



## Operation Manual of BN02 series Electric Actuator

(BN02 Series)

**THEOBORN AUTO-CONTROL VALVES CO.,LTD**

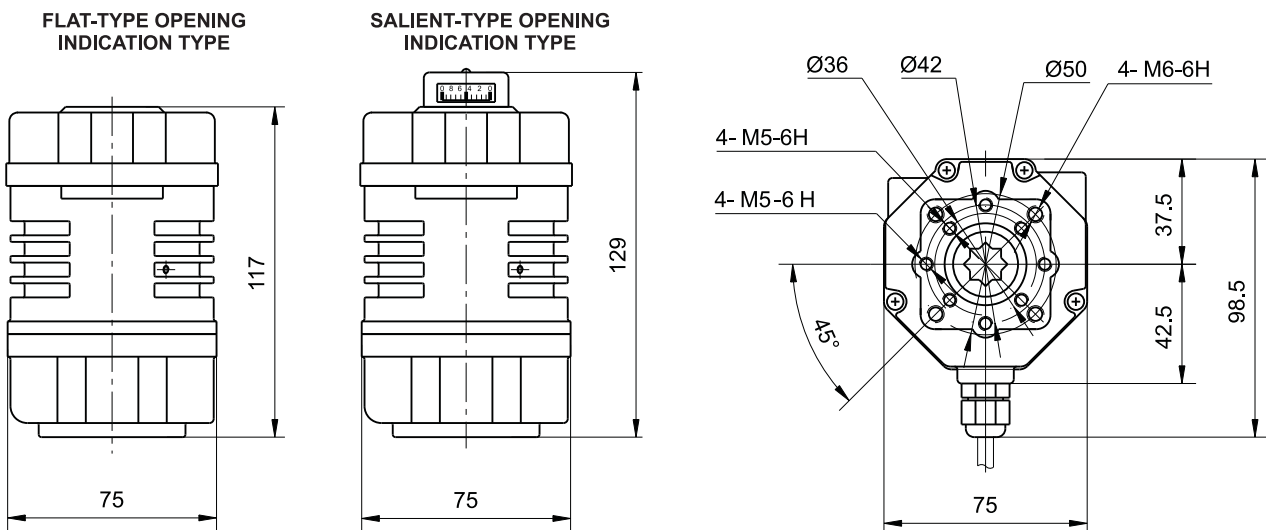
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## Notes

- 1.No manual operation is allowed when it is energized.
- 2.Do not open the rubber cover of manual operation port if you are not operating manually,so as to avoid water or dust from entering into the actuator.
- 3.Please not to operate the actuator out of the range of the indicator.Otherwise the actuator will not be able to work normally.
- 4.The actuator is equipped with overheat protection device,when the motor exceeds the temperature 125 °C,the overheat protection device will switch off the motor power automatically.
- 5.It is necessary to install additionally the leakage protection device before it is put into operation.
- 6.Please confirm the input voltage and all connections.
- 7.It is not allowed to in series or in parallel the power lines for two or more sets of actuators,otherwise,it will cause movement out of control and motor over temperature rising due to the interference of condensers from each other.
- 8.It is prohibited to operate the actuator under overload condition.
- 9.The manufacturer will not be responsible for the improper changes and maintenance on the actuator.

## I .Overall Dimension



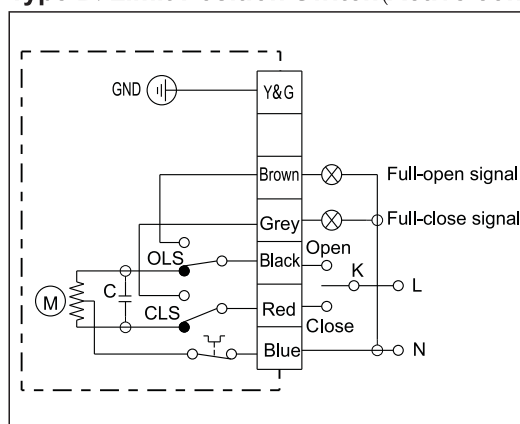
Square	□9x9, □11x11
Flange	F03,F04,F05
Valve stem	Height: ≤ 16mm

## II .Performance Paramenters

Parameters	BN02			
	DC24V	AC24V	AC110V	AC220V
Motor Power	8W	6W	6W	6W
Rated Current	0.7A	1.3A	0.3A	0.15A
Standard Time/Torque	15S/18Nm			
Optional Time/Torque	7S/9Nm,60S/18Nm			
Turning Angle	0~90°,0~180°			
Available Control Circuit	Type D	Type B,Type C,Type G,		
Total Weight	1.0kg			
Insulating Resistance	100MΩ/250VDC		100MΩ/500VDC	
Withstand Voltage Class	500VDC 1minute		1500VDC 1minute	
Protection Class	IP 67			
Installation Angle	360°,at any angle			
Electric Interface	7-core cable for connection			
Ambient Temperature	-30°C~+60°C			
Fuse	2A	3A	1A	1A

## lii. Control Circuit

### Type B: Limit Position Switch(Active contact)

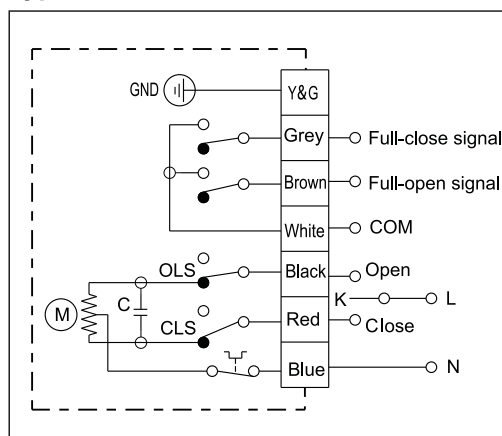


The opening or closing operation is realized by switching open or close the circuit. Outputting a group of full-open or full-close active signals.

#### Notes of wiring terminals:

- 1.Terminal in blue is for the connection of zero line of power cord
- 2.The connection between power phase line and terminal in red is for the operation of "close"
- 3.The connection between power phase line and terminal in black is for the operation of "open"
- 4.When the power phase line is connected with the terminal in red and "close"operation is at its position, the "full-close signal" indication lamp connected with terminal in grey lights up.
- 5.When the power phase line is connected with the terminal in black and "open"operation is at its position, the "full-open signal" indication lamp connected with terminal in brown lights up.
- 6.Terminal in Y&G connects PE.

### Type C: Position Switch with Passive contact



The opening or closing operation is realized by switching open or close the circuit. Outputting a group of full-open or full-close active signals.

#### Notes of wiring terminals:

- 1.Terminal in blue is for the connection of zero line of power
- 2.The connection between power phase line and terminal in red is for the operation of "close"
- 3.The connection between power phase line and terminal in black is for the operation of "open"
- 4.Terminal in white is common terminal as passive contact
- 5.When it is at "open"operation position, terminal in brown will output the "Full open" signal
- 6.When it is at "close"operation position, terminal in grey will output the "Full close" signal
- 7.Terminal in Y&G connects PE.

**Note:** The internal circuit of actuator is shown in the dotted frame

## Type D: DC control circuit, with passive contact switch

According to the single conductivity of diode, the opening and the closing operation can be realized by means of the exchanging of the positive pole and the negative pole of DC power supply and output a group of full open or close passive signals.

**Notes of wiring terminals:**

- 1.For the operation of "close", the terminal in red is connected with positive pole and the terminal in black is connected with negative pole. For operation of "open", the terminal in black is connected with positive pole and the terminal in red is connected with negative pole.
- 2.The terminal in white is the common terminal with passive contact.
- 3.When it is at "open" operation position, terminal in brown will output the "Full open" signal
- 4.When it is at its "close" operation position, terminal in grey will output the "Full close" signal.
- 5.Terminal in Y&G connects PE

**Note:** the internal circuit of actuator is shown in the dotted frame.

## Type G: with potentiometer

The opening or closing operation is performed by control circuit, outputting resistance signals corresponding to opening position

**Notes of wiring terminals:**

- 1.Terminal in blue is for the connection of zero line of power.
- 2.the connection between power phase line and terminal in red is for the operation of "close"
- 3.the connection between power phase line and terminal in black is for the operation of "open"
- 4.terminal in white is low end of potentiometer, the resistance value between terminal in white and brown increases in proportion to the opening valve when the operation of "open"
- 5.terminal in brown is boom of potentiometer
- 6.terminal in grey is high end of potentiometer the resistance value between terminal in grey and brown decreases as the opening increases when the operation of "open"
- 7.terminal in Y&G connects PE

## IV. Requirement Of Installation Conditions

The product can be installed not only indoors, but also outdoors.

The product is not explosion-proof, care shall be taken to avoid inflammable and explosive environment.

It is necessary to have protective cover installed, if it operates in such conditions of long time raining, directly receiving sunshine or spatter.

Please reserve space for manual operation and maintenance.

The ambient temperature shall be within the rang of -30℃~+60℃

Special hint: this type of product is not for high temperature environment.

## V. Requirement For Working Medium Temperature

When it operates with valve, the heat of working medium will be conducted to the body of the unit, care shall be taken to the temperature rising.

It is possible to directly install the unit if the temperature of working medium is below 80℃

If the temperature of working medium is higher than 80℃, direct installation is forbidden, the radiator device shall be additionally installed.

## VI. Requirement of installation and application

This type of actuator is suitable for the valves with ISO5211 standard: Installation size: F03, F04, F05, square valve stem with sizes of 11x11 or 9x9; height:  $\leq 16\text{mm}$ .

During the connection with valve, both actuator and valve must be at full close position.

After connection with the valve, drive the electric actuator by handle for full open and full close once and confirm the operation is stable without eccentricity and distortion. Check the valve, if full close and full open in the range of opening indication of the actuator.

### Special hint:

1. Too much force will lead to the electric actuator over-travel and being damaged.
2. Not to operate the electric actuator outside the range of opening indicator.

## VII. Electric test-run

Connect the circuit correctly according to the control circuit diagram adhered inside the cover for junction box. After confirming, switch on the power supply.

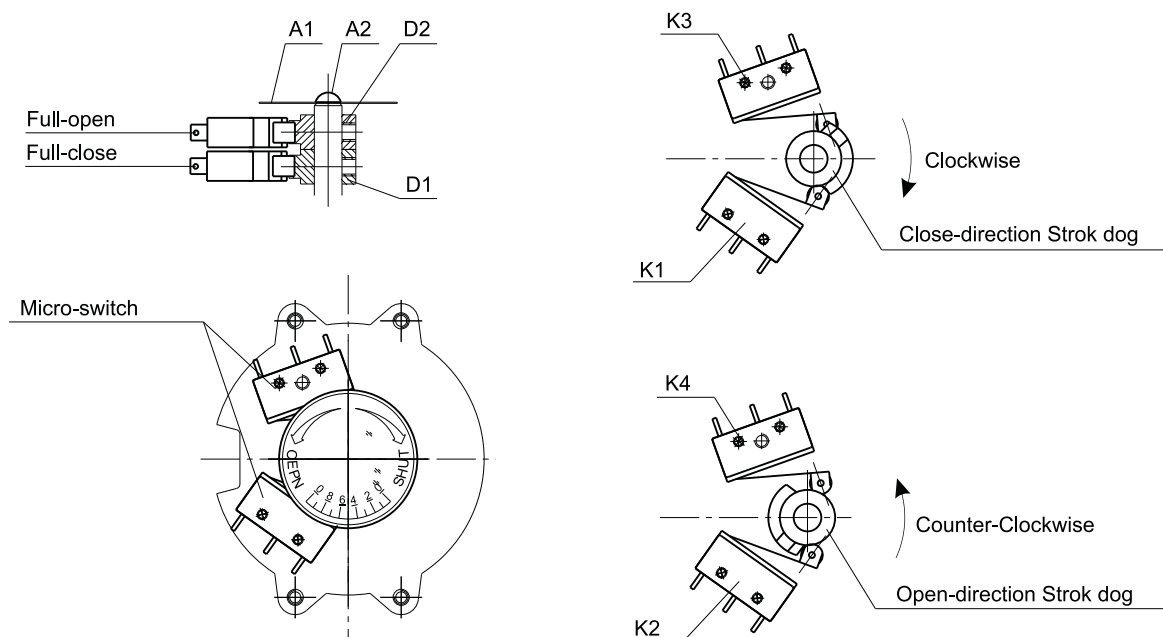
The switch is turned to CLOSE, the actuator drives the valve to close position (clockwise direction) until limit switch (K1) for close direction is actuated. The electric actuator will stop turning.

The switch is turned to OPEN, the actuator drives the valve in a counter-clockwise direction until the limit switch (K2) is open, the electric actuator will stop turning.

## VIII. Adjustment Of Flat-type Opening Indication Electric Limit

1. Drive the valve to full-close position by handle.
2. Loosen the lock screw A2 on scale plate, adjust scale plate A1, making the pointer to the "O" position on the scale plate (shut position), tighten lock screw A2 on scale plate.
3. see Fig:(1) loosen fixed screw on close-direction stroke dog D1, turn D1 in a clockwise direction, in turn actuate the micro-switch K3, K1, then stop turning D1 when u hear a click sound from K1 and fasten the fixed screw on D1.
4. Drive the valve to full-close position by handle, loosen fixed screw on close-direction stroke dog D2, turn D1 in a clockwise direction, in turn actuate the micro-switch K4, K2, then stop turning D1 when u hear a click sound from K1 and fasten the fixed screw on D2.

**Special hint:** K3 is full-close signal position which advances  $3^\circ$  than valve full-open position (stopper designed type, nonadjustable); which advances  $3^\circ$  than valve full-open position (stopper designed type, nonadjustable); no K3, K4 micro-switch for type C.

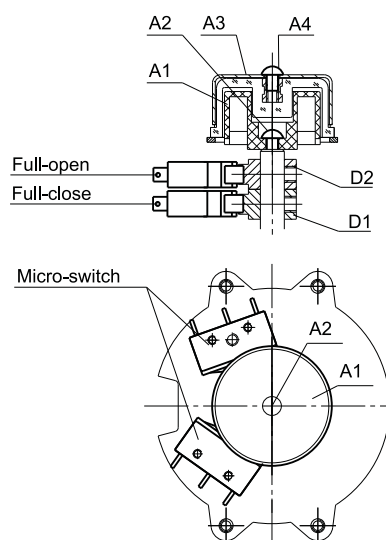
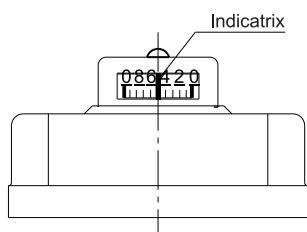


## IX.adjustment Of Salient Type Opening Indication Electric Limit

1. Drive the valve to full-close position by handle.
2. See Fig :(2) Loosen screw A2 properly, turn opening indicator A1,making the pointer to 50% position on the A1(green area), tighten screw A2
3. see Fig:(1) loosen fixed screw on close-direction stroke dog D1,turn D1 in a clockwise direction, in turn actuate the micro-switch K3,K1,then stop turning D1 when u hear a click sound from k1 and fasten the fixed screw on D1.
4. Drive the valve to full-open position by handle, loosen fixed screw on open-direction stroke dog D2,turn D2 in a counter-clockwise direction, in turn actuate the micro-switch K4,K2,then stop turning D2 when u hear a click sound from K2 and fasten the fixed screw on D2.
5. Install cover for electric elements, tighten screw of cover.
6. Loosen screw A4 properly,, making the any window on the opening indicator A3,just aim red area with "shut" on the opening indicator A1,tighten screw A4.

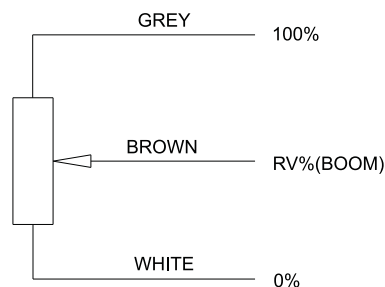
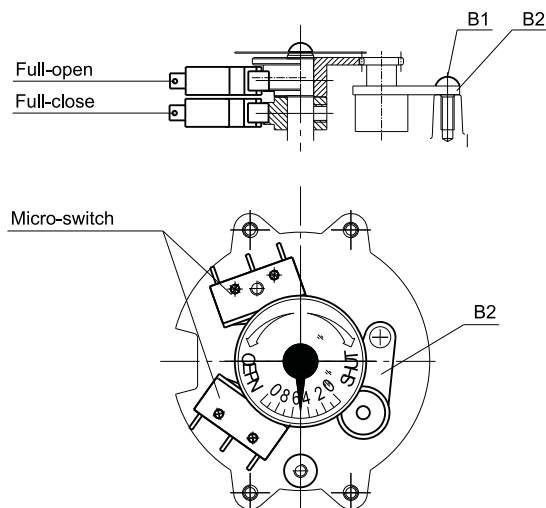
**Special hint:**Green area indicates full-open position

Red area indicates full-close position



## X. Adjustment Of Potentiometer

1. Drive the actuator to the middle position by hands, making the pointer to 50% position on scale plate.
2. refer to Fig3,measure the resistance between the initial end and terminal end of the potentiometer with multi-meter(between grey and white wiring of potentiometer).record the resistance value.
3. loosen the screw B1, apply a appropriate force to the mounting plate B2 of potentiometer, disengage the opening gear and potentiometer gear.
4. connect separately the boom of potentiometer (potentiometer BROWN wiring) and the another any terminal of potentiometer with two terminals of multi-meter, turn the gear of potentiometer slowly, check its reading, stop the adjustment when the resistance value is  $R/2 \pm 2 \Omega$  and apply a appropriate force to engage the opening gear and potentiometer gear (if micro-adjust is needed, you can adjust bracket plate assemble, as is shown in Fig(3)arrow direction),then tighten the screw B1.



## XI. Maintenance

1. Since the high-grade molybdenum-base lubricant with long service life and good pressure resistance is employed, no lubrication and periodical maintenance are needed.

2. If the operation of the valve is rare, please drive the actuator regularly and check if there is any abnormal condition.

## XII. Trouble Shooting

Problems	Causes	Remedy
Motor does not start	The power cord is not plugged in.	Plug in the power cord
	Broken connection, connector and cable is disengaged.	Connect the power line. Connect and fasten the terminal correctly.
	Voltage is not right or too low.	Check the voltage if it's normal
	The overheat protection device is initiated. (the ambient temperature too high, or valve clogged.)	Cool down the ambient temperature. Check the valve manually. See if it can be opened and closed normally
	The micro-switch is not properly moving	Replace the micro-switch
	The capacitor is defective.	Contact the manufacturer and replace the capacitor
	The diode for DC electric actuator is open	Contact the manufacturer and replace the diode
Indication lamp for open/close does not work	Bulb damaged	Replace the lamp
	The action of micro-switch is not proper	Replace the micro-switch
Motor could not stop running when reaching the limit position	The action of micro-switch is not proper	Replace the micro-switch
	Misconnect the limit switch with the control circuit	Adjust the connection
	The diode of DC electric actuator is short.	Contact the manufacturer and replace the diode
Actuator got water	The glass len for electric is broken	Contact the manufacturer for repair