

NA SERIES QUARTER TURN ACTUATOR

Instruction and Maintenance Manual



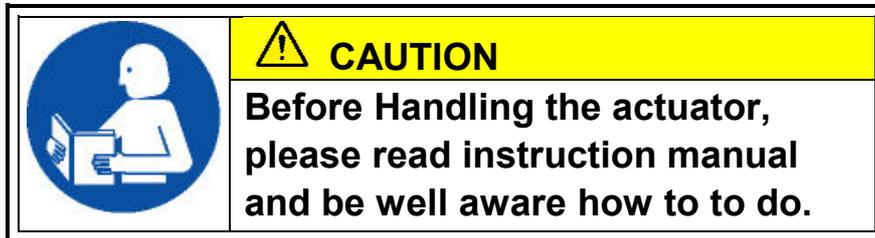
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NA Series actuator is a engineered products which has been designed for usage of automation of 90° rotary valve or same operating principle equipment. Internal provisions like as self-locking which prevent reverse action from valve, Manual Override, and mechanical torque switches(except for NA06 & 09) which protect actuator from overload, Space heater for anti-condensation provide optimum condition for actuator operation.

Enclosure

Al alloy enclosure is treated by Hard-anodized and powder coated. Therefore it can be used under severe corrosive atmosphere. All enclosures are designed to provide IP67grade ingress protection with explosion proof structure and to provide best performance under any circumstances.

Performance and applicable range

13 model of NA06, 09, 15, 19, 28, 38, 50, 60, 80, 100, 150, 200, 250 provide various torque 6Kg.m~ 250Kg.m and these are suitable for operation of 50A ~600A of butterfly valve, 40A~400A of Ball valve, and other 90° rotary equipment like as Damper.

Lubrication and convenient installation for any direction

NA Series actuator has double worm gearing, and the mechanism is fully filled with grease.

There is no leak of lubricant because housing is totally enclosed structure. Therefore installation for any direction is possible on the purpose.

Inspection, Measurement and test

The performance and quality of NA Series actuators are certified by factory through out the leak, torque test and other necessary measurement after assembly and 100% certified product only delivered to customer.

Temperature, Humidity and Altitude

NA Series Actuators are designed suitable for following condition. User should note these conditions when you select actuator.

| | |
|---------------------|--------------------|
| Ambient Temperature | : -10°C ~ 55°C |
| Max. Temp. of fluid | : 80°C |
| Relative Humidity | : RH90% |
| Altitude | : Lower than 1000m |

1. Please check if the supplied actuator is suitable one for your application.
2. Please check Model, Mounting base, Electrical specification and options comparing to your specification for purchasing.
(Can check these on the name plate mounted on actuator)

For your information, EMICO recommend NA series actuator for your Butterfly / Ball valve as follows.

| Model | Butterfly Valve | Ball valve(2-way) | Ball valve(3-way) |
|-------|-----------------|-------------------|-------------------|
| NA06 | 80A | 40A | |
| NA09 | 100A | 50A | 40A |
| NA15 | 125A | 65A | 50A |
| NA19 | 150A | 80A | 65A |
| NA28 | 200A | 100A | 80A |
| NA38 | 250A | | 100A |
| NA50 | | 125A | |
| NA60 | 300A | 150A | 125A |
| NA80 | 350A | | 150A |
| NA100 | | 200A | |
| NA150 | 400A / 450A | | |
| NA200 | 500A | 250A | 200A |
| NA250 | 600A | 300A | 250A |

- Above table shows suitable size of actuator for valves which work under 10Kg/Cm² of operating pressure.
If you need more information, please consult with factory or regional representative
3. Because Electric wiring diagram, test report and instruction manual are supplied together with actuator, please check if these are supplied or not.
 4. Please check tool and screw set for installation.

Caution

1. When you handle actuator which is not completely installed, please make sure that power should not be supplied into the actuator.

2. If limit switches are not set yet, please make sure that actuator should not be fully open or close.

Actuator should be stored at dry and clean place if it is not immediately installed after delivery.

The place should

There should be no severe vibration and temperature change in the place. If it is high humidity, power should be supplied at least every two week in order to operate the heater to prevent condensation.

Also, please do not remove the plug which mounted into actuator cable entry until wiring is ready in the field.

| | |
|--|--|
|  | ⚠ CAUTION |
| | <i>: If trouble due to inappropriate storage and place, EMICO can not guaranty the performance and quality.</i> |

Please be careful not to operate actuator to fully close or fully open until the direction of actuator is not confirmed (Especially 3 phase electricity). Also if limit switches are not completely set yet, it can be a major cause of damage of valve and actuator.

(Limit switches are already set when delivery, limit switches can be set again in the field if necessary).

It is very simple to operate actuator by manual or electrical as follows.

Manual operation

If you want to operate actuator by manual, pull the lever (toward handwheel), so that clutch is to be engaged with handwheel.

If it is engaged, then you can operate actuator to any direction by manual. Direction Indication of Open and Close is marked on the handwheel and handle cover and in general, to turn clockwise is close and counter clockwise is open.

Electrical operation

After completion of wiring, you can operate actuator by switch in the Local panel.

If electricity is supplied, actuator automatically returns from manual to electrical operation mod.

If lever lean toward opposite side of handwheel, you can acknowledge it as electrical operating mode.

The Indication of valve position is done by indicator which is shown through the window of actuator top cover.



Open



Close

Indicator is designed same as shape of disc of butterfly valve and user can easily acknowledge the valve position from a distance.

Taking off Top cover

By using the L-wrench, unscrew the screw of top cover and take off the top cover from assembly.

Electrical wiring

Wiring should be done as per the wiring diagram which is provided together with actuator. Especially electricity (voltage, phase and hertz) should be confirmed comparing to the details on nameplate.

| | |
|---|---|
|  | ⚠ Warning |
| | <p>Relays for power supply should not be connected to more than two actuators.</p> |

Grounding, Heater and internal wiring

1. Grounding lug in actuator and outside of actuator should done.
 - Connect the grounding wire to the position of the following mark:



2. Wiring to heater should be done
3. Please make sure that wiring to terminal block should be tightly done.
4. When wiring to terminal block, there should be some gap between the wires in order to prevent electric shortage due to the interference between the wires.

3Phase(220V, 380V or 440V or others) electric power

| | |
|---|--|
|  | Danger |
| | <p>NEVER connect phase conductors (L1, L2, L3) or neutral conductor (N) to the protective earth terminal marked PE.</p> |

Because there is no way to identify each phase among 3 phase, user should confirm the actuator correct rotating direction.

Otherwise, it can be a major problem of motor burning.

In order to check correct rotating direction for start up, followings should be done.

1. Make valve disc 45° position by using manual handwheel of actuator.
2. Push the Close or Open switch for approx. 3seconds, check the rotating direction of valve disc.
3. If direction of valve disc is reverse, immediately stop the actuator and check the wiring again.

Then change 2 wires each other among 3 wires(U V W).

Single phase(110V or 220V) Power

When wiring, please be careful not to supply power to open and close terminal simultaneously.

This is a major cause of motor burning and after service at free of charge is impossible.

Caution :

Without confirmation rotating direction of 3 phase, actuator can be operated in reverse direction.

In this case, limit switches can not function and therefore Jamming of gearing or motor burning can occur.

This is not a trouble which free after service is applicable.

Others after wiring

After completion of wiring, make internal wires well arranged by using cable tie & etc and remove substance in the actuator if any in order to avoid any trouble due to the substance.

After completion of all wiring and arrangement in internal, put the top cover on the housing and fasten the 4 retaining screws.

Cable entry is consist of 2 ea PF 3/4 TAP and when you do wiring through cable entry, please be careful for following cases.

Cable Gland

Certified products as per standard should be used and there must be tight sealing by using elastic rubber packing, hardening resin, compound and metallic packing (metallic seize cable) to prevent any harmful influence from outside like as moisture or leak of water.

Cable conduit

When use cable conduit, need to make hole for retaining screws on following parts and tight up with the retaining screws.

Otherwise, it should be tightly fixed through the hole which has no internal threads.

1. Outside wall of actuator
2. Plate mounted on inside or outside wall of actuator
3. Component for sealing which is a part of wall of actuator or mounted on wall of actuator.

Others

1. Please make sure that internal wiring to terminal block should be tight
2. Please make Sealed cable entry by factory as it is if you don't use.
3. Direction of Cable entry toward ground is recommended if possible.
4. Conduit should be a product certified by anti-water leaks, and in case of usage of uncertified product, after service at free of charge is not possible.

Ex-proof products

Cable Gland for pertaining performance of ex-proof is not our scope of supply and certified products by the regulation or standard by local institute should be used.

If it is difficult, please consult with our regional agent or distributor.

In case of usage of uncertified component and failure, we are free from the responsibility for that fault.

Set of Close limit switch

Pulling the lever and turn the handwheel toward clockwise to make valve full close position.

Then adjusting lower cam to be contacted to close limit switch, tighten the bolt for limit cam and fix.

Set of Open limit switch

Turning the manual handwheel to counter clockwise and make actuator full Open.

Then adjust upper cam of limit switch (Open limit switch) as same way to adjust Close limit switch.

Mechanical Stop Bolt

When you adjust Open & Close limit switch, because Mechanical Stop Bolt can interrupt the setting of valve operation, turning the mechanical stop bolt counter clockwise with using L-wrench by 2 turn from open & close position and tighten it.

Commissioning

After checking of adjustment of Open & Close limit switches and interruption of Mechanical Stop Bolt, operating actuator 2~ 3 times (Open-Close, Close-Open) by using switch in control panel, check if each lamp is on or not.

Setting of torque switches

Generally speaking, it is not necessary to adjust the torque switches because the switches are already set by factory before delivery.

But if you still need to adjust the switches, please consult with us or regional agent

Wrench bolts fastening Torque switches are marked by red paint.

If the bolts are changed and trouble happens because of this change, EMICO has no responsibility for that problem.

Operating test of torque switches

IN order to check the operating of torque switches, push the roll of micoro switch of torque switch during open or close operation.

If actuator stop, it means that torque switches work successfully.

 **Caution :**

Torque switches are installed for the purpose of protection of actuator and valve and because these are set by factory with precision equipment, EMICO can not guaranty the performance if these are changed or adjusted without consultation with factory.

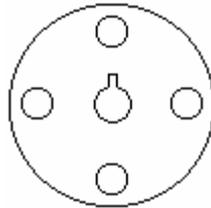
Drive bushing

Drive bushing for mounting actuator on is supplied for every actuator and valve stem with key way type is recommended to use.

Taking apart the drive bushing and machining

Remove 4 retaining bolt of drive bushing and take drive apart from actuator.

When machine the drive bushing and key way, please make the key way toward one retaining screw among 4.



Mounting actuator

When mount actuator on valve, after making direction of drive bushing of actuator same direction with key way of valve, tighten the 4 retaining bolt by using L-wrench.

(When valve is closed (or opened), make actuator closed (or opened) by using manual handle or switch on the panel.

If key way direction of drive bushing is not same direction of key way of valve, it is not proper way of mounting

Installation

Considering of maintenance or repair, please make sure that the should be enough space between actuator and other equipment or wall which allow easy access.

Noah actuator can be installed toward any direction without leaks of lubricant or water but in case of vertical piping, cable entry is installed toward ground if possible.

Also, following cases are to be considered.

In case of butterfly valve

Please be careful when install actuator on butterfly valve because normal operation is not possible if both face of valve seat are suppressed too much.

In case of 3way ball valve

Please check if the valve is L port or T port

In case of damper

Please make sure that mounting should be done when damper is completely closed.

Prior to this, check if rotating direction of damper is same with that of actuator.

In case of direct mounting and use of rod box, check if damper is open or close.

It is recommended to use the rod box type for the severe application like as vibration or high temperature.

Mounting base of EMICO's noah actuator is produced as per the ISO5211 standard supplied.

In case of Top flange of valve for mounting, please use the separate special adaptor for mounting.

| Actuator | Base | Thread | B.C.D | Max Stem dia |
|-----------------|----------|-----------|----------|--------------|
| NA- 6, 9 | F07 | M8 | 70 | 22 |
| NA- 15, 19 | F07,F10 | M8 , M10 | 70,102 | 22 |
| NA- 28, 38, 50 | F10,F12 | M10, M12 | 102,125 | 32 |
| NA-60, 80, 100 | F12,F14 | M12,M16 | 125, 140 | 42 |
| NA-150,200, 250 | F14*,F16 | M16*, M20 | 140*,165 | 75 |

Marked * is Optional specification

In case of use of valve which is not met with ISO5211 standard, please provide the valve information including top flange dimension when order, so that mounting base will be provide as per your valve.

When operation, there is some cases that operating is not successful due to several reason.

If those, please check as per follows

Mechanical trouble

1. Pulling the Hand/Auto lever of actuator, operate the valve by manual
2. If handwheel is O.K, there is no trouble in mechanism and check electrical trouble.
3. If handwheel is not move, it could be “Jamming” and check as follows.
Jamming happen during close operation, loose mechanical stop bolt by 2 turns which is opposite side from handwheel and pulling the lever and turn handwheel left.
If doing this and Jamming is released, check the power wiring.
4. If handwheel is operated without any load, mounting between actuator and valve is not proper and need to check it
5. If valve is not fully closed or opened, please check adjustment of limit switches.
6. Valve operation is smooth and well by using manual handwheel, check “Electrical problem”

Electrical defect

Check if there is no defect in control panel.

If no problem, then check actuator.

1. Check the status of main power and control power, then check relay fuse, lamps and switches in the control panel.
2. If there is a defect in the panel, please change or repair that part.

After checking as per above and found no defect, check as per mechanical trouble.

3. Check the motor operation and change or repair if defect is found.
4. If motor operation is not successful, check the wiring and capacitor because defect of capacitor could be a reason.
5. If torque switches works, check if there is no substance between seat and valve or between seat and damper because actuator is under overload condition.
If no substance is found, consult with the factory because selection of actuator for valve or damper was not proper and
6. If defect in switches is found, adjust it or replace and repair as per the reason found.

 **Caution :**

Beside from above mechanical and electrical problem, upon the site condition, various problem can be occurred.

If it is necessary to dismantle the actuator, please contact the factory or regional agent and inform the model, power, Serial No., current situation in detail as far as possible, so that consultant can find the reason and do to fix the problem.

Noah actuator is designed to withstand for 30 years just same with life of plant but regular check and maintenance (at least 2 times per year) which operate actuator

Caution

Please be noticed that free after service is not applicable to following cases.

1. Damage and trouble caused by user's inattention
2. Trouble caused by modification or repair without consulting with EMICO
3. Trouble caused by inappropriate change of our standard wiring
4. Trouble caused by operation without confirmation of rotating direction(3phase)
5. Trouble caused inappropriate sealing of cable gland or conduit
6. Trouble caused by force major.
7. Trouble occurred over warranty period

Dismantling for replacement

Before dismantling the actuator, disconnect incoming power supply to actuator.

Dismantling should be done as per enclosed procedure.

Re-assembling

Reverse of dismantling procedure.

Drawings Mechanical assembly

- Assembly for NA-04, 06, 09 (D.W.G No. M006-101-A)
- Assembly for NA-15, 19 (D.W.G No. M015-101-A)
- Assembly for NA-28, 38, 50 (D.W.G No. M028-101-A)
- Assembly for NA-60, 80, 100 (D.W.G No. M060-101-A)
- Assembly for NA-150, 200, 250 (D.W.G No. M200-101-A & M200-102-A)

Electrical wiring

- DWG NO : NU-11000-A for 1Ph wiring diagram
- DWG NO : NS-11000-A for 1Ph wiring diagram
- DWG NO : NT-31000-A for 3Ph wiring diagram
- DWG NO : NS-31000-A for 3Ph wiring diagram

Recommended Spare Parts

Following Spare Modules in stock for each size of actuator are recommended.

1. Mechanical modules : 1 set per 50pcs of actuators
2. Electrical modules : 1 set per 50pcs of actuators
3. Motor : 1 set per 50pcs of actuators
4. Switch engagement : 1 set per 50pcs of actuators
5. O-ring & Screws : 1 set per 25pcs of actuators
6. Terminal Block : 1 set per 50pcs of actuators
7. Declutching mechanism : 1 set per 50pcs of actuators

Dismantling procedure for replacement

Before dismantling the actuator, disconnect incoming power supply to actuator.

| |
|---|
| 1) Put the valve closed position by turning the handwheel and remove stud nuts below actuator. Lift Actuator and separate it from valve |
| 2) Remove the 4 retaining screws on the corner of Top cover and pull off top cover squarely with both hands |
| 3) If the optional Potentiometer was fitted remove the retaining screws and take it off |
| 4) Condenser for single phase motor was fitted, remove the retaining screw and take it off. |
| 5) Remove retaining screws and take off the Terminal block and Space heater. |
| 6) Remove retaining screws(M4x4, M5x4) and take off the Limit and Torque switch assembly |
| 7) Remove the retaining screw and take off the Motor. |
| 8) Remove the Torque shaft |
| 9) Remove the retaining screws and take off Disk cover for 1 st shaft. |
| 10) Remove the retaining screw and take off Handle cover assembly. |
| 11) To take off the declutching lever, clutch A and Auto/Hand Yoke, loose the retaining screw. |
| 12) Remove the lever. |
| 13) Remove Clutch A & Auto/hand yoke |
| 14) Remove the snap ring. |
| 15) Take off the 1 st worm wheel. |
| 16) Pull off the 1 st worm gear together with bearing. |
| 17) Remove the retaining screws of Thrust cover and take off the Thrust cover. |
| 18) Remove the Mechanical stop bolts(Stopper for opening and closing direction) |
| 19) Remove the retaining screws of End cover and take off the End cover. |
| 20) Remove the retaining screws of Drive bushing and take off the Drive bush. |
| 21) Remove the retaining screws of Base and take off the Base assembly |
| 22) Push the Center column from top side and take off center column assembly. |
| 23) Pull off the 2 nd worm assembly with Disc spring & bearing. |
| 24) Remove the retaining screws and take off the window cover assembly |