

Explanation of symbols

WARNING


Potential hazard situation which can cause serious personal injury or death if the safety instruction is not observed.

CAUTION


Potential hazard situations that can cause minor or moderate personal injury if the safety instruction is not observed.

CAUTION

Potential hazard situations that can cause material loss if the safety instruction is not observed.

 Important instructions, information or tips that you should always observe.

- List
- Step

 Carefully read through all the safety information before starting the test.



General safety instructions

- Only specialised personnel with specific system knowledge are authorised to carry out tests on the device.
- Always comply with the company and national accident prevention/health & safety regulations.
- Always wear the required protective clothing such as protective footwear, protective goggles, etc.
- Do not install a repaired device in the vehicle unless it has passed the following tests.
- Never install a leaking or damaged device on the vehicle. This could cause an accident.

Equipment/tools required

- Test bench 435 197 000 0 or adequate testing equipment
- Test hoses
- Test Hose 452 600 003 0
- Matching test ports
- Clamping angle 899 709 035 2
- Soapsuds and brush
- Threadlocking adhesive 852 003 390 4

Setting the pilot control

- Hexagonal key, size 2.5 mm
- Size 19 open end wrench
- Load-Sensing Valve Adjuster 899 709 109 2

Additional documents required

- Test Bench 435 197 000 0 - Operating Instructions
- General Repair and Test Information 820 001 074 3
- Outline Drawings




The documents are available on the WABCO website <http://www.wabco-auto.com> - simply enter the product or document number in INFORM.

Hints for testing

- While testing the device always observe the test instruction
- Only start testing after you have read and understood all information required for testing.
- Test the device only on a calibrated test bench.
- In case of doubt, use test values specified by the vehicle manufacturer.
- Perform the following test steps in the specified order.

Preparations

1 – Place device on workbench.

CAUTION **Danger of injury due to the device falling**
 Ensure that the device cannot roll or drop off the workbench. Otherwise your feet could be injured.

External evaluation

2 – Inspect device for external damage.


3 – Check all ports of the device for contamination by carrying out a visual inspection.

Preparations

4 – Secure device on suitable holding appliance.
 – Clamp the clamping angle of the device in the vice.

CAUTION **Damage to the device by vice**
 Never directly clamp the device in the vice. This could damage the device.

5 – Connect device to test bench 435 197 000 0 or adequate test facility (see testing diagram).

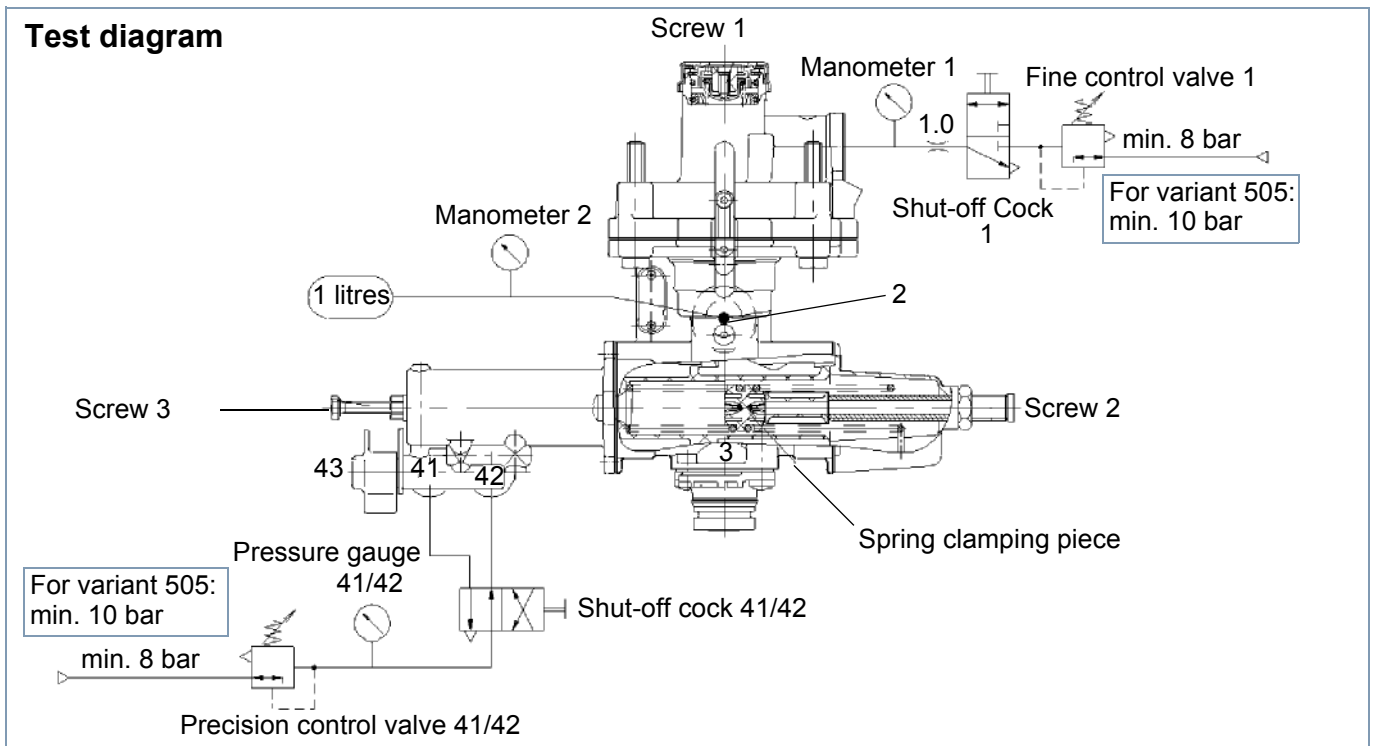
CAUTION **Danger of injury due to hose coming loose, possibly with a loud bang**
 Make sure that plug-in connections on the test bench / testing equipment and on the device are safely plugged. A hose that comes loose may cause injury.

! For the relevant supply pressure, refer to proposal drawing.

! **Test Bench 435 197 000 0:** Ensure that the stopcocks are in a correct normal position.

Normal position of stopcocks on the test bench 435 197 000 0


Shut-off cocks	R	B	C	F	L	V	2	3	4	6	7	11	12	21	22
on						x						x			
off	x	x	x	x			x	x	x	x	x		x	x	x



Testing


- ! Please refer to the table "Test Values" at the end to the test instructions for test values for the respective variant.

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
1	Connect device according to diagram.	0	0	0	
2	Open <i>cut-off cock 1</i> . Pressurize and vent the device a number of times via <i>precision control valve 1</i> and <i>precision control valve 41/42</i> .	V2a	V2b	-	
3.1	Increase pressure with <i>precision control valve 41/42</i> and <i>precision control valve 1</i> .	V3.1a	0.5	-	<i>Cover connections 41 and 43</i> with soap suds. Permissible leakage: 8 cm ³ / min
3.2	Increase pressure with <i>precision control valve 1</i> .	V3.2a	V3.2b		
3.3	Reduce pressure with <i>precision control valve 1</i> and <i>precision control valve 41/42</i> .	0	0	0	
4	! Adjust screw 3 only when device is pressureless. Change length 3 of screw 3 and vent device with <i>precision control valve 1</i> until the lowest value is reached at pressure gauge 2. Length 3 ≈ 20 mm. Reduce pressure with <i>precision control valve 1</i> to 0 bar.	0	V4b	-	
5	Setting the pilot stage				Test value pressure gauge 2 is not reached. Close <i>cut-off cock 1</i> . Correct adjustment at screw 1 (pilot stage) stage. Open <i>cut-off cock 1</i> . Repeat test step 5. Secure screw with threadlocking adhesive (852 003 390 4) when the piston 475 710 621 4 is inserted.
5.1	Increase pressure via <i>precision control valve 1</i> .	0	1.4	P5.1	

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
6	Setting the characteristic curve				
6.1	Unladen position Lower pressure with <i>precision control valve 1</i> .	0	0	0	
6.2	 Adjust screw 3 only when device is pressureless. Adjust pressure at pressure gauge 2 with screw 3. (Screw in and counter screw 3). Increase pressure with <i>precision control valve 1</i> .	0	V6.2b	P6.2	
6.3	Lower pressure with <i>precision control valve 1</i> .	0	0	0	
6.4	Increase pressure with <i>precision control valve 41/42</i> .	V6.4a	0	0	
6.5	Increase pressure with <i>precision control valve 1</i> .	V6.5a	V6.5b	P6.5	If the test value is not reached, adjust <i>precision control valve 1</i> and <i>precision control valve 41/42</i> to 0 bar. If pressure gauge 2 too large, screw in screw 2. If pressure gauge 2 too small, unscrew screw 2. Repeat test steps 6.4 and 6.5.
6.6	Lower pressure with <i>precision control valve 1</i> .	V6.6a	0	0	
6.7	Fully laden position Increase pressure with <i>precision control valve 41/42</i> .	V6.7a	-	-	


Test instruction for Automatic Load Sensing Valve

475 714 ... 0

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
6.8	Increase pressure with <i>precision control valve 1</i> .	V6.8a	V6.8b	P6.8	<p>If the test value is not reached, determine Δp (difference between desired and actual value) and decrease <i>precision control valve 1</i> and <i>precision control valve 41/42</i> to 0 bar.</p> <p>If pressure gauge 2 too low:</p> <p>a) Unscrew screw 2 ($\Delta p = 0.1 \text{ bar} \hat{=} 3 \text{ mm}$)</p> <p>b) Unscrew clamping piece and repeat test steps 6.4 and 6.5. Repeat process b until test value 6.5 is reached. Then repeat test steps 6.6 to 6.8.</p> <p>If pressure gauge 2 too high:</p> <p>c) Unscrew screw 2 ($\Delta p = 0.1 \text{ bar} \hat{=} 3 \text{ mm}$)</p> <p>d) Screw in clamping piece and repeat test steps 6.4 and 6.5 until test value 6.5 is reached. Then repeat test steps 6.6 to 6.8.</p>
6.9	Lower pressure with <i>precision control valve 41/42</i> .	V6.9a	-	-	
6.10	Increase pressure with <i>precision control valve 1</i> .	V6.10a	V6.10b	P6.10	Pressure drop at pressure gauge 2 when compared with test step 6.8
6.11	Lower pressure with <i>precision control valve 1</i> .	V6.11a	0	0	
6.12	<p>Actuate test port 43 via test hose 452 600 003 0.</p> <p>CAUTION Danger of injury through wing nut</p> <p></p> <p>Fingers may be squashed in the process of screwing in the test hose.</p>	V6.12a	0	P6.12	Venting test connection 42!

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
6.13	Increase pressure with <i>precision control valve 1</i> .	V6.13a	V6.13b	P6.13	Test value of 6.2 must be reached. Permissible leakage on test hose 43: 8 cm ³ /min
6.14	Reduce pressure with <i>precision control valve 1</i> and <i>precision control valve 41/42</i> . Remove test connection.	0	0	0	Piston is pushed out (initial position).
7	Test of grading and characteristic curve				
7.1	Connect <i>connection 41</i> with <i>precision control valve 41/42</i> via <i>shut-off cock 41/42</i> .	0	0	0	
7.2	Increase pressure with <i>precision control valve 41/42</i> .	V7.2a	0	0	
7.3	Increase pressure with <i>precision control valve 1</i> .	V7.3a	0.3	≥0.1	
7.4	Increase pressure with <i>precision control valve 1</i> .	V7.4a	1.5 > 1.5	-	Test grading. Pressure stages on pressure gauge 2 ≤ 0.2 bar
7.5	Increase pressure with <i>precision control valve 1</i> .	V7.5a	5 > 5	-	Pressure gauge 2 must follow immediately. Test grading. Pressure stages on pressure gauge 2 ≤ 0.2 bar.
7.6	Increase pressure with <i>precision control valve 1</i> .	V7.6a	V7.6b	P7.6	(test value 6.5) Check device (including separation joints) for tightness. Permissible leakage: 8 cm ³ /min
7.6.1	Connect <i>connection 41</i> with <i>precision control valve 42/42</i> via <i>shut-off cock 41/42</i> . Check device for tightness. Reconnect <i>connection 41</i> with <i>precision control valve 41/42</i> .	V7.6.1a			Check device (including separation joints) for tightness. Permissible leakage: 8 cm ³ /min
7.7	Lower pressure with <i>precision control valve 1</i> .	V7.7a	0	0	

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
7.8	Increase pressure with <i>precision control valve 41/42</i> .	V7.8a	-	-	
7.9	Increase pressure with <i>precision control valve 1</i> .	V7.9a	V7.9b	P7.9	(test value 6.8)
7.10	Lower pressure with <i>precision control valve 1</i> .	V7.10a	0	0	
7.11	Increase pressure with <i>precision control valve 41/42</i> .	V7.11a	-	-	
7.12	Increase pressure with <i>precision control valve 1</i> .	V7.12a	V7.12b	-	Check device for tightness. Permissible leakage: 8 cm ³ /min
7.13	Lower pressure with <i>precision control valve 1</i> .	V7.13a	0	0	
7.14	Lower pressure with <i>precision control valve 41/42</i> .	V7.14a	-	-	
7.15	Increase pressure with <i>precision control valve 1</i> .	V7.15a	V7.15b	P7.15	(test value 6.10)
7.16	Lower pressure with <i>precision control valve 1</i> .	V7.16a	0	0	
7.17	Actuate test port 43 with test hose 452 600 003 0.	V7.17a	0	0	Venting test connection 41.
7.18	Increase pressure with <i>precision control valve 1</i> .	V7.18a	V7.18b	P7.18	Test value 6.2 must be reached. Permissible leakage on test hose 43: 8 cm ³ /min
7.19	Adjust <i>precision control valve</i> and <i>precision control valve 41/42</i> to 0 bar. Adjust shut-off cock 41/42 and test connection to the original position.	0	0	0	
8	Test of the tappet clamping				
8.1	Increase pressure with <i>precision control valve 41/42</i> .	V8.1a	-	-	
8.2	Increase pressure with <i>precision control valve 1</i> .	V8.2a	2	≈ 1.4	
8.3	Lower pressure with <i>precision control valve 41/42</i> .	0	2	=>	Pressure drop against no. 8.2 max. 0.1 bar in 10 s.

No.	Test step	Default value		Test value	Comment
		Manometers 41/42 (bar)	Manometer 1 (bar)	Manometer 2 (bar)	
8.4	Increase pressure with <i>precision control valve 41/42</i> .	V8.4a	2	=>	Pressure increase against no. 8.2 max. 0.3 bar in 10 s.
8.5	<p>Adjust <i>precision control valve</i> and <i>precision control valve 41/42</i> to 0 bar.</p> <p>CAUTION  Danger of injury due to hose coming loose, possibly with a loud bang Do not disconnect the hose connections until you have vented the device to 0 bar. Clean device.</p>	0	0	0	

Test instruction for Automatic Load Sensing Valve

475 714 ... 0

	Test values for devices 475 714 ... 0									
	500	501	503	504	505	509	510	511	512	514
V2a	7	7	7	7	7	7	7	7	7	6.5
V2b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
V3.1a	7	7	7	7	7	7	7	7	7	6.5
V3.2a	7	7	7	7	7	7	7	7	7	6.5
V3.2b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
V4b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P5.1	0.7 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}	0.5 ⁰ _{-0.1}	0.5 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}	0.5 ⁰ _{-0.1}	0.7 ⁰ _{-0.1}
V6.2b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P6.2	1.8±0.1	2±0.1	1.95±0.1	2.6±0.1	2±0.1	2.6±0.1	2.4±0.1	2.4±0.1	5±0.1	1.8±0.1
V6.4a	1	0.45	1	1.85	0.85	0.9	0.8	1.1	3.65	0.8
V6.5a	1	0.45	1	1.85	0.85	0.9	0.8	1.1	3.65	0.8
V6.5b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P6.5	2.1±0.1	2.3±0.1	2.3±0.1	3±0.1	2.25±0.1	2.8±0.1	2.75±0.1	2.7±0.1	5.25±0.1	2.1±0.1
V6.6a	1	0.45	1	1.85	0.85	0.9	0.8	1.1	3.65	0.8
V6.7a	3.7	2.7	2.6	3.3	6.6	4.4	3.35	5.7	6.2	4.45
V6.8a	3.7	2.7	2.6	3.3	6.6	4.4	3.35	5.7	6.2	4.45
V6.8b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P6.8	5.7±0.2	6.2±0.2	7.2±0.3	7.2±0.3	6.1±0.3	6.2±0.2	6.2±0.2	6.2±0.2	6.5±0.2	6±0.3
V6.9a	3.3	2.3	2.2	2.9	6	4	2.95	5.2	5.6	3.95
V6.10a	3.3	2.3	2.2	2.9	6	4	2.95	5.2	5.6	3.95
V6.10b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P6.10	<5.7±0.2	<6.2±0.2	<7.2±0.3	<7.2±0.3	<6.1±0.3	<6.2±0.2	<6.2±0.2	<6.2±0.2	<6.5±0.2	<6±0.3
V6.11a	3.3	2.3	2.2	2.9	6	4	2.95	5.2	5.6	3.95
V6.12a	3.3	2.3	2.2	2.9	6	4	2.95	5.2	5.6	3.95
V6.13a	3.3	2.3	2.2	2.9	6	4	2.95	5.2	5.6	3.95
V6.13b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P6.13	1.8±0.1	2±0.1	1.95±0.1	2.6±0.1	2±0.1	2.6±0.1	2.4±0.1	2.4±0.1	5±0.1	1.8±0.1
V7.2a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.3a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8

Table: Test value

	Test values for devices 475 714 ... 0									
	500	501	503	504	505	509	510	511	512	514
V7.4a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.5a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.6a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.6b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P7.6	2.1±0.1	2.3±0.1	2.3±0.1	3±0.1	2.25±0.1	2.8±0.1	2.75±0.1	2.7±0.1	5.25±0.1	2.1±0.1
V7.6.1a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.7a	1	0.45	1	1.85	0.85	0.9	0.65	1.1	3.65	0.8
V7.8a	3.7	2.7	2.6	3.3	6.6	4.4	3.35	5.7	6.2	4.45
V7.9a	3.7	2.7	2.6	3.3	6.6	4.4	3.35	5.7	6.2	4.45
V7.9b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P7.9	5.7±0.2	6.2±0.2	7.2±0.3	7.2±0.3	6.1±0.3	6.2±0.2	6.2±0.2	6.2±0.2	6.5±0.2	6±0.3
V7.10a	3.7	2.7	2.6	3.3	6.6	4.4	3.35	5.7	6.2	4.45
V7.11a	4.1	3	2.8	3.6	7.7	5	3.8	6.3	7.6	5.2
V7.12a	4.1	3	2.8	3.6	7.7	5	3.8	6.3	7.6	5.2
V7.12b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P7.12	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
V7.13a	4.1	3	2.8	3.6	7.7	5	3.8	6.3	7.6	5.2
V7.14a	3.3	2.3	2.2	2.9	2.25	4	2.95	5.2	5.6	3.95
V7.15a	3.3	2.3	2.2	2.9	2.25	4	2.95	5.2	5.6	3.95
V7.15b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P7.15	<5.7±0.2	<6.2±0.2	<7.2±0.3	<7.2±0.3	<6.1±0.3	<6.2±0.2	<6.2±0.2	<6.2±0.2	<6.5±0.2	<6.5±0.3
V7.16a	3.3	2.3	2.2	2.9	2.25	4	2.95	5.2	5.6	3.95
V7.17a	3.3	2.3	2.2	2.9	2.25	4	2.95	5.2	5.6	3.95
V7.18a	3.3	2.3	2.2	2.9	2.25	4	2.95	5.2	5.6	3.95
V7.18b	6	6.5	7.6	7.6	6.5	6.5	6.5	6.5	7	6.5
P7.18	1.8±0.1	2±0.1	1.95±0.1	2.6±0.1	2±0.1	2.6±0.1	2.6±0.1	2.4±0.1	5±0.1	1.8±0.1
V8.1a	2.7	1.9	2	2.75	4.5	3	2.5	3.9	3.5	3.5
V8.2a	2.7	1.9	2	2.75	4.5	3	2.5	3.9	3.5	3.5
V8.4a	6	4.6	3.6	4.5	10	8.1	8.8	10	10	8.6

Table: Test value