REPAIRMANUAL2005-2012

WP SHOCK ABSORBER
4618 BAVP DCC
990 SUPER DUKE
950 SUPERMOTO
950 SUPER ENDURO

REPARATURANLEITUNG

MANUALE DI RIPARAZIONE

MANUEL DE RÉPARATION

MANUAL DE REPARACIÓN

ART.NR.: 3.211.231-E

EXPLANATION - UPDATING

3.211.0125-E Repair Manual WP SHOCK ABSORBER 4618 BAVP

990 SUPERDUKE, 950 SUPERMOTO, 950 SUPER ENDURO

Basicversion Modelyear 2005/06

3/2006

Edition: 3/2006

INTRODUCTION

This repair manual offers extensiv repair-instructions and is an up-to-date version that describes the latest models of the series. However, the right to modifications in the interest of technical improvement is reserved without updating the current issue of this manual.

A description of general working modes common in work shops has not been included. Safety rules common in the work shop have also not been listed. We take it for granted that the repairs are made by qualified profesionally trained mechanics.

Read through the repair manual before beginning with the repair work.

⚠ WARNING ⚠

STRICT COMPLIANCE WITH THESE INSTRUCTIONS IS ESSENTIAL TO AVOID DANGER TO LIFE AND LIMB.

! CAUTION !

NON-COMPLIANCE WITH THESE INSTRUCTIONS CAN LEAD TO DAMAGE OF MOTORCYCLE COMPONENTS OR RENDER MOTORCYCLES UNFIT FOR TRAFFIC !

„NOTE" POINTS OUT USEFUL TIPS.

Use only **ORIGINAL KTM/WP SPARE PARTS** when replacing parts.

The KTM high performance shock absorber is only able to meet user expectations if the maintenance work is performed regularly and professionally.

TÜV MANAGEMENT SERVICE ISO 9001

REG.NO. 12 100 6061

In accordance with the international quality management ISO 9001 standard, KTM uses quality assurance processes that lead to the highest possible product quality.

KTM Sportmotorcycle AG reserves the right to modify any equipment, technical specifications, colors, materials, services offered and rendered, and the like so as to adapt them to local conditions without previous announcement and without giving reasons, or to cancel any of the above items without substituting them with others. It shall be acceptable to stop manufacturing a certain model without previous announcement. In the event of such modifications, please ask your local KTM dealer for information.

KTM Sportmotorcycle AG
5230 Mattighofen, Austria

REPLY FAX FOR REPAIR MANUALS

We have made every effort to make our repair manuals as accurate as possible but it is always possible for a mistake or two to creep in.

To keep improving the quality of our repair manuals, we request mechanics and shop foremen to assist us as follows:

If you find any errors or inaccuracies in one of our repair manual – whether these are technical errors, incorrect or unclear repair procedures, tool problems, missing technical data or torques, inaccurate or incorrect translations or wording, etc. – please enter the error(s) in the table below and fax the completed form to us at 0043/7742/6000/5349.

NOTE to table:
- Enter the complete item no. for the repair manual in column 1 (**e.g.: 3.211.125-E**).
  You will find the number on the cover page or in the left margin on each right page of the manual.
- Enter the corresponding page number in the repair manual (**e.g.: 2-3**) in column 2.
- Enter the current text (inaccurate or incomplete) in column 3 by quoting or describing the respective passage of the text. If your text deviates from the text contained in the repair manual, please write your text in German or English if possible.
- Enter the correct text in column 4.

Your corrections will be reviewed and incorporated in the next issue of our repair manual.

Item no. of repair manual	Page	Current text	Correct text

Additional suggestions, requests or comments on our Repair Manuals (in German or English):

Name mechanic/shop foreman **Company/work shop**

SPECIAL TOOLS 1

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Art.Nr.: 3.211.125-E

T 101S
Mounting tool for spring

T 106
Hook wrench

T 107S
Depth stop

T 125S
Pin wrench

T 132
Loctite 2701

T 145S
Dismounting/Mounting tool

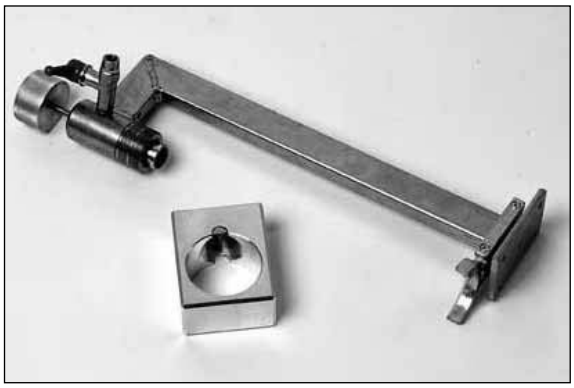
T 146
Dismounting/Mounting tool

T148
Bushing

T 152
Lubricant

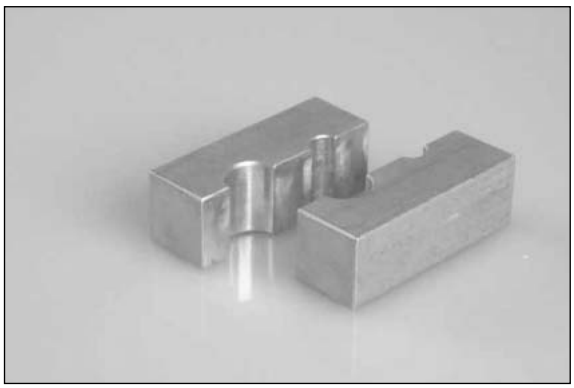
T 158
O-ring grease

T 159
Waterproof grease



T 170S1
Nitrogen filling device

T 625
Lubricant



T 1202S
Clamping block

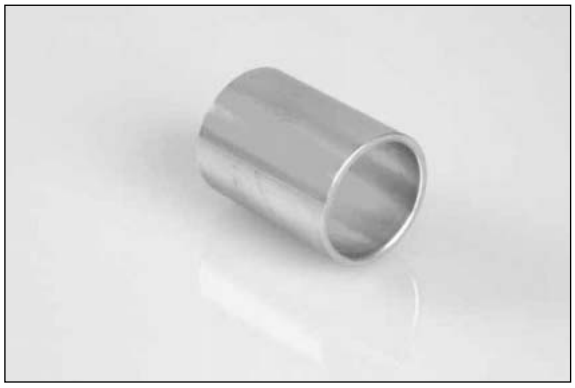
T 1204
Mounting bushing

T 1205
Calibration pin

T 1206
Mounting tool

T 1207S
Dismounting/Mounting tool

T 1208
Dismounting/Mounting tool

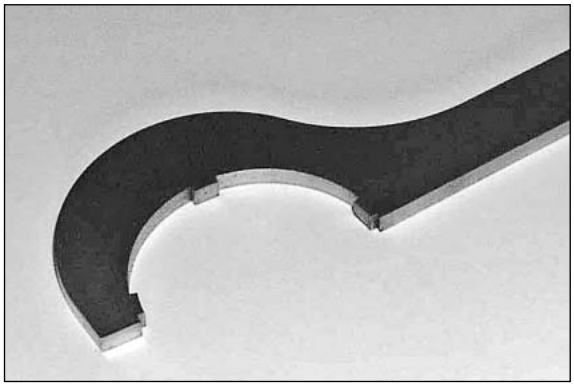


T 1209
Dismounting/Mounting tool

T 1218
Adjusting wrench

T 1240S
Vacuum filling device

T 1515
Protective sleeve



T 1533
Hook wrench

GENERAL INFORMATION 2

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Exploded view 990 Super Duke, 950 Supermoto

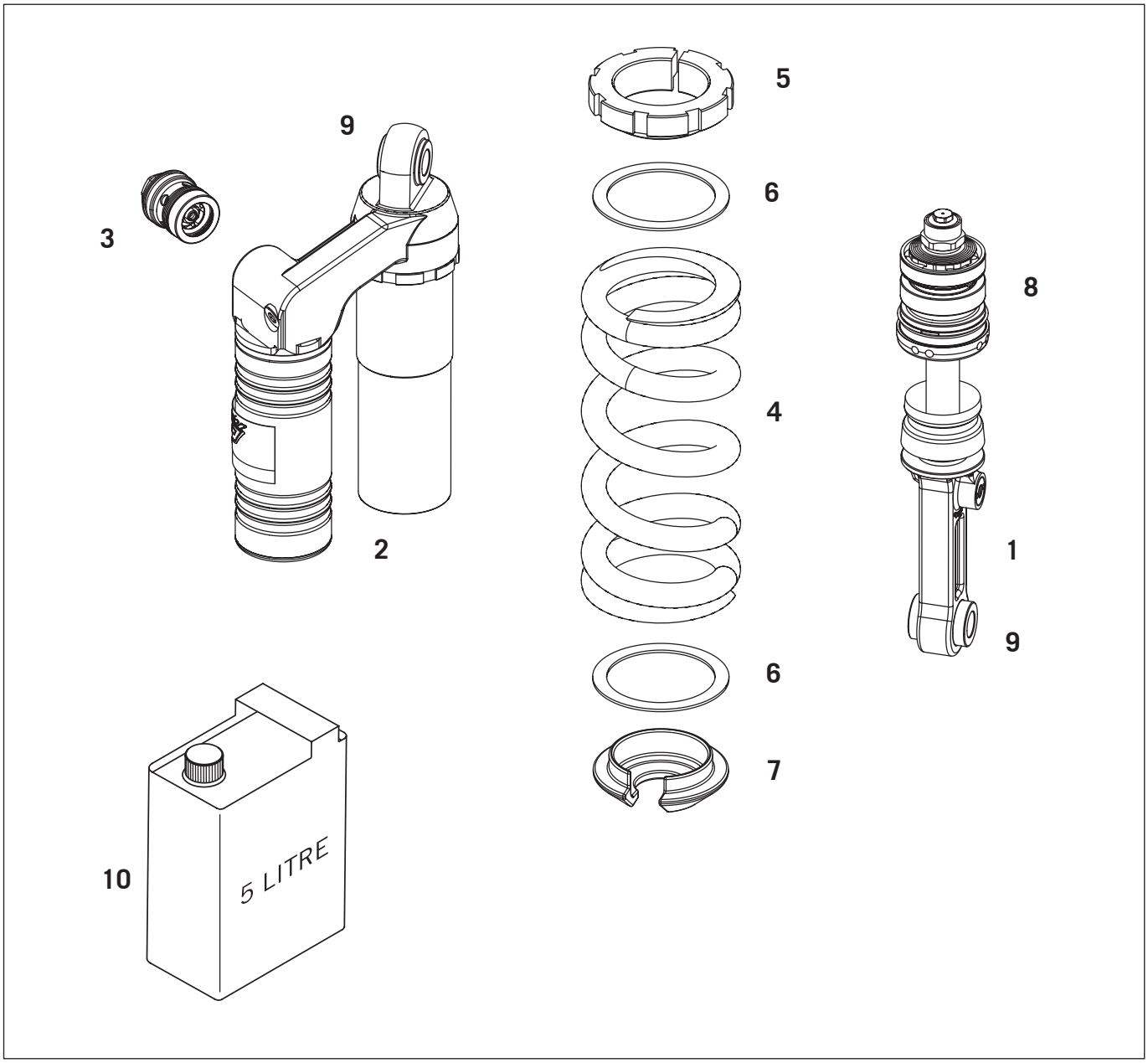
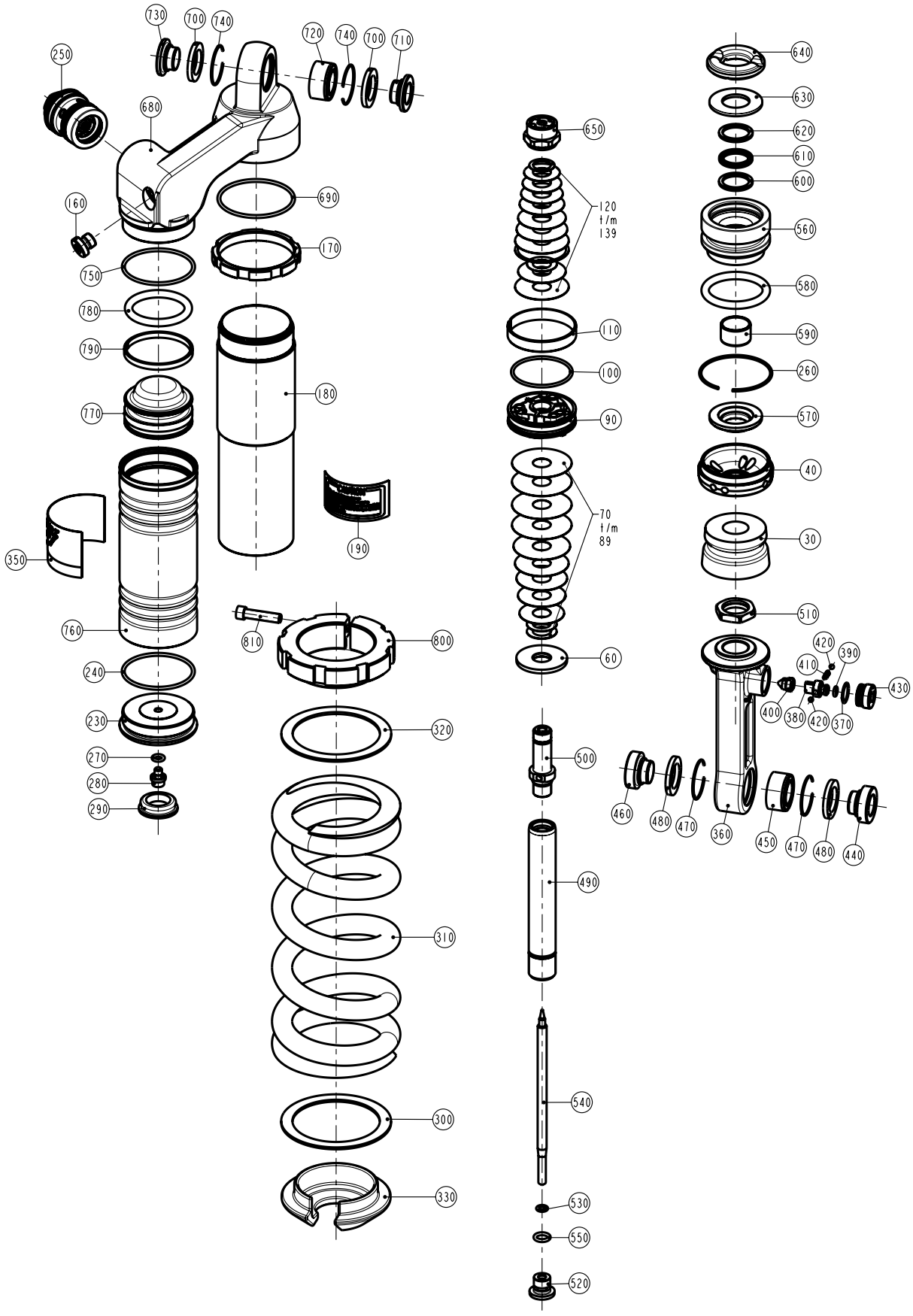
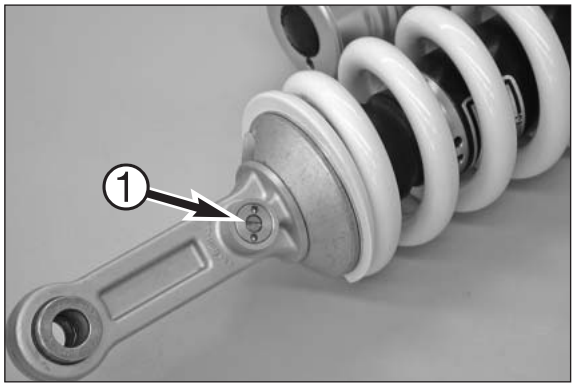


FIG	Designation	Quantity
1	Lower part of shock absorber	1
2	Upper shock absorber case	1
3	DCC compression damping adjustment	1
4	Spring (59 150-185 d13,5) 990 Super Duke	X
4	Spring (59 160-185 d13,5) 990 Super Duke	1
4	Spring (59 170-185 d14) 990 Super Duke	X
4	Spring (59 120-215 d13,0) 950 Supermoto	X
4	Spring (59 130-215 d13,5) 950 Supermoto	1
4	Spring (59 140-215 d13,75) 950 Supermoto	X
5	Adjusting nut (M52x1.5)	1
6	Washer for spring (d58)	2
7	Spring retainer (h=15 d=28)	1
8	Repair kit, seal ring	1
9	Repair kit, suspension	1
10	Shock absorber oil, 5 liters	1

Exploded view 950 Super Enduro

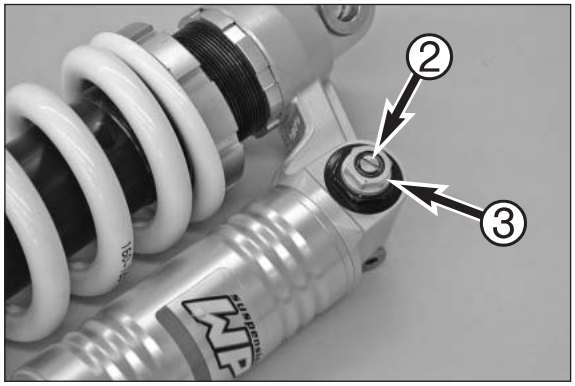


Item	Description
30	Rubber buffer
40	Cover
60	Shim for rebound damping
70	Spacer plate 12x22x0,30
71	Shim 12x26x0,25
72	Shim 12x28x0,25
73	Shim 12x30x0,20
74	Shim 12x32x0,20
75	Shim 12x34x0,20
76	Shim 12x36x0,20
77	Shim 12x38x0,20
78	Shim 12x40x0,25
79	Shim 12x40x0,25
80	Spacer plate 12x30x0,10
81	Shim 12x40x0,20
82	Shim 12x40x0,20
90	Piston
100	O-ring 37,82x1,78
110	Piston ring
120	Shim 12x32x0,25
121	Shim 12x32x0,25
122	Spacer plate 12x24x0,10
123	Shim 12x30x0,25
124	Shim 12x30x0,25
125	Shim 12x28x0,25
126	Shim 12x26x0,25
127	Shim 12x24x0,25
128	Shim 12x20x0,30
129	Spacer plate 12x24x2,5
160	Bleeder screw
170	Lock ring
180	Pipe
190	Sticker “Wp Caution (PDS Ktm)”
230	Reservoir cap
240	O-ring 45x2
250	DCC (dual compression control)
260	Lock ring
270	O-ring 5,28x1,78
280	Plug
290	Rubber cap "Do not open"
300	Spacer
310	Spring
320	Spacer
330	Spring retainer
350	Sticker “WP”
360	Shock absorber mount
370	O-ring 12x1
380	Adjusting screw for rebound
390	O-Ring 4x1,5
400	Adjusting adapter for rebound
410	Spring
420	Steel ball
430	Rebound cap
440	Distance bushing 14x32
450	Bearing
460	Distance bushing 14x32
470	Lock ring
480	Seal ring D=25
490	Piston rod
500	Holder 13,5x40
510	Nut
520	Needle guide
530	O-ring 5x1,5
540	Needle
550	O-ring 7,5x2
560	Adapter
570	Dust boot
580	O-ring 36x5
590	Distance bushing
600	Safety ring 22,55x1,5
610	Quad seal ring 18x2,62
620	Safety ring 22,55x1,5
630	Steel washer 18,5x35,4x2
640	Rebound rubber
650	Piston rod nut
680	Upper shock absorber case
690	O-ring 48x2
700	Seal ring D=25
710	Distance bushing 14x24
720	Bearing
730	Distance bushing 14x24
740	Lock ring
750	O-ring 45x2
760	Reservoir
770	Dividing piston
780	O-ring 35x5
790	Piston ring 3,9x1,5x138
800	Adjusting ring
810	AH screw



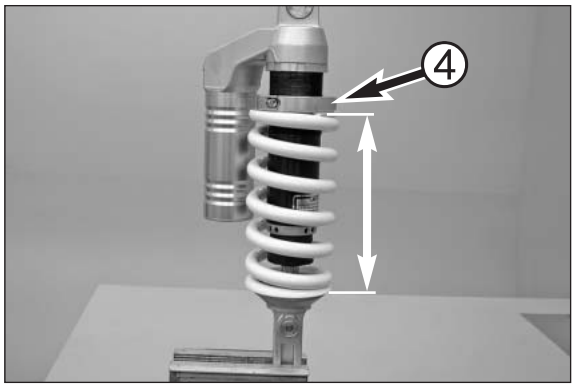
Adjusting the position of the compression and rebound damping

Rebound damping:
- Turn in the adjusting screw ❶ in a clockwise direction all the way to the stop.
- Turn back the respective number of clicks in a counterclockwise direction.



Compression damping, low speed:
- Turn in the adjusting screw ❷ in a clockwise direction all the way to the stop.
- Turn back the respective number of clicks in a counterclockwise direction.

Compression damping, high speed:
- Turn in the adjusting screw ❸ in a clockwise direction all the way to the stop.
- Turn back the respective number of clicks in a counterclockwise direction.



Adjusting the spring preload

NOTE: the spring preload is the difference between the unloaded and preloaded length of the spring.

- Tighten the adjusting nut ❹ with the special tool T106 until you have the prescribed spring preload.
- Tighten the lock screw on the adjusting nut.

DISMOUNTING/MOUNTING THE SHOCK ABSORBER 3

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DISASSEMBLING AND ASSEMBLING THE SHOCK ABSORBER 4

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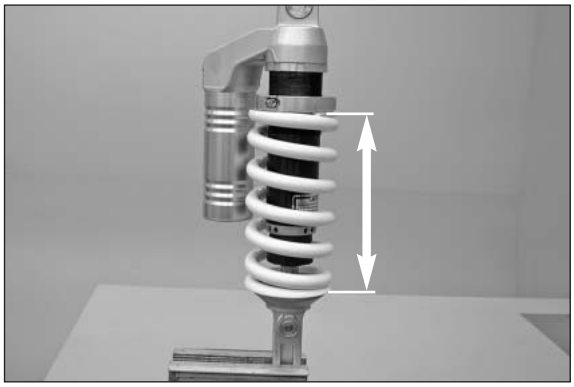
Art.Nr.: 3.211.125-E

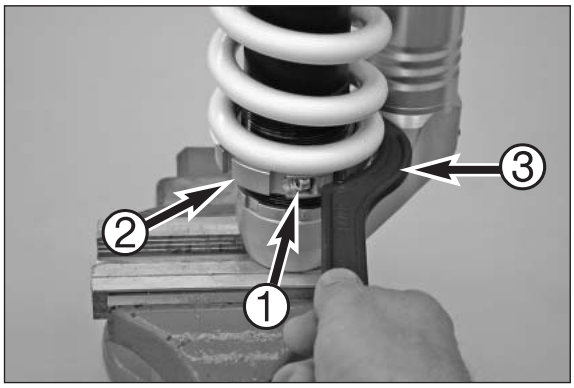


Disassembling the shock absorber

– Write down the spring preload.

– Write down the rebound and compression damping settings, counting the clicks or number of turns while turning in a clockwise direction.

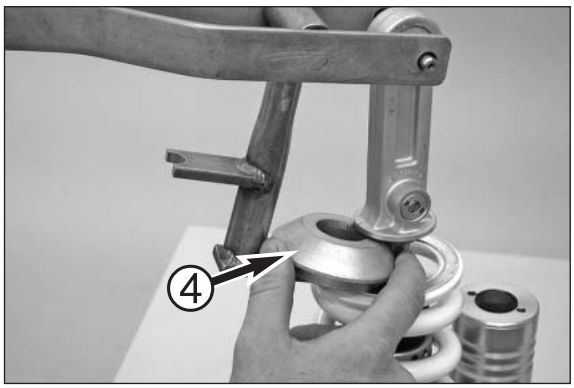
– Unscrew all of the adjusting screws in a counterclockwise direction.



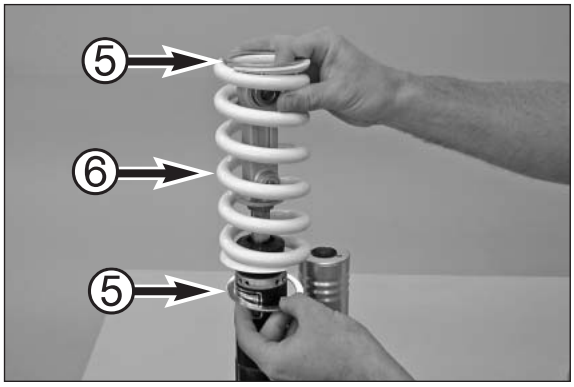
– Clamp the upper part of the shock absorber in a vise as shown in the photo, using protective jaws.

– Loosen the lock screw ❶ (AH 4 mm), loosen the adjusting nut ❷ using the special tool T106 ❸ and relieve the spring.

NOTE: mark the position of the lock screw.



– Press the spring down with the special tool T101S and pull out the spring retainer ❹.



– Remove the washers ❺ and spring ❻.

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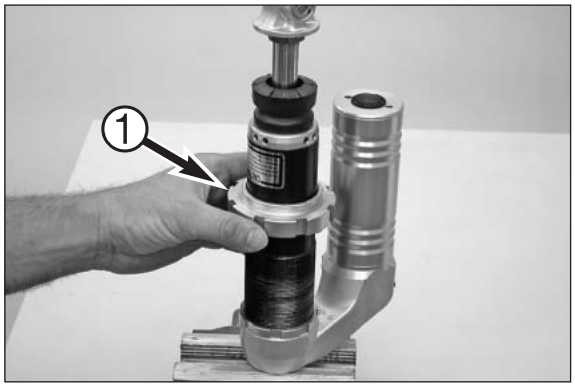
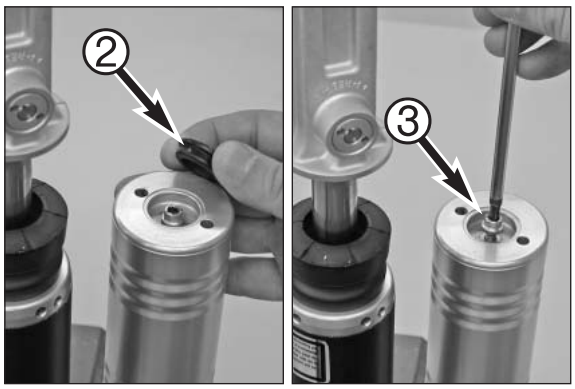
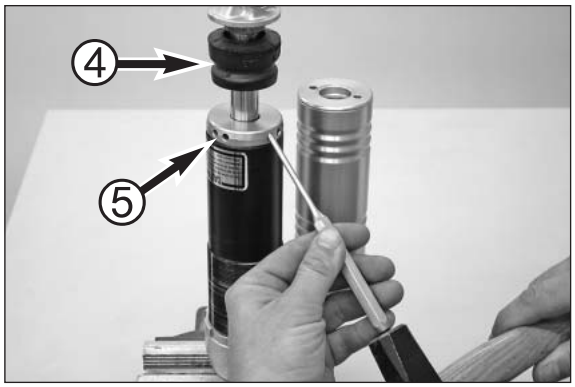


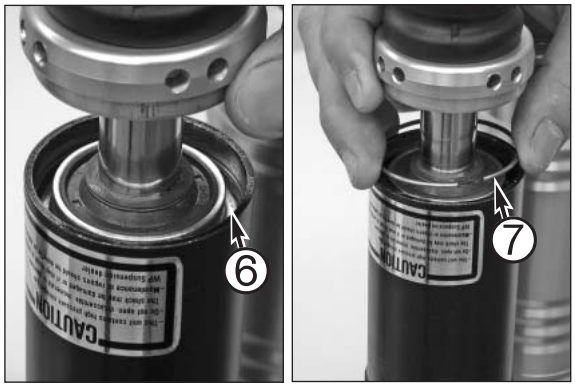
– Remove the adjusting nut ❶.



– Remove the rubber cap ❷ and slowly unscrew the plug ❸ (AH 4 mm) until the nitrogen pressure is reduced, remove the plug.



– Slide the rubber puffer ❹ up.
– Tap the cover ❺ off the pipe with a suitable tool.

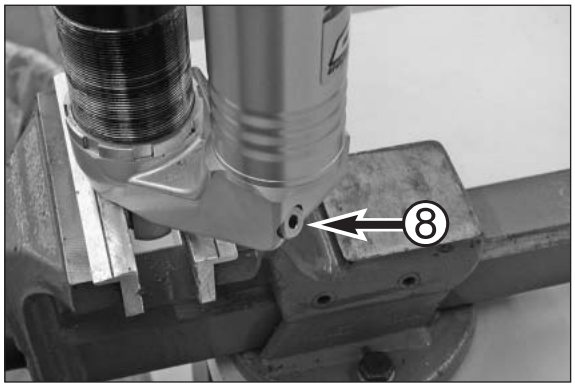


– Press the seal ring support ❻ down (will take some effort!) and remove the lock ring ❼.

NOTE: the lock ring has a scuffed area where you can insert the screwdriver.

! CAUTION !

DO NOT SCRATCH THE INSIDE OF THE PIPE, OTHERWISE THE O-RING WILL BE DAMAGED WHEN ASSEMBLING OR DURING OPERATION.

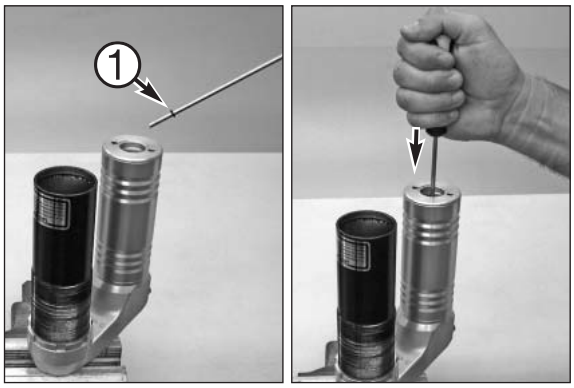


– Loosen the filling screw ❽ 1-2 turns but do not remove.

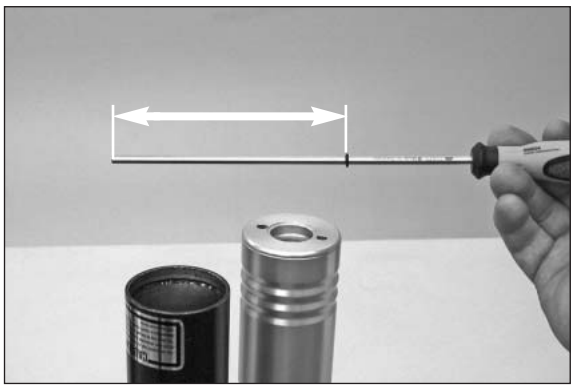
– Vigorously but carefully pull up the piston rod and remove from the shock absorber.

NOTE: if you cannot pull out the piston rod, clamp the shock absorber at the bottom and tap on the compensating tank with a plastic hammer.

– Unclamp the shock absorber and drain the oil into a suitable vessel.

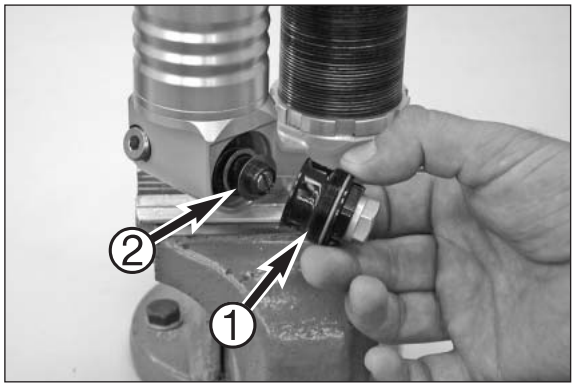


– Clamp the shock absorber again, mount the O-ring on special tool T107S ❶ approx. 20 mm from the end and press the dividing piston all the way down. This will push the O-ring back and will mark the lowest position of the dividing piston.



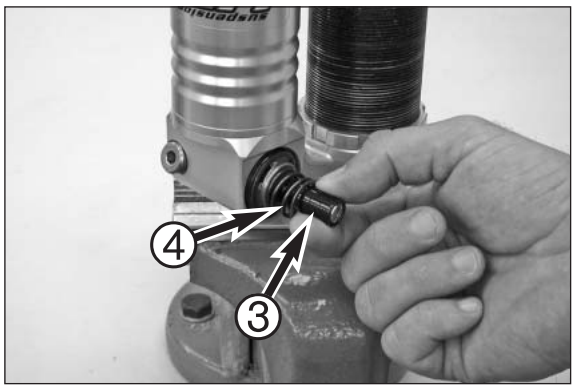
– Measure the distance between the O-ring and the end of the special tool T107S and write it down.

NOTE: you will need this measurement when you fill the shock absorber!

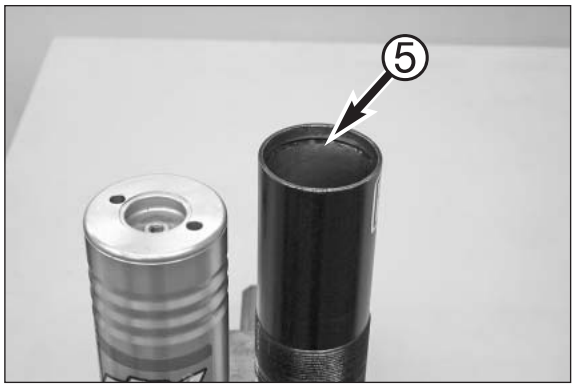


– Unscrew the compression damping adjustment ❶ (A/F 24).

– Remove the washer ❷ from the spring of the compression damping piston, it usually remains in the compression damping adjustment.



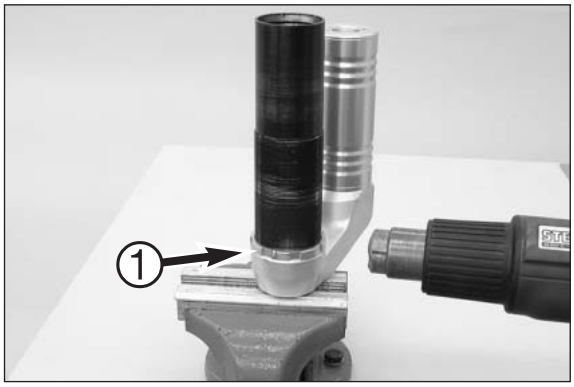
– Remove the compression damping piston ❸ together with the spring ❹.



Checking the components

– Check all components for wear/damage, thoroughly clean all parts and blow dry with compressed air.

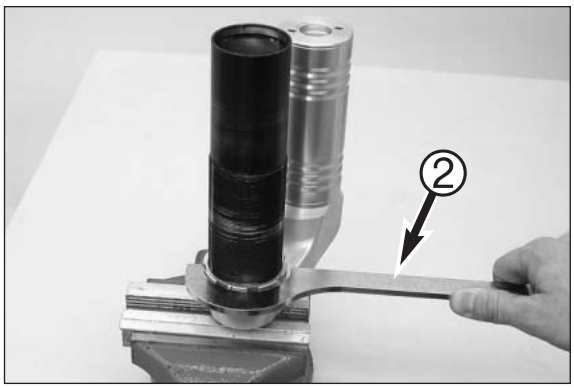
NOTE: make sure the surface of the shock absorber pipe ❺ is not scratched on the inside since this will damage the O-ring.



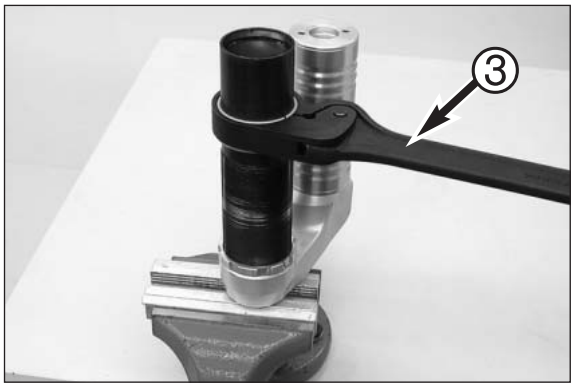
Further disassembly - 950 Super Enduro only

NOTE: further disassembly is not required for 990 Super Duke or 950 Supermoto shock absorbers since they come with assemblies.

– Heat the shock absorber case ❶ around the pipe/lock ring with a hot-air blower.

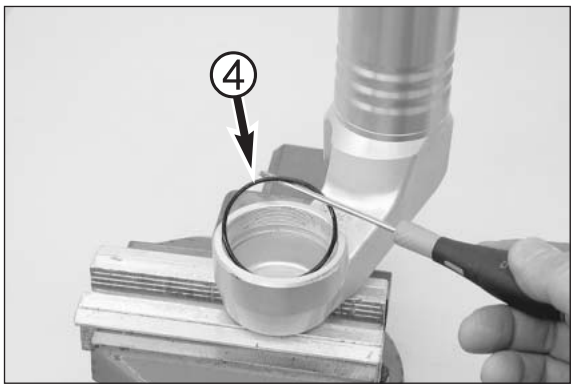


– Loosen the lock ring using T1533 ❷ and turn away from the shock absorber case.



– Use a suitable detergent to remove all grease from the pipe and slip on T146 ❸ with T148.

– Heat the shock absorber case around the pipe with a hot-air blower, loosen the pipe and remove.

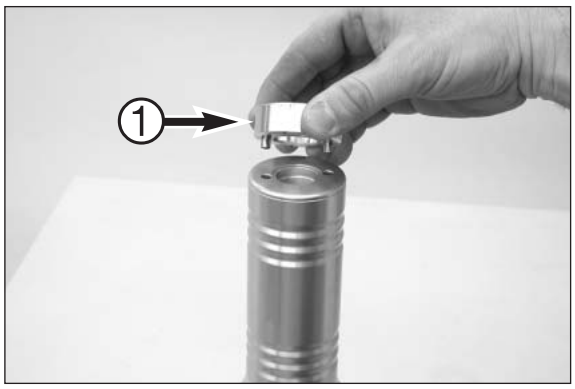


– Remove the O-ring ❹ from the groove and discard.

Disassembling/assembling the reservoir (950 Super Enduro only)

– Heat the reservoir around the shock absorber case and reservoir cap.

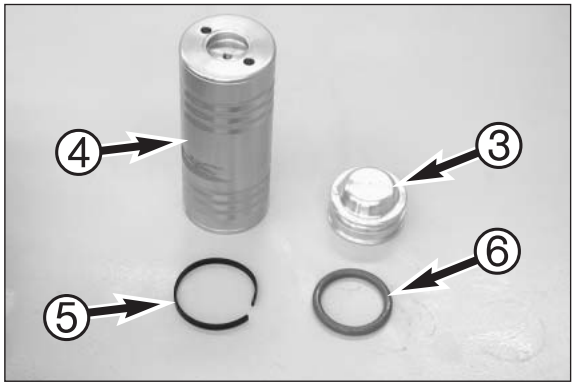
NOTE: only heat the reservoir cap if it is to be removed.



– Place T145S ❶ on the reservoir cap.

– Mount T125S ❷ on T145S and unscrew the reservoir cap or reservoir.

– Remove the O-ring.



– Push the dividing piston ❸ out of the reservoir ❹, remove the piston ring ❺.

– Take the O-ring ❻ out of the groove in the dividing piston.

– Check all parts for damage or wear and replace if necessary.

– Apply T158 to the groove of the dividing piston.

– Mount the O-ring in the groove.

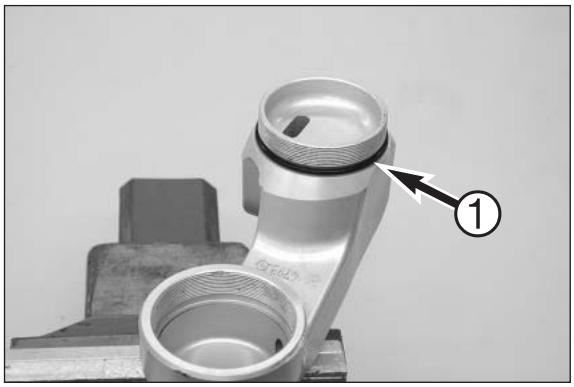
– Lubricate the O-ring with T158.

– Apply a small amount of T158 to the bearing surface of the reservoir.
– Mount the dividing piston.

NOTE: the reservoir has an identification groove that must be mounted facing the shock absorber case.

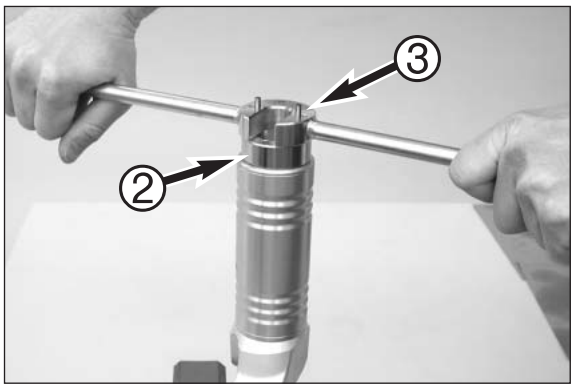
– Slide the dividing piston a little into the reservoir.

– Remove any grease from the reservoir thread.



– Mount a new O-ring ❶ in the groove of the shock absorber case.

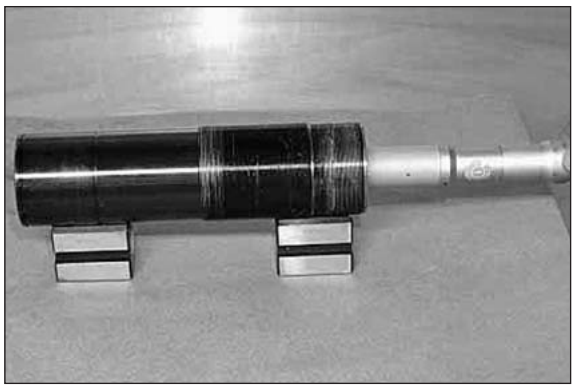
– Apply T132 to the thread of the shock absorber case.



– Screw on the reservoir and tighten with T145S ❷ and T125S ❸.

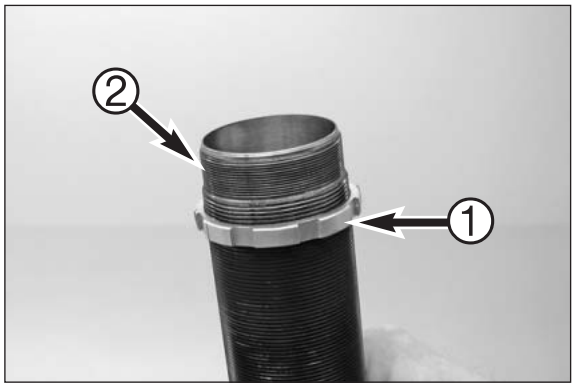
Checking the pipe

– Check the bearing surface of the pipe. If necessary, polish the bearing surface with 600 grit sandpaper.



– Measure the inner diameter at both ends and in the center of the pipe

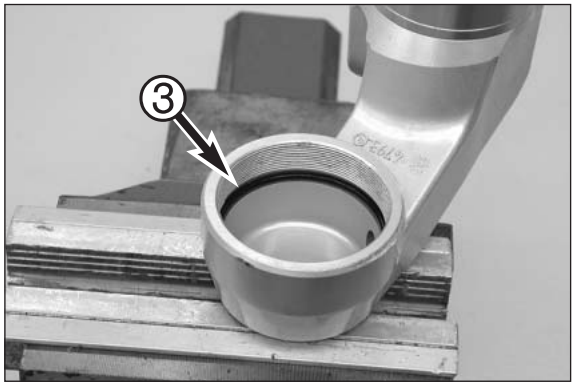
Maximum diameter: 46.10 mm



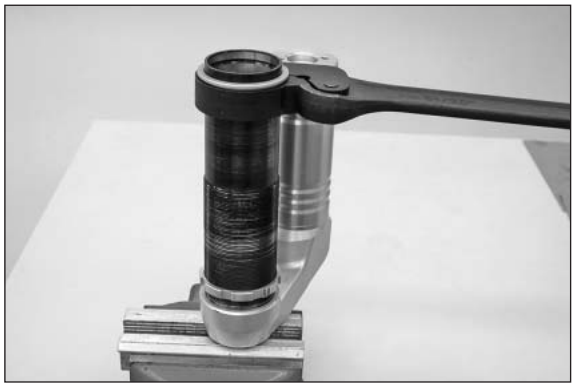
Mounting the pipe

– Screw the lock ring ❶ several turns onto the thread of the pipe.

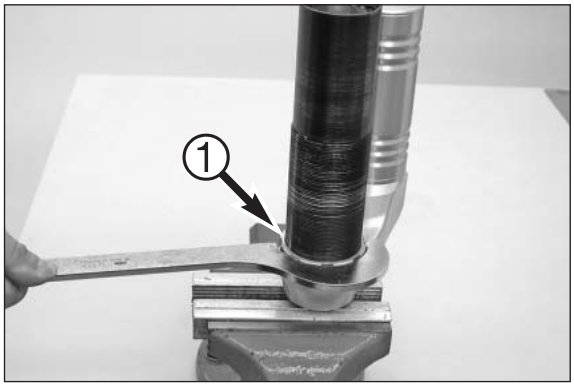
– Apply T132 to the front part of the thread ❷.



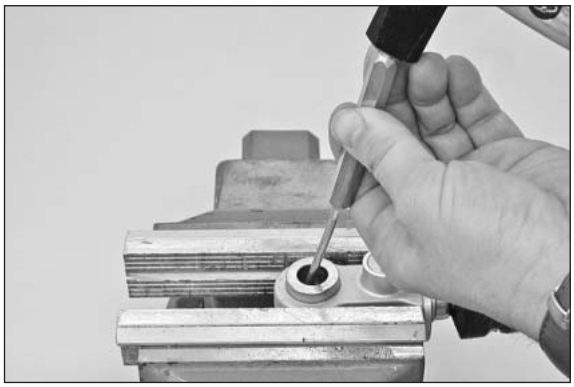
– Grease a new O-ring ❸ and mount in the groove of the shock absorber case.



– Screw the pipe onto the shock absorber case and tighten with T146 and T148.



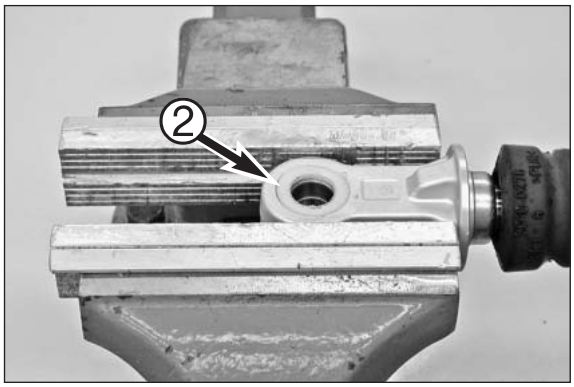
– Turn the lock ring ❶ towards the case and tighten with T1533.



Replacing the heim joint

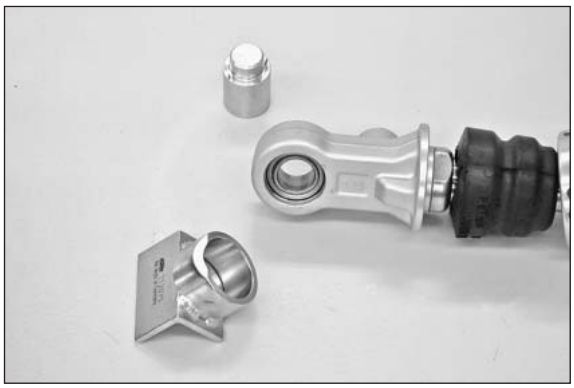
NOTE: instructions on how to replace the heim joint in the piston rod are provided below. Use the same procedure for the heim joint in the shock absorber case.

– Clamp the piston rod in a vise using aluminum protective jaws.
– Use a suitable tool to tap out the distance bushing from the opposite side.

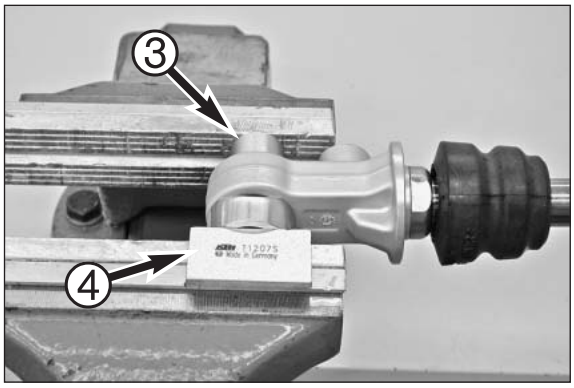


– Turn the piston rod over, remove the seal ring ❷.

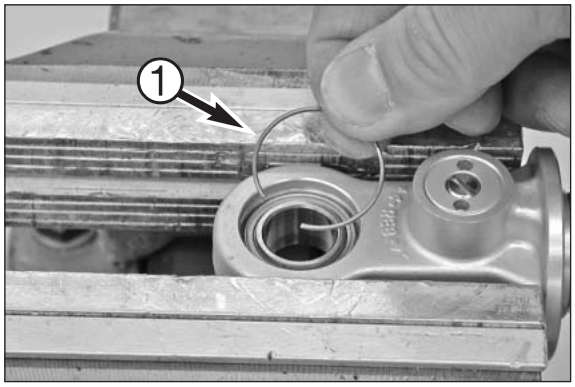
– Tap out the distance bushing on the opposite side and remove the other seal ring.



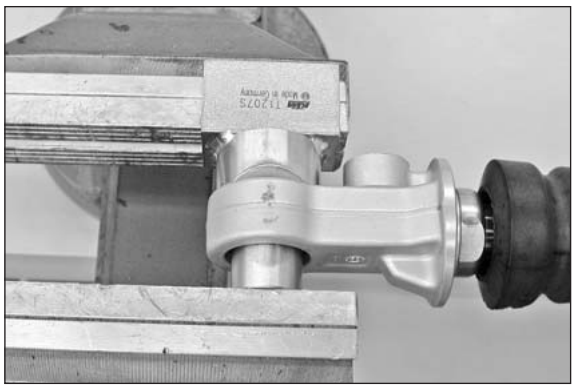
NOTE: usually the lock rings cannot be dismounted due to the position of the heim joint. If you press the heim joint towards one of the lock rings with T1207S, you will be able to remove the other lock ring.



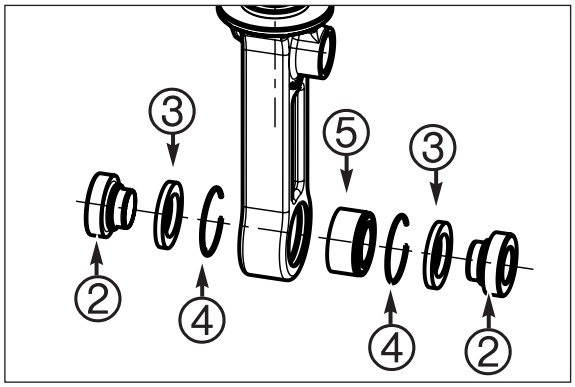
– Insert one side of the punch ❸ on T1207S into the heim joint, apply the pressing sleeve ❹ on T1207S on the opposite side and press with the vise.



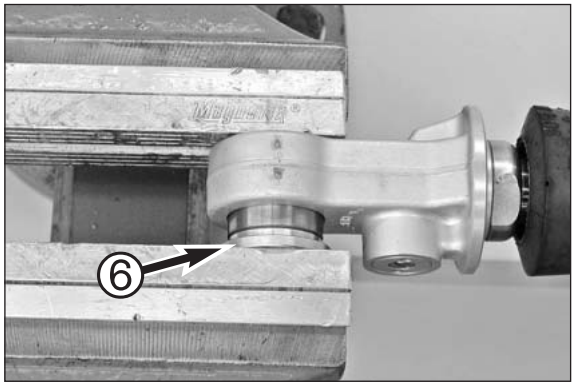
– Reclamp the piston rod, lift the lock ring ❶ out of the groove with a sharp tool (needle) and remove.



– Insert one side of the punch on T1207S into the heim joint, apply the pressing sleeve on T1207S on the other side and press out the heim joint with the vise.



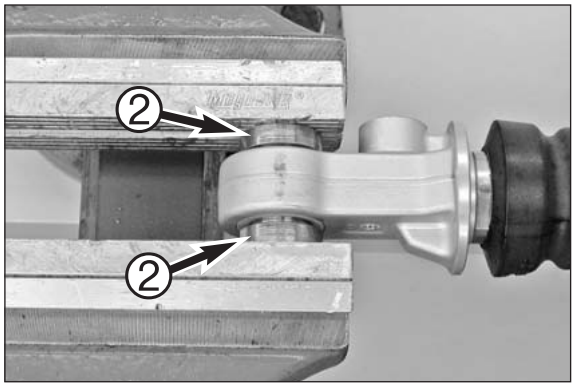
Heim joint components:
– Distance bushing ❷
– Seal ring ❸
– Lock ring ❹
– Heim joint ❺



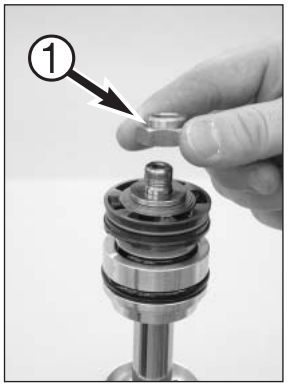
– Insert a new heim joint with the chamfer first in the piston rod and press in all the way to the stop with T1206 ❻.

– Unclamp the piston rod and press in the heim joint with T1207S until it touches the lock ring.

– Remount the lock ring.



– Mount both seal rings, press in both distance bushing ❷ until flush with the vise.

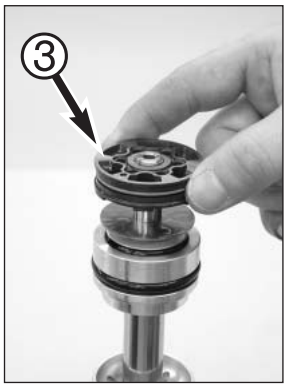


Disassembling the piston rod (950 Super Enduro only)

– Clamp the piston rod in a vise using aluminum protective jaws.
– Loosen the piston rod nut ❶ (A/F 22) and remove.

– Remove the set of shims ❷ for the rebound damping.

NOTE: to prevent the set of shims from falling apart, slide the shims on a screwdriver and set aside.



– Take piston ❸ off the piston rod.

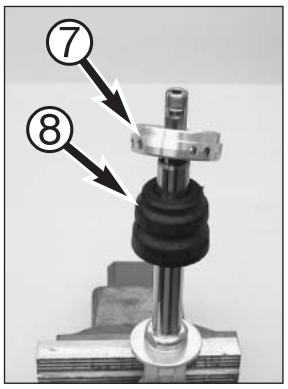
NOTE: individual shims for the compression damping may stick to the bottom of the piston. Remove from the piston but leave them on the piston rod.

– Remove the set of shims ❹ for the compression damping.

NOTE: to prevent the set of shims from falling apart, slide the shims on a screwdriver and set aside.

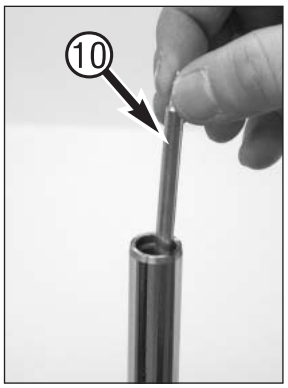
– Remove shim ❺.

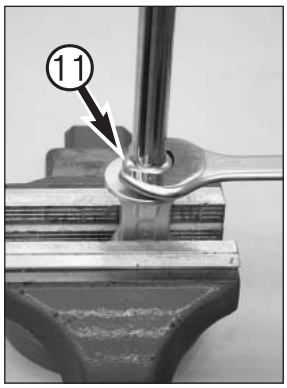
– Remove adapter ❻.



– Remove the cover ❼ and rubber buffer plug ❽.

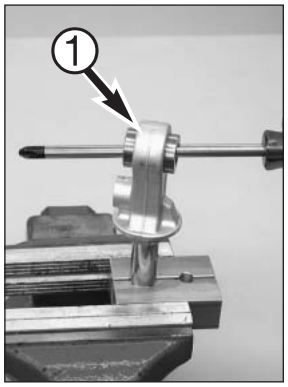
– Heat the piston rod with a hot-air blower, loosen the holder (A/F 15) ❾ and unscrew.





– Take the needle ❿ out of the piston rod.

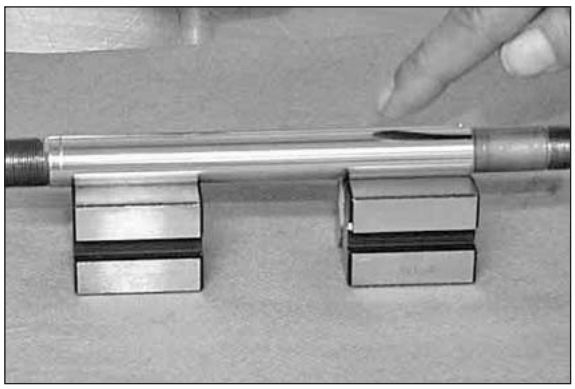
– Heat the counternut (A/F 24) ⓫ on the piston rod with a hot-air blower and loosen.



– Remove all of the grease from the piston rod and clamp with T1202S.
– Heat the shock absorber mount ❶ with a hot-air blower, loosen and unscrew.

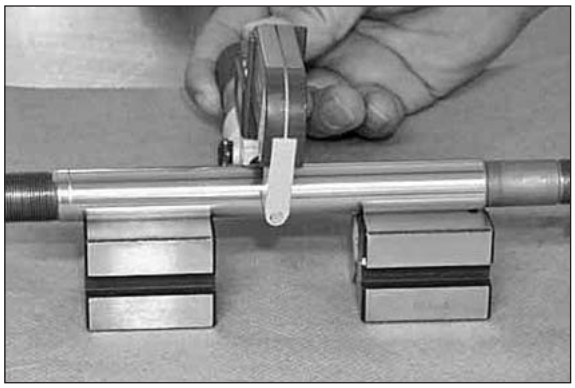
– Pull the needle guide ❷ out of the piston rod, discard the O-ring.

– Clean the thread of the piston rod with a wire brush.



Checking the piston rod

– Always replace the piston rod if you find any scratches or dents on the bearing surface.
– Always replace the DU bushing for the adapter.

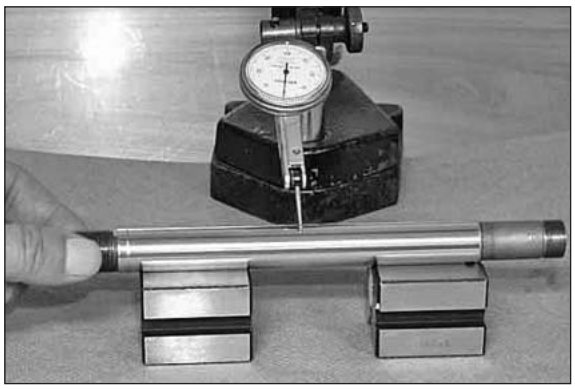


– Position the mounting stands as far as possible towards the outer side of the piston rod's bearing surface.

– Measure the diameter of the piston rod, turn the piston rod 90° and measure the diameter again.

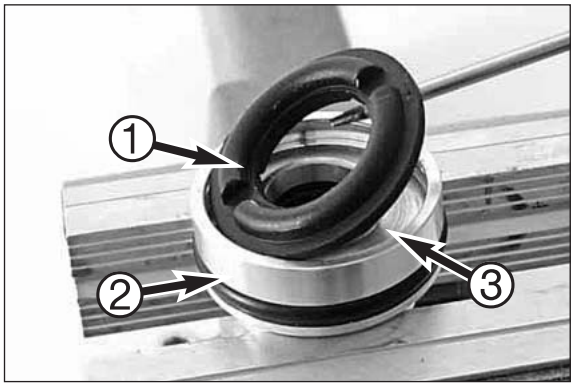
– Repeat the measurements at various points on the piston rod.

The maximum diameter is: 17.99 mm
The minimum diameter is: 17.94 mm



– Measure the piston rod runout, turn the piston rod 360°.

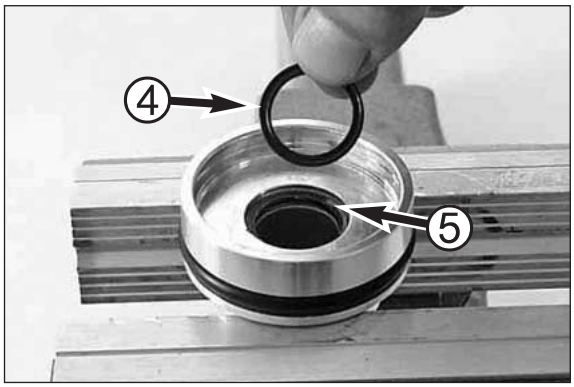
The maximum runout is: 0.03 mm.



Disassembling the adapter

– Pry the rebound rubber ❶ out of the DU bushing ❷.

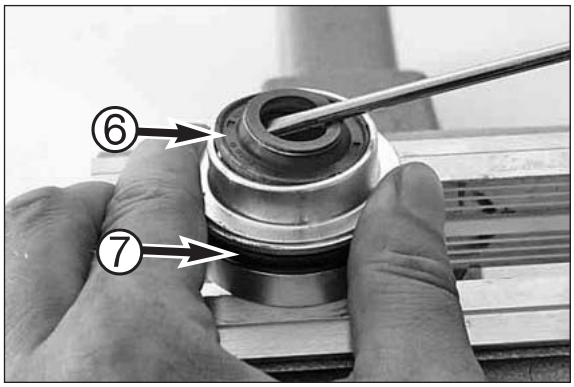
– Remove the steel plate ❸.



– Remove the safety ring ❹.

– Remove the quad seal ring ❺.

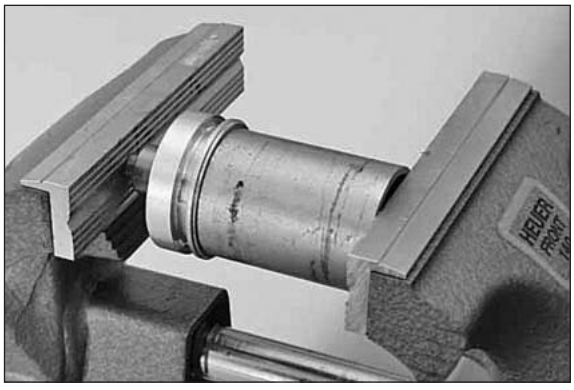
– Remove the second safety ring.



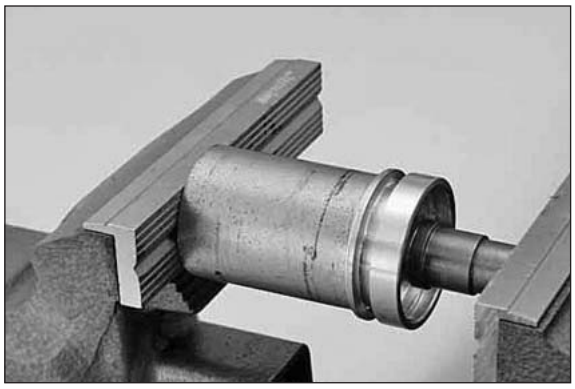
– Pry the seal ring ❻ out of the adapter.

– Remove the O-ring ❼ from the groove in the adapter.

– Dismounting/mounting tool T1208, adapter and T1209.



– Press the DU bushing out of the adapter.



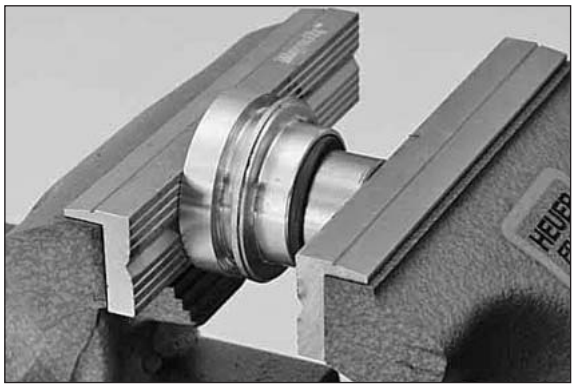
Assembling the DU bushing adapter

– Press the new DU distance bushing into the adapter with T1208 and T1209.

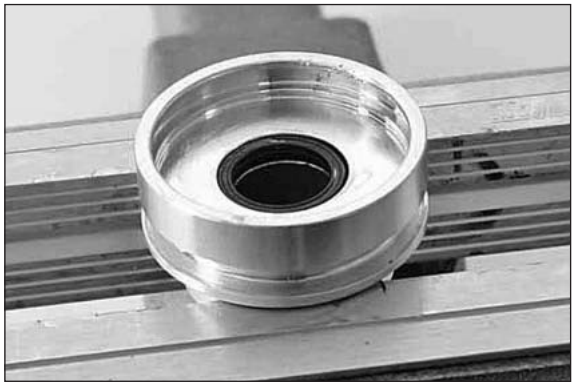
– Lubricate the calibration pin with shock absorber oil.

– Calibrate the DU distance bushing with the calibration pin T1205 and T1209.

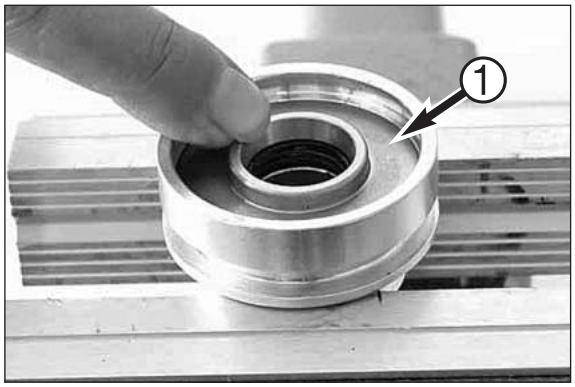
– Use T1204 to press the calibration pin into the DU distance bushing.



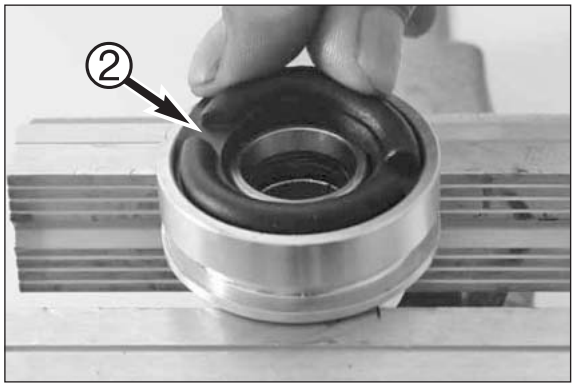
– Press in the sealing ring using T1204



– Mount the lock rings and the quad ring in the right order - see disassembling.

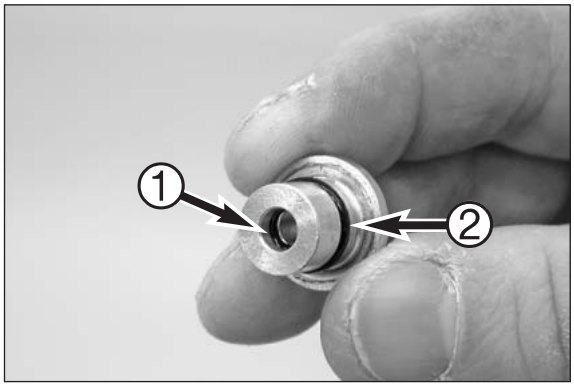


– Mount the steel plate ❶.



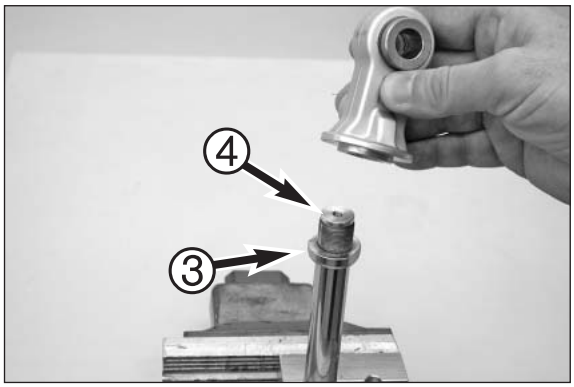
– Mount the rebound rubber ❷.

– Make sure the rebound rubber can still turn in the adapter.

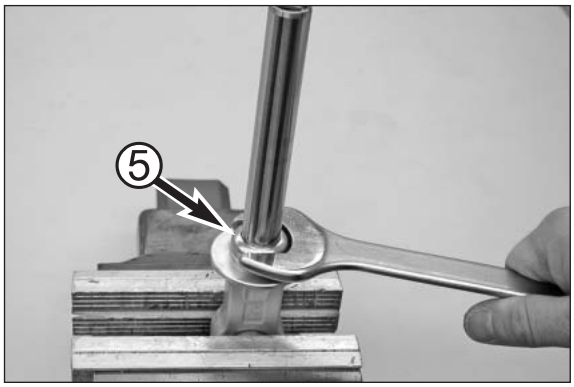


Assembling the piston rod

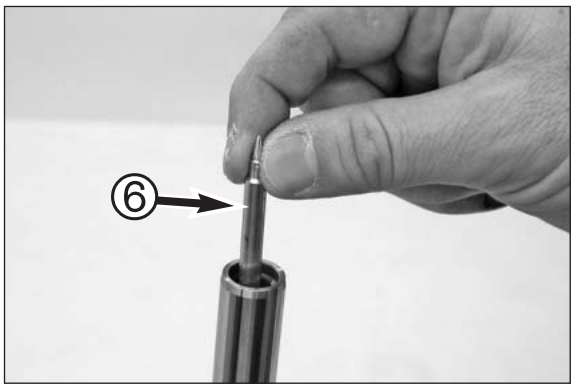
– Replace the inner ❶ and outer ❷ O-ring on the needle guide, greasing the new O-rings with T158.



– Clamp the piston rod in a vise using T 1202S.
– Screw the nut ❸ onto the piston rod all the way to the end with the rounded side first.
– Mount the needle guide ❹ onto the piston rod.
– Apply T132 to the thread on the piston rod, screw on the shock absorber mount and tighten.

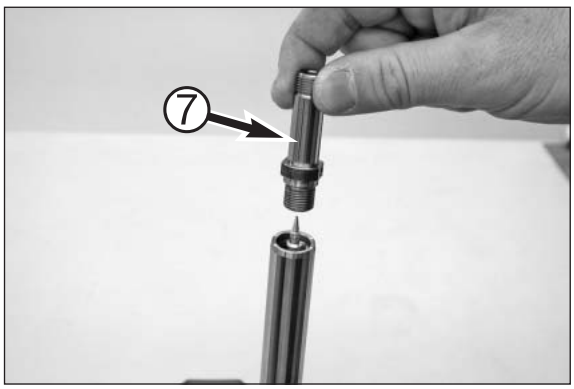


– Clamp the piston rod and shock absorber mount in the vise and tighten the nut ❺ (A/F 24).

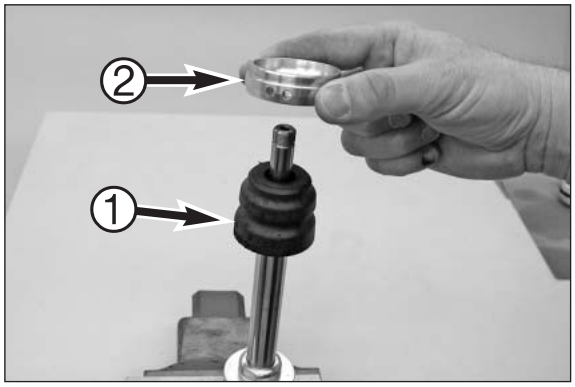


– Mount the needle ❻ in the piston rod.

NOTE: insert the needle in the needle guide which will automatically center the needle.



– Clean the thread on the holder ❼ and apply T132.
– Screw the holder on the piston rod and tighten (A/F 15).

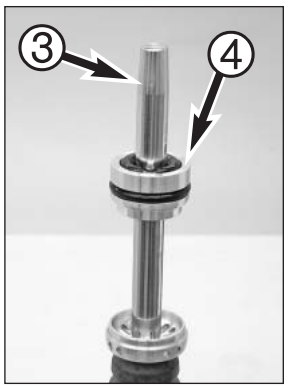


– Slide the rubber buffer plug ❶ onto the piston rod.

NOTE: the rubber buffer plug must be mounted with the recess first so it can be pushed over the nut on the piston rod.

– Slide on the cover ❷.

NOTE: mount the cover with the side having the larger diameter first.



– Slide T1515 ❸ over the piston rod and lubricate with a little oil.
– Lubricate the seal ring on the adapter ❹ with T625.
– Carefully slide the adapter with the seal ring facing down over T1515 onto the piston rod, remove T1515.
– Lubricate the O-ring on the adapter with T158.

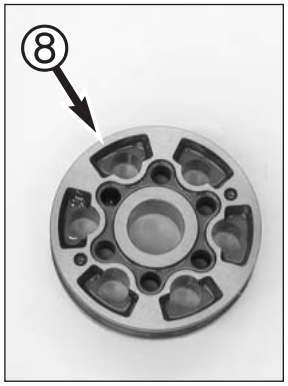
– Mount the washer ❺ with the groove facing up.

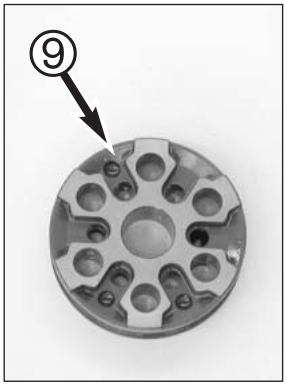
– Mount the set of shims ❻ for the compression damping.

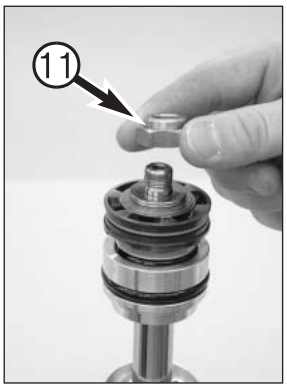
NOTE: the shims with the larger diameter will be on top.

– Slide on the piston ❼.

NOTE:
– Upper view of the piston ❽, lower view of the piston ❾.
– Before mounting the piston, polish both sides on an even surface with 600-grit sandpaper.



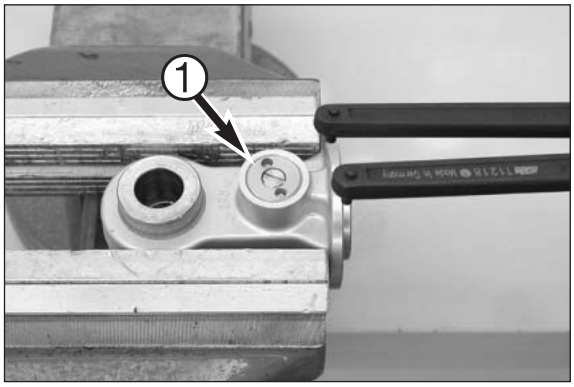




– Mount the shims ❿ for the rebound damping.

NOTE: the shims with the smaller diameter will be on top.

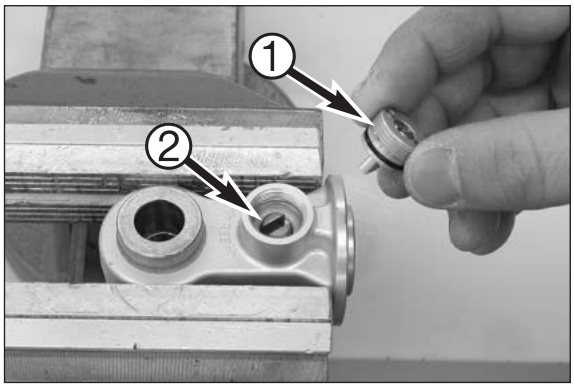
– Apply T152 to the thread, screw on the piston rod nut ⓫ (A/F 22) and tighten to 30 Nm.



Disassembling/assembling the rebound adjustment

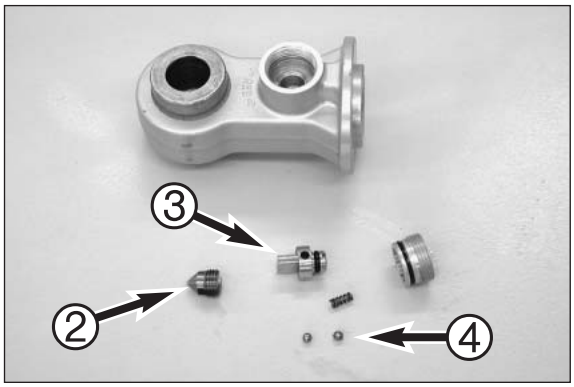
– Clamp the shock absorber mount in the vise as illustrated.

– Loosen the rebound cap ❶ with T1218 and unscrew.



– Remove the rebound cap ❶.

– Unscrew the adjustment adapter ❷ and remove.

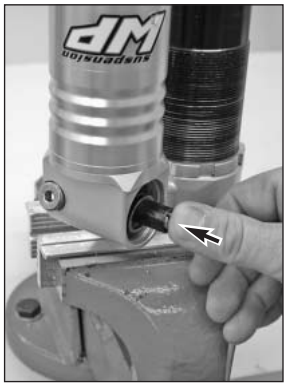


– Pull the adjusting screw ❸ out of the rebound cap.

– Remove both steel balls ❹ and the spring from the adjusting screw.

– Check all parts for damage or wear, clean and reassemble, replace and grease the O-rings.

NOTE: grease the steel balls to hold in place in the adjusting screw prior to mounting.

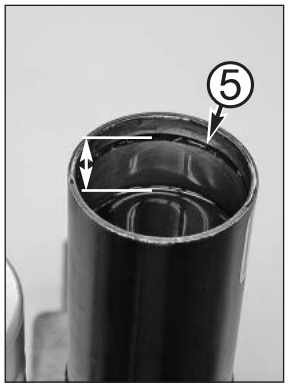


Assembling the shock absorber

– Grease the O-ring ❶ on the compression damping piston with special grease T158, slide the compression damping piston in the bore until it engages and mount the spring and washer.

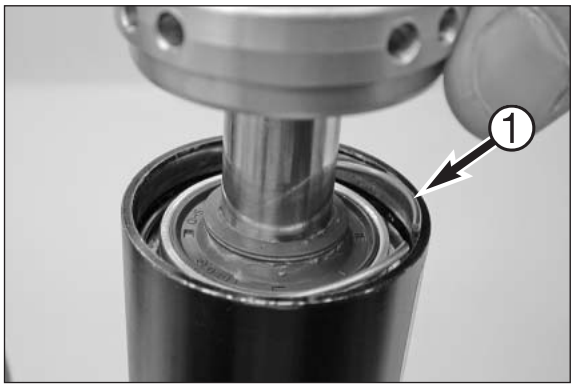
– Grease the O-ring ❷ on the compression damping adjustment with special grease T158 and the screw in the compression damping adjustment. Tighten the compression damping adjustment to 50 Nm.

– Unscrew the filling screw ❸ and screw on a suitable filling adapter ❹ for special tool T1240S (vacuum filling maschine).



– Add fresh shock absorber oil up to approx. 20 mm under the groove ❺.

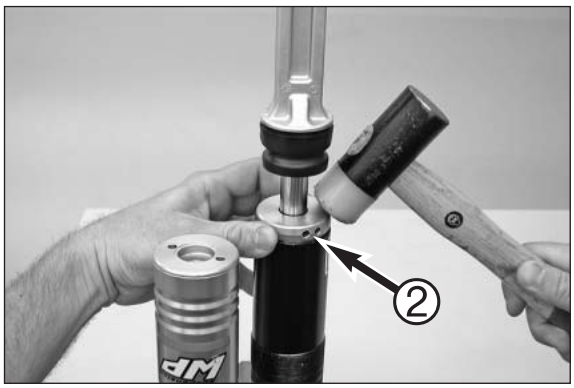
– Carefully slide in the piston rod to be able to mount the lock ring.



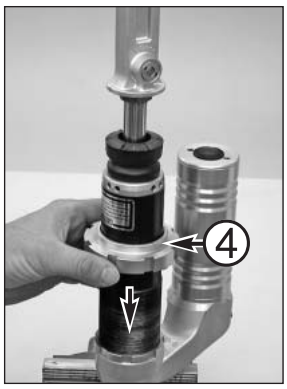
– Mount the lock ring ❶.

! CAUTION !

FIRST INSERT THE CLOSED PART OF THE LOCK RING, THEN THE TWO ENDS. THIS WILL PREVENT THE SURFACE OF THE PIPE FROM BEING SCRATCHED UNDER THE GROOVE AND THE O-RING FROM BEING DAMAGED WHEN INSERTED OR WHEN IN OPERATION.



– Evenly tap the cover ❷ in place with a plastic hammer.

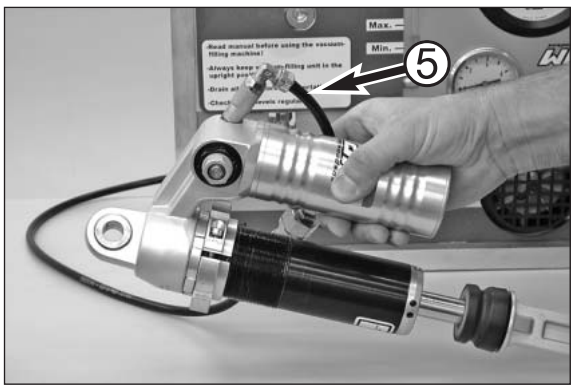


– Grease the thread on the adjusting nut ❸ with special grease T159 and screw all the way down with the collar ❹ facing up.

Filling the shock absorber

! CAUTION !

BEFORE YOU START TO WORK WITH THE VACUUM FILLING MASCHINE, CAREFULLY READ THE INSTRUCTIONS PROVIDED IN CHAPTER 5 TO AVOID MAKING ANY ERRORS WHEN FILLING THE SHOCK ABSORBER.

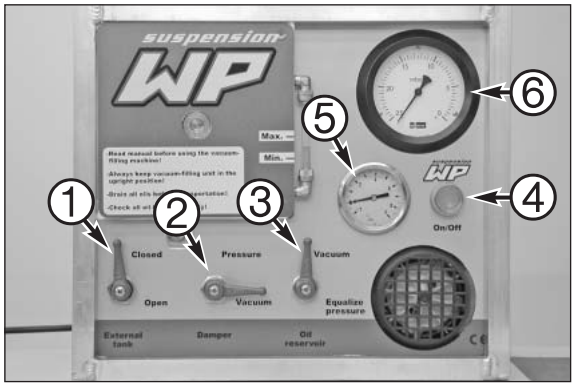


– Attach the filling adapter ❺ to the connection on the vacuum filling maschine T1240S.

– Hold the shock absorber as shown in the photo. The filling connection with the adapter must be in the highest position.

⚠ WARNING ⚠

DO NOT HOLD THE PISTON ROD SINCE IT WILL MOVE IN AND OUT DURING THE FILLING PROCESS.



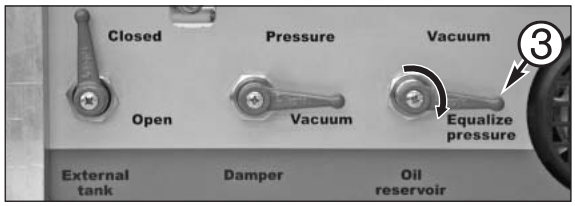
1. Ventilation/filling process

– Move the control levers into the positions shown in the photo.

NOTE: "External tank" control lever ❶ to "Closed", "Damper" ❷ to "Vacuum" and "Oil reservoir" ❸ to "Vacuum".

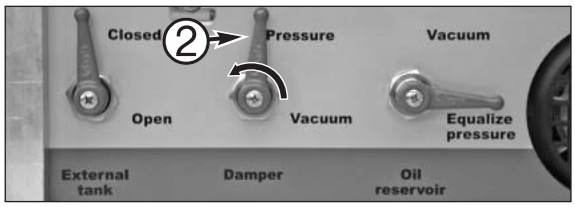
– Press the "On/Off" ❹ switch to start the ventilation process.

NOTE:
– The pressure gauge ❺ (bar) will drop below 0 bar (almost -1).
– The vacuum gauge ❻ (mbar) will drop to 4 mbar.



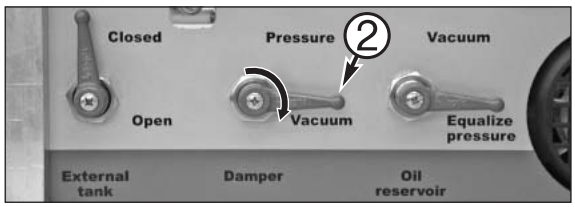
– As soon as the vacuum gauge ❻ (mbar) reaches approx. 4 mbar, turn the "Oil reservoir" control lever ❸ to "Equalize Pressure".

NOTE: the pressure gauge ❺ (bar) will rise to 0 bar.



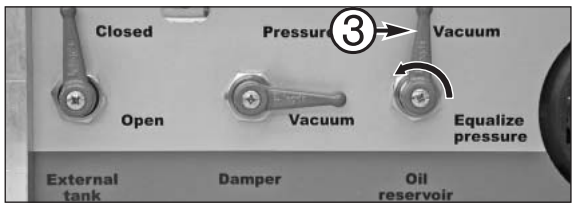
– As soon as the pressure gauge ❺ (bar) reaches 0 bar, turn the "Damper" control lever ❷ to "Pressure".

NOTE: oil will be pumped into the shock absorber, the pressure gauge ❺ (bar) will rise to approx. 3 bar; this value is preset (see Chapter 5).



– As soon as the pressure gauge ❺ (bar) reaches approx. 3 bar, turn the "Damper" control lever ❷ back to "Vacuum".

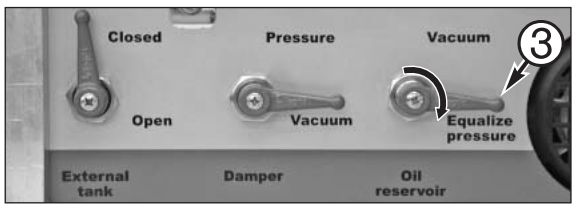
NOTE: the pressure gauge ❺ (bar) will drop to 0 bar.



2. Ventilation/Filling process

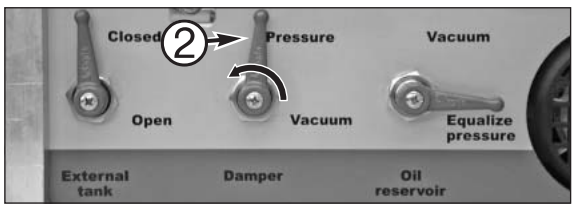
– As soon as the pressure gauge ❺ (bar) reaches 0 bar, turn the "Oil reservoir" control lever ❸ to "Vacuum".

NOTE: the vacuum gauge ❻ (mbar) will drop to 8 mbar.



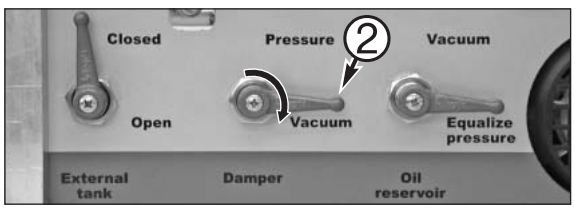
– As soon as the vacuum gauge ❻ (mbar) reaches 8 mbar, turn the "Oil reservoir" control lever ❸ to "Equalize Pressure".

NOTE: the pressure gauge ❺ (bar) will drop to 0 bar.



– As soon as the pressure gauge ❺ (bar) reaches 0 bar, turn the "Damper" control lever ❷ to "Pressure".

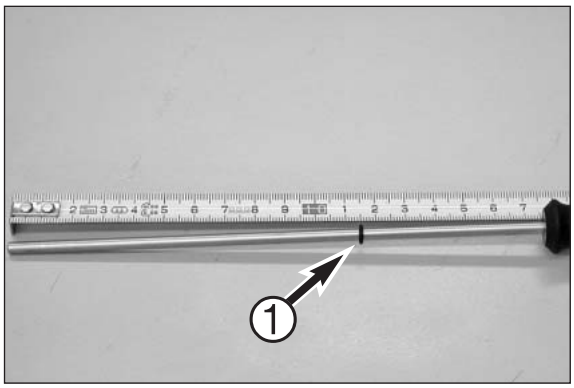
NOTE: oil will be pumped into the shock absorber, the pressure gauge ❺ (bar) will rise to approx. 3 bar; this value is preset (see Chapter 5).



– As soon as the pressure gauge ❺ (bar) reaches approx. 3 bar, turn the "Damper" control lever ❷ to "Vacuum".

NOTE: the pressure gauge ❺ (bar) will drop to 0 bar.

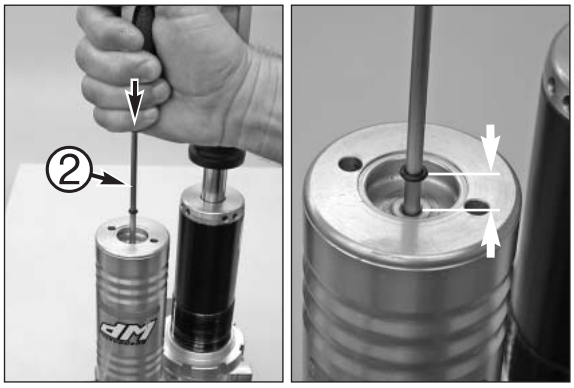
– As soon as the pressure gauge ❺ (bar) reaches 0 bar, actuate the "On/Off" ❹ switch. The shock absorber is filled.



– Clamp the shock absorber again after it is filled.

NOTE: Leave the filling adapter and vacuum filling maschine T1240S connected.

– Measure the position of the O-rings ❶ and compare with the measurement you took before. Correct if necessary.

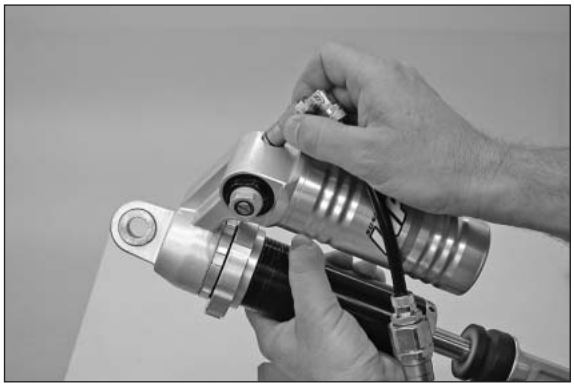


– Insert the dividing piston with the special tool T107S ❷ until the O-ring is approx. 10 mm over the bore, but no further.

! CAUTION !

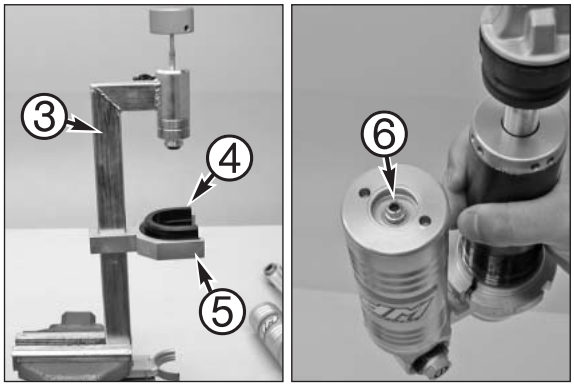
IF THE POSITION OF THE DIVIDING PISTON IS INCORRECTLY ADJUSTED, THE SHOCK ABSORBER WILL NOT FUNCTION PROPERLY AND CAN BE DESTROYED WHEN COMPRESSED.

NOTE: the resistance should be firm when you press down on the dividing piston with the special tool. If the resistance is soft and flexible, it is likely that air is still left in the shock absorber, i.e. the ventilation process must be repeated.



– Disconnect the vacuum filling maschine T1240S, holding the shock absorber with the filling connection in the highest position. Remove the filling connection, screw on the plug and tighten to 16 Nm.

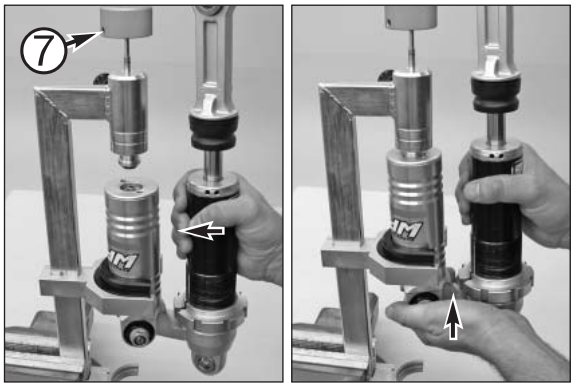
NOTE: you will be able to see the shock absorber oil when you remove the connection. It should be filled all the way up to the edge.



Filling nitrogen

– Clamp the nitrogen filling device T170S1 ❸ in a vise as shown in the photo and attach the insert ❹ to the bracket ❺ but do not tighten the screws on the bracket yet.

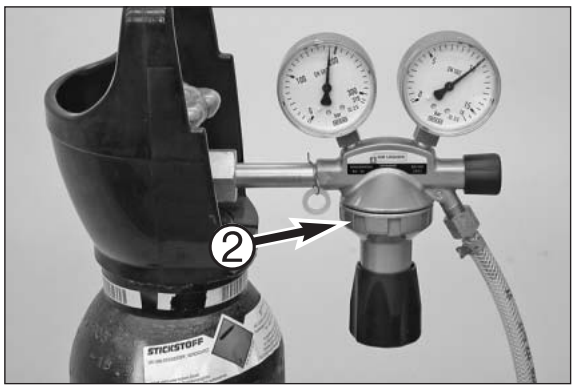
– Screw the plug ❻ in approx. 2 turns but do not tighten yet.



– Slide the shock absorber into the insert in the bracket and press up. Tighten the screws on the bracket.

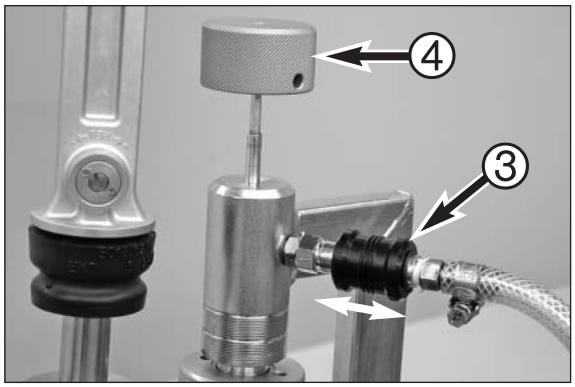
NOTE: the hexagon on the knob ❼ must engage in the AH plug. The plug will be closed with the knob after filling.

– Attach the nitrogen to the connection ❶ on special tool T170S1.



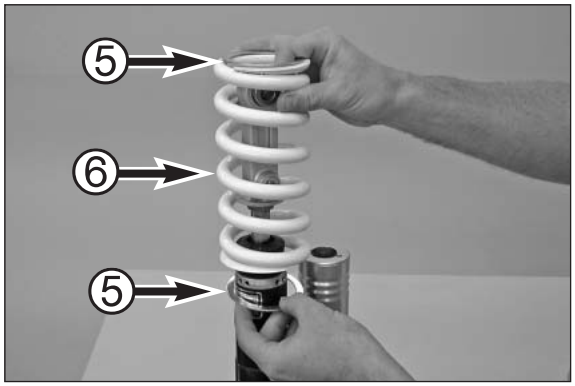
– Set the pressure regulator ❷ on the nitrogen bottle to 10 bar, move the tap ❸ into the "Open" position and fill for at least 15 seconds.

NOTE:
– Observe the gauge on the pressure regulator. The pressure will drop slightly when filling. Make sure the shock absorber is filled with 10 bar.
– To open the tap, slide the black sleeve towards the tool T170S1 ("Open"); to close, slide it away from the tool ("Closed").



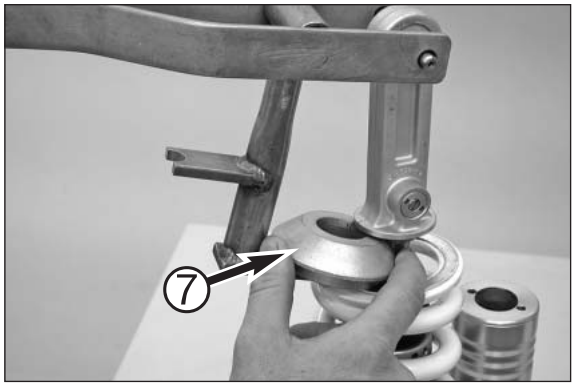
– Turn the knob ❹ to close the plug on the shock absorber.

– Move the tap into the "Closed" position and loosen the screws on the bracket. Remove the shock absorber from the T170S1 and clamp the upper section in the vise.



– Mount the washer ❺ and the spring ❻.

NOTE: you should be able to read the lettering on the spring when the shock absorber is mounted on the vehicle, i.e. it should be in an inverted position.



– Clamp the spring with special tool T101S and mount the spring retainer ❼, remove T101S.

NOTE: position the spring retainer so that the seam ("joint") is opposite the end of the spring.

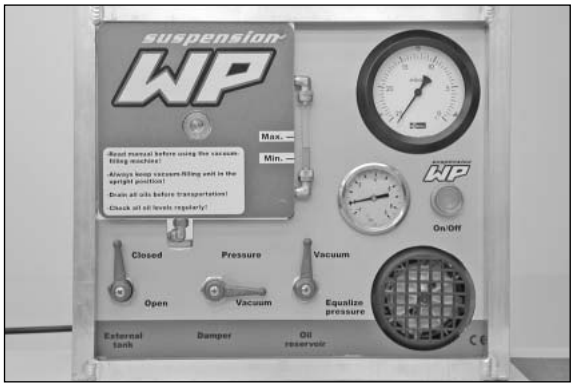
– Adjust the spring preload as written down or according to the specifications using the special tool T106.

– Adjust the rebound and compression damping.

– Unclamp the shock absorber and turn the upper part in the opposite direction as the lower part until the rebound damping and compression damping settings are opposite each other.

MANUAL FOR VACUUM-/FILLING MASCHINE 5

INDEX



Introduction

The WP Suspension vacuum-filling machine is designed specially for the filling of shock absorbers. The machine enables you to fill a shock absorber with no air inside the shock absorber. The layout of the system was chosen to allow maximum flexibility for the filling of shock absorbers and to create a compact, lightweight construction. The machine has two main parts; the vacuum filling unit and an external tank. The configuration, vacuum- and pressure values as well as filling adapters that have to be used, depend on the type of damper that has to be filled.

Each vacuum filling machine has been put trough a test before delivery to customers.
Because of this test, there might be a small amount of oil left in the vacuum pump. The vacuum filling machine is delivered without compressed air nipple, because of the wide variety of nipples used. Before taking the machine into service, a nipple ❶ has to be mounted to the pressure regulator (thread size G¼).

Supplied parts

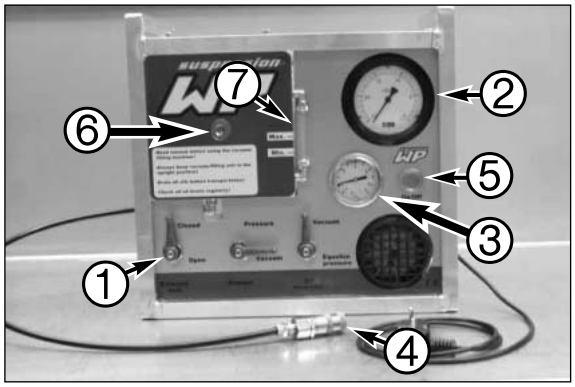
Owners manual vacuum filling machine
Filling adapter A (Competition and PDS (G1/8))
Filling adapter B (For filling trough CC- mechanism)
Filling adapter C (Steering dampers)
1 Litre vacuum pump oil Vm22
Vacuum filling unit
External tank
Connecting hose external tank

Technical features

Vacuum pump PB 0003 A :
Nominal displacement: 3 m^3/h (50Hz), 3,6 m^3/h (60Hz)
Ultimate pressure : 2mbar
Nominal motor rating : 0,1 Kw (50Hz), 0,12 Kw (60Hz)
Nominal motor speed : 3000 min^{-1} (50Hz), 3600 min^{-1} (60Hz)
Sound level (DIN 45635) : 59 dB (A)
Oil filling : 0,06 l

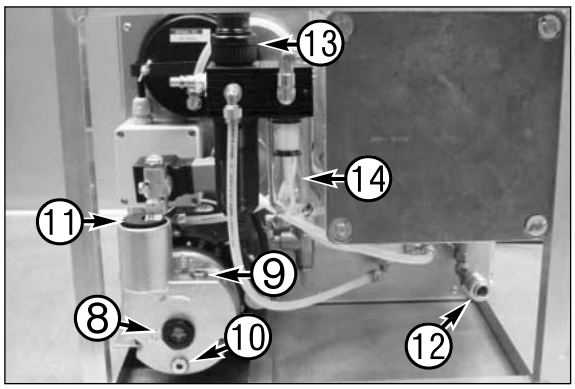
Vacuum filling unit :
Width : 400mm
Depth : 255mm
Height : 380mm
Dry weight : 14,5Kg
Max oil quantity : ±1,8 l

External Tank :
Width : 220mm
Depth : 220mm
Height : 695mm
Weight : 9,9Kg

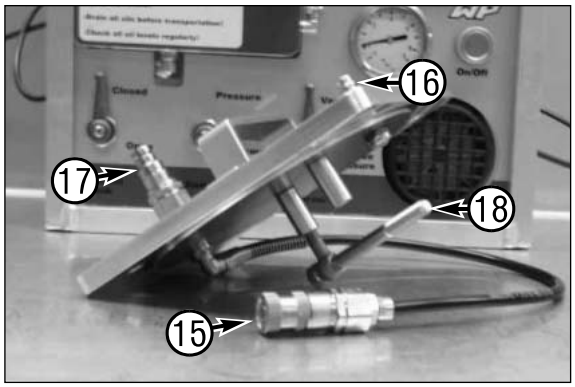


Overview of vacuum filling machine

- Control levers ❶
- Vacuum gauge (mbar) ❷
- Pressure gauge (bar) ❸
- Damper connector ❹
- Main power switch ❺
- Filling plug ❻
- Oil level indicator ❼



- Vacuum pump oil level indicator ❽
- Vacuum pump filling plug ❾
- Vacuum pump draining plug ❿
- Exhaust filter ⓫
- External tank connector (air) ⓬
- Pressure regulator ⓭
- Oil separator ⓮



- Damper connector ⓯
- External tank connector (air) ⓰
- External tank connector (oil) ⓱
- Damper hanging hook ⓲

General handling information

! CAUTION !

- Only people who have read and understood the manual are allowed to operate the vacuum-filling machine.
- The instructions given in this manual must be followed carefully. Any deviation from the instructions could result in a dangerous situation for the user of the filling installation. Deviation from the instructions may also cause a bad vacuum filling of the damper, and will result in dangerous situations when using this damper.
- The oil in the vacuum pump and the damper-oil in the oil reservoir should always be drained before transportation!
- Never use the vacuum-filling machine for other purposes than mentioned in this manual.
- It is not allowed to let the machine (trail)run with disconnected safety features or safety covers.
- The vacuum pump must never be used without oil!
- Only use Busch Vm22 vacuum pump oil!

- The oil level of the vacuum pump should never exceed max level and should never be lower than the min level. Keep the oil level close to the max level to ensure good function and cooling of the pump.

- The vacuum-filling machine should be in upright position at all times! Place the vacuum-filling machine on a stabile flat and horizontally surface in the upright position.

- The area surrounding the vacuum pump will be warm, do not touch the vacuum pump during or shortly after operation, as the pump will be hot!
- Be aware of the exhaust gasses coming from the outlet of the pump. The temperature of these gasses can run up to 90°C!
- There has to be an undisturbed fresh airflow around the vacuum-filling machine, to ensure sufficient cooling of the pump.
- The outlet of the pump should be free at all times to avoid damage to the pump. Exhaust gas must be allowed to escape from the vicinity of the pump to avoid overheating.
- Fill the oil reservoir until the level indicator reaches max level. The oil level should never be lower than min level to ensure correct vacuum filling of the damper.
- Always connect the machine to a grounded power supply (220 Volts).
- Always maintain the vacuum-filling unit according to maintenance instructions. To ensure safe, long-time and high quality application.
- Do not stick objects through the protective cap of the pump fan.
- The pump is protected against thermal overload of the motor by a thermal-lag switch. When the motor has cooled down, the vacuum pump starts again automatically.
- The ambient temperature when using the vacuum-filling machine should be between 12 and 30°C.

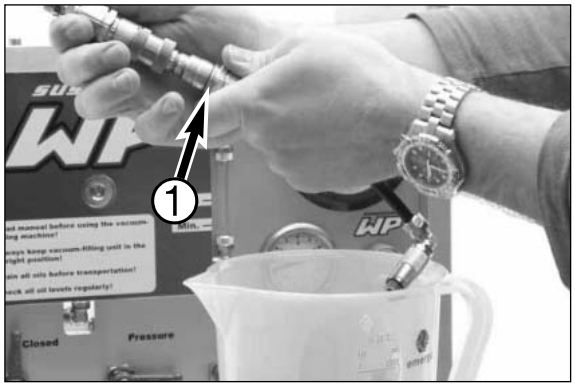
– The penetration of dirt inside of the external tank must be avoided as much as possible. The dirt may clog up the filter in the lid of the external tank, causing a malfunction of the vacuum filling installation.

– Be careful when lowering a damper into the external tank. Damaging the top of the tank may result in air leakage, and thus a malfunction of the vacuum filling installation.

– Never hang a damper from the damper connector of the vacuum filling machine!

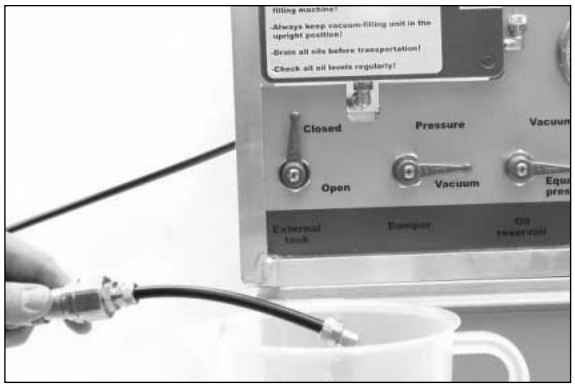
– The installation can be cleaned with a mild soap, do not use aggressive products as these might damage the stickers on the installation.

– If at any time you feel uncertain of the vacuum filling of a damper, start over again to ensure safety.

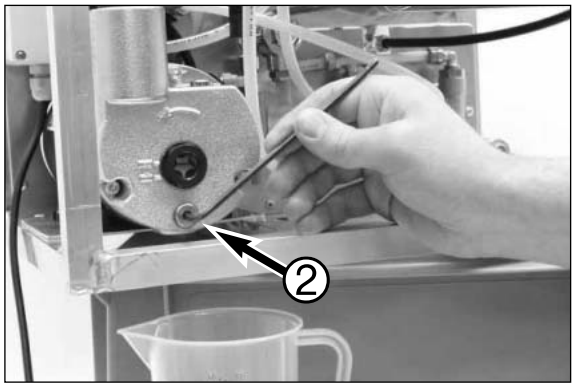


Before / during transportation

– Disconnect the power and air supply. The oil in the vacuum pump and the damper-oil in the oil reservoir should always be drained before transportation. For draining the oil reservoir, connect filling adapter A ❶ to the damper connector of the filling unit while holding the adapter above a measuring cup.



– Let the oil run out of the reservoir. When there is no more oil flowing, disconnect the filling adapter.



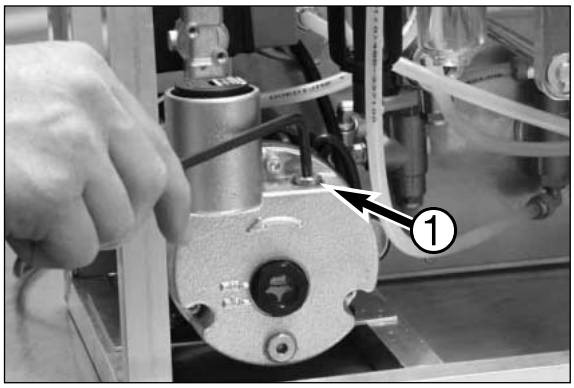
– For draining the vacuum pump-oil, unscrew the draining plug ❷ and let the oil flow into a measuring cup. When the oil is drained, place back the draining plug.

! CAUTION !

The installation must be transported in an upright position and must be protected against external forces. The machine contains sensitive parts so handle with care, protect the installation against shocks etc.

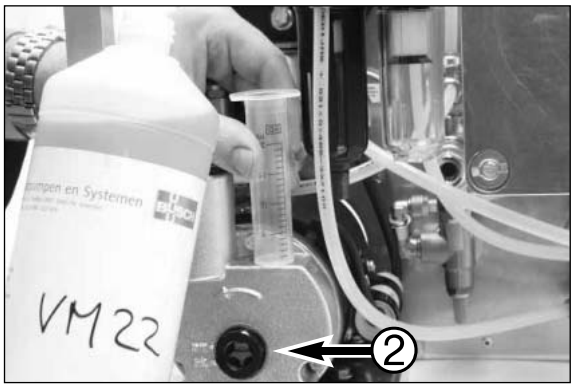
Preparing vacuum filling machine for use (after transportation)

– Place the vacuum-filling machine on a stabile flat and horizontally surface in the upright position. There has to be an undisturbed fresh airflow around the vacuum-filling machine, to ensure sufficient cooling of the pump.

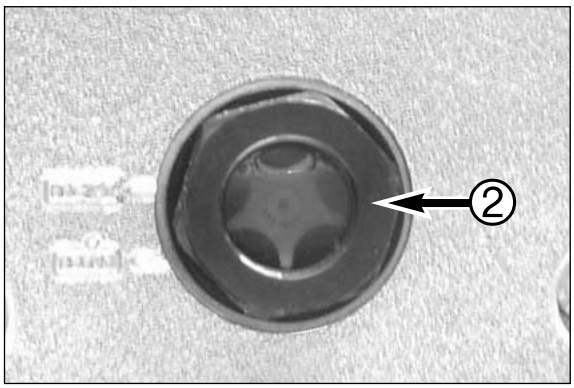


Filling vacuum pump oil

– Remove the filling plug ❶ of the vacuum pump.



– Fill up the vacuum pump with oil to the max level on the level indicator ❷.



– The oil level should never exceed max level and should never be lower than the min level. Only use Busch Vm22 vacuum pump oil! Keep the oil level close to the max level to ensure good function and cooling of the pump. Place back the filling plug.

Filling damper oil

– Remove the filling plug ❸ of the oil reservoir.

– Fill the oil reservoir until the level indicator reaches max. level. Place back the filling plug using a torque wrench. The filling plug has to be fastened with a torque of 10 Nm. The vacuum-filling unit should always be in the upright position, to avoid oil spreading trough the entire system! This will cause serious damage to the vacuum filling machine. Only use oil approved by WP Suspension!

– Place back the filling plug using a torque wrench. The filling plug has to be fastened with a torque of 10 Nm.

Connecting power
– Connect the machine to a grounded power supply 220 Volts.

Connecting air
– Connect the machine to an air supply 2-8 bar.

Vacuum air bleeding of damper oil
– Before the unit can be used, the oil in the oil reservoir should be put under vacuum in order to get rid of the air inside of the oil. The control levers should be in the following positions:

– The control levers should be in the following positions (after new oil filling):

External tank	Closed
Damper	Vacuum
Oil reservoir	Vacuum

– Now switch the power on and let the machine run for about 2 minutes, switch off the power. The vacuum-filling machine is now ready for use.

Using the filling adapters

Filling adapter A

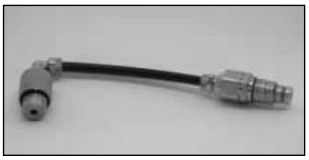
– Screw the filling adapter into the filling hole of the damper. The nose of the filling adapter is able to rotate in relation to the rest of the filling adapter.

Filling adapter B

– Turn the shell anti clockwise, in relation to the pin, until it hits the fixed stop. The slot in the shell should be lined up with the slot in the pin. Now gently shove the adapter into the CC-housing of the damper. Turn the shell clockwise while holding the top of the pin until the shell can not be turned further. Check if the filling adapter is placed securely by pulling the pin, the filling adapter should be locked in the CC-housing.

Filling adapter C

– Screw the filling adapter into the filling hole of the damper. The nose of the filling adapter is able to rotate in relation to the rest of the filling adapter.



General operation instructions

As is mentioned earlier, the vacuum-filling machine enables the user to fill a damper in different manners. A main possibility to fill a damper is with or without an external tank. This general description will mention both ways. The following descriptions are discussed only to give a general understanding of the operation of the vacuum-filling machine. The procedure may vary on details when filling a specific damper, for instance certain dampers have to be filled using an external tank, wile others might not need to be filled in an external tank. Also the filling pressures vary with each type of damper, this concerns the vacuum pressure as well as the overpressure(most dampers 3 bar). The manual will include a list with the correct filling pressures, configuration and filling adapters that have to be used. The procedure for filling of a steering damper is different to the filling of other dampers. Other dampers are filled with overpressure, this is not the case for a steering damper. The general operation instructions for steering dampers will also be mentioned.

For illustration of the operating procedures we will use the following pressures:

– Overpressure: 3 bar
– Pressure 1st cycle: 4mbar
– Pressure 2nd cycle: 8mbar

! CAUTION !

IF AT ANY TIME YOU FEEL UNCERTAIN OF THE VACUUM FILLING OF A DAMPER, START OVER AGAIN TO ENSURE SAFETY!

General preparation procedures

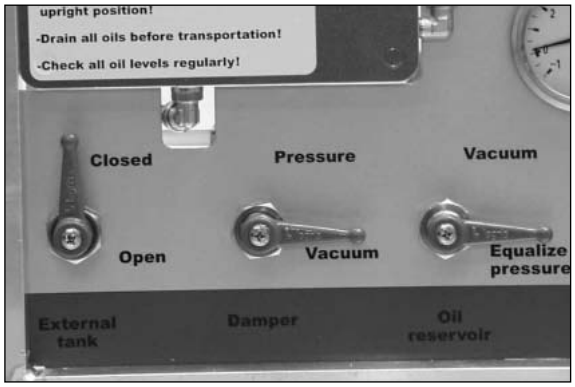
The damper must be filled with as much oil as possible, when assembling. This operation minimizes the amount of air in the damper and allows the vacuum-filling machine to give a good result. The damper will have a bad filling if this guideline is not followed! When vacuum filling, the damper should not have a spring on it. If the damper was properly serviced, the nitrogen pressure has been released.

! CAUTION !

MAKE SURE THAT THERE IS NO NITROGEN PRESSURE LEFT IN THE DAMPER BEFORE USING THE VACUUM-FILLING MACHINE AND LEAVE THE NITROGEN FILLING BOLD OUT. COMPRESSION AND REBOUND ADJUSTERS SHOULD ALL BE IN THE FULLY OPEN POSITION (-). SCREW THE FILLING ADAPTER IN THE FILLER OPENING OF THE DAMPER.

Before filling a damper the oil level in the oil reservoir has to be checked, it should not exceed the max. level and should never be under min. level before filling a damper. Correct the level if necessary.

Check if the overpressure value corresponds with the instructions for the particular damper. The pressure that has been adjusted before shipment should be 3 bar, because this is the overpressure used for most dampers.

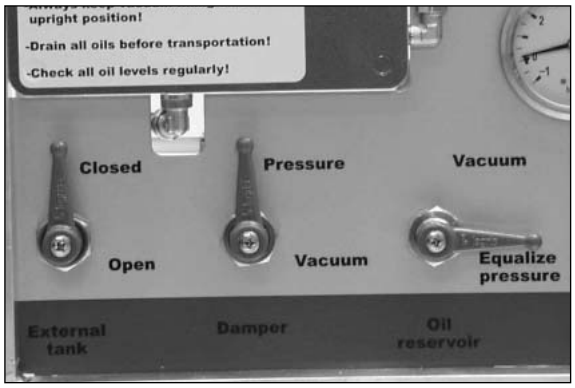


! CAUTION !

DURING THE FOLLOWING PROCEDURE THE PUMP MUST NOT BE TURNED ON.

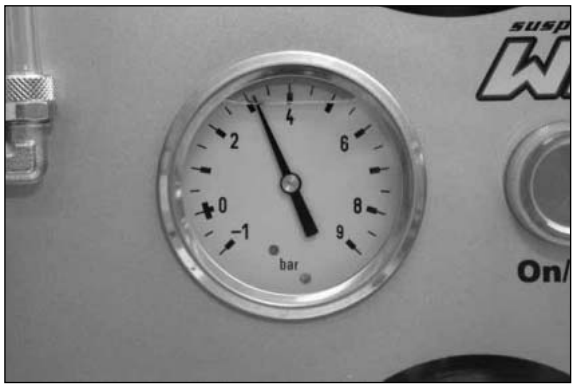
– Make sure the control levers are in the following positions:

External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure



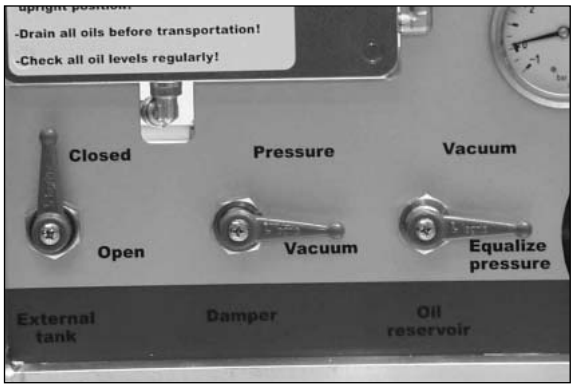
– Now move lever Damper to the Pressure position.

External tank	Closed
Damper	Pressure
Oil reservoir	Equalize pressure



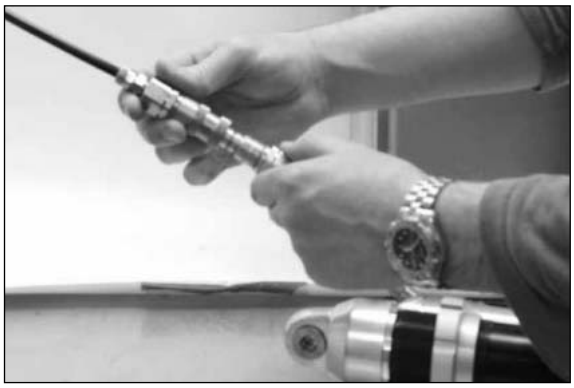
– The pressure gauge will show the current overpressure

– The pressure can be adjusted by pulling up and turning the knob of the pressure regulator. For increasing pressure turn knob clockwise and for lowering pressure turn knob anti clockwise.

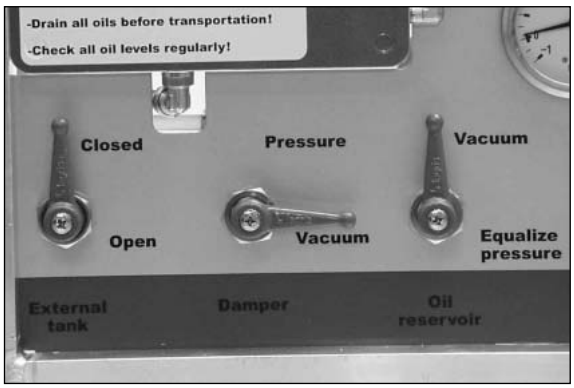


– When the correct pressure has been set, press knob of pressure regulator down and release the pressure by moving lever Damper to the Vacuum position.

External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure



Filling procedure without external tank
– The damper can now be connected to the vacuum-filling machine.



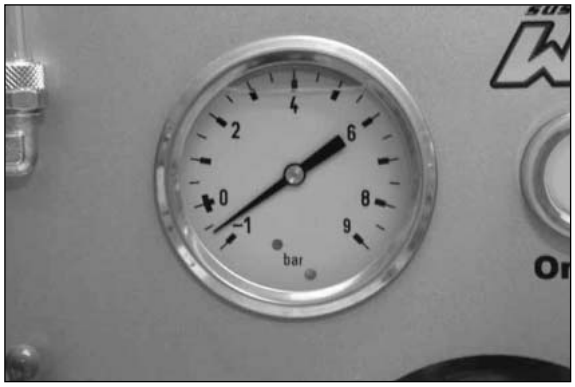
– Put the control levers in the following positions;

External tank	Closed
Damper	Vacuum
Oil reservoir	Vacuum

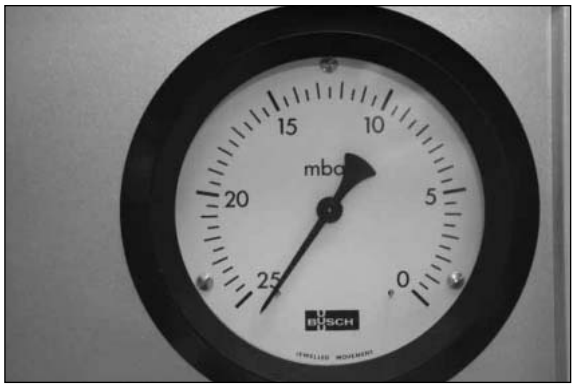
! CAUTION !

THE DAMPER SHOULD BE HELD IN A MANNER THAT YOUR HAND WILL NOT BE CLOSE TO THE SPINDLE AS THE SPINDLE MOVES DURING THE PROCESS. ALSO THE DAMPER MUST BE HELD UNDER THE LEVEL OF THE OIL RESERVOIR, TO LET THE AIR BE DRAWN FROM THE DAMPER. BE SURE TO KEEP AWAY FROM THE SPINDLE, BECAUSE THE SPINDLE MOVES DURING THE PROCESS! THE SPINDLE MUST BE ALLOWED TO MOVE UNRESTRICTED. IT IS ALSO POSSIBLE TO HANG THE DAMPER FROM THE UPPER MOUNTING, IN THIS WAY IT IS NOT NECESSARY TO HOLD THE DAMPER IN YOUR HAND. NEVER HANG THE DAMPER FROM THE DAMPER CONNECTOR!

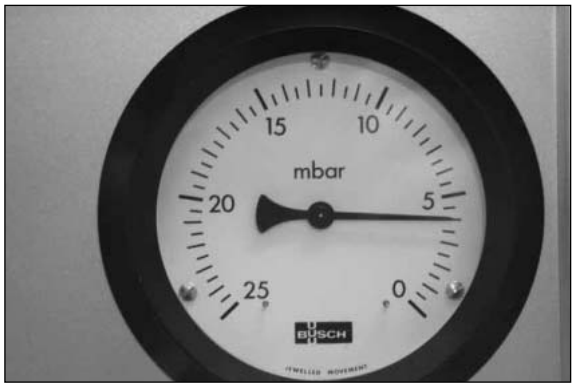
– Now the main power can be turned on and the vacuum process will start.



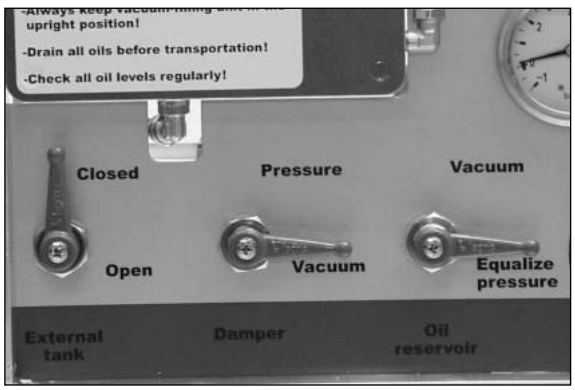
– First you will see the pressure gauge moving to a negative pressure.



– As soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure.

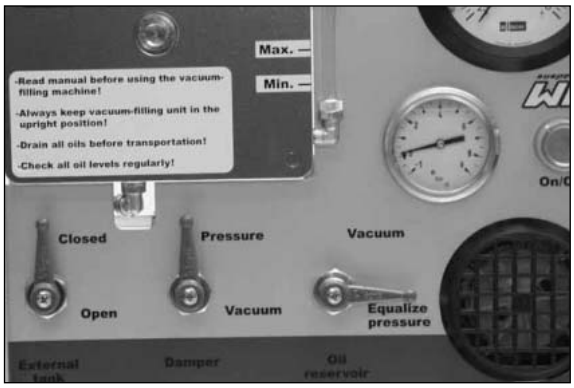


– As soon as the vacuum gauge reaches the specified pressure, in this example 4 mbar, the lever Oil reservoir should be moved to Pressure equalize.



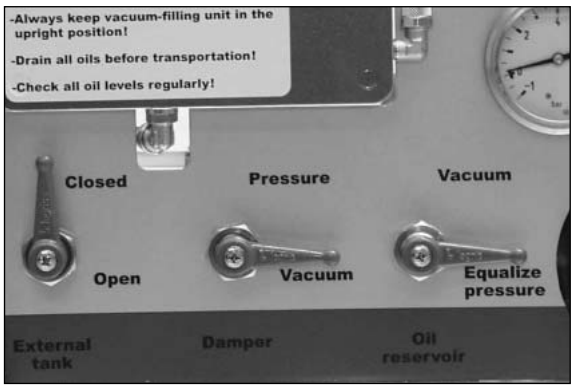
External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

– Now the vacuum will be released, and you will see the pressure rising on both gauges.
– Shortly after this the vacuum gauges starts to run to a low pressure. This is happening because the pump is now working in a small volume witch includes the vacuum gauge. When the pressure gauge has reached 0 bar, the lever Damper can be moved to Pressure.



External tank	Closed
Damper	Pressure
Oil reservoir	Equalize pressure

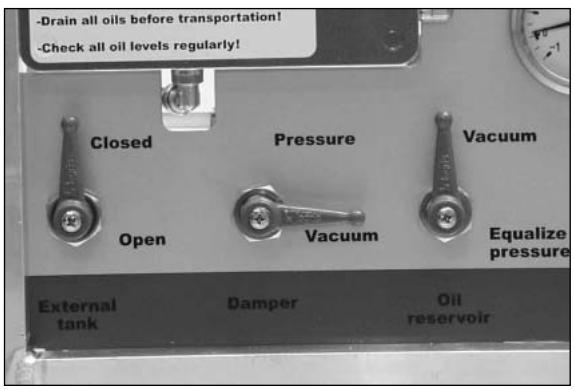
– This will start the forcing of oil into the damper, you will see the pressure gauge move to the pressure that has been set earlier, in this case 3 bar.



– As soon as the pressure has been reached, the lever Damper can be moved to the Vacuum position.

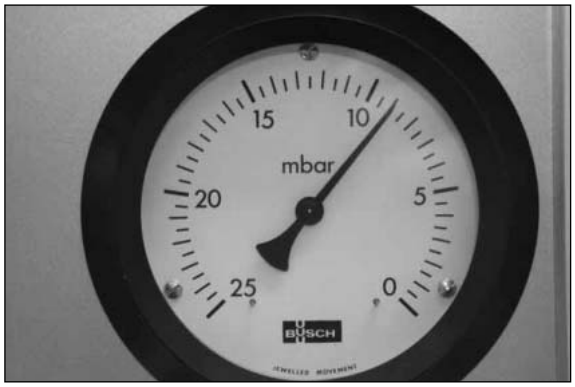
External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

– This will release the pressure and the pressure gauge will move back to 0 bar.

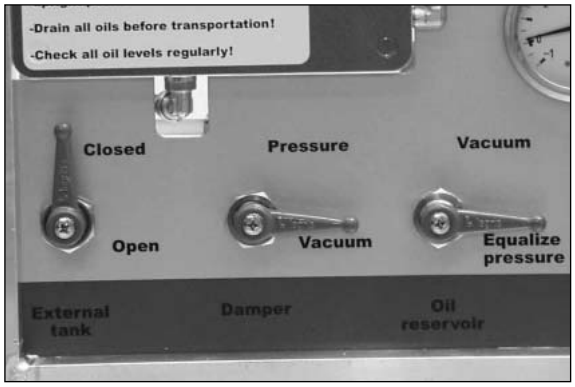


– When the pressure gauge reaches 0 bar, the lever Oil reservoir can be moved to Vacuum, this will start the 2nd cycle of vacuum.

External tank	Closed
Damper	Vacuum
Oil reservoir	Vacuum

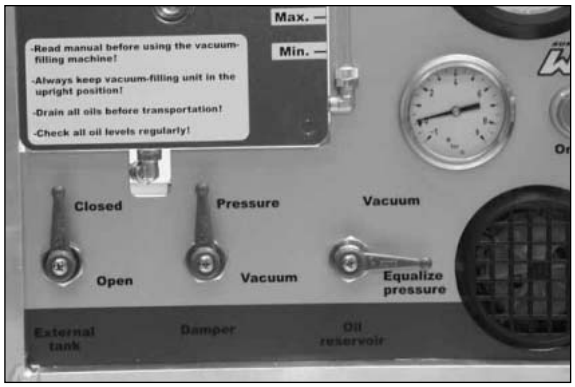


– Now you will see the pressure gauge moving to a negative pressure, as soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure.
– As soon as the vacuum gauge reaches the specified pressure(2nd cycle), in this example 8 mbar, the lever Oil reservoir should be moved to Pressure equalize.



External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

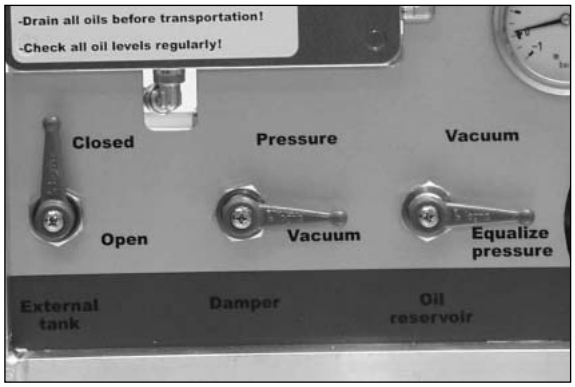
– Now the vacuum will be released, and you will see the pressure rising on both gauges, shortly after this the vacuum gauges starts to run to a low pressure. This is happening because the pump is now working in a small volume witch includes the vacuum gauge.



– When the pressure gauge has reached 0 bar, the lever Damper can be moved to Pressure.

External tank	Closed
Damper	Pressure
Oil reservoir	Equalize pressure

– This will start the forcing of oil into the damper, you will see the pressure gauge move to the pressure that has been set earlier, in this case 3 bar.



– As soon as the pressure has been reached, the lever Damper can be moved to the Vacuum position.

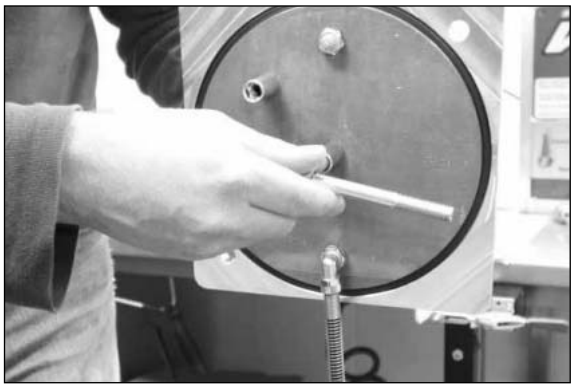
External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

– This will release the pressure and the pressure gauge will move back to 0 bar. As soon as the pressure gauge reaches 0 bar, the main power switch can be turned off. This ends the vacuum filling process.

! CAUTION !

THE SEPARATION PISTON SHOULD BE PRESSED INTO THE CORRECT POSITION USING TOOL T107S. THE DAMPER CAN NOW BE DISCONNECTED FROM THE VACUUM-FILLING MACHINE. THE FILLING ADAPTER CAN BE REMOVED, SOME OIL MAY LEAK WHEN YOU ARE REMOVING THE FILLING ADAPTER.

Filling procedure using the external tank
– Remove the lid of the external tank and connect the damper to the quick release connecter under the lid.

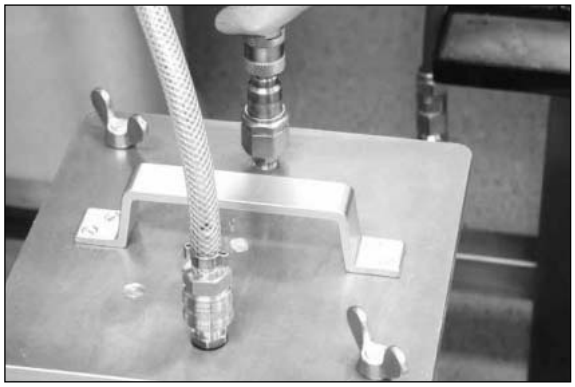


– The hook can be placed on several places on the lid, you might have to move the hook to another position in order to hang up a certain damper.

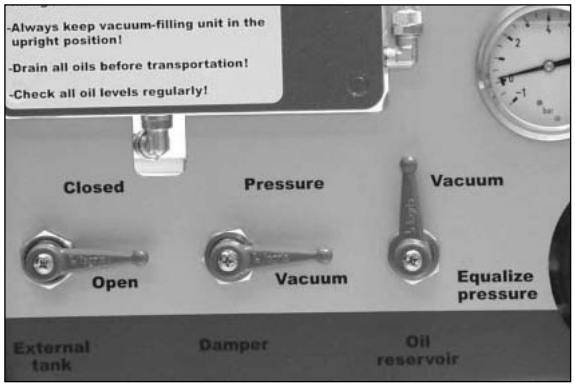
– Hang the damper on the hook under the lid.

– Lower the damper into the external tank, be careful not to damage the top of the cylinder as this is the place where the seal works. Damaging the top of the cylinder may result in leakage, when this occurs the vacuum-filling machine will no longer function. Carefully guide the hose into the external tank to avoid kink of the hose.
– Put the lid on the external tank and apply a light pressure to the lid. The external tank should be used in the upright position, and the tank should always be placed lower than the vacuum filling unit.
– Tighten both wing nuts slightly

– And you also need to connect the damper connection to the external tank.
– Now the vacuum filling unit has to be connected to the external tank, this means connecting the connection hose external tank.



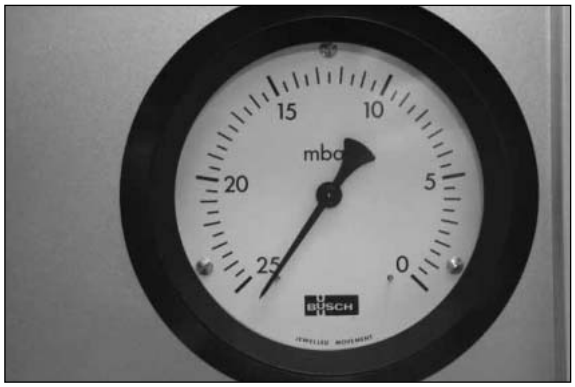
– You also need to connect the damper connection to the external tank.



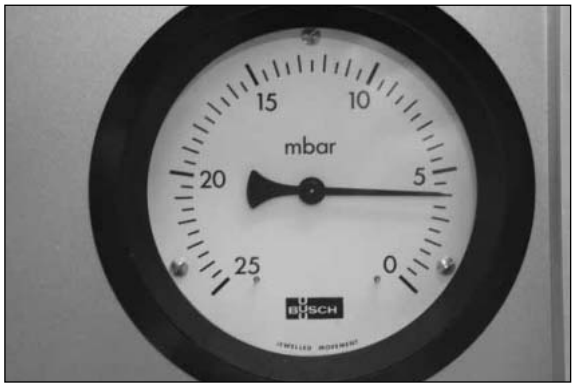
– Put the control levers in the following positions.

External tank	Open
Damper	Vacuum
Oil reservoir	Vacuum

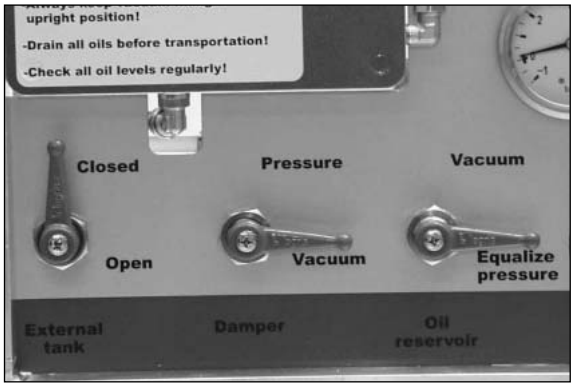
– Now the main power can be turned on and the vacuum process will start. First you will see the pressure gauge moving to a negative pressure.



– As soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure.



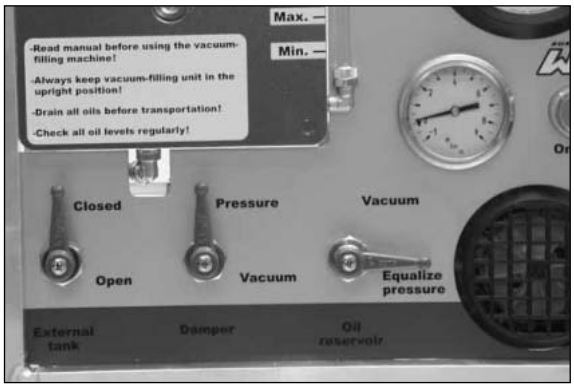
– As soon as the vacuum gauge reaches the specified pressure, in this example 4 mbar the lever External tank should be moved to Closed position and the lever Oil reservoir should be moved to Equalize pressure.



External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

– Now the vacuum will be released, and you will see the pressure rising on both gauges.

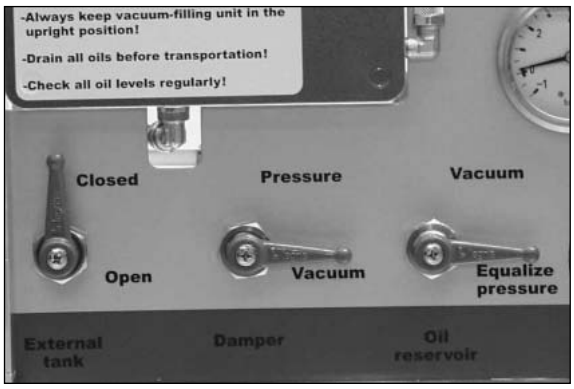
– Shortly after this the vacuum gauge starts to run to a low pressure. This is happening because the pump is now working in a small volume which includes the vacuum gauge. When the pressure gauge has reached 0 bar.



– The lever Damper can be moved to Pressure.

External tank	Closed
Damper	Pressure
Oil reservoir	Equalize pressure

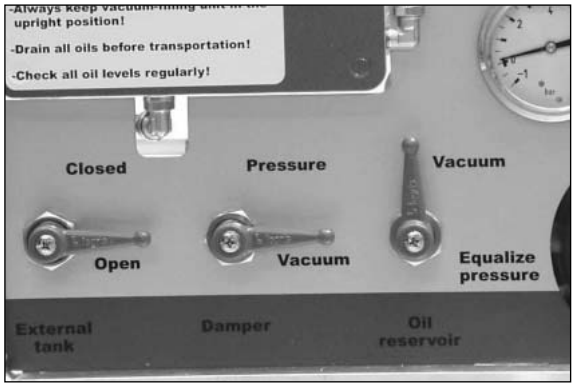
– This will start the forcing of oil into the damper, you will see the pressure gauge move to the pressure that has been set earlier, in this case 3 bar.



– As soon as the pressure has been reached, the lever damper can be moved to the Vacuum position.

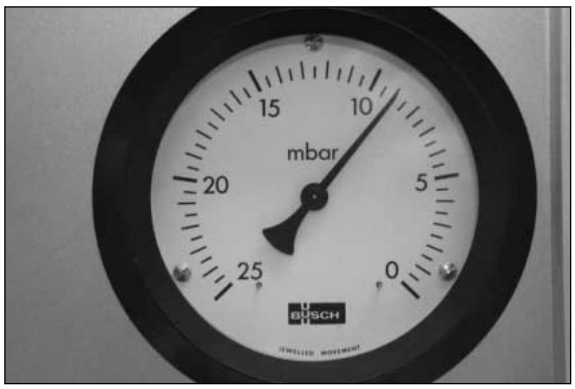
External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

– This will release the pressure and the pressure gauge will move back to 0 bar.

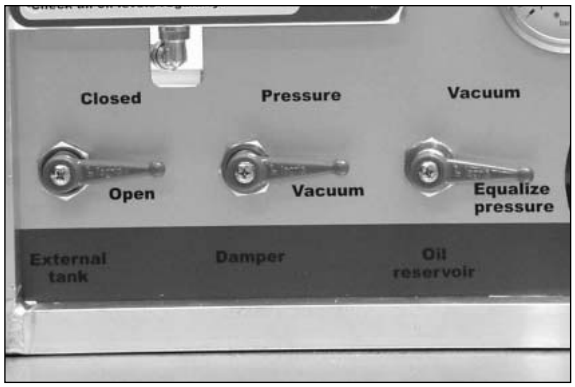


– When the pressure gauge reaches 0 bar, the lever Oil reservoir can be moved to Vacuum and the lever External tank must be moved to Open position, this will start the 2nd cycle of vacuum.

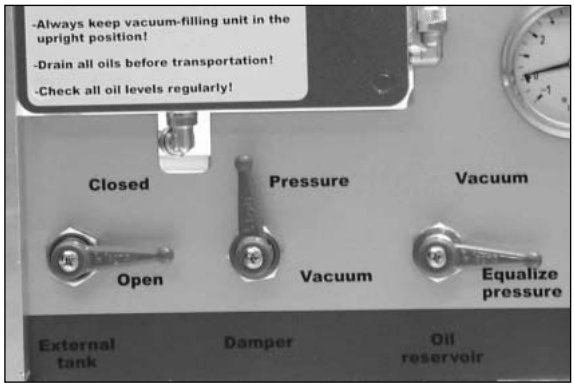
External tank	Open
Damper	Vacuum
Oil reservoir	Vacuum



– Now you will see the pressure gauge moving to a negative pressure, as soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure. As soon as the vacuum gauge reaches the specified pressure (2nd cycle), in this example 8 mbar, the lever Oil reservoir should be moved to Equalize pressure.



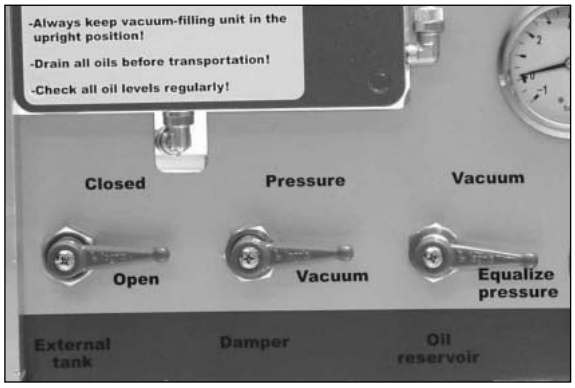
External tank	Open
Damper	Vacuum
Oil reservoir	Equalize pressure



– When the pressure gauge has reached 0 bar, the lever Damper can be moved to Pressure.

External tank	Open
Damper	Pressure
Oil reservoir	Equalize pressure

– This will start the forcing of oil into the damper, you will see the pressure gauge move to the pressure that has been set earlier, in this case 3 bar. As soon as the pressure has been reached the lever Damper can be moved to the Vacuum position.



External tank	Open
Damper	Vacuum
Oil reservoir	Equalize pressure

– This will release the pressure and the pressure gauge will move back to 0 bar.
– As soon as the pressure gauge reaches 0 bar, the main power switch can be turned off. This ends the vacuum filling process.

! CAUTION !

THE LID OF THE EXTERNAL TANK CAN BE REMOVED (LEAVE THE HOSES CONNECTED) AND THE SEPARATION PISTON SHOULD BE PRESSED INTO THE CORRECT POSITION USING TOOL T107S. THE DAMPER CAN NOW BE DISCONNECTED FROM THE VACUUM-FILLING MACHINE. THE FILLING ADAPTOR CAN BE REMOVED, SOME OIL MAY LEAK WHEN YOU ARE REMOVING THE FILLING ADAPTOR.

Filling procedure steering dampers

! CAUTION !

STEERING DAMPERS GENERALLY USE DIFFERENT OIL THAN NORMAL DAMPERS. FOR THIS REASON IT IS NECESSARY TO DRAIN AND CLEAN THE OIL RESERVOIR, AS DESCRIBED IN "MAINTENANCE" .MAKE SURE THAT IT IS CLEAR TO EVERYONE THAT THE OIL RESERVOIR CONTAINS STEERING DAMPER OIL! THERE MIGHT BE A SMALL AMOUNT OF OIL LEFT IN THE CONNECTOR UNDER THE LID OF THE EXTERNAL TANK.

– Connect the filling adaptor to the filling connector under the lid of the external tank and let the oil flow into a measuring cup.

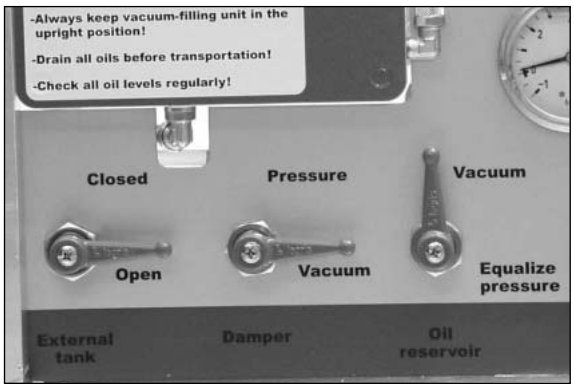
– Remove the lid of the external tank and connect the damper to the quick release connecter under the lid. Hang the damper on the hook under the lid, using a tie wrap. Lower the damper into the external tank.

! CAUTION !

BE CAREFUL NOT TO DAMAGE THE TOP OF THE CYLINDER AS THIS IS THE PLACE WHERE THE SEAL WORKS. DAMAGING THE TOP OF THE CYLINDER MAY RESULT IN LEAKAGE, WHEN THIS OCCURS THE VACUUM-FILLING MACHINE WILL NO LONGER FUNCTION. PUT THE LID ON THE EXTERNAL TANK AND APPLY A LIGHT PRESSURE TO THE LID. THE EXTERNAL TANK SHOULD BE USED IN THE UPRIGHT POSITION, AND THE TANK SHOULD ALWAYS BE PLACED LOWER THAN THE VACUUM FILLING UNIT.

– Now the vacuum filling unit has to be connected to the external tank, this means connecting the connection hose external tank.

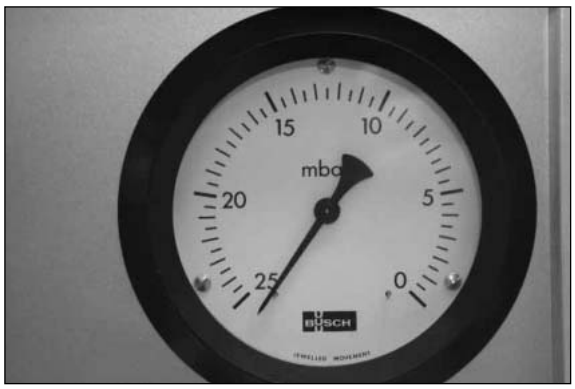
– And you also need to connect the damper connection to the external tank.

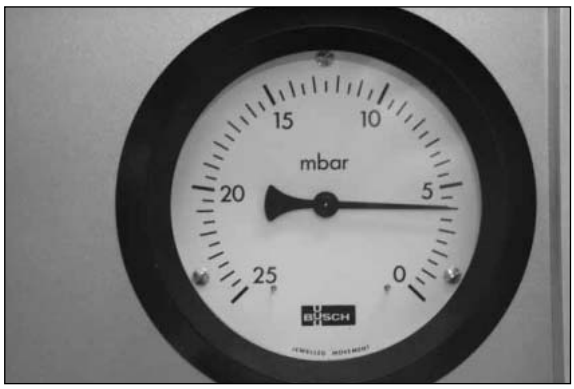


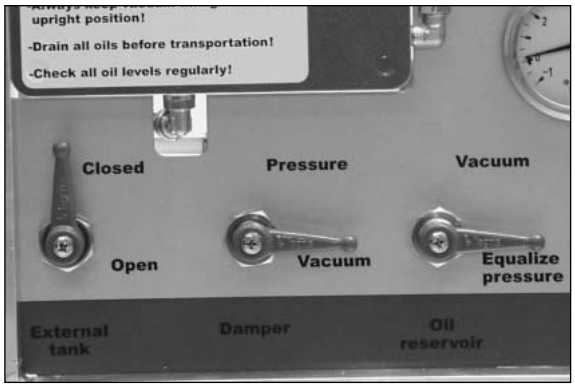
– Put the control levers in the following positions;

External tank	Open
Damper	Vacuum
Oil reservoir	Vacuum

– Now the main power can be turned on and the vacuum process will start.
– First you will see the pressure gauge moving to a negative pressure as soon as the vacuum gauge reaches the specified pressure, in this example 4 mbar as soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure.





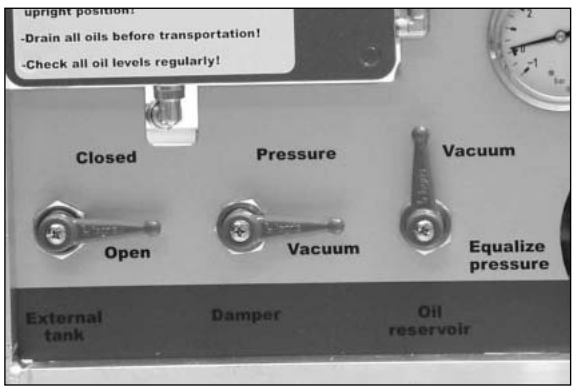


– The lever External tank should be moved to Closed position and the lever Oil reservoir should be moved to Equalize pressure. The lever Oil reservoir can be moved to Vacuum and the lever External tank must be moved to Open position.

External tank	Closed
Damper	Vacuum
Oil reservoir	Equalize pressure

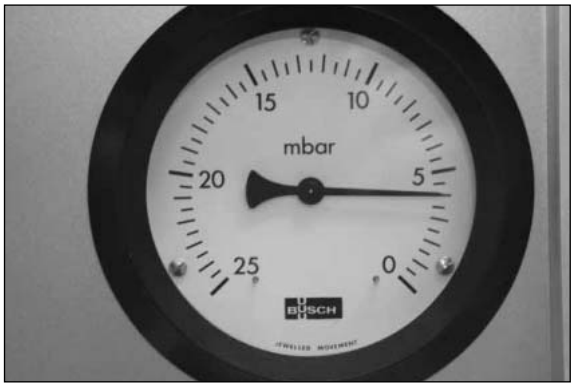
– Now the vacuum will be released, and you will see the pressure rising on both gauges.

– Shortly after this the vacuum gauge starts to run to a low pressure. This is happening because the pump is now working in a small volume witch includes the vacuum gauge.



– When the pressure gauge has reached 0 bar the lever Oil reservoir can be moved to Vacuum and the lever External tank must be moved to Open position, this will start the 2nd cycle of vacuum.

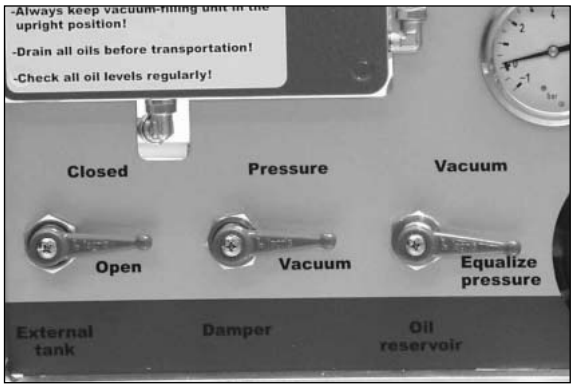
External tank	Open
Damper	Vacuum
Oil reservoir	Vacuum



– Now you will see the pressure gauge moving to a negative pressure, as soon as the pressure reaches 25 mbar the vacuum gauge will also start moving to a lower pressure.

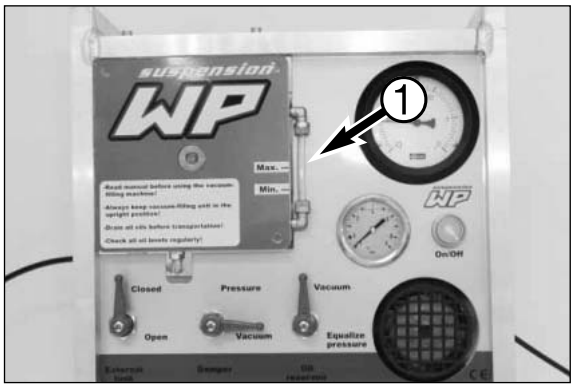
– As soon as the vacuum gauge reaches the specified pressure (2nd cycle), in this example 4 mbar the lever Oil reservoir should be moved to Equalize pressure.

External tank	Open
Damper	Vacuum
Oil reservoir	Equalize pressure



– Now the vacuum will be released, and you will see the pressure rising on both gauges, shortly after this the vacuum gauges starts to run to a low pressure. This is happening because the pump is now working in a small volume witch includes the vacuum gauge.

– The lid of the external tank can be removed and the filling adaptor can be disconnected. The filling adaptor can be removed from the steering damper, some oil may leak when you are removing the filling adaptor.
– Drain the small amount of oil left in the connector by connecting the filling adaptor to the filling connector under the lid of the external tank and letting the oil flow into a measuring cup. If the vacuumfilling machine is no longer used for filling steering dampers, the oil reservoir has to be drained and cleaned, as described in “maintenance”.

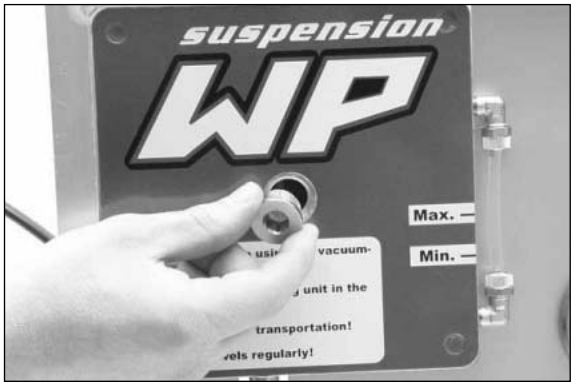


Frequent checks

– Checking / filling up oil reservoir
– Check the oil level ❶ in the oil reservoir, it should never be lower than min level to ensure correct vacuum filling of the damper.

! CAUTION !

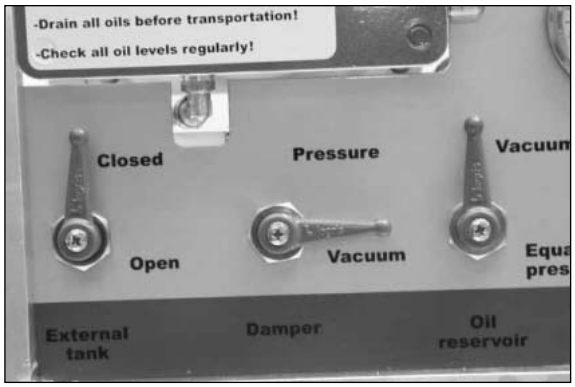
THE VACUUM-FILLING UNIT SHOULD ALWAYS BE IN THE UPRIGHT POSITION TO AVOID OIL SPREADING TROUGH THE ENTIRE SYSTEM!!! THIS WILL CAUSE SERIOUS DAMAGE TO THE VACUUM FILLING MACHINE! ONLY USE OIL APPROVED BY WP SUSPENSION!



– Remove the filling plug of the oil reservoir.

– Fill the oil reservoir until the level indicator reaches max. level.

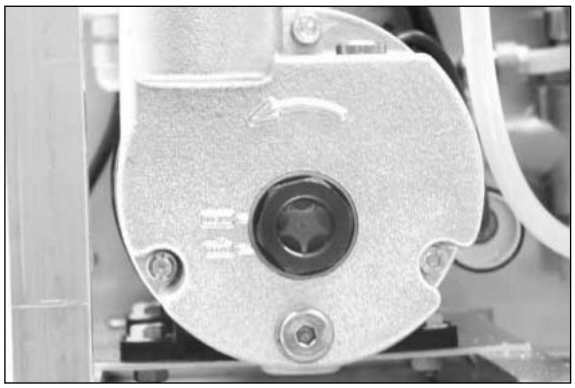
– Place back the filling plug using a torque wrench. The filling plug has to be fastened with a torque of 10 Nm.



– Before the unit can be used, the oil in the oil reservoir should be put under vacuum in order to get rid of the air inside of the oil.
– The control levers should be in the following positions (after correction of oil level):

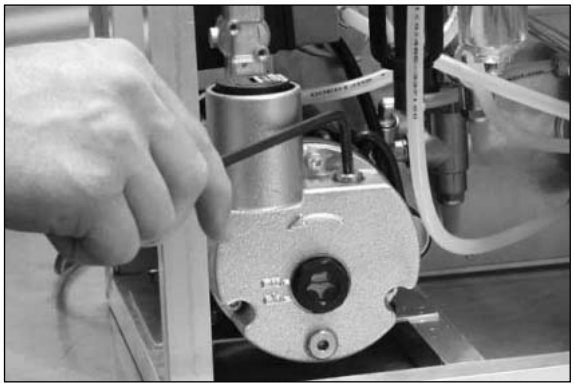
External tank	Closed
Damper	Vacuum
Oil reservoir	Vacuum

– Now switch the power on and let the machine run for about 1 minute, switch off the power.
– The vacuum-filling machine is now ready for use.



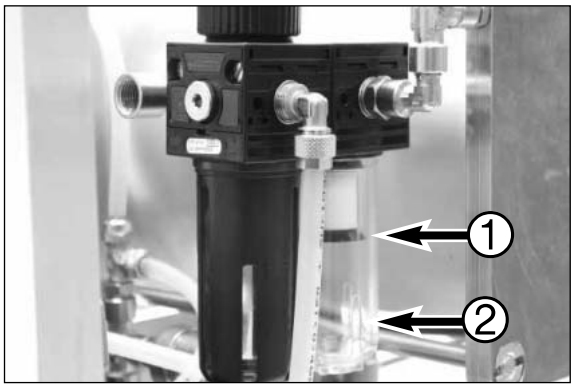
Checking / adjusting oil level vacuum pump

– The oil level of the vacuum pump should never exceed max level and should never be lower than the min level. Keep the oil level close to the max level to ensure good function and cooling of the pump.



– Remove the filling plug of the vacuum pump.

– Fill up the vacuum pump with oil to the max. level on the level indicator. Only use Busch Vm22 vacuum pump oil! Place back the filling plug.

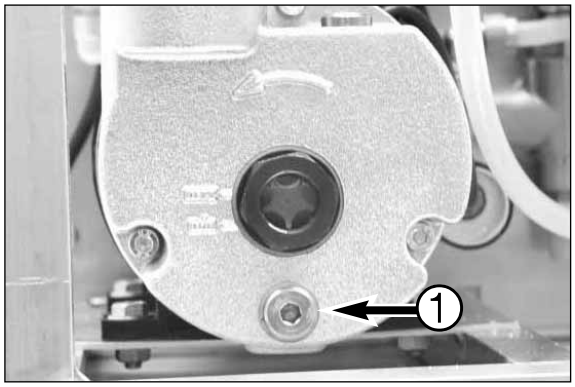


Checking / cleaning oil separator

– The oil level in the oil separator has to be checked regularly, to avoid the oil from being sucked into the system causing damage. If the level is close to 2 cm away from the black ring ❶ inside of the oil seperator, the oil must be drained.

– Turn the glass cap ❷ under the oil separator anti clockwise and remove the glass cap.

– Clean the cap ❸ and screw it back on the oil separator.



Maintenance

! CAUTION !

DURING MAINTENANCE THE VACUUM-FILLING MACHINE SHOULD ALWAYS BE DISCONNECTED FROM BOTH AIR AND ELECTRICAL SUPPLY!

Maintenance vacuum pump

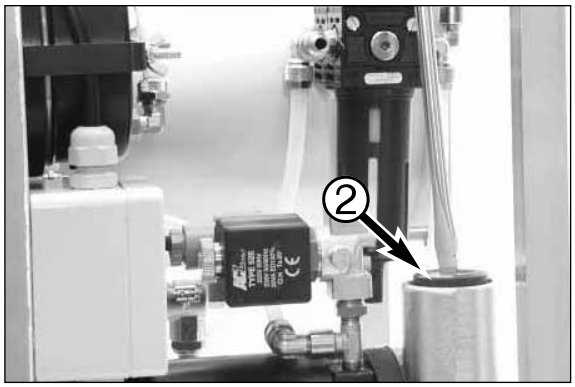
– The vacuum pump oil must be changed after the first 100 hours of operation. Further oil changes depend on operating conditions. The oil must be changed after 500-2000 hours of operation, but at least semi-annually. If there is considerable pollution or water in the sump oil (either as pure water or as an emulsion) oil changing is required as soon as possible.

– To change the oil, the warm pump must be switched off. Drain the oil trough the oil drain plug ❶.

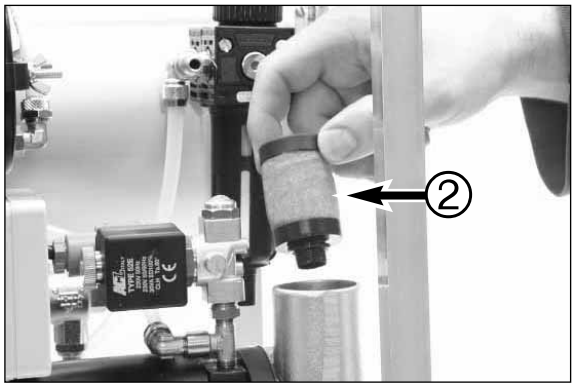
– Refasten the oil drain plug and fill fresh oil through the fill plug.
– Use only Bush Vm22 vacuum pump oil.

! CAUTION !

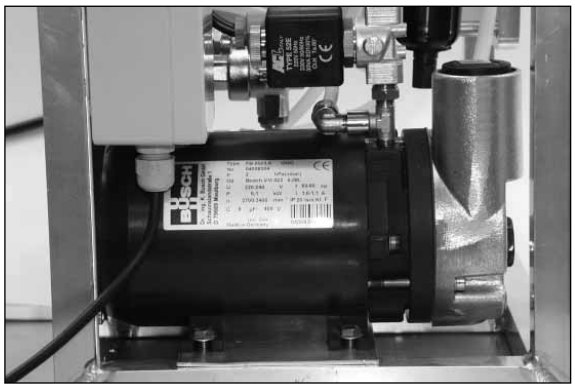
USED OIL SHOULD BE DISPOSED OF ACCORDING TO ENVIRONMENTAL LAWS.



– The exhaust filter must be changed every 500 hours of operation. If there is considerable pollution causing increased power consumption, increased temperature and/or decreased separation of oil in exhaust gas, it must be changed earlier. For changing of the exhaust filter unscrew the filter ❷ with a screwdriver and take it out of the housing.



– Place the new filter ❷ and fasten the filter hand tight, using a screwdriver.

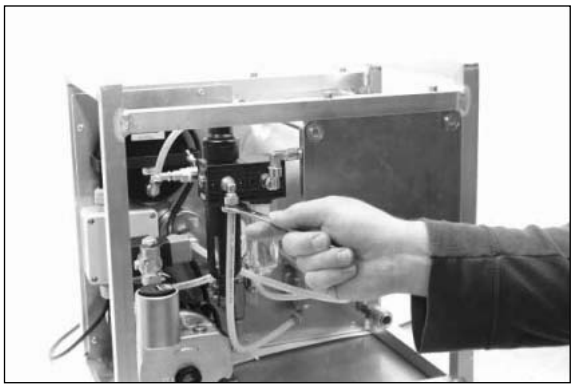


– The pump should be checked regularly for excessive dirt build-up on the surface of the pump. The dirt may cause the pump to thermally fail.
– The installation can be cleaned with a mild soap, do not use aggressive products as these might damage the stickers on the installation.

– The fan cover should also be checked regularly for dirt. Spoiling the fan cover prevents cool air intake and may lead to overheating of the vacuum pump.

Cleaning oil reservoir

– The oil reservoir should be disassembled and cleaned at least every 6 months. When the vacuumfilling installation is used intensively, the reservoir has to be cleaned more often. During filling of dampers a small amount of assembling dirt of the damper is coming into the oil reservoir. The dirt sinks down in the reservoir and gets caught behind a ridge in the reservoir. This prevents the dirt from (re)entering the damper. When too much dirt is collected, the dirt will be able to enter the damper. For this reason regular cleaning is necessary.



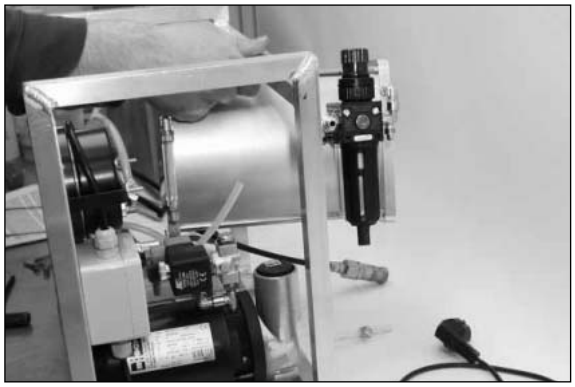
– For draining the oil reservoir, connect filling adaptor A to the damper connector of the filling unit and place the adaptor above a measuring cup. Let the oil run out of the reservoir. When there is no more oil flowing, the filling adaptor can be disconnected.
– Clean seperators before taking out oil reservoir, according to description under “frequent checks”.

– Remove the pressure pipe from the pressure regulator.

– Remove the vacuum pipe from the oil seperator.

– Remove the 4 bolts of the oil reservoir, while supporting the reservoir to prevent it from falling.

– When the bolts have been removed, gently move the backside of the reservoir inwards. This way the oil level indicator will not get stuck behind the backplate of the installation.



– The oil reservoir can now be taken out of the frame trough the backside of the installation. Guide the damper connector pipe to avoid kink.

– Place the oil reservoir on the front lid and remove the nuts from the rear lid using tool T103. Hold the threaded rod while unscrewing the nuts, to avoid the rods from piercing the front sticker of the oil reservoir.

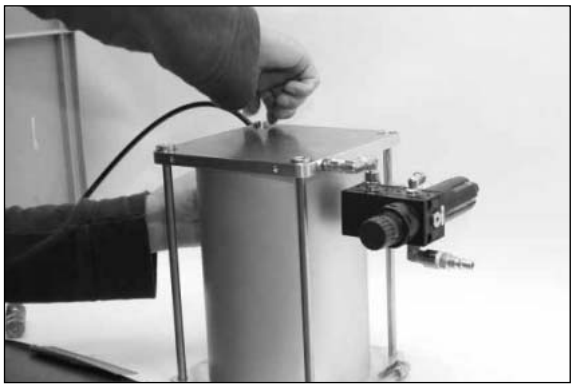
– Now hold the front lid and the aluminium tube down and gently pul the rear lid upwards. Be careful as the lid might suddenly pop lose.

– Now clean the inside of the oil reservoir with a degreaser and make sure there is no dirt or degreaser left inside of the oil reservoir.

– Grease the O-ring of the rear lid with special O-ring grease (PP300) T158.

– Replace the rear lid carefully.

– Be sure that the front and rear lid are correctly lined up.



– Screw the nuts on the treaded rod and tighten them with the adjustable pin spanner T103.
– Hold the threaded rod while screwing the nuts, to avoid the rods from piercing the front sticker of the oil reservoir.

– Now place back the oil reservoir in the reversed order.

Filling damper oil
– Remove the filling plug of the oil reservoir.
– Fill the oil reservoir until the level indicator reaches max. level. Place back the filling plug using a torque wrench. The filling plug has to be fastened with a torque of 10 Nm.

! CAUTION !

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Vacuum air bleeding of damper oil
– Before the unit can be used, the oil in the oil reservoir should be put under vacuum in order to get rid of the air inside of the oil.
– The control levers should be in the following positions (after new oil filling):

External tank	Closed
Damper	Vacuum
Oil reservoir	Vacuum

– Now switch the power on and let the machine run for about 2 minutes, switch off the power. The vacuum-filling machine is now ready for use.

Spare parts

	Partnumber
Exhaust filter vacuum pump	T1254
O-ring oil reservoir	T1253
Vacuum pump oil Vm22, 1 litre	T1255
O-ring lid external tank	T1258
Quick release hydraulic connector male	T1262
Quick release hydraulic connector female	T1263
Filling adapter A	T1245S
Filling adapter B	T1246S
Filling adapter C	T1247S
Connecting hose external tank	T1259
Seal (filling adapter A)	T1248
O-ring 18x2 Viton (filling adapter C)	T1256
O-ring 17.12x2.62 UP Viton (filling adapter B)	T1257
Filling plug oil reservoir	T1252
Complete oil reservoir	T1250
Sticker front lid oil reservoir	T1251
Manual vacuum-filling machine	5300.0074
Hose PU 100 8x6 black (1 meter)	T1260
Hose PU 100 8x6 transparent (1 meter)	T1261

Filling list

Component	External tank	Filling adaptor	Pressure 1st cycle	Pressure 2nd cycle	Overpressure
3612 PGB/CC	Yes	A or B **	4 mbar	8 mbar	3 bar
3612 Emulsion *					
4681 PGB/CC	Yes	A or B **	4 mbar	8 mbar	3 bar
4681 Emulsion *					
4618 Competition	No	A	4 mbar	4 mbar	3 bar
5018 Competition	No	A	4 mbar	8 mbar	3 bar
5018 PDS 1998	Yes	B	4 mbar	8 mbar	3 bar
5018 PDS 1999	Yes	B	4 mbar	8 mbar	3 bar
5018 PDS 2000	Yes	B	4 mbar	8 mbar	3 bar
5018 PDS 2001	Yes	B	4 mbar	8 mbar	3 bar
5018 PDS 2002	No	A	4 mbar	8 mbar	3 bar
5018 PDS 2003	No	A	4 mbar	8 mbar	3 bar
5018 PDS 2004	No	A	4 mbar	8 mbar	3 bar
2010 Steering damper *					
1508 Steering damper	Yes	C	4 mbar	4 mbar	-

* = not possible
** = If the shock absorber is supplied with a plug R1/8 you can use filling adaptor “A”.

Short operation instruction for vacuum filling unit

! CAUTION !

IF AT ANY TIME YOU FEEL UNCERTAIN OF THE VACUUM FILLING OF A DAMPER, START OVER AGAIN TO ENSURE SAFETY.

Procedure without external tank

– Begin situation
  External tank Closed
  Damper Vacuum
  Oil reservoir Vacuum

– Switch the pump on

– At 1st cycle pressure (mbar)
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Closed
  Damper Pressure
  Oil reservoir Equalize pressure

– At required pressure
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Closed
  Damper Vacuum
  Oil reservoir Vacuum

– At 2nd cycle pressure (mbar)
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Closed
  Damper Pressure
  Oil reservoir Equalize pressure

– At required pressure
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

When pressure has dropped back to 0 bar, the pump can be shut down.

Procedure using the external tank

– Begin situation
  External tank Open
  Damper Vacuum
  Oil reservoir Vacuum

– Switch the pump on

– At 1st cycle pressure (mbar)
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Closed
  Damper Pressure
  Oil reservoir Equalize pressure

– At required overpressure
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Open
  Damper Vacuum
  Oil reservoir Vacuum

– At 2nd cycle pressure (mbar)
  External tank Open
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Open
  Damper Pressure
  Oil reservoir Equalize pressure

– At required overpressure
  External tank Open
  Damper Vacuum
  Oil reservoir Equalize pressure

When pressure has dropped back to 0 bar, the pump can be shut down.

Procedure steering damper

– Begin situation
  External tank Open
  Damper Vacuum
  Oil reservoir Vacuum

– Switch the pump on

– At 1st cycle pressure (mbar)
  External tank Closed
  Damper Vacuum
  Oil reservoir Equalize pressure

– At 0 bar
  External tank Open
  Damper Vacuum
  Oil reservoir Vacuum

– At 2nd cycle pressure (mbar)
  External tank Open
  Damper Vacuum
  Oil reservoir Equalize pressure

When pressure has dropped back to 0 bar, the pump can be shut down.