Maintenance Manual

Plug Sliding Door Generation 2.1

Version 5 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:
5	14-02-2017	M. Stoelinga - Technical Documentation Specialist	• Changed the torque settings page from a table to an overview with images
4	25-06-2015	K. Slager	• Torx torque values removed because of interpretation difficulty
3	25-06-2015	K. Slager - Technical Documentation Specialist	• PS2 maintenance manual split into PS2.0 and PS2.1 maintenance manual.

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 symbol:

Read instructions; It is important to read the instructions before installing and 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 operation knowledge about the door system may causes high risk when not informed. 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; For installation and the adjustment of the door system are no special tools necessary. 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

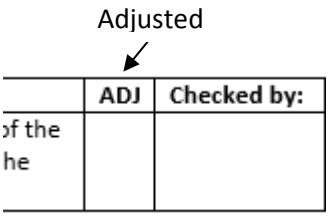
This guide is meant for the maintenance of Ventura plug sliding 2.1 (second generation) door systems. It is important to follow all instructions. **All instructions must be conducted without air/electric pressure** unless mentioned otherwise. When pressure is needed it will be mentioned. The instructions should be executed for the left and right door leaf when it's a double leaf door system (seen from the inside of the vehicle). 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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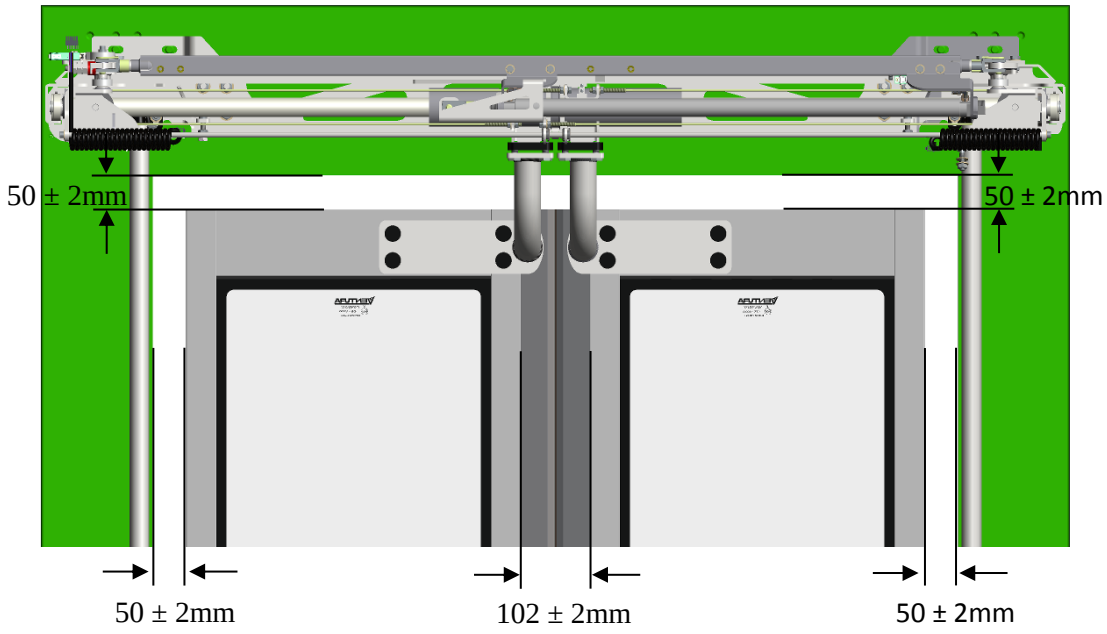
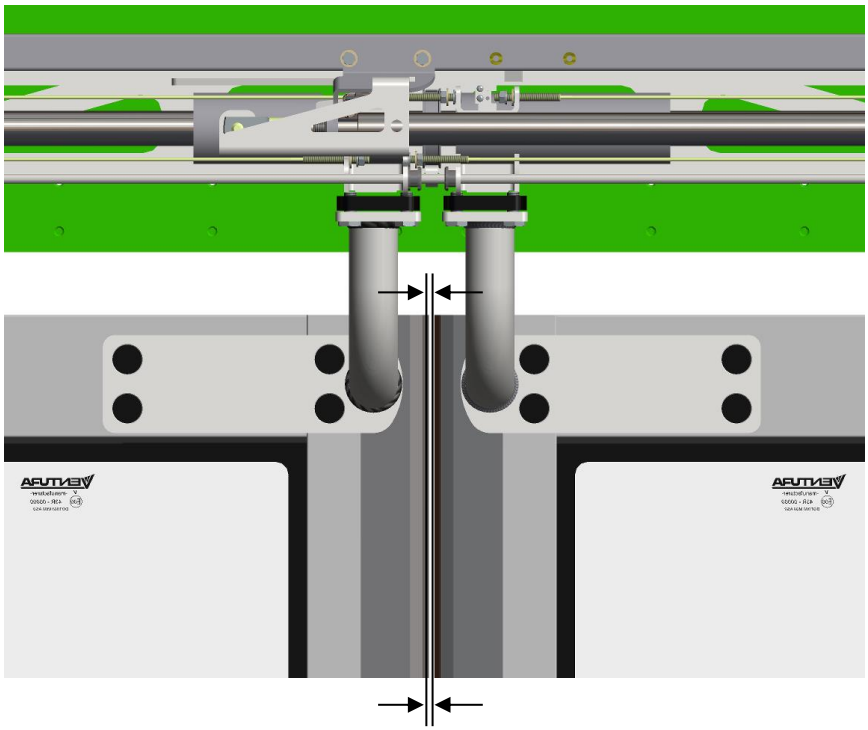
1 MAINTENANCE DOOR

Safety warning: 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



Nr.	Check	ADJ	Checked by:
1.	When closed there should be 102±2mm distance between the door leafs measured from the aluminum profiles of the door leafs (with pressure). If not adjusted correctly, the sensitive edges are compressed or a gap between the door leafs can lead to potential hand traps.		
2.	Check if the horizontal space between the door leafs (excluding the rubber) and the aperture is 50 ± 2mm.		
3.	Check if the distances at the top and the bottom of the door leafs are 50 ± 2mm (measured between the door leaf profiles and the aperture).		



Equal gap between the door leafs

Nr.	Check	ADJ	Checked by:
4.	Check if there is an equal gap between the door leafs (without pressure).		

1.2 Door shafts

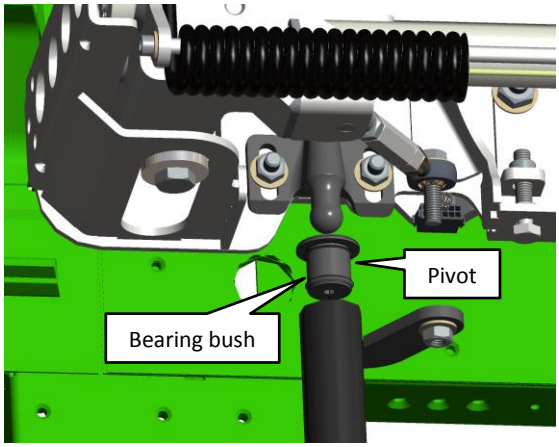


Figure 1.1: Exploded view of door shaft at the top

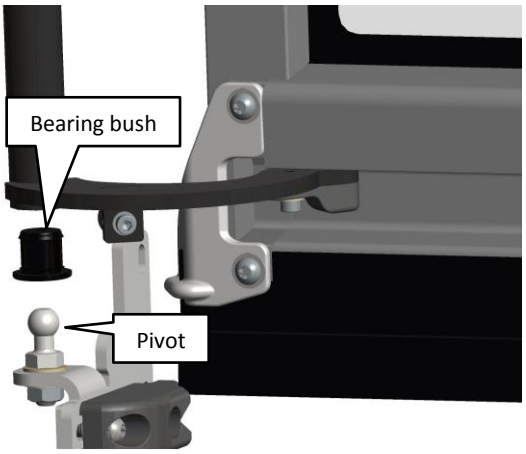


Figure 1.2: Exploded view of door shaft at the bottom

Nr.	Check	ADJ	Checked by:
1.	Check if the top bearing bush and pivot aren't broken or worn out. If so replace part.		
2.	Check if the bottom bearing bush and pivot aren't broken or worn out. If so replace part.		
3.	Check if the door shaft is free from vertical play (up and downward movement).		

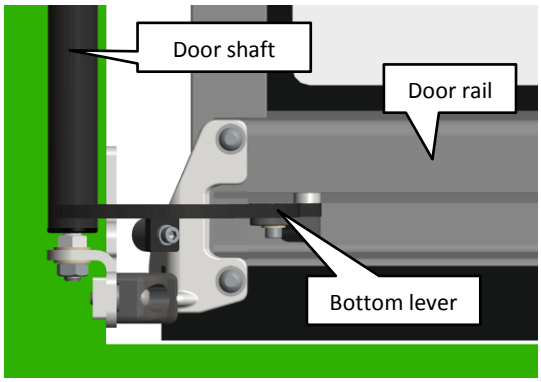


Figure 1.3: Check distance between door rail and bottom lever

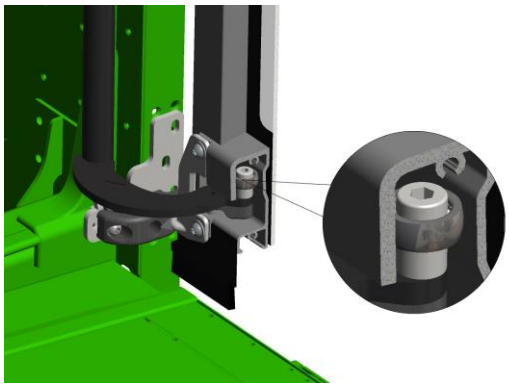
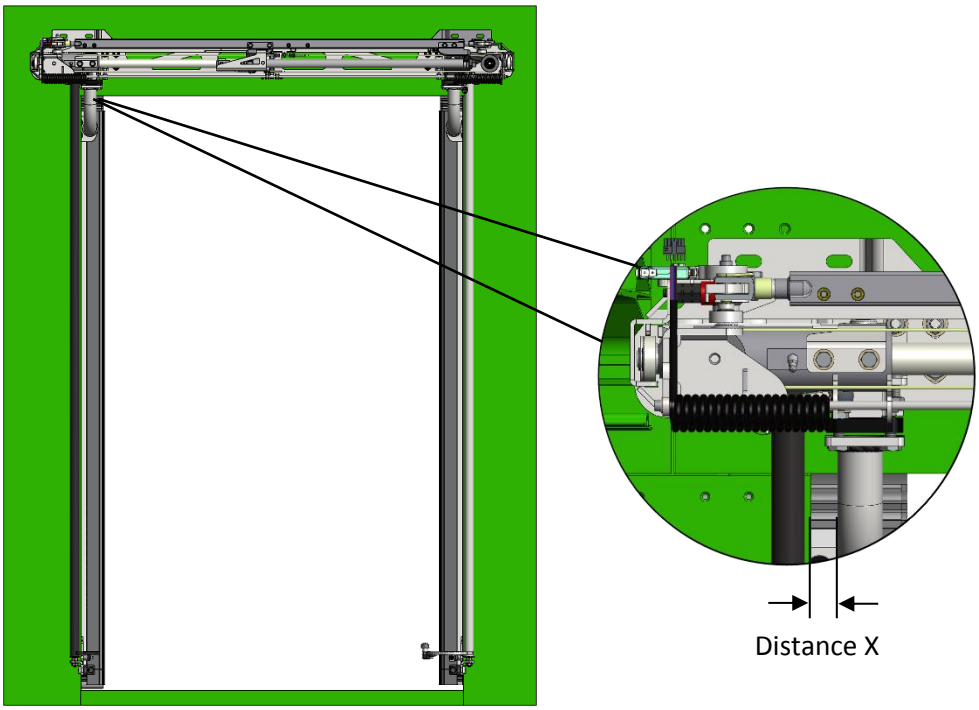


Figure 1.4: Cutout view of the guide roller

Nr.	Check	ADJ	Checked by:
4.	Check if the distance between the bottom lever of the door shaft and the guiding rail of the door leaf is 4-8mm (closed position), otherwise re-adjust the door shaft height.		
5.	Check if the guide roller is not broken or worn out. If so, replace part.		

1.3 Door leafs in open position



Nr.	Check	ADJ	Checked by:
1.	Put the door in a 100% open position. Push each door leaf away from the center of the aperture, one at the time. If there is excess play, the door leaf does not fully open. In this case, check the generic manual for adjustment.		
2.	Check if “Distance X” between the aperture and the door arm of both door leafs are equal.		

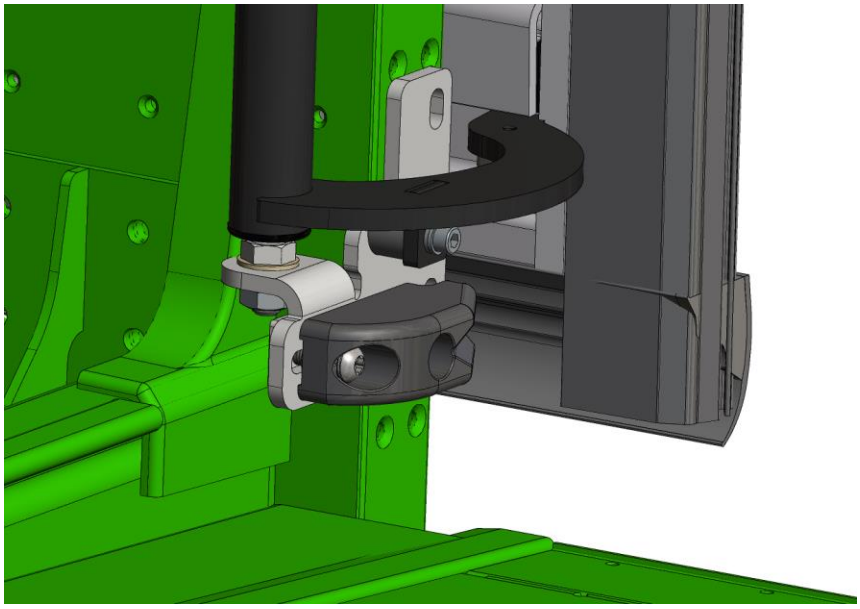


Figure 1.5: Bottom support

Nr.	Check	ADJ	Checked by:
1.	Put the door leafs in open position and check if the roller of the door shaft support touches the end of the guiding rail. If not the door leaf doesn't swing fully open at the bottom. This can be adjusted with the connection rods (See figure 1.14).		
2.	The end stop of the door shaft should touch the door shaft support when door is open (See figure 1.13).		

1.4 Door leafs parallel to the aperture

Figure 1.6: Door leafs parallel to the aperture, seen from above

Figure 1.7: Door leafs parallel to the aperture

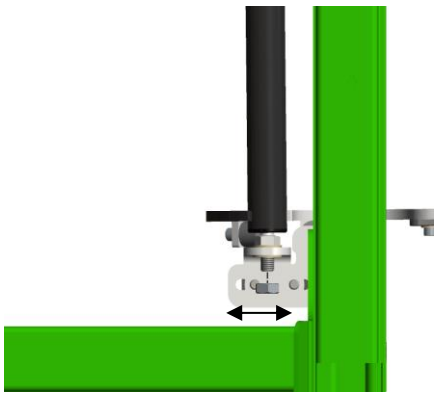


Figure 1.8: Adjust door shaft position

Nr.	Check	ADJ	Checked by:
1.	Check if the door leafs are parallel to the step wedge when fully open (without pressure, see figure 1.5). When closed, the door leafs can be put straight by the catch wedge, but should be straight on their own. Adjust the door leaf when not straight at fully open.		
2.	Check if the side seals of the door leafs fit well to the side of the aperture. The outward side of the side seal should be relatively straight and not bend inwards or leaf a gap between the side seals and the aperture.		

1.5 Over-Center soft-stopper

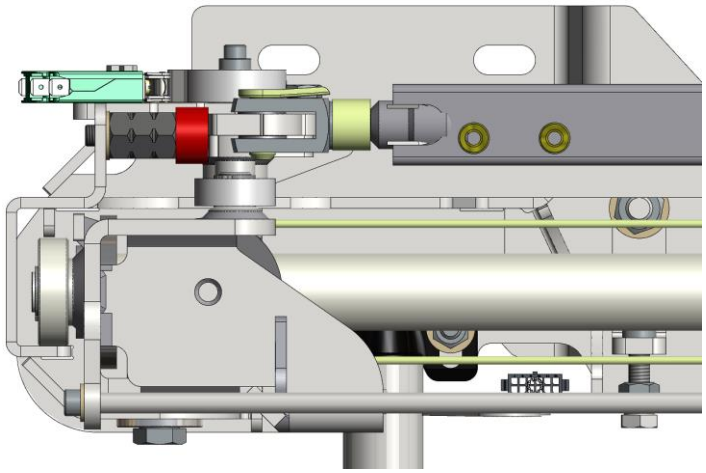


Figure 1.9: Soft stopper door mechanism

Nr.	Check	ADJ	Checked by:
1.	Check if the lever touches the soft stopper when in closed position (with pressure). If not, the door mechanism might not go over-center, securing the door system.		

1.6 Tension steel cables

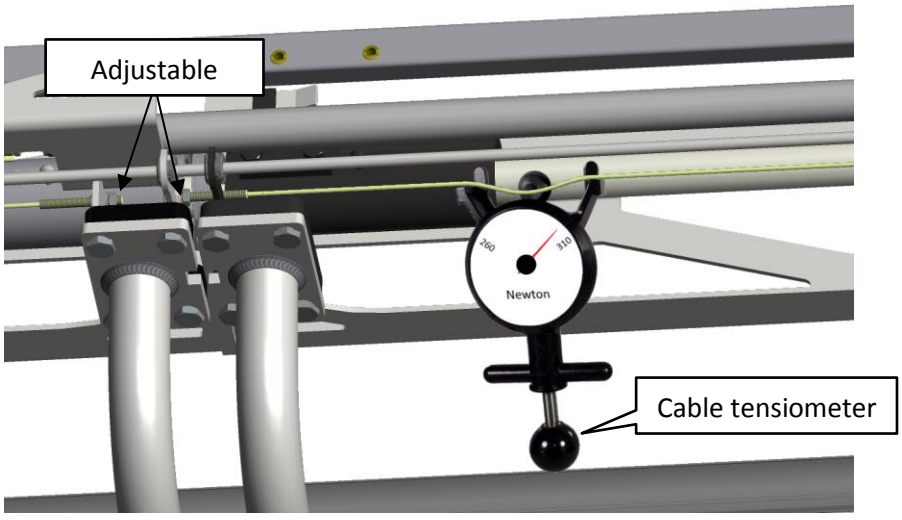


Figure 1.10: Measure tension of steel cables with a tensiometer

Nr.	Check	ADJ	Checked by:
1.	Check the steel cables with a tension gauge. The tension should be within 260-310 Newton. (Doors at least in half open position and without pressure). If necessary adjust cable length on spanner.		

1.7 Greasing bearing housings

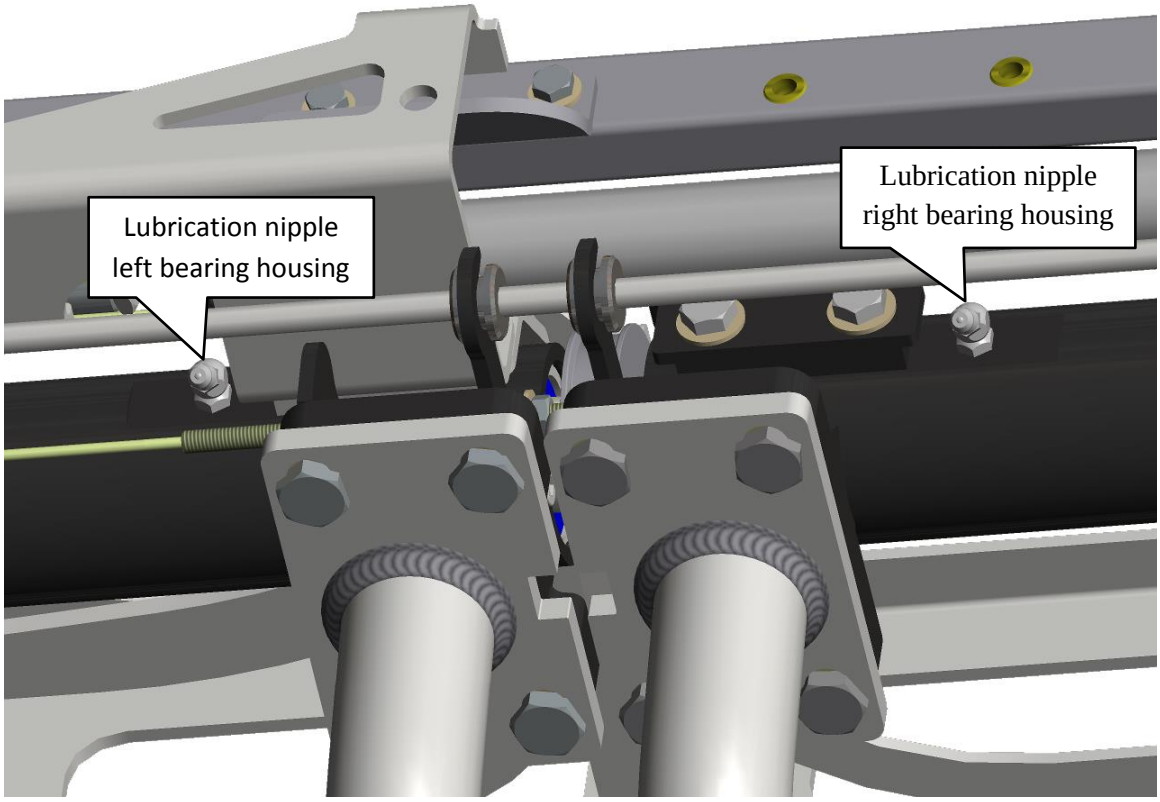


Figure 1.11: Apply multipurpose grease (Q8 Rembrandt EP-2) to bearing housings

Nr.	Check	ADJ	Checked by:
1.	- Greasing of the bearing housing. The housing is greased before delivering. (Advice: *multipurpose grease, Q8 Rembrandt EP-2*[2]). - Both bearing housings have to be refilled every year (Normal use, 20 gr. Grease.) - First 10 gr. grease after moving the door wing a few times, again 10 gr. grease).		

[2] NLGI 2
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. Q8 Rembrandt EP greases provide for long service life and offers rust protection even in the presence of water. (http://www.q8oils.com/)

1.8 Filter regulator

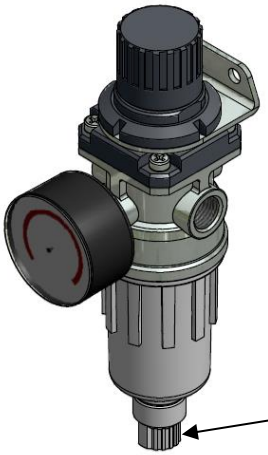


Figure 1.12: Camozzi filter regulator

Figure 1.13: Parker filter regulator

Nr.	Check	ADJ	Checked by:
3.	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.		
4.	In case the filter regulator is a Camozzi instead of an older Parker. 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.		
5.	Check if the pressure of the pneumatic system is between 8 ± 1 bar.		

1.9 Sensitive edge

Nr.	Check	ADJ	Checked by:
1.	Check if the sensitive edges are functioning.		

2 OPERATIONAL

2.1 Operation and controls

Nr.	Check	ADJ	Checked by:
1.	Open cycle, speed and cushioning (nominal 3.5 sec).		
2.	Closing cycle, speed and cushioning (nominal 3.5 sec).		
3.	Check the pneumatic system for leaking 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).		

Table 2.1: Checking of operational and control functions

2.2 Safety

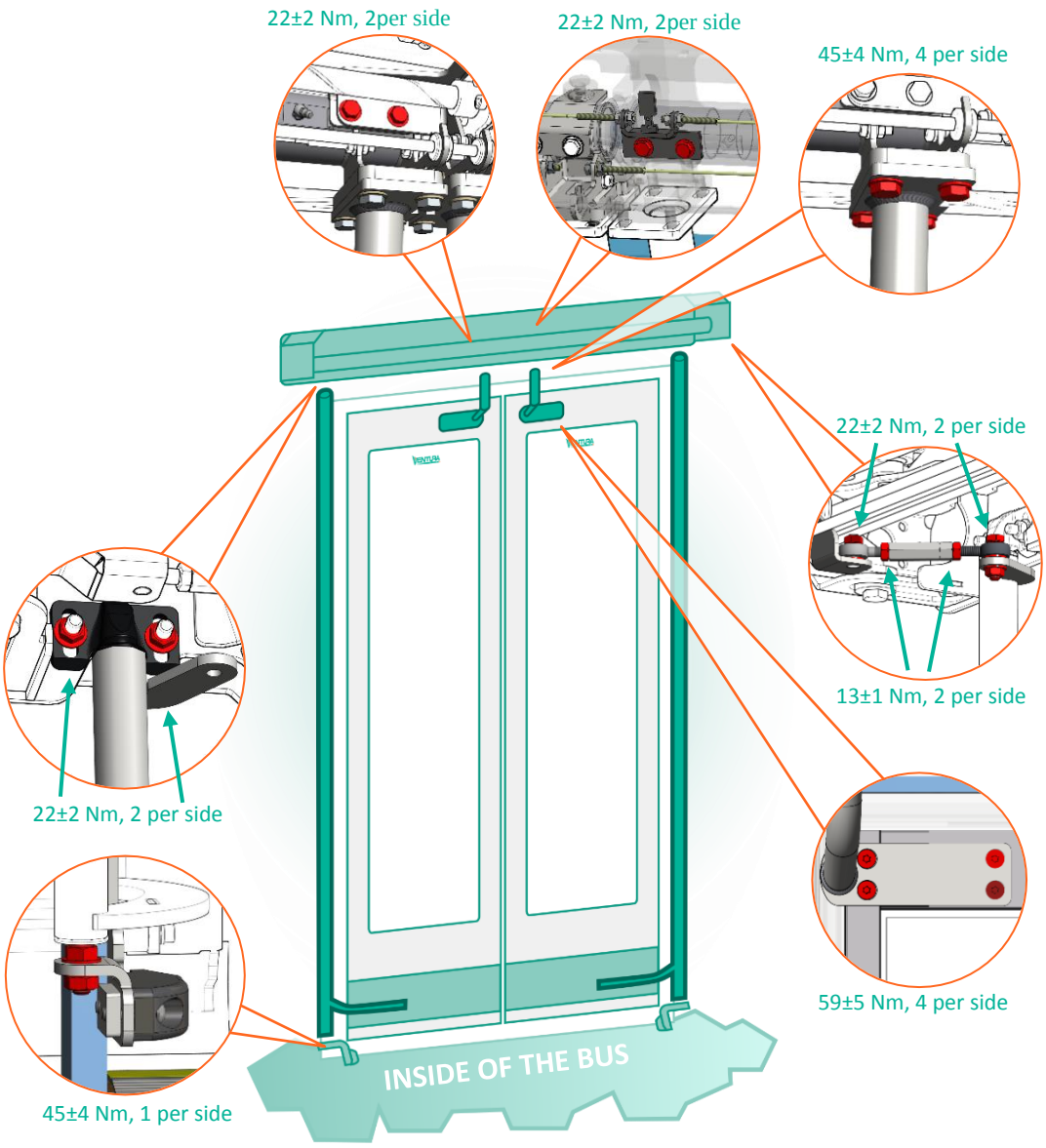
Nr.	Check	ADJ	Checked by:
1.	Check emergency buttons.		
2.	Check pneumatic obstruction detection (if applicable)		

Table 2.2: Checking of safety measurements

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