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# CONTENTS VALVES

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# CONTENTS VALVES

## PNEUMATIC ACTUATED INERT ISOLATION VALVES



## MANUALLY OPERATED BALL VALVES



## ELECTRIC MOTOR ACTUATED BALL, GLOBE & BUTTERFLY VALVES



## PNEUMATIC ACTUATED BALL VALVES



## ELECTRIC VALVE ACTUATORS

## TECHNICAL BULLETIN

# Takasago Soft Seal Feature

*For Applications Requiring Inert Valves Where Particles Are In Flow Stream*

### TYPICAL APPLICATIONS

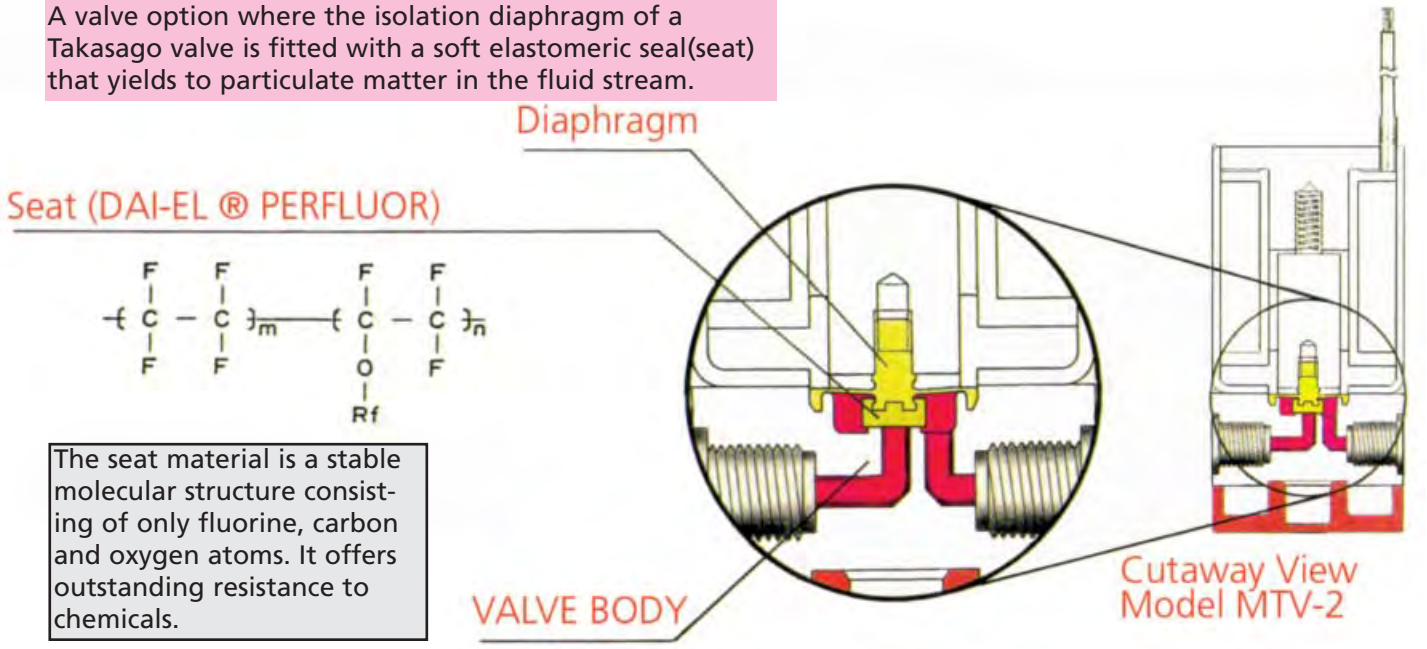
The Soft Seal option is particularly useful in analytical and clinical chemistry applications where inert valve materials are needed but particulate matter may be present in the fluid stream. Particulate matter typically damages soft material such as PTFE resulting in valve leakage in the valve seat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




The seat material is a stable molecular structure consisting of only fluorine, carbon and oxygen atoms. It offers outstanding resistance to chemicals.

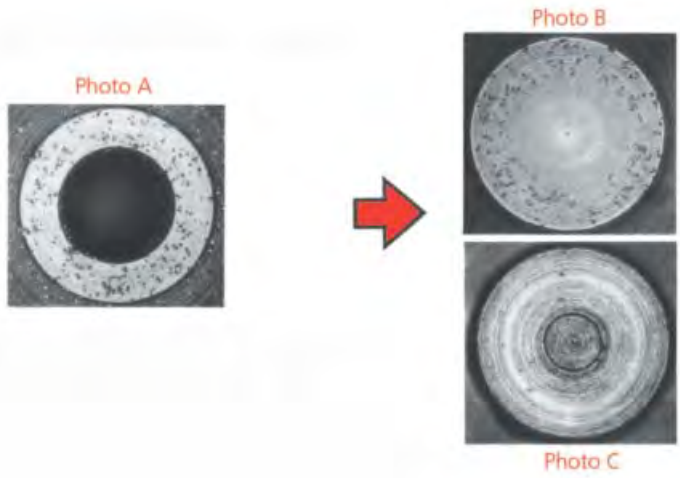
### Soft Seal Demonstrated

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.



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## TECHNICAL BULLETIN

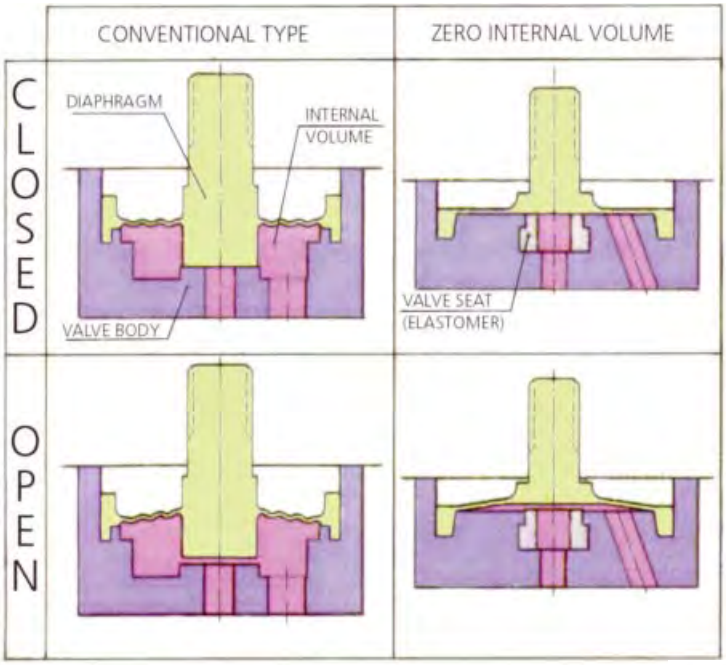
# Takasago Zero Internal Volume Option

*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.

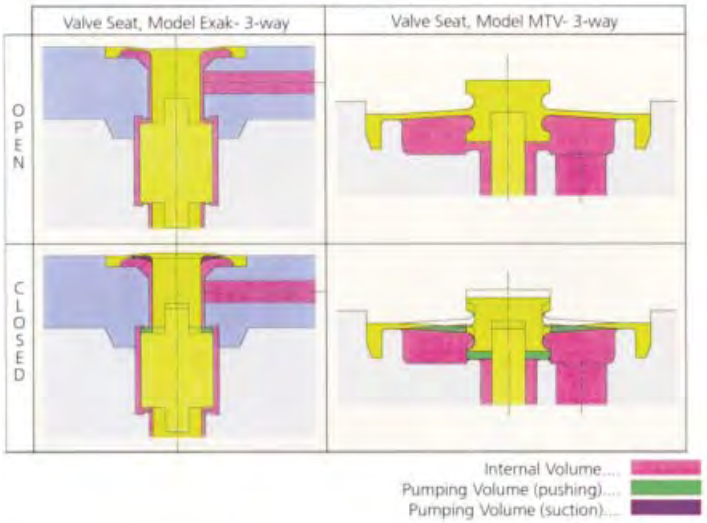
| Model | Type | Internal Volume |
|---|---|---|
| MTV | Conventional | 87 µl |
| MTV | Zero Internal Volume | *34µl |
| STV | Conventional | 87µl |
| STV | Zero Internal Volume | *16µl |

*Passage Volumes Only

## Takasago Diaphragm Pumping Volume

Typical Pumping Volume µl

| 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 |



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## TECHNICAL BULLETIN

# Takasago Ventiduct Feature

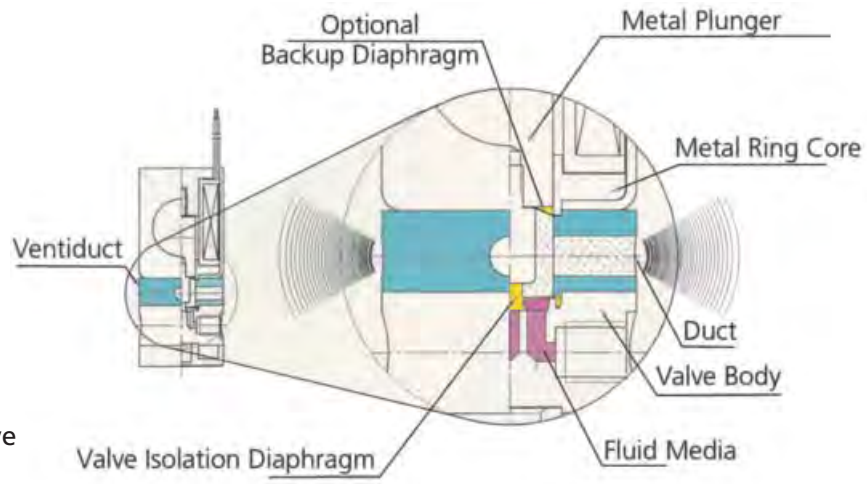
*For Temperature Sensitive And Volatile Fluid Media Applications*

### 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.

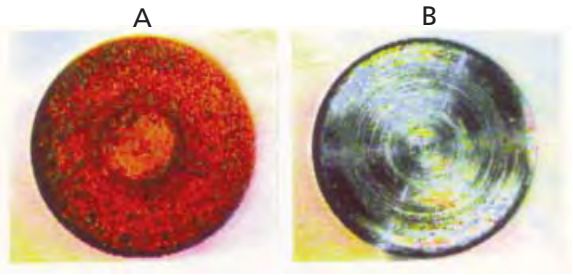
The Ventiduct protects the fluid media from heat generated by the solenoid. Conversely, Ventiduct shields the valve solenoid when the fluid media is at a high temperature.

Typical Takasago Teflon Valve
With Ventiduct Option



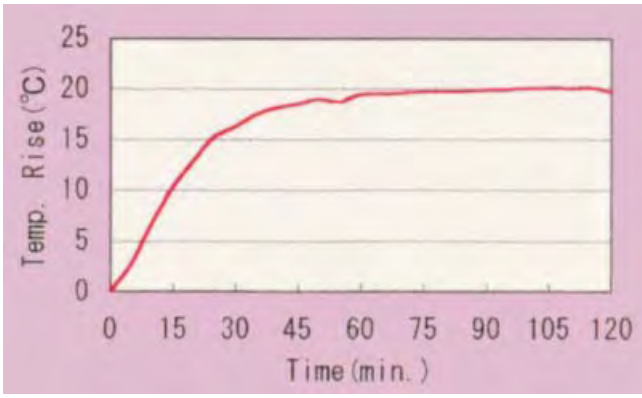

The pictures to the right demonstrate the effectiveness of Ventiduct in protecting the metal solenoid parts from exposure to Trifluoro Acetic Acid for 48 hours at room temperature. A 0.2 mm thick PTFE isolation diaphragm was used.

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

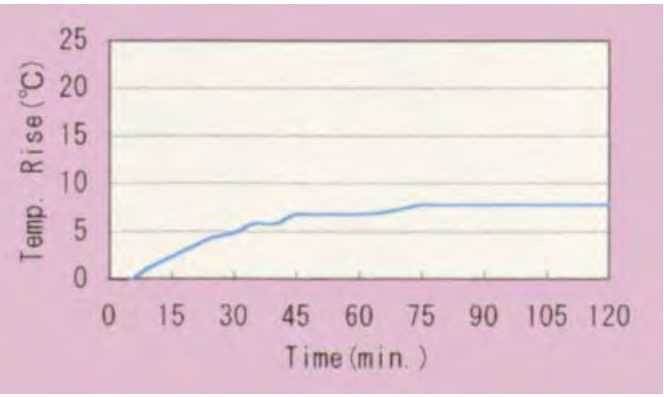



The charts below demonstrate the effectiveness of Ventiduct for heat control by thermal radiation. The Ventiduct reduces the temperature rise in the valve by approximately 12°C.
**Test Conditions:** Fluid- water; Valve Type- MTV-2; Full Rated Voltage Applied (24Vdc)

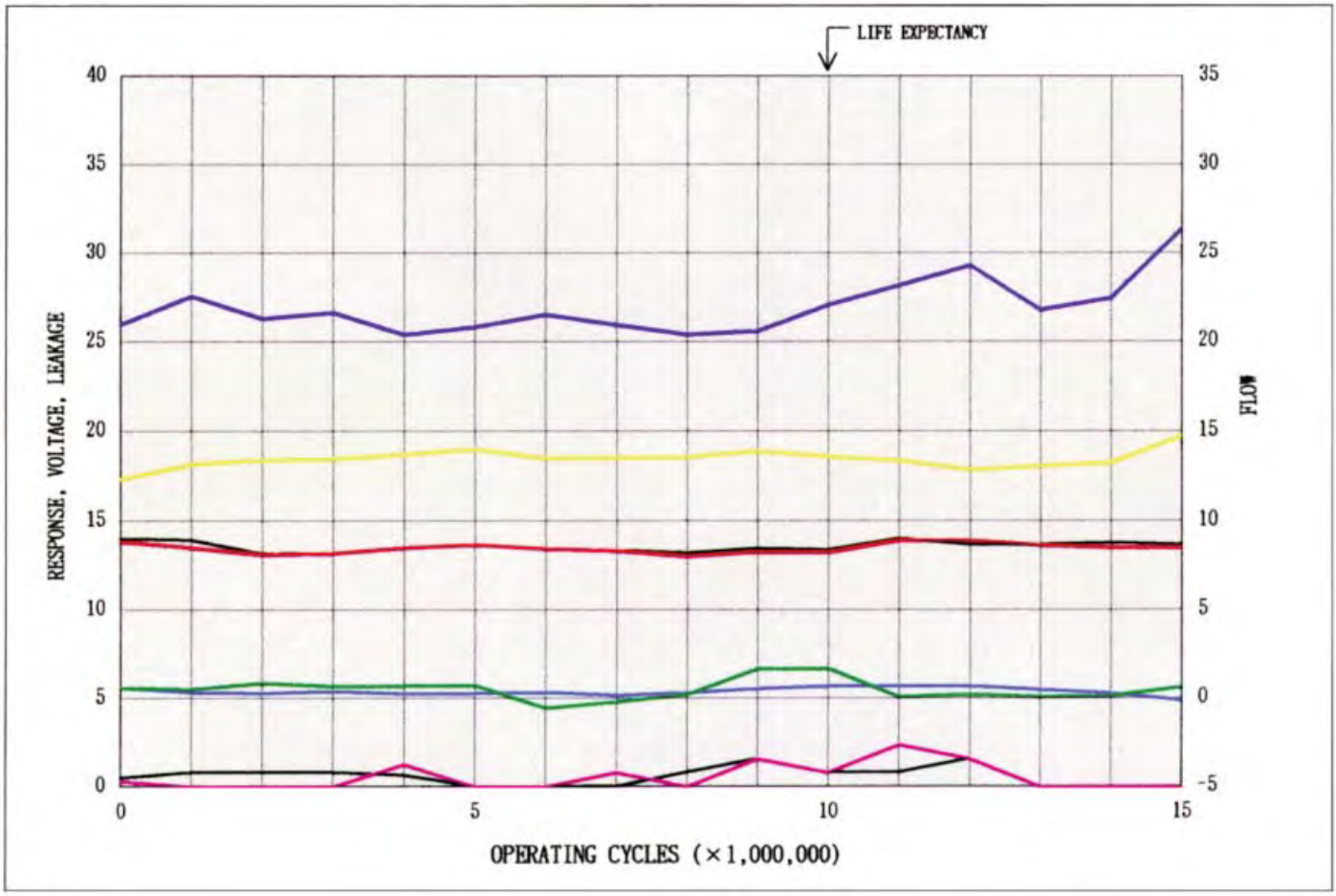
Without Ventiduct




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 |



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# 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

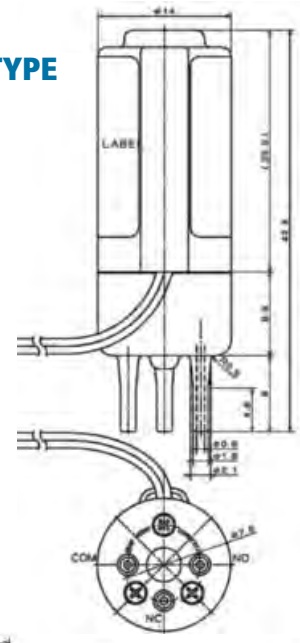
**EXAKN - ABCD**

**EXAMPLE: EXAKN-E2S24V**

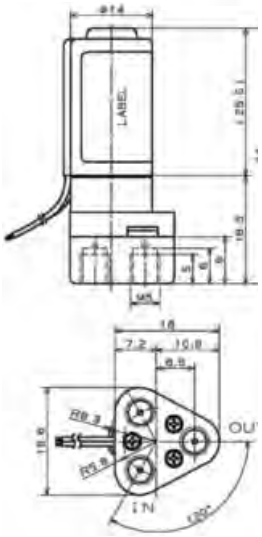
| A<br>Configuration | B<br>Connections | C<br>Mounting | D<br>Voltage |
|---|---|---|---|
| C=2-way, NC<br>O=2-way, NO<br>E=3-way | 1=M5<br>2=Barb | S=Stem<br>M=Manifold<br>(Barb connection only) | 12V=12Vdc<br>24V=24Vdc |

## DIMENSIONS (MM)

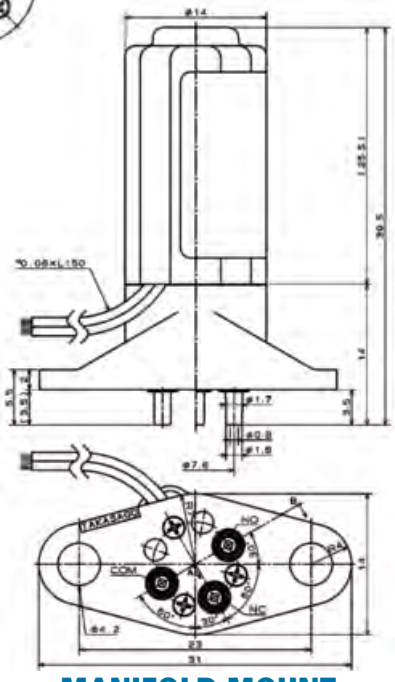
### BARB TYPE




### THREADED TYPE




### MANIFOLD MOUNT



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**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.

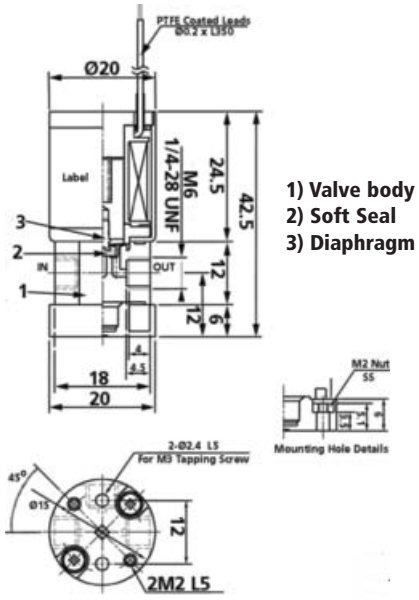
The STV-K and STV-R valves are excellent choices for demanding low flow applications where minimum size and internal volume are requirements.

## 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)




**1) Valve body**
**2) Soft Seal**
**3) Diaphragm**

## ORDERING INFORMATION

**A-BCDE**

**EXAMPLE: STV2-1/4UKG12V**

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



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**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.

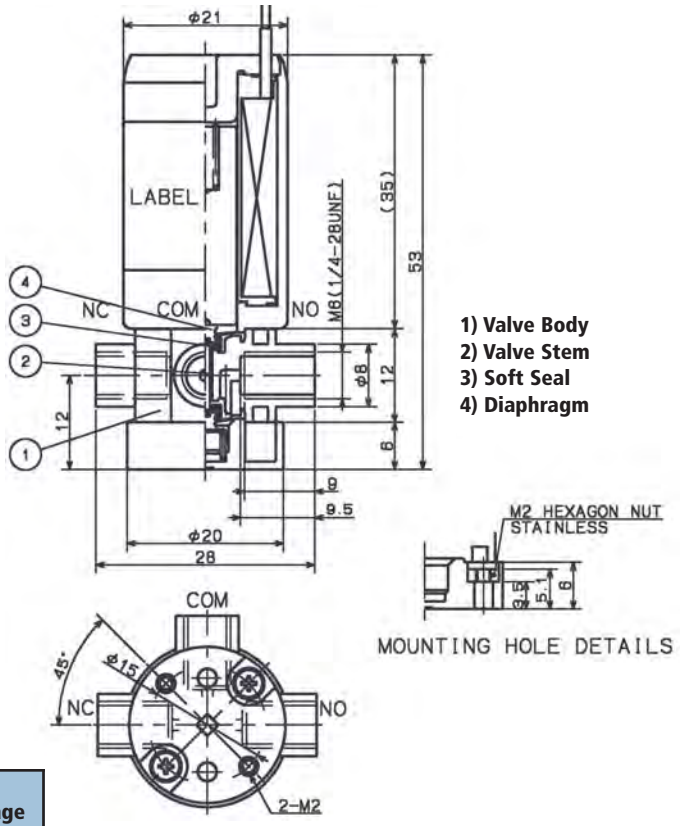
The CTV-K and CTV-R valves are excellent choices for demanding low flow applications where minimum size and internal volume are requirements.

## 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

## DIMENSIONS (MM)




**1) Valve Body**
**2) Valve Stem**
**3) Soft Seal**
**4) Diaphragm**

## 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<br>M6= M6 threaded | K=PEEK<br>R=PPS | G=Perfluor<br>F=FPM | 12V=12Vdc<br>24V=24Vdc |



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**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 agressive media may be present.

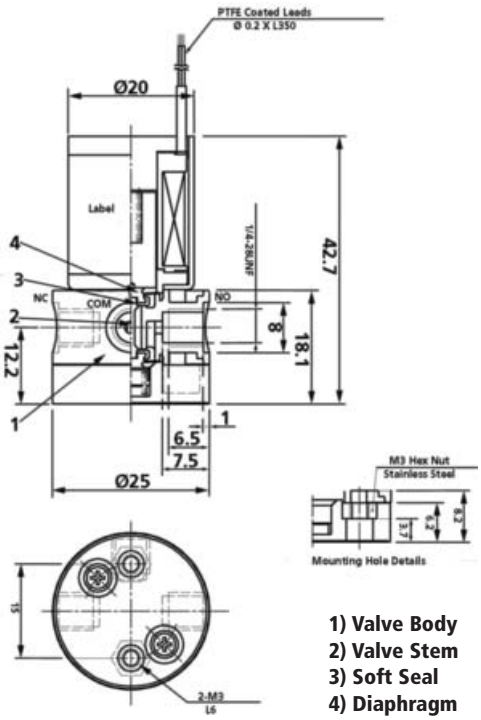
The STV-K-1 is an excellent choice for demanding low flow applications where minimum size and internal volume are requirements.

## 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)




**1) Valve Body**
**2) Valve Stem**
**3) Soft Seal**
**4) Diaphragm**

## ORDERING INFORMATION

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

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

| A= Voltage |
|---|
| 12V=12Vdc |
| 24V=24Vdc |



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# 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.

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

## 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

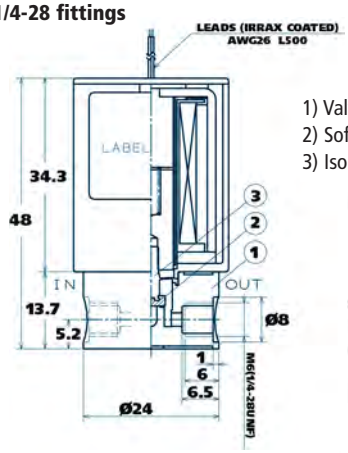
**SELECT MODEL NUMBER AND VOLTAGE (AB)**

| Model Number | | Body | | Orifice | |
|---|---|---|---|---|---|
| A | B | Material | Connection | Sizes | Seal |
| **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 |

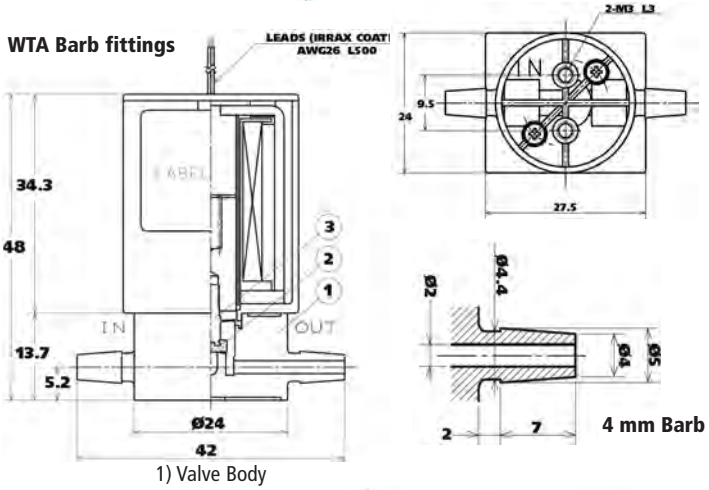
**Bold Order combinations typically ship from stock**

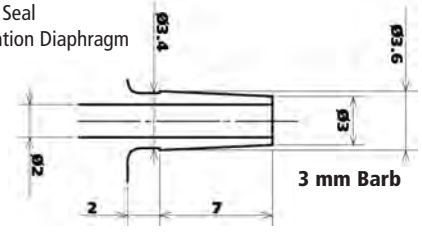
## DIMENSIONS (MM)

**WTA 1/4-28 fittings**




**WTA Barb fittings**




**3 mm Barb**



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**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.

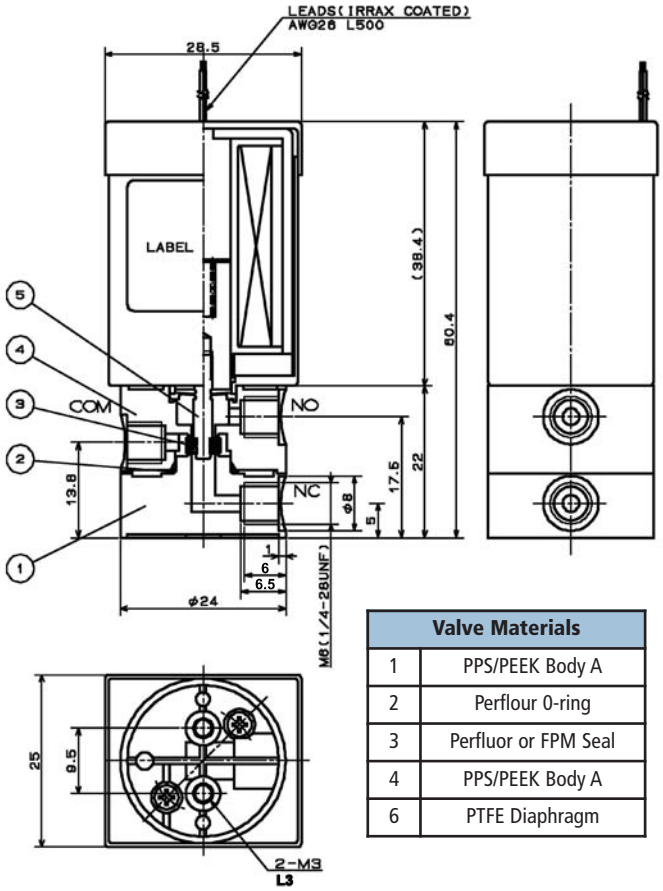
The WTB series are a three-way configuration. Model WTB-3R have molded PPS bodies and Model WTB-3K have molded PEEK bodies. The valves have PTFE isolation diaphragms and a Perfluor or FPM soft valve seat seal.

## 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

## DIMENSIONS (MM)




| Valve Materials | |
|---|---|
| 1 | PPS/PEEK Body A |
| 2 | Perflour 0-ring |
| 3 | Perfluor or FPM Seal |
| 4 | PPS/PEEK Body A |
| 6 | PTFE Diaphragm |

## ORDERING INFORMATION

**ABC-D**

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

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



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# 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 availabe in two way, normally open and normally closed, and three way configurations.

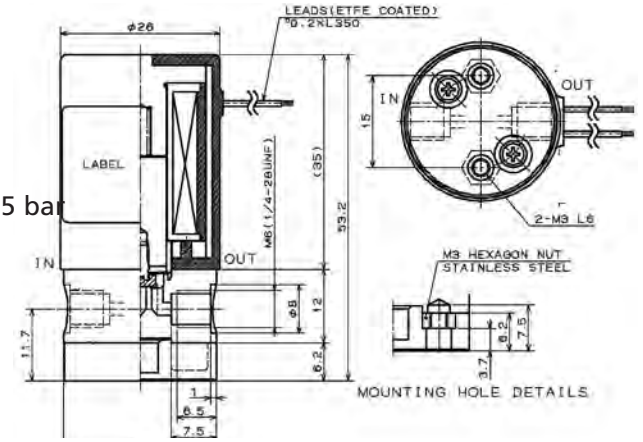
## SPECIFICATIONS

***GENERAL***

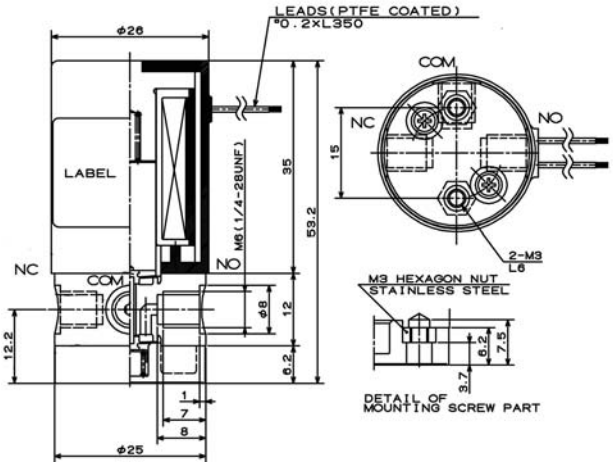
Rated Voltage- 12Vdc or 24Vdc
Min. Operating Voltage- 90% of rated voltage
Drop Out Voltage- 10% of rated voltage
Power Consumption- 1.9 Watts
Coil Temp. Rise- Max 35°C
Solenoid Housing- SPS (Syndiotactic Polystyrene) encapsulated
Orifice Diameter-1.6mm
Internal Volume, two way- IN, 12µl; OUT 60µl
Internal 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

### TWO WAY




### THREE WAY




## ORDERING INFORMATION

**ABCDE**

**EXAMPLE: MTV-3T1/4UG12V**

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

**Bold Order combinations typically ship from stock**

# 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.

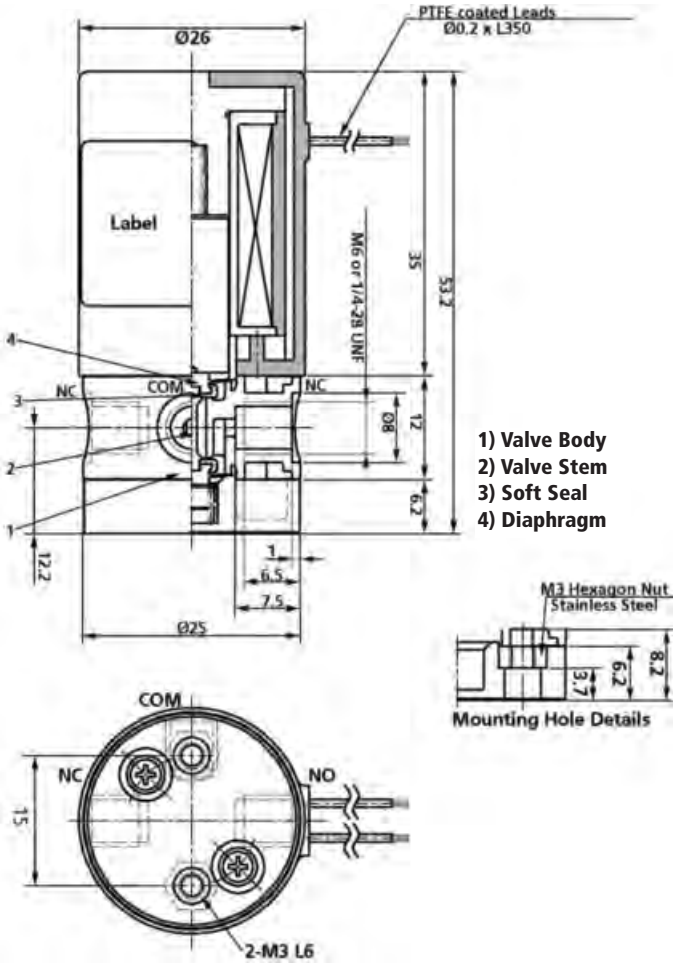
The MTV-3N is offered with molded PEEK or PPS body material. The isolation diaphragm is PTFE and the valve seal material is a soft Perfluor.

## 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<br>Connections | B<br>Body | C<br>Voltage |
|---|---|---|
| **1/4U=1/4-28 threaded**<br>M6= M6 threaded | **KGL=PEEK**<br>**RGL=PPS** | **12V=12Vdc**<br>**24V=24Vdc** |

**Bold Order combinations typically ship from stock**

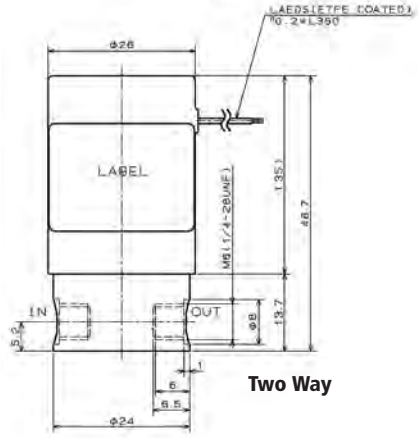
# TAKASAGO
# MTV 2R/3R/2K/3K Inert Isolation Valve
*Solenoid Operated, PEEK & PPS Valves*

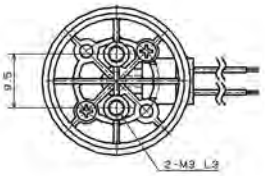
## DESCRIPTION
Model MTV-R/K inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals which are forgiving of particulate matter that would typically destroy an inert valve.

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

**Bold order combinations typically ship from stock**



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**TAKASAGO**

# 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.

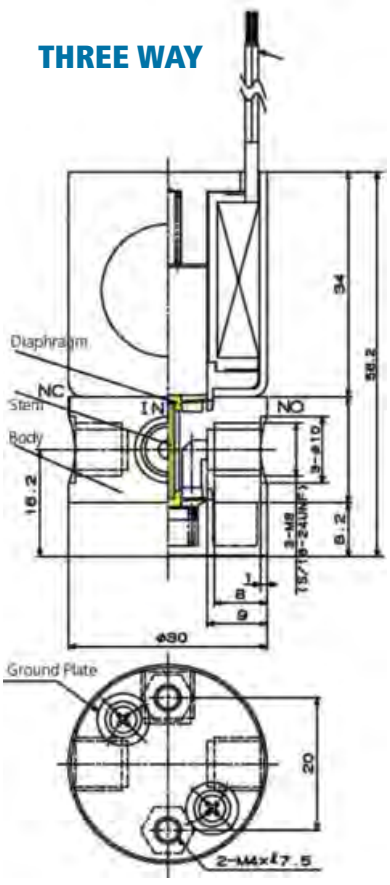
The MLV series are available in two way, normally open and normally closed, and three way configurations.

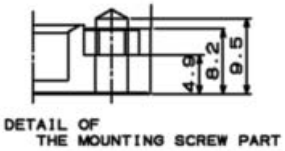
## SPECIFICATIONS

***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

## THREE WAY




## ORDERING INFORMATION

**ABCDE**

**EXAMPLE: MLV-3TM8G-12V**

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

## NOTE:

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



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## 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

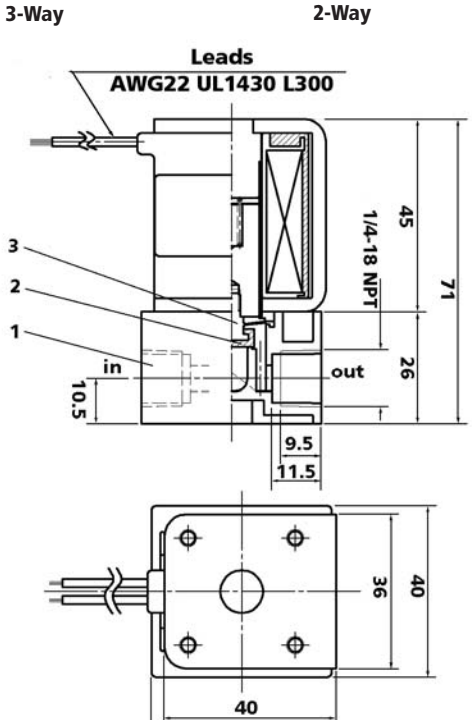

PKV-2K

## 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 or1/4-18 NPT
Valve Body Material- PPS or PEEK
Isolating Diaphragm Material- PTFE
Valve Seat Seal Material- FPM or Perfluor
3-W Valve Stem Material- PCTFE

## DIMENSIONS (MM)




## ORDERING INFORMATION

***ABCDE***
***EXAMPLE: PKV-2RD1/4NG12V***

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

# 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-

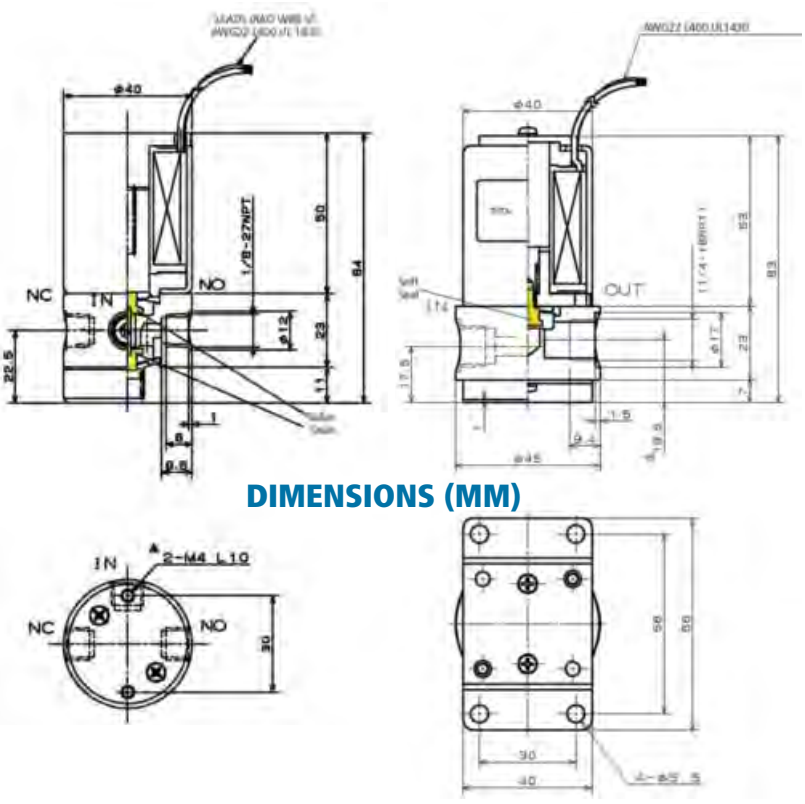
NRV THREE WAY

NRV TWO WAY

## 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




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<br>5=5 mm<br>6=6 mm | C=2-way, NC<br>O=2-way, NO<br>E=3-way | T=PTFE<br>P=HPVC | T=PTFE<br>G=Perfluor<br>V=FPM | 12V=12Vdc<br>24V=24Vdc | 8=1/8-27 NPT<br>4=1/4-18 NPT | D=Ventiduct |



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**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.

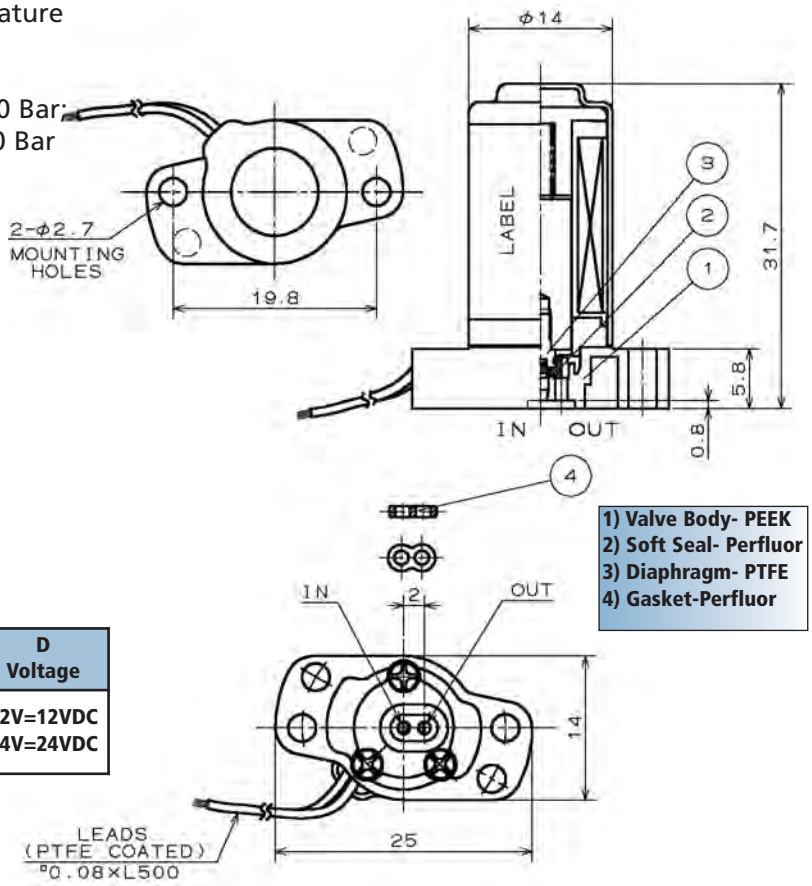

**EXV-2K-MFG**

## 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

## DIMENSIONS (MM)




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

## ORDERING INFORMATION

**ABCD**

**EXAMPLE: EXV-2KMFG12V**

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

**Bold order combinations typically ship from stock**



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**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.

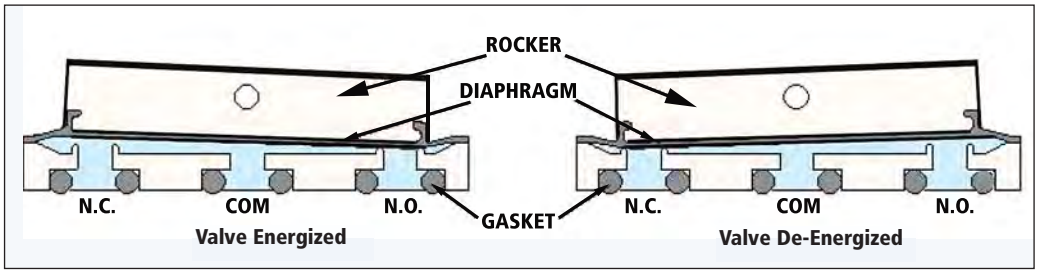
The small rectangular footprint (16 x 27 mm) minimizes manifold size and reduces internal passage volume.

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.

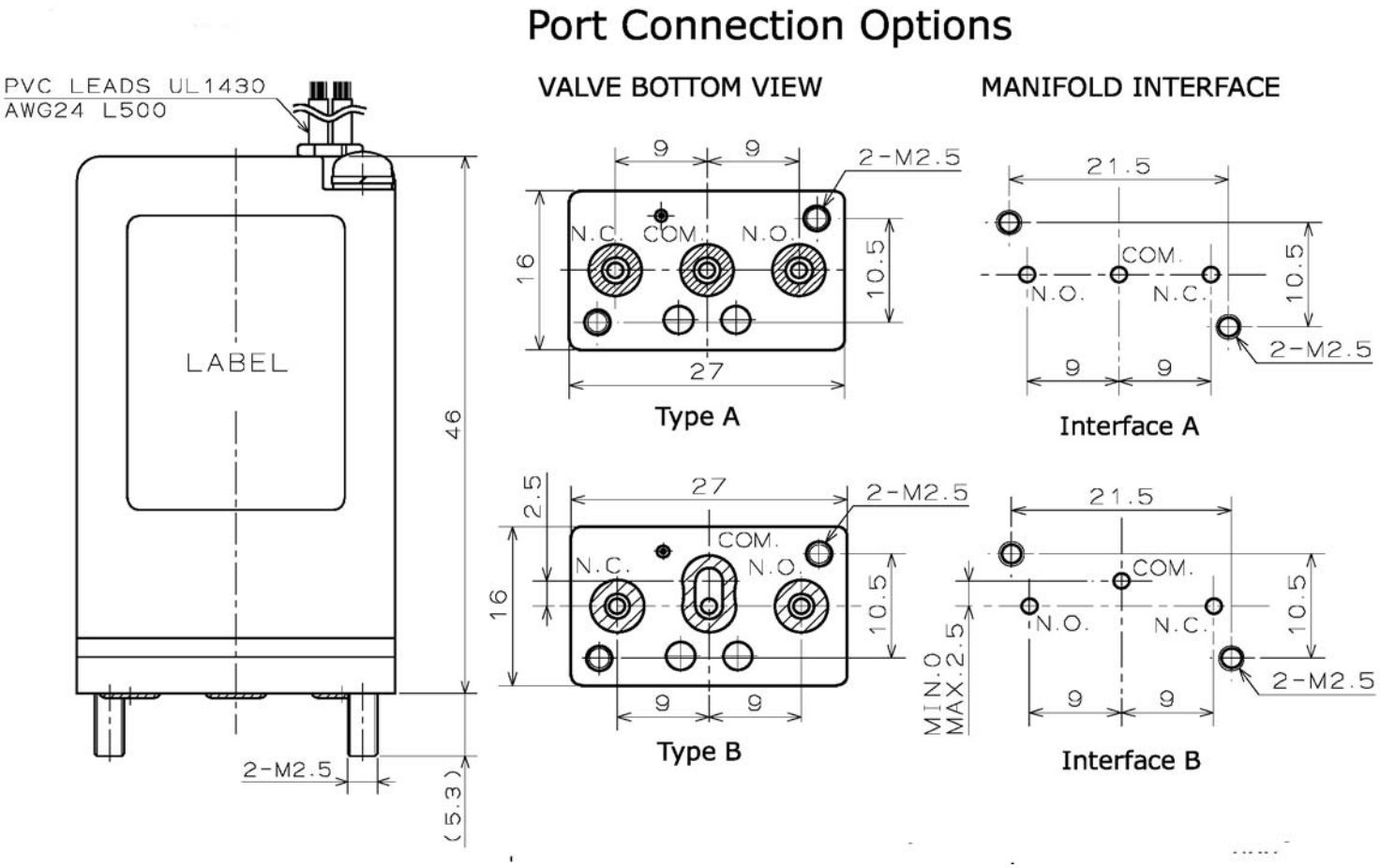

***ROCKER CROSS-SECTION***




## 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 45oC (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 | Vavle Body: Peek; Optionally PPS<br>Diaphragm & Gasket: Perfluoroelastomer; Optionally FPM or EPDM | | |

## DIMMENSIONS (MM)




## ORDERING INFORMATION

***SELECT MODEL NUMBER AND VOLTAGE***
***RVA-ABCDEF***
***EXAMPLE: RVA-2KG-A12V***

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



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**TAKASAGO**

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

*N.C., Solenoid Operated, PEEK Valves*

## DESCRIPTION

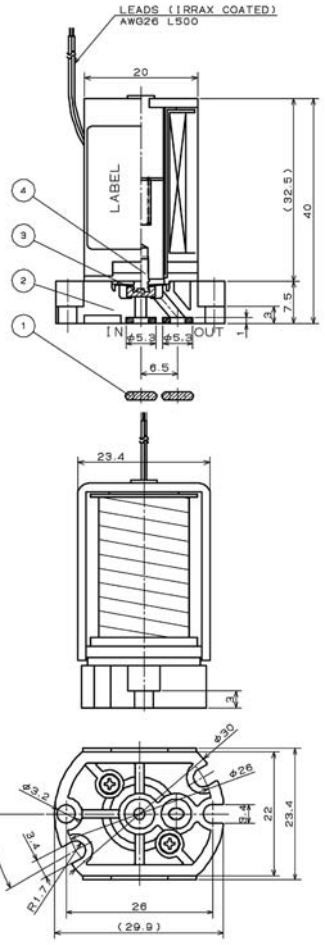
Model series WTA-2MF manifold mount inert isolation valves offer great performance and a choice of wetted materials for compatibility with aggressive media. The valves utilize unique soft elastomeric seals that are forgiving of particulate matter that would typically destroy an inert valve.

The valves mount on a customer configured manifold. Sealing is accomplished with two O-rings (either FPM or Perfluor).

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.

These valves are ideal for automated chemistry applications and are an economical choice for original equipment manufacturers. Manifold mounting allows an OEM flexibility in the layout of fluidic circuits and reduces plumbing and internal volumes. Valves are easily field replaced if damaged.

## DIMENSIONS (MM)




1) O-Ring
2) Valve Body
3) Soft Seal
4) Isolation Diaphragm

## 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
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

## ORDERING INFORMATION (A-B-C-D-E)

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

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

**Bold order combinations typically ship from stock**



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# TAKASAGO
# STV Disk Type Inert Manifold Valve
*Solenoid Operated, PTFE or PEEK Bodies*

**STV-2-4**

## 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.

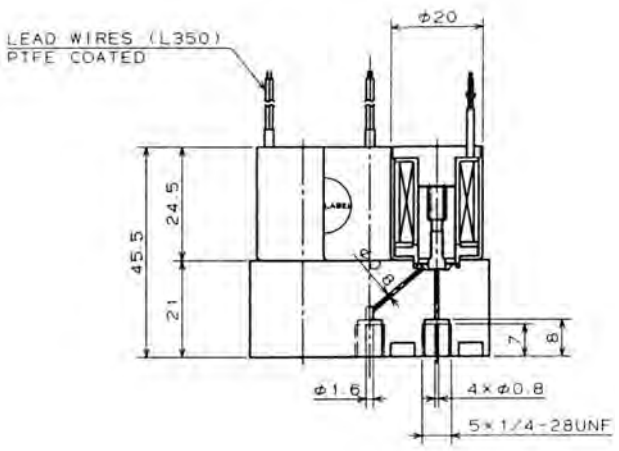
Fast response time, consistent valve performance over valve life, and continuous duty rating make the STV valves ideal for solvent selection applications for automated chemistry sample preparation.

## SPECIFICATIONS

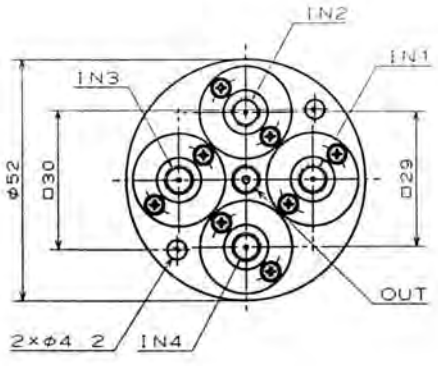
***GENERAL***

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

## DIMMENSIONS




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 12 VALVE MANIFOLD**
**12 INLETS, COMMON OUTLET**

***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 4 VALVE MANIFOLD**
**4 INLETS, COMMON OUTLET**

| | 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.

**EXV 4 VALVE MANIFOLD**
**4 INLETS, COMMON OUTLET**



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# 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

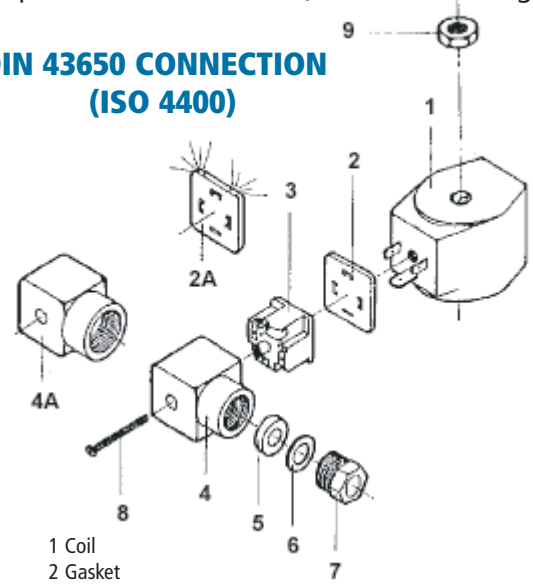
## ELECTRICAL INSTALLATION

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)




1 Coil
2 Gasket
2a Optional gasket with energized coil indicator light.
3 Electric terminals block. Maximum wire size AWG14 (1.6 mm.)
4 Cover with opening for armored cable. Strain relief "PG9", for cable O.D. from 6 to 8 mm. Cover with indicator light upon request.
4a Cover with opening for conduit. ½ NPT Connection. (Part No 3189-2). Cover with indicator light upon request.
5 Strain relief gasket.
6 Washer.
7 Strain relief.
8 Fixing screw.
9 Coil fixing nut.

## 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 ½ 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.



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| PROBLEM | POSSIBLE CAUSES | SOLUTIONS |
|---|---|---|
| **1.Valves do not open when energized (NC) or when de-energized (NO).** | **For direct acting valves**<br>1. Voltage less than 15% of the nominal voltage.<br>2. Too high a differential pressure for that model.<br>3. Burnt coil (with the circuit open).<br>4. Plunger jammed with solids.<br>5. Damaged plunger.<br>**For pilot operated valves**<br>The same as above plus:<br>6. Differential pressure too low.<br>7. Jammed pilot piston.<br>8. Damaged pilot piston, pilot piston rings or diaphragm.<br>9. Pilot orifice blocked.<br>10. Pilot gasket damaged or mis-aligned.<br>11. Excessive viscosity. | 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.<br>2. Reduce pressure to the maximum shown on the valve nameplate or change it for a more adequate one.<br>3. See Burnt Coils (Problem 3).<br>4. Clean the plunger's core tube and the valve. If the system lacks an adequate strainer before the valve, the problem will persist.<br>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.<br>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.<br>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.<br>8. Change damaged parts. Check that the cause is not dirt. Also see solution #1.<br>9. Clean the orifice, if the orifice is damaged consult Clark. Also see solution #1.<br>10. This is caused by poor assembly. Change the damaged part and assemble the valve correctly. The O-ring must be correctly fitted.<br>11. Fluids with vicosities exceeding 60 cSt cannot be used with pilot operated valves. |
| **2.The valve remains open** | **For direct acting valves**<br>1. The coil was not de-energized (NC valve) or energized (NO valve).<br>2. Plunger jammed with solids.<br>**For pilot assisted valves**<br>The same as above plus:<br>3. The pilot orifice does not close.<br>4. Compensation orifice blocked.<br>5. Jammed pilot piston.<br>6. Pilot piston, Pilot piston rings or diaphragm damaged.<br>7. Excessive viscosity. | 1. Check the control circuits.<br>2. Clean the plunger's core tube and the valve. If the system lacks an adequate strainer before the valve, the problem will persist.<br>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.<br>4. Clean the orifice, if the orifice is damaged consult Clark.<br>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.<br>6. Change the damaged parts. Check that the cause is not dirt.<br>7. Fluids with vicosities 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.** | 1. Excessive voltage.<br>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.<br>3. The coil's nominal voltage is less than the source's or does not correspond to its cycling.<br>4. Excessive fluid or ambient temperature.<br>5. Moisture entering the interior of the coil.<br>6. Lack of part of the electromagnetic package when it is not integrated to the coil.<br>7. It is energized outside the valve (AC only). | 1. The voltage must not exceed 10% of the nominal voltage, and only for brief periods. Correct the voltage.<br>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.<br>3. Check that the voltage and current type is as indicated on the coil.<br>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 210ºC. The fluid temperature cannot be above 180ºC. When handling hot fluids and the ambient exceeds 30ºC, it is advisable to fit the valve in the most ventilated area.<br>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.<br>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.<br>7. Do not energize the coil if it is not fitted to the valve. |
| **4.The coil vibrates when energized.** | 1. Insufficient voltage.<br>2. Dirty fixed core and plunger surfaces, they have scales. | 1. Adjust the voltage within the permitted parameters.<br>2. Clean the surfaces. If scales remain there, change the components. |
| **5-Fluid leakage when closed.** | 1. Main or pilot seat damaged or dirty. | 1. Clean or change seats. If the orifice seats are damaged, consult Clark. |
| **6-It operates slowly or fails.** | 1. Compensation or pilot orifice partially blocked.<br>2. Excessive fluid viscosity.<br>3. Temporary excess or lack of differential pressure. | 1. In case of dirt, clean the orifices. In case of damage, consult Clark.<br>2. The fluid's viscosity must not exceed 60 cSt.<br>3. Check that both differential and opening pressure differential are within the limits indicated in the valve nameplate. |



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**CLARK**

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

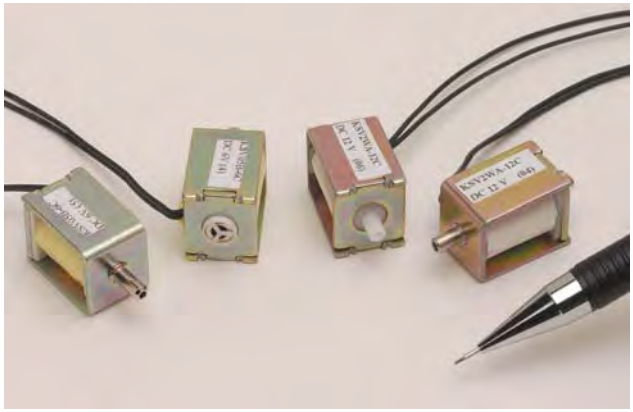
*DC Power, Air or Inert Gas, Pressure to 465 mm Hg (9 PSI)*

## 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 ±10% | 42 Ohm ±10% | 40 Ohm ±10% | 100 Ohm ±10% | 16 Ohm ±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. | 0-45ºC | 0-45ºC | 0-45ºC | 0-45ºC | 0-45ºC | 0-45ºC |
| Storage Temperature | -20-60ºC | -20-60ºC | -20-60ºC | -20-60ºC | -20-60ºC | -20-60ºC |
| 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 |



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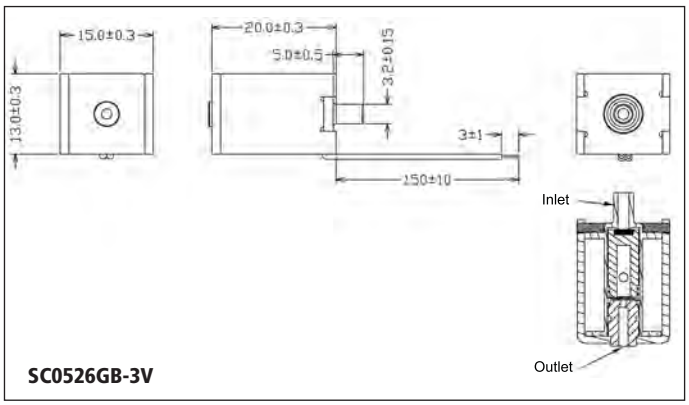
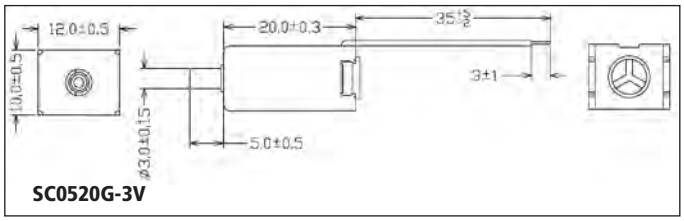
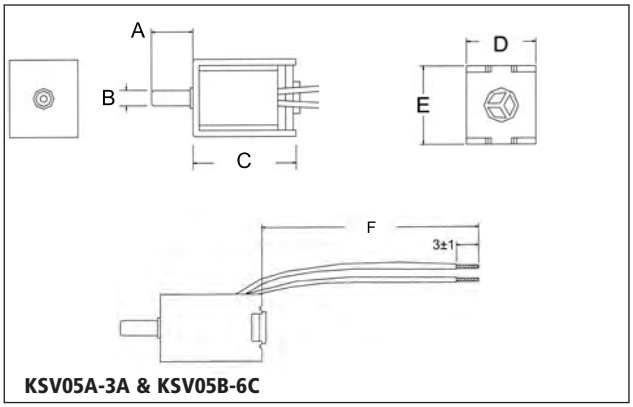
## DIMENSIONS (MM)



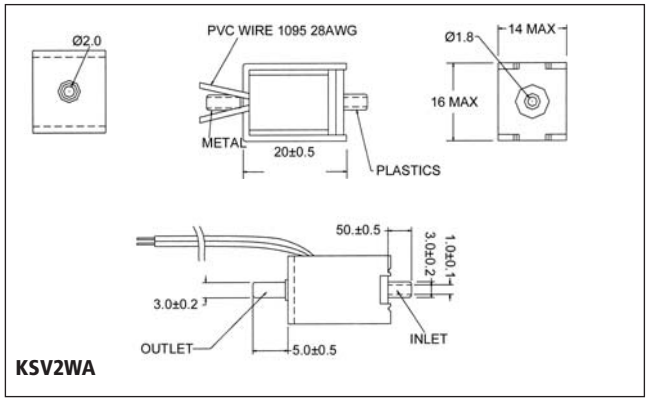

SC0526GB-3V




SC0520G-3V

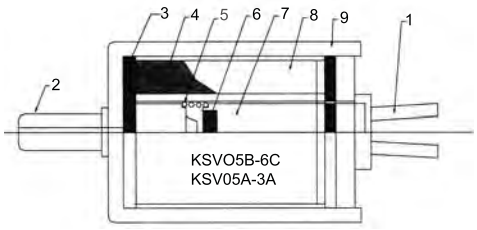



KSV05A-3A & KSV05B-6C




KSV2WA

| | 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, 130ºC
4) Wire: 2-uew, 130ºC
5) Spring: Spring Steel
6) Washer: Rubber
7) Plunger: Steel
8) Tape: Mylar, 130ºC
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**



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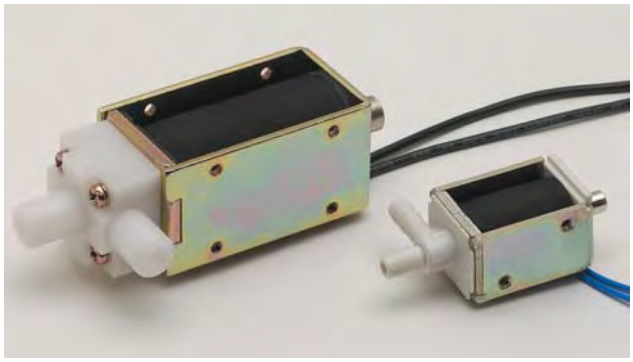
# CLARK
# KSV3 3-Way Solenoid Valve
*DC Power, Air or Inert Gas, to 5 PSI*



## 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

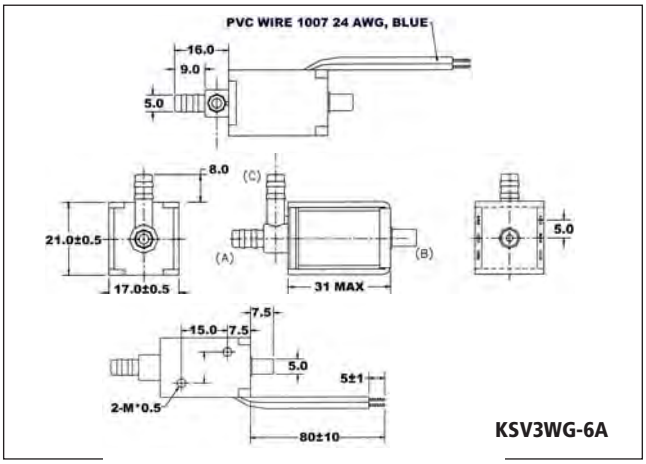
| | KSV3WG-6A | KSV3WC-12B | KSV3WC-24A |
|---|---|---|---|
| Media | Air or Inert gas | | |
| Power | 6 Vdc | 12 VDC | 24 VDC |
| Power Consumption | 2.12 W | 2.8 W | 2.74W |
| Rated Current | 353 mA | 240 mA | 115 mA |
| Coil Resistance | 17 Ohm±10% | 50 Ohm ±10% | 210 Ohm ±10% |
| Recommended Duty 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 |

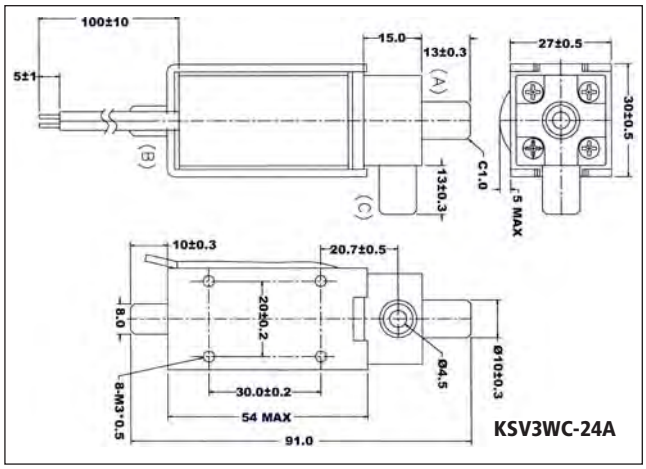
## ORDERING INFORMATION

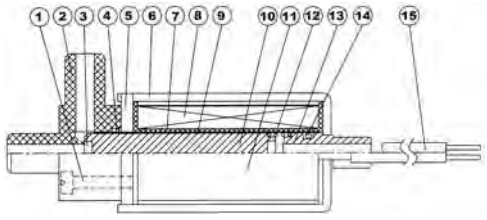
### SELECT MODEL NUMBER

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

## DIMENSIONS (MM)




| | |
|---|---|
| 1) Bobbin- Plastic 130°C | 2) Washer: Rubber |
| 3) Frame: Cold Steel | 4) Coil Wire: 2-uew, 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 |



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## 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) | Orfice Dia. (mm) | Cv Coef. (GPM) | Kv Coef. ($m^3/h$) | 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 |



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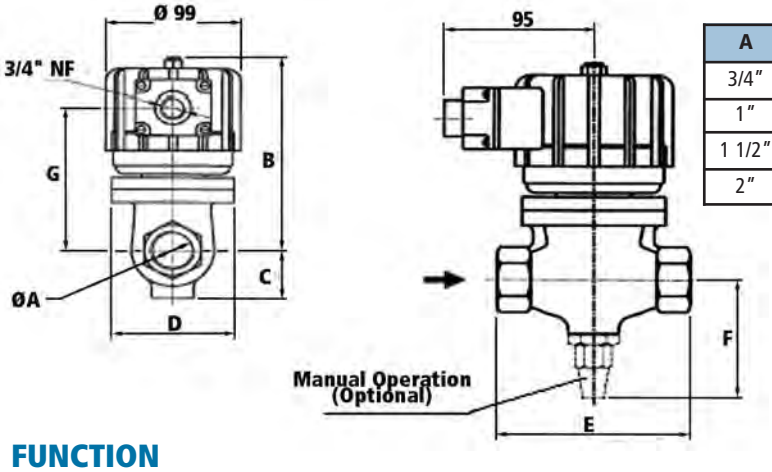
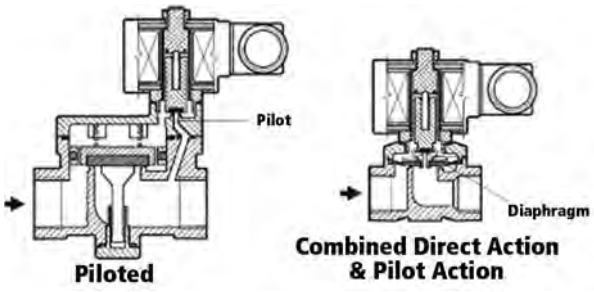
## DIMENSIONS (MM)




| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| 3/4" | 150 | 32 | 76 | 100 | 80 | 113 |
| 1" | 157 | 41 | 90 | 122 | 89 | 120 |
| 1 1/2" | 173 | 49 | 100 | 139 | 97 | 136 |
| 2" | 180 | 51 | 110 | 149 | 100 | 143 |

## 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/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:

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

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**
**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<br>S= 304 SS<br>I= 316 SS | A= Acrylo-Nitrile<br>N= Neoprene<br>E= Ethylpropylene<br>V= Viton<br>ST= Teflon | 06= 3/4"<br>08= 1.0"<br>12= 1 1/2"<br>16= 2.0" | - = Fully Piloted<br>A= Combined Piloted & Direct Acting | - = BSP<br>T= NPT | S28F= AC, 50 Hz, 0-80°C<br>S28H= AC, 50 Hz, 0-180°C<br>S30F= AC, 60 Hz, 0-80°C<br>S30H= AC, 60 Hz, 0-180°C<br>S48H= DC, 0-180°C | 12V= 12V<br>14V= 14V<br>24V= 24V<br>110V= 110V<br>220V= 220V<br>240V= 240V | Prefix YC= Weather Proof Housing<br><br>Suffix M= Manual Operation |

## INSTALLATION RECOMMENDATIONS

1) Place a strainer with a porosity ≤ 100µ 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.

# 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 ($m^3/h$) | 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 |



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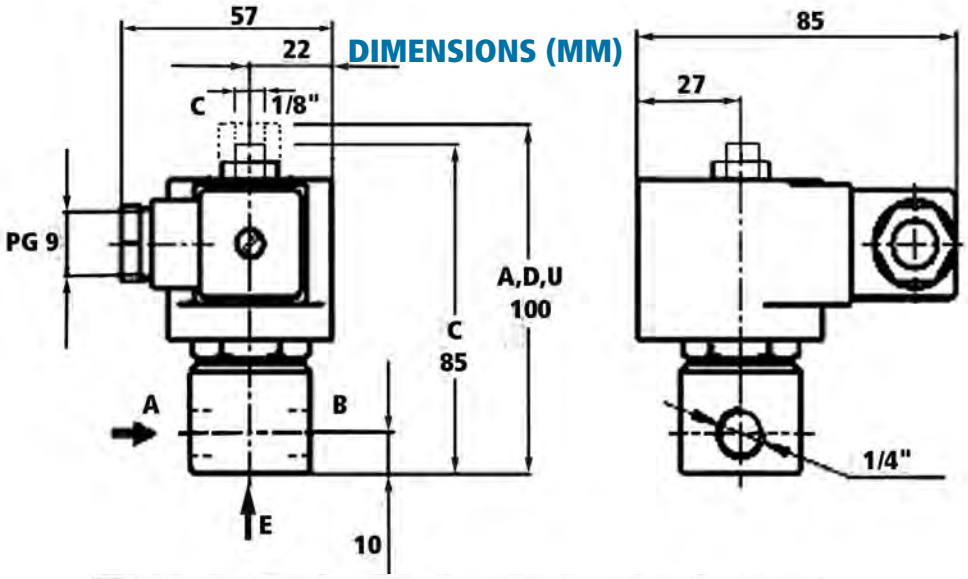
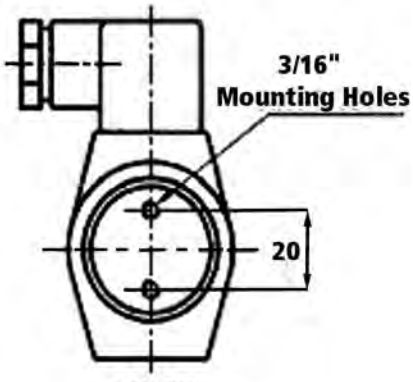
## DIMENSIONS (MM)




| 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.

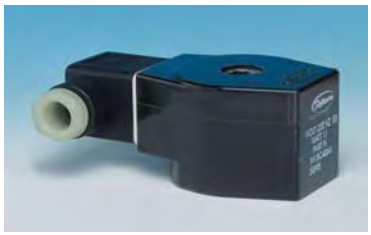
Except "C", all constructions may be used for any configurations but it is desirable to select the valve according to its use to obtain the best performance.

Flow Calculation, Liquids:

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

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: 1323SV17ATF24DC**

| 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**<br>S= 304 SS<br>I= 316 SS | **A= Acrylo-Nitrile**<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene | **17= 1.75**<br>20=2.00<br>25= 2.50 | **U= U Construction**<br>C= C Construction<br>D= D Construction<br>A= A Construction | **T= NPT**<br>- = BSP | **F= Class F**<br>H= Class H | **12DC= 12 VDC**<br>**120AC= 120 VAC, 60 HZ**<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 HZ | Prefix YC=<br>Weather Proof Housing<br>(1/2" NPT Thread)<br><br>Suffix M=<br>Manual<br>Operation<br><br>Coil Indicator Light=<br>Consult Factory |

**Bold Order Combinations Typically Ship From Stock**

## INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity ≤ 100µ upstream of valve (see Clark Solutions Model 1359 Y Strainer).



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## 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.

File LR87427 2M - LR108921-1

File MH16855 Vol. 2 Sec. 2

## 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 avail- able
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

**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 ($m^3/h$) | 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 | | | |



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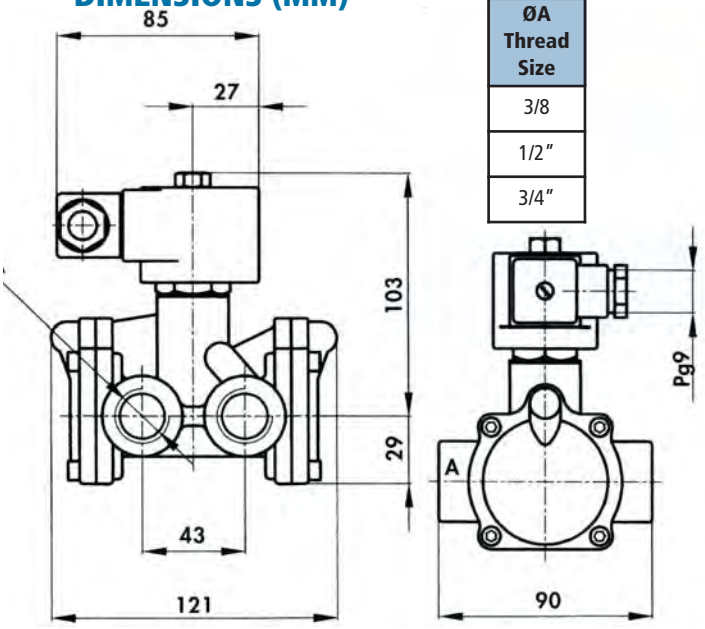
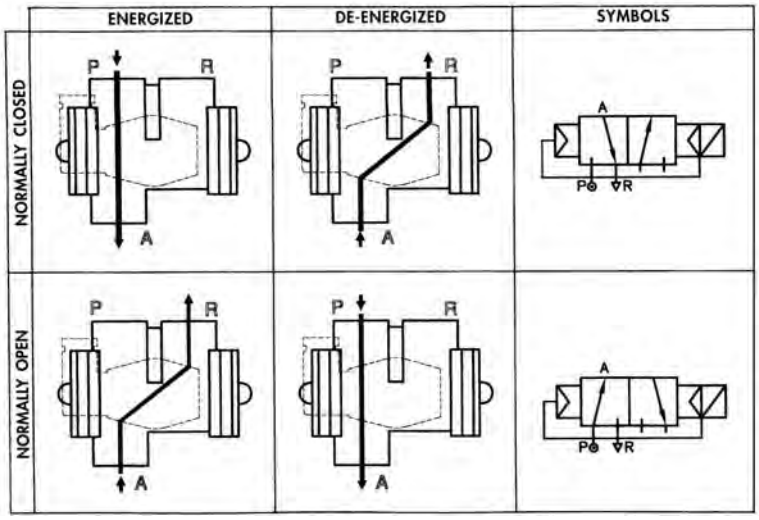
## DIMENSIONS (MM)




| ØA Thread Size |
|---|
| 3/8 |
| 1/2" |
| 3/4" |

Table 3




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.

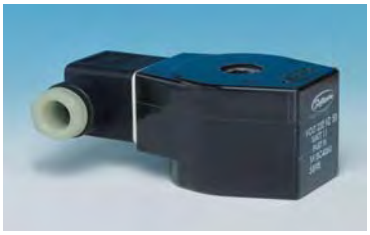
When the pilot valve opens, a passage that bypasses the valve piston/seat and connects downstream of the piston/seat is opened, relieving pressure from the top of the valve piston/seat. The inlet fluid pressure lifts up the piston to open the valve.

Flow Calculation, Liquids:

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

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: 1325BA4CT24DC**

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

## INSTALLATION RECOMMENDATIONS

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



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# 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. |

| Orfice Dia. (mm) | 0.Cv Coef. (GPM) | Kv Coef. ($m^3/h$) | 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 |



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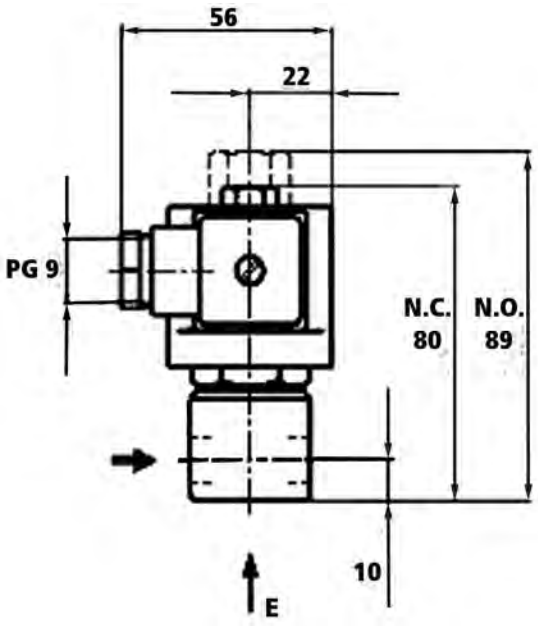
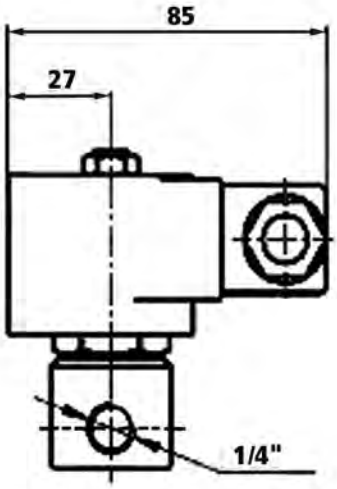
## DIMENSIONS (MM)

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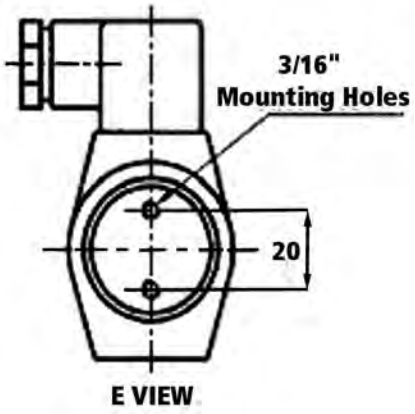
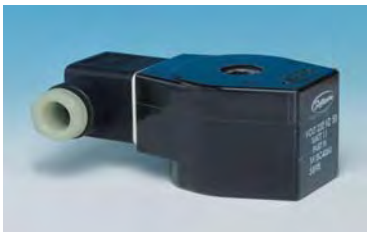



Flow Calculation, Liquids:

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

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: 1327BN122-TH24DC**

| Model Number Information | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Model** | **Body Material** | **Seat & Seal Material** | **Orifice Size (mm)** | **Configuration** | **Connection Threads** | **Coil Type** | **Voltage** | **Options** |
| **1327** | **B= Brass**<br>S= 304 SS<br>I= 316 SS<br>H= Iron | **A= Acrylo-Nitrile**<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene<br>T= Teflon | **302= 3.00**<br>**522= 5.25**<br>122= 1.25<br>172= 1.75<br>222=2.25<br>402= 4.00<br>502= 5.00 | **- = Normally Closed**<br>2NA=Normally Open | **T= NPT**<br>- = BSP | **F= Class F**<br>H=Class H | **12DC= 12 VDC**<br>**120AC= 120 VAC, 60 Hz**<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz | Prefix YC= Weather Proof Housing (1/2" NPT Thread)<br>Suffix M= Manual Operation<br>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 ≤ 100µ upstream of valve (see Clark Solutions Model 1359 Y Strainer).



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## 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)** | **Orfice Dia. (mm)** | **Cv Coef. (GPM)** | **Kv Coef. ($m^3/h$)** | **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 |



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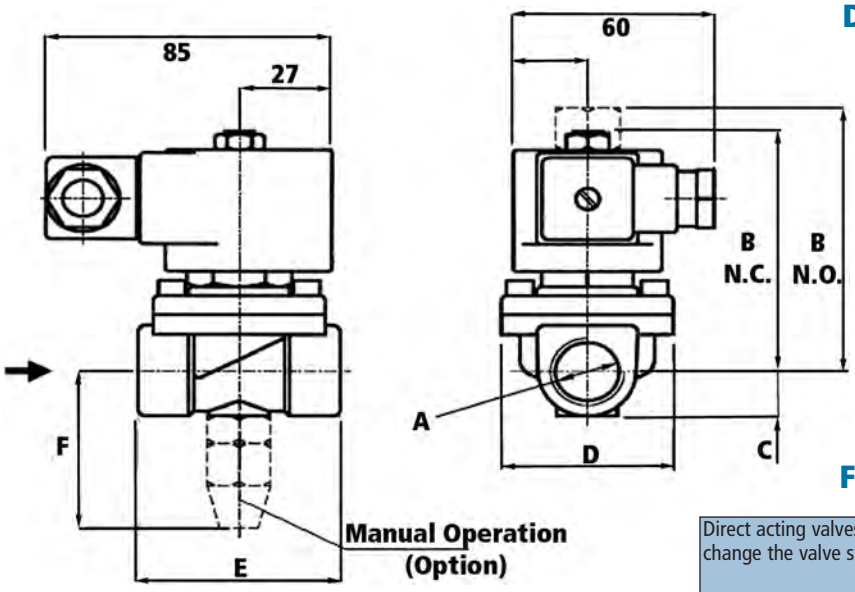
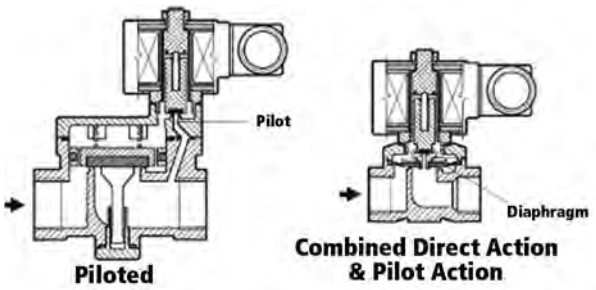



## DIMENSIONS (MM)

| 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.

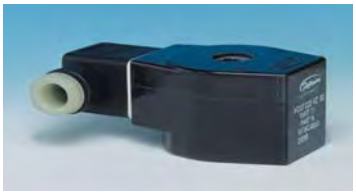
When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

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:

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

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 Connector**

**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: 1335BN3AT12DC**

| Model Number Information | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Model** | **Body Material** | **Seat & Seal Material** | **Pipe Connection** | **Configuration** | **Connection Threads** | **Voltage** | **Options** |
| **1335** | **B= Brass**<br>I= 316 SS | **A= Acrylo-Nitrile**<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene | **3= 3/8"**<br>**4= 1/2"**<br>**6= 3/4"** | **- = Pilot operated Normally Closed**<br>A = Combined Acting, Normally Closed<br>INA = Pilot operated Normally Open | **T= NPT**<br>- = BSP | **12DC= 12 VDC**<br>**120AC= 120 VAC, 60 Hz**<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz | Prefix YC= Weather Proof Housing (1/2" NPT Thread)<br>Suffix M= Manual Operation<br>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 $\leq$ 100µ upstream of valve (see Clark Solutions Model 1359 Y Strainer). Install valve in any position, preferably on a horizontal pipeline with coil up.



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## 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** | **Orfice Dia. (mm)** | **Cv Coef. (GPM)** | **Kv Coef. ($m^3/h$)** | **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 |



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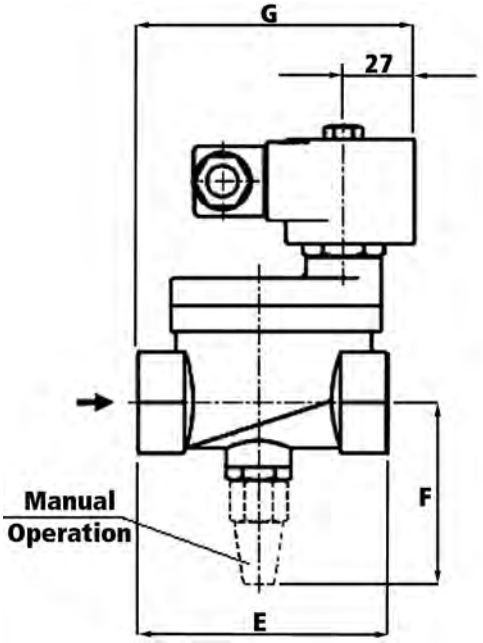
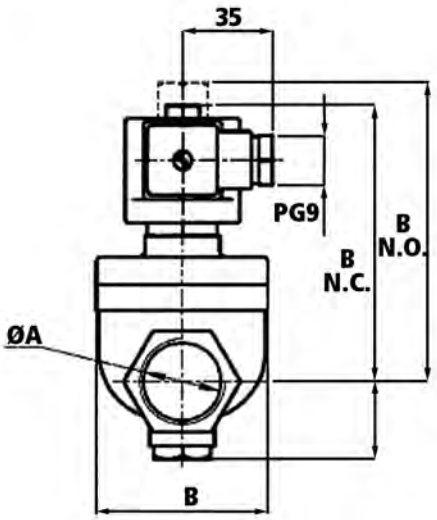
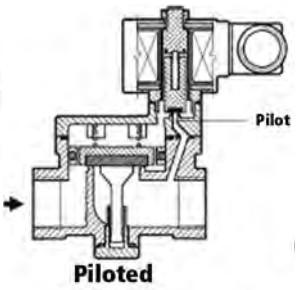
## DIMENSIONS (MM)




File LR87427 2M - LR108921-1

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| 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.

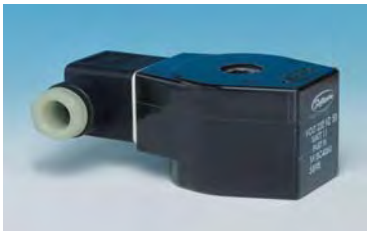
When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

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:

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

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**<br>S= 304 SS<br>I= 316 SS | **A= Acrylo-Nitrile**<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene<br>T= Teflon | **08= 1"**<br>**12= 1 1/2'**<br>**16= 2"**<br>06= 3/4"<br>20= 2 1/2"<br>24= 3" | **- = Normally Closed**<br>INA=Normally Open | **T= NPT**<br>- = BSP | **F= Class F**<br>H= Class H | **12DC= 12 VDC**<br>**120AC= 120 VAC, 60 Hz**<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz | Prefix YC= Weather Proof Housing (1/2" NPT Thread)<br>Suffix M= Manual Operation, Main Orifice<br>Suffix MP= Manual Operation, Pilot Orifice<br>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 $\leq$ 100µ 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.



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## CLARK SOLUTIONS

# Model 1359 Y Strainer

*General Purpose, Particle Retention From 100 Microns*


### DESCRIPTION

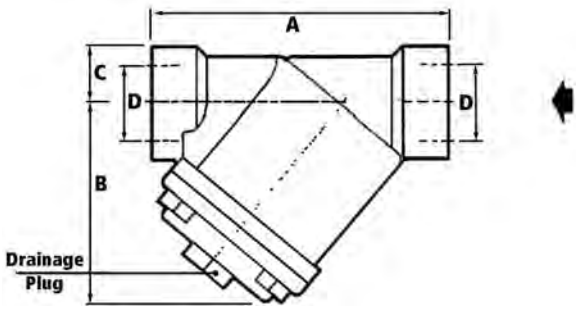
Model 1359 Strainers have a basket type filtering element with double mesh stainless steel construction. The strainer body material is of iron.

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*



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## 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 ($m^3/h$ | 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 |



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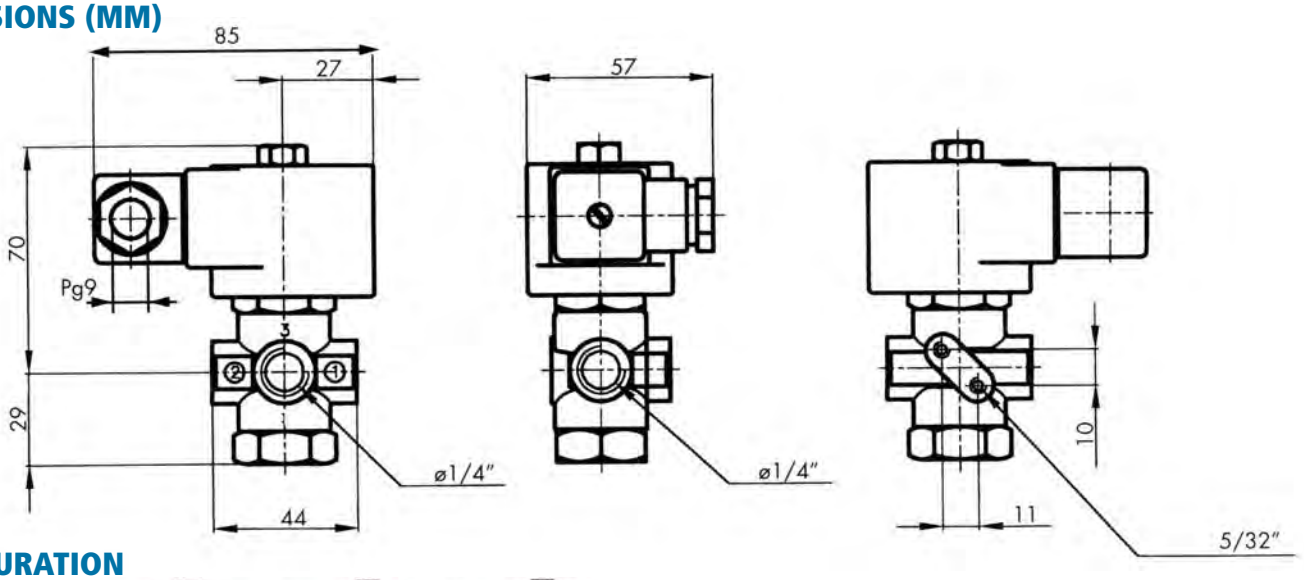
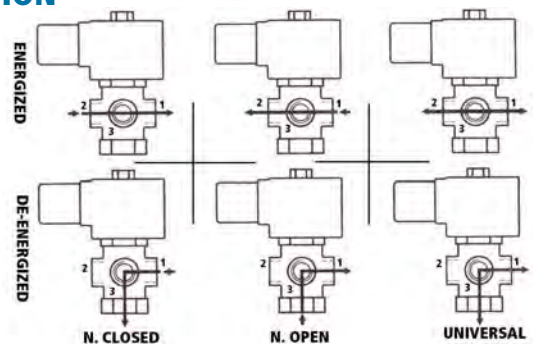
## DIMENSIONS (MM)




## CONFIGURATION




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

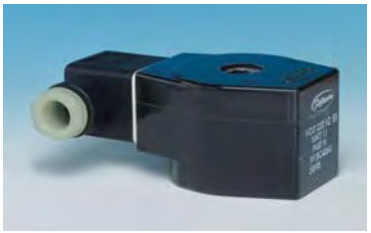
Except "C", normally open, all constructions may be used for any configurations but it is desireable to select the valve according to its use to obtain the best performance.

Flow Calculation, Liquids:

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

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<br>S= 304 SS<br>H= Iron | A= Acrylo-Nitrile<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene | 17= 1.75<br>22=2.25<br>30= 3.00<br>40= 4.00 | U= Universal<br>A= Normally Open<br>C= Normally Closed | T= NPT<br>- = BSP | F=Class F<br>H= Class H | 12DC= 12 VDC<br>120AC= 120 VAC, 60 Hz<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz | Prefix YC=<br>Weather Proof Housing<br>(1/2" NPT Thread)<br><br>Suffix M=<br>Manual<br>Operation<br><br>Coil Indicator Light=<br>Consult Factory |

## INSTALLATION RECOMMENDATIONS

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



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## 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** | **Orfice Dia. (mm)** | **Cv Coef. (GPM)** | **Kv Coef. ($m^3/h$)** | **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 |



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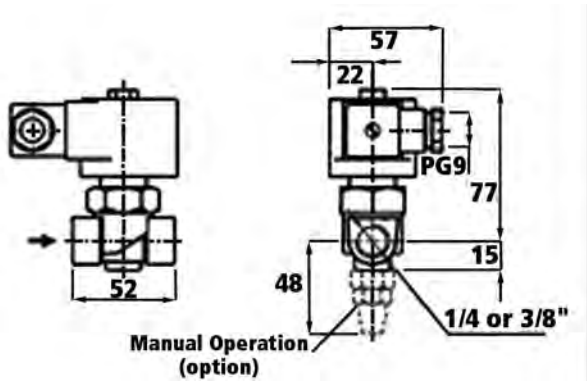
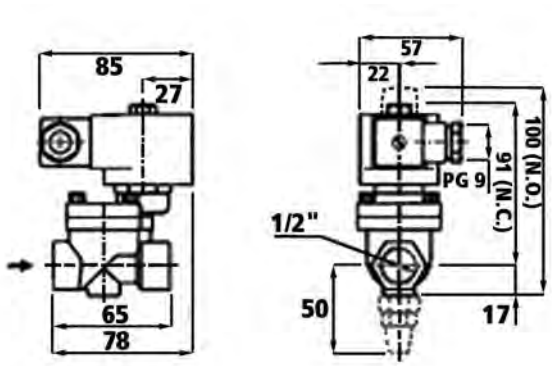
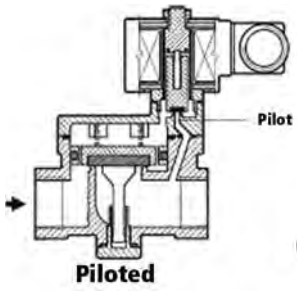
## DIMENSIONS (MM)

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.

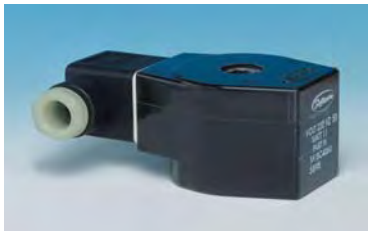
When the pilot valve is closed, the pressure builds up via a small passage from the upstream side of the valve piston/seat. The valve seat is also acted on by a spring.

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:

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

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<br>S= 304 SS<br>I= 316 SS | A= Acrylo-Nitrile<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene<br>T= Teflon | 2= 1/4"<br>4= 1/2"<br>3= 3/8" | - = Normally Closed<br>INA=Normally Open | T= NPT<br>- = BSP | F= Class F<br>H= Class H<br>**Magnetically latched solenoids available on select models. Please call us for details.** | 12DC= 12 VDC<br>120AC= 120 VAC, 60 Hz<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz | Prefix YC= Weather Proof Housing (1/2" NPT Thread)<br>Suffix M= Manual Operation, Main Orifice<br>Suffix MP= Manual Operation, Pilot Orifice<br>Coil Indicator Light= Consult Factory |

## INSTALLATION RECOMMENDATIONS

Place a strainer with a porosity $\leq$ 100µ 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.

# 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 | Orfice Dia. (mm) | Cv Coef. (GPM) | Kv Coef. ($m^3/h$) | 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 |



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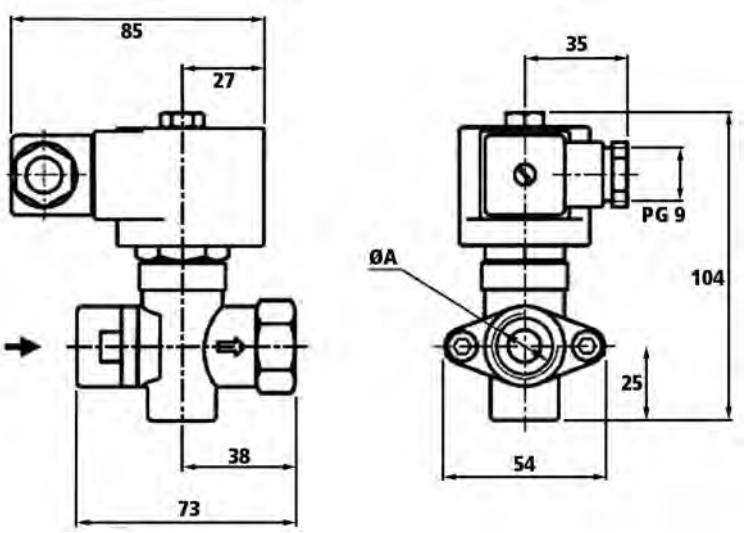
## DIMENSIONS (MM)

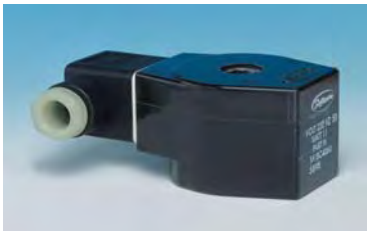



| ØA |
|---|
| 1/4" |
| 3/8" |
| 1/2" |

Flow Calculation, Liquids:

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

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<br>NS= Nickel Plated Brass | 08= 8mm | 2=1/4"<br>3= 3/8"<br>4= 1/2" | - = Normally Closed<br>NA=Normally Open | T= NPT<br>- = BSP | 120AC= 120VAC<br>240AC= 240VAC<br>24AC= 24VAC | Prefix YC= Weather Proof Housing (1/2" NPT Thread)<br><br>Coil Indicator Light= Consult Factory |

## INSTALLATION RECOMMENDATIONS

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



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## 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. ($m^3/h$) | 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**



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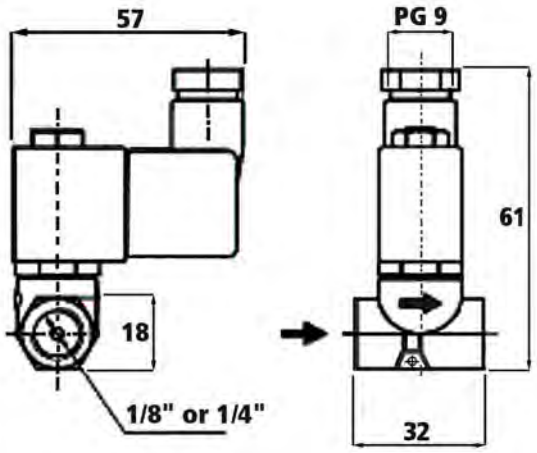
## DIMENSIONS (MM)




Flow Calculation, Liquids:

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

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**<br>V= Viton<br>N= Neoprene<br>E= Ethylpropylene | **12= 1.25 mm**<br>**17= 1.75 mm**<br>**30= 3.00 mm**<br>22= 2.25 mm | **1= 1/8"**<br>2= 1/4" | **T= NPT**<br>- = BSP | **12DC= 12 VDC**<br>**120AC= 120 VAC, 60 Hz**<br>24DC= 24 VDC<br>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 ≤ 100µ 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).



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## 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.

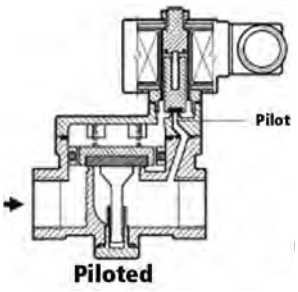
The unit has a power consumption of 6 watts and a life cycle rating greater than five million cycles.

## 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. ($m^3/h$) | 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 $\leq$ 100µ upstream of valve (see Clark Solutions Model 1359 Y Strainer).
2) Mount the valve preferably on a horizontal pipeline with coil upright.



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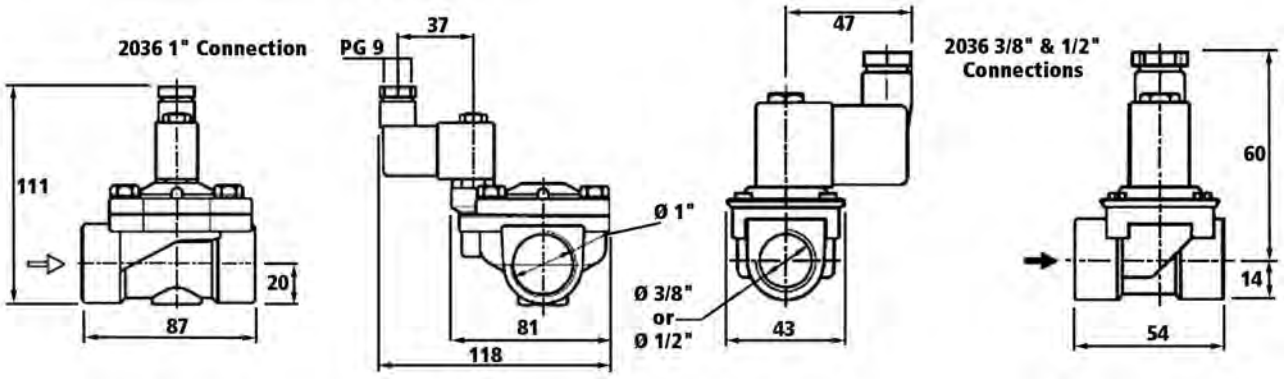
## DIMENSIONS (MM)




Flow Calculation, Liquids:

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

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)


**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"<br>6= 3/4"<br>8= 1"<br>3= 3/8" | T= NPT<br>- = BSP | 12DC= 12 VDC<br>120AC= 120 VAC, 60 Hz<br>24DC= 24 VDC<br>24AC= 24 VAC, 60 Hz |

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

# 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.

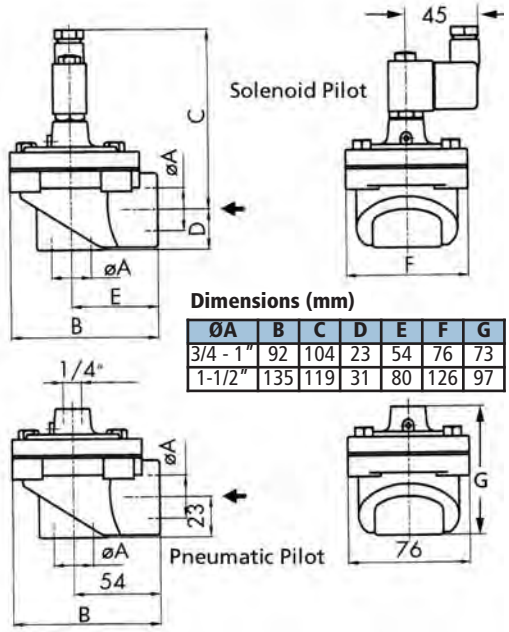
The valves employ a choice of solenoid or pneumatic valve operation. The valves have a high flow rate and fast response time.

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




**Dimensions (mm)**

| ØA | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| 3/4 - 1" | 92 | 104 | 23 | 54 | 76 | 73 |
| 1-1/2" | 135 | 119 | 31 | 80 | 126 | 97 |

| 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 pnematic 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<br>H= Hytrel | 06= 3/4"<br>08= 1"<br>12= 1 1/2" | S= Solenoid<br>- = Pneumatic | T= NPT<br>- = BSP | F= Class F<br>H= Class H | 12DC= 12 VDC<br>24DC= 24 VDC<br>120AC= 120 VAC, 60 Hz<br>24AC= 24 VAC, 60 Hz | *Standard*<br>Prefix YC=<br>Weather Proof Housing<br>(1/2" NPT Thread) |



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# 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.

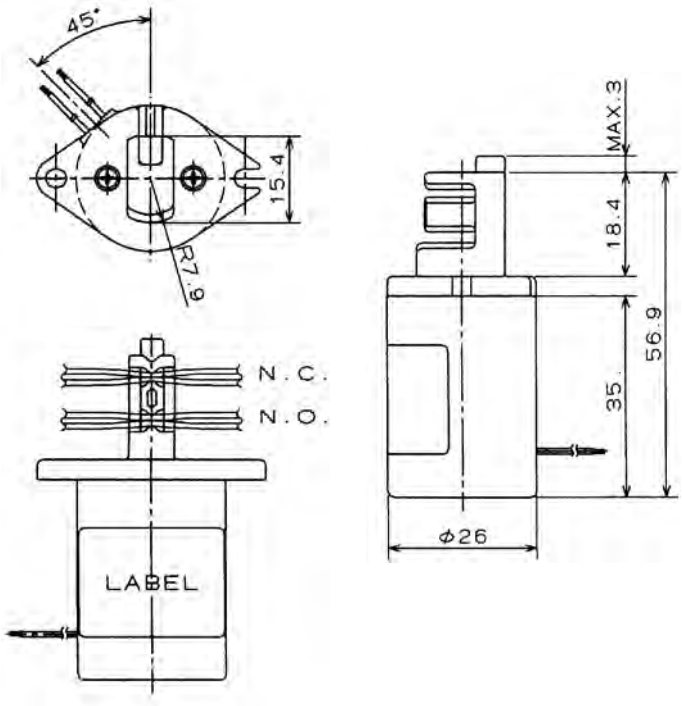
Each model can be configured for three way (dual tube), two way normally open (single tube) or two way normally closed (single tube) operation.

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

PM UNIVERSAL PINCH VALVE

## 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 (Polybuthylene 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*

## DIMMENSIONS



## ORDERING INFORMATION
**AB**
**EXAMPLE: PM0815W12V**

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

**Bold order combinations typically ship from stock**



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# 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

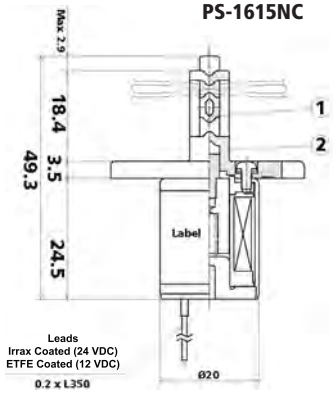
*Delrin is a registered trademark of E. I. du Pont de Nemours and Company*

## ORDERING INFORMATION

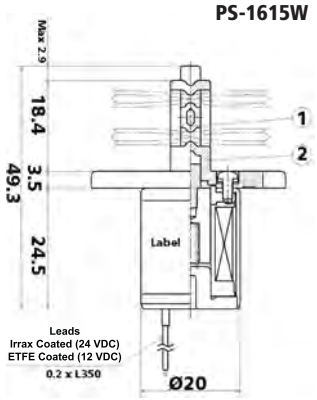
| Model | Config. | Tubing | Tubing I.D. | Tubing O.D. | Operating Pressure |
|---|---|---|---|---|---|
| PS-0815NC(12V, 24V) | 2-Way, N.C. | Silicone | 0.8 mm | 2.4 mm | 1.5 bar (21.77 PSI) |
| PS-0815NO(12V, 24V) | 2-Way, N.O. | | 0.8 mm | 2.4 mm | |
| PS-0815W(12V, 24V) | 3-Way | | 0.8 mm | 2.4 mm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

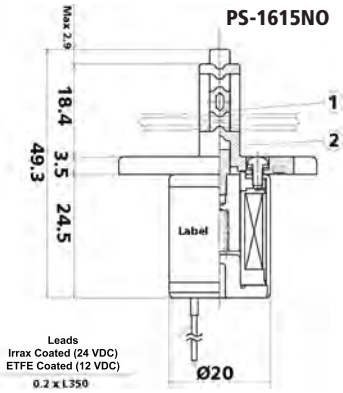
**PS-1615NC**



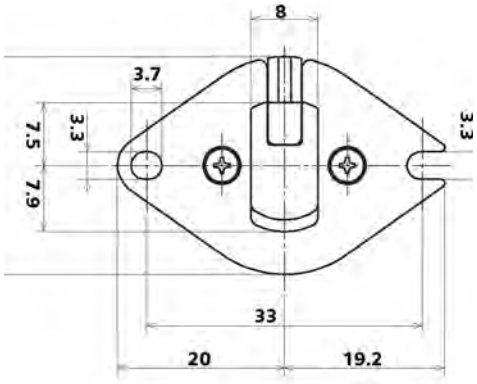

**PS-1615W**




**PS-1615NO**




**1) Pinching Head**
**2) Tube Holder**



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# 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

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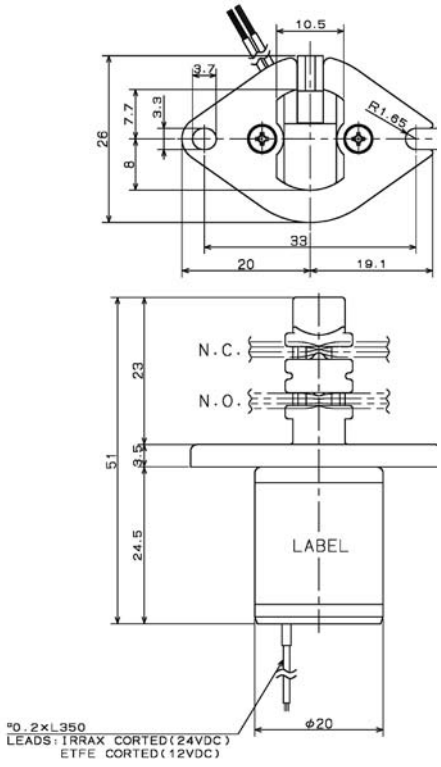
*Pharmed is a registered trademark of Norton Company*

## DIMENSIONS(MM)




## 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. | | 1 mm | 3 mm | 1 bar (14.51 PSI) |
| PSK-1015NC(12V, 24V) | 2-Way, N.C. | Silicone Pharmed® | 1 mm | 3 mm | 1.5 bar (21.77 PSI) |
| PSK-1015NO(12V, 24V) | 2-Way, N.O. | | 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 | |



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## 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.

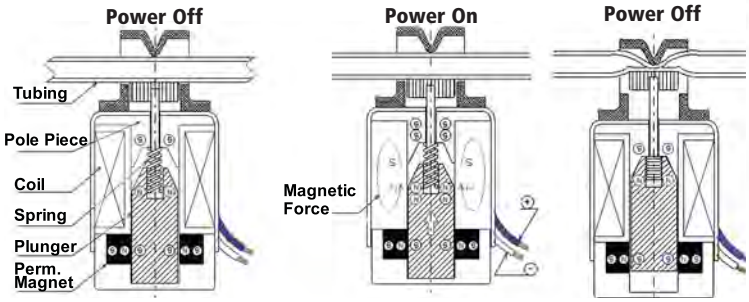
Tube changes are facilitated by a convenient push button manual solenoid override.

## 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***

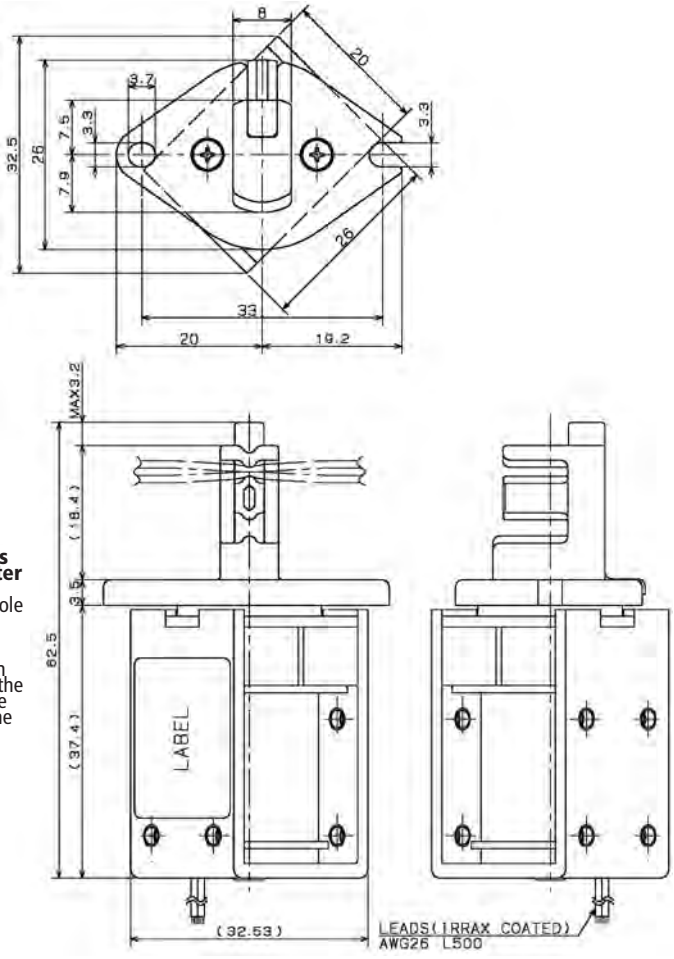



**Permanent magnet's attractive force less than spring force:** There is an open space between the pole piece and the plunger and the attractive force of the permanent magnet is lower than the force of the spring

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.

## DIMENSIONS(MM)




## 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 | |

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

# TAKASAGO
# MODEL NP PINCH VALVES
*Solenoid Operated, 2-Way & 3-Way Configurations, Tube Sizes to 6.4 mm I.D.*

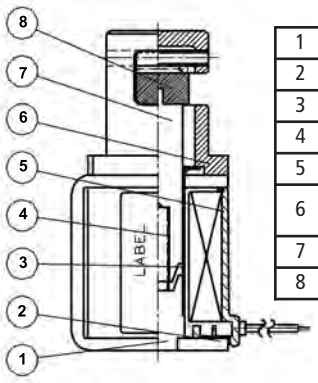
## DESCRIPTION
Model NP pinch valves are rugged pinch valves for use with 2.0, 3.0 and 6.0 and 6.4 mm I.D. Silicone or Pharmed® tubing. The valves are particularly well suited for on/off fluid control applications where the fluid media is difficult for conventional valves to handle or where the complete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

## SPECIFICATIONS

***GENERAL***

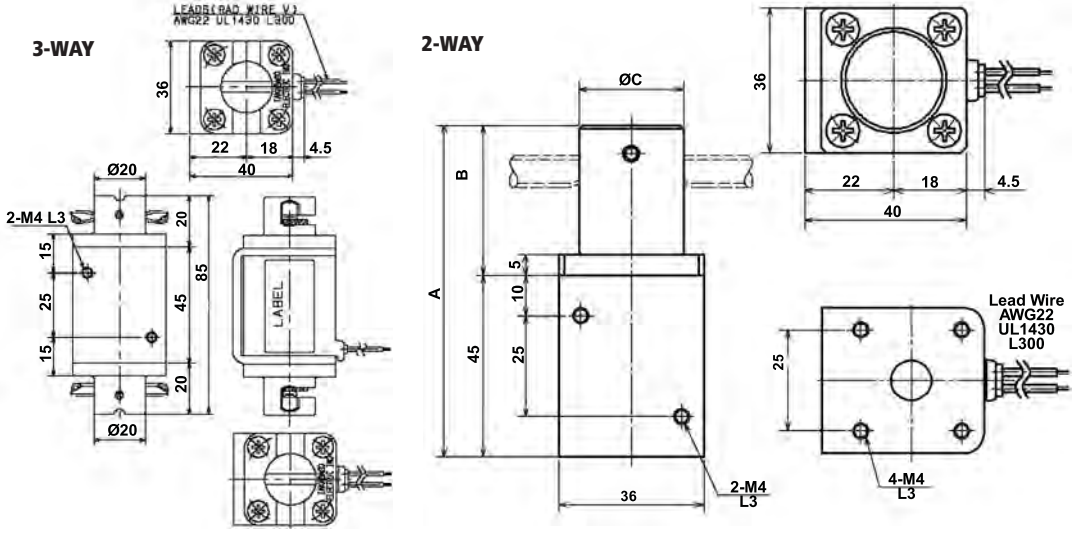
Rated Voltage- 12Vdc or 24Vdc
Power Consumption- 10 Watts
Duty- Continuous
Tube Material- Silicone, Pharmed®
Tube Sizes- 2.0 mm ID x 4.0 mm OD, 3.0 mm ID x 5.0 mm OD, 6 mm ID x 8 mm OD and 6.4 mm ID x 9.6 mm OD
Max Operating Pressure- See Table
Ambient Temperature Range: 0-40°C (32-104°F)
Insulation 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 |



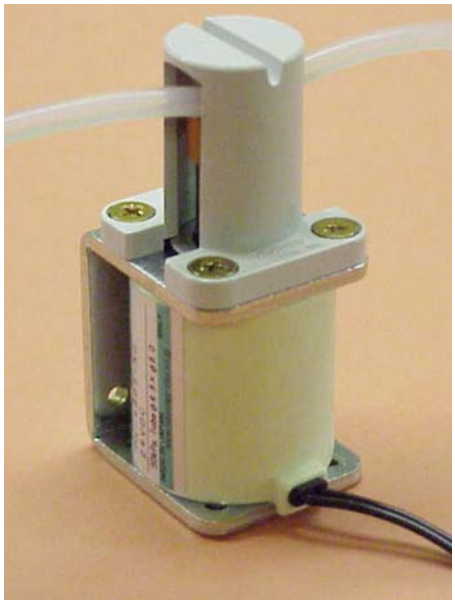

| | |
|---|---|
| 1 | Pole Piece- K-M31 |
| 2 | Frame- SPCC |
| 3 | Seamless Pipe- SUS304 |
| 4 | Spring- SUS304WPB |
| 5 | Coil Assembly- SPS Molded |
| 6 | Tube Holder- HPVC (PPS available on some models) |
| 7 | Plunger- K-M31 |
| 8 | Pinching Head- Silicone |

## DIMENSIONS(MM)




| 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*



**PK PINCH VALVE**

## 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.

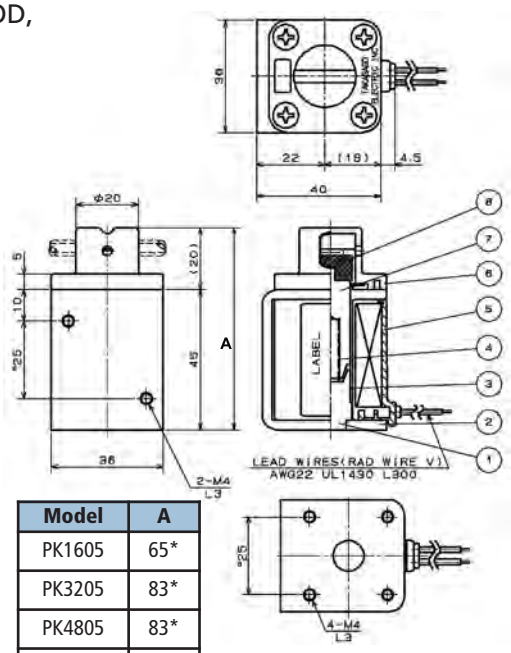
## SPECIFICATIONS

***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

## 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

## ORDERING INFORMATION

**ABCD**

**EXAMPLE: PK1605NO12V**

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

**Bold order combinations typically ship from stock**



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# TAKASAGO
# MODEL EPK PINCH VALVE
*Solenoid Operated, Two Way Configuration*

EPK PINCH VALVE

## 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.

## 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

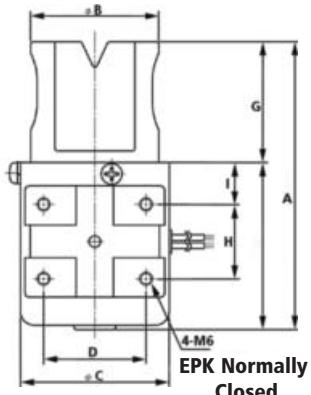
## ORDERING INFORMATION

**ABC**

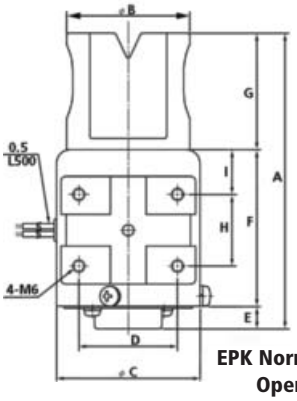
**EXAMPLE: EPK1005NC12V**

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

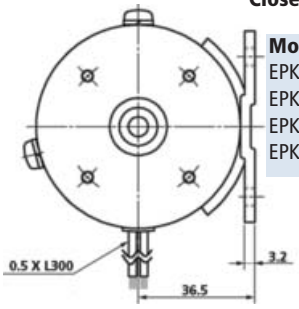
## DIMENSIONS(MM)




EPK Normally Closed

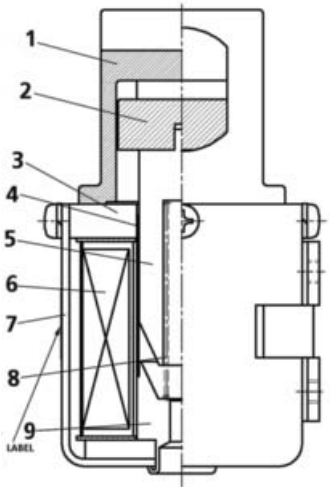



EPK Normally Open




| Model | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| EPK1005NC | 112 | 34 | 64 | 44 | - | 72 | 40 | 32 | 18 |
| EPK1005NO | 120 | 34 | 64 | 44 | 10 | 70 | 40 | 32 | 20 |
| EPK1502NC | 124 | 55 | 64 | 44 | - | 72 | 52 | 32 | 18 |
| EPK1502NO | 132 | 55 | 64 | 44 | 10 | 70 | 52 | 32 | 20 |

| | 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



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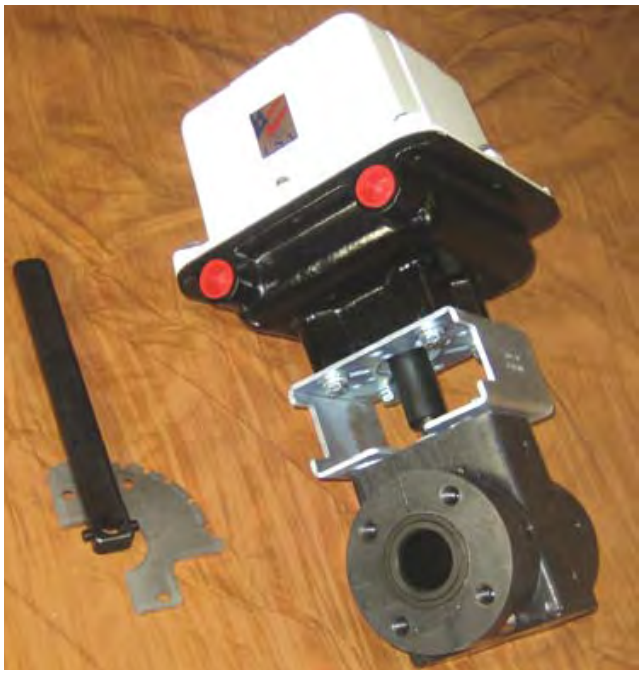
**CLARK**

# 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.

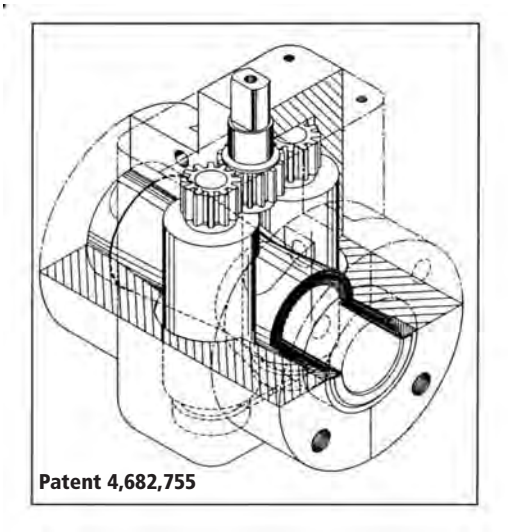


**Series 22 Dia-Cam Pinch Valve is available with manual or electronic actuator**

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

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.



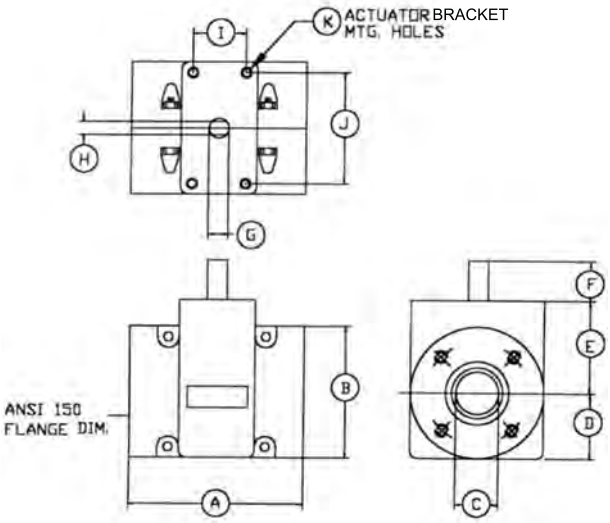
**Patent 4,682,755**

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

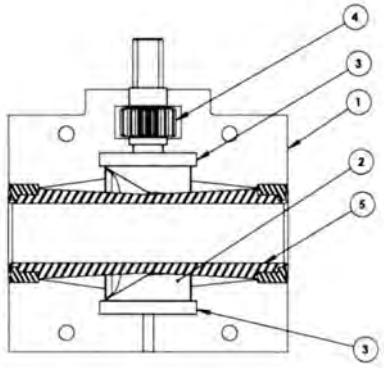


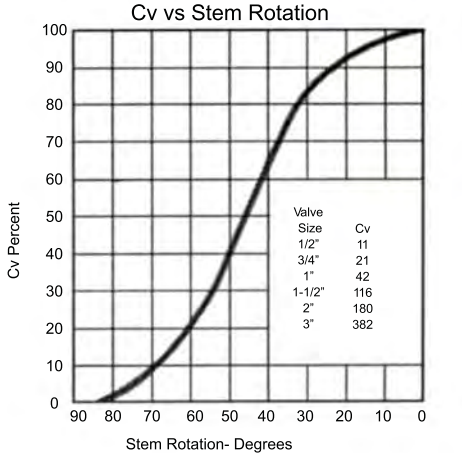
Clark Solutions • 10 Brent Drive • Hudson, MA 01749 • Tel. 978 / 568 3400 • Fax 978 / 568 0060

## 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<br>4-20 mA | two-position/tri-state* | 0-10 VDC<br>4-20 mA |
| Input Impepance | 250 Ohms for 4-20 mA | | | |
| Operating range | 0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, & custom signal ranges available | | | |
| Fedback 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 90º - 320º | | | |
| 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 | 0-320º | | | |
| Factory setting | none | | | |
| Ratings | 125/250 VAC: 10 Amp, 1/3 hp<br>125 VDC: 0.5 Amps<br>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 90º | 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:<br>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

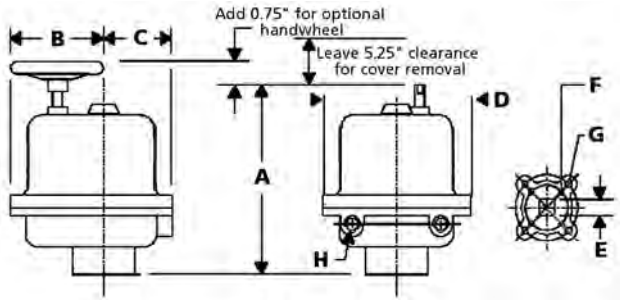
** Does not include line loss. Add 16 VA if heater and stat (H/S) is used

†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

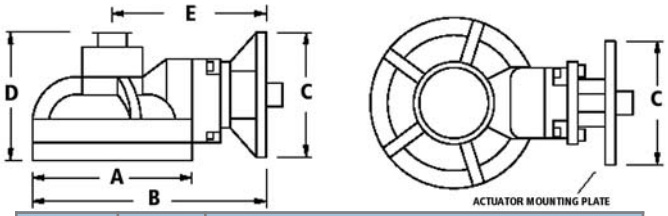



| Table 2 RE Dimensions (inches) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Actuator Model No. | A | S | C | D | E | F | G | H |
| RE3 - RE6 | 9.93 | 5.15 | 3.48 | 7.42 | 0.75 sq. 0.63 deep | N/A | 5/16-16UNC-2B 0.625 deep BC: 3.25 | 1/2"NPT |
| RE10 - RE20 | 11.65 | 6.07 | 4.40 | 9.75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

**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




| 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= Vinylester fiberglass composite | 01= ANSI Class 150 Flange Dim. | NO= None (bare stem) HK= Handle Kit AP= Automation Package (see columns G,H & I) | 0F= 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) |

| I Actuator Options |
|---|
| AS(2,3)= Auxiliary Switch(es) |
| HT= Heater/thermostat (Outdoor Applications |
| OH= Overide 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*

**PDT Series**

**PMDP Series**

## 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 of 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

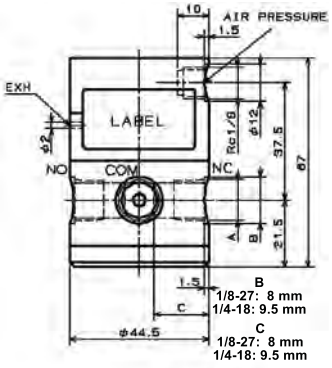
## SPECIFICATIONS

Actuation Pressure: 300 to 600 kPa ( 43.5 to 87 PSI)
Air Supply Port: PDT-1/8-27 NPT; PMDT-1/4-28

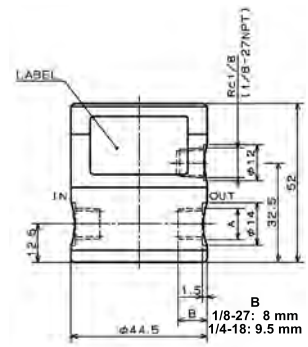
| Model PDT | | | | | | | | Pressure Rating | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | Config. | Orifice Size | Port Connections | Valve Body | Isolation Diaphragm | Soft Seal | Valve Stem | Common (Inlet) | Normally Closed | Normally Open | Media Temp | Ambient Temp |
| 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 | - | | | - | | |

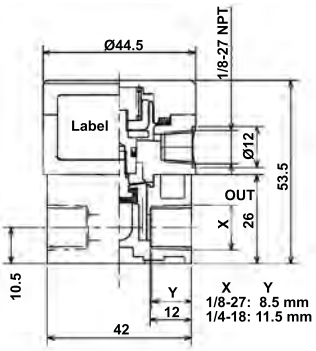
## DIMENSIONS



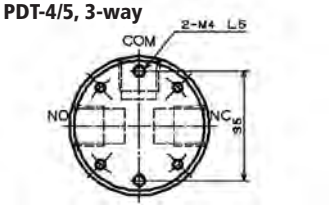

PDT-4/5, 3-way

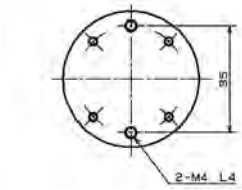


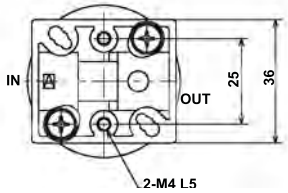

PDT-4/5, 2-way. NC

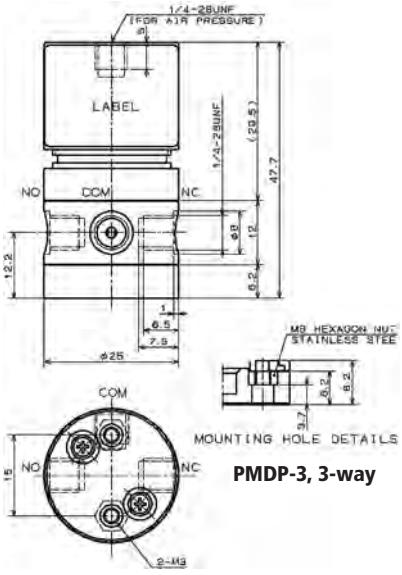



PDT-4/6 2-way. NO/NC

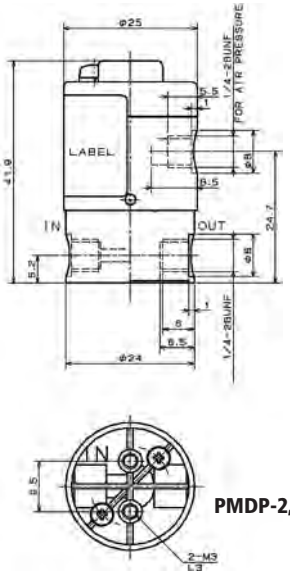



PMDP-3, 3-way




PMDP-2, 2-way, NC

## CLARK SOLUTIONS

# OMNI Manual Operated Ball Valves

*3/8" to 3" PVC or CPVC, EPDM Seals And PTFE Seats*

## DESCRIPTION

Omni valves are a one-piece, compact design, non-union type. O-rings are EPDM and seats are PTFE. The seats have EPDM backing cushions. PVC material 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.

- Blocks in two directions
- Unibody construction
- Compact, low profile, short face-to-face dimensions
- PTFE seat backed by EPDM for low stem torque
- Rated for full vacuum service

## SPECIFICATIONS

***GENERAL***

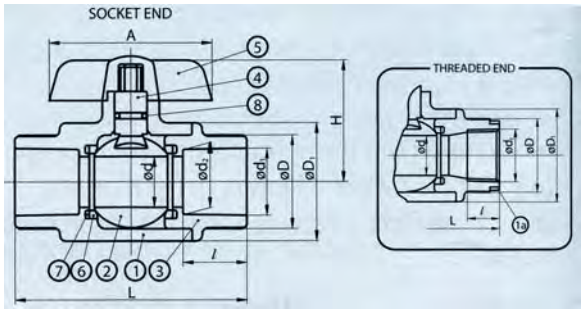
Nominal Sizes: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2", 3"
Connections:
Socket: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2", 3"
ASTM schedule 40
Threaded: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2" NPT
Valve Bodies, Ball, End Connector & Stem: PVC or CPVC
Valve Seats: PTFE backed with EPDM
Seals: EPDM

**Max. Pressure Rating (PSI) vs Temperature**

| Nominal Size | | PVC | CPVC | | | |
|---|---|---|---|---|---|---|
| | | 30°F 100°F | 30°F 100°F | 121°F 140°F | 141°F 175°F | 176°F 195°F |
| Inches | mm | | | | | |
| 3/8-2 | 13-50 | 150 | 150 | 120 | 90 | 60 |
| 3 | 80 | 150 | 150 | 120 | 90 | 60 |

## PARTS LIST & DIMENSIONS (INCHES, MM)

| No. | Description | Pcs | Material |
|---|---|---|---|
| 1 | Body | 1 | PVC, CPVC |
| 2 | Ball | 1 | PVC, CPVC |
| 3 | End Connector | 1 | PVC, CPVC |
| 4 | Stem | 1 | PVC, CPVC |
| 5 | Handle | 1 | ABS |
| 6 | Seat | 2 | PTFE |
| 7 | Cushion | 2 | EPDM |
| 8 | O-Ring | 1 | EPDM |
| 1a | Ring* | 2 | 304 SS |
| *Used for CPVC body, threaded end, 1/2" to 1" | | | |




| Nominal Size | | Socket ASTM SCH 40 | | | | Threaded | | | | | | | | Weight (lbs) | Cv |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inches | mm | $d_1$ | $d_2$ | l | L | $d_1$ | l | L | d | A | D | $D_1$ | h | | |
| 3/8 | 13 | .0687 | 0.671 | 0.59 | 3.35 | 3/8" NPT | 0.59 | 3.35 | 0.51 | 2.36 | 1.22 | 1.38 | 1.65 | 0.22 | 7.7 |
| 1/1 | 13 | 0.848 | 0.836 | 0.69 | 3.82 | 1/2" NPT | 0.59 | 3.82 | 0.59 | 2.76 | 1.22 | 1.38 | 1.73 | 0.26 | 14 |
| 3/4 | 20 | 1.058 | 1.046 | 0.72 | 4.02 | 3/4" NPT | 0.67 | 4.06 | 0.79 | 3.15 | 1.46 | 2.17 | 2.17 | 0.55 | 29 |
| 1 | 25 | 1.325 | 1.310 | 0.87 | 4.49 | 1" NPT | 0.79 | 4.45 | 0.98 | 3.15 | 1.77 | 2.36 | 2.36 | 0.88 | 47 |
| 1 1/4 | 30 | 1.670 | 1.655 | 0.94 | 5.00 | 1 1/4" NPT | 0.87 | 5.00 | 1.22 | 3.74 | 2.13 | 2.76 | 2.76 | 1.21 | 72 |
| 1 1/2 | 40 | 1.912 | 1.894 | 1.09 | 5.98 | 1 1/2" NPT | 0.98 | 5.94 | 1.38 | 4.33 | 2.50 | 2.99 | 2.99 | 1.32 | 140 |
| 2 | 50 | 2.387 | 2.369 | 1.16 | 6.93 | 2" NPT | 1.10 | 6.97 | 1.77 | 4.33 | 3.01 | 3.31 | 3.31 | 2.20 | 185 |
| 3 | 80 | 3.516 | 3.492 | 1.87 | 9.29 | 3" NPT | 1.17 | 9.29 | 2.70 | 7.87 | 4.25 | 4.88 | 4.88 | 6.61 | 410 |

## ORDERING INFORMATION

***ORDER NUMBER (SEE TABLE)***

**OMNI-A-B-C**

***EXAMPLE: OMNI-020-1072***

| A= Size | | B= Body Material & Connection Type | C= Options |
|---|---|---|---|
| 003= 3/8" | 005= 1/2" | 1070= PVC Socket Type | NSF= NSF-61 Approval |
| 007= 3/4" | 010= 1" | 1071= PVC Threaded Type | |
| 012= 1 1/4" | 015= 11/2" | 1072= CPVC Socket Type | |
| 020= 2" | 030= 3" | 1073= CPVC Threaded Type | |



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## CLARK SOLUTIONS

# Series 23 Multi-Port Manual And Actuated Ball Valves

*1/2" to 4" PVC, CPVC, PP or PVDF Construction*

## DESCRIPTION

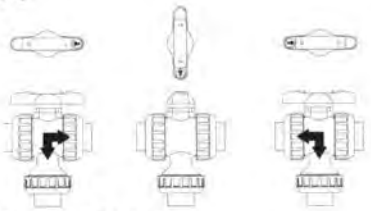
All Series 23 Multiport ball valves are of molded thermoplastic construction with union end on all three ports. Carriers thread into the body in order to provide blocking capabilities in the OFF position. Stems have double O-Rings and are of blow out proof design. The valve handle doubles as carrier removal and/or tightening tool. An ISO mounting pad is integrally molded into valve body. Material choices include PVC conforming to ASTM D1784 Cell Classification 12454-A, CPVC conforming to ASTM D1784 Cell Classification 23567-A, PP conforming to ASTM D4101 Cell Classification PP0210B67272 and PVDF conforming to ASTM D3222 Cell Classification Type II.

The valves are rated to 150 psi at 70°F. PTFE seats have an elastomeric backing cushion of the same material as the valve seals.

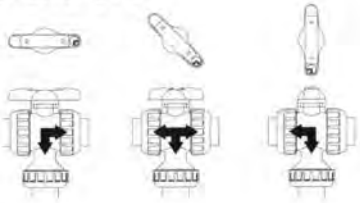
- True Union design on all three ports
- Double O-ring seals on stem for added protection
- Integrally molded ISO mounting pad for both manual and actuated operations
- Blow-out proof, solid mold bottom entry design
- Blocks from left or right union ports, leaving full pressure on the opposite end of valve
- Standard "L" port ball permits flow from common port toeither left or right port or to "OFF" position
- PTFE seats with elastomeric backing cushions ensure bouble-tight shut-off and a low fixed torque, while at the same time compensating for wear
- Built-in spanner wrench on the handle for valve disassembly and assembly
- All sizes rated for full vacuum service
- Eliminates need for additional valve and "Tee"
- Pneumatic and electric actuators & accessories
- Stem extensions
- 2" square operating nut or "T" nut
- Locking handles
- Limit switches
- "T" port, Double "L" port Cross Port Ball Options
- 4 different flow patterns through 3 separate ports are possible because of the crossed flow patterns within the ball
- Changing position of handle changes flow pattern. Handle rotates 360°.

***AVAILABLE FLOW PATTERNS***

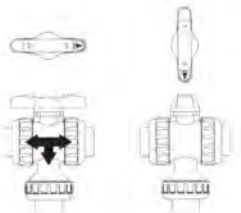
L-Port



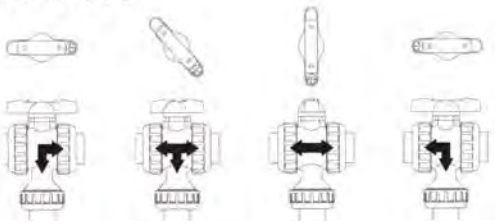
Double L-Port



T-Port



Cross Port



## SPECIFICATIONS

***GENERAL***

Sizes: 1/2" – 4" (call for optional 6" size)
Bodies: PVC, CPVC, PP, PVDF
Seats: PTFE backed with EPDM or FKM
Seals: EPDM or FKM
Actuator Options: Electric or pneumatic

| Nominal Size (Inches) | Cv (L-Port) | Cv (DBL-L Port) | Weight Threaded | Weight Flanged |
|---|---|---|---|---|
| 1/2 | 7.4 | 6.3 | 0.66 | 1.76 |
| 3/4 | 10 | 8.5 | 1.10 | 2.42 |
| 1 | 23 | 20 | 1.76 | 3.52 |
| 1 1/2 | 43 | 36 | 4.18 | 6.36 |
| 2 | 59 | 45 | 5.73 | 8.59 |
| 3 | 130 | 99 | 15.43 | 18.95 |
| 4 | 260 | 200 | 35.27 | 39.90 |



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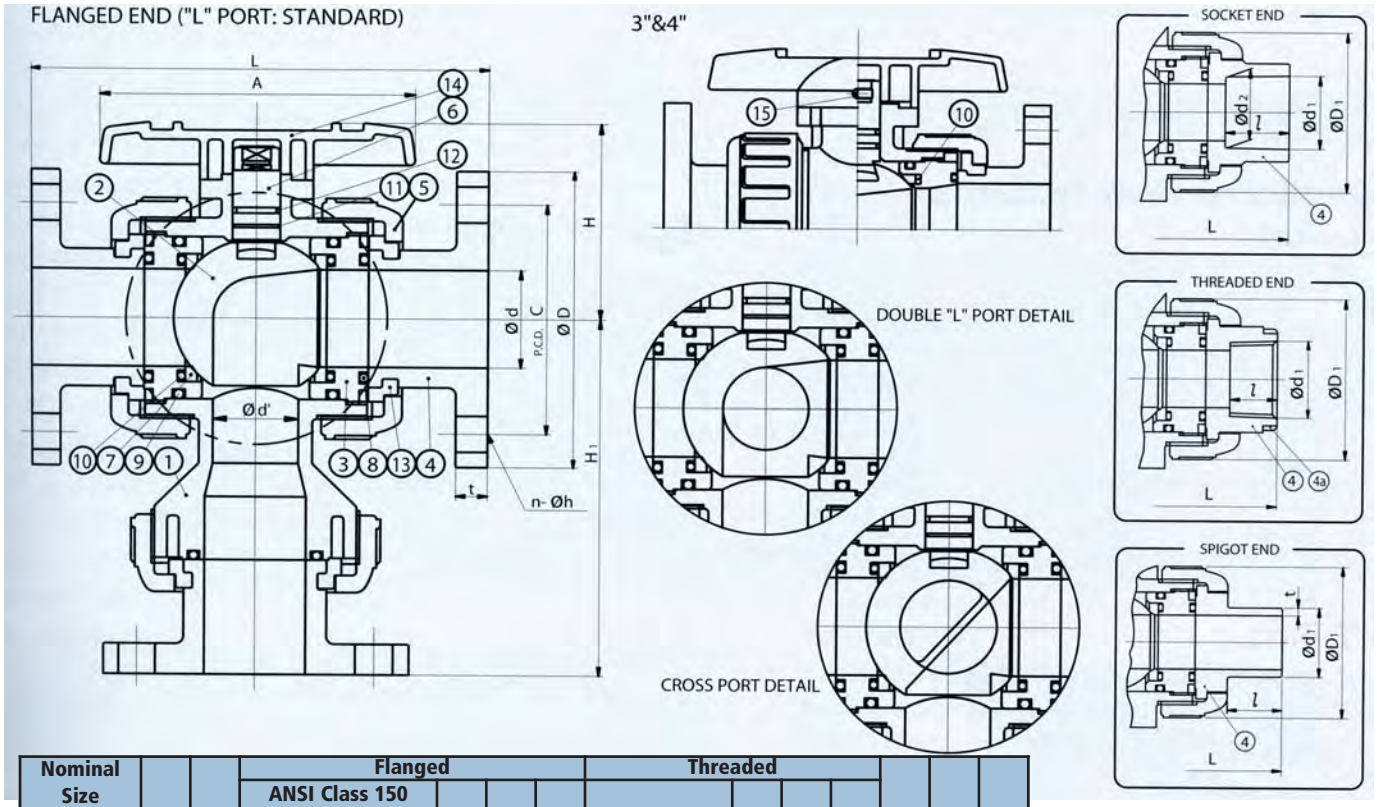
## PARTS LIST & DIMENSIONS (INCHES, MM)




| Nominal Size | | | | Flanged ANSI Class 150 | | | | | | | Threaded | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inches | mm | d | d¹ | D | C | n | h | L | t | $H_1$ | $d_2$ | l | L | $H_1$ | $D_1$ | H | A |
| 1/2 | 15 | 0.59 | 0.59 | 3.50 | 2.38 | 4 | 0.62 | 5.63 | 0.47 | 3.70 | 1/2" NPT | 0.59 | 4.02 | 2.89 | 1.89 | 2.03 | 3.62 |
| 3/4 | 20 | 0.79 | 0.79 | 3.88 | 2.75 | 4 | 0.62 | 6.77 | 0.55 | 4.50 | 3/4" NPT | 0.67 | 4.72 | 3.48 | 2.36 | 2.34 | 3.94 |
| 1 | 25 | 0.98 | 0.98 | 4.25 | 3.12 | 4 | 0.62 | 7.36 | 0.55 | 5.24 | 1" NPT | 0.79 | 5.16 | 4.13 | 2.76 | 2.68 | 4.33 |
| 1 1/2 | 40 | 1.57 | 1.26 | 5.00 | 3.88 | 4 | 0.62 | 8.35 | 0.63 | 6.50 | 1 1/2" NPT | 0.98 | 6.42 | 5.53 | 3.94 | 3.50 | 5.16 |
| 2 | 50 | 2.01 | 1.69 | 6.00 | 4.75 | 4 | 0.75 | 9.21 | 0.63 | 7.34 | 2" NPT | 1.10 | 7.76 | 6.61 | 4.96 | 4.04 | 6.26 |
| 3 | 80 | 3.07 | 2.70 | 7.50 | 6.00 | 4 | 0.75 | 11.97 | 0.71 | 10.06 | 3" NPT | 1.38 | 10.39 | 9.25 | 5.98 | 5.51 | 9.45 |
| 4 | 100 | 3.94 | 3.54 | 9.00 | 7.50 | 8 | 0.75 | 14.65 | 0.71 | 12.01 | 4" NPT | 1.77 | 14.17 | 11.77 | 8.27 | 7.01 | 12.01 |

| Nominal Size | | Socket PVC, CPVC ASTM Sched. 80/40 | | | L | $H_1$ | PP, PVDF (DIN) DIN 16962 | | | | | PP, PVDF (IPS) | | | | Spigot (Butt End) PP, PVDF Din 3442 | | PP | PVDF | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inches | mm | $d_1$ | $d_2$ | l | | | $d_1$ | $d_2$ | l | L | $H_1$ | $d_1$ | l | L | $H_1$ | $d_2$ | l | t | t | L | $H_1$ |
| 1/2 | 15 | 0.848 | 0.836 | 0.875 | 4.45 | 3.08 | 0.768 | 0.760 | 0.57 | 3.90 | 2.80 | 0.83 | 0.87 | 4.45 | 3.09 | 0.787 | 0.728 | 0.098 | 0.075 | 4.88 | 3.27 |
| 3/4 | 20 | 1.058 | 1.046 | 1.000 | 5.08 | 3.56 | 0.965 | 0.957 | 0.63 | 4.49 | 3.27 | 1.03 | 1.00 | 5.08 | 3.61 | 0.984 | 0.886 | 0.106 | 0.075 | 5.67 | 3.90 |
| 1 | 25 | 1.325 | 1.310 | 1.125 | 5.75 | 4.32 | 1.240 | 1.232 | 0.71 | 4.84 | 3.94 | 1.30 | 1.13 | 5.75 | 4.37 | 1.260 | 0.886 | 0.118 | 0.094 | 6.06 | 4.53 |
| 1 1/2 | 40 | 1.912 | 1.894 | 1.375 | 7.24 | 5.71 | 1.947 | 1.937 | 0.93 | 5.83 | 5.16 | 1.89 | 1.37 | 7.24 | 5.85 | 1.969 | 1.260 | 0.181 | 0.118 | 6.85 | 6.02 |
| 2 | 50 | 2.387 | 2.369 | 1.500 | 8.23 | 6.66 | 2.461 | 2.445 | 1.08 | 6.93 | 6.06 | 2.36 | 1.50 | 8.23 | 6.76 | 2.480 | 1.417 | 0.228 | 0.118 | 8.82 | 7.01 |
| 3 | 80 | 3.516 | 3.492 | 1.875 | 11.10 | 9.59 | 3.612 | 3.498 | 1.40 | 9.88 | 8.82 | 3.48 | 1.87 | 11.10 | 11.10 | 3.543 | 1.496 | 0.323 | 0.169 | 11.61 | 9.69 |
| 4 | 100 | 4.518 | 4.491 | 2.000 | 13.90 | 11.58 | 4.293 | 4.278 | 1.63 | 12.20 | 10.98 | 4.48 | 2.25 | 14.37 | 14.37 | 4.331 | 1.752 | 0.394 | 0.209 | 12.72 | 11.85 |

### Pressure vs Temperature (PSI, Water)

| Nominal Size | | PVC | | | CPVC | | | | PP | | | PVDF | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30°F | 71°F | 106°F | 30°F | 121°F | 141°F | 176°F | -5°F | 86°F | 141°F | -5°F | 141°F | 176°F | 196°F |
| Inches | mm | 100°F | 105°F | 120°F | 120°F | 140°F | 175°F | 195°F | 85°F | 140°F | 175°F | 140°F | 175°F | 195°F | 210°F |
| 1/2-2 | 15-50 | 150 | 150 | 150 | 150 | 120 | 85 | 55 | 150 | 90 | 60 | 150 | 120 | 110 | 85 |
| 3-4 | 80-100 | 150 | 150 | 150 | 150 | 85 | 55 | 45 | 150 | 75 | 45 | 150 | 100 | 85 | 70 |

| No. | Description | Pcs | Material |
|---|---|---|---|
| 1 | Body | 1 | PVC, CPVC, PP, PVDF |
| 2 | Ball | 1 | PVC, CPVC, PP, PVDF |
| 3 | Carrier | 2 | PVC, CPVC, PP, PVDF |
| 4 | End Connector | 3 | PVC, CPVC, PP, PVDF |
| 5 | Union Nut | 3 | PVC, CPVC, PP, PVDF |
| 6 | Stem | 1 | PVC, CPVC, PP, PVDF |
| 7 | Seat | 2 | PTFE |
| 8 | O-Ring (A) | 3 | EPDM, FKM, Others |
| 9 | O-Ring (B) | 2 | EPDM, FKM, Others |
| 10 | Cushion* O-Ring-C** | 2 | EPDM, FKM, Others |
| 11 | O-Ring (D) | 1 | EPDM, FKM, Others |
| 12 | O-Ring (E) | 1 | EPDM, FKM, Others |
| 13 | Stop Ring*** | 3 | PVDF |
| 14 | Handle | 1 | ABS |
| 15 | Screw | 1 | 304 Stainless Steel |
| 4a | Ring*** | 3 | 304 Stainless Steel |

*Size 1/2" to 2" **Size 3" & 4"
***Flanged End
****CPVC Threaded, 1/2' & 1"

## ORDERING INFORMATION 23-A-B-C-D *EXAMPLE: 23-010-2520-L*

| A= Size | B= Body Material, Connection Type & O-RingMaterial | | C= Port D=Options |
|---|---|---|---|
| 005= 1/2" 007= 3/4"<br>010= 1" 015= 11/2"<br>020= 2" 030= 3"<br>040= 4" | 2510= PVC Socket, EPDM<br>2511= PVC Threaded, EPDM<br>2512= PVC FLG, EPDM<br>2516= CPVC Socket, EPDM<br>2517= CPVC Threaded, EPDM<br>2518= CPVC Flg, EPDM<br>2513= PVC Socket, FKM<br>2514= PVC Threaded, EPDM<br>2515= PVC FLG, FKM<br>2519= CPVC Socket, FKM | 2521= CPVC Flg,, FKM<br>2527= PP DIN Socket, FKM<br>2529= PP Threaded, FKM<br>2530= PP Butt, FKM<br>2528= PP IPS Socket, FKM<br>2531= PP Flg, FKM<br>2532= PVDF DIN Socket,<br>2534= PVDF Threaded, FKM<br>2533= PVDF IPS Socket, FKM<br>2536= PVDF Flg, FKM | L=L Port<br>DL= Double L Port<br>T= T Port<br>CP=Cross Port<br>**Options**<br>NSF= NSF-61<br>Approval<br>Actuators= Call for details |



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# 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.



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***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 PSIG x .8 =8 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 PSIG +14.7) x.42 =14.6 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

$Cv=Qx\sqrt{(Sg/DP)}$ 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)

$Cv=Q/(3x\sqrt{(DPxP_2)})$ 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)
$P_2$ =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.

| Table B | Saturated Steam Table: Temperature (°F) of Inlet Pressure from 0°F to 600°F | | | | | | |
|---|---|---|---|---|---|---|---|
| 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 | | | | | | |

| Table C | Two-Way Electronic Ball 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" |
| 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 |

| Table D | Three-Way Electronic Ball 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" |
| 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 |



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# 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.

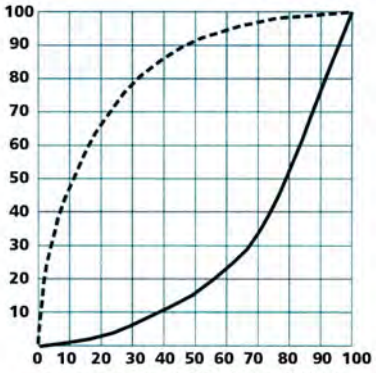



Table A

## 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

Table B Two-Way Bronze Body Temperature/Pressure Rating

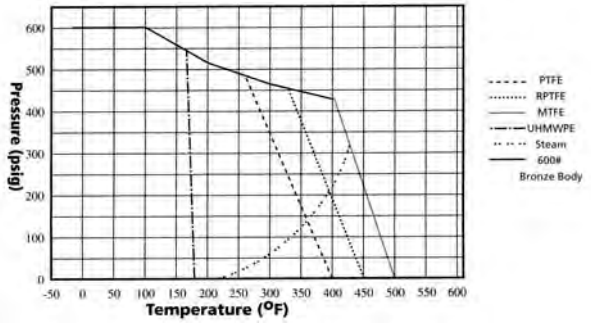
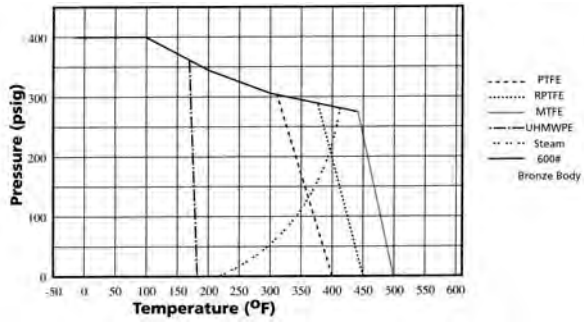



Table C Three-Way Bronze Body Temperature/Pressure Rating




### *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



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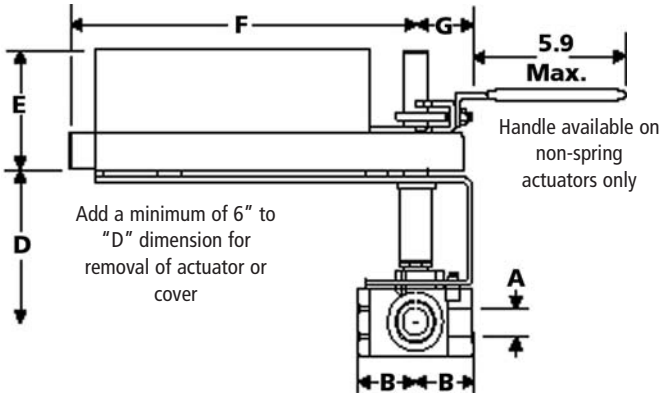
| Table D<br>Two-Way Valves | | | Close-Off Rating (PSI Differential Pressure) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actuator Base Model Number<br>Non-Spring Return Motors | | | | | | Actuator Base Model Number<br>Spring Return Motors | | | |
| NPT | $C_v$ | 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<br>Three-Way Valves | | | Close-Off Rating (PSI Differential Pressure) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Actuator Base Model Number<br>Non-Spring Return Motors | | | | | | Actuator Base Model Number<br>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 |

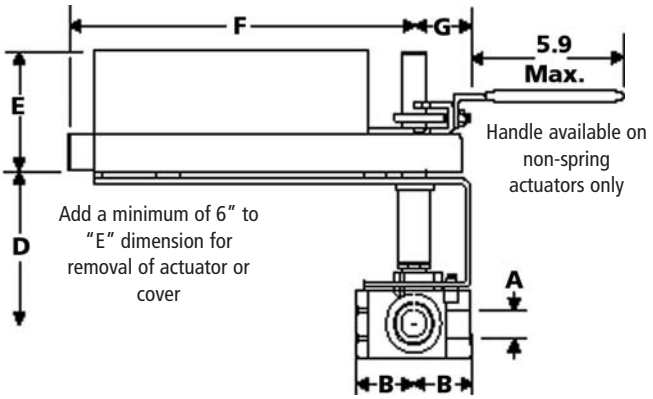



** Add 2.3 inches for "HT" applications
*** Cv per customer spec
† "C" dimension from center line of valve to face of port (three-way valves only)
‡ "H" dimension is width of motor

| 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 |

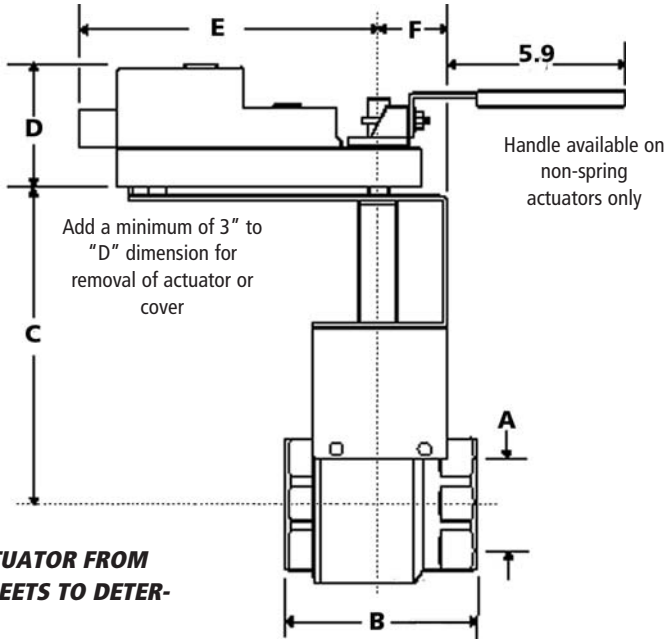
* Add 4.0 inches for "HT" applications
** Add 4.0" for dual actuator applications
† "C" dimension from center line of valve to face of port (three-way valves only)
‡ "H" dimension is width of motor




| 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 daul 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)<br>SS= Stainless Steel | N= None<br>WP= NEMA 4/4x actuator enclosure<br>HT= Steam Service (MTFE packing & seat seals) | SBS= Stainless Ball & Stem (standard) |

## CLARK SOLUTIONS

# 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

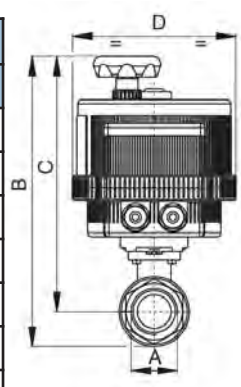
**-Low Torque Valve Stem & Valve Seat Design Means Smaller Actuators**
**-Square Stem Valve Design With ISO 5211 Actuator Pad For Structural Strength**
**-Complete Design Control With Integrated Components From One Manufacturer**

| General Valve Specifications | | | |
|---|---|---|---|
| **8E064/68 2-Way Brass** | **8E065/66 3-Way Brass** | **8E067 2-Way SS** | **8E069/70/71/72 3-Way SS** |
| - Full Port from 1/4" to 4"<br>-*PSI Pressure Rating 600 WOG - 150 WSP<br>-Temperature to 366°F<br>-Blow out proof stem, chrome plated brass ball (SS Ball Model 68)<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & closed position | - "T" & "L" Ports from 1/4" to 3"<br>-*PSI Pressure Rating 400 WOG - 100 WSP<br>-Temperature to 344°F<br>Four seat design for sealing between pressurized ports<br>-Blow out proof stem, chrome plated brass ball<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & closed position | - Full Port from 1/4" to 3"<br>-2 pc stainless steel ASTM A351 - CF8M<br>-*PSI Pressure Rating 1000 WOG - 150 WSP<br>-Temperature to 366°F<br>-Blow out proof stem<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & closed position | - Full Port from 1/4" to 2"; Standard port from 1/2" to 2"<br>-Stainless steel ASTM A351 - CF8M<br>-Self adjusting stem packing<br>-*PSI Pressure Rating 1000 WOG (1/4 to 1"), 800 WOG (1/4" to 2")<br>-Temperature range -20°F to 450°F<br>-Blow out proof stem<br>-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 |







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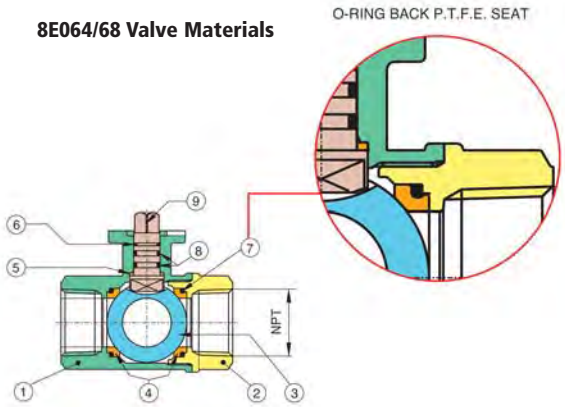
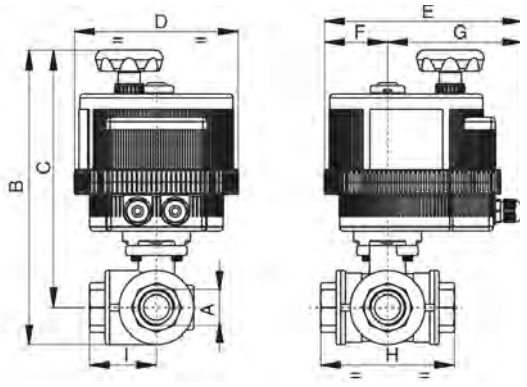
## 8E064/68 Valve Materials

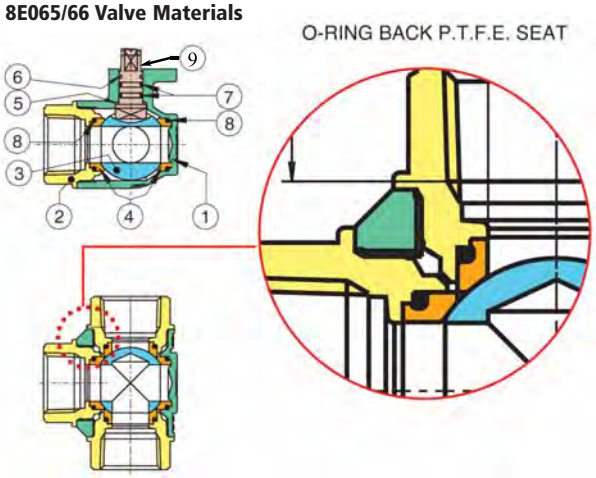



| | Part Name | Material 8E064 | Material 8E068 | QTY |
|---|---|---|---|---|
| 1 | Body | *Brass CW617N (C37700) | *Brass CW617N (C37700) | 1 |
| 2 | End Connection | *Brass CW617N (C37700) | *Brass CW617N (C37700) | 1 |
| 3 | Ball | *Brass CW617N (C37700) | Stainless Steel STM A351 - CF8M | 1 |
| 4 | 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) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| SizeSize/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 |

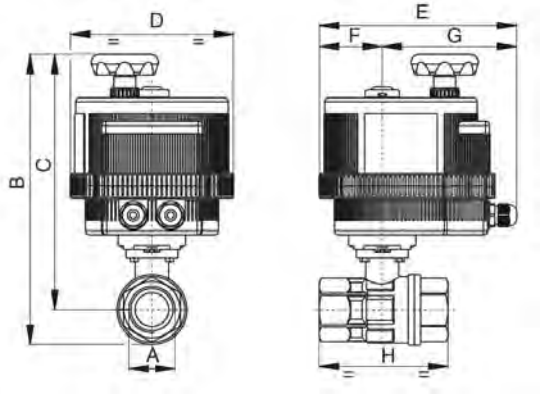



## 8E065/66 Valve Materials

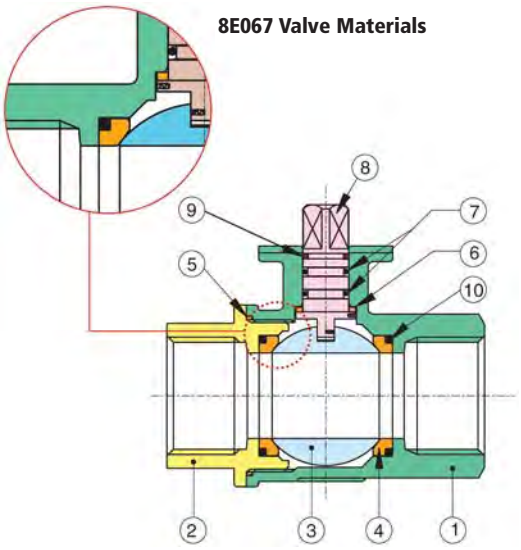



| | Part Name | Material 8E065/66 | QTY |
|---|---|---|---|
| 1 | Body | *Brass CW617N (C37700) | 1 |
| 2 | End Connection | *Brass CW617N (C37700) | 3 |
| 3 | Ball | *Brass CW617N (C37700) | 1 |
| 4 | Ball Seat | P.T.F.E. | 4 |
| 5 | Thrust Washer | P.T.F.E. | 1 |
| 6 | Stem Seal | P.T.F.E. | 1 |
| 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 |



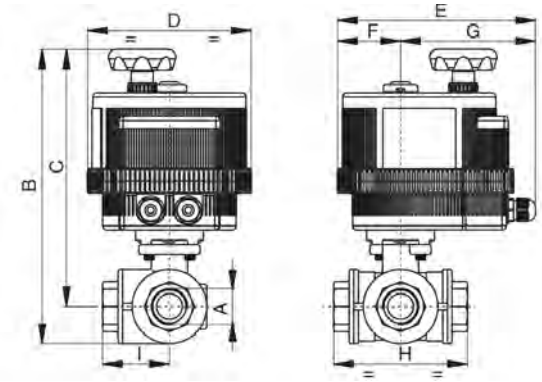
**8E067 Valve Materials**



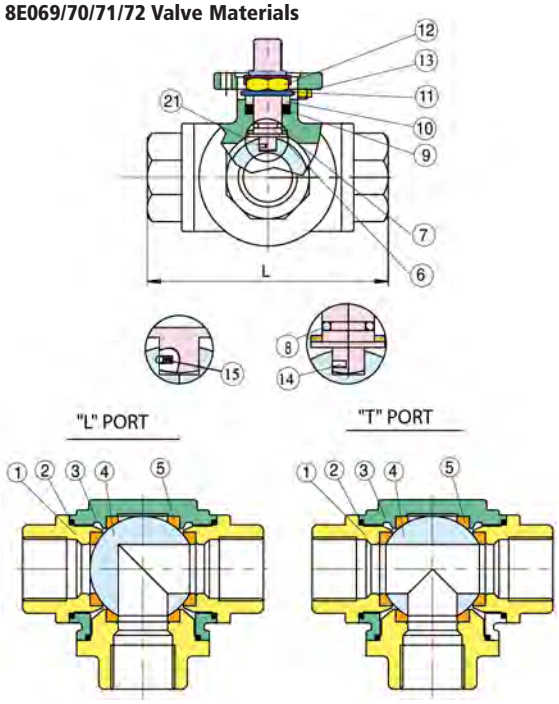

| | Part Name | Material 8E067 | QTY |
|---|---|---|---|
| 1 | Body | ASTM A351 CF8M | 1 |
| 2 | End Connection | ASTM A351 CF8M | 1 |
| 3 | Ball | ASTM A351 CF8M | 1 |
| 4 | Ball Seat | P.T.F.E. | 2 |
| 5 | Seat | P.T.F.E. | 1 |
| 6 | Stem Seal | P.T.F.E. | 1 |
| 7 | O-Ring | FKM (Viton®) | 2 |
| 8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




| | 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.

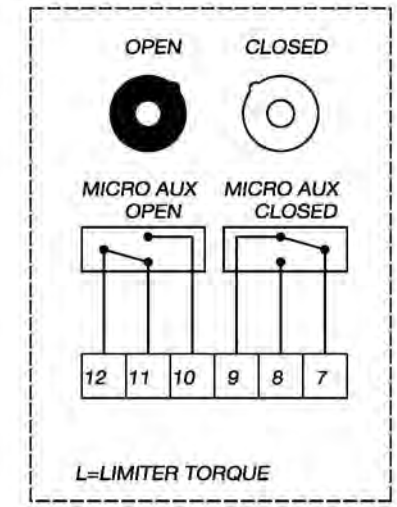
The actuator housing is made from a VO self-extinguish class techno-polymer material. The gear drive is made of two steel and techno-polymer gear wheels, sustained by hardened steel pinions, mounted on self-lubricating bushings (excluding model VB015), and inserted in a rugged die-cast aluminum structure.

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.

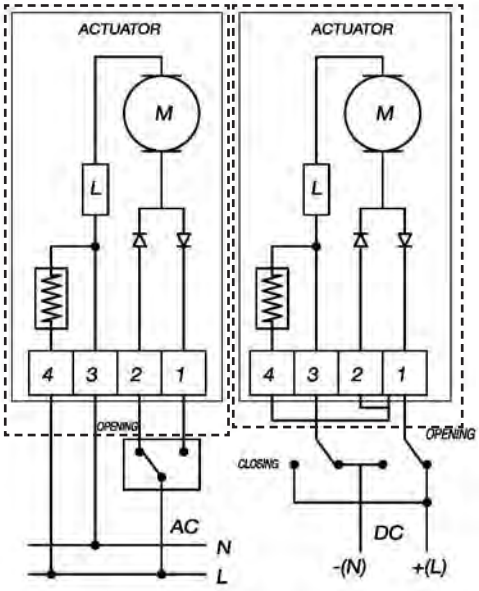
Two auxilliary limit switches are standard and optional 4-20 mA/0-10V modulating boards and battery backup protection are available.

| 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 |

### *VB015 12-24V AC/DC*

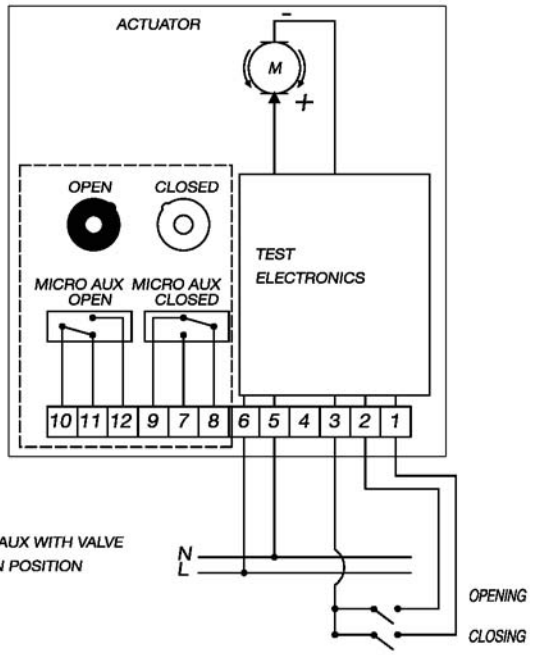



MICRO AUX WITH VALVE
IN OPEN POSITION

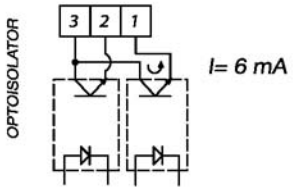



**DC Power**
To open: Line to 2
Neutral to 3
To Close: Line to 3
Neutral to 1

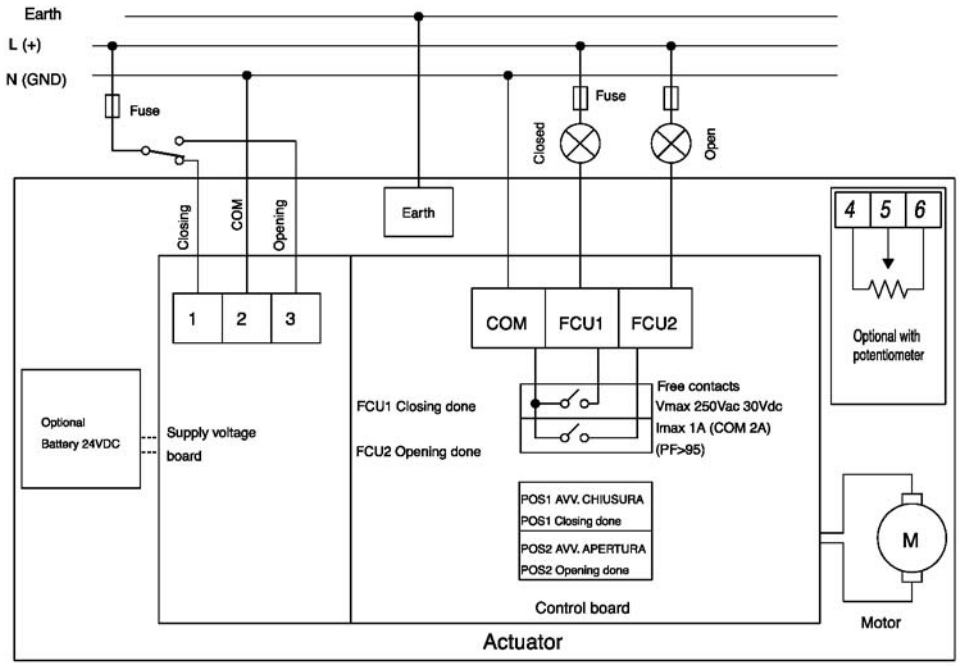
### *VB015 115V-230V AC*



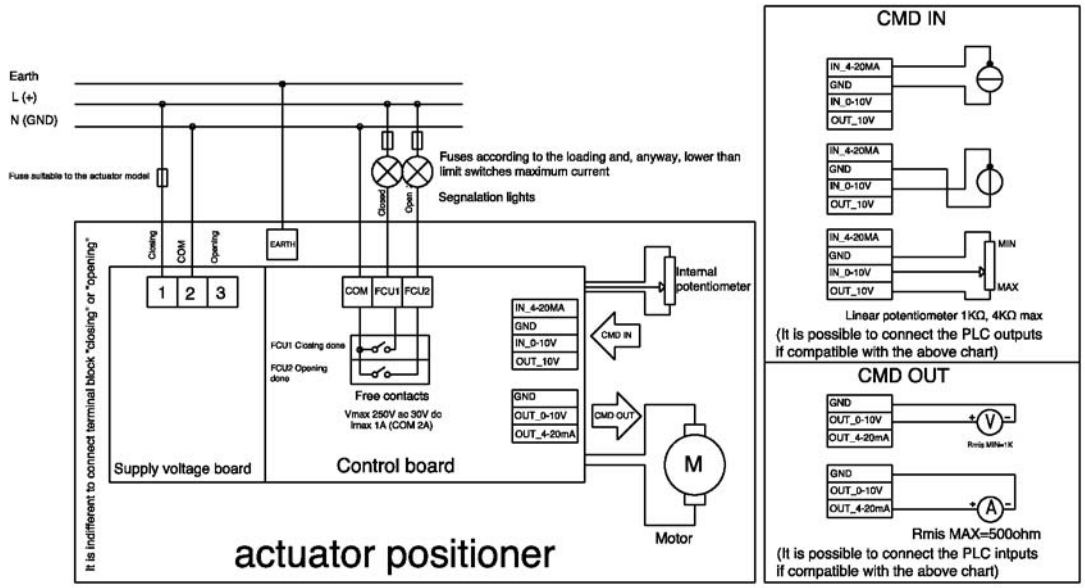

STATIC IMPULSE DRIVE OPTOISOLATED BY PLC



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

## 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***

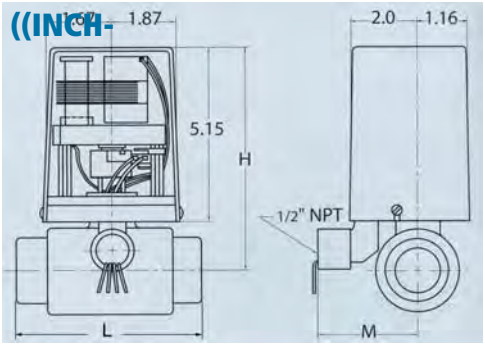
Motor Type: Unidirectional, Single phase
Voltage: 120 Vac, 50/60 Hz (15 VDC, 24 VDC, 12 VAC, 24 VAC & 220 VAC optional)
Current Draw: 2.2 Amps
Torque: 120 in-lbs
Switch: One SPDT (15 Amp rating)
Housing: Corrosion/weather proof NEMA 4X
Nominal Sizes: 3/8", 1/2", 3/4", 1", 1 1/4" 1 1/2", 2"
Connections: 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

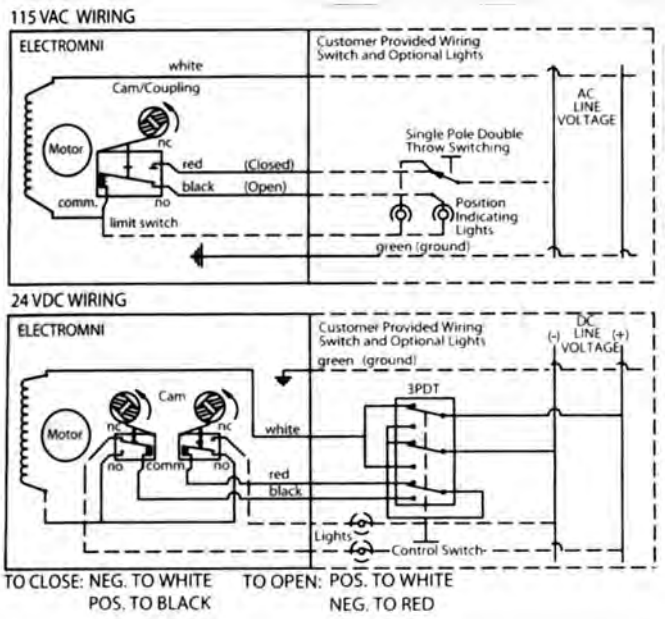
| Voltage | Curent (Amps) | Cycle Time (Seconds) | Duty Cycle (%) |
|---|---|---|---|
| 115 VAC | 2.10 | 5 | 25 |
| 220 VAC | 0.60 | 5 | 25 |
| 12 VAC | 2.25 | 5 | 75 |
| 24 VAC | 4.00 | 5 | 75 |
| 12 VDC | 2.00 | 5 | 75 |
| 24 VDC | 3.50 | 5 | 75 |

## 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




## 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"<br>005= 1/2"<br>007= 3/4"<br>010= 1"<br>012= 1 1/4"<br>015= 1 1/2"<br>020= 2" | 2015= PVC Socket Type<br>2016= PVC Threaded Type<br>2017= CPVC Socket Type<br>2018= CPVC Threaded Type | -= None<br>2101000= 2 Position Indicating Lights[1]<br>2102001= 2-Wire Control[1]<br>2103100= Extra Limit Switch[1]<br>2104749= 12 VDC Actuator<br>2104750= 24 VDC Actuator<br>2104751= 12 VAC Actuator<br>2104752= 24 VAC Actuator<br>2104753= 220 VAC Actuator<br>[1] Must be factory installed. |



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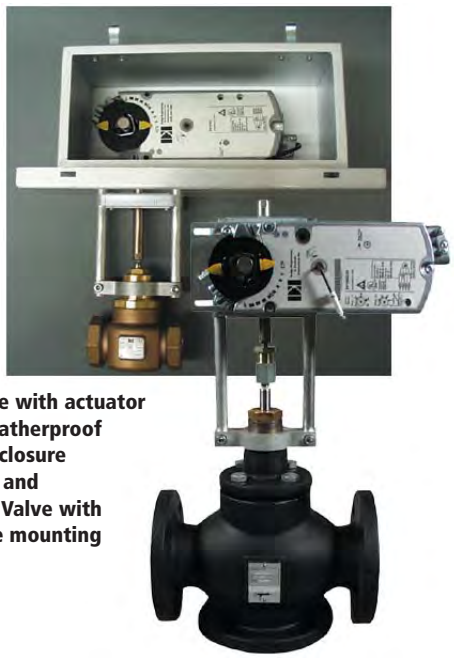
## CLARK SOLUTIONS

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

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@250ºF, Steam 15 PSI<br>Three-Way: Mixing 365 PSI@250ºF, Diverting 335 PSI@300ºF | | | Two-Way: Water 150 PSI @ 250°F, Steam: 15 PSI, 100 PSI for " -ST" only<br>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<br>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)<br>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)<br>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 | | |



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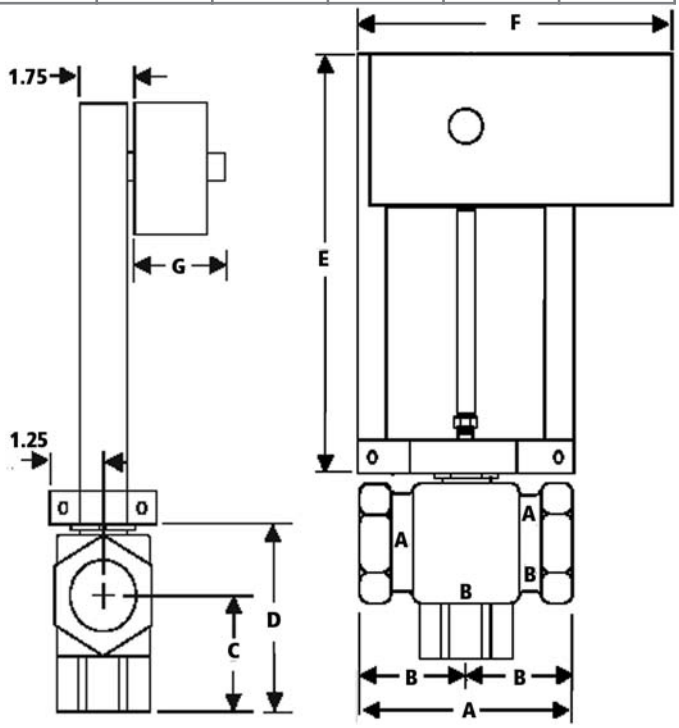
| Table B | 1/2" to 2" Globe Valve Actuator Model Number Selection Chart Threaded Ports | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Size (NPT) | Two-Way | | Three-Way | | Actuator Model Number/Minimum Close-Off Pressure (PSI) | | | | | | |
| | Cv | Valve Model | Cv | Valve 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)

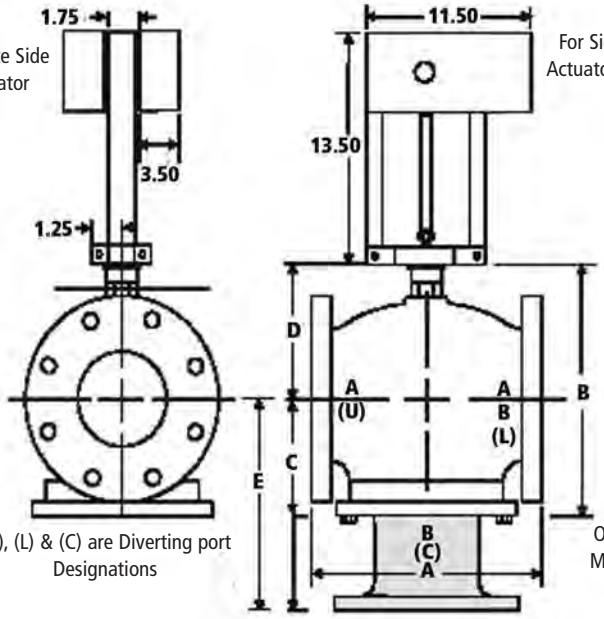
| Table D | Two-Way Valve, 1/2" through 2" | | | | |
|---|---|---|---|---|---|
| Size | Model | Dimensions (inches) | | | |
| | | A | B | C | D |
| 1/2" | GS2A-Cv | 2.75 | 1.38 | 1.13 | 2.94 |
| 3/4" | GS2A-6.3 | 3.25 | 1.63 | 1.00 | 3.94 |
| 1" | GS2A-10 | 3.75 | 1.88 | 1.50 | 3.75 |
| 1 1/4" | GS2A-16 | 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 |
| Three-Way Valve (Mixing) | | | | | |
| 1/2" | GS3A-Cv | 2.88 | 1.44 | 2.13 | 4.31 |
| 3/4" | GS3A-6.3 | 3.25 | 1.63 | 2.19 | 4.31 |
| 1" | GS3A-10 | 3.88 | 1.94 | 2.38 | 4.50 |
| 1 1/4" | GS3A-16 | 4.88 | 2.44 | 2.36 | 4.63 |
| 1 1/2" | GS3A-25 | 5.19 | 2.59 | 2.88 | 4.63 |
| 2" | GS3A-40 | 6.25 | 3.13 | 3.31 | 4.75 |

| 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 |




*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 "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.

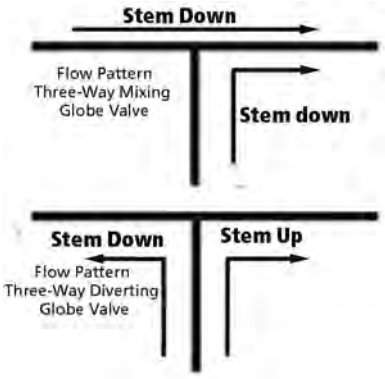
Add 3.85 " Width to Opposite Side of Assembly for Dual Actuator Assemblies




For Side-mounted Actuators (Standard)

(U), (L) & (C) are Diverting port Designations

Optional Service Flange for Mixing Bodies (Standard for Diverting Valve Bodies)




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

## CLARK SOLUTIONS

# 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 (pg 65) 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-Way Differential Pressure (PSI) | | | Three-way Differential Pressure (PSI) | | |
| | Two Position | Modulating | | | | | | | | |
| | @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



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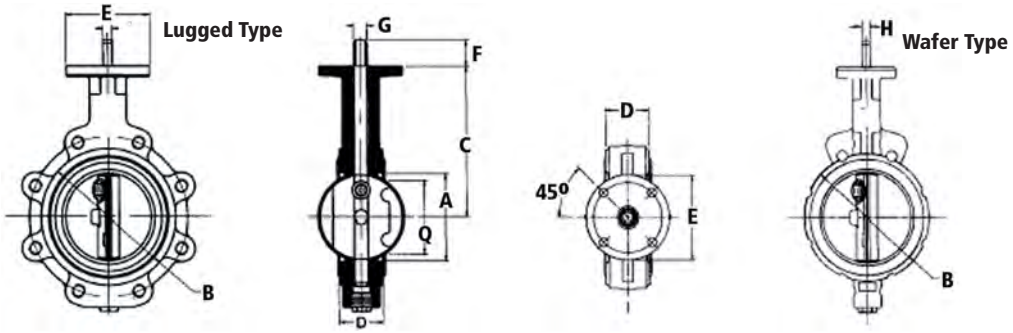
| Table B | Industrial Actuator Selection Chart for valve sizes 2" to 20" | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Valve Size | Cv | | Valve Model | | Actuator Model/Maximum Close-off- PSI | | | | | |
| | Two Position | Modulating | | | Two-Way Differential Pressure (PSI) | | | 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)

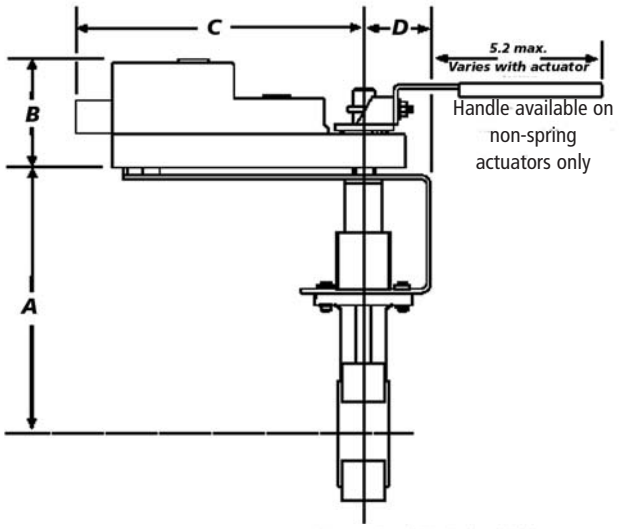



| Table C | Valve Dimensions (inches) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Mounting Flange Drilling | | | | | | | Lug Bolt Data | | |
| Valve Size | A | B | C | D | E | F | BC | #Holes | Hole Dia. | G | H | Q* | Key | BC | #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

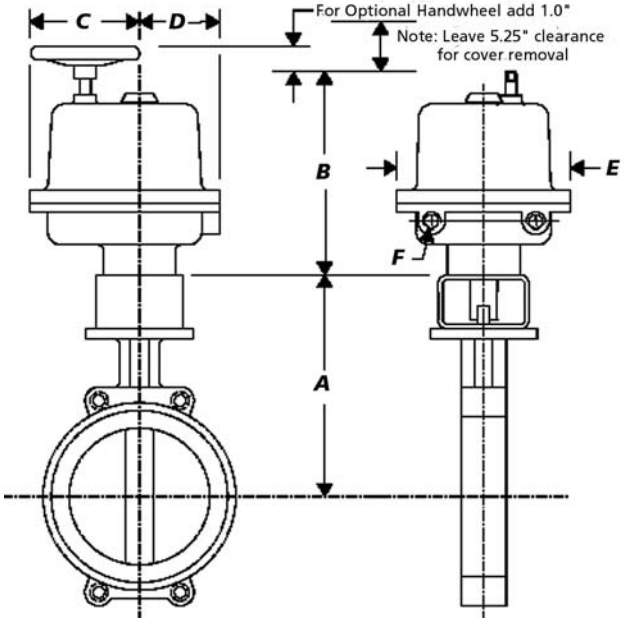
* Q dimension is the minimum allowable pipe or flange inside diameter at the centered body face to protect the disc sealing edge against damage when opening the valve

| Two-Way Valve, 2" through 6" With Commercial Actuators | | |
|---|---|---|
| Size | Model | Dimensions |
| | | A |
| 2" | RS2B-2 | 9.1 |
| 2 12" | 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 |

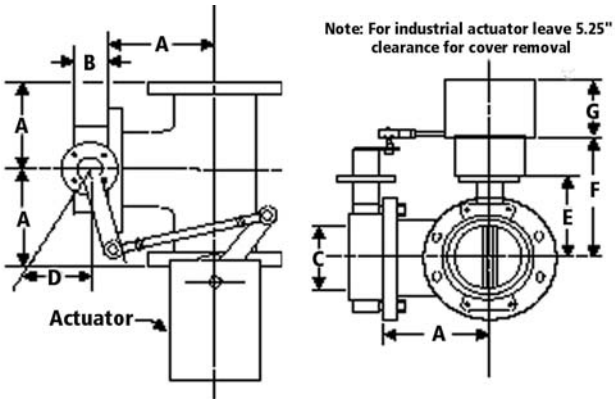
‡"E" dimension is the actuator width




| Two-Way Valve, 2" through 14" With Industrial RE Series Actuators | | |
|---|---|---|
| Size | Model | Dimensions |
| | | A |
| 2" | RS2B-2 | 8.4 |
| 2 12" | 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 |

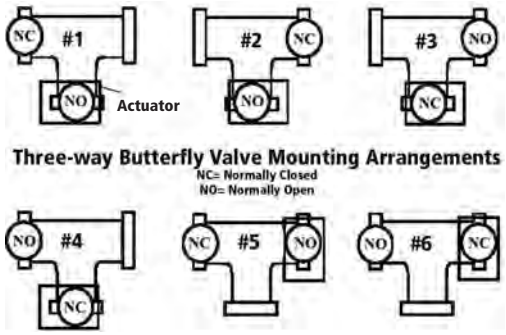
| RE Series NEMA 4/4x Actuator Dimensions | | | | | |
|---|---|---|---|---|---|
| Actuator | Dimensions (inches) | | | | |
| | B | C | D | E | F |
| Non-Spring Return | | | | | |
| RE1.5-RE6 | 9.93 | 5.15 | 3.48 | 7.42 | 1/2" NPT |
| RE10-RE30 | 11.65 | 6.07 | 4.40 | 9.75 | 3/4" NPT |

-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 actuarors
-Call for valve sizes 16" and greater



## 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**<br>**Base Model** | **B**<br>**Optional Materials**<br>**Select as many as apply** | **C**<br>**Mounting Style** | **D**<br>**Three-Way Mounting Arrangement** |
| See Tables A & B<br>Standard Materials are :<br>Cast Iron Body<br>Aluminum Bronze Disc<br>Stainless Steel Stem<br>EPDM Seat | - = none<br>IB=Ductile Iron Body<br>SB=Cast Steel Body<br>AB=Aluminum Body<br>ID=Ductile Iron Disc(Phosphate or Nylon 11 Coated)<br>SD= Stainless Steel Disc<br>CS=Carbon Steel Disc<br>BS= BUNA-N Seat<br>VS= Viton GF Seat | L=Lugged type<br>W=Wafer Type | 1= 1<br>2= 2<br>3= 3<br>4= 4<br>5= 5<br>6= 6 |



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## CLARK SOLUTIONS

# 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.

### 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 18001Certified Factory

### ACTUATOR FEATURES

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

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



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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 "burnishing" 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 reducing 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 operating 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** |
| - Full Port from 1/4" to 4"<br>-*PSI Pressure Rating 600 WOG - 150 WSP<br>-Temperature to 366ºF<br>-Blow out proof stem, chrome plated brass ball (SS Ball Model 68)<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & | - "T" & "L" Ports from 1/4" to 3"<br>-*PSI Pressure Rating 400 WOG - 100 WSP<br>-Temperature to 344ºF<br>Four seat design for sealing between pressurized ports<br>-Blow out proof stem, chrome plated brass ball<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & | - Full Port from 1/4" to 3"<br>-2 pc stainless steel ASTM A351 - CF8M<br>-*PSI Pressure Rating 1000 WOG - 150 WSP<br>-Temperature to 366ºF<br>-Blow out proof stem<br>-P.T.F.E. seats w/o-ring backing for low operating torque<br>-P.T.F.E. seats and double o-ring stem packing<br>-100% electronically tested in the open & | - Full Port from 1/4" to 2"; Standard port from 1/2" to 2"<br>-Stainless steel ASTM A351 - CF8M<br>-Self adjusting stem packing<br>-*PSI Pressure Rating 1000 WOG (1/4 to 1"), 800 WOG (1/4" to 2")<br>-Temperature range -20ºF to 450ºF<br>-Blow out proof stem<br>-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***

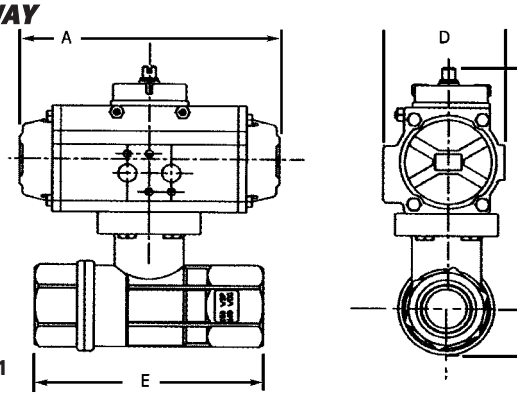



fig. 1

| *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**

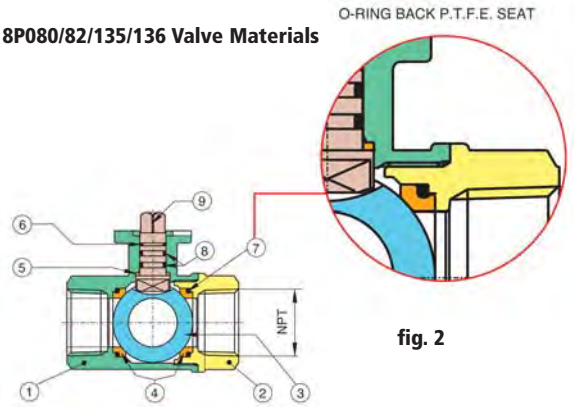



fig. 2

| | 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***

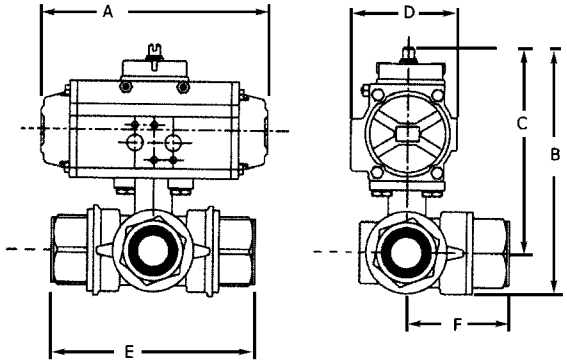



fig. 3

**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**

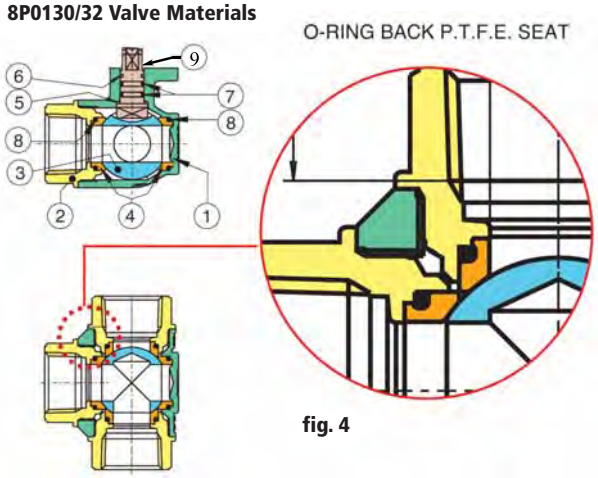



fig. 4

| | 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*

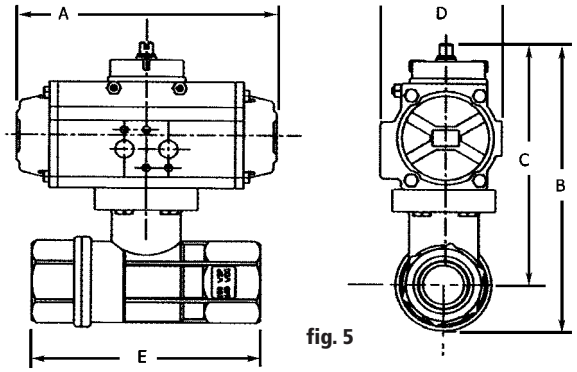



fig. 5

**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 |

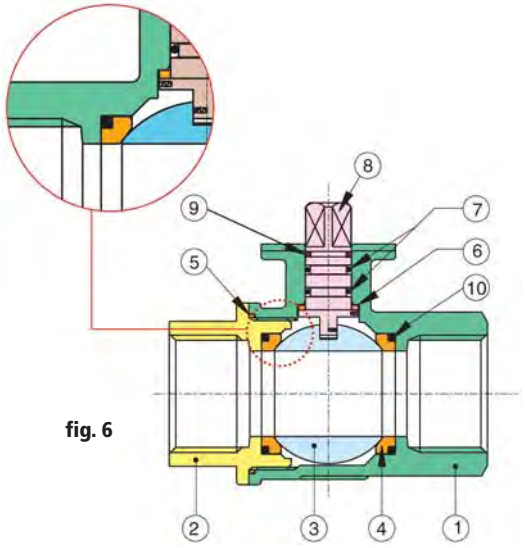



fig. 6

| | 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

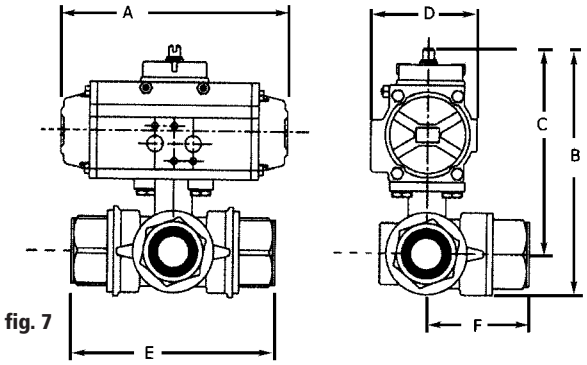



fig. 7

| 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**

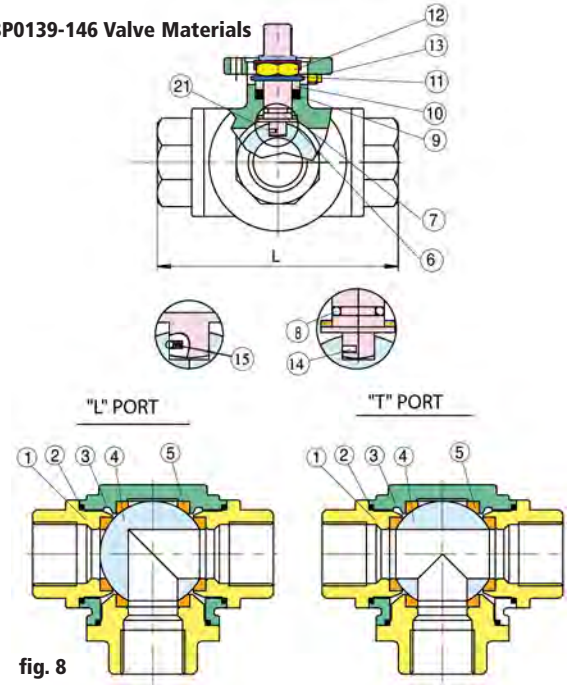



fig. 8

| 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 8P0139-146 | 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

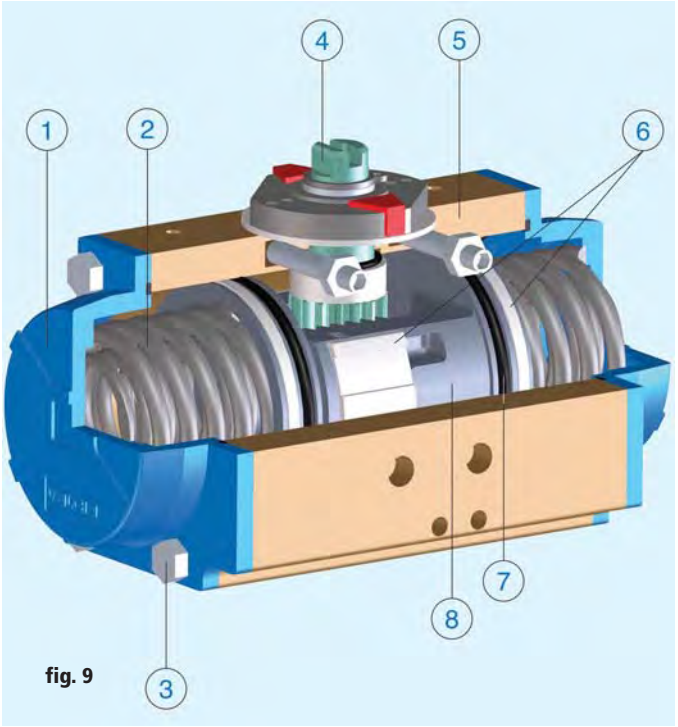


fig. 9

## *GENERAL SPECIFICATIONS*

Types:
- DA- Double Acting
- SR- Spring Return

Actuation Pressure Rating: Minimum 80 PSI, maximum 115 PSI

Temperature Range:
- Standard (NBR Seals): -4ºF to +185ºF
- High Temp Option (Viton Seals): -4ºF to +302ºF
- Low Temperature Option (Silicon Seals): -40ºF to +185ºF

Rotation: 0-90º adjustable ±5º in both clockwise and counterclockwise directions by means of adjusting screws outside the internal supply chambers

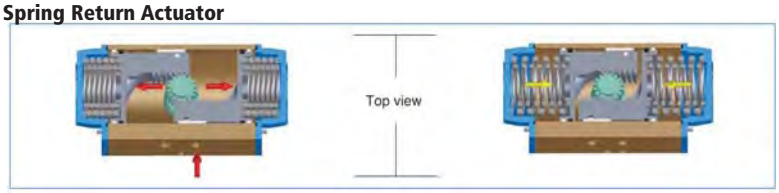
Position Indicator: Standard

Air Supply Connections:
- Models 32, 52. 63, 75, 85- 1/8" NPT;
- Model 100- 1/4" NPT

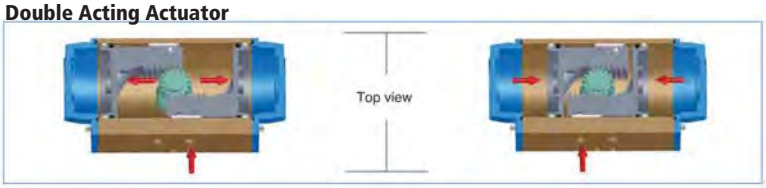
Lubrication: Pre lubricated for life of actuator on assembly

## *ACTUATOR OPERATION*

**Spring Return Actuator**




**Double Acting Actuator**



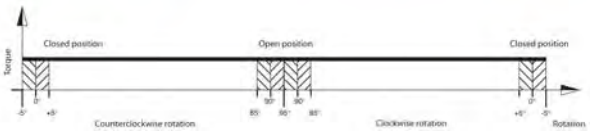



fig. 10

**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.**

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

ANTI-BLOWOUT SYSTEM

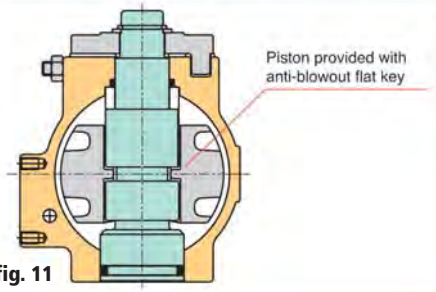


fig. 11

| 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*

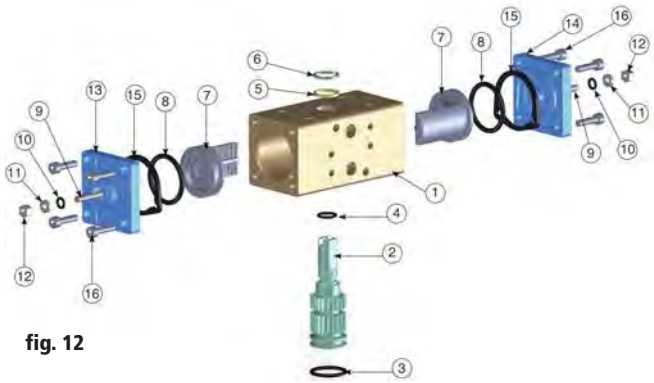


fig. 12

| 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 | | | | |

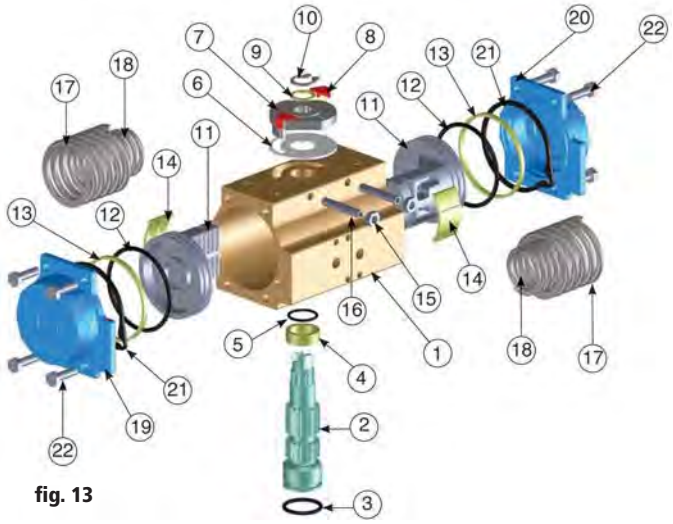


fig. 13

| 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

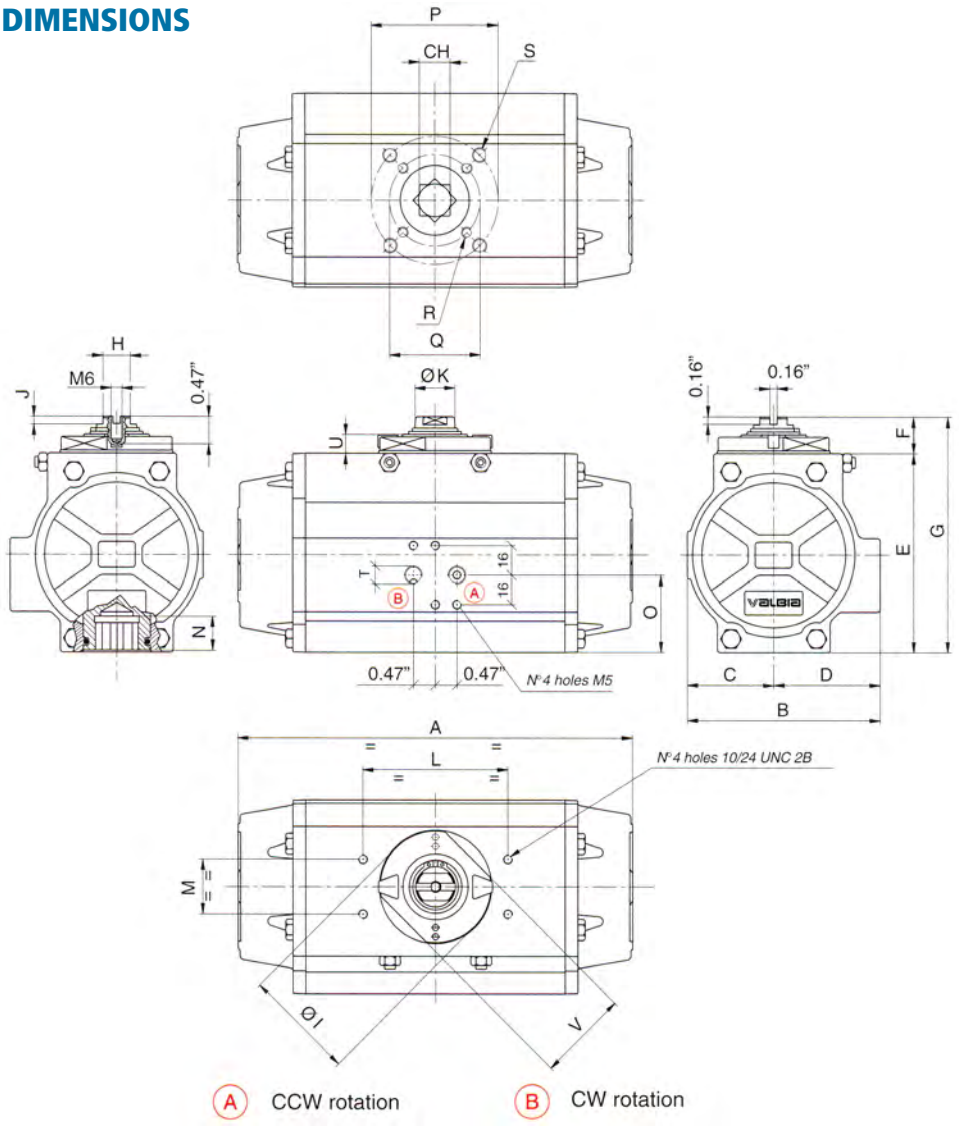



fig. 13

| Dimensions (inches) Models 52 to 100 (fig. 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 | FO3-05 | 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 |

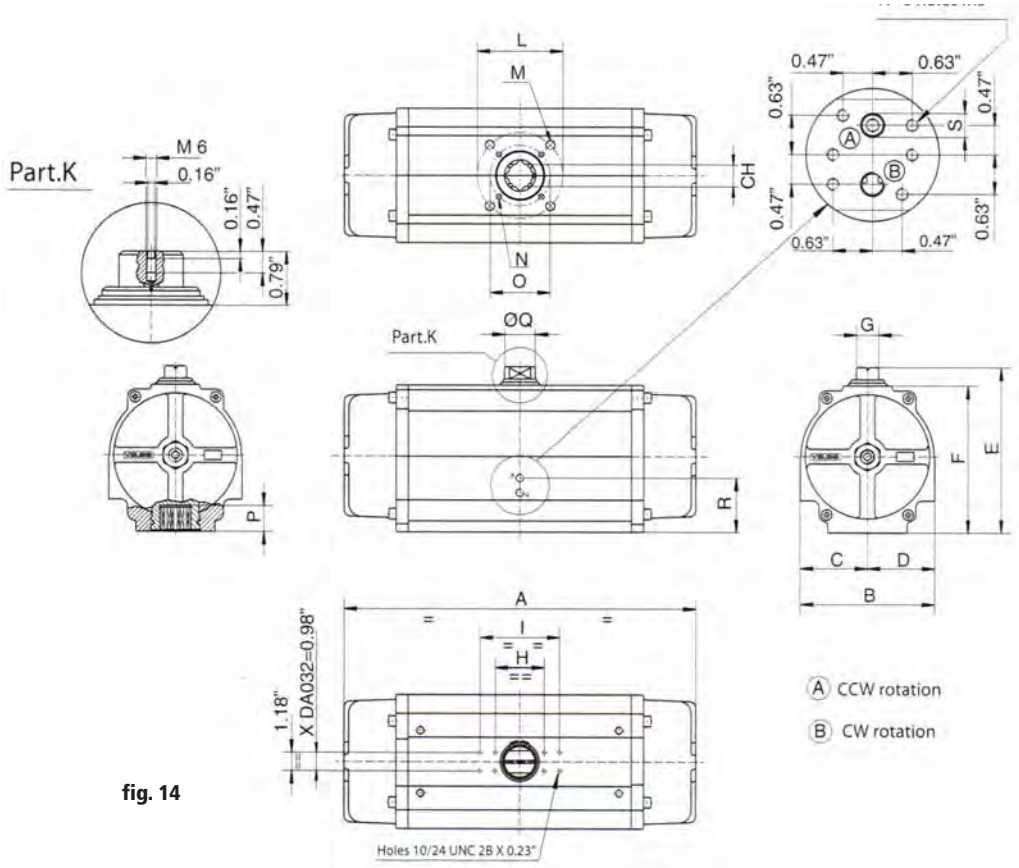



**fig. 14**

| Dimensions (inches) Models 52 to 100 (fig. 14) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | FO3-05 | 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 |

## ORDERING INFORMATION

***A-B-C***
***EXAMPLE: 8P0129-S-2"***

| A<br>Model<br>Double Acting Actuator | B<br>Actuator Ambient Temperature Range | C<br>Size/NPT Conn. |
|---|---|---|
| 8P0080(LF)= Brass 2-way Full Port (Lead Free Option)<br>8P0135(LF)= Brass 2-way, SS Stem (Lead Free Option)<br>8P0129(LF)= Brass 3-way, "T" port (Lead Free Option)<br>8P0130(LF)= Brass 3-way, "L" port (Lead Free Option)<br>8P0133= SS 2-way<br>8P0139= SS 3-way, standard "T" port<br>8P0140= SS 3-way, standard "L" port<br>8P0144= SS 3-way, Full"T" port<br>8P0146= SS 3-way, Full "L" port | S= Standard (NBR Seals): -4ºF to +185ºF<br>H= High Temp Option (Viton Seals): -4ºF to +302ºF<br>L= Low Temperature Option (Silicon Seals): -40ºF to +185ºF | 1/4"= 1/4"<br>3/8"= 3/8"<br>1/2"= 1/2"<br>3/4"= 3/4"<br>1"= 1"<br>1-1/4"= 1-1/4"<br>1-1/2"= 1-1/2"<br>2"= 2"<br>2.5"= 2 1/2"<br>3"= 3"<br>4= 4" |

***A-B-C-D***
***EXAMPLE: 8P0134-S-NC-1/2"***

| A<br>Model<br>Spring Return Actuator | B<br>Actuator Ambient Temperature Range | C<br>Normal Position<br>(no air pressure) | D<br>Size/NPT Conn. |
|---|---|---|---|
| 8P0082(LF)= Brass 2-way Full Port (Lead Free Option)<br>8P0136(LF)= Brass 2-way, SS Stem (Lead Free Option)<br>8P0131(LF)= Brass 3-way, "T" port (Lead Free Option)<br>8P0132(LF)= Brass 3-way, "L" port (Lead Free Option)<br>8P0134= SS 2-way<br>8P0141= SS 3-way, standard "T" port<br>8P0142= SS 3-way, standard "L" port<br>8P0145= SS 3-way, Full"T" port<br>8P0146= SS 3-way, Full "L" port | S= Standard (NBR Seals): -4ºF to +185ºF<br>H= High Temp Option (Viton Seals): -4ºF to +302ºF<br>L= Low Temperature Option (Silicon Seals): -40ºF to +185ºF | NC= Normally Closed<br>NO= Normally Open | 1/4"= 1/4"<br>3/8"= 3/8"<br>1/2"= 1/2"<br>3/4"= 3/4"<br>1"= 1"<br>1-1/4"= 1-1/4"<br>1-1/2"= 1-1/2"<br>2"= 2"<br>2.5"= 2 1/2"<br>3"= 3"<br>4= 4" |

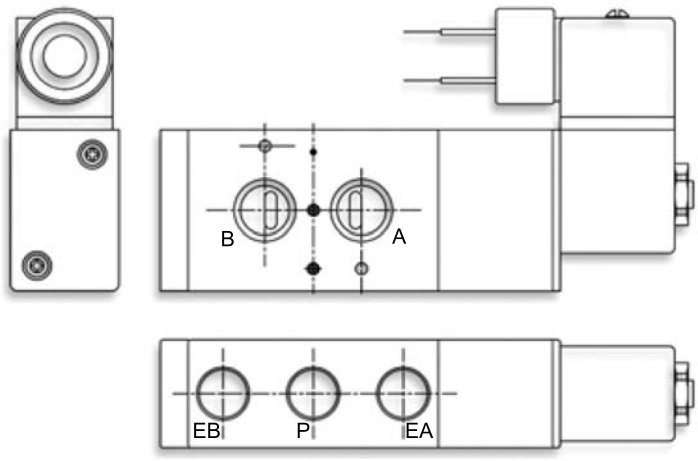
## ACCESSORIES

### 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 screwsto 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, cloed 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 |

MH 13513

LR51090

| 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 |

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

FM APPROVED

Class I, Zone 1, Ex mll T4: AEx mll
Class I, Div. 1; Groups A, B, C, D
Class ll, 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**

**SBM-2 Bronze Muffler**

**SCM-2 Speed Control Muffler**

## CLARK SOLUTIONS

# EN44 & EN88 Non-Spring Return Electric Actuators

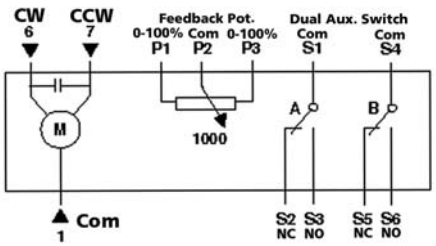
*On/Off, Tri-State, & Modulating, 44 & 88 in-lb*

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.

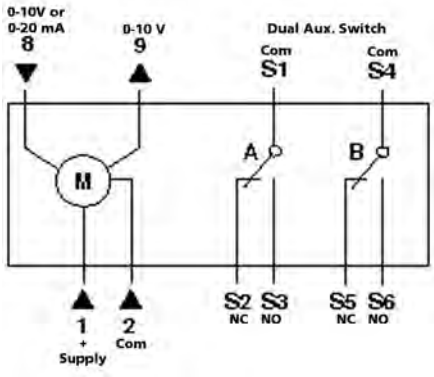
Models EN44B2 and EN88B2 direct coupled 24 VAC non-spring return rotary electronic actuators are designed for modulating control of dampers or valves. They may be used in applications requiring up to 44 in-lb (5 N-m) of torque or 88 in-lb (10 N-m) of torque.

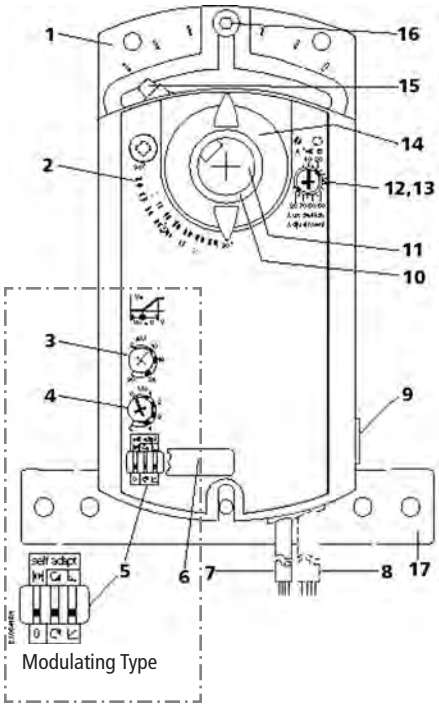
## WIRING & COMPONENTS

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.



Clark Solutions • 10 Brent Drive • Hudson, MA 01749 • Tel. 978 / 568 3400 • Fax 978 / 568 0060

| 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<br>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<br>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<br>1/ 4" to 1/2" (6 mm to 12.7 mm) square<br>9/16" (15 mm) hex | | | |
| Minimum shaft length | 3/4" (20 mm) | | | |
| Auxiliary features<br>–Feedback potentiometer (-P option) | 0 to 1000 Ohms, <10 mA | | | |
| – Auxiliary switches (-S option) | plenum: 4 A resistive, 24 VAC<br>plenum: 2 A inductive, 24 VAC | | | |
| –Control Signal Adjustment (ZS option)<br>-Offset (start point) | – | | 0-5 VDC | |
| -Slope | – | | 2-30VDC | |
| Switch range (-S option)<br>– Switch A | 0° to 90° with 5° intervals | | | |
| – Recommended range usage | 0° to 45° | | | |
| – Factory setting | 5° | | | |
| – Switching hysteresis | 2° | | | |
| Switch range (-S option)<br>– Switch B | 0° to 90° with 5° intervals | | | |
| – Recommended range usage | 45° to 90° | | | |
| – Factory setting | 85° | | | |
| – Switching hysteresis | 2° | | | |
| Running time | 90 secs at 60 Hz<br>(108 secs at 50 Hz) | 125 secs at 60 Hz<br>(155 secs at 50 Hz) | 90 secs at 60 Hz<br>(108 secs at 50 Hz) | 125 secs at 60 Hz<br>(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<br>Emissions standards: EN50081-1<br>Immunity standards: EN50082-2 | | | |
| Quality standard | ISO 9002 | | | |
| Weight | 1.06 lbs (0.48 kg) | | | |

## CLARK SOLUTIONS

# EN132, EN177 & EN310 Non-Spring Return Electric Actuators

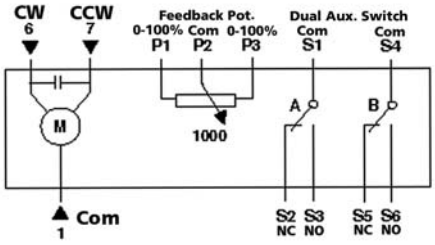
The EN132C2(-S), EN177C2(-S) and EN310C2(-S) direct coupled 24 VAC non-spring return (NSR) rotary electronic actuators are designed for tri-state (floating) or two-position control of building HVAC dampers and valves.

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.

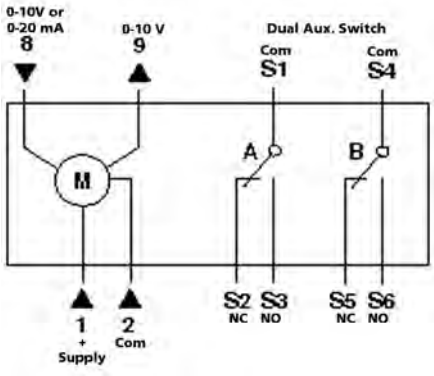
These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass dampers and valves requiring up to 132 in-lb (15 N-m), 177 in-lb (20 N-m), or 310 in-lb (35 N m) torque.

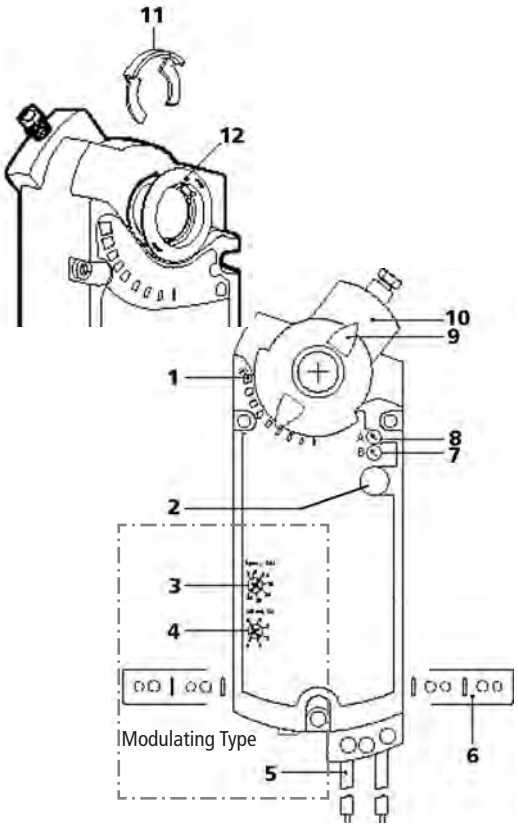
## WIRING & COMPONENTS

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.



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| 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 0º to 95º rotation | | | | | | | |
| Potentiometer | 0-1000 Ohms<10mA | 0-1000 Ohms, max. 1 mA | | - | - | - | - | - |
| Manual override | push down button | | | | | | | |
| Angle of rotation | mechanically limited to 95º | | | 90 to 95º 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, -5º to 90º (-5º is spring return position) | | | visual indicator, 0 to 90º | | | | |
| 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) – Switch A | 0° to 90° with 5° intervals | | | | | | | |
| – Rec. range usage | 0° to 45° | | | | | | | |
| – Factory setting | 5° | | | | | | | |
| – Switching hysteresis | 2° | | | | | | | |
| Switch range (-S option) – Switch B | 0° to 90° with 5° intervals | | | | | | | |
| – Rec. range usage | 45° to 90° | | | | | | | |
| – Factory setting | 85° | | | | | | | |
| – Switching hysteresis | 2° | | | | | | | |
| Running time for 90º | 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 4/4xhousings 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) | | | |

## CLARK SOLUTIONS

# ES62A, ES75A & ES142A Spring Return Electric Actuators

*Two Position Control, 62, 76 & 142 in-lb*

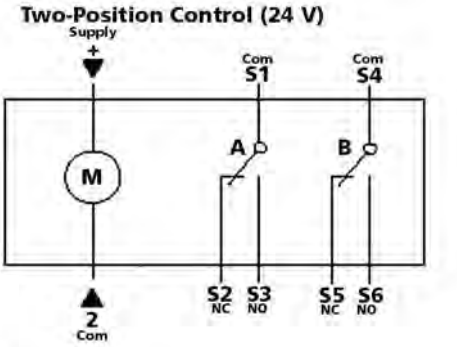
The ES75A and ES142 (24 VAC or 115 VAC) and the ES62A (24 VAC/VDC or 115 VAC) direct coupled two-position spring return electronic actuators are for control of building HVAC dampers or valves.

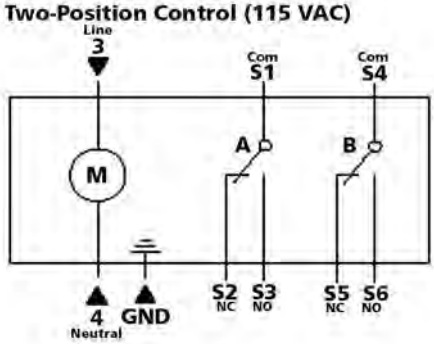
These actuators are used for the control of valves or dampers requiring up to 62 in-lb (7 N-m),75 in-lb (8.5 N-m) or 142 in-lb (16 N-m) of torque. They are designed for applications that require the valve or damper to return to its fail-safe position

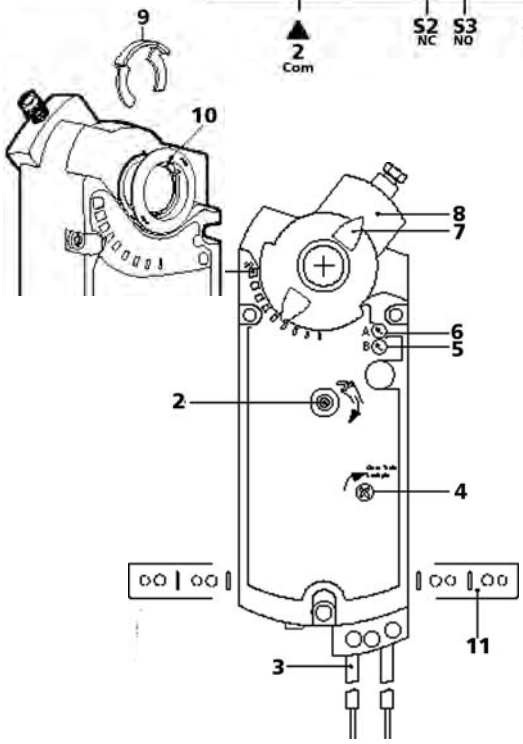
## FEATURES

- 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




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..



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| 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%<br>24VDC ±15%<br>50/60Hz | 120 VAC ±10%<br>50/60Hz | 24 VAC ±20%, -15%<br>50/60Hz | | 115 VAC ±15%<br>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.<br>Plenum Cable | 3', 18 AWG, BX conn. | 3', 18 AWG, BX conn.<br>Plenum Cable | | 3', 18 AWG, BX conn.<br>Standard Cable | |
| Overload protection | electronic throughout 0º to 95º rotation | | | | | |
| Manual override | 3mm hex crank, Shipped with actuator | | | | | |
| Angle of rotation (max.) | 95º | | | | | |
| 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<br>(CW=clockwise Direction with power, counterclockwise by spring; CCW=reverse of CW) | | | | | |
| Position indication | Visual Indicator, -5º to 90º (-5º is spring return position) | | | | | |
| Shaft size | 1/4" to 3/4" dia.<br>1/ 4" to 1/2"sq | 3/8" to 1" dia.<br>1/4" to 3/4"sq | | | | |
| Minimum shaft length | 3/4" (20 mm) | | | | | |
| – Auxiliary switches (-S option) | 24 to 250 VAC, 6 A res<br>12 to 30 VDC, 2A | | Plenum 4A resistive, 24 VAC<br>Plenum 2A inductive, 24 VAC | | 24 to 250 VAC, 6 A resistive<br>24 to 250 VAC, 2 A inductive | |
| Switch range (-S option)<br>– Switch A | 0° to 90° with 5° intervals | | | | | |
| – Rec. range usage | 0° to 45° | | | | | |
| – Factory setting | 5° | | | | | |
| – Switching hysteresis | 2° | | | | | |
| Switch range (-S option)<br>– Switch B | 0° to 90° with 5° intervals | | | | | |
| – Rec. range usage | 45° to 90° | | | | | |
| – Factory setting | 85° | | | | | |
| – Switching hysteresis | 2° | | | | | |
| Running time (nominal) | 90 secs running<br>spring return- 15 secs typ.,(<60 secs. max. at -25ºF) | | 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) | | | |

## CLARK SOLUTIONS

# ES62, ES75 & ES142 Spring Return Electric Actuators

*Tri-State, & Modulating, 132, 177 & 310 in-lb*

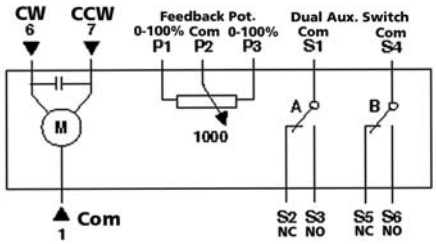
The ES62C2(-S)(24 VAC/VDC), ES75C2(-S) and ES142C2(-S) direct coupled 24 VAC spring return electronic actuators are designed for tri-state (floating) control of building HVAC dampers and valves.

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.

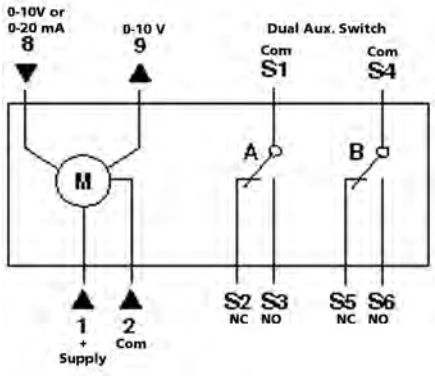
These actuators are used in constant or variable air volume installations for the control of return air, mixed air, exhaust, and face and bypass valves or dampers requiring up to 62 in-lb (7 N-m), 75 in-lb (8.5 Nm) or 142 in-lb (16 Nm) torque. They are designed for applications that require the valve or damper to return to a fail-safe position when there is a power failure.

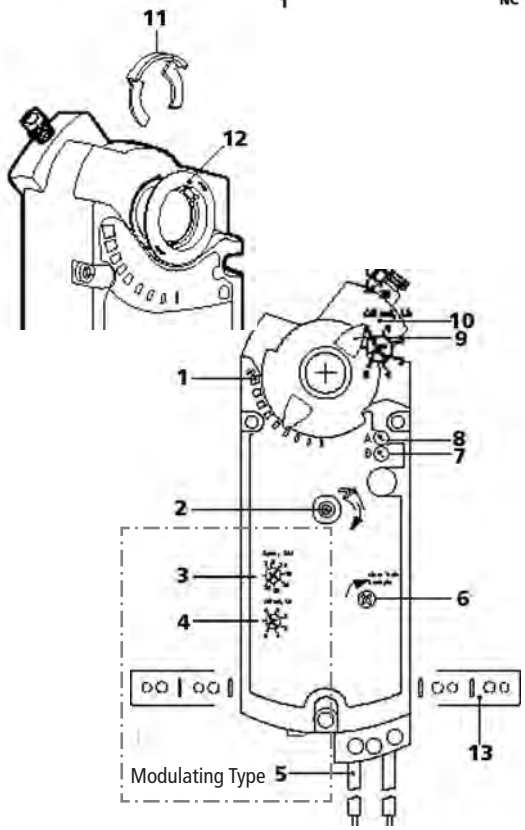
## WIRING & COMPONENTS

Tri-State Control




Modulating Control




1. Positioning scale for angle of rotation
2. Manual override wrench opening and direc- tion 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.



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| 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<br>0-20 mA | Plenum Cabling | ES62B2 | - | ES62B2-S | ES62B2-ZS | ES62B2-ZS-S |
| 75 in-lb min. (8.5 N-m) | 0-10 VDC<br>0-20 mA | Plenum Cabling | ES75B2 | - | ES75B2-S | ES75B2-ZS | ES75B2-ZS-S |
| 142 in-lb min. (16 N-m) | 0-10 VDC<br>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.<br>1/ 4" to 1/2"sq | 3/8" to 1" dia.<br>1/4" to 3/4"sq | | 1/4" to 3/4" dia.<br>1/ 4" to 1/2"sq | 3/8" to 1" dia.<br>1/4" to 5/8"sq | | |
| Minimum shaft length | 3/4" (20 mm) | | | | | | |
| – Auxiliary switches (-S option) | 24 to 250 VAC, 6 A res<br>12 to 30 VDC, 2A | Plenum 4A resistive, 24 VAC<br>Plenum 2A inductive, 24 VAC | | 24 to 250 VAC, 6 A res<br>12 to 30 VDC, 2A | Plenum 4A resistive, 24 VAC<br>Plenum 2A inductive, 24 VAC | | |
| Switch range (-S option) | 0° to 90° with 5° intervals | | | | | | |
| – Switch A | | | | | | | |
| – Rec. range usage | 0° to 45° | | | | | | |
| – Factory setting | 5° | | | | | | |
| – Switching hysteresis | 2° | | | | | | |
| Switch range (-S option) | 0° to 90° with 5° intervals | | | | | | |
| – Switch B | | | | | | | |
| – Rec. range usage | 45° to 90° | | | | | | |
| – Factory setting | 85° | | | | | | |
| – Switching hysteresis | 2° | | | | | | |
| Running time for 90° | motor: 90 secs, constant<br>spring 15 secs typ. (60max) | motor:120 secs, constant<br>spring: 25 sec Typ. | motor: 90 secs, constant<br>spring: 15 sec Typ. | | motor:150 secs, constant<br>spring: 25 secTyp. | motor:90 secs, constant<br>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) | | - | - | | |

## CLARK SOLUTIONS

# 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.

**Table 1 RE Series Industrial Actuators**

| Actuator Model No. | Output Torque | | Speed* sec/90º | Speed** sev/270º | Speed** sec/360º |
|---|---|---|---|---|---|
| | 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

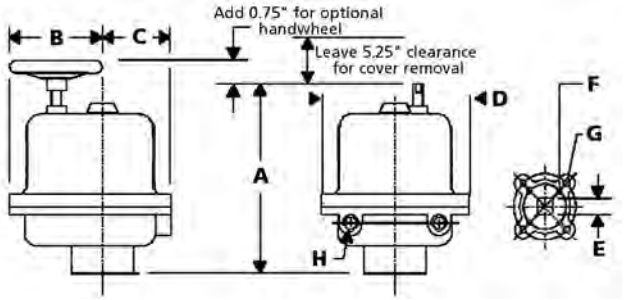


**Table 2 RE Dimensions (inches)**

| 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 |



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| 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<br>4-20 mA | two-position/tri-state* | 0-10 VDC<br>4-20 mA |
| Input Impepance | 250 Ohms for 4-20 mA | | | |
| Operating range | 0 to 10 VDC, 2 to 10 VDC, 4 to 20 mA, & custom signal ranges available | | | |
| Fedback 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<br>125 VDC: 0.5 Amps<br>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 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: 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" & "X" versions add 38 & 78 lbs respectively for the Torque Maximizer.

## ORDERING

***RE-A-B-C-D-E*** ***EXAMPLE: RE10-F-2***

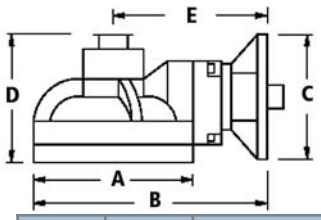
| A Torque in-lbs | |
|---|---|
| 1.5 | 150 |
| 3 | 300 |
| 6 | 600 |
| 8.5 | 850 |
| 10 | 1000 |
| 15 | 1500 |
| 20 | 2000 |
| 25 | 2500 |
| 30 | 3000 |

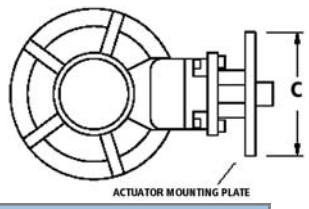
| B Torque Maximizer Increases Actuator Torque by multiplier of 2.55 | |
|---|---|
| | Torque in-lbs |
| - | none |
| 15T | 3825 |
| 20T | 5100 |
| 25T | 6375 |
| 30T | 7650 |
| Multiplier of 3.40 | |
| 30X | 10,200 |

| C Control Signal | |
|---|---|
| F | Two-position/Tri-state with current limiting |
| G | Modulating 0(2)-10V or 0(4)-20mA with current limiting |

| D Power | |
|---|---|
| 1 | 120 V |
| 2 | 24V |
| 3 | 220V |

| E Options |
|---|
| AS(2,3)= Auxiliary Switch(es) |
| HT= Heater/thermostat |
| OH= Overide 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.