

KELMO[®] EX Series

Electric Actuators for Ball and Butterfly Valves



Next-Generation Electrical Actuator

Realization of Upgraded General-Purpose Actuators EXSERIES

The modularization and adoption of the common parts have brought significant advantages to the EXS and EXH series, such as the following:

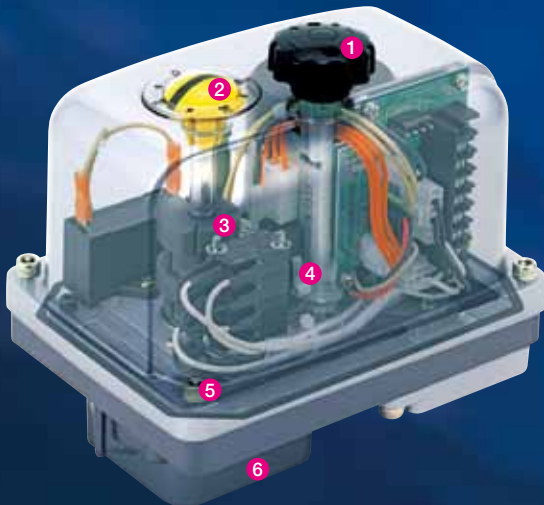
Better cost performance

Compared with other equivalent actuators, EXS and EXH are superior in terms of specification and performance.

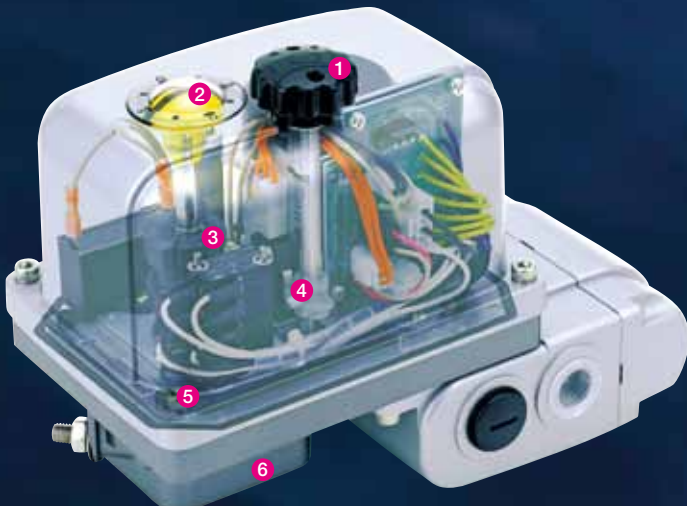
Instant option availability

EXS and EXH can be used in various applications by simple instant replacement of the module parts and exchangeable extension circuit boards.

Improvement in operability and maintenance



EXH: High-speed actuator for ball valves



EXS: Standard-speed actuator for ball and/or butterfly valves

Simplicity

In addition to the modular construction and adoption of common parts, the highly visible position indicator and manual handle contribute to easy and speedy maintenance.



Manual override

The actuator can be manually operated using the easy-to-use round handle. Auxiliary hexagonal wrenches will make operation easier.



Position indicator

The actuators come with a highly visible position indicator with a transparent cover as standard.



Precision adjustable cam / Standard auxiliary limit switch

The cams can be adjusted to precise positions. Two auxiliary limit switches, in addition to two standard limit switches, are provided, which can be used for the output signal with a voltage that users can select. Two more auxiliary limit switches or a potentiometer can be added as an option. Special limit switches are available for extremely small amperage requirement. (50 mA or smaller).



Interlock switch

The interlock switch cuts off the power supply when pulled up, which ensures safe manual operation. The manual mode is indicated by the output signal.



Stainless steel exterior bolting

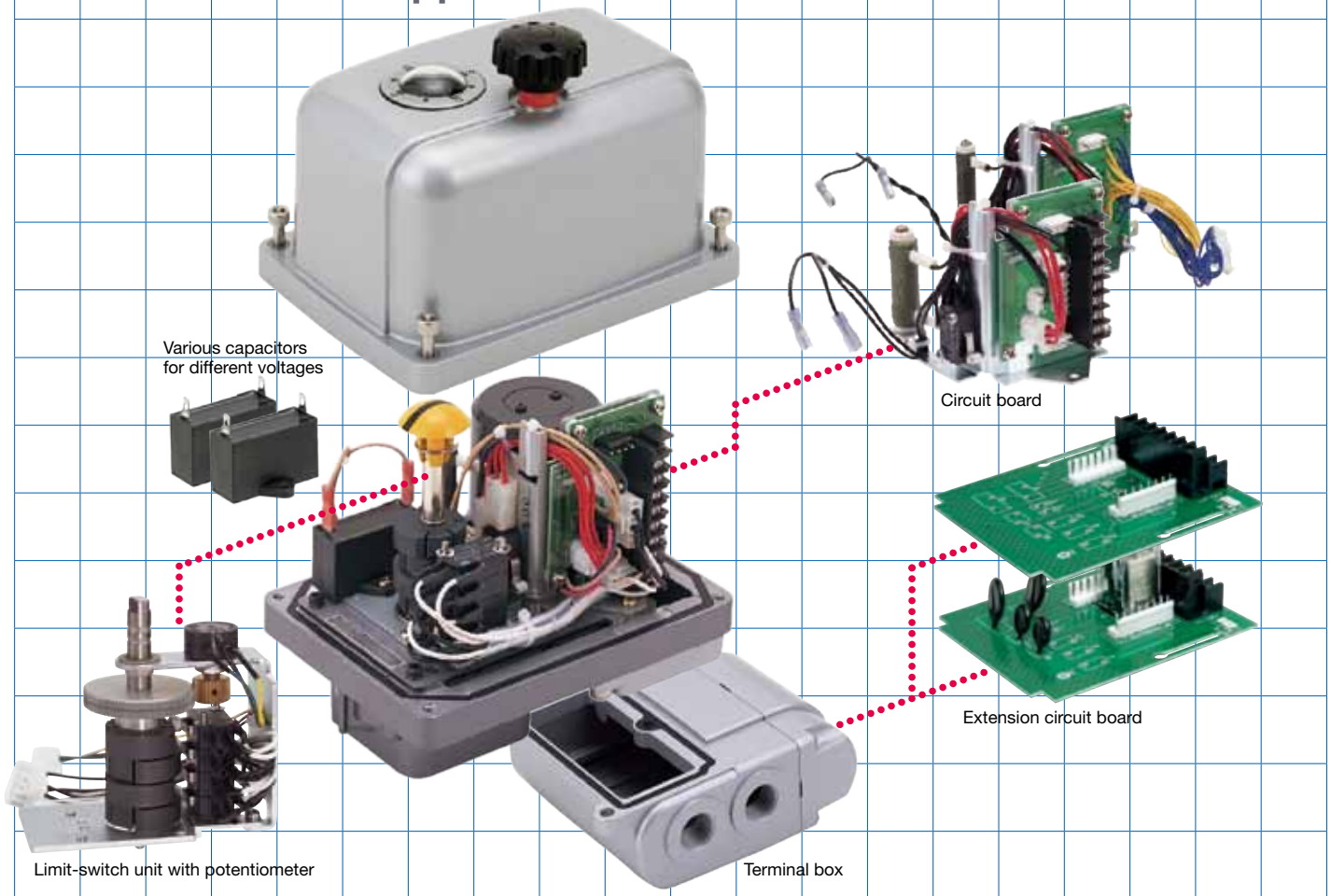
All bolts used outside the actuator are made of stainless steel. Combined with the adoption of fall-off-proof bolts, the actuator features high durability and reliability suitable for long service life.



Adoption of planetary gear

A planetary gear is used in the output reduction gear system, which enables achievement of a high reduction ratio with compact design.

The adoption of common parts and part modularization allows flexible modification, which widens the applications of the actuator.



Optional Specifications

Power supply

EXH EXS

AC 110 V 50/60 Hz

AC 115 V 50/60 Hz

AC 120 V 60 Hz

AC 220 V 50/60 Hz

AC 230 V 50/60 Hz

AC 240 V 50 Hz

AC 115 V 50 Hz, AC 120 V 60 Hz, AC 230 V 60 Hz, and AC 240 V
The allowable fluctuation in the supply voltage is limited within between -10% and +5% for 50 Hz.

Relays

EXH EXS

Relays (on/off by a-contact) can be provided in the actuator using extension circuit boards

Limit-switch specifications

EXH EXS

Contact for micro load (minute electrical current)
The two standard limit switches can be replaced by optional limit switches for micro load (minute electrical current)

Potentiometer output

EXH EXS

135 Ω (Coil type)

500 Ω (Coil type)

The valve opening degree is indicated by the resistance value.

Auxiliary limit-switch specifications

EXH EXS

Two more additional limit switches can be added.

Switches for micro-load application are also available.

Including the four standard limit switches, a total of six switches can be used.
(In case a potentiometer is used, a maximum of four limit switches can be used.)

Terminal box

EXH

G1/2 two conduit ports

G3/4 one conduit port

NPT1/2 two conduit ports

NPT3/4 one conduit port

M20 one conduit port

The terminal box with two G1/2 conduit ports is equipped as standard for the EXS type.

For the EXH type, use of the terminal box allows the actuator to be connected to cables without removing the cover and to extend the actuator functions using optional circuit boards.

Conduit port

EXH EXS

G3/4, NPT1/2, NPT3/4, M20

Specification

High-Speed Type for Ball Valves	EXH100/200-1	EXH100/200-2	EXH100/200-3	EXH100/200-4	EXH100/200-5	
Standard-Speed Type for Butterfly and Ball Valves	EXS100/200-2	EXS100/200-3	EXS100/200-4	EXS100/200-5	EXS100/200-5	
Power supply	100/200 V AC ±10% 50/60 Hz					
Output torque (Nm)	9.8	49	196	588	1000	
Rated current (A) *1	100 V AC	0.65	1.2	2.8	2.8	
	200 V AC	0.35	0.35	0.6	1.5	1.5
Motor type	Reversible					
Motor output (rating) (W)	16	16	31	85	85	
Rotation direction	Tune clockwise to close and counterclockwise to open the valves					
Duty factor (%ED) *2	30	30	30	30	30	
Valve closing time (s) *3	EXH 50 Hz	9	14	21	28	49
	EXH 60 Hz	8	12	17	23	41
	EXS 50 Hz	—	25	35	49	49
	EXS 60 Hz	—	21	30	41	41
Space heater volume (W)	15	15	15	15	15	
Position limit switch*4	Two switches with no supplied voltage					
Switch contact voltage	250 V AC 2 A least resistance load					
Insulation class	JIS Class E, Strength: 1500 V AC 1 min. or 1800 V 1 s., Resistance: 100 MΩ minimum at 500 V DC					
Overload protection	Thermal protection					
Service environment	Indoor/Outdoor (submergence and direct sunlight must be avoided)					
Waterproof and dustproof	Equivalent to IP 67					
Ambient temperature	From -10°C to +50°C					
Conduit ports	EXH	One G1/2				
	EXS	Two G1/2				
Mounting position	From vertical position to horizontal position (no downward position)					
Manual operation	Pull up the manual override handle knob for manual operation, which will activate the built-in interlock switch to cut off the power supply. To restore electrical operation, push down the handle knob.					
Mechanical stopper	EXH	Mechanical stoppers are installed in the open and closed position. The stoppers can be adjusted by 7° in both positions				
	EXS	The mechanical stoppers, which can be adjusted in the closed position, are installed in the open and closed positions.				
Position indicator	The position indicator, covered by a transparent cover, is installed at the top of the actuator cover.					
Mounting flange	Meets the ISO 5211 requirement					

*1 When selecting a relay for driving an actuator, please be sure to consider that the actuator is a motor (inductive load). The life of contacts may be extremely degraded by the influence of transient rush current in excess of rated current. Please obtain for checking and studying, the relay specifications and durability data, etc., with regard to the inductive load, issued by the relay manufacturer.

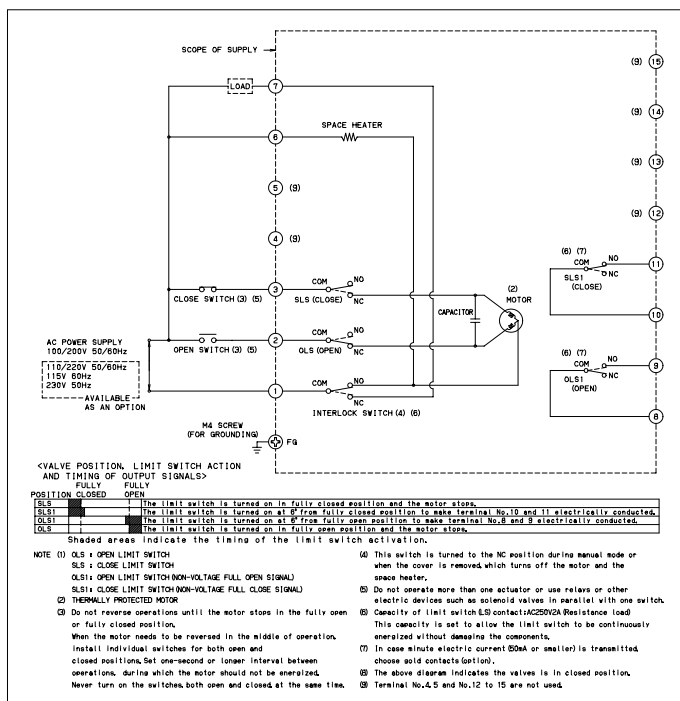
*2 Please ensure downtime of more than 2.5 times of open/close duration as a guide.

*3 The open/close time for no-load operation of a single actuator. The time for implemented use on a valve will be longer by 3% to 10%.

*4 If the minute load current less than 50 mA is used, please designate the gold contact version (option).

• The siloxane gas may be generated from silicon resin. Please avoid installing in a siloxane gas atmosphere because the contact fault of micro switches in the actuator may occur.

Circuit Diagram



Product Code

EX Series Product Code

EX □ □ — □

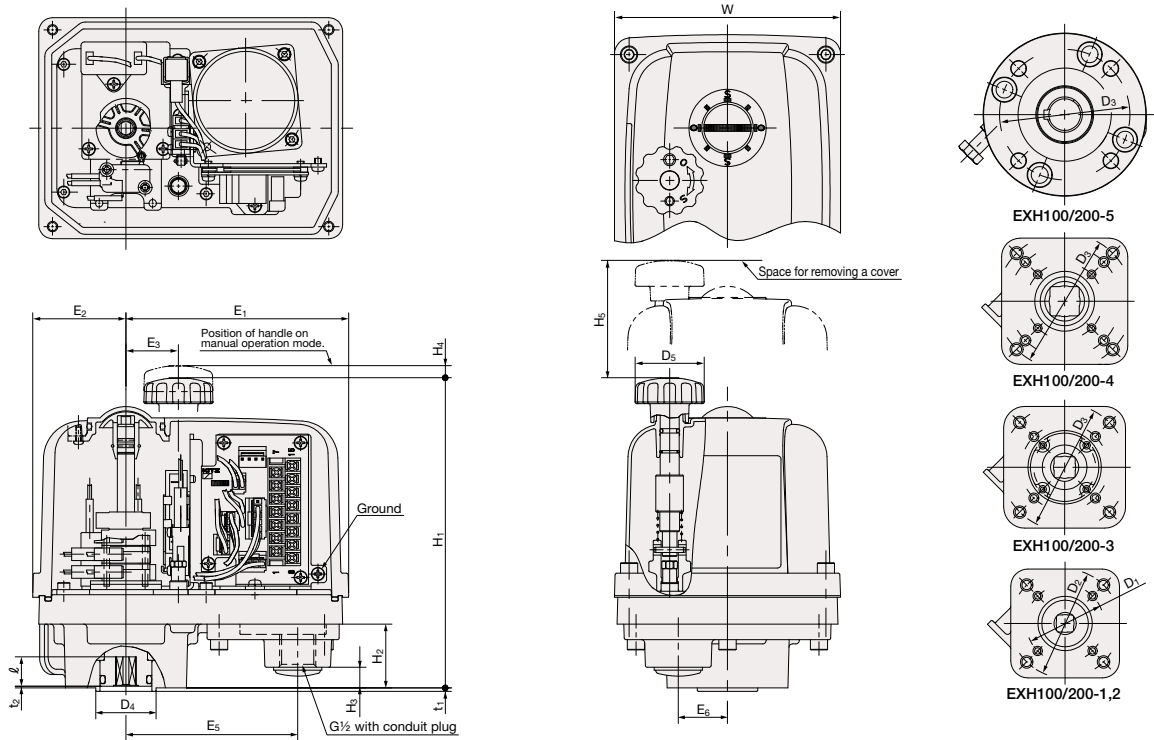
Actuator size
 EXH: 1 · 2 · 3 · 4 · 5 EXS: 2 · 3 · 4 · 5

Power supply
 100 : AC 100 V
 200 : AC 200 V

Type
 EXH: High-speed actuator for ball valves.
 EXS: Standard-speed actuator for ball and butterfly valves.

Dimensions

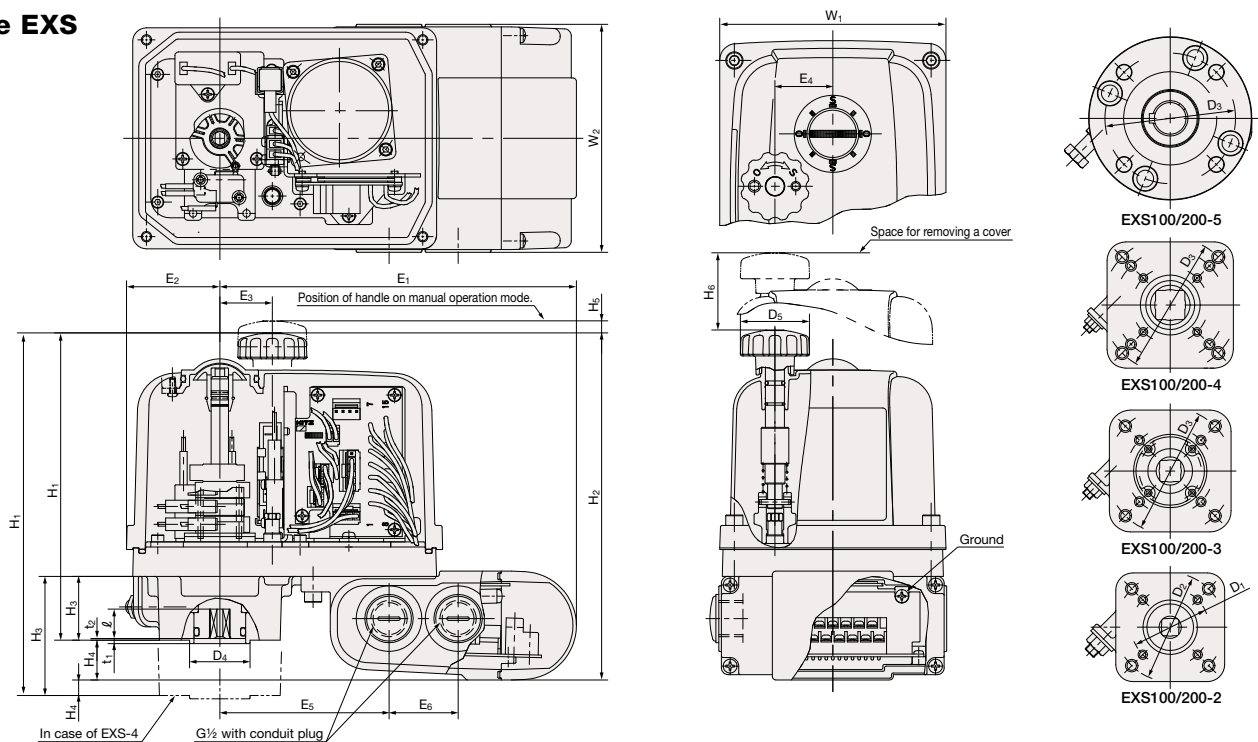
Type EXH



unit: mm

Type	E ₁	E ₂	E ₃	E ₄	E ₅	E ₆	W	H ₁	H ₂	H ₃	H ₄	H ₅	D ₁	D ₂	D ₃	D ₄	D ₅	ℓ	t ₁	t ₂
EXH100/200-1	129	54	30.4	33.5	99.5	28.5	131	181	37	12	10	107.5	50	70	—	35	40	16	2	1
EXH100/200-2	129	54	30.4	33.5	99.5	28.5	131	181	37	12	10	107.5	50	70	—	35	40	16	2	1
EXH100/200-3	152	69	45.1	42	123	28.5	158	206.5	44	19	10	117.5	50	70	102	55	60	25	2	1
EXH100/200-4	168	73	51.3	50	138.5	28.5	188	276	78	53	10	153	70	102	125	55	60	34	2	1
EXH100/200-5	168	73	51.3	50	138.5	28.5	188	357	159	134	10	153	—	—	140	100	60	65	3	—

Type EXS



unit: mm

Type	E ₁	E ₂	E ₃	E ₄	E ₅	E ₆	W ₁	W ₂	H ₁	H ₂	H ₃	H ₄	H ₅	H ₆	D ₁	D ₂	D ₃	D ₄	D ₅	ℓ	t ₁	t ₂
EXS100/200-2	206.5	54	30.4	33.5	98	40	131	132	181	204	37	23	10	107.5	50	70	—	35	40	16	2	1
EXS100/200-3	230	69	45.1	42	121.5	40	158	132	206.5	222.5	44	16	10	117.5	50	70	102	55	60	25	2	1
EXS100/200-4	245.5	73	51.3	50	137	40	188	132	276	258	78	18	10	153	70	102	125	55	60	34	2	1
EXS100/200-5	245.5	73	51.3	50	137	40	188	132	357	258	159	99	10	153	—	—	140	100	60	65	3	—

Actuator Sizing

● Sizing condition: Ball valve

Service Condition	Fluid	Clean Fluid	Highly Viscous Fluid *2	Foreign Particles Included *3
Fluid type	Water, Lubricant	Standard sizing	○	○
	Air, gas, or steam: 0.69 MPa or lower	Standard sizing	○	○
	Solvents *1	○	○	○
	Vacuum or oil-free service	○	○	○
Service temperature	The service temperature shall be limited by the seat material of the valve			

* Contact KITZ for actuator sizing, where mark ○ is indicated.

*1 Solvents, such as kerosene, naphtha or alcohol.

*2 Viscosity ranges from 10000 to 50000 CP.

*3 Inclusion of powder and slurry.

● Sizing condition: Butterfly valve

Fluid type	Smooth fluid (clean water, lubricant, etc.)
Velocity (liquid)	3 m/s or slower

*Contact KITZ for advice under the following conditions:

-Service conditions do not meet those specified above.

-Valve operation is interrupted for more than three months.

Type/Bore	Shell Materials	Class	Connection	Product Code	Size																	
					mm	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
					inch	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14	16
Ball valve/Full bore	Cast iron	JIS 10K	Threaded	10FCT	[Color-coded area]																	
			Flanged	10FCTB																		
			10STBF																			
	Ductile iron	JIS 10K	Flanged	10STBF	[Color-coded area]																	
				10UT																		
	Stainless steel /Carbon steel	Class 150	Flanged	150UTDZ	[Color-coded area]																	
				150SCTDZ																		
				10UTDZ																		
				10SCTDZ																		
				300UTDZ																		
300SCTDZ																						
20UTDZ																						
20SCTDZ																						
Ball valve /Reduced port	Stainless steel	JIS 10K Class 150 JIS 20K Class 300	Flanged	150UTR	[Color-coded area]																	
				300UTR																		
	Carbon steel	JIS 10K Class 150 JIS 20K Class 300		150SCTR																		
				300SCTR																		
Ball valve /Full bore three way Ball valve /Full bore PFA lining	Stainless steel	JIS 10K	Flanged	10UTB4T(L)A ^{Note1}	[Color-coded area]																	
				10UTBLN																		
Butterfly valve	Aluminum	JIS 10K	Wafer	10XJME ^{Note2}	[Color-coded area]																	
				10XJSME ^{Note2}																		
	Ductile iron	JIS 16K BS PN16		10DJ																		
				16DJ, PN16DJ																		
	Stainless steel	JIS 10K JIS 16K		10UB																		
				16UB																		

* Maximum differential pressure: 0.5 MPa

(Note 1) Consult KITZ when the actuator is mounted on three-way ball valves. The pattern of flow directional form is limited.

(Note 2) Consult KITZ when the actuator is mounted on manual operation valves. Special parts are needed to mount the actuator.

Dimensions of flange

Actuator	ISO Flange	Diameter of Raised Face	Axis Side Length	Axis Depth
EXH-1	F05 + F07	35	□9	16
EXH-2	F05 + F07	35	□11	16
EXH-3	F05 + F07 + F10	55	□17	25
EXH-4	F07 + F10 + F12	55	□27	34
EXH-5	F14	100	φ38 key way (10×8)	65

Precautions

CAUTION

- Be sure to read and follow the instructions in the operating manual when handling the actuator introduced in this catalog.
- Handle the product carefully so that it may not fall or drop. Avoid any unnecessary mechanical impact.
- The indoor storage area of the product must be dust-free, with low humidity, and is well-ventilated.
- DO NOT remove protective cover until installation.
- DO NOT apply excessive load or step on the product, which may damage the product or cause personal injury.
- Allow sufficient room for manual operation or removal of the actuator cover when the valve is installed in the pipeline.
- If the actuator is exposed to sunlight or rainwater while in service, use appropriate protection for trouble-free operation. In addition, use insulation boards for the heat generated from the equipment around the actuator.
- Take appropriate measures against the possibilities of damage by briny atmosphere or snow or if freezing is expected.
- Avoid installing the valve where the actuator may be affected by vibration caused by other equipment such as pumps or engines.
- Before installation, clean the connecting pipes to remove any foreign objects such as sand, dust, or welding spatters.
- When threaded valves are screwed into pipes, apply a spanner to the ends of the valves on the side of the connecting pipe being inserted.
- For flanged valves, alternately tighten bolts at the end flanges in a star pattern to ensure proper fastening of the flanges.
- The actuator should not be mounted downward in any piping orientation.
- Flush the pipeline to remove foreign particles from the pipes.
- If cast iron or cast carbon steel valves are used in the water line, be aware that rust may develop in the valves, which may damage the ball seats and lead to operation failure. Pay extra attention on the valve selection and protection from rust.
- Connect cables correctly in accordance with the circuit diagram.
- Be sure to use a terminal base when connecting the cables.
- After connecting the cables, conduct an insulation resistance test to ensure its insulation.
- Ensure that the housing is securely sealed with sealing materials such as O-rings to prevent dust or water from entering the housing.
- DO NOT try to simultaneously operate two or more actuators using only one operating switch. Other electrical equipment should not also be operated at the same time with one operation switch.
- Ensure that the space heater is always activated to keep the interior of the actuator warm to protect against condensation, which may result in operational malfunction.
- Ensure that the actuator is powered off when use for manual operation.
- Allow at least 1-s interval when the direction of operation is reversed. Failure to follow this instruction may result in operation malfunction.
- If materials containing silicon are present in the environment, a contact failure may occur due to the generation of siloxane gas. DO NOT use the product in an environment containing siloxane gas.
- DO NOT use silicon-containing materials (electric wire, filler, and adhesive) when wiring because it may result in a contact failure due to the generation of siloxane gas.
- DO NOT make any unauthorized modifications. Such modifications may result in improper operation or accidents. We shall not be responsible for any troubles or accidents caused by improper use of the products.
- Refer to our catalogs for more details on the valve information.

WARNING

- This product is not designed for explosion-proof locations. DO NOT use it in any inflammable or corrosive gaseous environment. Further DO NOT use it for handling inflammable fluids.
- DO NOT disassemble the actuator while the unit is energized.
- DO NOT put your fingers or insert any foreign objects in the valve core before or during valve operation.

Liability Disclaimer

Our company does not assume responsibility for any damage caused by natural disasters, destructive actions by third parties, accidents, deliberate damage by customers, misuse, usage under abnormal conditions, and other conditions outside our expressed responsibility. We also do not assume responsibility for damages when the purchaser of our product fails to observe the restrictions described in the catalog, instruction manual, and manual included with the product as well as for any damage caused by usage outside the defined specifications during installation and use of our product. Further, our company does not assume any responsibility for damages caused by modification of the product done by parties other than our company and for damages due to the effects of other additional equipment not intended for our product.

CAUTION

Pressure-temperature ratings and other performance data published in this catalog have been developed from our design calculation, in-house testing, field reports provided by our customers and/or published official standards or specifications. They are good only to cover typical applications as a general guideline to users of KITZ products introduced in this catalog.

For any specific application, users are kindly requested to contact KITZ Corporation for technical advice, or to carry out their own study and evaluation for proving the suitability of these products to such an application. Failure to follow this request could result in property damage and/or personal injury, for which we shall not be liable.

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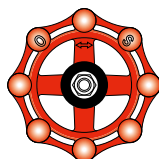
Read the instruction manual carefully before use.

NOTICE

If any products designated as strategic material in the Foreign Exchange and Foreign Trade Law, Cabinet Order Concerning Control of Export Trade, Cabinet Order Concerning Control of Foreign Exchange, and other related laws and ordinances ("Foreign Exchange Laws") are exported to any foreign country or countries, an export license issued by the Japanese Government will be required under the Foreign Exchange Laws.

Further, there may be cases where an export license issued by the government of the United States or other country will be required under the applicable export-related laws and ordinances in such relevant countries.

The contract shall become effective subject to the fact that a relevant export license is obtained from the Japanese Government.



*A chrysanthemum-handle is a symbol of KITZ,
the brand of valve reliability*

ISO 9001 certified since 1989

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