

JMO Installation Instructions

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Inspection

After uncrating the JMO Motor Operator, check to see that everything has been shipped by comparing items received with the packing slip. In particular check that a manual operating crank, swing handle, coupler with hardware have been included. Any discrepancies should be immediately reported to Joslyn Hi-Voltage. Damaged items should be reported immediately to the transport carrier for reimbursement.

Special attention should be paid to the nameplate. On it will be specified the operating control and power drive voltages. These should be in agreement with what is desired.

Included in the shipment should be an Installation Manual and installation drawings including wiring diagram, schematic diagram and an outline diagram.

Introduction

The JMO Motor Operator is basically a gear reducer (including a worm gear reduction) driven by an electric motor. Maximum rotation in either direction is 270 degrees. Normal rotational speed of the JMO will provide optimum air switch operating performance. The rated speed is 3-4 seconds at 10,000 in-lbs. and 6-8 seconds at 20,000 in-lbs. Rated torque is provided at minimum rated ANSI control voltages. The output shaft decoupler provides a means of mechanically isolating the power drive from the vertical operating shaft. The coupler has provisions to permit security locking the power drive in the engaged or disengaged position. It also incorporates security locking of the coupler in the open or closed air switch position when the coupler is in the disengaged position.

Standard Features

Included with each unit are the following:

1. A power drive assembly housed in all aluminum, sealed, and vented enclosure. This enclosure has a provision for padlocking. Access is provided through a front door as well as two side doors. These doors are hinged and can swing open a full 180 degrees. They also can be removed.
2. With the front and/or side doors removed, power drive components especially mesh points of gears are guarded to protect against accidental entry.
3. Gears of the power train are covered with a permanent bonded lubricant. This lubricant has a temperature range of -65 degrees Fahrenheit to 650 degrees Fahrenheit and performs exceptionally well on surfaces that experience high contact pressures.
4. The gear teeth and bearings are lubricated with a lubricating grease. This grease is a non-soap, synthetic-hydrocarbon base fluid with an operating temperature range of -65 degrees Fahrenheit to 350 degrees Fahrenheit.
5. The electric motor provided is a series wound type motor with split series field windings for reverse rotation. The motor is capable of developing high starting torques. It has ball bearings supporting the armature that are lubricated for life. The temperature range of the lubricant is -58 degrees Fahrenheit to 248 degrees Fahrenheit.

6. With the front door open, access is provided to manually operate the air switches utilizing the mechanical advantage of the gear set. **CAUTION: IT IS RECOMMENDED TO NEVER MANUALLY OPERATE THE UNIT WITHOUT FIRST DISCONNECTING THE POWER SUPPLY.** A 12 inch long crank is provided with the JMO.
7. An interlock switch with contact in the control circuit, monitors the presence of the crank. This is a safety secondary measure to protect against false motor starts. **THE PRIMARY SAFETY MEASURE IS TO PULL THE FUSED DISCONNECT BEFORE MANUAL OPERATION.**
8. A 100 watt heater is provided that helps minimize condensation within the enclosure.
9. A cam limit and auxiliary switch connects directly to the output shaft which rotates the vertical operating pipe. Cams can be adjusted to trip limit switches anywhere from 0 to 360 degrees position of the output shaft. Cam dwell is 270 degrees. Each switch is a form "c" contact, single throw design. These switches are rated 15 amps at 115 VAC and 0.5 Amps at 125 VDC. Five (5) auxiliaries are standard.
10. A thermal overload relay monitoring the motor current is provided and is factory set in the automatic reset mode.
11. The electrical pushbuttons on reversing contactors are modular in design. This offers component replacement of a unit without replacing the entire unit. The reversing contactors are mechanically as well as electrically interlocked.
12. The coupler cannot be locked into position unless the air switch has the same open to close relationship as the power drive.
13. Engagement or disengagement of the power drive can be determined by simply looking at the coupler.
14. The coupler permits structural expansion differences between the JMO mounting and the vertical operating pipe system up to 0.5 inches in either direction. At this range of vertical operating pipe travel, no structural expansion load is transferred to the motor operator. **CAUTION: AT EXTREME EXPANSION DIFFERENTIAL LEVELS THE VERTICAL PIPE WOULD BE LIFTED OUT OF THE COUPLER MECHANISM AND DISENGAGE THE JMO.**

Options Available

The following can be supplied:

1. An electric counter can be provided to monitor the number of switch full cycle (open and close) operations.
2. An electric motor, counter, and controls can be supplied for any of the following voltages:
 - 48 VDC
 - 125 VDC
 - 115 VAC
 - 230 VAC

3. Additional cam actuated auxiliaries can be provided. Accommodations have been made for as many as six additional for a total of 11 auxiliaries.
4. A limit switch with a 10 Amp rating at 125 VDC and 5 Amp at 250 VDC can be substituted for the standard auxiliary. This switch is a form "c" contact, single throw design.
5. An incandescent light can be provided to illuminate the interior of the enclosure when either a door is opened or a selector switch is turned.
6. A 115 VAC duplex outlet receptacle can be supplied to provide power to standard small electrically driven devices.

Installation

It is recommended that the steps listed below are followed in the sequence given in order to avoid personal injury and damage to the unit.

Handling of the unit should be done using approved mechanical techniques. NEVER GET UNDER A HOISTED UNIT! NEVER HOIST THE UNIT WITH THE COUPLER ATTACHED. THE COUPLER IS NOT PERMANENTLY AFFIXED AND MAY BE JARRED LOOSE IN THE LIFTING ATTEMPT! During all handling operations protect the unit from damage especially the Output Shaft.

ALL HIGH VOLTAGE SAFETY PROCEDURES MUST BE FOLLOWED WHEN PERFORMING THE INSTALLATION AND ADJUSTMENT OF THE AIR SWITCH AND JMO MOTOR OPERATOR.

The following tools are necessary for installation:

1. A drill motor and drill bit to drill a 3/4 inch diameter hole.
2. A socket wrench preferably with a 1/2 inch drive.
3. Socket (15/16 inch)
4. Box wrench (15/16 inch)
5. Crescent wrench that opens up to at least 1 inch.
6. Medium size straight flank screw driver.
7. Open end wrenches (11/16 inch), two (2) required.
8. Socket (9/16 inch)
9. Torque wrench (9/16 socket) up to 150 in. lbs.

Mounting

1. Place all air-break switches in the closed position.
2. Remove the four (4) shipping fasteners located at the backside of the unit. CARE must be exercised in removing these fasteners. A seal was provided for each fastener and is located on the inside of the enclosure. Each seal prevents leakage through the clearance hole for the fastener. We do not want to damage this seal when removing the fastener or dislodge it from the cemented position.

3. Position the JMO Motor Operator so that the top surface of the JMO is as perpendicular as possible to the vertical operating pipe and is centered on the output shaft. Note that after mounting the JMO the bottom of the vertical operating pipe must be 2 3/4" to minimum to 3 1/8" maximum above the top of the JMO output shaft. Shim if necessary for perpendicularity and proper distances. Insert your 5/8 diameter fasteners through the mounting structure and clearance holes in the unit. **BE CAREFUL – REMEMBER OUR SEALS.** Slip the plain washers provided over the fasteners inside the enclosure. While holding one end of the fastener with a 15/16 box wrench tighten the other end with a 15/16 socket. The JMO should now be solidly fastened to the mounting structure.
4. If not done in the previous step cut the vertical operating pipe to provide the specified clearance from the output shaft. Lift the vertical shaft to allow for the coupler placement. Place the spacer sleeve over the output shaft and then place the coupler over the shaft and resting on the sleeve.
5. Remove the locking castings from the JMO until all the adjustments have been made.

Electrical

1. Check the wiring of the JMO to verify the direction of rotation to open or close the air switch as required.
2. Remove the conduit plate and make desired holes for interconnection wiring.
3. Make all interconnections as per the drawing diagram.
4. Do not electrically operate with the coupler engaged until after the complete adjustment is made.
5. If the factory setting of rotation is correct for your switch system place the JMO in the closed position.

If the rotation is different from the required position, then manually crank the JMO to the closed position (using the locking ear of the coupler as a reference). **REMOVE THE LOCK STOPS.** Then refer to the wiring diagram to change the motor rotation and limit switches.

Pinning Vertical Operating Pipe to Coupler

1. There are four (4) temporary set screws supplied to connect the coupler to the vertical operating pipe. Place the two 3/8" gage blocks between the coupler and the sleeve. Before tightening verify that the air switches and the JMO are both in the same operating position. The coupler should be in the engaged position. Tighten the installation set screws in the coupler to temporarily connect to the vertical operating pipe centering the vertical pipe as best as possible in the coupler.
2. The JMO is now connected to the vertical operating pipe and the gage blocks should be removed.

3. Insert the manual operating crank and manually operate the switch and perform or verify the switch adjustments.
4. After verification of the switch adjustments check that the coupler's swing handle location in the open and closed position is as desired. Normally the swing handle would be set for equal travel either side of an imaginary centerline through the front of the JMO. If the swing handle location needs readjustment simply loosen the temporary installation set screws and retighten in the desired location using the gage blocks as per section 1.

Limit Switch Adjustment

1. As mentioned in the section STANDARD FEATURES, the limit and auxiliary switches are cam operated and are connected directly to the output shaft. High frictional forces retain the cams to the cam shaft. These forces are exerted from two hex jam nuts on both sides of each cam.
2. The JMO has been designed with dynamic breaking so each of the two limit switches has a dynamic break switch operated by a cam that is pinned to the respective close or open cam operated limit switch. It is important to verify that the limit switch and dynamic break switches are being actuated properly: The dynamic break switch operates prior to its respective open or closed limit switch. First verify that the appropriate limit switch is being actuated as the switch is manually closed. Then verify that the limit switch which is located directly below is being actuated prior. The cams are adjusted by loosening the cam nuts and positioning the cam in the desired position. The dynamic break cam will move automatically with its respective limit switch cam. See the wiring diagram for information to reset the dynamic break position if needed. The dynamic break cam can be set for one of two pin engagement positions: see the wiring diagram for information on moving the dynamic break to the alternate locking pin location.
3. Now verify or adjust the open limit switch cam assembly so that as the switch is manually cranked to the open position the open limit switch and the dynamic break switches are actuated (LS/aa and 17/b respectively).

Auxiliary Switches

1. Set the auxiliary switches to actuate at the desired operating points by adjusting each independent auxiliary cam and then tightening the cam nuts in position.
2. Note that the auxiliary switches provided are form "c" contacts and have been factory wired to the normally closed contacts. If desired the contacts can be modified to normally open by simply moving the wire connection to the unused terminal on the snap switch.

Final Adjustment

1. Make a temporary mark on the coupler position in both open and closed positions on the cabinet housing. Place the coupler in the disengaged position. The JMO will now be electrically operated to verify rotation and open and closed positioning of the motor operator.

2. Press the close and open pushbuttons and note the rotation and the stopping positions of the coupler. The coupler should align with the marked positions. Readjust the limit switches or motor wiring if the stopping positions or rotation is incorrect. Also note that when the motor operator reaches each position that the JMO abruptly stops indicating that the dynamic breaking contacts are operating properly. There should be no coasting of the operator.
3. If adjustments appear correct engage the coupler and electrically open and close the switch system and verify proper operation, or make final readjustments to the limit switches as required to provide travel of the vertical shaft.
4. If all adjustments including the auxiliary switches have been checked then proceed to pin the vertical operating pipe in position.

Vertical Pipe Pinning

1. Using the 3/4 diameter holes in the coupler as a template, drill a 3/4 diameter hole in each side of the vertical operating pipe. The holes should be deburred to obtain a proper fit. Slip the JMO drive pin into each hole to check the fit. Insert the sliding drive plate into one of the pockets of the coupler. Align the hole with the coupler hole and insert the drive pin through until the pin reaches the other side of the vertical operating pipe and then insert the other "sliding drive plate." After positioning the drive pin in the coupler, turn the locking screw in the "sliding drive plate" and tighten the lock nut to secure the locking screw. Note that the drive will be able to move within the coupler.
2. Remove the temporary set screws from the coupler. The coupler should drop down the 3/8 in. that the gauge blocks had positioned the coupler above the spacer sleeve. Also note that the top of "sliding drive plate" should be approximately flush with the top of the coupler body.
3. Remove the coupler pin and pin from the main body assembly. Disassemble the coupler dog and clean out all metal chips from the drilling operation. Reassemble and grease the drilled holes for rust protection.

Locking Casting Installation

Mount the locking castings to the JMO. The locking castings are provided to allow padlocking the air switch in the closed or open position with the coupler in the disengaged position. The castings should be bolted into position after electrically operating the switch to the open and closed positions. Allow for clearance between the locking castings and the coupler so that the coupler will not strike the locking castings.