

# Eclipse

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## Ratio Regulator

ES Series  
Version 1



The ES-Series ratio regulators are used in applications where gas to air proportional flow is required. The gas flow is controlled as a function of the air pressure through a loading line which connects into the top of the regulator. As the system air pressure increases, it forces the ratio regulator valve to open causing the outlet pressure to increase until the two pressures balance. As the load line pressure increases, the ratio of the outlet pressure to the load line pressure will be slightly less than 1:1.

The ratio regulators have a bias adjustment for varying the gas flow when setting the burner at low fire. It can be used to increase or decrease the gas flow resulting in gas rich or lean combustion. The adjustment is restricted in the gas rich direction, therefore, limiting the gas flow at zero air pressure. Ratio Regulators are control valves only and cannot be used as gas shut-off valves.

The ratio regulators are designed to optimize performance as ambient temperature and inlet pressure vary. Features include:

- UL recognized and CE approved for natural gas, propane, and butane.
- Valve seat design for consistent low fire repeatability.
- Balanced double diaphragm design allows regulator to operate over a wide range of inlet pressures while minimally affecting outlet pressure.
- Rugged die cast aluminum housing.
- Corrosion resistant internal components.
- Synthetic rubber diaphragms for excellent low temperature performance.
- Inlet pressure tap with connector (1-1/2", 2" & 3" NPT (Rp) models only).
- High turndown option available.

## Compatibility/Temperature Specifications

Compatible Gases	Ambient Temperature Range
Natural Manufactured Mixed Vaporized Liquefied Petroleum LP Gas-Air Mixture	-40°F to 205°F (-40°C to 96.1°C)



## CAUTION

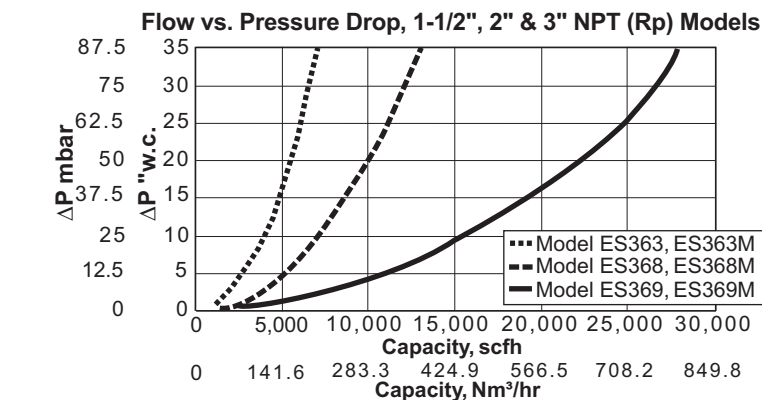
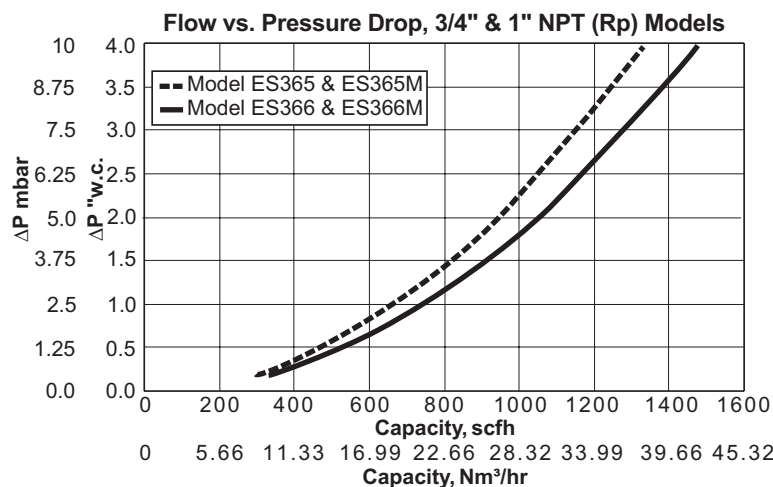
- Below 32°F (0°C), the gas must be free of water vapor which could condense and freeze within the valve.

## Model Specifications

Model	Part Number	Pipe Thread	Maximum Inlet Pressure <sup>1</sup>	Capacity <sup>2</sup>
ES365	19997	3/4" NPT	1.0 psi	1,245 scfh
ES365M	19998	Rp 3/4	69.2 mbar	35.27 Nm <sup>3</sup> /hr
ES366	15939	1" NPT	1.0 psi	1,380 scfh
ES366M	19999	Rp 1	69.2 mbar	39.09 Nm <sup>3</sup> /hr
ES363	20312	1-1/2" NPT	5.0 psi	6,350 scfh
ES363M	20311	Rp 1-1/2	346.2 mbar	179.9 Nm <sup>3</sup> /hr
ES368	10315	2" NPT	5.0 psi	11,600 scfh
ES368M	19990	Rp 2	346.2 mbar	328.6 Nm <sup>3</sup> /hr
ES369	10316	3" NPT	5.0 psi	26,000 scfh
ES369M	19989	Rp 3	346.2 mbar	736.5 Nm <sup>3</sup> /hr

<sup>1</sup> Gas inlet pressure must be greater than the total of the outlet pressure plus the pressure drop across the regulator at the required flow.

<sup>2</sup> Capacity for natural gas (0.60 s.g.). When using propane or butane, divide capacity by conversion factors listed below.



## Conversion Factors

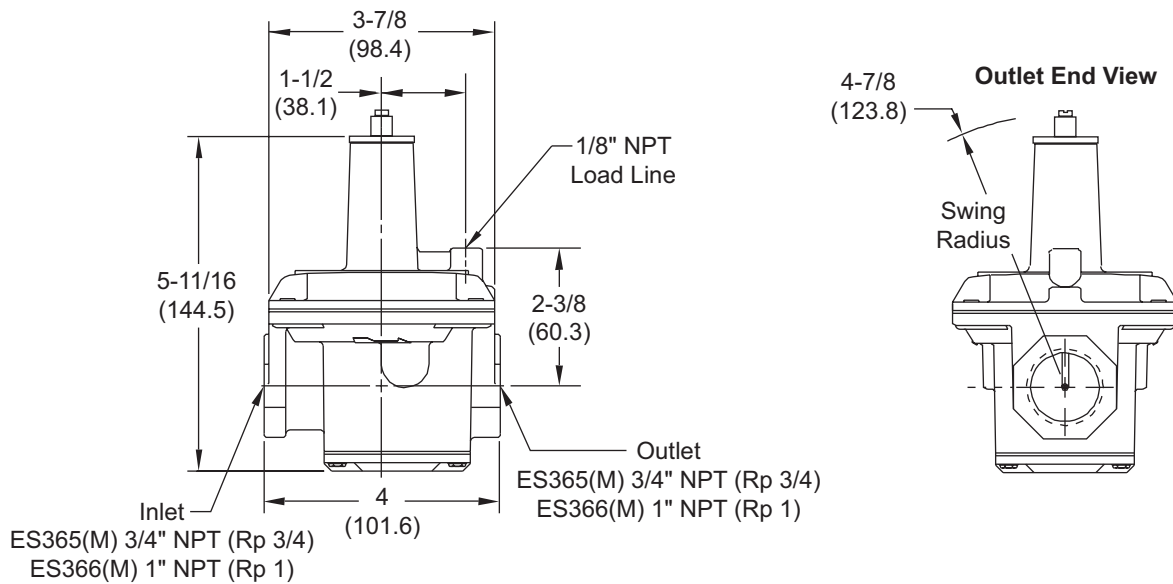
Gas	Conversion Factor
Propane (1.5 s.g.)	1.58
Butane (2.0 s.g.)	1.82

**Example:** Find the pressure drop created by 15,000 scfh of propane through an ES369 ratio regulator.

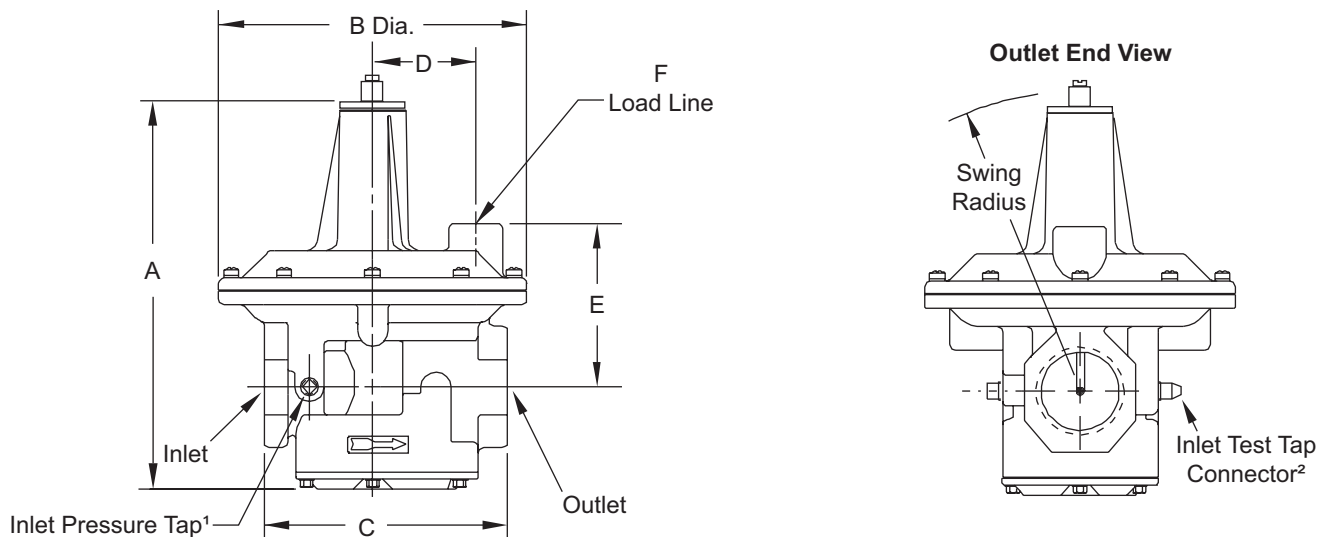
- Convert propane to the equivalent natural gas flow: 15,000 x 1.58 = 23,700 scfh.
- Plot the point where 23,700 scfh crosses the ES369 curve on the graph.
- Translate the intersection point back to the pressure drop axis.
- The pressure drop at 23,700 scfh natural gas, equivalent to 15,000 scfh propane, is approximately 23.5" w.c.

**NOTE:** These graphs are for natural gas (0.60 s.g.). For propane or butane, multiply the gas flow by the factor listed below to calculate the equivalent natural gas flow, then find the pressure drop from the above graphs.

## Dimensions in Inches (mm), Models ES365 (M) & ES366 (M)



## Dimensions in Inches (mm), Models ES363(M), ES368(M) & ES369(M)



<sup>1</sup> 1/4" taper pipe plug on ES363(M) and ES368(M). No tap this side on ES369(M).

<sup>2</sup> 1/8" taper test tap connector, 0.34" OD (8.6 mm) for slip-on hose.

Model	Swing Radius	Inlet/Outlet	A	B	C	D	E	F
ES363	6-3/16"	1-1/2" NPT	9"	7"	5-1/2"	2-3/8"	3-3/4"	1/2" NPT
ES363M	157.1 mm	Rp 1-1/2	228.6 mm	177.8 mm	139.7 mm	60.3 mm	92.2 mm	Rp 1/2
ES368	9-3/16"	2" NPT	11-1/4"	9-1/8"	7-5/8"	3-1/8"	4-5/16"	3/4" NPT
ES368M	233.4 mm	Rp 2	285.7 mm	231.7 mm	193.6 mm	79.3 mm	109.5 mm	Rp 3/4
ES369	13-1/4"	3" NPT	16-1/16"	13-7/16"	10-3/8"	4-7/8"	6-1/8"	3/4" NPT
ES369M	336.6 mm	Rp 3	407.9 mm	341.3 mm	263.5 mm	123.8 mm	155.5 mm	Rp 3/4

## **Model Selection**

Select a combustion system ratio regulator based on the following considerations:

1. Ratio regulator selection based on flow:

- Define the maximum gas flow required for the system.
- Identify the ratio regulator for that flow based on the capacities listed in Model Specifications Chart on page 2.

2. Minimum inlet pressure calculation:

- Define the pressure drop through the ratio regulator based on the Flow vs. Pressure Drop curves and conversion factors listed in the Specifications section.
- Calculate the pressure losses through components mounted between the ratio regulator and the burner.
- Define the as pressure required at the burner.
- Calculate the minimum inlet pressure to ratio regulator by taking 125% of the sum between the ratio regulator drop, component drops and burner pressure.
- Verify that the inlet pressure is within the ratio regulator limit. If not, make the necessary changes to the ratio regulator or the upstream pressure control.

**Contact your Eclipse representative, or the factory for help in selecting the proper ratio regulator for your application.**



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