Maintenance Manual

Inward Gliding Door

New Bus for London

Version 2 20150323

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

Vehicle Type:	
Vehicle Number:	
Customer:	

Revision no.	Date:		
2	23-03-2015	Description of the change:	- Added Nord-lock disk torque setting
1	18-11-2014		
		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

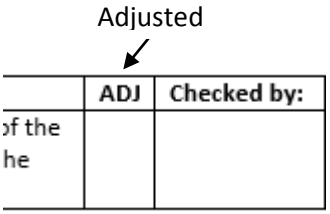
This guide is meant for the maintenance of Ventura inward gliding 4 platform door system specifically in the Wright New Bus for London. It is important to follow all instructions. **All instructions must be conducted without air/electric pressure** unless mentioned otherwise. When pressure is needed 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.

Signing

When maintenance is performed, all checks should be signed with a signature or name when the setting is correct. This should be done after adjustment when necessary. When adjustment is performed, sign the second last column with a checkmark.



Lubricants/Grease

Certain parts need grease as a lubricant. Ventura Systems uses a multipurpose Lithium based grease "*Q8 Rembrandt EP-2*[1]", which has extreme pressure properties. Additional information of Rembrandt EP-2 like products and details can be requested if necessary.

[1] Multi-purpose lithium soap based greases with the **addition of an extreme pressure (EP) additive** to give excellent anti-wear properties for plain and anti-friction bearings operating under heavy or shock loaded conditions, according NLGI 2. Q8 Rembrandt EP greases provide for long service life and offers rust protection even in the presence of water. (http://www.q8oils.com/)

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1 MAINTENANCE DOOR

Safety warning: Do not use pneumatic pressure during maintenance unless mentioned otherwise. Remove pneumatic pressure after every check.

1.1 Door leafs in closed position

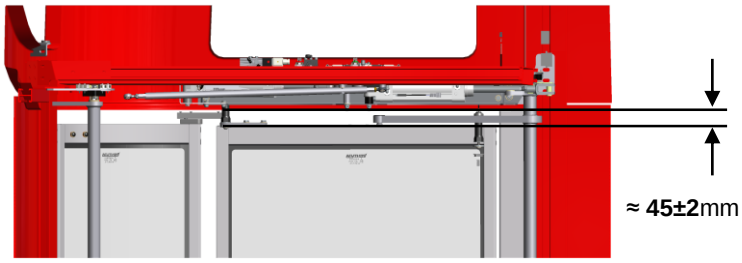

Figure 1.1: Check door height (distance between door leaf profile and aperture)

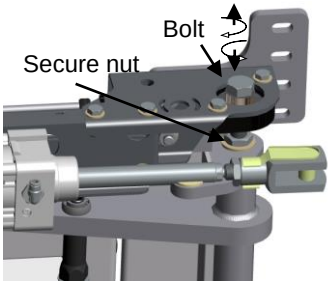

Figure 1.2: Height adjustment

Nr.	Check	ADJ	Checked by:
1.	Check if the height between the profile at top of the door leaf and the aperture is 45±2mm. It is important to not measure from the aperture rubber seal to the door leaf because of tolerances of rubber. Therefore it is important to only measure from the horizontal profiles of the door leafs and the aperture.		

Figure 1.3: Door height at bottom of door leaf

Nr.	Check	ADJ	Checked by:
2.	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.		

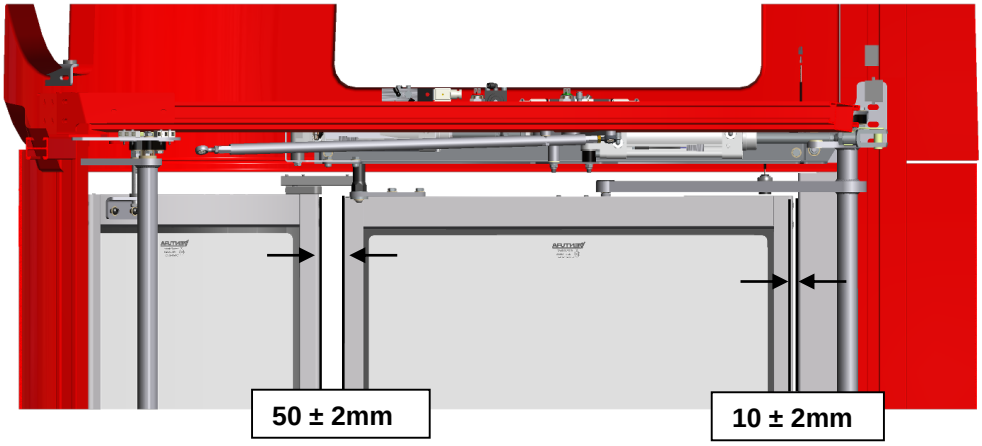

Figure 1.4: Horizontal alignment door leafs

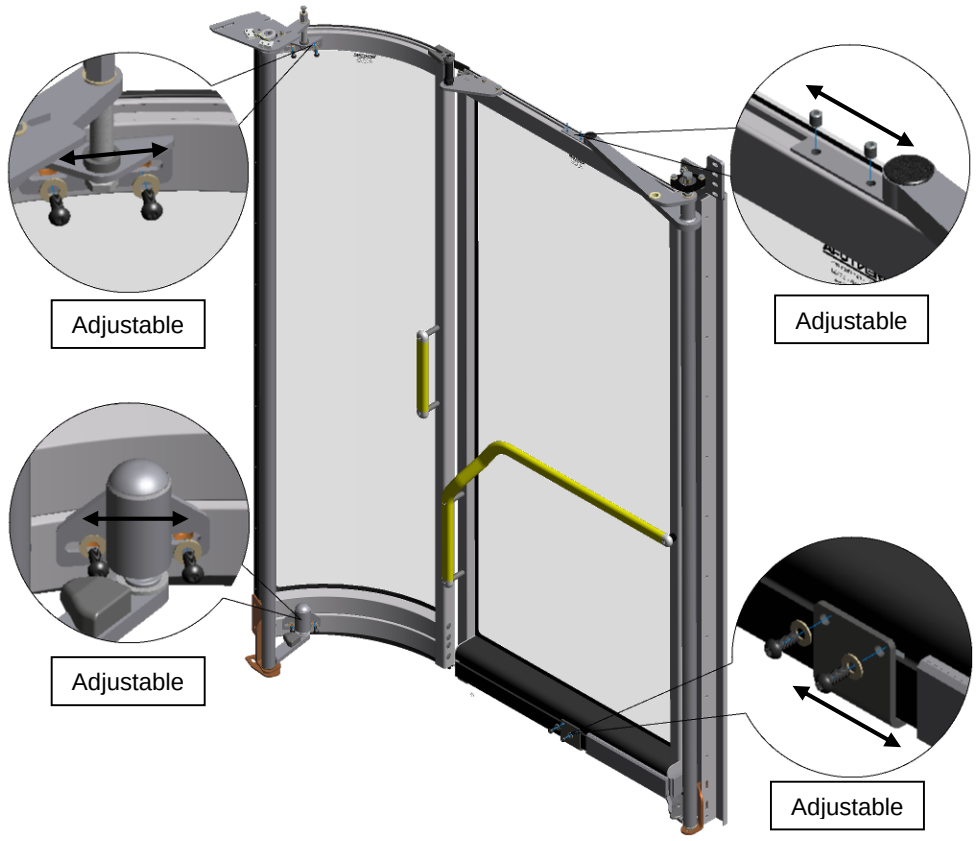

Figure 1.5: Horizontal adjustment of door leafs

Nr.	Check	ADJ	Checked by:
1.	Check if the distance between the profiles of the door leafs is 50±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 10mm. In theory the distance should be even at both sides. (With pressure). Do not measure from the door seals but only from the profiles.		

1.2 Door shafts

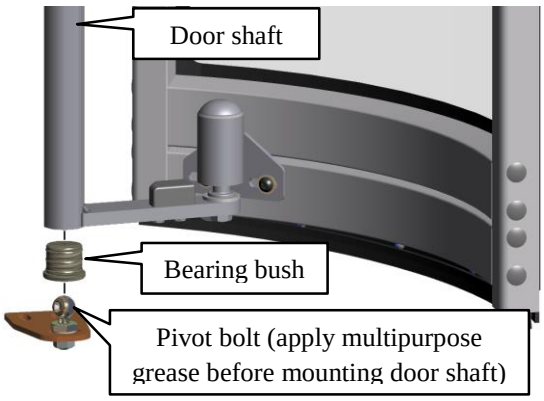

Figure 1.6: Left door shaft

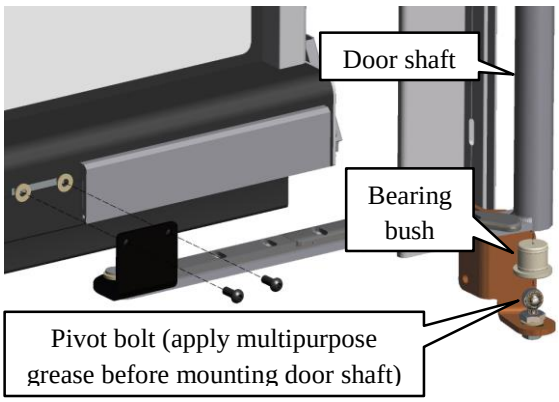

Figure 1.7: Right door shaft

Nr.	Check	ADJ	Checked by:
1.	Check if the bearing bush is not broken. If broken replace part.		
2.	Check if the door shafts have vertical play. If so, then re-adjust the bottom supports.		

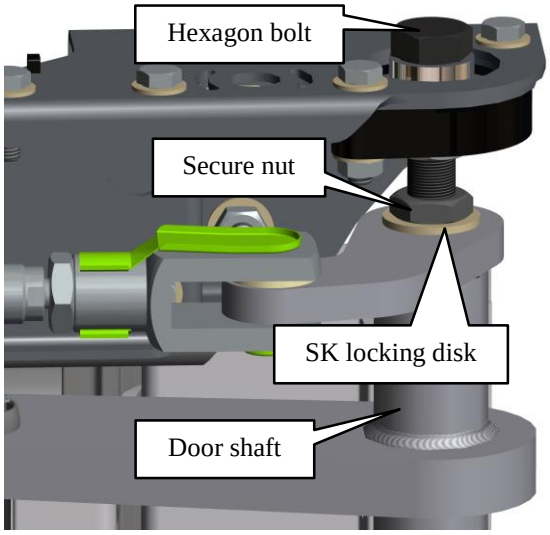

Figure 1.8: Secure nut old situation with SK locking disk

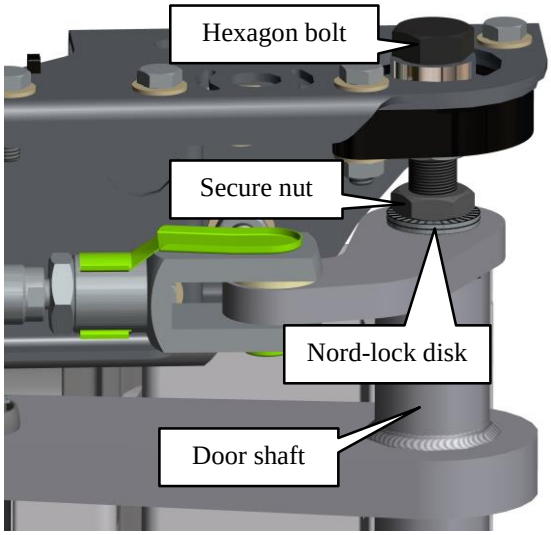

Figure 1.9: Secure nut with new Nord-lock disk

Nr.	Check	ADJ	Checked by:
3.	*Note: Check if there is one or two rings underneath the secure nut. Two rings means the door shaft has a Nord-lock locking disk.* Check if the torque setting of the secure nut is 100Nm or 75Nm when a Nord-lock disk is applied. If not, re-torque the secure nut.		

1.3 Door leafs in open position

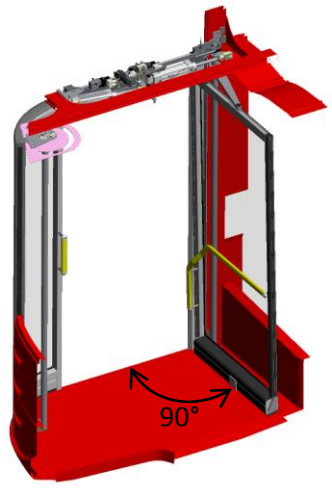

Figure 1.10: Right door angle

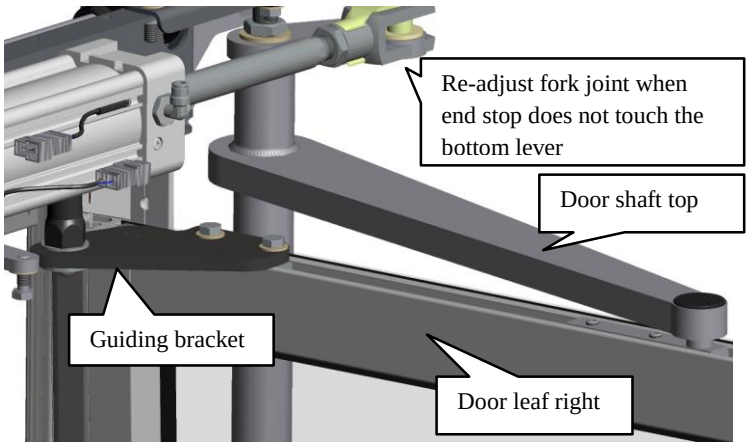

Figure 1.11: Adjustment of the fork joint and guiding bracket

Nr.	Check	ADJ	Checked by:
1.	Check if in an open position, the right door leaf is perpendicular to the aperture. If not, the re-adjust the position of the guiding bracket.		
2.	Check if there is no movement in the bended (left) door leaf when in open position with pressure.		

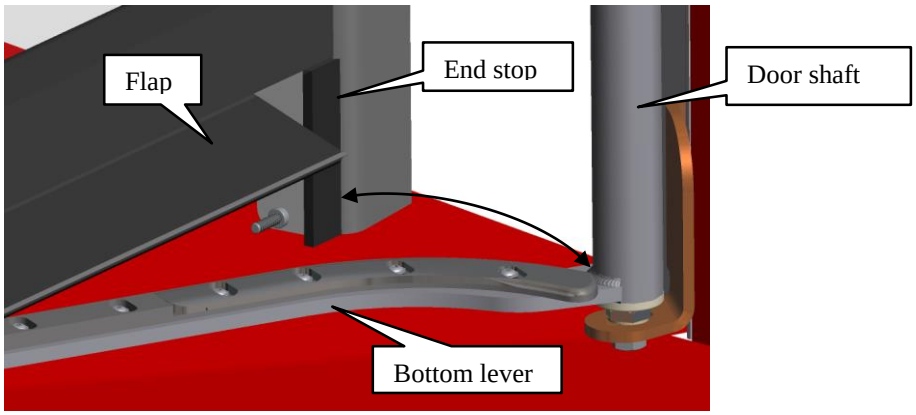

Figure 1.12: Right door leaf rubber end stop, in half open position

Nr.	Check	ADJ	Checked by:
3.	Check if in a fully closed position with pressure, the rubber end stop touches the bottom lever. If not, then re-adjust the fork joint length as shown in figure 1.11.		

1.4 Door flap

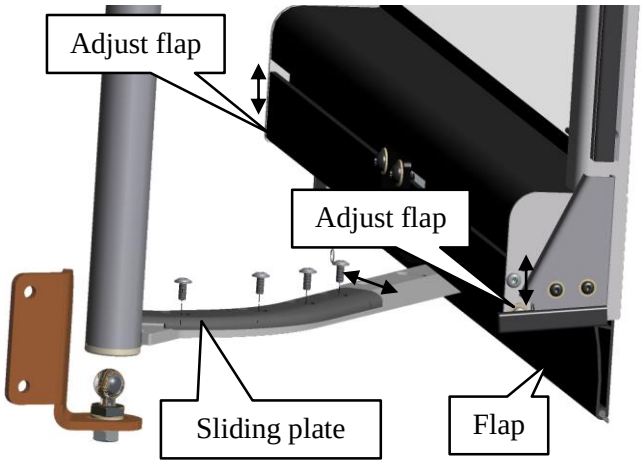

Figure 1.13: Detailed view of sliding plate and backside flap

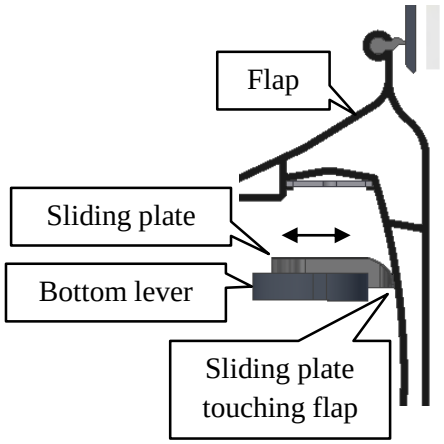

Figure 1.14: Adjustment sliding plate

Nr.	Check	ADJ	Checked by:
1.	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.		
2.	Check if the flap is fully down on the right moment. This is when the door is almost fully closed. If not, then re-adjust the sliding plate by loosening the fasteners and move the sliding plate through the slotted holes.		

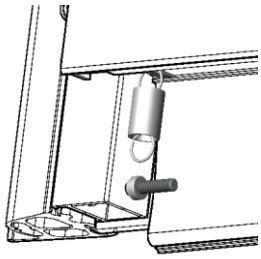

Figure 1.15: Door flap spring

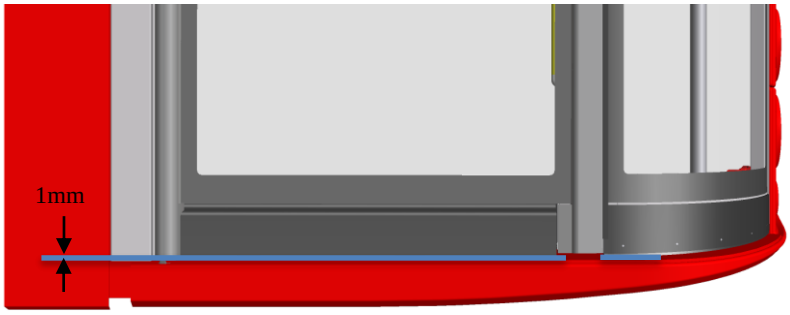

Figure 1.16: Door flap height

Nr.	Check	ADJ	Checked by:
3.	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.		
4.	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.		
5.	Check if the flap moves freely during open and closing movement. If not, then re-adjust the flap height.		

1.5 Adjust the door leafs to be parallel to the aperture

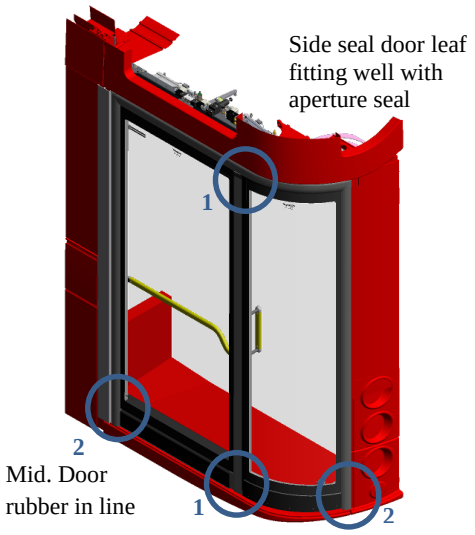

Figure 1.17: Door leafs in-line with step edge

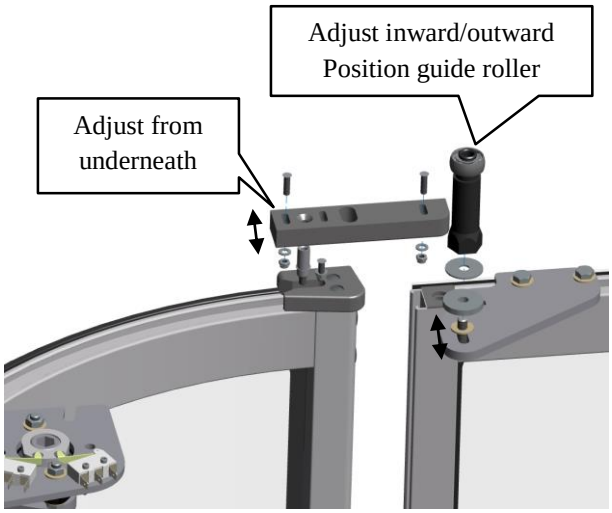

Figure 1.18: Adjust inward/outward middle position door leafs

Nr.	Check	ADJ	Checked by:
1.	Check if the side seals of the door leafs are in line with the sides of the aperture (with pressure). If not, then re-adjust the guide roller and block from underneath the aperture.		

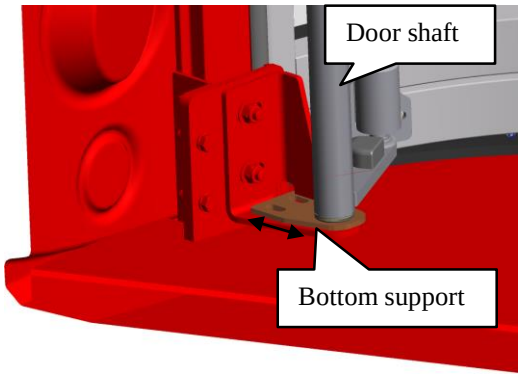

Figure 1.19: Left door bottom support

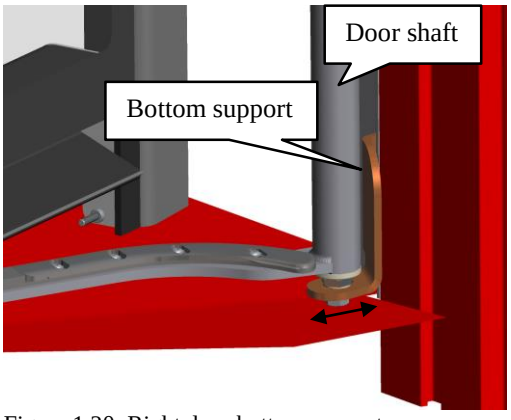

Figure 1.20: Right door bottom support

Nr.	Check	ADJ	Checked by:
2.	Check if the door leafs are fitting well to the aperture seal in the bottom corners. If not, then re-adjust the inward/outward position of the door shafts on the bottom supports.		

1.6 Reed switch

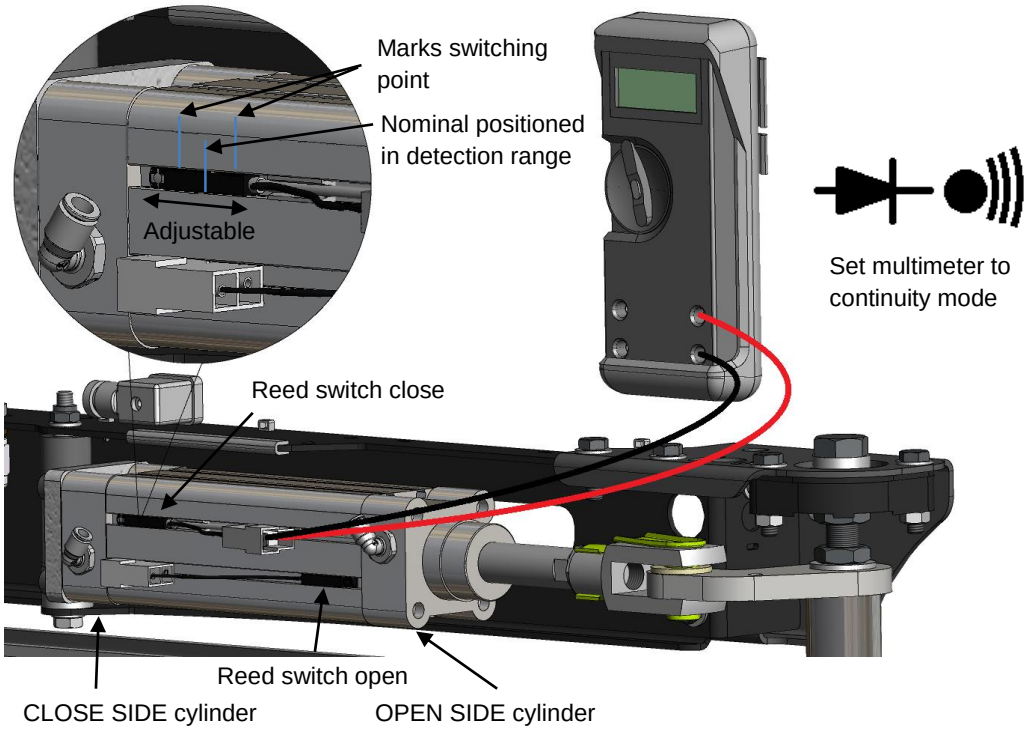

Figure 1.21: Position of the reed switch

Nr.	Check	ADJ	Checked by:
	Reed switch test procedure: 1. *Put pressure on the system.* 2. *Put the door in a fully closed position to test the reed switch close, and put the door in open position to test the reed switch open.* 3. *Loosen the screw on the reed switch. Do not turn the screw of the reed switch more than 90°.* 4. *Use a multimeter (continuity mode) to see if the reed switch detects the magnetic part of the cylinder rod. Connect the reed switch leads to the connector of the reed switch.* 5. *Mark the beginning and end of the range in which the reed switch detects the magnetic part of the cylinder rod. Mark the positions with a pencil do define a range.* 6. *Mark the nominal position between the two marked positions and put the reed switch on the nominal position.* 7. *Tighten the screw of the reed switch. Do not turn the screw of the reed switch more than 90°.* 8. *Afterwards use workshop procedure (according to manual) to learn-in to define the end positions of the door system.*		
1.	Check if the reed switch open on the close side of the cylinder is adjusted in the middle of the range when the door is in closed position (with pressure).		
2.	Check if the reed switch close on the open side of the cylinder is adjusted in the middle of the range when the door is in open position (with pressure).		

1.7 Spiral cable (if applicable)

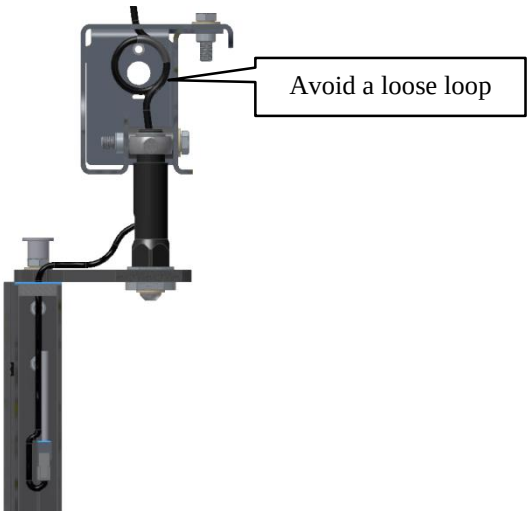

Figure 1.22: spiral cable for sensitive edge

Nr.	Check	ADJ	Checked by:
1.	Check if spiral cable moves free on the shaft.		
2.	Add multipurpose 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.		

1.8 Filter regulator

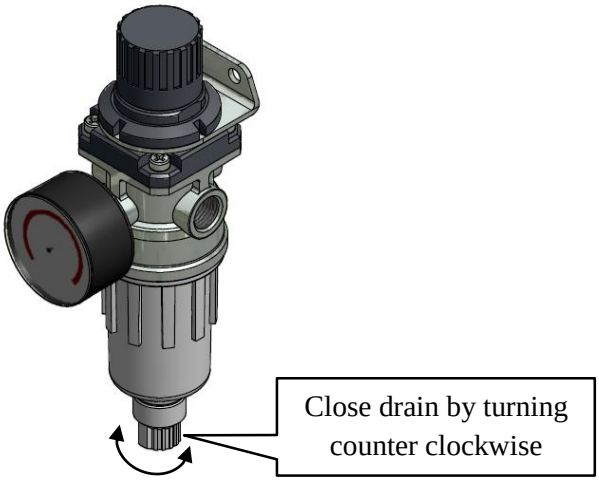

Figure 1.23: Camozzi filter regulator

Figure 1.24: Parker filter regulator

Nr.	Check	ADJ	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 a 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 8 ± 1 bar.		

2 OPERATIONAL

2.1 Operation and controls

Nr.	Check	ADJ	Checked by:
1.	Open cycle, speed and cushioning (nominal 3.5 sec). If the cycle speed is off, readjust the cushioning by adjusting the cushioning screw. The cushioning has to be at least one quarter open, else the obstruction detection unit might interfere the opening movement.		
2.	Open cycle, speed and cushioning (nominal 3.5 sec). If the cycle speed is off, readjust the cushioning by adjusting the cushioning screw.		
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

Nr.	Check	ADJ	Checked by:
1.	Check if the emergency buttons are working (with pressure).		
2.	Check if the pneumatic obstruction detection is working by obstructing the right door leaf with a lifeless object (with pressure).		
3.	Check if the sensitive edge between the door leafs is functioning (with pressure). 		
4.	Check if the sensitive edge on the flap bracket of the right door leaf is functioning (with pressure). 		

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.

	Class 8.8
Size	**Torque dry range (Nm)**
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
M16 half (IG door shaft secure nut)	100 (4.8 class)

Table 3.1: Torque chart for hex bolts. Zinc plated in Nm. [2] [3]

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

Size	**Metric[4]**	**Torque dry range (Nm)**
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[5]

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

[2] Imperial. Fastener Torque Chart. In Imperial Supplies. Retrieved May 7, 2014, from http://www.imperialsupplies.com/pdf/A_FastenerTorqueCharts.pdf.

[3] Torque values according Fabory, values correspond with friction coefficient µk=0.14, most common, Faborycentres issue 04, 15092002, page 15-37-1, 15-37-2

[4] 15092002, page 15-371,15-37-2

[5] Wiha. Typical Dimensional & Torque Specifications. In Wiha Tools Marketing. Retrieved May 7, 2014, from http://www.wihatools.com/Marketing/torxspec.htm.

4 REMARKS