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E920 Series Intelligent Electric Actuators

▶ For Multi-turn Application

北方阀控
Beifang Actuators

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BFYBE920-2015E Issue 2015-09

BFYBE920 Issue 2015

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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 so on. 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.

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Features

Convenient

Without removing the cover, the consumer can non-intrusively set limit, torque, operating, interface language and other parameters by the infra-red setting tool, local selectors or external networking.

Reliability

The adoption of absolute encoder makes the valve position data be saved in the event of power supply failure.

Excellent electrical design makes E920 series have excellent anti-interference ability.

E920 series offer more features: diagnostic, historical data record, auto adjust the phase sequence, phase loss protection and overcurrent protection. It is easy troubleshooting for the back-bit liquid crystal display to clearly show the failure message.

Powerful

The 16-bit absolute addressing mode and unique and novel braking technique make E920 series have high control accuracy. At the same time, E920 series support various on-off controlling such as ESD, interlocking, remote conditional control, support analog proportional modulating with various current and voltage and support Modbus and other fieldbus control.

Structure

▸ Motor

The low inertia high torque motor geared with the worm shaft can be dismantled and maintained easily.

▸ Terminal box

Separate double sealed terminal box ensures the good tightness even when the terminal cover is removed during site wiring.

▸ 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.

▸ Control unit

It includes mainboard, power module, display unit, auxiliary control module, reversing motor starter, etc. The hardware design has features of high integration and good coordination.

▸ Display screen

The highlight dot-matrix LCD screen makes for clearly displaying and easy reading and also supports multi-language display.

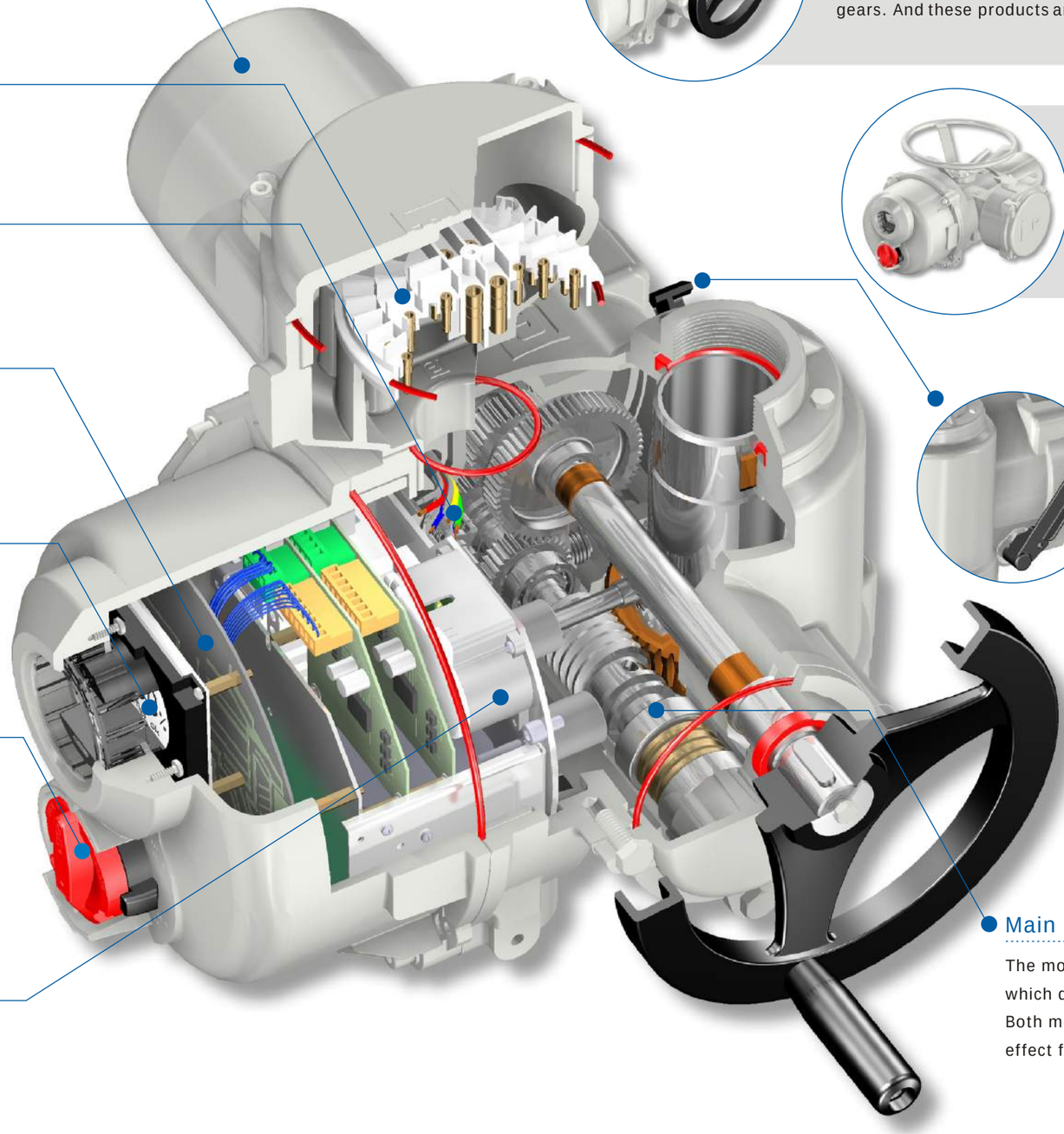
E920 series have a rechargeable battery auto charged in actuator to display the equipment state in case of power-off.

▸ Local operation

- A lockable "Local/Stop/Remote" selector switch and an "Open/Close" switch are provided for setting parameters.
- The magnetic reed switch is not designed with through shaft which would have to be sealed.
- The two switches are coaxial mounted, so one hand can complete all operations.

▸ Limit switch

16-bit absolute encoder makes the valve position data be saved in the event of manual operation during loss of the power supply.



For the products with the larger output torque, begin with E9202, a side mounted handwheel with small force is provided for driving the drive sleeve by the double reduction mechanism of spur gear pair and worm-gears. And these products are self-locking even manual operating.

For E9201, 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: E9201 is not self-locking when manual operating for the direct-connected operation mode.

▸ The hand/auto lever

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

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

Standard

Ordinary products Comply with GB/T28270《Intelligent valve electric actuator》.

Ambient temperature

Standard: -25℃ ~ +70℃ , Explosion-proof: -20℃ ~ +40℃.

Degree of protection

Standard IP67 (GB4208) : Protection from dust and submersion in water to a depth of 1m for 30 minutes.

Options IP68 (GB4208) : Protection from dust and submersion in water to a depth of 3m for 48 hrs.

Ex degree

The Ex degree of E920 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 the lubricating grease periodically.

Power supply

Standard Three phase three wire system 380V/50Hz AC power supply. The product can work normally in the condition of ±10% voltage vibration or ±5% frequency vibration.

Options 220VAC/50Hz/1ph power supply (Apply to 9201 unit).

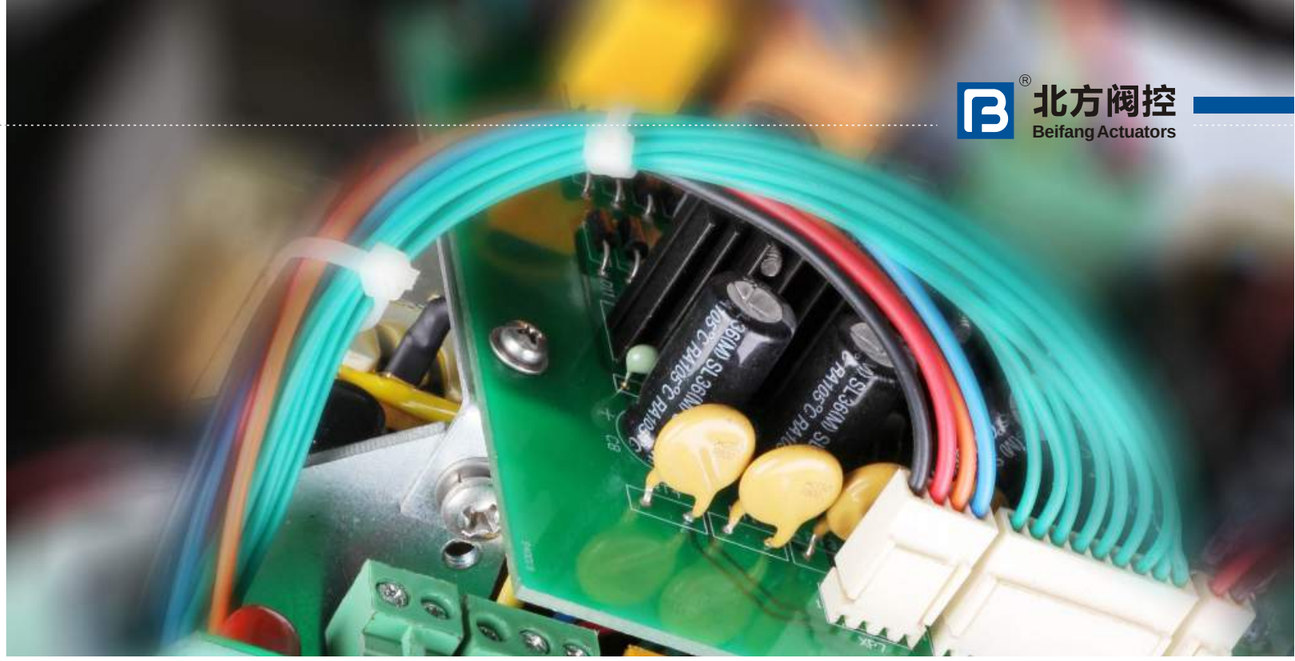
Cable gland

E920 series with separate double sealed terminal box supply three conduit entries: 2×1" NPT and 1x1$^{1}/_{2}$" NPT. An additional conduit entry $^{3}/_{4}$" NPT may be supplied if need.

Motor

E920 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:

- 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.
- 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

E920 series supplied a handwheel for manual operation in the event of adjusting or a power supply failure. The electric priority hand/auto switch is adopted for E920 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 E9201 is installed on the drive sleeve.

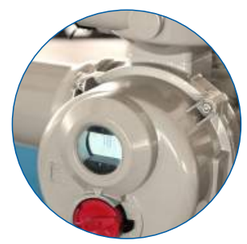
The clutch of E9202~E9206 with small force is installed on the worm shaft, and these products are lockable in the state of manual operation.

Limit switch

The turns of the drive sleeve are transmitted to the 16-bit photoelectric absolute encoder. Please see the "main parameter" for the travel range and minimal output angle.

Torque switch

The control system reads the axial displacement of the worm shaft on the precise potentiometer. The control accuracy is ±3% rated torque.



Infra-red setting tool

Historical data record

The operating and alarm data can be saved for the equipment maintenance.

Parameter set

All parameters could be set by the infra-red setting tool, local switches and upper computer.

Infra-red setting tool

The infra-red setting tool is supplied for setting and remote controlling.

- Waterproof grade: Ip65;
- Ex-proof grade: Ex ib IIC T4 Gb （intrinsic safety);
- Valid operating distance ≤ 0.75 m

Local operation

Two coaxial mounted magnetic switchs are provided, one is a local/stop/remote selector switch, and the other is an open/close switch.

- The local/stop/remote selector switch can be locked in three modes to prevent from mistaken operation .
- The open/close switch can be inching or keeping operated(the operating mode is settable), and it will auto back to the middle position if released.

Remote open/close operation

Varies remote control mode could be achieved by different wiring.

- 2-wire: Operate the valve open or close through single excitation signal and can not stop during running.
- 3-wire: Inching operate the valve through open and close signal.
- 4-wire: Operate the valve through open, close and stop signal.

ESD signal

E920 series supply terminals for ESD signal. The ESD process mode could be set for full open, full close or keep and could be set to override motor overheat protect, local stop, external interlock, and so on. It also could be set to high level valid or low level valid.

The function of eliminating valve jam

E920 series can be provided with the function of "eliminating valve jam". If the valve is not in full open or full closed position while an "over torque" signal is detected during the operating of the valve, E920 series will try to eliminate valve jam: Operate the valve to rotate in a reverse direction for 1 second and then in a normal direction, the instantaneous high torque generated by the hammer function will try to eliminate valve jam. After repeating the process three times, if the "over torque" signal still exist, an warning signal will be feedback.

Interlocking operation

E920 series supply terminals for interlocking open and close. Its working mode can be set to:

-
- " " " "
" " " "

Remote proportional modulating control (options)

E920 series can proportionally modulate valves by receiving analog signals. In case of signal lost, the valve could be set to move to: fully open, fully close or keep in place.

- Signal ranges (select by parameter setting): 4~20 mA, 0~20 mA, 0~10 mA, 0~5mA, 1~5 VDC, 0~5 VDC, 0~10 VDC, 0~20VDC.
- Control accuracy: It is higher than 1% when the travel range is more than 5 turns. It is higher than 0.1% when the travel range is more than 50 turns.

Analog feedback outputting

- A group of valve position signals: 4~20mA, 0.5% linearity.
- A group of torque feedback signals: 4~20mA, 0.5% linearity.

On-off outputting

Standard: Provide 4 configurable magnetic latching relays that can feedback the valve position or fault signals in case of power-failure. Provide a passive supervisory relay to monitor and feedback the working state of units. Capacity of each contact is 5A 250VAC.
Options: Add 4 additional magnetic latching relays.

Anti-water hammer (Two speed control)

E920 can be set to two speed controlled, which can eliminate the "water hammer" effect with intermittent way. The open/close running and stopping time can be set freely.

Fieldbus (options)

With RS485 interface, support Modbus fieldbus agreement.

Main parameters

Output parameters

Model	E9201 / E9201Ex											
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

Model	E9202 / E9202Ex						E9203 / E9203Ex					
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	600	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

Model	E9204 / E9204Ex						E9205 / E9205Ex					
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	61:1				2500	3.0	85:1
18	800	1.5	51:1	1200	2.2	51:1	1800	3.0	73:1	2450	4.0	73:1
24	900	2.2	51:1	1200	3.0	51:1	1800	4.0	73:1	2500	5.5	73:1
36	700	2.2	51:1	900	3.0	51:1	1200	4.0	73:1	1700	5.5	73:1
48	700	2.2	25:1	900	3.0	25:1	1300	4.0	37:1	1800	5.5	37:1
72	500	2.2	25:1	700	3.0	25:1	900	4.0	37:1	1200	5.5	37:1

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

Note 2: The output torque is the setting torque at the factory. Stall torque will be 1.1~1.5 times this value instantaneously.

Note 3: 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 4: If the output speed is 48 or 72 r/min , the actuator is unlockable.

Mechanical parameters

Model		E9201 / E9201Ex		E9202/E9202Ex	E9203/E9203Ex	E9204/E9204Ex	E9205/E9205Ex
Travel range	Turns	1600	1600	1600	1800	1800	1800
Minimal output angle	Degree	9.5	9.5	9.5	10.8	10.8	10.8
Allowable Thrust	kN	35	70	120	180	240	350
Weight	kg	47	47	62	85	115	195

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

Motor parameters

E9201 / E9201Ex				E9202/E9202Ex		E9203/E9203Ex		E9204/E9204Ex		E9205/E9205Ex	
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	0.37	2.3	0.37	2.3	0.55	2.8	1.5	4.8	3.0	9.0
0.12	0.9	0.55	2.8	0.55	2.8	0.75	3.5	2.2	6.5	4.0	11.0
0.18	1.2			0.75	3.5	1.1	4.5	3.0	9.0	5.5	13.5
0.25	1.4			1.1	4.5	1.5	4.8				

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

Model and specification

Model

E9202 Ex

	Base No.
Null	Ordinary type (non-ex-proof)
Ex	Ex-proof type

Specification

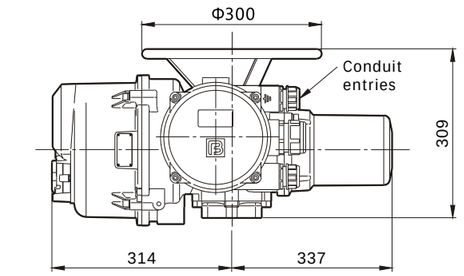
E9202Ex • 30 - 18 T 8 S : C631 : F14Y10

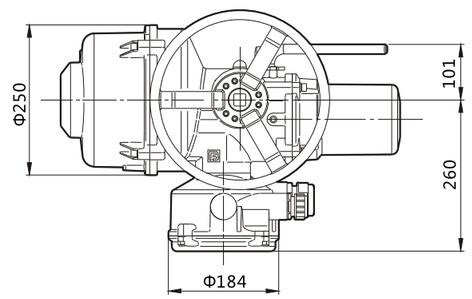
	Connection ways and code for valve
	Wiring diagram
	Power supply:
Null	Three-phase AC power supply
S	Single-phase AC power supply
D	DC power supply
	Degree of protection: (if the former one is a letter, omit "P")
Null	IP67
P8	IP68
	Working mode and functions:
Null	Open-close type
T	Modulating type
N	Fieldbus type (Open-close)
M	Fieldbus type (Modulating)
	Output Speed, r/min
	Output torque, x10Nm
	Model

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

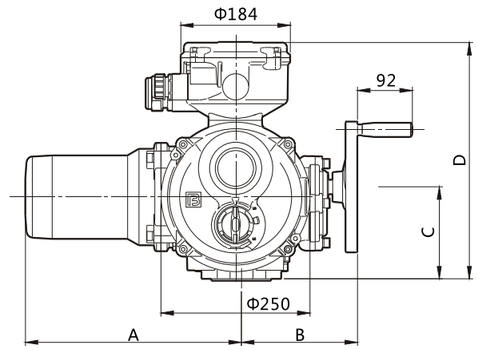
Overall dimension

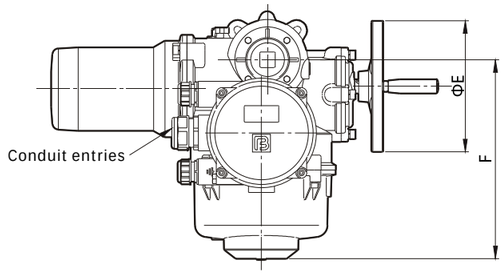
E9201 / E9201Ex





E9202~E9205 /E9202Ex~E9205Ex





	A	B	C[1]	D[1]	E	F
E9202 /E9202Ex	253	199	155	397	220	334
E9203 /E9203Ex	403	242	176	416	320	356
E9204 /E9204Ex	441	273	183	422	400	376
E9205/E9205Ex	533	331	206	456	500	417

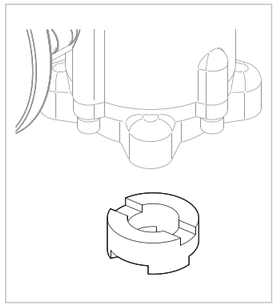
Note 1 : The value changes with the joint flange.

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.

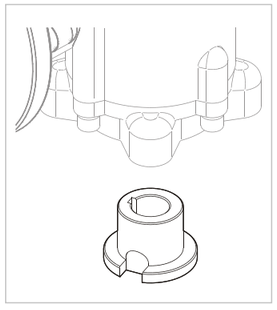


Type Z connection

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.

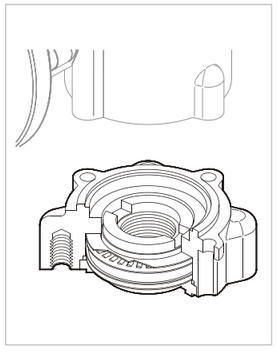


Type T connection

Type T connection is for the application of withstanding thrust.

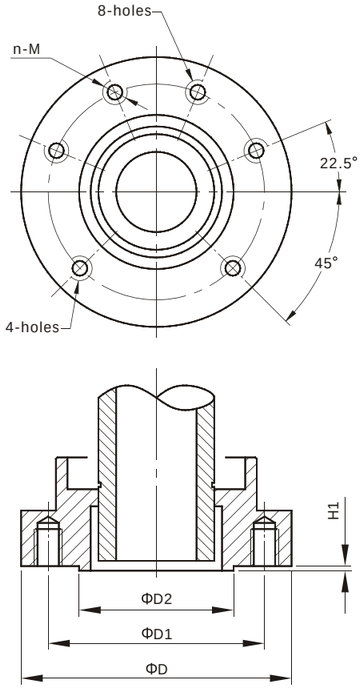
The thrust components which are used for transmission of torque and withstanding thrust are mounted to the outputting end to connect to the valve. The integral sealed thrust components filled with grease consist of thrust base, copper stem nut, upper and lower thrust bearing, etc.

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



Mounting dimension

Joint flange



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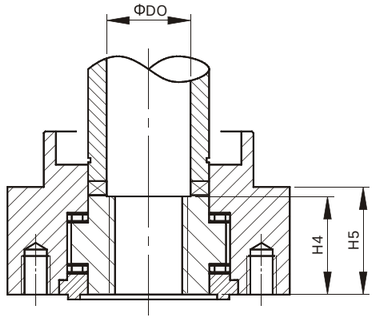
Flange code	D	D1	D2	H1	n	M
F07	90	70	55	3	4	M8
F10	125	102	70	3	4	M10
F10A	125	102	70	3	4	M8
F14	175	140	100	3	4	M16
F16	210	165	130	3	4	M20
F25	300	254	200	5	8	M16
F30	350	298	230	5	8	M20
J 10	115	95	75	凹5	4	M8
J 12	145	120	90	凹5	4	M10
J 16	185	160	125	凹5	4	M12
J 20	225	195	150	凹5	4	M16
J 25	275	235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

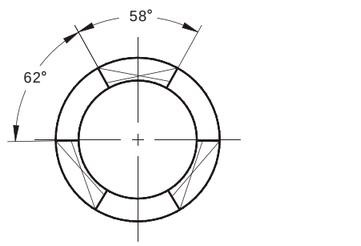
E9201 E9201Ex		E9202 E9202Ex	E9203 E9203Ex	E9204 E9204Ex	E9205 E9205Ex
F07, F10	F10	F14	F16	F25	F30
F10A	F10A	J12	F14	F16	F25
J10	J10	J16	J20	J20	J25
J12	J12			J25	J30

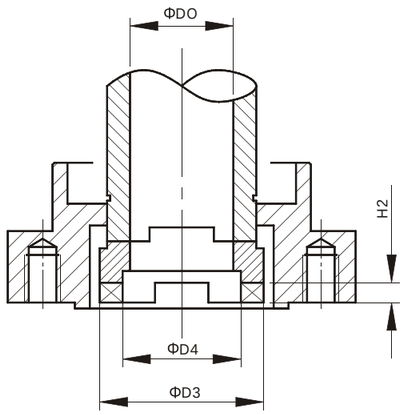
Type T (stem nut)



	E9201 E9201Ex		E9202 E9202Ex	E9203 E9203Ex	E9204 E9204Ex	E9205 E9205Ex
H4	57	57	60	75	75	100
H5	62	62	78	93	100	126
Max-dia. Of stem D0	26	36	48	60	75	95

Type Y (plug)





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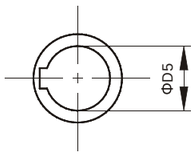
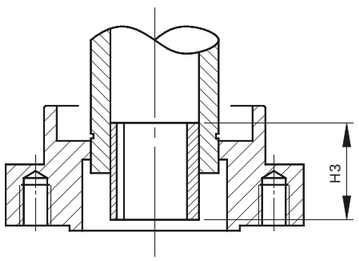
Plug code	D3	D4	H2
Y04	32	22	6
Y05	38	28	7
Y06	44	30	8
Y08	55	42	10
Y09	72	46	12
Y10	72	50	12
Y12	78	60	12
Y13	86	67	12
Y14	93	70	12
Y15	95	75	12
Y16	99	81	12
Y20	126	102	16
Y22	135	111	13

	E9201 E9201Ex		E9202 E9202Ex	E9203 E9203Ex	E9204 E9204Ex	E9205 E9205Ex
Max. optional plug	Y08	Y08	Y10	Y13	Y16	Y22
Max-dia. Of stem D0	26	36	48	60	75	95

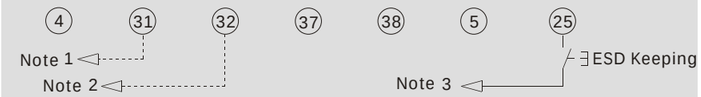
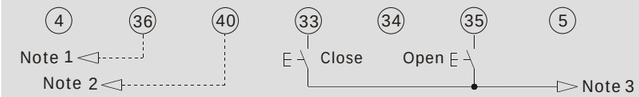
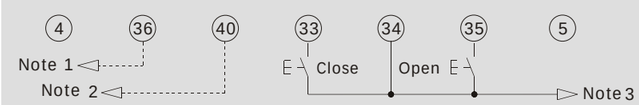
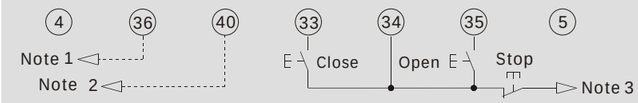
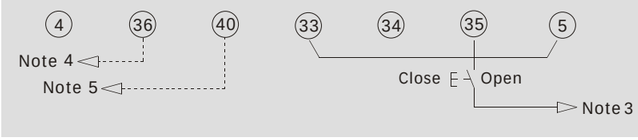
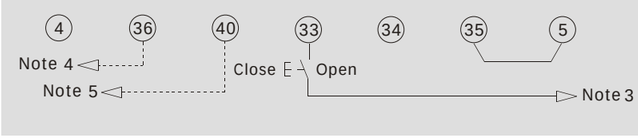
Type Z (key joint)





	E9201 E9201Ex	E9202 E9202Ex	E9203 E9203Ex	E9204 E9204Ex	E9205 E9205Ex
Max. Diameter D5	25	36	45	60	78
H3	38	44	68	90	110

Reference wiring

Emergency protection (ESD)	
Interlocking control	
Open/close inching control	
Open/close keeping Reversible during travelling	
Open/stop/close keeping	
2-wire control Excitation open and non-excitation close (Open priority)	
2-wire control Excitation close and non-excitation open (Close priority)	

Introduction :

Note 1: Short with terminal ④ in the case of internal electricity supply. Connect to one end /the negative electrode in the case of 20~60VAC/DC external power supply.

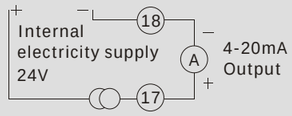
Note 2: Connect to one end in the case of 60~120VAC external power supply.

Note 3: Short with terminal ⑤ in the case of internal electricity supply. Connect to the other end /the positive electrode in the case of external power supply.

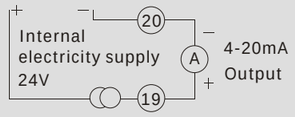
Note 4: Short with terminal ④ in the case of internal electricity supply. Connect to one end /the negative electrode in the case of 20~60VAC/DC external power supply and short with terminal ④ at the same time.

Note 5: Connect to one end in the case of 60~120VAC external power supply and short with terminal ④ at the same time.

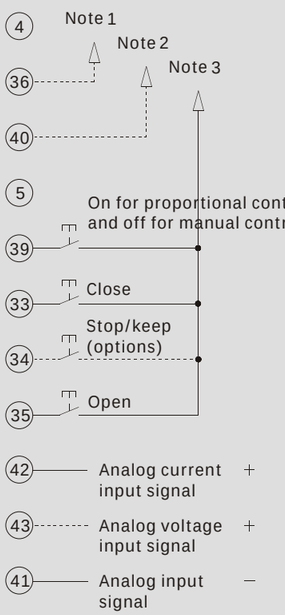
Remote valve position signal feedback



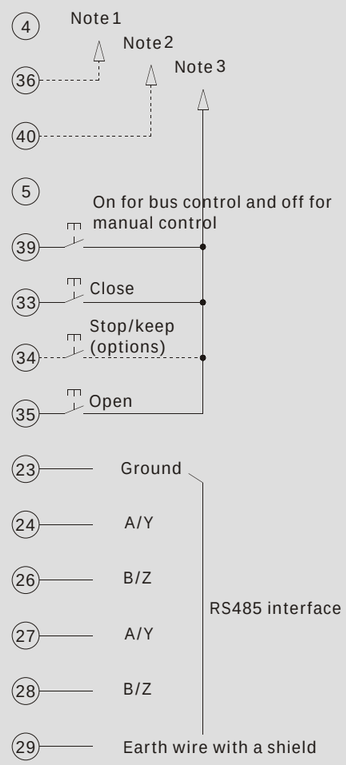
Remote valve position signal feedback



Analog proportional control and remote manual control



Bus control (Modbus) and remote manual control



Introduction :

Note 1: Short with terminal ④ in the case of internal electricity supply. Connect to one end /the negative electrode in the case of 20~60VAC/DC external power supply.

Note 2: Connect to one end in the case of 60~120VAC external power supply.

Note 3: Short with terminal ⑤ in the case of internal electricity supply. Connect to the other end /the positive electrode in the case of external power supply.

E920

Series Intelligent Electric Actuators

▶ For Multi-turn Application