



Inward Gliding Door System 4

Maintenance Manual

Version	2.0
Release date	2020-10-01
Document ID	IG4100001
Project name	Inward Gliding Door System 4
Project ID	IG4

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Revision history

Revision	Date	By	Description
2.0	2020-10-01	Prepared: <i>M.Stoelinga</i>	Adjusted torque setting of the Nordlock Ring. Added repair option to sensitive edge chapter. Adjusted contact email from service to support@venturasystems.com. Adjusted leakage test to test the full system
1.3	2020-04-30	Prepared: <i>M.Stoelinga</i>	Added check for the Clevis Pin and lever bush. Removed torque setting check of the secure nut from wearparts. Added warnings at the sensitive edge check. Textual improvements. Added torque settings to this manual.
1.2	2019-12-06	Prepared: <i>M.Delorme</i> <i>M.Stoelinga</i>	Added check for the clevis pin Minor text improvements. Updated references
1.1	2019-07-24	Prepared: <i>M.Stoelinga</i>	- Adjusted the air leakage test to an acceptable air leakage of 0.2 and 2 bar
1.0	2019-07-18	Prepared: <i>M.Stoelinga</i>	Added air leakage chapter Adjusted minor lay-out and textual issues Changed grease from "Arcanol MULTITOP" to "Kroon Multi Purpose Lithep EP2" except the grease inside the bearing house. Updated references.
0.4	2018-12-04	Prepared: <i>M.Stoelinga</i>	Frequency changed.
0.3	2018-11-30	Prepared: <i>M.Stoelinga</i>	Frequency changed. Moved "Clamping force test" from "Safety parts" to "Part inspections". Added the sentence: "Contact your local Agent for parts." Adjusted filter regulator check for electric systems with non-Ventura DCU.
0.2	2018-11-15	Prepared: <i>M.Stoelinga</i>	Rephrased safety checks. Changed reference from appendix to installation manual. Adjusted contact information.
0.1	2018-11-13	Prepared: <i>M.Stoelinga</i>	Initial version.



Preface

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1 Introduction

1.1 Purpose

This maintenance manual describes maintenance and small adjustment procedures for the Ventura inward gliding door system. Together with the installation manual, commissioning manual and system drawings makes a complete set of documentation. It is important to follow all instructions. All instructions must be conducted without air/electric power unless mentioned otherwise. The instructions should be executed for the left and right door leaf when the system contains two door leaves. A well-adjusted door system is less vulnerable to failure. The right maintenance is crucial for the durability of the door system.

1.2 Scope

The purpose of this document is to guide trained service mechanics through the maintenance steps of the inward gliding door system. When repairs have to be made, the mechanic needs to use the repair manual, or the proper service instruction.

1.3 Definitions

Definition	Description
Wear part	Wear is progressive damage to a part caused by relative motion with respect to another substance or part.
Safety part	A safety part is a part, which is important to the overall safety of a system.

Table 1: Definitions

1.4 Acronyms and Abbreviations

Abbreviation	Description
DCU	Door Control Unit
HQ	Headquarters
IATF	International Automotive Task Force
IG	Inward Gliding
ISO	International Standardization Organization
REG	Regulation
PSI	Pounds per Square Inch

Table 2: Acronyms and abbreviations

1.5 References

1.5.1 External documents

Reference	Description	Date
APTA:2013	Standard bus procurement guidelines : A standardized request for proposal contract form for the transit industry	2013-05-01
IATF 16949:2016	Automotive quality management system standard	2016-10-01
ISO 9001:2015	ISO Standard for Quality Management Systems – Requirements.	2015-10-01
REG 107 Rev 08	Uniform provisions concerning the approval of category M2 or M3 vehicles with regard to their general construction (Incorporating all valid text up to: Supplement 1 to 08 series of amendments)	2019-10-15
TS 155 Rev 2	Bus door safety systems	2017-11-23

Table 3: External documents

1.5.2 Ventura Systems documents

Reference	Type	Description	Revision	Date
IG4100002	IM	Inward Gliding Door System 4 : Installation Manual	2.0	2020-05-18
QM000001	DG	Documentation Guideline	3.1	2020-01-14

Table 4: Ventura Systems documents

1.6 Overview

Section 1 gives an introduction, definitions and overview of this document.

Section 2 contains the general door system safety instructions, safety symbols and disclaimer.

Section 3 contains the maintenance instructions.

2 Door installation safety

2.1 General

Safety of the operator and bystanders is one of the main concerns in designing and developing a new piece of equipment. Ventura's door systems have the proper safety features for common use of the system. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. As you install, operate, or maintain the door system, you must be alert to potential hazards. Make sure you have the necessary training, skills and tools to perform any assembly, or maintenance procedures. Improper operation and maintenance of this door system may result in a dangerous situation that may cause injury or death.

Ventura Systems cannot anticipate every possible circumstance that may involve a potential hazard. The warnings in this document and on the product are not all-inclusive. If a method of installation or operation is used, which is not specifically recommended by Ventura Systems, you must satisfy yourself that it is safe for you and for others. You should also ensure that the door system will not be damaged or be made unsafe by the installation and/or operational methods you choose. The information, specifications and illustrations in this document are based on the information that was available at the time this document was written and can change at any time without notice.

2.2 Disclaimer

The information contained in this maintenance document is based upon reliable technical data at the time the document was published. These instructions are intended for use by persons having the technical knowledge to maintain this door system. The instructions are to be used at the maintenance mechanic's own discretion and risk. Ventura Systems assumes no responsibility for results obtained or damage incurred from the use of this material either in whole or in part by the installer. This document provides basic instructions for the maintenance of the door system in a step-by-step sequence that will work in most types of maintenances. While effort has been made to ensure the information in this document is correct and complete, we would appreciate it if you would contact us in case of errors.

2.3 Safety alert symbols

This document contains safety messages which alert you to potential personal injury hazards. Obey all safety messages in this document to avoid possible injury or death. The following key words and layouts calls for your attention: DANGER, WARNING, CAUTION and NOTICE. Below are examples of these safety messages. The NOTE message is used for additional information but these are not threatening for the mechanic, bystanders, nor the door system.



DANGER!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.



WARNING!

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION!

Indicates a potentially hazardous situation which if not avoided, may result in minor or moderate injury.

NOTICE

Indicates that equipment or property damage can result if instructions are not followed.

NOTE

Additional information important but not threatening for people or to the system.

2.4 Safety instructions



WARNING!

This door system is designed for a specific application;

DO NOT modify or use this unit for any application other than for which it was designed.

Door systems operated improperly or by untrained personnel is dangerous. Lack of operation knowledge may cause high risk.

Do not install this door system if it is damaged. If you are in doubt if the door system has a defect, immediately stop the installation and contact Ventura Systems.

Do not connect the door system to air or electric supply during the maintenance process. If the manual states otherwise, follow the manual.

Do not attempt to install the door system under influence of drugs or alcohol.

NOTICE

Do not modify the door system or safety devices. Unauthorized modifications may impair its function and safety.

If equipment has been altered in any way from the original design, Ventura Systems does not accept any liability for injury or warranty.

If replacement of parts is necessary, genuine factory replacement parts must be used to restore the door system to its original specifications.

*always disconnect the air and/or electric power while replacing parts. Safety features may not be active while replacing parts.

Ventura Systems will not accept responsibility for damages as a result of the use of unapproved parts.

While working on the Ventura door systems wear appropriate personal protective equipment.

This list may include but is not limited to:

- Protective shoes with slip resistant soles
- Protective goggles, glasses or face shield
- A hard hat

Follow the regional and country laws and safety precautions.

3 Maintenance

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 portal.

Whenever the amount of cycles is past, we advise to execute the applicable maintenance. At the table below, we address the chapter names.

Cycles assumption	Minimal maintenance	Applicable for
75.000	Every 3 months	Safety parts Operational checks
150.000	Every 6 months	Wear parts
300.000	Every 12 months	Parts inspections

Table 5: Maintenance frequencies

Execute at least the minimal maintenance intervals.

3.1 Safety parts

The checks in this chapter are very important. If these parts are not installed correctly, it can have great consequences for the safety of the system. When the system has two door leaves, the checks must be executed for both sides.

Ventura Systems recommend to execute all safety checks regularly and at least according to the maintenance intervals mentioned in the table "Maintenance frequencies".

3.1.1 Emergency release

Apply power and/or pressure to the system and put the door(s) in closed position.



CAUTION!

Be aware the system could move when applying power and/or pressure to the system.

1. When the system is active, activate the emergency release.
The following events should occur.
2. The power/pressure is released from the system.
3. The door(s) can be opened manually.
 - Reset the emergency release.
 - Open and close the door(s) using the power source.



WARNING!

Remove the power and/or pressure from the system after executing this step and before you continue.

3.1.2 Sensitive edge

Apply power and/or pressure to the system and put the door(s) in closed position.



CAUTION!

Be aware the system could move when applying power and/or pressure to the system.

Do not apply an obstruction with bodyparts.
When the safety parts do not function this could result in serious injury.

Put the doors in open position before executing the following steps. Close the doors using the power.

- Press against the right mid seal at a height of 1 meter or less. The doors go to open position.
- Press against the left mid seal at a height of 1 meter or less. The doors go to open position.

When the door leaves do not open when pressing the mid seals as described, perform the following checks or execute the repair instruction.



WARNING!

Remove the power and/or pressure from the system before you continue.

- Pull out the cap at the top of the vertical profile. Be aware to not damage the cable, cap or seal.
- Disconnect the sensitive edge from the spiral cable.
- Set the multimeter to continuity mode and connect the multimeter to the connector of the sensitive edge.

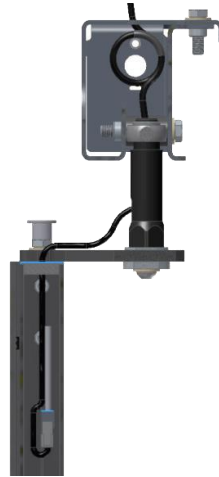


Figure 1: Spiral cable runs smooth and has no overlength

1. Be sure there is no force pressing the mid seal which can activate the sensitive edge. Resistance is $8k2\Omega$ or $1k2\Omega$ on the resistor of the sensitive edge.
2. Apply force onto the mid seal of the door leaf. Resistance is approximately $0. \sim 0 \Omega$

Reconnect the sensitive edge to the spiral cable and perform the following checks.

1. Check if spiral cable moves free on the shaft.
2. Check if all the excess length from the spiral cable is fitted inside the door profile. The spiral cable should be fixed to the guiding shaft bracket with a tie wrap. Be sure there is a little play.
3. Add multipurpose grease on the spiral cable shaft so the cable moves smoothly.(Use "Kroon Multi Purpose Lithep EP2" or a grease with similar specifications)

When the sensitive edge is not working properly, replace it.

NOTE

The sensitive edge is malfunctioning when the resistance is infinite. $\infty \Omega$.

3.2 Wear parts

These parts wear out and must be replaced when damaged, worn, after the prescribed cycles or after the prescribed time the parts are in usage. When a part has an amount of maximum cycles, it will be mentioned.

3.2.1 Clevis pin and lever bush

- Check if the lever bush is not damaged.
- Check if there are no excessive wear marks on the lever bush.
- Check if there is grease between the clevis pin and the lever bush.

If the bush damaged or worn, replace the bush.

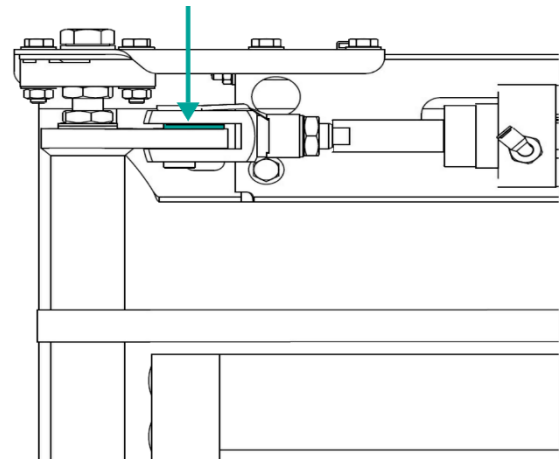


Figure 2: over center position

- Check if the clevis pin is not damaged.
- The Clevis pin has to connect the fork joint to the upper lever of the door shaft.

If the clevis pin is damaged, replace the clevis pin.

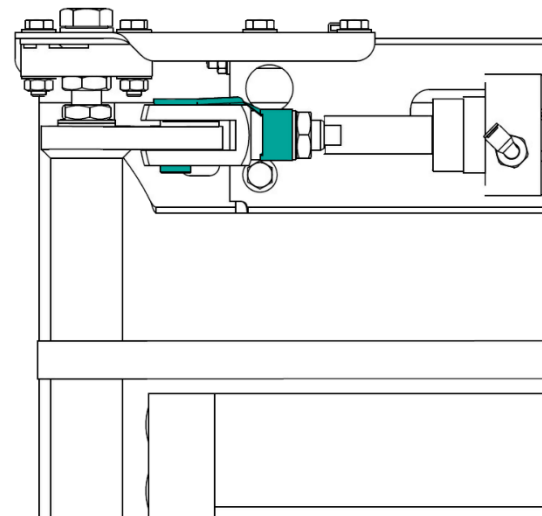


Figure 3: check the clevis pin

3.2.2 Guide rollers

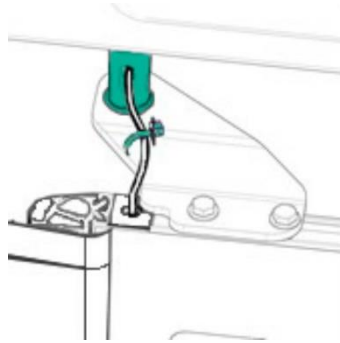


Figure 4: Guiding shaft

1. The guide rollers on top of the guiding shafts are not worn or damaged in any way. Check for damage visually and feel if there are no worn places on the guide rollers.
2. The guide rollers do not press against the guide rail while the doors are opening or closing.

3.2.3 Bearing bush shaft

- Check if the door shaft is free from vertical play (up and downward movement).
- Check if the door does not squeak. If it does apply some grease between the bearing and bearing bolt.

If the door shaft is free from vertical play, continue without executing this step. If there is play, execute the following checks.

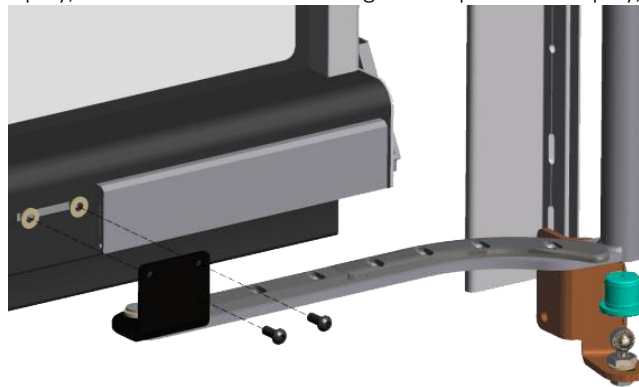


Figure 5: Bottom bearing bush

1. Check if the bottom bearing bush is not broken.

3.2.4 Bearing bush bottom

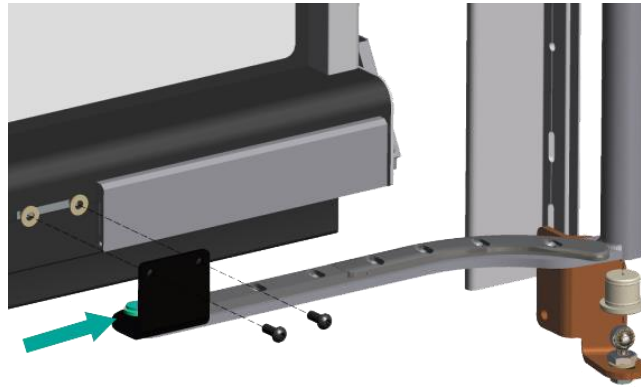


Figure 6: Lever bearing bush

1. Check if the bearing bush on the lever is not broken.
2. Check if the bearing bush on the lever is not blocked by dust and dirt.

3.2.5 Sliding plate

The sliding plate at the bottom lever is not heavily worn.
when the sliding plate is not worn, continue to the next step.

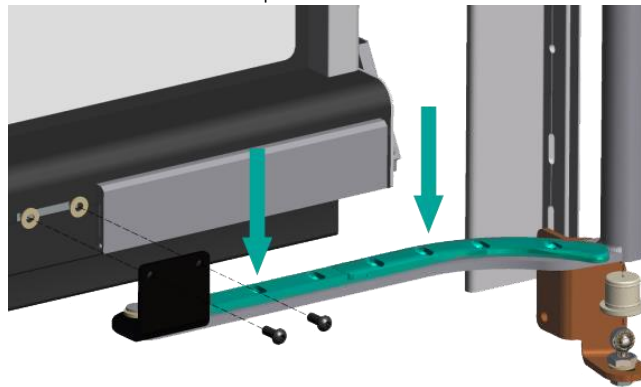


Figure 7: Sliding plate

1. When the sliding plate is worn, replace the part.

3.3 Parts inspections

These parts can get affected by usage and must be re-adjusted or cleaned when needed. Check the distance settings of the door system in open and closed position following the installation manual. Check the torque settings of the door system following the installation manual.

3.3.1 Filter regulator

Check if the system is equipped with a regulator or a filter regulator. If there is no regulator or a filter regulator, skip this step.

1. Check if the pressure of the pneumatic system is 8* bar.
*in case of an electric system with a non-Ventura DCU, check if the pressure of the pneumatic system is 6 bar.
2. 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 open.
3. Replace the filter when it is not clear white.

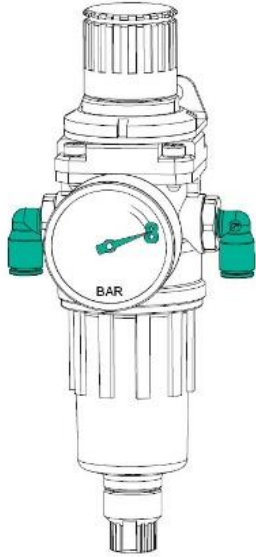


Figure 8: Camozzi filter regulator

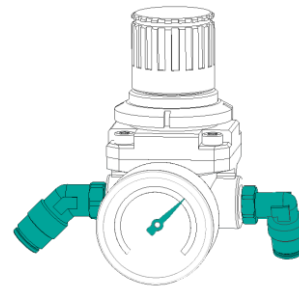


Figure 9: Camozzi regulator

Open drain by turning clockwise
Close drain by turning counter clockwise

NOTICE

Depending on the filter regulators location, it is advised to keep the drain closed so it will not spill dirt over vital parts of the bus.

3.3.2 Clamping force test

Be assured all safety features of the system are active. Execute the obstruction test following the applicable regulations for your company. (Regulations Ventura meets are REG107, TS155 or APTA)

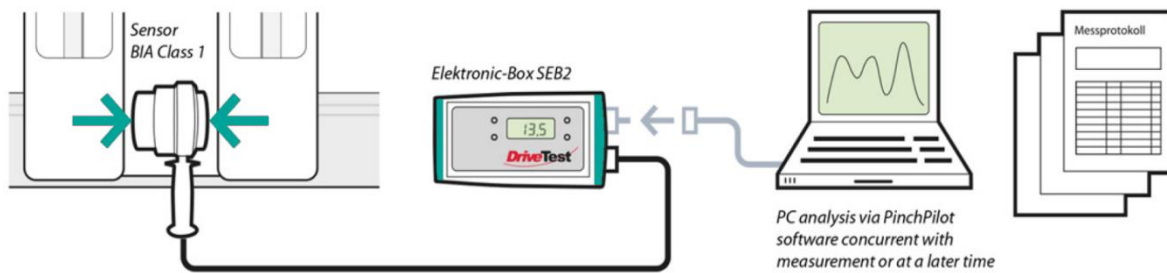


Figure 10: Obstruction test setup

1. Setup the measurement system following the user manual included with the measurement tool.
2. Apply power and/or pressure to the system.



CAUTION!

Be aware the system could move when applying power and/or pressure to the system.

3. Put the doors in open position.
4. Execute the test according to the applicable regulations.

When the test is not successful;

- Check the safety parts of system.
- Check adjustments following the installation manual.



WARNING!

Remove the power and/or pressure from the system after executing this step and before you continue.

3.3.3 Air leakage test

All stated air leakage test values are applicable solely on one door system. Only check the leakage on door systems when the door is not functioning properly or air leakage is hearable.

Check for damaged air pipes or connectors. Locate the leak by checking air leak noises and feelable airflow coming from the connectors or pipes.

To reduce air leakage, maintain the filter regulator at least every 2 months. Manually drain the bowl according to the maintenance manual. Change the filter element inside the bowl, at least every year.

Starting pressure of the test is 8 Bars. Test time is one minute.

The leakage value is a constant indicator in testing supplied pneumatic parts.

The system may leak a maximum of 1 Bar per minute.

To test the air leakage there are three main tests. All of them use a schematic drawing how to connect the Manometer. The icons used are displayed in the legend.

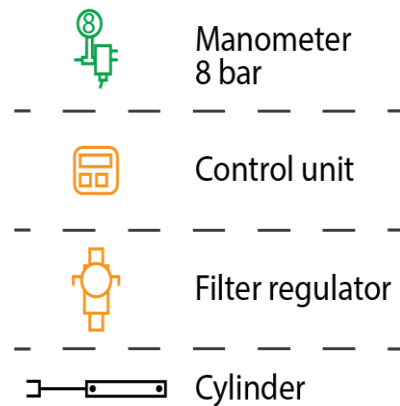


Figure 11: Legend for air leakage images

The testing device can be ordered with number U994. This is a Manometer combined with manual valve.

Testing the complete door system

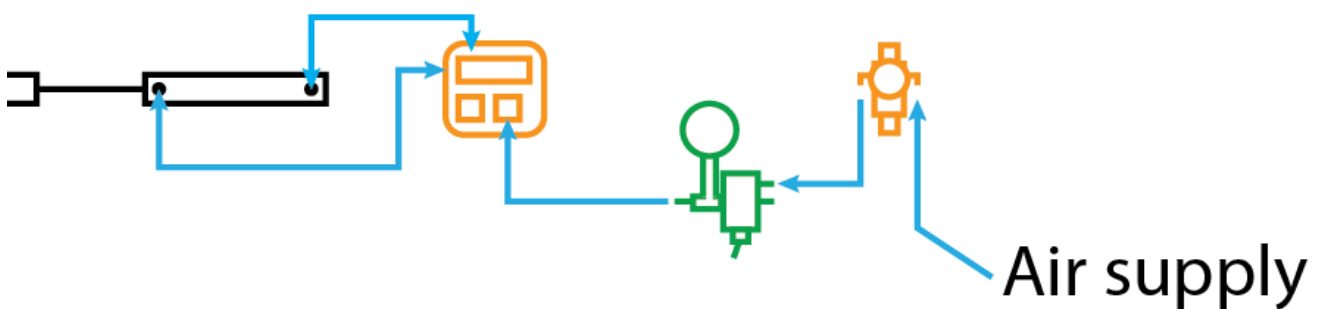


Figure 12: Testing complete door system

1. Connect the testing device between the filter regulator and the rest of the door system as shown in the image above.
2. Start the engine of the bus, air pressure should be 8 Bar.
3. Put the doors in open position.
4. Remove the air pressure at the filter regulator.
5. Set the test device on "open".
6. Turn up the air pressure at the filter regulator till 8 Bar.
7. Turn on the manometer at the testing device by pressing the left button and check the pressure.
8. Set the test device on "testing".
9. Measure the pressure drop for 1 minute in open position, the value from 8 Bar should not drop more than 1 Bar.
Execute the same test but in closed position.
10. Set the test device on "open".
11. Let go of the air pressure at the filter regulator.
12. Remove the testing device and fit the air tubes in their original state.
13. Turn up the air pressure at the filter regulator till 8 Bar.
14. If the value drops more than 1 Bar in one minute, go to the next steps to determine possible cylinder leakage.

3.3.4 grease spiral cable shaft

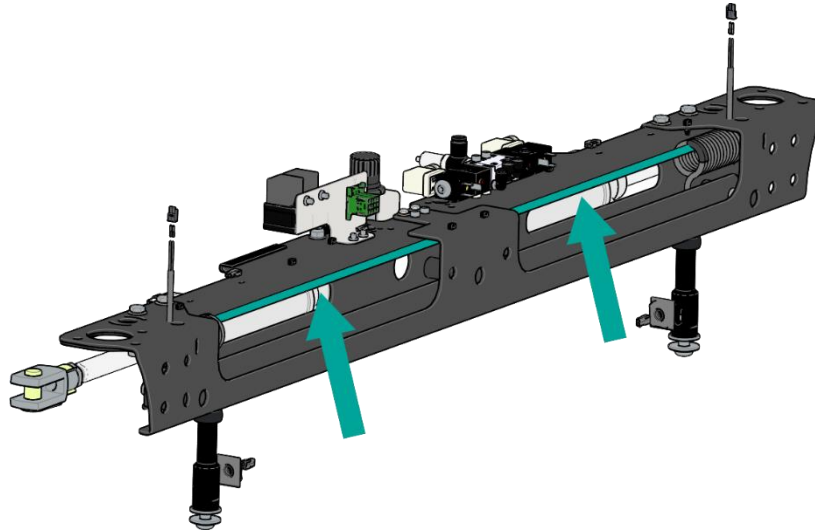


Figure 13: Spiral cable guiding shaft

1. The shaft is clean of dirt.
 2. There is a layer of grease on the guiding shaft which helps the spiral cable run smoothly over the shaft.
- Apply grease when needed. (Use "Kroon Multi Purpose Lithep EP2" or a grease with similar specifications)

4 Torque Settings

All generic IG settings that require torque tightening are in this chapter. Check all mentioned fasteners on the correct torque settings. In case of a double leaf system, check both sides.

The fasteners which connect Ventura parts onto the vehicle are, in most cases, non-Ventura parts. Therefore the torque of these fasteners is not defined by Ventura.

After setting a part to torque specification, mark the connection with a torque marker.

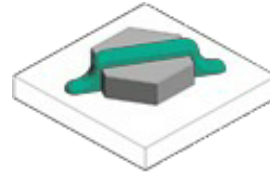


Figure 14: mark the fasteners with a torque marker.

In case the secure nut is hard to reach due to environmental limitations, a special developed tool can be purchased at Ventura. (No. VA3860) This tool ensures far better reachability and much less applicable torque needed, therefore this tool can enhance quality of the final product and reduce lead time.

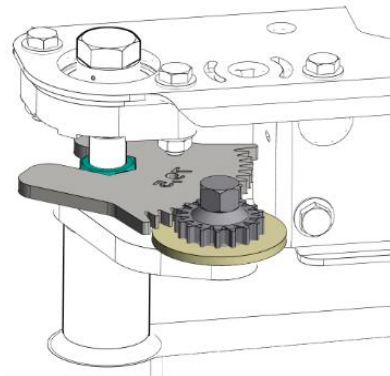


Figure 15: torque tool VA3860

The position in the system overview have details in the following part of this manual. In the second part the torque settings are described.

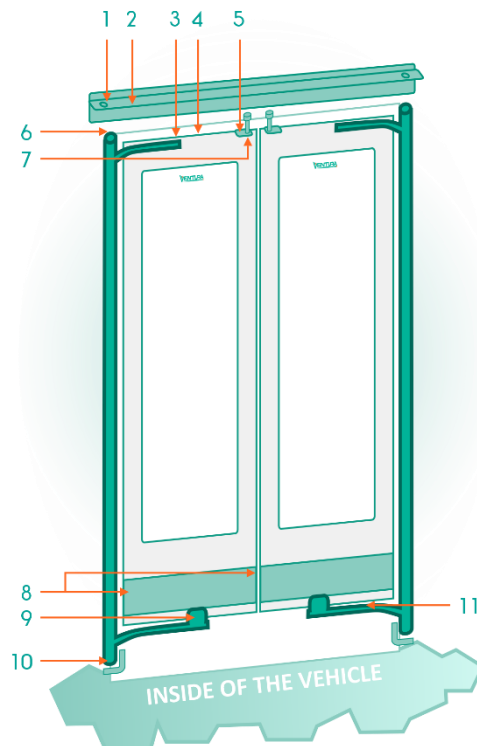
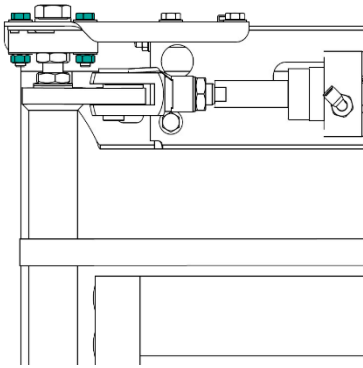


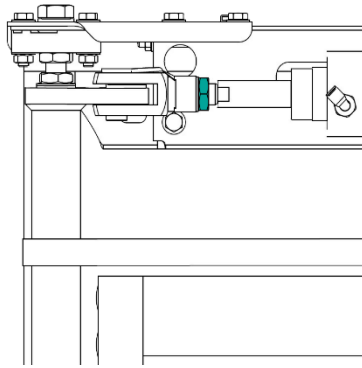
Figure 16: torque setting overview.

Position 1



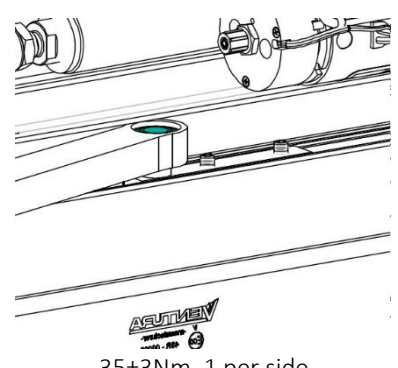
22±2Nm, 2 per side

Position 2



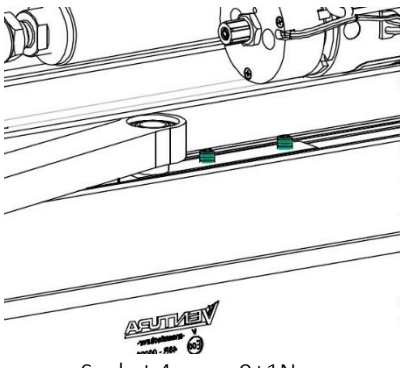
36±3Nm, 1 per side

Position 3



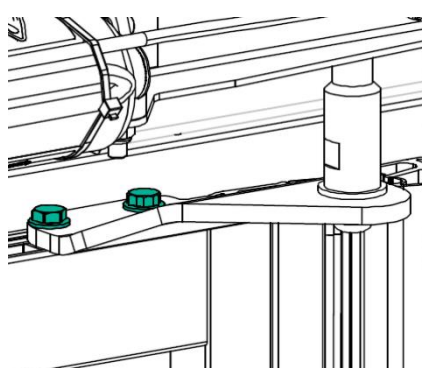
35±3Nm, 1 per side

Position 4



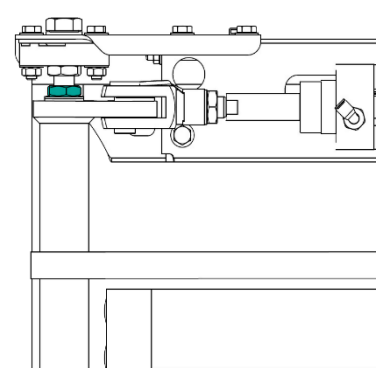
Socket 4mm = 9±1Nm,
Socket 5mm = 15±1Nm, 2 per side

Position 5



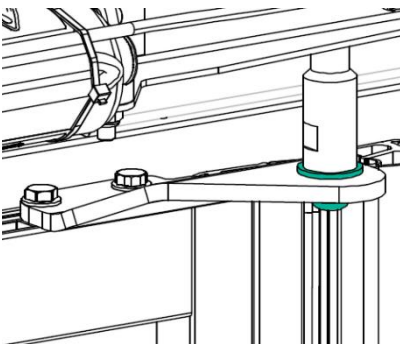
22±2Nm, 2 per side

Position 6



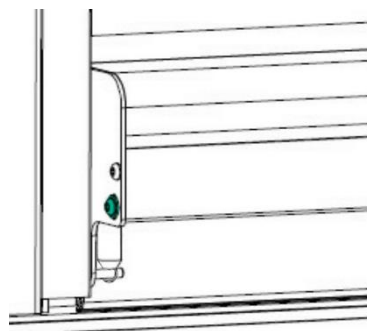
126 +0/-5Nm, 1 per side

Position 7



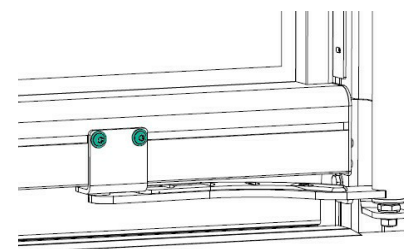
Socket M8 = 22±2Nm,
Torx M10 = 60±5Nm, 1 per side

Position 8



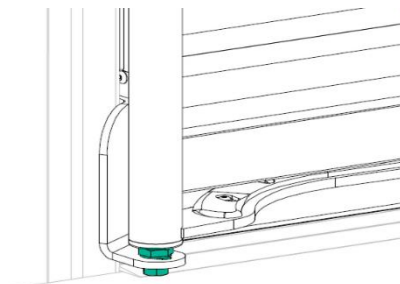
12±1Nm, 2 per side

Position 9



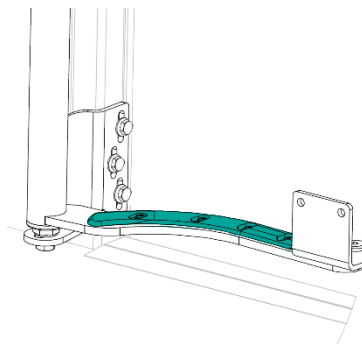
Torx m8 = 22±2Nm,
Socket 5mm = 15±1Nm, 2 per side

Position 10



45±4Nm, 1 per side

Position 11



9±1Nm, 4/5 per side

5 Operational checks

Execute these checks before applying power.



WARNING!

Applying power to an unchecked system may result in a potentially hazardous situation which, if not avoided, could result in death or serious injury.

No.	Check	Verified by	Approved
1.	Be assured all fasteners are on torque as described in the installation manual of this system.		
2.	Check if no cables/tubes are loose on the system.		
3.	Check if all parts are in place.		
4.	Manually check if the door leaf/leaves open and close without obstructions.		
5.	All safety parts are connected.		

After these checks, the power may be applied.

5.1 Operation and controls

These checks are all with power and/or pressure.

No.	Check	Verified by	Approved
1.	In case of Pneumatic parts: There is no leakage in the pneumatic system. Also, no leakage while opening and closing the doors.		
2.	In case of electric parts: Check if the electric parts and wires has no short circuits or damages.		
3.	Check if all settings match the installation manual.		

5.2 Safety checks

These checks are all with power and/or pressure.

No.	Check	Verified by	Approved
1.	All emergency buttons are functioning.		
2.	Check pneumatic obstruction detections (if applicable)		
3.	Apply an obstruction while closing. Doors open again. Test left and right separately. *CAUTION!		
4.	Apply an obstruction while opening. Doors go to half open position. Test left and right separately. (if applicable) *CAUTION!		



CAUTION!

Do not use body parts to apply an obstruction.

6 Contact

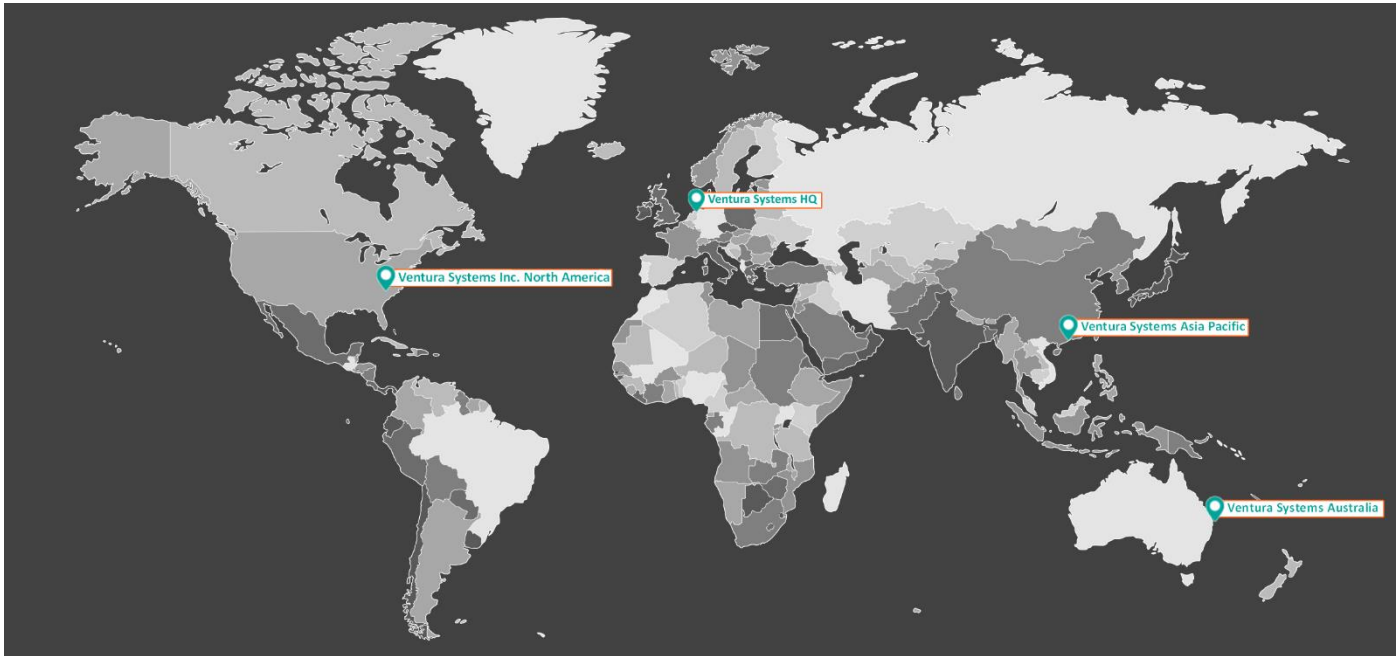


Figure 17: World map Ventura locations






Ventura Systems HQ	Ventura Systems Asia Pacific	Ventura Systems Australia	Ventura Systems Inc North America
 De Marne 216 8701MH Bolsward The Netherlands	Unit 10 on the 13/F Fotan Industrial Centre 26-28 Au Pui Wan Street Hong Kong	PO Box 284 Sanctuary Cove QLD 4212 Australia	160 Gibson Ct NC 28034 Dallas
 +31 (0) 51 557 7750	+852 2712 6001		+1 704-691-0311
 +31 (0) 51 557 3410	+852 2512 2325		+1 704-691-0313
 support@venturasystems.com	info@venturasystems.hk	info@venturasystems.com.au	info@venturasystems.com
 www.venturasystems.nl			

Table 6: General contact information



Ventura Systems HQ	Ventura Systems Asia Pacific	Ventura Systems Australia	Ventura Systems Inc North America
 parts@venturasystems.com	info@venturasystems.hk	info@venturasystems.com.au	info@venturasystems.com
 +31 (0) 515 577485			

Table 7: Parts contact information

Contact your local Agent for parts.