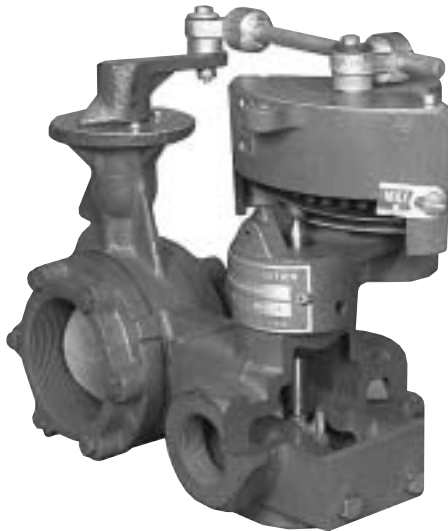


## Design and Application Details

### MICRO-RATIO® Valves

#### Principle of Operation

MICRO-RATIO® Valve assemblies typically consist of a fixed-gradient air butterfly valve mechanically linked to one or more adjustable gradient SYNCHRO Fuel Control Valve(s).



*Cut-away view of M- 3" x 1-1/4" -P MICRO-RATIO® Valve*

The tandem linkage gives accurate proportioning of the air/fuel(s) ratios required for your specific burner system/application.

The multiple screw adjustment feature of the SYNCHRO Valve provides a mechanical means of adjusting the air/fuel(s) ratios at each of twelve valve positions throughout the capacity range of each valve.

**Maximum application flexibility** is provided from over 500 possible valve combinations.

**Air-gas-oil valves in tandem-linked combination** are ideal for multi-zone or stand-by fuel system control.

**Totally enclosed cam assemblies** are available to protect the valve's internal adjusting mechanism against moisture and/or hostile environments.

**Air-gas-oil SYNCHRO Valves may be used independently** for single control or throttling of multiple flow paths or fuels.

#### Nomenclature

MICRO-RATIO® Valve assemblies are designated by listing the individual valves, starting with the air valve, then each of the fuel valves to be included, as well as their relative position in the assembly.

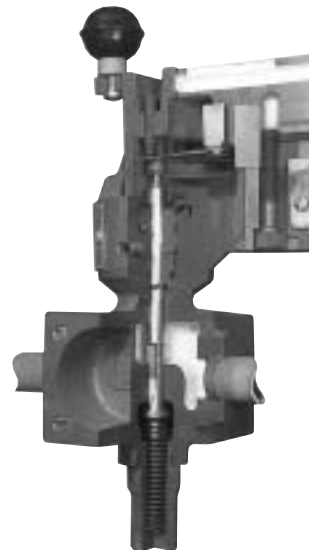
#### Examples:

*"Duplex" MICRO-RATIO® Valve assembly*

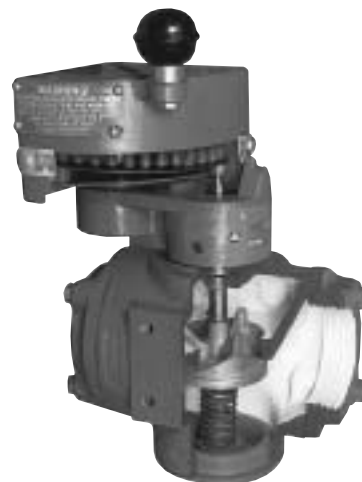
**M- 6" x 2" -P**  
(air) x (gas)

*"Quadriplex" MICRO-RATIO® Valve assembly*

**M- 10" x 4" -M x 1/2" -O -200 x 2" -P**  
(air) x (gas) x (oil) x (gas)



*Cut-away view of  
3/4" -O -200  
SYNCHRO Oil Valve  
with standard cam  
assembly*



*Cut-away view of  
2-1/2" -P  
SYNCHRO Gas  
Valve with standard  
cam assembly*

# Capacities and Specifications

## SYNCHRO and MICRO-RATIO® Valves

### General

All Maxon Flow Control Valves are designed for **throttling service only** and are **not** intended for tight shut-off.

**Flow direction** is not a factor with butterfly-type valve bodies; however, with poppet-type SYNCHRO Valves, fluid flow through the valve must only be in the direction indicated by the arrowhead cast into each valve body.

#### SYNCHRO Valve Specifications

Maximum ambient temperature: 125°F (52°C)

SYNCHRO Valve		Cv Flow Factor [1]	Maximum Inlet Pressure (PSIG)	Torque Required [2] (inch-pounds)	Maximum Fluid Temperature
Type	Size				
Standard Butterfly Type	1-1/2"-M	80	5	120	200°F (93°C)
	3"-S				
	2"-M	135			
	4"-S				
	2-1/2"-M	200		180	
	3"-M	380			
	4"-M	600			
	6"-M	1550			
	8"-M	2750			
10"-M	4300				
12"-M	6200		200°F (93°C)		
Special High Pressure (SHP) Butterfly Type	1-1/2" -M -SHP	80	15	180	200°F (93°C)
	3" -S -SHP				
	2" -M -SHP	135	12		
	4" -S -SHP				
	2-1/2" -M -SHP	200	11		
3" -M -SHP	380	9			
4" -M -SHP	600	6			
Gas Poppet Type	1/2" -P	4.6	20	90	200°F (93°C)
	3/4" -P	6.5			
	1" -P	8			
	1-1/4" -P	11.8	15		
	1-1/2" -P	17.7			
	2" -P	40	5		
	2-1/2" -P	50			
Oil Poppet Type	3/8" -O -8	0.05	300	125 @ 10 PSIG	350°F (177°C)
	1/2" -O -20	0.14		or	
	1/2" -O -50	0.35			
	1/2" -O -100	0.7		220 @ 250 PSIG	
	3/4" -O -200	1.41			
	1" -O -400	2.82			
1" -O -750	5.3				

[1] Cv factors based on flow through a wide-open valve.

[2] Torque required is shown for maximum rated pressure unless noted otherwise. At lower pressures, less torque may be required.

[3] High temperature version is available up to 450°F.

All valve combinations will be assembled in “**right hand**” flow direction unless specified as “**left hand**” assembly. When looking directly at the air valve indicator dial, a “right hand” arrangement is indicated by flow coming from the right side of the fuel valve quadrant and flowing to the left side. A “left hand” assembly is opposite, with flow from left to right.

For instructions for reversing valve body flow direction in the field, see page 7016.

**Torque requirements** listed in tables below are important and are to be used in selecting your automatic control operators. Torque figures (inch-pounds) are additive for your complete MICRO-RATIO® Valve assembly.

**Example:** For M- 6" x 2" -P MICRO-RATIO® Valve:

M- 6" requires 60 in-lbs

2" -P requires 90 in-lbs

M- 6" x 2" -P assembly requires 150 in-lbs

The automatic control motor you select must be capable of developing at least 150 in-lbs of torque in order to throttle this particular MICRO-RATIO® Valve combination if valve is applied at maximum inlet pressures shown.

#### Air Control Valve Specifications

Maximum ambient temperature: 125°F (52°C)

Maximum fluid temperature: 200°F (93°C)

High temperature version available to 800°F

Butterfly Type Air Valve Size	Cv Flow Factor [1]	Maximum Inlet Pressure (PSIG)	Torque Required [2] (inch-pounds)
M- 1-1/2"	80	5	5
M- 2"	135		
M- 2-1/2"	200		
M- 3"	380		
M- 4"	600		
M- 6"	1550		
M- 8"	3750		100
M- 10"	4300		
M- 12"	6200		
M- 14"	8430		
M- 16"	11020		
M- 18"	13950		

[1] Cv factors based on flow through a wide-open valve.

[2] Torque required is shown for maximum rated pressure. At lower pressures, less torque may be required.

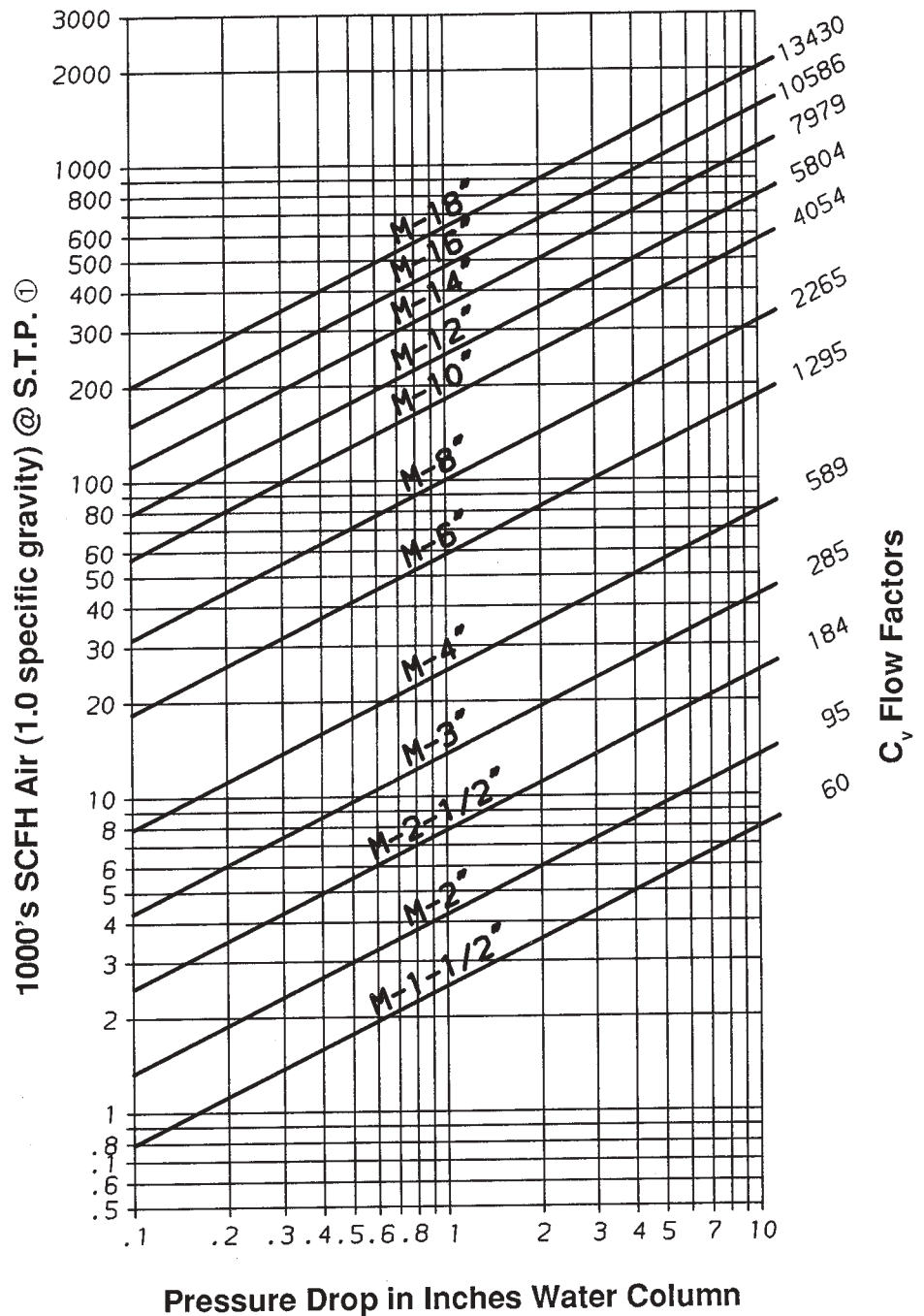
# Performance Data

## (M-) Style Control Valves – Air Service

**Air Valves** are normally sized to match the combustion air pipe sizing. Pressure drops of 1" wc to 2.5" wc are typical. If supply pressures are higher than required, smaller valves can be used, or travel limited to restrict maximum flow rate.

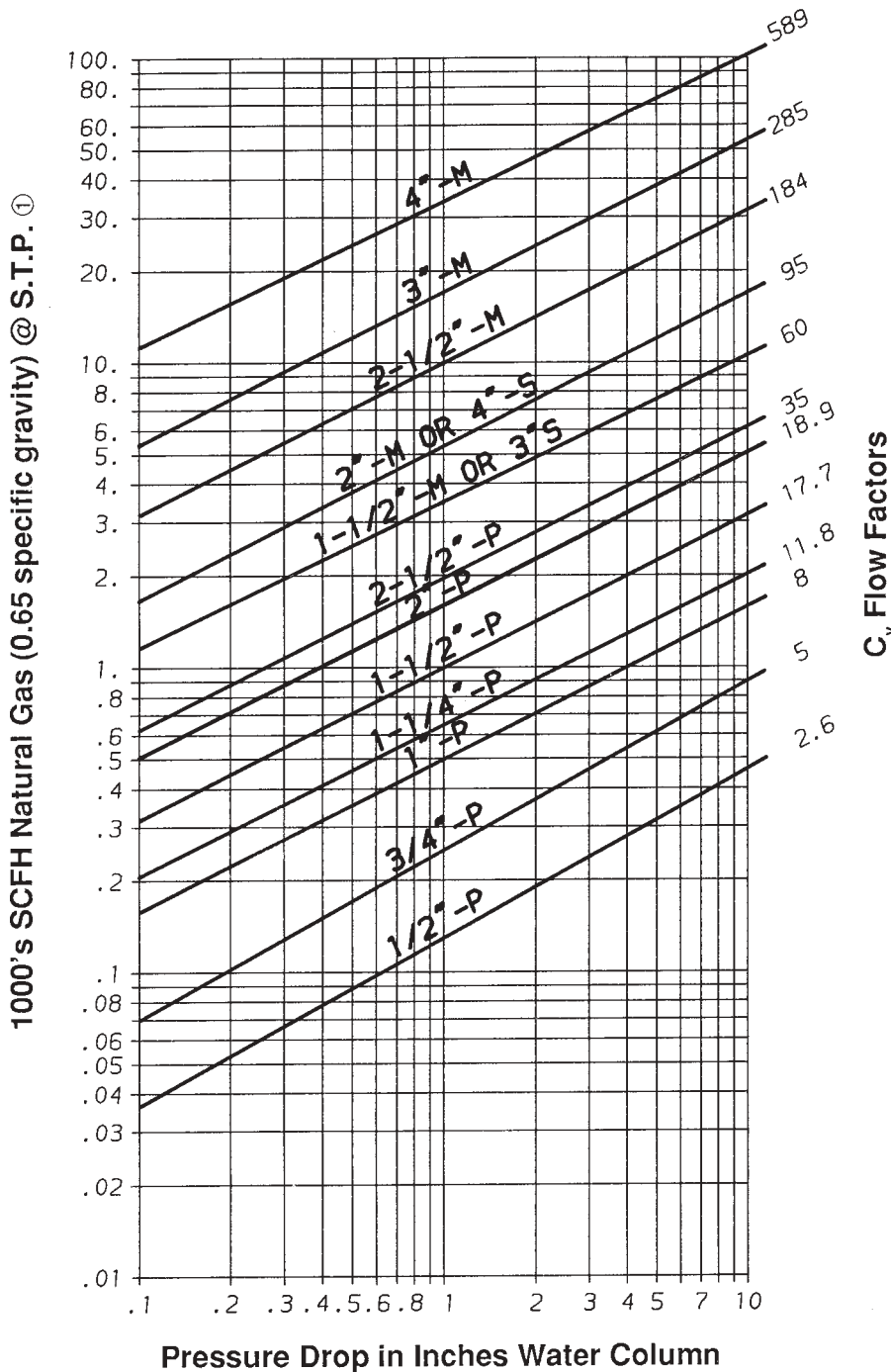
**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)



# Performance Data

## SYNCHRO Gas Valves – Natural Gas Service



**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

Gas Valves are normally sized based on inlet pressure and allowable pressure drop. See guidelines at right.

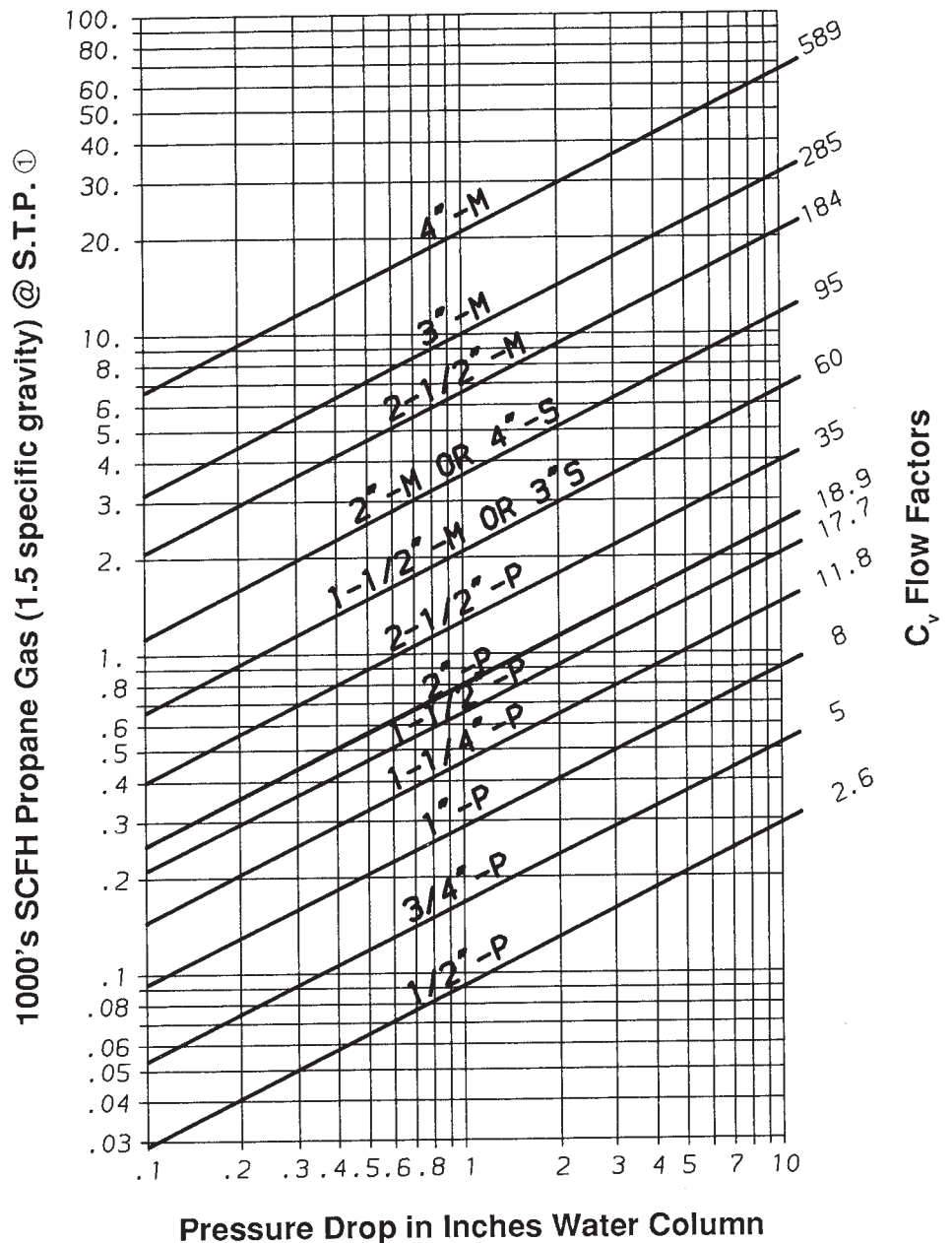
Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

# Performance Data

## SYNCHRO Gas Valves – Propane Gas Service

**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

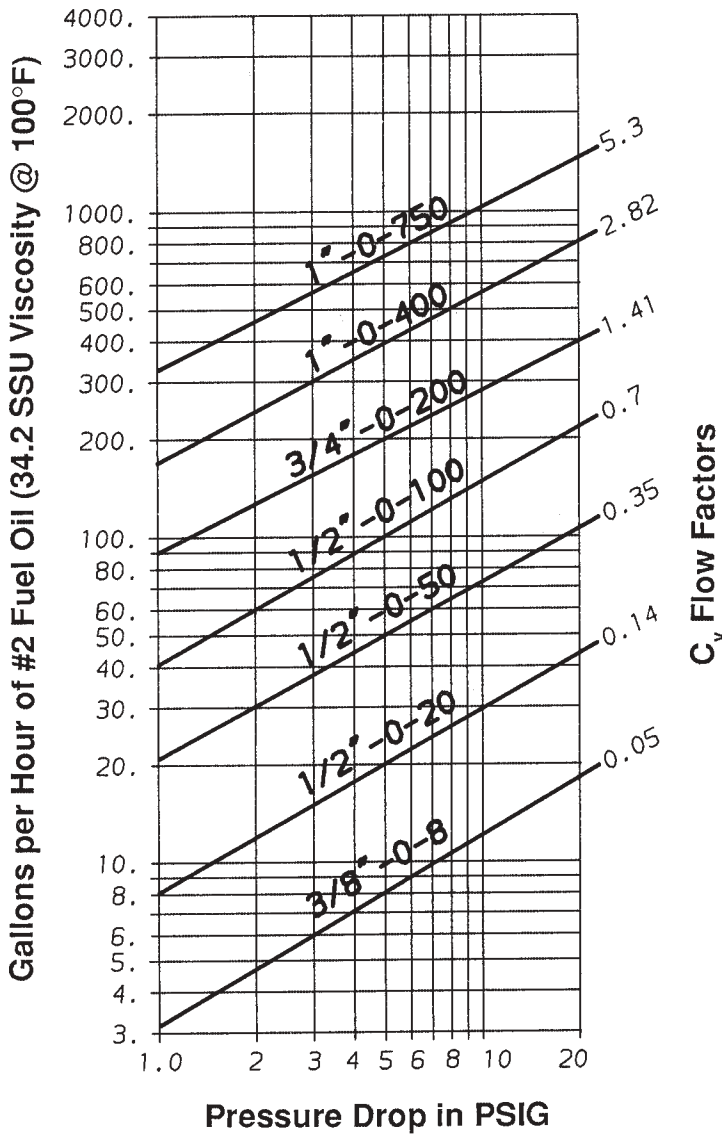


**Gas Valves** are normally sized based on inlet pressure and allowable pressure drop. See guidelines at right.

Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

## Performance Data

### SYNCHRO Oil Valves – #2 Fuel Oil Service



**Oil Valves** are normally sized for approximately 5 psi pressure drop. **For #2 oil service**, see chart at left.

**For preheated #5 or #6 oil**, multiply the required flow rate in gph by the factor given in the table shown below the chart, then select a valve based upon that equivalent flow of #2 oil and its allowable pressure drop.

**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

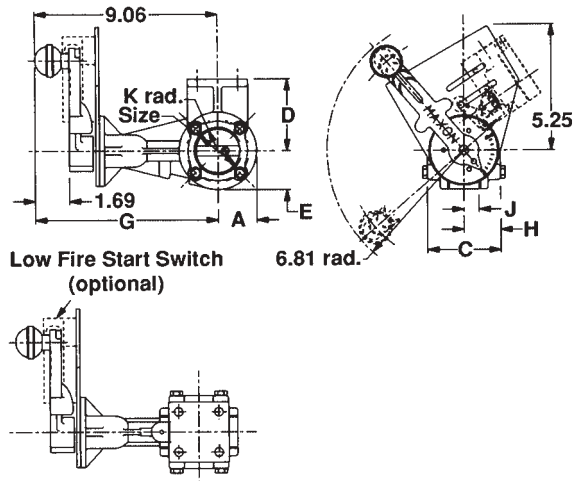
Oil Grade	#5		#6				
Temperature (°F) at Inlet	125	160	122	140	180	210	220
Factor	1.43	1.11	2.86	2	1.25	1.11	1.05

**For example:** To size for 5 psi drop with a 50 gph flow of #6 preheated to 140°F, the multiplier is "2". Equivalent flow of #2 oil is then 50 x 2, or 100 gph. Chart shows that a 5 psi drop will require use of a 1/2" -O -100 SYNCHRO Oil Valve.

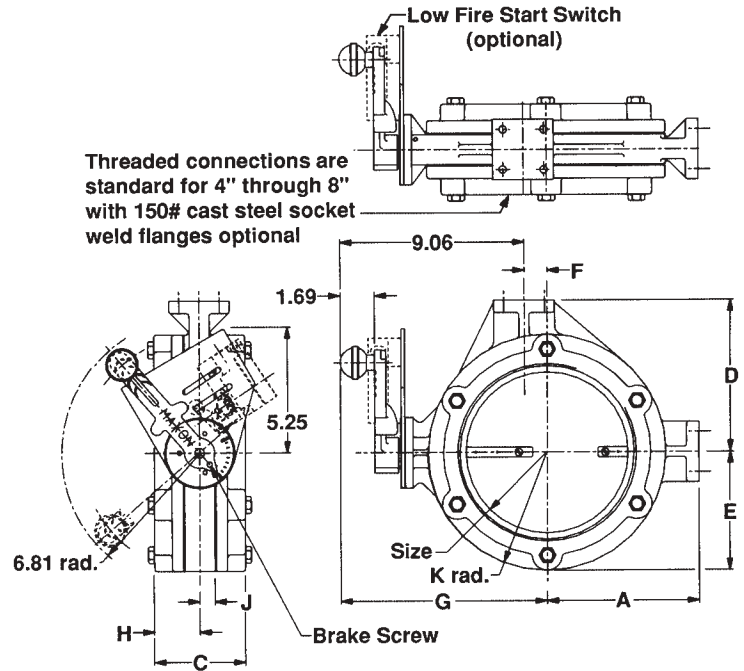
# Dimensions (in inches)

## (M-) Style Manual Air Control Butterfly-type Valves

M- 1-1/2" through M- 4" Valves



M- 6" through M- 18" Valves



Size	A	C	D	E	F [2]	G	H [1]	J	K	
M- 1-1/2"	1.75	3.62	3.56	1.75	---	9	1.81	0.75	1.75	
M- 2"	1.94			1.94					1.94	
M- 2-1/2"	2.38			2.38					2.38	
M- 3"	2.62	4.0	4.06	2.62			2.0		2.62	
M- 4"	3.19	4.25	4.56	3.19			2.12		3.19	
M- 6"	6.06	4.25	6.06	4.44			2.12		4.44	
M- 8"	7.5	4.5	7.56	5.88	1.12	10.12	2.25	5.88		
M- 10"	7.75	6.5	8.38	6.5	3.62	12.38	3.25	1.25	8	
M- 12"	8.75	5.31	9.5	8	4.62	13.38	2.69	1.5	9.5	
M- 14"	9.75	5.38	10.5	8.69	5.75	14.5			10.5	
M- 16"	10.62	8.12	11.38	9.69	6.62	15.38			4.06	11.75
M- 18"	11.62	8.5		10.75	7.62	16.38			4.25	12.5

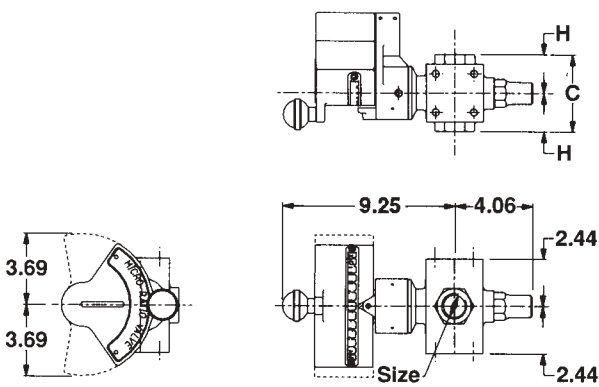
[1] M- 10" and larger are wafer-type. Companion flanges not included.  
 [2] Centerline offset (on M- 8" and larger sizes only)

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

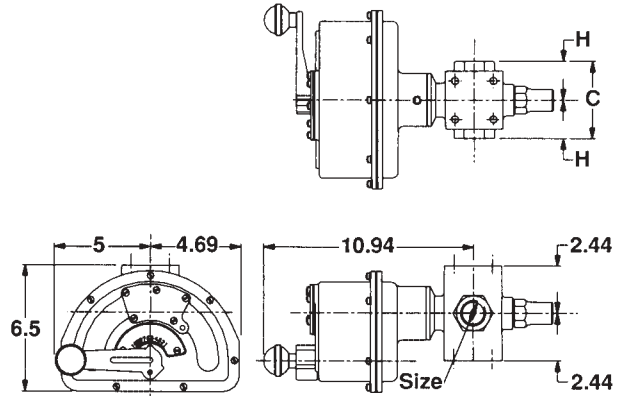


### Dimensions (in inches)

#### SYNCHRO Oil Valves

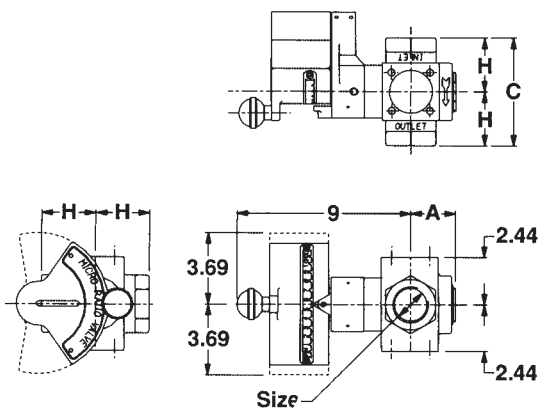


Standard Cam Version

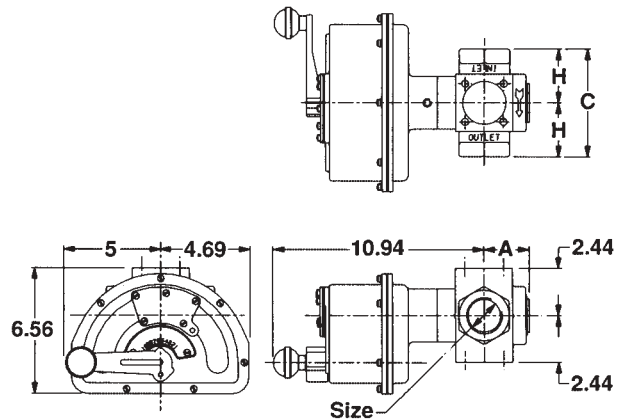


Totally-Enclosed Cam Version

#### SYNCHRO Gas Poppet Valves



Standard Cam Version



Totally-Enclosed Cam Version

#### SYNCHRO Oil Valves

Size	C		H	
	350°F	450°F	350°F	450°F
3/8" -O -8	4	4.5	2	2.25
1/2" -O -20				
1/2" -O 50				
1/2" -O -100				
3/4" -O -200				
1" -O -400				
1" -O -750				

#### SYNCHRO Gas Poppet Valves

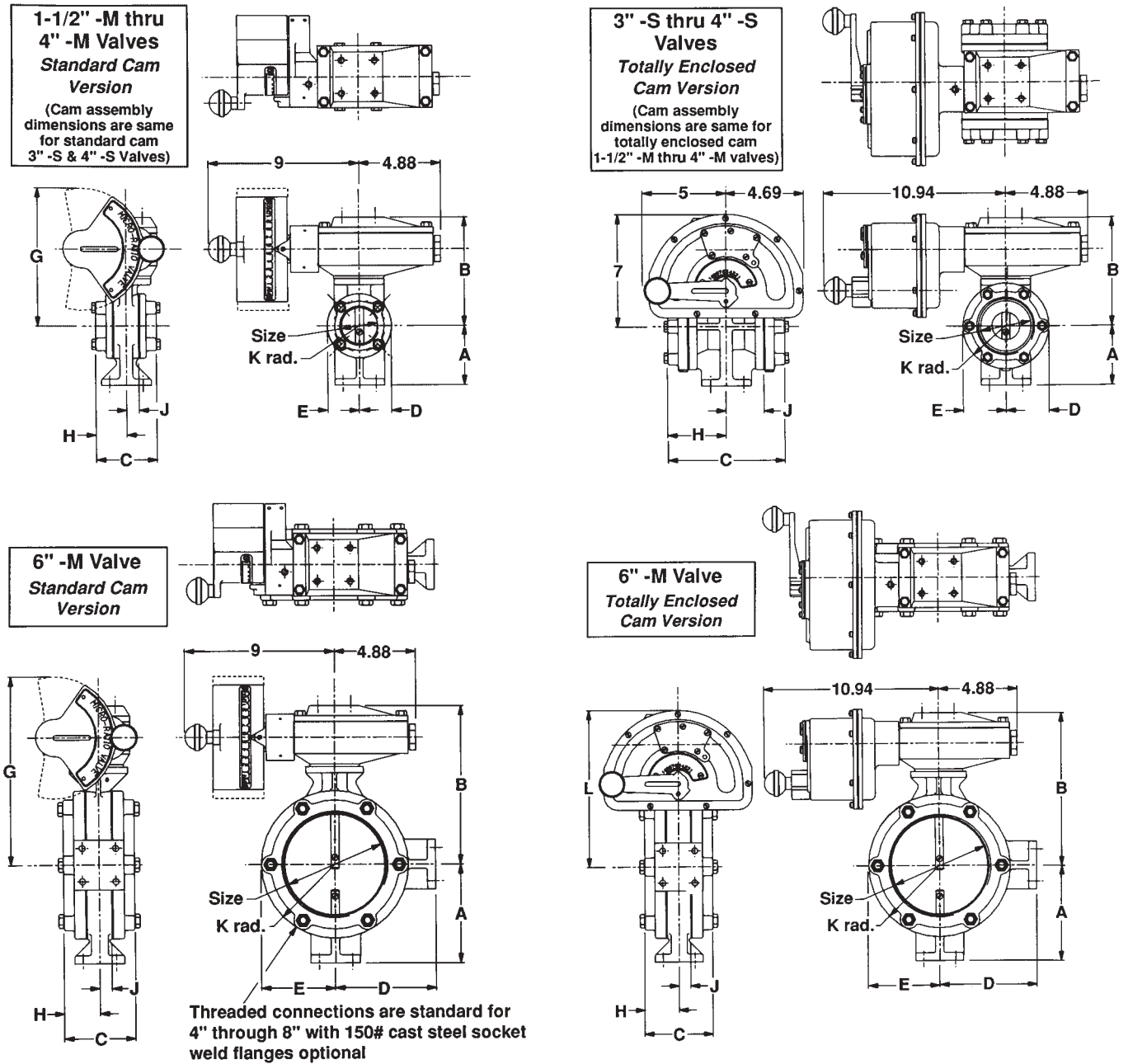
Size	A	C	H
1/2" -P	1.81	4.25	2.12
3/4" -P			
1" -P			
1-1/4" -P	2.31	5.62	2.81
1-1/2" -P	3.75	7.25	3.62
2" -P		7.5	3.75
2-1/2" -P			

Pipe threads on this page conform to NPT (ANSI Standard B2.1)



# Dimensions (in inches)

## (-M) Style SYNCHRO Butterfly-type Gas Valves (1-1/2" through 6") – cast iron bodies



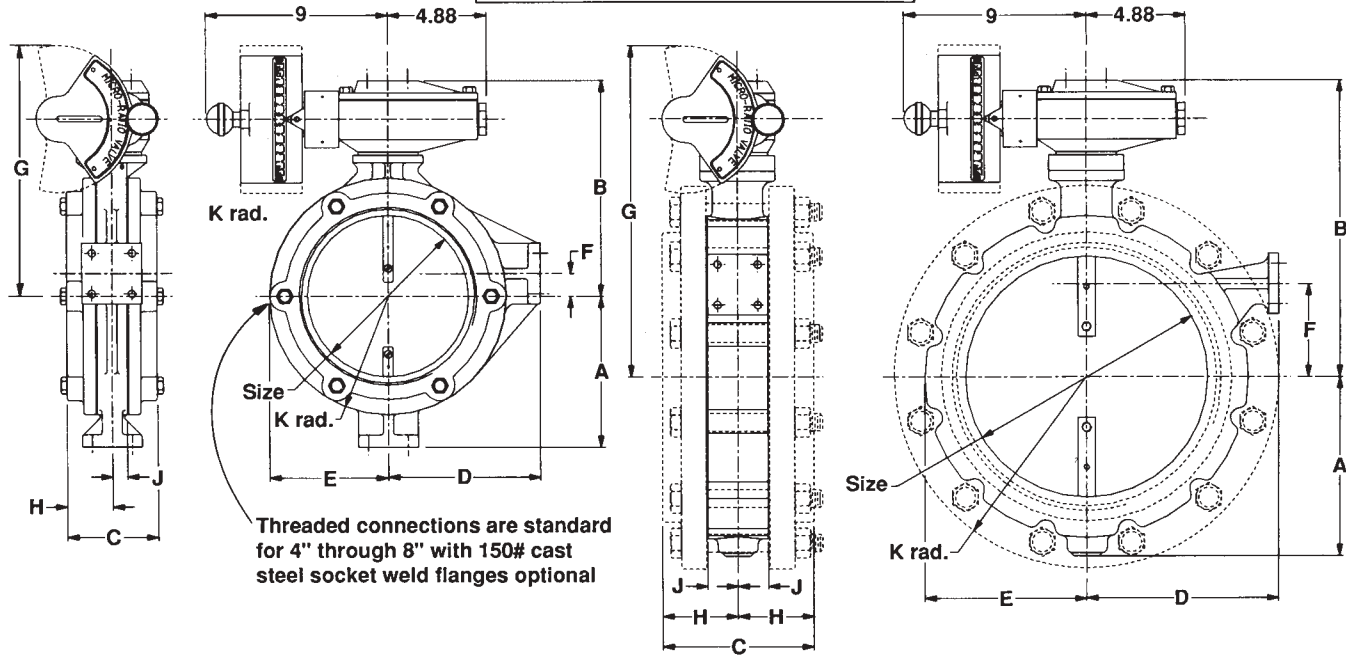
Size	A	B	C	D	E	G	H	J	K	L
1-1/2" -M			3.62	1.94	1.94		1.82	0.75	1.94	
3" -S			7.0	2.56	2.56		3.5	2.25	2.56	
2" -M	3.56	6.5	3.62	1.91	1.94	8.31	1.82	0.75	1.94	6.75
4" -S			8.25	3.19	3.19		4.12	2.75	3.19	
2-1/2" -M			3.88	2.38	2.38		1.94		2.38	
3" -M	4.06	7.5	4.0	2.62	2.62	9.31	2.0	0.75	2.56	7.75
4" -M	4.56		4.25	3.19	3.19		2.12		3.19	
6" -M	5.94	9.56	4.25	6.06	4.44	11.31	2.12		4.44	9.81

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

# Dimensions (in inches)

(-M) Style SYNCHRO Butterfly-type Gas Valves (8" through 12") – cast iron bodies

**8" -M through 12" -M Valves**  
Standard Cam Version

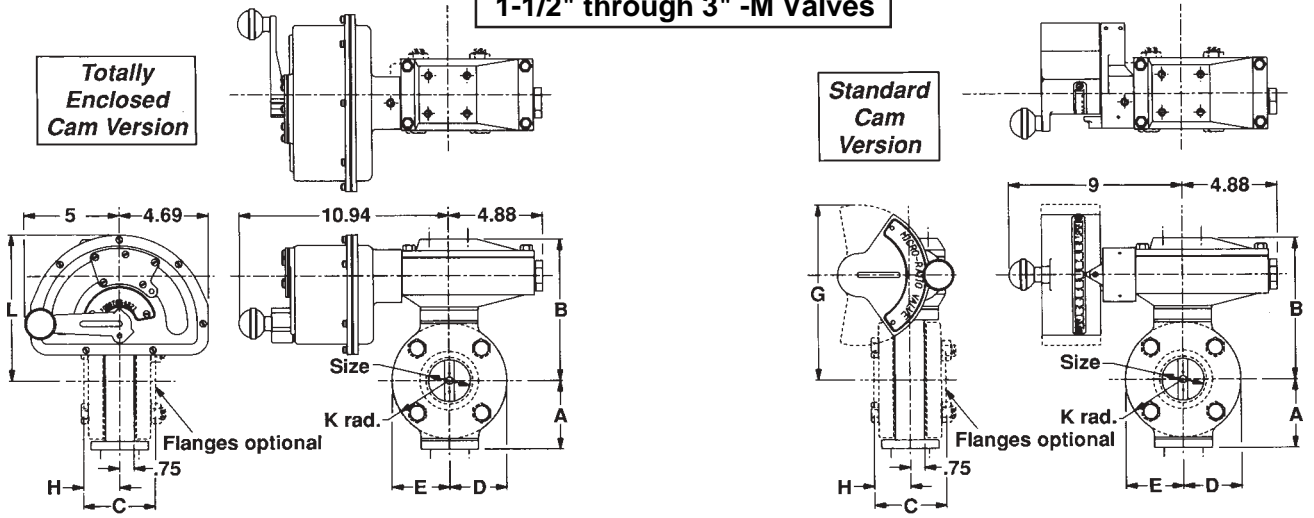


Pipe threads on this page conform to NPT (ANSI Standard B2.1)

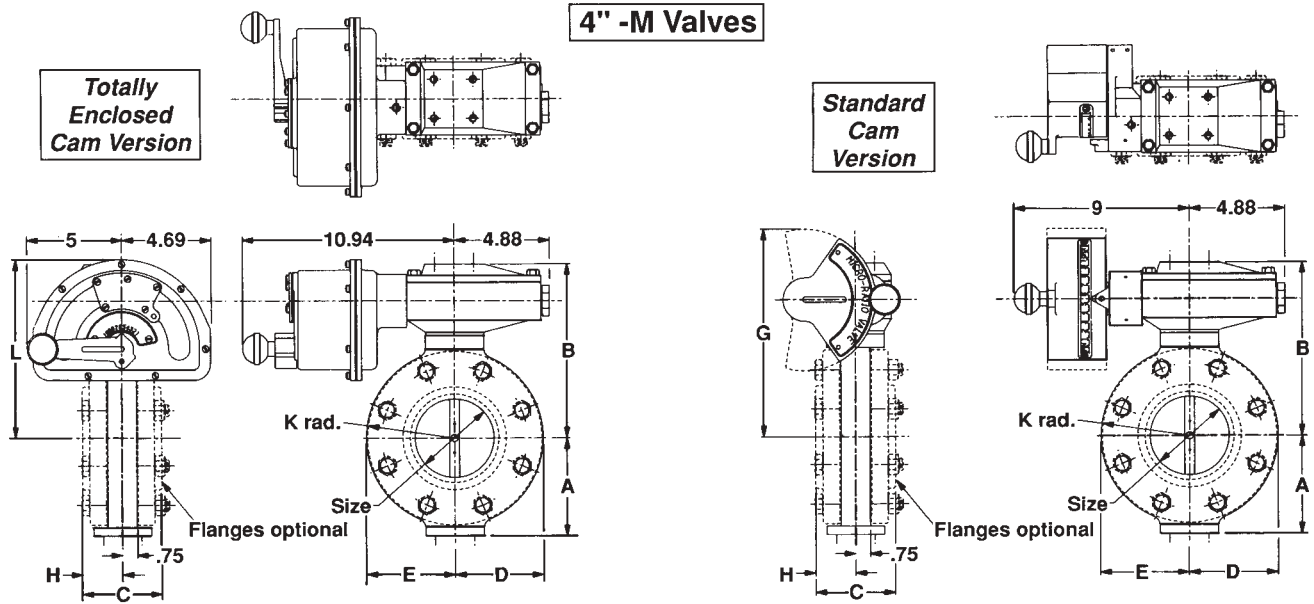
# Dimensions (in inches)

## (-M) Style SYNCHRO Butterfly-type Gas Valves (1-1/2" through 4" sizes, steel bodies)

### 1-1/2" through 3" -M Valves



### 4" -M Valves



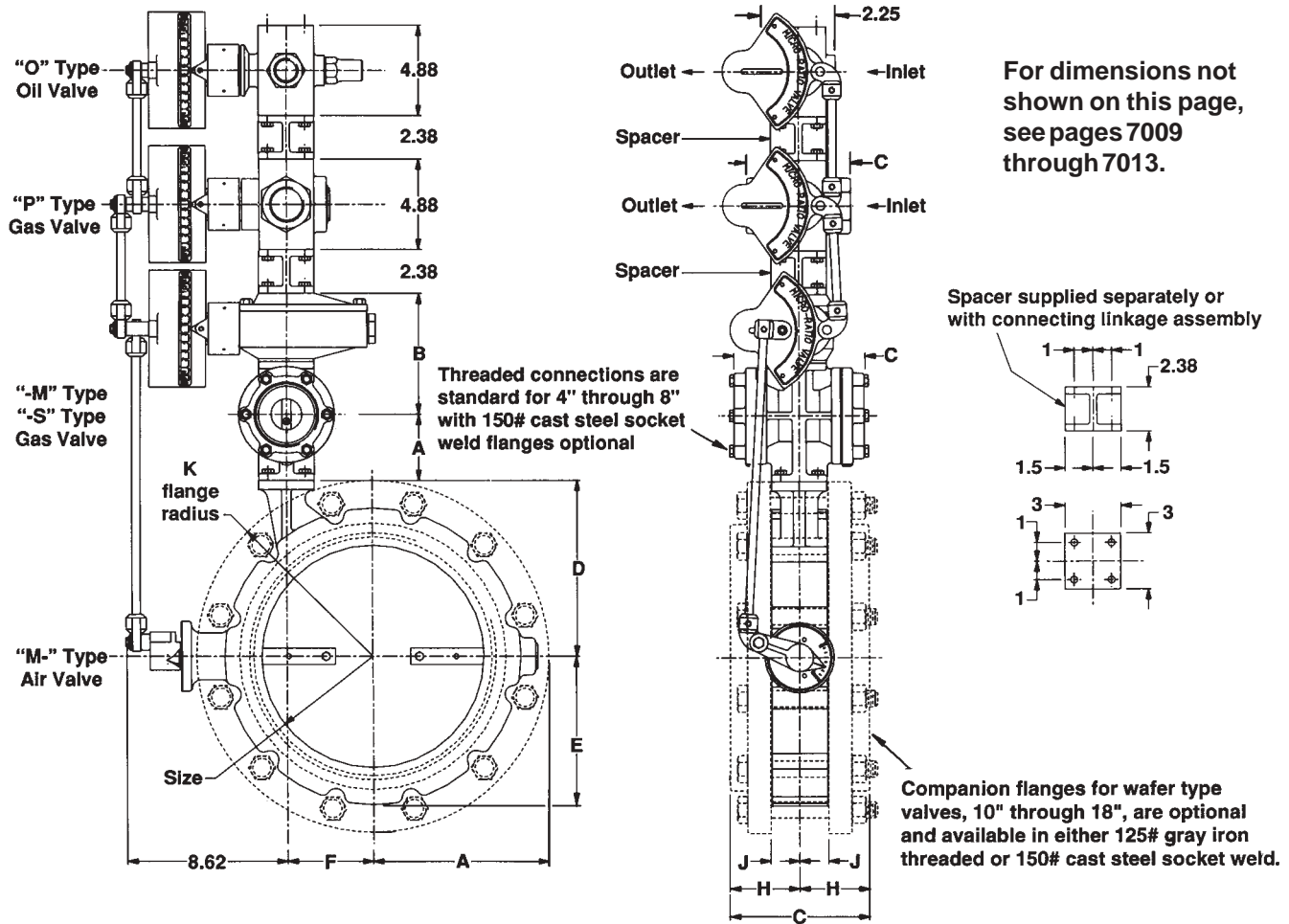
NOTE: Companion flange sets for these wafer type valves are optional and available in 150# ANSI cast steel flat faced welding flanges. Companion flange sets include 2 flanges, gaskets, nuts & bolts.

Size	A	B	C	D & E	G	H	K	L	Bolt Holes
1-1/2" -M	3.62	7.31	3.38	2.25	9.06	1.69	2.5	7.56	4
2" -M	3.56	7.38	3.62	3	9.12	1.81	3	7.62	
2-1/2" -M	4.06	7.88	3.88	3.5		1.94	3.5	8.12	
3" -M	4.31	8.12	4	3.75	9.88	2	3.75	8.38	
4" -M	5.06	9	4.25	4.56	10.75	2.12	4.5	9.25	8

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

# Dimensions (in inches)

## MICRO-RATIO® Valve arrangements (right hand arrangement shown)



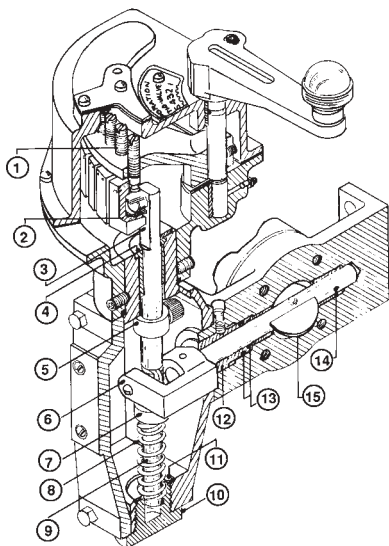
Air Control Valves									SYNCHRO Gas Valves					
									Butterfly-type			Poppet-type		
Size	A	C	D	E	F	H	J	K	Size	A	B	C	Size	C
M- 1-1/2"	1.75	3.62	3.56	1.75	---	1.81	0.75	1.75	1-1/2" -M	3.56	6.5	3.62	1/2" -P	4.25
M- 2"	1.94			1.94				3" -S	7.0				3/4" -P	
M- 2-1/2"	2.38	3.88	2.38	2.0	2.12	2.12	0.75	2.38	2" -M	7.5	3.62	1" -P	5.62	
M- 3"	2.62	4.0	4.06					2.62	4" -S			8.25		1-1/4" -P
M- 4"	3.19	4.25	4.56	3.19	2.12	2.12	0.75	3.19	2-1/2" -M	7.5	3.88	1-1/2" -P	5.62	
M- 6"	6.06	4.25	6.06	4.44				4.44	3" -M			4.06		4.0
M- 8"	7.5	4.5	7.56	5.88	1.12	2.25	0.75	5.88	4" -M	4.56	4.25	2-1/2" -P	7.5	
M- 10"	7.75	6.5	8.38	6.5	3.62	3.25	1.25	8	6" -M	5.94	9.5	4.25		
M- 12"	8.75	5.31	9.5	8	4.62	2.69	1.5	9.5	8" -M	7.38	10.69	4.5		
M- 14"	9.75	5.38	10.5	8.69	5.75			10.5	10" -M	7.75	13.75	6.5		
M- 16"	10.62	8.12	11.38	9.69	6.62	4.06	1.5	11.75	12" -M	8.75	14.75	7.5		
M- 18"	11.62	8.5		10.75	7.62	4.25		12.5						

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

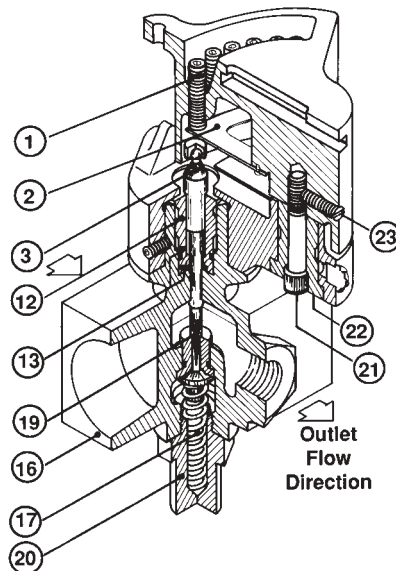
# Component Identification

## MICRO-RATIO® and SYNCHRO Flow Control Valves

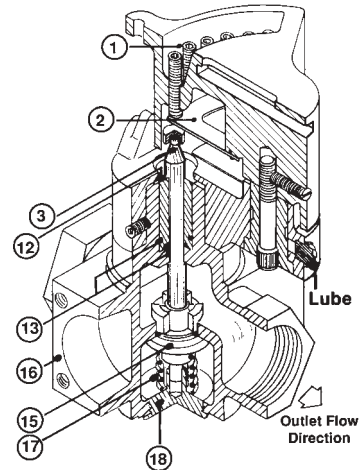
**(-M) SYNCHRO Gas Valve**  
Butterfly-type with totally enclosed cam assembly



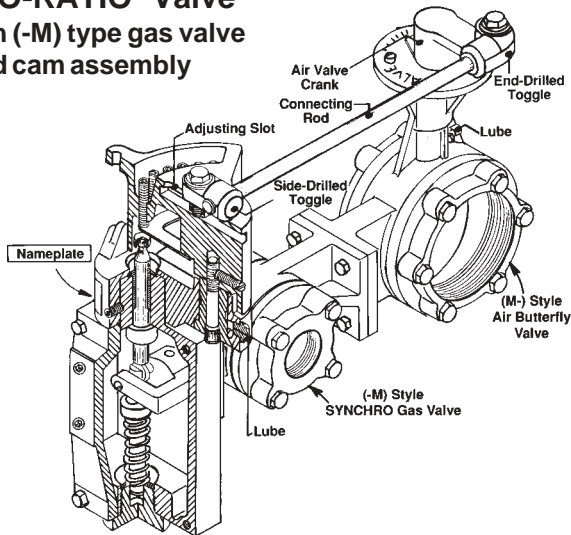
**(-O) SYNCHRO Oil Valve**  
Poppet-type with standard cam assembly



**(-P) SYNCHRO Gas Valve**  
Poppet-type with standard cam assembly



**Duplex MICRO-RATIO® Valve**  
(M-) air valve with (-M) type gas valve and standard cam assembly



### Legend

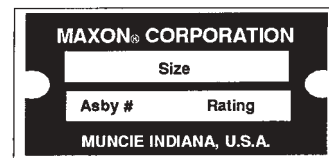
Item	Description
1	Adjusting Screws
2	Cam Springs
3	Plunger/Cap Assembly
4	Plunger Bushing
5	Set Collar
6	Operating Crank
7	Upper Spring Retainer
8	Gas Valve Spring
9	Spring Return Shaft
10	Shaft Retainer
11	Lower Spring Retainer
12	Packing Collar
13	O-rings
14	Operating Shaft
15	Valve Disc
16	Valve Body
17	Valve Disc Spring
18	Valve Disc Guide
19	Valve Stem
20	Spring Support Plug
21	Stud Bolt
22	Bushing
23	Locking Screw

### Suggested Spare Parts

- Cam Springs
- Plunger/Cap Assembly
- Adjusting Screws

Order spare parts for Flow Control Valves by identifying required items from drawings above, and referencing information on SYNCHRO Valve nameplate (shown at right)

### SYNCHRO Valve Nameplate



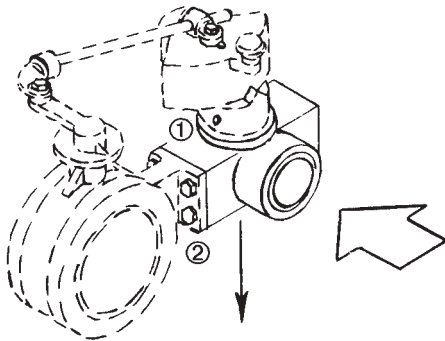
## Suggested Maintenance/Inspection Procedures

### Maxon MICRO-RATIO® Valves

#### Field Rotation of SYNCHRO Valves in MICRO-RATIO® Valve Assemblies

Flow direction through (-P) and (-O) poppet-type SYNCHRO Valves must be in the direction indicated on valve body casting. If reversal of the SYNCHRO Valve body is required for piping convenience, follow these steps:

1. Loosen neck set screws (one on each side) [1].
2. Remove bracket cap screws [2] and save.
3. Remove valve body [3] while supporting air butterfly [5] and adjusting screw carrier assembly [4].
4. Rotate valve body [3] 180°, then reposition and install bracket cap screws [2] loosely.
5. Check carefully that screw carrier assembly [4] is lowered into position, then tighten neck set screws [1] into neck indentation.
6. Tighten bracket cap screws [2].

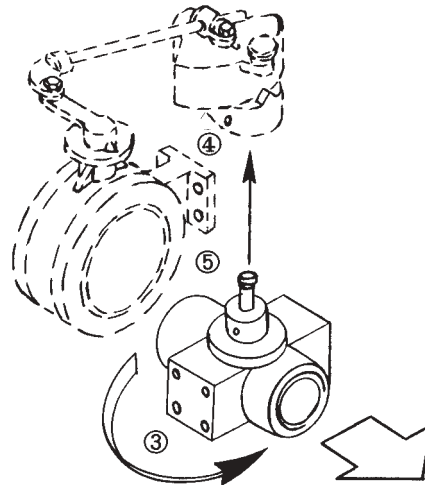


#### Valve Lubrication Suggestions

Some lubrication of moving parts may be required. All moving parts, O-rings and cam strips are lubricated at time of manufacturing. A periodic inspection should be performed to insure all parts continue to move freely and function properly. A periodic re-application of lubricant will extend the service life of your Maxon MICRO-RATIO® Valve.

#### The following lubricants are suggested:

Manufacturer	Lubricant
Keystone Div., Philadelphia, PA	#84-EP-2, NLGI #2 Lithium base grease
Standard Oil Co. (of Indiana)	Stanolith grease #42
Shell Oil Co.	Alvania grease #1
Stewart Warner Corp.	Alemite lubricant #32





## Design and Application Details

### Series “Q” Adjustable Gradient Gas Control Valves

The Series “Q” butterfly gas valve is equipped with the Maxon multiple-screw adjusting cam for adjusting the flow from maximum to minimum. The numbers on an external indicator strip correspond to a series of adjusting screws which may be set initially to give the desired contour to the cam.

A Series “Q” Valve may be used for most gas throttling applications and provides flexibility of adjustment.

Series “Q” Valves can be easily adapted for automatic operation with either electric or pneumatic control operators.

Maxon has designed a broad range of **Connecting Base and Linkage (CB & L) assemblies** to properly position and align those operators for control of Maxon Flow Control Valves.

CB & L assemblies are available for the most commonly-used electric and air operators.

**Maxon CB & L assemblies are designed to position control operators, not to support them.** User must provide auxiliary support in the form of wall brackets, floor stands, turnbuckle hangers, etc. to support the weight and size of your operator.

**Optional tandem linkage assembly** is available to connect two Series “Q” Valves together for control by a single automatic control operator.

Connecting linkage is available to mount a Series “Q” Valve in a **stand-by fuel arrangement** with PREMIX® Blower Mixers or Series “66” AIRFLO® Mixers as shown on page 7018.



*Series “Q” Valve with connecting base and linkage positioning a typical electric control operator*



*Series “Q” Valve with connecting base and linkage positioning a typical pneumatic control operator*



## Capacities and Specifications

### Series "Q" Adjustable Gradient Gas Control Valves

#### General

All Maxon Flow Control Valves are designed for **throttling service only** and are not intended for tight shut-off.

All Series "Q" Gas Control Valves are **UL (Underwriters Laboratory) listed** for air, natural gas and liquefied petroleum gas service.

**Torque requirements** listed in table at right are to be used in selecting your automatic control operator.

#### Nomenclature

Series "Q" Valves are designated first by the pipe size (inlet and outlet), followed by the letter "Q" to indicate the valve series.

**Example:** 2" -Series "Q" Control Valve

#### Series "Q" Gas Control Valve Specifications

Maximum ambient temperature: 125°F (52°C)

Maximum fluid temperature: 150°F (66°C)

Series "Q" Butterfly-type Valve Size	Cv Flow Factor [1]	Maximum Inlet Pressure (PSIG)	Torque Required [2] (inch-pounds)
1" -Q	18	25	120
1-1/4" -Q	42		
1-1/2" -Q	80	20	100
2" -Q	138	10	48
2-1/2" -Q	180		
3" -Q	265	5	24

[1] Cv factors based on flow through a wide-open valve.

[2] Torque required is shown for maximum rated pressure. At lower pressures, less torque is required.

### Special application of Series "Q" Valve for stand-by service on PREMIX® Blower Mixers and Series "66" AIRFLO® Mixers

Propane is frequently used as a stand-by fuel for natural gas. When propane is carburetted with air at a central mixing point and delivered in the regular natural gas lines at a Btu value and specific gravity permitting performance characteristics closely matching the primary fuel, it may be burned in most industrial gas equipment without any change in adjustment.

However, LPG can also often be used in the raw, uncarburetted state. For example, the Maxon Series "Q" Gas Control Valve may be linked to the ratio valve of a Maxon PREMIX® Blower Mixer or Series "66" AIRFLO® Mixer to provide for pre-adjustment of the fuel-air ratio for both the primary fuel and a stand-by fuel.

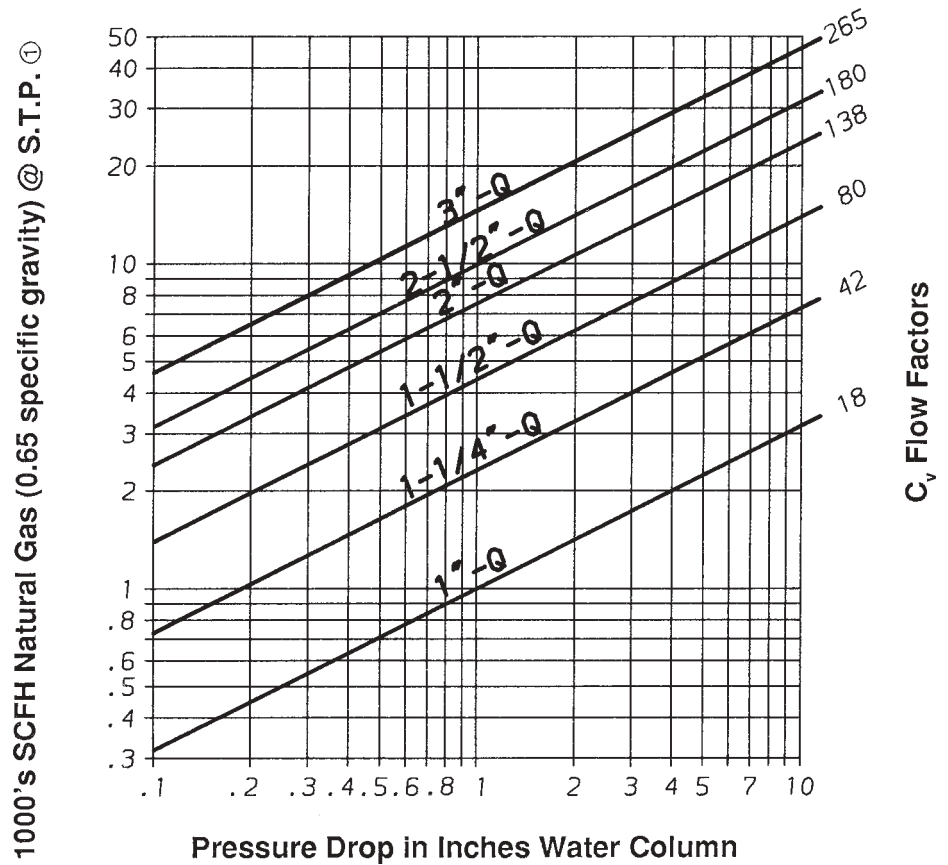


## Performance Data

### Series "Q" Control Valves – Natural Gas Service

**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

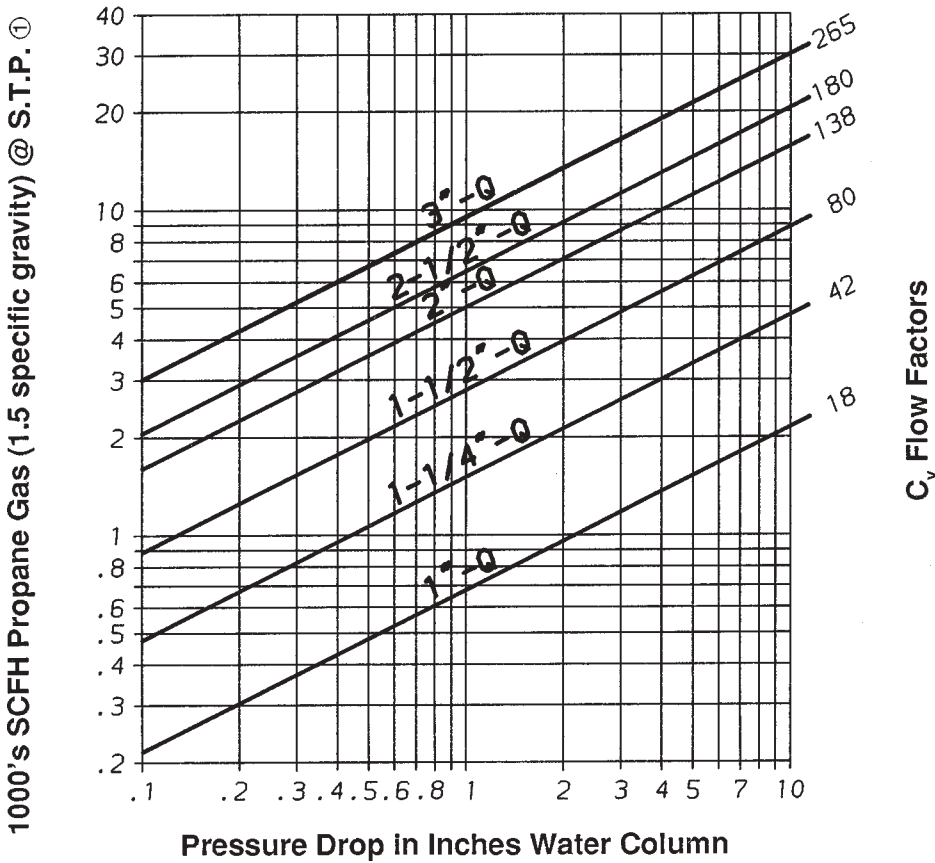


**Gas Valves** are normally sized based on inlet pressure and allowable pressure drop. See guidelines at right.

Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

## Performance Data

### Series "Q" Control Valves – Propane Gas Service



**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

**Gas Valves** are normally sized based on inlet pressure and allowable pressure drop. See guidelines at left.

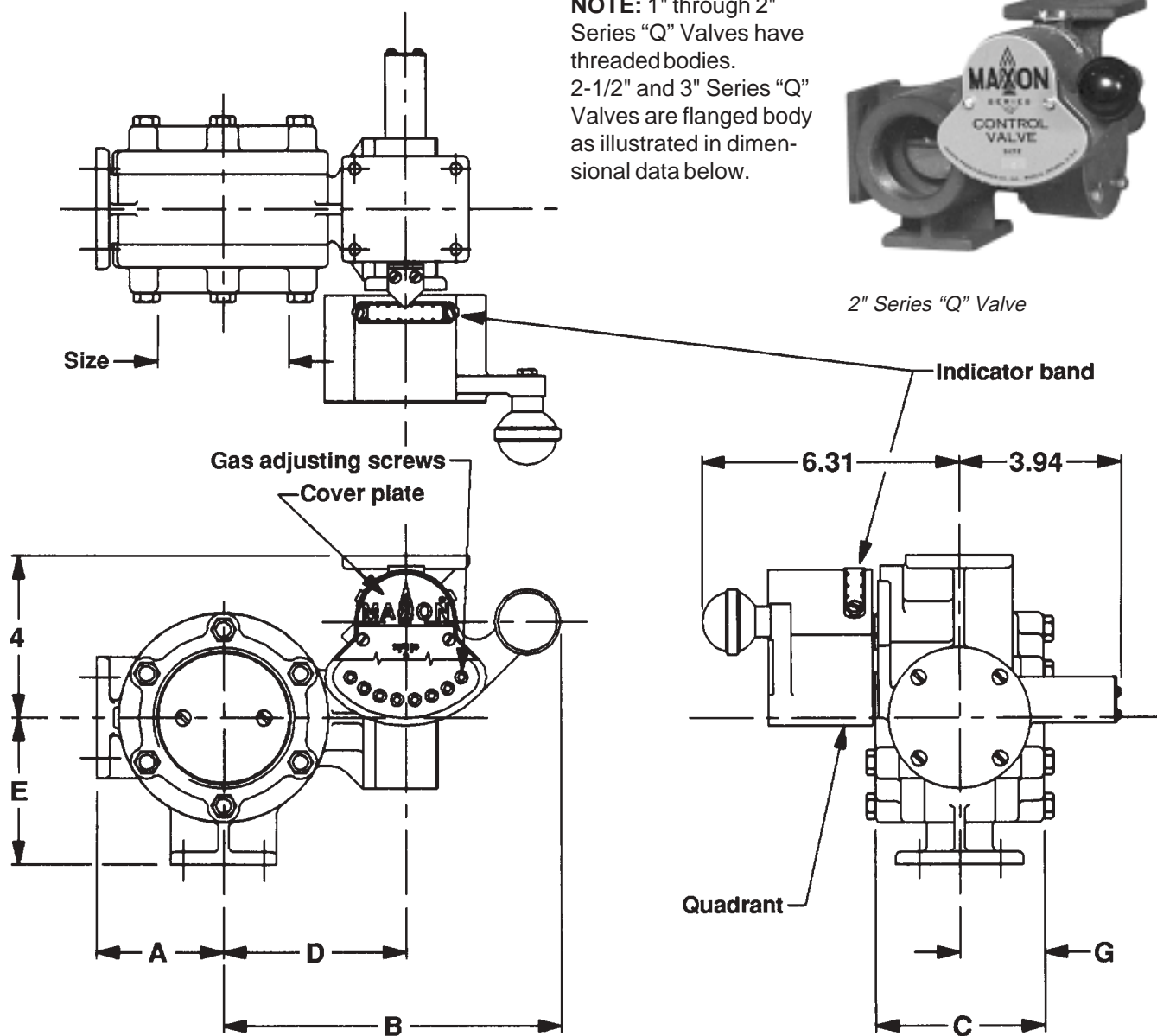
## Dimensions (in inches)

### Series "Q" Gas Control Valves

**NOTE:** 1" through 2" Series "Q" Valves have threaded bodies. 2-1/2" and 3" Series "Q" Valves are flanged body as illustrated in dimensional data below.



2" Series "Q" Valve

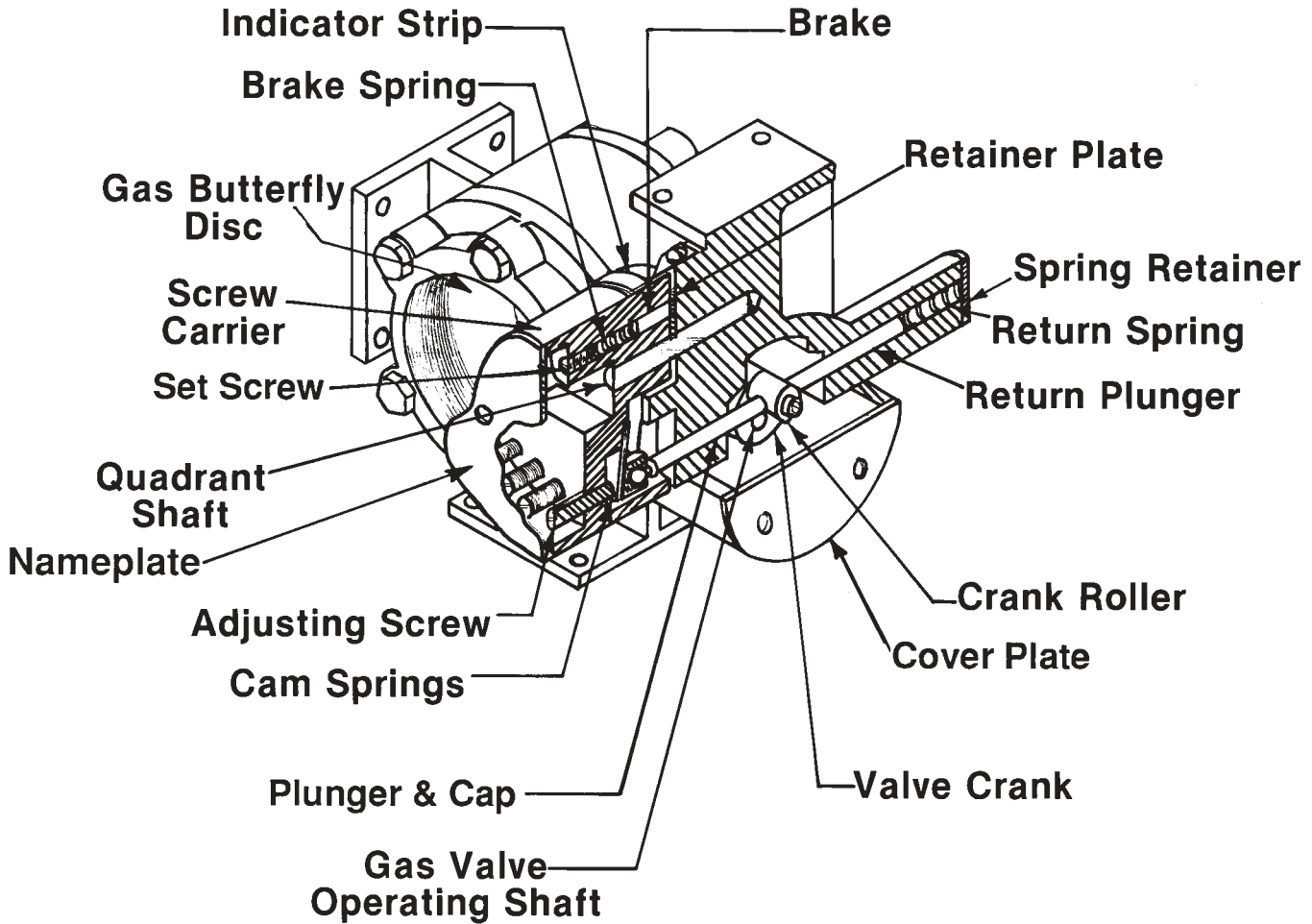


Size (inches)	A	B	C	D	E	G
1"	1.81	7.19	5	3.5	2	2.5
1-1/4"				3.75		
1-1/2"	2.25	7.44		4.5	2.62	
2"			3.88	3.62		
2-1/2"	3.12	8.19	4.25		1.94	
3"			2.12			

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

# Component Identification

## Series "Q" Adjustable Gradient Gas Control Valves



### Suggested Spare Parts

- Cam springs
- Plunger/cap assembly
- Adjusting screws

Order spare parts for Series "Q" Valves by identifying required items from drawing above and referencing information on valve nameplate (shown at right).

### Series "Q" Valve Nameplate



# Capacities and Specifications

## Series “CV” Control Valves and Series “BV” Balancing Valves

### General

All Maxon Flow Control Valves are designed for **throttling service only** and are not intended for tight shut-off.

**Series “CV” Valves are offered in four different versions:**

1. Standard assemblies **without** connecting base and linkage (CB & L) assembly (order CB & L separately)
2. UL (Underwriters Laboratory) listed assemblies **without** CB & L (CB & L ordered separately)
3. Standard assemblies **with** CB & L to accept electric control operators, such as:
  - A. **Penn/Johnson** #M-80 or #M-81
  - B. **Honeywell** #M644, #M744, #M941, #M944 or #M7044
  - C. **Barber-Colman** #EA50
4. UL (Underwriters Laboratory) listed assemblies with CB & L as in #3 above.

### Designations

Both of these valve types are designated first by the nominal pipe size (inlet and outlet) followed by the letters indicating the valve series.

**Example:**

- 1" - Series “BV” Balancing Valve
- 1-1/4" -U Series “CV” Control Valve

**UL (Underwriters Laboratory) listed series “CV” Valve assemblies are available** in all sizes for air, natural gas and liquefied petroleum gas service.

### Series "CV" Control Valve Specifications

Maximum ambient temperature: 125°F (52°C)  
 Maximum fluid temperature: 150°F (66°C)

Butterfly-type Series "CV" Valve Size	Cv Flow Factor [1]	Maximum Inlet Pressure (PSIG)	Torque Required [2] (inch-pounds)
1/2" -CV	5	25	25
3/4" -U -CV [3]			
3/4" -CV	11		
1" -U -CV [3]			
1" -CV	18		
1-1/4" -U -CV [3]			
1-1/4" -CV	42		
1-1/2" -CV	80	20	
2" -CV	138		
2-1/2" -CV	180	15	
3" -CV	265		

[1] Cv factors based on flow through a wide-open valves.  
 [2] Torque required is shown for maximum rated pressure. At lower pressures, less torque may be required.  
 [3] "U" designates undersized ports.

### Series "BV" Balancing Valve Specifications

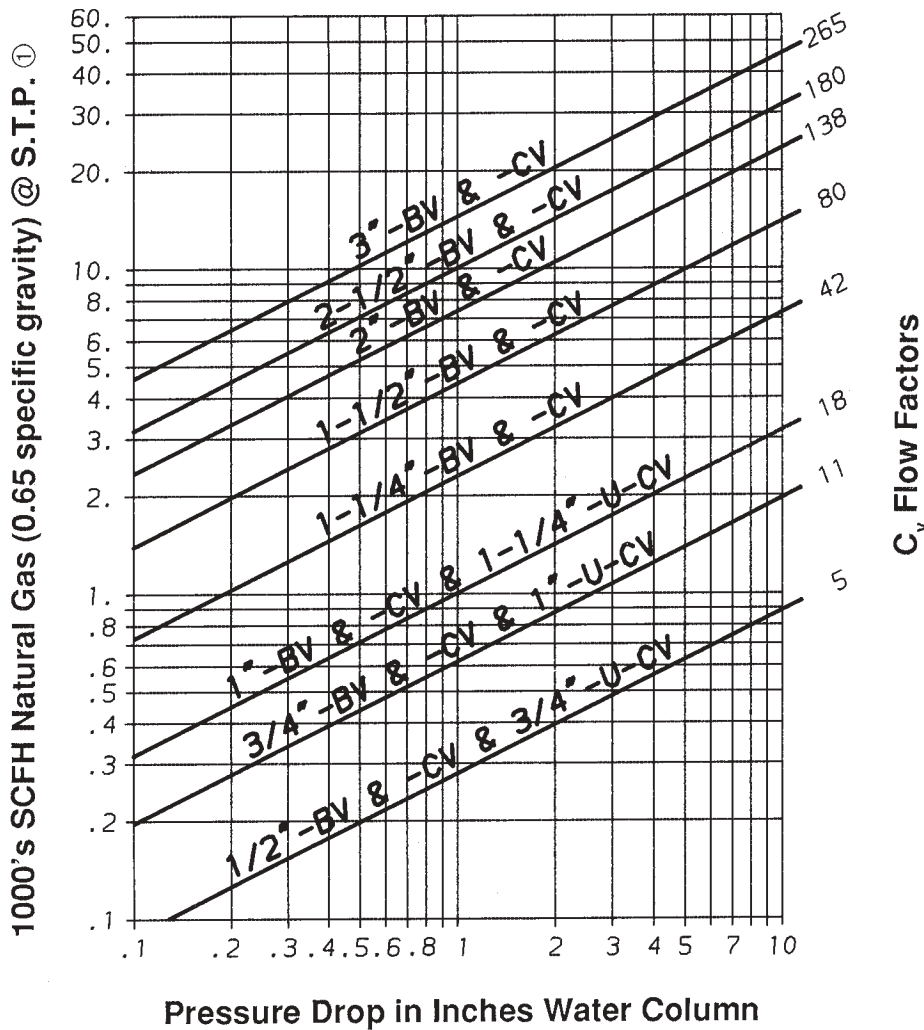
Maximum ambient temperature: 125°F (52°C)  
 Maximum fluid temperature: 150°F (66°C)

Butterfly-type Series "BV" Valve Size	Cv Flow Factor [1]	Maximum Inlet Pressure (PSIG)
1/2" -BV	5	25
3/4" -BV	11	
1" -BV	18	
1-1/4" -BV	42	
1-1/2" -BV	80	
2" -BV	138	20
2-1/2" -BV	180	
3" -BV	265	15

[1] Cv factors based on flow through a wide-open valve.

# Performance Data

## Series "BV" and "CV" Gas Control Valves – Natural Gas Service



**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

**Gas Valves** are normally sized based on inlet pressure and allowable pressure drop. See guidelines at left.

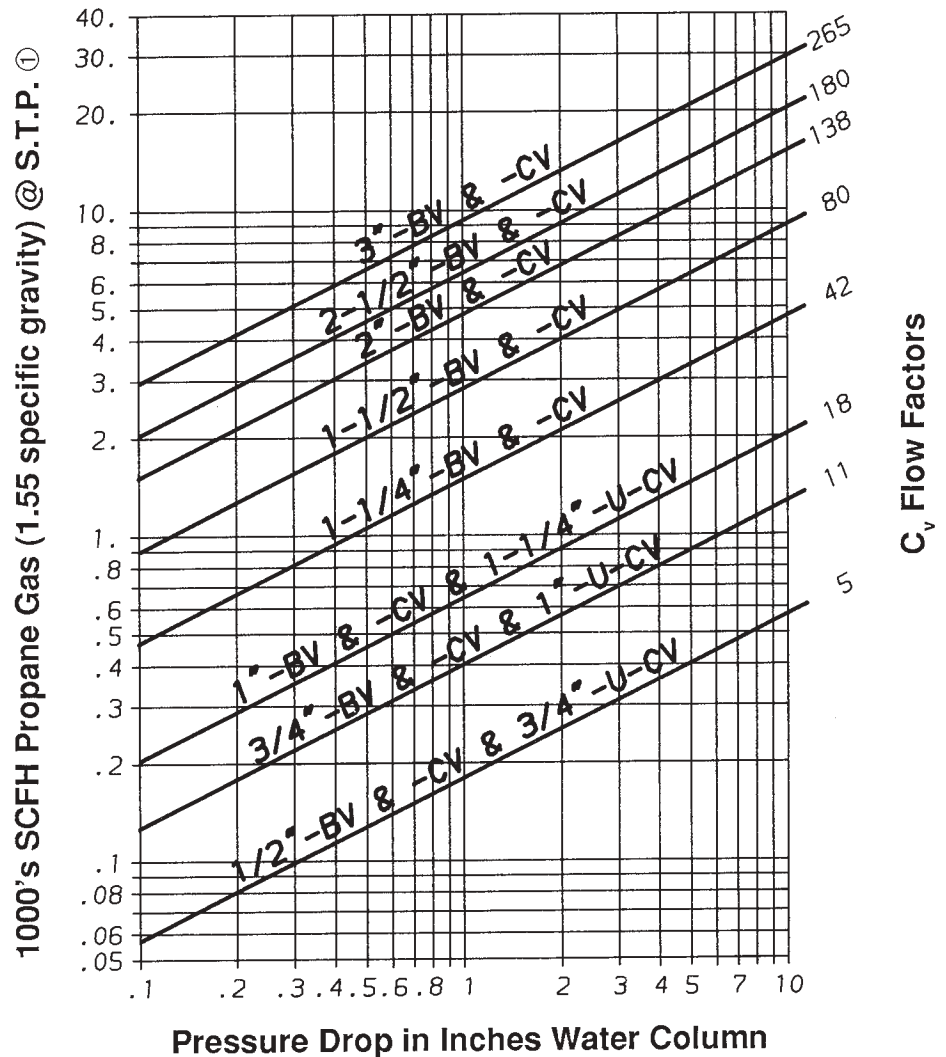


# Performance Data

## Series "BV" and "CV" Gas Control Valves – Propane Gas Service

**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

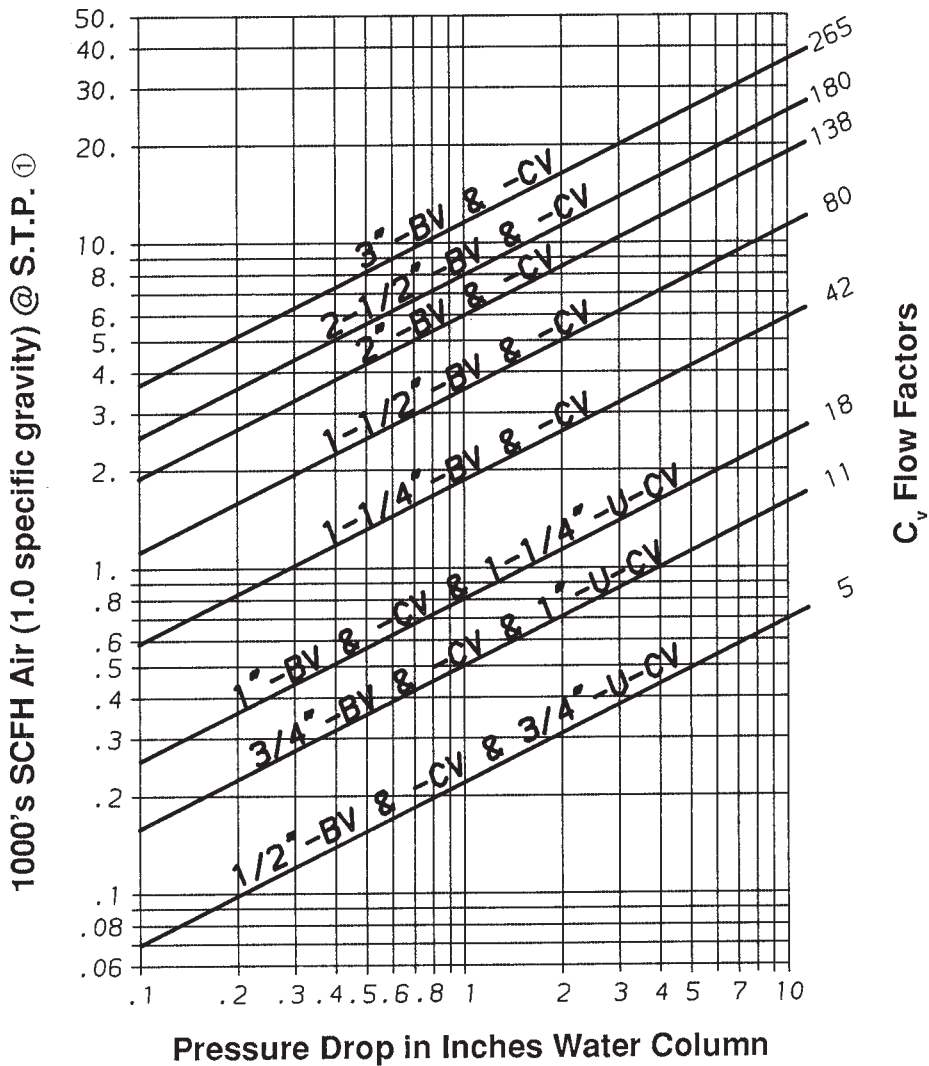


**Gas Valves** are normally sized based on inlet pressure and allowable pressure drop. See guidelines at left.

Gas Inlet Pressure	Suggested Pressure Drop
3" wc - 5" wc	0.5" wc - 1.5" wc
4 osi - 8 osi	1" wc - 2" wc
8 osi - 16 osi	2" wc - 5" wc
2 psi - 3 psi	6" wc - 10" wc

# Performance Data

## Series "BV" and "CV" Gas Control Valves – Air Service



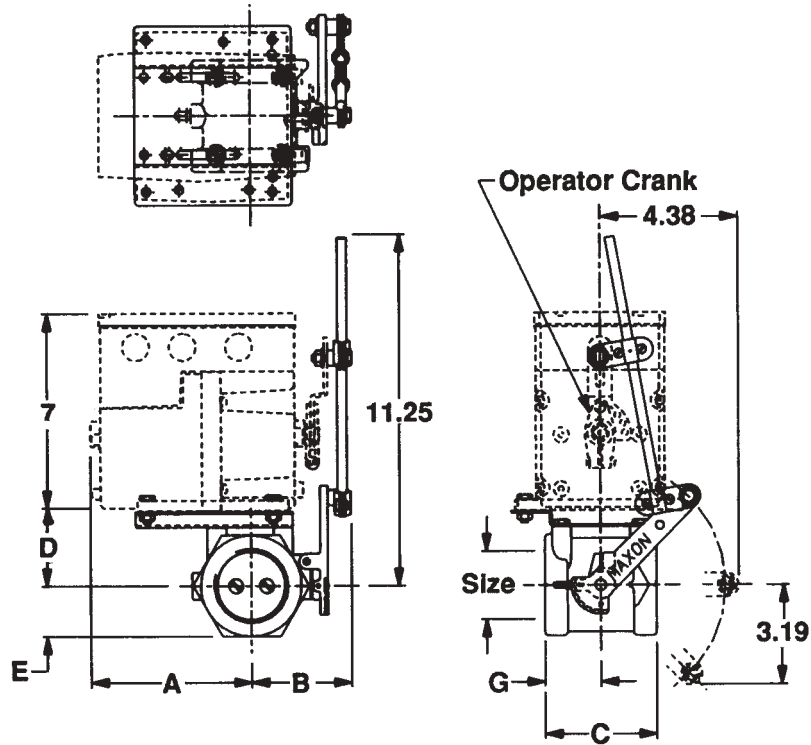
**Note:** The capacities and pressure drops indicated in this chart are based on flow through a wide-open valve. If valve is less than fully open, higher drops and lower flows will result.

[1] S.T.P. = Standard Temperature and Pressure defined at: (60°F and 14.7 PSIA and 15.6°C and 760mm Hg)

**Air Valves** are normally sized to match the combustion air pipe sizing. Pressure drops of 1" wc to 2.5" wc are typical. If supply pressures are higher than required, smaller valves can be used, or travel limited to restrict maximum flow rate.

# Dimensions (in inches)

## Series "CV" Control Valves



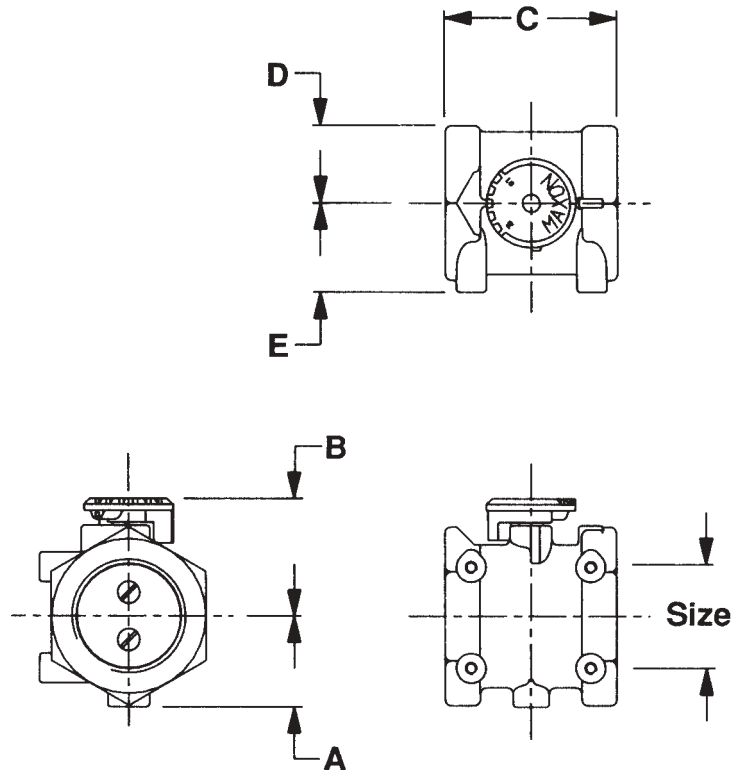
Size	A		B	C	D	E	G
	B-C [1]	M-H [2]					
1/2"	4.19	4.62	3.06	3.25	1.78	0.78	1.62
3/4"					1.89		
1"					1.98	1	
1-1/4"					3.38	1.94	
1-1/2"	3.94	4.38	3.31	3.62	2.38	1.62	1.81
2"							
2-1/2"	3.19	3.62	4.06	4.62	2.69	1.94	2.31
3"				5			

[1] Barber-Colman  
 [2] Honeywell

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

### Dimensions (in inches)

#### Series "BV" Balancing Valves



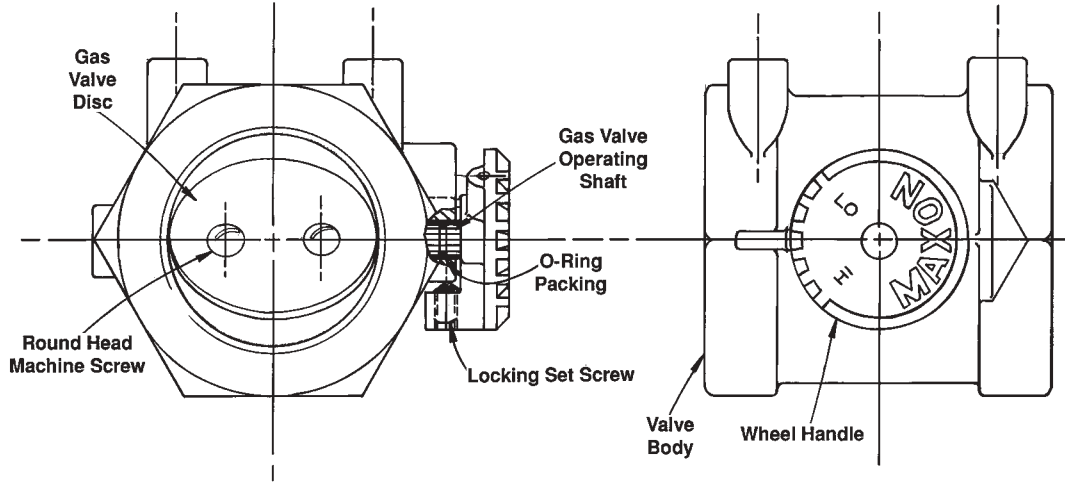
Size	A	B	C	D	E
1/2"	1.25	2.25	3.25	0.75	1.25
3/4"				1	
1"				1.19	
1-1/4"	1.38	2.5	3.62	1.31	1.44
1-1/2"	1.81			1.62	1.56
2"	1.88	3.25	5	1.94	1.88
2-1/2"	2.75			2.31	2.19
3"					2.56

Pipe threads on this page conform to NPT (ANSI Standard B2.1)

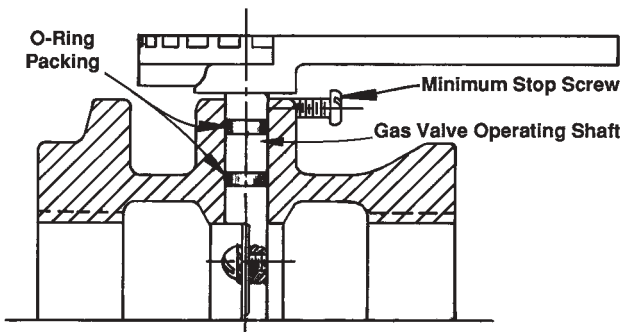
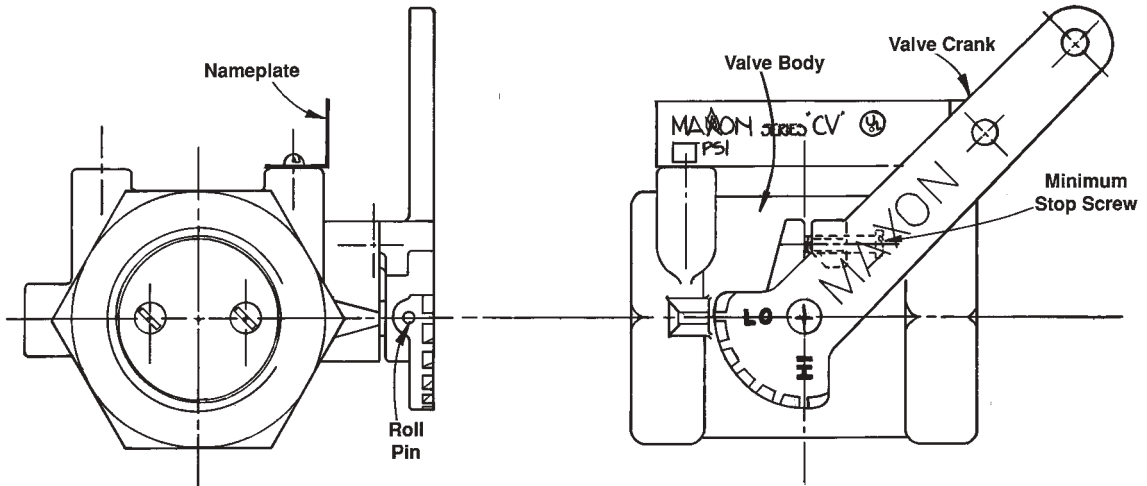
# Component Identification

## Series "BV" Balancing Valves and Series "CV" Flow Control Valves

### Series "BV" Balancing Valve



### Series "CV" Control Valves



Typical internal construction  
(Series "CV" Valve shown)



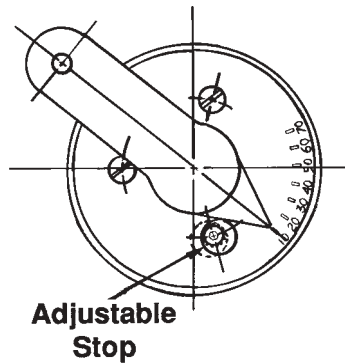
Series "CV" Control Valve Nameplate

Order spare parts for Series "CV" and "BV" Flow Control Valves by identifying required items from the drawings above and referencing information on valve nameplate (shown above).

## Accessories

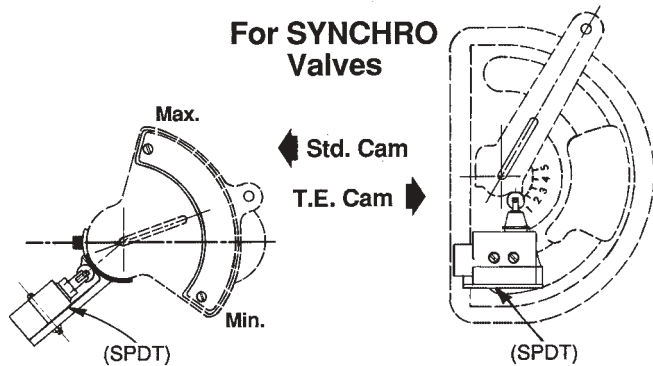
### Adjustable Stop for air control valves

Optional Adjustable Stop shown at right sets a minimum to prevent full closure of the air valve.

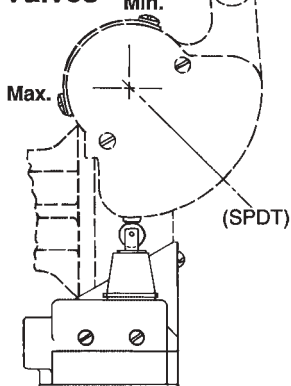


### Position Switches for electrical indication of valve position

Standard Low Fire Start (LFS) Switch opens the circuit when valve leaves minimum position. Weather-proof and Hazardous Location/Weatherproof versions differ only in the physical switch size and rating. High and low fire position switch includes (2) SPDT switches. One switch may be field-set to activate at "high" position, while other is set to activate at "low" fire position.



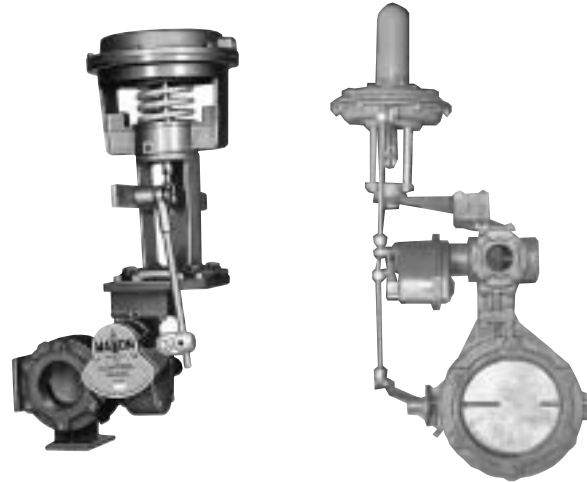
### For "Q" Valves



### Connecting Base & Linkage Assemblies

Maxon has designed a broad range of Connecting Base & Linkage Assemblies (CB & L) to properly position and align the popular operators for control of Maxon flow control valves.

Proper position and alignment are essential for smooth and trouble-free operation of flow control valves.



*Air operator shown on Series "Q" Control Valve and MICRO-RATIO® Valve*