

ROLLER GARAGE  
DOOR  
BR-77E, BR-100E

**AiKON**  
DISTRIBUTION



Assembly  
and  
Operating  
Instructions



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## [A000131] 1. OVERVIEW

This Installation and Operating Manual is intended for professional fitters and product owners. It contains the essential information to guarantee safe installation and use, as well as the information about correct care and maintenance of the products. Before beginning installation, read the entire manual, follow its guidelines, and perform all activities in the described order. The product and its separate elements shall be installed in accordance with the manual. Follow the guidelines for assembly and use to allow for correct assembly and to ensure a long and reliable use.

[A000120] The Manual applies to several product model variants.

[B000203] The door is also referred to as the „product“.

[B000204] The control device is also referred to as the „drive unit“.



- [A000132] **The product may be installed and adjusted by a PROFESSIONAL INSTALLER only.**
- [A000094] **The scope of activities a Professional Installer and the Owner can perform is described further in this manual.**
- [C000445] The electric drive unit or the controller can only be installed and adjusted by a **PROFESSIONAL INSTALLER** who is competent in automation and mechanical engineering equipment for residential use and must do the installation and adjustments in accordance with the current laws of the country of use.
- [A000104] **Failure to comply with the recommendations and suggestions contained in this Installation and Operating Manual will release the Manufacturer from all liability and warranty obligations.**

[C000001] The roller doors are garage doors and cannot be used for continuous work. The roller doors are designated for single-family homes as well as commercial purposes (i.e. doors installed at commercial buildings such as shops, offices, service premises, etc.). These doors cannot be used at collective garages and other premises where an intensive usage is predicted.

[A000099] The reference drawings found in the manual may vary in finish details. When necessary, the details are shown in separate drawings.

When installing the product, follow the occupational health and safety regulations for installation and fitting works with the use of power tools, depending on the applied installation technology, and consider the applicable standards, laws and reference construction documentation.

When renovating / fitting, protect all components against splashing of plaster, cement, gypsum, etc. These may leave stains of dirt.

After completing the installation and checking for correct operation of product hand over the Installation and Operating Manual to the owner. The Installation and Operating Manual should be protected against being destroyed and kept it safe.

[A000145] When the product is the result of the installation of parts supplied by various manufacturers or suppliers, the installer is considered to be the manufacturer of the installed product.

[B000002] The type and structure of the building material to which the products will be fastened determines the choice of the mounting elements.

By default, wall plugs intended for installation in solid materials with dense structure (e.g. concrete, solid brick) are supplied together with the product. If the product is installed in other materials, the mounting elements should be substituted with ones appropriate for installing in the materials of which the walls and the ceiling are made.

Wall plugs or anchors must be certified for use in construction and must be selected in accordance with the Manufacturer's instructions taking into account the required load-bearing capacity. The installer should follow the mounting element selection guidelines supplied by the manufacturer of the mounting elements. The selected mounting elements should not negatively impact the functioning of the product.

[A000115] Assemble and install the product in accordance with the requirements of EN 13241. Install the product using only original fastening elements (e.g. bolts, screws, nuts and washers) supplied with the product, compliant with the EN or ISO standards.



- [B000189] **It is prohibited to remove any structural components!** This may result in damage to parts which normally ensure the safe use of the product.
- **Alteration of any components or parts is prohibited.**

[A000122] The Manufacturer shall not be liable for any damage or operating malfunctions caused by use of the product with equipment from other suppliers. Such use also voids the warranty issued by the Manufacturer.

[A000097] The manual covers the installation of the products with standard equipment and optional equipment components. The scope of standard and optional equipment is defined in the commercial offer.

[B000024] The door packaging is intended solely to secure the door during transportation. Packaged doors must not be exposed to adverse impact of weather conditions. They must be stored on hardened, dry surface (flat level surface which does not change its properties under internal factors), in enclosed, dry and airy rooms, in the place where they will not be exposed to any other external factors that may cause deterioration of stored doors, components and packaging. It is forbidden to store and warehouse the doors in wet rooms and rooms with fumes harmful for painted and zinc plated coatings.

[B000025] Airtight foil packaging must be unsealed when storing the doors to avoid adverse change of microclimate inside the packaging. Failure to do so may result in the damage of painted and zinc plated coating.

[B000028] Glasses used in glazed elements (windows, aluminium glazed profiles) are made of plastic. The absorbency of moisture from the air is the natural property of plastic glasses, which in changing weather conditions can result in temporary steam precipitation and settlement inside the glazing. Sweating of glazed aluminium profiles is a natural phenomenon, and is not subject to warranty claims.

[B000029] Dry, clean and very soft, preferably cotton fabrics, must be used to clean the panes in glazing (windows, glazed aluminium profiles). Non-scrubbing cleaning agents, e.g. wash-up liquid with neutral pH value may be used, but it is recommended to perform a trial on a small surface previously. The pane must be rinsed with water thoroughly before cleaning (it is not recommended to use high-pressure cleaning appliances) in order to remove particles of impurities and dust that may cause scratching of pane surface. It is not recommended to use cleaning agents that contain alcohol or solvents (they cause permanent tarnishing of pane surface).

[C000094] Aluminium profiles used in the doors are made of profiles without thermal barrier. Sweating of aluminium profiles is a natural process and it shall not be subject to claims.

[C000443] No elements of the drive may be modified or removed. Doing so may influence its safe operation. Changing drive subassemblies is forbidden.

[A000134] Copying these Instructions without prior written permission and further copy contents verification by the Manufacturer is prohibited.

[B000096] When installing the drive unit, recommendations of the door manufacturer, manufacturer of the drive unit and the accessories should be observed. To connect the drive unit, only original subassemblies must be used.

[A000051] It is not allowed to modify the door sealing (e.g. to shorten the seals).

[B000003] It is prohibited to obstruct the door movement area. The door opens vertically upwards. Therefore, no obstacles may be located in the way of door opening or closing. It is necessary to ensure that during door movement no people, especially children, or objects are on its way.



[A000129] **Install the operator using the holders and adapter brackets provided by the Manufacturer.**

[C000075] The wiring system and the electric shock protection installations are defined by current norms and regulations. Only a qualified installer is allowed to perform electrical works.

- The drive feed circuit should be equipped with a cut-off protection, a residual current circuit-breaker, and an overcurrent protection.
- The gate power supply system should be executed as a separate electrical circuit.
- Grounding of the drive unit is obligatory and should be done in the first place.
- Disconnect power supply prior to any works on the electrical system. Disconnect any backup batteries, if used.
- In case of the fuse activation, first find the reason and remove the problem, and only then redeploy the gate.
- In case a problem persists and information from this instruction fails to help, contact the manufacturer technical department.
- Any rework or repairs on the system should be conducted only by a professional installer.
- Usage other than stated in this instruction is not allowed.
- Neither children nor adults should stay within the gate operating area.

## [B000199] 2. TERMS AND DEFINITIONS ACC. TO STANDARD

Explanation of warning signs used in the Instruction:



**Attention!** - warning sign used to denote the attention.



**Information** - warning sign used to denote important information.



**Reference mark** - sign referring to a given paragraph in the Assembly Instruction.

**Professional Installer** - competent person or organization, offering to third parties door installation services, including its improvement (according to EN 12635).

**Owner** - a natural or legal person who has legal title to administer the door, and takes responsibility for its operation and use (acc. to EN 12635).

**Report Book** - a book containing the main data about the door, and which has a specially designated places for records about inspections, tests, maintenance and various repairing works or modifications to the door (according to EN 12635).

[B000213] **Door operating cycle** - a single instance of opening and closing of the door.

## [C000002] 3. EXPLANATION OF SYMBOLS

- W1 - Left lateral space
- W2 - Right lateral space
- So - Width of the opening
- Ho - Height of the opening
- N - Headroom
- Sb - Width of the doors
- L - Length of the guide
- A - Doors frame height
- M - Motor operator
- IR - Photocell
- L - Left-hand side motor operator mounting
- Tr - Transmitter
- P - Right-hand side motor operator mounting
- Re - Receiver
- Pbk - Black lead
- Pb - Brown lead
- Pg - Green lead
- Pbl - Blue lead
- Pyg - Yellow-green lead
- Pw - White lead
- PY - Yellow lead
- A1 - Hanger
- A2 - Winding shaft
- A3 - Protection ring
- A4 - AW77 AW100 Profile
- A5 - AW77P AW100P glazed profile
- A6 - Track
- A7 - Gasket and terminal profile
- A8 - Cover
- A9 - Actuator
- A10 - Slide and brush seal in the track

- A11 - Crank handle of the emergency operator
- A12 - Brake

## [B000205]

- Fd - the maximum force measured with an instrument during the dynamic activity time TD
- Fs - the maximum force measured with an instrument outside the dynamic activity time TD
- Td - the time during which the measured force exceeds 150 N
- Tt - the time during which the measured force exceeds 25 N

## [A000052]



- option



- manually operated



- automatic

## [A000080]



the indoors, or inner side of the door



the outdoors, or outer side of the door



correct position or action



incorrect position or action



supervision



factory settings



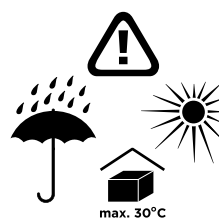
[C000383] Do not stay, pass, run or drive under the door when it is in motion. Before opening or closing, ensure that no persons, and especially children or any objects, are in the path of the moving garage door. No persons, objects or vehicles are allowed to stay within the clearance of the open door.



[C000384] Do not use the garage door to lift any objects or people.



[C000385] Do not use the door when inoperable.



[C000393] Protect the garage door in the packaging against weather.

#### [C000003] 4. BUILD DESCRIPTION AND TECHNICAL SPECIFICATION

The door shutter is made of aluminium profiles, filled with Freon-free polyurethane foam. Door rails are of aluminium, without a thermal spacer. Optionally, glass profiles may be used in the doors (without a thermal separator). The roller-shutter door is driven with a DC 230V-50Hz tubular linear actuator. This actuator is not intended for continuous operation. The door fitted with a tubular linear actuator can perform a maximum of 4 cycles per hour, but no more than 25 cycles per day. Otherwise, a thermal cutoff trips and the door becomes inoperative for a dozen or so minutes (until the actuator cools down). If the thermal cutoff trips twice, do not operate the door until the actuator is completely cooled down (about 60 min.). Each operator unit features a crank-driven emergency opening mechanism. Do not open the door using the emergency crank if the thermal cutoff tripped. This may lead to actuator damage. Because doors cannot be fitted with wickets, installation of an additional entry door is recommended.

[C000030] With the door open and limit switches positioned properly, the clear opening height after the door installation - as standard - is as follows (fig. 6):

- BR-77E door; Ho-130 [mm] for the door without safety edge and Ho-170 [mm] for the door with safety edge
- BR-100E door; Ho-180 [mm] for the door without safety edge and Ho-230 [mm] for the door with safety edge



[C000032] **Manual crank or chain hoist is designed for the door emergency opening only and cannot be used as a primary drive.**

[C000222] Remote control with emitters is an optional equipment for the electric operator. If remote control for automatic closing is applied, the edge safety ledge has to be mounted. In order to prevent the doors closing when there is an object in the doors inside diameter, closure-protecting photocells can be mounted.

#### [A000102] 5. APPLICATIONS AND INTENDED USE

All products shall be used and operated as intended. Their selection and use in building engineering shall follow the specific technical documentation of the installation site prepared according to current laws and standards.

[C000446] The drive unit is intended for operating doors installed in single-family houses. The drive unit is not intended for collective garage rooms (with more than 2 parking places).

[B000182] Due to the adopted anti-corrosion solution, the doors can be used as intended for in environment with Corrosivity Category C1, C2 and C3 according to PN-EN ISO 12944-2 and PN-EN ISO 14713.

[A000171] The product is normally designed to be installed inside the premises.

#### [B000170] 5.1. THE RANGE OF ENVIRONMENTAL CONDITIONS, FOR WHICH THE DOOR HAS BEEN DESIGNED

Temperature - (-30 °C) to +50 °C

Relative humidity - max. 80% not condensated

Electromagnetic fields - not applicable

Refers to manually operated doors. The range of environmental conditions for the doors with drive is stated in the Assembly and Operating Instruction of the drive.

#### [B000190] 6. SAFETY GUIDELINES

Minimum safety levels provided in the door closing edge as required by PN-EN 13241.

Door operation method	Usage		
	Trained door operators (private premises)	Trained door operators (public premises)	Non-trained door operators (public premises)
Deadman control with the view of the door (Totmann version)	Push-button control without electric latching	Key-switch control without electric latching	Unacceptable
Impulse control with the view of the door (Automatik version)	(KLB) (BF)	(KLB) (BF)	(KLB) (BF)
Impulse control without the view of the door (Automatik version)	(KLB) (BF)	(KLB) (BF)	(KLB) (BF)
Automatic control (Automatik version – automatic closing)	(KLB) (BF)	(KLB) (BF)	(KLB) (BF)

(KLB) – safety edge – obligatory

(BF) – photocells – obligatory

(BF) – photocells – optional

[C000447] Photocells must be used whenever:

- the automatic door closing function is enabled
- the remote control functionality is used
- the controller is outside of the line of sight of the door
- the door is not in the direct line of sight of the user
- the door is intended to be operated automatically

[C000448] If the door drive unit is operated with the automatic closing enabled or the door opens directly to a public road or a public pedestrian pavement, install a warning lamp as regulated by the laws of the country where the drive unit will be operated.

#### [A000006] 7. REQUIRED INSTALLATION CONDITIONS

The gate should be used and operated in compliance with its intended use.

Selection and application of gates in construction industry should be based on technical documentation of the facility developed in compliance with regulations and standards in force.

[B000005] The doors can be mounted to reinforced concrete walls, those made of bricks, or steel frameworks. A room intended to mount the doors should be finished completely (plastered walls, finished floor), walls must not have any faults in quality of work. The room should be dry and free of chemicals being harmful for coating paints.

Both side walls, the frontal wall and door assembly opening lintel must be vertical and perpendicular to the floor, and must be finished.



**It is prohibited to install the door in a room in which finishing works are still to be done (plastering, gypsum finishing, grinding, painting, etc.).**

Floor in bottom sealing area must be levelled and constructed in such a way as to ensure free water drain. Appropriate ventilation (drying) of garage must be ensured.



**Professional installer should install a garage door electrical drive unit according to the drive unit Assembly and Operating Instruction.**

[B000092] The area to install the door should be free from any pipes, cables, etc.



**[B000214] According to the current European regulations, a power-operated gate must be manufactured along with Directive 2006/42/EC. It must follow the following standards, as well: EN 13241-1, EN 12445, EN 12453, and EN 12635.**

[A000143] Perform the risk analysis with a list of basic safety requirements provided in Annex I of the Machinery Directive and indicate appropriate solutions to be applied in the place of installation (installation conditions).



- [C000081] **The product cannot be installed in an explosive atmosphere. Safety hazard.**
- [C000449] **Protect the drive unit against water.**
- [D000142] **Before any maintenance or inspection of a garage door, disconnect the drive from power source. Also a battery power supply should be disconnected if it has been delivered.**
- [B000007] **It is prohibited to keep using the door, if any faults in its operation, or damage of its components are found. Do not operate; contact an authorised service centre or a Professional Installer. Caution! Danger.**

#### [C000087] 8. DOOR INSTALLATION ERRORS

Errors may occur when installing the door, but they are easy to avoid when the following steps are taken:

- Shutter rails and the door frame mounted correctly (plumb line, level, diagonals)
- The shutter when closed forms a smooth plane, profiles are not distorted
- Limit switches are adjusted properly
- All elements tighten up
- Properly installed brush seal and lintel slides
- Properly adjusted and installed guards in the running brackets



**Disregarding these basic recommendations may cause malfunctioning, damage.**

#### [A000008] 9. ENVIRONMENTAL PROTECTION

##### Packaging

Packaging (cardboard, plastics, etc.) are classified as waste suitable for recycling. Follow local legislation for specific material before throwing it away.



## Product scrapping

The product consists of many different materials. Most of the materials used are suitable for recycling. Sort it before disposal, and then deliver to refuse collection and disposal area for recycling.



**Follow local legislation for specific material before scrapping.**

[A000009] **Important: Recycling cuts raw material usage and wastes volume.**

[A000118] This equipment is labelled according to the Waste Electrical and Electronic Equipment Directive 2012/19/EC.

This labelling states that once used, the equipment must not be disposed of with household waste. The equipment user must bring the waste equipment to authorised WEEE collectors. The collectors, including local collection points, retailers and community units form an appropriate system for handing over the WEEE. Proper disposal of waste electrical and electronic equipment helps avoiding the consequences to human health and environment caused by hazardous components and improper landfilling or processing of waste equipment.

## [A000041] 10. INSTALLATION INSTRUCTIONS

Proper operation largely depends on correct installation of the product.

The Manufacturer recommends its authorised installation companies. Safe and intended operation of the product can only be ensured by correct installation and maintenance carried out according to the Manual.

[B000207] Install and adjust the product in accordance with the requirements of EN 13241.

Use only the original fixing elements supplied with the product and EN-compliant fasteners (e.g. bolts, nuts, washers) to install the product.

[B000096] When installing the drive unit, recommendations of the door manufacturer, manufacturer of the drive unit and the accessories should be observed. To connect the drive unit, only original subassemblies must be used.



[B000032] **When a Professional Installer installs an electric drive unit on the door, follow the Installation and Operating Manual.**

[A000136] Before proceeding with the installation, a risk analysis must be performed, including all safety conditions, as provided by Appendix 1 Machine Directive, to indicate solutions to be used with the installation (planning permission).

## [B000191] 10.1. SAFETY REQUIREMENTS

The methods for installing electrical wiring systems and electric shock protection are defined in applicable standards and laws.

Connect the electrical wiring of the drive unit with the wiring included by the Manufacturer.

The electrical wiring system must be built according to local regulations.

Only qualified installers may perform electrical work.

The door and the drive unit must comply with PN-EN 12453 and PN-EN 12604.

[B000215] Installation works to be performed in line with the following European Norms: 2004/108/EC; 2006/42/EC; 2006/95/EC; EN 13241-1 as amended. Install safety units (photocells, safety bars, etc.) according to applicable standards to protect persons, animals or objects that can appear near the gate from hitting, injury or damage.



- [A000026] **Keep the packaging (plastics, polystyrene, etc.) out of reach of children.**
- [C000451] **Do not connect the drive unit to a power source before completing the installation process.**
- [A000028] **During the performance of installation/renovation work, remove all jewellery and use personal protective equipment (clothes, goggles, gloves etc.).**

## [A000041] 10.2. INSTALLATION INSTRUCTIONS

Proper operation largely depends on correct installation of the product.

The Manufacturer recommends its authorised installation companies. Safe and intended operation of the product can only be ensured by correct installation and maintenance carried out according to the Manual.

[D000144] Preparatory activities include preparation of the wiring system. A rough layout of the device components and wire arrangement is presented in figure 105.



- **Electrical wiring must be made by local regulations.**
- **Only a qualified installer may perform any electrical works**

[D000145] The garage ceiling must provide safe installation of the operator. If the construction of the ceiling is too light or the ceiling is too high, the operator must be installed on a support structure adapted for the conditions in the room. Mounting the door or the operator fixing elements in a way that allows their dislocation during operation is not allowed.

[C000085] Correct operation of the door and the drive set to a large extent depends on the drive correct installation. To avoid malfunctioning, premature wear or warranty loss of the drive, this manual has to be strictly followed.

[B000183] Keep the door pack list for future reference.

## [D000002] 10.3. ASSEMBLY SEQUENCE

Fig. 9-10. Before starting the assembly, the dimensions of the door should be checked and compared with the dimensions of the opening.

Fig. 15. Drill the assembly openings in the guides.

Fig. 20-20.5. Once all holes are drilled, mount brush seals and remove shavings from rails.

Fig. 25. Mark the mounting holes according to pattern. Drill holes, place universal plugs and place screws on without tightening them.

Fig. 26.2. In BR-100E doors mount door slides for the frame A=400 mm high.

Fig. 26.3. In BR-100E doors mount door slides for the frame A=360 mm high.

Fig. 30. Place the doors frame on rails.

Fig. 35-40. Put the doors against the wall, marking off mounting holes (for rails) on the wall.

Fig. 40. Drill assembly holes for rails on the wall, seat universal plug sleeves in the holes. It is allowed to drill the assembly openings in the wall directly after the door has been faced with the opening through the openings in the guides.

Fig. 45. Fix the guides to the wall.

Fig. 50. Remove the cover of the doors' curtain.

Fig. 60. Fit the crank of the manual opening and fully unfold the doors curtain.

Fig. 70. Mount the assembly angle bars.

Fig. 75. Tighten the bolts fastening the rails.

Fig. 80. Bend the assembly angle bars.

Fig. 90. Place the hangers along the line of the openings on the shaft and fasten them to the shaft.

Fig. 95. Fasten the cover of the doors' curtain.

Fig. 100-115. Connect electric devices (if any) in accordance with section 11

Fig. 110. Connect the safety edge.

Fig. 115. Connect the brake to the control device (install the brake as described in the Brake Operating Manual).

## [D000439] 10.4. INSTALLATION OF THE CRANK HANDLE THROUGH THE WALL

Fig. 195. The figure shows installation for right-hand drive as viewed from the door case's/ guard's side. Installation for left-hand drive should be made in a similar way.



[D000441] **Refers to the door BR-77E.**

## [C000005] 11. CONNECTION OF THE ELECTRICAL DRIVE AND CONTROL DEVICES

Doors are controlled using the „top-bottom“ switch installed inside the room, and the key switch installed outside. Additionally, doors can be fitted with a remote control system (transmitters, receiver, safety edge, and photocells) on request. Do not remove the seal (sticker) from the control device.



**Do not activate both switches controlling the door at the same time. The switches that control the door cannot operate when the self-holding function is active.**

### 11.1. 230V POWER SOCKET

The power socket with an earthing pin must be located near the manual control switch.

### 11.2. THE CONNECTION OF THE "TOP-BOTTOM" SWITCH (FIG. 100)

The "top-bottom" manual control switch must be installed on an indoor wall of the garage in a location enabling the user to see the entire passage when operating the door. If the key switch is used, it can be installed on an outdoor garage wall, but, similarly, the location must enable the user to see the entire passage when operating the door. This is due to third person safety requirements.



**When the remote control device is used, the door must be fitted with a safety edge; photocells can also**

be used.

### [C000008] 11.3. MANUAL CONTROL BUTTONS

Manual control buttons are installed:

- in a place where the operator will have an unobstructed view of the door and its surroundings
- in a place where the device cannot be turned on unintentionally
- away from moving parts
- at a height of at least 1.5 m

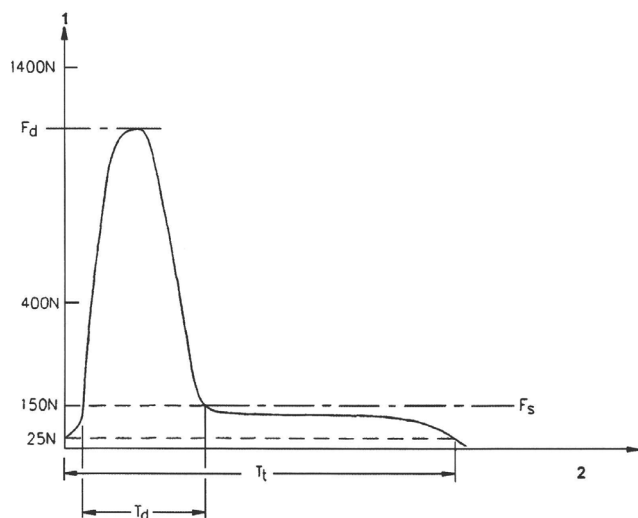
### [D000691] 12. DRIVE UNIT ADJUSTMENT

[C000012] **Before first door operation check its correct installation according to Assembly and Operating Instruction.**

The door is installed properly when its leaf/ curtain moves smoothly and its operation is easy.



- [B000094] **Failure to perform the above-mentioned work can cause the door leaf/curtain to suddenly drop and injure people or damage items near the door.**
- [C000453] Check whether the overload switch (applies to operators with the overload adjustment feature) and the optical strip operate properly. The door should stop and reverse when the door leaf touches an object (made of hard expanded polypropylene, XPS or wood) 80 [mm] in diameter and 50 [mm] high, placed on the floor. **Caution! Danger.**
- [C000454] Do a functional test of the photocells. When the door is closing, it should stop and reverse as soon as the photocell light beam is interrupted.
- [B000208] Measure the force at the closing edge. Verify that the force restriction meets the specifications of PN-EN 12453 Annex A. **In accordance with the PN-EN 12453 standard, the dynamic force of the main closing edge cannot exceed 400 [N], while the duration of dynamic force application should not exceed 750 [ms]. Caution! Danger.**



- [D000668] Failure to comply may result in severe injuries due to crushing by the door or other hazards.

**Caution! Danger.**

### [C000024] 12.1. SETTING AND ADJUSTMENT OF LIMIT SWITCHES

- To maintain or adjust the actuator, use only tools that will not damage it during dismantling or adjustment, like a dedicated regulating screw delivered with the door.
- Limit switches are adjusted manually, with slow turns of regulation screws: hasty turning may damage the actuator.
- Do not turn the regulation screws while the door is moving.
- Adjust / regulate limit switches with manual operation switches: using control switches/ transmitters involves a delay of impulses, which makes accurate setting of the up / down shutter position impossible.

[C000030] With the door open and limit switches positioned properly, the clear opening height after the door installation - as standard - is as follows (fig. 6):

- BR-77E door; Ho-130 [mm] for the door without safety edge and Ho-170 [mm] for the door with safety edge
- BR-100E door; Ho-180 [mm] for the door without safety edge and Ho-220 [mm] for the door with safety edge



- [B000032] **When a Professional Installer installs**

**an electric drive unit on the door, follow the Installation and Operating Manual.**

- [C000092] **Call a Professional Installer to check and adjust the position of limit switches after completing the finishing or refurbishment works related to the modification of the floor level and after the disassembly or reassembly of the garage door or the operator.**

### [C000009] 12.2. SETTING / ADJUSTMENT OF LIMIT SWITCHES

When adjusting the down shutter position limit switch, the location of hangers and the top profile after complete door closing should be taken for reference (fig. 135-137).



**In case the down shutter position limit switch is set „ahead“ (fig. 132) to the optimum proceed as follows:**

Activate the door for closing (fig. 140) and let the shutter stop completely. Then press the „DOWN“ button and while holding it - turn a bit the S1 down shutter position regulation screw in the + direction (fig. 145) till the door is activated. If the shutter (the top profile and the hangers) is not located correctly on the next stop (fig. 136), repeat the procedure until the location is correct.



**In case the down shutter position limit switch is set „behind“ (fig. 135) to the optimum proceed as follows:**

Activate the door for opening and then stop it at the height of 50 cm (fig. 160). Turn a bit the S1 down shutter position regulation screw in the - direction (fig. 150). Then, activate the door for closing (fig. 140) and let the shutter stop completely. If the shutter (the top profile and the hangers) is not located correctly on the stop (fig. 136), repeat the procedure until the location is correct. When adjusting the up shutter position limit switch, location of the bottom profile after complete door opening should be taken for reference (fig. 170-172).



**In case the down shutter position limit switch is set „ahead“ (fig. 172) to the optimum proceed as follows:**

Activate the door for opening (fig. 165) and let the shutter stop completely. Then press the „UP“ button and while holding it - turn a bit the S2 up shutter position regulation screw in the + direction (fig. 180) till the door is activated. If the shutter (the bottom profile) is not located correctly on the next stop (fig. 171), repeat the procedure until the location is correct.



**In case the up shutter position limit switch is set „behind“ (fig. 165) to the optimum proceed as follows:**

Activate the door for closing and then stop it at the height of 50 cm, below the header (fig. 175). Turn a bit the S2 up shutter position regulation screw in the - direction (fig. 185). Then, activate the door for opening (fig. 190) and let the shutter stop completely. If the shutter (the bottom profile) is not located correctly on the stop (fig. 171), repeat the procedure until the location is correct.



**On completing the adjustment, open and close the door to verify correct limit switch function. In case the shutter is not drawn into the canopy when the door is open, it should be entered into it by means of the emergency crank. Before commencing the door operation, verify if it is adjusted correctly and safety devices are readily operable.**

### [A000007] 13. ADDITIONAL REQUIREMENTS

After the installation is completed, it must be checked that the door is fitted with CE data plate according to the standard. If this plate is missing, fit the door with such a data plate. After verifying the correct operation of the door, the Assembly and Operating Instruction and door report book, if required, should be handed over to the Owner.

[C000481] Warning labels should be attached permanently in a visible location near the door or the central control unit.

[A000137] Once the installation has been completed:



- [B000209] Verify proper adjustment of the product and its compliance with EN 13241, EN 12453 and EN 12445. Do the checks explained in Section. 12.
- [C000457] Verify proper performance of all safety equipment (overload switch, optical sensor strip, photocells, etc.). The door must stop and reverse when the door leaf touches any object 80 [mm] in diameter at the height of 50 [mm] when standing on the ground. **Caution! Danger.**
- [B000007] It is prohibited to keep using the door, if any faults in its operation, or damage of its components are found. Do not operate;

contact an authorised service centre or a Professional Installer.

**Caution! Danger.**

- [B000216] Check the emergency opening mechanism supplied with the operator.
- [C000468] Check visually the door and the whole system for maladjustment, mechanical damage, tear and wear evidence, cables or operator parts damage. The door is properly mounted only when its leaf moves smoothly.
- [A000144] **The Professional Installer must explain proper operation of the product to its user, including the emergency procedures, and train the user in proper use.**
- [C000460] Once the installation has been completed, hand over the Installation and Operating Manual with the Door Logbook (if included with the product) to the Owner.
- [B000094] If the above mentioned works are not performed, there is a risk that the leaf may suddenly fall down and hurt people, or cause damage to objects in its vicinity.

**Caution! Danger.**

- [A000069] After completing the installation, the installer must train the user on how to use the product. The installer must instruct all the users on to use the product safely in accordance with the Operating Manual. It is prohibited for untrained persons to use the product.

[C000010] **14. DISASSEMBLY OF DOORS**

Disassembly of the gate should be carried in a sequence reverse to assembly. Turn off the power supply before the disassembly procedure.

[D000363] **15. OPERATION ISSUES**

The following basic conditions ensure longterm and smooth operation of the door:

- provision of free water drainage in the bottom seal area,
- protection of the door from such agents corroding varnish coats and metal as: acids, bases and salts,
- when finishing or maintaining a room the door should be protected against plaster, paints and solvents chipping,
- electrically controlled doors should be opened in line with the instruction manual delivered with the electric equipment,
- activation of the „down self-hold“ control function is only allowed if the door is secured with safety bar sensors,
- do not use malfunctioning doors or the ones with damaged subassemblies; contact an authorised service,
- opening and closing should be done in line with the door Installation & Operation Manual,
- in daily operation, use the electric control system to open and close the door; in an emergency - use the emergency crank for opening the operator or the chain hoist
- do not allow the door curtain to accumulate too much dirt, in particular, protect the door from scratching e.g. by sand or dust or other agents.
- do not allow the brush seal to accumulate too much dirt, this may lead to door curtain damage
- some door curtain deflection is allowed if it does not prevent the door from operating properly
- if the curtain slides out from the tracks, the curtain must be inserted into the tracks using the crank or the chain hoist for emergency opening
- do not use the electric operator if the curtain slid out from tracks
- do not change the phase sequence of the three-phase voltage after installing and commissioning the door, this may lead to door damage
- do not operate the door if the hangers mounting the door curtain to the winding shaft are visibly damaged, and if any irregularities in the hanger operation are found, if the door has been in operation for over 2 years or if the door has performed over 10,000 cycles, hangers must be replaced
- [C000469] Do not allow the protective rings installed on the winding shaft, brush seal installed in the lintel, and seals in the tracks to accumulate too much dirt, as this may cause curtain surface damage.



[B000202] **In case of electrically driven doors, where a lock or a locking bolt is applied, installing a lock sensor or a locking bolt sensor is recommended. Otherwise, if an actuator is connected to the power network the locking bolt or the lock should be blocked in an open position.**

- [D000692] The door warranty covers 10,000 cycles, however, not more than 25 cycles per day, taking into account the performance of the maximum number of 4 cycles per hour (tubular actuator). When the device operates in ambient temperatures of +40°C ÷ +60°C, the number of cycles should be halved.
- [D000449] IP rating of tubular drive: IP44, working temperatures: from - 10°C to +40°C

- [C000250] If the door curtain, lock or latch is iced or frozen, apply the recommended de-icing agents or use a heater before opening the door. Failure to comply with the instructions provided above may cause door or actuator damage.
- [C000069] Signs appearing on profiles during usage result from natural wear-and-tear, and are not subject to any claims.
- [C000329] The marks from pressing and abrasion, especially on the top profiles, are caused by normal design of the door and not eligible for any warranty claims. To avoid increased friction, frequently clean of all dirt, e.g. sand, dust, etc.
- [C000461] During the full operating cycle of the door, the user shall visually monitor the door operating area and keep all bystanders away until the door is fully opened/closed.
- [C000224] If there is no other entrance to the room, it is prohibited to close the door when persons are inside. In daily operation, use the electric control system to open and close the door; in an emergency - use the emergency crank for opening the operator or the chain hoist. Do not rotate the emergency crank or the chain host in the closing direction when the door is closed. Door damage may occur.



• **Do not use the crank or the chain hoist for emergency opening when the operator is running, operator damage may occur.**

- [B000210] Do not modify the adjustments done by the Professional Installer.

**Caution! Danger.**

- [A000062] Any self-retained repairs of the door are prohibited.

[A000138] **16. OPERATING INSTRUCTION**



- [C000383] Do not stay, pass, run or drive under the door when it is in motion. Before opening or closing, ensure that no persons, and especially children or any objects, are in the path of the moving garage door. No persons, objects or vehicles are allowed to stay within the clearance of the open door.
- [C000384] Do not use the garage door to lift any objects or people.
- [A000103] **Do not use faulty products!** Do not use the product and contact an authorized service centre if the product is malfunctioning or its subassemblies are damaged.
- [A000125] Do not remove, alter or disable any protective equipment.
- [B000194] The product can only be operated when all the required safety devices are in place and if these devices are operational.
- [C000042] This equipment can only be operated by children above 8 years of age, persons with impaired physical/and or mental performance and inexperienced users under supervision or according to the operating manual and with the principles of safe use and related hazards properly explained. The equipment shall not be cleaned by children without supervision. Mind that children must never play with this equipment.
- [B000211] Keep batteries, rechargeable batteries or other small power sources out of the reach of children. Hazard of swallowing by children or pets!

**Deadly hazard!**

If this emergency occurs, immediately consult a medical doctor or seek medical attention. Do not shorten the battery leads. Do not throw the batteries into fire. Do not recharge non-rechargeable batteries. Explosion hazard!

- [C000076] **Do not obstruct the door leaf movement area.** Make sure that no persons, especially children, or objects stand in the way of a closing or opening door leaf.
- [C000077] No barriers may stand in the way of a door leaf.

**Caution! Danger.**

- [C000078] The door can be opened and closed using the drive unit only when the door is within the operator's sight, unless it is fitted with suitable safety devices.

**Caution! Danger.**

- [C000079] The door may be approached only when its motion (opening or closing) is finished. Approaching the door in motion is not allowed.

**Caution! Danger**

- [C000080] Remote control transmitters, transmitters or other control equipment to activate the door should be kept out of reach of children, to avoid unauthorised activation. Children should not be allowed to play with this equipment. Transmitters should be kept in dry places.

**Caution! Danger.**

- [D000143] Do not obstruct the door or the drive motion area. Do not put fingers or objects into the slide rail.

**Caution! Danger.**

- [D000667] Do not operate the drive unit if it requires servicing or adjustment. Improper installation or balance of the door may cause severe injury.
- [C000335] **Wind-related damage.** Do not operate the door when the wind load exceeds the wind load resistance class provided on the door's nameplate. The wind pressure causes the door curtain deflection. In case of strong wind load, the door curtain and construction can be damaged.
- [B000103] **IMPORTANT! Damage due to temperature difference.** The temperature difference between the outdoors (environment) and indoors (room) can cause product elements to bend (bimetal effect). If this occurs, operating the product can lead to damage.
- [C000027] Each time before operating the door, it is necessary to make sure that the lock or bolt is not in its closed position. **It is allowed to start the door operation only when the lock and/ or bolt is in its open position.**
- [A000133] The latch or lock should be opened and closed smoothly, without any jerking which decreases the durability and safety of use.
- [C000224] If there is no other entrance to the room, it is prohibited to close the door when persons are inside. In daily operation, use the electric control system to open and close the door; in an emergency - use the emergency crank for opening the operator or the chain hoist. Do not rotate the emergency crank or the chain host in the closing direction when the door is closed. Door damage may occur.
- **Do not use the crank or the chain hoist for emergency opening when the operator is running, operator damage may occur.**

[C000013] **Electrically driven door****I. Door operation in normal conditions (no blackout):**

1. Opening: press the button (UP) and hold till the door is fully open.
2. Closing: press the button (DOWN) and hold till the door is completely closed.
3. The door stops at any position when only the button is released.

**II. Door operation in normal conditions (no blackout) by remote control (the door opening/closing is visible to the operator):**

3. Opening: press once the remote control button and wait till the door is fully open.
4. Closing: press once the remote control button and wait till the door is completely closed. (if auto-closing option is active, the door closes when a predefined time elapses).
5. The door stops at any position when the remote control button is pressed.

[C000226] **III. Door emergency operation - in manual (blackout):**

**Disconnect the drive from the power source before proceeding with the emergency operation.**

Manual emergency operation is intended to open and close the door in a blackout.



**Risk of injury when operated incorrectly!**

Switch the main drive switch off before proceeding with the emergency operation. Emergency operation is only allowed when the engine is not running. When starting the drive manually, take a safe position. When spring-brake actuators are applied, the door opening and closing should proceed by overcoming the brake resistance. For safety reasons, brakes in doors with no weight balance may be released only when the door is down-positioned, for control purposes. With an emergency operation, the door may not be positioned beyond the extreme points because it automatically triggers limit switches. Electrical activation of the door is impossible then.

1. Only the emergency crank supplied with the door may be used to open the door manually.
2. The crank is not meant to be used for a daily operation, but only in an emergency.
3. In a daily operation, the crank should be taken away and kept safely away from unauthorised persons.
4. Do not turn the crank when power is supplied to the actuator.



- [C000092] **Call a Professional Installer to check and**

**adjust the position of limit switches after completing the finishing or refurbishment works related to the modification of the floor level and after the disassembly or reassembly of the garage door or the operator.**

- [D000668] **Failure to comply may result in severe injuries due to crushing by the door or other hazards.**

[C000223] **Emergency operator crank rotation directions:**

Actuator on the right:

- clockwise - opening
- anticlockwise - closing

Actuator on the left:

- clockwise - closing
- anticlockwise - opening



[C000032] **Manual crank or chain hoist is designed for the door emergency opening only and cannot be used as a primary drive.**

[A000139] **17. ROUTINE MAINTENANCE INSTRUCTIONS**[A000140] **17.1. ACTIVITIES WHICH MAY BE PERFORMED BY THE OWNER AFTER CAREFUL READING THE INSTRUCTION**

[A000060] **Disconnect the drive power supply during all maintenance and inspection works.**

[C000476] **Do the following at least every 3 months:**

- [C000470] Clean the external/internal door leaf surface with a sponge and clean water or varnish cleaning products available in stores. Do not use cleaning products that could scratch the surface, sharp tools, nitro solvent-based products and detergents. Do not use power washers.
- [C000469] Do not allow the protective rings installed on the winding shaft, brush seal installed in the lintel, and seals in the tracks to accumulate too much dirt, as this may cause curtain surface damage.

[B000217] **Cleaning panes in the glazing (small windows, glazed aluminium profiles)**

Before cleaning, if unsure as to the material the glazing is made of, make sure the pane is scratch-resistant. Low-hardness materials have low resistance to mechanical damage and scratch easily (e.g. standard SAN, PMMA). Follow the recommendations below to minimize the risk of scratching and other pane surface damage:

- first, clean the pane surface with compressed air or flush it with running water to remove dirt and dust particles that could scratch the pane surface
- next, use the appropriate soft cleaning tool. Non-abrasive cleaning agents can be used. A neutral pH, alcohol-free, delicate washing-up liquid is an appropriate cleaning agent. It is recommended to test the cleaning agent on a small surface of the pane.
- use a soft water-absorbing chamois leather or cotton cloth to dry the pane surface
- the temperature of the pane surface and water should not exceed 25 °C when cleaning

**Do not use the following:**

- rubber squeegees, scrapers and blades
- abrasive agents, solvents and alcohol-based window cleaners
- power washers
- excessive amount of water which may lead to pane fogging

[C000472] **Carry out ongoing inspections of the door at least every 6 months, perform the following (if applicable):**

- check the elements fastening the door to the wall, bolts (screws), and feed rollers, make sure to eliminate any irregularities found, do not operate the door until the irregularities are eliminated
- check the operation of the emergency opening mechanism supplied with the operator
- check the electrical cables to see whether they show any signs of wear
- clean the photocell covers or the signal lamp cover lens on a regular basis
- replace the transmitter batteries at least every 12 months
- check whether the operator is properly fixed
- perform control device maintenance in accordance with the control device Operating Manual

[C000224] If there is no other entrance to the room, it is prohibited to close the door when persons are inside. In daily operation, use the electric control system to open and close the door; in an emergency - use the emergency crank for opening the operator or the chain hoist. Do not rotate the emergency crank or the chain host in the closing direction when the door is closed. Door damage may occur.





**Do not use the crank or the chain hoist for emergency opening when the operator is running, operator damage may occur.**

**[C000473] Gates with an electric operator require the following actions to be performed at least every 6 months (if applicable):**

- check whether limit switches are properly adjusted (operate the door and observe the location where the door stops),
- [C000030] With the door open and limit switches positioned properly, the clear opening height after the door installation - as standard - is as follows (fig. 6):
  - BR-77E door; Ho-130 [mm] for the door without safety edge and Ho-170 [mm] for the door with safety edge
  - BR-100E door; Ho-180 [mm] for the door without safety edge and Ho-230 [mm] for the door with safety edge
- check whether the electrical protective devices operate properly by simulating the operating conditions
- check the photocells by simulating the operating conditions - when the light beam is interrupted, the door should stop and reverse
- check the optical strip - the door must stop and reverse when the leaf touches any object 80 [mm] in diameter at the height of 50 [mm] when standing on the floor.
- check the lock or latch closing sensor - when the lock or latch is closed, the door should not operate
- check the light curtain - when the light beam is interrupted, the door should stop and reverse



- [B000007] It is prohibited to keep using the door, if any faults in its operation, or damage of its components are found. Do not operate; contact an authorised service centre or a Professional Installer.  
**Caution! Danger.**
- [D000668] Failure to comply may result in severe injuries due to crushing by the door or other hazards.  
**Caution! Danger.**

**[A000141] 17.2. ACTIVITIES TO BE PERFORMED BY A PROFESSIONAL INSTALLER ONLY**

Any alterations and modifications to the door should be agreed on with the door manufacturer.



**[A000093] Periodically inspect the door at least every 12 months.**

- [C000474] identify the door: door type, serial number
- check door signage, warning and information labels, replace if missing
- check the Warranty Sheet or the Door Report Book - validity, current entries
- check the operating conditions of the door, if the conditions differ from the required operating conditions or if the door is not used in accordance with its intended use, inform the owner of the possible consequences (e.g. possible failures).

**Caution! Danger.**

- check whether the lock or latch operate properly (if provided)
- check the operation of the remote control transmitter, replace batteries if required
- read the number of cycles and write them down in the Warranty Sheet (doors fitted with operators with the cycle counter feature)
- eliminate any irregularities in door operation, as well as element damage posing a hazard to the safety of use
- [B000219] visually inspect the condition of the panels, taking care to notice any potential damage
- visually inspect the technical condition of the tracks
- check the mechanical components affecting the safety and proper operation of the door. Eliminate any failures and repair or replace any malfunctioning components and parts.
- check whether the track rollers rotate during the opening and closing of the door leaf. Check the condition of the rollers if they show resistance or if they do not rotate at all, adjust the rollers or replace the entire assemblies if required
- check the condition of the seals and brushes, replace if visible damage is found
- check whether free water drainage is provided around the bottom seal area
- check whether all electrical protective devices operate properly by simulating their operating conditions in accordance with section 17.1.
- if electric operators malfunction, disconnect the operator from the power supply for 2÷3 min., and reconnect
- check whether the operator works properly, check the limit switch adjustment in accordance with section 12.
- check whether the emergency opening mechanism supplied with the operator

works properly

- perform all the actions in accordance with the Installation and Operating Manual of the door, the electric operator and the control device
- check whether the lock or latch mechanism, and the lock or latch closing sensor operate correctly - when the lock or latch is closed, the door should not operate (if applicable)
- check the electrical system, in particular, check the electrical cables
- check all the installation fastening points for wear, failure or imbalance
- check the mechanical components affecting the safety and proper operation of the product
- perform the required maintenance actions in accordance with section 17.1.
- eliminate any irregularities in door operation, as well as element damage posing a hazard to the safety of use
- [B000209] Verify proper adjustment of the product and its compliance with EN 13241, EN 12453 and EN 12445. Do the checks explained in Section 12



- [D000668] **Failure to comply may result in severe injuries due to crushing by the door or other hazards.**
- [D000166] **Before any maintenance or inspection of a garage door, disconnect the drive from power source. Also a battery power supply should be disconnected if it has been delivered.**

[A000147] Perform all the actions in accordance with the Installation and Operating Manual of the door, the electric operator and the control device. Provide any remarks and recommendations you might have to the door owner in writing, e.g. note them in the Door Report Book or in the Warranty Sheet and hand it over to the door owner. After completing the inspection, confirm that the inspection was performed by adding an entry in the Door Report Book or in the door Warranty Sheet.

**[A000107] 17.3. ACTIONS RESTRICTED TO AUTHORISED SERVICE AGENTS OF THE MANUFACTURER**

- any modifications of the product
- repairs of components
- [C000465] Power cable replacement



**[D000166] Before any maintenance or inspection of a garage door, disconnect the drive from power source. Also a battery power supply should be disconnected if it has been delivered.**

[A000147] Perform all the actions in accordance with the Installation and Operating Manual of the door, the electric operator and the control device. Provide any remarks and recommendations you might have to the door owner in writing, e.g. note them in the Door Report Book or in the Warranty Sheet and hand it over to the door owner. After completing the inspection, confirm that the inspection was performed by adding an entry in the Door Report Book or in the door Warranty Sheet.

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[A000079] **The manufacturer reserves the right to introduce design modifications due to technological progress that do not alter the product functionality, without prior notice.**

**This documentation is copyright of the manufacturer. Copying, reproduction and usage in full or in a part without the written consent of the owner is prohibited.**

[A000048] **This document has been translated from Polish. In case of discrepancies, the Polish version prevails.**  
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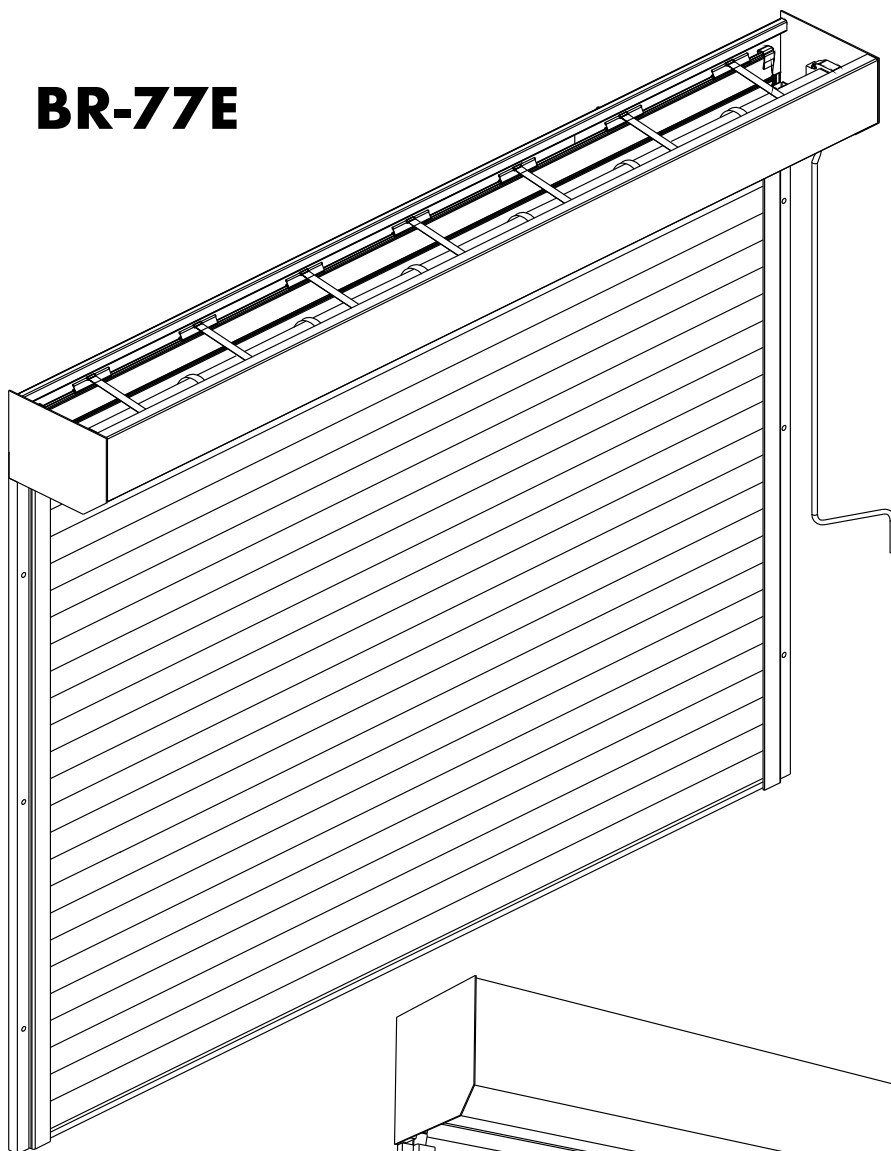
## [D000170] 19. FREQUENTLY ASKED QUESTIONS

Cause	Solution
Door does not stop at open/close position	<ul style="list-style-type: none"> <li>• Check limit switches function and adjustment</li> </ul>
Door does not stop upon contact with barrier; door equipped with control panel	<ul style="list-style-type: none"> <li>• Check safety edge function</li> <li>• Check condition and connection of spiral cable</li> <li>• Check jumper in control panel</li> </ul>
Control system operates correctly but door does not react to motion	<ul style="list-style-type: none"> <li>• Check actuator-to-control connection</li> <li>• Check condition of hangers</li> <li>• Check actuator power supply</li> </ul>
Operating door moves with resistance, shutter does not open smoothly, profiles block in rails	<ul style="list-style-type: none"> <li>• Check rails for soil</li> <li>• Check brushes positioning in rails</li> </ul>
Door opens automatically upon contact with floor; door equipped with control panel	<ul style="list-style-type: none"> <li>• Check safety edge function</li> <li>• Check the fastening and the position of buffer stops in the bottom profile</li> <li>• Check floor levelling</li> </ul>
Operating door manifests vibrations in the fastening construction	<ul style="list-style-type: none"> <li>• Check all connecting parts condition and correct if required (drive and rails setting bolts, and setting screws, etc.)</li> </ul>
Diode on transmitter (remote control) is off	<ul style="list-style-type: none"> <li>• Replace batteries, possibly replace the transmitter</li> </ul>
SterowaniControl system does not react to signal from operative transmitter (remote control)	<ul style="list-style-type: none"> <li>• Check fuse in control panel</li> <li>• Check controller power supply</li> <li>• Program the transmitter</li> </ul>
Manual control does not work, but LED does not react to pressing UCZ button	<ul style="list-style-type: none"> <li>• Disconnect control from power source for ca. 1 minute and connect again</li> <li>• Disconnect control from power source, check fuse and replace if burnt out</li> <li>• Check connection to power source</li> </ul>
LED does not react to pressing UCZ button	<ul style="list-style-type: none"> <li>• Disconnect control from power source, mount A-F jumper, connect again and check control function</li> <li>• Control system works: check photocells connection or replace them (unblock A-F jumper)</li> <li>• Control system does not work: disconnect control from power source for ca. 1 minute</li> </ul>
Safety edge does not react to barrier on closing	<ul style="list-style-type: none"> <li>• Check engine-to-control connection</li> <li>• Check safety edge connection</li> </ul>

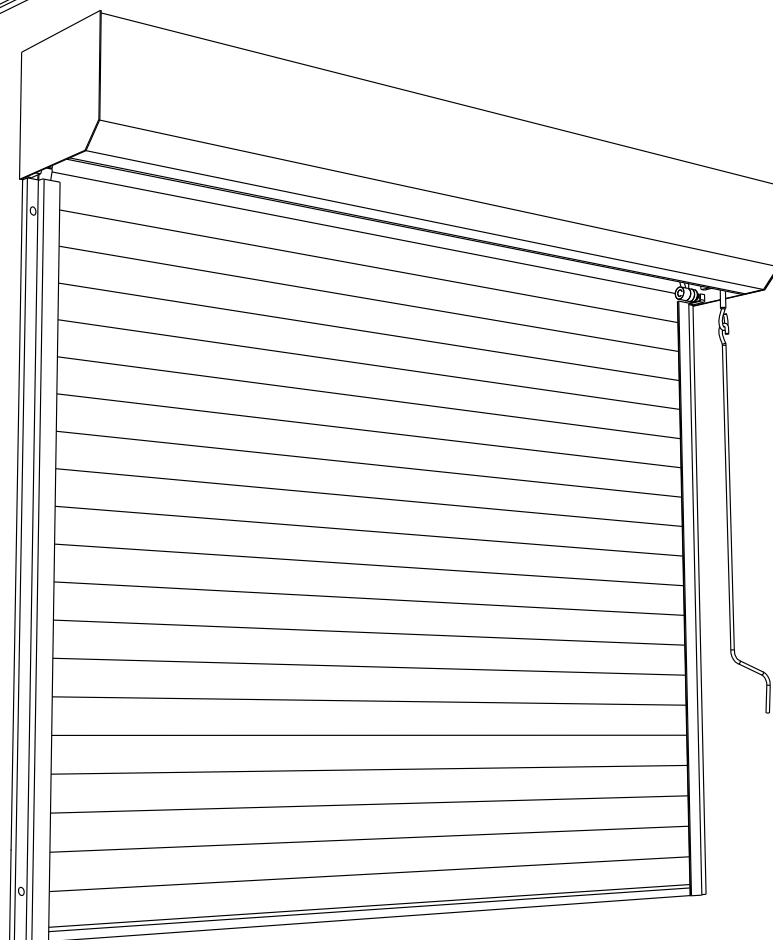
In case of any doubts, or if a cause remains unsolved, please contact the authorized service centre.

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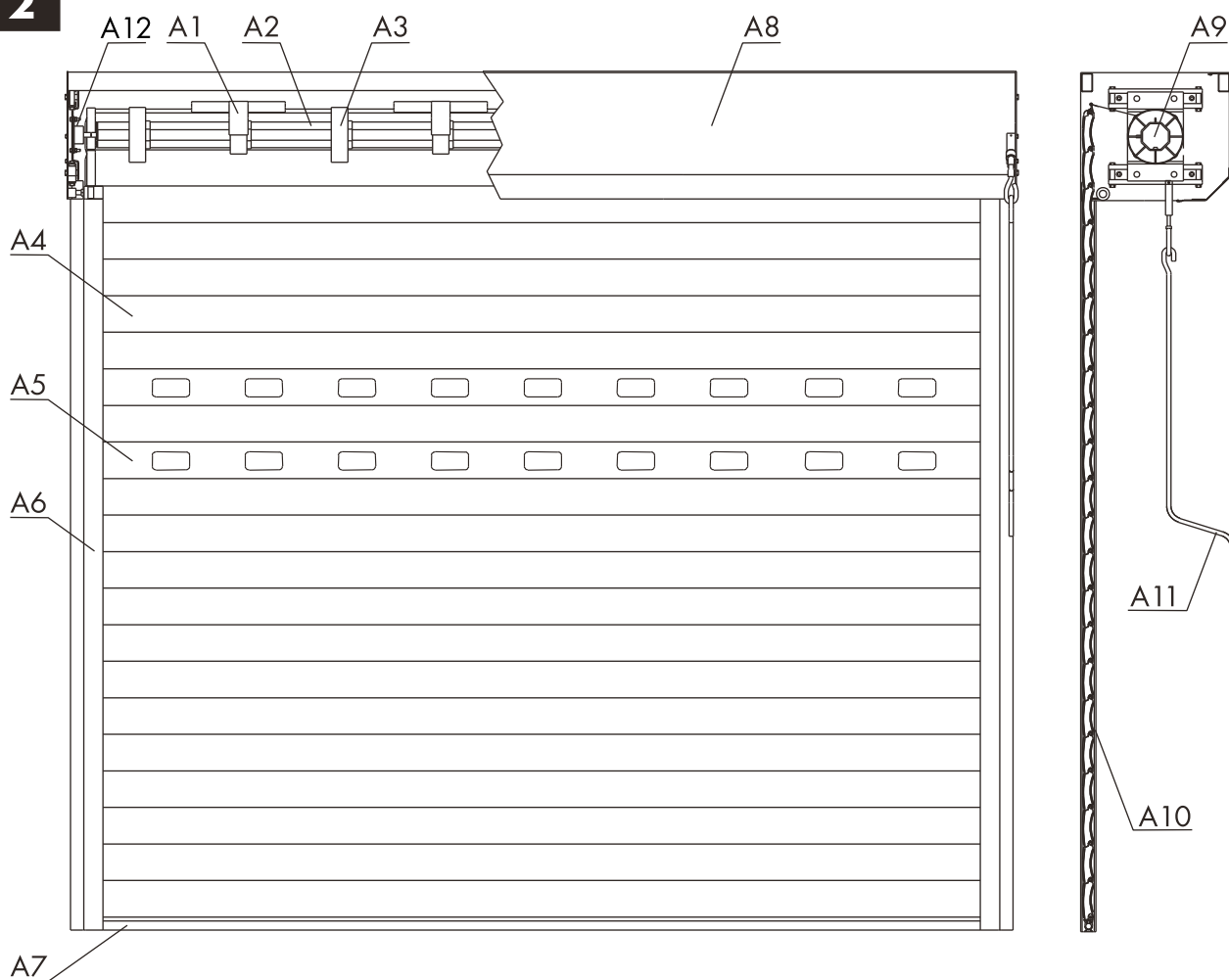
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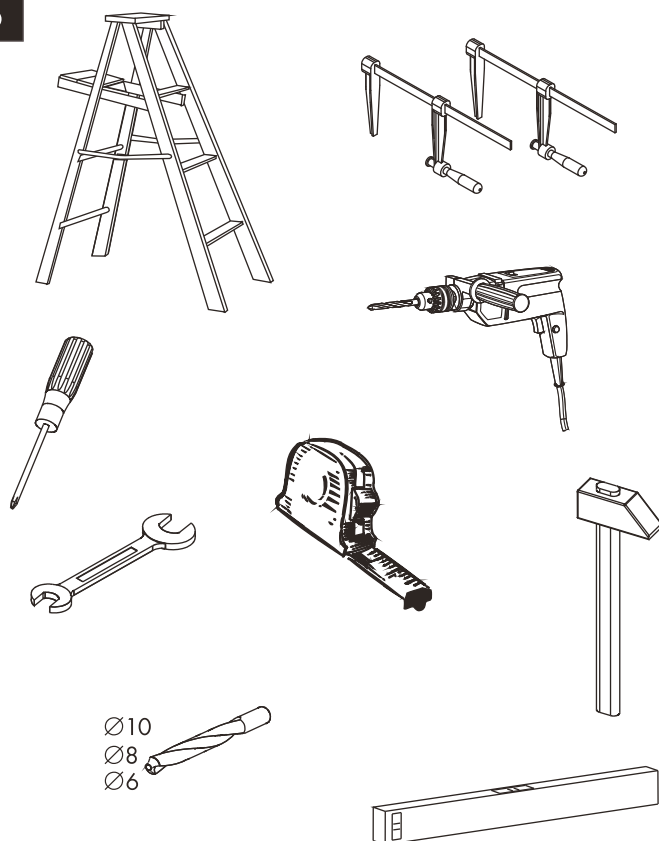
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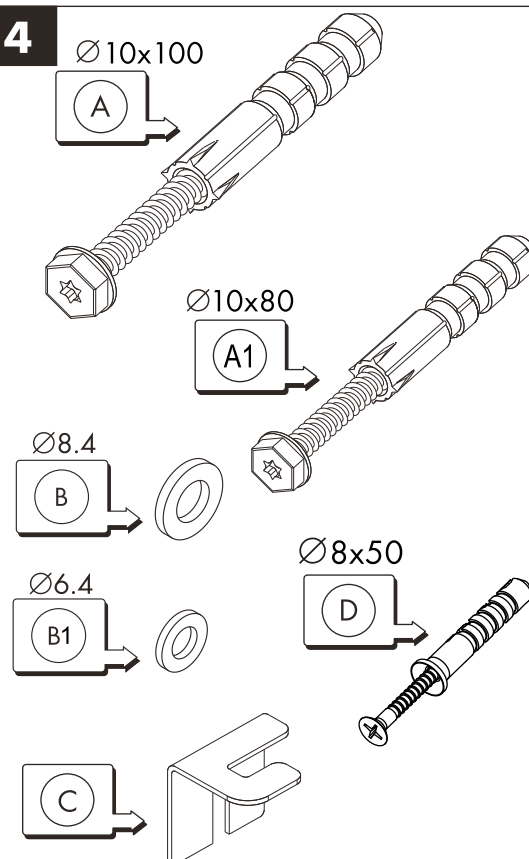
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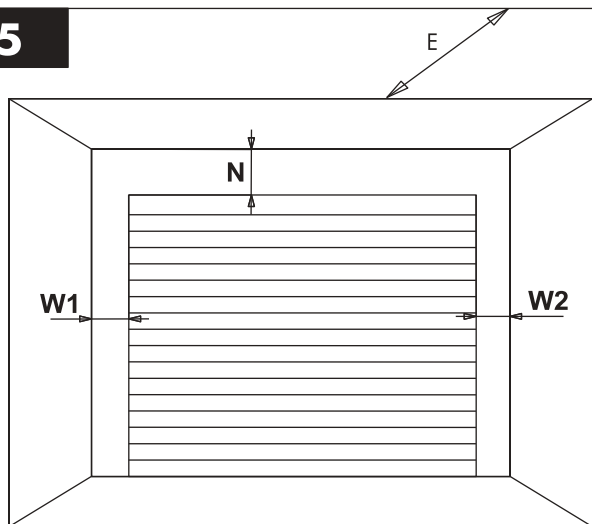
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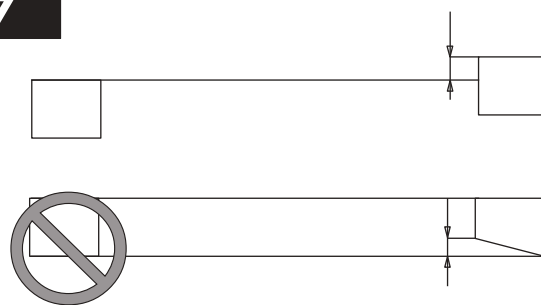
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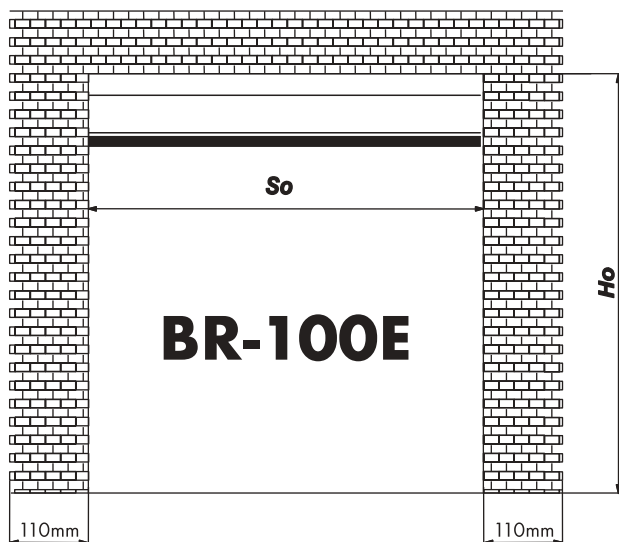
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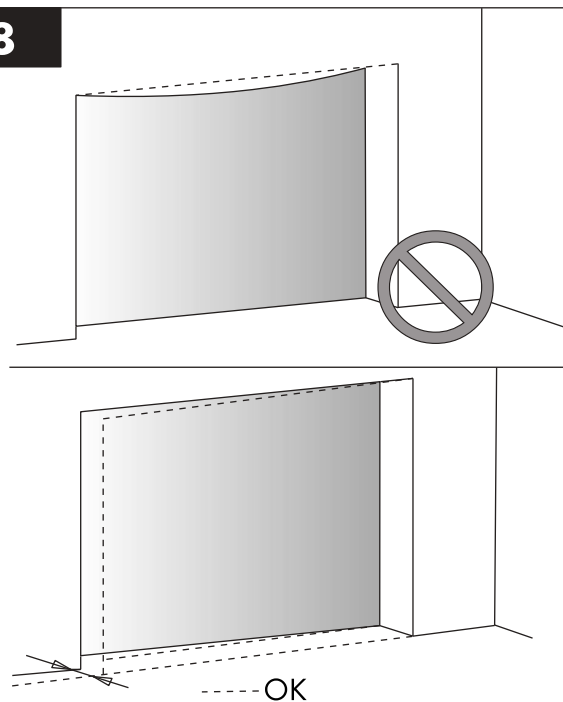
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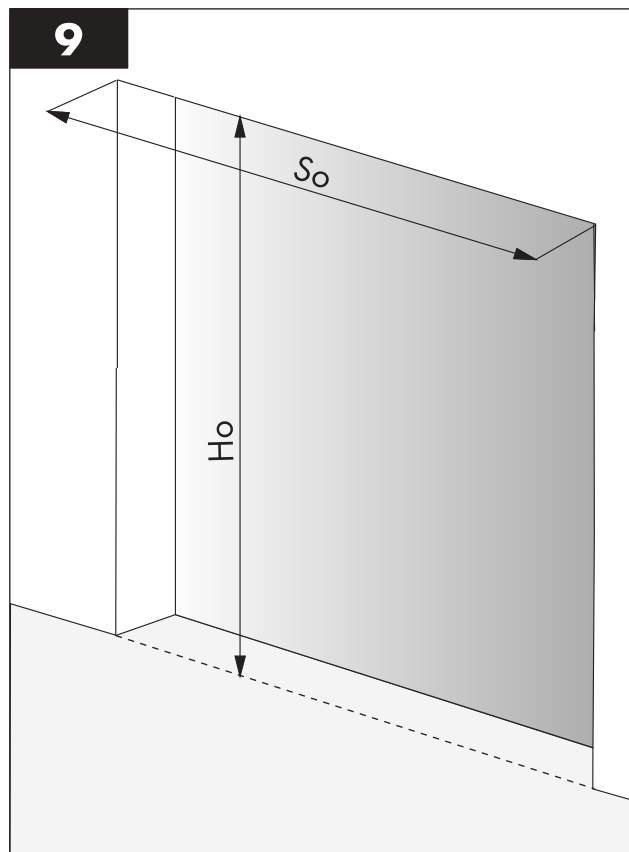
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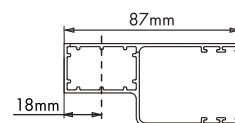
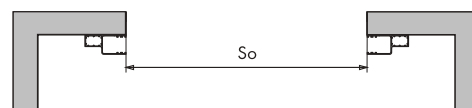
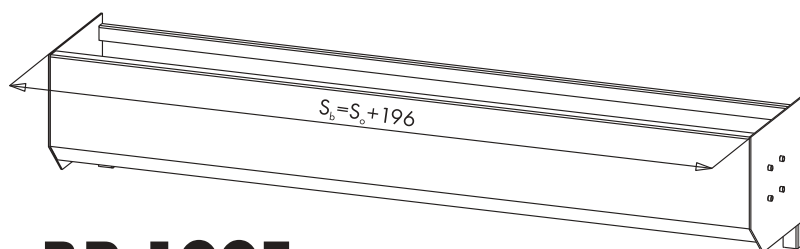
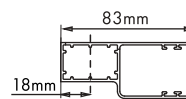
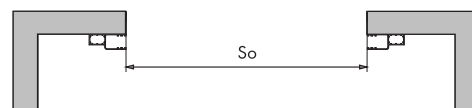
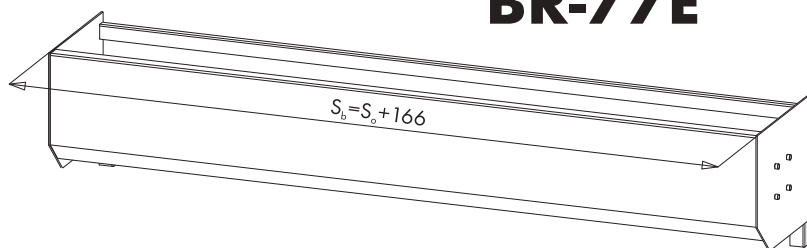


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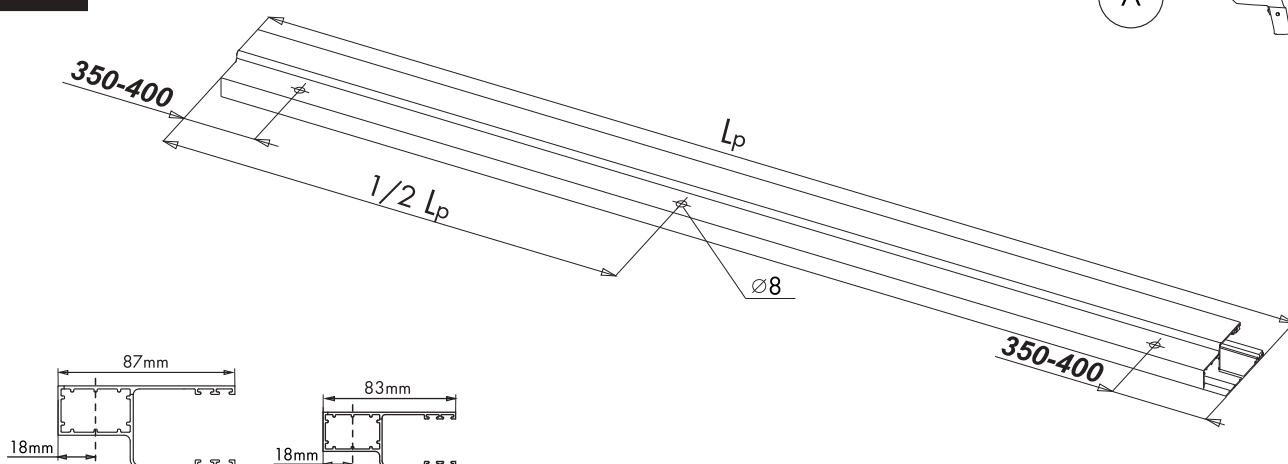
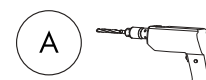
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**BR-77E**

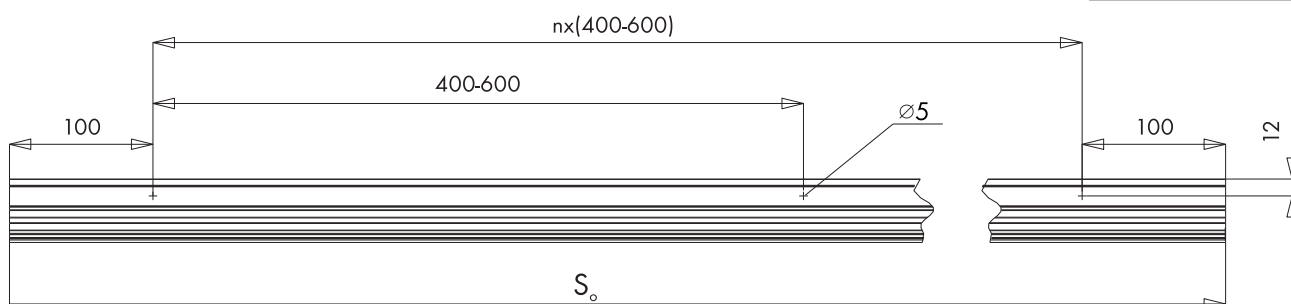
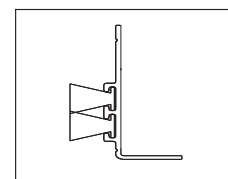


**BR-100E**

15



20

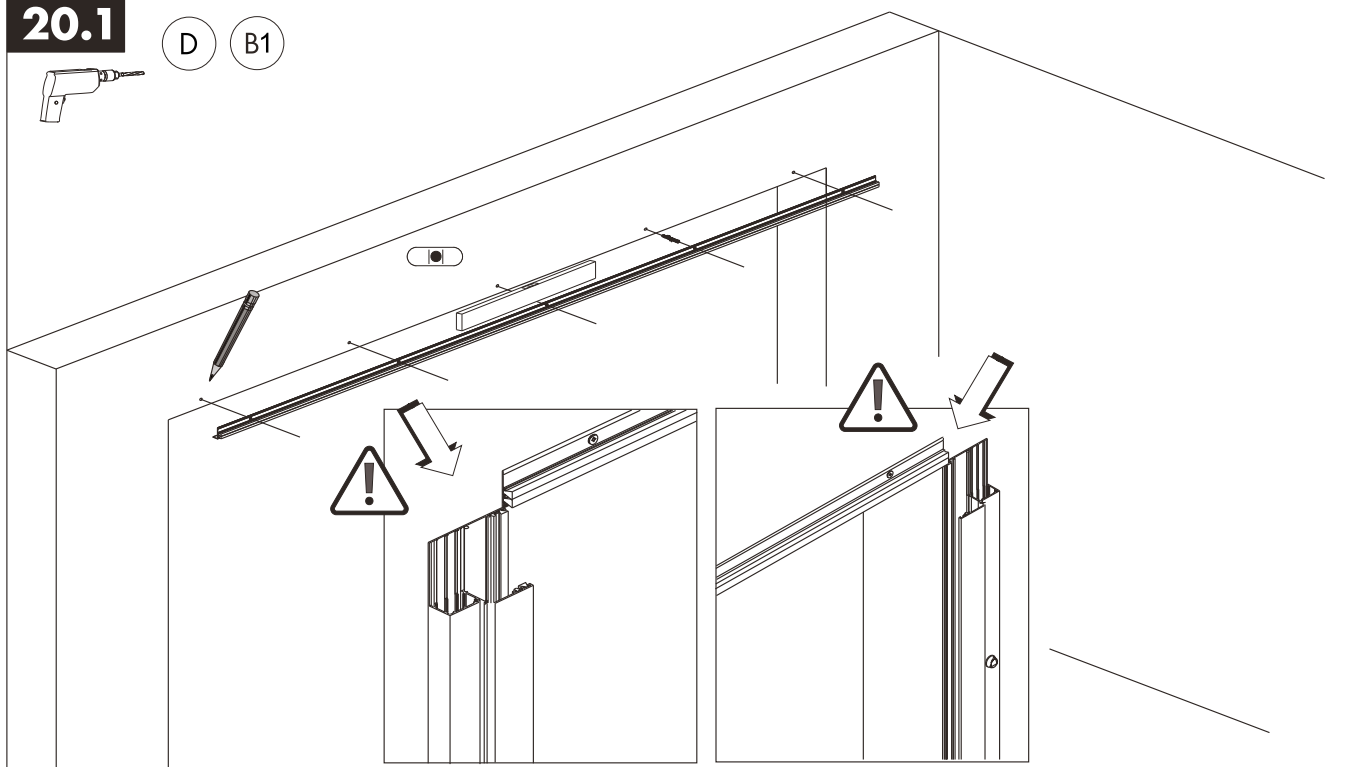
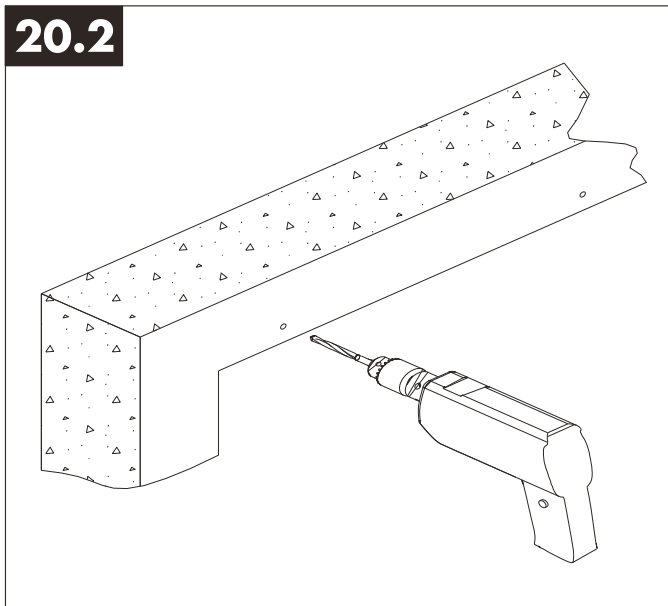
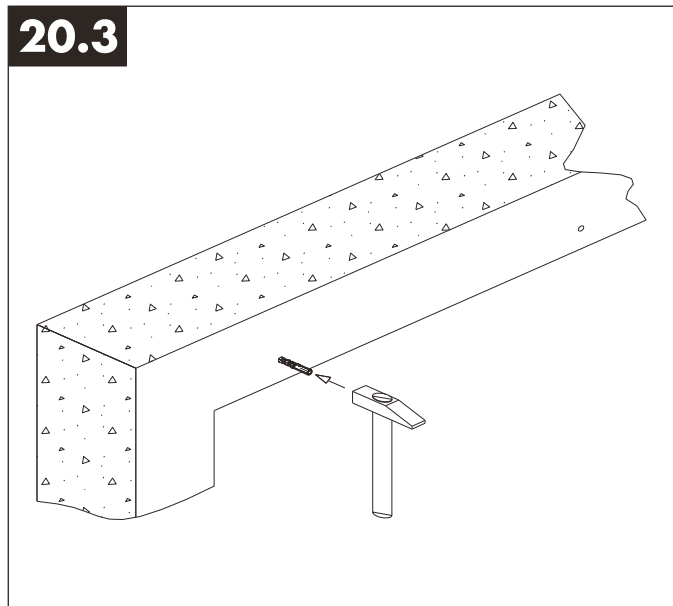
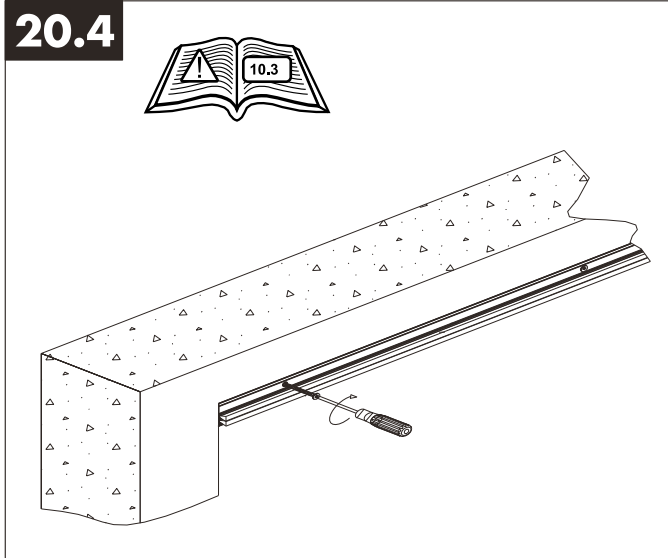
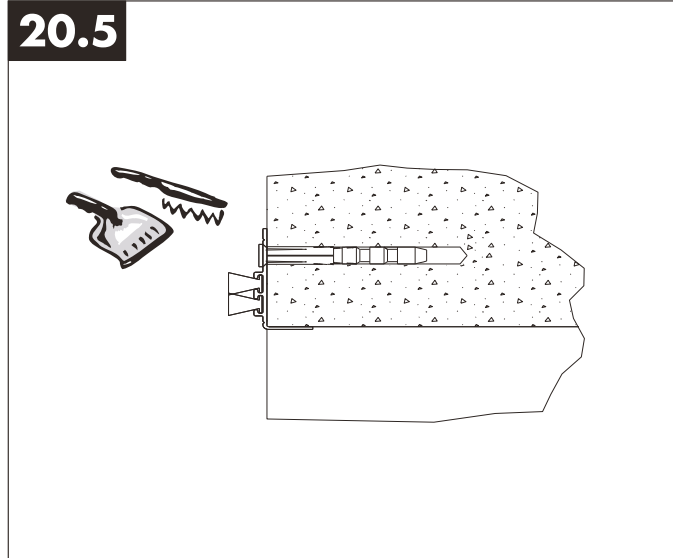




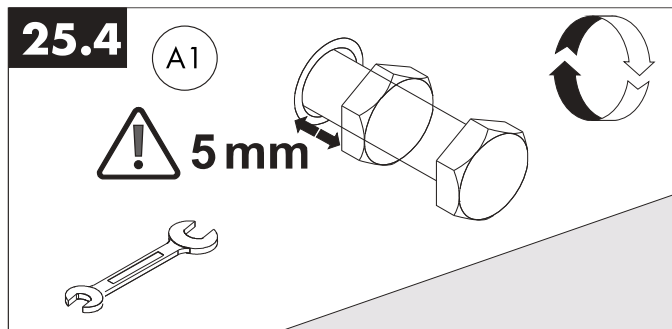
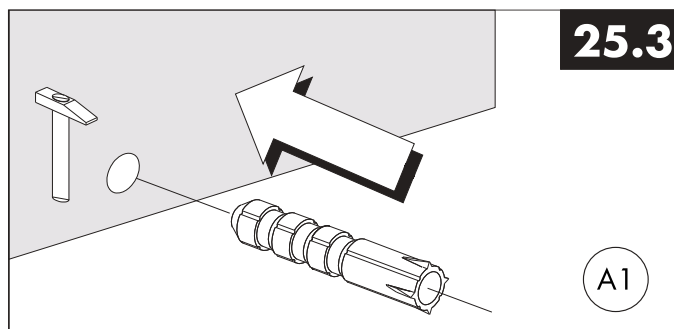
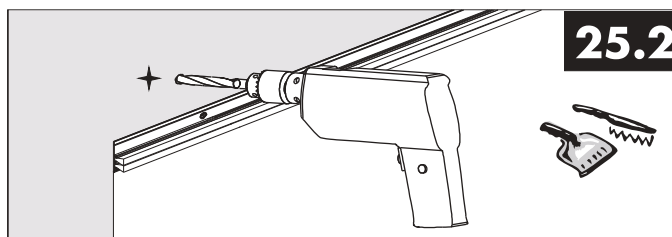
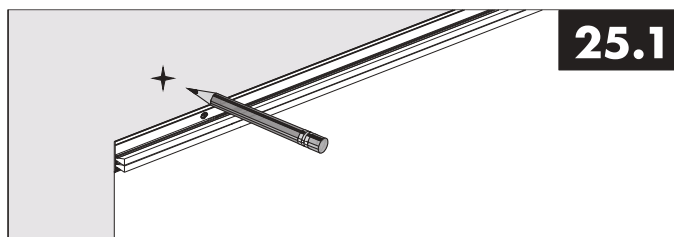
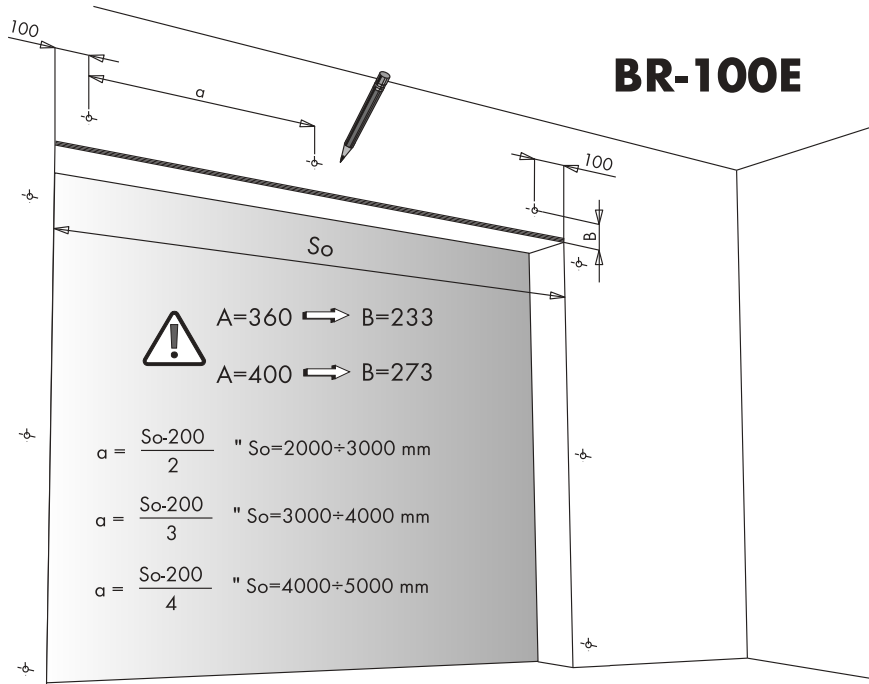
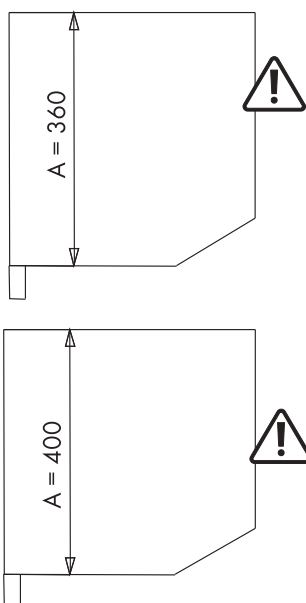
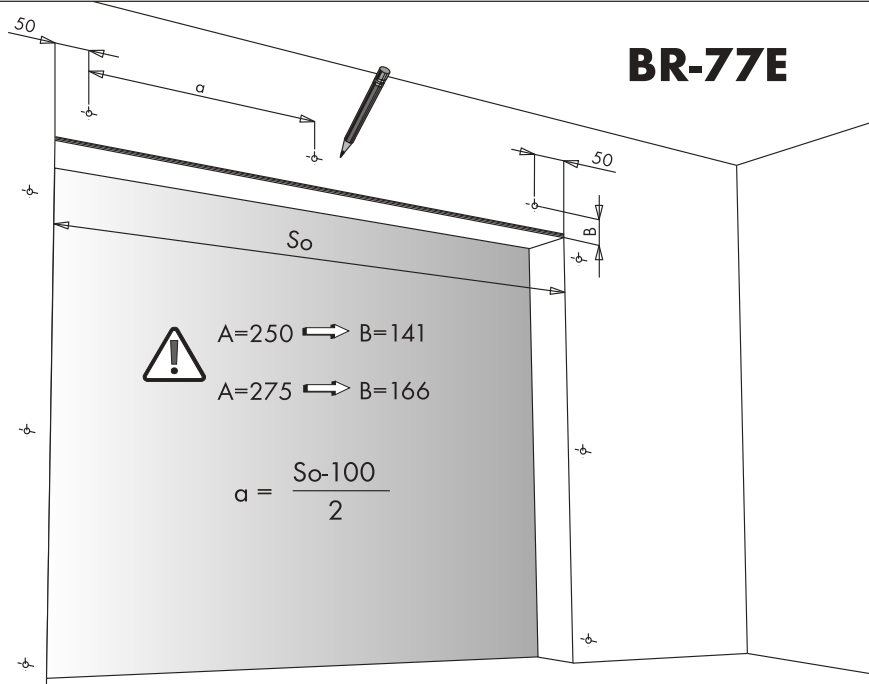
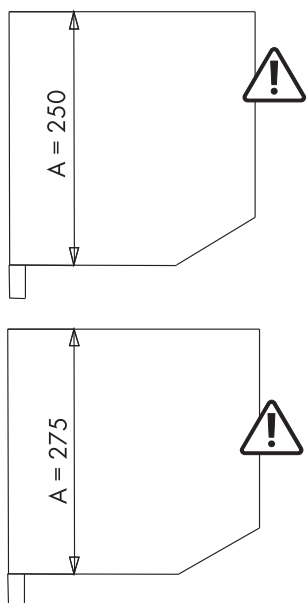
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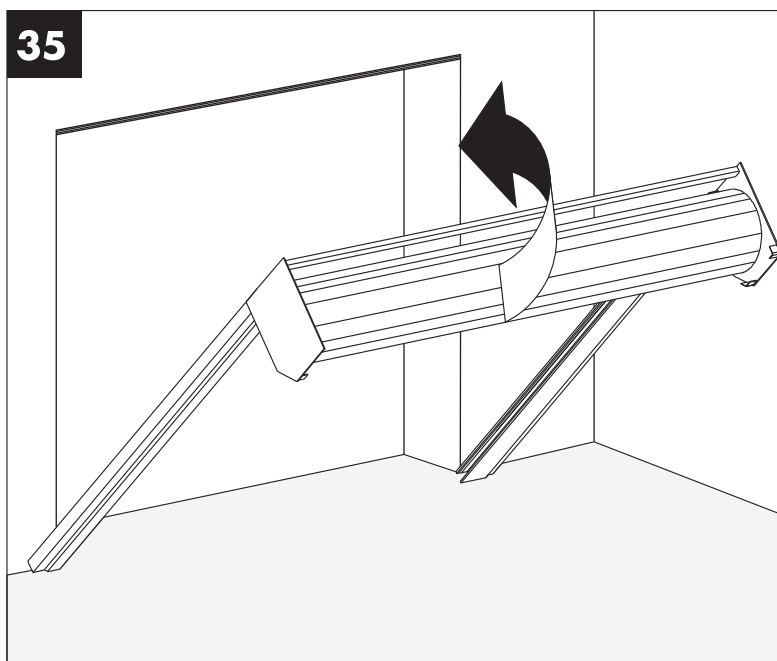
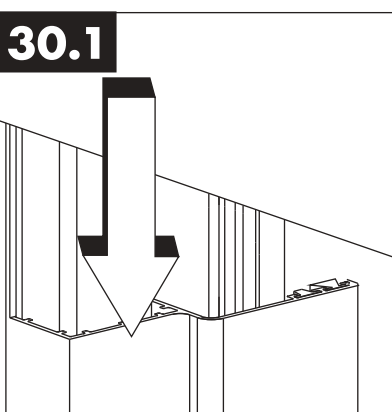
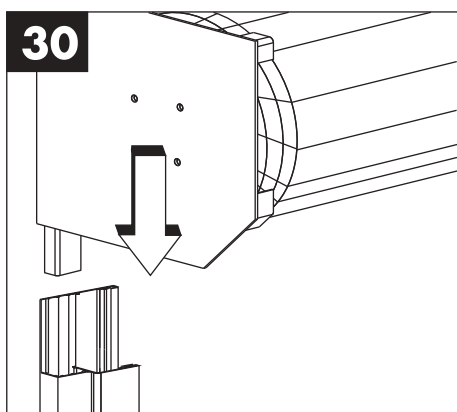
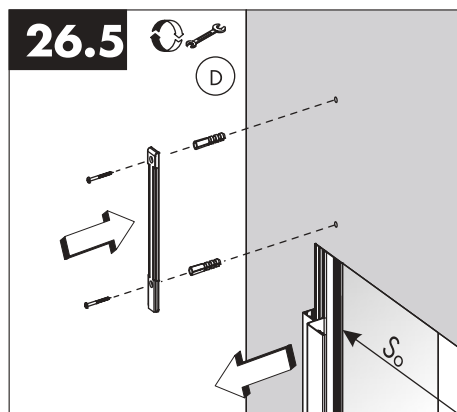
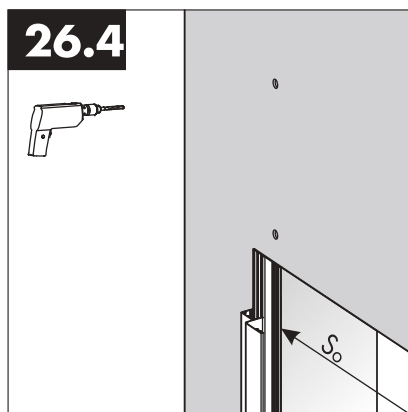
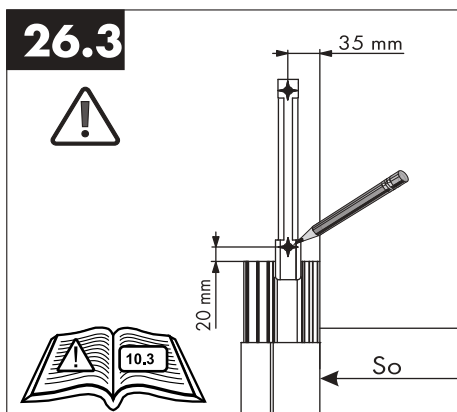
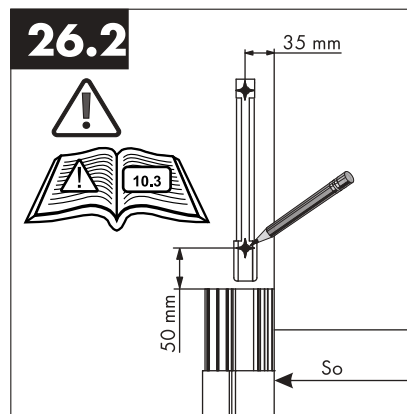
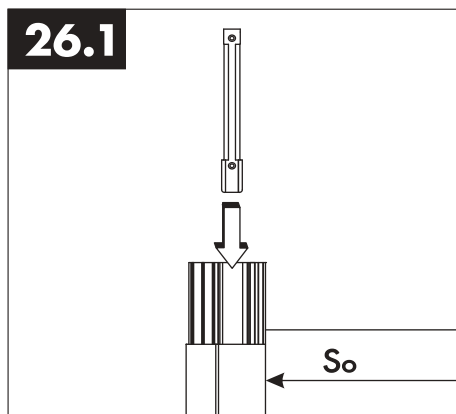
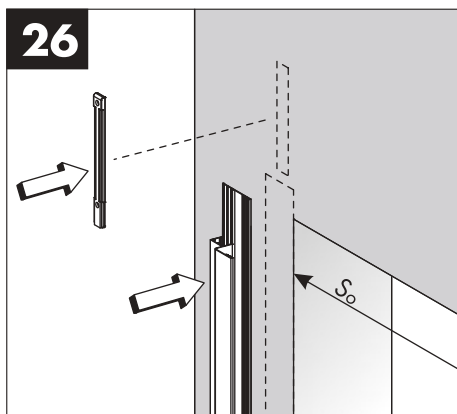
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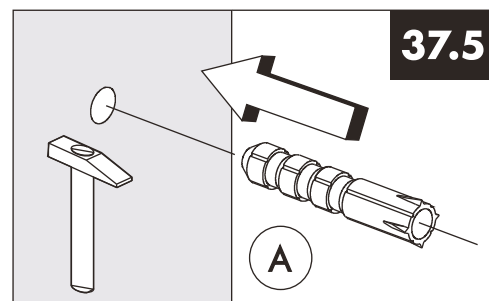
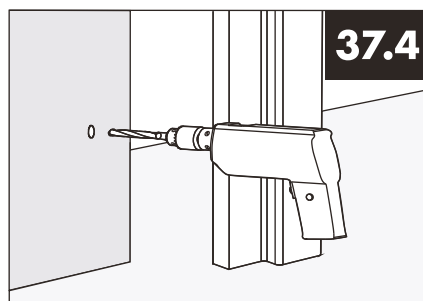
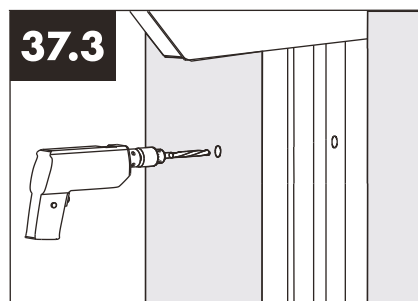
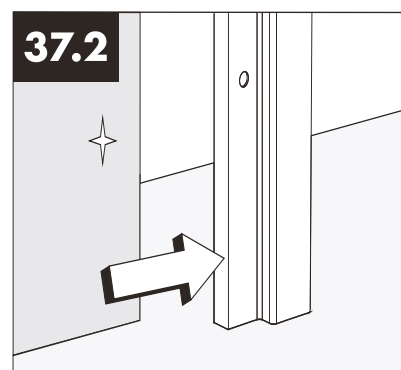
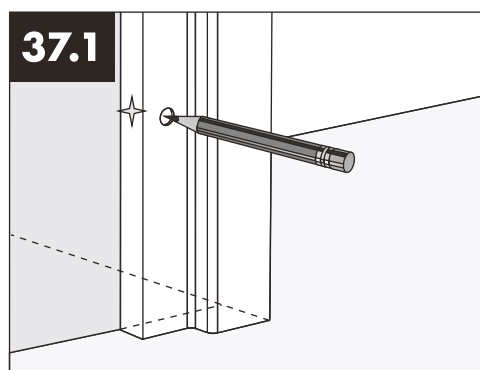
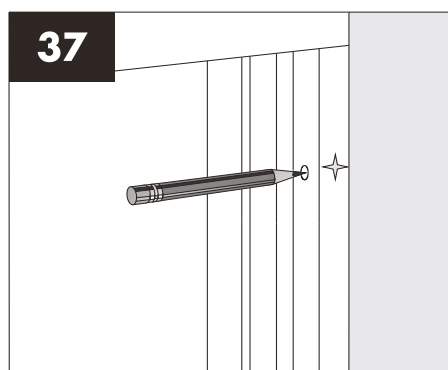
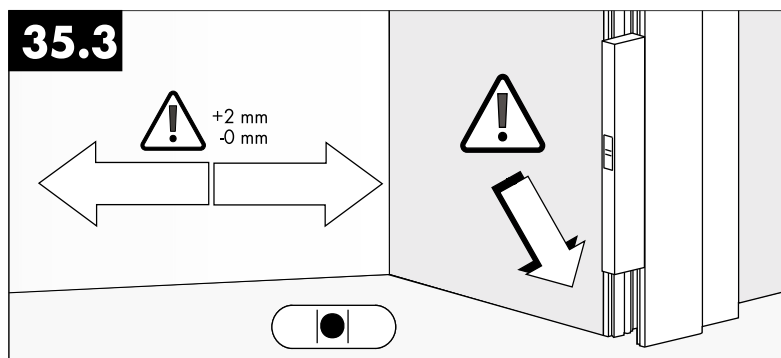
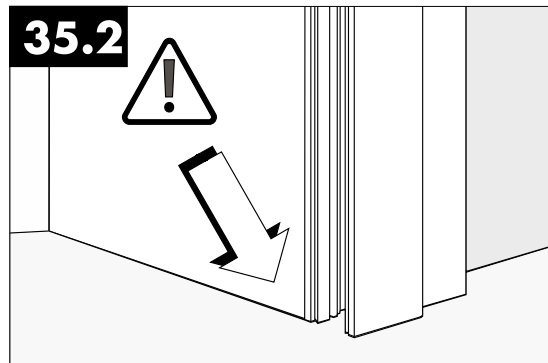
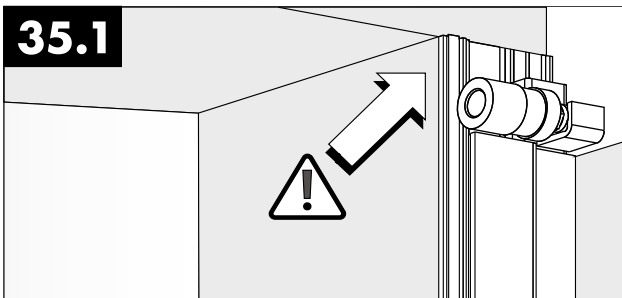
B1

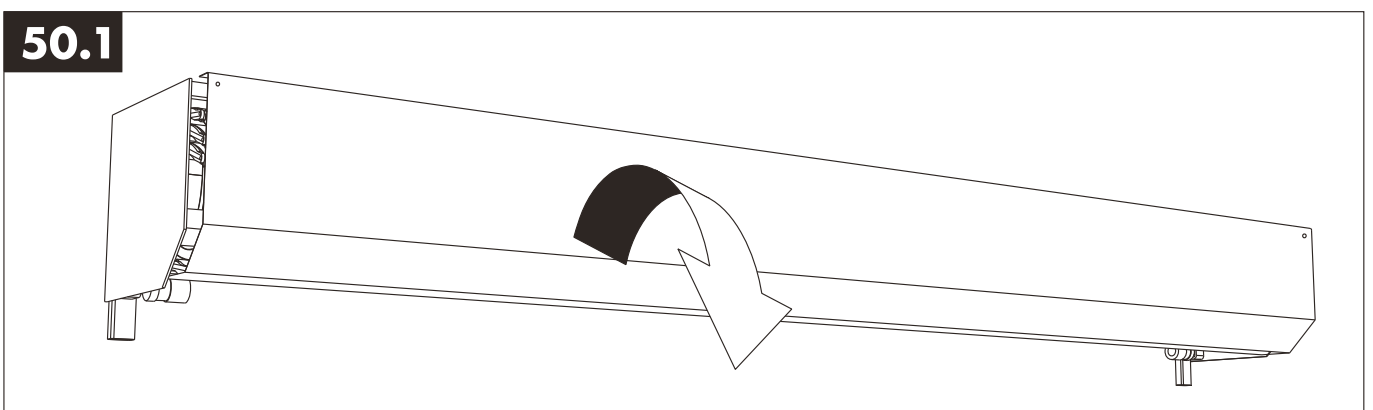
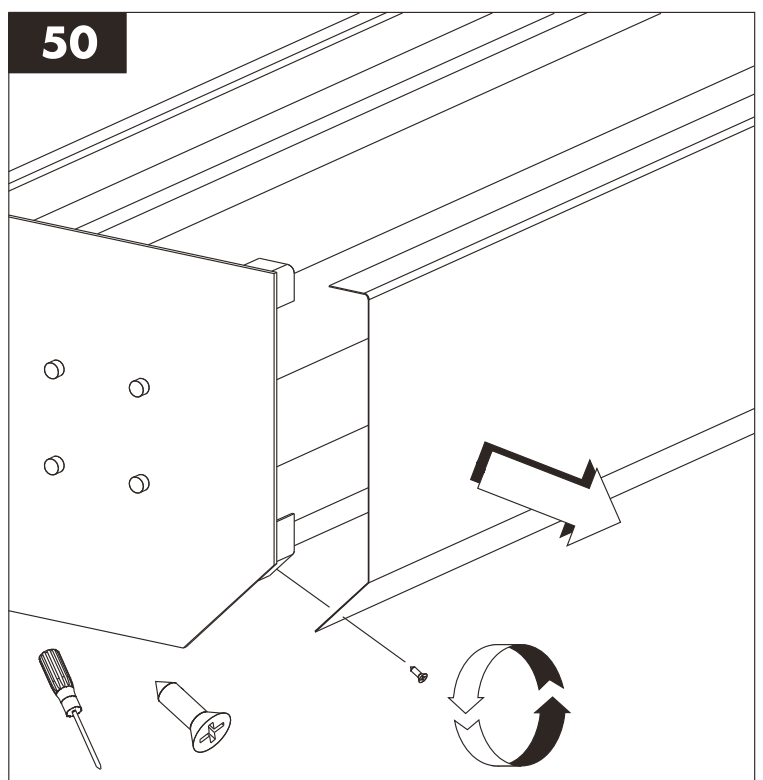
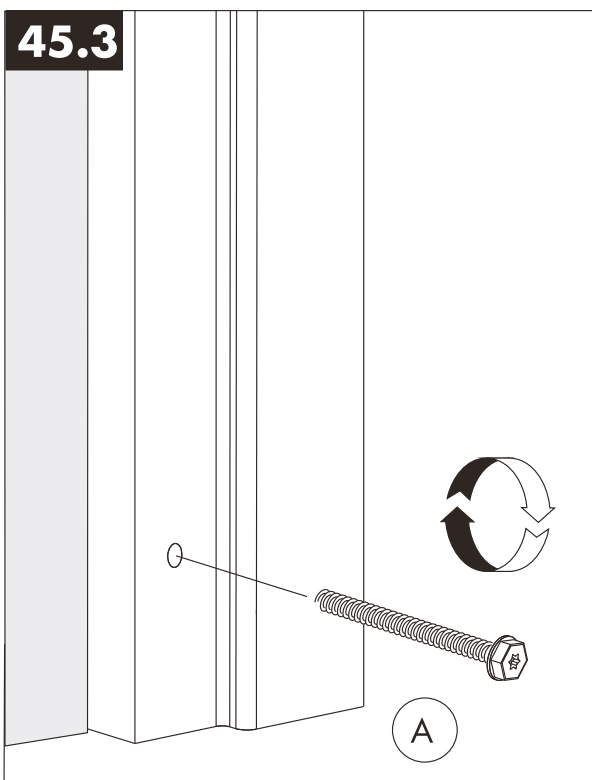
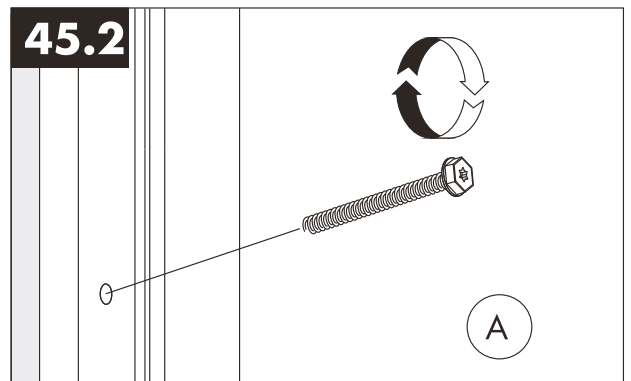
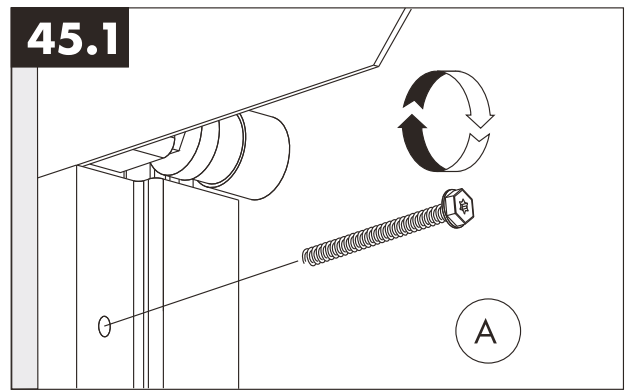
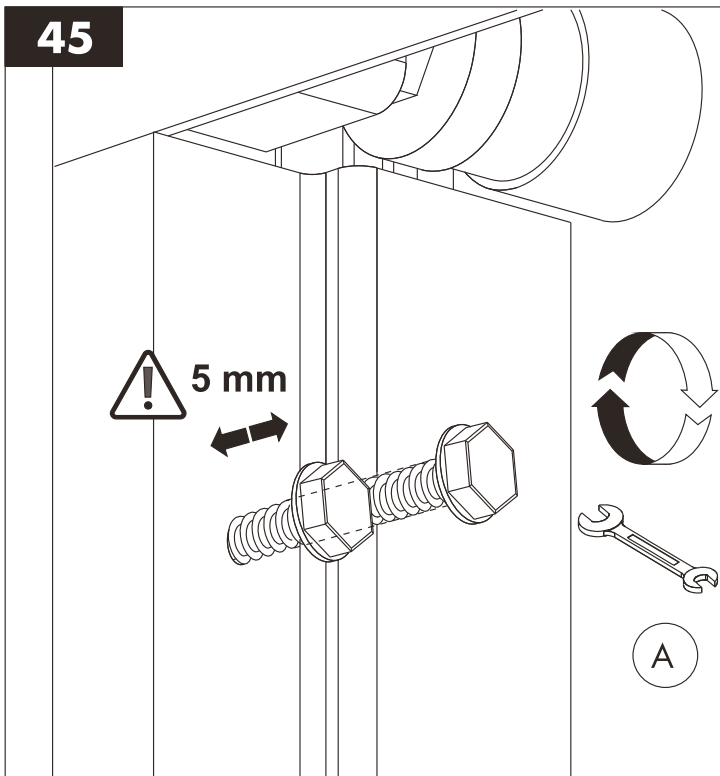
**20.2****20.3****20.4****20.5**

25

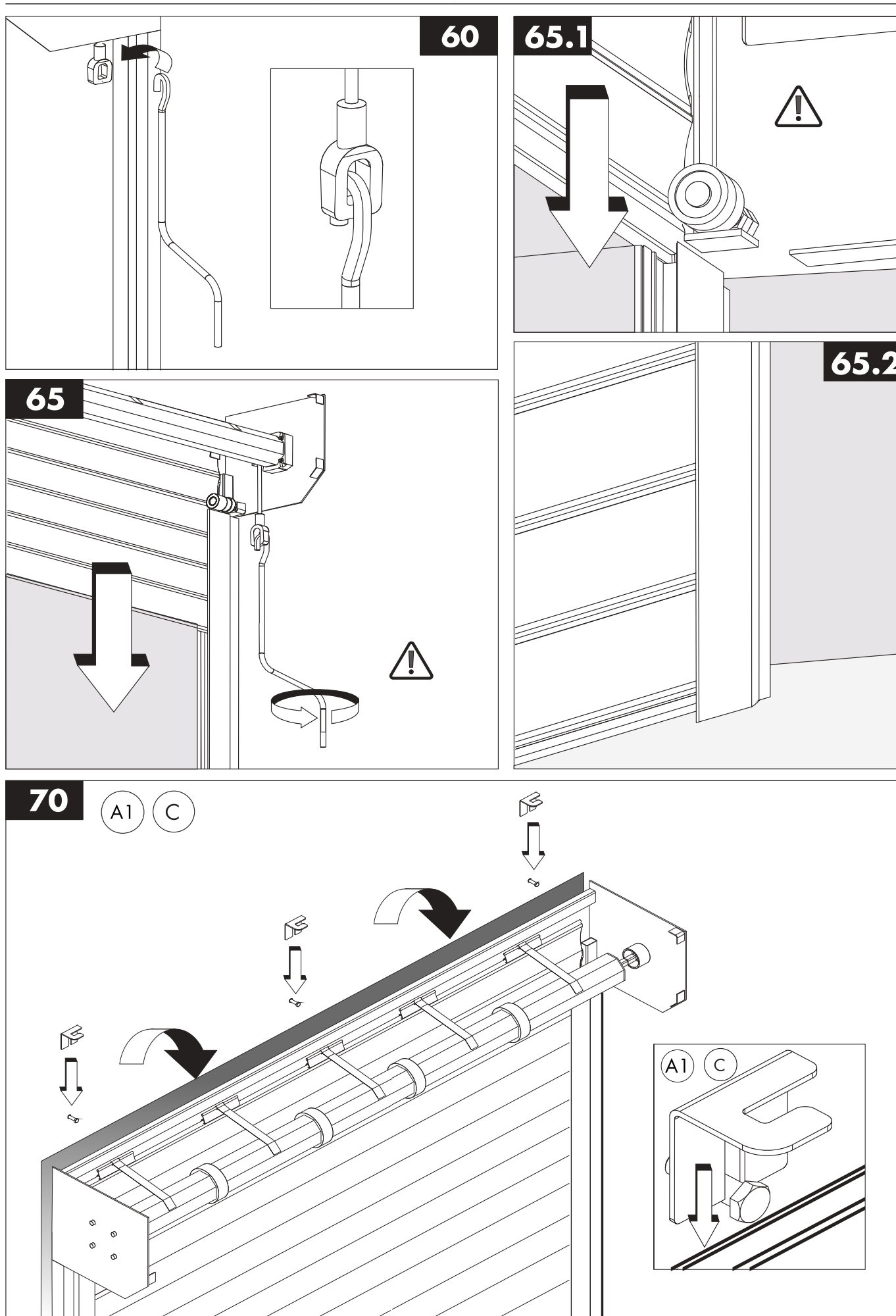


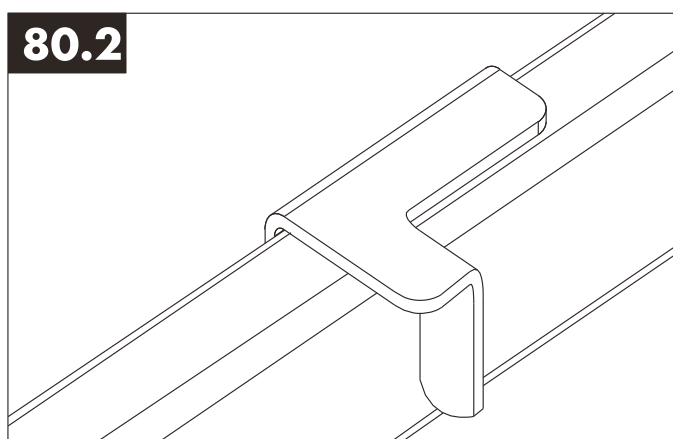
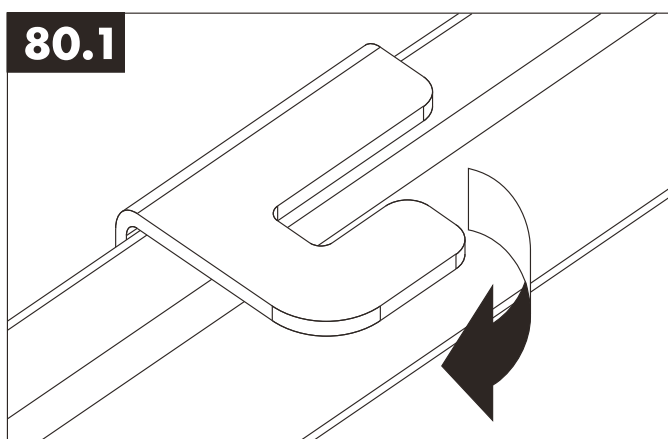
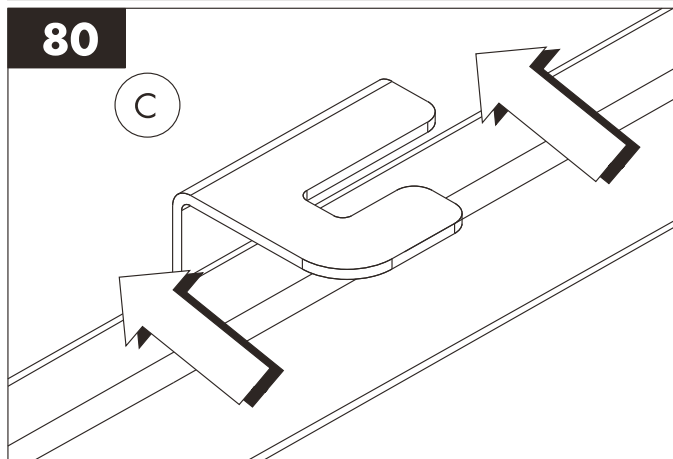
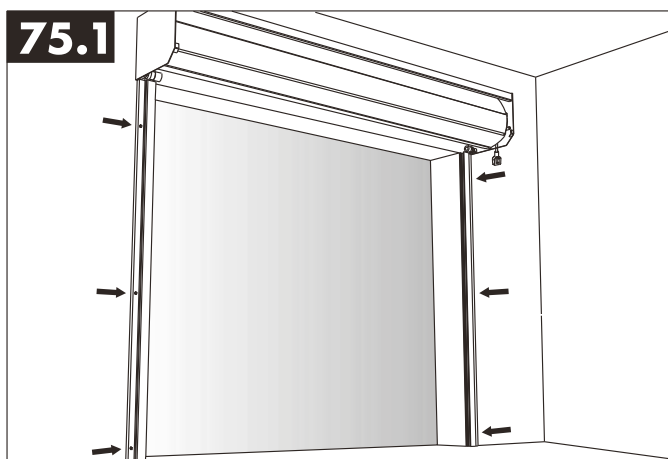
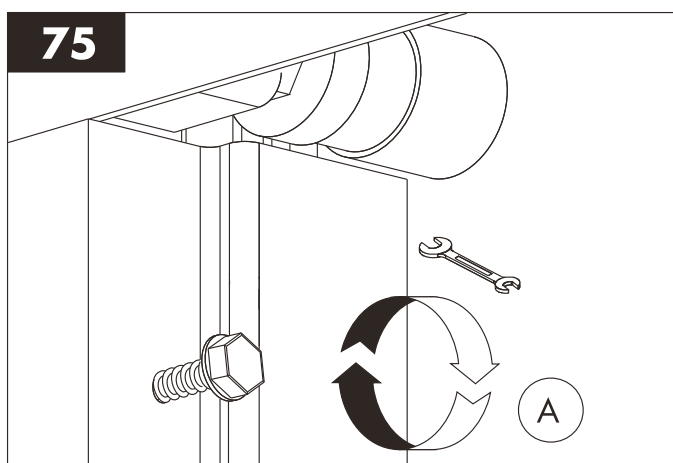
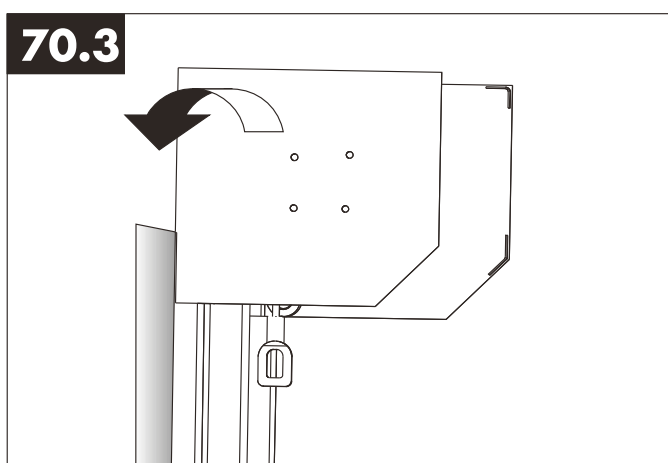
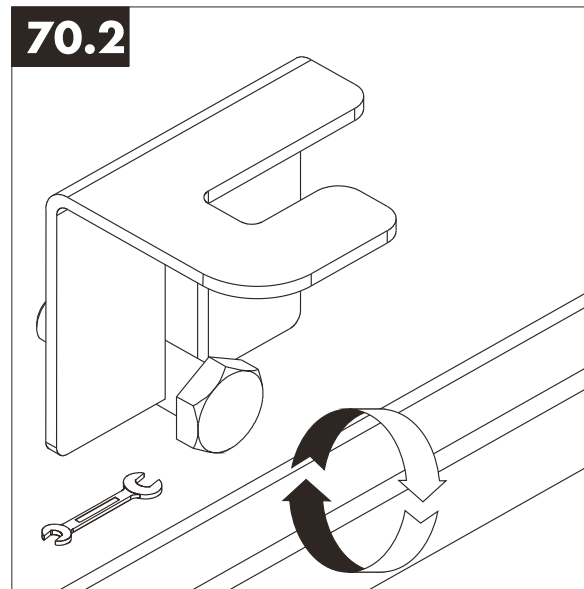
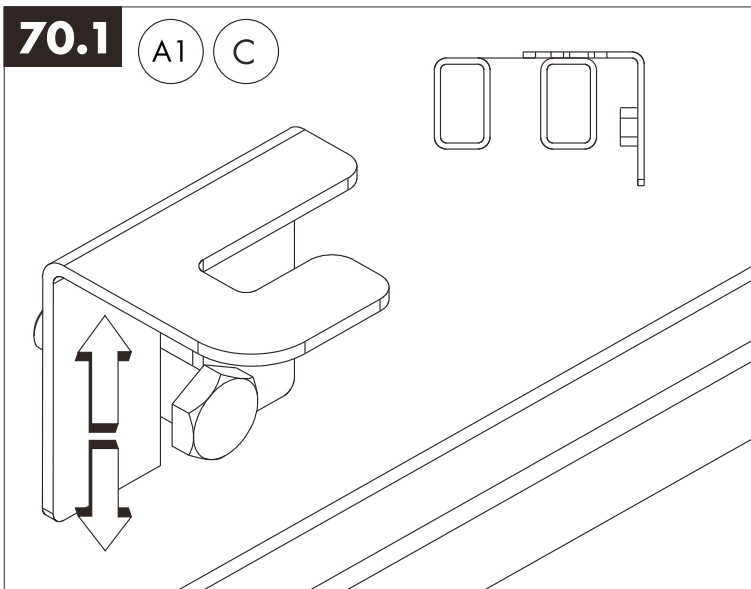






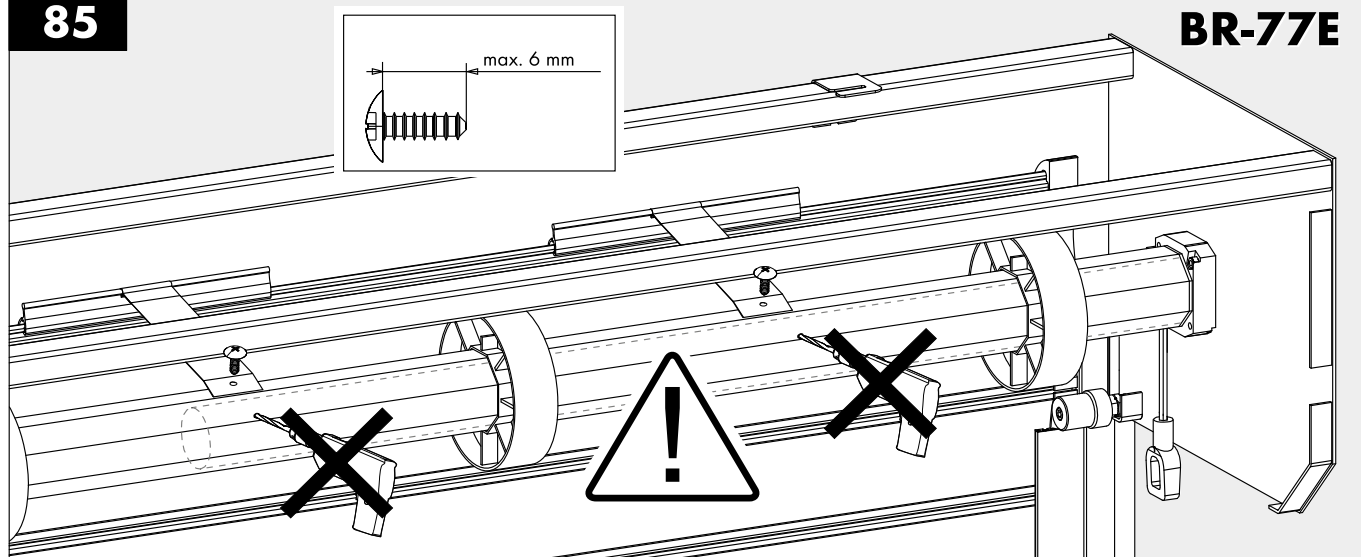






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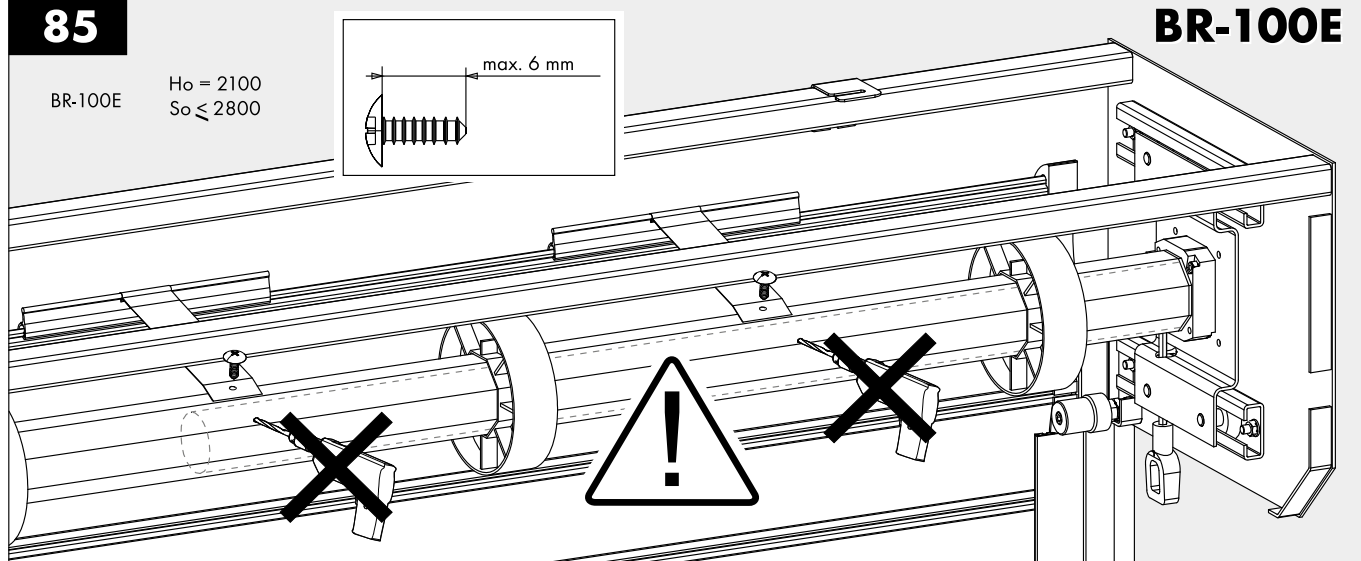


85

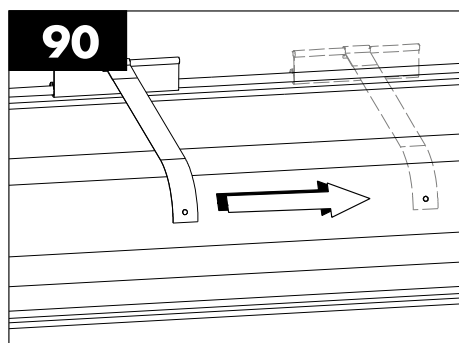
BR-100E

BR-100E

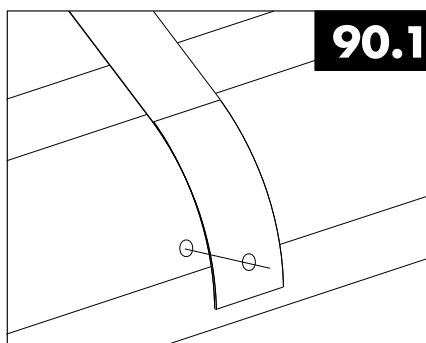
$H_o = 2100$   
 $S_o \leq 2800$



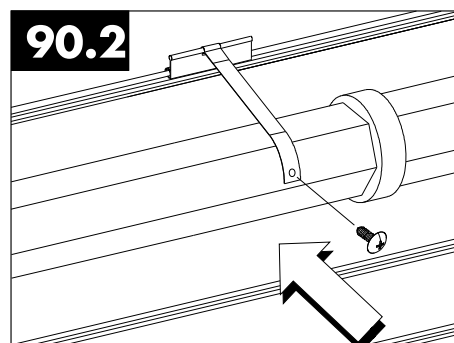
90



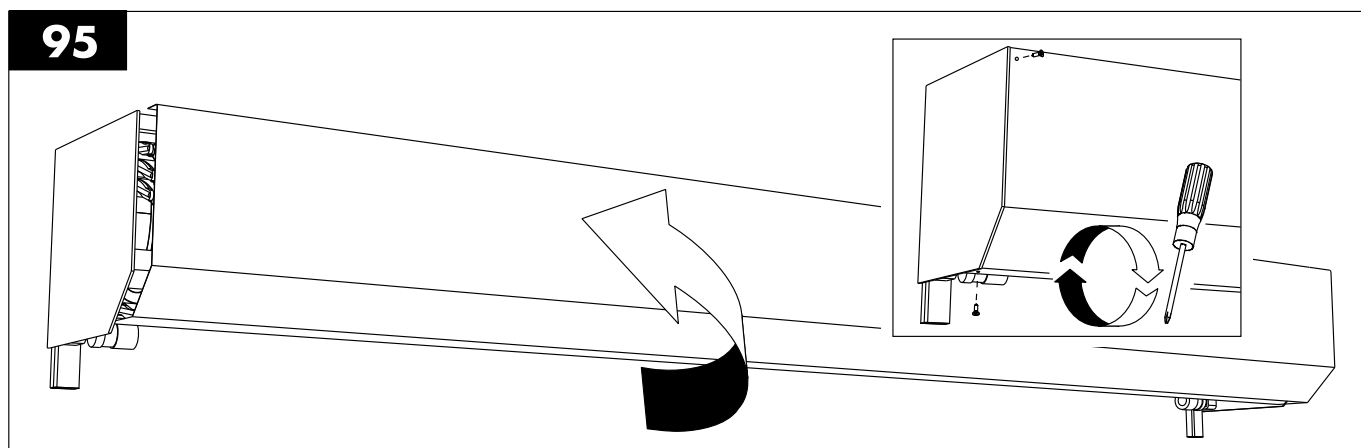
90.1



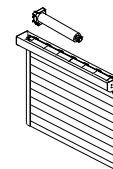
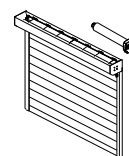
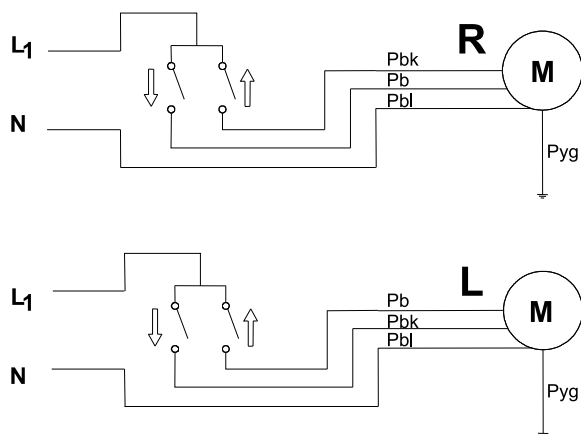
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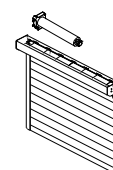
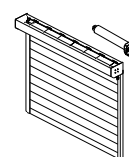
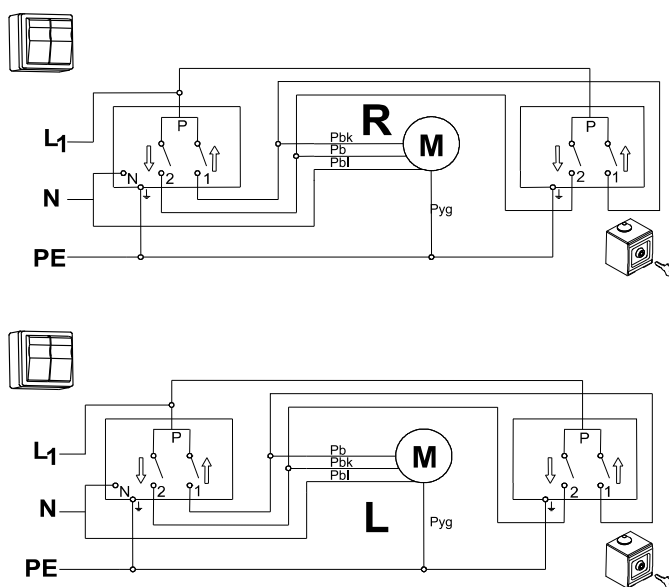
95



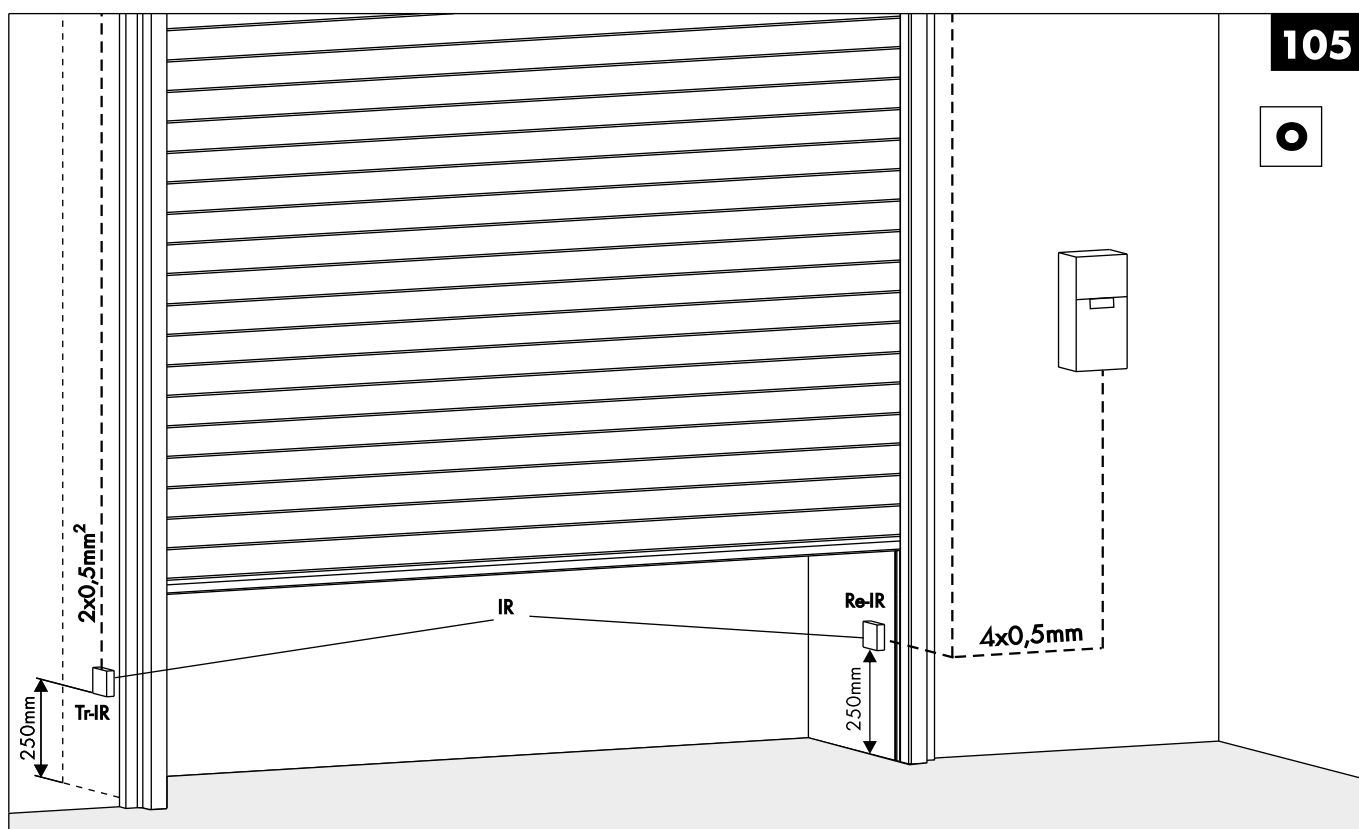
100

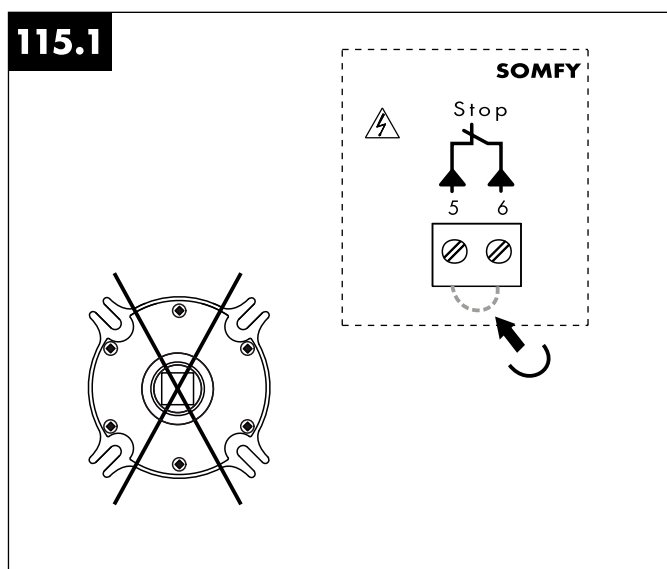
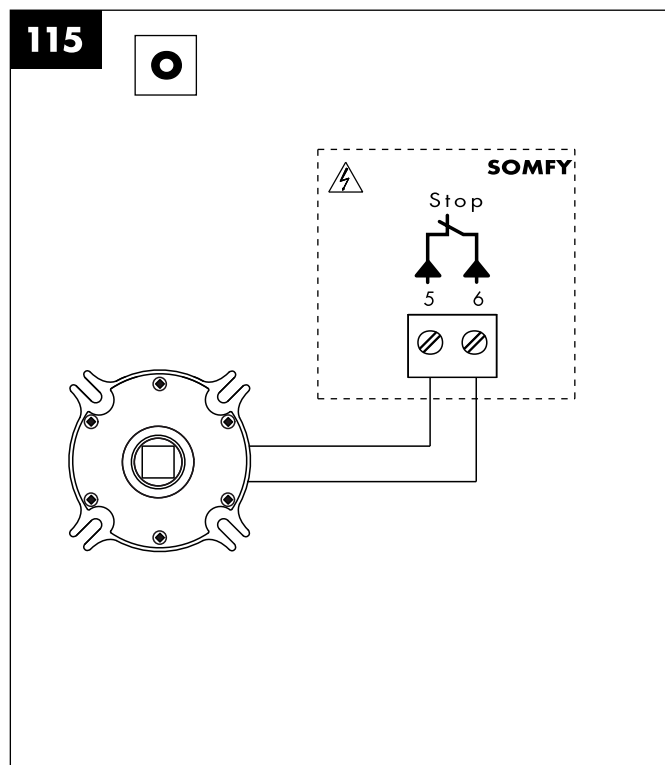
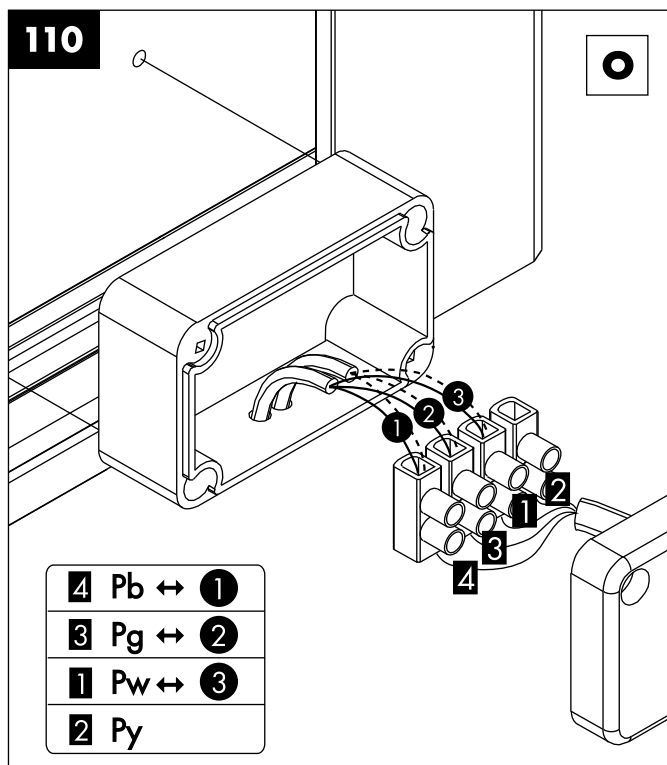


100.1

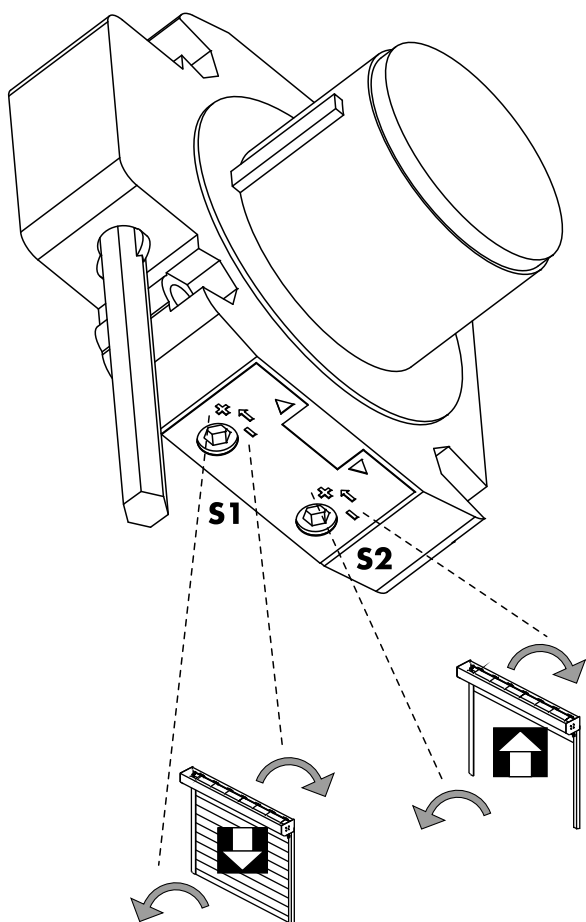
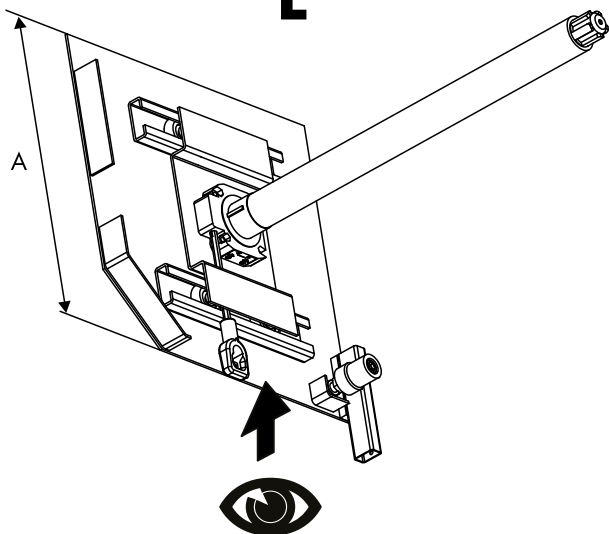
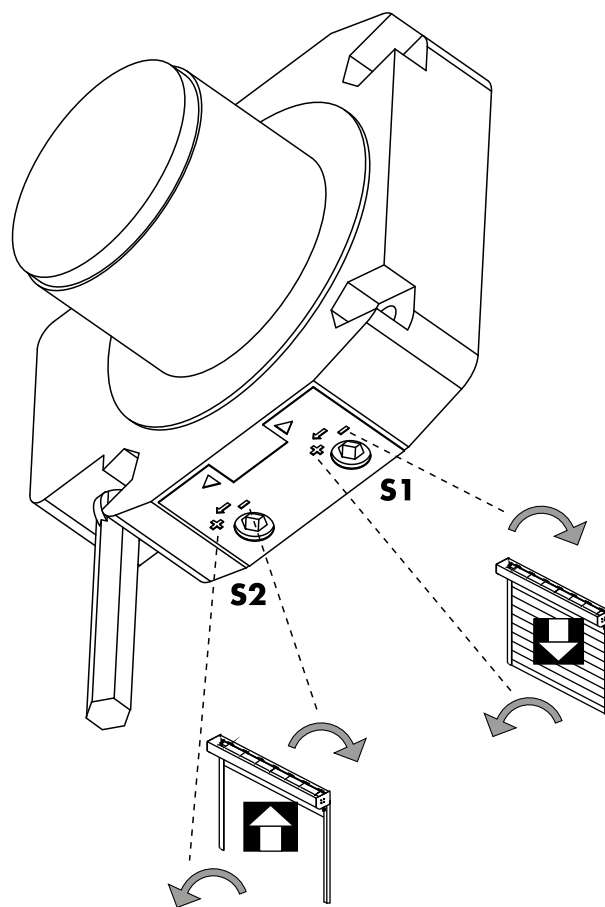
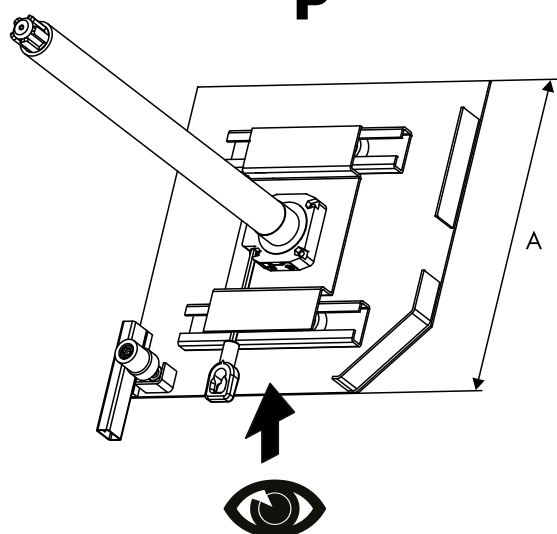


105







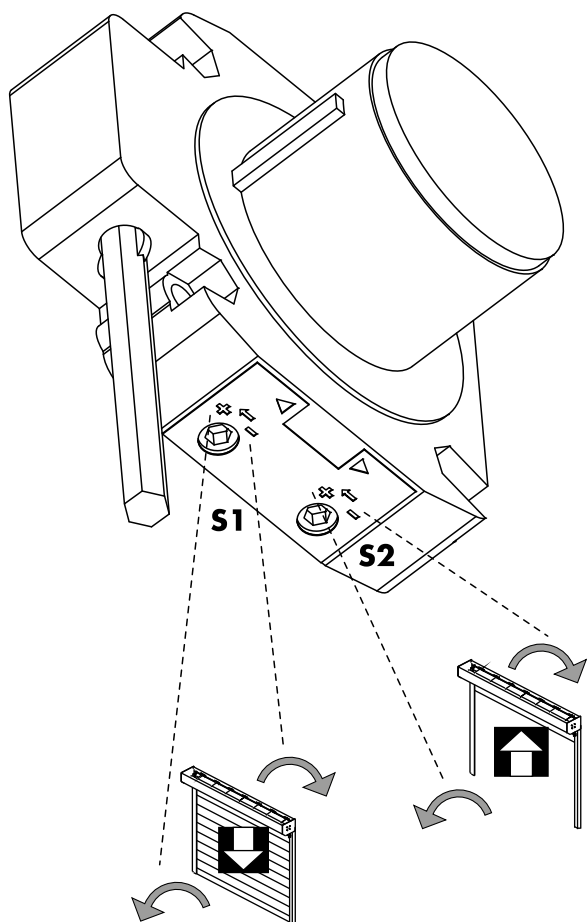
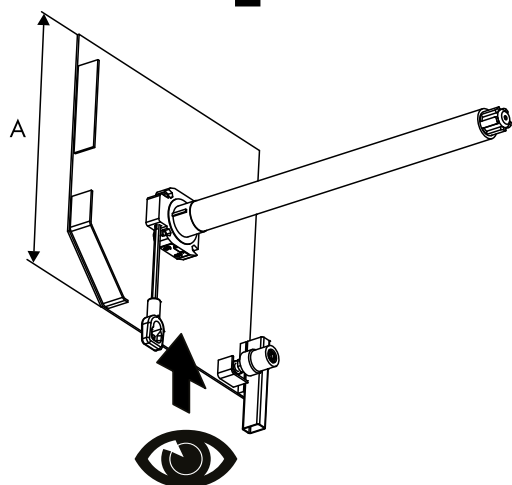
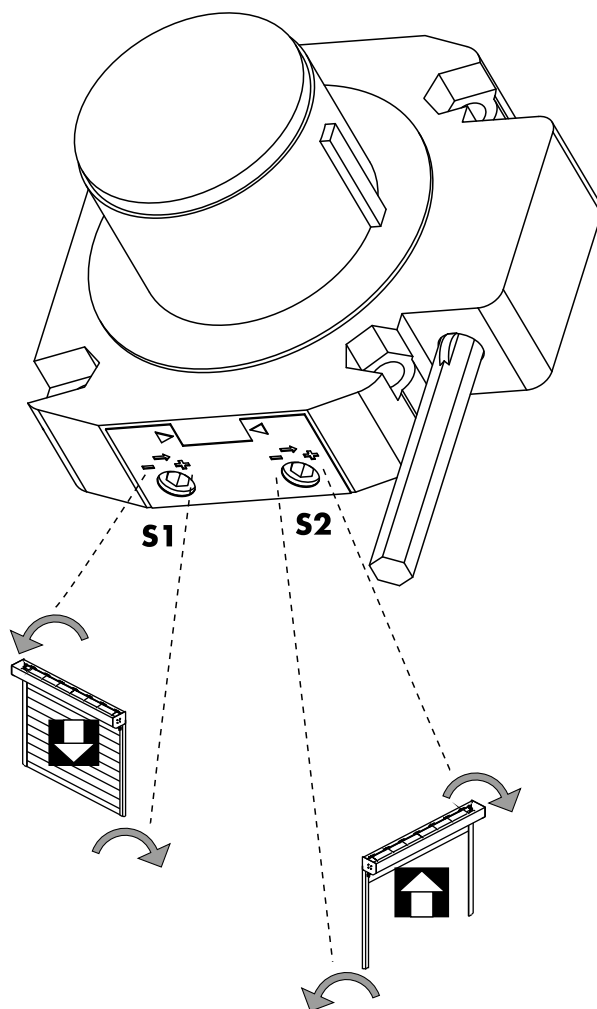
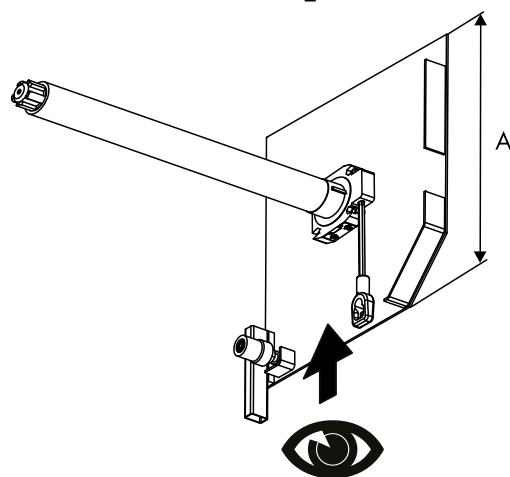
**L****P**

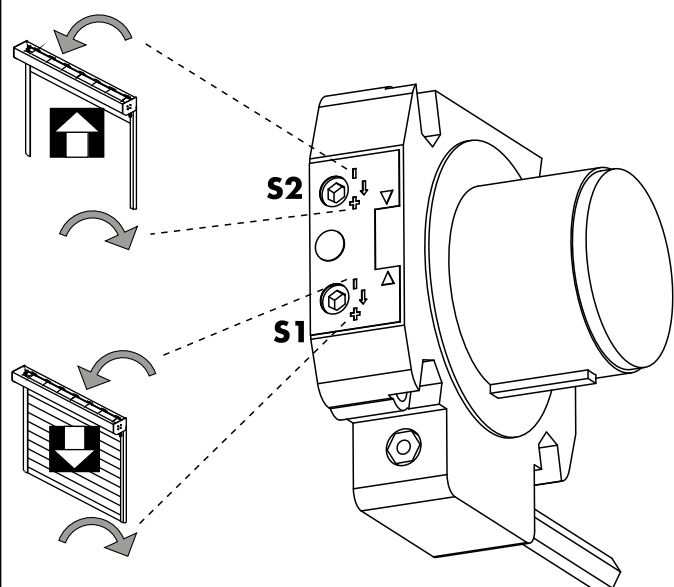
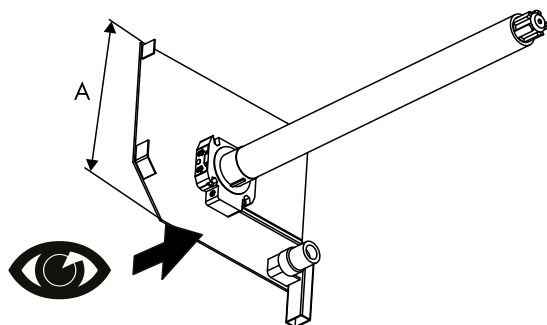
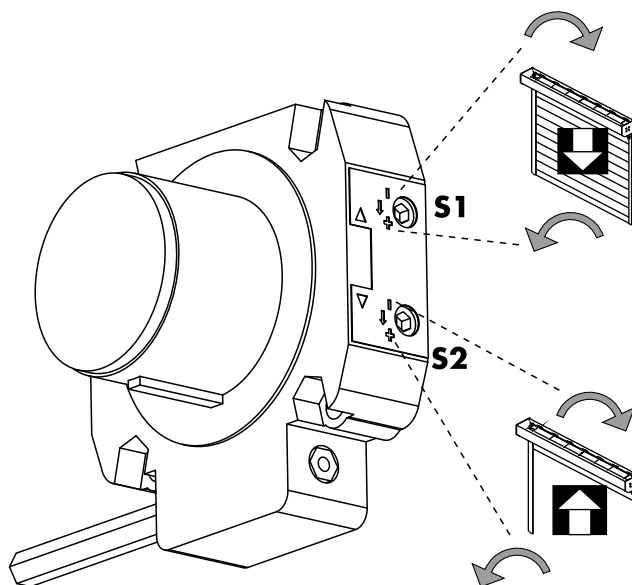
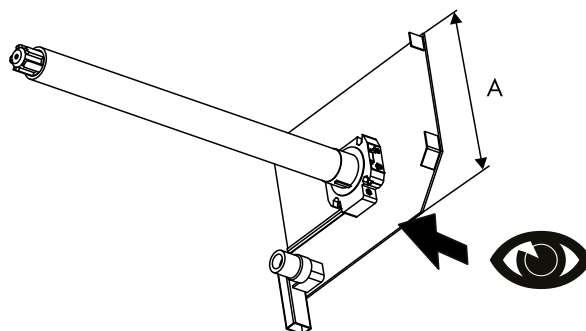
**BR-100E**

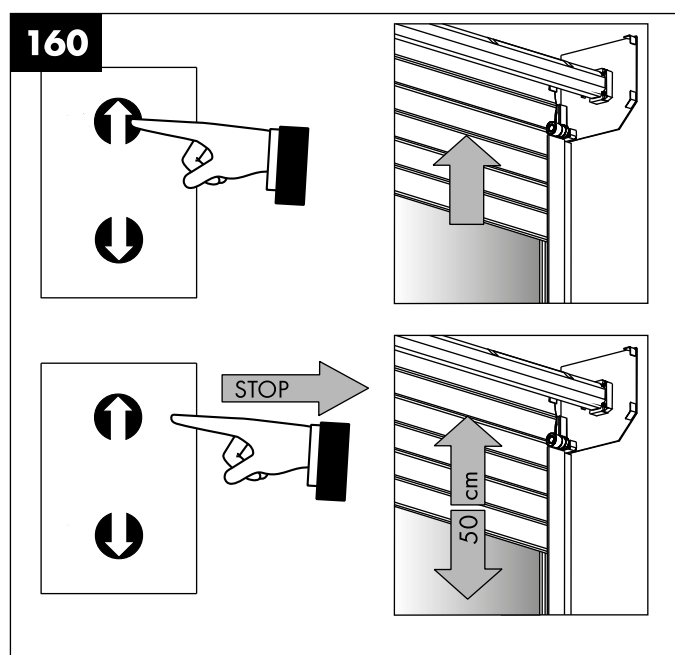
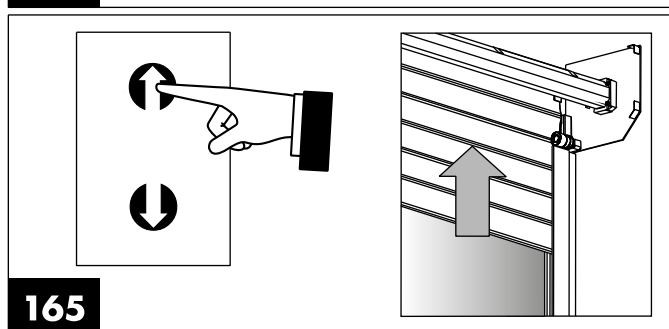
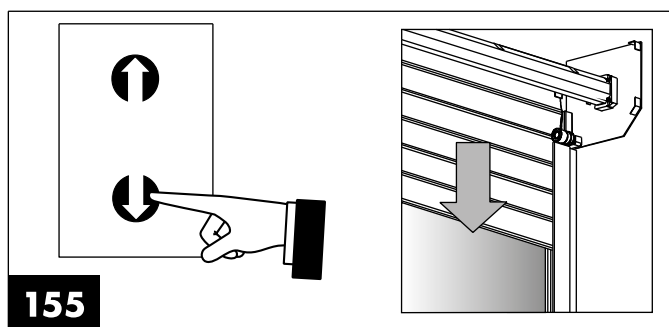
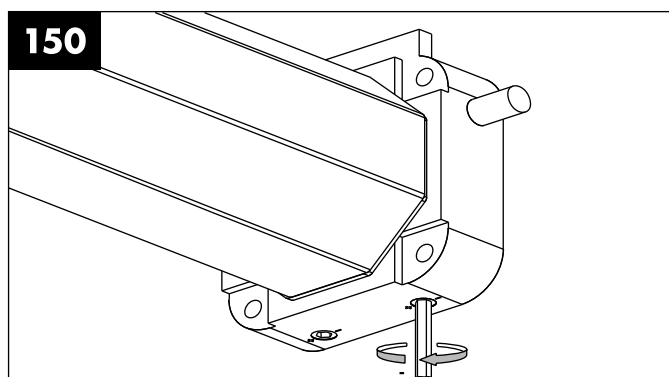
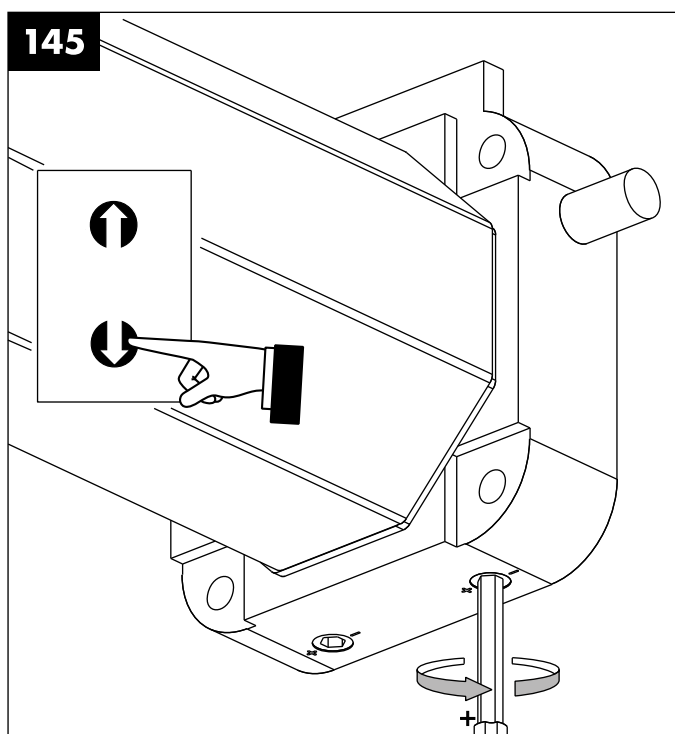
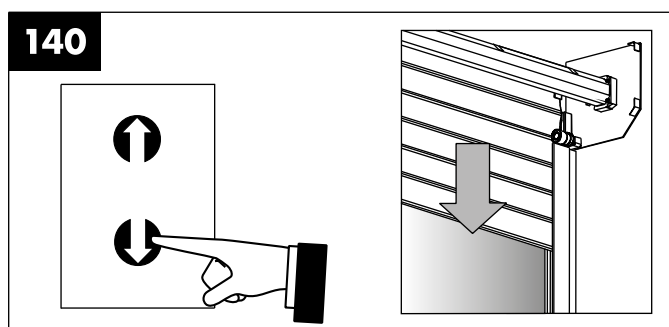
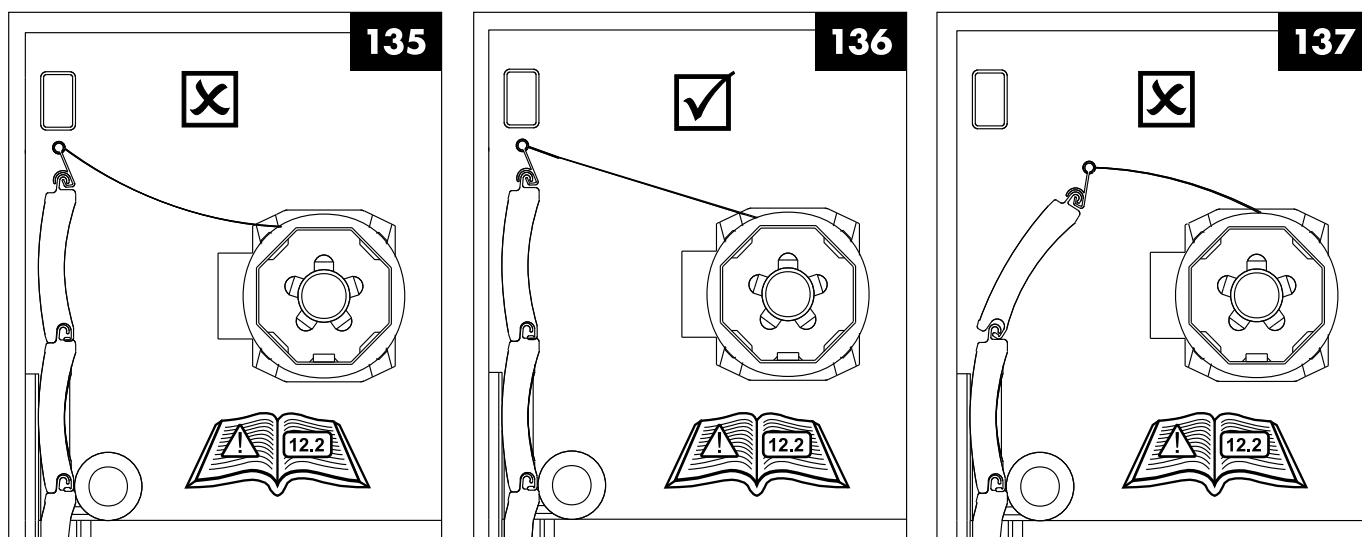
A=330

**BR-77E**

A=250; 275

**L****P**

**L****P**



170



171



**BR-77E**



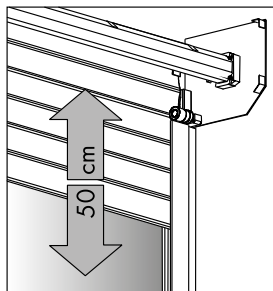
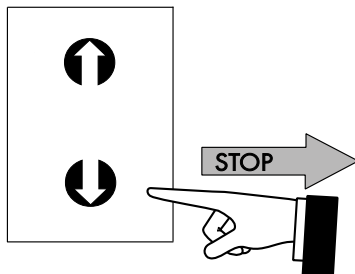
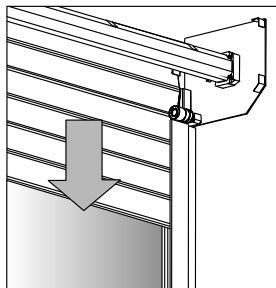
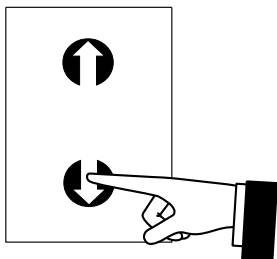
172



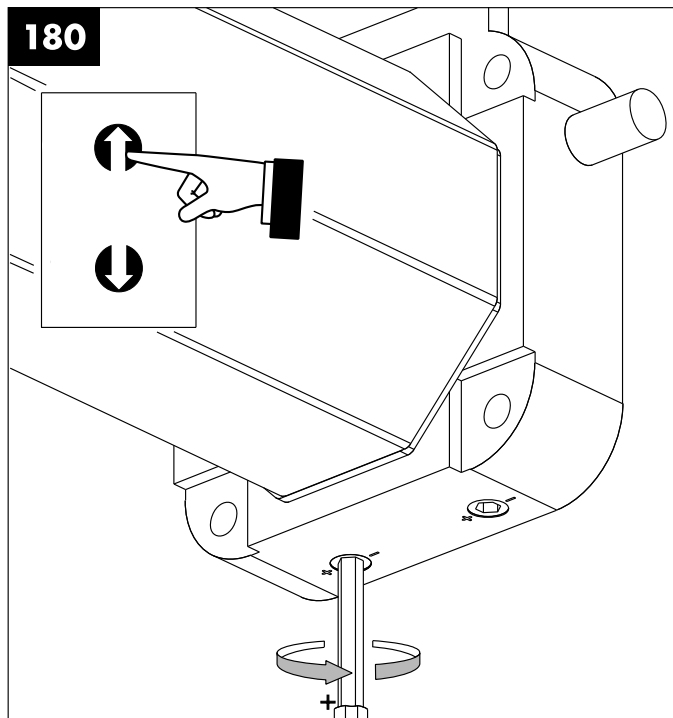
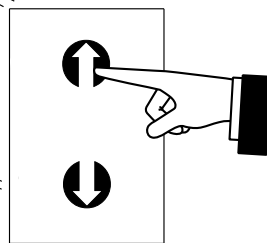
**BR-100E**



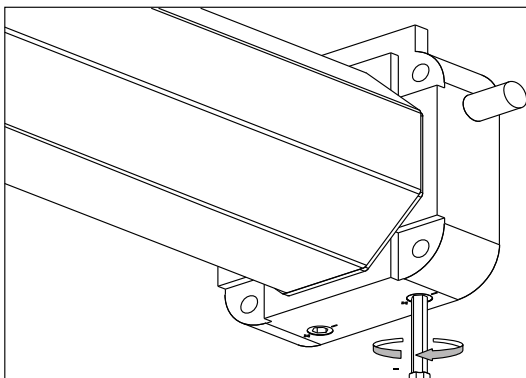
175



180



185



190

