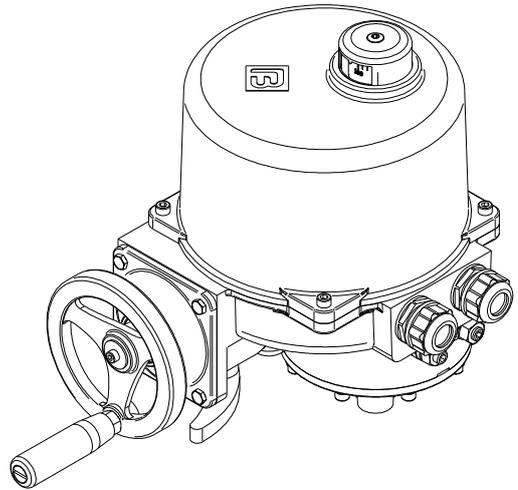


810 SERIES ELECTRIC ACTUATORS

INSTRUCTION MANUAL



TIANJIN BEIFANG VALVE ACTUATOR CO., Ltd.

Issue 200910

BFS810-02

Thank you for purchasing and using our products. This manual is valid for 810 series electric quarter-turn actuators.

Please before you operate your product, be sure to read this booklet carefully. These operation instructions are only valid for “clockwise closing”, i.e. driven shaft turns clockwise to close the valve.

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Please tell us some information about your products when contact with us:

Model, Factory Number, Production Date, etc.

1. Summarize

- 1.1 Range of application 810 series electric actuators can provide a reliable position control of quarter-turn applications such as butterfly, ball valves, especially the valves of large buildings.
- 1.2 Brief
- The motor is installed in the electrostatic painting die-cast aluminum case, which makes 810 series electric actuators have features of beautiful appearance, light weight and low noise.
 - 810 series valve actuators powered by electric have limit switch and torque switch both in open and close direction.
 - 810 series valve actuators with control package integrate the startup of motor and other control units in a watertight box.
- 1.3 Warnings and notes Non-observance of the **warnings** and **notes** may lead to serious injuries or damages. Qualified personnel must be thoroughly familiar with all **warnings** and **notes** in these operation instructions.



This sign means: **Hint!**
Explain the topic in detail.



This sign means: **Note!**
Non-observance of these notes may lead to the performance degradation or the failure of operation.



This sign means: **Warning!**
Not carrying out the “warnings” correctly can affect the safety of persons or material.

2. Technical data

- Power: Standard: 380V/50Hz/1ph AC, voltage vibration range: $\pm 10\%$, frequency vibration range: $\pm 5\%$.
Options: 380V/50Hz/3ph AC
- Work duty: Standard: S2 system. 15 minutes cyclic running time, the startup interval is 2~3 times running time. 60 starts/hr. for application, do not exceed 600 starts/hr. when adjusting.
Options: MS4—S4 system, used for precise adjusting, 1200 starts/hr.
- Protection: Standard: A temperature protection switch embedded in the windings of the motor will trip the actuator control circuit if the motor windings overheat. There is overcurrent protection in the actuators with control package.
3 phase actuators with control package have protection of phase-loss and phase sequence.
- Temperature: Standard: $-20^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- Noise: 1 phase: below 70dB
3 phase: below 65dB

Degree of protection: Standard: IP67 (GB4208)
Options: WT8—IP68 (GB4208)

•Key performance parameters:

Base No.	Unit type	Output torque	Operating time	Single-phase motors		Three-phase motors	
		Nm	s/90°	Power W	Current A	Power W	Current A
8100	8100-2.5	25	5.5	25	0.5	20	0.2
	8100-4.5	45	11				
	8100-8	80	21				
8101	8101-7	70	5.5	60	0.7	30	0.4
	8101-11	110	11				
	8101-15	150	22				
8102	8102-12	120	7	60	1.1	90	0.6
	8102-20	200	14				
	8102-30	300	28				
8103	8103-20	200	7	90	1.6	90	0.9
	8103-40	400	14				
	8103-60	600	28				

•Mechanical data:

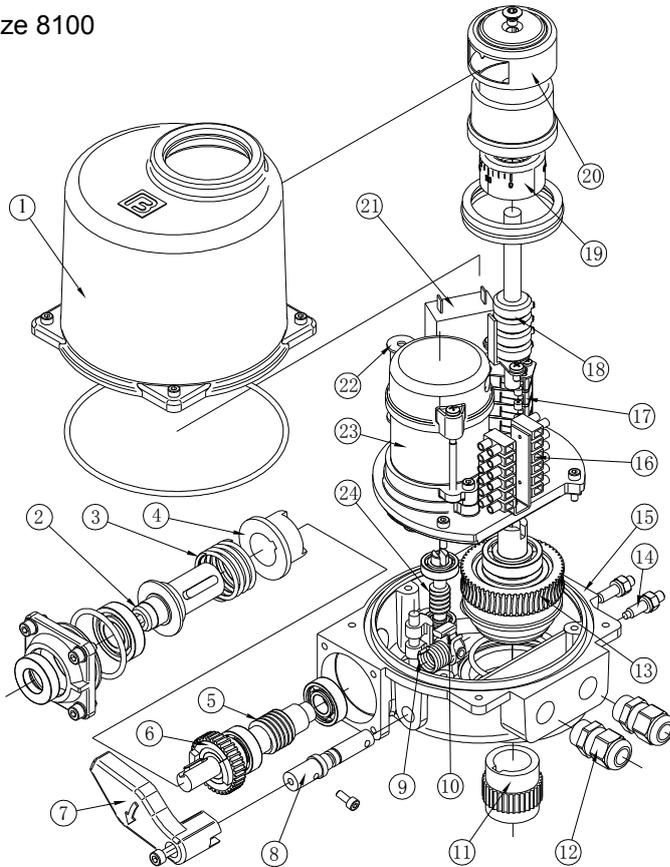
	8100	8101	8102	8103
Max-dia of Stem mm	φ 22	φ 22	φ 35	φ 42
Handwheel turns	14	15	16	14
Weight kg	5.5	11	15	23

3.Transport and storage

- The actuators should be strongly packed and transported to the site.
- Do not attach ropes or hooks to the handwheel for lifting.
- If the actuator is mounted to valve, attach ropes or hooks for the purpose of lifting by hoist to valve and not to the actuator.
- Actuators should be stored in a dry and ventilated warehouse.
- For protecting from dampness, the actuators without being used for a long time should be stored on brackets or wooden flooring.
- Actuators should be covered to prevent from dust and grease.
- Connect the internal space heater regularly, or place desiccant in the compartment to protect the switches.

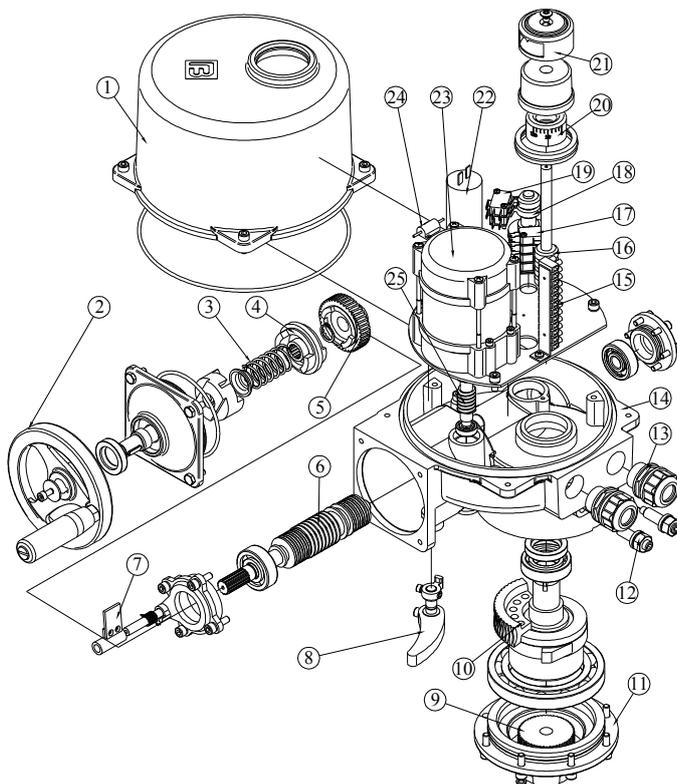
4. Constructions

• Size 8100



1	Cover	13	Output shaft
2	Manual input shaft	14	Mechanical stops
3	Press reed	15	Main house
4	Clutch	16	Terminal strips
5	Two-step worm shaft	17	Limit switches
6	Worm gear	18	Limit cams
7	Auto/hand lever	19	Indicating dial
8	Switch shaft	20	Indication window
9	Torsional spring	21	Capacitance
10	Crank	22	Space heater
11	Drive sleeve	23	Motor
12	Cable splice	24	Worm shaft

• Sizes 8101~8103

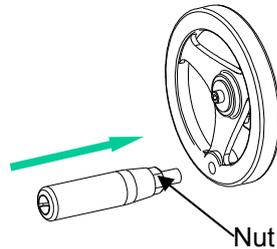


1	Cover	14	Main house
2	Handwheel	15	Terminal strips
3	Press reed	16	Limit cams
4	Clutch	17	Limit switches
5	Worm gear	18	Torque cams
6	Two-step worm shaft	19	Torque switches
7	Support bar	20	Indicating dial
8	Auto/hand lever	21	Indication window
9	Drive sleeve	22	Capacitance
10	Output shaft	23	Motor
11	Contact flange	24	Space heater
12	Mechanical stops	25	Worm shaft
13	Cable splice	26	

5. Installation

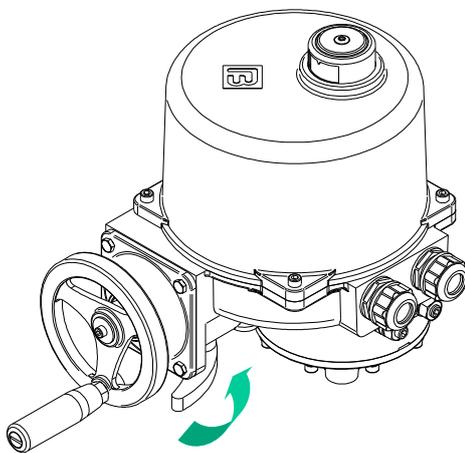
5.1 Installing handwheel

To prevent damage during transporting, the handwheel and handle is individually packaged. If necessary, connect them.



- Take out the handwheel and handle.
- Screw the handle into the handwheel.
- Clockwise tighten the nut.

5.2 Auto/hand shift



- The auto/hand shift can be carried safely at any time.
- For 8100 the auto/hand shift can be carried at any time: Turn the handle in the arrow direction, and manual operation can be run with an inner hexagon spanner; If the spanner is taken away, the handle will automatic reset, and the power operation is re-engaged.
- For 8101~8103 series, turn the handle according to the graphic direction, then release it, manual drive is engaged if the handle doesn't return to its initial state; Otherwise, turn the handwheel with pressing the handle until the auto/hand switch succeed. Energization of the motor will automatically re-engage power operation.

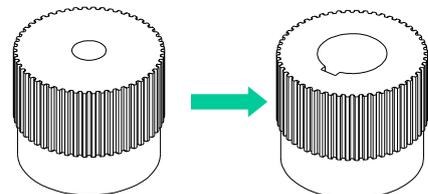
 **Do not move the auto/hand lever forcibly after finishing the manual operation. Energization of the motor will automatically re-engage power operation.**

 **If the auto/hand shift failure occurs, do not move the lever forcibly, turn the handwheel until the auto/hand switch succeed.**

5.3 Installation to valves

Preparation:

- Take out the drive sleeve from the actuator.
- Machine the drive sleeve according to the valve stem.



Connection with the valve:

- Ensure that the valve is in the full close position.
- Actuators are delivered in full close position. (If the valve is in full open position, counterclockwise turn the handwheel to drive the unit to the full open position.)
- Put the machined drive sleeve covered with grease into the output shaft.
- Mount the actuator to the valve and then tighten them with bolts.

6. Setting the Mechanical stops

- This step must be carried before the valve is mounted to the pipe.
- The rotation degree set at the factory is about 90° .
- The rotation degree must be set to more than the required after mounting to valve.



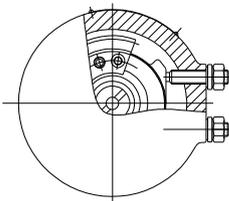
In the full close position, the mark at the bottom of the output shaft must be on the coordinate line and be in the same side with the mechanical stops.



When the mark at the bottom of the output shaft is on the coordinate line while the mechanical stops exactly withstand the output shaft, turn the mechanical stops back within 3 circles. Otherwise, the units can not run properly.

6.1 Full close position

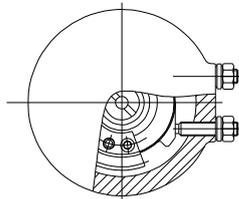
Vertical view



- Manual operate the valve to the full close position.
- Loosen the nut of the close mechanical stop.
- Clockwise screw the stop to exactly touch the worm wheel, then turn back 1 circle.
- Screw the nut of the close mechanical stop.

6.2 Full open position

Vertical view



- Manual operate the valve to the full open position.
- Loosen the nut of the open mechanical stop.
- Clockwise screw the stop to exactly touch the worm wheel, then turn back 1 circle.
- Screw the nut of the open mechanical stop.

7. Electrical Connection

When finish installation, connect wires according to the wiring diagram supplied with the unit.



Work on the electrical system or equipment must only be carried out by an electrician who possess operating certificate or by specially instructed personnel under the control and supervision of such an electrician and in accordance with the applicable electrical engineering rules.

1. Shut off all incoming power.
2. Open the cover, keep the wire connecting cavity clean and dry.
3. Check the stickup code to ensure that it coincides with the code of the wiring diagram supplied with the unit and connect wires properly. Conduit entries in the main house provide two openings ($M16 \times 1.5$ for size 8100, $G3/4$ for sizes 8101~8103) for routing the pilot cable and the dynamic cable. Seal the openings after wiring.
4. Manual operate the unit to keep the valve in the intermediate position, turn power on and check the rotating direction of the motor, then cut off power supply. If the direction is wrong, interchange any two leads of the three phase motors.

8. Setting the limit switch

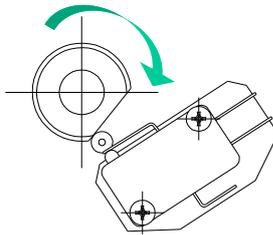
The limit switch must be adjusted after the actuator has been mounted on its associated equipment to make the responding contacts can be operated once the valve reach the required position.

Set the limit switch with the actuator mounting to the valve.

The unit is supplied with 4 switches, each of which has 3 contacts. From the top down, the 4 switches is for full open, opening additional position and full close, closing additional position in turn. The switches are pressed when the valve is in mid-position. The adjusting proceed as follows:

8.1 Full close position

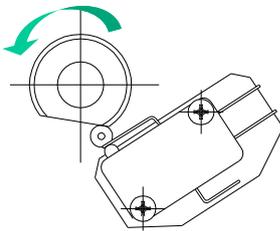
Vertical view



- Open the cover and ensure the screw of the close position cam is loosen.
- Manual operate the valve to full close position.
- Clockwise rotate the close position cam to the position showed in the left figure, once hear a “click” sound, tighten the screw of the cam.
- Power operate the valve towards opening till the full close switch is pressed, then power operate the valve to full close position.
- If the full close position is inaccurate, repeatedly adjust the cam to the suitable location.
- Adjust the closing additional cam and make it touch the switch earlier than the full close one.

8.2 Full open position

Vertical view



- Open the cover and ensure the screw of the open position cam is loosen.
- Manual operate the valve to full open position.
- Counterclockwise rotate the open position cam to the position showed in the left figure, once hear a “click” sound, tighten the screw of the cam.
- Power operate the valve towards closing till the full open switch is pressed, then power operate the valve to full open position.
- If the full open position is inaccurate, repeatedly adjust the cam to the suitable location.
- Adjust the opening additional cam and make it touch the switch earlier than the full open one.



Adjusting the cams can control the on and off of the limit switch, which are respectively used for disconnecting the power and memorizing the travel of the output shaft.



Limit switch is not factory set. It must be set when the unit is installed on the valve.

- **Reset the limit switch prior to motor operation if the unit has been dismantled or removed from the valve.**
- **Do not motor operate the valve without first setting the limit switch.**



Disconnect all incoming power before opening or closing the cover.

- **Check to ensure that the valve is in the fully open position when the unit is dismantled from the valve.**
- **Check to ensure that the potentiometer gear is disengaged.**

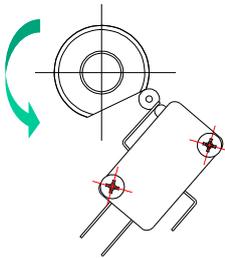
9.Setting the torque switch The torque switch is designed to protect the actuator in open and close directions. **The torque was set at the factory. The setting torque is equal to the “Max. Output Torque ” in the nameplate. It is not need to be reset generally.**

There is no torque switch in 8100 series.

The torque switch controls the amount of torque by two cams touching the relevant micro-switches which are open torque and close torque in turn, from the top down.

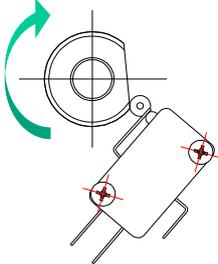
⚠ Do not adjust the torque switch at will. The valve can not open/close properly or can be damaged with the improper setting.

9.1 Close direction



- Loosen the screw in the close cam.
- Motor operate the valve towards closing to insure the proper setting required.
- Counterclockwise rotate the close cam, then tighten the screw once hear a “click” sound.
- Motor operate the valve to check that if the closing torque is meet the requirement when the power to motor is interrupted.
- Confirm the setting with three replications.

9.2 Open direction



- Loosen the screw in the open cam.
- Motor operate the valve towards opening to insure the proper setting required.
- Clockwise rotate the open cam, then tighten the screw once hear a “click” sound.
- Motor operate the valve to check that if the opening torque is meet the requirement when the power to motor is interrupted.
- Confirm the setting with three replications.

10.Position indicator

The position indicator must be set after finishing the setting of limit switch.

There are two windows for position indicator, one shows numeral scale and the other shows “OPEN” or “CLOSE”. One window is at the same side of the handwheel at the factory.

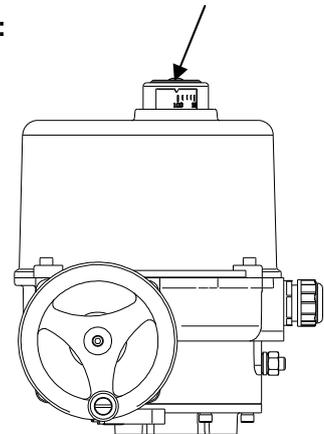
Change the position of windows, if necessary:

- Loosen the bolts of windows.
- Rotate the windows to the required position.
- Tighten the bolts of windows.

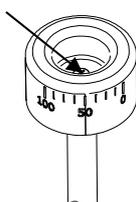
•Proceed as follows:

- Motor operate the valve to the full close position.
- Open the cover, loosen the indicator bolt.
- Rotate the dial, make scale “0” face the window.
- Tighten the indicator bolt.
- Mount the cover then check and adjust the scale to a suitable location.
- Operate the unit to check and ensure the indicator is correct.

Bolts of windows



Indicator bolt



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