Perfect Observe and Control Device

Build Smart Cities

Ball Valve series—2-port Flanged
Technical Data Sheet

Rev.1.1.1

Actuator for Flanged Ball Valve

TW20/TW50 series

Torque: 20Nm/50Nm

Voltage: 24V / 220V

Actuator Features

- **Modulating and On-off in One, RS485 Interface Available**

It is integrated modulating and on-off, which can be shifted via DIP switches on site. RS485 communication can be customized, which adopts Modbus protocol and has a higher control accuracy.

- **Multiple Signals Setting on Site**

Multiple signals are available, such as 0(2)-10V, 0(4)-20mA, which can be shifted via DIP switches on site.

- **Manual Function**

The actuator has the mechanical manual function.

- **Local Control Mode**

Local control and remote control can be shifted.

- **Automatically Stroke Testing**

It can test the valve stroke automatically. Power on stroke testing and manual stroke testing can be shifted.

- **Losing Signal Mode**

LED lights are outside the actuator, which can shows the status of running and alarming.

Type Overview

Actuator							
Force	Voltage	Type	Control signal	Feedback signal	Velocity	Power	Recommended Transformer
20N.M	24V	TW20NM-BX24	0(2)~10VDC，0(4)~20mA 3-position	0(2)~10VDC，0(4)~20mA	30s/90°	24VAC:30VA 24VDC:12VA	50VA 30VA
		TW20NM-BX24-485	0(2)~10VDC，0(4)~20mA 3-position RS485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	30s/90°	24VAC:30VA 24VDC:12VA	50VA 30VA
		TW20NM-BX24-F2	0(2)~10VDC，0(4)~20mA 3-position	0(2)~10VDC，0(4)~20mA 2SPDT feedback	30s/90°	24VAC:30VA 24VDC:12VA	50VA 30VA
	220V	TW20NM-BX220	0(2)~10VDC，0(4)~20mA	0(2)~10VDC，0(4)~20mA	30s/90°	40VA	/
		TW20NM-BX220-485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	30s/90°	40VA	/
		TW20NM-BX220-F2	0(2)~10VDC，0(4)~20mA 3-position	0(2)~10VDC，0(4)~20mA 2SPDT feedback	30s/90°	40VA	/
50N.M	24V	TW50NM-BX24	0(2)~10VDC，0(4)~20mA	0(2)~10VDC，0(4)~20mA	30s/90°	24VAC:40VA 24VDC:20VA	60VA 50VA
		TW50NM-BX24-485	0(2)~10VDC，0(4)~20mA 3-position RS485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	30s/90°	24VAC:40VA 24VDC:20VA	60VA 50VA
		TW50NM-BX24-F2	0(2)~10VDC，0(4)~20mA 3-position	0(2)~10VDC，0(4)~20mA 2SPDT feedback	30s/90°	24VAC:40VA 24VDC:20VA	60VA 50VA
	220V	TW50NM-BX220	0(2)~10VDC，0(4)~20mA	0(2)~10VDC，0(4)~20mA	30s/90°	50VA	/
		TW50NM-BX220-485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	0(2)~10VDC，0(4)~20mA No feedback signal RS485	30s/90°	50VA	/
		TW50NM-BX220-F2	0(2)~10VDC，0(4)~20mA 3-position	0(2)~10VDC，0(4)~20mA 2SPDT feedback	30s/90°	50VA	/

Wiring Instruction

1. Please cut off power supply during wiring in order to ensure personal safety!

2. Carefully check the power voltage when wiring, wire according to the product parameter, if not, it may cause fire and endanger personal safety in severe case!

3. Open the cover when wiring, prohibit disassembling other spare parts!

4. After wiring, please install the cover to the original position to avoid electric shock!

DIP Switch Instruction

DIP	Function	Description	
S1-1	Starting of control/ feedback signal	ON	4~20mA or 2~10VDC
		OFF	0~20mA or 0~10VDC
S1-2	Type of control signal	ON	Current signal
		OFF	voltage signal
S1-3	Impedance match of control signal	ON	voltage signal
		OFF	Current signal
S1-4	Type of feedback signal	ON	Current signal
		OFF	voltage signal
S1-5	Operating mode	ON	when the control signal increases, actuator runs to"1" , when the control signal decreases, actuator runs to "0".
		OFF	when the control signal increases, actuator runs to"0" , when the control signal decreases, actuator runs to "1".
S1-6	Losing control signal mode	ON	When lose control signal (voltage type or current type), actuator will provide a min. control signal internally.
		OFF	1)When lose control signal (voltage type),actuator will provide a max. control signal internally. 2)When lose control signal (current type),actuator will provide a min. control signal internally.
S1-7	Self-stroking mode	ON	Power on each time, self-stroking starts automatically.
		OFF	Self-stroking starts only when press the self-stroking button manually.
S1-8	Control type (when S1-9 is OFF)	ON	3-position type
		OFF	Proportional type
S1-9	Control mode	ON	RS485
		OFF	Proportional type and 3-position type
S1-10	Losing signal position locked*	ON	When the control signal is disconnected, the actuator remains at the current position (only applicable to input signals 4-20mA) .
		OFF	The actuator operates according to S1-6 settings.

*Note: 1) S1-10 is only applicable when S1-2 is in the ON state.

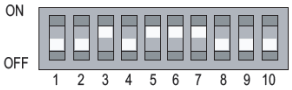
2) S1-10 takes priority over S1-6.

DIP Switch Setting Instruction

- **Proportional**

Control signal/feedback signal: 4~20mA

Control signal/feedback signal: 0~10VDC



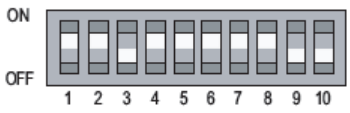
When S1-8 is set to OFF, the actuator is proportional type. Actuator can be controlled by control signal via connecting terminals:
When the control signal increases, actuator runs to "1", the valve tends to open.

When the control signal decreases, actuator runs to "0", the valve tends to close.

When the control signal has no changing, actuator shaft and valve stem stay in present position.

When voltage (or current) signal is disconnected, this is equivalent to input a min. control signal, actuator runs to "0", valve will close.

- **3-position**



When S1-8 is set to ON, the actuator is 3-position type. control the actuator by the switch. Terminal O, E and Y don't work by this time!

24V 3-position:

O, OPEN connected: actuator runs to "1", valve tends to open

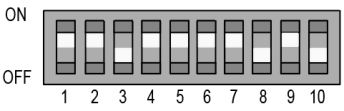
O, CLOSE connected: actuator runs to "0", valve tends to close

220V 3-position:

1 and 2 connected to power: actuator runs to "0"

1 and 3 connected to power: actuator runs to "1"

- **RS485 Bus Communication**

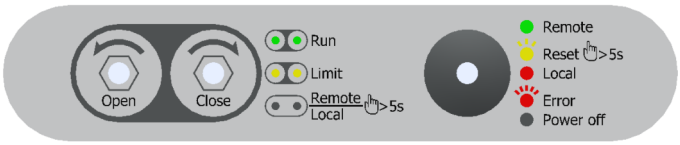


When the actuator is controlled by RS485 bus communication. It is remotely controlled by 8 and 9.

Actuator can be controlled remotely by RS485 bus communication, actuator supports ModBus protocol.

Notes: Terminal O, E, Y, CLOSE, and OPEN don't work!

Indicating Light Instruction



Reset	Status	Description
Green	Always	Normal mode
Red	Always	Local mode
Orange	Flashing(1Hz)	Self-stroke
Red	Quick flashing(2Hz)	Alarming

UP	Status	Description
Green	Always	Normal mode
Red	Always	Local mode
Orange	Always	Reach upper limit position
Red	Flashing(1Hz)	Alarming

DOWN	Status	Description
Green	Always	Normal mode
Red	Always	Local mode
Orange	Always	Reach lower limit position
Red	Flashing(1Hz)	Alarming

Debugging Instruction

A. Connect actuator and valve body.

B. Connect the power supply and the control signal line.

C. Set DIP Switch to needed position. After setting, turn on actuator power, pre-setting function will come into effect (DIP Switch can be set with power).

D. Power on the actuator.

E. Actuator self-stroking: the purpose of this step is to match the actuator with the valve body:

1) The Reset yellow indicating light will keep flashing(1Hz), actuator shaft extends to "0" firstly, and then, it retracts to "1", actuator will not be controlled by signal by this time.

2) After 2 mins, Reset yellow light stops flashing, self-stroking stops and the matching of the valve and actuator is finished. By then, actuator running direction can be controlled by control signal.

3) If the Reset red light is quick flashing (2Hz) during the self-stroking, it means the self-stroking status is not correct and the actuator starts alarming. The actuator can't match with the max. stroke of valve.

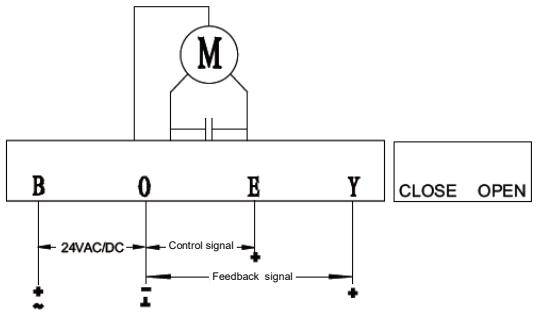
Remarks: If self-stroking is needed in a power-on state, press down the Reset button over 5s, and then the actuator will start self-stroking. Self-stroking phenomenon is the same as step 1), 2).

1. The factory default setting is automatic self-stroking, it means the actuator will repeat automatic self-stroking when power on each time!

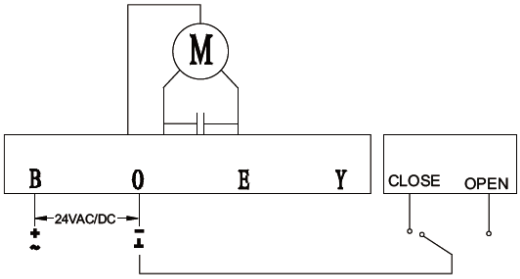
2. If you don't need automatic self-stroking function, you can set the 7th switch to OFF, it will change into manual self-stroking (Phenomenon is the same as step 1), 2).

Wiring Diagram

- **TW20（50）NM-BX24**

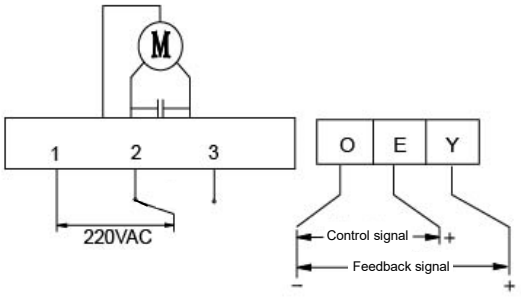


Proportional

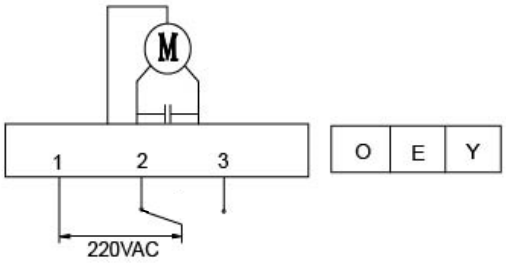


3-position

- **TW20（50）NM-BX220**

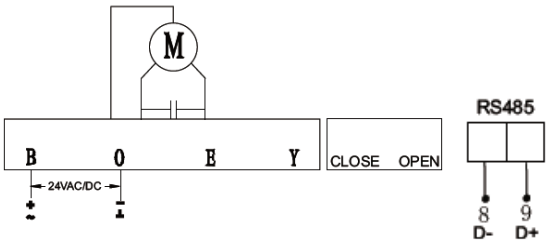


Proportional

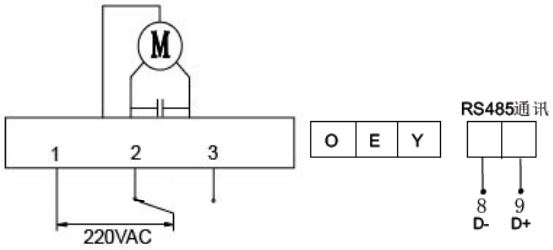


3-position

- **TW20 (50) NM-BX24 (220)-485**



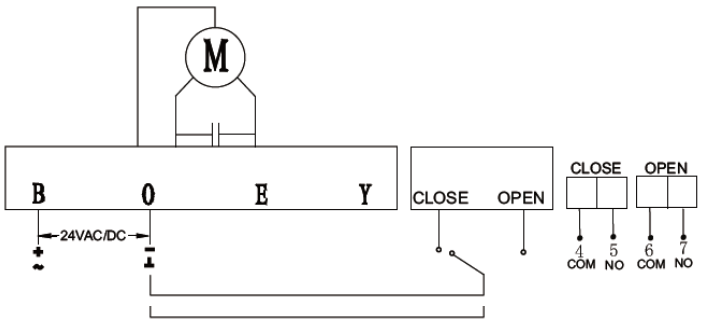
TW20 (50) NM-BX24-485



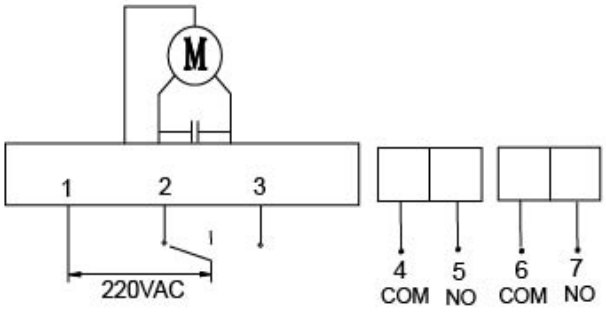
TW20 (50) NM-BX220-485

Notes:
1) When wiring BX24 actuator with RS485 communication function, only B, O and RS485 communication terminal need to be connected.
2) When wiring BX220 actuator with RS485 communication function, only 1, 2 and RS485 communication terminal need to be connected.

- **TW20 (50) NM-BX24(220)-F2**



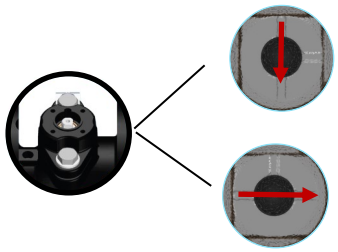
TW20 (50) NM-BX24-F2



TW20 (50) NM-BX220-F2

Installation Instruction

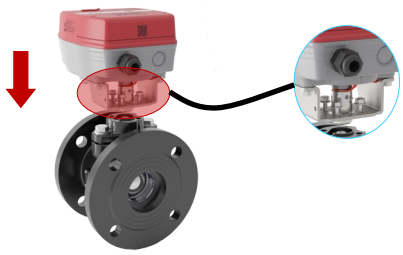
1. In order to make the valve and actuator match better， please make sure the valve is full-closed and the actuator opening pointer is at the “0” position before installation.



The valve shaft is at the left position, the valve is closed, and the actuator pointer is at the "0" position.

The valve shaft is at the right position, the valve is fully opened, and the actuator pointer is at the "1" position.

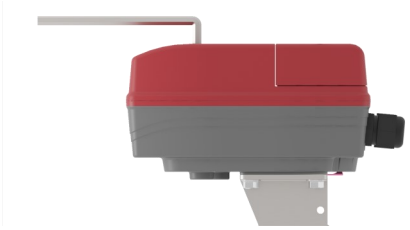
2. Align to location hole, install actuator vertically on the valve body according to the direction shown below.



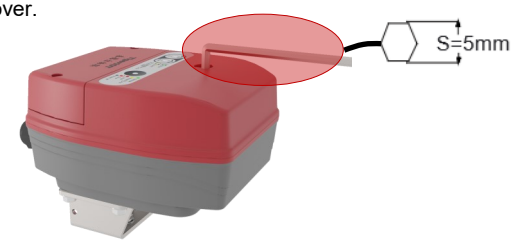
3. Insert the pointer hole by 5mm Allen wrench on the top and tighten manually.

Actuator Manual function

1. Shut off, take out the Allen wrench and prepare for manual operation.

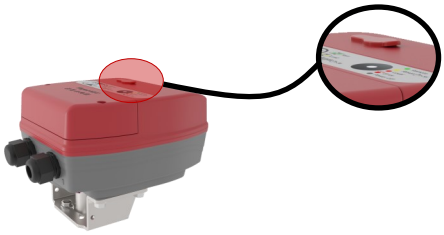


2. Insert the Allen wrench into the manual hole on the top of the cover.



3. Turn the Allen wrench anticlockwise, the valve will open, turn it clockwise, the valve will close.

4. Manual operation is done, take out the wrench and cover tightly the red plug.



Note: In the case of power off, the actuator needs self-stroking again after the manual operation is completed.

Manual self-stroking method: press the Reset button on the actuator cover over 5s, actuator will enter self-stroking!

Technical Parameters

• Functional data-Actuator	
Rate torque	20N.M / 50N.M
Operating voltage TW...-BX24... TW...-BX220...	 24VAC± 15%, 24VDC+15% 220VAC ± 15%
Frequency	50Hz or 60Hz
Sensitivity	Proportional: 1.0% (factory setting) RS485: 0.5% (factory setting)
Blind zone	3.0 % (default setting)
Impedance (only for proportional type)	
Voltage Input Impedance	＞100K
Current Output Load Requirement	＜0.2K
Parallel Operation	＜10 actuators (depends on controller output impedance)
Load Requirements (only for proportional type)	
Voltage Output Load Requirement	＞2K
Current Output Load Requirement	＜0.5K
Degree of Protection	IP65
Lifetime	100 thousand full open and close

• Actuator spare parts materials	
Cover	PC
Seat	Die casting aluminum

• Environmental data	
Running	
Ambient temperature	-25~+65℃
Ambient humidity	≤95% RH non condensation
Storage	
Ambient temperature	-40~+65℃
Ambient humidity	≤95% RH condensation

Flanged Ball Valve

TBF series

DN40~DN150

PN16

Valve Features

- **Equal-percentage Flow Characteristics**

The valve from AB to A has a perfect equal-percentage control curve, and the rangeability is >100:1. The valve core is made of stainless steel, which is more corrosion resistant and has a longer service life.

- **Fixed Valve Core**

It adopts fixed valve core structure with a high close-off DP and a low torque.

- **Zero Leakage Rate**

It is “0” leakage rate when the valve is closed from A to AB.

- **Stainless Steel Full Core**

It adopts full core structure with dual seal and is made of stainless steel with corrosion resistance.

- **Double Flange Connection**

It is much easier to locate and install with double flange connection compared to wafer connection.

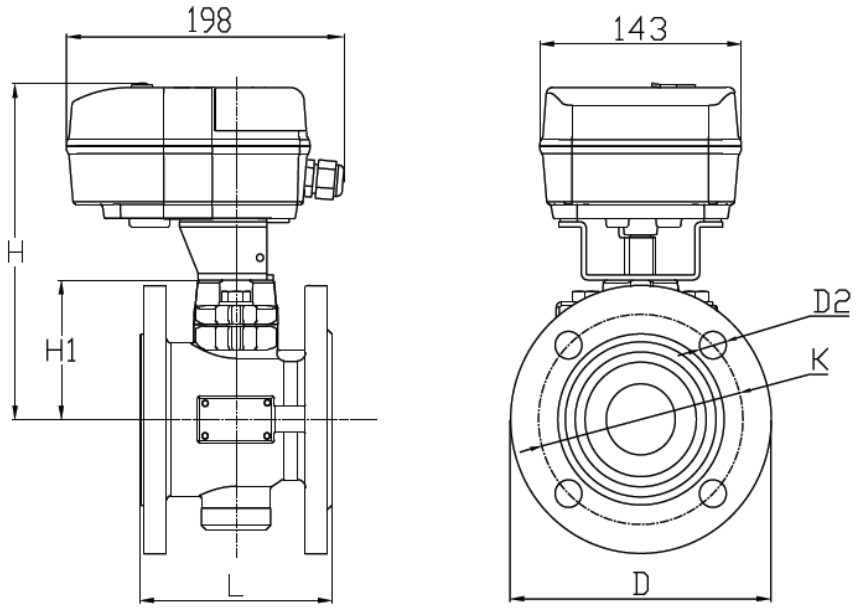
- **Quality Materials**

The valve body is made of high-quality ductile iron (EN-GJS-450-10), and the surface adopts electrostatic spraying craft, the body has better intensity and corrosion resistance.

Type Overview

TPF series					
Valve type		Matched Actuator Force		20N.M	50N.M
PN16	Nominal size [in.] [mm]	Connection	Kvs [m3/h]	△Ps [MPa]	△Ps [MPa]
TBF40-2VGC-CX	1 1/2" 40	Flanged	40	1.4	/
TBF50-2VGC-CX	2" 50	Flanged	78	1.4	/
TBF65-2VGC-CX	2 1/2 " 65	Flanged	120	0.8	/
TBF80-2VGC-CX	3" 80	Flanged	160	0.8	/
TBF100-2VGC-CX	4" 100	Flanged	275	/	0.7
TBF125-2VGC-CX	5" 125	Flanged	396	/	0.7
TBF150-2VGC-CX	6" 150	Flanged	544	/	0.7

Dimension



DN	D mm	D2 mm	K mm	L mm	H1 mm	H mm
DN40	150	4-19	110	136.5	82	217
DN50	165	4-19	125	136.5	91	226
DN65	185	4-19	145	136.5	98	233
DN80	200	8-19	160	168	105	240
DN100	220	8-19	180	211	117	252
DN125	250	8-19	210	262.5	138	273
DN150	285	8-23	240	315	152	287

Technical Parameters

• Functional data-Valve	
Nominal pressure	DN40~DN150
Nominal pressure	PN16/PN25
Flow Characteristics	A-AB equal percentage
Rangeability	>100 : 1
Leakage rate	Zero leakage
Permissible medium	Hot/chilled water
Medium temperature	-5~+120℃
Connection	Flanged ISO 7005-2

• Valve spare parts materials	
Valve body	Ductile iron
Valve core	Stainless steel
Valve stem	Stainless steel
Valve seat	PTFE
O-ring	FKM， EPDM and NBR are optional

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