APV

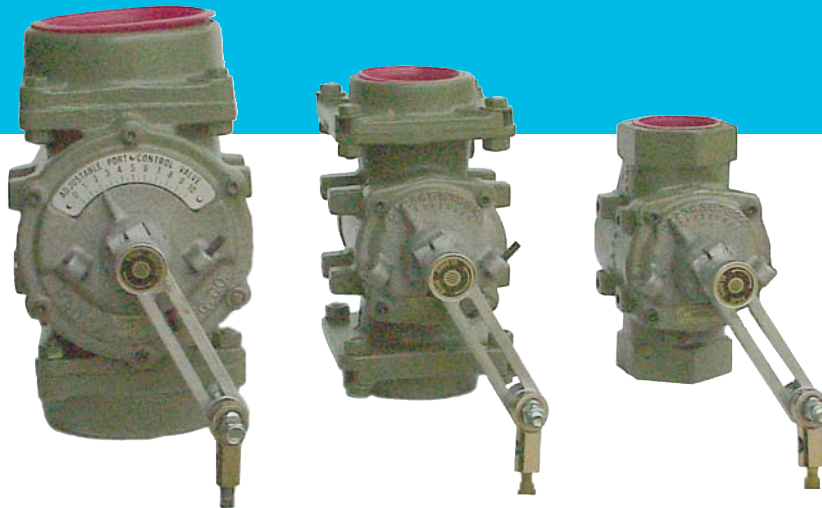## Adjustable Port Valves

APV-1
Edition 05-08

Hauck, a product brand
of the Elster Group

- Single port adjustment knob for positive position lockout

- Simple and efficient flow setup and adjustment

- Mounting pads for control motor/other valves

- Installation in any position

- Adjustable limit stops

- Low operating torque

- Available in sizes from 1 to 10 inches

- Pressure to 15 psig (103 kPa) through 4 inch size,
  5 psig (35 kPa) for 6 inch size and larger

- Temperatures to 200°F (93°C)

elster
Hauck

Hauck Adjustable Port Valves (APV) are a dependable and accurate means of controlling the flow of air or gas to burners on furnaces, ovens, kilns and dryers and for other industrial control applications. These valves feature an easy, single adjustment and are designed to hold the desired settings in either automatic or manual operation systems.

Valve flow rate is controlled by operating the lever to rotate the cylindrical piston for desired amount of port opening. The height of the rectangular port opening can be adjusted for the entire range of lever travel by merely turning a single adjusting knob. This knob has **closed** and **open** direction arrows and a socket screw for positive position lockout.

Full valve control range is obtained by 90 degree lever rotation. The adjustable radius and positioning features of the lever permit easy linkage to a control motor or drive mechanism. A ball joint snap connection on the lever eliminates friction from misalignment and allows the valve to be quickly disconnected from a control system for manual operation or adjustment. Adjustable limit stop screws for the valve pointer are vibration proof.

A separate vibration proof friction type locking screw is provided to lock any manual setting of the valve pointer. The valve piston
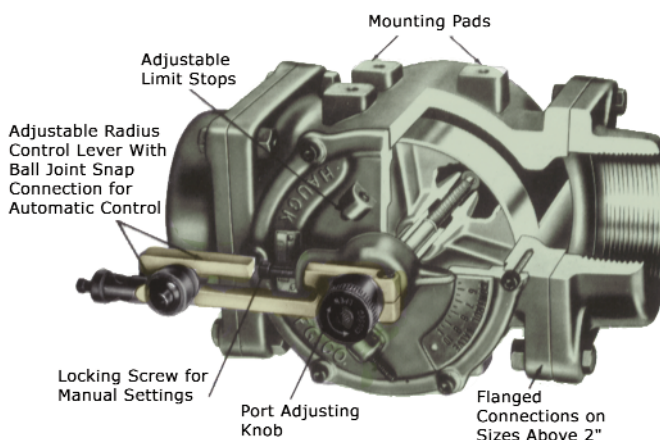
shaft has a ball thrust bearing and take-up screw which eliminates cylinder end play and related flow variations. These valves are designed for use as control valves and **cannot** be used as shutoff valves.

Hauck APVs have mounting pads drilled and tapped on both sides. They can be supplied with connecting linkage and brackets for automatic control and in multiple valve units. Units combining other Hauck valves are also available.

The entire valve internals with valve cover assembly are removable from the valve body by unscrewing the cover plate screws.

All valve bodies up to 4" size are cast iron. Larger sizes are of steel. Valve pistons are of machined aluminum alloy in all sizes. Valve covers are aluminum alloy in sizes 1" through 4", and steel in the 6, 8 and 10" sizes.

Valve sizes 1" through 2" have one piece bodies with screwed connections. Valve sizes 3" and 4" have flanged type screw connections. The 6, 8 and 10" valves will mate to ANSI 125 lb rated flanges.

Valve sizes 1" through 4" are designed for operating pressures up to 15 psig. The 6, 8 and 10" valves are rated for pressures up to 5 psig. APV valves may be used with temperatures up to 200°F (93°C).

Manual or automatic control is achieved by moving the adjustable radius control lever. The piston is thereby rotated to proportionally open the rectangular port in the valve body. The height of the port is adjusted by a single adjusting knob. When the height adjustment is made to satisfy maximum flow conditions, this establishes the port height for all rotational valve positions.
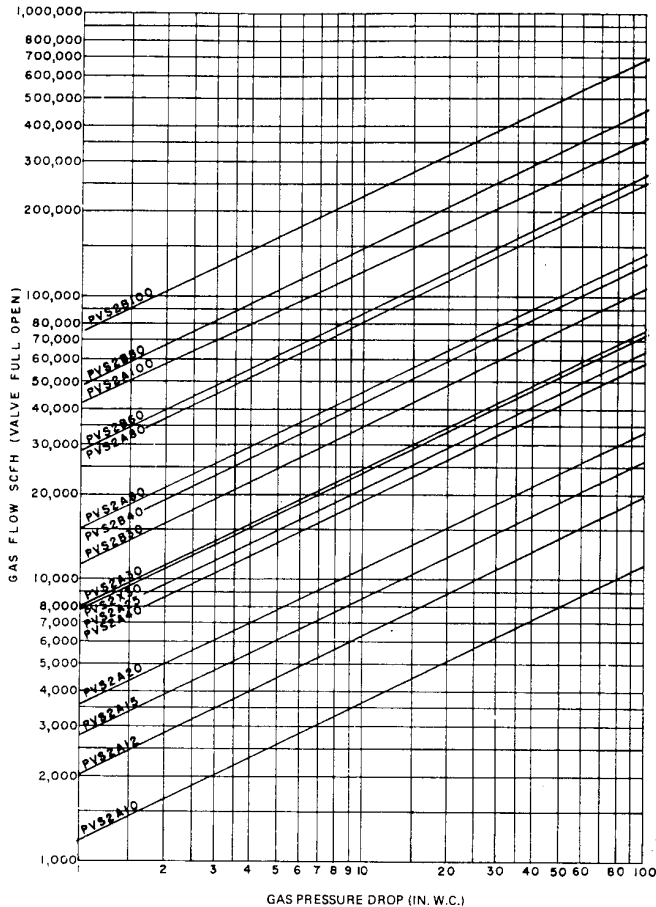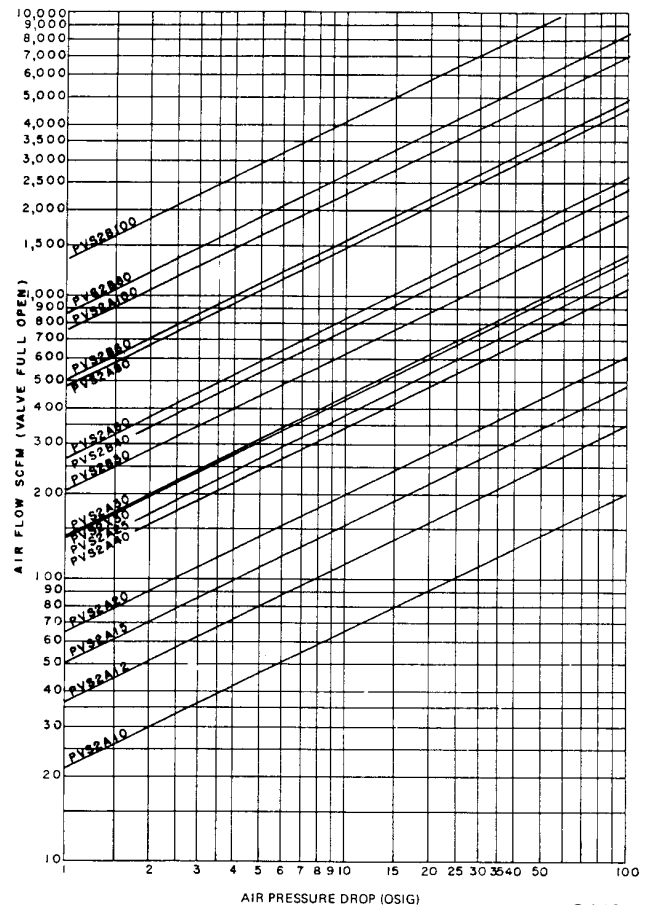
PVS ADJUSTABLE PORT VALVES

NATURAL GAS

AIR

Q137

Q140

NOTES:

1. Capacities based on gas @ 0.60 s.g., air @ 1.0 s.g., and 68°F temperature.
2. Static pressure drop measured across full open valve, i.e., pointer at position 10 and adjusting screw turned in fully.
3. Maximum inlet pressure is **15 psig** up to 4" valve size and **5 psig** for 6" and larger valve size.
4. Maximum temperature is **200°F**.

CORRECTION FACTORS

PRESSURE (GAS OR AIR Correction Factor C_1)

Pressure Drop (psig)	Inlet Pressure (psig) 5	10	15
1	1.15	1.29	1.42
2	1.63	1.80	1.95
3	1.95	2.25	2.45
4	2.20	2.50	2.85
5	2.45	2.75	3.00
10		3.70	4.05
15			4.70

TEMPERATURE (GAS OR AIR Correction Factor C_2)

Temperature (°F)	68	100	150	200
Multiplier	1.00	1.03	1.07	1.12

SPECIFIC GRAVITY (GAS Correction Factor C_3)

Gas	Coke Oven	Natural Gas			Blast Furnace	Propane	Butane
Specific Gravity	.40	.59	.60	.61	1.02	1.52	2.01
Multiplier	1.224	1.007	1.000	.992	.767	.628	.547

EXAMPLE:

Determine the corrected volumetric flow rate in standard cubic feet per hour for a PVS2A20 (2") adjustable port valve for propane gas at 100°F having an inlet pressure of 15 psig and a pressure drop of 5 psig.

Using the equation: Q(corrected) = C_1 x C_2 x C_3 x Q(rated)

1. From the standard flow curve for Natural Gas (Q137) at 27.7 "w.c. pressure drop, determine the rated flow: Q(rated) = 14,000 scfh.
2. From the Pressure correction factor table, determine the pressure correction factor: C_1 = 3.00
3. From the Temperature correction factor table, determine the temperature correction factor: C_2 = 1.03
4. From the Specific Gravity correction factor table, determine the specific gravity correction factor for Propane: C_3 = 0.628

Then, Q(corrected) = (3.00) x (1.03) x (0.628) x (14,000)
= 27,170 scfh of propane gas

HAUCK MANUFACTURING CO., P.O. Box 90, Lebanon, PA 17042-0090 717-272-3051
Fax: 717-273-9882

APV-2

2/04

www.hauckburner.com
www.morterahauck.com   ventas@morterahauck.com

MORTERA Y COMPAÑIA, S. A DE C. V.

PVS ADJUSTABLE PORT VALVES

GY231

VALVE NO.	VALVE SIZE N.P.T.	A	B	C	D	E	F	G	H	I	J MIN.	J MAX.	K	L	M	N	P THD.	Q
PVS 2A10	1"	3 7/8	1 15/16	4 15/16	2 13/16	4 3/4	6 3/8	3 3/16	1 1/8	–	2 5/8	4 3/8	7/8	1 1/8	5/16	4 5/8	5/16–18	6 3/16
PVS 2A12	1 1/4"	4 1/16	2 1/2	5 1/4	2 9/16	5 1/16	7 1/4	3 5/8	1 1/8	–	2 5/8	4 3/8	1 1/8	7/8	7/16	4 5/8	5/16–18	6 3/16
PVS 2A15	1 1/2"																	
PVS 2A20	2"	6 1/4	3 1/8	6 7/16	3 1/4	6 1/4	10 7/8	5 7/16	1 1/8	–	2 5/8	4 3/8	1	–	1/2	5 13/16	5/16–18	6 3/16
PVS 2A30 / PVS 2B30	3"																	
PVS 2A40 / PVS 2B40	4"	5	2 1/2	5 5/8	3 7/8	5 5/8	9 1/4	4 17/32	1 1/8	–	2 5/8	4 3/8	–	–	9/16	5 5/16	7/16–18	6 3/16
PVS 2A25	2 1/2"																	
PVS 2X30	3"																	

DIMENSIONS IN INCHES

SECTION A A

MOUNTING PADS FOR ACCESSORIES

ADJUSTABLE LIMIT STOPS

ADJUSTABLE RADIUS

BALL JOINT SNAP CONNECTION

25/64" DIA. HOLE FOR 3/8" DIA. ROD

P, 8 HOLES M DEPTH

INLET

INLET, N.P.T.

OUTLET, N.P.T.

90° ROTATION

ADJUSTABLE PORT CONTROL VALVE

HAUCK MFG.CO.

* PORT HEIGHT ADJUSTING KNOB WITH LOCKING SCREW

** LOCKING SCREW FOR MANUAL SETTINGS

Dimensions for 6,8 & 10 sizes on reverse side.

HAUCK MANUFACTURING CO., P.O. Box 90, Lebanon, PA 17042-0090 717-272-3051
Fax: 717-273-9882

11/90

APV-3

www.morterahauck.com   ventas@morterahauck.com

DIMENSIONS

GY229

DIMENSIONS IN INCHES

VALVE NO.	VALVE SIZE	A	B	C	D	E	F	G	H	J MIN	J MAX	K	L	M	N	O	P	Q	R	S	T	U	NUMBER OF HOLES IN FLANGE
PVS 2A60C PVS 2B60C	6"	10¾	5⅜	9½	8¼	5¼	8⅛	11	½	2⅝	4⅜	1	1⅛	7⅞	7½	15	3	6³⁄₁₆	⅞	¾	45°	½-13	8
PVS 2A80C PVS 2B80C	8"	13½	6¾	11¾	9⅞	7⅜	9⅝	13½	½	2⅝	4⅜	1	1⅛	8³⁄₁₆	8½	17	3	6³⁄₁₆	⅞	¾	45°	½-13	8
PVS 2A100C PVS 2B100C	10"	15⅝	7⅞	14¼	11½	9⅞	11⅜	16	½	2⅝	4⅜	1	1⅛	10⅞	10	20	3	6³⁄₁₆	1	⅞	30°	½-13	12

* PORT HEIGHT ADJUSTING KNOB WITH LOCKING SCREW

** LOCKING SCREW FOR MANUAL SETTINGS

*** 125 LB. AM. STD. FLANGE SIZE

ADJUSTABLE LIMIT STOPS

MOUNTING PAD FOR ACCESSORIES

ADJUSTABLE RADIUS

BALL JOINT SNAP CONNECTION

²⁵⁄₆₄" DIA HOLE FOR ⅜"DIA. ROD

SECTION A-A

INLET

OUTLET

90° ROTATION

ADJUSTABLE PORT CONTROL VALVE

HAUCK

L"R DIA HOLES FOR S"DIA. BOLTS ON INLET & OUTLET FLANGE

PVS ADJUSTABLE PORT VALVES

PORT WIDTH VALVE LEVER POSITION
(HEIGHT ADJUSTING KNOB AT 1/4 POSITION)
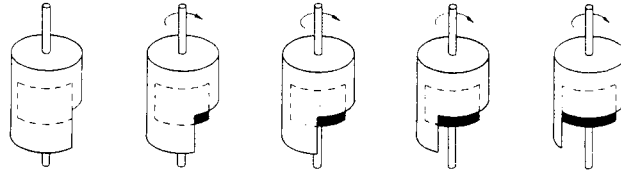
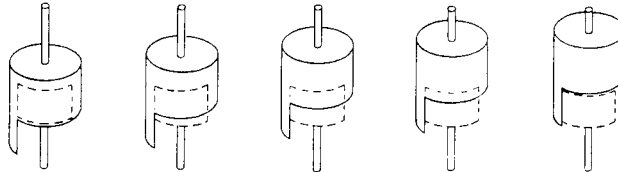| WIDTH POSITIONS	CLOSED	1/4	1/2	3/4	OPEN
DIAL SETTING	0	2.5	5	7.5	10

PORT HEIGHT ADJUSTING KNOB SETTING
(WIDTH LEVER AT POSITION 10)

HEIGHT POSITIONS	CLOSED	1/4	1/2	3/4	OPEN
	0	25%	50%	75%	100%

MANUAL   MULTIPLE VALVES   AUTOMATIC

(OVER)

HAUCK MANUFACTURING CO., P.O. Box 90, Lebanon, PA 17042-0090 717-272-3051
Fax: 717-273-9882

11/90

APV-4

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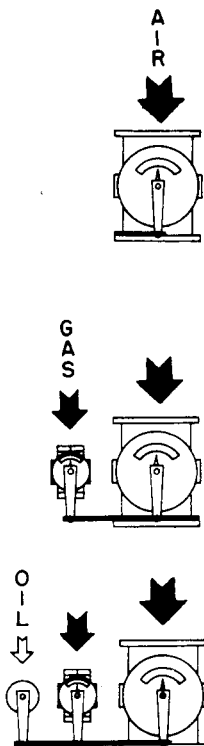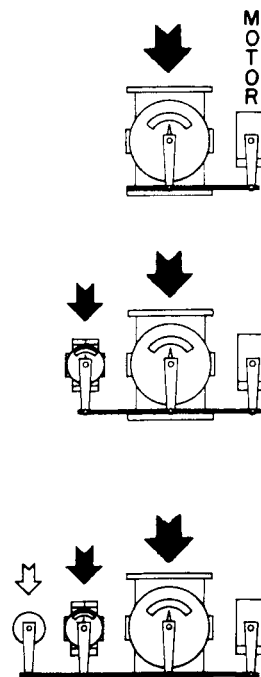
ADJUSTABLE PORT VALVE DIAGRAM

(C)
Adjustable
Radius
Lever

(E)
Port
Adjusting
Knob

(D)
Port
Adjusting
Knob
(Inner)
Set Screw

(B)
Lock Screw
(Manual Settings)

Valve Port

Port
Adjusting
Screw

Bearing Seat
Adjusting
Screw

Ball
Thrust
Bearing

HAUCK
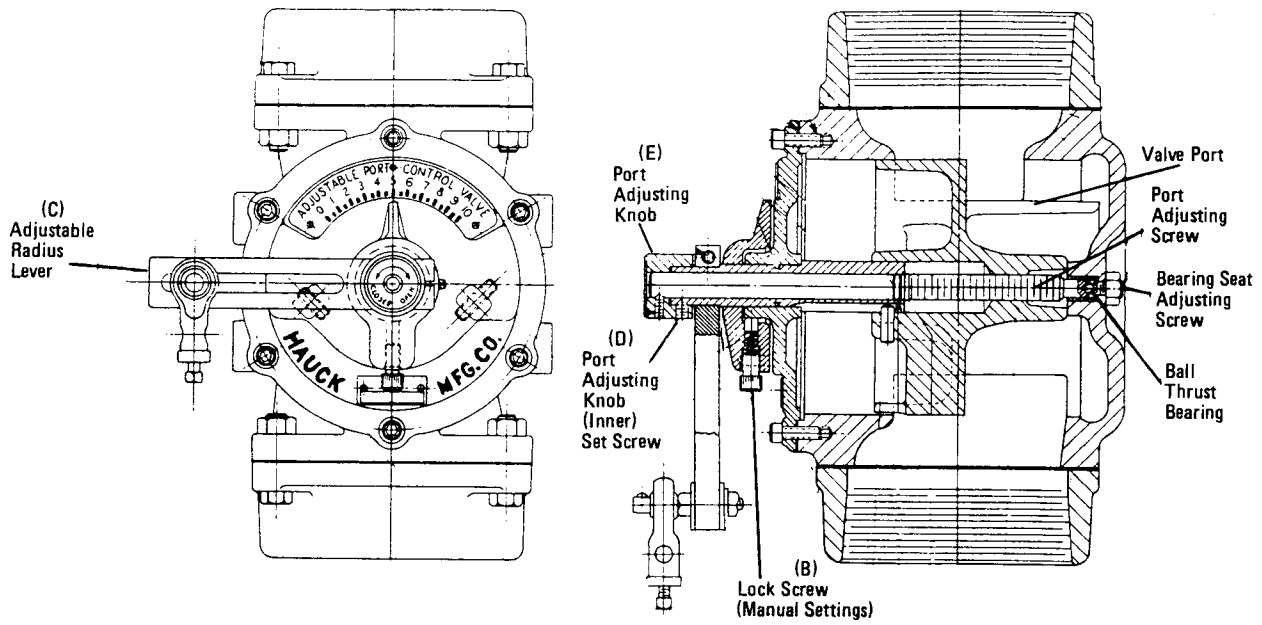
FVA-FVS ADJUSTABLE FLOW VALVES

NATURAL GAS

. STRAIGHT VALVE—GAS

Q135

ANGLE VALVE—GAS

Q136
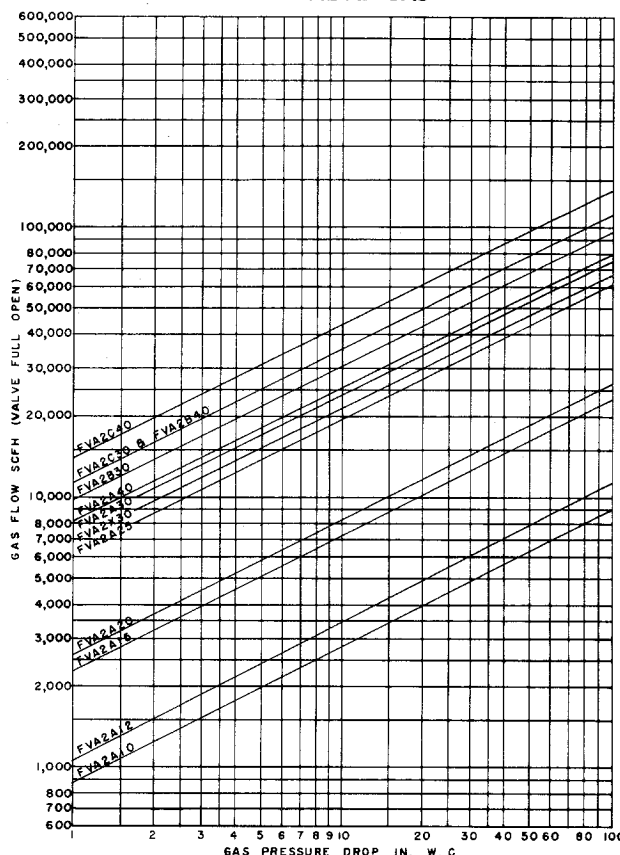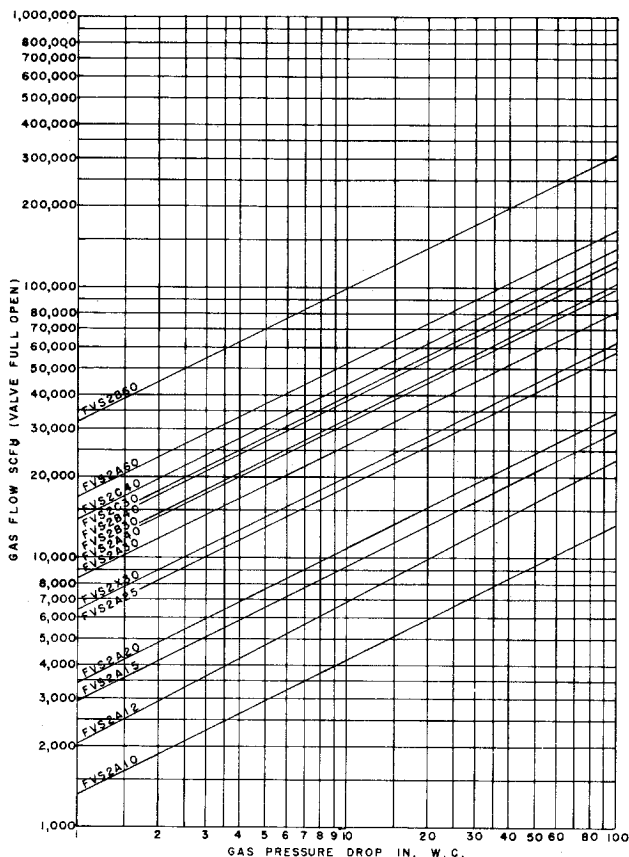
EXPLANATION:

1. Capacities are maximum, pointer on position 10 and valve piston in the full open position.
2. Maximum pressure: 1" to 4" - 15 psig, 6" - 3 psig.
   Maximum temperature: all valves - 250° F.
3. For purposes of correction, capacities are taken from curves Q135 and Q136.
4. For a known valve, flows can be corrected for:
   HIGH PRESSURE - Correction Factor C_1
   GAS TEMPERATURE - Correction Factor C_2
   SPECIFIC GRAVITY - Correction Factor C_3
   According to the equation:
   $Q_{(corrected)} = C_1 \times C_2 \times C_3 \times Q_{(rated)}$

CORRECTION FACTORS

HIGH PRESSURE (Correction Factor C_1)

Pressure Drop (psig)	INLET PRESSURE (PSIG)		
	5	10	15
1	1.15	1.29	1.42
2	1.63	1.80	1.95
3	1.95	2.25	2.40
4	2.20	2.50	2.73
5	2.45	2.75	2.95
10		3.70	4.15
15			4.70

To find flow rate for high pressure air or gas, multiply flow at 16 osig (27.7 in W.C.) by correction factor in the table.

TEMPERATURE (Correction Factor C_2)

Temperature - ° F	68	100	200	250
Multiplier	1.00	1.03	1.12	1.16

SPECIFIC GRAVITY (Correction Factor C_3)

Gas	Coke Oven	Natural Gas			Blast Furnace	Propane	Butane
Specific Gravity	.40	.59	.60	.61	1.02	1.52	2.01
Multiplier	1.224	1.007	1.000	.992	.767	.628	.547

EXAMPLE:

Determine the corrected volumetric flow rate in standard cubic feet per hour for a FVS2A15 (1½") adjustable flow valve for propane gas at 100° F having an inlet pressure of 15 psig and a pressure drop of 5 psi.
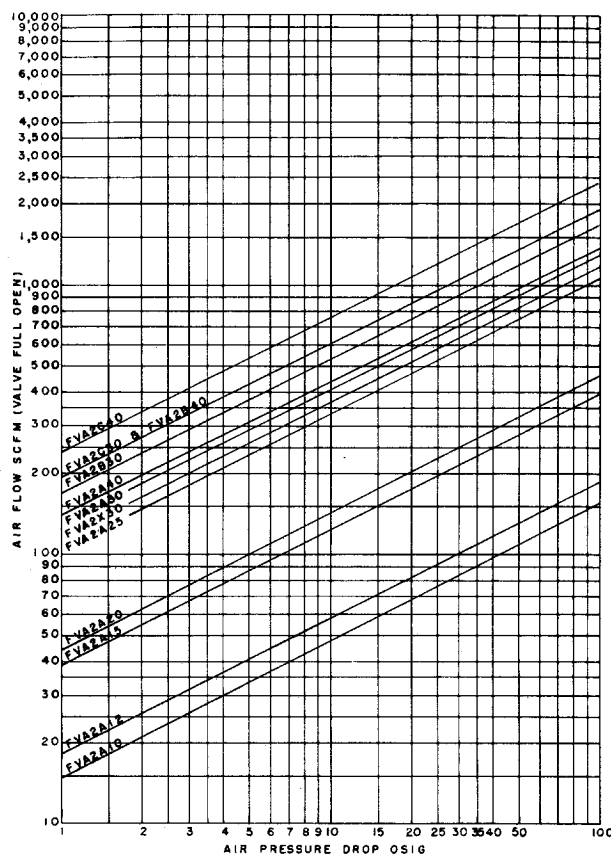
1. From the standard flow curve for Natural Gas (Q135) at 27.7" w.c. rated pressure drop read: $Q_{(rated)}$ = 15,000 scfh.
2. From the High Pressure correction factor chart, determine the capacity correction factor: C_1 = 3.0
3. From the Temperature correction factor chart, determine the capacity correction factor: C_2 = 1.03
4. From the Specific Gravity correction factor chart, determine the factor for Propane: C_3 = 0.628

$Q_{(corrected)}$ = (3.0) x (1.03) x (0.628) x (15,000)
= 29,108 scfh of propane gas

(OVER)

2/91   AFV-2

AIR

STRAIGHT VALVE—AIR

Q138

ANGLE VALVE—AIR

Q139

EXPLANATION:

1. Capacities are maximum, pointer on position 10 and valve piston in the full open position.
2. Maximum pressure: 1'' to 4'' - 15 psig, 6'' - 3 psig.
   Maximum temperature: all valves - 250° F.
3. For purposes of correction, capacities are taken from curves Q138 and Q139.
4. For a known valve, flows can be corrected for:
   HIGH PRESSURE - Correction Factor C_1
   AIR TEMPERATURE - Correction Factor C_2
   According to the equation:
   $$Q(corrected) = C_1 \times C_2 \times Q(rated)$$

CORRECTION FACTORS

HIGH PRESSURE (Correction Factor C_1)

Pressure Drop (psig)	INLET PRESSURE (PSIG)		
	5	10	15
1	1.15	1.29	1.42
2	1.63	1.80	1.95
3	1.95	2.25	2.45
4	2.20	2.50	2.85
5	2.45	2.75	3.00
10		3.70	4.05
15			4.70

To find flow rate for high pressure air or gas, multiply flow at 16 osig (27.7 in. W.C.) by correction factor in the table.
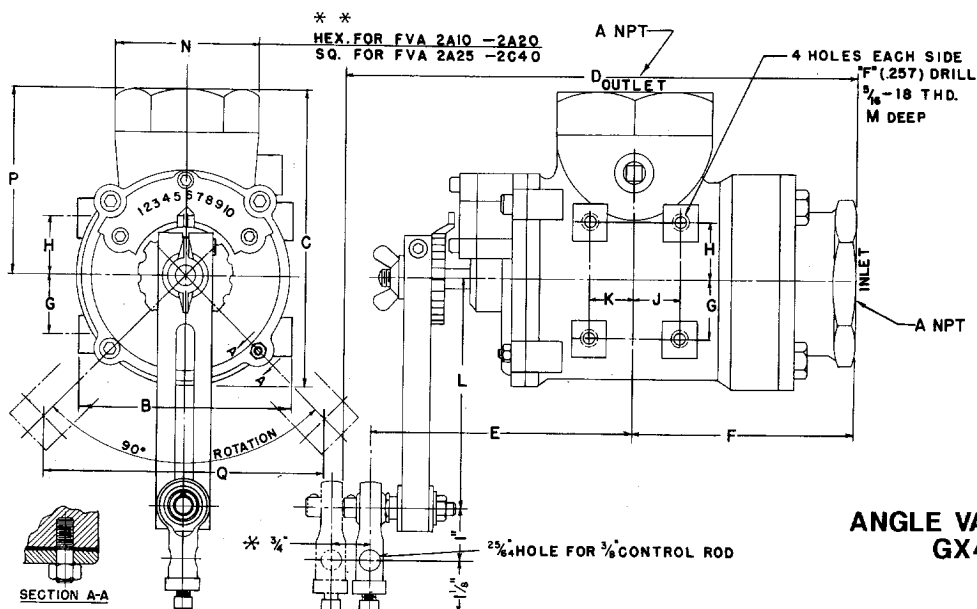
TEMPERATURE (Correction Factor C_2)

Temperature - ° F	68	100	200	250
Multiplier	1.00	1.03	1.12	1.16

EXAMPLE:

Determine the corrected volumetric flow rate in standard cubic feet per hour for a FVS2A15 (1½'') adjustable flow valve for air at 100° F having an inlet pressure of 15 psig and a pressure drop of 5 psi.

1. From the standard flow curve for Air (Q138) at 16 oz. rated pressure drop read: Q(rated) = 12,000 scfh.
2. From the High Pressure correction factor chart, determine the capacity correction factor: $C_1 = 3.0$
3. From the Temperature correction factor chart, determine the capacity correction factor: $C_2 = 1.03$

   $$Q(corrected) = (3.0) \times (1.03) \times (12,000)$$
   $$= 37,080 \text{ scfh of air}$$

SELECTION TABLE

VALVE SIZE	PORT SIZE	STRAIGHT MODEL NO.	ANGLE MODEL NO.
1"	A	FVS2A10D	FVA2A10B
1¼"	A	FVS2A12D	FVA2A12B
1½"	A	FVS2A15D	FVA2A15B
2"	A	FVS2A20D	FVA2A20B
2½"	A	FVS2A25F	FVA2A25A
3"	X	FVS2X30F	FVA2X30A
3"	A	FVS2A30F	FVA2A30B
3"	B	FVS2B30F	FVA2B30B
3"	C	FVS2C30F	FVA2C30B
4"	A	FVS2A40F	FVA2A40B
4"	B	FVS2B40F	FVA2B40B
4"	C	FVS2C40F	FVA2C40B
6"	A	FVS2A60F	—
6"	B	FVS2B60F	—

FVA-FVS ADJUSTABLE FLOW VALVES

ANGLE VALVES (1-4")
GX428

VALVE MODEL NO.	A NPT	DIMENSIONS — INCHES										L		M	N	P	Q
		B	C	D	E	F	G	H	J	K	MIN	MAX	M	N	P	Q
FVA 2A10 -2A12	1 or 1¼	4 ⅛	5	7 ¹⁵/₁₆	4 ¹¹/₃₂	3 ¹/₃₂	1 ⅛	1 ⅛	1	1	1 ⅛	4 ⅜	⁵/₁₆	2 ⅝	3	6 ³/₁₆
FVA 2A15 -2A20	1½ or 2	4 ⅛	5 ²³/₃₂	9 ¹⁵/₁₆	5 ¹/₃₂	4 ⁹/₃₂	1 ⅛	1 ⅛	⅞	1 ⅛	1 ⅛	4 ⅜	⁷/₁₆	3 ½	3 ⅝	6 ³/₁₆
FVA 2A25 -2X30	2½ or 3	5	6 ³/₃₂	10²⁹/₃₂	5 ⁹/₁₆	4 ²⁵/₃₂	1 ⅛	1 ⅛	1	1	1 ⅛	4 ⅜	⁹/₁₆	4 ⅞	4 ½	6 ³/₁₆
FVA 2A30 -2C40	3 or 4	6 ¼	8 ¹¹/₁₆	12 ⅚	6 ³/₃₂	5 ²⁹/₃₂	1 ⅛	1 ⅛	1	1	1 ⅛	4 ⅜	½	5 ½	5 ⁷/₁₆	6 ³/₁₆

NOTE: 1. TORQUE REQUIREMENT, 20 IN-LB
* WHEN ORDERING SPECIFY DOUBLE BALL SNAP IF DESIRED
** FVA 2A10-2A20 HAVE ONE PIECE CAST BODYS
FVA 2A25-2C40 HAVE REMOVABLE COMPANION FLANGES
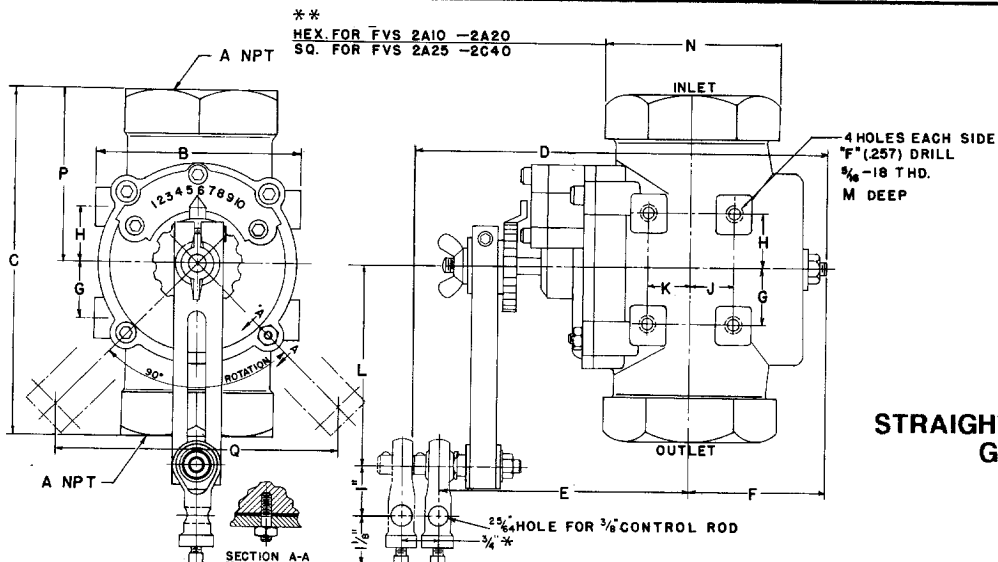
STRAIGHT VALVES (1-4")
GX427

VALVE MODEL NO.	A NPT	DIMENSIONS — INCHES										L		M	N	P	Q
		B	C	D	E	F	G	H	J	K	MIN	MAX	M	N	P	Q
FVS 2A10 -2A12	1 or 1¼	4 ⅛	6 ⅜	8 ⅛	4 ¹¹/₁₆	2 ⅞	1 ⅛	1 ⅛		⅞	1 ⅛	4 ⅜	⁵/₁₆	2 ⅝	3 ³/₁₆	6 ³/₁₆
FVS 2A15 -2A20	1½ or 2	4 ⅛	7 ¼	8 ⅛	4 ⅞	2 ¹/₁₆	1 ⅛	1 ⅛		⅞	1 ⅛	4 ⅜	⁷/₁₆	3 ½	3 ⅝	6 ³/₁₆
FVS 2A25 -2X30	2½ or 3	5	9 ¹/₁₆	9 ¹/₁₆	5 ⁹/₁₆	2 ¹⁵/₁₆	1 ⅛	1 ⅛		1	1 ⅛	4 ⅜	½	4 ⅞	4 ½	6 ³/₁₆
FVS 2A30 -2C40	3 or 4	6 ¼	11	9 ¹⁵/₁₆	6	3 ⅜	1 ⅛	1 ⅛		1	1 ⅛	4 ⅜	½	5 ½	5 ½	6 ³/₁₆

NOTE:
1. TORQUE REQUIREMENT, 20 IN-LB
2. FOR 6" VALVE, WRITE FOR PRINT OF DRAWING GY226F
* WHEN ORDERING SPECIFY DOUBLE BALL SNAP IF DESIRED

** FVS 2A10 -2A20 HAVE ONE PIECE CAST BODYS
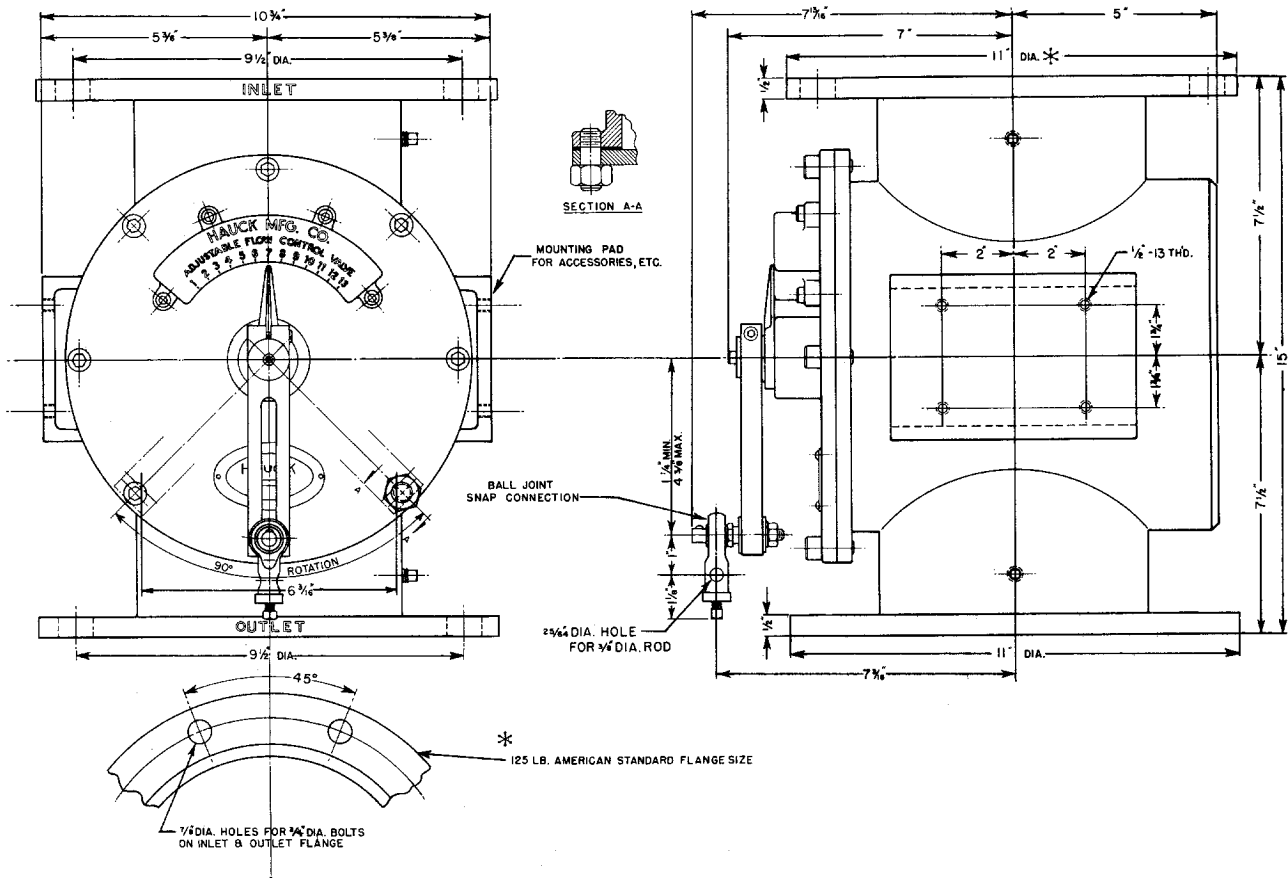FVS 2A25 -2C40 HAVE REMOVABLE COMPANION FLANGES

(OVER)

www.morterahauck.com   ventas@morterahauck.com

STRAIGHT VALVES (6")
GY226

INLET

HAUCK MFG. CO.
ADJUSTABLE FLOW CONTROL VALVE
1 2 3 4 5 6 7 8 9 10 11 12 13

HAUCK

90°   ROTATION

6 3/16"

OUTLET

9 1/2" DIA.

45°

7/8" DIA. HOLES FOR 3/4" DIA. BOLTS
ON INLET & OUTLET FLANGE

SECTION A-A

MOUNTING PAD
FOR ACCESSORIES, ETC.

BALL JOINT
SNAP CONNECTION

2 3/64" DIA. HOLE
FOR 3/8" DIA. ROD

*

125 LB. AMERICAN STANDARD FLANGE SIZE

1/2" -13 THD.

FVA-FVS ADJUSTABLE FLOW VALVES

CONTROL

When adjusting screws are LEVEL the flow curve without any back pressure on the valve is a straight line, as shown. When valves are installed in a combustion system, as the burner flow rate increases the back pressure in th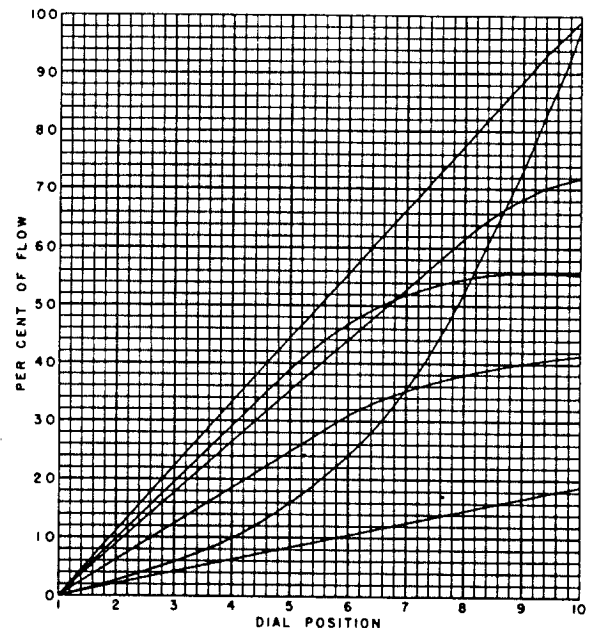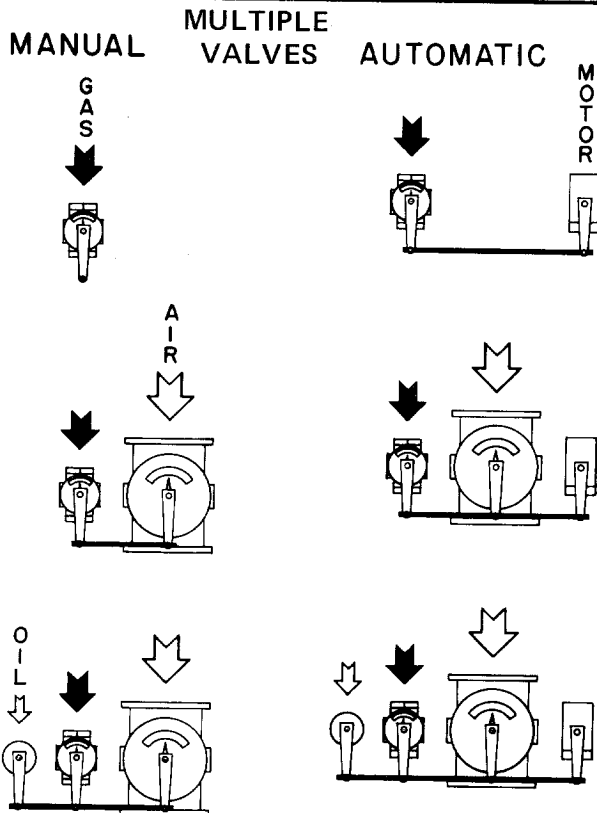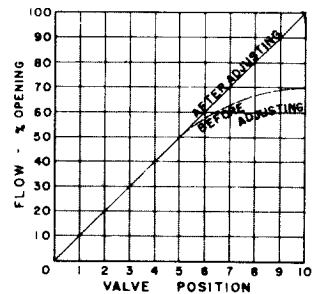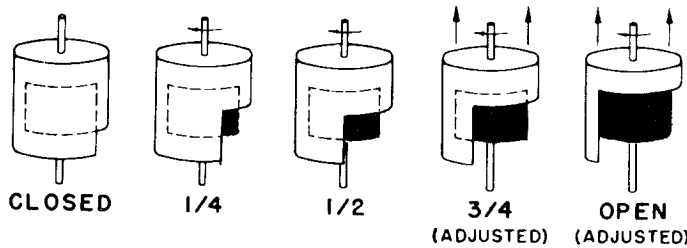e downstream side of the valve increases causing the flow through the valve to "fall off" from a straight line curve, as shown.

By turning the adjusting screws in, flow can be increased separately at each of ten valve positions to produce a straight line flow curve for the combustion system.

LEVEL SCREWS

CLOSED   1/4   1/2   3/4   OPEN
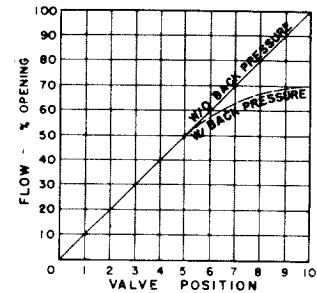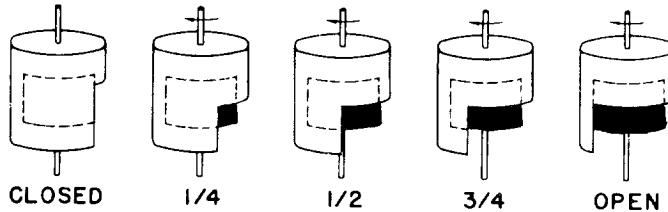
VALVE ADJUSTED TO REMOVE "FALL OFF"

CLOSED   1/4   1/2   3/4 (ADJUSTED)   OPEN (ADJUSTED)

MANUAL   MULTIPLE VALVES   AUTOMATIC

GAS

AIR

OIL

MOTOR

Several typical flow curves which are obtainable with the Hauck Adjustable Flow Valve.
Valve flow curve can be characterized to match the flow curves of valves with which it is used.