



The development and proliferation of SCADA, CAN, Intranet, and Cellular systems has increased the requirement for electronically controlled valves that interface with these systems. The OCV Series 22 Digital Control Valves were specifically designed for this task. While retaining the advantages of simplicity and line pressure operation, these valves offer an ease of operation and degrees of control and flexibility not previously achieved.

*Note: For clarification of electronic terminology refer to the OCV Electronic Glossary*

ValveMeter Ultra shown ▲

## SERIES FEATURES/ADVANTAGES

- ▶ Used as part of a digital or analog SCADA System or as a "stand alone"
- ▶ Can be used to control almost any process variable
- ▶ Configurable to accept all common process signals (4-20mA, 0-5 Volt, etc.)
- ▶ Simple valve sizing
- ▶ Extreme stability over wide flow ranges
- ▶ Allows for frequent set point change
- ▶ Analog and/or digital remote set point available
- ▶ 110-250 VAC 50-60 Hz, DC or Solar Powered units available
- ▶ Remote monitoring and control over CAN, Digital SCADA Intranet, and RF Systems available
- ▶ Valve scheduling for control parameter modification (time, process variables)
- ▶ Configurations for low pressure applications
- ▶ Hydraulic pilot backup systems available
- ▶ Control and monitoring parameters to meet user needs
- ▶ Low Pressure applications available

## FUNCTION OFFERED BY SERIES 22 CONTROL VALVE

While conventional valves control the valve function hydraulically, the series 22 can control these functions electronically. Some common functions are listed below, although just as in hydraulic applications, the electronic functions can be mixed and matched in any fashion to fit a specific application.

## APPLICATION

APPLICATION	INPUT DEVICE REQUIRED
FLOW RATE CONTROL	Flow Meter
FLOW METERING AND CONTROL	Self Contained Components
PRESSURE REDUCING	Downstream Pressure Transducer
BACK PRESSURE CONTROL	Upstream Pressure Transducer
DIFFERENTIAL PRESSURE CONTROL	Differential Pressure Transducer
MODULATING LEVEL CONTROL	Level Transducer
BLENDING *	Two flow meters
TEMPERATURE CONTROL	Thermocouple or RTD

\*Blending Valve - Requires flow meters in both controlled and uncontrolled lines.

## OPERATING PRINCIPLES OF THE SERIES 22 CONTROL VALVE

### The system consists of:

- ▶ Universal Valve Controller (UVC)
- ▶ Process Transducer(s)
- ▶ Model 115-3, hydraulically operated, dual solenoid controlled valve
- ▶ Valve Position Transmitter - required on some valves, optional on others

### UVC Valve Controller

The UVC Controller is the electronic brains of the system. It is a highly sophisticated electronic module whose purpose is to control a process variable (flow, pressure, etc.). The UVC receives input, compares it to the desired control setting and then sends electrical power to the valve solenoids until the desired setting is achieved.

### Model 115-3 Control Valve

The 115-3 valve is the dual solenoid, diaphragm actuated control valve for the Series 22 electronic control valve. It is positioned by its two solenoid pilots (2) and (3). With pilot (2) closed and pilot (3) open, the diaphragm chamber of the main valve (1) is vented to downstream and the valve moves further open at an adjustable rate. Conversely, with pilot (2) open and pilot (3) closed, inlet pressure is applied to the main valve diaphragm chamber, moving the valve further closed at an adjustable rate. Finally, with both pilots closed, the diaphragm chamber is "hydraulically locked" (no flow on or off the chamber) and the valve holds its position. The 115-3 valve can be ordered with normally open, or normally closed pilots. In the event of a power failure, the valve will close, open or hold last position, depending on which failure position is specified.

### UVC Operation with Valve

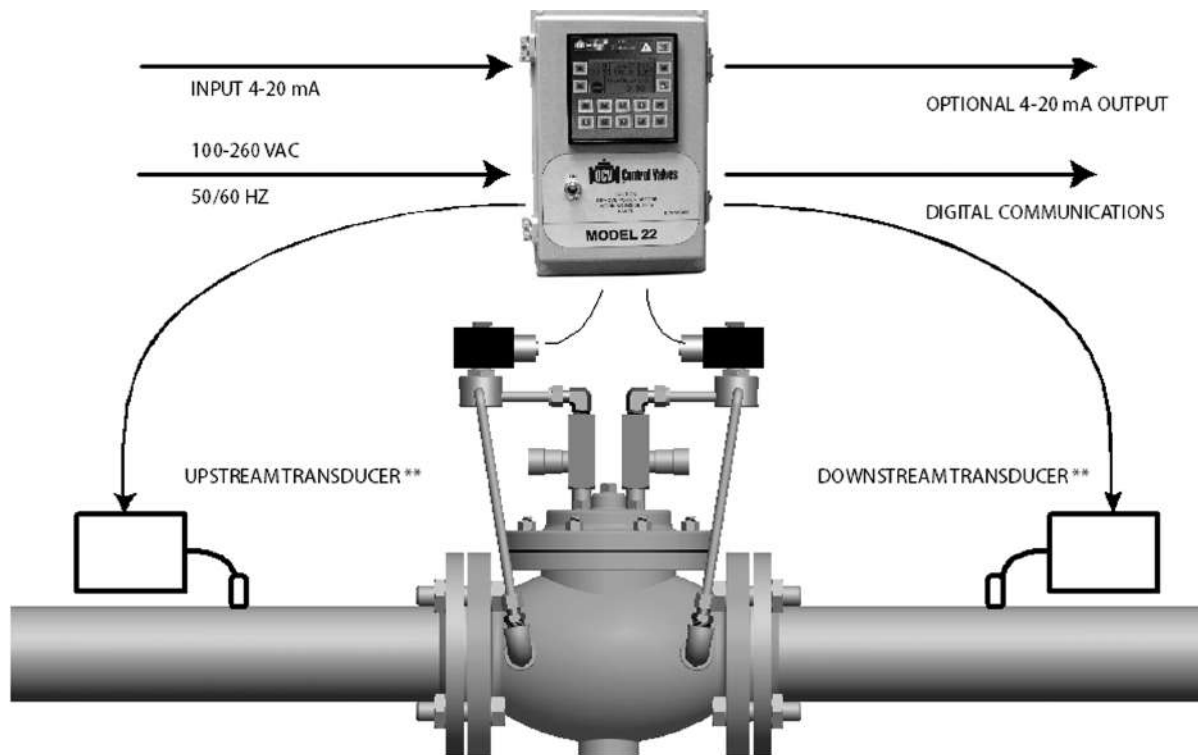
The UVC receives a signal (PV) from the process transducer and compares it to the programmed set point. If the PV is outside the small dead band around the set point, the controller begins pulsing the appropriate solenoid pilot open and closed on a time proportional basis, with the amount of open time directly proportional to the deviation from the set point. Hydraulic locking occurs when the process variable is within the dead band around the set point. The pulsing action enables the set point to be maintained within close limits, with a minimum of overshoot or "hunting" when process conditions change. The locking action gives the valve extreme stability, even at highly throttled (low flow) positions. The UVC can be configured to either close, open or hold last position in the event input signal failure.

### Valve Position Transmitter

The valve position transmitter (optional) uses movement of the valve stem to provide a 4-20mA analog signal proportional to the valve position. The signal increases as the valve opens. Mounted to the center port of the valve bonnet, a rod is threaded into the main valve stem. The valve position transmitter may be installed on virtually any OCV Control Valve without disassembly of the valve itself.

### Process Transducer

A Process Transducer is a device that converts pressure, position, flow, temperature, or level to an electrical measurement. (e.g. Volts, Milliamps, frequency, or pulses)



\*\* PRESSURE TRANSDUCER, FLOW METER, LEVEL TRANSMITTER, THERMOCOUPLE OR RTD

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## THE CONTROLS

The OCV "Universal Valve Controller" (UVC) is a series that has been built and designed to provide numerous control functions for the OCV control valve. In addition, the UVC can be customized for specific user requirements.

### Features of UVC Controllers

- Field Upgradeable - Should system require
- Process Variable Input
  - Analog (0-10 V, 4-20mA)
  - Digital (pulse)
- Remote Access / Communication (SCADA)
  - 4-20mA for Remote Set Point
  - RS232/RS485 Communication Port
- Internal Real Time Clock
  - Time, Day of Week
- Enclosure: NEMA 4X (IP66)
- Electronic Controllers are UL listed
- Operational Power
  - 110-250 VAC, 50/60Hz (less than 30 Watts)
  - Battery backup and DC Models are available consult factory
- Power Saving Options
  - Adjustable Display Activities
  - Adjustable Solenoid Activation Cycle Time (where applicable)

In addition to the above features, two upgrade models are available. They include all of the above options, plus what is listed below.

### UVC BASIC ▼



Display may vary

#### Features of UVC Basic:

- 128x64 Graphic Monochrome Display
- 15 Keys for entry and scrolling

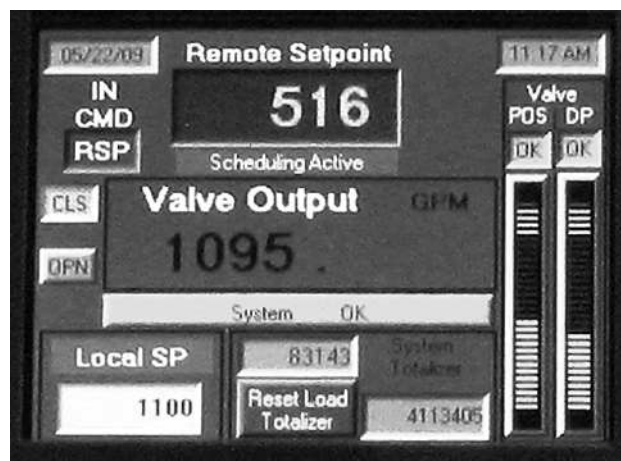
#### Special Optional Features:

- Analog Output (4-20mA)
- Additional Discrete Inputs & Outputs
- SMS (text) Messaging by GSM Modem

#### UVC Basic Typical Applications:

- Pressure Control
- Level/Altitude Control
- Flow Control with External Flow Meter
- Flow Metering
- And others consult factory

### UVC ULTRA ▼



Display may vary

#### Specific Features of UVC Ultra

- 320x240 Color Graphic Display
- 5 Keys & Virtual Keyboards
- Touch screen
- Logging Capabilities

#### Special Optional Features:

- Analog Output (4-20mA)
- MODBUS Protocol Support
- Additional Discrete Inputs & Outputs
- SMS (text) Messaging by GSM Modem
- Ethernet Communications
- Email Generation upon valve errors; sends to 1-5 email addresses

#### UVC Ultra Typical Applications:

- Pressure Control
- Level/Altitude Control
- Flow Control without External Flow Meter
- Flow Metering
- And others consult factory

## VALVE MODEL SELECTION CHART

FEATURE		HYDRAULIC REDUCING OVERRIDE	HYDRAULIC SUSTAINING OVERRIDE	DUAL-CHAMBER MAIN VALVE WITH INDEPENDENT OPERATING PRESSURE (low head applications)
Pressure reducing	22R		22RBP	
Flow	22F	22FPR	22FBP	22F-2
Back pressure-sustaining	22S	22SPR		22S-2
Level	22L			22L-2
Temperature	22T			22T-2
Blending	22B			22B-2

## CONTROLLER SELECTION GUIDE

Model Series		Type of Control		Touch Screen		Auto-Tune		# Analog Inputs (1)		EMERG CL		Totalizers		Solenoids		Alarm		Analog Output		Set Point Digital		Other Available Voltages 110-250 VAC Std		Solar Power		Totalizers		Logging		SCADA		Access		Ethernet	
							OPTIONS																												
BASIC	FLOW		Y	2\2	Y	2	2	1	2\1	5*	24/12V	Available	2		Y																				
	PRESURE		Y	2\2	Y	N/A	2	1	2\1	5*	24/12V	Available	N/A		Y																				
	TEMP		Y	2\2	Y	N/A	2	1	2\1	5*	24/12V	Available	N/A		Y																				
ULTRA	Flow	Y	Y	2\2	Y	2	2	1	2\1	5*	24Vdc	Available	2	Y	Y	Y	Y	Y																	
	Pressure	Y	Y	2\2	Y	N/A	2	1	2\1	5*	24Vdc	Available	N/A	Y	Y	Y	Y	Y																	
	Temp	Y	Y	2\2	Y	N/A	2	1	2\1	5*	24Vdc	Available	N/A	Y	Y	Y	Y	Y																	
VALVE METER																																			
Ultra	Flow	Y		3\6	Y	2	2	1	2\1	5*	24Vdc	Available	2	Y	Y	Y	Y	Y																	

- ~ (1) where x/x = available inputs/used inouts  
 ~ Y = yes  
 ~ \*more digital set points may be added with additional hardware  
 ~ The numbers in the chart list the numbers of options available

## VALVE SIZING

For the most comprehensive procedure in sizing Electronic Control Valves, it is best to use our ValveMaster program on our website, [www.controlvalves.com](http://www.controlvalves.com). In its absence, the following procedure will generally suffice.

VALVE SIZE	US	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"	14"	16"	24"
GLOBE	US	23	27	47	68	120	200	450	760	1250	1940	2200	2850	6900
Cv	METRIC	5.5	6.5	11.3	16.3	28.7	47.9	108	182	299	465	527	683	1653
ANGLE	US	30	35	65	87	160	270	550	1000	1600	2400	--	4000	--
Cv	METRIC	7.2	8.4	15.6	20.8	38.3	64.7	132	240	383	575	--	958	--

where:

Q = Flow Rate in USGPM (U.S.) or Q = Flow Rate in liters/sec (Metric)

Cv = Flow Rate in USGPM @ 1 psi pressure drop (U.S.) or Cv = Flow Rate in liter/sec @ 1 bar pressure drop (Metric)

DP = Pressure drop in psi (U.S.) or DP = Pressure drop in bar (Metric)

sg = specific gravity of line fluid

$$DP = sg \left( \frac{Q}{C_v} \right)^2$$

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## SPECIFICATIONS

NOTE: ALL waterworks valves meet the Low-Lead laws of the United States, including individual state laws, as of March 2014.  
 \*Valves 1-1/4" through 24" are certified to NSF/ANSI 372. Valves 4" through 24" are also certified to NSF/ANSI 61-G.

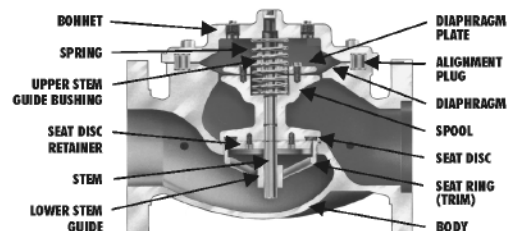


VALVE BODY & BONNET		DUCTILE IRON		CAST STEEL		STAINLESS STEEL	
Material Specification		ASTM A536/65-45-12 (epoxy coated)		ASTM A216/WCB (epoxy coated)		ALL GRADES	
END CONNECTIONS							
Flange Standard (also available in metric)		ANSI B16.42		ANSI B16.5		ANSI B16.5	
Flange Class		150#	300#	150#	300#	150#	300#
Flange Face		Flat	Raised	Raised	Raised	Raised	Raised
Maximum Working Pressure		250 psi	640 psi	285 psi	740 psi	285 psi	740 psi
Screwed Working Pressure: ANSI B1.20.1 640 psi				Grooved End Working Pressure: 300 psi			
INTERNALS							
Stem		STAINLESS STEEL					
Spring		STAINLESS STEEL					
Spool		DUCTILE IRON (epoxy coated) / OPTIONAL - STN. STL.				STAINLESS STEEL	
Seat Disc Retainer		DUCTILE IRON (epoxy coated) (10" & LARGER) STN. STL. (8" & SMALLER / OPTIONAL - ALL SIZES)				STAINLESS STEEL	
Diaphragm Plate		DUCTILE IRON (epoxy coated) / OPTIONAL - STN. STL.				STAINLESS STEEL	
Seat Ring (Trim)		LOW-LEAD BRONZE OR STN. STL.				STN. STL.	
Upper Stem Bushing		BRONZE OR TEFLON®				TEFLON®	
Lower Stem Bushing		NOT APPLICABLE FOR LOW-LEAD BROZE SEAT RINGS / TEFLON FOR FOR STN. STL. SEAT RINGS					
ELASTOMER PARTS (Rubber)							
Diaphragm/Seat Disc/O-Rings		EPDM					
Operating Temperature*		32°F to 230°F					
*Consult factory when temperatures approach low or high temperature allowance.							
COATINGS							
NSF-61 EPOXY COATING							
ELECTRICAL SOLENOIDS							
Bodies		BRASS / OPTIONAL - STAINLESS STEEL					
Endlosures		WATER TIGHT, NEMA 1, 3, 4, & 4X					
Power		AC, 60HZ - 24, 120, 240, 480 VOLTS		AC, 50HZ - In 110 VOLT MULTIPLES		DC, 6 12, 24, 240 VOLTS	
Operation		ENERGIZE TO OPEN (NORMALLY CLOSED)			DE-ENERGIZE TO OPEN (NORMALLY OPEN)		
CONTROL PILOTS							
Bodies		LOW-LEAD BRONZE		STN. STL.			
Internal		STAINLESS STEEL		STAINLESS STEEL			
Tubing		COPPER		STAINLESS STEEL			
Fittings		LOW-LEAD BRASS		STAINLESS STEEL			

TEFLON® is a registered trademark of DuPont.

The diagram illustrates the internal mechanical components of a valve. On the left side, labels point to the BONNET, SPRING, UPPER STEM GUIDE BUSHING, SEAT DISC RETAINER, and the central STEM. On the right side, labels point to the DIAPHRAGM PLATE, ALIGNMENT PLUG, DIAPHRAGM, SPOOL, and SEAT DISC. The assembly shows the relationship between these parts, including the spring mechanism and the diaphragm assembly.

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### Globe Flanged Sizes

1.25"	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"*	20"*	24"
32mm	40mm	50mm	65mm	80mm	100mm	150mm	200mm	250mm	300mm	350mm	400mm	450mm*	500mm*	600mm

\*CONSULT FACTORY



### Angle Flanged Sizes

1.25"	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	16"
32mm	40mm	50mm	65mm	80mm	100mm	150mm	200mm	250mm	300mm	400mm



### Globe/Angle Screwed Sizes

1.25"	1.5"	2"	2.5"	3"
32mm	40mm	50mm	65mm	80mm



### Globe/Angle Grooved Sizes

1.5"	2"	2.5"	3"	4"	6"*
32mm	50mm	65mm	80mm	100mm	150mm*

\*GLOBE ONLY

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## DIMENSIONS

U.S. DIMENSIONS - INCHES

DIM	END CONN.	1 1/4-1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	24
A	SCREWED	8 3/4	9 7/8	10 1/2	13	--	--	--	--	--	--	--	--
	GROOVED	8 3/4	9 7/8	10 1/2	13	15 1/4	20	--	--	--	--	--	--
	150# FLGD	8 1/2	9 3/8	10 1/2	12	15	17 3/4	25 3/8	29 3/4	34	39	40 3/8	62
	300# FLGD	8 3/4	9 7/8	11 1/8	12 3/4	15 5/8	18 5/8	26 3/8	31 1/8	35 1/2	40 1/2	42	63 3/4
B	SCREWED	1 7/16	1 11/16	1 7/8	2 1/4	--	--	--	--	--	--	--	--
	GROOVED	1*	1 3/16	1 7/16	1 3/4	2 1/4	3 5/16	--	--	--	--	--	--
	150# FLGD	2 5/16-2 1/2	3	3 1/2	3 3/4	4 1/2	5 1/2	6 3/4	8	9 1/2	10 5/8	11 3/4	16
	300# FLGD	2 5/8-3 1/16	3 1/4	3 3/4	4 1/8	5	6 1/4	7 1/2	8 3/4	10 1/4	11 1/2	12 3/4	18
C	SCREWED	4 3/8	4 3/4	6	6 1/2	--	--	--	--	--	--	--	--
	GROOVED	4 3/8*	4 3/4	6	6 1/2	7 5/8	--	--	--	--	--	--	--
	150# FLGD	4 1/4	4 3/4	6	6	7 1/2	10	12 11/16	14 7/8	17	--	20 13/16	--
	300# FLGD	4 3/8	5	6 3/8	6 3/8	7 13/16	10 1/2	13 3/16	15 9/16	17 3/4	--	21 5/8	--
D	SCREWED	3 1/8	3 7/8	4	4 1/2	--	--	--	--	--	--	--	--
	GROOVED	3 1/8*	3 7/8	4	4 1/2	5 5/8	--	--	--	--	--	--	--
	150# FLGD	3	3 7/8	4	4	5 1/2	6	8	11 3/8	11	--	15 11/16	--
	300# FLGD	3 1/8	4 1/8	4 3/8	4 3/8	5 13/16	6 1/2	8 1/2	12 1/16	11 3/4	--	16 1/2	--
E	ALL	6	6	7	6 1/2	8	10	11 7/8	15 3/8	17	18	19	27
F	ALL	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	6 3/8	6 3/8	6 3/8	6 3/8	6 3/8	8
G	ALL	6	6 3/4	7 11/16	8 3/4	11 3/4	14	21	24 1/2	28	31 1/4	34 1/2	52
H	ALL	10	11	11	11	12	13	14	17	18	20	20	28 1/2

\*GROOVED END NOT AVAILABLE IN 1 1/4"

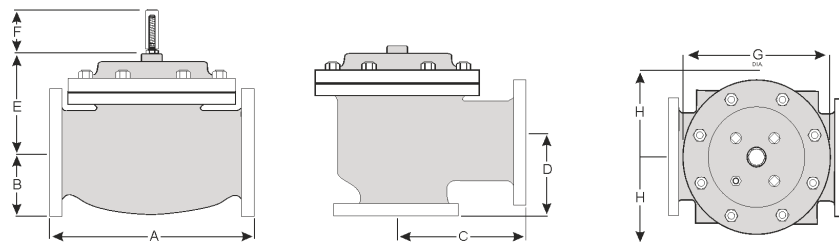
METRIC DIMENSIONS - M.M.

DIM	END CONN.	DN32-DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	DN600
A	SCREWED	222	251	267	330	--	--	--	--	--	--	--	--
	GROOVED	222	251	267	330	387	508	--	--	--	--	--	--
	150# FLGD	216	238	267	305	381	451	645	756	864	991	1026	1575
	300# FLGD	222	251	283	324	397	473	670	791	902	1029	1067	1619
B	SCREWED	37	43	48	57	--	--	--	--	--	--	--	--
	GROOVED	25*	30	37	44	57	84	--	--	--	--	--	--
	150# FLGD	59-64	76	89	95	114	140	171	203	241	270	298	406
	300# FLGD	67-78	83	95	105	127	159	191	222	260	292	324	457
C	SCREWED	111	121	152	165	--	--	--	--	--	--	--	--
	GROOVED	111*	121	152	165	194	--	--	--	--	--	--	--
	150# FLGD	108	121	152	152	191	254	322	378	432	--	529	--
	300# FLGD	111	127	162	162	198	267	335	395	451	--	549	--
D	SCREWED	79	98	102	114	--	--	--	--	--	--	--	--
	GROOVED	79*	98	102	114	143	--	--	--	--	--	--	--
	150# FLGD	76	98	102	102	140	152	203	289	279	--	398	--
	300# FLGD	79	105	111	111	148	165	216	306	298	--	419	--
E	ALL	152	152	178	165	203	254	302	391	432	457	483	686
F	ALL	98	98	98	98	98	98	162	162	162	162	162	203
G	ALL	152	171	195	222	298	356	533	622	711	794	876	1321
H	ALL	254	279	279	279	305	330	356	432	457	508	508	724

\*GROOVED END NOT AVAILABLE IN DN32

For maximum efficiency, the OCV control valve should be mounted in a piping system so that the valve bonnet (cover) is in the top position. Other positions are acceptable but may not allow the valve to function to its fullest and safest potential. In particular, please consult the factory before installing 8" and larger valves, or any valves with a limit switch, in positions other than described. Space should be taken into consideration when mounting valves and their pilot systems.

A routine inspection & maintenance program should be established and conducted yearly by a qualified technician. Consult our factory @ **1-888-628-8258** for parts and service.



Represented by:



Check individual models for availability.

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