Maintenance manual

Inward Gliding Door

Version 9 20170214

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

Vehicle Type:	
Vehicle Number:	
Customer:	

Revision no.	Date:	Name & function:	Description of the change:
11	14-02-2017	M. Stoelinga - Technical Documentation Specialist	- Changed the torque settings page from a table to an overview with images.
10	22-04-2016	K. Slager - Technical Documentation Specialist	- Changed maintenance frequency from usage depended to frequency per topic
9	06-11-2015	" "	- Changed 45mm between top door leaf and aperture to 37mm, because of measurement including the aperture seal, which is always 8mm thick. - Removed distances 18mm and 23mm between door leafs and aperture and replaced with equal space on both sides. - Reference to tool documentation for torqueing the secure nut with the Ventura tool.
8	26-06-2015	" "	- Small linguistic changes. - Added explanations to checks.
6	02-12-2014	" "	- All checkpoints reordered and re-categorized. - Changed 102±2mm to 104±2mm between door leafs because of different stiffness in side seals. - Added note to check 13:1. - All figures replaced to increase understandability. - Added column "ADJ" to tables for marking if check needed adjustment before signing. - Changed height and with tolerances from 1mm to 2mm. - Added secure nut setting and torque specification when Nord-lock ring is applied.

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.

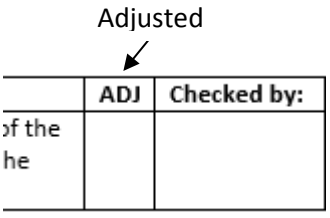
How often you need to do maintenance on the door system depends on many factors. All checks have an indicator for how often it needs maintenance, based on 40,000 kilometres per year. If a bus drives less per year, the doors are generally used more often and the amount of checks should be multiplied by the factor derived from the kilometres.

Indicator	Description	Kilometres or miles per year
2x Per year	Critical check Minimum of twice a year	40,000 km or 25,000 mi
1x Per year	Less critical check Minimum of once a year	40,000 km or 25,000 mi

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: Most checks don't require pneumatic or electric pressure. Remove pressure before maintenance. If pressure is needed, it is mentioned in the check. Remove pressure after the check and when the next step doesn't require pressure.

1.1 Door leafs in closed position

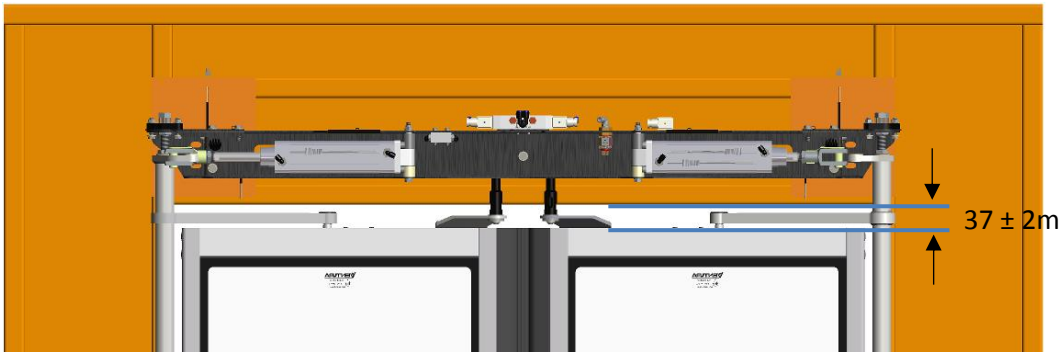


Figure 1.1: Check door height (distance between door leaf horizontal profile and aperture

Nr.	Check 2x Per year	ADJ	Checked by:
1.	Check if the height between the top of the door leaf and the aperture is 37±2mm (measure from the portal seal). The door leaf rubber seals are running freely from the portal seal. This setting is for end users only, as the main manual states 45mm±2mm, because this is a theoretical distance between the aperture without aperture seal and the door leaf.		

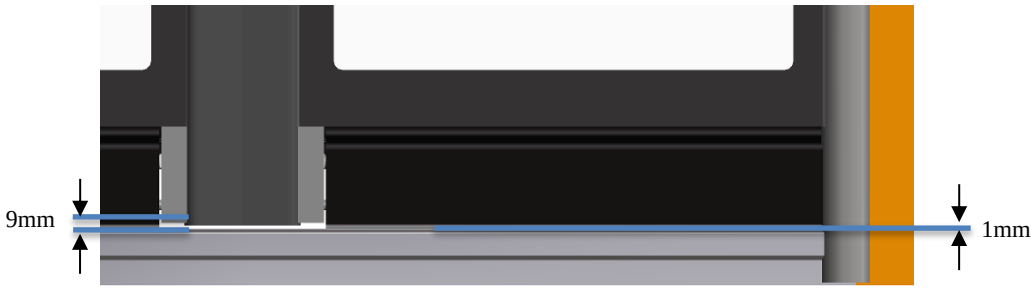


Figure 1.2: Detail of the flap height at the bottom of the door leafs

Nr.	Check 1x Per year	ADJ	Checked by:
2.	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.		

3.	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.		

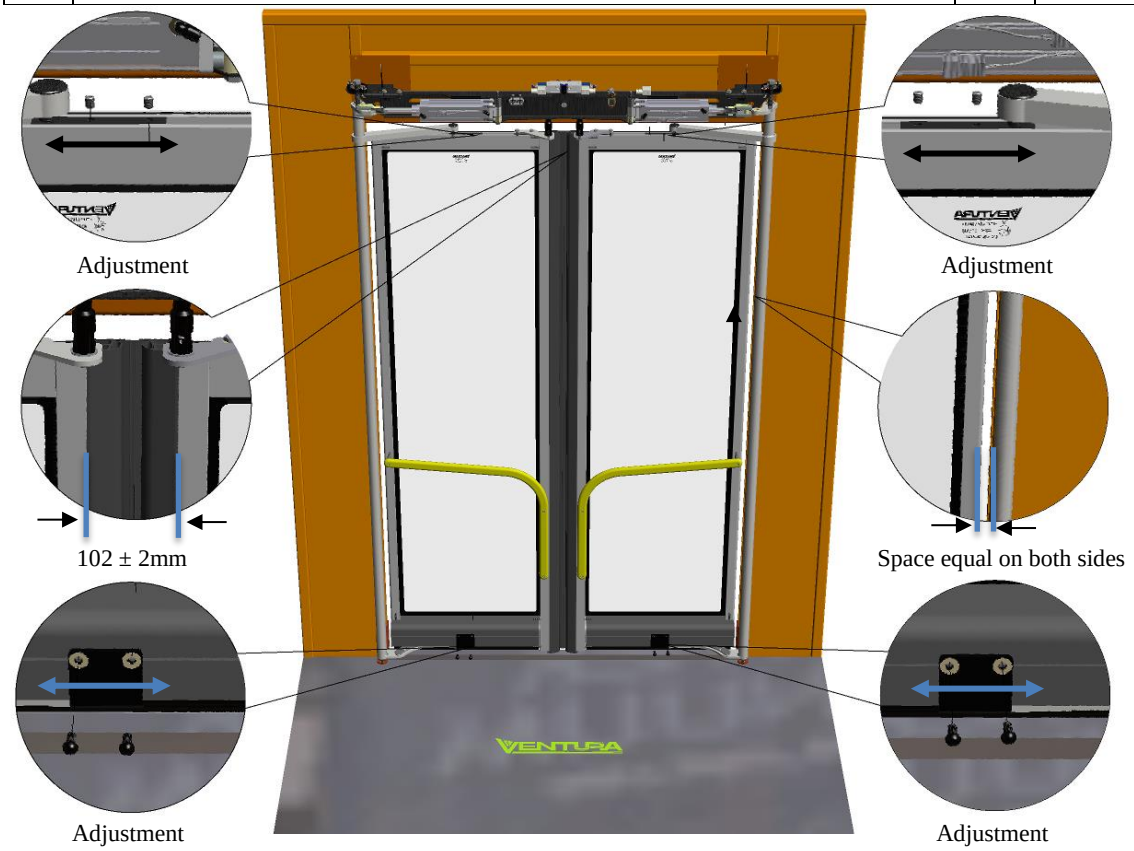
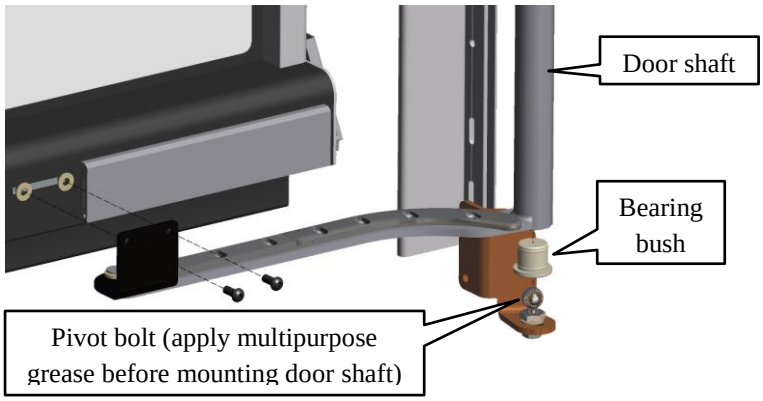


Figure 1.3: Horizontal adjustment of the door system

Nr.	Check	ADJ	Checked by :
4.	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.		
5.	Check if the distance between the door leafs and the aperture is equal on both sides (with pressure).		

1.2 Door shafts



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

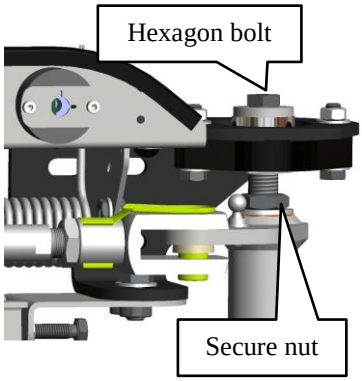


Figure 1.4: IG3 secure nut

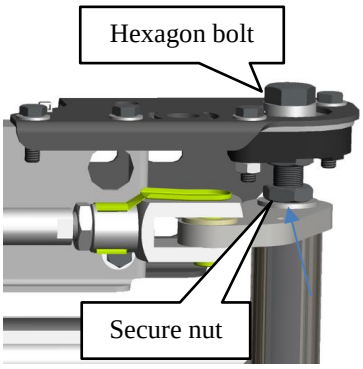


Figure 1.5: IG4 secure nut

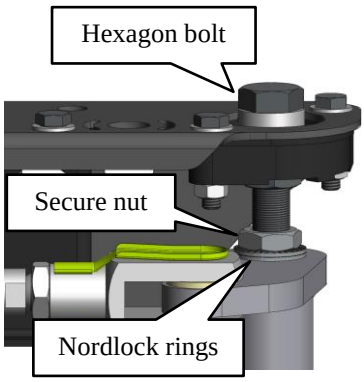


Figure 1.6: IG4 secure nut with Nord-lock

Nr.	Check	ADJ	Checked by:
	Note: Check if the there is one or two rings under the secure nut. Two rings means the door shaft has a Nord-lock locking disk.		
2.	Check if the torque setting of the secure nut is 100Nm or 75Nm when a Nord-lock locking disk is applied. If not, re-torque the secure nut. If you use the Ventura torque Wrench Tool, first read the tool documentation.		

Notice: If reachability of the secure nut is a problem, use one of the following tools:
*-**VA3860** Torque Wrench Tool 79.5 (Applicable for all IG4 doors)*
*-**VA4146** Torque Wrench Tool 89 + 85.5 (Applicable for all IG3 doors)*

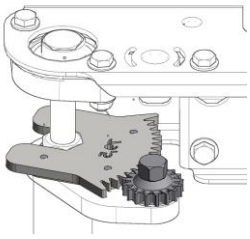


Figure 1.7: Torque Wrench Tool

1.3 Door leafs in open position

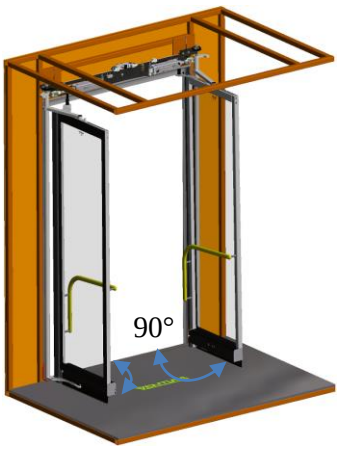


Figure 1.8: Right door angle

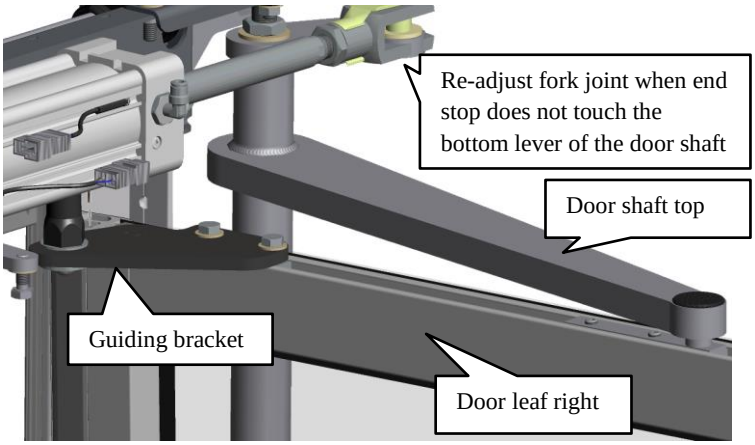


Figure 1.9: Adjustment of fork joint and guiding bracket

Nr.	Check	ADJ	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). *Note: The angle may differ depending on clearance in the aisle. Check the specific manual for the door system if 90° is not feasible.*		
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.		

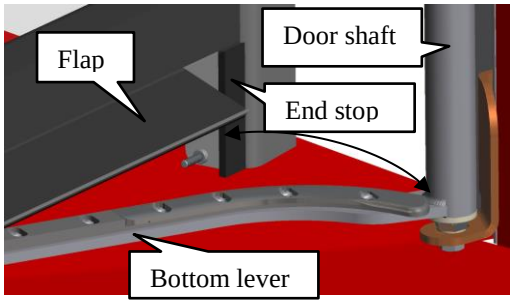


Figure 1.10 Square end stop plate

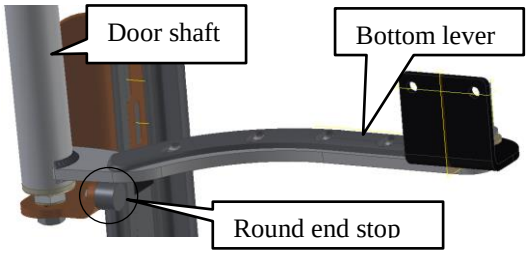


Figure 1.11: Round end stop

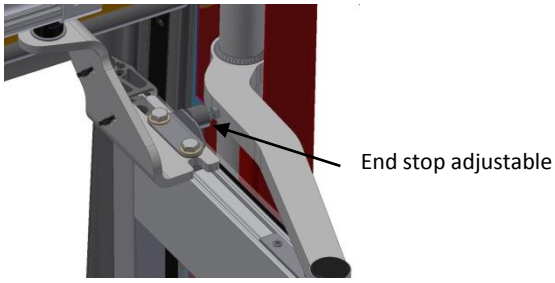
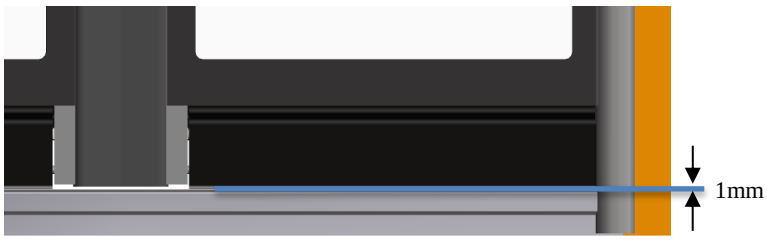


Figure 1.12: Extra end stop on door shaft top lever

Nr.	Check	ADJ	Checked by:
3.	Check if in a fully open position the door shaft bottom leaver touches the rubber cover plate on the door leaf as seen in Figure 1.8. 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 1.9). 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. In some rare cases there is an extra end stop on the door shaft top lever (Figure 1.11). Check if the door leaf touches the end stop when in a fully open position. *Note: Each side may have a different kind of end stop.*		



Nr.	Check	ADJ	Checked by:
4.	Check if the flap runs free during open and closing movement.		

5.	Check if the door leaf runs freely during open and closing movement by checking if there is at least 2mm space between the lowest part of the door leaf and the floor.		

1.4 Door flap

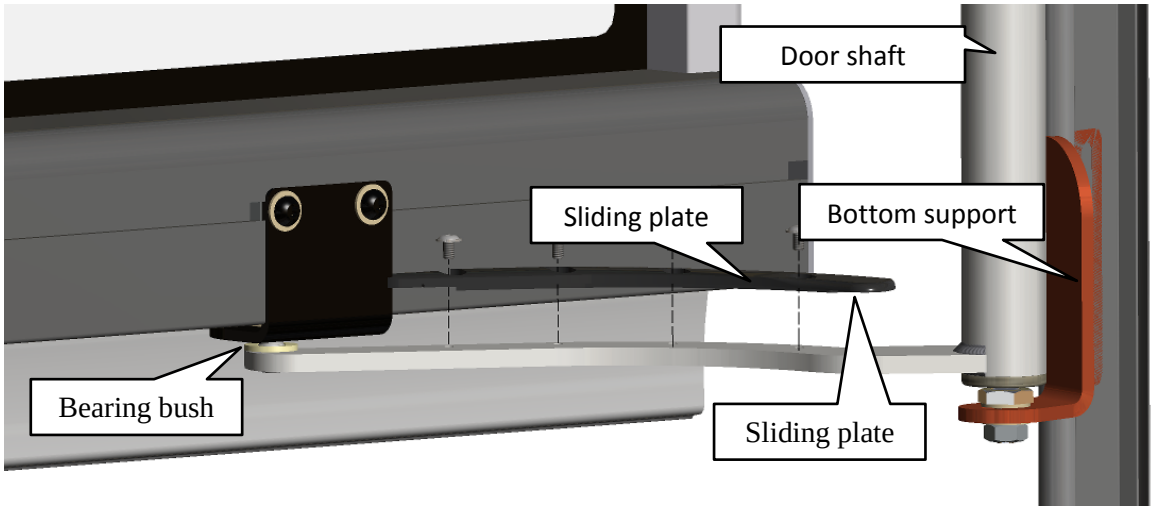


Figure 1.13: Detailed view of sliding plate and bearing bush

Nr.	Check	ADJ	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.		
3.	Check if the sliding plate is free from dust and grease or other impurities as his affects the durability of the sliding plate.		

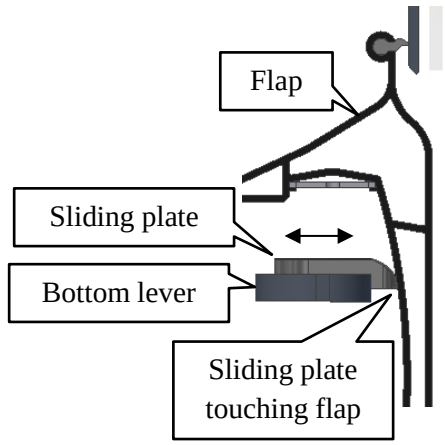


Figure 1.14: Sliding plate adjustment

Nr.	Check	Checked by:

4.	Check if the flap moves down on the right moment (when the door is almost fully closed, the flap should be fully down).	

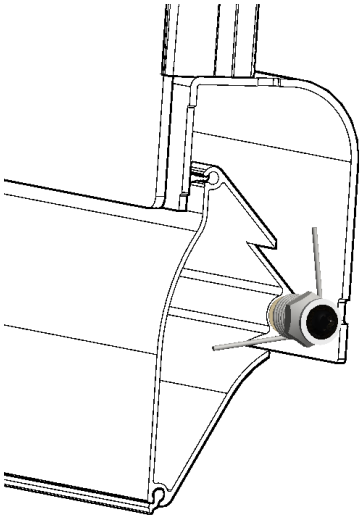


Figure 1.15: Door flap spring IG3

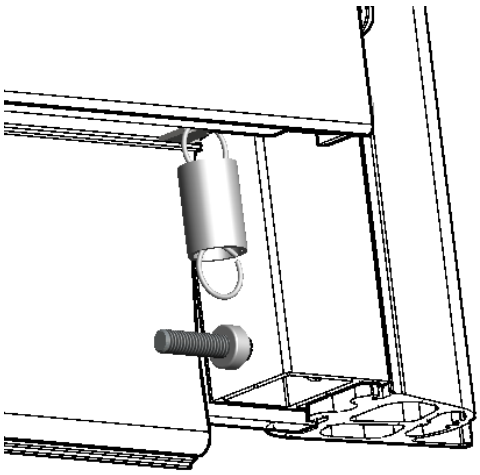


Figure 1.16: Door flap spring IG4

Nr.	Check	Checked by:
5.	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.	

1.5 Adjust the door leafs to be parallel to the aperture

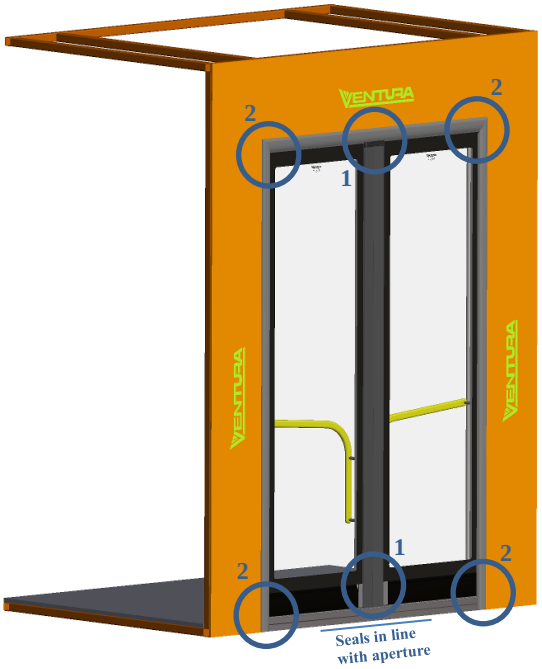


Figure 1.17: Seals in line with the aperture

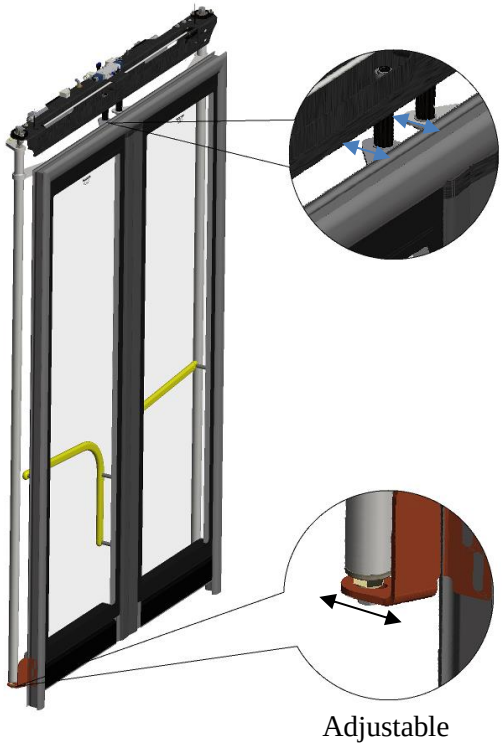


Figure 1.18: IG4 adjustment of the seals

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).		
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).		

1.6 Reed switch (if applicable)

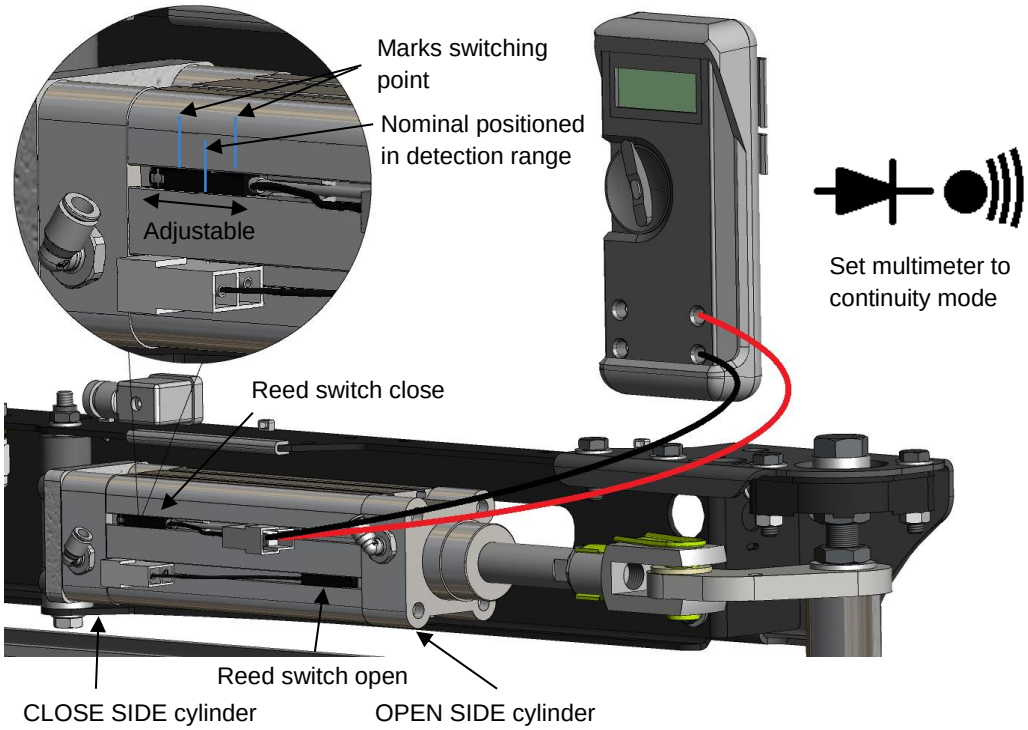


Figure 1.19: Position of the reed switch

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 Sensitive edge (if applicable)

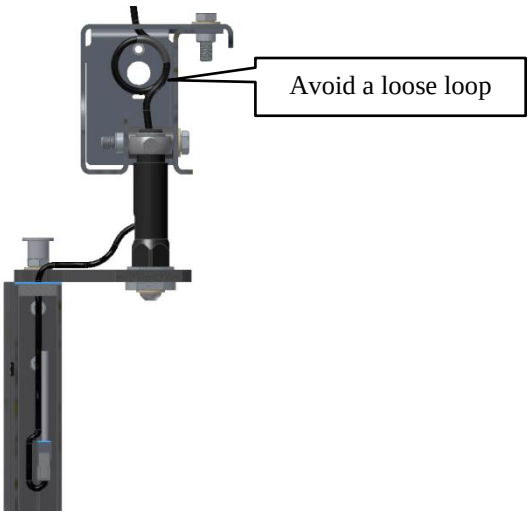


Figure 1.20: spiral cable for sensitive edge

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 edges are functional (with pressure) by compressing the side seals at the bottom when the door moves into a closed position.		

1.8 Filter regulator

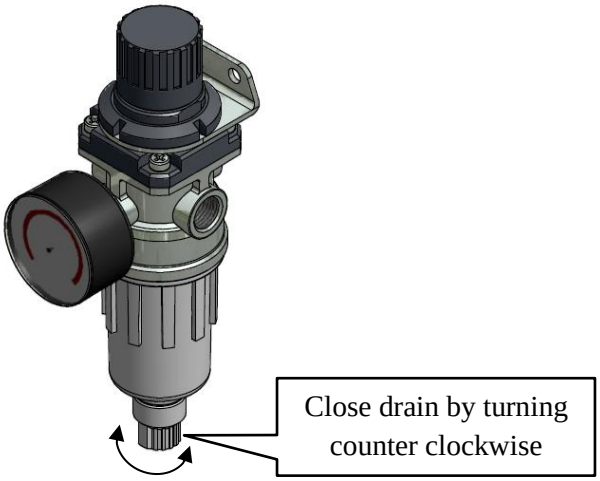


Figure 1.21: Camozzi filter regulator

Figure 1.22: 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	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).	

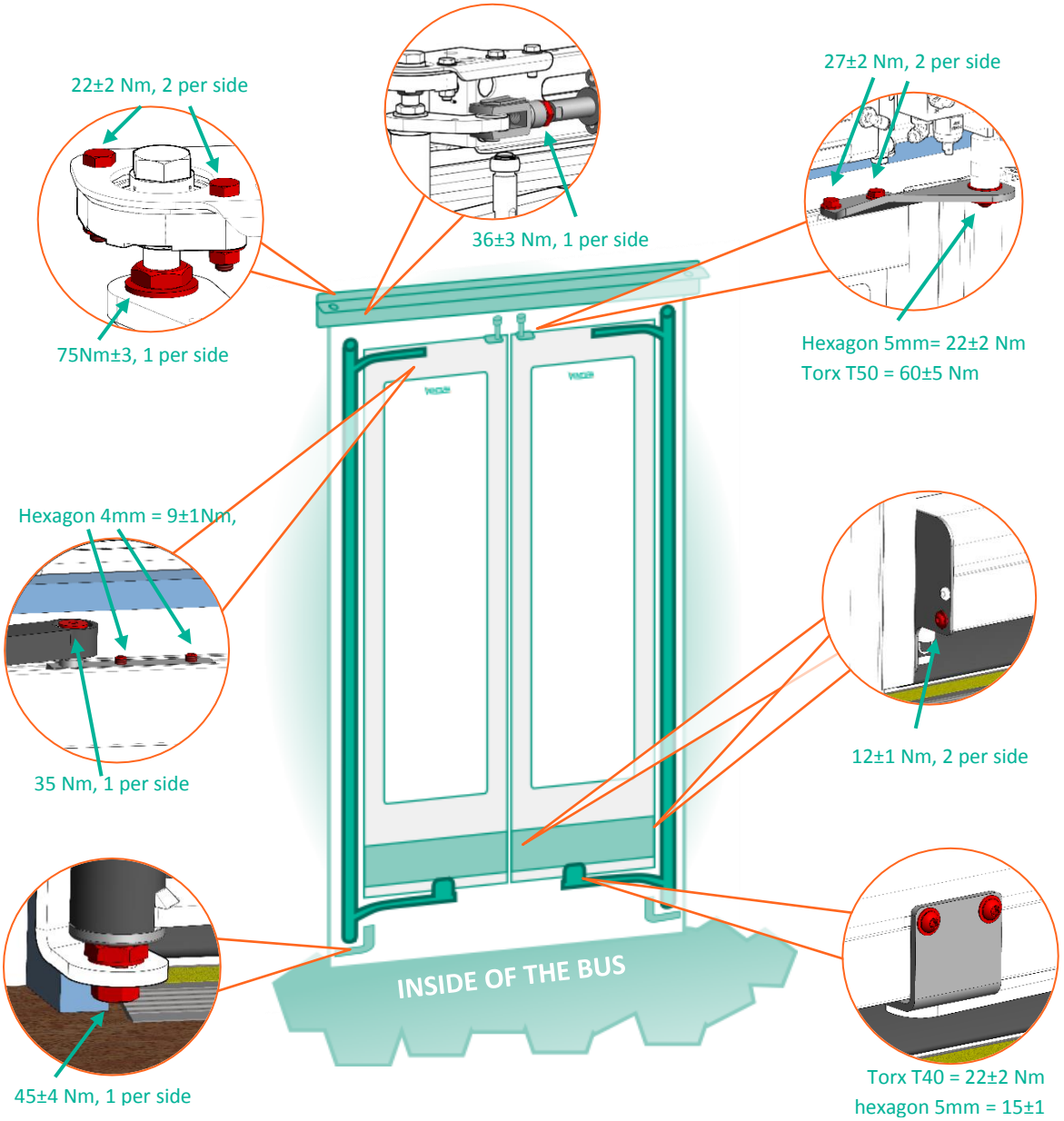
2.2 Safety

Nr.	Check	Checked by:
1.	Check emergency buttons.	
2.	Check pneumatic obstruction detection (if applicable)	

Signed on behalf of: Date:

3 TORQUE SETTINGS

In the overview below are the torque 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.



4 REMARKS