3065 Aspirator Mixers are used to create a uniform air / fuel mixture to feed premix burner nozzles. Energy from blower air passing through the 3065 venturi creates suction, which entrains a proportional flow of gas at atmospheric (zero gauge) pressure. Multiple premix burner nozzles fed by a 3065 can be controlled by a single manual or motorized air valve.

Proper air/fuel ratio is initially set by adjusting the integral V-port* valve built into the mixer. The ratio is maintained from high fire to low by an “atmospheric regulator” (zero governor) or by cross connecting the regulator (e.g., North American’s 7218).

For additional information see the following sheets:
— Sheet 3065-1 : Sizing Data
— Sheet 3065-2 dims-pl : Dimensions and Parts List
— Sheet 4600-1 : Series 4651, 4659, and 4682 Burner Nozzles

For coke oven, manufactured, and other gases corrosive to brass, specify 3065- K Mixer with iron/steel parts in place of brass.

3065 Aspirator Air/Gas Mixer Features

— Mixes air with any fuel gas from 500 to 3,200 Btu/ft³
— Over 200 size combinations to fit most applications
— 3/4” to 8” air inlet & premix outlet
— Efficient design with low pressure loss
— Suitable for single or multiple small premix nozzles
— Rugged cast iron construction* for long life
— Compact construction for easy installation
— Mount in any position
— Interchangeable displacement rods for optimum mixture pressure and suction ratio.
— Rods can be changed without breaking air or gas piping
— Built in gas adjustment valve cartridge*
— Gas adjustment cartridge & gas inlet are interchangeable*

Rated Air Flow of each 3065 without rod (scfh)

<table>
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<th>Mixer P. (&quot;wc&quot;)</th>
<th>4</th>
<th>8</th>
<th>12</th>
<th>16</th>
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<td>6</td>
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Figure 1. Typical arrangement of 3065 Aspirator Mixer with burner, atmospheric regulator, and air valve.

Figure 2. Cut-a-way view of 3065 Aspirator Mixer

*3065-9 Mixers have fabricated steel construction and a separate 1127-7-F limiting orifice butterfly valve in the gas line upstream of the mixer.
ASPIRATOR MIXER PRINCIPLES

Aspirator mixers use the venturi effect to pull fuel into an air stream. This also creates shear between the flows that efficiently mixes them together to make uniform premix.

3065 mixers have built in pressure tap locations to measure the air pressure as it enters the mixer and the mixture pressure as it exits the mixer. For air / natural gas systems, the customary rule is “the air pressure in osi should be 2X the numerical value of the mixer pressure in inches water column” or 3.5 to 1 (1 osi = 1.73 “wc”). So if the desired mixture pressure is 4” w.c. the air pressure should be 8 osi (14” w.c.). This ratio helps ensure there is enough energy in the air to pull the correct amount of fuel into the mixer. (For coke oven gas and manufactured gas the ratio is 4 to 1) inches air pressure to inches mixture pressure.

The differential pressure is the difference between air pressure and the mixture pressure (dp = ap - mp). By using the 3.5:1 ratio above, the differential pressure is 71% of the air pressure (66% is normally the minimum recommended). Knowing the differential pressure across the mixer also helps in estimating the air flow through the mixer during operation.

A definite relationship should also be maintained between mixer air orifice area and burner exit port area (about a 2.5:1 ratio for natural gas: and 2.9:1 for coke oven gas and manufactured gas). To conform to field conditions or to get lower or higher mixture pressures (with more or less suction, respectively), 3065 mixers have interchangeable displacement rods that permit changing the mixer air orifice size. Rods can be changed without breaking the piping. The rod diameter in 32nds of an inch is stamped on the rod nut.

A zero governor (atmospheric regulator) is a ratio regulator that depends on suction from an aspirator mixer to control air / fuel ratio. It is the classic way of controlling fuel air ratio in premix combustion system as it does not require high gas pressure supply. This is very important when gas delivery systems have limited supply pressures.

Zero governors work by maintaining atmospheric pressure (zero pressure) at the regulator outlet. Increasing air flow through a mixer’s venturi increases suction on the gas line. To maintain its “zero” outlet pressure, the regulator opens its’ gas valve to increase the amount of gas flowing to the mixer. When the air flow is reduced, the suction is decreased and the regulator valve closes to maintain the zero pressure.

If the air pressure drop across the mixer is less than 66% of the air supply pressure, there may not be enough suction generated by the mixer to use a true zero governor. In this case cross-con-nect the regulator to the mixture pressure tap (or air pressure tap) with an impulse line. When a zero governor is cross-connected, the gas pressure at the zero governor (regulator) inlet must be equal to impulse line pressure plus pressure drop across the governor.

Cross connecting the ratio regulator gives the system designer an option to reduce the system air pressure requirement by choosing a mixer with less pressure drop across the mixer. A simple way to size a cross connected system is to use an air pressure in osi with the same numeral value of the mixer pressure in inches water column or a 1.73 to 1.0 ratio. This will give a pressure drop of 42% of the supply pressure. The minimum air pressure drop for a cross connected system is 33% of the supply pressure. Lower pressure drop across the mixer will result in lower quality air/fuel mixing.

The air/fuel ratio system will lose resolution as the gas pressure upstream of the regulator and mixer is increased. Do not set the gas pressure upstream of the ratio regulator higher than necessary or the air/fuel ratio adjustment could get touchy.

SIZING 3065 MIXERS for BURNERS

North American 4651, 4659, and 4682 premix burners share the same capacity rating system, but not every size premix burner capacity is available for every burner nozzle type, or suitable to operate at every pressure on the tables listed below. Consult the individual burner bulletin and sheets for details and operating stability range.

On “Sheet 3065-1 : Sizing Data”:

- Use Table 1 to size a 3065 mixer for a single North American premix premix burner.
- Use Table 2 to size a 3065 mixer for multiple North American premix burners.
- Use Chart 1 or Table 3 with the desired air flow and mixer DP to identify the correct 3065 mixer to match other premix burners for use with zero governor ratio control.
- Since flow through most premix burners is nearly proportional to open orifice area, 3065 mixers can be matched to premix burners by determining the open area and finding the closest 4682 burner size by area using Sheet 4600-1. Use that nozzle size with Table 1 or 2.

Flow through 3065 mixers is also nearly proportional to throat area, so the capacity of an unlisted mixer-rod combination can be determined by comparing its net throat area with that of a closest known model.
3065-S ASPIRATOR MIXERS

3065-S Aspirator Mixers have oversized throats for higher air capacities and mixture pressures than standard mixers. They are useful where:

— Burner capacity does not match a standard mixer size, e.g., certain line burner assemblies and special bore nozzles.
— Mixture line size is restricted, and the use of a standard mixer would prevent the combustion system from reaching full capacity.
— A modest increase in combustion system capacity is desired without extensive re-piping.

Increasing mixer capacity in the 3065-S involves sacrificing suction efficiency, therefore it may be necessary to cross connect the zero governor.

When feeding several nozzles from one 3065-S Mixer, a mixture manifold at least one pipe size larger than the mixer outlet is recommended.

Optional Observation Port

3065-1 through -8 mixers without rods and some -7 and -8 sizes with large hollow rod are available with a centerline observation port. See "Sheet 3065-2 dims-pl" for details on which mixers can accept an observation port.

Mixer Installation

3065 Mixers can be mounted in any position convenient to the application piping. The gas adjustment cartridge assembly can be mounted in either side of mixer. Gas inlet is perpendicular to air line. Mixers are shipped with the valve closed and with right-hand assembly as shown. Plugged pipe taps (1/8") are provided for pressure readings.

When mounting the 3065 mixer, leave clearance for removing the cap and Allen wrench adjustment of the gas valve. The cap conceals the gas adjustment, discourages tampering with the setting, and reduces the chance of gas leaks. The gas adjustment valve is not designed for tight shut off, so use a suitable shut off valve upstream of the 3065 mixer.

Installing elbows directly at the outlet of a 3065 mixer or using a short nipple between the 3065 mixer and burner can cause combustion instability, or require narrowly held air/fuel ratio settings. It can require the mixture pressure to be held lower than desired to avoid flame lift-off, and nuisance outages of flame supervisory devices. To help avoid these problems install straight unobstructed pipe with a minimum length of 5 L/D between the mixer and premix burner nozzle. If space is limited, the mixer can be connected to the burner with two long nipples and an elbow (see sketch). Allow at least 4 pipe diameters on each side of the elbow.

For additional information see: Handbook Supplement 14 “Straight Pipe Run Requirements”.

Figure 5. Gas Cartridge detail of 3065 Aspirator Mixer

Figure 6. Minimum recommended straight pipe runs

Materials

3065-0 through -8 mixer bodies and mixing chambers are machined from iron castings. The -7 and -8 sizes have viton gaskets on flanged connections.

Depending on the mixer size, gas cartridge assemblies are made from brass, steel, cast iron, and seals made from viton and nitril.

On 3065-K models, steel is substituted for the brass parts. (for use with gases corrosive to brass).

Mixer displacement rods are made from steel. The rod support plugs are made from brass or aluminum on -6 through -9 sizes.

3065-9 mixer bodies and mixing chambers are fabricated from steel, and assembled with a viton gasket. The 1122-7-F valve used on the 3065-9 for gas adjustment is made from, cast iron, stainless steel, and has a viton seal.
8666 TESTIPS

Flames often are not easily visible when sealed-in nozzles are used. An 8666 Testip facilitates setting desired air to gas mixture.

The Testip is installed in mixture line per diagram below; it is lit with a manual torch after main flame has been lit. Air/gas ratio is adjusted in the mixer until Testip flame seems appropriate:

— A purple tinge indicates a lean ratio.
— A greenish-blue inner cone denotes a rich fire.
— Compare testip flame with known correct burner ratio setting.

Testips are turned off after ratio setting has been set. They should be removed (and the hole plugged) when not in use.

Do not use an 8666 Testip for final settings with mixers smaller than 1½", its capacity would represent too high a percentage of total capacity to allow accurate main flame settings.

Use extra caution with 8666 Testips outdoors, the flame can be difficult to see in direct sunlight.

ORDERING INFORMATION

3065 Mixer with rod part numbers = 3065-
Example: 3065-4-15

3065-S Mixer with rod part numbers = 3065-
Example: 3065-7-S20

3065-K Mixer with rod part numbers = 3065-
For Coke oven, manufactured, and other gases corrosive to brass, specify 3065- -K Mixer.
Example: 3065-0-K6

3065 Mixer only part numbers = 3065-
(Rod not included)
Example: 3065-0

3065 or -S Rod only part numbers = 3065-
(Mixer not included)
Example: 3065-4-12RA