

# FSB 35 Fire-Safe Direct Mount 3-Piece

## Full Port Ball Valves

1/4" – 4" (DN8 – DN100)  
2000 psi (138 bar)



FIRE-SAFE



ANTI-STATIC



2014/68/EU



SAFETY

# Strong & Reliable

With the increasing demand of fire-safe ball valves, DIE ERSTE is proud to introduce the new Series FSB 35 Ball Valves. FSB 35 ball valves are most suitable where operational perfection is needed, especially in the event of a fire. DIE ERSTE FSB 35 ball valves assure bubble tight sealing and zero leakage in high pressure and fire conditions.

Series FSB 35 has been approved to API 607 4th Edition, with the combination of graphite sealing, secondary fire-safe contact, anti-static stem, and strong body bolts, Series FSB 35 ball valves offer secondary sealing for superior sealing effects. In high pressure condition, two sets of sealing rings are used to prevent leakage. In fire condition, the secondary sealing rings become the main sealing elements after the PTFE seats have been burnt away.

Anti-static devices are also installed on the stem. During the ball valve operation, static charge might build up between ball and seat, and can be potentially dangerous with inflammable fluids. To solve the problem, small metal ball and spring are used to discharge the static and maintain the electric continuity.

Instead of four long body bolts in the conventional three piece ball valves, FSB 35 ball valves use eight strong body bolts to secure connections between center piece and two side caps. For larger sizes, twelve body bolts are used. The tensile body bolts are screwed into the center piece for maximum closure, and also prevent expansion of the bolts.

## (A) ISO5211 Actuator Direct Mount

Square stem and twin ISO 5211 pattern mounting pad allow for easy actuator installation without bracket and adaptor.

## (B) Stem Packing

Self-adjusting stem packing assembly with Belleville washers for temperature variation, vibration, and security. In FSB ball valves, graphite stem packing is used to prevent leakage through stem.

## (C) Blowout-Proof Stem

The stem is inserted from inside the body bore. This particular design prevents the stem from shooting out when there is excess pressure in the bore caused by high temperature heat.

## (D) Anti-Static Device

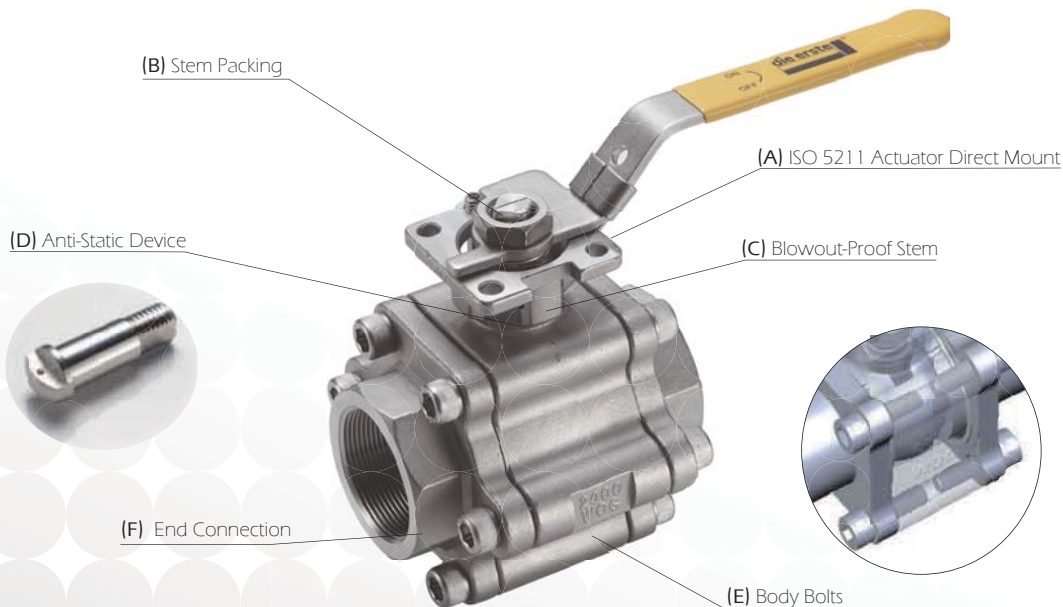
All FSB ball valves are equipped with Anti-static Device in the ball bore. This device provides a grounding path between the valve body and the ball for static electric charges.

## (E) Body Bolts

The hinge on the central body provides the alignment of body to the end connection. In FSB ball valves, eight body bolts are screwed into the body to secure the valve structure in high pressure environment. Twelve bolts are used for larger sizes of Series FSB 35 ball valves.

## (F) End Connection

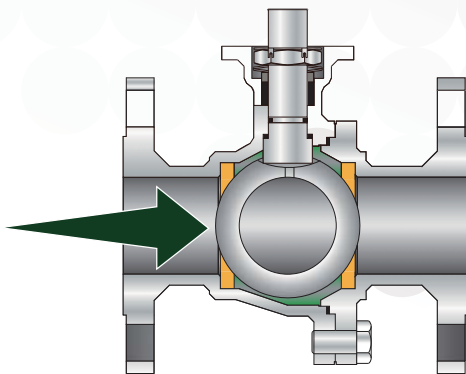
The Series FSB 35 ball valve is available with threaded end, butt-welding, socket-welding. Other connection type is available upon request.



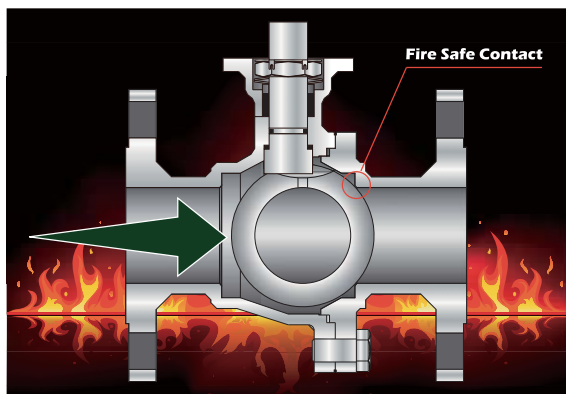
# Fire-Safe Design

## Fire-Safe Contact Surface

The end cap is specially designed and machined precisely to fit with the valve ball surface. During the event of fire, the soft ball seat may disintegrate in high temperature due to the nature of the material. Thus, the valve ball comes into contact with the fire-safe contact surface and forms a secondary metal-to-metal seal. The downstream flow pushes the floating ball to the side, and effectively seals the bore.



Before a fire



After a fire



## Seals and Packings

### Graphite Stem Seals and Packing

With the high temperature resistance property, graphite becomes the perfect material of choice for sealing parts. The graphite sealing rings are enclosed in a compartment and will not be in touch with the fluid. Therefore, regardless of the temperature and pressure, graphite seals stay immobile and continuously prevent leakage from or into the joined parts while under compression.

### Dual Body Seal

Series FSB 35 ball valves utilize two sets of body seals to prevent leakage. The inner body seal which are made with PTFE, for the purposes of avoiding graphite contamination in the fluid, though the chances are rare. The outer body seal is made with graphite material for fire-safe reason. Both seals are securely placed in the groove to avoid movements.

### Direct Mounting Pad

The dual ISO direct mounting pad allows precise and flexible mounting of actuator. Usually two sets of mounting holes are drilled for different actuator sizes. With the integrally cast top mounting platform, machined flat surface and square stem, the design ensures correct alignment of the actuator to effectively minimize the side-loading during high cycle or continuous duty applications. The well-supplied (air or electric power) actuation equipments can be removed safely and easily while the valve is under the line pressure.



## Direct Mount with Actuators

## CE Marking

The whole series of ball valves is approved according to European Directive 2014/68/EU.

### Vacuum

Standard Series 35 ball valves, can be rated to hold in part of the "Medium Vacuum" range to 52 TORR (mm of Hg) or 52000 microns in temperature ratings from -4°F to 350°F (-20°C to 180°C). Here only PTFE seats and seals are highly recommended for this vacuum service. Please consult with us for a customizing solution.

### Size Range

1/4"~4" (DN8~DN100)

### Standards

ASME B16.34, B16.25, B1.20.1  
 API 607, API6D, API 598  
 ISO 5211, ISO 5209, ISO 228-1, ISO 7-1, ISO 261, ISO 10497  
 DIN EN 10204, DIN 259/2999, DIN EN 10226  
 MSS SP-25, MSS SP-72  
 BS 5351

### Marine Application

Casting from Lloyd's or DNV approved foundry available upon request.

### Certifications of Series FSB 35:



API 607 Fire Test or Soft Seated Quarter Turn Valves



Canadian Registration Number



ATEX Directive 2014/34/EU Explosive Prevention



Low Emission Certified  
 TA-Luft 2002, Sec. 5.2.6.4  
 VDI 2440 2000, Sec. 3.3.1.3  
 Please inquire



SIL3 Capable  
 Please inquire



### Pressure Rating:

2000 psi (138 bar)  
 150 psi (10 bar) with saturation steam

### Temperature Range:

- 4°F to 392°F (-20°C to 200°C) with Carbon Filled Seat
- 4°F to 350°F (-20°C to 180°C) with RPTFE seat
- 4°F to 350°F (-20°C to 180°C) with PTFE seat

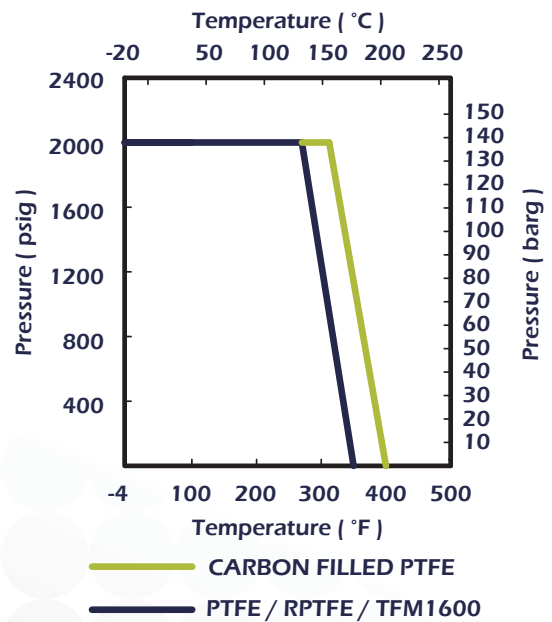
### End Connection:

- Female threaded to NPT, DIN 259/2999, and BS standards
- Butt-welding ends Sch80
- Socket-welding ends

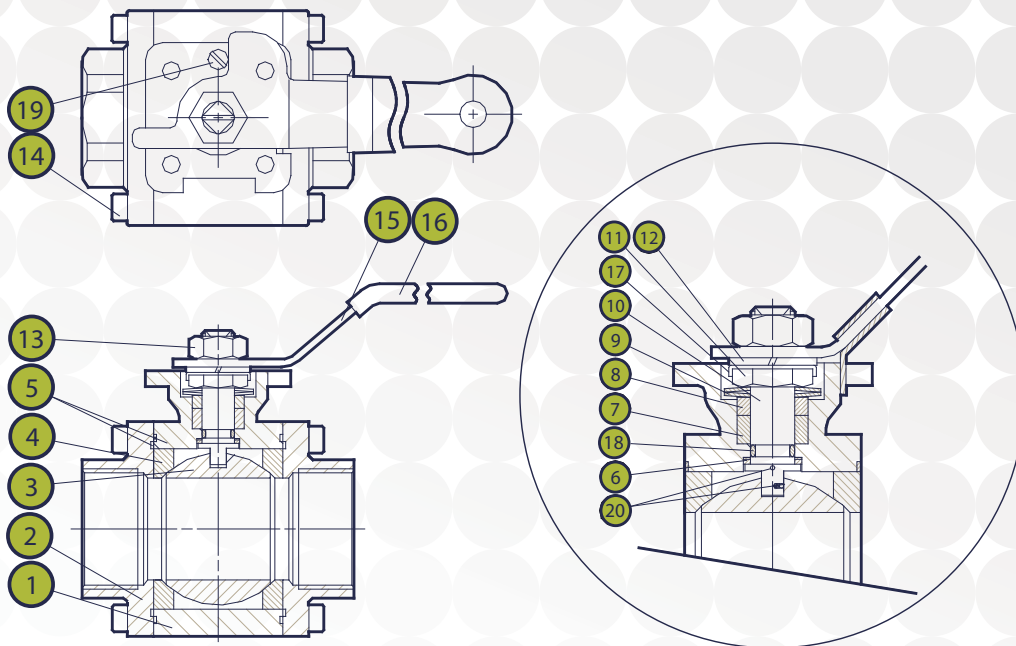
### Body Material:

ASTM CF8M, CF8, WCB  
 DIN 1.4408, 1.4308, 1.0619

### Pressure and Temperature Rating



This table express Seat material resistance as declared by the original manufacturers. The values are to be considered with other parameters such as size, seat design and temperature limitations as governed by relevant standards such as ASME B16.34 or EN-12516.



NO	PART NAME	MATERIAL
1	BODY	CF8M / WCB
2	CAP	CF8M / WCB
3	BALL	CF8M / CF8
4	BALL SEAT	TFM 1600 RPTFE PTFE
5	BODY SEAL	PTFE & GRAPHITE
6	THRUST WASHER	PTFE & GRAPHITE
7	STEM PACKING	GRAPHITE
8	GLAND	SS 304
9	BELLEVILLE SPRING	SS 301
10	STEM	SS 316 / SS 304

NO	PART NAME	MATERIAL
11	NUT	SS 304
12	SPRING WASHER	SS 304
13	NUT	SS 304
14	BOLT	A2-70 / ISO 898-1 12.9
15*	HANDLE	SS 304 / Zinc PLATED STEEL
16	HANDLE SLEEVE	VINYL
17	LOCK SADDLE	SS 304
18	O-RING	VITON
19	STOP PIN	SS 304 / ISO 898-1 12.9
20	ANTI-STATIC	SS 316

\*Round bar handle is provided for size 4" (DN100)

Size		Cv	Kv
inch	DN		
1/4"	8	6.3	5.4
3/8"	10	6.2	5.4
1/2"	15	20.9	18.1
3/4"	20	49.4	42.7
1"	25	81	70.1
1 1/4"	32	127.9	110.6
1 1/2"	40	191.5	165.7
2"	50	376	325.2
2 1/2"	65	642	555.3
3"	80	901	779.4
4"	100	1588	1373.6

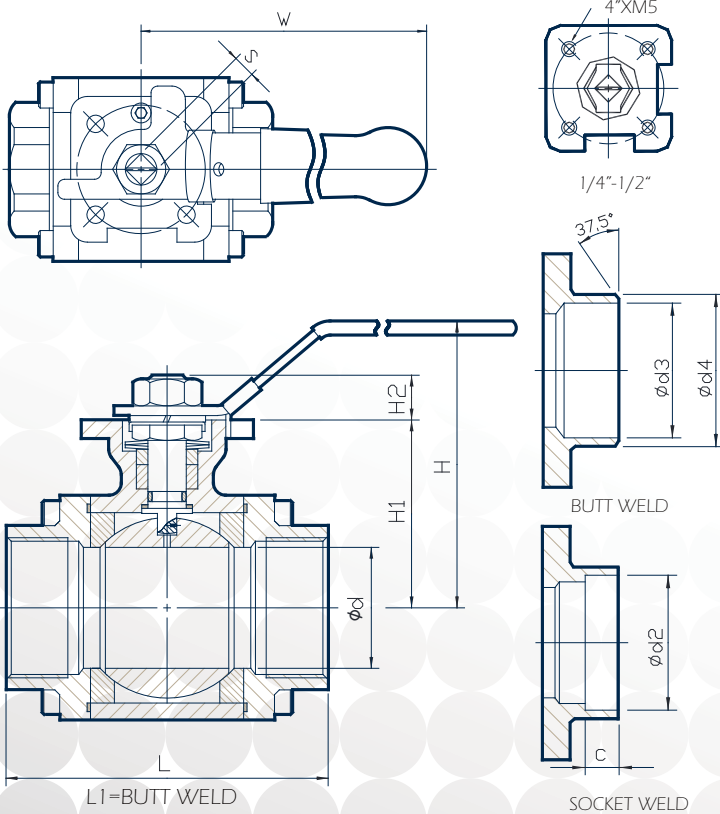
The left table represents the Flow Coefficients (Cv) and Flow Factor (Kv) for DIE ERSTE Series FSB 35 ball valves. This number represents the volume of water at 60°F that will flow in US gallon per minute through a valve with a 1 lb/in<sup>2</sup> pressure drop across in the full open position. For Kv, it is the flow of water with temperature from 5°C - 30°C in cubic meters per hour (m<sup>3</sup>/h) with a pressure drop of 1 bar.

$$Cv = F \sqrt{\frac{SG}{\Delta P}}$$

The Cv value is dependent on flow rate, pressure drop, specific gravity. The larger the Cv value, the easier the fluid will flow within the valve. However, Cv value is easily affected by various factors, such as fluid type, fluid viscosity, saturated steam pressure.

Dimensions inch/mm

SIZE inch DN	d	L	L <sub>1</sub>	H	W	H1	H2	S	d2	d3	d4	C	ISO 5211	Weight lbs Kg
1/4" 8	0.4 11	2.55 65	2.75 70	2.75 70	5.51 140	1.47 37.5	0.31 8	0.35 9	0.56 14.2	0.31 7.8	0.54 13.8	0.39 10	F04	2.2 1
3/8" 10	0.43 11	2.55 65	2.75 70	2.75 70	5.51 140	1.47 37.5	0.31 8	0.35 9	0.69 17.6	0.43 10.8	0.68 17.3	0.39 10	F04	2.2 1
1/2" 15	0.55 14	2.95 75	2.95 75	2.75 70	5.51 140	1.47 37.5	0.31 8	0.35 9	0.86 21.8	0.56 14.3	0.85 21.7	0.51 13	F04	2.2 1
3/4" 20	0.81 20.5	3.14 80	3.54 90	3.54 90	7.08 180	1.97 50	0.43 11	0.43 11	1.07 27.2	0.78 19.7	1.07 27.2	0.59 15	F04 F05	2.65 1.2
1" 25	1.00 25	3.54 90	3.93 100	3.93 100	7.08 180	2.36 60	0.43 11	0.43 11	1.33 33.9	0.98 25	1.34 34	0.59 15	F04 F05	4.63 2.1
1 1/4" 32	1.24 31.5	4.33 110	4.33 110	4.40 112	8.46 215	2.83 72	0.63 16	0.55 14	1.68 42.7	1.30 32.9	1.68 42.7	0.59 15	F07	7.28 3.3
1 1/2" 40	1.46 37	4.72 120	4.92 125	4.52 115	8.46 215	2.99 76	0.63 16	0.55 14	1.92 48.8	1.51 38.4	1.91 48.6	0.63 16	F07	9.92 4.5
2" 50	1.97 50	5.51 140	5.90 150	5.23 133	8.46 215	3.66 93	0.63 16	0.55 14	2.41 61.2	1.95 49.5	2.38 60.5	0.67 17	F07	15.87 7.2
2 1/2" 65	2.56 65	7.28 185	7.48 190	6.81 173	12.99 330	4.58 116.5	0.94 24	0.86 22	2.91 73.9	2.32 58.9	2.87 73	0.67 17	F07 F10	29.54 13.4
3" 80	3.15 80	8.07 205	8.66 220	7.24 184	12.99 330	5.00 127	0.94 24	0.86 22	3.53 89.8	2.90 73.6	3.50 89	0.67 17	F07 F10	46.3 21
4" 100	3.94 100	9.45 240	10.63 270	9.53 242	23.62 600	6.26 159	1.14 29	1.06 27	4.54 115.2	3.82 97.1	4.50 114.3	0.79 20	F10	75.84 34.4

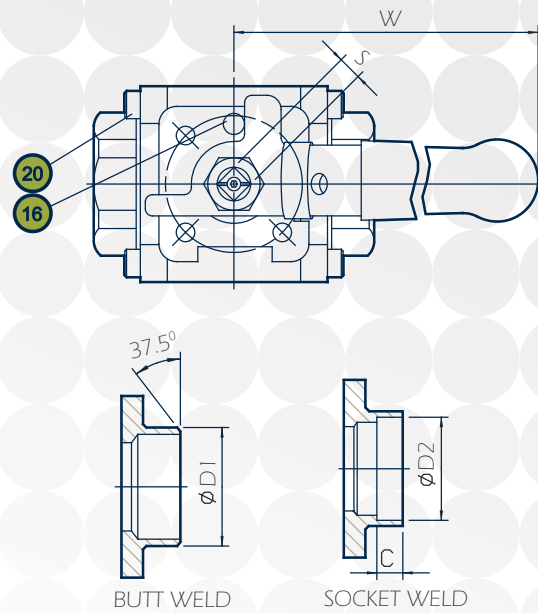
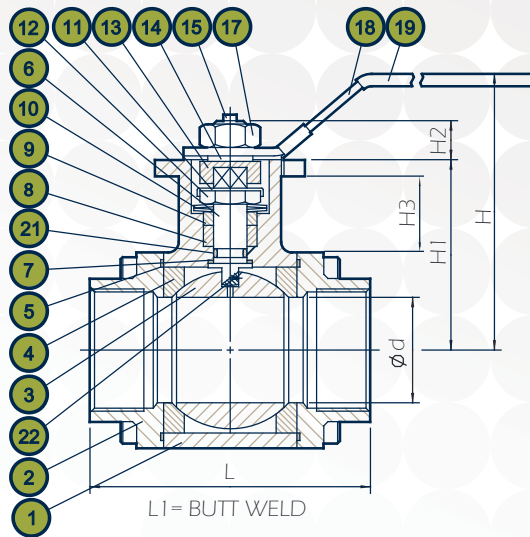


Valve Size inch	DN	Torque (N.m)	Torque (lbs.in)
1/4	8	13	70.8
3/8	10	13	70.8
1/2	15	13	70.8
3/4	20	19	97.4
1	25	25	142
1 1/4	32	28	204
1 1/2	40	36	292
2	50	45	354
2 1/2	65	85	637
3	80	96	752
4	100	185	1416

Note: Torque measured at ambient temperature with no loading; safety factor is not included.

**FSB 35-EXT (optional)**

To increase ease of actuator mounting for small-sized ball valves, FSB 35-EXT option has been created with extended length between body and mounting pad.



NO	PART NAME	MATERIAL
1	BODY	CF8M / WCB
2	CAP	CF8M / WCB
3	BALL	CF8M / WCB
4	BALL SEAT	TFM 1600 RPTFE PTFE
5	BODY SEAL	PTFE & GRAPHITE
6	STEM	SS 316 & SS 304
7	THRUST WASHER	PTFE & GRAPHITE
8	STEM PACKING	GRAPHITE
9	GLAND	SS 304
10	BELLEVILLE WASHER	SS 301

NO	PART NAME	MATERIAL
11	LOCK SADDLE	SS 304
12	GLAND NUT	SS 304
13	COUPLER	CF8
14	COUPLER WASHER	SS 304
15	COUPLER BOLT	SS 304
16	STOP PIN	A2-70 / ISO 898-1 12.9
17	HANDLE NUT	SS 304
18	HANDLE	SS304 / ZINC PLATED STEEL
19	HANDLE SLEEVE	VINYL PLASTISOL
20	BODY BOLT	A2-70 / ISO 898-1 12.9
21	O-RING	VITON
22	ANTI-STATIC DEVICE	SUS 316

**Dimensions inch/mm**

SIZE inch DN	d	L	L <sub>1</sub>	H	W	H1	H2	S	d2	d3	d4	C	ISO 5211	Torque lbs.in N.m	Weight lbs Kg
1/4" 8	0.4 11	2.55 65	2.75 70	3.31 84	5.51 140	2.03 51.5	0.35 9	0.35 9	0.56 14.2	0.31 7.8	0.54 13.8	0.39 10	F04	115 13	2.2 1
3/8" 10	0.43 11	2.55 65	2.75 70	3.31 84	5.51 140	2.03 51.5	0.35 9	0.35 9	0.69 17.6	0.43 10.8	0.68 17.3	0.39 10	F04	115 13	2.2 1
1/2" 15	0.55 14	2.95 75	2.95 75	3.31 84	5.51 140	2.03 51.5	0.35 9	0.35 9	0.86 21.8	0.56 14.3	0.85 21.7	0.51 13	F04	115 13	2.2 1
3/4" 20	0.81 20.5	3.14 80	3.54 90	4.09 104	7.08 180	2.52 64	0.43 11	0.43 11	1.07 27.2	0.76 19.4	1.07 27.2	0.59 15	F04 F05	168 19	2.87 1.3

Note: Torque measured at ambient temperature with no loading; safety factor is not included.

UHMWPE – Ultra High  
Molecular Weight Polyethylene



## Valve Seat Selection

Please contact your sales for more properties of materials

### Valve Seat Selection Guide

Seat Code	Description	Temperature Range
VIRGIN PTFE	The most common material of seat ring. With excellent chemical resistance, PTFE can be used almost in all media.	-20°C to 180°C (-4°F to 350°F)
RPTFE (15% GLASS FILLED PTFE)	Similar to PTFE, but offers higher pressure capacity while temperature is increasing. The material itself is harder than conventional PTFE. Please specify the application due to confusion with PTFE.	-20°C to 180°C (-4°F to 350°F)
CARBON FILLED PTFE	Specially used for steam and thermal oil, with low coefficient of friction. The chemical resistance is similar to PTFE and RPTFE. 15% carbon and 25% carbon are provided.	-20°C to 200°C (-4°F to 392°F)
S/S POWDER FILLED PTFE	Combined with the strength of stainless steel and lubricity of PTFE, 50% SS316 powder is added to 50% PTFE. Abrasion resistance of metal and higher pressure rating than RPTFE.	-20°C to 200°C (-4°F to 392°F)
TFM1600	TFM is a modified PTFE which reduces permeation to provide advantages for corrosive applications or those applications where PTFE is used as a barrier to protect against or contain aggressive chemicals.	-40°C to 180°C (-40°F to 350°F)
DELRIN	High pressure seat material. Delrin material is able to sustain pressure up to 5000 psig. However, it is not recommended to use in oxygen applications.	-20°C to 80°C (-4°F to 180°F)
PEEK	Highest pressure resistance. Excellent in recovery from deformation, and high degree of dimensional stability. High mechanical strength.	-20°C to 240°C (-4°F to 464°F)

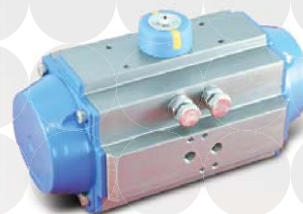


# Automation Accessories

## Pneumatic Actuators

### VT Series – Rack & Pinion Type

The VT Series rack & pinion actuators are reliable quality products, which can be relied on to perform faultlessly under any difficult circumstances. For double-acting mode, the actuator is available in 11 sizes. Under the provision of common power supply (80 psi), the output torque ranges from 8.02 to 2877 Nm (71 to 25469 in-lbs). For single-active, also known as spring return type, 10 sizes are available.



## Electric Actuators

### JS Series

The JS Series electric actuators are made in new sizes from 34.3 to 597.8 Nm (303.6 to 5290.8 in-lbs), which are generally applied for ball valves with maximum size 6", and butterfly valves with maximum size 12", and are available in on-off or modulating versions, with a choice of duty cycles. All models include standard manual override, visual position indicator, torque limiter and adjustable-position switches.



## VSII™ Namur Type Solenoid Valves for Valve Actuator

VSII™ namur type solenoid valve is specifically engineered to pilot pneumatic process valve actuators. Using enhanced materials, VSII™ has an operating temperature range from -20°C up to 50°C (-4°F up to 140°F). The most notable improvement is the patented rotary sealing plate. It features in the field conversion from 3/2 to 5/2 action without the need for tools or additional parts, and incorporates exhaust feedback to increase actuator spring life span.



## Other Fire-safe Products

FSB 2D	FSB 26	FSB 23	FSB 1D	FSB 22
				
CLASS 150 (PN16/40) DN15 - DN200	6000 psi DN8 - DN50	3000 psi DN8 - DN50	PN16/PN40 DN15 - DN150	2000 psi DN8 - DN50

## How to order

VALVE TYPE	PORT	BODY MATERIAL	SEAT	TRIM	TYPE OF CONNECTION	PRESSURE RATING	SPECIAL REQUEST	SIZE OF CONNECTION	OTHERS
A	B	C	D	E	F	G	H	I	J



Taiwan  
5F-1, No. 936,  
Sec. 4, Wen-Sin Road  
Taichung City 406, Taiwan  
T +886 (4) 2231 0059  
F +886 (4) 2236 0236

Shanghai  
Rm. 1803-A, No.  
678, Gu-Bei Rd.,  
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