

Radius, LLC

Electric quarter turn actuator

EW series

Installation, Maintenance and Operating Manual

Models EW-880, 1400, 2100, 3100, 4400, 7000, 9700, 13000, 17000, 26500

EW-IMO-04



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Thank you for purchasing our EW series electric actuator!

For safe and proper operation, please carefully read this manual before installation and save it for reference.

Important Note: The contents of this manual is subject to change without individual notice.

## 1. Before using actuator

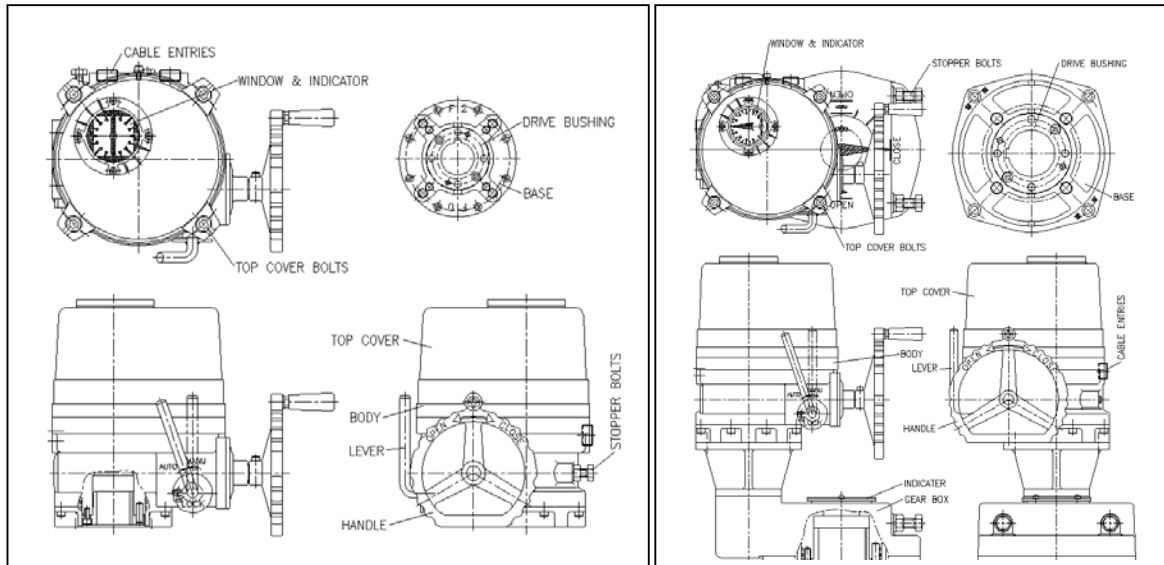
Please check individual test report, nameplate and electrical wiring (inside of actuator).

- 1) Visual check : Painting, indicator, hand-wheel, etc
- 2) Specification: users may check with test report and name plate to be sure actuator is suitable for requirement and specification of application
- 3) Optional items: Check if all optional items are included.
- 4) Check if electrical specification is correct (check wiring diagram inside of actuator, name plate).
- 5) Check if the electrical power is correct..
- 6) Check if instruction manual, test report (Warranty papers) and electrical wiring diagram are supplied.

If there is any discrepancy, please ask local distributor of Radius to solve or replace any discrepancy immediately.

## 2. EW actuator

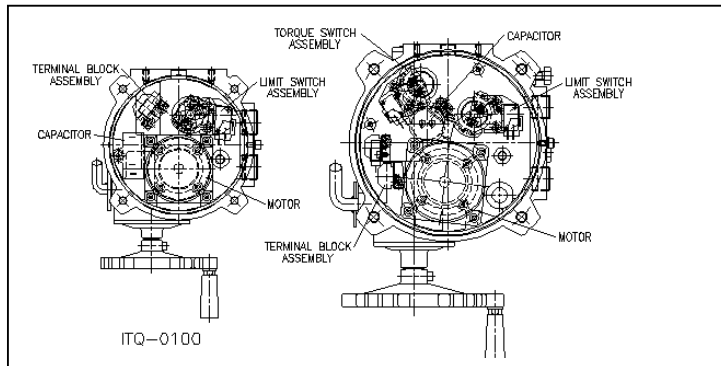
### External components



EW-880-9700

EW-13000-26500

## Internal components



EW-880

EW-1400-26500

## 2) Specifications

Enclosure	Weather proof enclosure IP67, NEMA 4 AND 4X, O-RING Sealed
Main power supply	110/220V AC 1Ph, 380/440V AC 3Ph 50/60Hz, $\pm 10\%$
Control power supply	110/220V AC 1Ph 50/60Hz, $\pm 10\%$
Duty cycle(On-Off)	S2, 20~50% Max 30Min
Duty cycle(Modulating)	S4, 30~50%, 300~1200starts/hour
Motor	Squirrel caged induction motor
Limit switches	OPEN/CLOSE, SPDT, 250V AC 10A RATING
Torque switches	OPEN/CLOSE, SPDT, 250V AC 10A Rating(Except for ITQ0030,0060,0100)
Stall protection(Temp.)	Built in thermal protection, high 300°f $\pm 10$ °f/low 145°f $\pm 27$ °f
Travel angle	90° $\pm 5$ °(0°~100°)
Position indicator	Plate with indication arrow
Manual override	De-clutchable
Self locking	Provided by double worm gearing (No brake required)
Mechanical stop	1 each for each travel end(OPEN and CLOSE), external adjustable
Heater	5W (110/220V AC) Anti-condensation
Cable entries	2* PF3/4" TAP
Lubrication	EP Type grease
Terminal block	Screw and lever push type(Spring loaded)
Ambient temperature	-10°f~+125°f (Except for optional electronic board)
Ambient humidity	90%RH Max, (Non-condensate)
Dielectric strength	1500V AC 1minute
Insulation resistance	500V DC 30M Ohm

Anti-vibration	X Y Z 10g, 0.2~34Hz, 30minute
External coating	Dry powder (Polyester)

### 3) Features and structure

#### (1) General :

The EW series actuator is designed for 90 degree turn applications such as damper, ball, plug, butterfly valves and other equipment

#### (2) Wide range of torque

Min. 250 to Max 27500 inch pounds

#### (3) Materials

Housing are hard-anodized AL alloy and external coating of epoxy powder suitable for severe conditions especially against corrosion. Housing is designed in accordance with IP67.

#### (4) Sealing

Sealing provided by double O-ring system

#### (5) Manual Override

Just by pulling the lever, operating mode is switched to manual. When supplying electrical power to actuator, clutch is automatically disengaged from manual and operating mode is switched to electric operation.

#### (6) Gear & Self locking

2<sup>nd</sup> staged Double worm gearing prevents movement caused by backward force transferred from valve provides an exact stable position of actuator and valve when electrical power is off.

High efficiency, low noise level and trouble free design are another advantage.

#### (7) Manual hand wheel

The Size of hand wheel is designed according to required torque to move the actuator, so that operator can easily move the actuator by hand.

#### (8) Motor

Motor specially designed for the EW actuator has several features such as high output power, high efficiency and thermostat installed inside of motor prevent overheat of motor and thermal damage of motor coil.

#### (9) Limit switch

Since limit switch is directly driven by the 2<sup>nd</sup> output shaft, position during operation is continuous and accurate. Setting of Cam is so easy that once the cam setting is done, position is almost permanent unless operator changes setting.

#### (10) Torque switch

Torque switch driven by the 2<sup>nd</sup> output drive shaft for continuous and accurate torque detection.

Torque spring which detects the variation of torque during operation is installed to prevent damage of valve and actuator under overload condition.

Once actuator is under overload, torque switch is tripped and actuator stops immediately.

Switches are installed for both open and close direction.

This switches set by factory can not be set again without checking with factory.

(11) Space heater

Spacer heater is installed to prevent damage caused by condensed water inside of actuator and includes internal thermostat to prevent overheating.

(12) Mechanical Travel Stops

Travel stops are installed for both close and open direction prevents actuator's travel over the limit during manual operation and also protects internal gearing disengagement.

(13) Indicator

Indicator directly driven by 2<sup>nd</sup> output drive shaft

Operator perceives exact current operating situation even from a distance.

(14) Terminal block

Spring loaded terminal strip protects against vibration and provides for additional contacts.

15) Wiring

Basic wiring is standardized to be simply and optimal.

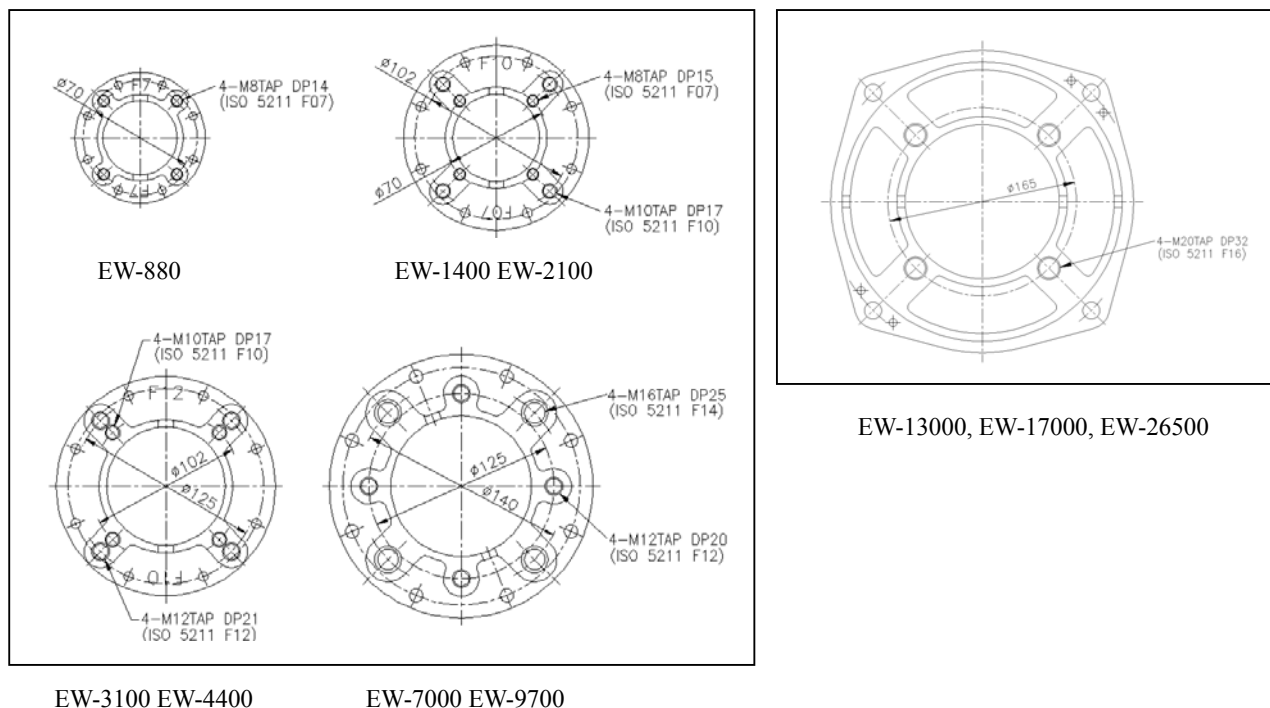
(16) Adaptation

Mounting base is designed according to ISO5211 but different dimension depending on application is also possible. Removable drive bushing provides convenient custom machining.

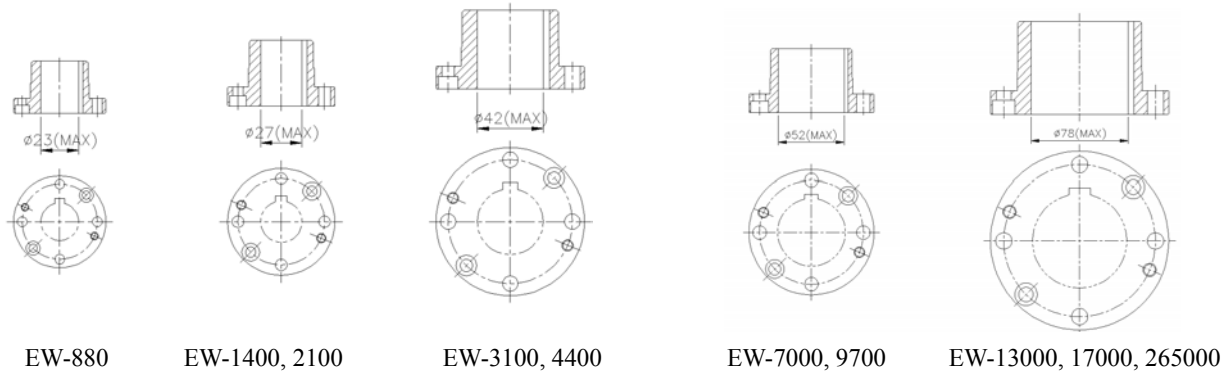
(17) Lubrication

Actuator is lubricated with EP type Moly Grease, no need to field lubricate.

(18) Mounting base according to ISO5211 standard



## Removable Drive Couplings



## 3. Sizing and application

1. Sizing should be done after careful reviewing valve factory requirements, temperature, characteristics of fluid etc.
2. Review application under special conditions such as high and low temperature, seawater, severe corrosion, high vibration), please consult with our technical dept before selecting actuator.
3. Decision by user ignoring our recommendation voids all factory warranties.

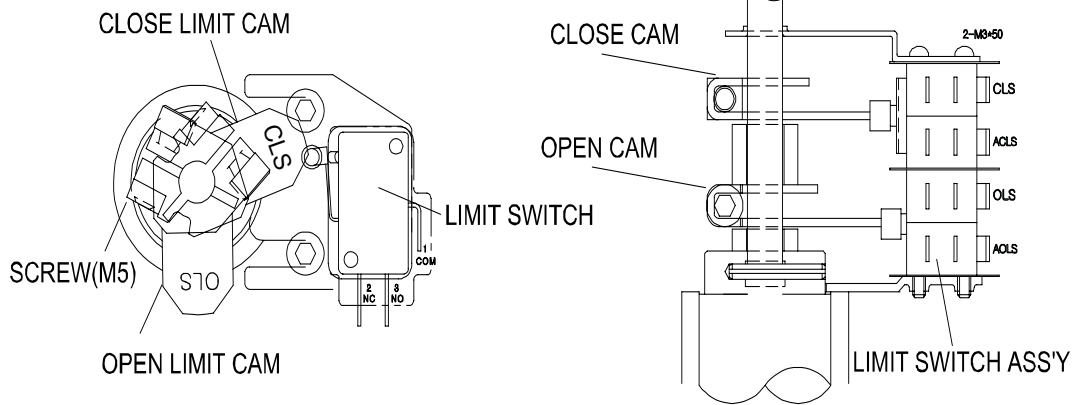
## 4. Settings

### 1) Manual operation

- ① Pull the lever toward hand wheel until lever moves perpendicular to pipeline.
- ② If lever does not move try pulling again while turning hand wheel slowly.
- ③ There is a casting mark to indicate rotating direction on hand wheel
- ④ Clockwise is the close direction and counter clockwise is the open direction.
- ⑤ **There is no need to position the lever back to the original position for electrical operation.**
- ⑥ Once electrical power is on, the lever will automatically return its original position by internal clutch mechanism.

### 2) Limit switch setting

- ① Pull the lever manual operation and turn hand wheel to move actuator full close(Or open) position
- ② Loosen the bolts tightening cam by L-wrench, and turn CLS(Or OLS) cam to CW (or to CCW), so that cam may hit the lever of close(Or open) limit switch.
- ③ Then tighten the bolt by L-wrench



### 3) Torque switches

Torque Switches are set by factory before delivery and there is no need to set the switches again, to check function:

- ① Push the lever of close switches by screw driver until it a “click” sound is heard, actuator should stop immediately. If it stops, switch is functional.
- ② Check open switches as per just above.
- ③ There is no guaranty in performance if settings are changed.
- ④ Before changing settings, please consult with factory.

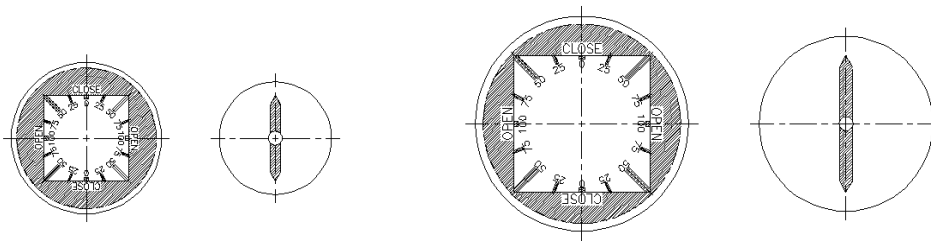
### 4) Travel Stop Settings

- ① Before manual operation, loosen both nuts and turn bolts outward by 3~ 4 threads.
- ② Move actuator manually to full close position.  
Once cam hits the lever of limit switch to trip, stop manual operation.
- ③ Then turn bolt inward until it stops (End of stop contacts the 2<sup>nd</sup> worm gear)
- ④ Turn stop bolt out by 2 threads and tighten the nut.
- ⑤ Repeat same above for open travel stop setting.

5) Indicator setting

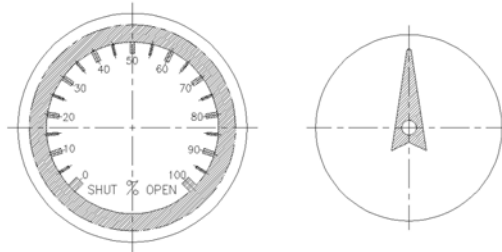
- ① Move actuator full close position and turn indicator by hand until orientation of indicator is aligned to the figure of window.
- ② Tighten the bolt (Be careful not to be injured by the cutting edge of indicator and electricity when power is on)
- ③ Figure of Window and indicator according to AWWA standard

**Indicator Arrangement**



EW-880

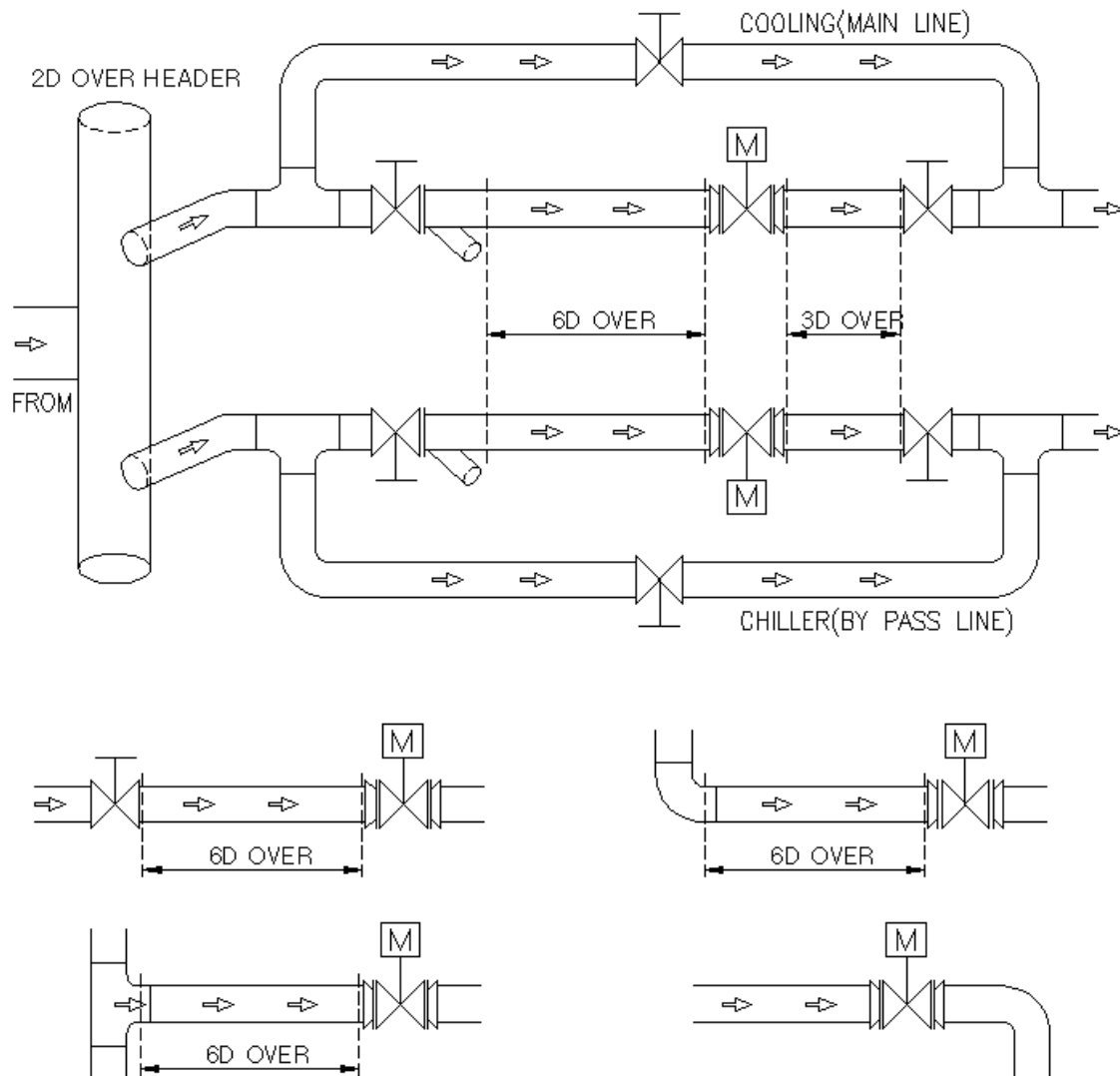
EW-1400-9700



EW-1300-26500

## 5. Recommendation for installation of actuator in the pipeline

### 1) Location of actuator on the pipeline



### 2) Orientation of installation of actuator

- ① It is recommended to install actuator in the position where cable entry is bottom orientated for watertight function and hand wheel faces front for easy manual operation.
- ② Reserve space for maintenance.

## 6. Electrical wiring

### 1) Before wiring

- ① Cable entries are machined with PF3/4" tap and sealed by Plug before delivery.
- ② Please retain any unused plugs.
- ③ Please make sure to seal the entries by using rubber or metallic packing after wiring, so that water may not enter the actuator.
- ④ On explosion proof models, please make sure to use the certified connection component which is at least same grade with actuator.

### 2) Electrical wiring

- ⑤ Check if electrical specification like power, wiring, etc are correct.
- ⑥ A wiring diagram is supplied with actuator.
- ⑦ Wiring should be done as per the given wiring diagram, such as power, control power, internal wiring and ground.
- ⑧ Make sure to supply electric power to heater to keep inside of actuator clean and dry.
- ⑨ Make sure to check wiring to the terminal is secure.
- ⑩ **Make sure that one relay operates one actuator only (Can not operate two or more actuators simultaneously)**
- ⑪ Make sure to clean inside of actuator and prevent foreign material inside.

### 3) Check rotating direction

- ③ In 3 phase actuator, operator should check the rotating direction of actuator before electrical operation.
- ④ If operating direction is wrong, limit switches don't function and will result in damage from jamming or motor overheating.
- ⑤ Set the actuator at 50% open(or Close) position by manual operation and supply power to the actuator and check it's rotating direction.
- ⑥ If actuator moves open as per open signal, the direction it is O.K, if reverse, change the wiring.
- ⑦ Among the 3 power wires, change the 2 that control the direction.
- ⑧ Then check the rotating direction again in order to confirm.

### 4) Commissioning

- ① Make sure to check the rotating direction of actuator first before operation.
- ② Check the function of limit and torque switches, direction of indicator and space heater.
- ③ Check lever movement (Manual override)
- ④ Check the lamps in the control panel.
- ⑤ After commission, please make sure to tighten the 4 bolts of the top cover and to do proper sealing.

### 3) Jamming

- ① In case that actuator moves to the wrong direction and moves further beyond the travel limit, internal worm gear contacts the travel stops and engaged each other. This is so call jamming, actuator will not move.
- ② How to solve
  - Turn off power
  - If jamming happened during close rotation, loosen travel stop out by about 2 ~3 threads
  - Pull the lever and put it manual position.
  - Turn hand wheel to counterclockwise until 50% open position.
  - Check rotating direction again.
  - If everything is O.K, put travel stop bolt in original position.
  - If jamming happened during open, procedure is same with close, but turn hand wheel to clockwise by manual.

### 4) Special tools for setting

- ① L-Wrench 1 set(Metric)
- ② Screw drivers (-, +)
- ③ Spanner set (Metric), Monkey spanner 200mm, 300mm 1 each,
- ④ Wire stripper, Long nose, Light
- ⑤ Multi Meter (AC, DC Volt, Resistance)
- ⑥ DC signal generator (0~4mA DC) : RPC option
- ⑦ mA DC Meter (0~25mA DC) : RPC and CT

## 8. Caution

- ① Selection of valve and actuator: Review all specification of valve and actuator carefully before making selection and reserve about 30% torque of actuator for safety purpose. If required torque is 90inch pounds recommended actuator torque is about 117inch pounds.
- ② Options: Please consult with factory before making selection, if possible.
- ③ Before setting limit switches, please don't operate actuator fully open or fully close.
- ④ After electrical wiring, make sure to secure the sealing of cable entries.
- ⑤ Before operating actuator, please review this manual carefully and follow the instruction without fail. Please be careful at temperature, humidity, vibration, voltage drop.
- ⑥ Storage: Keep actuator dry, clean and cool.
- ⑦ Trouble Shooting : Please refer to following trouble shooting but please don't dismantle the actuator without consulting with factory.
- ⑧ If repair or maintenance is required, please check the model, electrical condition, serial Number and current situation before consulting factory.

## 8. Trouble Shooting

1) 110/220VAC 1Ph, 380/440VAC 3Ph actuator

Trouble	Possible Causes	Possible Solution
Actuator doesn't work at all	Check if power is on	Power on
	Check if voltage is too low	Check power
	Motor and supplied power is different	Check motor power and supplied power
	Improper Wiring	Check Wiring
	Coil of motor is damaged	Change the motor
	Thermostat of motor trips	Change thermostat
	Capacitor is damaged	Change the capacitor
	Setting of limit and torque switch is not correct	Do setting switches again
	Jamming happens	Check rotating direction per instruction
Torque switch open	Actuator is undersized	Select again as per real requirement
	Foreign material between valve seat and disc	Remove foreign material
	Travel stop is set prior to limit switch	Reset the travel stop
Switching to manual is not possible	Lever is not fully pulled over	Fully pull over the lever
	Lever is not pulled over because of jamming	Disengage the jamming
	Clutch of lever and handle is engaged each other	Turning handle slowly, pull over lever
Abnormal signal indicator	Damage of signal LED	Change the signal LED
	Damage of micro switches	Change the micro switches
	Setting of limit switch is wrong	Re set switch again
	Travel stop is set prior to limit switch	Re set travel stops

## 10. Maintenance

### 1) Lubrication

Lubrication is already done by factory and generally no need field lubricate..

In places such as very dry condition below R.H 15% or high temperature higher than 30°C, it is required to lubricate every two years through Grease Nipple.

### 2) Regular operation

Electrical power always should be supplied to actuator and it is recommended to operate actuator once a week.

### 3) Maintenance

Please check operating condition, corrosion, painting & etc at regular intervals.

### 4) Others

Should you have any further questions, please contact us through Phone, fax and E-mail without hesitation.