



920 Series Electric Actuators

► For Multi-turn Application



Summary

► Applicability

They provide a reliable position control of gate, stop valves, as well as similar ones. Combining with a worm-gear box can be used on part-turn applications, such as butterfly and ball valves.

► Torque / 44 ~5,000 Nm

Features

- 1

920 series with a full range of features and wide adaptation have a wide torque range from 44Nm to 5000Nm and the seven bases can match different valves.
- 2

Adopting patented hand/auto switching mechanism, the shift from manual to motor operation is semiautomatic of electric priority. Manual operation of 920 series is safe and reliable.
- 3

Fully sealed design of mounting O-ring or lip seal in the cylinder surface has features of reliable sealing and the seals can be easily mounted and dismantled. 920 series (include ex-proof units) with IP65 (GB4208-2008) enclosure can ensure complete protection from dust and sprinkling. IP67 or IP68 enclosure can be provided if need.
- 4

The products with output type of thrust, adopting independent thrust component to withstand thrust from valve stem, the main house does not need to withstand the axial thrust from the drive sleeve.
- 5

Designing with modular structure makes 920 series successfully combine the mechanical and electronic elements by mounting control unit on the basis of the basic type.
- 6

920 series can have explosion-proof enclosure to reach Ex d IIC T4 Gb (GB3836.1-2010 , GB3836.2-2010) .



About us

Tianjin Beifang Valve Actuator Co., Ltd. (BF for short) always focus on the design and manufacture of excellent valve actuator and control equipment.

BF attaches great importance to product design, and the design team has strong product design and innovation ability. BF has complete intellectual property rights and a number of technical patents. Over the years, our products have been annual exported in batches and were widely and successfully used in water treatment, oil, electricity, chemical and other industries.

BF acquired the authentication of quality management system standards ISO9000 of DNV in 1998. Strict quality control in all stages and constantly improving the product quality control standards is the consensus of the staff.

BF believes that only solid the software and hardware foundation to achieve long-term stable development. We have set up some advanced computer-aided system, such as product design, resource management, production management, and soon. And we have set up the platform of precision machining mainly based on CNC machining center. We also continue to establish and improve a documented management system.

BF will design and manufacture products solidly and continue our efforts to create more value for customers.

Where to find information

Summary	01/	Main parameters	09/
Features	01/	Overall dimension	11/
Structure	02/	Fitting to valve	14/
Configuration and function	04/	Mounting dimension	15/
Model and specification	08/	Wiring diagram	17/

Structure

► Motor

The high power factor motor with special high torque low inertia and less heat generation can be dismantled and maintained easily.

► Hand/Auto switch

For the electric priority hand/auto switch, whenever the motor engages, the hand/auto clutch will auto return to ensure safe operation. During the motor operating, no friction between movement parts and switching mechanism effectively enhances the life and reliability of the switching mechanism.

► Terminal blocks

For the basic type, the terminal blocks are mounted in the control box. The ex-proof type and integrated type products are designed with separate double sealed terminal box.

► Position indicator

A mechanical indicator continuously indicates the valve position. This mechanism can meet the requirement of a broad range of turns.

► Limit switch

The turns of the drive sleeve are transmitted through the bevel gear pair to a counter, by which the different positions can be counted independently (two positions can be controlled at most both in OPEN and CLOSE direction) . The limit switches are mounted above the counter. Once the drive sleeve turns to the setting position, the limit switch will be operated and so the motor will be switched off.

The counter is designed with isolation function which realized by structure of copper gear set, reliably avoid the mutual interference of different counting position. The self-cleaning switches composed of conductive ring and contact slice have silver contacts which can be used for controls with higher current.

► Torque switch

The disk spring is mounted on the worm shaft. The axial move of the worm shaft is proportional to the torque generated by the actuator. Two torque switches in open/close direction sense the movement of the worm shaft and interrupt the power to the motor.

The hand/auto lever

The lockable hand/auto lever with small force is side mounted.

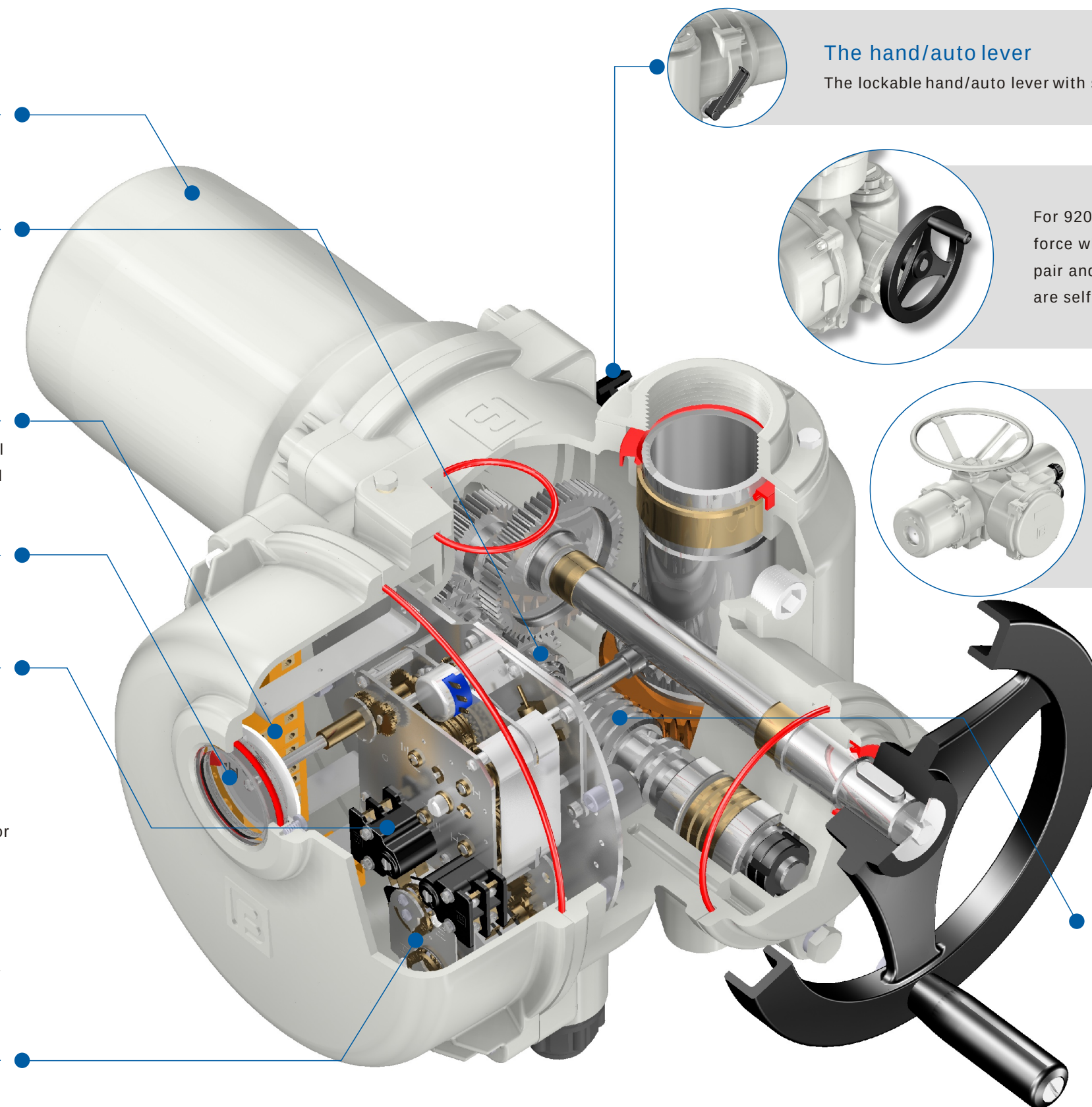
For 9202~9206, a side mounted handwheel with small force which drives the drive sleeve by the spur gear pair and worm-gears is provided. And these products are self-locking even manual operating.

For 9200 and 9201, a top mounted handwheel directly drives the drive sleeve by engaging with the clutch, which makes it has the characteristics of simple structure and quick operation.

Note: 9200 and 9201 are not self-locking when manual operating for the direct-connected operation mode.

Main Drive

The motor gear set drives the worm and worm gear, which drive the valve stem or the stem nut. Both motor and manual operations have a hammer effect for eliminating valve jam.



Configuration and function

920 series include the basic type and the integrated type.

Basic type: Include motor, reduction mechanism, limit and torque switch. The consumers could fulfill “local/remote” operation by equipping with the BF series controllers made in our company or other similar equipment.

Integrated type: It integrates reversing starters, protection elements, logic elements, in/output units in a watertight box, which can fulfill “local/remote” operation. This kind of actuator include : Open-close type (fulfill the fully open/close operation) and modulating type (fulfill the proportional control of the opening degree of valves.)

A full range of options could be provided, if necessary, please tell us when order.

► Standard

Ordinary products comply with GB/T24923 《Technical specifications of basic version electric valve actuators》.

► Ambient temperature

	Basic and integrated type	Ex-proof type and ex-proof integrated type
Standard	- 20 ~ +70 °C	- 20 ~ +50 °C
Low temperature	- 40 ~ +60 °C	
Ultralow temperature	- 60 ~ +60 °C	

► Degree of protection

Standard	IP65 (GB4208) : Protection from dust and sprinkling.
Options	IP67 (GB4208) : Protection from dust and submersion in water to a depth of 1m for 30 minutes. IP68 (GB4208) : Protection from dust and submersion in water to a depth of 3m for 48 hrs.

► Ex degree

The Ex degree of 920 series is Ex d IIC T4 Gb (GB3836.1, GB3836.2) .

► Lubrication

Extreme pressure lithium grease is used in the products. And it is not need to refresh and add the lubricating grease periodically.

► Coating

The grey (RAL 7030) acrylic polyurethane spraying surface has excellent corrosion resistance. If other color required, please contact us.



► Power supply

Standard	Three phase four wire system 380VAC /50Hz power supply. The product can work normally in the condition of ±10% voltage vibration or ±5% frequency vibration.
Options	Three phase three wire system 380VAC /50Hz power supply. 220VAC/50Hz/1ph power supply (apply to 9200 and 9201).

► Cable gland

	Basic type	Integrated type and ex-proof type
Standard	2x G1”	2x 1” NPT, 1x 1 1/2” NPT(an additional 3/4” NPT is optional)
Options	2x 1” NPT	

► Motor

920 series adopt special motor for valve with high torque low inertia. A temperature protection switch embedded in the windings of the motor will trip the actuator control circuit if the motor windings overheat. Duty of motor as follows:

S2-15: The continuous running time of the motor is less than 15 minutes , and it will not start again until the motor surface cooled to ambient temperature. This kind of motor is used for operating the valve full open or full close.

S4-25 %: The proportion of each working time and working cycle (the interval between two starts) is not more than 25%. This kind of motor is the standard configuration for the modulating type.

► Manual operation

920 series supply a handwheel for manual operation in the event of adjusting or a power supply failure. The electric priority hand/auto switch is adopted for 920 series. By operating the hand/auto lever, manual drive is engaged. Energization of the motor automatically re-engages power operation and the handwheel can not be driven.

The clutch of 9200 and 9201 is installed on the drive sleeve.

The clutch of 9202~9206 with small force is installed on the worm shaft, and these products are lockable even in the state of manual operation.

► Limit switch

The 2-set counter with two end positions of open and close is supplied as standard to fulfill the limit switch. And two large capacity self-cleaning switches of 250VAC 10A are supplied for each position.

Options 4-set counter: Add the intermediate position control both in open and close direction.
3-layer switch: Three self-cleaning switches are supplied for each position for transmitting signals.

► Torque switch

Torque switch mechanism is used to limit the maximum output torque of the actuator.920 series adopted mechanical torque switch and supplied two DPDT switches of 250VAC 10A in open/close direction respectively.

Options Three switches: Add a DPDT switch in open/close direction respectively.
Four switches: Add two DPDT switches respectively in open/close direction respectively.

► Position indication

A continuous mechanical position indicator is provided for local indication. It is possible to the consumers correct setting for the travel.

► Position transmitter

920 series actuators provide a potentiometer of 560Ω. If require special potentiometer, please contact us. Two optional module can output 4~20mADC analog signal proportional to valve position. Generally, 4mA corresponds to fully close position, 20mA corresponds to fully open position.

VPT2 Two-wire system. Input 24VDC signal by two wire and feedback 4~20mA DC signal at the same time.
VPT4 Four-wire system. Input 220VAC signal by two wire, feedback 4~20mADC signal by other two wire.

► Flared switch

Options: A micro switch of 250VAC 10A is used for providing intermittent flared signals of on and off when the electric actuator operates.

► Heat and dehumidify

920 series provide a space heater to prevent from humidity and condensation.

► Integrated type

The control package integrates the contactor for reversing startup of motor, control and protection units. Other control elements to automatically position a valve in proportion to an analog signal could be supplied if necessary. Integrated type actuator is a mechatronics product.

Local/Remote operation:

920 series provide a “Local/Stop/Remote” selector switch and an “Open/Close” local switch. The two switches are non-through coaxial mounted, and the “Local/Stop/Remote” selector switch can be locked in three modes to prevent from mistaken operation. In “Local” mode, the “Open/Close” local switch can be inching or keeping operated, and it will auto back to the middle position if released

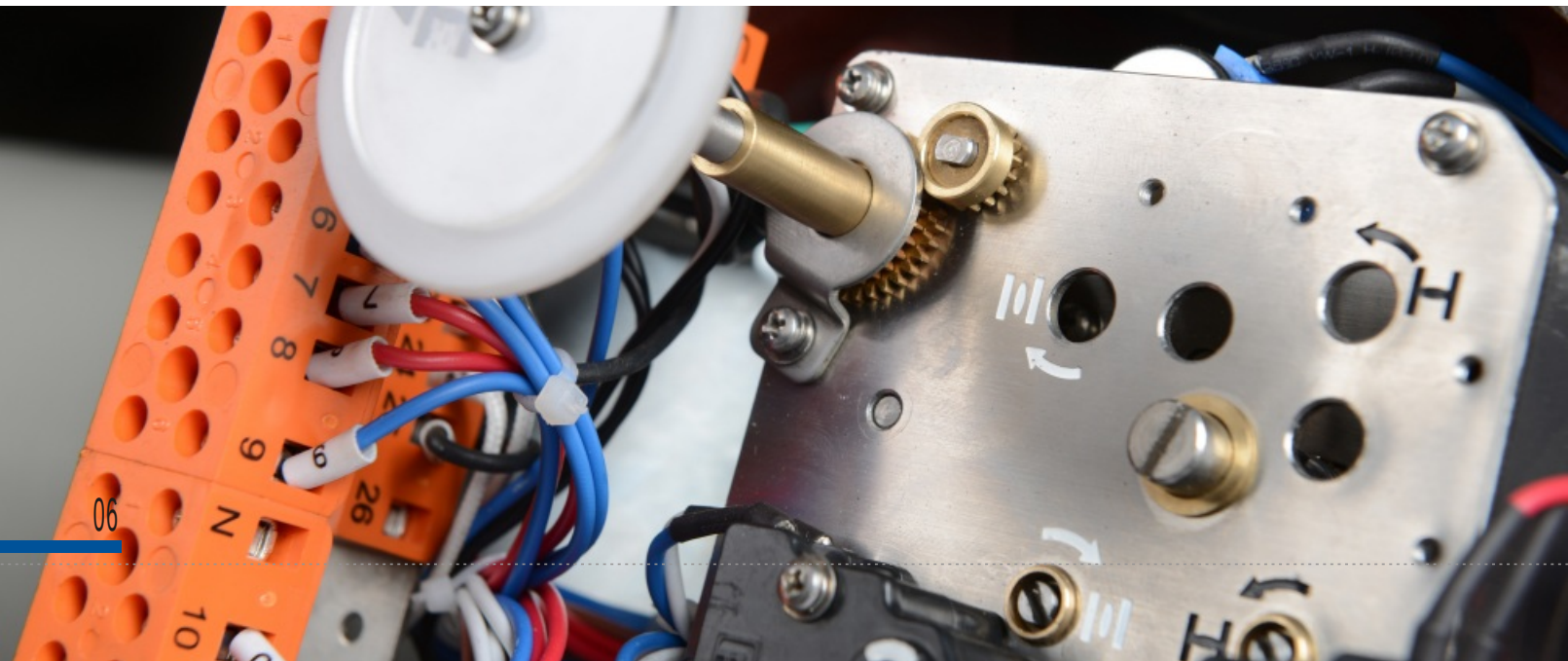
Protection :

Mechanical interlock	The open and close contactors are supplied with mechanical interlock component, which can effectively prevent short circuits or contact ignition when reversing.
Overcurrent protection	The overcurrent protection circuit are supplied for overcurrent protection.
Phase correction	(Apply to 3ph power supply) No matter how the phase of power supply, the products can work normally.
Phase-failure protection	(Apply to 3ph power supply) Real-time monitor the three phase power to prevent the motor running short of phase.
Instant reverse protection	Prevent the motor from damage of instant reversals of the motor

► Proportional modulating

920 series can proportional modulate the valve according to the received 4 ~ 20mA DC control signal.

- 1) It can achieve the best control precision by the adaptive algorithm. Usually the steady state control precision is higher than 2%.
- 2) Isolated output 4 ~ 20mADC valve position signal (percentage) .
- 3) Setting of open mode: In general, 4mA corresponds to full close position, 20mA corresponds to full open position. If need, this parameter can be set with 4mA corresponding to full open position, 20mA corresponding to full close position.
- 4) Setting of signal loss action (action of 920 series when control signal loss) : Keep in place, full open or full close.
- 5) The sensitivity can be set. When the valve inertia is larger or the load changes dramatically, for tracking control signal, the electric mechanism may start repeatedly, which is shock phenomenon. Reduce sensitivity can effectively eliminate the shock.



Model and specification

Model

[illegible]

Note1: If the options are required, please tell us when order.

Main parameters

Output parameters

Base No.	9200						9201					
Output speed r/min	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio
12				75	0.09	1:1				150	0.18	1:1
18	55	0.09	1:1	75	0.12	1:1	100	0.18	1:1	150	0.25	1:1
24	55	0.12	1:1	75	0.18	1:1	100	0.25	1:1	150	0.37	1:1
36	55	0.18	1:1	75	0.25	1:1	100	0.37	1:1	150	0.55	1:1
48	55	0.18	1:1	75	0.25	1:1	80	0.25	1:1	120	0.37	1:1
72	44	0.18	1:1	60	0.25	1:1	80	0.37	1:1	120	0.55	1:1

Base No.	9202						9203					
Output speed r/min	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio
12				280	0.37	35:1	440	0.55	42:1	1600	0.75	42:1
18	200	0.37	27:1	300	0.55	27:1	450	0.75	32:1	600	1.1	32:1
24	200	0.55	27:1	300	0.75	27:1	510	1.1	32:1	600	1.5	32:1
36	200	0.75	27:1	300	1.1	27:1				450	1.5	32:1
48	200	0.75	13:1	300	1.1	13:1				520	1.5	17:1
72	170	0.75	13:1	250	1.1	13:1				340	1.5	17:1

Base No.	9204						9205					
Output speed r/min	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio
12				1200	1.5	59:1				2500	3.0	83:1
18	800	1.5	49:1	1200	2.2	49:1	1800	3.0	72:1	2500	4.0	72:1
24	900	2.2	49:1	1200	3.0	49:1	1800	4.0	72:1	2500	5.5	72:1
36	700	2.2	49:1	900	3.0	49:1	1200	4.0	72:1	1800	5.5	72:1
48	700	2.2	24:1	900	3.0	24:1	1300	4.0	36:1	1700	5.5	36:1
72	500	2.2	24:1	700	3.0	24:1	900	4.0	36:1	1200	5.5	36:1

Overall dimension

Base No.	9206					
Output speed r/min	Output torque Nm	Motor power kW	Manual gear ratio	Output torque Nm	Motor power kW	Manual gear ratio
12	3700	5.5	123:1	5000	5.5	123:1
18	2900	5.5	96:1	5000	7.5	96:1
24				3800	7.5	96:1
36				2800	7.5	96:1
48				2600	7.5	48:1
72				1800	7.5	48:1

Note 1: The value in the table is the data of 380VAC/3ph/50Hz, duty type S2 of motor.

Note 2: For 9200 unit, there is no integrated type.

Note 3: The output torque is the setting torque at the factory. Stall torque will be 1.1~1.5 times this value instantaneously.

Note 4: Output speed is the running speed of the drive sleeve. The value in the table is the data of 50Hz. If special speed is required, please contact us.

Note 5: If the output speed is 48 or 72 r/min , the actuator is unlockable.

Mechanical parameters

Base No.			9200	9201	9202	9203	9204	9205	9206
Travel range ¹ (Turns)	Type I	Turns	1~50						
	Type II	Turns	1~490						
Allowable thrust (Stem nut)		kN	35	70	120	180	240	350	670
Weight ²		kg	32	47	62	85	115	195	260

Note 1: "Travel range" is the turns of valve stem from the full close to full open position. The value in the table is showed as standard, if the turns are out of the standard range, please contact us.

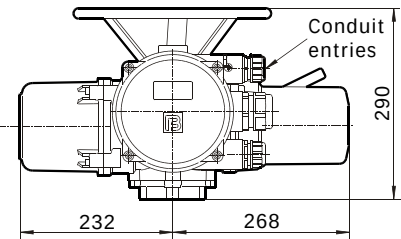
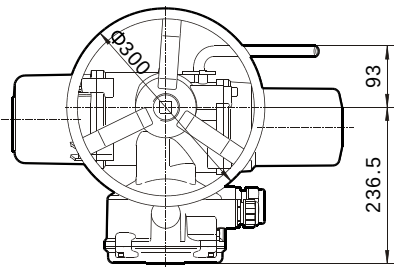
Note 2: The value of weight will change with different connection ways, dimension or configuration.

Motor parameters.

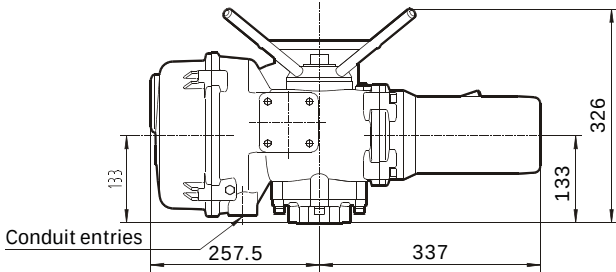
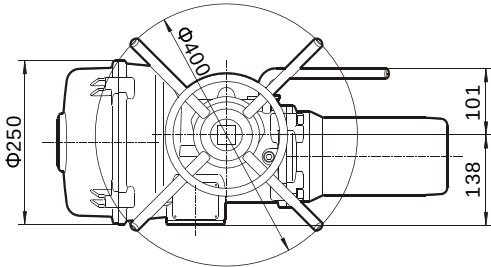
9200		9201		9202		9203		9204		9205		9206	
Power kW	Rated current A	Power kW	Rated current A	Power kW	Rated current A	Power kW	Rated current A	Power kW	Rated current A	Power kW	Rated current A	Power kW	Rated current A
0.09	0.6	0.18	1.2	0.37	1.5	0.55	2.3	1.5	4.8	3.0	9.0	5.5	13.5
0.12	0.9	0.25	1.4	0.55	2.2	0.75	3.5	2.2	6.5	4.0	11.0	7.5	19
0.18	1.2	0.37	2.3	0.75	2.5	1.1	4.5	3.0	9.0	5.5	13.5		
0.25	1.4	0.55	2.8	1.1	4.0	1.5	4.8						

Note: The value in the table is the data of 380VAC/3ph/50Hz, duty type S2 of motor.

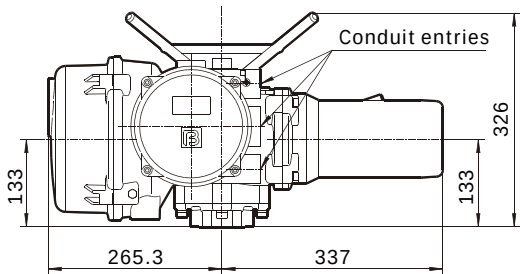
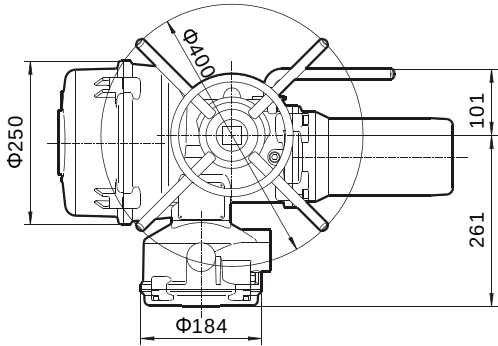
9200 /9200Ex



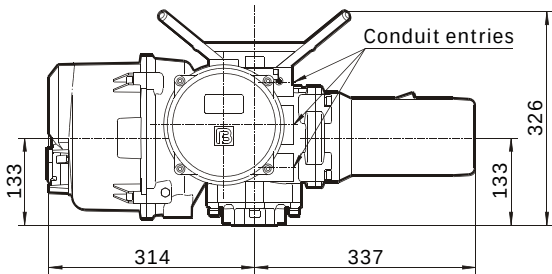
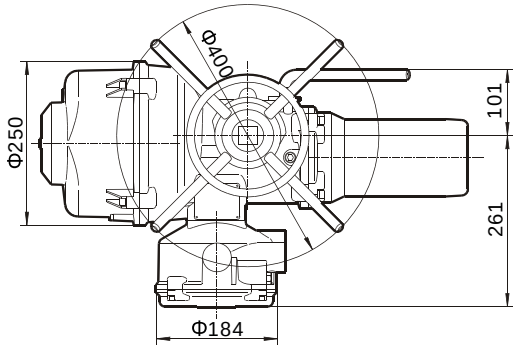
9201



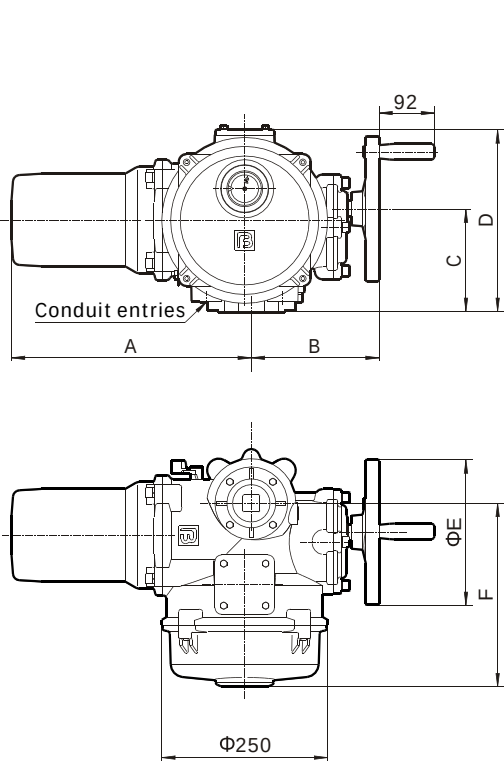
9201Ex



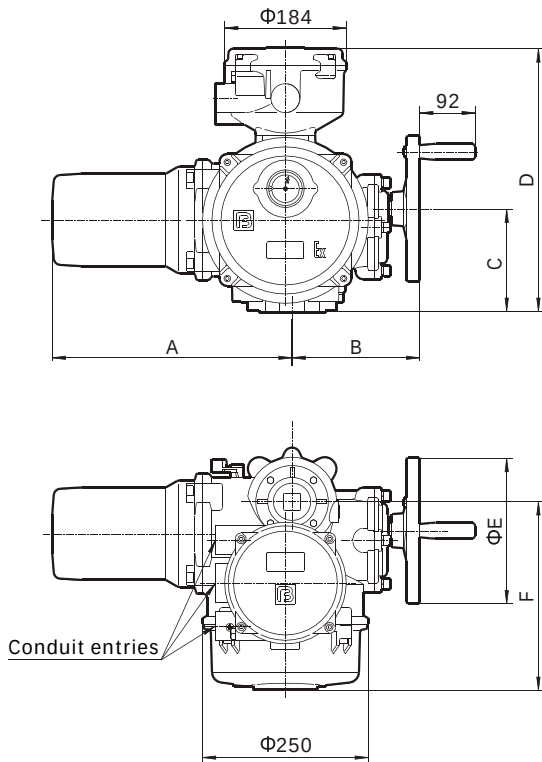
C9201 /C9201Ex



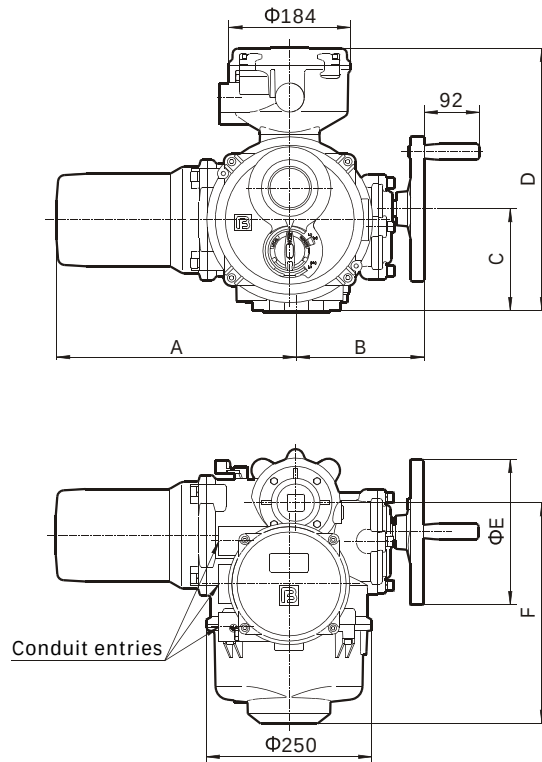
9202~9206



9202Ex~9206Ex



C9202~C9206 /C9202Ex~C9206Ex



	A	B	C ¹	D ¹	E	F
9202	253	199	155	273	220	277.5
9203	403	242	176	292	320	299.5
9204	441	273	183	298	400	319.5
9205	533	331	206	332	500	360.5
9206	626	370	240	368	600	391.5

	A	B	C ¹	D ¹	E	F
9202Ex	253	199	155	397	220	285.3
9203Ex	403	242	176	416	320	307.3
9204Ex	441	273	183	422	400	327.3
9205Ex	533	331	206	456	500	368.3
9206Ex	626	370	240	492	600	399.3

	A	B	C ¹	D ¹	E	F
C9202 C9202Ex	253	199	155	397	220	334
C9203 C9203Ex	403	242	176	416	320	356
C9204 C9204Ex	441	273	183	422	400	376
C9205 C9205Ex	533	331	206	456	500	417
C9206 C9206Ex	626	370	240	492	600	448

Note 1 : The value changes with the joint flange.

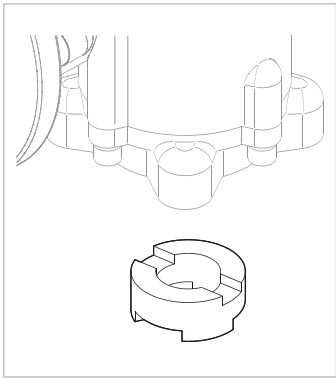


Fitting to valve

Type Y connection

Type Y connection is for the application of withstanding torque.

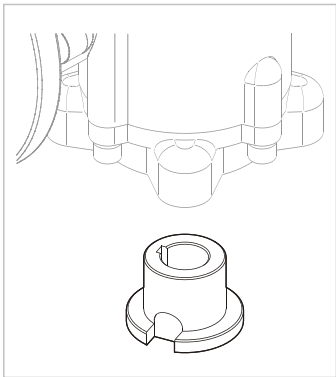
The removable plug sleeve is mounted to the end of the drive sleeve to connect to the valve. It can be mounted or dismounted without removing any other parts.



Type Z connection

Type Z connection is for the application of withstanding torque.

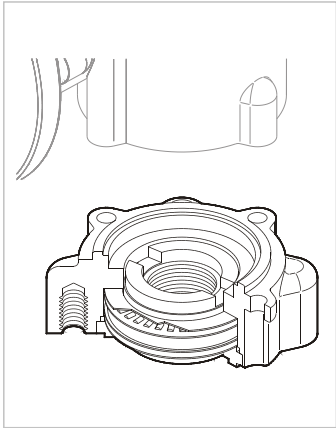
The removable drive bush with keyhole is mounted to the end of the drive sleeve to connect to the valve. It can be mounted or dismounted without removing any other parts. The type and size of the keyhole can be customized. Or a pilot hole may be supplied to be machined by users themselves.



Type T connection

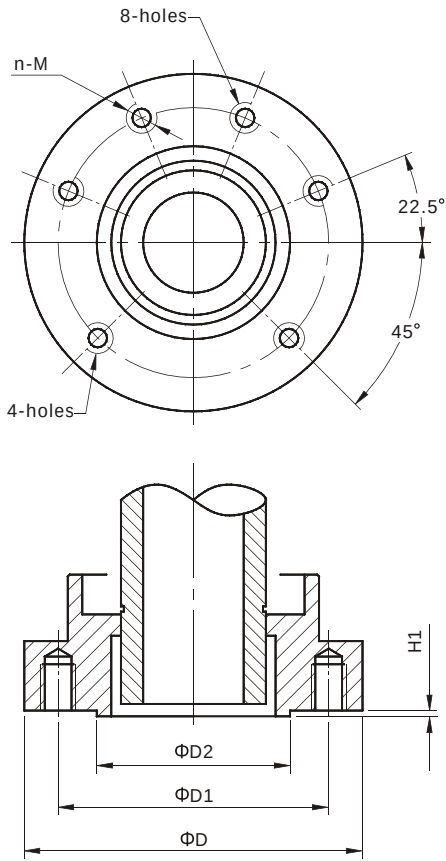
Type T connection is for the application of withstanding thrust. The thrust components which are used for transmission of torque and withstanding thrust are mounted to the outputting end to connect to the valve. The integral sealed thrust components filled with grease consist of thrust base, copper stem nut, upper and lower thrust bearing, etc.

Usually, the stem nut will be supplied with a pilot hole to be machined by users themselves.



Mounting dimension

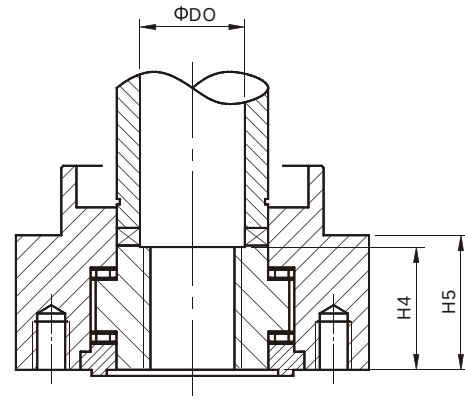
Joint flange



mm						
Flange code	D	D1	D2	H1	n	M
F07	90	70	55	3	4	M8
F10	125	102	70	3	4	M10
F10A	125	102	70	3	4	M8
F14	175	140	100	3	4	M16
F16	210	165	130	3	4	M20
F25	300	254	200	5	8	M16
F30	350	298	230	5	8	M20
F35	415	356	260	5	8	M30
J 10	115	95	75	Concave 5	4	M8
J 12	145	120	90	Concave 5	4	M10
J 16	185	160	125	Concave 5	4	M12
J 20	225	195	150	Concave 5	4	M16
J 25	275	235	180	Concave 6	4	M20
J 30	330	285	220	Concave 8	4	M24
J 35	380	340	280	Concave 6	8	M20

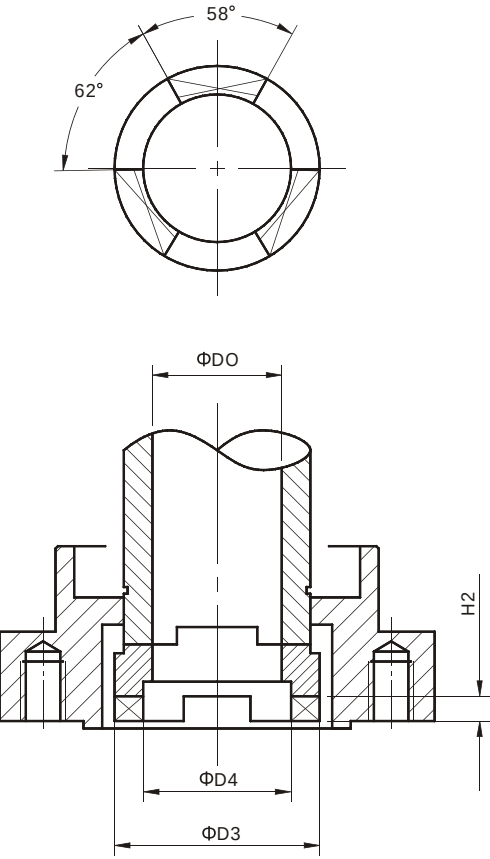
9200	9201	9202	9203	9204	9205	9206
F07	F10	F14	F16	F25	F30	J35
F10A	F10A	J12	F14	F16	F25	F35
J10	J10	J16	J20	J20	J25	
J12	J12			J25	J30	

Type T (stem nut)



	9200	9201	9202	9203	9204	9205	9206
H4	57	57	60	75	75	100	150
H5	62	62	78	93	100	126	165
Max-dia. of stem D0	26	36	48	60	75	95	120

Type Y (plug)

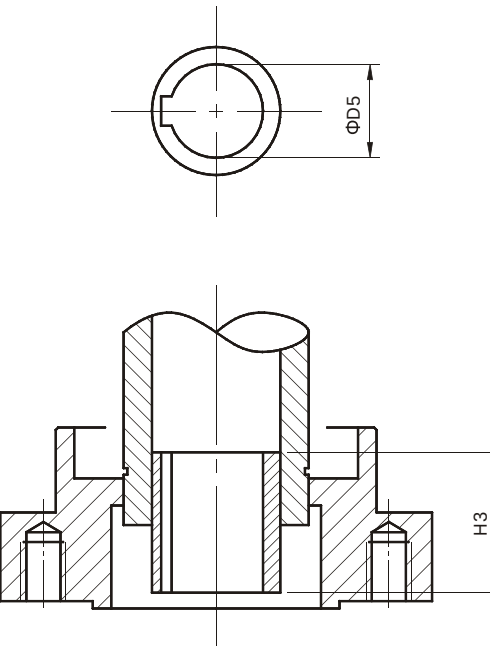


Max. optional plug
Max-dia. of stem D0

Plug code	mm		
	D3	D4	H2
Y04	32	22	6
Y05	38	28	7
Y06	44	30	8
Y08	55	42	10
Y09	72	46	12
Y10	72	50	12
Y12	78	60	12
Y13	86	67	12
Y14	93	70	12
Y15	95	75	12
Y16	99	81	12
Y20	126	102	16
Y22	135	111	13
Y25	158	125	20

9200	9201	9202	9203	9204	9205	9206
Y06	Y08	Y10	Y13	Y16	Y22	Y25
26	36	48	60	75	95	120

Type Z (key joint)



Max. diameter D5
H3

9200	9201	9202	9203	9204	9205	9206
19	25	36	45	60	78	95
28	38	44	68	90	110	140

Wiring diagram

2.This book lists the typical wiring principle of basic type. Many wiring diagram are not listed. Please contact us if you need them.

Introduction

- 1. The internal wiring is showed on the right side of the dashed line or inside the dashed line.
- 2. Limit switches in the diagram show that the valve is in the intermediate position. Torque switches show that the valve is not over torque.

Symbol description

KXK	Open limit switch
GXK	Close limit switch
KZK	Open torque switch
GZK	Close torque switch
M	Motor
MTH	Temperature protection switch in motor winding
THR	Space heater
U	Potentiometer

Limit switch contact development

Limit switch	Valve position	
	Full close	Full open
1KXK	ON	OFF
2KXK	OFF	ON
3KXK	ON	ON
4KXK	OFF	OFF
1GXK	OFF	ON
2GXK	ON	OFF
3GXK	ON	ON
4GXK	OFF	OFF

Basic type (Three-phase AC power supply)

