



The Quality Name in High Voltage Switching

Type VM-1

Motor Operator

All Ratings

INSTALLATION &

INSTRUCTION

MANUAL



The Quality Name in High Voltage Switching

Safety Information

DANGER

IMPROPER HANDLING, INSTALLATION, OPERATION OR MAINTENANCE OF THIS EQUIPMENT MAY CAUSE IMMEDIATE HAZARDS WHICH WILL LIKELY RESULT IN SERIOUS PERSONNEL INJURY OR DEATH.

WARNING

The equipment covered by this publication must be handled, installed, operated and maintained by qualified persons who have direct knowledge and experience dealing with the hazards involved and are thoroughly trained in the handling, installation, operation and maintenance of high voltage transmission and distribution equipment. These instructions are meant for only such **Qualified Persons**. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

A **Qualified Person** is one who is trained in and has skills necessary:

- to read and comprehend this instruction book – understanding that these instructions are general in nature
- to accept personal responsibility to prepare and maintain an intrinsically safe work environment and maintain control of the work site to safeguard all persons present
- to develop and implement a proper rigging, lifting, and installation plan along with all safety precautions required to insure safe and proper lifting and installation of the equipment.
- to distinguish between energized and non energized parts
- to determine proper approach distances to energized parts
- to properly work with and around energized or de-energized equipment that may be pressurized with gas
- for proper use of personal protective equipment, insulating and shielding materials, insulated tools for working near energized and /or pressurized electrical equipment
- to recognize and take necessary precautions for the unique and dynamic conditions of site and specialized equipment to maintain a safe work environment during handling, installation, operation, and maintenance of high voltage switching equipment

The instructions in this manual are general guidelines for this type of equipment and not specific to the equipment supplied. Portions of it may not be applicable or may not have complete instructions for your specific equipment.

If you do not understand any part of these instructions or need assistance, contact Southern States Service Division at 770-946-4562 during normal business hours (8:00am – 4:30pm EST, M-F) or 770-946-4565 after normal business hours.



The Quality Name in High Voltage Switching

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| Product Purchased Region | Product Installed Region | Warranty Holder | Warranty Duration |
|--------------------------|--------------------------|---------------------|--|
| U.S and Canada | U.S and Canada | End User | Five (5) Years |
| All Other Conditions | | Immediate Purchaser | Earlier of 1 year from installation or 18 months from shipment |

TYPE VM-1



Installation and Adjustment Procedures

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Important

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Southern States reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material, or both, the latter shall take precedence.

Installation and Adjustment Procedures

Unpacking:

Unpack the mechanism and check for damage. If damage is found, file a claim with the carrier immediately and notify the factory.

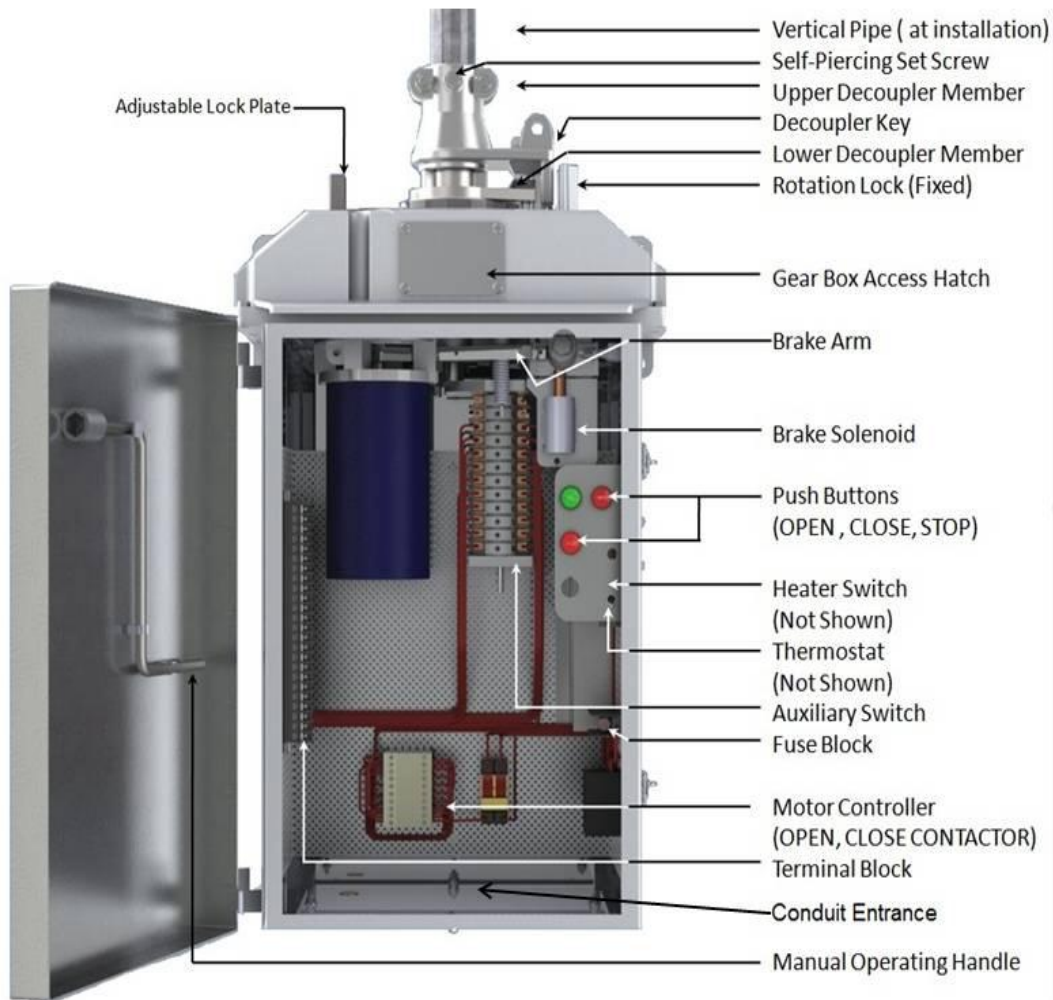


Figure 1 - Part Identification

Storage:

If this equipment is to be stored prior to use:

1. Store the VM-1 mechanism in the upright position
2. The door should be latched closed
3. No part of the mechanism should be submerged
4. Indoor storage or covering with a tarp is not necessary, but preferred. As with all electrical equipment, however, condensation is a consideration.
5. The heater should be energized if the mechanism is stored outdoors for an extended period (3+ months) or in a humid environment. Refer to wiring diagram drawing for heater connection.

Installation and Adjustment Procedures

Static brake

The static brake is an electro-mechanical mechanism comprised of a brake pad, brake arm, spring and solenoid. The spring provides the mechanical force necessary to depress the brake and keep the motor operator from turning. When the motor is energized, the brake solenoid, seen in Figure 1, depresses the spring thereby releasing the brake and allowing the motor operator to function.

Dynamic brake

The dynamic brake is a strictly electrical device. A set of contacts runs parallel to the motor which is normally closed. When the operator needs to be stopped, a short is induced across the motor operator which therefore stops the operator from rotating.

Installation Note: Installation consists of mounting and adjusting the VM-1 Motor Mechanism to coordinate with the switch operating controls. Sketches and dimensions contained in this manual are for illustration only. Refer to unit assembly drawing and operating mechanism drawing for specific dimensions.

Application Note: The VM-1 Motor Mechanism is equipped with an adjustable rotation lock that provides variable starting and stopping points on a rotational angle between 30° and 330°. Refer to section VIII for adjustment of this lock.

Caution: Use manual operation for installation. **Do not perform electrical operation until all adjustments are complete. Keep away from moving parts. Keep away from electrical components unless power has been disconnected.**

Installation:

1. Mount the VM-1 Mechanism as shown on the Operating Mechanism Drawing or Mounting Arrangement Drawing. Refer to Switch Installation Instructions for switch adjustment.
2. Attach the upper decoupler member to the vertical pipe in accordance with the instructions provided for the **decoupler type** supplied.
3. **Universal Decoupler (Not Common)**
 - Do not drive in the self-piercing set screws at this time.
 - The vertical pipe should bottom out in the lower decoupler section for 1-1/2 inch pipe and in the upper decoupler section for 2 inch pipe.
 - Discard cap and hardware for the unused section.
 - A clearance of ½ inch must be maintained between the upper and lower decoupler members. To adjust, raise or lower the vertical pipe in the vertical bearing at the top of the pipe. The full pipe weight must be supported by the vertical bearing.
 - When required clearance is achieved, pierce the pipe with the set screw in the pipe collar above the vertical bearing.
 - It may be necessary to pre-drill all set screw holes, using the threaded drill guides if provided.
 - Refer to Figures 2 and 3 for decoupler operation. Use the decoupler key to align the upper decoupler member with the fixed rotation lock and tighten clamping bolts. **Do not** pierce the pipe with set screw at this time.

Installation and Adjustment Procedures

4. Single Size Decoupler:

- **Do not pierce the pipe with the self-piercing set screws at this time.**
- The vertical pipe should bottom out in the upper decoupler member.
- A clearance of ½ inch must be maintained between the upper and lower decoupler members. To adjust, raise or lower the vertical pipe in the vertical bearing. The vertical bearing must support the full weight of the pipe.
- When required clearance is achieved, pierce the pipe with the set screw in the collar above the vertical bearing. (Do not drive set screw into coupling yet)
- If heavy wall pipe is used it will be necessary to pre-drill all set screw holes, using the threaded drill guides when provided.
- Refer to Figure 3 for decoupler operation. Use the decoupler key to align the upper decoupler member with the fixed rotation lock. Tighten the clamping bolts. **Do not pierce the pipe** until proper switch operation has been confirmed.

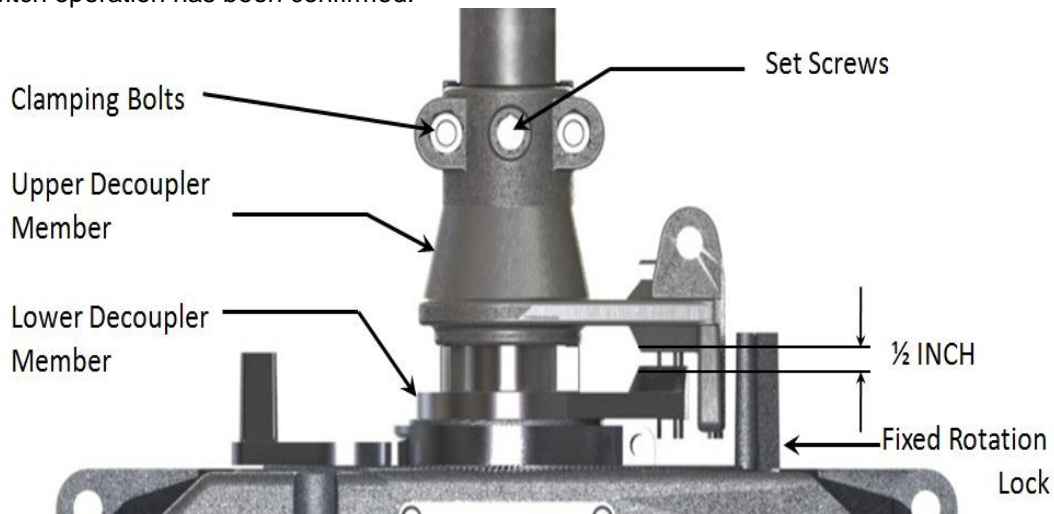
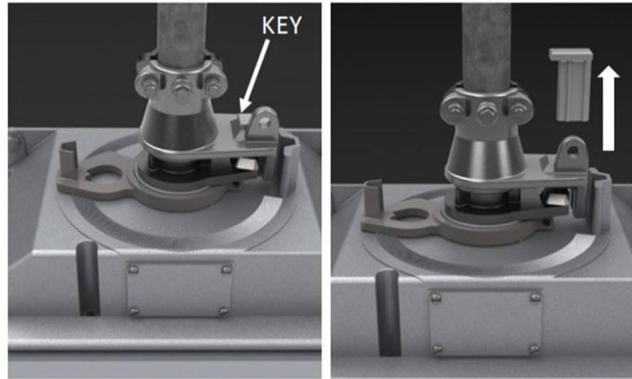


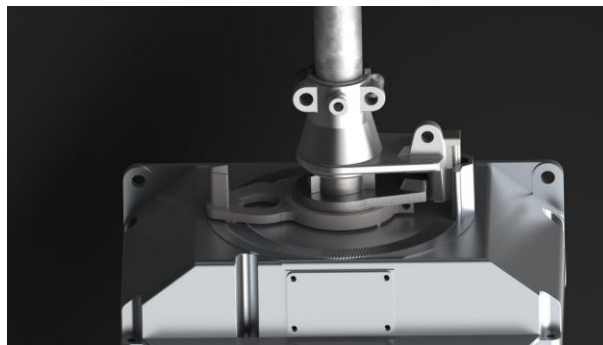
Figure 2 - Decoupler

Note : If the upper decoupler member rests upon the lower decoupler member, it is not adjusted properly. The 1/2 –inch gap must be present at installation to allow thermal expansion.

Installation and Adjustment Procedures



A. VM-1 coupled to switch – ready to operate. B. Remove key to decouple VM-1 from the switch.



C. VM-1 Decoupled- Switch is locked out

Figure 3 - Decoupler Operation

Decoupler Operation:

If decoupler key is hard to remove, use crank handle or swing handle to back off torque load. The key should have adequate clearance between the lower decoupler member when the key is in the decoupled (locked out) position.

Electrical Check-Out Procedure:

1. Although electrical operation of the switch should not be attempted until later, the VM-1 mechanism can be **checked** electrically now ***with the VM-1 decoupled from the switch***
2. Decouple as shown in Figure 3 and connect the VM-1 mechanism for electrical operation as shown on the wiring diagram drawing. Refer to Figure 1 for conduit entry into the cabinet.
3. Proper rotation is set at the factory, however adjustment may be required. Test each mechanism to confirm rotation output agrees with the operating mechanism drawing. It is recommended the decoupled VM-1 be hand cranked to the midpoint of rotation before the initial test operation. Use the push buttons for testing operation.
4. **OPEN** and **CLOSE** push buttons (if supplied) initiate electrical operation.

Installation and Adjustment Procedures

5. **STOP** button (if supplied) overrides all other commands, sets the brake and halts mechanism operation.
6. The motor fuses (or circuit breakers) must be in place for electrical operation.
7. In event of motor overload: (When Supplied)
 - The thermal overload relay will trip.
 - Remove cause of overload.
 - Allow motor to cool until it reaches normal operating temperature.
 - Reset the thermal overload relay by flipping the motor switch to the **OFF** position, and then back to the **ON** position.
 - Use the **OPEN** and **CLOSE** push buttons to resume electrical operation.
8. If over or under rotation is observed, adjust the motor limit switches as directed in Auxiliary Switch Adjustment: Page 11

Caution: *Before performing any maintenance or adjustment inside the VM-1 housing, make sure the circuits are de-energized.*

Adjusting Switch Operation to VM-1 Rotation:

1. Adjust the switch operating mechanism to match the specified rotation of the VM-1 mechanism by adapting the length of the adjustable arm at the top of the vertical pipe. Refer to the Operating Mechanism drawing and switch installation instructions for this procedure.
2. Perform all trail operations manually. Refer to Figure 4.
3. Do not rotate the VM-1 past the open and/or close position locks. Over rotation can damage the switch and operating mechanism.
4. The motor safety switch automatically disconnects the motor from the line voltage when the manual crank handle is inserted.
5. Removal of the manual hand crank automatically reconnects the motor with the line voltage.
6. Refer to switch installation instructions for adjustment procedures of the operating mechanism. During switch adjustments, use the position stops (if supplied) as reference points for fully open and fully closed.

Installation and Adjustment Procedures

Manual Operation:

1. Depress brake arm.
2. Fit the socket on the hex head shaft.
3. Crank the gearbox manually.

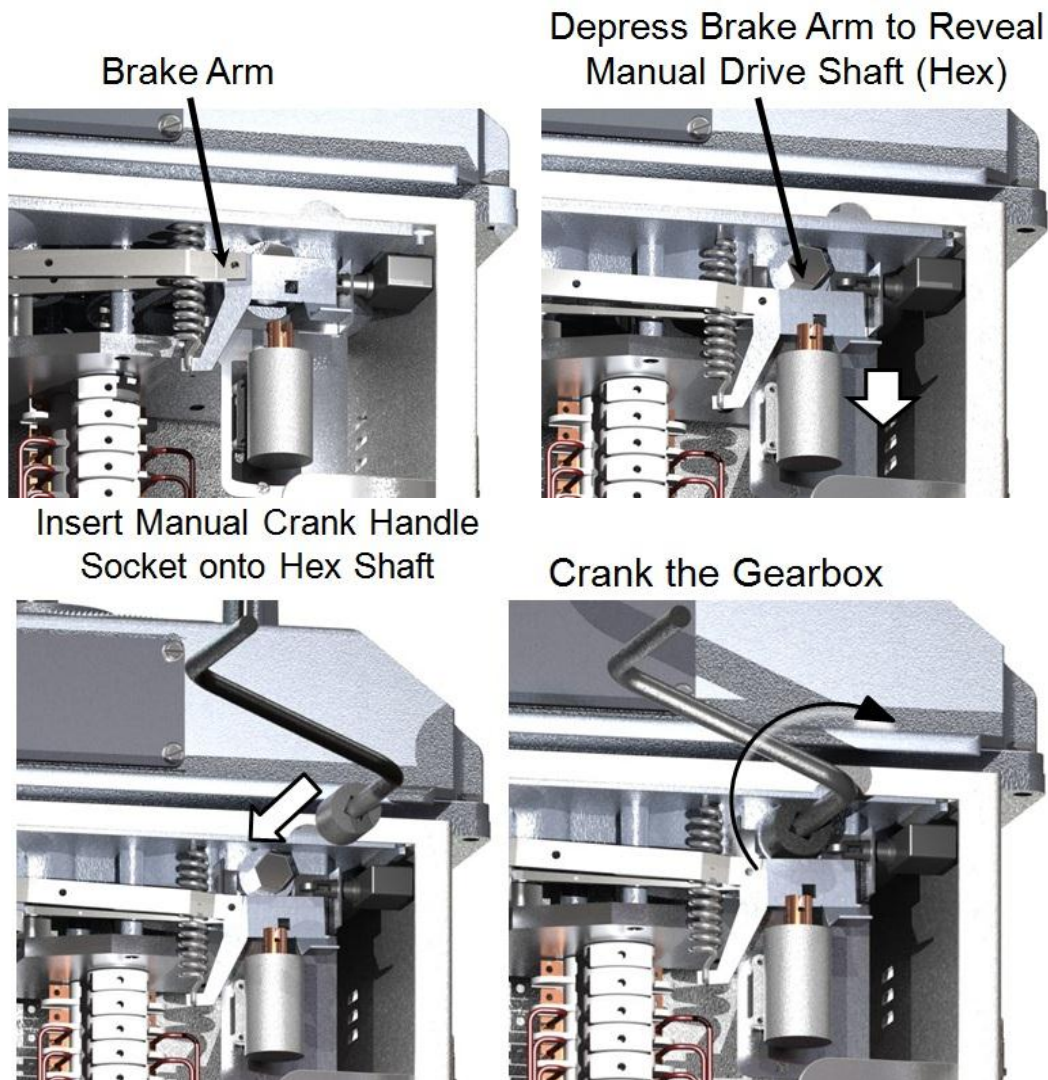


Figure 4 - Manual Operation

Electrical Operation:

1. Complete adjustments of switch and operating mechanism.
2. MAKE SURE MANUAL ROTATION OF THE SWITCH MATCHES THE ELECTRICAL ROTATION OF THE VM-1 MECHANISM.
3. Remove the manual operating handle and test electrical operation of the switch.
4. NOTE: The stop button when supplied will override all other commands.

Installation and Adjustment Procedures

Changing Output Rotation:

1. Two adjustments are required to change rotation of the VM-1 mechanism. The adjustable lock position and the motor limit switch settings.
2. Loosen the adjustable lock plate and disengage-Refer to Figure 5.
3. Manually rotate the VM-1 mechanism to the desired position. (See Figure 6) Adjust the motor limit switches to stop the motor at the new position as described in section IX. The limit switches are the two top poles of the auxiliary switch. The motor switch and fuse switch should be in the OFF position.
4. To check degree of rotation, use cast-in rotation marks on top of the gearbox.
5. Decouple and check new rotation electrically.
6. Perform several trial operations to confirm limit switch setting is correct.
7. Rotate the adjustable lock plate to its new position and retighten.
8. If necessary, realign the pressure-sensitive open and close position indicators.

Special Application Note: *To adjust the starting position, lock the upper decoupler member closed with the clamping bolts loose and the vertical pipe free to rotate. Reposition vertical pipe to desired position. (the swing handle socket may be used for this operation.) Tighten the clamping bolts and drive in the self-piercing set screw after the desired starting position is achieved.*

Important: *The optional stop tangs(not shown) are for use as a reference point during manual operation and are not intended to stop motor operation. Do not overdrive against these tangs.*



Figure 5 - Re-Position Locking Plate Manually

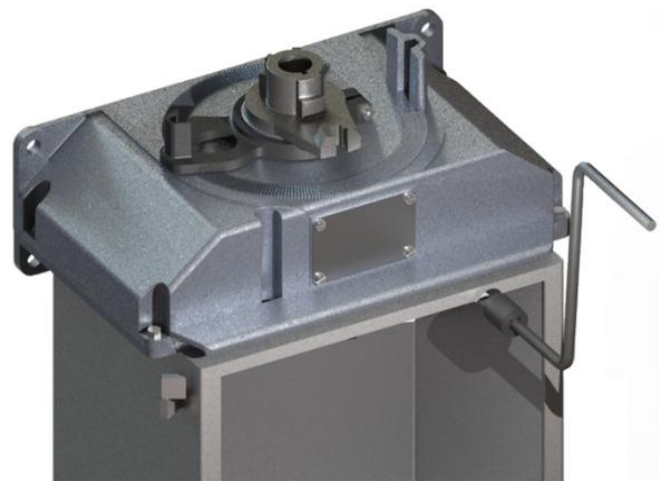


Figure 6 - Rotate with Crank Handle to Desired Position

Installation and Adjustment Procedures

Auxiliary Switch Adjustment:

1. Each auxiliary switch contact is spring loaded.
2. A contact is opened and held open by a cam operating against a roller – Refer to Figure 8.
3. The Auxiliary switch is adjustable in infinite steps to open and close at any point in the line switch operation.
4. To adjust the auxiliary switch, use a 3/32 inch Allen wrench, loosen the screw that holds the cam on the cam wheel. Do not loosen the screw more than required to allow cam movement.
5. Slide the cam around the cam wheel to desired position and retighten the screw.
6. In closed position, allow approximately ¼ inch clearance between the cam and cam roller – refer to Figure 8
7. Retighten the cam wheel set screw firmly. Do not over tighten.
8. Perform several trial operations to make sure the setting is correct.
9. Each contact is adjusted independent of other contacts. Any contact may be made a Type A or Type B by adjusting the switch as indicated on Figure 8, Figure 9, Figure 10, Figure 11, Figure 12 and Figure 13.

Installation and Adjustment Procedures

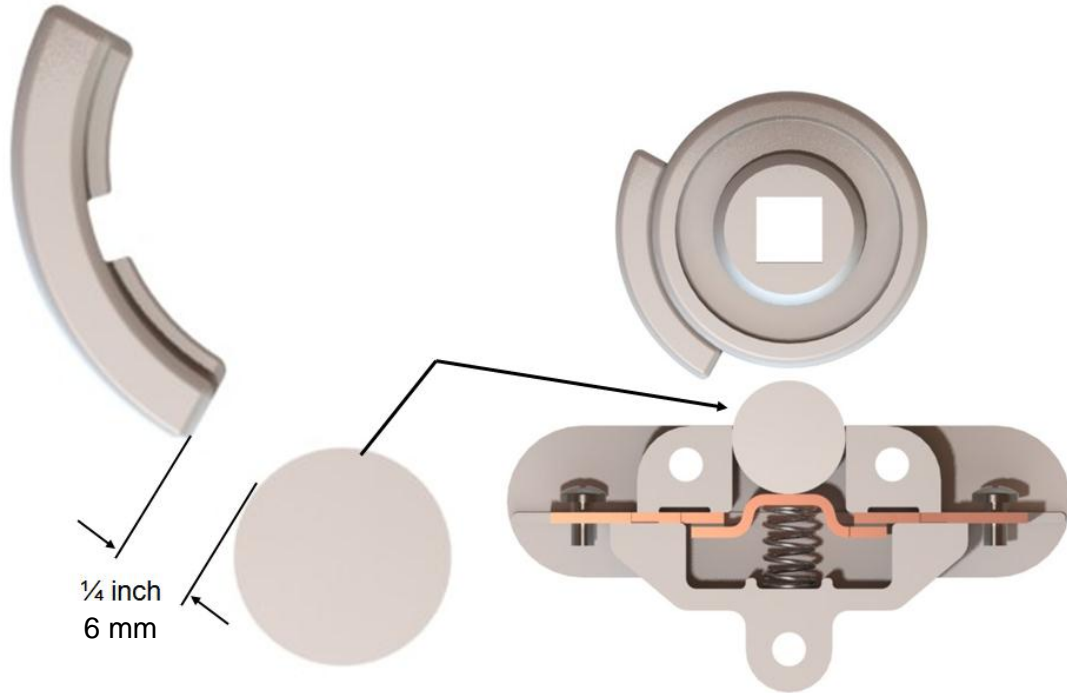


Figure 7 - Auxiliary Switch

Installation and Adjustment Procedures

Procedure for Setting Auxiliary And Limit Switch Contacts

Factory Settings:

- ⊢ Closed in counter-clockwise limit position (CCW). (Figure 8)
- ~~⊢~~ Closed in clockwise limit position (CW). (Figure 9)

All Illustrations Shown From Above

Limit Switches

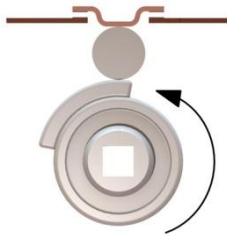


Figure 8 - CCW – LS

Set Mechanism (vertical pipe) in CCW limit position and set as shown.

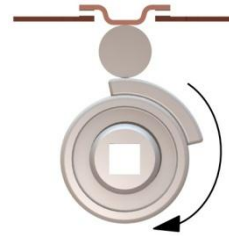


Figure 9 - CW – LS

Set mechanism (vertical pipe) in CW limit position and set as shown.

Auxiliary Switches

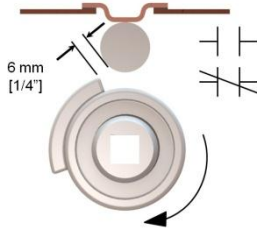


Figure 10 - Vertical Pipe Rotates CCW to Open.

1. Set mechanism in closed position and set all ⊢ auxiliary switches as shown.

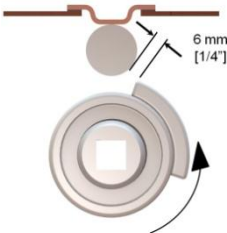


Figure 11 - Vertical Pipe Rotates CCW to Open.

2. Set mechanism in open position and set all ~~⊢~~ auxiliary switches as shown.

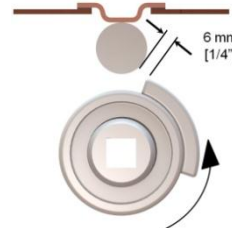


Figure 12 - Vertical Pipe Rotates to CW To Open.

1. Set mechanism in closed position and set all ⊢ auxiliary switches as shown.

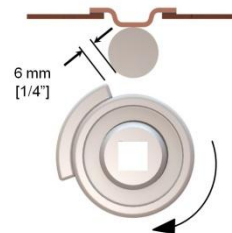


Figure 13 - Vertical Pipe Rotates CW to Open.

2. Set mechanism to open position and set all ~~⊢~~ auxiliary switches as shown.

Maintenance

Reverse Motor Rotation:

1. Motor Mechanisms are factory wired to rotate in the direction indicated on the switch operating mechanism drawing or customer's order.
2. Refer to notes on the VM-1 wiring diagram should it become necessary to reverse rotation.
3. All auxiliary contacts must be readjusted after changing leads. Follow procedure described on 11.

Caution: *When reversing rotation, always have the VM-1 decoupled from the switch. Leave it decoupled until complete adjustment has been made. The motor fuses and heater fuses should be pulled during adjustment of the auxiliary switch and overload toggle switch when provided placed in off position.*

Swing Handle Attachment:

1. Attach swing handle socket as shown in Figure 14.
2. When supplied, the switch position indicator is attached to the vertical pipe, above the swing handle socket, and aligned with indicator on the decoupler.

Note: **Emergency switch operation can be performed with the Swing Handle. The Swing Handle can also be used to provide chopping action under icing conditions or to relieve pressure when removing the decoupler key.**

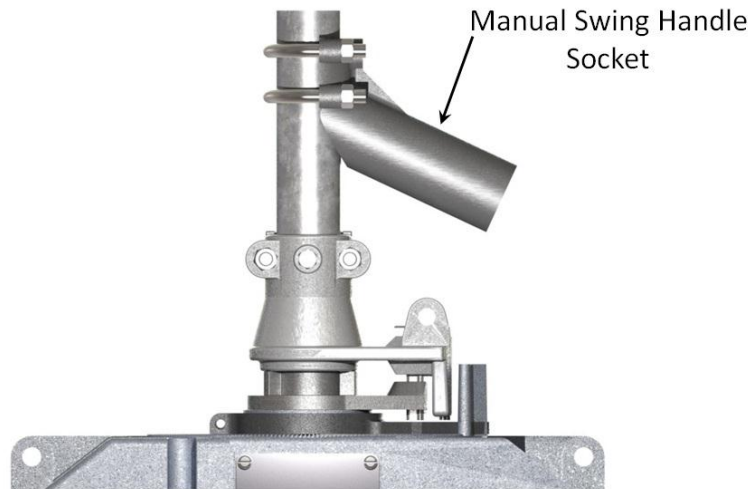


Figure 14 - Swing Handle Attachment

Maintenance:

1. The VM-1 requires no maintenance under normal service conditions.
2. Should severe conditions exist:
 - a. Remove access plate from gear box.
 - b. Spray gears and shafts with a light coating of silicone lubricant every five years.
 - c. Apply a few drops of heavy oil (EP-type preferred) to the thrust washers supporting the center and right-side shafts.
 - d. Re-seal access plate with "Permatex" (hardening grade) or equivalent.

Important: *Do not use a fluid type lubricant on motor pinion due to possible seepage to the brake disc.*



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