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# **CLEMENTS**

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## **Low Vacuum Low Flow Regulator**

SUC 89150

SUC 89152

proven through performance



## **User Manual**

Manual No. SUC 91005 428  
Issue 6

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## **Safety**

Thank you for purchasing this Clements Low Vacuum Low Flow Regulator.

For your safety it is imperative that this unit only be operated by authorised personnel in accordance with the instructions as described in this manual. Operated in this way, the Low Vacuum Low Flow Regulator will provide years of service.

Due to continual improvements in product design, the Low Vacuum Low Flow Regulator may vary in detail from the descriptions in this manual. In the event of further questions please contact your local distributor or BMDi TUTA Healthcare direct.

User Manual

Low Vacuum Low Flow Regulator

Manual Number SUC 91005 428 Issue 6

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## **Contents**

|   |           |
|---|-----------|
| <b>Specification.....</b>               | <b>4</b>  |
| <b>Installation and Operation .....</b> | <b>4</b>  |
| <b>Safety Test.....</b>                 | <b>6</b>  |
| <b>Maintenance .....</b>                | <b>7</b>  |
| <b>Sterilisation.....</b>               | <b>8</b>  |
| <b>Spare Parts.....</b>                 | <b>8</b>  |
| <b>Accessories.....</b>                 | <b>9</b>  |
| <b>Disassembly and Repair .....</b>     | <b>10</b> |
| <b>Parts Assembly.....</b>              | <b>13</b> |
| <b>Troubleshooting.....</b>             | <b>15</b> |
| <b>Warranty .....</b>                   | <b>16</b> |

### **Warning**

**To avoid any injury to patients this apparatus must only be operated by fully trained personnel.**

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## Specifications

|                     |   |
|---------------------|---|
| Vacuum Range        | 0 to -150 mmHg, 0 to -20 kPa  |
| Maximum Flow        | 7 to 8 litres/minute  |
| Flow Rate           | 0 to 8 Litres of Free Air Per Minute (LFAPM)                              |
| Regulator Mechanism | Suspended frictionless double diaphragm                                   |
| Filter              | Porous bronze filter, 90 micron   |
| Safety              | Pressure safety valve, ball and seat type                                 |
| Gauge               | Diaphragm type; Dual scale, graduated in kPa and mm Hg                    |
| Gauge Range         | 0 to -25 kPa, graduated at 1.0 kPa<br>0 to -200 mmHg, graduated at 5 mmHg |
| Environment         | Indoor  |
| GMDN Code           | 37780   |
| ARTG Number         | 141742  |

## Installation and Operation

Carefully examine the suction regulator for any visual signs of damage that might have occurred during shipment.

Screw the suction regulator to the wall outlet with the index handwheel or slot “V” at back of body into mounting wall bracket located at the back of the unit.

Turn on full vacuum by rotating the control knob fully clockwise. Occlude the regulator exhaust and check that the safety valve is operating. The valve should operate at 150 mm Hg (-20 kPa).

If the above reading is not obtained, the safety valve is not working correctly. .

To rectify the problem carry out the following

- 1 Disconnect regulator from vacuum supply.
- 2 Remove the safety jar and unscrew the safety valve assembly. Do not block the Safety Valve hole as this will cause damage to the gauge if the vacuum is not disconnected.
- 3 Thoroughly clean all components.
- 4 Connect to a vacuum supply and turn the control knob to the fully on position.
- 5 Reassemble the safety valve components, apply a small amount of 'Loctite' to the thread and screw the assembly into the jar cap approximately three turns.
- 6 Fit the safety jar, occlude the suction inlet and check gauge reading.
- 7 If any further adjustment is required, remove the safety jar and screw the safety valve in or out to obtain the correct reading.

**N.B. Do not block Safety Valve as this will cause damage to the Gauge which will not be covered by the warranty.**

## **General Usage.**

To set the regulator to desired setting

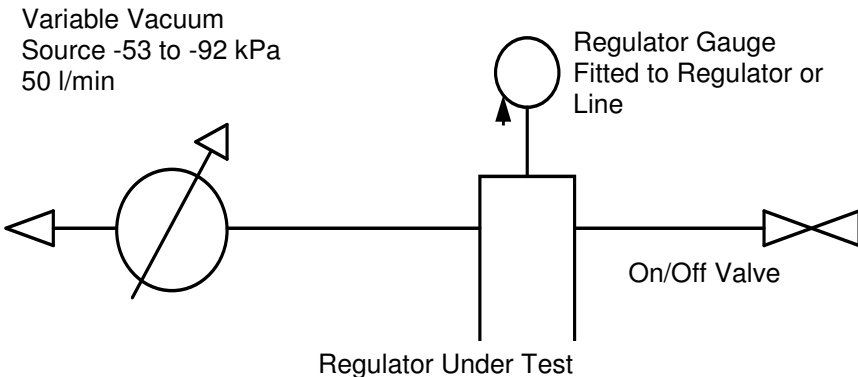
- 1 Occlude inlet
- 2 Wind regulator control knob to register higher than required setting
- 3 Allow setting to stabilise
- 4 Slowly wind back regulator knob to required level
- 5 Release inlet
- 6 Occlude inlet & check the unit returns to set level
- 7 Release inlet & apply to patient

## Safety Test for Vacuum Regulator with Variable Setting

- Install the regulator to be tested as shown in the diagram.
- Set the vacuum source to -79 kPa and the regulator to -20 kPa or one fifth of full scale.
- Reduce the vacuum source to -53 kPa and read the new occluded vacuum on the regulator gauge.
- Set the regulator to -53 kPa or four fifths of full scale and adjust the vacuum source from -53 kPa to -79 kPa.
- Read the new occluded vacuum on the regulator gauge.
- Adjust the vacuum source from -79 kPa to -53 kPa and read the new occluded vacuum on the regulator gauge.
- Repeat the above three times.

Each time the source vacuum is changed the regulator gauge should read within 0.4 kPa of its' setting before the change.

### Arrangement For Testing Vacuum Regulator Setting



## Maintenance

| <b>Year</b> | <b>1st Quarter</b>                                 | <b>2nd Quarter</b>                                 | <b>3rd Quarter</b>                                 | <b>4th Quarter</b>   |
|-------------|--|--|--|--|
| <b>1</b>    | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve   |
| <b>2</b>    | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow and vacuum. Strip and inspect safety valve parts and replace 'O' ring and filter. |
| <b>3</b>    | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum and safety valve. Check filter and seals, replace if necessary.           |
| <b>4</b>    | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow and vacuum. Strip and inspect safety valve parts and replace 'O' ring and filter. |
| <b>5</b>    | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum, bronze filter and safety valve | Check flow, vacuum and safety valve. Check filter and seals, replace if necessary.           |

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## Cleaning and Sterilisation

### Warning

Do not immerse or autoclave the unit unless the gauge, diaphragm assembly and nylon balls have been removed.

### Cleaning

Clean using a pH neutral disinfectant for wiping or immersion cleaning. Flush after immersing using distilled water and dry thoroughly before reassembly of the unit.

### Sterilisation

The unit may be safely autoclaved once the gauge, diaphragm assembly and nylon balls have been removed.

## Spare Parts

|               |   |
|---------------|---|
| SUC 80253     | Low Vacuum Gauge  |
| SUC 81500 043 | Vacuum Controller spring  |
| SUC 89140 029 | Knob Tension Spring   |
| SUC 89140 036 | Overhaul Kit for Regulators ('O' Ring x4, Large Diaphragm, Small Diaphragm, Valve Seat) |
| SUC 89150 011 | Regulator Assembly Handle Tool  |
| SUC 89150 012 | Regulator Assembly Tool   |
| SUC 89210     | Assembled Safety Trap Jar for Regulators  |
| SUC 89250 024 | Kit for Regulators  |
| SUC 91005 428 | User Manual for the Low Vacuum Low Flow Regulators SUC89150 / SUC89152                  |

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## Accessories

|               |   |
|---------------|---|
| SUC 89140 085 | MAK 300 antibacterial canister and lid                        |
| SUC 89240 081 | MAK 500 canister with lid                                     |
| SUC 89140 087 | Adapter for attaching canister to regulators                  |
| SUC 89240 088 | MAK 300 jar only  |
| SUC 89240 084 | MAK 500 jar only  |
| SUC 89240 090 | HEPA bacterial filters for MAK 300<br>(Pack of 20)            |
| SUC 89101     | BS MK IV connector kit  |
| SUC 89102     | Puritan Bennett connector kit                                 |
| SUC 89104     | Drager connector kit  |
| SUC 89310 001 | Porous Bronze Filter (Pack of 20)                             |
| SUC 80297 001 | Yellow medical suction tubing (20 metre roll)                 |
| SUC 89455 001 | Kit, Plastic V bracket to hold suction devices<br>(Pack of 5) |

## **Disassembly and Reassembly**

The Clements Suction Regulator is a precision machined and assembled device that will, under normal operation, provide many years of service. In the event of any malfunction that requires the unit to be dismantled the procedures described below should be followed.

### **Tools Required**

Adjustable Wrench

Allen Keys

Circlip Pliers (internal)

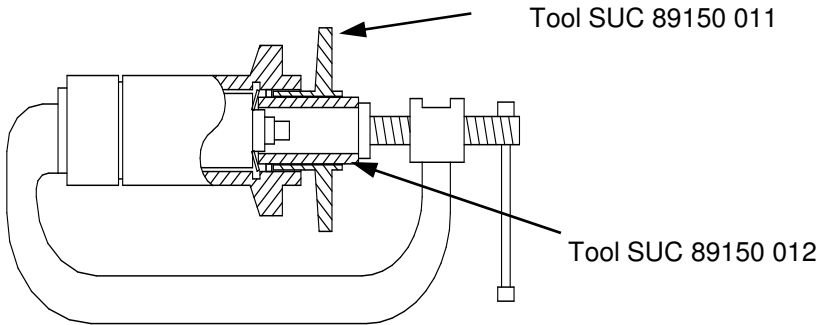
Small Screwdriver

Drill Press (or G Clamp)

Special Tools (Clements SUC 89150 011 and SUC 89150 012)

### **Disassembly**

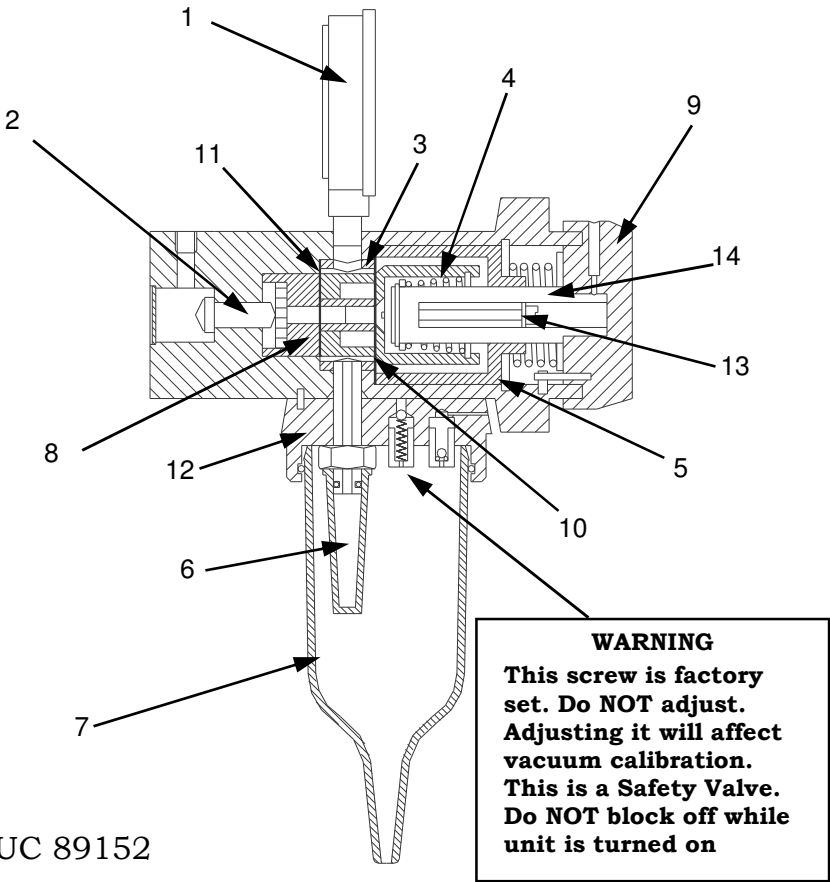
1. Remove vacuum gauge.
2. Remove safety jar and bronze filter.
3. Remove safety jar cap by unscrewing the securing screw. Take care that the small 'O' ring seal is not lost.
4. Remove the control knob by loosening the two grub screws.
5. Remove the compression spring and two nylon washers.
6. Remove the stop screw from the main body.
7. Remove the circlip that retains the piston assembly and the belleville washer.
8. Remove the piston assembly.
9. Unscrew the diaphragm compressor (left hand thread).
10. Remove the circlip from the spring barrel and take out the control screw and spring.
11. Remove the adjusting set screw and spring from inside the control screw.
12. Remove the diaphragm and valve assembly.
13. Remove the countersunk head screw and disassemble the diaphragm and valve assembly.



## Re-assembly

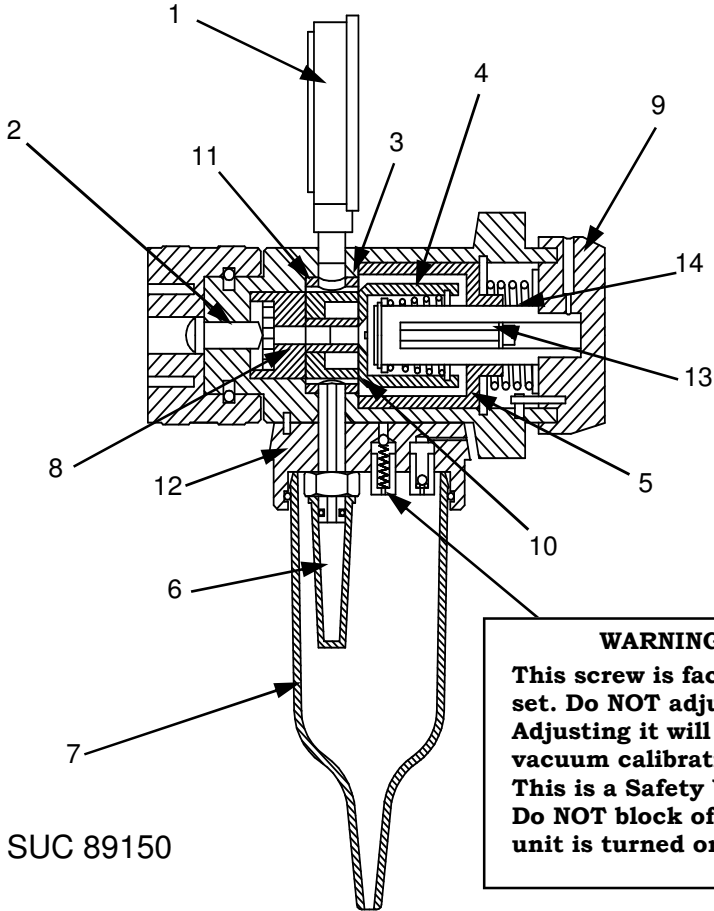
- 1 Reassemble the diaphragm and valve assembly and replace the countersunk head screw.
- 2 Lightly grease the fibre washer and reassemble the adjusting set screw and spring into the control screw.
- 3 Insert the control screw and spring into the spring barrel and secure with the circlip.
- 4 Replace the diaphragm compressor (left hand thread) so that it rests lightly against the diaphragm assembly.
- 5 Replace the belleville washer.
- 6 Compress the belleville washer and replace the large circlip. (Clements special tools SUC 89150 011 and SUC 89150 012 will be needed for this operation).
- 7 Refit the stop screw into the main body.
- 8 Refit the vacuum gauge using a suitable thread sealant.
- 9 Place the nylon and fibre washers and knob spring into position.
- 10 Lightly grease the 'O' ring and refit the jar cap to the main body with the securing screw.

- 11 Place the bronze filter in its position with a twisting action.
- 12 Insert the safety jar into the jar cap.
- 13 Connect the regulator to a vacuum supply.
- 14 Occlude the inlet hole at the bottom of the main body and slowly adjust the control screw until the vacuum gauge just lifts off the zero position. This must be done in conjunction with setting the Safety Valve. The adjusting control screw must be wound up in 0.2 kPa steps as should also the Safety valve until the reading of 20 kPa is reached. When first occluding the inlet take care that the gauge does not over run the end of its scale.
- 15 Carefully push the control knob onto the control screw and lock it into position with the socket head screw. Ensure that the stop pin is hard against the left hand side of the stop screw.
- 16 Ensure that the vacuum gauge still lifts slightly off the zero position with the knob in the off position and the inlet occluded.
- 17 Remove the control knob label
- 18 Using a small screwdriver through the hole in the control knob and with the control knob in the off position, turn the adjusting set screw until the vacuum gauge reads zero. This should be done whilst regulator is connected to a 0 – 12 lpm flowmeter to assist in checking for vacuum leakage.
- 19 Ensure that the grub screws in the knob are tight and replace the label.
- 20 Test the regulator as described in the Installation and Operation section.



SUC 89152

| Item | Description          | Item | Description     |
|------|----------------------|------|-----------------|
| 1    | Gauge                | 8    | Piston Assembly |
| 2    | Valve                | 9    | Control Knob    |
| 3    | Outer Spacer         | 10   | Large Diaphragm |
| 4    | Control Spring       | 11   | Small Diaphragm |
| 5    | Diaphragm Compressor | 12   | Jar Cap         |
| 6    | Bronze Filter        | 13   | Adjusting Screw |
| 7    | Safety Jar           | 14   | Control Screw   |



SUC 89150

| Item | Description          | Item | Description     |
|------|----------------------|------|-----------------|
| 1    | Gauge                | 8    | Piston Assembly |
| 2    | Valve                | 9    | Control Knob    |
| 3    | Outer Spacer         | 10   | Large Diaphragm |
| 4    | Control Spring       | 11   | Small Diaphragm |
| 5    | Diaphragm Compressor | 12   | Jar Cap         |
| 6    | Bronze Filter        | 13   | Adjusting Screw |
| 7    | Safety Jar           | 14   | Control Screw   |

## Troubleshooting

| <b>Fault</b>  | <b>Check</b>  | <b>Rectify</b>   |
|---|---|--|
| No reading on suction gauge                         | Pipeline supply<br>Safety Jar fitting<br>'O' Ring Seal<br>Connection to wall<br>Blockage in regulator | Supply source<br>Tighten into body<br>Replace if damaged<br>Tighten handwheel<br>Dismantle and clean |
| Full scale reading on suction gauge at all settings | Debris on valve seat  | Dismantle and clean  |
| Suction gauge reading creeps                        | Debris on valve seat  | Dismantle and clean  |
| Suction gauge reading creeps downwards              | Pipeline supply<br>Safety Jar fitting<br>'O' Ring Seal<br>Regulator<br>Diaphragms                     | Supply source<br>Tighten into body<br>Replace if damaged<br>Dismantle and check replace if damaged   |
| Slow response to suction setting                    | Bronze Filter<br>Metering Jet   | Clean or replace<br>Replace if worn  |

## Warranty

BMDi TUTA Healthcare Pty Limited ("BMDi TUTA Healthcare") warrants that this product is free from defects in workmanship and materials for a period of 12 months from the date of shipment by BMDi TUTA Healthcare or its authorised agent to the purchaser. Subject to the conditions of this warranty, if the product fails to operate for any reason within the warranty period and the product is returned to the place of purchase at the purchaser's expense, BMDi TUTA Healthcare will repair or replace the product free of charge.

If a valid warranty claim is made within 30 days from the date of shipment, then BMDi TUTA Healthcare will also reimburse the purchaser for reasonable freight costs in returning the product to the place of purchase.

## Conditions of Warranty

1. The product must be returned to the place of purchase with proof of purchase.
2. his warranty is only available to the original purchaser of the product.
3. The product must not have had its serial number removed, defaced or changed, its casing opened, its power supply altered or have been tampered with in any other way.
4. This warranty does not cover :
  - inadequate or incorrect site preparation;
  - improper installation;
  - connection to the wrong voltage;
  - failure of the product due to misuse;
  - the use or operation of the product outside of the physical, electrical or environmental specifications of the product;
  - use in a manner or environment in which the product is not designed to be used;
  - improper adjustment, calibration or operation by the purchaser;
  - the use of accessories including consumables, hardware or software which were not manufactured or approved in writing by BMDi TUTA Healthcare;
  - any modifications of the product which were not authorised in writing by BMDi TUTA Healthcare;
  - any contamination or leakages caused or induced by the purchaser; and
  - inadequate or improper maintenance of the product.
5. This warranty does not cover normal wear and tear.
6. BMDi TUTA Healthcare will not be responsible for damage or loss caused during shipping.
7. In Australia, apart from any warranties implied by the Trade Practices Act 1974 all other warranties expressed or implied and whether arising by virtue of statute or otherwise are hereby excluded.
8. Outside Australia, all other warranties expressed or implied and whether arising by virtue of statute or otherwise (including any warranties implied by the Vienna Convention) are hereby excluded.
9. BMDi TUTA Healthcare' obligations under this warranty are limited to the repair or replacement of the product, within the terms of this warranty and the total liability of BMDi TUTA Healthcare for loss or damage of every kind whether arising pursuant to the terms of the sale of the product or otherwise in connection with the product is limited to the amount paid by the purchaser to BMDi TUTA Healthcare for the product.
10. Apart from any liability imposed by Part VA of the Trade Practices Act, BMDi TUTA Healthcare accepts no other liability for any loss or damage occasioned (including consequential loss or damage) in any way as a result of the use of the product.
11. The warranty does not extend to cover damage to the following parts as they are inherently prone to wear :
  - Motor Brushes.
12. This warranty does not extend to cover corrosion due to any cause nor to any damage to painted or anodised surfaces.
13. BMDi TUTA Healthcare will give the purchaser the benefit of any manufacturer's warranty in respect of any components in the product which were not manufactured by BMDi TUTA Healthcare, if such a manufacturer's warranty is available.