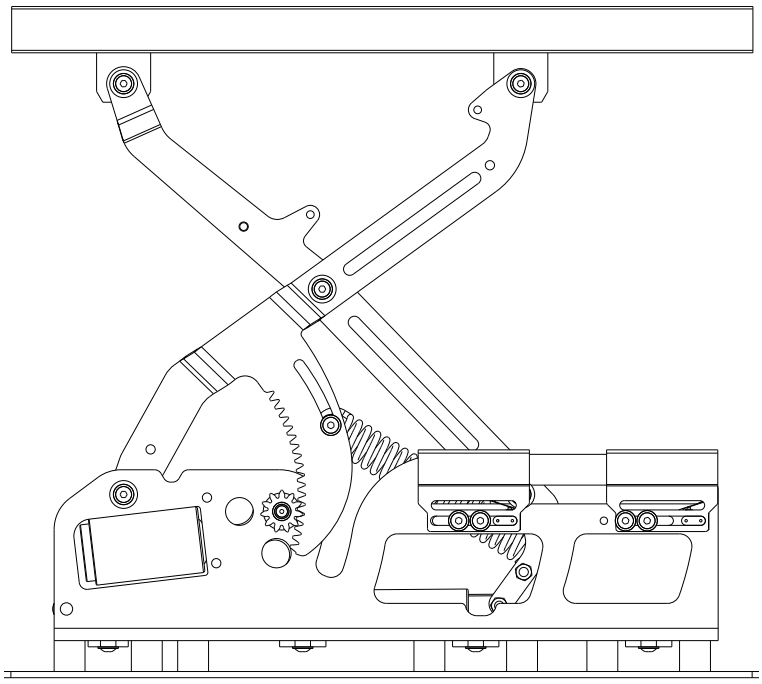
# Installation instructions

## Heavy-duty window regulator FHxx-200/FHxx-250



Please read these assembly instructions **carefully**. They contain important instructions and specifications to ensure that the heavy-duty window regulator is installed properly and safely. Installation and electrical connection work must be carried out by suitably trained professionals. **The manufacturer's warranty** does not **cover damages due to incorrect installation or improper handling.**

**The following symbols indicate important information:**

GENERAL WARNING! **Failure to observe this warning can lead to malfunctions or limitations to functions.**

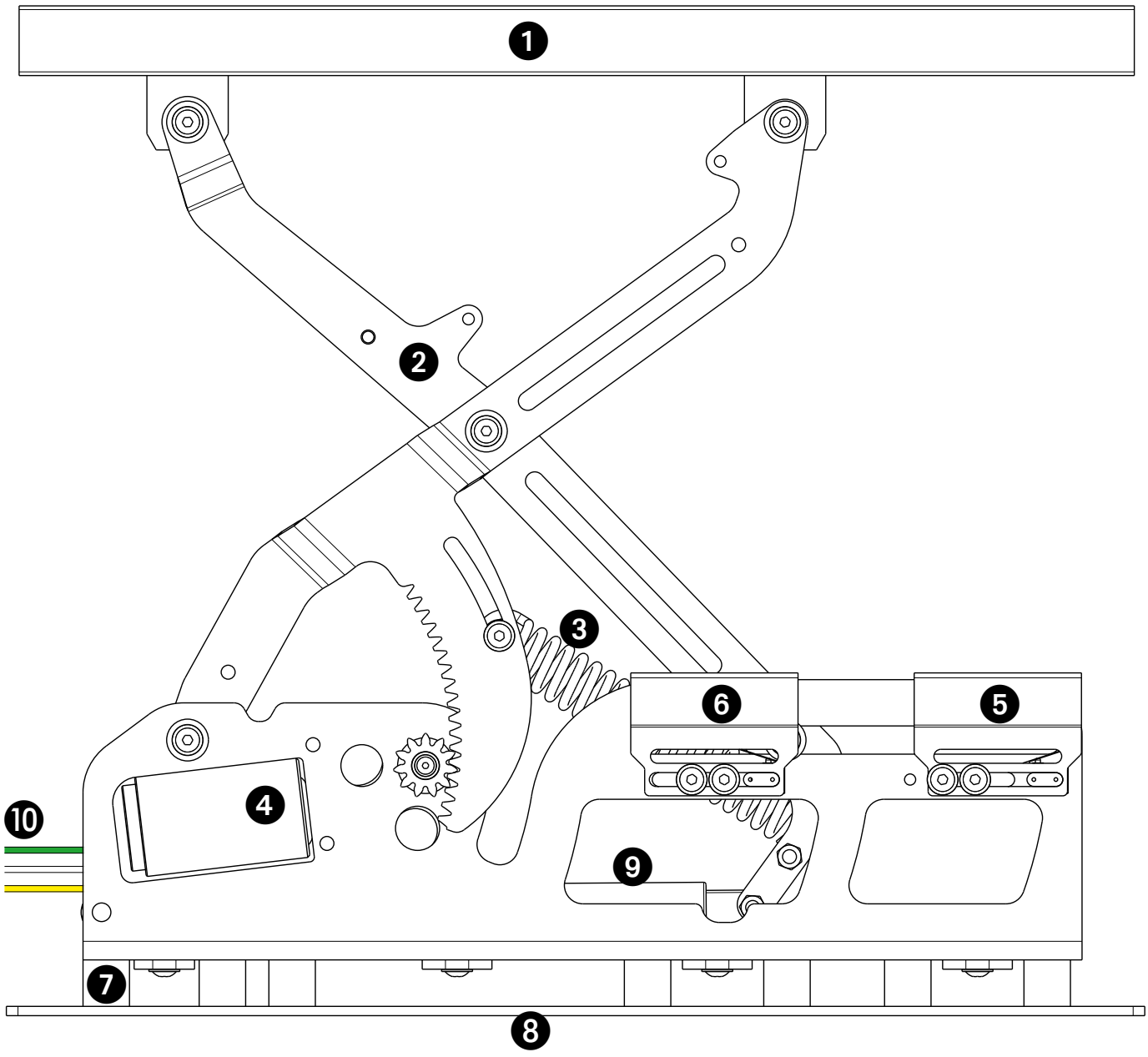
CRUSHING HAZARD/AMPUTATION HAZARD! **Failure to observe this warning can lead to hands being crushed or amputation injuries.**

TECHNICAL WARNING! **Failure to observe this warning can mean that the heavy-duty window regulator becomes damaged or destroyed.**

Explanatory video available!
(Scan QR code or enter link)

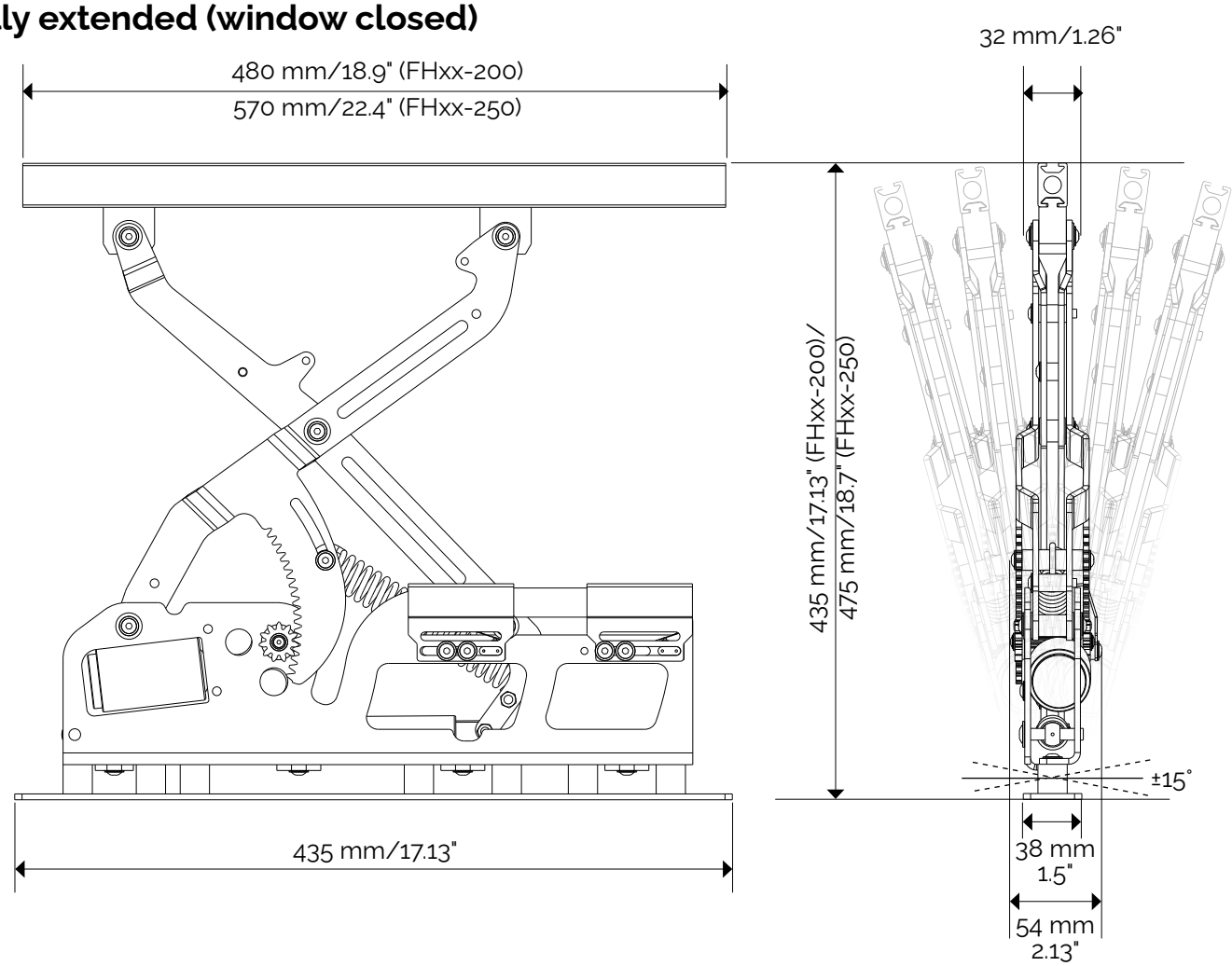
**www.i-provide.de/en/videos**

# Overview

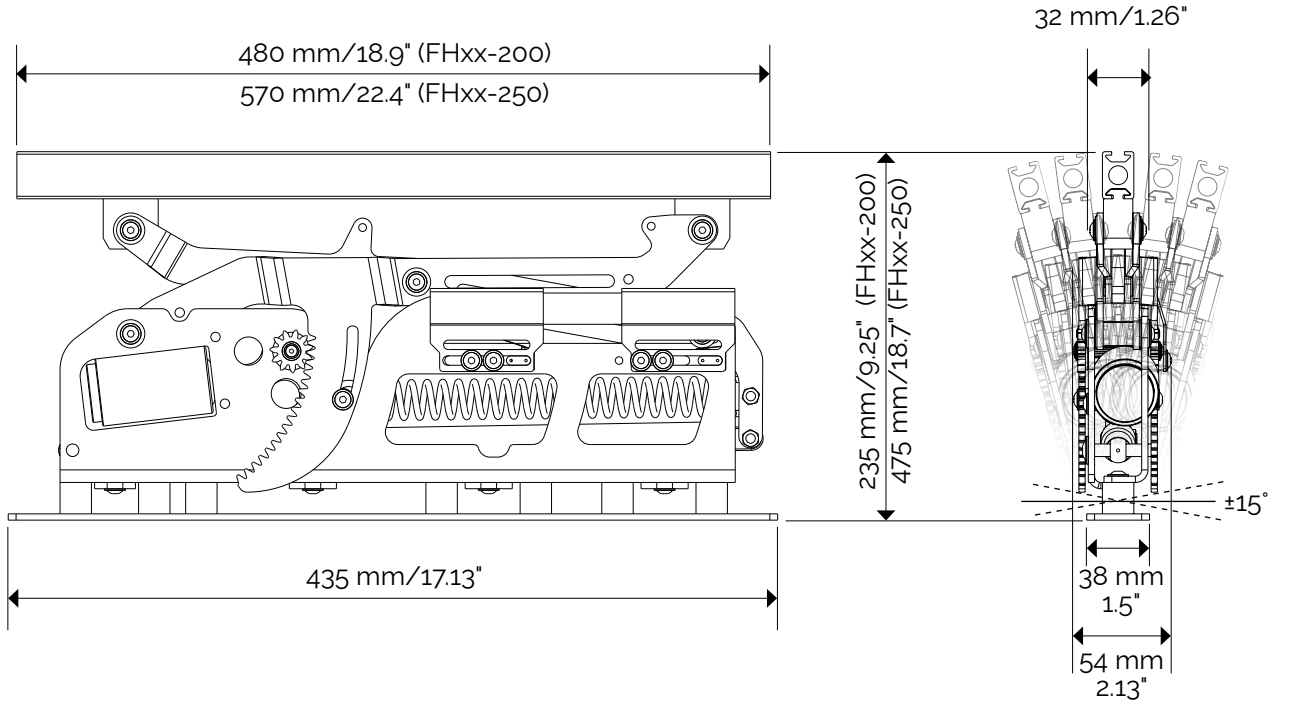



1. Window connection profile
2. Scissor mechanism
3. Spring to balance mass
4. Drive motor
5. Limit switch for “Window open” end position (wire colors: green/white)
6. Limit switch for “Window closed” end position (wire colors: yellow/white)
7. Flexible rubber elements
8. Connection bars for doors
9. Gas traction spring
10. Electrical connection (100 mm/3.9")

## Fully extended (window closed)

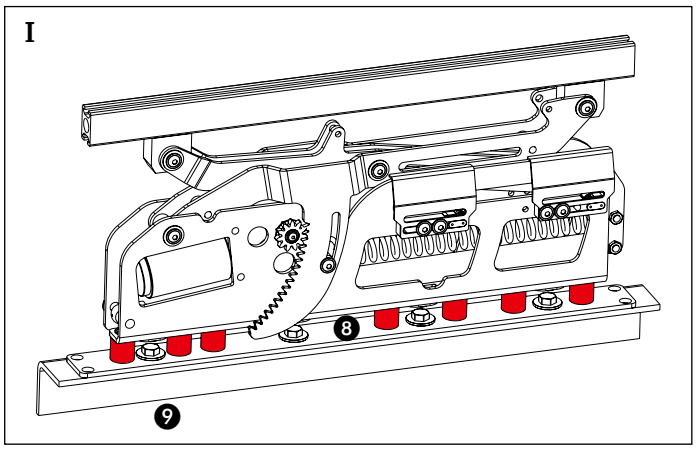



## Fully lowered (window open)

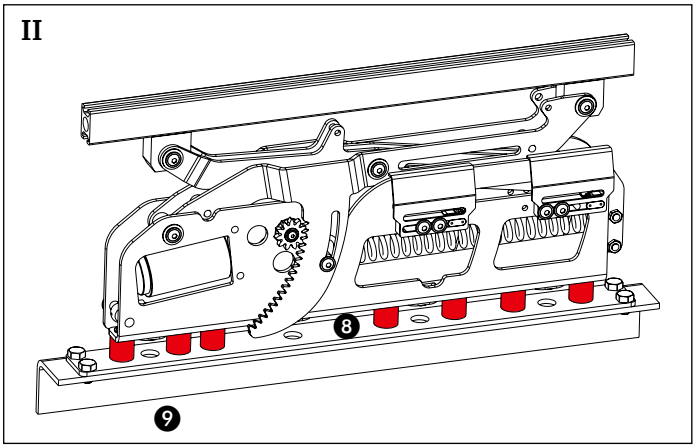


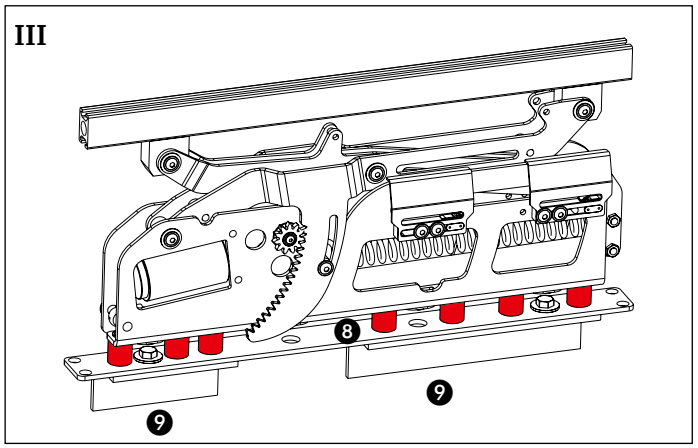
# Preparations

## 1. Creating mounting points in the door




The lower connection bar ❽ for the window regulator requires a robust mounting point in the vehicle door, which must be suitably designed to support the window weight. **Ideally, the connection bar should rest fully on an end-to-end mounting rail ❾, which you must provide in the door.** Fit screw connections as shown in Fig. I or II, for example. If an end-to-end mounting rail is not feasible due to a lack of space, the areas beneath the flexible rubber elements (red) must be structurally reinforced as a minimum. (Fig. III). The rubber elements provide a tilt adjustment of up to 15° between the connection bar and the lifting mechanism (see page 3).




Explanatory video available!
(Scan QR code or enter link)

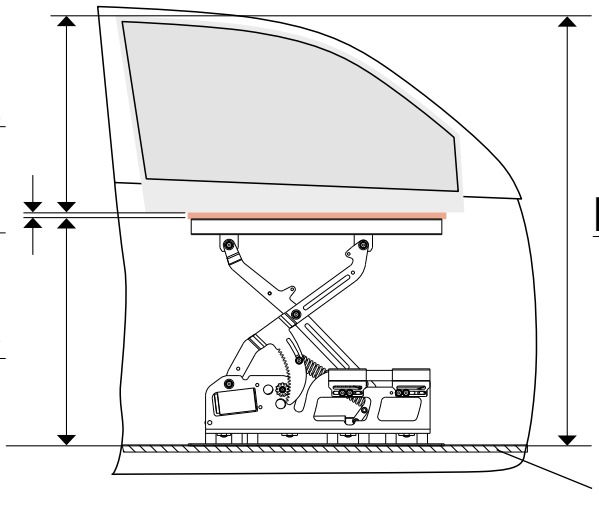
**www.i-provide.de/en/video1**

To guarantee the full load capacity for the lifting mechanism, the assembly situation should be chosen **so that the window regulator is fully extended in height when the window is closed.** You should determine the vertical position (L) of the mounting rail in the vehicle door accordingly. You need to take into account the height of the factory-supplied or self-manufactured window adapters (B) (also see pp. 7–8).

Window height **A**

Window adapter height (see pp. 7–8) **B**

Maximum lifting height C:
FHxx-200: 435 mm/17.13"
FHxx-250: 475 mm/18.7" **C**




View of vehicle door from inside

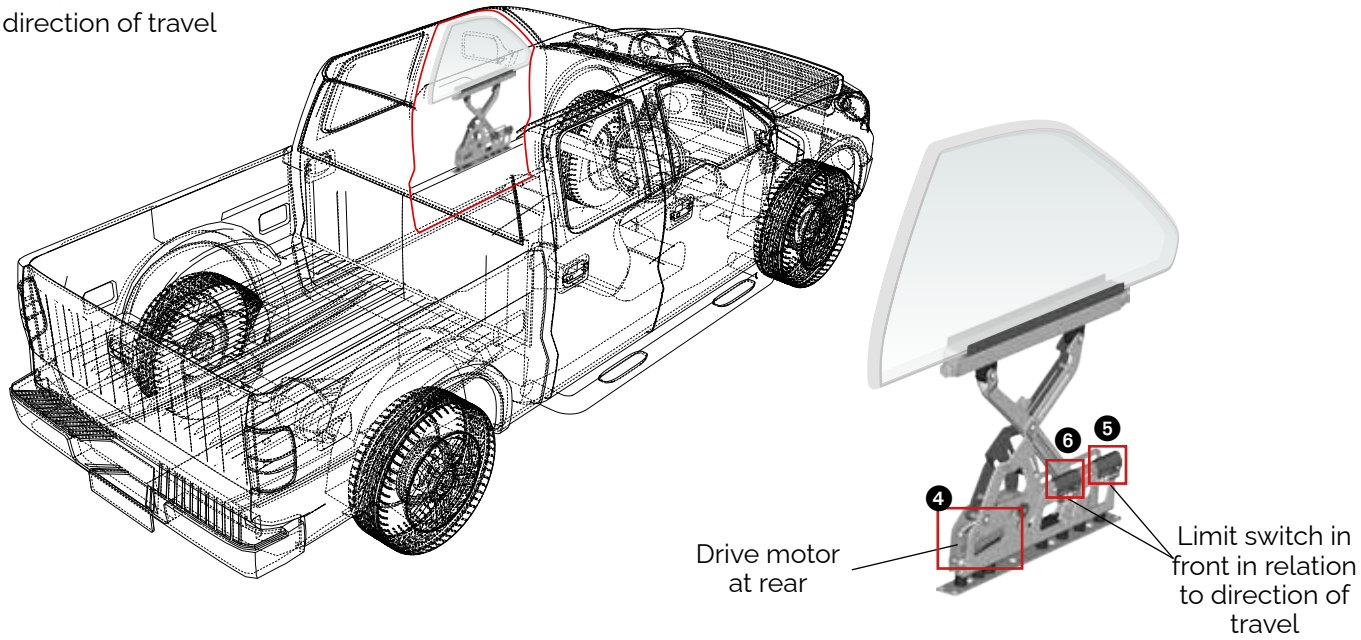
Installation position Mounting rail/ mounting points

**L** = A + B + C

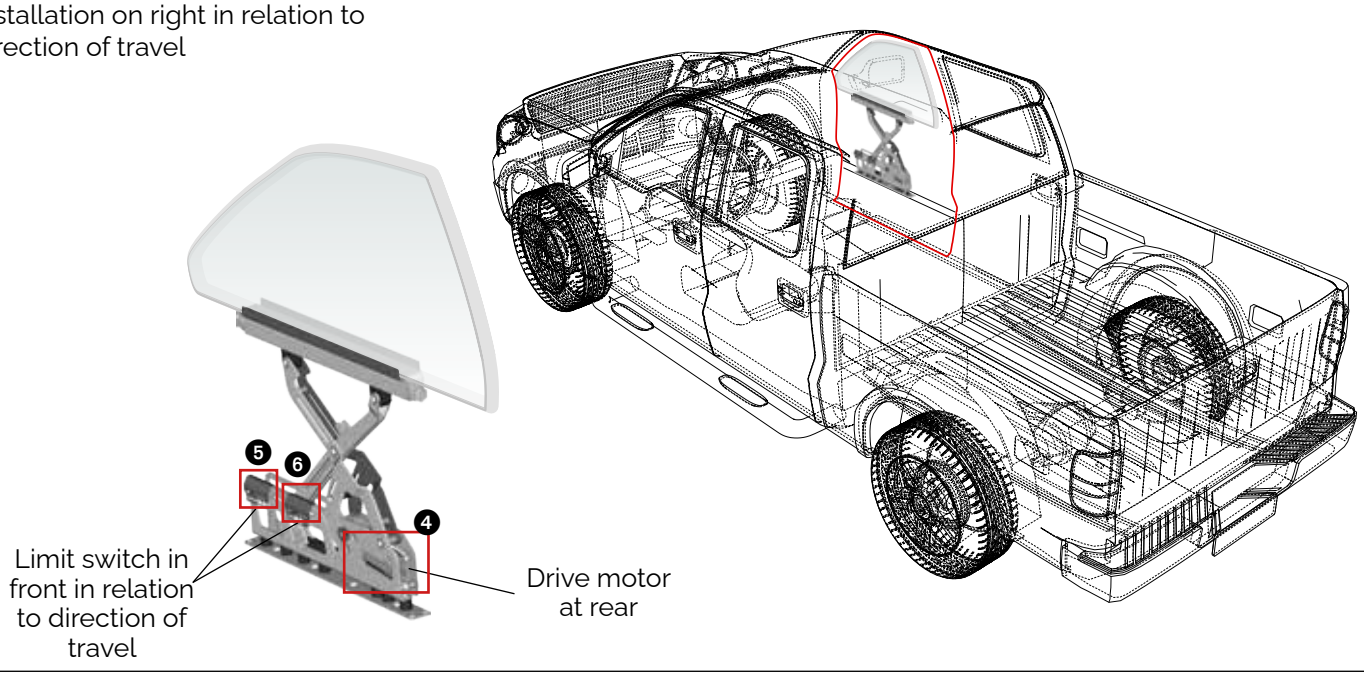
## 2. Installation position left or right in relation to direction of travel

The heavy-duty window regulator is pre-assembled in the factory based on your order and shipped for installation on the left or right side in relation to the direction of travel. The drive motor ❹ should always be positioned at the rear in relation to direction of travel and the limit switches ❺ ❻ at the front. Access to the limit switches must be ensured so that the end positions can be precisely adjusted or corrected, even after installation. If needed, a heavy-duty window regulator can be quickly converted ready to be installed on the opposite side (see page 10).

Installation on left in relation to direction of travel




Installation on right in relation to direction of travel



## 3. Placing the window regulator in mounting position

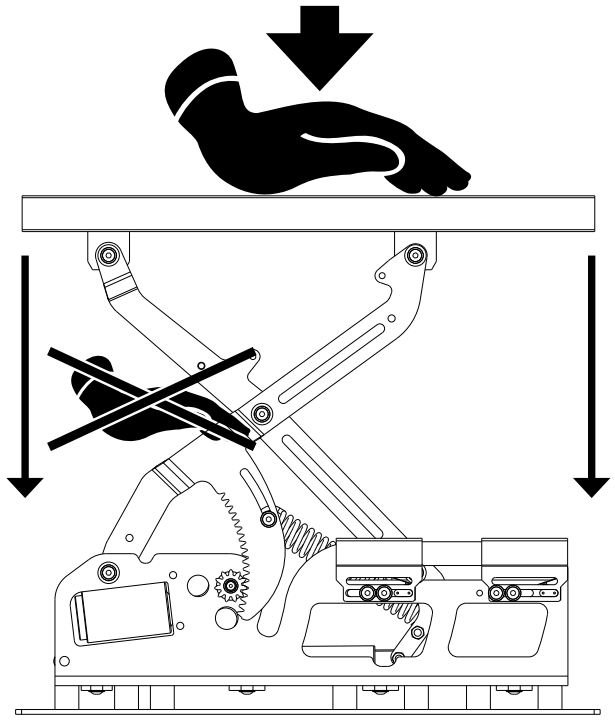
The window regulator must be in the "Fully lowered/window open" position when it is installed. **The following instructions must be observed when adjusting the window regulator without the window pane.** Connect the window regulator to a suitable power source as specified in the electrical connection diagram on page 11. Suitable adapter cables (see page 11) are included with the your first delivery.

**CRUSHING HAZARD/AMPUTATION HAZARD!** The window regulator is designed to move heavy weights up to 80 kg/176 lbs. The forces it produces are thus considerable. **Do not interfere with the scissor mechanism when the motor is adjusting the window regulator. Ensure you keep your other hand out of the hazard area.** It is best to have a second person help you when adjusting the window regulator.

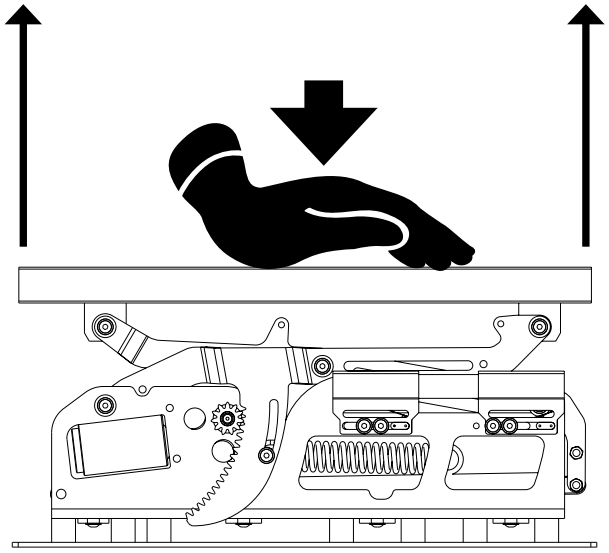
**RISK OF DESTRUCTION!**Our heavy-duty window regulator is calibrated for the weight of the pane ex works. Different springs produce a preload force. Without the weight of the window pane, the imbalance of forces may overload the motor, which **will then be irreparably damaged. You must apply a counter-pressure roughly equal to the weight of the pane (see below).**

Now move the heavy-duty window regulator to the position required for installation:

**Actively push the window regulator down with force when lowering it.**



**Apply counter-pressure against the movement of the window regulator when raising it.**



Explanatory video available!
(Scan QR code or enter link)

**www.i-provide.de/en/video2**

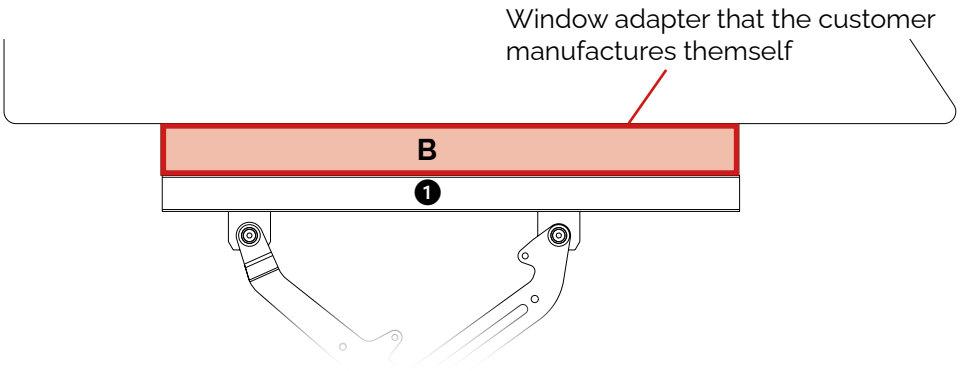
## 4. Installation

The window regulator can be fitted into the door and screwed to the mounting rail once the mounting rail has been fitted to the vehicle door **(see page 4),** a check has been made to ensure the limit switches are on the right side **(see page 5)**, the right lifting height has been set for installation (**see page 6)** and the electrical connection has been prepared **(see page 11)**.

## 5. Installing the window pane

The window pane can now be mounted on the connection profile ❶. You should use your own window adapter (order without adapter), the U-adapter, or the S-adapter, depending on what you ordered.

**Own adapter**

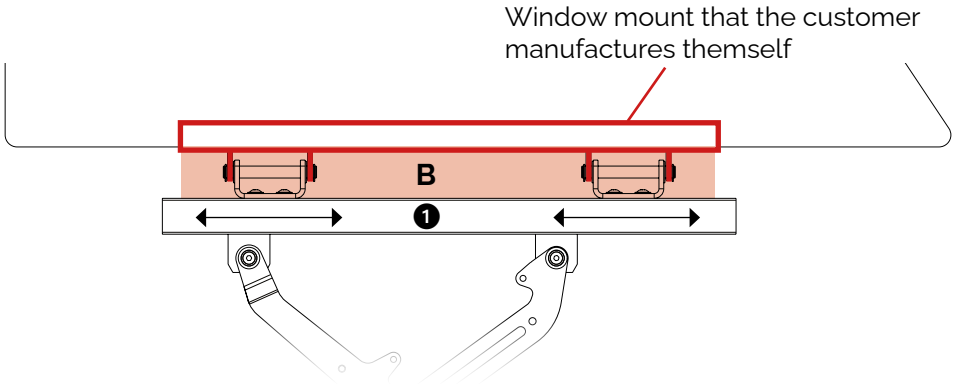



Measure B (see page 4) equals the height of the **custom-made window adapter** between the connection rail's resting surface and the window mount's resting surface.

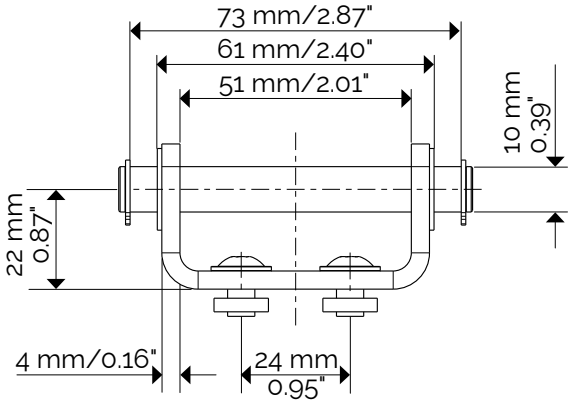
Explanatory video available!
(Scan QR code or enter link)

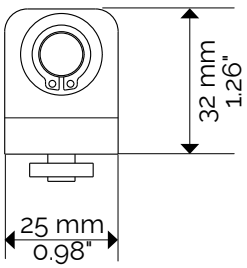
**www.i-provide.de/en/video3**

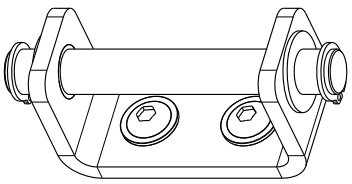
**U-adapter**




Measure B (see page 4) equals the height of the U-adapter plus the installation height up to the resting surface on the **window mount that the customer manufactures themself**. The position of the U-adapter on connection profile ❶ is variable.



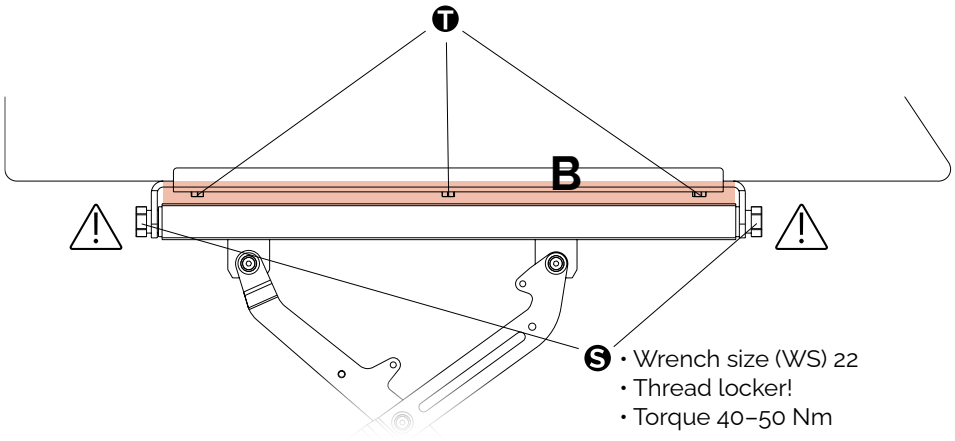



Explanatory video available!
(Scan QR code or enter link)

**www.i-provide.de/en/video4**

# Installation

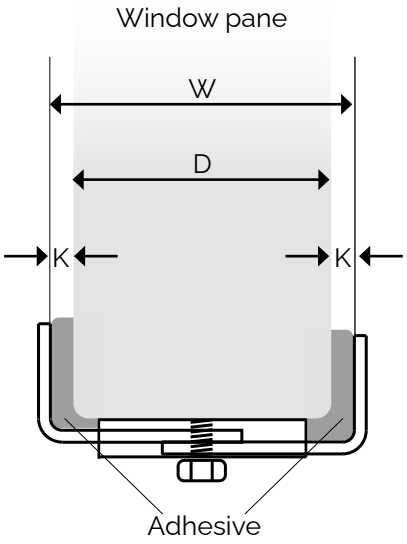
**S-adapter**



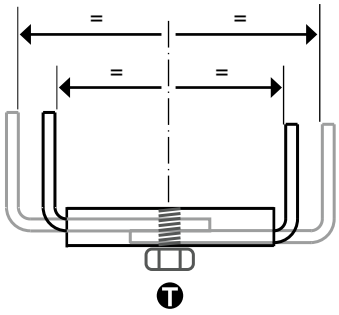

Measure B (see page 4) is 19 mm/0.75".

The S-adapter can be adjusted precisely to the pane thickness. Use a spanner to undo the three screws T and pull or push the side brackets to match the thickness of the window pane. In doing so, note that you must leave a bonding gap **(K)** on both sides for adhering the pane to the S-adapter in accordance with the adhesive manufacturer's specifications. This is generally 1 to 3 mm wide and needs to be added to the thickness of the pane **(D)**, thus giving you the adjustment measure **(W)**. Ensure that the two side brackets are symmetrically aligned. Fasten the screws T firmly again.

**W** = K + D + K




Ensure installation
is symmetrical



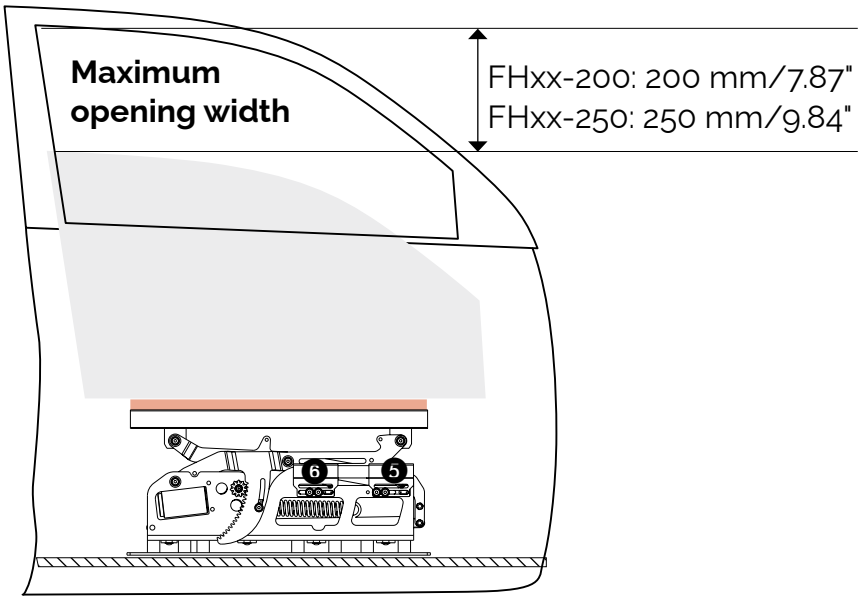

• Wrench size (WS) 10
• Thread locker!
• Torque 8 – 10 Nm

So that the S-adapter can be easily removed for adjustment work, the two side hexagon screws S are only loosely pre-installed at the factory and must be firmly tightened (torque 40–50 Nm) prior to operation.

## 6. Setting the opening width

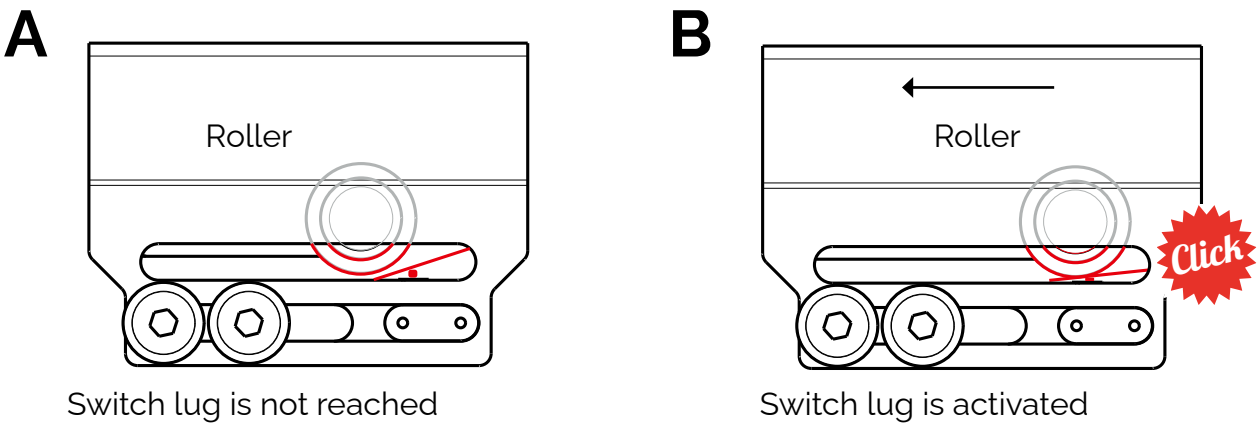
The window's maximum opening width is 200 or 250 mm/7.87 or 9.84", depending on the window regulator's design. The limit switches ❺ and ❻ switch off the drive when the upper or lower end position is reached.

**RISK OF DESTRUCTION!**
If the limit switches are not set accurately, the motor will press into the mechanical block continuously and become overloaded. It can then **become damaged irreparably**.




Move the window regulator to the required lower end position for the open window. The roller at the lower end of the scissor mechanism is meant to trigger the limit switch located at the front in relation to the direction of travel. The roller does not reach the limit switch before adjustment is made. **(A)**. Undo the two Allen screws and move the limit switch ❺ (wire color: green/white) sideways until the roller reaches the switch lug and the limit switch is triggered **(B)**. You will know it is in the right position when you hear the activated switch click. Fasten the Allen screws firmly and secure the screws with a threadlocker (e.g. Loctite271).

### Setting the lower end position (open window)




Switch lug is not reached

Switch lug is activated

### Setting the upper end position (closed window)

Move the window regulator to the required upper end position for the closed window and repeat the process with the limit switch located at the rear in relation to the direction of travel ❻ (wire color: yellow/white).

Explanatory video available!
(Scan QR code or enter link)

**www.i-provide.de/en/video5**

# Appendix

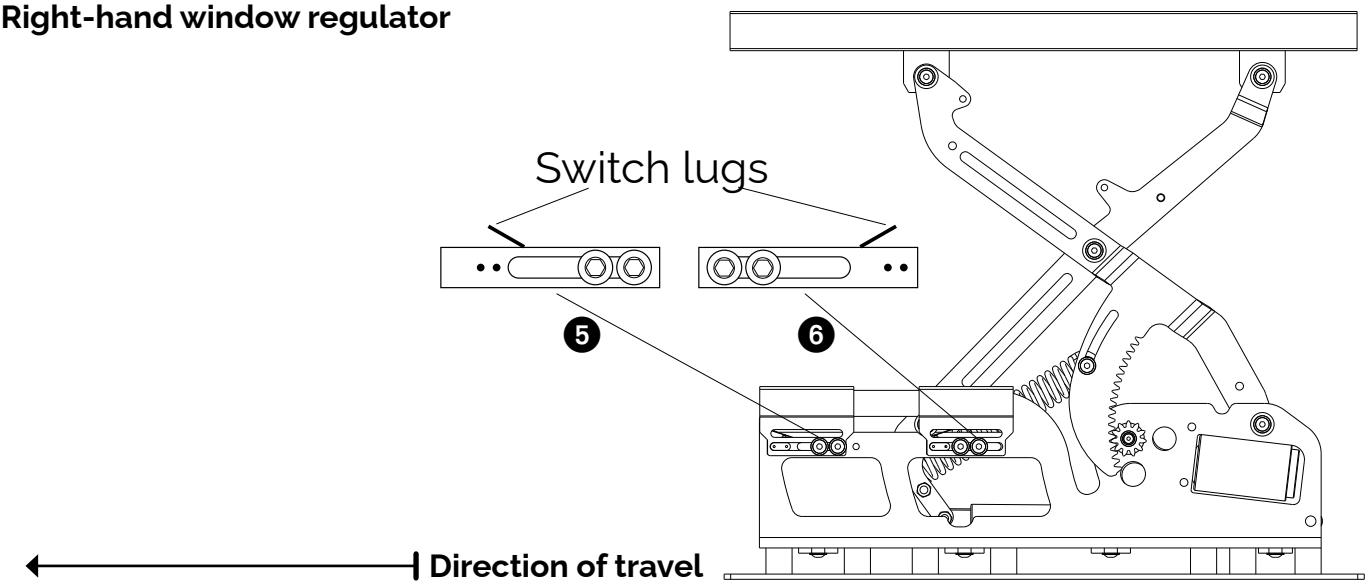
## 7. Converting the right-hand/left-hand window regulator

If the heavy-duty window regulator is not used on the side indicated in the order (see page 4), the limit switches must be changed over to the other side so that they can still be accessed after installation is complete.

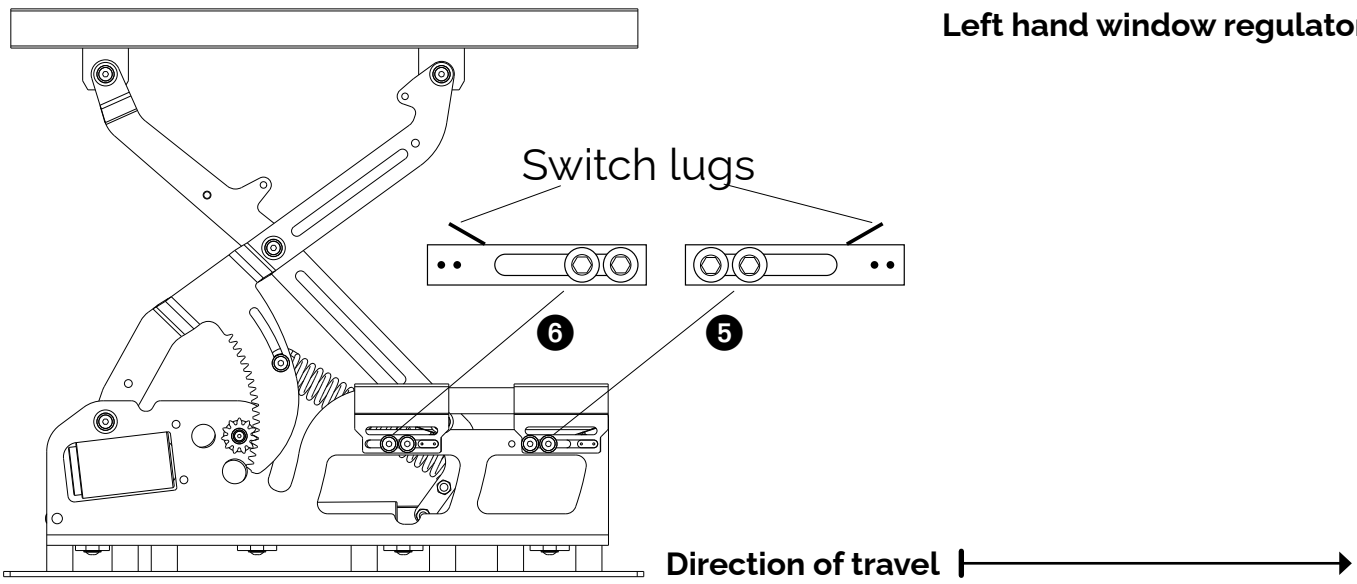
**Risk of destruction:** In doing so, you must ensure that the switch lugs on the limit switches are pointing in the right direction and the limit positions are correctly assigned:

Limit switch ❺ "Window open" --> Wire colors: green/white --> Switch lugs in direction of travel
Limit switch ❻ "Window closed" --> Wire colors: yellow/white --> Switch lugs against direction of travel

**Right-hand window regulator**




**Left hand window regulator**



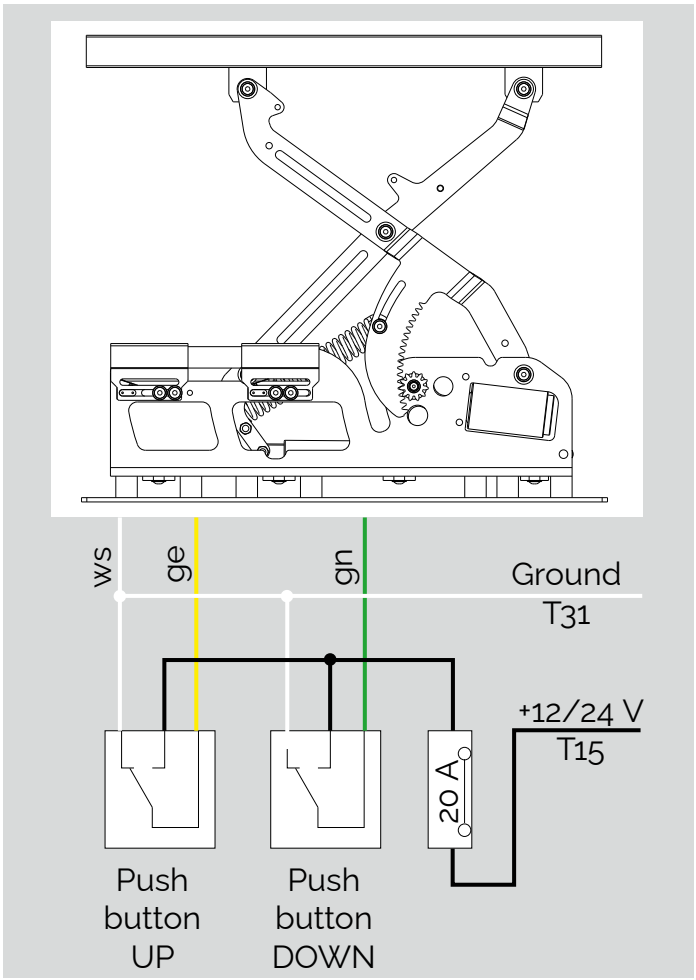

Explanatory video available!
(Scan QR code or enter link)

**www.i-provide.de/en/video6**

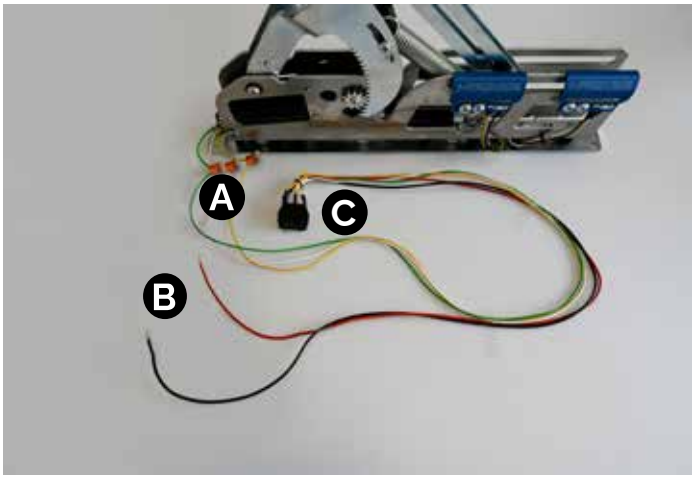
## 8. Electrical connection

The heavy-duty window regulator is connected to the 12V or 24V electrical system, depending on the configuration, as per the adjacent connection diagram. It should be protected with a suitable fuse or circuit breaker approved for use in vehicles, specifically a 20 amp fuse with a slow-blow design (> 200 ms).

Only **qualified technical staff** may connect electrical components to the vehicle's electrical system. Inadequate design and overloading can pose a **fire hazard** even in low voltage installations.




We recommend using our adapter cable (included with the initial order) for functional tests and preparations before installation. Connect the adapter cable to the corresponding color-coded connection terminals on the window regulator Ⓐ. Connect the cables Ⓑ to a suitable power source. You can now use the switch Ⓒ to move the window regulator up and down into the required position. **IMPORTANT: You must follow the procedure described on page 6.**




## 9. Storage/disposal

You must dispose of the window regulator as per applicable regional regulations when it comes to the end of its service life. The individual parts should be recycled.

**RISK OF INJURY!** Before disassembling the window regulator, the balancing spring ❸ and the gas traction spring ❾ must be detached to remove tension. Only qualified personnel should perform this task and with the window regulator fully extended. If in doubt, please return the window regulator to i-provide in the extended position ready for disposal.

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# Other products for armored vehicles: Door hinges and chassis parts

Trailing link (rear axle)

Wheel carrier (front axle)

Transverse link (front axle)

We produce ready-to-install door hinges and chassis parts to customer specifications for different armored vehicles. All parts are exclusively manufactured according to your CAD data and drawings. Based on your material specifications, we produce precision components from high-grade steels and effectively protected from corrosion with a galvanic coating. Material certificates as well as measuring and test records in accordance with VDA standards are available upon request. Below is an excerpt of brands for which we have manufactured door hinges and/or chassis parts:

- Audi
- Bentley
- Lexus
- Mercedes Benz G-Class
- Mercedes Benz Sprinter
- Toyota

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