

RG

SERIES

Linear Gearbox



OPERATION MANUAL



SUN YEH ELECTRICAL IND. CO., LTD.

SY10-C001B-EN

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1 General Information

1.1 Safety Instructions

- Installation, maintenance and repair works must be performed by trained personnel.
- The handling shall follow the safety and warning instruction contained in this manual.
- The user should read and follow instructions contained in this operation manual included with the product. Failure to do this may result in damages and void warranty. Sun Yeh will not be liable for damages due to operator negligence or misuse.
- Local health and safety legislation shall be complied with.

1.2 Installation Notices

- Ensure the dust of the flange surfaces of the gearbox and the actuator has been should be no damage, scratches and kept clean before mounting with actuator.
- Fasten all the connecting components when mounting with gearbox to avoid the danger.
- Use certified slings when lifting the gearbox by hoist.

1.3 Storage, Transport and Packaging

1.3.1 Receiving / Inspection

- Carefully inspect the package for any damages resulting from shipping and report all damages to the freight carrier and seller.
- After unpacking the product and information packet, please keep the cartons and any packing materials in case of product return or replacement. Verify that the items on the packing slip or on the bill of lading are the same as what were ordered. If there is any discrepancy, please contact the seller.

1.3.2 Storage

- The gearbox should be stored in a dry area with relative humidity of less than 90 % and at temperatures between -20 °C to +40 °C (-4 °F to +104 °F).
- The product shall be stored with suitable protection from corrosive substance that can damage the metal and insulating parts.

1.3.3 Transport

- The lifting can be divided into the following two ways:
 - Gearbox with valve: The rope or hook should be secured evenly on the gearbox and valve while lifting.
 - Gearbox with actuator: The rack gear will not slide off the gearbox due to the self-locking function of the actuator while lifting. Therefore, the rope or hook should be secured on the gearbox.
- ⚠ **DO NOT lift the gearbox alone. Please mount the gearbox with actuator or valve before lifting to avoid danger.**
- ⚠ **Please remove the dust-proof stem protection sleeve before lifting to avoid damage.**



Correct: The actuator is suspended with the gearbox.



Error: Suspend the gearbox separately.

- Gearboxes packaged in cartons can stand up to land, sea, or air transportation.
- Packaged products shall avoid of violent impact and strong vibrations and be protected from rain or snow.
- The dust-proof stem protection sleeve has been well packed for transportation. Avoid violent collisions when using or storing the dust-proof stem protection sleeve to prevent it from breaking.

1.4 Lubrication

- The gear train has been sufficiently lubricated at the factory. No additional lubrication is required.

2 Product Overview

RG series liner gearbox RG-3 to RG-8 are suitable for knife gate valve, ball valve and designed to combine with quarter-turn electrical actuators . These gearboxes provide thrust ranges from 3 to 21 kN (675 lbf to 4721 lbf). Excellent sealing of joined surface provides IP67 enclosure for outdoor use. Removable stem drive insert can be machined and assembled easily per customer's valve specifications.

Aluminum alloy housing with high strength and durability is used for RG series. The spur gear and rack gear structure have the advantages of high efficiency and long life. Gear trains are factory lubricated and can withstand the ambient temperature from -30°C to $+65^{\circ}\text{C}$ (-22°F to $+149^{\circ}\text{F}$).

2.1 Features

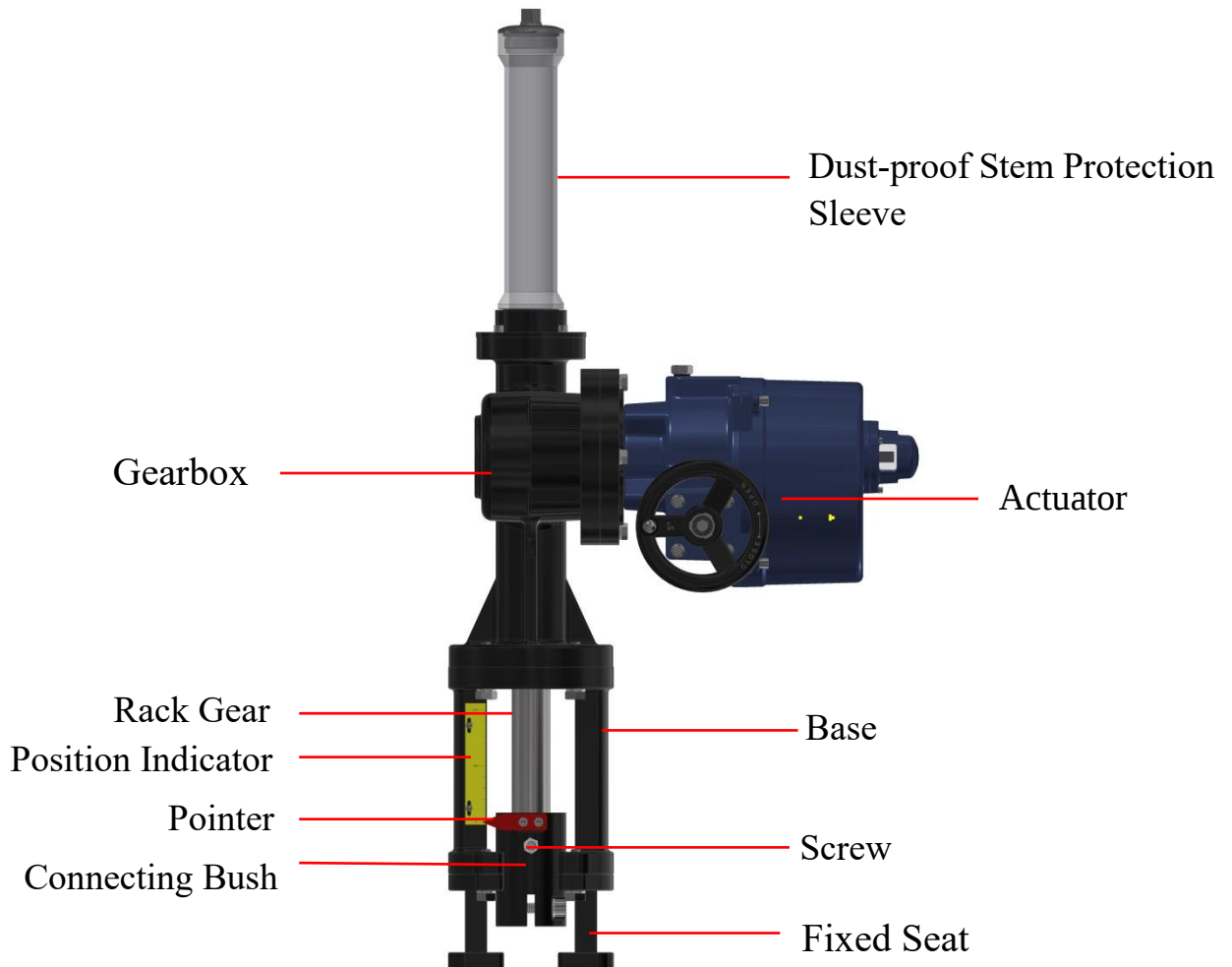
- The quarter-turn actuator can be converted into the linear motion by the spur gear and rack gear structure.
- Various strokes can be chosen.
- Disassemble and changeover the actuator easier and faster.
- Customized mounting kits according to the valve's mounting base.
- Maximum output thrust is up to 21 kN (4721 lbf) and maximum stroke is up to 300 mm (12 inch).
- ISO 5211 mounting flange (Input flange).
- NEMA 4X, 5 & IP 67 enclosure for outdoor use.
- The gear train has been sufficiently lubricated at the factory. No additional lubrication is required.

2.2 Working Conditions

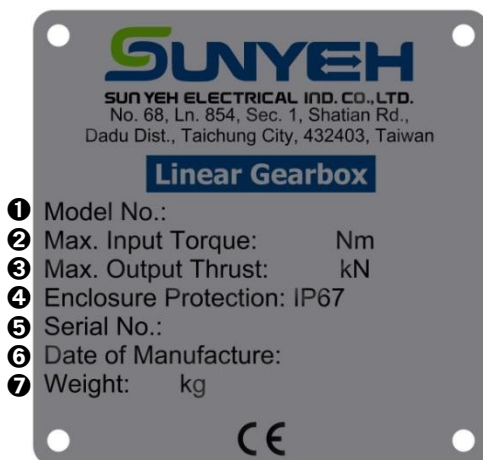
- Ambient temperature: -30°C to $+65^{\circ}\text{C}$ / -22°F to $+149^{\circ}\text{F}$.
- Relative humidity: 30% to 95%.

3 Product Mechanical Data

3.1 Parts Identification



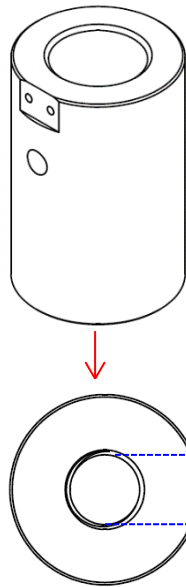
3.2 Nameplate



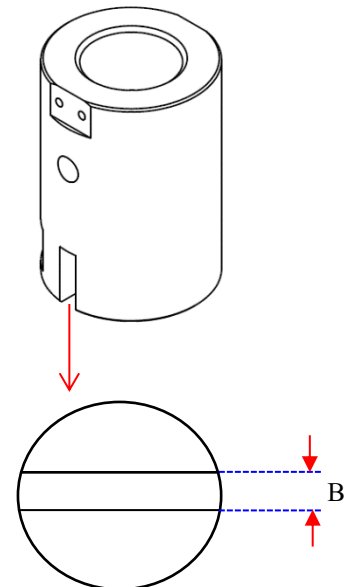
3.3 Technical Information

Model	Input Shaft		Max Input Torque		Input Mounting Flange (ISO 5211)	Weight		Max Stroke		Max Output Thrust		Max. Allowable Valve Stem (Output)	
	mm	inch	Nm	in-lb		kg	lb	mm	inch	kN	lbf	Screwed End Connection (A)	Plate Connection (B)
												mm	mm
RG-3	□22	0.866	150	1330	F10	14.5	32	100	4	3	675	Ø44	6
RG-6	□36	1.417	650	5755	F12	28	62	200	8	12	2670	Ø55	8.5
RG-8	Ø35	1.378	1500	13280	F14	52.5	116	300	12	21	4721	Ø60	11.5

⚠ Please contact your salesperson if other special requirements.



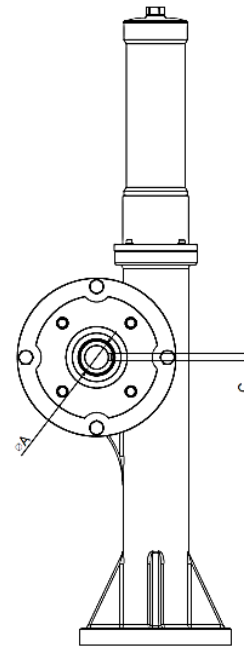
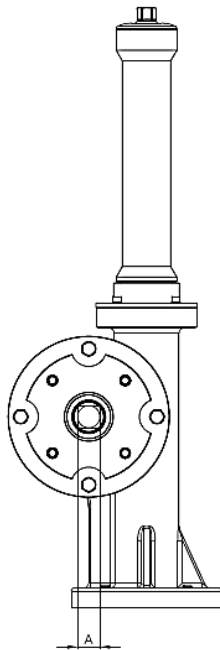
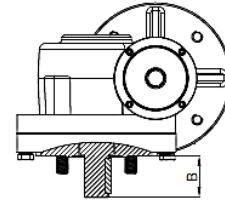
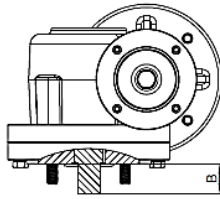
【Screwed End Connection】



【Plate Connection】

4 Valve Mounting Instructions

4.1 Input Flange Specification



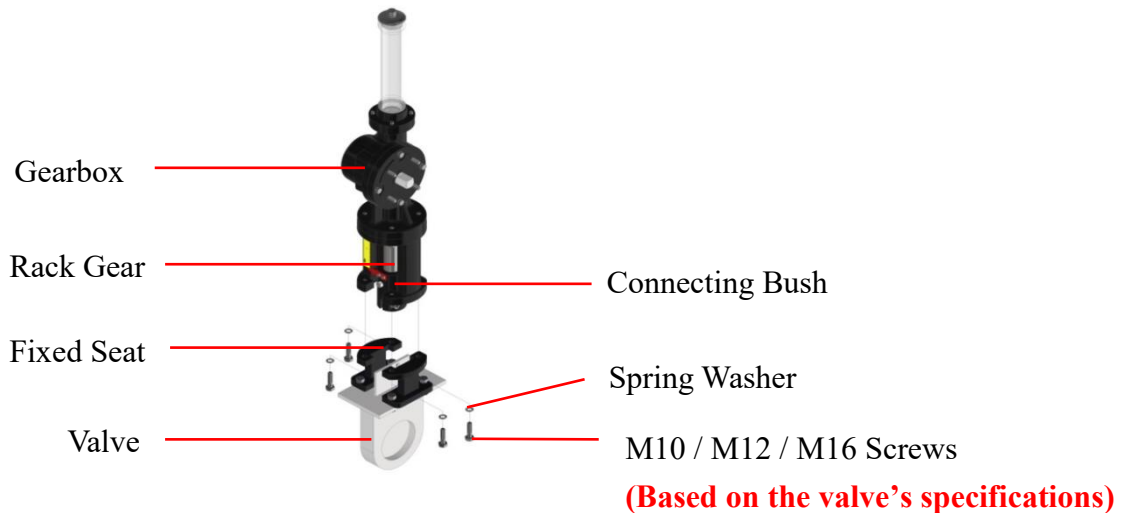
【RG-3 to RG-6】

【RG-8】

Gearbox Model	Suitable Actuator Model	Shaft (A)		Length of Shaft (B)		Key (C)		Actuator Mounting Flange (ISO 5211)
		mm	inch	mm	inch	mm	inch	
RG-3	OM-2 to OM-3	□22	0.866	30	1.181	-	-	F10
RG-6	OM-H	□36	1.417	40	1.574	-	-	F10
	OM-4 to OM-6							F12
RG-8	OM-7 to OM-8	∅35	1.378	60	2.362	10 × 10	0.394×0.394	F14

4.2 Mounting Gearbox with Valve

- ⚠ **Do not tighten the screws securely from steps 4.2.1 to 4.2.3 until step 4.2.4 is completed.**
- ⚠ **The gearbox shall be sized to ensure that its thrust output meets the load requirements of valve. (As a MINIMUM, a 30% safety factor is suggested for the calculation of thrust requirement).**
- ⚠ **The connecting bush and fixed seat should be machined to the appropriate size based on the valve specifications.**



4.2.1 Connecting Bush and Valve

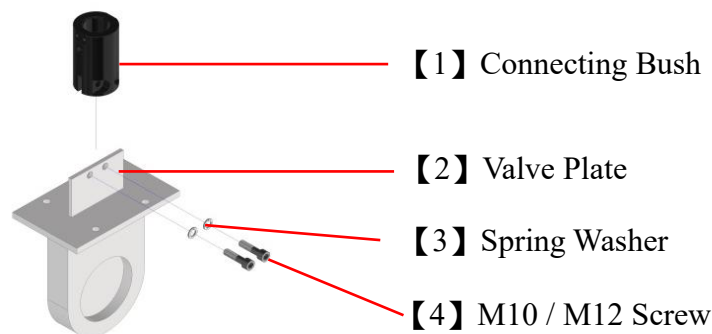
There are two assembly instructions per different valve types.

➤ Plate Connection:

1. Mount the connecting bush 【1】 with the valve plate 【2】 .
2. Use M10 / M12 screws 【4】 and the spring washer 【3】 to fasten the valve plate 【2】 .

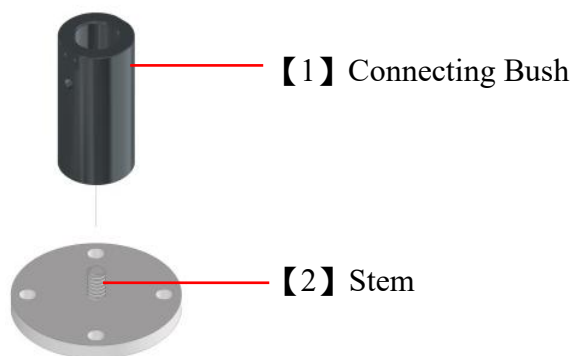
⚠ **Screw sizes will differ from valve's specifications as shown in the below table and please contact your salesperson for other screw sizes.**

Model	Screw Size	Tighten Torque (Nm)
RG-3 & RG-6	M10	35
RG-8	M12	61

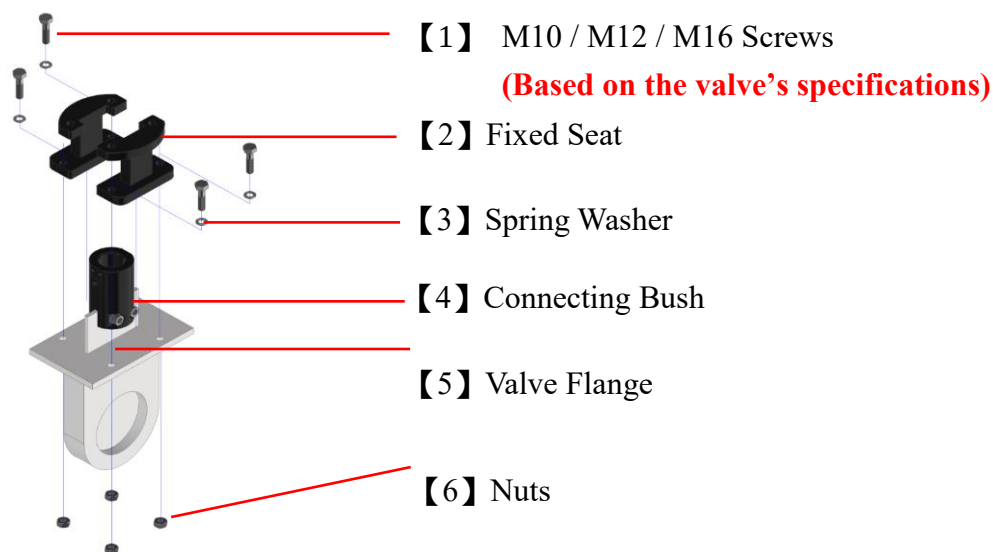


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- Screwed End Connection: Tighten the connecting bush 【1】 into the valve stem 【2】 securely.



4.2.2 Fixed Seat and Valve



a

1. Mount the fixed seat 【2】 with the valve flange 【5】 and ensure the screw holes of the fixing seat are aligned with the flange holes.
2. Use M10 / M12 / M16 screws 【1】 with spring washers 【3】 and nuts 【6】 to fasten the fixed seat 【2】 on the valve flange 【5】 .



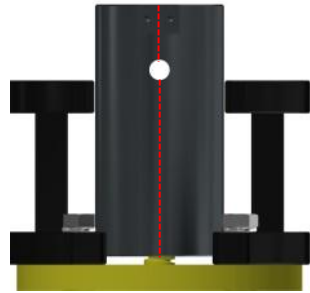
Do not tighten the screws securely.



Screw sizes will differ from valve's specifications as shown in the below table and please contact your salesperson for other screw sizes.

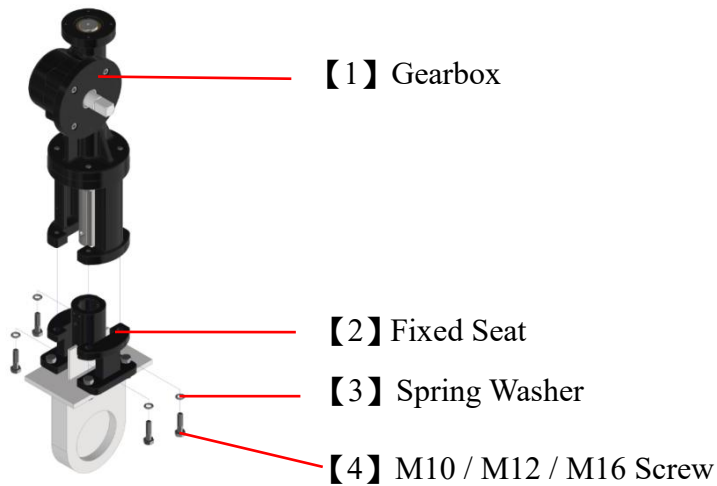
【RG Series】Linear Gearbox

⚠ When the valve is screwed end connection, after the fixed seat 【2】 is installed, please fine-tune the 【4】 connection bushing holes to align with the middle position of the fixing seat as shown in the figure below.



Model	Screw Size	Tighten Torque (Nm)
RG-3	M10	35
RG-6	M12	61

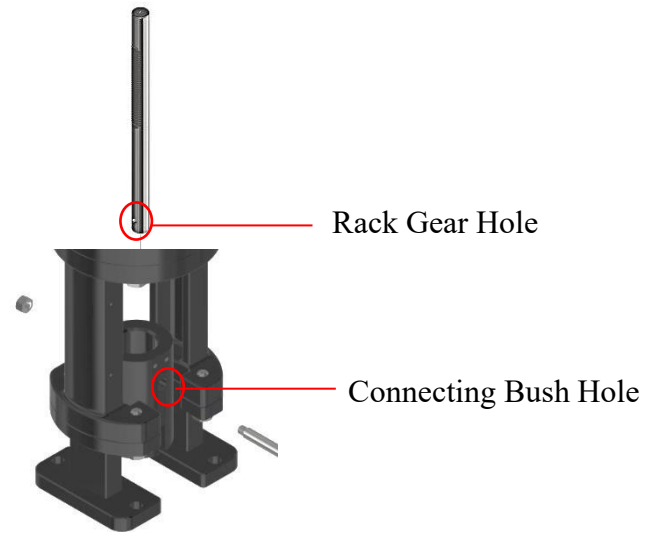
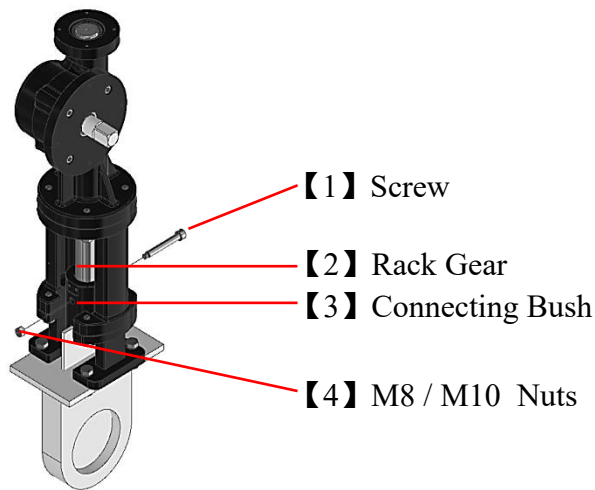
4.2.3 Gearbox and Fixed Seat



1. Mount the gear box 【1】 with the fixing seat 【2】 and ensure it is aligned with the holes of the fixed seat.
2. Use M10 / M12 / M16 screws【4】and spring washers 【3】to fasten the fixed seat 【2】 with the gear box 【1】 upwards.
3. Assembly is completed.

Model	Screw Size	Tighten Torque (Nm)
RG-3	M10	35
RG-6	M12	61
RG-8	M16	151

4.2.4 Rack Gear and Screw



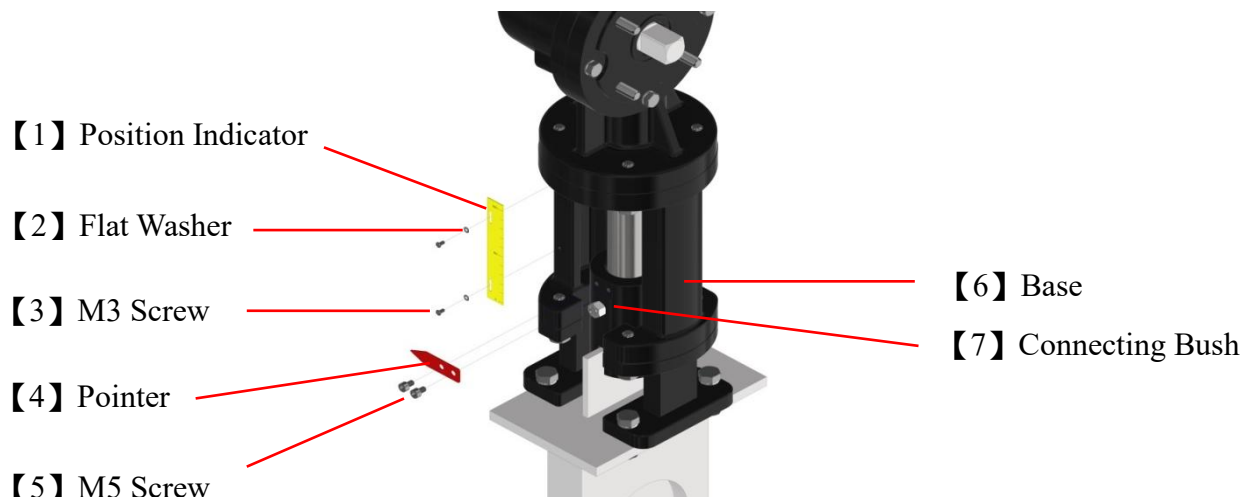
【Rack Gear Hole and Connecting Bush Hole】

1. Align the hole of rack gear 【2】 with the hole of connecting bush 【3】 .
2. Use Screw 【1】 and M8 / M10 nut 【4】 to fix the Rack Gear 【2】 and Connecting Bush 【3】 .
3. Assembly is completed.

⚠ Ensure that the shaft center of the rack gear is vertically aligned with the valve flange, and then tighten all the screws in the installation steps 4.2.1 to 4.2.3.

Model	Screw Size	Tighten Torque (Nm)
RG-3	M8	17.5
RG-6 & RG-8	M10	35

4.2.5 Position indicator, Pointer and Base



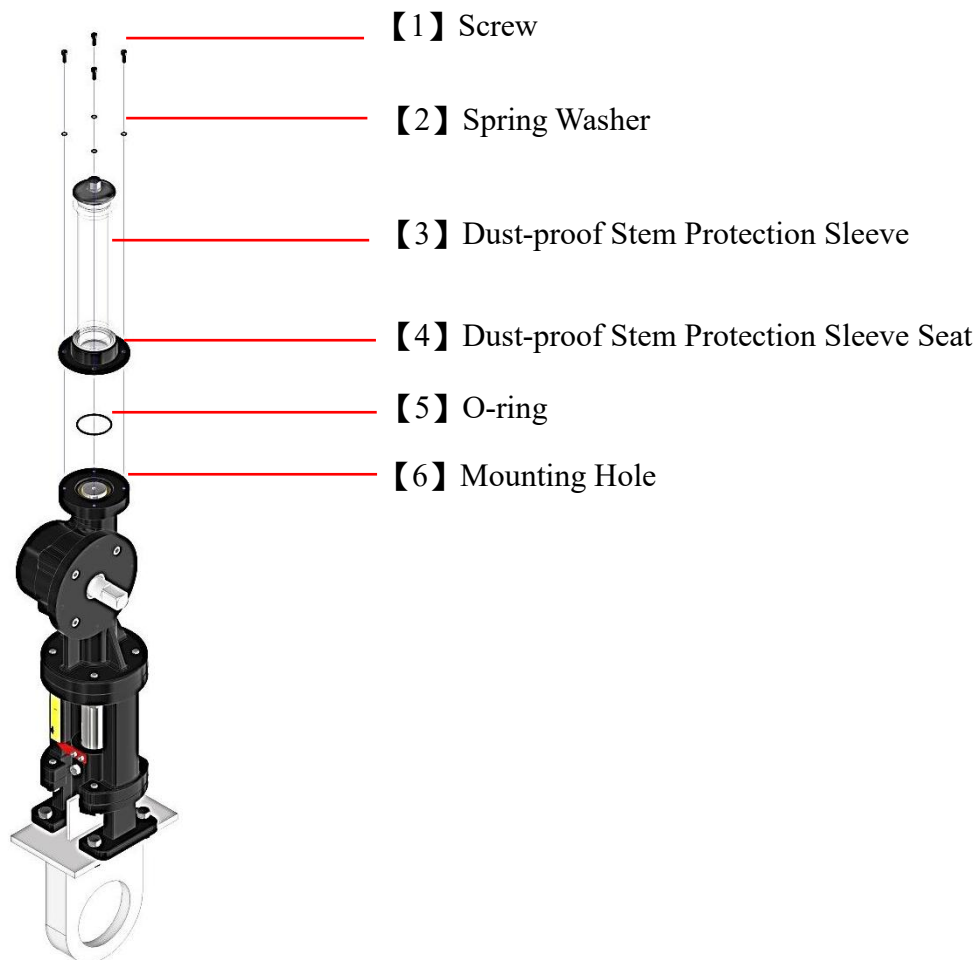
1. Use M5 screws 【5】 to fasten the pointer 【4】 on the connecting bush 【7】 .
2. Align the 0% of the position indicator 【1】 with the pointer 【4】 .
3. Use M3 screws 【3】 and flat washer 【2】 to fasten the position indicator 【1】 on the base 【6】 .



**⚠ Tighten the screws after the pointer is aligned with the 0% position of the position indicator.
(as shown in the figure left.)**

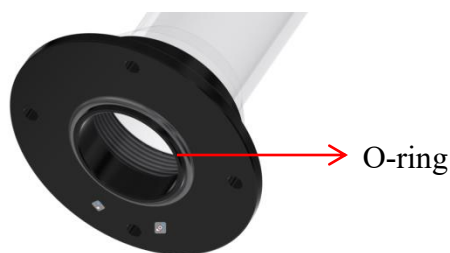
4. Assembly is completed.

4.2.6 Mount Dust-proof Stem Protection Sleeve with Gearbox



1. Put the O-ring 【5】 into the 【4】 dust-proof stem protection sleeve seat.

⚠ Ensure that the O-ring is installed properly to achieve IP protection rating.



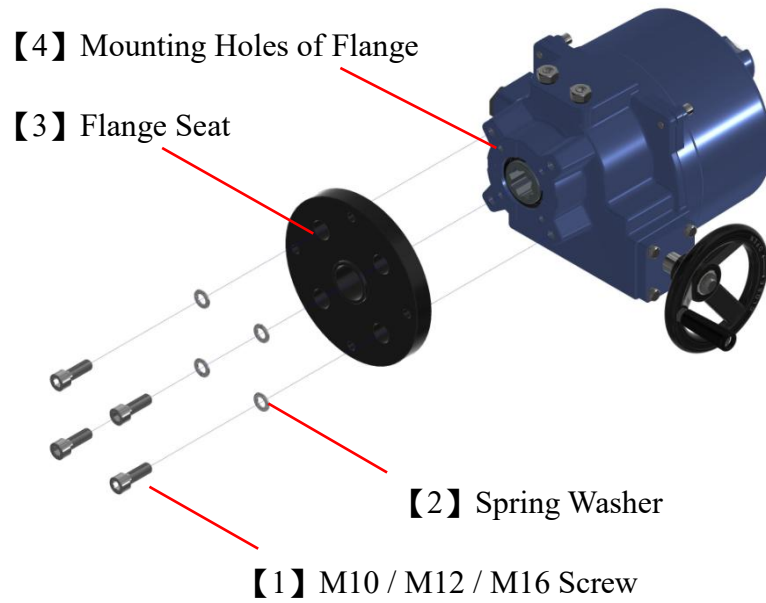
2. Align with the mounting hole 【6】 .
3. Use screws 【1】 and spring washer 【2】 to fasten the dust-proof stem protection sleeve 【4】 to mounting hole 【6】 properly.
4. Assembly is completed.

Model	Screw Size	Tighten Torque (Nm)
RG-3, RG-6 and RG-8	M5	4

4.3 Mount Gearbox with Actuator

⚠ Perform the following assembly steps after completing the installation of the gearbox and valve.

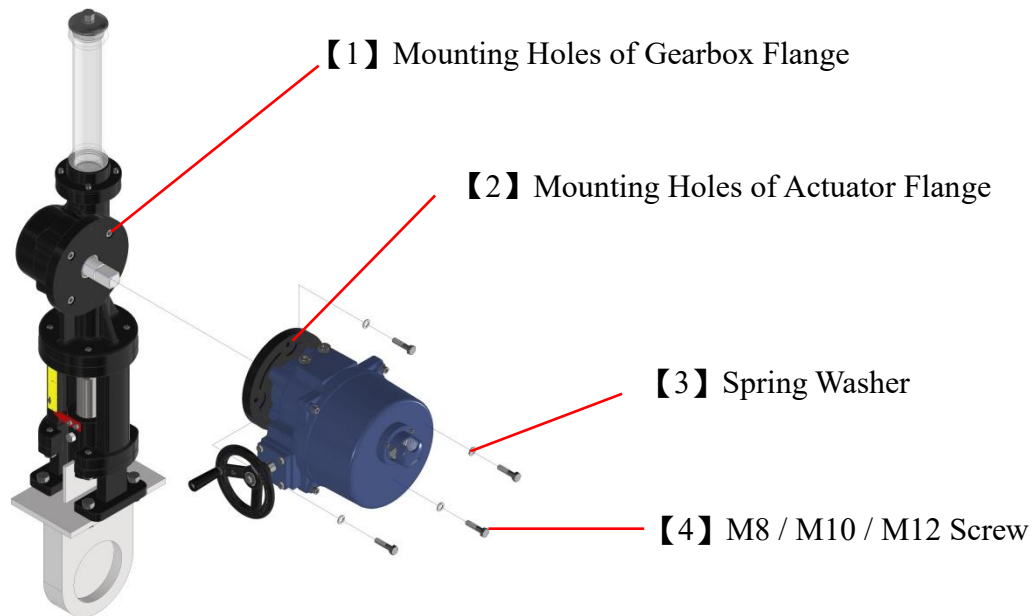
4.3.1 Actuator and Flange



1. Align the flange seat 【3】 with mounting holes of flange 【4】 .
2. Use M10 / M12 / M16 screws 【1】 and spring washers 【2】 to fasten the flange seat 【3】 to mounting holes of flange 【4】 .

Actuator Model No.	Screw Size	Tighten Torque (Nm)
OM-2 to OM-3 and OM-H	M10	35
OM-4 to OM-6	M12	61
OM-7 to OM-8	M16	151

4.3.2 Mount Actuator with Gearbox



1. Align the mounting holes of actuator flange 【2】 and mounting holes of gearbox flange 【1】 .

⚠ Before combining the gearbox with the actuator, please manually adjust the mounting holes of actuator flange to align with mounting holes of gearbox flange, and then tighten the screws.

2. Use M8 / M10 / M12 screws 【4】 and spring washers 【3】 to fasten the mounting holes of actuator flange 【2】 to mounting holes of gearbox flange 【1】 .

Actuator Model No.	Screw Size	Tighten Torque (Nm)
OM-2 to OM-3 and OM-H	M8	17.5
OM-4 to OM-6	M10	35
OM-7 to OM-8	M12	61

3. Assembly is completed.

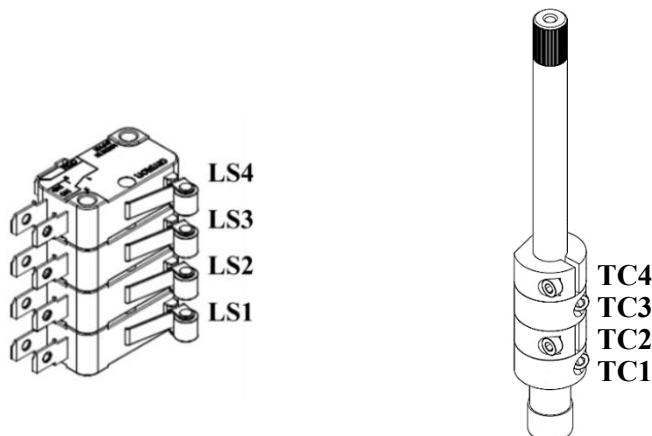
4.4 Actuator Set-up

-  **The power must be off during this procedure so as to avoid damage to the actuator.**
-  **All steps below must be completed before normal operation.**

The actuators have been set and calibrated at the factory. Most of products will not require recalibration of these settings. However these are general settings. After valve and actuator are bolted together, apply power to verify the end positions are correct. If an adjustment is required, please follow steps below:

4.4.1 Instructions

- The travel cams are set to control the open and closed position of the valve.
OM-2 to OM-8 and OM-H : The position is set to stop the travel of the actuator when the travel cams don't activate the limit switch.
- The standard is with two limit switches (LS1 & LS2) and cams (TC1 & TC2).
LS1 & LS2 : LS1 is for open and LS2 is for close. They limit the fully-open and fully-closed travel range by disabling the electric motor.
LS3 & LS4 are optional. They allow external equipment to confirm that the valve has reached the fully-open and fully-closed positions.



- **Dry contact sequence diagram (LS3 & LS4)**

Symbol	Contact	Position	
		100%	0%
LS4 (Dry Contact)	D - F	-----	-----
	D - E	-----	-----
LS3 (Dry Contact)	A - C	-----	-----
	A - B	-----	-----

- Solid line (—) : Dry contact in conductive state.
- Dotted line (----) : Dry contact in non-conductive state.

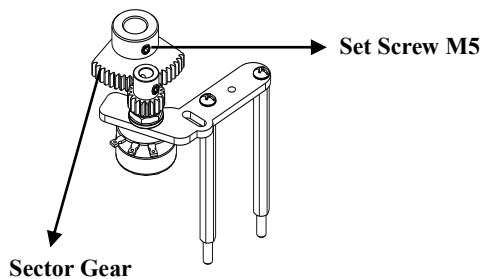
4.5 Adjustment Steps

- ⚠ **The factory setting is in the "fully closed" position.**
- ⚠ **When selecting an RG gearbox, the actuator should be sized per corresponding specifications.**

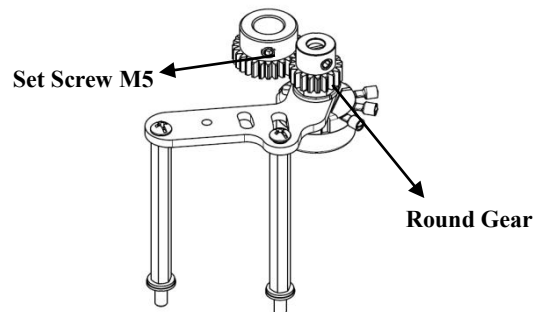
- a. Turn power off.
- b. When choosing modulating units or VR, loosen the set screw on the sector gear or round gear.

⚠ **Modulating Control is suitable for valves up to 6 inches.**

⚠ **The actuators should be equipped with different VR based on the corresponding angle of operation.**



【Sector Gear】



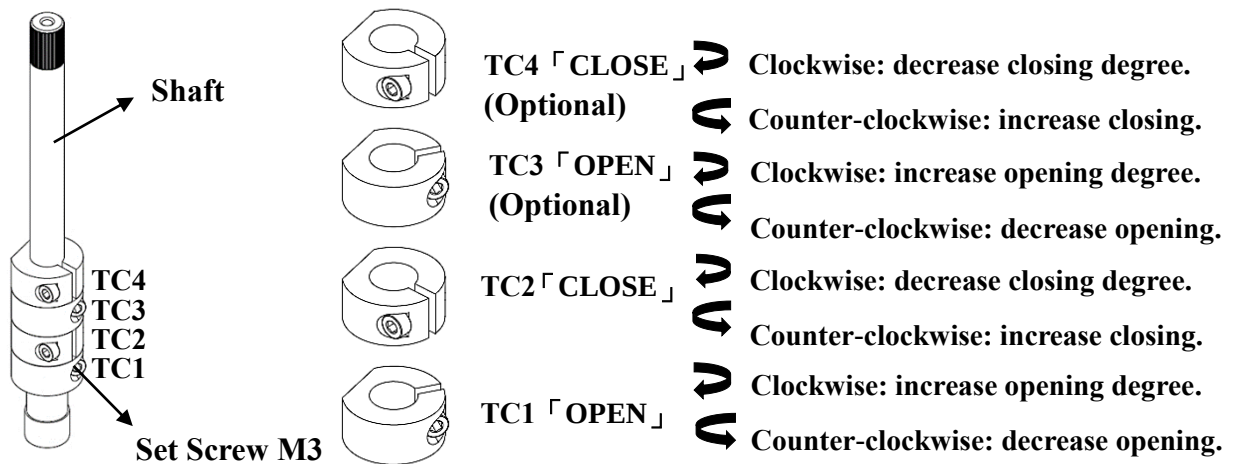
【Round Gear】

- c. Adjust the **fully-open** position
 1. Use the manual override to turn the valve to fully-open position.
 2. Remove the cover.
 - Loosen the M3 set screw of cam TC1 with a 2.5 mm Allen Key.
 3. Adjust the travel cam
 - Rotate the cam TC1 counter-clockwise to contact the switch arm.
 - Slowly rotate the cam TC1 counter-clockwise until a light click is heard.
 4. Securely tighten the M3 set screw and apply power to check if the fully-open position is correct. If it is not correct, please repeat steps 1 to 3.
 5. Use the same method to reset the cam TC3.
 - ⚠ **Adjust cam TC3 so it trips just before cam TC1 does.**
 6. After the adjustment is completed, check again that the M5 set screw is securely tightened.

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d. Adjust the fully- closed position

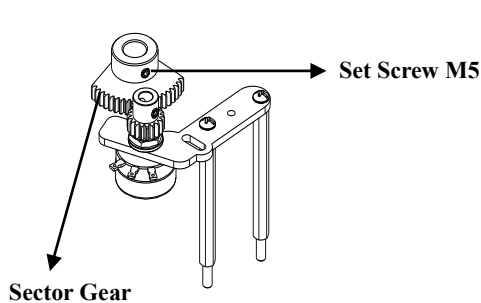
1. Use the manual override to turn the valve to fully-closed position.
2. Loosen the M3 set screw of cam TC2 with a 2.5 mm Allen Key.
3. Adjust the travel cam
 - Rotate the cam TC2 clockwise to contact the switch arm.
 - Slowly rotate the cam TC2 clockwise until a light click is heard.
4. Securely tighten the M3 set screw and apply power to check if the fully-closed position is correct. If it is not correct, please repeat steps 1 to 3.
5. Use the same method to reset the cam TC4.
- ⚠ **Adjust cam TC4 so it trips just before cam TC2 does.**
6. After the adjustment is completed, check again that the M5 set screw is securely tightened.



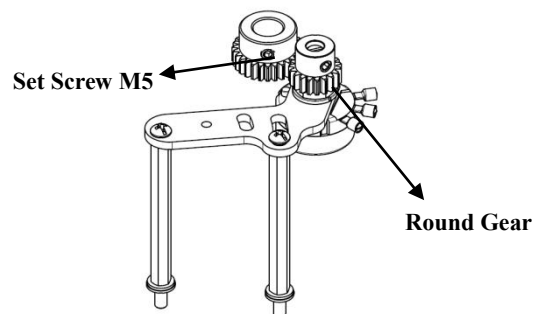
e. When choosing modulating units or VR:

Supply power to run the actuator to the fully-closed position. Adjust the gear and the set screws based on the actuator model listed below.

OM-2 to OM-8 and OM-H	Rotate the sector gear or round gear clockwise to the end and tighten the M5 set screw.
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【Sector Gear】



【Round Gear】

f. The setting procedure is now completed.

5 Warranty

Sun Yeh Ele. Co. Ltd warrants that for a period of twelve months from the date of manufacture it will either repair or replace, at its option, any of its products which prove to be defective in material or workmanship. This warranty does not cover damage resulting from causes such as abuse, misuse, modification or tampering by users. This warranty is extended only to the immediate purchaser of the Sun Yeh product and is not transferable. To obtain service under this warranty, the purchaser must first acquire a return authorization from Sun Yeh. Products must be returned to Sun Yeh under freight prepaid.

This warranty is in lieu of all other obligations, liabilities or expressed warranties. Any implied warranties, including any implied warranty of merchantability are hereby expressly excluded. In no event shall Sun Yeh be liable for special, incidental or consequential damages arising in connection with the use of its products, or for any delay in the performance of this warranty due to cause beyond its control.

6 Disposal

Please obey the local environment regulation for equipment scrapping.



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