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- 60** Model PL Latching Pinch Valve
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- 62** Model PK Pinch Valves
Two-way Configuration, Solenoid Operated, 3-6 mm Tubing
- 63** Model EPK Pinch Valve
Two way Configuration, Solenoid Operated, 10 mm or 15 mm Tubing

64-67 MANUAL & MOTORIZED PINCH VALVES

- Series 22 Dia-Cam Pinch Valve
1/2" to 3" Pipe Sizes, Elastomeric or PTFE Wetted Parts

PNEUMATIC ACTUATED INERT ISOLATION VALVES

- 68,69** Series P Inert Pneumatic Isolation Valves, PTFE Isolation Diaphragm
Two- and Three-way, Orifice Sizes From 1.6 to 25 mm

BALL, GLOBE & BUTTERFLY VALVES

- 70 to 75** Motor Actuated Valve Application Guide
Ball, Globe & Butterfly Selection and Sizing Guidelines
- 76** Model 83 Fast Actuation Ball Valves, 3/8" to 2", PVC or CPVC Construction
- 77,78,79** DEI Motor Actuated Ball Valves
On/Off, Tri-State & Modulating, 1/2" to 3"
- 80-85** Series 8E NEMA 4X Motor Actuated Ball Valves
On/Off & Modulating 1/4" to 4"
- 86-95** Series 8P Pneumatic Direct Acting And Spring Return Actuated Ball Valves 1/4" to 4"
- 96,97,98** DEI Motor Actuated Globe Valves
On/Off, Tri-State & Modulating, 1/2" to 6"
- 99-108** 500 Series Butterfly Valves
Manual, Electric & Pneumatic Operation
On/Off, Tri-State & Modulating, 1-1/2" to 12"
- 109-112** DEI Motor Actuated Butterfly Valves
On/Off & Modulating, 2" to 20"

ELECTRIC VALVE ACTUATORS

- 113,114** EN44 & EN88 Non-Spring Return Electric Actuators
On/Off, Tri-State & Modulating, 44 & 88 in-lb Torque
- 115,116** EN132, EN177 & EN310 Non-Spring Return Electric Actuators
On/Off, Tri-State & Modulating, 132, 177 & 310 in-lb Torque
- 117,118** ES62A, ES75A & ES142A Spring Return Electric Actuators
Two Position Control, 62, 75 & 142 in-lb Torque
- 119,120** ES62, ES75 & ES142 Spring Return Electric Actuators
Tri-State & Modulating, 62, 75 & 142 in-lb Torque
- 121,122** RE Reversing Electronic NEMA 4/4X Actuators
On/Off, Tri-State & Modulating, 150 to 10,200 in-lb Torque

TECHNICAL BULLETIN

Takasago Soft Seal Feature

For Applications Requiring Inert Valves Where Particles Are In Flow Stream

TYPICAL APPLICATIONS

The Soft Seal option is particularly useful in analytical and clinical chemistry applications where inert valve materials are needed but particulate matter may be present in the fluid stream. Particulate matter typically damages soft material such as PTFE resulting in valve leakage in the valve seat area.

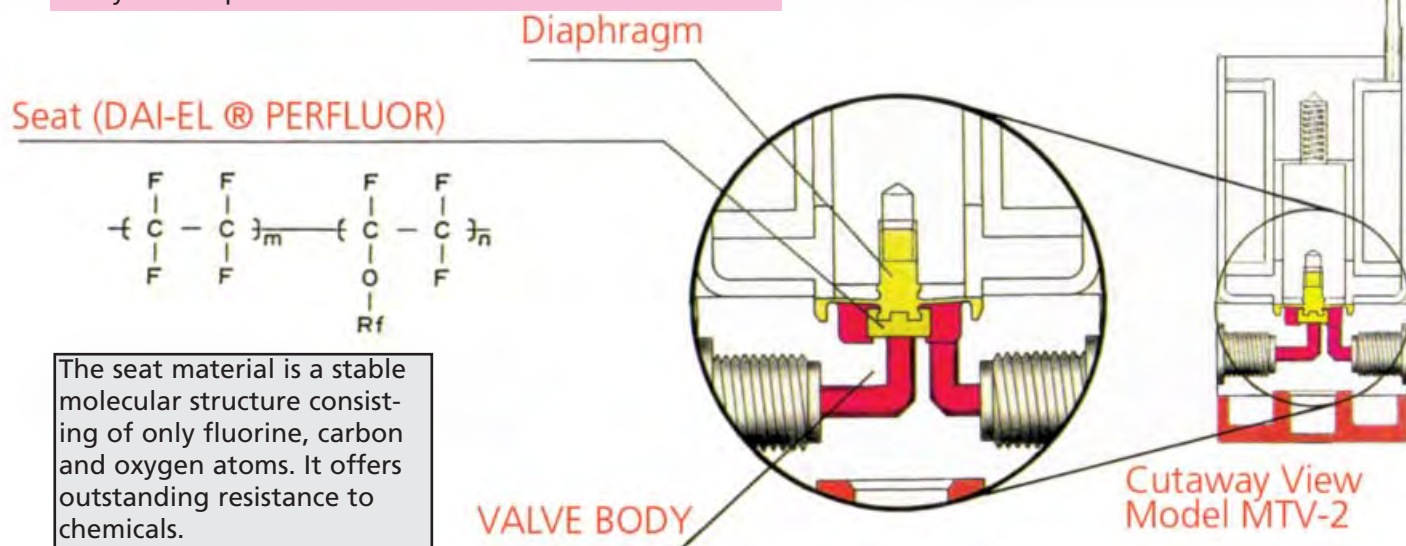
The Soft Seal option is available or standard on most Takasago models.



Typical Takasago Teflon Valve

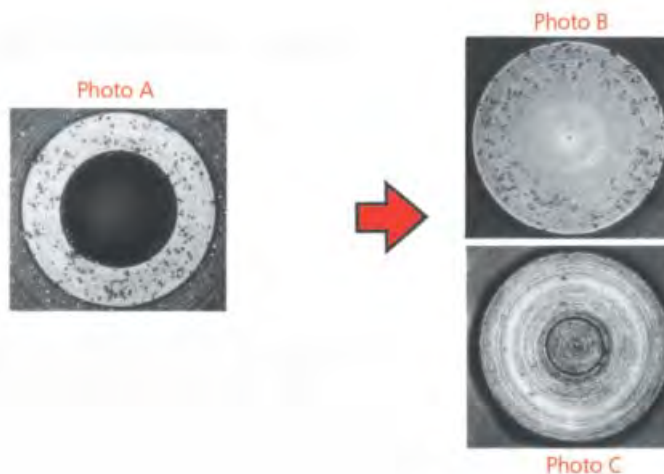
The Soft Seal Feature Is.....

A valve option where the isolation diaphragm of a Takasago valve is fitted with a soft elastomeric seal(seat) that yields to particulate matter in the fluid stream.



Soft Seal Demonstrated

- 1) A valve seat (photo A) is sprinkled with glass beads 40 microns in size.
- 2) The valve is cycled.
- 3) Photo B is that of an all PTFE valve seat. Many holes can be observed.
- 4) Photo C is that of a seat with a soft seal. No significant scratches can be observed.



TECHNICAL BULLETIN

Takasago Zero Internal Volume Option

Prevents Cross-Contamination, Reduces Sample And Reagent Volumes

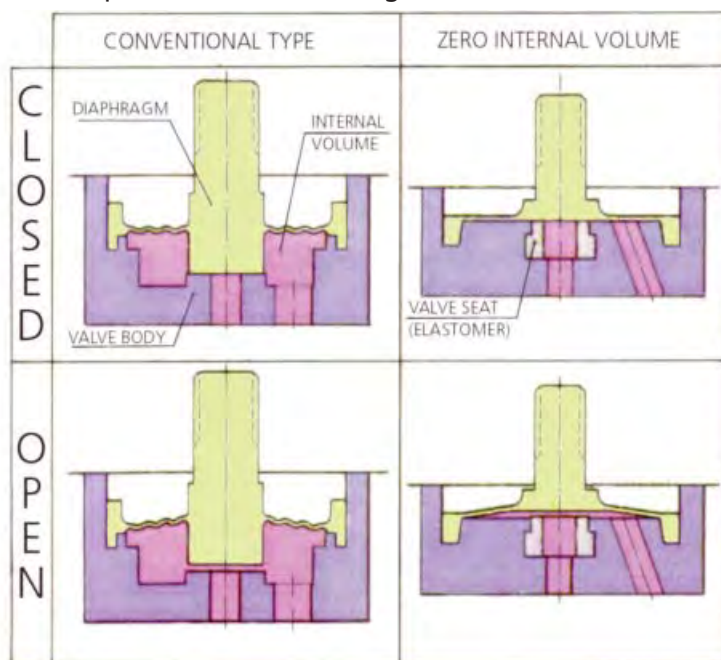
TYPICAL APPLICATIONS

The internal volume is the space between the isolation diaphragm and the valve body. When the valve closes, this volume is trapped, often reducing the sensitivity of the instrument. In a conventional valve seat design, the protruding valve seat is hard and prevents the Teflon diaphragm from flattening against the valve body.

In the zero internal volume system, a special soft inert elastomer (perfluoroelastomer) is used for the valve seat. When the valve closes the soft protrusion presses flat, eliminating the internal volume.



Typical Takasago Teflon Valve



FEATURES

CROSS- CONTAMINATION PREVENTION

FASTER FLUSHING

PERFECT EJECTION OF AIR BUBBLES

REDUCE USE OF SAMPLE AND REAGENTS

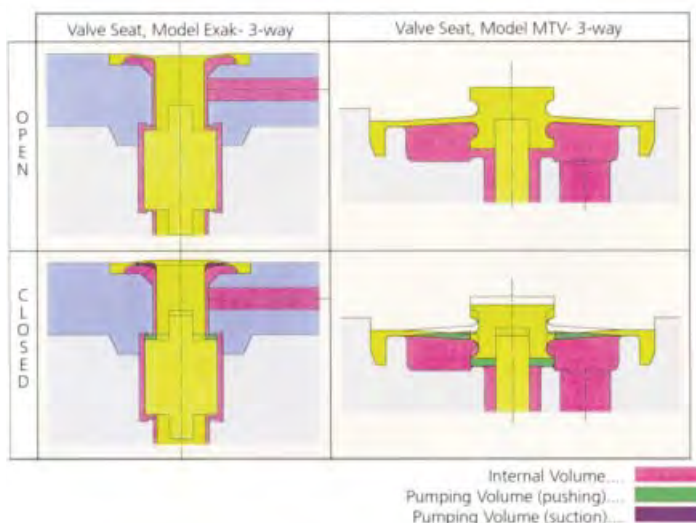
The zero internal volume option is available for 2-way valve model types STV and MTV.

Model	Type	Internal Volume
MTV	Conventional	87 μ l
MTV	Zero Internal Volume	*34 μ l
STV	Conventional	87 μ l
STV	Zero Internal Volume	*16 μ l

*Passage Volumes Only

Takasago Diaphragm Pumping Volume

Typical Pumping Volume μ l				
Model	Port	On	Off	
MTV- 3 way	Comm.	-0.64	-0.34	
	N.C.	-0.64	+2.01	
	N.O.	0.00	-0.034	
EXAKN- 3 way	Comm.	+0.015	-0.015	
	N.C.	+0.007	0.000	
	N.O.	0.000	0.000	



TECHNICAL BULLETIN

Takasago Ventiduct Feature

For Temperature Sensitive And Volatile Fluid Media Applications

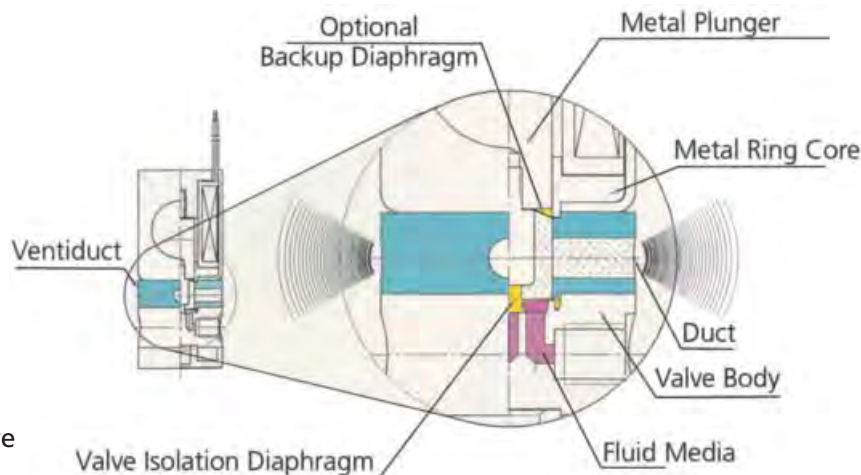
TYPICAL APPLICATIONS

The Ventiduct is an optional part fitted between the valve body and solenoid. It has ducts for ventilation and heat radiation. Ventiduct isolates and protects the metal solenoid parts from contact with volatile corrosive gases such as Trifluoro Acetic Acid that manage to pass through a standard Teflon isolation diaphragm.

The Ventiduct protects the fluid media from heat generated by the solenoid. Conversely, Ventiduct shields the valve solenoid when the fluid media is at a high temperature.

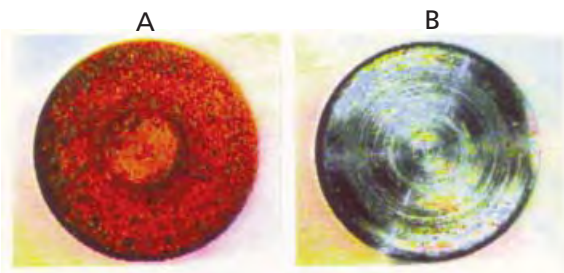


Typical Takasago Teflon Valve
With Ventiduct Option



The pictures to the right demonstrate the effectiveness of Ventiduct in protecting the metal solenoid parts from exposure to Trifluoro Acetic Acid for 48 hours at room temperature. A 0.2 mm thick PTFE isolation diaphragm was used.

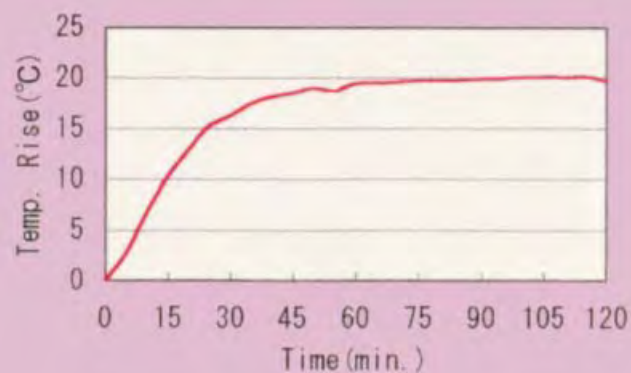
The metal plunger of Valve A is clearly corroded while Valve B is unaffected.



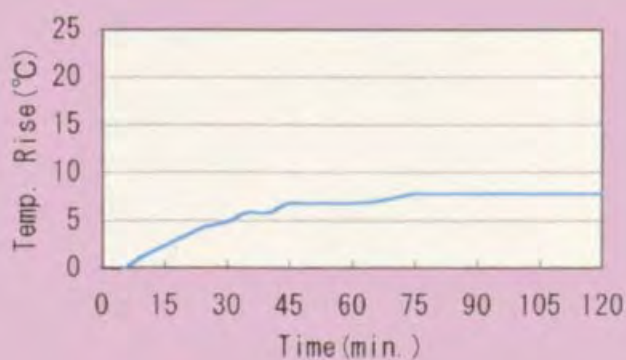
The charts below demonstrate the effectiveness of Ventiduct for heat control by thermal radiation. The Ventiduct reduces the temperature rise in the valve by approximately 12°C.

Test Conditions: Fluid- water; Valve Type- MTV-2; Full Rated Voltage Applied (24Vdc)

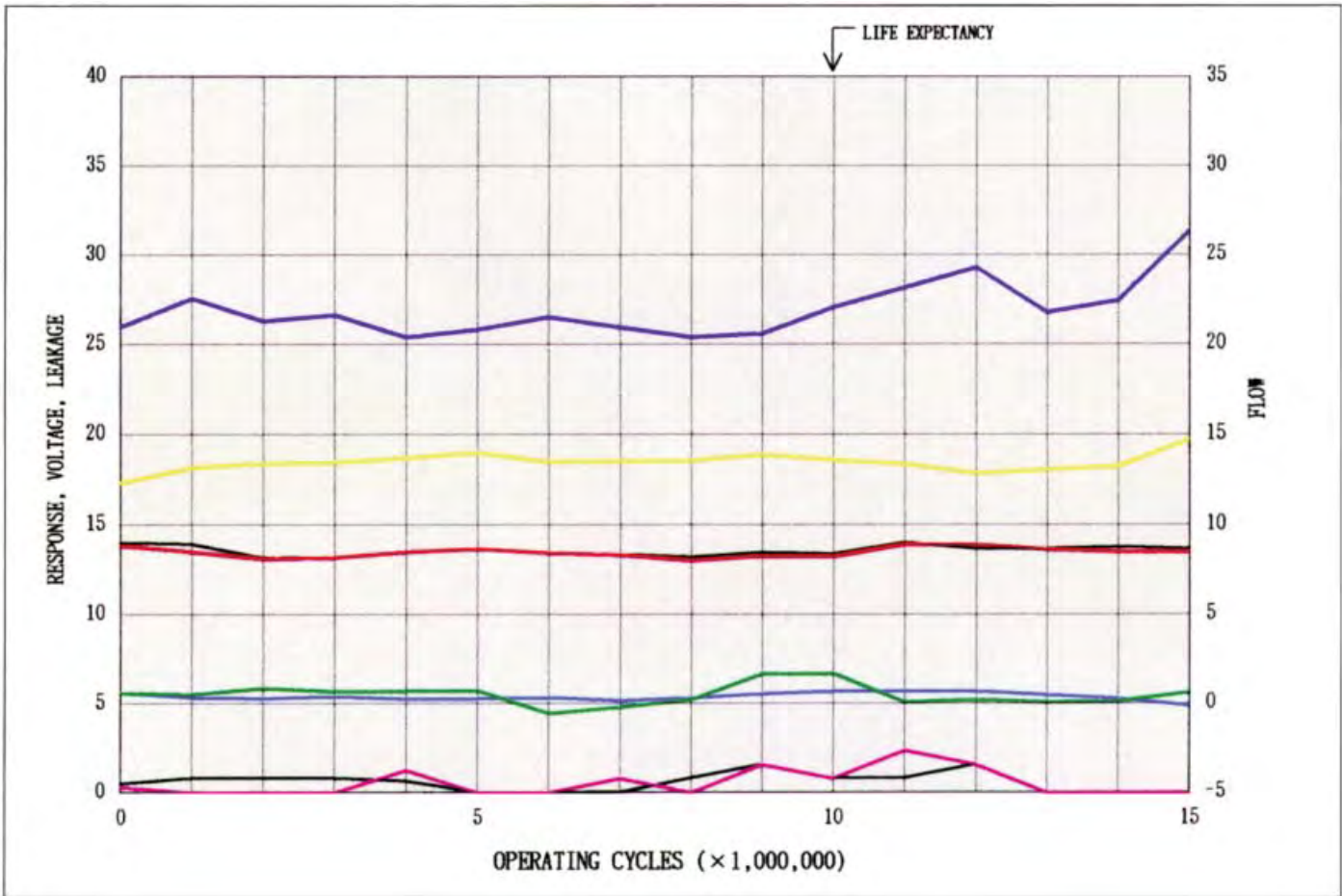
Without Ventiduct



With Ventiduct



MTV-3 ENDURANCE TEST



TEST	Specification	After 10 mil. cycles
Response Time		
On ———	20~30 msec	27
Off ———	5~10 msec	6.7
Voltage (Rated 24v)		
Min. Operating ———	< 21.6V	18.6
Release ———	> 2.4V	5.7
Leakage (1 bar air)		
N.O. Port ———	< 7.9 μl/10sec	0.38
N.C. Port ———	< 7.9 μl/10sec	2.07
Flow (3 psi air)		
N.O. Port ———	> 8 lpm	8.37
N.C. Port ———	> 8 lpm	8.23

TAKASAGO

EXAKN Inert Isolation Valve

Solenoid Operated, Two Way & Three Way

DESCRIPTION

Model EXAKN isolation valves are very small in size with negligible internal volume.

The valves incorporate a perfluoroelastomer soft valve seat (retainer) which is resistant to damage caused by foreign particle matter.

EXAKN is ideal for automated chemistry applications where the goal is to minimize reagent and sample waste.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Power Consumption- 1.2 Watts
 Operating Duty- Continuous
 Operating Life- 10,000,000 cycles
 Coil Temp. Rise- Max 47°C from room temp.
 Solenoid Housing- Chrome steel
 Orifice Diameter- 0.8 mm
 Internal Volume, Barb - IN:12µl; NC, 13µl; NO,11µl
 Internal Volume, Thread - IN:15µl; NC, 16µl; NO,14µl
 Operating Pressure- IN, -300mmHg to 3.0 Bar;
 OUT, 1.45 Bar

Media Temperature Range- 0-60°C
 Ambient Temperature Range-0-60°C
 Insulation Class- Class B
 Insulation Resistance- min 50 Mohm at 500 Vdc
 Dielectric Strength- 1500 Vac/1 minute
 Lead Length- 150 mm, A.W.G. 28 Teflon coated
 Port Connection- Hose barb or threaded
 Valve Body Material & Stopper- ETFE
 Isolating Diaphragm Material- PTFE
 Valve Seat Seal Material- Dai-el Perfluor
 Spring Case- PVDF
 Weight- 24 grams(2-way)

ORDERING INFORMATION

EXAKN - ABCD

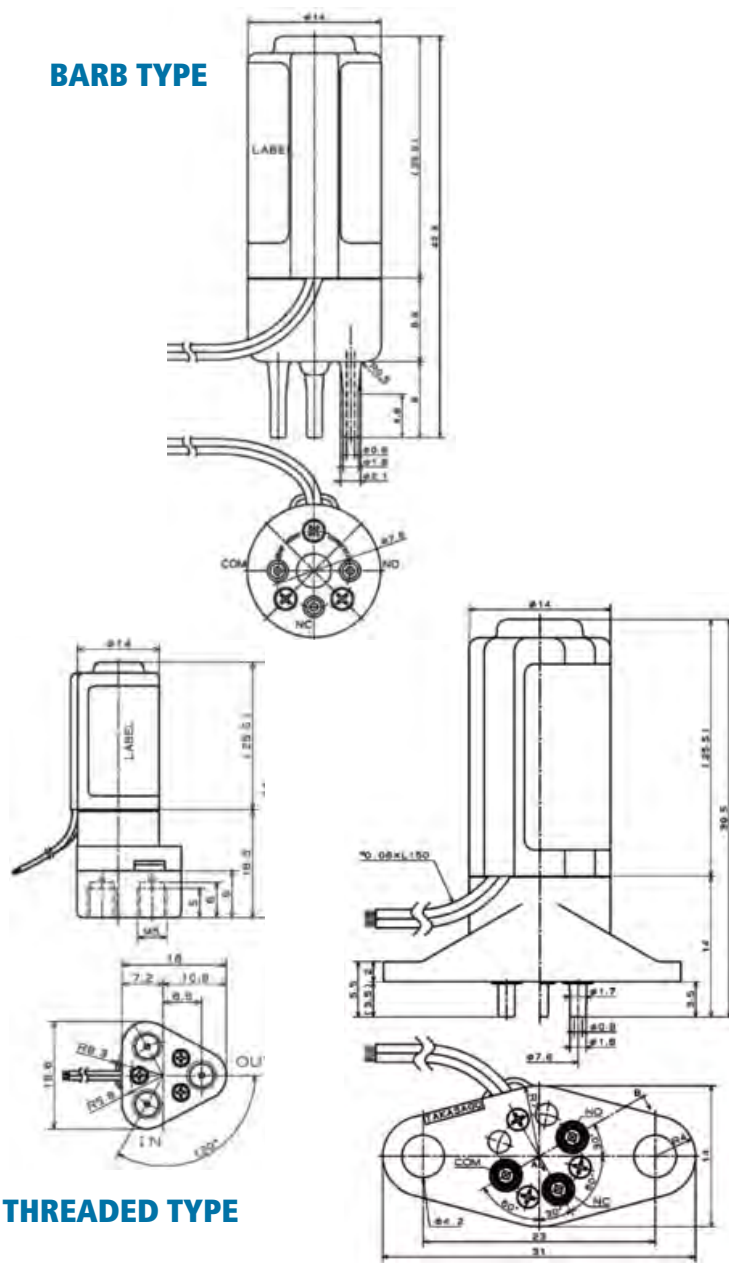
EXAMPLE: EXAKN-E2S24V

A Configuration	B Connections	C Mounting	D Voltage
C=2-way, NC O=2-way, NO E=3-way	1=M5 2=Barb	S=Stem M=Manifold (Barb connection only)	12V=12Vdc 24V=24Vdc



DIMENSIONS (MM)

BARB TYPE



THREADED TYPE

MANIFOLD MOUNT

TAKASAGO

STV-K PEEK & STV-R PPS Molded Isolation Valves

Solenoid Operated, Two way Valves, 1.2 mm Orifice

DESCRIPTION

Model STV-K or STV-R isolation valves have molded PEEK or PPS valve bodies and PTFE isolation diaphragm materials for compatibility with aggressive media. The valves are standard with unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically damage a plastic valve seat.

The STV-K and STV-R valves are excellent choices for demanding low flow applications where minimum size and internal volume are requirements.

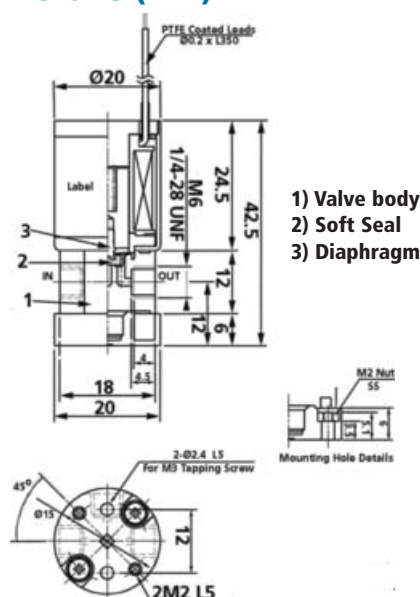
SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Power Consumption- 2.5 Watts
 Operating Duty- continuous
 Media Temperature Range- 5-50°C (41 to 122°F)
 Ambient Temperature Range- 5-50°C (41 to 122°F)
 Orifice Diameter-1.2 mm
 Operating Pressure-
 IN: -375 mmHg to 2.0 Bar (14.8" Hg to 29 psi)
 OUT: 0-0.5 Bar (7.25 psi)
 Insulation Class- Class B
 Insulation Resistance- 50 Mohm at 500 Vdc
 Dielectric Strength- 1500 Vac/1 minute
 Port Connection- 1/4-28 threaded, M6
 Valve Body Material- PEEK or PPS
 Isolating Diaphragm Material- PTFE
 Valve Seat Seal Material- Perfluor or FPM



DIMENSIONS (MM)



ORDERING INFORMATION

A-BCDE

EXAMPLE: STV2-1/4UKG12V

A Model	B Connections	C Valve Body Material	D Seat Material	E Voltage
STV-2= 2-way, N.C. STV-02= 2-way, N.O.	1/4U=1/4-28 threaded M6= M6 threaded	K=PEEK R=PPS	G=Perfluor F=FPM	12V=12Vdc 24V=24Vdc

TAKASAGO

CTV-K PEEK & CTV-R PPS Molded Isolation Valves

Solenoid Operated Three way Valves, 1.2 mm Orifice

DESCRIPTION

Model CTV-K or CTV-R isolation valves have molded PEEK or PPS valve bodies and PTFE isolation diaphragm materials for compatibility with aggressive media. The valves are standard with unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically damage a plastic valve seat.

The CTV-K and CTV-R valves are excellent choices for demanding low flow applications where minimum size and internal volume are requirements.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Power Consumption- 3.5 Watts
 Operating Duty- continuous
 Media Temperature Range- 5-50°C (41 to 122°F)
 Ambient Temperature Range- 5-50°C (41 to 122°F)
 Orifice Diameter-1.2 mm
 Operating Pressure-
 COM:-375 mmHg to 2.0 Bar (14.8"Hg to 29 psi)
 NC/NO: 0-0.5 Bar (7.25 psi)
 Insulation Class- Class B
 Insulation Resistance- 50 Mohm at 500 Vdc
 Dielectric Strength- 1500 Vac/1 minute
 Port Connection- 1/4-28 threaded, M6
 Valve Body Material- PEEK or PPS
 Isolating Diaphragm Material- PTFE
 Valve Seat Seal Material- Perfluor or FPM
 Valve Stem (3-way)- ceramic

ORDERING INFORMATION

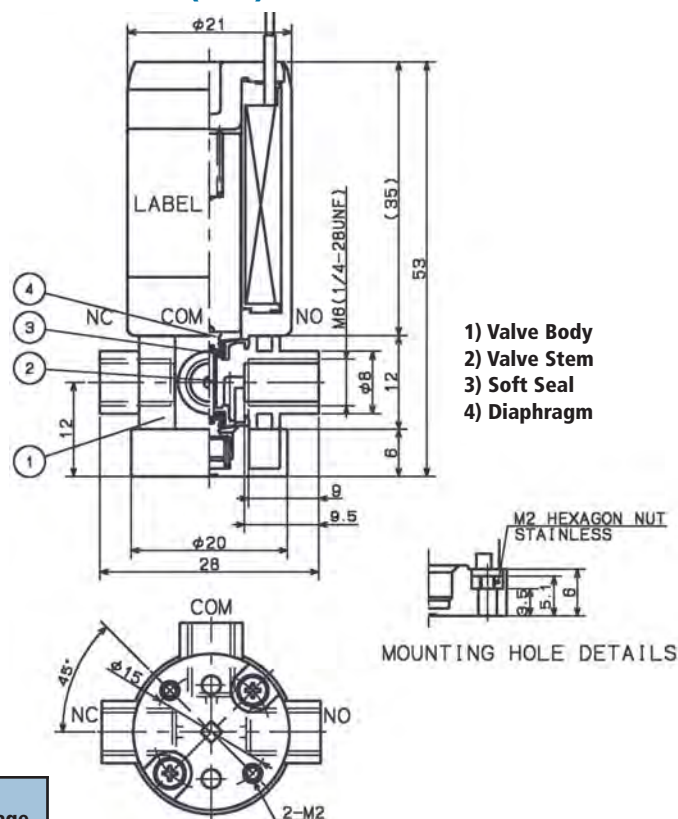
A-BCDEF

EXAMPLE: CTV-3-1/4UKG24V

A Model	D Connections	B Valve Body Material	E Seat Material	F Voltage
CTV-3	1/4U=1/4-28 threaded M6= M6 threaded	K=PEEK R=PPS	G=Perfluor F=FPM	12V=12Vdc 24V=24Vdc



DIMENSIONS (MM)



TAKASAGO

STV-K-1 Molded PEEK Panel Mount Isolation Valves

Solenoid Operated, Three way Valve

DESCRIPTION

Model STV-K-1 isolation valves have molded PEEK valve bodies and PTFE isolation diaphragm materials for compatibility with aggressive media. The valves are standard with unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically damage a plastic valve seat.

A smaller diameter solenoid coil differentiates model STV-K-1 from model STV-K. This feature allows the possibility to panel mount the unit to isolate the metal parts of the solenoid from the process area where aggressive media may be present.

The STV-K-1 is an excellent choice for demanding low flow applications where minimum size and internal volume are requirements.

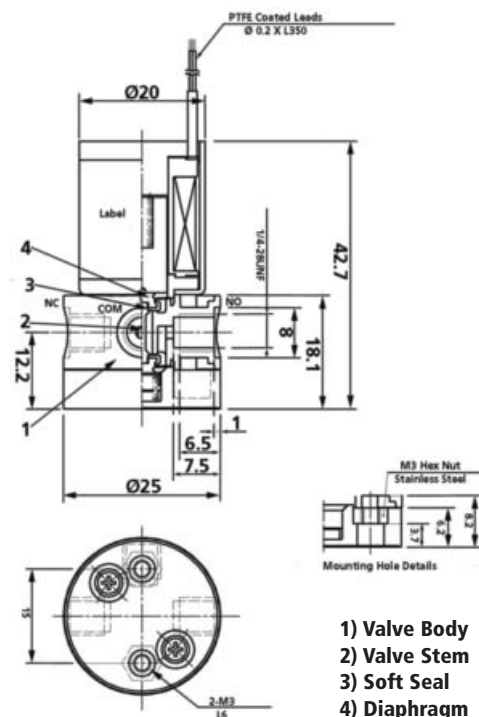


SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
Min. Operating Voltage- 90% of rated voltage
Drop Out Voltage- 10% of rated voltage
Power Consumption- 3.0 Watts
Operating Duty- continuous
Media Temperature Range- 5-60°C
Ambient Temperature Range- 5-40°C
Orifice Diameter- 1.8 mm
Internal Volume- COM 61µl
NC, NO 72 µl each
Operating Pressure- COM, -0.5 bar to 2.0 Bar
NC/NO, 0-0.5 Bar
Insulation Class- Class B
Insulation Resistance- 50 Mohm at 500 Vdc
Dielectric Strength- 1500 Vac/1 minute
Port Connection- 1/4-28 threaded
Valve Body Material- PEEK
Isolating Diaphragm Material- PTFE
Valve Seat Seal Material- Perfluor
Valve Stem- PEEK

DIMENSIONS (MM)



ORDERING INFORMATION

STV-3-1/4UKG-1-A

EXAMPLE: STV-3-1/4UKG-1-24V

A= Voltage
12V=12Vdc
24V=24Vdc

TAKASAGO

WTA-2 2-Way Normally Closed Inert Isolation Valve

Solenoid Operated, PEEK & PPS Valves

DESCRIPTION

Model series WTA inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals that are forgiving of particulate matter that would typically destroy an inert valve.

The WTA series are a two way, normally closed configuration. Model WTA-2R have molded PPS bodies and Model WTA-2K have molded PEEK bodies. The valves have PTFE isolation diaphragms and a Perfluor or FPM soft valve seat seal.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption- 2.8 Watts

Coil Temp. Rise- Max 65°C from room temperature

Orifice Diameter- 2mm (1.6 mm for PTFE Body)

Operating Pressure- Inlet -700mmHg to 2.0 bar

Outlet: 1.0 bar

Media Temperature Range- 5-50°C

Weight- 81 grams

Insulation Class- Class E

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1000 Vac/1 minute

Port Connection- 1/4-28 threaded, 3 mm or 4 mm barb

Valve Body Material- PEEK or PPS (PTFE optional, consult factory)

Isolating Diaphragm Material- PTFE

Valve Seat Soft Seal Material- Dai-el Perfluor or FPM

ORDERING INFORMATION

SELECT MODEL NUMBER AND VOLTAGE (AB)

Model Number		Body Material	Connection	Orifice Sizes	Seal
A	B				
WTA-2R-1/4UF	12V=12VDC 24V=24VDC	PPS	1/4-28UNF	2 mm	FPM
WTA-2K-1/4UG		PEEK	1/4-28UNF	2 mm	Perfluor
WTA-2R-1/4UG		PPS	1/4-28UNF	2 mm	Perfluor
WTA-2R-N3F		PPS	3 mm Barb	2 mm	FPM
WTA-2K-N3G		PEEK	3 mm Barb	2 mm	Perfluor
WTA-2R-N3G		PPS	3 mm Barb	2 mm	Perfluor
WTA-2R-N4F		PPS	4 mm Barb	2 mm	FPM
WTA-2K-N4G		PEEK	4 mm Barb	2 mm	Perfluor
WTA-2R-N4G		PPS	4 mm Barb	2 mm	Perfluor

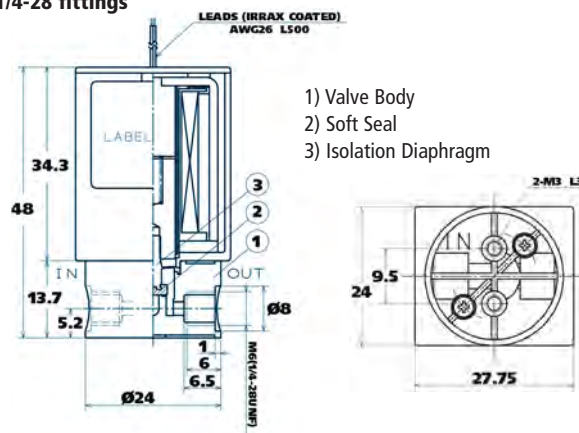
Bold Order combinations typically ship from stock



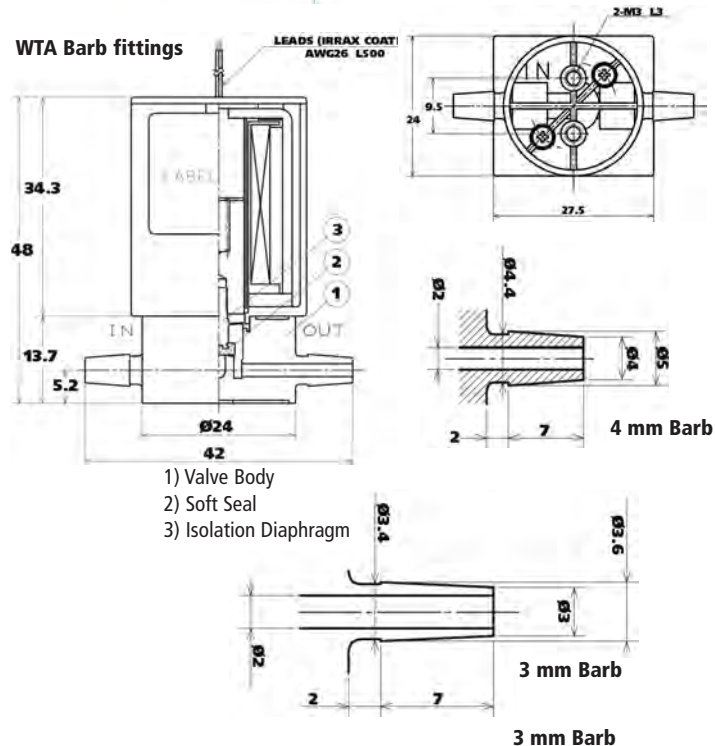
Series WTA Optional PTFE, PPS & PEEK Body, Threaded & Barb

DIMENSIONS (MM)

WTA 1/4-28 fittings



WTA Barb fittings



TAKASAGO

WTB-3, 3-Way Inert Isolation Valve

Solenoid Operated, PEEK or PPS Valve Bodies

DESCRIPTION

Model series WTB inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals that are forgiving of particulate matter that would typically destroy an inert valve.

The WTB series are a three-way configuration. Model WTB-3R have molded PPS bodies and Model WTB-3K have molded PEEK bodies. The valves have PTFE isolation diaphragms and a Perfluor or FPM soft valve seat seal.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption- 3.4 Watts

Duty Cycle- Continuous

Coil Temp. Rise- Max 65°C from room temperature

Orifice Diameter- 2mm

Operating Pressure-

Com: -675mmHg to 2.0 bar (-26" Hg to 29 psi)

NO & NC: 1.0 bar (14.5 psi)

Media & Ambient Temperature Range- 5-50°C (41-122°F)

Weight- 81 grams

Insulation Class- Class E

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

Port Connection- 1/4-28 threaded, M6 threaded, 3 mm or 4 mm barb

Valve Body Material- PEEK or PPS

Isolating Diaphragm Material- PTFE

Valve Seat Soft Seal Material- Dai-el Perfluor or FPM

ORDERING INFORMATION

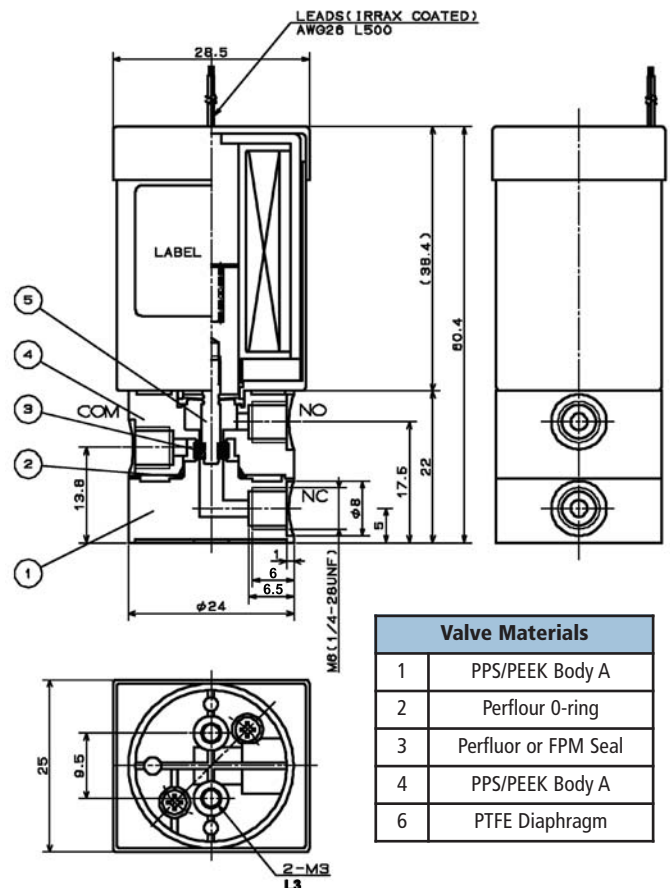
ABC-D

EXAMPLE: WTB-3R1/4UG-12V

A Model/Body Material	B Connection	C Seal Material	D Voltage
WTB-3K= PEEK WTB-3R= PPS	Threaded Ports 1/4U= 1/4-28 UNF M6= M6 Hose Barb N3= 3 mm N4= 4mm	G= Perfluor F= FPM	12V= 12VDC 24V= 24VDC



DIMENSIONS (MM)



Valve Materials	
1	PPS/PEEK Body A
2	Perfluor O-ring
3	Perfluor or FPM Seal
4	PPS/PEEK Body A
6	PTFE Diaphragm

TAKASAGO

MTV-2T & 3T PTFE Isolation Valves

Solenoid Operated

DESCRIPTION

Model MTV isolation valves offer great performance and PTFE wetted materials for compatibility with aggressive media. The valves are available with unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically scratch a PTFE valve seat.

The MTV series are available in two way, normally open and normally closed, and three way configurations.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Power Consumption- 1.9 Watts
 Coil Temp. Rise- Max 35°C
 Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated
 Orifice Diameter-1.6mm
 Internal Volume, two way- IN, 12μl; OUT 60μl
 Internal Volume, three way- COM, 26μl; NC/NC, 132μl
 Operating Pressure, two way- IN, -750mmHg to 3.0 bar; OUT, 0.5 bar
 Operating Pressure, three way- COM, -750 mmHg to 3.0 bar;
 NC/NO, 0.5 bar
 Response Time- ON, 20-30ms; OFF, 5-10ms
 Media Temperature Range- 5-60°C
 Ambient Temperature Range-5-50°C
 Operating Life- 10 million cycles
 Weight- two way, 93 grams; three way, 95 grams
 Insulation Class- Class B
 Insulation Resistance- 50 Mohm at 500 Vdc
 Dielectric Strength- 1500 Vac/1 minute
 Port Connection- 1/4-28 threaded, M6
 Valve Body Material- PTFE
 Isolating Diaphragm Material- PTFE
 Valve Seat Seal Material- PTFE or Dai-el Perfluor (soft seal)

Note: Soft Seal Diaphragm valves have different pressure rating
 two way- IN, -700mmHg to 2 Bar; OUT 0.5 Bar
 three way- COM -700mmHg to 2 Bar; NO/NC 0.5 Bar

ORDERING INFORMATION

ABCDE

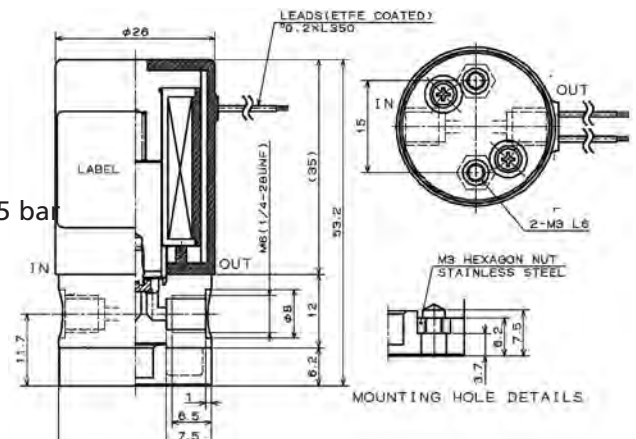
EXAMPLE: MTV-3T1/4UG12V

A Configuration	B Connection	C Seal	D Voltage	E Options
MTV-2T= 2-way, NC MTV-3T= 3-way MTV-02T= 2-way, NO	1/4U=1/4-28 threaded M6= M6 threaded	G=Perfluor T=PTFE	12V=12Vdc 24V=24Vdc	V=Ventiduct NMF=zero Internal Volume

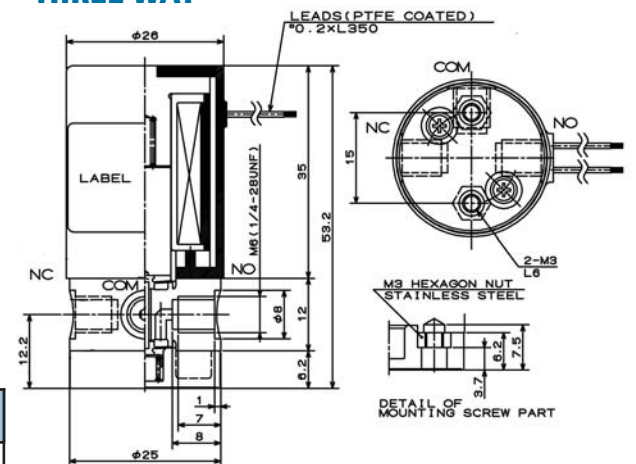
Bold Order combinations typically ship from stock



TWO WAY



THREE WAY



TAKASAGO

MTV-3N, Inert 3-way Isolation Valve

Solenoid Operated, PEEK or PPS Body

DESCRIPTION

Model MTV-3N inert 3-way isolation valve offers great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals which are forgiving of particulate matter that would typically destroy an inert valve.

The MTV-3N is offered with molded PEEK or PPS body material. The isolation diaphragm is PTFE and the valve seal material is a soft Perfluor.

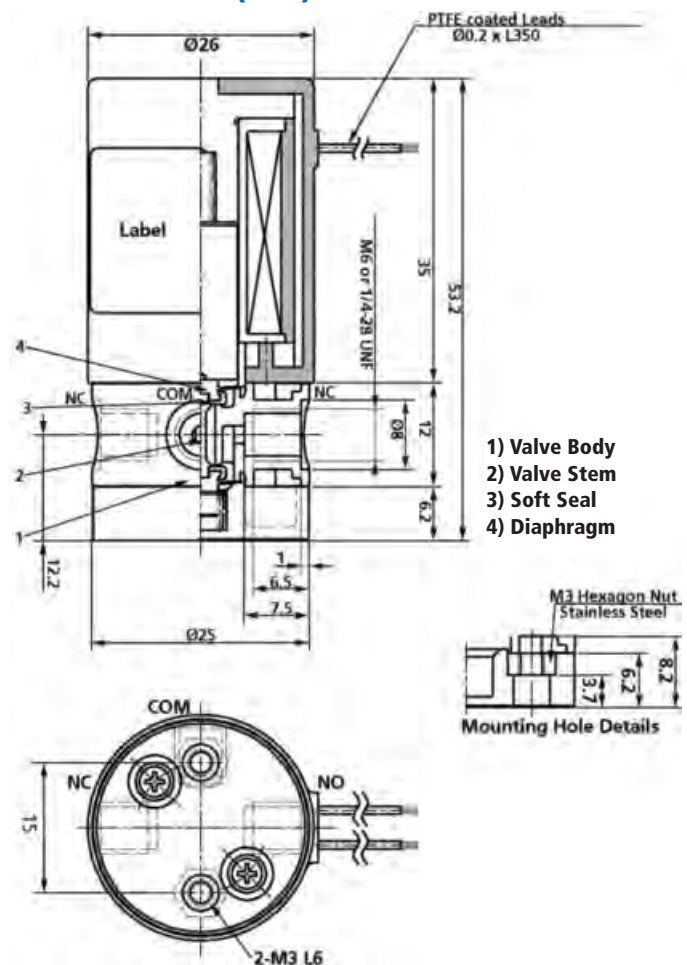


SPECIFICATIONS

GENERAL

- Rated Voltage- 12Vdc or 24Vdc
- Min. Operating Voltage- 90% of rated voltage
- Drop Out Voltage- 10% of rated voltage
- Power Consumption- 4.4 watts
- Coil Temp. Rise- Max 75°C from room temperature
- Orifice Diameter- 1.8 mm
- Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated
- Internal Volume- COM, 61 micro liters
NC & NO, 72 micro liters
- *Operating Pressure- COM, -0.8 to 2.0 bar
NC/NO, 0-0.5 bar
- Media Temperature Range- 5-60°C
- Ambient Temperature Range- 5-50°C
- Operating Life- 9 million cycles
- Weight- 88 grams
- Insulation Class- Class B
- Insulation Resistance- 50 Mohm at 500 Vdc
- Dielectric Strength- 1500 Vac/1 minute
- Port Connection- 1/4-28 threaded, M6
- Valve Body Material- PEEK or PPS
- Valve Stem- PEEK or PPS
- Isolating Diaphragm Material- PTFE
- Valve Seat Seal Material -Perfluor
- * A high pressure model (6 bar) is available,

DIMENSIONS (MM)



ORDERING INFORMATION

MTV-3NABC

EXAMPLE: MTV-3N1/4UKGL12V

A Connections	B Body	C Voltage
1/4U=1/4-28 threaded M6= M6 threaded	KGL=PEEK RGL=PPS	12V=12Vdc 24V=24Vdc

Bold Order combinations typically ship from stock

TAKASAGO

MTV 2R/3R/2K/3K Inert Isolation Valve

Solenoid Operated, PEEK & PPS Valves

DESCRIPTION

Model MTV-R/K inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals which are forgiving of particulate matter that would typically destroy an inert valve.

The MTV series are available in two way, normally open and normally closed; and three way configurations. Model MTV-2R and

-3R valves have molded PPS bodies and Model MTV-2K and -3K valves have PEEK molded bodies. A choice of FPM or Perfluor

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption- 2.6 Watts

Coil Temp. Rise- Max 50°C from room temperature

Orifice Diameter- 2mm

Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated

Internal Volume, two way- IN, 30 micro liters; OUT 240 micro liters

Internal Volume, three way- COM, 30 micro liters; NC, 82 micro liters;
NO, 194 micro liters

Operating Pressure, two way- IN, -700mmHg to 2.0 bar; OUT, 1.0 bar
(Optional 7.0 bar IN, 2.0 bar OUT)

Operating Pressure, three way- Com,-700 mmHg to 2.0 bar;
NC/NO,1.0 bar

Response Time- ON, 30ms; OFF, 7-15ms

Media Temperature Range- 5-60°C

Operating Life- 9 million cycles

Weight- two way, 85 grams; three way, 88 grams

Insulation Class- Class B

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

Port Connection- 1/4-28 threaded, 4 mm barb connection, M6

Valve Body Material- PEEK or PPS

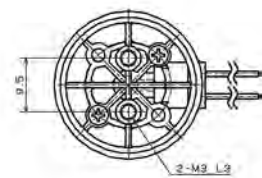
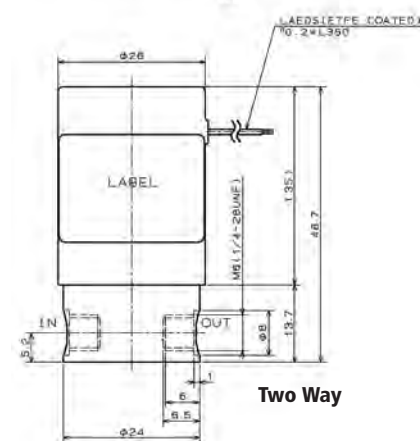
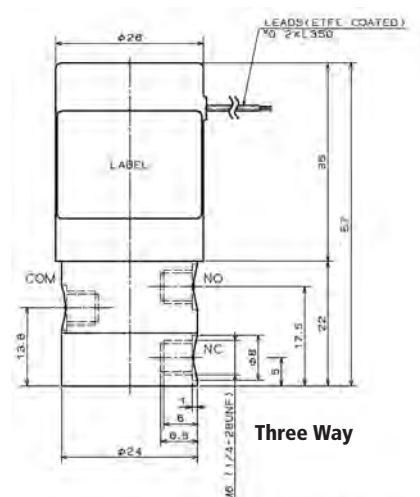
Isolating Diaphragm Material- PTFE

Valve Seat Seal Material-Dai-el Perfluor or FPM

"O" Ring Material (three way only)- Perfluor or FPM



DIMENSIONS (MM)



ORDERING INFORMATION

ABCDE

EXAMPLE: MTV-3R1/4UF12V

A Config. & Body Material	B Connections	C Seat Material	D Options	E Voltage
MTV-2R= 2-way,NC,PPS MTV-2K=2-way,NC,PEEK MTV-3R= 3-way,PPS MTV-3K= 3-way,PEEK MTV-02R= 2-way,NO,PPS MTV-02K= 2-way,NO,PEEK	1/4U=1/4-28 threaded N4= 4mm barb M6= M6 threaded	F=FPM G=Perfluor	--None H=High Pressure Option (Two way, N.C. only, 4.4 W power consumption)	12V=12Vdc 24V=24Vdc

Bold order combinations typically ship from stock

TAKASAGO

XTA-3, 3-Way Inert Isolation Valve

Solenoid Operated, PEEK or PPS Valve Bodies, Built-in Hit & Hold Circuit

DESCRIPTION

Model series XTA inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals that are forgiving of particulate matter that would typically destroy an inert valve.

The XTA series are a three-way configuration. Model XTA-3R have molded PPS bodies and Model XTA-3K have molded PEEK bodies. The valves have PTFE isolation diaphragms and a Perfluor or FPM soft valve seat seal.

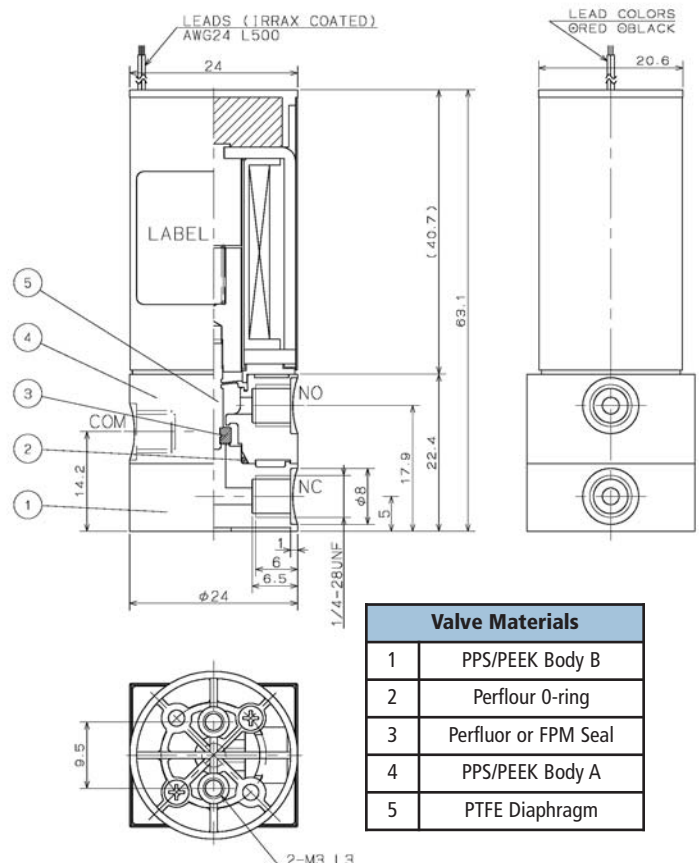
The XTA series feature a built-in microprocessor based hit and hold circuit that drops the supply voltage after energizing the valve to reduce heat and power consumption.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Power Consumption- 11.2W inrush, 1.8W holding
 Duty Cycle- Continuous; The hit and hold circuit is timer controlled and it is not recommended to run the on/off cycles at over 3 Hz
 Orifice Diameter- 2mm
 Operating Pressure-
 Com: 2 Bar (29 PSI)
 N.O. & N.C.: 1 Bar (14.5 PSI)
 Media & Temperature Range- 5 to 70°C (41 to 158°F)
 Ambient Temperature Range- 5 to 50°C (41 to 122°F)
 Insulation Class- Class E
 Insulation Resistance- 50 Mohm at 500 Vdc
 Dielectric Strength- 1000 Vac/1 minute
 Port Connection- 1/4-28 threaded, M6 threaded, 3 mm or 4 mm barb
 Valve Body Material- PEEK or PPS
 Isolating Diaphragm Material- PTFE
 Valve Seat Soft Seal Material- Dai-el Perfluor or FPM
 Wiring- Polarity important, red wire to positive (+), black wire to negative (-)

DIMENSIONS (MM)



ORDERING INFORMATION

ABC-D

EXAMPLE: XTA-3R1/4UG-12V

A Model/Body Material	B Connection	C Seal Material	D Voltage
XTA-3K= PEEK XTA-3R= PPS	Threaded Ports 1/4U= 1/4-28 UNF M6= M6 Hose Barb N3= 3 mm N4= 4mm	G= Perfluor F= FPM	12V= 12VDC 24V= 24VDC

MLV-2T & 3T PTFE Isolation Valves

Solenoid Operated, Two Way And Three Way

DESCRIPTION

Model MLV isolation valves offer great performance and inert wetted materials for compatibility with aggressive media. The valves are available with unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically scratch a PTFE valve seat.

The MLV series are available in two way, normally open and normally closed, and three way configurations.



SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 7.5% of rated voltage or higher

Power Consumption- 4.4 watts (soft seal), 3.1 watts (PTFE seal)

Coil Temp. Rise- Max 60°C

Solenoid Housing- Black Chrome Steel

Orifice Diameter-2.5 mm

Internal Volume (Depends On Model Selected)- IN/COM, 75 to 185 µl;
NO/NC, 140 to 285µl

Operating Pressure, two way- IN,COM -300mmHg to 2.0 bar; NO/NC ,
0.5 bar

Proof Pressure-2.6 Bar

Response Time- ON, 20-30ms; OFF, 5-10ms

Media Temperature Range- 5-60°C

Ambient Temperature Range-5-60°C

Operating Life- 5 million cycles

Weight- 93 grams

Insulation Class- Class B

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

Port Connection- 5/16-24 threaded, M8, 1/8-27 NPT

Valve Body Material- PTFE

Valve Stem (3-way)- Ceramic (PTFE seal), PCTFE (soft seal)

Isolating Diaphragm Material- PTFE

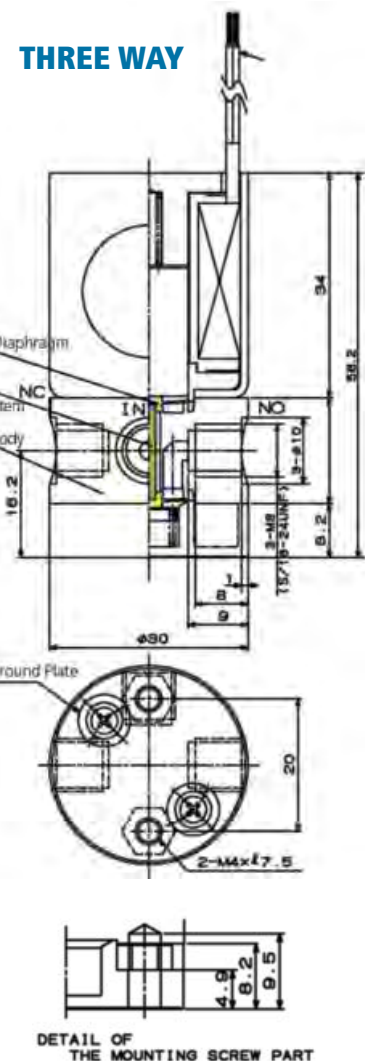
Valve Seat Seal Material- PTFE or Dai-el Perfluor

ORDERING INFORMATION

ABCDE

EXAMPLE: MLV-3TM8G-12V

A Config. & Body Material	B Connections	C Seat Material	D Options	E Voltage
MLV-2T= 2-way,NC MLV-3T= 3-way MLV-02T= 2-way,NO	M8= M8 1/8N=1/8-27 NPT 5/16U=5/16-24	G=Perfluor T=PTFE	--None D=Ventiduct M=Manifold Mount	12V=12Vdc 24V=24Vdc



NOTE:

Please contact us for 2-way and manifold mount dimension drawings

TAKASAGO

PKV-R/K PPS & PEEK Molded Inert Isolation Valves

Solenoid Operated, Two & Three Way, 4 or 6 mm Orifice

DESCRIPTION

Model PKV-two-way and three-way isolation valves are an economic molded design. They have 4 or 6 mm orifice size and a particle tolerant soft valve seat seal.

The valve body is molded of PPS or PEEK and other standard wetted materials are a PTFE isolation diaphragm and FPM valve seat seal.

The valves are particularly suitable for control of waste fluid lines on automated chemistry equipment such as analytical, clinical and biotechnology analyzers. They are also well suited to a large variety of high purity applications in semiconductor, pharmaceutical

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption-

2-W:6 Watts

3-W: 10 Watts

Operating Duty- continuous

Coil Temp. Rise- Max 55°C from room temp.

Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated

Orifice Diameter- 4 or 6 mm

Operating Pressure-

2-W IN: -675 mm Hg to 2 bar (29 psi)

2-W OUT: 0 to 0.5 bar (7.25 psi)

3-W NO/NC: -0 to 0.5 bar (7.25 psi)

3-W COM: -675 mm Hg to 1 bar (14.5 psi)

Media Temperature Range- 0-60°C (140°F)

Ambient Temperature Range- 0-40°C (104°F)

Insulation Class- Class B

Insulation Resistance- min 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

Port Connection- 1/8-27 or 1/4-18 NPT

Valve Body Material- PPS or PEEK

Isolating Diaphragm Material- PTFE

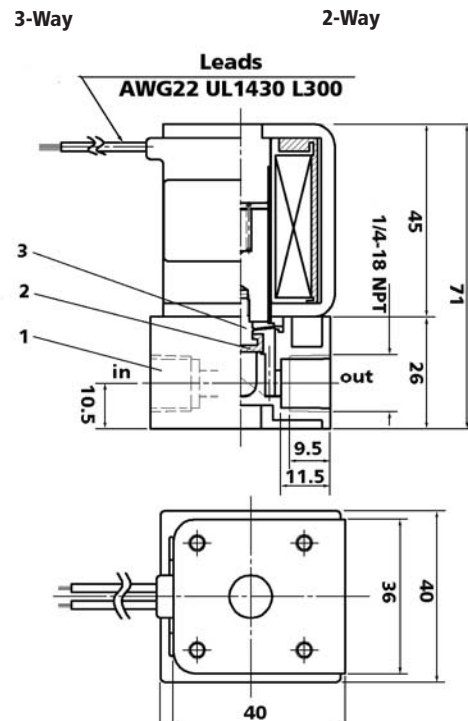
Valve Seat Seal Material- FPM or Perfluor

3-W Valve Stem Material- PCTFE



PKV-2K

DIMENSIONS (MM)



ORDERING INFORMATION

ABCDE

EXAMPLE: PKV-2RD1/4NG12V

A Model	B Orifice	C *Connection	D Valve Seat	E Voltage
PKV-2R= NC, PPS				
PKV-2K=NC, PEEK				
PKV-02R=NO, PPS	B= 4mm	1/8N= 1/8 NPT	F= FPM	12V=12 VDC
PKV-02K=NO, PEEK	D= 6mm	1/4N= 1/4 NPT	G= Perfluor	24= 24 VDC
PKV-3R=3-way, PPS				
PKV-3K=3-way, PEEK				

TAKASAGO

NRV Inert Isolation Valve

Solenoid Operated, Two Way & Three Way

DESCRIPTION

Model NRV isolation valves have orifice sizes from 4 to 6 mm and are available with particle tolerant soft valve seat seals.

The valves are particularly suitable for control of waste fluid lines on automated chemistry equipment such as analytical, clinical and biotechnology analyzers. They are also well suited to a large variety of high purity applications in semi-

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption- 5.5 Watts

Operating Duty- continuous

Coil Temp. Rise- Max 60°C from room temp.

Orifice Diameter- 4-6 mm

Operating Pressure- IN, -700mmHg to 1.5 Bar;
OUT, 0.5 Bar

Media Temperature Range- 5-60°C

Ambient Temperature Range- 5-60°C

Insulation Class- Class E

Insulation Resistance- min 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

Port Connection- 1/8-27 NPT or 1/4-18 NPT

Valve Body Material- PTFE or HPVC

Isolating Diaphragm Material- PTFE

Valve Seat Seal Material- PTFE, Dai-el Perfluor, FPM

Stem Materials (Three-Way Valves)-

PTFE or HPVC body & PTFE seal: ceramic

PTFE body & Perfluor or FPM seal: PCTFE

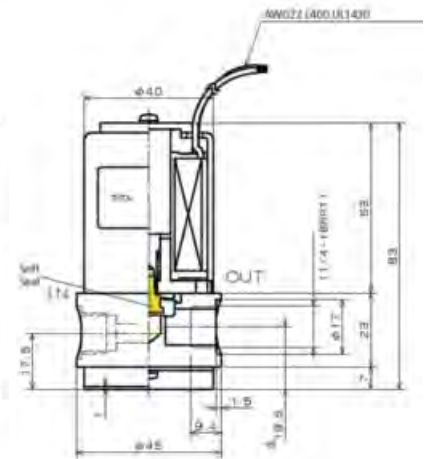
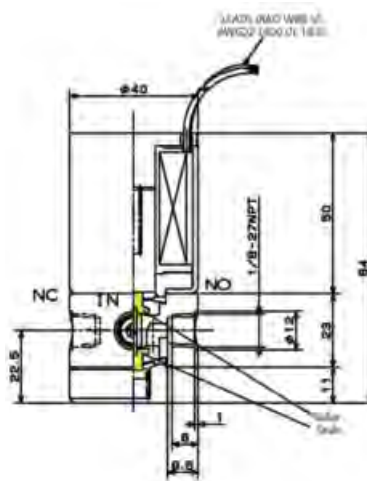
HPVC body & Perfluor or FPM seal: HPVC



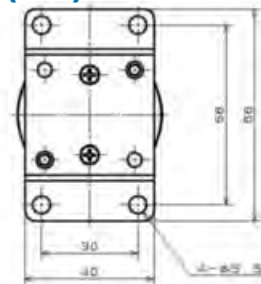
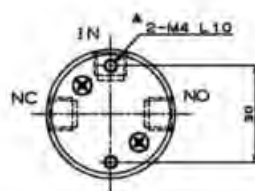
NRV THREE WAY



NRV TWO WAY



DIMENSIONS (MM)



ORDERING INFORMATION

ABCDEFGH

EXAMPLE: NRV4CPG12V8

A Model	B Orifice	C Configuration	D Valve Body	E Seat Material	F Voltage	G Connections	H Options
NRV=NRV	4=4 mm 5=5 mm 6=6 mm	C=2-way, NC O=2-way, NO E=3-way	T=PTFE P=HPVC	T=PTFE G=Perfluor V=FPM	12V=12Vdc 24V=24Vdc	8=1/8-27 NPT 4=1/4-18 NPT	D=Ventiduct

LV Manifold Mount 2-Way Inert Isolation Valve

N.C., Solenoid Operated, PEEK Valves, 0.8 mm Orifice

DESCRIPTION

LV manifold mountable diaphragm isolation valve is just 8.9 mm x 10.4 mm (Width X Depth), giving a footprint of less than 1 cm². Because it can be mounted in the smallest of spaces, miniaturization of manifolds and shortening the flow-path between ports are possible.

The internal volume is just 3.3 μ l on the inlet side, and it is 8.3 μ l on the outlet side.

The body material is PEEK and the diaphragm material is perfluoroelastomer meaning this valve is highly chemically inert (other body materials are available).



These valves are ideal for automated chemistry applications and are an economical choice for original equipment manufacturers.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Power Consumption- 1.2 Watts

Duty Cycle: Continuous

Coil Temp. Rise- Max 60°C from room temperature

Orifice Diameter- 0.8 mm

Operating Pressure- Inlet to 1.0 bar
Outlet to 0.5 bar

Media Temperature Range- 5-50°C

Ambient Temperature Range- 5-40°C

Insulation Class- Class B

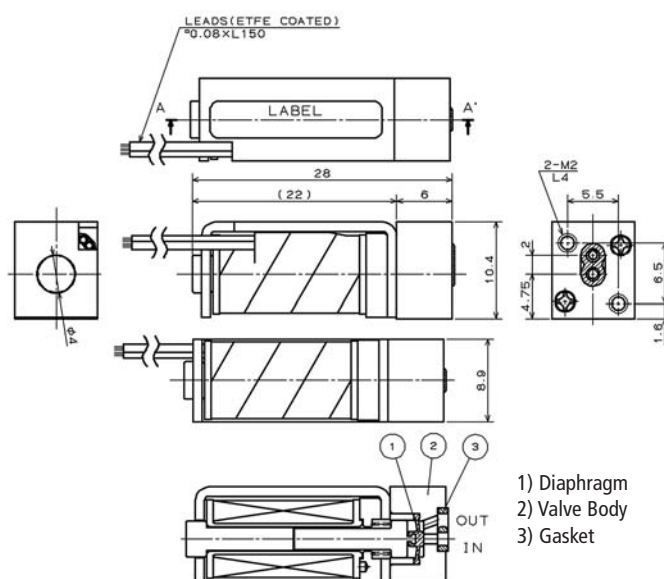
Dielectric Strength- 1000 Vac/1 minute

Port Connection- O-ring Seal 2.6 mmOD x 1.3 mm wall

Valve Body Material- PEEK, PPS, PCTFE

Isolating Diaphragm Material- Perfluor

DIMENSIONS (MM)



ORDERING INFORMATION (A-B-CDE)

EXAMPLE: LV-2K-MFG12V

A Model	B Body Material	C Mounting	D Seals & O-rings	E Power Supply
LV	2K= PEEK 2R= PPS	MF= Manifold Mount	G= Perfluor	12V= 12 VDC 24v= 24 VDC

TAKASAGO

EXV-2MF Manifold Mount Inert Isolation Valves

1.0 mm Orifice, PEEK or PPS, 2-Way, Normally Closed

DESCRIPTION

Model EXV-2MF manifold mount inert isolation valves mount directly on customer designed manifold blocks. A Perfluor or FPM gasket provides sealing.

The valves have molded PEEK or PPS valve bodies and unique Perfluor soft elastomeric seals which are forgiving of particulate matter that would typically scratch a PTFE valve seat. An FPM seal is also available.

The valve's small size and mounting style allows the end user flexibility and minimum internal volume in the layout of fluidic circuitry.

SPECIFICATIONS

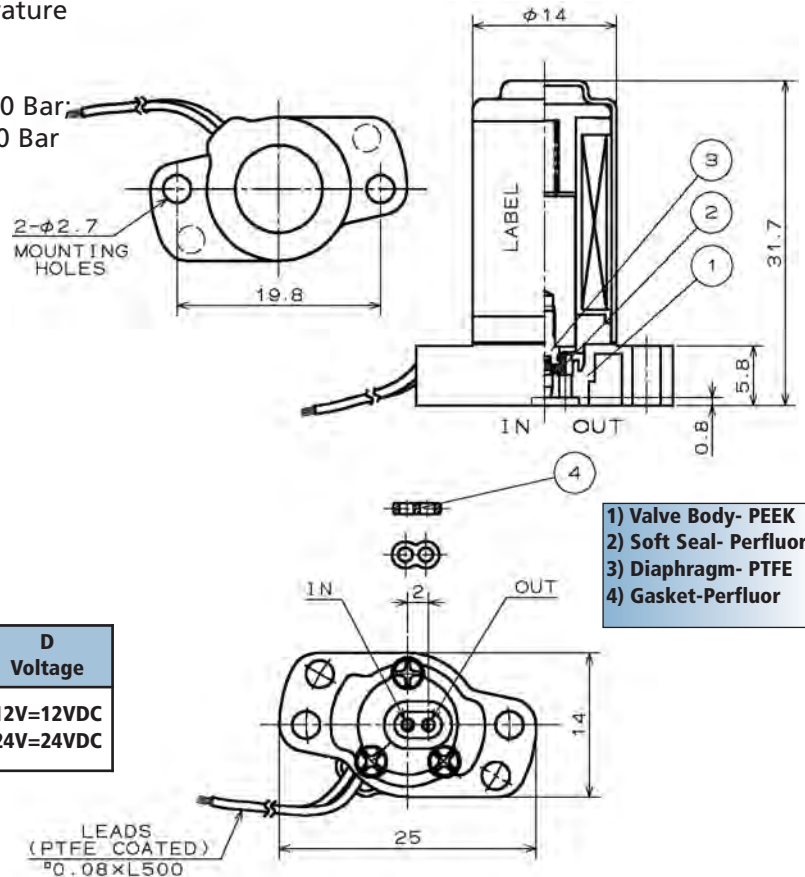
GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Power Consumption- 2.8W
 Operating Duty- continuous
 Coil Temp. Rise- Max 110°C from room temperature
 Orifice Diameter- 1.0mm
 Internal Volume- IN, 4μl; OUT, 25μl
 Operating Pressure (2-w)- IN, -150 mmHg to 2.0 Bar;
 OUT, -375 mmHg to 2.0 Bar
 Media Temperature Range- 0-40°C
 Ambient Temperature Range-0-40°C
 Weight- 23 grams
 Insulation Class- Class F
 Dielectric Strength- 1500 Vac/1 minute
 Port Connection- Perfluor gasket, FPM gasket
 Valve Body Material- PEEK, PPS
 Isolating Diaphragm Material- PTFE
 Valve Seat Seal Material- Dai-el Perfluor, FPM



EXV-2K-MFG

DIMENSIONS (MM)



- 1) Valve Body- PEEK
- 2) Soft Seal- Perfluor
- 3) Diaphragm- PTFE
- 4) Gasket-Perfluor

ORDERING INFORMATION

ABCD

EXAMPLE: EXV-2KMFG12V

A Model	B Mounting	C Valve Seat	D Voltage
EKV-2K=PEEK Body EXV-2R=PPS Body	MF=Manifold Mounting	G=Perfluor F=FPM	12V=12VDC 24V=24VDC

Bold order combinations typically ship from stock

TAKASAGO

RVA Series Rocker Type Isolation Valve

Inert Valves, 2-way & 3-way , 1.6 mm Orifice, Manifold Mount

DESCRIPTION

Model series RVA is a miniature rocker style isolation valve suitable for a wide range of manifolds designed for in-vitro diagnostic, analytical and laboratory instruments.

The small rectangular footprint (16 x 27 mm) minimizes manifold size and reduces internal passage volume.

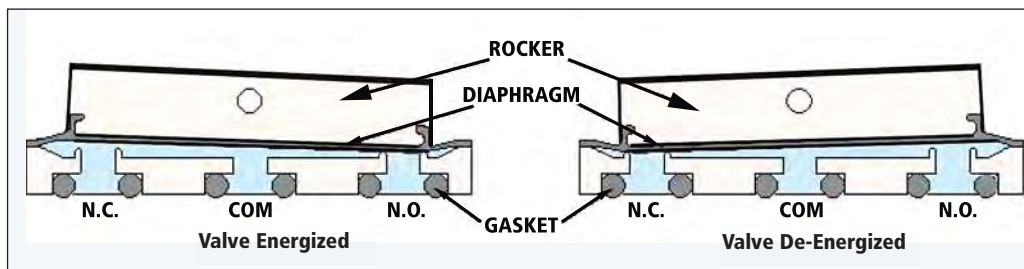
Standard materials in contact with the process fluid are PEEK valve body and perfluoroelastomer diaphragm and seal.

Pumped volume is quite small as there is no volumetric change in the valve chamber with actuation of the rocker.

The valve can optionally be provided with a built-in voltage dropping circuit that drops the voltage to a holding voltage 100 ms after the valve is energized. This reduces heat generation and reduces energy consumption.



ROCKER CROSS-SECTION

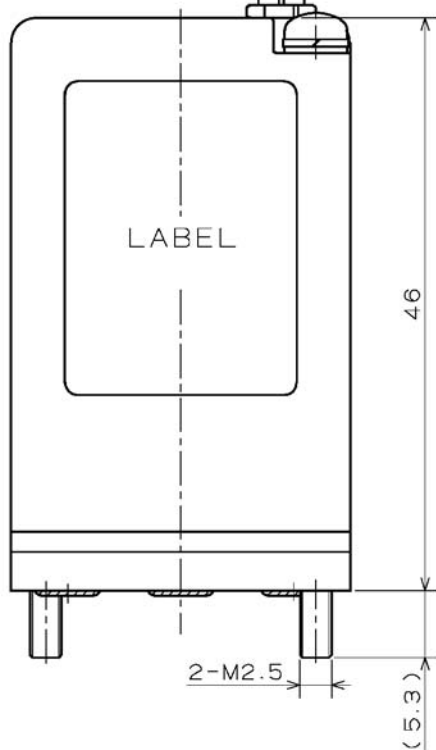


SPECIFICATIONS

Model	RVA-2K-MFGA	RVA-02K-MFGA	RVA-3K-MFGA
Type	2-way N.C.	2-way N.O.	3-way
Orifice Diameter	1.6 mm (optionally 0.8 mm)		
Operating Pressure Range	-95 to 200 kPa (28" Hg Vac to 29 PSI); Optionally to 600 kPa (87 PSI)		
Port Connection	Gasket Seal, see Port Connection Options drawing		
Media Temp. Range	5 to 45°C (41-113°F); 0-60°C (140°F) for FPM & EPDM models		
Ambient Temp. Range	5 to 45°C (41-113°F); 0-55°C (131°F) for FPM & EPDM models		
Rated Voltage	12 VDC, 24 VDC		
Power Consumption	3.4 W (Optionally 0.85 W with a Hit & Hold Circuit)		
Duty Cycle	Continuous		
Insulation Class	Class B		
Wetted Materials	Valve Body: Peek; Optionally PPS Diaphragm & Gasket: Perfluoroelastomer; Optionally FPM or EPDM		

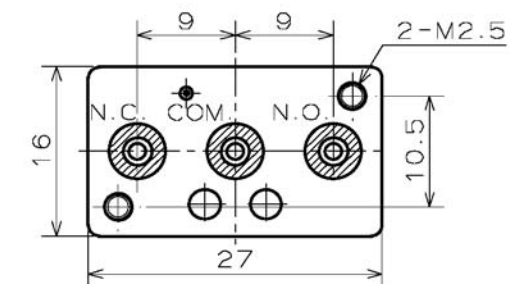
DIMENSIONS (MM)

PVC LEADS UL1430
AWG24 L500

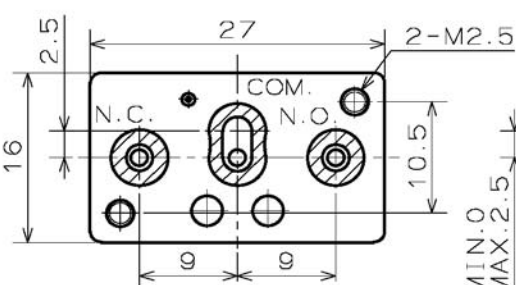


Port Connection Options

VALVE BOTTOM VIEW

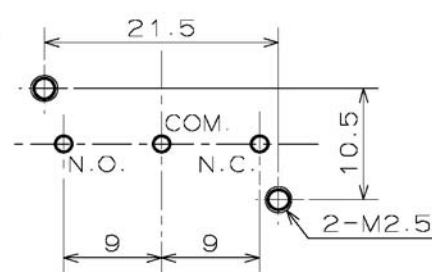


Type A

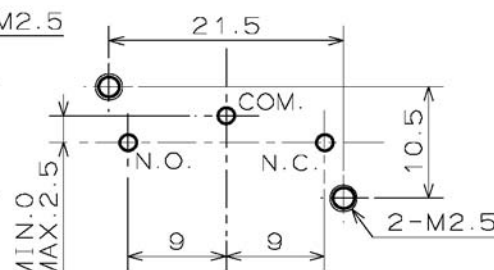


Type B

MANIFOLD INTERFACE



Interface A



Interface B

ORDERING INFORMATION

SELECT MODEL NUMBER AND VOLTAGE

RVA-ABCDEF

EXAMPLE: RVA-2KG-A12V

Model Number	A Type	B Body Material	C Diaphragm & Gasket	D Max. Pressure	E Port Connection	F Voltage
RVA	02= 2-way, N.O. 2= 2-way, N.C. 3= 3-way	R= PPS K= PEEK	E= EPDM F= FPM G= Perfluoroelastomer	= 200 kPa (30 PSI) H= 600 kPa (87 PSI)	A= Type A B= Type B	12V= 12VDC 24V= 24VDC

WTA-2MF Manifold Mount 2-Way Inert Isolation Valve

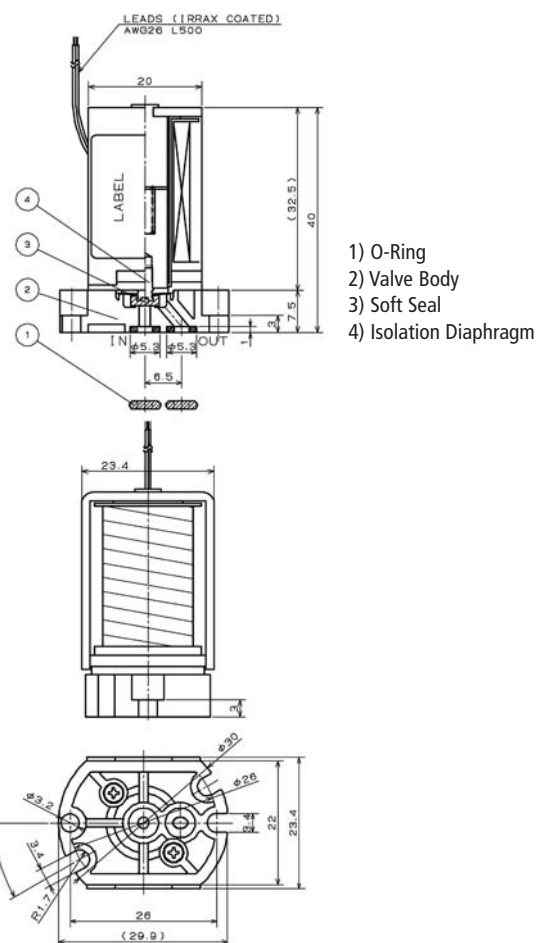
DESCRIPTION



Two solenoid valves are shown, one in the foreground and one slightly behind it. They have a yellow and blue body with a brass-colored top. Two black cables are coiled next to them. Two O-rings are visible on the surface.

The WTA series are a two way, normally closed configuration and have molded PEEK bodies. The valves have PTFE isolation diaphragms and a Perfluor or FPM soft valve seat seal.

DIMENSIONS (MM)



GENERAL

Rated Voltage- 12Vdc or 24Vdc
Min. Operating Voltage- 90% of rated voltage
Drop Out Voltage- 10% of rated voltage
Power Consumption- 2.8 Watts
Duty Cycle: Continuous
Coil Temp. Rise- Max 65°C from room temperature
Orifice Diameter- 2mm
Operating Pressure- Inlet -700mmHg to 2.0 bar
Outlet: 1.0 bar
Media & Ambient Temperature Range- 5-50°C
Weight- 81 grams
Insulation Class- Class E
Insulation Resistance- 50 Mohm at 500 Vdc
Dielectric Strength- 1000 Vac/1 minute
Port Connection- O-ring Seal 2.6 mmOD x 1.3 mm wall
Valve Body Material- PEEK
Isolating Diaphragm Material- PTFE
Valve Seat Soft Seal Material- Perfluor or FPM

EXAMPLE: WTA-2K-MF-G-12V

A Model	B Body Material	C Mounting	D Seals & O-rings	E Power Supply
WTA	2K= PEEK	MF= Manifold Mount	G= Perfluor F= FPM	12V= 12 VDC 24v= 24 VDC

Bold order combinations typically ship from stock

TAKASAGO

STV Disk Type Inert Manifold Valve

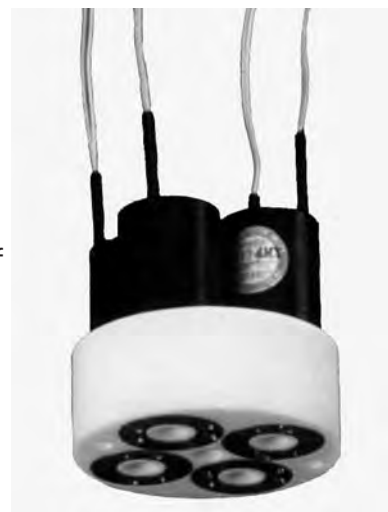
Solenoid Operated, PTFE or PEEK Bodies

DESCRIPTION

Model STV disk type manifold accommodates four two way, normally closed valves with separate inlets and a common outlet on one block of PTFE. The unit is only 2 inches in diameter offering excellent economy of space.

Model STV has very little internal volume. The valves are isolation type valves and only inert materials are in contact with the process media.

Fast response time, consistent valve performance over valve life, and continuous duty rating make the STV valves ideal for solvent selection applications for automated chemistry sample preparation.



STV-2-4

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Power Consumption- 2.4 watts/valve

Orifice Diameter- 0.8mm or 1.0mm

Fluid Connection- 1/4-28 thread

Media Temp Range- 0-60°C

Ambient Temp Range- 0-60°C

Internal Volume- inlet 22µl each; outlet, 127µl

Max Operating Pressure- inlet, 2.5 bar; outlet, 0.5 bar

Response Time- 6-8 msec

Operating Life- minimum 10 million cycles

Coil Temperature Rise- 60°C above ambient

Duty Cycle- continuous

Insulation Class-Class E

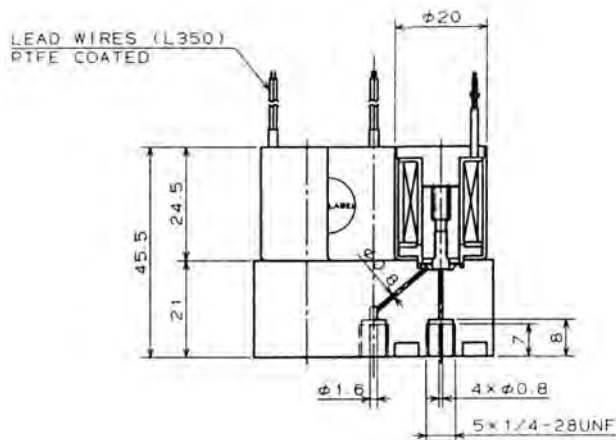
Insulation Resistance- 50Mohm at 500Vdc

Dielectric Strength- 1500Vac/60 seconds

Valve Body Material-PTFE or PEEK

Isolating Diaphragm Material- PTFE

DIMENSIONS



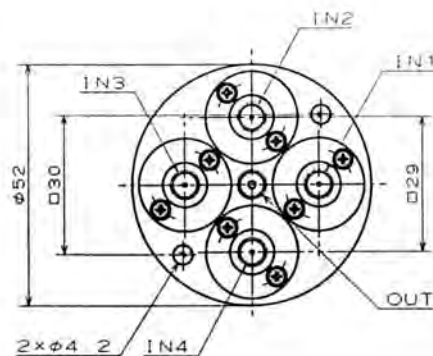
Note-Designs are available with up to 12 valves per manifold.

ORDERING INFORMATION

STV-2-4-A-B-C

EXAMPLE: STV-2-4-MX-1-12V

A= Valve Body Material	B= Orifice Size	C=Voltage
MX=PTFE	1= 0.8mm	12V=12Vdc
PK=PEEK	2= 1.0mm	24V=24Vdc



TAKASAGO

STV & EXV Manifold Designs

Solenoid Operated

DESCRIPTION

Model STV and EXV manifold designs offer an integrated solution to reducing plumbing and internal volume in automated chemistry applications.

The valve designs have all inert wetted parts. Unique Takasago design features such as low pumping volume, Ventiduct and Soft Seal can be incorporated into a manifold design depending on the application. Individual valves can be field replaced.

As most manifold offerings are generally unique to individual customer needs the following specifications are only intended to give a reasonable idea of performance.

STV

3, 4, 6, 12 two way normally open or normally closed valves on a common block with individual valve inlets/outlets connected to a common outlet/inlet. Features include field replaceable valves, zero internal volume option and particle tolerant Soft Seals.

EXV

3 to 12 two way valves mounted in line on a common manifold block. Features include field replaceable valves, Ventiduct and particle tolerant Soft Seals.

	STV	EXV
Rated Voltage-	12Vdc or 24Vdc	
Power Consumption-	1.7 W/valve	1.2 W/valve
Orifice Diameter-	1.0 mm	0.8 mm
Fluid Connection-	1/4-28 thread	
Media Temp Range-	0-60°C	
Ambient Temp Range-	0-60°C	
Max Operating Pressure In-	2.5 bar	1.0 bar
Max Operating Pressure Out-	0.5 bar	1.0 bar
Response Time-	6-8 msec	
Operating Life-	minimum 10 million cycles	
Coil Temperature Rise-	60°C above ambient	47°C above ambient
Solenoid Housing-	chrome steel	
Duty Cycle-	continuous	
Insulation Class-	Class E	Class B
Insulation Resistance-	50Mohm at 500Vdc	
Dielectric Strength-	1500Vac/60 seconds	
Valve Body Material-	PTFE or PEEK	
Isolating Diaphragm Material-	PTFE	
Valve Seat Seal-	PTFE or Perfluor	
Please call or write with your requirements, we will respond with drawing work, performance and commercial details.		



STV 12 VALVE MANIFOLD
12 INLETS, COMMON OUTLET



STV 4 VALVE MANIFOLD
4 INLETS, COMMON OUTLET



EXV 4 VALVE MANIFOLD
4 INLETS, COMMON OUTLET

CLARK SOLUTIONS

Technical Bulletin, General Industry Solenoid Valves

Installation and Troubleshooting

MODELS COVERED IN THIS BULLETIN 1314, 1323, 1325, 1327, 1335, 1342, 1365, 1390, 1393, 2026, 2036

ELECTRICAL INSTALLATION

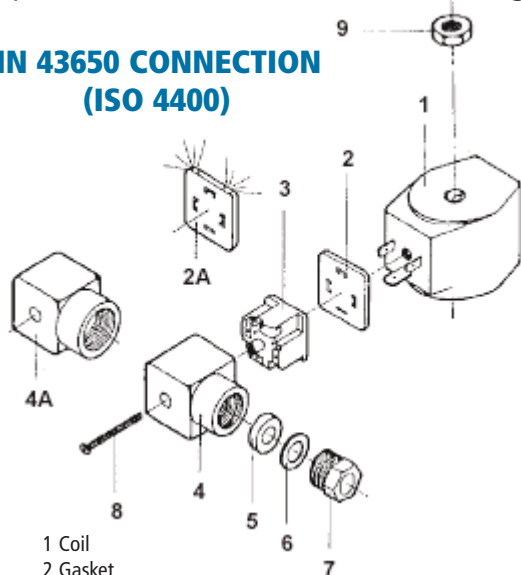
All the coils are for continuous use - permanent or high frequency operation.

Check that the coil supplied with the valve has the correct voltage and current required. If not, replace it with the adequate coil without changing the valve.

The allowed voltage variation that does not affect the performance of the valve is -15% to +10% of the nominal voltage for AC and -10% to +10% for DC.

Except for valve series 1314, the models are generally

DIN 43650 CONNECTION (ISO 4400)



MECHANICAL INSTALLATION

- Verify that the working conditions are within the range of differential pressure and temperature indicated on the nameplate of the valve.
- Place a strainer with adequate capacity and a mesh smaller than 100 μ immediately upstream from the valve.
- The most favorable mounting position is on a horizontal pipeline with the coil upright.
- Pipelines upstream from the valve must be carefully and exhaustively cleaned even before the strainer, by means of purges with compressed air or any other system that guarantees the disposal of solid elements as well as welding bits, mud, dirt, etc., especially with new pipelines.
- Follow the arrow that indicates the flow direction in the valve's body. The input pressure must always be equal or greater than the output pressure.

INSTRUCTIONS FOR THE ELECTRICAL CONNECTION WITH STRAIN RELIEF

1. Unscrew the screw (8) to reach the block (3), where the terminals are. The system is designed to use armored cables with 3 "PG9" conductors. Carry out Neutral - Live - Ground connections.
2. Insert the terminal block into the cover (4) according to the desired entrance angle, in any of the four possible positions: Left, Right, Above, Below.
3. Insert the coil blades into the connector. Fasten it with the screw (8).
4. Finally but very important, tighten the strain relief (7) to make sure that it is hermetic. Otherwise, moisture may enter and cause a short-circuit between the terminals.

INSTRUCTIONS FOR THE COVER WITH AN OPENING FOR 1/2 NPT CONDUIT.

1. Follow instructions 1, 2 and 3 for strain relief connector.
2. It is important to be sure that the interconnection is hermetic, so we recommend the use of a sealant or gasketing tape over the threads.

COIL FIXING

The nut (9) that fixes the coil to the core-tube must be 5 Nm / 0.5 kpm / 3.75 lbf, to prevent the coil from turning round. Avoid unnecessary tension that may damage the core-tube due to excess of torsion.

TROUBLE SHOOTING PROBLEMS

Most of the failures that occur when starting a new installation are the result of lack of cleanness in the pipelines between the filter and the valve, due to left-overs of packaging, Teflon, welding residue, dirt, etc.. However, in spite of having made a good choice, a good installation and the adequate maintenance, some contingent factors may occur after the installation and disturb a suitable operation. The following page shows the most common failures with their possible causes and solution.

PROBLEM	POSSIBLE CAUSES	SOLUTIONS
1.Valves do not open when energized (NC) or when de-energized (NO).	<p>For direct acting valves</p> <ol style="list-style-type: none"> 1. Voltage less than 15% of the nominal voltage. 2. Too high a differential pressure for that model. 3. Burnt coil (with the circuit open). 4. Plunger jammed with solids. 5. Damaged plunger. <p>For pilot operated valves The same as above plus:</p> <ol style="list-style-type: none"> 6. Differential pressure too low. 7. Jammed pilot piston. 8. Damaged pilot piston, pilot piston rings or diaphragm. 9. Pilot orifice blocked. 10. Pilot gasket damaged or mis-aligned. 11. Excessive viscosity. 	<ol style="list-style-type: none"> 1. Check the coil voltage, which must not be less than 85% of the indicated nominal voltage. If this is the case, adjust the source to the adequate value. 2. Reduce pressure to the maximum shown on the valve nameplate or change it for a more adequate one. 3. See Burnt Coils (Problem 3). 4. Clean the plunger's core tube and the valve. If the system lacks an adequate strainer before the valve, the problem will persist. 5. Replace the damaged part. Damage may be caused by fluid abrasive elements or high operation frequency over a long period of time and exceeding the part's life. 6. This factor should be considered when choosing a valve. It may occur due to over-sizing or reduction of differential pressure. If differential pressure cannot be increased by increasing the flow, the valve must be changed for an adequate one. 7. Check that solids have not affected the piston's movement. After cleaning, check that it is not damaged. A strainer must be placed upstream from the valve to eliminate the problem. 8. Change damaged parts. Check that the cause is not dirt. Also see solution #1. 9. Clean the orifice, if the orifice is damaged consult Clark. Also see solution #1. 10. This is caused by poor assembly. Change the damaged part and assemble the valve correctly. The O-ring must be correctly fitted. 11. Fluids with viscosities exceeding 60 cSt cannot be used with pilot operated valves.
2.The valve remains open	<p>For direct acting valves</p> <ol style="list-style-type: none"> 1. The coil was not de-energized (NC valve) or energized (NO valve). 2. Plunger jammed with solids. <p>For pilot assisted valves The same as above plus:</p> <ol style="list-style-type: none"> 3. The pilot orifice does not close. 4. Compensation orifice blocked. 5. Jammed pilot piston. 6. Pilot piston, Pilot piston rings or diaphragm damaged. 7. Excessive viscosity. 	<ol style="list-style-type: none"> 1. Check the control circuits. 2. Clean the plunger's core tube and the valve. If the system lacks an adequate strainer before the valve, the problem will persist. 3. Check that the plunger is not jammed or the seats damaged. In the first case, clean it, in the second case, change it. If the orifice seat is damaged, consult Clark. 4. Clean the orifice, if the orifice is damaged consult Clark. 5. Check that solids have not affected the piston's movement. After cleaning, check that it is not damaged. A strainer must be placed upstream from the valve to eliminate the problem. 6. Change the damaged parts. Check that the cause is not dirt. 7. Fluids with viscosities exceeding 60 cSt cannot be used with pilot operated valves.
3. The coil gives off a burning smell after working for a short period or it burns up frequently.	<ol style="list-style-type: none"> 1. Excessive voltage. 2. Only for AC: Too high a pressure that does not allow the pilot to open, therefore, only inrush current is present, which doubles the holding current. 3. The coil's nominal voltage is less than the source's or does not correspond to its cycling. 4. Excessive fluid or ambient temperature. 5. Moisture entering the interior of the coil. 6. Lack of part of the electromagnetic package when it is not integrated to the coil. 7. It is energized outside the valve (AC only). 	<ol style="list-style-type: none"> 1. The voltage must not exceed 10% of the nominal voltage, and only for brief periods. Correct the voltage. 2. Adjust the maximum working pressure to the maximum shown on the nameplate. If pressure is within the parameters, check that voltage is not less than 85% of the nominal voltage. 3. Check that the voltage and current type is as indicated on the coil. 4. The fluid, atmosphere and power of the coil determine the internal temperature. As a general rule, the fluid temperature + ambient temperature must not exceed 210°C. The fluid temperature cannot be above 180°C. When handling hot fluids and the ambient exceeds 30°C, it is advisable to fit the valve in the most ventilated area. 5. Check that DIN coils' strain relief is tight and the armored cable corresponds to the connector PG size. For series 1314, check that the housing and connection are closed. See mounting recommendations. 6. Replace the missing parts because they are part of the magnetic circuits and their absence results in an increase of the intensity which reduces the force of the magnetic attraction. 7. Do not energize the coil if it is not fitted to the valve.
4.The coil vibrates when energized.	<ol style="list-style-type: none"> 1. Insufficient voltage. 2. Dirty fixed core and plunger surfaces, they have scales. 	<ol style="list-style-type: none"> 1. Adjust the voltage within the permitted parameters. 2. Clean the surfaces. If scales remain there, change the components.
5-Fluid leakage when closed.	<ol style="list-style-type: none"> 1. Main or pilot seat damaged or dirty. 	<ol style="list-style-type: none"> 1. Clean or change seats. If the orifice seats are damaged, consult Clark.
6-It operates slowly or fails.	<ol style="list-style-type: none"> 1. Compensation or pilot orifice partially blocked. 2. Excessive fluid viscosity. 3. Temporary excess or lack of differential pressure. 	<ol style="list-style-type: none"> 1. In case of dirt, clean the orifices. In case of damage, consult Clark. 2. The fluid's viscosity must not exceed 60 cSt. 3. Check that both differential and opening pressure differential are within the limits indicated in the valve nameplate.

CLARK

SC & KSV 2-Way N.C. & 2-Way N.O. Solenoid Vent Valves

DC Power, Air or Inert Gas, Pressure to 465 mm Hg (9 PSI)

DESCRIPTION

Model series KSV offers great performance in a very economical design. This product is best suited for OEM applications where the valve performance is acceptable and where low component cost is necessary.

The valve plunger and spring are fabricated from steel and therefore the valve is limited to use with air and other inert gases.

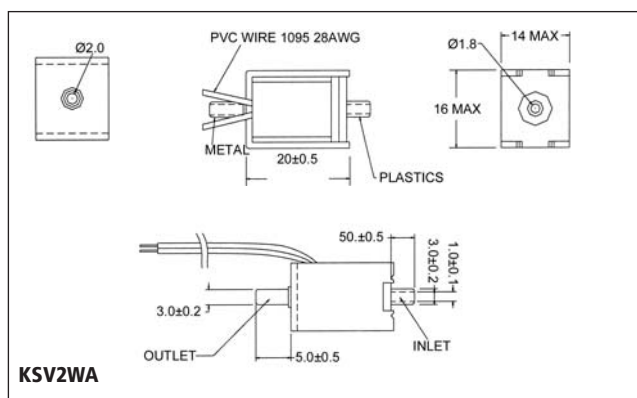
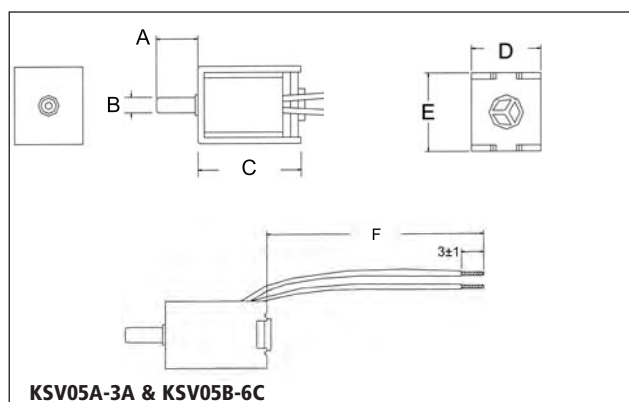
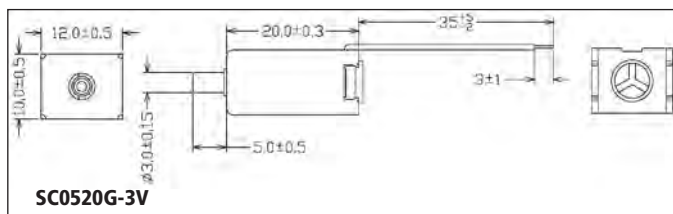
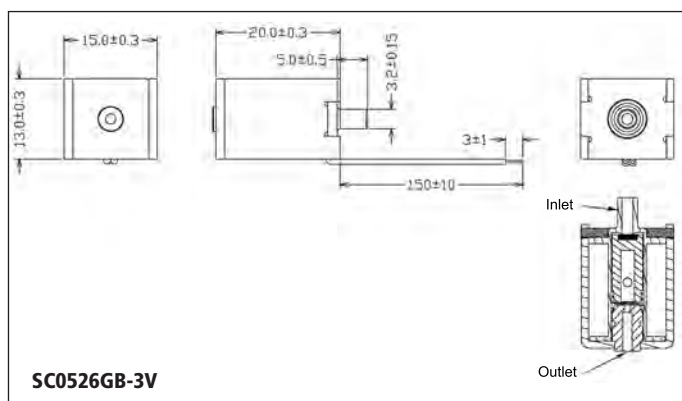
Product uses are on medical equipment such as venting a cuff on automatic blood pressure measurement equipment, appliance applications and a range of industrial low pressure pneumatic control applications.



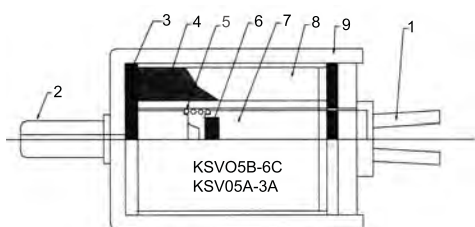
SPECIFICATIONS

	SC0526GB-3V	SC0520G-3V	KSV05A-3A	KSV05B-6C	KSV2WA-6A	KSV2WA-12A
Configuration	Normally Closed	Normally Open	Normally Open	Normally Open	Normally Closed	Normally Closed
Media	Air or Inert Gases					
Power	3 VDC	3 VDC	3 VDC	6 VDC	6 VDC	12 VDC
Power Consumption	0.9 W	0.21 W	0.225W	0.225W	2.25W	5.54 W
Rated Current	300 mA	70 mA	75 mA	60 mA	375 mA	462 mA
Coil Resistance	10 Ohm \pm 10%	42 Ohm \pm 10%	40 Ohm \pm 10%	100 Ohm \pm 10%	16 Ohm \pm 10%	25-30 Ohms
Recommended Duty Cycle (Coil Energized)	100%	100%	100%	100%	20%	10%
Recommended Max On Time	-	-	-	-	10 Seconds	5 Seconds
Typ. Cycle Life (No Load)	>200,000	>200,000	>30,000	>30,000	>30,000	>50,000
Rated/Max Inlet Pressure	350/350 mm Hg	300/350 mm Hg	300/330 mm Hg	300/350 mm Hg	300/350 mm Hg	465/620 mm Hg
Approx. Exhaust time	<3 sec. to drop pressure from 300 mm Hg to 15 mm Hg in a 100 cc tank	<3 sec. to drop pressure from 300 mm Hg to 15 mm Hg in a 100 cc tank	<3 sec. to drop pressure from 300 mm Hg to 15 mm Hg in a 100 cc tank	<6 sec. to drop pressure from 300 mm Hg to 10 mm Hg in a 500 cc tank	<4 sec. to drop pressure from 300 mm Hg to 15 mm Hg in a 500 cc tank	<4.5 sec. to drop pressure from 465 mm Hg to 15 mm Hg in a 500 cc tank
Operating Temp.	0-45°C	0-45°C	0-45°C	0-45°C	0-45°C	0-45°C
Storage Temperature	-20-60°C	-20-60°C	-20-60°C	-20-60°C	-20-60°C	-20-60°C
Insulation Class	A	A	A	A	A	A
Lead Wires	UL 1095, 28 AWG 150 mm (Black)	UL 1095, 28 AWG 75 mm (Black)	UL 1095, 28 AWG 43 mm (Black)	UL 1095, 28 AWG 153 mm (Black)	UL 1095, 28 AWG 153 mm (Black)	UL 1095, 28 AWG 65 mm (Black)
Wiring Polarity	None					
Inlet Connection	3.2 mm	3 mm Barb	3 mm Barb	3 mm Barb	3 mm Barb	3 mm Barb
Outlet Connection	To Atmosphere	To Atmosphere	To Atmosphere	To Atmosphere	3 mm Barb	3 mm Barb

DIMENSIONS (MM)



	A	B	C	D	E	F
KSV05A-3A	5.0±0.5	3.0 ±0.2	20±0.5	10.0±0.5	12.2±0.5	43 ±10.0
KSV05B-6C	7.0±0.5	3.0 ±0.2	20±0.5	14.0 Max	16.0 Max	153 ±5.0



- 1) PVC Wire: UL1095 28AWG, black
- 2) Nozzle: Steel
- 3) Bobbin: Plastic, 130°C
- 4) Wire: 2-uew, 130°C
- 5) Spring: Spring Steel
- 6) Washer: Rubber
- 7) Plunger: Steel
- 8) Tape: Mylar, 130°C
- 9) Frame: Cold Steel
- 10) Magnet

ORDERING INFORMATION

SELECT MODEL NUMBER

Model	Description
SC0526GB-3V	Two-way, Normally Closed, 3 VDC
SC0520G-3V	Two-way, Normally Open, 3 VDC
KSV05A-3A	Two-way, Normally Open, 3 VDC
KSV05B-6C	Two-way, Normally Open, 6 VDC
KSV2WA-6A	Two-way, Normally Closed, 6 VDC
KSV2WA-12A	Two-way, Normally Closed, 12 VDC

Above items typically ship from stock
Consult Factory for other voltages & configurations

CLARK

KSV3 3-Way Solenoid Valve

DC Power, Air or Inert Gas, to 5 PSI

DESCRIPTION

Model series KSV3 offers great performance in a very economical design. This product is best suited for OEM applications where the valve performance is acceptable and where low component cost is necessary.

The valve plunger and spring are fabricated from steel and therefore the valve is limited to use with air and other inert gases.

The KSV3 is a three way configuration and is available for 6VDC, 12 VDC and 24 VDC power.

Product uses are on medical equipment such as filling and venting a cuff on automatic blood pressure measurement equipment, appliance applications and a range of industrial low pressure pneumatic control applications.

SPECIFICATIONS

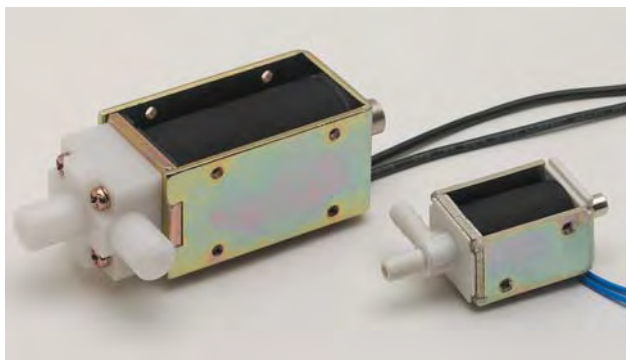
	KSV3WG-6A	KSV3WC-12B	KSV3WC-24A
Media	Air or Inert gas		
Power	6 Vdc	12 VDC	24 VDC
Power Consumption	2.12 W	2.8 W	2.74W
Rated Current	353 mA	240 mA	115 mA
Coil Resistance	17 Ohm±10%	50 Ohm ±10%	210 Ohm ±10%
Recommended Duty Cycle (Coil Energized)	10%	20%	20%
Recommended Max On Time	10 Seconds	10 Seconds	10 Seconds
Typ. Cycle Life	>50,000	>30,000	>30,000
Rated/Max Inlet Pressure	260/330 mm Hg	260/330 mm Hg	260 mm Hg
Approx. Exhaust time	<5 sec. to drop pressure from 300 mm Hg to 10 mm Hg in a 500 cc tank	<6 sec. to drop pressure from 300 mm Hg to 10 mm Hg in a 500 cc tank	<6 sec. to drop pressure from 300 mm Hg to 10 mm Hg in a 500 cc tank
Operating Temp.	0-45°C	0-45°C	0-45°C
Storage Temperature	-20-60°C	-20-60°C	-20-60°C
Insulation Class	A	A	A
Lead Wires	UL 1095, 28 AWG 80 mm	UL 1095, 28 AWG 80 mm (Black)	UL 1095, 28 AWG 150 mm
Comm. (C) & N.C. (A) Connection	5 mm	8 mm	10 mm
N.O. Connection (B)	5 mm	5 mm	8 mm
Orifice	3 mm	3.2 mm	4.5 mm

ORDERING INFORMATION

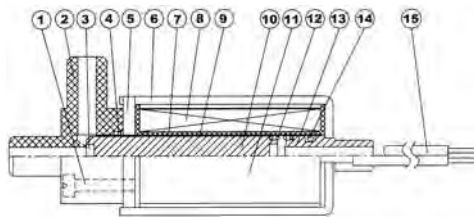
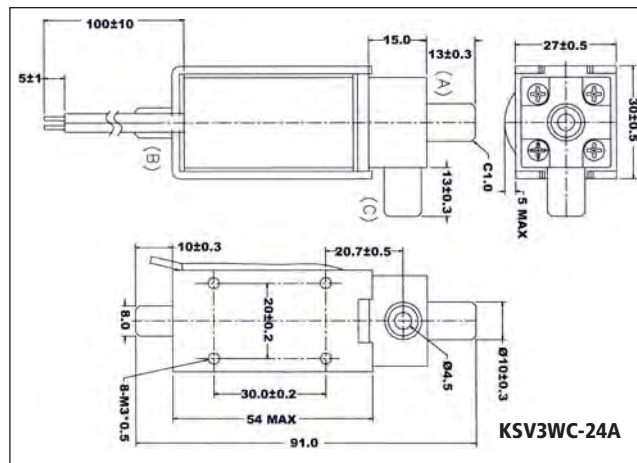
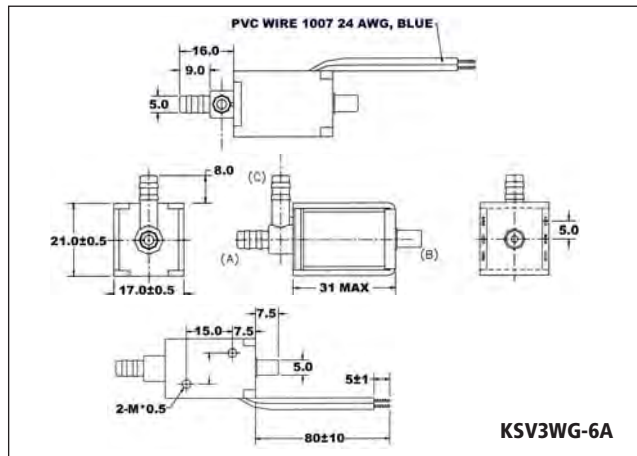
SELECT MODEL NUMBER

Model	Description
KSV3WG-6A	Three-way, 6VDC
KSV3WC-12B	Three-way, 12 VDC
KSV3WC-24A	Three-way, 24 VDC

Description
Three-way, 6VDC
Three-way, 12 VDC
Three-way, 24 VDC



DIMENSIONS (MM)



- | | |
|-----------------------------|-----------------------------------|
| 1) Bobbin- Plastic 130°C | 2) Washer: Rubber |
| 3) Frame: Cold Steel | 4) Coil Wire: 2-uaw, 130°C |
| 5) Black Tape: Mylar, 130°C | 6) Plunger- Steel, SPCC T20 |
| 7) Spring: Spring Steel | 8) O Ring: Rubber |
| 9) Nozzle: Steel, 3 mm | 10) PVC lead Wire: UL 1095, 28AWG |

CLARK SOLUTIONS

Model 1314, 2-Way, Normally Closed Solenoid Valve

3/4 to 2" Pipe Size, Piloted and Partially Piloted Operation

DESCRIPTION

Model 1314 two-way normally closed solenoid valves are available in bronze, 304 or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene, Viton®, and Teflon® satisfy many general industry applications.

The valves employ a choice of internally solenoid piloted operations dependent on system pressure requirements. A choice of solenoids cover a range of ambient temperatures and operating voltages.

Options include weather proof housing and manual override.



File LR87427 2M - LR108921-1

SPECIFICATIONS

GENERAL

Operation: Normally closed
 Valve Body Material: Bronze, AISI304 Stainless Steel, AISI316 Stainless Steel
 Valve Seals & Seats: Table 2
 Connections: BSP or NPT
 Valve Life: > 1,000,000 cycles, field rebuild kits available
 Operating Voltage- 12V, 24V, 110V, 220V, 240V AC/DC 50/60Hz
 Standard Solenoid Housing: Iron, 3/4 NF connector
 Weather Proof Solenoid Housing: NEMA 4X, Iron Epoxy Paint, 1/2 " BSP or NPT connector
 Power Consumption:
 Class F coil to 80°C: 50 Hz, 28 W; 60 Hz, 30 W; DC, 48 W
 Class H Coil to 180°C: 50 Hz, 28 W; 60 Hz, 30 W; DC, 48 W

Table 1

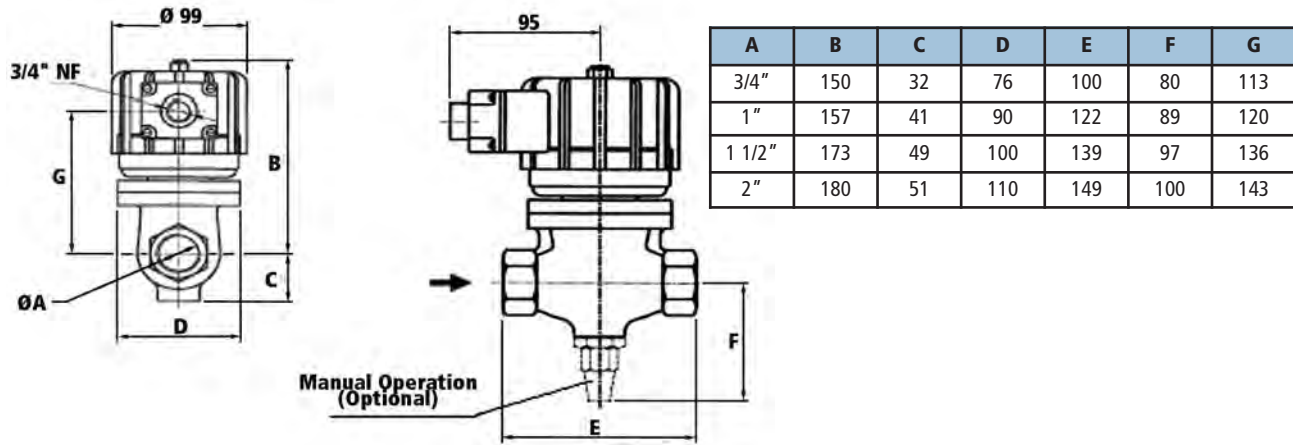
Wetted Materials						
Body	Plunger	Plunger Tower	Springs	Diaphragm	Inner-Diaph. Material	Piston
Bronze	AISI 430F	304L or 305 SS	Copper	See Table 2	-	AISI 304
AISI 304	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 304	AISI 304
AISI 316	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 316	AISI 304

Table 2

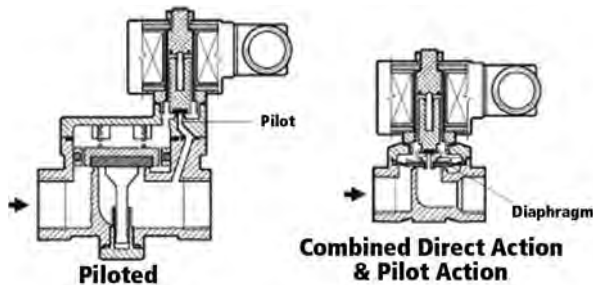
Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®	Teflon®
Maximum Temperature	+80°C	+80°C	+150°C	+180°C	+180°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.	Steam, hot oils, corrosive fluids.

Connection (NPT or BSP)	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Weight (kg)	Maximum temperature and catalog No. according to seat material				
					Acrylo - Nitrile	Neoprene®	Ethylpropylene	Viton®	Teflon®
					80°C	80°C	150°C	180°C	180°C
Bronze body - Combined Direct/Piloted - Minimum differential pressure: 0 bar - Maximum differential pressure: 7 bar (101.5 PSID)									
3/4"	19	7.02	6	4	1314BA06A	1314BN06A	1314BE06A	1314BV06A	1314BST06A
1"	26	11.70	10	4.9	1314BA08A	1314BN08A	1314BE08A	1314BV08A	1314BST08A
1 1/2"	32	17.55	15	6.5	1314BA12A	1314BN12A	1314BE12A	1314BV12A	1314BST12A
2"	38	26.91	23	7.3	1314BA16A	1314BN16A	1314BE16A	1314BV16A	1314BST16A
Bronze body - Piloted - Minimum differential pressure: 0.1 bar - Maximum differential pressure: 15 bar (217.7 PSID)									
3/4"	19	7.02	6	4	1314BA06	1314BN06	1314BE06	1314BV06	1314BST06
1"	26	11.70	10	4.4	1314BA08	1314BN08	1314BE08	1314BV08	1314BST08
1 1/2"	32	17.55	15	6.5	1314BA12	1314BN12	1314BE12	1314BV12	1314BST12
2"	38	21.91	23	7.3	1314BA16	1314BN16	1314BE16	1314BV16	1314BST16

DIMENSIONS (MM)



FUNCTION



Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seal. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seal and connects downstream of the piston/seal is opened, relieving pressure from the top of the valve piston/seal. The inlet fluid pressure lifts up the piston to open the valve.

Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)
 C_v= Valve Flow Coefficient
 DP= Valve Pressure Drop, PSID
 G= Specific Gravity of Liquid (= 1.0 for Water)

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLES: 1314IV06-TS30H110V

YC1314BN08ATS30F220V

Model Number Information								
Model	Body Material	Seat & Seal Material	Connection	Valve Actuation	Connection Threads	Coil Type	Voltage	Options
1314	B=Bronze S= 304 SS I= 316 SS	A= Acrylo-Nitrile N= Neoprene E= Ethylpropylene V= Viton ST= Teflon	06= 3/4" 08= 1.0" 12= 1 1/2" 16= 2.0"	- = Fully Piloted A= Combined Piloted & Direct Acting	- = BSP T= NPT	S28F= AC, 50 Hz, 0-80°C S28H= AC, 50 Hz, 0-180°C S30F= AC, 60 Hz, 0-80°C S30H= AC, 60 Hz, 0-180°C S48H= DC, 0-180°C	12V= 12V 14V= 14V 24V= 24V 110V= 110V 220V= 220V 240V= 240V	Prefix YC= Weather Proof Housing Suffix M= Manual Operation

INSTALLATION RECOMMENDATIONS

- 1) Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).
- 2) Mount the valve only on a horizontal pipeline with the coil upright.
- 3) The valve input pressure must always be equal or greater than the output pressure.

CLARK SOLUTIONS

Model 1323, 3-Way Solenoid Valve

1/4" Pipe Size, Direct Acting Solenoid

DESCRIPTION

Model 1323 three-way solenoid valves are available in brass, 304 or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene and Viton® satisfy many general industry applications.

The valves employ a direct acting solenoid. A choice of solenoids cover a range of ambient temperatures and operating voltages.

Options include weather proof housing, energized coil indicator light and manual override.

SPECIFICATIONS

GENERAL

Operation: 3-way, two positions (N.C., N.O., divergent, convergent, universal)

Valve Body: Brass, AISI 304 stainless steel, AISI 316 stainless steel

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: See Table 2

Connections: 1/4" BSP or NPT

Operating Voltage: 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Connector Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof: Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W

Options: Manual operation, weatherproof housing, energized coil indicator light

Weight: 0.5 kg



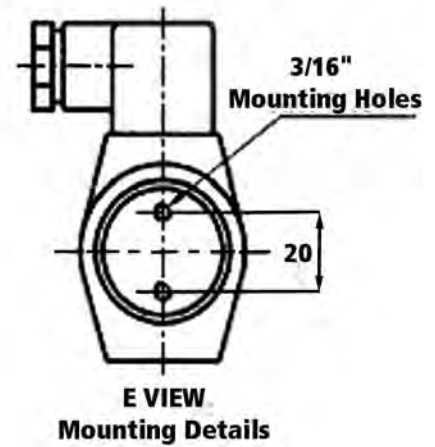
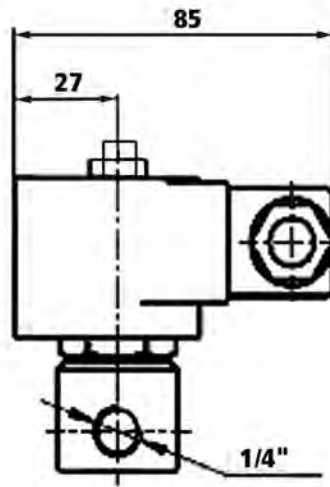
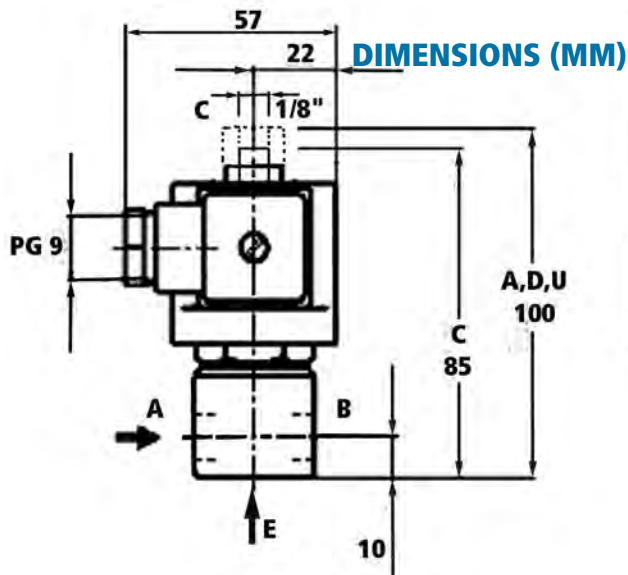
Table 1

Wetted Materials			
Body	Plunger	Plunger Tower	Springs
Brass	AISI 430F	304L or 305 SS	Copper
AISI 304	AISI 430F	304L or 305 SS	Silver & 302
AISI 316	AISI 430F	304L or 305 SS	Silver & 302

Table 2

Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®
Maximum Temperature	+80°C	+80°C	+150°C	+150°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.

Orifice Diameter	Cv (GPM)	Kv (m³/h)	Max. Differential Pressure (bar) by Configuration			
			N.C.	N.O.	DIV	CONV.
Three-Way, Two Position, "C" Construction (See Table on next page), N.C., No Connector at "C" Outlet						
1.75	0.103	0.09	10	-	-	-
2.00	0.117	0.10	7	-	-	-
2.50	0.164	0.14	3	-	-	-
Three-Way, Two Position, "D" Construction (See Table on next page), Divergent						
1.75	0.103	0.09	10	-	20	-
2.00	0.117	0.10	7	-	15	-
2.50	0.164	0.14	3	-	10	-
Three-Way, Two Position, "A" Construction (See Table on next page), N.O.						
1.75	0.103	0.09	5	12	5	5
2.00	0.117	0.10	3	10	3	3
2.50	0.164	0.14	-	3	-	-
Three-Way, Two Position, "U" Construction (See Table on next page), Universal						
1.75	0.103	0.09	8	12	20	8
2.00	0.117	0.10	6	10	15	6
2.50	0.164	0.14	3	3	10	3



Construction	C & D	A	D	U	U
De-Energized					
Energized					
Configuration	N.C	N.O	Divergent	Convergent	Universal

Install in any position, preferably on a horizontal run of pipe with coil upright.

Except "C", all constructions may be used for any configurations but it is desirable to select the valve according to its use to obtain the best performance.

Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for Water)

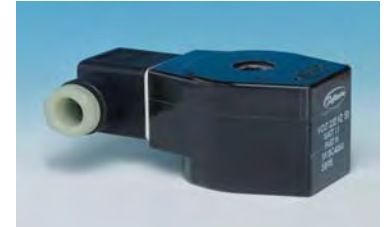
ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1323SV17ATF24DC



Option YC Weather Proof Housing
with 1/2" NPT Threaded Conduit



Standard Coil and DIN43650

Model Number Information								
Model	Body Material	Seat & Seal Material	Orifice Size (mm)	Construction (See Above Table)	Connection Threads	Coil Type	Voltage	Options
1323	B= Brass S= 304 SS I= 316 SS	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene	17= 1.75 20= 2.00 25= 2.50	U= U Construction C= C Construction D= D Construction A= A Construction	T= NPT - = BSP	F= Class F H= Class H	12DC= 12 VDC 120AC= 120 VAC, 60 HZ 24DC= 24 VDC 24AC= 24 VAC, 60 HZ	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation Coil Indicator Light= Consult Factory
Bold Order Combinations Typically Ship From Stock								

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

CLARK SOLUTIONS

Model 1325, 3-Way Solenoid Valve

3/8", 1/2", 3/4" Pipe Size, Pilot Operated

DESCRIPTION

Model 1325 three-way solenoid valves are available in brass or 304 stainless steel bodies. A choice of seal and seat materials including Acrylo-Nitrile and Viton® are available. The 1325 valves were designed as pilot valves for larger pneumatic actuators, but can be used in general applications provided the pressure characteristics of the process conform to these indicated in Table 3.

The valves have a metal core diaphragm and pilot operated action. The pilot orifice has internal discharge so it may be used with fluids that cannot be discharged into the atmosphere. They have a greater flow capacity and faster response time than slide valves of the same size.

Options include weather proof housing, energized coil indicator light and manual override.

SPECIFICATIONS

GENERAL

Operation: 3-way, two position, (N.C., N.O., divergent, convergent, universal)

Valve Body : Brass or AISI 304 stainless steel

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: Acrylo-Nitrile, or Viton®

Connections: 3/8", 1/2", 3/4" BSP or NPT

Operating Voltage- 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Connector Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof : Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating: Class F coil to 80°C: 60 Hz, 13 W; DC, 19 W

Options: Weatherproof housing, energized coil indicator light



File LR87427 2M - LR108921-1



File MH16855 Vol. 2 Sec. 2

Table 1

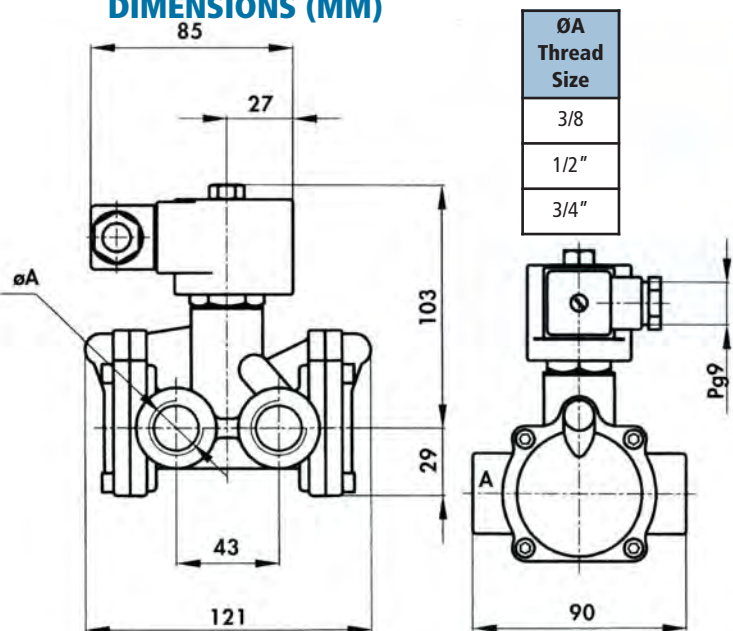
Wetted Materials						
Body	Plunger	Plunger Tower	Springs	Diaphragm	Inner-Diaph. Material	Piston
Brass	AISI 430F	304L or 305 SS	Copper	See Table 2	-	AISI 304
AISI 304	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 304	AISI 304

Table 2

Seat Material	Acrylo Nitrile	Viton®
Maximum Temperature	+80°C	+150°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.

Connection	Orifice Diameter (mm)	Cv (GPM)	Kv (m³/h)	Differential Pressure (bar)		Weight (kg)
				Minimum	Maximum	
Three-Way, Two Position, Forged Brass Body- Normally Closed Construction						
3/8"	16	3.16	2.7	0.5	10	2.3
1/2"		3.98	3.4			
3/4"		5.50	4.7			
Three-Way, Two Position, Forged Brass Body- Normally Open Construction						
3/8"	16	3.16	2.7	0.5	10	2.3
1/2"		3.98	3.4			
3/4"		5.50	4.7			
Three-Way, Two Position, AISI 304Stainless Steel Body- Normally Closed Construction						
3/8"	16	3.16	2.7	0.5	10	2.3
1/2"		3.98	3.4			
3/4"		5.50	4.7			
Three-Way, Two Position, AISI 304Stainless Steel Body- Normally Open Construction						
3/8"	16	3.16	2.7	0.5	10	2.3
1/2"		3.98	3.4			
3/4"		5.50	4.7			

DIMENSIONS (MM)



Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seat and connects downstream of the piston/seat is opened, relieving pressure from the top of the valve piston/seat. The inlet fluid pressure lifts up the piston to open the valve.

Table 3

	ENERGIZED	DE-ENERGIZED	SYMBOLS
NORMALLY CLOSED			
NORMALLY OPEN			

Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for Water)

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1325BA4CT24DC

Model	Body Material	Seat & Seal Material	Connection	Configuration	Connection Threads	Voltage	Options
1325	B= Brass S= 304 SS	A= Acrylo-Nitrile V= Viton	6= 3/4" 3= 3/8" 4= 1/2"	C= Normally Closed A= Normally Open	T= NPT - = BSP	12DC= 12 VDC 120AC= 120 VAC, 60 HZ 24DC= 24 VDC 24AC= 24 VAC, 60 HZ	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation Coil Indicator Light= Consult Factory

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

CLARK SOLUTIONS

Model 1327, 2-Way, NC or NO Solenoid Valve

1/4" Pipe Size, Direct Acting Solenoid

DESCRIPTION

Model 1327 two-way normally closed and normally open solenoid valves are available in brass, 304 or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene, Viton®, and Teflon® satisfy many general industry applications.

The valves employ a direct acting solenoid. A choice of solenoids cover a range of ambient temperatures and operating voltages.

Options include weather proof housing, energized coil indicator light and manual override.

SPECIFICATIONS

GENERAL

Operation: Normally closed or normally open

Valve Body : Brass, AISI 304 stainless steel, AISI 316 stainless steel

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: See Table 2

Connections: 1/4" BSP or NPT

Operating Voltage: 12 VDC; 24 VDC/VAC; 120 VAC; 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Connector Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof : Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W

Options: Manual operation, weatherproof housing, energized coil indicator light

Weight: 0.5 kg



Table 1

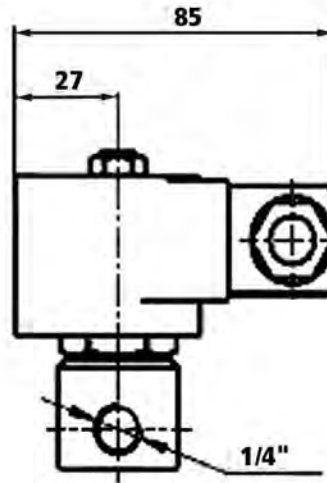
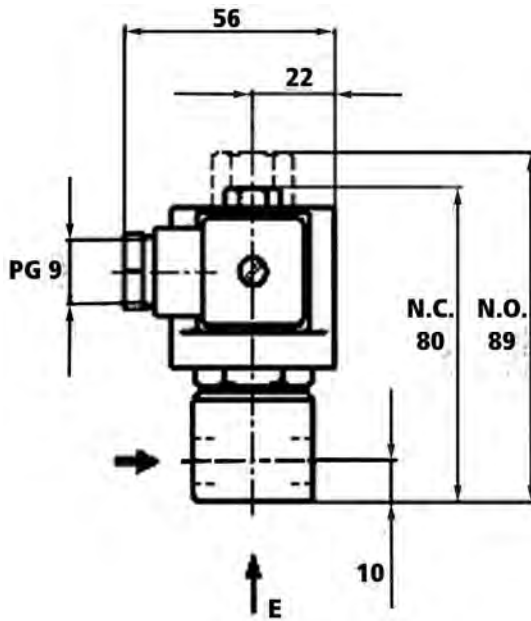
Wetted Materials			
Body	Plunger	Plunger Tower	Springs
Brass	AISI 430F	304L or 305 SS	Copper
AISI 304	AISI 430F	304L or 305 SS	Silver & 302
AISI 316	AISI 430F	304L or 305 SS	Silver & 302

Table 2

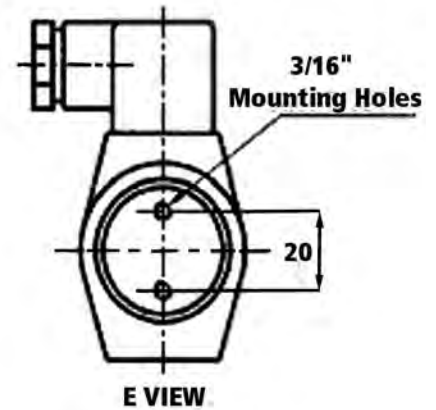
Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®	Teflon®
Maximum temperature	+80°C	+80°C	+150°C	+180°C	+180°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.	Steam, hot oils, corrosive fluids.

Orifice Dia. (mm)	0.Cv Coef. (GPM)	Kv Coef. (m³/h)	Max Differential Pressure (bar)
Brass body, Normally Closed			
1.25	0.059	0.05	100
1.75	0.105	0.09	35
2.25	0.152	0.13	20
3.00	0.304	0.26	10
4.00	0.503	0.43	5
5.00	0.702	0.60	3
5.25	0.760	0.65	2.2
Brass body, Normally Open			
1.25	0.059	0.05	50
1.75	0.105	0.09	20
2.25	0.152	0.13	12
2.5	0.304	0.17	10
3.00	0.503	0.26	10
4.00	0.072	0.43	5

DIMENSIONS (MM)



File MH16855 Vol. 2 Sec. 2



Flow Calculation, Liquids:

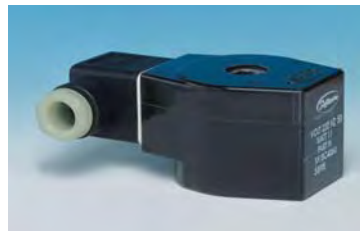
$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for



Standard Coil and DIN43650



Option YC Weather Proof Housing with 1/2" NPT Threaded Conduit

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1327BM122-TH24DC

Model Number Information								
Model	Body Material	Seat & Seal Material	Orifice Size (mm)	Configuration	Connection Threads	Coil Type	Voltage	Options
1327	B= Brass S= 304 SS I= 316 SS H= Iron	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene T= Teflon	302= 3.00 522= 5.25 122= 1.25 172= 1.75 222= 2.25 402= 4.00 502= 5.00	- = Normally Closed 2NA=Normally Open	T= NPT - = BSP	F= Class F H=Class H	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation Coil Indicator Light= Consult Factory
Bold	Order Combinations Typically Ship From Stock							

Magnetically latched solenoids available on select models. Please call us for details.

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

CLARK SOLUTIONS

Model 1335, 2-Way, NC & NO Solenoid Valve

3/8 to 3/4" Pipe Size, Piloted, Combined & Direct Acting Solenoid

DESCRIPTION

Model 1335 two-way normally closed and normally open solenoid valves are available in forged brass or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene, and Viton® satisfy many general industry applications.

Options include weather proof coils & housing, manual override and energized coil indicator light.



SPECIFICATIONS

GENERAL

Operation: Normally closed or normally open

Valve Body Materials: Forged brass, investment cast
AISI 316 stainless steel

Diaphragm: Metal core with choice of seat material

Valve Seats: Acrylo-Nitrile, Neoprene®,

Ethylpropylene, Viton®

Valve Life: > 1,000,000 cycles, field rebuild kits
available

Connections: BSP or NPT

Operating Voltage: 12 VDC; 24 VDC/VAC;
120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated coil,
DIN 43650 connection (PG-9)

Optional Weather Proof Solenoid Housing: NEMA 4, IP65

Power Consumption: Class F coil to 80°C: 60 Hz, 13 W;
DC, 19 W

Options: Manual operation, energized coil indicator
light

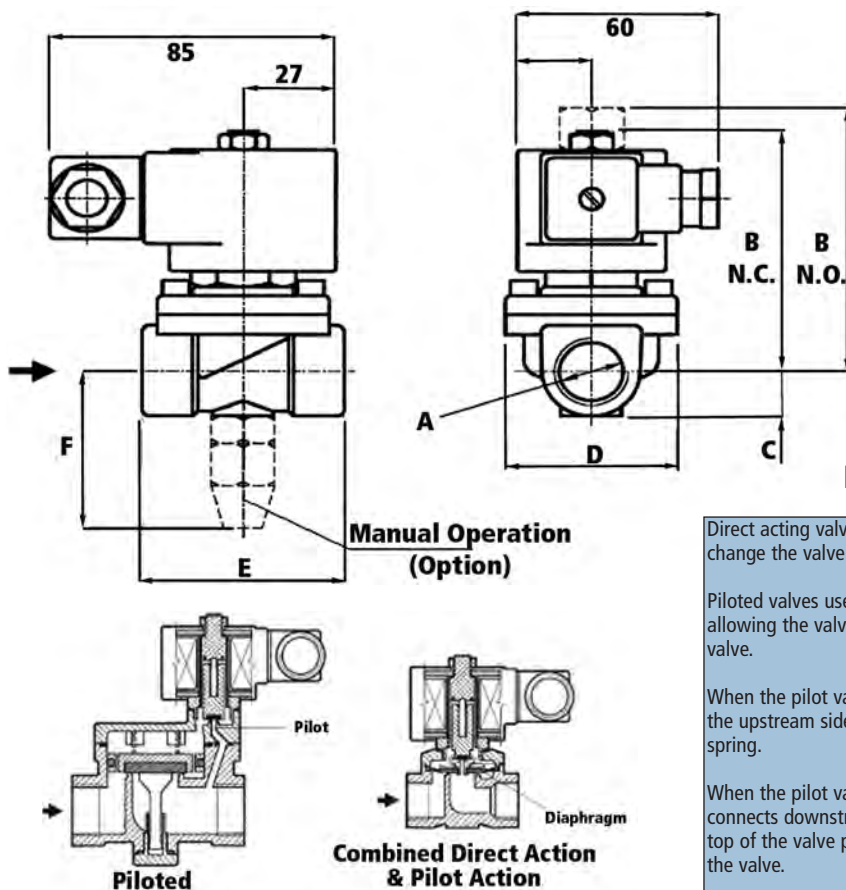
Table 1

Wetted Materials						
Body	Plunger	Plunger Tower	Springs	Diaphragm	Inner-Diaph. Material	Piston
Brass	AISI 430F	304L or 305 SS	Copper	See Table 2	-	AISI 304
AISI 316	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 316	AISI 316

Table 2

Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®
Maximum Temperature	+80°C	+80°C	+150°C	+150°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water, steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.

Connection (NPT or BSP)	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Weight (kg)
Brass Body, Pilot Operated, Normally Closed: Minimum Differential, 0.1 Bar; Maximum Differential Pressure, 10.0 Bar				
3/8"	14	2.75	2.35	0.76
1/2"	14	3.10	2.65	0.76
3/4"	18	5.03	4.30	0.98
Brass Body, Combined Acting, Normally Closed: Minimum Differential, 0 Bar; Maximum Differential Pressure, 7.0 Bar				
3/8"	14	2.75	2.35	0.76
1/2"	14	3.10	2.65	0.76
3/4"	18	5.03	4.30	0.98
Brass Body, Pilot Operated, Normally Open: Minimum Differential, 0.1 Bar; Maximum Differential Pressure, 10.0 Bar				
3/8"	14	2.75	2.35	0.76
1/2"	14	3.10	2.65	0.76
3/4"	18	5.03	4.30	0.98



DIMENSIONS (MM)

A NPT or BSP	B N.C.	B N.O.	C	D	E	F
3/4"	80	88	15	51	60	53
1"						
1, 1/2"	82	90	17	58	72	55

FUNCTION

Direct acting valves rely on the force applied by the solenoid or spring to change the valve state.

Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seal. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seal and connects downstream of the piston/seal is opened, relieving pressure from the top of the valve piston/seal. The inlet fluid pressure lifts up the piston to open the valve.

Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

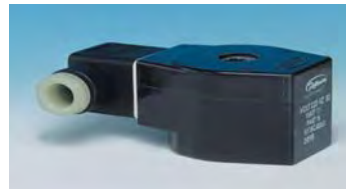
Q= Flow Rate, GPM (U.S.A.)
 C_v= Valve Flow Coefficient
 DP= Valve Pressure Drop, PSID
 G= Specific Gravity of Liquid (= 1.0 for Water)

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1335BN3AT12DC

Model Number Information							
Model	Body Material	Seat & Seal Material	Pipe Connection	Configuration	Connection Threads	Voltage	Options
1335	B= Brass I= 316 SS	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene	3= 3/8" 4= 1/2" 6= 3/4"	- = Pilot operated Normally Closed A = Combined Acting, Normally Closed INA = Pilot operated Normally Open	T= NPT - = BSP	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation Coil Indicator Light= Consult Factory
Bold Order Combinations Typically Ship From Stock							



Standard Coil and
DIN43650 Connector



Option YC Weather Proof Housing
with 1/2" NPT Threaded Conduit

Magnetically latched solenoids available on select models. Please call us for details.

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity ≤ 100μ upstream of valve (see Clark Solutions Model 1359 Y Strainer). Install valve in any position, preferably on a horizontal pipeline with coil up.

CLARK SOLUTIONS

Model 1342, 2-Way, NC or NO Solenoid Valve

3/4", 1", 1 1/2", 2", 2 1/2", & 3" Pipe Size, Pilot Operated

DESCRIPTION

Model 1342 two-way normally closed and normally open solenoid valves are available in brass, 304 or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene, Viton®, and Teflon® satisfy many general industry applications.

The valves employ a solenoid operated pilot valve to change valve state. This enables the valve to use the pressure at the inlet of the valve to assist in changing the valve's state, resulting in a higher operating pressure rating.

Options include weather proof housing, energized coil indicator light and manual override on main passage and on pilot orifice.

SPECIFICATIONS

GENERAL

Operation: Normally closed or normally open

Valve Body : Brass, AISI 304 stainless steel, AISI 316 stainless steel

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: See Table 2

Connections: 3/4", 1", 1 1/2", 2", 2 1/2", 3" BSP or NPT

Operating Voltage- 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof : Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W

Options: Manual operation, weatherproof housing, energized coil indicator light

Weight: 0.5 kg



Table 1

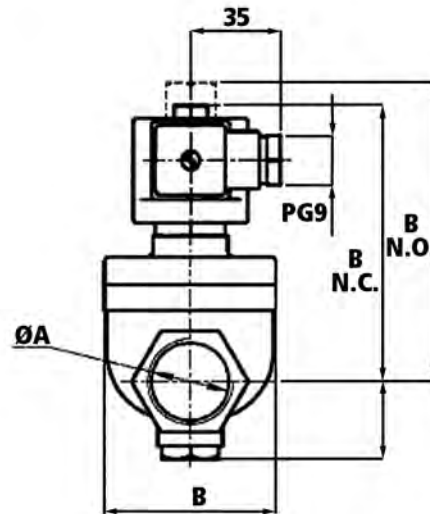
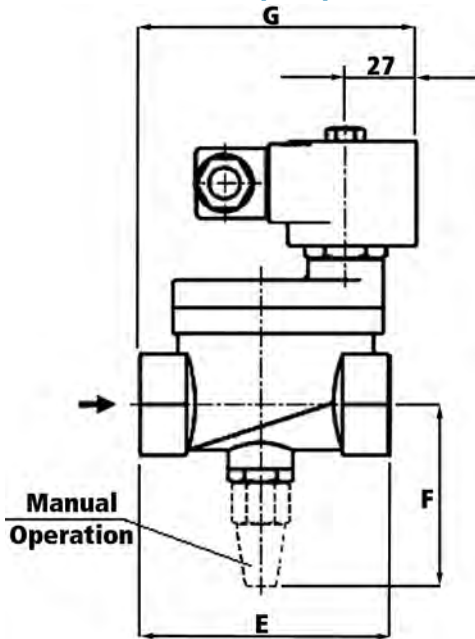
Wetted Materials						
Body	Plunger	Plunger Tower	Springs	Diaphragm	Inner-Diaph. Material	Piston
Brass	AISI 430F	304L or 305 SS	Copper	See Table 2	-	AISI 304
AISI 304	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 304	AISI 304
AISI 316	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 316	AISI 316

Table 2

Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®	Teflon®
Maximum Temperature	+80°C	+80°C	+150°C	+180°C	+180°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.	Steam, hot oils, corrosive fluids.

Connection	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Weight (kg)
Brass body, Normally Closed- Minimum differential pressure with Teflon seat: 0.5 bar- others: 0.2 bar- Maximum differential pressure: 15				
3/4"	20	5.85	5	1.2
1"	26	12.87	11	1.7
1 1/2"	38	29.25	25	3.1
2"	50	46.80	40	4.1
2 1/2"	76	77.22	66	19.1
3"	76	99.45	85	18.2
Brass body, Normally Open- Minimum differential pressure with Teflon seat: 0.5 bar- others: 0.2 bar- Maximum differential pressure: 10 bar				
3/4"	20	5.85	5	1.2
1"	26	12.87	11	1.7
1 1/2"	38	29.25	25	3.1
2"	50	46.80	40	4.1
2 1/2"	76	77.22	66	19.1
3"	76	99.45	85	18.2

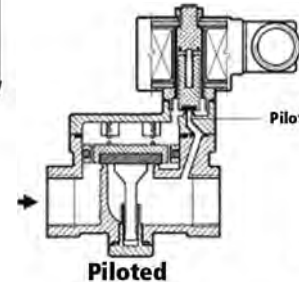
DIMENSIONS (MM)



File LR87427 2M - LR108921-1



File MH16855 Vol. 2 Sec. 2



A	B	C	D (N.C.)	D (N.O.)	E	F	G
3/4"	52	26	104	114	71	68	84
1"	67	30	108	118	96	72	104
1, 1/2"	81	36	119	129	114	79	122
2"	97	44	125	135	128	85	138
2 1/2-3"	163	89	214	224	224	170	134

Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seat and connects downstream of the piston/seat is opened, relieving pressure from the top of the valve piston/seat. The inlet fluid pressure lifts up the piston to open the valve.

Flow Calculation, Liquids:

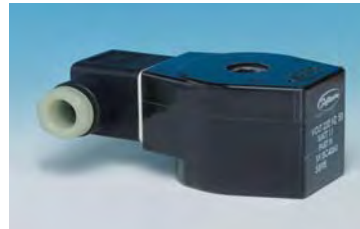
$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for Water)



Standard Coil and DIN43650



Option YC Weather Proof Housing with 1/2" NPT Threaded Conduit

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1342SN06-TH24DC

Model Number Information								
Model	Body Material	Seat & Seal Material	Connection	Configuration	Connection Threads	Coil Type	Voltage	Options
1342	B= Brass S= 304 SS I= 316 SS	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene T= Teflon	08= 1" 12= 1 1/2" 16= 2" 06= 3/4" 20= 2 1/2" 24= 3"	- = Normally Closed INA=Normally Open	T= NPT - = BSP	F= Class F H= Class H	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation, Main Orifice Suffix MP= Manual Operation, Pilot Orifice Coil Indicator Light= Consult Factory
Bold Order Combinations Typically Ship From Stock								
						Magnetically latched solenoids available on select models. Please call us for details.		

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

The valve input pressure must always be greater than the valve outlet pressure.

In order for the N.C. or N.O. valve to open, the minimum pressures per specs must be maintained.

CLARK SOLUTIONS

Model 1359 Y Strainer

General Purpose, Particle Retention From 100 Microns

DESCRIPTION

Model 1359 Strainers have a basket type filtering element with double mesh stainless steel construction. The strainer body material is of iron.

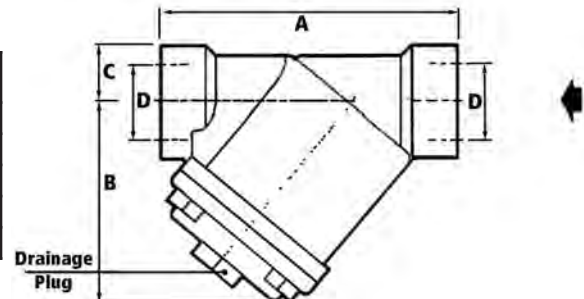
Model 1359 incorporates a flanged cover with drainage connection. The model has a particle retention capacity from 100 microns.

This model is ideal for protecting Clark and other solenoid valves from damage related to particle contamination.



DIMENSIONS (MM)

A	B	C	D (NPT or BSP)
80	60	16	1/2"
100	78	18	3/4"
120	95	21	1"
150	121	32	1 1/2"
180	165	39	2"



SPECIFICATIONS

GENERAL

Basket Filtering Element: Double mesh stainless steel

Particle Retention: From 100 microns

Cover: Flanged with drainage plug

Body Material: Iron

Connections: 1/2", 3/4", 1", 1 1/2", 2" NPT or BSP

Connection	Cv (GPM)	Kv (m ³ /h)	Max. Pressure (bar)	Max. Temperature (°C)	Weight (kg)	Catalog No.
1/2"	7.02	6	10	180	0.5	1359FS4
3/4"	14.04	12			1.0	1359FS6
1"	21.66	19			1.6	1359FS8
1 1/2"	46.80	40			3.0	1359FS12
2"	76.05	65			5.2	1359FS16

ORDERING INFORMATION:

Select Catalog Number From Above Chart, Add Suffix T for NPT

CLARK SOLUTIONS

Model 1365, 3-Way Solenoid Valve

1/4" Pipe Size, Direct Acting Solenoid

DESCRIPTION

Model 1365 three-way solenoid valves are available in brass, iron or 304 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene and Viton® satisfy many general industry applications.

The valves employ a direct acting solenoid. A choice of solenoids cover a range of ambient temperatures and operating voltages.

Options include weather proof housing, energized coil indicator light and manual override.

SPECIFICATIONS

GENERAL

Operation: 3-way, two position (N.C., N.O., divergent, universal)

Valve Body : Brass, AISI 304 stainless steel, iron

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: Acrylo-Nitrile, Neoprene®, Ethylpropylene or Viton®

Connections: 1/4" BSP or NPT

Operating Voltage: 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Connector Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof: Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W

Options: Manual operation, weatherproof housing, energized coil indicator light

Weight: 0.6 kg



File LR87427 2M - LR108921-1



File MH16855 Vol. 2 Sec. 2

Table 1

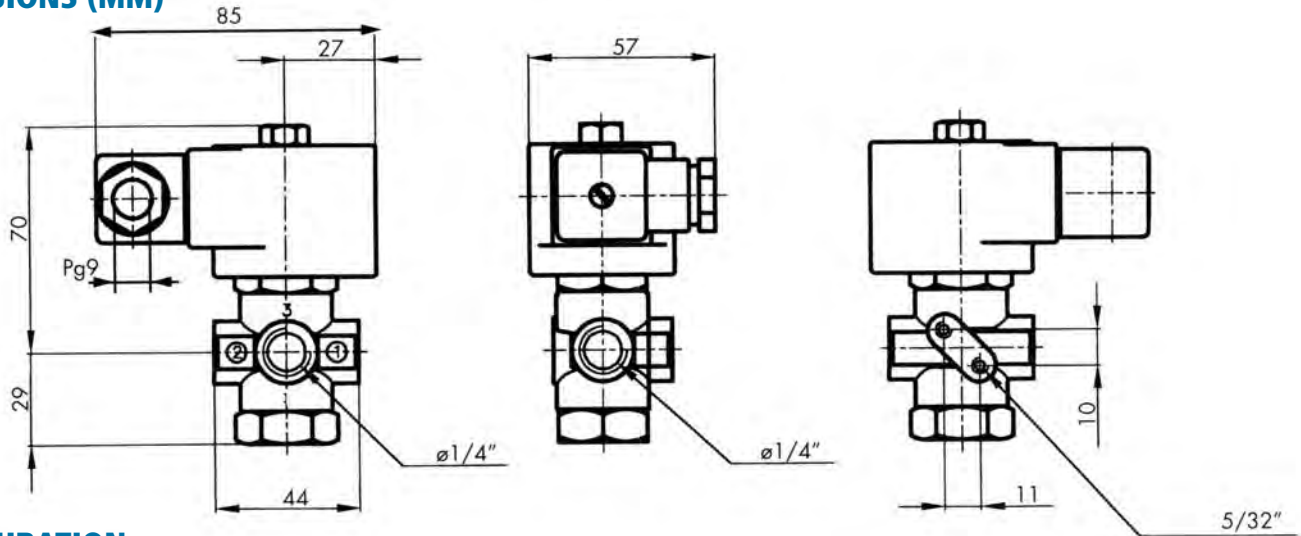
Wetted Materials			
Body	Plunger	Plunger Tower	Springs
Brass	AISI 430F	304L or 305 SS	Copper
AISI 304	AISI 430F	304L or 305 SS	Silver & 302

Table 2

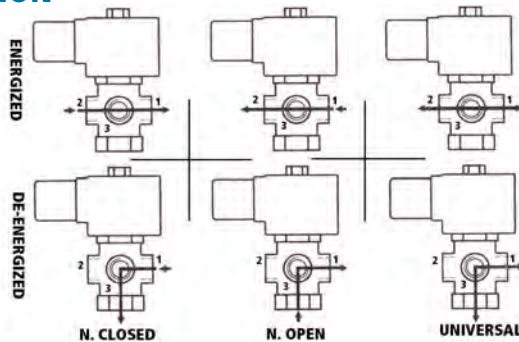
Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®
Maximum Temperature	+80°C	+80°C	+150°C	+150°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon 12.	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.

Orifice Diameter	Cv (GPM)	Kv (m³/h)	Max. Differential Pressure (bar) by Configuration			
			N.C.	N.O.	DIV.	CONV.
Three-Way, Two Position, "C" Construction, Normally Closed, No Connector at "C" Outlet						
1.75	0.94	0.08	15	5	20	5
2.25	0.140	0.12	8	3	15	3
3.00	0.246	0.21	4	1	10	1
4.00	0.351	0.30	2	-	8	-
Three-Way, Two Position, "A" Construction, Normally Open						
1.75	0.94	0.08	7	8	20	7
2.25	0.140	0.12	5	6	15	5
3.00	0.246	0.21	3	4	10	3
4.00	0.351	0.30	1	2	8	1
Three-Way, Two Position, Three-Way, Two Position, "U" Construction, Universal						
1.75	0.94	0.08	10	7	20	7
2.25	0.140	0.12	8	5	15	5
3.00	0.246	0.21	4	3	10	3
4.00	0.351	0.30	1.5	1.5	8	1.5

DIMENSIONS (MM)



CONFIGURATION



Install in any position, preferably on a horizontal run of pipe with coil upright.

Except "C", normally open, all constructions may be used for any configurations but it is desirable to select the valve according to its use to obtain the best performance.

Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

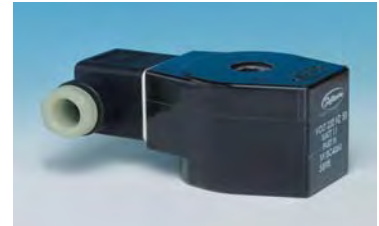
Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for Water)



Option YC Weather Proof Housing
with 1/2" NPT Threaded Conduit



Standard Coil and DIN43650

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1365SV40UTF120AC

Model Number Information								
Model	Body Material	Seat & Seal Material	Orifice Size (mm)	Configuration (See Above)	Connection Threads	Coil Type	Voltage	Options
1365	B= Brass S= 304 SS H= Iron	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene	17= 1.75 22= 2.25 30= 3.00 40= 4.00	U= Universal A= Normally Open C= Normally Closed	T= NPT - = BSP	F= Class F H= Class H	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation Coil Indicator Light= Consult Factory

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

CLARK SOLUTIONS

Model 1390, 2-Way, NC or NO Solenoid Valve

1/4", 3/8" & 1/2" Pipe Size, Pilot Operated

DESCRIPTION

Model 1390 two-way normally closed and normally open solenoid valves are available in brass, 304 or 316 stainless steel bodies. A variety of seal and seat materials including Acrylo-Nitrile, Neoprene®, Ethylpropylene, Viton®, and Teflon® satisfy many general industry applications.

The valves employ a solenoid operated pilot valve to change valve state. This enables the valve to use the pressure at the inlet of the valve to assist in changing the valve's state, resulting in a higher operating pressure rating.

Options include weather proof housing, energized coil indicator light and manual override on main passage and on pilot orifice.

SPECIFICATIONS

GENERAL

Operation: Normally closed or normally open
Valve Body : Brass, AISI 304 stainless steel, AISI 316 stainless steel

Valve Life: > 1,000,000 cycles, field rebuild kits available

Valve Seals & Seats: See Table 2

Connections: 1/4", 3/8" & 1/2", BSP or NPT
Operating Voltage- 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof : Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W

Options: Manual operation, weatherproof housing, energized coil indicator light

Weight: 0.5 kg



Table 1

Wetted Materials						
Body	Plunger	Plunger Tower	Springs	Diaphragm	Inner-Diaph. Material	Piston
Brass	AISI 430F	304L or 305 SS	Copper	See Table 2	-	AISI 304
AISI 304	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 304	AISI 304
AISI 316	AISI 430F	304L or 305 SS	Silver & 302	See Table 2	AISI 316	AISI 316

Table 2

Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®	Teflon®
Maximum Temperature	+80°C	+80°C	+150°C	+180°C	+180°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.	Steam, hot oils, corrosive fluids.

Connection	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Weight (kg)
Brass body, Normally Closed- Minimum differential pressure with Teflon seat: 0.5 bar- others: 0.2 bar- Maximum differential pressure: 15 bar				
1/4"	6	0.936	0.80	0.70
3/8"	9	0.760	0.65	0.65
1/2"	12	1.050	0.90	0.90
Brass body, Normally Open- Minimum differential pressure with Teflon seat: 0.5 bar- others: 0.2 bar- Maximum differential pressure: 10 bar				
1/4"	6	0.936	0.70	0.70
3/8"	9	0.760	0.65	0.65
1/2"	12	1.050	0.90	0.90

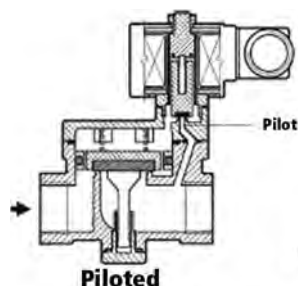
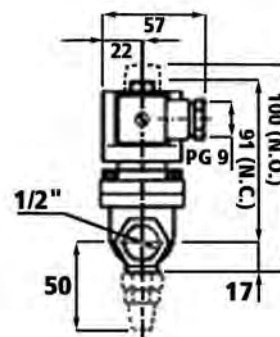
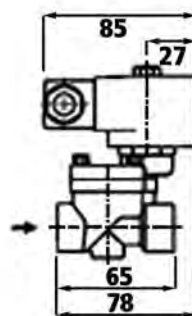
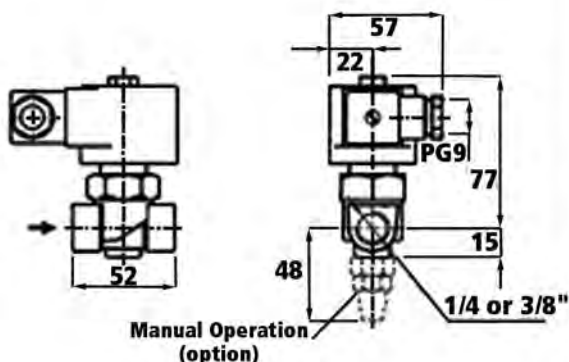
DIMENSIONS (MM)



File LR87427 2M - LR108921-1



File MH16855 Vol. 2 Sec. 2



Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seat and connects downstream of the piston/seat is opened, relieving pressure from the top of the valve piston/seat. The inlet fluid pressure lifts up the piston to open the valve.

Flow Calculation, Liquids:

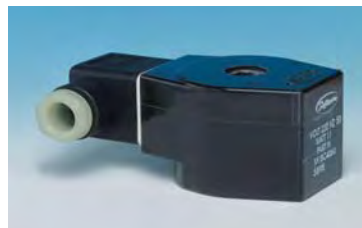
$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)

Cv= Valve Flow Coefficient

DP= Valve Pressure Drop, PSID

G= Specific Gravity of Liquid (= 1.0 for Water)



Standard Coil and DIN43650



Option YC Weather Proof Housing
with 1/2" NPT Threaded Conduit

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1390SN2-TH24DC

Model Number Information								
Model	Body Material	Seat & Seal Material	Connection	Configuration	Connection Threads	Coil Type	Voltage	Options
1390	B= Brass S= 304 SS I= 316 SS	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene T= Teflon	2= 1/4" 4= 1/2" 3= 3/8"	- = Normally Closed INA=Normally Open	T= NPT - = BSP	F= Class F H= Class H Magnetically latched solenoids available on select models. Please call us for details.	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Suffix M= Manual Operation, Main Orifice Suffix MP= Manual Operation, Pilot Orifice Coil Indicator Light= Consult Factory

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).

The valve input pressure must always be greater than the valve outlet pressure.

In order for the N.C. or N.O. valve to open, the minimum pressures per specs must be maintained.

CLARK SOLUTIONS

Model 1393, 2-Way, NC or NO Solenoid Valve

1/4", 3/8", 1/2" Pipe Size, Direct Acting Solenoid for Steam & Hot Fluids

DESCRIPTION

Model 1393 two-way normally closed and normally open solenoid valves have a forged brass body.

Model 1393 is suitable for steam and compatible hot fluids. Close off is accomplished with a stainless steel blade type closure on Teflon seats. Unlike conventional valves, the flow passage is straight reducing pressure drop and turbulence.

This valve is ideal for applications such as steam dryers, autoclaves, boiling pans, fryers, condensation draining, coffee machines etc.

Options include weather proof housing and energized coil indicator light.

SPECIFICATIONS

GENERAL

Operation: Normally closed or normally open

Valve Body : Nickel-plated forged brass

Valve Life: > 1,000,000 cycles, field rebuild kits available

Plunger: AISI 430F Stainless steel

Plunger Tower: 304L or 305 non-magnetic stainless steel

Valve Seals & Seats: Teflon

Connections: 1/4", 3/8", 1/2" BSP or NPT

Operating Voltage- 24V, 220V, 240V, AC 60Hz

Standard Solenoid Housing: Encapsulated, includes
DIN 43650 connector (PG-9)

Connector Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof: Encapsulated
coil, 1/2" NPT potted conduit connection with
flying leads

Coil Rating: Class H Coil to 180°C: 60 Hz, 25 W

Options: Weatherproof housing, energized coil
indicator light



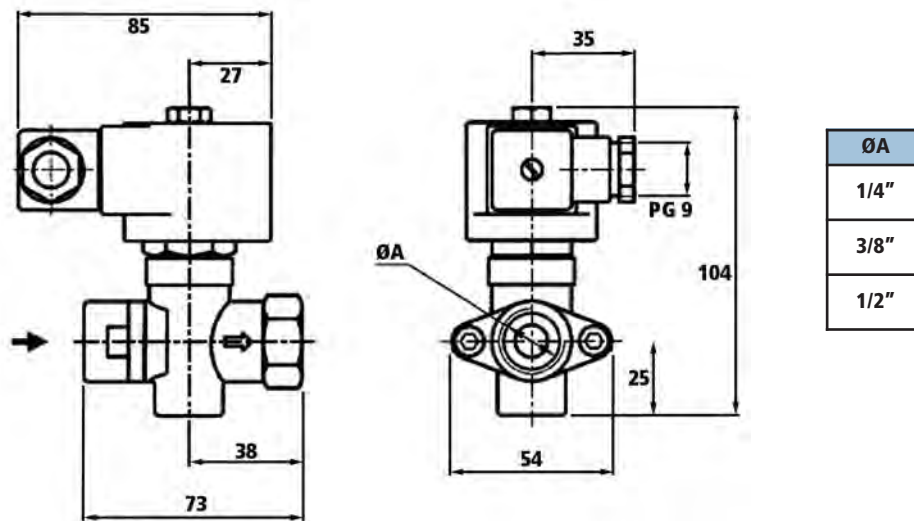
File LR87427 2M - LR108921-1



File MH16855 Vol. 2 Sec. 2

Connection	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Differential Pressure (bar)		Weight (kg)	Max. Temperature (°C)	Catalog Number	
				Minimum	Maximum			Brass	Nickel Plated
Normally Closed									
1/4"	8	2.106	1.80	0	4	0.83	180	1393BS082	1393NS082
3/8"		3.276	2.80			0.75		1393BS083	1393NS083
1/2"		3.276	2.80			0.77		1393BS084	1393NS084
Normally Open									
1/4"	8	2.106	1.80	0	4	0.83	180	1393BS082NA	1393NS082NA
3/8"		3.276	2.80			0.75		1393BS083NA	1393NS083NA
1/2"		3.276	2.80			0.77		1393BS084NA	1393NS084NA

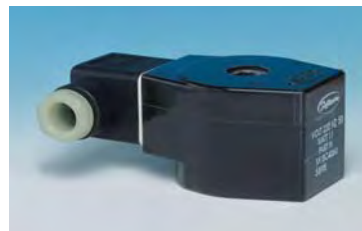
DIMENSIONS (MM)



Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)
 Cv= Valve Flow Coefficient
 DP= Valve Pressure Drop, PSID
 G= Specific Gravity of Liquid (= 1.0 for



Standard Coil and DIN43650



Option YC Weather Proof Housing
 with 1/2" NPT Threaded Conduit

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 1393BS082NAT120AC

Model Number Information							
Model	Body Material	Orifice Size (mm)	Pipe Connection	Valve Configuration	Connection Threads	Voltage	Options
1393	BS= Brass NS= Nickel Plated Brass	08= 8mm	2= 1/4" 3= 3/8" 4= 1/2"	- = Normally Closed NA=Normally Open	T= NPT - = BSP	120AC= 120VAC 240AC= 240VAC 24AC= 24VAC	Prefix YC= Weather Proof Housing (1/2" NPT Thread) Coil Indicator Light= Consult Factory

INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer). Mount **only** on a horizontal run of pipe with coil upright.

CLARK SOLUTIONS

Model 2026, 2-Way, Normally Closed Solenoid Valve

1/8 & 1/4" Pipe Size, Direct Acting Solenoid

DESCRIPTION

Model 2026 two-way normally closed solenoid valves have a compact, forged brass body. A variety of seat material including Acrylo-Nitrile, Neoprene®, Ethylpropylene and Viton® satisfy many general industry applications.

The valve coil and housing is weather, water and saline corrosionproof according to IP65 and NEMA4x.

The unit has a power consumption of 6 watts and a response time less than 10 milliseconds.

SPECIFICATIONS

GENERAL

Operation: Normally closed

Valve Body Material: Brass

Valve Life: > 5,000,000 cycles, field rebuild kits available

Valve Seals & Seats: Acrylo-Nitrile, Neoprene®,

Ethylpropylene, Viton®

Connections: 1/8" or 1/4" BSP or NPT

Operating Voltage: 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated mini-coils with DIN 43650 connector (with PG9 wire strain relief)

Coil & Housing Rating: IP65, NEMA4x

Power Consumption: 6 Watts

Coil: Thermal Class F to 155°C

Electrical Connection: Screw Terminal

Response Time with Air at 6 Bar: <10 ms

Weight: Approx. 170 g



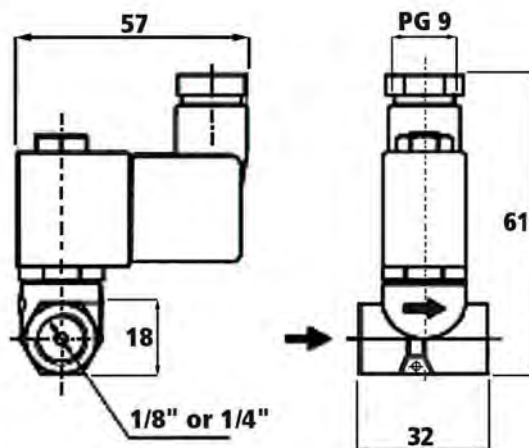
Seat Material	Acrylo Nitrile	Neoprene®	Ethyl-propylene	Viton®
Maximum temperature	+80°C	+80°C	+150°C	+150°C
Uses	Water, air, light oils, kerosene. Low and medium vacuum.	Oxygen, alcohol, argon, other non-corrosive light gases and liquids. Freon	Water steam, hot water, acetone.	Benzene, naphtha, aromatics, etc.. Hot gases. High vacuum.

Connection (NPT or BSP)	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Max. Differential Pressure (bar)
1/8"	1.25	0.059	0.05	50
	1.75	0.105	0.09	20
	2.25	0.152	0.13	10
	3.00	0.293	0.25	4
1/4"	1.25	0.059	0.05	50
	1.75	0.105	0.09	20
	2.25	0.152	0.13	10
	3.00	0.293	0.25	4



NEMA4x Coil and Housing and DIN43650 Connector

DIMENSIONS (MM)



Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)
 Cv= Valve Flow Coefficient
 DP= Valve Pressure Drop, PSID
 G= Specific Gravity of Liquid (= 1.0 for Water)

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 2026BN121T120AC

Model Number Information						
Model	Body Material	Seat & Seal Material	Orifice	Connection	Connection Threads	Voltage
2026	B=Brass	A= Acrylo-Nitrile V= Viton N= Neoprene E= Ethylpropylene	12= 1.25 mm 17= 1.75 mm 30= 3.00 mm 22= 2.25 mm	1= 1/8" 2= 1/4"	T= NPT - = BSP	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz
Bold Order Items Typically Ship From Stock						

Magnetically latched solenoids available on select models. Please call us for details.

INSTALLATION RECOMMENDATIONS

- 1) Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).
- 2) Mount the valve in any position (preferably on a horizontal pipeline with coil upright).

CLARK SOLUTIONS

Model 2036, 2-Way, Normally Closed Solenoid Valve

3/8", 1/2", 3/4" & 1" Pipe Size, Pilot Operated

DESCRIPTION

Model 2036 two-way normally closed solenoid valves have a forged brass body. The unit has a seat material of Acrylo-Nitrile with a metal core for use to 80°C.

The valve coil and housing is weather, water and saline corrosionproof according to IP65 and NEMA4x.

The unit has a power consumption of 6 watts and a life cycle rating greater than five million cycles.

SPECIFICATIONS

GENERAL

Operation: Normally closed

Valve Body Material: Brass

Valve Life: > 5,000,000 cycles, field rebuild kits available

Valve Seals & Seats: Acrylo-Nitrile

Connections: 3/8", 1/2", 3/4", 1" BSP or NPT

Operating Voltage- 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated mini-coils

with DIN 43650 connector (with PG9 wire strain relief)

Coil & Housing Rating: IP65, NEMA4X

Power Consumption: 6 Watts

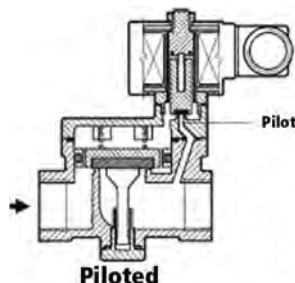
Coil: Thermal Class F to 155°C

Electrical Connection: Screw Terminal

Weight: Approx. 170 g



Connection	Orifice Dia. (mm)	Cv Coef. (GPM)	Kv Coef. (m³/h)	Differential Pressure (bar)		Weight (kg)	Max. Temperature (°C)	Catalog Number
				Minimum	Maximum			
Normally Closed								
3/8"	10	1.99	1.7	0.1	10	0.32	80	2036BA3
1/2"	10	2.22	1.9			0.64		2036BA4
3/4"	16	6.44	5.5			0.98		2036BA6
1 "	25	10.53	9	0.3				2036BA8



Piloted valves use the fluid pressure to assist in opening and closing the valve, allowing the valve to operate against higher pressures than a direct acting valve.

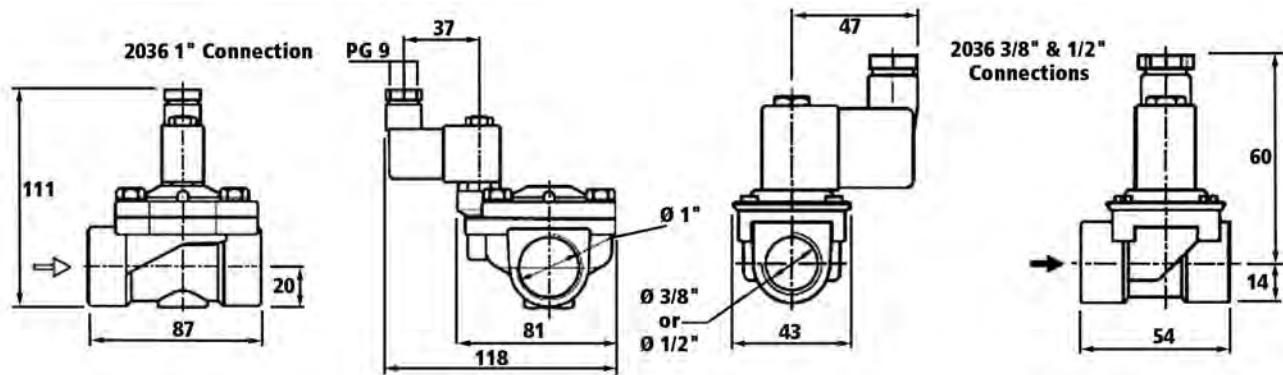
When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

When the pilot valve opens, a passage that bypasses the valve piston/seat and connects downstream of the piston/seat is opened, relieving pressure from the top of the valve piston/seat. The inlet fluid pressure lifts up the piston to open the valve.

INSTALLATION RECOMMENDATIONS

- 1) Place a strainer with a porosity $\leq 100\mu$ upstream of valve (see Clark Solutions Model 1359 Y Strainer).
- 2) Mount the valve preferably on a horizontal pipeline with coil upright.

DIMENSIONS (MM)



Flow Calculation, Liquids:

$$Q = C_v \sqrt{\frac{DP}{G}}$$

Q= Flow Rate, GPM (U.S.A.)
 C_v= Valve Flow Coefficient
 DP= Valve Pressure Drop, PSID
 G= Specific Gravity of Liquid (= 1.0 for Water)



NEMA4x Coil and Housing
and DIN43650 Connector

ORDERING INFORMATION

SELECT ITEM FROM EACH COLUMN IN CHART BELOW FROM LEFT TO RIGHT

EXAMPLE: 2036BA3T24DC

Model Number Information					
Model	Body Material	Seat & Seal Material	Connection	Connection Threads	Voltage
2036	B=Brass	A= Acrylo-Nitrile	4= 1/2" 6= 3/4" 8= 1" 3= 3/8"	T= NPT - = BSP	12DC= 12 VDC 120AC= 120 VAC, 60 Hz 24DC= 24 VDC 24AC= 24 VAC, 60 Hz

Magnetically latched solenoids available on select models. Please call us for details.

CLARK SOLUTIONS

Model 2073, 2-Way, NC Solenoid or Pneumatic Valve

3/4", 1", 1 1/2" For Dust Collector Reverse Pulse Applications

DESCRIPTION

Model 2073 two-way normally closed valves are designed for use on dust collection equipment (Bag Houses) to deliver pulses of compressed air to filtering tube sleeves. The air knocks off accumulated media "cake" on the filter on a timed basis or on demand via a control loop. The cake falls to a hopper from which it is removed.

The valves employ a choice of solenoid or pneumatic valve operation. The valves have a high flow rate and fast response time.

Model 2073 valves have injected or cast aluminum bodies and a choice of Acrylo-Nitrile or Hytrel diaphragm materials. NEMA 4 weatherproof coil construction is optional.



SPECIFICATIONS

GENERAL

Operation: Normally closed

Valve Body : Injected or cast aluminum

Valve Life: > 1,000,000 cycles, field rebuild kits available

Response time: 50-100 ms (typical)

Plunger & Plunger Tower: Stainless steel

Valve Seals & Seats: Acrylo-Nitrile, Hytrel

Connections: 3/4", 1", 1 1/2" BSP or NPT

Operating Voltage- 12 VDC; 24 VDC/VAC; 120 VAC, 60Hz

Standard Solenoid Housing: Encapsulated, includes DIN 43650 connector (PG-9)

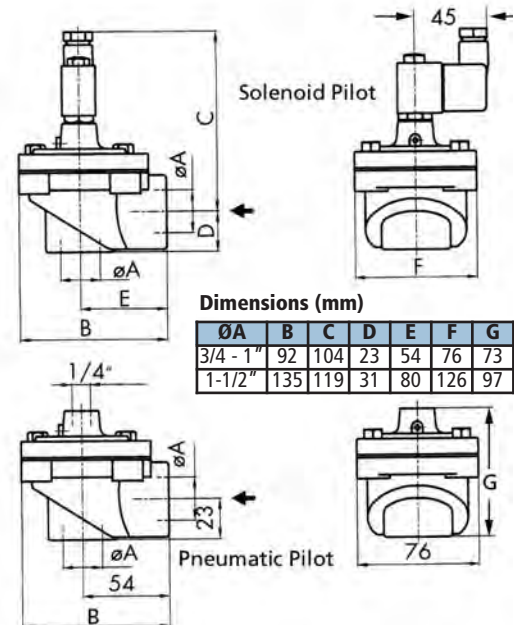
Wire Connection: Screw terminal

Optional IP65/NEMA4 Weather Proof : Encapsulated coil, 1/2" NPT potted conduit connection with flying leads

Coil Rating:

Class F coil to 80°C: AC 60 Hz, 13 W; DC, 19 W

Class H coil to 180°C: AC 60 Hz, 13 W; DC, 19 W



Connection	Orifice (mm)	Cv Coef. (GPM)	Kv Coef. (m ₃ /h)	Differential pressure (bar)		Power (Watts)	Max. Temp. (°C)	Weight (kg)
				Minimum	Maximum			
Integrated Solenoid Pilot								
3/4"	29	10.18	8.7	0.5	10	6	80	0.93
1"	29	18.72	16			6		0.93
1 1/2"	40	33.93	29			11		1.3
External Pneumatic Pilot (The auxiliary pneumatic signal must be greater than the main input pressure)								
3/4"	29	10.18	8.7	0.5	10	-	80	0.93
1"	29	18.72	16					0.93
1 1/2"	40	33.93	29					1.3

Model Number Information								
Model	Body Material	Diaphragm Material	Connection	Pilot Type	Connection Threads	Coil Type	Voltage	Options
2073	L= Aluminum	A= Acrylo-Nitrile H= Hytrel	06= 3/4" 08= 1" 12= 1 1/2"	S= Solenoid - = Pneumatic	T= NPT - = BSP	F= Class F H= Class H	12DC= 12 VDC 24DC= 24 VDC 120AC= 120 VAC, 60 Hz 24AC= 24 VAC, 60 Hz	<u>Standard</u> Prefix YC= Weather Proof Housing (1/2" NPT Thread)

TAKASAGO

MODEL PM UNIVERSAL PINCH VALVE

Solenoid Operated, Two Way and Three Way Configuration

DESCRIPTION

Model PM pinch valve offers excellent reliability in a compact, versatile design. Reasonable cost and consistent performance are accomplished through molding and automated assembly technology.

Each model can be configured for three way (dual tube), two way normally open (single tube) or two way normally closed (single tube) operation.

Tube changes are facilitated by a convenient push button manual solenoid override.



SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
Min. Operating Voltage- 90% of rated voltage
Drop Out Voltage- 10% of rated voltage
Power Consumption- 4.4 Watts
Coil Temp. Rise- Max 75°C from room temperature
Tube Material- Silicone Rubber
Tube Size- 0.8mm ID x 2.4mm OD or 1.0mm ID x 3.0mm OD
Tube Holder- Delrin®
Pinching Head- PBT (Polybutylene Terephthalate)
Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated
Max Operating Pressure- 1.5 bar
Weight-89 grams
Insulation Class- Class B
Insulation Resistance- 50 Mohm at 500 Vdc
Dielectric Strength- 1500 Vac/1 minute

Delrin is a registered trademark of DuPont

ORDERING INFORMATION

AB

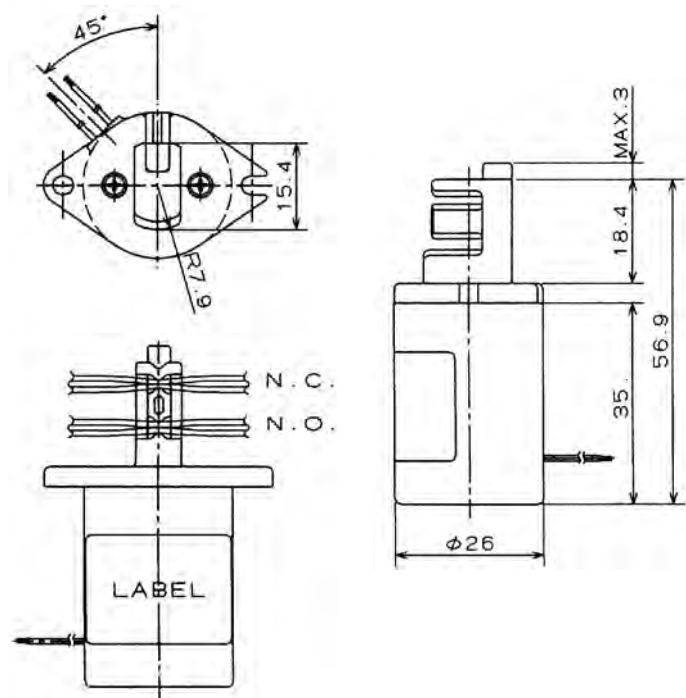
EXAMPLE: PM0815W12V

A *Model & Tube Size	B Voltage
PM0815W=0.8 mm I.D x 2.4 mm O.D.	12V=12VDC
PM1015W=1.0 mm I.D. x 3.0 mm O.D.	24V=24VDC
*Unit not supplied with tubing	

Bold order combinations typically ship from stock

PM UNIVERSAL PINCH VALVE

DIMENSIONS



TAKASAGO

MODEL PS PINCH VALVE

Solenoid Operated, Two Way and Three Way Configuration

DESCRIPTION

Model PS pinch valve offers excellent reliability in a compact, versatile design. Reasonable cost and consistent performance are accomplished through molding and automated assembly technology.

Model PS is available in three way (dual tube), two way normally open (single tube) or two way normally closed (single tube) configurations.

Tube changes are facilitated by a convenient push button manual solenoid override.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Duty Cycle- Continuous
 Power Consumption- 3 Watts
 Ambient Temperature Range- 0-40°C
 Tube Material- Silicone Rubber, Pharmed®
 Tube Size- 0.8mm. 1.0 mm & 1.6 mm ID
 Tube Holder- Delrin®
 Pinching Head- PBT (Polybuthylene Terephthalate)
 Max Operating Pressure- See Table
 Weight-89 grams
 Dielectric Strength- 1500 Vac/1 minute

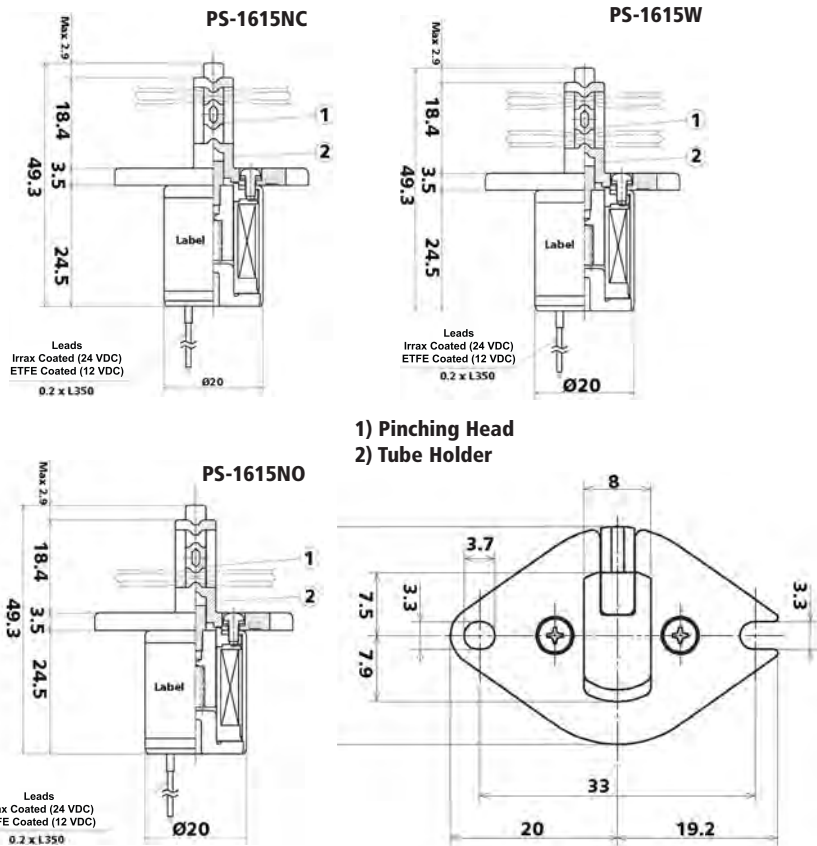
Delrin is a registered trademark of E. I. du Pont de Nemours and Company

ORDERING INFORMATION

Model	Config.	Tubing	Tubing I.D.	Tubing O.D.	Operating Pressure
PS-0815NC(12V, 24V)	2-Way, N.C.	Silicone	0.8 mm	2.4 mm	1.5 bar (21.77 PSI)
PS-0815NO(12V, 24V)	2-Way, N.O.		0.8 mm	2.4 mm	
PS-0815W(12V, 24V)	3-Way		0.8 mm	2.4 mm	
PS-1010NO(12V, 24V)	2-Way, N.O.	Silicone Pharmed®	1 mm	3 mm	1 bar (14.51 PSI)
PS-1015NC(12V, 24V)	2-Way, N.C.		1 mm	3 mm	
PS-1015NO(12V, 24V)	2-Way, N.O.		1 mm	3 mm	
PS-1015W(12V, 24V)	3-Way	Silicone	1 mm	3 mm	1.5 bar (21.77 PSI)
PS-1615NC(12V, 24V)	2-Way, N.C.		1.6 mm	3.2 mm	
PS-1615NO(12V, 24V)	2-Way, N.O.		1.6 mm	3.2 mm	
PS-1615W(12V, 24V)	3-Way		1.6 mm	3.2 mm	



DIMENSIONS(MM)



TAKASAGO

MODEL PSK PINCH VALVE

Solenoid Operated, Two Way and Three Way Configuration

DESCRIPTION

Model PSK pinch valve offers excellent reliability in a compact, versatile design. Reasonable cost and consistent performance are accomplished through molding and automated assembly technology.

Model PSK is available in three way (dual tube), two way normally open (single tube) or two way normally closed (single tube) configurations. The PSK models are the same as model PS except they have a tube holding feature on the pinching head.

Tube changes are facilitated by a convenient push button manual solenoid override.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Duty Cycle- Continuous
 Power Consumption- 3 Watts
 Ambient Temperature Range- 0-40°C
 Tube Material- Silicone Rubber, Pharmed®
 Tube Size- 0.8mm, 1.0 mm & 1.6 mm ID
 Tube Holder- Delrin®
 Pinching Head- PBT (Polybuthylene Terephthalate)
 Max Operating Pressure- See Table
 Weight-89 grams
 Dielectric Strength- 1500 Vac/1 minute

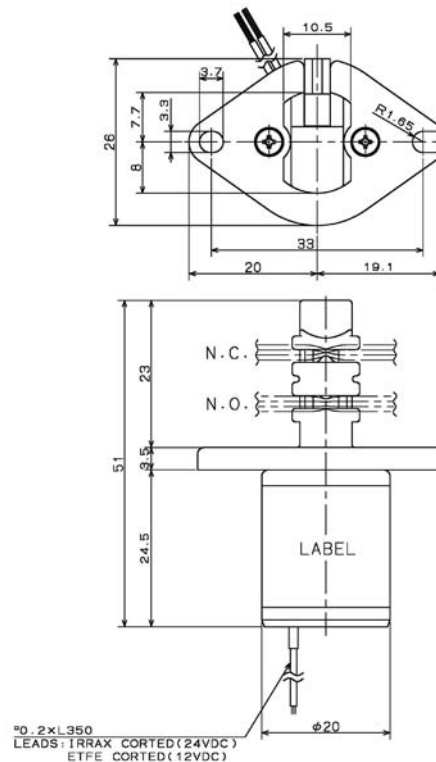
*Delrin is a registered trademark of E. I. du Pont de Nemours and Company
 Pharmed is a registered trademark of Norton Company*

ORDERING INFORMATION

Model	Config.	Tubing	Tubing I.D.	Tubing O.D.	Operating Pressure
PSK-0815NC(12V, 24V)	2-Way, N.C.	Silicone	0.8 mm	2.4 mm	1.5 bar (21.77 PSI)
PSK-0815W(12V, 24V)	3-Way		0.8 mm	2.4 mm	
PSK-1010NO(12V, 24V)	2-Way, N.O.	Silicone Pharmed®	1 mm	3 mm	1.5 bar (21.77 PSI)
PSK-1015NC(12V, 24V)	2-Way, N.C.		1 mm	3 mm	
PSK-1015NO(12V, 24V)	2-Way, N.O.	Silicone Pharmed®	1 mm	3 mm	
PSW-1015W(12V, 24V)	3-Way		1 mm	3 mm	
PSK-1615NC(12V, 24V)	2-Way, N.C.	Silicone	1.6 mm	3.2 mm	
PSK-1615NO(12V, 24V)	2-Way, N.O.		1.6 mm	3.2 mm	
PSK-1615W(12V, 24V)	3-Way		1.6 mm	3.2 mm	



DIMENSIONS(MM)



TAKASAGO

MODEL PL LATCHING PINCH VALVE

Solenoid Operated, Two Way N.O. and Two Way N.C.

DESCRIPTION

Model PL pinch valve has a latching solenoid, which maintains the valve's open or closed state through the utilization of a permanent magnet. PL valves offer excellent reliability in a compact, versatile design. Reasonable cost and consistent performance are accomplished through molding and automated assembly technology.

Model PL is available in two way normally open (single tube) or two way normally closed (single tube) configurations.

Tube changes are facilitated by a convenient push button manual solenoid override.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Duty Cycle- Intermittent

Power Consumption- 8 Watts

Ambient Temperature Range- 0-40°C

Tube Material- Silicone Rubber

Tube Size- 1.0 mm I.D., 3 mm O.D.

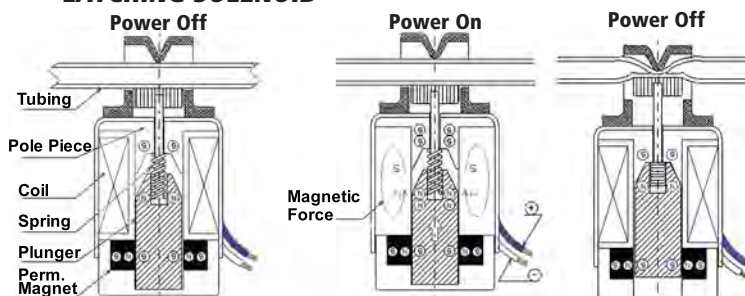
Tube Holder- Delrin®

Pinching Head- PBT (Polybuthylene Terephthalate)

Max Operating Pressure- 1.5 bar (21.77 PSI)

Dielectric Strength- 1500 Vac/1 minute

LATCHING SOLENOID



Permanent magnet's attractive force less than spring force:
There is an open space between the pole piece and the plunger and the attractive force of the permanent magnet is lower than the force of the spring.

Current flows to the coil, the electromagnetic force is created in such direction that the attractive force increases and becomes stronger than the spring. Then, the plunger moves towards the pole piece.

Permanent magnet's attractive force greater than spring force:
The space between the pole piece and the plunger narrows and so the attractive force strengthens. Even when the magnetic force from the coil is cut, the attractive force is stronger than the force of the spring.

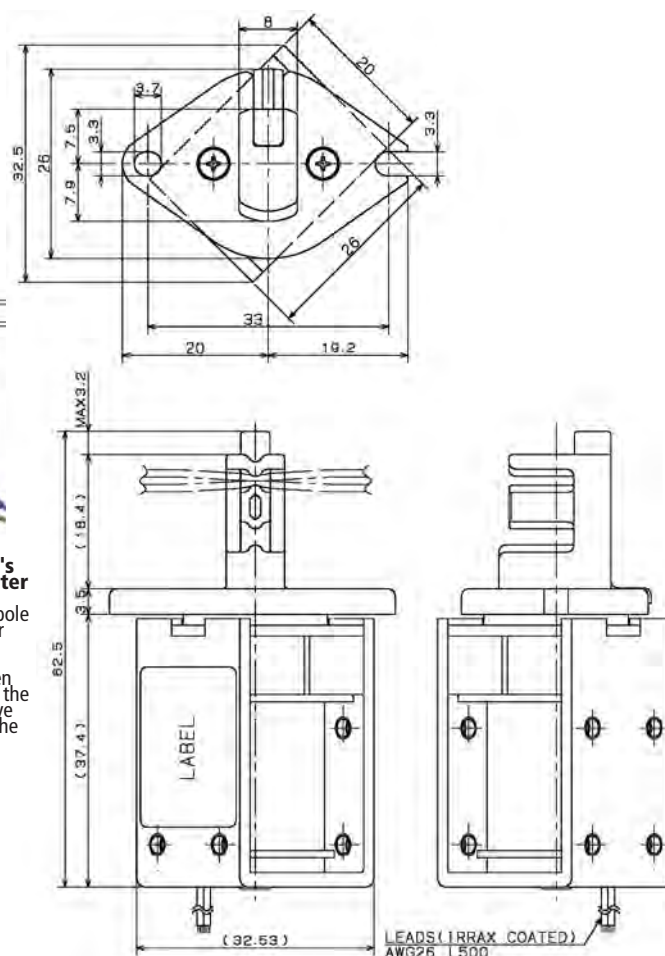
ORDERING INFORMATION

Model	Config.	Tubing	Tubing I.D.	Tubing O.D.	Operating Pressure
PL-1015NC(12V, 24V)	2-Way, N.C.	Silicone	1 mm	3 mm	1.5 bar (21.77 PSI)
PL-1015NO(12V, 24V)	2-Way, N.O.		1 mm	3 mm	

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DIMENSIONS(MM)



TAKASAGO

MODEL NP PINCH VALVES

Solenoid Operated, 2-Way & 3-Way Configurations, Tube Sizes to 6.4 mm I.D.

DESCRIPTION

Model NP pinch valves are rugged pinch valves for use with 2.0, 3.0 and 6.0 and 6.4 mm I.D. Silicone or Pharmed® tubing. The valves are particularly well suited for on/off fluid control applications where the fluid media is difficult for conventional valves to handle or where the complete fluid system wetted components need periodic replacement.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Power Consumption- 10 Watts

Duty- Continuous

Tube Material- Silicone, Pharmed®

Tube Sizes- 2.0 mm ID x 4.0 mm OD, 3.0 mm ID x 5.0 mm OD,
6 mm ID x 8 mm OD and 6.4 mm ID x 9.6 mm OD

Max Operating Pressure- See Table

Ambient Temperature Range: 0-40°C (32-104°F)

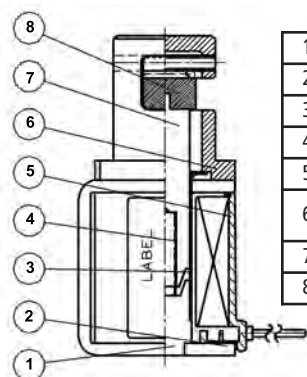
Insulation Class- Class B

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

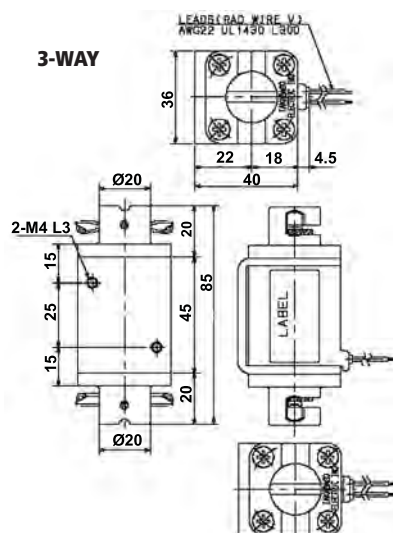


Model	Configuration	Tubing	Tubing I.D.	Tubing O.D.	Operating Pressure
NP-0205-DR(12V,24V)	3-Way	Pharmed®	2 mm	4 mm	0.5 bar (7.26)
NP-0205-NC(12V,24V)	2-Way, N.C.		2 mm	4 mm	0.5 bar (7.26)
NP-0305-DR(12V,24V)	3-Way		3 mm	5 mm	0.5 bar (7.26)
NP-0305-NC(12V,24V)	2-Way, N.C.	Silicone	3 mm	5 mm	0.5 bar (7.26)
NP-0305-NO(12V,24V)	2-Way, N.O.		3 mm	5 mm	0.5 bar (7.26)
NP-0310-DR(12V,24V)	3-Way		3 mm	5 mm	1.0 bar (14.5)
NP-0802-NC(12V,24V)	2-Way, N.C.		6 mm	8 mm	0.2 bar (2.9 PSI)
NP-0802-NO(12V,24V)	2-Way, N.O.		6 mm	8 mm	0.2 bar (2.9 PSI)
NP-6405-NC(12V,24V)	2-Way, N.C.		6.4 mm	9.6 mm	0.5 bar (7.26)

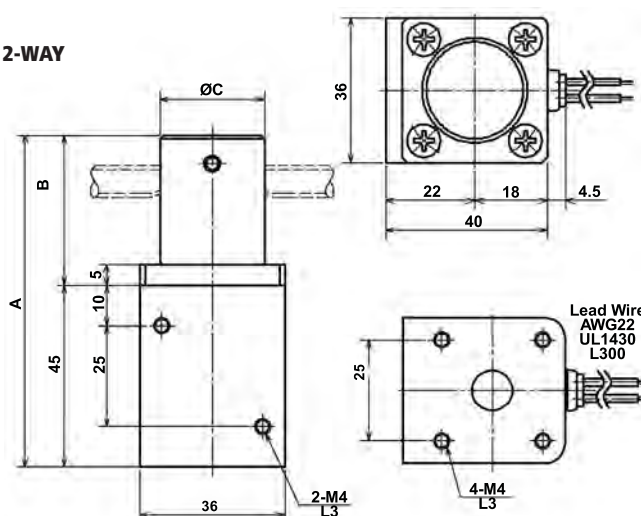


1	Pole Piece- K-M31
2	Frame- SPCC
3	Seamless Pipe- SUS304
4	Spring- SUS304WPB
5	Coil Assembly- SPS Molded
6	Tube Holder- HPVC (PPS available on some models)
7	Plunger- K-M31
8	Pinching Head- Silicone

DIMENSIONS(MM)



2-WAY



Model	A (mm)	B (mm)	C (mm)
NP-0205-NC	65	20	19
NP-0305-NC	64.5	19.5	20
NP-0802-NC	82	37	26
NP-6405-NC	82	37	26
NP-0305-NO	70.3	20	20
NP-0802-NO	90	45	26

TAKASAGO

MODEL PK PINCH VALVES

Solenoid Operated, Two Way Configuration

DESCRIPTION

Model PK pinch valves are rugged pinch valves for use with 1.6, 3.2 and 4.8 mm I.D. Silicone tubing. The valves are particularly well suited for on/off fluid control applications where the fluid media is difficult for conventional valves to handle or where the complete fluid system wetted components need periodic replacement.

Model PK valves retain the tubing in a closed cradle.

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc

Min. Operating Voltage- 90% of rated voltage

Drop Out Voltage- 10% of rated voltage

Power Consumption- 10 Watts

Coil Temp. Rise- Max 80°C from room temperature

Coil Lead Wire- RAD Wire V, AWG 22, UL1430, L300 mm

Tube Material- Silicone Rubber

Tube Sizes- 1.6 mm ID x 4.8 mm OD, 3.2 mm ID x 6.4 mm OD,

4.8 mm ID x 8 mm OD and 6.4 mm ID x 9.6 mm OD

Tube Holder- Modified PPO

Pinching Head- Silicone Rubber

Spring-SUS304WPB

Seamless Pipe- SUS304

Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated

Max Operating Pressure- 0.5 bar

Weight-290 grams

Insulation Class- Class B

Insulation Resistance- 50 Mohm at 500 Vdc

Dielectric Strength- 1500 Vac/1 minute

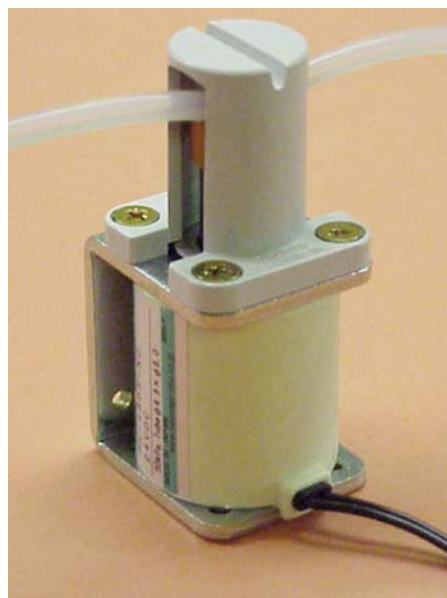
ORDERING INFORMATION

ABCD

EXAMPLE: PK1605NO12V

A *Model	B Tube Size	C Configuration	D Voltage
PK=PK	1605=1.6 mm I.D. 3205= 3.2 mm I.D. 4805= 4.8 mm I.D. 6405= 6.4 mm I.D.	NC= Normally Closed NO= Normally Open	12V= 12VDC 24V= 24 VDC
*Unit not supplied with tubing			

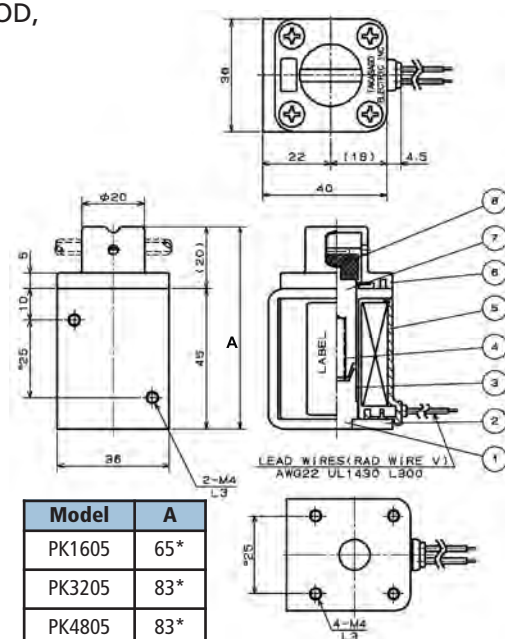
Bold order combinations typically ship from stock



PK PINCH VALVE

DIMENSIONS(MM)

NORMALLY CLOSED TYPE PK



Model	A
PK1605	65*
PK3205	83*
PK4805	83*
PK6405	83*

*Add 5.3 mm for NO

- 1) Pole Piece
- 2) Frame
- 3) Seamless Pipe
- 4) Spring
- 5) Coil Assembly
- 6) Tube Holder
- 7) Plunger
- 8) Pinching Head

TAKASAGO

MODEL EPK PINCH VALVE

Solenoid Operated, Two Way Configuration

DESCRIPTION

Model EPK pinch valves are large, rugged pinch valves for use with 10 mm and 15 mm I.D. silicone tubing. The valves are particularly well suited for on/off fluid control applications where the fluid media is difficult for conventional valves to handle or where the complete fluid system wetted components need periodic replacement.

Model EPK valves retain the tubing in a closed cradle. An integral mounting bracket is standard.



EPK PINCH VALVE

SPECIFICATIONS

GENERAL

Rated Voltage- 12Vdc or 24Vdc
 Min. Operating Voltage- 90% of rated voltage
 Drop Out Voltage- 10% of rated voltage
 Duty Cycle- 10% on time, 90% off to max on time of 5 minutes
 Power Consumption- 60 Watts
 Coil Lead Wire- Neoprene coated, 0.5 x L300 mm
 Tube Material- Silicone Rubber
 Tube Size- 10 mm or 15 mm I.D.
 Max Operating Pressure- 0.5 bar(10 mm I.D.); 0.2 Bar (15 mm I.D.)
 Weight- 1200 grams
 Insulation Class- Class E
 Insulation Resistance- 10 Mohm at 500 Vdc

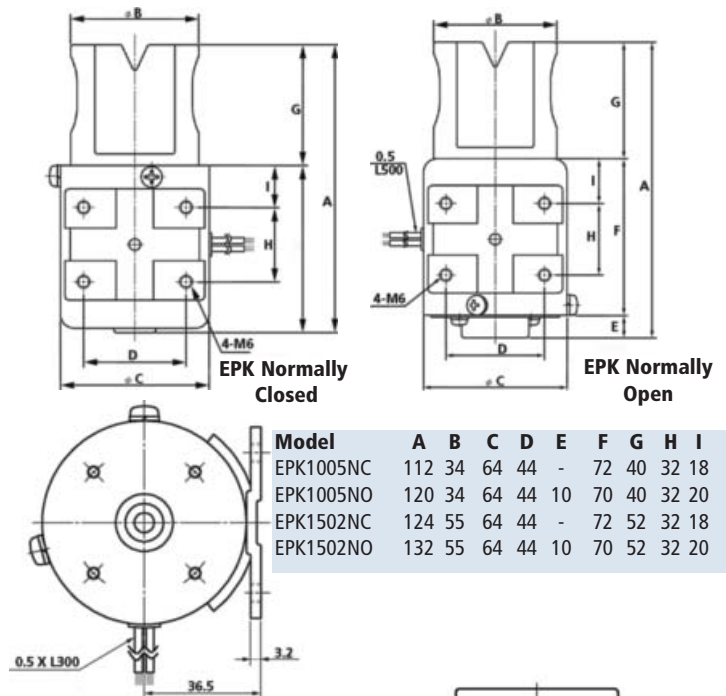
ORDERING INFORMATION

ABC

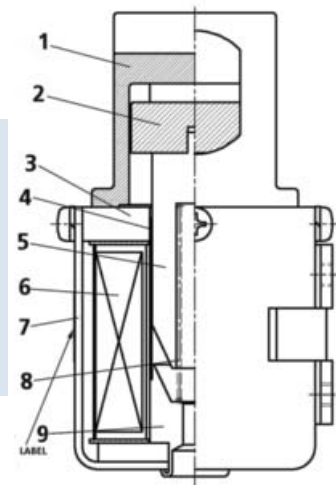
EXAMPLE: EPK1005NC12V

A *Model & Tube Size	B Configuration	C Voltage
EPK1005=10mm I.D.	NC=Normally Closed	12V=12VDC
EPK1502=15mm I.D.	NO=Normally Open	24V=24VDC
*Unit not supplied with tubing		

DIMENSIONS(MM)



Item	Material
1) Tube Holder	PPO
2) Pinch Head	Silicone
3) Ring Core	SPCC
4) Plunger Guide	SUS304
5) Plunger	SS400
6) Coil Assembly	
7) Bonnet	SPCC
8) Spring	SUS304
9) Pole Piece	SUM22



Normally Closed

CLARK

Series 22 Dia-Cam Pinch Valve

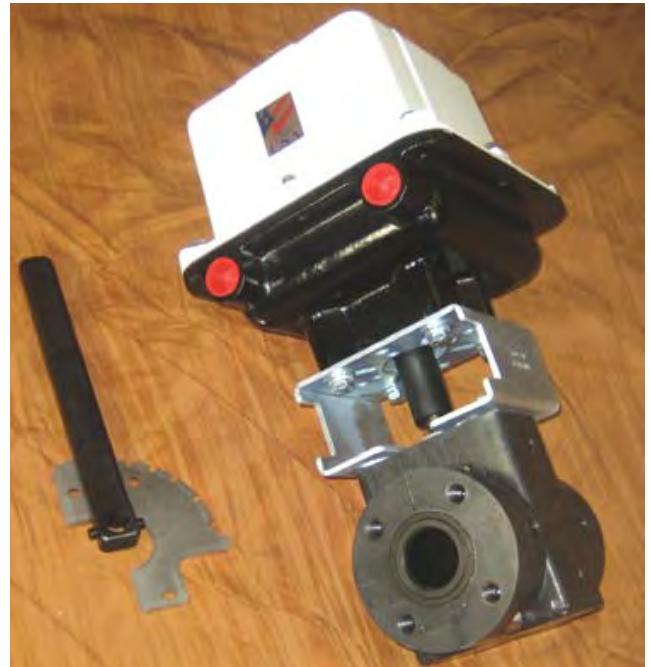
1/2" to 3" Sizes, Manual or Motorized Actuation, Quarter Turn

DESCRIPTION

The Series-22 Quarter-Turn Dia-Cam valve is a high flow capacity pinch valve, designed, for hard-to handle fluids, especially slurries. The valve interior consists of a fabric reinforced elastomeric or PTFE- lined Diaphragm Spool... the only wetted component of the valve. Two opposing gear-driven cams, contained in a flanged split vinylester-fiberglass body, act on the Diaphragm Spool, providing flow control over the entire 90 degrees of valve stem travel. The valve exhibits negligible pressure drop in the open position and bubble- tight closure even around solids in the closed position. Where solids in the slurry make operation of other types of valves such as ball, plug and butterfly valves, extremely problematic, the Series-22 Dia-Cam valve is ideally suited for slurries since there are no "dead zones" in the valve internals.

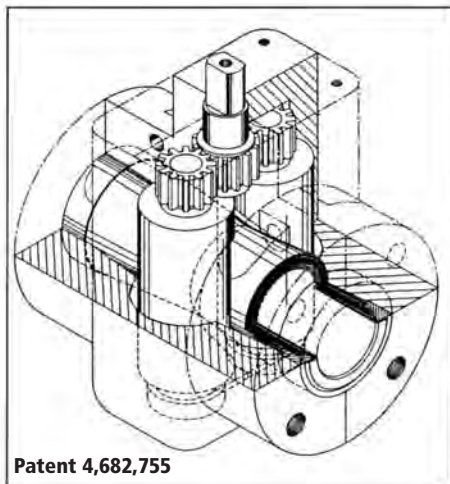
The valve ID mates to Schedule 40 piping systems and installs without flange gaskets. The valve is utilized in either ON-OFF or FLOW CONTROL applications.

Manual operation of the valve is accomplished with a 6-position notched detent plate and spring-loaded lever assembly. Automated Operation is achieved by Specifying a Clark RE series electric quarter-turn actuator. Pneumatic actuators are available on request



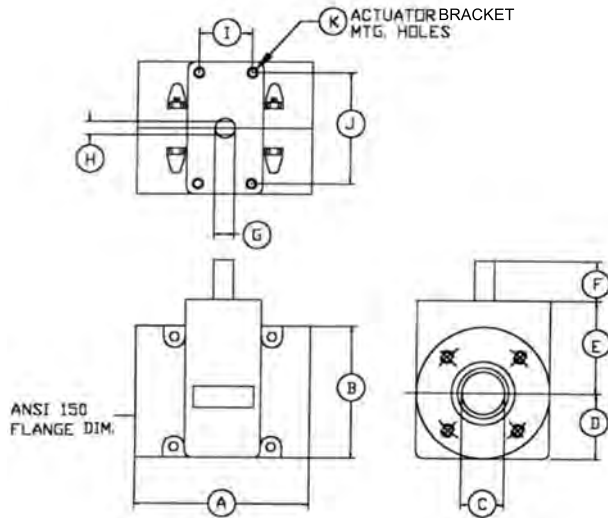
Series 22 Dia-Cam Pinch Valve is available with manual or electronic actuator

Maximum working pressure for all sizes is 125 psig. Operating temperature is -40 to 275°F depending on the elastomer system used in the valve. For throttling applications, proper valve sizing involves determining the Cv required, taking into consideration fluid viscosity, pipeline size and cavitation potential. Consult Factory for sizing verification.

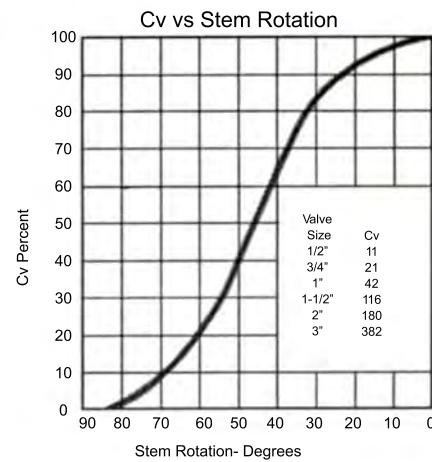
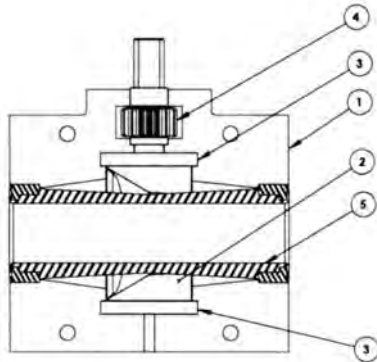


FEATURES	APPLICATIONS
-Flow-Thru Design	-Lime slurry, FGD scrubber fluids
-NO "Dead Zones"	-Limestone, titanium dioxide slurries
-Only ONE Wetted Part	-Pulp, resin-fiber slurries
-No Flange Gaskets Required	-Sewage treatment fluids, grit
-Closes bubble-tight on solids	-Powders, plastic pellets
-On-Off or Flow Control Service	-Paints, pigments, glues
-Lever Detent Assembly for Manual Operation	-Corrosive gels, brine
-Actuated with Any Quarter-Turn Pneumatic or Electric Control Package	-pH control chemicals, precipitates
-Corrosion-Resistant Vinylester-Fiberglass Construction	-Sand-water muds, resin-fiber slurry
-Molded-In Steel Inserts for Flange Bolts and Actuator Mounting Bolts	-Pet foods, candies, cereals
-Face-to-Face Dimensions per ANSI B16.10, Class 150	-Metallic sludge, paper stock
-Flange Dimensions per ANSI B16.5, Class 150	-Photographic chemicals, alumina
-Diaphragm spool materials available in many Standard and Food Grade Elastomers and	-Soda ash, caustic soda
	-Personal care products

DIMENSIONS, CONNECTIONS & WEIGHT



Dimension	Valve Size/Dimensions (inches)					
	1/2"	3/4"	1"	1-1/2"	2"	3"
A	4.25	4.63	5.00	6.55	7.05	8.05
B	3.50	3.88	4.25	5.00	6.00	7.50
C	0.62	0.82	1.04	1.61	2.07	3.07
D	1.77	2.03	2.03	2.50	3.00	3.75
E	2.16	2.50	2.50	3.50	4.23	5.00
F	1.13	1.31	1.31	1.50	1.50	2.16
G	0.56	0.56	0.56	0.75	1.00	1.125
H	0.38	0.38	0.38	0.50	0.50	0.69
I	1.38	1.40	1.40	2.00	2.37	2.88
J	2.88	3.48	3.48	4.20	5.03	5.25
K	10-24 .25 dp	10-24 .25 dp	10-24 .25 dp	5/16-18 .64 dp	5/16-18 .64 dp	3/8-16 .75 dp
WT (LBS)	3.25	5.00	5.50	9.38	14.50	22.75



Construction Materials			
Part	Quantity	Name	Material
1	2	Body Half	Vinylester-Fiberglass Composite
2	2	Closure Cam	Vinylester-Fiberglass Composite with Molded-in Carbon Steel Gears
3	4	Closure Cam Bearing	UHMWPE, Nylon
4	1	Stem Gear Assembly	Plated Carbon Steel With Nylon Bushings
5	1	Diaphragm Spool Assembly	Fabric-reinforced Elastomer or PTFE-lined with FRP Rings

Valve Size	Torque Required (Inch Pounds) at Process Pressure				
	0 PSIG	30 PSIG	60 PSIG	90 PSIG	120 PSIG
1/2"	80	110	140	190	220
3/4"	125	175	225	312	350
1"	125	175	225	312	350
1-1/2"	400	575	720	800	930
2"	750	970	1150	1630	1900
3"	1400	1800	2200	2900	3500

RE REVERSING ELECTRONIC NEMA 4/4X ACTUATORS FOR SERIES 22 PINCH VALVES

On-Off, Tri-State & Modulating Control

Model RE electric/electronic actuators are ideal for Series 22 valve applications. The actuators are available with torque ratings from 150 in-lbs to 10,200 in-lbs. They incorporate current limiting as a means of protecting the actuator for over-torque situations and do not depend on torque switches or thermal overload sensing. The current limiting feature activates a light (and an optional relay) upon exceeding the current limit set, to allow for easy field diagnostics.



All actuators accept 24 VAC or VDC power and 120 or 220 VAC with the addition of a transformer. All actuators have field adjustable speed control as a standard feature. Actuators are designed for temperatures ranging from -40 °F to 150 °F (-40 °C to 65 °C). For temperatures below 32 °F (0 °C), outdoor applications, high humidity or wet locations the actuators can be supplied with an electric heater and thermostat.

All actuators have a solid state braking system, which works with or without power, (rated to 1-1/4 times the torque rating of the actuator). All units are equipped with a manual override, which will allow the actuator to be rotated in the clockwise or counter-clockwise direction. Optional solid cast aluminum override handwheels are available (spoked handwheels are not acceptable due to safety issues).

The actuator housing is a high strength aluminum casting with an exterior grade polyurethane enamel coating for excellent wear, corrosion, impact and UV resistance. The actuators are NEMA 4/4X type minimum. All cover fasteners are stainless steel. All actuators have a position indicator with the angle of rotation clearly marked. All actuators used in outdoor applications have white covers to lessen the solar heat load.

Model RE is capable of accepting 4-20 mA with 250 Ohms impedance, 0-10 VDC or 2-10 VDC signals. Input signal isolation is provided to isolate the input signal from the actuator power so that the signal and power can come from different sources, without the need for exterior isolation modules.

Specifications	RE3.0F - RE6.0F	RE3.0G - RE6.0TG	RE10F - RE15TF	RE10G - RE15TG
Power supply	12 VDC, 24 VAC or DC, 120 VAC, 50/60 Hz			
Transformer sizing**	30 VA(class 2 power source required)		50 VA(class 2 power source required)	
Electrical connection	dual conduit entry (1/2")		dual conduit entry (3/4")	
Control signal	two-position/tri-state*	0-10 VDC 4-20 mA	two-position/tri-state*	0-10 VDC 4-20 mA
Input Impeance	250 Ohms for 4-20 mA			
Operating range	0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, & custom signal ranges available			
Feedback output	0 to 10 VDC standard, 4 to 20 mA optional			
Manual override	de-clutching shaft with flats, optional override handwheel			
Angle of rotation	Typically 90° - 320°			
Minimum torque	depends on model, see RE actuator selection table			
Direction of rotation	standard: increase signal = CCW (jumper selectable)			
Position indication	visual mechanical position indicator			
Gear train	heat treated metal gears, permanently lubricated			
Brakes	solid state braking system			
Duty cycle/Life	100%/2000 hours actual drive time			
- Auxiliary switches	cam operated, 1 standard, up to 3 optional			
Switch	form C; SPDT			
Range usage	0-320°			
Factory setting	none			
Ratings	125/250 VAC: 10 Amp, 1/3 hp 125 VDC: 0.5 Amps 250 VDC: 0.25 Amps			
Switch Connections	male quick connect type tabs			
Control signal Adjustment:				
Offset	-	0-3Vdc	-	0-3VDC
Factory Setting	-	0-10 VDC or 4-20 mA	-	0-10 VDC or 4-20 mA
Span	-	adjustable	-	adjustable
Running time for 90°	adjustable- see RE actuator selection table			
Humidity	95% RH noncondensing			
Housing type	NEMA type 4/4x (pending UL, CSA approval)			
Housing material	cast aluminum			
Operating temperature †	-40°F to 150°F (-40°C to 65°C)			
Noise level	max. 20 dBA	20 dBA	<45 dBA running	
Servicing	maintenance free			
Agency ratings	UL 873 or UL60730 listed, CE-UL certified to CSA C22.2 No. 24-93 (pending CE approval for plenum models)			
Options:				
Heater & Thermostat †	for outdoor & harsh environments			
Override Handwheel	non-spoked for safety			
Over current Alarm Relay	output rating: 130 mA max., 9-130 VAC/DC			
Weight	17 lb		25 lbs‡	

* Input signal range from 9-130 VAC or VDC

** Does not include line loss. Add 16 VA if heater and stat (H/S) is used

†Optional heater and stat required for low temperatures, high humidity, extreme condensation or outdoor applications.

‡For "T" versions add 38 & 78 lbs respectively for the Torque Maximizer.

RE Actuator Selection				
Pinch Valve	Actuator Model No.	in-lb	N-m	Speed* sec/90°
2-Position On-Off				
1/2"	RE3.0F1	300	34	10-25
3/4"	RE6.0F1	600	68	10-25
1"	RE6.0F1	600	68	10-25
1-1/2"	RE10F1	1000	114	35-75
2"	RE20F1	2000	227	35-70
3"	**RE15TF1	3825	434	35-70
Modulating (0-10 V or 4-20 mA)				
1/2"	RE3.0G1	300	34	10-25
3/4"	RE6.0G1	600	68	10-25
1"	RE6.0G1	600	68	10-25
1-1/2"	RE10G1	1000	114	35-70
2"	RE20G1	2000	227	35-70
3"	RE15TG1**	3825	434	35-70

* speed is adjustable and varies slightly with load.

** Requires optional torque maximizer (added gear reduction between actuator & valve)

Torque Maximizer for 3" pinch valves

The Torque Maximizer permits Model RE actuators to operate at required torques up to 10,200 in-lbs. It also allows the actuator to be mounted in applications with space or location limitations.

The Torque Maximizer provides added gear reduction between the actuator and the valve, thereby increasing the torque of the actuator. This product is 85% efficient in transferring the torque from the input to output drive shaft. This unit bolts directly onto the base of the RE actuator, then the combined actuator/gear

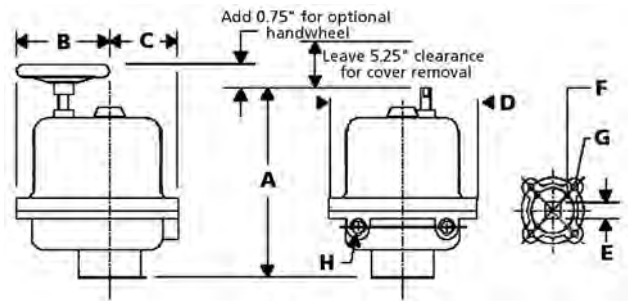
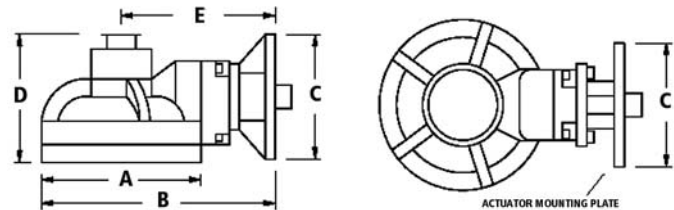


Table 2 RE Dimensions (inches)								
Actuator Model No.	A	S	C	D	E	F	G	H
RE3 - RE6	9.93	5.15	3.48	7.42	0.75 sq. 0.63 deep	N/A	5/16-16UNC-2B 0.625 deep BC: 3.25	1/2" NPT
RE10 - RE20	11.65	6.07	4.40	9.75	1.00 sq. 2.00 deep	3/8-16UNC-2B 1.12 deep BC: 4.00	7/16-16UNC-2B 1.50 deep BC: 4.965	3/4" NPT



Model Option	Weight (lbs)	Torque Maximizer Dimensions (inches)				
		A	B	C	D	E
T (used for 3" size pinch valves)	38	7.25	10.63	5.25	4.63	7.00

ORDERING INFORMATION

BUILD PART NUMBER FROM BELOW VALVE MATRIX: A-B-C-D-E-F-G-H-I

EXAMPLE: 22-1/2"-01-08-01-AP-OF-RE-OH-CUL

A Valve Series	B Size	C Diaphragm Spool Material	D Body Material	E Connections	F Actuation	G Application	H Actuator
22	1/2" 3/4" 1" 1-1/2" 2" 3"	00= Natural Rubber 01= Neoprene 02= Buna-N 04= Hypalon 05= EPDM 06= Chlorobutyl 07= Viton 15= PTFE/EPDM	08= Vynlester fiberglass composite	01= ANSI Class 150 Flange Dim.	NO= None (bare stem) HK= Handle Kit AP= Automation Package (see columns G,H & I)	OF= On-Off Control FC= Proportional/Modulating Flow Control; FC option uses a thicker diaphragm spool and modified closure cams. Purchase of a spare diaphragm spool is recommended for FC.	- = None RE= RE Electric Actuator Assembled to Valve (See RE Actuator Selection Table if ordering separate from Pinch Valve)

Actuator Options

AS(2,3)= Auxiliary Switch(es)
HT= Heater/thermostat (Outdoor Applications)
OH= Override Handwheel
AR= Over Current Alarm Relay
cUL= cUL Certification (must be ordered with actuator if required)

PNEUMATIC ACTUATORS ARE ALSO AVAILABLE, PLEASE CALL US TO DISCUSS YOUR APPLICATION

TAKASAGO

Series P Pneumatic Isolation Valves

Air Operated, Two Way & Three Way

DESCRIPTION

Model Series P pneumatic isolation valves are pressure actuated and have orifice sizes from 1.8 to 5 mm.

The valves are particularly suitable for applications where use of air instead of electricity to actuate the valve makes sense such as explosive and inflammable environments. The wetted components are ideal for high purity or chemically aggressive media.

Type PDT are air operated valves with outer dimensions of Ø44.5 x 52.0 mm. The orifice diameter is 4.0, 5.0 mm or 6.0 mm. PTFE material is used for the isolation diaphragms and valve body materials include PTFE, PEEK and PPS. Certain models are available with Perfluor or FPM soft seals intended to provide the best performance where particulate matter may be present in the fluid stream.

Type PMDP are small air operated valves with outer dimensions of Ø25.0 x 47.7 mm. The orifice diameter is 1.8 or 2.0 mm. PEEK or PPS is used for the body and PTFE for the isolation diaphragm. A perfluoro elastomer soft seal material provides valve seat protection where particulate matter is present in

SPECIFICATIONS

Actuation Pressure: 300 to 600 kPa (43.5 to 87 PSI)

Air Supply Port: PDT-1/8-27 NPT; PMDT-1/4-28



PDT Series

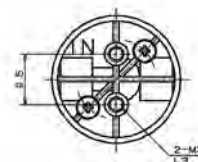
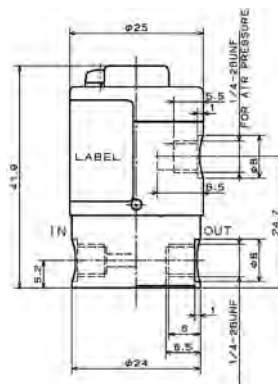
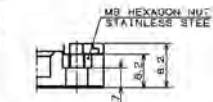
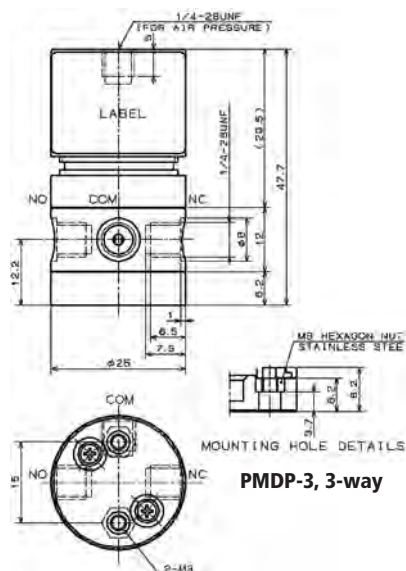
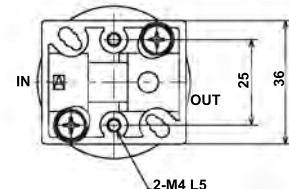
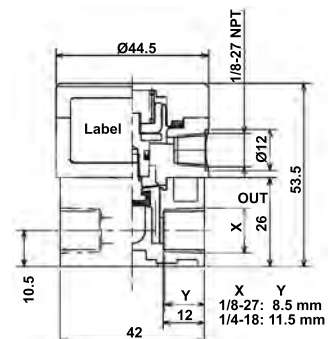
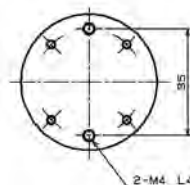
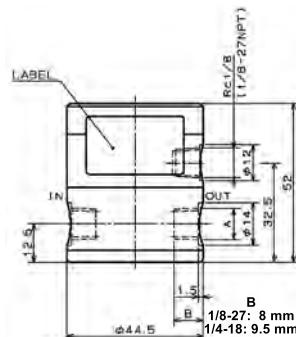
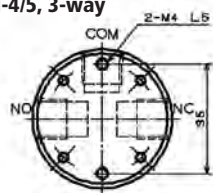
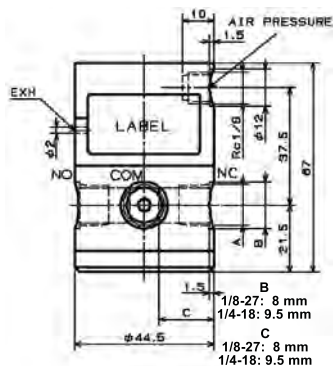


PMDP Series

Model PDT								Pressure Rating				
Model	Config.	Orifice Size	Port Connections	Valve Body	Isolation Diaphragm	Soft Seal	Valve Stem	Common (Inlet)	Normally Closed	Normally Open	Media Temp	Ambient Temp
PDT-4E1/8N	3-way	4 mm	1/8-27 NPT	Machined PTFE	PTFE	-	PCTFE	300kPa (43.5 PSI)	150 kPa (21.8 PSI)	150 kPa (21.8 PSI)	0-60°C	0-60°C
PDT-4E1/4N	3-way	4 mm	1/4-18 NPT		PTFE	-	PCTFE					
PDT-5E1/8N	3-way	5 mm	1/8-27 NPT		PTFE	-	PCTFE					
PDT-5E1/4N	3-way	5 mm	1/4-18 NPT		PTFE	--	PCTFE					
PDT-4C1/8N	2-way, NC	4 mm	1/8-27 NPT		PTFE	--	-		0-100 Kpa (14.5 PSI)			
PDT-4C1/4N	2-way, NC	4 mm	1/4-18 NPT		PTFE	-	-					
PDT-5C1/8N	2-way, NC	5 mm	1/8-27 NPT		PTFE	-	-					
PDT-5C1/4N	2-way, NC	5 mm	1/4-18 NPT		PTFE	-	-					
PDT-02(K,R)B1/8N(F,G)	2-way, NO	4 mm	1/8-27 NPT	Injection Molded PEEK/PPS	PTFE	FPM/Perfluor	-	200 kPa (29 PSI)	-	50 kPa (7.25 PSI)	Perfluor Soft Seal 5-60°C	Perfluor Soft Seal 5-60°C
PDT-02(K,R)B1/4N(F,G)	2-way, NO	4 mm	1/8-27 NPT		PTFE	FPM/Perfluor			-			
PDT-02(K,R)D1/8N(F,G)	2-way, NO	6 mm	1/8-27 NPT		PTFE	FPM/Perfluor			-			
PDT-02(K,R)D1/4N(F,G)	2-way, NO	6 mm	1/4-18 NPT		PTFE	FPM/Perfluor			-			
PDT-2(K,R)B1/8N(F,G)	2-way, NC	4 mm	1/8-27 NPT		PTFE	FPM/Perfluor			50 kPa (7.25 PSI)	-	FPM Soft Seal 0-60°C	FPM Soft Seal 0-60°C
PDT-2(K,R)B1/4N(F,G)	2-way, NC	4 mm	1/4-18 NPT		PTFE	FPM/Perfluor				-		
PDT-2(K,R)D1/8N(F,G)	2-way, NC	6 mm	1/8-27 NPT		PTFE	FPM/Perfluor				-		
PDT-2(K,R)D1/4N(F,G)	2-way, NC	6 mm	1/4-18 NPT		PTFE	FPM/Perfluor				-		

Model PMDP								Pressure Rating				
Model	Config.	Orifice Size	Port Connections	Valve Body	Isolation Diaphragm	Soft Seal	Valve Stem	Common (Inlet)	Normally Closed	Normally Open	Media Temp	Ambient Temp
PMDP-3-M6RG	3-way	2 mm	M6	PPS	PTFE	Perfluor	PPS	0-400 kPa (58 PSI)	0-100 Kpa (14.5 PSI)	0-100 Kpa (14.5 PSI)	5-60°C	5-60°C
PMDP-3-1/4URG	3-way	2 mm	1/4-28	PPS	PTFE	Perfluor	PPS					
PMDP-3-M6KG	3-way	2 mm	M6	PEEK	PTFE	Perfluor	PEEK					
PMDP-3-1/4UKG	3-way	2 mm	1/4-28	PEEK	PTFE	Perfluor	PEEK					
PMDP-2R-M6G	2-way NC	2 mm	M6	PPS	PTFE	Perfluor	-	-100mm Hg to 500 Kpa (3.94" Hg to 72.5 PSI)	0-300 kPa (0-43.5 PSI)	-		
PMDP-2R-1/4UG	2-way NC	2 mm	1/4-28	PPS	PTFE	Perfluor	-			-		
PMDP-2K-M6G	2-way NC	2 mm	M6	PPS	PTFE	Perfluor	-			-		
PMDP-2K-1/4UG	2-way NC	2 mm	1/4-28	PPS	PTFE	Perfluor	-			-		

DIMENSIONS



Motor Actuated Valve Application Guide

Ball Valves, Globe Valves & Butterfly Valves

INTRODUCTION

The control valve is one of the most important items in a fluidic system. If greater attention were paid to the proper sizing and application of control valves there would be fewer flow control problems. A valve that is undersized can result in insufficient flow at design conditions. An oversized valve is subject to instability as it attempts to control flow over a very small portion of its overall flow range. In effect, an oversized valve will have a much greater change in flow for the same change in signal as a properly sized valve.



FLOW COEFFICIENT (CV)

The single most important piece of information needed to select a control valve is the valve sizing coefficient, Cv. Cv is defined as the flow rate in U.S.gallons of water (at 60°F) that will pass through the valve in one minute with a differential pressure across the valve of 1 PSI. A valve's Cv is unique to the size, angle of opening and manufacturer's style. The information to consider in determining the Cv includes:

Table A	Variable	Water	Steam	Chemicals
	Line Size	size (inches)	size (inches)	size (inches)
	Flow Rate of Application	GPM	LBS/Hr or BTUH	GPM
	Pressure Drop (DP) of the Coil or Application	PSID	PSID	PSID
	Temperature of Fluid	°F	°F	°F
	Chemical Type	%Glycol (if any)	Any Additives?	Specify Type
	Additive Concentration	NA	NA	%

When these variables are known, the Cv required for the application can be determined using the formulas on the following pages of this bulletin. Regardless of the Cv, the valve size should not exceed the line size. For modulating applications, it is typically one or two sizes smaller than line size.

CONTROL VALVE PRESSURE DROP

In most instances, the only variable when calculating the Cv required of the valve is the pressure drop (DP) across the valve. The pressure drop across a valve is always measured with the valve fully open. In HVAC applications the heat exchange coil has typically been selected (or already exists) before the valve is chosen, therefore the GPM and pressure drop of the coil should be known. For optimal control, the pressure drop across the control valve should be equal to, or slightly greater than, the pressure drop of the coil and its fittings. This will ensure that the valve will control the flow through the coil through its entire range of travel. When controlling flow for a non-coil application, the same principle applies as indicated above for coil applications. Whatever the valve is directly controlling should be viewed as a system with a specific opening at the valve. The pressure upstream and downstream of the system determine the amount of flow through the system. Therefore, the ideal pressure drop across the control valve should be equal to, or greater than, the pressure drop of the system that is being controlled.

WATER APPLICATIONS

Two-Position Control

- Ball,globe or butterfly valves can be used for this application.
- The pressure drop across the valve should be low (usually less than 2 PSI)in its open position.
- Valves for this purpose are typically selected at line size to minimize installation cost and pressure drop. In some applications, ball and butterfly valves can be used one size smaller than line size without dropping enough pressure to affect system performance.

Modulating Control

- The pressure drop across a two-way valve should be equal to,or slightly greater than,the pressure drop of the coil and its fittings. On a three-way valve,the pressure drop is based on the drop between the common port of the valve and the port which you are trying to control (with the port fully open). A typical coil pressure drop for HVAC applications is usually 3 PSI or less. This is the reason why a 3-5 PSI pressure drop across the valve has been used as a rule of thumb.

STEAM APPLICATIONS

Steam applications can be divided into two categories depending on the steam pressure present: inlet steam pressures that are less than or equal to 15 PSIG, and those that are greater than 15 PSIG. The standard pressure drop used in the Cv equation for saturated steam is 80% of the inlet gauge pressure for steam less than or equal to 15 PSIG, and 42% of the inlet absolute pressure for steam greater than 15 PSIG. A valve used for modulating control will typically be at least one size smaller than the line size and may be two or more sizes smaller.

Low Pressure Steam (less than or equal to 15 PSIG):

–Two-Position Control: The valve is usually selected as line size.

–Modulating Control: The pressure drop across the valve for proper modulation is typically 80% of the inlet gauge pressure. Use the steam equation below to determine the Cv.

Example : A system with a 10 PSIG inlet pressure should have a valve sized with an 8 PSI drop. $10 \text{ PSIG} \times .8 = 8 \text{ PSI}$

High Pressure Steam (greater than 15 PSIG):

–Two-Position Control: The valve is usually selected to be line size.

–Modulating Control: The pressure drop across the valve for proper modulation is typically 42% of the inlet absolute pressure (absolute pressure is gauge pressure plus local atmospheric pressure, 14.7 PSIA at sea level).

Example : A system with a 20 PSIG inlet pressure should have a valve sized with a 14.6 PSI drop. $(20 \text{ PSIG} + 14.7) \times .42 = 14.6 \text{ PSI}$

VALVE SIZING

The next step in sizing any valve is to calculate the Cv requirement using the information gathered from the outline on Table A. The Cv can be determined using several methods, but the most accurate method is to use the formulas listed below. The Cv calculated should always determine the valve size selected. Remember that different valve types of the same size (globe, ball or butterfly) will have different Cv ratings. After calculating the Cv with the equation listed below, if the valve size that you initially select is smaller than line size, refer to Tables B to H to determine the valve Cv adjusted for line size.

Water Valves

$$Cv = Q / \sqrt{DP}$$

Where: Cv = the valve sizing coefficient

Q = flow in gallons per minute (GPM)

DP = pressure drop across the valve (PSI)

Liquids other than water

$$Cv = Q \times \sqrt{Sg / DP}$$

Where: Cv = the valve sizing coefficient

Q = flow in gallons per minute (GPM)

Sg = specific gravity of the liquid

DP = pressure drop across the valve (PSI)

Steam (Saturated)

$$Cv = Q / (3 \times \sqrt{DP \times P_2})$$

Where: Cv = the valve sizing coefficient

Q = Steam flow in pounds per hour (Lbs/Hr)

DP = Pressure drop across the valve in PSI

= .80 (PSIG) of the valve inlet gauge pressure for steam ≤ 15 PSIG

= .42 (PSIA) of the valve inlet absolute pressure for steam > 15 PSIG

PSIG = Steam gauge pressure (PSIG)

PSIA = Steam absolute pressure (PSIA), equal to PSIG + 14.7 (at sea level)

P₂ = Steam outlet absolute pressure (PSIA) = (Steam inlet gauge pressure + 14.7) - DP

Note: It is extremely important to use PSIG for steam inlet 15 PSIG and under and PSIA for steam inlet greater than 15 PSIG.

VALVE SELECTION

Once the pressure drop and subsequent Cv requirement is established, the most appropriate and cost effective valve for the application can be determined. Factors that influence the decision are:

–Fluid type (i.e. water, steam, chemicals, etc.)

–Fluid pressure and temperature

–Temperature fluctuation of the fluid (Example: Will the valve control fluid at 180 °F then 40 °F?)

–Close-off requirements (the torque required at a specific differential pressure to close the valve)

–Requirements for tight shut-off (allowable leakage rate; no leakage at specified differential or an acceptable %)

–Ambient conditions (i.e. temperature, humidity, special conditions, indoor or outdoor applications, etc.)

Valve selection can be divided into the five common HVAC applications:

1) Two-position control of hot or chilled water

2) Two-position control of steam

3)Modulating control of hot or chilled water

4)Modulating control of steam.

5)Two-position or modulating control of water or steam with the valve subjected to a wide variation of temperature (Example:180°F hot water then 45°F chilled water)

These five applications will be examined separately and the most cost effective valve solution that provides proper control will be noted.

1)Two-Position Control: Isolation of Hot or Chilled Water

For valve sizes 1/2"to 2", the ball valve is a very cost effective choice. Ball valves provide tight close-off for the rated differential, and in this size range have female NPT threads which make installation easy. The trim materials are stainless steel ball and stem for extended valve life. The ball valve can produce cost savings as high as 50%over a comparable globe valve alternative. For three-way operation, ball valves should only be applied in diverting service to maintain their inherent equal percentage type flow characteristics and extend seal life. For valve sizes 2-1/2"and up, the butterfly valve is the most cost effective solution. Beginning at 2-1/2", material costs and increased actuator torque requirements increase ball valve pricing beyond that of the butterfly valve. Butterfly valves offer excellent temperature isolation between the fluid and actuator, as well as tight shut-off on resilient seated models, when applied for the correct differential pressure. Butterfly valves also provide flexibility, with options for choosing the material for the body, seat and disc to extend the temperature and application range of the product.

2)Two-Position Control: Isolation of Low Pressure Steam (less than or equal to 15 PSIG)

On valves 1/2"to 6",the globe valve is the most common type, although a special ball valve assembly designed for steam has better close-off, less pressure drop, and a much higher flow rate than a globe valve of the same size. On 1/2" to 3" applications, ball valves are more cost effective than globe valves, with a much higher body pressure rating. Both the globe valve and our specially designed ball valve offer good temperature isolation between the valve and its actuator. Clark offers a complete line of globe and ball valve assemblies, with options for spring return and non-spring return actuators. On sizes 2-1/2"and up, butterfly valves should also be examined for cost effectiveness. Standard aluminum bronze valves are used for saturated steam applications <10 PSIG. For steam >10 PSIG, but <30 PSIG, butterfly valves should be equipped with Viton seats to handle the elevated steam temperatures (for pure steam only, chemical additives may cause damage to the seats). For 10 PSIG or greater, high performance butterfly valves are well suited for steam applications. Clark offers Viton seats for standard butterfly valves and high performance butterfly valves for higher temperatures and pressures.

3)Modulating Control: Hot Water or Chilled Water Two-Way & Three-Way Applications

For valve sizes 1/2"to 3"(Two-Way)and 1/2" to 2" (Three-Way), a ball valve is a very cost effective alternate choice for the standard globe valve, providing very accurate flow control when properly sized for the application. It also offers superior close-off to a globe valve and has an equal percentage flow curve that complements the flow curve of the coil. With a higher flow rate than a globe valve of the same NPT size, a ball valve sized for the same application will usually be smaller. For those people who prefer globe valves, Clark has a wide selection of globe valves to meet most applications.

For three-way diverting applications, the ball valve is an excellent choice. In a new construction or rework situation, a three-way ball valve placed upstream of the coil that diverts flow through the coil or bypasses the coil is a very cost effective alternative to a mixing globe valve placed on the downstream side of the coil. The ball valve will achieve the same results, offering very accurate control at a cost effective price. It also has the advantage of a packing nut that is adjustable for long term wear.

Special Note on Three-Way Ball Valves Piped for Mixing Applications:

When a three-way ball valve is piped as a mixing valve instead of a diverting valve (which it was designed to be) the flow is in the opposite direction of the valve's intended design. When piped this way, the valve will not respond with an equal percentage type curve. The flow curve is highly dependent on the pressure difference of the two flow streams being mixed. Also, the seats on either side of the ball were designed for a diverting flow pattern. If this flow direction is reversed, the seats will wear prematurely. When piped as a mixing valve, the valve may or may not provide good flow control.

Three-way mixing applications are one of the most common reasons for choosing a globe valve.

For valve sizes 2-1/2"and above, the butterfly valve is a good choice if the conditions are correct. For modulating control,the butterfly valve's Cv at a 70° angle of opening should be used to size the valve properly. Butterfly valves can control flow most effectively when operating between a 20° to 70° angle of opening. As a general rule, therefore, a butterfly valve can be used to replace a globe valve whenever the

minimum required Cv for the application exceeds the published flow rate of the butterfly valve with the disc at 20° open. If the minimum Cv required is less than the flow rate published for a 20° open position, a smaller ball or globe valve would have to be used in conjunction with the butterfly valve in order to provide good modulation throughout the complete flow range required of the coil. Example: Many large air handling units have minimum heating and cooling loads that exceed the flow rate of a properly sized butterfly valve at a 20° disc open position. In this application, a butterfly valve could be used effectively to control flow.

Special Note on Ball Valves:

Clark strongly recommends the use of a stainless ball and stem for all modulating ball valves. A chromium plated bronze ball will not withstand the continuous cycling encountered in a modulating service. The chromium plate will flake away in a short period of time, creating a leakage path and will score the seal material. The stainless steel ball has no plating to flake off and, therefore, the initial microscopic layer of Teflon that creeps into the surface pores of the ball remains there as a lubrication layer. Also, the slot on the top of a chrome plated ball (where the stem engages the ball) tends to widen with extensive modulation, allowing play when changing direction of travel (i.e. the actuator will rotate and the ball will not). The stainless ball and stem is much harder and does not widen.

4) Modulating Control: Low Pressure Steam (less than or equal to 15 PSI)

Globe valve sizes 1/2" to 6", or high temperature ball valve sizes 1/2" to 3", can effectively modulate flow. Factors that affect this decision include: the cost effectiveness of each valve assembly, Cv requirements, size constraints, close-off requirements and the temperature of the application. Clark's high temperature ball valve series with a standard port design should be applied only to low pressure steam applications when modulating the valve. At pressures above 15 PSIG, the ball valve is subject to a wear phenomenon known as wire draw, which erodes the lip of the opening of the ball and ultimately creates excessive valve leakage. For valve sizes 2-1/2" and above, butterfly valves should be considered. If the butterfly valve is being used for modulating control, the same issues apply as those discussed for modulating control of hot or chilled water. For modulating control, the valve should be used between 20° and 70° (disc position). Remember, however, that the standard aluminum bronze disc is recommended only to a temperature of 239°F (10 PSIG saturated steam). The EPDM seat, if used above the recommended temperature limit, will remold itself (permanently warp) and create a leakage path and possibly bind the valve.

5) Two-Position or Modulating Control of High Pressure Steam

Proper valve selection for high pressure steam is dependent upon the individual application. Our technical staff will gladly assist you in selecting the most appropriate and cost-effective valve solution for your application.

Globe Valve Linkages

The globe valve linkage converts the actuator's rotary motion to linear motion, which is necessary for a globe valve. The linkages are available in three types:

- 1) Zone up to 90 in-lb (depending on actuator's physical dimensions)
- 2) Low torque up to 200 in-lb
- 3) Medium torque up to 800 in-lb

The metallic linkage provides outstanding flexibility for custom applications and can be fitted with extra long legs for increased temperature isolation. The collar of the linkage can be custom machined, if necessary, to meet a wide variety of applications.

Clark High/Low Temperature Ball Valve Assemblies

Also in the 1/2" to 3" size, specially designed high/low temperature ball valves are a great alternative. A high/low temperature ball valve assembly includes upgraded trim materials with a stainless steel ball and stem, upgraded seat material, and a high stand-off stem adapter with extra-high brackets to further thermally isolate the actuator in high or low temperature applications.

Pressure (PSIG)	Temperature °F	Pressure (PSIG)	Temperature °F	Pressure (PSIG)	Temperature °F	Pressure (PSIG)	Temperature °F
0	212	125	353	250	406	450	460
2	219	130	356	255	408	460	462
4	224	135	358	260	409	470	464
6	230	140	361	265	411	480	466
8	235	145	363	270	413	490	468
10	239	150	366	275	414	500	470
15	250	155	368	280	416	510	472
20	259	160	371	285	417	520	474
25	267	165	373	290	419	530	476
30	274	170	375	295	420	540	478
35	281	175	377	300	422	550	480
40	287	180	380	310	425	560	482
45	292	185	382	320	427	570	483
50	298	190	384	330	430	580	485
55	303	195	386	340	433	590	487
60	307	200	388	350	436	600	489
65	312	205	390	360	438		
70	316	210	392	370	441		
75	320	215	394	380	443		
80	324	220	395	390	446		
85	328	225	397	400	448		
90	331	230	399	410	451		
95	335	235	401	420	453		
100	338	240	403	430	455		
105	341	245	404	440	457		
110	344						
115	347						
120	350						

NPT	Model Number	Line Size										
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"
1/2"	2-050-002	2.0	2.0	1.9	1.9	1.9	-	-	-	-	-	-
1/2"	2-050-004	4.0	3.8	3.6	3.5	3.5	-	-	-	-	-	-
1/2"	2-050-9.8	9.8	7.3	6.3	5.8	5.6	-	-	-	-	-	-
3/4"	2-075-025	-	25.0	19.5	16.3	14.8	13.4	-	-	-	-	-
3/4"	2-075-033	-	33.0	22.7	18.0	16.0	23.1	-	-	-	-	-
1"	2-100-035	-	-	35.0	31.1	27.4	23.8	22.4	-	-	-	-
1"	2-100-047	-	-	47.0	38.6	32.1	26.7	24.7	-	-	-	-
1 1/4"	2-125-047	-	-	-	47.0	44.0	37.6	34.5	32.9	-	-	-
1 1/4"	2-125-081	-	-	-	81.0	67.9	49.5	43.0	40.0	-	-	-
1 1/2"	2-150-081	-	-	-	-	81.0	68.0	58.8	54.3	50.1	-	-
1 1/2"	2-150-105	-	-	-	-	105.0	80.5	66.4	60.0	54.5	-	-
2"	2-200-105	-	-	-	-	-	105.0	97.9	90.1	81.7	77.8	-
2"	2-200-360	-	-	-	-	-	360.0	216.3	157.6	122.2	110.4	-
2 1/2"	2-250-440	-	-	-	-	-	-	440.0	329.8	217.3	184.3	-
3"	2-300-390	-	-	-	-	-	-	-	390.0	307.8	257.4	233.9

NPT	Model Number	Line Size									
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	
1/2"	3-050-002	2.0	2.0	1.9	1.9	-	-	-	-	-	
1/2"	3-050-006	6.0	5.3	4.8	4.6	-	-	-	-	-	
3/4"	3-075-012	-	12.0	11.2	11.2	10.0	-	-	-	-	
1"	3-100-014	-	-	14.0	14.0	13.3	12.9	-	-	-	
1 1/4"	3-125-022	-	-	-	-	21.7	20.8	20.2	-	-	
1 1/2"	3-150-030	-	-	-	-	30.0	29.2	28.3	27.8	-	
2"	3-200-050	-	-	-	-	-	50.0	49.2	48.1	46.7	
2"	3-200-091	-	-	-	-	-	91.0	86.3	80.8	74.5	

Table E Two-Way Electronic Globe Valves: Adjusted Cv Ratings for Piping Geometry Factor (Fp)													
NPT	Model Number	Line Size											
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
1/2"	GS2A-1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
1/2"	GS2A-1.6	1.6	1.6	1.6	1.5	1.5	-	-	-	-	-	-	-
1/2"	GS2A-2.5	2.5	2.4	2.4	2.4	2.3	-	-	-	-	-	-	-
1/2"	GS2A-4.0	4.0	3.7	3.6	3.5	3.4	-	-	-	-	-	-	-
3/4"	GS2A-6.3	-	6.3	6.2	6.0	6.0	-	-	-	-	-	-	-
1"	GS2A-10	-	-	10.0	9.9	9.7	9.6	-	-	-	-	-	-
1 1/4"	GS2A-16	-	-	-	16.0	15.9	15.5	15.3	-	-	-	-	-
1 1/2"	GS2A-25	-	-	-	-	25.0	24.5	24.0	23.7	-	-	-	-
2"	GS2A-40	-	-	-	-	-	40.0	39.6	39.0	38.2	-	-	-
2 1/2"	GS2A-63	-	-	-	-	-	-	63.0	62.5	61.1	60.2	59.6	-
3"	GS2A-100	-	-	-	-	-	-	-	100.0	98.1	96.0	94.6	93.1
4"	GS2A-160	-	-	-	-	-	-	-	-	160.0	158.3	156.0	152.9
5"	GS2A-250	-	-	-	-	-	-	-	-	-	250.0	248.1	242.5
6"	GS2A-400	-	-	-	-	-	-	-	-	-	-	400.0	392.3

Table F Three-Way Electronic Globe Valves: Adjusted Cv Ratings for Piping Geometry Factor (Fp)													
NPT	Model Number	Line Size											
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
1/2"	GS3A-1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
1/2"	GS3A-1.6	1.6	1.6	1.6	1.5	1.5	-	-	-	-	-	-	-
1/2"	GS3A-2.5	2.5	2.4	2.4	2.4	2.3	-	-	-	-	-	-	-
1/2"	GS3A-4.0	4.0	3.7	3.6	3.5	3.4	-	-	-	-	-	-	-
3/4"	GS3A-6.3	-	6.3	6.2	6.0	6.0	-	-	-	-	-	-	-
1"	GS3A-10	-	-	10.0	9.9	9.7	9.6	-	-	-	-	-	-
1 1/4"	GS3A-16	-	-	-	16.0	15.9	15.5	15.3	-	-	-	-	-
1 1/2"	GS3A-25	-	-	-	-	25.0	24.5	24.0	23.7	-	-	-	-
2"	GS3A-40	-	-	-	-	-	40.0	39.6	39.0	38.2	-	-	-
2 1/2"	GS3A-63	-	-	-	-	-	-	63.0	62.5	61.1	60.2	59.6	-
3"	GS3A-100	-	-	-	-	-	-	-	100.0	98.1	96.0	94.6	93.1
4"	GS3A-160	-	-	-	-	-	-	-	-	160.0	158.3	156.0	152.9
5"	GS3A-250	-	-	-	-	-	-	-	-	-	250.0	248.1	242.5
6"	GS3A-400	-	-	-	-	-	-	-	-	-	-	400.0	392.3

Table G Electronic Butterfly Valves: Adjusted Cv Ratings for Two-Way & Three-Way Valves with 70° Angle of Opening													
NPT	Model Number	Line Size											
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
1/2"	GS3A-1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
1/2"	GS3A-1.6	1.6	1.6	1.6	1.5	1.5	-	-	-	-	-	-	-
1/2"	GS3A-2.5	2.5	2.4	2.4	2.4	2.3	-	-	-	-	-	-	-
1/2"	GS3A-4.0	4.0	3.7	3.6	3.5	3.4	-	-	-	-	-	-	-
3/4"	GS3A-6.3	-	6.3	6.2	6.0	6.0	-	-	-	-	-	-	-
1"	GS3A-10	-	-	10.0	9.9	9.7	9.6	-	-	-	-	-	-
1 1/4"	GS3A-16	-	-	-	16.0	15.9	15.5	15.3	-	-	-	-	-
1 1/2"	GS3A-25	-	-	-	-	25.0	24.5	24.0	23.7	-	-	-	-
2"	GS3A-40	-	-	-	-	-	40.0	39.6	39.0	38.2	-	-	-
2 1/2"	GS3A-63	-	-	-	-	-	-	63.0	62.5	61.1	60.2	59.6	-
3"	GS3A-100	-	-	-	-	-	-	-	100.0	98.1	96.0	94.6	93.1
4"	GS3A-160	-	-	-	-	-	-	-	-	160.0	158.3	156.0	152.9
5"	GS3A-250	-	-	-	-	-	-	-	-	-	250.0	248.1	242.5
6"	GS3A-400	-	-	-	-	-	-	-	-	-	-	400.0	392.3

Table H Electronic Butterfly Valves: Adjusted Cv Ratings for Two-Way & Three-Way Valves with 90° Angle of Opening													
NPT	Model Number	Line Size											
		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
1/2"	GS3A-1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	-	-	-	-
1/2"	GS3A-1.6	1.6	1.6	1.6	1.5	1.5	-	-	-	-	-	-	-
1/2"	GS3A-2.5	2.5	2.4	2.4	2.4	2.3	-	-	-	-	-	-	-
1/2"	GS3A-4.0	4.0	3.7	3.6	3.5	3.4	-	-	-	-	-	-	-
3/4"	GS3A-6.3	-	6.3	6.2	6.0	6.0	-	-	-	-	-	-	-
1"	GS3A-10	-	-	10.0	9.9	9.7	9.6	-	-	-	-	-	-
1 1/4"	GS3A-16	-	-	-	16.0	15.9	15.5	15.3	-	-	-	-	-
1 1/2"	GS3A-25	-	-	-	-	25.0	24.5	24.0	23.7	-	-	-	-
2"	GS3A-40	-	-	-	-	-	40.0	39.6	39.0	38.2	-	-	-
2 1/2"	GS3A-63	-	-	-	-	-	-	63.0	62.5	61.1	60.2	59.6	-
3"	GS3A-100	-	-	-	-	-	-	-	100.0	98.1	96.0	94.6	93.1
4"	GS3A-160	-	-	-	-	-	-	-	-	160.0	158.3	156.0	152.9
5"	GS3A-250	-	-	-	-	-	-	-	-	-	250.0	248.1	242.5
6"	GS3A-400	-	-	-	-	-	-	-	-	-	-	400.0	392.3

CLARK SOLUTIONS

Model 83 Electrically Actuated Ball Valves

3/8" to 2" PVC or CPVC, 5 Second Cycle Time

DESCRIPTION

All model 83 open/close electrically actuated ball valves sizes 3/8" thru 2" have direct mounted unidirectional 90° turn actuators (115 Vac & 220 Vac, 12/24 AC & DC are reversing). The actuators are weatherproof (NEMA 4X), have a green lead for grounding, and all wire leads protrude from a 1/2" NPT conduit port.

The valves are a one-piece, compact design, non-union type. O-rings are EPDM, seats are PTFE with EPDM backing cushions. PVC conforms to ASTM D1784 Cell Classification 12454-A, and CPVC conforms to ASTM D1784 Cell Classification 23567-A.

The valves are rated 150 psi at 70°F.

SPECIFICATIONS

GENERAL

Motor Type: Unidirectional, Single phase
Voltage: 120 Vac, 50/60 Hz (15 VDC, 24 VDC, 12 VAC, 24 VAC & 220 VAC optional)

Current Draw: 2.2 Amps

Torque: 120 in-lbs

Switch: One SPDT (15 Amp rating)

Housing: Corrosion/weather proof NEMA 4X

Nominal Sizes: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2"

Connections: Socket: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2" ASTM schedule 40

Threaded: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2" NPT

Ambient Temp. Range Actuator: 150 °F

Fluid Temp. Range: 30 to 120°F

Valve Bodies, Ball, End Connector & Stem: PVC or CPVC

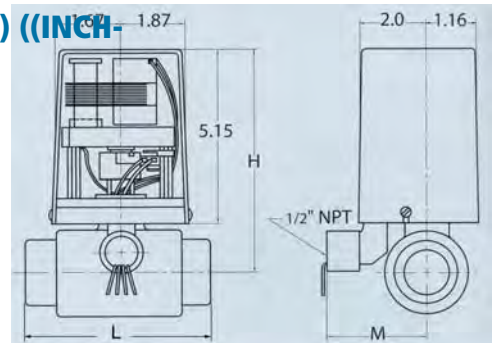
Valve Seats: PTFE backed with EPDM

Seals: EPDM



DIMENSIONS (INCHES) ((INCH-

Size (inches)	L	H	M	Cv	Wt (lbs)
3/8	3.35	5.84	2.75	7.7	1.75
1/2	3.82	5.84	2.75	14	1.75
3/4	4.06	6.24	2.75	29	2.00
1	4.45	6.25	2.75	47	2.50
1 1/4	5.00	-	-	72	-
1 1/2	5.94	6.33	2.75	140	3.00
2	6.97	6.65	2.75	185	4.00



WIRING

Voltage	Current (Amps)	Cycle Time (Seconds)	Duty Cycle (%)
115 VAC	2.10	5	25
220 VAC	0.60	5	25
12 VAC	2.25	5	75
24 VAC	4.00	5	75
12 VDC	2.00	5	75
24 VDC	3.50	5	75

ORDERING INFORMATION

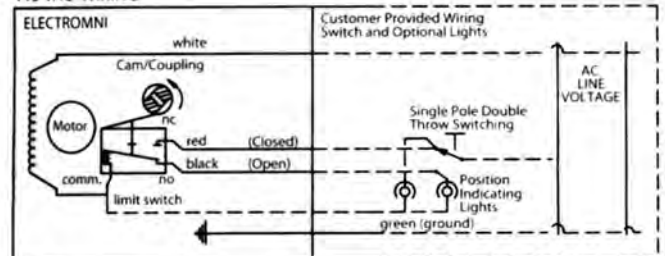
ORDER NUMBER (SEE TABLE)

83-A-B-C

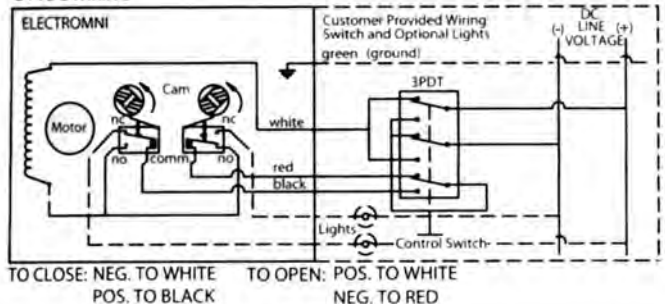
EXAMPLE: 83-005-2016-2103100

A= Size	B= Body Material & Connection Type	C= Options
003= 3/8" 005= 1/2" 007= 3/4" 010= 1" 012= 1 1/4" 015= 1 1/2" 020= 2"	2015= PVC Socket Type 2016= PVC Threaded Type 2017= CPVC Socket Type 2018= CPVC Threaded Type	-= None 2101000= 2 Position Indicating Lights ¹ 2102001= 2-Wire Control ¹ 2103100= Extra Limit Switch ¹ 2104749= 12 VDC Actuator 2104750= 24 VDC Actuator 2104751= 12 VAC Actuator 2104752= 24 VAC Actuator 2104753= 220 VAC Actuator ¹ Must be factory installed.

115 VAC WIRING



24 VDC WIRING



DEI

2-Way & 3-Way 1/2" to 3" Electronic Ball Valves

On/Off, Tri-State, & Modulating

DESCRIPTION

Clark electrically actuated ball valves are supplied with bronze or 316 stainless steel body and 316 stainless steel ball (with TFE reinforced seats) and stem. The valve stem seal is high performance graphite impregnated Teflon™. The stem seal is rated four times the modulation life of RTFE making the valve ideal for modulating or tri-state applications.

The valves have a blowout proof stem design and are individually leak tested with air under water at each end of travel. The stem packing gland nut is adjustable to compensate for wear. The valve design allows disassembly of valve top, inspection, and replacement of packing without system shutdown or valve body removal.

A High/Low temperature option provides MTFE ball seats for excellent wear on low pressure steam (≤ 15 PSI) and other applications where the temperature varies.

The valve actuator brackets are metallic, not plastic, and allow free air movement between the actuator and the valve to minimize heat transfer and condensation. The high temperature seal option adds dimension between the valve and actuator.

SPECIFICATIONS

VALVES

Sizes: 1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 3"

Operating Pressure & Temperature Rating: See Tables B & C

Operating Vacuum: to 29 inches Hg

C_v & Close off Rating: See Tables D & E, consult factory for higher differential pressure ratings than listed

Valve Body: Bronze or 316 stainless steel

Ball & Stem: 316 stainless steel

Stem Seal: High performance graphite impregnated Teflon™

Thrust Seal: Reinforced TFE

Ball Seats: Reinforced TFE or optional MTFE for high or low temperatures

Leak Testing: All valves tested to MSS-SP-72, 100 PSI air under water, in the open and closed positions

ACTUATORS

See separate actuator specification bulletins

VALVE & ACTUATOR SELECTION

- 1) Review our Motor Actuated Valve Application Guide (pg 65) and select the valve type, size & materials. Refer to Clark bulletins on Globe valves or Butterfly valves if these valve types are better suited to the application.
- 2) Review valve C_v and close-off rating chart (Tables D&E) and select base valve model and actuator model
- 3) Review selected actuator specification bulletin and determine specific actuator model number
- 4) Review valve and actuator dimensions (tables F to H)
- 5) Assemble final model number using model number guidelines

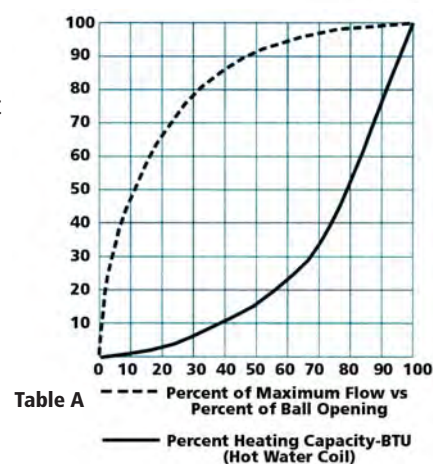


Table B Two-Way Bronze Body Temperature/Pressure Rating

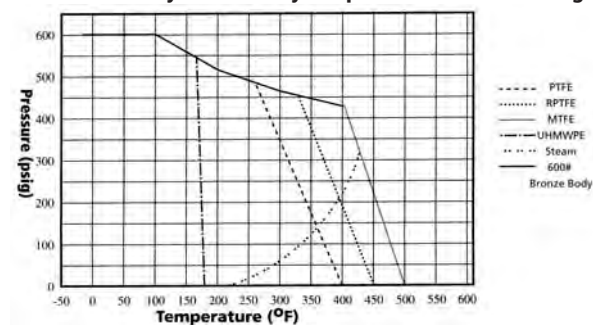


Table C Three-Way Bronze Body Temperature/Pressure Rating

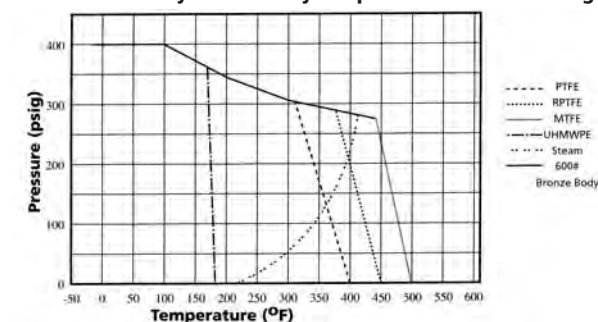


Table D Two-Way Valves			Close-Off Rating (PSI Differential Pressure)									
			Actuator Base Model Number Non-Spring Return Motors						Actuator Base Model Number Spring Return Motors			
NPT	C _v	Valve Model#	EN44	EN88	EN132	EN177	EN310	EN310(Dual)	ES62	ES75	ES142	ES142(dual)
1/2"	*	2-050-Cv	123	212	373	500	600	-	169	212	401	600
1/2"	9.8	2-050-9.8	123	212	373	500	600	-	169	212	401	600
3/4"	25	2-075-020	-	212	373	500	600	-	169	212	401	600
3/4"	33	2-073-033	-	143	283	380	600	-	-	143	305	600
1"	35	2-100-035	-	117	232	311	545	600	-	117	250	500
1"	47	2-100-047	-	-	118	159	280	559	-	-	128	351
1 1/4"	47	2-125-047	-	-	99	133	233	466	-	-	107	320
1 1/4"	81	2-125-081	-	-	-	79	139	278	-	-	64	128
1 1/2"	81	2-150-081	-	-	-	106	186	336	-	-	85	170
1 1/2"	105	2-150-105	-	-	-	-	104	208	-	-	-	95
2"	105	2-200-105	-	-	-	99	174	348	-	-	80	160
2"	360	2-200-360	-	-	-	-	90	180	-	-	-	80
2 1/2"	440	2-250-440	-	-	-	-	-	139	-	-	-	-
3"	390	2-300-390	-	-	-	-	-	139	-	-	-	-

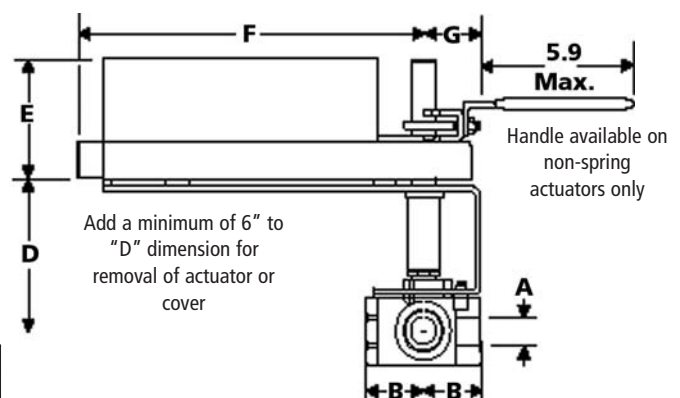
Table E Three-Way Valves			Close-Off Rating (PSI Differential Pressure)									
			Actuator Base Model Number Non-Spring Return Motors						Actuator Base Model Number Spring Return Motors			
NPT	C _v	Valve Model#	EN44	EN88	EN132	EN177	EN310	EN310(Dual)	ES62	ES75	ES142	ES142(dual)
1/2"	*	3-050-Cv	123	212	298	400	-	-	169	212	400	-
1/2"	6	3-050-006	123	212	298	400	-	-	169	212	400	-
3/4"	12	3-075-012	-	212	298	400	-	-	169	212	400	-
1"	14	3-100-014	-	117	232	311	400	-	-	117	250	400
1 1/4"	22	3-125-022	-	-	99	133	233	400	-	-	107	320
1 1/2"	30	3-150-030	-	-	79	106	186	348	-	-	85	170
2"	50	3-200-050	-	-	-	-	81	163	-	-	-	74
2"	91	3-200-091	-	-	-	-	81	163	-	-	-	74

* Specify Cv in closest number when ordering a special reduced size Cv (i.e., 0.5, 1, 2, 3...up to 5 for three-way and 9 for two-way)

Note: Weather Proof housings or Type RE Actuator are available for NEMA 4 application requirements and/or where higher close-off is required, please consult us

Table F Dimensions Two-Way Valve, 1/2" through 1"						
Size	Cv	Model	Dimensions (inches)			
			A	B	C†	D**
1/2"	***	2-050-Cv	0.5	1.1	NA	3.1
1/2"	9.8	2-050-9.8	0.5	1.1	NA	3.1
3/4"	25	2-075-025	0.7	1.5	NA	3.3
3/4"	33	2-075-033	0.8	1.6	NA	3.3
1"	35	2-100-035	0.9	1.7	NA	3.4
Three-Way Valve, 1/2" through 1"						
1/2"	***	3-050-Cv	0.5	1.1	1.2	3.1
1/2"	6	3-050-006	0.5	1.1	1.2	3.1
3/4"	12	3-075-012	0.7	1.5	1.6	3.3
1"	14	3-100-014	1.0	2.0	1.7	3.4

Actuator Dimensions				
Actuator	Dimensions (inches)			
	E	F	G	H‡
Spring Return				
ES62	2.5	6.4	1.7	3.2
ES75/142	2.9	8.8	2.3	4.0
Non-Spring Return				
EN44/88	2.4	3.8	1.7	2.8
EN132	2.5	6.4	1.7	3.2
EN177	2.9	8.8	2.3	4.0



** Add 2.3 inches for "HT" applications

*** Cv per customer spec

† "C" dimension from center line of valve to face of port (three-way valves only)

‡ "H" dimension is width of motor

Table G Dimensions Two-Way Valve, 1" through 2"						
Size	Cv	Model	Dimensions (inches)			
			A	B	C†	D*
1"	47	2-100-047	1	1.8	NA	3.4
1 1/4"	47	2-125-047	1	2	NA	4.1
1 1/4"	81	2-125-081	1.3	2.1	NA	4.1
1 1/2"	81	2-150-081	1.3	2.2	NA	4.1
2"	105	2-200-105	1.5	2.4	NA	5.9
Three-Way Valve, 1" through 2"						
1 1/4"	22	3-125-022	1	2	2.4	4.1
1 1/2"	30	3-150-030	1.3	2.2	2.4	4.4
2"	50	3-200-050	1.5	2.4	2.5	5.9
2"	91	3-200-091	2	2.7	2.7	7.7

Actuator Dimensions				
Actuator	Dimensions (inches)			
	E**	F	G	H‡
Spring Return				
ES142	2.9	8.8	2.3	4.0
Non-Spring Return				
EN132	2.5	6.4	1.7	3.2
EN177/310	2.9	8.8	2.3	4.0

* Add 4.0 inches for "HT" applications

** Add 4.0" for dual actuator applications

† "C" dimension from center line of valve to face of port (three-way valves only)

‡ "H" dimension is width of motor

Table H Dimensions, Two-Way Valve, 1 1/2" through 3"					
Size	Cv	Model	Dimensions (inches)		
			A	B	C*
1 1/2"	105	2-150-105	1.5	4.8	8.2
2"	360	2-200-360	2	5.4	8.5
2 1/2"	440	2-250-440	2.5	6.5	8.9
3"	390	2-300-390	2.5	6.8	8.9

Actuator Dimensions				
Actuator	Dimensions (inches)			
	D**	E	F	G†
Spring Return				
ES142	2.9	8.8	2.3	4.0
Non-Spring Return				
EN310	2.9	8.8	2.3	4.0

* Dimensions are valid for both standard and "HT" versions

** Add 4.0" for dual actuator applications

† "G" dimension is width of motor

ORDERING INFORMATION

1) SPECIFY ACTUATOR MODEL NUMBER: FIRST SELECT BASE ACTUATOR FROM TABLES D & E, THEN SEE SPECIFIC ACTUATOR SPECIFICATION SHEETS TO DETERMINE COMPLETE MODEL NUMBER

Non-Spring Return Actuators

EN44 & EN88: *Pages 82-83

EN132, EN177 & EN310: *Pages 84-85

Spring Return Actuators

ES62, ES75 & ES142: *Pages 88-89

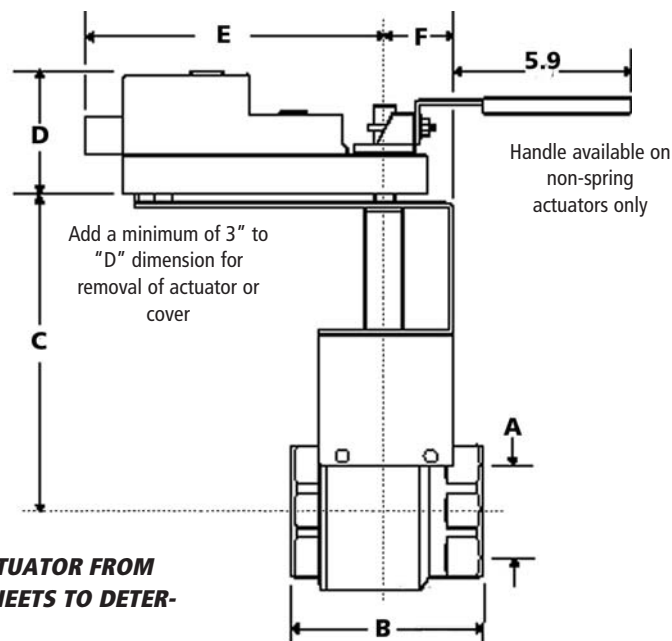
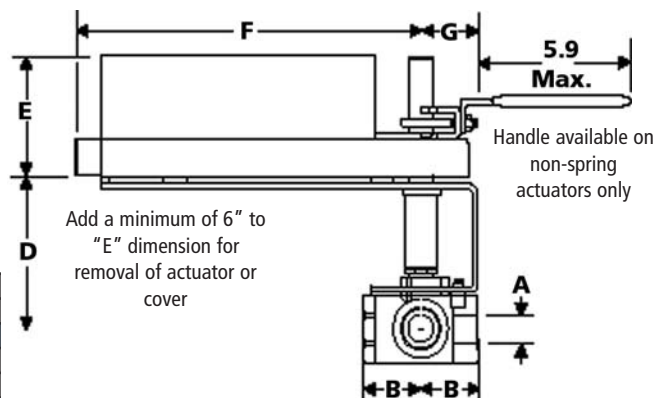
* From www.clarksol.com use hyperlinks

2) SPECIFY VALVE MODEL NUMBER (A-B-C-D), SEE TABLES BELOW

EXAMPLE: EN88C2 - 2-075-020-N-SBS

ACTUATOR VALVE

Valve Model Selection			
A= Base Model	B= Valve Body Material	C= Options	D= Valve Trim Materials
See Tables D & E	- = Bronze (standard) SS= Stainless Steel	N= None WP= NEMA 4/4x actuator enclosure HT= Steam Service (MTFE packing & seat seals)	SBS= Stainless Ball & Stem (standard)



BONOMI

8E Series Electric Actuated NEMA 4X Ball Valves

1/4" to 4" Brass & Stainless Steel, 2-way & 3-way configurations



MODEL SERIES 8E064/68

64: Direct mount 2-way brass full port valve

68: Direct Mount 2-way brass full



MODEL SERIES 8E065/66

65: Direct mount 3-way brass

standard "T" port valve

66: Direct Mount 3-way brass



MODEL SERIES 8E067

67: Direct mount 2-way SS full port valve



MODEL SERIES 8E069/70/71/72

69: Direct Mount 3-way SS standard "T" port valve

70: Direct Mount 3-way SS standard "L" port valve

71 Direct Mount 3-way SS full port "T" valve

72: Direct Mount 3-way SS full port "L" valve

Actuator Features

- NEMA 4X, IP 65, IP 67 Enclosure
- 12v DC/AC, 24v DC/AC, 100-240 VAC
- Manual Over-ride
- ON/Off or optional modulating operation
- Optional fail safe battery backup
- Torque limiter built-in
- Standard heater is activated when actuator powered and temp. is below 77°F
- Standard position indicator
- Two auxiliary limit switches are standard

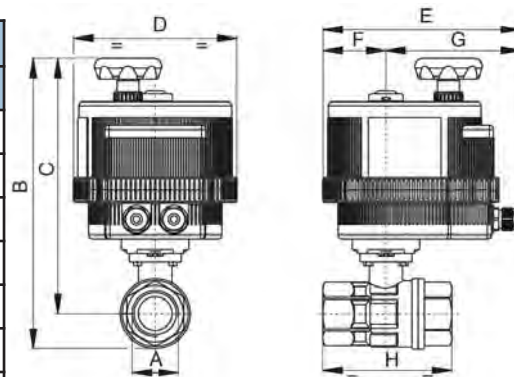
-Low Torque Valve Stem & Valve Seat Design Means Smaller Actuators
-Square Stem Valve Design With ISO 5211 Actuator Pad For Structural Strength
-Complete Design Control With Integrated Components From One Manufacturer

General Valve Specifications

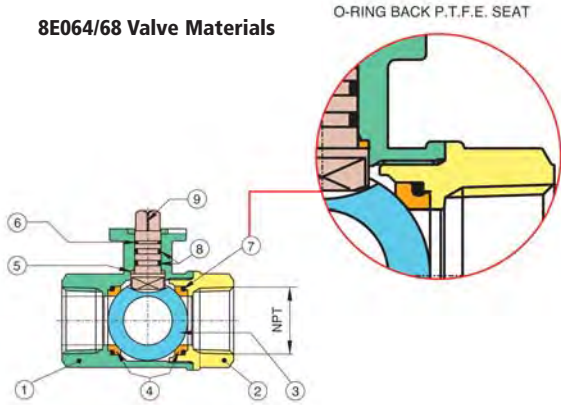
8E064/68 2-Way Brass	8E065/66 3-Way Brass	8E067 2-Way SS	8E069/70/71/72 3-Way SS
<ul style="list-style-type: none">- Full Port from 1/4" to 4"-*PSI Pressure Rating 600 WOG - 150 WSP-Temperature to 366°F-Blow out proof stem, chrome plated brass ball (SS Ball Model 68)-P.T.F.E. seats w/o-ring backing for low operating torque-P.T.F.E. seats and double o-ring stem packing-100% electronically tested in the open & closed position	<ul style="list-style-type: none">- "T" & "L" Ports from 1/4" to 3"-*PSI Pressure Rating 400 WOG - 100 WSP-Temperature to 344°FFour seat design for sealing between pressurized ports-Blow out proof stem, chrome plated brass ball-P.T.F.E. seats w/o-ring backing for low operating torque-P.T.F.E. seats and double o-ring stem packing-100% electronically tested in the open & closed position	<ul style="list-style-type: none">- Full Port from 1/4" to 3"-2 pc stainless steel ASTM A351 - CF8M-*PSI Pressure Rating 1000 WOG - 150 WSP-Temperature to 366°F-Blow out proof stem-P.T.F.E. seats w/o-ring backing for low operating torque-P.T.F.E. seats and double o-ring stem packing-100% electronically tested in the open & closed position	<ul style="list-style-type: none">- Full Port from 1/4" to 2"; Standard port from 1/2" to 2"-Stainless steel ASTM A351 - CF8M-Self adjusting stem packing-*PSI Pressure Rating 1000 WOG (1/4 to 1"), 800 WOG (1/4" to 2")-Temperature range -20°F to 450°F-Blow out proof stem-100% electronically tested in the open & closed position
* WOG-Water, Oil, Gas max. pressure capability over temp. range WSP- Working Steam Pressure, max. steam pressure at the highest temperature rating			

VALVE DIMENSIONS & MATERIALS OF CONSTRUCTION

8E064/68 2-Way Brass Dimensions (inches)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
A	0.25	0.375	0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00
B	7.51	7.51	7.51	7.72	8.33	8.63	11.30	12.0	14.20	14.90	16.90
C	6.85	6.85	6.85	6.93	7.36	7.50	9.92	10.20	11.90	12.30	13.70
D	4.84	4.84	4.84	4.84	4.84	4.84	6.18	6.18	7.28	7.28	8.31
E	6.41	6.41	6.41	6.41	6.41	6.41	7.50	7.50	8.43	8.43	9.33
F	2.64	2.64	2.64	3.00	3.35	3.66	4.15	4.80	6.10	6.89	8.03
Actuator	VB015	VB015	VB015	VB015	VB015	VB015	VB030	VB030	VB060	VB060	VB0110



8E064/68 Valve Materials

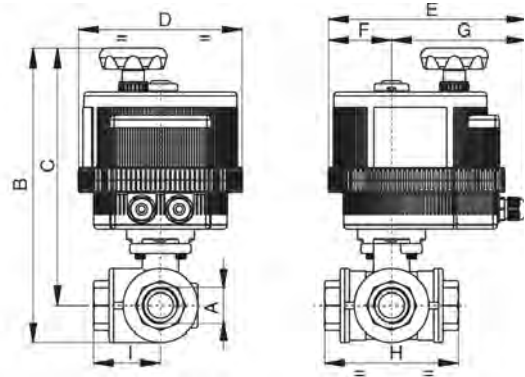


	Part Name	Material 8E064	Material 8E068	QTY
1	Body	*Brass CW617N (C37700)	*Brass CW617N (C37700)	1
2	End Connection	*Brass CW617N (C37700)	*Brass CW617N (C37700)	1
3	Ball	*Brass CW617N (C37700)	Stainless Steel STM A351 - CF8M	1
4	Ball Seat	P.T.F.E.	P.T.F.E.	2
5	Thrust Washer	P.T.F.E.	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	P.T.F.E.	1
7	O-Ring Body	FKM (Viton®)	FKM (Viton®)	2
8	O-ring Stem	FKM (Viton®)	FKM (Viton®)	2
9	Stem	*Brass CW617N (C37700)	Stainless Steel ASTM A351 - CF8M	1

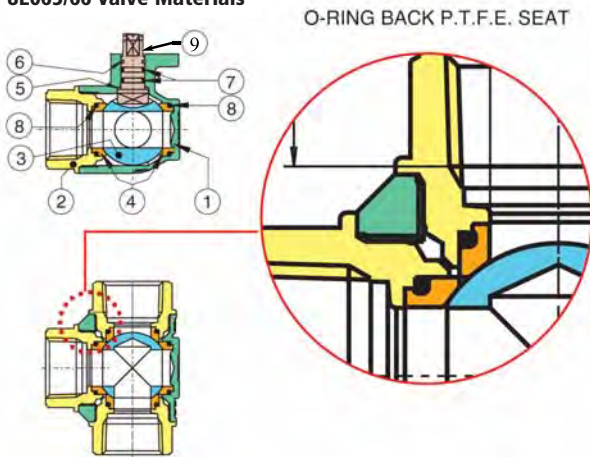
* Order Option LF- Lead Free Brass, CW510L/ASTM C28500, NSF 61 Annex F + G approved

3-Way Brass Dimensions (inches)

Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
A	0.39	0.43	0.43	0.59	0.79	0.98	1.26	1.57	1.95	1.95
B	7.44	7.44	7.44	7.63	9.98	10.40	11.10	13.00	13.30	13.30
C	6.77	6.77	6.77	6.86	9.03	9.25	9.74	11.30	11.90	11.90
D	4.84	4.84	4.84	4.84	6.18	6.18	6.18	7.28	7.28	7.28
E	6.41	6.41	6.41	6.41	7.50	7.50	7.50	8.43	8.43	8.43
F	2.64	2.64	2.87	3.19	3.74	4.39	4.86	5.73	6.93	7.08
G	1.32	1.32	1.44	1.60	1.87	2.20	2.43	2.87	3.47	3.54
Actuator	VB015	VB015	VB015	VB015	VB030	VB030	VB030	VB060	VB060	VB060



8E065/66 Valve Materials

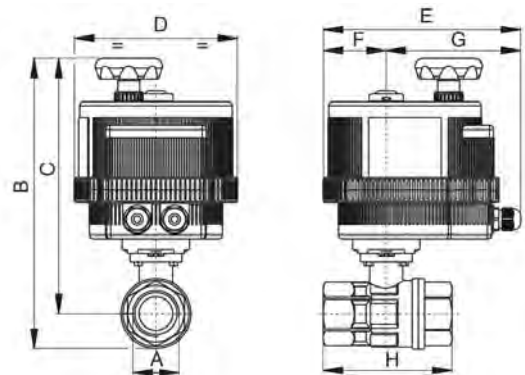


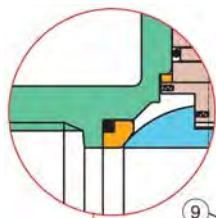
	Part Name	Material 8E065/66	QTY
1	Body	*Brass CW617N (C37700)	1
2	End Connection	*Brass CW617N (C37700)	3
3	Ball	*Brass CW617N (C37700)	1
4	Ball Seat	P.T.F.E.	4
5	Thrust Washer	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	1
7	O-Ring Stem	FKM (Viton®)	2
8	O-ring Body	FKM (Viton®)	2
9	Stem	*Brass CW617N (C37700)	1

** Order Option LF- Lead Free Brass, CW510L/ASTM C28500, NSF 61 Annex F + G approved

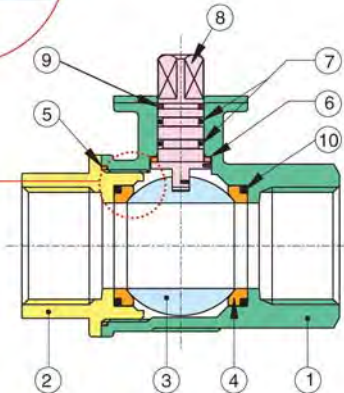
8E067 2-Way Stainless Steel Dimensions (inches)

Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
A	0.25	0.375	0.50	0.75	1.00	1.25	1.50	2.00	2.50	3.00
B	7.77	7.70	7.53	7.76	8.33	8.73	11.40	12.10	15.00	15.80
C	7.00	7.00	6.85	6.93	7.32	7.46	9.88	10.20	13.00	13.30
D	4.84	4.84	4.84	4.84	4.84	4.84	6.18	6.18	7.28	8.19
E	6.41	6.41	6.41	6.41	6.41	6.41	7.50	7.50	8.43	8.43
F	2.60	2.60	2.63	3.02	3.54	3.93	4.40	5.81	6.40	7.00
Actuator	VB015	VB015	VB015	VB015	VB015	VB015	VB030	VB030	VB060	VB110



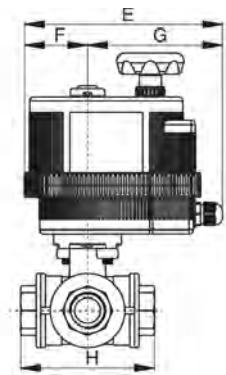
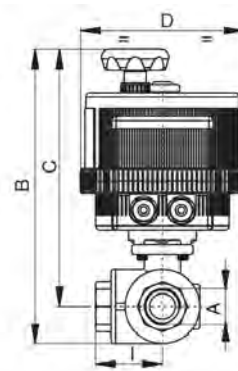


8E067 Valve Materials

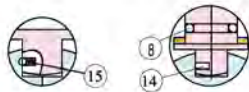
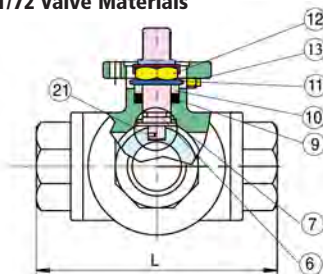


	Part Name	Material 8E067	QTY
1	Body	ASTM A351 CF8M	1
2	End Connection	ASTM A351 CF8M	1
3	Ball	ASTM A351 CF8M	1
4	Ball Seat	P.T.F.E.	2
5	Seat	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	1
7	O-Ring	FKM (Viton®)	2
8	Stem	ASTM A351 CF8M	1
9	Stem Seat	P.T.F.E.	1
10	O-Ring	FKM (Viton®)	2

8E069/70/71/72 3-Way Stainless Steel Dimensions (inches)								
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A-Full Port	0.25	0.470	0.59	0.78	0.98	1.25	1.50	2.00
A-Std Port	-	-	0.47	0.59	0.78	0.98	1.25	-
B	8.40	8.40	10.30	10.30	11.80	12.40	13.90	15.10
C	7.70	7.70	9.10	9.10	10.70	11.00	12.10	12.90
D	4.84	4.84	3.18	6.18	7.28	7.28	8.19	8.19
E	6.41	6.41	7.50	7.50	8.43	8.43	9.33	9.33
F	2.83	2.83	3.26	3.89	4.40	4.92	5.86	6.85
G	1.41	1.41	1.63	1.94	2.20	2.46	2.93	3.42
Actuator	VB015	VB015	VB030	VB030	VB060	VB060	VB110	VB190

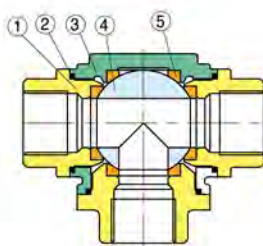
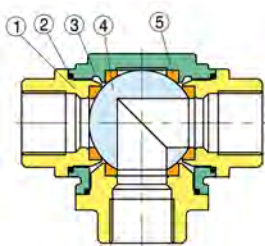


8E069/70/71/72 Valve Materials



"L" PORT

"T" PORT



	Part Name	Material 8E069/70/71/72	QTY
1	End Cap	ASTM A351 CF8M	3
2	Gaslet	P.T.F.E.	3
3	Body	ASTM A351 CF8M	1
4	Ball	ASTM A351 CF8M	1
5	Seats	R.T.F.E.	4
6	Stem	P.T.F.E.	1
7	Stem Seal	R.P.T.F.E	1
8	O-Ring	FKM (Viton®)	1
9	Stem Packing	FKM (Viton®)	1
10	Gland	304 SS	1
11	Disk Washer	301 SS	2
12	Stem Nut	304 SS	1
13	Pin Nut	304 SS	1
14	Insert Pin	316 SS	1
15	Antistatic Device	316 SS	1

VALVE ACTUATOR

Series VB actuators are designed for the automation of ball and butterfly valves for the industrial, commercial and OEM markets. A result of years of intensive R & D, advanced high-tech electrical components design and precise gearing, VB electric actuators offer the best in performance and long term reliability.

The actuator housing is made from a VO self-extinguish class techno-polymer material. The gear drive is made of two steel and techno-polymer gear wheels, sustained by hardened steel pinions, mounted on self-lubricating bushings (excluding model VB015), and inserted in a rugged die-cast aluminum structure.

The direct connection of the actuators to the valves is made via a painted die-cast aluminum plate with a dual drilled ISO 5211 interface. All actuators are provided with an electronic system and torque limiter. A heater is built-in and is activated once the actuator is powered and when the temperature inside the housing drops below 77°F to prevent condensation.

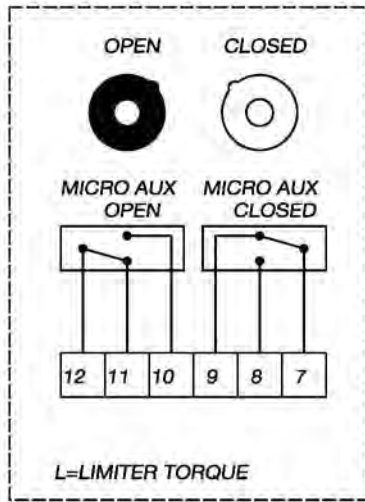
Two auxiliary limit switches are standard and optional 4-20 mA/0-10V modulating boards and battery backup protection are available.



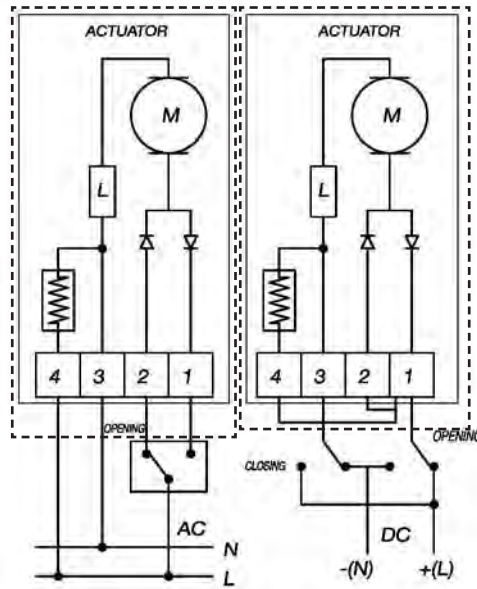
Model	VB015	VB030	VB060	VB110	VB190	VB270	VB350
Max Working Torque (in-lbs)	133	266	530	975	1680	2390	3100
Working Time (sec)	10	8	9	27	27	50	50
Operating Temperature	-4 to 131°F						
Torque Limiter	STD	STD	STD	STD	STD	STD	STD
Duty Rating	50%	75%	75%	75%	75%	75%	75%
Protection	NEMA 4 X IP65	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67
Rotation	90°	90°	90°	90°	90°	90°	90°
Optional Rotation	180°	180° or 270°	180° or 270°	180° or 270°	180° or 270°	180° or 270°	180° or 270°
Manual Override	STD	STD	STD	STD	STD	STD	STD
Position Indicator	STD	STD	STD	STD	STD	STD	STD
Heater	STD	STD	STD	STD	STD	STD	STD
Additional Limit Switches	2 supplied, VMax 250 VAC, 30 VDC, imax 1A,						
Positioner PCB 4-20 mA & 0-10 V	Not Available	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)
Linear Potentiometer 5K Ohms, 1 Watt	Not Available	Available Option	Available Option	Available Option	Available Option	Available Option	Available Option
Enclosure Electrical Conn.	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland
Version H Nominal Voltage	110VAC or 230 VAC	100-240 VAC					
Version H Current Consumption	110 VAC- 75mA 230 VAC-25mA	0.3-0.2A	0.6-0.3A				
Version H Power Consumption	110 VAC- 6.6 VA 230 VAC-6.0 VA	30-48 VA	60-72 VA				
Version L Nominal Voltage	12V or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC
Version L Current Consumption	12V- 1.2A 24V- 0.6A	12V- 2.0A 24V- 1.0A	12V- 3.6A 24V- 1.8A	12V- 2.0A 24V- 1.0A	12V- 3.6A 24V- 1.8A	12V- 3.6A 24V- 1.8A	12V- 3.6A 24V- 1.8A
Version L Power Consumption	15 VA	24 VA	44 VA	24 VA	44 VA	44 VA	44 VA
Frequency	50/60 Hz						
Weight	3.09	5.07	7.28	10.80	10.80	13.23	13.23

WIRING

VB015 12-24V AC/DC



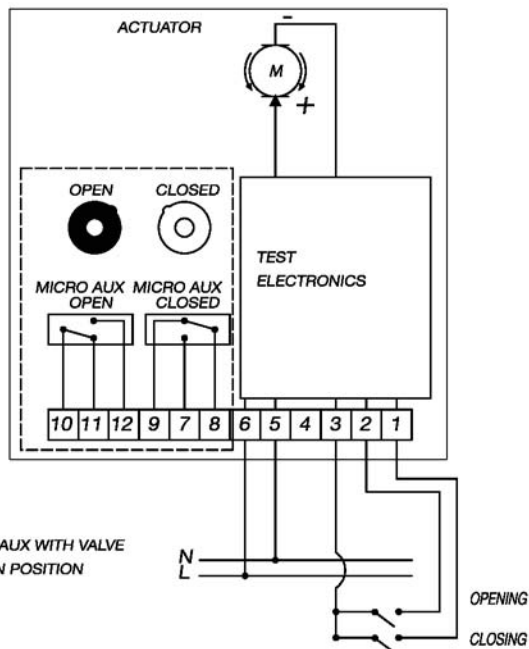
MICRO AUX WITH VALVE
IN OPEN POSITION



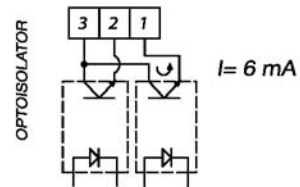
DC Power

To open: Line to 2
Neutral to 3
To Close: Line to 3
Neutral to 1

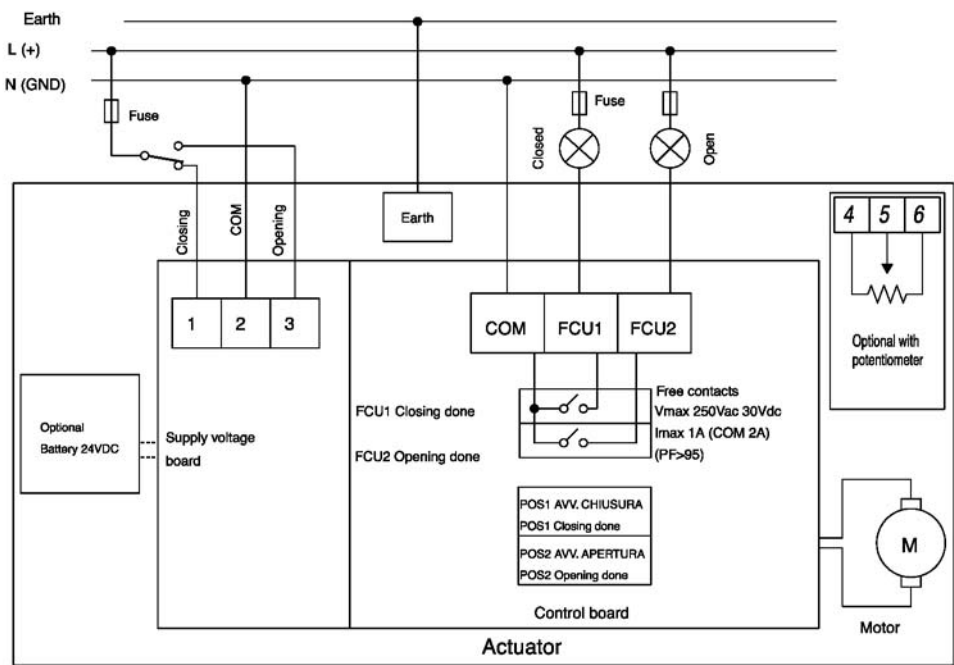
VB015 115V-230V AC



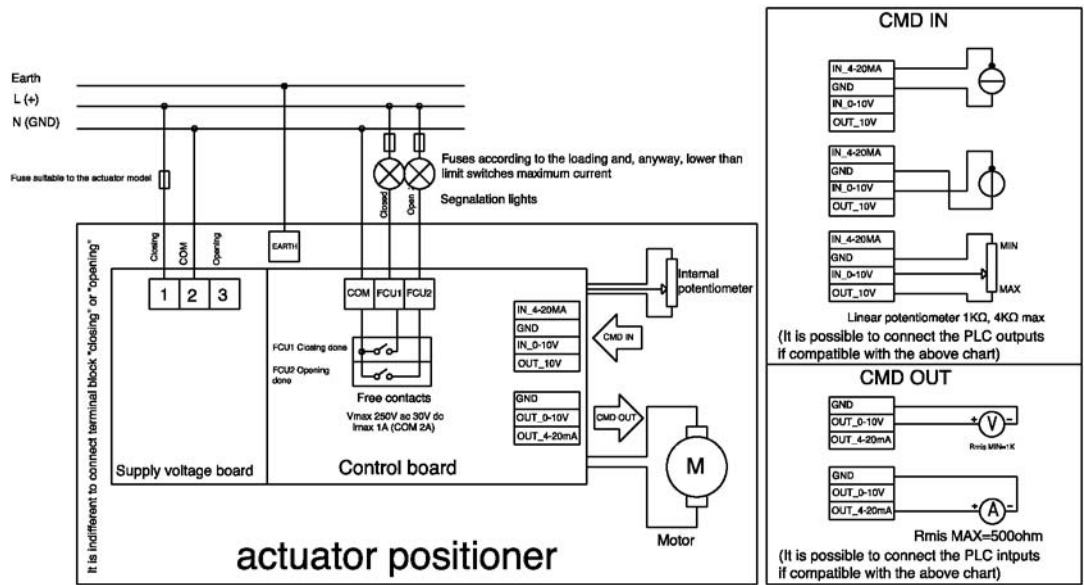
STATIC IMPULSE DRIVE OPTOISOLATED BY PLC



VB30 TO VB350 12 V DC, 24V AC/DC, 110-240 VAC



4-20 M/0-10V ACTUATOR POSITIONER WIRING VB30 TO VB350 12 V DC, 24V AC/DC, 110-240 VAC



ORDERING INFORMATION

A-BC-D

EXAMPLE: 8E068-002-1/2"

A Model	B Actuator Circuit	C Voltage	D Size/NPT Conn.
8E064(LF)= Brass 2-way (Lead Free Option) 8E068(LF)= Brass 2-way, SS Ball & Stem (Lead Free Option) 8E065(LF)= Brass 3-way, "T" port (Lead Free Option) 8E066(LF)= Brass 3-way, "L" port (Lead Free Option) 8E067= SS 2-way 8E069= SS 3-way, standard "T" port 8E070= SS 3-way, standard "L" port 8E071= SS 3-way, Full "T" port 8E072= SS 3-way, Full "L" port	00= Standard Electric Actuator 00P= Standard Electric Actuator with optional 5K Potentiometer *01= Standard Electric Actuator with Fail-safe battery back-up (12VDC not available) 02V= Actuator with 0-10V & 4-20 mA positioner circuit *Specify required valve position upon power failure	1= L1, 12 VDC 2= L2, 24V AC/DC 3= H1, 100-240 VAC	1/4" = 1/4" 3/8" = 3/8" 1/2" = 1/2" 3/4" = 3/4" 1" = 1" 1-1/4" = 1-1/4" 1-1/2" = 1-1/2" 2" = 2" 2.5" = 2-1/2" 3" = 3" 4" = 4"

BONOMI

8P Series Pneumatic Actuated Ball Valves

1/4" to 4" Brass & Stainless Steel, 2-way & 3-way configurations



SERIES 8P0080/82/135/136

- 80: Direct mount 2-way brass full port valve, DA, double acting actuator
82: Direct mount 2-way brass full port valve, SR, spring return actuator
135: Direct Mount 2-way brass full port valve, SS stem, DA, double acting actuator
136: Direct Mount 2-way brass full port valve, SS stem, SR, spring return actuator



SERIES 8P0129/131(T,L)

- 129: Direct mount 3-way brass T port valve, DA, Double Acting Actuator
131: Direct mount 3-way brass T port valve, SR, spring return actuator
130: Direct mount 3-way brass L port valve, DA, Double Acting Actuator
132: Direct mount 3-way brass L port valve, SR, spring return actuator



SERIES 8P0133/134

- 133: Direct mount 2-way SS full port valve, DA, double acting actuator
134: Direct mount 2-way SS full port valve, SR, spring return



SERIES 8P0139/141/143/145/140/142/144/146 (T,L)

- 139: Direct mount, 3-way SS, "T" std port valve, DA, double acting actuator
141: Direct mount, 3-way SS, "T" std port valve, SR, spring return actuator
143: Direct mount, 3-way SS, "T" full port valve, DA, double acting actuator
145: Direct mount, 3-way SS, "T" full port valve, SR, spring return actuator
140: Direct mount, 3-way SS, "L" std port valve, DA, double acting actuator
142: Direct mount, 3-way SS, "L" std port valve, SR, spring return actuator
144: Direct mount, 3-way SS, "L" full port valve, DA, double acting actuator
146: Direct mount, 3-way SS, "L" full port valve, SR, spring return actuator

GENERAL

Striving for low operating torque on ball valves has been the goal of every ball valve manufacturer. All 8P direct mount ball valves are designed with the lowest possible operating torque versus all other ball valves used in industry today. The traditional "floating" style ball valve that is so widely used today has sealing components that are forcibly compressed together in order to make an effective ball to seat connection. This ensures tight sealing in the field, which is a priority. However, during the assembly process the ball itself is being "driven" to seal on the downstream seat. This assembly technique, with contact of the O.D. of the ball to the downstream TFE seat forms a "set" or a deformation/indentation to the seat itself. This downstream sealing is the industry standard and perhaps the only way for general purpose ball valves to operate and effectively seal. The end result creates a high initial breakaway torque simply because, when operated, the ball is attempting to dislodge itself from the deformed downstream seating surface.

All 8P series brass and 2-way SS direct mount ball valves incorporate technologically advanced "O" ring back TFE seats to dramatically reduce operating torque. To start, viton "O" rings are inserted into grooves formed and located on the backside of the TFE seat itself. They are preassembled as a unit and then assembled into the valves.

8P valves are designed to operate with a minimum of 80 PSI air supply.

VALVE FEATURES

- Low Torque Valve Stem & Valve Seat Design Means Smaller Actuators
- Square Stem Valve Design With ISO 5211 Actuator Pad For Structural Strength
- Complete Design Control With Integrated Components From One Manufacturer
- Produced In An ISO 9001, ISO 14001, OHSAS 18001 Certified Factory

ACTUATOR FEATURES

- 0-90° Rotation adjustable $\pm 5^\circ$ by means of adjusting screws
- Standard Temp. range -40 to +185°F; Hi temp option -4 to 302°F, Lo temp option -40 to 185°F
- Twin Rack & Pinion Design
- Constant Torque Output
- Compact Design
- Standard position indicator
- Pre-lubricated for life of actuator
- Optional Limit Switches

The ball valve is fully assembled and tested with the "O" rings exerting only a minimum amount of pressure on the TFE seats. The o-rings in turn seal on both the upstream and downstream side of the ball, similar to the dynamics of a trunnion style ball valve. Due to light force exerted, only a "single point" of each seat comes in contact with the ball.

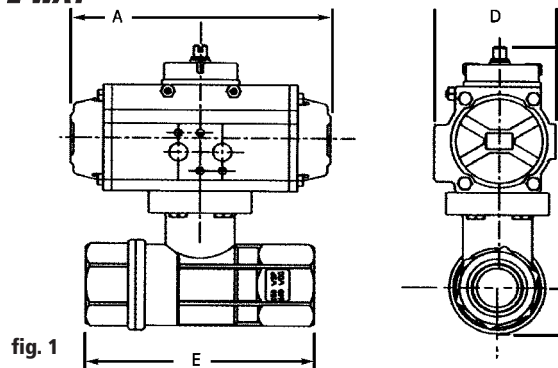
The stem sealing design of 8P direct mount valves also plays a role in lowering the torque. After each direct mount forging or investment casting is machined, they are transferred to a secondary "burnish-ing" operation performed on the stem sealing area. This special burnishing creates a micro finish in the I.D. area of the stem thus ridding each piece of potential machining imperfections and assisting in reduc-ing the valve torque. The use of dual Viton "O" ring seals along with two TFE auxiliary seals insure an excellent stem seal that does not require field adjustment as is common to conventional style ball valves.

The technological advancement of superior stem sealing and the "O" ring back seat design has allowed 8P direct mount ball valves to enjoy the reputation of having the highest performance and lowest oper-ating torque in the industry. Lower operating torque equates to the use of smaller size actuators and a smaller package profile.

General Valve Specifications			
8P080/82/135/136 2-Way Brass	8P0129/131(T,L) 3-Way Brass	8P0133/134 2-Way SS	8P0139/40/41/42/43/44/45/46 3-Way SS
<ul style="list-style-type: none"> - Full Port from 1/4" to 4" -*PSI Pressure Rating 600 WOG - 150 WSP -Temperature to 366°F -Blow out proof stem, chrome plated brass ball (SS Ball Model 68) -P.T.F.E. seats w/o-ring backing for low operating torque -P.T.F.E. seats and double o-ring stem packing -100% electronically tested in the open & 	<ul style="list-style-type: none"> - "T" & "L" Ports from 1/4" to 3" -*PSI Pressure Rating 400 WOG - 100 WSP -Temperature to 344°F Four seat design for sealing between pressurized ports -Blow out proof stem, chrome plated brass ball -P.T.F.E. seats w/o-ring backing for low operating torque -P.T.F.E. seats and double o-ring stem packing -100% electronically tested in the open & 	<ul style="list-style-type: none"> - Full Port from 1/4" to 3" -2 pc stainless steel ASTM A351 - CF8M -*PSI Pressure Rating 1000 WOG - 150 WSP -Temperature to 366°F -Blow out proof stem -P.T.F.E. seats w/o-ring backing for low operating torque -P.T.F.E. seats and double o-ring stem packing -100% electronically tested in the open & 	<ul style="list-style-type: none"> - Full Port from 1/4" to 2"; Standard port from 1/2" to 2" -Stainless steel ASTM A351 - CF8M -Self adjusting stem packing -*PSI Pressure Rating 1000 WOG (1/4 to 1"), 800 WOG (1/4" to 2") -Temperature range -20°F to 450°F -Blow out proof stem -100% electronically tested in the open & closed position at 80 PSI
* WOG-Water, Oil, Gas max. pressure capability over temp. range WSP- Working Steam Pressure, max. steam pressure at the highest temperature rating			

VALVE DIMENSIONS & MATERIALS OF CONSTRUCTION

BRASS 2-WAY



*8P0080/8P0135 2-Way Brass Dimensions (inches) with Double Acting Actuator (fig. 1)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
A	4.33	4.33	4.33	4.33	4.33	4.33	5.51	5.51	6.37	6.37	9.37
B	4.52	4.52	4.52	4.72	5.31	5.66	7.48	8.22	9.60	10.4	13.00
C	3.85	3.85	3.85	3.93	4.37	4.48	6.06	6.41	7.40	7.83	9.76
D	1.77	1.77	1.77	1.77	1.77	1.77	2.79	2.79	3.18	3.18	4.17
E	2.63	2.63	2.63	3.99	3.54	4.01	4.48	5.43	6.18	7.40	8.85
Actuator	32	32	32	32	32	32	52	52	63	63	85

* 8P0135 is available for sizes 1/4" to 2" only

*8P0082/8P0136 2-Way Brass Dimensions (inches) with Spring Return Actuator (fig. 1)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
A	5.51	5.51	5.51	5.51	5.51	5.51	6.37	6.37	9.37	9.37	10.70
B	5.51	5.51	5.51	5.59	6.29	6.61	7.91	8.66	10.70	11.50	13.50
C	4.84	4.84	4.84	4.92	5.31	5.47	6.49	6.85	8.50	8.93	10.20
D	2.79	2.79	2.79	2.79	2.79	2.79	3.18	3.18	4.17	4.17	4.84
E	2.63	2.63	2.63	2.99	3.54	4.01	4.48	5.43	6.18	7.40	8.85
Actuator	52	52	52	52	52	52	63	63	85	85	100

* 8P0136 is available for sizes 1/4" to 2" only

8P080/82/135/136 Valve Materials

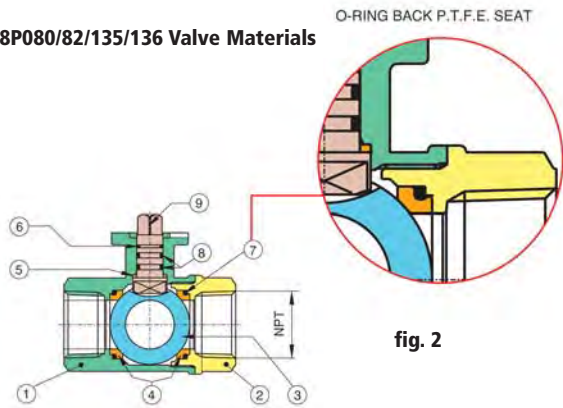


fig. 2

	Part Name	Material 8P080/82	Material 8P0135/136	QTY
1	Body	*Brass CW617N (C37700)	*Brass CW617N (C37700)	1
2	End Connection	*Brass CW617N (C37700)	*Brass CW617N (C37700)	1
3	Ball	*Brass CW617N (C37700)	Stainless Steel STM A351 - CF8M	1
4	Ball Seat	P.T.F.E.	P.T.F.E.	2
5	Thrust Washer	P.T.F.E.	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	P.T.F.E.	1
7	O-Ring Body	FKM (Viton®)	FKM (Viton®)	2
8	O-ring Stem	FKM (Viton®)	FKM (Viton®)	2
9	Stem	*Brass CW617N (C37700)	Stainless Steel ASTM A351 - CF8M	1

* Order Option LF- Lead Free Brass, CW510L/ASTM C28500, NSF 61 Annex F + G

BRASS 3-WAY

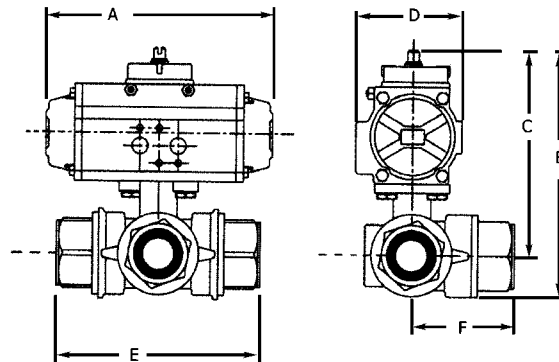


fig. 3

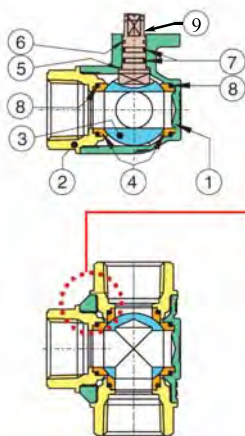
8P0129 3-Way Brass "T" Port Dimensions (inches) with Double Acting Actuator (fig 3)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	
A	4.33	4.33	4.33	4.33	5.51	5.51	6.37	8.15	8.15	8.15	
B	4.44	4.44	4.44	4.61	6.16	6.59	7.77	9.24	10.20	10.20	
C	3.81	3.78	3.74	3.86	5.23	5.47	6.47	7.58	8.04	8.10	
D	1.77	1.77	1.77	1.77	2.80	2.80	3.17	3.72	3.72	3.72	
E	2.64	2.64	2.87	3.19	3.74	4.39	4.86	5.73	6.93	7.08	
F	1.32	1.32	1.44	1.60	1.87	2.20	2.43	2.87	3.47	3.51	
Actuator	32	32	32	32	52	52	63	75	75	75	

8P0131 3-Way Brass "T" Port Dimensions (inches) with Spring Return Actuator (fig 3)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	
A	5.51	5.51	5.51	6.37	6.37	6.37	9.35	10.70	10.70	10.70	
B	5.40	5.40	5.40	5.96	6.60	7.03	8.87	10.10	11.10	11.30	
C	4.77	4.77	4.77	5.24	5.67	5.91	7.57	8.41	8.89	9.05	
D	2.80	2.80	2.80	6.37	6.37	6.37	9.35	10.70	10.70	10.70	
E	2.64	2.64	2.87	3.19	3.24	4.39	4.86	5.93	6.93	7.09	
F	1.32	1.32	1.44	1.60	1.83	2.20	2.43	2.87	3.47	3.54	
Actuator	52	52	52	63	63	63	85	100	100	100	

8P0130 3-Way Brass "L" Port Dimensions (inches) with Double Acting Actuator (fig 3)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	
A	4.33	4.33	4.33	4.33	5.51	5.51	5.51	6.37	6.37	6.37	
B	4.44	4.44	4.44	4.61	6.16	6.59	7.33	8.59	9.54	9.58	
C	3.81	3.78	3.74	3.86	5.23	5.47	6.03	6.93	7.39	7.35	
D	1.77	1.77	1.77	1.77	2.80	2.80	2.80	3.17	3.17	3.17	
E	2.64	2.64	2.87	3.19	3.74	4.39	4.86	5.73	6.93	7.08	
F	1.32	1.32	1.44	1.60	1.87	2.20	2.43	2.87	3.47	3.54	
Actuator	32	32	32	32	52	52	52	63	63	63	

8P0132 3-Way Brass "L" Port Dimensions (inches) with Spring Return Actuator (fig 3)											
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	
A	5.51	5.51	5.51	5.51	5.51	5.52	6.37	9.35	9.35	9.35	
B	5.40	5.40	5.40	5.52	6.16	6.59	7.77	9.69	10.50	10.60	
C	4.77	4.77	4.77	4.82	5.23	5.47	6.47	8.03	8.49	8.43	
D	2.80	2.80	2.80	2.80	2.80	2.80	3.17	4.17	4.17	4.17	
E	2.64	2.64	2.87	3.19	3.24	4.39	4.86	5.93	6.93	7.09	
F	1.32	1.32	1.44	1.60	1.83	2.20	2.43	2.87	3.47	3.54	
Actuator	52	52	52	52	52	52	63	85	85	85	

8P0130/32 Valve Materials



O-RING BACK P.T.F.E. SEAT

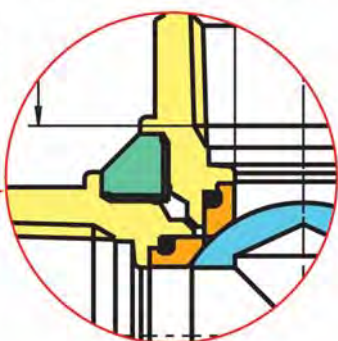


fig. 4

	Part Name	Material 8P0130/32	QTY
1	Body	*Brass CW617N (C37700)	1
2	End Connection	*Brass CW617N (C37700)	3
3	Ball	*Brass CW617N (C37700)	1
4	Ball Seat	P.T.F.E.	4
5	Thrust Washer	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	1
7	O-Ring Stem	FKM (Viton®)	2
8	O-ring Body	FKM (Viton®)	2
9	Stem	*Brass CW617N (C37700)	1

** Order Option LF- Lead Free Brass, CW510L/ASTM C28500, NSF 61 Annex F + G approved

STAINLESS STEEL 2-WAY

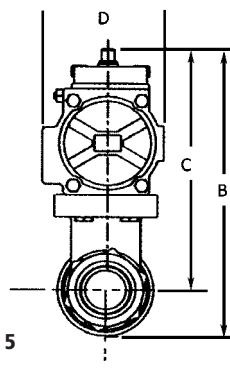
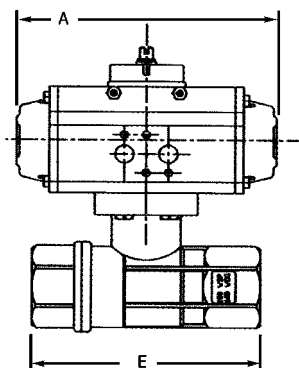


fig. 5

8P0133 2-Way Stainless Steel Dimensions (inches) with Double Acting Actuator (fig 5)										
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
A	4.33	4.33	4.33	4.33	4.33	4.33	5.51	5.51	11.60	13.30
B	4.80	4.80	4.52	4.76	5.35	5.74	7.51	8.30	11.50	12.70
C	4.00	4.00	3.85	3.93	4.33	4.44	6.02	6.37	9.21	10.10
D	1.77	1.77	1.77	1.77	1.77	1.77	2.79	2.79	3.72	4.17
E	2.56	2.56	2.63	3.07	3.54	3.93	4.40	5.31	6.33	7.00
Actuator	32	32	32	32	32	32	52	52	75	85

8P0134 2-Way Stainless Steel Dimensions (inches) with Spring Return Actuator (fig 5)										
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"
A	5.51	5.51	5.51	5.51	5.51	5.51	6.37	6.37	18.50	20.90
B	5.70	5.70	5.51	5.70	6.29	6.69	7.95	8.74	13.50	14.80
C	5.00	5.00	4.80	4.88	5.27	5.43	6.45	6.81	11.70	12.40
D	2.79	2.79	2.79	2.79	2.79	2.79	3.18	3.18	5.39	5.83
E	2.86	2.86	2.63	3.07	3.54	3.93	4.40	5.31	6.33	7.00
Actuator	52	52	52	52	52	52	63	63	115	125

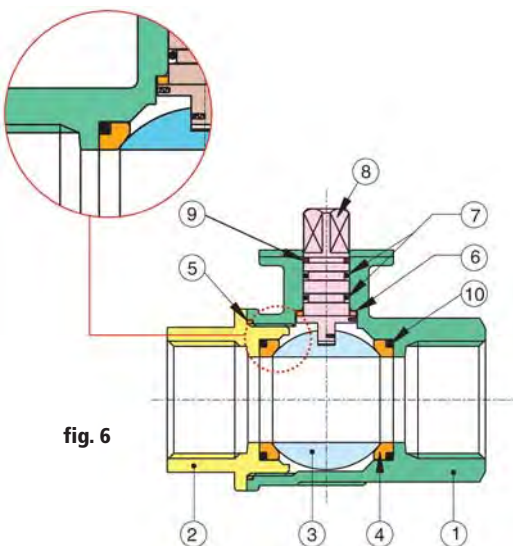
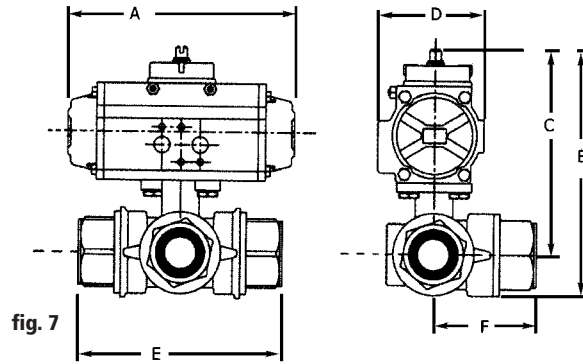


fig. 6

	Part Name	Material 8P0133/34	QTY
1	Body	ASTM A351 CF8M	1
2	End Connection	ASTM A351 CF8M	1
3	Ball	ASTM A351 CF8M	1
4	Ball Seat	P.T.F.E.	2
5	Seat	P.T.F.E.	1
6	Stem Seal	P.T.F.E.	1
7	O-Ring	FKM (Viton®)	2
8	Stem	ASTM A351 CF8M	1
9	Stem Seat	P.T.F.E.	1
10	O-Ring	FKM (Viton®)	2

STAINLESS STEEL 3-WAY



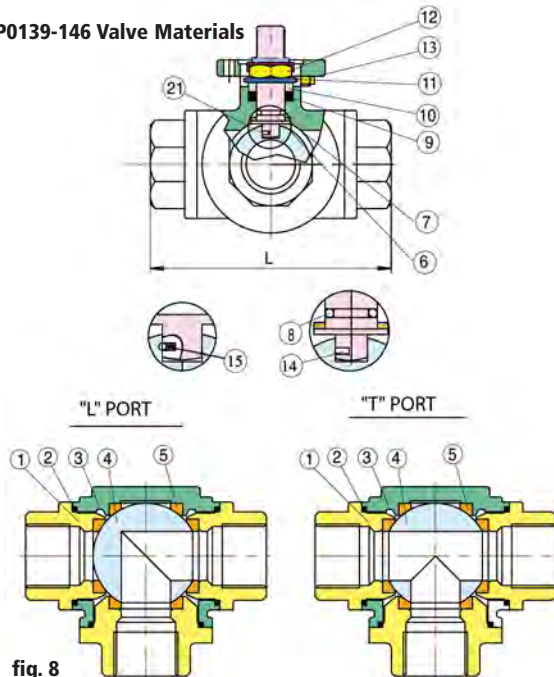
8P0139/143 3-Way Stainless Steel Std & Full "T" Port Dimensions (inches) with Double Acting Actuator (fig 7)								
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A	5.49	5.49	5.49	6.38	6.38	8.15	9.35	10.60
B	5.75	5.75	6.10	7.10	7.50	8.95	10.40	11.50
C	4.72	4.72	5.14	6.50	6.90	7.50	8.60	9.60
D	2.80	2.80	2.80	3.17	3.17	3.72	4.17	4.84
E	2.83	2.83	3.26	3.89	4.40	4.92	5.86	6.85
F	1.42	1.42	1.64	2.05	2.30	2.38	3.10	3.42
Actuator	52	52	52	63	63	75	85	100

8P0141/145 3-Way Stainless Steel Std & Full "T" Port Dimensions(inches) with Spring Return Actuator (fig 7)								
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A	6.38	6.38	6.38	8.15	8.15	10.60	10.60	14.40
B	5.98	5.98	6.25	7.75	8.00	9.85	10.70	12.40
C	5.38	5.38	6.05	6.65	7.00	8.50	9.23	10.90
D	3.17	3.17	3.17	3.72	3.72	4.84	4.84	5.83
E	2.83	2.83	3.26	3.89	4.40	4.92	5.86	6.85
F	1.42	1.42	1.64	2.05	2.30	2.38	2.38	3.42
Actuator	63	63	63	75	75	100	100	125

8P0140/144 3-Way Stainless Steel Std & Full "T" Port Dimensions (inches) with Double Acting Actuator (fig 7)								
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A	5.49	5.49	5.49	6.38	6.38	8.15	9.35	10.60
B	5.75	5.75	6.10	7.10	7.50	8.95	10.40	11.50
C	4.72	4.72	5.14	6.50	6.90	7.50	8.60	9.60
D	2.80	2.80	2.80	3.17	3.17	3.72	4.17	4.84
E	2.83	2.83	3.26	3.89	4.40	4.92	5.86	6.85
F	1.42	1.42	1.64	2.05	2.30	2.38	3.10	3.42
Actuator	52	52	52	63	63	75	85	100

8P0142/146 3-Way Stainless Steel Std & Full "T" Dimensions (inches) with Spring Return Actuator (fig 7)								
Size/NPT Conn.	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
A	6.38	6.38	6.38	8.15	8.15	10.60	10.60	14.40
B	5.98	5.98	6.25	7.75	8.00	9.85	10.70	12.40
C	5.38	5.38	6.05	6.65	7.00	8.50	9.25	10.90
D	3.17	3.17	3.17	3.72	3.72	4.84	4.84	5.83
E	2.83	2.83	3.26	3.89	4.40	4.92	5.86	6.85
F	1.42	1.42	1.64	2.05	2.30	2.38	2.38	3.42
Actuator	63	63	63	75	75	100	100	125

8P0139-146 Valve Materials



3-Way Stainless Steel Std & Full Port Orifice Sizes(inches)								
Size/NPT	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Full Port	0.25	0.470	0.59	0.78	0.98	1.25	1.50	2.00
Standard Port	-	-	0.47	0.59	0.78	0.98	1.25	-

Part Name	Material	QTY
1 End Cap	ASTM A351 CF8M	3
2 Gaslet	P.T.F.E.	3
3 Body	ASTM A351 CF8M	1
4 Ball	ASTM A351 CF8M	1
5 Seats	R.T.F.E.	4
6 Stem	P.T.F.E.	1
7 Stem Seal	R.P.T.F.E	1
8 O-Ring	FKM (Viton®)	1
9 Stem Packing	FKM (Viton®)	1
10 Gland	304 SS	1
11 Disk Washer	301 SS	2
12 Stem Nut	304 SS	1
13 Pin Nut	304 SS	1
14 Insert Pin	316 SS	1
15 Antistatic Device	316 SS	1

VALVE ACTUATORS



GENERAL SPECIFICATIONS

Types:

DA- Double Acting

SR- Spring Return

Actuation Pressure Rating: Minimum 80 PSI, maximum 115 PSI

Temperature Range:

Standard (NBR Seals): -4°F to +185°F

High Temp Option (Viton Seals): -4°F to +302°F

Low Temperature Option (Silicon Seals): -40°F to +185°F

Rotation: 0-90° adjustable $\pm 5^\circ$ in both clockwise and counterclockwise directions by means of adjusting screws outside the internal supply chambers

Position Indicator: Standard

Air Supply Connections:

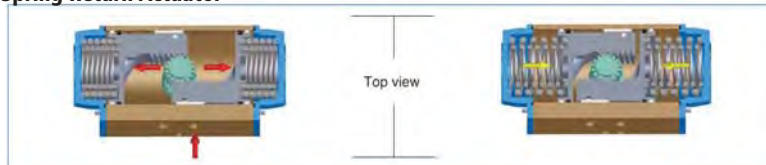
Models 32, 52, 63, 75, 85- 1/8" NPT;

Model 100- 1/4" NPT

Lubrication: Pre lubricated for life of actuator on assembly

ACTUATOR OPERATION

Spring Return Actuator



Double Acting Actuator

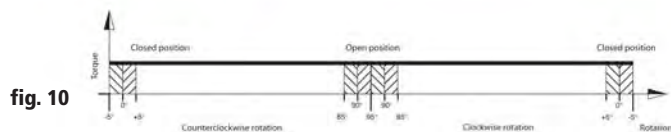
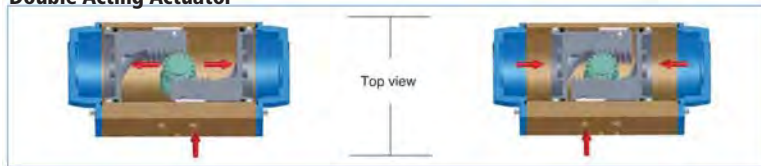


fig. 10

The torque of a double acting actuator remains constant throughout the complete actuation while the torque of the spring return actuator is not constant but decreasing. Series 8P valve assemblies have actuators selected by the factory to meet the valve torque requirements. This assumes the actuation supply pressure is a minimum of 80 PSI.

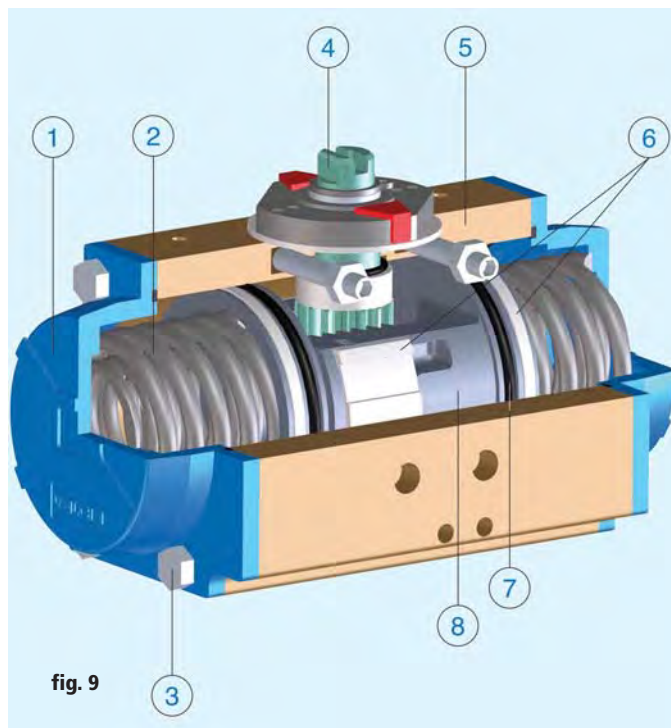


fig. 9

	Description
1	Die Cast Aluminum End Caps -Standard polyester powder coated
2	Concentric Spring Sets -Standard treatment phosphated– -High resistance and reliability - Long securing screws to allow safe dismantling for maintenance -Same body dimensions for DA/SR versions
3	Assembling Screw -Stainless Steel
4	Steel Pinion - Standard version nickel plated - Stainless steel for corrosive environments -Anti-blow out design
5	Extruded Aluminum Body UNI 6060 -Hard-coat anodized finish 40-50 (microns) -Nickel or epoxy coating optional -Good Wear & high corrosion resistance - Bore finish to high standard to ensure low friction
6	POM Piston Guides - Large contact area -Low friction material with long life
7	Seals - NBR: Standard -Viton: High temp. version -Silicon: Low temp. version
8	Pistons - Die Cast Aluminum (nickel plating available)

ANTI-BLOWOUT SYSTEM

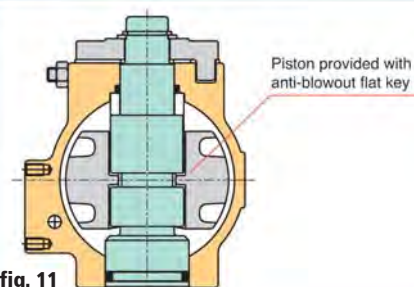


fig. 11

Model	32	52	63	75	85	100
Working Time (sec)						
Direct Acting Counterclockwise Rotation	0.03	0.03	0.06	0.12	0.20	0.30
Direct Acting Clockwise Rotation	0.03	0.04	0.08	0.12	0.19	0.27
Spring Return Counterclockwise	-	0.09	0.14	0.22	0.31	0.44
Spring Return Clockwise Rotation	-	0.09	0.14	0.22	0.33	0.46
Actuator Air Consumption (cubic inches per stroke)						
Direct Acting Counterclockwise Rotation	2.44	6.10	11.60	21.97	31.12	48.21
Direct Acting Clockwise Rotation	1.83	7.93	14.04	26.85	39.06	61.02
Spring Return Clockwise Rotation	-	6.71	11.60	21.97	32.34	48.82
Weight (lbs)						
Direct Acting	1.08	2.25	3.26	5.51	7.39	11.02
Spring Return	-	2.62	3.97	6.94	9.37	14.40

ACTUATOR PARTS

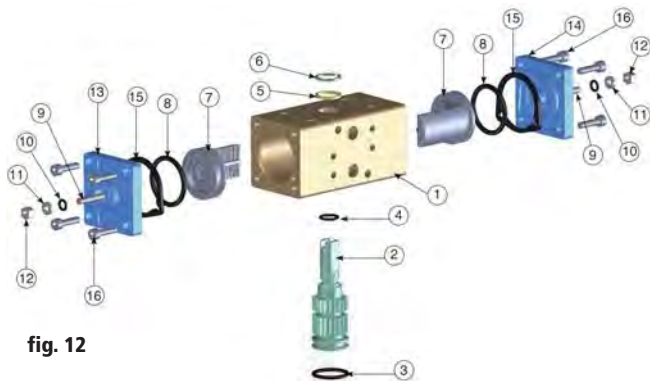


fig. 12

Model 32 Actuator Parts (fig. 12)				
	Part Name	Material	Treatment	QTY
1	Body	Extruded Aluminum	Hard Anodized	1
2	Anti-blowout pinion	Steel	Nickle plated	1
*3	Lower pinion o-ring	NBR		1
*4	Top pinion o-ring	NBR		1
*5	Spacer ring	POM		1
6	Pinion snap ring	Steel	Nickle plated	1
7	Piston	Die Cast Aluminum		2
*8	Piston o-ring	NBR		2
9	Stop bolt	Stainless steel		2
*10	Stop bolt o-ring	NBR		2
11	Washer	Stainless steel		2
12	Stop bolt retaining nut	Stainless steel		2
13	Left end cap	Die Cast Aluminum	Painted	1
14	Right end cap	Die Cast Aluminum	Painted	1
15	End cap seats	NBR		2
16	End fixing screw	Stainless steel		8
* Parts subject to wear				

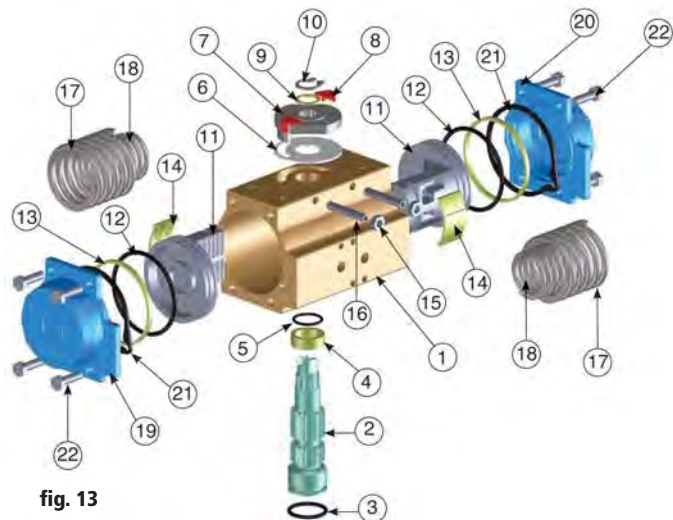


fig. 13

Model 52-100 Actuator Parts (fig. 13)					
	Part Name	Material	Treatment	QTY DA	QTY SR
1	Body	Extruded Aluminum	Hard Anodized	1	1
2	Anti-blowout pinion	Steel	Nickle plated	1	1
*3	Lower pinion o-ring	NBR		1	1
*4	Pinion spacer ring	POM		1	1
*5	Top pinion o-ring	NBR		1	1
*6	Cam spacer ring	POM		1	1
7	Cam	Stainless steel		1	1
8	Position Indicator	Nylon		2	2
9	Pinion washer	Stainless steel		1	1
10	Pinion snap ring	Reinforced steel UNI 7436	Nickle plated	1	1
11	Piston	Die Cast Aluminum		2	2
*12	Piston o-ring	NBR		2	2
*13	Anti-friction ring	POM		2	2
*14	Piston thrust block	POM		2	2
15	Stop bolt retaining nut	Stainless steel		2	2
16	Stop bolt	Stainless steel		2	2
17	External spring	Steel	Zinc-phosphate	0	**
18	Internal spring	Steel	Zinc-phosphate	0	**
19	Left end cap	Die Cast Aluminum	Painted	1	1
20	Right end cap	Die Cast Aluminum	Painted	1	1
21	End cap seats	NBR		2	2
22	End cap fixing screw	Stainless steel		8	8
* Parts subject to wear **Factory fixed dependent on model					

ACTUATOR DIMENSIONS

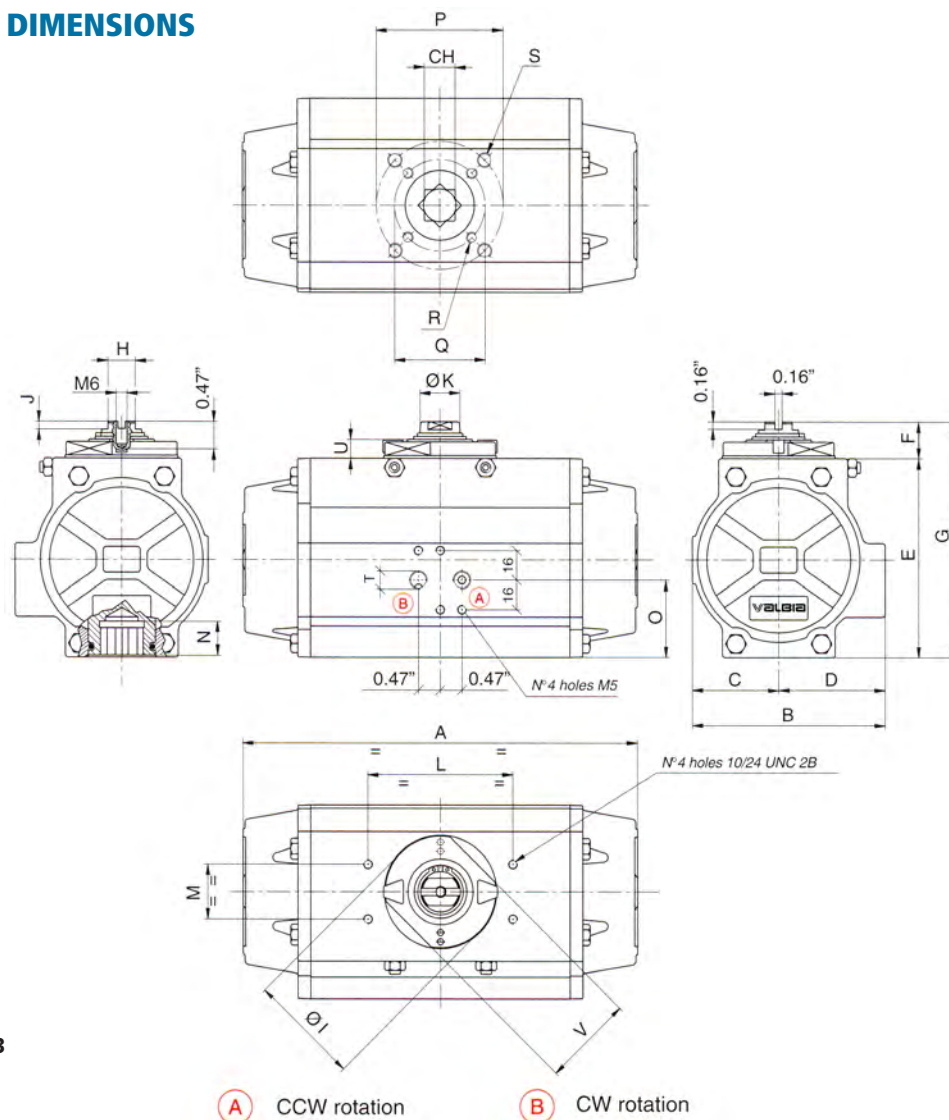


fig. 13

Dimensions (inches) Models 52 to 100 (fg. 13)																								
Mod.	Valve Flange Drilling ISO 5211	CH	A	B	C	D	E	F	G	H	ØI	J	ØK	L	M	N	O	P	Q	R	S	T NPT	U	V
52	F03-05	0.43	5.49	2.80	1.18	1.61	2.74	0.79	3.52	0.35	1.65	0.24	0.47	3.15	1.18	0.47	1.04	1.97	1.42	10-24 UNC 2Bx0.29"	1/4-20 UNC 2Bx0.35"	1/8"	0.35	1.50
63	F05-F07	0.55	6.38	3.17	1.40	1.77	3.17	0.79	3.96	0.43	1.89	0.24	0.59	3.15	1.18	0.63	1.08	2.76	1.97	1/4-20 UNC 2Bx0.31"	5/16-18UNC 2Bx0.47"	1/8"	0.35	1.61
75	F05-F07	0.67	8.15	3.72	1.65	2.07	3.82	0.79	4.61	0.51	2.40	0.18	0.75	3.15	1.18	0.75	1.38	2.76	1.97	1/4-20 UNC 2Bx0.31"	5/16-18UNC 2Bx0.47"	1/8"	0.41	1.97
85	F05-F07	0.67	9.35	4.17	1.87	2.30	4.27	0.79	5.06	0.59	2.40	0.18	0.87	3.15	1.18	0.75	1.65	2.76	1.97	1/4-20 UNC 2Bx0.31"	5/16-18UNC 2Bx0.47"	1/8"	0.41	1.97
100	F07-F10	0.67	10.69	4.84	2.17	2.68	4.78	0.79	5.57	0.59	2.40	0.18	0.87	3.15	1.18	0.81	1.97	4.02	2.76	5/16-18UNC 2Bx0.31"	3/8-16 UNC 2Bx0.55"	1/4"	0.41	1.97

ACCESSORIES

NMR1 Namur Solenoid Valve 4-way Conduit

Cv: 1.68

Ports: 1/4" NPT

Pressure Range: 20-120 PSIG

Power: 12V or 24 VDC, 110VAC

Duty Cycle: 100% continuous

Power Consumption: 2.5 W



Model	Power	Inrush Current
NMR1-C1	110 VAC	62 mA
NMR1-C2	24 VDC	108 mA
NMR1-C12	12 VDC	204 mA
NMR1-EX1	110 VAC	74 mA
NMR1-EX2	24 VDC	190 mA
NMR1-EX12	12 VDC	36 mA

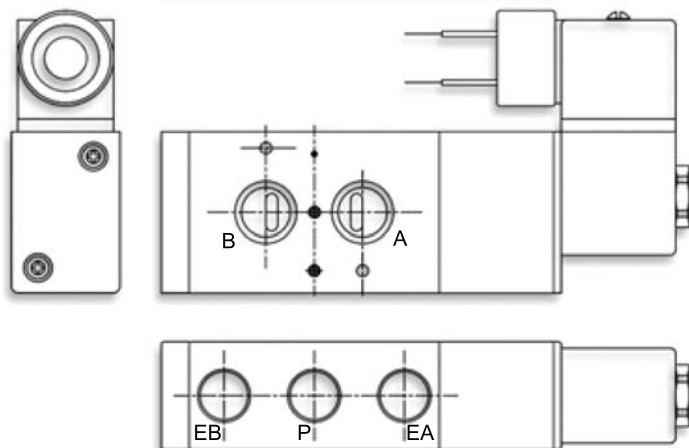
Temperature Range: 35°-130°F

Standard Accessories Supplied: NBR o-rings
and mounting screws to affix valve
directly to actuator models 32-100

Enclosure: IP 65, NEMA 4X

Conduit Connection: 1/2" NPT

Solenoid Placement Option: Option R locates
the solenoid closest to the B Supply port



Port	Standard Configuration	Solenoid Mounting Option R
A	Air Supply, closed when solenoid de-energized	Air Supply, open when solenoid de-energized
B	Air Supply, open when solenoid de-energized	Air Supply, closed when solenoid de-energized
EB	Port B exhaust	Port B exhaust
P	Pressure/Air Supply	Pressure/Air Supply
EA	Port A exhaust	Port A exhaust



Ordering Information	
Model	Description
NMR1-C1 (R)	110 VAC, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve Body)
NMR1-C2 (R)	24 VDC, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve Body)
NMR1-C12 (R)	12 VDC, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve Body)
NMR1-EX1 (R)	110 VAC, Explosion Proof, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve)
NMR1-EX2 (R)	24 VDC, Explosion Proof, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve Body)
NMR1-EX12 (R)	12 VDC, Explosion Proof, 4-Way, Conduit Conn., (R Option Solenoid Located to B Supply Port End of Valve Body)
Exhaust Port Mufflers	
SBM-2	1/4" NPT Sintered Bronze Muffler
SCM-2	1/4" NPT Speed Control Muffler



SBM-2 Bronze Muffler



SCM-2 Speed Control Muffler

Explosion Proof Option
Model NMR1-EX offers the same
operating performance as model
NMR1 except it is rated for haz-
ardous locations



Class I, Zone 1, Ex mII T4: AEx mII
Class I, Div. 1; Groups A, B, C, D
Class II, Groups A, B, C, D
T4 Ta= -20°C to +60°C
100% Duty Cycle



NMR1-EX Solenoid
Supplied with three
18", 18AWG wires
potted to the
connector, tinned
ends

Two-Way & Three-Way Electronic Globe Valves

1/2" to 6", Two-State, Tri-State, Modulating

DESCRIPTION

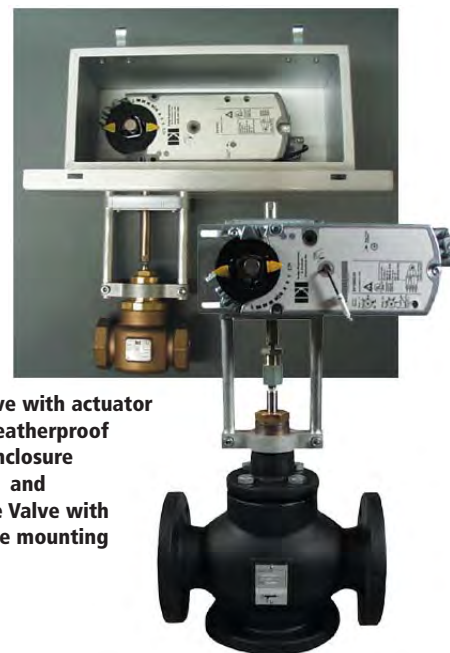
Clark Globe Valves 1/2" through 2" are bronze body, NPT screw type, and are rated for ANSI Class 250 working pressure. The operating temperature range (of the controlled medium) limits are 20° to 250°F. Valve stems are stainless steel and valve plugs are brass for water service and brass or stainless steel for steam service, depending on temperature and pressure requirements. Stem packing is EPDM O-ring or Teflon/EPDM, depending on temperature. 1/2" through 2" two-way valves are rated for 25 PSI differential for water applications and 15 PSI inlet for steam applications. 1/2" through 2" three-way valves are rated for 25 PSI differential. Optional trim materials are available for higher temperature/pressure applications. Flow type for two-way valves is equal percentage or modified equal percentage for water or steam applications. Flow type for three-way valves is linear and all screwed valves meet ANSI class IV leakage standards (not to exceed 0.01% of Cv).

Globe Valves 2-1/2" through 6" are cast iron body, flanged, and rated for ANSI Class 125 working pressure. The operating temperature range (of the controlled medium) is 20° to 250°F for water and/or low pressure steam applications (up to 15 PSI inlet pressure) with normal duty packing and up to 337°F maximum temperature with optional Teflon/EPDM V-ring packing for higher pressure steam and hot water. Valve stems are stainless steel and valve plugs are brass or stainless steel. Stem packing is EPDM O-rings or optional Teflon/V-ring/EPDM O-ring. Two-way standard valves are rated for 25 PSI differential pressure for water applications and 15 PSI differential pressure for steam applications (50 PSI differential with optional stem packing and stainless steel trim). Three-way valves are rated for 25 PSI differential (optional trim for 50 PSI differential). Flow type for two-way valves are equal percentage or modified equal percentage for water applications. Flow type for three-way valves are modified equal percentage or linear. All flanged valves meet ANSI Class IV leakage standards (not to exceed 0.01% of Cv).

Available actuators are modulating, floating (tri-state), or two-position type with or without spring return as required for the application. Each valve actuator has current limiting or stall detection circuitry incorporated into its design to prevent damage to the actuator. A gear release or manual override crank is provided on the motor to allow for manual override. The actuators are powered by a 24 VAC, 120 VAC or 24 VDC power source. Actuators are UL listed.

Table A

Specifications	1/2 to 2", Two and Three-way			Flanged 2 1/2 to 6", Two and Three-way		
Flow Characteristics	Two-way: Equal Percentage, Three-way: Linear			Two-Way: Equal Percentage, Three-Way: Mod. Equal Percentage or Linear		
Valve Body Rating	ANSI Class 250, ANSI Leakage Class IV			ANSI Class 125, ANSI Leakage Class IV (ANSI 250 available)		
Max. Recommended Inlet Pressure	Two-Way: Water 365 PSI@250°F, Steam 15 PSI Three-Way: Mixing 365 PSI@250°F, Diverting 335 PSI@300°F			Two-Way: Water 150 PSI @ 250°F, Steam: 15 PSI, 100 PSI for " -ST" only Three-Way: Mixing 150 PSI @ 250°F, Diverting (2-1/2" to 5") 140 PSI @ 300°F (6" to 8") 140 PSI @ 150°F		
Max. Recommended Diff. Pressure	Two-Way: Water 25 PSI, Steam: 15 PSI, 50 PSI for "-ST" only Three-Way: Mixing 25 PSI, Diverting 50 PSI			Two-Way: Water 25 PSI, Steam: 15 PSI, 50 PSI for "-ST" only Three-Way: Mixing 25 PSI, Diverting 50 PSI		
Maximum Close-off Pressure	See Tables B & C					
Operating Temperature Range	Two and Three-Way Mixing: 20°F to 250°F (-7°C to 121°C) Three-Way Diverting: 32°F to 300°F (0°C to 149°C)			Two and Three-Way Mixing: 20°F to 250°F (-7°C to 121°C) Three-Way Diverting: (2-1/2" to 5") 32°F to 300°F (0°C to 149°C), (6" to 8")32°F to 150°F (0°C to 66°C)		
Materials	Standard	"-SS"	"-ST"	Standard	"-SS"	"-ST"
Body	Bronze	Bronze	Bronze	Cast Iron	Cast Iron	Cast Iron
Stem	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Packing (Two and Three-Way)	EPDM O-Ring	EPDM O-Ring	Teflon / EPDM V-Ring	EPDM O-Ring	EPDM O-Ring	Teflon / EPDM V-Ring
Packing (Three-Way Diverting)	TFE V-Ring	-	-	TFE V-Ring	-	-
Trim	Bronze	Stainless Steel	Stainless Steel	Bronze	Stainless Steel	Stainless Steel
Seat	Single, metal to metal					
Connections	Female NPT			Flanged Ends		



Globe Valve with actuator in Weatherproof Enclosure and Globe Valve with Flange mounting

Table B 1/2" to 2" Globe Valve Actuator Model Number Selection Chart Threaded Ports											
Size (NPT)	Two-Way		Three-Way		Actuator Model Number/Minimum Close-Off Pressure (PSI)						
	Cv	Valve Model	Cv	Valve Model	EN44-NP	EN44	EN88	EN62	ES75	EN132	ES142
1/2"	1.0	GS2A-1.0	1.0	GS3A-1.0	143	143	>250	201	244	>250	>250
1/2"	1.6	GS2A-1.6	1.6	GS3A-1.6	143	143	>250	201	244	>250	>250
1/2"	2.5	GS2A-2.5	2.5	GS3A-2.5	143	143	>250	201	244	>250	>250
1/2"	4.0	GS2A-4.0	4.0	GS3A-4.0	143	143	>250	201	244	>250	>250
3/4"	6.3	GS2A-6.3	6.3	GS3A-6.3	83	83	167	117	142	250	>250
1"	10	GS2A-10	10	GS3A-10	59	59	118	83	100	177	190
1 1/4"	16	GS2A-16	16	GS3A-16	39	39	78	55	67	117	127
1 1/2"	25	GS2A-25	25	GS3A-25	27	27	53	38	45	79	86
2"	40	GS2A-40	40	GS3A-40	-	-	33	23	28	49	54

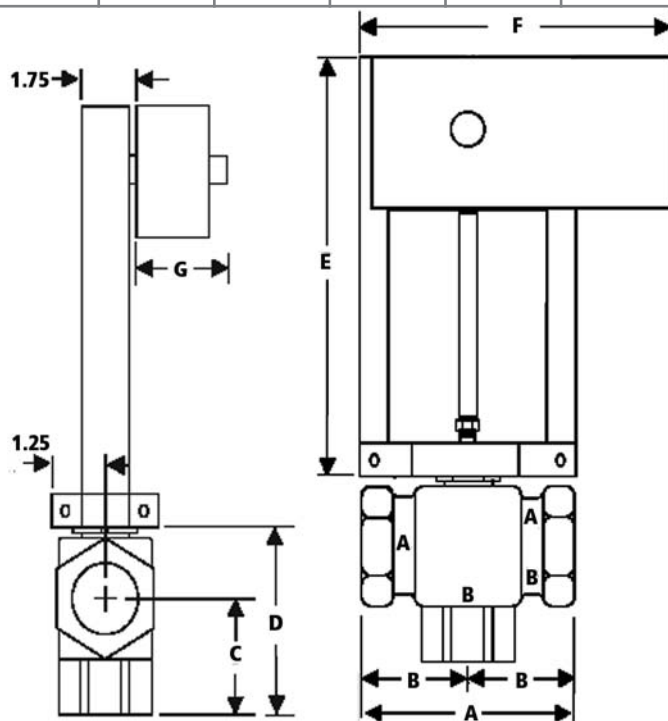
Table C 2 1/2" to 6" Globe Valve Actuator Model Number Selection Chart Flange Connections											
Size (NPT)	Two-Way		Three-Way Mixing		Three-Way Diverting		Actuator Model Number/Minimum Close-Off Pressure (PSI)				
	Cv	Valve Model	Cv	Valve Model	Cv	Valve Model	ES142	EN177	EN310	Dual ES142	Dual EN310
2 1/2"	63	GF2A-63	63	GF3A-63	68	GFD3A-68	41	51	89	81	178
3"	100	GF2A-100	100	GF3A-100	85	GFD3A-85	26	33	58	52	115
4"	160	GF2A-160	160	GF3A-160	160	GFD3A-160	10	12	21	19	42
5"	250	GF2A-250	250	GF3A-250	195	GFD3A-195	-	-	14	12	27
6"	400	GF2A-400	400	GF3A-400	270	GFD3A-270	-	-	9	9	19

DIMENSIONS (INCHES)

Table D Two-Way Valve, 1/2" through 2"					
Size	Model	Dimensions (inches)			
		A	B	C	D
1/2"	GS2A-Cv	2.75	1.38	1.13	2.94
3/4"	GS2A-6.3	3.25	1.63	1.00	3.94
1"	GS2A-10	3.75	1.88	1.50	3.75
1 1/4"	GS2A-16	5.00	2.50	1.63	4.13
1 1/2"	GS2A-25	5.06	2.53	2.00	4.28
2"	GS2A-40	6.13	3.06	2.44	4.56

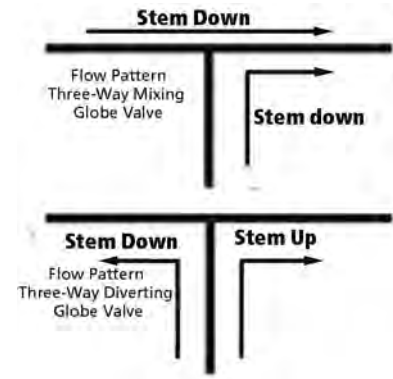
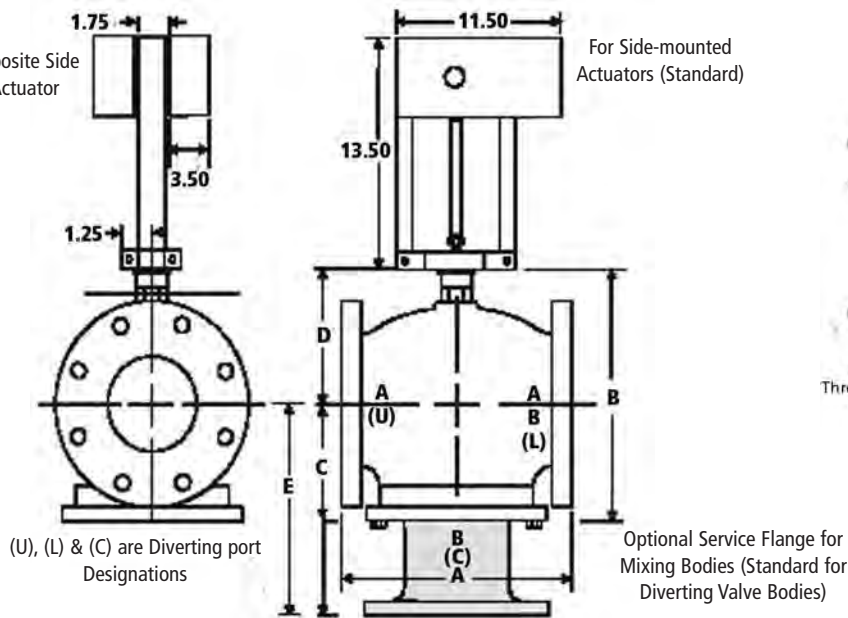
Actuator Dimensions				
Actuator	Dimensions (inches)			
	Linkage Type*	E	F	G
Spring Return				
ES62	Low	11.3	11.5	3.5
ES75	Low	11.3	11.5	3.5
ES142	Low	11.3	11.5	3.5
Non-Spring Return				
EN44/88	Zone	9.5	7.5	3.5
EN132	Low	11.3	11.5	3.5
EN177	Low	11.3	11.5	3.5
EN310	Med	13.5	11.5	3.5

"Med" to 800 in-lb. Extra long (XL) legs are available for high temperature applications and shorter legs for applications where space is limited. Call for application assistance.



*The linkage is constructed of high strength extruded aluminum alloy, torque tested to over 1200 in-lbs. Dual units are rated for continuous use at 800 in-lbs. The linkage connects valve and actuator and converts the rotary action of the actuator to linear motion. "Zone" covers torque requirements to 90 in-lb, "Low" to 200 in-lb and

Add 3.85 " Width to Opposite Side of Assembly for Dual Actuator Assemblies



Two-Way Valve, 2 1/2 to 6"												
Size	Cv	Model No.	A	B	C	Flanges		Drilling		Machine Bolts		
						Dia.	Thick.	DBC**	Dia.	Qty.	Dia.	Lgth.
2 1/2"	63	GF2A-63	10 7/8	11	4 7/8	7	3/4	5.5	3/4	4	5/8	2.50
3"	100	GF2A-100	11 3/4	12 1/4	5 5/16	7 1/2	7/8	6.0	3/4	4	5/8	2.50
4"	160	GF2A-160	13 7/8	13 9/16	6 5/16	9	1	7.5	3/4	8	5/8	3.00
5"	250	GF2A-250	15 3/4	15 3/16	7	10	1	8.5	7/8	8	3/4	3.00
6"	400	GF2A-400	17 3/4	16 3/4	7 7/8	11	1	9.5	7/8	8	3/4	3.25

Three-Way Mixing Valve, 2 1/2 to 6"												
Size	Cv	Model No.	A	B	C	Flanges		Drilling		Machine Bolts		
						Dia.	Thick.	DBC**	Dia.	Qty.	Dia.	Lgth.
2 1/2"	63	GF3A-63	10 7/8	9 3/8	3 3/4	7	11/16	5.5	3/4	4	5/8	2.50
3"	100	GF3A-100	11 3/4	10 3/4	4 3/8	7 1/2	3 4	6.0	3/4	4	5/8	2.50
4"	160	GF3A-160	13 7/8	12 1/2	5 1/8	9	15/16	7.5	3/4	8	5/8	3.00
5"	250	GF3A-250	15 3/4	13 3/4	5 3/4	10	15/16	8.5	7/8	8	3/4	3.00
6"	400	GF3A-400	17 3/4	15 1/2	6 5/8	11	1	9.5	7/8	8	3/4	3.25

Three-Way Diverting Valve, 2 1/2 to 6"												
Size	Cv	Model No.	A	D*	E	Flanges		Drilling		Machine Bolts		
						Dia.	Thick.	DBC**	Dia.	Qty.	Dia.	Lgth.
2 1/2"	68	GFD3A-68	9	5 1/2	7 1/8	7	11/16	5.5	3/4	4	5/8	2.50
3"	85	GFD3A-85	10	6 1/8	8	7 1/2	3/4	6.0	3/4	4	5/8	2.50
4"	160	GFD3A-160	13	7 1/8	9 7/8	9	15/16	7.5	3/4	8	5/8	3.00
5"	195	GFD3A-195	12	7 1/2	10 1/2	10	15/16	8.5	7/8	8	3/4	3.00
6"	270	GFD3A-270	14 1/8	7 7/8	11 1/8	11	1	9.5	7/8	8	3/4	3.25

* "D" dimension applies to three-way diverting bodies only

** DBC=Diameter of Bolt Circle

ORDERING INFORMATION

1) REVIEW OUR MOTOR ACTUATED CONTROL VALVE APPLICATION GUIDE (PAGE 65)

2) SPECIFY ACTUATOR MODEL NUMBER (FIRST SELECT BASE ACTUATOR FROM TABLES B & C, THEN SEE SPECIFIC ACTUATOR SPECIFICATION SHEETS TO DETERMINE COMPLETE MODEL NUMBER)

Non-Spring Return Actuators

EN44 & EN88: *Pages 82-83

EN132, EN177 & EN310: *Pages 84-85

Spring Return Actuators

ES62, ES75 & ES142: *Pages 86-87

* From www.clarksol.com use hyperlinks

3) SPECIFY VALVE MODEL NUMBER (SEE TABLES BELOW)

A-B-C

Example: EN88C2 - GS2A-16-WP

A Valve Base Model Number	B Optional Materials See Table A	C Other Options
See Tables B & C Standard Materials are : Body: Cast Iron Trim: Bronz Stem: Stainless Steel Packing: EPDM Seat: Single, Metal to Metal	- = Standard SS = "SS" materials ST = "ST" materials	WP=NEMA 4/4x Actuator Enclosure WS=Weather Shield

BONOMI

500 Series Manual, Electric & Pneumatic Butterfly Valves

Direct Mount Cartridge-Style ANSI 150 Butterfly Valves, 1.5" to 12" Pipe Sizes

SERIES 500 Cast Iron Wafer Body

SERIES 501 Ductile Iron Lug

Standard Models

500N - Nylon-11 Coated Disc, Wafer Body

500S - CF8M S.S. Disc, Wafer Body

501N - Nylon-11 Coated Disc, Lug Body

501S - CF8M S.S. Disc, Lug Body

Standard Features

- ISO 5211/DIN 3337 Direct Mounting Flange
- Conforms to API598, API609, and MSS SP-67
- Conforms to ASTM/ANSI B16.1 and B16.5
- Pnenolic-Backed Cartridge Seats-No Gaskets Necessary

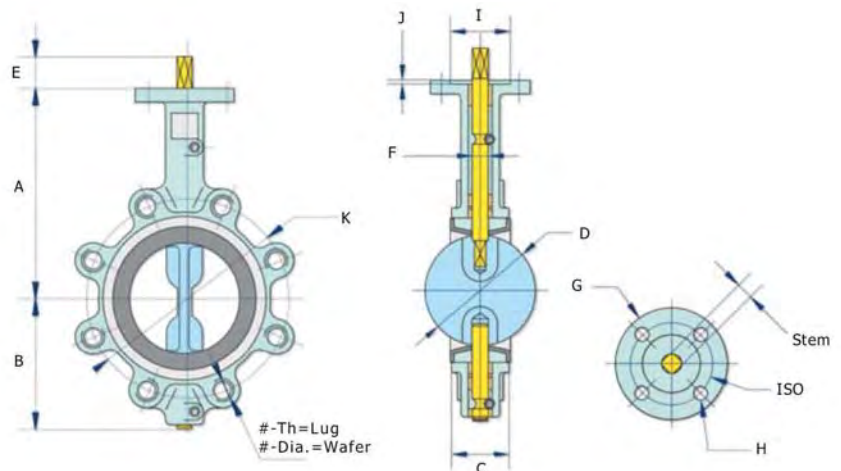


Table 1

Size (Inch)	ISO 211	Stem (mm)	A	B	C	D	E	F	Upper Flange				ANSI	Wafer	Wt.	Lug	Wt.	Seat Torque		Cv (gpm@1psi)	
									G	H	I	J						K	#-Dia.	(lbs)	#-Thd
*1.5	F05	9	5.71	2.97	1.61	1.67	0.47	0.50	3.03	4-0.28	1.38	0.12	3.88	4-0.75	4.8	4-5/8"-11	7.1	101	105	35	108
2	F05	9	6.34	3.15	1.65	2.07	0.47	0.50	3.03	4-0.27	1.38	0.12	4.74	4-0.75	5.5	4-5/8"-11	8.4	107	115	45	135
2.5	F05	9	6.89	3.50	1.76	2.54	0.47	0.50	3.03	4-0.27	1.38	0.12	5.49	4-0.75	7.1	4-5/8"-11	9.3	234	167	65	220
3	F05	9	7.13	3.74	1.78	3.10	0.47	0.50	3.03	4-0.27	1.38	0.12	6.00	4-0.75	8.4	4-5/8"-11	10.4	205	223	70	300
4	F07	11	7.87	4.49	2.05	4.09	0.63	0.62	3.54	4-0.35	2.17	0.12	7.50	4-0.75	10.8	8-5/8"-11	19.8	339	385	140	605
5	F07	14	8.34	5.00	2.14	4.85	0.75	0.75	3.54	4-0.35	2.17	0.12	8.50	4-0.87	15.4	8-3/4"-10	24.0	523	602	235	1010
6	F07	14	8.90	5.47	2.20	6.13	0.75	0.75	3.54	4-0.35	2.17	0.12	9.50	4-0.87	17.2	8-3/4"-10	31.3	677	871	360	1620
8	F10	17	10.24	6.89	2.34	7.97	0.75	0.87	4.92	4-0.47	2.76	0.14	11.75	4-0.87	29.1	8-3/4"-10	40.1	1205	1450	715	3205
10	F10	22	11.50	7.99	2.58	9.86	0.95	1.12	4.92	4-0.47	2.76	0.14	14.25	4-1.00	42.2	12-7/8"-9	59.1	1890	2200	1225	5305
12	F10	22	13.27	9.53	3.03	11.87	0.95	1.24	5.51	4-0.47	2.76	0.14	17.00	4-1.00	71.5	12-7/8"-9	88.2	2808	3350	1900	8250

*1-1/2" available only in model 500S

Note:

1. Maximum Working Pressure is 200psi
2. Seating Torque Tested at 70°F Water-No Safety Factors
3. Series 501 Maximum Dead Head Service is 100psi
4. All Dimensions are Inches Unless Specified
5. All Threads UNC

Table 2				Standard Materials	
Part	Description		Material		
1	Body	Lug	Epoxy Coated Ductile Iron		
		Wafer	Epoxy Coated Cast Iron		
2	Seat		EPDM (-30°F to 360°F)		
3	Lower Shaft		416 Stainless Steel		
4	Disc	500N/501N	Ductile Iron & Nylon 11		
		500S/501S	CF8M		
5	Upper Shaft		416 Stainless Steel		
6	Locating Pin		Carbon Steel		
7	Bushing		PTFE		
8	O-Ring		EPDM		
Optional Seat Materials					
Food Grade EPDM (-30° to 225°F)		520 Wafer			
		521 Lug			
VITON (+10° to 400°F)		530 Wafer			
		531 Lug			
Buna-N (+10° to 180°F)		540 Wafer			
		541 Lug			

SERIES 500 and SERIES 501 Manually Operated Butterfly Valves

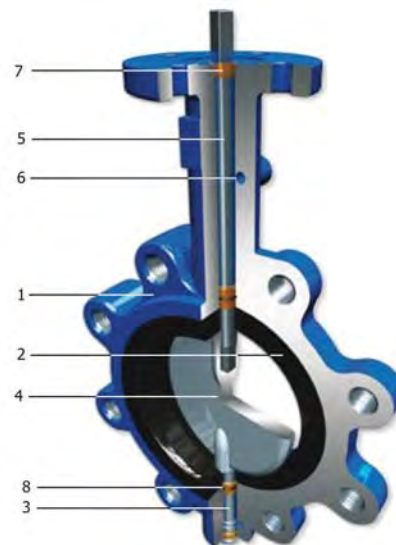
Standard Models

Standard Features

LEVER	GEAR	LEVER	GEAR
L500N	G500N	• Light Weight	• Direct Mount ISO 5211
L500S	G500S	• 10 Position Stop	• Low Turn Ratio
L501N	G501N	• All Sizes	• IP54 Enclosure
L501S	G501S		

Table 3

Seal Material & Temp Range	Style	Wafer Body		Lug Body	
		Nyl-11	CF8M	Nyl-11	CF8M
EPDM (-30 to 250°F)	Lever	L500N	L500S	L501N	L501S
	Gear	G500N	G500S	G501N	G501S
FG EPDM (-30 to 225°F)	Lever	L520N	L520S	L521N	L521S
	Gear	G520N	G520S	G521N	G521S
Viton (+10 to 400°F)	Lever	L530N	L530S	L531N	L531S
	Gear	G530N	G530S	G531N	G531S
Buna-N (+10 to 180°F)	Lever	L540N	L540S	L541N	L541S
	Gear	G540N	G540S	G541N	G541S



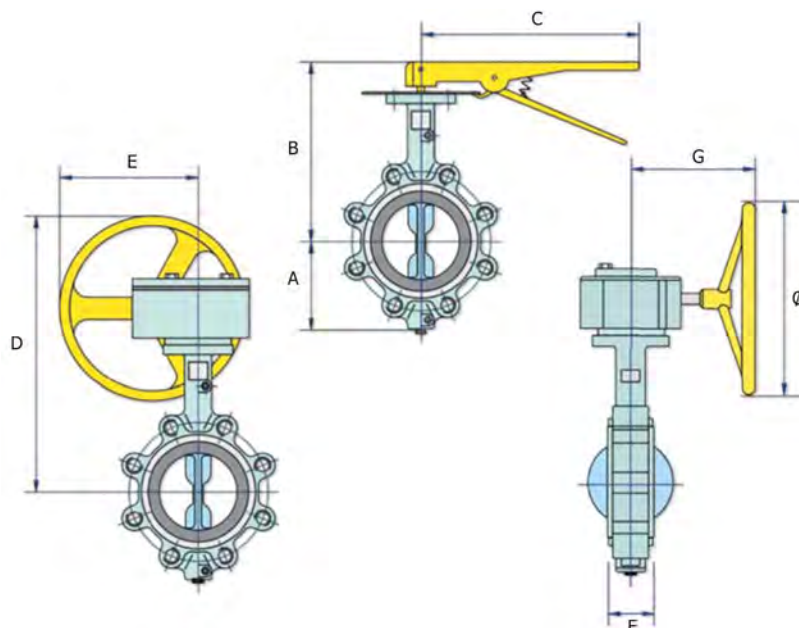


Table 4

Size	A	B	C	D	E	F	G	Manual Operator		Wafer- Weight w/operator		Lug- Weight w/operator		ØH	Cv (gpm@1psi)	
								Lever	Gear	Lever	Gear	Level	Gear		50% OP	100% OP
1.5"	2.97	7.24	10.63	10.15	4.75	1.61	6.00	50L-1	50G-1	6.8	16.3	9.6	19.1	5.91	34	104
2"	3.14	7.60	10.63	10.78	4.75	1.65	6.00	50L-1	50G-1	7.5	17.0	10.4	19.9	5.91	45	135
2.5"	3.50	8.15	10.63	11.33	4.75	1.75	6.00	50L-1	50G-1	9.1	18.6	11.3	20.8	5.91	65	220
3"	3.74	8.38	10.63	11.57	4.75	1.77	6.00	50L-1	50G-1	10.4	19.9	12.4	21.9	5.91	70	300
4"	4.48	9.13	10.63	12.31	4.75	2.05	6.00	50L-1	50G-1	12.8	22.3	21.8	31.3	5.91	140	605
5"	4.99	9.60	10.63	12.78	4.75	2.14	6.00	50L-1	50G-1	17.4	26.9	26.0	35.5	5.91	235	1010
6"	5.47	10.16	10.63	13.34	4.75	2.19	6.00	50L-1	50G-1	19.2	28.7	33.3	42.8	5.91	360	1620
8"	6.88	12.01	14.17	17.84	8.35	2.38	9.84	50L-2	50G-2	33.4	57.8	44.4	68.8	11.81	715	3205
10"	7.99	13.27	19.68	19.04	8.35	2.58	9.84	50L-3	50G-2	48.1	70.9	64.9	87.8	11.81	1225	5305
12"	9.52	15.04	19.68	20.81	9.06	3.02	9.84	50L-3	50G-3	77.3	104.6	94.0	121.3	11.81	1900	8250

Note: 1. The Maximum Working Pressure is 200psi 2. Series 501 Dead-End Service is 100psi maximum 3. All Dimensions are Inches Unless Specified

ELECTRIC VALVE ACTUATORS

Series VB actuators are designed for the automation of ball and butterfly valves for the industrial, commercial and OEM markets. A result of years of intensive R & D, advanced high-tech electrical components design and precise gearing, VB electric actuators offer the best in performance and long term reliability.

The actuator housing is made from a V-O rated, self-extinguishing class techno-polymer material. The gear drive is made of two steel and techno-polymer gear wheels, sustained by hardened steel pinions, mounted on self-lubricating bushings (excluding model VB015), and inserted in a rugged die-cast aluminum structure.

The direct connection of the actuators to the valves is made via a painted die-cast aluminum plate with a dual drilled ISO 5211 interface. All actuators are provided with an electronic system and torque limiter. A heater is built-in and is activated once the actuator is powered and when the temperature inside the housing drops below 77°F to prevent condensation.

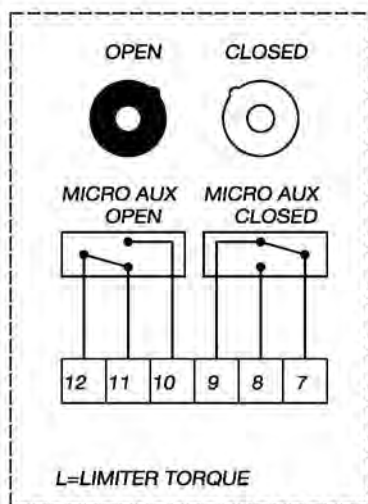
Two auxilliary limit switches are standard and optional 4-20 mA/0-10V modulating boards and battery



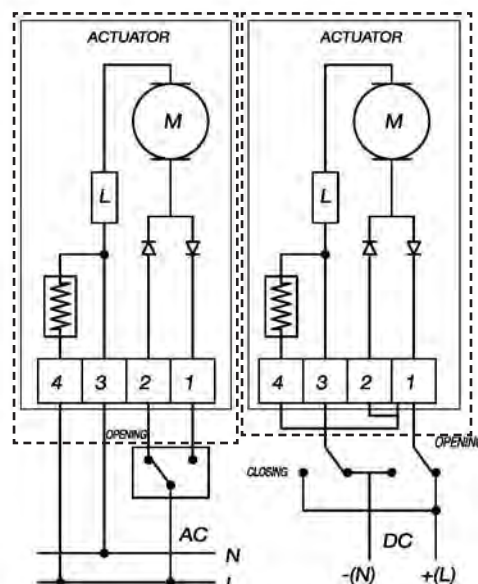
Table 5	Model	VB015	VB030	VB060	VB110	VB190	VB270	VB350
Max Working Torque (in-lbs)		133	266	530	975	1680	2390	3100
Working Time (sec)		10	8	9	27	27	50	50
Operating Temperature		-4 to 131°F						
Torque Limiter		STD	STD	STD	STD	STD	STD	STD
Duty Rating		50%	75%	75%	75%	75%	75%	75%
Protection		NEMA 4 X IP65	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67	NEMA 4 X IP65-67
Rotation		90°	90°	90°	90°	90°	90°	90°
Optional Rotation		180°	180° or 270°	180° or 270°	180° or 270°	180° or 270°	180° or 270°	180° or 270°
Manual Override		STD	STD	STD	STD	STD	STD	STD
Position Indicator		STD	STD	STD	STD	STD	STD	STD
Heater		STD	STD	STD	STD	STD	STD	STD
Additional Limit Switches		2 supplied, VMax 250 VAC, 30 VDC, imax 1A						
Positioner PCB 4-20 mA & 0-10 V		Not Available	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)	Available Option (except 12V models)
Linear Potentiometer 5K Ohms, 1 Watt		Not Available	Available Option	Available Option	Available Option	Available Option	Available Option	Available Option
Enclosure Electrical Conn.		2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland	2 x PG11 Cable Gland
Version H Nominal Voltage		110VAC or 230 VAC	100-240 VAC					
Version H Current Consumption		110 VAC- 75mA 230 VAC-25mA	0.3-0.2A	0.6-0.3A				
Version H Power Consumption		110 VAC- 6.6 VA 230 VAC-6.0 VA	30-48 VA	60-72 VA				
Version L Nominal Voltage		12V or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC	12 VDC or 24V AC/DC
Version L Current Consumption		12V- 1.2A 24V- 0.6A	12V- 2.0A 24V- 1.0A	12V- 3.6A 24V- 1.8A	12V- 2.0A 24V- 1.0A	12V- 3.6A 24V- 1.8A	12V- 3.6A 24V- 1.8A	12V- 3.6A 24V- 1.8A
Version L Power Consumption		15 VA	24 VA	44 VA	24 VA	44 VA	44 VA	44 VA
Frequency		50/60 Hz						
Weight		3.09	5.07	7.28	10.80	10.80	13.23	13.23

WIRING

VB015 12-24V AC/DC



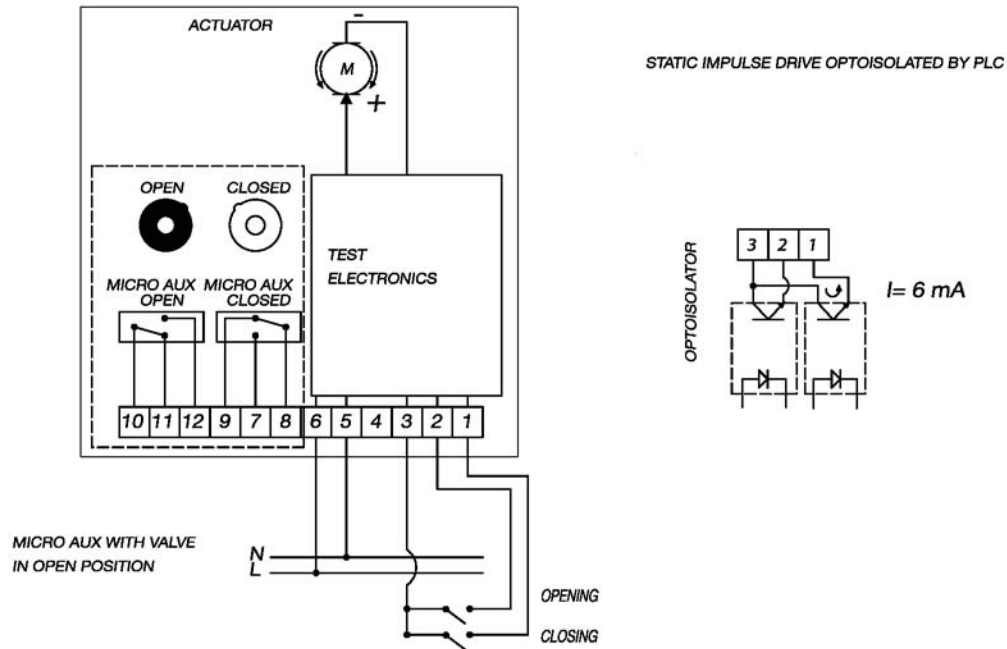
MICRO AUX WITH VALVE
IN OPEN POSITION



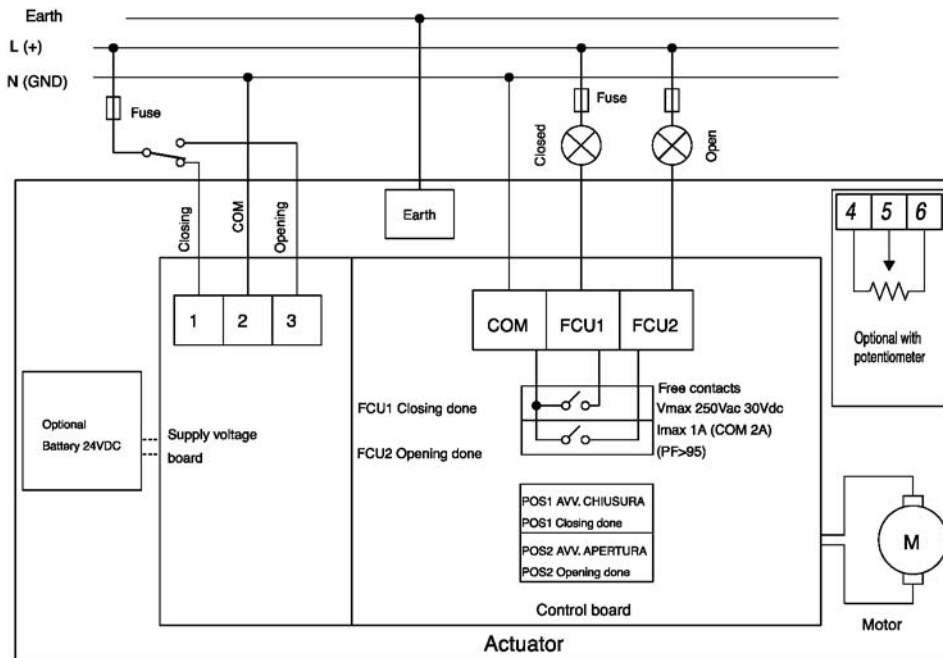
DC Power

To open: Line to 2
Neutral to 3
To Close: Line to 3
Neutral to 1

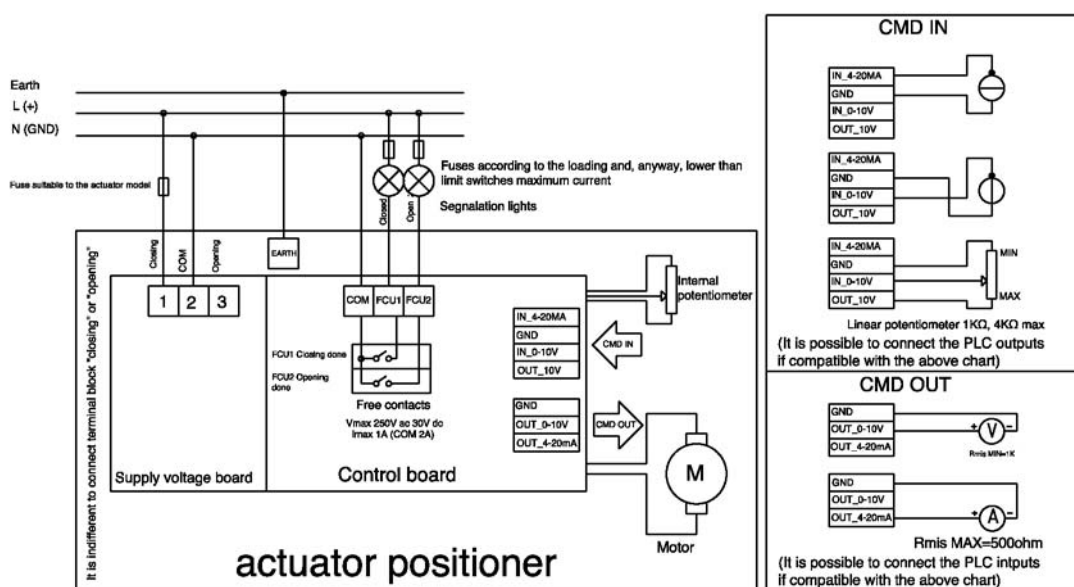
VB015 115V-230V AC



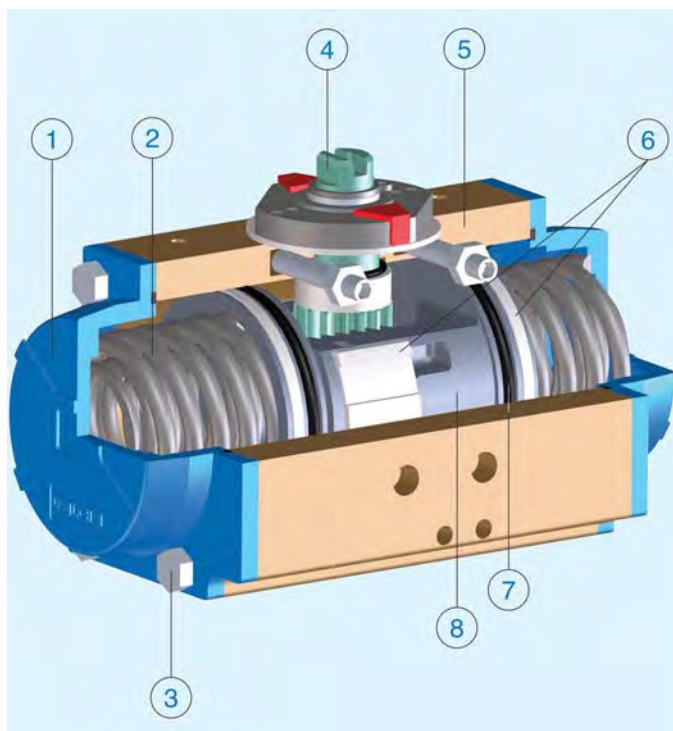
VB30 TO VB350 12 V DC, 24V AC/DC, 110-240 VAC



4-20 M/O-10V ACTUATOR POSITIONER WIRING VB30 TO VB350 12 V DC, 24V AC/DC, 110-240 VAC



PNEUMATIC VALVE ACTUATORS



GENERAL SPECIFICATIONS

Types:

DA- Double Acting

SR- Spring Return

Actuation Pressure Rating: Minimum 80 PSI, maximum 115 PSI

Temperature Range:

Standard (NBR Seals): -4°F to +185°F

High Temp Option (Viton Seals): -4°F to +302°F

Low Temperature Option (Silicon Seals): -40°F to +185°F

Rotation: 0-90° adjustable $\pm 5^\circ$ in both clockwise and counterclockwise directions

by means of adjusting screws outside the internal supply chambers

Position Indicator: Standard

Air Supply Connections:

Models 32, 52, 63, 75, 85- 1/8" NPT;

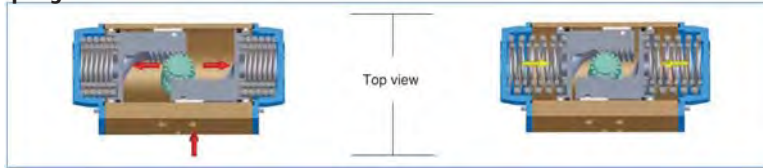
Model 100- 1/4" NPT

Lubrication: Pre lubricated for life of actuator on assembly

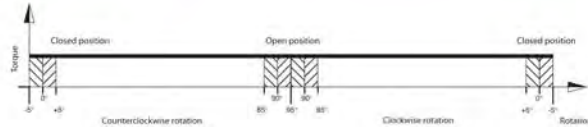
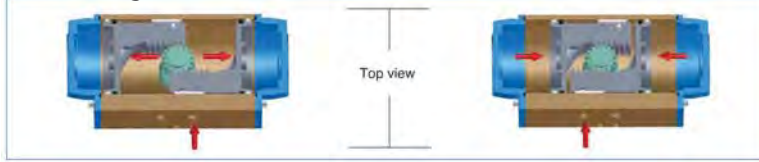
	Table 6	Description
1		Die Cast Aluminum End Caps -Standard polyester powder coated
2		Concentric Spring Sets -Standard treatment phosphated– -High resistance and reliability - Long securing screws to allow safe dismantling for maintenance -Same body dimensions for DA/SR versions
3		Assembling Screw -Stainless Steel
4		Steel Pinion - Standard version nickel plated - Stainless steel for corrosive environments -Anti-blow out design
5		Extruded Aluminum Body UNI 6060 -Hard-coat anodized finish 40-50 (microns) -Nickle or epoxy coating optional -Good Wear & high corrosion resistance - Bore finish to high standard to ensure low friction
6		POM Piston Guides - Large contact area -Low friction material with long life
7		Seals - NBR: Standard -Viton: High temp. version -Silicon: Low temp. version
8		Pistons - Die Cast Aluminum (nickel plating available)

ACTUATOR OPERATION

Spring Return Actuator



Double Acting Actuator



The torque of a double acting actuator remains constant throughout the complete actuation while the torque of the spring return actuator is not constant but decreasing. Series 8P valve assemblies have actuators selected by the factory to meet the valve torque requirements. This assumes the actuation supply pressure is a minimum of 80 PSI.

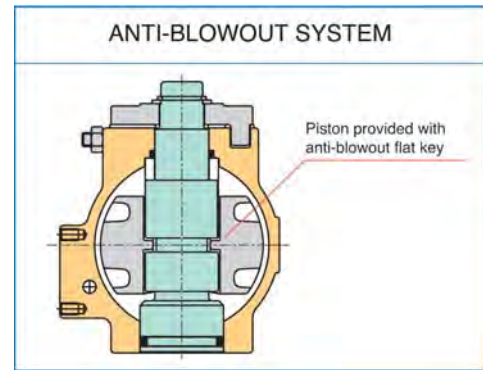


Table 7	Model	32	52	63	75	85	100
Working Time (sec)							
	Direct Acting Counterclockwise Rotation	0.03	0.03	0.06	0.12	0.20	0.30
	Direct Acting Clockwise Rotation	0.03	0.04	0.08	0.12	0.19	0.27
	Spring Return Counterclockwise	-	0.09	0.14	0.22	0.31	0.44
	Spring Return Clockwise Rotation	-	0.09	0.14	0.22	0.33	0.46
Actuator Air Consumption (cubic inches per stroke)							
	Direct Acting Counterclockwise Rotation	2.44	6.10	11.60	21.97	31.12	48.21
	Direct Acting Clockwise Rotation	1.83	7.93	14.04	26.85	39.06	61.02
	Spring Return Clockwise Rotation	-	6.71	11.60	21.97	32.34	48.82
Weight (lbs)							
	Direct Acting	1.08	2.25	3.26	5.51	7.39	11.02
	Spring Return	-	2.62	3.97	6.94	9.37	14.40

ACTUATOR PARTS

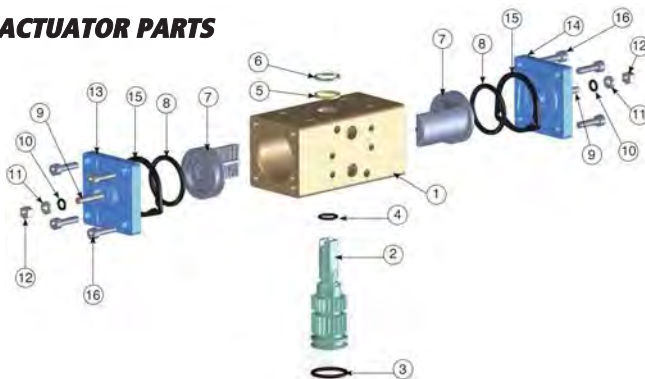
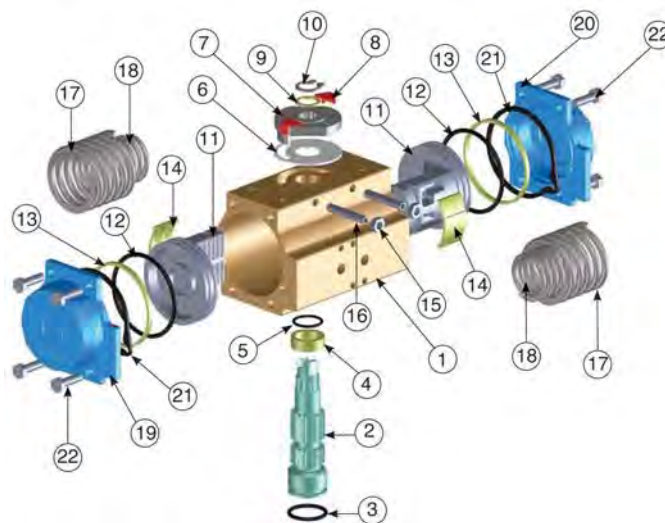


Table 8 Model 32 Actuator Parts				
	Part Name	Material	Treatment	QTY
1	Body	Extruded Aluminum	Hard Anodized	1
2	Anti-blowout pinion	Steel	Nickle plated	1
*3	Lower pinion o-ring	NBR		1
*4	Top pinion o-ring	NBR		1
*5	Spacer ring	POM		1
6	Pinion snap ring	Steel	Nickle plated	1
7	Piston	Die Cast Aluminum		2
*8	Piston o-ring	NBR		2
9	Stop bolt	Stainless steel		2
*10	Stop bolt o-ring	NBR		2
11	Washer	Stainless steel		2
12	Stop bolt retaining nut	Stainless steel		2
13	Left end cap	Die Cast Aluminum	Painted	1
14	Right end cap	Die Cast Aluminum	Painted	1
15	End cap seats	NBR		2
16	End fixing screw	Stainless steel		8

* Parts subject to wear

Table 9 Model 52-100 Actuator Parts (fig. 13)					
	Part Name	Material	Treatment	QTY DA	QTY SR
1	Body	Extruded Aluminum	Hard Anodized	1	1
2	Anti-blowout pinion	Steel	Nickle plated	1	1
*3	Lower pinion o-ring	NBR		1	1
*4	Pinion spacer ring	POM		1	1
*5	Top pinion o-ring	NBR		1	1
*6	Cam spacer ring	POM		1	1
7	Cam	Stainless steel		1	1
8	Position Indicator	Nylon		2	2
9	Pinion washer	Stainless steel		1	1
10	Pinion snap ring	Reinforced steel UNI 7436	Nickle plated	1	1
11	Piston	Die Cast Aluminum		2	2
*12	Piston o-ring	NBR		2	2
*13	Anti-friction ring	POM		2	2
*14	Piston thrust block	POM		2	2
15	Stop bolt retaining nut	Stainless steel		2	2
16	Stop bolt	Stainless steel		2	2
17	External spring	Steel	Zinc-phosphate	0	**
18	Internal spring	Steel	Zinc-phosphate	0	**
19	Left end cap	Die Cast Aluminum	Painted	1	1
20	Right end cap	Die Cast Aluminum	Painted	1	1
21	End cap seats	NBR		2	2
22	End cap fixing screw	Stainless steel		8	8
* Parts subject to wear **Factory fixed dependent on model					



SERIES E500 Electrically Operated Butterfly Valves

E500S- Direct Mount, Wafer Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Electric Actuator

E500N- Direct Mount, Wafer Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Electric Actuator

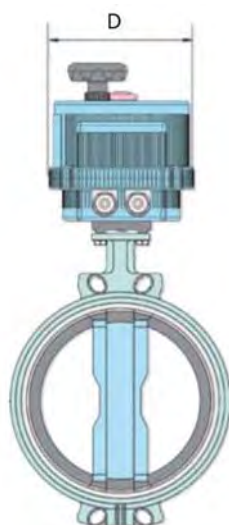


Table 12 Voltage Supply Order Suffix		
001=std. 12v AC/DC	011= 12v AC/DC Battery Back-Up/Fail safe	021= 12v AC/DC Positioner
002=std. 24v AC/DC	012= 24v AC/DC Battery Back-Up/Fail Safe	022= 24v AC/DC Positioner
003=std. 100-240 VAC	013= 100-240VAC Battery Back-Up/Fail Safe	023= 100-240 VAC Positioner

Table 10 E500S Dimensions (Inches)										
	1 1/2"	2	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	1.61	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	16.08	16.89	17.79	18.27	20.82	21.80	23.51	26.27	28.68	*
C	13.11	13.40	14.29	14.53	16.33	16.80	18.04	19.38	20.69	*
D	6.18	6.18	6.18	6.18	7.28	7.28	8.31	8.31	8.74	*
E	7.50	7.50	7.50	7.50	8.43	8.43	9.33	9.33	9.72	*
ACT.	VB-030	VB30	VB30	VB30	VB060	V060	VB110	VB190	VB350	*
Wt./Lbs	9.9	10.6	12.2	13.5	18.1	22.7	28.0	39.9	55.5	*

Table 11 E500N Dimensions (Inches)										
	1 1/2"	2	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	16.89	17.79	18.27	20.82	21.80	23.51	26.27	28.68	*
C	-	13.40	14.29	14.53	16.33	16.80	18.04	19.38	20.69	*
D	-	6.18	6.18	6.18	7.28	7.28	8.31	8.31	8.74	*
E	-	7.50	7.50	7.50	8.43	8.43	9.33	9.33	9.72	*
ACT.	-	VB30	VB30	VB30	VB060	V060	VB110	VB190	VB350	*
Wt./Lbs	-	10.6	12.2	13.5	18.1	22.7	28.0	39.9	55.5	*

E501S-Direct Mount, Lug Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Electric Actuator
E501N- Direct Mount, Lug Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Electric Actuator

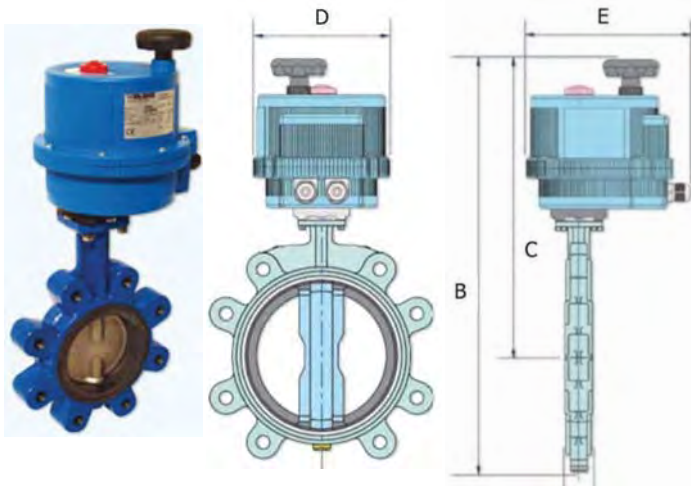


Table 13 E501S Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	16.89	17.79	18.27	20.82	21.80	23.51	26.27	28.68	*
C	-	13.40	14.29	14.53	16.33	16.80	18.04	19.38	20.69	*
D	-	6.18	6.18	6.18	7.28	7.28	8.31	8.31	8.74	*
E	-	7.50	7.50	7.50	8.43	8.43	9.33	9.33	9.72	*
ACT.	-	VB30	VB30	VB30	VB060	V060	VB110	VB190	VB350	*
Wt./Lbs	-	13.5	14.4	15.5	27.1	31.3	42.1	50.9	72.4	*

Table 14 E501N Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	16.89	17.79	18.27	20.82	21.80	23.51	26.27	28.68	*
C	-	13.40	14.29	14.53	16.33	16.80	18.04	19.38	20.69	*
D	-	6.18	6.18	6.18	7.28	7.28	8.31	8.31	8.74	*
E	-	7.50	7.50	7.50	8.43	8.43	9.33	9.33	9.72	*
ACT.	-	VB30	VB30	VB30	VB060	V060	VB110	VB190	VB350	*
Wt./Lbs	-	13.5	14.4	15.5	27.1	31.3	42.1	50.9	72.4	*

* Consult Factory

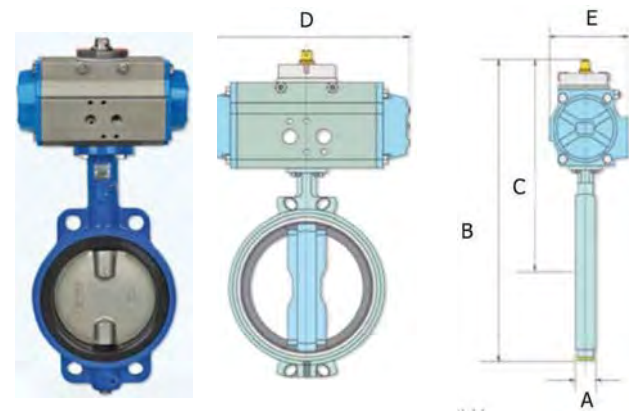
Table 15 Voltage Supply Order Suffix		
001=std. 12v AC/DC	011= 12v AC/DC Battery Back-Up/Fail safe	021= 12v AC/DC Positioner
002=std. 24v AC/DC	012= 24v AC/DC Battery Back-Up/Fail Safe	022= 24v AC/DC Positioner
003=std. 100-240 VAC	013= 100-240VAC Battery Back-Up/Fail Safe	023= 100-240 VAC Positioner

SERIES DA/SR500 Pneumatically Operated Butterfly Valves

DA500S- Direct Mount, Wafer Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Double Acting Actuator
SR500S- Direct Mount, Wafer Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Spring Return Actuator
DA500N- Direct Mount, Wafer Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Double Acting Actuator
SR500N- Direct Mount, Wafer Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Spring Return Actuator

Table 16 DA500S Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	1.61	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	3.03
B	12.20	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	31.38
C	9.23	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	21.85
D	5.49	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	20.55
E	2.80	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	7.36
ACT.	52	52	52	63	75	75	85	100	125	140
Wt./Lbs	7.0	7.7	9.3	11.7	16.3	22.8	28.2	46.9	76.1	114.7

Table 17 SR500S Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	1.61	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	12.20	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	*
C	9.23	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	*
D	5.49	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	*
E	2.80	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	*
ACT.	75	75	75	75	100	115	125	160	200	*
Wt./Lbs	11.7	12.4	14.0	15.3	25.2	39.3	62.5	94.1	153	*



* Consult Factory

Table 18 DA500N Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	3.03
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	31.38
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	21.85
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	20.55
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	7.36
ACT.	-	52	52	63	75	75	85	100	125	140
Wt./Lbs	-	7.7	9.3	11.7	16.3	22.8	28.2	46.9	76.1	114.7

Table 19 SR500N Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	*
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	*
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	*
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	*
ACT.	-	75	75	75	100	115	125	160	200	*
Wt./Lbs	-	12.4	14.0	15.3	25.2	39.3	62.5	94.1	153	*

* Consult Factory

DA501S- Direct Mount, Lug Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Double Acting Actuator

SR501S- Direct Mount, Lug Body, EPDM Seats, Stainless Steel Disc Butterfly Valve With Spring Return Actuator

DA501N- Direct Mount, Lug Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Double Acting Actuator

SR501N- Direct Mount, Lug Body, EPDM Seats, Nylon Coated Ductile Iron Disc Butterfly Valve With Spring Return Actuator

Table 20 DA501S Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	3.03
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	31.38
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	21.85
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	20.55
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	7.36
ACT.	-	52	52	63	75	75	85	100	125	140
Wt./Lbs	-	7.7	9.3	11.7	16.3	22.8	28.2	46.9	76.1	114.7

Table 21 SR501S Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	*
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	*
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	*
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	*
ACT.	-	75	75	75	100	115	125	160	200	*
Wt./Lbs	-	15.3	16.2	17.3	34.2	47.9	76.6	105	170	*

Table 22 DA501N Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	3.03
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	31.38
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	21.85
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	20.55
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	7.36
ACT.	-	52	52	63	75	75	85	100	125	140
Wt./Lbs	-	10.6	11.5	13.7	25.3	31.4	42.3	57.9	93.0	131.4

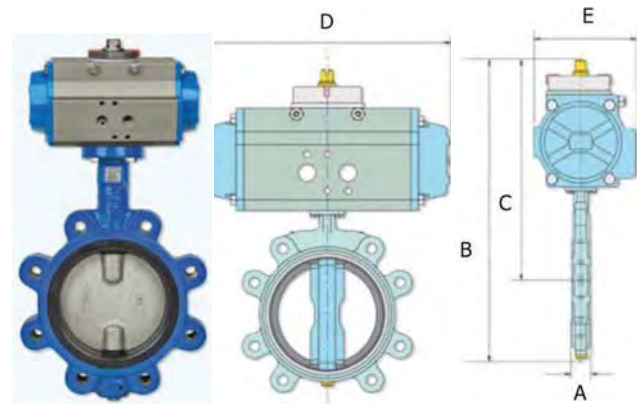


Table 23 SR501N Dimensions (Inches)										
Size	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
A	-	1.65	1.76	1.78	2.05	2.14	2.19	2.38	2.58	*
B	-	13.01	13.91	14.83	16.97	18.4	19.94	23.88	27.60	*
C	-	9.86	10.41	11.09	12.48	13.4	14.47	16.99	19.61	*
D	-	5.49	5.49	6.38	8.15	9.35	10.69	12.91	16.85	*
E	-	2.80	2.80	3.17	3.72	4.17	4.84	5.39	6.46	*
ACT.	-	75	75	75	100	115	125	160	200	*
Wt./Lbs	-	15.3	16.2	17.3	34.2	47.9	76.6	105	170	*

* Consult Factory

ORDERING INFORMATION

Valve Operation	Order Information	Sample Part Number
Manual	1) Select model number from table 3 2) Select size from table 4	G500N-2"
Electric Operater	1) Select model number & size from tables 10,11,13,14 2) Select voltage from tables 10 & 15	E501S-2"-002
Pneumatic	1) Select model number & size from tables 16, 17, 18, 19, 20, 21, 22, 23	E500N-5"

DEI

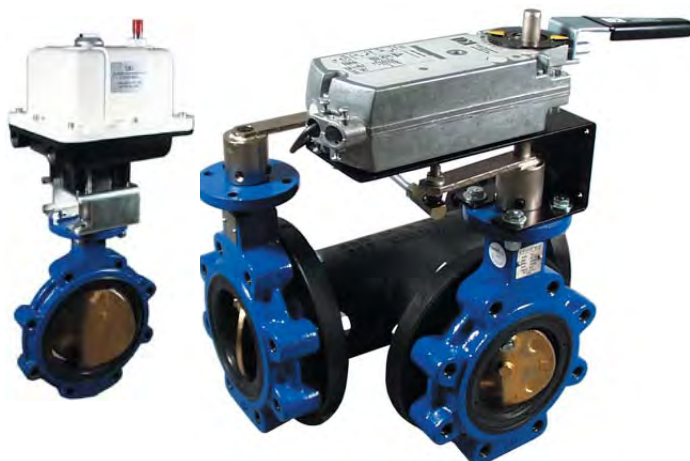
RS Series Resilient Seat Butterfly Control Valves

Commercial or Industrial Grade Actuators, 2" to 20"

DESCRIPTION

Clark offers a complete line of Butterfly valves for both commercial and industrial applications. The valves are designed for hot and chilled water, as well as steam applications up to 10 PSI saturated steam inlet. The valves can be used for on/off or throttling control, isolation, flow balance, mixing or diversion.

Valves are available in full-lugged or wafer mounting style. All bodies meet ANSI 150 pressure ratings for hydrostatic requirements. The valves are compatible with ANSI 125/150 flanges. Standard valves 2"-12" are bidirectional with a bubble-tight shut-off pressure rating of up to 250 PSI dead end service. Valves 14"-20" are also bidirectional with a bubble-tight shut-off standard pressure rating of 50 PSI. Rating to 150 PSI is available with non-undercut (NU) discs.



A selection of commercial grade actuators and industrial grade NEMA 4/4X actuators are available.

SPECIFICATIONS

VALVES

Standard Materials:

BODY: Cast Iron

DISC: Aluminum Bronze

STEM: Stainless Steel

SEAT: EPDM

Optional Materials:

BODY: Ductile Iron, Cast Steel, Aluminum

DISC: Ductile Iron (Phosphate or Nylon 11 Coated), Stainless Steel

STEM: Carbon Steel (Phosphate Coated)

SEAT: BUNA-N (Nitrile), Viton GF

ACTUATORS

See selected actuator specification sheet

VALVE & ACTUATOR SELECTION

(UNITS ARE SUPPLIED FULLY ASSEMBLED & TESTED)

- 1) Review our Motor Actuated Valve Application Guide and select the valve type, size & materials. Refer to Clark bulletins on Ball valves or Globe valves if these valve types are better suited to the application.
- 2) Review valve C_v and close-off rating chart (Tables A&B) and select base valve model and actuator model
- 3) Review Valve and actuator dimensions
- 4) Review selected actuator spec. sheet and determine specific actuator model number
- 5) Assemble final model number using model number guidelines under "Ordering Information"

Table A Commercial Actuator Selection Chart for valve sizes 2" to 6"										
Valve Size	Cv		Base Valve Model		Actuator Model Number/Maximum Close-off- PSI					
	Two Position	Modulating			Two-Way Differential Pressure (PSI)			Three-way Differential Pressure (PSI)		
	@90°	@70°	Two-way	Three-way	50	100	150**	50	100	150**
2"	60	52	RS2B-2	RS3B-2	ES142 EN177	ES142 EN177	ES142 EN177	ES142 EN177	ES142* EN177	ES142* EN177
2 1/2"	151	107	RS2B-2.5	RS3B-2.5	ES142 EN177	ES142* EN177	ES142* EN310	ES142* EN310	ES142* EN310	EN310*
3"	262	175	RS2B-3	RS3B-3	ES142* EN310	ES142* EN310	ES142 EN310	ES142* EN310	ES142* EN310	EN310*
4"	647	453	RS2B-4	RS3B-4	ES142* EN310	EN310*	EN310*	ES142* EN310	EN310*	EN310*
5"	1141	832	RS2B-5	RS3B-5	EN310*	EN310*	EN310*	EN310*	-	-
6"	1580	1160	RS2B-6	RS3B-6	EN310*	-	-	EN310*	-	-

* requires two actuators

Table B Industrial Actuator Selection Chart for valve sizes 2" to 20"										
Valve Size	Cv		Valve Model		Actuator Model/Maximum Close-off- PSI					
	Two Position	Modulating			Two-Way Differential Pressure (PSI)			Three-way Differential Pressure (PSI)		
	@90°	@70°	Two-way	Three-way	50	100	150*	50	100	150*
2"	60	52	RS2B-2	RS3B-2	RE1.5	RE1.5	RE1.5	RE1.5	RE3	RE3
2 1/2"	151	107	RS2B-2.5	RS3B-2.5	RE3	RE3	RE3	RE3	RE3	RE6
3"	262	175	RS2B-3	RS3B-3	RE3	RE3	RE3	RE3	RE6	RE6
4"	647	453	RS2B-4	RS3B-4	RE3	RE6	RE6	RE3	RE6	RE6
5"	1141	832	RS2B-5	RS3B-5	RE6	RE6	RE10	RE6	RE10	- RE10
6"	1580	1160	RS2B-6	RS3B-6	RE6	RE10	RE10	RE6	RE15	RE15
8"	2892	2524	RS2B-8	RS3B-8	RE15	RE20	RE20	RE15	RE25	RE30
10"	4593	3470	RS2B-10	RS3B-10	RE20	RE15T	RE15T	RE20	RE20T	RE20T
12"	6682	5600	RS2B-12	RS3B-12	RE30	RE20T	RE20T	RE20T	RE25T	RE25T
14"	10000	7400	RS2B-14	RS3B-14	RE30	RE25T	RE25T	RE20T	call	call
16"	13000	9600	RS2B-16	RS3B-16	RE20T	RE30T	call	RE25T	call	call
18"	18000	96000	RS2B-18	RS3B-18	RE25T	call	call	call	call	call
20"	22000	12000	RS2B-20	RS3B-20	RE30T	call	call	call	call	call

-ratings based on 10ft/sec max. fluid velocity

*call for close-offs greater than 150 PSI

DIMENSIONS (INCHES)

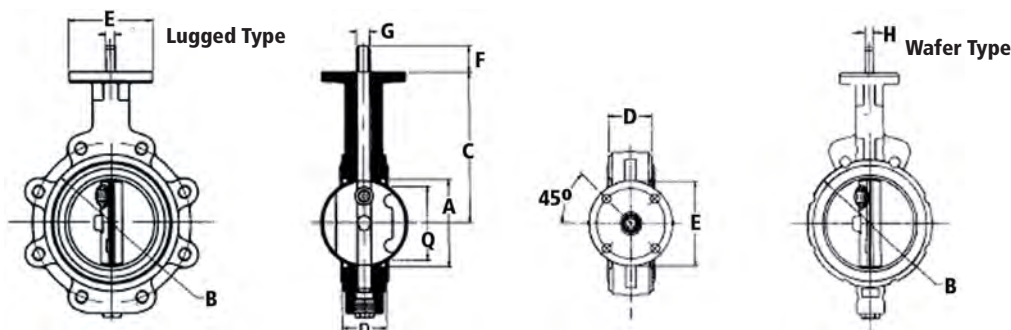


Table C	Valve Dimensions (inches)															
	A	B	C	D	E	F	Mounting Flange Drilling			G	H	Q*	Key	Lug Bolt Data		
							BC	#Holes	Hole Dia.					BC	#Holes	Threads UNC-2B
2"	2.06	4.13	5.32	1.69	4.00	1.25	3.25	4	0.44	0.56	0.38	1.38	n/a	4.75	4	5/8-11
2 1/2"	2.56	4.63	5.94	1.81	4.00	1.25	3.25	4	0.44	0.56	0.38	2.00	n/a	5.50	4	5/8-11
3"	3.06	5.19	6.31	1.81	4.00	1.25	3.25	4	0.44	0.56	0.38	2.63	n/a	6.00	4	5/8-11
4"	4.06	6.38	7.13	2.06	4.00	1.25	3.25	4	0.44	0.63	0.44	3.69	n/a	7.50	8	5/8-11
5"	5.06	7.38	7.69	2.25	4.00	1.25	3.25	4	0.44	0.75	0.50	4.75	n/a	8.50	8	3/4-10
6"	5.81	8.50	8.31	2.25	4.00	1.25	3.25	4	0.44	0.75	0.50	5.56	n/a	9.50	8	3/4-10
8"	7.81	10.69	9.50	2.38	6.00	1.25	5.00	4	0.56	0.88	0.63	7.75	n/a	11.75	8	3/4-10
10"	9.81	13.00	10.88	2.69	6.00	2.00	5.00	4	0.56	1.13	n/a	9.75	1/4x1/4	14.25	12	7/8-9
12"	11.81	14.38	11.25	3.13	6.00	2.00	5.00	4	0.56	1.13	n/a	11.75	1/4x1/4	17.00	12	7/8-9
14"	13.25	16.75	12.00	3.00	6.00	3.00	5.00	4	0.56	1.38	n/a	13.13	5/16/5/16	18.75	12	1-8
16"	15.25	19.00	12.95	4.00	6.00	3.00	5.00	4	0.56	1.63	n/a	15.00	3/8x3/8	21.25	16	1-8
18"	17.25	21.38	14.50	4.25	8.00	4.25	6.50	4	0.81	1.88	n/a	16.88	1/2x3/8	22.75	16	1 1/8-7
20"	19.25	23.50	15.88	5.00	8.00	4.25	6.50	4	0.81	1.88	n/a	18.75	1/2x3/8	25.00	20	1 1/8-7

Standard 2" - 12' valves have fixed resilient seats, 14" and above have removable seats

* Q dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve

Two-Way Valve, 2" through 6" With Commercial Actuators		
Size	Model	Dimensions A
2"	RS2B-2	9.1
2 1/2"	RS2B-2.5	9.6
3"	RS2B-3	10.0
4"	RS2B-4	10.8
5"	RS2B-5	11.4
6"	RS2B-6	12.0

Actuator Dimensions				
Actuator	Dimensions (inches)			
	B*	C	D	E‡
Spring Return				
ES142	2.9	8.8	2.3	4.0
Non-Spring Return				
EN177	2.5	6.4	1.7	3.2
EN310	2.9	8.8	2.3	4.0

‡"E" dimension is the actuator width

Two-Way Valve, 2" through 14" With Industrial RE Series Actuators		
Size	Model	Dimensions A
2"	RS2B-2	8.4
2 1/2"	RS2B-2.5	9.0
3"	RS2B-3	9.3
4"	RS2B-4	10.2
5"	RS2B-5	10.7
6"	RS2B-6	11.3
8"	RS2B-8	12.5
10"	RS2B-10	13.9
12"	RS2B-12	14.3
14"	RS2B-14	16.0

RE Series NEMA 4/4x Actuator Dimensions					
Actuator	Dimensions (inches)				
	B	C	D	E	F
Non-Spring Return					
RE1.5-RE6	9.93	5.15	3.48	7.42	1/2" NPT
RE10-RE30	11.65	6.07	4.40	9.75	3/4" NPT

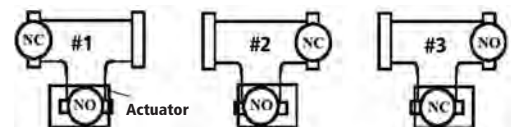
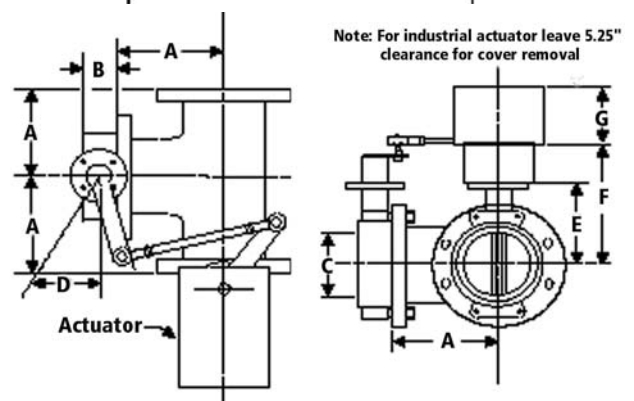
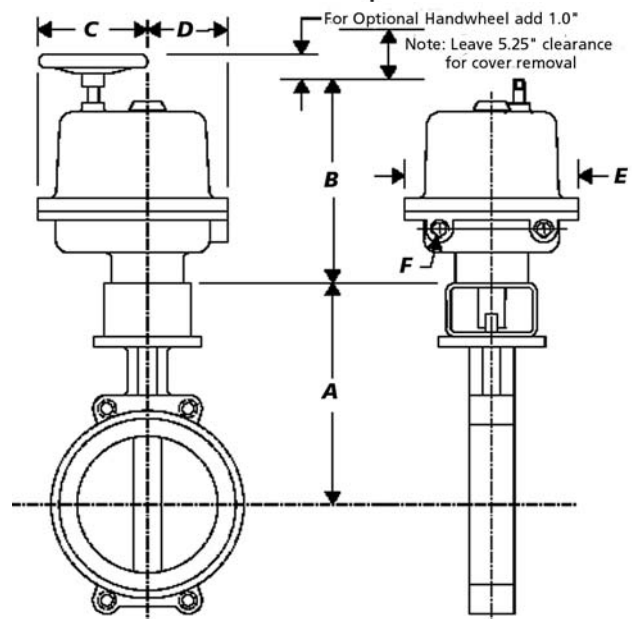
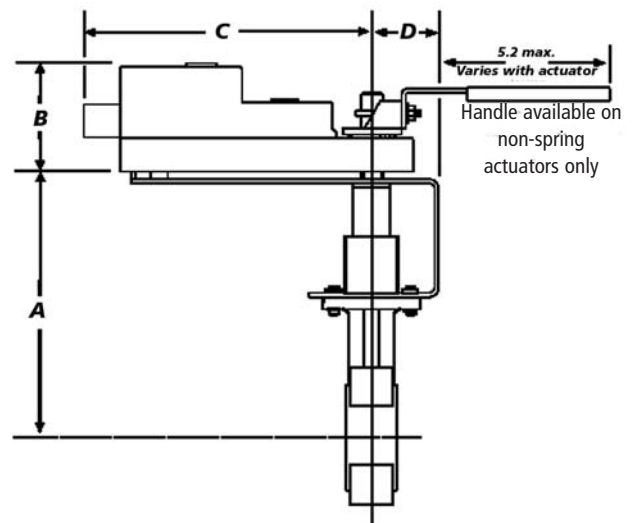
-Valves are sometimes directly mounted to actuator (no bracket)

-Call valve for sizes 16" and larger

Three-Way Valve, 2" through 6" With Commercial Actuators									
Size	Valve Model	Actuator Model	Dimensions (inches)						
			A	B	C	D	E	F	G
2"	RS3B-2	ES142/EN177	4.50	1.69	1.38	3.36	5.31	9.01	3.50
2 1/2"	RS3B-2.5	ES142*/EN310	5.00	1.81	2.00	3.36	5.94	9.64	3.50
3"	RS3B-3	ES142*/EN310	5.50	1.81	2.63	3.36	6.31	10.01	3.50
4"	RS3B-4	ES142*/EN310	6.50	2.06	3.69	3.36	7.13	10.83	3.60
5"	RS3B-5	EN310*	7.50	2.25	4.75	4.77	7.69	11.39	2.90
6"	RS3B-6	EN310*	8.00	2.25	5.56	4.77	8.31	11.86	2.90
Three-Way Valve, 2" through 12" With Industrial RE Series Actuators									
2"	RS2B-2	RE1.5	4.50	1.69	1.39	3.36	5.31	7.31	9.26
2 1/2"	RS2B-2.5	RE3	5.00	1.81	2.00	3.36	5.94	7.94	9.26
3"	RS2B-3	RE3	5.50	1.81	2.63	3.36	6.31	8.31	9.26
4"	RS2B-4	RE3	6.50	2.06	3.69	3.36	7.13	9.13	9.26
5"	RS2B-5	RE6	7.50	2.25	4.75	4.77	7.69	9.69	9.26
6"	RS2B-6	RE6	8.00	2.25	5.56	4.77	8.31	10.13	9.26
8"	RS2B-8	RE15	9.00	2.38	7.75	5.47	9.50	12.50	11.65
10"	RS2B-10	RE20	11.00	2.69	9.75	6.54	10.88	13.88	11.65
12"	RS2B-12	RE30	12.00	3.13	11.75	6.54	12.25	15.25	11.65

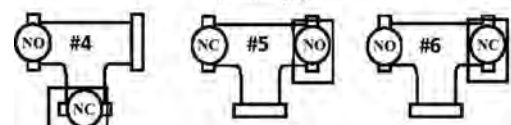
*Requires two actuators

-Call for valve sizes 16" and greater



Three-way Butterfly Valve Mounting Arrangements

NC= Normally Closed
NO= Normally Open



ORDERING INFORMATION

1) SPECIFY ACTUATOR MODEL NUMBER: FIRST SELECT BASE ACTUATOR FROM TABLES A & B, THEN SEE SPECIFIC ACTUATOR SPECIFICATION SHEETS TO DETERMINE

COMPLETE MODEL NUMBER

*Non-Spring Return Actuators

EN44 & EN88

EN132, EN177 & EN310

*Spring Return Actuators

ES62, ES75 & ES142

*Industrial Actuators

RE

* See catalog or <http://www.clarksol.com/html/ValveActuators.cfm>

2) SPECIFY VALVE MODEL NUMBER (SEE TABLES BELOW)

A-B-C-D

EXAMPLE: RE6F1 - RS2B6-L

(ACTUATOR) (VALVE)

Valve Model Number			
A Base Model	B Optional Materials Select as many as apply	C Mounting Style	D Three-Way Mounting Arrangement
See Tables A & B Standard Materials are : Cast Iron Body Aluminum Bronze Disc Stainless Steel Stem EPDM Seat	- = none IB=Ductile Iron Body SB=Cast Steel Body AB=Aluminum Body ID=Ductile Iron Disc(Phosphate or Nylon 11 Coated) SD= Stainless Steel Disc CS=Carbon Steel Disc BS= BUNA-N Seat VS= Viton GF Seat	L=Lugged type W=Wafer Type	1= 1 2= 2 3= 3 4= 4 5= 5 6= 6

DEI

EN44 & EN88 Non-Spring Return Electric Actuators

On/Off, Tri-State, & Modulating, 44 & 88 in-lb

The EN44C2 and EN88C2 direct coupled 24 VAC non-spring return rotary electronic actuators are designed for tri-state (floating) control or two-position control (with external relay) of valves and dampers. They may be used in applications requiring up to 44 in-lb (5 N-m) of torque or 88 in-lb (10 N-m) of torque.

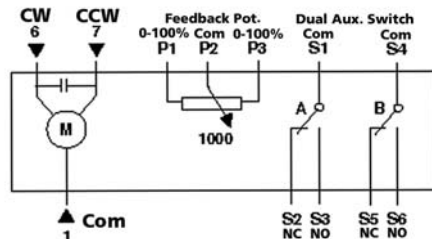
Models EN44B2 and EN88B2 direct coupled 24 VAC non-spring return rotary electronic actuators are designed for modulating control of dampers or valves. They may be used in applications requiring up to 44 in-lb (5 N-m) of torque or 88 in-lb (10 N-m) of torque.



WIRING & COMPONENTS

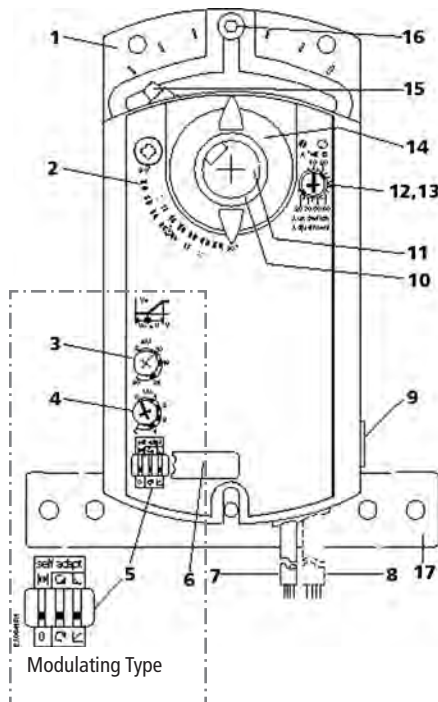
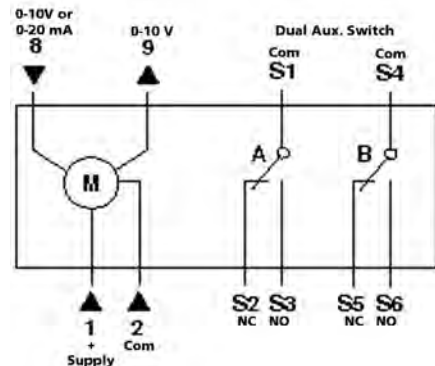
Two Position or Tri-State Control

(ENxx-C2)



Modulating Control

(ENxxB2)



1. Base plate
2. Positioning scale for angle of rotation
3. Slope adjustment ("ZS" version)
4. Offset (start point) adjustment ("ZS" version)
5. DIP switches
6. Cover for DIP switches
7. Connection cables
8. Connection cables ("S" option)
9. Manual override
10. Coupling bushing
11. Centering element for EN44 and (EN88 shaft diam 0.8 mm to 10 mm)
12. Auxiliary switch A ("S" option)
13. Auxiliary switch B ("S" option)
14. Position indicator
15. Adjustment lever with locking screw
16. Adjusting screw for mechanical range stop
17. Mounting bracket

OPERATION

Two Position or Tri-state: A floating control signal controls the actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to wire 6 causes the actuator coupling to rotate clockwise. A 24 VAC control signal to wire 7 causes the actuator coupling to rotate counterclockwise. In the event of a power failure, or with no control voltage, the actuator holds its current position.

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

Modulating Type: A continuous 0 to 10 VDC signal from a controller to wire 8 operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires 9 and wire 2 (com) to monitor the position of the motor.

In the event of a power failure the actuator holds its position. In the event only the control signal is lost, the actuator returns to the "0" position.

Actuator Part Number Table							
Torque	Input Signal	Cabling	24 VAC Operating Voltage				
			Standard	With Potentioeter	Dual Auxiliary Switches only	Span/Offset Adjustable	Dual Aux. Switches and Span/Offset Adjustable
44 in-lb min. (5 N-m)	Tri-state or two-position	Plenum Cabling	EN44C2	EN44C2-P	EN44C2-S	-	-
44 in-lb min. (5 N-m)	Tri-state or two-position	Non-plenum Cabling	EN44C2-NP	-	-	-	-
88 in-lb min. (10 N-m)	Tri-state or two-position	Plenum Cabling	EN88C2	EN88C2-P	EN88C2-S	-	-
44 in-lb min. (5 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	EN44B2	-	EN44B2-S	EN44B2-ZS	EN44B2-ZS-S
88 in-lb min. (10 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	EN88B2	-	EN-88B2-S	EN88B2-ZS	EN88B2-ZS-S
Specifications		EN44C2-NP, EN44C(S,P)	EN88C2(S,P)		EN44B2(S, EN44B2-ZS(S)	EN88B2(S), EN88B2-ZS(S)	
Power supply		24 VAC +20%, -15% 50/60 Hz					
Transformer sizing		2.3 VA (class 2 power source req. for UL)			3.3 VA (class 2 power source req. for UL, class III per EN60730))		
Electrical connection		(-NP) Non-Plenum cable Standard: 3 ft plenum rated cable; conduit connector optional			3 ft 18 AWG plenum cable		
Control signal "Y"		-	-		0-10 VDC, 0-20 mA†		
Input resistance		-	-		100 Kohm VDC		
Operating range		-	-		0-10 VDC, 0-20 mA†		
Fedback signal		-	-		0-10 VDC, 1 mA Max		
Angle of rotation		0-95°, adj. stops			0° to 95°, adj. stops		
Torque at rated voltage		44 in-lb min. (5 N-m)	88 in-lb min. (10 N-m)		44 in-lb min. (5 N-m)	88 in-lb min. (10 N-m)	
Direction of rotation		reversible with wiring			reversible w/dip switch factory setting is clockwise, with position feedback signal		
Position indication		clip on indicator					
Shaft size		3/8" to 5/8" (8 mm to 16 mm) round 1/ 4" to 1/2" (6 mm to 12.7 mm) square 9/16" (15 mm) hex					
Minimum shaft length		3/4" (20 mm)					
Auxiliary features		0 to 1000 Ohms, <10 mA					
-Feedback potentiometer (-P option)		plenum: 4 A resistive, 24 VAC plenum: 2 A inductive, 24 VAC					
-Auxiliary switches (-S option)							
-Control Signal Adjustment (ZS option)		-			0-5 VDC		
-Offset (start point)							
-Slope		-			2-30VDC		
Switch range (-S option)					0° to 90° with 5° intervals		
- Switch A		0° to 45°					
- Recommended range usage		5°					
- Factory setting		2°					
- Switching hysteresis		2°					
Switch range (-S option)		0° to 90° with 5° intervals					
- Switch B		45° to 90°					
- Recommended range usage		85°					
- Factory setting		2°					
- Switching hysteresis		2°					
Running time		90 secs at 60 Hz (108 secs at 50 Hz)	125 secs at 60 Hz (155 secs at 50 Hz)		90 secs at 60 Hz (108 secs at 50 Hz)	125 secs at 60 Hz (155 secs at 50 Hz)	
Humidity		95% RH noncondensing					
Housing type		NEMA type 2/IP54 according to EN60529; NEMA 4/4X housings available on request					
Housing material		Durable plastic					
Ambient temperature		-22°F to 130°F (-30°C to 55°C)					
Storage temperature		-22°F to 140°F (-30°C to 60°C)					
Noise level		<35 dBA					
Servicing		maintenance free					
Agency ratings		UL 873 listed, CE-UL certified to CSA C22.2 No. 24-93					
CE conformity		Electromagnetic Compatibility (EMC): 89/336/EEC Emissions standards: EN50081-1 Immunity standards: EN50082-2					
Quality standard		ISO 9002					
Weight		1.06 lbs (0.48 kg)					

DEI

EN132, EN177 & EN310 Non-Spring Return Electric Actuators

The EN132C2(-S), EN177C2(-S) and EN310C2(-S) direct coupled 24 VAC non-spring return (NSR) rotary electronic actuators are designed for tri-state (floating) or two-position control of building HVAC dampers and valves.

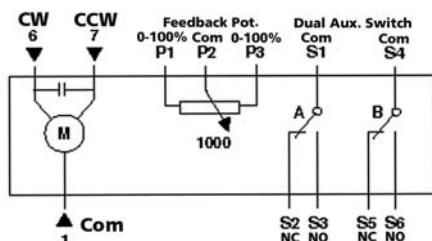
The EN132B2, EN132B2-ZS-S, EN177B2(-S), EN177B2-ZS(-S), EN177D2(S), EN310B2(-S), EN310B2-ZS(-S) and EN310D2(-S) direct coupled 24 VAC non-spring return (NSR) rotary electronic actuators are designed for modulating control of building HVAC dampers or valves.

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers and valves requiring up to 132 in-lb (15 N-m), 177 in-lb (20 N-m), or 310 in-lb (35 N m) torque.

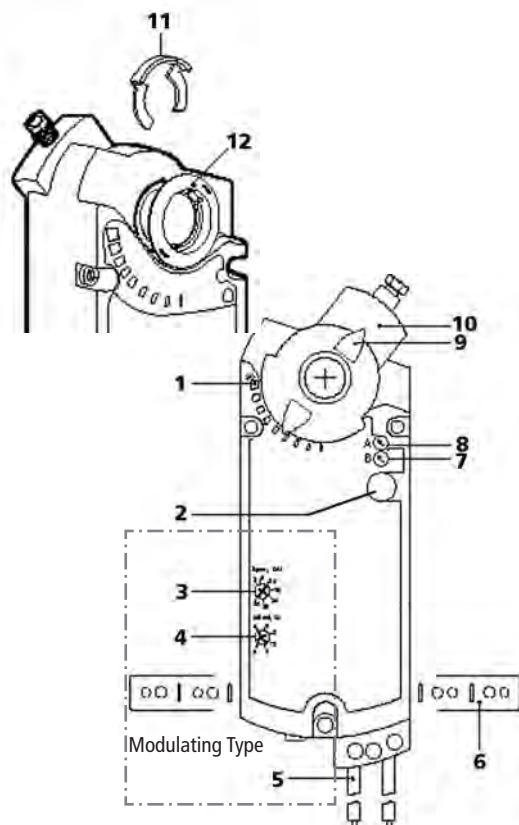
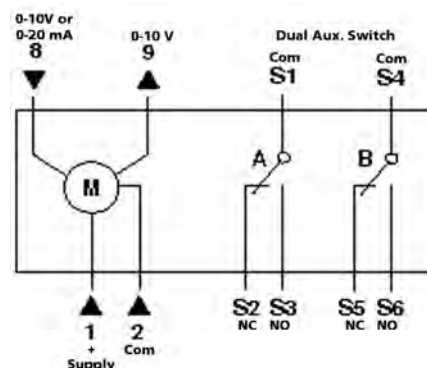


WIRING & COMPONENTS

Two Position or Tri-State Control



Modulating Control



1. Positioning scale for angle of rotation
2. Manual override (push)
3. Span adjustment (-ZS version)
4. Offset (start point) adjustment (-ZS version)
5. Connection cables
6. Mounting bracket
7. Auxiliary switch B (-S option)
8. Auxiliary switch A (-S option)
9. Position indicator
10. Standard or self-centering shaft adapter*
11. Shaft adapter locking clip
12. Position indicator adapter

* Self-centering shaft adaptor shown

OPERATION

Two Position or Tri-state: A floating control signal controls the actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to wire 6 causes the actuator coupling to rotate clockwise. A 24 VAC control signal to wire 7 causes the actuator coupling to rotate counterclockwise. Reverse the position indicator so that the counterclockwise 0 to 90 scale is visible, if needed.

In the event of a power failure, or with no control voltage, the actuator holds its current position.

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

Modulating Type: A continuous 0 to 10 VDC signal from a controller to wire 8 operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires 9 and wire 2 (com) to monitor the position of the motor.

In the event of a power failure the actuator holds its position. In the event only the control signal is lost, the actuator returns to the "0" position.

Actuator Model Number Table							
Torque	Input Signal	Cabling	24 VAC Operating Voltage				
			Standard	With Dual Auxiliary Switches & Potentiometer	Dual Auxiliary Switches only	Span/Offset Adjustable	Dual Aux. Switches and Span/Offset Adjustable
132 in-lb min. (15 N-m)	Tri-state or two-position	Std. or Plenum	EN132C2	EN132C2-S	-	-	-
177 in-lb min. (20 N-m)	Tri-state or two-position	Plenum Cabling	EN177C2	EN177C2-S	-	-	-
310 in-lb min. (35 N-m)	Tri-state or two-position	Plenum Cabling	EN310C2	EN310C2-S	-	-	-
132 in-lb min. (15 N-m)	0-10 VDC 0-20 mA	Std. or Plenum	EN132B2	-	-	-	EN132B2-ZS-S
177 in-lb min. (20 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	EN177B2	-	EN-177B2-S	EN177B2-ZS	EN177B2-ZS-S
	4-20 mA	Plenum Cabling	EN177D2	-	EN177D2-S	-	-
310 in-lb min. (35 N-m)	0-10 VDC	Plenum Cabling	EN310B2	-	EN310B2-S	EN310B2-ZS	EN310B2-ZS-S
	4-20 mA	Plenum Cabling	EN310D2	-	EN310D2-S	-	-

Specifications	EN132C2(S)	EN177C2(S)	EN310C2(S)	EN132B2(ZS)(S)	EN177B2(ZS)(S)	EN310B2(ZS)(S)	EN177D2(S)	EN310D2(S)
Power supply	24 VAC ±20%	24 VAC ±15%, 50/60 Hz		24 VAC ±20%	24 VAC +20%, -15% 50/60 Hz			
Transformer sizing	(class 2 power source required for UL)							
Power consumption	3 VA running	4 VA running	6 VA running	5 VA running	4 VA running	6 VA running	4 VA running	6 VA running
Electrical connection	3 ft 18 AWG plenum cable							
Control signal "Y"	-	-	-	0-10 VDC, 0-20 mA(add 500 ohm, 1/4 w resistor across pins 2 & 8)			4-20 mA	
Input resistance	-	-	-	>100 Kohm	100 Kohm		500 ohms	
Operating range	-	-	-	0-10 VDC, 0-20 mA			4-20 mA	
Fedback signal	-	-	-	0-10 VDC, 1 mA max.				
Overload protection	electronic throughout 0° to 95° rotation							
Potentiometer	0-1000 Ohms<10mA	0-1000 Ohms, max. 1 mA		-	-	-	-	-
Manual override	push down button							
Angle of rotation	mechanically limited to 95°			90 to 95° max.				
Minimum torque	132 in-lb min.	177 in-lb min.	310 in-lb min.	132 in-lb min.	177 in-lb min.	310 in-lb min.	177 in-lb min.	310 in-lb min.
Direction of rotation	selectable by dip switch							
Position indication	Visual Indicator, -5° to 90° (-5° is spring return position)			visual indicator, 0 to 90°				
Shaft size	1/4" to 3/4" dia. 1/ 4" to 1/2 "sq	3/8" to 1" dia. 1/4" to 3/4"sq		1/4" to 3/4" dia. 1/ 4" to 1/2"sq	3/8" to 1" dia. 1/4" to 3/4"sq			
Minimum shaft length	3/4" (20 mm)							
– Auxiliary switches (-S option)	24 to 250 VAC, 6 A res 12 to 30 VDC, 2A	Plenum 4A resistive, 24 VAC Plenum 2A inductive, 24 VAC		24 to 250 VAC, 6 A resistive 12 to 30 VDC, 2A	Plenum 4A resistive, 24 VAC Plenum 2A inductive, 24 VAC			
Switch range (-S option)	0° to 90° with 5° intervals							
– Switch A	0° to 45°							
– Rec. range usage	5°							
– Factory setting	2°							
– Switching hysteresis	2°							
Switch range (-S option)	0° to 90° with 5° intervals							
– Switch B	45° to 90°							
– Rec. range usage	85°							
– Factory setting	2°							
– Switching hysteresis	2°							
Running time for 90°	125 secs at 60 Hz 150 secs at 50 Hz	120 secs		125 secs at 60 Hz 150 secs at 50 Hz	150 secs			
Humidity	95% RH noncondensing							
Housing type	NEMA type 1/IP40 according to EN60529; NEMA 4/4x housings available on request							
Housing material	Diecast aluminum							
Ambient temperature	-25°F to 130°F (-32°C to 55°C)							
Storage temperature	-25°F to 158°F (-32°C to 70°C)			-40°F to 158°F (-40°C to 70°C)				
Noise level	max. 40 dBA	max. 45 dBA						
Servicing	maintenance free							
Agency ratings	UL 873 or UL60730 listed, CE-UL certified to CSA C22.2 No. 24-93							
CE conformity	EMC: 89/336/EEC, Emissions: EN5081-1							
Immunity	EN61000-6-2 except EN50082-1	IEN50082-2						
Quality standard	ISO 9002							
Weight	2.2 lbs (1.o kg)	4.4 lbs (2.0 kg)		2.2 lbs (1.o kg)	4.4 lbs (2.0 kg)			

DEI

ES62A, ES75A & ES142A Spring Return Electric Actuators

Two Position Control, 62, 76 & 142 in-lb

The ES75A and ES142 (24 VAC or 115 VAC) and the ES62A (24 VAC/VDC or 115 VAC) direct coupled two-position spring return electronic actuators are for control of building HVAC dampers or valves.

These actuators are used for the control of valves or dampers requiring up to 62 in-lb (7 N-m), 75 in-lb (8.5 N-m) or 142 in-lb (16 N-m) of torque. They are designed for applications that require the valve or damper to return to its fail-safe position

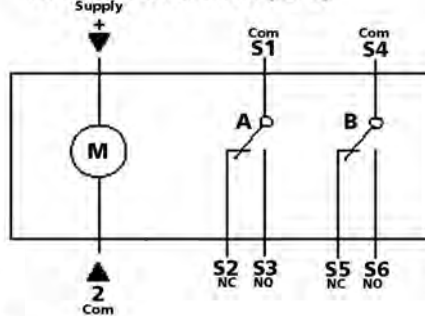
FEATURES

- Brushless DC motor technology with stall protection
- Bi-directional fail-safe spring return
- Unique self-centering shaft coupling
- Access to all functions from either side of the actuator
- All metal housing
- Manual override
- 5 ° pre-load as shipped from factory
- Models with independently adjustable dual auxiliary switches available
- UL, CSA approved; CE rating for ES62

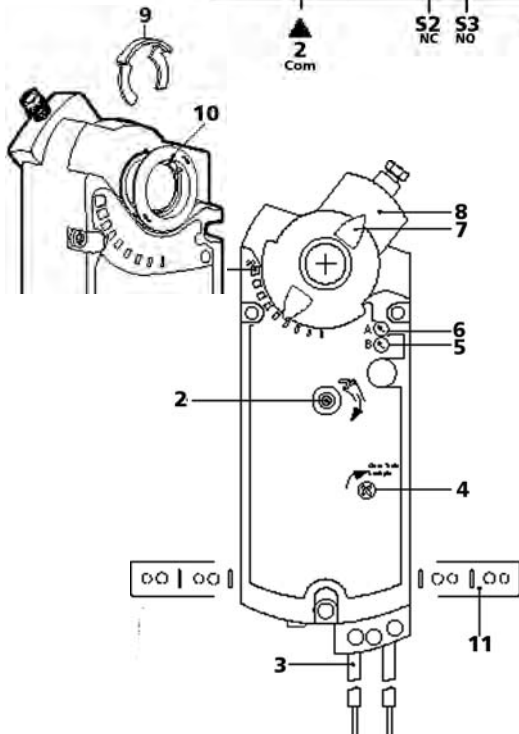
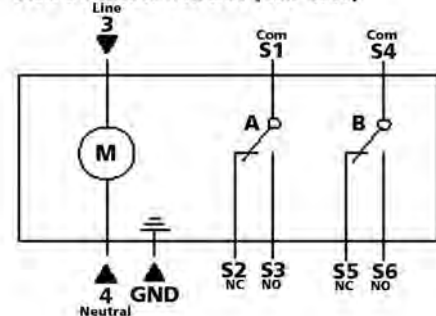
WIRING & COMPONENTS



Two-Position Control (24 V)



Two-Position Control (115 VAC)



1. Positioning scale for angle of rotation
2. Manual override wrench opening and direction of rotation arrow
3. Connection cables
4. Gear train lock pin
5. Auxiliary switch B (-S option)
6. Auxiliary switch A (-S option)
7. Position indicator
8. Standard or self-centering shaft adapter*
9. Shaft adapter locking clip
10. Position indicator adapter
11. Mounting bracket* Self-centering shaft adaptor shown

*Self-centering shaft adapter shown

OPERATION

Two Position: When power is applied, the actuator coupling moves toward the "90 °" position. In the event of a power failure, or when operating voltage is turned off, the actuator returns to the "0 " position..

Actuator Model Number Table						
Torque	Input Signal	Cabling	24 VAC Operating Voltage		115 VAC Operating Voltage	
			Standard	Dual Auxiliary Switches	Standard	Dual Auxiliary Switches
62 in-lb min. (7 N-m)	Two-Position	Std. or Plenum	ES62A2	ES62A2-S	ES62A1	ES62A1-S
75 in-lb min. (8.5 N-m)	Two-Position	Std. or Plenum	ES75A2	ES75A2-S	ES75A1	ES75A1-S
142 in-lb min. (16 N-m)	Two-Position	Std. or Plenum	ES142A2	ES142A2-S	ES142A1	ES142A1-S

Specifications	ES62A2(S)	ES62A1(S)	ES75A2(S)	ES142A2(S)	ES75A1(S)	ES142A1(S)
Power supply	24 VAC ±20% 24VDC ±15% 50/60Hz	120 VAC ±10% 50/60Hz	24 VAC ±20%, -15% 50/60Hz		115 VAC ±15% 50/60Hz	
Transformer sizing	(class 2 power source required for UL)					
Power consumption	5 VA running	7 VA running	8 VA running		9 VA running	
Electrical connection	3', 18 AWG, BX conn. Plenum Cable	3', 18 AWG, BX conn.	3', 18 AWG, BX conn. Plenum Cable		3', 18 AWG, BX conn. Standard Cable	
Overload protection	electronic throughout 0° to 95° rotation					
Manual override	3mm hex crank, Shipped with actuator					
Angle of rotation (max.)	95°					
Minimum torque	62 in-lb	62 in-lb	75 in-lb	142 in-lb	75 in-lb	142 in-lb
Direction of rotation	Direction & Direction spring return, selectable when ordering (CW=clockwise Direction with power, counterclockwise by spring; CCW=reverse of CW)					
Position indication	Visual Indicator, -5° to 90° (-5° is spring return position)					
Shaft size	1/4" to 3/4" dia. 1/ 4" to 1/2" sq	3/8" to 1" dia. 1/4" to 3/4" sq				
Minimum shaft length	3/4" (20 mm)					
– Auxiliary switches (-S option)	24 to 250 VAC, 6 A res 12 to 30 VDC, 2A		Plenum 4A resistive, 24 VAC Plenum 2A inductive, 24 VAC		24 to 250 VAC, 6 A resistive 24 to 250 VAC, 2 A inductive	
Switch range (-S option)	0° to 90° with 5° intervals					
– Switch A	0° to 45°					
– Rec. range usage	5°					
– Factory setting	2°					
– Switching hysteresis	2°					
Switch range (-S option)	0° to 90° with 5° intervals					
– Switch B	45° to 90°					
– Rec. range usage	85°					
– Factory setting	2°					
– Switching hysteresis	2°					
Running time (nominal)	90 secs running spring return- 15 secs typ.,(<60 secs. max. at -25°F)		150 seconds constant, independent of load, spring return: 25 sec. typ. (30 sec. max)	90 seconds constant, independent of load, spring return: 15 sec. typ. (30 sec. max)	150 seconds constant, independent of load, spring return: 25 sec. typ. (30 sec. max)	90 seconds constant, independent of load, spring return: 15 sec. typ. (30 sec. max)
Humidity	5 to 95% RH noncondensing					
Housing type	NEMA type 1/IP40 according to EN60529; NEMA 4/4X housings available on request					
Housing material	Diecast aluminum alloy					
Ambient temperature	-25°F to 130°F (-32°C to 55°C)					
Storage temperature	-25°F to 158°F (-32°C to 70°C)			-40°F to 158°F (-40°C to 70°C)		
Noise level	40 dBA		max. 45 dBA			
Servicing	maintenance free					
Agency ratings	UL 873 or UL60730 listed, CE-UL certified to CSA C22.2 No. 24-93					
CE conformity	EMC: 89/336/EEC, Emissions: EN5081-1					
Immunity	IEN50082-2					
Quality standard	ISO 9002					
Weight	2.86 lbs (1.3 kg)		4.85 lbs (2.2 kg)			

DEI

ES62, ES75 & ES142 Spring Return Electric Actuators

Tri-State, & Modulating, 132, 177 & 310 in-lb

The ES62C2(-S)(24 VAC/VDC), ES75C2(-S) and ES142C2(-S) direct coupled 24 VAC spring return electronic actuators are designed for tri-state (floating) control of building HVAC dampers and valves.

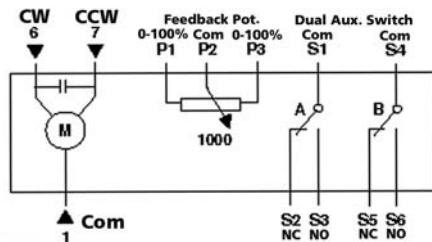
The ES62B2(-S), ES62B2-ZS(-S), ES75B2(-S), ES75B2-ZS(-S), ES142B2(-S), ES142B2-ZS(-S) & ES142D2(-S) direct coupled 24 VAC spring return electronic actuators are designed for modulating control of building HVAC dampers and valves.

These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass valves or dampers requiring up to 62 in-lb (7 N-m), 75 in-lb (8.5 Nm) or 142 in-lb (16 Nm) torque. They are designed for applications that require the valve or damper to return to a fail-safe position when there is a power failure.

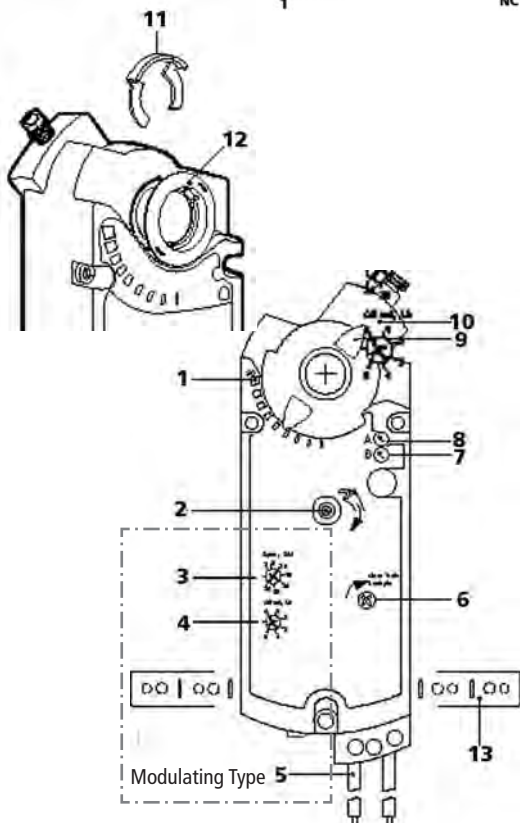
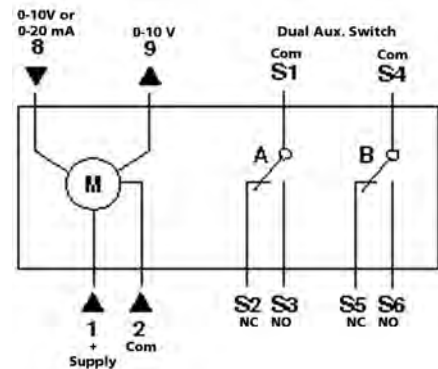


WIRING & COMPONENTS

Tri-State Control



Modulating Control



1. Positioning scale for angle of rotation
2. Manual override wrench opening and direction of rotation arrow
3. Span adjustment (-ZS version)
4. Offset (start point) adjustment (-ZS version)
5. Connection cables
6. Gear train lock pin
7. Auxiliary switch B
8. Auxiliary switch A
9. Position indicator
10. Standard or self-centering shaft adapter*
11. Shaft adapter locking clip
12. Position indicator adapter
13. Mounting bracket

* Self-centering shaft adaptor shown

OPERATION

Two Position or Tri-state: A floating control signal controls the actuator. The actuator's angle of rotation is proportional to the length of time the signal is applied. A 24 VAC control signal to wire 6 causes the actuator coupling to rotate clockwise. A 24 VAC control signal to wire 7 causes the actuator coupling to rotate counterclockwise.

With no control voltage the actuator holds its current position.

In the event of a power failure, the actuator spring returns to the "0" position.

An improperly-tuned control loop will cause excessive repositioning that will shorten the life of the actuator.

Modulating Type: A continuous 4 to 20 mA or 0 to 10 VDC signal from a controller to wire 8 operates the actuator. The angle of rotation is proportional to the control signal. A 0 to 10 VDC position feedback output signal is available between wires 9 and wire 2(com) to monitor the position of the motor.

In the event of a power failure, or when the operating voltage is shut off, the actuator returns to the "0" position.

Actuator Part Number Table							
Torque	Input Signal	Cabling	24 VAC Operating Voltage				
			Standard	With Dual Auxiliary Switches & Potentioeter	Dual Auxiliary Switches only	Span/Offset Adjustable	Dual Aux. Switches and Span/Offset Adjustable
62 in-lb min. (7 N-m)	Tri-state (floating)	Standard Cable	ES62C2	ES62C2-S	-	-	-
75 in-lb min. (8.5 N-m)	Tri-state (floating)	Plenum Cabling	ES75C2	ES75C2-S	-	-	-
142 in-lb min. (16 N-m)	Tri-state (floating)	Plenum Cabling	ES142C2	ES142C2-S	-	-	-
62 in-lb min. (7 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	ES62B2	-	ES62B2-S	ES62B2-ZS	ES62B2-ZS-S
75 in-lb min. (8.5 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	ES75B2	-	ES75B2-S	ES75B2-ZS	ES75B2-ZS-S
142 in-lb min. (16 N-m)	0-10 VDC 0-20 mA	Plenum Cabling	ES142B2	-	ES142B2-S	ES142B2-ZS	ES142B2-ZS-S
142 in-lb min. (16 N-m)	4-20 mA	Plenum Cabling	ES142D2	-	ES142D2-S	-	-
Specifications	ES62C2(S)	ES75C2(S)	ES142C2(S)	ES62B2(S)(ZS,S)	ES75B2(S)(ZS,S)	ES142B2(S)(ZS,S)	ES142D22(S)
Power supply	24 VAC +20%,24VDC±15%	24 VAC +20%-15%,50/60HZ		24 VAC +20%, 24VDC±15%	24 VAC +20%, -15% 50/60 Hz		
Transformer sizing	(class 2 power source required for UL, CSA)						
Power consumption	5 VA running	8 VA running		5 VA running	9 VA running		
Electrical connection	3 ft 18 GA appliance cable	3 ft 18 AWG plenum cable					
Control signal "Y"	-	-	-	0-10 VDC(max 35VDC), 0-20 mA(add 500 ohm, 1/4 W resistor across pins 2 & 8)			4-20 mA
Input resistance	-	-	-	>100 Kohm	100 Kohm (0.1 mA)		500 ohms
Operating range	-	-	-	0-10 VDC, 0-20 mA(add 500 ohm, 1/4 W resistor across pins 2 & 8)			4-20 mA
Fedback signal	-	-	-	0-10 VDC, ±1 mA max. for 95°			
Overload protection	electronic throughout 0° to 95° rotation						
Potentiometer	0-1000 Ohms, max. 1 mA			-	-	-	-
Manual override	3 mm hex crank (shipped with actuator)						
Angle of rotation	mechanically limited to 95°						
Minimum torque	62 in-lb min.	75 in-lb min.	142 in-lb min.	62 in-lb min.	75 in-lb min.	142 in-lb min.	142 in-lb min.
Direction of rotation	Direction & Direction spring return, selectable when ordering (CW=clockwise Direction with power, counterclockwise by spring; CCW=reverse of CW)						
Position indication	visual indicator, -5° to 90° (-5° is spring return position)			visual indicator, 0 to 90° (0° is spring return position)			
Shaft size	1/4" to 3/4" dia. 1/4" to 1/2"sq	3/8" to 1" dia. 1/4" to 3/4"sq		1/4" to 3/4" dia. 1/4" to 1/2"sq	3/8" to 1" dia. 1/4" to 5/8"sq		
Minimum shaft length	3/4" (20 mm)						
— Auxiliary switches (-S option)	24 to 250 VAC, 6 A res 12 to 30 VDC, 2A	Plenum 4A resistive, 24 VAC Plenum 2A inductive, 24 VAC		24 to 250 VAC, 6 A res 12 to 30 VDC, 2A	Plenum 4A resistive, 24 VAC Plenum 2A inductive, 24 VAC		
Switch range (-S option)	0° to 90° with 5° intervals						
— Switch A	0° to 45°						
— Rec. range usage	5°						
— Factory setting	2°						
— Switching hysteresis							
Switch range (-S option)	0° to 90° with 5° intervals						
— Switch B	45° to 90°						
— Rec. range usage	85°						
— Factory setting	2°						
— Switching hysteresis							
Running time for 90°	motor: 90 secs, constant spring 15 secs typ. (60max)	motor:120 secs, constant spring: 25 sec Typ.	motor: 90 secs, constant spring: 15 sec Typ.		motor:150 secs, constant spring: 25 secTyp.	motor:90 secs, constant spring: 15 sec Typ.	
Humidity	95% RH noncondensing						
Housing type	NEMA type 1/IP40 according to EN60529; NEMA 4/4X housings available on request						
Housing material	Diecast aluminum						
Ambient temperature	-25°F to 130°F (-32°C to 55°C)						
Storage temperature	-25°F to 158°F (-32°C to 70°C)						
Noise level	max. 20 dBA	20 dBA	<45 dBA running				
Servicing	maintenance free						
Agency ratings	UL 873 or UL60730 listed, CE-UL certified to CSA C22.2 No. 24-93 (pending CE approval for plenum models)						
CE conformity	EMC: 89/336/EEC, Emissions: EN5081-1						
Immunity	EN61000-6-2 except EN50082-1	IEN50082-2					
Quality standard	ISO 9002						
Weight	2.86 lbs (1.3 kg)	6 lbs (2.7 kg)		-	-		

DEI

RE Reversing Electronic NEMA 4/4X Actuators

On-Off, Tri-State, & Modulating Control, 150 in-lb to 10,200 in-lb

Model RE electric/electronic actuators are ideal for demanding valve applications and air damper control. The actuators are available with torque ratings from 150 in-lbs to 10,200 in-lbs. They incorporate current limiting as a means of protecting the actuator for over-torque situations and do not depend on torque switches or thermal overload sensing. The current limiting feature activates a light (and an optional relay) upon exceeding the current limit set, to allow for easy field diagnostics.

All actuators accept 24 VAC or VDC power and 120 or 220 VAC with the addition of a transformer. All actuators have field adjustable speed control as a standard feature. Actuators are designed for temperatures ranging from -40 °F to 150 °F (-40 °C to 65 °C). For temperatures below 32 °F (0 °C), outdoor applications, high humidity or wet locations the actuators can be supplied with an electric heater and thermostat.

All actuators shall have a solid state braking system, which works with or without power, (rated to 1-1/4 times the torque rating of the actuator). All units are equipped with a manual override, which will allow the actuator to be rotated in the clockwise or counter-clockwise direction. Optional solid cast aluminum override handwheels are available (spoked handwheels are not acceptable due to safety issues).

The actuator housing is a high strength aluminum casting with an exterior grade polyurethane enamel coating for excellent wear, corrosion, impact and UV resistance. The actuators are NEMA 4/4X type minimum. All cover fasteners are stainless steel. All actuators have a position indicator with the angle of rotation clearly marked. All actuators used in outdoor applications have white covers to lessen the solar heat load.

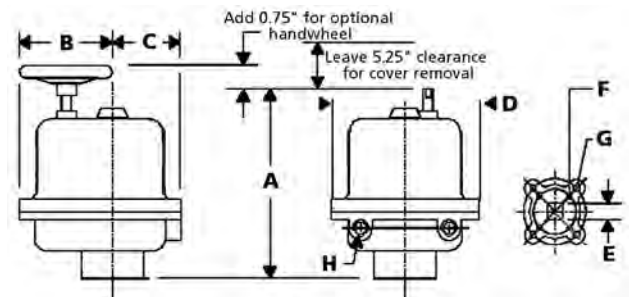
Model RE is capable of accepting 4-20 mA with 250 Ohms impedance, 0-10 VDC or 2-10 VDC signals. Input signal isolation is provided to isolate the input signal from the actuator power so that the signal and power can come from different sources, without the need for exterior isolation modules.



Actuator Model No.	Output Torque		Speed* sec/90°	Speed** sev/270°	Speed** sec/360°
	in-lb	N-m			
RE1.5	150	17	10-25	-	-
RE3	300	34	10-25	-	-
RE6	600	68	10-25	-	-
RE8.5	850	96	10-25	-	-
RE10	1000	114	35-70	-	-
RE15	1500	170	35-70	-	-
RE20	2000	227	35-70	-	-
RE25	2500	284	35-70	-	-
RE30	3000	340	35-70	-	-
RE15T**	3825	434	-	105-210	-
RE20T**	5100	579	-	105-210	-
RE25T**	6375	724	-	105-210	-
RE30T**	7650	869	-	105-210	-
RE30X**	10200	1158	-	-	140-280

* speed is adjustable and varies slightly with load.

** Requires optional torque maximizer (added gear reduction between actuator & valve/damper)



Actuator Model No.	A	S	C	D	E	F	G	H
RE1.5 - RE8.5	9.93	5.15	3.48	7.42	0.75 sq. 0.63 deep	N/A	5/16-16UNC-2B 0.625 deep BC: 3.25	1/2" NPT
RE10 - RE30	11.65	6.07	4.40	9.75	1.00 sq. 2.00 deep	3/8-16UNC-2B 1.12 deep BC: 4.00	7/16-16UNC-2B 1.50 deep BC: 4.965	3/4" NPT

Table 3	RE1.5F - RE8.5F	RE1.5G - RE8.5G	RE10F - RE30X	RE10XG - RE30XG
Power supply	12 VDC, 24 VAC or DC, 120 VAC, 50/60 Hz			
Transformer sizing**	30 VA(class 2 power source required)		50 VA(class 2 power source required)	
Electrical connection	dual conduit entry (1/2")		dual conduit entry (3/4")	
Control signal	two-position/tri-state*	0-10 VDC 4-20 mA	two-position/tri-state*	0-10 VDC 4-20 mA
Input Impeance	250 Ohms for 4-20 mA			
Operating range	0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, & custom signal ranges available			
Feedback output	0 to 10 VDC standard, 4 to 20 mA optional			
Manual override	de-clutching shaft with flats, optional override handwheel			
Angle of rotation	Typically 90° - 320°			
Minimum torque	depends on model, see table 1			
Direction of rotation	standard: increase signal = CCW (jumper selectable)			
Position indication	visual mechanical position indicator			
Gear train	heat treated metal gears, permanently lubricated			
Brakes	solid state braking system			
Duty cycle/Life	100%/2000 hours actual drive time			
– Auxiliary switches	cam operated, 1 standard, up to 3 optional			
Switch	form C; SPDT			
Range usage	0-320°			
Factory setting	none			
Ratings	125/250 VAC: 10 Amp, 1/3 hp 125 VDC: 0.5 Amps 250 VDC: 0.25 Amps			
Switch Connections	male quick connect type tabs			
Control signal Adjustment:	-	0-3Vdc	-	0-3VDC
Offset	-	0-10 VDC or 4-20 mA	-	0-10 VDC or 4-20 mA
Factory Setting	-	adjustable	-	adjustable
Span	-	adjustable	-	adjustable
Running time for 90°	adjustable- see table 1			
Humidity	95% RH noncondensing			
Housing type	NEMA type 4/4x (pending UL, CSA approval)			
Housing material	cast aluminum			
Operating temperature †	-40°F to 150°F (-40°C to 65°C)			
Noise level	max. 20 dBA	20 dBA	<45 dBA running	
Servicing	maintenance free			
Agency ratings	UL 873 or UL60730 listed, CE-UL certified to CSA C22.2 No. 24-93 (pending CE approval for plenum models)			
Options:	for outdoor & harsh environments			
Heater & Thermostat †	non-spoked for safety			
Override Handwheel	output rating: 130 mA max., 9-130 VAC/DC			
Over current Alarm Relay				
Weight	17 lb		25 lbs‡	

* Input signal range from 9-130 VAC or VDC

** Does not include line loss. Add 16 VA if heater and stat (H/S) is used

† Optional heater and stat required for low temperatures, high humidity, extreme condensation or outdoor applications.

‡ For "T" & "X" versions add 38 & 78 lbs respectively for Torque Maximizer.

ORDERING

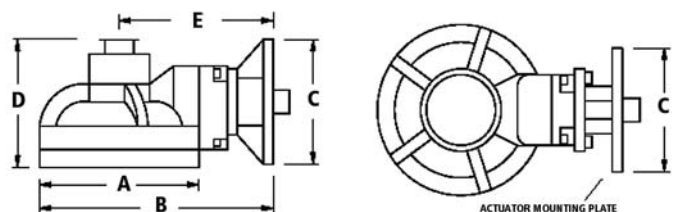
RE-A-B-C-D-E

EXAMPLE: RE10-F-2

A Torque in-lbs	B Torque Maximizer Increases Actuator Torque by multiplier of 2.55	C Control Signal	D Power
1.5 150		F Two-position/Tri-state with current limiting	1 120 V
3 300		G Modulating	2 24V
6 600		0(2)-10V or 0(4)-20mA with current limiting	3 220V
8.5 850			
10 1000			
15 1500			
20 2000			
25 2500			
30 3000			

Torque in-lbs	Torque in-lbs
-	none
15T	3825
20T	5100
25T	6375
30T	7650
Multiplier of 3.40	
30X	10,200

E Options
AS(2,3)= Auxiliary Switch(es)
HT= Heater/thermostat
OH= Override handwheel
AR= Over Current Alarm Relay



Model	Weight (lbs)	Torque Maximizer Dimensions (inches)				
		A	B	C	D	E
T	38	7.25	10.63	5.25	4.63	7.00
X	78	11.25	15.50	5.25	6.63	9.88

The Torque Maximizer permits Model RE actuators to operate at required torques up to 10,200 in-lbs. It also allows the actuator to be mounted in applications with space or location limitations.

The Torque Maximizer provides added gear reduction between the actuator and the valve or damper, thereby increasing the torque of the actuator. This product is 85% efficient in transferring the torque from the input to output drive shaft. This unit bolts directly onto the base of the RE actuator, then the combined actuator/gear operator unit is mounted to the valve, damper or other application.