The 422 Operator and 450 MPS Control Panel: Installation Manual

Contents

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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 422 Series Compact Operator

Parameter	422 Standard	422 VHS
Physical dimensions of the operator	weight: 15-1/2 lb (7 kg) length: 38 7/8 in. (987 mm) width × height: 3 1/2 × 4 1/2 in (90 × 114 mm)	weight: 14-1/3 lb (6.5 kg) length: 32-9/16 in. (827 mm) width × height: 3 1/2 × 4 1/2 in. (90 × 114 mm)
Maximum gate leaf weight, lb (kg)	900 (410)	440 (200)
Maximum gate leaf length, ft (m)	10 (3)	4 (1.2)
Motor speed, rpm	1400	
Thrust and traction force, lb (kg)	0–1100 (0–500)	
Hydraulic locking[1]	In both opened and closed positions	
Maximum motor run time at 72 deg F (24 deg C):	50%	
Absorbed power, W	310	
Operating temperature range, deg F (deg C)[1]	-4 to 131 (-20 to 55)	
Thermal cut out, deg F (deg C)	212 (100)	
Oil quantity, qt (l)	1 (0.9)	7/8 (0.8)
Oil type	FAAC XD 220 or Shell/Tellus #15	
Power voltage required, VAC (frequency, Hz)[2]	115 (50 to 60) or 230, +6 or -10% (50 to 60)	

[1] Extreme differences in temperature and intermittent or no operation of the gate (for example, the gate is held open during an extreme temperature rise) may adversely affect operation. In such cases, we recommend you install external locking mechanisms and an SB model of the operator. Call us for details.

[2] Your standard 220 VAC power source meets the specification for 230 VAC, +6 or -10%

The Control Panel

The 450 MPS control panel is installed with a 422 Series Operator. The control panel allows you to set the opening/closing time, the leaf delay for a two-leaf gate system, the operating logic for your gate system, the pause time, the reversing stroke, and the behavior of reversing devices.

Both your operator and control panel 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 control panel, refer to the label on the transformer of the control panel.

Power source: 220 or 115 VAC
Operating logic available: A, S, E, EP, B, and C

> Note: Your standard 220 VAC power source meets the specifications for 230 VAC +6 or -10%, 50–60 Hz.

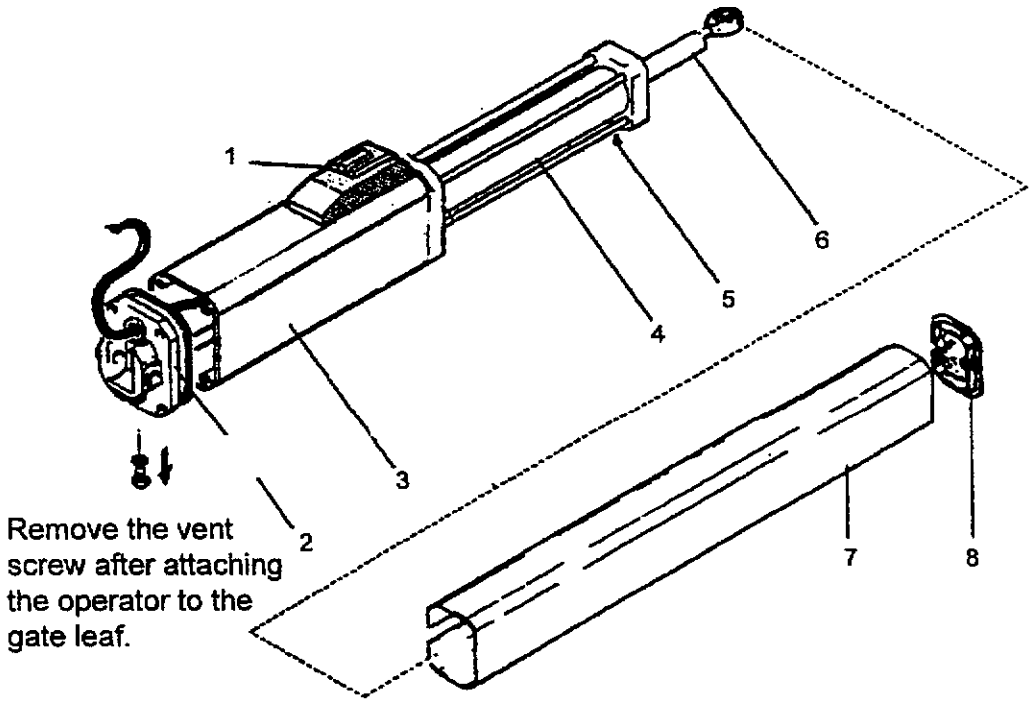
Unpacking the Operator

When you receive your 422 Compact Operator, complete the following steps.

Inspect the shipping box for physical damage such as leaking oil or 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). If you have ordered a kit (a pair of operators), you will have twice the quantity of parts listed below (except where noted).

1 Control panel box with control panel installed inside (only 1 per kit)
1 422 Operator unit
1 Protective cover for the operator (with 2 screws)
1 Protective cover end cap
1 Rear mounting bracket (for post or wall)
1 Rear mounting plate (use is optional)
1 Operator pin with 1 nut and washer for attachment to rear mounting bracket
1 Rear fork
1 Operator pin with 1 self-locking nut for attachment to rear flange of operator
1 Ball joint (eyelet) with nut and washer that screws into the end of the piston rod
1 Front mounting bracket with nut and bolt
1 Locking cap cover and special key for Manual Release mechanism



1 Locking cap
2 Rear flange
3 Operator casing housing pump and motor
4 Cylinder body
5 A cover fixing screw (1 of 2)
6 Piston rod
7 Protective cover
8 Protective cover end cap

Figure 1. The 422 Operator

The 422 Series Compact Operators

General Characteristics

The FAAC 422 Series Operators are automatic, light-duty gate operators designed for a swinging gate leaf weighing up to 900 pounds (410 kg).

> Note: The 422 Series Compact Operators are *not* recommended for use with solid gates.

Designed for residential use, the 422 Operator (the Standard or VHS model) consists of an electric motor and a hydraulic unit, both housed in an anodized aluminum casing that also serves as an oil reservoir. A control panel and its box come with the 422 Operator.

The 422 Operator can be used on gates that swing inward or outward on opening. In addition, the operator provides hydraulic locking in both the opened and closed positions and is designed for a gate leaf with a maximum width of 10 ft (3 m).

The hydraulic locking that the 422 Operator provides is a service feature that helps to keep a gate fully opened or fully closed. However, we recommend external locking mechanisms for any one of the following situations:

- Your gate leaf length meets following limit:
  For the Standard 422: 10 ft
  For the 422 VHS: 4 ft
- Your installation site requires tight security.
- Your gate site is subject to vandalism.
- Your gate site is subject to strong or very gusty wind.
- Your gate site experiences extreme temperature differences and intermittent or no operation of the gate (for example, the gate is held open during an extreme temperature rise).
- Your gate design includes a firebox for emergency entry/exit.

For gates with two leaves, two operators are installed, one on the inside of each leaf. One control panel drives both the operators. One gate leaf can be programmed to swing slightly later than the other on closing to allow for overlapping leaves.

The electronic control panel is a microprocessor-based controller that accepts a range of product accessories and reversing devices to allow flexibility in designing the gate system. The control panel allows you to set the opening/closing time, the leaf delay for a two-leaf gate system, the operating logic for your gate system, the pause time, the reversing stroke, and the behavior of reversing devices.

For its protection, the single phase, bidirectional electric motor shuts off automatically if its operating temperature reaches 212 deg F (100 deg C). The hydraulic unit consists of a piston rod and a positive displacement, internal gear pump. To prevent the piston from bottoming in its cylinder, the gate leaves must have a fixed positive stop in both the opened and closed positions.

The 422 Operator also includes a Manual Release mechanism and two bypass valves that control the thrust of the gate leaves. The Manual Release mechanism is a key-operated device that allows you to operate the gate by hand. Swinging the gate open or closed by hand is necessary during installation and useful during power failures.

The two bypass valves located beneath the locking cap on the top of the operator can be adjusted to vary the force of the gate as it opens or closes. In general, the pressure should be slightly higher when the piston rod is retracting than when it is extending.

Adjusting the bypass valves is necessary for the minimum safety of both people and property. FAAC safety standards state that the gate should stop its movement if it encounters a force of more than about 33 lb.

Reversing devices such as photocells or inductive loops should be installed to provide more complete safety for people and property.

Operating Logic

The 422 Operator provides a Manual Release mechanism for manually operating the gate. The 450 MPS Control Panel provides additional operating modes (see pages 7 and 8 as well as the text that follows). Manual operation of the gate requires using a special key in the locking cap; the other operating modes are set on the control panel.

Manual Release Mechanism

The Manual Release mechanism is a built-in release device of the 422 Operator (see Figure 2). To access the keyhole, gently press on the cover of the locking cap and slide it in the direction of the arrow. Then insert the key and turn it one full turn counterclockwise to disengage the operator's hydraulic operation.

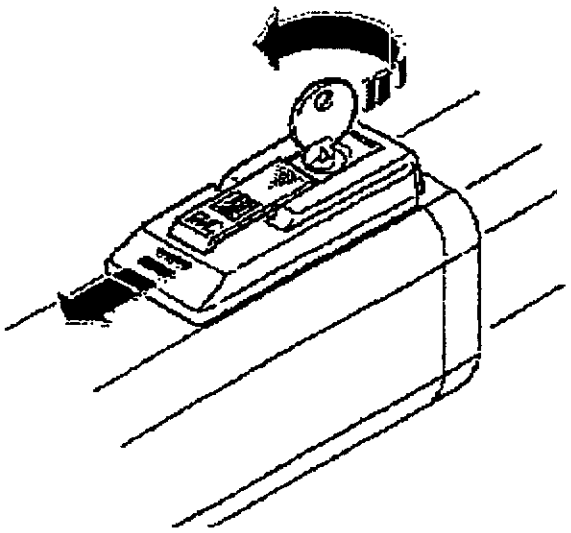


Figure 2. After sliding the cover aside, insert and turn the key counterclockwise one full turn for manual release

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.

> **Caution:** You can remove the key *only* after you have re-engaged the hydraulic system of the operator.

> **Caution:** Retracting the piston too quickly when operating the gate manually may result in oil seeping through the vent hole, possibly compromising the oil level in the operator.

You re-engage the motor of the operator by turning the key clockwise one full turn. Remove the key and slide the cover closed.

450 MPS Logic 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 pages 8 and 9.

- **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 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.
- **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 (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 422 Series Compact Operator involves preparing the gate, installing the operator(s), installing the control panel, fine-tuning the installed operator(s), and bleeding the operator.

> **Note:** The following installation instructions assume you are fully capable of installing an electro-hydraulic operator for 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 422 Series Operators.

Prepare the Gate

Before installing the 422 Operator, you need to prepare the gate itself for the operator. Be sure to do the following things:

1. Make sure that the gate structure is solidly built. Add reinforcing crosspieces if necessary to the gate leaves.
2. Make sure the gate leaf is plumb. This means the gate leaf does **not** swing when it is at rest in any position along its path.
3. Make sure that the gate moves smoothly on its hinges without excessive friction by swinging it open and closed by hand. If necessary, oil all the gate's moving parts.
4. Provide limit stops for the gate leaves in the fully opened and fully closed positions (see Figure 3).

Install the Operator

Once you have prepared the gate, you are ready to proceed with the installation of the operator. Follow the instructions below to install your operator, whether for an inward or outward swinging gate.

Installing the operator consists of the following steps:

- Attaching the rear mounting bracket to the column
- Attaching the operator to the rear mounting bracket
- Attaching the front mounting bracket to the operator
- Attaching the operator to the gate leaf
- Decreasing the pressures for the operator
- Installing the control panel
- Adjusting the hydraulic pressures

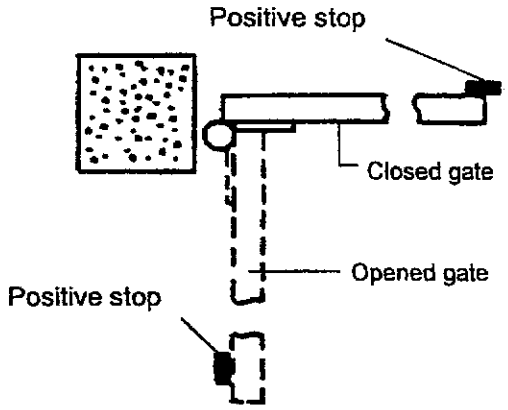


Figure 3. Limit stops

If you are installing an outward swinging gate, some steps are slightly different than for inward swinging gates. Read the instructions carefully.

Attach the Rear Mounting Bracket

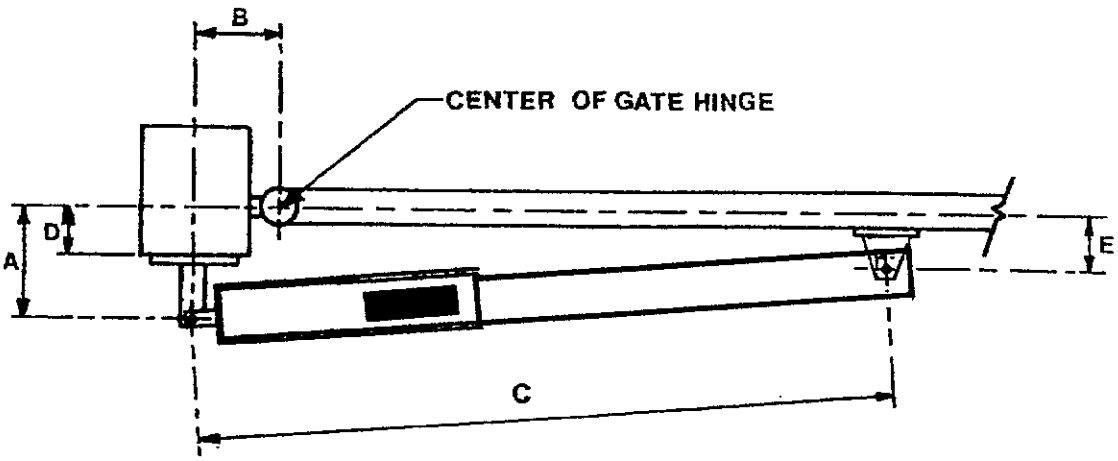
Inward Swinging Gate:

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 recess liner. Large pillars require a recess liner to house the rear mounting bracket and part of the operator so that the pillar will not interfere with the 90-deg swing of the gate when it is fully opened.

To determine whether you need a recess liner, measure the distance *D* (shown in Fig. 4) on your gate (this is known as the offset distance). If distance *D* greater than the dimension shown in Figure 4, notch the post and construct a recess liner for the post mounting bracket. The recess liner should be constructed of $^{3}/_{16}$ or $^{1}/_{4}$ in. steel with a minimum interior height of 8 in. (20 cm) so as to allow you to meet the stringent specifications shown in Figure 4. Make sure the recess liner is securely embedded in the post (or wall).

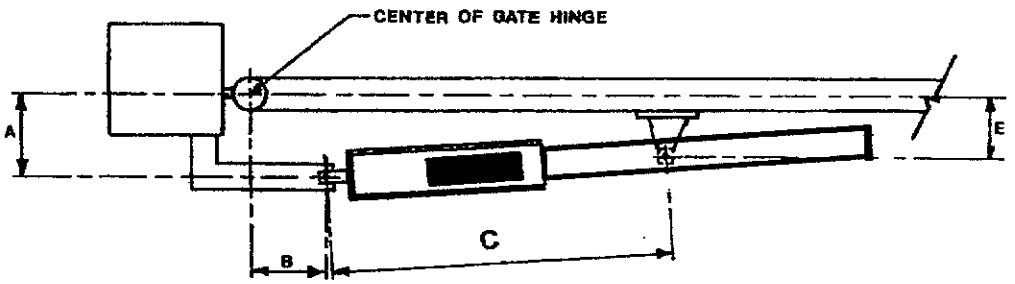
Once you have positioned the rear mounting bracket, attach the bracket to the post (or wall or recess liner), making sure the dimensions on your gate system meet the specifications shown in Figure 4.

> **Note:** You can alter the Rear Mounting Bracket to meet the dimensions of your gate. Using the rear mounting plate is optional.



	422 Standard	422 VHS
A	4-3/4 in. (12 cm)	3-1/8 in. (8 cm)
B	4-3/4 in. (12 cm)	3-1/8 in. (8 cm)
C	36-5/8 in. (93 cm)	29-3/4 in. (75.5 cm)
D	If greater than $2^{3}/_{4}$ in. (7 cm), construct a recess liner	If greater than $1^{1}/_{8}$ in. (2.9 cm), construct a recess liner
E	Must be less than A	Must be less than A

Figure 4. Important dimensions for an inward swinging gate



	422 Standard	422 VHS
A	4-3/4 in. (12 cm)	3-1/8 in. (8 cm)
B	4-3/4 in. (12 cm)	3-1/8 in. (8 cm)
C	27 in. (68.5 cm)	23-1/4 in. (59 cm)
E	Must be less than A	Must be less than A

Figure 5. Important dimensions for an outward swinging gate

Outward Swinging Gate:

If you are installing the 422 Operator to swing the gate outward, construct a steel elbow of 1-1/2 in. by 1/2 in. (3.8 by 1.3 cm) steel to attach to the gate pillar and rear mounting bracket (see Figure 5 for elbow dimensions).

Once you have attached the elbow to the post, attach the rear mounting bracket to the elbow, and attach the fork support to the rear mounting elbow.

Attach the Operator to the Rear Mounting Bracket

First you need to disengage the hydraulic operation of the operator with the manual release. Insert your key in the locking cap, and turn the key counterclockwise one full turn.

Next, place the mounting fork into the operator's rear flange, align, and secure with the long pin and self-locking nut.

Attach this fork assembly to the rear mounting bracket and secure it with the short pin, washer, and nut.

Attach the Front Mounting Bracket to the Operator

With the operator disengaged from its hydraulics with the Manual Release mechanism, screw the ball joint with its nut and washer into the end of the operator's piston. You can now move the operator's piston by hand while you attach the operator to the gate leaf.

Inward Swinging Gate:

Fasten the ball joint on the end of the piston rod in the bracket of the front coupling with the bolt and nut. Pull the piston out of its cylinder about 11 in. (28 cm).

> **Caution:** The piston should never hit the end of the cylinder but should remain 1/4 in. (6 mm) from the fully extended position.

Outward Swinging Gate:

Fasten the end of the piston rod in the bracket of the front coupling with the bolt and nut. Pull the piston out of its cylinder about 1/4 in. (6 mm).

> **Caution:** The piston should never hit the end of the cylinder but should remain 1/4 in. (6 mm) from the fully retracted position.

Attach the Operator to the Gate Leaf

Because of the force the 422 Operator exerts on a gate leaf, the front mounting bracket must be attached to a rigid surface. In the case of a rigid, metal gate leaf, the metal of the leaf may be sufficient. In the case of wooden or flexible gates, a reinforcing steel plate must be attached to the gate leaf where the front mounting bracket will be placed.

With the gate in the fully closed position, clamp the front mounting bracket against the gate leaf so that the cylinder is level. Mark the location of the front mounting bracket and temporarily clamp the front mounting bracket into position.

Move the gate leaf by hand to the fully opened position against the gate stop. Be sure the piston is not completely extended (or retracted for outward swinging gates). If necessary, remove the operator from the mounting brackets and adjust the extension of the piston rod.

Once you determine the cylinder is level and the piston properly extended, permanently attach the front mounting bracket to the gate leaf. Be sure to protect the piston if you are welding.

Once the operator is attached to the gate leaf, you should remove the vent screw (see Figure 1). The purpose of this screw hole is to allow the unit to breathe air to and from the hydraulic fluid cavity. The hole must be plugged during shipment to prevent the fluid from leaking out.

How you remove the screw depends on the date of manufacture of your operator. You need either a 7 mm hex wrench or 3 mm Allen wrench to remove the vent screw.

> **Caution:** Failure to remove the vent screw may result in the erratic operation of the operator or in overheating.

After you have removed the vent screw, use the Manual Release key to re-engage the hydraulic system of the operator (turn the key at least one full turn clockwise until it encounters resistance). Remove the key and keep track of it for use during the rest of the installation.

Decrease the Pressures for the Operator

> **WARNING!** You must decrease the pressures of the gate's opening and closing momentum before you operate the gate electrically. The pressure valves are not preset at the factory and may operate the gate leaf with enough force to endanger people and seriously damage the gate leaf itself.

To access the valve screws, remove the locking cap cover. Make sure the hydraulic system is engaged and the key is not inserted in the lock. Then remove the two screws on the locking cap with a 3-mm hex key (see Figure 6), and lift the entire locking cap assembly off the operator

> **WARNING!** Failure to remove the key from the Manual Release lock before you remove the entire locking cap assembly may compromise the Manual Release itself.

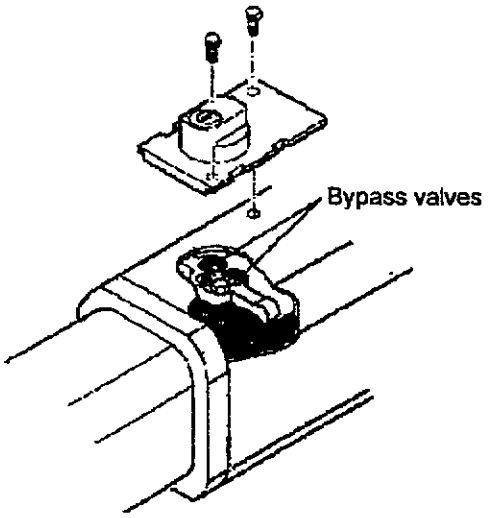


Figure 6. The location of the bypass valve screws in the 422 Operator

The green and red screws beneath the locking cap on the top of the operator are the bypass valve adjustment screws that control the force of the gate's opening and closing momentum (see Figure 6). For both valves, turning the screws clockwise increases the pressure and turning them counterclockwise decreases the pressure.

Inward Swinging Gate:

The green valve adjusts the opening pressure, and the red valve adjusts the closing pressure. Turn both valves counterclockwise one full turn to decrease the pressure now.

After you have made some electrical connections, you will have to adjust the pressure adjustments for safety, so replace the locking cap with its two screws but do not replace the locking cap cover.

Outward Swinging Gate:

The green valve adjusts the closing pressure, and the red valve adjusts the opening pressure. Turn both valves counterclockwise one full turn to decrease the pressure now.

After you have made some electrical connections, you will have to adjust the pressure adjustments for safety, so replace the locking cap now with its two screws but do not replace the locking cap cover.

Installing the 450 MPS Control Panel

Locate the control panel in the most convenient position possible, considering the movement of the gate. For example, a good position for the control panel box is on the inner face of the post or pillar. Figure 7 shows the typical layout for a two-leaf gate with the 422 Operator.

If you are embedding the control panel box into a wall or post, you must be sure to allow a clearance of $^3/_{16}$ in. (5 mm) between the surface of the wall or post and the rim under the lid of the control panel box.

Installing the control panel consists of the following general steps:

- Connecting the main power to the control panel
- Connecting the activating device
- Connecting the operator to the control panel
- Checking the direction of the motor's rotation
- Connecting other devices (activating and reversing) to the control panel
- Setting DIP switches and potentiometers for normal operation

The installer is responsible for grounding the gate and operator systems, for providing the main power breaker switch, and for making sure that the entire gate system meets all applicable electrical codes.

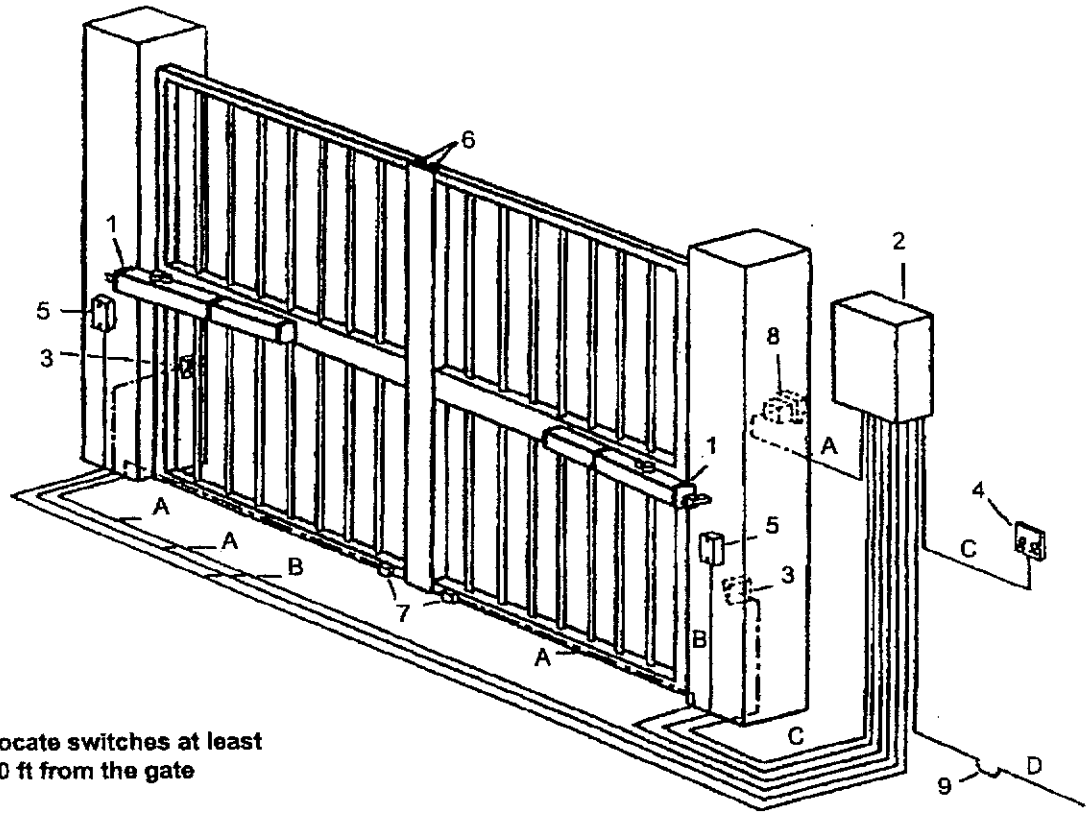
Connect the Main Power Supply

> WARNING! Turn the main power off before you make any electrical connections or set any switches inside the control panel box.

Wire the main power supply to control panel terminals in block J1 (see Figures 8 and 9). The installer is responsible for insuring that a separate, grounded circuit protected by a circuit breaker is between the control panel and the main power supply. All wiring should conform to applicable electrical codes, and all wiring and fittings should be weatherproof and/or suitable for burial.

Connect the ground to the grounding terminal in block J1 and connect the power wires to the terminals labeled N (neutral) and L (phase).

> **Caution**: The operators are grounded only by the grounded circuit the installer provides.



		Wire Gauges for Given Voltage			
		220 VAC		115 VAC	
1	Operator	A	2 x 18 AWG	A	2 x 18 AWG
2	Control Panel	B	4 x 14 AWG	B	4 x 14 AWG
3	Photocell	C	5 x 18 AWG	C	5 x 18 AWG
4	Switch	D	4 x 14 AWG up to 414 ft	D	3 x 14 AWG up to 130 ft 3 x 10 AWG up to 340 ft
5	Junction box				
6	Reversing edges				
7	Gate stops				
8	Switch				
9	Wiring to main circuit breaker				

Figure 7. The layout of a sample gate system

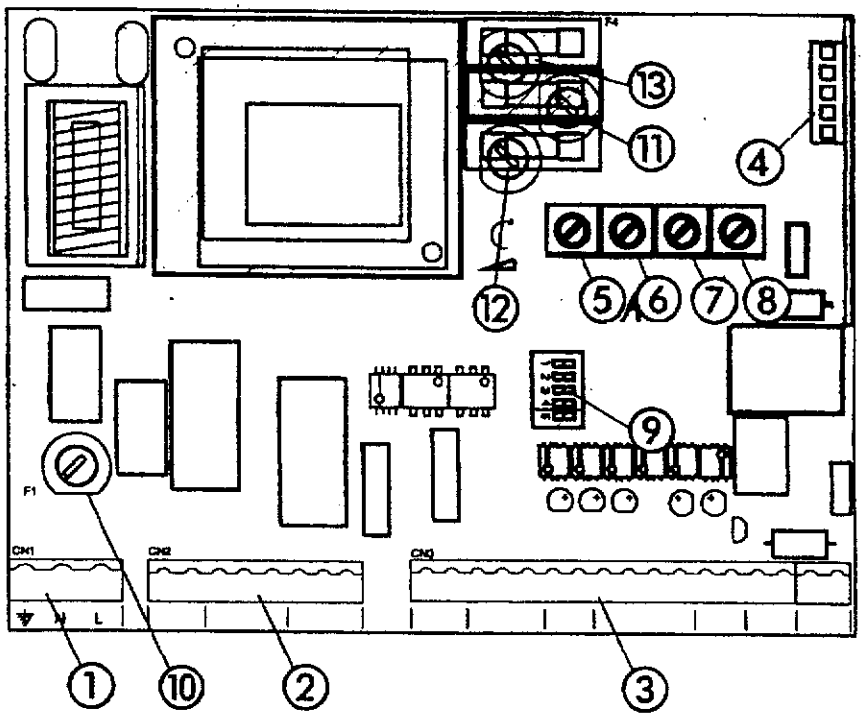
Connect One Activating Device

WARNING! Turn the main power off before you make any electrical connections or set any switches inside the control panel enclosure.

For the purposes of installation you need to connect at least one normally open (N.O.) activating device for your operator(s).

- If you have a two-leaf gate design, connect the activating device to terminals 18 and 19.
- If you have a one-leaf gate design, connect the activating device to terminals 16 and 17.

You use this activating device in the rest of the installation process. You can connect additional activating devices later.



1	J1 terminal block for main power supply	8	Leaf delay potentiometer		
2	J2 terminal block for connecting the operator(s)	9	DIP switch assembly		
3	J3 terminal block for low-voltage accessories	**Fuses**		**220 VAC**	**115 VAC**
4	J4 quick connector port	10	F1, Main power	5 A	10 A
5	Pressure adjustment potentiometer	11	F2, Accessories	800 mA	800 mA
6	Pause time potentiometer	12	F3, Electric lock	1.6 A	1.6 A
7	Potentiometer for adjusting open/close time	13	F4, Microprocessor	250 mA	250 mA

Figure 8. The 450 MPS control panel

Connect the Operator(s) to the Control Panel

WARNING! Turn the main power off before you make any electrical connections or set any switches inside the control panel box.

Using a Junction Box

Connecting your operator(s) to the control panel may require the use of one or more junction boxes. Whether you need 0, 1, or 2 U.L. Listed junction boxes depends on your gate design (refer to Figure 10).

If any operator is more than 2 ft away from the U.L. Listed control panel enclosure, the connection must be made inside a junction box. Use a U. L. Listed cord grip where the operator cord enters the junction box; use conduit between the junction box and the enclosure.

Connecting the Operator(s)

Caution: Do not use the terminal connections for Motor 2 (terminals 6, 7, and 8) if yours is a one-leaf gate design.

Note: If you have a one-leaf gate design, the operator must be connected to Motor 1 (terminals 3, 4, and 5).

If your gate system has one operator, connect the capacitor and the brown and black (or red and black) wires from your operator to the terminals 3 and 5 in block J2 for Motor 1. Connect the blue (or white) wire from the operator to terminal 4 for Motor 1.

Note: If you want to delay the closing of one gate leaf in a two-leaf gate design, be sure to connect its operator to Motor 1 (terminals 3, 4, and 5).

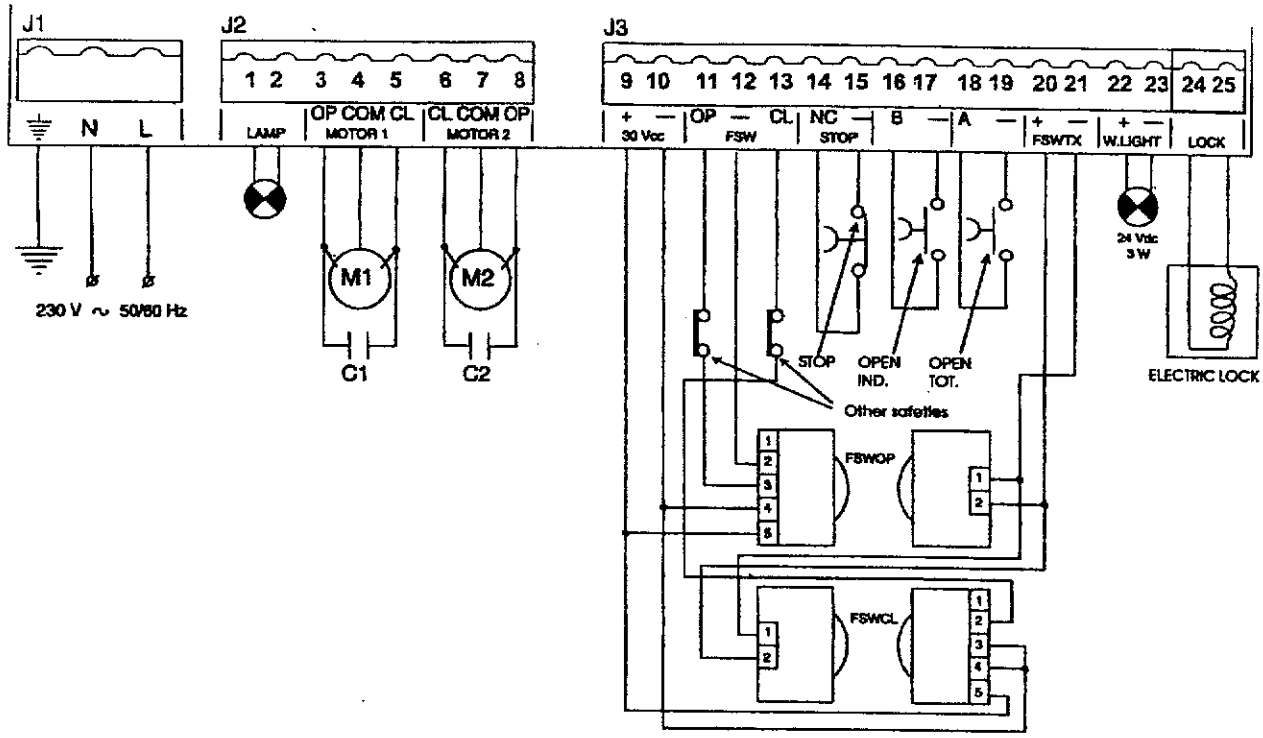


Figure 9. The terminal strip wiring of the 450 MPS

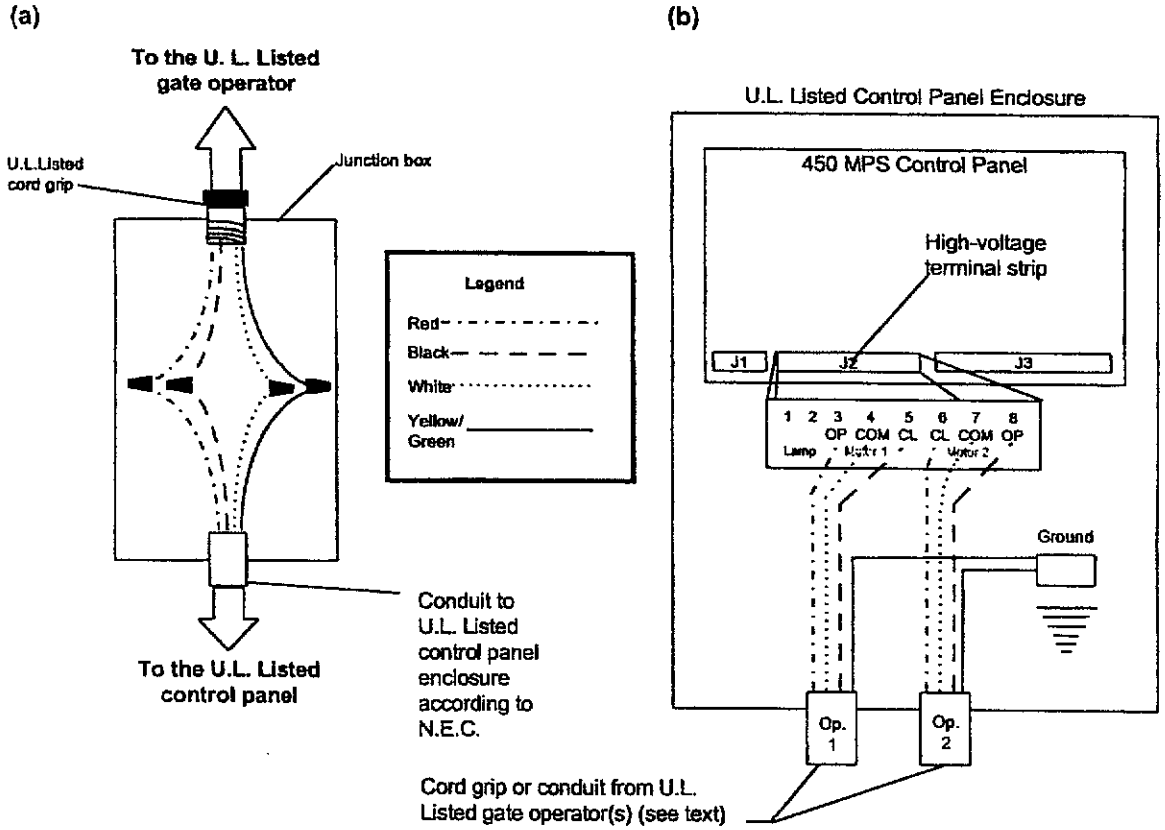


Figure 10. Wiring detail (a) inside the junction box and (b) from the junction box or operator to the high-voltage terminal strip on the 450 MPS control panel

If your gate system has two operators, connect the second operator to terminals 6, 7, and 8 in block J2 for Motor 2. Connect the capacitor and the brown and black (or red and black) wires to terminals 6 and 8, and connect the blue (or white) wire from the operator to terminal 7 for Motor 2.

Check the Motor's Direction of Rotation

After you have connected the main power supply, one activating device, and the operator(s) to the control panel, you need to check the direction of rotation for each operator motor in your gate design.

To check a motor's direction of rotation, you must have three closed circuits on terminal block J3. Install one circuit between terminals 11 and 13, another circuit between terminals 13 and 21, and another circuit (or stop device) between terminals 14 and 15.

You cannot check the motor's direction of rotation without these circuits (jumpers) or the accessories. When properly prepared for testing, the LEDs DL2 and DL3 should be illuminated.

> **WARNING!** Running the operator—even for testing purposes—without a connected reversing device is potentially dangerous. Do not place yourself within the path of the moving gate during your test.

Disengage the operator(s) with the Manual Release key, and open the gate by hand about halfway.

Next, engage the operator(s) with the Manual Release key so that you can check the rotation of the motor(s).

Turn on the main power and send an activating signal to the operator. The gate leaf (or leaves) should open. If a gate leaf closes, then you need to turn off the main power and reverse the connection of the brown and black (or red and black) wires on terminal block J2 for the operator controlling that leaf. Then you need to recheck the rotation direction again.

If your gate system has two operators, be sure the motor of each rotates in the correct direction.

After having completed your test of the motor's direction of rotation, replace any test circuits you installed (between terminals 13 and 15, between 13 and 21, and between 14 and 15) with the proper reversing and stop devices. The instructions for installing such accessories follow.

Connect Other Devices

> WARNING! Turn the main power off before you make any electrical connections or set any switches inside the control panel box.

Now you can connect additional reversing and activating devices to the control panel. Refer to Figure 8 for the general control panel layout, and refer to Figure 9 for the layout of the terminal strip.

> **Note:** The 450 MPS control panel allows a maximum accessory load of 500 mA.

Power Supply for Accessories: You can access a 30 VDC output for supplying power to accessories that require DC voltage through terminals 9 and 10 (located above the label *30 Vcc*) on terminal block J3. In most cases, this source can be used to power 24 VDC accessories.

Reversing Devices: Reversing devices include photocells, inductive loops, and so forth. All of the reversing devices should have contacts of the normally closed (N.C.) type. Where you connect a device depends on whether you want the device to operate during opening or during closing.

> **Note:** A reversing device is required for a U.L recognized installation.

> **Caution:** Failure of a reversing device that operates during opening causes a gate to lock in the closed position and requires the use of the Manual Release.

To wire photocells, refer to Figure 9 (see FSWOP for opening photocells, and FSWCL for closing photocells—wire the photocells exactly as shown). See Figure 11 for the wiring of inductive loops. In either case, if you have multiple devices, wire them in series.

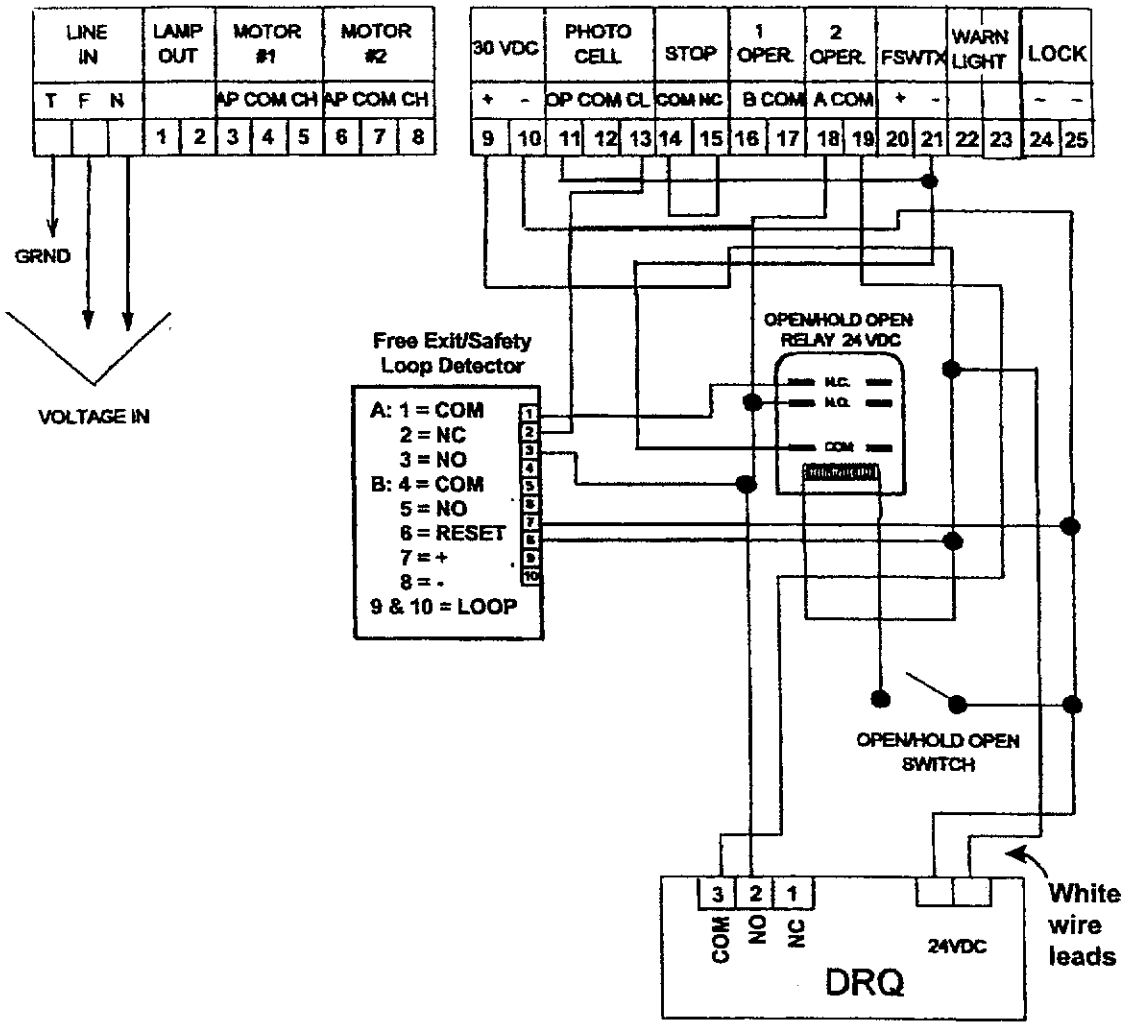


Figure 11. Wiring diagram showing loop detector

FAAC International, Inc., strongly recommends you install reversing devices. If you choose not to install such devices, then you must install the necessary circuit(s) for the control panel to work.

- If you do not install an opening reversing device, install a circuit between 11 and 21 on terminal block J3.
- If you do not install a closing reversing device, install a circuit between 13 and 21 on terminal block J3.

In addition, terminal block J3 requires a fail-safe connection for the photocells. Connect the photocells to terminals 20 and 21 in the FSWTX grouping.

Activating Devices and Radio Receiver: The activating devices and radio receiver for your gate must have normally open (N.O.) contacts. If you have only one gate leaf, connect such devices to terminals 16 and 17. If your gate has two leaves, connect the devices to terminals 18 and 19.

In addition, terminal block J3 requires a fail-safe connection for the transmitter of the photocells. Connect the transmitter to terminals 20 and 21 in the FSWTX grouping.

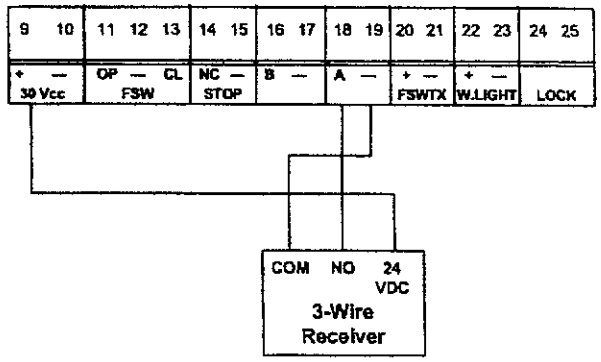


Figure 12. Connect a three-wire receiver

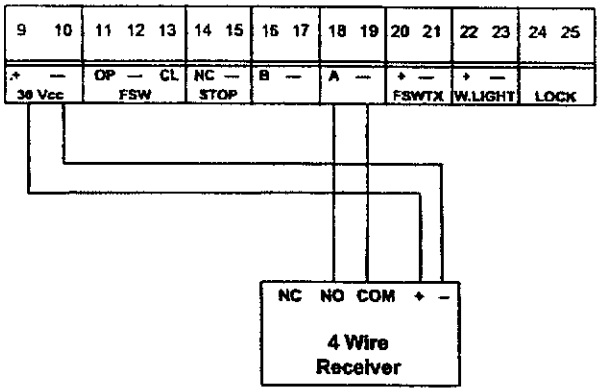


Figure 13. Connect a four-wire receiver

Decoder Card: If you are installing the Digicard magnetic card reader or the Digikey keyboard, use the quick-fit connector J4 for the DS (formerly the MD01) decoder card (see Figure 8).

Open/Hold Open Device: To open and hold open the gate, an Open/Hold Open device must make a set of contacts across terminals 18 and 19 (or 16 and 17) and must break a set of contacts between terminals 13 and 21 (see Figure 14).

Stop Button: The stop button you install must have normally closed (N.C.) contacts. Multiple stop buttons must be wired in series. Connect your stop device between terminals 14 and 15.

> **Note:** If you choose not to install a stop button, you must install a circuit between terminals 14 and 15 for the control panel to work.

The LED Indicators: The five light-emitting diodes (LEDs) on the control panel can be used to check for the proper functioning of the devices you attach to the control panel. The LED lights are on whenever the contacts are closed across each of the respective terminals.

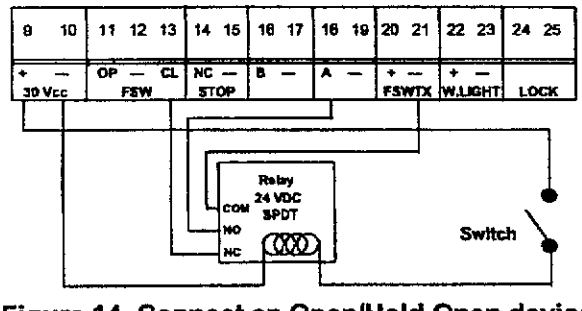


Figure 14. Connect an Open/Hold Open device with an external relay on the 450 MPS control panel

DL1 and DL2 should illuminate only when an activating signal is sent for 2 and 1 gate leaves, respectively. DL3 should be illuminated except when the stop button is pressed. DL4 and DL5 should be illuminated except when the reversing devices, for opening and closing, respectively, are triggered. Use the LEDs and the table below to determine if the accessory devices you have installed are operating properly.

LED	On	Off
DL1, Open 2 leaves	Command active	Command inactive
DL2, Open 1 leaf	Command active	Command inactive
DL3, Stop	Command not active	Command active
DL4, FTSW Open	Opening reversing devices not triggered	Reversing device triggered
DL5, FTSW Close	Closing reversing devices not triggered	Reversing device triggered

Electric Lock: An electric lock can make use of the reversing stroke function controlled by DIP switch 5. A reversing stroke is a short closing phase that allows the electric lock time to disengage itself before the operator starts its opening. Use DIP switch 5 if necessary for your lock to function correctly. Connect your lock to the terminals 24 and 25. The terminals provide 12 VAC pulsed power.

See Figure 15 for the connections for a magnetic locking device.

Warning Light: Connect a warning light to terminals 22 and 23 in the group labeled *W.LIGHT* in terminal block J3. The terminals provide an output voltage of 30 VDC, maximum power 3 Watts. This output voltage will power most 24 VDC warning lights.

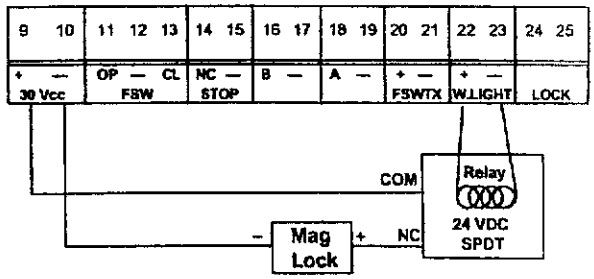


Figure 15. Connect a mag lock to the 450 MPS control panel as shown

Note: The behavior of the warning light varies according to the logic you have set.

Logics A, S, E, EP, and B: The warning light is on steadily during opening and the pause phase. During closing, the light flashes.

Logic C: The warning light is on steadily during opening and flashes during closing.

Set Other Operating Controls

WARNING! Turn off the main power before you make any electrical connections or set any switches inside the control panel box.

Note: Some DIP switch assemblies are labeled differently depending on their date of manufacture. OPEN indicates *off* and ON indicates *on*.

You need to set DIP switches and adjust some potentiometers on the control panel for your gate's operation. The 450 MPS Control Panel has 5 DIP switches and 4 potentiometers that control a wide range of functions.

Set DIP Switches

Switches 1, 2, and 3 (Operating Logic): The 450 MPS Control Panel offers six operating modes (refer to the operating logic tables earlier in these instructions for more detail):

- A (automatic)
- S (security)
- E (semi-automatic)
- EP (semi-automatic, step by step)
- B (manned, pulsed)
- C (manned and constant)

Switches 1, 2, and 3 control the operating logic according to the following scheme:

Logic	DIP Switch		
	1	2	3
A	off	off	off
S	on	off	off
E	off	on	off
EP	on	on	off
B	on	on	on
C	off	off	on

Switch 4 (Reversing Device Behavior on Closing): Refer to the operating logic tables earlier in these instructions and to the table below for how to set DIP switch 4.

Gate Behavior During Closing	DIP Switch 4
Gate immediately reverses its direction	off
Gate stops and reverse its direction when reversing device is no longer triggered	on

Switch 5 (Reversing Stroke): Some electric locks require a reversing stroke to disengage the lock. If your lock requires this reversing stroke, set DIP switch 5 according to the following table.

Reversing Stroke	DIP Switch 5
Not activated	off
Activated	on

Adjust the Potentiometers

The four potentiometers control the torque (or pressure), the pause time between opening and closing, the opening/closing time of operation, and the leaf delay on closing.

Torque (Pressure): The torque (or pressure) potentiometer must be turned all the way clockwise. The potentiometer controls voltage to the operator, which can affect the life of the operator's motor. The torque/pressure potentiometer cannot be used to adjust the operator's hydraulic operating pressures.

Caution: Failure to turn the torque/pressure potentiometer to maximum in the clockwise direction jeopardizes the life of the motor of your operator.

WARNING! Adjust the operating pressure on the 422 Operator only by means of the hydraulic bypass valve screws. See pages 12 and 21.

Pause Time: The pause time between opening and closing can be adjusted from 5 to 240 seconds. Turn the potentiometer clockwise to increase the pause time and counterclockwise to decrease the pause time.

Opening/Closing Time: The opening/closing time is adjustable from 10 to 62 seconds. The approximate opening/closing time for a 90-degree opening is 6 seconds (for the VHS model) or 15 seconds (for the standard model). Turn the potentiometer clockwise to increase the time and counterclockwise to decrease the time.

For optimal operation, set the time so that the motor remains activate for a couple of seconds after the leaf has reached its limit stop for opening and for closing.

Leaf Delay: You may choose to delay one leaf on closing for overlapping gate leaves. Be sure the operator on the leaf for delayed closing is connected to Motor 1. On opening, the leaf connected to Motor 2 is delayed 2.5 sec.

> **Note**: You cannot *adjust* this opening delay of the operator connected to Motor 2. However, you can avoid the opening delay—and closing delay—by connecting both operators (and their capacitors) to Motor 1.

The time is adjustable from 0 to 28 seconds. Turn the potentiometer clockwise to increase the time and counterclockwise to decrease the time.

> **Note**: If one-leaf gate designs, be sure to set the potentiometer for leaf delay to its minimum (0 seconds).

> **Note**: If the opening/closing time is set at less than the leaf delay time, the delayed leaf closes at the end of the closing time.

Adjust the Hydraulic Pressures

The pressure a gate leaf applies to an obstacle in its path is determined by the bypass valve adjustment. The safety standards of FAAC International, Inc., state that the gate should stop when it meets with a force of more than 33 lb (15 kg). It is also desirable to have the pressure slightly higher when the piston rod is retracting than when it is extending.

> **WARNING!** The pressure valves may operate the gate leaf with enough force to endanger people and seriously damage the gate leaf itself. Increase the pressures in small (1/4 turn) increments, and set the pressure adjustments at the ***minimum*** level necessary for the gate's operation.

> **Caution**: Excessively high pressure settings cause problems with the self-bleeding function of the operator and cause excessive wear of the pump and motor.

You need to fine tune the pressures for both opening and closing momentums after you have installed the control panel for the 422 Operator.

To access the bypass valve screws that control the pressure, make sure the Manual Release key is not inserted in the lock and remove the locking cap with a 3-mm hex key (see Figure 6).

> **Caution**: The Manual Release and the key are indexed in the closed position (the key is turned all the way clockwise and is snug). Removing the key when it is in any other position compromises the Manual Release function.

For both the red and green bypass valve screws beneath the locking cap, turning the screws clockwise increases the pressure and turning them counterclockwise decreases the pressure.

Before reinstalling the locking cap, you must be sure that the top of the brass key assembly in the locking cap is flush with the top of the black plastic locking cap (see Figure 16). If the key assembly is not flush, press it into position or remove the key and turn the locking cap assembly over and press down on the unit until the brass key assembly snaps back into place.

Next, reinstall the locking cap with its two screws. (If you have not removed the vent screw, this may not be possible, so *remove the vent screw!*)

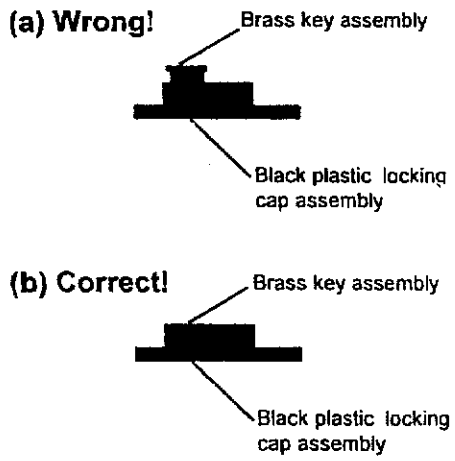


Figure 16. The brass key assembly in relation to the black plastic locking cap, side view: (a) do not install in this orientation and (b) install the locking cap only when the top of the brass key assembly is flush with the black plastic housing of the locking cap assembly

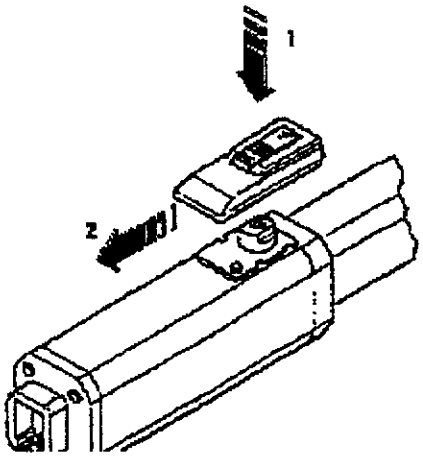


Figure 17. Install the locking cap cover

Now you can install the locking cap cover as shown in Figure 17. Snap the cover on before you attempt to slide the entire cover in the direction of the arrow. If the cover does not snap into place, you are unable to slide the cover into position.

> **WARNING!** If the brass key assembly is not properly seated in the locking cap assembly, you risk damaging, even eliminating, the Manual Release function of the operator.

Bleeding the Operator

It is not necessary to bleed the 422 Operator as it is designed to bleed itself under the following conditions:

1. The vent screw has been removed.
2. The operator has an adequate oil supply.
3. The hydraulic pressures have been properly set.

Install the Operator Cover

To install the cover over the piston of the operator, first insert the two spacers (items labeled *2* in Figure 18) in the front flange of the operator as shown. The spacers dampen any vibrations to the operator.

Next, slip the cover over the operator. The slit in the cover should face the gate, and the cover should be placed firmly over the rear of the operator cover (item 1 in the figure).

Finally, use the black plastic screws (items 3 and 4) to fix the cover to the operator and the end cap (item 5).

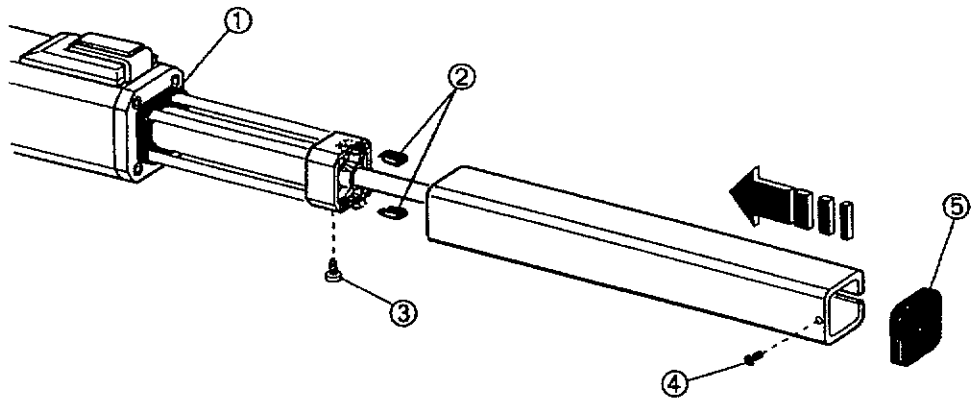


Figure 18. Install the cover over the piston of the 422 Operator

Maintenance

The 422 Operator

The FAAC recommended maintenance schedule varies according to the frequency of use of the operators, whether lightly used operators (once or twice an hour) or heavily used operators (many cycles per hour).

Check the oil.
To check the oil level correctly, remove the locking cap from the operator. The oil level should be ¾ to 1 in. below the top of the housing. If you overfill the operator with oil, the excess weeps out the vent screw hole.

Light duty use: every 6 mo
Heavy duty use: every 3 mo

Change the oil.
Changing the oil requires removing the operator from its installed position. Remove the locking cap and drain the oil out of the hole under the cap after gently rolling the operator upside down.

Light duty use: every 2 yr
Heavy duty use: every 1 yr

Check the pressure settings.
Light duty use: every 6 mo
Heavy duty use: every 3 mo

The Control Panel

The control panel itself requires no maintenance. However, you should check the control panel enclosure at least annually to make sure the enclosure is properly sealed and to remove any debris.

Troubleshooting

WARNING! Before you do any work on the control panel, be sure to turn off the main power.

Problem: The gate does not respond to an activating signal.
Solution:
Verify that you have correctly wired the operator to the control panel.

Verify that the LED DL3 is on. If it is not illuminated, then check the fuses on your control panel.

If the LED DL3 is not illuminated and your fuses are okay, then the stopping device is being triggered and is preventing the gate from responding to your signal. If you have no stopping device installed, then be sure you have installed a jumper across the appropriate terminals.

Verify that your activating device works properly. Either DL1 or DL2 (depending on your gate design) should illuminate when you signal the gate to close (or open) and LED DL3 should be on. If either DL1 or DL2 does not illuminate when you signal the gate, then the problem may be in your activating device. Short across the appropriate terminals. If the short causes the gate to close (or open), then the problem is in the activating device. Repair or replace the device.

Problem: The radio controlled opener does not open the gate.
Solution:
Check the light on the front of the remote transmitter. It should illuminate when you signal the gate. If it does not illuminate and if the batteries are okay, repair or replace the transmitter.

Verify that the wiring is correct for the radio controlled device and the antenna.

Check DL1 and DL2. One should illuminate when the transmitter button is pressed.

Determine if the fault is in the receiver by temporarily connecting a push button device across the appropriate terminals. If such a push button device opens the gate, repair or replace the receiver.

Problem: The gate doesn't open (or close) though the motors are running.
Solution:
Make sure that the motor is running in the right direction, and make sure the Manual Release mechanism has fully engaged the hydraulic system.

Increase the bypass pressure in small 1/4 turn increments to see if the hydraulic system needs more pressure.

Problem: The gate opens but does not close.
Solution:
Make sure you have selected the desired operating mode.

Verify that the reversing devices are working properly. DL4 or DL5 should illuminate when a reversing device is triggered. If either does not illuminate, then one of your reversing devices is preventing the gate from responding to your signal. Check your reversing devices.

If no reversing devices are installed, make sure a circuit is installed between appropriate terminals.

If the motor is running, insure that the bypass valves are correctly adjusted. Increase the bypass pressure in small 1/4 turn increments to see if the hydraulic system needs more pressure.

Problem: The gate does not fully open (or close).
Solution:
Increase the bypass pressure(s) to see if the hydraulic system needs more pressure.

Check the operator's motor run time selection. You should set a time that is just longer than the rated speed of your model of operator. For example, because the 400 CBAC has a rated opening time of 17 sec, you should select a time that is just longer than the opening time.

Check to see that there are no obstructions in the path of the gate or that the hinges are not binding.

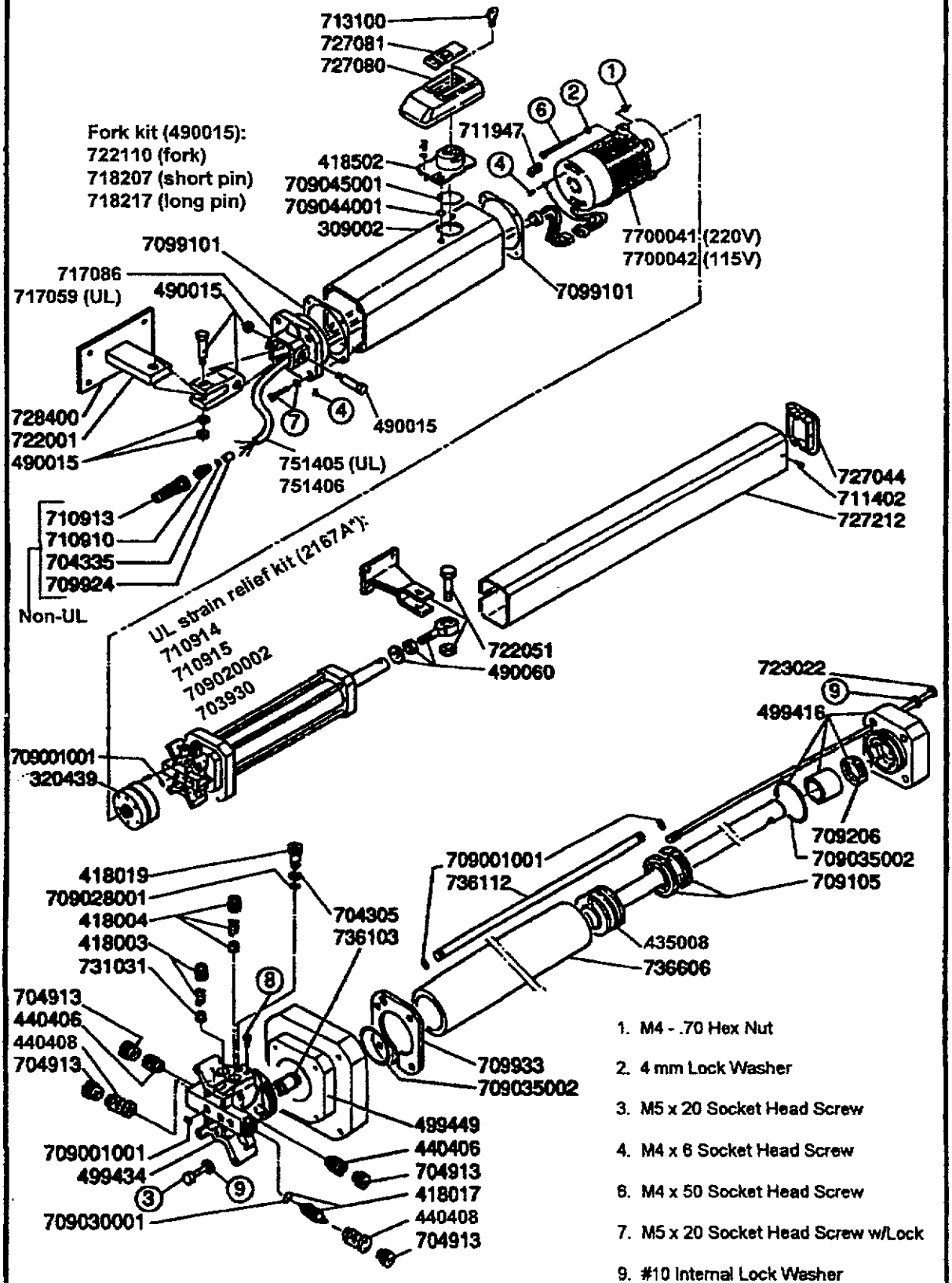
Problem: The operator doesn't work smoothly and the gate jerks as it opens and closes.
Solution:
Check the oil level in the operator.

Make sure the Manual Release mechanism has fully engaged the hydraulic operation of the operator.

Bleed the air from the hydraulic system by cycling the gate (opening and then closing) 10 times and pausing for a couple of minutes between cycles.

Make sure that a flexible gate leaf is not the problem. If the gate leaf flexes, then stiffen the gate or use a slower operator.

Exploded View — 422 CBAC



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FAAC

Limited Warranty

To the original purchaser only: FAAC International, Inc., warrants, for twenty-four (24) months from the date of invoice, the gate operator systems and other related systems and equipment manufactured by FAAC S.p.A. and distributed by FAAC International, Inc., to be free from defects in material and workmanship under normal use and service for which it was intended *provided* it has been properly installed and operated. FAAC International, Inc.'s obligations under this warranty shall be limited to the repair or exchange of any part of parts manufactured by FAAC S.p.A. and distributed by FAAC International, Inc. Defective products must be returned to FAAC International, Inc., freight prepaid by purchaser, within the warranty period. Items returned will be repaired or replaced, at FAAC International, Inc.'s option, upon an examination of the product by FAAC International, Inc., which discloses, to the satisfaction of FAAC International, Inc., that the item is defective. FAAC International, Inc. will return the warranted item freight prepaid. The products manufactured by FAAC S.p.A. and distributed by FAAC International, Inc., are not warranted to meet the specific requirements, if any, of safety codes of any particular state, municipality, or other jurisdiction, and neither FAAC S.p.A. or FAAC International, Inc., assume any risk or liability whatsoever resulting from the use thereof, whether used singly or in combination with other machines or apparatus.

Any products and parts not manufactured by FAAC S.p.A. and distributed by FAAC International, Inc., will carry only the warranty, if any, of the manufacturer. This warranty shall not apply to any products or parts thereof which have been repaired or altered, without FAAC International, Inc.'s written consent, outside of FAAC International, Inc.'s workshop, or altered in any way so as, in the judgment of FAAC International, Inc., to affect adversely the stability or reliability of the product(s) or has been subject to misuse, negligence, or accident, or has not been operated in accordance with FAAC International, Inc.'s or FAAC S.p.A.'s instructions or has been operated under conditions more severe than, or otherwise exceeding, those set forth in the specifications for such product(s). Neither FAAC S.p.A. or FAAC International, Inc., shall be liable for any loss or damage whatsoever resulting, directly or indirectly, from the use or loss of use of the product(s). Without limiting the foregoing, this exclusion from liability embraces a purchaser's expenses for downtime or for making up downtime, damages for which the purchaser may be liable to other persons, damages to property, and injury to or death of any persons. Neither FAAC S.p.A. or FAAC International, Inc., assumes nor authorizes any person to assume for them any other liability in connection with the sale or use of the products of FAAC S.p.A. or FAAC International, Inc. The warranty hereinabove set forth shall not be deemed to cover maintenance parts, including, but not limited to, hydraulic oil, filters, or the like. No agreement to replace or repair shall constitute an admission by FAAC S.p.A. or FAAC International, Inc., of any legal responsibility to effect such replacement, to make such repair, or otherwise. This limited warranty extends only to wholesale customers who buy directly through FAAC International, Inc.'s normal distribution channels. FAAC International, Inc., does not warrant its products to end consumers. Consumers must inquire from their selling dealer as to the nature and extent of that dealer's warranty, if any.

This warranty is expressly in lieu of all other warranties expressed or implied including the warranties of merchantability and fitness for use. This warranty shall not apply to products or any part thereof which have been subject to accident, negligence, alteration, abuse, or misuse or if damage was due to improper installation or use of improper power source, or if damage was caused by fire, flood, lightning, electrical power surge, explosion, wind storm, hail, aircraft or vehicles, vandalism, riot or civil commotion, or acts of God.

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