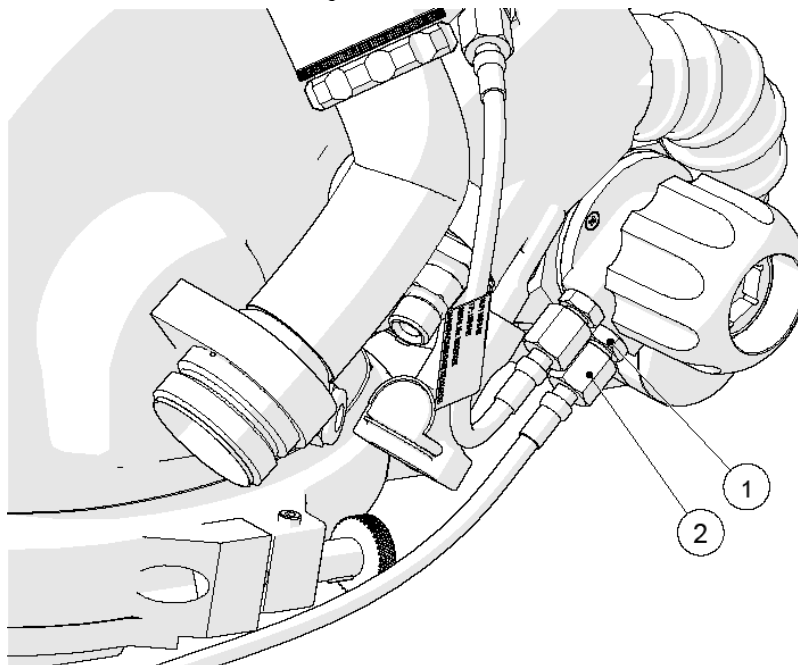
12.1 Helmet Quick Connect Hose Replacement

Hose part number DB5002500

Tools required;

- 14 mm OE Spanner
- 9/16" OE Spanner

Figure 86



1. Using a 14 mm spanner brace the fitting item 1, then using a 9/16" spanner undo the hose connection item 2.
2. Fit the replacement hose using the same spanners.
3. Leak test at working pressure.

12.2 Helmet Inhale Mushroom Replacement

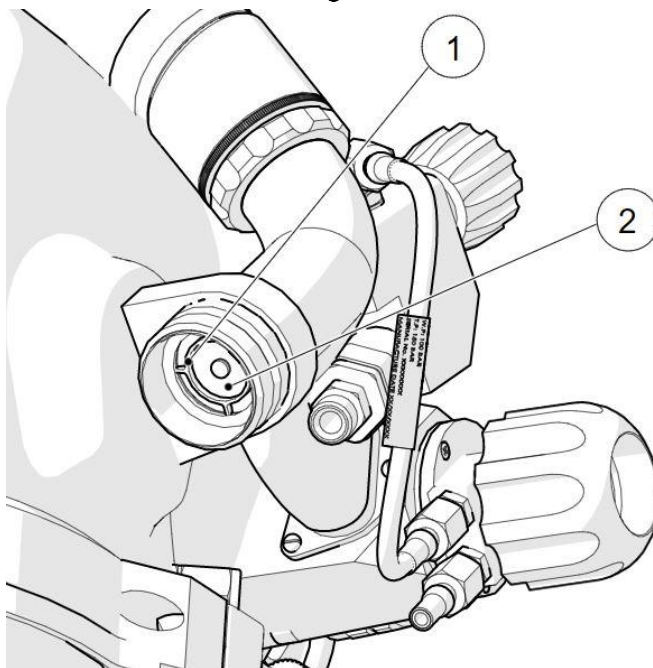
Mushroom part number DM2494A

Mushroom Support Clip part number E15215

Tools required;

- O-ring tool

Figure 87



1. Using an O-ring tool gently lever out the mushroom support clip item 1.
2. Using an O-ring tool hook the outer edge of the mushroom item 2, and pull away from the central mounting boss, discard the mushroom.
3. Clean and inspect the mushroom support clip, discard and replace if damaged.
4. Fit the replacement mushroom ensuring the central hole is correctly located in the groove on the support boss.
5. Fit the mushroom support clip with the sharp edge toward the mushroom.
6. Test the valve in accordance with section 10.10, Mushroom Test.

12.3 Helmet Exhale Mushroom Replacement

Mushroom part number DM2494A

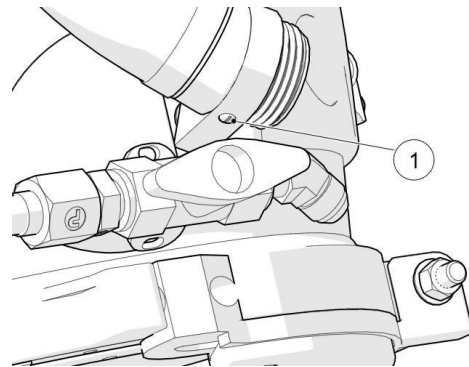
Mushroom Support Clip part number E15215

Tools required;

- O-ring tool

1. Remove the camera bracket

2. Remove the hose retaining screw (item 1) from the left hand hose retaining bracket.



3. Remove the exhale hose from the from the left hand hose retaining bracket.

4. Using soft jaw pump pliers, slacken the captive nut on the Y-piece to release the exhale hose.

5. Using an O-ring tool gently lever out the mushroom support clip.

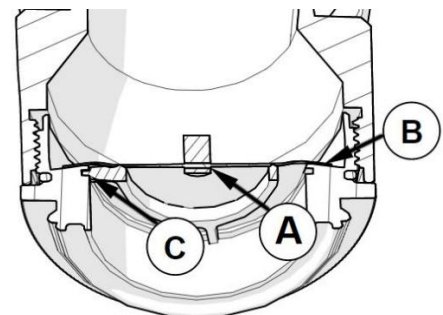
6. Using an O-ring tool hook the outer edge of the mushroom, and pull away from the central mounting boss.

7. Clean and inspect the mushroom support clip, discard and replace if damaged.

8. Fit the replacement mushroom ensuring the central hole is correctly located in the groove on the support boss.

9. Fit the mushroom support clip with the sharp edge toward the mushroom.

10. Ensure the mushroom is correctly located on the central boss **A**, the mushroom edge is correctly located against the sealing face **B** and the support clip is correctly fitted in the locating groove **C**.



11. Reassemble the hose and left hand hose retaining bracket.

12. Refit the camera bracket.

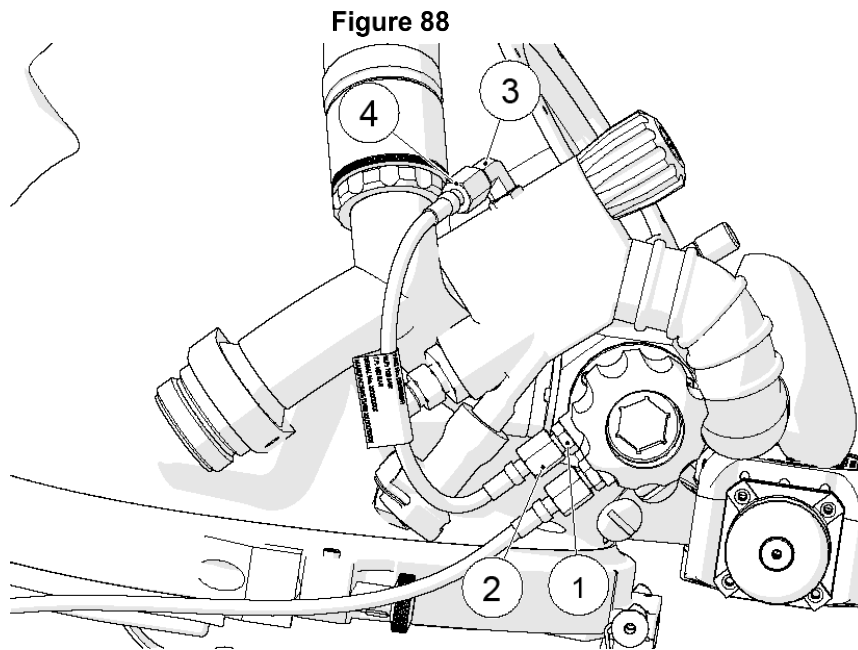
13. Test the valve in accordance with section 10.10, Mushroom Test.

12.4 COBRA Supply Hose Replacement

Hose part number DB5003041

Tools required;

- 7/16" OE Spanner
- 14 mm OE Spanner
- 9/16" OE Spanner



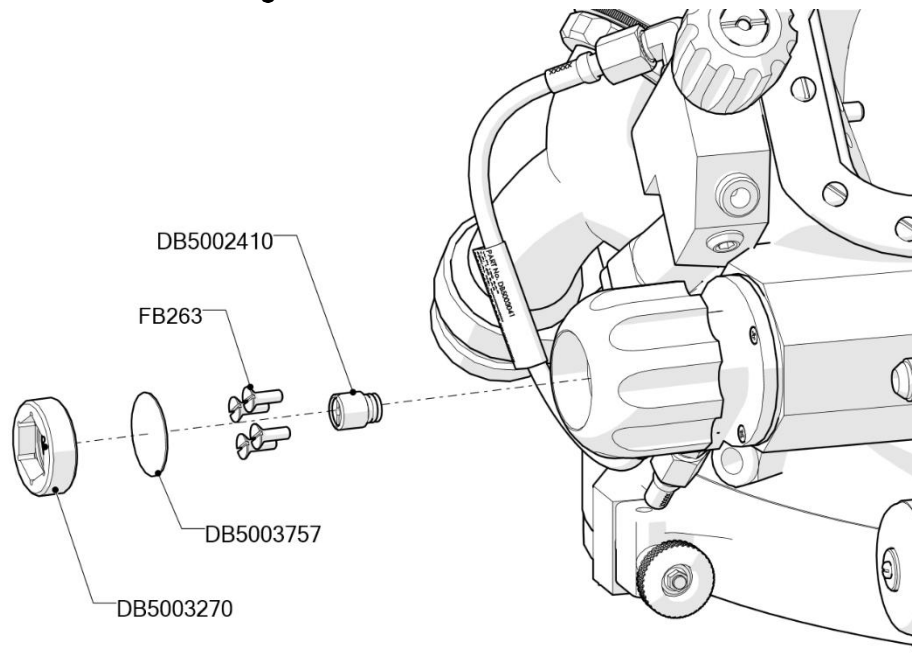
1. Using a 14 mm spanner brace the fitting item 1, then using a 9/16" spanner undo the hose connection item 2.
2. Using a 7/16" spanner brace the fitting item 3, then using a 9/16" spanner undo the hose connection item 4.
3. Fit the replacement hose using the same spanners ensuring that the hose is routed tight to the helmet and not twisted.
4. Leak test at working pressure.

12.5 Replace Helmet Relief Valve

Tools required;

- Special Tool DB5003284
- Slotted Screwdriver
- Special Tool DB5004015

Figure 89 **Helmet Relief Valve**



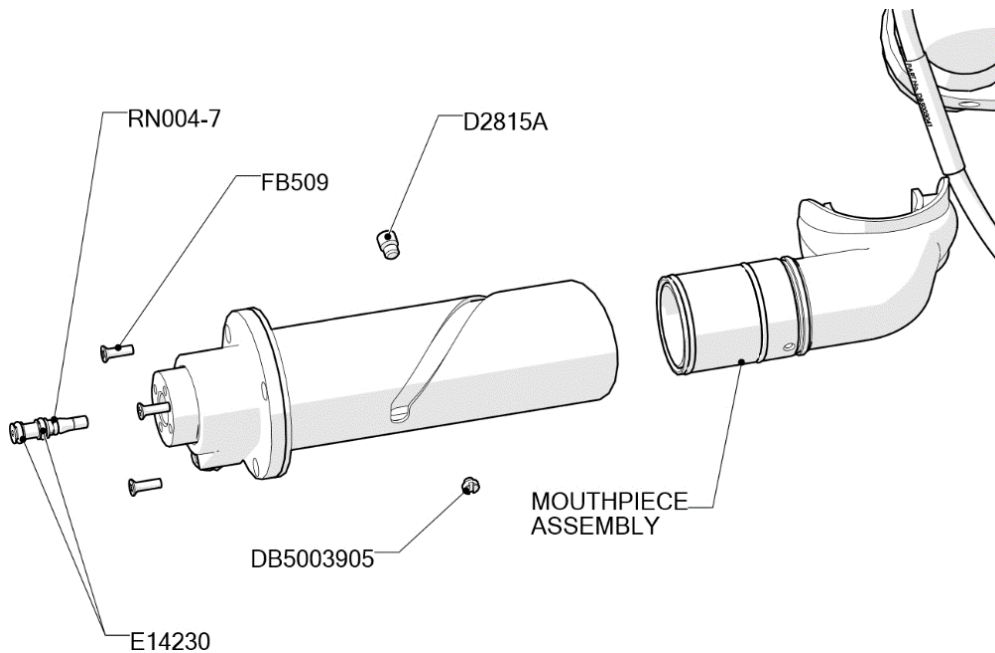
1. Using special tool DB5003284, remove the mesh holder DB5003270.
2. Remove the mesh DB5003757.
3. Remove the four screws FB263 and the handle DB5003937.
4. Remove the relief valve assembly DB5002410 using special tool DB5004015.
5. Fit the new relief valve assembly DB5002410 using special tool DB5004015.
6. Replace the handle DB5003937
7. Apply Loctite 222 to screws FB263, insert and tighten to 5 lbf/in
8. Re-fit mesh and mesh holder

12.6 Replace Spool Valve O-rings

Tools required;

- Special Tool DB5003284
- Special Tool DB5004015
- Special Tool DB5002917
- 2 mm Allen Key

Figure 90 Telescopic Spool Assembly



1. Refer to drawing Handle Assembly, Helmet Activation, COBRA DB5002409S1.
2. Ensure the mouthpiece is stowed.
3. Using special tool DB5003284, remove the mesh holder DB5003270.
4. Remove the mesh DB5003757.
5. Remove screws FB263 (x4) and handle DB5003936.
6. Using special tool DB5004015, remove the helmet relief valve DB5002410.
7. Remove screws FB509 (x3).
8. Withdraw full activation assembly from helmet.
9. Refer to drawing Telescopic Sleeve Assembly, COBRA DB5002318S1.
10. Remove cap screw D2815 and screw DB5003905 and withdraw the mouthpiece assembly.
11. Refer to drawing Handle Assembly, Helmet Activation, COBRA DB5002409S1 / DB5002409.

12. Insert special tool DB5002917 into inner sleeve DB5003901 and rotate the tool to locate the 3 pin holes in the activation flange DB5003906.
13. Using a 2 mm allen key, unscrew the spool piece DB5003776.
14. Lubricate and replace O-rings E14230 (x2) and RN004-7.
15. On re-assembly, ensure spring DB5003946 is located correctly and that no bending is evident.
16. Check spool valve moves freely in bore, rotate the spool 360° to check for straightness of the spool.

Note Cap screws D2815, DB5003905 and FB263 x4 require Loctite 222 on re-fitting, please refer to torque settings.

Countersink screw FB509 x3 requires Loctite 222 on the countersink portion of the screw only, please refer to torque settings.

CAUTION

Loctite requires a minimum of 8 hours setting time before diving may commence.

12.7 Replace Telescopic Sleeve Assembly (Mouthpiece)

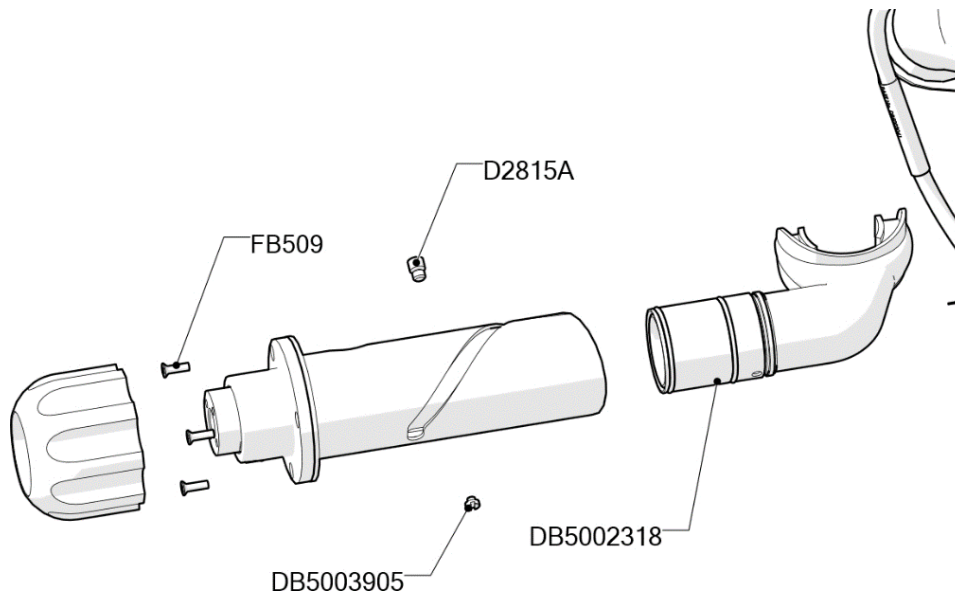
Note The original mouthpiece design (DB5002318) was modified in 2022 for ease of assembly. When spares of DB5002318 are exhausted the sleeve assembly must be updated by fitting DB5002495. The following procedure may be used to fit DB5002495.

Once converted, mouthpiece spare DB5002964 is to be used to replace the mouthpiece.

Tools required;

- Crosshead Screwdriver
- 4 mm Allen Key
- Slotted Screwdriver

Figure 91 Mouthpiece Assembly



1. Remove screws FB509 (x3).
2. Withdraw full activation assembly from the helmet.
3. Remove cap screw D2815 and screw DB5003905 and withdraw telescopic sleeve assembly (mouthpiece) DB5002318.
4. Fit new telescopic sleeve assembly (mouthpiece) DB5002318/ DB5002495.
5. Refit activation assembly to helmet.
6. Operate activation handle to check for correct deployment and stowage of mouthpiece.

CAUTION

Loctite requires a minimum of 8 hours setting time before diving may commence.

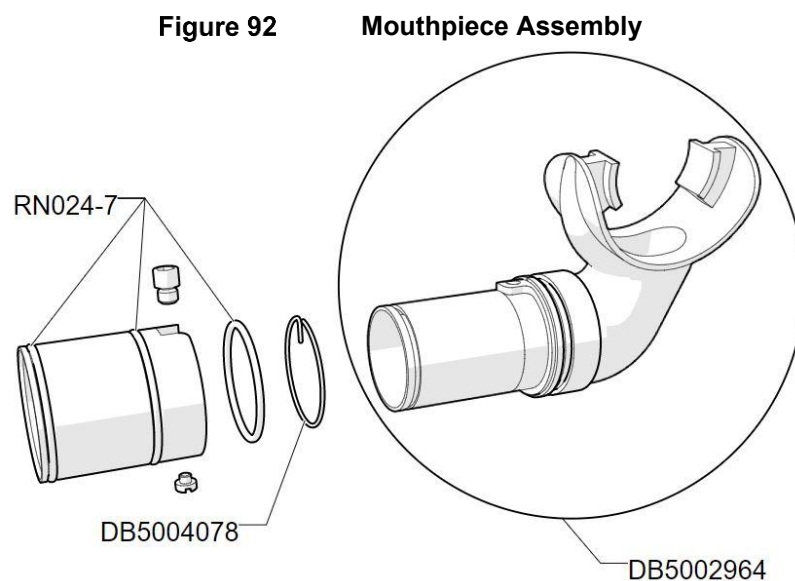
Note Cap screws D2815 and DB5003905 require Loctite 222 on re-fitting.

Countersink screw FB509 x3 requires Loctite 222 on the countersink portion of the screw only, please refer to torque settings.

12.8 Revised Mouthpiece Replacement

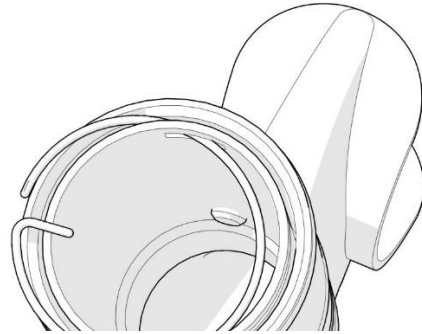
Tools required;

- Crosshead Screwdriver
- 4 mm Allen Key
- Slotted Screwdriver



1. Remove screws FB509 (x3), refer to Figure 91.
2. Withdraw full activation assembly from the helmet.
3. Remove cap screw D2815 and screw DB5003905 and withdraw telescopic sleeve assembly (mouthpiece) DB5002318.
4. Remove the mouthpiece inner sleeve retaining clip by gripping the tang of the clip with long nose pliers and pulling / twisting the out of the slot in the sleeve.
5. Inspect the retaining clip, if no longer circular or damaged replace with new DB5004078.
6. Remove and discard the mouthpiece and inner sleeve assembly.

7. Inspect the O-rings for damage replace if required. Lightly lubricate replacement O-rings with Christo-lube.
8. Fit the replacement inner sleeve and mouthpiece assembly DB5002967.
9. Fit the replacement retaining clip by feeding the plain end into the slot in the sleeve and feeding / rotating the clip until the tang is located in the slot.
10. Using an O-ring tool and working from the tang end of the clip press the clip into the groove on the inner sleeve.



Note Cap screws D2815 and DB5003905 require Loctite 222 on re-fitting.

Countersink screw FB509 x3 requires Loctite 222 on the countersink portion of the screw only, please refer to torque settings.

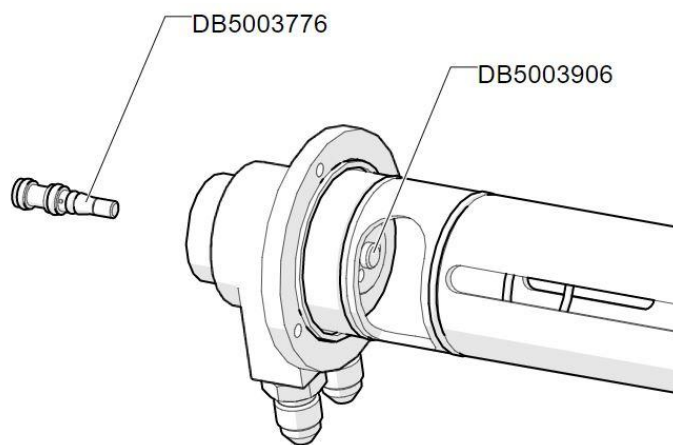
12.9 Helmet Activation Spring Replacement

Tools required;

- DB5002917, TOOL, FLANGE, HELMET ACTIVATION, COBRA
- 2 mm Allen Key

1. Refer to drawing Telescopic Sleeve Assembly, COBRA DB5002409S1.
2. Remove the telescopic sleeve assembly in accordance with section 12.7.
3. Using tool DB5002917, hold the activation flange DB5003906 stationary then using a 2mm allen key unscrew and remove the activation spool DB5003776.

Figure 93 Activation Spool Removal



4. Remove the activation flange and spring, discard the spring DB5003946.
5. Fit the replacement spring and refit the activation flange.
6. Inspect and lubricate the O-rings, replace as required.
7. Reassemble by reversing the disassembly instructions.
8. Check spool valve moves freely in bore, rotate the spool 360° to check for straightness of the spool.
9. Test the activation prior to commencing diving operations.

13 Maintenance Procedures Backpack

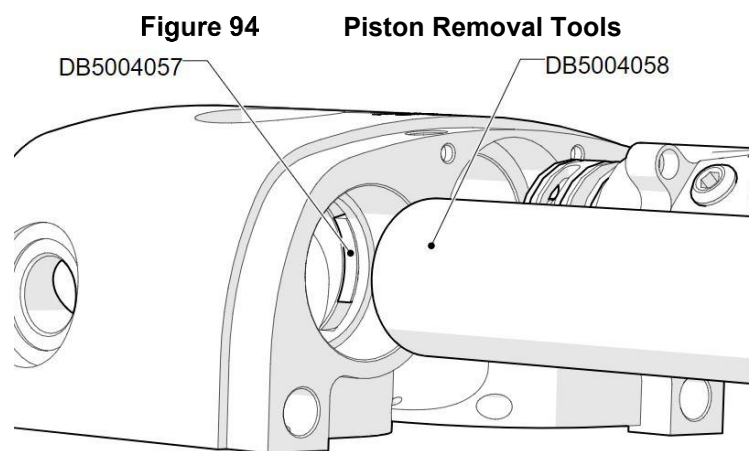
13.1 Backpack Disassembly

Note Refer to drawing DB5002043S1 and DB5002053S1 for clarification of item numbers and locations.

Note Full disassembly of the set to lowest replaceable assembly is given below. Full disassembly may not be required for replacement of some parts.

1. Remove the two breathing hoses.
2. Remove the five M6 thumbscrews at the side and bottom and four M8 thumbscrews at the top to remove the back plate and harness assemblies.
3. Remove five socket screws, washers and nuts using a 16 mm spanner and a 6 mm allen key to free the harness assembly from the backplate assembly.
4. Remove the demand cap assembly then withdraw the staple plate and withdraw the outlet plenum staple and remove the counterlungs, Replace the demand cap assembly.
5. Remove the four button head socket screws and washers using a 4mm allen key and remove the cover.
6. Remove the scrubber housing cap and scrubber.
7. Using a 14 mm spanner remove the HP gauge hose from the upper of the manifold ports.
8. Remove the two M3 slotted screws 31 securing the rotowink reference hose to the head assembly then remove the rotowink reference hose.
9. Using a 13 mm spanner remove the rotowink hose from the head assembly.
10. Remove the hot water shroud supply hose from the quick connect outlet spigot.
11. Using an 18 mm spanner remove the hot water outlet hose between the scrubber / hot water housing and hot water outlet housing.
12. Using a 13 mm spanner remove the hot water inlet hose from the chassis hot water relief valve and the scrubber / hot water housing.
13. Using 17 mm spanner remove the nyloc nut and washer retaining the hot water hose.
14. Remove the hot water splitter block from the hot water hose.
15. Remove the hot water inlet spigot from the chassis using a 30 mm spanner.
16. Using a 14 mm spanner remove the HP supply hose from the regulator.
17. Using a 7/16" spanner remove the HP hose from the lower of the manifold ports.
18. Using a 7 mm spanner or flat blade screwdriver release the four jubilee clips and protective bands retaining the cylinder assembly, remove the cylinder assembly.

19. Remove the staple plate from the top of the set.
20. Remove the 21 mm retaining nut securing the piston assembly to the scrubber / hot water housing accessed from within the scrubber / hot water housing.
21. Remove four button head screws 34 and washers 39 securing the head assembly to the chassis, then remove the head and piston assembly from the scrubber / hot water housing.
22. Remove the exhale tube from the scrubber / hot water housing.
23. Using a 26 mm spanner remove the demand hose from the demand valve.
24. Remove the four M3 slotted screws 30 retaining the demand valve, then remove the demand valve.

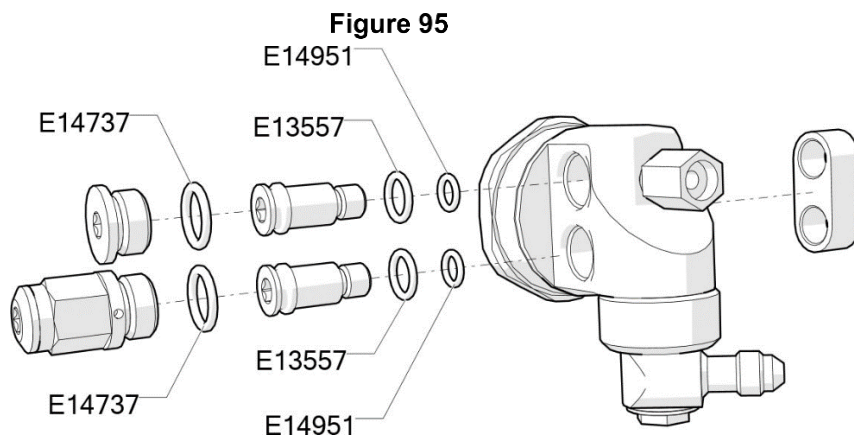


25. Prior to removing or inserting the piston assembly insert the tool DB5004057 into the cross port (dimple upward and toward the exhale pipe port) and insert tool DB5004058 into the exhale port to hold DB5004057 in place.
26. Remove the two M4 cap screws retaining the piston assembly in the head assembly, then separate the piston assembly from the head assembly
27. Using a 9/16" spanner connect the braided quick connect hose to the piston assembly.
28. Using a 13 mm spanner disconnect the demand hose from the piston assembly.
29. Remove the relief valve and adjacent blank from the two stage regulator.
30. Disconnect the two stage regulator from the piston assembly using a 5 mm allen key on the post connectors revealed beneath the relief valve and adjacent blank.
31. Using a 5 mm allen key remove the two upper screws 34 and washers 39 and two lower screws 35 and washers 39 securing the scrubber / hot water housing to the chassis.
32. Remove the scrubber / hot water housing.

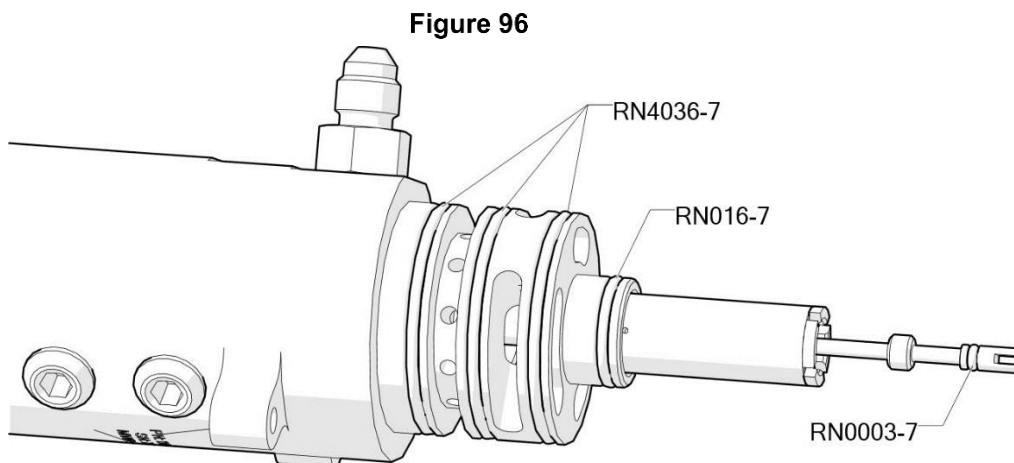
13.2 Backpack Reassembly

Note All O-rings are to be inspected for damage, replaced if required and lightly lubricated with Christo-lube prior to fitting.

1. Fit the scrubber / hot water housing to the chassis and secure with two upper screws 34 and washers 39 and two lower screws 35 and washers 39.
2. Remove the relief valve and adjacent blank from the two stage regulator.
3. Remove the post connectors from the regulator body.
4. Fit O-rings to the post connectors, see Figure 85 for part numbers.



5. Connect the two stage regulator to the piston assembly.
6. Fit O-rings to the piston chamber, see Figure 96 for part numbers.



7. Using a 13 mm spanner connect the demand hose to the piston assembly.
8. Using a 9/16" spanner connect the braided quick connect hose to the piston assembly.
9. Referring to Section 13.1, Figure 94 and instruction 25, install the piston assembly in the head assembly and retain with two M4 cap screws.

10. Lubricate the demand valve O-ring RN017-7, then fit the demand valve to the head assembly and secure with four M3 slotted screws 30.
11. Using a 26 mm spanner connect the demand hose to the demand valve.
12. Fit the exhale pipe O-rings (2 off) RN0519-7.
13. Fit the exhale tube to the scrubber / hot water housing.
14. Remove the 21 mm retaining nut from the bottom of the piston assembly, inspect, replace if required and refit the internal O-ring E14737.
15. Inspect, replace if required, lubricate and refit the external O-ring E16663 on the bottom shaft of the piston assembly.
16. Fit the head and piston assembly to the scrubber / hot water housing, ensure the piston shaft O-ring is located within the wall of the scrubber / hot water housing. Loosely retain with the 21 mm retaining nut, accessed from within the scrubber / hot water housing.
17. Secure the head assembly to the chassis with the four button head screws 34 and washers 39.
18. Tighten the 21 mm retaining nut.
19. Fit the staple plate to the top of the head assembly with the extended portion toward the demand cap.

Note Jubilee clip nuts are to be located on the external side.

Note The centre of the manifold is to be set 40 mm from the top of the chassis.

20. Install the cylinder assembly on the chassis.

WARNING

ENSURE THE CYLINDERS ARE EMPTY.

21. Slacken the manifold locknuts.
22. Gradually tighten the four jubilee clips while ensuring the cylinders remain parallel. Ensure no stress is transferred to the manifold by checking it rotates freely during tightening of the jubilee clips and protective bands.
23. Tighten the manifold locknuts, refer to "Torque Settings".
24. Lubricate the O-ring RV2508-7 on the HP hose male fitting.
25. Route the HP supply hose through the chassis hole adjacent the manifold shutoff valve.
26. Using a 7/16" spanner fit the HP hose to the lower of the manifold ports.
27. Using a 14 mm spanner fit the HP supply hose to the regulator.

28. Inspect, replace if required, lubricate and refit the two hose seal O-rings 42 RN2512-7 and the single O-ring 41 RN014-7 on the hot water inlet spigot.
29. Fit the hot water inlet spigot to the chassis using a 30 mm spanner.
30. Fit the hot water splitter block to the hot water hose and fit the hot water hose to the spigot and retain with the nyloc nut.
31. Lubricate the O-rings on the hot water inlet hose, DD051308 at the relief valve end, DD030028 at the scrubber end.
32. Using a 13 mm spanner fit the hot water inlet hose to the chassis hot water relief valve and the scrubber / hot water housing.
33. Lubricate the O-rings on the hot water outlet hose, DD051308 at each end.
34. Using an 18 mm spanner fit the hot water outlet hose between the scrubber / hot water housing and hot water outlet housing.
35. Fit the hot water shroud supply hose to the quick connect outlet spigot.
36. Lubricate the rotowink reference hose O-ring RN2512-7, then fit the rotowink reference hose to the head assembly and secure with the two M3 slotted screws 31.
37. Fit a replacement O-ring E13574 to the rotowink hose connector fitting.
38. Using a 13 mm spanner fit the rotowink hose to the head assembly.
39. Lubricate the O-ring E13529 on the HP gauge hose, and using a 14 mm spanner fit the HP gauge hose to the upper of the manifold ports at the manifold shutoff valve.
40. Fit the scrubber assembly to the scrubber / hot water housing then fit the scrubber housing cap and secure with the staple.
41. Fit the cover and secure with the four button head socket screws and washers using a 4 mm allen key.
42. Turn the set onto its back.
43. Remove the demand cap assembly then withdraw the staple plate and fit the counterlungs, securing with the staple plate and outlet plenum staple. Replace the demand cap assembly to retain the staple plate.
44. Fit the harness assembly to the backplate assembly with the five socket screws, washers and nuts using a 17 mm spanner and a 6 mm allen key.
45. Fit the back plate assembly and secure with the five M6 thumbscrews at the side and bottom and four M8 thumbscrews at the top.
46. Fit the two breathing hoses.

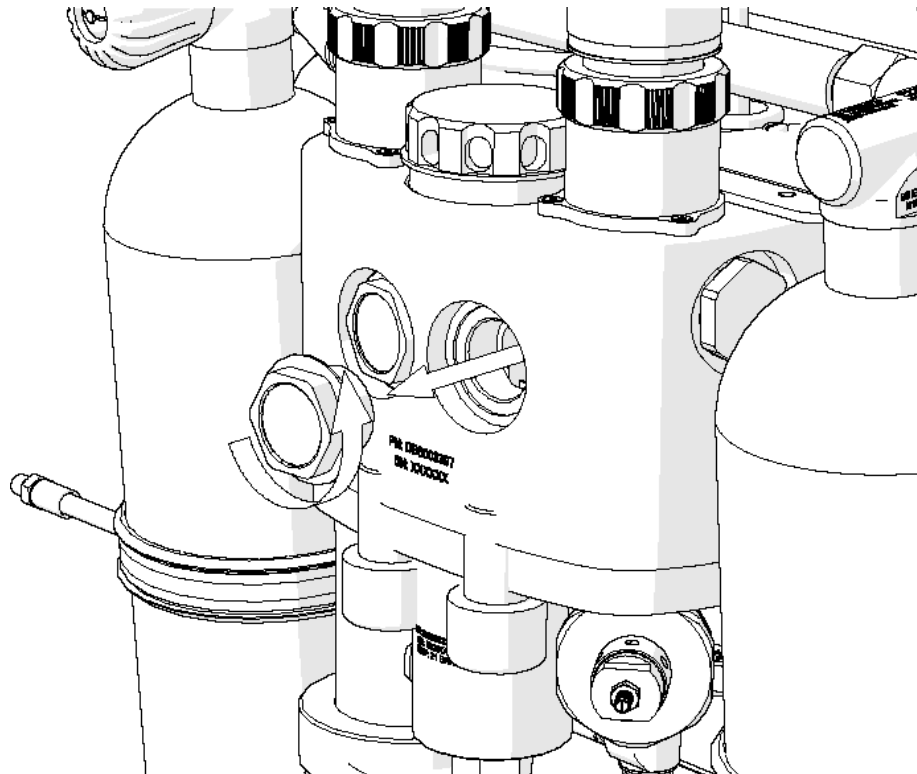
13.3 External Exhaust Valve Replacement

Part number DB5002131

Tools required;

- 1-1/8" AF Socket, 1/2" drive
- 1/2" Drive Ratchet

Figure 97



1. Using the 1-1/8" socket and ratchet remove the exhaust valve.
2. Fit the replacement exhaust valve using the 1-1/8" socket and 1/2" Drive Ratchet.

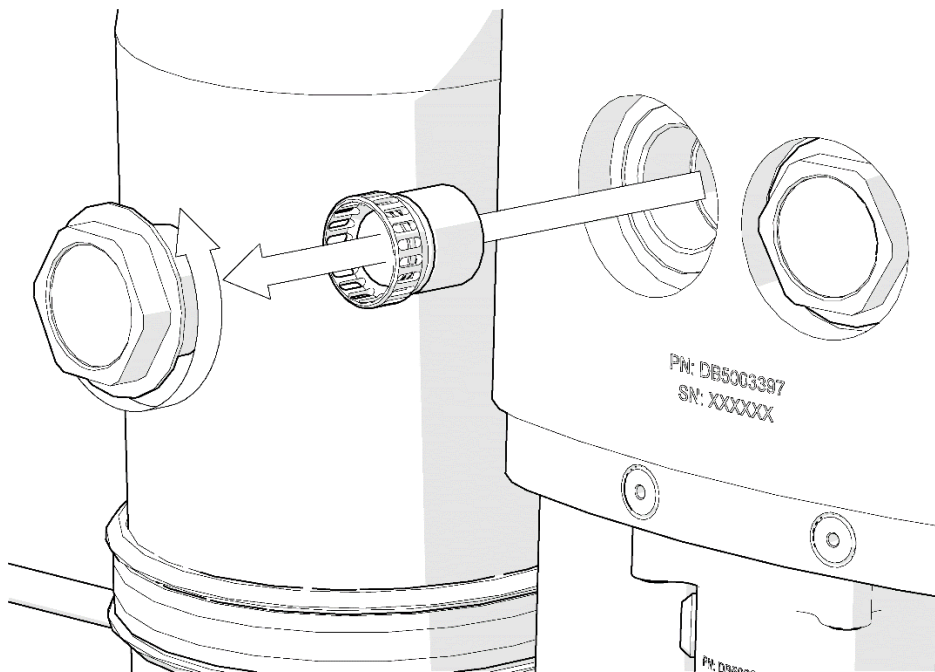
13.4 Internal Exhaust Valve Replacement

Part number DB5002133

Tools required;

- 1-1/8" AF Socket, 1/2" drive
- 1/2" Drive Ratchet
- O-ring pick

Figure 98



1. Using the 1-1/8" socket and ratchet remove the external exhaust valve.
2. Using the O-ring pick extract the internal exhaust valve. Return to JFD for repair / rebuild.
3. Fit the replacement internal exhaust valve
4. Re-fit the external exhaust valve using the 1-1/8" socket and 1/2" Drive Ratchet.

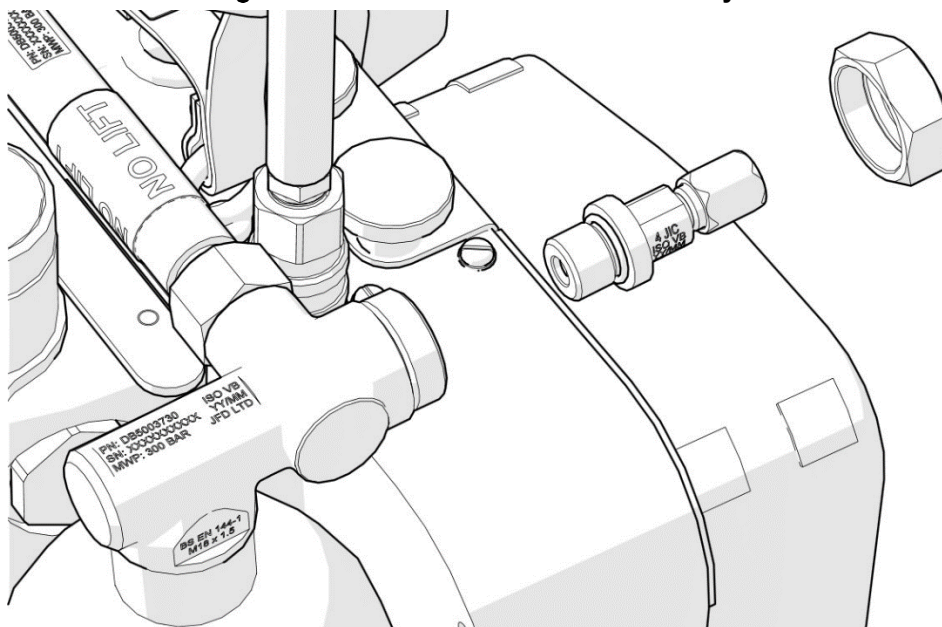
13.5 Manifold Charging Adaptor Servicing

Part number DB5002403

Tools required;

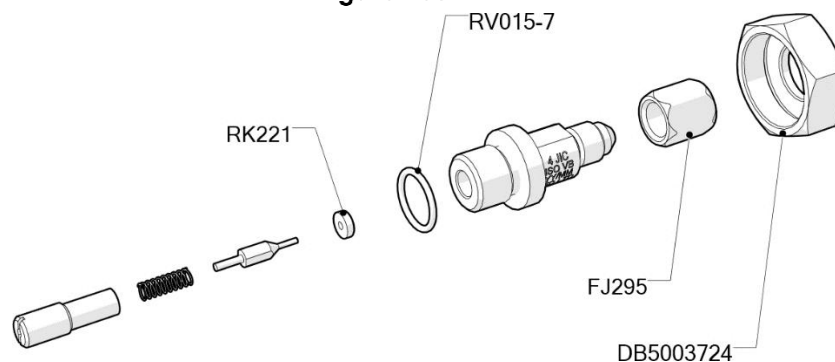
- 32 mm Spanner
- 14 mm Spanner
- O-ring tool
- No.8 Self Tapping screw

Figure 99 Cover removed for clarity



1. Using the 32 mm spanner remove the charging adaptor retaining nut.
2. Using the 14 mm spanner remove the charging adaptor.
3. Using an O-ring tool remove the O-ring, inspect for damage, replace if required.
4. Inspect the charging adaptor and retaining nut, replace if required then reassemble by reversing the removal instructions.
5. Service the charging adaptor as follows;

Figure 100



6. Using a slotted screwdriver and 14 mm spanner, remove the spring retainer.
7. Take out the spring and valve pin, inspect for damage, replace if required.
8. Screw a No.8 self tapping screw into the valve seat to extract the valve seat.

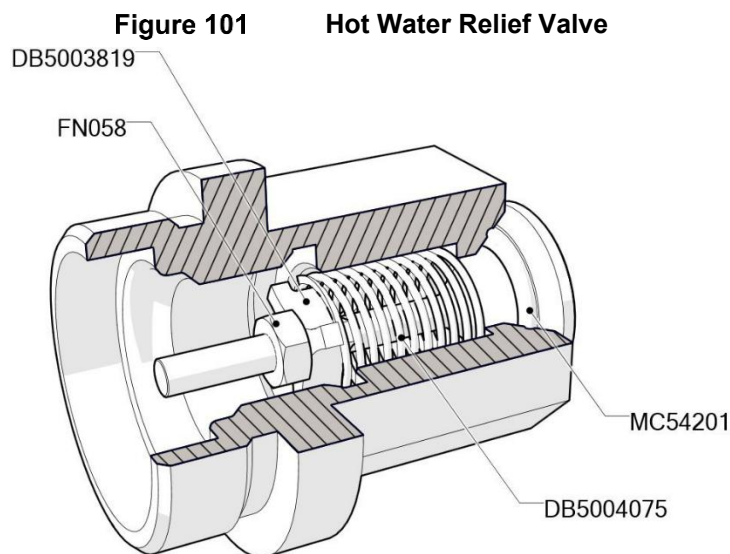
Note Use a 1.5 mm pin (such as a welding rod) to ensure that the valve seat does not invert during installation.

CAUTION

Do not remove the filter.

9. Fit a new valve seat chamfered end first into the body.
10. Reassemble by reversing the removal instructions.

13.6 Hot Water Relief Valve Setting



1. Slacken the locknut FN058.
2. While holding the valve stem turn the adjuster DB5003819 clockwise to increase the setting or anticlockwise to reduce the setting.
3. Tighten the locknut and retest.
4. If the correct setting cannot be achieved replace the hot water relief valve assembly DB5002335.

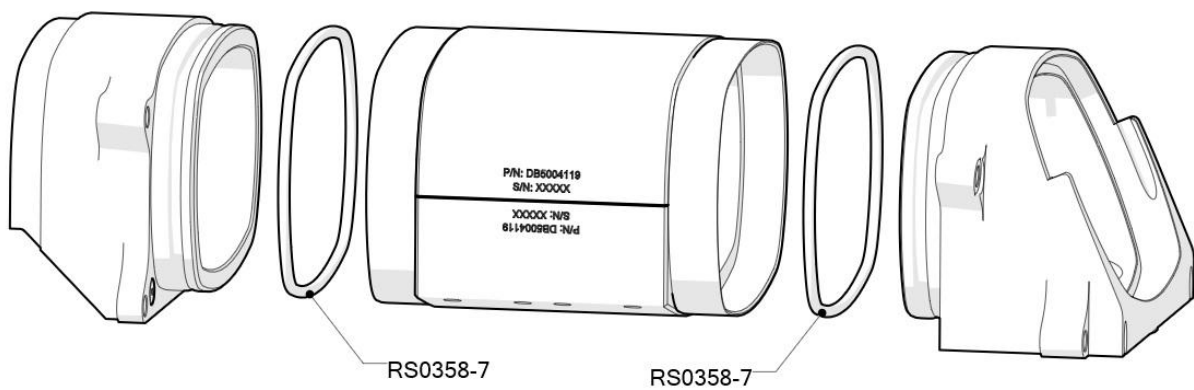
13.7 Scrubber / Hot Water Housing Service

Tools required;

- 13 mm AF Spanner, 2 off
- 13 mm AF Hex Socket
- Torque Wrench
- 3 mm Allen Key

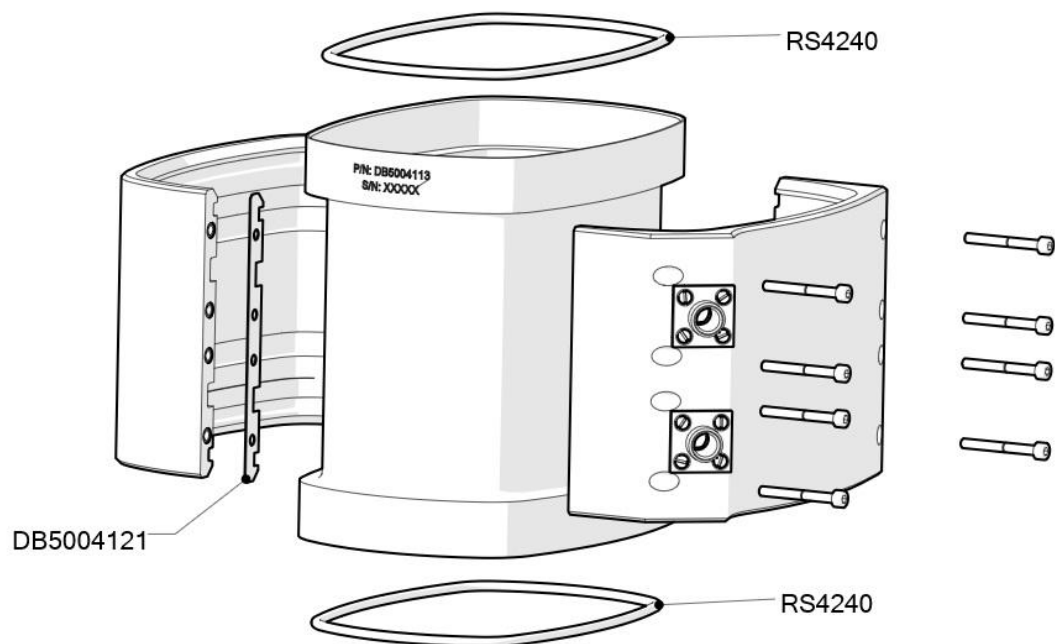
1. Dis-assemble the backpack in accordance with 13.1 Backpack Disassembly.
2. Using two 13 mm spanners remove the four tie-bars from the housing, discard the four nylock nuts.

Figure 102 Separate the Plenums



3. Separate the inlet and outlet plenums from the water jacket assembly.

Figure 103 Separate the Water Jacket

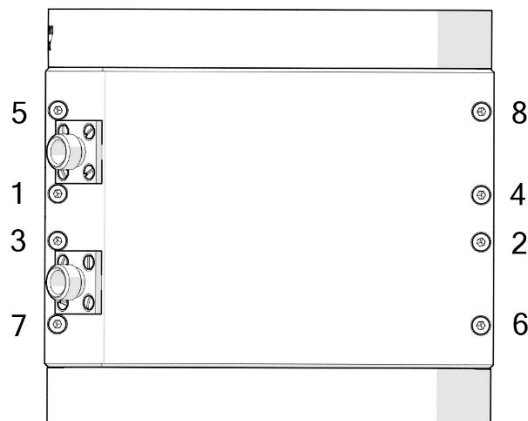


4. Remove the O-rings from the plenums. Inspect the O-rings and replace if required. Lubricate with Christo-lube.
5. Using a 3 mm Allen key remove the eight allen screws holding the two halves of the water shroud together.

Note If the two halves of the water jacket cannot be separated, blank one of the water connections and introduce pressurised water to the other, maximum 5 psi.

6. Separate the two halves of the water jacket, discard the two gaskets.
7. Wash the two halves of the water jacket and jacket body in warm water. A soft brush may be used to dislodge any adhered deposits. Wipe dry with a lint free cloth.
8. Remove the two O-rings from the housing body. Inspect the O-rings and replace if required. Lubricate with Christo-lube.
9. Reassemble the water jacket onto the body using new gaskets DB5004121 and tighten the M4 x 35 hex screws using tool TA80112 to 12 lbf/in, in the order shown in Figure 95.

Figure 104 Water Jacket Screw Tightening



10. Reassemble the housing using new nylock nuts FN019. Torque the nylock nuts to 20 lbf/in.

13.7.1 Water Jacket Testing

Note Some leakage from the water jacket is allowable during the following test.

1. Connect the water jacket outlet hose DB5002124 to the outlet connection.
2. Flow 3 lpm water to the inlet connection while the outlet is open.
3. Ensure that any leakage from the water jacket is no greater than 0.5 lpm.

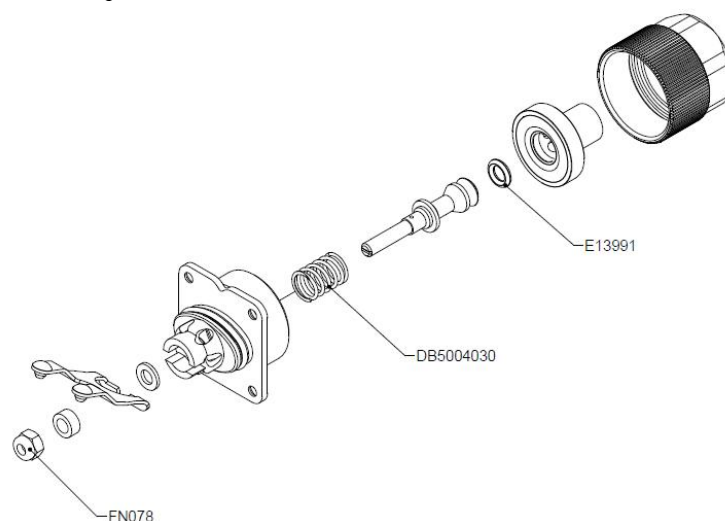
13.8 Demand Valve Service

Tools required;

- Christo-lube grease
- Slotted Screwdriver
- 7 mm Spanner

1. Ensure the cylinder shut-off valve is closed.
2. Remove the backplate assembly.
3. Remove the backplate DB5002186.
4. Remove the demand hose DB5002106.
5. Remove the valve seat D1998.
6. Remove the demand cap DB5002112, retaining ring DB5003148 and washer DB5003149.
7. Unscrew the diaphragm assembly DB5002008.
8. Refer to drawing Demand Valve Assembly, COBRA DB5002110S1.
9. Using a thin 7 mm spanner, hold the demand stem nut FN078.
10. Using a flat screwdriver, unscrew and remove the valve stem (from the opposite end from the nut). Remove and discard the O-ring E13991 from the valve stem.
11. Remove the nut FN078, spacer DB5003627, demand lever, washer DB5003628 and spring DB5004030. Discard the spring and nut.
12. Lightly lubricate and fit a new O-ring E13991 to the valve stem.
13. Reassemble the lever side of the valve in the order; spring, washer, lever, spacer and nut. Then install the valve stem and screw in to the nut.

Figure 105 Demand Valve Service Items

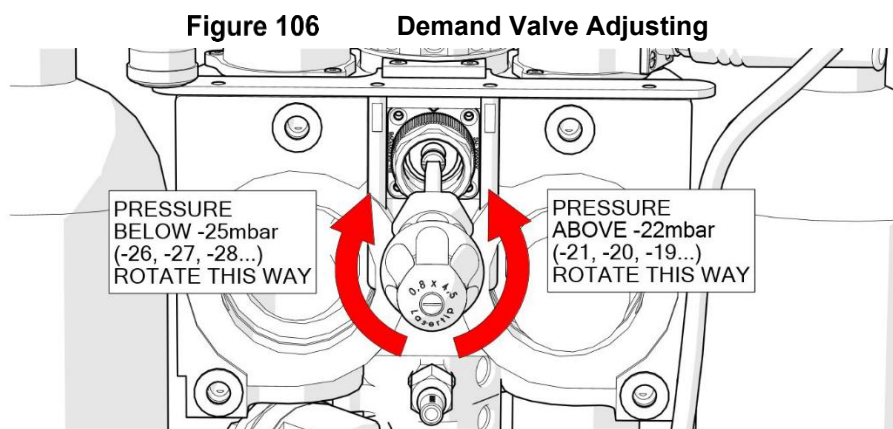


14. Set the Demand Valve cracking pressure in accordance with paragraph 13.9, Demand Valve Cracking Pressure Setting.

13.9 Demand Valve Cracking Pressure Setting

Tools required;

- Slotted Screwdriver
 - 7 mm Spanner
1. Ensure the cylinder shut-off valve is closed.
 2. Remove the backplate DB5002186.
 3. Remove the demand hose DB5002106.
 4. Remove the valve seat D1998.
 5. Remove the demand cap DB5002112, retaining ring DB5003148 and washer DB5003149.
 6. Unscrew the diaphragm assembly DB5002008.
 7. Refer to drawing Demand Valve Assembly, COBRA DB5002110S1.
 8. Using a thin 7 mm spanner, hold the demand stem nut FN078.
 9. Using a flat screwdriver, turn the valve stem (from the opposite end from the nut).



10. Replace the seat D1998 and hose. Ensure the face O-ring on the hose fitting remains in the correct place.
11. Replace the diaphragm assembly DB5002008. Set the adjusting thread on the positive pressure rod flush with the top of the plastic fitting on the diaphragm.
12. Replace the washer DB5003149 and Retaining Ring DB5003148

Note Following any adjustment of the demand valve cracking pressure, positive pressure setting must be checked, and adjustment made if out of limits. Similarly following any adjustment of the positive pressure setting, demand valve cracking pressure must be checked and adjustment made if out of limits.

13. Test and adjust positive pressure setting if required in accordance with section 10.2.

14. Test and adjust the demand valve cracking pressure in accordance with section 10.7.
15. Repeat steps 13 and 14 until cracking pressure and positive pressure are within limits.

13.10 Rotowink Indicator Replacement

Tools required;

- Suction Tool E16649
 - Rotowink removal tool DB5004030
1. Refer to drawing Rotowink Assembly, COBRA DB5002134S1.
 2. Unscrew the Rotowink Cap DB5004004 from the Rotowink Housing DB5004005.
 3. Using Suction tool E16649, remove the Lens D266.
 4. Unscrew the Rotowink base DB5004006 from the Rotowink Housing DB5004005.
 5. Remove the internal O-ring and diaphragm from the Eyeball Indicator DB5004014.
 6. Grip the Rotowink removal tool DB5004030 in a vice.
 7. Whilst holding the Rotowink Housing DB5004005, hook the disk on the end of the tool into the internal O-ring groove on the Eyeball indicator DB5004014.
 8. Pull the Rotowink Housing away from the tool to withdraw the eyeball indicator.
 9. Insert replacement Eyeball Indicator.
 10. Re-assembly by reversing the disassembly instructions.

13.11 Change 1st stage piston and/or spring

1. Remove piston assembly as detailed in section 13.13 Piston Assembly Removal.
2. Refer to drawing Two Stage Regulator, COBRA DB5002314S1.
3. Unscrew the two stage regulator cap DB5003503 from the two stage regulator housing DB5003501.
4. Inspect plastic seat on piston (D2203E) and spring (RK225), replace if necessary.
5. Replace O-rings (RV0801-7) and (RN806-7).
6. Re-assemble and test.

CAUTION

Inlet Cap DB5003503 shall be hand-tightened only. Do not over-tighten as this can cause distortion.

13.12 Change 2nd Stage Seat and Valve Pin

1. It may be possible to carry out this operation without removing the piston block from the COBRA set, otherwise remove piston block from set as described in 13.13 Piston Assembly Removal.
2. Refer to drawing Two Stage Regulator, COBRA DB5002314S1
3. Remove the two stage regulator cap DB5003502 from the two stage regulator housing DB5003501
4. Remove the internal components until the 2nd stage valve retainer D2210G is visible. Unscrew this item.
5. Remove the valve seat RK221, valve pin D2260F and spring RK223. Inspect and replace as required.
6. Re-assemble the regulator, noting carefully the order of the components and the required orientation of valve seat RK221

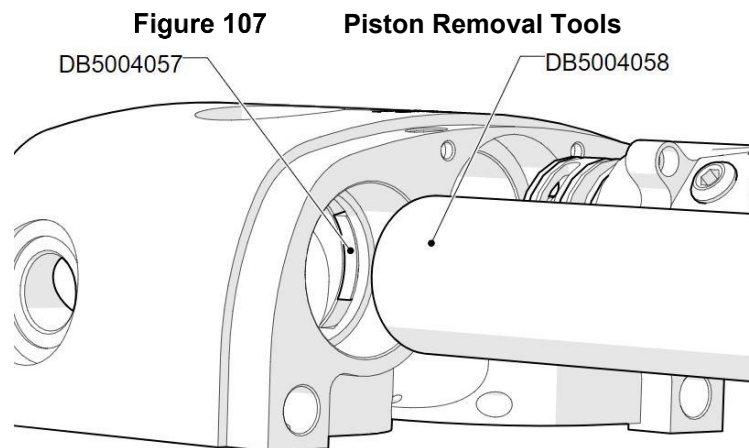
13.13 Piston Assembly Removal

Note This procedure is not to be carried out in isolation, but only as directed as part of other corrective maintenance.

Tools required;

- 21 mm 1/2" Drive Socket
 - 1/2" Drive 300 mm Extension
 - 1/2" Drive Ratchet or Tommy Bar
 - 14 mm AF Spanner
1. Refer to drawing Head Assembly, COBRA DB5002002S1.
 2. Remove the demand cap, retaining ring and washer.
 3. Unscrew and remove the diaphragm assembly.
 4. Refer to drawing Backpack, Final Assembly, COBRA Mk 2 DB5002043S1.
 5. Remove the backplate assembly.
 6. Remove both counterlungs.
 7. Disconnect the hot water hoses from the scrubber / hot water housing.
 8. Remove the scrubber cap assembly and withdraw the Scrubber canister.
 9. Using a 21 mm socket, extension and ratchet remove the sealing nut from inside the top of the scrubber housing
 10. Remove the four M8 button head screws which retain the scrubber / hot water housing to the chassis assembly. Move the Scrubber / Hot Water housing aside to allow the piston assembly to be removed.
 11. Remove the Exhale tube.

12. Using a 14 mm spanner disconnect the HP supply hose from the bottom of the two stage regulator.
13. Remove exhale tube.
14. Refer to drawing Backpack, Final Assembly, COBRA Mk 2 DB5002043S1.
15. Using a 3 mm allen key remove the two cap screws retaining the piston assembly to the head.

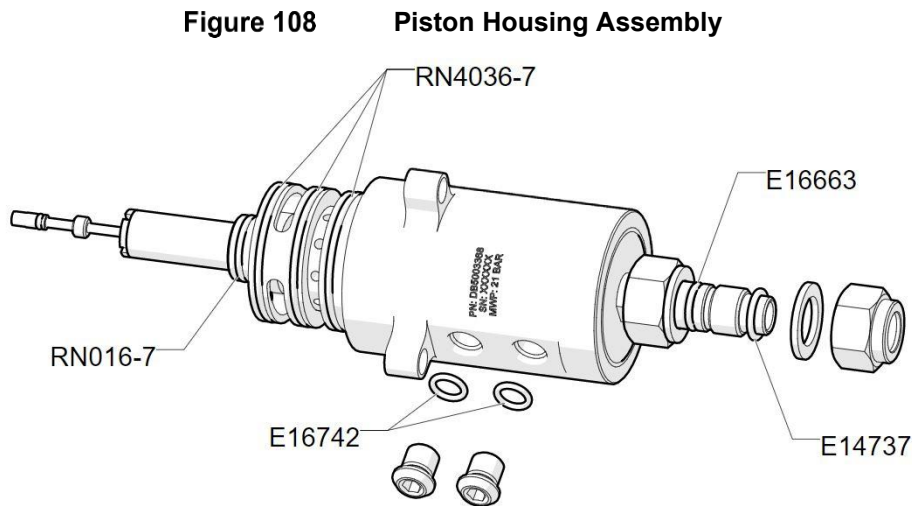


16. Prior to removing or inserting the piston assembly insert the tool DB5004057 into the cross port (dimple upward and toward the exhale pipe port) and insert tool DB5004058 into the exhale port to hold DB5004057 in place.
17. Withdraw Piston assembly from head.
18. Inspect the piston assembly port within the head for debris, clean with lint free cloths if required.
19. Re-assembly is the reverse of removal. All exposed O-rings should be inspected and, if necessary, replaced before re-assembly. Care must be taken to avoid damage to O-rings when re-inserting the piston block into the head. O-rings should be lightly lubricated with Christo-lube.

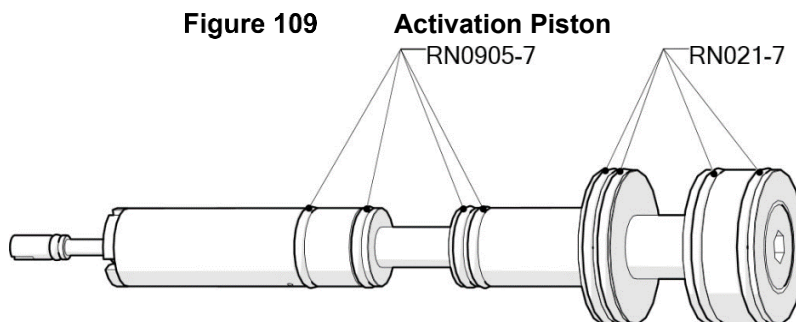
13.14 Piston Assembly Service

1. Remove the piston assembly in accordance with section 13.13.
2. Remove and discard the piston assembly outer O-rings.

Note: O-rings are required to be changed at annual service. During periodic inspection only change o-rings if wear or damage is detected.



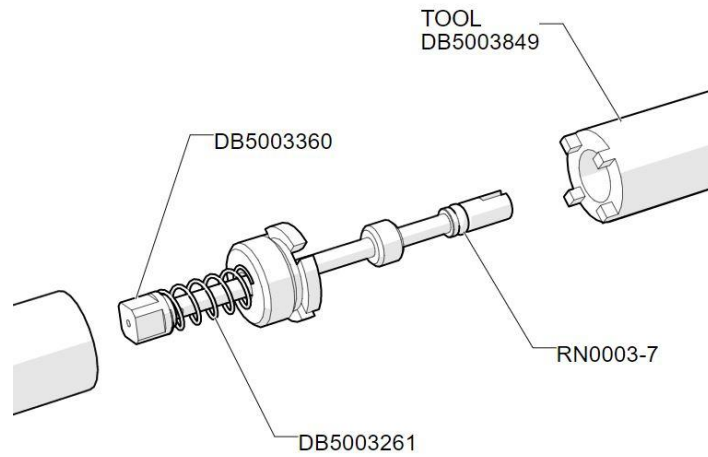
3. Remove the 22 mm Lee Jet housing nut.
4. Using a 12 mm spanner remove the Lee Jet housing. Remove and discard the Lee Jet housing O-ring.
5. Push the activation piston from the housing.



6. Remove and discard the O-rings from the activation piston.
7. Using lint free cloths clean the piston and piston housing interior, taking care not to push any debris into cross ports.
8. Using the piston cap tool DB5003849 remove the piston cap along with the positive pressure adjustment rod.
9. Remove and discard the O-ring RN0003-7.

- Using a 5mm spanner remove and discard the Spring Nut DB5003360 and Spring DB5003261.

Figure 110 Positive Pressure Adjustment Rod



- Reassemble the piston assembly ensuring all O-rings are lubricated with Christo-lube grease.
- Referring to Section 13.13, Figure 107 and instruction 16 reassemble the piston in the head.

Appendix A System Drawings

Backpack, Mk 2, Final Assembly, Steel Cyls	A-2
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Backpack, Mk 2, Final Assembly, Steel Cyls

ITEM No.	PART No.	DESCRIPTION	QTY.
1	C3282A	HOSE, SLS HOT WATER, SHROUD	1
2	DB5002015	COUNTERLUNG ASSEMBLY, INHALE, COBRA	1
3	DB5002016	COUNTERLUNG ASSEMBLY, EXHALE, COBRA	1
4	DB5002017	HOSE, BREATHING, ASSEMBLY, COBRA	2
5	DB5002054	BACKPACK, MK2, INITIAL ASSEMBLY, LARGE OD CYL	1
6	DB5002072	HARNASS, YELLOW, COBRA, COMPLETE	1
7	DB5002225	CYLINDER ASSEMBLY, 232 BAR, HELIOX, M25, COBRA	1
8	DB5002195	HOSE ASSEMBY, C/W CONTENTS GAUGE, COBRA	1
9	DB5002332	STAPLE ASSEMBLY, OUTLET PLENUM, COBRA	1
10	DB5002498	HOSE ASSEMBLY, HOT WATER, EXTERNAL, COBRA MK2	1
11	DB5002501	SPLITTER BLOCK, COBRA	1
12	DB5002918	HOSE, H.P. SUPPLY, 5-16" UNF(M) - 4 JIC(F), COBRA	1
13	DB5003199	CLAMP, CYLINDER, COBRA	4
14	DB5004076	SPIGOT, SWIVEL, HOT WATER HOSE, COBRA, M10	1
15	DB5004127	PLATE, ID, COBRA MK2, STEEL CYLINDERS	1
16	FB26762	SCREW, BUTTON, SCKT, M10 X 20LG, SS 316	5
17	FC023	FSTR, RIVET, POP, 3.2 DIA X 10MM LONG	2
18	FN101	NUT, NYLOC, M10, SS 316	6
19	FW125	WASHER, M10, FORM A, SS 316L	6
20	FW156	SEAL, COPPER, 1/4", 7C4	1
21	FW174	WASHER, M3.5, FORM A, SS316	2
22	RN014-7	O-RING	1
23	RN2512-7	O-RING	2
24	DB5004161	CUSHION INSERT, YELLOW COBRA HARNASS	1

BROKEN OUT DETAIL
SCALE 1:2

BACK COVER VIEW
SCALE 1:15

EXPLODED ISOMETRIC VIEW

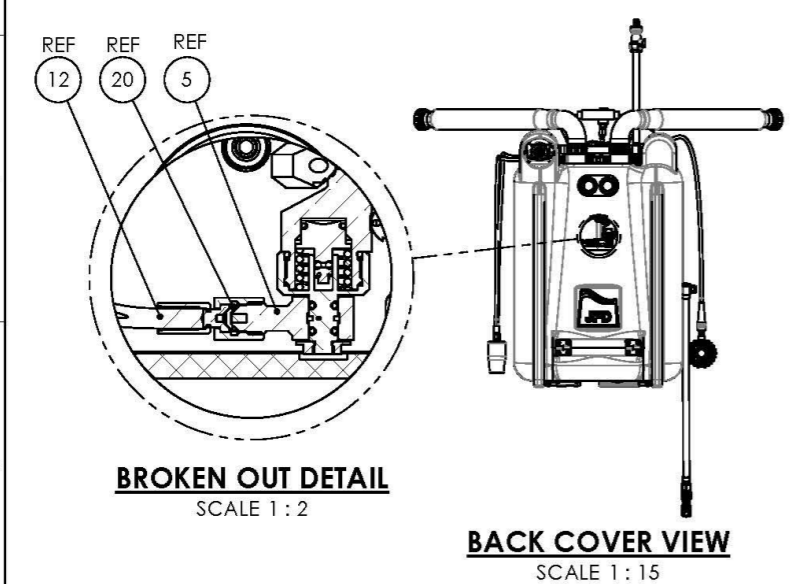
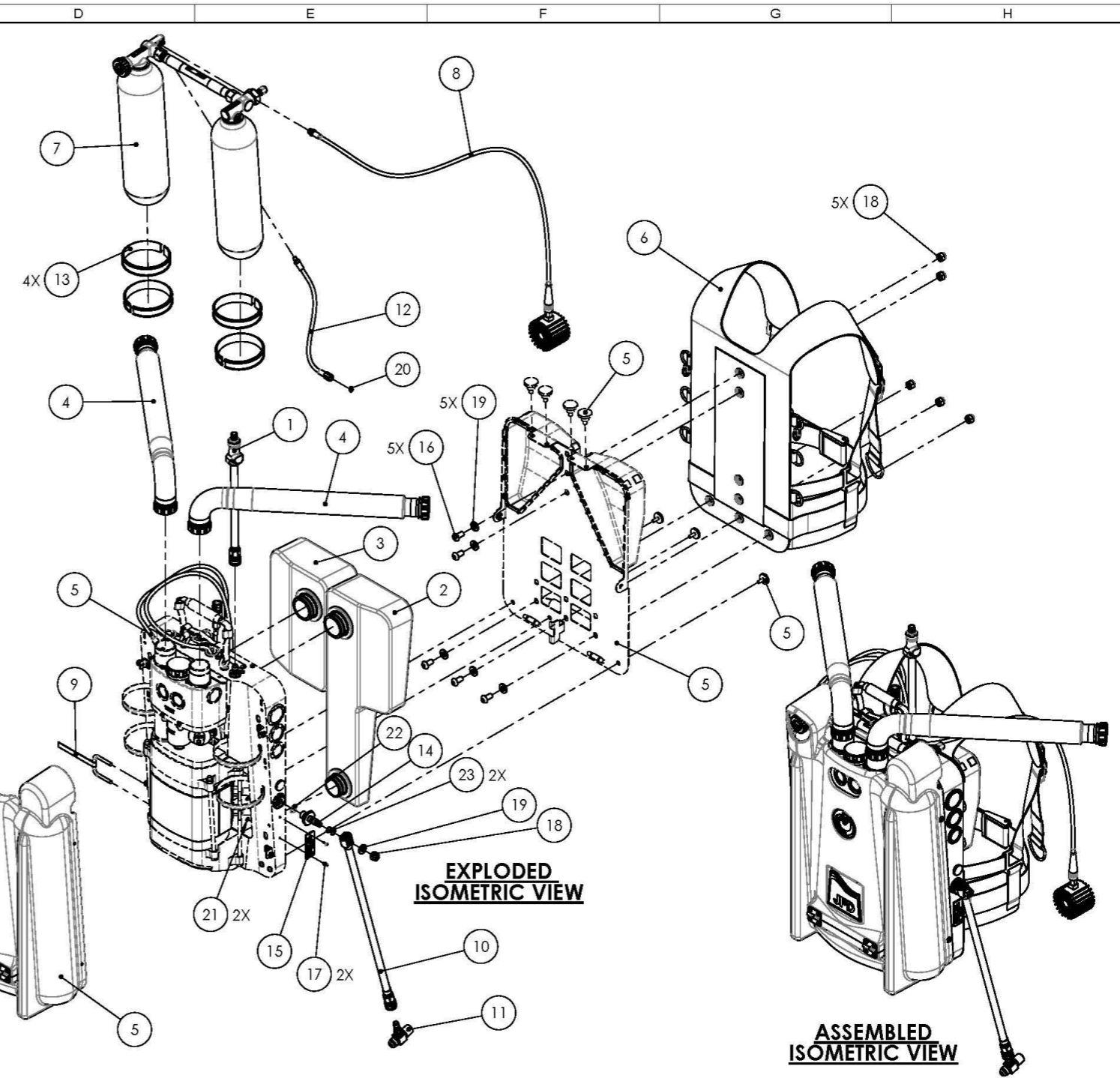
ASSEMBLED ISOMETRIC VIEW

<p>NOTES:</p> <p>MATERIAL: SEE BILL OF MATERIALS</p> <p>FINISH: N/A</p> <p>MASS: N/A</p> <p>ALL DIMENSIONS ARE IN mm (UOS)</p> <p>ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)</p>	<p>REVISIONS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> <tr> <td>R03</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R02</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R01</td> <td>HARNASS UPDATED, CUSHION ADDED</td> <td>35331</td> <td>GC</td> <td>28/10/25</td> <td>JM</td> </tr> <tr> <td>R00</td> <td>ISSUED FOR MANUFACTURE</td> <td></td> <td>GC</td> <td>31/05/21</td> <td>AB</td> </tr> </table>	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	R03						R02						R01	HARNASS UPDATED, CUSHION ADDED	35331	GC	28/10/25	JM	R00	ISSUED FOR MANUFACTURE		GC	31/05/21	AB	<p>TITLE: BACKPACK, MK2, FINAL ASSEMBLY, STEEL CYLS</p> <p>DRAWING NO: DB5002044S1</p> <p>REV: R01</p> <p>PART NO: DB5002044</p> <p>PRODUCT / PROJECT NO: COBRA</p> <p>SCALE (UOS): 1:10</p> <p>SHEET: 1 of 1</p>	<p>JFD</p> <p>JFD WESTHILL ENTERPRISE DRIVE, WESTHILL, ABERDEEN, AB32 6TQ, UK</p> <p>+44 (0)1224 740145 jfdglobal.com</p>
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R02																																	
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R00	ISSUED FOR MANUFACTURE		GC	31/05/21	AB																												

Rev 8

Backpack, COBRA Mk 2, SS Composite Cylinders

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	C3282A	HOSE, SLS HOT WATER, SHROUD	1
2	DB5002015	COUNTERLUNG ASSEMBLY, INHALE, COBRA	1
3	DB5002016	COUNTERLUNG ASSEMBLY, EXHALE, COBRA	1
4	DB5002017	HOSE, BREATHING, ASSEMBLY, COBRA	2
5	DB5002054	BACKPACK, MK2, INITIAL ASSEMBLY, LARGE OD CYL	1
6	DB5002060	HARNESS, COBRA	1
7	DB5002959	CYLINDER ASSEMBLY, 300 BAR, SS COMPOSITE, COBRA	1
8	DB5002195	HOSE ASSEMBY, C/W CONTENTS GAUGE, COBRA	1
9	DB5002332	STAPLE ASSEMBLY, OUTLET PLENUM, COBRA	1
10	DB5002498	HOSE ASSEMBLY, HOT WATER, EXTERNAL, COBRA MK2	1
11	DB5002501	SPLITTER BLOCK, COBRA	1
12	DB5002918	HOSE, H.P. SUPPLY, 5-16" UNF(M) - 4 JIC(F), COBRA	1
13	DB5003199	CLAMP, CYLINDER, COBRA	4
14	DB5004076	SPIGOT, SWIVEL, HOT WATER HOSE, COBRA, M10	1
15	DB5004133	PLATE, ID, COBRA MK2 SS COMPOSITE CYLINDERS	1
16	FB26762	SCREW, BUTTON, SCKT, M10 X 20LG, SS 316	5
17	FC023	FSTR, RIVET, POP, 3.2 DIA X 10MM LONG	2
18	FN101	NUT, NYLOC, M10, SS 316	6
19	FW125	WASHER, M10, FORM A, SS 316L	6
20	FW156	SEAL, COPPER, 1/4", 7C4	1
21	FW174	WASHER, M3.5, FORM A, SS316	2
22	RN014-7	O-RING	1
23	RN2512-7	O-RING	2



NOTES:				<table border="1"> <tr><td>R03</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R02</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R01</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R00</td><td>ISSUED FOR MANUFACTURE</td><td>✗</td><td>KR</td><td>14/10/21</td><td>JM</td></tr> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> </table>			R03						R02						R01						R00	ISSUED FOR MANUFACTURE	✗	KR	14/10/21	JM	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	BACKPACK, COBRA MK2, SS COMPOSITE CYLINDERS DB5002045S1		 JFD WESTHILL ENTERPRISE DRIVE, WESTHILL, ABERDEEN, AB32 6TQ, UK TEL: +44 (0) 1224 740145 E: enquires@jfdglobal.com W: jfdglobal.com	
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				THIRD ANGLE PROJECTION DO NOT SCALE DRAWING		DRAWING NO. DB5002045 PRODUCT / PROJECT No. COBRA		SCALE (UOS) 1:10 SHEET 1 OF 1																																

Backpack, Mk 2, Standard Build

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	C3282A	HOSE, SLS HOT WATER, SHROUD	1
2	DB5002015	COUNTERLUNG ASSEMBLY, INHALE, COBRA	1
3	DB5002016	COUNTERLUNG ASSEMBLY, EXHALE, COBRA	1
4	DB5002017	HOSE, BREATHING, ASSEMBLY, COBRA	2
5	DB5002054	BACKPACK, MK2, INITIAL ASSEMBLY, LARGE OD CYL	1
6	DB5002072	HARNESS, YELLOW, COBRA, COMPLETE	1
7	DB5002969	CYLINDER ASSEMBLY, 300 BAR, SS COMPOSITE, COBRA	1
8	DB5002195	HOSE ASSEMBY, C/W CONTENTS GAUGE, COBRA	1
9	DB5002332	STAPLE ASSEMBLY, OUTLET PLENUM, COBRA	1
10	DB5002498	HOSE ASSEMBLY, HOT WATER, EXTERNAL, COBRA MK2	1
11	DB5002501	SPLITTER BLOCK, COBRA	1
12	DB5002918	HOSE, H.P. SUPPLY, 5-16" UNF(M) - 4 JIC(F), COBRA	1
13	DB5003199	CLAMP, CYLINDER, COBRA	4
14	DB5004076	SPIGOT, SWIVEL, HOT WATER HOSE, COBRA, M10	1
15	DB5004155	PLATE, ID, DB5002046	1
16	FB26762	SCREW, BUTTON, SCKT, M10 X 20LG, SS 316	5
17	FC023	FSTR, RIVET, POP, 3.2 DIA X 10MM LONG	2
18	FN101	NUT, NYLOC, M10, SS 316	6
19	FW125	WASHER, M10, FORM A, SS 316L	6
20	FW156	SEAL, COPPER, 1/4", 7CA	1
21	FW174	WASHER, M3.5, FORM A, SS316	2
22	RN014-7	O-RING	1
23	RN2512-7	O-RING	2
24	DB5004161	CUSHION INSERT, YELLOW COBRA HARNESS	1

BACK COVER VIEW
SCALE_1:15

BROKEN OUT DETAIL
SCALE_1:2

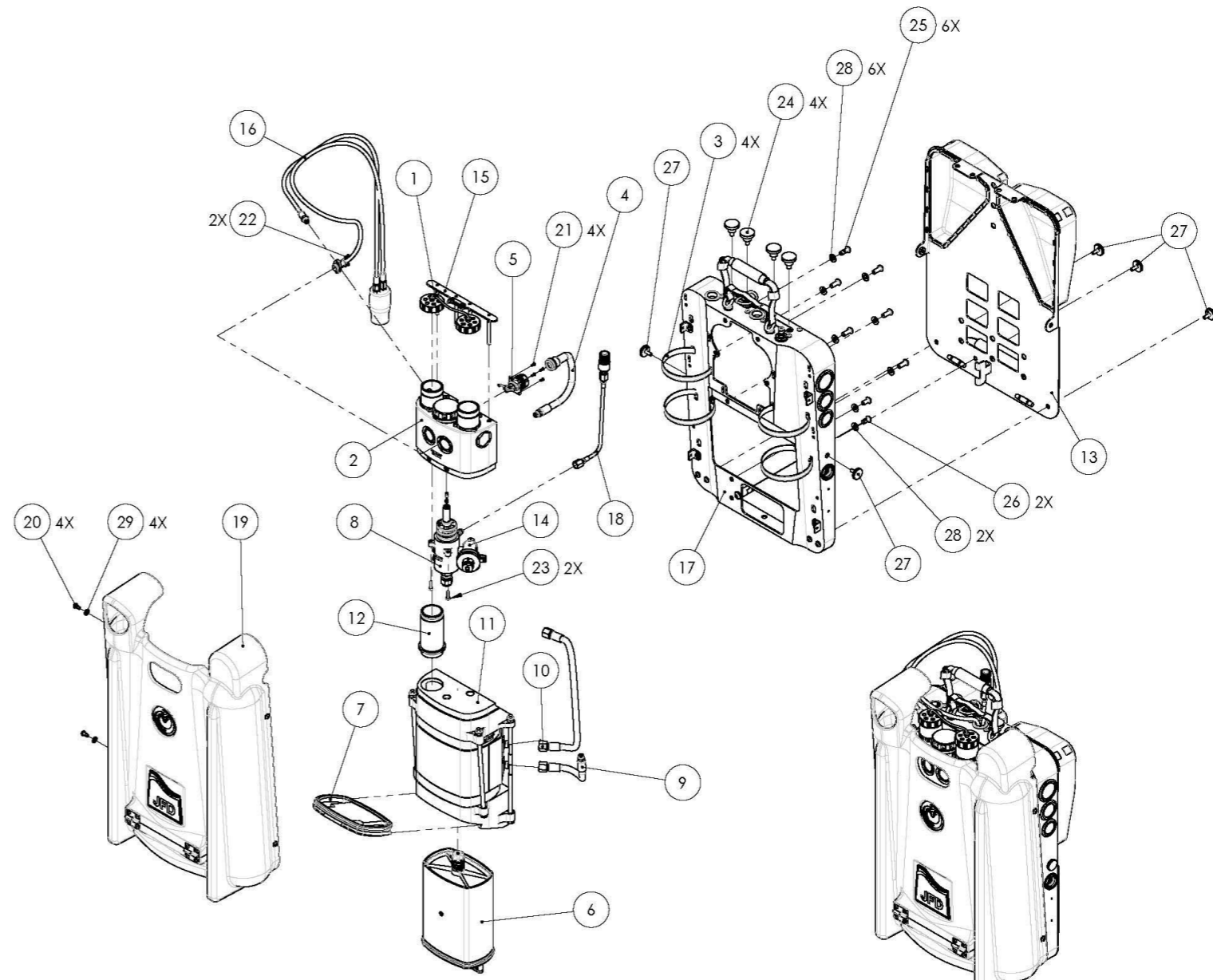
EXPLODED ISOMETRIC VIEW

ASSEMBLED ISOMETRIC VIEW

NOTES: MULTIPLE: N/A FINISH: N/A MASS: N/A ALL DIMENSIONS ARE IN mm (UOS) ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>R03</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R02</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R01</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>R00</td><td>ISSUED FOR MANUFACTURE</td><td>KR</td><td>29/10/25</td><td>JM</td><td></td></tr> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> <tr> <td>①</td> <td>THIRD ANGLE PROJECTION</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>DO NOT SCALE DRAWING</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p style="font-size: 8px;">JFD OWNS THE COPYRIGHT OF THIS DOCUMENT AND ANY DESIGN RIGHT HEREIN. IT IS SUPPLIED IN CONFIDENCE AND MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT PERMISSION IN WRITING FROM THE COMPANY.</p>	R03						R02						R01						R00	ISSUED FOR MANUFACTURE	KR	29/10/25	JM		REV	DESCRIPTION	ECN	BY	DATE	AUTH.	①	THIRD ANGLE PROJECTION						DO NOT SCALE DRAWING					<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">BACKPACK, COBRA MK2, STANDARD BUILD</td> </tr> <tr> <td>DRAWING NO. DB5002046S1</td> <td>REV R00</td> </tr> <tr> <td>PART NO. DB5002046</td> <td>PRODUCT / PROJECT NO. COBRA</td> </tr> <tr> <td>SIZE A3</td> <td>SCALE (UOS) 1:10</td> </tr> <tr> <td></td> <td>SHEET 1 of 1</td> </tr> </table> <div style="text-align: right; margin-top: 10px;"> JFD WESTHILL ENTERPRISE DRIVE, WESTHILL, ABERDEEN, AB32 6TQ, UK +44 (0)1224 740145 jfdglobal.com </div>	BACKPACK, COBRA MK2, STANDARD BUILD		DRAWING NO. DB5002046S1	REV R00	PART NO. DB5002046	PRODUCT / PROJECT NO. COBRA	SIZE A3	SCALE (UOS) 1:10		SHEET 1 of 1
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SIZE A3	SCALE (UOS) 1:10																																																					
	SHEET 1 of 1																																																					

Backpack, Mk 2, Initial Assembly, Large OD Cyl

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	D311	PROTECTION COVER ASSY, IN/EXHALE DUCT	1
2	DB5002002	HEAD ASSEMBLY, COBRA	1
3	DB5002019	JUBILEE CLIP, C/W HEATSHRINK	4
4	DB5002106	HOSE ASSEMBLY, DEMAND VALVE, COBRA	1
5	DB5002110	DEMAND VALVE ASSEMBLY, COBRA	1
6	DB5002115	SCRUBBER CANISTER ASSEMBLY, COBRA	1
7	DB5002118	CAP ASSEMBLY, SCRUBBER HOUSING, COBRA	1
8	DB5002120	PISTON ASSEMBLY, COBRA	1
9	DB5002123	HOSE ASSEMBLY, INLET, HOT WATER, COBRA	1
10	DB5002124	HOSE ASSEMBLY, OUTLET, HOT WATER, COBRA	1
11	DB5002504	SCRUBBER HOUSING, ISOLATED WATER JACKET, COBRA	1
12	DB5002135	EXHALE PIPE ASSEMBLY, COBRA	1
13	DB5002186	BACKPLATE ASSEMBLY, COBRA	1
14	DB5002314	TWO STAGE REGULATOR, COBRA	1
15	DB5002402	STAPLE PLATE ASSEMBLY, COBRA	1
16	DB5002494	HOSE ASSEMBLY, LONG, C/W ROTOWINK, COBRA	1
17	DB5002507	CHASSIS ASSEMBLY, COBRA MK2, LARGE OD CYLINDERS	1
18	DB5002497	HOSE ASSEMBLY, Q/C, BACKPACK, COBRA MK2	1
19	DB5002508	CHASSIS ASSEMBLY, COBRA MK2, LARGE OD CYLINDERS	1
20	DB5004098	SCREW, SHOULDER, COBRA COVER	4
21	E15370	SCREW, M/C, CSK, SLOTTED, M3 X 0.5 X 8LG	4
22	FB164	SCREW, M/C, CSK, SLOTTED, M3 X 10MM, A2-70	2
23	FB264	SCREW, CAP, SCKT, M4X16MM LG	2
24	FB414	SCREW, THUMB, KNURLED, COLLARED, M8 X 12, A2 SS	4
25	FB487	SCREW, BUTTON HEAD SOCKET, M8 X 1.25 X 20LG, SS 316	6
26	FB618	SCREW, SOCKET BUTTON HEAD, M8 X 16, A4	2
27	FB817	SCREW, THUMB, KNURLED, FLAT, M6 X 16, A4 SS	5
28	FW044	WASHER, PLAIN, M8, S316	8
29	FW70368	WASHER, M6, 12.5 OD, RUBBER	4



EXPLODED ISOMETRIC VIEW

ASSEMBLED ISOMETRIC VIEW

NOTES:

R03					
R02					
R01					
R00	ISSUED FOR MANUFACTURE	GC	31/05/21	AB	
REV	DESCRIPTION	ECN	BY	DATE	AUTH.

TITLE		
BACKPACK, MK2, INITIAL ASSEMBLY, LARGE OD CYL		
DRAWING NO.	REV	
DB5002054S1	R00	
PART NO.	PRODUCT / PROJECT No.	
DB5002054	COBRA	
SIZE	SCALE (UOS)	SHEET
A3	1:10	1 OF 1

JFD WESTHILL
ENTERPRISE DRIVE,
WESTHILL, ABERDEEN,
AB32 6TQ, UK

TEL: +44 (0)1224 740145
E: enquiries@jfdglobal.com
W: jfdglobal.com

Helmet, COBRA Mk 2, 17C

Rev 8

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	DM28400	HOTWATER SHROUD KIT (NOT SHOWN)	1
2	A10170	HELMET, ULTRAJEWEL 601 (17C) **CE MARKED	1
3	DB5002412	KIT, HELMET ACTIVATION, COBRA	1
4	C28500	HELMET HOSE ASSY, SLS	1
5	DM28810	HOUSING, SLS, EXHALE FLAP VALVE, PLATED	1
6	DM025	VALVE, RECLAIM SHUT OFF, S17C, UJ401/SLS	1
7	DM2494A	MUSHROOM FLAP VALVE, RED, SLIC ON, 36MM DIA, 3MM HOLE	1
8	C2904B	SLS SIDE BUX POSITIONABLE ELBOW	1
9	D2900	SUPPORT, IN/EXHALE/FLAP VALVE, SLS, S17C, FOR S17C, ON	2
10	TV035	COLOURWATCH HELMET HANDLE	1
11	RN028-7	O-RING	1
12	E15215	SUPPORT CLIP, INLET MUSHROOM	1
13	DE175	WASHER	4
14	FB231	SCREW, M/C, PAN HD, SLOTTED, M5 X 12 LONG, 316 SS	6
15	FN013	NUT, SELFLOCK, 10 UNC X 10 MM A/F, SS 316	1
16	D292	SCREW, BARB, SUPERLITE 17C, SLS	1
17	DE1831	SIDE BLOCK, SLS	1
18	DM3304A	ORAL NASAL MASK, SLS	1
19	D2784A	SUPPORT, SLS OVER PRESSURE MUSHROOM	1
20	DE028	VALVE, EXHAUST	1
21	DE239	WEIGHT, PORT SIDE, SLS, 17C, C/W UJ601	1
22	RN030-7	O-RING	1
23	DB5003041	HOSE, BRAIDED, 360MM, SUPPLY, COBRA HELMET	1
24	DB5002500	HOSE, QUICK CONNECT ASSEMBLY, COBRA MK2 HELMET	1
25	DB5004082	LABEL, COBRA HELMET, CE, DB500HD	1
26	DE159	SCREW	2
27	FW078	WASHER, PLAIN, M5, SS316	2
28	DE094	WASHER	2
29	FB72536	SCREW, M/C, PAN HD, 10 UNC X 1 1/4", A2-70 SS	1

EXPLODED ISOMETRIC VIEW

ISOMETRIC VIEW
SCALE 1:4

ALTERNATIVE ISOMETRIC VIEW
SCALE 1:4

<p>1. LABEL TO BE APPLIED SO THAT IT IS VISIBLE THROUGH VIEWPORT AND NOT COVERED BY HEAD CUSHION</p> <p>2. REMOVE EXISTING CENTRAL SCREW FROM WEIGHT AND REPLACE WITH ITEM 29.</p>	<p>SEE PARTS LIST</p> <p>REVISIONS CHANGES MADE AT THIS REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> <th>AUTH</th> </tr> </thead> <tbody> <tr> <td>R00</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R01</td> <td>ITEM 29 UPDATED</td> <td>2885</td> <td>KE</td> <td>20/09/22</td> <td>JM</td> </tr> <tr> <td>R02</td> <td>ISSUED FOR MANUFACTURE</td> <td>CB</td> <td>09/09/19</td> <td>AN</td> </tr> </tbody> </table> <p>MACHINING TOLERANCE: ±1.0 (0 <100) ±0.5 (100-500) ±1.0 (500-1000) ±0.25 (1000-5000) ±0.5 (5000-10000) ±0.5*</p> <p>FABRICATION TOLERANCE: ±1.0 (0 <100) ±0.5 (100-500) ±1.0 (500-1000) ±0.25 (1000-5000) ±0.5 (5000-10000) ±0.5*</p> <p>ANGULAR TOLERANCE: ±0.5*</p> <p>THIRD ANGLE PROJECTION</p> <p>DO NOT SCALE DRAWING</p>	REV	DESCRIPTION	BY	DATE	AUTH	R00					R01	ITEM 29 UPDATED	2885	KE	20/09/22	JM	R02	ISSUED FOR MANUFACTURE	CB	09/09/19	AN
REV	DESCRIPTION	BY	DATE	AUTH																		
R00																						
R01	ITEM 29 UPDATED	2885	KE	20/09/22	JM																	
R02	ISSUED FOR MANUFACTURE	CB	09/09/19	AN																		

HELMET, COBRA MK2, 17C		
PART NO. DB5002202S1	REV. R01	
PART NO. DB500HD	PRODUCT PRESENTATION COBRA	<p>JFD WESTHILL ENTERPRISE DRIVE, WESTHILL, ABERDEEN, AB32 4SQ, UK</p> <p>TEL: +44 (0)124746146</p> <p>enquiries@jfglobal.com</p> <p>www.jfglobal.com</p>
SCALE: A2	SCALE: 1:3	

Helmet, COBRA Mk 2, For Greco Comms

Rev 8

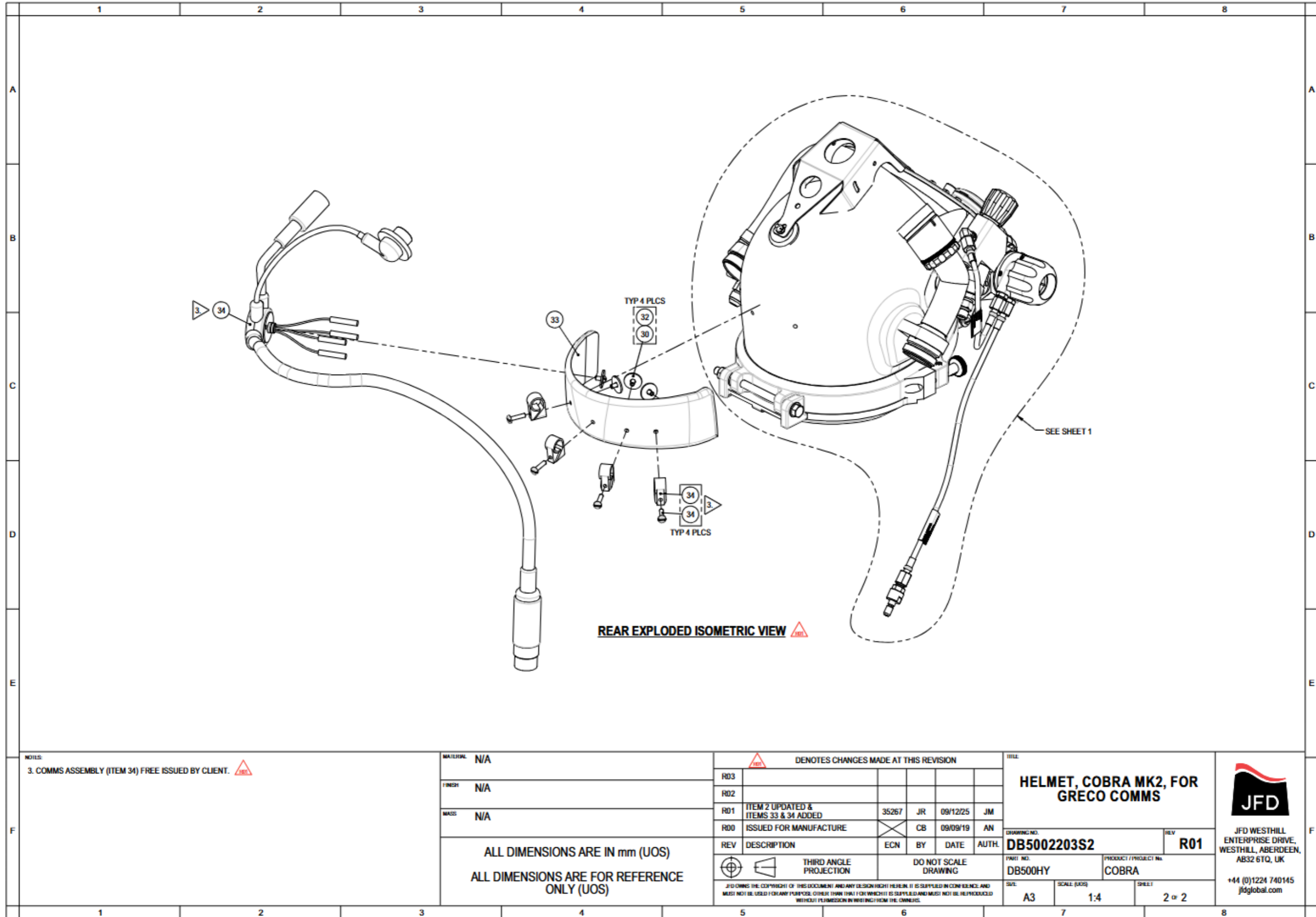
ITEM No.	PART No.	DESCRIPTION	QTY.	
1	DM28400	HOTWATER SHROUD KIT, (SLS HELMET ONLY)	1	
2	A10170	HELMET, ULTRAJEWEL 601 (17C), CE MARKED	1	
3	DB5002412	KIT, HELMET ACTIVATION, COBRA	1	
4	C28500	HELMET HOSE ASSY,SLS	1	
5	DM28810	HOUSING, SLS, EXHALE FLAP VALVE,PLATED	1	
6	DM025	VALVE, RECLAIM SHUT OFF, S17C, UJ601/SLS	1	
7	DM2494A	MUSHROOM FLAP VALVE,RED SILICON,36MM DIA,3MM HOLE	1	
8	C2904B	SLS SIDE BLK POSITIONABLE ELBOW	1	
9	D2500	SUPPORT,INEXHALE/FLAP VALVE,SLS,S17C, FOR S17C ON	2	
10	TV035	COLOURWATCH HELMET HANDLE	1	
11	RN028-7	O-RING	1	
12	E15215	SUPPORT CLIP, INLET MUSHROOM	1	
13	DE175	WASHER	4	
14	FB231	SCREW, M/C, PAN HD, SLOTTED, M5 X 12 LONG, 316 SS	6	
15	FN013	NUT, SELFLOCK, 10 UNC X 10 MM A/F, SS 316	1	
16	D292	SCREW,BARB, SUPERLITE 17C, SLS	1	
17	DE1831	SIDE BLOCK, SLS	1	
18	DM3304A	ORAL NASAL MASK-SLS	1	
19	D2784A	SUPPORT,SLS OVER PRESSURE MUSHROOM	1	
20	DE028	VALVE,EXHAUST	1	
21	DE239	WEIGHT, PORT SIDE, SL17C C/W UJ601	1	
22	RN030-7	O-RING	1	
23	DB5003041	HOSE, BRAIDED, 360MM, SUPPLY, COBRA HELMET	1	
24	DB5002500	HOSE, QUICK CONNECT ASSEMBLY, COBRA MK2 HELMET	1	
25	DB5004048	SPACER, HELMET BRACKET, COBRA	1	
26	FB063	SCREW, M/C, PAN HD, 10UNC X 3/4"	1	
27	FW012	WASHER, PLAIN, 10UNC	1	
28	DB5004083	LABEL, COBRA HELMET, CE, DB500HY	1	
29	DE159	SCREW	2	
30	DE094	WASHER	6	
31	FW078	WASHER, PLAIN, M5, SS316	2	
32	FB018	SCREW, M/C, PAN HD, 10UNC X 3/8"	4	
33	DB5004143	REAR WEIGHT, GRECO COMMS, COBRA	1	
34	N/A	COMMS SET FOR DB500HY	1	

ISOMETRIC VIEWS

<p>NOTES:</p> <p>1. LABEL TO BE APPLIED SO THAT IT IS VISIBLE THROUGH VIEWPORT & NOT COVERED BY HEAD CUSHION.</p> <p>2. SEE SHEET 2 FOR REAR WEIGHT & COMMS ATTACHMENT.</p> <p>3. COMMS ASSEMBLY (ITEM 34) FREE ISSUED BY CLIENT.</p>	<p>MATERIAL: N/A</p> <p>FINISH: N/A</p> <p>MASS: N/A</p>	<p>△ DENOTES CHANGES MADE AT THIS REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>RD3</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>RD2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>RD1</td><td>ITEM 2 UPDATED & ITEMS 33 & 34 ADDED</td><td>35267</td><td>JR</td><td>09/12/25</td><td>JM</td></tr> <tr><td>RD0</td><td>ISSUED FOR MANUFACTURE</td><td></td><td>CB</td><td>09/09/19</td><td>AN</td></tr> <tr><td>REV</td><td>DESCRIPTION</td><td>ECN</td><td>BY</td><td>DATE</td><td>AUTH.</td></tr> </table>	RD3						RD2						RD1	ITEM 2 UPDATED & ITEMS 33 & 34 ADDED	35267	JR	09/12/25	JM	RD0	ISSUED FOR MANUFACTURE		CB	09/09/19	AN	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	<p style="text-align: center;">HELMET, COBRA MK2, FOR GRECO COMMS</p> <p>DRAWING NO: DB5002203S1 REV: R01</p> <p>PART NO: DB500HY PRODUCT / PROJECT No: COBRA</p> <p>SIZE: A3 SCALE (A3): 1:5 SHEET: 1 of 2</p> <p style="font-size: small;">JFD OWNS THE COPYRIGHT OF THIS DOCUMENT AND ANY DESIGN RIGHT HEREIN. IT IS SUPPLIED IN CONFIDENCE AND MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT PERMISSION BY WRITING FROM THE OWNERS.</p>
RD3																																	
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RD0	ISSUED FOR MANUFACTURE		CB	09/09/19	AN																												
REV	DESCRIPTION	ECN	BY	DATE	AUTH.																												

ALL DIMENSIONS ARE IN mm (UOS)
ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)

Rev 8



NOTES:
3. COMMS ASSEMBLY (ITEM 34) FREE ISSUED BY CLIENT.

MATERIAL:	N/A
FINISH:	N/A
MASS:	N/A
ALL DIMENSIONS ARE IN mm (UOS) ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)	

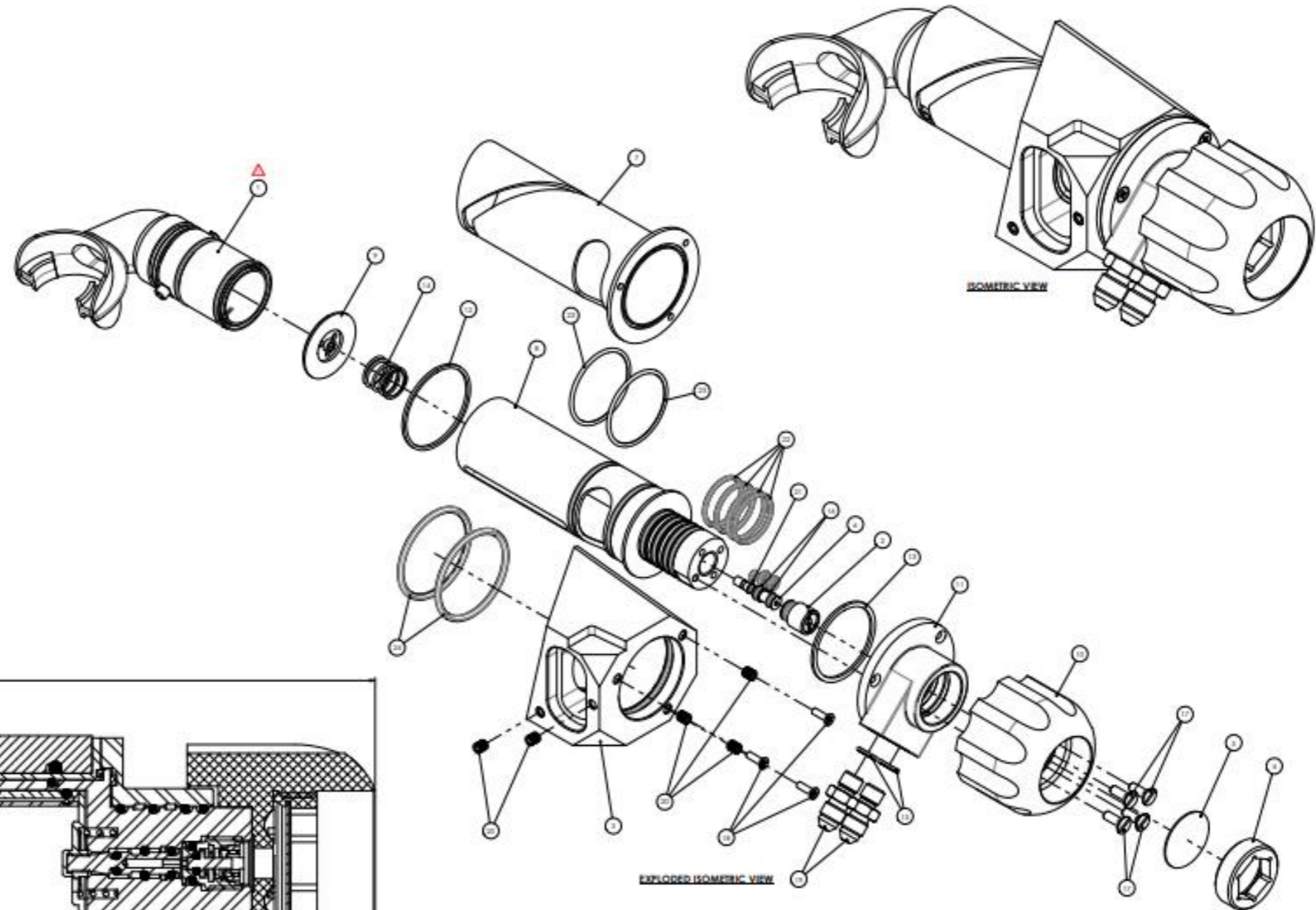
DENOTES CHANGES MADE AT THIS REVISION						
REV	DESCRIPTION	ECN	BY	DATE	AUTH.	
R03						
R02						
R01	ITEM 2 UPDATED & ITEMS 33 & 34 ADDED	35267	JR	09/12/25	JM	
R00	ISSUED FOR MANUFACTURE		CB	09/09/19	AN	

HELMET, COBRA MK2, FOR GRECO COMMS	
DRAWING NO. DB5002203S2	REV R01
PART NO. DB500HY	PRODUCT / PROJECT No. COBRA
SIZE A3	SCALE (UOS) 1:4
SHEET 2 of 2	

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Handle Assembly, Helmet Activation, COBRA

ITEM NO.	PART NO.	DESCRIPTION	QTY
1	DB500249	TELESCOPIC SLIDE ASSEMBLY, HELMET ACTIVATION, COBRA	1
2	DB500250	RELIEF VALVE ASSEMBLY, HELMET ACTIVATION, COBRA	1
3	DB500244	HOUSING, COBRA HOUSING/PIECE	1
4	DB500251	HOLDER, MESH MANDREL SET ACTIVATION, COBRA	1
5	DB500252	MESH MANDREL CHARGE, COBRA	1
6	DB500273	SPACER, O-RING SET ACTIVATION, COBRA	1
7	DB500290	SPACER, O-RING SET ACTIVATION, COBRA	1
8	DB500291	SPACER, O-RING SET ACTIVATION, COBRA	1
9	DB500292	SPACER, O-RING SET ACTIVATION, COBRA	1
10	DB500293	SPACER, O-RING SET ACTIVATION, COBRA	1
11	DB500294	SPACER, O-RING SET ACTIVATION, COBRA	1
12	DB500295	SPACER, O-RING SET ACTIVATION, COBRA	1
13	DB500296	SPACER, O-RING SET ACTIVATION, COBRA	1
14	DB500297	SPACER, O-RING SET ACTIVATION, COBRA	1
15	DB500298	SPACER, O-RING SET ACTIVATION, COBRA	1
16	DB500299	SPACER, O-RING SET ACTIVATION, COBRA	1
17	DB500300	SPACER, O-RING SET ACTIVATION, COBRA	1
18	DB500301	SPACER, O-RING SET ACTIVATION, COBRA	1
19	DB500302	SPACER, O-RING SET ACTIVATION, COBRA	1
20	DB500303	SPACER, O-RING SET ACTIVATION, COBRA	1
21	DB500304	SPACER, O-RING SET ACTIVATION, COBRA	1
22	DB500305	SPACER, O-RING SET ACTIVATION, COBRA	1
23	DB500306	SPACER, O-RING SET ACTIVATION, COBRA	1
24	DB500307	SPACER, O-RING SET ACTIVATION, COBRA	1

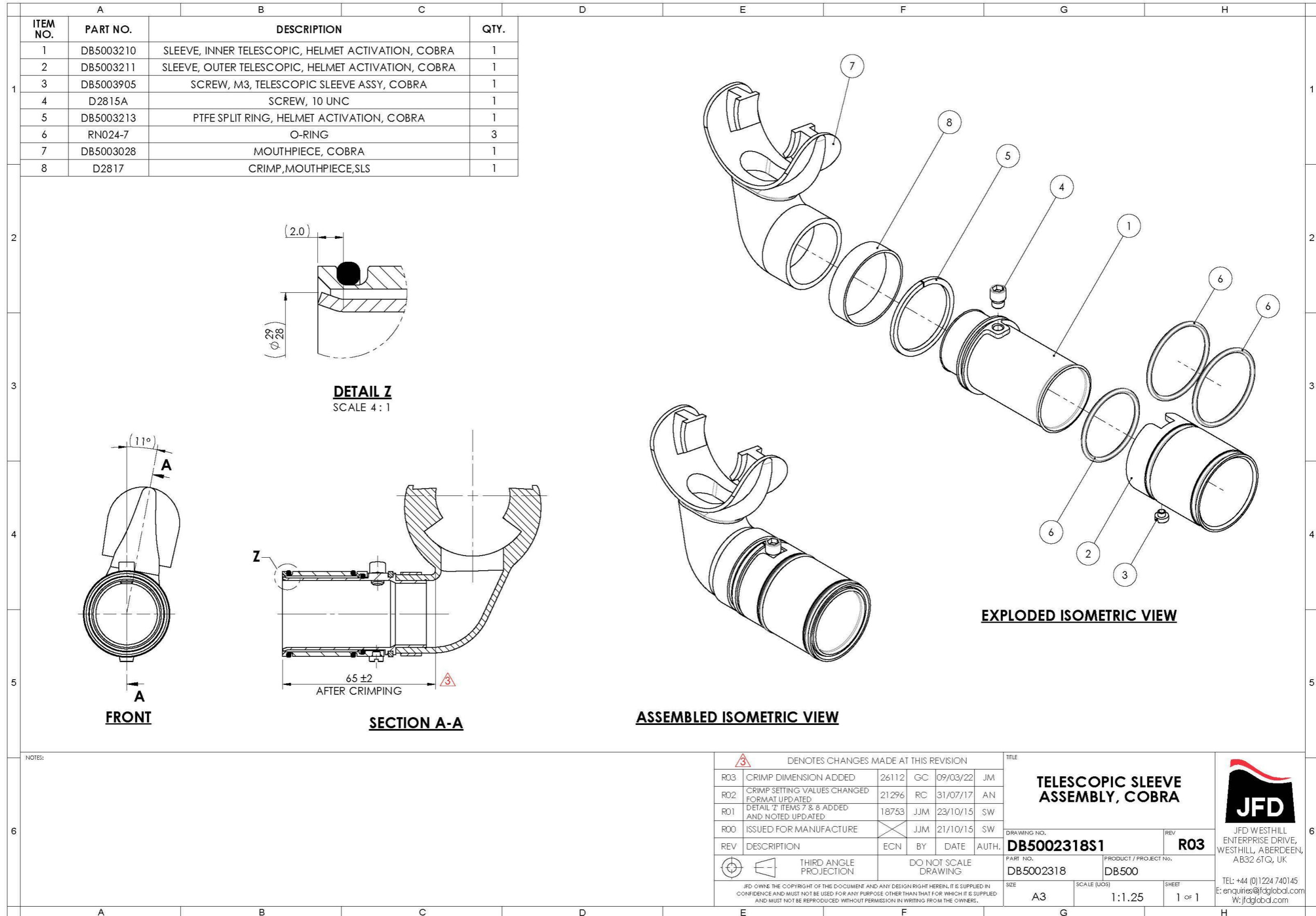


Rev 8

1. ASSEMBLE IN ACCORDANCE WITH AJP DB500-AP-7597.
 2. CLEAN FOR OXYGEN GAS SERVICE IN ACCORDANCE WITH GEN-WP-001.

BILL OF MATERIALS		REVISIONS		HANDLING AND STORAGE	
ITEM NO.	DESCRIPTION	REV.	DATE	BY	CHKD.
1	TELESCOPIC SLIDE ASSEMBLY, HELMET ACTIVATION, COBRA	1	01/12/2011	JFD	
2	RELIEF VALVE ASSEMBLY, HELMET ACTIVATION, COBRA	1	01/12/2011	JFD	
3	HOUSING, COBRA HOUSING/PIECE	1	01/12/2011	JFD	
4	HOLDER, MESH MANDREL SET ACTIVATION, COBRA	1	01/12/2011	JFD	
5	MESH MANDREL CHARGE, COBRA	1	01/12/2011	JFD	
6	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
7	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
8	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
9	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
10	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
11	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
12	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
13	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
14	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
15	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
16	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
17	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
18	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
19	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
20	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
21	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
22	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
23	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	
24	SPACER, O-RING SET ACTIVATION, COBRA	1	01/12/2011	JFD	

Telescopic Sleeve Assembly, COBRA (Replaced 2022)



Telescopic Sleeve Assembly, Serviceable, COBRA

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	DB5004077	SLEEVE, INNER TELESCOPIC, REMOVABLE, COBRA	1
2	DB5003211	SLEEVE, OUTER TELESCOPIC, HELMET ACTIVATION, COBRA	1
3	DB5003905	SCREW, M3, TELESCOPIC SLEEVE ASSY, COBRA	1
4	D2815A	SCREW, 10 UNC	1
5	DB5003213	PTFE SPLIT RING, HELMET ACTIVATION, COBRA	1
6	RN024-7	O-RING	3
7	DB5003028	MOUTHPIECE, COBRA	1
8	D2817A	CRIMP, MOUTHPIECE, SLS	1
9	DB5004078	CLIP, RETAINING, TELESCOPIC SLEEVE, COBRA	1

EXPLODED ISOMETRIC VIEW

△ MOUTHPIECE MOLD SEAM

△ TAPPED HOLE (CAP SCREW HIDDEN)

△ CRIMP HIDDEN FOR CLARITY

△ Δ OF MOUTHPIECE MOLD SEAM SHOWN APPROXIMATELY. TANGENT TO EDGE OF TAPPED HOLE

BROKEN OUT SECTION VIEW

NOTES: ALL DIMENSIONS ARE IN mm (UOS) ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)	MATERIAL: SEE PARTS LIST FINISH: N/A GRADE: N/A	△ DENOTES CHANGES MADE AT THIS REVISION R03 R02 POSITIONING INFO ADDED 31844 GC 21/10/23 AB R01 DIMENSION ADDED 30524 JR 04/01/23 JM R00 ISSUED FOR MANUFACTURE X JR 03/11/22 JM	TITLE: TELESCOPIC SLEEVE ASSEMBLY, SERVICEABLE, COBRA DRAWING NO: DB5002495S1 REV: R02 PART NO: DB5002495 PRODUCT/PROJECT NO: COBRA SIZE: A3 SCALE (JOB): 1:1 SHEET: 1 of 1
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 +44 (0)1224 740145
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Demand Valve Assembly, COBRA

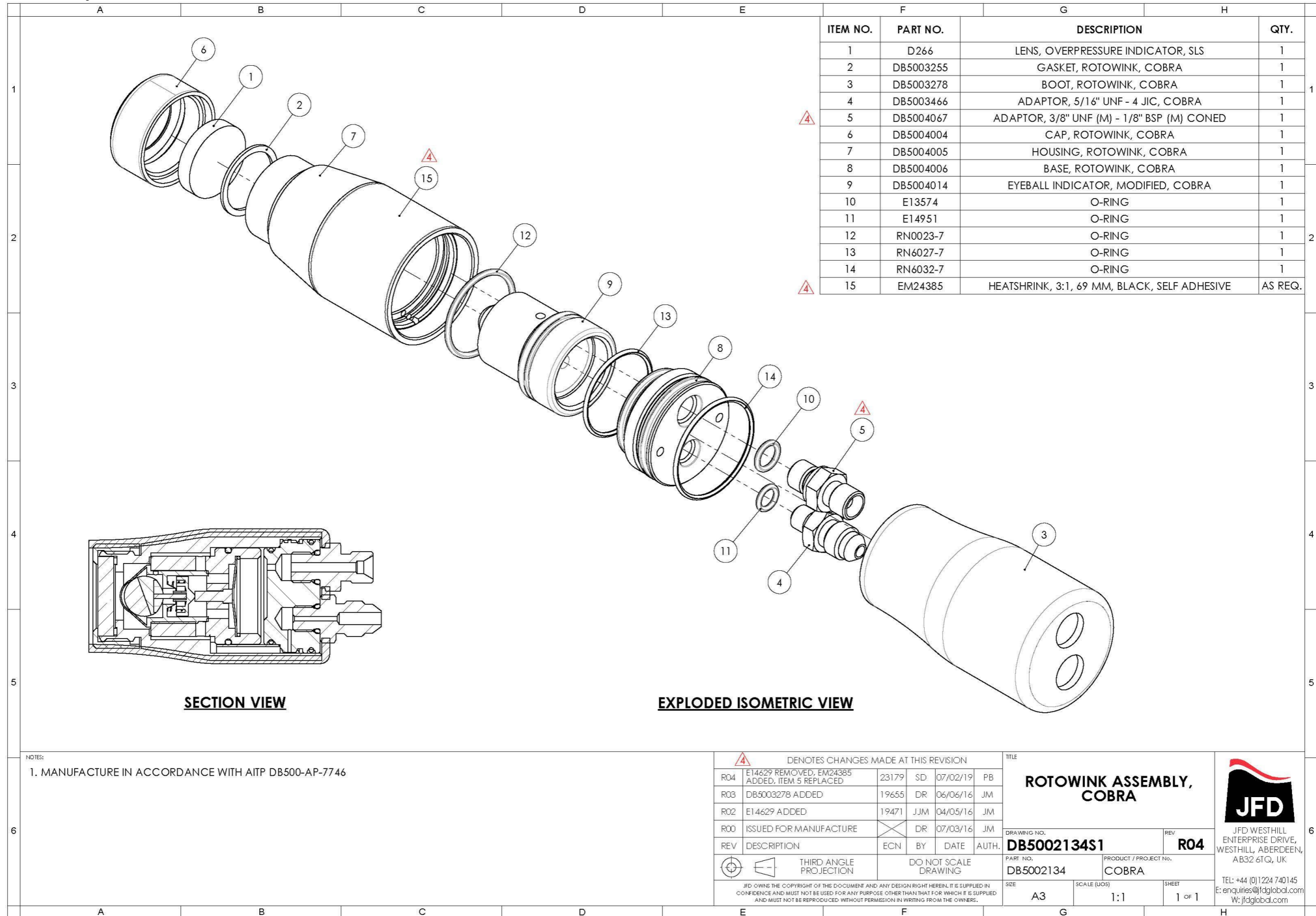
ITEM No.	PART No.	DESCRIPTION	QTY.	
1	D1998	VALVE SEAT RETAINER	1	
2	DB5003178	LEVER, DEMAND VALVE, COBRA	1	
3	DB5003191	STEM, DEMAND VALVE, COBRA	1	
4	DB5003193	NUT, DEMAND VALVE, COBRA	1	
5	DB5004030	SPRING, 9.1MM OD, 25.4MM FL, SS316	1	
6	DB5003298	SPIGOT, FLANGED, DEMAND VALVE, COBRA	1	
7	DB5003627	SPACER, DEMAND VALVE, COBRA	1	
8	DB5003628	WASHER, DEMAND VALVE, COBRA	1	
9	DB5004070	BUTTON, DEMAND LEVER, COBRA	2	⚠
10	E13991	O-RING	1	
11	FN078	NUT, NYLOC, M4, 316 ST STEEL	1	
12	RN017-7	O-RING	1	

EXPLODED ISOMETRIC

SECTION A-A
SCALE 1.5 : 1

<p>NOTES:</p> <ol style="list-style-type: none"> CLEAN FOR OXYGEN SERVICE IN ACCORDANCE WITH GEN-WP-001 ASSEMBLE IN ACCORDANCE WITH DB500-AP-7604 	<p>MATERIAL: SEE PARTS LIST</p> <p>FINISH: N/A</p> <p>ALL DIMENSIONS ARE IN mm (UOS) ALL DIMENSIONS BEFORE PLATING (UOS) REMOVE ALL SHARP EDGES AND BURRS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>MACHINING TOLERANCE</th> <th>FABRICATION TOLERANCE</th> </tr> </thead> <tbody> <tr> <td>NO DECIMAL PLACE ±1.0</td> <td>>0 <100 ±0.5</td> </tr> <tr> <td>ONE DECIMAL PLACE ±0.2</td> <td>>100 <500 ±1.5</td> </tr> <tr> <td>TWO DECIMAL PLACE ±0.05</td> <td>>500 ±3.0</td> </tr> <tr> <td colspan="2" style="text-align: center;">ANGULAR TOLERANCE ±0.5°</td> </tr> </tbody> </table>	MACHINING TOLERANCE	FABRICATION TOLERANCE	NO DECIMAL PLACE ±1.0	>0 <100 ±0.5	ONE DECIMAL PLACE ±0.2	>100 <500 ±1.5	TWO DECIMAL PLACE ±0.05	>500 ±3.0	ANGULAR TOLERANCE ±0.5°		<p>⚠ DENOTES CHANGES MADE AT THIS REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> </thead> <tbody> <tr> <td>R04</td> <td>DB5004070 REPLACES DE768</td> <td>23332</td> <td>SD</td> <td>20/02/19</td> <td>PB</td> </tr> <tr> <td>R03</td> <td>DB5004022 REPLACED WITH DB5004030</td> <td>20908</td> <td>ZD</td> <td>18/04/17</td> <td>AN</td> </tr> <tr> <td>R02</td> <td>DB5004022 REPLACES DB5003222</td> <td>19689</td> <td>JJM</td> <td>13/06/16</td> <td>JM</td> </tr> <tr> <td>R00</td> <td>ISSUED FOR MANUFACTURE</td> <td></td> <td>LM</td> <td>30/09/15</td> <td>SW</td> </tr> </tbody> </table> <p>THIRD ANGLE PROJECTION</p> <p>DO NOT SCALE DRAWING</p> <p><small>JFD OWNS THE COPYRIGHT OF THIS DOCUMENT AND ANY DESIGN RIGHT HEREIN. IT IS SUPPLIED IN CONFIDENCE AND MUST NOT BE USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUPPLIED AND MUST NOT BE REPRODUCED WITHOUT PERMISSION IN WRITING FROM THE OWNERS.</small></p>	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	R04	DB5004070 REPLACES DE768	23332	SD	20/02/19	PB	R03	DB5004022 REPLACED WITH DB5004030	20908	ZD	18/04/17	AN	R02	DB5004022 REPLACES DB5003222	19689	JJM	13/06/16	JM	R00	ISSUED FOR MANUFACTURE		LM	30/09/15	SW	<p>TITLE</p> <p style="text-align: center;">DEMAND VALVE ASSEMBLY, COBRA</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DRAWING NO.</td> <td>REV</td> </tr> <tr> <td>DB5002110S1</td> <td>R04</td> </tr> <tr> <td>PART NO.</td> <td>PRODUCT / PROJECT No.</td> </tr> <tr> <td>DB5002110</td> <td>COBRA</td> </tr> <tr> <td>SIZE</td> <td>SCALE (UOS)</td> <td>SHEET</td> </tr> <tr> <td>A3</td> <td>1:1</td> <td>1 OF 1</td> </tr> </table> <div style="text-align: right;"> <p>JFD WESTHILL ENTERPRISE DRIVE, WESTHILL, ABERDEEN, AB32 6TQ, UK</p> <p>TEL: +44 (0)1224 740145 E: enquiries@jfdglobal.com W: jfdglobal.com</p> </div>	DRAWING NO.	REV	DB5002110S1	R04	PART NO.	PRODUCT / PROJECT No.	DB5002110	COBRA	SIZE	SCALE (UOS)	SHEET	A3	1:1	1 OF 1
MACHINING TOLERANCE	FABRICATION TOLERANCE																																																								
NO DECIMAL PLACE ±1.0	>0 <100 ±0.5																																																								
ONE DECIMAL PLACE ±0.2	>100 <500 ±1.5																																																								
TWO DECIMAL PLACE ±0.05	>500 ±3.0																																																								
ANGULAR TOLERANCE ±0.5°																																																									
REV	DESCRIPTION	ECN	BY	DATE	AUTH.																																																				
R04	DB5004070 REPLACES DE768	23332	SD	20/02/19	PB																																																				
R03	DB5004022 REPLACED WITH DB5004030	20908	ZD	18/04/17	AN																																																				
R02	DB5004022 REPLACES DB5003222	19689	JJM	13/06/16	JM																																																				
R00	ISSUED FOR MANUFACTURE		LM	30/09/15	SW																																																				
DRAWING NO.	REV																																																								
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DB5002110	COBRA																																																								
SIZE	SCALE (UOS)	SHEET																																																							
A3	1:1	1 OF 1																																																							

Rotowink Assembly, COBRA



NOTES:
1. MANUFACTURE IN ACCORDANCE WITH AITP DB500-AP-7746

REV	DESCRIPTION	ECN	BY	DATE	AUTH.
R04	E14629 REMOVED, EM24385 ADDED, ITEM 5 REPLACED	23179	SD	07/02/19	PB
R03	DB5003278 ADDED	19655	DR	06/06/16	JM
R02	E14629 ADDED	19471	JJM	04/05/16	JM
R00	ISSUED FOR MANUFACTURE			07/03/16	JM

THIRD ANGLE PROJECTION
 DO NOT SCALE DRAWING

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TITLE ROTOWINK ASSEMBLY, COBRA	
DRAWING NO. DB5002134S1	REV. R04
PART NO. DB5002134	PRODUCT / PROJECT No. COBRA
SIZE A3	SCALE (UOS) 1:1
SHEET 1 OF 1	

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 AB32 6TQ, UK
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 E: enquiries@jfdglobal.com
 W: jfdglobal.com

Piston Assembly, COBRA

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	DB5003116	HOUSING, LEE JET, COBRA	1
2	DB5003117	NUT, M16 x 1.0, 316 SS, LEE JET HOUSING, COBRA	1
3	DB5003261	SPRING, COMPRESSION, 5.5 MM OD, 12.7MM LG, SS316	1
4	DB5003221	SPRING, 302 ST. STEEL	1
5	DB5003356	ROD, ADJUSTMENT, POSITIVE PRESSURE, COBRA	1
6	DB5003360	NUT, SPRING, POSITIVE PRESSURE, COBRA	1
7	DB5003368	CHAMBER, PISTON, ACTIVATION, COBRA	1
8	DB5003369	PISTON, ACTIVATION, COBRA	1
9	DB5003370	CAP, PISTON, COBRA	1
10	DB5003371	DISC, PEEK, PISTON, COBRA	1
11	DB5003550	WASHER, PTFE, LEE JET HOUSING, COBRA	2
12	DB5003551	NUT, SEALING, INLET PLENUM, COBRA	1
13	DES4227	PLUG, BLANKING, 3/8"UNF, APEKS	2
14	E14737	O-RING	1
15	E15309	O-RING	1
16	E16663	O-RING, N-70	1
17	DO03028	O-RING	2
18	FP2076	CONNECTOR, 4 JIC X 7/16"-20UNF	1
19	MC109	MISC, LEE JET, 2400LOHM	1
20	RN0003-7	O-RING	1
21	RN016-7	O-RING	1
22	RN021-7	O-RING	4
23	RN0805-7	O-RING	4
24	RN4036-7	O-RING	3
25	E13529	O-RING	1

EXPLODED ISOMETRIC VIEW

SECTION A-A
SCALE 1:1

NOTES: 1. CLEAN FOR OXYGEN SERVICE IN ACCORDANCE WITH GEN-WP-001. 2. ASSEMBLE IN ACCORDANCE WITH DB500-AP-7568. 3. ITEM 25 FOR REFERENCE.	MATERIAL: SEE PARTS LIST FINISH: N/A MARK: N/A	DENOTES CHANGES MADE AT THIS REVISION <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>RD6</td><td>ITEM 17 WAS E16742</td><td>33519</td><td>KR</td><td>19/09/25</td><td>JM</td></tr> <tr><td>RD5</td><td>ITEM 25 ADDED</td><td>20180</td><td>JR</td><td>13/01/17</td><td>AN</td></tr> <tr><td>RD4</td><td>DB5003261 REPLACES DB5003220</td><td>19690</td><td>JJM</td><td>14/06/16</td><td>JM</td></tr> <tr><td>RD0</td><td>ISSUED FOR MANUFACTURE</td><td></td><td>LM</td><td>28/08/15</td><td>SW</td></tr> </table>	RD6	ITEM 17 WAS E16742	33519	KR	19/09/25	JM	RD5	ITEM 25 ADDED	20180	JR	13/01/17	AN	RD4	DB5003261 REPLACES DB5003220	19690	JJM	14/06/16	JM	RD0	ISSUED FOR MANUFACTURE		LM	28/08/15	SW	TITLE: PISTON ASSEMBLY, COBRA PART NO: DB5002120S1 PROJECT/PROJECT NO: COBRA REV: R06 SIZE: A3 SCALE: 1:3 SHEET: 1 of 1
RD6	ITEM 17 WAS E16742	33519	KR	19/09/25	JM																						
RD5	ITEM 25 ADDED	20180	JR	13/01/17	AN																						
RD4	DB5003261 REPLACES DB5003220	19690	JJM	14/06/16	JM																						
RD0	ISSUED FOR MANUFACTURE		LM	28/08/15	SW																						

ALL DIMENSIONS ARE IN mm (UOS)
 ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)

THIRD ANGLE PROJECTION DO NOT SCALE DRAWING
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Two Stage Regulator, COBRA

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	D2203E	PISTON, SLS, 1ST STAGE	1
2	D2206F	DVR EQP, SLS VIV PIN 2ND STGE	1
3	D2207	PLATE, DIAPHRAGM SUPPORT, SLS	1
4	D2210G	DVR EQP, SLS VIV SEAT RETAINER, 2ND STG	1
5	D2212B	DVR EQP, SLS SPRING, ADJUSTMENT PLATE	1
6	D2281	SLS, SPRING SUPPORT PLATE	1
7	D2282	SLIP RING, REGULATORS, SLS MKIII	1
8	D22830	DIAPHRAGM, 2ND STAGE REGULATOR, SLS	1
9	D32860	DVR EQP, SLS REG CAP SLEEVE	1
10	D32870	DVR EQP, SLS REG MESH	1
11	DB5002585	RELIEF VALVE, 4 BAR, TWO STAGE REG, COBRA	1
12	DB5003198	NUT, RETAINING, SWIVEL, TWO STAGE REGULATOR, COBRA	1
13	DB5003501	HOUSING, TWO STAGE REGULATOR, COBRA	1
14	DB5003502	CAP, END, TWO STAGE REGULATOR, COBRA	1
15	DB5003503	CAP, 1ST STAGE, TWO STAGE REGULATOR, COBRA	1
16	DB5003504	SWIVEL, 4 JIC, TWO STAGE REGULATOR, COBRA	1
17	DB5003505	POST, CONNECTOR, 5/16", TWO STAGE REGULATOR, COBRA	2
18	DB5003506	PLUG, 5/16", TWO STAGE REGULATOR, COBRA	1
19	DB5003508	COLLAR, TWO STAGE REGULATOR, COBRA	1
20	DB5004027	SPRING, INNER, 2 STAGE, COBRA	1
21	DM399	VALVE, SAFETY RELIEF	1
22	E13567	O-RING	2
23	E14737	O-RING	1
24	E14951	O-RING	2
25	FB080	SCREW, SOCKET SET, CONE POINT, 10 UNC x 3/4"	1
26	FE012	FILTER, SINTERED, (MEAN PORE SIZE 35 MICRON)	1
27	FN015	NUT, HEX, HALF, 10 UNC	1
28	RK221	VALVE SEAT	1
29	RK223	SPRING, COMPRESSION, 3.75 OD X 11.11 FIL	1
30	RK225	SPRING, COMPRESSION, 18.29 OD x 22.23 FIL	1
31	RK230	SPRING, COMPRESSION	1
32	E98386	O-RING, 22MM ID, 2MM CS	1
33	RN806-7	O-RING	1
34	RV0010-7	O-RING, 6.07MM ID X 1.78MM, VITON 75A	2
35	RV0801-7	O-RING	1
36	VM052	GASKET, RELIEF VALVE, SLS	1

EXPLODED ISOMETRIC VIEW
SCALE 1:1

VALVE SEAT ORIENTATION
SCALE 1:1

SECTION A-A

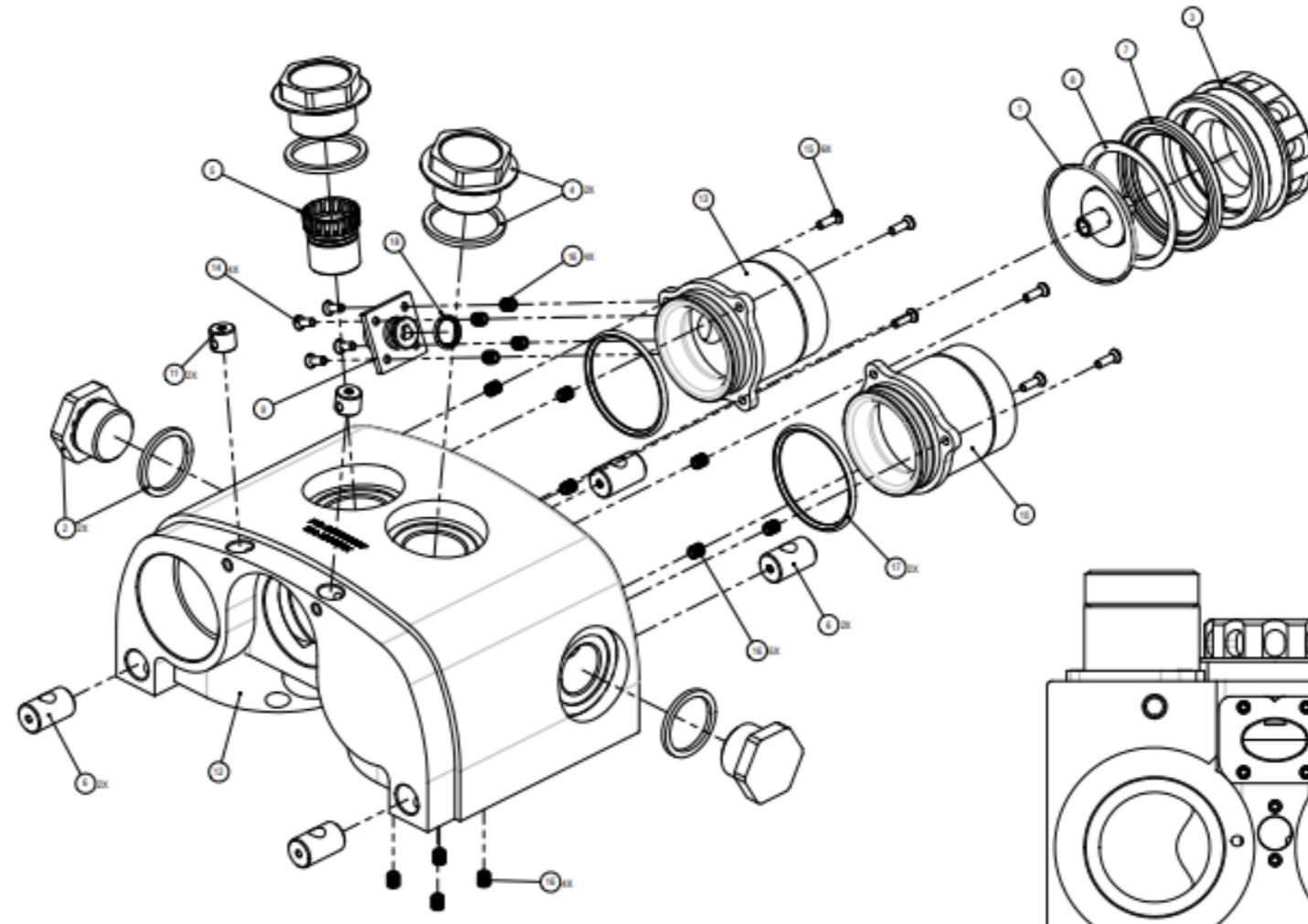
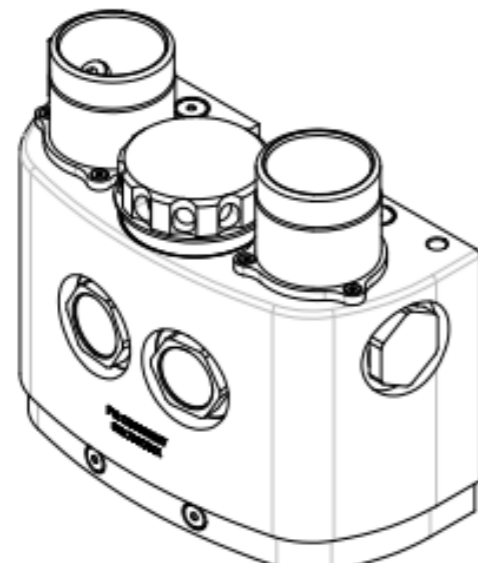
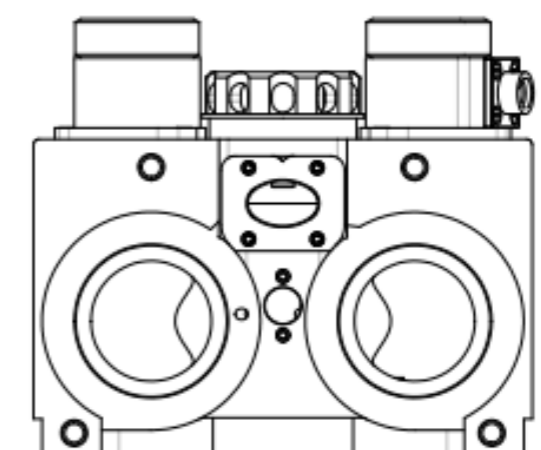
SECTION B-B

<p>NOTES:</p> <ol style="list-style-type: none"> ENSURE VALVE SEAT (ITEM 28) IS FITTED WITH NON-CHAMFERED SIDE AGAINST VALVE PIN (ITEM 2). CLEAN FOR OXYGEN SERVICE IN ACCORDANCE WITH GEN-WP-001. ASSEMBLE IN ACCORDANCE WITH DB500-AP-7566. MAX. SUPPLY PRESSURE: 300 bar. ENSURE ITEM 15 HAS PLAIN BAND IN CENTRE OF KNURLED SURFACE. CONTINUOUS KNURLING INDICATES SUPERSEDED PART. 	<p>MATERIAL: SEE PARTS LIST</p> <p>FINISH: N/A</p> <p>WEIGHT: 0.7kg</p>	<p>REVISIONS:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> </thead> <tbody> <tr> <td>R03</td> <td>ITEMS 15 & 32 UPDATED</td> <td>34001</td> <td>JR</td> <td>19/03/25</td> <td>AB</td> </tr> <tr> <td>R02</td> <td>INNER SPRING REPLACED</td> <td>20831</td> <td>DR</td> <td>22/03/17</td> <td>GM</td> </tr> <tr> <td>R01</td> <td>H.P. O-RINGS CHANGED TO VITON</td> <td>20023</td> <td>DR</td> <td>04/10/16</td> <td>GM</td> </tr> <tr> <td>R00</td> <td>ISSUED FOR MANUFACTURE</td> <td></td> <td>DR</td> <td>28/07/15</td> <td>SW</td> </tr> </tbody> </table>	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	R03	ITEMS 15 & 32 UPDATED	34001	JR	19/03/25	AB	R02	INNER SPRING REPLACED	20831	DR	22/03/17	GM	R01	H.P. O-RINGS CHANGED TO VITON	20023	DR	04/10/16	GM	R00	ISSUED FOR MANUFACTURE		DR	28/07/15	SW	<p>TITLE: TWO STAGE REGULATOR, COBRA</p> <p>REV: R04</p> <p>ITEM NO.: DB5002314S1</p> <p>WORK NO.: DB5002314</p> <p>PRODUCT/PROJECT NO.: COBRA</p> <p>SCALE (SIZE): 1:2</p> <p>SHEET: 1 of 1</p>
REV	DESCRIPTION	ECN	BY	DATE	AUTH.																												
R03	ITEMS 15 & 32 UPDATED	34001	JR	19/03/25	AB																												
R02	INNER SPRING REPLACED	20831	DR	22/03/17	GM																												
R01	H.P. O-RINGS CHANGED TO VITON	20023	DR	04/10/16	GM																												
R00	ISSUED FOR MANUFACTURE		DR	28/07/15	SW																												

Head Assembly, COBRA

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	DB5002000	DIPHRAGM ASSEMBLY COBRA	1
2	DB5002001	PLUG O/R WASHER BLANKING HEAD COBRA	2
3	DB5002112	DIAPHRAGM CAP ASSEMBLY COBRA	1
4	DB5002101	EXHAUST VALVE ASSEMBLY EXTERNAL COBRA	2
5	DB5002102	EXHAUST VALVE ASSEMBLY INTERNAL COBRA	1
6	DB5002104	RIGHT MOUNTING HEAD COBRA	4
7	DB5002108	RING RETAINING DIPHRAGM DEMAND VALVE COBRA	1
8	DB5002109	RIGHTER DIPHRAGM DEMAND VALVE COBRA	1
9	DB5004008	ADAPTOR ROTARY COBRA	1
10	DB5004002	ADAPTOR BREATHING HOSE INHALE COBRA SS216	1
11	DB5003007	RIGHT MOUNTING CHAMBER PISTON COBRA	2
12	DB5003007	HEAD COBRA	1
13	DB5004002	ADAPTOR ROTARY EXHALE COBRA SS216	1
14	815270	SCREW M6 CSK SLOTTED M3 X 0.5 X 8.0	1
15	FR160	SCREW M6 CSK SOCKET W/ X 10	6
16	FR03020	INSERT M6 TAPPEX TRISERT 3 216 STAINLESS	16
17	RN010-7	O-RING	2
18	RN010-7	O-RING	1

EXPLODED ISOMETRIC VIEW

REAR VIEW

ISOMETRIC VIEW

1. ITEM 2 TO BE TORQUED TO 50 N-m.

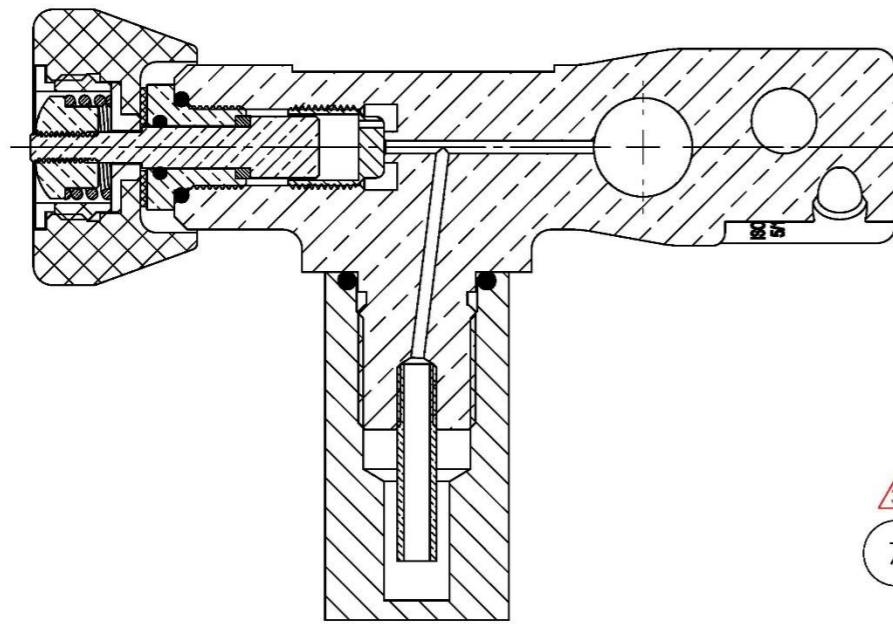
SEE PARTS LIST		DENOTES CHANGES SINCE AT THIS REVISION	
REV	DESCRIPTION	BY	DATE
R06	ITEM 16 QTY UPDATED	30257	GC 21/10/20
R05	ITEMS 10 & 13 UPDATED	30662	KR 16/11/20
R04	NOTE 1 UPDATED	24197	CR 10/09/19
R03	ISSUED FOR MANUFACTURE	DR	10/02/16
R02	DESCRIPTION	DR	10/02/16
R01	DESCRIPTION	DR	10/02/16

HEAD ASSEMBLY, COBRA	
DB5002002S1	R06
DB5002002	COBRA
A2	23
1 of 1	

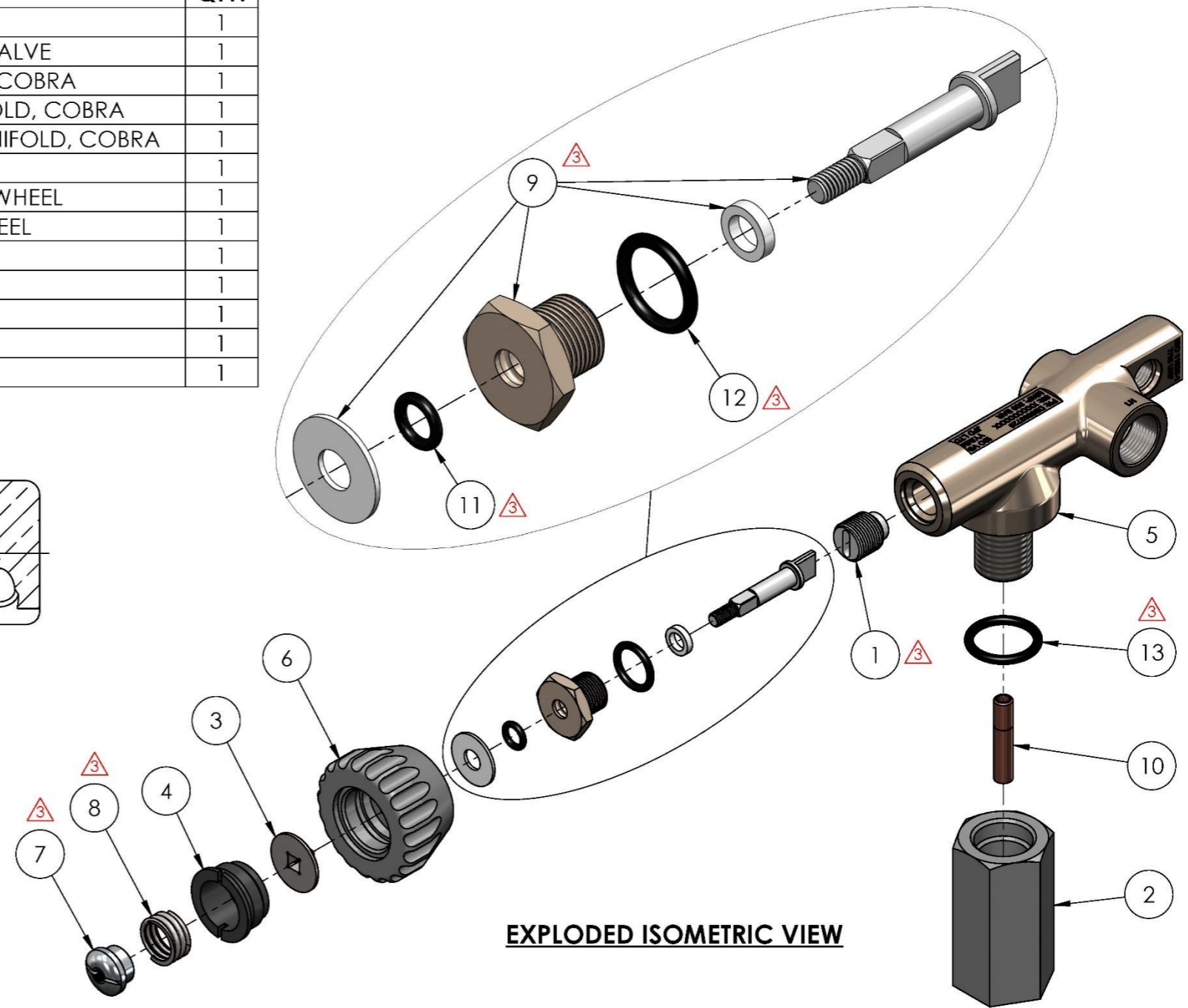
UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS ARE IN mm (UNLESS OTHERWISE SPECIFIED)
 UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS ARE IN mm (UNLESS OTHERWISE SPECIFIED)
 UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS ARE IN mm (UNLESS OTHERWISE SPECIFIED)

Valve Assembly, Shut-off, M18, COBRA

ITEM	PART No.	DESCRIPTION	QTY.
1	DB105469	INSERT, SHUTOFF VALVE SEAT, PEEK	1
2	DB1008827	BLANKING CAP, PROTECTING, M18, PILLAR VALVE	1
3	DB5003337	DISC, SHUT-OFF, TWIN CYLINDER MANIFOLD, COBRA	1
4	DB5003525	RETAINER, SHUT-OFF, TWIN CYLINDER MANIFOLD, COBRA	1
5	DB5003729	ELBOW, SHUT-OFF, M18, TWIN CYLINDER MANIFOLD, COBRA	1
6	DB5003731	HANDLE, SHUT-OFF, H.P. MANIFOLD, COBRA	1
7	E13545	BUTTON, CHROMED, SHUT-OFF VALVE HANDWHEEL	1
8	E13546	SPRING, STAINLESS STEEL, SHUT-OFF HANDWHEEL	1
9	E13548	TOP ASSEMBLY, SHUT-OFF VALVE, CHROME	1
10	E15299	DIP TUBE	1
11	E15573	O-RING	1
12	RV014-7	O-RING	1
13	RV116-7	O-RING	1



SECTION VIEW



EXPLODED ISOMETRIC VIEW

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- NOTES
- ASSEMBLE IN ACCORDANCE WITH AITP: DB500-AP-30019.
 - STRIP BOUGHT-IN ASSEMBLY E13548 (ITEM 9) REMOVING EXISTING INTERNAL SPINDLE O-RING & OUTER O-RING AND REPLACING WITH E15573 (ITEM 11) AND RV014-7 (ITEM 12).

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES		MATERIAL	
MACHINING	FABRICATION	FINISH	THIRD ANGLE PROJECTION
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

SEE PARTS LIST

N/A

THIRD ANGLE PROJECTION

REV	DESCRIPTION	ECN No.	BY	DATE	AUTH BY
R06					
R05					
R04					
R03	BoM UPDATED & O-RINGS CHANGED	20091	DR	11/10/16	GM
R02	E16486 REPLACED WITH DB5003467 & OXYGEN CLEAN NOTE REMOVED	19046	JJM	09/02/16	JM
R01	NOTE 1 UPDATED	18811	LM	16/11/15	SW
R00	ISSUED FOR MANUFACTURE		JJM	05/11/15	SW

VALVE ASSEMBLY, SHUT-OFF, M18, COBRA

DRAWING No. **DB5002101S1** REV **R03**

PART No. **DB5002101** PRODUCT / PROJECT No. **COBRA**

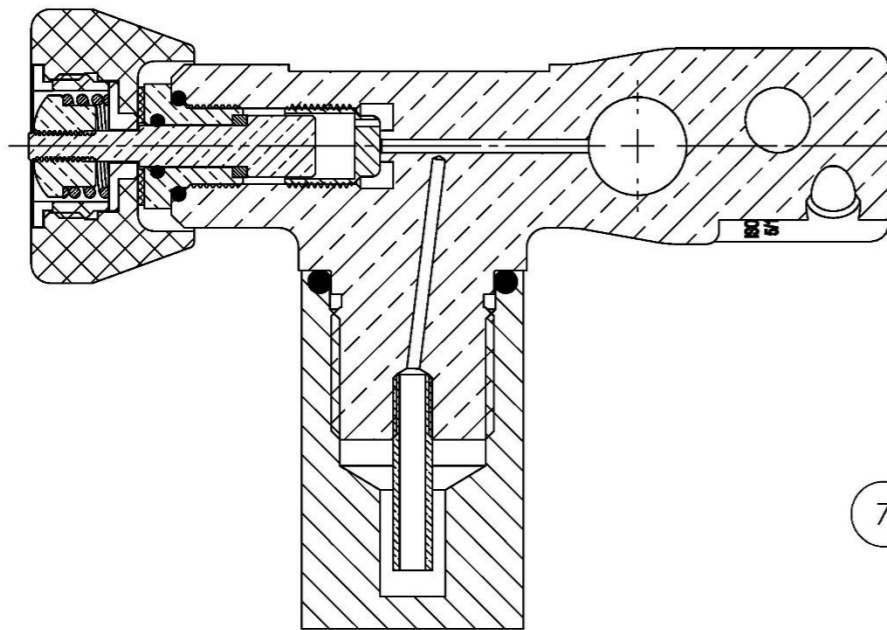
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WESTHILL
ABERDEEN
AB32 6TQ
UNITED KINGDOM

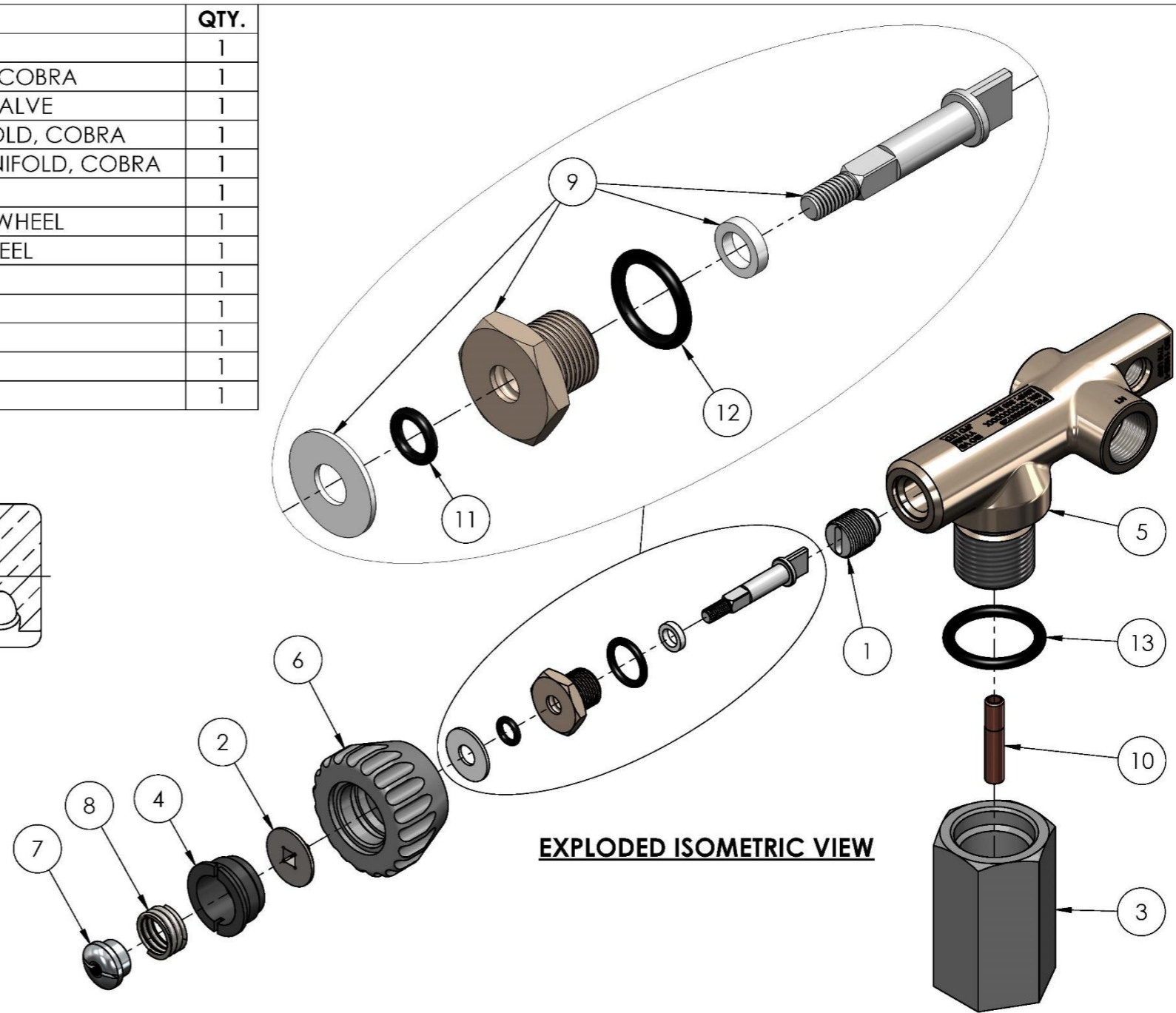
Tel : +44(0)1224 740145
Fax : +44(0)1224 740172
email : info@divexglobal.com
www.divexglobal.com

Valve Assembly, Shut-off, M25, COBRA

ITEM	PART No.	DESCRIPTION	QTY.
1	DB105469	INSERT, SHUTOFF VALVE SEAT, PEEK	1
2	DB5003337	DISC, SHUT-OFF, TWIN CYLINDER MANIFOLD, COBRA	1
3	DB5003494	BLANKING CAP, PROTECTING, M25, PILLAR VALVE	1
4	DB5003525	RETAINER, SHUT-OFF, TWIN CYLINDER MANIFOLD, COBRA	1
5	DB5003725	ELBOW, SHUT-OFF, M25, TWIN CYLINDER MANIFOLD, COBRA	1
6	DB5003731	HANDLE, SHUT-OFF, H.P. MANIFOLD, COBRA	1
7	E13545	BUTTON, CHROMED, SHUT-OFF VALVE HANDWHEEL	1
8	E13546	SPRING, STAINLESS STEEL, SHUT-OFF HANDWHEEL	1
9	E13548	TOP ASSEMBLY, SHUT-OFF VALVE, CHROME	1
10	E15299	TUBE, DIP	1
11	E15573	O-RING	1
12	RV014-7	O-RING	1
13	RV214-7	O-RING	1



SECTION VIEW



EXPLODED ISOMETRIC VIEW

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NOTES 1. ASSEMBLE IN ACCORDANCE WITH AITP: DB500-AP-30021. 2. STRIP BOUGHT-IN ASSEMBLY E13548 (ITEM 9) REMOVING EXISTING INTERNAL SPINDLE O-RING & OUTER O-RING AND REPLACING WITH E15573 (ITEM 11) AND RV014-7 (ITEM 12).	ALL DIMENSIONS SHOWN ARE IN MM (UOS) ALL DIMENSIONS BEFORE PLATING (UOS) REMOVE ALL SHARP EDGES AND BURRS	MATERIAL SEE PARTS LIST	TITLE VALVE ASSEMBLY, SHUT-OFF, M25, COBRA										
	FINISH N/A	DIMENSIONAL TOLERANCES <table border="1"> <thead> <tr> <th>MACHINING</th> <th>FABRICATION</th> </tr> </thead> <tbody> <tr> <td>NO DECIMAL PLACES ±1.0</td> <td>SIZE >0 <100 ±0.5</td> </tr> <tr> <td>ONE DECIMAL PLACE ±0.2</td> <td>SIZE >100 <500 ±1.5</td> </tr> <tr> <td>TWO DECIMAL PLACE ±0.05</td> <td>SIZE >500 ±3.0</td> </tr> <tr> <td>ANGULAR TOLERANCE ±0.5°</td> <td>ANGULAR TOLERANCE ±0.5°</td> </tr> </tbody> </table>	MACHINING	FABRICATION	NO DECIMAL PLACES ±1.0	SIZE >0 <100 ±0.5	ONE DECIMAL PLACE ±0.2	SIZE >100 <500 ±1.5	TWO DECIMAL PLACE ±0.05	SIZE >500 ±3.0	ANGULAR TOLERANCE ±0.5°	ANGULAR TOLERANCE ±0.5°	THIRD ANGLE PROJECTION
MACHINING	FABRICATION												
NO DECIMAL PLACES ±1.0	SIZE >0 <100 ±0.5												
ONE DECIMAL PLACE ±0.2	SIZE >100 <500 ±1.5												
TWO DECIMAL PLACE ±0.05	SIZE >500 ±3.0												
ANGULAR TOLERANCE ±0.5°	ANGULAR TOLERANCE ±0.5°												

REV	DESCRIPTION	ECN No.	BY	DATE	AUTH. BY
R00	ISSUED FOR MANUFACTURE		DR	12/10/16	GM

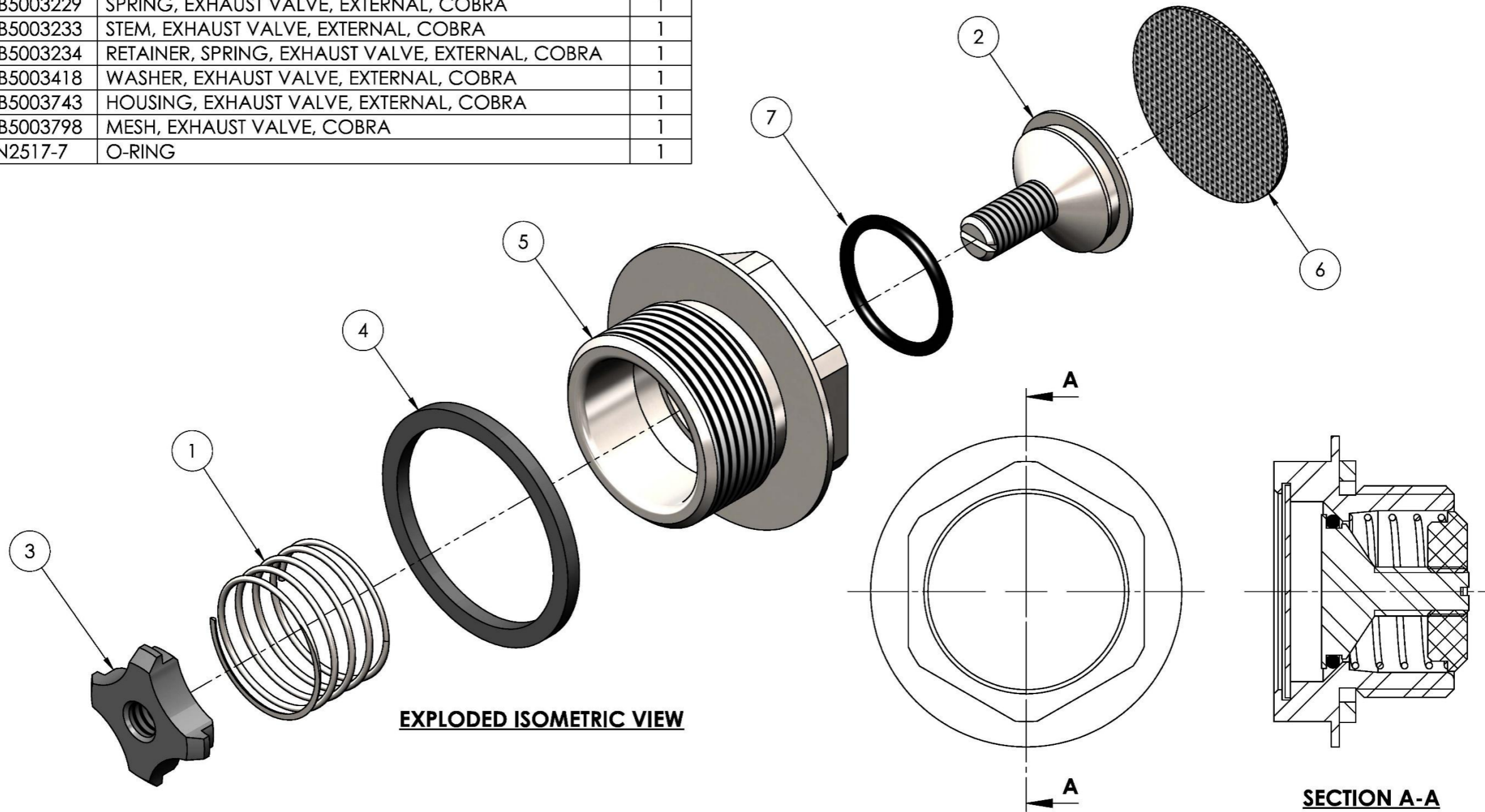
DO NOT SCALE DRAWING

SIZE	A3	SCALE	NTS	SHEET	1	OF	1
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 www.divexglobal.com

Exhaust Valve Assembly, External, COBRA

ITEM	PART No.	DESCRIPTION	QTY.
1	DB5003229	SPRING, EXHAUST VALVE, EXTERNAL, COBRA	1
2	DB5003233	STEM, EXHAUST VALVE, EXTERNAL, COBRA	1
3	DB5003234	RETAINER, SPRING, EXHAUST VALVE, EXTERNAL, COBRA	1
4	DB5003418	WASHER, EXHAUST VALVE, EXTERNAL, COBRA	1
5	DB5003743	HOUSING, EXHAUST VALVE, EXTERNAL, COBRA	1
6	DB5003798	MESH, EXHAUST VALVE, COBRA	1
7	RN2517-7	O-RING	1



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NOTES
 MANUFACTURE IN ACCORDANCE WITH AITP DB500-AP-7725.

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
 ALL DIMENSIONS BEFORE PLATING (UOS)
 REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES			
MACHINING		FABRICATION	
NO DECIMAL PLACES	±1.0	SIZE >0 <100	±0.5
ONE DECIMAL PLACE	±0.2	SIZE >100 <500	±1.5
TWO DECIMAL PLACE	±0.05	SIZE >500	±3.0
ANGULAR TOLERANCE	±0.5°	ANGULAR TOLERANCE	±0.5°

MATERIAL
 SEE PARTS LIST

FINISH
 N/A



R06					
R05					
R04					
R03					
R02					
R01					
R00	ISSUED FOR MANUFACTURE	DR	04/02/16	JM	
REV	DESCRIPTION	ECN No	BY	DATE	AUTH. BY

TITLE
EXHAUST VALVE ASSEMBLY, EXTERNAL, COBRA

DRAWING No. **DB5002131S1** REV **R00**

PART No. **DB5002131** PRODUCT / PROJECT No. **COBRA**

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 email : info@divexglobal.com
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DO NOT SCALE DRAWING

SIZE **A3** SCALE **2:1** SHEET **1** OF **1**

Exhaust Valve Assembly, Internal, COBRA

Rev 8

ITEM No.	PART No.	DESCRIPTION	QTY.
1	DB500133	HOUSING, INTERNAL EXHAUST VALVE, COBRA	1
2	DB5004011	SPRING, INTERNAL RELIEF	1
3	E15326	TOP-HAT, RELIEF VALVE, FACEMASK/INHALE, CILUNG	1
4	E15329	O-RING	1
5	DB5004154	VALVE STEM, EXHAUST, COBRA	1
6	E14719	O-RING	1

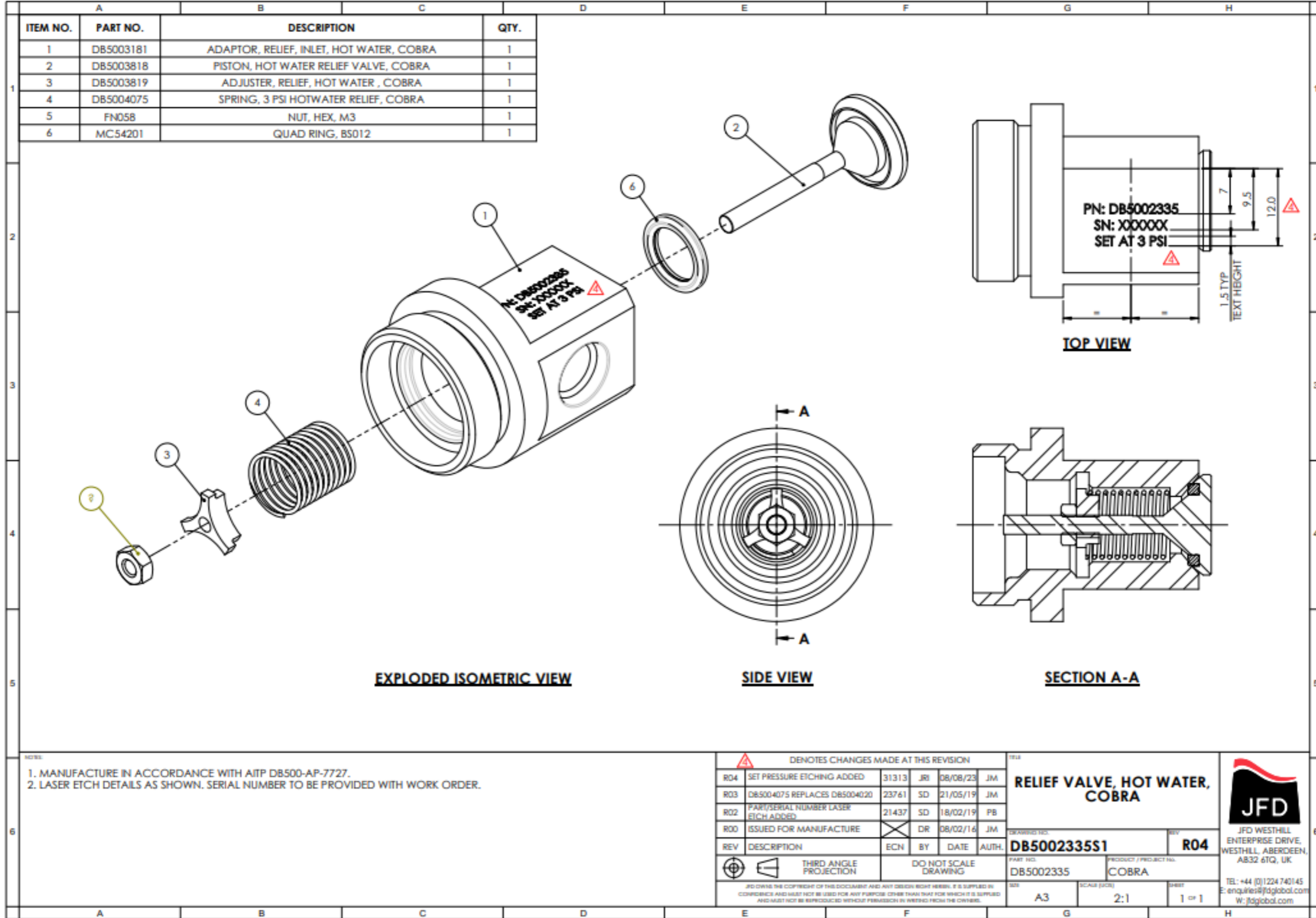
EXPLODED ISOMETRIC VIEW

SECTION A-A

<p>NOTES:</p> <p>1. ASSEMBLE IN ACCORDANCE WITH DB500-AP-7610.</p>	<p>MATERIAL: SEE PARTS LIST</p> <p>FINISH: N/A</p> <p>WEIGHT: 0.02kg</p> <p style="text-align: center;">ALL DIMENSIONS ARE IN mm (UOS) ALL DIMENSIONS ARE FOR REFERENCE ONLY (UOS)</p>	<p style="text-align: center;">▲ DENOTES CHANGES MADE AT THIS REVISION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>ECN</th> <th>BY</th> <th>DATE</th> <th>AUTH.</th> </tr> <tr> <td>R03</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>R02</td> <td>E16375 REPLACED WITH DB5004154</td> <td>33702</td> <td>GC</td> <td>16/04/25</td> <td>AB</td> </tr> <tr> <td>R01</td> <td>E15148 REPLACED WITH DB5004011</td> <td>19201</td> <td>JJM</td> <td>11/03/16</td> <td>JM</td> </tr> <tr> <td>R00</td> <td>ISSUED FOR MANUFACTURE</td> <td></td> <td>LM</td> <td>09/10/15</td> <td>SW</td> </tr> </table>	REV	DESCRIPTION	ECN	BY	DATE	AUTH.	R03						R02	E16375 REPLACED WITH DB5004154	33702	GC	16/04/25	AB	R01	E15148 REPLACED WITH DB5004011	19201	JJM	11/03/16	JM	R00	ISSUED FOR MANUFACTURE		LM	09/10/15	SW	<p style="text-align: center;">EXHAUST VALVE ASSEMBLY, INTERNAL, COBRA</p> <p style="text-align: center;">PART No: DB5002133S1 REV: R02</p> <p style="text-align: center;">PROJECT/PROJECT No: COBRA</p> <p style="text-align: center;">SIZE: A3 SCALE (SIZ): 2:1 SHEET: 1 of 1</p>
REV	DESCRIPTION	ECN	BY	DATE	AUTH.																												
R03																																	
R02	E16375 REPLACED WITH DB5004154	33702	GC	16/04/25	AB																												
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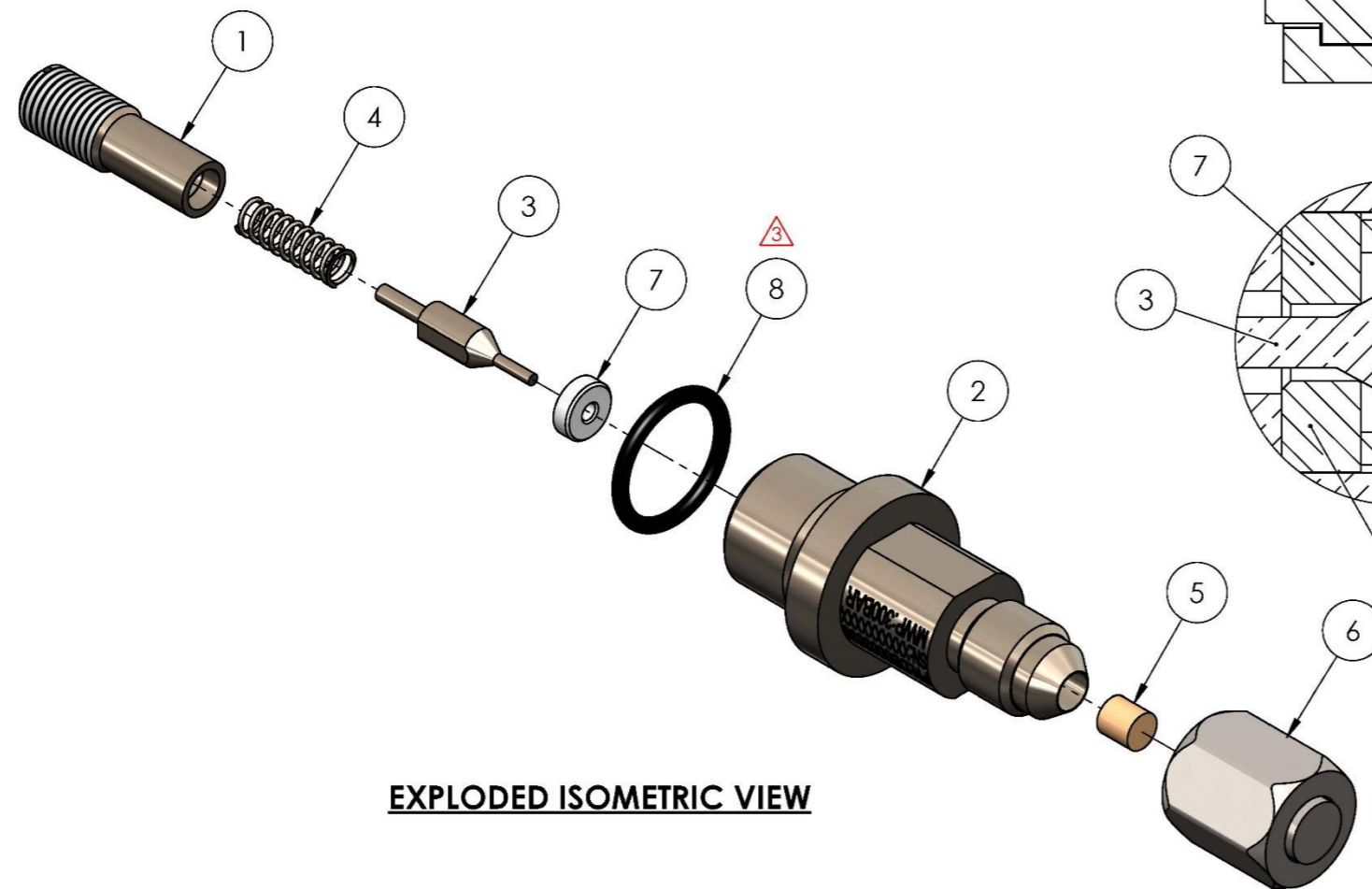
Relief Valve, Hot Water, COBRA

Rev 8

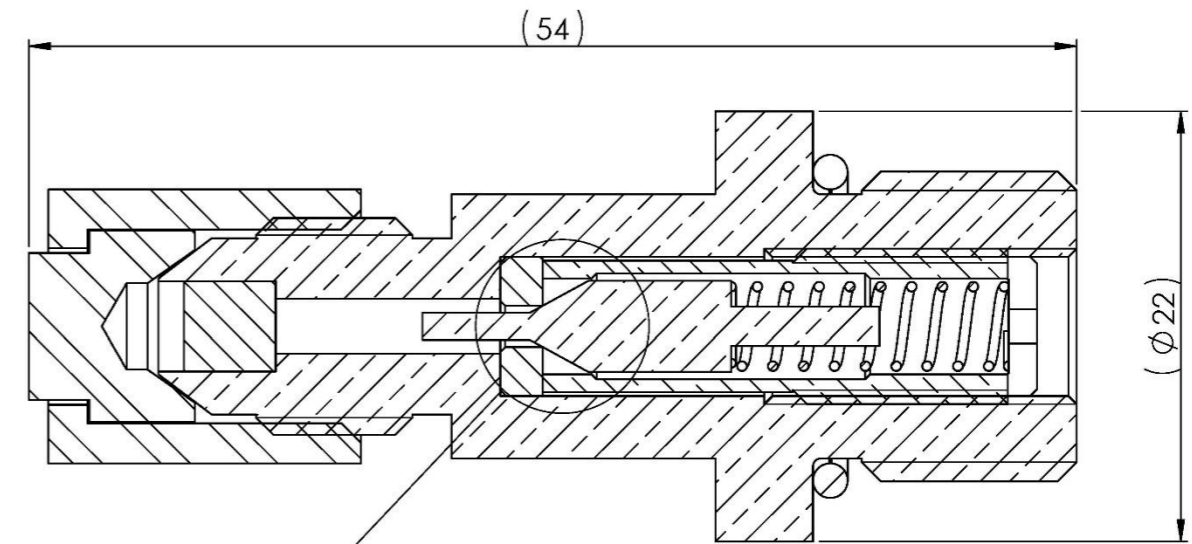


Adaptor Assembly, Charging, H.P. Manifold, COBRA

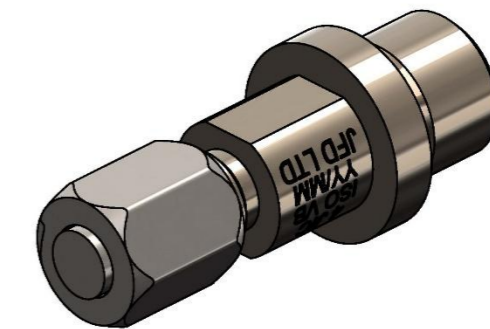
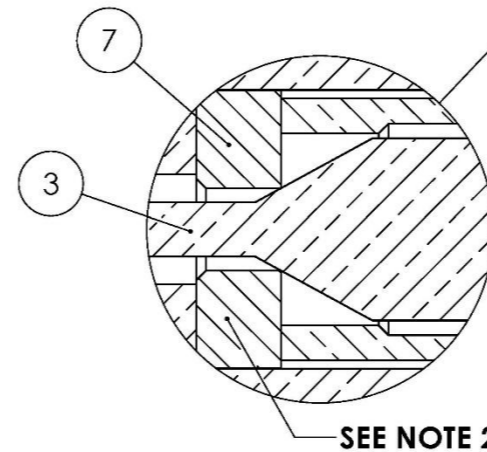
ITEM	PART No.	DESCRIPTION	QTY.
1	DB5003419	CHECK VALVE, CHARGE ADAPTOR, TWIN CYL MANIFOLD	1
2	DB5003538	HOUSING, CHARGE ADAPTOR, TWIN CYLINDER MANIFOLD	1
3	DB5003820	PIN, VALVE, CHARGE POINT, COBRA	1
4	DB5003829	SPRING, CHARGING ADAPTOR, COBRA	1
5	FE012	FILTER, SINTERED	1
6	FJ295	CAP, 4-JIC, SS, MWP620BAR	1
7	RK221	VALVE SEAT	1
8	RV015-7	O-RING	1



EXPLODED ISOMETRIC VIEW



SECTION VIEW



ASSEMBLED ISOMETRIC VIEW

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- NOTES
1. ASSEMBLE IN ACCORDANCE WITH AITP : DB500-AP-7615.
 2. ENSURE ITEM 7 (RK221) IS POSITIONED WITH SHARP TOWARDS ITEM 3 (DB5003820).
 3. CLEAN FOR OXYGEN SERVICE IN ACCORDANCE WITH GEN-WP-001.

- DENOTES CHANGES MADE AT THIS REVISION.

ALL DIMENSIONS SHOWN ARE IN MM (UOS)
ALL DIMENSIONS BEFORE PLATING (UOS)
REMOVE ALL SHARP EDGES AND BURRS

DIMENSIONAL TOLERANCES		MATERIAL	
MACHINING	FABRICATION	FINISH	THIRD ANGLE PROJECTION
NO DECIMAL PLACES ±1.0	SIZE >0 <100 ±0.5	N/A	
ONE DECIMAL PLACE ±0.2	SIZE >100 <500 ±1.5		
TWO DECIMAL PLACE ±0.05	SIZE >500 ±3.0		
ANGULAR TOLERANCE ±0.5°	ANGULAR TOLERANCE ±0.5°		

REV	DESCRIPTION	ECN No.	BY	DATE	AUTH BY
R06					
R05					
R04					
R03	O-RING REPLACED	20023	DR	12/10/16	GM
R02	TITLE UPDATED	19327	JJM	01/04/16	JM
R01	NOTE 3 UPDATED	18810	LM	16/11/15	SW
R00	ISSUED FOR MANUFACTURE		JJM	06/11/15	SW

TITLE	
ADAPTOR ASSEMBLY, CHARGING, H.P. MANIFOLD, COBRA	
DRAWING No.	REV
DB5002403S1	R03
PART No.	PRODUCT / PROJECT No.
DB5002403	COBRA
SIZE	SCALE
A3	NTS
SHEET 1 OF 1	

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