

# C-APU

## COMPACT AIR PROCESSING UNIT

### 932 501 XXX 0

#### TESTING AND ADJUSTMENT INSTRUCTION



**WABCO**



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<http://www.wabco.info/i/206>



## 1 General information



### Copyright and trademark notice


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### Symbols used

|  |   |
|--|---|
|  <b>WARNING</b>   | <b>Specifies a potentially hazardous situation</b><br>Not observing the safety instruction can result in severe injuries or death.<br>– <i>Follow the instructions in this warning note to avoid injury or death.</i>   |
|  <b>CAUTION</b> | <b>Specifies a potentially hazardous situation</b><br>Specifies a possible hazardous situation<br>Not observing the safety instruction can result in minor or moderately severe injuries.<br>– <i>Follow the instructions in this warning note to avoid any injuries.</i> |
| <b>CAUTION</b>   | <b>Specifies possible material damage</b><br>Not observing the safety instruction can lead to material damage.<br>– <i>Follow the instructions in this warning note to avoid any material damage.</i>   |

 Important information, instructions and/or tips that you must always observe without fail.

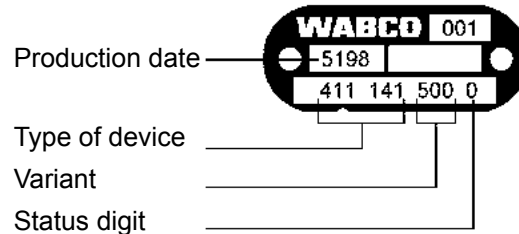


Reference to information on the internet

- Action step
  - ⇒ Consequence of an action
- List

### Structure of the WABCO product number

WABCO product numbers consist of 10 digits.



0 = New device (complete device)  
1 = New device (subassembly)  
2 = Repair kit or subassembly  
4 = Component part  
7 = Replacement device  
R = Reman

### Your direct contact to WABCO

In addition to our online services, trained members of staff are there to help you at our WABCO Service Partners to directly answer any technical or business-related questions you may have.

Contact us if you need assistance:

- Find the right product
- Diagnosis support
- Training
- System support
- Order management



You can find your WABCO partner here:

<http://www.wabco-auto.com/en/how-to-find-us/contact/>

## 2 Safety instructions

### Observe all required provisions and instructions:

- It is essential that you read this testing and adjustment instruction carefully before carrying out the test and do observe their content in order to avoid personal injury and/or material loss.
- Keep the testing and adjustment instruction for future use.
- WABCO will only guarantee the security, reliability and performance of their products and systems if all information in this publication is adhered to.
- Always follow the specifications and instructions of the vehicle manufacturer.
- Observe all accident regulations of the respective company as well as regional and national regulations.
- Only specially trained staff in first-rate workshops are to undertake testing and adjustment.
- Heed the additionally required documents, see „3 General hints for testing“, page 7.

### Note the following instructions for safe test implementation:

- Only start testing after you have read and understood all information required for testing.
- Do keep to the content of this testing and adjustment instruction during the actual test.
- Wear protective gear (protective goggles, protective footwear, etc.).
- Test sample on calibrated test bench only.
- In cases of uncertainty, only use test values stipulated by the vehicle manufacturer.
- If the test values cannot be attained, then re-set the test specimen.
- Undo the locking screws, hoses and components of the test specimen only when the respective lines have been vented.
- Before starting each test, make sure that the switch cocks are in their correct normal position (see WABCO mobile test bench – Operating Instructions).
- Do not install a repaired device in the vehicle unless it has passed the following tests.

## 3 General hints for testing

This is a testing and adjustment instruction for C-APU.



Fig. 1 C-APU

This instruction specifies those requisite tests and adjustment which need to be undertaken after a device is repaired.

### Additional documents required

| PUBLICATION TITLE                               | PUBLICATION NUMBER |
|---|--------------------|
| WABCO Mobile Test Bench - Operating Instruction | 815 980 215 3      |
| General Repair and Test Hints                   | 815 xx0 109 3      |

\*Language code XX: 01 = English, 02 = German, 03 = French, 04 = Spanish, 05 = Italian, 06 = Dutch, 07 = Swedish, 08 = Russian, 09 = Polish, 10 = Croatian, 11 = Romanian, 12 = Hungarian, 13 = Portuguese (Portugal), 14 = Turkish, 15 = Czech, 16 = Chinese, 17 = Korean, 18 = Japanese, 19 = Hebrew, 20 = Greek, 21 = Arabic, 24 = Danish, 25 = Lithuanian, 26 = Norwegian, 27 = Slovenian, 28 = Finnish, 29 = Estonian, 30 = Latvian, 31 = Bulgarian, 32 = Slovakian, 34 = Portuguese (Brazil), 35 = Macedonian, 36 = Albanian, 97 = German/English 98 = = multilingual, 99 = non-verbal



### The additionally required documents are here:


- Open the WABCO website: <http://www.wabco-auto.com>
- Click the link *Product Catalogue INFORM*.
- Enter the publication number into the *Product Number* field.
- Click the *Start* button.
- Click the *Publications* radio button.

Please note that the publications are not always available in all language versions.

### Equipment and tools required

- WABCO Mobile Test Bench 453 197 003 0 or an adequate testing equipment
- Allen Key size 3 mm
- Suitable leak detector
- Tubular (hexagon) box spanner size 10 mm

## 4 Testing and Adjustment

|  |  |
|--|--|
|  <b>WARNING</b> | <b>Danger of accidents</b><br>A faulty test specimen can adversely affect the vehicle's function. <ul style="list-style-type: none"><li>– <i>Do not install a repaired device in the vehicle unless it has passed the following tests.</i></li></ul> |
|--|--|

### 4.1 External evaluation


- Examine the test specimen for signs of any visible damage.
- Visually check all connections of the test specimen as to being unimpeded.

### 4.2 Preparations

- Place the WABCO Mobile Test Bench onto a workbench so that the case cover faces upwards.

**!** The calibration of the installed pressure gauges is only valid for a horizontal setup of the WABCO Mobile Test Bench.

- Make sure that all switch cocks are in their normal position (closed).
- Limit the supply pressure to 12 bar.

|  |  |
|--|--|
|  <b>CAUTION</b> | <b>Risk of injury</b><br>Non-fixed test specimens could fall from the workbench and lead to injuries in the process. <ul style="list-style-type: none"><li>– <i>Secure the test specimen to prevent it from falling.</i></li></ul> |
|--|--|

|                |   |
|----------------|---|
| <b>CAUTION</b> | <b>Test specimen damage</b><br>Any direct clamping in a vice could damage the test specimen and this, in turn, would impair its function. <ul style="list-style-type: none"><li>– <i>Never directly clamp the test specimen in the vice. Firstly secure it to a suitable workholding fixture.</i></li></ul> |
|----------------|---|

- Fix the test specimen in the workholding fixture.
- Clamp the test specimen into the vice with the aid of the workholding fixture.



## 4.3 Test specimen connection

- Connect the test specimen to the connecting points of the WABCO Mobile Test Bench using the hoses. Please observe the following figures.

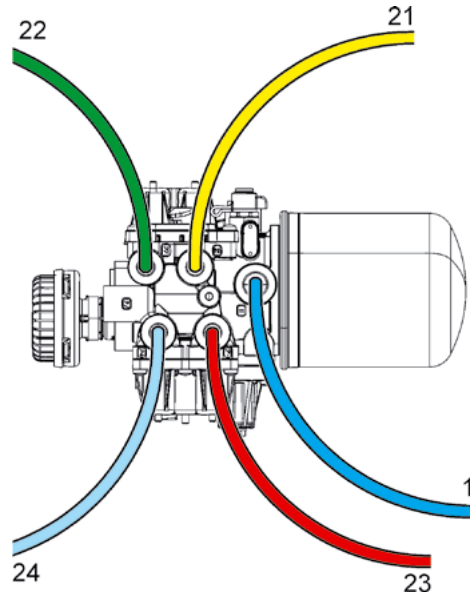


Fig. 2 Connections of hoses to C-APU

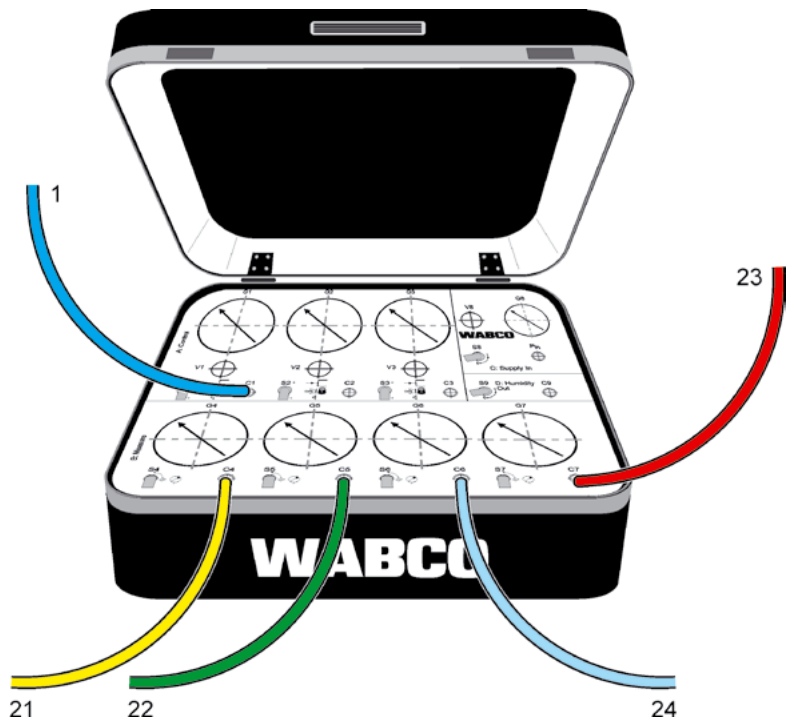


Fig. 3 Connections of hoses to WABCO Mobile Test Bench

| LEGEND                       |                 |
|------------------------------|-----------------|
| Port 22                      | Green hose      |
| Port 21                      | Yellow hose     |
| Port 1                       | Dark blue hose  |
| Port 23                      | Red hose        |
| Port 24                      | Light blue hose |
| Port 25 & port 4 are closed. |                 |

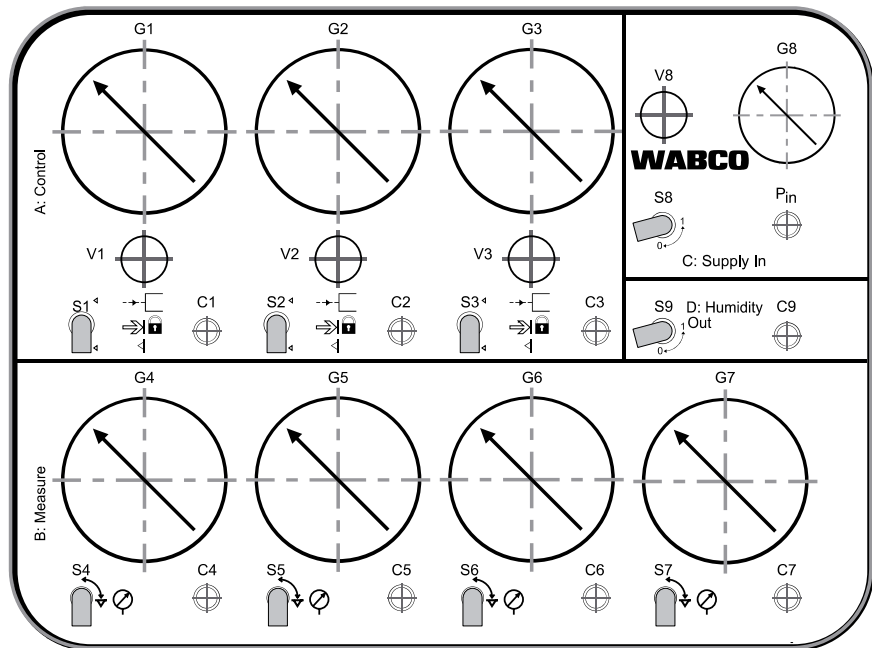


Fig. 4 Fig. WABCO Mobile Test Bench structure

## LEGEND

|                        |   |
|------------------------|---|
| <b>A: Control</b>      | 'Control' area  |
| <b>B: Measure</b>      | 'Measurement' area  |
| <b>C: Supply In</b>    | 'Supply' area   |
| <b>D: Humidity Out</b> | 'Humidity outlet' area  |
| <b>G1 - G8</b>         | Pressure gauge 16 bar   |
| <b>V1 - V8</b>         | Precision control valves                                      |
| <b>C1 - C9</b>         | Compressed-air couplings                                      |
| <b>S1 - S9</b>         | Switch cocks  |
| <b>P<sub>in</sub></b>  | Connecting nipple nominal width 7.2 for compressed-air supply |
|                        | Open flow   |
|                        | Maintain pressure   |
|                        | Closed  |

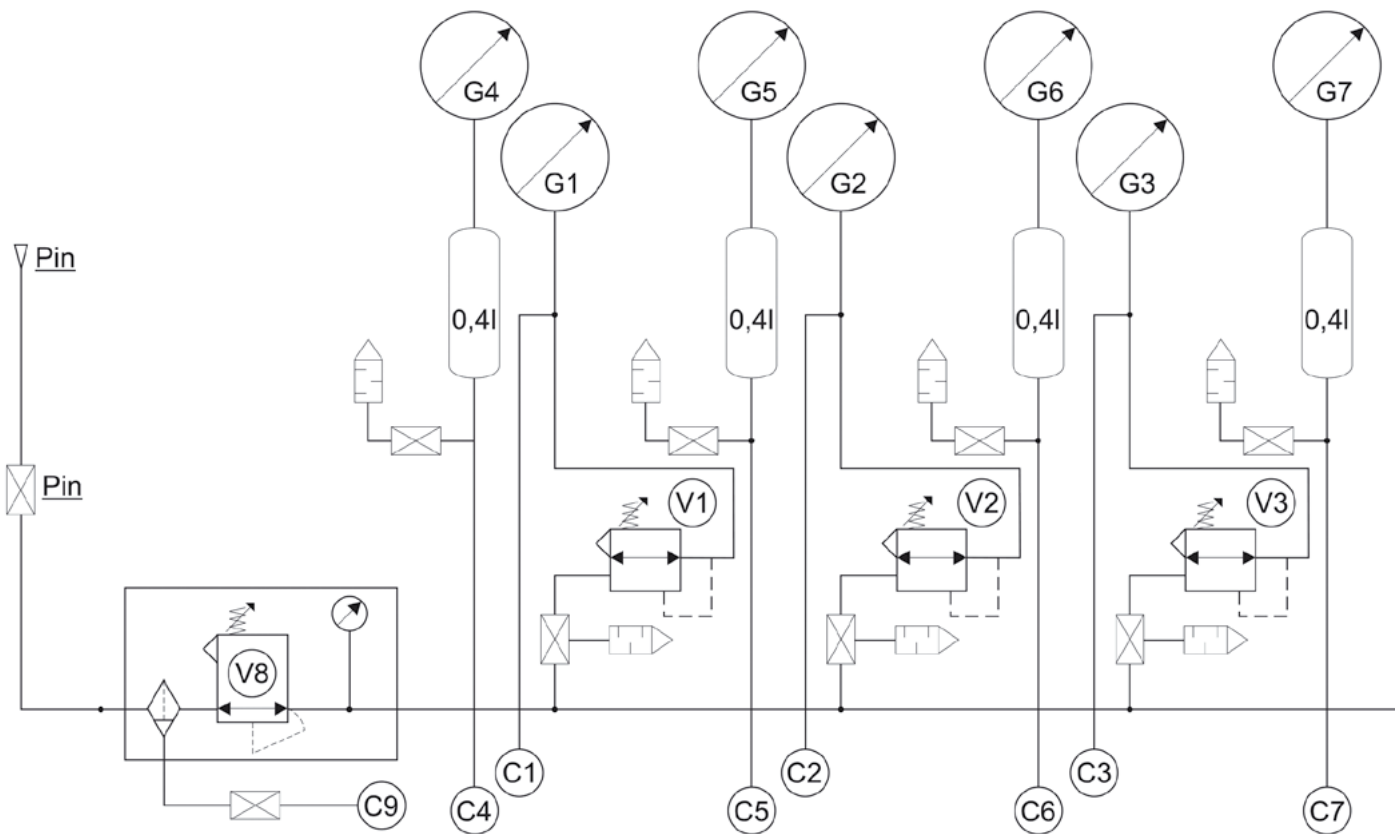



Fig. 5 Circuit Diagram for WABCO Mobile Test Bench

|  |   |
|--|---|
|  <b>CAUTION</b> | <p><b>Risk of injury</b><br/>Injuries may arise from loose plug connections during the compressed air test.</p> <ul style="list-style-type: none"> <li>– Ensure that the plug connections at the test bench and test specimen are securely inserted.</li> </ul> |
|--|---|

### Adjustment Screws

- A Cut Out / Cut in
- B Back Flow
- C Pressure Limiting Valve
- 21 Circuit 1
- 22 Circuit 2
- 23 Circuit 3
- 24 Circuit 4

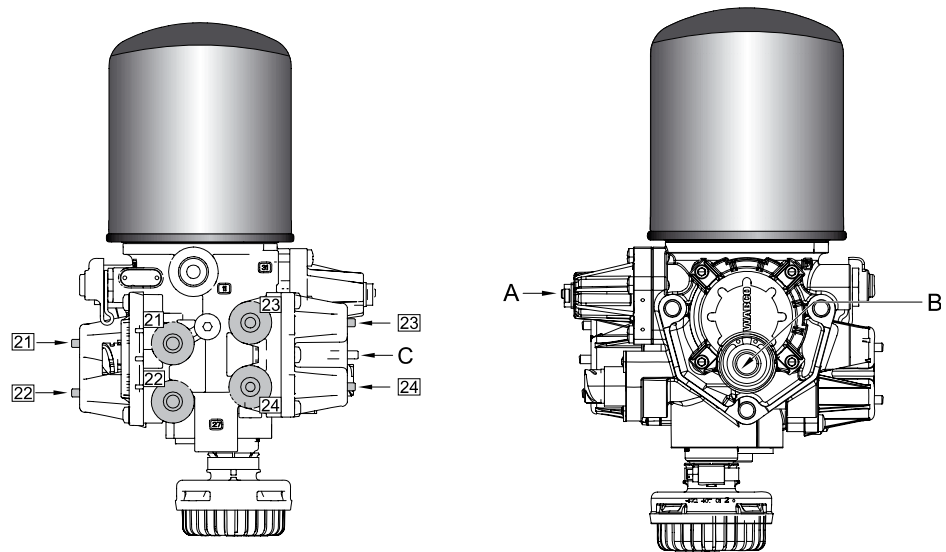


Fig. 6 Description of adjustment screws

## 4.4 Carrying out the test

- Perform the following test sequence in the specified order.  
Supply pressure is 12 bar max.

**!** Please only adjust an unpressurized device.


### 4.4.1 Test Sequence for Multi-Circuit Protection Valve

| POS.                               | SEQUENCE  | BRAKE CIRCUITS 1 & 2   |        |        | TRAILER          | AUXILIARY EQUIPMENT | REMARKS  |
|------------------------------------|---|--|--------|--------|------------------|---------------------|--|
|                                    |   | G1   | G4     | G5     | G6               | G7                  |  |
| <b>1 Filling process</b>           |   |  |        |        |                  |                     |  |
|                                    | Open S1<br>Close S1   | 10.0   | ~ 10.0 | ~ 10.0 | ~ 8.5            | ~ 8.5               | Perform item 2 - 3 times.  |
| <b>2 Pressure limitation</b>       |   |  |        |        |                  |                     |  |
|                                    | Open S1.<br>Open S6.<br>Close S6.   | 10.0<br>10.0   | >0     | >0     | >0<br>8.5 -0.1   | >0<br>8.5 -0.1      | Record only maximum values.<br>Use <i>adjustment screw C</i> over pressure limiting valve to adjust, repeat until ok.<br><i>Adjustment screw C, see „Fig. 6 Description of adjustment screws“, page 11.</i>  |
| <b>3 Opening pressures</b>         |   |  |        |        |                  |                     |  |
|                                    | Open S1.<br><br>Open S5.<br>Close S5.<br>Open S4.<br>Close S4.<br>Open S6.<br>Close S6.<br>Open S7.<br>Close S7.<br>Close S1. | 10.0<br><br><i>Circuit 2</i><br><i>Circuit 1</i><br><br><br><br><br><br>10.0 |        |        | <i>Circuit 4</i> | <i>Circuit 3</i>    | <i>Values „Opening Pressure“, see „4.5 Test Values (according to outline drawings)“, page 14.</i><br><br>Use <i>screw 22</i> to adjust.<br><br>Use <i>screw 21</i> to adjust.<br><br>Use <i>screw 24</i> to adjust.<br><br>Use <i>screw 23</i> to adjust.<br><br><i>Adjustment screws, see „Fig. 6 Description of adjustment screws“, page 11.</i> |
| <b>4 Leakage test total device</b> |   |  |        |        |                  |                     |  |
|                                    | Open S1.<br>Close S1.<br>Open S4 - S7.  | 10,0<br>0  | 0      | 0      | 0                | 0                   | <b>⚠ CAUTION</b><br><b>Danger of accidents</b><br>A leaky test specimen can adversely affect the vehicle's function.<br><ul style="list-style-type: none"> <li>– Check the test specimen with a suitable leak detector.</li> <li>– Only install seal-tight devices into the vehicle.</li> </ul>  |

## 4.4.2 Test Sequence for Air Dryer

| POS. | SEQUENCE   | G1                                     | G4  | REMARKS   |
|------|--|--|---|---|
| 1    | Open S1.<br>Close S1.  | 12.6 ±0.2<br>No drop pressure allowed. |   | <p><b>⚠ CAUTION</b><br/> <b>Danger of accidents</b><br/>                     A leaky test specimen can adversely affect the vehicle's function.</p> <ul style="list-style-type: none"> <li>– Check the test specimen with a suitable leak detector.</li> <li>– Only install seal-tight devices into the vehicle.</li> </ul> <p>Tightness test of the purge valve.</p>   |
| 2    | Adjust switch-off ( $p_{off}$ ) pressure with screw A.                       |  | $p_{off} = \text{Value „Cut Out“}$          | <p>When reaching switch-off (<math>p_{off}</math>) pressure, sudden air-expulsion out of exhaust 3 and pressure drop at G1.<br/>                     Adjust screw A to reach specified value.<br/>                     Adjustment screw A, see „Fig. 6 Description of adjustment screws“, page 11.<br/>                     Value „Cut Out“, see „4.5 Test Values (according to outline drawings)“, page 14.</p>  |
| 3    | Open S7 for 2 - 3 seconds.<br>Close S7.                                      |  |   | Repeat operations 5 times via fast switching of unloader.   |
| 4    | Check switch-off pressure.   | <0.7                                   | $p_{off} = \text{Value „Cut Out“}$          | <p>Air- expulsion out of exhaust 3.<br/>                     Abrupt pressure decrease at G1.<br/>                     Measure backpressure at G1.<br/>                     Value „Cut Out“, see „4.5 Test Values (according to outline drawings)“, page 14.</p>   |
| 5    | Open S7 slowly.<br>Check $\Delta p$ .  |  | $\Delta p = \text{Value „Operating Range“}$ | <p><math>\Delta p = p_{off} - p_{on}</math><br/>                     Air-expulsion out of exhaust 3.<br/>                     Sudden stop, when switch-on pressure (<math>p_{on}</math>) is reached.<br/>                     Value „Operating Range, see „4.5 Test Values (according to outline drawings)“, page 14.</p>   |
| 6    | Check of internal leakages (after pressure drop at G4 through regeneration). |  | No drop pressure allowed.                   | <p>Device is in off-load phase.</p> <p><b>⚠ CAUTION</b><br/> <b>Danger of accidents</b><br/>                     A leaky test specimen can adversely affect the vehicle's function.</p> <ul style="list-style-type: none"> <li>– Check the test specimen with a suitable leak detector.</li> <li>– Only install seal-tight devices into the vehicle.</li> </ul> <p>Check port 4 for porosity (external &amp; internal leakages).<br/>                     Check leakage of non-return valve and governor valve assembly .</p> |
| 7    | Open S7 slowly.<br>Close S7.   |  | $\Delta p = \text{Value „Operating Range“}$ | <p>Check again operating range.<br/> <math>\Delta p = p_{off} - p_{on}</math><br/>                     Value „Operating range“, see „4.5 Test Values (according to outline drawings)“, page 14.</p>   |

| POS. | SEQUENCE  | G1 | G4  | REMARKS  |
|------|-----------|----|---|--|
| 8    | Open S7.  |    | Pressure drop around<br>$\Delta p_{reg} = \text{Value „Back Flow“}$ | Check $\Delta p_{REG}$ value.<br>If not achieving the $\Delta p_{REG}$ value, adjust <i>screw B</i> and repeat from position 6.<br><i>Adjustment screw B, see „Fig. 6 Description of adjustment screws“, page 11.</i><br><i>Value „Back Flow“, see „4.5 Test Values (according to outline drawings)“, page 14.</i> |
| 9    | Close S7. |    | Pressure drop around<br>$\Delta p_{reg} = \text{Value „Back Flow“}$ | <i>Value „Back Flow“, see „4.5 Test Values (according to outline drawings)“, page 14.</i><br>If achieving the $\Delta p_{reg}$ value, push cap in.   |

|  |  |
|--|--|
|  <b>WARNING</b> | <p><b>Danger of accidents</b><br/>A faulty test specimen can adversely affect the vehicle's function.</p> <ul style="list-style-type: none"> <li>– Check complete system for its proper function after any replacement or any repair.</li> <li>– Test-drive vehicle after any equipment installation into it.</li> </ul> |
|--|--|

## 4.5 Test Values (according to outline drawings)

| C-APU VARIANTS | CUT OUT<br>$p_{off}$ | OPERATING RANGE<br>$\Delta p$ | BACK FLOW +/-0.5 BAR<br>$\Delta p_{reg}$ |
|----------------|----------------------|-------------------------------|--|
| 932 501 002 0  | 10.0 +/-0.2          | 1.0 +0.7                      | 0.5 xOR                                  |
| 932 501 003 0  | 8.3 +/-0.2           | 0.6 +0.6                      | 0.55 xOR                                 |
| 932 501 004 0  | 10.5 +/-0.2          | 0.9 +0.6                      | 0.4 xOR                                  |
| 932 501 005 0  | 11.0 -0.4            | 0.7 +0.6                      | 0.55 xOR                                 |
| 932 501 006 0  | 8.3 +/-0.2           | 0.6 +0.6                      | 0.4 xOR                                  |

| C-APU VARIANTS | OPENING PRESSURE |           |           |           |
|----------------|------------------|-----------|-----------|-----------|
|                | CIRCUIT 1        | CIRCUIT 2 | CIRCUIT 3 | CIRCUIT 4 |
| 932 501 002 0  | 6.9 - 0.3        | 6.9 - 0.3 | 7.2 - 0.3 | 7.2 - 0.3 |
| 932 501 003 0  | 6.5 - 0.3        | 6.5 - 0.3 | 7.2 - 0.3 | 6.5 - 0.3 |
| 932 501 004 0  | 7.0 - 0.3        | 7.0 - 0.3 | 7.0 - 0.3 | 7.0 - 0.3 |
| 932 501 005 0  | 6.9 - 0.3        | 6.9 - 0.3 | 7.0 - 0.3 | 6.9 - 0.3 |
| 932 501 006 0  | 6.9 - 0.3        | 6.9 - 0.3 | 7.2 - 0.3 | 6.9 - 0.3 |





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