



YARWAY HY-DROP® 5800 SERIES THROTTLING VALVES

DATASHEET

Controls the destructive forces inherent in high pressure drop service through rapid energy dissipation.



FEATURES

- Dual range throttling – primary range plus a super capacity blast range.
- Rapid energy dissipation – controls the destructive forces inherent in high pressure drop service.
- Accurate and repeatable settings – micrometer dial assures setting accuracy and positive resetting capability.
- Quick-change disc – insert an interchangeable stem-disc into the same valve body to convert from one orifice size to another.
- Guided-disc – eliminates disc vibration and chatter.
- Loose disc – Disc design provides multiposition seating and assures positive alignment of seat and disc surfaces. This gives sure protection against premature failures from seat-to-disc “grind” prevalent in valves of integral stem-disc design.
- Dual-purpose disc – separate surfaces for shutoff and throttling.
- Stellite seat – resists corrosion and wiredrawing.
- In-line repair – Yarway reseating tool can be used to cut a new seat in-line without removing the valve from the piping.
- Resetting capability – The Hy-Drop® valve has positive resetting capability to accommodate multiple-operation programs with accurate flow control variations.
- Motor actuation – For local or remote operation.
- Pneumatic actuation – For automatic control.

GENERAL APPLICATION

The Hy-Drop® 5800 Series Throttling Valve is designed for continuous blowdown, but also works well for sampling, high pressure vents, boiler feed pump bypass relief, high pressure drop services associated with erosive and wiredrawing characteristics – or where velocity is sufficient to destroy valves of conventional globe or even venturi designs.

TECHNICAL DATA

Size range:	NPS 1 and 1½ (DN 25 and 40)
Pressure class:	ASME B16.34 Class 1700 or 2700
Materials:	ASME A105 or ASME A182 F22

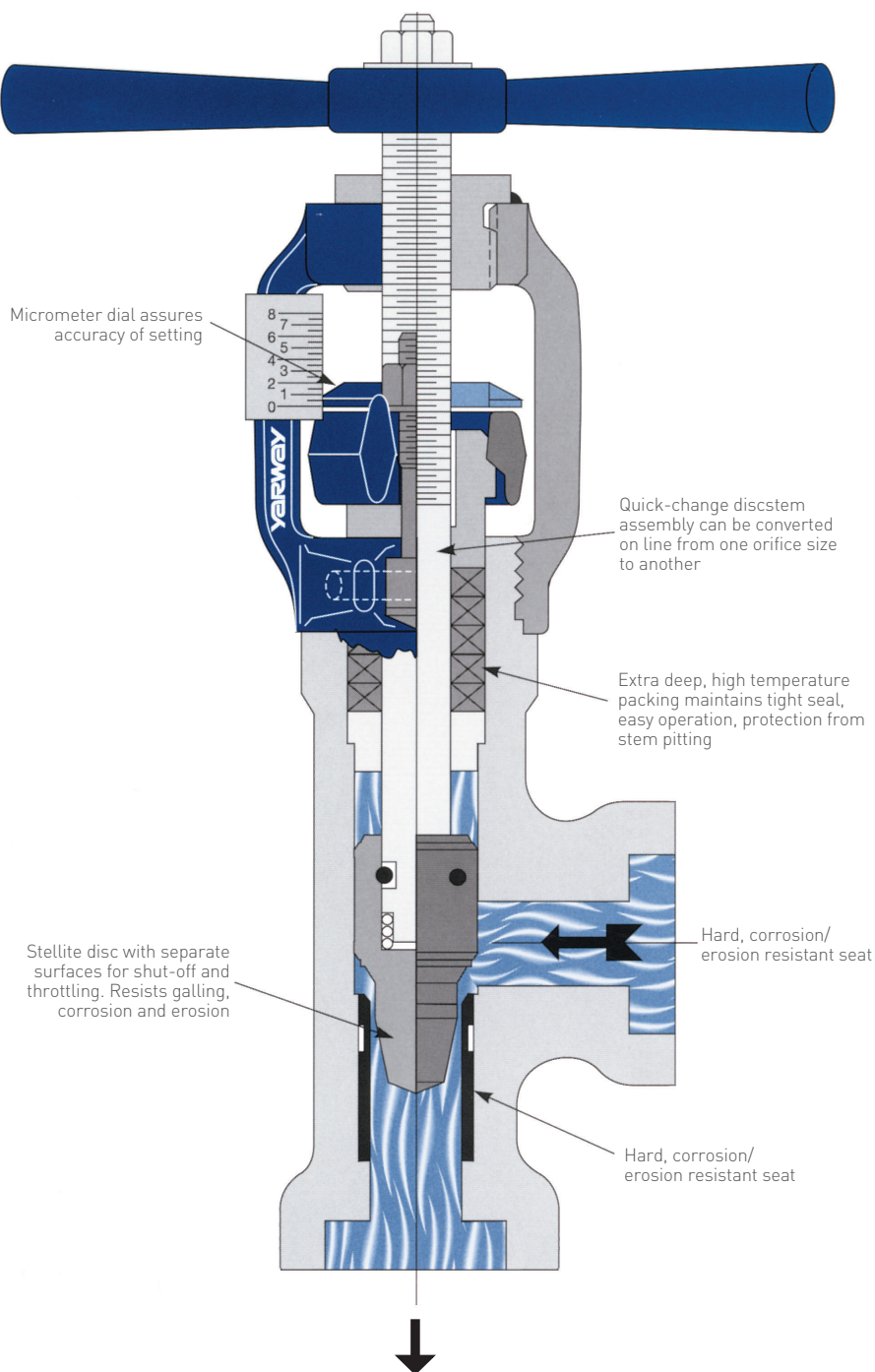
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GENERAL DESCRIPTION

Valves used for throttling services have always been subject to rapid deterioration in the form of erosion, cavitation damage and wiredrawing of vital parts. Even venturi valves and other special configurations are vulnerable. The Hy-Drop® 5800 Series throttling valve embodies a unique concept, which so controls the destructive forces inherent in high pressure-drop service that deterioration of parts is virtually eliminated. Rapid energy dissipation is essential to the throttling process and the Hy-Drop® 5800 Series valve actually encourages this at the same time containing its destructive capability. The basis for this concept is in the configuration of the flow path as determined by the shape of the valve disc and seat. Fluid flowing through the annulus between disc and cylindrical seat accelerates smoothly until it reaches the blunt end of the disc. At this point, the flow area increases abruptly at its center and the resulting pressure drop at the core of the flow path causes rapid expansion of the fluid toward the core. Thus, the essential vaporization and turbulence occur at the center, within a layer of unvaporized fluid which continues to flow along- and protect- the sleeve wall. With this configuration, the vaporization process is so efficient that the vapor formed is momentarily super-saturated and the remaining liquid subcooled, until equilibrium is re-established a short distance down the sleeve passage.

FIGURE 1

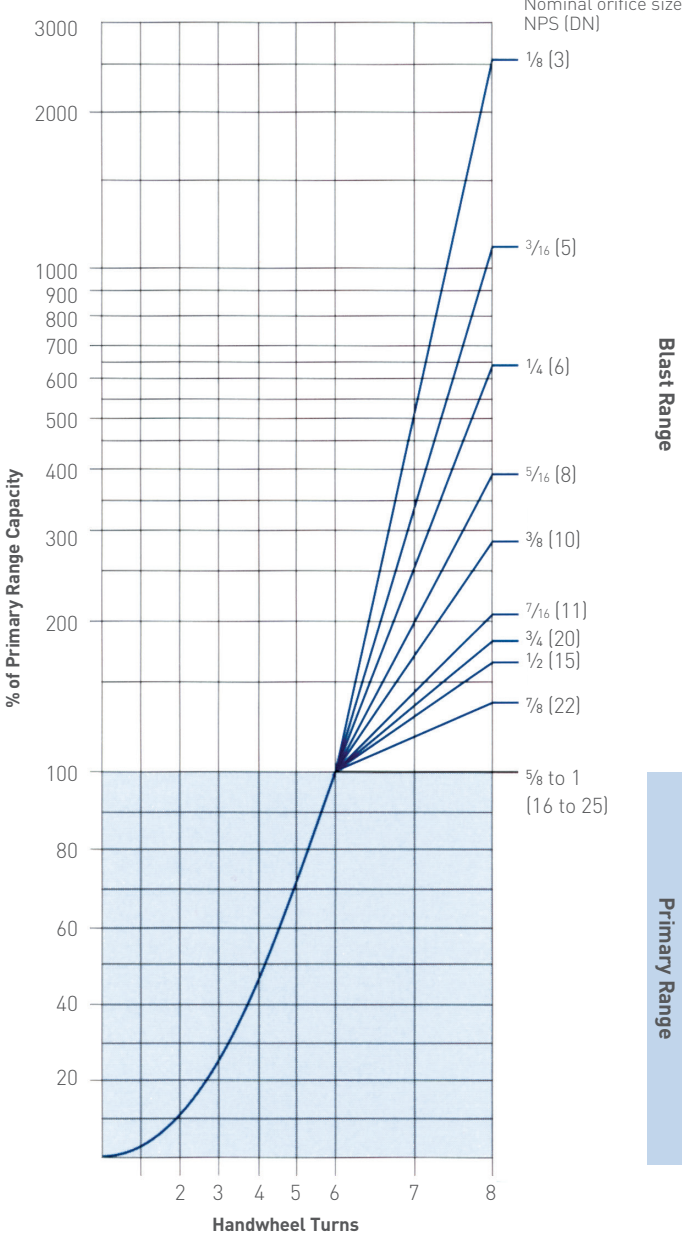


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FIGURE 2

Valve Rangeability



DUAL-RANGE THROTTLING

The Hy-Drop® valve provides throttling through the primary range of conventional throttling valves plus a supercapacity blast range for purging foreign particles from the line or for accelerated drainage of the system during startup or shutdown.

Turns 3 through 6 of the T-handle provide throttling in the primary range. From the sixth to the eighth handwheel turn on the Hy-Drop® valve, the disc is elevated beyond the point where it influences control in the primary range. Size availability is provided per the following schedule:

Valve Size, NPS (DN)	Nominal Orifice Sizes, In. (mm)	Seat Diameter, In. (mm)
1 (25)	1/8 to 5/8 (3 to 16)	5/8 (16)
1 1/2 (40)	1/8 to 5/8 (3 to 16)	5/8 (16)
1 1/2 (40)	3/4 to 1 (20 to 25)	7/8 (22)

NOTE:

Not recommended for operations below three turns.

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Valve/Trim Selection

Consult your Emerson sales representative for size verification on all applications. Valve selector curve displays the expected flow rates for traditional continuous blowdown applications. Refer to the formulas for steam, liquid or gas service.

Flow Rate Calculation Formulas

Rate of flow, pressure drop or valve size can be determined by using the Yarway valve flow coefficient, C_v , in the following formulas:

LIQUID

Q = U.S. gpm

$$C_v = \frac{Q \sqrt{G}}{\sqrt{\Delta p}}$$

**W = lb/hr
(Flowing conditions)**

$$C_v = \frac{W}{500 \sqrt{\Delta p} \sqrt{G}}$$

GAS

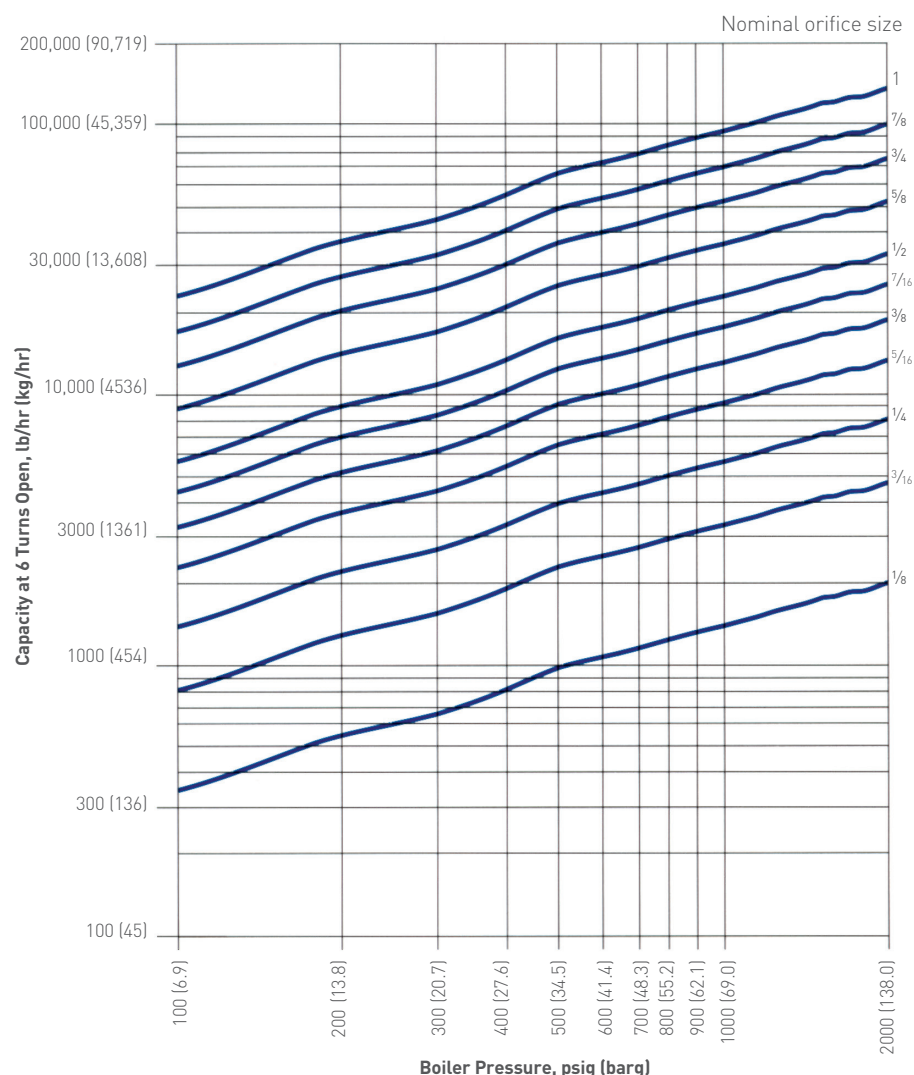
Q = Volumetric flow (SCFH)

$$C_v = \frac{Q}{963} \sqrt{\frac{GT}{\Delta p (P_1 + P_2)}}$$

K_v = metric flow coefficient
[1 m³/hr water with 1 bar pressure drop]
 K_v = 0.865 C_v
Convert data to Imperial units and use procedures above.

FIGURE 3

Valve Selector Curve - Continuous Blowdown (Flashing Water)



STEAM

Saturated

W = lb/hr*

Superheated

W = lb/hr*

$$C_v = \frac{W}{500 \sqrt{\Delta p (P_1 + P_2)}} \quad C_v = \frac{(1 + 0.0007 T_{SH}) W}{2.1 \sqrt{\Delta p (P_1 + P_2)}}$$

* When Δp equals or exceeds P_1 , the term $\frac{1}{2}$ becomes 0.87P

C_v = valve flow coefficient
 G = specific gravity (water at 60°F = 1)
 Δp = $(P_1 - P_2)$ = pressure drop psi
 P_1 = inlet absolute pressure psia (14.7 + psig)
 P_2 = outlet absolute pressure psia (14.7 + psig)
 T_{SH} = superheat °F
 T = absolute temperature of flowing medium (F + 460)

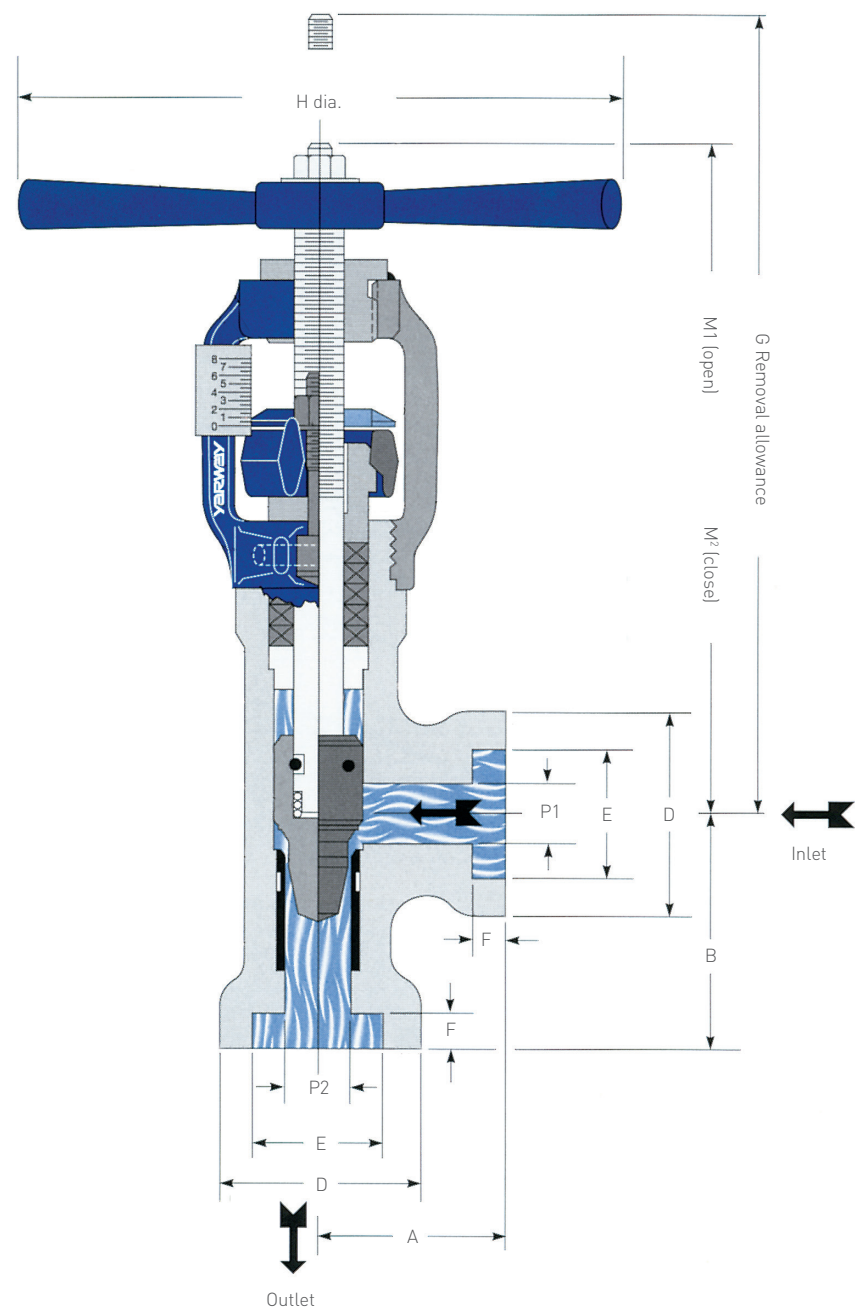
NOTE:

Consult your Emerson sales representative when pressure exceeds 2000 psig (138 bar).

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DIMENSIONS

Size, NPS (DN)	DIMENSIONS, In. (mm)											Weight, lbs (kg)
	A	B	D	E	F	G	H	M1	M2	P1	P2	
1 (25)	2¾ (70)	3½ (89)	3¼ (83)	1.330 (33)	½ (13)	21 (533)	9 (228)	11½ (292)	10½ (267)	⅞ (14)	⅞ (22)	25 (11.3)
1½ (40)	2¾ (70)	3½ (89)	3¼ (83)	1.915 (49)	½ (13)	21 (533)	9 (228)	11½ (292)	10½ (267)	⅞ (22)	⅞ (22)	25 (11.3)

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PARTS AND MATERIALS

Item	Description	Material
1	Body	ASME SA-182 grade F22 or ASME SA-105
2	Gland	AISI 4140
3	Indicator	Aluminum
4	Stem	ASTM A582 type 416
5	Stuffing box bushing	AISI 410
6	Packing	Garlock 98 and graph lock
7	Indicator bushing	AISI 416
8	Split gland bushing	AISI 1018
9	Yoke bushing	ASTM B21 UNS C4 6400
10	Yoke	ASME SA-182 grade F22
11	T-Handle	ASTM A-47 grade 32510
12	Washer	Carbon steel
13	Hex Nut	Low carbon steel
14	Washer	Carbon steel
15	Indicator scale and nameplate	AISI 302
16	Spring	Inconel® X
17	Hex nut	ASME SA-194 grade 2H
18	Swing bolt	ASME SA-193 grade B7
20	Swing bolt pin	AISI 6150 or 8740
21	Disc	AMS-5385 (stellite no. 21)
22	Seat	AMS-5387 (stellite no. 6)

WATER SPECIFIC GRAVITY TABLE

Temperature	γ _s
60°F (16°C)	1.000
100°F (38°C)	0.997
200°F (93°C)	0.982
300°F (149°C)	0.958
400°F (204°C)	0.927
500°F (260°C)	0.887
600°F (316°C)	0.824
700°F (371°C)	0.659

NOTE:

Inconel® is the mark owned by Special Metals Corporation.

PRESSURE/TEMPERATURE RATINGS

Service Temperature		Maximum Allowable Working Pressure							
		Class 1700				Class 2700			
		F22		A105		F22		A105	
°F	°C	psig	bar	psig	bar	psig	bar	psig	bar
200	93	4250	293	4250	293	6750	465	6750	465
250	121	4215	291	4222	291	6700	462	6750	465
300	149	4185	289	4190	289	6650	459	6660	459
350	177	4155	286	4170	288	6600	455	6625	457
400	204	4125	284	4150	286	6550	452	6590	454
450	232	4110	283	4150	286	6530	450	6590	454
500	260	4100	283	4150	286	6515	449	6590	454
550	288	4095	282	4150	286	6500	448	6590	454
600	316	4085	282	4150	286	6490	447	6590	454
650	343	4055	280	4050	279	6440	444	6435	444
700	371	4005	276	3915	270	6365	439	6220	429
750	399	4005	276	3590	248	6365	439	5705	393
800	427	4005	276	2910	201	6365	439	4625	319
850	454	3835	264	-	-	6095	420	-	-
900	482	3400	234	-	-	5400	372	-	-
950	510	2740	189	-	-	4410	304	-	-
1000	538	2040	141	-	-	3400	234	-	-

NOTE:

1. All ratings are in accordance with ASME pressure/temperature ratings (B16.34 - 1996) limited class.

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VALVE SIZE, NOMINAL ORIFICE SIZE AND FLOW COEFFICIENTS

Valve Size, NPS (DN)	Nominal Orifice Size, In. (mm)	PRIMARY RANGE COEFFICIENT		BLAST RANGE COEFFICIENT
		C _v 3 turns	C _v 6 turns	C _v 8 turns
1, 1½ (25, 40)	⅛ (3)	0.1	0.3	7.7
1, 1½ (25, 40)	⅜ (5)	0.2	0.7	7.7
1, 1½ (25, 40)	¼ (6)	0.4	1.2	7.7
1, 1½ (25, 40)	⅝ (8)	0.6	2.0	7.7
1, 1½ (25, 40)	¾ (10)	0.8	2.8	7.7
1, 1½ (25, 40)	7/16 (11)	1.1	3.8	7.7
1, 1½ (25, 40)	½ (13)	1.5	4.9	7.7
1, 1½ (25, 40)	⅝ (16)	2.3	7.7	7.7
1½ (40)	¾ (19)	3.3	11.0	20.0
1½ (40)	7/8 (22)	4.5	15.0	20.0
1½ (40)	1.0 (25)	6.0	20.0	20.0

HOW TO SPECIFY

Size

Yarway Hy-Drop® throttling valve, suitable for high pressure-drop services; to be of integral bonnet design and angle pattern. Valve to possess dual range capability as permitted by the nominal orifice size which is herein specified to be. Quick-change plug to be provided to accommodate future demands of change in original orifice size without replacement or change in valve body; loose disc design to afford multi-position seating and to provide two separate elemental surfaces for the separate functions of shut-off and throttling; disc to be of solid Stellite. Valve to be provided with socketwelding ends.

Sizes

Connection: Hy-Drop® throttling valve is made in two pipe sizes, NPS 1 and 1½ (DN 25 and 40). Socketwelding ends are provided. For other connection content consult your Emerson's sales representative.

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MOTOR OPERATED VALVES

Yarway Hy-Drop® 5800 Series valves are available with Bettis™ XTE3000 modulating electric actuators or Fisher™ Type 657 direct-acting or Fisher Type 667 reverse-acting pneumatic actuators.

Actuator Type	Actuator	Hy-Drop® Models	Attributes
Electric	XTE 010/90	All	S4-50% 1200 St/h Modulating Duty, Hard-wired control, Handwheel, Power/Speed options: 480 V/3 Ph/ 60 Hz/29 RPM, 440 V/3 Ph/60 Hz/ 29RPM, 415 V/3 Ph/50 Hz/24 RPM, 380 V/3 Ph/50 Hz/24 RPM or 240 V/3 Ph/50 Hz/24 RPM, Standards options: FM approval or ATEX approval
	XTE 030/360	1½ and 2, Class 2700	
Pneumatic	Fisher Type 667 (fail closed) Size 40 (1E8058 27082 spring, 12 to 30 psi bench set)	NPS 1 (DN25) (up to 1870 psi (129 bar))	Fisher DVC6200H positioner with HART® 7 protocol, 4-20 mA position feedback, ½ NPT conduit and ¼ NPT pneumatic connections, Fisher Type 67CFR air filter regulator
	Fisher Type 667 (fail closed) Size 45 (1E8272 27082 spring, 19 to 30 psi bench set)	NPS 1 (DN25) (up to 5250 psi (362 bar)) or NPS 1½ (DN40) (up to 2000 psi (138 bar))	
	Fisher Type 667 (fail closed) Size 46 (1E8263 27082 spring, 17 to 30 psi bench set)	NPS 1 or NPS 1½ (DN 25 or 40) (up to 2770 psi (191 bar))	
	Fisher Type 657 (fail open) Size 40 (1E8053 27082 spring, 6 to 15 psi bench set)	NPS 1 (DN 25) (up to 1700 psi (117 bar)) or NPS 1½ (DN 40) (up to 1100 psi (76 bar))	
	Fisher Type 657 (fail open) Size 45 (1E8270 27082 spring, 6 to 15 psi bench set)	NPS 1 (DN 25) (up to 2730 psi (188 bar)) or NPS 1½ (DN 40) (up to 1830 psi (126 bar))	
	Fisher Type 657 (fail open) Size 46 (1E8272 27082 spring, 6 to 14 psi bench set)	NPS 1 (DN 25) (up to 4450 psi (307 bar)) or NPS 1½ (DN 40) (up to 3000 psi (207 bar))	



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Yarway Hy-Drop® 5800 Series valves are also available with a mounting plate without actuator. The mounting plate will be tack welded to the yoke and be supplied with a 6 spline drive bushing for electric actuators and the yoke boss nut for pneumatic actuators. Conversion kits are also available to convert manual-operated Hy-Drop® 5800 Series valves to motor-operated. The mounting plate will be threaded.

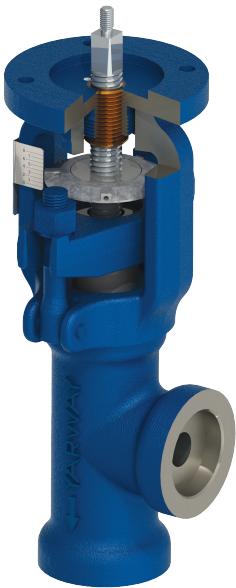
ELECTRIC MOTOR OPERATED VALVE DATA

VALVE		STEM		Turns to Open	REQUIRED TORQUE		Mounting Flange Options
Size, NPS (DN)	Class	Thread	Rise		Ft-lbs	N•m	
1 (25)	1700	¾-8 ACME	1 in. (25.4 mm)	8	25	33.9	F10, FA10
1½ and 2 (40 and 50)	1700	¾-8 ACME	1 in. (25.4 mm)	8	58	78.6	F10, FA10
1 (25)	2700	¾-8 ACME	1 in. (25.4 mm)	8	36	48.8	F10, FA10
1½ and 2 (40 and 50)	2700	¾-8 ACME	1 in. (25.4 mm)	8	75	102	F10, FA10, F14, FA14

PNEUMATIC MOTOR OPERATED VALVE DATA

VALVE SIZE, NPS (DN)	STEM		REQUIRED THRUST (lbs)		Standard Mounting Flange
	Thread	Rise	Closing	Opening	
1 (25)	½ -20 UNF	1 in. (25.4 mm)	Thrust (lbs) = 0.617*P1+166	Thrust (lbs) = 0.345*P1+166	Fisher 657/667 size 40/45/46
1½ (40)	½ -20 UNF	1 in. (25.4 mm)	Thrust (lbs) = 0.888*P1+240	Thrust (lbs) = 0.852*P1+240	

P1 = Maximum Inlet Pressure in psig



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ORDERING GUIDE

Available Configurations (Select One)

- ☐ Type 5817 - Class 1700
- ☐ Type 5827 - Class 2700

Size (Select One)

- ☐ NPS 1 (DN 25)
- ☐ NPS 1½ (DN 40)

Material (Select One)

- ☐ A105
- ☐ F22

End Connections (Select One)

- ☐ SWE
- ☐ Other _____

Orifice (Select One)

- ☐ ⅛ in. (3 mm)
- ☐ ⅜ in. (5 mm)
- ☐ ¼ in. (6 mm)
- ☐ ⅝ in. (8 mm)
- ☐ ¾ in. (10 mm)
- ☐ 7/16 in. (11 mm)
- ☐ ½ in. (15 mm)
- ☐ 5/8 in. (16 mm)
- ☐ ¾ in. (20 mm) (NPS 1½ (DN 40) only)
- ☐ 7/8 in. (22 mm) (NPS 1½ (DN 40) only)
- ☐ 1 in. (25 mm) (NPS 1½ (DN 40) only)

Actuation (Select One)

- ☐ Manual - T-handle
- ☐ Mounting plate
Specify Mounting Flange Size _____
- ☐ Bettis™ XTE3000 Electric Actuator
- ☐ Fisher™ Type 657 Pneumatic Actuator
- ☐ Fisher Type 667 Pneumatic Actuator

Bettis Model Options (If Applicable)

- ☐ Bettis XTE 010/90
- ☐ Bettis XTE 030/360

Bettis Standard Options (If Applicable)

- ☐ FM Approval
- ☐ ATEX

Bettis Power Options (If Applicable)

- ☐ 480 V/3 Ph/60 Hz
- ☐ 440 V/3 Ph/60 Hz
- ☐ 415 V/3 Ph/50 Hz
- ☐ 380 V/3 Ph/50 Hz
- ☐ 240 V/3 Ph/50 Hz

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OTHER PRODUCTS

Yarway Blow-off Valves

Basic requirements for the design and use of blow-off valves are established by the ASME power boiler code, section 1. The general form of a valve, the materials of its construction, allowable boiler pressures and the installation of the valve are all determined by the code. Yarway blow-off valves are designed in conformance with code requirements per ASME section 1, ASME B31.1 and ASME B16.34.

Yarway valves are especially designed for the punishment of blow-off service in boiler systems with pressures up to 3206 psig (221 bar).

The rugged construction of these valves can successfully withstand the combination of problems inherent in the service - a service in which high pressures result in high velocities which can cause wiredrawing and cavitation of metal services.

Two broad categories of Yarway blow-off valves are available - those that operate on a sliding principle and those that operate on a seat-and-disc principle. They are summarized below.

Seatless Valves for Pressures to 935 psig (64.5 bar) (Class 250 to 600)

The seatless blow-off valve is a sliding plunger type, opened and closed by means of a handwheel and nonrising stem and sealed against leakage by packing rings above and below the ports. Ample flow area is provided in the hollow plunger; absence of projections or pockets prevents accumulation of scale and sediment that can impede flow and shorten the life of the valve. Annular space in the body permits pressure to surround the plunger, making the valve a fully balanced unit easy to operate at high pressures.

This valve is available in angle or straightway styles, cast iron or steel construction and flanged ends. Pressure classes are 250, 300 and 600.

Hardseat Valves for Pressures to 2455 psig (169 bar) (Class 600 and 1500)

The hardseat valve has a seat and disc design with flow entering under the seat. It is opened and closed by means of a handwheel and threaded rising stem. The stuffing box bushing and threaded yoke bushing provide a simple, sturdy guide for the stem. This valve has been designed with thick stellite facings on the disc and seat to provide the hard wearing, anti-galling surfaces characteristic of stellite.

Usual installation of this valve allows the flow to enter below the seat. As the valve is opened, the lip on the end of the disc restricts flow until the beveled edge or seating surface of the disc is well away from the seat. This minimizes wiredrawing and protects the sealing faces. The valve should be opened rapidly and fully to help increase the life of the internal parts.

Hardseat valves are available in angle or straightway styles, socketweld or flanged end connections with manual or electric motor actuation. Class ratings are 600 and 1500.

Unit Tandem Valves for Pressures to 3206 psig (221 bar) (Class 300 to 2500)

The Yarway unit tandem valve features a one-piece steel block which serves as a common body for both blowing and sealing valves. This construction eliminates interconnecting welds, or bolts and gaskets where flanged valves are required, and makes the unit tandem a compact design. For valves with basic pressure rating to 600 psi (41.4 bar) (medium pressure unit tandem) the inlet valve is a hardseat type and the discharge valve is of the seatless type. For basic pressure ratings above 600 to 2500 psi (41.4 to 172 bar), both inlet and discharge valves are hardseat type. All features of the Yarway single valves are contained in the unit tandem design with the additional advantage of a one-piece, heavy duty construction.

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