



SOLENOID VALVES
MEETING CHALLENGES AND
CUSTOMIZING SOLUTIONS

Your Global Source for Today's Most Popular Solenoid Valves



Power Generation
Plants



Water Treatment
Systems



Offshore
Oil & Gas Facilities



Steel Mills & Foundries



Fuel & Chemical
Refineries

Alcon Solenoid Valves, a division of International Motion Control (IMC), has over fifty years of experience in designing and manufacturing solenoid valves. Our solenoid valves are used throughout the world and have a reputation for quality and dependability.

Alcon valves are found in applications where liquid or gas flow must be reliably and automatically controlled.

Our product line offers a full range of valves for general purpose and special-purpose duty:

- Air
- Water
- Gases
- Fuel
- Hot Water
- Steam
- Cryogenics
- Aggressive Media

The range of valves shown in the catalog largely covers the standard products supplied on a regular basis.

Customer Service and Request for Quotation (RFQ)

Alcon's business is built on supplying modified standard product and 100% special solenoid valves to our ever-changing market place. We welcome the opportunity to meet your individual needs.

To request a quote, please use our on-line RFQ form or the one located within this catalog. Ongoing developments will result in new products being added to the Alcon valve range.

For all of your customer support requirements, or to request a catalog, please contact us:

Toll free: 1-888-307-0708

Fax: 1-716-662-0406

www.alconsolenoids.com

alcon
SOLENOID VALVES
An **IMC** Company

Alcon Valve Range

Request For Quotation (RFQ) 1

Selecting and Ordering Solenoid Valves 2

2 Way General Purpose Solenoid Valves

U21 Series • 1/8" - 3/8" • Normally Closed 3

UACD Series • 3/8" - 2" • Normally Closed 5

UACP Series • 3/8" - 2" • Normally Closed 7

22 Series • 1/8" - 3/8" • Normally Open 9

ACDN Series • 3/8" - 2" • Normally Open 11

ACPN Series • 3/8" - 2" • Normally Open 13

HP Series • 1/4" - 1/2" • Normally Closed 15

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Mailing Address:

Address: _____
 Company: _____
 Name: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Phone: _____ Fax: _____ Email: _____

Complete this form and fax to:
Alcon North America
1-716-662-0406

Please call us at:
1-888-307-0708
 regarding your specific application
 or to request a catalog.

Line Fluid:

Air Water Hot Water Steam Natural Gas Oil Other Gas or Liquid _____

Line Pressure:

(a) Inlet: _____ psi
 (b) Downstream: _____ psi
 (a-b) Maximum O.P.D. _____ psi
 Minimum O.P.D. _____ psi

Line Fluid Temperature:

Minimum: _____ °F
 Maximum: _____ °F

Ambient Temperature:

Minimum: _____ °F
 Maximum: _____ °F

Valve Type:

2-Way 3-Way 5-Way Namur

Mode of Operation:

Normally Open Normally Closed Universal

Pipe Size:

_____ NPT

Orifice Size:

Maximum Allowable Pressure Drop:

_____ psi

Flow:

_____ Cv _____ GPM _____ SCFM

Body Material:

Brass Stainless Steel Other _____

Seal Material:

Buna PTFE Viton EPDM Other _____

Operating Voltage:

AC Voltages (60Hz/50Hz) **DC Voltages**
 24 VAC 12 VDC Other _____
 120 VAC 24 VDC
 220 VAC

Power Consumption:

_____ Watts

Electrical Connection:

Conduit with Leads DIN Other _____

Enclosure:

NEMA 2 (Metal Can) NEMA 4 (Glass Reinforced Nylon) NEMA 6 (Hazardous Duty) Other _____

Agency Approval:

UL CSA FM Other _____

Make/Catalog number Number:

Alcon Catalog Number: _____

Make/Model of Current Valve now in service: _____

Quantity Required: _____ Single Shipment Annually Target Price (\$): _____

Request For Quotation

Alcon Catalog Use

This catalog is designed for ease-of use by anyone needing to learn more about Alcon solenoid valves. Whether you are a System Designer or Purchaser, this resource has been developed with you in mind.

Selection Process

We offer an extensive range of solenoid valves for Industrial and OEM markets. There are numerous configurations of body material, seal packages, and electrical connections available for an Alcon solenoid valve.

Alcon solenoid valves within this catalog are conveniently organized by valve Series. Refer to Table of Contents and page tabs. Each valve Series has unique Features, Options and Technical Specifications.

To determine the Alcon solenoid valve required to meet your needs, fundamental information is necessary:

1. Media being passed through the valve
2. Flow Rate
3. Working Pressure Range
4. Media Temperature

We recommend providing as much information as possible when ordering an Alcon Solenoid Valve, assuring that the right valve is selected and delivered.

Please specify the following information:

| ORDERING INFORMATION | Example |
|---|-----------------|
| Catalog Number | U21-31-21-12 |
| Required Valve Body Material | Stainless Steel |
| Required Seal Package | EPDM |
| Required Voltage | 12 Volt DC |
| Electrical Connection | NEMA 4, 9mm DIN |
| Maximum System Pressure | 300 PSI |
| Operating Pressure Differential Range (OPD) | 10 PSI |
| Media / Fluid | Drain Water |
| Fluid Temperature Range | 55°F - 180°F |
| Ambient Temperature Range | 55°F - 95°F |
| Corrosive Properties, if applicable..... | pH = 7.2 |
| <i>(Refer to our Corrosion Reference Guide, page 39)</i> | |

All of the above information is used to create your Alcon solenoid valve. For Features, Options and Technical Specifications that are not cataloged – **please Contact us using our Request for Quotation (RFQ) on the facing page or on our website at www.alconsolenoids.com**

Features

- Compact Valve Design
- Wide Range of Available Orifices
- Zero Pressure Rated
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass
Optional Body Material: Stainless Steel

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM +32°F to +248°F
 VITON +32°F to +302°F
 PTFE +32°F to +356°F

Note: Temperature ranges indicate approved media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F



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Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/8" | 1.6 | 0.12 | 870 | 0-675 | 0-310 | 14.5 | 1.0 | U21-31-21-12 |
| 1/8" | 2.4 | 0.24 | 870 | 0-300 | 0-140 | 14.5 | 1.0 | U21-32-21-12 |
| 1/8" | 3.0 | 0.35 | 870 | 0-225 | 0-65 | 14.5 | 1.0 | U21-33-21-12 |
| 1/4" | 1.6 | 0.12 | 870 | 0-675 | 0-310 | 14.5 | 1.0 | U21-41-21-12 |
| 1/4" | 2.4 | 0.24 | 870 | 0-300 | 0-140 | 14.5 | 1.0 | U21-42-21-12 |
| 1/4" | 3.0 | 0.35 | 870 | 0-225 | 0-65 | 14.5 | 1.0 | U21-43-21-12 |
| 1/4" | 4.5 | 0.53 | 870 | 0-105 | 0-34 | 14.5 | 1.0 | U21-44-21-12 |
| 1/4" | 6.0 | 0.70 | 870 | 0-60 | 0-15 | 14.5 | 1.0 | U21-45-21-12 |
| 3/8" | 6.0 | 0.70 | 870 | 0-60 | 0-15 | 14.5 | 1.5 | U21-75-21-12 |
| 3/8" | 9.5 | 1.75 | 870 | 0-10 | 0-3.3 | 14.5 | 1.5 | U21-76-21-12 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

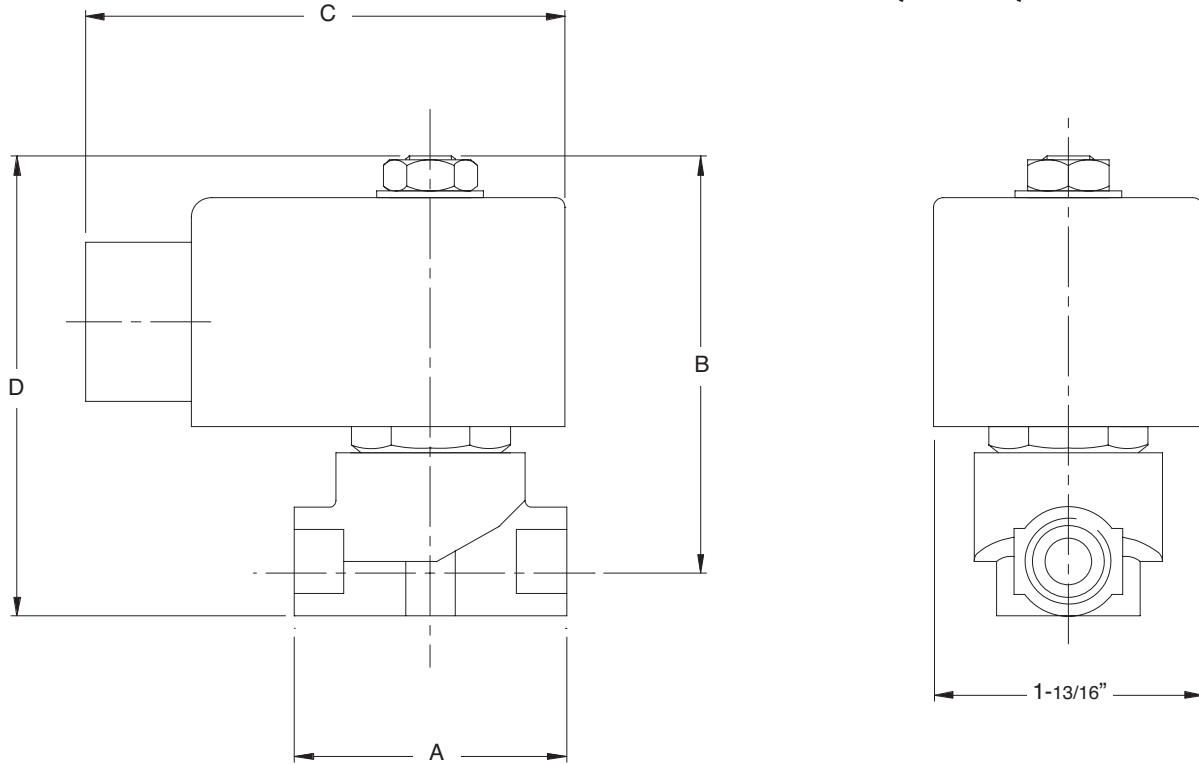
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



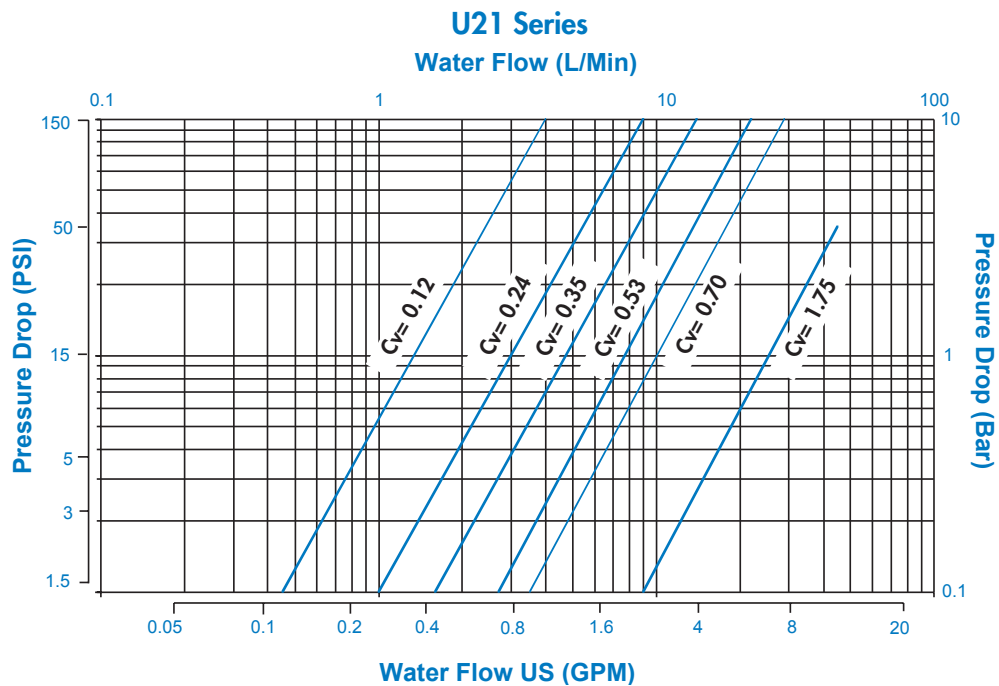
Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|--------|----|--------|
| 1/8" | 1-3/4" | 2-3/4" | 3" | 3-1/8" |
| 1/4" | 1-3/4" | 2-3/4" | 3" | 3-1/8" |
| 3/8" | 2" | 3" | 3" | 3-1/4" |

U21 Series

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Robust Valve Design
- Diaphragm Operation
- Fully Ported Orifices for high Cv
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel*

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM +32°F to +248°F
 VITON +14°F to +302°F

Note: Temperature ranges indicate approved media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F



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Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|-----|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 3/8" | 16.0 | 3.5 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD3 |
| 1/2" | 16.0 | 4.9 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD4 |
| 3/4" | 16.0 | 5.4 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD6 |
| 1" | 20.0 | 8.2 | 725 | 0-150 | 0-150 | 14.5 | 4.0 | UACD7 |
| 1-1/4" | 40.0 | 30 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD8 |
| 1-1/4" | 40.0 | 30 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD8T |
| 1-1/2" | 40.0 | 30 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD9 |
| 1-1/2" | 40.0 | 30 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD9T |
| 2" | 40.0 | 33 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD10 |
| 2" | 40.0 | 33 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD10T |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

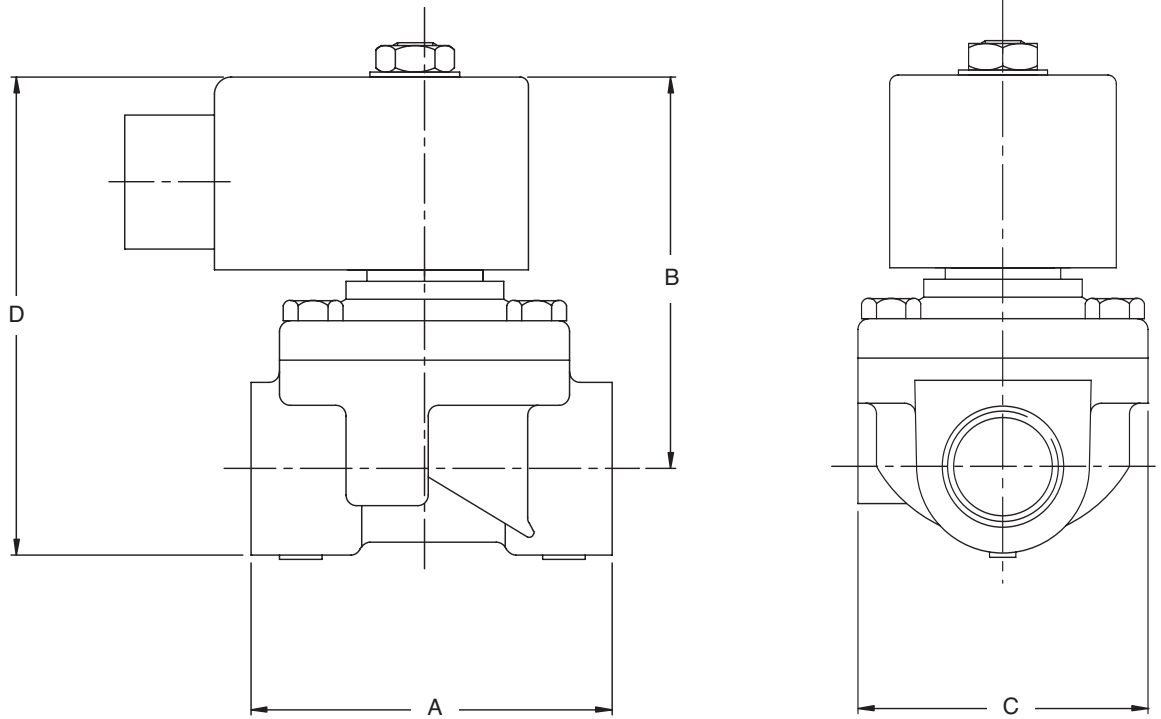
Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

*For larger valves in Stainless Steel, UACD8 through 10T, consult factory for price, availability and minimum quantity

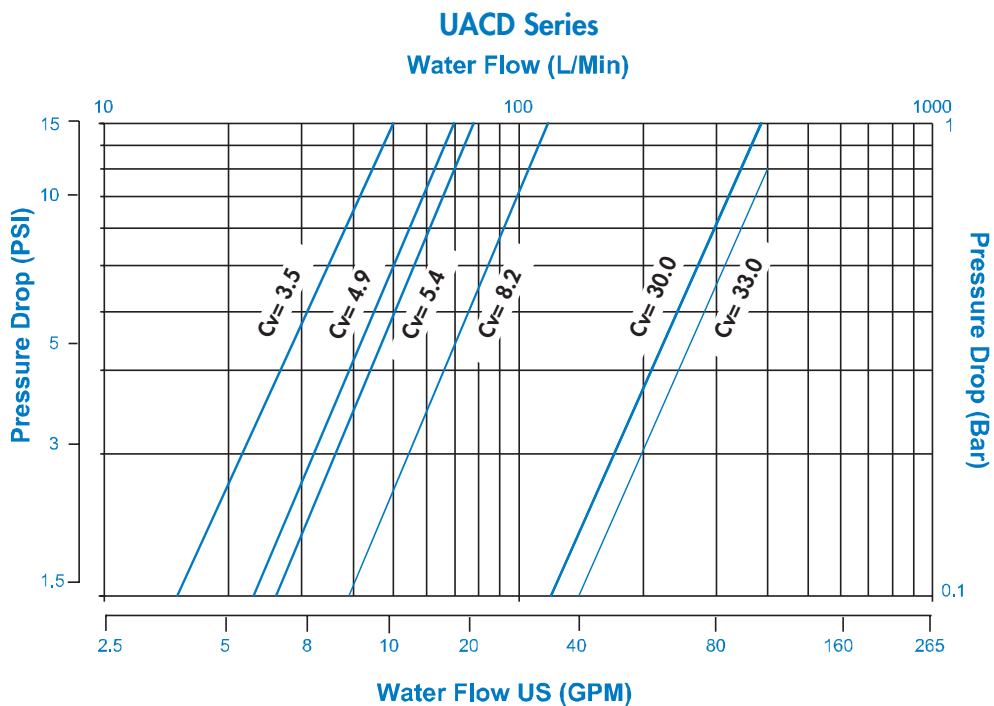


Dimensional Data

| Pipe Size | A | B | C | D |
|-------------|--------|---------|--------|--------|
| 3/8" - 3/4" | 2-3/4" | 3-7/16" | 3" | 4-3/8" |
| 1" | 3-3/8" | 3-7/16" | 3" | 5-3/8" |
| 1-1/4" - 2" | 5-3/8" | 4-5/8" | 4-3/4" | 5-7/8" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Heavy Duty Valve Design
- Piston Operation
- Wide Temperature Range Capabilities
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM +32°F to +248°F
 VITON +14°F to +302°F
 PTFE +32°F to +356°F

Note: Temperature ranges indicate media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Ambient Temperature: +14°F to +122°F



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Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 3/8" | 16.0 | 3.5 | 725 | 5-150 | 5-150 | 14.5 | 2.8 | UACP3 |
| 1/2" | 16.0 | 4.9 | 725 | 5-150 | 5-150 | 14.5 | 2.8 | UACP4 |
| 3/4" | 16.0 | 6.3 | 725 | 5-125 | 5-125 | 14.5 | 2.8 | UACP6 |
| 1" | 25.0 | 8.6 | 725 | 5-125 | 5-125 | 14.5 | 5.0 | UACP7 |
| 1-1/4" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.8 | UACP8 |
| 1-1/2" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.8 | UACP9 |
| 2" | 32.0 | 24.5 | 725 | 5-125 | 5-125 | 14.5 | 11.5 | UACP10 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

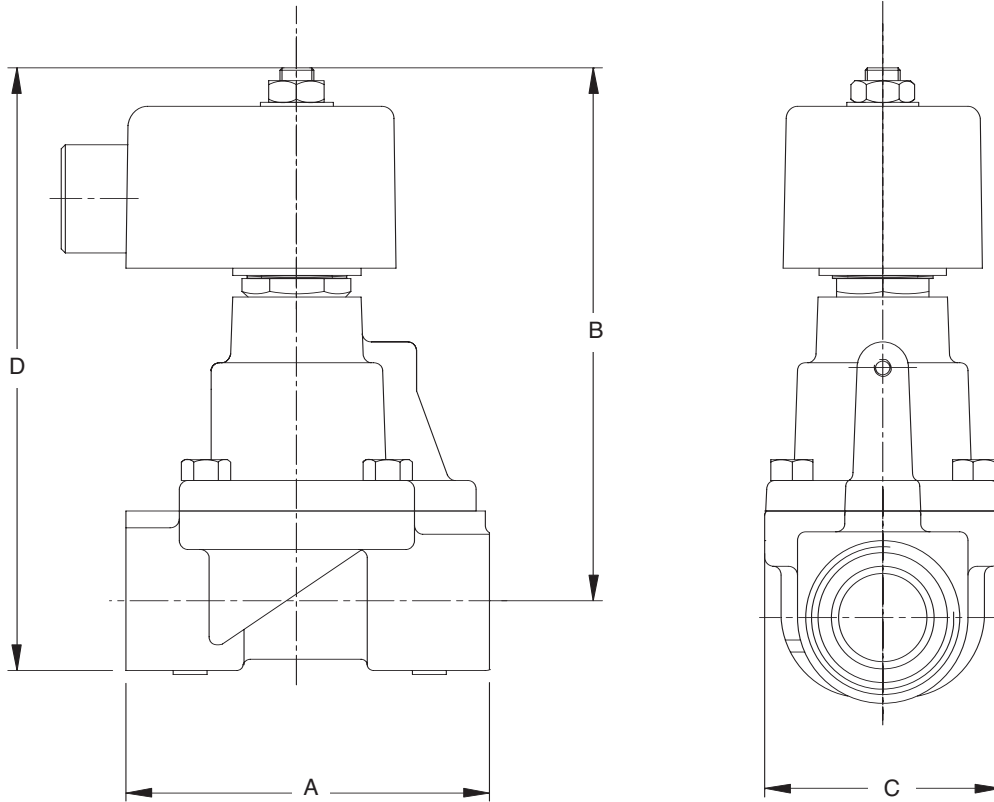
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

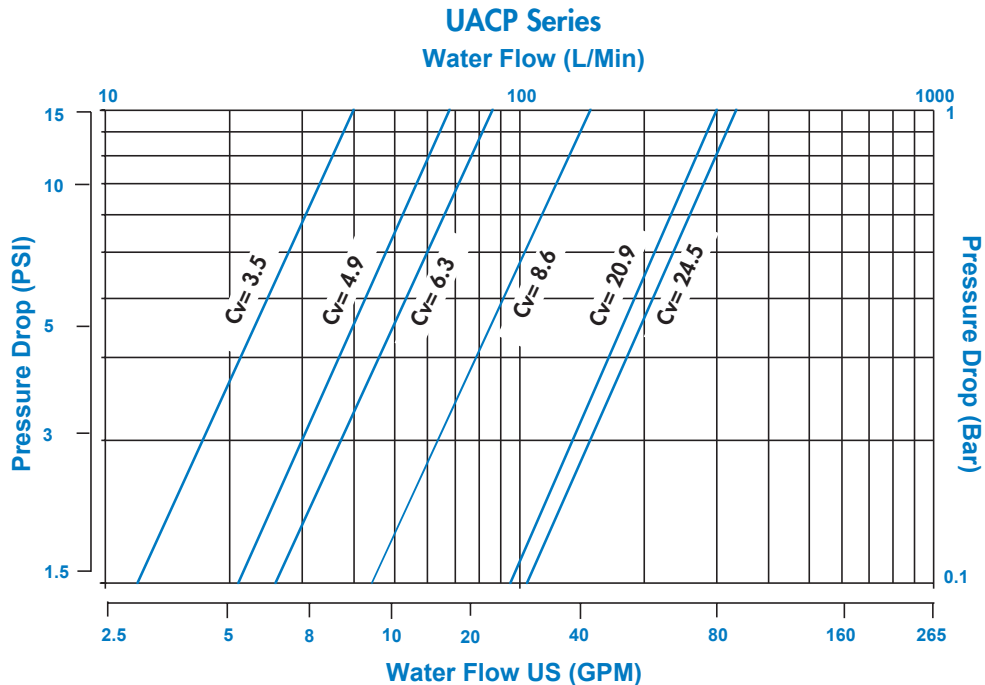


Dimensional Data

| Pipe Size | A | B | C | D |
|-----------------|--------|----------|--------|----------|
| 3/8" - 3/4" | 2-1/2" | 4-1/8" | 2-1/4" | 4-13/16" |
| 1" | 4-1/4" | 4-15/16" | 3" | 5-3/4" |
| 1-1/4" - 1-1/2" | 4-5/8" | 5-1/4" | 3-1/4" | 8-1/4" |
| 2" | 5-3/4" | 5-3/4" | 4" | 8-1/4" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Zero Pressure Rated
- Ideal for In-Line System Service and Repair
- Choice of Valve Body Material and Seals

Technical Specification

| | |
|---------------------------------|---|
| Standard Body Material: | Brass |
| Optional Body Material: | Stainless Steel |
| Standard Seal Material: | Nitrile (BunaN) +14°F to +176°F |
| Optional Seal Materials: | EPDM -58°F to +248°F VITON -4°F to +302°F PTFE -321°F to +356°F |

Note: Temperature Ranges indicate media temperatures for seal material.

| | |
|-----------------------------------|--------------------------------------|
| Coil Voltage DC: | 12v, 24v |
| Coil Voltage AC (60 Hz): | 24v, 120v, 220v |
| Standard Protection Class: | NEMA 2 (Metal Enclosure as shown) |
| Electrical Connection: | 1/2" NPT Conduit Hub with 18" leads |
| Optional Protection Class: | NEMA 4 (Din Connector) |
| Electrical Connection: | 9mm Din Connector (DIN 43650) |
| Coil Insulation: | Class H suitable for continuous duty |
| Ambient Temperature: | +14°F to +122°F |



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/8" | 1.5 | 0.12 | 725 | 0-300 | 0-300 | 14.5 | 0.7 | 22-31-21-12 |
| 1/8" | 3.0 | 0.35 | 725 | 0-150 | 0-150 | 14.5 | 0.7 | 22-33-21-12 |
| 1/4" | 1.5 | 0.12 | 725 | 0-300 | 0-300 | 14.5 | 0.7 | 22-41-21-12 |
| 1/4" | 3.0 | 0.35 | 725 | 0-150 | 0-150 | 14.5 | 0.7 | 22-43-21-12 |
| 1/4" | 6.0 | 0.70 | 725 | 0-15 | 0-15 | 14.5 | 0.7 | 22-45-21-12 |
| 3/8" | 6.0 | 0.70 | 725 | 0-15 | 0-15 | 14.5 | 0.7 | 22-75-21-12 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

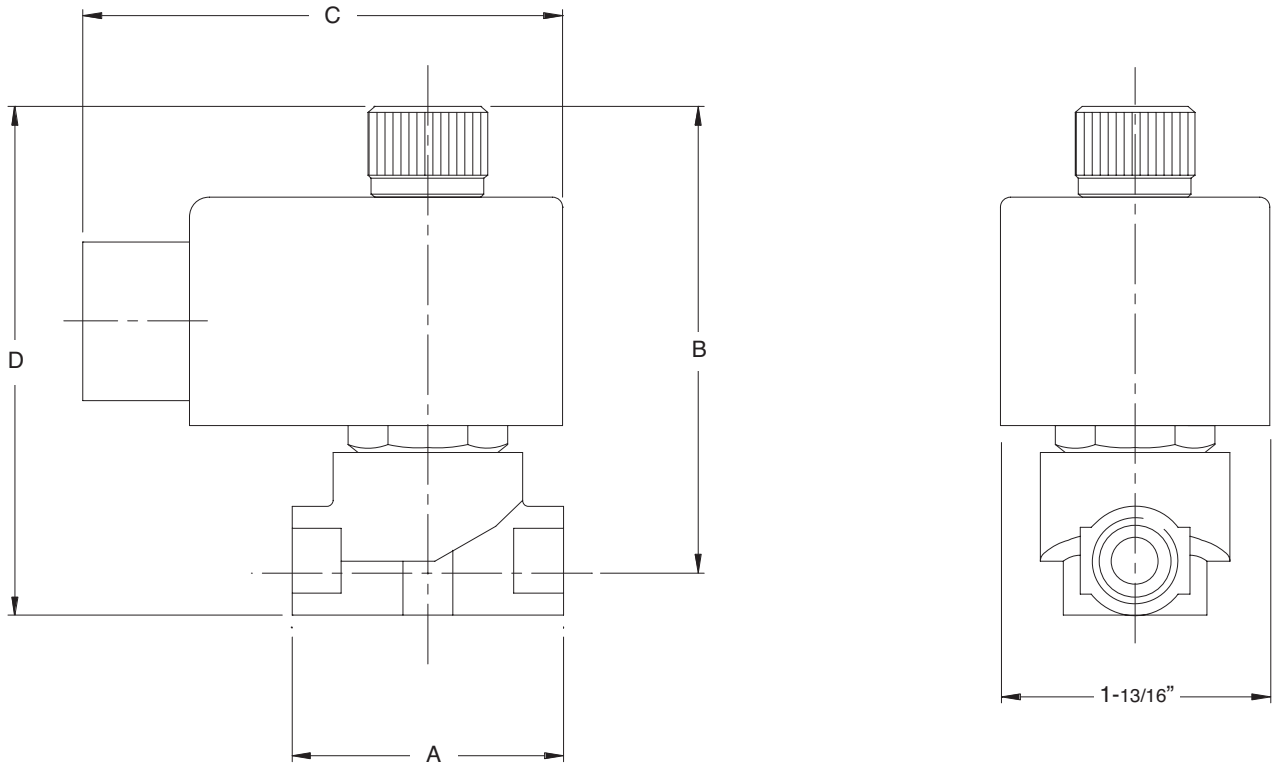
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

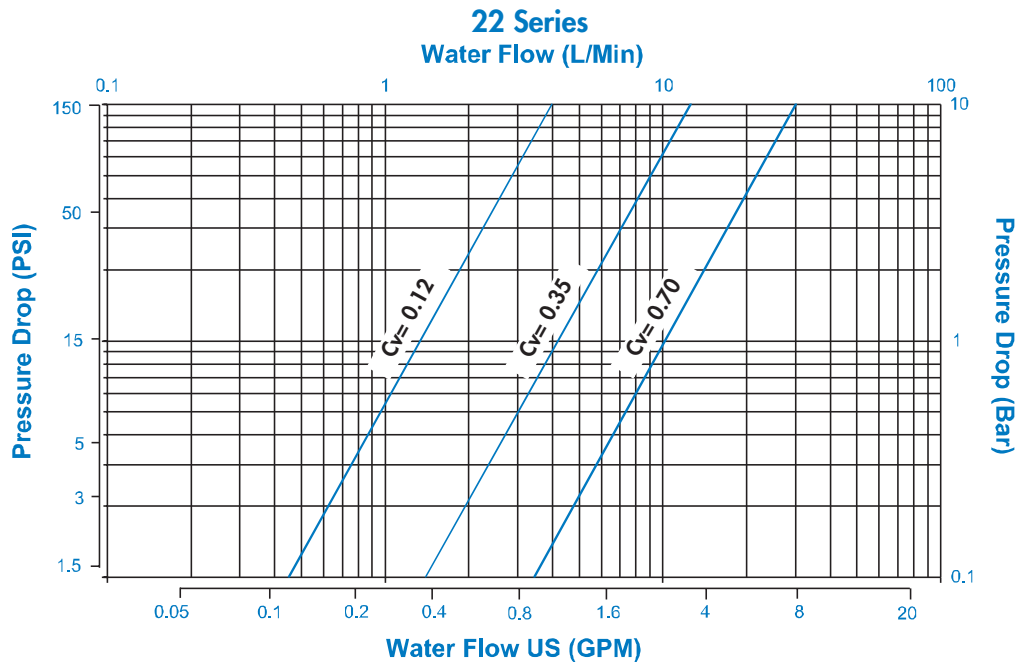


Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|--------|----|---------|
| 1/8" | 1-3/4" | 2-3/4" | 3" | 3-1/16" |
| 1/4" | 1-3/4" | 2-3/4" | 3" | 3-1/16" |
| 3/8" | 2" | 2-3/4" | 3" | 3-1/16" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Robust Valve Design
- Diaphragm Operation
- Fully Ported Orifices for high Cv
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel*

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM -58°F to +248°F
 VITON -4°F to +302°F

Note: Temperature ranges indicate media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Ambient Temperature: +14°F to +122°F



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 3/8" | 16.0 | 3.5 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | ACDN3 |
| 1/2" | 16.0 | 4.9 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | ACDN4 |
| 3/4" | 16.0 | 5.4 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | ACDN6 |
| 1" | 20.0 | 8.2 | 725 | 0-150 | 0-150 | 14.5 | 4.0 | ACDN7 |
| 1-1/4" | 40.0 | 30.0 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | ACDN8 |
| 1-1/2" | 40.0 | 33.0 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | ACDN9 |
| 2" | 40.0 | 33.0 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | ACDN10 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

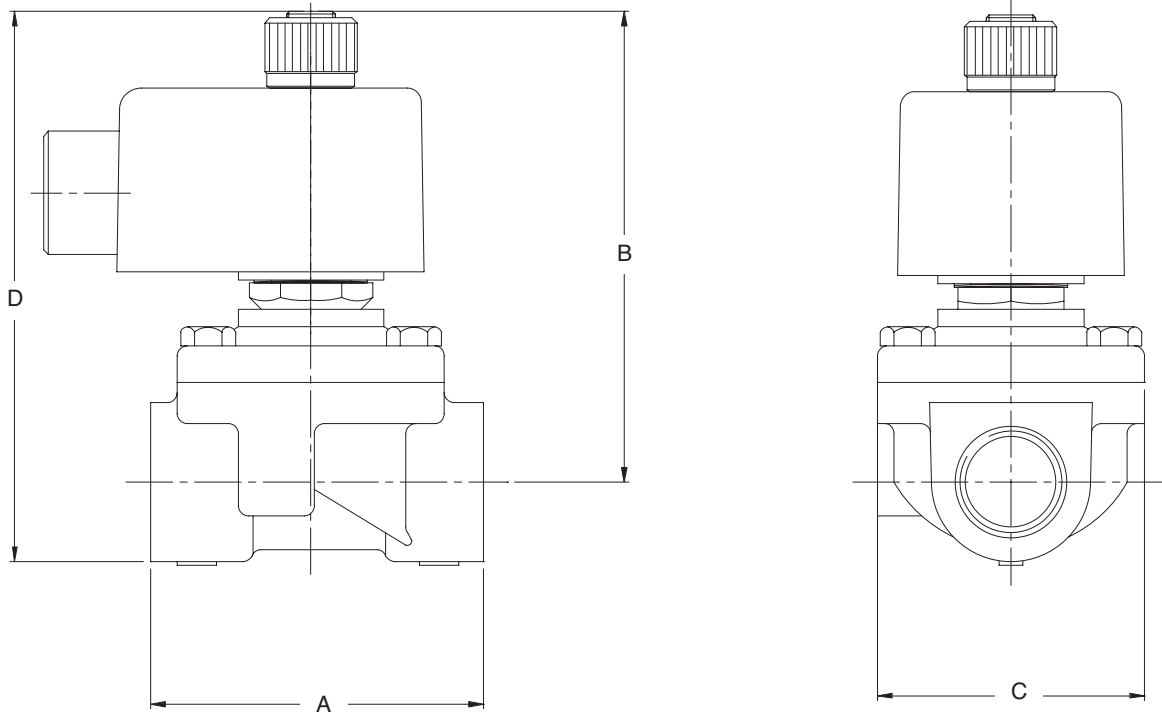
Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

*For larger valves in Stainless Steel, ACDN8 through 10, consult factory for price, availability and minimum quantity

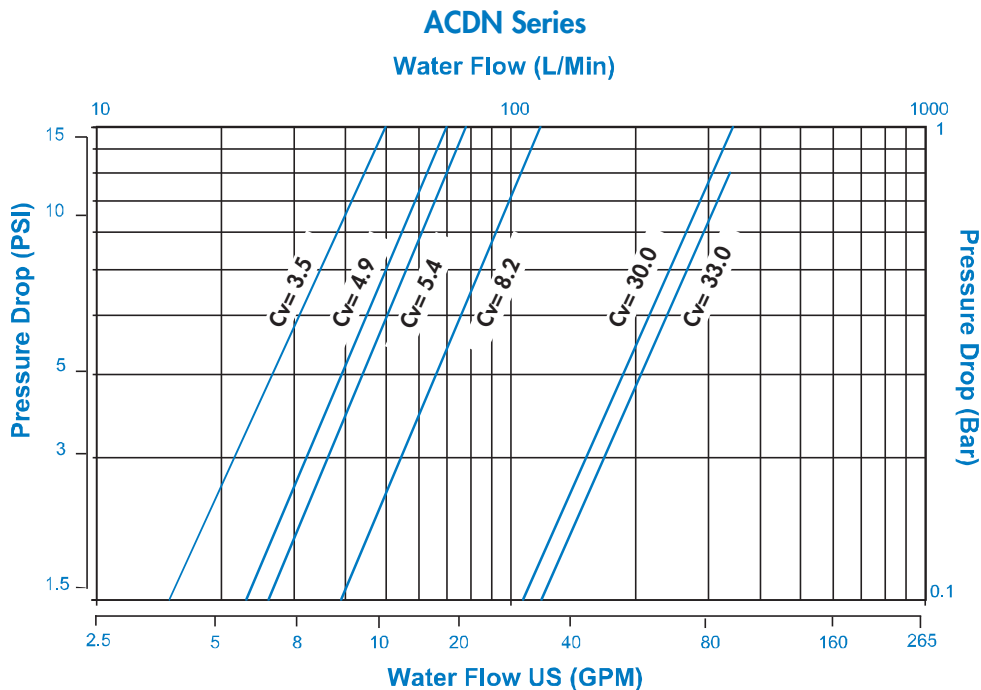


Dimensional Data

| Pipe Size | A | B | C | D |
|-------------|--------|---------|--------|--------|
| 3/8" - 3/4" | 2-3/4" | 3-7/16" | 3" | 4-3/8" |
| 1" | 3-3/8" | 3-7/16" | 3" | 5-3/8" |
| 1-1/4" - 2" | 5-3/8" | 4-5/8" | 4-3/4" | 5-7/8" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Heavy Duty Valve Design
- Piston Operation
- Wide Temperature Range Capabilities
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM -58°F to +248°F
 VITON -4°F to +302°F
 PTFE -321°F to +356°F

Note: Temperature ranges indicate media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Ambient Temperature: +14°F to +122°F



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 3/8" | 16.0 | 3.5 | 725 | 5-150 | 5-150 | 14.5 | 2.8 | ACPN3 |
| 1/2" | 16.0 | 4.9 | 725 | 5-150 | 5-150 | 14.5 | 2.8 | ACPN4 |
| 3/4" | 20.0 | 6.3 | 725 | 5-150 | 5-150 | 14.5 | 2.8 | ACPN6 |
| 1" | 20.0 | 8.3 | 725 | 5-150 | 5-150 | 14.5 | 5.0 | ACPN7 |
| 1-1/4" | 30.0 | 20.9 | 725 | 5-150 | 5-150 | 14.5 | 6.8 | ACPN8 |
| 1-1/2" | 30.0 | 20.9 | 725 | 5-150 | 5-150 | 14.5 | 6.8 | ACPN9 |
| 2" | 32.0 | 24.5 | 725 | 5-150 | 5-150 | 14.5 | 11.5 | ACPN10 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

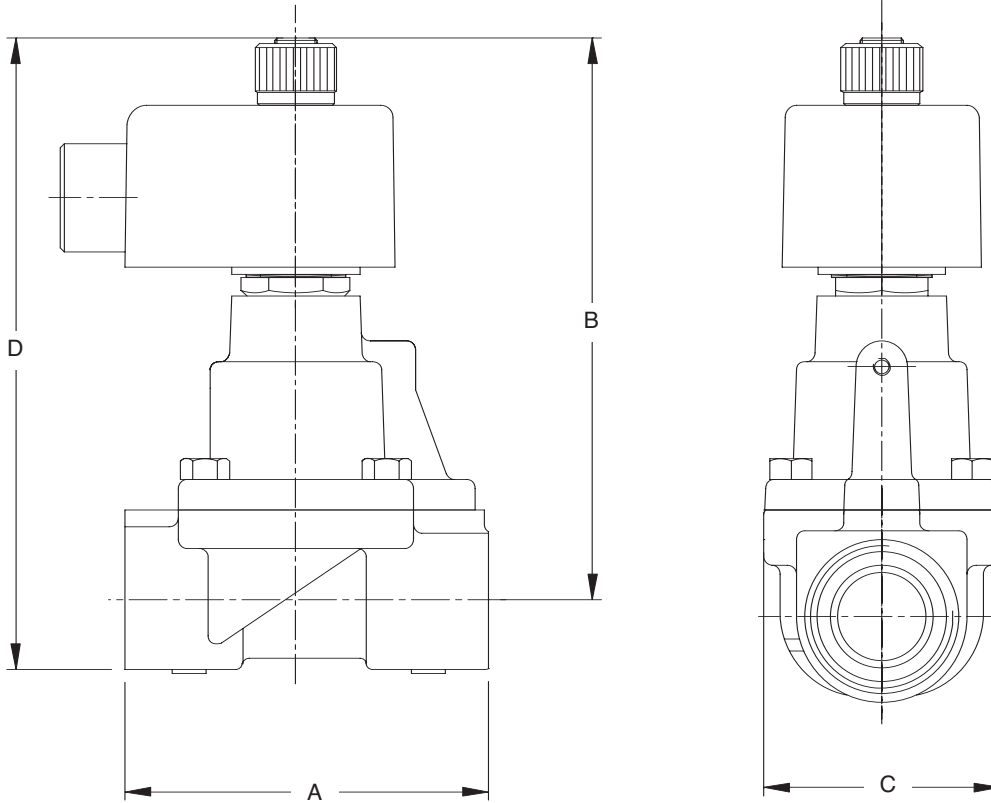
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



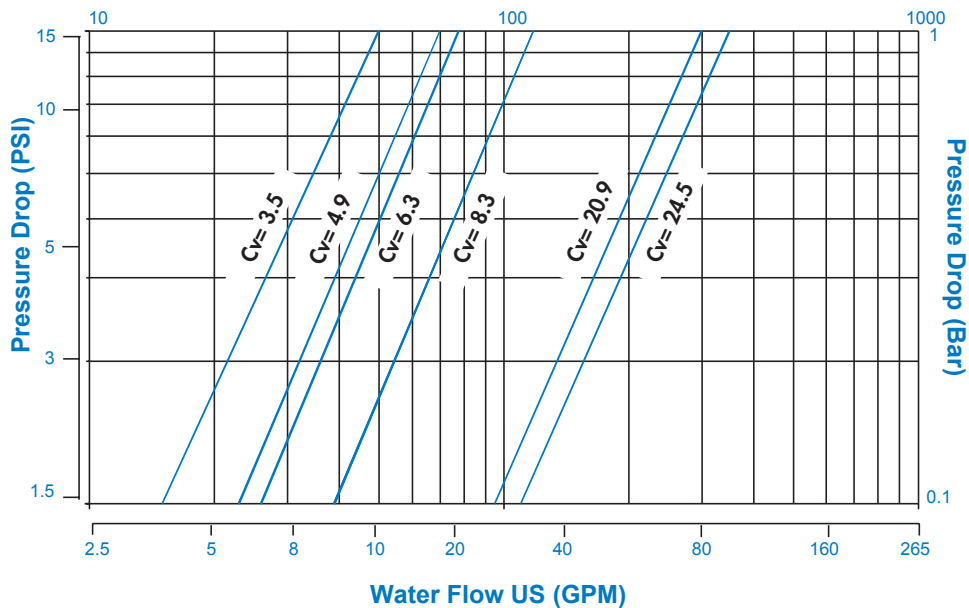
Dimensional Data

| Pipe Size | A | B | C | D |
|-----------------|--------|--------|--------|--------|
| 3/8" - 1/2" | 3-3/8" | 5-3/8" | 2-1/4" | 6" |
| 3/4" - 1" | 3-3/8" | 5-3/8" | 2-1/4" | 6" |
| 1-1/4" - 1-1/2" | 4-5/8" | 5-1/4" | 3-1/4" | 8-1/4" |
| 2" | 5-3/4" | 5-3/4" | 4" | 8-1/4" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

**ACPN Series
Water Flow (L/Min)**



Features

- Ideal for High Pressure Applications
- Compact Valve Design
- Piston Operated
- Choice of Valve Body Material and Seals

Technical Specification

| | |
|---------------------------------|--|
| Standard Body Material: | Brass |
| Optional Body Material: | Stainless Steel |
| Standard Seal Material: | Stainless Steel -4°F to +356°F |
| Optional Seal Materials: | EPDM -4°F to +248°F VITON -4°F to +302°F PTFE -4°F to +356°F |

Note: Temperature ranges indicate media temperatures for seal material.

| | |
|-----------------------------------|--------------------------------------|
| Coil Voltage AC (60 Hz): | 24v, 120v, 220v |
| Standard Protection Class: | NEMA 2 (Metal Enclosure as shown) |
| Electrical Connection: | 1/2" NPT Conduit Hub with 18" leads |
| Optional Protection Class: | NEMA 4 (Din Connector) |
| Electrical Connection: | 9mm Din Connector (DIN 43650) |
| Coil Insulation: | Class H suitable for continuous duty |
| Ambient Temperature: | +14°F to +122°F |



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) AC Coil | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-------------------|-------------|-------------|----------------|
| 1/4" | 8.0 | 1.12 | 2100 | 15-1500 | 14.5 | 1.5 | HP2 |
| 3/8" | 8.0 | 1.12 | 2100 | 15-1500 | 14.5 | 1.5 | HP3 |
| 1/2" | 8.0 | 1.12 | 2100 | 15-1500 | 14.5 | 1.5 | HP4 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

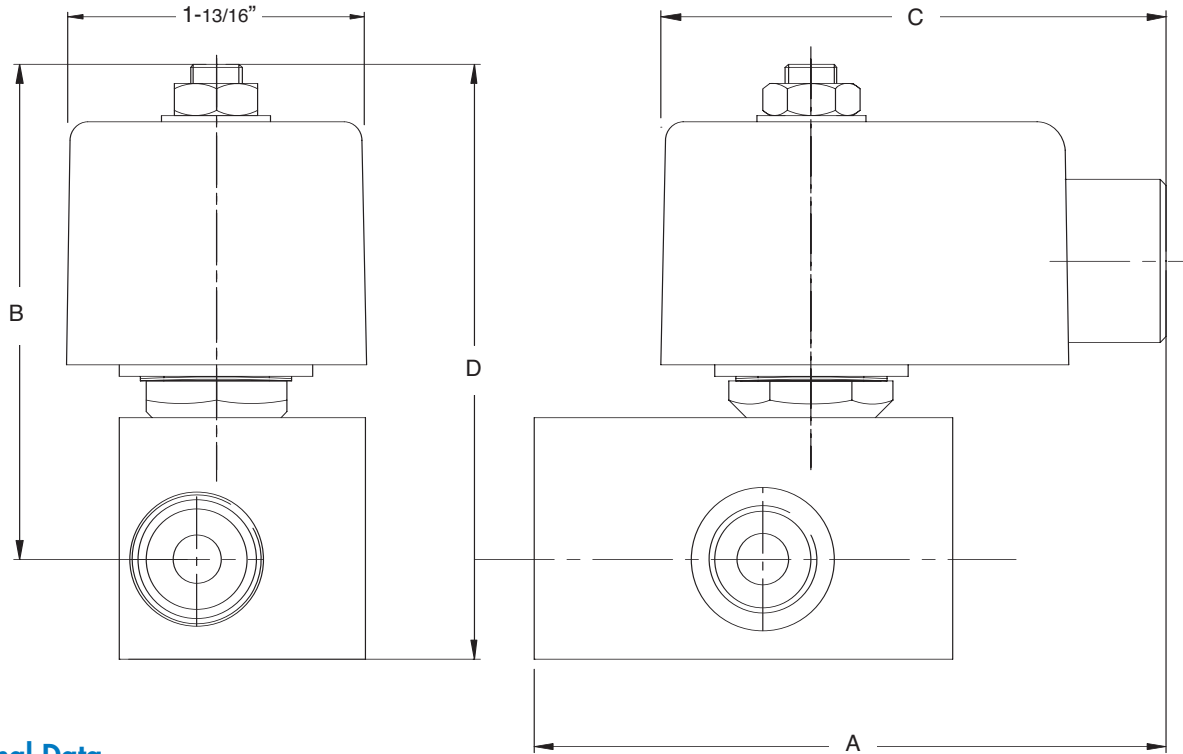
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



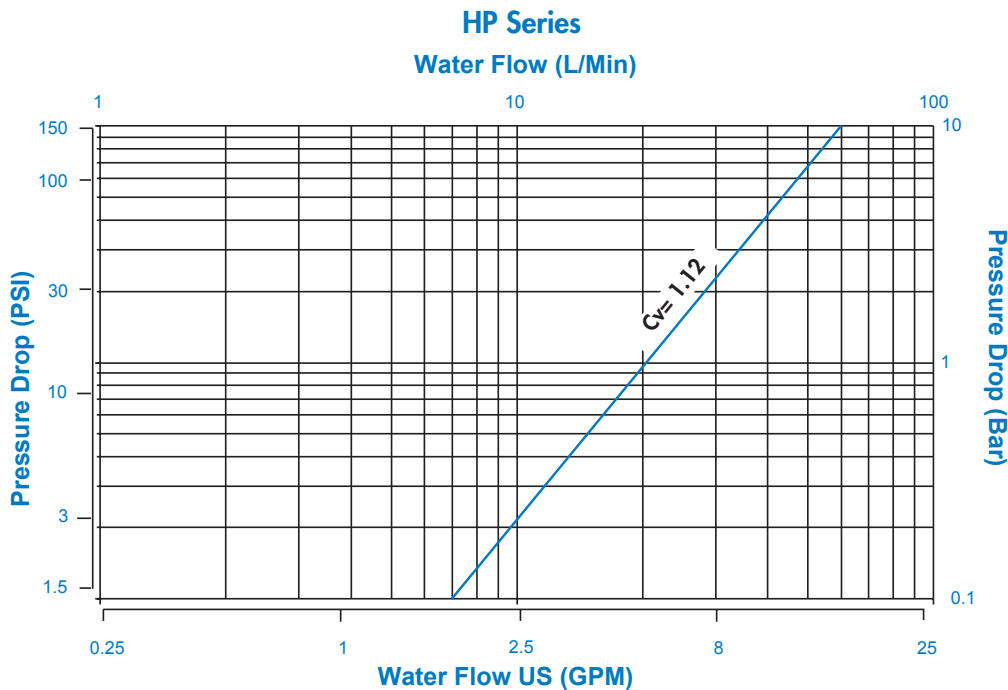
Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|----------|--------|----|---------|
| 1/4" | 2-11/16" | 3" | 3" | 3-9/16" |
| 3/8" | 2-11/16" | 3" | 3" | 3-9/16" |
| 1/2" | 3-1/4" | 3-1/4" | 3" | 4" |

Note: Inlet and outlet are at 90 degrees.

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



U31 Series • 1/8" - 1/4" • Normally Closed

U32 Series • 1/8" - 1/4" • Normally Open

U33 Series • 1/8" - 1/4" • Universal

Features

- Ideal for Mixing, Diverting and Venting Applications
- Compact Valve Design
- Wide Range of Available Orifices
- Zero Pressure Rated
- Choice of Valve Body Material and Seals

Technical Specification

Standard Body Material: Brass
Optional Body Material: Stainless Steel

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM +32°F to +248°F
 VITON +32°F to +302°F

Note: Temperature ranges indicate approved media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F



Selection Guide – Refer to flow chart on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/8" | 1.2 | 0.05 | 870 | 0-170 | 0-170 | 14.50 | 1.0 | *U31-39-21-12 |
| 1/8" | 1.6 | 0.13 | 870 | 0-155 | 0-155 | 14.50 | 1.0 | U31-31-21-12 |
| 1/8" | 2.4 | 0.24 | 870 | 0-100 | 0-100 | 14.50 | 1.0 | U31-32-21-12 |
| 1/8" | 3.0 | 0.35 | 870 | 0-85 | 0-85 | 14.50 | 1.0 | U31-33-21-12 |
| 1/4" | 1.6 | 0.13 | 870 | 0-155 | 0-155 | 14.50 | 1.0 | U31-41-21-12 |
| 1/4" | 2.4 | 0.24 | 870 | 0-100 | 0-100 | 14.50 | 1.0 | U31-42-21-12 |
| 1/4" | 3.0 | 0.35 | 870 | 0-85 | 0-85 | 14.50 | 1.0 | U31-43-21-12 |
| 1/8" | 1.6 | 0.10 | 870 | 0-145 | 0-145 | 14.50 | 1.0 | U32-31-21-12 |
| 1/8" | 2.4 | 0.22 | 870 | 0-78 | 0-78 | 14.50 | 1.0 | U32-32-21-12 |
| 1/8" | 3.0 | 0.26 | 870 | 0-40 | 0-40 | 14.50 | 1.0 | U32-33-21-12 |
| 1/4" | 1.6 | 0.10 | 870 | 0-145 | 0-145 | 14.50 | 1.0 | U32-41-21-12 |
| 1/4" | 2.4 | 0.22 | 870 | 0-78 | 0-78 | 14.50 | 1.0 | U32-42-21-12 |
| 1/4" | 3.0 | 0.26 | 870 | 0-40 | 0-40 | 14.50 | 1.0 | U32-43-21-12 |
| 1/8" | 1.6 | 0.10 | 870 | 0-107 | 0-107 | 14.50 | 1.0 | U33-31-21-12 |
| 1/8" | 2.4 | 0.22 | 870 | 0-42 | 0-42 | 14.50 | 1.0 | U33-32-21-12 |
| 1/8" | 3.0 | 0.26 | 870 | 0-30 | 0-30 | 14.50 | 1.0 | U33-33-21-12 |
| 1/4" | 1.6 | 0.10 | 870 | 0-107 | 0-107 | 14.50 | 1.0 | U33-41-21-12 |
| 1/4" | 2.4 | 0.22 | 870 | 0-42 | 0-42 | 14.50 | 1.0 | U33-42-21-12 |
| 1/4" | 3.0 | 0.26 | 870 | 0-30 | 0-300 | 14.50 | 1.0 | U33-43-21-12 |

P.Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

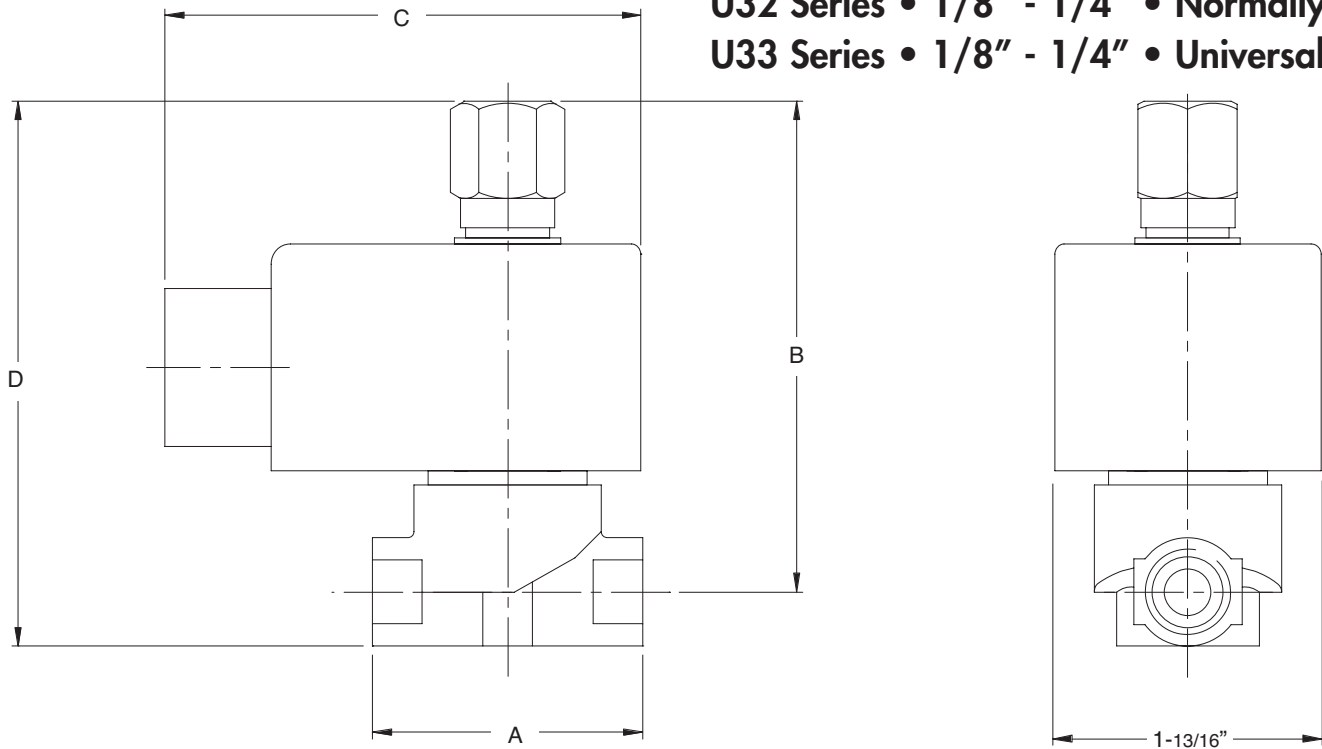
When the lower value of OPD is zero, the valve will operate without pressure differential. Otherwise this value represents the minimum pressure differential required to operate the valve.

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details.

* Valve is FM approved only when specified with Viton seals. For gas and oil safety shut-off, consult manufacturer for more information.

- U31 Series • 1/8" - 1/4" • Normally Closed**
- U32 Series • 1/8" - 1/4" • Normally Open**
- U33 Series • 1/8" - 1/4" • Universal**



Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|---------|----|---------|
| 1/8" | 1-3/4" | 3-5/16" | 3" | 3-9/16" |
| 1/4" | 1-3/4" | 3-5/16" | 3" | 3-9/16" |

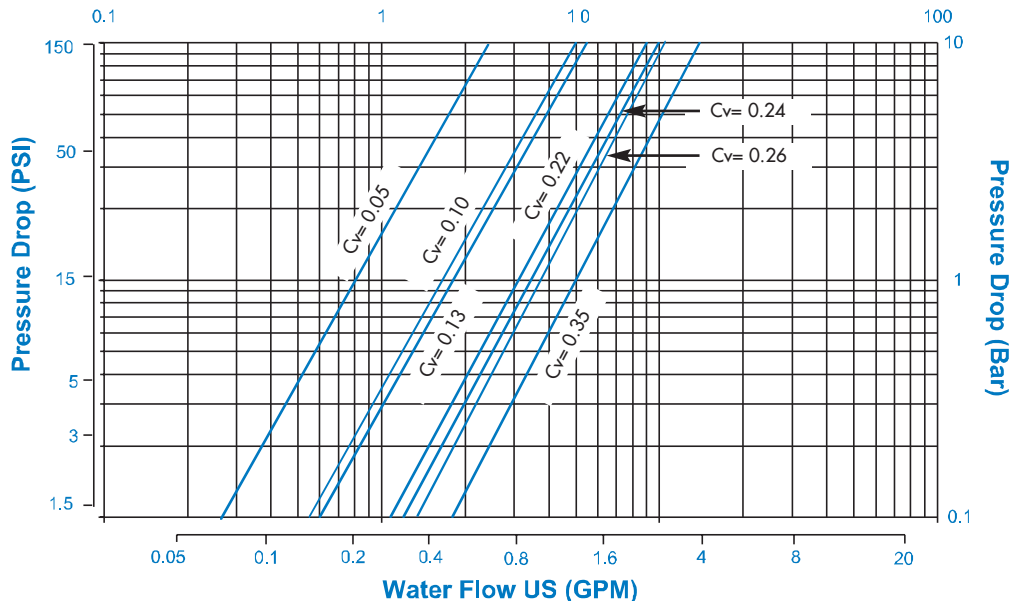
U31, U32, U33 Series

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

U31, U32, U33 Series

Water Flow (L/Min)



Features

- Stainless Steel Construction as Standard
- Designed for Actuator Control
- Larger Porting for High Cv
- Zero Pressure Rated

Technical Specification

| | |
|--|---|
| Standard Body Material: | Stainless Steel |
| Standard Seal Material: | Nitrile (BunaN) +14°F to +176°F |
| Optional Seal Materials: | EPDM +14°F to +248°F |
| <i>Note: Temperature ranges indicate media temperatures for seal material.</i> | |
| Coil Voltage DC: | 12v, 24v |
| Coil Voltage AC (60 Hz): | 24v, 120v, 220v |
| Standard Protection Class: | NEMA 4 (Din Connector as shown) |
| Electrical Connection: | 9mm Din Connector (DIN 43650) |
| Optional Protection Class: | NEMA 6 (Hazardous Enclosure see page 35) |
| Electrical Connection: | 1/2" NPT Conduit Hub |
| Coil Insulation: | Class H suitable for continuous duty |
| Specifiable Options: <i>(One option per valve)</i> | Manual Override Manual Reset Manual Latch |
| Ambient Temperature: | +14°F to +122°F |
| Media: | Air |



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/4" | 8.8 | 0.61 | 290 | 0-150 | 0-150 | 14.5 | 2.0 | 33B31Z5A1 |
| 3/8" | 8.8 | 0.61 | 290 | 0-150 | 0-150 | 14.5 | 2.0 | 33C31Z5A1 |
| 1/2" | 8.8 | 0.61 | 290 | 0-150 | 0-150 | 14.5 | 2.0 | 33D31Z5A1 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

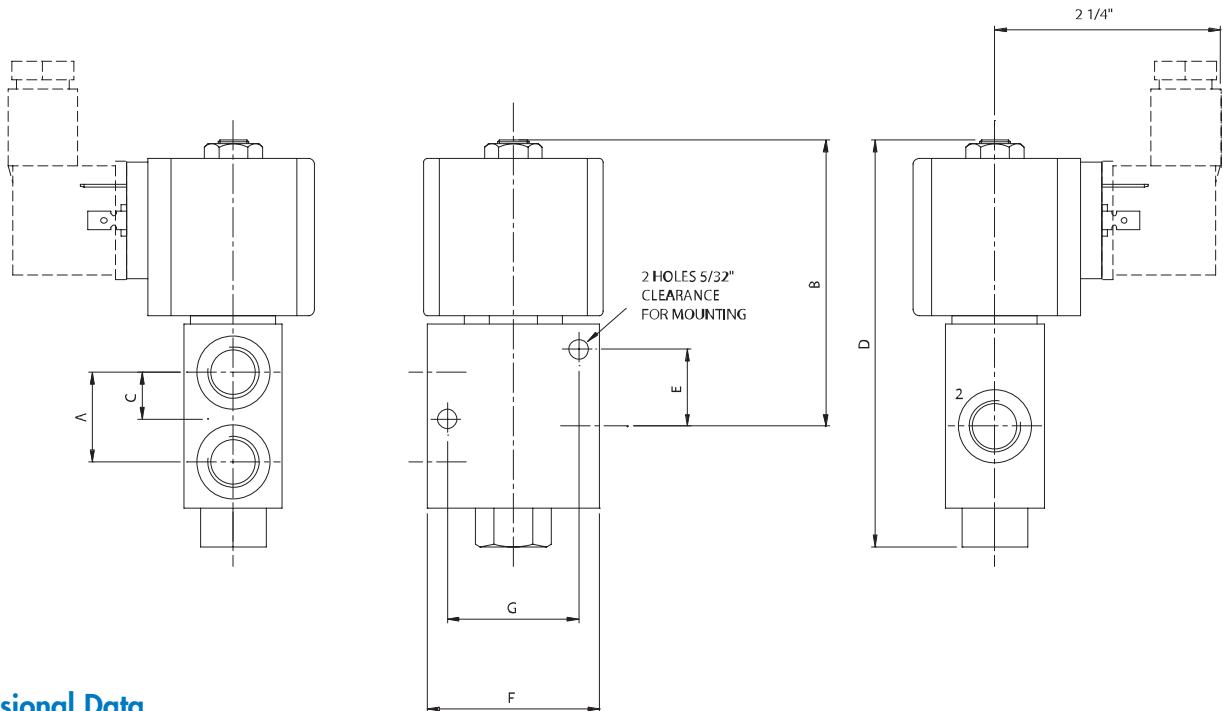
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

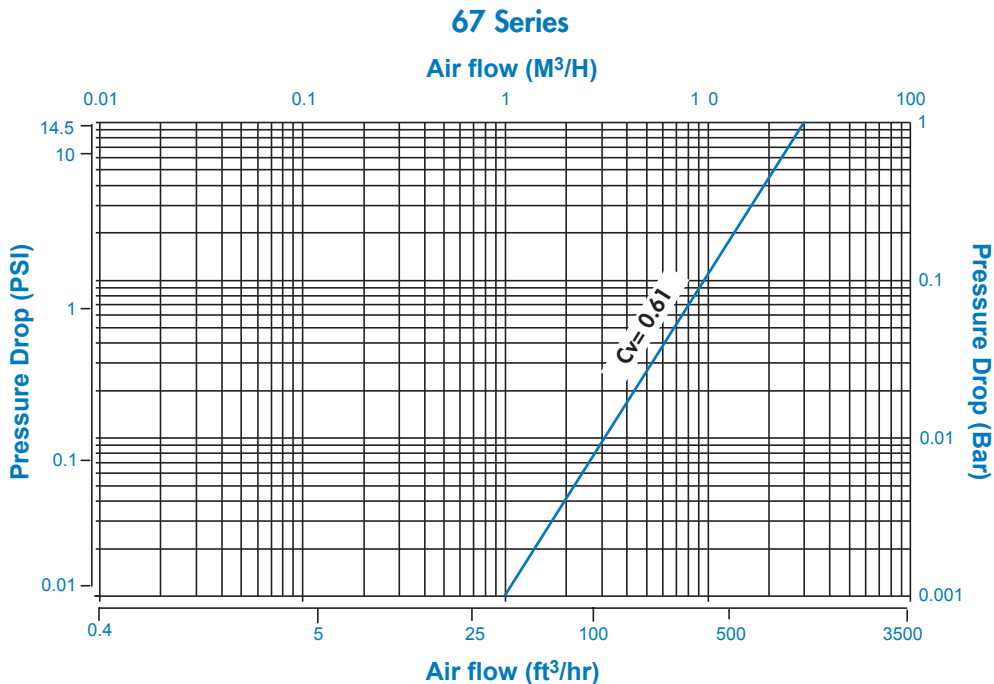


Dimensional Data

| Pipe Size | A | B | C | D | E | F | G |
|-----------|--------|--------|--------|--------|-------|--------|--------|
| 1/4" | 0.905" | 3" | 0.472" | 4-1/4" | 0.787 | 1-3/4" | 1.338" |
| 3/8" | 1.318" | 3-1/2" | 0.629" | 5-1/4" | 0.944 | 2-1/2" | 1.653" |
| 1/2" | 1.318" | 3-1/2" | 0.629" | 5-1/4" | 0.944 | 2-1/2" | 1.653" |

How to use Flow Chart based on Cv

1. Select the required flow, ft³/hr.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Namur Interface for Direct Actuator Mounting
- Designed for Actuator Control
- Pilot Operated Spool Valve Technology
- Choice of Valve Body Material

Technical Specification

Standard Body Material: Anodized Aluminum
Optional Body Material: Stainless Steel

Standard Seal Material: Nitrile (BunaN) +14°F to +176°F
Optional Seal Materials: EPDM +14°F to +248°F

Note: Temperature ranges indicate media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 4 (Din Connector as shown)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class F

Ambient Temperature: +14°F to +122°F

Media: Air



Namur Series

Selection Guide – Refer to flow data on next page

| Pipe Size | Cv | OPD (PSI) | | Power Watts | Body Material | Weight lbs. | Catalog Number |
|-----------|------|-----------|---------|-------------|---------------|-------------|----------------|
| | | AC Coil | DC Coil | | | | |
| 1/4" | 0.50 | 36-150 | 36-150 | 5.0 | Aluminum | 0.4 | NAMUR STD. |
| 1/4" | 0.50 | 36-150 | 36-150 | 14.5 | Aluminum | 1.3 | NAMUR EExd |
| 1/4" | 0.50 | 36-150 | 36-150 | 1.6 | Aluminum | 0.4 | NAMUR EExia |
| 1/4" | 0.50 | 36-150 | 36-150 | 5.0 | SS | 1.0 | NAMUR SS |
| 1/4" | 0.50 | 36-150 | 36-150 | 14.5 | SS | 1.8 | NAMUR SS EExd |
| 1/4" | 0.50 | 36-150 | 36-150 | 1.6 | SS | 0.4 | NAMUR EExia |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

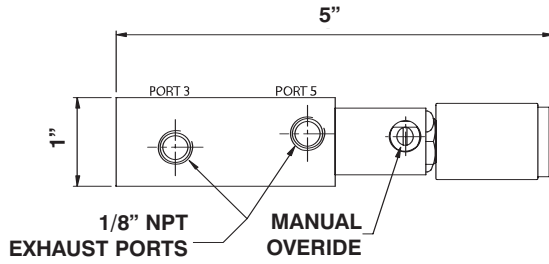
Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential.
Otherwise this value represents the minimum pressure differential required to operate the valve

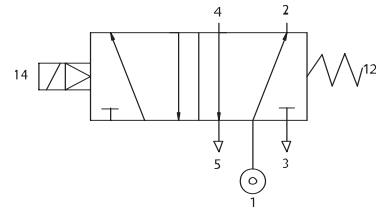
Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

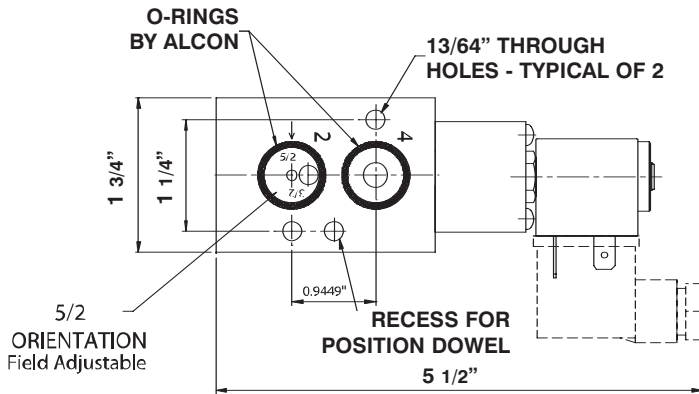
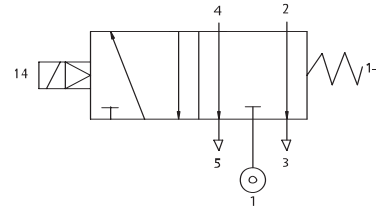
Namur 5/2 Universal Series • 3 Way Convertible



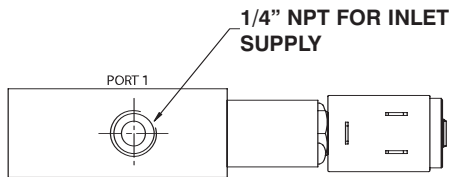
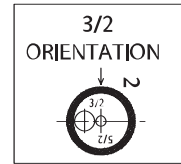
5/2 ORIENTATION



3/2 ORIENTATION



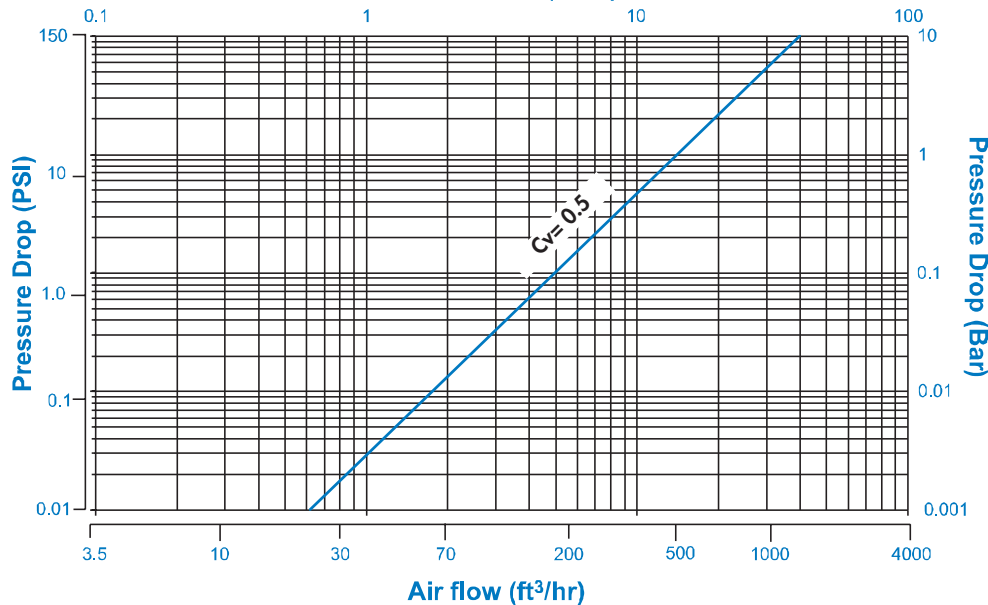
Field Adjustable



How to use Flow Chart based on Cv

1. Select the required flow, ft³/hr.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

Universal Series - 5/2
Air Flow (M³/H)



Features

- Lightweight Aluminum Construction
- Ideal for Low Pressure Natural Gas
- Approved Safety Shut-off Valve
- Fully Ported Orifices for High Flow at Minimal Pressure Drop
- Zero Pressure Rated

Technical Specification

| | |
|---|--------------------------------------|
| Standard Body Material: | Aluminum |
| Standard Seal Material: | Nitrile (BunaN) +14°F to +176°F |
| <i>Note: Temperature ranges indicate approved media temperatures for seal material.</i> | |
| Coil Voltage AC (60 Hz): | 24v, 120v |
| Standard Protection Class: | NEMA 2 (Metal Enclosure as shown) |
| Electrical Connection: | 1/2" NPT Conduit Hub with 18" leads |
| Optional Protection Class: | NEMA 4 (Din Connector) |
| Electrical Connection: | 9mm Din Connector (DIN 43650) |
| Coil Insulation: | Class H suitable for continuous duty |
| Approved Ambient Temperature: | +14°F to +140°F |



Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Gas Flow Rate* ft3/hr | P. Max (PSI) | OPD (PSI) AC Coil | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|-----------------------|--------------|-------------------|-------------|-------------|----------------|
| 1/4" | 12.7 | 126 | 14.5 | 0-2.0 | 14.5 | 0.50 | UGB2 |
| 3/8" | 12.7 | 175 | 14.5 | 0-2.0 | 14.5 | 0.50 | UGB3 |
| 1/2" | 12.7 | 190 | 14.5 | 0-2.0 | 14.5 | 0.50 | UGB4 |
| 3/4" | 19.0 | 473 | 14.5 | 0-1.25 | 14.5 | 0.50 | UGB6 |
| 1" | 19.0 | 525 | 14.5 | 0-1.25 | 14.5 | 0.50 | UGB7 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

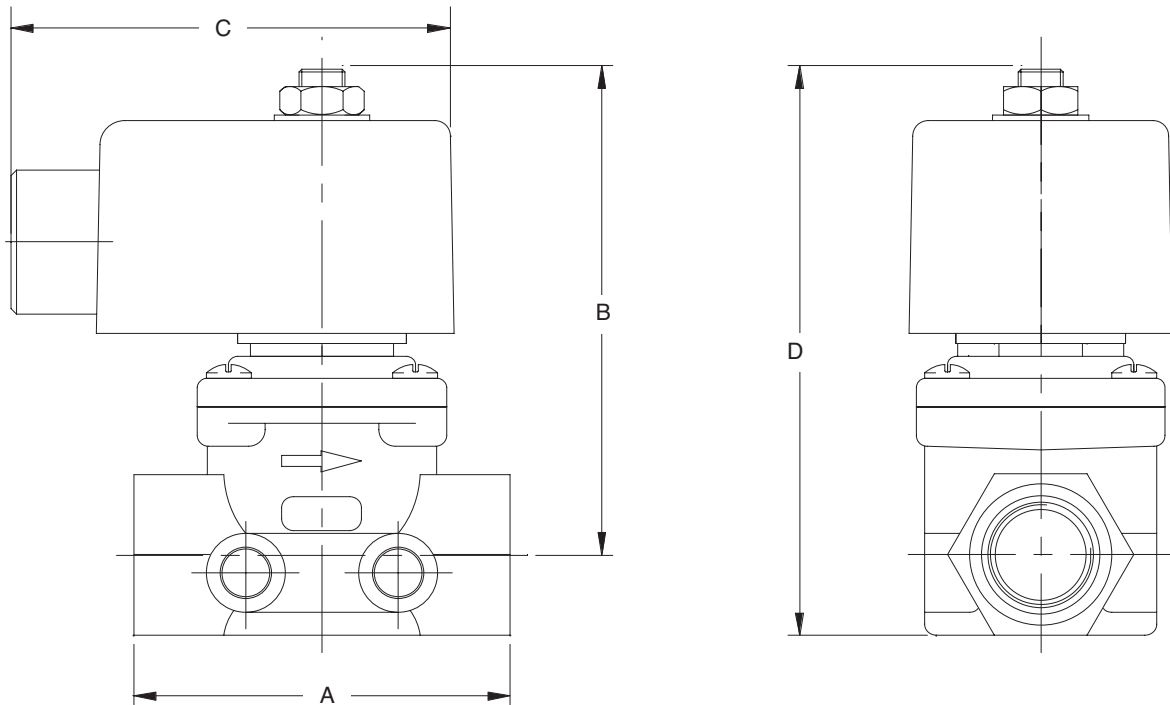
Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

*Gas Flow is typically not Cv rated. Indicated flow is rated at Δp= 1.00 "WG



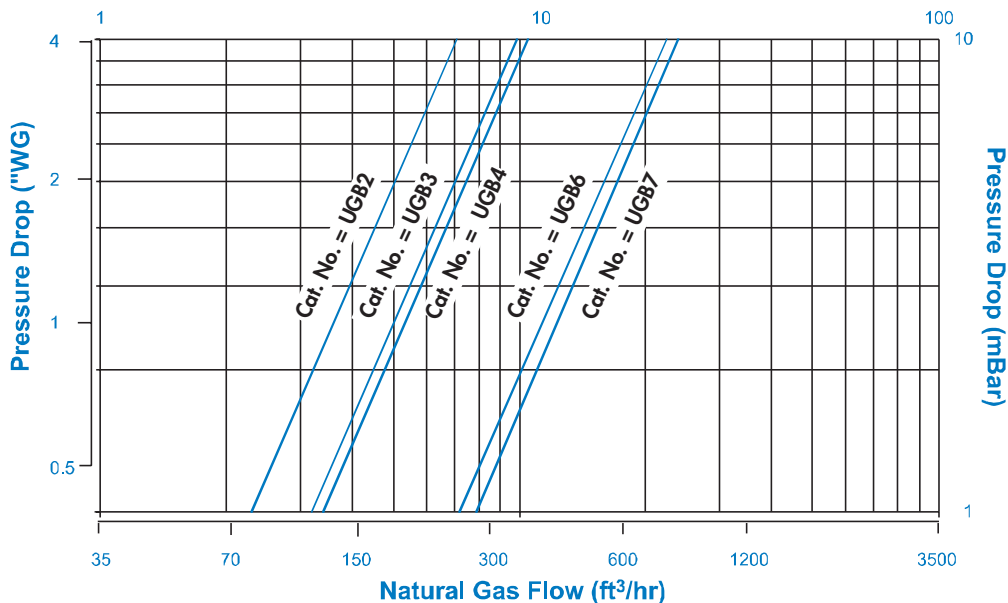
Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|---------|---------|---------|
| 1/4" | 2-1/4" | 3" | 3" | 3-5/8" |
| 3/8" | 2-1/4" | 3" | 3" | 3-5/8" |
| 1/2" | 2-1/4" | 3" | 3" | 3-5/8" |
| 3/4" | 3-3/8" | 3-9/16" | 2-9/16" | 4-1/4" |
| 1" | 4-3/8" | 3-9/16" | 2-9/16" | 4-7/16" |

How to use Flow Chart

1. Select the required flow, ft³/hr.
2. Note the corresponding Cat No. and pressure drop.
3. Using Cat. No., (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size and Catalog Number.

UGB Series
Natural Gas Flow (M³/Hr)



Features

- Compact Valve Design
- Ideal for Air, Inert Gases, Manufactured Gas, Natural Gas, LP Gas or Light Oil
- Approved Safety Shut-Off Valve
- Zero Pressure Rated

Technical Specification

| | |
|---|--|
| Standard Body Material: | Brass |
| Standard Seal Material: | Nitrile (BunaN) +14°F to +176°F |
| <i>Note: Temperature ranges indicate approved media temperatures for seal material.</i> | |
| Coil Voltage AC (60 Hz): | 24v, 120v |
| Standard Protection Class: | NEMA 2 (Metal Enclosure as shown) |
| Electrical Connection: | 1/2" NPT Conduit Hub with 18" leads |
| Coil Insulation: | Class H suitable for continuous duty |
| Approved Ambient Temperature: | +14°F to +122°F |
| Media: | Air, Inert Gas, Manufactured Gas, Natural Gas, LP-Gas or Light Oil (No.2 Oil or lighter) |



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Canadian Standards
Association

Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) AC Coil | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-------------------|-------------|-------------|----------------|
| 1/8" | 4.5 | 0.53 | 870 | 0-10 | 12.5 | 1.0 | U28-34-21-12 |
| 1/8" | 6.0 | 0.70 | 870 | 0-10 | 12.5 | 1.0 | U28-35-21-12 |
| 1/8" | 3.5 | 0.42 | 870 | 0-300 | 16.0 | 1.0 | *U28-38-22-12 |
| 1/4" | 4.5 | 0.53 | 870 | 0-10 | 12.5 | 1.0 | U28-44-21-12 |
| 1/4" | 6.0 | 0.70 | 870 | 0-10 | 12.5 | 1.0 | U28-45-21-12 |
| 3/8" | 6.0 | 0.70 | 870 | 0-10 | 12.5 | 1.0 | U28-75-21-12 |
| 3/8" | 9.5 | 1.75 | 870 | 0.10 | 12.5 | 1.0 | U28-76-21-12 |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

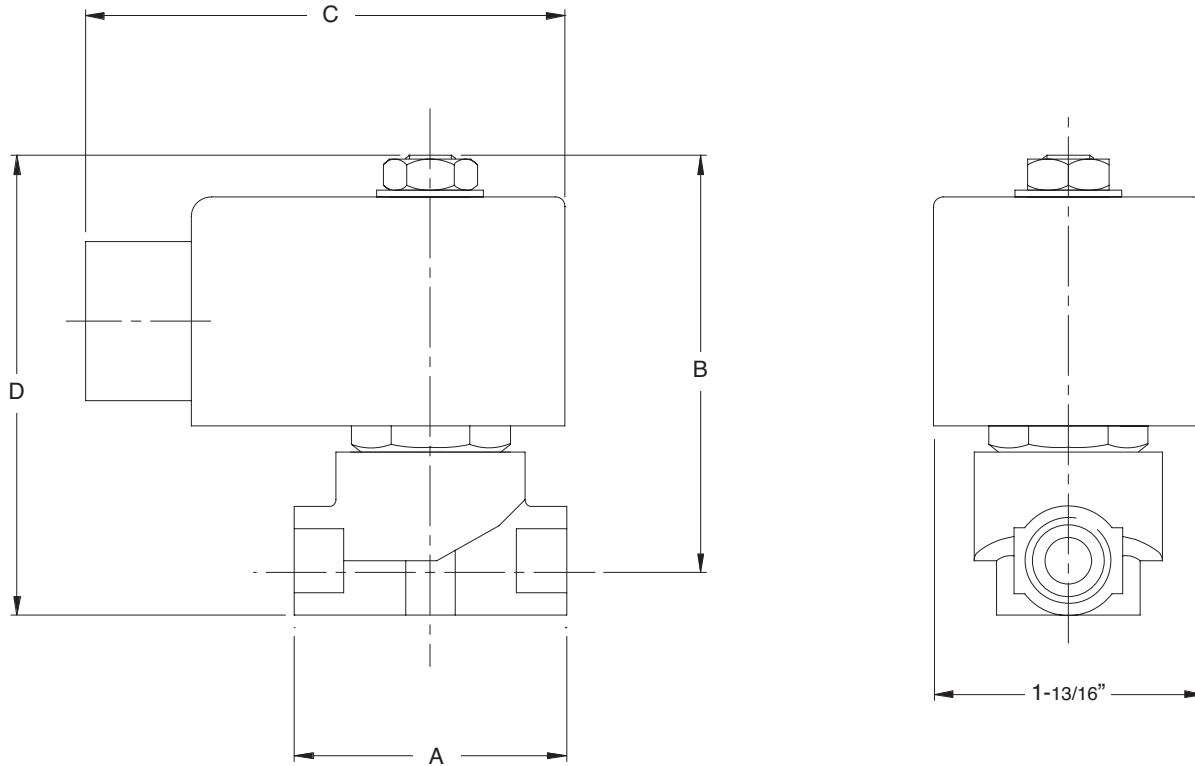
When the lower value of OPD is zero, the valve will operate without pressure differential.
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

*Valve designed to operate with larger OPD. Valve configuration includes VITON Seals (+14°F to +176°F) as standard.

U28 Series

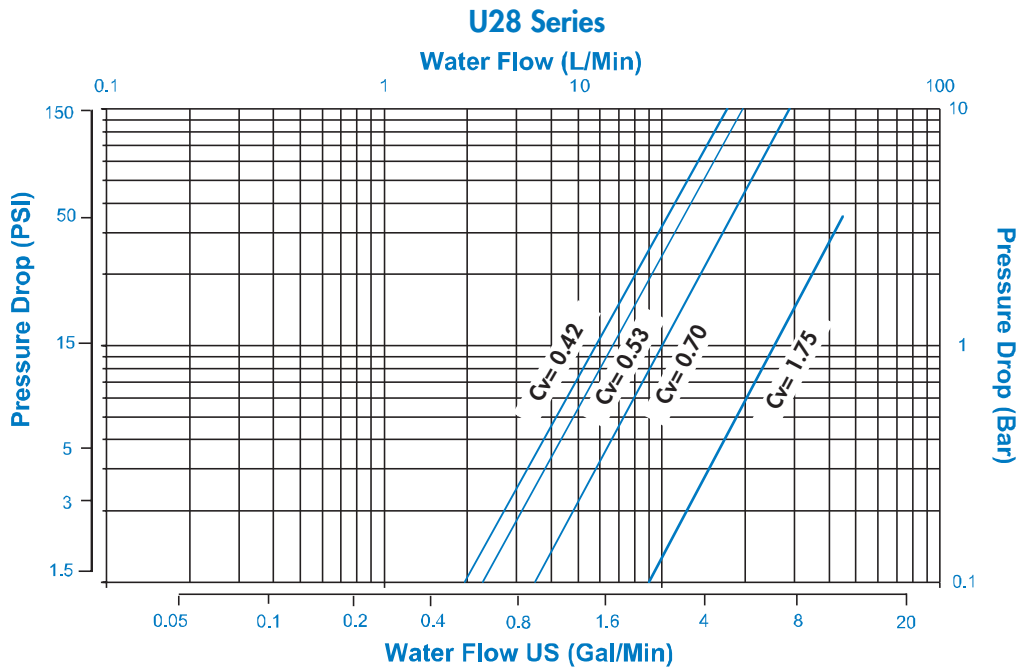


Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|--------|----|--------|
| 1/8" | 1-3/4" | 2-3/4" | 3" | 3-1/8" |
| 1/4" | 1-3/4" | 2-3/4" | 3" | 3-1/8" |
| 3/8" | 2-1/2" | 3" | 3" | 3-1/2" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Compact Valve Design
- Choice of Brass or Stainless Steel Valve Body
- Viton Seal Configuration provides approved Safety Shut-off for Fuel Oils

Technical Specification

Standard Body Material: Brass

Standard Seal Material: VITON*

Note: Temperature ranges indicate approved media temperatures for seal material, see Selection Guide below.

Coil Voltage AC (60 Hz): 24v, 120v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)

Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F

Media: Air, Water, Inert Gas
No. 2 Fuel Oil (or lighter)
No. 6 Fuel Oil



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Approved

Selection Guide – Refer to flow data on next page (No. 2 Fuel Oil)

| Pipe Size | Cv | Orifice mm | P. Max (PSI) | OPD (PSI) AC Coil | *Temperature Rating (°F) | Power Watts | Weight lbs. | Catalog Number |
|-----------|------|------------|--------------|-------------------|--------------------------|-------------|-------------|----------------|
| 1/4" | 1.35 | 8.8 | 870 | 5-300 | 15°F to +176°F | 12.5 | 1.00 | UACF2NV |
| 3/8" | 1.47 | 8.8 | 870 | 5-300 | 15°F to +176°F | 12.5 | 1.00 | UACF3NV |

Selection Guide – Refer to flow data on next page (No. 6 Fuel Oil)

| Pipe Size | Cv | Orifice mm | P. Max (PSI) | OPD (PSI) AC Coil | *Temperature Rating (°F) | Power Watts | Weight lbs. | Catalog Number |
|-----------|------|------------|--------------|-------------------|--------------------------|-------------|-------------|----------------|
| 1/4" | 1.35 | 8.8 | 870 | 5-150 | 158°F to +240°F | 12.5 | 1.00 | UACF2NV |
| 3/8" | 1.47 | 8.8 | 870 | 5-150 | 158°F to +240°F | 12.5 | 1.00 | UACF3NV |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

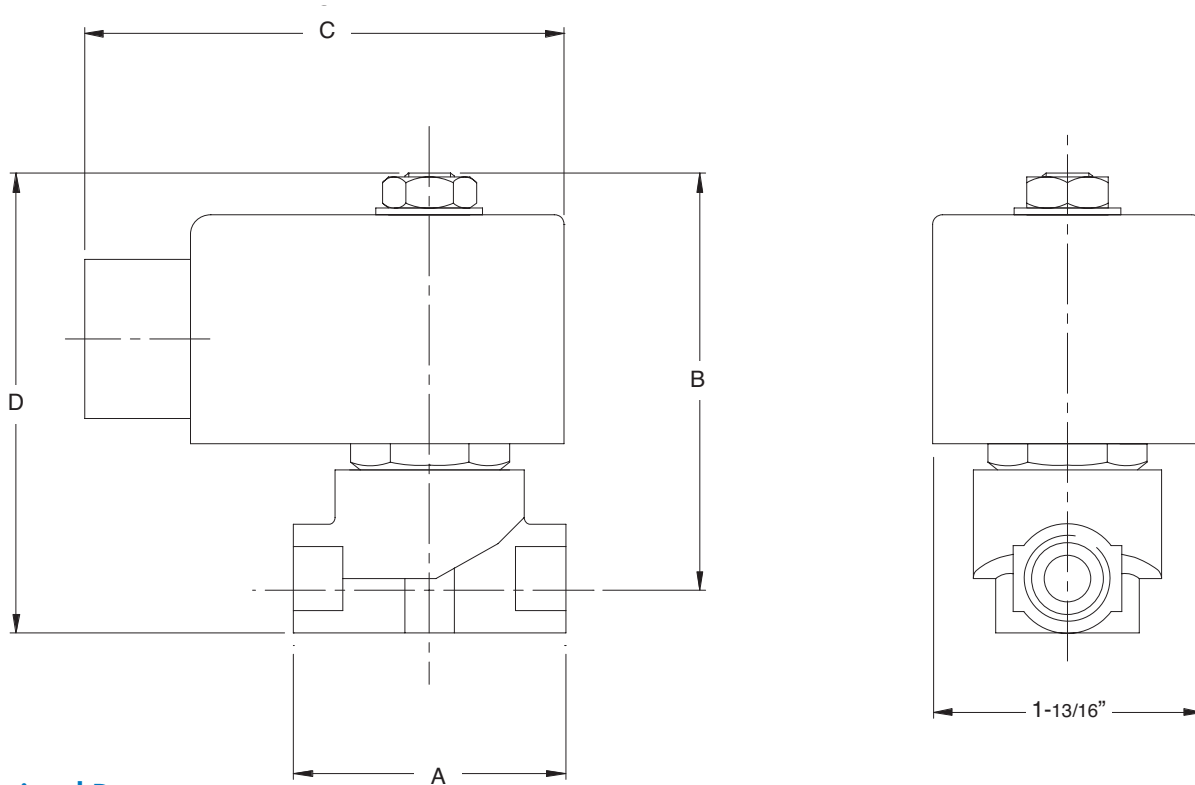
Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details

UACF Series



Dimensional Data

| Pipe Size | A | B | C | D |
|-----------|--------|----|--------|--------|
| 1/4" | 1-3/4" | 3" | 2-1/2" | 3-1/4" |
| 3/8" | 2" | 3" | 2-1/2" | 3-1/2" |

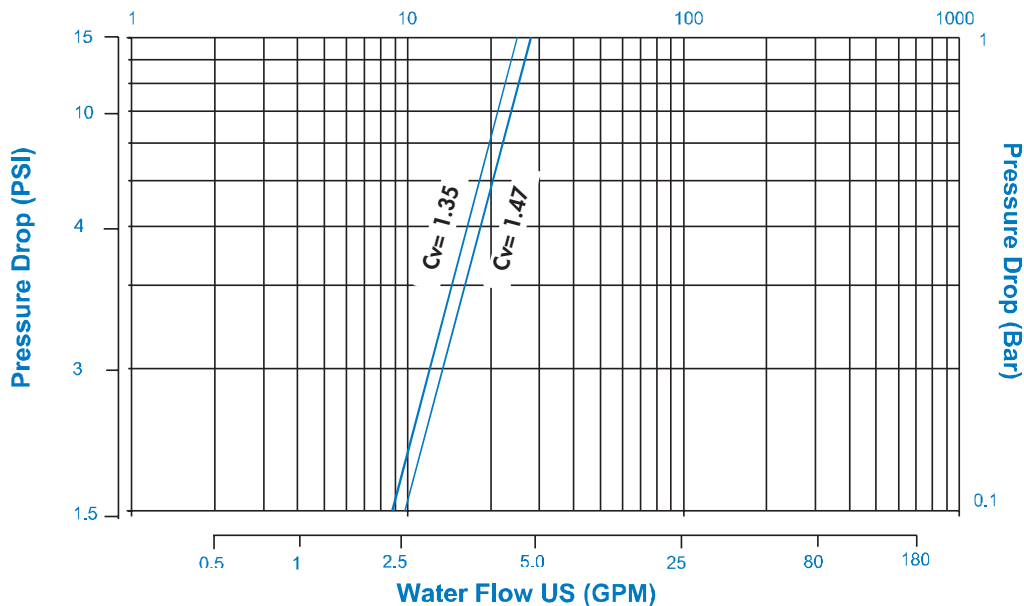
UACF Series

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

UACF Series

Water Flow (L/Min)



Features

- Wide Range of Available Product
- Specifically Designed for Hot Water Temperature up to +248°F
- Choice of Brass or Stainless Steel Valve Body

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel*

Standard Seal Material: EPDM +32°F to +248°F

Note: Temperature ranges indicate approved media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F

Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/8" | 1.6 | 0.12 | 870 | 0-675 | 0-310 | 14.5 | 1.0 | U21-31-23-12 |
| 1/8" | 2.4 | 0.24 | 870 | 0-300 | 0-140 | 14.5 | 1.0 | U21-32-23-12 |
| 1/8" | 3.0 | 0.35 | 870 | 0-225 | 0-65 | 14.5 | 1.0 | U21-33-23-12 |
| 1/4" | 1.6 | 0.12 | 870 | 0-675 | 0-310 | 14.5 | 1.0 | U21-41-23-12 |
| 1/4" | 2.4 | 0.24 | 870 | 0-300 | 0-140 | 14.5 | 1.0 | U21-42-23-12 |
| 1/4" | 3.0 | 0.35 | 870 | 0-225 | 0-65 | 14.5 | 1.0 | U21-43-23-12 |
| 1/4" | 4.5 | 0.53 | 870 | 0-105 | 0-34 | 14.5 | 1.0 | U21-44-23-12 |
| 1/4" | 6.0 | 0.70 | 870 | 0-60 | 0-15 | 14.5 | 1.0 | U21-45-23-12 |
| 3/8" | 16.0 | 3.5 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD3E |
| 1/2" | 16.0 | 4.9 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD4E |
| 3/4" | 16.0 | 5.4 | 725 | 0-150 | 0-150 | 14.5 | 2.0 | UACD6E |
| 1" | 20.0 | 8.2 | 725 | 0-150 | 0-150 | 14.5 | 4.0 | UACD7E |
| 1-1/4" | 40.0 | 30 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD8E |
| 1-1/4" | 40.0 | 30 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD8TE |
| 1-1/2" | 40.0 | 30 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD9E |
| 1-1/2" | 40.0 | 30 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD9TE |
| 2" | 40.0 | 33 | 725 | 0-60 | N/A | 14.5 | 6.6 | UACD10E |
| 2" | 40.0 | 33 | 725 | 5-150 | 5-150 | 14.5 | 6.6 | UACD10TE |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



Valve Sizes 1/8" - 1/4"



Valve Sizes 3/8" - 2"

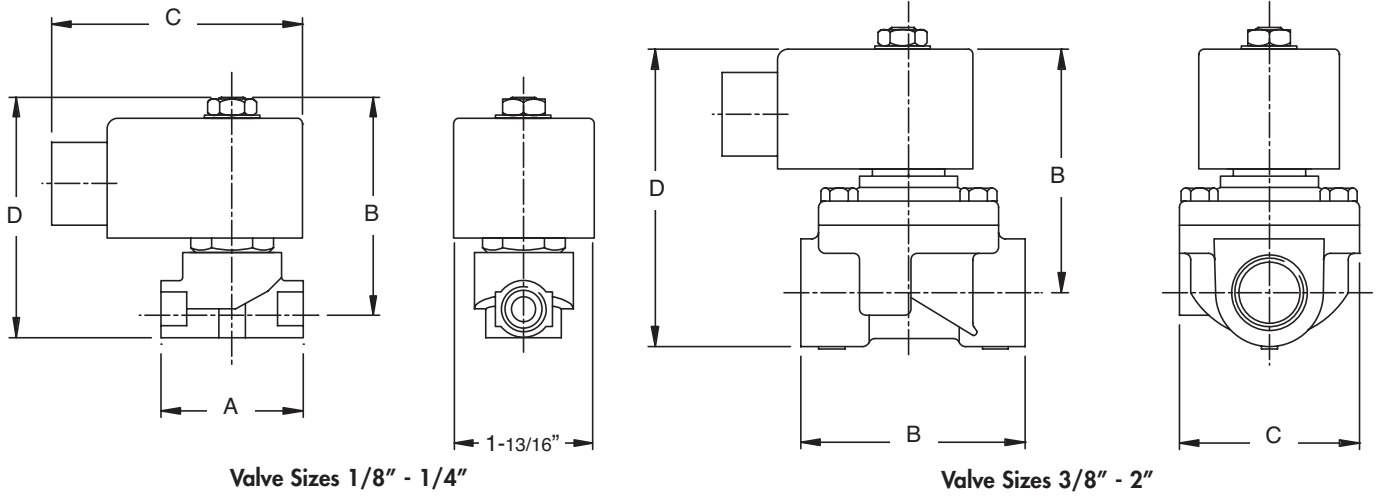


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* For larger valves in Stainless Steel, UACD8E through 10TE, consult factory for price, availability and minimum quantity



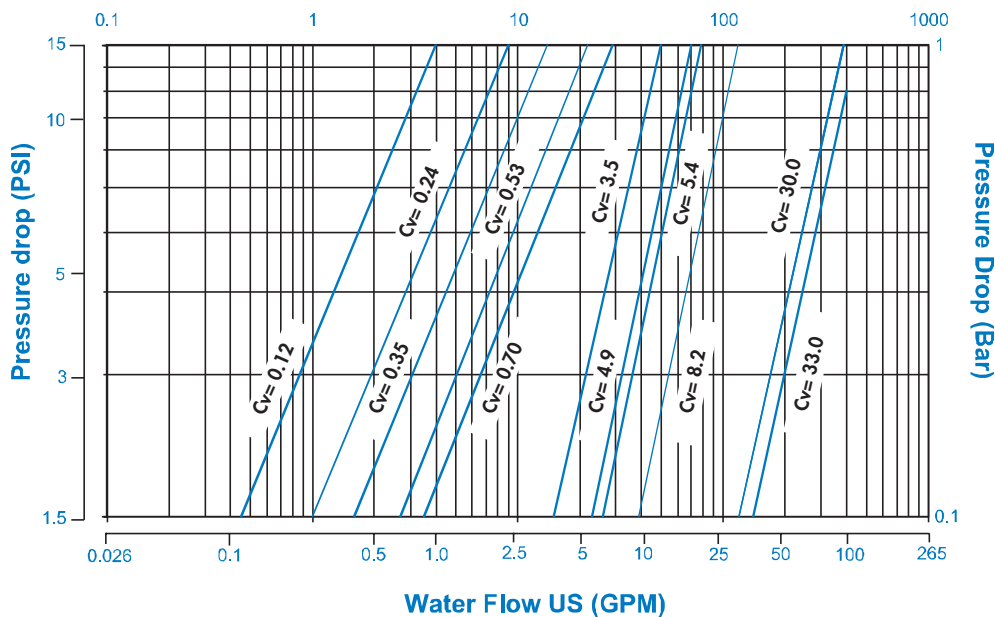
Dimensional Data

| Pipe Size | A | B | C | D |
|-------------|--------|---------|--------|--------|
| 1/8" - 1/4" | 1-3/4" | 2-3/4" | 3" | 3-1/8" |
| 3/8" - 3/4" | 2-3/4" | 3-7/16" | 3" | 4-3/8" |
| 1" | 3-3/8" | 3-7/16" | 3" | 5-3/8" |
| 1-1/4" - 2" | 5-3/8" | 4-5/8" | 4-3/4" | 5-7/8" |

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the Selection Guide on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

**Hot Water Series
Water Flow (L/Min)**



Features

- Wide Range of Available Product
- Specifically designed for Steam Service up to +356°F
- Teflon® - PTFE Seals
- Choice of Brass or Stainless Steel Valve Body

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel

Standard Seal Material: PTFE +32°F to +356°F

Note: Temperature ranges indicate approved media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Optional Protection Class: NEMA 4 (Din Connector)
Electrical Connection: 9mm Din Connector (DIN 43650)

Coil Insulation: Class H suitable for continuous duty

Approved Ambient Temperature: +14°F to +122°F

Media: Steam

Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/8" | 3.0 | 0.35 | 870 | 0-125 | 0-125 | 14.5 | 1.00 | U21-33-24-12 |
| 1/4" | 3.0 | 0.35 | 870 | 0-125 | 0-125 | 14.5 | 1.00 | U21-43-24-12 |
| 1/8" | 4.5 | 0.53 | 870 | 0-125 | 0-70 | 14.5 | 1.00 | U21-34-24-12 |
| 1/4" | 4.5 | 0.70 | 870 | 0-125 | 0-70 | 14.5 | 1.00 | U21-44-24-12 |
| 3/8" | 16.0 | 3.5 | 725 | 5-125 | 5-125 | 14.5 | 2.80 | UACP3X |
| 1/2" | 16.0 | 4.9 | 725 | 5-125 | 5-125 | 14.5 | 2.80 | UACP4X |
| 3/4" | 16.0 | 6.3 | 725 | 5-125 | 5-125 | 14.5 | 2.80 | UACP6X |
| 1" | 25.0 | 8.3 | 725 | 5-125 | 5-125 | 14.5 | 5.00 | UACP7X |
| 1-1/4" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.80 | UACP8X |
| 1-1/2" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.80 | UACP9X |
| 2" | 32.0 | 24.5 | 725 | 5-125 | 5-125 | 14.5 | 11.50 | UACP10X |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



Valve Sizes 1/8" - 1/4"



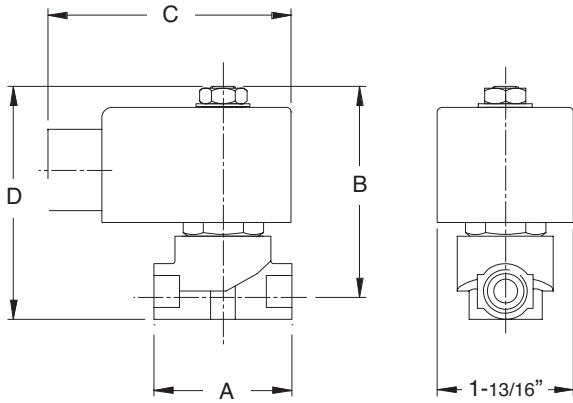
Valve Sizes 3/8" - 2"



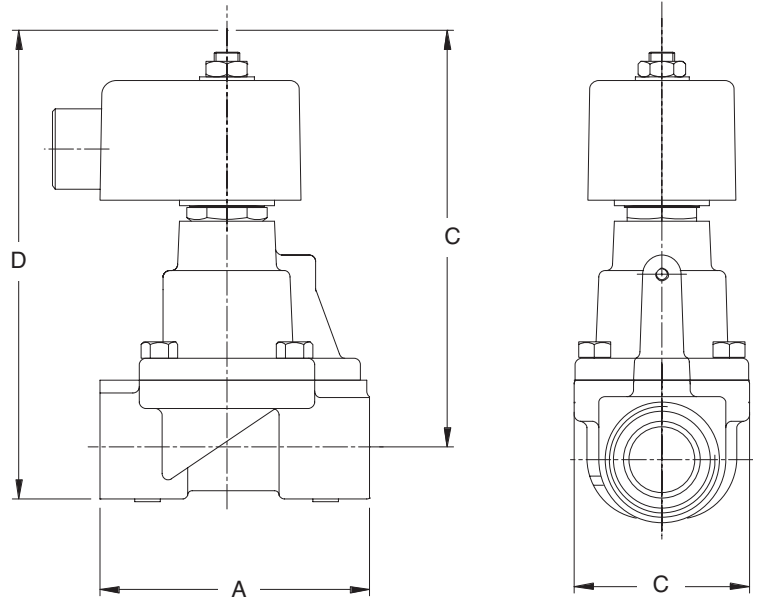
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Valve Sizes 1/8" - 1/4"



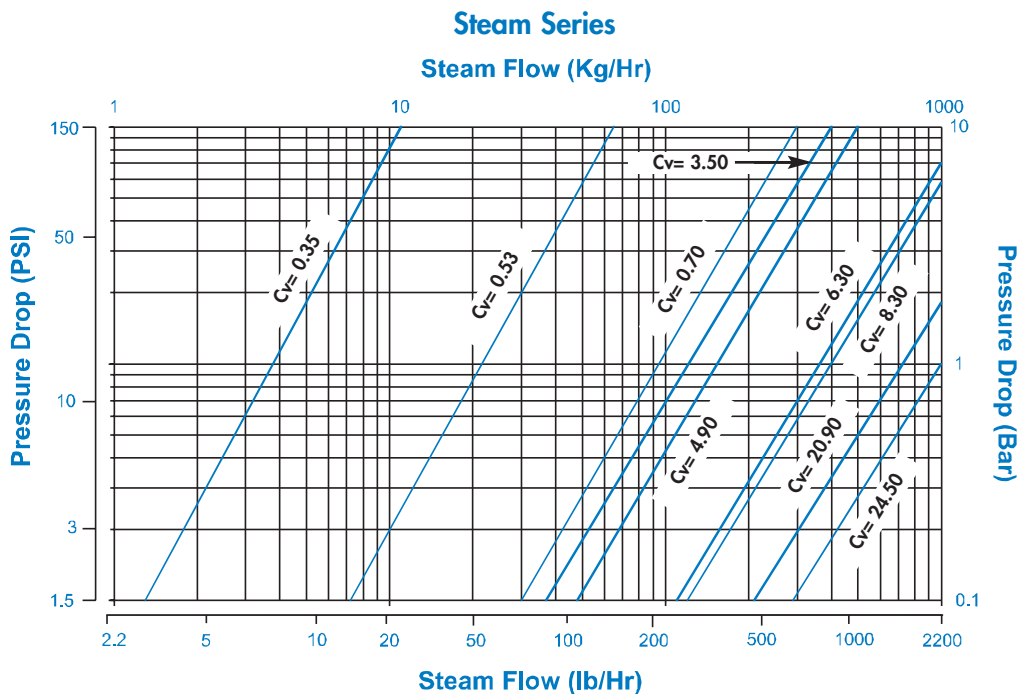
Valve Sizes 3/8" - 2"

Dimensional Data

| Pipe Size | A | B | C | D |
|-----------------|---------|----------|---------|----------|
| 1/8" - 1/4" | 1-3/4" | 2-3/4" | 2-9/16" | 3-1/16" |
| 3/8" - 3/4" | 2-1/2" | 4-1/8" | 2-5/16" | 4-13/16" |
| 1" | 4-7/16" | 4-15/16" | 3-1/16" | 5-3/4" |
| 1-1/4" - 1-1/2" | 4-5/8" | 5-1/4" | 2-7/8" | 7-1/16" |
| 2" | 5-3/4" | 5-11/16" | 3-3/4" | 8-1/4" |

How to use Flow Chart based on Cv

1. Select the required flow, lb/hr.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the Selection Guide on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.



Features

- Controls Cryogenic Media down to -321°F
- Degreased and Individually Packaged for Cryogenic Service
- Larger Porting for High Cv
- Teflon® - PTFE Seals
- Choice of Brass or Stainless Steel Valve Body

Technical Specification

Standard Body Material: Brass 3/8" to 1" / Bronze 1-1/4" to 2"
Optional Body Material: Stainless Steel

Standard Seal Material: PTFE -321°F to +32°F

Note: Temperature ranges indicate media temperatures for seal material.

Coil Voltage DC: 12v, 24v
Coil Voltage AC (60 Hz): 24v, 120v, 220v

Standard Protection Class: NEMA 2 (Metal Enclosure as shown)
Electrical Connection: 1/2" NPT Conduit Hub with 18" leads

Coil Insulation: Class H suitable for continuous duty

Ambient Temperature: +14°F to +122°F

Media: Cryogenic



Valve Sizes 1/8" - 1/4"



Valve Sizes 3/8" - 2"

Selection Guide – Refer to flow data on next page

| Pipe Size | Orifice mm | Cv | P. Max (PSI) | OPD (PSI) | | Power Watts | Weight lbs. | Catalog Number |
|-----------|------------|------|--------------|-----------|---------|-------------|-------------|----------------|
| | | | | AC Coil | DC Coil | | | |
| 1/4" | 4.5 | 0.53 | 870 | 0-120 | 0-120 | 14.5 | 1.0 | 68-44-24-12 |
| 1/4" | 6.0 | 0.70 | 870 | 0-60 | 0-60 | 14.5 | 1.0 | 68-45-24-12 |
| 3/8" | 16.0 | 3.5 | 725 | 5-125 | 5-125 | 14.5 | 2.8 | 68 ACP3X |
| 1/2" | 16.0 | 4.9 | 725 | 5-125 | 5-125 | 14.5 | 2.8 | 68 ACP4X |
| 3/4" | 16.0 | 6.3 | 725 | 5-125 | 5-125 | 14.5 | 2.8 | 68 ACP6X |
| 1" | 25.0 | 8.3 | 725 | 5-125 | 5-125 | 14.5 | 5.0 | 68 ACP7X |
| 1-1/4" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.8 | 68 ACP8X |
| 1-1/2" | 30.0 | 20.9 | 725 | 5-125 | 5-125 | 14.5 | 6.8 | 68 ACP9X |
| 2" | 32.0 | 24.5 | 725 | 5-125 | 5-125 | 14.5 | 11.5 | 68 ACP10X |

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components

Operating Pressure Differential (OPD):

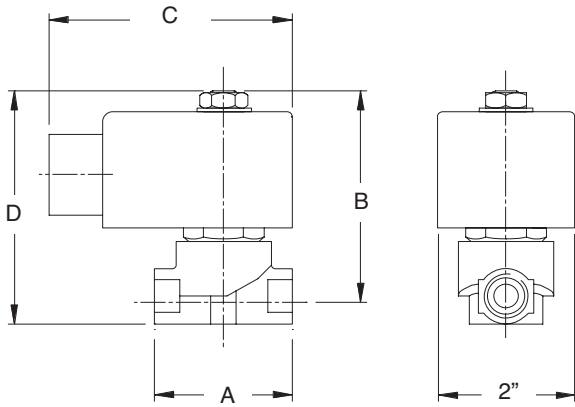
The differential pressure range between the inlet and outlet ports at which the valve can safely operate
 Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient

Zero Pressure Rated (refer to OPD):

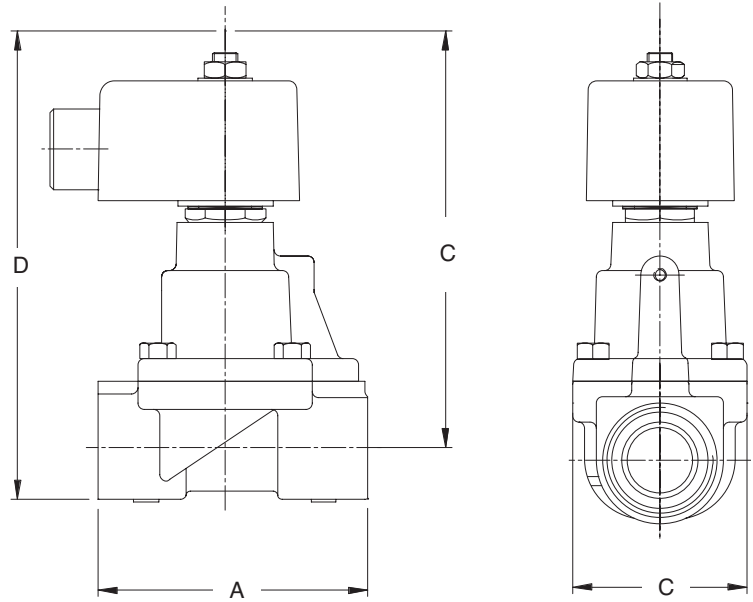
When the lower value of OPD is zero, the valve will operate without pressure differential
 Otherwise this value represents the minimum pressure differential required to operate the valve

Catalog Number:

Represents the valve in its standard (base) configuration. Optional specification combinations will modify this number accordingly - consult manufacturer for details



Valve Sizes 1/8" - 1/4"



Valve Sizes 3/8" - 2"

Dimensional Data

| Pipe Size | A | B | C | D |
|-----------------|---------|----------|---------|----------|
| 1/8" - 1/4" | 1-3/4" | 2-3/4" | 2-9/16" | 3-1/16" |
| 3/8" - 3/4" | 2-1/2" | 4-1/8" | 2-5/16" | 4-13/16" |
| 1" | 4-7/16" | 4-15/16" | 3-1/16" | 5-3/4" |
| 1-1/4" - 1-1/2" | 4-5/8" | 5-1/4" | 2-7/8" | 7-1/16" |
| 2" | 5-3/4" | 5-11/16" | 3-3/4" | 8-1/4" |

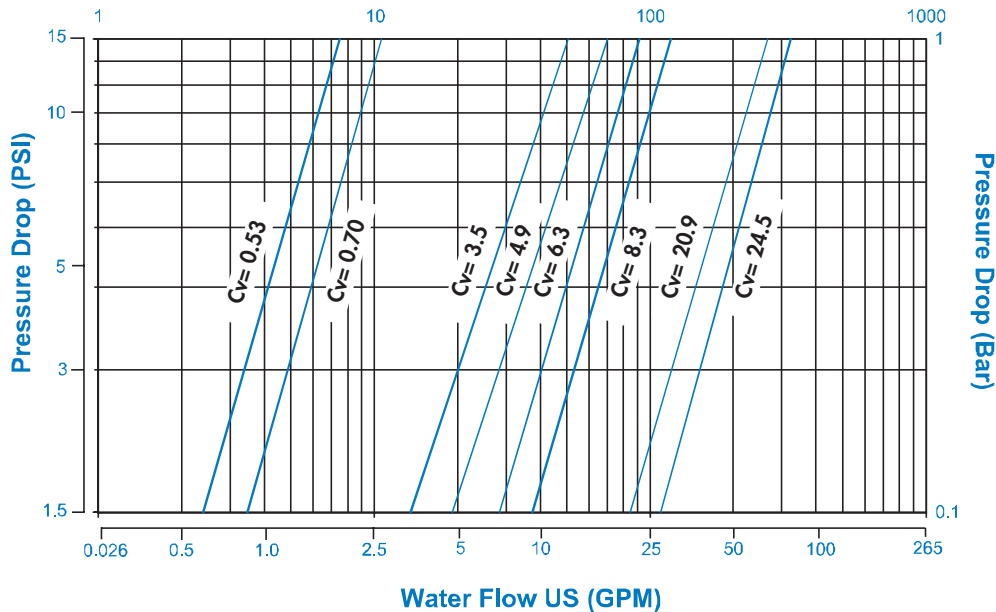
Special Purpose - Cryogenic

How to use Flow Chart based on Cv

1. Select the required flow, GPM.
2. Note the corresponding Cv and pressure drop.
3. Using Cv, (Refer to the *Selection Guide* on the previous page.), choose the desired valve by pipe size, Cv and Catalog Number.

68 Series Cryogenic

Water Flow (L/Min)



Features

- Special purpose solenoid valves are used for controlling gases or liquids where a potentially explosive gas/air mixture is present for long periods or likely to occur in normal operation.
- Alcon flameproof enclosures are suitable for hazardous areas Zone 1 and Zone 2, Class 1 Division 1, Class 2 Division 2, and may be used in the control of Groups IIA, IIB, IIC gases.

Applications

- Valves configured for Hazardous Areas, Do Not Qualify for UL Listing
- User to consult all applicable codes, such as N.E.C., for definitions, performance and safety requirements associated with Hazardous Area Classification, Apparatus Group, Zones, Divisions and Temperature Classifications.
- *Applicable to all catalog valves except UGB, U28 and UACF Series*

Technical Specification

| | |
|--|---|
| Power Consumption: | Up to 14.5 Watt 212v DC or Up to 19 VA 230VAC |
| Standard Material: | Aluminum with Stainless Steel Nameplate |
| Standard Finish: | Epoxy Painted |
| Optional Material: | Type 316 Stainless Steel with Stainless Steel Nameplate |
| Optional Finish: | Electro-polished, Corrosion Resistant |
| Standard Temperature Rating: | T6 within a -58°F to +104°F ambient range |
| Optional Temperature Rating: | T4 within a -58°F to +158°F ambient range |
| Electrical Entry: | 1/2" N.P.T. |
| Additional Weight; Standard Valve | 3.0 lbs |

31EExd

3 Way, Normally Closed



ACP10 EExd

2 Way, Normally Closed



TYPE 316 Stainless Steel EExd

Electro-polished



Aluminum EExd

Epoxy Painted



Special Purpose Valves

Features

- Alcon provides UL and CSA compliant explosion proof enclosures in a encapsulated coil mounted in a metal enclosure, offering NEMA 4 protection.
- Available in voltages 12v through to 240v AC & DC Coil is earthed via metal housing.

Applications

- Valves configured for Hazardous Areas, Do Not Qualify for UL Listing
- User to consult all applicable codes, such as N.E.C., for definitions, performance and safety requirements associated with Hazardous Area Classification, Apparatus Group, Zones, Divisions and Temperature Classifications.
- *Applicable to 21, ACDT, ACP, 31, 67, 5/2 and Namur Series*

Technical Specification

| | |
|-----------------------------|--|
| Protection Class: | Class I, DIV 2, Groups A & B Class I, DIV 1, Groups C & D Class II, DIV 1, Groups E, F & G |
| Temperature Class: | T3C |
| Ambient Temperature: | +32°F to +158°F |
| Power Consumption: | 7.3 Watts AC, 9.5 Watts DC |
| Standard Material: | Plated Steel Enclosure with Molded Coil |
| Electrical Entry: | 1/2" N.P.T. with 18" Flying Lead |

21EExd
2 Way Normally Closed

Explosion Proof Enclosures
EExd



Alcon engineering information describes the operation of the Alcon solenoid valves including:

Normally Closed (2/2 or N/C)

2 way, normally closed, energize to open, on/off operation (de-energize to close), with one inlet and one outlet connection. There are 2 types of valve operation, Direct Acting and Pilot Operated.

- a) **Direct Acting** - The coil supplies all the power to open the valve and the valve will operate from zero pressure.
- b) **Pilot Operated** - This can be either diaphragm or piston operated. These valves have a pilot hole which is opened/closed by the coil acting upon a plunger and diaphragm or piston used to control the main orifice. The operation relies on the media pressure difference between the inlet and outlet and a minimum operating pressure is required to operate these valves unless stated as zero.

Normally Open (2/2 or N/O)

2 way, normally open, energize to close, de-energize to open, with one inlet and one outlet connection. Available direct acting or pilot operated.

Normally Closed (3/2 or N/C)

Valve open when energized, closed when de-energized. This valve operates on the same principle as the 2/2 N/C version except the valve has 3 connections, 2 orifices, one normally open, one normally closed. The use of these are for operation of actuators for larger valves where a single cylinder spring return system is employed.

The other 3/2 options are:

Normally Open (3/2 or N/O)

Valve open when de-energized, closed when energized.

Universal (3/2 or UNI)

Valve may be used as normally closed, normally open or diversion/selector valve.

5/2

These valves are available in 2 forms:

- a) **Single solenoid** - 2 position, spool and sleeve type, which is based on an air pilot/spring return mechanism. When de-energized, the valve allows the inlet and one outlet to be connected, exhausting the other outlet connection through an exhaust port. When energized, the action reverses.
- b) **Dual solenoid valves** - These spool and sleeve type solenoid valves are momentary contact type. When one coil is energized, the inlet is connected to one outlet, with the other outlet connection connected to an exhaust port, when the coil is de-energized and other coil energized, the action is reversed. These valves are for use on double acting cylinder applications.

Manual Reset (Solenoid)

2/2 N/C Normally Closed

These valves operate on the same principle as 2/2 N/C direct acting version except - once the coil is energized the valve will not open until manually opened by either a lever or push reset device.

General uses of the above are for safety systems where knowledge of an electrical failure is required.

Temperature Relationship

If a valve is energized for long periods, this causes a temperature rise in the coil.

Applications whereby a high ambient and high temperature media exist can be reviewed with the manufacturer to ensure combined temperatures do not exceed valve operational parameters.

Duty and Protection Class

Alcon Solenoid Valves have coils suitable for continuous duty (100% ED). The normal voltage tolerance is +/- 10%

Enclosure Protection - Non-Hazardous Locations

Comparison of American NEMA classification & European IP classification

| Nema Type & Relevant Tests | Description | Equiv. Degree of Protection |
|----------------------------|---|-----------------------------|
| 1 | General Purpose - Indoor | IP 30 |
| *2 | Drip proof - Indoor | IP 32 |
| 3 | Dust tight and Rain tight - Outdoor | IP 54 |
| 3R | Rain proof - Outdoor | IP 54 |
| *4 | Water tight and Dust tight - Indoor and Outdoor | IP 65 IP 65 |
| 4X | Dust tight, Water tight and corrosion resistant Indoor and Outdoor | IP 65 IP 65 |
| *6 | Submersible, Water tight and Dust tight - Indoor and Outdoor | IP 67 IP 67 |
| 12 | Industrial Use. Dust tight and Drip proof - Indoor | IP 52 |
| 13 | Oil tight and Dust tight - Indoor | IP 55 |

*Refer to Alcon Standard Enclosures NEMA 2, 4 or 6.

Quality Assurance

Alcon Solenoid Valves are manufactured in compliance with current ISO standards.

Each valve is 100% pressure tested for positive shut-off and "no-leak" to atmosphere.

Each valve is individually packaged and fully thread protected with port caps.

Flow Data

Alcon solenoid valves are cataloged with respect to flow: Cv, ft³/hr or lbs/hr. Individual flow charts are illustrated in the catalog for each type of Alcon valve describing the most common application - air, water, gas or steam.

Where Cv is defined as:

The flow of water through a valve at 60° F in US gallon/minute at a pressure drop of 1 lb/in²

The dimensions of Kv values can be transposed by means of following factors:

$$C_v = 1.16 \times K_v$$

$$K_v = 0.853 \times C_v$$

Where Kv is defined as:

1 cubic meter an hour of water with a pressure drop of 1 bar (m³/hr Δp1 bar). (1 m³/hr = 1000 liters per hour).

Pressure Ratings

P. Max:

The maximum pressure a valve can be subjected to without causing damage to the valve components.

Operating Pressure Differential (OPD):

The differential pressure range between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage in a 80°F ambient.

Zero Pressure Rated (refer to OPD):

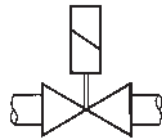
When the lower value of OPD is zero, the valve will operate without pressure differential. Otherwise this value represents the minimum pressure differential required to operate the valve.

Mounting

Alcon valves are generally suitable for Universal mounting which means that the valve can be mounted in a horizontal or vertical pipeline.

Preferred mounting arrangements are noted below

- a) Solenoid vertical and uppermost; valve to be fitted to horizontal pipe with solenoid vertical.



- b) Consult manufacturer for additional details regarding other mounting arrangements.
- c) For all liquid applications, the use of a pipeline strainer provided by others, is recommended.
- d) All Alcon valves are permanently stamped with directional flow arrows or port numbering indicating proper flow direction. Valves must be installed in accordance with these markings for proper functionality.

Water Hammer Protection

It is advised that where high flow rates are encountered, an accumulator/anti-knock/damper device should be installed immediately upstream of the solenoid valve.

Alcon Corrosion Resistance Guide

Please note that this chart is for general recommendation only. When ordering valves for corrosive duty application details are to be given, particularly, media, % concentration, temperature and ambient temperature. For additional support please contact Alcon.

Corrosion Reference Guide

| Material | Valve Body | | | | | Seals | | | | *Notes |
|----------------------------|------------|-------|-----|----|-----------|---------|------|-------|------|--------|
| | Alum | Brass | Brz | Cl | Stainless | Nitrile | EPDM | Viton | PTFE | |
| Acetic Acid 10% | NR | NR | NR | NR | • | NR | • | NR | • | 1 |
| Acetone | • | • | • | • | • | NR | • | NR | • | |
| Acetylene | NR | • | • | NR | • | NR | • | • | • | 1 |
| Air | • | • | • | • | • | • | • | • | • | |
| Ammonia Gas Anhydrous 20% | NR | NR | NR | • | • | NR | • | NR | • | |
| Argon Gas | • | • | • | NR | • | NR | • | • | • | |
| Beer | NR | NR | NR | NR | • | • | • | • | NR | |
| Benzene | • | • | • | NR | • | NR | NR | • | • | |
| Bromine (Liquid) | NR | NR | NR | NR | NR | NR | NR | • | NR | 1 |
| Butane | • | • | • | • | • | • | NR | • | • | |
| Carbon Dioxide (Gas) | • | • | • | • | • | • | • | • | • | |
| Carbon Dioxide (Liquid) | NR | NR | NR | NR | • | NR | NR | NR | • | |
| Carbon Tetrachloride (Dry) | NR | • | • | NR | • | NR | NR | • | • | |
| Carbonated water | NR | NR | NR | NR | • | • | • | NR | • | |
| Caustic Soda 30% | NR | NR | NR | NR | • | NR | • | NR | • | |
| Chrome Acid 20% - 20C | NR | NR | NR | NR | • | NR | NR | • | • | |
| Chlorine Gas (Dry) | NR | NR | NR | NR | NR | NR | NR | • | • | 1 |
| Chlorine Liquid | NR | NR | NR | NR | NR | NR | NR | • | • | 1 |
| Chlorine in Water | NR | • | • | NR | • | • | • | NR | • | 2 |
| Coke Oven Gas | • | NR | NR | • | • | • | NR | NR | • | |
| Coolant | NR | • | • | NR | • | • | NR | • | • | |
| Creosote | • | NR | NR | NR | • | NR | NR | • | • | |
| Crude Oil | • | NR | NR | NR | • | • | NR | • | • | |
| De-ionized Water | NR | NR | NR | NR | • | • | • | • | • | |
| De-mineralized Water | NR | NR | NR | NR | • | • | • | • | • | |
| Detergents | NR | • | • | NR | • | • | • | • | • | |
| Diesel Oil | • | • | • | • | • | • | NR | • | • | |
| Distilled Water | NR | • | • | NR | • | • | • | • | • | |
| Ethyl Alcohol | NR | • | • | NR | • | • | • | • | • | |
| Ethylene Glycol | • | • | • | NR | • | • | • | • | • | |
| Ethylene Oxide | NR | NR | NR | NR | • | NR | NR | NR | NR | 1 |
| Food products | NR | NR | NR | NR | • | • | NR | • | NR | |
| Freon 12 | NR | • | • | • | • | NR | NR | NR | • | |
| Freon 22 | NR | NR | NR | NR | • | NR | NR | NR | • | |
| Freon Solvents | NR | • | • | NR | • | • | NR | NR | • | |
| Fuel Oil | • | • | • | NR | • | • | NR | • | • | |
| Gasoline | NR | • | • | NR | • | NR | NR | • | • | |
| Helium | • | • | • | NR | • | • | • | • | • | |
| Hydraulic Fluids | NR | • | • | NR | • | NR | NR | • | • | |
| Hydrochloric Acid | NR | NR | NR | NR | NR | NR | NR | NR | • | 1 |
| Hydrogen Gas | • | • | • | • | • | • | • | • | • | 3 |
| Hydrogen Sulphide (Dry) | NR | NR | NR | NR | • | NR | • | • | • | |
| Jet Fuel | • | NR | NR | NR | • | • | NR | • | • | |
| Kerosene | • | • | • | • | • | • | NR | • | • | |

| Material | Valve Body | | | | | Seals | | | | *Notes |
|--------------------------|------------|-------|-----|----|-----------|---------|------|-------|------|--------|
| | Alum | Brass | Brz | Cl | Stainless | Nitrile | EPDM | Viton | PTFE | |
| LPG | • | • | • | NR | • | • | NR | • | • | |
| Lubricating Oil | • | • | • | • | • | NR | • | • | • | |
| Methane Gas | • | • | • | • | • | • | NR | • | • | |
| Methyl Alcohol | NR | • | • | • | • | • | • | • | • | |
| Mineral Oil | • | • | • | • | • | • | NR | • | • | |
| Natural Gas | • | • | • | • | • | • | • | • | • | |
| Natural Gas Liquid | NR | • | • | NR | • | NR | NR | NR | • | 3 |
| Nitric Acid 50% 20C | NR | NR | NR | NR | • | NR | NR | • | • | |
| Nitrogen Gas | • | • | • | • | • | • | • | • | • | |
| Nitrogen Liquid | NR | • | • | NR | • | NR | NR | NR | • | 3 |
| Nitrous Oxide | NR | NR | NR | NR | • | NR | • | NR | • | |
| Oxygen Gas | NR | • | • | NR | • | NR | NR | • | • | 3 |
| Oxygen Liquid | NR | • | • | NR | • | NR | NR | NR | • | 3 |
| Paraffin | • | • | • | NR | • | • | • | • | • | |
| Perchlrenthylene 20C | NR | • | • | NR | • | NR | NR | • | • | |
| Phosphoric Acid 30% | NR | NR | NR | • | NR | NR | • | • | • | 1 |
| Photographic Solution | NR | NR | NR | NR | NR | NR | NR | NR | • | 1 |
| Potable water | NR | • | • | NR | • | • | • | • | • | |
| Potassium Sulphate | NR | NR | NR | • | • | • | • | • | • | |
| Propane | • | • | • | NR | • | • | NR | • | • | |
| Salt Water | NR | NR | • | NR | • | • | • | • | • | 1 |
| Sea Water | NR | NR | • | NR | • | • | • | • | • | 1 |
| Soapy Water | NR | • | • | NR | • | • | NR | • | • | |
| Sodium Hydroxide 70% | NR | NR | NR | NR | • | NR | • | • | • | |
| Sodium Hypochlorite 5% | NR | NR | NR | NR | • | NR | • | • | • | |
| Steam 0 - 50 PSI | NR | • | • | NR | • | NR | • | NR | • | |
| Steam 0 - 125 PSI | NR | • | • | NR | • | NR | NR | NR | • | |
| Steam Condensate | NR | • | • | NR | • | NR | • | NR | • | |
| Sulphur Dioxide | NR | NR | NR | NR | • | NR | • | NR | • | |
| Sulphuric Acid 40% | NR | NR | NR | NR | NR | • | • | • | • | 1 |
| Sulphurous Acid 5% - 20C | NR | NR | NR | NR | NR | NR | NR | • | • | 1 |
| Toluene | • | • | • | NR | • | NR | NR | NR | • | |
| Town Gas | • | • | • | • | • | • | NR | • | • | |
| Trichlorethylene (Dry) | NR | NR | NR | NR | • | NR | NR | • | • | |
| Turpentine | • | • | • | NR | • | • | NR | • | • | |
| Vegetable Oil | NR | NR | NR | NR | • | • | NR | • | • | |
| Vinegar | NR | NR | NR | NR | • | NR | • | NR | • | 1 |
| Water (Mains) | NR | • | • | • | • | • | • | • | • | |
| Water 80 - 120°C | NR | • | • | NR | • | NR | • | • | • | |
| Water 120 - 150°C | NR | • | • | NR | • | NR | NR | • | • | |
| Water 150 - 180°C | NR | • | • | NR | • | NR | NR | NR | • | |
| Water Boiler Feed | NR | NR | NR | NR | • | • | • | NR | • | |
| Water/Glycol Solutions | NR | • | • | NR | • | NR | • | • | • | |
| White Spirit | • | • | • | • | • | NR | NR | • | • | |

• = Recommended
NR = Not Recommended

Notes:

1. Non-standard materials of construction are required. Consult factory for details, price and availability.
2. Chlorine must not exceed 5 parts per million
3. Alcon is required to provide industry standard degreasing, cleaning and individual packaging with appropriate label. Consult factory for details, price and availability.

Viscosity Conversion Table

| Redwood 1 (seconds) | Redwood 11 (seconds) | Saybolt Universal SSU (seconds) | Saybolt Furol (seconds) | Engler (degrees) | Kinematic (centistokes) |
|------------------------|-------------------------|------------------------------------|----------------------------|---------------------|----------------------------|
| 30 | - | - | - | 1.05 | 1.5 |
| 32 | - | 34 | - | 1.15 | 2.5 |
| 34 | - | 37 | - | 1.25 | 3.4 |
| 36 | - | 40 | - | 1.3 | 4.2 |
| 38 | - | 42 | - | 1.4 | 5.0 |
| 40 | - | 45 | - | 1.45 | 5.7 |
| 45 | - | 50 | - | 1.6 | 7.5 |
| 50 | - | 57 | - | 1.8 | 9.4 |
| 55 | - | 62 | - | 1.9 | 11.0 |
| 60 | - | 68 | - | 2.1 | 12.6 |
| 65 | - | 74 | - | 2.2 | 14.2 |
| 70 | - | 79 | - | 2.4 | 15.5 |
| 75 | - | 85 | - | 2.6 | 17.0 |
| 80 | - | 92 | - | 2.7 | 18.6 |
| 85 | - | 98 | - | 2.9 | 20.0 |
| 90 | - | 103 | - | 3.0 | 21.3 |
| 95 | - | 109 | - | 3.2 | 22.8 |
| 100 | - | 115 | 15 | 3.4 | 24.1 |
| 110 | - | 125 | 16 | 3.7 | 26.7 |
| 120 | - | 137 | 17 | 4.0 | 29.2 |
| 130 | - | 148 | 18 | 4.3 | 31.7 |
| 140 | - | 160 | 20 | 4.6 | 34.2 |
| 150 | - | 171 | 21 | 4.9 | 36.8 |
| 160 | - | 183 | 22 | 5.2 | 39 |
| 180 | - | 205 | 24 | 5.9 | 44 |
| 200 | - | 228 | 26 | 6.5 | 49 |
| 225 | - | 256 | 28 | 7.3 | 55 |
| 250 | - | 285 | 31 | 8.1 | 62 |
| 275 | - | 313 | 34 | 8.9 | 68 |
| 300 | - | 342 | 37 | 9.8 | 74 |
| 325 | 34 | 370 | 40 | 10.6 | 80 |
| 350 | 36 | 399 | 42 | 11.4 | 86 |
| 375 | 38 | 428 | 45 | 12.2 | 93 |
| 400 | 41 | 456 | 48 | 13.0 | 99 |
| 450 | 46 | 513 | 53 | 14.7 | 111 |
| 500 | 51 | 570 | 59 | 16.3 | 124 |
| 550 | 56 | 628 | 65 | 17.9 | 136 |
| 600 | 61 | 684 | 71 | 19.5 | 148 |
| 700 | 71 | 799 | 82 | 22.8 | 173 |
| 800 | 81 | 912 | 94 | 26.1 | 198 |
| 900 | 91 | 1 025 | 105 | 29.3 | 222 |
| 1 000 | 100 | 1 142 | 117 | 32.6 | 247 |
| 1 100 | 110 | 1 257 | 128 | 35.9 | 272 |
| 1 200 | 120 | 1 368 | 140 | 39 | 296 |
| 1 400 | 140 | 1 599 | 163 | 46 | 346 |
| 1 600 | 160 | 1 825 | 186 | 52 | 395 |
| 1 800 | 180 | 2 050 | 209 | 59 | 444 |
| 2 000 | 200 | 2 280 | 232 | 65 | 493 |
| 2 200 | 220 | 2 510 | 255 | 72 | 534 |
| 2 400 | 240 | 2 735 | 278 | 78 | 592 |
| 2 600 | 260 | 2 965 | 302 | 85 | 642 |
| 2 800 | 280 | 3 190 | 325 | 91 | 691 |
| 3 000 | 300 | 3 420 | 348 | 98 | 741 |
| 3 500 | 350 | 3 990 | 406 | 114 | 864 |
| 4 000 | 400 | 4 560 | 464 | 130 | 987 |
| 4 500 | 450 | 5 140 | 522 | 147 | 1 112 |
| 5 000 | 500 | 5 700 | 580 | 163 | 1 235 |
| 5 500 | 550 | 6 280 | 639 | 179 | 1 359 |
| 6 000 | 600 | 6 840 | 696 | 195 | 1 482 |
| 6 500 | 650 | 7 415 | 754 | 212 | 1 605 |
| 7 000 | 700 | 7 990 | 814 | 228 | 1 730 |
| 7 500 | 750 | 8 550 | 869 | 244 | 1 850 |
| 8 000 | 800 | 9 120 | 928 | 261 | 1 957 |

Note: This table may be used only for conversion of fluid viscosities at the same temperature.

Force & Velocity

| | From | To | Multiply by |
|--------------------|--------------------|-----------------------|--------------------------|
| 1.488 | kg/m | lb.p.ft. | 0.672 |
| 0.496 | kg/m | lb.p.yd. | 2.016 |
| 1.575 | kg/mm ² | ton p.sq.in (Britain) | 0.635 |
| 1.406 | kg/mm ² | ton p.sq.in (USA) | 0.7112 |
| 0.07031 | kg/cm ² | lb.p.sq.in. | 14.223 |
| 4.883 | kg/m ² | lb.p.sq.ft. | 0.2048 |
| 0.5425 | kg/m ² | lb.p.sq.yd. | 1.843 |
| 0.0277 | kg/cm ³ | lb.p.cu.in. | 36.1271 |
| 16.018 | kg/m ³ | lb.p.cu.ft. | 0.0624 |
| 0.5933 | kg/m ³ | lb.p.cu.yd. | 1.6855 |
| 0.00508 | m/s | ft.p.min. | 196.851 |
| 1.699 | m ³ /h | cu.ft.p.min. | 0.5885794 |
| 0.1383 | kgm | ft-lb | 7.233 |
| 309.7 | kgm | ft.ton (Britain) | 0.003229 |
| 276.5 | kgm | ft.ton (USA) | 0.003617 |
| 107.6 | kgm | B.T.U. | 9.2956 x 10 ³ |
| 0.138255 | kgm/s | ft-lb.p.sec. | 7.233 |
| 76.04 | kgm/s | HP | 0.013151 |
| 1.0139 | PS | HP | 0.9863 |
| 270 000 | kgm | PS/h | 3.7037 x 10 ⁶ |
| 273750 | kgm | HP/h | 3.6529 x 10 ⁶ |
| 75 | kgm/s | PS | 0.01333 |
| 102.03 | kgm/s | kW | 0.0098013 |
| 0.27778 | mm/s | m.p.h. | 3-6 |
| 0.00054 | knots | m.p.h. | 1 852 |
| 1.94386 | knots | m.p.s. | 0.51444 |
| 0.000494 | knots | yd.p.h. | 2 025-35 |
| 0.1781 | kcal/s | HP | 5.6148 |
| Multiply by | To | From | |

General Heat Conversions

| | From | To | Multiply by |
|---------------------------|----------------------|----------------|-------------|
| 0.0023425 | kcal | kgm | 426.9 |
| 3.2386 x 10 ⁴ | kcal | ft.lb. | 3087.8 |
| 0.1757 | kcal/s | PS | 5.692 |
| 0.1781 | kcal/s | HP | 5.6148 |
| 0.2390057 | kcal/s | kW | 4.184 |
| 0.7351 | kW | PS | 1.3604 |
| 0.7452926 | kW | HP | 1.341755 |
| 0.0013551 | kW | lt.lb.sec. | 737.97 |
| 0.0011628 | kWh | kcal | 860 |
| 2.9289 x 10 ⁻⁴ | kWh | B.T.U. | 3412.74 |
| 2.7225 x 10 ⁻⁴ | kWh | kgm | 367.310 |
| 3.7647 | kWh | ft-lb | 2.656 700 |
| 0.252 | kcal | B.T.U. | 3 9683 |
| 0.5556 | kcal/kg | B.T.U.p.lb. | 1.8 |
| 0.0391 | kcal/cm ² | B.T.U.p.sq.in. | 25.59 |
| 2.712 | kcal/m ² | B.T.U.p.sq.ft. | 0.3686 |
| 0.01538 | kcal/m ² | B.T.U.p.cu.in. | 65.02 |
| 8.899 | kcal/m ³ | B.T.U.p.cu.ft. | 0.1124 |
| Multiply by | To | From | |

Temperature Conversions

| From | To | Substitute in Formula |
|--------------------|--------------------|-----------------------|
| Degrees Celsius | Degrees Fahrenheit | (°C x 9/5) + 32 |
| Degrees Celsius | Kelvin | (°C + 273.16) |
| Degrees Fahrenheit | Degrees Celsius | (°F - 32) x 5/9 |
| Degrees Fahrenheit | Degrees Rankin | (°F + 459.69) |

Head and Pressure

| | kPa (kNm ²) | Water | | bar | kg/cm ² | ibf/in ² (psi) | atmos | Mercury (Hg) | |
|-----------------------|----------------------------|---------|--------|----------|--------------------|------------------------------|----------|--------------|--------|
| | | m | ft | | | | | mm | inch |
| 1kPa | 1 | 0.101 | 0.335 | 0.009 93 | 0.0101 | 0.145 | 0.009 81 | 7.44 | 0.2953 |
| 1 m | 9.81 | 1 | 3.281 | 0.098 | 0.0999 | 1.422 | 0.0968 | 73.55 | 2.836 |
| 1 ft | 2.989 | 0.3048 | 1 | 0.029 89 | 0.0305 | 0.434 | 0.0295 | 22.42 | 0.882 |
| 1 bar | 100 | 10.2 | 33.445 | 1 | 1.0197 | 14.504 | 0.987 | 750 | 29.530 |
| 1 kgf/cm ² | 98.1 | 10.0 | 32.809 | 0.981 | 1 | 14.223 | 0.968 | 735.56 | 28.959 |
| 1 psi | 6.895 | 0.703 | 2.307 | 0.069 | 0.070 | 1 | 0.068 | 51.714 | 2.036 |
| 1 atmos | 101.32 | 10.34 | 33.9 | 1.0132 | 1.0332 | 14.696 | 1 | 760 | 29.92 |
| 1 mm | 13.4 | 0.0136 | 0.0446 | 0.1333 | 0.136 | 0.0193 | 0.132 | 1 | 0.0394 |
| 1 inch | Mercury 3.3864 | 0.34534 | 1.133 | 0.0338 | 0.0345 | 0.491 | 0.0334 | 25.4 | 1 |

Capacity & Flow Rate

| | m ³ /h | l/s | l/m | m ³ /s (cumec) | UK gpm | US gpm | ft ³ /sec | Water | |
|----------------------|-------------------|--------|--------|------------------------------|--------|--------|----------------------|----------|---------|
| | | | | | | | | UK ton/h | tonne/h |
| 1 m ³ /h | 1 | 0.278 | 16.66 | 0.000278 | 3.666 | 4.40 | 0.009 81 | 0.982 | 1.000 |
| 1 l/s | 3.60 | 1 | 60 | 0.001 | 13.2 | 15.83 | 0.0353 | 3.528 | 3.60 |
| 1 l/m | 0.060 | 0.0167 | 1 | 1.666 x 10 ⁻⁵ | 0.2199 | 0.264 | 0.000588 | 0.059 | 0.060 |
| 1 m ³ /s | 3600 | 1000 | 60,000 | 1 | 13,000 | 15,800 | 35,315 | 3532 | 3600 |
| 1 UK gpm | 0.272 | 0.0757 | 4.546 | 0.000 0757 | 1 | 1.2 | 0.002 267 | 0.268 | 0.272 |
| 1 US gpm | 0.227 | 0.0632 | 3.785 | 0.0000630 | 0.833 | 1 | 0.002 23 | 0.223 | 0.227 |
| 1 ft ³ /s | 101.9 | 28.32 | 1698 | 0.0283 | 374 | 449 | 1 | 100 | 101.9 |
| 1 UK ton/h | Water 1.02 | 0.283 | 17 | 0.000283 | 3.73 | 4.48 | 0.010 | 1 | 1.02 |
| 1 tonne/h | 1.005 | 0.278 | 16.7 | 0.000 278 | 3.666 | 4.41 | 0.0098 | 0.980 | 1 |

Volume Conversions

| To Obtain | Cubic Decimeters (Liters) | Cubic Inches | Cubic Feet | U.S. Quart | U.S. Gallon | Imperial Gallon | U.S. Barrel (Petroleum) |
|---------------------------|---------------------------|--------------|------------|------------|-------------|-----------------|-------------------------|
| Cubic Decimeters (Liters) | 1 | 61.0234 | 0.03531 | 1.05668 | 0.264178 | 0.220083 | 0.00629 |
| Cubic Inches | 0.01639 | 1 | 5.787x10 | 0.17332 | 0.004329 | 0.003606 | 0.000003 |
| Cubic Feet | 28.317 | 1728 | 1 | 29.9221 | 7.48055 | 6.22888 | 0.1781 |
| U.S. Quart | 0.94636 | 57.75 | 0.03342 | 1 | 0.25 | 0.2082 | 0.00595 |
| U.S. Gallon | 3.78543 | 231 | 0.13368 | 4 | 1 | 0.833 | 0.02381 |
| Imperial Gallon | 4.54374 | 277.274 | 0.16054 | 4.80128 | 1.20032 | 1 | 0.02877 |
| U.S. Barrel (Petroleum) | 158.98 | 9702 | 5.6146 | 168 | 42 | 34.973 | 1 |

1 cubic meter = 1,000,000 cubic centimeters
1 litre = 1,000 milliliters = 1,000 cubic centimeters

Length Conversions

| To Obtain | Meters | Inches | Feet | Millimeters | Miles | Kilometers |
|-------------|---------|---------|-----------|-------------|--------------|------------|
| Meters | 1 | 39.37 | 3.2808 | 1000 | 0.0006214 | 0.001 |
| Inches | 0.0254 | 1 | 0.0833 | 25.4 | 0.00001578 | 0.0000254 |
| Feet | 0.3048 | 12 | 1 | 304.8 | 0.0001894 | 0.0003048 |
| Millimeters | 0.001 | 0.03937 | 0.0032808 | 1 | 0.0000006214 | 0.000001 |
| Miles | 1609 35 | 63,360 | 5,280 | 1,609,350 | 1 | 1.60935 |
| Kilometers | 1000 | 39,370 | 3,280.83 | 1,000,000 | 0.62137 | 1 |

1 meter = 100 centimeters = 1000 millimeters = 0.001 kilometers = 1,000,000 micrometers
To convert metric units merely adjust the decimal point.
1 centimeter = 10 millimeters 1 inch = 2.54 centimeters = 25.4 millimeters

Conversion Charts

Pressure Conversions

| To Obtain Multiply by Number of | Pounds per Square Inch | Inches of Water Column | Feet of Water Column | Inches of Mercury | Ounces per Square Inch | Bar | Millibar | Kilopascals | Kilograms per Square Centimeter |
|---------------------------------------|------------------------|------------------------|----------------------|-------------------|------------------------|----------|----------|-------------|---------------------------------|
| Pounds Per Square Inch | 1 | 27.68 | 2.307 | 2.036 | 16 | 0.06895 | 68.95 | 6.895 | 0.0703 |
| Inches of Water Column | 0.0361 | 1 | 0.8333 | 0.7355 | 0.5776 | 0.002491 | 2.491 | 0.2491 | 0.00254 |
| Feet of Water Column | 0.4336 | 12 | 1 | 0.8826 | 6.936 | 0.02989 | 29.89 | 2.989 | 0.0305 |
| Inches of Mercury | 0.4911 | 13.60 | 1.133 | 1 | 7.858 | 0.03386 | 33.86 | 3.386 | 0.03453 |
| Ounces per Square Inch | 0.9625 | 1.73 | 0.144 | 0.127 | 1 | 0.00431 | 4.309 | 0.4309 | 0.0044 |
| Bar | 14.50 | 401.5 | 33.45 | 29.53 | 232 | 1 | 1000 | 100 | 1.020 |
| Millibar | 0.0145 | 0.4015 | 0.03345 | 0.02953 | 0.232 | 0.001 | 1 | 0.100 | 0.00102 |
| Kilopascals | 0.1450 | 4.015 | 0.3345 | 0.2953 | 2.32 | 0.01 | 10 | 1 | 0.0102 |
| Kilograms per Square Centimeter | 14.22 | 393.7 | 32.81 | 28.96 | 227.5 | 0.9807 | 980.7 | 98.07 | 1 |

Volumetric Rate of Flow Conversions

| To Obtain Multiply by Number of | Liters per Second | Liters per Minute | Cubic Meters per Hour | Cubic Feet per Hour | Gallons per Minute | Imperial Gallons per Minute | U.S. Gallons per Minute | U.S. Barrels per Day (42 U.S. Gal) |
|---------------------------------------|-------------------|-------------------|-----------------------|---------------------|--------------------|-----------------------------|-------------------------|------------------------------------|
| Liters per Second | 1 | 60 | 3.600 | 127.1 | 21.19 | 13.20 | 15.85 | 543.4 |
| Liters per Minute | 0.1667 | 1 | 0.06000 | 2.119 | 0.03532 | 0.2200 | 0.2642 | 9.057 |
| Cubic Meters per Hour | 0.2778 | 16.67 | 1 | 35.31 | 0.5886 | 3.666 | 4.403 | 150.9 |
| Cubic Feet per Hour | 0.007865 | 0.4719 | 0.02832 | 1 | 0.01667 | 0.1038 | 0.1247 | 4.275 |
| Cubic Feet per Minute | 0.4719 | 28.32 | 1.6999 | 60.00 | 1 | 6.229 | 7.481 | 256.5 |
| Imperial Gallons per Minute | 0.07577 | 4.546 | 0.2727 | 9.633 | 0.1606 | 1 | 1.201 | 41.17 |
| U.S. Gallons per Minute | 0.06309 | 3.785 | 0.2271 | 8.021 | 0.1337 | 0.8327 | 1 | 34.29 |
| U.S. Barrels per Day | 0.001840 | 0.1104 | 0.006624 | 0.2339 | 0.003899 | 0.02428 | 0.02917 | 1 |

Velocity Conversions

| To Obtain Multiply by Number of | Feet per Second | Feet per Minute | Miles per Hour | Meters per Second | Meters per Minute | Kilometers per Hour |
|---------------------------------------|-----------------|-----------------|----------------|-------------------|-------------------|---------------------|
| Feet per Second | 1 | 60.00 | 0.6818 | 0.3048 | 18.29 | 1.097 |
| Feet per Minute | 0.01667 | 1 | 0.01136 | 0.005080 | 0.3048 | 0.01829 |
| Miles per Hour | 1.467 | 88.00 | 1 | 0.4470 | 26.82 | 1.609 |
| Meters per Second | 3.280 | 196.9 | 2.237 | 1 | 60.00 | 3.600 |
| Meters per Minute | 0.05468 | 3.281 | 0.03728 | 0.01667 | 1 | 0.06000 |
| Kilometers per Hour | 0.9113 | 54.68 | 0.6214 | 0.2778 | 16.67 | 1 |

Torque Conversions

| To Obtain Multiply by Number of | Newton Meters | Kilogram Force Meters | Foot Pounds | Inch Pounds |
|---------------------------------------|---------------|-----------------------|-------------|-------------|
| Newton Meters | 1 | 0.1020 | 0.7376 | 8.851 |
| Kilogram Force Meters | 9.807 | 1 | 7.233 | 86.80 |
| Foot Pounds | 1.356 | 0.1383 | 1 | 12.00 |
| Inch Pounds | 0.1130 | 0.01152 | 0.8333 | 1 |

Force Conversions

| To Obtain Multiply by Number of | Kilonewtons | Kilogram Force | Pound Force | Poundals |
|---------------------------------------|-------------|----------------|-------------|----------|
| Kilonewtons | 1 | 102.0 | 224.8 | 7233 |
| Kilogram Force | 0.009807 | 1 | 2.205 | 70.93 |
| Pound Force | 0.004448 | 0.4536 | 1 | 32.17 |
| Poundals | 0.0001383 | 0.01410 | 0.03108 | 1 |

Area Conversions

| To Obtain Multiply by Number of | Square Meters | Square Inches | Square Feet | Square Miles | Square Kilometers |
|---------------------------------------|---------------|---------------|--------------------------|---------------------------|---------------------------|
| Square Meters | 1 | 1549.99 | 10.7639 | 3.861 x 10 ⁻⁷ | 1 x 10 ⁶ |
| Square Inches | 0.0006452 | 1 | 6.944 x 10 ⁻³ | 2.491 x 10 ⁻¹⁰ | 6.452 x 10 ⁻¹⁰ |
| Square Feet | 0.0929 | 144 | 1 | 3.587 x 10 ⁻⁸ | 9.29 x 10 ⁻⁸ |
| Square Miles | 2,589.999 | | 27,878.400 | 1 | 2.59 |
| Square Kilometers | 1,000,000 | | 10,763,867 | 0.3861 | 1 |

1 square meter = 10,000 square centimeters
1 square millimeter = 001 square centimeter = 0.00155 square inches

Density Conversions

| To Obtain Multiply by Number of | Grams per Milliliter | Kilogram per Cubic Metre | Pounds per Cubic Foot | Pounds per Cubic Inch |
|---------------------------------------|----------------------|--------------------------|-----------------------|-----------------------|
| Grams per Milliliter | 1 | 1000 | 62.43 | 0.03613 |
| Kilograms per Cubic Meter | 0.001000 | 1 | 0.06243 | 0.00003613 |
| Pounds per Cubic foot | 0.01602 | 16.02 | 1 | 0.0005787 |
| Pounds per Cubic Inch | 27.68 | 27,680 | 1728 | 1 |

Orifice Sizes -

Common ORIFICE sizes and ISO equivalents in mm.

| Inches | mm | Inches | mm |
|-----------------|------|-----------------|-------|
| 3/64" (0.0469) | 1.19 | 7/16" (0.4375) | 11.11 |
| 1/8" (0.0625) | 1.59 | 1/2" (0.5000) | 12.70 |
| 5/64" (0.0781) | 1.98 | 5/8" (0.6250) | 15.88 |
| 3/32" (0.0937) | 2.38 | 11/16" (0.6875) | 17.46 |
| 1/8" (0.1250) | 3.18 | 3/4" (0.7500) | 19.05 |
| 5/32" (0.1562) | 3.97 | 1" (1.0000) | 25.40 |
| 11/64" (0.1719) | 4.37 | 1-1/8" (1.1250) | 28.58 |
| 3/16" (0.1875) | 4.76 | 1-1/4" (1.2500) | 31.75 |
| 7/32" (0.2187) | 5.55 | 1-1/2" (1.5000) | 38.10 |
| 1/4" (0.2500) | 6.35 | 1-3/4" (1.7500) | 44.45 |
| 9/32" (0.2812) | 7.14 | 2" (2.0000) | 50.80 |
| 5/16" (0.3125) | 7.94 | 3" (3.0000) | 76.20 |

ALCON PRODUCT CATALOG

Alcon Product Catalog provides product guidelines for further investigation by users having technical expertise. The user, through their own analysis, is solely responsible for the final selection of their products ensuring that all performance, safety and warning requirements of the application are met. Manufacturer cannot accept any liability associated with product selection or the application of product.

Consistent with Manufacturer's policy of Constant Product Improvement, Manufacturer reserves the right to change products and associated information, as described herein or at any time without prior notice.

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All warnings must be read and understood before designing a system utilizing, installing, servicing, or removing Alcon product. Improper use, installation or servicing of Alcon product could create a hazard to personnel and property.

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Do not install or service any Alcon product on a system or machine without first depressurizing the system and turning off any air, fluid, or electricity to the system or machine. If damage should occur to an Alcon product, do not operate the system containing the Alcon product until proper repair or replacement is performed.

LIMITED PRODUCT WARRANTY

Products sold by Manufacturer are warranted to be free from defective material and workmanship for a period of 12 months from date of shipment or 18 months from date of manufacture, whichever ever occurs first, provided said items are used in accordance with Manufacturer's specifications. This warranty does not extend to damages that result from misuse, neglect, accident, abuse, or improper handling. The warranty will be void if the product has been subject to unauthorized repair or modification.

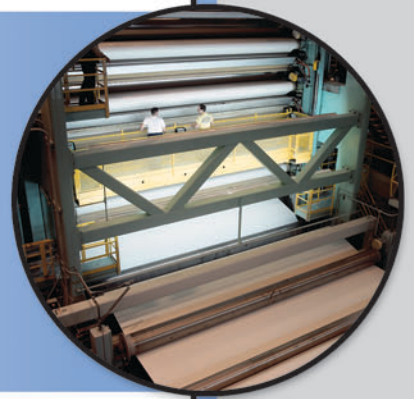
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