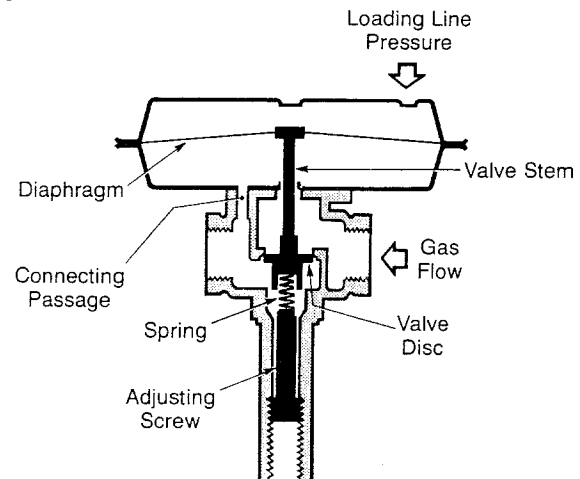
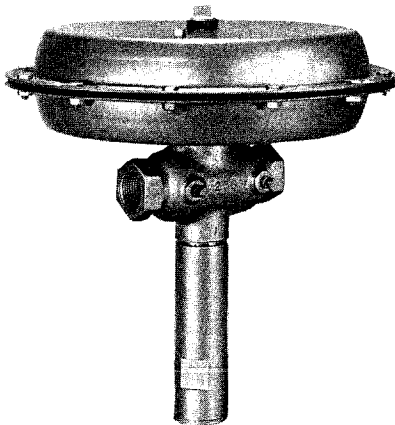


# ECLIPSE ADJUSTABLE BIAS PROPORTIONATOR VALVES

## SERIES "ABP"



Eclipse Adjustable Bias Proportionators (ABP) are designed to vary burner gas flow in proportion to changes in combustion air flow. As shown in the graph below, the ABP can be adjusted to hold a constant air/gas ratio during turndown, or to shift the air/gas ratio toward excess air or excess gas operation. Combustion systems that include an ABP can be easily adjusted for optimum burner performance at all firing rates.

### OPERATION

ABP's are normally installed in the main gas line to one or more burners. The top chamber of the ABP is connected through a loading line to the combustion air manifold downstream of the

main air control valve. Referring to the above illustration, the ABP valve stem moves downward to increase gas flow, upward to decrease gas flow. Valve stem weight, loading line pressure on the diaphragm, and gas inlet pressure on the valve disc all tend to open the valve. These forces are opposed by spring pressure and by gas outlet pressure applied to the diaphragm through the connecting passage.

At high fire, the valve will be almost fully open. As combustion air flow is reduced, loading line pressure drops and the valve begins to close. If the spring pressure exactly balances valve stem weight and inlet pressure, the valve will maintain the high fire air/gas ratio during turndown. If, however, the adjusting screw has been turned clockwise to increase spring pressure, the air/gas ratio will become increasingly lean as loading line pressure drops. Turning the screw counterclockwise from the balanced point will decrease spring pressure, producing fuel rich turndown.

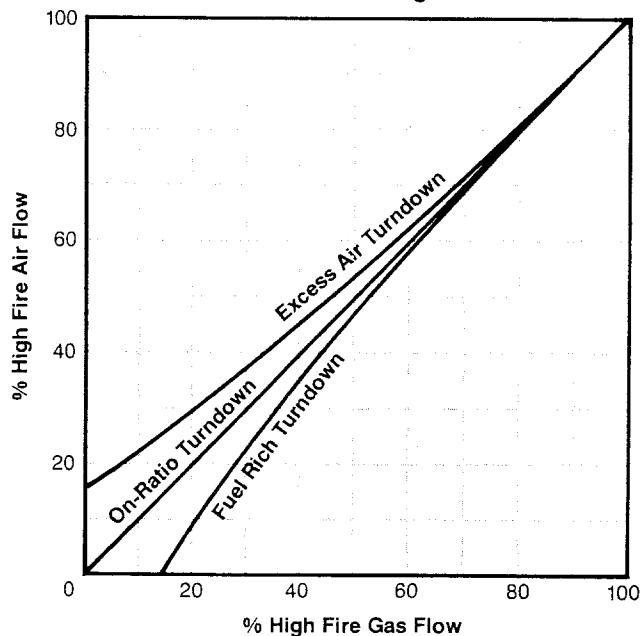
During system start-up, before gas pressure is applied to the inlet, the ABP is closed. When the safety shut-off valves open upstream of the ABP, the valve gradually opens to the low fire position, initially providing a very lean mixture. This action prevents the fuel surge common to conventional proportionator valves which are fully open at system start-up.

The ABP is intended for use as a control valve only and must not be used as a tight shut-off valve.

### ADVANTAGES

- • • Improves combustion system efficiency
- • • Adapts to a wide range of air/gas requirements
- • • Rugged, lightweight construction
- • • Easy installation
- • • Accurate control over 30:1 gas turndown from rated flow with 4" w.c. pressure drop through the valve

**TYPICAL BIASING CURVES**  
From On-Ratio High Fire

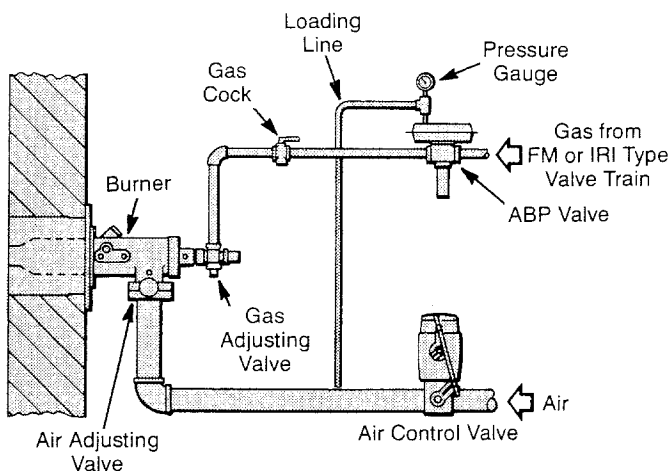


**ECLIPSE COMBUSTION**

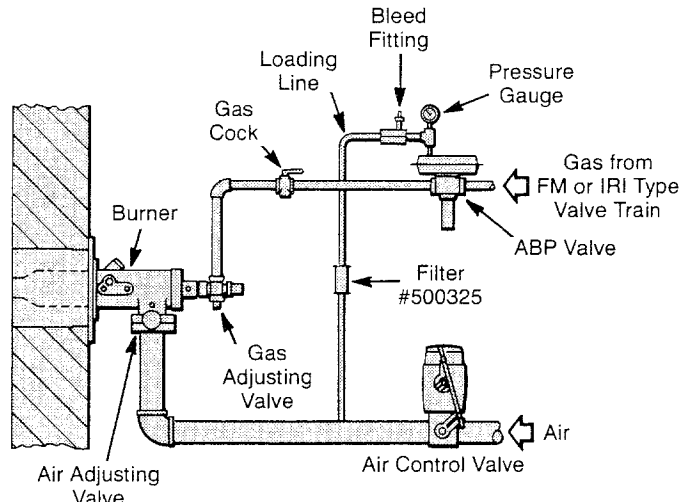
# TYPICAL APPLICATIONS

## SYSTEM 1—Less Bleed Fitting

## SYSTEM 2—With Bleed Fitting



Gas pressure available at ABP outlet is greater than loading line pressure.



Gas pressure available at ABP outlet is less than loading line pressure.

## SPECIFICATIONS

- Maximum Gas Inlet Pressure: 2.5 psi
- Maximum Differential Pressure Between Loading Line & Gas Inlet: 2.0 psi
- Materials
  - Bowls: Stamped Steel
  - Body: Cast Iron
  - Disc: Brass with Buna-N rubber seat
  - Diaphragm: Fairprene
- Compatible Gases
  - Air, Natural Gas, Propane Vapor, Butane Vapor. Contact factory for other gases.

Maximum Ambient Temperature: 140°F.

### Mounting Position

Adjusting stem must point straight down; leave room beneath stem for bias adjustment.

### Sizes

- Valve with threaded body: 1", 1½", & 2" N.P.T.
- Valve with threaded companion flanges: 3" N.P.T.

## VALVE SELECTION

System 1 above illustrates the most common arrangement of control systems using the ABP. During system operation, ABP gas outlet pressure will be approximately equal to loading line air pressure. Before sizing and selecting an ABP valve, determine the high fire gas pressure required at the burner inlet. Add to this

the estimated high fire piping and valve pressure losses between the ABP and the burner. The total represents the high fire gas outlet pressure required from the ABP and also the high fire loading line pressure.

Minimum gas pressure needed at the ABP inlet equals the high fire loading pressure plus the pressure drop through the ABP body. For good system control, the drop through the ABP body should never be less than 2" w.c. or greater than 56" w.c. (2 psi). Calculate the ABP pressure drop for your system by subtracting the required high fire loading line pressure from the actual inlet gas pressure. If this pressure drop is greater than 56" w.c., the gas inlet pressure will need to be decreased. If, however, this drop is less than 2" w.c., gas inlet pressure will need to be increased, or a bleed fitting used to reduce the loading line pressure as shown in System 2 above. By adjusting the bleed fitting orifice during burner set-up, high fire loading line air pressure may be reduced to provide an acceptable gas pressure drop through the valve body. Any change in bleed fitting adjustment after the system is set up will require re-adjustment of the ABP bias setting. Eclipse recommends that bleed fittings be used only if absolutely necessary. **Because dust and grit in the combustion air can foul bleed fitting orifices, Eclipse strongly recommends the use of a loading line air filter on systems using bleed fittings.**

Once an acceptable pressure drop has been determined, find the column in the Capacity Table below corresponding to this drop and read down to the gas capacity nearest to but higher than the flow required at high fire. Select the corresponding valve.

## CAPACITIES—SCFH \*

Catalog Number	Pipe Size	ABP Gas Inlet Pressure Minus Loading Line Pressure							
		Minimum 2" W.C.	4" W.C.	6" W.C.	8" W.C.	14" W.C. (0.5 psi)	28" W.C. (1.0 psi)	42" W.C. (1.5 psi)	Maximum 56" W.C. (2.0 psi)
104 ABP	1"	650	920	1130	1300	1720	2430	2980	3440
106 ABP	1-1/2"	2190	3100	3800	4380	5800	8200	10000	11600
108 ABP	2"	3890	5500	6740	7780	10300	14600	17800	20600
112 ABP	3"	7850	11100	13600	15700	20800	29400	36000	41500

\*Capacities listed are for natural gas at .65 sp. gr. For other gases, multiply capacities by these factors: Butane, .548; propane, .628; air, .775.

## SPRING SELECTION

104 and 106 ABP's are furnished with two adjusting springs. A red spring is installed at the factory and is suitable for most applications. Under certain conditions, however, the alternate yellow spring will give the valve better low fire flow characteristics. Refer to the Spring Selection Graph below to determine which spring will be required for individual applications.

108 and 112 ABP's are furnished with a single adjusting spring which gives the required biasing characteristics under all normal operating conditions.

## LEAKAGE RATES

By design, ABP's permit a small amount of leakage even with the valve closed. If the ABP has been properly sized, it will have at least 80 to 1 flow turndown, so system control shouldn't be adversely affected. However, if the furnace or oven must operate at gas flows below the leakage rate, temperature overshooting will occur. Before selecting an ABP, check the leakage table below. Control regulators such as the ABP are not intended to be tight

shutoff valves. Use approved safety shutoff valves and gas cocks for that purpose.

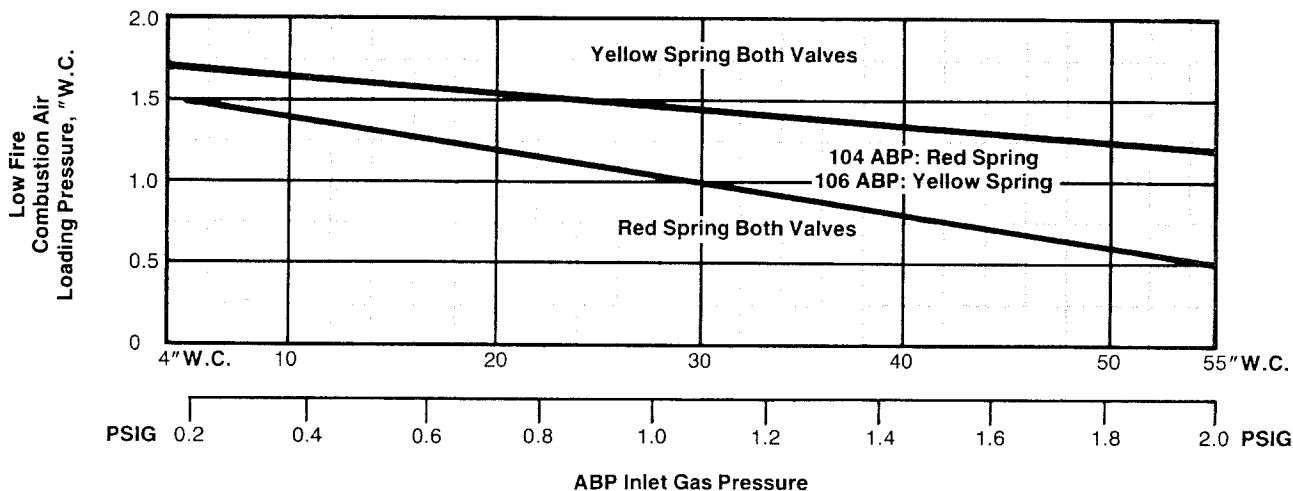
## SPECIAL SYSTEMS

Systems which use a high pressure air purge before burner start-up may exceed the 2 psig differential pressure limit between the loading line and gas inlet pressures. A solenoid valve installed in the loading line of such systems can be used to prevent ABP damage. The solenoid valve closes before the purge to isolate the ABP from the high loading line pressure, then opens afterward to allow normal system control.

Some systems require an ABP outlet pressure of 2 psig or higher to achieve rated burner capacity. As the system approaches low fire, loading line pressure may drop more than 2 psig below ABP inlet pressure. This situation may be avoided by installing a regulator valve upstream of the ABP and connecting the regulator's top diaphragm chamber to the air loading line. See Eclipse Information Guide M-405 for details.

## 104 & 106 ABP SPRING SELECTION

- DIRECTIONS:**
1. Locate low fire combustion air loading pressure on vertical axis.
  2. Move right to intersection with ABP inlet gas pressure.
  3. Choose spring according to the area of the graph in which the intersection falls: Upper portion, yellow spring for both valves; Middle section, red spring for 104 ABP, yellow spring for 106 ABP; Lower section, red spring for both valves.



## LEAKAGE RATES—SCFH\*

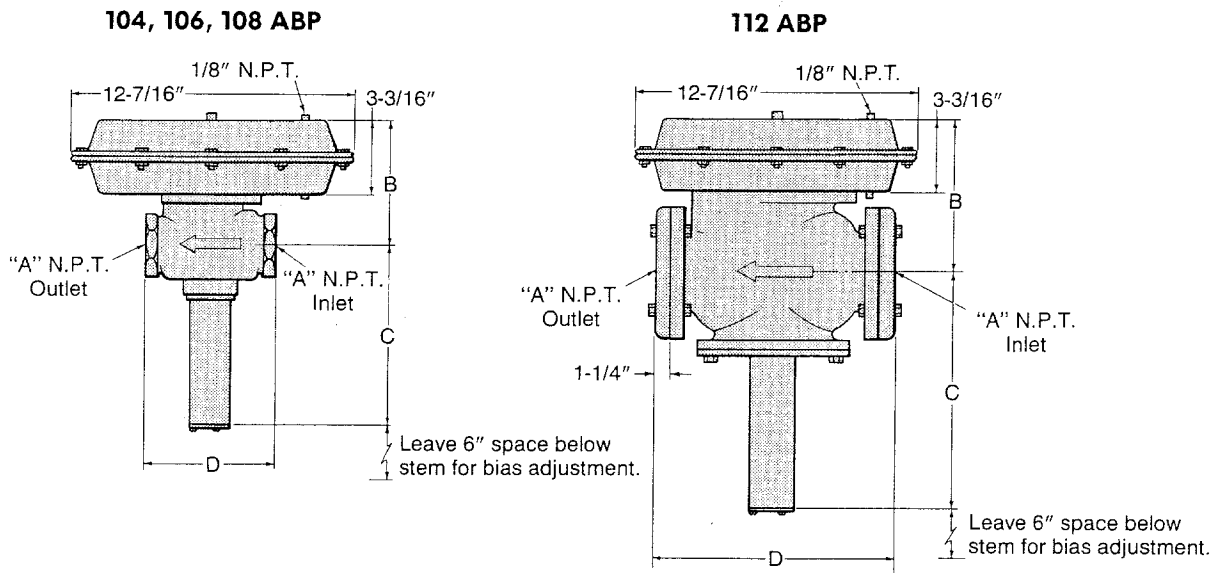
With Valve Closed

Catalog Number	ABP Gas Inlet Pressure Minus Loading Line Pressure				
	8" W.C.	14" W.C. (0.5 psi)	28" W.C. (1.0 psi)	42" W.C. (1.5 psi)	55" W.C. (2.0 psi)
104 ABP	16	21	30	37	42
106 ABP	32	42	60	74	85
108 ABP	54	71	100	123	141
112 ABP	67	88	125	153	177

\*Capacities listed are for natural gas at .65 sp. gr. For other gases, multiply capacities by these factors: Butane, .548; propane, .628; air, .775.

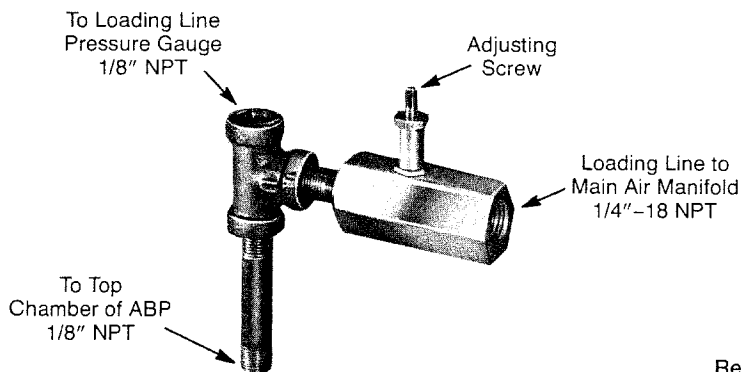
Do not use on ABP if minimum flow required under any condition is less than the leakage rate listed.

## DIMENSIONS

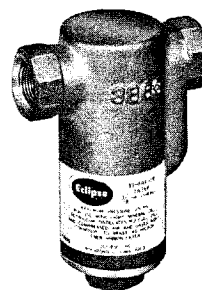


Catalog Number	Assembly Number	Dimensions in Inches				Shipping Wt.-Lbs.
		A	B	C	D	
104 ABP	500625	1	5-1/16	7-9/16	5-1/2	20
106 ABP	500626	1-1/2	5-1/2	8	5-3/4	23
108 ABP	500627	2	6-7/16	8-1/2	9	32
112 ABP	500628	3	6-3/4	10-5/8	11-9/16	40

### BLEED FITTING Assembly No. 300674



### LOADING LINE AIR FILTER 1/4", 3/8", 1/2"



Removable washable element filters down to 40 microns. See Eclipse Bulletin P-75 for details.



**ECLIPSE COMBUSTION**