

VAL-MATIC®

Proven Design

Preferred Features

Advanced Technology



Cam-Centric®
100% Port
Plug Valves



www.valmatic.com

Meets AWWA C517
NSF/ANSI 372 Certified

Feature Highlights

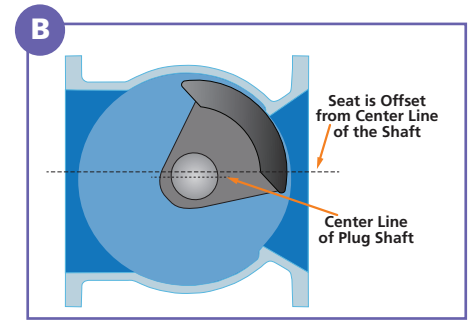
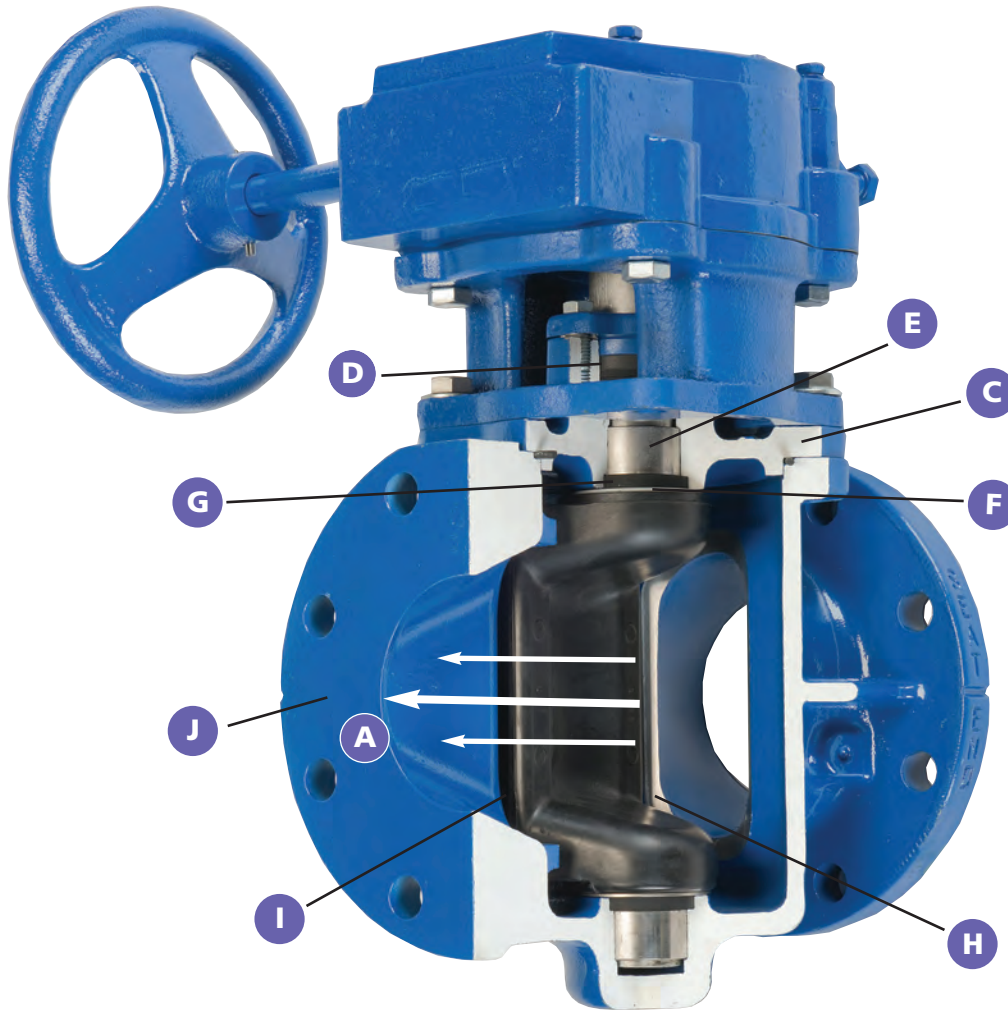


Figure 1. Eccentric Action

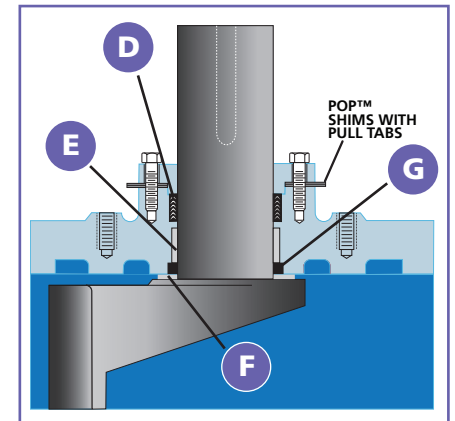


Figure 2. Upper Bearing Journal

A. 100% Port

The rectangular port area matches the full pipe area for low headloss and non-clog performance. The full discharge downstream port has no restriction to provide maximum flushing action.

B. Eccentric Action

Provides positive shut off in both directions at full rating with wear resistant action and low torque.

C. Full Top Access Cover with Adjustable Packing

The removable full size top access cover enables maintenance and inspection without valve removal. The packing is adjustable and replaceable without removal of the actuator.

D. V-Packing

V-Type packing gland with removable POPT™ shims for controlled adjustment and long packing life.

E. Radial Bearings

Heavy Duty, T316 Stainless Steel, Permanently Lubricated.

F. Thrust Bearing

Upper and Lower PTFE thrust bearings provides ease of actuation during operating conditions.

G. Grit-Guard™ Shaft Seal

The resilient molded *Val-Matic Exclusive* Grit-Guard™ seals extend packing and bearing life by reducing wear and infiltration of grit.

H. Seat

The robotic pulsed-arc welded 95% nickel raised seat is corrosion and wear resistant.

I. Plug

The plug is contoured and out of the flow path when open for reduced headloss and energy efficiency. The rigid ductile iron plug is fully encapsulated with molded rubber in all sizes for maximum resistance to corrosion and wear.

J. End Connections

Flange mating dimensions comply with ANSI Class 125. Mechanical Joint dimensions comply with AWWA C111. Laying lengths comply with AWWA C517.

Proven Design

With installations worldwide, the Val-Matic Cam-Centric® Plug Valve has proven itself as the preferred valve for wastewater, industrial waste and process applications. The Cam-Centric® Plug Valve is a ¼ turn eccentric plug valve allowing cost effective, low torque actuation for pump control, shut-off and throttling service. The valve's eccentric action rotates the plug in and out of the seated position with minimal contact, thereby preventing high torque and wear to the valve seat and plug. The combination of the eccentric action, stainless steel bearings, Grit-Guard™ seals and heavy duty nickel seat assures long life with minimal maintenance.

Preferred Features

The Cam-Centric® Plug Valve features a shaft sealing system that utilizes V-Type packing, a packing follower and a Grit-Guard™ seal for ease of maintenance and to reduce wear. The Grit-Guard™ seals reduce wear by preventing grit and media from reaching the bearings and packing to prevent plug lock up. The seals are standard in both the upper and lower journals (Figure 2). To prevent the packing from being over tightened, the shaft seal incorporates POP™ (Packing Overload Protection) Shims. The packing is easily adjusted by removing the POP™ shims as necessary utilizing the pull tab feature (Figure 2). Adjustment or replacement of the V-Type packing can be done without removal of the gear, motor or cylinder actuator.

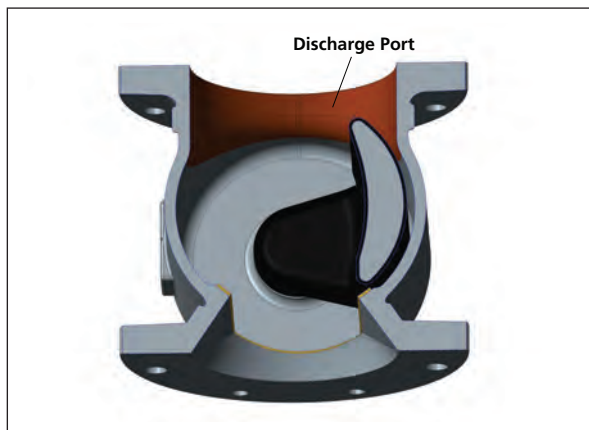


Figure 3. Full Discharge Port

The outlet of the Cam-Centric® Plug Valve contains a full discharge port that is specifically designed to prevent clogging in wastewater and slurry services. The port provides full flushing action, draining the sediment and grit from the valve during cycling. The outlet is equal to the pipe size, yields low headloss and enables cleaning of the pipeline with a resilient, high-density polyurethane foam pig (Figure 3).

The Cam-Centric® bearing package consists of permanently lubricated, T316 stainless steel radial bearings in both the upper and lower journals. The thrust bearings are made of PTFE for ease of operation. The bearings are protected from grit-related wear by the resilient Grit-Guard™ seals.

The Cam-Centric® Plug Valve utilizes a contoured and totally encapsulated molded plug to reduce corrosion and wear in severe abrasive applications. Its ductile iron construction provides strength and rigidity to withstand dynamic forces from flow and pressure.



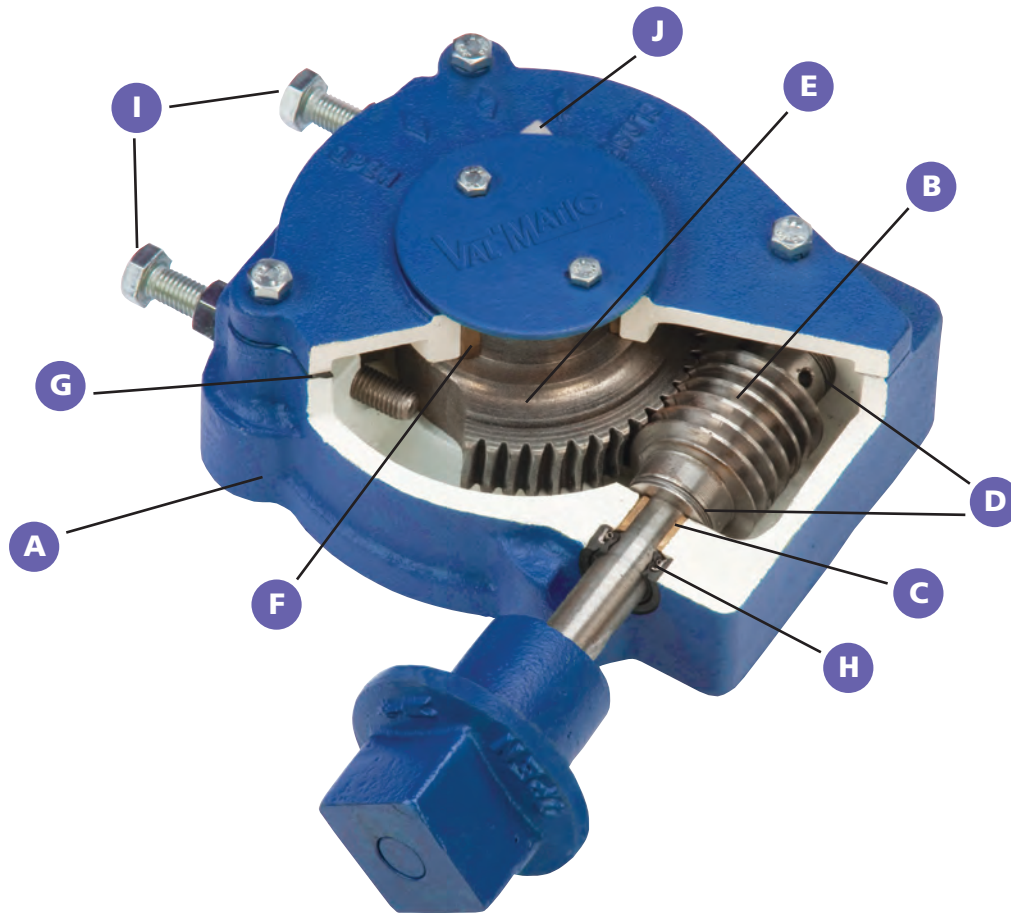
Figure 4. Robotic welding of nickel seat

The valve seat is a welded overlay of 95% pure nickel applied directly to the body on a machined surface using a state-of-the-art robotic pulse-arc welding system for a consistent, high quality weld (Figure 4).

Advanced Technology

Incorporating the latest in valve technology assures a high-quality valve that will provide long service. The design process utilized solid modeling and finite element analysis (FEA) of the key structural components. Flow and torque data was derived from flow tests, mathematical models and computational fluid dynamics (CFD). Manufacturing technology uses automated process control in the foundry and ISO 9001 controlled manufacturing processes. Every valve is tested in accordance with AWWA C517 and MSS SP-108 on automated hydraulic test rigs with gauges calibrated in accordance with ISO standards.

Worm Gear Features



Val-Matic Worm Gear

A valve actuator must perform to the same level as the valve. The Val-Matic worm gear is designed and built to provide the same long term service as our Cam-Centric® Plug Valve. The exclusive bearing package in the worm gear includes four bronze sleeve bearings and two roller thrust bearings. This exclusive package assures smooth operation and long life regardless of the valve's orientation or application. The ductile iron segment gear coupled with the upper and lower bronze radial bearings exceed the requirements of AWWA C517 for strength and durability. All worm gears are designed to withstand a rim pull of 200 pounds on handwheels and an input torque of 300 foot pounds for operator nuts without damage. Buried service worm gear input shafts are corrosion resistant, the housing is packed with grease, and the indicator is replaced with a blind cover. Worm gears can be provided with hand-

wheels, chainwheels or 2" operator nuts.

A. Housing

Heavy duty, totally enclosed and sealed.

B. Worm

Hardened steel for durability and long life.

C. Radial Shaft Bearings

Bronze shaft bearings extend life and provide ease of operation (rear shaft bearing not visible).

D. Roller Thrust Bearings

Provides smooth operation and extends life.

E. Segment Gear

Heavy duty ductile iron for high strength. Provided with precision bore and keyway for connection to the valve shaft in multiple positions.

F. Segment Gear Radial Bearings

Upper and lower bronze bearings provide ease of operation and extend life (lower bearing not visible).

G. Cover Gasket

Seals housing and prevents foreign material from entering actuator and prevents loss of grease.

H. Shaft Seal

Prevents foreign material from entering the actuator.

I. External Stops

Both open and closed stops are external and easily adjustable.

J. Position Indicator

Displays precise plug position on above ground service.

The Cam-Centric® Plug Valve is available with a wide range of actuation options, from simple lever operation to advanced pump control systems. Options include 2" operator nuts, worm gears, chainwheels, electric motor and cylinder actuation. A wide variety of accessories such as floor stands and extended bon-

nets are also available (see accessories on page 7). Val-Matic Engineering personnel work closely with cylinder and electric actuation manufacturers to assure actuator/valve compatibility. This assures the actuator you specify will deliver the performance you expect when utilized with a Cam-Centric® Plug Valve.



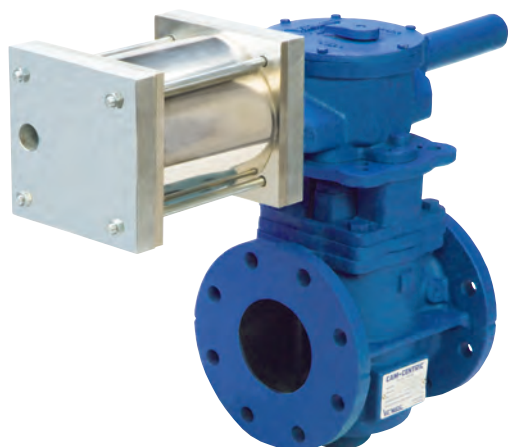
Direct Nut operated valve with memory stop:

- Adjustable open memory stop for system balancing
- Adjustable close stop
- Adjustable friction collar with nylon bearing
- For use with lever accessories



Val-Matic Worm Gears:

- Heavy duty, totally enclosed and sealed
- For above ground and buried service applications
- Bronze radial bearings and roller thrust bearings provide smooth operation and extended life



Val-Matic Cylinder Actuation:

- Compliance with AWWA C541 for Power Actuation
- Pneumatic/Hydraulic
- Single Acting or Double Acting
- Fail Open/Closed for power failure
- Modulating Service
- Throttling Service
- Limit Switches, Solenoid Valves, Positioners
- Manual Overrides
- Pump Control



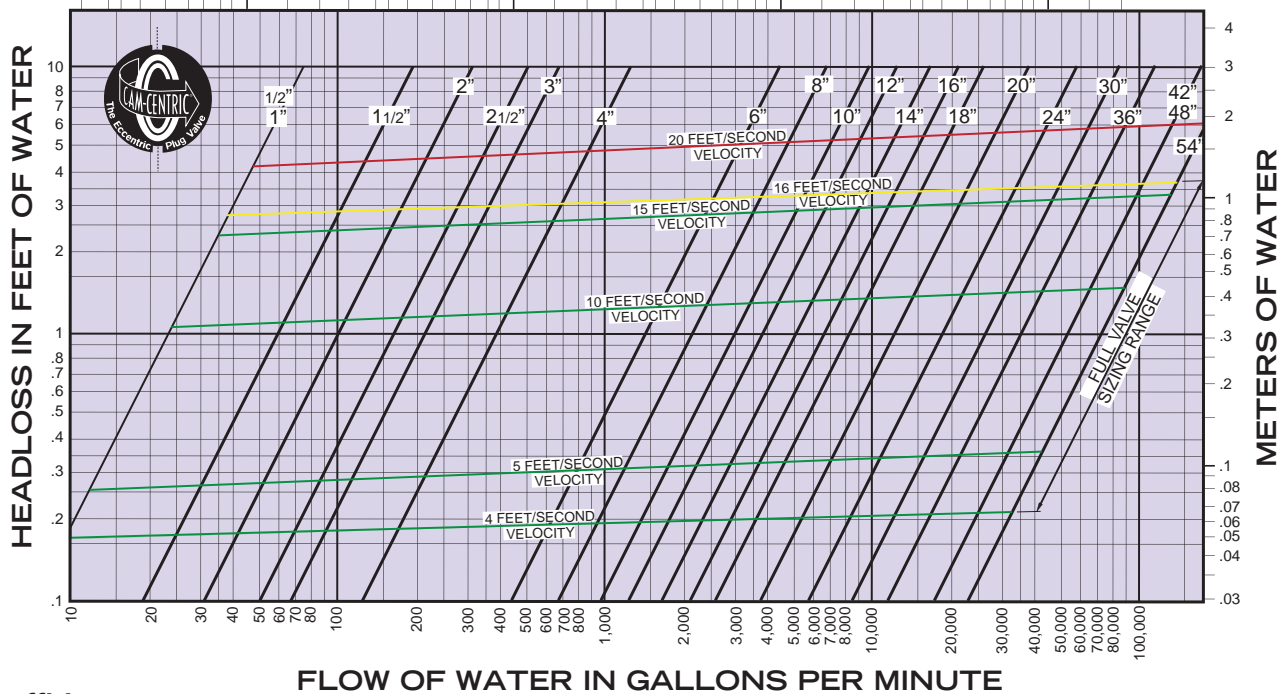
Electric Actuation:

- 110 Single Phase, 230/460 Three Phase
- Compliance with AWWA C542 for Power Actuation
- Modulating Service
- Throttling Service
- Remote push button control and indication
- Torque Switches, Limit Switches
- De-clutchable handwheels
- Available from a wide variety of manufacturers

Headloss Charts

100% Port

CUBIC METERS PER HOUR



Flow Coefficients

Size	1/2-1	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48	54
Cv	37	94	150	240	850	1477	1930	2820	3980	5160	7290	8700	11,800	14,400	22,000	34,300	56,900	91,650	91,650	124,800

Installation Instructions

The installation of the valve is important for its proper operation. The valve is capable of flow in either direction but the maximum operating pressure can vary with the location of the seat end (Figure 5). The words "SEAT END" are marked on the valve flange.

SUSPENDED SOLIDS SERVICE: For fluids containing suspended solids, special orientations are needed to prevent debris from collecting in the valve. For horizontal installations (Figure 6), the valve should be installed with the flow entering the seat end of the valve and the shaft in a horizontal position with the plug up when open. For vertical installations (Figure 7), the valve must be installed with the seat end up regardless of flow direction.

CLEAN SERVICE: For both horizontal and vertical installations, install in the direct pressure orientation (pressure opposite the seat end).

AIR AND GAS SERVICE: Install valve in the direct pressure orientation (pressure opposite the seat end). Lubricate plug face with FDA approved silicone grease such as Dow Corning #7 before installation. Gear actuators are required for gas service applications.

PUMP DISCHARGE SERVICE: On all horizontal pump discharge applications, the seat end should be towards the pump.

BURIED SERVICE: Gear actuators are recommended for buried valves to hold the valve in position and provide multi-turn closure to prevent water hammer. The valve should be installed with the shaft horizontal and the actuator nut directed upwards. The valve box or extension pipe should be installed so that the actuator nut and extension stem turn freely.

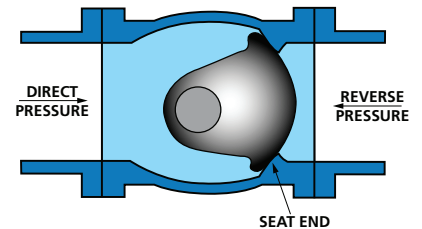


Figure 5. Installation Orientation

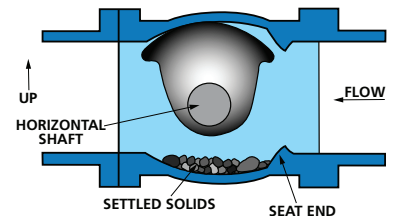


Figure 6. Horizontal Pipe with Solids

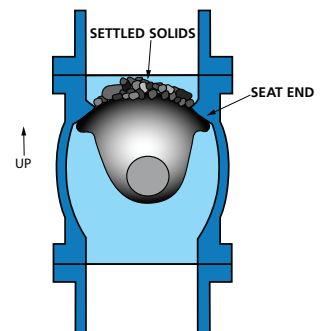


Figure 7. Vertical Pipe with Solids

PRESSURE RATINGS

MAXIMUM PRESSURE RATINGS			
SERIES	CONNECTION	SIZE RANGE	CWP (psig)
5600R	ANSI Class 125 Flanged 100% Port	2" - 2 1/2"	175
		42" - 54"	150
5600F	ANSI Class 125 Flanged 100% Port	3" - 12"	175
		14" - 36"	150
5700F	AWWA C111 Mechanical Joint 100% Port	3" - 12"	175
		14" - 36"	150
5700R	AWWA C111 Mechanical Joint 100% Port	42" - 54"	150
5600HP 5700HP	ANSI Class 125 Flanged 100% Port High Pressure	6" - 20"	250
5800RTL	ASME NPT Threaded	1/2" - 2"	175

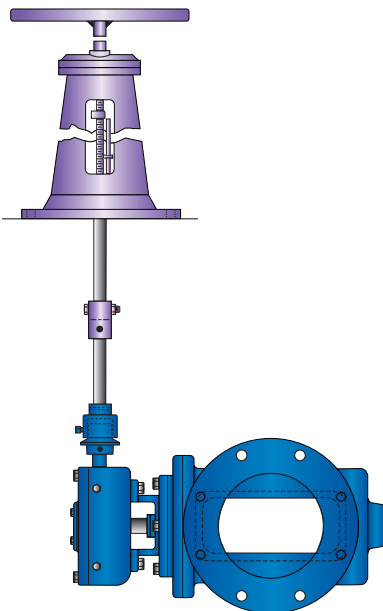
MATERIALS OF CONSTRUCTION

COMPONENT	STANDARD
Body (5600R, 5600F, 5700R, 5700F)	Cast Iron ASTM A126, Class B
Body (5600HP, 5700HP)	Ductile Iron ASTM A536, Grade 65-45-12
Plug and Integral Shaft	Ductile Iron ASTM A536, Grade 65-45-12, Buna-N Encapsulated, ASTM D2000
Radial Shaft Bearings	T316 Stainless Steel
Top and Bottom Thrust Bearings	PTFE
Available Coatings	Two-Part Epoxy, Fusion Bonded Epoxy, Glass Lining, Rubber Lining

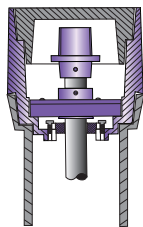
Accessories

Space limitations and application specifics often require special accessories. In addition to those shown below, Val-Matic offers a wide range of accessories to meet your application requirements.

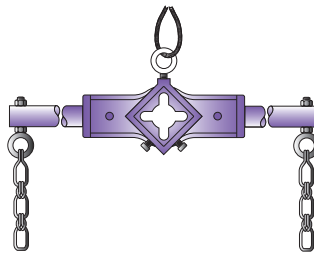
**Floor Stand with
Extension Stem**



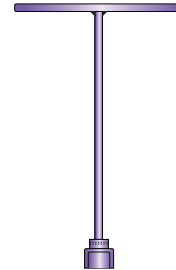
**Ground Level
Position Indicator**



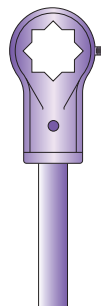
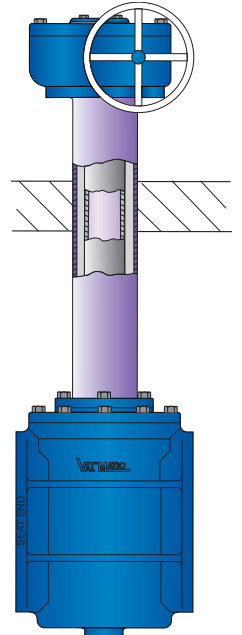
Chainlever



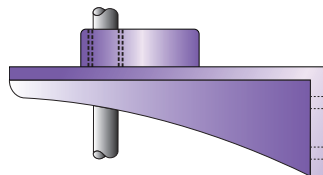
"T" Wrench



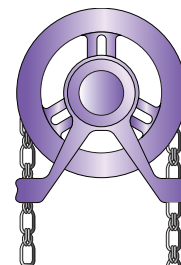
Extended Bonnet



Lever



Stem Guide

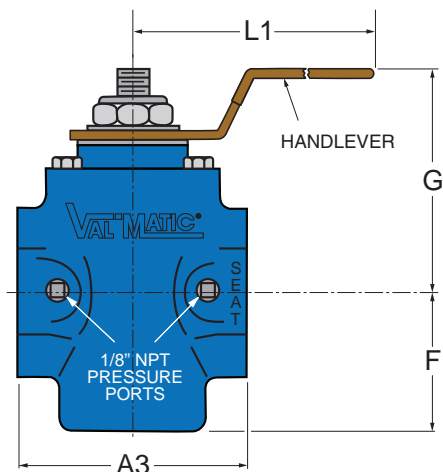


Chainwheel

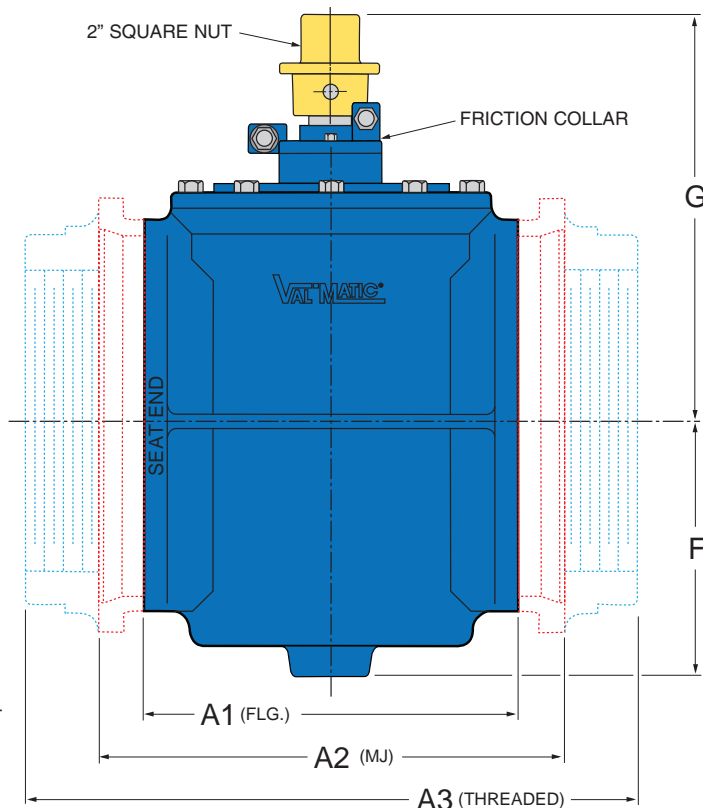
Installation Dimensions

Direct Nut Operated

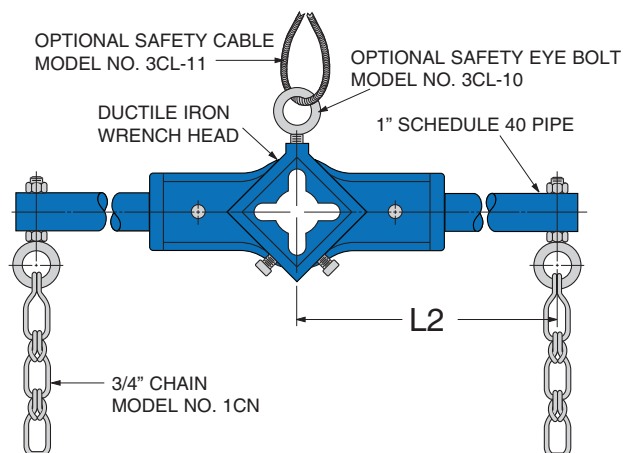
Flanged, Mechanical Joint, Threaded End Connections



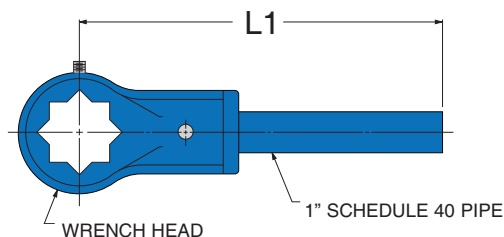
Sizes 1/2" - 2"



Sizes 2" - 8"



Chainlever



Handlever

Dimensions in Inches

Valve Size	Flanged Model No.	MJ Model No.	Threaded Model No.	Handlever Model No.	Chainlever Model No.	Reverse PSI	Direct PSI	A1	A2	A3	F	G	L1	L2
1/2	-	-	5800.5RTL	Std	-	175	175			4.13*	1.88	3.19	4.25	-
3/4	-	-	5800.75RTL	Std	-	175	175			4.13*	1.88	3.19	4.25	-
1	-	-	5801RTL	Std	-	175	175	-	-	3.13	1.88	3.19	4.25	-
1 1/4	-	-	5801.25RTL	Std	-	175	175			6.75*	2.88	4.25	6.50	-
1 1/2	-	-	5801.5RTL	Std	-	175	175			6.75*	2.88	4.25	6.50	-
2	5602RN	-	5802RTL	Std	-	175	175	7.50	-	5.25	2.88	4.25	6.50	-
2 1/2	5625RN	-	5825RTN	4L	3CL	175	175	7.50	-	8.75	4.63	10.00	22.00	16.00
3	5603FN	5703FN	5803FTN	4L	3CL	175	175	8.00	11.50	8.75	4.63	10.00	22.00	16.00
4	5604FN	5704FN	-	4L	4CL	175	175	9.00	14.25	-	5.56	10.93	22.00	22.00
6	5606FN	5706FN	-	8L	6CL	50	100	10.50	15.75	-	7.06	12.31	44.00	32.00
8	5608FN	5708FN	-	8L	8CL	50	100	11.50	17.25	-	8.75	13.88	44.00	44.00

*Asterisk indicates length includes reducing bushing.

Notes: 1. Flange drilling conforms to ANSI B16.1, Class 125.

2. Mechanical Joint (MJ) Ends conform to ANSI/AWWA C110/A21.10.

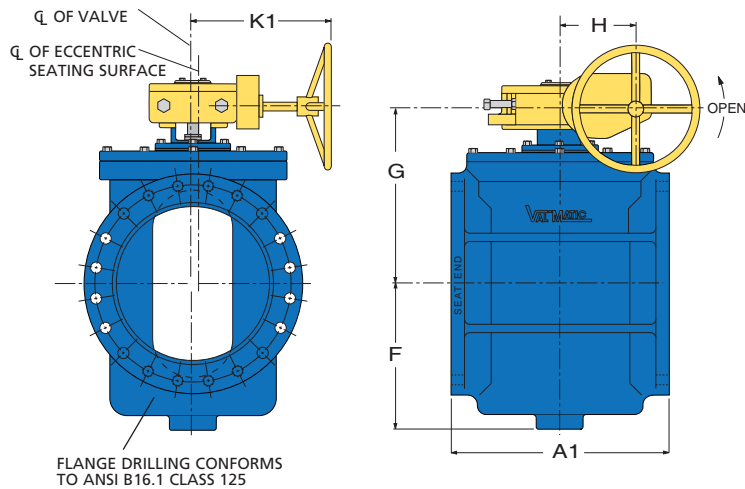
3. Threaded Ends conform to ANSI/ASME B1.20.1.

4. Handlevers (i.e. 4L) Chainlevers (i.e. 3CL) and Chain (1CN) are ordered separately.

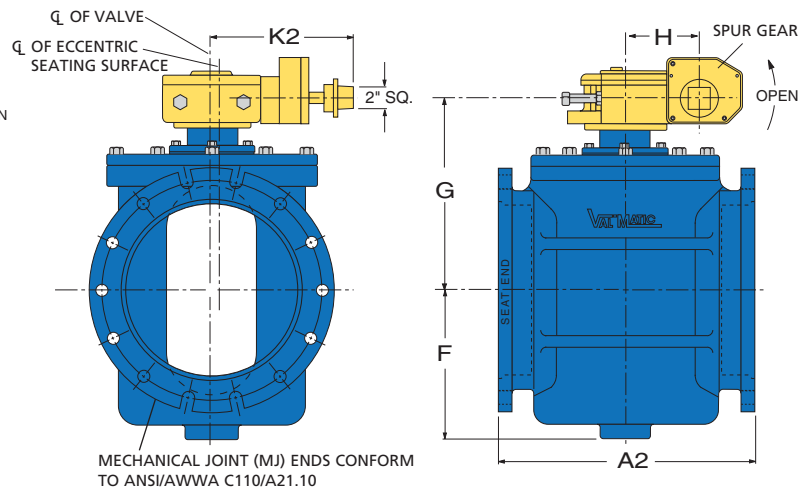
100% Port

Flanged & Mechanical Joint End Connections

Series 5600F Flanged



Series 5700F Mechanical Joint



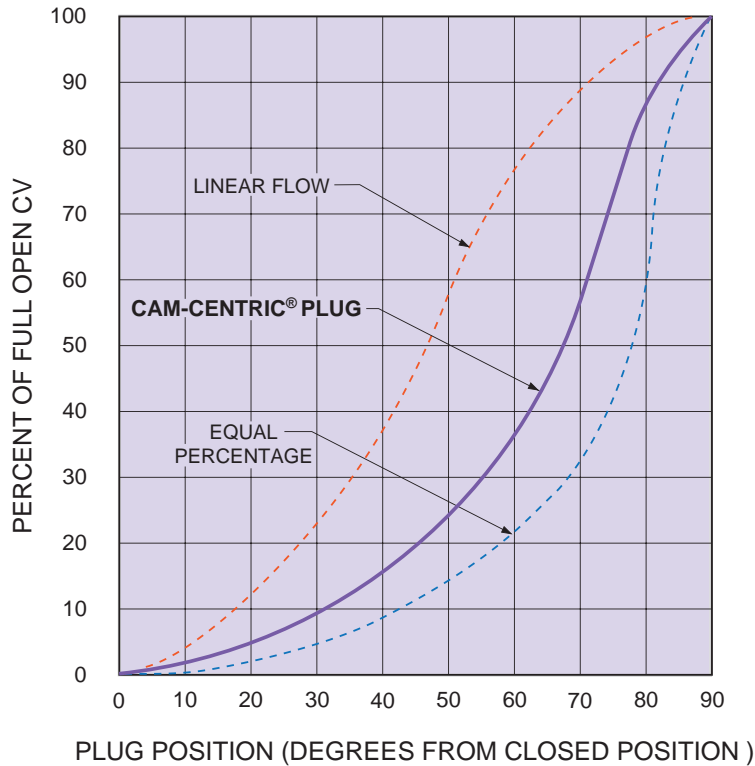
Dimensions in Inches

Valve Size	Flanged Model No.	MJ Model No.	Reverse PSI	Direct PSI	A1	A2	F	G	H	K1	K2
3	5603F/7A08*	5703F/8A02A*	175	175	8.00	11.50	4.50	7.50	3.06	9.50	9.00
4	5604F/7A08*	5704F/8A02*	175	175	9.00	14.25	5.56	9.31	3.06	9.50	9.00
6	5606F/5A08*	5706F/6A02	175	175	10.50	15.75	7.06	11.40	3.06	13.10	9.00
8	5608F/5B16	5708F/6B02	175	175	11.50	17.25	8.75	12.10	3.06	13.10	9.00
10	5610F/5D16	5710F/6D02	175	175	13.00	18.75	10.40	15.20	4.75	18.90	7.88
12	5612F/5D24	5712F/6F02	175	175	14.00	19.75	13.00	17.50	4.75	18.90	7.88
14	5614F/5F24	5714F/6F02	150	150	17.00	24.50	13.10	19.21	5.62	18.90	13.00
16	5616F/5J18	5716F/6J02	150	150	17.75	24.69	15.63	23.04	9.69	15.50	13.00
18	5618F/5L24	5718F/6M02	150	150	21.50	28.50	15.63	23.00	9.69	17.50	13.00
20	5620F/5Q30	5720F/6Q02	150	150	23.50	30.50	17.50	24.70	7.30	19.10	14.50
24	5624F/5T30	5724F/6T02	150	150	30.00	37.00	19.00	23.90	4.24	19.60	15.20
30	5630F/5W24	5730F/6W02	150	150	37.50	45.50	24.00	27.30	2.77	23.70	20.10
36	5636F/5Z24	5736F/6Z02	150	150	52.00	61.88	27.00	33.40	4.91	25.70	20.60
42	5642R/7Z30	-	50	100	84.00	-	38.13	48.46	10.90	36.32	-
	5642R/7Z36	-	100	150	-	94.00				-	36.32
	-	5742R/8Z02	150	150	-	-				-	36.32
48	5648R/7Z30	-	50	100	84.00	-	38.13	48.46	10.90	36.32	-
	5648R/7Z36	-	100	150	-	84.00				-	27.60
	-	5748R/8Z02	150	150	-	-				-	27.60
54	5654R/7ZA36	-	150	150	96.00	-	38.57	56.56	10.90	36.32	-

*Asterisk indicates valve model numbers without spur gear

- Notes:
1. Replace handwheel (HW) diameter in the model number (i.e. /5A08) with 02 for 2" square operating nut (i.e./5A02).
 2. Add a C suffix to model number to include Chainwheel Kit (i.e. 5606F/5A08C).
 3. Available with ISO/PN drilling.
 4. Consult factory for larger sizes.

Flow Characteristics



INHERENT VALVE FLOW CHARACTERISTICS

To control pressure surges and provide good controllability, the flow characteristics of valves should be considered.

The graph at left shows the inherent flow characteristics at a constant ΔP for various valves.

The plug valve has an inherent flow characteristic similar to equal percentage. When installed in a pipeline, the plug valve will approximate a linear flow characteristic because the piping system pressure losses will shift the flow curve to the left. A linear installed flow characteristic will help control surges and provide a wide range of controllability.

Installations



Cam-Centric® Plug Valve with worm gear actuator and chainwheel



Cam-Centric® Plug Valve with Val-Matic Swing-Flex®



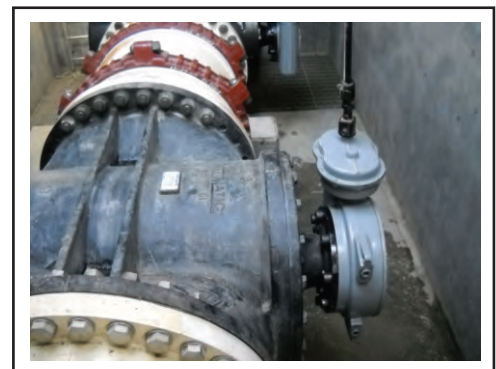
Cam-Centric® Plug Valve with Val-Matic dual body combination Air Valve



Cam-Centric® Plug Valve with motor actuator



Cam-Centric® Plug Valve with worm gear actuator



Cam-Centric® Plug Valve with worm gear actuator and extension stem

100% Port Specification

SCOPE

- 1.1 This specification covers the design, manufacture, and testing of 1/2 in. (15 mm) through 54 in. (1350 mm) 100% Port Eccentric Plug Valves suitable for water or wastewater service with pressures up to 250 psig (1725 kPa).
- 1.2 Plug Valves shall be quarter-turn, 100% port eccentric, with resilient encapsulated plug.

STANDARDS AND APPROVALS

- 2.1 Eccentric plug valves shall be designed, manufactured and tested in accordance with American Water Works Association Standard ANSI/AWWA C517.
- 2.2 All Plug Valves shall be certified Lead-Free in accordance with NSF/ANSI 372.
- 2.3 Manufacturer shall have a quality management system that is certified to ISO 9001 by an accredited, certifying body.

CONNECTIONS

- 3.1 Threaded valves shall have threaded NPT full size inlets. The connection shall be hexagonal for a wrench connection.
- 3.2 Flanged valves shall have flanges with drilling to ANSIB16.1, Class 125.
- 3.3 Mechanical Joint valves shall fully comply with ANSI/AWWA C111/A21.11.

DESIGN

- 4.1 Valves shall have port areas of not less than 100% of pipe area.
- 4.2 2 1/2 in. (65 mm) and larger valves shall have a valve seat that is a welded overlay of 95% pure nickel applied directly to the body on a pre-machined, cast seating surface and machined to a smooth finish.
- 4.3 Threaded valves shall have shaft seals which consist of V-type lip seal in a fixed gland with a resilient O-ring spring.
- 4.4 2 1/2 in. (65 mm) and larger plug valves shall have shaft seals which consist of V-type packing in a fixed gland with an adjustable follower and removable shims under the follower flange to provide for adjustment and prevent over compression.
- 4.5 Permanently lubricated, radial shaft bearings shall be supplied in the upper and lower bearing journals to eliminate the need for grease fittings. Thrust bearings shall be provided in the upper and lower journal areas, except for threaded type which only have upper thrust bearings.
- 4.6 Both the packing and bearings in the upper and lower journals shall be protected by Buna-N shaft seals located on the valve shaft to minimize the entrance of grit into the bearing journal and shaft seal areas.
- 4.7 Threaded valve bodies shall have 1/8" NPT upstream and downstream pressure ports.

MATERIALS

- 5.1 Valve bodies and covers shall be constructed of ASTM A126 Class B cast iron for working pressures up to 175 psig (1200 kPa) and ASTM A536 Grade 65-45-12 for working pressures up to 250 psig (1725 kPa). The words "SEAT END" shall be cast on the exterior of the body seat end.
- 5.2 2 1/2 in. (65 mm) and larger plugs shall be of one-piece construction and made of ASTM A126 Class B cast iron or ASTM A536 Grade 65-45-12 ductile iron and fully encapsulated with resilient facing per ASTM D2000-BG and ANSI/AWWA C517 requirements.
- 5.3 Plug valves shall have radial shaft bearings constructed of self-lubricating Type 316 stainless steel. The thrust bearings shall be PTFE. Cover bolts shall be corrosion resistant with zinc plating.

ACTUATION

- 6.1 Threaded valves shall be equipped with a hand lever with a dial indicator and open memory stop.
- 6.2 Valves 2 1/2 in. (65 mm) to 8 in. (200 mm) shall be equipped with a 2 inch square nut for direct quarter turn operation with a hand lever. The packing gland shall include a friction collar and an open position memory stop. The friction collar shall include a nylon sleeve to provide friction without exerting pressure on the valve packing.
- 6.3 When specified, valves 4 in. (100 mm) and larger shall include a totally enclosed and sealed worm gear actuator with position indicator (above ground service only) and externally adjustable open and closed stops. The worm segment gear shall be ASTM A536 Grade 65-45-12 ductile iron with a precision bore and keyway for connection to the valve shaft. Bronze radial bearings shall be provided for the segment gear and worm shaft. Alloy steel roller thrust bearings shall be provided for the hardened worm.
- 6.4 All gear actuators shall be designed to withstand, without damage, a rim pull of 200 lb. on the hand wheel and an input torque or 300 ft-lbs. for nuts.
- 6.5 Buried service actuators shall be packed with grease and sealed for temporary submergence to 20 feet of water. Exposed worm gear shafts shall be stainless steel.

OPTIONS

- 7.1 The interior and exterior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy.
- 7.2 Available linings include rubber for abrasive or corrosive fluids and glass for a smooth, non-stick surface.

MANUFACTURE

- 8.1 Manufacturer shall demonstrate a minimum of ten (10) years' experience in the manufacture of plug valves. When requested, the manufacturer shall provide test certificates, dimensional drawings, parts list drawings and operation and maintenance manuals.
- 8.2 The exterior of the valve for above ground service shall be coated with a universal alkyd primer. Valve exterior for buried service shall be coated with an epoxy coating.
- 8.3 Valve shall be marked with the Serial Number, Manufacturer, Size, Cold Working Pressure (CWP) and the Direct and Reverse Actuator Pressure Ratings on a corrosion resistant nameplate.
- 8.4 Plug Valves shall be Series # 5000 as manufactured by Val-Matic Valve and Mfg. Corporation, Elmhurst, IL. USA or approved equal.



Val-Matic's quality of design and meticulous workmanship has set the standards by which all others are measured. Quality design features such as the AWWA **Ener-G® Ball Valve** with its energy efficient design, fusion bonded epoxy and adjustable resilient seating....**Cam-Centric® Plug Valves** have more requested features than any other eccentric plug valve....**American-BFV® Butterfly Valves** include a field replaceable seat without the need for special tools....**Tilted Disc® Check Valves** with high strength and wear resistant aluminum bronze trim as standard....**Silent Check Valves** featuring combined resilient/metal-to-metal seating and are **NSF/ANSI 61 & 372 Certified**....**Sure Seal Foot Valves** provided with a heavy duty stainless steel screened inlet....**Swing-Flex® and Surgebuster® Check Valves** designed with an unrestricted full flow area....**Swing Check Valves** with field adjustable closure versatility....**Dual Disc® Check Valves** utilizing stabilized components to provide extended life....**Air Release, Air/Vacuum and Combination Air Valves** provided standard with Type 316 stainless steel trim....**VaultSafe®** family of products includes the **FloodSafe® Inflow Preventer**, **FrostSafe®** two-way damper and the **VentSafe®** vent pipe security cage. The **QuadroSphere® Trunnion Ball Valve** features a unique ball design with recessed surfaces creating additional flow paths to provide a self-cleaning action and reduced wear and torque.

Val-Matic is totally committed to providing the highest quality valves and outstanding service to our customers. Complete customer satisfaction is our goal.

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