

Hydraulic Operator HS-4

Receiving Instructions

Handle with extreme care

Please read the following instructions completely prior to commencing installation.

The equipment is a precision-engineered motor operator.

Every effort has been made to properly prepare the equipment for shipment.

To lift operator out of crate, attach rigging to the top of the aluminum support channel. Do not lift by the operating mechanism.

Carefully and thoroughly inspect this shipment.

It is absolutely necessary that any and all shipping loss or damage is reported to the local freight agent within fifteen (15) days of delivery. Please request an on-site agent inspection of the damages.

Note:

Failure to file a damage / loss claim within the specified period waives the right to supplier or carrier loss reimbursement. Do not accept damaged goods until the delivering driver has made a damage notation on the freight bill.

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operations or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchasers purposes, the matter should be referred direct to the Turner Electric, LLC factory at 1-618-397-1865.

Description

The Turner Hydraulic Actuated Motor Operator (HAMO) model HS-4 is a constant speed, constant torque operator for use with airbreak disconnect switches. The modular unit can be utilized to operate a switch from remote locations and for automatic relay switching schemes.

Operation

The HS-4 power unit consists of a motor driven hydraulic pump, with solenoid actuated valves and a hydraulic RAM. When activated, the solenoid valves are energized allowing fluid to be pumped into the RAM thus rotating the output shaft in the desired direction. (See Figure 1).

Important:

Regardless of unit is installed on a new or existing switch, the disconnect switch should be completely and properly adjusted and operating satisfactorily prior to motor operator installation. If an existing switch,

proper maintenance should be performed. Installation of the operator should be done with the switch and the operator in the closed position.

Operator mechanical Installation

Note:

Use the aluminum support channel for lifting the motor operator.

1.0 Locate the required mounting heights for the operator. This would normally be at a height where an operating person can easily access the manual handle. Align operator power shaft with switch vertical operating pipe (VOP) with a level. Mount the HS-4 operator securely to the switch structure or pole with thru bolts and lag screws (See dwg. 8935 or appropriate drawing).

2.0 Cut off the vertical operating pipe (VOP) 11" from the top of the operator power shaft (see Figure 2).

3.0 The handle assembly is a two (2) piece unit consisting of a manual swing handle/locking assembly and a VOP four (4) piercing screw coupling. The unit is shipped assembled with the pipe coupling secured to the handle with hand-tightened piercing screws. To install the handle assembly:

3.1 Remove the pipe coupling from the handle assembly and slide up on the VOP. Orient the pipe coupling screws toward the mounting structure. Hand snug screws to hold the coupling in place.

3.2 Place the handle assembly over the slotted power shaft.

3.3 Align VOP and handle assembly. Loosen the pipe coupling and slide it down the handle.

3.4 Raise the entire handle coupling assembly one inch (1") above the power shaft bearing. Align handle tang with power shaft locking key-way (see Figure 3). Tighten but do not pierce downpipe couplings four (4) piercing screws.

3.5 Insert the manual-operating swing handle in the cast handle socket. (Note: "J" slot in handle should engage a pin in the socket). Confirm that the handle socket tang locks into the power shaft coupling key-way (see Figure 4).

3.6 Manually operate the switch and adjust the swing handle position to obtain equal handle travel on both sides of operator center line. Securely tighten piercing set screws and mark position of coupling to handle assembly. Remember that the switch operates a total of 90 degrees - to open or close. Therefore, the switch should be half way open when the swing handle is at the mid-point of the top place.

3.7 The "lock down stops" are used to lock the switch in the open or closed position when the motor operator is disengaged from the VOP. Remove the switch handle and adjust the "lock down stops" in the open and closed positions. Secure nuts.

3.8 Pierce two (2) pipe coupling screws on vertical operating pipe. Do not pierce manual handle set screws. Important: Manual operation of the switch must be satisfactory prior to motorizing. Again check the switch to make sure all necessary adjustments for switch levers, reach rods, arcing horns, interrupters, etc. are correct. See appropriate switch installation instruction book for details.

3.9 Complete battery cabinet AC & DC wiring. See wiring diagram for proper motor operator fuse block wiring. Confirm polarity.

*The HS-4 is shipped with the reservoir filled. Before any energizing of the unit, remove the large reservoir plug from the reservoir and replace the vented breather cap.

4.0 Open & Close Cycle Description

It is imperative that the installer fully understand the role and sequence of operation of the various devices in the HS-4. Please carefully review the following opening and closing description prior to energizing the equipment. Please note that units are shipped in a counter clockwise to open set up as standard. (Unless specified otherwise in the order.) A tag on the actuator is marked accordingly. Confirm that the opening direction of the operator and the opening direction of the switch are identical. If they are not, reverse the unit per instructions at 20.

HS-2 OPENING CYCLE DESCRIPTION (C. C. W.)

- 1) The switch is in the cw closed position.
- 2) Cam 1 controls clockwise rotation.
- 3) Cam 2 controls counter clockwise rotation.
- 4) Cam 3 controls the red open/close indicator lights and will break approximately at the halfway point of the operation.
- 5) Depress and hold local/remote push button and operate the toggle switch to open then release both switches. The circuit will seal in automatically.
- 6) The open relay, open solenoid valve and motor solenoid relay will make. The motor will start driving the pump actuator.
- 7) With the open solenoid valve open, oil flows to the actuator.
- 8) Fluid will strike the piston side of the actuator and it will rotate ccw.
- 9) Cam 2 will transfer after approximately 10 degrees rotation.
- 10) Cam 3 will transfer approximately halfway through the cycle changing the closed indicator light (red) to open (green) – Note: Cam 2 and 3 have no effect on this operation.
- 11) Actuator will extend to the full open position.
- 12) At the full open position, cam 1 will open and drop out entire circuit. Cam 2 will be made for next operation.

HS-2 CLOSING CYCLE DESCRIPTION (cw)

- (1)The switch is in the ccw open position.
- (2)Cam 2 controls counter clockwise rotation.
- (3)Cam 1 controls clockwise rotation.
- (4)Cam 3 controls the open/close indicator lights and will make at approximately 45 degrees or one- half of total travel of switch, if so desired.
- 5) Depress and hold local/remote push button. Operate the toggle switch to close then release both switches. The circuit will seal in automatically.
- 6) The close relay, closing solenoid valve and motor solenoid relay will make powering the motor, driving the pump.
- 7) With the close solenoid valve open, oil flows to the actuator.
- 8) Fluid will strike the rod side of the actuator and will rotate cw.
- 9) Cam 1 will transfer after approximately 10 degrees.
- 10) At approximately 45 degrees rotation cam 3 will make and change the open indicator light (green) to closed (red).
- 11) The actuator will continue to retract to the full close position.
- 12) At the full closed position, cam 2 will open and drop out entire circuit. Cam 1 will be made and ready for next open operation.

A note about hydraulic fluid:

The equipment is provided with MIL-5606 hydraulic fluid. The fluid is capable of maintaining specified viscosity over a wide temperature, -40 degree to +170 degree F. See MSDS for specific info. Use of any fluid other than specified will affect the operating characteristics.

The HS-4 is shipped with the reservoir filled. When filling and maintaining the HS-4 operator, every effort should be made to insure only DIRT-FREE and WATER-FREE fluid is used. It is important to maintain safe and clean work habits. To do otherwise will jeopardize warranty.

5.0 Check the hydraulic fluid to motor/pump reservoir. The filler hole is located on the top side of the reservoir. Insert the funnel tube (included) into the filler hole and fill with fluid (included) ¾” to 1” from reservoir top with actuator retracted.

NOTE: DO NOT INSERT FUSES UNTIL OIL RESERVOIR LEVEL HAS BEEN CHECKED AND THE LARGE PLUG REMOVED AND REPLACED WITH THE VENTED BREATHER CAP.

6.0 Insert fuses (included) per the following fuse schedule.

Terminal Block Position	24 Volt
F1	FRN30
F2	NON6
F3	NON6
F4	MDL-10 (Optional battery charger, 24VDC only)

Decouple operator handle (handle down). Manually open switch and leave handle disengaged.

Note at this time that:

Limit switch 1 controls cw rotation.

Limit switch 2 controls ccw rotation.

Limit switch 3 operates the red/green indicator lights.

See Figure 1 for location.

7.0 Depress local/remote selector switch and operate toggle switch to left (open). Recall that the switch is in the open position and that the operator was shipped in half open position - or midpoint.

8.0 The output shaft and stop will rotate and stop just prior to coming into contact with one of the adjustable overtravel stops. The unit must stop approximately 1/8" before the stop comes into contact with the overtravel stop. The overtravel stop should be adjusted to limit the travel of the stop. The limit switch which controls the opening rotation may need adjustment (see 6.0 above to determine the controlling switch).

9.0 Manually close the switch.

10.0 Depress local/remote selector switch and operate the toggle to right (close).

Repeat same procedure for overtravel stop adjustment as discussed in step 8.0 . The limit switch that controls the closing rotation may need adjustment (see 6.0 above to determine the controlling switch).

11.0 Couple switch to hydraulic operator (handle up and engaged into both switch and shaft slots.) Place a padlock in the locking hole.

12.0 Open the switch with the operator.

12.1 As the switch opens, confirm that the stops are properly adjusted. Important - Do not over-drive the operator. (See paragraph 14 for adjustment of speed.)

13.0 Close the switch with the operator.

13.1 As the switch closes, confirm that the stops are properly adjusted. Do not over-drive.

14.0 After all adjustments are completed, pierce all set screws and tighten both cam set screws. Tighten lock down stops and install the stop shroud at the top of the cabinet.

15.0 Connect remote control wiring: (see wiring diagram)

Three wires from customers equipment are required:

Labeled Common - + found on TB 1-6

Labeled Open - found on TB 1-7

Labeled Close - found on TB 1-8

Note that customer's control input must be disengaged prior to end of HS-4 operation. If it is not, unit will continue to attempt to operate. The HS-4 electrically seals in, requiring only a short duration (1 sec.) control input.

16.0 Rotation limits

All HS-4 units are factory adjusted for 90 degree rotation, unless specified otherwise. If the application requires greater than 90 degree rotation (up to 120 degrees) make the following changes.

- a) Change the position of the overtravel and lockdown stops located on the power shaft behind the stop shroud above the HS-4 cabinet to the desired position.
- b) Change the position of cams for LS1, LS2 and LS3 to reflect the increased travel.

17.0 Reversing the unit

All HS-4 units are factory wired for cw closing unless specified otherwise. If it is necessary to reverse the unit for ccw closing, make the following connection changes.

- a) Interchange green and red wires on LS1 and LS2.
- b) Interchange blue and orange wires on LS1 and LS2.
- c) Interchange green and red wires on LS3.
- d) Interchange solenoid "A" and "B" wires on TB 1-9 and -10.
- e) Mark up appropriate wiring diagrams to reflect actual installation.

18.0 Consult attached trouble shooting guide in the event of installation problems.

HS-4 Trouble Shooting

PROBLEM: Everything dead - no red or green indicator lamp.

- 1) Check battery status
- 2) Replace fuse 2

PROBLEM: Have indicator lights but motor relay only clicks.

- 1) Battery voltage possibly low - recharge or replace
- 2) Replace fuse 1

PROBLEM: Pump motor running but no actuator movement.

- 1) Low on oil - fill to ¾" to 1" from top with actuator retracted.
- 2) Solenoid valve not engaging - replace solenoid fuse.

PROBLEM: Pressure builds and actuator extends / retracts but sluggishly.

- 1) Low batteries - voltage below pick up of start relay.
- 2) Respective open / close valve:
 - a) may be sticking - depress solenoid valve from each end to free sticking
 - b) coil may not be closing
- 3) Low on oil - fill ¾" to 1" from top with actuator retracted

PROBLEM: Operator starts to open or close, then stops.

- 1) Check limit switches. Defective or need adjustment.
- 2) Defective open or close relays. Replace.
- 3) Check fuses.

PROBLEM: Operator not shutting off at end of cycle.

- 1) LS1 or LS2 defective or out of adjustment.
- 2) Respective relay holding on. Replace.

PROBLEM: Actuator has jerky start / stop reaction.

- 1) Open or close relay is defective. Replace.
- 2) Air in hydraulic system. Operate in each direction to bleed off air.
- 3) Manual handle assembly riding on top plate.
- 4) Low on fluid.

Recommended Spare Parts

DESCRIPTION	for 1 Unit	for 10 Units
Open/Close solenoid valve	1	1
Solenoid	1	1
100 Watt heater strip	1	1
Limit switch	1	1
Power Units (complete)	0	1
Open / Close Relay	0	1