The 412 Operator and 450 MPS Control Panel: Installation Manual

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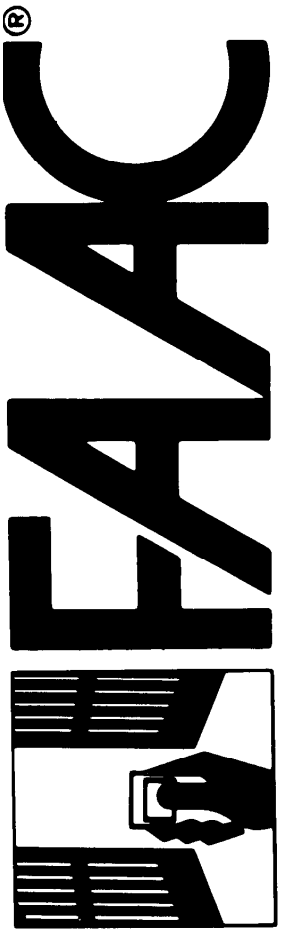

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Important Safety Information

Both the installer and the owner and/or operator of this system need to read and understand this installation manual and the safety instructions supplied with other components of the gate system. This information should be retained by the owner and/or operator of the gate.

WARNING! To reduce the risk of injury or death

1. **READ AND FOLLOW ALL INSTRUCTIONS.**
2. Never let children operate or play with gate controls. Keep the remote control away from children.
3. Always keep people and objects away from the gate. NO ONE SHOULD CROSS THE PATH OF THE MOVING GATE.
4. Test the gate operator monthly. The gate MUST reverse on contact with a rigid object or stop when an object activates the non-contact sensors. After adjusting the force or the limit of travel, retest the gate operator. Failure to adjust and retest the gate operator properly can increase the risk of injury or death.
5. Use the emergency release only when the gate is not moving.
6. KEEP GATES PROPERLY MAINTAINED. Read the owner's manual. Have a qualified service person make repairs to gate hardware.
7. The entrance is for vehicles only. Pedestrians must use separate entrance.
8. SAVE THESE INSTRUCTIONS.

There are three kinds of safety issues involved with an automatic gate operator: issues arising from the design of the gate, from the installation of the gate and the operator, and from the use of the gate operator. The following information is designed to help you be sure your gate and its operator are well-designed, installed correctly, and used safely.

Gate Design

1. A gate is a potential traffic hazard, so it is important that you locate the gate far enough away from the road to eliminate the potential of traffic getting backed up. This distance is affected by the size of the gate, how often it is used, and how fast the gate operates.
2. The operator you choose to install on your gate must be designed for the type and size of your gate and for the frequency with which you use the operator.
3. Your gate must be properly installed and must work freely in both directions before the automatic operator is installed.
4. An automatic operator should be installed on the inside of the property/fence line. Do not install the operator on the public side of the property/fence line.
5. Pedestrians should not use a vehicular gate system. Prevent such inappropriate use by installing separate gates for pedestrians.
6. Exposed, reachable pinch points on a gate are potentially hazardous and must be eliminated or guarded.
7. Outward swinging gates with automatic operators should not open into a public area.
8. The operating controls for an automatic gate must be secured to prevent the unauthorized use of those controls.
9. The controls for an automatic gate should be located far enough from the gate so that a user cannot accidentally touch the gate when operating the controls.
10. An automatic gate operator should not be installed on a gate if people can reach or extend their arms or legs through the gate. Such gates should be guarded or screened to prevent such access.

Installation

1. If you have any question about the safety of the gate operating system, do not install this operator. Consult the operator manufacturer.
2. The condition of the gate structure itself directly affects the reliability and safety of the gate operator.
3. Only qualified personnel should install this equipment. Failure to meet this requirement could

cause severe injury and/or death, for which the manufacturer cannot be held responsible.

4. The installer must provide a main power switch that meets all applicable safety regulations.
5. Clearly indicate on the gate with a minimum of 2 warning signs (visible from either side of the gate) that indicate the following:
    - The gate is automatic and could move at any time, posing a serious risk of entrapment.
    - Children should not be allowed to operate the gate or play in the gate area.
    - The gate should be operated only when it is visible to the operator and the when the area is free of people and obstructions.
6. It is extremely unsafe to compensate for a damaged gate by overtightening a clutch or increasing hydraulic pressure.
7. Devices such as reversing edges and photocells must be installed to provide better protection for personal property and pedestrians. Install reversing devices that are appropriate to the gate design and gate application.
8. Before applying electrical power, be sure that the voltage requirements of the equipment correspond to your supply voltage. Refer to the label on your operator system.

Use

1. Use this equipment only in the capacity for which it was designed. Any use other than that stated should be considered improper and therefore dangerous.
2. When using any electrical equipment, observe some fundamental rules:
    - Do not touch the equipment with damp or humid hands or feet.
    - Do not install or operate the equipment with bare feet.
    - Do not allow small children or incapable persons to use the equipment.
3. If a gate system component malfunctions, turn off the main power before making any attempt to repair it.
4. Do not attempt to impede the movement of the gate. You may injure yourself as a result.
5. This equipment may reach high temperatures during operation; therefore, use caution when touching the external housing of the operator.
6. Learn to use the manual release mechanism according to the procedures found in this installation manual.
7. Before carrying out any cleaning or maintenance operations, disconnect the equipment from the electrical supply.
8. To guarantee the efficiency of this equipment, the manufacturer recommends that qualified personnel periodically check and maintain the equipment.

U.L. Class and FAAC Operator Model		Duty Cycle	Typical Use
Class I: Residential Vehicular Gate Operator			
402	750	Limited duty	• Home use
422	760		• Small apartment building, for example, up to 4 units in a building, with limited public access
412			
Class II: Commercial/General Access Vehicular Gate Operator			
400	640	Continuous duty	• Apartment buildings
620			• Very public access
Class III: Industrial/Limited Access Vehicular Gate Operator			
400	640	Continuous duty	• No public access
620			
Class IV: Restricted Access Vehicular Gate Operator			
620	640	Continuous duty	• Prison rated security

Technical Data

The 412 Compact Operator

Parameter	Measure	
Voltage required[1], VAC	115, +6 or -10%, 50–60 Hz	230, +6 or –10%, 50–60 Hz
Duty type	Residential duty	
Maximum duty cycle[2]	18 cycles/hr	30 cycles/hr
Maximum leaf length, ft (m)	14 (4.3)g	
Maximum leaf swing, deg	110	
Thrust and traction[3], ft-lb (Nm)	0–294 (0–400)	0–235 (0–320)
Stroke, in. (cm)	11 3/8 (29)	
Rod speed[4], in./sec (cm/sec)	3/4 (1.9)	5/8 (1.6)
Thermal cut out, deg F (deg C)	284 (140)	
Operator dimensions, l × w × h, in. (cm)	39 5/16 × 3 3/4 × 7 9/16 (99.8 × 9.5 × 19.2)	
Operator weight, lb (kg)	14.3 (6.5)	
Current draw, A	5	2
Maximum amperage draw for accessories, mA	300	360

[1] Your standard 220 VAC power supply meets the specification for 230 VAC, +6 or –10%

[2] While the 412 Operator is capable of 18 or 30 cycles/hr, as a residential-duty operator it is not designed for such continuous, sustained operation.

[3] Additional torque may be available for heavier gate leaves if you change capacitors. Call our Technical Department. Note that any change in the capacitors may affect duty cycle.

[4] The 90-deg opening time for a gate with the 412 Operator is a maximum of about 46 sec. Note that both the mounting dimensions and the torque adjustment help to determine the precise opening speed.

The Control Panel

The 450 MPS control panel is installed with the 412 Compact Operator. Both the control panel and the operator must use the same power supply voltage.

To determine the voltage requirement of your operator, look at the label on the operator. To determine the voltage requirement of your 450 MPS control panel, refer to the label on the transformer of the control panel.

The control panel allows you to set these parameters:

- The closing leaf delay for a two leaf gate system (note the opening leaf delay is fixed at 2.5 sec)
- The opening/closing time
- The pause time
- The torque
- The operating logic for your gate system
- The reversing stroke function of the operator
- The behavior of triggered reversing devices

Power source: Use the power source that matches both the operator and the control panel.

Note that your standard 220 VAC power source meets the specification for 230 VAC (+6 or –10%, 50–60 Hz).

Operating logics available: A, S, E, EP, B, and C.

Unpacking the Operator

When you receive your 412 Compact Operator, complete the following steps.

Inspect the shipping box for physical damage such as a torn carton. Then inspect the operator after you remove it from the box. Notify the carrier immediately if you note any damage because the carrier must witness the damage before you can file a claim.

As you unpack the box, insure that all the parts listed below are included (also see Figure 1). Your kit (a pair of operators) has these parts:

- 1 Control panel box with control panel installed inside (only 1 per kit). Inside the enclosure is a package of 4 screws to hold the lid on the enclosure and 4 plugs for the surface mounting knockout holes.
- 2 412 Operator units. One is marked SX and one is marked DX. Be sure to install each on the proper gate leaf (see Figure 2).
- 2 Protective covers for the worm screw housing of the operator
- 1 Package of mounting hardware:
  - 2 Rear mounting brackets
  - 2 Rear mounting plates that attach to the gate post (or column)
  - 2 Front mounting brackets that attach the operators to the gate leaves
- 1 Parts package:
  - 2 Capacitors
  - 2 End caps
  - 2 Plastic inserts for the protective cover
  - 2 Manual Release keys
  - 2 Plugs for covering the Manual Release keyhole
  - 6 Snap rings
  - 4 Screws for attaching the cover to the operator
  - 2 Long pins for rear mounting (each requires 1 snap ring)
  - 2 Short pins for front mounting (each requires 2 snap rings)

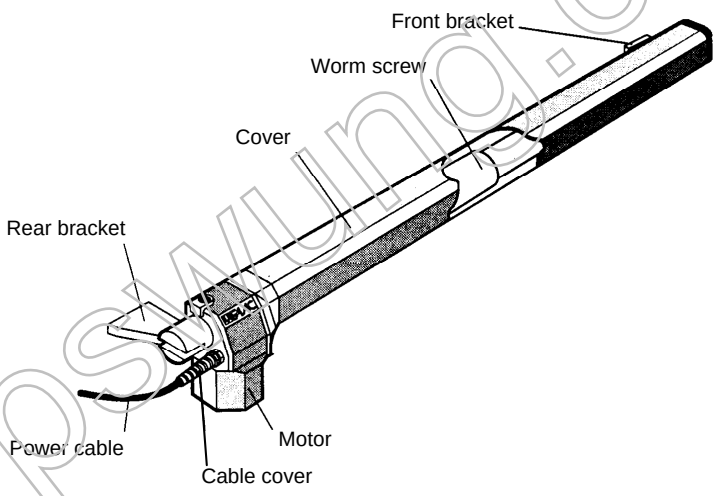


Figure 1. Parts of the 412 Compact Operator (SX model is shown)

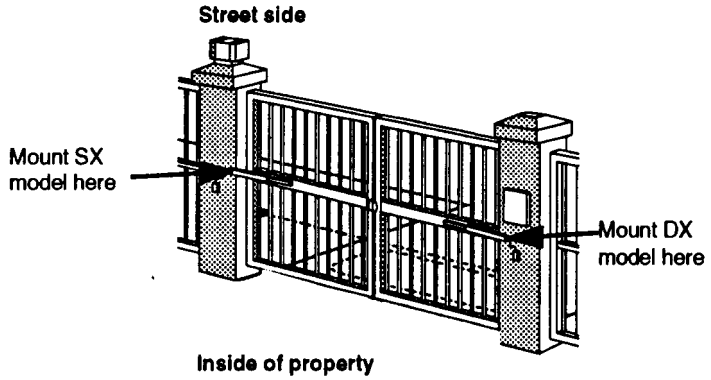


Figure 2. Mount the proper model (SX or DX) on the gate leaf whether the gate swings inward or outward.

The 412 Compact Operator

General Characteristics

The FAAC 412 Compact Operator is an automatic gate operator for a swinging gate leaf. The 412 Compact Operator is useful in apartment and other residential applications and can accommodate a gate leaf up to 14 ft (4.3 m) long.

The self-contained 412 Compact Operator consists of an electric motor that drives a worm screw housed in an aluminum casing.

The locking the 412 Operator provides in the fully opened and fully closed positions is a service device rather than a security device. Additional, external locks are recommended under the following conditions:

- Yours is a solid-faced gate.
- The length of the gate leaf is 6 ft (2 m) or longer.
- The installation requires tight security.
- The site is subject to vandalism.
- The site is subject to strong or very gusty wind.

For gates with two leaves, two operators are installed. Each of them is designed for either the right or left gate leaf: If the hinge is on the left as you face the gate on the side where the operator will be installed, you want a left or SX version; if the hinge is on the right when you face the gate on the side where the operator will be installed, you want a right or DX version. A kit has one right and one left version.

In two-operator gate installations, both operators are wired to one control panel. In such gate installations, one leaf can be wired and programmed to close slightly later than the other leaf to accommodate overlapping gate designs.

The 450 MPS electronic control panel is a microprocessor-based controller that accepts a wide range of product accessories and reversing devices, thus allowing for flexible gate system design. The control panel sets the closing leaf delay, the opening/closing time, the pause time, the torque, the operating logic of the gate system, the function of the reversing stroke (required for some electric locks), and the behavior of triggered reversing devices during the closing phase.

For its protection, the single-phase, bidirectional motor shuts off automatically if its operating temperature reaches 284 deg F (140 deg C). Also for the protection and proper operation of the 412 Operator, each gate leaf on which it is installed must have a fixed positive stop in both the opened and closed positions.

Built-in security and anti-crushing measures of the 412 Operator include a key-operated Manual Release mechanism and a torque adjustment mechanism that precisely controls the force transmitted to the gate leaf through the 412 Operator.

The Manual Release mechanism is a key-operated device that disengages (or engages) the worm screw drive of the 412 Operator. When the drive is disengaged, you can open and close the gate leaf by hand. Such manual operation of the gate is necessary during installation and useful during power failures.

The torque of the 412 Operator is controlled by a potentiometer located on the 450 MPS control panel. FAAC recommends that the gate leaf stop if it encounters a force of more than about 33 lb (15 kg).

Reversing devices (such as inductive loops and photocells) should be installed to provide non-contact reversing operation.

Operating Logic

The 412 Operator provides a Manual Release mechanism for manually operating the gate. Manual operation of the gate requires using a special key. The 450 MPS Control Panel provides logical operating modes set on the control panel.

Manual Release Mechanism

The Manual Release mechanism is a built-in release device of the 412 Operator (see Figure 3). To access the keyhole, remove the plug on the top of the motor housing. Then insert the key and turn it a half turn in the direction of the gate's closing to disengage the operator's motorized operation. You can now move the gate leaf by hand to open or close the gate. Operating the gate leaf by hand is necessary during installation and is useful during power failures.

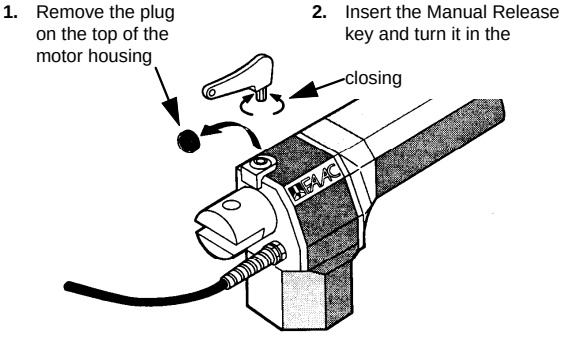


Figure 3. Use the Manual Release key to disengage the 412 Operator from its motor so that you can move the gate leaf by hand in the opening or closing direction

You re-engage the motor of the operator by turning the key one full turn in the direction of the gate's opening. Remove the key and replace the plug.

General Operating Logic

Given the electromechanical nature of the 412 Operator, the behavior of the operator when it encounters an obstacle is always the same *no matter which logical mode of operation has been set on the control panel.*

If an obstruction interrupts the gate's opening, the gate stops its movement (depending on the weight of the obstruction) though the motor continues to run its entire cycle. Sending a signal after the interruption in opening causes the gate to close.

> **WARNING!** The pressure the gate leaf applies to an obstruction is determined by the torque adjustment setting. It is the installer's responsibility to make sure the torque is correctly set.

If an obstacle interrupts the gate's closing, the gate stops its movement, though the motor continues to run its entire cycle. Sending another signal causes the gate to reopen.

> **WARNING!** Any triggered reversing or stopping device prevents an activating command from being recognized. You cannot activate the gate to open or close until the reversing or stopping device has been cleared.

Logical Operating Modes

> **Note**: Reversing devices are either opening reversing devices or closing reversing devices, depending on where the device is connected on the terminal strip. FAAC strongly recommends the use of reversing devices no matter which logic you choose for your gate operation.

The logics available on the 450 MPS control panel are briefly described below. You can find a complete description of each logic in the tables on the following pages.

- **A (automatic):** The gate opens on command and automatically closes after a pause phase. A second command on opening is ignored; a second command during the pause phase causes the gate to close immediately; a second command during closing reopens the gate.
- **S (security):** The automatic mode is like A logic except that a second command during opening immediately closes both gate leaves.
- **E (semi-automatic):** This mode requires a command to open and a command to close. A second command during opening or closing causes the gate leaves to stop all motion. A third command then closes the gate.
- **EP (semi-automatic, step by step):** This mode requires a command to open and a command to close. A second command during opening or closing causes the gate leaves to stop all motion. A third command then reverses the previous motion of the gate leaves.
- **B (manned, pulsed):** This mode is designed for guard station use and requires a three-button switch (pulsed) to open, close, and stop the gate barrier.
- **C (manned and constant):** This mode is designed for guard station use and requires at least a two-button switch (constant pressure required on each button) to open, close, and stop the gate barrier (no pressure on a button stops the gate).

> **WARNING!** FAAC strongly recommends that you install a non-contact reversing device for all gate systems.
>
> **WARNING!** Any triggered reversing or stopping device prevents an activating command from being recognized. You cannot activate the gate to open or close until the reversing or stopping device has been cleared.

Refer to the operating logic tables on the next two pages for more detail.

A (Automatic) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens both leaves and closes them after pause time	Opens single leaf connected to Motor 1 and closes it after pause time	No effect	No effect	No effect	Off
Opening	No effect	No effect	Stops	Stops; gate closes when reversing device no longer triggered	No effect	On
Opened	Closes both leaves immediately	Closes leaf immediately	Stops	No effect	Gate remains open until reversing devices no longer triggered	On
Closing	Opens both leaves immediately	Opens leaf immediately	Stops	No effect	Depends on DIP switch 4	Flashes
Stopped	Closes the leaves	Closes the leaf	No effect (opening is inhibited)	No effect	No effect (opening is inhibited)	On

S (Security) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens both leaves and closes them after pause time	Opens single leaf connected to Motor 1 and closes it after pause time	No effect	No effect	No effect	Off
Opening	Closes both leaves immediately	Closes the leaf immediately	Stops	Stops; gate closes when reversing device no longer triggered	No effect	On
Opened	Closes both leaves immediately	Closes leaf immediately	Stops	No effect	Gate remains open until reversing devices no longer triggered	On
Closing	Opens both leaves immediately	Opens leaf immediately	Stops	No effect	Depends on DIP switch 4	Flashes
Stopped	Closes the leaves	Closes the leaf	No effect (opening is inhibited)	No effect	No effect (opening is inhibited)	On

B (Manned, Pulsed) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens 1 or both leaves	No effect	No effect	No effect	No effect	Off
Opening	No effect	No effect	Stops	No effect	Stops	On
Opened	No effect	Closes 1 or both leaves	No effect	No effect	No effect	On
Closing	No effect	No effect	Stops	Stops	No effect	Flashes
Stopped	Opens 1 or both leaves	Closes 1 or both leaves	No effect	No effect	No effect	On

E (Semi-automatic) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens both leaves	Opens single leaf connected to Motor 1	No effect	No effect	No effect	Off
Opening	Stops	Stops	Stops	Stops; gate closes when reversing device no longer triggered	No effect	On
Opened	Closes both leaves immediately	Closes leaf immediately	Stops	No effect	No effect (opening is inhibited)	On
Closings	Stops	Stops	Stops	No effect (opening is inhibited)	Depends on DIP switch 4	Flashes
Stopped	Closes the leaves	Closes the leaf	No effect (opening is inhibited)	No effect	No effect (opening is inhibited)	On

EP (Semi-automatic, Step by Step) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens both leaves	Opens single leaf connected to Motor 1	No effect (opening is inhibited)	No effect (opening is inhibited)	No effect (opening is inhibited)	Off
Opening	Stops	Stops	Stops	Stops; gate closes when reversing device no longer triggered	No effect	On
Opened	Closes both leaves immediately	Closes leaf immediately	Stops	No effect	No effect (opening is inhibited)	On
Closing	Stops	Stops	Stops	No effect (opening is inhibited)	Depends on DIP switch 4	Flashes
Stopped	Gate leaves reverse direction	Gate leaf reverses direction	No effect (opening is inhibited)	No effect (opening is inhibited)	No effect (opening is inhibited)	On

C (Manned and Constant) Logic

Gate Status	Open A	Open B	Stop	Opening Reversing Device(s)	Closing Reversing Device(s)	Warning Light
Closed	Opens 1 or both leaves	No effect	No effect	No effect	No effect	Off
Opening	No effect	No effect	Stops	No effect	Stops	On
Opened	No effect	Closes 1 or both leaves	No effect	No effect	No effect	On
Closing	No effect	No effect	Stops	Stops	No effect	Flashes
Stopped	Opens 1 or both leaves	Closes 1 or both leaves	No effect	No effect	No effect	On

Installation Instructions

Installing the 412 Operator involves preparing the gate, installing the operator(s), installing the control panel, setting the torque adjustments on the control panel, and setting other operational controls.

> **Note:** The following installation instructions assume you are fully capable of installing an electromechanical operator on a gate. This manual does not instruct you in designing a gate, installing a gate (whether on masonry, wood, or metal posts), or basic electrical wiring. The installation tasks discussed in this manual are tasks peculiar to the 412 Operator.

Prepare the Gate

Before you install the 412 Operator, you need to prepare the gate itself for the operator. Be sure to do the following three things:

1. Make sure that the gate structure is solidly built. Add reinforcing crosspieces if necessary to the gate leaves.
2. Make sure that the gate moves smoothly on its hinges without excessive friction by swinging it opened and closed by hand. If necessary, lubricate all the gate's moving parts.
3. Provide limit stops for the gate leaves in the fully opened and fully closed positions (see Figure 4).

Install the Operator

Once you have prepared the gate, you are ready to proceed with the installation of the operator.

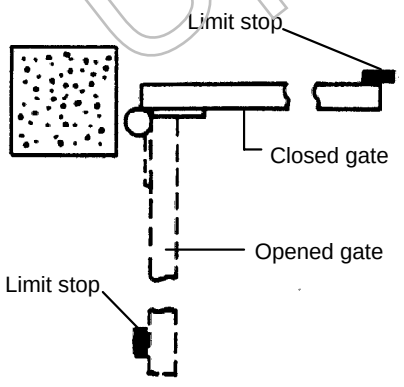


Figure 4. Provide positive limit stops for the gate leaf

Follow the instructions below to install your operator whether in an inward or outward swinging configuration.

Installing the operator consists of the following steps:

- Establishing the orientation of each gate leaf and its operator.
- Attaching the rear mounting bracket
- Attaching the operator to the rear mounting bracket
- Attaching the front mounting bracket to the operator
- Attaching the front mounting bracket to the gate leaf
- Attaching the operator's protective cover
- Installing the 450 MPS control panel
- Adjusting the torque for the operator
- Setting the operating controls

Establish the Orientation of the Operator and the Gate Leaf

Before you begin mounting brackets or attaching parts, you first need to establish the proper orientation of each operator in relation to its gate leaf.

Figure 2 (page 4) shows a biparting gate from the side where the operators are mounted. The operator attached to the hinge on the left of the gate must be an SX model. If the hinge is on the right side, the DX model must be installed.

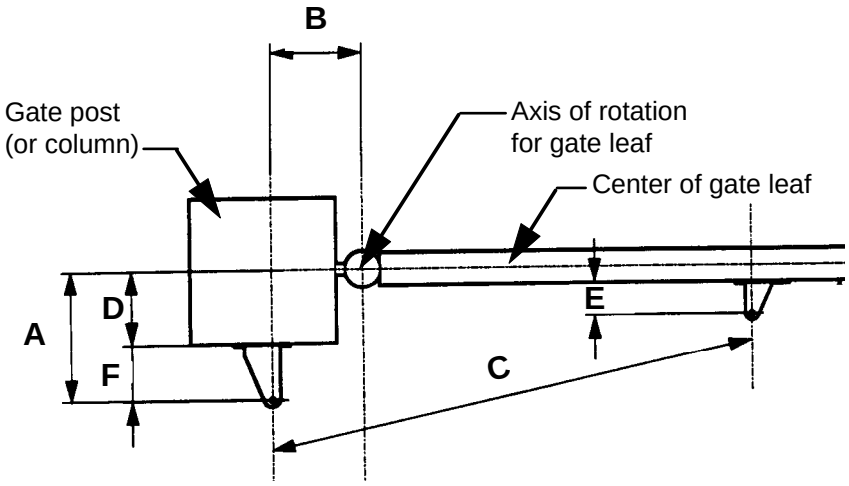
Installing the operator on the wrong side makes it impossible to install the cover of the operator.

Attach the Rear Mounting Bracket

Inward swinging gate:

You need to determine whether to attach the rear mounting bracket directly to the post (or wall) or to notch the post and install a recessed liner. Large pillars require a recessed liner to house the rear mounting bracket and part of the operator so that the pillar will not interfere with the swing of the gate when it is fully opened.

To determine whether you need a recessed liner, measure the distances *B* and *D* (shown in Fig. 5) on your gate. If your measure of *B* or *D* is greater than the dimensions shown for your operator in Figure 5, notch the post and construct a recessed liner for the post



	Mounting Dimensions[a]	
	90-deg Swing	**110-deg Swing**
A	5 3/4 in. (14.5 cm)	4 7/8 in. (12.5 cm)
B	5 3/4 in. (14.5 cm)	4 7/8 in. (12.5 cm)
	WARNING! **A** and **B** should differ by *no more than* 1/2 in. Larger differences may *dangerously* alter the speed of operation.	
C	35 1/8 in. (89.2 cm)	
D	4 in. (10 cm)	3 1/8 in. (8 cm)
E	3 1/8 in. (8 cm)	3 1/8 in. (8 cm)
F	***Absolute minimum of 1 3/4 in. (4.5 cm)***	

[a] Gate speed increases as the dimensions A and B decrease. The torque adjustment may also affect the gate speed.

[b] The sum of A and B must equal a minimum of 3 5/8 in. (9 cm).

Figure 5. Important mounting dimensions for inward-swinging 412 operators, top view

mounting bracket (see Figure 6). The recessed liner should be constructed of 3/16 or 1/4 in. steel with a minimum interior height of 11 13/16 in. (30 cm) so as to allow you to meet the required dimensions shown in Figure 5. Make sure the recessed liner is securely embedded in the post (or wall).

There are two parts to the rear mounting bracket. The horizontal bracket attaches to the operator, and the slotted vertical plate attaches to the gate post (see Figure 8). Weld the two parts together and bolt the assembly to the gate post of column. Note, though, that use of the vertical rear mounting plate is optional.

Once you have positioned the rear mounting bracket, attach the bracket to the post (or wall or recessed liner), making sure the dimensions on your gate system match those shown in Figure 5.

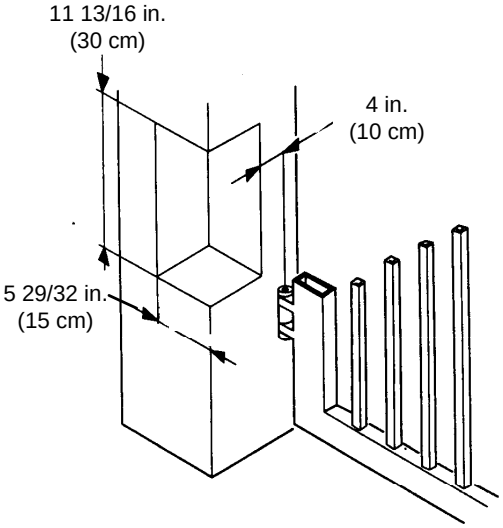


Figure 6. The required dimensions of the recessed liner when notching the gate post

Outward swinging gate:
If you are installing the 412 Operator to swing the gate outward, construct a steel elbow of sufficient size to attach to the gate pillar and rear mounting bracket (see Figure 7 for elbow dimensions).

Attach the Operator to the Rear Mounting Bracket

Attach the operator to the rear mounting bracket with the long pin and one snap ring on the bottom (see Figure 8).

Attach the Operator to the Front Mounting Bracket

Attach the operator to the front mounting bracket with the short pin and one snap ring on the bottom and one snap ring on the top (see Figure 9).

Attach the Front Mounting Bracket to the Gate Leaf

Disengage the operator's worm screw drive from its motor with the Manual Release. Insert the key in the top of the motor assembly, and turn the key a half turn in the direction of the gate's closing.

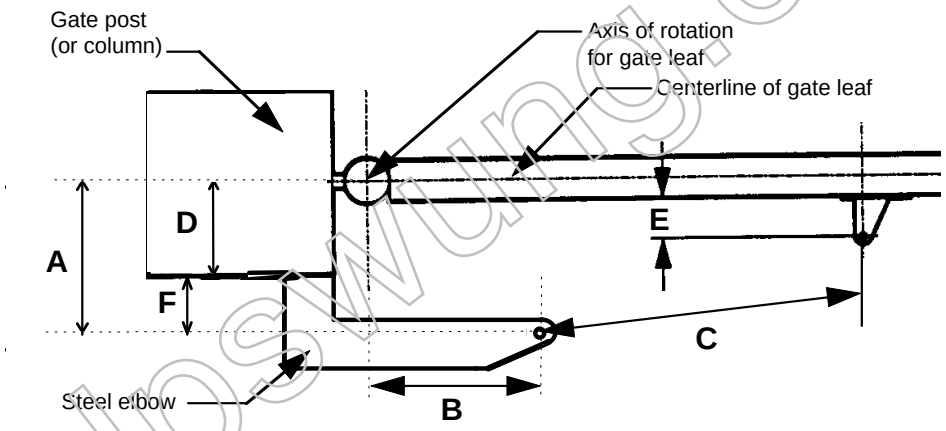
You should be able to lengthen or shorten the cylinder covering the operator's worm screw by pulling or pushing the cylinder. Lengthen or shorten the operator to the required distance for your gate installation:

Inward swinging: Lengthen the worm screw completely and push the cylinder in one inch.

Outward swinging: Shorten the worm screw completely and then pull the cylinder out one inch.

With the gate in the fully closed position, temporarily clamp the front mounting bracket (previously attached to the operator) to the gate leaf and insure that the cylinder of the worm screw is level.

Move the gate leaf by hand to the fully opened position against the gate stop and insure that the cylinder is level.



	Mounting Dimensions[a]	
	90-deg Swing	**110-deg Swing**
A	5 3/4 in. (14.5 cm)	4 7/8 in. (12.5 cm)
B	5 3/4 in. (14.5 cm)	4 7/8 in. (12.5 cm)
	WARNING! **A** and **B** should differ by *no more than* 1/2 in. Larger differences may *dangerously* alter the speed of operation.	
C	24 1/4 in. (62 cm)	
D	4 in. (10 cm)	3 1/8 in. (8 cm)
E	**Absolute minimum of 3 1/8 in. (8 cm)**	
F	**Absolute minimum of 1 3/4 in. (4.5 cm)**	

[a] Gate speed increases as the dimensions A and B decrease. The torque adjustment may also affect the gate speed.

[b] The sum of A and B must equal a minimum of 3 5/8 in. (9 cm).

Figure 7. Important mounting dimensions for outward-swinging 412 operators, top view