



MEETING CHALLENGES AND
CUSTOMIZING SOLUTIONS

ITT Alcon

ITT Alcon, a brand of ITT Corporation, designs and manufactures general purpose, specialty and customized solenoid valves and components in a wide variety of materials and configurations to meet a broad range of applications.

These valves can be found in oil and gas, industrial process, potable water control, HVAC, automotive aftermarket, irrigation, industrial equipment and other industries and are available through a network of stocking distributors and factory direct sales managers.

ITT Alcon has manufacturing facilities in North America and Europe and global direct sales and distribution coverage. These facilities are fully integrated with Lean and Six Sigma practices and employ best-in-class engineering and system design capabilities.

In the following pages, you will find an extensive selection of our standard product lines. If your application requires customization, please contact your direct sales representative or our factory (see page 5).

alcon

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VALVE SELECTION

The Ideal Valve for Your Industry	This table will help you to identify the products which are most commonly used in your sector. Don't forget to look at the other pages also, as you may find something which meets your specific requirements.																											
	<div style="display: flex; justify-content: space-between; font-size: small;"> 100 Series300 Series1200 Series1300 Series2000 Series900 Series950 SeriesU21UACDUACPACDNACPN22 SeriesU31, U32 & U33 Series61 Series71 SeriesACE SeriesACC Series67 SeriesNamurUGB SeriesU28 SeriesUACF SeriesHP Series68 SeriesACHL SeriesHWA Series </div>																											
	Page Number	8	10	12	14	16	18	20	24	26	28	30	32	34	36	38	40	42	44	48	50	54	56	58	60	62	64	66
	Carwash	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓						✓			
	Floor Care	✓	✓	✓	✓	✓			✓	✓		✓		✓	✓	✓	✓	✓	✓						✓			
	Water Industries	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓									
	Oil & Gas	✓	✓		✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓
	General Industrial	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓		✓	
	Cryogenics																									✓		
	HVAC	✓	✓		✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓			✓	✓			✓		
	Robotics								✓						✓		✓			✓					✓			
	Hazardous Area Environments*								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓		
	Steam								✓	✓	✓																	
Food & Beverage	✓	✓	✓	✓	✓	✓		✓			✓		✓		✓	✓	✓	✓										
Process Applications	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		

*Valve models designated in this row are available with hazardous area coil enclosures. See page 68 for details.



ITT Alcon maintains the highest certifications on all relevant product lines. These certifications include NSF, UL, CSA, and CE. The icons below will designate the certifications of each valve series on the following pages.



National Sanitation Foundation



Canadian Standards Association



Conformité Européenne (European Conformity)



Underwriters Laboratory, Inc.

ICONOGRAPHY

The industry-specific icons below serve the same purpose as road signs; they are designed to help navigate through this catalog. The signs help to give direction and facilitate a better understanding of the valves ITT offers.



CAR WASH



HVAC



FLOOR CARE



ROBOTICS



WATER INDUSTRIES



HAZARDOUS AREA ENVIRONMENTS



OIL & GAS



STEAM



GENERAL INDUSTRIAL



PROCESS APPLICATIONS



CRYOGENICS



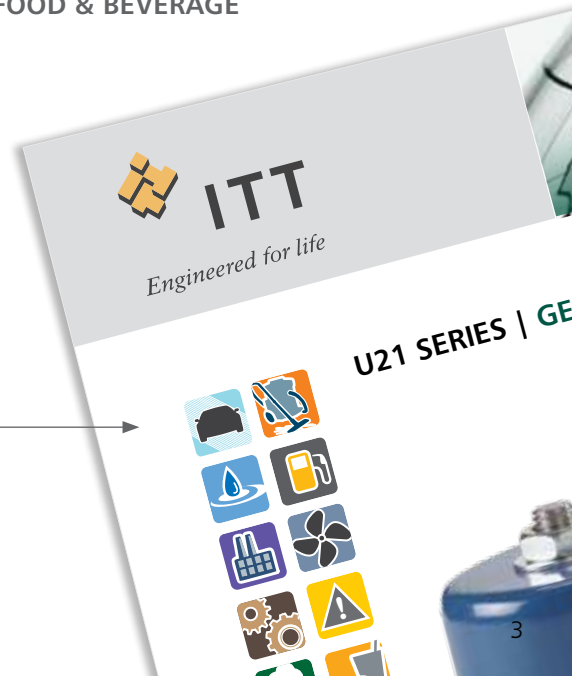
FOOD & BEVERAGE

ICONOGRAPHY IN USE

A set of icons are located on the upper left hand corner of each product page. These icons are an easy way to see what industry that particular valve is appropriate for while browsing our products.

For example, the U21 Series valve is appropriate for use in Car Wash, Floor Care, Water Industries, Oil & Gas, etc.

You can also refer to the chart on page 2 for an overview of all valves and the industries they are used in.





BUILD-A-VALVE | DESCRIPTION

Model Number

The first two digits of the part number designate the model – also referred to as valve series – and each valve series is depicted on the following pages. The remaining digits of the part number represent the configuration of the valve i.e., seals, flow patterns etc. These configurations are limited by the design of the valve series, and only available options are listed for each series.

Port Connection

Available port sizes vary with valve series and are NPT by default. Most valves are available in ISO through our European channels. Please contact your direct sales representative or our factory for details.

Features

Some valve models are available with various features, such as magnetic latching. These options are listed under the Feature heading in the Part Number Selection Guild for each valve model.

Orifice

ITT Alcon offers various orifice sizes. For some models, the orifice size is determined by the port size the user selects. In these cases, the orifice size option in the Part Number Selection Guild will be listed as “Standard”. For other models, there are multiple orifice sizes that can be paired with each port size. However, not all orifice sizes will be available with all port sizes. The user should first choose the desired port size, and then refer to the orifice options that are available based on the port size choice. For each orifice option, note the restrictions, which are listed in the Part Number Restrictions section.

Body Material

The valve body refers not to the solenoid actuator but to the portion of the valve with port connections. Material availability depends on the valve series that is selected. Please consult the material compatibility tables in the back of this catalog, and check the pressure and temperature ratings of the valve, to determine the best material selection.

Seal Material

ITT Alcon offers a wide range of valve seals. Temperature ratings for each seal type are listed for each valve series. Further information can be found in the material compatibility tables.

Flow Pattern

Flow patterns are listed as follows: 2WNC (2 Way Normally Closed), 2WNO (2 Way Normally Open), 3WNC (3 Way Normally Closed), 3WNO (3 Way Normally Open), Universal, and Selecting.

AC/DC

ITT Alcon offers valves in AC and DC. 60Hz is standard but 50Hz is available. Additional electrical features and configurations are available. Please contact the factory for more information.

Voltage

For most models, a wide range of voltages are available.

Connection

Depending on the valve series, there are different electrical connection options available. Some of the connections have specific protection classes, such as NEMA4. Please refer to the General Information section for each valve series.

Coil Insulation

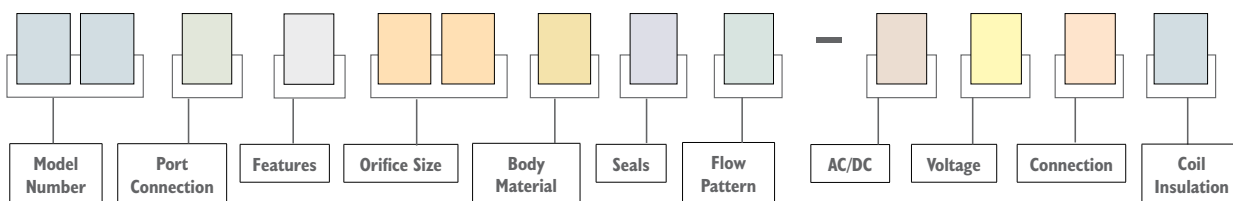
Coil insulation is rated based on the temperature the coil can withstand while operating. Class H coils and above are suitable for continuous duty. Please see page 72 for coil classes and corresponding temperature ratings.

BUILD-A-VALVE | ORDERING INFORMATION | (714) 628-8104

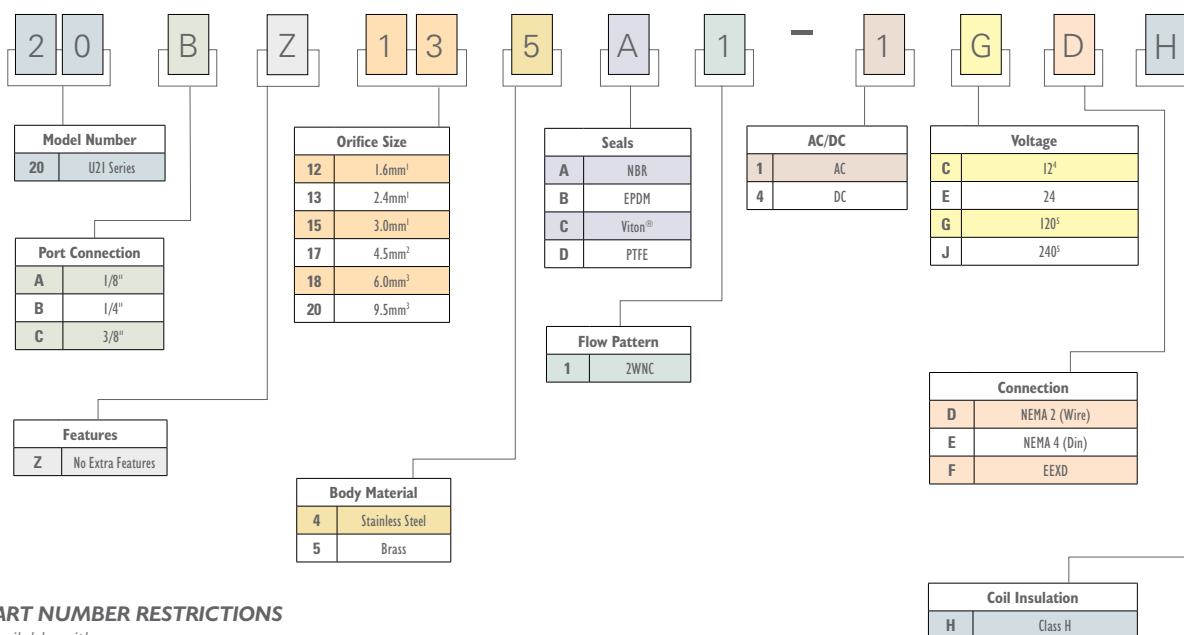
Step 1) Select the model for your application and turn to that page in the catalog.

Step 2) Using the Part Number Selection Guide, choose from the available options in each category to generate your part number.

Please note the restrictions on some of the options, which are notated by superscripts and listed in the Part Number Restrictions section.



An example part number could be: 20BZ135A1-1GDH as shown below.



PART NUMBER RESTRICTIONS

Available with:

¹1/8" & 1/4" ports only, ²1/4" ports only, ³3/8" ports only, ⁴DC only, ⁵AC only.

Step 3) To order, please contact your local distributor, regional sales manager, or our factory direct at 714-628-8104.

A list of our distributors is available on our website at www.ittsolenoidvalves.com





GENERAL
PURPOSE
VALVES



100 SERIES | GENERAL PURPOSE VALVE



Spade connection option shown



Wire leads option shown



1/2" NPT male conduit connection shown

GENERAL INFORMATION

Valve Highlights

- 1/8" ports
- Normally open and normally closed flow patterns
- Molded coil for maximum protection
- DC magnetic latching available
- Thermoplastic polyester coil encapsulant

Component Material Combinations

- Zinc plated steel yoke is standard with plastic and brass valve bodies
- Stainless steel yoke is standard with stainless steel valve body
- Brass base nut is standard with plastic and brass valve bodies
- Stainless steel base nut is standard with stainless steel valve body
- Copper shading ring in AC units

Internal Components

- Stainless steel

Optional Features

- Magnetic latching – See page 23 for performance details

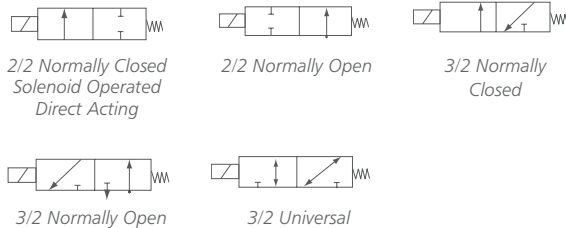
Electrical Characteristics

- Standard coil class: A (221°F/105°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 12 or 24
- AC voltages: 12, 24, 120, or 240

Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- See page 71 for maximum differential pressure

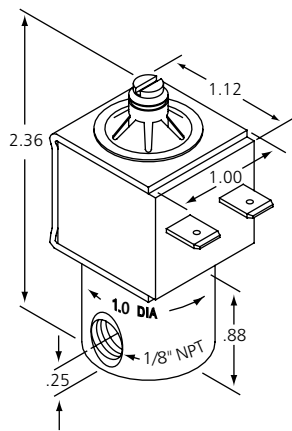
MODES OF OPERATION



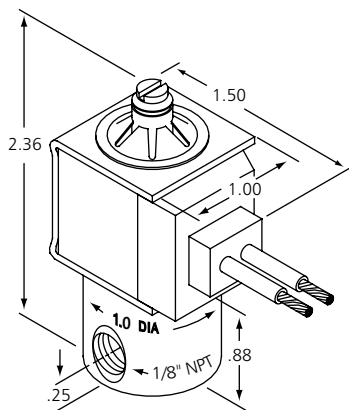
See page 74 for details on modes of operations.



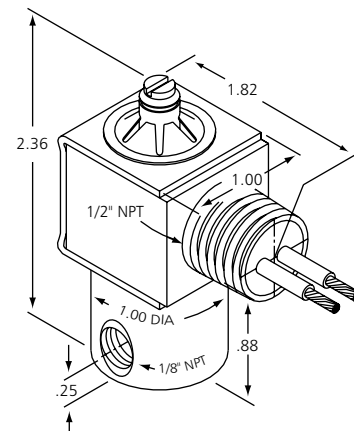
DIMENSIONAL DRAWINGS [INCHES]



Spade connection option shown

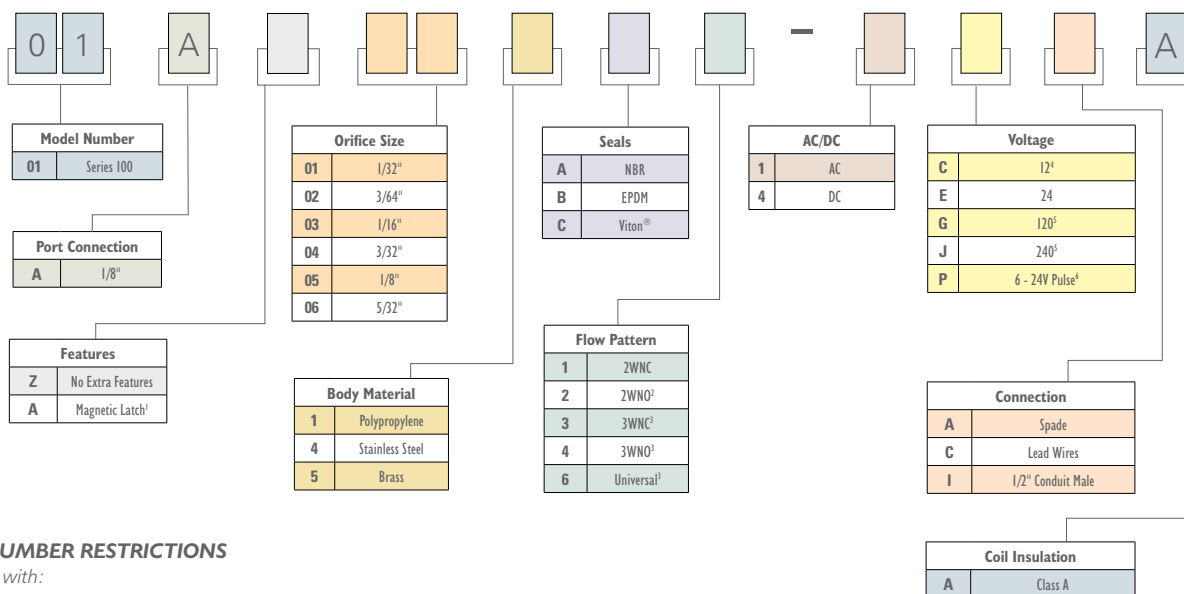


Wire leads connection option shown



1/2" male conduit connection option shown

PART NUMBER SELECTION GUIDE FOR SERIES 100



PART NUMBER RESTRICTIONS

Available with:

¹Normally closed flow patterns only, ²1/32", 3/64" & 1/16" orifice sizes only,

³1/32", 3/64" 1/16" & 3/32" orifice sizes only, ⁴DC only, ⁵AC only, ⁶Must choose P when choosing Magnetic Latch, Feature A

STANDARD FLOW DATA

FLOW-H2O (GPM)

NOMINAL ORIFICE DIAMETER	MAXIMUM GPM WATER FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.06	0.10	0.14	0.20	0.24	0.28	.032
3/64 (.047)	0.15	0.24	0.35	0.46	0.61	0.70	0.80
1/16 (.063)	0.24	0.38	0.56	0.80	0.98	1.12	1.28
3/32 (.094)	0.51	0.82	1.19	1.70	2.05		
1/8 (.125)	0.84	1.34	1.96	2.80			
5/32 (.156)	1.19	1.90					

FLOW-AIR (SCFM)

NOMINAL ORIFICE DIAMETER	MAXIMUM SCFM AIR FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.30	0.56	0.80	1.70	2.10	2.70	3.30
3/64 (.047)	0.75	1.40	2.00	3.50	5.25	6.75	8.25
1/16 (.063)	1.20	2.24	3.20	5.60	8.40	10.80	13.20
3/32 (.094)	2.55	4.76	6.80	11.90	18.60		
1/8 (.125)	4.20	7.84	11.20	19.60			
5/32 (.156)	5.93	11.06					

For additional flow and pressure information, including three way orifice flow rates, please refer to page 71.

CUU facility is ISO9001 Quality System, and ISO14001 Environmental System certified. Refer to page 70 for details.



300 SERIES | GENERAL PURPOSE VALVE



GENERAL INFORMATION

Valve Highlights

- 1/8" ports
- Normally open and normally closed flow patterns
- 1/2" internal NPT electrical connection
- ABS plastic canister material
- Compact design
- Direct acting
- Epoxy encapsulated coil

Component Material Combinations

- Brass base nut is standard with plastic and brass valve bodies
- Stainless steel base nut is standard with stainless steel valve body
- Copper shading ring in AC units

Internal Components

- Stainless steel

Electrical Connection

- 18 AWG, 18" leads
- PVC insulation
- UL type 1015

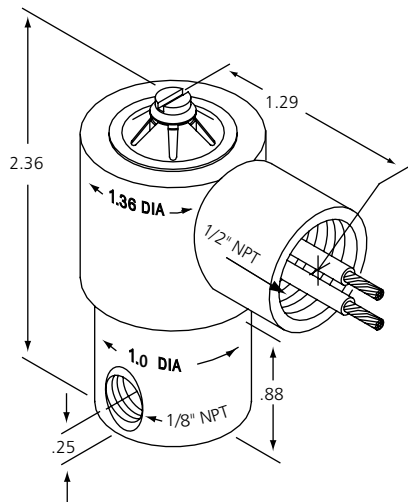
Electrical Characteristics

- Standard coil class: A (221°F/105°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 12, or 24
- AC voltages: 12, 24, 120, or 240

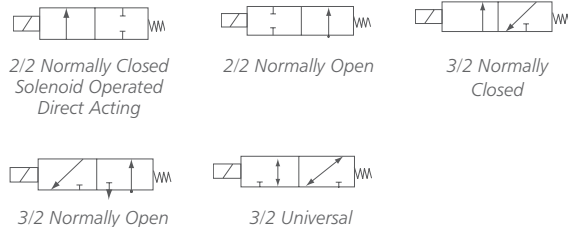
Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- See page 71 for maximum differential pressure

DIMENSIONAL DRAWING [INCHES]

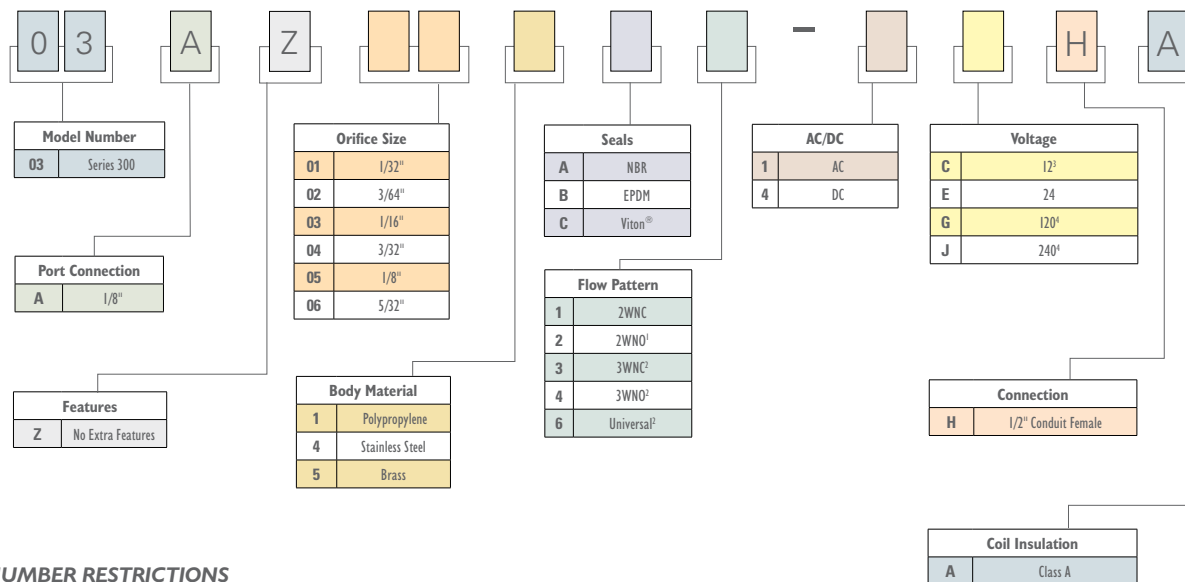


MODES OF OPERATION



See page 74 for details on modes of operations.

PART NUMBER SELECTION GUIDE FOR SERIES 300



PART NUMBER RESTRICTIONS

Available with:

¹1/32", 3/64" & 1/16" orifice sizes only, ²1/32", 3/64", 1/16" & 3/32" orifice sizes only

³DC only, ⁴AC only

STANDARD FLOW DATA

FLOW-H₂O (GPM)

NOMINAL ORIFICE DIAMETER	MAXIMUM GPM WATER FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.06	0.10	0.14	0.20	0.24	0.28	.032
3/64 (.047)	0.15	0.24	0.35	0.46	0.61	0.70	0.80
1/16 (.063)	0.24	0.38	0.56	0.80	0.98	1.12	1.28
3/32 (.094)	0.51	0.82	1.19	1.70	2.05		
1/8 (.125)	0.84	1.34	1.96	2.80			
5/32 (.156)	1.19	1.90					

FLOW-AIR (SCFM)

NOMINAL ORIFICE DIAMETER	MAXIMUM SCFM AIR FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.30	0.56	0.80	1.70	2.10	2.70	3.30
3/64 (.047)	0.75	1.40	2.00	3.50	5.25	6.75	8.25
1/16 (.063)	1.20	2.24	3.20	5.60	8.40	10.80	13.20
3/32 (.094)	2.55	4.76	6.80	11.90	18.60		
1/8 (.125)	4.20	7.84	11.20	19.60			
5/32 (.156)	5.93	11.06					

For additional flow and pressure information, including three way orifice flow rates, please refer to page 71.

CUU facility is ISO9001 Quality System, and ISO14001 Environmental System certified. Refer to page 70 for details.



1200 SERIES | GENERAL PURPOSE VALVE



GENERAL INFORMATION

Valve Highlights

- 1/8" ports
- Two way normally closed flow pattern
- Glass filled nylon canister material
- Epoxy encapsulated coil
- Plastic base nut

Component Material

- Copper shading ring on AC valves
- Internal components stainless steel

Electrical Connection

- 18 AWG, 18" leads
- PVC Insulation

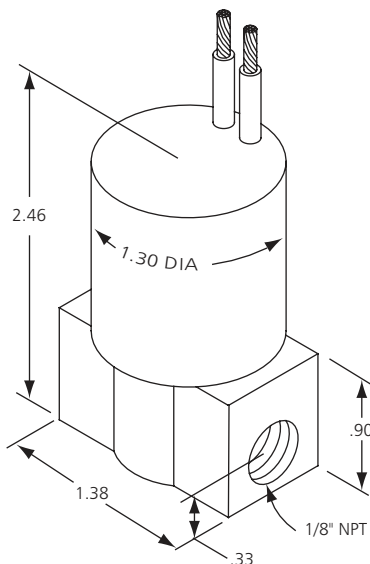
Electrical Characteristics

- Standard coil class: A (221°F/105°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 6, 12, or 24
- AC voltages: 12, 24, 120, or 240

Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- See page 71 for maximum differential pressure

DIMENSIONAL DRAWING [INCHES]



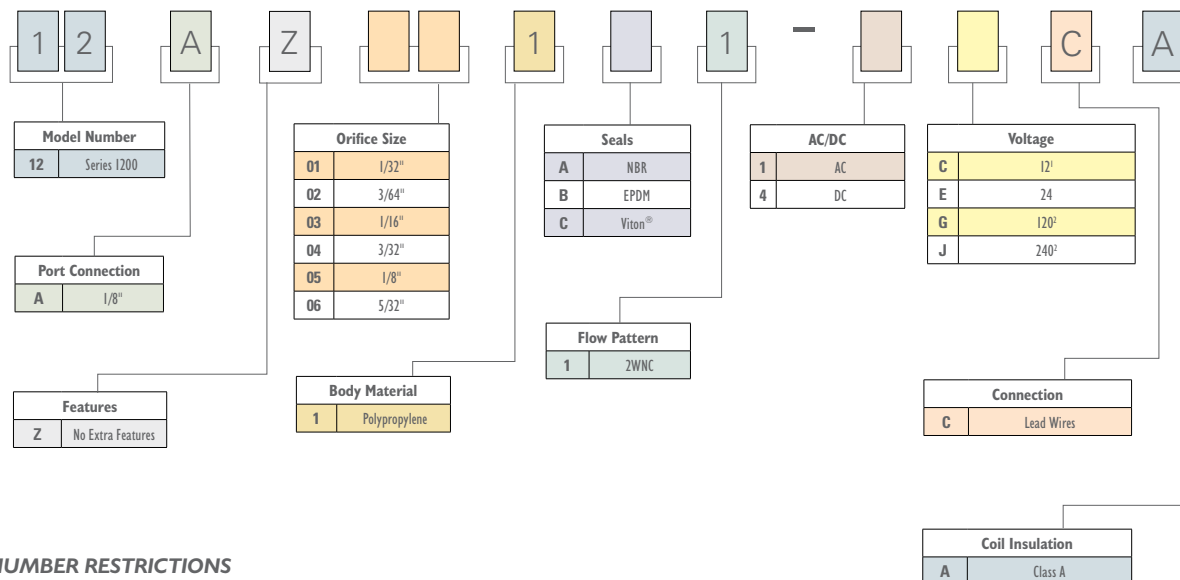
MODE OF OPERATION



2/2 Normally Closed Solenoid Operated
Direct Acting

See page 74 for details on modes of operations.

PART NUMBER SELECTION GUIDE FOR SERIES 1200



PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA

FLOW-H2O (GPM)

NOMINAL ORIFICE DIAMETER	MAXIMUM GPM WATER FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.06	0.10	0.14	0.20	0.24	0.28	.032
3/64 (.047)	0.15	0.24	0.35	0.46	0.61	0.70	0.80
1/16 (.063)	0.24	0.38	0.56	0.80	0.98	1.12	1.28
3/32 (.094)	0.51	0.82	1.19	1.70	2.05		
1/8 (.125)	0.84	1.34	1.96	2.80			
5/32 (.156)	1.19	1.90					

FLOW-AIR (SCFM)

NOMINAL ORIFICE DIAMETER	MAXIMUM SCFM AIR FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.30	0.56	0.80	1.70	2.10	2.70	3.30
3/64 (.047)	0.75	1.40	2.00	3.50	5.25	6.75	8.25
1/16 (.063)	1.20	2.24	3.20	5.60	8.40	10.80	13.20
3/32 (.094)	2.55	4.76	6.80	11.90	18.60		
1/8 (.125)	4.20	7.84	11.20	19.60			
5/32 (.156)	5.93	11.06					

For additional flow and pressure information, including three way orifice flow rates, please refer to page 71.

CUU facility is ISO9001 Quality System, and ISO14001 Environmental System certified. Refer to page 70 for details.



1300 SERIES | GENERAL PURPOSE VALVE



GENERAL INFORMATION

Valve Highlights

- 1/8" ports
- DIN terminal connection
- Compact design
- Direct acting
- Molded coil for maximum protection
- Normally open and normally closed flow patterns
- Thermoplastic polyester coil encapsulant

Component Material

- Copper shading ring on AC valves
- Internal components stainless steel

Electrical Connection

- DIN 43650 Form-B

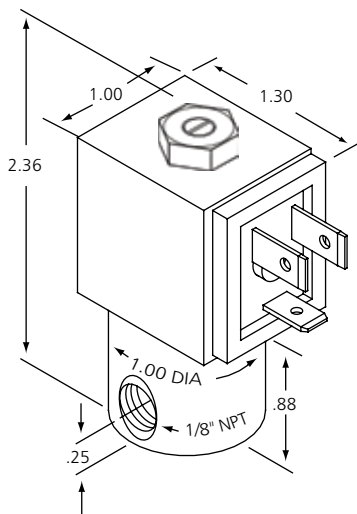
Electrical Characteristics

- Standard coil class: F (311°F/155°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 12, or 24
- AC voltages: 12, 24, 120, or 240

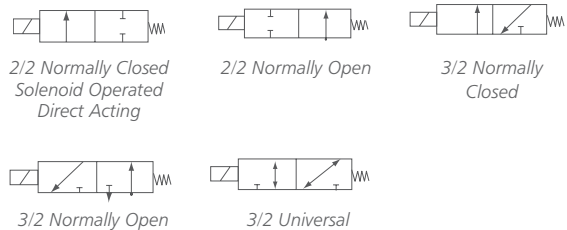
Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- See page 71 for maximum differential pressure

DIMENSIONAL DRAWING [INCHES]

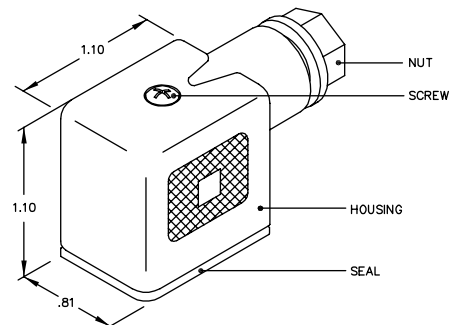


MODES OF OPERATION

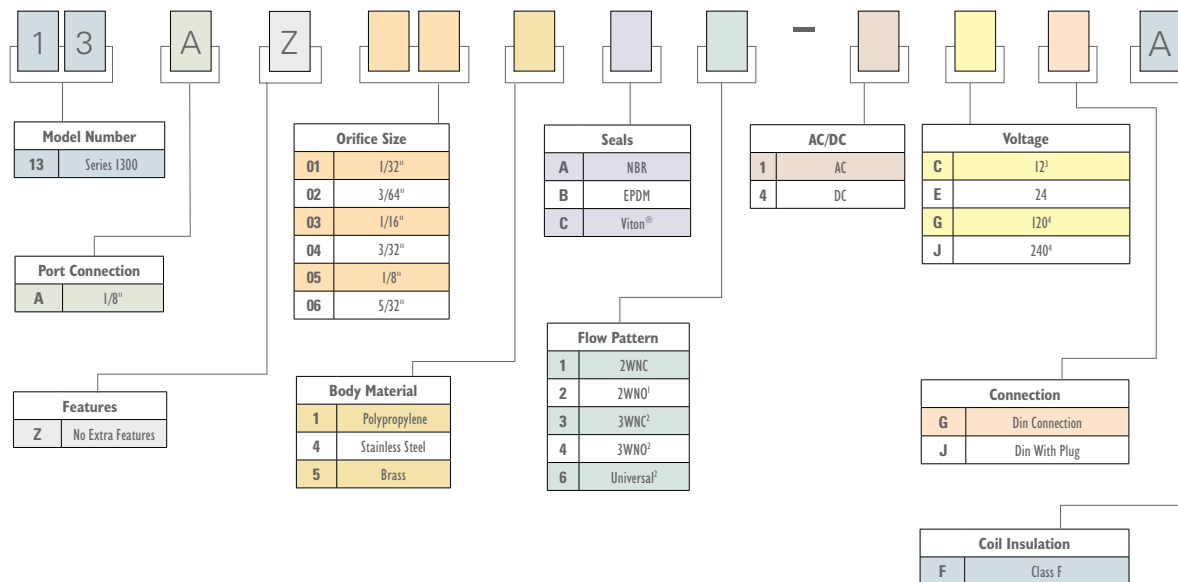


See page 74 for details on modes of operations.

OPTIONAL DIN PLUG [INCHES]



PART NUMBER SELECTION GUIDE FOR SERIES 1300



PART NUMBER RESTRICTIONS

Available with:

¹1/32", 3/64" & 1/16" orifice sizes only, ²1/32", 3/64", 1/16" & 3/32" orifice sizes only

³DC only, ⁴AC only

STANDARD FLOW DATA

FLOW-H2O (GPM)

NOMINAL ORIFICE DIAMETER	MAXIMUM GPM WATER FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.06	0.10	0.14	0.20	0.24	0.28	.032
3/64 (.047)	0.15	0.24	0.35	0.46	0.61	0.70	0.80
1/16 (.063)	0.24	0.38	0.56	0.80	0.98	1.12	1.28
3/32 (.094)	0.51	0.82	1.19	1.70	2.05		
1/8 (.125)	0.84	1.34	1.96	2.80			
5/32 (.156)	1.19	1.90					

FLOW-AIR (SCFM)

NOMINAL ORIFICE DIAMETER	MAXIMUM SCFM AIR FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/32 (.031)	0.30	0.56	0.80	1.70	2.10	2.70	3.30
3/64 (.047)	0.75	1.40	2.00	3.50	5.25	6.75	8.25
1/16 (.063)	1.20	2.24	3.20	5.60	8.40	10.80	13.20
3/32 (.094)	2.55	4.76	6.80	11.90	18.60		
1/8 (.125)	4.20	7.84	11.20	19.60			
5/32 (.156)	5.93	11.06					

For additional flow and pressure information, including three way orifice flow rates, please refer to page 71.

CUU facility is ISO9001 Quality System, and ISO14001 Environmental System certified. Refer to page 70 for details.



2000 SERIES | GENERAL PURPOSE VALVE



Spade terminal option shown



Wire leads option shown



DIN option shown



GENERAL INFORMATION

Valve Highlights

- 1/4" and 3/8" NPT ports
- Normally open and normally closed flow patterns
- Direct acting
- Multiple connection types available
- Polyphenylene sulfide coil encapsulant

Component Material

- Copper shading ring in AC units
- Zinc plated nut
- Stainless steel top port
- Stainless steel internal components

Electrical Connection Options

- 1/4" spades
- 18 AWG, 18" wire leads
- DIN 43650 Form-A

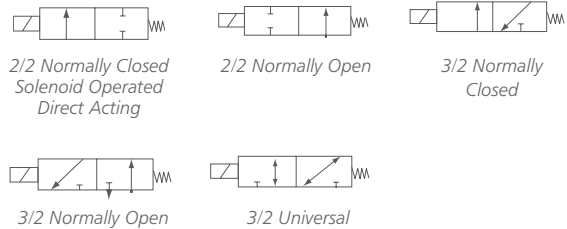
Electrical Characteristics

- Standard coil class: F (311°F/155°C)
- Power consumption: 12 watts AC, 14 watts DC
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

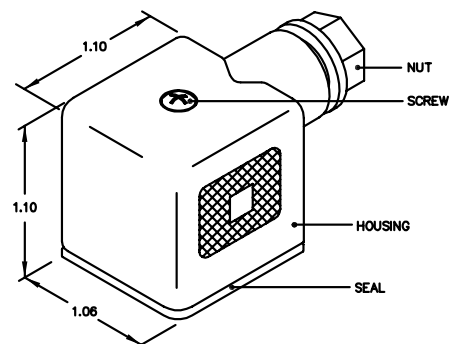
- Operating temperature varies depending on seal material. Consult factory for details.

MODES OF OPERATION

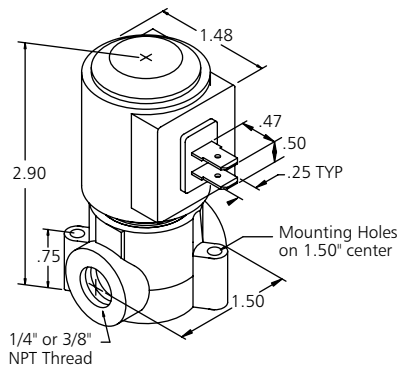


See page 74 for details on modes of operations.

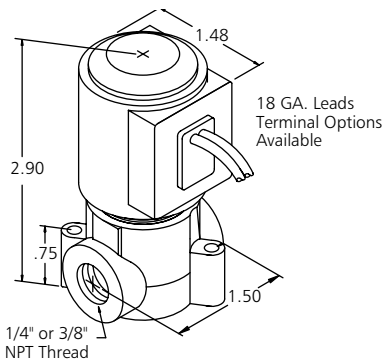
OPTIONAL DIN PLUG [INCHES]



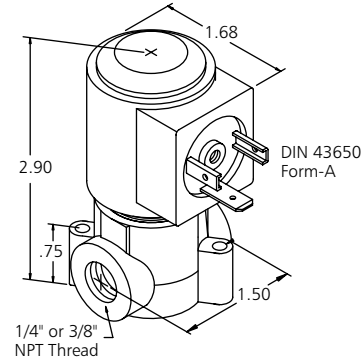
DIMENSIONAL DRAWINGS [INCHES]



Spade terminal option shown

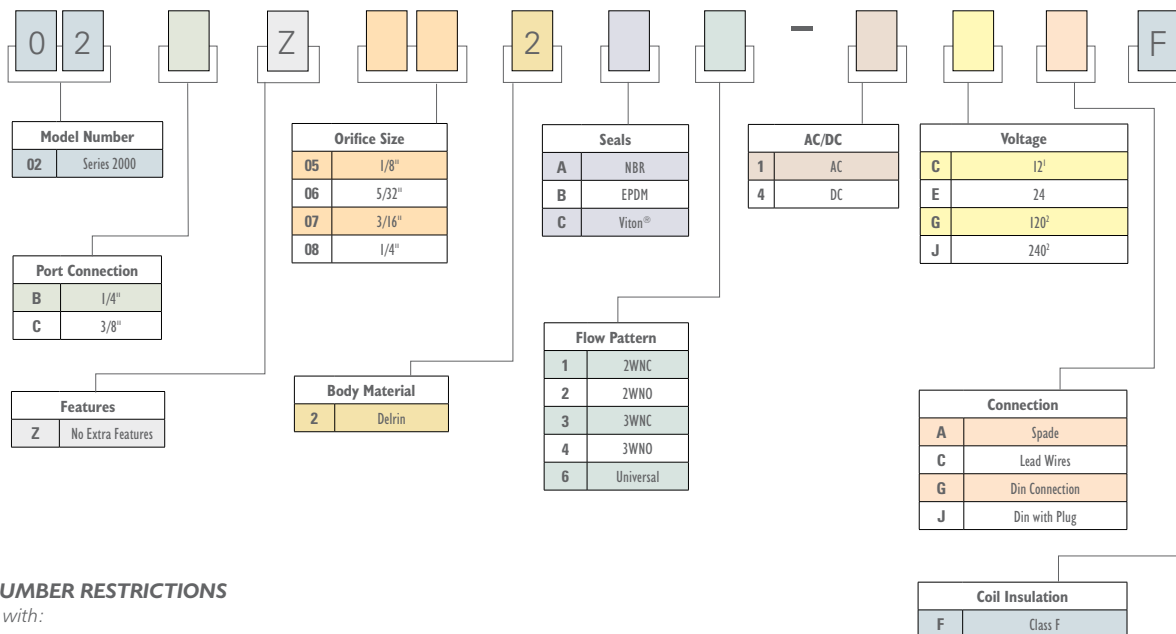


Wire leads option shown



DIN terminal option shown

PART NUMBER SELECTION GUIDE FOR SERIES 2000



PART NUMBER RESTRICTIONS

Available with:
¹DC only, ²DC only

STANDARD FLOW DATA

FLOW-H₂O (GPM)

NOMINAL ORIFICE DIAMETER	MAXIMUM GPM WATER FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/8 (.125)	0.58	0.95	1.40	2.04	2.44	2.80	3.08
5/32 (.156)	0.73	1.18	1.75	2.48	3.05		
3/16 (.188)	0.96	1.56	2.32	3.34			
1/4 (.250)	1.80	2.95	4.34				

FLOW-AIR (SCFM)

NOMINAL ORIFICE DIAMETER	MAXIMUM SCFM AIR FLOW						
	10PSI	25PSI	50PSI	100PSI	150PSI	200PSI	250PSI
1/8 (.125)	0.20	2.0	8.0	14.0	19.0	28.0	32.0
5/32 (.156)	.33	3.3	13.2	23.1	31.2		
3/16 (.188)	0.45	4.5	18.0	31.5			
1/4 (.250)	0.62	6.2	24.8				



900 SERIES | GENERAL PURPOSE VALVE



3/8" NPT port option shown



3/4" NPT port option shown



GENERAL INFORMATION

Valve Highlights

- 3/8", 1/2" and 3/4" NPT ports
- Normally open and normally closed options available
- Solenoid piloted diaphragm valve

Component Material Combinations

- Brass base nut is standard
- Stainless steel nut is optional
- Copper shading ring in AC units
- Internal components are stainless steel

Connection Types

- 1/4" spade
- Lead wires
- 1/2" conduit male
- 1/2" conduit female
- Strain Relief DIN 43650 Form-B

Electrical Characteristics

- Standard coil class: A (221°F/105°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 12, or 24
- AC voltages: 12, 24, 120, or 240

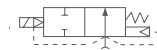
Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- Operating pressure: 10 – 150 PSI
- Zero pressure rated valves available. Consult factory.
- Max fluid temperature: 180°F/82°C
- 3/8" port max flow: 30 GPM at 150 PSI
- 1/2" port max flow: 36 GPM at 150 PSI
- 3/4" port max flow: 36 GPM at 150 PSI

MODES OF OPERATION



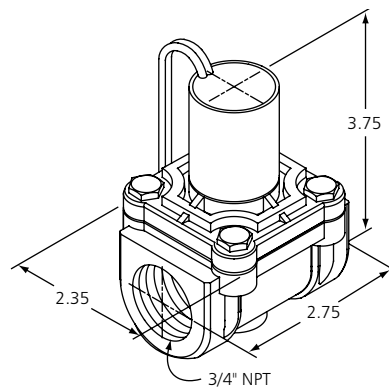
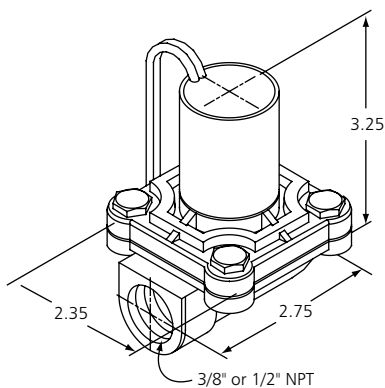
2/2 Normally Closed Solenoid Pilot Operating



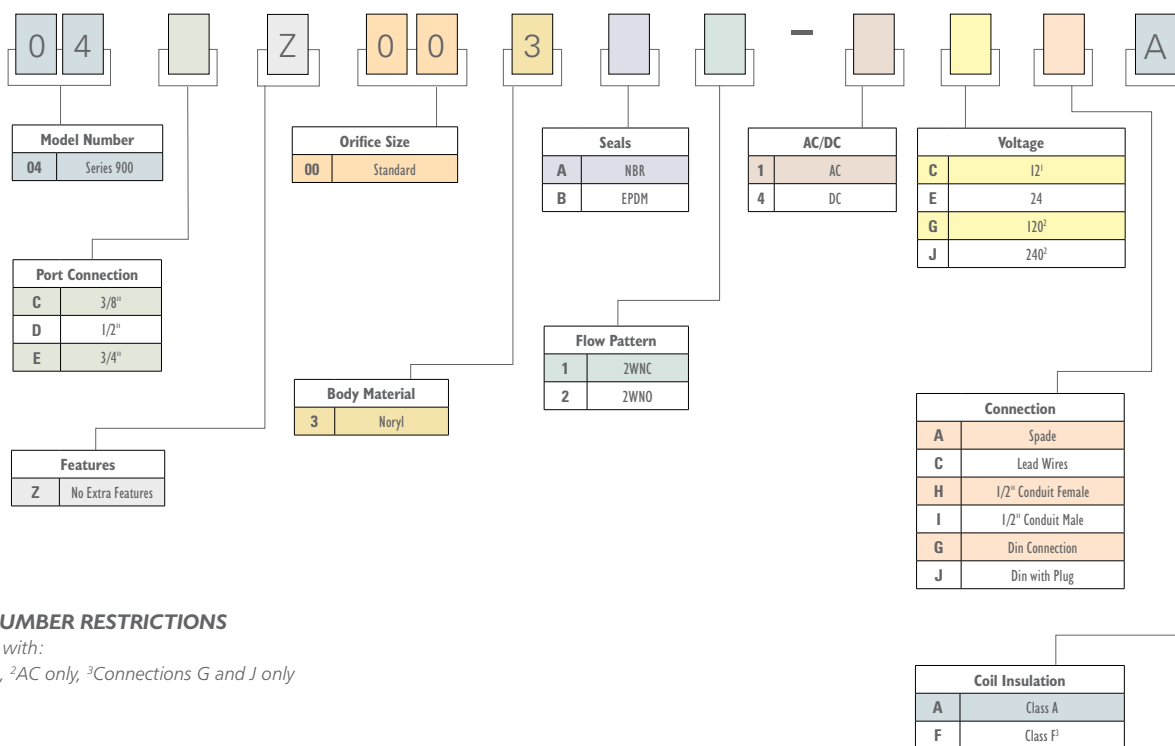
2/2 Normally Open Solenoid Pilot Operating

See page 74 for details on modes of operations.

DIMENSIONAL DRAWINGS



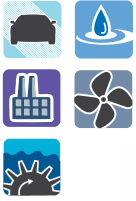
PART NUMBER SELECTION GUIDE FOR SERIES 900



PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only, ³Connections G and J only



950 SERIES | GENERAL PURPOSE VALVE



GENERAL INFORMATION

Valve Highlights

- 3/4" and 1" NPT ports
- Normally open and normally closed options available
- Solenoid piloted diaphragm valve
- Manual solenoid override
- Optional flow control feature available

Component Material Combinations

- Brass base nut is standard
- Stainless steel nut is optional
- Copper shading ring in AC units
- Internal components are stainless steel
- Valve body material: Glass filled nylon

Connection Types

- 1/4" spade
- Lead wires
- 1/2" conduit male
- 1/2" conduit female

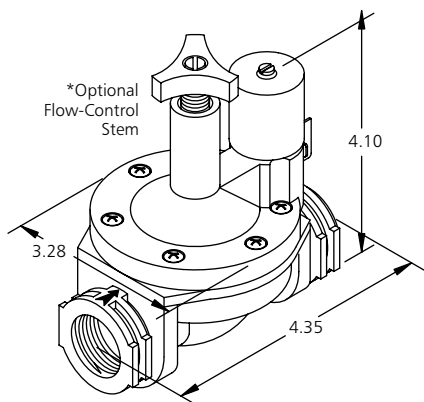
Electrical Characteristics

- Standard coil class: A (221°F/105°C)
- Power consumption: 5 watts AC, 6 watts DC
- DC voltages: 12, or 24
- AC voltages: 12, 24, 120, or 240
- UL certification on "A" and "I" connection options

Operating Characteristics

- Operating temperature range: Up to 120°F/49°C
- Operating pressure: 10 – 150 PSI
- Max fluid temperature: 180°F/82°C
- 3/4" port max flow: 40 GPM at 150 PSI
- 1" port max flow: 45 GPM at 150 PSI

DIMENSIONAL DRAWING [INCHES]

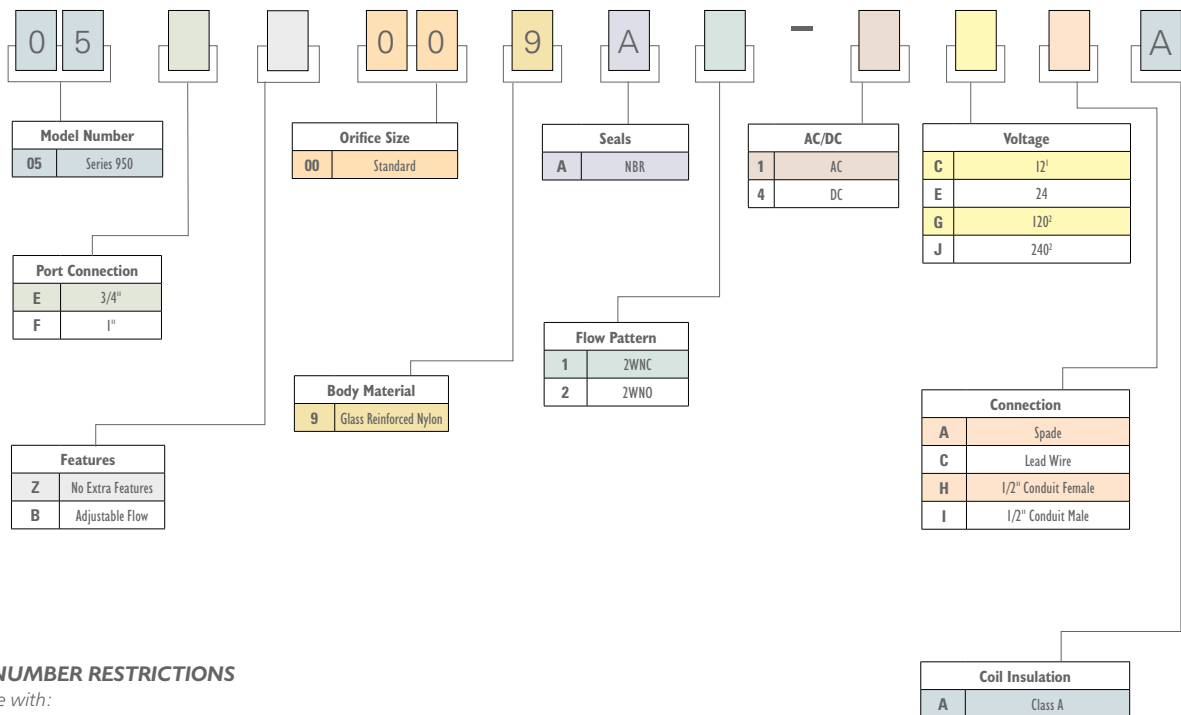


MODES OF OPERATION



See page 74 for details on modes of operations.

PART NUMBER SELECTION GUIDE FOR SERIES 950



PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only



MANIFOLDS



GENERAL INFORMATION

Manifold Highlights

- Available in standard four and six station configurations
- Available in standard orifice sizes of 3/64", 1/16" and 3/32"
- Consult factory for customized manifolds

Technical Information

- Ports are located 1-1/2" on center
- 1/8" NPT ports
- Material: Acetal

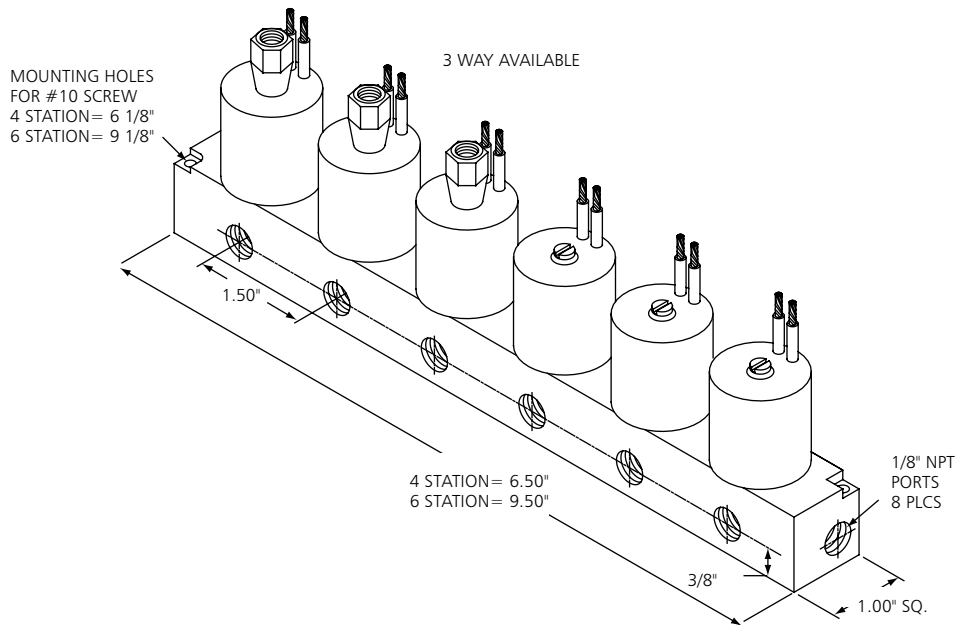
Compatible With

- Series 100
- Series 300
- Series 1200

Ordering Information

- Consult factory for part numbers and additional product information

DIMENSIONAL DRAWING [INCHES]



LATCHING VALVES



GENERAL INFORMATION

Highlights

- Designed to remain un-energized in two stable positions without power consumption
- Valve changes positions by means of a momentary pulse (20-50 milliseconds)
- Magnetic force is used to maintain position

Available With

- Series 100

2-wire Coil Lead Marking

- Red: + for latching
- Black: common

3-wire Coil Lead Marking

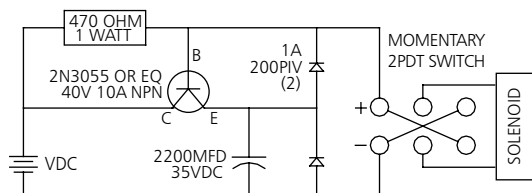
- Red: + for latching
- Black: common
- Green: unlatching

Voltage: Latching coils are designed for pulses from 6 volts to 24 volts DC.

Standard Current Pulse: 50 ms. Unlatching pulse time exceeding 50 ms is undesirable as the armature may reactuate momentarily. Coil resistance, and therefore pulse current, is selected appropriate to the valve or actuator function — i.e. 2-way or 3-way, orifice sizes, pressure, etc.

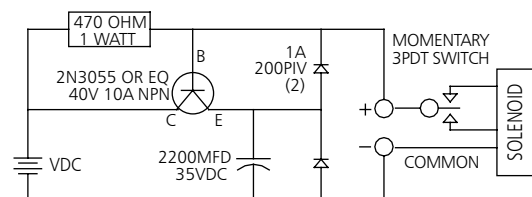
DIMENSIONAL DRAWINGS

Typical Circuit for 2-wire Latching Actuator/Valve



Standard 2-wire unit is 4.9 Ω resistance
Current @ 18V=3.7A; @ 24V=4.9A

Typical Circuit for 3-wire Latching Actuator/Valve



Special voltages, coil construction, seals, and materials are available; please consult factory.



U21 SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/8", 1/4" and 3/8" NPT ports
- Normally closed flow pattern
- Compact valve design
- Wide range of available orifices
- Zero pressure rated

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F (Steam Series)

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

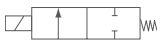
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Closed
Solenoid Operated Direct Acting

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

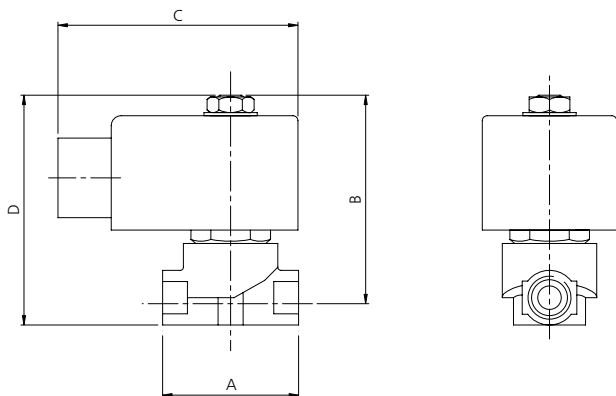
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/8"	1.6	0.12	870	0-675	0-310	1.0
1/8"	2.4	0.24	870	0-300	0-140	1.0
1/8"	3.0	0.35	870	0-225	0-65	1.0
1/4"	1.6	0.12	870	0-675	0-310	1.0
1/4"	2.4	0.24	870	0-300	0-140	1.0
1/4"	3.0	0.35	870	0-225	0-65	1.0
1/4"	4.5	0.53	870	0-105	0-34	1.0
1/4"	6.0	0.70	870	0-60	0-15	1.0
3/8"	6.0	0.70	870	0-60	0-15	1.5
3/8"	9.5	1.75	870	0-10	0-3.3	1.5

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

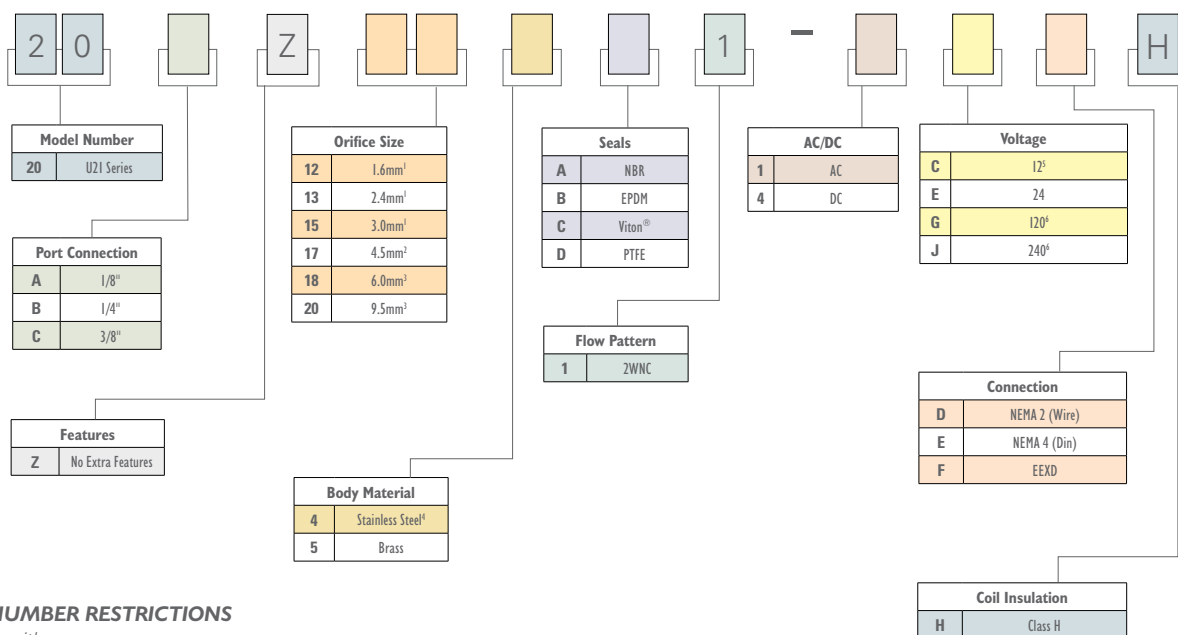
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR U21 SERIES



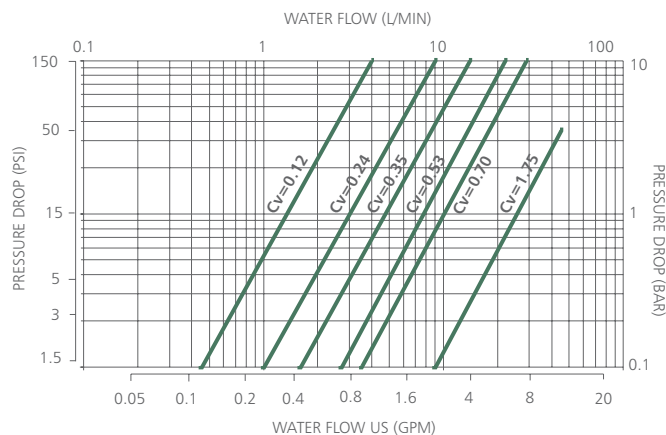
PART NUMBER RESTRICTIONS

Available with:

¹1/8" & 1/4" ports only, ²1/4" ports only, ³3/8" ports only, ⁴1/8" and 1/4" ports only, ⁵DC only, ⁶AC only.

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice when building the part number.





UACD SERIES | GENERAL PURPOSE VALVE



NEMA 4 protection class shown



GENERAL INFORMATION

Valve Highlights

- 3/8" – 2" NPT ports
- Normally closed flow pattern
- Diaphragm operated
- Fully ported orifices for high Cv

Body Materials

- Brass 3/8" – 1" port sizes
- Bronze 1-1/4" – 2" port sizes
- Stainless steel is optional for any size

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F (Hot Water Series)
- Viton®: -4°F to 302°F

Electrical Connection Options

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

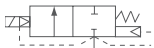
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Closed Solenoid Pilot Operating

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
3/8"	16.0	3.5	725	0-150	0-150	2
1/2"	16.0	4.9	725	0-150	0-150	2
3/4"	16.0	5.4	725	0-150	0-150	2
1"	20.0	8.2	725	0-150	0-150	4
1-1/4"	40.0	30.0	725	0-60*	N/A	6.6
1-1/4"	40.0	30.0	725	5-150	5-150	6.6
1-1/2"	40.0	30.0	725	0-60*	N/A	6.6
1-1/2"	40.0	30.0	725	5-150	5-150	6.6
2"	40.0	33.0	725	0-60*	N/A	6.6
2"	40.0	33.0	725	5-150	5-150	6.6

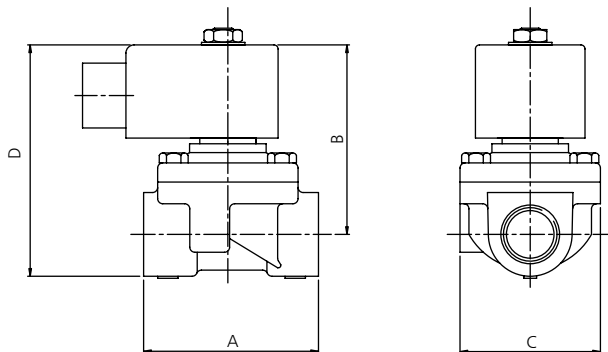
¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

* Zero Pressure Rated (refer to OPD figures): 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.

*To build a 1-1/4", 1-1/2" or 2" valve that is zero pressure rated, choose option H in the features section. If H is not selected for these sizes OPD will default to 5-150.

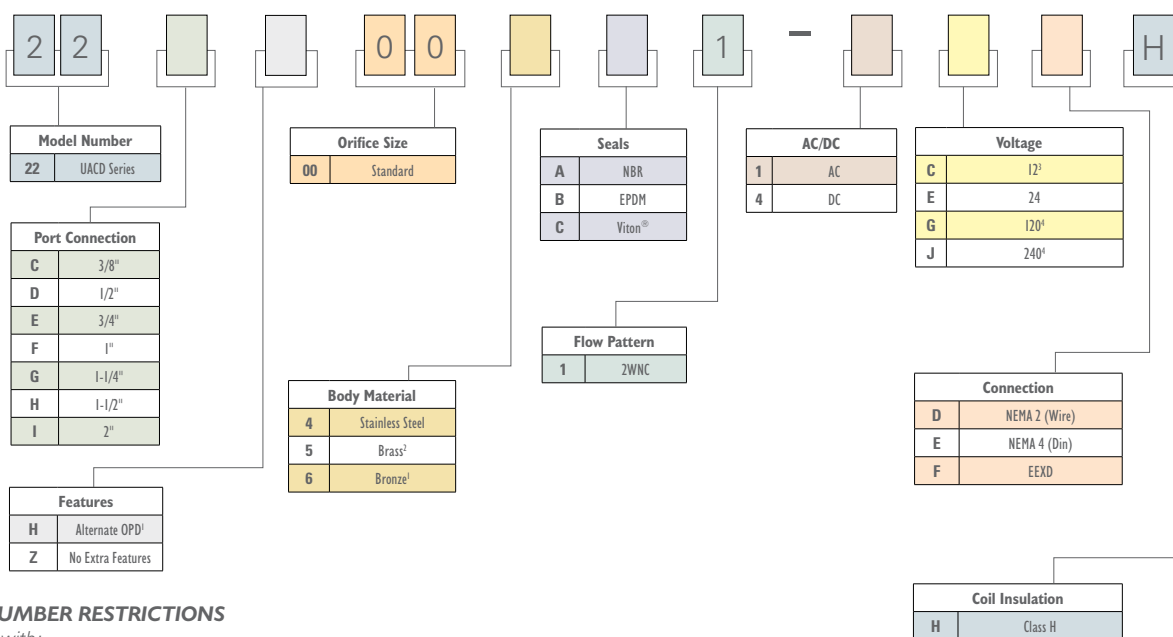
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR UACD SERIES



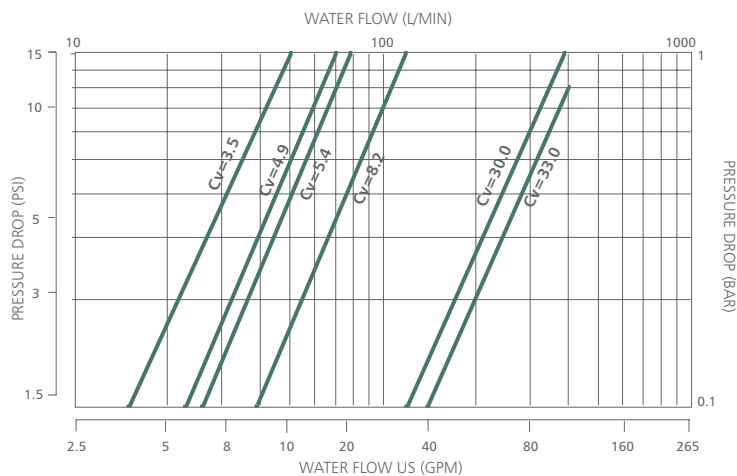
PART NUMBER RESTRICTIONS

Available with:

¹1-1/4", 1-1/2", 2" ports only, ²3/8", 1/2", 3/4" & 1" ports only, ³DC only, ⁴AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice when building the part number.





UACP SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 3/8" – 2" NPT ports
- Normally closed flow pattern
- Piston operated
- Wide temperature range capabilities

Body Materials

- Brass 3/8" – 1" port sizes
- Bronze 1-1/4" – 2" port sizes

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F (Steam Series)

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

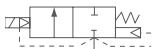
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Closed Solenoid Pilot Operating

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

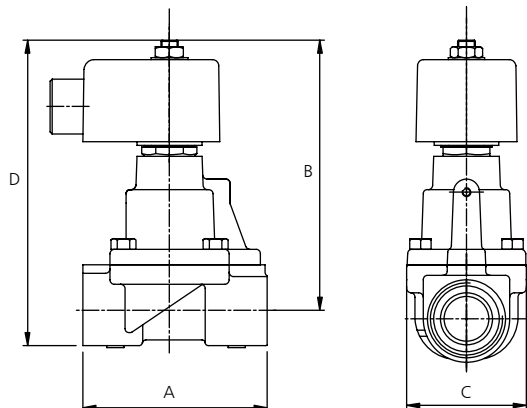
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
3/8"	16.0	3.5	725	5-150	5-150	2.8
1/2"	16.0	4.9	725	5-150	5-150	2.8
3/4"	16.0	6.3	725	5-125	5-125	2.8
1"	25.0	8.6	725	5-125	5-125	5.0
1-1/4"	30.0	20.9	725	5-125	5-125	6.8
1-1/2"	30.0	20.9	725	5-125	5-125	6.8
2"	32.0	24.5	725	5-125	5-125	11.5

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

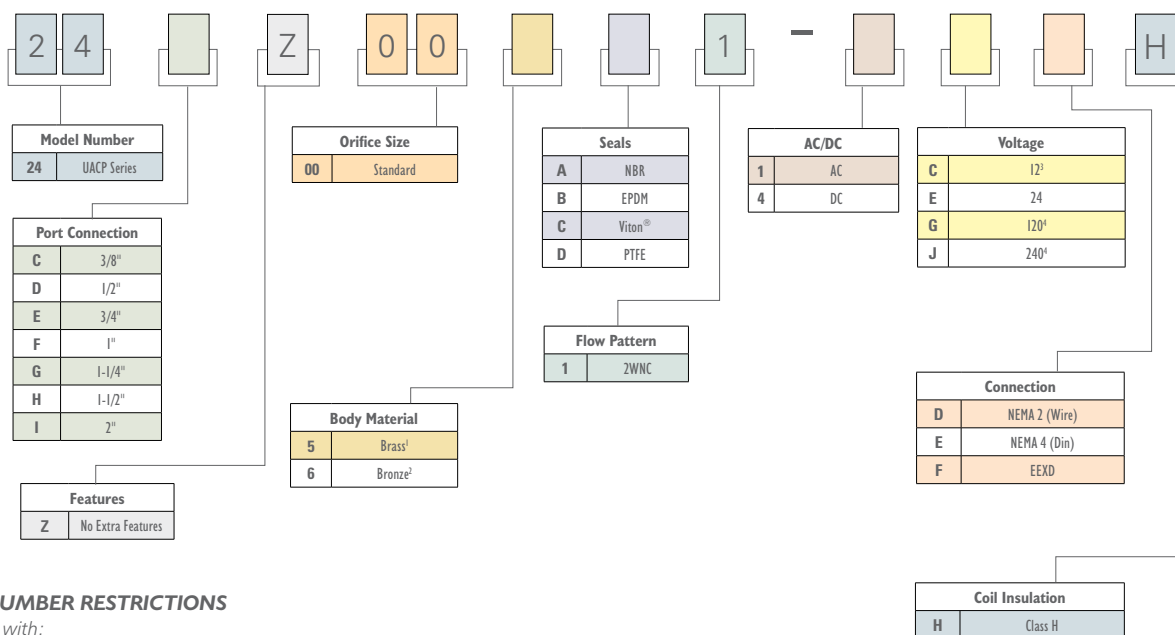
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR UACP SERIES



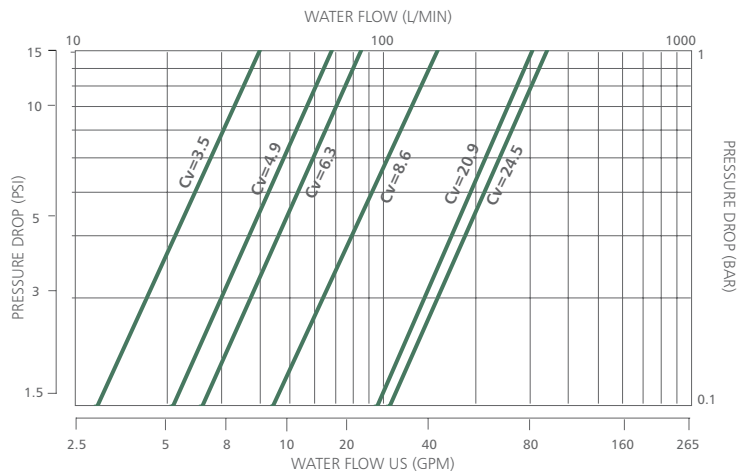
PART NUMBER RESTRICTIONS

Available with:

¹3/8", 1/2", 3/4" & 1" ports only, ²1-1/4", 1-1/2" & 2" ports only, ³DC only, ⁴AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice when building the part number.





ACDN SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 3/8" – 2" NPT ports
- Normally open flow pattern
- Fully ported orifices for high Cv
- Choice of valve body material and seals

Body Materials

- Brass 3/8" – 1" port sizes
- Bronze 1-1/4" – 2" port sizes
- Stainless steel is optional for any size

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

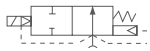
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Open Solenoid Pilot Operating

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

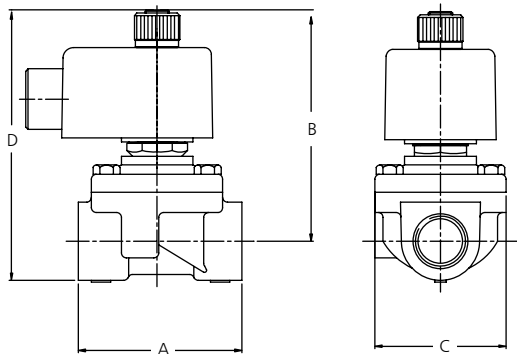
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
3/8"	16.0	3.5	725	0-150	0-150	2.0
1/2"	16.0	4.9	725	0-150	0-150	2.0
3/4"	16.0	5.4	725	0-150	0-150	2.0
1"	20.0	8.2	725	0-150	0-150	4.0
1-1/4"	40.0	30.0	725	5-150	5-150	6.6
1-1/2"	40.0	33.0	725	5-150	5-150	6.6
2"	40.0	33.0	725	5-150	5-150	6.6

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

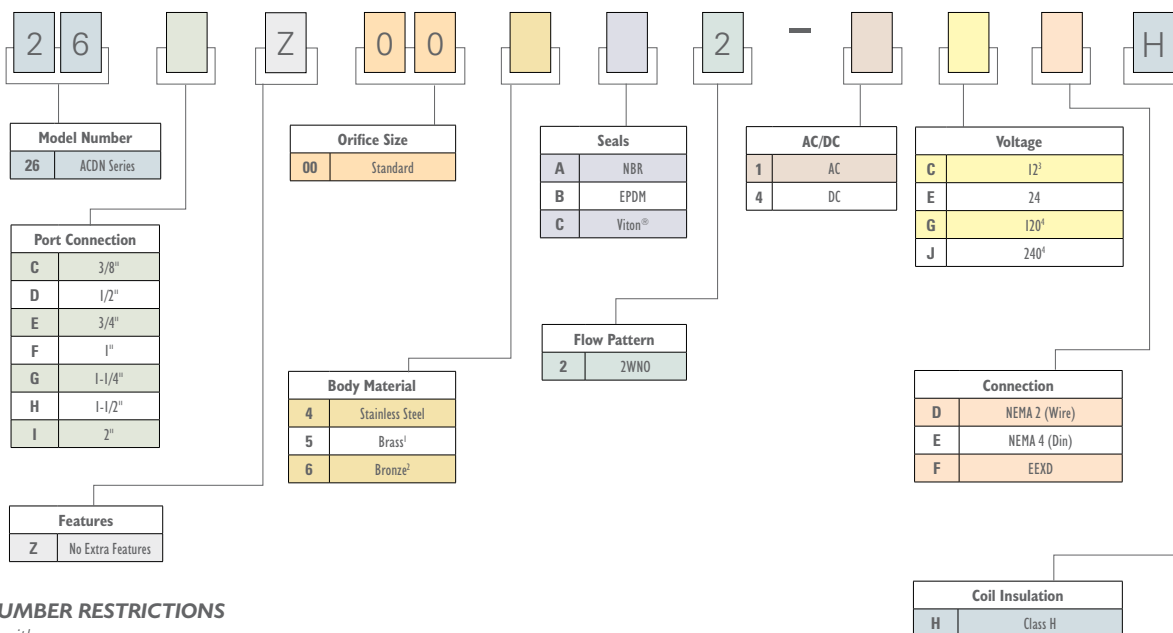
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR AC DN SERIES



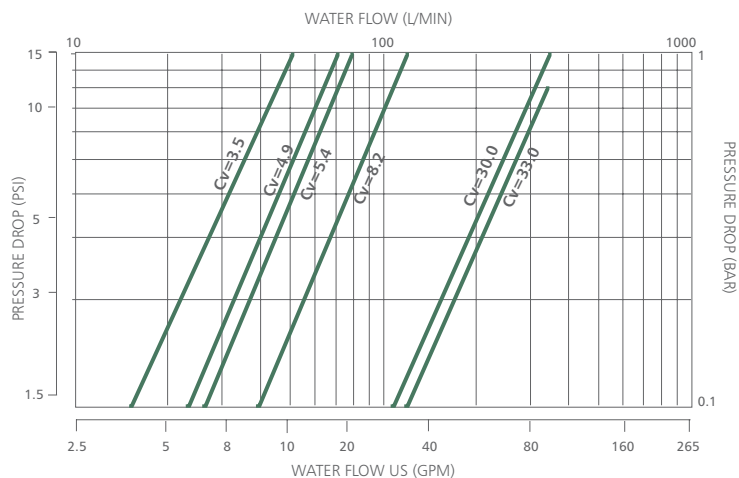
PART NUMBER RESTRICTIONS

Available with:

¹3/8", 1/2", 3/4" & 1" ports only, ²1-1/4", 1-1/2" & 2" ports only, ³DC only, ⁴AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice when building the part number.





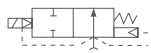
ACPN SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



MODE OF OPERATION



2/2 Normally Open Solenoid Pilot Acting

See page 74 for details on modes of operations.

GENERAL INFORMATION

Valve Highlights

- 3/8" – 2" NPT ports
- Normally open flow pattern
- Piston operated
- Choice of valve body material and seals

Body Materials

- Brass 3/8" – 1" port sizes
- Bronze 1-1/4" – 2" port sizes

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

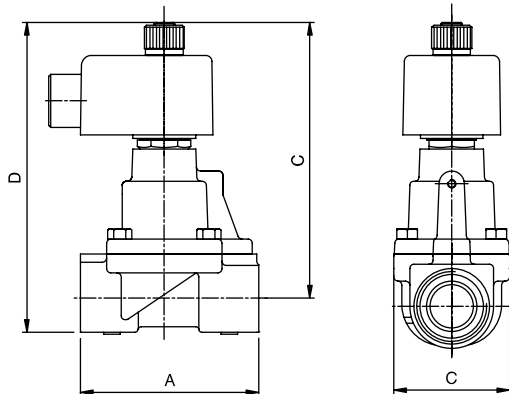
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
3/8"	16.0	3.5	725	5-150	5-150	2.8
1/2"	16.0	4.9	725	5-150	5-150	2.8
3/4"	20.0	6.3	725	5-150	5-150	2.8
1"	20.0	8.3	725	5-150	5-150	5.0
1-1/4"	30.0	20.9	725	5-150	5-150	6.8
1-1/2"	30.0	20.9	725	5-150	5-150	6.8
2"	32.0	24.9	725	5-150	5-150	11.5

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

³ Zero Pressure Rated (refer to OPD figures): 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.

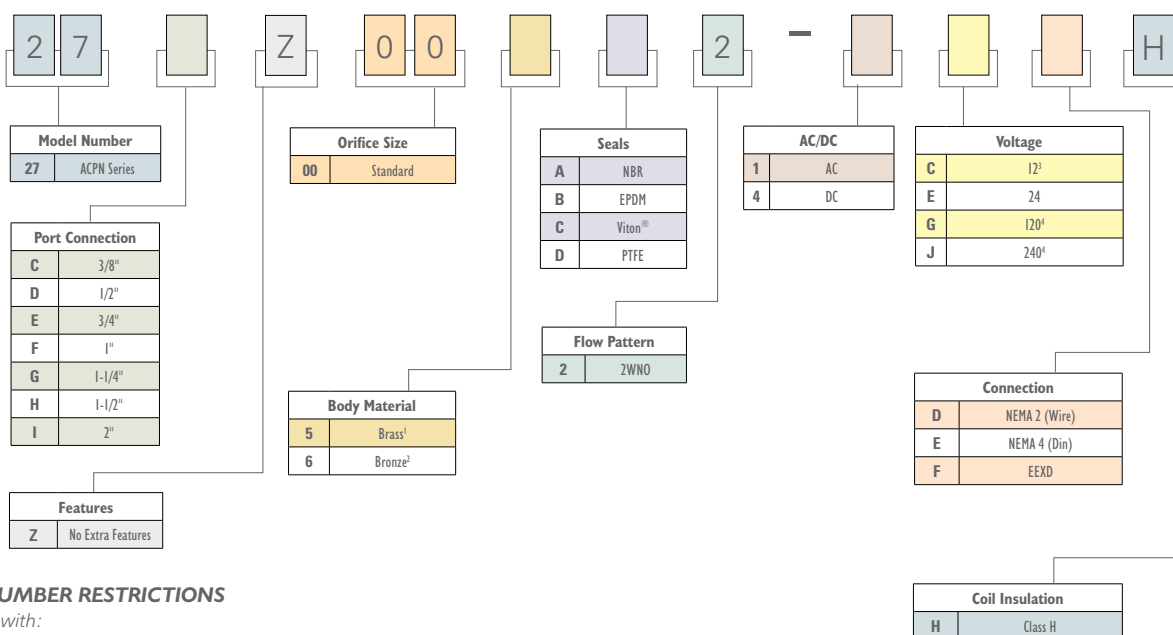
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR ACPN SERIES



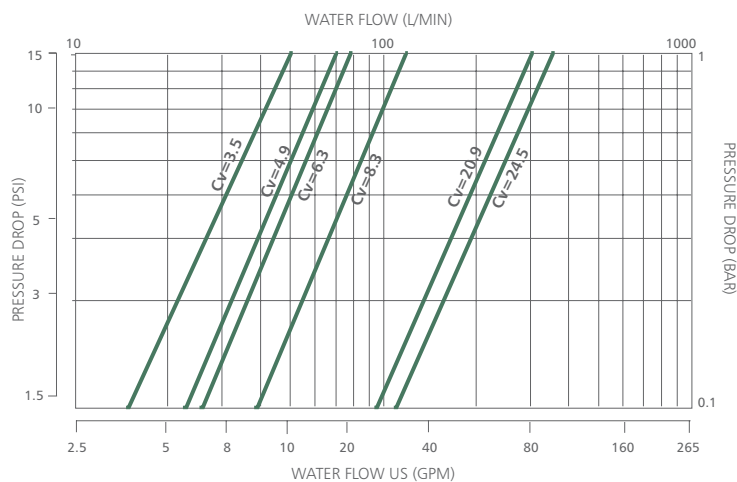
PART NUMBER RESTRICTIONS

Available with:

¹3/8", 1/2", 3/4" & 1" ports only, ²1-1/4", 1-1/2" & 2" ports only, ³DC only, ⁴AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice when building the part number.





22 SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/8" – 3/8" NPT ports
- Normally open flow pattern
- Zero pressure rated
- Ideal for in-line systems

Body Materials

- Brass
- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F (Steam Series)

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Open Solenoid Direct Acting

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

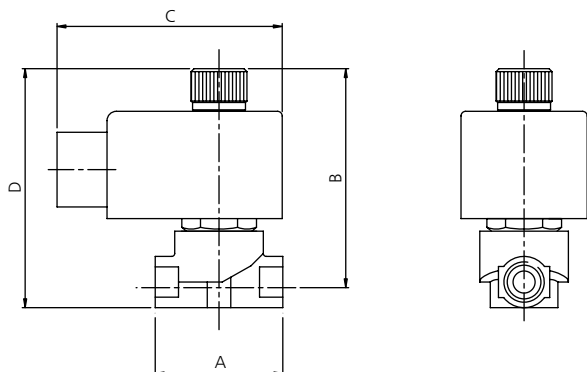
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/8"	1.5	0.12	725	0-300	0-300	0.7
1/8"	3.0	0.35	725	0-150	0-150	0.7
1/4"	1.5	0.12	725	0-300	0-300	0.7
1/4"	3.0	0.35	725	0-150	0-150	0.7
1/4"	6.0	0.70	725	0-15	0-15	0.7
3/8"	6.0	0.70	725	0-15	0-15	0.7

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

³ Zero Pressure Rated (refer to OPD figures): 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.

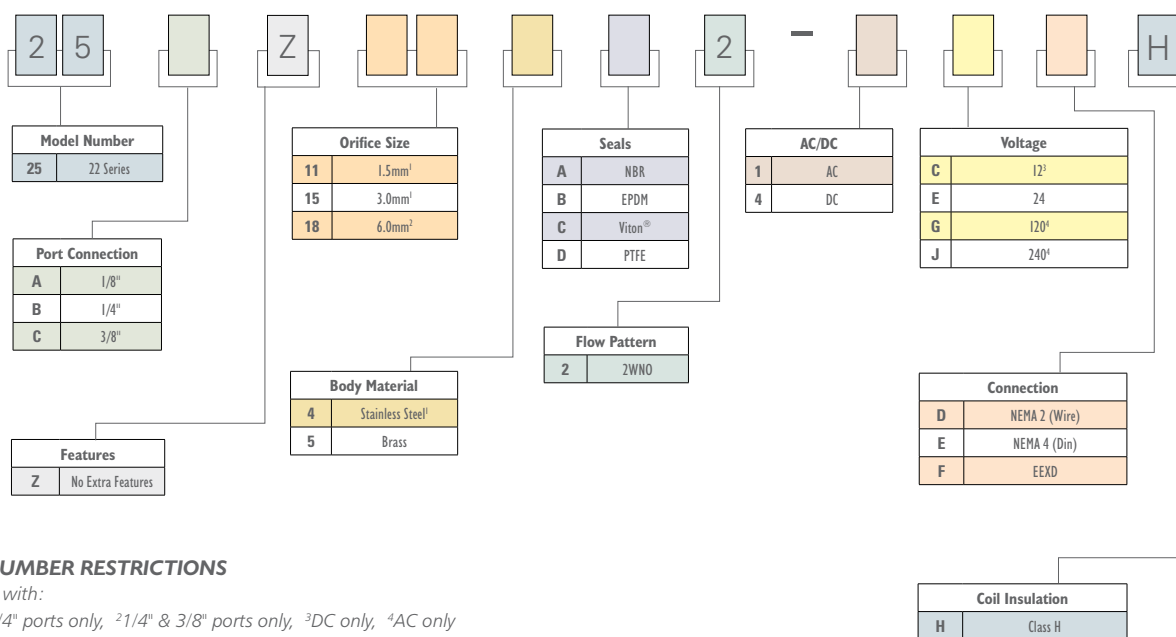
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR 22 SERIES



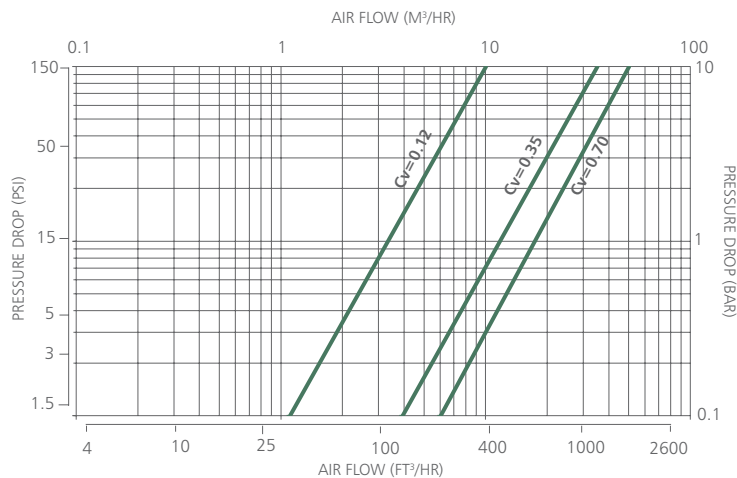
PART NUMBER RESTRICTIONS

Available with:

¹1/8" & 1/4" ports only, ²1/4" & 3/8" ports only, ³DC only, ⁴AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





U31, U32, & U33 SERIES | GENERAL PURPOSE VALVE



1/2" metal conduit hub shown in picture



PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)	FLOW PATTERN
				AC COIL	DC COIL		
1/8"	1.2	0.05	870	0-170	0-170	1.0	3WNC
1/8"	1.6	0.13	870	0-155	0-155	1.0	3WNC
1/8"	2.4	0.24	870	0-100	0-100	1.0	3WNC
1/8"	3.0	0.35	870	0-85	0-85	1.0	3WNC
1/4"	1.6	0.13	870	0-155	0-155	1.0	3WNC
1/4"	2.4	0.24	870	0-100	0-100	1.0	3WNC
1/4"	3.0	0.35	870	0-85	0-85	1.0	3WNC
1/8"	1.6	0.10	870	0-145	0-145	1.0	3WNO
1/8"	2.4	0.22	870	0-78	0-78	1.0	3WNO
1/8"	3.0	0.26	870	0-40	0-40	1.0	3WNO
1/4"	1.6	0.10	870	0-145	0-145	1.0	3WNO
1/4"	2.4	0.22	870	0-78	0-78	1.0	3WNO
1/4"	3.0	0.26	870	0-40	0-40	1.0	3WNO
1/8"	1.6	0.10	870	0-107	0-107	1.0	3WUNV
1/8"	2.4	0.22	870	0-42	0-42	1.0	3WUNV
1/8"	3.0	0.26	870	0-30	0-30	1.0	3WUNV
1/4"	1.6	0.10	870	0-107	0-107	1.0	3WUNV
1/4"	2.4	0.22	870	0-42	0-42	1.0	3WUNV
1/4"	3.0	0.26	870	0-30	0-30	1.0	3WUNV

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80 °F.

³ Zero Pressure Rated (refer to OPD figures): 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.

GENERAL INFORMATION

Valve Highlights

- 1/8" & 1/4" NPT ports
- 3-way flow patterns
- Ideal for mixing, diverting and venting
- Zero pressure rated

Flow Patterns

- 3 way normally open (31 Series)
- 3 way normally closed (32 Series)
- 3 way universal (33 Series)

Body Materials

- Brass
- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14 °F to 176 °F
- EPDM: -58 °F to 248 °F
- Viton®: -4 °F to 302 °F

Electrical Connection Options

- 1/2" NPT metal conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

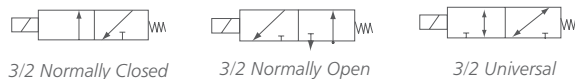
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

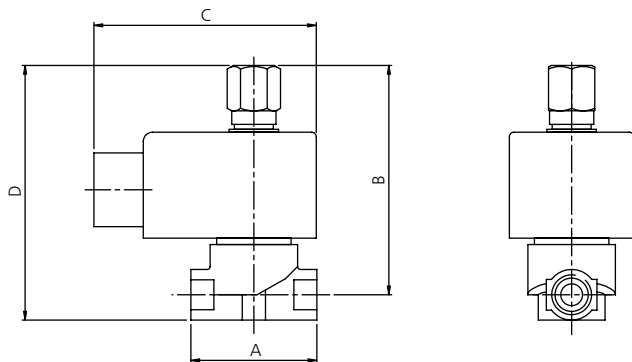
- Approved ambient temperature range: 14 °F to 122 °F

MODES OF OPERATION



See page 74 for details on modes of operations.

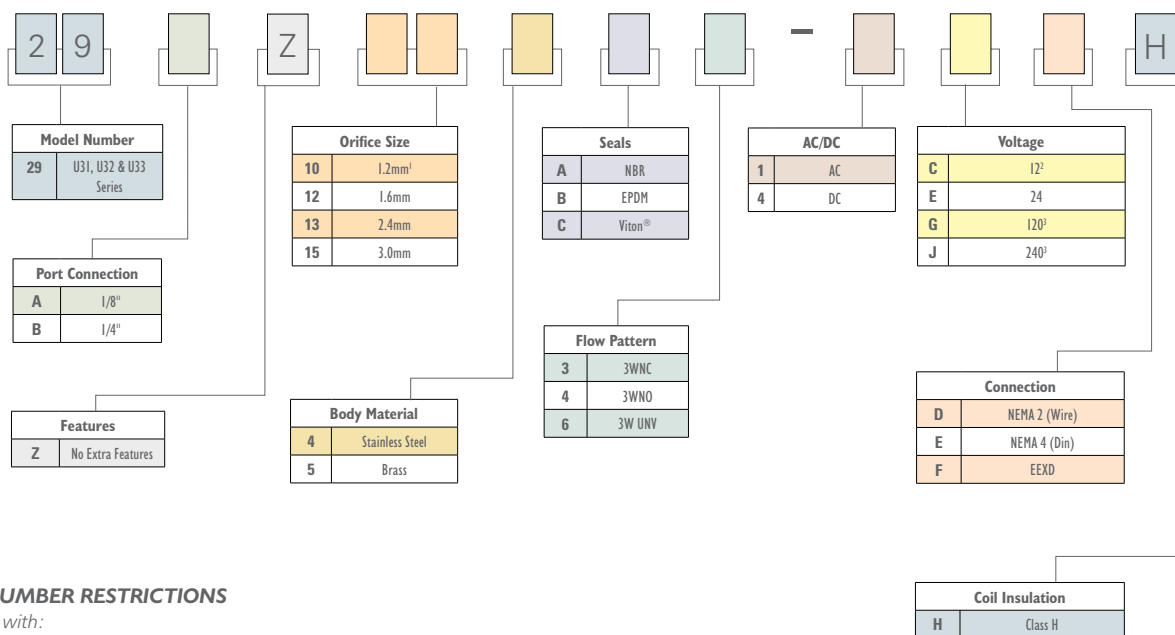
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR U31, U32 & U33 SERIES



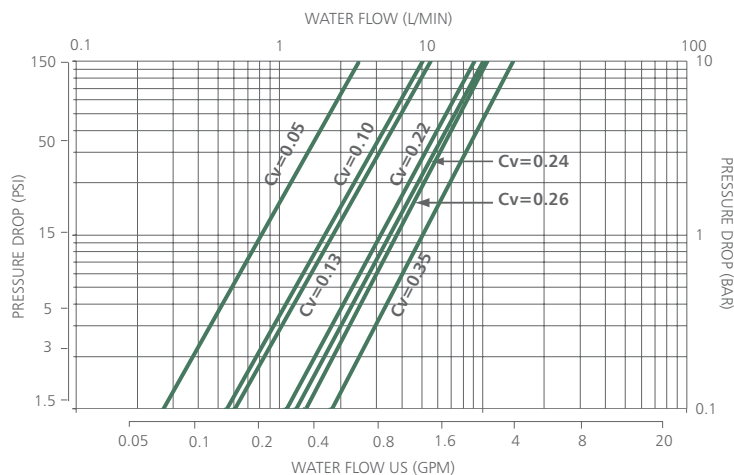
PART NUMBER RESTRICTIONS

Available with:

¹3-way normally closed flow pattern only, ²DC only, ³AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





61 SERIES | GENERAL PURPOSE VALVE



MODE OF OPERATION



2/2 Normally Closed
Solenoid Operated Direct Acting

See page 74 for details on modes of operations.

GENERAL INFORMATION

Valve Highlights

- 1/8" & 1/4" NPT ports
- 2-way normally closed flow pattern
- Zero pressure rated

Body Material Options

- 316 stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection

- 9mm din connector
(NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: F
- Power consumption: 13 Watts
- DC voltages: 12, 24
- AC voltages: 24, 120, or 220

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

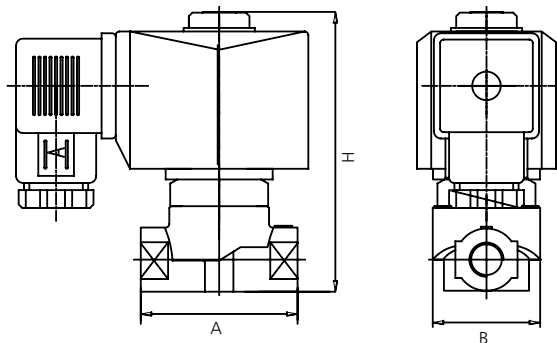
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/8"	2.5	0.27	232	0-145	0-145	0.8
1/8"	3.0	0.35	232	0-102	0-102	0.8
1/4"	2.5	0.27	232	0-145	0-145	0.8
1/4"	3.0	0.35	232	0-102	0-102	0.8

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

DIMENSIONAL DRAWINGS [INCHES]

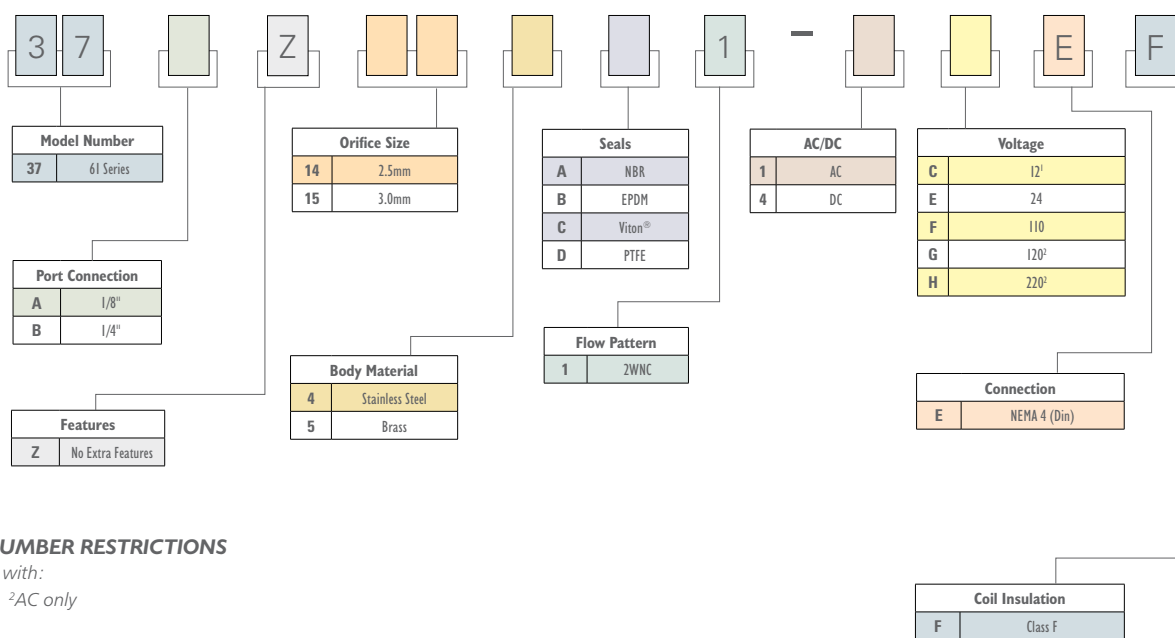


Note: Solenoid Coil may be rotated to any angle.

DIMENSIONAL DATA

PORT SIZE	A	B	H	WEIGHT (LBS)
1/8" & 1/4"	1.575"	1.063"	2.638"	0.77

PART NUMBER SELECTION GUIDE FOR 61 SERIES



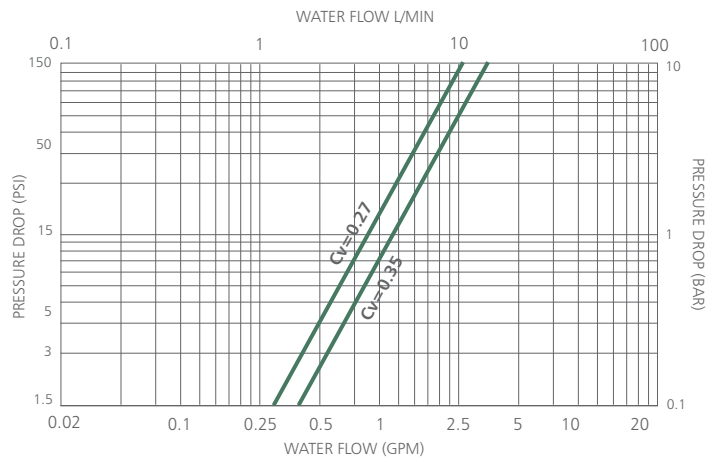
PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





71 SERIES | GENERAL PURPOSE VALVE



Stainless steel body shown

MODE OF OPERATION



See page 74 for details on modes of operations.

GENERAL INFORMATION

Valve Highlights

- 1/8" & 1/4" NPT ports
- 3-way normally closed flow pattern
- Zero pressure rated

Body Material Options

- Brass
- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection

- 9mm din connector
(NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: F
- Power consumption: 13 Watts
- DC voltages: 12, 24 or 110
- AC voltages: 24, 110, 120, or 220

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

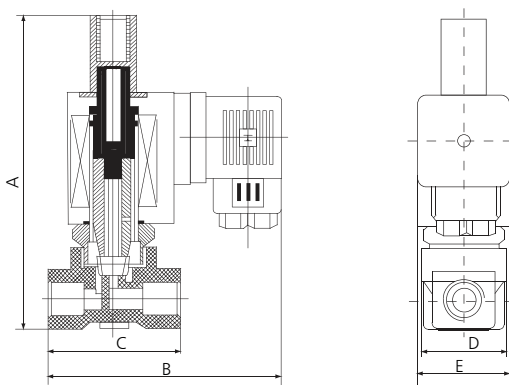
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/8"	1.5	0.08	145	0-87	0-44	2.6
1/8"	2.5	0.24	145	0-56	0-29	2.6
1/8"	3.0	0.27	145	0-56	0-29	2.6
1/4"	1.5	0.08	145	0-87	0-44	2.6
1/4"	2.5	0.24	145	0-56	0-29	2.6
1/4"	3.0	0.27	145	0-56	0-29	2.6

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

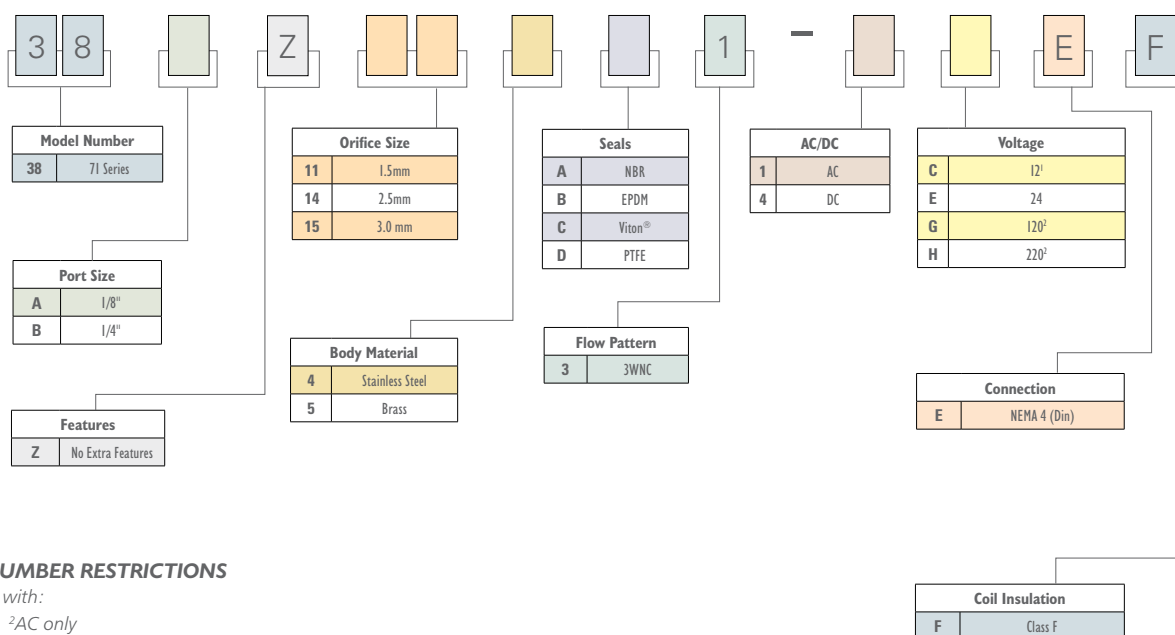
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT SIZE	A	B	C	D	E	WEIGHT (LBS)
1/8"	3.700"	2.866"	1.614"	1.063"	1.420"	0.99
1/4"	3.700"	2.866"	1.614"	1.063"	1.420"	0.99

PART NUMBER SELECTION GUIDE FOR 71 SERIES



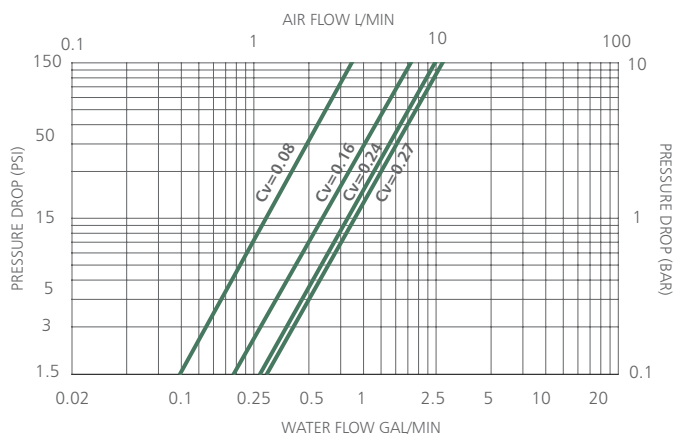
PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





ACE SERIES | GENERAL PURPOSE VALVE



GENERAL INFORMATION

Valve Highlights

- 3/8" – 2" NPT ports
- 2-way normally closed flow pattern
- Diaphragm operated
- Fully ported orifices for high flow

Body Material Options

- Brass
- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection

- 9mm din connector (NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: F
- Power consumption: 13 Watts
- DC voltage: 12 & 24
- AC voltages: 24, 120 & 220

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

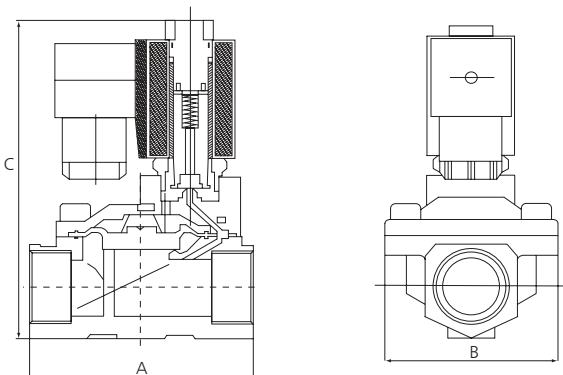
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
3/8"	13.0	3.7	250	7-200	7-200	1.8
1/2"	13.0	6.2	250	7-200	7-200	1.5
3/4"	20.0	9.7	250	7-200	7-200	2.0
1"	25.0	17.9	250	7-200	7-200	3.1
1-1/4"	35.0	24	250	7-200	7-200	6.2
1-1/2"	40.0	39	250	7-200	7-200	5.9
2"	50.0	48	250	7-200	7-200	10.6

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

³ Zero Pressure Rated (refer to OPD figures): 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.

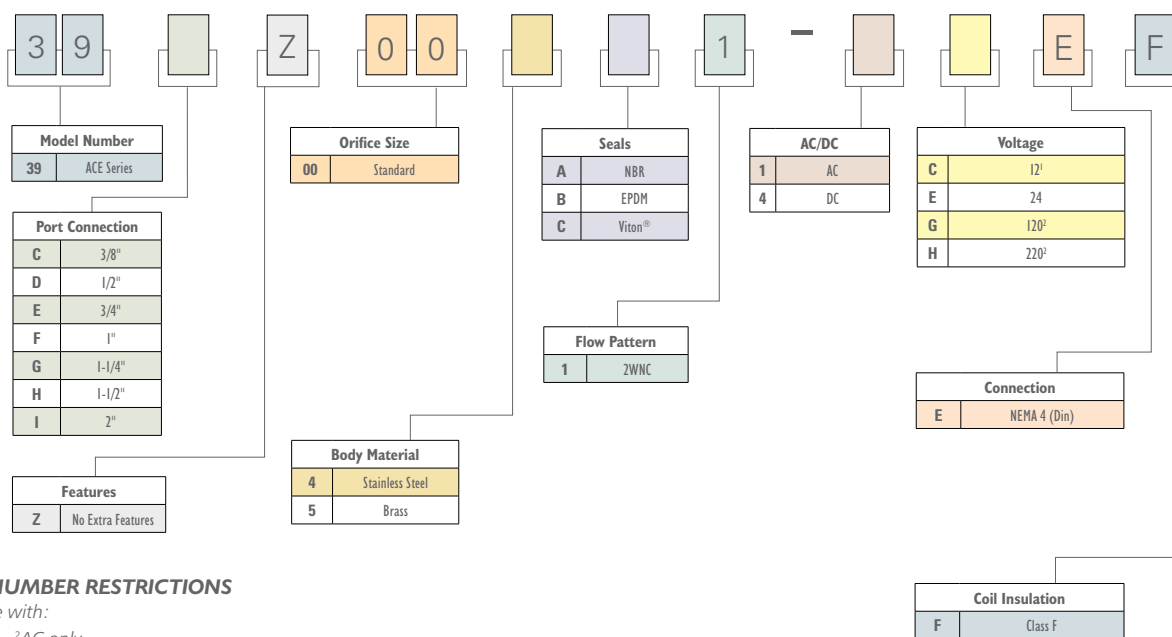
DIMENSIONAL DRAWINGS



DIMENSIONAL DATA

PORT SIZE	A	B	C	WEIGHT (LBS)
3/8"	2.598"	1.890"	4.409"	1.76
1/2"	2.598"	1.890"	4.409"	1.54
3/4"	2.952"	2.283"	4.645"	1.98
1"	3.780"	2.755"	5.157"	3.09
1-1/4"	5.157"	3.780"	5.748"	6.17
1-1/2"	5.157"	3.780"	5.866"	6.0
2"	6.496"	4.724"	6.575"	10.5

PART NUMBER SELECTION GUIDE FOR ACE SERIES



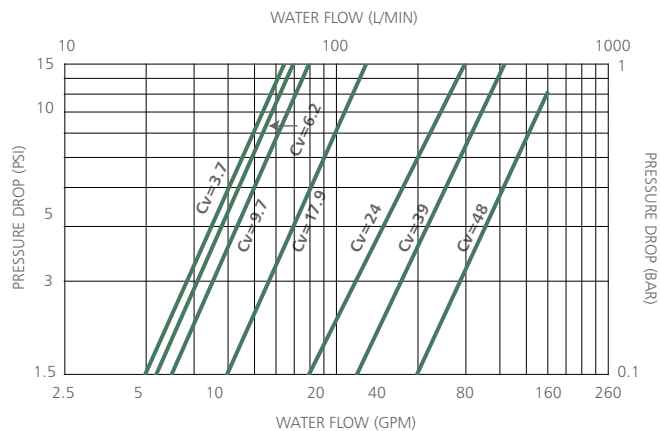
PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice size when building a part number.





ACC SERIES | GENERAL PURPOSE VALVE



MODE OF OPERATION



See page 74 for details on modes of operations.

GENERAL INFORMATION

Valve Highlights

- 1/2" – 2" NPT ports
- 2-way normally closed flow pattern
- Diaphragm operated
- Zero pressure rated

Body Material Options

- Brass

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F

Electrical Connection

- 9mm din connector
(NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: F
- Power consumption: 13 Watts
- DC voltage: 24
- AC voltages 60Hz: 230

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- DC Voltage: 12 & 24
- AC Voltage: 24, 120 & 220

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

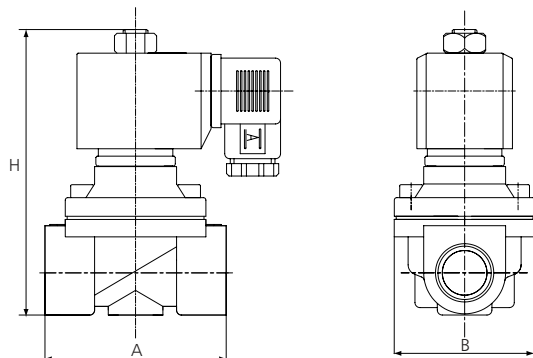
PORT SIZE	ORIFICE (MM)	CV	P. MAX ¹ (PSI)	OPD ² (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/2"	16.0	4.8	250	0-145	0-145	19.8
3/4"	20.0	7.5	250	0-145	0-145	2.4
1"	25.0	11.9	250	0-145	0-145	3.1
1-1/4"	32.0	23.9	250	0-145	0-102	7.5
1-1/2"	40.0	28.9	250	0-145	0-102	7.3
2"	50.0	47.9	250	0-145	0-102	11.9

¹ P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

² Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

² Zero Pressure Rated (refer to OPD figures): 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.

DIMENSIONAL DRAWINGS

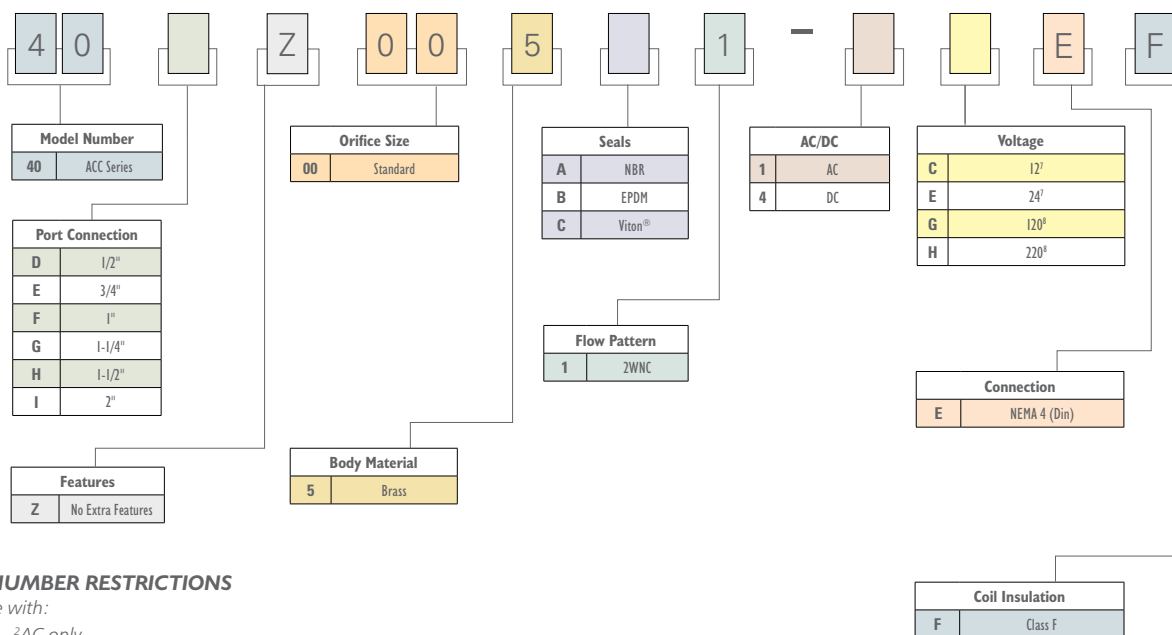


(Alternate coil shown above)

DIMENSIONAL DATA

PORT SIZE	A	B	H
1/2"	2.716"	2.244"	4.173"
3/4"	2.874"	2.244"	4.488"
1"	3.897"	3.031"	4.764"
1 1/4"	4.409"	3.406"	5.906"
1 1/2"	4.843"	3.700"	6.299"
2"	6.614"	4.843"	7.205"

PART NUMBER SELECTION GUIDE FOR ACC SERIES



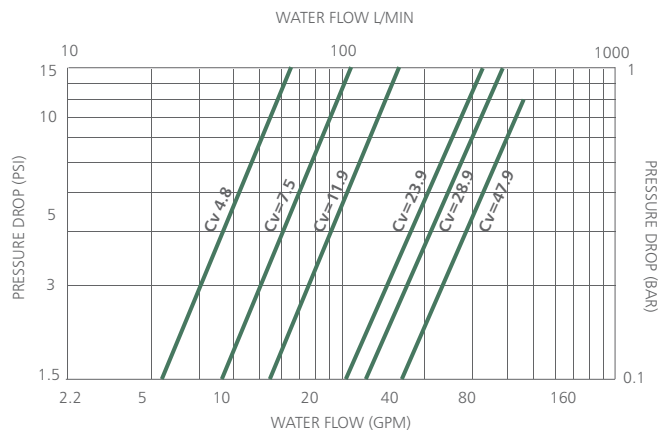
PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice size when building a part number.





 
No unauthorized personnel
to and from the machine
during operation.
Nur autorisierte Personen
dürfen an der Maschine
arbeiten.
Personnel autorisés
seulement pour
l'exploitation de la machine.



ACTUATOR CONTROL VALVES



67 SERIES | ACTUATOR CONTROL VALVE



9mm Din connection shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/4" – 1/2" ports
- Stainless steel construction
- Designed for actuator control
- Zero pressure rated

Body Material Options

- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F

Electrical Connection Options

- Standard: 9mm din connector (NEMA 4 protection class)
- Optional: Hazardous enclosure, see page 68 for details (NEMA 6 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

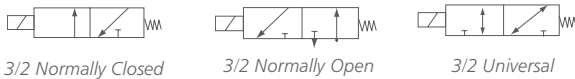
Optional Features (one option per valve)

- Manual override
- Manual reset
- Manual latch

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- Approved media: Air

MODES OF OPERATION



See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

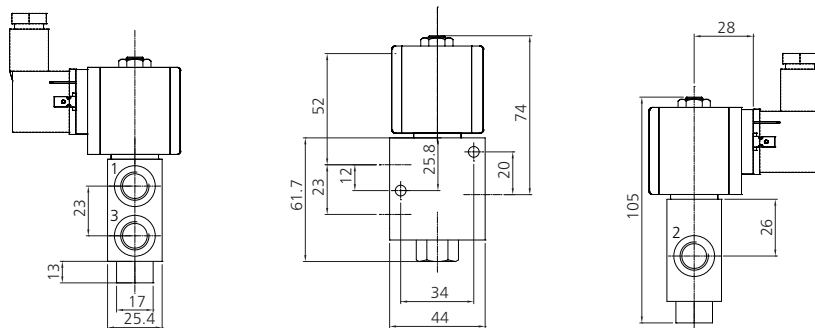
PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/4"	8.8	0.61	290	0-150	0-150	2.0
3/8"	8.8	0.61	290	0-150	0-150	2.0
1/2"	8.8	0.61	290	0-150	0-150	2.0

*P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

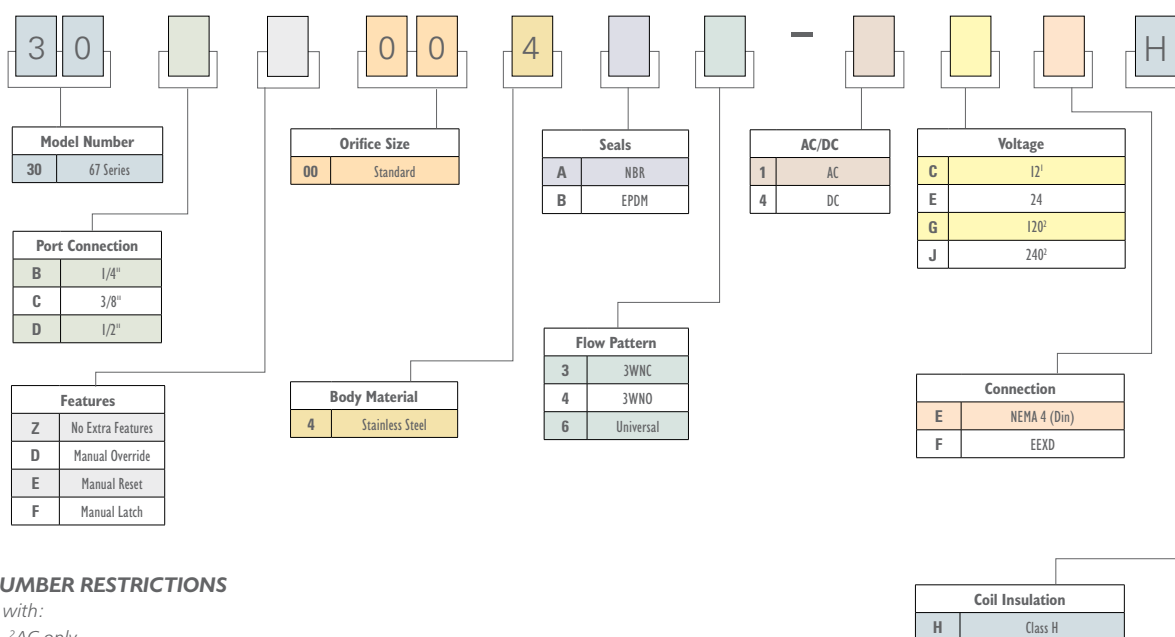
** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

** Zero Pressure Rated (refer to OPD figures): 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.

DIMENSIONAL DRAWINGS [INCHES]



PART NUMBER SELECTION GUIDE FOR 67 SERIES

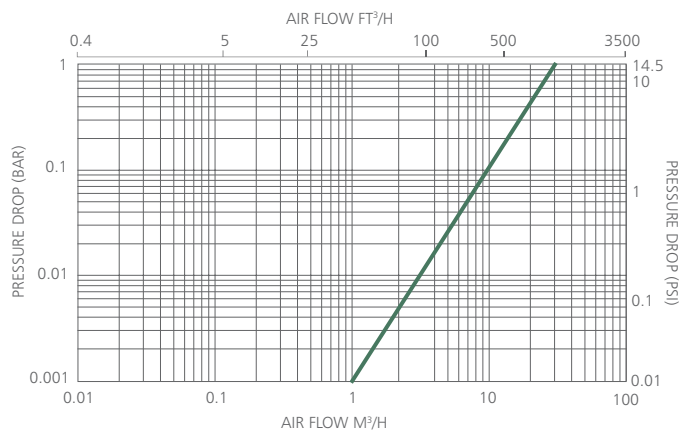


PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA





NAMUR 5/2 SERIES | ACTUATOR CONTROL VALVE



For definition of valve type refer to page 70

GENERAL INFORMATION

Valve Highlights

- 1/4" ports
- Namur interface for actuator mounting
- Pilot actuated spool valve

Body Materials

- Anodized aluminum
- Stainless steel

Seal Options and Temperature Ranges

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F

Electrical Connection

- Standard: 9mm din connector (NEMA 4 protection class)
- Optional: Hazardous enclosure, see page 68 for details (NEMA 6 protection class)

Electrical Characteristics

- Standard coil class: F
- Power consumption: See table below
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- Approved media: Air

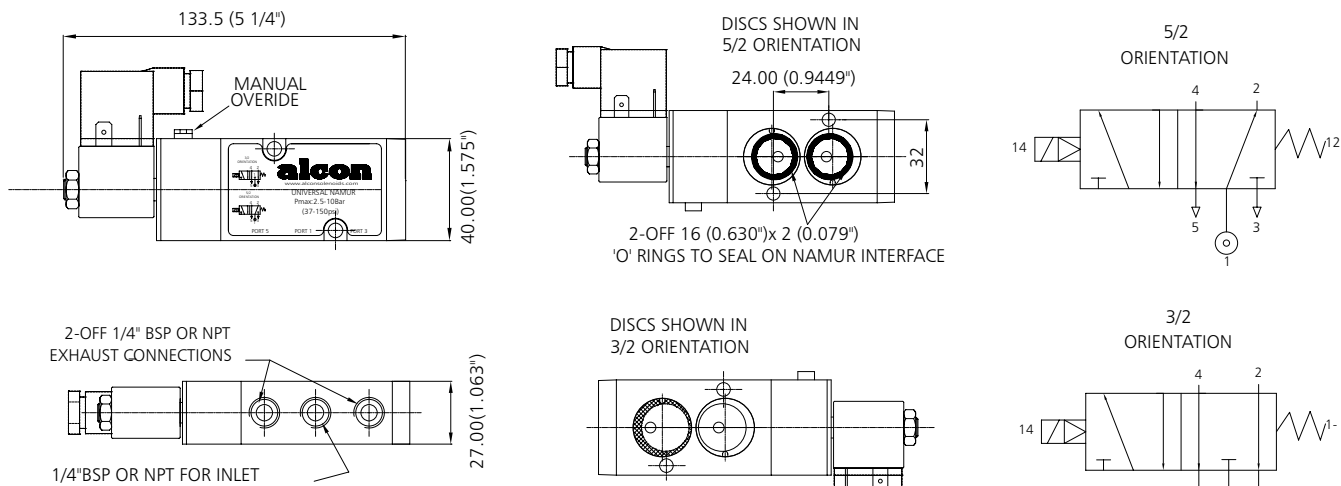
PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

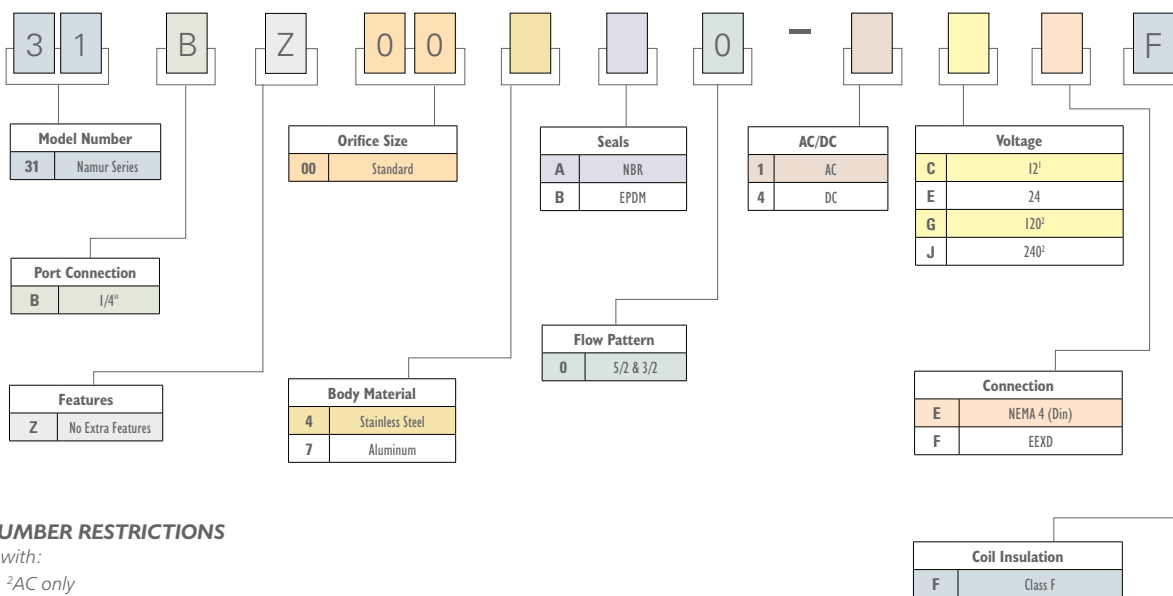
PORT SIZE	CV	OPD* (PSI)		POWER (WATTS)	BODY MATERIAL	WEIGHT (LBS.)
		AC COIL	DC COIL			
1/4"	0.50	36-150	36-150	5.0	Aluminum	0.4
1/4"	0.50	36-150	36-150	14.5	Aluminum	1.3
1/4"	0.50	36-150	36-150	1.6	Aluminum	0.4
1/4"	0.50	36-150	36-150	5.0	SS	1
1/4"	0.50	36-150	36-150	14.5	SS	1.8
1/4"	0.50	36-150	36-150	1.6	SS	0.4

* Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

DIMENSIONAL DRAWINGS [INCHES]



PART NUMBER SELECTION GUIDE FOR NAMUR SERIES

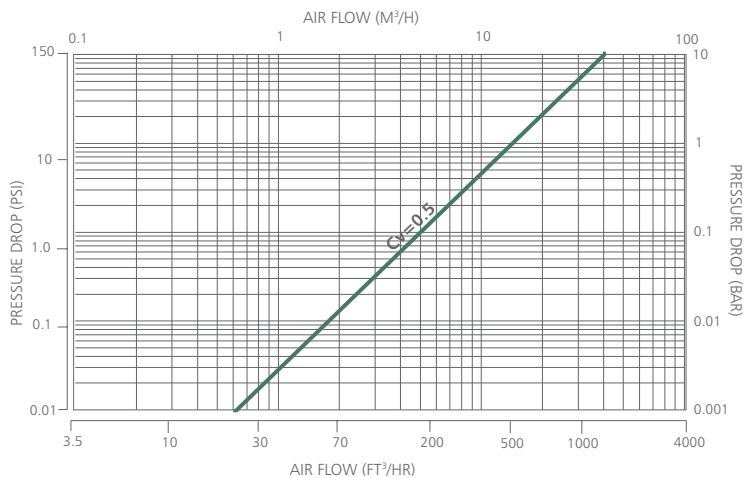


PART NUMBER RESTRICTIONS

Available with:

¹DC only, ²AC only

STANDARD FLOW DATA







SPECIALTY VALVES



UGB SERIES | FOR USE WITH NATURAL GAS



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/4" – 1" NPT ports
- 2-way normally closed
- Lightweight aluminum construction
- Zero pressure rated
- Fully ported orifices for high flow at minimal pressure drop

Body Materials

- Aluminum

Seal Options and Temperature Range

- Nitrile (BunaN): 14°F to 176°F

Electrical Connection Options

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- AC voltages: 24 & 120

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- Media: Natural gas

MODE OF OPERATION



2/2 Normally Closed
Solenoid Operated Direct Acting

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

PORT SIZE	ORIFICE (MM)	GAS FLOW RATE* (FT ³ /HR)	P. MAX** (PSI)	OPD*** (PSI) AC	WEIGHT (LBS.)
1/4"	12.7	126.0	14.5	0-2.0	0.5
3/8"	12.7	175.0	14.5	0-2.0	0.5
1/2"	12.7	190.0	14.5	0-2.0	0.5
3/4"	19.0	473.0	14.5	0-1.5	0.5
1"	19.0	525.0	14.5	0-1.5	0.5

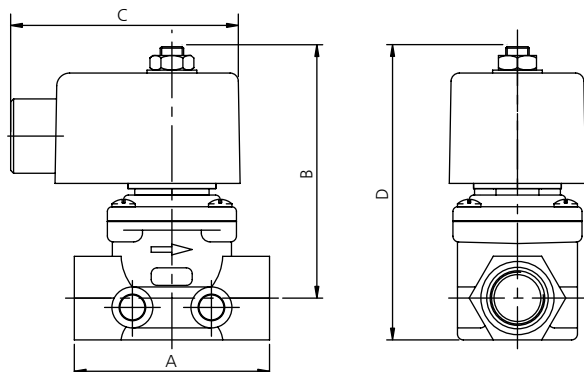
*Gas flow is typically not Cv rated. Indicated flow is rated at change in $p=1.0$ "WG

**P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

***Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

***Zero Pressure Rated (refer to OPD figures): 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.

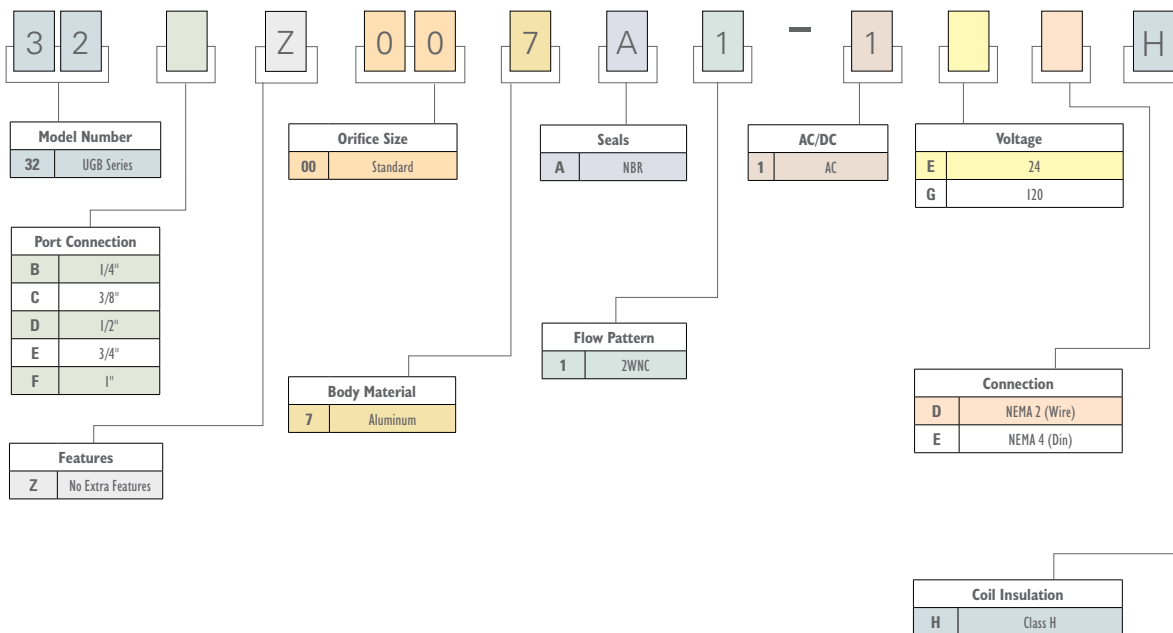
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

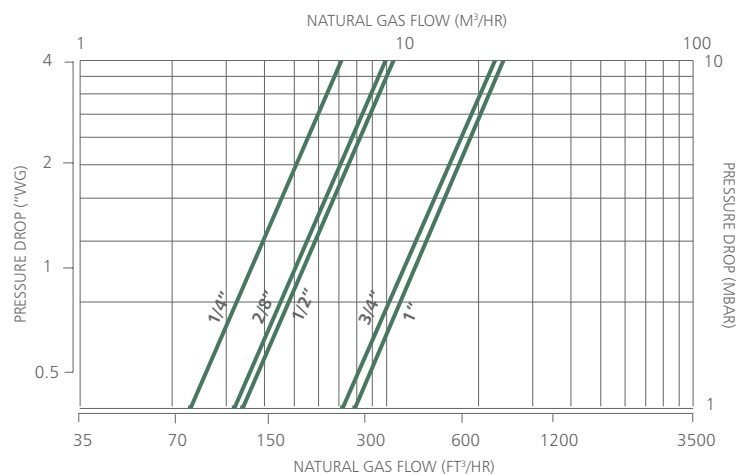
PORT SIZE	A	B	C	D
1/4"	2-1/4"	3"	3"	3-5/8"
3/8"	2-1/4"	3"	3"	3-5/8"
1/2"	2-1/4"	3"	3"	3-5/8"
3/4"	3-3/8"	3-9/16"	2-9/16"	4-1/4"
1"	4-3/8"	3-9/16"	2-9/16"	4-7/16"

PART NUMBER SELECTION GUIDE FOR UGB SERIES



STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. Each flow curve will be labeled with the port size. Choose the port size that corresponds to the flow rate needed when building your part number.





U28 SERIES | FOR USE WITH GASES & FUELS



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/8" – 3/8" NPT ports
- 2-way normally closed flow pattern
- Approved safety shut-off valve
- Zero pressure rated

Body Materials

- Brass

Seal Options and Temperature Range

- Nitrile (BunaN): 14°F to 176°F
- Viton®: -4°F to 302°F

Electrical Connection

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: See table below
- AC voltages: 24 & 120

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- Media: Ideal for air, inert gas, manufactured gas, natural gas and light oil

MODE OF OPERATION



2/2 Normally Closed
Solenoid Operated Direct Acting

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

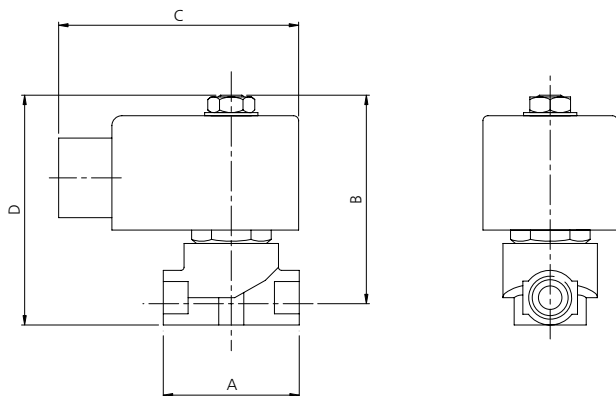
PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI) AC	WATTS	WEIGHT (LBS.)
1/8"	3.5	0.42	870	0-10	16	1.0
1/8"	4.5	0.53	870	0-10	12.5	1.0
1/8"	6.0	0.70	870	0-10	12.5	1.0
1/4"	4.5	0.53	870	0-10	12.5	1.0
1/4"	6.0	0.70	870	0-10	12.5	1.0
3/8"	6.0	0.70	870	0-10	12.5	1.2
3/8"	9.5	1.75	870	0-10	12.5	1.2

*P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

** Zero Pressure Rated (refer to OPD figures): 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.

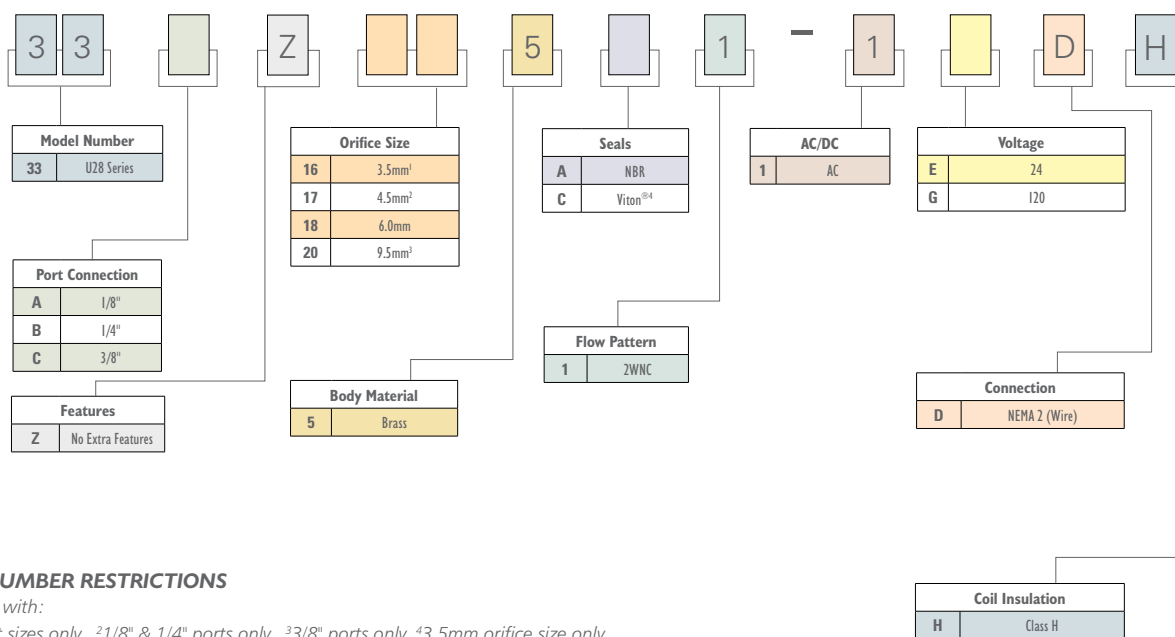
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR U28 SERIES



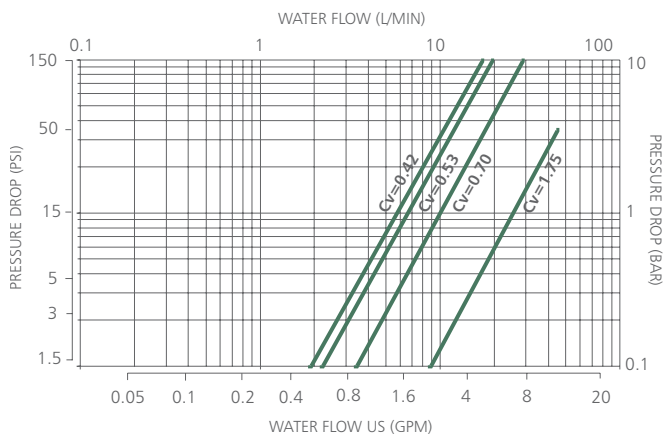
PART NUMBER RESTRICTIONS

Available with:

¹1/8" port sizes only, ²1/8" & 1/4" ports only, ³3/8" ports only, ⁴3.5mm orifice size only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





UACF SERIES | FOR USE WITH FUEL OIL



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/4" & 3/8" NPT ports
- 2-way normally closed flow pattern
- Viton® seal configuration provides approved safety shut-off for fuel oils

Body Material

- Brass

Seal Options and Temperature Range

- Viton®: -4°F to 302°F (Standard)

Electrical Connection

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: See table below
- AC voltages: 24 & 120

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F
- Approved Media: Air, water, inert gas, number 2 fuel oil or lighter, and number 6 fuel oil

MODE OF OPERATION



2/2 Normally Closed
Solenoid Operated Direct Acting

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

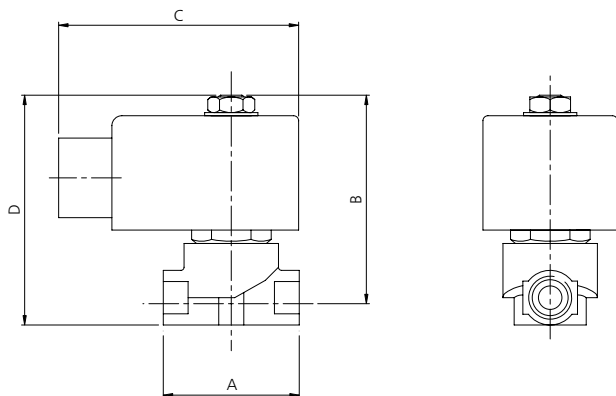
PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI) AC	WATTS	WEIGHT (LBS.)
1/4"	8.8	1.35	870	5-300	12.5	1.0
3/8"	8.8	1.47	870	5-300	12.5	1.0
1/4"	8.8	1.35	870	5-150	12.5	1.0
3/8"	8.8	1.47	870	5-150	12.5	1.0

*P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

** Zero Pressure Rated (refer to OPD figures): 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.

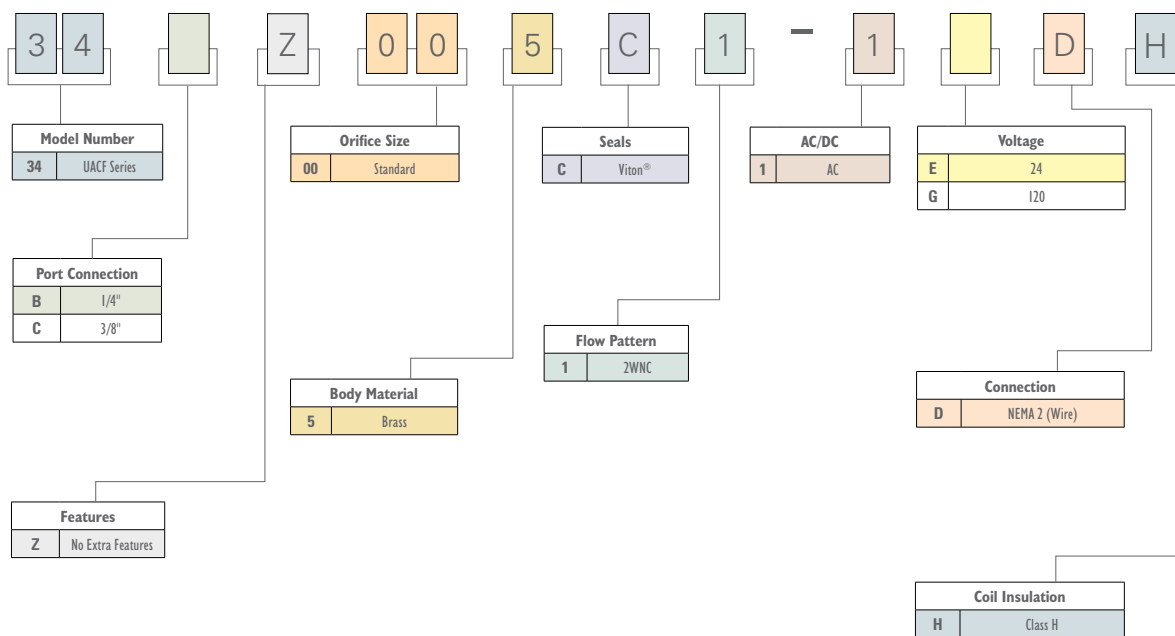
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

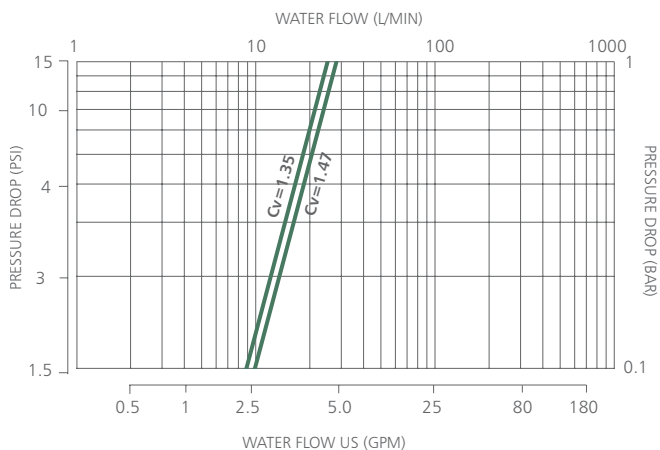
PORT SIZE	A	B	C	D
1/4"	1-3/4"	3"	2-1/2"	3-1/4"
3/8"	2"	3"	2-1/2"	3-1/2"

PART NUMBER SELECTION GUIDE FOR UACF SERIES



STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





HP SERIES | FOR HIGH PRESSURE APPLICATIONS



1/2" metal conduit hub shown in picture



GENERAL INFORMATION

Valve Highlights

- 1/4", 3/8" & 1/2" NPT ports
- 2-way normally closed
- Ideal for high pressure applications
- Piston operated
- Compact valve design

Body Material

- Brass
- Stainless steel

Seal and Temperature Range

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection Options

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)
- 9mm din connector (NEMA 4 protection class)

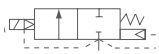
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 watts
- AC voltages: 24, 120, or 240

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

MODE OF OPERATION



2/2 Normally Closed
Solenoid Pilot Operated

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

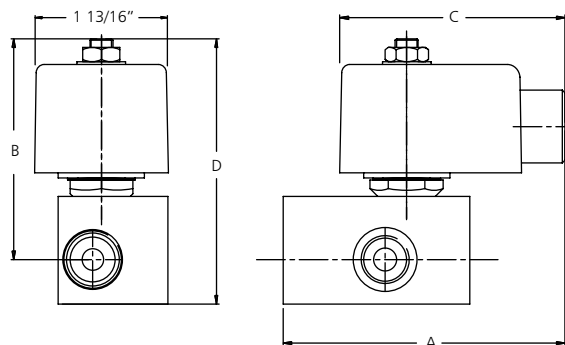
PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI) AC COIL	POWER (WATTS)
1/4"	8.0	1.12	2100	15-1500	1.5
3/8"	8.0	1.12	2100	15-1500	1.5
1/2"	8.0	1.12	2100	15-1500	1.5

* P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F

** Zero Pressure Rated (refer to OPD figures): 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.

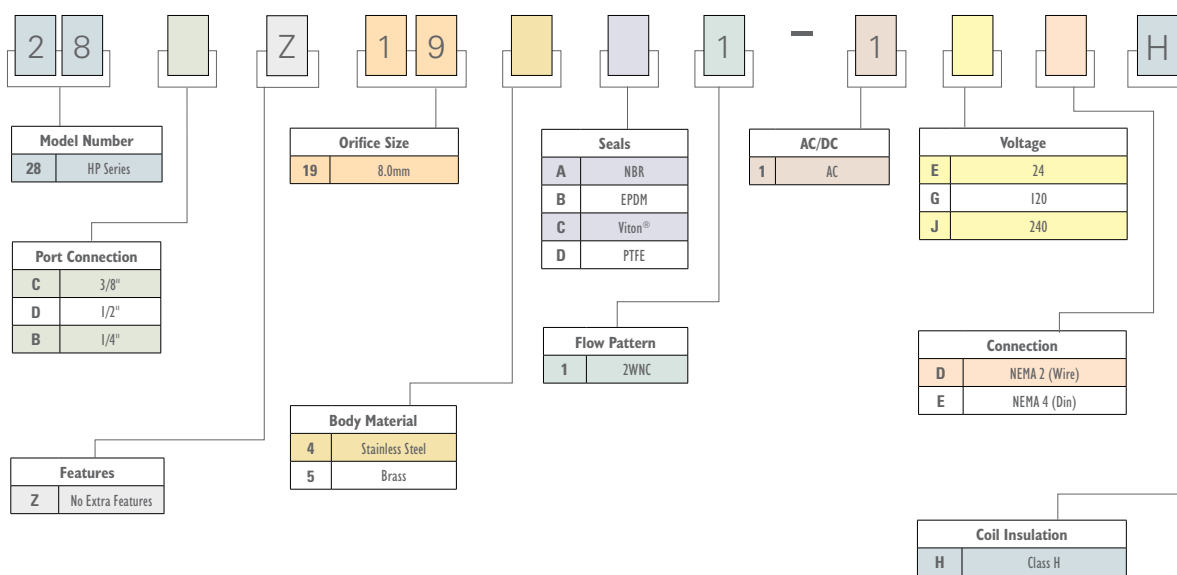
DIMENSIONAL DRAWINGS [INCHES]



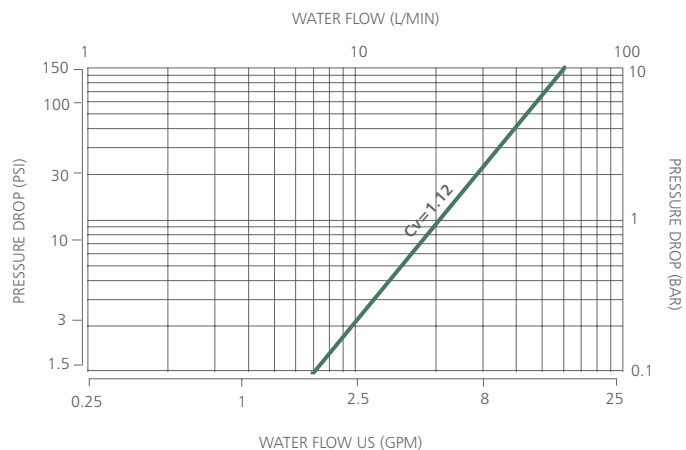
DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR HP SERIES



STANDARD FLOW DATA





68 SERIES | FOR USE IN CRYOGENIC APPLICATIONS



1/4" port, 1/2" metal conduit hub shown in picture

MODES OF OPERATION	
	2/2 Normally Closed Solenoid Operated Direct Acting
	2/2 Normally Closed Solenoid Pilot Operated

See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI)		WEIGHT (LBS.)
				AC COIL	DC COIL	
1/4"	4.5	0.53	870	0-120	0-120	1.0
1/4"	6.0	0.70	870	0-60	0-60	1.0
3/8"	16.0	3.50	725	5-125	5-125	2.8
1/2"	16.0	4.90	725	5-125	5-125	2.8
3/4"	16.0	6.3	725	5-125	5-125	2.8
1"	25.0	8.3	725	5-125	5-125	5.0
1-1/4"	30.0	20.9	725	5-125	5-125	6.8
1-1/2"	30.0	20.9	725	5-125	5-125	6.8
2"	32.0	24.5	725	5-125	5-125	11.5

*P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80°F.

** Zero Pressure Rated (refer to OPD figures): 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.

GENERAL INFORMATION

Valve Highlights

- 1/8" – 2" NPT ports
- 2-way normally closed flow pattern
- Degreased and individually packaged
- Controls cryogenic media down to -321 °F
- Teflon® PTFE seals
- 3/8" and larger piston operated

Body Materials

- Brass 3/8" – 1" port sizes
- Bronze 1-1/4" – 2" port sizes

Seal and Temperature Range

- PTFE: -328 °F to 356 °F

Electrical Connection

- 1/2" NPT conduit hub with 18" leads (NEMA 2 protection class)

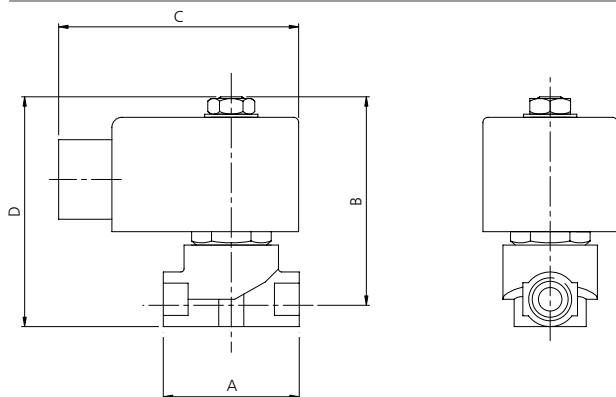
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5 Watts
- DC voltages: 12, or 24
- AC voltages: 24, 120, or 240

Operating Characteristics

- Media: Cryogenic

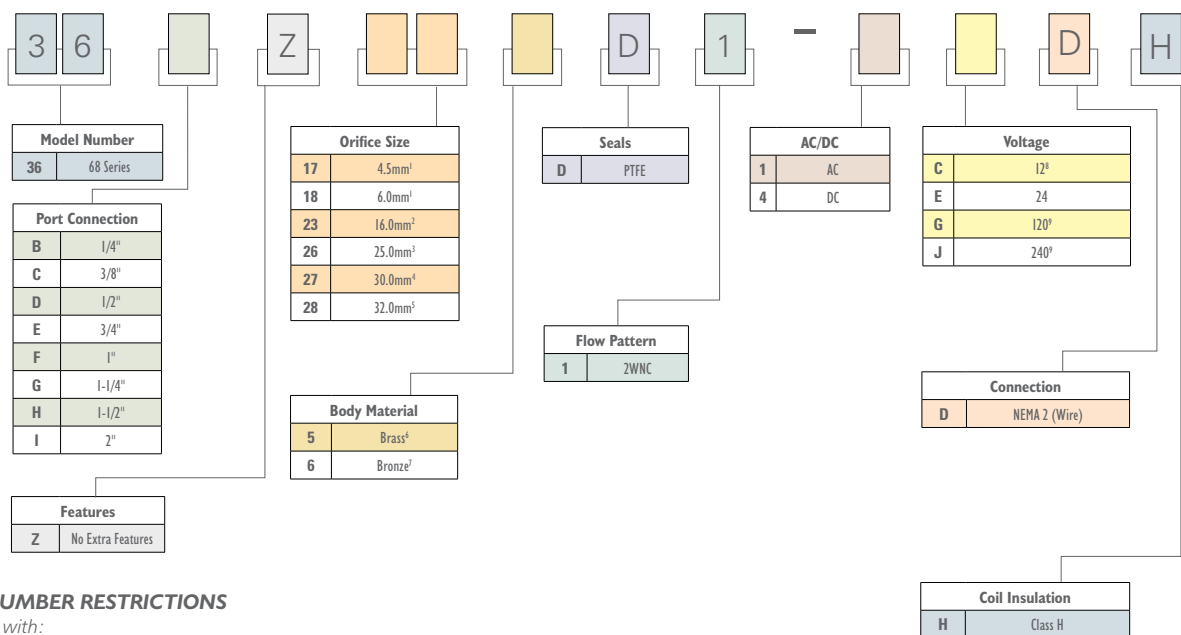
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT 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"

PART NUMBER SELECTION GUIDE FOR 68 SERIES



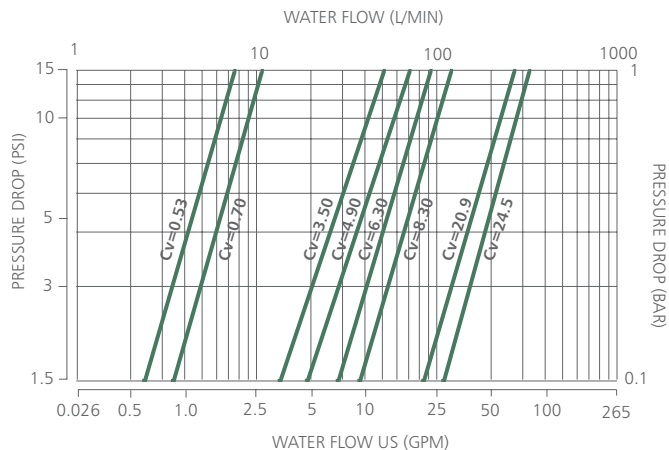
PART NUMBER RESTRICTIONS

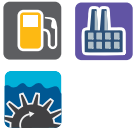
Available with:

¹1/4" port only, ²3/8", 1/2" & 3/4" ports only, ³1" port only, ⁴1-1/4" & 1-1/2" ports only, ⁵2" port only, ⁶3/8", 1/2", 3/4" & 1" ports only, ⁷1-1/4", 1-1/2" & 2" ports only, ⁸DC only, ⁹AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose this orifice size when building the part number.





ACHL SERIES | MANUAL RESET PROCESS VALVE



MODE OF OPERATION



See page 74 for details on modes of operations.

GENERAL INFORMATION

Valve Highlights

- 3/8" – 8" NPT ports
- 2-way normally closed flow pattern
- Manual lever reset design
- AC version fitted with DC internal rectifier

Body Materials

- Bronze

Seal and Temperature Range

- Nitrile (BunaN): 14°F to 176°F
- EPDM: -58°F to 248°F
- Viton®: -4°F to 302°F
- PTFE: -328°F to 356°F

Electrical Connection

- 9mm din connector
(NEMA 4 protection class)

Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- Power consumption: 14.5, 22 Watts
- DC voltage: 12 & 24
- AC voltages: 24, 120 & 220

Operating Characteristics

- Approved ambient temperature range: 14°F to 122°F

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

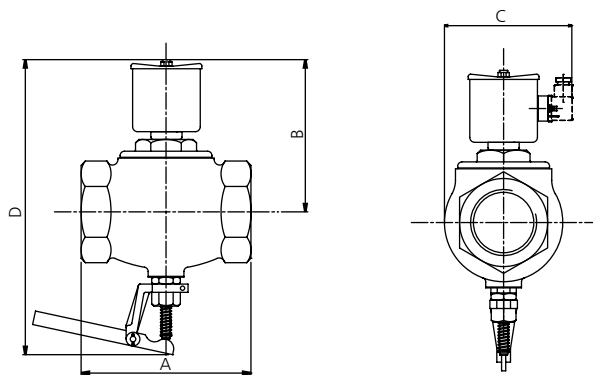
PORT SIZE	ORIFICE (MM)	CV	P. MAX* (PSI)	OPD** (PSI)	WEIGHT (LBS.)
3/8"	16.0	5.8	232	0-125	3.1
1/2"	16.0	3.5	232	0-125	3.1
3/4"	19.0	9.3	232	0-125	4.2
1"	22.0	11.0	232	0-125	4.2
1-1/4"	38.0	26.7	232	0-125	6.8
1-1/2"	38.0	26.7	232	0-44	6.8
2"	51.0	54.5	232	0-44	8.1
2-1/2"	76.0	74.2	232	0-15	17.2
3"	76.0	89.3	232	0-15	17.2
4"	102.0	193.7	232	0-12	89.1
6"	152.0	384.0	232	0-4	155.1
8"	200.0	575.4	232	0-4	330.0

*P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80 °F.

** Zero Pressure Rated (refer to OPD figures): 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.

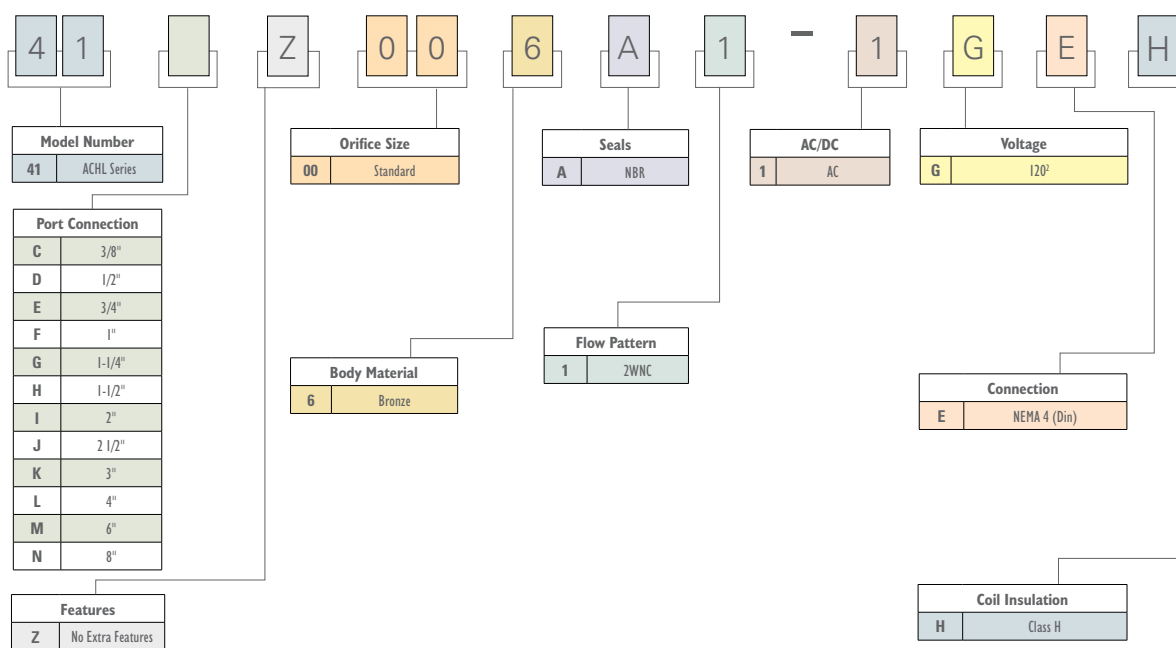
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT SIZE	A	B	C	D
3/8"	2.756"	3.937"	2.953"	7.244"
1/2"	2.756"	3.937"	2.953"	7.244"
3/4"	1.732"	2.756"	2.953"	7.717"
1"	1.732"	2.756"	2.953"	7.717"
1 1/4"	2.480"	2.992"	2.953"	8.701"
1 1/2"	2.480"	2.992"	2.953"	8.701"
2"	2.480"	5.394"	2.953"	10.748"
2 1/2"	10.23"	5.394"	2.953"	10.748"
3"	7.755"	5.394"	2.953"	10.748"
4"	11.469"	11.220"	7.480"	22.716"
6"	14.016"	12.992"	10.236"	27.001"
8"	19.488"	13.976"	12.205"	28.189"

PART NUMBER SELECTION GUIDE FOR ACHL SERIES

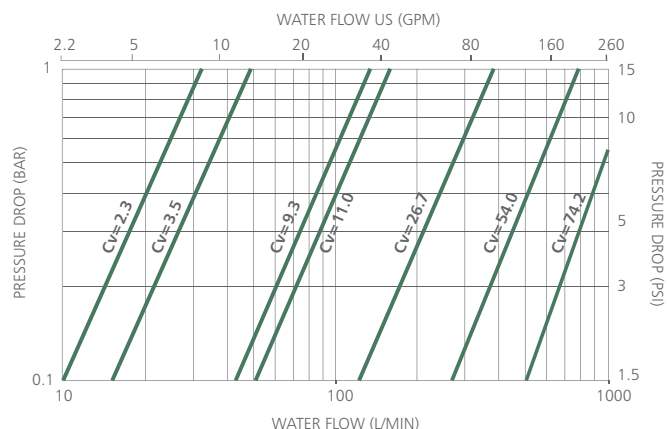


PART NUMBER RESTRICTIONS

Available with: ¹DC only, ²AC only

STANDARD FLOW DATA

1. Select the required flow.
2. Note the corresponding pressure drop.
3. Based on the point where the two intersect, identify the most appropriate flow curve.
4. The flow curve will be labeled with a flow rate in Cv. Using the Port and Orifice Selection Guide on the left side of the page, identify the orifice size that corresponds to the desired Cv. Choose a port size that corresponds to this orifice size when building a part number.





HWA SERIES | 2-WAY MOTORIZED GAS VALVE



MODE OF OPERATION



See page 74 for details on modes of operations.

PORT AND ORIFICE SELECTION GUIDE

SELECTION OF PORT AND ORIFICE SIZES WITH CORRESPONDING FLOW, PRESSURE, POWER AND WEIGHT SPECIFICATIONS

PORT SIZE	ORIFICE (MM)	GAS FLOW* (FT ³ /HR)	P. MAX** (PSI)	OPD*** (PSI)	WEIGHT (LBS)
1-1/4"	68.0	1642	72.5	0 - 5	46.52
1-1/2"	68.0	1642	72.5	0 - 5	46.52
2"	68.0	2895	72.5	0 - 5	46.52
2-1/2"	87.0	4767	72.5	0 - 5	50.93
3"	87.0	5720	72.5	0 - 5	50.93
4" Flanged	104.0	6885	72.5	0 - 5	186.30
6" Flanged	154.0	12888	72.5	0 - 3	302.70

*Gas flow is typically not Cv rated. Indicated flow is rated at change in $p=1.0$ "WG

**P. Max: The maximum pressure a valve can be subjected to without causing damage to the valve components.

*** Operating Pressure Differential (OPD): The difference in pressure between the inlet and outlet ports at which the valve can safely operate. Catalog figures represent tests carried out at +/- 10% of rated voltage with ambient temperature of 80 °F

*** Zero Pressure Rated (refer to OPD figures): 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.

GENERAL INFORMATION

Valve Highlights

- 1-1/4" – 6" NPT ports
- 2-way normally closed flow pattern
- Approved for main gas safety shut off
- Suitable for automatic burners
- Suitable for fire protection systems
- Ideal for low pressure natural gas
- Approved to EN161
- Compliant with Gas Application Directive
- Zero pressure rated
- Slow opening
- Fitted with pressure test points
- Visual position indicator
- Port sizes 4" and 6" are NC150 Flanged Standard

Body Materials

- Aluminum (for up to 3" ports)
- Cast iron (for above 3" ports)

Seal and Temperature Range

- Nitrile (BunaN): 14 °F to 176 °F

Electrical Connection

- Suitable for M20 conduit

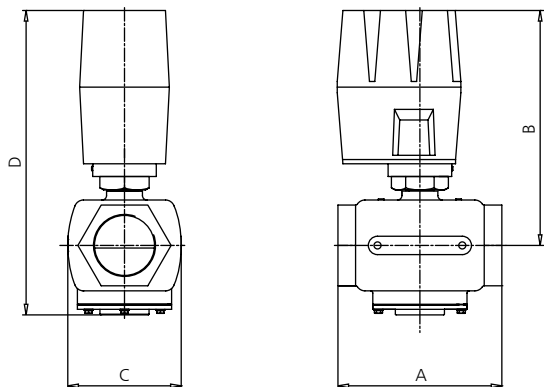
Electrical Characteristics

- Standard coil class: H (Suitable for continuous duty)
- AC voltages (60 Hz): 120 and 230
- 14.5 watts for models with ports below 4"
- 22 watts for models with port 4" and above

Operating Characteristics

- Approved ambient temperature range: 14 °F to 122 °F
- Closing time: less than 1 second

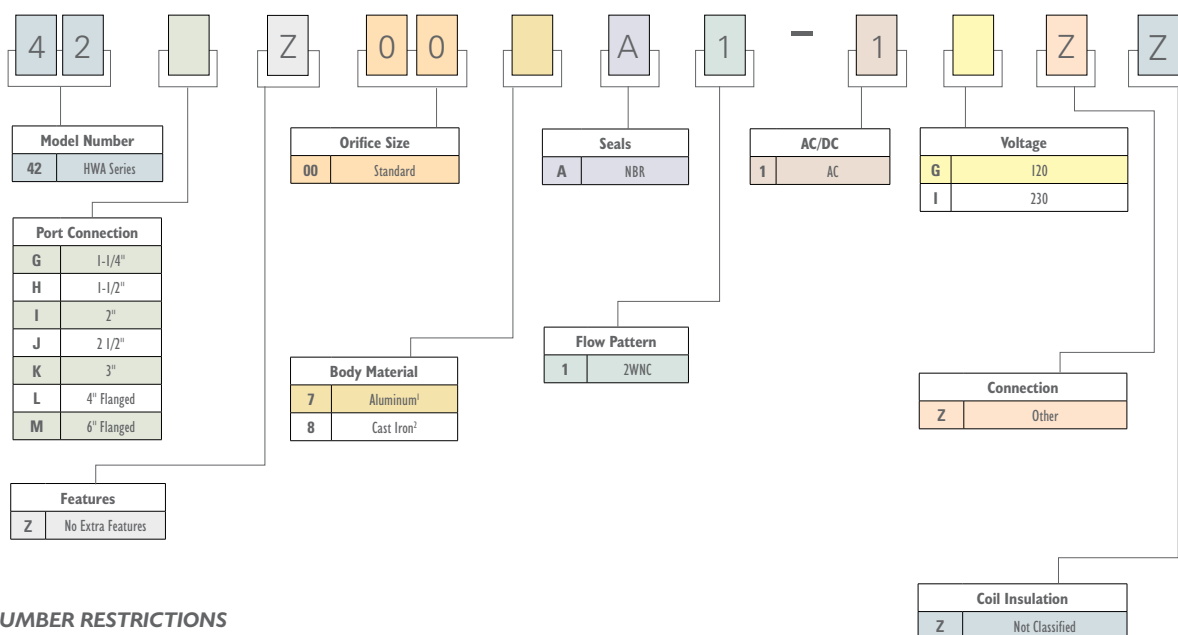
DIMENSIONAL DRAWINGS [INCHES]



DIMENSIONAL DATA

PORT SIZE	A	B	C	D
1-1/4"	5.866"	11.575"	5.000"	14.488"
1-1/2"	5.866"	11.575"	5.000"	14.488"
2"	7.008"	11.575"	5.000"	14.488"
2" Flanged	9.055"	12.362"	5.000"	15.433"
2-1/2"	9.370"	12.756"	6.260"	16.496"
2-1/2" Flanged	11.417"	12.913"	6.260"	16.654"
3"	9.370"	12.756"	6.260"	16.496"
3" Flanged	12.205"	12.913"	6.260"	16.654"
4"	11.496"	13.858"	4.724"	20.000"
6"	14.016"	14.961"	7.008"	22.047"

PART NUMBER SELECTION GUIDE FOR HWA SERIES



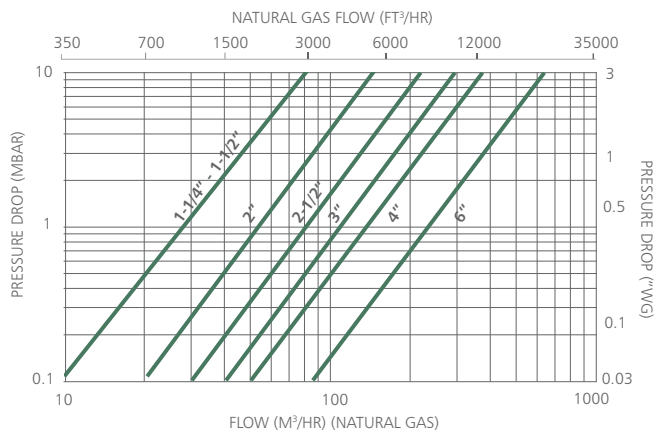
PART NUMBER RESTRICTIONS

Available with:

¹1-1/4"- 3" ports only, ²4" & 6" ports only

STANDARD FLOW DATA

1. Select the required flow in GPM.
2. Note the corresponding pressure drop.
3. At the point where the two intersect, identify the appropriate flow curve.
4. The flow curve will be labeled with a port size. Choose this port size when building the part number.





HAZARDOUS AREA



ALUMINUM EEXD (POLYESTER COATED)



316 STAINLESS STEEL EEXD (ELECTRO-POLISHED)

GENERAL INFORMATION

Features

- Hazardous area solenoid valves are used for controlling gases or liquids where a potentially explosive gas/air mixture is present or is likely to occur during normal operation
- Alcon flame proof enclosures are suitable the following areas/gases:
 - Zones 1 & 2
 - Class 1 Division 1
 - Class 1 Division 2
 - Groups IIA, IIB, IIC gases

Product Specific Information

- Valves configured for hazardous areas do not qualify for UL listings
- 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

Technical Specifications

- Standard Material: Aluminum with stainless steel nameplate
- Finish: Epoxy painted
- Optional Material: Type 316 stainless steel with Stainless steel nameplate
- Optional Finish: Electro-polished, corrosion resistant finish
- Standard Temperature Rating: T6 within a -58°F to 104°F ambient range
- Optional Temperature Rating: T4 with a -58°F to 158°F ambient range
- Electrical Entry: 1/2" NPT port
- Additional Weight: 3 lbs



TECHNICAL INFORMATION



ENGINEERING DATA | TECHNICAL INFORMATION

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

Some Alcon Solenoid Valves have coils suitable for continuous duty. 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 & Outdoor	IP 65
4X	Dust tight, Water tight and corrosion resistant - Indoor & Outdoor	IP 65
*6	Submersible, Water tight and Dust tight - Indoor & Outdoor	IP 67
I2	Industrial Use. Dust tight and Drip proof - Indoor	IP 52
I3	Oil tight and Dust tight - Indoor	IP 55

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

QUALITY ASSURANCE

ITT's Chihuahua Mexico [CUU] manufacturing facility is ISO 9000: 2004 certified. This prestigious certification highlights our implemented management system of process control, continuous improvement and high customer focus. ITT also houses R&D and engineering teams in Wolverhampton England, as well as a second world-class valve manufacturing facility.

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.

ENGINEERING DATA | TECHNICAL INFORMATION

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:

$$Cv = 1.16 \times Kv$$






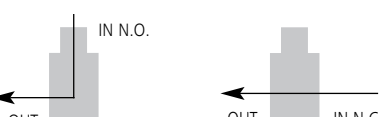
$$Kv = 0.853 \times Cv$$

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).

FLOW PATTERNS FOR SERIES 100, 300, 1200 AND 1300 VALVES

1/8" FLOW PATTERNS		ORIFICE DIAMETER		MAX. OPERATING PRESSURE		CV FACTOR	
DE-ENERGIZED	ENERGIZED	BODY	STOP	AC	DC	BODY	STOP
2-WAY NORMALLY CLOSED 		1/32		250	250	0.019	
		3/64		250	250	0.046	
		1/16		250	200	0.080	
		3/32		150	100	0.170	
		1/8		90	70	0.280	
		5/32		30	25	0.395	
2-WAY NORMALLY OPEN 			1/32	250	250		0.019
			3/64	200	200		0.046
			1/16	150	150		0.080
3-WAY NORMALLY CLOSED 		1/32	1/32	125	125	0.019	0.019
		3/64	3/64	90	90	0.046	0.046
		1/16	1/16	60	60	0.080	0.080
		3/32	1/16	30	30	0.170	0.080
3-WAY NORMALLY OPEN 		1/32	1/32	200	200	0.019	0.019
		3/64	3/64	150	150	0.046	0.046
		1/16	1/16	125	125	0.080	0.080
		3/32	1/16	125	125	0.170	0.080
DIVERTING 		1/32	1/32	200	200	0.019	0.019
		3/64	3/64	150	150	0.046	0.046
		1/16	1/16	125	125	0.080	0.080
		3/32	1/16	125	125	0.170	0.080
SELECTOR 		1/32	1/32	200	200	0.019	0.019
		3/64	3/64	150	150	0.046	0.046
		1/16	1/16	125	125	0.080	0.080
		3/32	1/16	125	125	0.170	0.080

*All flow patterns are available with all Alcon valves except series 1200 which is 2-way Normally Closed



ENGINEERING DATA | TECHNICAL INFORMATION

FLOW PATTERNS AND PRESSURES FOR SERIES 2000 VALVES

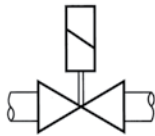
Flow Pattern	Orifice Diameter		Max. Operating Pressure	Cv Factor	
	Body	Stop		Body	Stop
2-WAY NORMALLY CLOSED	1/8	-	250	0.35	-
	5/32	-	250	0.45	-
	3/16	-	125	0.5	-
	1/4	-	40	0.75	-
2-WAY NORMALLY OPEN	-	1/16	250	-	0.08
	-	3/32	150	-	0.25
	-	1/8	115	-	0.35
3-WAY NORMALLY CLOSED	1/8	3/32	95	0.35	0.25
	5/32	3/32	70	0.45	0.25
	3/16	3/32	45	0.50	0.25
	1/4	3/32	30	0.75	0.25
3-WAY NORMALLY OPEN	all	1/16	200	0.25	0.08
	all	3/32	150	0.35	0.25
	all	1/8	100	0.45	0.35
UNIVERSAL (SELECTOR / DIVERTOR)	1/8	3/32	80 / 250	0.35	0.25
	5/32	3/32	70 / 250	0.45	0.25
	3/16	3/32	60 / 125	0.5	0.25
	1/4	3/32	25 / 40	0.75	0.25

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 strainer is recommended.
- d) Most Alcon valves are permanently stamped with directional flow arrows or port numbering indicating proper flow direction. These valves must be installed in accordance with these markings for proper functionality.

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.

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.

ENGINEERING DATA | TECHNICAL INFORMATION

COPPER WINDING TEMPERATURE CLASSIFICATION

The temperature classification indicates the maximum temperature at which the insulation system can operate for normal expected service life. In general, all materials used in a given insulation system will be rated for temperatures equal to, or exceeding, the temperature classification system specification.

INSULATION SYSTEM	TEMPERATURE RATING	
	Class A	105 °C
Class B	130 °C	266 °F
Class F	155 °C	311 °F
Class H	180 °C	356 °F

IEEE Std. 117

PROTECTION CLASS, IP RATINGS AND HAZARDOUS AREAS

ENCLOSURE PROTECTION
NON HAZARDOUS LOCATIONS. COMPARISON OF AMERICAN NEMA CLASSIFICATION & EUROPEAN CENELEC IP CLASSIFICATION

Nema Type & Relevant Tests	Description	Equiv. Degree of Protection	NEMA
1	General purpose - Indoor	IP30	
2	Drip Proof - Indoor	IP32	NEMA 2
3	Dust and rain tight - Outdoor	IP54	
3R	Rain proof - Outdoor	IP54	
4	Water tight and dust tight - Indoor and Outdoor	IP65	NEMA 4
4X	Water tight, dust tight and corrosion resistant - Indoor and Outdoor	IP65	
6	Submersible, Water tight and dust tight - Indoor and Outdoor	IP67	NEMA 6
12	Industrial use, dust tight and drip proof - Indoor	IP52	
13	Oil tight and Dust tight - Indoor	IP55	

IP NO.	FIRST NUMBER - PROTECTION AGAINST SOLIDS	SECOND NUMBER - PROTECTION AGAINST LIQUIDS
0	No protection	No protection
1	Protected against solid objects over 50mm ø	Protected against vertically falling drops of water
2	Protected against solid objects over 12mm ø	Protected against direct sprays up to 15° from vertical
3	Protected against solid objects over 2.5mm ø	Protected against direct sprays up to 60° from vertical
4	Protected against solid objects over 1mm ø	Protected against direct sprays from all directions limited ingress permitted
5	Protected against dust - limited ingress permitted	Protected against low pressure jets from all directions limited ingress permitted
6	Totally protected against dust	Protected against strong jets from all directions limited ingress permitted
7		Protected against effects of immersion from 15cm - 1m
8		Protected against long periods of immersion under pressure

INTERNATIONAL STANDARDS TEMPERATURE CLASSIFICATION

IEC 79-8 & CENELEC		AMERICAN NEC	
Class	Max. surface temp (°C)	Class	Max. surface temp (°C)
T1	450	T1	450
T2	300	T2	300
		T2A	280
		T2B	260
		T2C	230
		T2D	215
T3	200	T3	200
		T3B	165
		T3C	160
T4	135	T4	135
		T4A	120
T5	100	T5	100
T6	85	T6	85




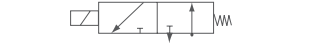

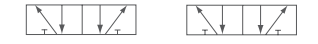

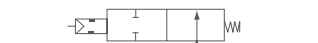




ZONES & DIVISIONS

DEFINE THE LIKELIHOOD OF THE HAZARD BEING PRESENT IN POTENTIALLY EXPLOSIVE CONCENTRATIONS

UK / CENELEC / IEC		USA & CANADA	
Hazard Continuously present (> 1000 Hrs/year)	Zone 0	Division 1	Hazard likely to be present: N.B. where the hazard is continuously present, electrical apparatus is avoided if possible. Intrinsically safe equip may not be used of not
Hazard likely to be present:	Zone 1		
Hazard unlikely to be present: typically only for Short periods or under fault conditions (< 10 Hrs/year)	Zone 2	Division 2	Hazard unlikely to be present- likely to be confined. An area adjacent to a Division 1 area.
Fully defined in BS5345 and IEC 79-10 (Guideline figures)			Fully described in Article 500 of the National Electric Code

ENGINEERING DATA | TECHNICAL INFORMATION

MODES OF OPERATION

 <p>Solenoid Operated Direct Acting</p> <p>Solenoid Pilot Operated</p>	<p>2/2 N/C NORMALLY CLOSED</p> <p>2 way, normally closed, energise to open, on/off operation (de-energise to close), with one inlet and one outlet connection.</p> <p>There are 2 types of valve operation – Direct Acting and Pilot Operated:</p> <ol style="list-style-type: none"> Direct Acting – The coil supplies all the power to open the valve and the valve will operate from zero pressure. Pilot Operated – this can either be 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.
 <p>Solenoid Direct Acting</p> <p>Solenoid Pilot Operated</p>	<p>2/2 N/O NORMALLY OPEN</p> <p>2 way, normally open, energise to close, de-energise to open, with one inlet and one outlet connection. Can be either direct acting or pilot operated.</p>
	<p>3/2 N/C NORMALLY CLOSED</p> <p>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 permanently open, one permanently closed. The use of these are for operation of actuators for large valves where single cylinder spring return system is employed.</p>
	<p>3/2 N/O NORMALLY OPEN</p> <p>Valve open when de-energized, closed when energized</p>
	<p>3/2 UNI UNIVERSAL</p> <p>Valve may be used as normally closed, normally open or diversion/selector valve</p>
	<p>5/2</p> <p>These valves are available in 2 forms:</p> <ol style="list-style-type: none"> Single Solenoid – 2 position, spool and sleeve type, which is based on an air pilot return mechanism. When de-energized, the valve allows one inlet and one outlet to be connected, exhausting the other inlet/outlet connection through an exhaust port. On energization, the action reverses. Dual Solenoid Valves – these spool and sleeve type solenoid valves are momentary contact type. When one coil is energized, one inlet is connected to one outlet, with the other inlet/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.
	<p>2/2 N/C NORMALLY CLOSED PNEUMATIC</p> <p>2 way, normally closed, pressurize to open, de-pressurize to close with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required.</p>
	<p>2/2 N/O NORMALLY OPEN PNEUMATIC</p> <p>2 way, normally open, pressurize to close, de-pressurize to open with the aid of a return spring, having one inlet and one outlet connection. Can be direct acting air operated against a return spring. Note: These valves are operated via a 3 way solenoid valve which is always required.</p>
	<p>2/2 N/C NORMALLY CLOSED MOTORIZED</p> <p>2 way, normally closed, energise to open – (slow opening) de-energise to close – (quick closing) with one inlet and one outlet connection. Motor driven against a return spring.</p>
	<p>2/2 N/O NORMALLY OPEN MOTORIZED</p> <p>2 way, normally open, energise to close – (slow closing) de-energise to open – (quick opening)</p>
	<p>2/2 N/C NORMALLY CLOSED MANUAL RESET (SOLENOID)</p> <p>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 rest device</p>
	<p>2/2 N/C NORMALLY CLOSED MANUAL RESET (MOTORIZED)</p> <p>The operation is similar to 2/2 N/C Normally Closed Manual Reset (Solenoid) except, once the motor is energized the valve will not open till a manual rest/relay button is operated, either remote or integral to the actuator. General use is for both manual reset or safety systems where knowledge of an electrical failure is required</p>

ENGINEERING DATA | CORROSION REFERENCE 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.

APPLICATION	VALVE BODY MATERIAL					SEAL MATERIAL				*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	NR	NR	NR	*	*	NR	*	NR	*	
Anhydrous 20%										
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	*	*	*	

* = 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

APPLICATION	VALVE BODY MATERIAL					SEAL MATERIAL				*NOTES
	Alum	Brass	Brz	Cl	Stainless	Nitrile	EPDM	Viton®	PTFE	
Jet Fuel	*	NR	NR	NR	*	*	NR	*	*	
Kerosene	*	*	*	*	*	*	NR	*	*	
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	*	*	*	*	*	
Perchlorethylene 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	*	*	



ENGINEERING DATA | 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.

ENGINEERING DATA | COMMON CONVERSION TABLES

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 ²	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 ² /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 103
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 106
273750	kgm	HP/h	3.6529 x 106
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	y.d.p.h.	2 025-35
0.1781	kcal/s	HP	5.6148
Multiply By	To	From	

LENGTH CONVERSIONS

Multiply by Number of	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	0.0001578	0.0000254
Feet	0.3048	12	1	304.8	0.0001894	0.0003048
Millimeters	0.001	0.03937	0.0032808	1	0.000006214	0.000001
Miles	1609	35 63.360	5.286	1,609,350	1	1.609
Kilometers	1000	39.370	3280.83	1,000,000	0.62137	1
U.S. Barrel (Petroleum)	158.98	9702	5.6146	168	42	34.973

NOTE: 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

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	ft.lbp.sec.	737.97
0.0011628	kWh	kcal	860
2.9289 x 10 ⁻⁴	kWh	B.T.U.	3412.74
2.7225 x 10 ⁻⁶	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 ³	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 ²	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)

VOLUME CONVERSIONS

Multiply by Number of	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

NOTE: 1 cubic meter = 1,000,000 cubic centimeters
 1 liter = 1,000 millimeters = 1,000 cubic centimeters



ENGINEERING DATA | COMMON CONVERSION TABLES

HEAD AND PRESSURE

	kPa (kNm ²)	Water		bar	kgf/cm ²	lbf/in ² (psi)	atmos	Mercury (Hg)	
		m	ft					mm	inch
1 kPa	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	Mercury	13.4	0.0136	0.0446	0.133	0.0193	0.132	1	0.0394
1 inch		3.3864	0.34534	1.133	0.0338	0.0345	0.491	0.0334	25.4

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	1.02
1 tonne/h		1.005	0.278	16.7	0.000 278	3.666	4.41	0.0098	0.980

PRESSURE CONVERSIONS

Multiply Number of	To Obtain	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	1	27.68	2.307	2.036	16	0.06895	68.95	6.895	0.0703
Inches of Water Column	0.0361	0.0361	1	0.8333	0.7355	5.776	0.002491	2.491	0.2491	0.00254
Feet of Water Column	0.4336	0.4336	12	1	0.8826	6.936	0.02989	29.89	2.989	0.0305
Inches of Mercury	0.4911	0.4911	13.60	1.133	1	7.858	0.03386	33.86	3.386	0.03453
Ounces per Square Inch	0.9625	0.9625	1.73	0.144	0.127	1	0.00431	4.309	0.4309	0.0044
Bar	14.50	14.50	401.5	33.45	29.53	232	1	1000	100	1.020
Millibar	0.0145	0.0145	0.4015	0.03345	0.02953	0.232	0.001	1	0.100	0.0102
Kilopascals	0.1450	0.1450	4.015	0.3345	0.2953	2.32	0.01	10	1	0.0102
Kilograms per Square Centimeter	14.22	14.22	393.7	32.81	28.96	227.5	0.9807	980.7	98.07	1

VOLUMETRIC RATE OF FLOW CONVERSIONS

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

ENGINEERING DATA | COMMON CONVERSION TABLES

VELOCITY CONVERSIONS

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

TORQUE CONVERSIONS

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

FORCE CONVERSIONS

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

AREA CONVERSIONS

Multiply by Number of	To Obtain	Square Meters	Square Inches	Square Feet	Square Miles	Square Kilometers
1	Square Meters	1	1549.99	10.7639	3.861×10^7	1×10^6
0.0006452	Square Inches	0.0006452	1	6.944×10^3	2.491×10^{10}	6.452×10^{10}
0.0929	Square Feet	0.0929	144	1	3.587×10^8	9.29×10^8
2,589.999	Square Miles	2,589.999		27,878.400	1	2.59
1,000,000	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

Multiply by Number of	To Obtain	Grams per Milliliter	Kilogram per Cubic Meter	Pounds per Cubic Foot	Pounds per Cubic Inch
1	Grams per Milliliter	1	1000	62.43	0.03613
0.001000	Kilograms per Cubic Meter	0.001000	1	0.06243	0.0003613
0.01602	Pounds per Cubic foot	0.01602	16.02	1	0.005787
27.68	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



WARRANTY & WARNINGS | INSTALLATION, OPERATION AND SERVICE

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.

DESIGN, APPLICATION, INSTALLATION AND SERVICE WARNINGS

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. Do not use these products where pressures and temperatures, or any technical parameters can exceed those listed under Technical Specifications. Through misuse, age, or malfunction, Alcon products can fail in various modes. The system designer is warned to consider the failure modes of all components used in the system and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure modes.

Recommendations and considerations may be obtained directly from the Manufacturer regarding the applicability of an Alcon product for a given use.

System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with certain products. It should be recognized that warnings are valid for any product, regardless of manufacturer.

All applicable electrical, mechanical, and safety codes, as well as governmental regulations and laws must be complied with when installing or servicing an Alcon product.

Alcon products must be installed or serviced by qualified, knowledgeable personnel who understand how these products are installed and operated. The responsible installing party must be familiar with the particular specifications for temperature, pressure, lubrication, environment and filtration of the Alcon product being installed or serviced. Additional specifications may be obtained upon request.

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.

Manufacturer's liability pursuant to warranty is limited to the replacement of the Alcon product proved to be defective provided the claimed defective product is returned to Manufacturer or its authorized distributor.

Contact Manufacturer for returned goods policy and procedure information.

Manufacturer provides no other warranties, expressed or implied, except as stated above. Manufacturer's warranty as stated herein is the only and exclusive remedy and in no event shall Manufacturer be responsible or liable for incidental or consequential damages.

