econ®

Premium Ball Valves

3-piece

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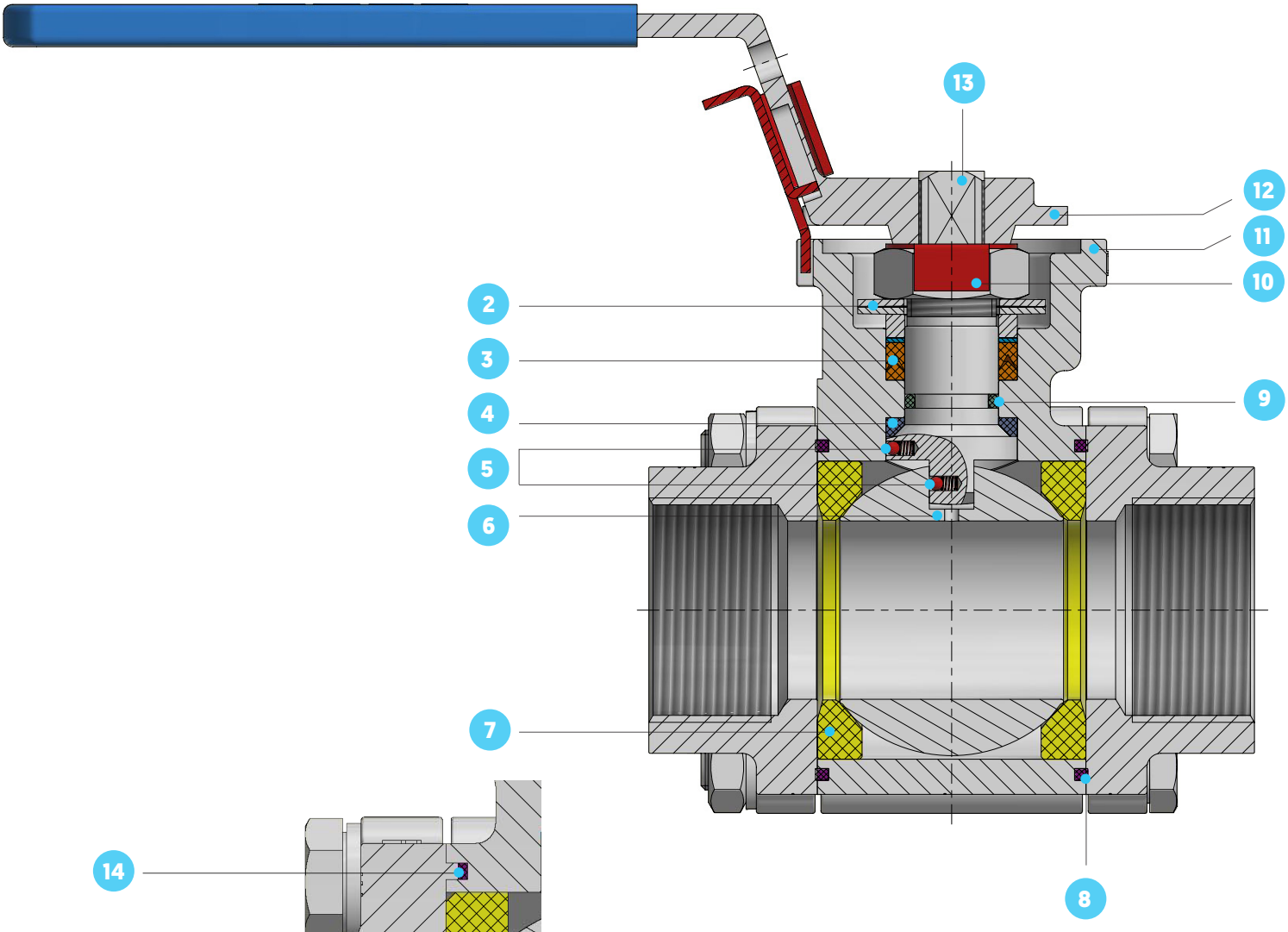
Premium 3-piece Ball Valves

Ball Valves take a leading role in the valve industry. The scope of applications is enormous, due to the quarter-turn construction. The construction makes these valves easy to operate and reduces maintenance costs. Moreover the full bore versions are ideal for conditions which require maximum flow capacity with minimum pressure drop. Please learn more about the features of these valves on the next pages.



Seat and body seal detail of fire safe valves

Construction

The Premium ball valves have a rugged three piece construction and are available in:

ASME Class 600:

- **Full bore: 1/4" - 2.1/2"**
- **Reduced bore: 3/4" - 3"**

ASME Class 300:

- **Full bore: 3" and 4"**
- **Reduced bore: 4"**

Relevant design standards are EN-ISO 17292, EN 12516, ISO 5211, ASME B16.34 and API 608.

Materials

Carbon steel ASTM A216 WCB (1.0619) and stainless steel ASTM A351 CF8M (1.4408) are the materials which form the standard supply. Other materials can be supplied upon request.

Finish

Castings have a high quality finish (minimum MSS SP-112, level 2). Carbon steel ball valves have a black oxide passivation applied by using a mixture of Sodium Hydroxide, Sodium, Nitrite and Trisodium.

Fire-Safe

Fire safe versions of the Premium valve series are available in full bore (size 1/4" to 2") and reduced bore (size 3/4" to 2"). These valves are fire-safe certified according to ISO 10497 3rd edition and API 607 7th edition. In the event of fire, a secondary metallic seat 15 prevents leakage through the valve port. A graphite gland packing 3 and the expanded graphite body gaskets 14 ensure tightness through the stem packing and body joints.

End connections

- **Threaded according:**
  - ISO 228-1 BSPP
  - ASME B1.20.1 NPT
- **Butt weld in carbon steel according:**
  - ASME B16.25-S40
  - EN 12627-1 (1/4" - 3/4") and EN 12627-2 (1" - 4")
- **Butt weld in stainless steel according:**
  - ASME B16.25-S40
  - EN 12627-1 (1/4" - 3/4") and EN 12627-2 (1" - 4")
  - ISO 1127-S1
  - SMS 3008 (EN 10357 Series D)
  - DIN 11850 Range 1 and 2 (EN 10357 Series B and A)
- **Socket weld according:**
  - ASME B16.11
  - EN 12760

Direct Mount 11

A Direct Mount top-flange according to ISO 5211 is standard for these ball valves. This feature makes it possible to mount an actuator without the need of a mounting bracket and drive coupler. This results in a considerable cost reduction, compact automated unit, a reduction of backlash caused by the accumulation of components and a higher level of safety for operators.

Ball

The highly polished solid ball has a pressure relief hole 6 in the stem slot in order to avoid pressure build-up in the body cavity. This ensures a tight shutoff and long service life. For low temperature applications a ball with an additional relief hole in the pressure side is available. This way the cavity will also be relieved in the closed position of the valve. Please note that this additional hole will turn the valve into a mono-directional valve.

V-port

These valves are also well suited for modulating services. V-port balls are available in 30°, 60° and 90°. Flow data of these balls is available later in this brochure.

Stem and stem seals 13

The valve stem assembly has a blow-out proof construction and a square top connection. This Premium valve is equipped with a threefold stem seal design:

- 4 **The primary seal is a TF 4215 (carbon reinforced PTFE) pyramid shaped thrust washer. The fire safe version has a 50% stainless steel reinforced PTFE thrust washer instead.**
- 9 **The secondary seal is a Viton (FPM/FKM) 70 GLT O-ring and suitable for services down to -40°C (-40°F).**
- 3 **The tertiary seal is a graphite reinforced PTFE stem packing or a full graphite stem packing for the fire safe valves.**

Two Belleville spring washers 2 ensure a long term optimal sealing performance and are also compensating for changing process conditions. Advantages of this feature are an increased operational safety, extended lifetime and less maintenance.

Fig. 7722

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Seats 7

A flexible seat design provides tight shut-off at high and low pressures. The special seat construction limits wear to a minimum and ensures low torque values under all operating conditions. Available seat materials are:

- **3M TF 4103 (15% glass reinforced PTFE)**
- **3M TF 4215 (25% carbon reinforced PTFE)**
- **3M TFM 1600 (modified virgin PTFE)**
- **PEEK (KETRON® 1000 - food grade)**

Please see also the pressure-temperature graphs later in this brochure.

Anti-static 5

The ball-stem connection and the stem-body connection have an anti-static feature, which ensures electrical continuity between these parts.

Fugitive emission

Because of the threefold stem seal construction utilizing a spring loaded gland packing, O-ring and pyramid shaped thrust washer, the Premium valves comply with very strict emission requirements. In this respect they are certified by TA-Luft (VDI 2440, section 3.3.1.3) and ISO 15848-1 CO1 Class AH and CO3 Class BH.

Operation 12

The ball valves have CF8 hand levers for the full bore sizes 1/4" to 3" and all reduced bore sizes 1/2" to 4" or a CF8/AISI 304 T-bar for the 4" full bore valve. All hand levers are lockable in the open and closed position by using a padlock. The non-fire safe valves also have an additional spring loaded locking device on the lever, which can also be secured by using a padlock.

Material and test certificate

All Econ® Pemium ball valves can be supplied with a EN 10204-3.1 material and test certificate.

Testing

All valves are 100% tight and are tested in accordance with EN 12266-1 leakage rate A or API 598 on request.

Lloyd's Register type approval certificate

The fire safe version of the Premium ball valve range was rewarded with a Lloyd's Register type approval certificate for Marine, Offshore and Industrial applications for particular services like:

- **Shipside valves**
- **Fire Main isolating valve**
- **Salt and fresh cooling water systems**
- **Ballast water and fresh water transfer systems**
- **Cargo lines on oil tankers and as "in-line" valves on chemical tankers and liquefied gas tankers**
- **Suction valves on double bottom fuel tanks**
- **Domestic fresh and salt water services**
- **Sanitary systems**
- **Inert gas systems**
- **Oil fuel systems as "in-line" valves**

EC1935 - Food contact materials

All parts of the stainless steel valves, which will be in contact with foodstuff are fully traceable and have been migration tested by an external laboratory and do fully comply with the EC 1935 regulations.

SIL

SIL is an international standard (IEC 61508) and is an abbreviation for "Safety Integrity Level". Econ® Premium ball valves are suitable for SIL 2 applications.

Options

- **Extended stem to allow pipe insulation**
- **Extended stem for low temperature applications down to -50˚C (-58˚F)**
- **Spring return (dead men's) lever**
- **Limit switches for remote open/close notification**
- **Pneumatic actuator**
- **Electric actuator**
- **Hydraulic actuator**
- **Electro-hydraulic actuator**

Hand operated ball valve with switch box

Stem extensions

Stem extensions are used for low and high temperature applications. In these cases the stem extensions will form a barrier between the valve and the lever or actuator. This way the operator or actuator is protected against the low or high temperature that the valve might reach. Also insulated pipe systems require valves with a stem extension in order to elevate the actuator above the insulation.

For the Econ® Premium ball valves two types of stem extensions are available. Both stem extensions have a height of 100 mm (3.94 inch) and can be combined with either a lever or an actuator. The stem extensions have a direct mount top flange, which is identical to the top flange of the ball valves themselves. All actuators with a ISO 5211 and parallel square connection can be mounted directly on these stem extensions.

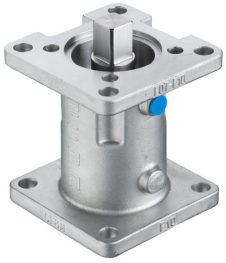


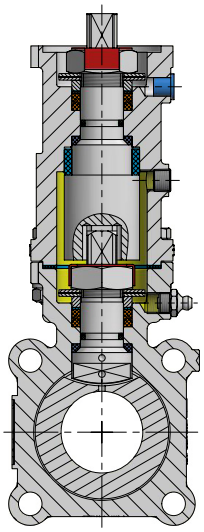
Fig. 7411 | Stem extension 100 mm – without stem packing

Fig. 7412 | Stem extension 100 mm – with stem packing

The **Fig. 7411** stem extension is mainly used for valves in insulated pipe systems in order to elevate the hand lever or actuator.

Fig. 7412 is equipped with the exact same stem packing as the ball valve itself. It therefor basically forms an additional stem packing on top of the valve's existing stem packing. This stem extension is widely used in low temperature applications down to -50°C [-58°F]. Due to the distance from the cold valve, the additional stem packing will operate at normal temperature and therefor reduces the risk of leakage.

The stem extension is mounted on top of the valve with a PTFE seal between both parts. Together with the stem packing at the top, it prevents the possibility of condensation freezing to the internal stem, which could block the valve. Additionally the stem extension can be filled with cryogenic grease as shown in the picture opposite (yellow filling). This way the dead space in the stem extension is eliminated, preventing the formation of condensation and ice in any way.



Cross section of a Fig. 7412
Stem extension with grease nipple on the valve and filled with cryogenic grease

Fig. 7412 | Stem extension
Stainless steel actuator and switch box

Fig. 7411 | Stem extension
Aluminium actuator, switch box and pilot valve

Fig. 7412 | Stem extension
Lever operated

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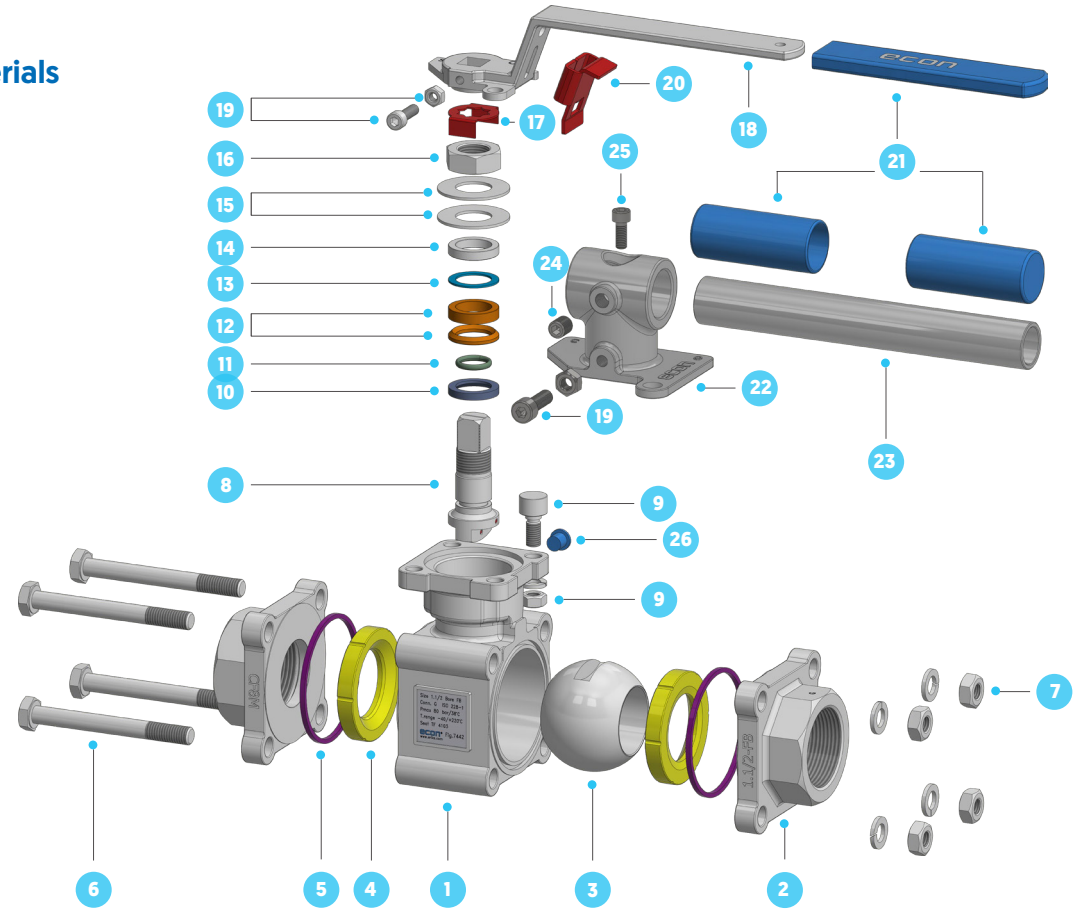
Premium 3-piece Ball Valves

Ball valve materials

Standard

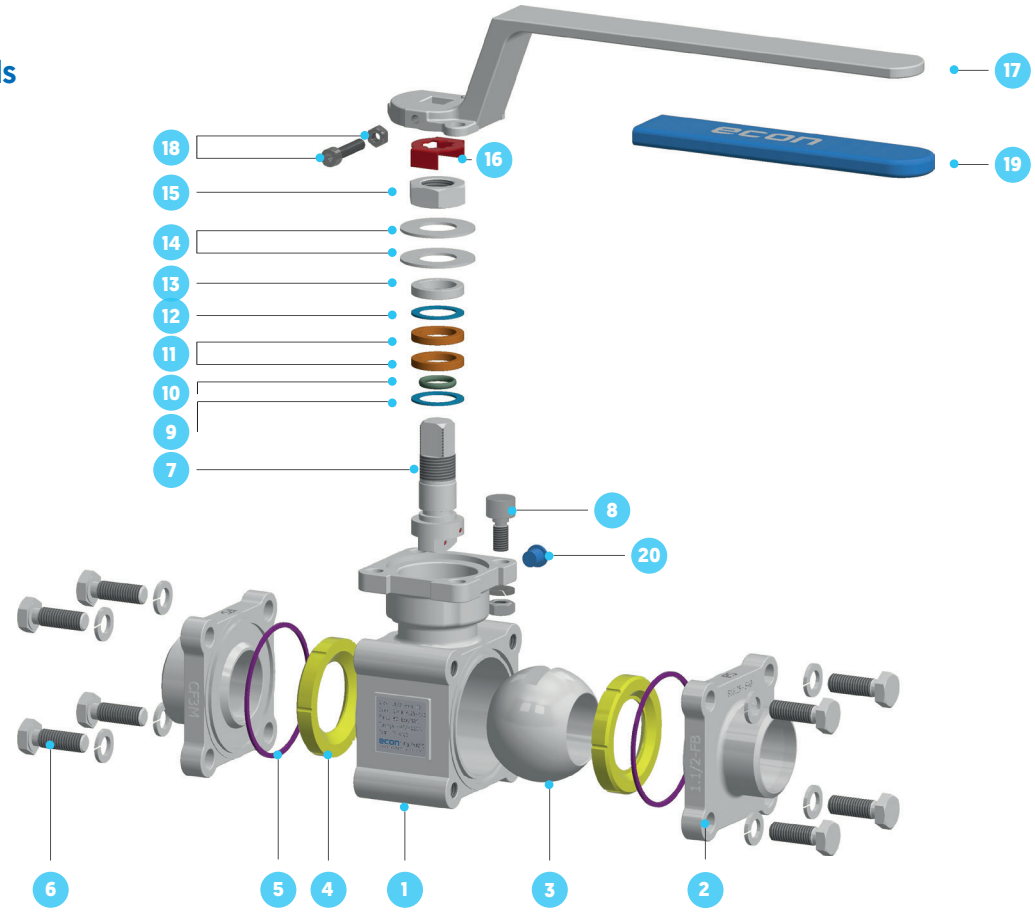


Pos.	Part name	Material		Pos.	Part name	Material	
		WCB	CF8M			WCB	CF8M
1	Body	A216-WCB	A351-CF8M	14	Gland	AISI-304	AISI-304
2	End-caps	A216-WCB	A351-CF8M A351-CF3M [1]	15	Disc springs	AISI-301	AISI-301
3	Ball	A351 CF8M	A351 CF8M	16	Hex jam nut	A194 Gr. 8	A194 Gr. 8
4	Seat rings	PTFE TF 4103 Optional: TF 4215, TFM 1600 or PEEK	PTFE TF 4103 Optional: TF 4215, TFM 1600 or PEEK	17	Nut locking cap	AISI 304	AISI 304
5	Body gasket	R-PTFE (20% glass - 5% carbon)	R-PTFE (20% glass - 5% carbon)	18	Hand lever	A351 CF8	A351 CF8
6	Body bolts	A2-70	A2-70	19	Bolt with locking nut	A2-70	A2-70
7	Body nuts	A2-70	A2-70	20	Locking device	AISI 304	AISI 304
8	Stem	A276-316 Gr. S	A276-316 Gr. S	21	Sleeve	Plastic	Plastic
9	Stopper bolt and nut	AISI-304	AISI-304	22	T-bar support [3]	A351 CF8	A351 CF8
10	Thrust washer seal	TF 4215	TF 4215	23	T-bar [3]	AISI 304	AISI 304
11	O-ring	FKM (FPM) 70 GLT [2]	FKM (FPM) 70 GLT [2]	24	Allen set screw	A2-70	A2-70
12	Stem packing	R-PTFE (15%-graphite)	R-PTFE (15%-graphite)	25	Bolt	A2-70	A2-70
13	Washer	R-PTFE (50%-stainl. steel)	R-PTFE (50%-stainl. steel)	26	Neck plug	Silicone rubber	Silicone rubber

1. *For all end-caps with welded ends* ***2.*** *Other O-ring materials on request* ***3.*** *4" full bore only*

Ball valve materials

Fire Safe



Pos.	Part name	Material		Pos.	Part name	Material	
		WCB Fire Safe	CF8M Fire Safe			WCB Fire Safe	CF8M Fire Safe
1	Body	A216-WCB	A351-CF8M	11	Stem packing	Graphite	Graphite
2	End-caps	A216-WCB	A351-CF8M A351-CF3M [1]	12	Washer	R-PTFE (50%-stainl. steel)	R-PTFE (50%-stainl. steel)
3	Ball	A351 CF8M	A351 CF8M	13	Gland	AISI-304	AISI-304
4	Seat rings	PTFE TF 4103 Optional: TF 4215, TFM 1600 or PEEK	PTFE TF 4103 Optional: TF 4215, TFM 1600 or PEEK	14	Disc springs	Inconel 718	Inconel 718
5	Body gasket	Expanded graphite	Expanded graphite	15	Hex jam nut	A194 Gr. 8	A194 Gr. 8
6	Body bolts	A193 B8M Class 2	A193 B8M Class 2	16	Nut locking cap		AISI 304
7	Stem	A276-316 Gr. S	A276-316 Gr. S	17	Hand lever	A351 CF8	A351 CF8
8	Stopper bolt and nut	AISI-304	AISI-304	18	Bolt with locking nut	A2-70	A2-70
9	Thrust washer seal	R-PTFE (50%-stainl. steel)	R-PTFE (50%-stainl. steel)	19	Sleeve	Plastic	Plastic
10	O-ring	FKM (FPM) 70 GLT [2]	FKM (FPM) 70 GLT [2]	20	Neck plug	Silicone rubber	Silicone rubber

***1.** For all end-caps with welded ends* ***2.** Other O-ring materials on request*

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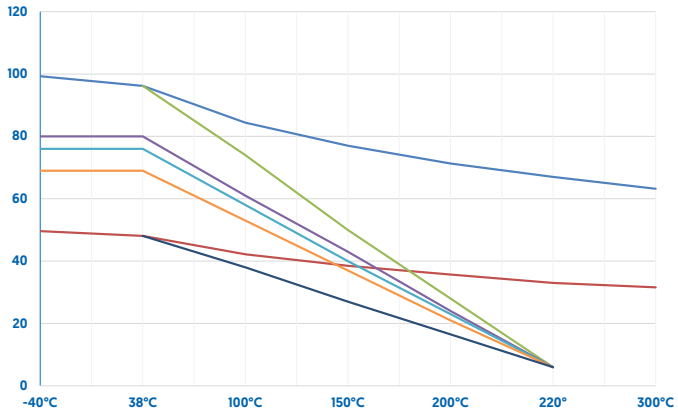
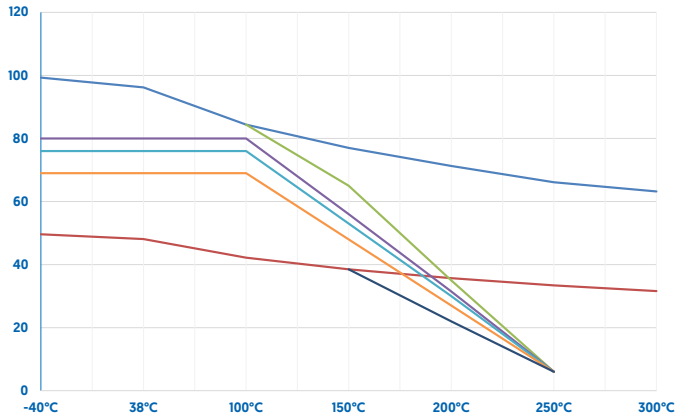
Premium 3-piece Ball Valves

Pressure-temperature ratings | Stainless steel valves

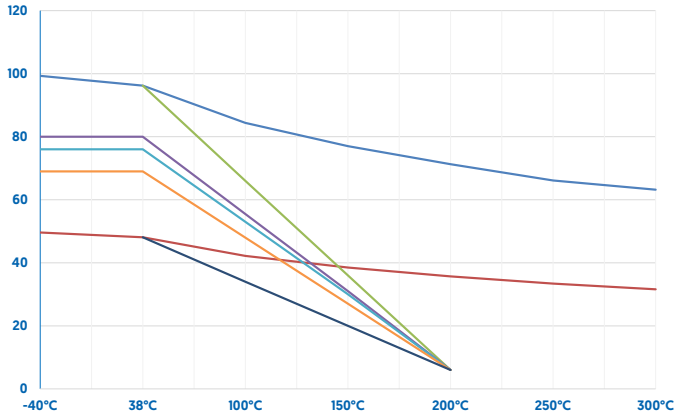
With TF 4103 seats



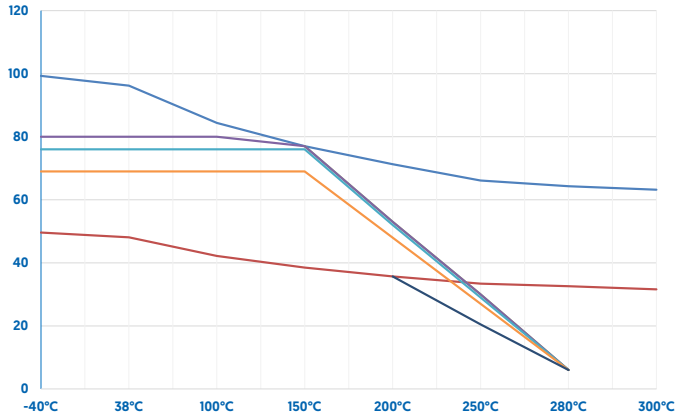
With TF 4215 seats



With TFM 1600 seats



With PEEK seats

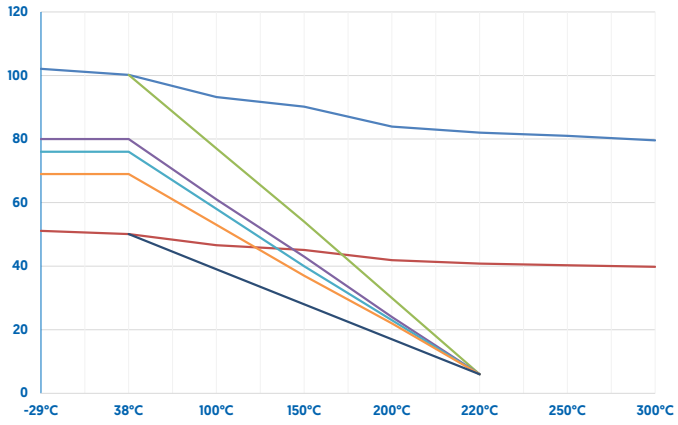


- **Body class 600**
- **Body class 300**
- **Valve size: 1/4" - 1" (CL 600)**
- **Valve size: 1.1/4" - 1.1/2" (CL 600)**
- **Valve size: 2" (CL 600)**
- **Valve size: 2.1/2" (CL 600)**
- **Valve size: 3" - 4" (CL 300)**

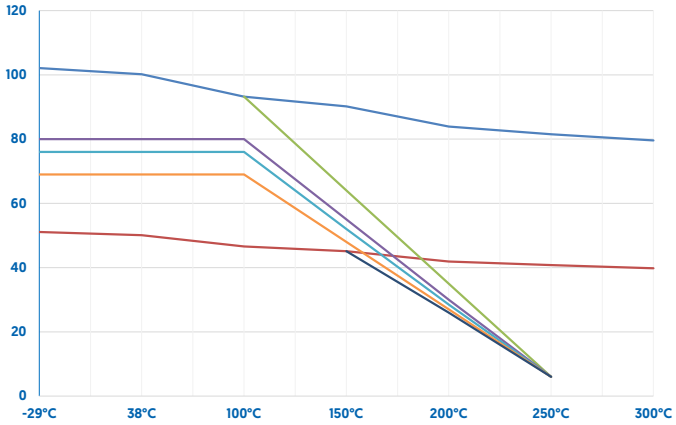
The above mentioned sizes are for full bore valves. For reduced bore valves, please take one size smaller.

Pressure-temperature ratings | Carbon steel valves

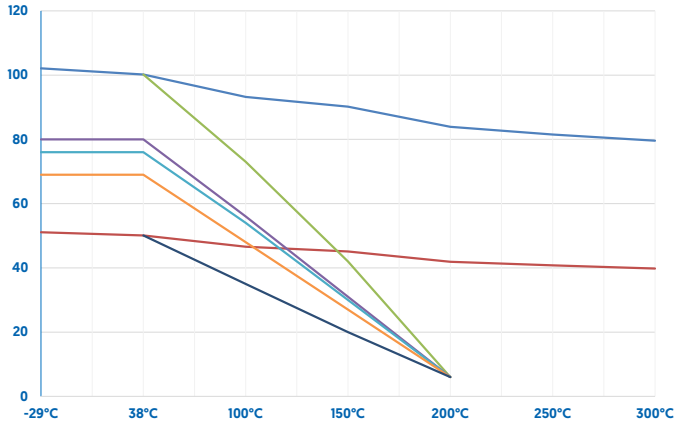
With TF 4103 seats



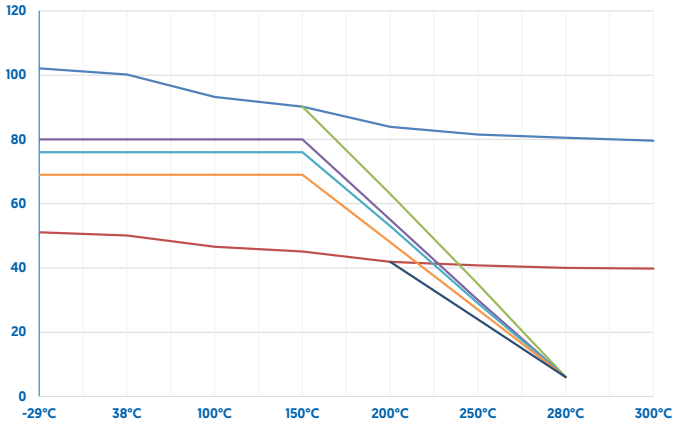
With TF 4215 seats



With 1/4" TFM 1600 seats



With PEEK seats



- Body class 600
- Body class 300
- Valve size: 1/4" - 1" (CL 600)
- Valve size: 1.1/4" - 1.1/2" (CL 600)
- Valve size: 2" (CL 600)
- Valve size: 2.1/2" (CL 600)
- Valve size: 3" - 4" (CL 300)

The above mentioned sizes are for full bore valves. For reduced bore valves, please take one size smaller.

Flow data for ON-OFF and V-port valves

Flow data of isolating valves is usually needed for pipe dimensions and pressure loss calculations, when the valve is in the fully open position. Most of the open/closed isolating valves are in the fully open position the most of the time and therefor these valves should have a high flow coefficient value to reduce pressure drops, which results in increasing plant efficiency and reduction of energy costs.

K_{vs} and C_{vs} values for ON-OFF ball valves in the fully open position

NPS		K_{vs}	C_{vs}
Full bore	Reduced bore		
1/4"	-	8,0	9,2
3/8"	-	9.0	10,4
1/2"	3/4"	11,0	12,7
3/4"	1"	28,0	32,4
1"	1.1/4"	48,0	55,5
1.1/4"	1.1/2"	71,0	82,1
1.1/2"	2"	104,0	120,2
2"	2.1/2"	208,0	240,5
2.1/2"	3"	277,0	320,2
3"	4"	502,0	580,3
4"	-	882,0	1.019,7

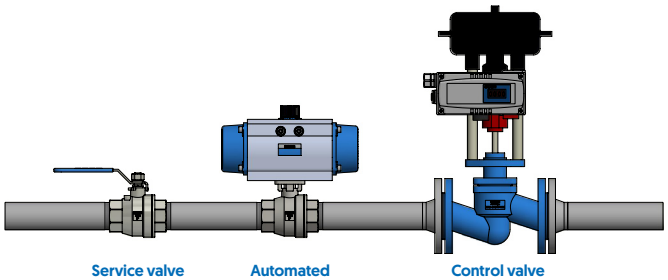
K_v and C_v values for V-port control ball valves

Standard Econ® Premium ball valves can be easily turned into control valves by replacing the standard ball by a 30°, 60° or 90° V-port ball. Control ball valves are more compact, have a lower weight and are much less expensive than comparably sized globe valves. V-port ball valves also offer bi-directional bubble-tight shutoff with zero leakage. Designed with flexibility in process conditions in mind, the K_v/C_v and control characteristics are easily changed by simply changing the ball.

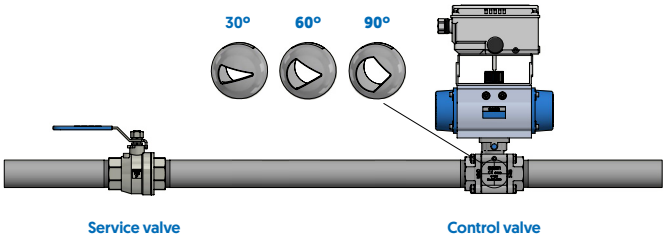
Lever operated
V-port ball valve

Position indicator
Fig. 7415

Traditional control system

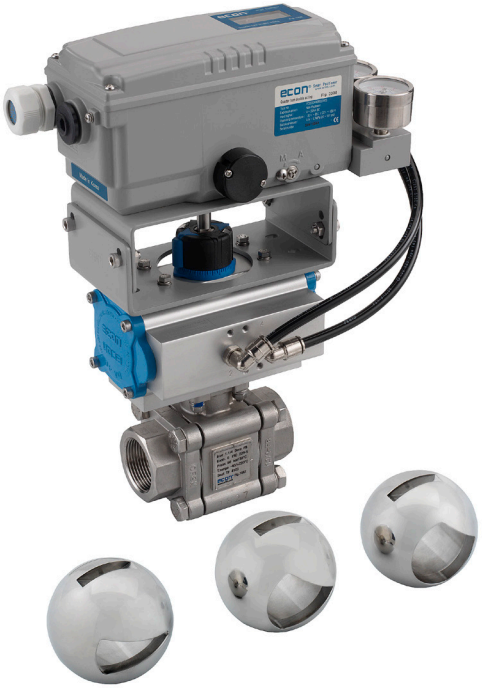


Econ V-port control system



V-port control ball valves can either be operated by a control lever, Econ® electro-pneumatic double acting or spring return actuator or an Econ® modulating electric actuator.

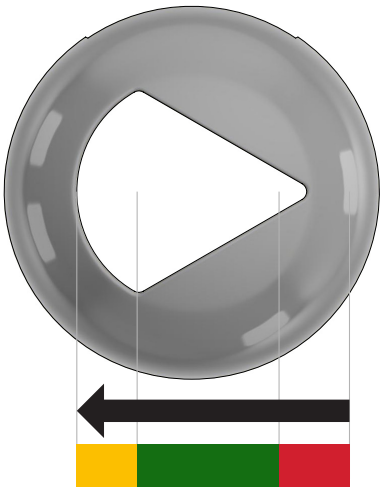
V-port ball valve with electric modulating actuator

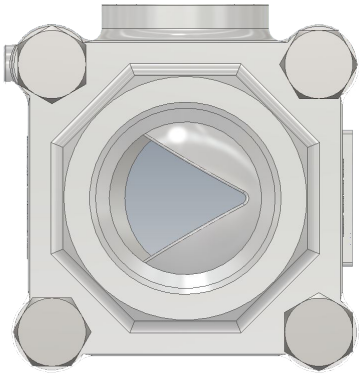


V-port ball valve with electro-pneumatic modulating actuator

In order to select the right valve for the application, please make sure your selection meets below requirements:

- **Select a nominal valve size from the K_v (C_v) table below, based on the calculated K_v (C_v)-value.**
- **Make sure the calculated K_v (C_v)-value is between the 30% and 90% opening angle of the valve.**
- **If the calculated K_v (C_v)-value is below 30% of the opening angle, the lifetime of the valve seats will be reduced.**
- **The maximum Δp must not exceed 14 bar (218 psi)**
- **A Δp higher than 5 bar (73 psi) will cause noise due to high medium velocity.**
- **Carbon reinforced (TF 4215) seats are recommended for most V-port control valve applications, but also other materials like glass reinforced PTFE (TF 4103), modified PTFE (TFM 1600) or PEEK are available.**
- **The maximum operation pressure for saturated steam is 7 bar in combination with TF 4215 seats and 9 bar in combination with PEEK seats.**
- **If the valve needs to be automated, please select an Econ® pneumatic or electric actuator and include a safety factor of at least 1,5 (for aqueous liquids). (The actuator must supply 50% more torque than the valve operating torque). This will increase the actuators lifetime and ensures fluent positioning.**





90%

30%

econ®

Premium 3-piece Ball Valves

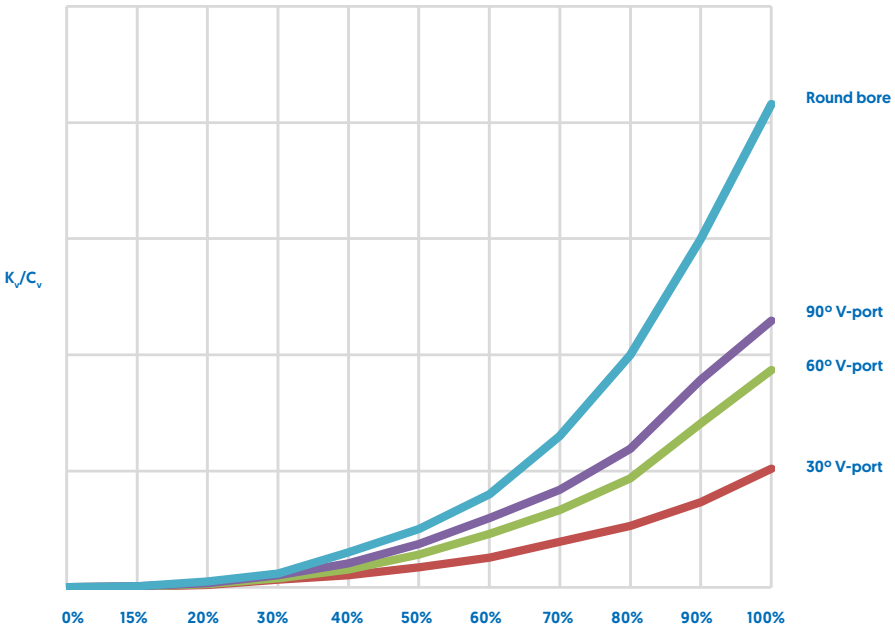
NPS	V-port	0%		15%		20%		30%		40%		50%		60%		70%		80%		90%		100%	
		K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_v	C_v	K_{vs}	C_{vs}
1/4" - 1/2" FB 3/4 RB"	30°	0,0	0,0	0,1	0,1	0,1	0,1	0,2	0,2	0,3	0,3	0,4	0,5	0,7	0,8	0,9	1,0	1,4	1,6	1,9	2,2	2,2	2,5
	60°	0,0	0,0	0,1	0,1	0,1	0,1	0,3	0,3	0,4	0,5	0,8	0,9	1,2	1,4	1,7	2,0	2,8	3,2	3,7	4,3	5,1	5,9
	90°	0,0	0,0	0,1	0,1	0,2	0,2	0,3	0,3	0,5	0,6	0,8	0,9	1,3	1,5	1,9	2,2	3,2	3,7	4,6	5,3	5,9	6,8
3/4" FB 1" RB	30°	0,0	0,0	0,1	0,1	0,2	0,2	0,4	0,5	0,6	0,7	0,9	1,0	1,5	1,7	2,0	2,3	2,8	3,2	3,8	4,4	4,6	5,3
	60°	0,0	0,0	0,1	0,1	0,2	0,2	0,6	0,7	0,9	1,0	1,4	1,6	2,4	2,8	3,4	3,9	5,5	6,4	7,7	8,9	10,2	11,8
	90°	0,0	0,0	0,2	0,2	0,3	0,3	0,7	0,8	1,0	1,2	1,7	2,0	2,6	3,0	3,9	4,5	6,8	7,9	9,6	11,1	11,9	13,8
1" FB 1.1/4" RB	30°	0,0	0,0	0,1	0,1	0,3	0,3	0,7	0,8	1,1	1,3	2,0	2,3	3,0	3,5	4,3	5,0	7,2	8,3	8,3	9,6	8,5	9,8
	60°	0,0	0,0	0,2	0,2	0,3	0,3	0,9	1,0	1,5	1,7	2,9	3,4	4,5	5,2	6,7	7,7	10,5	12,1	13,0	15,0	17,9	20,7
	90°	0,0	0,0	0,2	0,2	0,3	0,3	1,5	1,7	2,9	3,4	4,3	5,0	6,9	8,0	9,7	11,2	13,6	15,7	17,9	20,7	24,7	28,6
1.1/4" FB 1.1/2" RB	30°	0,0	0,0	0,2	0,2	0,3	0,3	0,9	1,0	1,7	2,0	3,1	3,6	4,7	5,4	6,8	7,9	8,5	9,8	11,1	12,8	12,8	14,8
	60°	0,0	0,0	0,2	0,2	0,5	0,6	1,5	1,7	2,6	3,0	4,7	5,4	8,1	9,4	10,9	12,6	16,2	18,7	22,1	25,5	33,2	38,4
	90°	0,0	0,0	0,3	0,3	0,7	0,8	1,7	2,0	4,3	5,0	6,8	7,9	11,9	13,8	16,2	18,7	23,8	27,5	33,2	38,4	46,8	54,1
1.1/2" FB 2" RB	30°	0,0	0,0	0,3	0,3	0,5	0,6	1,4	1,6	2,6	3,0	4,3	5,0	6,4	7,4	9,4	10,9	11,9	13,8	14,5	16,8	17,0	19,7
	60°	0,0	0,0	0,3	0,3	0,7	0,8	2,1	2,4	3,4	3,9	6,8	7,9	11,1	12,8	16,2	18,7	23,0	26,6	34,0	39,3	44,2	51,1
	90°	0,0	0,0	0,3	0,3	0,8	0,9	3,0	3,5	6,0	6,9	11,1	12,8	17,0	19,7	26,4	30,5	35,7	41,3	53,6	62,0	66,3	76,6
2" FB 2.1/2" RB	30°	0,0	0,0	0,3	0,3	1,0	1,2	3,2	3,7	5,1	5,9	8,5	9,8	12,8	14,8	19,6	22,7	26,4	30,5	36,6	42,3	51,0	59,0
	60°	0,0	0,0	0,3	0,3	1,3	1,5	3,9	4,5	7,7	8,9	14,0	16,2	23,0	26,6	33,2	38,4	46,8	54,1	70,6	81,6	93,5	108,1
	90°	0,0	0,0	0,4	0,5	1,7	2,0	5,1	5,9	10,2	11,8	18,7	21,6	29,8	34,5	38,3	44,3	59,5	68,8	89,3	103,2	114,8	132,7
2.1/2" FB 3" RB	30°	0,0	0,0	0,3	0,3	0,9	1,0	3,4	3,9	6,8	7,9	10,2	11,8	15,3	17,7	23,8	27,5	31,5	36,4	52,7	60,9	63,8	73,8
	60°	0,0	0,0	0,3	0,3	1,3	1,5	4,3	5,0	8,5	9,8	17,9	20,7	28,9	33,4	45,1	52,1	63,8	73,8	87,6	101,3	127,5	147,4
	90°	0,0	0,0	0,4	0,5	1,4	1,6	6,0	6,9	11,9	13,8	23,8	27,5	40,8	47,2	59,5	68,8	90,1	104,2	136,0	157,2	185,0	213,9
3" FB 4" RB	30°	0,0	0,0	0,4	0,5	1,0	1,2	3,4	3,9	6,8	7,9	11,9	13,8	19,6	22,7	28,1	32,5	39,1	45,2	55,3	63,9	69,7	80,6
	60°	0,0	0,0	0,4	0,5	2,1	2,4	5,1	5,9	11,9	13,8	21,3	24,6	34,0	39,3	55,3	63,9	77,4	89,5	108,8	125,8	140,3	162,2
	90°	0,0	0,0	0,6	0,7	3,0	3,5	6,8	7,9	15,3	17,7	29,8	34,5	51,0	59,0	76,5	88,4	114,8	132,7	174,3	201,5	263,5	304,6
4" FB	30°	0,0	0,0	0,5	0,6	1,7	2,0	5,1	5,9	12,8	14,8	24,7	28,6	40,8	47,2	60,4	69,8	85,0	98,3	110,5	127,7	135,2	156,3
	60°	0,0	0,0	0,6	0,7	2,6	3,0	9,4	10,9	21,3	24,6	34,0	39,3	50,2	58,0	76,5	88,4	119,9	138,6	180,2	208,3	302,6	349,8
	90°	0,0	0,0	0,9	1,0	3,0	3,5	13,6	15,7	34,0	39,3	63,8	73,8	106,3	122,9	161,5	186,7	250,8	289,9	375,7	434,3	569,5	658,4

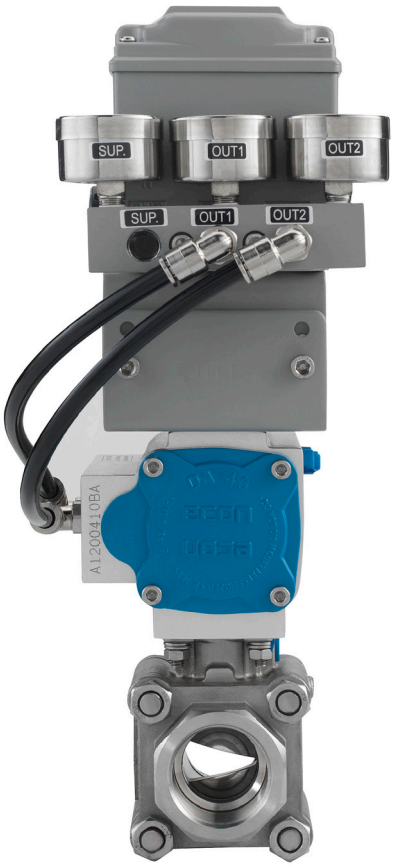
Notes:

- *K_v is the volume of water at 20°C in m³ per hour at a Δp of 1 bar.*
- *C_v is the volume of water at 60°F in US Gallons per minute at a Δp of 1 psi.*
- *K_{vs} is the K_v-value in the fully open position.*
- *C_{vs} is the C_v-value in the fully open position*
- *0%: Valve is in the fully closed position.*
- *100%: Valve is in the fully open position.*

Characterized control

These curves of standard ports are general guidelines and are not specific to any particular valve size.





Valve operating torques

In order to make the correct selection of a pneumatic, electric or hydraulic actuator for operating the valve, the below table needs to be used. Depending on the application and type of media a safety factor must be added to the valve torque. An indication of these factors are being mentioned further down this page. For additional safety it's being recommended that the actuator will not supply more torque than the maximum allowable stem torque (MAST). Please contact your ECON distributor if help is needed for selecting the correct actuator.

BTO (Nm)											MAST	
Valve size - NPS		PTFE seats (TF 4103, TF 4215 and TFM 1600)								PEEK seats	A276-316 Grade S at 20°C	A276-316 Grade S at 200°C
		ΔP (bar)								Max. torque		
FB	RB	0	20	35	51	70	76	80	102			
1/4"	-	7	7	7	7	7	7	7	7	10	39	28
3/8"	-	7	7	7	7	7	7	7	7	10	39	28
1/2"	3/4"	7	7	7	7	7	7	7	7	10	39	28
3/4"	1"	9	9	9	9	9	9	9	9	16	39	28
1"	1.1/4"	12	12	12	14	14	14	15	15	26	70	51
1.1/4"	1.1/2"	19	19	19	19	20	23	25	-	30	70	51
1.1/2"	2"	23	23	25	28	29	30	31	-	40	145	105
2"	2.1/2"	42	42	42	43	47	51	-	-	76	145	105
2.1/2"	3"	49	49	49	67	86	-	-	-	110	261	189
3"	4"	62	62	71	87	-	-	-	-	125	261	189
4"	-	90	90	95	120	-	-	-	-	260	567	411

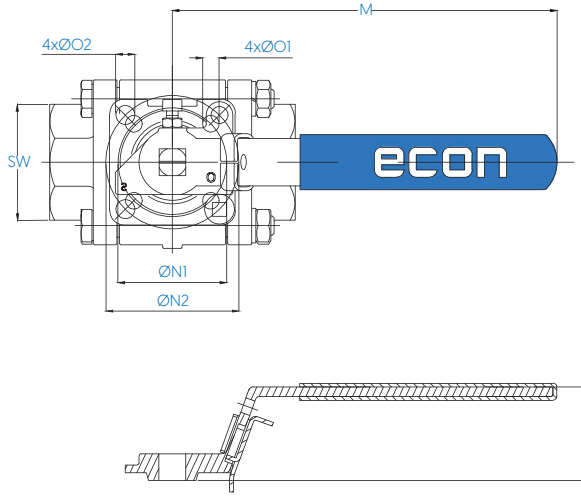
Basic principles for actuator sizing:

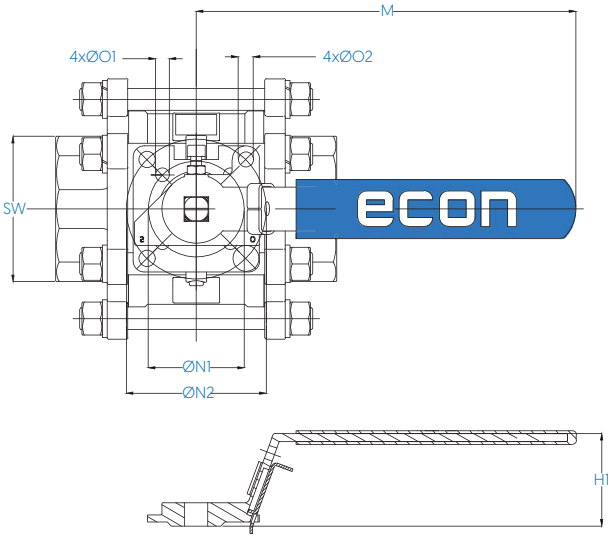
- *BTO: Break Torque to Open.*
- *Torque values are based on aqueous liquids (water).*
- *Solid particles and fouling of the ball and seats will lead to higher torques and accelerated wear.*
- *Safety factors for actuator sizing according to the table below:*

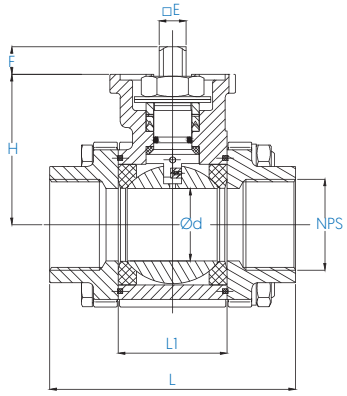
Medium/Application	Safety factor for open-close service
Aqueous liquids (water)	1.3
Lubricating media (oils)	0.8
Sludges	2
Dry gases	1.5
Dirty gases, natural gas and LPG	2
Oxygen, Chlorine, Hydrogen and cryogenic applications	1.5
Modulating applications for aqueous liquids	1,5

Hydraulic actuated ball valve

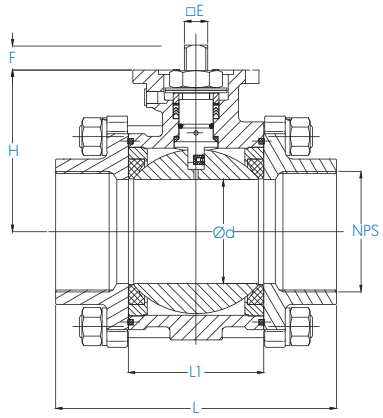
DImensions | Full bore







NPS 1/4" - 1.1/2"

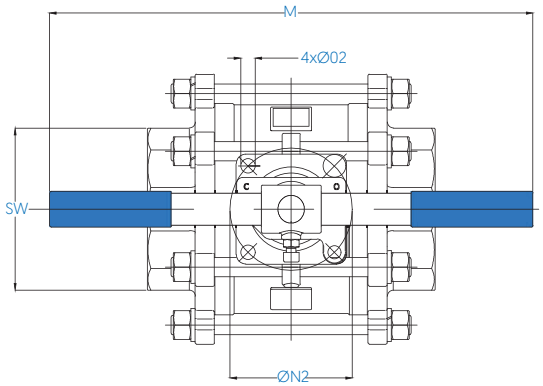


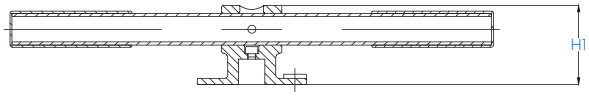
NPS 2" - 3"
Fire Safe - NPS 2"

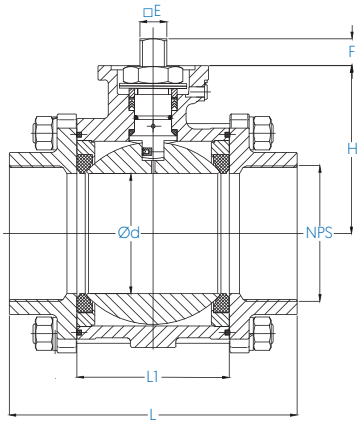
NPS	Class	Ød	□E	F	H	H1	H1	L	L	L1	M	M	ØN1	ØN2	ØO1	ØO2	SW	Weight	V	W	Z	G [1]	Size	Weight
							Fire Safe	ISO 228-1 BSPP ASME B1.20.1 NPT	SMS 3008			Fire Safe							Stem extension 7411 & 7412					
								ASME B16.25-S40 EN 12627	ISO 1127-S1															
								ASME B16.11 EN 12760	DIN 11850-R2									kg						kg
1/4"	600	15,0	9	9,0	40,0	43,0	43,0	71	116	25,2	140	140	F03	F04	5,5	5,5	22	0,9	F04	F03-F04	100	1/8"	1	0,6
3/8"	600	15,0	9	9,0	40,0	43,0	43,0	71	116	25,2	140	140	F03	F04	5,5	5,5	25,4	0,9	F04	F03-F04	100	1/8"	1	0,6
1/2"	600	15,0	9	9,0	40,0	43,0	43,0	72	116	25,2	140	140	F03	F04	5,5	5,5	30,	1,0	F04	F03-F04	100	1/8"	1	0,6
3/4"	600	20,0	9	9,0	45,0	43,0	43,0	97	125	32,3	140	140	F03	F04	5,5	5,5	36,0	1,5	F04	F03-F04	100	1/8"	1	0,6
1"	600	25,0	11	11,0	52,5	44,5	44,5	109	135	42,3	165	190	F04	F05	5,5	7,0	44,5	2,0	F05	F04-F05	100	1/8"	2	0,9
1.1/4"	600	31,8	11	11,0	58,0	45,0	45,0	118	146	49,4	165	190	F04	F05	5,5	7,0	54,0	3,0	F05	F04-F05	100	1/8"	2	0,9
1.1/2"	600	38,0	14	15,0	79,0	51,0	69,0	129	157	57,2	202	290	-	F07	-	9,0	61,0	4,5	F07	F07	100	1/8"	3	1,8
2"	600	50,0	14	15,0	88,0	51,0	69,0	145	202	71,4	202	290	-	F07	-	9,0	74,0	6,5	F07	F07	100	1/8"	3	1,8
2.1/2"	600	65,0	17	18,0	108,0	70,0	-	185	215	86,6	257	-	F07	F10	9,0	11,0	93,0	12,5	F10	F07-F10	100	1/8"	4	2,7
3"	300	76,0	17	18,0	118,0	70,0	-	205	230	99,0	257	-	F07	F10	9,0	11,0	106,0	16,5	F10	F07-F10	100	1/8"	4	2,7
4"	300	100,0	22	22,5	140,0	67,5	-	240	260	127,0	405	-	F10	-	11,0	-	135,0	26,0	F10	F10	100	1/8"	5	3,6

1: Fig. 7412 only

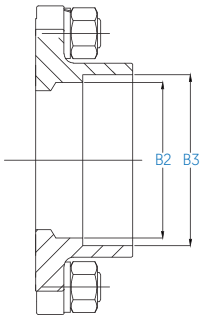
Note: Dimensions in mm



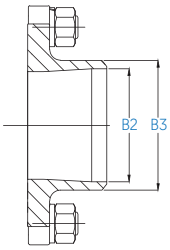




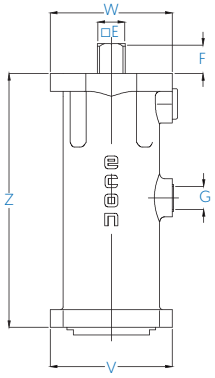
NPS 4"



Socket Weld End



Butt Weld End

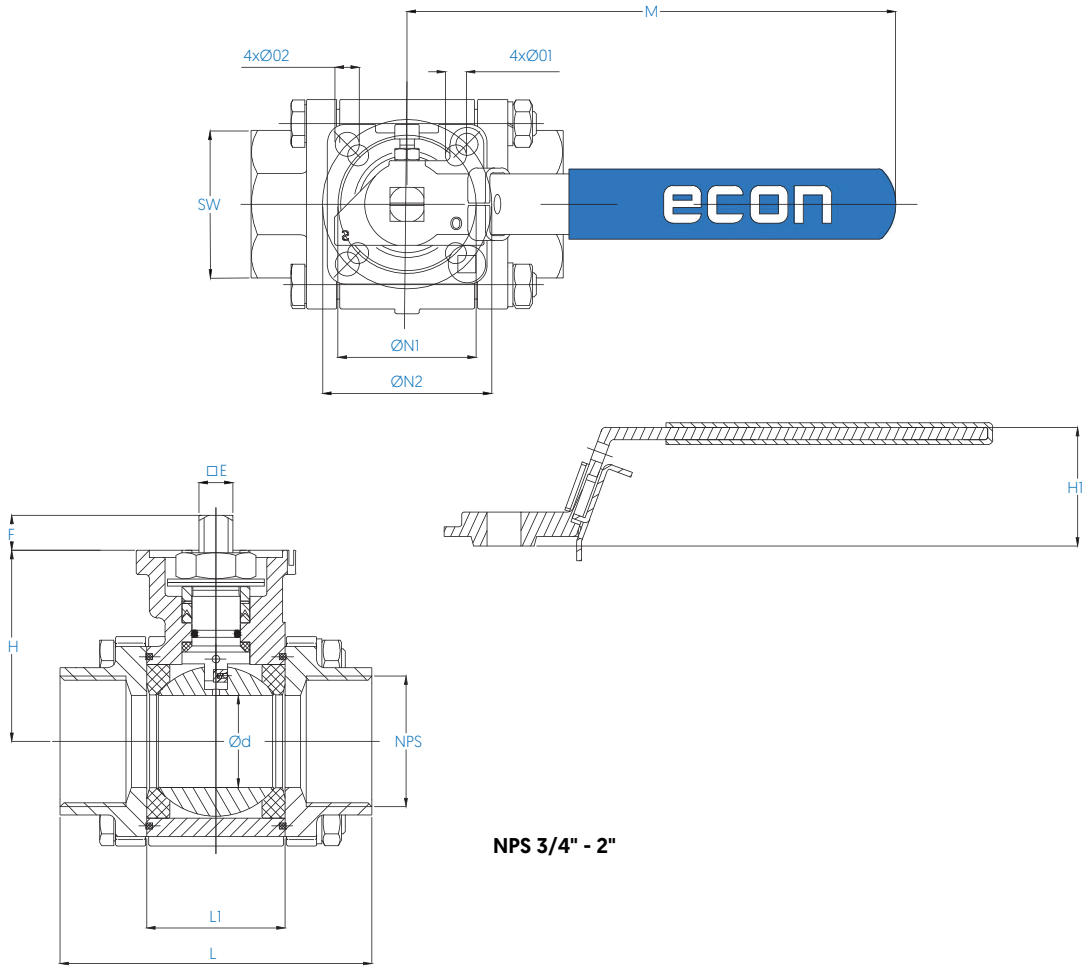


Stem Extension Size 1 to 5

NPS	B2	B3	B2	B3	B2	B3	B2	B3	B2	B3	B2	B3	B2	B3
	Butt weld		Butt weld		Butt weld		Butt weld		Butt weld		Socket weld		Socket weld	
	ASME B16.25-S40		EN 12627		SMS 3008		DIN 11850-R2		ISO 1127-S1		EN 12760		ASME B16.11	
1/4"	9,2	13,7	11,5	14,0	8,0	10	-	-	10,3	13,5	11	14,4	11	14,4
3/8"	12,5	17,1	12,6	17,2	10,0	12	10	13	14,0	17,2	14.5	17,8	14,5	17,8
1/2"	15,8	21,3	15,0	21,7	16,0	18	16	19	18,1	21,3	18,0	21,9	18,0	21,9
3/4"	21,0	26,7	20,5	27,2	22,6	25	20	23	23,7	26,9	23,5	27,4	23,5	27,4
1"	26,6	33,4	25,7	34,0	-	-	26	29	29,7	33,7	29,5	34,1	29,5	34,1
1.1/4"	35,1	42,2	34,4	42,7	-	-	32	35	38,4	42,4	38,0	42,9	38,0	42,9
1.1/2"	40,9	48,3	40,3	48,3	-	-	38	41	44,3	48,3	44,0	49,0	44,0	49,0
2"	52,5	60,3	51,3	60,3	-	-	50	53	55,1	60,3	56,0	61,5	56,0	61,5
2.1/2"	62,5	75,0	67,1	76,3	-	-	66	70	70,9	76,1	72,0	77,0	72,0	74,0
3"	77,9	88,9	80,0	88,9	-	-	81	85	83,7	88,9	-	-	84,5	90,0
4"	102,3	114,3	103,1	116,0	-	-	100	104	109,1	114,3	-	-	110,0	115,5

Note: Dimensions in mm

DImensions | Reduced bore

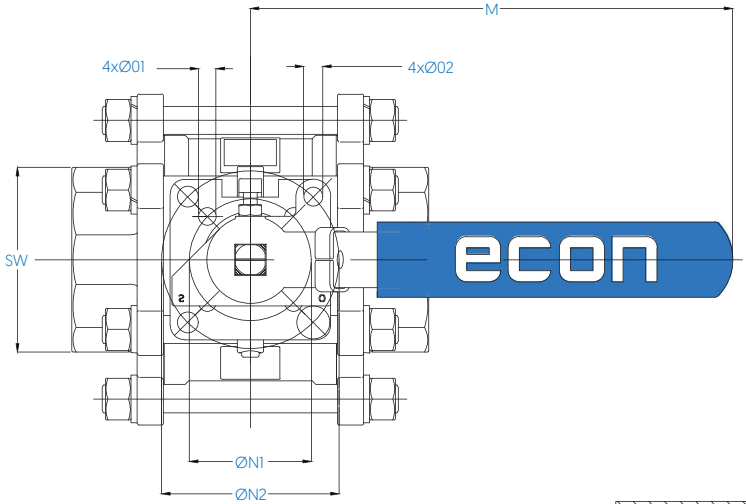


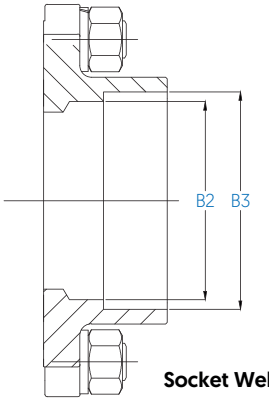
NPS 3/4" - 2"

NPS	Class	Ød	□E	F	H	H1	H1	L	L	L1	M	M	ØN1	ØN2	ØO1	ØO2	SW	Weight	V	W	Z	G [1]	Size	Weight
							Fire Safe	ISO 228-1 BSPP ASME B1.20.1 NPT	SMS 3008			Fire Safe							Stem extension 7411 & 7412					
								ASME B16.25-S40 EN 12627	ISO 1127-S1															
								ASME B16.11 EN 12760	DIN 11850-R2									kg						kg
3/4"	600	15,0	9	9	40,0	43,0	43,0	72	116	25,2	140	140	F03	F04	5,5	5,5	36,0	1,0	F04	F03-F04	100	1/8"	1	0,6
1"	600	20,0	9	9	45,0	43,0	43,0	97	125	32,3	140	140	F03	F04	5,5	5,5	44,5	1,5	F04	F03-F04	100	1/8"	1	0,6
1.1/4"	600	25,0	11	11	52,5	44,5	44,5	109	135	42,3	165	190	F04	F05	5,5	7,0	54,0	2,0	F05	F04-F05	100	1/8"	2	0,9
1.1/2"	600	31,8	11	11	58,0	45,0	45,0	118	146	49,4	165	190	F04	F05	5,5	7,0	61,0	3,0	F05	F04-F05	100	1/8"	2	0,9
2"	600	38,0	14	15	79,0	51,0	69,0	129	157	57,2	202	290	-	F07		9,0	74,0	4,5	F07	F07	100	1/8"	3	1,8
2.1/2"	600	50,0	14	15	88,0	51,0	69,0	145	202	71,4	202	290	-	F07		9,0	93,0	6,5	F07	F07	100	1/8"	3	1,8
3"	600	65,0	17	18	108,0	70,0	-	185	215	86,6	257	-	F07	F10	9,0	11,0	108,0	12,5	F10	F07-F10	100	1/8"	4	2,7
4"	300	76,0	17	18	118,0	70,0	-	205	230	99,0	257	-	F07	F10	9,0	11,0	133,0	16,5	F10	F07-F10	100	1/8"	4	2,7

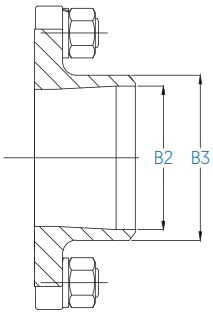
1: Fig. 7412 only

Note: Dimensions in mm

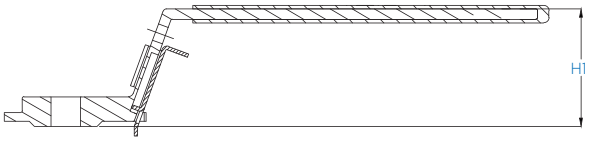


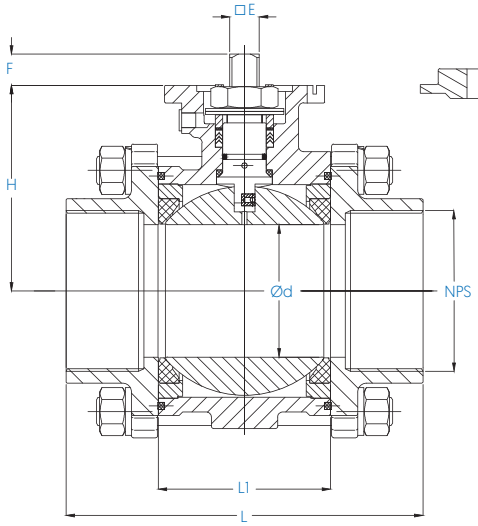


Socket Weld End

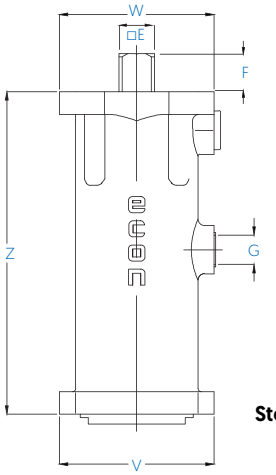


Butt Weld End





NPS 2.1/2" - 4"
Fire Safe - NPS 2.1/2"



Stem Extension
Size 1 to 5

NPS	B2	B3	B2	B3	B2	B3	B2	B3	B2	B3	B2	B3
	Butt weld		Butt weld		Butt weld		Butt weld		Socket weld		Socket weld	
	ASME B16.25-S40		EN 12627		SMS 3008		ISO 1127-S1		EN 12760		ASME B16.11	
3/4"	21,0	26,7	20,5	27,2	22,6	25,0	23,7	26,9	23,5	27,4	23,5	27,4
1"	26,6	33,4	25,7	34,0	29,6	32,0	29,7	33,7	29,5	34,1	29,5	34,1
1.1/4"	35,1	42,2	34,4	42,7	31,3	33,7	38,4	42,4	38,0	42,9	38,0	42,9
1.1/2"	40,9	48,3	40,3	48,3	35,6	38,0	44,3	48,3	44,0	49,0	44,0	49,0
2"	52,5	60,3	51,3	60,3	48,9	51,0	55,1	60,3	56,0	61,5	56,0	61,5
2.1/2"	62,5	75,0	67,1	76,3	60,3	63,5	70,9	76,1	72,0	77,0	72,0	74,0
3"	77,9	88,9	80,0	88,9	72,9	76,1	83,7	88,9	-	-	84,5	90,0
4"	102,3	114,3	103,1	116,0	97,6	101,6	109,1	114,3	-	-	110,0	115,5

Note: Dimensions in mm

econ®

Ball Valves summary

Econ® 1-piece reduced bore ball valve

Fig. 7744

Econ® 1-piece reduced bore ball valves have a BSP or NPT threaded connection.
These ball valves have an extremely compact design and do have competitive prices.

- **Pressure rating 1000 WOG (68 bar)**
- **Reduced bore**
- **Stainless steel 316 body, ball and stem**
- **PTFE**
- **Sizes 1/4" - 2"**
- **End-connection standards: ISO 228-1 BSPP or ASME B1.20.1 NPT**

Econ® 2-piece full bore ball valve

Fig. 7752

These competitive priced Econ® 2-piece full bore ball valves have a BSP or NPT threaded connection and lockable lever.

- **Pressure rating 1000 WOG (68 bar)**
- **Full bore**
- **Stainless steel 316 body, ball and stem**
- **PTFE seats**
- **Sizes 1/4" - 3"**
- **ISO 5211 "Direct Mount" top flange (Fig. 7752ISO)**
- **End-connection standards: ISO 228-1 BSPP or ASME B1.20.1 NPT**

Econ® 3-piece full bore ball valve

Fig. 7446 (BSP), Fig. 7546 (NPT), Fig. 7646 (BW or SW)

This economy type Econ® 3-piece full bore ball valve is the most cost-effective choice for a hand operated 3-piece ball valve.

- **Pressure rating 1000 WOG (68 bar)**
- **Full bore**
- **Stainless steel 316 body, ball and stem**
- **PTFE seats**
- **Sizes 1/4" - 3"**
- **End-connection standards:**
  - **Threaded: ISO 228-1 BSPP or ASME B1.20.1 NPT**
  - **Butt weld: ASME B16.25-S40**
  - **Socket weld: ASME B16.1**

Econ® 3-piece full bore ball valve with ISO "Direct Mount" top flange

Fig. 7424 (CS BSP), Fig. 7524 (CS NPT), Fig. 7624 (CS BW or SW)

Fig. 7444 (SS BSP), Fig. 7544 (SS NPT), Fig. 7644 (SS BW or SW)

This type Econ® 3-piece full bore ball valve is equipped with a "Direct Mount" top flange according to ISO 5211 and a lockable lever.

- **Pressure rating 1000 WOG (68 bar)**
- **Full bore**
- **Stainless steel 316 body, ball and stem**
- **PTFE seats**
- **ISO 5211 "Direct Mount" top flange**
- **Sizes 1/4" - 4"**
- **End-connection standards:**
  - **Threaded: ISO 228-1 BSPP or ASME B1.20.1 NPT**
  - **Butt weld: ASME B16.25-S40**
  - **Socket weld: ASME B16.1**

Econ® 3-piece full bore ball valve for steam and condensate applications

Fig. 74441 (carbon steel), Fig. 74442 (stainless steel)

This Econ® 3-piece full bore ball valve with BSP threaded connections is specially designed for steam and condensate applications up to 14 bar and is equipped with a "Direct Mount" top flange according to ISO 5211 and a lockable lever.

- **Pressure rating 1000 WOG (68 bar)**
- **Full bore**
- **Stainless steel 316 or cast steel body**
- **PTFE (TFM 4215) seats**
- **ISO 5211 "Direct Mount" top flange**
- **Sizes 1/4" - 2"**
- **End-connection standards: ISO 228-1 BSPP**

Econ® Quick-Weld full bore ball valve with ISO “Direct Mount” top flange

Fig. 7611, Fig. 7641, Fig. 7654

The Econ® Quick-Weld full bore ball valve has rotatable welding connections, which save installation time up to 30%! The valve is also equipped with a “Direct Mount” top flange according to ISO 5211 and a lockable lever.

- Pressure rating 1000 WOG (68 bar)
- Full bore
- Stainless steel 316 body, ball and stem
- PTFE (TFM 1600) and RPTFE (Fig. 7645) seats
- ISO 5211 “Direct Mount” top flange
- Sizes 1/4" - 3”
- End-connection standards:
  - Fig. 7611: Orbital butt welding, EN 10357-A (DIN 11850-2) and EN 10357-D (Dutch dairy)
  - Fig. 7641: Orbital butt welding, ISO 1127-1
  - Fig. 7654: ASME B16.25-S40

Econ® Premium 3-piece full or reduced bore ball valve with ISO top flange

Fig. 7422 (CS BSP), Fig. 7522 (CS NPT), Fig. 7622 (CS BW), Fig. 7722 (CS SW), Fig. 7442 (SS BSP), Fig. 7542 (SS NPT), Fig. 7642 (SS BW), Fig. 7742 (SS SW)

The Econ® Premium ball valve is a rugged 3-piece ball valve with BSP, NPT, Butt Weld or Socket Weld connections and can be supplied in stainless steel or cast steel in both full bore and reduced bore. The valve is equipped with a "Direct Mount" top-flange according to ISO 5211 and has a spring loaded lockable lever.

- Pressure rating Class 600 (102 bar)
- Full or reduced bore
- Standard or Fire Safe approved versions
- Stainless steel 316 or cast steel body
- PTFE (TF 4103, TF 4215, TFM 1600) or PEEK seats
- ISO 5211 "Direct Mount" top flange
- Sizes
  - Full bore 1/4" - 4"
  - Reduced bore 3/4" - 4"
  - Fire Safe full bore: 1/4" - 2"
  - Fire Safe reduced bore: 3/4" - 2"

Econ® wafer type full bore ball valve with ISO “Direct Mount” top flange

Fig. 7343 (CS) and Fig. 7383 (SS)

The Econ® wafer type ball valve with DIN flange connections can be supplied in stainless steel 316 or cast steel. These valves have a “Direct Mount” top flange according to ISO 5211 and a lockable lever.

- Pressure rating PN16 and PN40
- Full bore
- Fire Safe approved
- Stainless steel 316 or cast steel body
- PTFE (TFM1600) seats
- ISO 5211 “Direct Mount” top flange
- Sizes DN15 - DN200
- Flange connection standard: EN 1092-1

Econ® 2-piece full bore ball valve with flange connections and ISO “Direct Mount” top flange

Fig. 7249 (DIN CS), Fig. 7289 (DIN SS), Fig. 7248 (DIN long pattern CS), Fig. 7288 (DIN long pattern SS), Fig. 7245 (ANSI 150 CS), Fig. 7285 (ANSI 150 SS), Fig. 7257 (ANSI 300 CS), Fig. 7297 (ANSI 300 SS)

The Econ® 2-piece ball valve with DIN or ASME flanges can be supplied in stainless steel 316 or cast steel. These valves have a “Direct Mount” top flange according to ISO 5211 and a lockable lever up to size DN150/6”.

- Pressure rating PN16, PN40, Class 150 and Class 300
- Full bore
- Fire Safe approved
- DIN valves available in short and long pattern
- Stainless steel 316 or cast steel body
- PTFE (TFM1600) seats
- ISO 5211 “Direct Mount” top flange
- Sizes DN15/½” - DN200/8”
- Flange connection standards:
  - EN 1092-1
  - ASME B16.5 RF

Econ® 3-way ball valve with ISO "Direct Mount" top flange

Fig. 7281 (CS flanged), Fig. 7291 (SS flanged), Fig. 7760L-BSP, fig. 7760L-NPT, Fig 7760T-BSP, Fig. 7760T-NPT

The 3-way Econ® ball valves have a "Direct Mount" top flange according to ISO 5211 and a lockable lever. The "Direct Mount" top flange makes it easy to automate the valves at a very competitive price. These valves can be supplied with a L-, T- or X-bore and with flanged, BSP or NPT threaded connections.

Flanged valves

- Pressure rating PN16, PN40 and Class 150
- PTFE (TFM 1600 or TF 4215) seats
- Full bore
- ISO 5211 "Direct Mount" top flange
- Stainless steel 316 or cast steel body
- Sizes DN15 / 1/2" - DN100/4"
- Flange connection standards:
  - EN 1092-1
  - ASME B16.5 RF

Threaded valves

- Pressure rating 1000 WOG (68 bar)
- RPTFE seats and seals
- Reduced bore
- ISO 5211 "Direct Mount" top flange
- Stainless steel 316 body, ball and stem
- Sizes 1/4" - 2"
- Threaded connection standards: ISO 228-1 BSPP or ASME B1.20.1 NPT

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