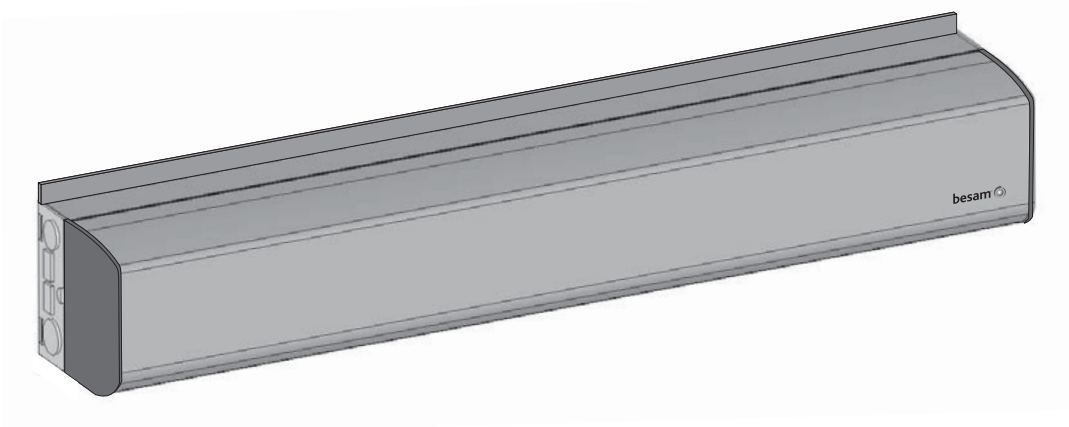
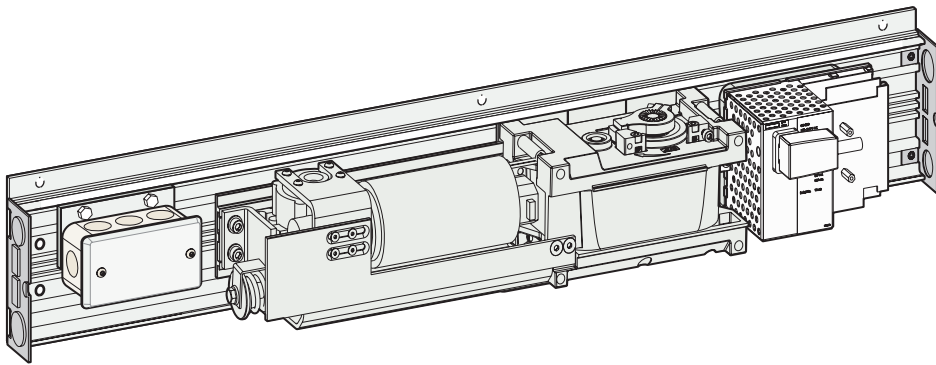


# Besam Low Energy Swing Door Operator SW100

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## Installation and Service Manual



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# Table of content

1	Revision . . . . .	4
2	Important information . . . . .	5
3	Introduction . . . . .	6
4	Technical specification . . . . .	7
5	How the SW100 works . . . . .	8
6	Models . . . . .	12
7	Part identification . . . . .	13
8	Options . . . . .	14
9	Pre-installation . . . . .	20
10	Mechanical installation . . . . .	23
11	Electrical connection . . . . .	31
12	Start-up . . . . .	36
13	Changing group of parameters . . . . .	42
14	Cover . . . . .	43
15	ANSI / BHMA A156.19 . . . . .	44
16	Troubleshooting . . . . .	47
17	Planned maintenance checklist . . . . .	49

The following pages have been revised:

<b>Page</b>	<b>Revision</b>
5	2.3 Glazing materials added
7	Cover depth changed from 5 3/16" to 5 1/8"

---

## 2

## Important information

---

### 2.1 Important notice

---

To avoid bodily injury, material damage and malfunction of the product, the instructions contained in this manual must be strictly observed during installation, adjustment, repairs and service, etc. Only Besam-trained technicians should be allowed to carry out these operations.

### 2.2 Radio and television reception

---

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been designed to comply with the emission limits in accordance with EN 61000-6-3 and EN 61000-6-2 (US market FCC 47 CFR Part 15B), which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient the receiving antenna.
- Relocate the receiver with respect to the equipment.
- Move the receiver away from the equipment.
- Plug the receiver into a different outlet so that equipment and receiver are on different branch circuits.
- Check that protective earth (PE) is connected.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions.

### 2.3 Glazing materials

---

The glazing material for swing doors shall comply with ANSI Z97.1

This manual contains the necessary details and instructions for the installation, maintenance and service of the low energy swing door operator SW100, a universal electro-mechanical operator suitable for all low energy applications of swing doors.

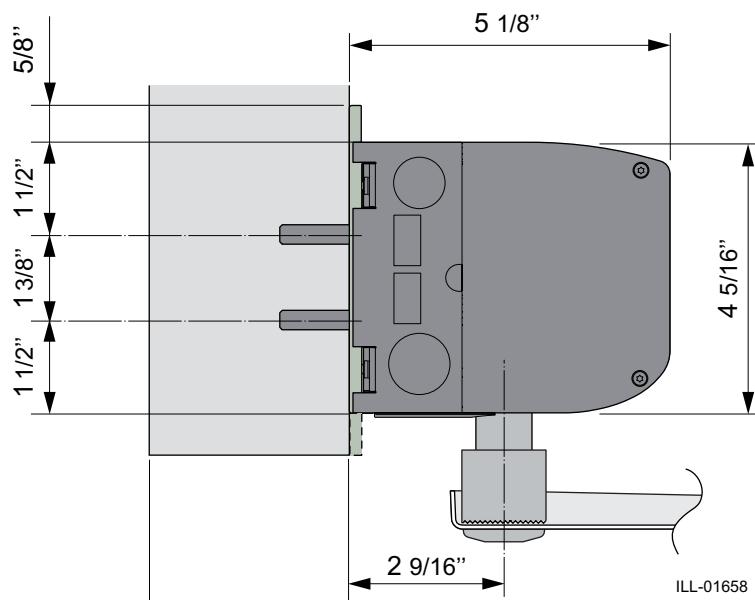
The SW100 can be mounted on either side of the door header for pull or push action, and is suitable for single or double doors fitted with butt hinges, offset or center pivots.

The SW100 ensures all-around safety. The operator can be combined with a full range of sensor products providing swing door safety, but meets also the requirements for a low energy operator without any sensors.

Power supply:	120 V AC +10/-15%, 50/60 Hz
Power consumption:	max. 75 W
Auxiliary voltage:	24 V DC, max. 400 mA
Internal control fuse:	2 x T 6.3 AH 250 V
Door width:	36-48" (914-1219 mm)
Electro-mechanical locking device	Selectable: 12V DC, max. 500 mA / 24 V DC, max. 250 mA
Door weight:	100-200 lb. (45-90 kg)
Door opening angle:	Push arm: 80° - 110°, with reveal 0 - 11 13/16" (0 - 300 mm)
	Pull arm: 80° - 110°, with reveal 0 - 5 1/8" (0 - 130 mm)
Opening time (0° - 80°):	variable between 3 - 6 seconds
Closing time (90° - 10°):	variable between 3 - 6 seconds
Hold open time:	1.5-30 seconds
Ambient temperature:	-4 °F to +113 °F (-20 °C to +45 °C)
Relative humidity (non-condensing)	Max. 85%

This product is to be installed internally or externally with suitable weather protection. Class of protection IP 20.

Complies with: IEC 335-1, ANSI/BHMA A156.19 and UL 325.



## 5

## How the SW100 works

---

The low energy swing door operator SW100 uses a DC motor and a gear-reduction system to drive an arm system, which opens the door. Closing power is provided by a motor and a clock spring. An electronic control unit uses a motor encoder and a microprocessor to control the door's movement.

### 5.1 Opening

---

When an opening signal is received by the control unit, the door is opened at the operator-adjusted opening speed. Before the door is fully open at back check, it slows automatically to low speed. The motor stops when the selected door opening angle has been reached. The open position is held by the motor.

If the door is obstructed while opening, it will either stall or stop which can be selected with a DIP-switch (SOS).

- When stalling - the door will continue to try to open during the hold open time.
- When stopping - the door will, even if hold open time has not expired, close after 2 seconds.

### 5.2 Closing

---

When the hold open time has elapsed, the operator will close the door automatically, using spring force and motor. The door will slow to low speed at latch check before it reaches the fully closed position. The door is kept closed by spring power or extended closing force by the motor.



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## 5.3 Functions on the basic control unit CU-ESD (see also page 32)

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### 5.3.1 Power failure

---

During power failure the operator acts as a door closer with controlled closing speed.

### 5.3.2 Spring force

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The operator is delivered with spring pre-tension factory set to 210°. If necessary, the spring tension can be electronically adjusted with a potentiometer to required closing force.

### 5.3.3 Extended closing force/torque (CLTQ)

---

If the potentiometer CLTQ is set to 0°, the door will close with normal spring power. If the potentiometer is turned clockwise, the motor will increase the closing force/torque.

### 5.3.4 Power assist (POAS)

---

If the potentiometer POAS is set to 0°, the door gives no power assist. If the potentiometer is turned clockwise, the motor will give/increase power assist when the door is opened manually.

### 5.3.5 Push and go (PAG)

---

DIP-switch to select “Push and Go” On or Off. “Push and Go” is available from any door position.

### 5.3.6 Overhead presence detector (OPD), frame mounted

---

When an OPD sensor is mounted on the frame or operator header just above the swing side of the door, it will—when activated—either keep the door open or closed. The sensor is not active during opening and closing. Lock-out signal must be connected for proper function.

- a closed door will not open, if the OPD detects activity in the field
- an open door will not close, if the OPD detects activity in the field
- during opening, the door will continue to open, even if the OPD detects activity in the field
- during closing, the door will continue to close, even if the OPD detects activity in the field
- the OPD is not active in program mode OFF, manually opened door or during battery operation (Power Save Mode).

### 5.3.7 Mat

---

Mat safety means that:

- a closed door will not open, if someone steps on the mat
- an open door will not close, if someone steps on the mat
- during opening, the door will continue to open, even if someone steps on the mat
- during closing, the door will continue to close, even if someone steps on the mat
- opening impulses are prevented during closing, if someone steps on the mat
- the mat is not active in program mode OFF, manually opened door or during battery operation (Power Save Mode).

## 5.4 Functions on the extension unit EXU-SI (see also page 34)

---

### 5.4.1 Kill function

---

- If kill circuit is closed, the control will ignore all signals and close door(s) at normal speed.
- When kill is no longer active, operator will resume normal operation.
- If kill function must have manual reset, jumper must be removed and reset button connected to terminal No. 8 and Ground.
- The lock will lock when kill is active regardless of program selector setting.
- The function of the lock can be changed during Kill (see page 42).

### 5.4.2 Function of locks

---

- The control has an available output of DC for external locks
- DIP-switches to select 12 or 24 V DC, locked with or without power
- DIP-switch for lock release and potentiometer for opening delay
- DIP-switch for lock kick if door is not fully closed, to overcome binding in the locking device during closing
- Input to unlock signal from lock. Potentiometer for opening delay is to be set to max. As soon as unlock signal is received the door will start to open. The output signal shall be active low.

### 5.4.3 Program selector

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- Input for OPEN, EXIT and OFF (if no program selector, AUTO is default).

### 5.4.4 Impulses

---

- Input for Outer impulse, Key impulse and Open/Close impulse.

---

### 5.4.5 Open / close impulse

---

The impulse will open the door and the door will stay open until a new impulse is given. If no impulse is given the door will close after 15 minutes. This can be made infinite by changing group of parameters (see page 42).

Open/close impulse works only in program selection “On”.

## 5.5 Functions on the extension unit EXU-SA (see also page 35) – optional

---

### 5.5.1 Presence impulse approach, door mounted

---

The presence impulse is active during fully open and closing. The sensor is mounted to the approach side of the door. Once the door is closed, the sensor is ignored and will not be active until the next impulse is received.

Note: When installed as a pair of doors, the presence impulse signal will re-open both doors. The sensor is not active in program mode OFF, manually opened door or during battery operation (Power Failure Mode).

### 5.5.2 Presence detection swingpath, door mounted

---

When a sensor that is mounted on the swing side of a door detects an object, it will send a command to the control unit to stall the door. If the control unit has received a short signal from the sensor and there is still hold open time left on the control unit, the door will continue on its way open if the object has cleared. The inhibit/blanking potentiometer can be adjusted so that the sensor will avoid detecting a wall or object near the full open position. Presence detection has a higher priority than presence impulse.

Note: When installed as a pair of doors the presence detection signal will stop both doors, except for double egress doors. The behavior for double egress doors can be changed (see page 42). The sensor is not active in program mode OFF, manually opened door or during battery operation.

### 5.5.3 Monitored safety sensors

---

Both presence impulse and presence detection can be monitored. If a sensor becomes defective, the operator will not accept any impulses and will then work as a manual door closer.

### 5.5.4 Open door indication

---

A relay output is used to indicate an opening cycle or a specific position of the door. The indication position is set by adjusting the inhibit/blanking potentiometer.

### 5.5.5 Error indication

---

A potential free contact COM/NO/NC for external error indication (see page 48).

Two main models of the low energy swing door operator SW100 are available:

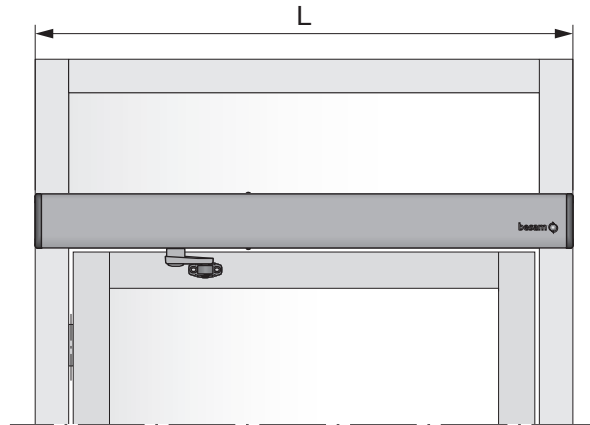
- Single operator
- Double operator

The operators are non-handed and not dependent on the hinges. The operators suit both pushing and pulling arm systems.

## 6.1 Single operator

The product is delivered complete with back plate, control unit, end plates and cover. Length including end plates,  $L = 39.5''$  (1003 mm).

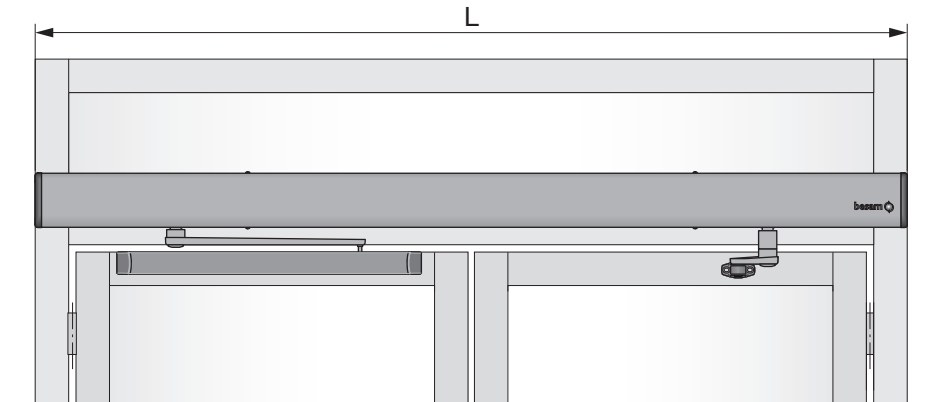
Pushing arm system shown.

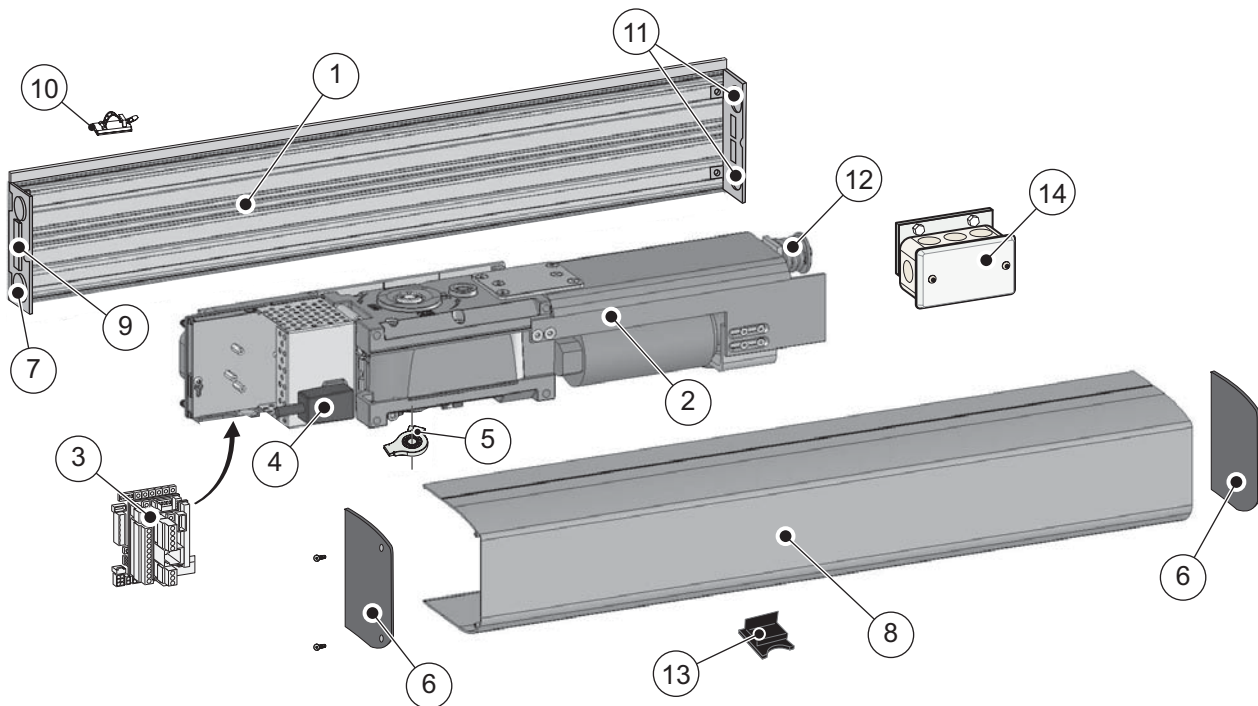


## 6.2 Double operator (Consult Product Order form for availability)

The product is delivered complete with back plate, control unit, end plates and cover. Cover length  $L$  is optional.

Two operators can be mounted under the same cover to open one door each. Pushing and pulling arm system shown (double egress).



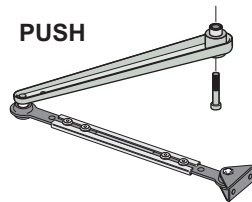


Item No.	P/N	Description
1	1003547	Back plate (shorty)
2	1003498	Transmission unit/operator
3	1003532	Control unit CU-ESD
	1003554	EXU-SI (Kit to extend the security functions) – optional
	1003557	EXU-SA (Kit to extend the safety functions) – optional
4	1700607	Mains contact
5	1003540	Door stop body
6	1003542	Top end plate
7	1003543	Bottom end plate
8	1003546	Main cover (shorty)
9	1003581	Power On/Off switch
	1003582	On/Off/Hold open switch – optional
10	1003578	Cable holder (50 pcs)
11	–	Knockouts for cable inlet
12	–	Belt tension device
13	1003545	Fill cover (output shaft)
14	1004437	Connection box
–	1003583	Sync cable – optional

## 8.1 Arm systems

### 8.1.1 Arm system, PUSH P/N: 1003576

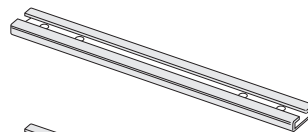
This arm system is delivered with drive arm, telescopic part and door fitting. It is used if the operator is installed on the wall on the opposite side of the door swing, and approved for fire door application.



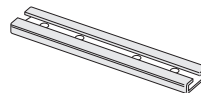
### 8.1.2 PUSH-arm extensions

Reveal = X	Extension
Up to 4-1/8" (0-105 mm)	None (standard arm)
4-1/8" to 8-11/16" (105-220 mm)	13-9/16" (345 mm)
8-11/16" to 11-13/16" (220-300 mm)	9-1/16" (230 mm) + Joint part

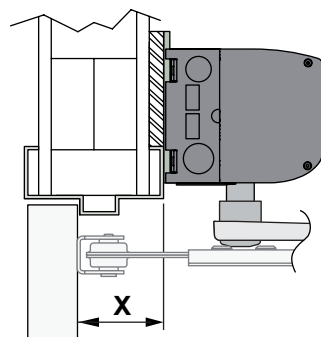
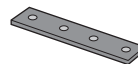
13-9/16" (345 mm) extension  
P/N: 21-06-17305



9-1/16" (230 mm) extension  
P/N: 21-06-17304

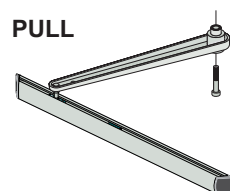


Joint part  
P/N: 21-06-17319

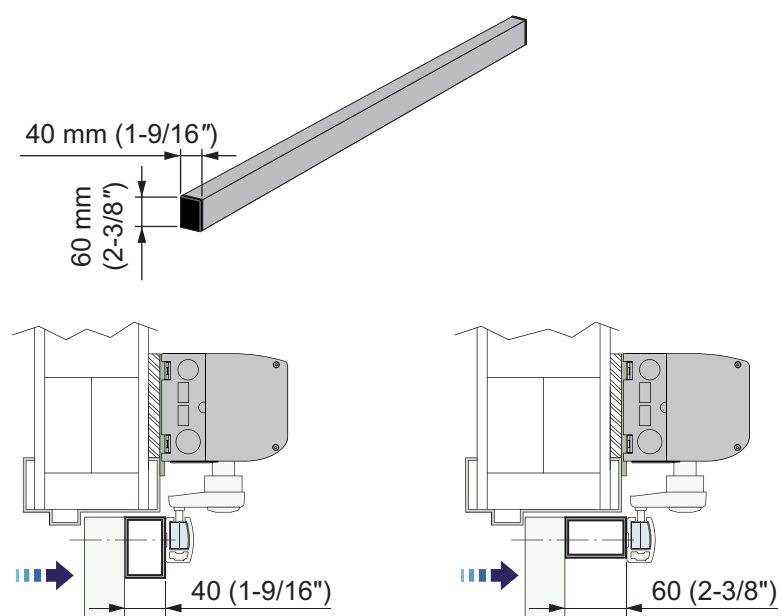


### 8.1.3 Arm system, PULL P/N: 1003577

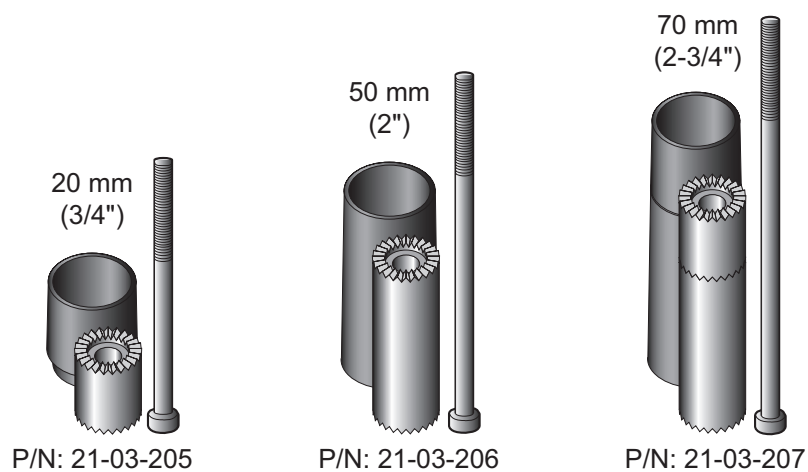
This arm system is delivered with drive arm, guide shoe and door fitting.



### 8.1.4 Reveal spacer, PULL P/N: 173804BK



### 8.1.5 Drive shaft extension kits



## 8.2 Push plates

---

For disable use, mount push plate 31" above floor level.

### 8.2.1 Push plates

---



P/N: 75-02-101



P/N: 75-02-102



P/N: 75-02-107



P/N: 75-02-108



P/N: 75-02-280

### 8.2.2 Remote transmitter push plates

---



P/N: 75-02-273



P/N: 75-02-272



P/N: 75-02-269



P/N: 75-02-270

### 8.2.3 Installation box for narrow plates

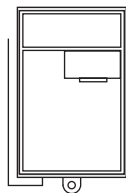
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P/N: 75-21-002

### 8.2.4 Remote receiver

---

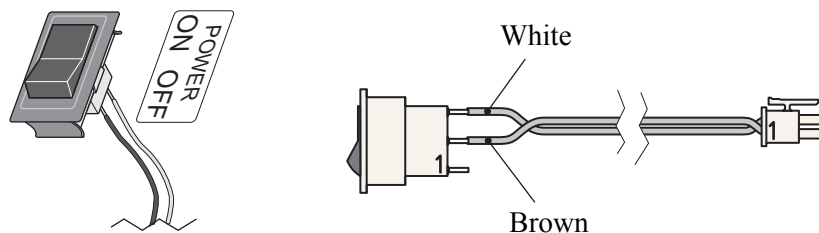


P/N: 75-02-271



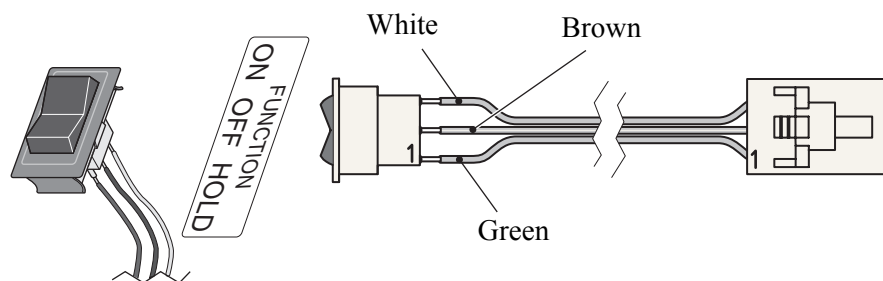
## 8.3 Control switches

### 8.3.1 Power On/Off switch (enclosed with the operator)



P/N: 1003581

### 8.3.2 On/Off/Hold open switch



P/N: 1003582

Function	Program
ON	Impulses from activation units connected to XIMP are forwarded into inner impulse (see page 32).
OFF	Impulses from activation units connected to XIMP are <b>not</b> forwarded into inner impulse. These units cannot open the door.
HOLD	The door is held permanently open.

## 8.4 Sync cable for double doors (synchronizing of 2 operators)

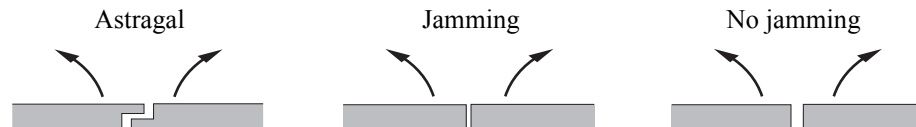


Note:  
The connection/markings of the sync cable determines which of the operators is the master and slave.

P/N: 1003583

### How to cut the jumper for double doors

Function		Door design		Cut the jumper with color	
Opening	Closing	Astragal	Jamming	Master side	Slave side
Synchronous	Synchronous	No	No	No cutting	No cutting
Synchronous	Asynchronous	Yes	No	Cut black	No cutting
Asynchronous	Asynchronous	Yes	Yes	No cutting	Cut red
Double egress		—	—	Cut black	Cut red



### Settings for double doors

Function	Settings on the	
	Master	Slave
<b>Common</b>		
Program selection	X	
Opening time	X	
Closing time	X	
Hold open time	X	
Close / Continue to open when the door is obstructed	X	
PAG On/Off	X	
Level of Power assist	X	(X)*
Extended closing force	X	(X)*
OPD Impulse or Mat Logic Impulse	X	
Selection of operating mode during operation on battery power	X	
<b>Individual</b>		
Lock/Unlock signal voltage	X	X
Locked without/with power	X	X
Lock release Enable/Disable	X	X
Open Delay Time	X	X
Lock kick Enable/Disable	X	X

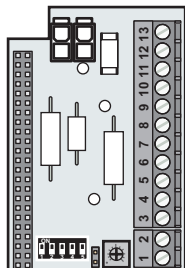
\* For “Double egress doors”, these functions must be set separately for Master and Slave as the arm systems as well as the air pressure may be different.

- Note:**
- Locks on the “Master” and “Slave” doors must be connected to the control unit (CU) on the corresponding operator.
  - Inner and outer impulses can be connected to either “Master” or “Slave” CU or both.
  - The OPD is to be connected to the “Master” CU except for “Double egress”, where each OPD must be connected to corresponding CU.
  - Door leaf mounted sensors must always be connected to corresponding CU.

## 8.5 Extension units (installation see page 33)

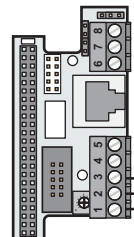
EXU-SI (kit for security functions)

P/N: 1003554



EXU-SA (kit for safety functions)

P/N: 1003557



## 8.6 Labels



P/N: 75-20-100

Dual Side “Automatic Door / Do Not Enter” – (Out)



P/N: 75-20-101

Dual Side “Automatic Door / Do Not Enter” – (In)



P/N: 75-20-102

Dual Side “Caution Automatic Door”



P/N: 1001695

Dual Side “Supervision of child”

## 9

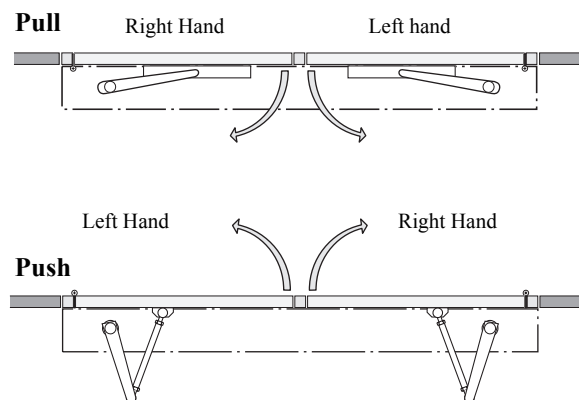
## Pre-installation

## 9.1 General tips/Safety concerns

- For enhanced security and vandalism protection, always mount the operator in the interior of a building whenever possible.
- Make sure that the power is off before installing.
- Make sure that the door leaf and the wall are properly reinforced at the installation points.
- Inspect the door hinges before installation to ensure that they are in good repair.
- Unpack the operator and make sure that all parts are delivered in accordance with the packing note.

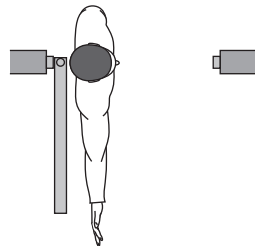
## 9.2 Door/Operator handing

## 9.2.1 Operator handing

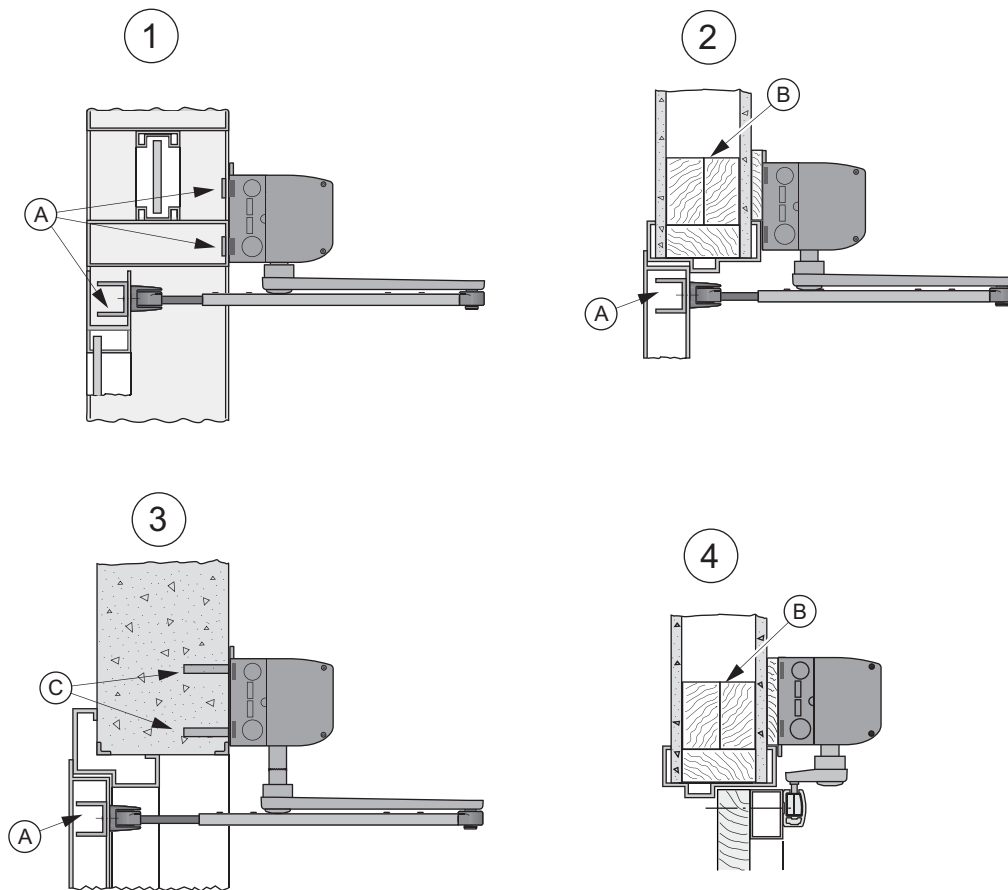


## 9.2.2 Door handing (Automatic Door Industry)

Door handing is determined by standing with your back to the hinges. The side to which the door normally opens (right or left) is the handing of the door. The diagram below shows a right-handed door.



## 9.3 Installation examples



1. Aluminum profile system
2. Plasterboard wall
3. Reinforced concrete wall and brick wall
4. Plasterboard wall

- A Steel reinforcement or rivnut  
 B Wood reinforcement  
 C Expansion-shell bolt (for brick wall min. M6x85, UPAT PSEA B10/25)

## 9.4 Fastening requirements

---

Base material	Minimum requirements of wall profile*
Steel	3/16" (5 mm)**
Aluminum	1/4" (6 mm)**
Reinforced concrete	min. 2" (50 mm) from the underside
Wood	2" (50 mm)
Brick wall	Expansion-shell bolt, min. M6x85, UPAT PSEA B10/25, min. 2" (50 mm) from the underside

\* Besam minimum recommended requirements. Building Codes may give different specifications. Refer to AHJ (Authority Having Jurisdiction).

\*\* Thinner wall profiles must be reinforced with rivnuts.

## 9.5 Tools required

---

- Torx T10
- Metric Allen wrenches 2.5, 3, 4, and 6 mm
- Flatblade screwdriver (potentiometer and terminal size)
- Screwdriver (Philips size 2)
- Nut driver, 5 mm
- Carpenter's level
- Tape rule
- Power drill and set of drill bits
- Center punch
- Wire stripper
- Silicone sealant
- Installation and Service Manual 1003680-US (this manual)

## 9.6 Installation on double doors

---

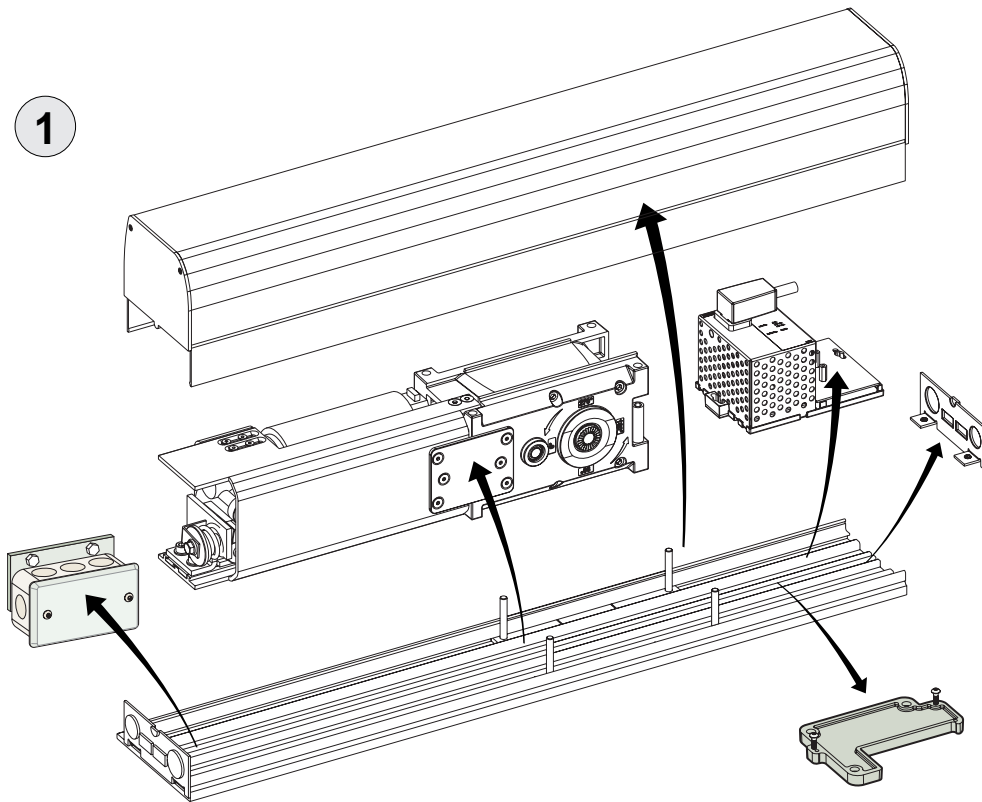
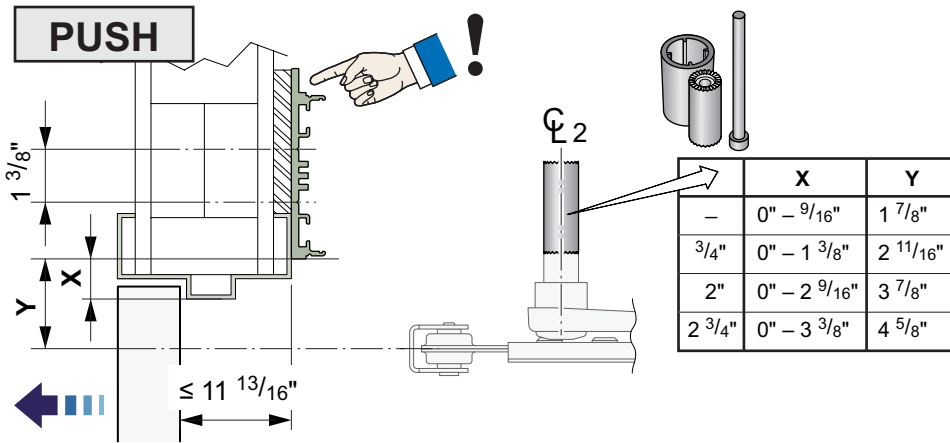
If the operators are to be mounted at the same height with pushing and pulling arm systems, the height is determined by the pulling arm system, PULL. The pushing arm system PUSH must always have a shaft extension, minimum 2" (50 mm), maximum 2 3/4" (70 mm) to match the mounting heights visually.

Example: if PULL/ST has a 3/4" (20 mm) extension, the PUSH must have a 2 3/4" (70 mm) extension. If PULL has 0 mm extension, the PUSH must have a 2" (50 mm) extension. See "Double operator (Consult Product Order form for availability)" on page 12.

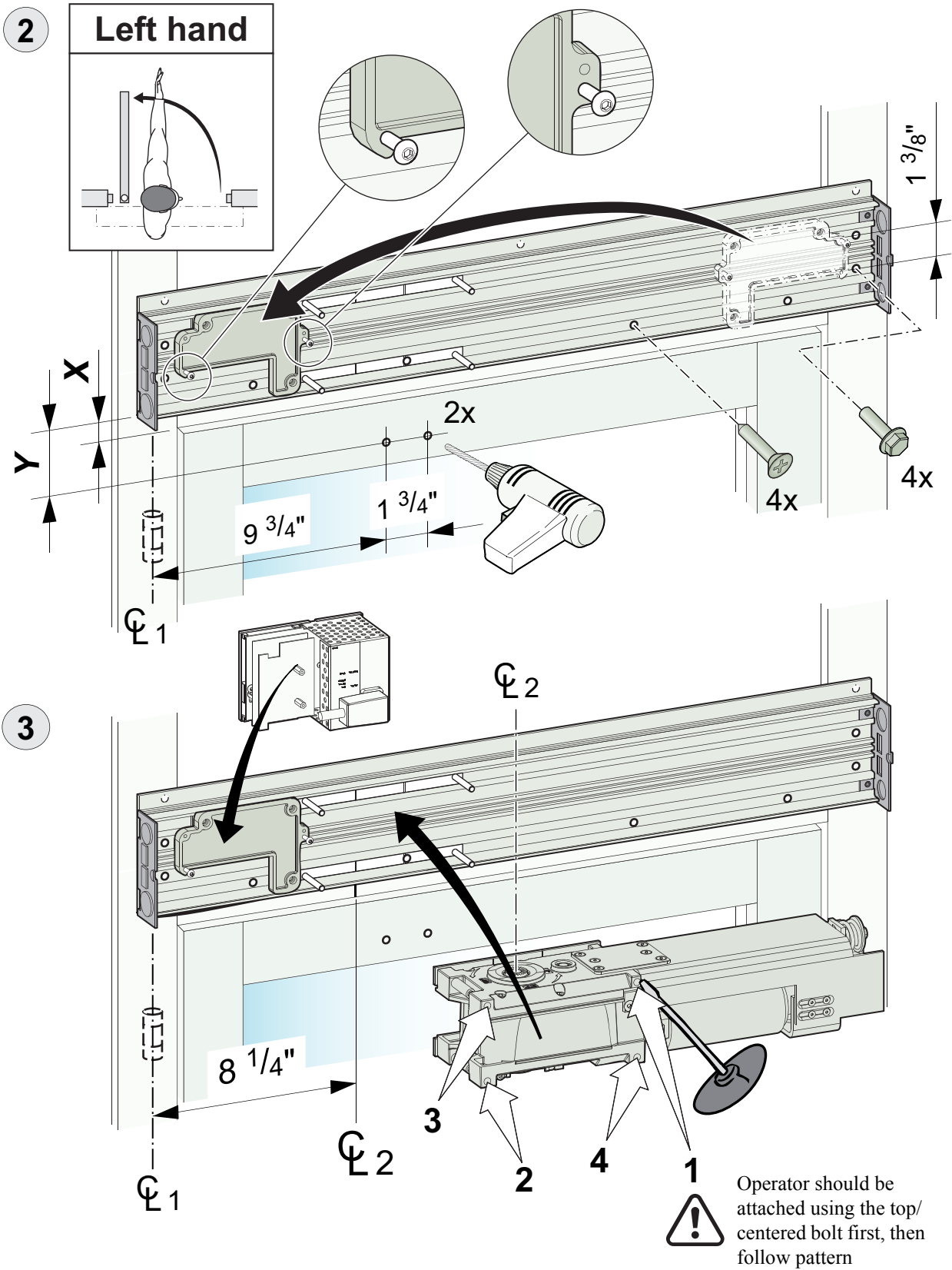
For installation, follow the instructions for the applicable arm system.

Note: Consider all power wire entry locations and signaling wires before preparing back plate.

10.1 Operator with PUSH arm system



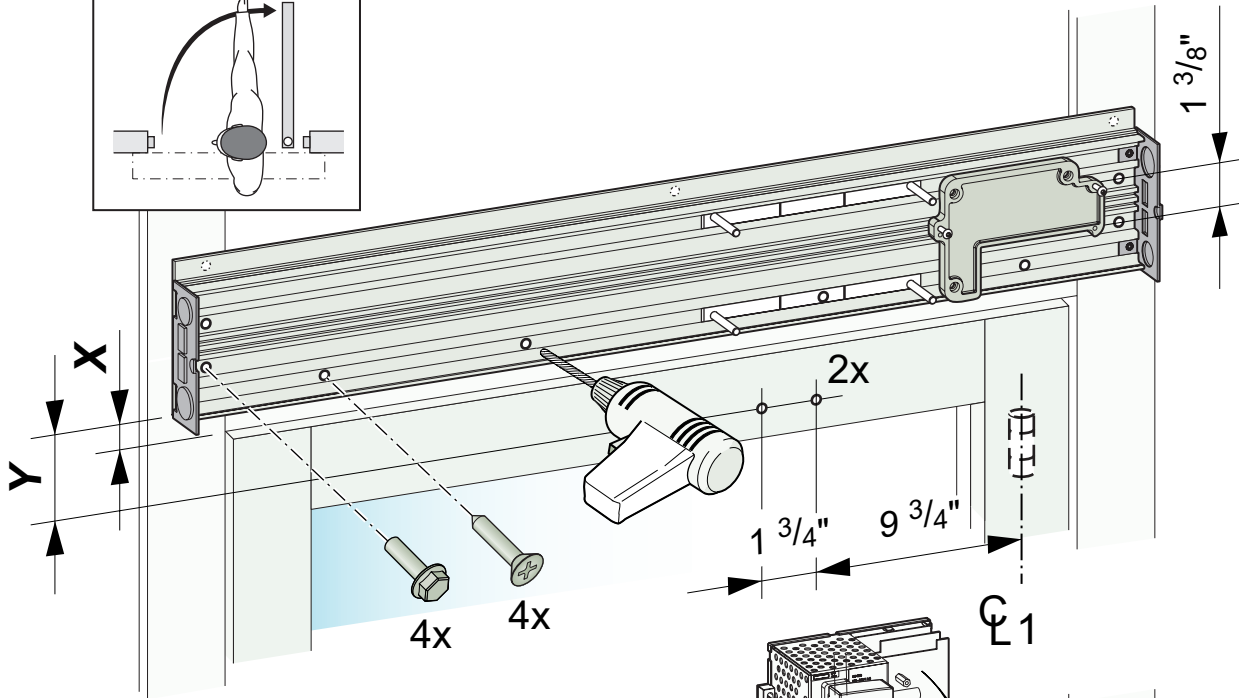
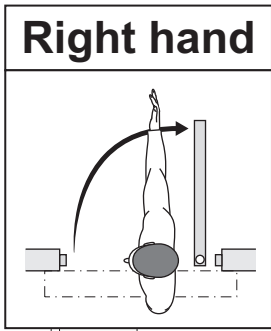
Cont. "Operator with PUSH arm system"



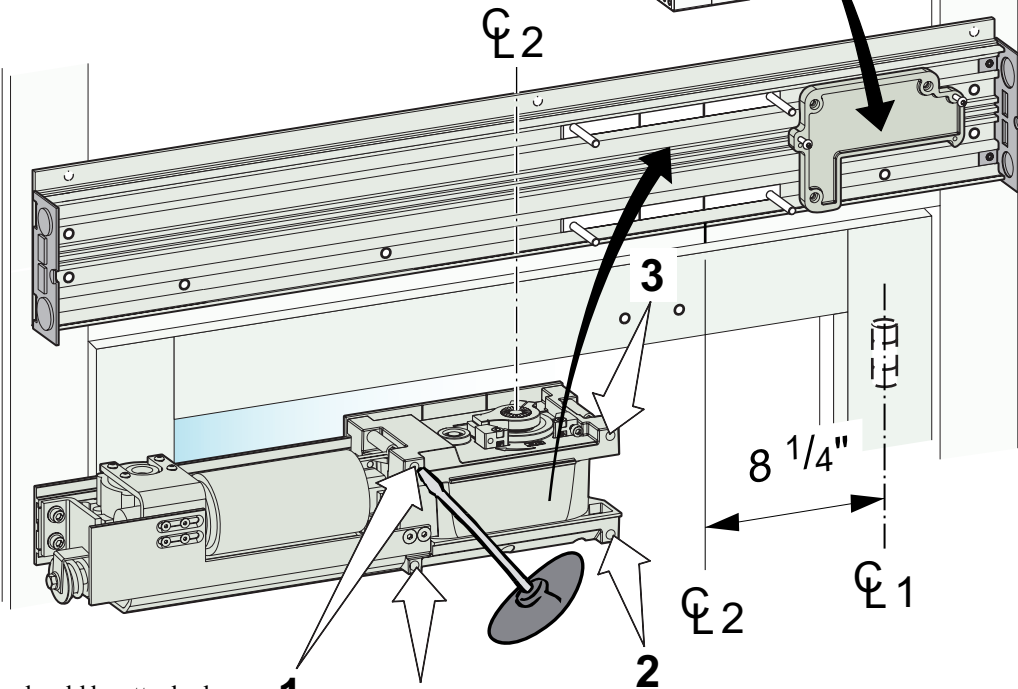


Cont. "Operator with PUSH arm system"

2



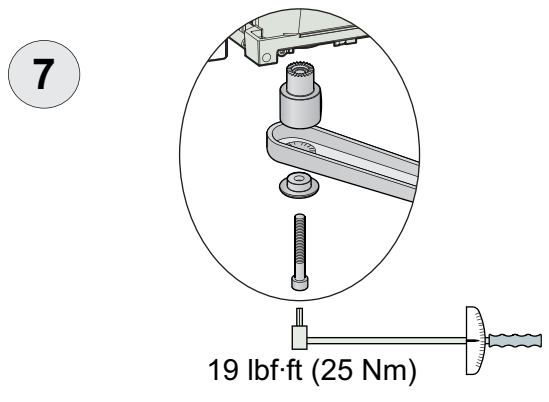
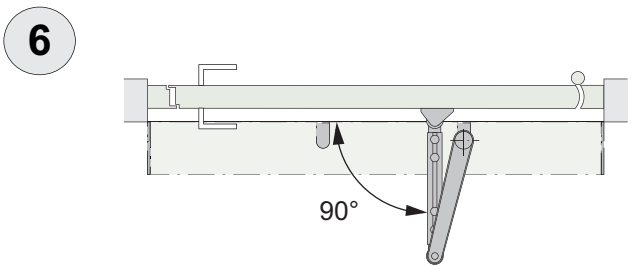
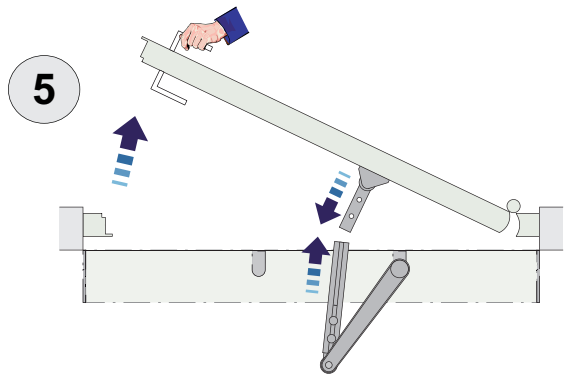
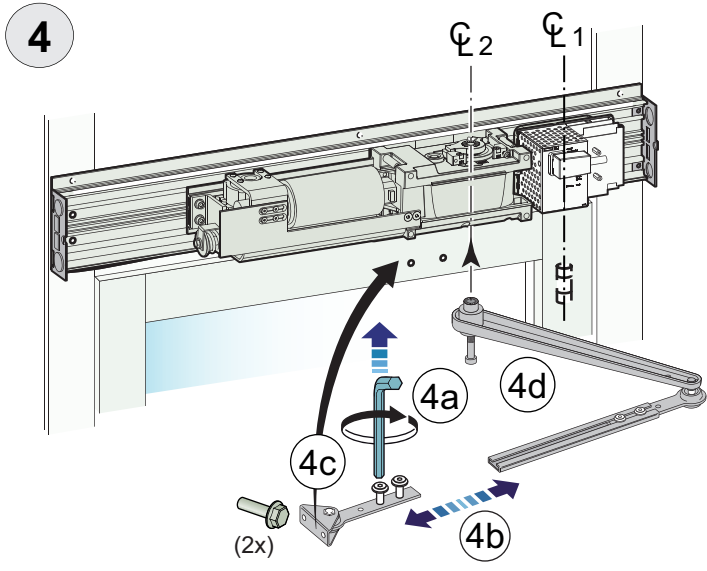
3



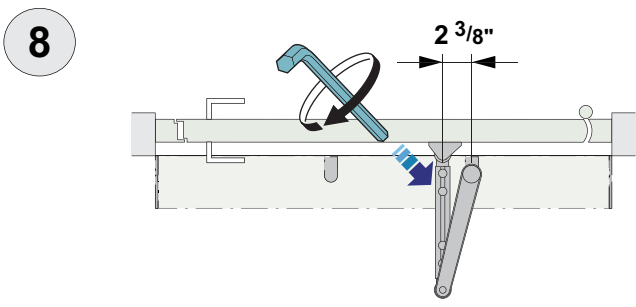
Operator should be attached using the top/centered bolt first, then follow pattern



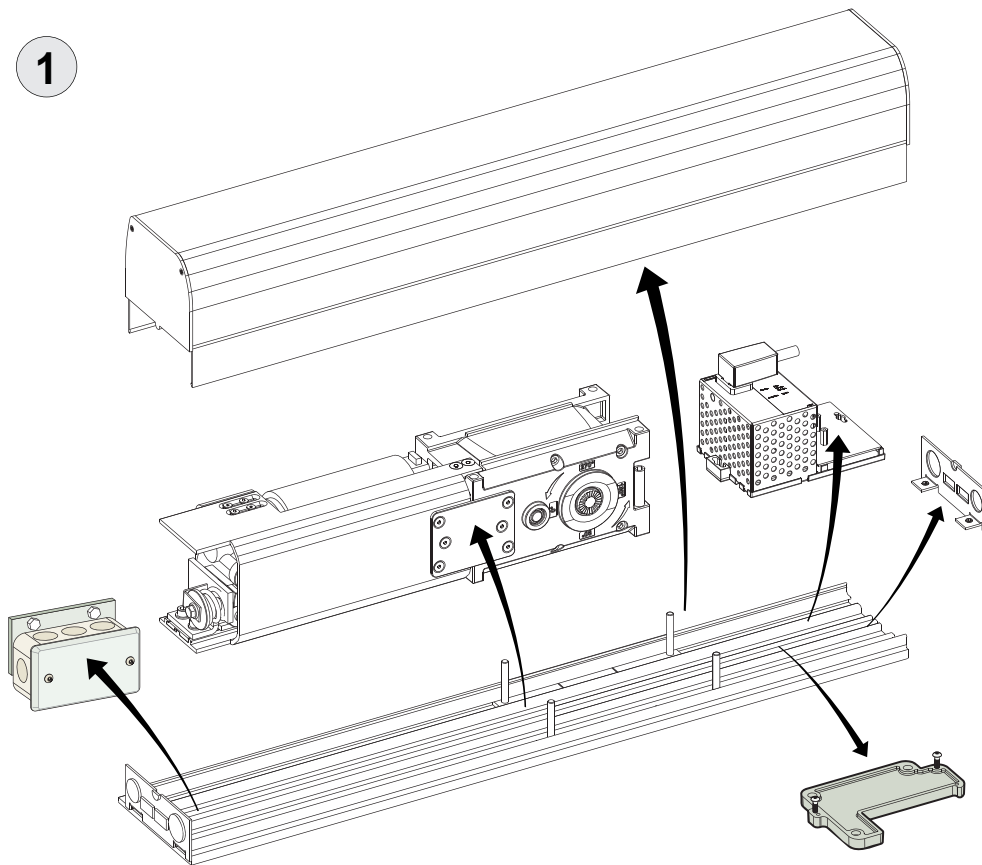
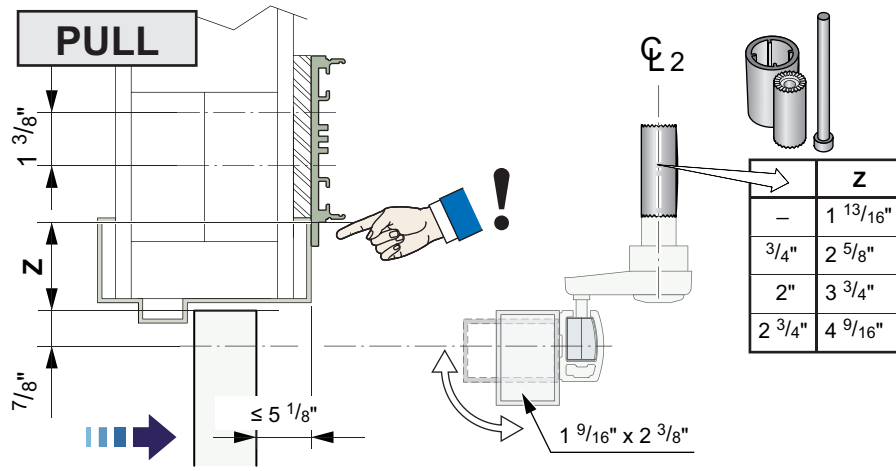
Cont. "Operator with PUSH arm system"



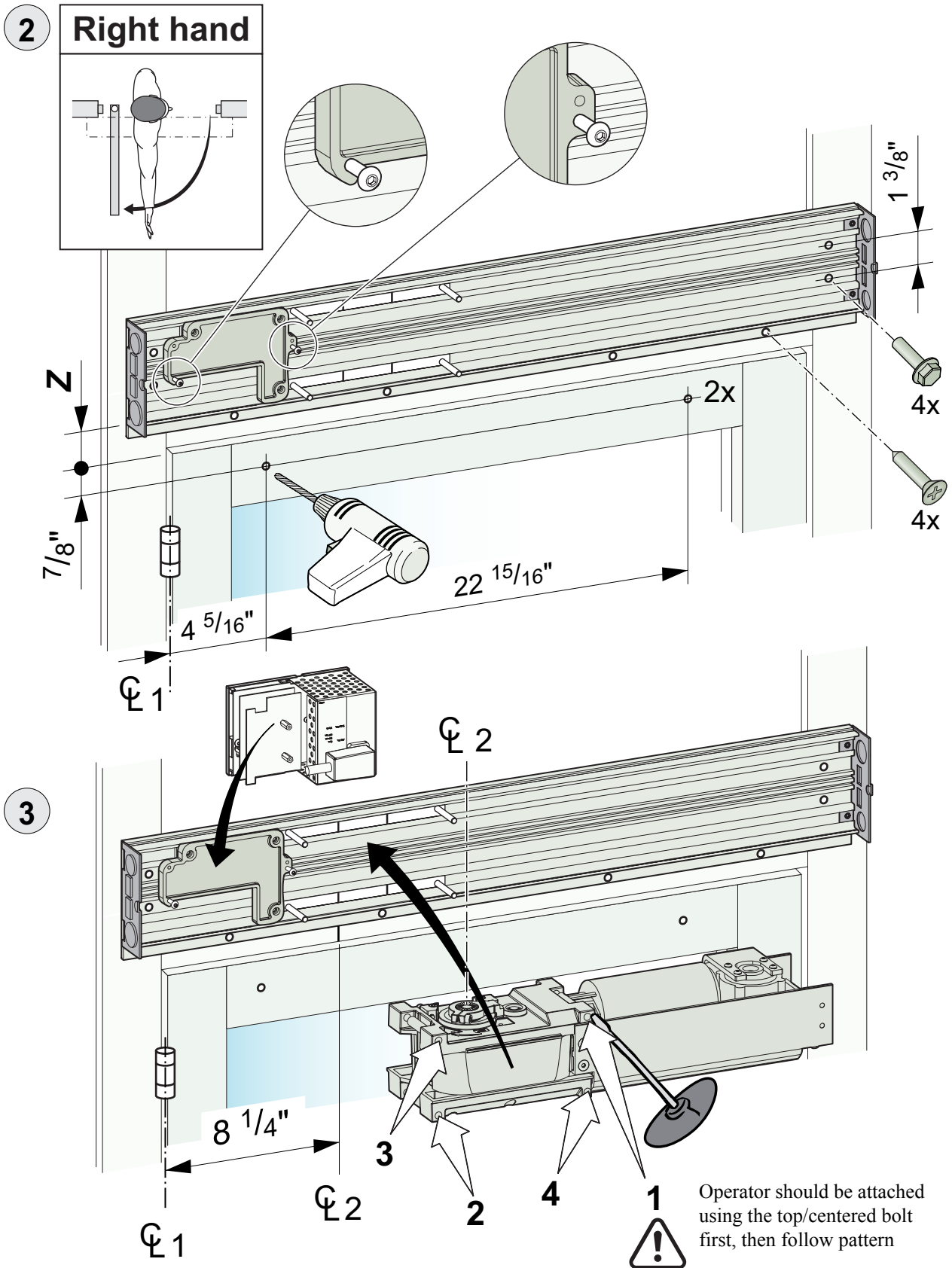
**Note:** Important measurement for correct opening and closing force



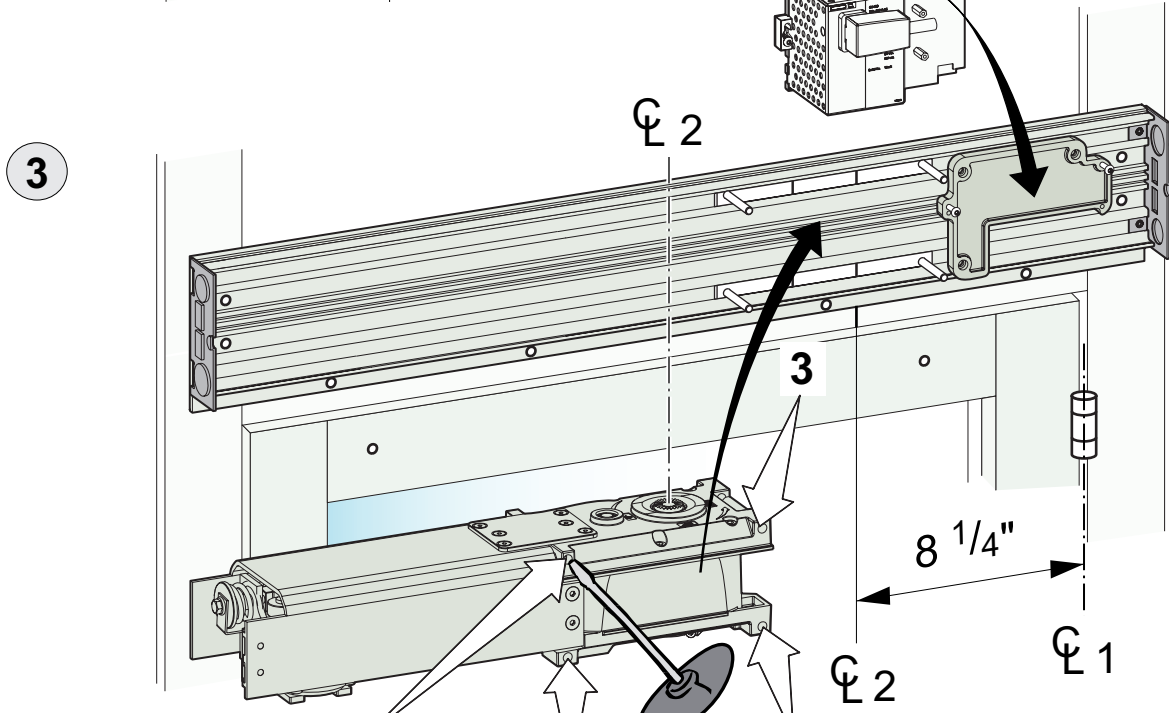
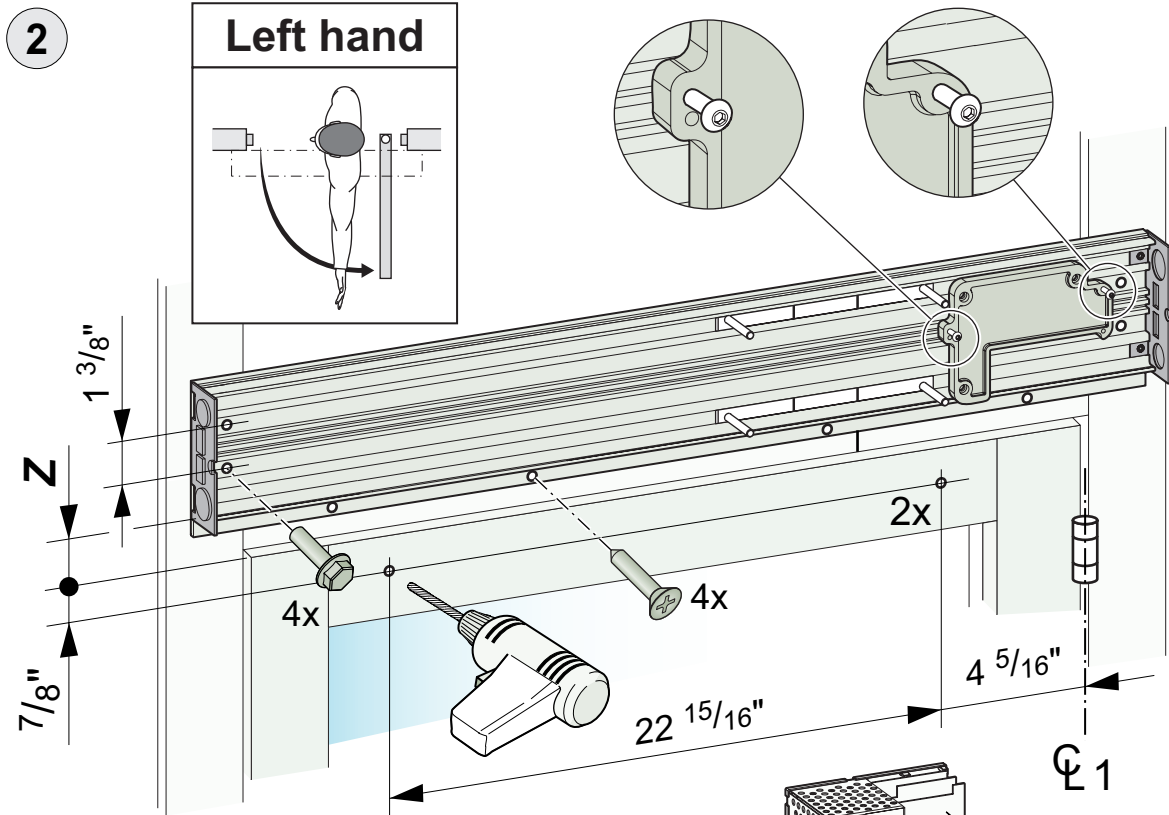
## 10.2 Operator with PULL arm system



Cont. "Operator with PULL arm system"



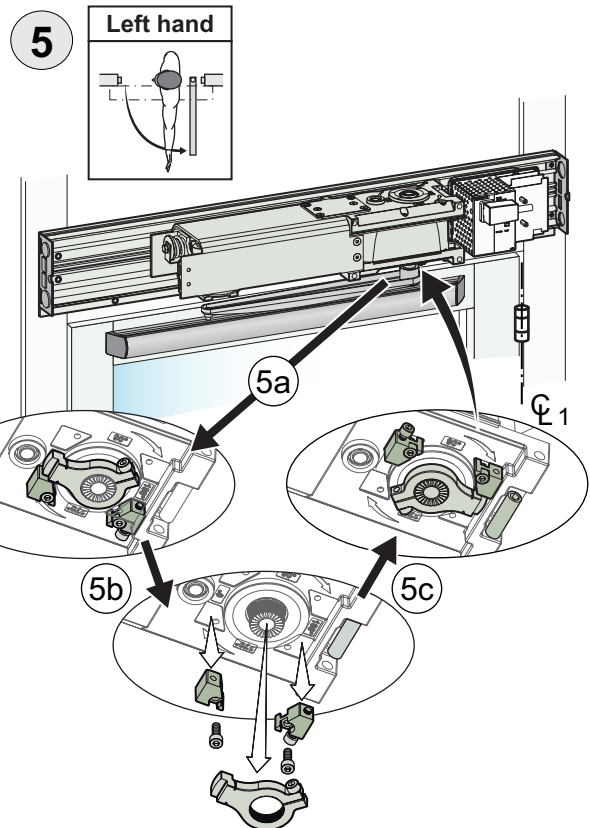
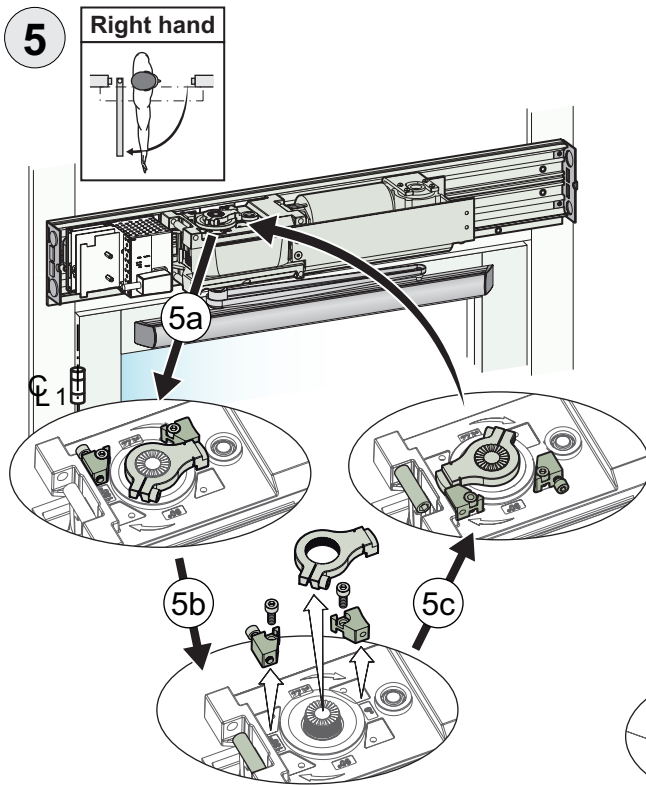
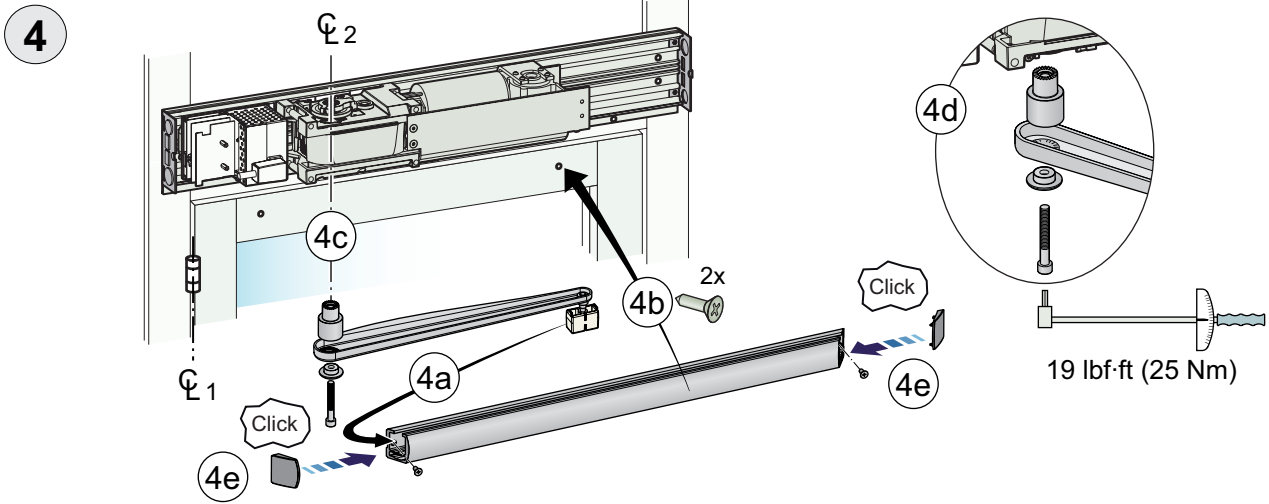
Cont. "Operator with PULL arm system"



Operator should be attached using the top/centered bolt first, then follow pattern.



Cont. "Operator with PULL arm system"



## 11

## Electrical connection

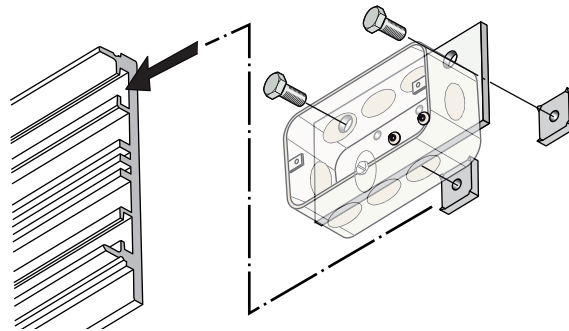
- During any work with the electrical connections the mains power must be disconnected.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

## 11.1 Connection box

## Fitting

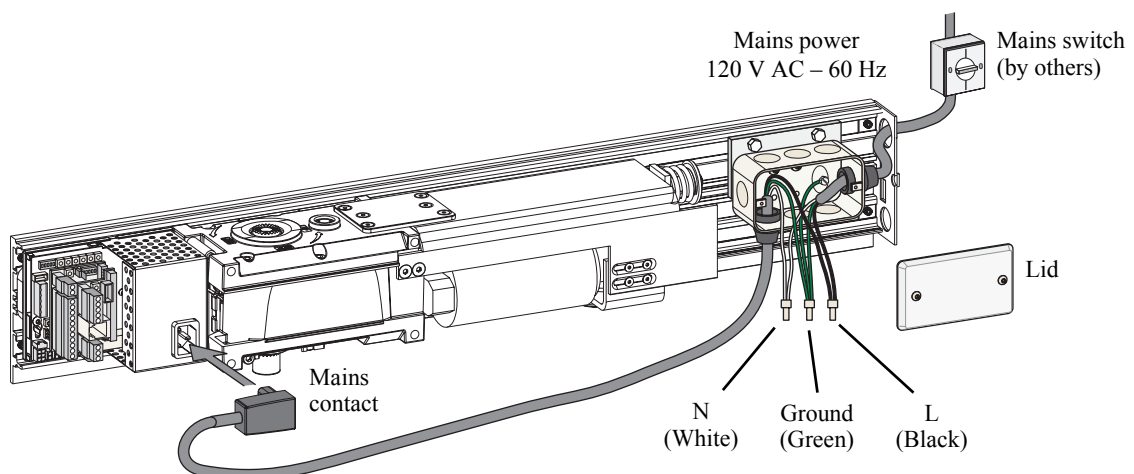
Fit the connection box in the back plate as shown below.

**Note:** To ensure for sufficient grounding, the square nuts must be turned with the teeth upwards against the box so that they cut through the anodizing in the back plate.



## Connection

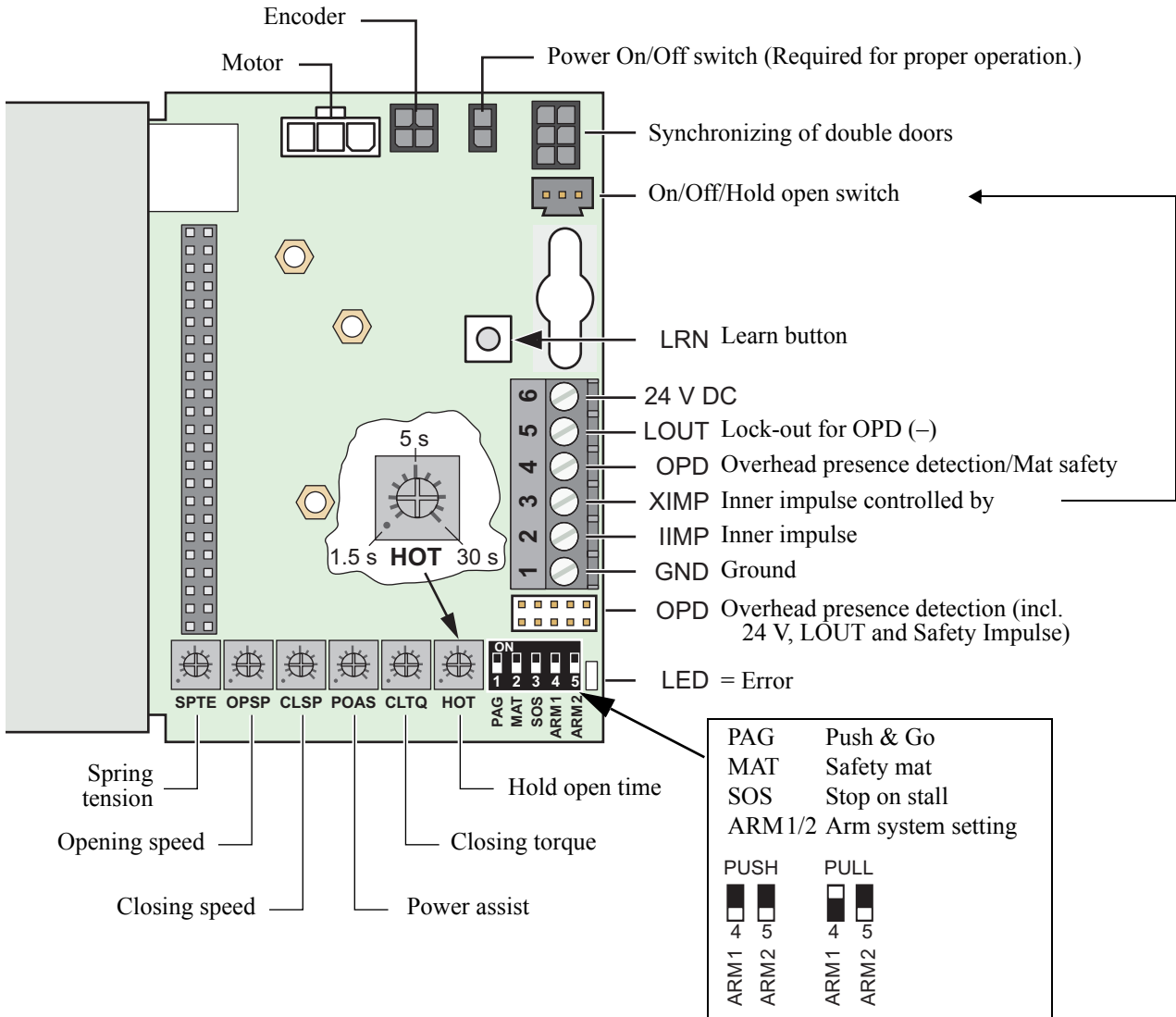
1. Switch off the mains power.
2. Unscrew the lid.
3. Connect the mains cable to the internal cable inside the connection box as shown below. Be aware, local code shall be followed.
4. Re-install the lid.
5. Connect the mains contact to the operator.



## 11.2 Control units

### 11.2.1 CU-ESD

The CU-ESD can be equipped with extension units, EXU-SI and/or EXU-SA, depending on the functions required (see page 10).

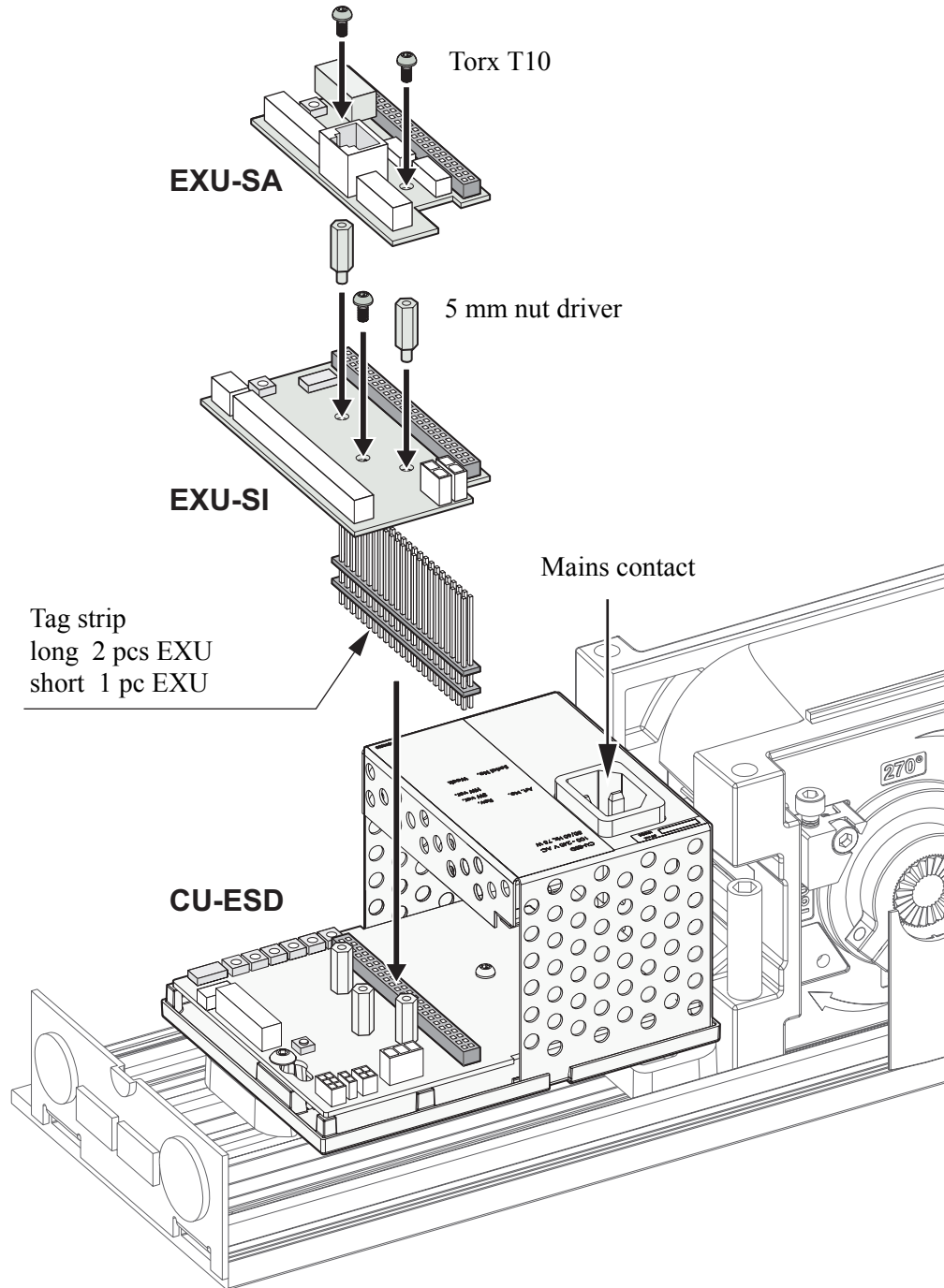




## 11.2.2 Extension units EXU-SI / EXU-SA

### Installation

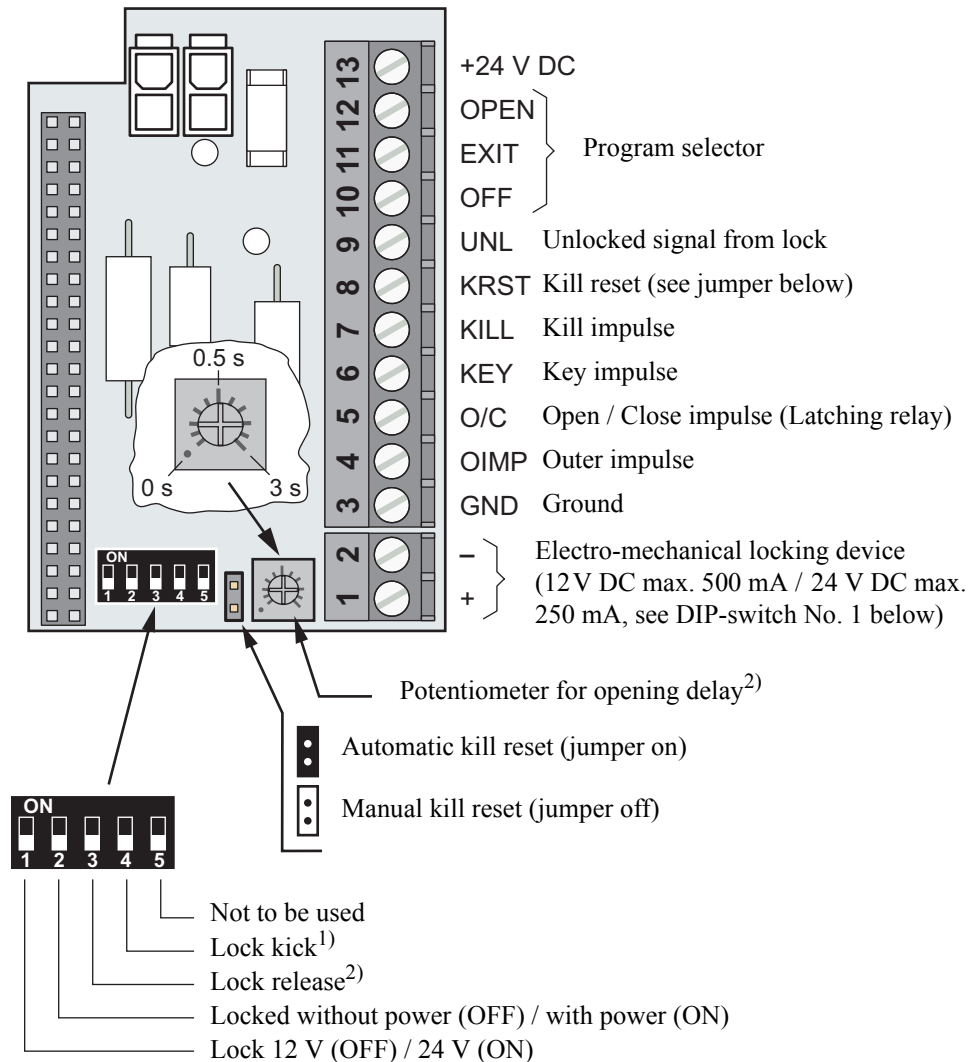
To extend the functions, the extension units can be mounted on top of the control unit CU-ESD, separately or combined.



### 11.2.3 Extension unit EXU-SI

#### Functions

This extension unit has inputs for electro-mechanical lock, program selector, kill function, open/close, key opening and outer impulse.



<sup>1)</sup> Independent of switch position (ON /OFF), the “latch check” complies with the ANSI 156.19 requirements.

Position OFF: Smooth closing, to be used on doors without lock.

Position ON: More powerful closing, to be used on doors with lock, to overcome binding in the locking device.

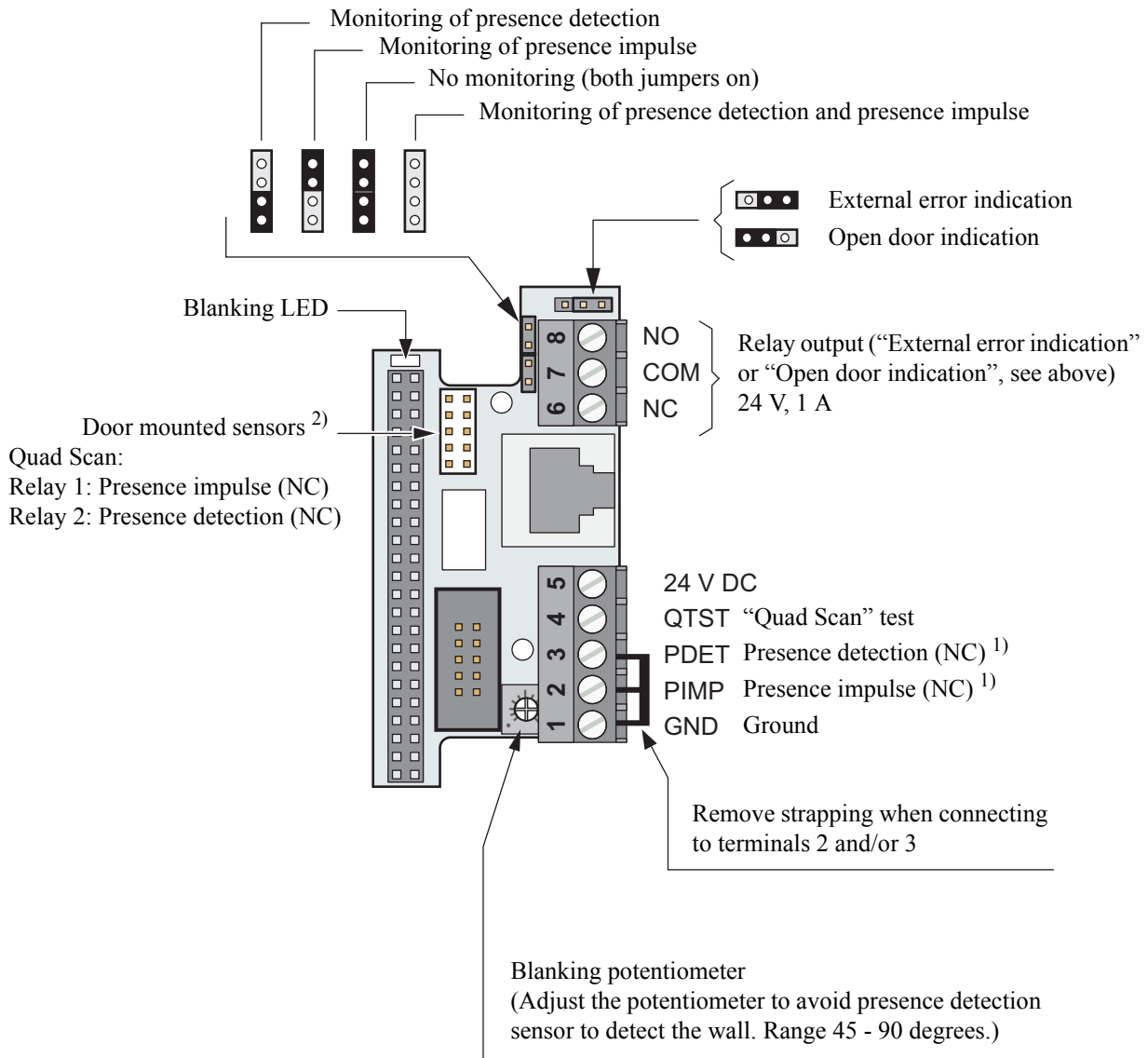
<sup>2)</sup> If the switch is set to ON, the “lock release” is active during the opening delay time set by the potentiometer.

For “pair of doors” installations, the “lock release” works in sequence: First the master then the slave.

### 11.2.4 Extension unit EXU-SA

This extension unit has inputs for door mounted sensors, which can give presence impulse on approach side and/or presence detection on swing path side. Relay output for error indication or door indication is also integrated.

#### Functions



<sup>1)</sup> If not used strap to “Ground”.

<sup>2)</sup> Remove strapping from terminals 2 and/or 3.

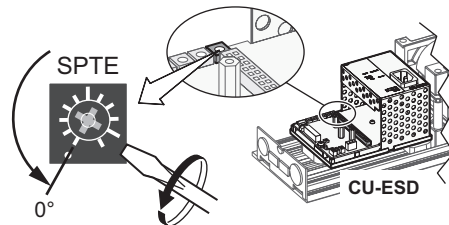
The spring pre-tension is **factory set to 210°** and is normally not necessary to adjust. If adjustment has to be carried out (see page 40).

## 12.1 Adjusting the door stop

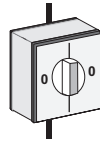
1. Close the door.



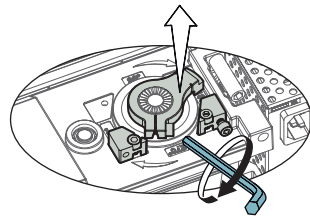
2. Turn the potentiometer SPTE to 0° (if not already on 0°).



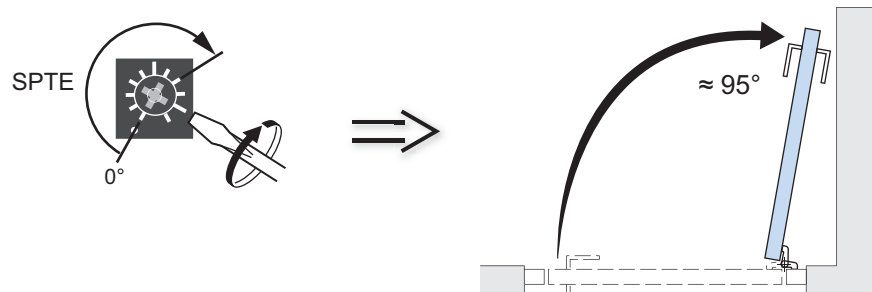
3. Switch on the mains power (the operator will find its closed position).



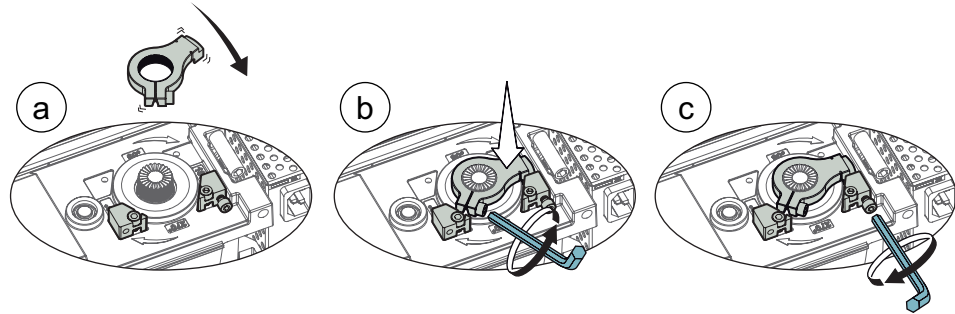
4. Loosen the door stop arm.



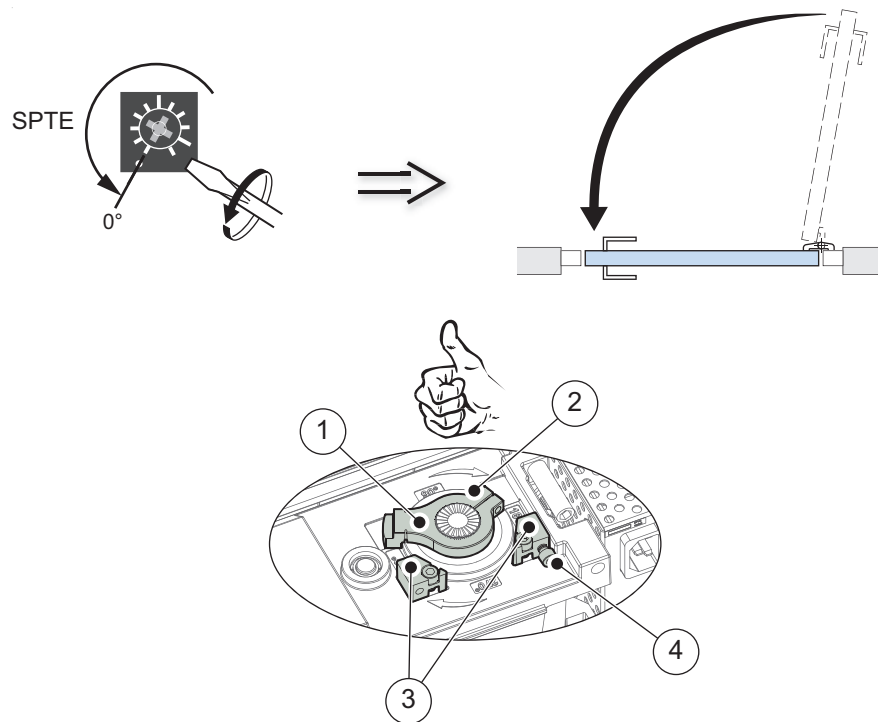
5. Open the door to required open position, plus approx. 5/8" (15 mm), by turning the potentiometer SPTE on the CU-ESD, clockwise.



6. Mount the door stop arm on the splines a), as close as possible to the stop block b). Fine-adjust with the screw on the stop block c).



7. Close the door by turning the potentiometer SPTE to  $0^\circ$  and let the door close.  
**Note:** Impulses are not accepted if SPTE is more than  $0^\circ$ .

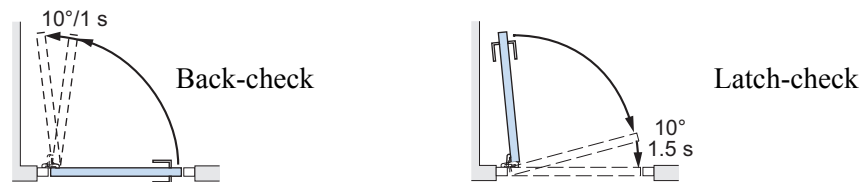


1. Door stop arm
2. Fixing screw
3. Stop block
4. Fine-adjustment screw

## 12.2 Auto-learn – automatically sets back and latch check (recommended)

This learning is performed by pushing the Learn button (LRN).

- Note:
- Before the learning procedure starts, make sure that the door has been properly closed i.e., not by force.
  - If any of the parameters “Spring pre-tension”, “Closing torque” (CLTQ) and “Lock release” (DIP-switch No. 3 on EXU-SI) are changed after performing a learn, a new learn must be carried out.
  - Learn can be carried out with activation units and locks connected.
  - The back-check will be automatically adjusted to 10° and 1 second before open position. The latch-check will be automatically adjusted to 10° and 1.5 seconds before closed position.



### 12.2.1 One push / two pushes on the Learn button (LRN)

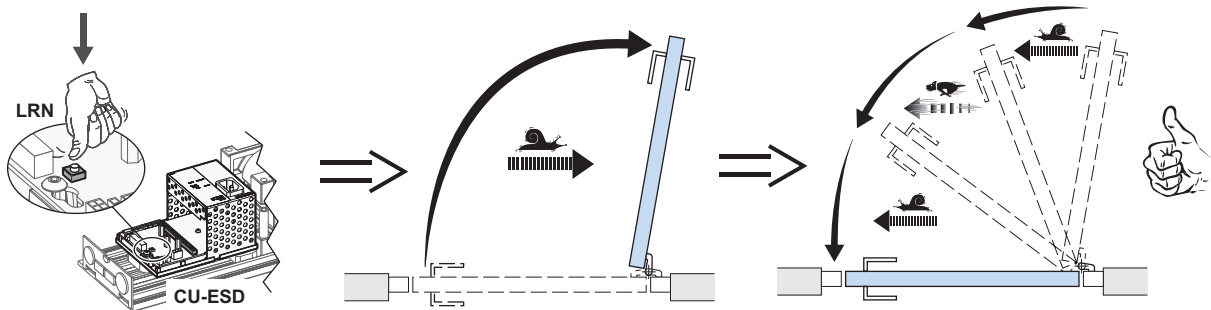
**Note:** Remain clear of swing path of door, as door may close rapidly. The door has no safety during auto-learn cycle.

#### One push (delayed opening)

Push the button once. The door will open after 2 seconds and adjust the back-check and latch-check automatically.

#### Two pushes (direct opening)

Push the button twice. As above, but the door starts to move directly.



### 12.2.2 Double doors

For double doors, the master door must be learned first and thereafter the slave door. When the slave door is learned, the master door will open up to fully open position during the learning phase of the slave door.

The doors can also be learned separately before connecting the sync cable. In case of astragal doors and separate learning, the master door must be held open before the slave door learn is carried out.

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## 12.3 Learn with advanced setting of “back- and latch-check”

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See the prerequisites for performing a “learn” under the heading “Auto-learn – automatically sets back and latch check (recommended)” on page 38.

1. Push the button once or twice as for auto-setting.
2. Stop the door at required back-check.
3. The door reverts towards closed position.
4. Remove the stop.
5. Stop the door at required latch-check.
6. The door reverts to learn the fully open position.
7. Remove the stop.
8. The door reverts to closed position.

---

## 12.4 Revert to default values for “back- and latch-check”

---

1. Disconnect batteries if any.
2. Disconnect the mains contact.
3. Press the “Learn button” and keep it depressed.
4. Connect the mains contact.
5. Watch the “Error LED”.



6. Release the “Learn button” after 3 seconds (LED is out).
7. The “Back check”, “Latch check” and “Open position” have now reverted to default values.
8. Disconnect the mains contact.
9. Next time the mains is connected, the operator will use the default values.

---

## 12.5 General adjustment

---

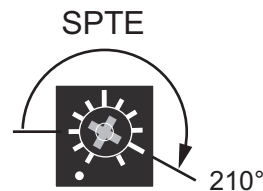
1. Set the hold open time with the potentiometer on the control unit.
2. Adjust the opening speed (OPSP) to comply with ANSI 156.19. Turning clockwise increases the speed (see “Table I” on page 45).
3. Adjust the closing speed (CLSP) to comply with ANSI 156.19. Turning counter-clockwise decreases the speed (see “Table I” on page 45).
4. Connect the required activation units.
5. Check that the installation complies with AHJ (Authority Having Jurisdiction).

## 12.6 Reducing / Increasing the “Spring pre-tension” (SPTE)

The spring pre-tension is **factory set to 210°** and is normally not necessary to adjust. If adjustment has to be carried out see below.

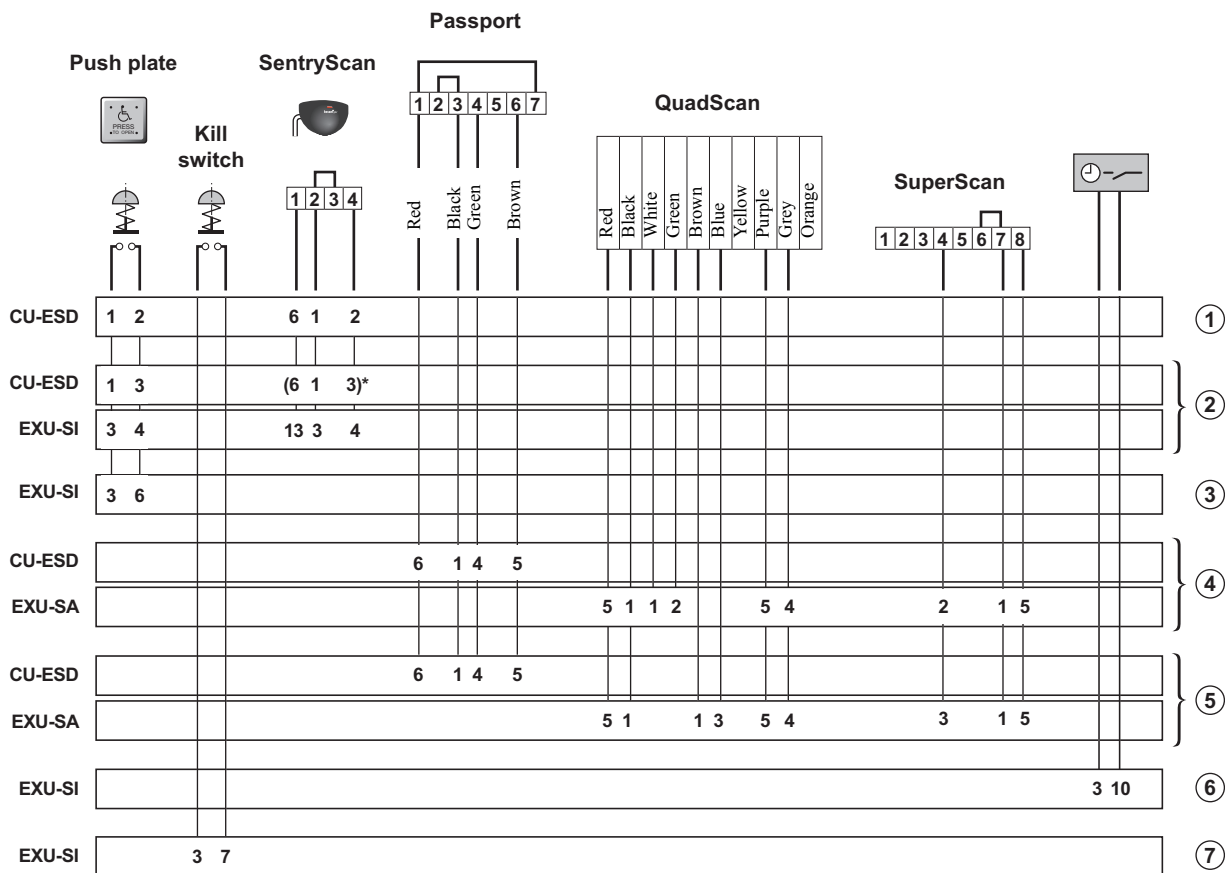
1. Loosen the door stop arm. Remove if fitted on the topside, slide down if fitted on the bottom.
2. Turn the potentiometer for spring pre-tension (SPTE) clockwise until the door opens to 45°.
3. Loosen the drive arm fixing screw.
4. Moving the door **towards open position**, reduces the tension, or:  
Moving the door **towards closed position**, increases the tension.
5. Tighten the drive arm.
6. Turn the potentiometer SPTE to 0°.
7. Open the door to required open position, plus approx. 15 mm (5/8"), by turning the potentiometer SPTE clockwise.
8. Mount the door stop arm as close as possible to the open door stop block, fine-adjust with the screw if necessary.
9. Turn the potentiometer SPTE to 0°.
10. Push the learn button.
11. Let the door do the learn cycle without touching it.

Note: Max. allowable spring pre-tension is 210°. Over-tension may damage the spring or overheat the motor.





## 12.7 Connection of activation units and accessories



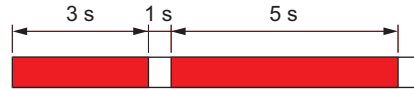
\* Standard

- ① Inner impulse
- ② Outer impulse
- ③ Key impulse
- ④ Presence impulse
- ⑤ Presence detection
- ⑥ Off
- ⑦ Kill impulse

# 13

## Changing group of parameters

1. Disconnect batteries if any.
2. Disconnect the mains contact.
3. Press the “Learn button (LRN)” and keep it depressed.
4. Connect the mains contact.
5. Watch the “Error LED”.



6. Release the “Learn Button” after the 5 seconds (LED is out).  
The “Error LED” flashes a number of short flashes that corresponds to the parameter group number (see table). After a short pause the LED will repeat the group number, and so on.
7. Pushing the “Learn button” once, increases the parameter group number. When the highest parameter group number is reached it will start with number 1 (default) again.
8. Push the button until you get the requested parameter group.
9. Disconnect the mains contact.
10. Next time the mains is connected, the operator will use the new group of parameters.

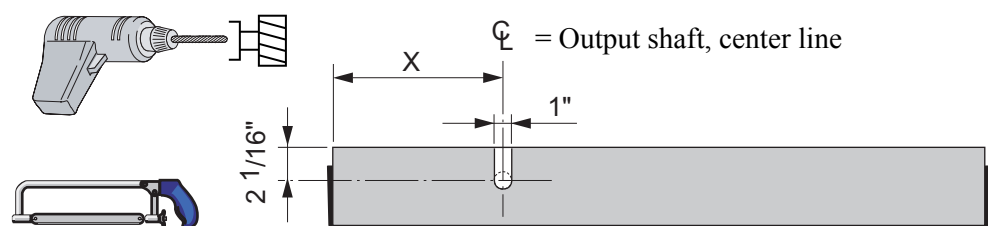
Parameter/Group	1 (default)	2	3	4	5	6	7	8
<b>Open/Close Hold Open Time</b>	15 minutes	Infinite		15 minutes	15 minutes	15 minutes	15 minutes	15 minutes
<b>Kill mode</b>	Locked during kill	Locked during kill		Lock follows program selector during kill	Locked during kill	Locked during kill	Locked during kill	Locked during kill
<b>Obstruction mode<sup>1)</sup></b>	Door closer	Door closer		Door closer	Reverses when obstructed	Door closer	Door closer	Door closer
<b>Double egress mode</b>	Separate presence detection	Separate presence detection		Separate presence detection	Separate presence detection	Common presence detection	Separate presence detection	Separate presence detection
<b>Lock retry</b>	On	On		On	On	On	Off	On
<b>Open/Close impulse</b>	In AUTO mode	In AUTO mode		In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In OFF, EXIT and AUTO mode

<sup>1)</sup> If set to “Reverses when obstructed”, the operator re-opens when obstructed, similar to a presence impulse. As default the operator tries to close two times extra in automatic operation, Off or Exit mode and one time in manual operation, Off or Exit mode if there is a problem with binding striking plates. This function can be switched off (see “Lock retry” above).

The cover and back plate are manufactured in clear anodized aluminum. The end plates are made of black painted steel sheet.

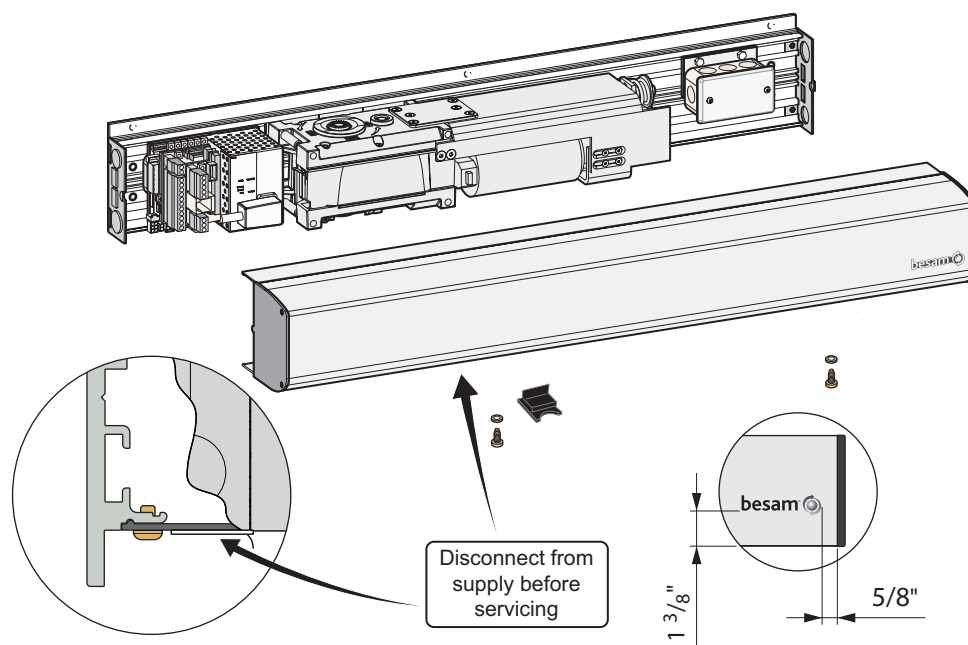
### 14.1 Creating slot in the cover for the drive shaft

1. Measure the distance  $X$  on the mounted operator from the pivot end of the back plate to the center line of the output shaft.
2. Use a 1" (25 mm) hole saw to cut the round hole for the output shaft.
3. Use a hack saw to make two straight cuts.



### 14.2 Fitting and removing the cover

The cover is slid over flanges in the back plate so that the ridges fit in the grooves. Snap on the fill cover into the slot for output shaft. Secure cover with screws. Stick the Besam logotype to the cover – see below. Stick the label to the underside of the cover – see below.



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## REQUIREMENTS FOR LOW ENERGY POWER OPERATED DOORS

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The following texts are excerpts from American National Standard for low energy power-operated doors. Please refer to the full standard if necessary.

### 1. Activation

---

The operator shall be activated by a knowing act.

### 2. Opening

---

Doors shall open from closed to back check, or 80 degrees whichever occurs first, in 3 seconds or longer as required in Table I. Backcheck shall not occur before 60 degrees opening.

Total opening time to 90 degrees shall be as in Table II. If the door opens more than 90 degrees, it shall continue at the same rate as backcheck speed.

When powered open, the door shall remain at the open position for not less than 5 seconds.

### 3. Closing

---

Doors shall close from 90 degrees to 10 degrees in 3 seconds or longer as required in Table I.

Doors shall close from 10 degrees to fully closed in not less than 1.5 seconds.

### 4. Force and Kinetic Energy

---

The force required to prevent a stopped door from opening or closing shall not exceed 15 lbf (67 N) measured 1 in (25 mm) from the latch edge of the door at any point during opening or closing.

The kinetic energy of a door in motion shall not exceed 1.25 lbf-ft (1.69 Nm). Table I provides minimum times for various widths and weights of doors for obtaining results complying with this kinetic energy.

Doors shall open with a manual force not to exceed 15 lbf (67 N) to release a latch, if equipped with a latch, 30 lbf (133 N) to set the door in motion, and 15 lbf (67 N) to fully open the door. The forces shall be applied at 1" (25 mm) from the latch edge of the door.

Table I

Minimum Opening Time to Back Check or 80 degrees, which ever occurs first, and the Minimum Closing Time from 90 degrees to Latch Check or 10 degrees.

“D” Door Leaf Width - Inches (mm)	“W” Door Weight in Pounds (kg)				
	100 (45.4)	125 (56.7)	150 (68.0)	175 (79.4)	200 (90.7)
*30 (762)	3.0	3.0	3.0	3.0	3.5
36 (914)	3.0	3.5	3.5	4.0	4.0
42 (1067)	3.5	4.0	4.0	4.5	4.5
48 (1219)	4.0	4.5	4.5	5.0	5.5

\* Check applicable Building Codes for clear width requirements in Means of Egress.

Table II

Total Opening Time to 90 Degrees

Backcheck at 60 degrees	Backcheck at 70 degrees	Backcheck at 80 degrees
Table I plus 2 seconds	Table I plus 1.5 seconds	Table I plus 1second
If the door opens more than 90 degrees, it shall continue at the same rate as backcheck speed.		

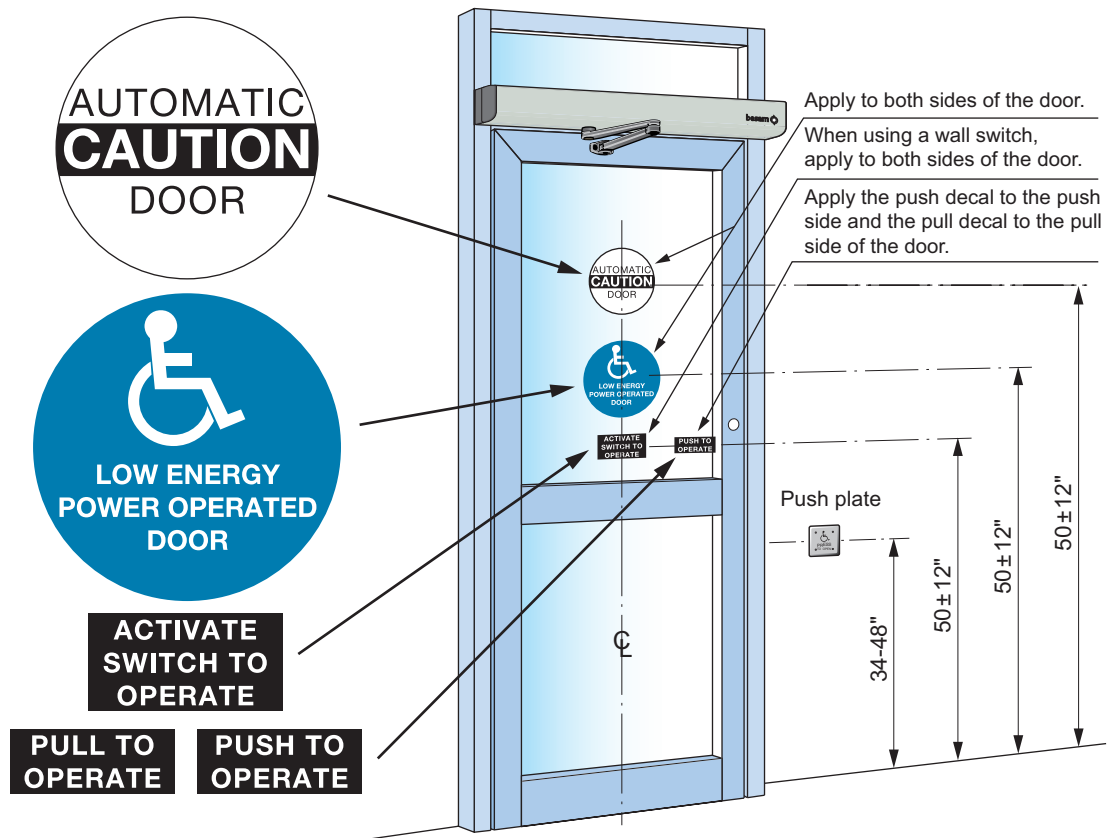
**Note:** To determine maximum times from close to full open, the operator shall be adjusted as shown in the chart. Back check occurring at a point between positions in Table II shall use the lowest setting. For example, if the backcheck occurs at 75 degrees, the full open shall be the time shown in Table I plus 1.5 seconds.

## 6. Signage

- 6.1 Doors shall be equipped with signage visible from either side, instructing the user as to the operation and function of the door. The signs shall be mounted 50" +/- 12" (1270mm +/- 305mm) from the floor to the center line of the sign. The letters shall be 5/8 inch (16 mm) high minimum.
- 6.2 **Low Energy Doors** All low energy doors shall be marked with signage visible from both sides of the door, with the words "AUTOMATIC CAUTION DOOR" (see illustration below). The sign shall be a minimum of 6 inches (152 mm) in diameter with black lettering on a yellow background. Additional information may be included.

Additionally one of the following knowing act signs shall be applied:

- 6.2.1 When a **Knowing Act Switch** is used to initiate the operation of the door operator, the doors shall be provided with signs on both sides of the door with the message "ACTIVATE SWITCH TO OPERATE". The lettering shall be white and the background shall be blue.
- 6.2.2 When push/pull is used to initiate the operation of the door operator, the doors shall be provided with the message "PUSH TO OPERATE" on the push side of the door and "PULL TO OPERATE" on the pull side of the door. The lettering shall be white and the background shall be blue.



Fault	Possible reasons why	Remedies/Explanations
<b>The door does not open</b> - The motor does not start	Control switch is set to OFF	Change the setting of the control switch
	Mains power is missing	Check the mains power switch
	Activation unit does not function	Strap impulse inputs
	Presence detection is activated	Check that there are no objects in the detection zone
	Kill activated	Deactivate Kill
	Potentiometer SPTE not turned to 0°	Turn SPTE to 0°
- The motor starts	Mechanical lock is locked	Unlock the lock
	Something jammed beneath the door	Remove object
	Electric striking plate is binding	Select lock release
		Adjust striking
Arm system has come loose	Turn potentiometer SPTE until the door-stop hits the stop-block. Put the door in required open position. Tighten the arm system. Turn SPTE to 0°	
<b>The door does not close</b>	Control switch is set to HOLD	Change the setting of the control switch
	Presence impulse is activated	Remove objects in the detection zone
	Something jammed beneath the door	Remove object
<b>The operator has unknown spring pre-tension</b>	Too many adjustments carried out	<ol style="list-style-type: none"> <li>1. Turn up the potentiometer SPTE until it is possible to loosen the door stop</li> <li>2. Remove the door stop and the arm system</li> <li>3. Unplug the mains and let spring close</li> <li>4. Unplug the motor plug</li> <li>5. Mount the drive arm from the arm system and find the o-pre-tension by moving back and forth</li> <li>6. Loosen the arm</li> <li>7. Connect the motor plug</li> <li>8. Adjust the SPTE to 210°</li> <li>9. Connect the mains</li> <li>10. Mount the door stop against the closing stop block</li> <li>11. Turn down SPTE to 0° - operator is now factory set</li> </ol>

## 16.1 Error indication

- During normal operation the “Error LED” on the control unit is illuminated.
- An extinguished LED indicates that there is no mains power.
- A flashing light on the LED indicates that the operator is out of function (see table below).

LED flash frequency	Reason	Remedy
One 0.3 s flash, pause etc.	+ 24 V DC external error or sensor monitoring error	Check for short circuit or broken monitored sensor
Two 0.3 s flashes, pause etc.	Battery defective	Replace battery (normal operation with mains power)
Three 0.3 s flashes, pause etc.	Control unit defective	Replace control unit
Four 0.3 s flashes, pause etc.	Encoder error	Check the encoder cable. Open and close the door manually and thereafter check the automatic function. If the operator is still out of function replace the drive unit.
Five 0.3 s flashes, pause etc.	Locking device defective	Check for e.g. short circuit in the locking device Replace locking device
	EXU-SI board defective	Replace EXU-SI board
Six 0.3 s flashes, pause etc.	Sync cable not connected or defective (double door only)	Connect the sync cable
		Replace the sync cable
Seven 0.3 s flashes, pause etc.	Slave control unit defective (double door only)	Check the flash frequency on the Slave LED and take necessary measures in accordance with this table.
Eight 0.3 s flashes, pause etc.	Motor overheated	Wait for the motor to cool down
Nine 0.3 s flashes, pause etc.	Blocked door and constant impulse	Toggle impulse



- Measure / Adjust Speeds – Measure to ANSI/BHMA A156.19 and local codes; adjust if necessary.
- Measure / Adjust Forces – Measure to ANSI/BHMA A156.19 and local codes; adjust if necessary.
- Measure / Adjust Time Delays – Measure to ANSI/BHMA A156.19 and adjust if necessary.
- Check Functioning – Mats, Sensors, Operator/Control, and Push Plates per device checklist and AAADM.
- Check Signage – Are all signs in place, readable, and in good condition?
- Check Door Hinging / Mechanical Soundness – all attachments, covers, arms, crash bars, etc.
- Check Finger Guards, Glass and Glass Stops, Trip Hazards, Rails and Sharp Edges.
- Check Emergency Egress (if so equipped).
- Check all wiring for good connections, proper insulation and clearance from moving parts.
- Go through Daily Safety Checklist with facility manager.







Besam US Inc., 1900 Airport Road, US-Monroe, NC 28110  
Tel: +1 704 290 5520 Fax: +1 704 290 5555  
[marketing@besam-usa.com](mailto:marketing@besam-usa.com)

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