



## Maintenance Manual

### Inward Gliding Door

### Version 5 20140701

**Reference:** ISO 9001 (2008) §7.5.1      Control of production and service provision

<b>Vehicle Type:</b>	
<b>Vehicle Number:</b>	
<b>Customer:</b>	

Revision no.	Date:		
5	01-07-2014	Description of the change:	<ul style="list-style-type: none"><li>- Different kind of end stop situations have been added to paragraph 1.7: Open/Closed position of the door leafs.</li><li>- Small changes in grammar throughout the document.</li><li>- Lowered the torque setting of the secure nut, described in paragraph 1.5: Door shafts.</li></ul>
		Name & function:	K. Slager Technical Documentation Specialist

## SAFETY INSTRUCTIONS

The instructions in this maintenance manual are essential for a correct operation of the door system. Please take notice of all warnings and safety precautions on this page to prevent injury to yourself or others or damage to the Ventura door system. The safety and operation instructions should be retained for future reference.

The consequences that could result from failure to observe the precautions are listed in this section and indicated by the following leaf symbol:



Read instructions; It is important to read the instructions before adjusting the door system. Sufficient technical knowledge is needed to be able to follow the instructions.



Operation; The door system consists of movable parts. Lack of operational knowledge of the door system may present a high risk to untrained personnel. When connecting the power supply, you have to be cautious about the operation of the door system.



Heavy components; the door system consists of relatively large and heavy components. For lifting and fitting these components use a lifting machine or ask a colleague to assist. Ventura Systems advice a maximum lifting weight of 22 Kg per person.



Calibrated tools; There are no special tools necessary for adjustment of the door system. It is important to use tools of good quality and calibrated to prevent damage to the door system or injury to yourself.



Power sources; During the installation period the door leafs may only be moved by hand. During adjustment of the door system it is forbidden to connect the power supply, unless it is written.



Replacements parts; When replacement parts are required, be sure that the power supply is removed from the door system and that the door system can only be moved by hand. Safety features may not be active when replacing parts.

### Notices

- While every effort has been made to ensure the information in this maintenance manual is correct and complete, in case of errors we would appreciate you will contact Ventura Systems.

## INSTRUCTIONS

This guide is meant for the maintenance of Ventura inward gliding series 3 and 4 door systems. It is important to follow all instructions. **All instructions must be conducted without air/electric pressure** unless mentioned otherwise. When pressure is needed it will be mentioned. The instructions should be executed for the left and right door leaf (seen from the inside of the vehicle) when it's a double leaf door system. How often you need to do maintenance on the door system can be seen in the table below.

Use	Times per day open/close	Frequent Maintenance
Normal	0-230	1x per year
Mid-Heavy	230-350	2x per year
Heavy	350-...	3x per year

Maintenance of a door system should only be performed when the bus is positioned on a flat surface to prevent distortion/twisting of the bus body, which can lead to inaccurate measurements of the door aperture.

## INDEX

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1	MAINTENANCE DOOR .....	5
1.1	Door leafs fitted correctly .....	5
1.2	Door leafs .....	6
1.3	Reed switch (if applicable) .....	7
1.4	Door Height .....	7
1.5	Door shafts .....	8
1.6	Door flap .....	10
1.7	Open/Closed position of the door leafs .....	11
1.8	Backside flap .....	13
1.9	Flap height .....	14
1.10	Spiral cable (if applicable) .....	15
1.11	Filter regulator .....	16
2	OPERATIONAL .....	17
2.1	Operation and controls .....	17
2.2	Safety .....	17
3	TORQUE SETTINGS .....	18
4	REMARKS .....	19

## 1 MAINTENANCE DOOR

**Safety warning:** Paragraph 1.1 to 1.3 require pressure on the pneumatic system. For all other paragraphs in this chapter it's important to remove the pressure before maintenance unless otherwise is mentioned.

### 1.1 Door leafs fitted correctly



Figure 1.1: Adjusting side seal of door leaf

Figure 1.2: Doors in line with aperture

Nr.	Check	Checked by:
1.	Check if the side seals of the door leafs are in line with the sides of the aperture (with pressure).	
2.	Check if the top and bottom of the door leafs are in line with each other and if the door leafs are in line with the step edge (with pressure).	

## 1.2 Door leafs

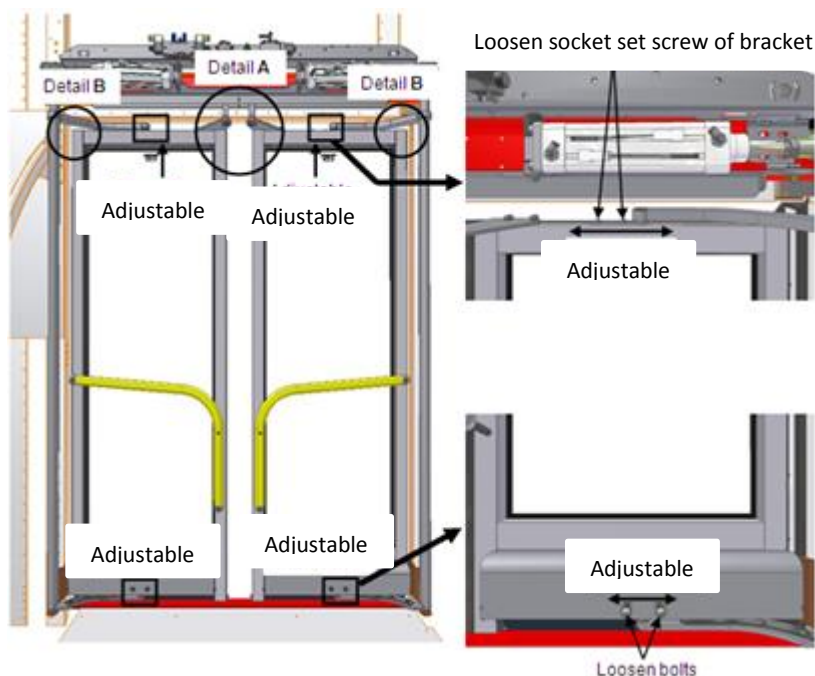


Figure 1.3: Adjustment of the door leafs

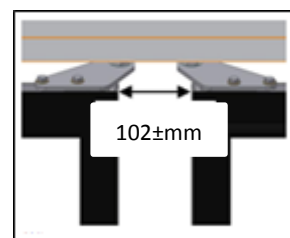


Figure 1.4: Distance

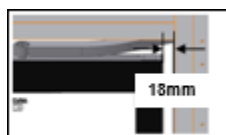


Figure 1.5: IG3 door

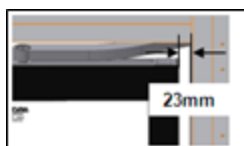


Figure 1.6: IG4 door

Nr.	Check	Checked by:
1.	Check if the distance between the profiles of the door leafs is 102±2mm (with pressure). Do not measure from the door seals but only from the profiles.	
2.	Check also if the distance between the profiles of the door leafs and the aperture is 18mm (IG3 door, see Figure 1.5) or 23mm (IG4 door, see Figure 1.6). In theory the distance should be even at both sides. (With pressure). Do not measure from the door seals but only from the profiles.	

### 1.3 Reed switch (if applicable)

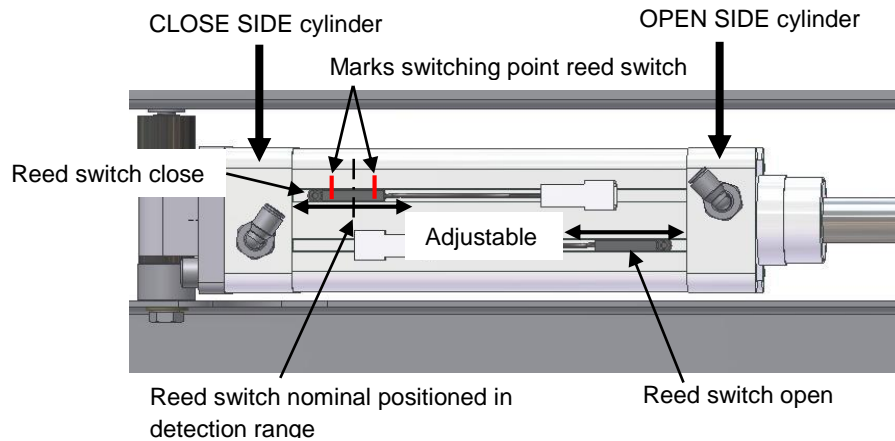


Figure 1.7: Position of the reed switch

Nr.	Check	Checked by:
1.	If applicable check if the reed switch is adjusted in the middle of the range in open position (with pressure).	
2.	If applicable check if the reed switch is adjusted in the middle of the range in closed position (with pressure).	

### 1.4 Door Height



Figure 1.8: Check door height (distance between door leaf profile and aperture)

Nr.	Check	Checked by:
1.	Check at the bottom of the portal if the gap between the vertical profiles of the door leafs and the floor is a minimum of 9mm over the full movement of the door.	
2.	Check if the height between the profile at top of the door leaf and the aperture is $45 \pm 5$ mm as a guide line for buses in service. It is important to not measure from the aperture rubber to the door leaf because the height of the rubber differs by customer. Therefore it is important to only measure from the horizontal profiles of the door leafs and the aperture.	

## 1.5 Door shafts

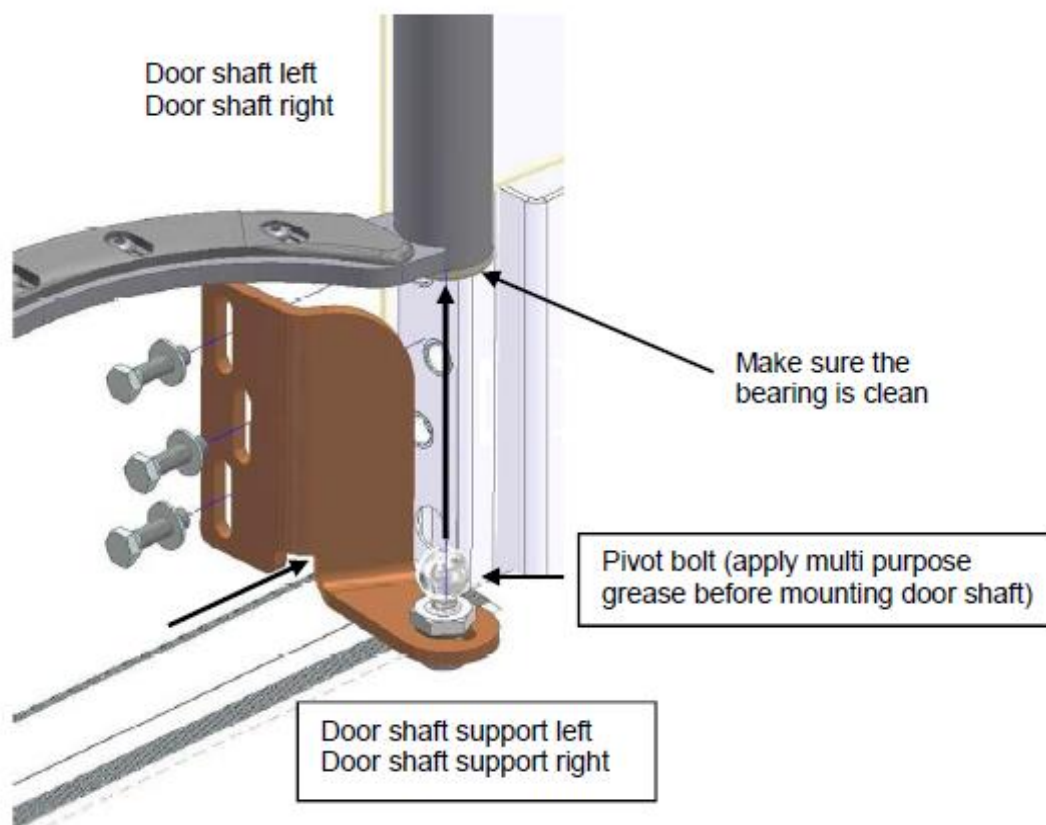


Figure 1.9: Checking of door shafts

Nr.	Check	Checked by:
1.	Check if the bearing bush is not broken. If broken replace part.	



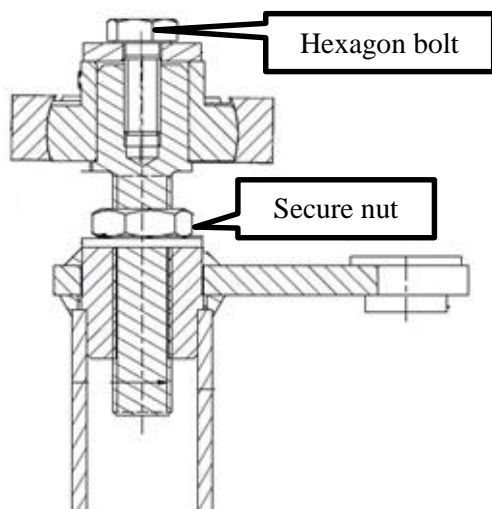


Figure 1.10: Door shaft IG3

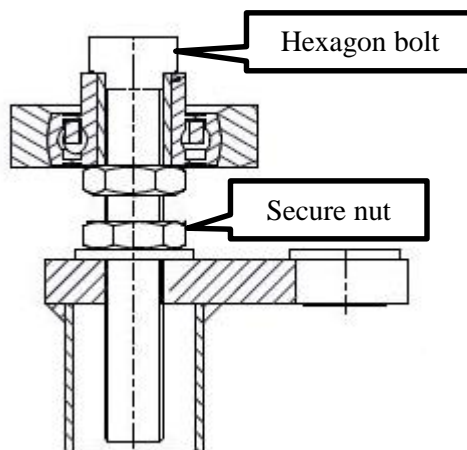


Figure 1.11: Door shaft IG4

Nr.	Check	Checked by:
2.	Check if the torque setting of the secure nut is 100Nm. If not, re-torque the secure nut.	

## 1.6 Door flap

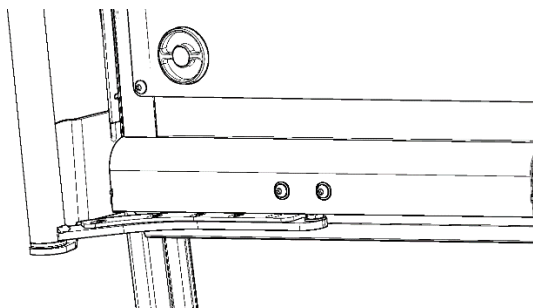


Figure 1.12: Door flap IG3

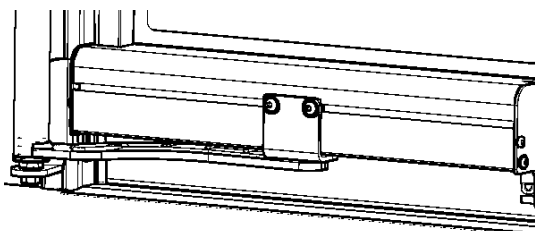


Figure 1.13: Door flap IG4

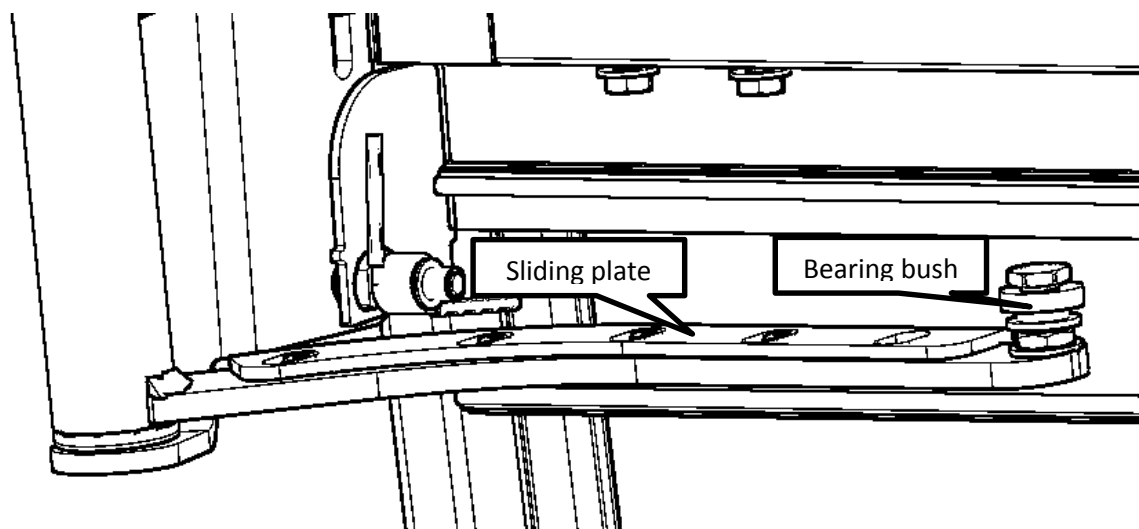


Figure 1.14: Detailed view of sliding plate and bearing bush

Nr.	Check	Checked by:
1.	Check if the bearing bush & ring are broken or worn out. If so, replace part.	
2.	Check if the sliding plate on the bottom door lever has excessive wear. In case of excessive wear replace part to ensure the door flap won't be damaged.	

## 1.7 Open/Closed position of the door leafs



Figure 1.15: Door opening 90°



Figure 1.16: Adjusting guiding bracket

Nr.	Check	Checked by:
1.	Put the door leafs in a fully open position and check if the door leafs in open position are in a 90° angle with the step edge of the vehicle (with the nominal adjustments as done by the initial installation).	
2.	Check the guiding roller on the guiding brackets on both door leafs. The rollers should roll smoothly inside the guiding rail. Inspect the rollers visually and check if there are no signs of excessive wear on the outside, like edges caused by a stuck roller. Replace the guiding roller when this part needs replacing.	

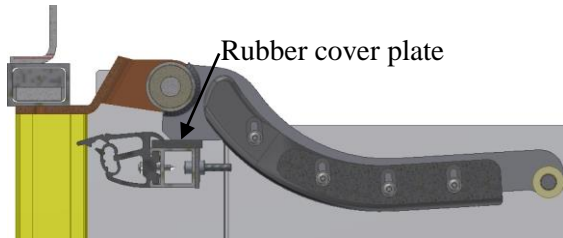


Figure 1.17: End stop as a cover plate, view from above

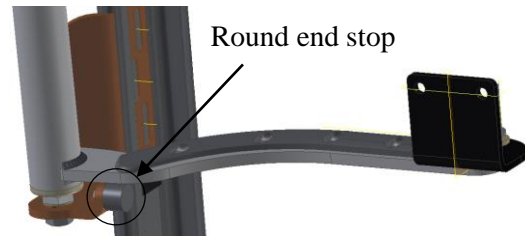


Figure 1.18: End stop as a round

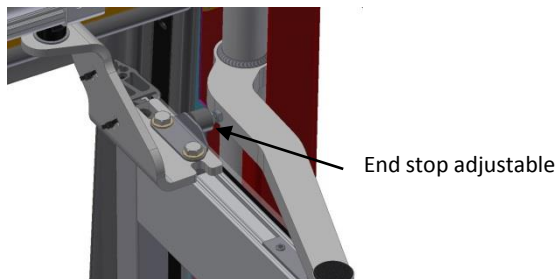
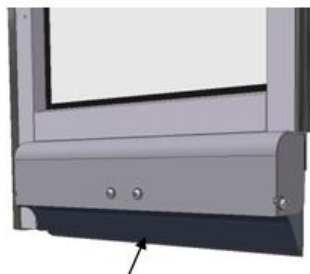


Figure 1.19: Extra end stop on door shaft top lever

Nr.	Check	Checked by:
3.	<p>Check if in a fully open position the door shaft bottom lever touches the rubber cover plate on the door leaf as seen in Figure 1.17. If the door system doesn't have the commonly applied cover plate, it is possible the bottom door shaft lever has a round end stop (Figure 1.18). In this case the door leaf should touch the round end stop on the bottom door shaft lever when the door is in a fully open position.</p> <p>In some rare cases there is an extra end stop on the door shaft top lever (Figure 1.19). Check if the door leaf touches the end stop when in a fully open position.</p> <p><i>Note: Each side may have a different kind of end stop.</i></p>	

## 1.8 Backside flap



Backside flap  
Figure 1: Backside flap

Nr.	Check	Checked by:
1.	Check if the flap moves down on the right moment (when the door is almost fully closed, the flap should be fully down)	

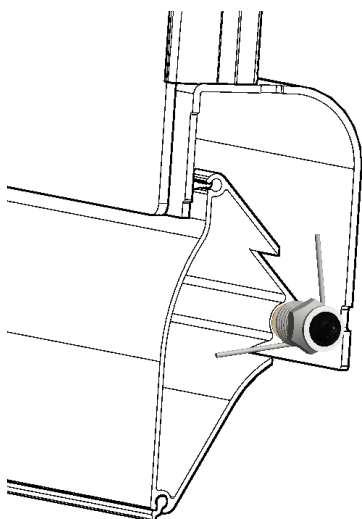


Figure 1.20: Door flap spring IG3

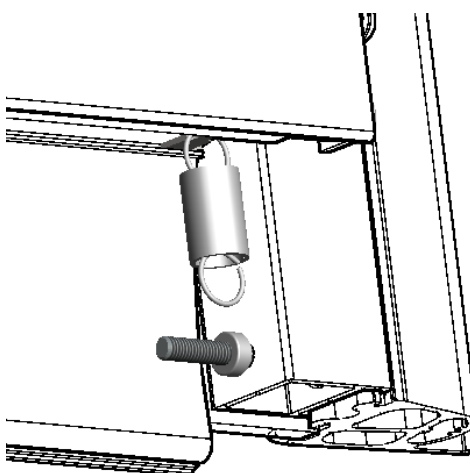


Figure 1.21: Door flap spring IG4

Nr.	Check	Checked by:
2.	Check if the door flap spring is broken or obstructed. The spring is used to keep the flap down when the door is closed. When broken or not fitted correctly the flap won't close properly. Replace the spring when broken.	

## 1.9 Flap height



Figure 1.22: Flap heights

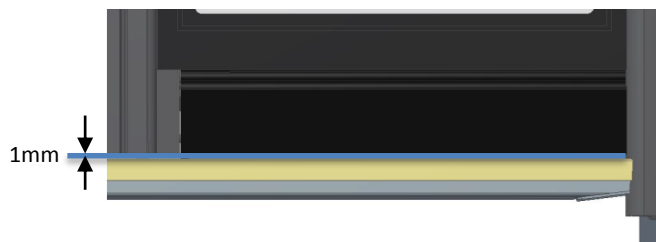


Figure 1.23: Detail of the flap height

Nr.	Check	Checked by:
1.	Check the measurement between the flap and the step edge. This should be a minimum of 1mm to ensure there is enough ground clearance. A gap bigger than 1mm will not affect the functioning of the door system, but will reduce the effectiveness of the sealing. If the gap is not properly set, then adjust the flap height according to the door system manual.	
2.	Check if the flap runs free during open and closing movement.	

## 1.10 Spiral cable (if applicable)

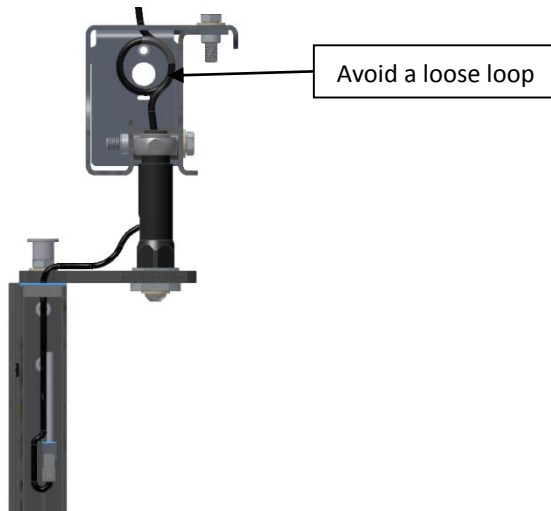


Figure 1.24: spiral cable for sensitive edge

Nr.	Check	Checked by:
1.	Check if spiral cable moves free on the shaft	
2.	Add grease on the spiral cable shaft so the cable moves smoothly	
3.	Check if all the excess length from the spiral cable is fitted inside the door profile. The end loop of the spiral cable should be fixed to the guiding shaft bracket with a ty-rap.	
4.	Check if the sensitive edge is functional (with pressure) by compressing the side seals at the bottom when the door moves into a closed position.	

## 1.11 Filter regulator

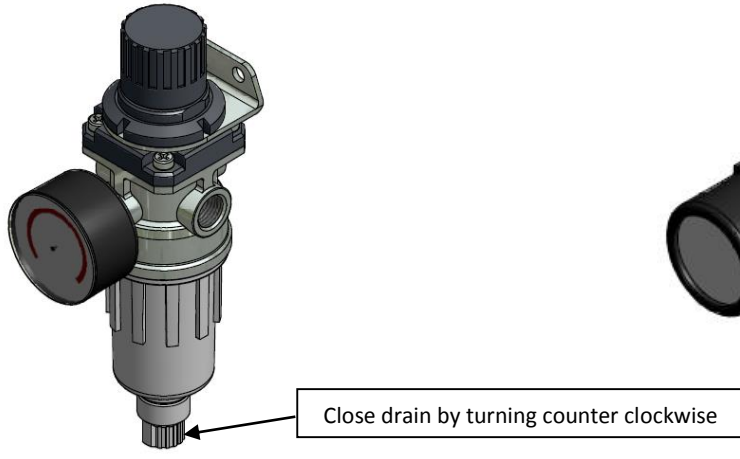


Figure 1.25: Camozzi filter regulator



Figure 1.26: Parker filter regulator

Nr.	Check	Checked by:
1.	Locate the filter regulator if present and check if the clear bowl of the filter regulator is not full. When full press the bottom release drain nipple upwards until the clear bowl is empty.	
2.	<u>In case the filter regulator is a Camozzi instead of an older Parker.</u> The Camozzi filter regulator is semi-automatic meaning the filter will drain itself when the pneumatic pressure drops below 0.3 bar (4.3 PSI) and the drain is also turned open. It is advised to always keep the drain closed so the drain will not spill dirt over vital parts of the bus, depending on the filter regulator location.	
3.	Check if the pressure of the pneumatic system is between 7.5 ±1.5 bar.	



## 2 OPERATIONAL

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### 2.1 Operation and controls

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Nr.	Check	Checked by:
1.	Open cycle, speed and cushioning (nominal 3.5 sec). If the cycle speed is off, readjust the cushioning by adjusting the Wabco unit or the cylinders when the system doesn't have a Wabco control unit.	
2.	Closing cycle, speed and cushioning (nominal 3.5 sec). If the cycle speed is off, readjust the cushioning by adjusting the Wabco unit or the cylinders when the system doesn't have a Wabco control unit.	
3.	Check the pneumatic system for leakage during opening and closing.	
4.	Check the electric system by looking for short circuits or damages.	
5.	Check if all fasteners are properly tightened (See chapter 3).	

### 2.2 Safety

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Nr.	Check	Checked by:
1.	Check emergency buttons.	
2.	Check pneumatic obstruction detection (if applicable)	
3.	Check sensitive edges (if provided).	
4.	Check potential finger traps.	

Signed on behalf of:

Date:

### 3 TORQUE SETTINGS

Guidelines for mounting and securing joints with steel bolts. In the tables below are the Torque  $M_a$  values given for bolts with nominal dimensions over full thread (no special bolts) with metric thread of hexagon bolts type DIN931, DIN933, DIN912. The Torque of bolts depends of friction coefficients of materials, surface treatments, surface conditions, fabrications methods etc. The values in tables below are values which correspond most with the practice, Torque dry.

	<b>Class 8.8</b>
<b>Size</b>	<b>Torque dry range (Nm)</b>
M5 pitch 0.8	6
M6 pitch 1.00	10
M8 pitch range (1.25 – 1.00)	25-27
M10 pitch range (1.50 – 1.00)	51 – 57
M12 pitch range (1.76 – 1.25)	87 – 96
M14 pitch range (2.00 – 1.50)	140 – 150
M16 pitch 2.00	215

Table 3.1: Torque chart for hex bolts. Zinc plated in Nm. <sup>1 2</sup>

Note: Torque of the bolts depends of pitch size, the lowest value in the table refers to the biggest pitch of the bolt.

<b>Size</b>	<b>Metric<sup>3</sup></b>	<b>Torque dry range (Nm)</b>
T25	M5	16 - 19
T30	M6	31 - 37
T40	M8	54 - 65
T50	M12	132 - 158
T55	M12	218 - 256
T60	M14	379 - 445
T70	M17	630 - 700

Table 3.2: Torque chart for torx bolts in Nm<sup>4</sup>

Note: Metric size correspond to Torx “Flat head” and Torx “Pan head”

<sup>1</sup> Imperial. Fastener Torque Chart. In Imperial Supplies. Retrieved May 7, 2014, from [http://www.imperialsupplies.com/pdf/A\\_FastenerTorqueCharts.pdf](http://www.imperialsupplies.com/pdf/A_FastenerTorqueCharts.pdf).

<sup>2</sup> Torque values according Fabory, values correspond with friction coefficient  $\mu_k=0.14$ , most common, Faborycentres issue 04, 15092002, page 15-37-1, 15-37-2

<sup>3</sup> 15092002, page 15-371,15-37-2

<sup>4</sup> Wiha. Typical Dimensional & Torque Specifications. In Wiha Tools Marketing. Retrieved May 7, 2014, from <http://www.wihatools.com/Marketing/torxspe.htm>.

Service instruction: SMIG34  
Revision: 5  
Date: 01-07-2014  
Page no.: 19

## 4 REMARKS

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