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Company

Flow-Tek

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Advanced V-Control Ball Valves, 1/4" - 12" Pneumatic, Electro-Pneumatic & Electric Controls



Threaded, Socket Weld, Butt Weld &
Flanged End Valves

Control Valves

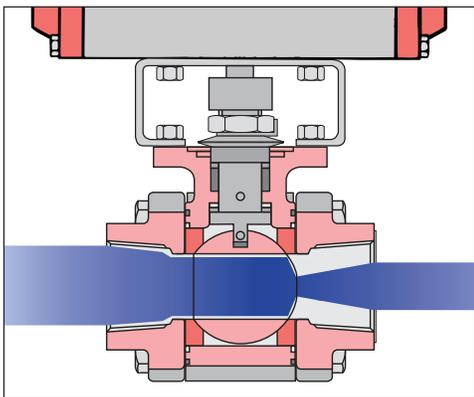
V-Control Ball Valves with Pneumatic, Electro-Pneumatic and Electric Actuation

A BUBBLE TIGHT SHUT OFF VALVE AND PRECISION CONTROL VALVE COMBINED IN ONE

Standard round ported ball valves have been used and continue to be used for many control applications such as services involving moderate pressure drops. Now, with the development of Flow-Tek's characterized V-balls, a full range of control applications is available with superior flow control. These 1/4 turn control ball valves are more compact, lighter weight and much less expensive than comparably sized globe valves and vee-ball control valves offered by other companies. Flow-Tek control valves offer fast response times to control signals due to advanced digital control of actuation and the inherent strengths of ball valves. These valves exceed Class VI to bubble tight shut off with zero leakage. Other features include superior rangeability and repeatability, high flow capacity, the ability to function with fluids containing solids and fibers, ease of maintenance and exceptional interface with PLCs and computer command signals. Flow-Tek high quality pneumatic and electric control actuators are very durable and efficient.

Increased Linear Response

Due to the in-line design inherent with characterized control ball valves, line media flows linearly through the piping system. The direct pattern provides increased media control and rapid response times to controller commands.



Media Flow entering valve from the left. Installing the V downstream is preferred.



15° V-Port



30° V-Port



60° V-Port



90° V-Port



Custom Slotted Port



Custom V Port

Exceptional Characterized Control

Flow-Tek's characterized balls provide predictable and accurate control of downstream flow rates. These precision cut balls match the control performance of globe valves while offering the economy, features and reduced size and weight of ball valves. A wide range of V-Port and Slotted Port characterized balls are standard. The standard characterized balls and an example of a custom ball are shown above. The 90° and 60° balls, like standard round hole balls, offer an equal percentage inherent flow characteristic. A slotted ball and a V-Port ball with a small angle opening, such as a 15° ball, furnish a linear inherent flow characteristic. Medium angle V-Port valves such as a 30° ball furnish a modified equal percentage inherent flow characteristic. Custom ports are also available to meet special control requirements. Designed with flexibility in process conditions in mind, the C_v and control characteristics are easily changed by simply changing the ball.

High Rangeability

The characterized ball delivers controllable flow characteristics from the nearly closed to the fully open position of the valve. Though port type and valve size affects the rangeability, Flow-Tek characterized balls have a minimum rangeability of 200 to 1 and can exceed 800 to 1. Flow rates are highly repeatable within the normal 20% – 80% range of travel.

High Flow Capacity

Flow-Tek's control ball valves have been designed to offer maximum flow characteristics that are substantially higher than comparably sized globe valves. The inherent flow pattern of ball valves increases flow rates and in many applications half pipeline size valves can be used. The self-cleaning action of the ball against the seat makes the ball valve acceptable for slurry and high fiber media services.

High Pressure Drops

Engineered to withstand high pressure drops while providing leak free operation, the V-Control Series delivers the precision control required by today's process industries. The ΔP limit for liquids is up to 500 psi and steam is up to 300 psi. Please consult the factory or your distributor for information on control valve sizing and pressure drop limitations.

Bidirectional Bubble Tight Shut Off

V-Control Series ball valves offer bidirectional bubble tight Class VI shut off in compliance with FCI 70-2 standards.

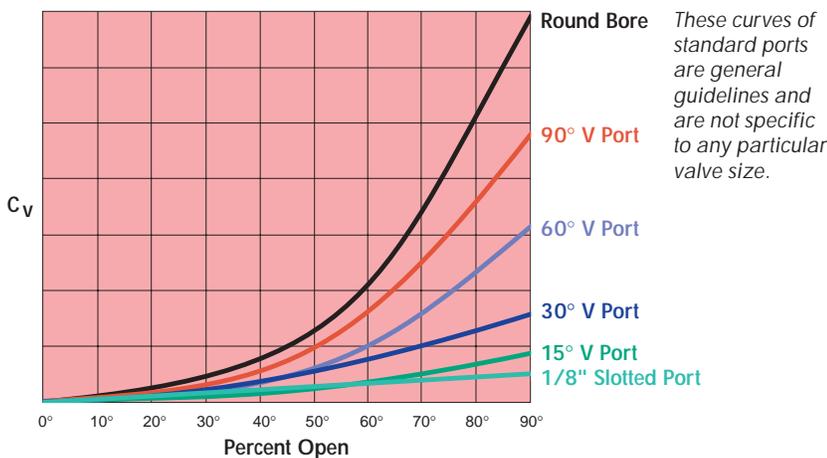


Ball Design

All Flow-Tek valves offer a precision machined, mirror finished, solid stainless steel ball. As with standard Flow-Tek round hole balls, the critical edges of the V-Port and slotted balls have blended curvatures to reduce seat wear and provide a high cycle life. Flow-Tek control valves have the cut in the ball instead of the seat — offering advantages of improved flexibility, durability and serviceability.

Flexibility: selection from the various standard balls and seats based on the application. Converting from a standard valve to a V-Port control valve is simply a matter of replacing the ball, all other valve parts remain the same. **Durability:** the pressure drop in a control valve is taken over the edges of the control element. Focusing the actual pressure drop at the edges of a V in the ball instead of in a soft seat material provides for a more durable product. **Serviceability:** when seat replacement is necessary, the center section of a Flow-Tek 3-piece valve can easily swing out for servicing. Competitors' valves, with the cut in the seat, require special end caps with a recess to accommodate the special seats. These end caps cannot swing out, requiring the valve to be completely removed from the line for servicing. Flow-Tek valves utilize standard end caps and seats for enhanced serviceability.

Characterized Control



Hysteresis

Flow-Tek control valve packages are inherently designed to eliminate any measurable amount of hysteresis. This is a very important feature in throttling control. Flow-Tek valves were designed with a tight connection between ball and stem, and the large stem diameter increases the connection surface. Both ball and stem connections are precision machined to tight tolerances limiting any possible hysteresis. The Flow-Tek design does not require hand matching of balls and stems to insure a tight connection. Standard valves can be converted to V-Port control valves in the field. Heavy duty brackets and couplers connect valves to actuators. Pneumatic actuator pistons have standard guide bearings to minimize side movement within the actuator body. All connections are manufactured to tight tolerances throughout the control valve package.

Stem Seals & Seats

Leak-free protection is achieved by Flow-Tek's stem packing design, live-loaded self-adjusting stem seals and superior seat construction. In combination with the long lasting service capabilities of Flow-Tek actuators, V-Control Series ball valves have a much higher cycle life than most control valves. With a low coefficient of friction and high resistance to erosion and corrosion, Flow-Tek valves are built to last.

Control Valves

Seat Selection

A wide range of seat materials are offered to meet most applications. Seats include RPTFE, TFM, Stainless Steel/PTFE (50/50), UHMWPE, PEEK and Tek-Fil® seats offering high temperature and high pressure capabilities. Metal and other seats are available, please consult the factory.

Applications

Temperature Control With shut off meeting Class VI requirements, these valves are ideal for steam/temperature control.

Flow Control The high flow capacity and predictable rangeability and repeatability of the V-Control Series valves make this the ideal choice for flow control services.

Steam Control The V-Control Series provides tight shutoff and utilizes Flow-Tek's live loaded Smart Stem design to eliminate typical problems of downstream leakage and stem leakage associated with globe style steam control valves.

Cavitation In applications where the possibility of cavitation exists, the valve should be installed with the V downstream to prevent damage to the valve body.

Level Control & PH Service A combination of Flow-Tek control actuation and standard round hole balls are the ideal package for these applications.

Media Containment Units Extended stem sealing units are designed to prevent costly downtime and provide double stem sealing. A button-head check valve for injection of a sealing agent can be added.



Pneumatic Controls

Digitally Controlled Ball Valves

For Precision Pneumatic Control Of Flow

The Flow-Tek Automator Pneumatic Control Actuator is equipped with advanced pneumatic or electro-pneumatic positioners for precise valve positioning. In combination with Flow-Tek's V-control balls, the Automator offers superior flow control. Three electro-pneumatic positioners are offered – *BusSmart Intelligent*, *Digital Smart* and *Analog*. The Automator Series pneumatic actuators are rack and pinion, opposed-piston actuators – designed with innovative, high performance features into a compact, rugged and reliable modular product line.

Automator Series Pneumatic Control Actuators offer many design features including:

- Double Acting and Spring Return units.
- Manual override.
- Highly visible valve status display.
- Externally adjustable bidirectional travel stops.
- Valve mounting to ISO 5211 standards without external piping. NAMUR standard mounting of accessories.
- Spring return units with spring cartridge system offers safety, simplicity and reduced space requirements. Spring return units have the same dimensions as the double acting.
- Supply air pressure to 140 psi (10 bar).
- Size 48 actuators have 1/8" NPT pneumatic air connections. Larger sizes have 1/4" NPT connections.
- Permanently lubricated piston guides, rings and output shaft bearings.
- Interchangeable modular positioner units and accessories.
- Low hysteresis through tight tolerance ball, stem and shaft connections.



Electro-Pneumatic Positioners

All Flow-Tek electro-pneumatic positioner enclosures are purged and waterproof to NEMA 4, 4x (IP65) standards. The positioners offer an I/P module with a pneumatic amplifier and a binary encoder position feedback module. With a low air consumption of 1.9 SCFH at 90 psi, Flow-Tek's positioners are very efficient to operate. The units respond to a 4-20 mA input command signal. Each unit has a mechanical travel position indicator. Maximum supply air pressure is 90 psi (6 bar). Modular accessories offered are a gauge manifold for single and double acting models, a booster relay and inductive limit switches.

BusSmart Intelligent Positioner

The Flow-Tek *BusSmart Intelligent Positioner* is microprocessor controlled and serial bus connected to deliver all the benefits of advanced digital electronics and communication to a pneumatic actuator. The microprocessor digitally communicates over a serial bus network, but can be configured to accept a 4-20 mA input command signal. *BusSmart* protocols offered are Foundation Fieldbus, Profibus PA, FoxCom and HART. Other features include travel limit stops, power cut off and split range adjustments. Characteristic curve functions can be freely defined with 22 user defined setpoints.

Functions The *BusSmart Positioner* offers the following ten menu functions: setting of actuator type and mounting, AutoStart, valve function, valve characteristic, valve limits with alarms and split range, adjustable control parameters, maintenance test of pneumatic output, manual setting of valve position, calibration functions and short AutoStart (determines the mechanical stops).

Diagnostics The *BusSmart Positioner* features corrective and preventative maintenance self-diagnostic checks that reduce operating costs by identifying potential problems. Diagnostic results are indicated both via a PC connection and local LEDs. The data can be continually monitored and recorded via a personal computer.

Corrective maintenance self-diagnostic functions aid in finding the cause of a problem. Direct control of the pneumatic output from 0 to 100% of the air supply allows verification of the pneumatic portion of the positioner and the possible jam of the valve or actuator. Manual entry of the setpoint can be made in local mode.

Preventative maintenance self-diagnostic functions include control deviation of setpoint versus valve position in terms of seconds and percent of travel from setpoint, cycle count and full stroke limits reached, monitoring of the air supply and air output pressures through optional pressure sensors, and monitoring of positioner temperature.



Pneumatic Controls



Digital Smart Positioner

The Flow-Tek Digital Smart Electro-Pneumatic Positioner is microprocessor controlled to deliver all the benefits of digital electronics to a pneumatic actuator, while responding to a traditional 4-20 mA analog command signal. The microprocessor constantly compares the command signal to the actual valve position and makes precise adjustments until the two measurements match within the user-selectable deadband. Calibration and configuration procedures are automatically performed with AutoStart push buttons.

The Digital Positioner features self-diagnostic checks which run constantly. The self-diagnostics, visually indicated by local LEDs, reduce operating and maintenance costs by identifying problems as they occur. Diagnostics include all the corrective maintenance functions of the BusSmart Positioner. Preventative maintenance diagnostics are not included.

Other features include travel limit stops, power cut off, split range and characteristic curve functions.

AutoStart Configuration - BusSmart and Digital Smart

Both the BusSmart Positioner and the Digital Positioner feature AutoStart with self-calibration and configuration by means of local push buttons and LEDs. Complicated potentiometer and switch settings are eliminated – configuration is simply a matter of pushing buttons. AutoStart automatically determines the mechanical travel limit stops, records the parameters and continually optimizes control behaviors and travel times bidirectionally by applying and analyzing setpoint jumps. Control behavior parameters are gain, damping and delay on positioning time. These parameters are automatically set for open and close differences and are user adjustable. The settings are then stored in non-volatile memory to prevent loss due to power failure. After performing the AutoStart procedure, the positioner is ready for operation.



Optional Boards - BusSmart and Digital Smart

These optional boards provide additional information and can be easily installed in the field. The boards may be installed in either style unit.

- 4-20 mA position feedback board constantly indicates valve position.
- Two binary inputs to directly control valve position.
- Two binary alarm outputs to indicate valve travel limits.



Analog Positioner

Flow-Tek's Analog Positioner offers solid state sensing and functions as an integrated I/P converter, amplifier and controller. Configuration is made by adjustment of switches and potentiometers. Separate potentiometers allow zero point and stroke range to be independently adjusted. Gain and stroke time are also user adjustable. A pneumatic test can be performed. Open and close speed control parameters are adjustable.

The Analog Positioner accepts input signals in either 4-20, 4-12, 12-20, 20-4, 20-12 or 12-4 mA. Clockwise or counter-clockwise actuator rotation can be set. Additional features include reverse polarity protection and an interlock diode.

Pneumatic Positioner

Flow-Tek's Pneumatic Positioner automatically positions the output shaft to precise valve angles between 0° and 90°. The standard input signal is 3-15 psi. It can function as double acting or spring return and is adaptable for applications where reversible or split range is required.

Explosion Proof BusSmart Units Profibus and Foundation Fieldbus units are intrinsically safe to FM & CSA standards and meet II 2 G EEx ia IIB/IIC, II 2 G EEx ib IIB/IIC specifications. HART and FoxCom units are intrinsically safe to FM & CSA standards and meet EEx ia IIC T4 specifications.

Explosion Proof Digital Units meet intrinsically safe FM & CSA standards and meet EEx ia IIC T4 specifications.

Explosion Proof Analog Units meet intrinsically safe FM, CSA & CENELEC standards.



Electric Controls

Digitally Controlled Ball Valves

For Precision Electric Control Of Flow

The Flow-Tek Series 70 Electric Actuator is equipped with a digital Servo for precise valve positioning. In combination with Flow-Tek's V-control balls, the Series 70 offers superior flow control. Two digital versions are offered – an analog input unit and BusSmart units with serial bus protocols. The Servo consists of a circuit board and a feedback potentiometer assembly, which both fit entirely within the standard Series 70 actuator housing. The circuit board has a screw-type terminal for ease of customer field wiring. Other terminals for internal field wiring are wired at the factory. The feedback potentiometer is driven by a gearset connected to the output drive.

Flow-Tek's unique digitally controlled Electric Actuators have many design advantages over present industry standards including:

- Simple and unique manual override handwheel system
- Lowest profile and lightest weight actuator on the market
- Simple finger or screw driver adjustment of travel limit cams without interference from other components
- Highly visible valve status display
- Externally adjustable travel stops
- Optional Torque Limiting Switching System: Switches independently respond to predetermined loads in both the open and closed directions by sensing the movement of the worm gear shaft, then interrupt the electrical power to the motor. The switches can operate at any point of actuator travel.
- Optional anticondensation Heater
- Optional Local Control Box.

The die-cast aluminum cover and base are waterproof (NEMA 4,4X, IP 65) and high-quality polyester powder coated for exceptional corrosion, wear, impact and ultra-violet resistance.

An Explosion Proof unit with the same features as the waterproof unit is available in some sizes. This unit is designed to meet NEMA 4,4X,7,9.



Digitally Controlled Analog Electric Actuators

The Series 70 with Servo Plus II delivers all the benefits of digital electronics to an actuator that responds to analog signals. The unit positions the valve in response to an analog command signal and produces an analog output signal of actual valve position. A microprocessor constantly compares the command signal to the actual valve position and makes precise adjustments until the two measurements match within the user-selectable deadband.

Features

The Servo Plus II features self-diagnostic checks which run constantly. The self-diagnostic results are visually indicated by locally flashing LEDs or graphically on a PC through the Configuration Tool Software. Self-diagnostics reduce operating and maintenance costs by identifying problems as they occur. Self-diagnostics include status indication operation, control signal & feedback pot calibrations, reverse acting & split range warnings, calibration in progress, handwheel engagement, command signal failure, feedback pot failure, travel limit switch failure, open & closed torque limit reached, feedback pot wired in reverse, and calibration invalid.

The Servo Plus II can be used with either 110 or 220 VAC actuators without changing jumpers or switches. User adjustable parameters include tailored bidirectional motor speed control & range, deadband, fail position upon loss of command signal, and run through protection by instant reverse delay.

Autocalibration

The Servo Plus II electric actuator offers **one touch** calibration. Complicated potentiometer and switch settings are eliminated. A signal generator is not required since the microprocessor already understands a 4-20 mA command signal. With the touch of a button, the auto calibration routine moves the actuator to the open and closed positions until the travel limit switches are reached. The settings are then stored in non-volatile memory to survive power outages. If limit switches are adjusted later, the autocalibration can be simply repeated.

Configuration Tool (OPTIONAL)

An optional Servo Plus Access Cable connects the Servo Plus II module to a personal computer running the Configuration Tool software. The program visually presents in highlighted text actuator operational conditions and parameter settings, and allows the user to easily make configuration adjustments.



Electric Controls



Typical installation of Series 70 DeviceNet Actuator

DeviceNet

An economical internationally recognized fieldbus network, DeviceNet is used to connect devices such as sensors and actuators while providing access to the intelligence present in those devices. Polled messages exchange data many times per second. Each scanner card in a PLC allows up to 64 devices to communicate with each other over a single cable. PLCs may use multiple scanners to connect as many devices as required.

DeviceNet Advantages

The DeviceNet fieldbus network greatly increases plant operation flexibility, efficiency and maintenance, and reduces installation and engineering costs.

Flexibility A wide variety of devices, such as control valves, sensors, motor controllers, pump controls, scanners, etc., can be installed along the DeviceNet trunk line by means of tap connectors. Devices can be removed or replaced while the network is operational. Additional devices can be added by simply connecting them to the existing bus line.

Efficiency The two way communication capacity of the network allows devices to provide information back to the controller, as well as respond to commands. Precise actuator position control and modification of parameters, such as valve travel limits and actuator speeds, can be easily performed. The entire plant can be controlled and monitored from a remote location.

Maintenance Diagnostic information such as motor temperature and current can be easily accessed from both local and remote locations over the network. Therefore, maintenance schedules can be planned and modified based on live information.

Installation Traditionally, plant controllers require one to two wires per function, per device. These wires must be physically run and identified throughout the plant. The labor, material, engineering and record keeping for any control system is time consuming and expensive. The DeviceNet fieldbus network eliminates these costs, delivering tremendous overall savings and enhanced performance.

BusSmart Electric Actuators

The Flow-Tek *BusSmart* DeviceNet Servo is microprocessor controlled and serial bus connected using firmware specifically designed to complement the capabilities of the Automator Series 70 Electric Actuator. The microprocessor continually responds to commands from the process controller or PLC, supplying information such as valve position, limit switch positions, and other parameters through a single network address, or MAC ID. The *BusSmart* Servo is fully ODVA (Open DeviceNet Vendor Association) compliant and can be configured, monitored and controlled over a single DeviceNet cable.

Features

The *BusSmart* Servo has the following features: **LED Indicators** – Power, Network/Module Status, Motor Running Open, Motor Running Closed and Calibration Status; **Network Adjustable Parameters** – Command Signal, Speed Control, Instant Reverse Delay, Service Notes, Reset, Restore Default Settings and Remote Autocalibration; **Network Viewable Parameters** – Actual Position, Motor Temperature, Motor Current and Serial Number.

Operation

The *BusSmart* Servo is easy to install and configure, similar to connecting a printer to a personal computer. Network communication wiring is accomplished through a single DeviceNet standard five-pin connector cable, and power to drive the actuator motor is brought to a terminal strip inside the actuator. Installation costs are greatly reduced. Configuration of features is made with Electronic Data Sheets (EDS) files and commercially available software. Calibration is a simple automatic process accomplished without complicated potentiometer and switch settings, and may be made with or without connection to the network. All configuration settings are stored in non-volatile memory and will survive power outages.

Electronic Data Sheet (EDS)

Flow-Tek's EDS simplifies installation, commissioning and monitoring. Configuration of features is made with EDS files and commercially available software that uses the EDS to present a clear graphic user interface for remote viewing and control. Similar to a spreadsheet, the EDS describes the various supported features of the *BusSmart* Servo.

Ball Valves



Valve Type	Porting	Body Materials	Sizes (ins)	Pressure Rating	Pressure Drop Limit [†]	Seat Materials	End Connections
3-Piece: Triad	Full Port & Standard Port	Stainless Steel & Carbon Steel	Full Port: 1/4 to 2 Std. Port: 1/4 to 2 1/2	ANSI Class 600	Liquids: 500 psi Steam: 300 psi	RPTFE, TFM, Tek-Fil [®] , PEEK, Metal	Threaded (NPT) Socket Weld Butt Weld
3-Piece: 7000/8000	Full Port	Stainless Steel & Carbon Steel	1/4 to 12	1/4 to 4": ANSI Class 300 6 to 10": ANSI Class 150	50 psi	RPTFE, Tek-Fil [®]	Threaded (NPT) Socket Weld Butt Weld Quick Clamp Raised Face Flanges
Flanged: F15, F30 & RF15	Full Port & Standard Port	Stainless Steel & Carbon Steel	Full Port: 1/2 to 12 Std. Port: 2 - 12	ANSI Class 150 ANSI Class 300	Liquids: 500 psi* Steam: 300 psi*	RPTFE, TFM, Tek-Fil [®] , PEEK, Metal	Raised Face Flanges

[†]Consult Flow-Tek factory or your distributor for information on control valve sizing and pressure drop limitations.

* Limited to ANSI pressure rating for Class 150 valves.

3-Piece Valves



Triad Series Valves

Triad Series ball valves are designed for heavy duty, high pressure applications and feature a redundant body seal.

7000/8000 Series Valves

7000/8000 Series ball valves are available in a wide range of end connections and seat materials.

Flanged Valves



F15/F30/RF15 Series Valves

Flow-Tek Flanged ball valves are ideal for industrial applications. Larger F15/F30 valves feature trunnion-type ball support.

For more detailed information please refer to valve brochures in the Product Manual.

Stem Assemblies

Flow-Tek features heavy duty, high quality stem designs with double "D" connections to ball and operator mounting. This connection simplifies mounting and indicates direction of flow. Stems are mated with the ball to ensure positive contact. All Flow-Tek stems are internal entry and blowout proof for maximum safety.

Smart Stem Valve Sizes 1/4" through 2-1/2"

Flow-Tek's control valves feature strong, large diameter stems with live-loaded, self-adjusting sealing utilizing Belleville washers that automatically adjust to compensate for changes in temperature and wear. Manual adjustments that can cause damage to the seal are not required. The assembly is secured by a saddle-type lock washer that prevents stem nuts from unthreading in high cycle automation applications.

Stem Design: Valve Sizes 2-1/2" through 12"

The stem is guided by the valve body and the gland, ensuring smooth operation even in high torque service. The independent packing gland can be easily adjusted without removing mounting hardware or actuator. The user-friendly packing gland and gland sleeve are V-slotted to more equally distribute the load in the event one side is over tightened. All stems are polished to reduce torque. For severe applications, optional Belleville washers can be added for a self-adjusting live load, providing a continuous compression seal.

Fire Safe Valves

Flow-Tek 3-Piece and Flanged valves are available as non-fire safe and Fire Safe to API 607 4th Edition standards. Flow-Tek's standard fire safe design features metal to metal ball to body contact during and after a fire, graphite stem packing, thrust bearings of stainless steel/PTFE, and graphite body seals. **Anti-Static Protection:** All Flow-Tek stems feature anti-static grounding devices as standard. These devices ensure electrical continuity between valve ball, stem and body, thus eliminating the possibility of static electric charges creating sparks within the valve.

Actuator Mounting

All V-Control Series ball valves feature Flow-Tek's Secure Mount actuator top plate mounting. The mounting is designed in accordance with ISO 5211 standards.



Flow-Tek

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