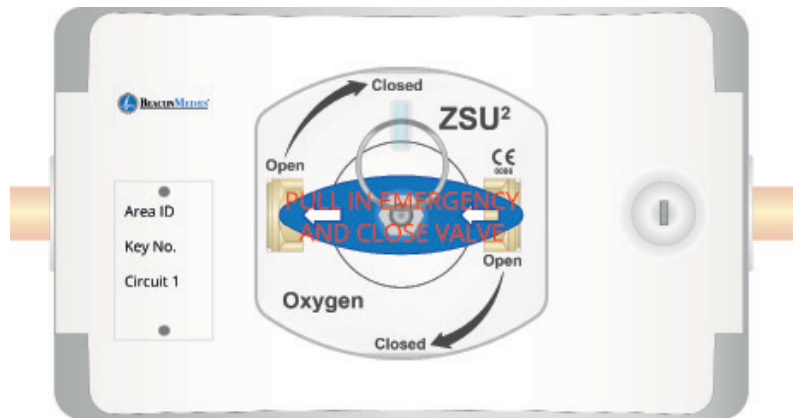


Operation and Maintenance Instructions



ZSU2

Area Valve Shutoff Unit

Part number 4233400307

Revision 00
JAN 09, 2020

Operation and Maintenance Manual

ZSU2 Area Valve Shutoff Unit

This unit is purchased from:

Date purchased:

Model number:

Serial number:

Option(s) included:

Any information, service or spare parts requests should include the serial number and be directed to:

BeaconMedæs
Telford Crescent, Staveley
Derbyshire S43 3PF

Telephone: +44 (0) 1246 474242
Email: gbn.info@beaconmedaes.com
Website Contacts: www.beaconmedaes.com

BeaconMedæs reserves the right to make changes and improvements to update products sold previously without notice or obligation.



Atlas Copco Ltd. trading as Atlas Copco Medical
Telford Crescent, Staveley, Derbyshire S43 3PF UK



Personnel must make themselves familiar with the contents of this manual and the function of the unit before installing, operating or maintaining.

Abbreviations

Abbreviation	Full Description	Abbreviation	Full Description
BS	British Standard	kPa	Kilo pascals
BSP	British Standard Pipe	Max	Maximum
CO2	Carbon dioxide	Med	Medical
°C	Degree Celsius	m	Meter
∅	Diameter	mm	Millimetres
ERM	Emergency reserve manifold	Min	Minimum
EN	European Standards	N2	Nitrogen
1st	First	N2O	Nitrous oxide
HTM	Health Technical Memorandum	NRV	Non-return valve
ID	Identification	OD	Outside Diameter
"	Inch	O2	Oxygen
ISO	International Standard Organisation	%	Percentage
Kg	Kilograms	2nd	Second

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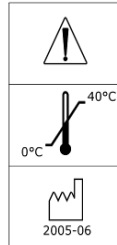
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Safety, Storage and Handling Data

The following symbols apply to this product and are used in these instructions and on the product in question. The meanings of these symbols are as specified below: -



- Read Instructions

- Temperature Limitations

- Date of Manufacture

Environmental Transport, Storage Conditions and Operating Conditions

Min ambient temperature - 0 degrees Celsius
 Max ambient temperature - 40 degrees Celsius
 Min relative humidity (non-condensing) - 10%
 Max relative humidity (non-condensing) - 95%
 Atmospheric pressure range - 70-110 kPa

Environmental Protection

Discard the unit and/or components in any standard refuse facility. The unit does not contain and hazardous substances.

WARNING... DO NOT USE OIL OR GREASE ON ANY ZONE SERVICE UNIT FOR ANY REASON! DOING SO COULD LEAD TO A FIRE OR EXPLOSION!

Use only approved oxygen compatible lubricants, which can be purchased from MedæS if necessary.

INSTALL THE ZSU2 ON COMPATIBLE SERVICES ONLY. USE ON INCOMPATIBLE SERVICES MAY RESULT IN AN EXPLOSION AND / OR A FIRE.

The ZSU2 is approved for use on the following gas services only. For other gas services, contact BeaconMedæS before installation.

- Oxygen
- Nitrous Oxide
- Nitrous Oxide/Oxygen mixture
- Medical Air
- Medical Vacuum
- Helium/Oxygen mixture
- Nitrogen
- Dry Carbon Dioxide
- Dry Carbon Dioxide/Oxygen mixture

ZSU2 Area Valve Shutoff Unit

Description and Operation

2.1 Introduction

The Zone Service Unit is an advanced development of the basic valve box, designed to provide a reliable zone isolation system with additional facilities to enable connection of an emergency supply, purge gas and sampling equipment.

ZSU2s should be fitted to all medical gas and vacuum services in a prominent and accessible position.

The ZSU2 consists of a quarter-turn ball valve enclosed in a valve box with a lockable hinged cover that incorporates an emergency access panel. Operation of the valve isolates the downstream zone and a physical barrier may be fitted if required to provide additional safety.

Unions fitted on both sides of the valve incorporate a gas specific NIST connector, complete with self-sealing check valve (except on vacuum) and blanking nut, for connection of emergency supplies, purge gas and sampling equipment via a length of hose and connectors to BS EN 739.

2.2 First Fix Assembly

The first fix enclosure consists of an extruded aluminium section with die-cast aluminium end caps. Within this enclosure are mounted the valve and associated pipework. A gas specific shroud is clipped into the top of the box. The first fix also provides a mounting point for a pressure switch.

2.3 Second Fix Assembly

The second fix assembly consists of an injection-moulded flame-retardant ABS bezel and door. The door is attached to the bezel by two spring-loaded dowel pins. This mechanism is completely enclosed and therefore offers a high degree of resistance to vandalism. The door and bezel are supplied pre-assembled, complete with a lock and an emergency access panel.

2.4 Line Valve

The line valve is a quarter-turn low-torque ball valve. A neat handle is used to operate the valve through 90 degrees, which moves a ball from the fully open to fully closed position. The movement of the valve is limited to prevent overtravel in both directions. Fitted between the valve body and the handle is a gas specific shroud plate. This plate indicates the media (gas type/vacuum) and has an arrow to indicate rotation movement of the handle. A flow direction arrow is moulded into the handle to indicate the direction of gas flow when fully open.

2.5 NIST Union Sub-assemblies

A NIST union sub-assembly is fitted to each side of the ball valve to retain a gasket. The union, gasket and 'O' ring seals are held in place by a running nut, which has holes on each face to allow the state of the gasket to be visible.

Each union incorporates a gas-specific NIST with self-sealing check valve, held in place by gas pressure. Flexible hoses to BS EN 739 may be used to connect to the NISTs for sampling, purging or back-feeding an emergency supply.

The NIST union sub-assembly is terminated in a stub pipe to allow direct connection to the distribution system. A low-flow connection point is also incorporated to attach pressure switches or gauges.

2.6 Through Gasket and 'O' ring Assembly

The through gasket is coloured white and retains an 'O' ring on one side. It is designed to allow full and free flow of gas through the assembly. Each ZSU2 is supplied with two through gaskets.

2.7 Blanking Gasket and 'O' ring Assembly

The blanking gasket is packaged in its own re-sealable plastic bag, and is only used when a physical barrier to the gas flow is required for zone isolation. The blanking gasket is coloured red, making it easily identifiable. Each ZSU2 is supplied with one blanking gasket, and when not in use, the blanking gasket should be stored in its re-sealable plastic bag.

2.8 Bezel and Door assembly

The bezel and door are moulded from flame-retardant ABS. The hinge mechanism is moulded into the bezel and door and uses two spring-loaded dowel pins. The door is hinged on the left-hand side and opens to approximately 160 degrees to allow easy access for maintenance. A central window in the door houses a transparent emergency access plastic panel, which allows inspection of the valve. The bottom of the door has rounded slots for ventilation to prevent accumulation of gasses in the event of a leak.

The cover is locked in place by a flat cam lock, with a wide range of key combinations to actively support security and any permit-to-work system.

The door has panel, top right, to allow for an Avery© Heavy Duty L7060 label or a 'Traffolite' label to be placed to provide the end user with a space for a customisable zone identification label.

2.9 Emergency Access Plastic Panel

The emergency access panel is manufactured from transparent plastic, and is annotated 'PULL IN EMERGENCY AND CLOSE VALVE'. The plastic panel is simply clipped into the inside of the door. The panel allows easy inspection of the state of the valve.

2.10 Ring Pull

The ring pull is attached through a hole in the plastic window in the position shown. In the event of an emergency, the ring should be pulled hard in order to remove the pull-out plastic panel. The plastic panel must

ZSU2 Area Valve Shutoff Unit

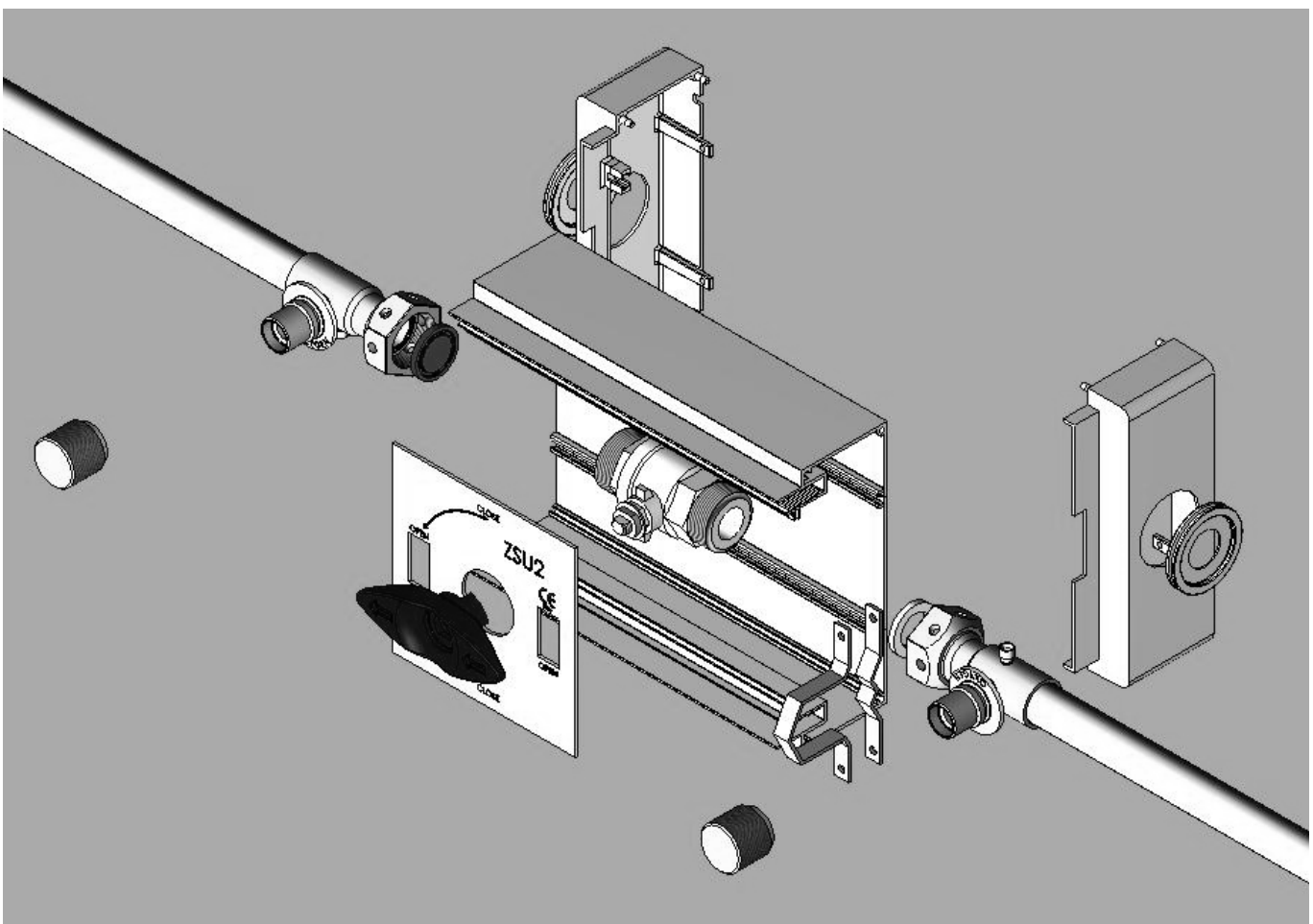
not be fitted without a ring-pull attached.

2.11 Tamper Alarm

A tamper alarm kit is available for the ZSU2, which, when installed can be interfaced to an alarm or BMS system to provide notification when the emergency access window is removed.

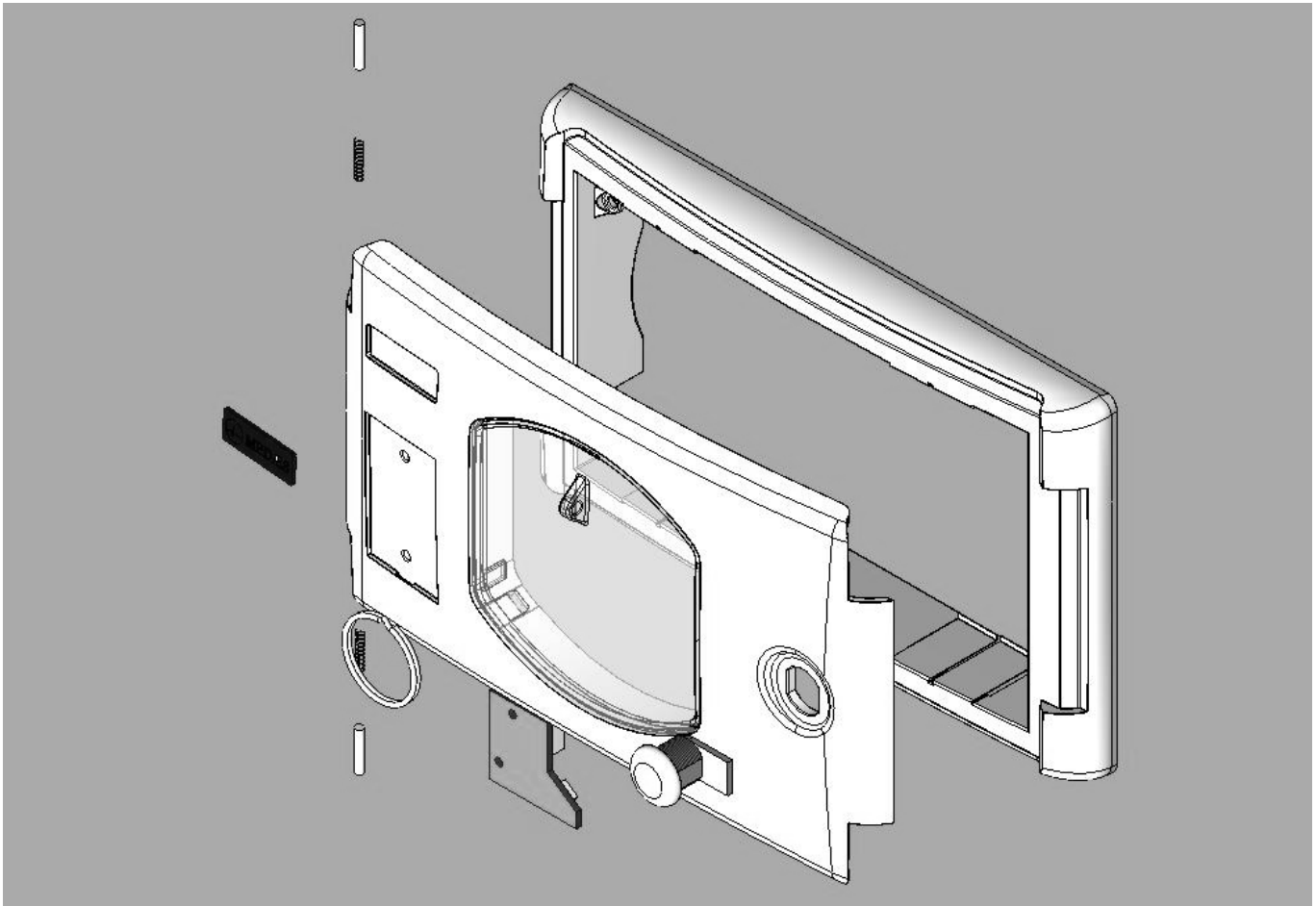
The small printed circuit board can provide a signal that is a normally closed contact, with or without line contact monitoring.

Figure 1. ZSU2 First Fix (22mm)



ZSU2 Area Valve Shutoff Unit

Figure 2. ZSU2 Second Fix (All services, sizes)



Operation

3.1 Normal operation

During use, the ZSU2 is normally set as follows:

- Full flow gaskets fitted.
- Line valve selected fully OPEN.
- Door closed and locked.
- Key retained by an 'Authorised Person' as defined by HTM2022/HTM02-01.

3.2 Emergency operation

In an emergency, e.g. fire which requires the zone to be isolated, proceed as follows:-

WARNING! ENSURE THAT NO PATIENTS ARE DEPENDANT ON THE SYSTEM BEFORE CLOSING ANY VALVE!

3.2.1 Pull the Ring Pull with two or three fingers to remove the pull-out plastic panel.

3.2.2 Turn the valve through 90° to fully CLOSED.

3.3 Maintenance operation

If the zone is required to be isolated for a maintenance task, proceed as follows:-

- 3.3.1 Obtain a work permit, and collect the correct keys from the "Authorised Person".
- 3.3.2 Unlock and open the door.
- 3.3.3 Select line valve fully CLOSED. ("Authorised Person" only)
- 3.3.4 Close and lock door. Retain keys until completion of task.
- 3.3.5 On completion of tasks, re-select ZSU2 in accordance with paragraph 4.1 or in accordance with the 'Permit to work' requirements.

Note:-
If during certain maintenance operations a physical barrier is required, fit the spade and 'O' ring seal assembly in accordance with paragraph 4.5. Correct use of NIST connections is detailed in paragraph 3.7

ZSU2 Area Valve Shutoff Unit

Physical barriers MUST always be used when a alternative type of gas is introduced into a section of the pipeline i.e. Nitrogen purging during pipeline brazing (an extension to an existing system).

4 Maintenance

4.1 Introduction

Zone Service Units are designed to operate with the minimum of maintenance and when correctly installed and commissioned, prove very reliable. Minor routine maintenance operations are recommended especially in view of the infrequent use of attention paid to these units during normal usage. All maintenance work must be carried out by a qualified and competent person who must be fully conversant with the procedures and standards required when working on Medical gas systems.

WARNING! OBTAIN A WORK PERMIT BEFORE COMMENCING ANY WORK ON A MEDICAL GAS INSTALLATION!

4.2 Tools and equipment

Common hand tools are required and they must be clean and serviceable. These include a 15mm box spanner or socket, an adjustable spanner and a parallel tip flat screwdriver. The tools are required for removal of the line valve handle and the running nuts during gasket removal, for NIST check valve 'O' ring and for emergency panel replacement. Only genuine BEACONMEDÆS spares should be used and all necessary spare parts must be obtained before commencing work.

4.3 Routine maintenance

BEACONMEDÆS can provide a planned preventative maintenance contract suitably adapted to meet the customer's requirements. The following routine maintenance is the recommended minimum:-

4.4 Quarterly inspection

The quarterly inspection is designed to exercise the line valve to ensure that the valve remains free for use in an emergency. The complete assembly must be checked for security, leaks and integrity proven. The quarterly inspection must be carried out on all ZSU2's and consists of the following procedure:-

WARNING! VALVE OPERATION MUST ONLY TAKE PLACE UNDER THE STRICT SUPERVISION OF THE 'AUTHORISED PERSON' AND IN ACCORDANCE WITH A PERMIT TO WORK SYSTEM.

4.4.1 Obtain the necessary key(s) from the Authorised Person and open the ZSU2 valve box. Ensure that the lock operates satisfactorily. Examine the entire assembly for correct assembly, security, corrosion and freedom of leaks.

Note:-

It is appreciated that the work content as step 2 may not always be possible depending upon the distribution system usage. Therefore it should be carried out whenever the opportunity arises.

4.4.2 Exercise the valve by selecting fully OPEN and fully CLOSED twelve times, to ensure that the valve will operate satisfactorily in an emergency.

4.4.3 Ensure that both NIST check valves are free from leaks and that the blanking nuts are correctly fitted and also free from leaks.

4.4.4 Ensure that a Ring Pull is securely attached to the plastic panel.

4.4.5 Ensure that the valve box is free from dirt and debris. Check that the blanking gasket and 'O' ring seal assembly is stowed in the box in its packaging.

4.4.6 Select the line valve fully OPEN, close and lock the door. Check that the zone identification label is legible and clearly visible through the plastic. Return the key(s) to the 'Authorised Person'.

4.5 Fitting the blanking gasket assembly

Extending an existing distribution system with subsequent brazing of medical gas pipelines, or pressure testing a limited run, both require the fitting of a physical barrier in the pipeline, preventing any possibility of a leakage past the closed line valve. Pipeline purging operations, especially when the upstream pipeline system remains in use, and other occasions as detailed in HTM2022/HTM02-01 also require the use of a physical barrier. The blanking gasket and 'O' ring assembly provides an effective barrier and is fitted in place of either gasket by the following procedure:-

WARNING! OBTAIN A WORK PERMIT BEFORE COMMENCING OPERATIONS. VALVE OPERATION MUST ONLY TAKE PLACE UNDER THE STRICT SUPERVISION OF THE 'AUTHORISED PERSON' AND IN ACCORDANCE WITH A PERMIT TO WORK SYSTEM.

4.5.1 Obtain the correct key(s) from the 'Authorised Person'. Unlock, open the door and select the line valve fully CLOSED.

4.5.2 Either insert a probe into an appropriate terminal unit and depressurise downstream system, or depressurise the upstream line if required.

4.5.3 Remove the handle retaining nut. Remove line valve handle and internal shroud plate.

4.5.4 Remove appropriate NIST blanking cap and using a suitable tool, open self-sealing valve to ensure that the system is fully depressurised.

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4.5.5 Using an adjustable spanner, slacken off the appropriate running nut and slide it back along the union sufficiently to withdraw through gasket. Ensure that the 'O' ring seal is withdrawn with the gasket. Check that the sealing face on the valve assembly is clean.

4.5.6 Remove the blanking gasket from its packaging. Ensure that a serviceable 'O' ring seal is correctly fitted to the gasket. Insert the gasket and ensuring that it is correctly positioned. Hand-tighten the running nut onto the valve and check that the gasket is visible through the holes in the nut. Using the adjustable spanner, tighten the running nut to secure the gasket.

4.6 Fitting Through Gasket

After carrying out any work, follow the procedure below to repressurise the system with the working gas.

4.6.1 Depressurise the pipeline as in paragraph 5.5.2.

4.6.2 Using the adjustable spanner, slacken off the running nut sufficiently to withdraw the blanking gasket, ensuring the 'O' ring seal is withdrawn as well. Place the blanking gasket and 'O' ring seal in its packaging and stow inside the valve box. Ensure that the sealing face on the valve assembly is clean.

4.6.3 Ensure that serviceable seal is correctly fitted to the through gasket. Insert gasket, ensuring that it is correctly positioned. Hand-tighten the running nut onto the valve and check that the gasket is visible through the holes in the nut. Using the adjustable spanner, tighten the running nut to secure the gasket.

4.6.4 Ensure that both NIST blanking nuts complete with sealing 'O' ring fitted and hand tight. Inspect line valve for correct assembly and security.

Note: Depending upon the type of work that has been carried out, it may be necessary to purge the installation with the working gas.

4.6.5 Temporarily refit line valve handle and with working pressure applied to the system, check all joints and connections for leaks with the valve selected fully OPEN. Remove handle.

4.6.6 Refit internal shroud plate over valve spindle and over flange locating pegs. Refit line valve handle and tighten the retaining nut. Operate handle and ensure that flow direction arrow coincides with the correct flow through the valve, as indicated by the sticker in the base of the valve box.

4.7 Use of the NIST connections

NIST connections are provided for purging, pressure testing,

gas purity sampling or connection of an emergency gas supply. The tests are normally carried out via the down-stream connection and introducing of a foreign gas only after fitting the spade and 'O' ring seal assembly (paragraph 5.5). The following procedure must be used:-

WARNING! OBTAIN A WORK PERMIT BEFORE COMMENCING OPERATIONS. VALVE OPERATION MUST ONLY TAKE PLACE UNDER THE STRICT SUPERVISION OF THE 'AUTHORISED PERSON' AND IN ACCORDANCE WITH A PERMIT TO WORK SYSTEM.

4.7.1 Obtain the correct key(s) from the 'Authorised Person'. Unlock and open the door.

4.7.2 Remove the correct NIST blanking nut complete with 'O' ring seal. Stow both components in the valve box.

4.7.3 The necessary service equipment (depending upon the servicing operation) must have the correct gas type NIST connection in accordance with BS EN 739 and a serviceable 'O' ring seal fitted.

4.7.4 Remove service equipment. Refit NIST blanking nut complete with PTFE sealing washer or serviceable 'O' ring seal fitted as applicable, do not over torque. Check connection for leaks.

4.7.5 Ensure that ZSU2 line valve is selected fully OPEN. Ensure that all tools are removed from the valve box. Close and lock the door. Return the key(s) to the 'Authorised Person'.

4.7.6 Ensure that ZSU2 line valve is selected fully OPEN. Ensure that all tools are removed from valve box. Close and lock the door. Return the key(s) to the 'Authorised Person'.

4.8 Replacing a line valve

A defective or leaking line valve must be replaced. Repairs to defective valves are not authorised as special tests and inspection procedures are required on completion of a repair. Stiff valves must NOT be lubricated in an attempt to free the operation. The procedure to replace a line valve is as follows:-

WARNING! OBTAIN A WORK PERMIT BEFORE COMMENCING OPERATIONS. SHUT DOWN OF A DISTRIBUTION SYSTEM MUST ONLY TAKE PLACE UNDER THE STRICT SUPERVISION OF THE 'AUTHORISED PERSON' AND IN ACCORDANCE WITH A PERMIT TO WORK SYSTEM.

4.8.1 Shut down and isolate the affected distribution system. Ensure that pipeline is fully depressurised.

4.8.2 Obtain the correct key from the 'Authorised Person'. Unlock and open the door. Remove both NIST blanking nuts and using a suitable tool open the self-sealing valves to ensure that the system is

ZSU2 Area Valve Shutoff Unit

depressurised.

- 4.8.3 Remove handle retaining nut/screw. Remove line valve handle and internal shroud plate.
- 4.8.4 Using two spanners, unscrew the union nuts from the valve. Slide nuts along union and ensure that the 'O' rings remain in place. Remove both gaskets complete with 'O' ring seals. Unscrew the M4 Nyloc nuts retaining the valve clamps, ensuring that the M4 'T' bolts are not lost. Remove line valve.
- 4.8.5 Check that both gaskets and both unions have a serviceable 'O' ring seal fitted. Ensure that the mating faces of the valve and both gaskets are clean. Remove all blanking caps from the replacement line valve and ensure that mating surfaces are clean. Insert replacement line valve, in the correct orientation. Position both gasket assemblies. Hand-tighten both union nuts. Replace 'T' bolts in the channel, and line up valve clamps. Replace and tighten the M4 Nyloc nuts. Using two spanners, fully tighten both union nuts.
- 4.8.6 Ensure that a serviceable 'O' ring is fitted to both NIST blanking nuts. Refit nuts.
- 4.8.7 Temporarily refit the line valve handle and select line valve fully OPEN. Reapply distribution system working pressure and inspect line valve assembly for leaks. Inspect line valve for correct assembly and security. Remove handle.
- 4.8.8 Refit internal shroud plate over valve spindle and locating pegs. Refit line valve handle and tighten retaining nut. Operate handle and ensure that the range of movement coincides with the flow direction sticker in the bottom of the box.
- 4.8.9 ZSU2 valve tightness. Check. With ZSU2 selected fully CLOSED, all appropriate terminal units fully closed and normal working pressure applied to distribution system. Depressurise downstream zone to 1 bar gauge. Check that there is no pressure change downstream to the ZSU2 after a test time of 15 minutes.
- 4.8.10 Select line valve fully OPEN. Ensure that all tools are removed from the valve box. Close and lock the door. Return the key to the 'Authorised Person'.
- 4.9 Plastic Window Replacement

Following emergency access, it will be necessary to replace the plastic access window.

The outer part of the previous window should be removed, with care being taken not to damage the door.

The new window should then be clipped in from the rear of the door.

The replacement window will come complete with a ring pull and a magnet to actuate a tamper proof switch, where fitted.

5. Fault Diagnosis

5.1 Introduction

The following paragraphs detail possible defects/symptoms which may occur in the Zone Service Unit with the necessary rectification action.

5.2 External leakage from line ball valve assembly

5.2.1 Gasket 'O' ring seal unserviceable. Remove gasket, check that mating surfaces of both line valve and flanged sub-assemblies are clean. Replace both 'O' ring seals with new items and refit gasket.

5.2.2 Leaking NIST Connection. Remove NIST blank nut, renew check valve 'O' ring seal, renew 'O' ring seal as applicable. Refit NIST blanking nut.

5.2.3 Valve Spindle Leaking. Replace line valve in accordance with paragraph 4.8

WARNING! DO NOT ATTEMPT TO CURE A DEFECTIVE VALVE BY INTERFERING WITH THE INTERNAL SEALS

5.3 Line valve stiff to operate

5.3.1 Line valve ball and seats seized. Exercise the valve from fully OPEN to fully CLOSED position 12 times. Check that the valve is easy to operate. If necessary, replace line valve in accordance with paragraph 4.8.

WARNING! DO NOT ATTEMPT TO CURE A STIFF VALVE BY LUBRICATION

5.4 Downstream pressure increased with ZSU2 closed.

5.4.1 Internal leak across line valve. Replace line valve in accordance with paragraph 4.8.

5.4.2 Line valve handle overtravels. Replace line valve and/or handle assembly in accordance with paragraph 4.8.

WARNING! DO NOT ATTEMPT TO CURE A DEFECTIVE VALVE BY INTERFERING WITH THE INTERNAL SEALS

ZSU2 Area Valve Shutoff Unit

6. Recommended Spares

6.1 Spares List

BEACONMEDÆS Zone Service Units are expected to give trouble free service without the need for a large holding of spare parts. The only recommended spares required to be held by the user are:-

Spares for ZSU2

Description	Part No.
Replacement line valve (22mm)	2003911
Replacement line valve (28mm)	2003912
Replacement valve handle	2003974
Replacement valve handle insert	2003974a
Replacement main 'O' ring (22mm)	2000152
Replacement main 'O' ring (28mm)	2003683
Replacement 'O' ring (Check valve)	1828857
Replacement 'O' ring (NIST Nut)	2004165
Replacement access panel	2003917
Zone identification label cover	2003977
Key and lock assembly	2003938

6.2 Spare scheduling

The recommended spares holding depends upon the number of ZSU2's installed. The number recommended for overseas customers is expressed in brackets and takes into account expected transport delays.

Part No.	Number of Zone Service Units installed			
	0-20	20-50	51-100	100+
2003911 (22mm)	1(2)	1(2)	2(3)	2 (3)
2003912 (28mm)	1(2)	1(2)	2(3)	2 (3)
2003974	1(2)	1 (2)	2 (3)	2 (3)
2003683	12(30)	24 (36)	36 (48)	48 (48)
2000152	12(30)	24 (36)	36 (48)	48 (48)
1828857	4(8)	4 (8)	8 (16)	8 (16)
2003917	2(3)	2 (3)	4 (6)	4 (6)
2003976	2(3)	2 (3)	4 (6)	4 (6)
2003977	2(3)	2 (3)	4 (6)	4 (6)
2003938	1(2)	1 (2)	2 (3)	2 (3)

6.3 Misplaced Spades

In the event of the gasket being lost or misplaced, replacement units may be ordered as follows:-

22mm blank gasket	2003923
22mm through gasket	2003924
28mm blank gasket	2003925
28mm through gasket	2003926

6.4 Other Spares

In the event of other spares being required, they may be obtained quickly by contacting either your local BEACONMEDÆS area office/representative or BEACONMEDÆS head office at Staveley.



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