Maintenance Manual

Rapid Sliding Door

Version 4 20150625

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

Vehicle Type:	
Vehicle Number:	
Customer:	

Revision no.	Date:		
4	25-06-2015	Description of the change:	- Torx torque values removed because of interpretation difficulty
3	27-05-2014	Description of the change:	- All checks have been re-arranged - New figures - "Adjusted" column added to tables - Pneumatic pressure advice has been changed
		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 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.

Notice

- 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

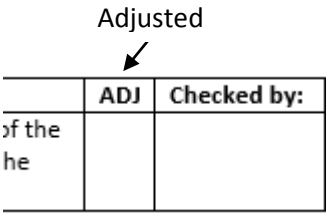
This guide is meant for the maintenance of Ventura rapid sliding door systems. It is important to follow all instructions. **All instructions must be conducted without air/electric pressure** unless mentioned otherwise. When pressure is needed it will be mentioned. The instructions should be executed for the left and right door leaf when it's a double leaf door system. 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/)

INDEX

1 MAINTENANCE DOOR

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

1.1 Door leaf in closed position

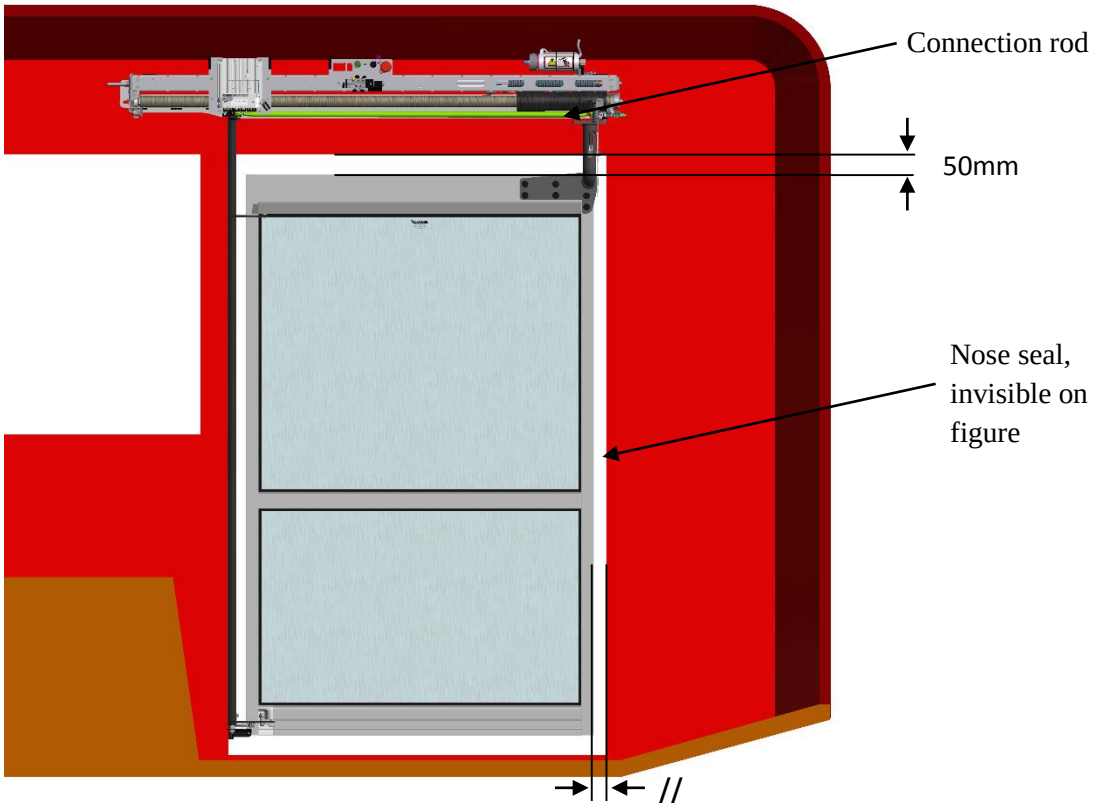


Figure 1.1: Door leaf in closed position

Nr.	Check	ADJ	Checked by:
1.	Check the height of the door leaf. The space between the aperture and the top profile of the door leaf needs to be 50mm across the entire width of the door leaf.		
2.	Check if the leading edge of the door leaf is parallel with the side of the aperture.		
3.	Check if the nose seal is not compressed when the door is closed. If so, adjust the “End stop CLOSING position” on the door mechanism as shown in Figure 1.12 and according to the manual.		

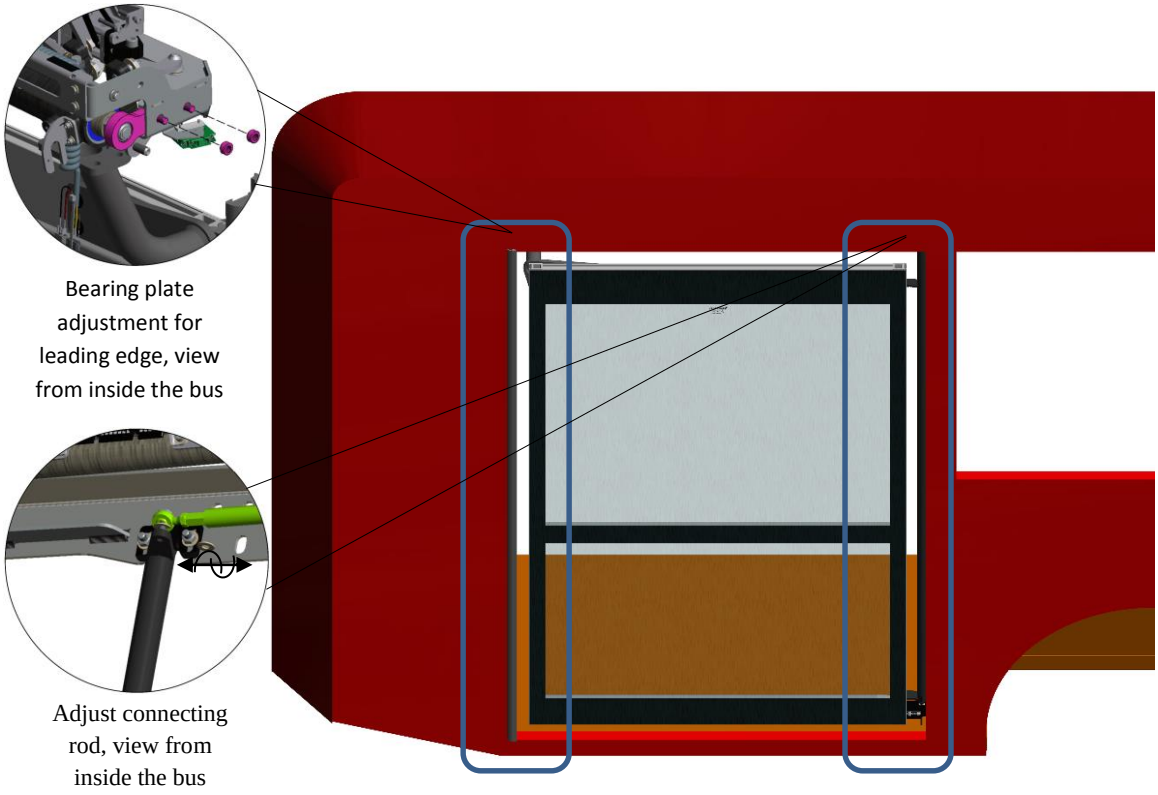


Figure 1.2: Door leaf parallel with the step edge

Nr.	Check	ADJ	Checked by:
4.	Check if the door side seal fits well against the aperture seal. The door leaf glass should be in line with the side of the bus. If not, then adjust the leading edge by moving the bearing plate or adjust the connection rod to adjust the inward/outward position of the other side of the door leaf. *Note: The leading edge is the edge of the door leaf with the nose rubber attached to the side.*		
5.	Check if the door leaf is parallel with the step edge when the door is in closed position.		

1.2 Door shaft

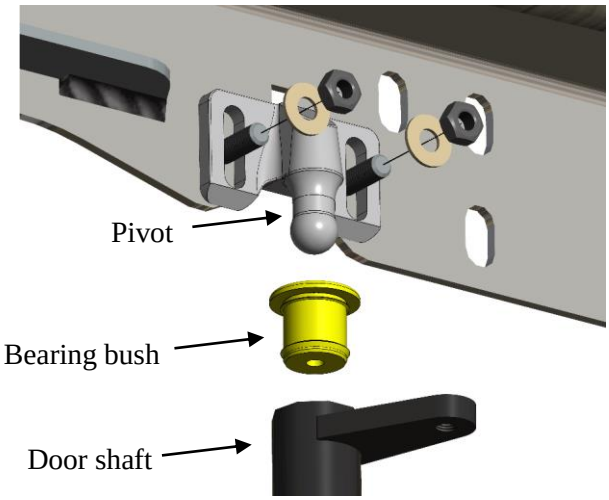


Figure 1.3: Door shaft top

Nr.	Check	ADJ	Checked by:
1.	Check if the bearing bush and pivot or not broken or worn out. If broken replace part.		
2.	Check if there's any vertical play on the door shaft. Assuming the door leaf is in good position, adjust the top pivot point downwards to remove any lose space.		

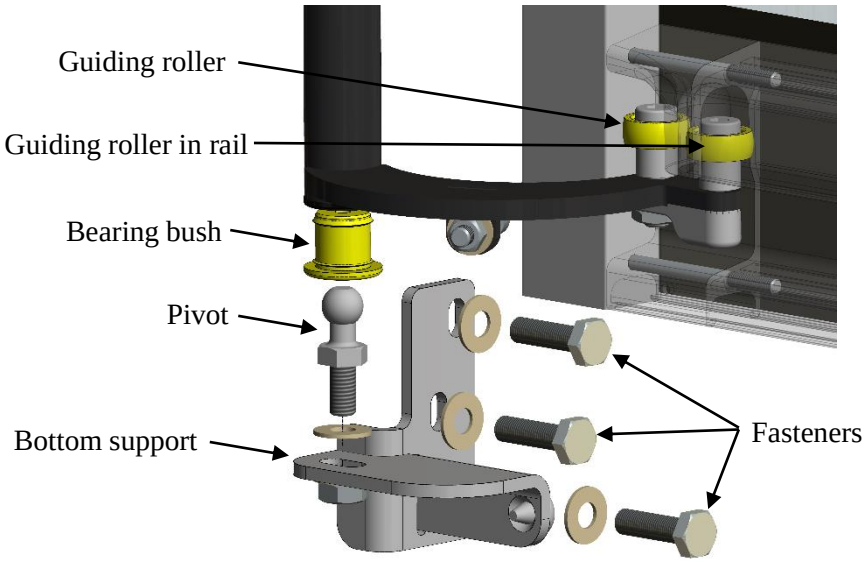


Figure 1.4: Door shaft bottom and bottom support

Nr.	Check	ADJ	Checked by:
3.	Check if the guide rollers are not broken or worn out. If broken replace part.		
4.	Check if the bearing bush is not broken or worn out. If broken replace part.		
5.	Check if the rollers and the guiding rail are clean from dirt or other impurities.		

1.3 Door leafs in open position

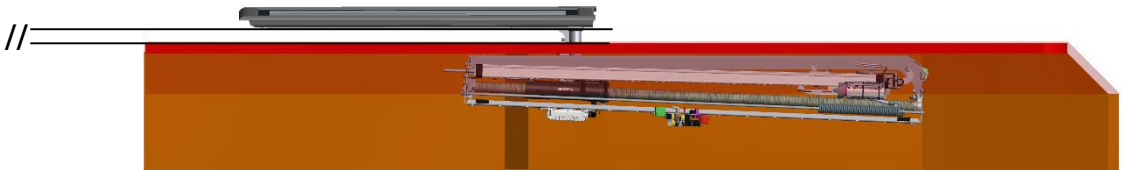


Figure 1.5: Door leaf parallel with the step edge

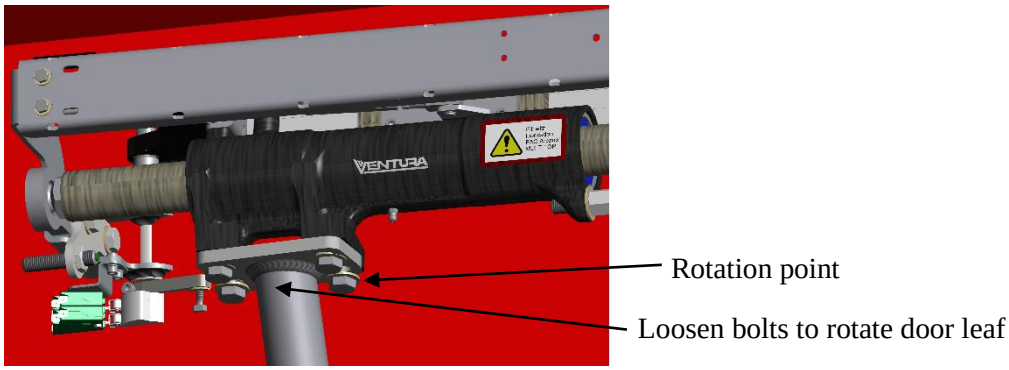


Figure 1.6: Rotating the door leaf

Nr.	Check	ADJ	Checked by:
1.	Check if the door and the side of the bus are parallel with each other, when the door is open. If not then adjust by rotating the door leaf.		

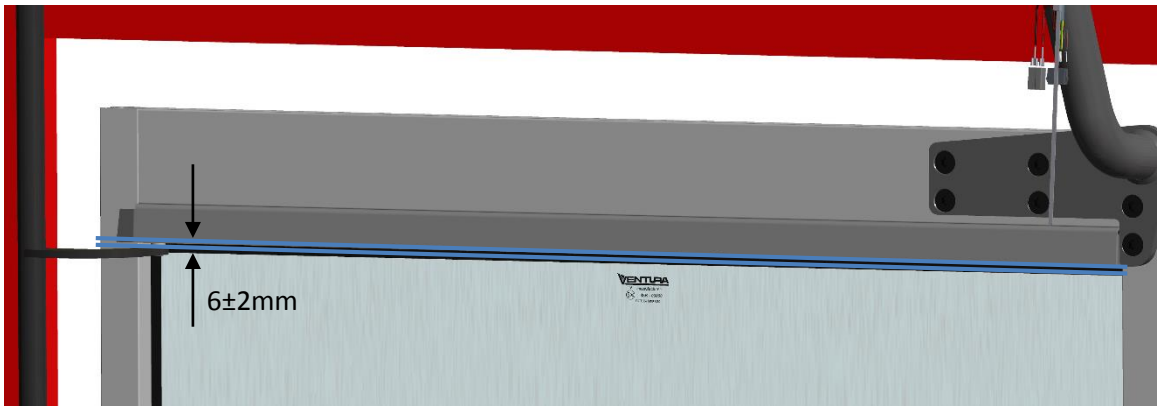


Figure 1.7: Door leaf upper rail

Nr.	Check	ADJ	Checked by:
2.	Check if the space between the upper rail and the upper level is consistently 6±2mm when the door is opening and closing.		

Note: If the system has an end stopper on the top lever, It is important to check the bottom end stop first, because this setting influences the position of the top end stopper, if applied on the door system.

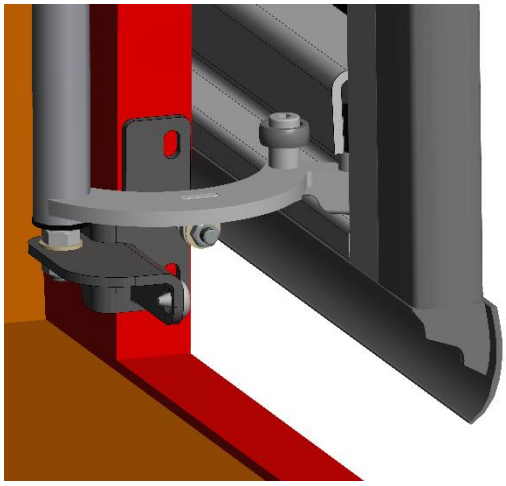


Figure 1.8: Door shaft bottom lever

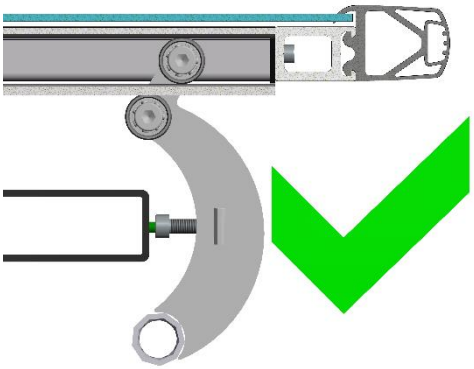


Figure 1.9: Good adjustment of end stop bottom lever

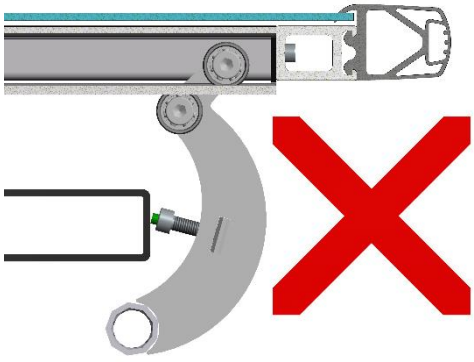


Figure 1.10: Wrong adjustment of end stop bottom lever

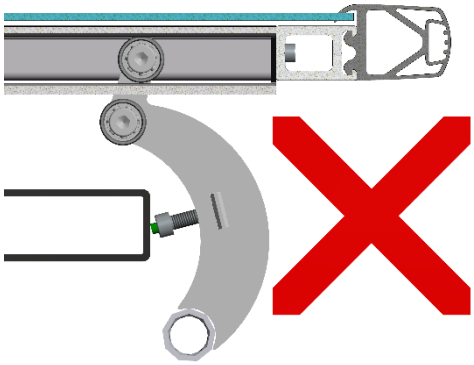


Figure 1.11: Wrong adjustment of end stop bottom lever

Nr.	Check	ADJ	Checked by:
3.	Check the end stopper on the bottom door shaft lever. The adjustment should represent Figure 1.9 to ensure there won't be too much tension on the guiding rollers. *Note: Older RS door systems only have one guiding roller.*		
4.	Check the end stopper on the top door shaft lever, if applicable. The top end stopper should be adjusted according to Figure 1.9.		

1.4 Soft stoppers door mechanism

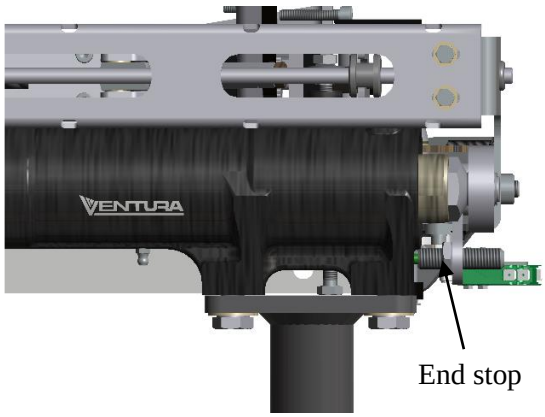


Figure 1.12: End stop door mechanism closed position

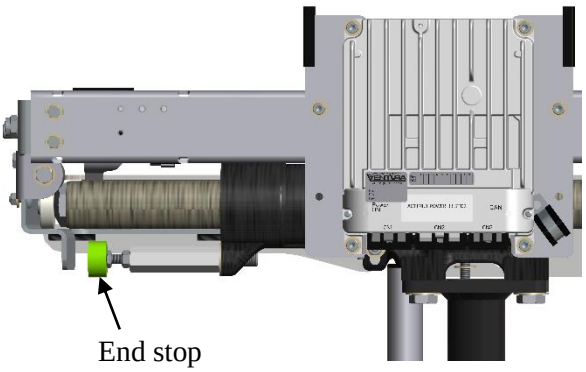


Figure 1.13: End stop door mechanism open position

Nr.	Check	ADJ	Checked by:
1.	Check if the bearing house is slightly pressed to the end stop when the door is in closed position (with pressure). It is important there's no gap between the door side seal and aperture seal. Adjustment: • Put the door in closed position on air pressure. • Adjust the end stop against the bearing house. • Open the door and then adjust the end stop 10mm longer. • Close the door. • There should be a gap now. Re-open and adjust the end stop 2mm shorter, repeat this until the gap is closed.		
2.	Check if there is a gap of 3mm between the inside roller in the door leaf guiding rail and the end of the guiding rail. If so, the door is able to fully open. If not, then adjust the end stop mounted on the bearing house. The end stop should touch the end plate when fully open. Adjustment: • Unscrew the end stop bolt 10mm • Open the door by hand (without pressure) • Screw the end stop bolt back in: Without force there has to be gap of 3mm between the end stop on the bearing house and the end plate on the frame of the mechanism		

1.5 Greasing of the bearing housing (pneumatic RS only)

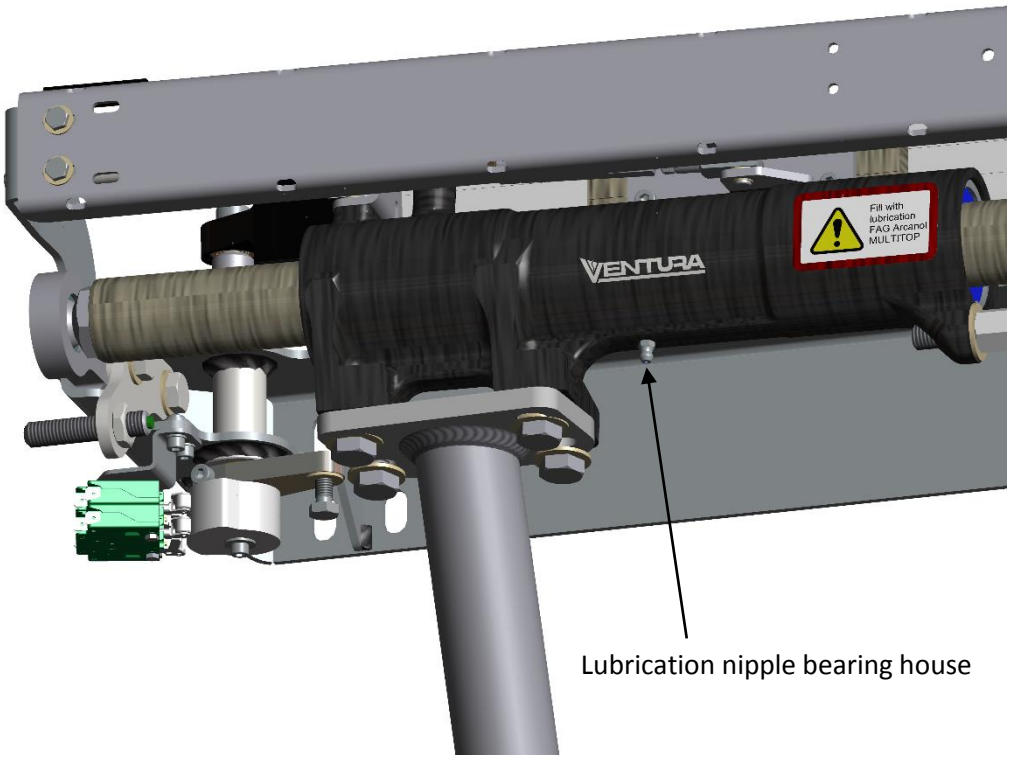


Figure 1.14: Lubrication nipple bearing housing

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]). <u>RS 1100 or bigger</u> - The bearing housing has to be refilled once a year (Normal use, 40 gr. Grease). - First 20 gr. grease after moving the door leaf a few times, again 20 gr. grease). <u>Smaller RS</u> - The bearing housing has to be refilled once a year (Normal use, 20 gr. Grease.) - First 10 gr. grease after moving the door leaf 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/)

1.6 Electric actuator (electric RS only)

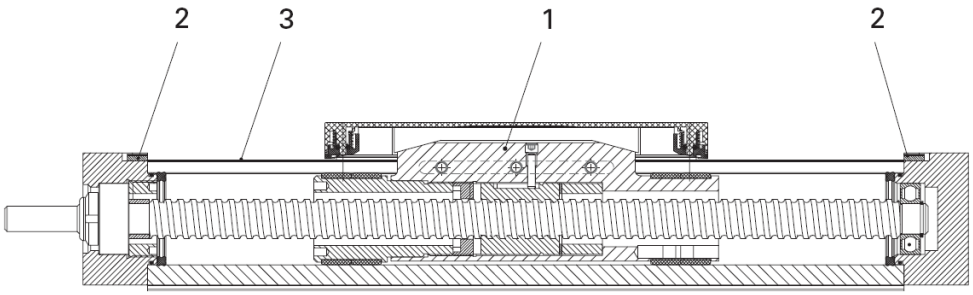


Figure 1.15: Electric actuator

Screw thread	Torque setting galvanized head screws
M 3	0.5 ± 0.1 Nm
M 4	2.2 ± 0.1 Nm

Nr.	Check	ADJ	Checked by:
1.	Check if the surface between the cover strip (3) and the aluminum profile of the actuator is clean from dirt and other impurities. (When cleaning do not use any aggressive cleaning materials and fluffy cloths.		
2.	Remove the cover strip and check if the spindle axis have a thin coating of grease. If not, then follow these steps: (It is advised to grease every 12 months) 1. Move the carrier (1) to the middle of the actuator. 2. Remove the clamps (2) at the end of the actuators and remove the cover strip (3). 3. Grease the spindle axis and the inside of the actuator evenly over the full length of the actuator. 4. Move the carrier a few times to each side. 5. Put the cover strip back in place and screw the clamps. *Note: Use lubricant HOERBIGER-ORIGA-Fett 2 (HO-grease 2 identification no. #15071 tube 45 gr).* *The shaft bearings don't need greasing.*		

1.7 Filter regulator

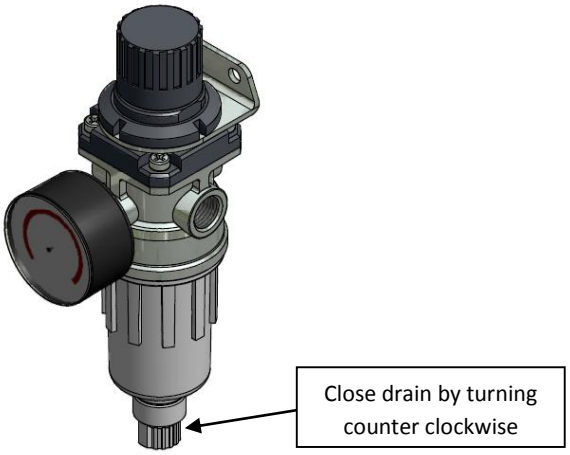


Figure 1.16: Camozzi filter regulator

Figure 1.17: Parker filter regulator

Nr.	Check	ADJ	Checked by:
	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.		
	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.		
	Check if the pressure of the pneumatic system is between 8 ± 1 bar.		

1.8 Sensitive edge

Nr.	Check	ADJ	Checked by:
	Check if the sensitive edge is 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 bolts and nuts are properly tightened (See chapter 3).		
6.	Check if the pressure of the pneumatic system is between 8 ± 1 bar.		

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

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

Table 3.1: Torque chart for hex bolts. Zinc plated in Nm. [3] [4]

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

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

[4] 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 REMARKS