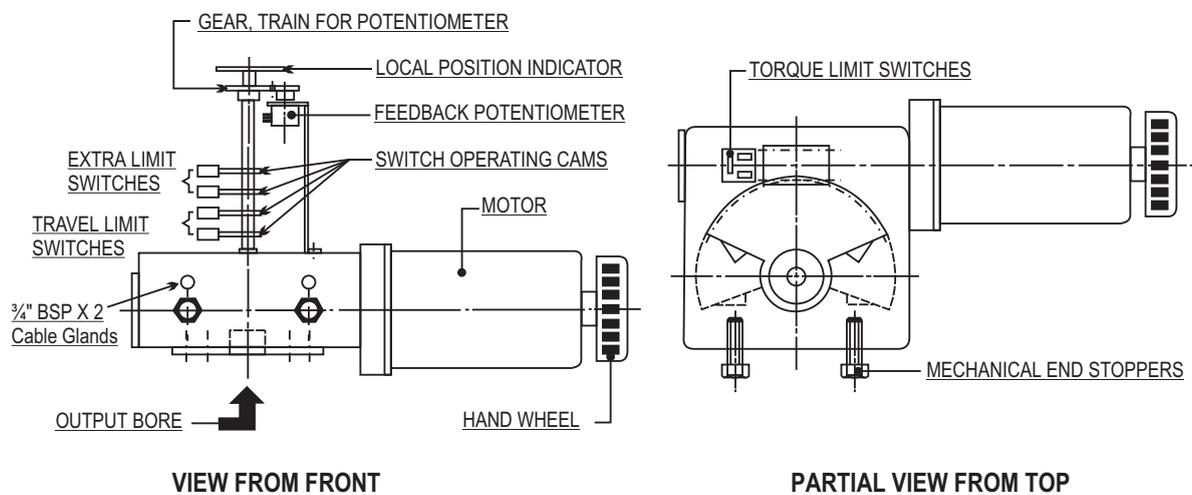


# OPERATING INSTRUCTIONS FOR MARSH

## QT SERIES SINGLE PHASE QUARTER-TURN ACTUATORS

### BLOCK DIAGRAM OF QT SERIES - MARSH ACTUATORS



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## QT SERIES SINGLE PHASE QUARTER-TURN ACTUATORS

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## STEPS TO BE TAKEN TO INSTALL & COMMISSION THE QT SERIES SINGLE PHASE ACTUATOR

### I) INSPECTIONS AND KNOWING THE PRODUCT :

- After receiving the unit inspect for physical damages, if any.
- Check the model specifications given on the actuator name plate & test report with respect to order and it's expected functions.
- These units are meant for quarterturn rotation of the final control element i.e. a valve or a damper. The motors used for these actuators are provided with capacitor and resistor and are suitable for bi-directional operation. The supply to the motor gets cut-off through position limit switches, at the end position, as per settings.

Adjustable mechanical end-stoppers are also provided as a back-up protection to avoid over-run in case of failure of limit switches.

The actuator can be operated manually through handwheel to a desired position. The mechanical movement can be checked from the local position indicator provided on the actuator.

- The actuators are provided with following accessories.

a) **STANDARD ACCESSORIES**

- Travel limit switches: 1NO + 1NC - Qty. 2 Nos.  
(One for opening & other for closing direction)
- Local position indicator
- Hand wheel for manual operation
- Adjustable mechanical end stoppers to prevent over-run of the final control element.

b) **SPECIAL ACCESSORIES** : (Supplied only on customer's specific requirements)

- Feed back potentiometer : 1 Turn / 10 Turns
- Remote position indicator : Analogue / Digital (Panel mounted)
- Two wire Transmitter (Model PPT-200) : Actuator / Panel Mounted
- Control Panel : Local / Remote
- Auxiliary travel limit switches : 1NO + 1NC (2 Nos. additional)
- Torque limit switches : 1NO + 1NC - 2 Nos.  
(Only in QT10 and onwards)
- Travel & Torque limit switches : 2 NO + 2 NC

II) **NO LOAD FUNCTIONAL TEST OF ACTUATOR:**

- 1) Check the desired functions of travel & torque switches by means of continuity tester as per wiring diagram.
- 2) Connect the 220VAC or 110 VAC, as the case may be, to the actuator as per the wiring diagram. If the supply is given between terminals 1 and 2 the motor will run in one direction and if it is given between terminals 1 and 3 the motor will run in other direction.
- 3) Check the movement of the output shaft by rotating the handwheel and also confirm the rotation of the local position indicating dial.

III) **INSTALLATION AND COMMISSIONING** : (Refer Product Catalogue for overall dimensions)

a) **MOUNTING & FIXING** :

- Check the mounting and coupling dimensions of the actuator with respect to final control element - Valve / Damper.
- Check the position of the key way in the actuator bore and also on the shaft of final control element. As the movement is restricted to only 90°, the key way position should synchronise in both the items to get the desired functions.

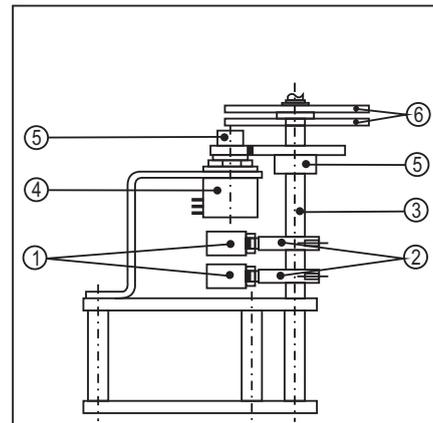
The above requirement also stands for any other form of coupling, instead of key way, for the actuator and final control element.

- Bring the actuator and also the final control element to about 50% open position and couple them together by using proper hardware.
- Rotate the actuator through handwheel while tightening the mounting bolts to ensure proper alignment and less loss of power in friction etc.

**B) SETTING OF TRAVEL LIMIT SWITCHES : REFER FIG. No. 1**

Close the valve / damper through the hand wheel operation of actuator. At this point the travel switch in the closed direction should also get operated by the cam, if it does not, loosen the cam by the Allen key and "JUST" operate the closing travel switch by the cam and tighten the same properly. Check the switching operation by giving the electric supply in closing direction, it is necessary to note the movement of the cam while closing operation and also to identify the closing switch before making the above adjustments. Repeat the above operation for open limit switch functions.

Repeat the above operation for auxiliary travel limit switches to operate them in the desired position.



**FIG. NO. 1**

- 1) Travel limit Switches
- 2) Travel limit Switch Operating cams
- 3) Indicator Shaft
- 4) Feedback Potentiometer
- 5) Gear Train for Potentiometer
- 6) Local position Indicator

**C) SETTING OF MECHANICAL END STOPPERS : REFER. FIG. No. 2**

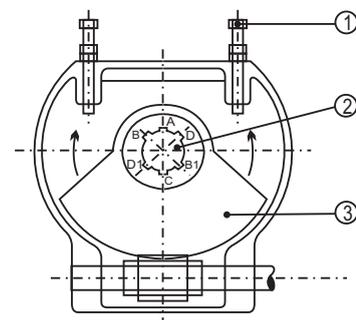
Mechanical end stoppers are provided as a back-up protection to prevent over travel of the actuator in case of failure of limit switches.

The worm wheel at the output side provided in the actuator, is in the form of a Sector, hence after the completion of 90° movement and a margin of 10° it will rest on a projecting bolt provided as an end stopper.

After the actuator has reached a fully closed position adjust the insertion of the stopper bolt in such a way that there is a slight gap between the worm wheel face and the bolt face so that the bolt will touch only in the event of overrun of the worm wheel.

Repeat the above operation for open direction of the actuator.

**Quarter-Turn Worm Gear Box**



**FIG NO. 2**

- 1) Mechanical End Stoppers
- 2) Output bore & various key way position
- 3) Sector Worm Wheel

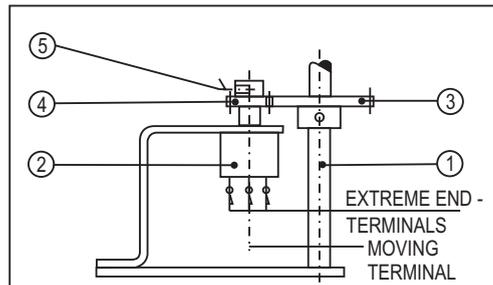
**D) SETTING PROCEDURE FOR POTENTIOMETER :**  
REFER FIG. NO. 3

1) If the potmeter gear is already connected to the driving gear, then measure the potmeter output by the multimeter as per wiring diagram for the full open to close operation of the final control element. If the potmeter output is matching with the required value then the factory setting need not be disturbed. It should also be noted that the potmeter output value may not match exactly with the required one due to various mechanical limitations. The finer settings have to be done at the receiving instruments to achieve the correct end result.

2) Check the free movement of the driving gear when the potmeter gear is not connected.

3) Check the rotary movement of the driving gear with respect to the open/close movement of the final control element and decide the rotary movement it is going to impart to the potmeter gear.

4) If the potmeter output required to be set between say 100 to 235 Ohms from fully close to fully open positions of the final control element then rotate the potmeter shaft "In appropriate direction" till the output becomes 100 Ohms. Close the final control element fully and engage the potmeter gear with the driving gear



**FIG. NO. 3**

- 1) Indicator Shaft
- 2) Potentiometer
- 3) Driving gear for pot meter
- 4) Driven gear for pot meter
- 5) Grub screw for fixing the gear

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gear. Tighten the potmeter properly as it may change its place if kept loose or break if it is over tightened.

5) Measure the potmeter output by moving the final control element from fully closed position to fully open position. If the potmeter value of say 100 Ohms is set at the fully closed position of the final control element then at fully open position the potmeter will give an output of approximately say 235 Ohms (Or any other value as per order specifications)

6) If the potmeter setting is noticed in a reverse way i.e. say 235 to 100 Ohms instead of 100 to 235 ohms for the expected movement of the final control element, then disconnect the wire at the one extreme end terminal & connect it to the other extreme end terminal of the potmeter. Repeat the setting procedure as explained in point Nos. 4 & 5 above. (It is necessary to rotate the potmeter shaft in several turns in a ten turn potmeter to get the required output value, of say 100 Ohms, when the wiring of extreme end terminal is interchanged)

7) If the required potmeter output does not come correctly with respect to the full travel movement of the final control element then the potmeter or the gear train may have to be changed. Refer the problem to the factory.

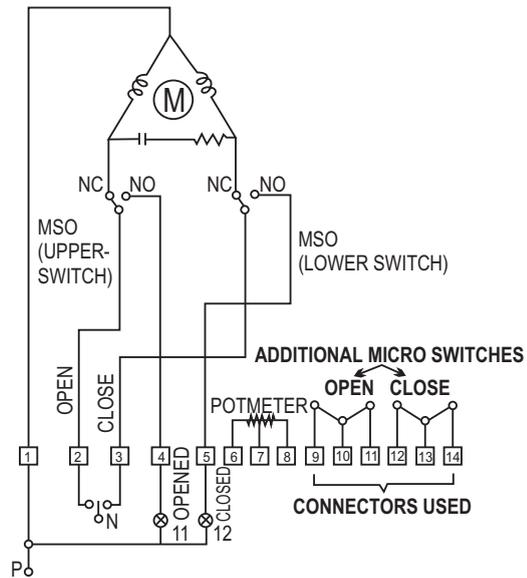
**E) LUBRICATION :**

All units are provided with lubricating grease which is sufficient for about 15000 operations under normal working conditions.

For second charging of grease, remove the mechanical end stopper bolt and insert about 0.5 Kg. of grease type Lithon-3 of Hindustan petroleum or equivalent through the bolt hole and replace the bolt in proper position.

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## WIRING DIAGRAM FOR ALL QT - SERIES ACTUATORS



Dr. No. : M545 R3