



Electric Actuators Series 05/10/20/40/60/100/200/300



Notes

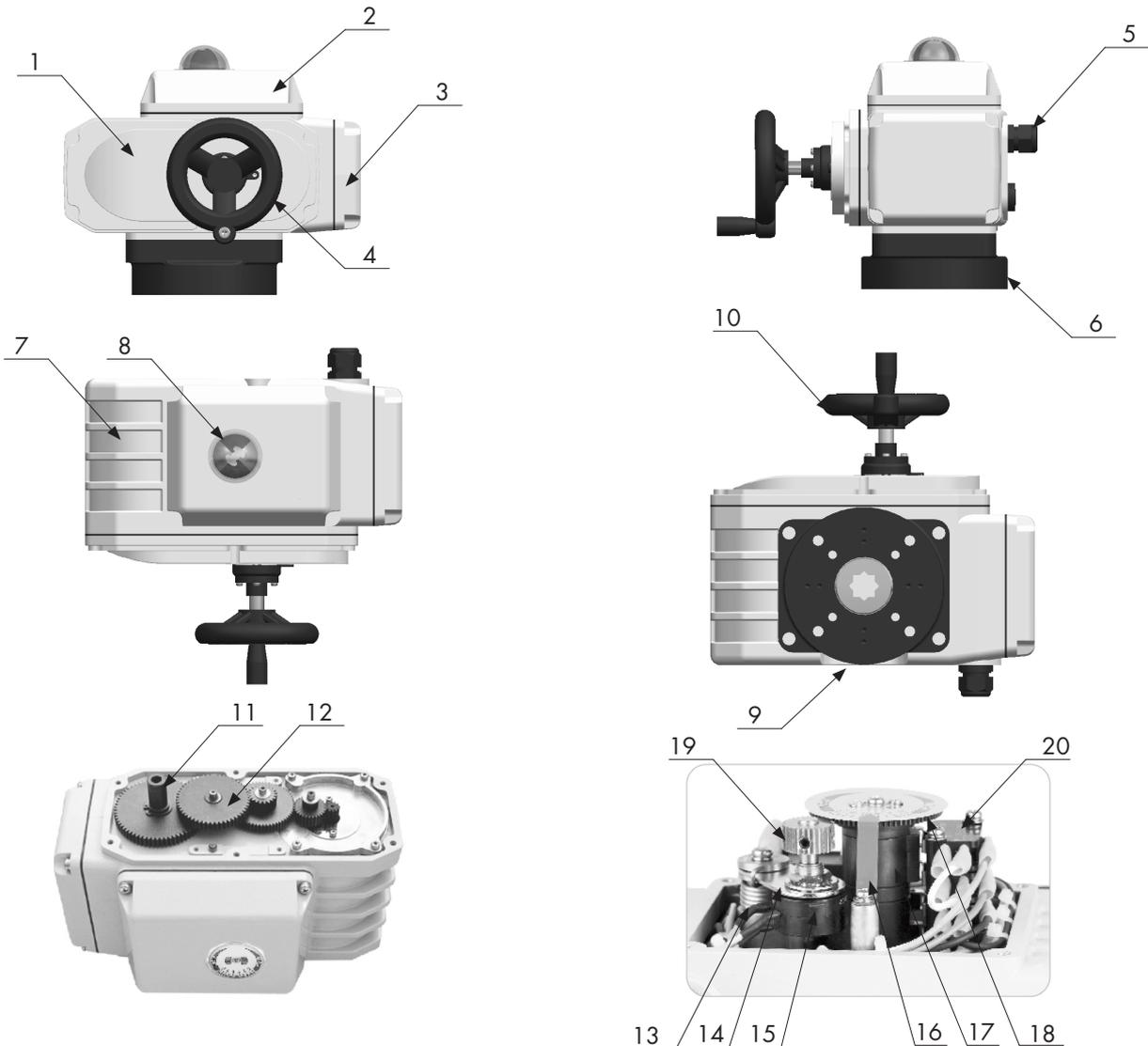
- No manual operation is allowed while the actuator is powered.
- The actuator is equipped with an overheat protection system. If the motor temperature exceeds 125 °C, the system will automatically shut off power to the motor.
- A leakage protection device (RCD/ground fault protection) must be installed before the actuator is put into operation.
- Verify the input voltage and all electrical connections before operation.
- Do not connect the power lines of multiple actuators in series or in parallel. This may cause uncontrolled movement or motor overheating due to electrical interference.
- Ensure that the cable entry is properly sealed and waterproofed according to the instructions in the manual. Failure to do so may allow water or dirt to enter the actuator and cause damage.
- The servo controller must be wired and adjusted according to the instruction manual to avoid damage.
- Installation and adjustment must be carried out only by qualified personnel.
- Do not operate the actuator under overload conditions.
- The manufacturer is not responsible for damage caused by improper modification or maintenance of the actuator.



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Components

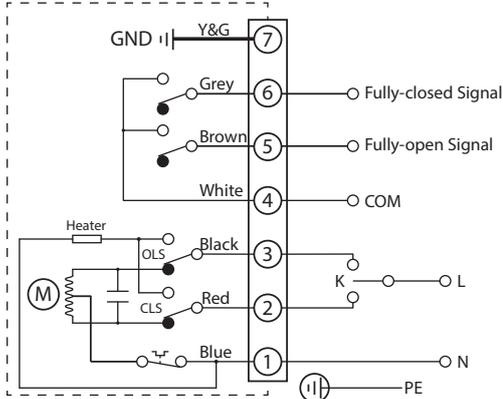


1	Drive Cover	2	Electrical Component Cover	3	Junction Box Cover	4	Manual Operation Port
5	Waterproof Cable Connector	6	Output Flange	7	Housing	8	Position Indicator
9	Mechanical Limit Stop	10	Handle	11	Worm Shaft	12	Reduction Gear Assembly
13	Torsion Spring	14	Potentiometer Mounting Plate	15	Potentiometer	16	Indicator Pointer
17	Stroke Adjustment Dog	18	Micro Switch	19	Potentiometer Gear	20	Opening Gear

Control Wiring

Type B/BD - 230VAC On/Off

Type B - B05 Wiring



Type B: Switch Control with Limit Position Feedback

Opening and closing operations are controlled by the OPEN and CLOSE control circuits.

The actuator provides **potential-free (dry) limit switch contacts** for position feedback.

The user must supply an external monitoring voltage to the COM terminal and read the returned signal from the corresponding output terminal.

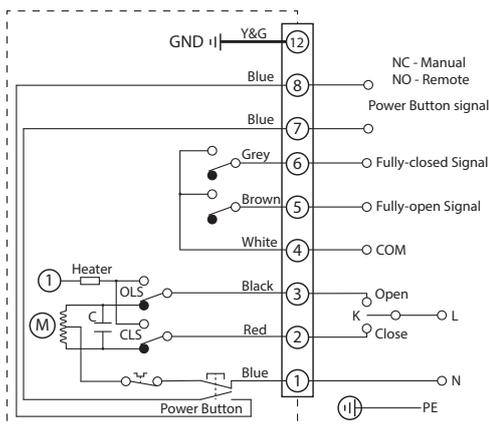
When the actuator reaches a limit position, the internal limit switch closes the contact between COM and the corresponding signal terminal.

Limit switch contact rating:
5 A, 250 VAC

Wiring Terminal Notes

- Terminal 1 – Neutral (N)
- Terminal 2 – CLOSE command input (connect phase L to drive actuator in closing direction)
- Terminal 3 – OPEN command input (connect phase L to drive actuator in opening direction)
- Terminal 4 – COM terminal for position feedback contacts.
- Terminal 5 – Fully open feedback signal (connected to COM when actuator is fully open)
- Terminal 6 – Fully closed feedback signal (connected to COM when actuator is fully closed)
- Terminal 7 – Protective Earth (PE) connection.

Type BD - BD010 Wiring



Type BD: Switch Control with Manual/Remote Status Signal

This circuit operates the same as Type B, but includes an additional power button / manual-remote status contact. The position feedback signals operate as described in Type B, using the COM terminal and the corresponding signal outputs.

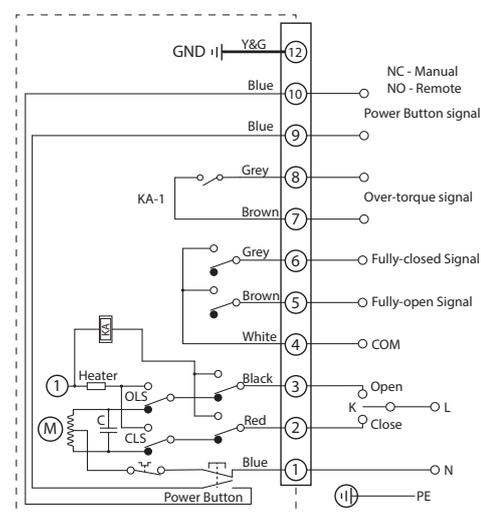
Limit switch contact rating:
15 A, 250 VAC

Manual override switch rating:
5 A, 250 VAC

Wiring Terminal Notes

- Terminal 1 – Neutral (N)
- Terminal 2 – CLOSE command input (L)
- Terminal 3 – OPEN command input (L)
- Terminal 4 – COM for position feedback contacts
- Terminal 5 – Fully open signal
- Terminal 6 – Fully closed signal
- Terminal 7 – COM for power button / manual-remote signal
- Terminal 8 – Power button signal (NC – Manual / NO – Remote)
- Terminal 12 – Protective Earth (PE)

Type BD - BD020 - 300



Type BD: Switch Control with Power Button and Over-Torque Signal

This circuit operates the same as Type BD, but includes an additional over-torque alarm signal. If excessive torque is detected during operation, the actuator will activate the torque protection mechanism and provide an alarm signal to the control system. Position feedback, over-torque alarm, and manual/remote status signals are provided through potential-free (dry) contacts.

Limit switch contacts: 15 A / 250 VAC

Manual/remote status contact: 5 A / 250 VAC

Over-torque relay contact: 5 A / 250 VAC

Wiring Terminal Notes

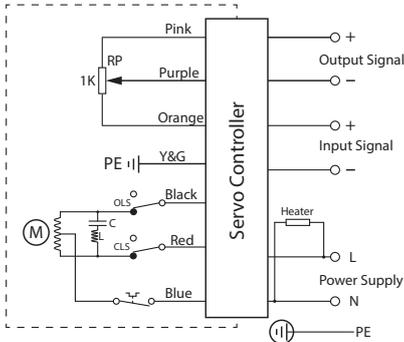
- Terminal 1 – Neutral (N)
- Terminal 2 – CLOSE command input (L)
- Terminal 3 – OPEN command input (L)
- Terminal 4 – COM for position feedback contacts
- Terminal 5 – Fully open signal
- Terminal 6 – Fully closed signal
- Terminal 7 – COM for over-torque relay contact
- Terminal 8 – Over-torque alarm signal
- Terminal 9 – COM for manual/remote status signal
- Terminal 10 – Manual/remote status signal (NC – Manual / NO – Remote)
- Terminal 12 – Protective Earth (PE)

Note: Feedback signals are potential-free contacts. An external monitoring voltage must be supplied to the COM terminal.

Control Wiring

Type E/ED - 230VAC Modulating

Type E - E05 Wiring



Type E: Modulating Control (4–20 mA)

The actuator operates in **modulating mode** and is controlled by a **4–20 mA analog input signal**. The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions.

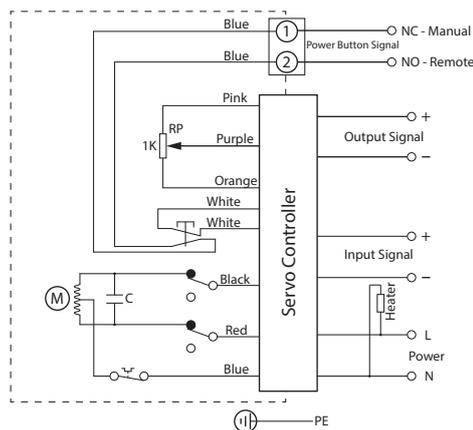
The servo controller also provides a **4–20 mA analog output signal** indicating the current actuator position for monitoring or feedback to the control system.

Internal limit switches (OLS and CLS) provide mechanical protection of the actuator travel limits.

Wiring Terminal Notes

- L: Phase (AC power supply)
- N: Neutral (AC power supply)
- PE: Protective Earth
- Input (+): 4–20 mA control signal
- Input (-): 4–20 mA control signal
- Output (+): 4–20 mA position feedback
- Output (-): 4–20 mA position feedback

Type ED - ED010 Wiring



Type ED: Modulating Control (4–20 mA) with Power Button Status

The actuator operates in **modulating mode** and is controlled by a **4–20 mA analog input signal**.

The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions. The servo controller also provides a **4–20 mA analog output signal** indicating the current actuator position. An additional **power button / manual-remote status contact** is provided to indicate whether the actuator is operating in **manual mode** or **remote control mode**.

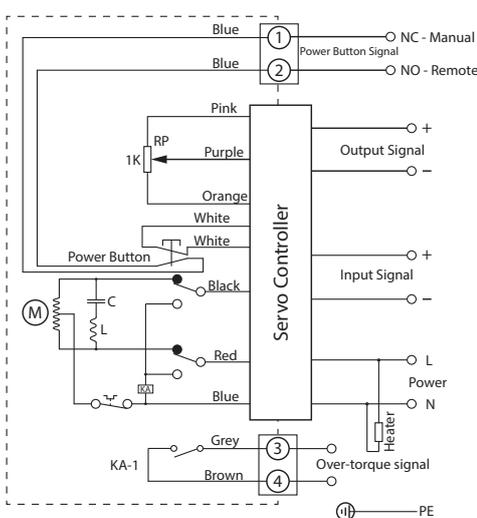
Manual override contact rating:

5 A, 250 VAC

Wiring Terminal Notes

- Terminal 1: Power button / manual-remote status contact (COM)
- Terminal 2: Power button / manual-remote status signal (NC – Manual / NO – Remote)
- Input signal (+): 4–20 mA control signal
- Input signal (-): 4–20 mA control signal
- Output signal (+): 4–20 mA position feedback
- Output signal (-): 4–20 mA position feedback
- L: Phase (AC power supply)
- N: Neutral (AC power supply)
- PE: Protective Earth

Type ED - ED020 - 300



Type ED: Modulating Control (4–20 mA) with Power Button Status and Over-Torque Signal

The actuator operates in **modulating mode** and is controlled by a **4–20 mA analog input signal**.

The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions. The servo controller provides a **4–20 mA analog output signal** indicating the current actuator position. A power button / manual-remote status contact indicates whether the actuator is operated in manual mode or remote control mode. An additional over-torque alarm contact is provided. When excessive torque is detected, the internal relay is energized and the contact changes state to signal the fault condition.

Manual override contact rating: 5 A / 250 VAC

Over-torque contact rating: 5 A / 250 VAC

Wiring Terminal Notes

- Terminal 1: Manual/remote status contact (COM)
- Terminal 2: Manual/remote status signal (NC – Manual / NO – Remote)
- Terminal 3: Over-torque alarm signal
- Terminal 4: COM for over-torque relay contact
- Input signal (+): 4–20 mA control signal
- Input signal (-): 4–20 mA control signal
- Output signal (+): 4–20 mA position feedback
- Output signal (-): 4–20 mA position feedback
- L: Phase (AC power supply)
- N: Neutral (AC power supply)
- PE: Protective Earth

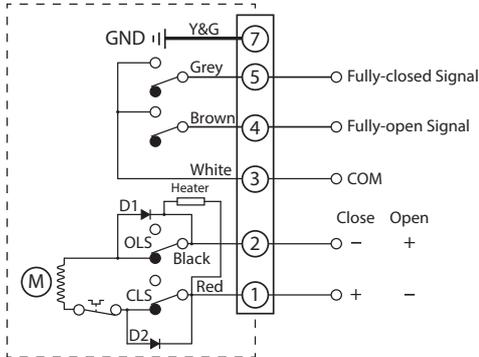
Note: The 4–20 mA input and output signals are active signals generated by the actuator controller. External loop power must not be applied.

Note: The control input can be configured for 4–20 mA or 2–10 V operation. Actuators are supplied factory configured for 4–20 mA.

Control Wiring

Type G/GD - 24VDC On/Off

Type G - G05 Wiring



Type G: DC Switch Control with Position Feedback

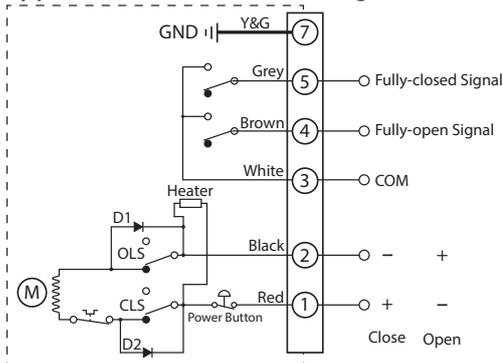
The actuator operates using a **24 VDC power supply**. Opening and closing operations are controlled by reversing the polarity of the DC supply applied to the actuator terminals. The actuator provides **potential-free (dry) limit switch contacts** for position feedback. The user must supply an external monitoring voltage to the **COM terminal** and read the returned signal from the corresponding output terminal. When the actuator reaches a limit position, the internal limit switch closes the contact between **COM** and the corresponding signal terminal.

Limit switch contact rating
5 A / 250 VAC

Wiring Terminal Notes

- Terminal 1 – 24 VDC power supply
- Terminal 2 – Control return (polarity reversed to change direction).
- Terminal 3 – COM for position feedback contacts
- Terminal 4 – Fully open signal
- Terminal 5 – Fully closed signal
- Terminal 7 – Protective Earth (PE)

Type GD - GD010 Wiring



Type GD: DC Switch Control with Power Button

This circuit operates the same as **Type G**, but includes an additional local power button for manual operation.

Opening and closing operations are controlled by reversing the polarity of the 24 VDC supply applied to the actuator terminals.

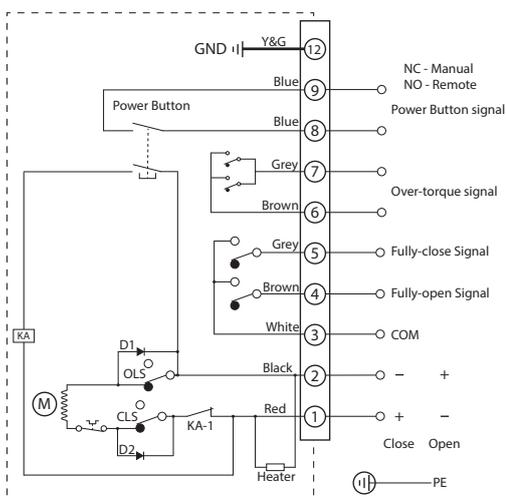
The position feedback signals operate as described in **Type G**, using the **COM terminal** and the corresponding signal outputs.

Limit switch contact rating: 5 A / 250 VAC

Wiring Terminal Notes

- Terminal 1 – 24 VDC power supply
- Terminal 2 – Control return (polarity reversed to change direction).
- Terminal 3 – COM for position feedback contacts
- Terminal 4 – Fully open signal
- Terminal 5 – Fully closed signal
- Terminal 7 – Protective Earth (PE)

Type GD - GD020 - 300



Type GD: DC Switch Control with Power Button and Over-Torque Signal

This circuit operates the same as **Type G**, but includes a local power button for manual operation, a manual/remote status signal, and an over-torque alarm signal.

Opening and closing operations are controlled by reversing the polarity of the 24 VDC supply applied to the actuator terminals.

Position feedback signals operate as described in **Type G**, using the **COM terminal** and the corresponding signal outputs.

When excessive torque is detected during operation, the actuator will activate the torque protection mechanism and provide an **over-torque alarm signal** through a potential-free contact.

Limit switch contact rating: 5 A / 250 VAC

Manual override contact rating: 5 A / 250 VAC

Over-torque contact rating: 5 A GP 125 VAC / 3 A GP 250 VAC

Wiring Terminal Notes

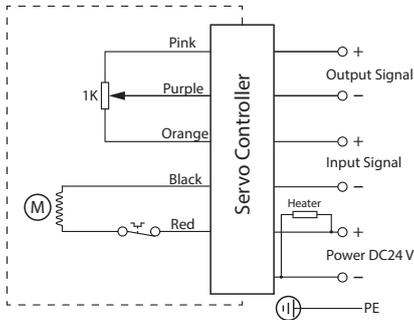
- Terminal 1 – 24 VDC power supply
- Terminal 2 – Control return (polarity reversed to change direction)
- Terminal 3 – COM for position feedback contacts
- Terminal 4 – Fully open signal
- Terminal 5 – Fully closed signal
- Terminal 6 – COM for over-torque signal
- Terminal 7 – Over-torque signal
- Terminal 8: Manual/remote status contact (COM)
- Terminal 9: Manual/remote status signal (NC – Manual / NO – Remote)
- Terminal 12 – Protective Earth (PE)

Note: Feedback signals are potential-free contacts. An external monitoring voltage must be supplied to the COM terminal.

Control Wiring

Type GEY/GEYD - 24VDC Modulating

Type GEY - GEY05 Wiring



Type GEY: Modulating Control (4–20 mA)

The actuator operates in **modulating mode** and is controlled by a 4–20 mA analog input signal. The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions.

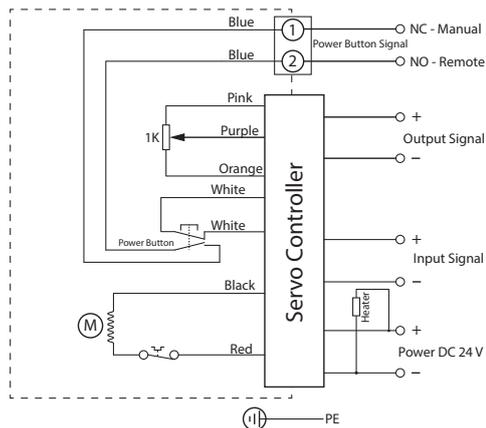
The servo controller provides a 4–20 mA analog output signal indicating the current actuator position for monitoring or feedback to the control system.

The actuator is powered by a 24 VDC power supply connected to the servo controller.

Wiring Terminal Notes

- Power Supply (+): +24 VDC
- Power Supply (-): 0 VDC
- Input (+): 4–20 mA control signal
- Input (-): 4–20 mA control signal
- Output (+): 4–20 mA position feedback
- Output (-): 4–20 mA position feedback
- PE: Protective Earth

Type GEYD - GEYD010 Wiring



Type GEYD: Modulating Control (4–20 mA) with Power Button Status

This circuit operates the same as **Type GEY**, but includes a local power button for manual operation and a manual/remote status signal.

The actuator operates in modulating mode and is controlled by a 4–20 mA analog input signal. The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions.

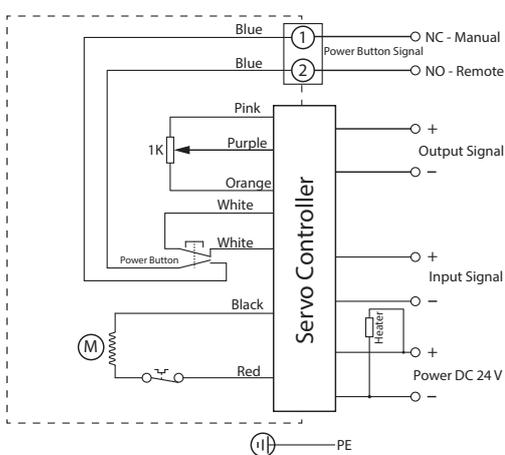
The servo controller provides a 4–20 mA analog output signal indicating the current actuator position for monitoring or feedback to the control system.

Manual override contact rating: 5 A / 250 VAC

Wiring Terminal Notes

- Terminal 1: Manual/remote status contact (COM)
- Terminal 2: Manual/remote status signal (NC – Manual / NO – Remote)
- Power Supply (+): +24 VDC
- Power Supply (-): 0 VDC
- Input (+): 4–20 mA control signal
- Input (-): 4–20 mA control signal
- Output (+): 4–20 mA position feedback
- Output (-): 4–20 mA position feedback
- PE: Protective Earth

Type GEYD - GEYD020 - 300



Type GEYD: Modulating Control (4–20 mA) with Power Button Status

This circuit operates the same as **Type GEYD**, but includes internal electronic over-torque protection.

The actuator operates in **modulating mode** and is controlled by a 4–20 mA analog input signal. The actuator position is proportional to the input signal, allowing continuous positioning between the fully closed and fully open positions.

The servo controller provides a 4–20 mA analog output signal indicating the current actuator position.

A local power button is provided for manual operation, and a manual/remote status contact indicates whether the actuator is operating in manual mode or remote control mode.

When the actuator torque exceeds the preset limit, the servo controller detects the increase in motor current and automatically cuts off the motor power to stop the actuator.

No external over-torque alarm signal is provided.

Manual override contact rating: 5 A / 250 VAC

Wiring Terminal Notes

- Terminal 1: Manual/remote status contact (COM)
- Terminal 2: Manual/remote status signal (NC – Manual / NO – Remote)
- Power Supply (+): +24 VDC
- Power Supply (-): 0 VDC
- Input (+): 4–20 mA control signal
- Input (-): 4–20 mA control signal
- Output (+): 4–20 mA position feedback
- Output (-): 4–20 mA position feedback
- PE: Protective Earth

Note: The 4–20 mA input and output signals are active signals generated by the actuator controller. External loop power must not be applied.

Application Requirements

1. Installation Conditions

- The actuator can be installed indoors or outdoors.
- The actuator is not explosion-proof. It must not be installed in flammable or explosive environments.
- If the actuator is exposed to prolonged rain, direct sunlight, or splashing water, a protective cover should be installed.
- Ensure that sufficient space is available for manual operation and maintenance.
- The ambient temperature range for operation is $-25\text{ }^{\circ}\text{C}$ to $+55\text{ }^{\circ}\text{C}$.

2. Working Medium Temperature

- When the actuator is installed on a valve, heat from the working medium may be transferred to the actuator body. The temperature rise of the actuator should therefore be taken into consideration.
- When the temperature of the working medium is high, the valve mounting bracket helps reduce heat transfer to the actuator.
- Use the standard mounting bracket when the working medium temperature is below $80\text{ }^{\circ}\text{C}$.
- Use the high-temperature mounting bracket when the working medium temperature is above $80\text{ }^{\circ}\text{C}$.

3. Installation Requirements for Cable and Conduit

- Refer to Fig. 1 when installing conduit pipes.
 1. The outer diameter of the conduit pipe should be $\varnothing 9\text{--}\varnothing 11\text{ mm}$.
 2. Ensure that the installation is fully waterproof.
 3. The electric actuator should be installed higher than the conduit pipe to prevent water in the conduit from flowing into the actuator.
- The outer diameter of the cable should be $\varnothing 9\text{--}\varnothing 11\text{ mm}$ (see Fig. 2). Only cables that properly fit the waterproof cable connector should be used. Otherwise, water may enter the actuator through the connector and damage internal components.
- Shielded cable should be used for signal wiring, and signal cables should be routed separately from power cables.

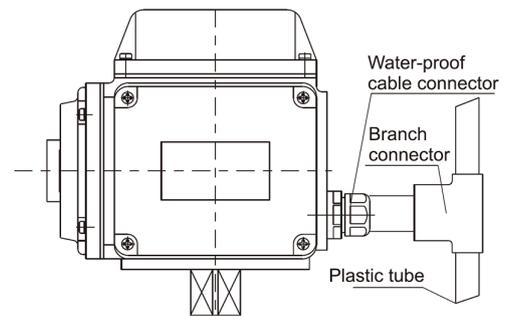


Fig. 1

4. Power Supply Requirements

- The power supply specified for the actuator model must be provided at the installation site.
- The available power supply options are:
 - AC $380\text{ V} \pm 10\%$, 50/60 Hz
 - AC $220\text{ V} \pm 10\%$, 50/60 Hz
 - AC $110\text{ V} \pm 10\%$, 50/60 Hz
 - AC $24\text{ V} \pm 10\%$, 50/60 Hz
 - DC $24\text{ V} \pm 5\%$

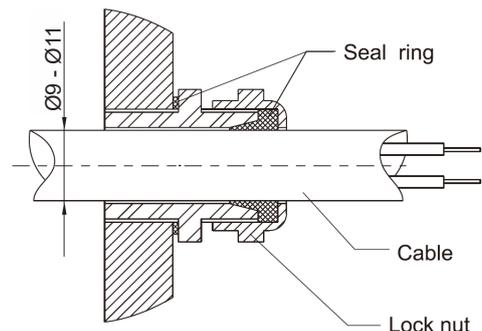


Fig. 2

5. Circuit Breaker / Fuse Selection

Actuator Series	DC 24V	AC 24V	AC 110V	AC 220V	AC 380V
05	5A	5A	3A	2A	2A
10	7A	7A	5A	3A	2A
20/40/60	15A	15A	7A	5A	3A
100/200/300	15A	—	7A	5A	5A

Note: Values indicate the recommended fuse or circuit breaker rating.

Actuator Installation on Valve

Installation Procedure (Fig. 3)

1. Manually turn the valve to the fully closed position and check for any abnormal conditions.
2. Install the mounting bracket on the valve.
3. Insert one end of the coupling into the valve spindle.
4. Using the manual crank, drive the actuator to the fully closed position (the pointer should indicate SHUT, which is the starting position of the scale). Insert the actuator output shaft into the square hole of the coupling.
5. Tighten the mounting bolts to secure the actuator to the bracket and the valve body.
6. Operate the actuator using the manual crank and verify that the operation is smooth and stable, without misalignment or distortion. Check that the valve can reach both fully closed and fully open positions within the actuator's indication range.

Note: Excessive force may cause the actuator to over-travel and become damaged.

Special Notes

For customers who supply their own mounting bracket and coupling:

- The bracket and coupling must be designed and manufactured by qualified mechanical technicians and must meet the requirements shown in Fig. 4.
- The precision of the square holes at both ends of the coupling must be ensured. Clearance should be minimized as much as possible to avoid backlash during valve operation.
- The alignment and positional accuracy of the square holes at both ends of the coupling must be maintained. Otherwise, the actuator travel may exceed the designed operating range, which can prevent the valve from operating correctly.

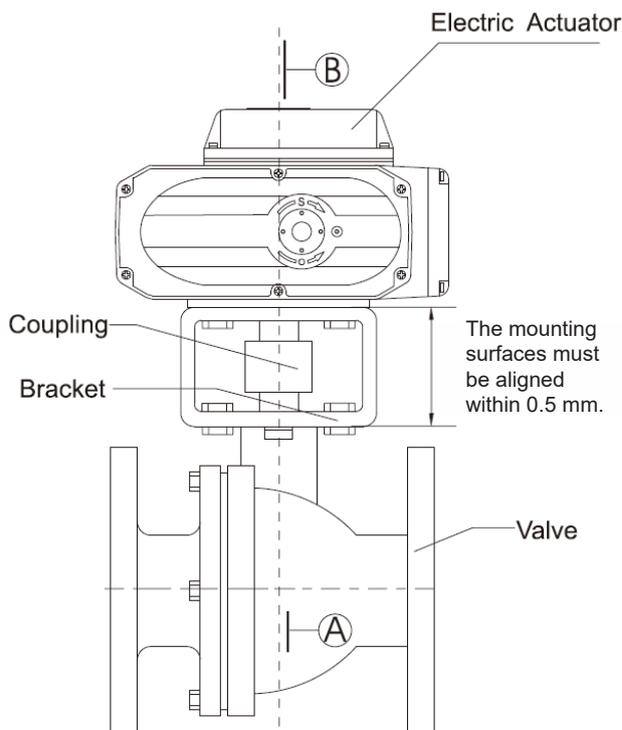


Fig. 4

The misalignment between axis A (valve stem) and axis B (actuator output shaft) shall not exceed 0.2 mm.

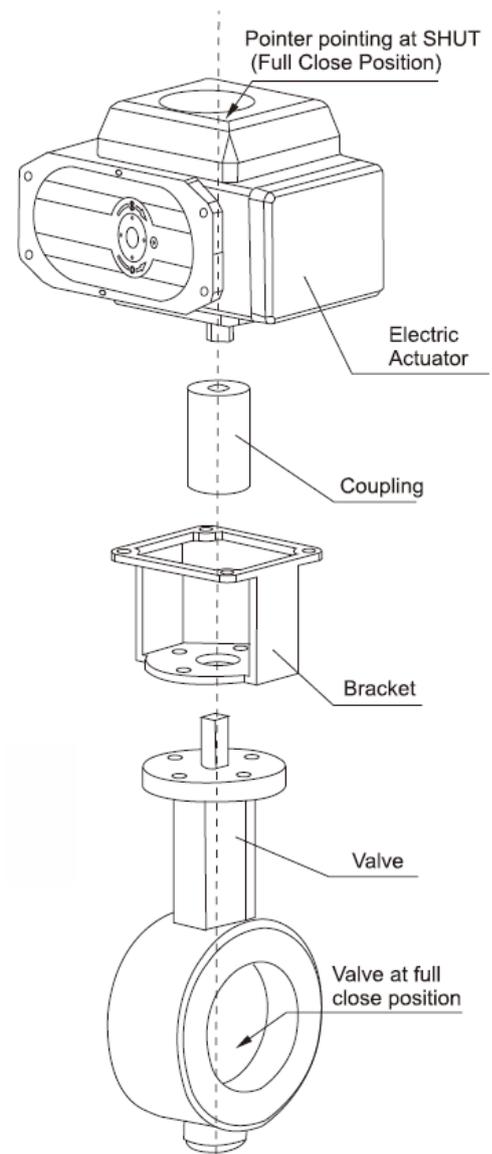


Fig. 3

Limit Switch Adjustment

1. Adjustment of Electric Limit for Micro-Regulation Type (Fig. 5)

Full-Close Position Adjustment

- Manually drive the valve to the fully closed position using the handwheel.
- Loosen the lock screw on the scale plate and adjust the scale so that the pointer indicates "0" (SHUT direction). Tighten the lock screw.
- Using a 2 mm hex key, rotate the shut-position adjustment shaft "S" clockwise.
- Continue turning until the limit switch is actuated (a click will be heard), then stop adjusting.

Full-Open Position Adjustment

- Manually drive the valve to the fully open position using the handwheel.
- Ensure the pointer indicates "0" on the OPEN direction of the scale plate.
- Using a 2 mm hex key, rotate the open-position adjustment shaft "O" counter-clockwise.
- Continue turning until the limit switch is actuated (a click will be heard), then stop adjusting.

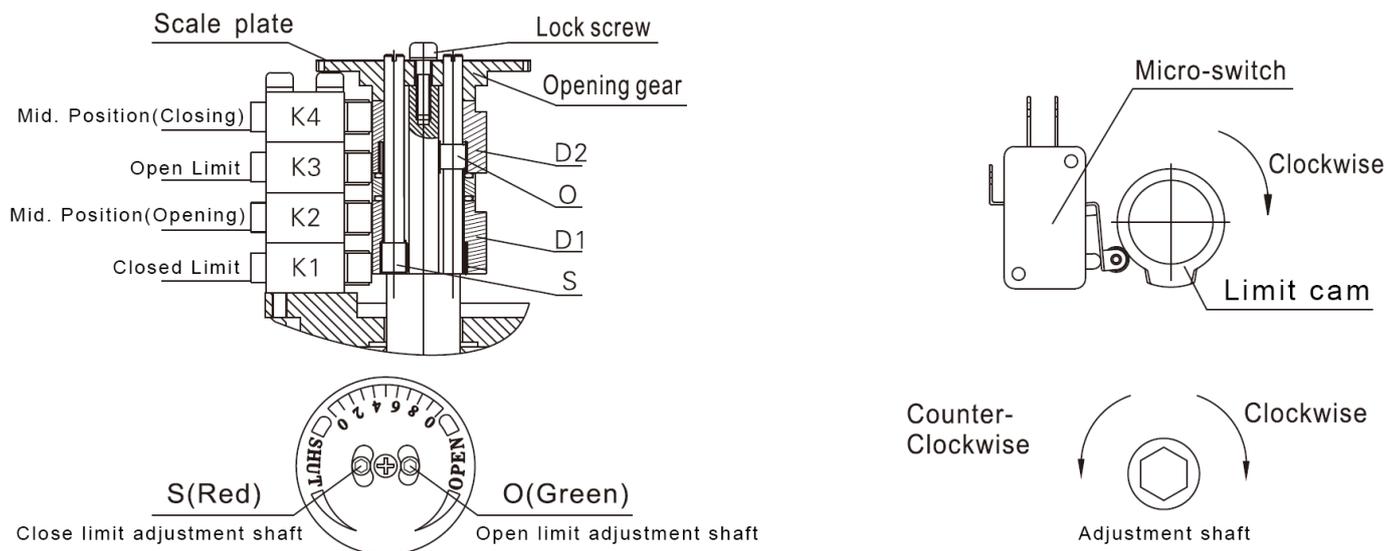


Fig. 5

Limit Switch Adjustment

2. Adjustment of Electric Limit for Middle Position Type (Fig. 6)

Adjustment D1 – Fully Closed Position

- Manually drive the valve to the fully closed position.
- Loosen the lock screw on the scale plate and adjust the scale so that the pointer indicates "0" in the SHUT direction. Tighten the lock screw.
- Loosen the fixing screw on stroke cam D1.
- Rotate D1 clockwise until the micro-switch K1 is actuated (a click will be heard).
- Tighten the fixing screw to secure D1.

Adjustment D2 – Fully Open Position

- Manually drive the valve to the fully open position.
- Ensure the pointer indicates "0" in the OPEN direction.
- Loosen the fixing screw on stroke cam D2.
- Rotate D2 counter-clockwise until the micro-switch K2 is actuated (a click will be heard).
- Tighten the fixing screw to secure D2.

Adjustment D3 – Open Direction Intermediate Position

- After setting the fully open position, rotate the valve approximately 2° toward the closing direction using the handwheel.
- Loosen the fixing screw on stroke cam D3.
- Rotate D3 counter-clockwise until micro-switch K3 is actuated, then tighten the fixing screw.

Adjustment D4 – Close Direction Intermediate Position

- After setting the fully closed position, rotate the valve approximately 2° toward the opening direction using the handwheel.
- Loosen the fixing screw on stroke cam D4.
- Rotate D4 clockwise until micro-switch K4 is actuated, then tighten the fixing screw.

Special Notes

1. If the valve stroke does not match the actuator stroke after installation, the fully closed and fully open positions must be readjusted according to steps 1 and 2 above.
2. During factory adjustment:
 - The close-direction intermediate switch is preset approximately 2° before the fully closed position.
 - The open-direction intermediate switch is preset approximately 2° before the fully open position.

These intermediate switches can be adjusted according to the control requirements.

The intermediate position switches provide passive contact signals, while the fully open and fully closed switches control the actuator travel limits.

Note: Types A, C, E, and F do not include intermediate position switches or cams.

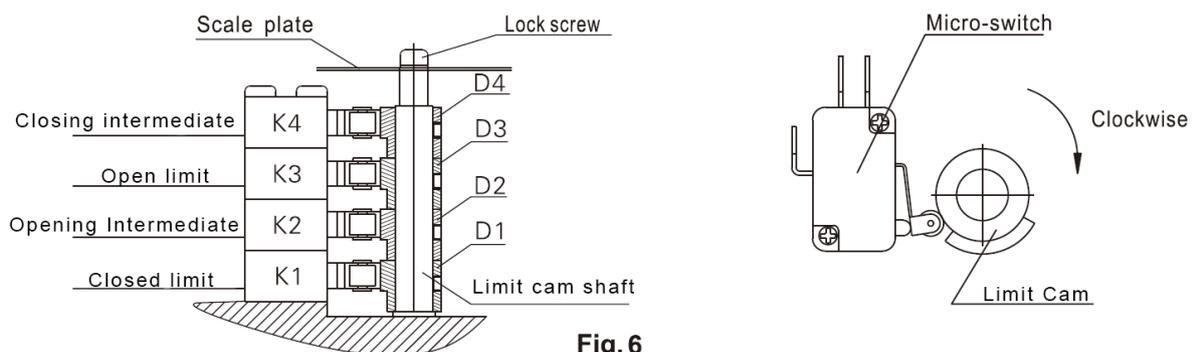


Fig. 6

Type E Actuator Adjustment Procedure

1. Install the electric actuator on the valve according to the instructions in "Installation of Electric Actuator onto Valve."
Verify that the actuator operates normally using manual operation.

2. Manually drive the valve to the fully closed position.

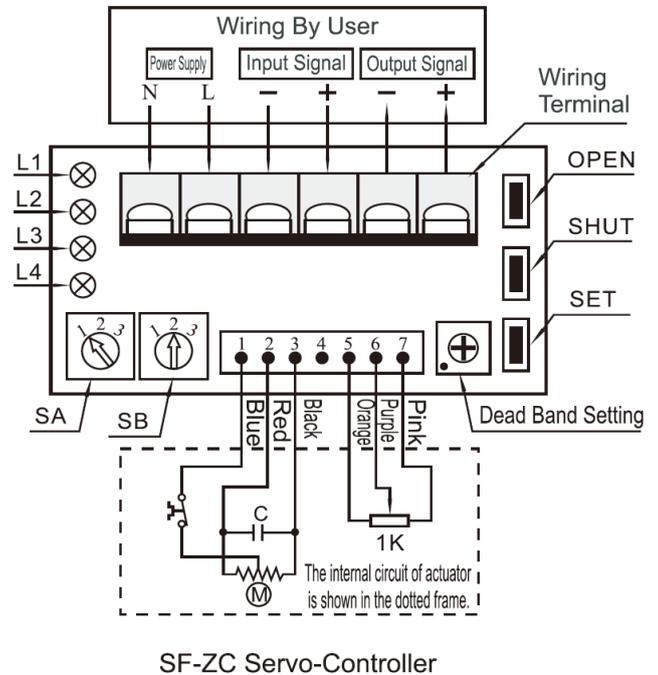
Ensure that the mechanical limit stopper does not contact the adjustment screws or housing.
If contact occurs, adjust the mechanical limit stopper according to the procedure described in "Overall Adjustment of Electric Valve."

Loosen the lock screw on the scale plate and adjust the scale plate so that the pointer indicates "0" in the SHUT direction. Tighten the lock screw.

3. Manually drive the valve to the fully open position.

Ensure that the mechanical limit stopper does not contact the adjustment screws or housing.
If necessary, adjust the mechanical limit stopper as described in "Overall Adjustment of Electric Valve."

When the valve stroke angle is 90°, the pointer should indicate "0" on the scale plate in the OPEN direction.



Special Notes

- Unless otherwise specified, the actuator stroke is factory-set to 90° between the fully closed and fully open positions. After the actuator is installed on the valve, the stroke angle must be readjusted if the valve's fully closed and fully open positions do not match those of the actuator. The mechanical limit stops must be adjusted according to the requirements shown in Fig. 8.
- Users must not adjust the potentiometer or its gear mechanism. For Type E actuators, the potentiometer is preset at the factory. Adjusting it may cause incorrect position feedback if the valve stroke is changed.
- Connect the wiring terminals according to Fig. 11 to avoid damage to the servo controller. Never connect the power supply wires to the input signal or output signal terminals.
- Input signal must be connected to a Class 2 circuit only.

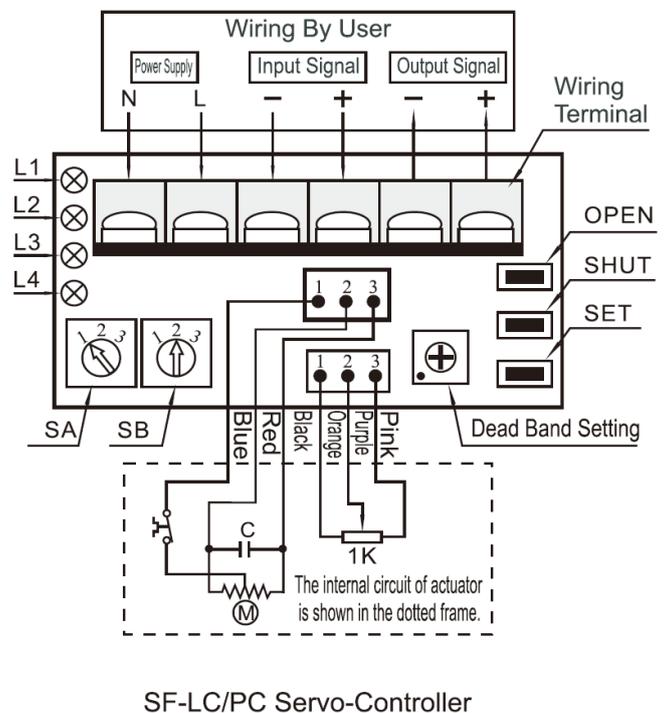


Fig. 7

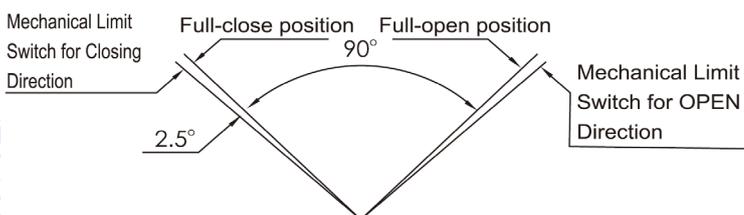


Fig. 8



Type E Actuator Adjustment Procedure

4. Servo Controller Board Description

Buttons

- **OPEN**
In SET mode (selector switch SA set to position 2), pressing the OPEN button drives the actuator in the opening direction. The actuator stops when the button is released.
Pressing SET + OPEN simultaneously sets the fully open position.
- **SHUT**
In SET mode, pressing the SHUT button drives the actuator in the closing direction. The actuator stops when the button is released.
Pressing SET + SHUT simultaneously sets the fully closed position.
- **SET**
Used together with the OPEN or SHUT button to perform configuration functions such as setting the limit positions.

Selector Switch

- **SA – Signal Action Mode**
Selects the relationship between the input signal direction and the actuator movement direction.
Factory setting: Position 1
- **SB – Fail-Safe Mode (Signal Loss Behavior)**
Determines the actuator position when the input signal is lost.
Factory setting: Position 2

Position	Function
1	Direct Action
2	Setting Mode
3	Reverse Action

Position	Behavior when signal is lost
1	Valve moves to fully open position
2	Valve holds current position
3	Valve moves to fully closed position

Dead Band Adjustment

- The dead band adjustment potentiometer is used to set the control dead band.
Adjustment range: 0.5% – 5.0%
Potentiometer scale: 1 – 10

Indicator Lamps

- **L1 – Power Indicator (Green)**
Lights when power is supplied to the servo controller (terminals L and N).
 - **L2 – Input Signal Fault (Red)**
Lights when the input signal is lost or invalid.
 - **L3 – Position Feedback Fault (Red)**
Lights when the position potentiometer circuit is open, shorted, or damaged.
 - **L4 – Actuator Stall Fault (Red)**
Lights when the actuator is mechanically blocked or stalled.
- SB – Fail-Safe Mode (Signal Loss Behavior)**
Determines the actuator position when the input signal is lost.
Factory setting: Position 2



Type E Actuator Adjustment Procedure

5. Setting

Set the selector switch **SA** to position "2" to enter **SET** mode. In SET mode, the following functions can be configured:

- Stroke standardization
- Input signal failure mode
- Dead band setting
- Manual operation
- Output signal adjustment

Stroke Calibration

Fully Closed Position

1. Move the actuator to the fully closed position using the OPEN or SHUT buttons.
2. Press and hold the SET button.
3. While holding SET, press the SHUT button and hold both buttons for approximately 4 seconds.
4. When indicator L2 lights, release both buttons.
5. When L2 turns off, the fully closed position calibration is completed.

Fully Open Position

1. Apply a 20 mA input signal to the input signal terminals.
2. Move the actuator to the fully open position using the OPEN or SHUT buttons.
3. Press and hold the SET button.
4. While holding SET, press the OPEN button and hold both buttons for approximately 4 seconds.
5. When indicator L2 lights, release both buttons.
6. When L2 turns off, the fully open position calibration is completed.

Dead Band Adjustment

The dead band potentiometer is used to adjust the control dead band.

- Turning clockwise increases the dead band.
- Turning counter-clockwise decreases the dead band.

Each scale step corresponds to approximately 0.5% dead band.

6. Automatic Operation

Set selector switch **SA** to position "1" or "3" to enter automatic mode.

In this mode, the actuator position and output signal follow the input control signal.

Input Signal	4 mA	8 mA	12 mA	16 mA	20 mA
Valve Position	0% (Closed)	25%	50%	75%	100%(Open)
Indicator Scale	0	2.5	5	7.5	10
Output Signal	4 mA	8 mA	12 mA	16 mA	20 mA

Notes: When selector switch SA is set to position 3 (reverse action):

- 4 mA input -> Valve fully open (100%)
- 20 mA input -> Valve fully closed (0%)

The output signal remains 4–20 mA proportional to the actuator position

- Servo controller accuracy: $\pm 1\%$ of full scale
- Repeatability error: $\leq 1\%$

7. Output Current Calibration

The output current of the servo controller is factory calibrated and normally does not require adjustment.

If the output current deviates from:

- 4 mA at the fully closed position, or
- 20 mA at the fully open position

and the error exceeds $\pm 1\%$, the output current can be recalibrated as described below.

Calibration Procedure

1. Connect a 20 mA DC ammeter to the output current terminals.
2. Set selector switch SA to position "2" to enter SET mode.
3. Press and hold the SET button.
While holding SET, press OPEN and SHUT simultaneously.
4. Release all three buttons when indicator L2 lights up.
The controller enters 4 mA calibration mode.

4 mA Adjustment

5. Observe the ammeter reading.
 - Press OPEN to increase the output current.
 - Press SHUT to decrease the output current.
6. Adjust the current to 4.00 mA (± 0.02 mA).
7. Press SET. Indicator L2 will turn off, then turn on again to confirm that the 4 mA calibration is complete.

20 mA Adjustment

8. The controller automatically enters 20 mA calibration mode.
9. Observe the ammeter reading.
 - Press OPEN to increase the output current.
 - Press SHUT to decrease the output current.
10. Adjust the current to 20.00 mA (± 0.02 mA).
11. Press SET to complete the calibration.
Indicator L2 will turn off, confirming that the output current calibration is finished.



Type E Actuator Adjustment Procedure

8. Fault Diagnosis and Troubleshooting

When a malfunction occurs, the indicator lamps on the servo controller will light up. Each indicator corresponds to a different type of fault.

L2 Indicator – Input Signal Fault

The servo controller considers the input signal invalid if the signal is:

- Lower than 2.5 mA, or
- Higher than 22 mA

Check the input signal voltage between the input terminals.

Expected voltage (with 220 Ω input resistance):

Input Current	Voltage
4 mA	0.88 V
20 mA	4.4 V

If the measured voltage is:

- Less than 0.55 V (≈ 2.5 mA), or
- Greater than 4.84 V (≈ 22 mA)

the input signal wiring may be:

- open circuit
- short circuit
- leaking current
- incorrect control signal

If the input signal is normal but L2 remains on, the fault may be in the servo controller.

L3 Indicator – Position Feedback Fault

This fault occurs in the position feedback circuit.

Check:

- potentiometer wiring
- potentiometer terminals for open or short circuits
- potentiometer condition

Under normal operation, the potentiometer voltage should be approximately 4 V, and the voltage at the potentiometer terminals should change with valve position.

If the potentiometer and wiring are normal but L3 remains on, the fault may be in the servo controller.

L4 Indicator – Actuator Mechanical Fault

This indicates a mechanical obstruction or actuator stall.

Check:

- motor wiring for loose or open connections
- motor operation
- whether the actuator can rotate freely by manual operation

Operate the actuator manually in both directions to verify that it is not mechanically stuck.

If no mechanical problem is found but L4 remains on, the fault may be in the servo controller.

And the error exceeds $\pm 1\%$, the output current can be recalibrated as described below.

Valve Position Does Not Match Input Signal

If the actuator position does not correspond to the input signal or the actuator cannot complete the full stroke:

Possible causes:

- Incorrect full-open calibration
- Incorrect 20 mA input signal during calibration
- Incorrect dead band potentiometer adjustment

Corrective action:

- Recalibrate the full-open position using the correct 20 mA input signal.
- If the problem persists, the fault may be in the servo controller.

Output Current Does Not Match Valve Position

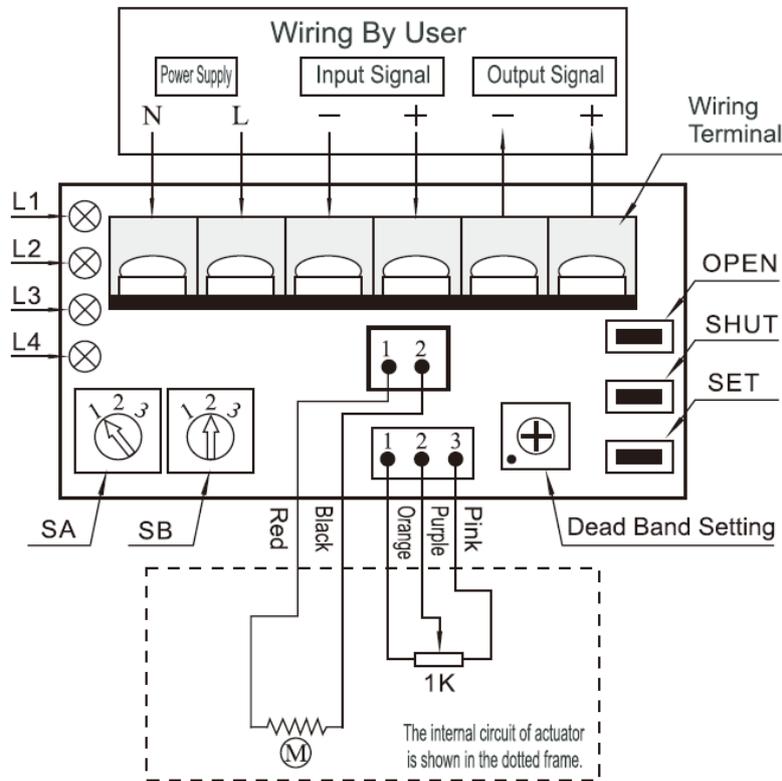
If the output current does not correspond to the valve opening:

Possible causes:

- damaged position potentiometer
- open or short circuit in potentiometer wiring

If the potentiometer circuit is normal but the output current still does not match the valve position after recalibration, the fault may be in the servo controller.

Type GEY Servo Controller Board Wiring



SF-ZCY/DC24V, SF-LCY/DC24V Servo-Controller

Fig. 9

Note: The wiring layout and adjustment procedure for the GEY servo controller are the same as described in "Adjustment Procedure – Type E Actuator."

Over-Torque Protection Principle

The actuator is equipped with a mechanical over-torque protection mechanism designed to prevent damage to the actuator and the valve.

When the load on the actuator output shaft reaches the rated torque of the actuator, the motor continues to drive the worm gear mechanism. At this point, the worm shaft compresses the butterfly spring, causing a small axial displacement of the shaft.

The spring tension is preset at the factory according to the actuator's rated output torque and must not be adjusted by the user.

When this axial displacement occurs, the torque switch is actuated and the motor power circuit is interrupted. The actuator then stops operating to prevent mechanical damage to the actuator and the valve.

Note

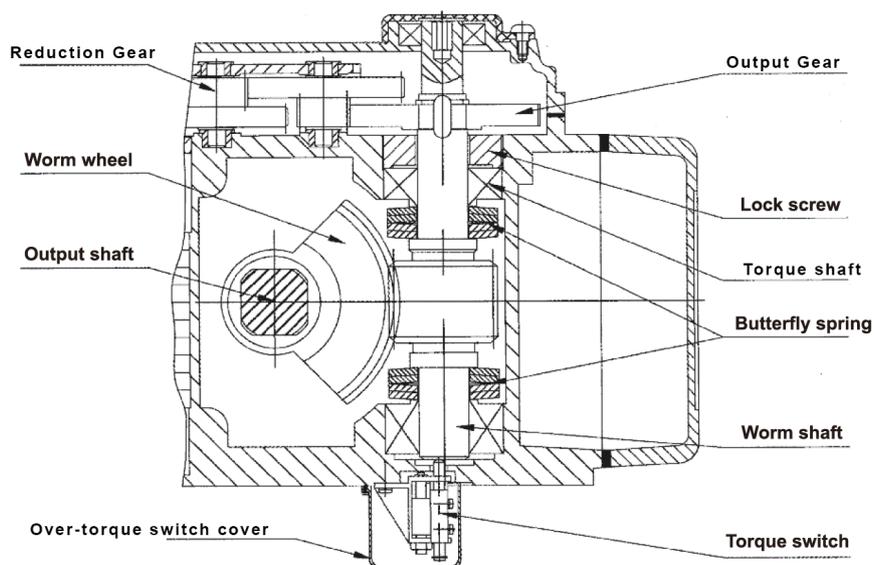
The actuator is equipped with separate torque switches for the opening and closing directions.

When the actuator torque reaches the preset limit during operation in either direction, the corresponding torque switch will activate and stop the actuator.

The method used to output an over-torque alarm signal depends on the actuator control type and is described in the following section.

Important

Over-torque protection is intended as a protective function only and should not be used as the normal method for stopping the actuator during operation.



Over-Torque Protection Mechanism

OVER-TORQUE TROUBLESHOOTING

Indication	Cause	Remedy
Open over-torque alarm indicator lights	Excessive load in the valve opening direction activates the over-torque protection.	<ol style="list-style-type: none"> 1. Operate the actuator in the closing direction to release the load. 2. Check the valve and remove any mechanical obstruction or overload in the opening direction.
Close over-torque alarm indicator lights	Excessive load in the valve closing direction activates the over-torque protection.	<ol style="list-style-type: none"> 1. Operate the actuator in the opening direction to release the load. 2. Check the valve and remove any mechanical obstruction or overload in the closing direction.

Warning: Do not remove the over-torque protection cover.

Over-Torque Protection Principle

Over-Torque Protection by Actuator Type

The method used to generate and output the over-torque alarm signal varies depending on the actuator control type.

Type BD / ED – Relay Output

In BD and ED actuators, the over-torque alarm signal is generated by an internal relay.

When an over-torque condition occurs, the relay coil is energized and the relay contact changes from the **open state** to the **closed state**, providing an alarm signal to the external control system.

The signal is provided as a **dry relay contact** and is not referenced to actuator Neutral (N).

The **Brown wire is COM** and the **Grey wire is the over-torque signal output**.

A **single over-torque alarm signal** is provided for both opening and closing directions. The actuator does not provide separate signals for opening and closing over-torque events

Relay contact rating:

5 A / 250 VAC

Type GD – Micro-Switch Output

In GD actuators, the over-torque alarm signal is generated directly by a mechanical micro-switch connected to the torque protection mechanism.

When the actuator torque exceeds the preset limit, the micro-switch closes and outputs the alarm signal.

The signal is provided as a **dry contact between terminals 7 (COM) and 6 (signal)** and may be connected to a PLC or external monitoring circuit.

Micro-switch rating:

5 A GP 125 VAC

3 A GP 250 VAC

Type GEYD – Electronic Over-Torque Protection

In GEYD actuators, over-torque protection is implemented electronically within the servo controller.

The controller continuously monitors the motor current during operation. As actuator torque increases, the motor current increases accordingly.

If the motor current exceeds the preset limit value, the controller will:

- Cut off the motor power
- Stop the actuator to prevent mechanical damage

No external over-torque alarm signal is provided for this actuator type.

Note

The output method of the over-torque alarm signal depends on the actuator type (relay contact, micro-switch contact, or electronic protection). Refer to the corresponding wiring diagram for terminal details.



Operation and Maintenance

1. Maintenance and Service

1. The actuator is filled with **high-grade molybdenum-based lubricant**, providing long service life and excellent load resistance. Under normal operating conditions, **no additional lubrication or periodic maintenance is required**.
2. If the valve is operated infrequently, it is recommended to **operate the actuator periodically** and check for any abnormal operation.
3. If abnormal noise, vibration, or irregular operation is detected, **stop the actuator immediately and inspect the valve and actuator system**.

2. Troubleshooting

Problem	Cause	Remedy
Motor does not start	Power cord not connected	Connect the power supply.
	Loose or broken wiring connection	Check and secure the wiring connections.
	Supply voltage incorrect or too low	Verify that the supply voltage is within the specified range.
	Thermal protection activated (ambient temperature too high or valve blocked)	Allow the actuator to cool. Check the valve manually to ensure it can open and close normally.
	Micro-switch not operating properly	Replace the micro-switch.
	Capacitor failure	Contact the manufacturer and replace the capacitor.
	Diode failure (DC actuator only)	Contact the manufacturer and replace the diode.
Position indicator lamp does not operate	Indicator lamp damaged	Replace the indicator lamp.
	Micro-switch not operating properly	Replace the micro-switch.
Motor does not stop at limit position	Micro-switch not operating properly	Replace the micro-switch.
	Incorrect phase sequence (three-phase power supply)	Correct the phase sequence.
	Limit switch incorrectly connected to the control circuit	Check and correct the wiring connection.
	Mechanical limit stop incorrectly adjusted	Readjust the mechanical limit according to the adjustment instructions.
	Diode failure (DC actuator only)	Contact the manufacturer and replace the diode.
Water inside actuator	Cable entry not properly sealed or water-proofed	Check cable entry and sealing according to installation instructions.
	Inspection window for electrical components damaged	Contact the manufacturer for repair.
	Cover screws of electrical compartment, junction box, or drive unit not tightened	Tighten all cover screws securely

Specifications and design are subject to change without prior notice for the purpose of product improvement.