

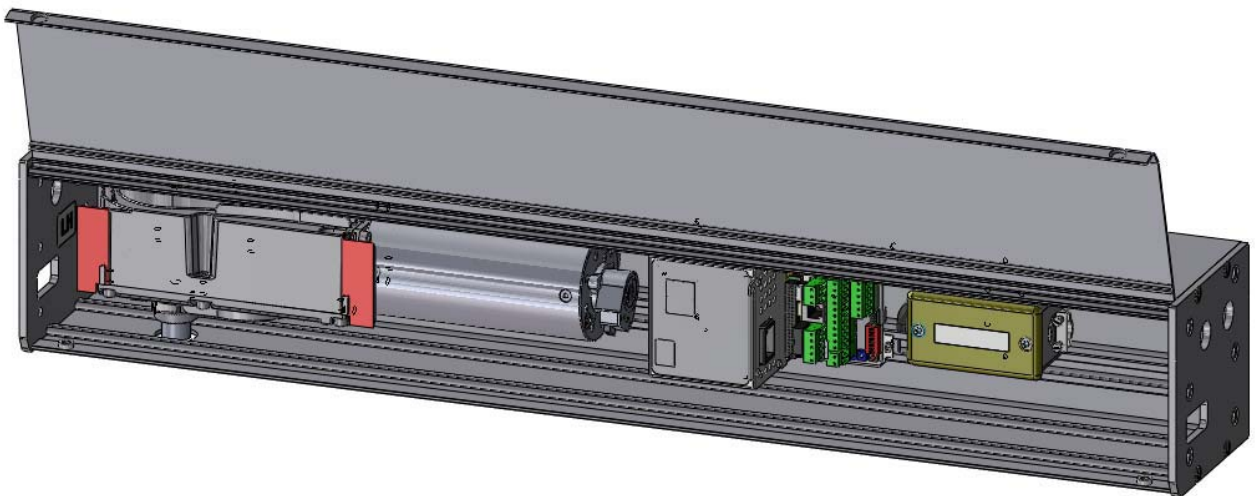
Swing Door Operator (OHC) Besam SW200i

Installation and Service Manual - Original instructions

Complies with ANSI/BHMA A156.10 and ANSI/BHMA A156.19 standard for Power

Assist and Low Energy Power Operated Doors.

UL325 & UL991 Listed



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1 Revision

Following pages have been revised:

Page	Revision 1.0
	This is the first version of the OHC Besam SW200i Installation and Service Manual.

2 Important information

HAZARD WARNING!



Failure to observe the information in this manual may result in personal injury or damage to equipment.

To reduce the risk of injury to persons - use this operator with single or double pedestrian swinging or folding doors only.

Save these instructions for future reference.

2.1 Intended use

The Besam SW200i is an automatic swing door operator developed to facilitate entrances to buildings and within buildings through swing doors. The Besam SW200i is a universal electro-mechanical operator that combines a Heavy Duty (HD) operator for large heavy doors with Low Energy (LE) applications of swing doors. The operator is factory set to Low Energy (LE).

The Besam SW200i can be concealed or surface applied on either side of the door for pull or push action, and is suitable for single doors, double doors and double egress doors fitted with swing clear hinges, offset or center pivots.

The Besam SW200i 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.

The operator is connected to the door leaf with a range of different arm systems.

The door is designed to offer continuous use, a high degree of safety and maximum lifetime.

For use see User manual 1007717.

2.2 Safety precautions

Do not climb on door parts.

Do not let children play with the door or the fixed controls.

Be sure to complete a risk assessment (PRA-0002) and the site acceptance test (PRA-0007) before taking the door into operation.

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. Training is needed to carry out these tasks safely. Only ASSA ABLOY Entrance Systems US Inc.-trained technicians should be allowed to carry out these operations.

2.3 Electronic equipment reception interference

The equipment complies with the European EMC directive (US market FCC Part 15), provided installed according to Installation and Service manual.

The equipment may generate and use radio frequency energy and if not installed and used properly, it may cause interference to radio, television reception or other radio frequency type systems.

If other equipment does not fully comply with immunity requirements interference may occur. 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 electronic technician for additional suggestions.

ASSA ABLOY Entrance Systems US Inc. products are equipped with electronics and may also be equipped with batteries containing materials which are hazardous to the environment. Disconnect power before removing electronics and battery and make sure it is disposed of properly according to local regulations (how and where) as was done with the packaging material.

2.4 Glazing materials

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

3 Technical specification

Manufacturer:	ASSA ABLOY Entrance Systems US Inc.
Address:	1900 Airport Road, Monroe, NC 28110, US
Type:	Besam SW200i
Power supply:	120 V AC +10/-15%, 50/60 Hz
Power consumption:	max. 300 W
Auxiliary voltage:	24 V DC, max. 700 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. 1200 mA / 24 V DC, max. 600 mA
Door weight:	Surface Applied, SA: 100-700 lb. (45-315 kg) Overhead Concealed, OHC: 100-350 lb. (45-160 kg)
Door opening angle:	PUSH: 80° - 110°, with reveal 0 - 12" (0 - 305 mm)
	PULL: 80° - 110°, with reveal 0 - 5 1/8" (0 - 130 mm)
	PAS: only 80°-95°, with reveal 0 - 5 1/8" (0 - 130 mm)
	80°-95° in a concealed application
Opening time (0° - 80°):	variable between 2 - 12 seconds
Closing time (90° - 10°):	variable between 4 - 12 seconds
HOLD open time:	1,5-30 seconds
Ambient temperature:	-4 °F to +113 °F (-20 °C to +45 °C)
Relative humidity:	Max. 95%
Drive unit weight:	19,8 lb. (9 kg)
This product is to be installed internally.	
Class of protection IP 20.	
Complies with: ANSI/BHMA A156.19, ANSI/BHMA A156.10, UL 325, UL 991, UL 244A, UL 1310, CAN/CSA-C22.2 N0 223-M91 and CAN/CSA-C22.2 N0 247-92	
Approvals:	Third party approvals from established certification organizations valid for safety in use and escape route safety. For details see Declaration of Conformity.

3.1 Opening times

Opening time is adjustable from 2-12 seconds and dependent on the weight, width and installed arm system of the door. For max opening times on low energy doors, see Table I on page 79.

4 How the Besam SW200i works

The swing door operator Besam SW200i uses a DC motor which is connected to the output shaft by a combination of a bevel gear and spur gears. The arm system that is connected to the output shaft opens the door in a wall mounted application.

There is also an adjustable spring mechanism connected to the output shaft. During opening of the door, the clock spring is tensioned by the rotation of the output shaft. During the closing cycle, the accumulated spring force is acting in the closing direction. The spring force can be adjusted so there is appropriate force to close the door when it is operated manually or in case of a power failure.

4.1 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). Stop on stall is always active in program selector Mode Off.

- Continue on stall - the door will continue to try to open during the hold open time.
- Stop on stall - the door will, even if hold open time has not expired, close after 2 seconds.

4.2 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 combined with extended closing torque by the motor.

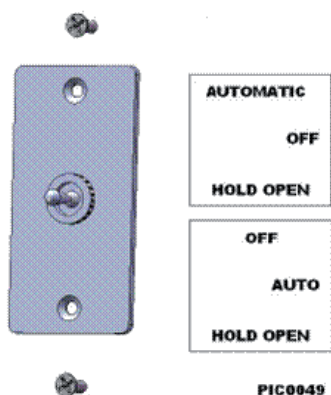
4.3 Control switch

4.3.1 ON/OFF/HOLD open switch (option)

3-position switch

P/N: 75-15-310 Clear

P/N: 75-15-310 Black



4.4 Functions on the basic control unit CU-200

Also see page 53 for more information.

4.4.1 Power failure

During power failure the operator acts as a door closer with controlled closing speed. The micro switch located next to the spindle shaft can be adjusted to control when lock kick occurs.

4.4.2 Spring force

The operator is delivered with spring pre-tension factory set to 360°. If necessary, the spring tension can be electronically adjusted with a potentiometer to required closing force, but max total 720°. The arm must also be relocated on the spindle.

4.4.3 Extended closing 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 torque.

Extended closing torque will be reduced to zero if:

- The door mounted sensor presence detection is activated during the last 10° before closing.
- The door mounted sensor presence impulse is activated in closed position or during closing (even if manually opened).

4.4.4 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. The range of the POAS is depending on the spring pre-tension.

4.4.5 Push and go (PAG)

DIP-switch to select Push and Go, ON or OFF. Push and Go is available from any door position. Push and Go is not active in programme selector setting OFF.

4.4.6 Overhead presence detector (OPD/OPS), frame mounted

When an OPD/OPS sensor is mounted on the frame or operator cover just above the swing side of the door, it will—when activated—either keep the door open or closed. The sensor input is not sensitive during opening and closing. Lock-out signal is available as it is required by some OPD/OPS sensors for proper function.

- a closed door will not open, if the OPD/OPS detects activity in the field
- an open door will not close, if the OPD/OPS detects activity in the field
- during opening, the door will continue to open, even if the OPD/OPS detects activity in the field
- during closing, the door will continue to close, even if the OPD/OPS detects activity in the field
- the OPD/OPS is not active in program mode OFF or manually opened door
- during closing, if an activation occur the door will re-open.

4.4.7 Activation delay (AD)

This function requires a constant inner impulse for the specified time before the door will open. Fixed 2 sec.

During closing the door will reopen immediately if impulsed.

4.4.8 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 or manually opened door.

4.5 Functions on the extension unit EXU-SI

Also see page 56 for more information.

4.5.1 KILL function



In the event that the KILL circuit is activated, all Safety Functions of the door will be overridden causing the door to close even though an object or person may be in the door's path of travel, and therefore may be subject to injury. This mode of operation is most generally used to isolate an area in the event of a fire.

- During KILL, the control will ignore all signals and close door(s) at normal speed.
- If impulse controlled KILL: The operator will resume normal operation after a KILL RESET. When manual RESET, jumper must be removed and reset button connected to terminal No. 8 and Ground.
- Or if state controlled KILL: When KILL signal is no longer active, operator will resume normal operation.
- The behavior of the lock during KILL depends on the group of parameters, see page 66.
- The KILL input may be connected to either a normally open contact with GND as reference or a normally closed contact with QTST as reference, depending of group of parameters, see page 66.

4.5.2 Function of locks

- The lock output only works when the function switch is in OFF or EXIT. If no function switch is used, OFF or EXIT must be connected to GND (0 VDC).
- 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 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 lock output signal shall be active low.
- If the door cannot fully close, the operator will perform a lock retry (once if manually open, twice if automatically open).

Panic bar can be disabled by the relay function on the extension board EXU-SA and an external power supply. Panic bar will then only be active during KILL. See Changing group of parameters on page 66.

4.5.4 Panic bar

Panic bar can be signaled to retract by the relay function on the extension board EXU-SA connected to the external panic bar power supply. Signal to panic bar will be removed during KILL impulse. See Changing group of parameters on page 66.

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

Note! In OFF-position the operator will comply with the Low Energy Regulation.

4.5.6 Program selector (wall mounted)

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

Note! In OFF-position the operator will comply with the Low Energy Standards if given a KEY impulse.

4.5.7 Impulses

- Input for OUTER impulse, KEY impulse and OPEN/CLOSE impulse.

4.5.8 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 66.

OPEN/CLOSE impulse works only in program selection AUTO. Can be programmed for OFF and EXIT as well, see page 66.

4.6 Functions on the extension unit EXU-SA

Also see page 57 for more information.

4.6.1 Presence impulse approach, door mounted / Door mounted presence sensor, non swing side (DMPS.NS)

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 or manually opened door (Power Failure Mode or during KILL function).

4.6.2 Presence detection swingpath, door mounted / Door mounted presence sensor, swing side (DMPS.SS)

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 . The sensor is not active in program mode OFF or manually opened door. In this OFF-mode the operator fulfills the Low Energy Standards.

4.6.3 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.

4.6.4 Relay output

- Error indication

A potential free contact COM/NO/NC for external error indication, see "Error indication" on page 72.

- KILL output

NO or NC signal

- Door indication
Used to indicate an open or closed position of the door. The indication position is set by adjusting the inhibit/blanking potentiometer.
- Panic bar
Parameter group 14, 15 and 16

5 Models

The Besam SW200i operator can be installed overhead concealed or surface mounted. These two versions can be used in the following installations:

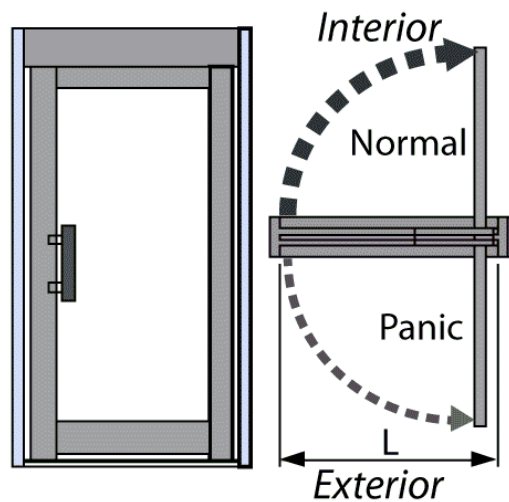
- Single doors
- Double doors (two operators)

5.1 Concealed mounted

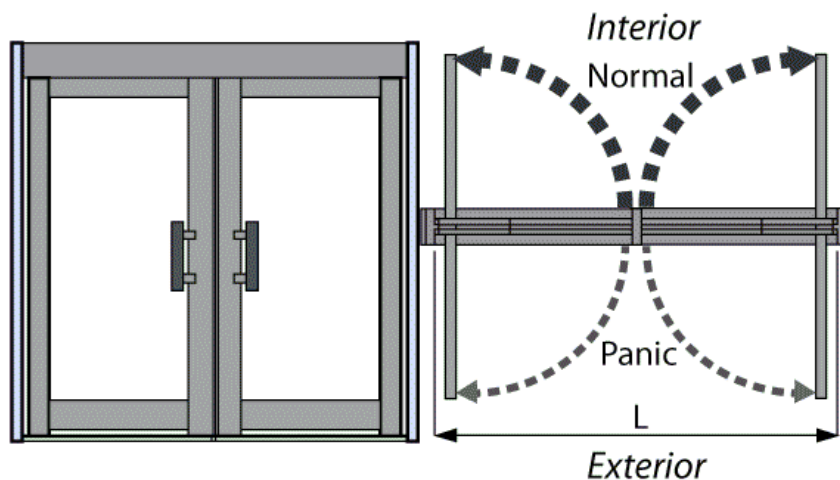
The concealed operator is used to control a center-pivot door, with the operator integrated and concealed in the header above the door. The door can be opened in a direction opposite to normal in an emergency (panic breakout). Manual reset by pushing the door back into normal operation sector is necessary.

A concealed operator can also be installed in the ceiling space above the door (bottom load). Such applications may require field engineering of components and hardware.

Operator for right handed door



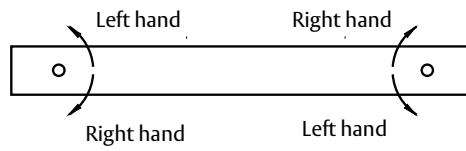
Operator for left and right handed door



6 Operator/Door handing

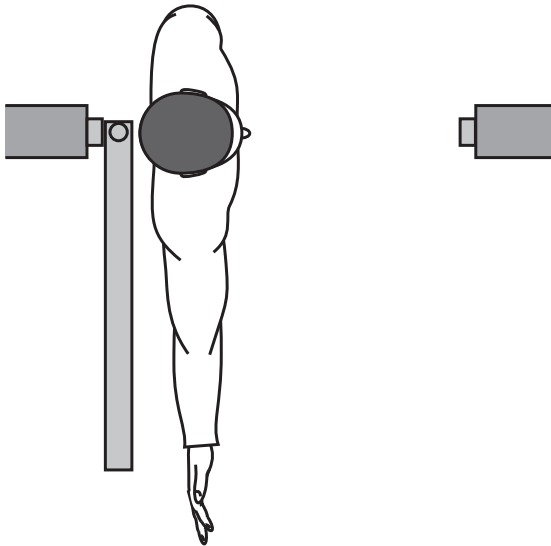
6.1 Operator handing

Concealed



6.2 Door handing

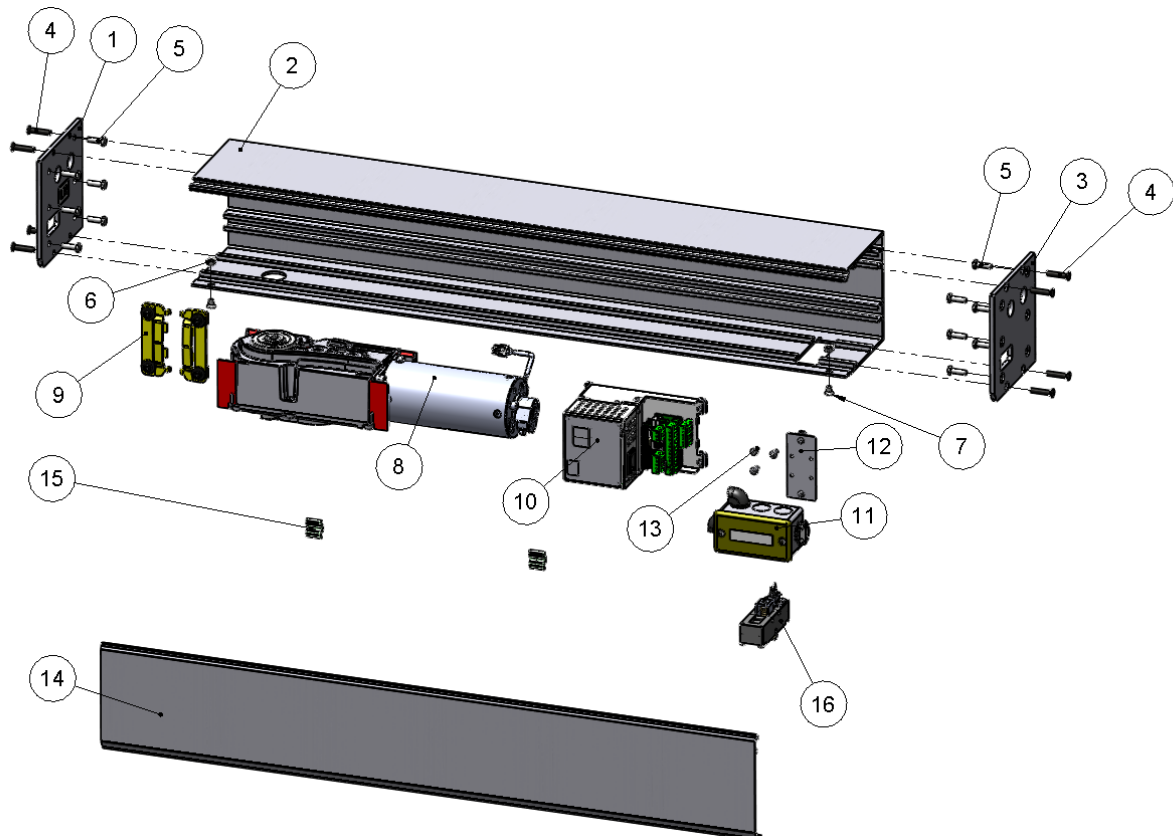
Door handing is determined by standing with your back to the hinges. The side that the door normally opens (right or left) is the handing of the door. The illustration below shows a right-handed door.



7 Part identification

7.1 OHC Side Load - Center Pivot

Note! For offset pivot and Surface applied, all parts are identical with exception of end caps. See end cap identification for details.



Item No.	Art. No.	Description
1	1008595	End Plate LH OHC Center Pivot
2	1008588	Head Box Beam Profile Besam SW200i OHC Side Load
3	1009277	End Plate RH OHC Center Pivot
4	1701704	M6x30 PFH Thread Forming Screw
5	93-09-723187	Screw M6x20
6	30-09-310	PEM Nut S-0420-2Z1
7	40-09-200	Screw CR-FHMS 0.25-20x0.375x0.375-N
8	1007291	Transmission Unit
9	1009607	Clamp and Bolt Assembly
10	1008346	CU-200 Control Unit with Expansion Boards
11	1007504	Connection Box Assy CPD Factory Wiring
12	1008614	Bracket Kit OHC Junction Box
13	723196	Screw ISO 7045 (MRX) MRX-TT-Z M5x10 F ZB 8.8
14	1008589	Head Box Cover Profile Besam SW200i OHC Side Load
15	1007531	Detachment Guard Cover
16	1008600	Breakaway Device Assy

7.2 End Cap Identification

Surface Applied

1009195 – LH

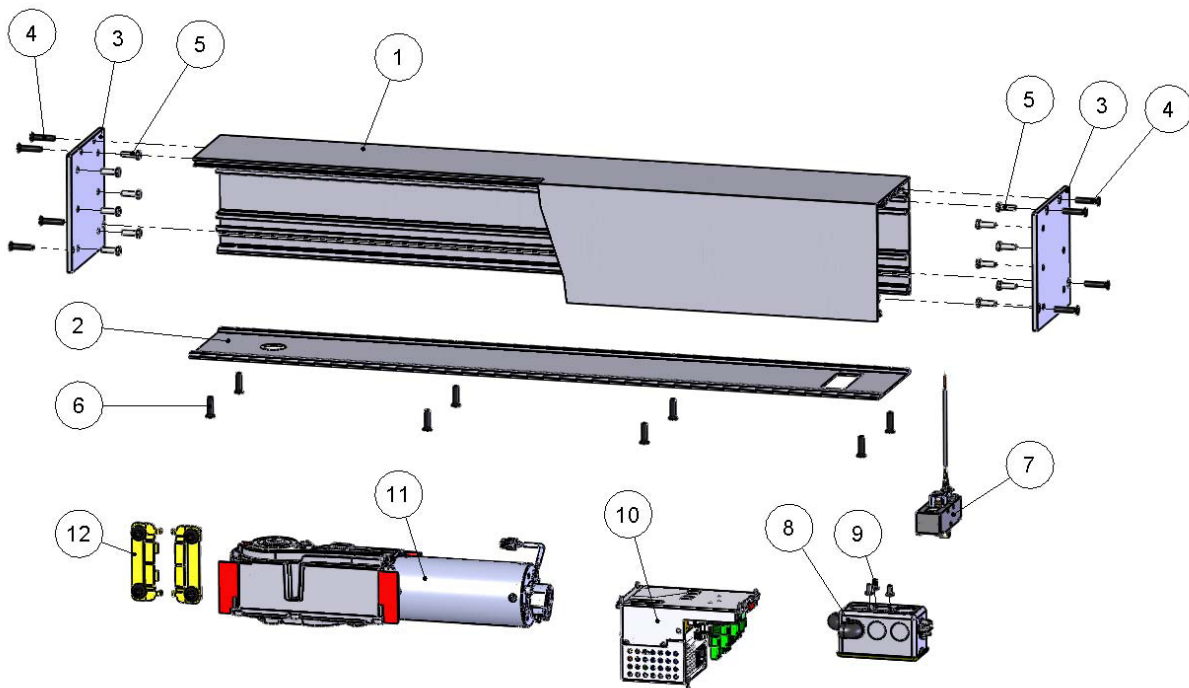
1009279 – RH

Offset Pivot

1008611 – LH

1009278 – RH

7.3 Bottom Load

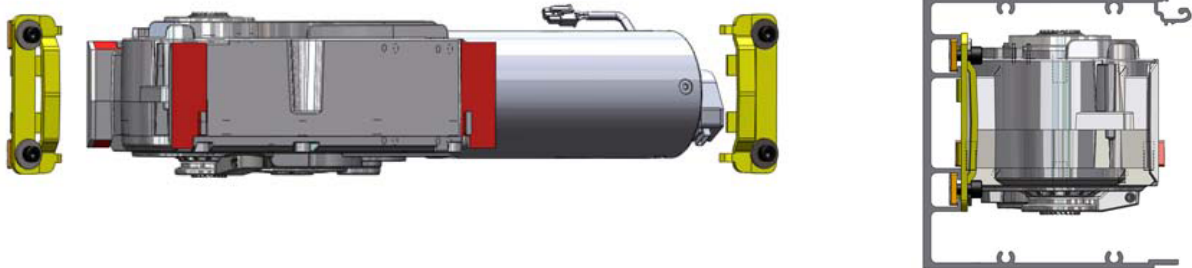


Item No.	Art. No.	Description
1	1008592	Head Box Beam Profile Besam SW200i OHC Bottom Load
2	1008593	Head Box Cover Profile Besam SW200i OHC Bottom Load
3	1008612	End Plate OHC Bottom Load
4	1701704	M6x30 PFH Thread Forming Screw
5	93- 09-723187	Screw M6x20
6	52-09-004	Screw 1/4-20x1" PFH TRS
7	1008600	Breakaway Device Assy
8	1007504	Connection Box Assy CPD Factory Wiring
9	723196	Screw ISO 7045 (MRX) MRX-TT-Z M5x10 FZB 8.8
10	1008346	CU-200 Control Unit with Expansion Boards
11	1007291	Transmission Unit
12	1009603	Clamp and Bolt Assembly

7.4 Component Mounting

Transmission Unit

Attach mounting brackets/hardware to transmission unit. Leave mounting bracket hardware loose. Align square nuts into nut run on back of header and slide transmission unit to correct location. With transmission unit in correct location, tighten mounting bracket hardware.

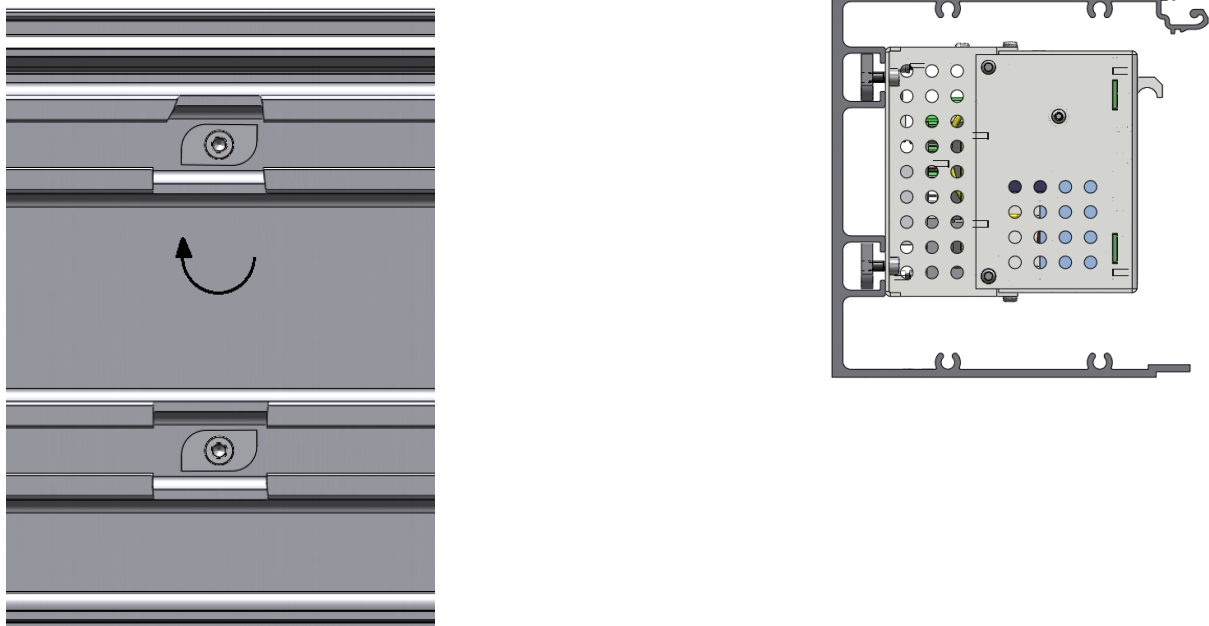


Controller

Remove (4) M4 X 8 SHCS and (4) oval nuts out of bag and attach to controller, orient oval nuts horizontally.

Oval nuts should be orientated per below for tightening/locking controller. Insert controller with hardware into nut run and tighten screws.

Note! For bottom load application, use M4 X 8 SHCS to mount controller directly to inside top of header, no oval nuts required.

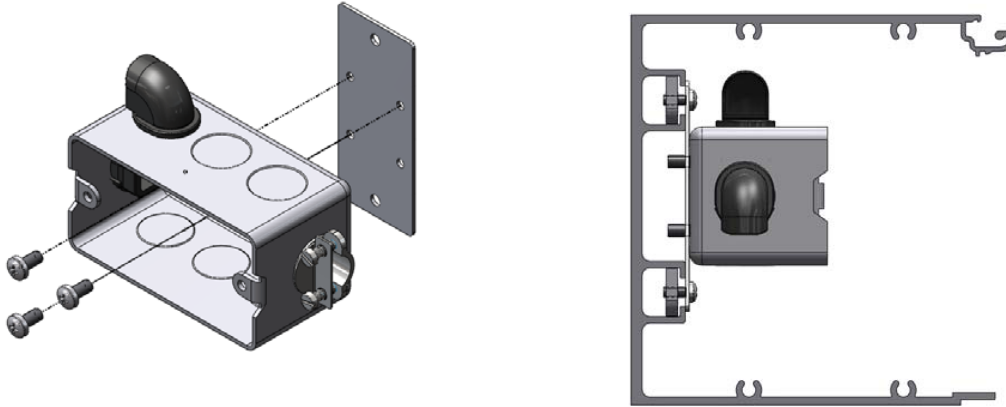


Junction Box

Locate junction box and junction box bracket kit. Remove junction box cover and locate M5 X 10 PHCS. Use screws provided to attach junction box to mounting plate.

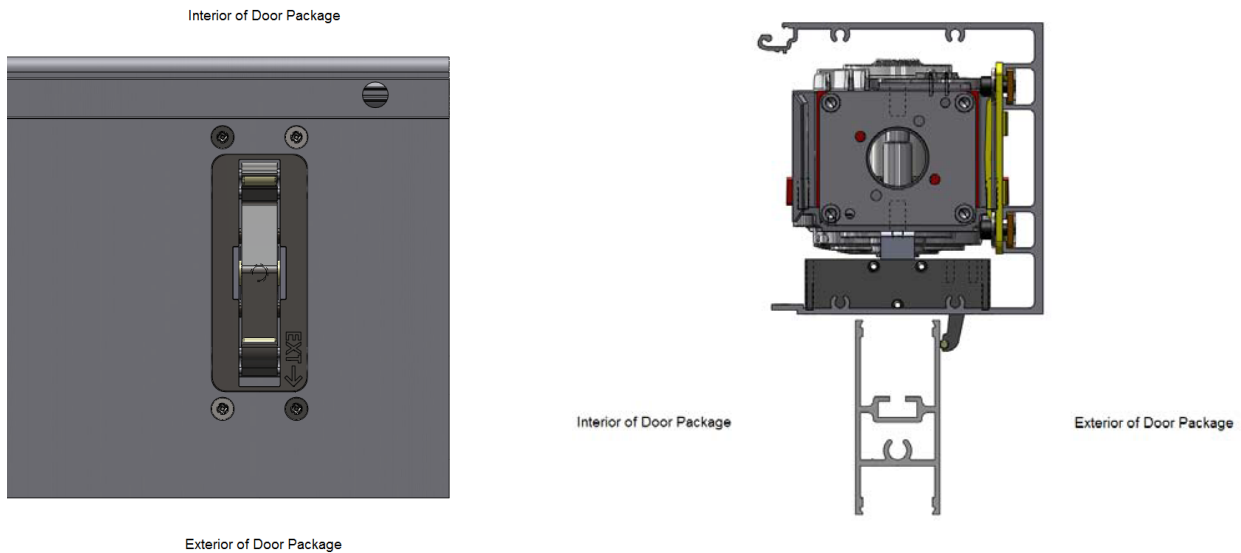
Use oval nuts (see orientation above) and screws provided to mount junction box to header.

Note! For bottom load application, use M5 X 10 PHCS to mount junction box directly to top of header, no mounting plate is required.

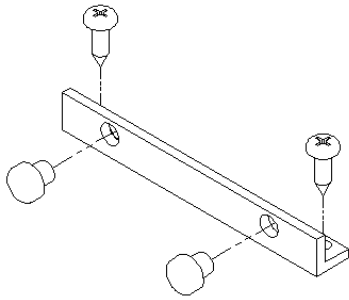


Panic Breakaway Device (Required on all OHC inswing door packages)

Use hardware provided to mount panic breakaway device. 'EXT' and arrow should be pointing to exterior of door package. Panic breakaway hook should be pressing against the exterior side of the top rail.



Door Stop (Required on all OHC outswing door packages)



P/N: 1010090

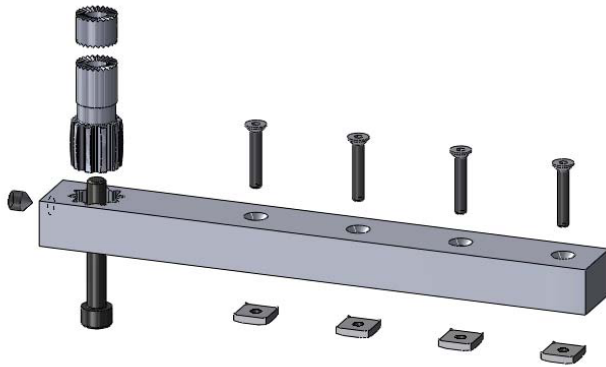
Use hardware provided to mount door stop to header in order to stop doors at closed position.

8 Arm systems

8.1 OHC Arm Kit

Can be used on OHC, Bottom Load and Readyfold door packages.

P/N: 1009345



8.2 Offset Pivot Arm Kit / Pull Arm Kit

P/N: 1007251



8.3 Push Arm Kit

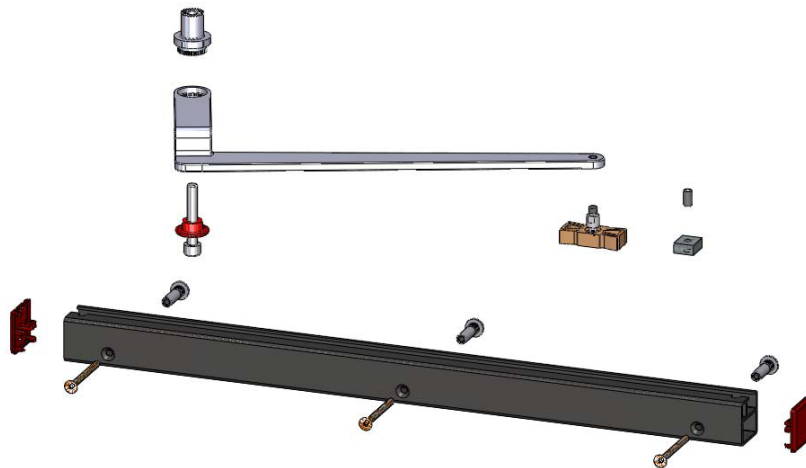
P/N: 1007241



8.4 Pas Arm Kit

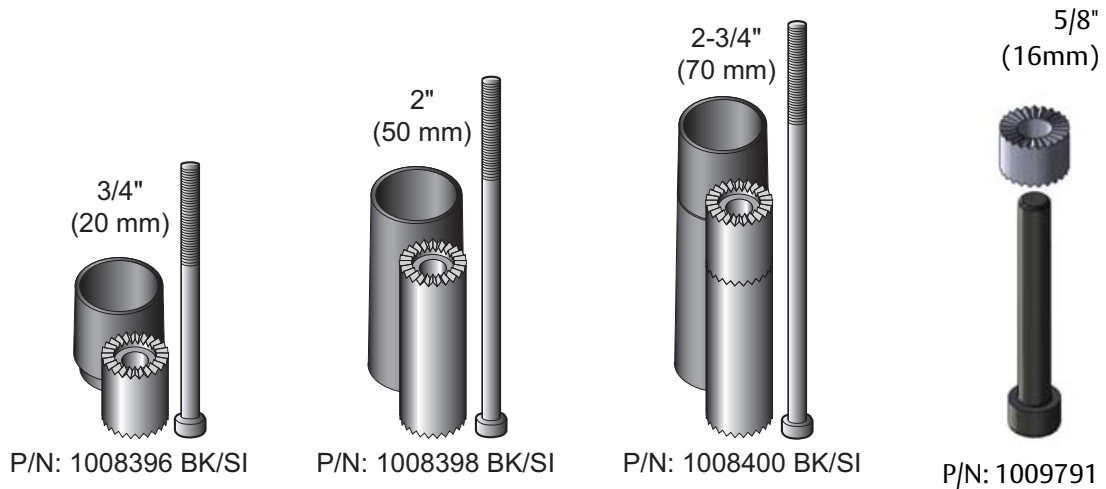
P/N: 1007247 PAS Arm - RH

P/N: 1007476 PAS Arm - LH



8.5 Drive shaft extension kits

The kits cannot be combined with each other.



8.6 Double door installations

There are four different types of double door installations:

- Astragal – Has an overlapping master door, can be opened synchronously if it is not jamming and must be closed asynchronously to avoid that the doors will jam or close in the wrong order.
- Jamming – This door type needs to be opened and closed asynchronously to avoid that the doors will jam with each other.
- Not jamming, not rebated – This door type has doors that always can move independently of each other and can be opened and closed synchronously.
- Double egress – This door type has doors that opens in different directions which can be opened and closed independently. This door type may have a different way of handling safety sensors due to the difference in opening direction of the doors.

Also see page 58.

8.6.1 Nurse and bed functionality

Connect a 1/0-switch to the slave control unit (inputs 3 and 7). This will make it possible to open only the master door, and both doors if necessary.

If Push and Go is ON the bed functionality can also be achieved by manually pushing the slave door which will start the door to open automatically.

9 Options

9.1 Push plates

For DISABLED or ADA use, mount push plate 31" above floor level.

9.1.1 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

9.1.2 Remote transmitter push plates



P/N: 75-02-273



P/N: 75-02-272



P/N: 75-02-269



P/N: 75-02-270

9.1.3 Installation box for narrow plates



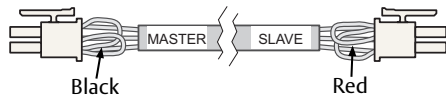
P/N: 75-21-002

9.1.4 Remote receiver



P/N: USRD433

9.2 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









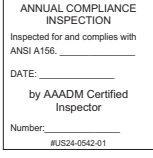

P/N: 331003583

9.3 Accessories

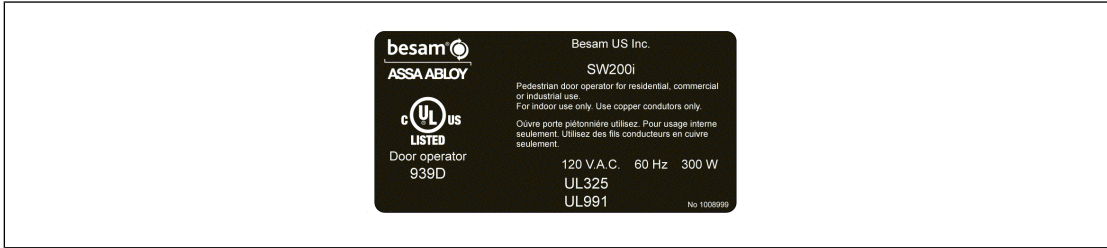
<p>3-position switch P/N: 75-15-310 Clear P/N: 75-15-310 Black</p>	<p>PS-4C P/N: 655845</p>	<p>Surface mounting box P/N: 655806</p>
<p>A photograph of a blue 3-position switch. To its right is a label with the following text: 'AUTOMATIC', 'OFF', 'HOLD OPEN', 'OFF', 'AUTO', 'HOLD OPEN'. Below the label is the part number 'PIC0849'.</p>	<p>A photograph of a black PS-4C lock mechanism with a silver key inserted into the keyhole. The lock has several small square indicators and arrows on its face.</p>	<p>A photograph of a grey surface mounting box, which is a rectangular enclosure with a keyhole on the front face.</p> <p>For use with PS-4C (P/N: 655845)</p>

9.4 Labels

Label kit P/N: 331007317

	
<p>Dual Side "AUTOMATIC DOOR / DO NOT ENTER" – Out</p>	<p>Dual Side "AUTOMATIC DOOR / DO NOT ENTER" – In</p>
	
<p>Dual Side "AUTOMATIC DOOR / CAUTION"</p>	<p>Dual side "Operator designed for disabled people"</p>
	
<p>Push side "PUSH TO ACTIVATE"</p>	<p>Pull side "PULL TO ACTIVATE"</p>
	
<p>Dual Side "Activate Switch to Operate"</p>	<p>"Danger"</p>
	
<p>"Certified Inspector"</p>	<p>"Safety information"</p>

Product label P/N: 1008999



10 Pre-installation

10.1 Types of installation

Concealed Installation

The operator may be installed in two types of header (casing): Side Load and Bottom Load.

Side Load is the standard type of header. The operator is installed in the header from the side.

Bottom Load is used for special applications where side access may be limited (for example, where the finished ceiling is flush with the bottom of the header). The operator is installed in the header from the bottom. Concealed means that the operator and the header are placed between the door-jamb with the door and header concealed within the plane of the wall.

10.2 General tips/Safety concerns

- For enhanced security and vandalism protection, always mount the operator access 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.

10.3 Summary Installation

This is only a summary of the installation process. See the rest of this manual for detailed information.

- a Establish installation height.
- b For surface applied installations, locate header horizontally above door so that the centerline of spindle to centerline of hinge dimension is correct.
- c Install the header.
- d Mount the operator.
- e For surface applied, attach the arm shoe to the door. For concealed installations, mount drive arm to shaft.
- f For surface applied installations, mount the rest of the drive arm. For concealed installations, mount/hang the door.
- g Complete all electrical connections to other operators or optional equipment.
- h Adjust the control unit for optimal and safe performance, in accordance with ANSI/BHMA A156.10 or A156.19 specifications for application.
- i Apply safety signage to the door(s).
- j Train facility manager in proper product operation.
- k Explain to the facility manager, the daily safety checklist described in the owner's manual, and leave a copy of the owner's manual with the facility manager.

10.4 Fastening requirements

Base material	Minimum requirements of wall profile*
Steel	3/16" (5 mm)**
Aluminium	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.

10.5 Test Equipment

- Stopwatch
- Force gauge 50 lb (22.7 kg) force range
- Multimeter

10.6 Tools required

- Set of box end wrenches
- Spirit Level or Bubble level
- Tape rule
- Power drill and set of drill bits
- Metric (mm) Allen wrench
- Center punch
- #2 & #3 Phillips screwdriver
- Flat blade screwdriver (small/medium/large)
- Wire stripper
- Pencil
- Torque wrench /w/ metric Allen sockets
- Additional mounting hardware (not supplied – see recommendations above)
- Silicone sealant
- Plumb bob
- This manual

11 Mechanical Installation

11.1 Installation for Center Pivot Doors

11.1.1 Finding the Pivot Height

OH = Door Opening Height

DH = Door Height

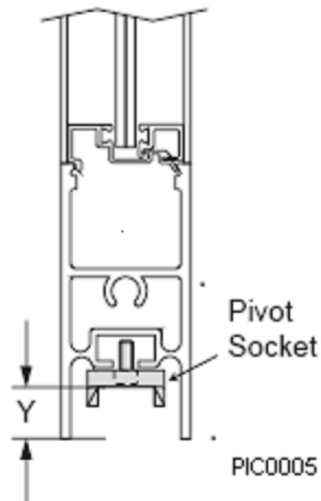
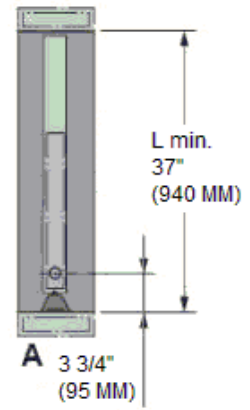
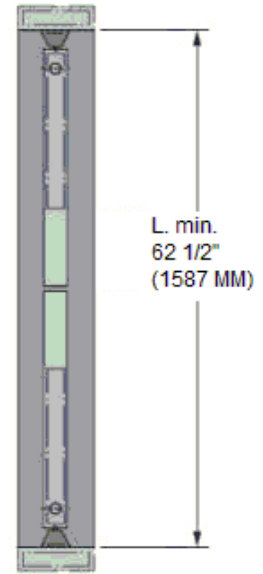
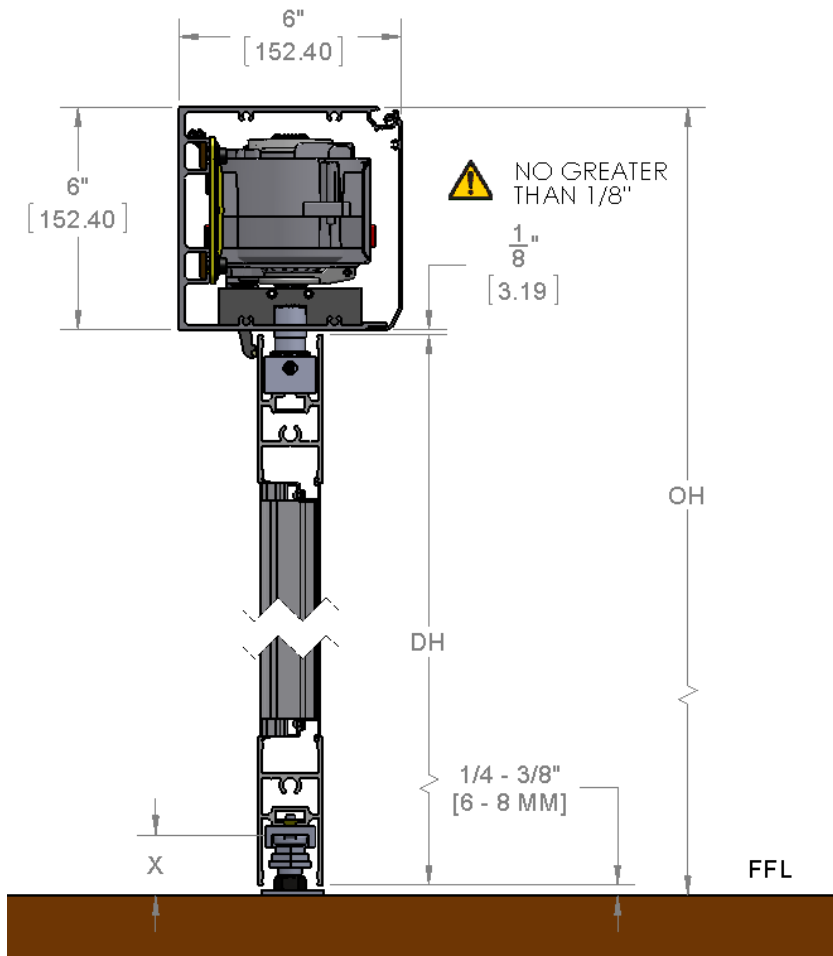
X = Pivot Height

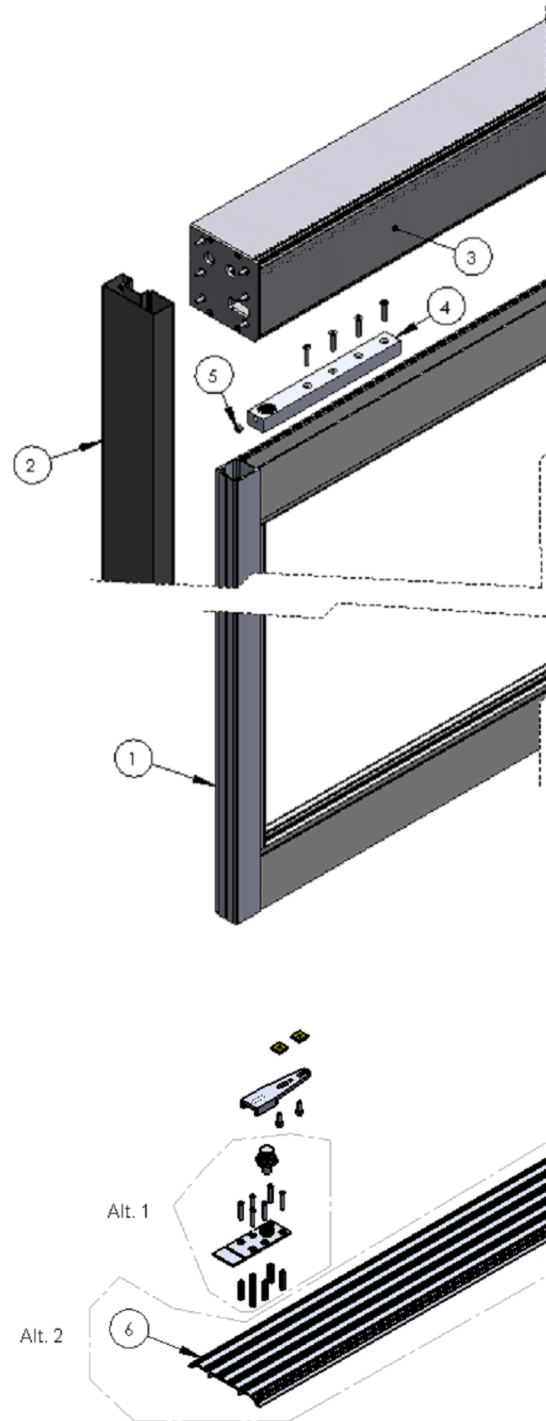
Y = Door Bottom to Receiving Surface of Pivot Socket

L = Header Length

FFL = Finish Floor Level

- a Measure the height of the door (DH).
- b Measure from the bottom of the door to the receiving surface of the pivot socket (Y). Subtract (Y) from (DH).
- c Add 1/8" to allow for top clearance.
- d Subtract the total from (OH) to obtain the Pivot Height (X).





- 1 Door leaf
- 2 Jamb/wall
- 3 Header housing
- 4 Drive arm

- 5 Lock screw
- 6 Threshold (optional)

11.1.2 Installation of Side-Load, Bottom Load & Offset Pivot Header and Operator

- a Establish the door opening height (OH) and the correct length (L) of the header, see page 29.
- b Measuring from the highest point on the floor, mark the door opening height on one door jamb.
- c Use a spirit level and transfer the mark to the opposite jamb.
- d Place header assembly onto your work surface. Open/remove cover and install all electrical components inside header, see chapter Part identification.

Note! The cables can enter the header from the hinge/pivot side or from the strike side. Try to bring all wiring in at the strike side because of the tight conditions between the operator and end cap.

- e Attach jambs to header using hardware provided. All jambs and headers are pre-machined for mounting and wire access holes.
- f Tilt header/jamb assembly up into rough opening in wall. Level header and plumb jambs, shimming as needed. Fasten jambs to sub-straight according to site conditions. Details will vary widely according to the nature of the installation site.

11.1.3 Mounting the Bottom Pivot

Prepare and install the bottom pivot (reference section titled, Finding the Pivot Height). The bottom pivot can be installed in two ways:

- Alt 1: With the base plate/bearing placed directly on the floor. The distance 3.75"/95 mm to the pivot centerline is obtained if the base plate is placed against the vertical jamb/wall.
- Alt 2: With the bearing installed directly into the threshold. Make sure that the centerline of the bottom pivot and the centerline of the drive shaft are aligned.

Tip Use plumb bob.

11.1.4 Installation of Door Leaf for Side load and Bottom Load

- a Adjust the bottom pivot using instructions found in section titled, Finding the Pivot Height.
- b Fit the drive arm to the operator drive shaft in line with the closed position for the door (0-position), and temporarily fix it with the drive arm set screw. The bottom of the door arm should align with the bottom of the spindle. Turn the SPTE potentiometer (Spring tension) clockwise until the door is open approx. 90 degrees.



The OHC arm without the door will open and close with great force, keep hands and face away from arm during these steps.

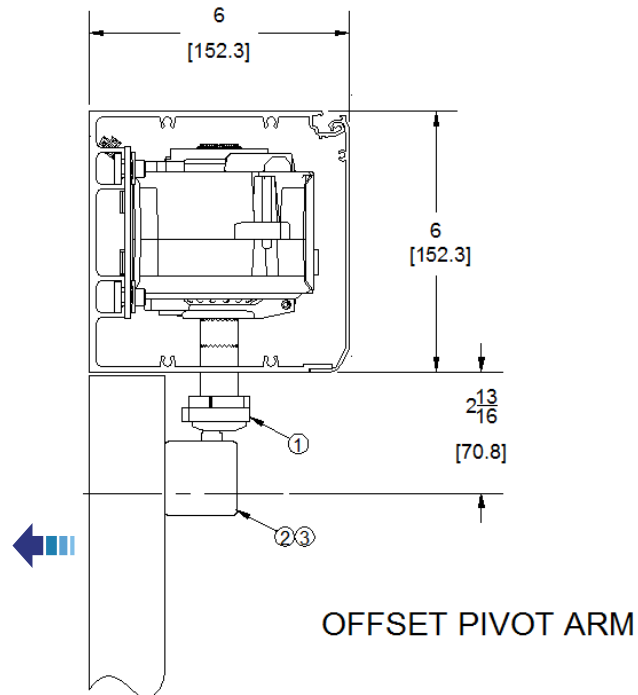
- c With the drive arm still attached to the operator shaft and the bottom pivot set in place, slide the back of the door closest to the hinge under the drive arm into the top web of the door.
- d Insert (4) square nuts provided with arm kit into top rail. Insert (4) M6 X 35 MM screws provide with arm kit into arm. Align screws with square nuts and finger tighten screws.

Note! Step e below is critical. The door must be allowed to self-adjust to the bottom pivot.

- e Loosen the drive arm set screw and allow the arm and door to settle against the bottom pivot.
- f Check that the door has 1/8" (3 mm) maximum clearance at top and does not interfere with the bottom pivot plate. Remove the door and adjust the bottom pivot if necessary.
- g Tighten the four screws in the drive arm/door and then re-tighten the set screw in the drive arm.
- h Turn the SPTE potentiometer (Spring tension) counter-clockwise until the door is at the closed position (0 degrees).

11.2 Offset Pivot Installation - Push

The Offset pivot system consists of a main arm, slide track, guide shoe and shaft adapter. All dimensions given here correspond to an opening angle of 90-100° operator with push arm on a right-handed door shown (left-handed door mirror image). See page 47 for slide track mounting.



- 1 Main Arm
- 2 Slide Track
- 3 Guide Shoe

11.3 Surface Mount Installation

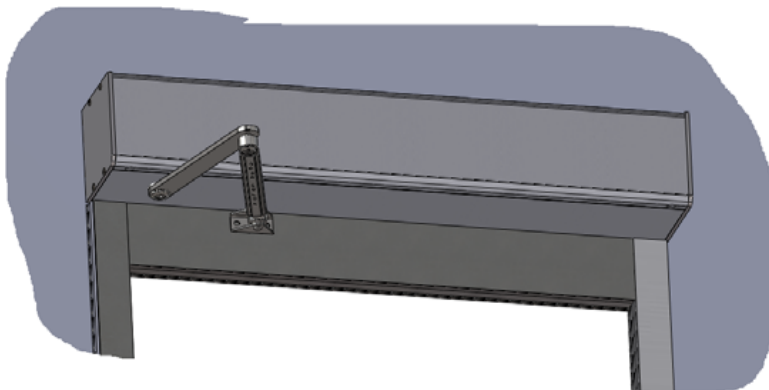
The surface mount operator is used to control all types of swing doors. The operator is mounted on either side of the door header, and the door is controlled with a push or PAS/pull arm system.

11.3.1 Models

PAS/Pull arm system on a right-handed door shown (header/case side).



Push arm system on a left-handed door shown (header/case side).



Surface Mount Installation

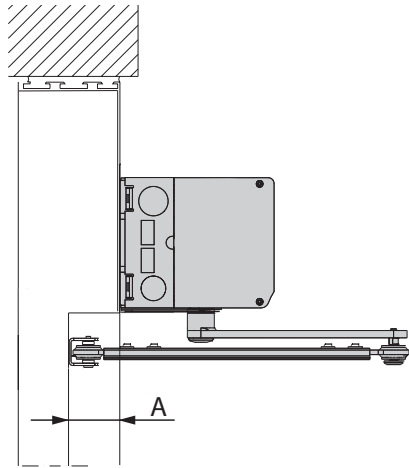
- a Establish the installation height and the correct width of the header.
- b Open/remove cover.
- c Mark and drill the fixing holes and the holes for the cable inlet in the header.
- d Mark and drill for cable inlets and mounting holes into the jamb/header (non-pivot side preferable) for the operator and arm system.
- e Install the header using appropriate screws, or if required, Riv-Nuts. Be sure the header is level left to right as well as front to back.

Note! If installing on a door with swing clear hinges be sure to maintain a maximum distance of $3\frac{3}{4}$ " (95mm) from centerline of spindle to centerline of pivot.

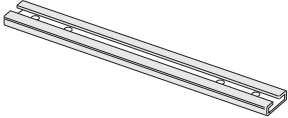
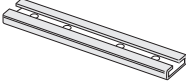
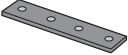
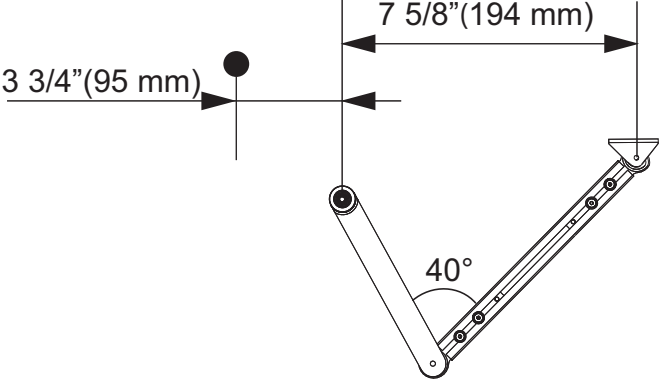
- f Install the external cables through the cable inlet holes. The cables can enter the casing from the hinge/pivot side or from the strike side, but it is always desirable to bring all wiring in at the strike side because of the tight conditions between the operator and the end cap.
- g Install all electrical components inside header, see page 15.
- h Mount the arm system and the door fitting, see page 29.

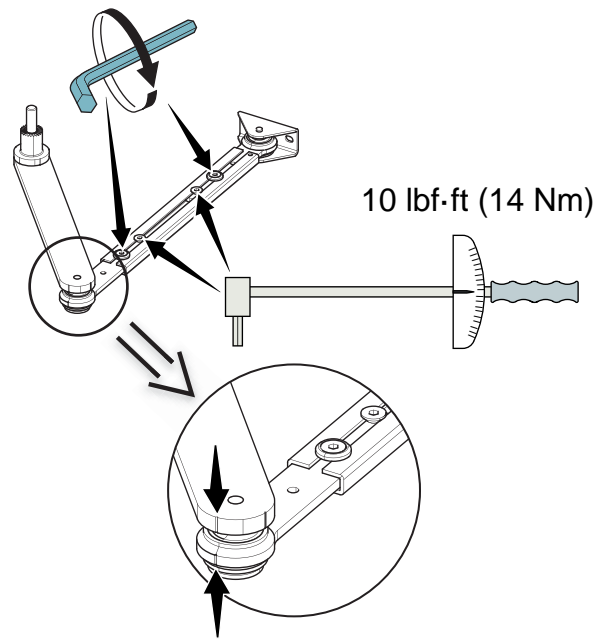
- i Install and make electrical connections, see page 50.
- j Make all final adjustments (sensors, gaps, etc) to the door package in accordance to ANSI requirements.
- k Re-Install cover.

11.3.2 Mounting the arm system



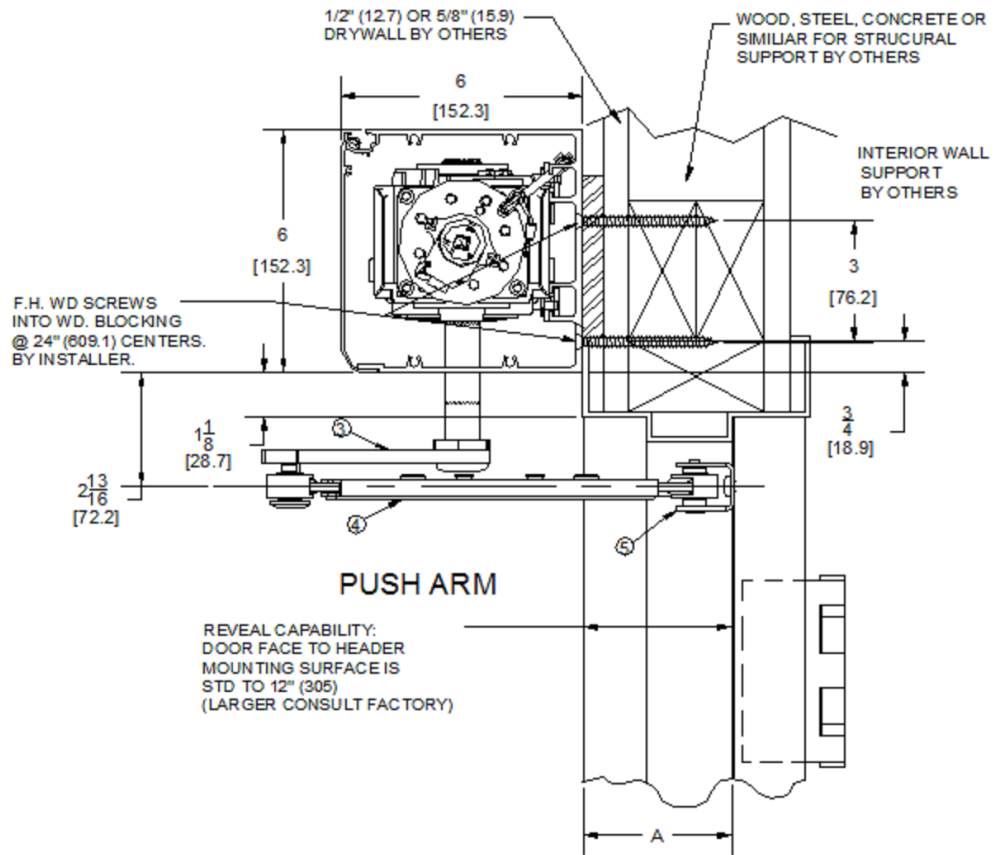
The push arm system consists of a main arm, telescopic part, arm shoe and shaft adapter. The maximum standard reveal A (see illustration above) is 12" (305 mm). All dimensions given here correspond to an opening angle of 90-100°. The operator is shown with push arm on a left-handed door (right-handed door mirror image).

Frame depth	
Extension	Standard
 <p>Telescopic part L= 13 1/2" (345 mm) P/N: 173005</p>  <p>Telescopic part L= 9 1/2" (230 mm) P/N: 173004</p>  <p>Joint assemble P/N: 173191</p>	



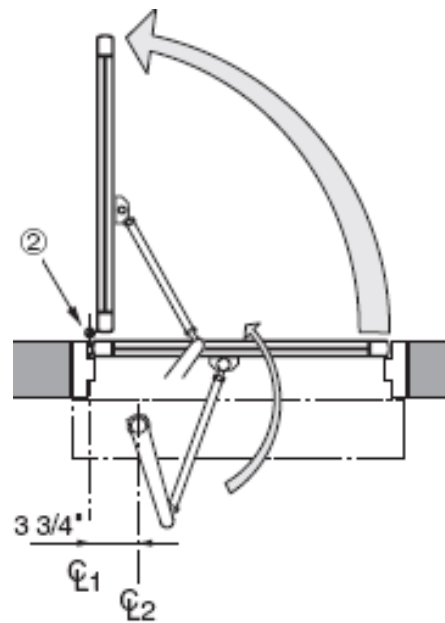
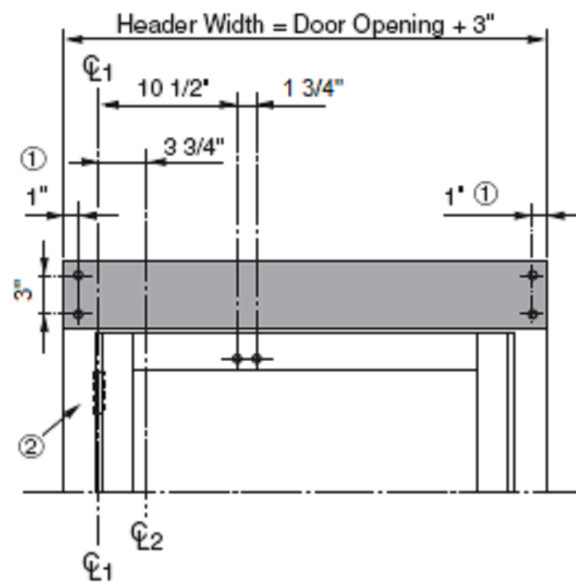
Align markings on drive arm and telescopic arm to achieve 40 degrees between the arms.

11.3.3 Push Arm System



- 3 Main arm
- 4 Telescopic part
- 5 Arm shoe

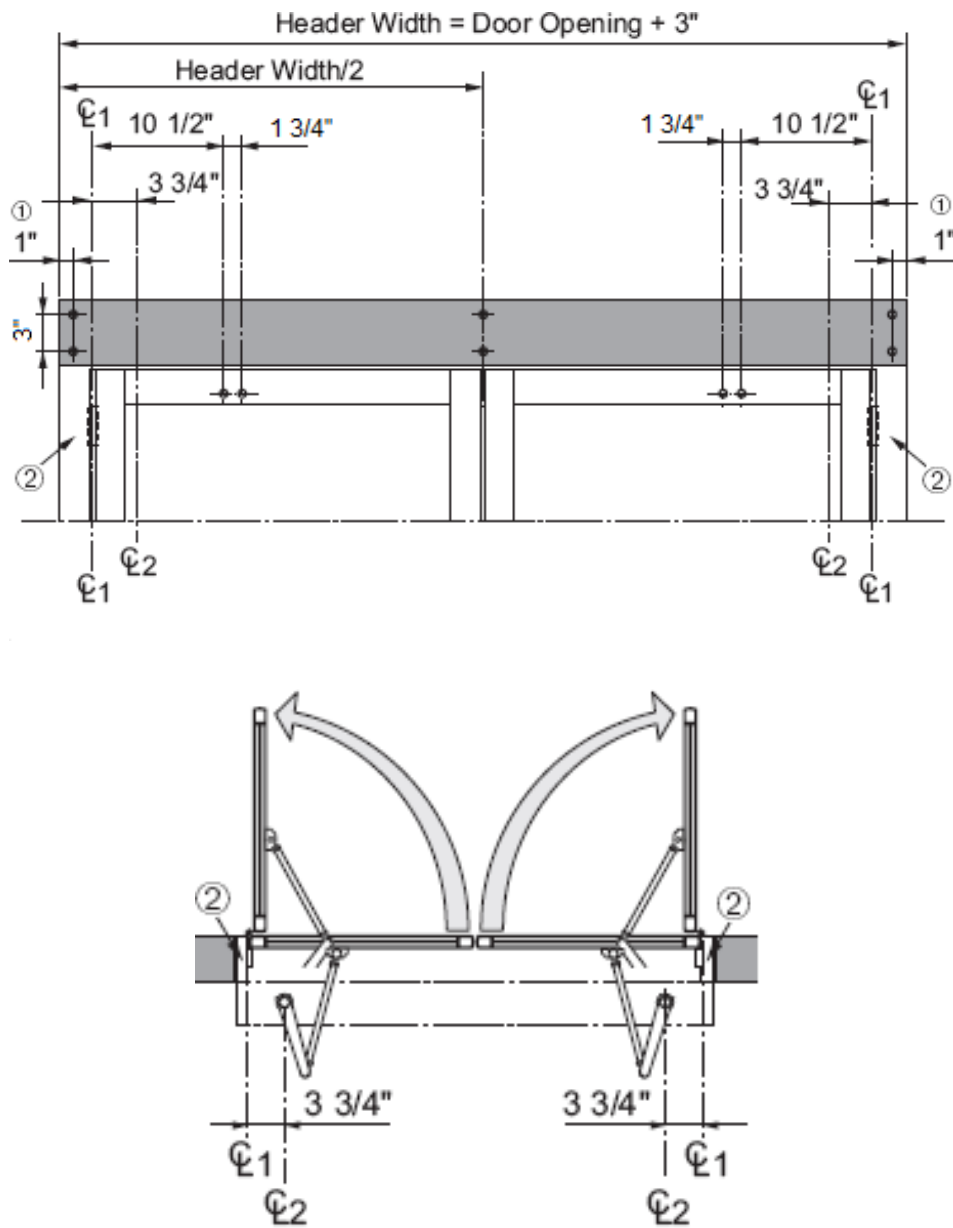
Push Arm System (single)



- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet to be drilled on site
- 2 Offset pivot or butt hinge
- CL1 Pivot/butt hinge centerline
- CL2 Drive shaft centerline

Push Arm System (double)

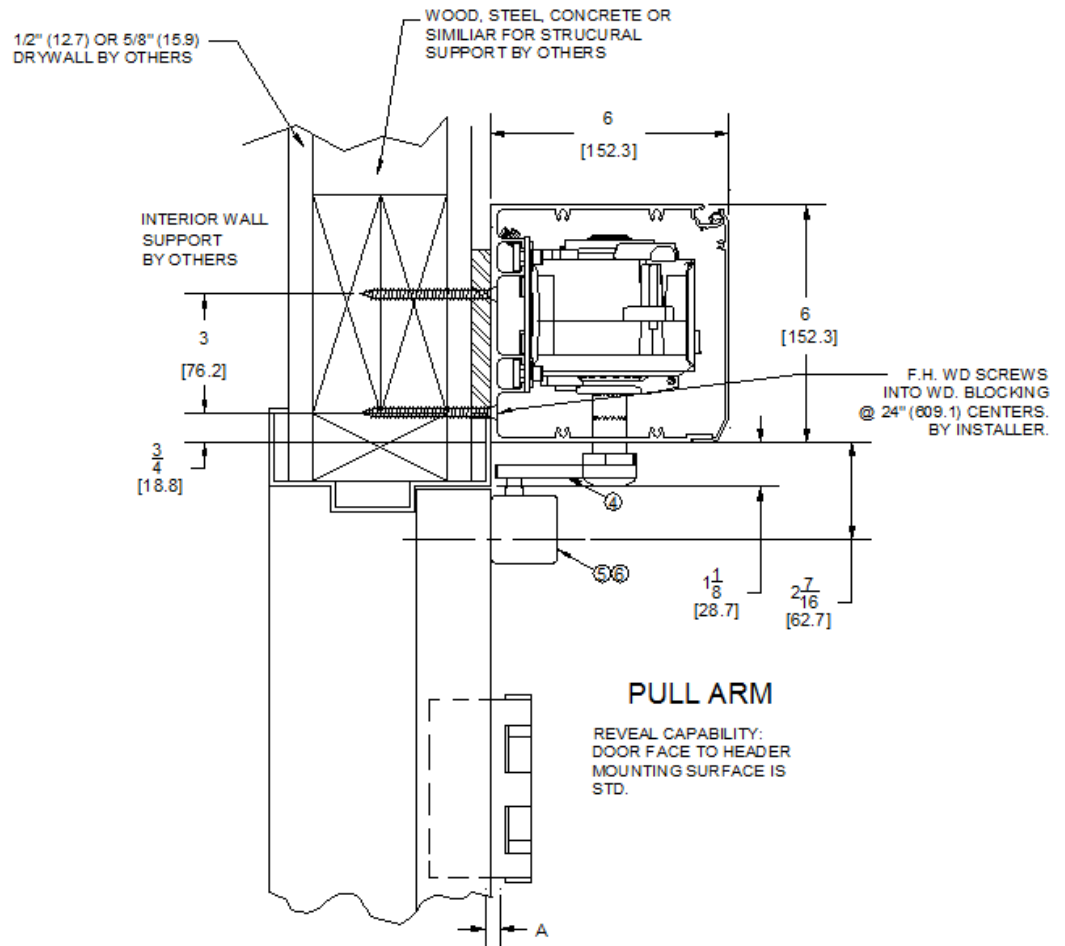
Surface applied dual push



- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet to be drilled on site
- 2 Offset pivot or butt hinge
- CL1 Offset pivot/butt hinge centerline
- CL2 Drive shaft centerline

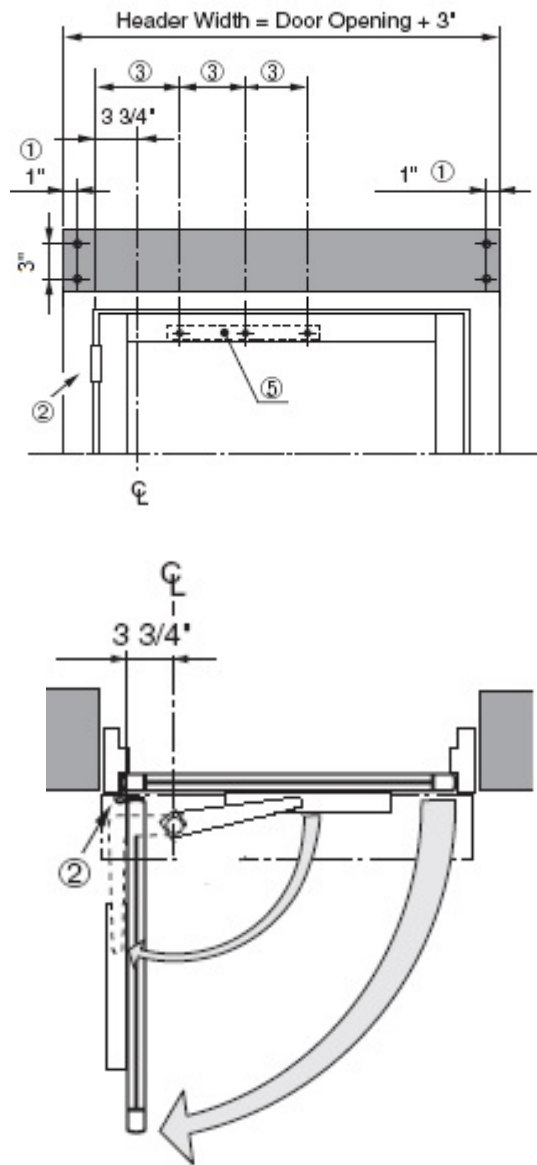
11.3.4 Surface Mount Installation – Pull

The pull arm system consists of a main arm, slide track, guide shoe and shaft adapter. The reveal, or distance from the wall line to the door leaf should be standard. All dimensions given here correspond to an opening angle of 90-100° operator with pull arm on a right-handed door shown (left-handed door mirror image).



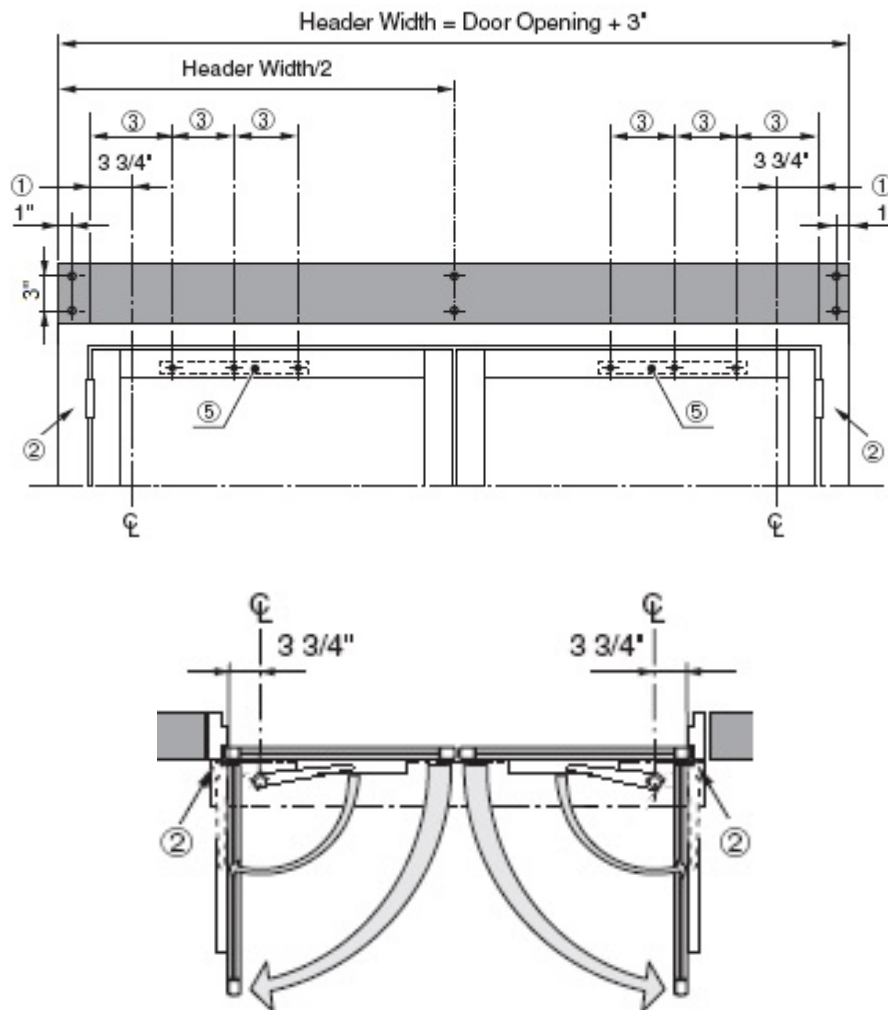
- 4 Main Arm
- 5 Slide Track
- 6 Guide Shoe

Pull Arm System (single)



- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet are predrilled (field installation requirements will dictate what type and size hardware to attach header to wall).
- 2 Offset pivot or butt hinge
- 3 Adjust during installation
- 5 Slide Track
- CL Drive shaft center line

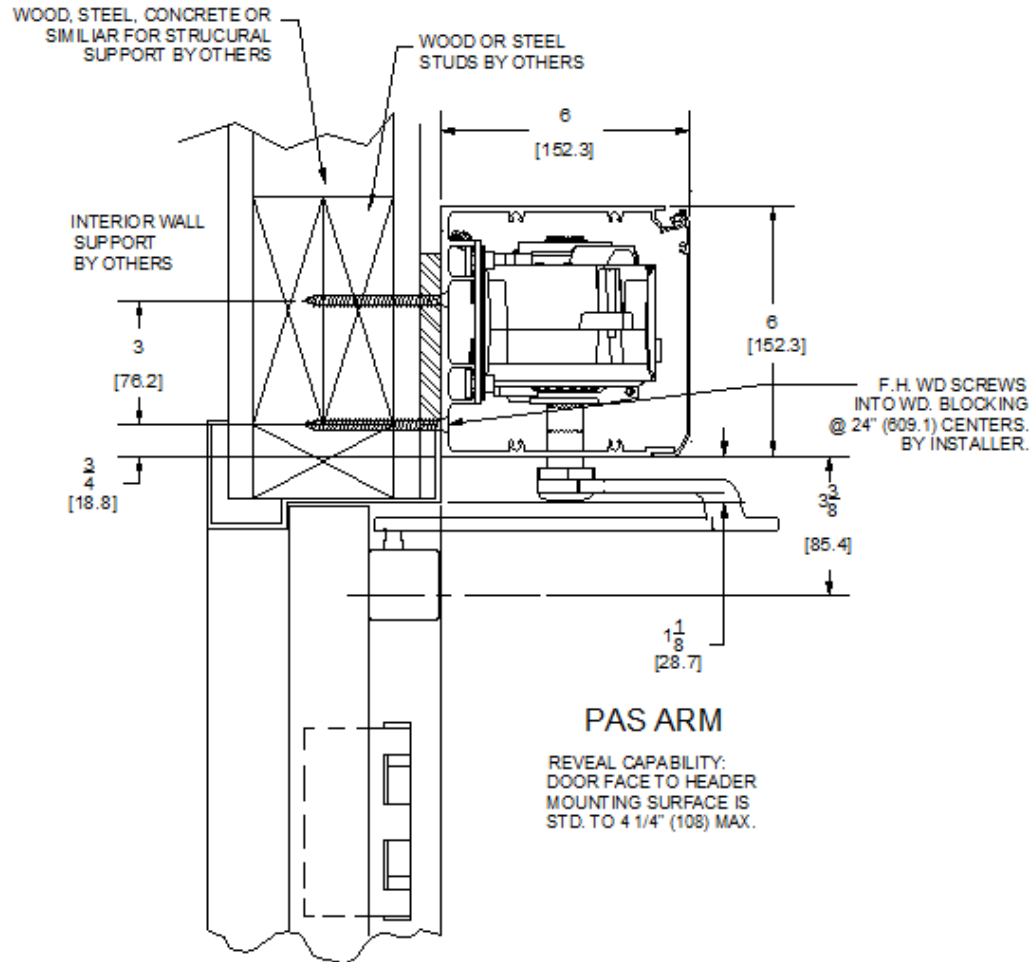
Pull Arm System (double)
Surface applied double pull



- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet are predrilled (field installation requirements will dictate what type and size hardware to attach header to wall.)
- 2 Offset pivot or butt hinge
- 3 Adjust during installation
- 5 Slide Track
- CL Drive shaft center line

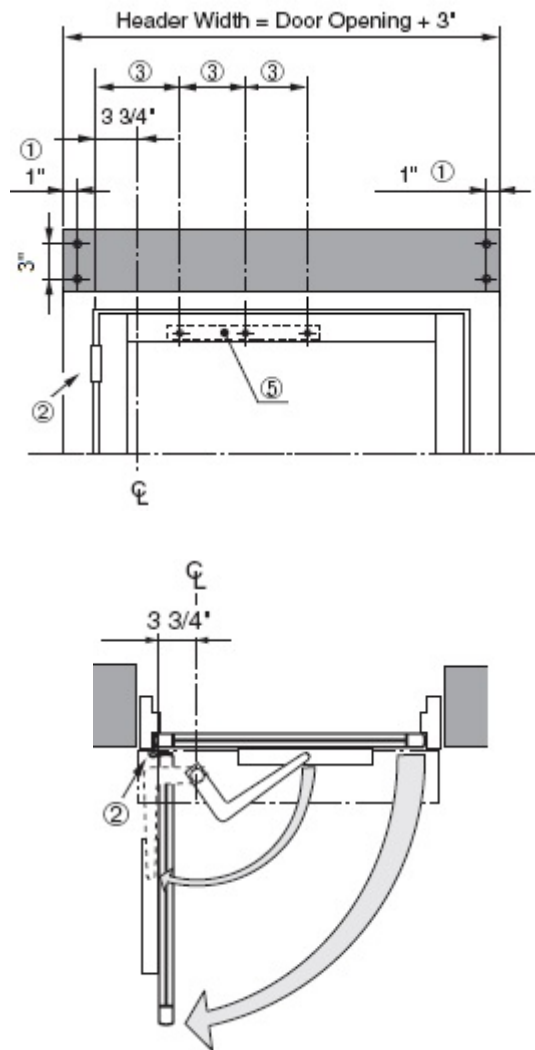
11.3.5 Surface Mount Installation – PAS

The PAS system consists of a main arm, slide track, guide shoe and shaft adapter. The maximum reveal, or distance from the wall line to the door leaf (A), should not exceed 4 1/4" (108 mm). All dimensions given here correspond to an opening angle of 90-100° operator with pull arm on a right-handed door shown (left-handed door mirror image).



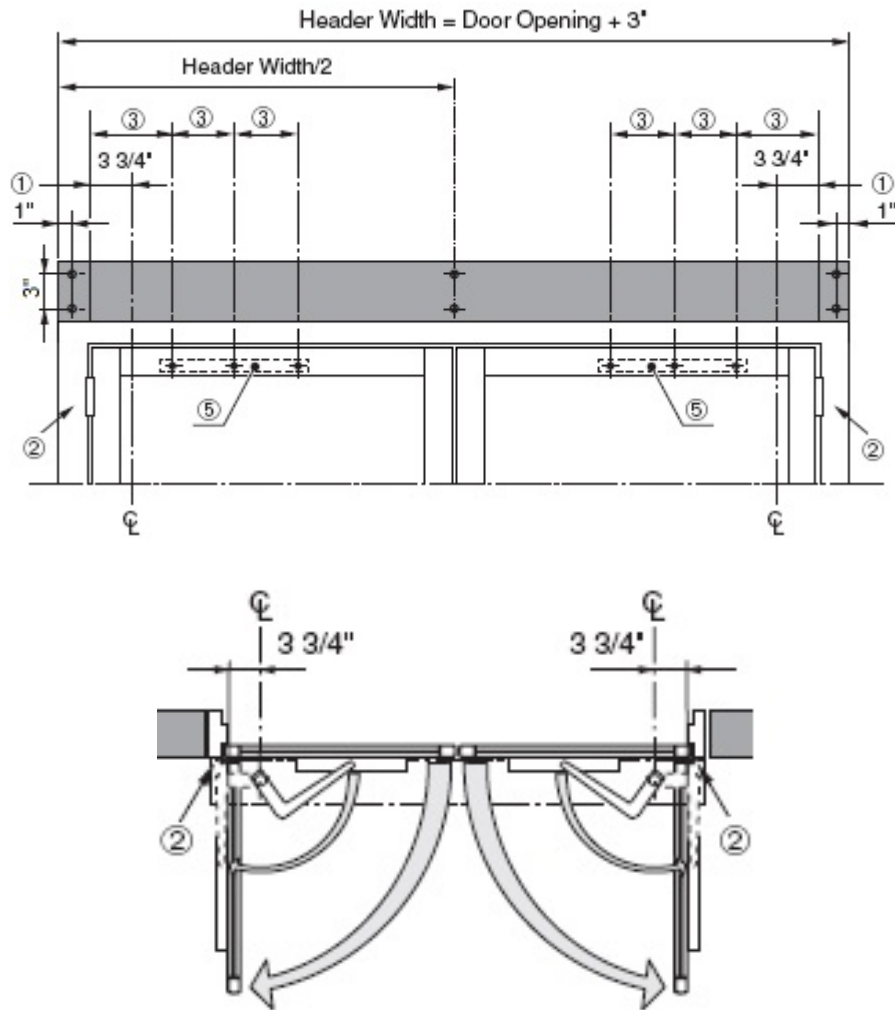
- 4 Main Arm
- 5 Slide Track
- 6 Guide Shoe

PAS Arm System (single)



- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet are predrilled (field installation requirements will dictate what type and size hardware to attach header to wall).
- 2 Offset pivot or butt hinge
- 3 Adjust during installation
- 5 Slide Track
- CL Drive shaft center line

PAS Arm System (double)
Surface applied double pull



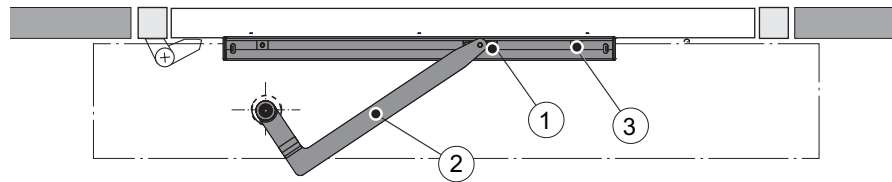
- 1 Clearance holes for 1/4" (6 mm) bolts and cable inlet are predrilled (field installation requirements will dictate what type and size hardware to attach header to wall).
- 2 Offset pivot or butt hinge
- 3 Adjust during installation
- 5 Slide Track
- CL Drive shaft center line

Slide Track Mounting (Pull/Offset Pivot & PAS Arm)

- a Locate the door in closed position.
- b Fix the main arm (2) with guide shoe (1) loose onto the operator shaft so that the guide shoe is just in contact with the door.
- c During the opening and closing movement of the door, the guide shoe (1) will move a certain distance on the door. Mark the end positions for this distance.

Note! The end positions do not always occur when the door is fully closed and fully open.

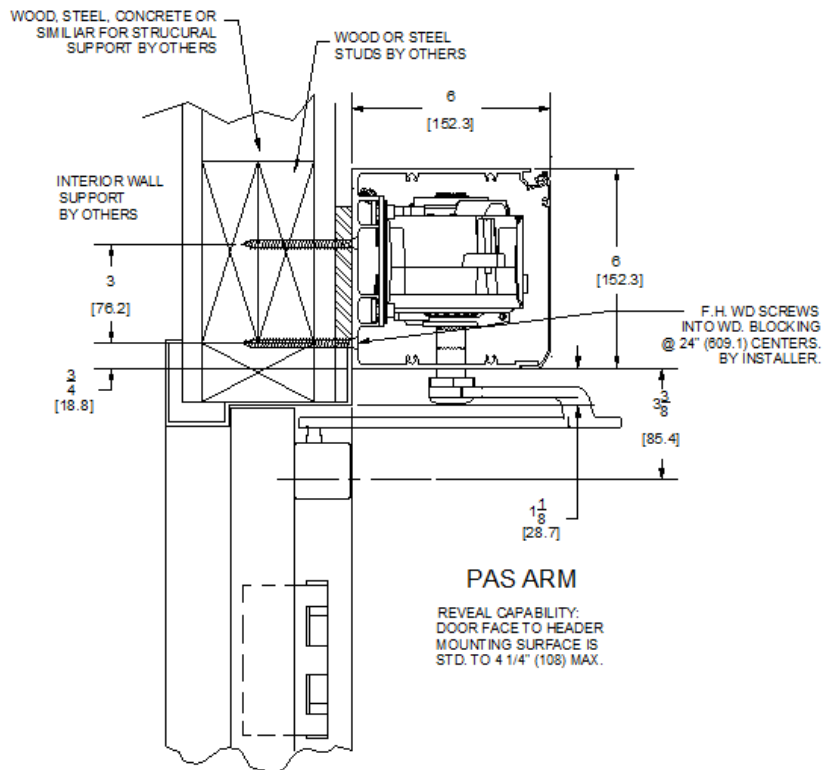
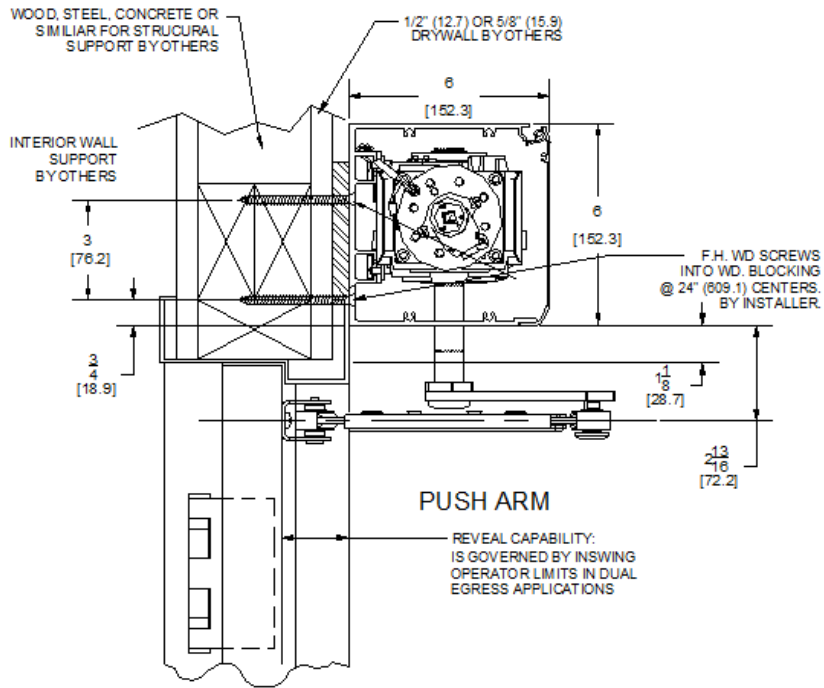
- d Position the slide track (3) on the door and mark the fixing holes, then drill holes in door.
- e Use hardware provided to mount slide track.



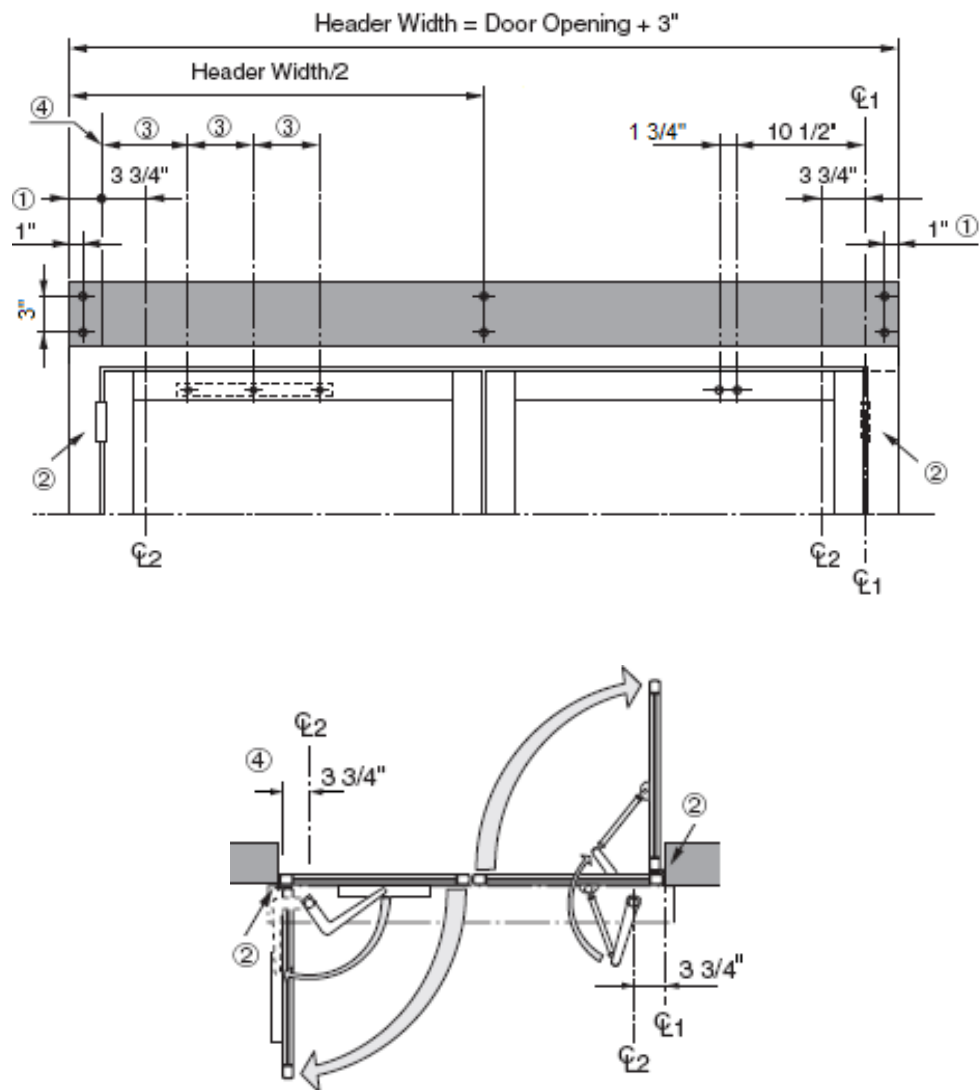
PAS-arm shown

- 1 Guide shoe
- 2 Main arm
- 3 Slide track

11.3.6 Push/Pull Arm System (double egress)



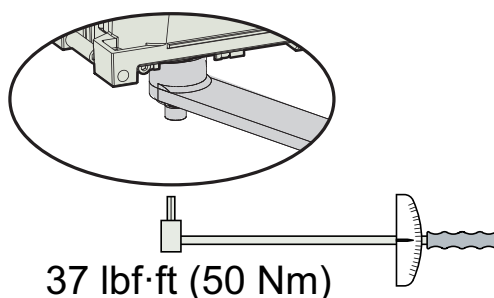
Surface applied dual egress



- | | | | |
|---|--|-----|-------------------------------------|
| 1 | Clearance holes for 1/4" (6mm) bolts and cable inlet to be drilled on site | 4 | Outer side of 90° |
| 2 | Offset pivot or butt hinge | CL2 | Drive shaft center line |
| 3 | Adjust during installation | CL1 | Offset pivot/butt hinge center line |

11.3.7 Fixing screw

When the arm installation is ready the fixing screw must be tightened with 37 lbf.ft (50 Nm).



12 Electrical connection

Note! The installation shall be made according to local codes.

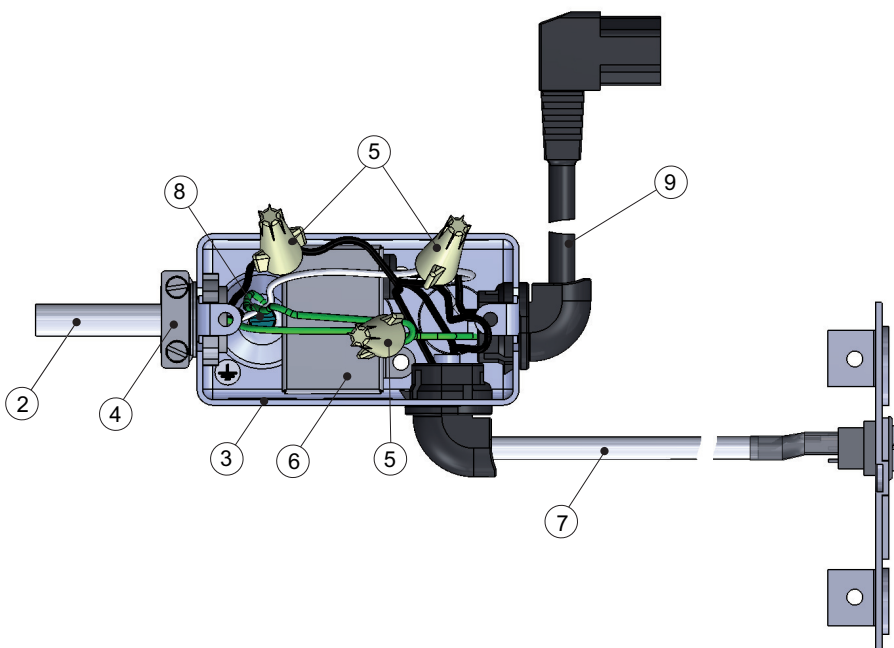
When working in, with or around electrical circuits, all power must be disconnected.

12.1 Connection box, single door

Fit the connection box in the back plate.

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.

- a Switch off the electrical power.
- b Unscrew the lid.
- c Strip approximately 5 inches off from the outer insulation of the power installation cable (2).
- d Insert the free end of the power installation cable into the connection box (3) through the metal strain relief (4).
- e For the following connections: Use twist-on wire connectors (“wire nuts”)(5), that are approved for the application. The wires should be stripped according to the instructions for the used wire connector. Be aware, local code shall be followed.
 - Connect the (white) neutral wire of the power installation cable with the AWG18 (white) neutral wire that extends from the CPD metal housing (6).
 - Connect the (black) phase wire of the power installation cable with the free AWG18 (black) wire of the cable of the rocker switch assembly (7).
 - Connect the solid green earth wire (8), that is attached to the bottom of the connection box, with the green earth wire of the power installation cable (2), and the green earth wire of the interconnection cable (9).
- f Tuck the slack of the wires into the largest compartment, between the CPD metal housing (6) and the wall of the connection box. Be careful not to place connectors, or excessive loops of wire, on top of the CPD metal housing as they might interfere with the fastening of the cover.
- g Fasten the lid (1) of the connection box.



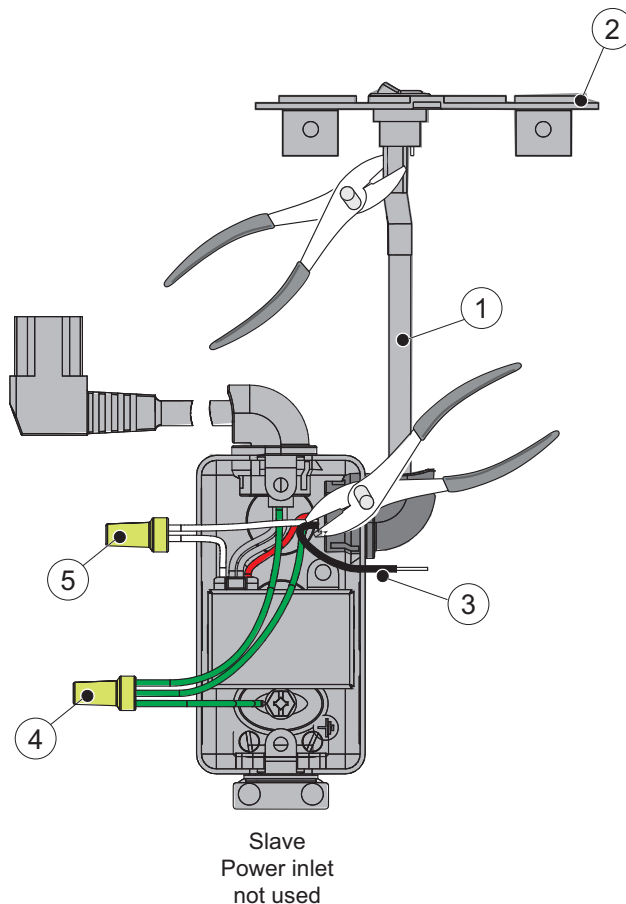
12.2 Connection box, double doors

Re-wiring of Slave Connection box to Master Connection Box

Only one power switch is needed to operate two units. Discard the extra switch and use the extra power wires found in cable (1) to route power between connection boxes.

Leave the black/white/green wires accessible for the electrician in the box tied to the Master control.

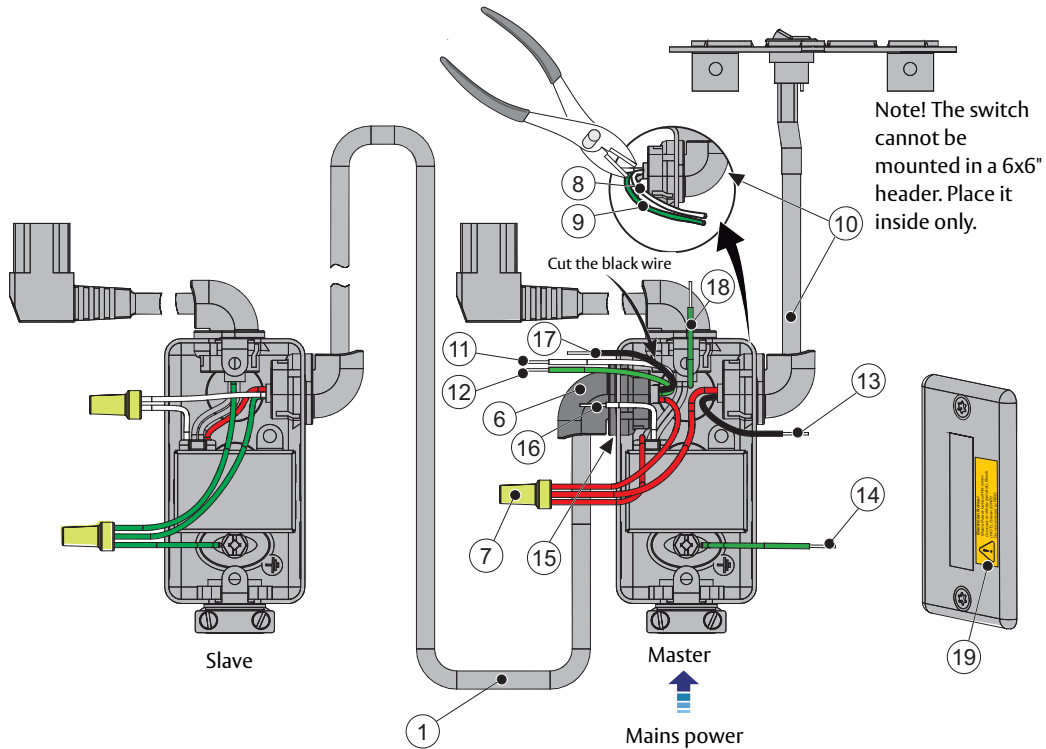
- a Remove the covers from both connection boxes.
- b Cut off the Rocker Switch cable (1) close to the switch on the unit intended to be the slave. The Bottom end plate (2) is now obsolete material and is not used in the installation.
- c Cut off the black wire (3) close to where it exits the cable (1), careful not to nick other wires. This wire will not be used.
- d Connect the three green wires using a wire nut (4).
- e Connect the two white wires using another wire nut (5).
- f Adjust all wires neatly into box and reinstall the cover on the Slave box.



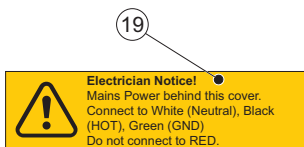
Assemble Slave Connection box to Master Connection box

- g Remove the knock-out plate of the unused entry (15) in the Master connection box.
- h Insert the cut cable (1) through the new hole. Mount a strain relief (6) around the cable and let it snap into the connection box wall leaving at least 4" of extra cable in the box.
- i Cut the red wire in the Master box, leaving equal legs, and connect the three red wire ends with a wire nut (7).
- j Cut off the white (8) and the green (9) wires from the Rocker Switch cable (10), being careful not to nick other wires.

- k Strip the white (11) and the green (12) wires from cable (1). Leave these two wires unconnected and cut off the remaining black wire (17) from cable (1).
- l Only the following wires should now be unconnected;
 - white wires (11) + (16) and green earth wires (12) + (14) + (18)
 - black wire (13) from the Rocker Switch cable
- m See Installation Manual (1007718), chapter Electrical Connection, section Connection box, how to connect the mains power supply cable to the Master Connection box.
- n Place the wires in the Master Connection box. Fasten the covers on both Connection boxes and connect the Interconnection cables to the control unit.



Note! Connect the sync cable (Kit No. 1008552) in between the two control units and apply an "Electrician Notice" label (19) to the cover of the Master mains power connection box.

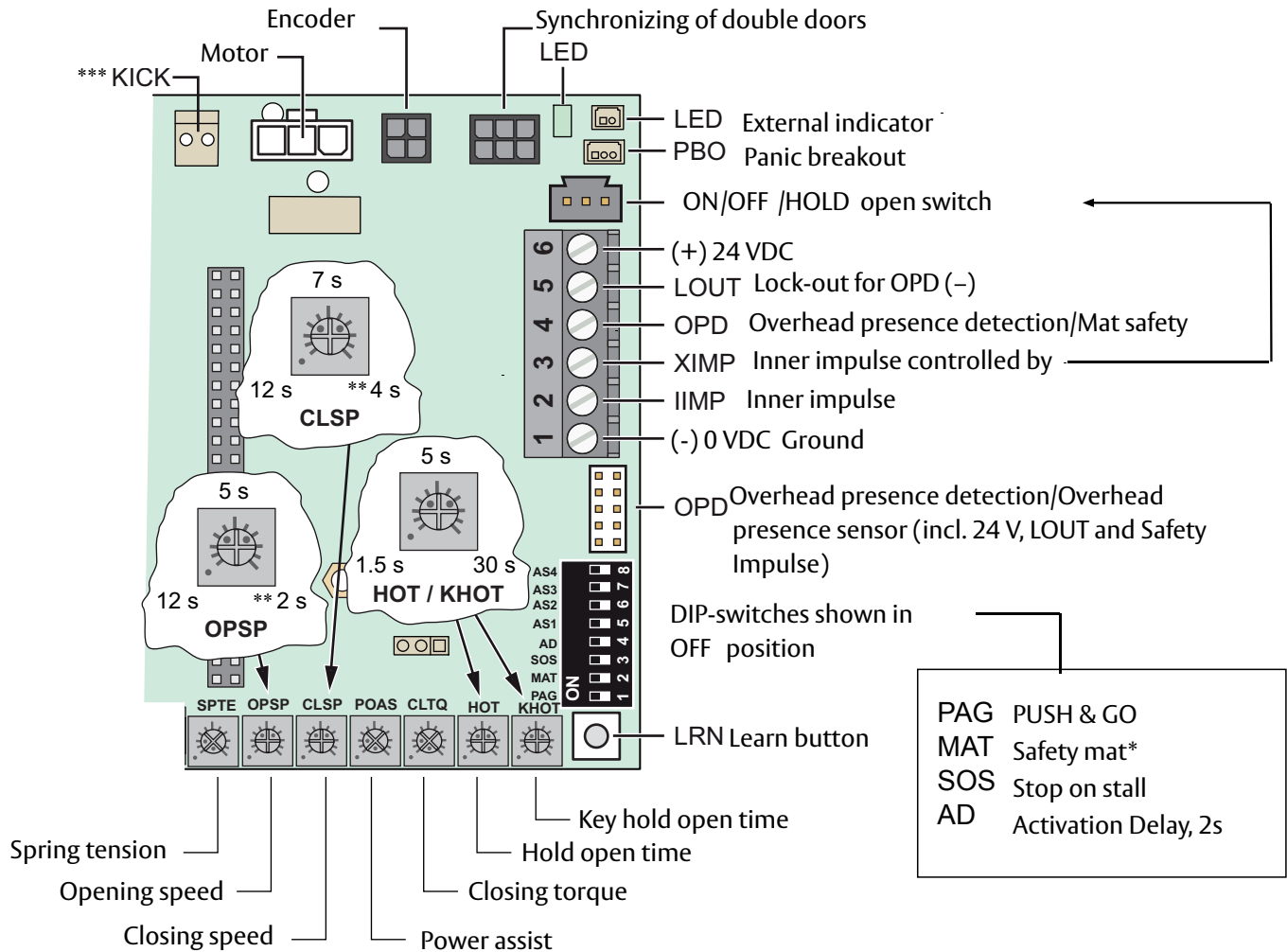


Tip: For convenience tape together 1" from the ends of the following wire combinations in the Master mains power connection box: Whites (11) + (16), Greens (12) + (14) + (18), Black should be a single wire.

12.3 Control units

12.3.1 CU-200

The CU-200 can be equipped with extension units, EXU-SI and/or EXU-SA, depending on the functions required, see page 56 or 57.



- * After changing MAT dip switch a new LEARN must be carried out.
- ** With heavier doors the time will increase.
- *** Remove jumper if/when connecting the mechanical lock kick used for fire doors.

12.3.2 Arm system selection

Factory set arm configuration is PUSH 8 1/4" (210 mm), if other is required:

Select arm configuration on the DIP-switches according to the table below.

Type of arm system	Spindle location (hinge to outgoing spindle)	ON=1 OFF=0			
		AS 1 DIP 5	AS 2 DIP 6	AS 3 DIP 7	AS 4 DIP 8
Pushing	PUSH, 8 1/4" (210 mm)	0	0	0	0
Pushing	PUSH, 3 3/4" (95 mm)	1	0	0	0
Pushing	PUSH, 2 3/4" (70 mm)	0	1	0	0
		1	1	0	0
		0	0	1	0
		1	0	1	0
		0	1	1	0
Concealed (Outswing)		1	1	1	0
Pulling PULL	PULL, 8 1/4" (210 mm) Reveal 0" - 2 9/16" (0-65 mm)	0	0	0	1
Pulling PULL	PULL, 8 1/4" (210 mm) Reveal 2 9/16" - 5 1/8" (65-130 mm)	1	0	0	1
Pulling PULL/PAS	PULL, 3 3/4" (95 mm) Reveal 0" - 2 9/16" (0-65 mm) PULL, 2 3/4" (70 mm) Reveal 0" - 2 9/16" (0-65 mm)	0	1	0	1
Pulling PULL/PAS	PULL, 3 3/4" (95 mm) Reveal 2 9/16" - 5 1/8" (65-130 mm) PULL, 2 3/4" (70 mm) Reveal 2 9/16" - 5 1/8" (65-130 mm)	1	1	0	1
		0	0	1	1
Sliding push	PULL 210, 8 1/4" (210 mm) Distance (Reveal + Door thickness + hinge) = 75-130 mm	1	0	1	1
Sliding push/Offset pivot	PULL 95, 3 3/4" (95 mm) Distance (Reveal + Door thickness + hinge) = 0-80 mm	0	1	1	1
Concealed (Inswing)	-	1	1	1	1

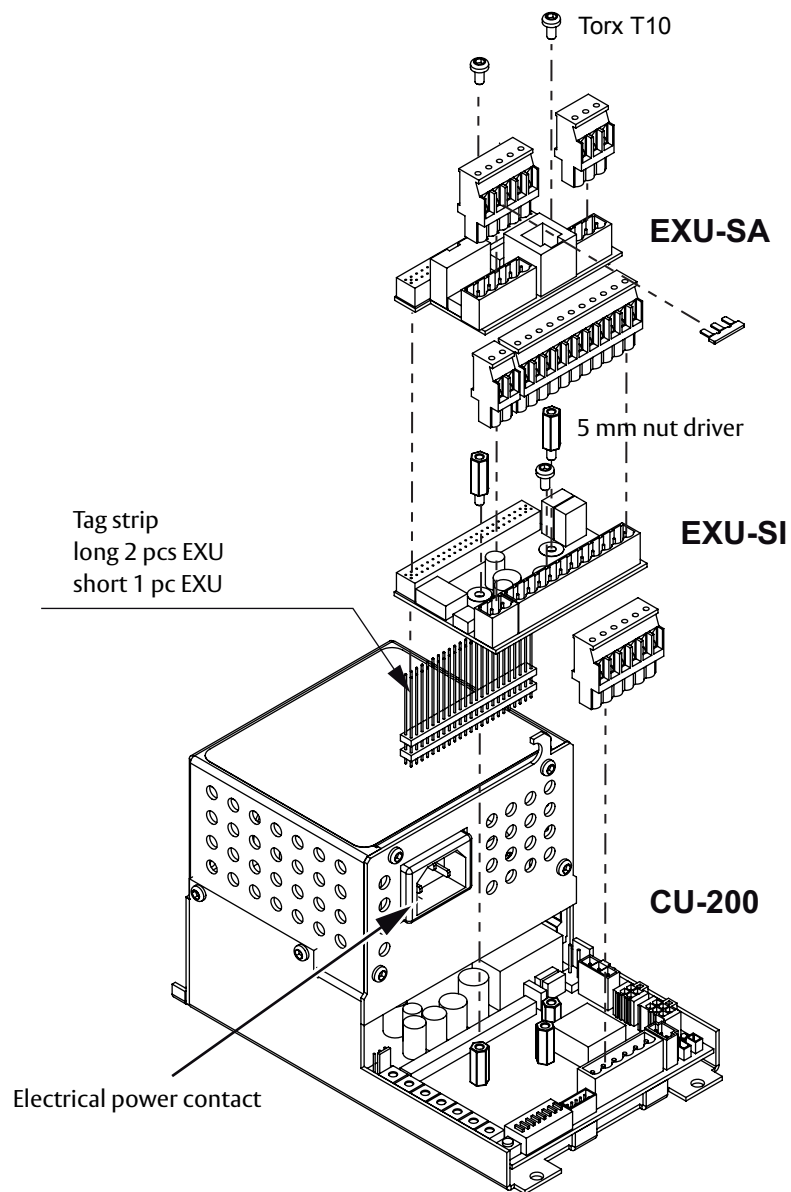
Note! The Panic Break Out Switch, shall be a normally closed contact, and is only needed at the Concealed inswing application.

Note! After changing any system selection a new LEARN must be carried out.

12.3.3 Extension units EXU-SI / EXU-SA

Installation

To extend the functions, the extension units can be mounted on top of the control unit CU-200, **separately** or combined.

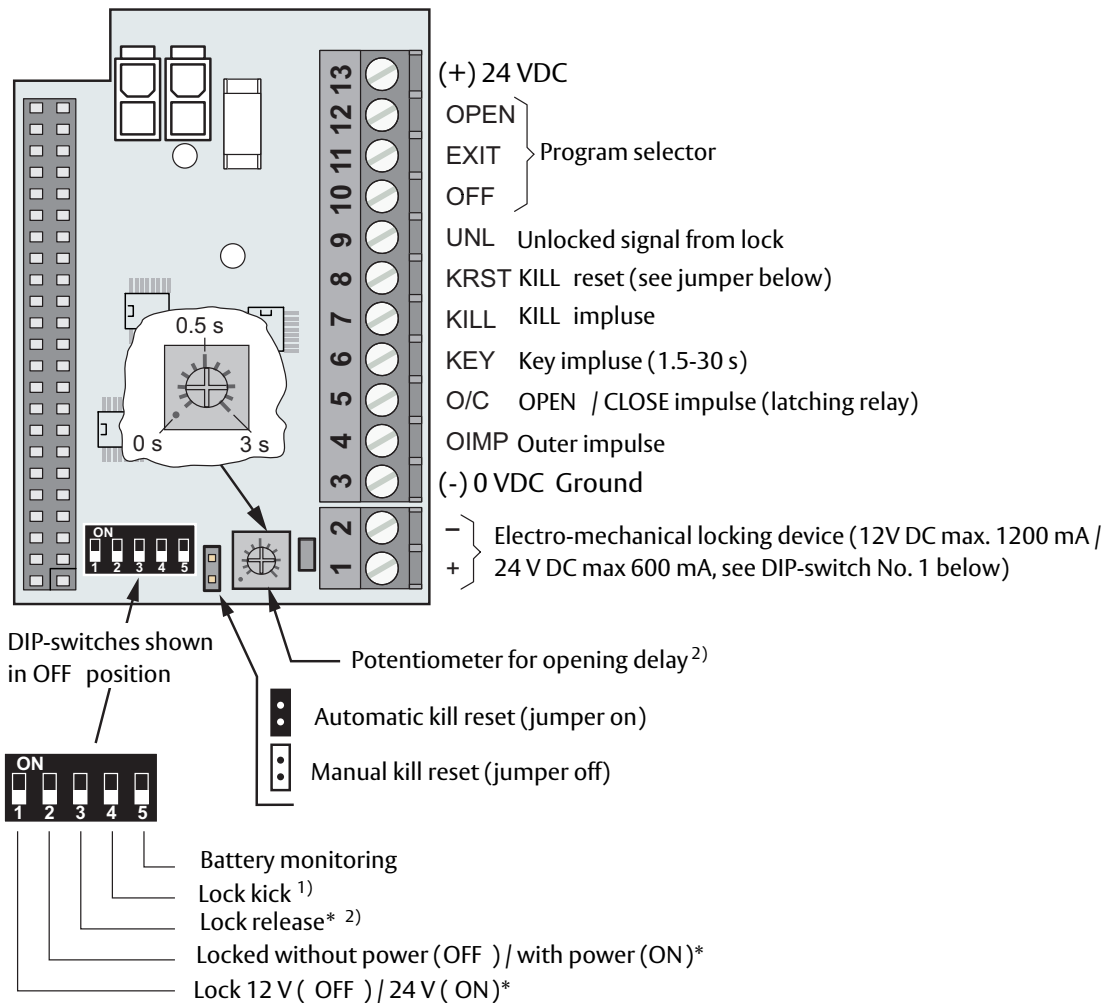


Note! After changing/replacing an extension unit a new LEARN must be carried out.

12.3.4 Extension unit EXU-SI

Functions

This extension unit has inputs for electro-mechanical lock, program selector, batteries, KILL function, OPEN/CLOSE, KEY opening and outer impulse.



1) 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.

2) 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.

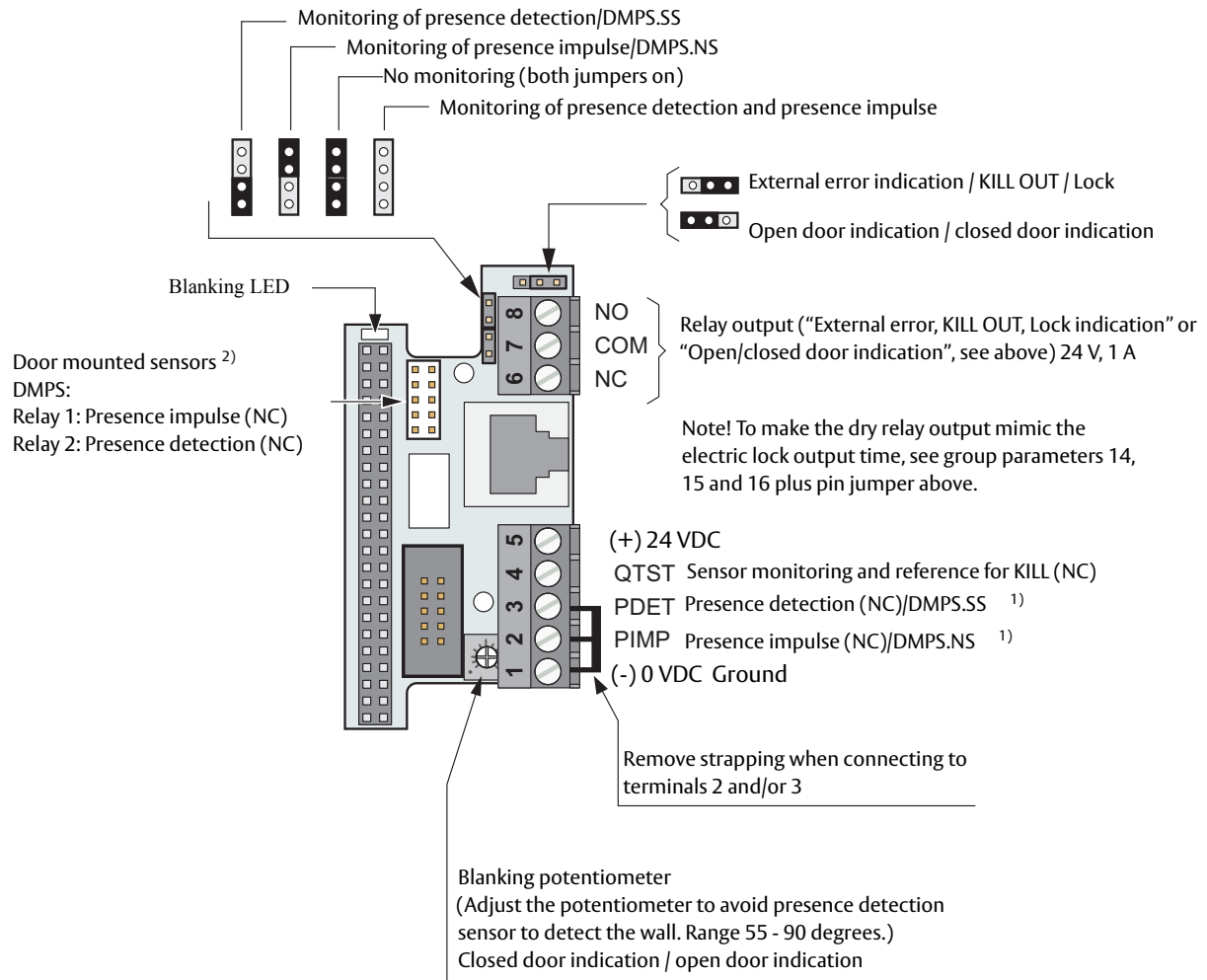
Note! Lock only functions when Program Selector is in OFF or EXIT.

* After changing any system selection a new LEARN must be carried out.

12.3.5 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

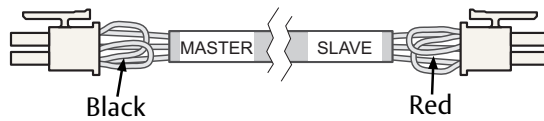


¹⁾ If not used strap to "Ground".

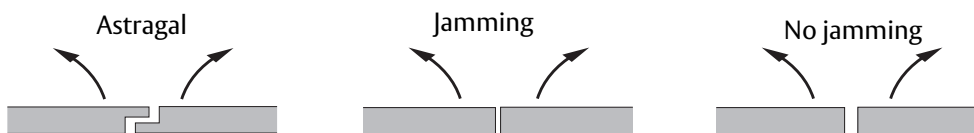
²⁾ Remove strapping from terminals 2 and/or 3.

12.3.6 How to cut the jumper on the sync cable for double doors

Note! Connect a cable between Master CU TB1(GND) and Slave CU TB1(GND).



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



Also see page 22.

12.3.7 Settings for double doors

Function	Settings on the	
	MASTER	SLAVE
Common		
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	
SOS On/Off	X	
Level of Power assist	X	(X)*
Extended closing torque	X	(X)*
OPD/OPS Impulse or Mat Logic Impulse	X	
Individual		
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!

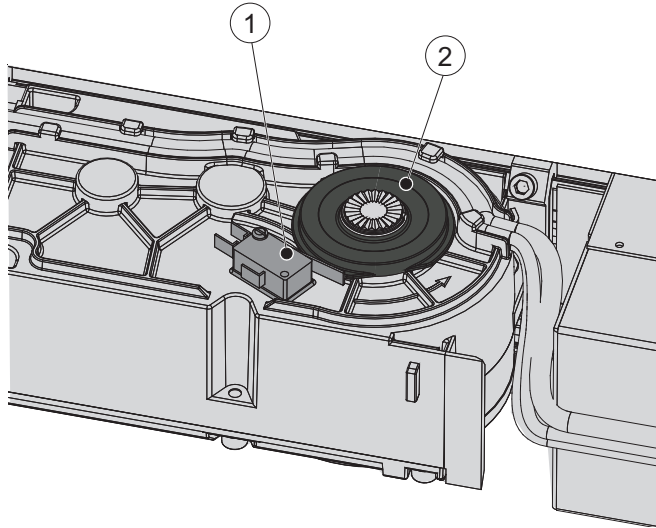
- Locks on the MASTER and SLAVE doors must be connected to the control unit (CU) on the corresponding operator.
- Inner and outer impulses can be connected to either MASTER or SLAVE CU or both.
- The OPD/OPS is to be connected to the MASTER CU except for “Double egress”, where each OPD/OPS must be connected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

13 Start-up

The spring pre-tension is **factory set to 360°** and is normally not necessary to adjust. If adjustment has to be carried out, see “Reducing / Increasing the “Spring pre-tension” (SPTE)” on page 69.

Check and adjust the micro switch (1), controlling the lock kick, by turning the black plastic cam (2) when power is off.

This lock kick is optional and only used with fire doors to give a lock kick at power failure.

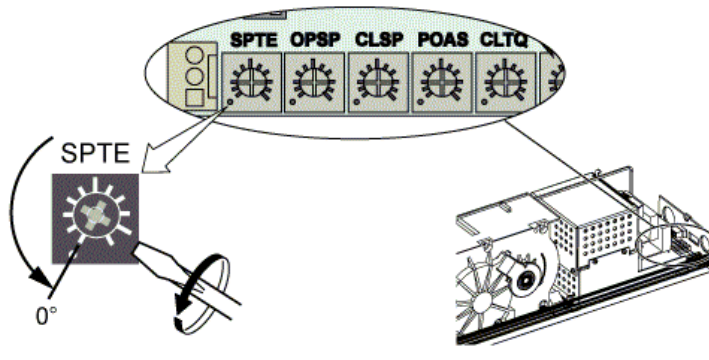


13.1 Adjusting the door stop

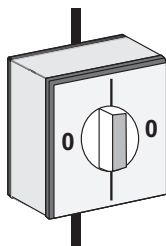
- a Close the door.



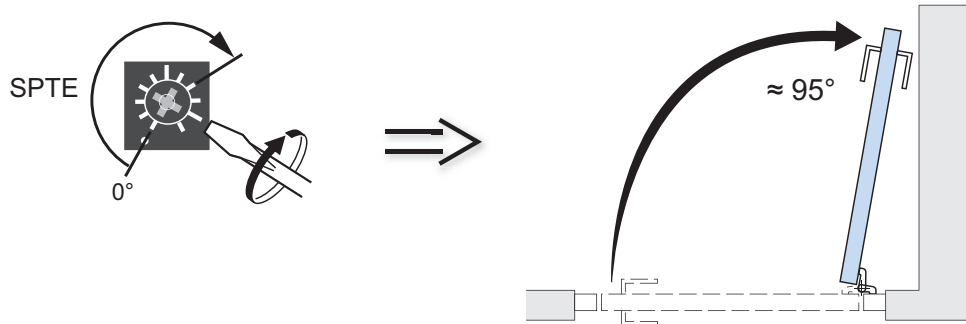
- b Turn the potentiometer SPTE to 0° (if not already on 0°).



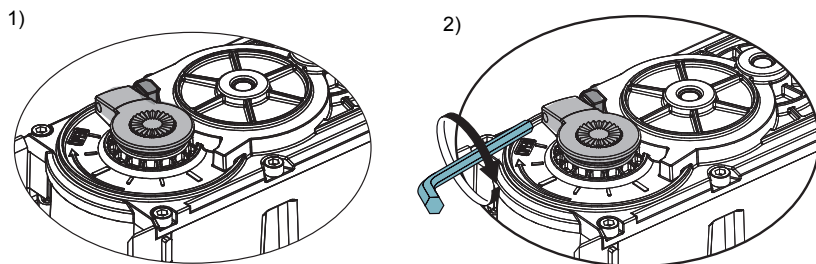
- c Switch on the electrical power (the operator will find its closed position) and make sure the LED is on.



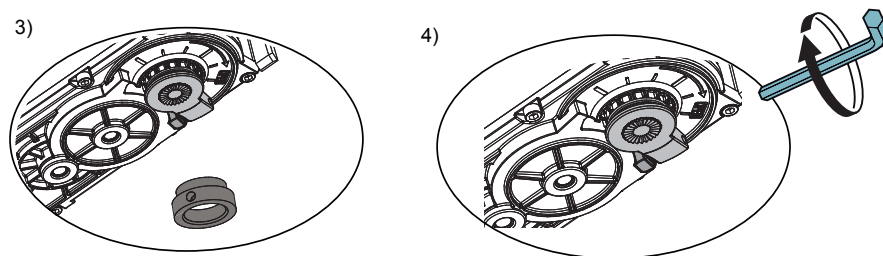
- d Open the door to required open position, plus approx. 5/8" (15 mm), by turning the potentiometer SPTE on the CU-200, clockwise.



- e When stop arm is on top of the operator, lift the door stop arm up and mount it on the splines, as close as possible to the stop block 1). Fine-adjust if necessary with the screw on the stop arm 2).

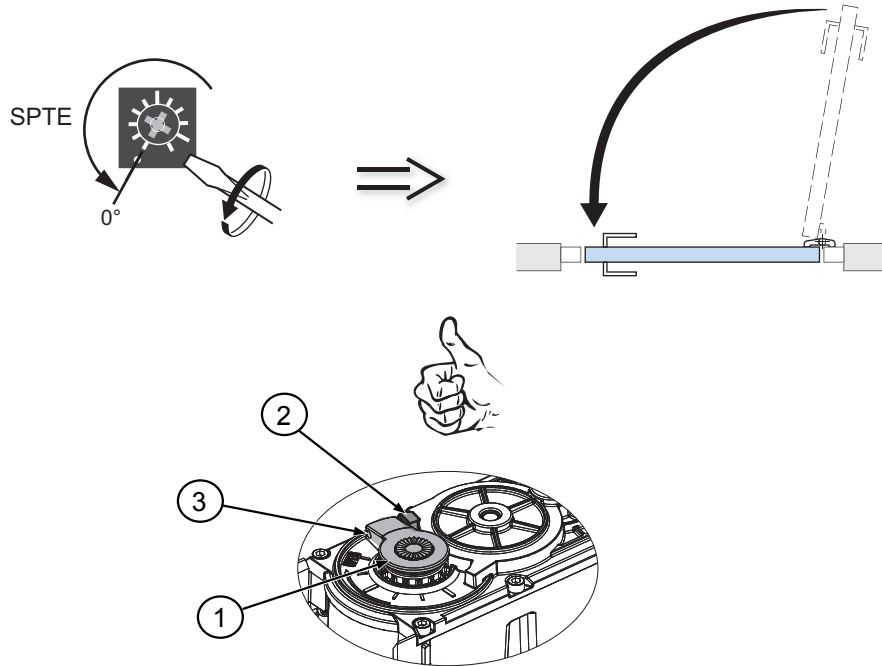


- f When stop arm is on the bottom of the operator, loosen the stop ring and the stop arm and let slide down. Mount the stop arm on the splines, as close as possible to the stop block 3). Mount the stop ring. Fine-adjust if necessary with the screw on the stop arm 4).



- g Close the door by turning the potentiometer SPTE to 0° and let the door close.

Note! Impulses are not accepted if SPTE is more than 0°.

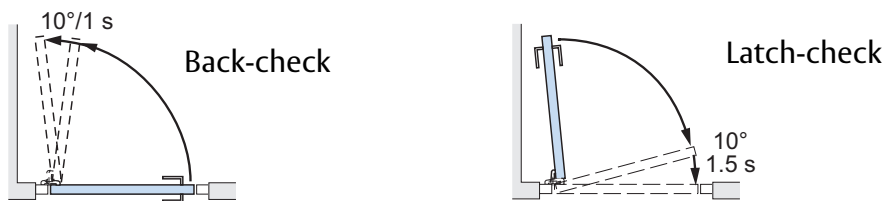


- 1 Door stop arm
- 2 Stop block
- 3 Fine-adjustment screw

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

This learning is performed by pushing the LEARN BUTTON (LRN).

- Before the learning procedure starts, make sure that the door has been properly closed i.e., not by force.
- A new learn must be carried out in following situations
 - 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.
 - If any of the arm system DIP-switches are changed.
 - If the MAT DIP switch is changed.
 - When replacing any of the extension units.
 - When changing of Locked with/without power.
 - When changing of Lock 12/24 V.
- 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.



13.2.1 Push the LEARN BUTTON (LRN)

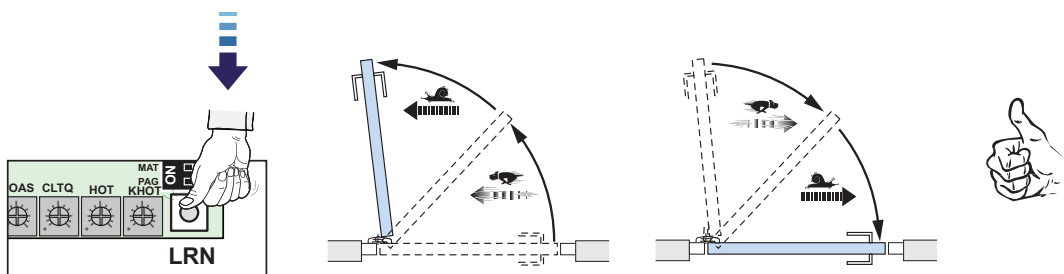


Remain clear of swing path of door, as door may open and close rapidly. The door has no safety during auto-learn cycle.

When the learn button is pressed the status LED starts to blink and will not stop until learn is concluded.

Note! Do not touch the door during the auto-learn cycle.

The learn cycle starts with sensor detection, during which the door will stand still. When the door starts moving the spring tension and door inertia are measured and the door open and close position is saved. When the learn is concluded the back-check, latch-check, opening time and closing time are calculated. The changed settings affect the behavior of the installation and must be verified.



13.2.2 Double doors

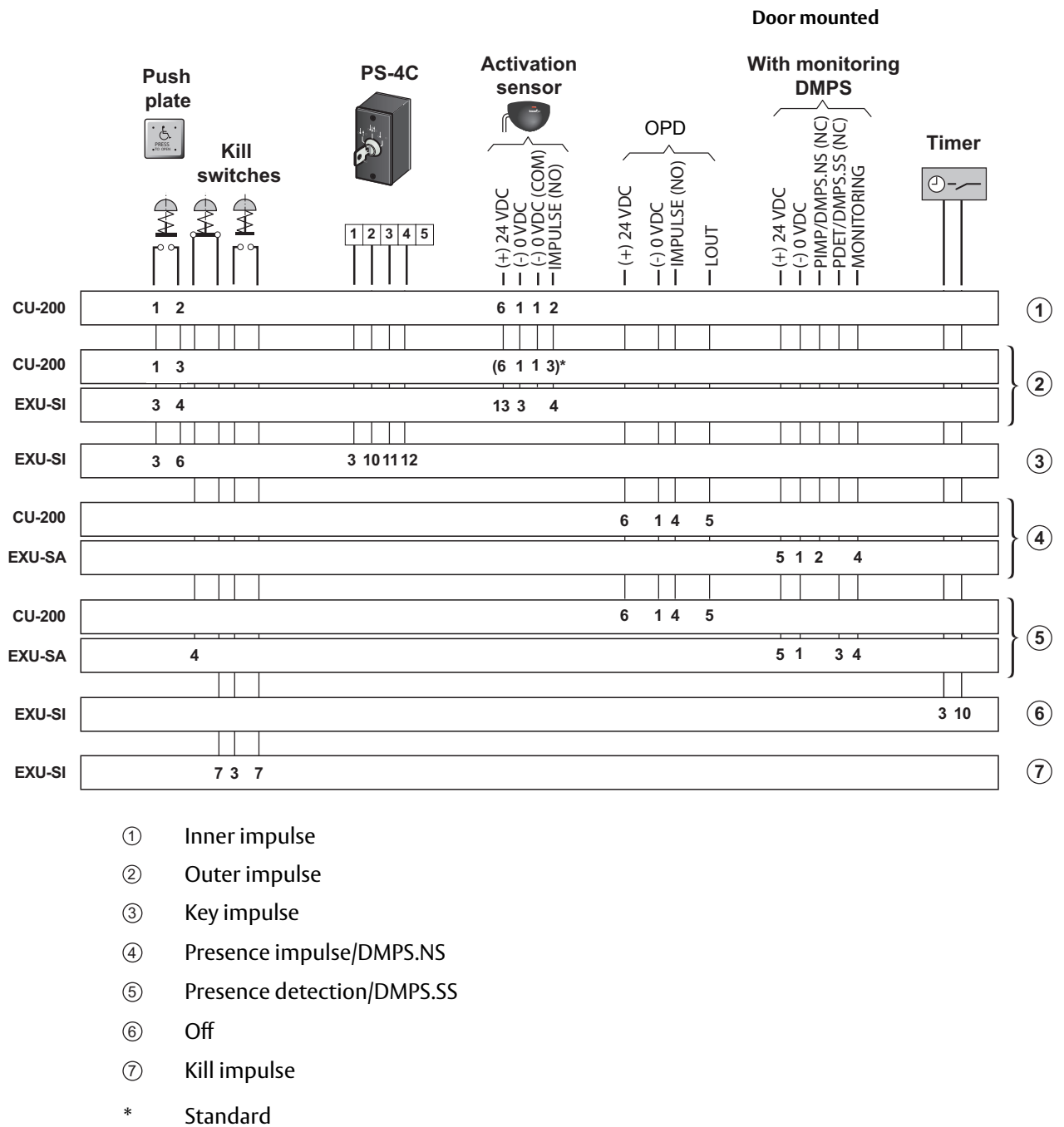
For double doors, the MASTER door must be learned first and thereafter the SLAVE door. When the SLAVE door is learned, the MASTER door will open up to fully open position during the learning phase of the SLAVE door.

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.

13.3 General adjustment

- a Set the hold open time with the potentiometer on the control unit.
- b Adjust the opening speed (OPSP) to comply with the applicable ANSI standard, A156.10 or A156.19. Turning clockwise increases the speed (see Table I on page 79).
- c Adjust the closing speed (CLSP) to comply with the applicable ANSI standard, A156.10 or A156.19. Turning counter- clockwise decreases the speed (see Table I on page 79).
- d Connect the required activation units.
- e Check that the installation complies with AHJ (Authority Having Jurisdiction).

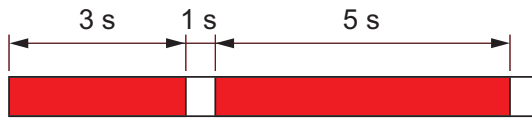
13.4 Connection of activation units and accessories



Note! According to local standard UL325 56 2.2, push plates shall be visible from the door.

14 Changing group of parameters

- a Disconnect the electrical power contact.
- b Press the LEARN BUTTON (LRN) and keep it depressed.
- c Connect the electrical power contact.
- d Watch the ERROR LED.



- e 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.
- f 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.
- g Push the button until you get the requested parameter group.
- h Disconnect the electrical power contact.
- i Next time the electrical power is connected, the operator will use the new group of parameters.

Parameter/Group	1 (default)	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
OPEN/CLOSE HOLD OPEN TIME	15 minutes	Infinite	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	Infinite	Infinite
KILL mode	Locked during KILL	Locked during KILL	Locked during KILL	Lock follows program selector during KILL	Locked during KILL	Locked during KILL	Locked during KILL	Locked during KILL	Lock follows program selector during KILL*	Locked during KILL	Unlocked during KILL	Unlocked during KILL	Locked during KILL	Unlocked during KILL	Locked during KILL	Locked during KILL
OBSTRUCTION mode¹⁾	Door closer	Door closer	Door closer	Door closer	Reverses when obstructed	Door closer	Door closer	Door closer	Door closer	Reverses when obstructed	Door closer	Door closer	Door closer	Door closer	Reverses when obstructed	Reverses when obstructed
DOUBLE EGRESS mode	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Common presence detection**	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection	Separate presence detection
LOCK RETRY	On	On	On	On	On	On	Off	On	On	On	On	On	On	On	On	On
OPEN/CLOSE impulse	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In OFF, EXIT and AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In AUTO mode	In OFF, EXIT and AUTO mode	In OFF, EXIT and AUTO mode
KILL Impulse Configuration	Normally Open	Normally Open	Normally Open	Normally Open	Normally Open	Normally Open	Normally Open	Normally Open	Normally Closed Monitored	Normally Open	Normally Open	Normally Closed Monitored	Normally Closed Monitored	Normally Closed Monitored	Normally Open	Normally Closed Monitored
Relay	Error indication	Error indication	Error indication	Error indication	Error indication	Error indication	Error indication	Error indication	Error indication	Error indication	KILLout	KILLout	KILLout	Lock	Lock	Lock

* The lock unlocks at impulse during KILL in EXIT mode.
 ** Please consider that use of Push And Go together with Common presence detection may cause stop in traffic flow.
 1) If set to REVERSES WHEN OBSTRUCTED, the operator re-opens when obstructed, similar to a presence impulse.
 In the default setting, if there is a bind with the strike plate when the door is closing the door will try to close two extra times in automatic operation, OFF or EXIT mode and once extra in manual operation.
 This function can be switched off (see "Lock retry" above).

Note! When changing group of parameters, normally only the master control must be configured in a double door application. When changing from or to group seven, both MASTER and SLAVE must be configured.

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

See the prerequisites for performing a “learn” under the heading “Auto-learn – automatically sets back and latch check (recommended)” on page 63.

- a Press the learn button.
- b Stop the door at the fully open position.
- c The door reverts towards closed position.
- d Stop the door at required latch-check.
- e The door reverts to the open position.
- f Stop the door at the required back check.
- g Remove the stop.
- h The door reverts to closed position.

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

- a Disconnect the electrical power contact.
- b Press the LEARN BUTTON and keep it depressed.
- c Connect the electrical power contact.
- d Watch the ERROR LED.



- e Release the LEARN BUTTON after 3 seconds (LED is out).
- f The BACK CHECK, LATCH CHECK and OPEN POSITION have now reverted to default values.
- g Disconnect the electrical power contact.
- h Next time the electrical power is connected, the operator will use the default values.

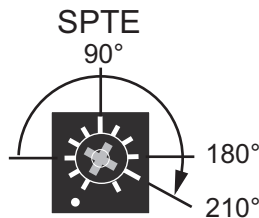
14.3 Reducing / Increasing the “Spring pre-tension” (SPTE)

The spring pre-tension is **factory set to 360°** and is normally not necessary to adjust. If adjustment has to be carried out, the electrical power must be switched on during spring pre-tension and learn, see below.

Make sure the potentiometers "Extended closing torque" (CLTQ) and "Power assist" (POAS) are set to 0°.

- a Loosen the door stop arm. Remove if fitted on the topside, slide down if fitted on the bottom.
- b Turn the potentiometer for spring pre-tension (SPTE) clockwise until the door opens to 45°.
- c Loosen the drive arm fixing screw.
- d Moving the door **towards open position**, reduces the tension, or:
Moving the door **towards closed position**, increases the tension.
- e Tighten the drive arm.
- f Turn the potentiometer SPTE to 0°.
- g Open the door to required open position, plus approx. 15 mm (5/8"), by turning the potentiometer SPTE clockwise.
- h Mount the door stop arm as close as possible to the open door stop block, fine- adjust with the screw if necessary.
- i Turn the potentiometer SPTE to 0°.
- j Push the LEARN BUTTON.
- k Let the door do the learn cycle without touching it.

Note! Max. allowable spring pre-tension is 720° which is recommended for OHC installation. Over-tension may damage the spring or overheat the motor.

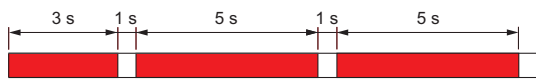


15 Classification

15.1 Entering the program mode (classification)

On the master control unit.

- Disconnect the mains plug
- Press the LEARN BUTTON while connecting the mains plug
- Watch the ERROR LED



- Release the LEARN BUTTON after the second 5 s has passed

15.2 Identify the current classification

The ERROR LED flashes an amount of short flashes that correspond to the classification number. After a short pause the LED will repeated the classification number and so on.

15.3 Changing the classification

If you push the LEARN BUTTON once, the classification number will increase. When you have reached the highest classification number it will start at number one again.

- Push the button until you get the requested classification
- Disconnect the mains plug

Next time you connect the mains the operator will use the new classification.

15.4 Classification table

Classification	1	2
	Full power	Low energy (Default)
Standard	ANSI 156.10	ANSI 156.19 (and DIN 18650-2)
Opening speed	2-12 s	Automatic limitation, 3-12 s
Closing speed	4-12 s	Automatic limitation, 4-12 s

The fastest setting of Opening Speed and Closing Speed are automatically limited to the value in the table, and can only be reduced.

If the Low Energy classification is used the operator will automatically follow the speed limitation in ANSI 156.19 (and DIN 18650-2).

The learn procedure must be carried out after a change of the classification setting.

Speed settings according to Table I in ANSI / BHMA A156.19 (LOW ENERGY APPLICATION)

16 Troubleshooting

Fault	Possible reasons why	Remedies/Explanations
The door does not open The motor does not start	Control switch is set to OFF	Change the setting of the control switch
	Electrical power power is missing	Check the electrical power 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°
The door does not close	Control switch is set to HOLD	Change the setting of the ON/OFF/HOLD open switch
	Presence impulse is activated	Remove objects in the detection zone
	Something jammed beneath the door	Remove object
The operator has unknown spring pre-tension	Too many adjustments carried out	<ul style="list-style-type: none"> a Turn up the potentiometer SPTE until it is possible to loosen the door arm stop b Remove the door stop and the arm system c Unplug the electrical power and let spring close d Unplug the motor plug e Mount the drive arm from the arm system and find the 0 pre-tension by moving back and forth f Loosen the arm g Connect the motor plug h * Turn the SPTE pot to 180° and wait until the spindle stops turning i Connect the electrical power. The operator will now tension the spring to factory set 720° j Mount the door stop against the closing stop block k Turn down SPTE to 0° - operator is now factory set l Turn to section 12 to adjust open stop position

* Adjusting the SPTE before power up increase the SPTE range 4 times i.e. 180° on the SPTE will tension the spring 2 turns = 720°. Adjusting to zero during power on will reset range of SPTE.

16.1 Error indication

- During normal operation the ERROR LED on the control unit is illuminated.
- An extinguished LED indicates that there is no electrical power power.
- A flashing light on the LED indicates that the operator is out of function (see table below).
- An audible warning signal can be achieved by using the accessory board AIU. It is connected to the 24 VDC and plugged into the EXU-SA relay output terminal.

LED flash frequency	Reason	Remedy
One 0.3 s flash, 10 s pause etc.	Kill impulse is active	Make a kill reset, reset kill switch or reset fire alarm
One 0.3 s flash, 2 s pause etc.	+ 24 V DC external error	Check for short circuit
One 0.3 s flash, 2 s pause etc.	Sensor monitoring error	Check for broken monitored sensor
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
Ten flashes	Settings have been made that requires a new learn or the learn has failed.	Check set up. Make a new learn.

17 Maintenance plan

Regular inspections shall be made according to national regulations by a trained and qualified person. The number of service occasions shall be in accordance with national requirements. This is especially important when the installation concerns a fire-approved door or a door with an emergency opening function. Refer to Besam Pro-Active Care option services to learn more about service possibilities!

As with all other technical products, an automatic door needs maintenance and service. It is essential to know the importance of maintenance to have a reliable and safe product.

Service and adjustments will ensure a safe and proper operation of an automatic door unit.

The table below shows the recommended interval, in months, when to replace parts during preventive maintenance.

Part	Part number	Cycles/hour in operation			Abusive Environment
		<10	<100	>100	
		Low traffic	Medium traffic	High traffic	
PUSH arm service kit	330000271 SI/BK	24	12	6	6
PULL arm service kit	330000272 SI/BK	24	12	6	6
Stop arm kit	330000276	24	12	6	6
Micro switch kit	330000275	24	12	6	6
Adaptor kit	330000270	24	12	6	6
Transmission unit	331007291	60	60	60	60
Connection box kit	331007504 BK	60	60	60	60
Control unit CU-200 with EXU-boards	331008346	60	60	60	60

18 ANSI / BHMA A156.10

18.1 REQUIREMENTS FOR POWER OPERATED DOORS

From American National Standard for Power-Operated Pedestrian Doors. Please refer to the full standard if necessary, obtainable through BHMA at (212) 661-4261. All figures referred to below can be found in the full standard. Excerpts reprinted with BHMA permission.

18.1.1 Swinging Doors

Automatic Swing Doors have a variety of configurations, including:

- A single door swinging in or out, left-handed or right handed
- A pair of doors simultaneously swinging in the same direction
- A pair of doors simultaneously swinging in opposite directions (double egress)

The door operator is concealed or surface applied. The doors are center pivoted, offset hung, balanced or butt hinged. No matter what the configuration or system, automatic swinging doors shall include guide rails, sensors or control mats and signage for the safety and convenience of the user.

6. Guide Rails

6.1.1 Two guide rails shall be installed on the swing side of each door. Single doors shall have one on each side of the door and pairs or double egress shall have one rail on each hinge side. Rails shall project to the leading edge of the widest door in the open position.

Exception #1: A wall or separator is permitted to be used in place of a rail, provided that it meets the criteria in 6.2.1 through 6.1.5

Exception #2: Guide rails for swing doors serving both egress and ingress shall project out from the face of the door jambs on the swing side to no less than the outside leading edge of the open door plus 55 in.

Exception #3: If double egress doors or a pair of doors is installed in a hallway, no guide rails are required if the distance between the wall and the door in the 90 degree open position does not exceed 10 in.

Exception #4: Guide rails for Knowing Act swinging doors serving both egress and ingress shall project out from the face of the doorjamb on the swing side to no less than the outside leading edge of the open door plus 12 in.

6.1.2 A guide rail shall be 30 in. high minimum measured from the floor surface.

6.1.3 A guide rail shall have a panel or divider to inhibit access to the protected area.

6.1.4 There shall be 6 in. minimum clearance between the rail and the door in the fully open position or between the rail and the leading edge of the door at the point in its arc of travel when it is closest to the rail. There shall be a 2 in. minimum clearance between the rail at the hinge side and the door in the fully open position.

6.1.5 Free standing guide rails shall have a maximum dimension between the rail and the jamb (or other adjacent surfaces) of 6 in.

For control mat adjustments, see full standard.

8. Sensors

8.1 General Requirements for Sensors

8.1.1 Activating zones for swinging, sliding and folding doors shall have a minimum width equal to the width of the clear opening measured at 8 in. and 30 in. perpendicular from the face of the closed door(s). The length from the face of the door shall be 43 in. minimum measured at the center of the clear opening. Detection shall be effective to within 5 in. from the face of the door measured at the center of the clear opening. Exception: If the 43" activating zone length is not practical due to physical or environmental conditions, it shall be permissible to be reduced to 30

inches, along with an additional sign, visible from the side the zone has been reduced on, stating "AUTOMATIC CAUTION DOOR" as described in 11.2.3.

8.1.2 Motion sensors shall detect a 28 in. minimum high person, moving at a rate of 6 in. per second minimum toward the center of the door within the detection zone described.

8.1.3 Presence sensors shall detect a stationary 28 in. minimum high person within the detection areas described for a minimum of 30 sec.

8.2 Swinging Doors

8.2.1 Swinging doors shall have an activating zone as described in 8.1.1.

8.2.2 A safety zone shall be provided on the swing side of all power operated swinging doors.

8.2.2.1 If an overhead presence sensor(s) is used to provide a safety zone, the length of the active area shall be effective to within 5 in. of the face of the closed door measured at the center of the door opening. The safety zone shall extend 5 in. minimum beyond the leading edge of the door in the open position when measured at the center of the door opening. The width of the active area measured perpendicular from the face of the closed door shall be the door opening less 5 in. maximum measuring both sides for a total of 10 in. maximum measured parallel to the face of the door at a distance of 8 in. and 30 in. When the safety zone is occupied by a 28 in. minimum high person fully in the safety zone of a fully open or closed door, the door operator shall not operate.

8.2.2.2 When an overhead presence sensor on the swing side is prevented from providing a safety signal to the control during the closing cycle, an additional sensor, sensors, or photo beam shall be used on the swing side to

- 1) stop the door, or
- 2) continue to close the door, or
- 3) slow the reopening door to a maximum latch edge speed of 4 in. per second measured within 1 in. of the latch edge before any contact is made.

8.2.2.2.1 When using a photo beam, the detection width shall be not less than the clear opening; the beam shall be located between 6 and 28 in. above the finish floor, and not more than 8 in. from the lead edge of the door panel in the full open position.

8.2.2.2.2 When using a door mounted presence sensor, the detection area shall be effective to within 5 in. from the face of the door, for one half of the width of the door, and to within 1 in. of the lead edge, and shall detect a 28 in. minimum high person fully in the defined area.

8.2.2.3 If a door mounted presence sensor is used to provide a safety zone, it shall be effective to within 5 in. from the face of the door for the width of the door less 5 in from the pivot point and to within 1 in. of the lead edge. A door mounted sensor on either side of the door shall detect a 28 in. minimum high person fully in the swing path, during the opening or closing cycle and shall cause the door to reverse direction, stop or slow down to a maximum latch edge speed of 4 inches per second measured within 1 in. of the latch edge before any contact is made.

8.2.3 Swinging doors serving both egress and ingress, including non-knowing act double egress doors, shall have on the swing side, a safety zone as defined in 8.2.2, and an activating zone. The length of the activating zone shall be established as follows: the activating zone starts adjacent to the safety zone and extending an additional 55 in. from the leading edge of the door in the open position. The activating zone shall have a minimum width equal to the width of the clear opening measured at 8 in. and 30 in. from the interlace of the safety and activating zones.

8.2.5 When sensors are used to provide both an activating and a safety zone, if the distance between the two non overlapping zones exceeds 8 in. the door system shall:

- 1) be equipped with a safety control mat; or
- 2) be equipped with a presence sensor across the door opening; or
- 3) have a door closing cycle delay of 4 seconds minimum after the activating zone is clear; or
- 4) be equipped with a door mounted presence sensor on the non swing side as described in 8.2.2.3.

For knowing Act and double egress doors, see full standard Section 9.

10. Entrapment Protection

10.2 Swinging Doors

10.2.1 The opening time of a swing door to 80 degrees shall not be less than 1.5 seconds

10.2.2 The force required to prevent a stopped power operated swinging door in the last 10 degrees of opening from moving in the direction of opening shall not exceed 30 lbf (133 N) measured 1 in. from the lock edge of the door.

10.2.3 Back check shall occur at no less than 10 degrees of the full open position.

10.2.4 Swing doors utilizing sensors or control mats shall remain open a minimum of 1.5 seconds after loss of detection unless otherwise specified in this standard.

10.2.5 A swing door shall be adjusted so that the closing times to latch shall be the minimum values in the following table:

Inches (mm)	Lbs. (kg)	Time
(D)	(W)	T (secs.)
36 (914) & under	to 100 (45)	2.0
36 (914)	to 140 (64)	2.3
42 (1067)	to 110 (50)	2.3
42 (1067)	to 150 (68)	2.7
48 (1219)	to 120 (55)	2.8
48 (1219)	to 160 (73)	3.2
For doors of other weights and widths: $T = D \sqrt{W} / 188$ where: W = Weight of door in pounds D = Width of door in inches T = Closing time to latch check in seconds		

10.2.6 Latch Check shall occur for swinging doors at no less than 10 degrees from closed position and the door shall not close through the final 10 degrees in less than 1.5 seconds.

10.2.7 The force required to prevent a stopped power operated swinging door from moving in the direction of closing shall not exceed a 30 lbf (133 N) measured 1 in. from the lock edge of the door at any point in the closing cycle.

10.2.8 In the event of power failure, a swing door shall be capable of being opened manually with no greater than a 30 lbf (133 N), applied 1 in. from the edge of the lock stile to open.

10.2.9 Swinging doors provided with a break away device shall require no more than 50 lbf (222 N) applied 1 in. from the edge of the locks tile to open. When the door(s) is opened in the break out mode, powered operating components excluding spring power shall not operate the doors.

10.2.10 The opening at hinge side of swinging door shall be: a) Less than ¼ in. wide with the door in any position, or b) At least ¾ in. wide with the door in any position. A door that does not comply with the above is acceptable if provided with a finger guard.

11. Signage

Consistent with section 2.2.2 of ANSI Z535.4 the "signage and warnings" guidelines of A156.10 are recognized, industry specific standards that predate the adoption of Z535.4 and are not replaced by the standards set forth therein.

11.1 All Swinging, sliding and folding doors shall be equipped with signage visible from both sides reading "AUTOMATIC DOOR" with letters ½ in. high minimum. The sign described in figures B-1, B-3, and B-5 shall be permitted to be used to satisfy this requirement.

11.2.1 An arrow sign shall be visible from the approach side of a swinging door mounted on the door at a height of 58" + 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter, having a green circle surrounding a black arrow on a white background.



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11.2.2 An International "DO NOT ENTER" sign shall be visible from the side of doors that swings towards pedestrians attempting to travel in the wrong direction mounted on the door at a height 58" + 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter, having a red circle with the wording, "DO NOT ENTER", in the red circle.

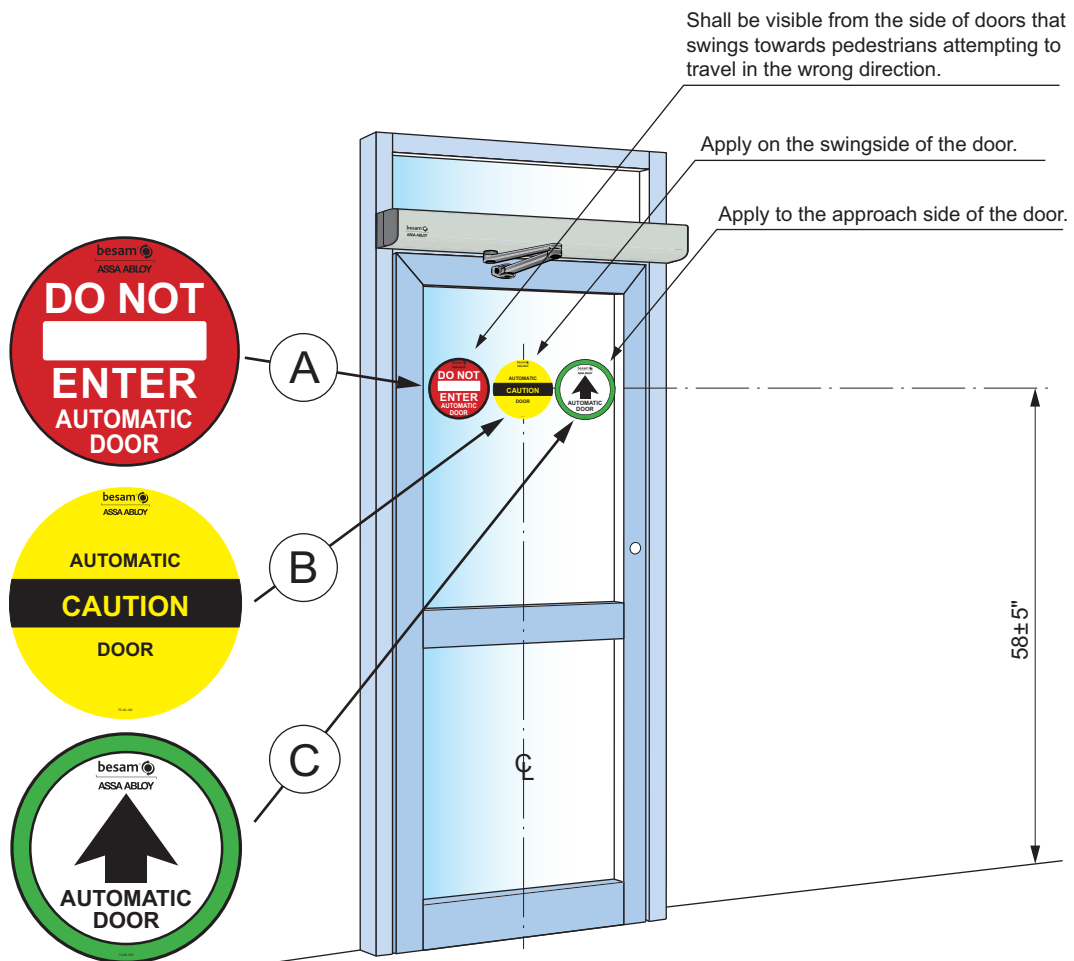


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11.2.3 Swinging doors serving both egress and ingress shall be marked with a decal visible from the swing side of the door, "AUTOMATIC CAUTION DOOR". The sign shall be mounted on the door at a height 58"± 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter and with black lettering on a yellow background.



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19 ANSI / BHMA A156.19 (LOW ENERGY APPLICATION)

19.1 REQUIREMENTS FOR POWER OPERATED DOORS

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

19.1.1 Activation

The operator shall be activated by a knowing act.

19.1.2 Opening

Doors shall open from closed to back check, or 80 degrees which ever 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.

19.1.3 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.

19.1.4 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 1 second
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.

19.1.5 Signage

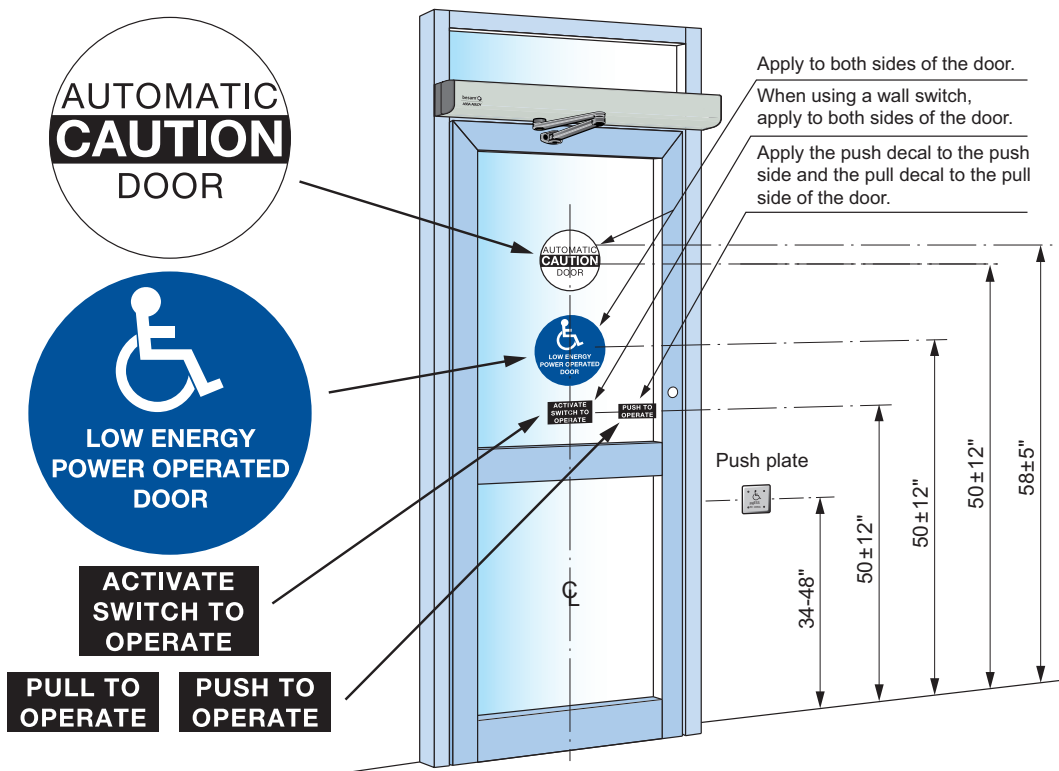
Doors shall be equipped with signage visible from either side, instructing the user as to the operation and function of the door. The signs shall be mounted 50" +/- 12" (1270mm +/- 305mm) from the floor to the center line of the sign. The letters shall be 5/8 inch (16 mm) high minimum.

Doors All 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:

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.

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.





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