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Notes on these instructions

This repair manual includes information and instructions on how to perform repair work on the seat suspension MSG 93.

The repair of the upper seat part is described in the repair manual for the upper seat part, to which a reference is made, if required.

Example: Remove the upper seat part (see repair manual for the upper seat part).

Each chapter starts with a list of all preparatory work to be completed before starting the repair. These preparations are described in separate chapters and shall be carried out without the preparatory steps described there.

At the beginning of each description for repair you will find an overview diagram. All parts included in the overview diagrams within one chapter are consecutively numbered starting with "1". Each component is referred to by the same number throughout the document.

With the help of these overview diagrams, an experienced technician will gain a quick overview.

For spare part orders, please use the numbers stated in the latest issue of the relevant spare parts catalogue.

The description of the work steps refers to the removed seat suspension and the dismounted upper seat part. Depending on the individual installation situation, some work may also be performed on the installed seat suspension. For this reason, check the environment of the installed seat suspension for this possibility before starting work. The safety instructions of the specific vehicle manufacturers and those stated in chapter 1 of this repair manual must be strictly observed.
This repair manual also includes some information on special seat designs, if these require further explanation. Since the scope of delivery depends on the specific customer order, the actual seat suspension design may deviate from the descriptions and illustrations in this manual.

If not stated otherwise, the directional indications "front, back" and "right, left" refer to the installed seat suspension regarded in the driving direction of the vehicle.

The document layout is suitable for later use of this repair manual via CD-ROM / INTERNET / INTRANET. A navigation line was entered below the heading for this. This navigation line includes the reference to the Table of Contents or the home page (end) which allows the user to jump directly to these chapters after the corresponding hyperlinks have been set.

**Basic information on the suspension**

The suspension is provided with a long-lasting lubrication (approx. 10 years). The lubricating points must be re-greased only after repair work, using an acid-free multi-purpose lubricant.

Replace all removed old parts with enclosed new ones. If there is no new part included, the old one is to be cleaned and checked for its suitability for re-use. Defective parts and worn parts must be replaced by new ones.

GRAMMER AG rejects any warranty claims if damaged or worn parts and assemblies are not replaced by spare parts released by GRAMMER AG.
Qualified personnel

These instructions offer basic information on proper technical seat repair. The contents of the work procedures described are intended for professionally educated technicians with profound product knowledge. This level of knowledge is an imperative requirement when performing the work and procedures described in this document.

In order to avoid bodily injury, reduced operational safety of the suspension or damage to the suspension resulting from improperly performed work, all information and instructions, in particular the safety instructions stated in chapter 1, must be read carefully and strictly observed.

As an inevitable matter of fact, GRAMMER AG cannot evaluate all situations and consequences that may bear a risk of injury for the persons involved in the described work procedures. For this reason it is absolutely necessary that every person who carries out repair work at the seat suspension uses his/her professional knowledge to make sure that his/her own safety will not be put at risk and that the selected type of repair will not cause any negative effects, in particular with regard to technical safety.

For this reason, GRAMMER AG disclaims liability for any possible damage of this kind.

We point out explicitly that all work steps and procedures described are to be performed with consideration to the applicable directives and regulations stipulated by the relevant local authorities and in compliance with the provisions on health protection, prevention of accidents and environmental protection.
Change notification and copyright

The suspensions are subject to continuous development. Please understand that we must reserve the right to make changes in shape, equipment and technical design. For this reason, the contents of this repair manual cannot be used to substantiate any possible claims.

Reprint, translation and copies of this manual or parts thereof are admissible only after written approval.

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1.1 Safety instructions
1.2 Rating plate

Note:
Please refer to the applicable seat operating instructions for further details.
1.1 Safety instructions

1. All inspection, test and repair work must be performed exclusively by adequately trained personnel.

2. All work steps and procedures described are to be performed with consideration to the applicable directives and regulations stipulated by the relevant local authorities and in compliance with the provisions on health protection, prevention of accidents and environmental protection.

3. Special notes in this repair manual are highlighted as follows:

⚠️ WARNING ... indicates possible risks for persons and their prevention.

⚠️ ATTENTION ... indicates possible damage or deterioration of material and their prevention.

Note: ... introduces an additional explanation for better understanding of the work to be carried out.

Installation note: ... introduces an additional explanation for better understanding of the installation work to be carried out.

4. Before starting any repair work
   - disconnect the battery from the power supply and
   - move the suspension down to the end stop.

5. When using oil, grease and other chemical substances, the relevant safety regulations for the handling and use of these products must be observed.
1.2 Rating plate

The rating plate is located on the back of the suspension in the top left corner.

The rating plate shows the following information (example):

(A) **BENENNUNG (DENOMINATION)** = MSG93

(B) **SACH Nr. (INVENTORY No.)** = 136 000

(C) **Year / CW / Assembly**
   - Year of manufacture = 04 (2004)
   - built in week = 44 (October)
   - Assembly = 091

(D) **AUFTRAGS NR. (Order No.)** = DE 45830380022

**Note:**
The inventory no. (B) is always to be quoted when orders are placed.
2 Repair work

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# Repair work

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2.1 Adjusting rail set (lower rail parts) – removal and installation

REMOVAL / INSTALLATION

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(1) Micro-encapsulated cap screw
..................................replace, 25 Nm

(2) Washer

(3) Adjusting rail
(delivery option) ..................grease

(4) L-bar (delivery option)

(5) Upper suspension part

Note:
The adjusting rails (3) can be unscrewed in different ways depending on the delivery option chosen. The number of required washers (2) may also vary. A description of the removal and installation is provided taking one of the most commonly used adjusting rail sets (3) as an example.
2.1 Adjusting rail set (lower rail parts) – removal and installation

Removal and installation

1. Remove the upper seat part (see repair manual for the upper seat part).

2. Prepare a screw positioning diagram for the four micro-encapsulated cap screws (1).

3. Undo the four micro-encapsulated cap screws (1) from the upper suspension part (5) and remove them with the washers (2).

**Installation notes:**
- Replace the micro-encapsulated cap screw (1) by a new one, 25 Nm.
- Tighten the micro-encapsulated cap screw (1) according to the respective screw positioning diagram.
2.1 Adjusting rail set (lower rail parts) – removal and installation

REMOVAL / INSTALLATION

4 Adjusting rail set with an L-bar (4):
   Remove the L-bar (4).
   **Note:**
   When screwing the L-bar (4) on, the washer (2) is no longer required.

5 Take off the two adjusting rails (3).
   **Installation note:**
   Apply acid-free multi-purpose lubricant to the top and side surfaces (F) of the adjusting rails (3).

6 Re-install the components in the reverse order of their removal.
2.2 Bellows – removal and installation

REMOVAL / INSTALLATION

(1) Upper suspension part
(2) Bellows
(3) Lower suspension part
(4) Knob for weight adjustment
(5) Wire insert
(6) Hook (lower suspension part)

1 Remove the upper seat part (see repair manual for the upper seat part).

2 Remove the adjusting rail set (chapter 2.1).
Removal and installation

3 Take off the bellows (2) from the eight hooks (6) on the lower suspension part (3).

4 Pull the bellows (2) at the front over the knob for weight adjustment (4).

5 Pull the bellows (2) at the back over the upper suspension part (1) and remove it from the suspension in forward direction.

6 Remove the wire insert (5) from the bellows (2).

Installation notes:
- The welding joint of the wire insert (5) must be located in the front part of the bellows (2).
- Install the wire insert (5) in the middle fold of the bellows (2).

7 Re-install the components in the reverse order of their removal.
2.3 Compressor – removal and installation

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2.3.1 Removal of the old compressor – installation of the new compressor

REMOVAL INSTALLATION

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(1) Cable tie.............................. 360 Nm
(2) Upper suspension part
(3) Cable tie
(4) Compressor cable
(5) Right-angle plug
(6) Flat plug
(7) Air hose
(8) Hose clamp
(9) Compressor, old
(10) Pad, old
(11) Insulating tape

WARNING The pressure in the pneumatic system may cause injury! The pneumatic system is to be vented before removing the old compressor (9).
2.3.1 Removal of the old compressor – installation of the new compressor

1. Remove the upper seat part (see repair manual for the upper seat part).

2. Remove the adjusting rail set (chapter 2.1).

3. Remove the bellows (chapter 2.2).

**Removal**

4. Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing! Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
5 Take off the insulating tape (11) from the compressor cable (4) and the two air hoses (7).

6 Mark the points where the compressor cable (4) is secured with five cable ties (3) and remove the cable ties (3).

7 Disconnect the electrical connection between the connector (connecting cable) and right-angle plug (5) (see chapter 2.8).

8 Disconnect the electrical connection between the valve and flat plug (6) (see chapter 2.5).
9  **WARNING** Damage!
Make sure not to damage the air hose connection (7), otherwise tightness will not be ensured.

Open the hose clamp (8) and pull off the air hose (7) from the connection of the old compressor (9).

10 Mark the points where the old compressor (9) is secured with two cable ties (1) and remove the cable ties (1).

11 Pull out the compressor cable (4) in forward direction and remove it with the old compressor (9) and old pad (10).
## 2.3.1 Removal of the old compressor – installation of the new compressor

### Installation

1. For fixing the shorter new compressor (12), drill two holes (arrows) with a diameter of 12 mm into the upper suspension part (2).

**Note:**
- Deburr the drill holes (arrows) in the upper suspension part (2).
- The distances:
  - \( A = 45 \text{ mm} \)
  - \( B = 20 \text{ mm} \)
  - \( C = 53 \text{ mm} \)
- Mark the position of the centres for the holes to be drilled into the upper suspension part (2).
- \( M \) = Mid-line of the upper suspension part (2), lengthwise.
2. Insert the new compressor (12) with the compressor cable (4) into the suspension and lay the compressor cable (4) according to the later fixation.

3. Place the new pad (13) between the upper part of the suspension (2) and new compressor (12) in such a way that the new compressor (12) cannot get into contact with the upper suspension part (2).
2.3.1 Removal of the old compressor – installation of the new compressor

4 Secure the new compressor (12) with two cable ties (1) to the front drill holes and the new drill holes intended for that, according to the marking.

**Notes:**

- Run the cable ties (1) through the drill holes in the upper suspension part (2) in such a way that the locking heads of the cable ties (1) point outwards.
- Loosely close the cable ties (1) so that the new compressor (12) can still be moved.
- Align the new compressor (12) and then use pliers to tighten the locking heads of the cable ties (1) to 360 Nm in downward direction (arrow).
- Mount the new compressor (12) in such a way that the piston housing (X) does not get into contact with the upper suspension part (2).
5 **WARNING** Damage!
Make sure not to damage the connection of the new compressor (12), otherwise tightness will not be ensured.

Connect the air hose (7) to the connection of the new compressor (12) and secure it with the hose clamp (8).

**Notes:**
- Clean the connection of the new compressor (12) prior to the installation of the air hose (7).
- Use the sealant STUCARIT 203 or any other suitable coating.
- Leave the connection opening of the new compressor (12) free of sealant.
- The flag of the hose clamp (8) must not point upwards.
6 Establish the electrical connection between the valve and flat plug (6) (see chapter 2.5).

7 Establish the electrical connection between the connector (connecting cable) and right-angle plug (5) (see chapter 2.8).

8 Wind insulating tape (11) several times around the compressor cable (4) and two air hoses (7) in the border area of the upper suspension part (2) in a width of at least 40 mm to protect them from being chafed.
2.3.1 Removal of the old compressor – installation of the new compressor

9 Secure the compressor cable (4) with five cable ties (3) according to the marking.

**Note:**
Tie back the excess length of the compressor cable (4).

10 Install the bellows (chapter 2.2).

11 Install the adjusting rail set (chapter 2.1).

12 Install the upper seat part (see repair manual for the upper seat part).
2.3.2 New compressor – removal and installation

REMOVAL / INSTALLATION

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(1) Cable tie.............................. 360 Nm
(2) Upper suspension part
(3) Cable tie
(4) Compressor cable
(5) Right-angle plug
(6) Flat plug
(7) Air hose
(8) Hose clamp
(9) Compressor (new).......apply sealant to the connection
(10) Pad
(11) Insulating tape
(12) Right-angle plug (compressor)
**WARNING** The pressure in the pneumatic system may cause injury! The pneumatic system is to be vented before removing the compressor (9).

**Note:**
Before removing the compressor (9), always check whether the compressor (9) or the compressor cable (4) is defective. Only replace the defective component (compressor (9) or compressor cable (4)).
2.3.2 New compressor – removal and installation

REMOVAL / INSTALLATION

1. Remove the upper seat part (see repair manual for the upper seat part).

2. Remove the adjusting rail set (chapter 2.1).

3. Remove the bellows (chapter 2.2).

Removal and installation

4. Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing! Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
5. Disconnect the electrical connection between the compressor (9) and right-angle plug (12).

**Installation note:**
The cable outlet at the right-angle plug (12) must point upwards when establishing the connection with the compressor (9).
6 If the compressor (9) is defective:

6.1 Open the hose clamp (8) and pull off the air hose (7) from the compressor connection (9).

**WARNING** Damage!
Make sure not to damage the air hose connection (7), otherwise tightness will not be ensured.

**Installation notes:**
- Use the sealant STUCARIT 203 or any other suitable coating.
- Leave the connection opening of the compressor (9) free of sealant.
- The flag of the hose clamp (8) must not point upwards.
2.3.2 New compressor – removal and installation

6.2 Mark the points where the compressor (9) is secured with two cable ties (1) and remove the cable ties (1).

**Installation note:**
Run the cable ties (1) through the corresponding drill holes in the upper suspension part (2) in such a way that the locking heads of the cable ties (1) point outwards. Loosely close the cable ties (1) so that the compressor (9) can still be moved. Align the compressor (9) and then use pliers to tighten the locking heads of the cable ties (1) to 360 Nm in downward direction (arrow).
6.3 Remove the compressor (9) with the pad (10).

**Installation notes:**
- Place the pad (10) between the upper suspension part (2) and the compressor (9) in such a way that the compressor (9) cannot get into contact with the upper suspension part (2).
- Mount the compressor (9) in such a way that the piston housing (X) does not get into contact with the upper suspension part (2).
7 If the compressor cable (4) is defective:

7.1 Take off the insulating tape (11) from the compressor cable (4) and the two air hoses (7).

**Installation note:**
Wind insulating tape (11) several times around the compressor cable (4) and two air hoses (7) in the border area of the upper suspension part (2) in a width of at least 40 mm to protect them from being chafed.

7.2 Mark the points where the compressor cable (4) is secured with five cable ties (3) and remove the cable ties (3).

**Installation note:**
Tie back the excess length of the compressor cable (4).
7.3 Disconnect the electrical connection between the connector (connecting cable) and right-angle plug (see chapter 2.8).

7.4 Disconnect the electrical connection between the valve and flat plug (6) (see chapter 2.5).

7.5 Pull out the compressor cable (4) in forward direction.

8 Re-install the components in the reverse order of their removal.
2.4 Upper suspension part – removal and installation

REMOVAL / INSTALLATION

(1) Stud ...........................grease
(2) Upper suspension part
(3) Hexagon nut ..........replace, 25 Nm
(4) Swinging structure
(5) Roller
(6) Roller guide ......................grease
2.4 Upper suspension part – removal and installation

1. Remove the upper seat part (see repair manual for the upper seat part).

2. Remove the adjusting rail set (chapter 2.1).

3. Pull the bellows down over the upper suspension part (2) and lay it down (see chapter 2.2).

4. Remove the two cable ties with which the compressor is secured to the upper suspension part (2) (see chapter 2.3) and lay down the compressor with the pad.

5. Remove the two cable ties with which the air hose set is secured to the upper suspension part (2) (see chapter 2.9).
2.4 Upper suspension part – removal and installation

Removal and installation

6 Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.

7 Unscrew the two hexagon nuts (3).

**Installation note:**
Replace the hexagon nut (3) by a new one, 25 Nm.

8 Knock out the two studs (1) and remove them.

**Installation note:**
Apply acid-free multi-purpose lubricant to the entire surface of the shoulder (F) and collar (F) of the stud (1).
9 Slightly lift the upper suspension part (2) at the back and lift the roller guides (6) out of the front rollers (5) of the swinging structure (4) by turning sideways. Then, remove the upper suspension part (2).

**Installation note:**
Apply acid-free multi-purpose lubricant to the front surface (roller starting point) (F) of the two roller guides (6).

10 Re-install the components in the reverse order of their removal.
2.5 Height and weight adjuster – removal and installation

REMOVAL / INSTALLATION

(1) Lower suspension part
(2) Connector (connecting cable)
(3) Flat plug (compressor cable)
(4) Toothed washer
(5) Hexagon nut ......................... 20 Nm
(6) Plastic knob
(7) Hexagon socket screw
(8) Valve
(9) Air hose
(10) Upper suspension part
(11) Retaining ring (quick fastener)

Note:
For removing the height and weight adjuster, it is not necessary to remove the upper seat part.
2.5 Height and weight adjuster – removal and installation

REMOVAL / INSTALLATION

WARNING The pressure in the pneumatic system may cause injury! The pneumatic system is to be vented before removing the height and weight adjuster.

ATTENTION Damage!
- Before withdrawing the air hose (9) from the valve (8), the retaining ring (11) at the valve (8) must be simultaneously pressed down on both sides (e.g. using flat pliers) so as to avoid damage (marks) to the air hose (9).
- Do not connect the air hose (9) more than 1 to 2 times. Always check the air hose (9) for damage (marks) prior to connecting.
1. Take off the bellows from the lower suspension part (1) (see chapter 2.2) and fasten it to the upper suspension part (10).

**Removal and installation**

2. Move the suspension to the highest position and secure it there.

⚠️ **WARNING** Risk of crushing! Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.

3. Disconnect the electrical connection between the valve (8) and connector (2).

4. Disconnect the electrical connection between the valve (8) and flat plug (3).
5 Pull out the air hose (9) from the valve (8).
**Installation note:**
Insert the air hose (9) into the valve (8) as far as possible.

6 Unscrew the hexagon socket screw (7) and take off the plastic knob (6).

7 Unscrew the hexagon nut (5).
**Installation note:**
Hexagon nut (5), 20 Nm.

8 Remove the toothed washer (4).

9 Pull out the valve (8) from the lower suspension part (1).

10 Re-install the components in the reverse order of their removal.
2.6 Vertical shock absorber – removal and installation

REMOVAL / INSTALLATION

(1) Swinging structure
(2) Vertical shock absorber
(2) Circlip
(4) Stud .................................. grease
(5) Shock absorber holder
(6) Circlip
(7) Stud .................................. grease

1 Remove the upper seat part (see repair manual for the upper seat part).

2 Remove the adjusting rail set (chapter 2.1).
3 Remove the bellows (chapter 2.2).

4 Remove the valve from the lower suspension part (see chapter 2.5).

**Note:**
The electrical connections at the valve do not need to be disconnected and the air hose does not need to be removed.

**Removal and installation**

5 Move the suspension to the highest position and secure it there.

⚠️ **WARNING** Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
6 Loosen up the circlip (6) from the stud (4) and then remove it.

7 Knock out the stud (4) from the shock absorber holder (5) and vertical shock absorber (2).
   **Installation note:**
   Apply acid-free multi-purpose lubricant to the entire surface of the stud (4).

8 Loosen up the circlip (3) from the stud (7) and then remove it.

9 Knock out the stud (7) from the swinging structure (1) and vertical shock absorber (2).
   **Installation note:**
   Apply acid-free multi-purpose lubricant to the entire surface of the stud (7).

10 Remove the vertical shock absorber (2).

11 Re-install the components in the reverse order of their removal.
2.7 Weight indicator – removal and installation

REMOVAL / INSTALLATION

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(1) Lower suspension part .......... grease
(2) Swinging structure
(3) Guide (display window)
(4) Weight indicator ribbon
(5) Roller
(6) Tension spring
(7) Upper suspension part
(8) Staple

Note:
It is not necessary to dismantle the upper seat part in order to remove the weight indicator.
2.7 Weight indicator – removal and installation

Removal and installation

1. Take off the bellows from the lower suspension part (1) (see chapter 2.2) and fasten it to the upper suspension part (7).

2. Move the suspension to the highest position and secure it there.

⚠️ **WARNING** Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.

3. Unhook the tension spring (6) from the weight indicator ribbon (4).
2.7 Weight indicator – removal and installation

REMOVAL / INSTALLATION

4 Unhook the tension spring (6) from the hole of the lower suspension part (1).

**Installation notes:**
- Hang in the hook (facing outwards) of the tension spring (6) into the hole of the lower suspension part (1).
- Fit the hook of the tension spring (6) between the first and third spiral.

5 Remove the guide (3) from the opening of the lower suspension part (1).

**Installation note:**
Apply acid-free multi-purpose lubricant to the opening (F) in the lower suspension part (1).

6 Remove the roller (5) from the weight indicator ribbon (4).
7 Open the two staples (8) on the weight indicator ribbon (4) and remove the weight indicator ribbon (4) from the tube of the swinging structure (2).

**Installation note:**
Put the two narrow imprinted bars (arrows) on the ribbon end of the weight indicator ribbon (4) on top of each other and attach two staples (8).

8 Re-install the components in the reverse order of their removal.
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2.8.1 Connecting cable – removal and installation (delivery option 1)

REMOVAL / INSTALLATION

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(1) Lower suspension part
(2) Connecting cable
(3) Compressor cable
(4) Cable tie
(5) Cable tie
(6) Right-angle plug (compressor cable)
(7) Connector (connecting cable)
(8) Connector (connecting cable)
(9) Valve
(10) Connector plug housing
(11) Connector set
(12) Connector plug (parts variant)
(13) Connector plug (parts variant)
(14) Upper suspension part
2.8.1 Connecting cable – removal and installation (delivery option 1)

**Note:**
It is not necessary to dismantle the upper seat part in order to remove the connecting cable (2).

1. Take off the bellows from the lower suspension part (1) (see chapter 2.2) and fasten it to the upper suspension part (14).

**Removal and installation**

2. Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
3 Mark the point where the connecting cable (2) is secured to the lower suspension part (1) with the cable tie (4) and remove the cable tie (4).

**Installation note:**
Close the cable tie (4) only loosely and do not pull it tight.

4 Mark the points where the connecting cable (2) and compressor cable (3) are secured with four cable ties (5) and remove the cable ties (5).

**Installation note:**
Tie back the excess length of the connecting cable (2).

5 Disconnect the electrical connection between the connector (7) and right-angle plug (6).
6 Disconnect the electrical connection between the connector (8) and valve (9).

7 Pull out the connecting cable (2) from the suspension and remove it.

8 If the connector set (11) is defective:
   Pull out the connector set (11) from the connector plug housing (10).
   **Note:**
   The different delivery options for the connector plugs (12 and 13) are to be observed.

9 Re-install the components in the reverse order of their removal.
2.8.2 Connecting cable – removal and installation (delivery options 2 and 3)

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(1) Lower suspension part
(2) Connecting cable
(3) Compressor cable
(4) Cable tie
(5) Cable tie
(6) Right-angle plug (compressor cable)
(7) Connector (connecting cable)
(8) Connector (connecting cable)
(9) Valve
(10) Bellows carrier (swinging structure)
(11) Cable tie
(12) Upper suspension part
(13) Cable tie
(14) Cable for the seat switch
(15) Cable tie
Note:
The connecting cable (2) of the delivery option 3 differs from the connecting cable (2) of the delivery option 2 by the additional cable for the seat switch (14). The point from which on the cable for the seat switch (14) runs in the lower suspension part (1) is marked with an arrow (X) in Fig. A.

1 Remove the bellows (chapter 2.2).

Removal and installation

2 Move the suspension to the highest position and secure it there.

⚠️ WARNING Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
3 Mark the points where the connecting cable (2) is secured to the lower suspension part (1) with two cable ties (11) and remove the cable ties (11).

4 Mark the point where the right-angle plug (6), compressor cable (3) and cable for the seat switch (14) are fixed with the cable tie (15) and remove the cable tie (15).

**Installation note:**
Tie back the excess length of the compressor cable (3).

5 Disconnect the electrical connection between the connector (7) and right-angle plug (6).

6 Disconnect the electrical connection between the connector (8) and valve (9).
7 Delivery option 3:
Connecting cable (2) with an additional cable for the seat switch (14):

7.1 Mark the point where the cable for the seat switch (14) is secured to the upper suspension part (12) with the cable tie (13) and remove the cable tie (13).

7.2 Mark the point where cable tie (5) is secured to the bellows carrier (10) with the cable tie (4) and remove the cable tie (4).

Installation note:
Close the cable tie (4) only loosely and do not pull it tight.

7.3 Mark the points where the cable for the seat switch (14) and compressor cable (3) are secured with three cable ties (5) and remove the cable ties (5).
2.8.2 Connecting cable – removal and installation (delivery options 2 and 3)

8 Pull out the connecting cable (2) from the suspension and remove it.

9 Re-install the components in the reverse order of their removal.
2.9 Air hose set – removal and installation

REMOVAL / INSTALLATION

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(1) Upper suspension part
(2) Cable tie
(3) Air hose (air hose set)
(4) Compressor cable
(5) Cable tie
(6) Cable tie
(7) Insulating tape
(8) Swinging structure
(9) Bellows carrier (swinging structure)

(A) Connection to the air spring
(B) Connection to the valve
(C) Connection to the compressor
**WARNING** The pressure in the pneumatic system may cause injury! The pneumatic system is to be vented before removing the air hose set (3).

1. Remove the upper seat part (see repair manual for the upper seat part).
2. Remove the adjusting rail set (chapter 2.1).
3. Remove the bellows (chapter 2.2).
Removal and installation

4 Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing! Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.

5 Take off the insulating tape (7) from the two air hoses (3) and the compressor cable (4).

**Installation note:** Wind insulating tape (7) several times around the two air hoses (3) and compressor cable (4) in the border area of the upper suspension part (1) in a width of at least 40 mm to protect them from being chafed.
6 Mark the points where the air hose (3) is secured to the upper suspension part (1) with two cable ties (2) and remove the cable ties (2).

7 **Delivery option 3 (connecting cable with an additional cable for the seat switch):**
   Remove the cable tie with which the cable tie (5) is secured to the bellows carrier (9) (see chapter 2.8).

8 Mark the points where the air hose (3) is secured with four cable ties (5) and remove the cable ties (5).
9 Mark the point where the air hose (3) is secured to the swinging structure (8) with a cable tie (6) and remove the cable tie (6).

10 Remove the air hose (3) from the air spring connection (A) (see chapter 2.10).

11 Remove the air hose (3) from the valve connection (B) (see chapter 2.5).

12 Remove the air hose (3) from the compressor connection (C) (see chapter 2.3).

13 Pull out the air hose (3) through the drill hole (arrow) of the bellows carrier (9) in downward direction.
2.9 Air hose set – removal and installation

REMOVAL / INSTALLATION

14 Remove the air hose (3) from the suspension in backward direction.

Installation notes:
- Lay the air hose (3) without any bents.
- When laying and securing the air hose (3), make sure that the air hose (3) cannot get into contact with the moving arm of the swinging structure (8) (chafing points: X₁, X₂, X₃) and does rest on the arm of the swinging structure (8) (bruising point: Y).

15 Re-install the components in the reverse order of their removal.
2.10 Air spring – removal and installation

(1) Lower suspension part
(2) Swinging structure
(3) Air spring.....................apply sealant to the connection
(4) Auxiliary tool (e.g. hammer)
(5) Hexagon socket screw ........ 10 Nm
(6) Hose clamp
(7) Air hose
(8) Bellows carrier

⚠️ WARNING The pressure in the pneumatic system may cause injury! The pneumatic system is to be vented before removing the air spring (3).
2.10 Air spring – removal and installation

REMOVAL / INSTALLATION

1 Remove the upper seat part (see repair manual for the upper seat part).

2 Remove the adjusting rail set (chapter 2.1).

3 Remove the bellows (chapter 2.2).

Removal and installation

4 Move the suspension to the highest position and secure it there.

**WARNING** Risk of crushing!
Secure the suspension between the roller of the swinging structure and the roller guide of the lower suspension part with a suitable spacer.
5  **WARNING**  Damage!
Make sure not to damage the air spring connection (3), otherwise tightness will not be ensured.

Open the hose clamp (6) and pull off the air hose (7) from the air spring connection (3).

**Note:**
For an easy removal, remove the cable tie with which the air hose (7) is secured to the swinging structure (2) (see chapter 2.9).

**Installation notes:**
- Clean the air spring connection (3) prior to installing the air hose (7).
- Use the sealant STUCARIT 203 or any other suitable coating.
- Leave the connection opening free of sealant.
- The flag of the hose clamp (6) must not point downwards.
6 Undo the hexagon socket screw (5) from the lower suspension part (1). **Installation notes:**
- Hexagon socket screw (5), 10 Nm.
- Make sure that the air spring (3) is positioned correctly. The securing nose at the bottom of the air spring (3) must snap into the drill hole (arrow) of the lower suspension part (1).

7 Turn the air spring (3) until the longitudinal connection on the top of the air spring (3) fits through the longitudinal hole of the bellows carrier (8).
8 Press the air spring (3) down first and then remove it in forward direction.

**Installation note:**
Before the air spring (3) is filled with air, an edge-free auxiliary tool (4) (e.g. hammer shaft) must be placed at the front between the swinging structure (2) and air spring (3) so that the fold on the back of the air spring (3) can press out.
Subsequently, remove the auxiliary tool (4) again.

9 Re-install the components in the reverse order of their removal.
2.11 Lower suspension part – removal and installation

(1) Upper suspension part
(2) Swinging structure
(3) Rubber buffer
(4) Lower suspension part
(5) Stud .........................grease
(6) Roller guide ....................grease
(7) Hexagon nut
(8) Micro-encapsulated cap screw .......................replace, 25 Nm
(9) Shock absorber holder
(10) Hexagon nut
(11) Micro-encapsulated cap screw .......................replace, 25 Nm
(12) Washer
(13) Bushing
(14) Rubber buffer
2.11 Lower suspension part – removal and installation

Note:
It is not necessary to dismantle the upper seat part in order to remove the lower suspension part (see repair manual for the upper seat part).

1. Take off the bellows from the lower suspension part (4) (see chapter 2.2) and fasten it to the upper suspension part (1).

2. Remove the cable tie with which the compressor cable (with connecting cable and air hose) is secured to the lower suspension part (4) (see chapter 2.3).

3. Remove the cable tie with which the connecting cable is secured to the lower suspension part (4) (see chapter 2.8).
4. Remove the valve from the lower suspension part (4) (see chapter 2.5).
   **Note:**
   The electrical connections at the valve do not need to be disconnected and the air hose does not need to be removed.

5. Remove the vertical shock absorber from the lower suspension part (4) (see chapter 2.6).
   **Note:**
   The vertical shock absorber can remain fixed to the swinging structure.

6. Take off the tension spring from the hole of the lower suspension part (4) (see chapter 2.7).

7. Dismantle the guide from the lower suspension part (4) and remove the roller from the weight indicator ribbon (see chapter 2.7).
8 Unscrew the hexagon socket screw from the lower suspension part (4) (see chapter 2.10).

**Note:**
The air spring can remain fixed to the swinging structure (2).

**Removal and installation**

9 Unlock the stud (5) and position the locking hook of the stud (5) vertically so that the stud (5) can be pulled out through the cut-out (arrow) in the lower suspension part (4).

**Installation note:**
The locking hook of the stud (5) must be pushed in until it audibly latches into place.
2.11 Lower suspension part – removal and installation

10 Pull out the stud (5) from the tube of the swinging structure (2) and the lower suspension part (1) to the left side.

**Installation note:**
Apply acid-free multi-purpose lubricant to the entire front surface (F) of the stud (5) in the width of a brush.

11 Turn the upper suspension part (1) with the swinging structure (2) sideways to the right and remove it from the roller guides (6) of the lower suspension part (4).

12 Remove the lower suspension part (4).

**Installation note:**
Apply acid-free multi-purpose lubricant to the front surface (roller starting point) (F) of the two roller guides (6).
2.11 Lower suspension part – removal and installation

REMOVAL / INSTALLATION

13 Unscrew the two micro-encapsulated cap screws (8) and remove the shock absorber holder (9) and two hexagon nuts (10).

**Installation note:**
Replace the micro-encapsulated cap screw (8) by a new one, 25 Nm.

14 Unscrew the micro-encapsulated cap screw (11) and remove the washer (12), bushing (13) and rubber buffer (14).

**Installation note:**
Replace the micro-encapsulated cap screw (11) by a new one, 25 Nm.

15 Remove two rubber buffers (3) from the lower suspension part (4).

16 Re-install the components in the reverse order of their removal.
2.12 Swinging structure – disassembly and assembly

DISASSEMBLY / ASSEMBLY

TABLE OF CONTENTS

(1) Swinging structure .................. grease
(2) Bushing .............................. grease
(3) Plastic roller ......................... grease

Installation note:
For the installation of a new swinging structure: Convert assemblies that do not belong to the scope of delivery of the new swinging structure.
2.12 Swinging structure – disassembly and assembly

1. Remove the upper seat part (see repair manual for the upper seat part).

2. Remove the adjusting rail set (chapter 2.1).

3. Remove the bellows (chapter 2.2).

4. Remove the cable tie with which the compressor cable (connecting cable, air hose) is secured to the swinging structure (1) and the lower suspension part (see chapter 2.3).

5. Remove the upper suspension part from the swinging structure (1) (see chapter 2.4).

**Note:**
The compressor can remain fixed to the upper suspension part.
6 Remove the valve from the lower suspension part (4) (see chapter 2.5).

**Note:**
The electrical connections at the valve do not need to be disconnected and the air hose does not need to be removed.

7 Dismount the vertical shock absorber from the swinging structure (1) (see chapter 2.6).

**Note:**
The vertical shock absorber can remain fixed to lower suspension part.

8 Remove the weight indicator ribbon from the tube of the swinging structure (see chapter 2.5).
9 Remove the cable tie with which the air hose is secured to the swinging structure (1) and pull out the air hose from the drill hole of the swinging structure (1) in downward direction (see chapter 2.9).

10 Remove the air spring (chapter 2.10).

11 Remove the lower suspension part from the swinging structure (1) (see chapter 2.11).
Disassembly and assembly

12 Remove the four plastic rollers (3) from the front roller axles of the swinging structure (1).
   **Installation notes:**
   - Apply acid-free multi-purpose lubricant to the front surface (F) of the plastic rollers (3).
   - Apply acid-free multi-purpose lubricant to the entire surface (F) of the front roller axles of the swinging structure (1) (running surface of the rollers).

13 Pull out the four bushings (2) from the back of the lugs of the swinging structure (1).
   **Installation note:**
   Apply acid-free multi-purpose lubricant to the entire outer surface of the bushings (2).

14 Assemble the components in the reverse order of their disassembly.