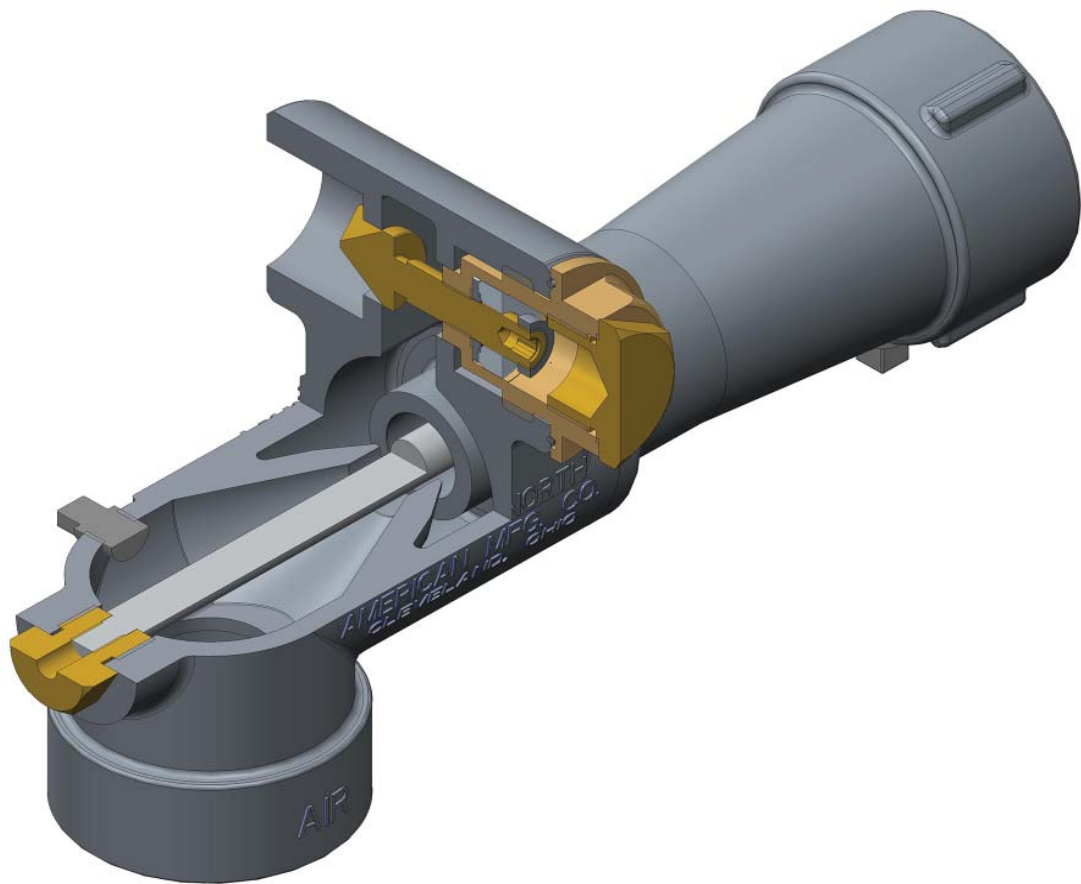


## 3065 North American Aspirators and Gas Mixers



### Dependable and uniform air/fuel mixtures

- Large range of available sizes for various applications
- Rugged design for long life
- Compact design allows for simple installation

# Design features and benefits of 3065 North American aspirators and gas mixers

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

For an observation port in place of a -0 plug (no rod) specify 3065- -0-OBS (3065-1 to -8 sizes).

## 3065 ASPIRATOR AIR/GAS MIXER FEATURES

- Mixes air with any fuel gas from 500 to 3,200 Btu/ft<sup>3</sup> HHV
- 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 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)

Air P. (osi)	4	8	12	16
Mixer D.P. ("wc)	4.9	9.8	14.8	19.7
Mixer P. ("wc)	2	4	6	8
3065-0-0	480	680	830	960
3065-1-0	650	930	1130	1310
3065-2-0	1220	1730	2120	2450
3065-3-0	1850	2620	3210	3710
3065-3-S0	2740	3870	4750	5480
3065-4-0	3200	4530	5550	6410
3065-4-S0	3960	5600	6860	7930
3065-5-0	4440	6280	7700	8890
3065-5-S0	6420	9070	11110	12800
3065-6-0	6640	9400	11510	13300
3065-6-S0	10950	15500	19000	21900
3065-7-0	13200	18700	22900	26400
3065-8-0	34100	48200	59100	68300
3065-8-S0	51700	73200	89600	103500
3065-9-0	65800	97300	111900	138000

\*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.

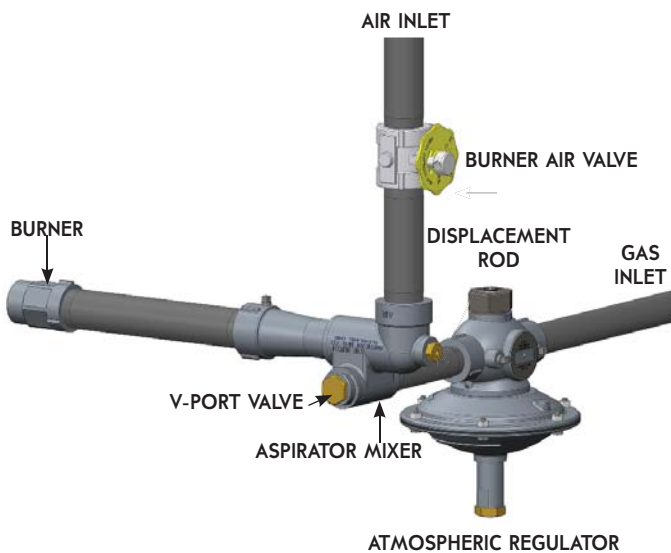


Figure 1. Typical arrangement of 3065 Aspirator Mixer with burner, atmospheric regulator, and air valve.

# 3065 Aspirator Mixer Operating Principles

Aspirator (air-jet) mixers generally operate with low pressure air in the 3 to 20 psi (5 to 35" w.c.) range and use the venturi effect to pull fuel into an air stream. This creates shear between the fuel and air flows that efficiently mixes them to make uniform (high quality) premix. They are often used with a zero governor (atmospheric regulator) which controls fuel/air ratio when the air flow through the mixer is adjusted.

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.

3065 mixers have a built in pressure tap to measure the air pressure as it enters the mixer and a tap to measure the mixture pressure as it exits the mixer. These taps can also be used as points to connect an impulse line for a cross connected ratio regulator control.

3065 mixers are suitable for operation over the entire range of conventional premix burners. Most North American premix burners have a minimum mixture pressure limit of .25" w.c., but depending on piping configuration, often must be set higher to prevent flashback. This means the low fire air pressure setting at the mixer inlet is usually above 1" w.c. Follow the North American piping guidelines to reduce the risk of flashback at low fire and flame lift-off at high fire.

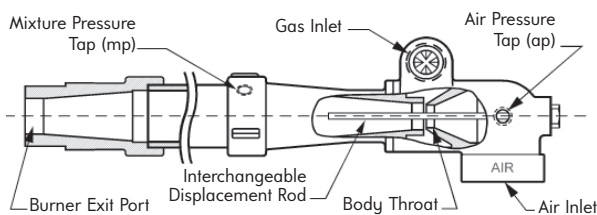


Figure 2. Typical 3065 Mixer & Premix Burner

The easiest way to pick the correct mixer for an application is to use the sizing tables in this bulletin. In cases where that is not appropriate, there are a number of factors to keep in mind.

1. "Mixture pressure": this is the pressure of the premix as it leaves the mixer which is the same as the pressure the burner requires upstream of the nozzle, plus piping pressure losses between the mixer and the burner (if any).
2. "Air pressure": this is the pressure required to supply air into the mixer.
3. "Mixer differential pressure": this is the difference between air pressure and the mixture pressure ( $dp = ap - mp$ ). Besides helping to size the mixer, knowing the mixer differential pressure at the required flow rate, helps in estimating the air flow through the mixer during operation.

4. The "Air pressure/mixer differential pressure" ratio is important to know (along with fuel type) when picking a mixer size, especially when using a zero governor (atmospheric regulator) for fuel/air ratio control.

— For air/natural gas or propane systems (800 Btu/ft<sup>3</sup> or more), "the air pressure in psi should be 2X the numerical value of the mixer pressure in inches water column" or a 3.5 to 1 air pressure/mixture pressure ratio. For example, if the desired mixture pressure at a burner nozzle is 4" w.c., then pick a mixer that requires 8 psi (14" w.c.) air pressure at the inlet to the mixer at the desired air flow rate (Note: 1 psi = 1.73" w.c.)

— For coke oven gas and manufactured gas "the air pressure/mixture pressure ratio is 4 to 1". So if the desired mixture pressure for a burner nozzle is 4" w.c. the air pressure at the inlet to the mixer at the desired air flow rate should be 16" w.c. (9.3 psi)

If the ratio regulator is cross-connected to the mixer with an impulse line, the air pressure/mixture pressure ratio becomes less critical for ratio control. This gives the system designer an option to reduce the system air pressure requirement by choosing a mixer with less pressure drop.

5. The quality (uniformity) of the air/fuel mixture is a function of the percentage of air pressure used for mixing.

The minimum recommended air pressure drop for a cross connected system is 33% of the supply pressure. Using less pressure drop across the mixer will result in low quality air/fuel mixing. A minimum air pressure drop of 66% of the air pressure is required to use a zero governor with natural gas.

If the ratio regulator is cross connected, it is acceptable to size the mixer so that the air pressure is 2X the mixture pressure. In this case the mixer pressure drop will be 50% of the supply pressure.

## ASPIRATOR MIXERS for 3/4" PREMIX PILOT TIPS

3065 mixers are suitable for supplying premix to single or multiple 3/4" pilot tips. The capacity of North American 4021 and 4027 pilot tips is similar to the capacity of a 4651-01-A size premix burner, so use the -01-A data in the sizing tables when sizing for 3/4" premix pilot tips. Consult the pilot bulletin for actual pilot capacities and pressure requirements.

The 4031 pilot mixer comes in one size, is simpler than the 3065 and is often preferred for use with a single 3/4" pilot tip. Old pilot systems that use the now obsolete 4035-01 and 4035-02 mixers can be replaced with the 4031 mixer.

For better pilot tip reliability, pilot ratio regulators should be cross-connected downstream of the pilot air control valve to a pilot mixture or air pressure tap.

## Using a zero governor (atmospheric regulator)

A zero governor (atmospheric regulator) is a ratio regulator that relies 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 mixers' venturi increases suction on 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 outlet pressure.

## Using a cross-connected ratio regulator

There are a number of reasons to cross-connect the ratio regulator feeding a 3065:

- The combustion chamber pressure varies or is different than the room pressure. For example premix burner used as pilot tips are almost always cross connected.
- 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.

The regulator can be cross-connected to the mixture pressure tap or air pressure tap with an impulse line (ideally 3/8" copper or SST tubing). When a zero governor is cross-connected, the gas pressure at the zero governor (regulator) inlet must be at least equal to the impulse line pressure plus pressure drop across the governor. Do not set the gas pressure upstream of the ratio regulator higher than necessary. When the gas pressure is increased above optimum the air/fuel ratio adjustment will lose resolution and get touchy.

Cross-connecting to the mixture pressure generally provides better ratio control resolution than using the air pressure tap. Use the air pressure tap to impulse line and regulator case is objectionable. For example when the fuel contains corrosive components.

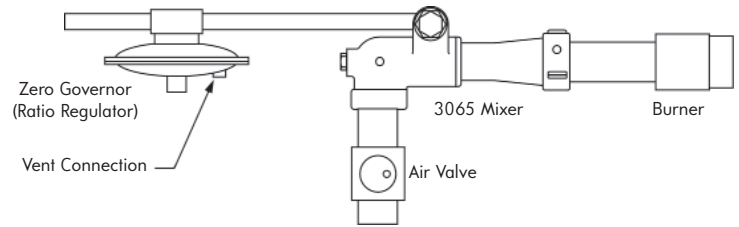


Figure 3. Typical ratio control system with zero governor ratio regulator

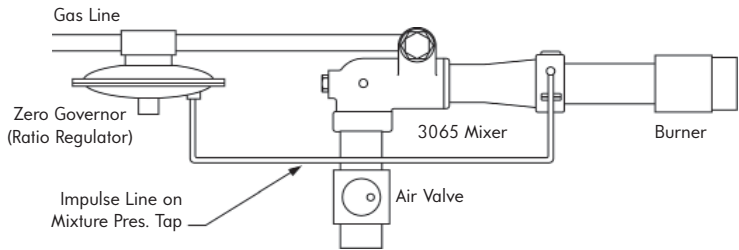


Figure 3b. Typical ratio control system with zero governor ratio regulator cross-connected to the mixture pressure.

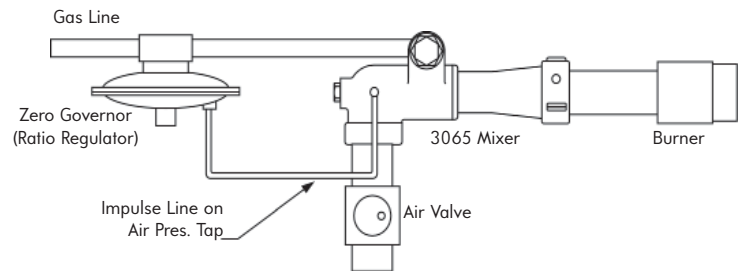


Figure 3c. Typical ratio control system with zero governor ratio regulator cross-connected to the air pressure.

# Mixer Installation - 8666 TESTIPS

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 the 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, use a suitable shut off valve upstream of the 3065 gas inlet.

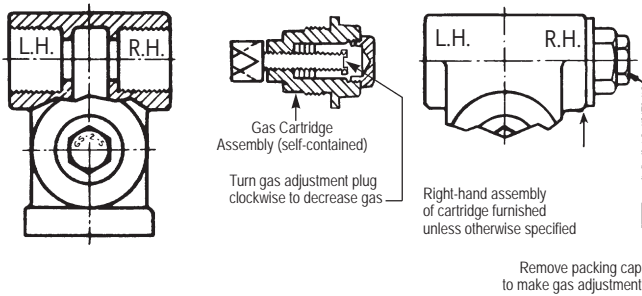


Figure 4. Gas Cartridge detail of 3065 Aspirator Mixer

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 pre-mix burner nozzle. If space is limited, then 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".

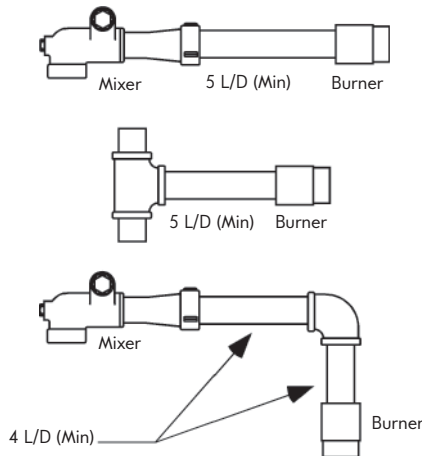


Figure 5. Minimum recommended straight pipe runs

When using a cross-connected regulator an impulse line can be taken off the tap provided on the 3065 mixer or use a tap location in a straight section of air piping.

Taps in piping should come off from the side or top of a pipe to prevent condensate or dirt from entering it. Small impulse lines are easily plugged by dirt. Avoid sharp edges and abrupt changes of flow direction. Any burrs or nipples projecting into the pipe cause the air in the pipe will increase velocity. Any change in velocity gives a false pressure reading.

Avoid dips in the impulse lines where condensed water could collect. If possible pitch impulse lines so water will run back to the air line and not to the regulator, where it could collect on the diaphragm and "fool" the regulator.

Leave the connection at the regulator end of an impulse line till last; and blow out the impulse line from the regulator end until you can feel air coming through the tapped pipe.

## 8666 TESTIPS

Flames often are not easily visible when sealed-in nozzles are used. An 8666 Testip facilitates setting desired air/fuel 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 lean ratio.
- A greenish-blue inner cone denotes a rich flame.
- Compare testip flame with 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.

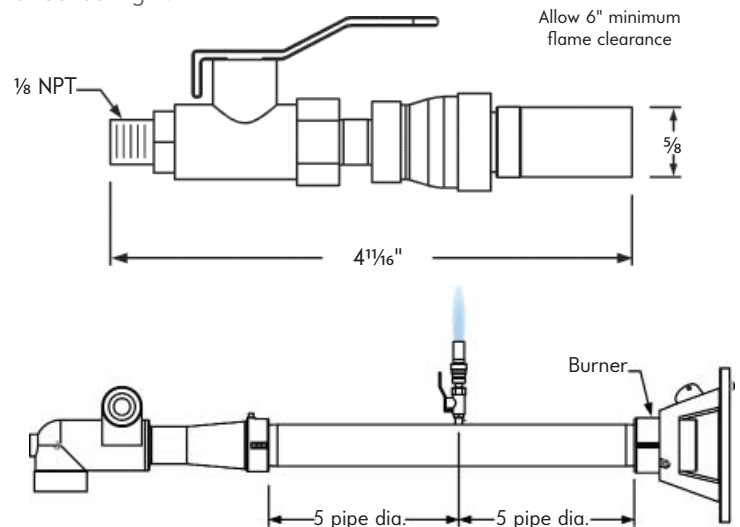


Figure 6. 8666 Testip

## 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 and cast iron, with seals made from viton and nitril.

Mixer displacement rods are made from steel. The rod support plugs are made from brass on -0 through -5 sizes and aluminum on -6 and larger sizes.

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

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, steel and has a viton seal.

## 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 using a -S mixer.

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

## ORDERING INFORMATION

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

\_\_\_\_\_ Rod size (0-80 see table 4 on Sheet 3065-2\_dims-pl)  
\_\_\_\_\_ Mixer Size (0-9)

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

\_\_\_\_\_ -S \_\_\_\_\_ Rod size (0-72 see table 4 on Sheet 3065-2\_dims-pl)  
\_\_\_\_\_ Mixer Size (3-8)

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

\_\_\_\_\_ -K \_\_\_\_\_ Rod size (0-72 see table 4 on Sheet 3065-2\_dims-pl)  
\_\_\_\_\_ Mixer Size (0-8)

**Example: 3065-0-K6**

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

\_\_\_\_\_ Mixer Size (0-9)

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

\_\_\_\_\_ - RA \_\_\_\_\_ Rod size (0-80 see table 4 on Sheet 3065-2\_dims-pl)  
\_\_\_\_\_ For Use in Mixer Size (0-9)

3065 with observation port in place of -0 plug = 3065-  
\_\_\_\_\_ - 0-OBS \_\_\_\_\_ Rod size (0) and -S or -K  
\_\_\_\_\_ For Use in Mixer Size (1-8)

**Example: 3065-6-0-OBS; 3065-6-S0-OBS; 3065-6-K0-OBS**

# Sizing 3065 Mixers Instructions

## • For Standard 4651, 4659, and 4682 premix 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 sizing tables. Consult the individual burner bulletin and sheets for details and operating stability range.

- Use **Table 1** to size a 3065 mixer for a single North American premix burner with zero governor control.
- Use **Table 2** to size a 3065 mixer for multiple North American premix burners, with zero governor control.

Mixer/burner pairings in **Table 1** and **2** maintain a relationship 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).

## • For other premix burners if the required burner flow is known:

- Determine how much mixture pressure is required for the premix burner that the 3065 is feeding by consulting burner instructions.
- Determine how much mixer air pressure is required for the fuel and control being used.
  - For zero governor control with Natural Gas, mixer air pressure (ap) = mp X 3.5
  - For zero governor control with Manufactured or Coke Oven Gas, mixer air pressure (ap) = mp X 4.0
  - For cross-connected regulator control with most fuels, and proper distance between the mixer and the burner, mixer air pressure (ap) = mp X 2 is adequate.
- To find mixer differential pressure (Pressure Drop Across Mixer), subtract mp from ap (dp = ap - mp)

Example, for zero governor control with Natural Gas with a burner that requires 6"w.c @ 6,000 cfh air mp = 6": ap=21"w.c.: dp = 15"w.c.

- Use **Chart 1** 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.

*Note that **Chart 1** does not list every size mixer available.*

- To use **Table 3** the dp and burner air flow will need to be converted via the square root law to 1" or 30"w.c. pressure with the new corresponding air flow.

*Example: dp = 15"w.c. @ 6,000 cfh air*

To find air flow when dp = 1"w.c.

$$\begin{aligned} \text{Solution: } Q_2 &= Q_1 \times \sqrt{\frac{\Delta P_2}{\Delta P_1}} \\ Q_2 &= 6,000 \times \sqrt{\frac{1}{15}} \\ Q_2 &= 1549 \text{ cfh air @ 1"} \end{aligned}$$

Using **Table 3**: choose a 3065-5-16 mixer (with 2 1/2" air inlet), if 2" air piping is required then a 3065-4-S12 could be used.

## • For premix burners if only the burner orifice area and required mixture pressure is known:

- 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 matching 4682 burner size by area using Sheet 4600-1. Use that nozzle size with **Table 1** or **2**.



# Sizing 3065 Aspirator Mixers - Table 1

Table 1 is used to size a single 3065 for any North American 4651, 4659, or 4682 premix burner, which all share the same capacity rating system. Mixer/burner recommendations in Table 1 maintain the required relationship between the mixer orifice size and burner port size for use with zero governor ratio control. To use this table, find burner size in the third column from the left, then read across to the mixer designation that appears to the left that matches the fuel being used.

### Aspirator Mixer for 3/4" Premix Pilot Tips:

The premix capacity of 3/4" 4021 and 4027 premix pilot tips is similar to the 4651-01-A burner. So use the -01-A data in Table 1 for 3/4" pilot mixer sizing. Consult the pilot bulletin for actual pilot capacities. The 4031 pilot mixer is often preferred for use with a single 3/4" pilot tip. For better pilot tip reliability, pilot ratio regulators should be cross-connected downstream of the pilot air control valve to a pilot mixture or air pressure tap.

**TABLE 1. Capacities\* scfh air of 3065 Mixers with North American burner nozzles.**  
(for Btu/h, multiply by 100)‡

Complete 3065 Mixer Designation		North American Premix Burner Size #	Required Air Pressure in osi for Natural Gas							
			2	4	6	8	10	12	14	16
Manufactured or Coke Oven Gas	Natural Gas		Required Air Pressure in osi ^ for Manufactured or Coke Oven Gas							
			2.3	4.6	6.8	9.1	11.4	13.7	16	18.3
			Mixture Pressure in inches of Water Column**							
			1	2	3	4	5	6	7	8
3065-0-10	3065-0-9	-01-A	130	180	230	260	290	320	340	370
3065-0-9	3065-0-8	-0-A	200	280	350	400	450	490	530	570
3065-0-8	3065-0-6	-0-B	250	350	430	500	560	610	660	710
3065-0-7	3065-0-5	-0-C	280	400	480	560	630	690	740	790
3065-1-9	3065-1-7	-1-A	350	490	610	700	780	860	930	990
3065-1-8	3065-1-5	-1-B	440	620	760	880	980	1 080	1 160	1 240
3065-2-13	3065-2-12	-2-A	560	790	970	1 120	1 250	1 370	1 480	1 580
3065-2-12	3065-2-10	-2-B	650	920	1 130	1 300	1 450	1 590	1 720	1 840
3065-2-10	3065-2-6	-2-C	780	1 100	1 350	1 560	1 740	1 910	2 060	2 210
3065-2-6	3065-2-0	-2-D	880	1 240	1 520	1 760	1 970	2 160	2 330	2 490
3065-3-14	3065-3-11	-3-A	980	1 390	1 700	1 960	2 190	2 400	2 590	2 770
3065-3-11	3065-3-6	-3-B	1 200	1 700	2 080	2 400	2 680	2 940	3 170	3 390
3065-4-18	3065-4-16	-4-A	1 500	2 120	2 600	3 000	3 350	3 670	3 970	4 240
3065-4-14	3065-4-10	-4-B	1 900	2 690	3 290	3 800	4 250	4 650	5 030	5 370
3065-4-12	3065-4-8	-4-C	2 050	2 900	3 550	4 100	4 580	5 020	5 420	5 800
3065-5-18	3065-5-14	-5-A	2 450	3 460	4 240	4 900	5 480	6 000	6 480	6 930
3065-5-13	3065-5-10	-5-B	2 900	4 100	5 000	5 800	6 500	7 100	7 700	8 200
3065-6-24	3065-6-20	-6-A	3 200	4 500	5 500	6 400	7 200	7 800	8 500	9 100
3065-6-18	3065-6-10	-6-B	3 850	5 400	6 700	7 700	8 600	9 400	10 200	10 900
3065-6-16	3065-6-0	-6-C	4 250	6 000	7 400	8 500	9 500	10 400	11 200	12 000
3065-7-38	3065-7-34	-7-A	4 750	6 700	8 200	9 500	10 600	11 600	12 600	13 400
3065-7-32	3065-7-26	-7-B	6 000	8 500	10 400	12 000	13 400	14 700	15 900	17 000
3065-7-26	3065-7-18	-7-C	7 050	10 000	12 200	14 100	15 800	17 300	18 700	19 900
3065-8-68	3065-8-64	-8-A	10 500	14 800	18 200	21 000	23 500	25 700	27 800	29 700
3065-8-60	3065-8-56	-8-B	13 000	18 400	22 500	26 000	29 100	31 800	34 400	36 800
3065-8-52	3065-8-36	-8-C	18 000	25 500	31 200	36 000	40 200	44 100	47 600	51 000
3065-8-28	3065-8-0	-8-D	21 500	30 400	37 200	43 000	48 100	52 500	57 000	60 800
3065-9-64	3065-9-56	-9	37 700	53 500	65 000	75 500	84 500	92 000	99 500	107 000

**NOTES:**

\* Air flow capacity data assumes stoichiometric ratio with natural gas, air flow increases with excess air and decreases with excess fuel.

‡ Capacities with 100% combustion air through mixer and nozzle. Burners can be operated with "rich" mixture if secondary air is available in vicinity of nozzle, which increases Btu/h capacities.

\*\* Not every size premix burner capacity is available for every burner type, or stable at every pressure on this table. Consult the individual burner bulletin and sheets for details and operating stability range.

^ Multiply air pressure in osi by 1.73 to convert pressure in osi to pressure in inches wc (16 osi = 27.7" w.c.)



# Sizing 3065 Aspirator Air/Gas Mixers - Table 2

**Table 2 lists proper selection if several burners are fed from a single 3065 mixer.** Burner capacity and number of premix burners (4651, 4659, or 4682) determine mixer selection. Mixer/burner recommendations in Table 2 maintain the required relationship between the mixer orifice size and burner port size for use with zero governor ratio control. Flow distribution and pressure drops should be considered carefully when designing the mixture manifold.

To use this table, find burner size in left-hand column, then read across to the mixer designation that appears under the number of burners to be fed.

Multiple premix burner arrangements with mixers larger than the three inch -7 size, burners above the -5-A size or with more than 10 burners are prone to flashback. When sizing mixers for multiple burners outside the range of Table 2, use a single mixer for each burner or divide the burners among two or more mixers, and select the mixers from Table 2.

**Aspirator Mixers for 3/4" Premix Pilot Tips:**

The premix capacity of 3/4" 4021 and 4027 premix pilot tips is similar to the 4651-01-A burner. To size a 3065 for multiple 3/4" pilot tips use the -01-A data row in Table 2 for 3/4" pilot mixer sizing. Consult the pilot bulletin for actual pilot capacities. The 4031 pilot mixer is often preferred for use with a single 3/4" pilot tip. Pilot ratio regulators should always be cross-connected to the mixture or air pressure taps on the mixer.

**TABLE 2. Recommended Mixer Selections for Multiple Burners Using Natural Gas**

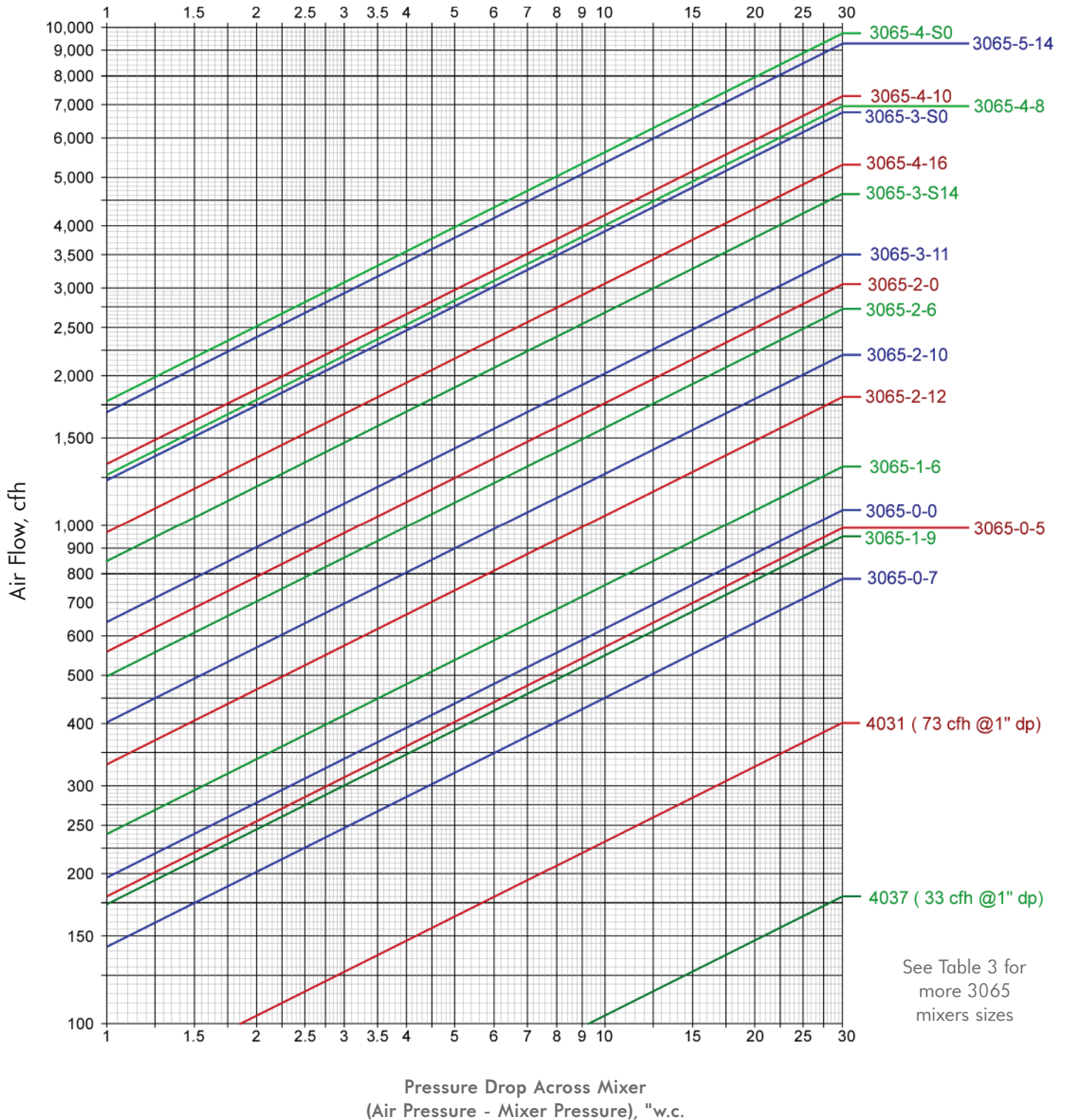
Burner Size desig.	Number of Burners per 3065 Aspirator Mixer									
	1	2	3	4	5	6	7	8	9	10
-01-A	3065-0-9	3065-0-5	3065-1-6	3065-2-13	3065-2-11	3065-2-8	3065-2-6	3065-2-0	3065-3-11	3065-3-6
-0-A	3065-0-8	3065-1-8	3065-1-5	3065-2-8	3065-3-13	3065-3-9	3065-3-5	3065-4-16	3065-4-14	3065-4-12
-0-B	3065-0-6	3065-1-4	3065-2-8	3065-3-12	3065-3-7	3065-4-16	3065-4-14	3065-4-10	3065-5-18	3065-5-16
-0-C	3065-0-5	3065-2-12	3065-3-13	3065-3-6	3065-4-15	3065-4-11	3065-5-18	3065-5-15	3065-5-10	3065-6-24
-1-A	3065-1-7	3065-2-9	3065-3-10	3065-4-17	3065-4-13	3065-4-5	3065-5-15	3065-5-10	3065-6-22	3065-6-20
-1-B	3065-1-5	3065-2-4	3065-3-4	3065-4-13	3065-5-18	3065-5-13	3065-6-24	3065-6-20	3065-6-15	3065-6-10
-2-A	3065-2-12	3065-3-9	3065-4-14	3065-5-17	3065-5-9	3065-6-20	3065-6-15	3065-6-6	3065-7-36	3065-7-34
-2-B	3065-2-10	3065-4-18	3065-4-8	3065-5-12	3065-6-22	3065-6-14	3065-7-38	3065-7-34	3065-7-32	3065-7-28
-2-C	3065-2-6	3065-4-15	3065-5-15	3065-6-24	3065-6-13	3065-7-36	3065-7-32	3065-7-28	3065-7-24	3065-7-18
-2-D	3065-2-0	3065-4-11	3065-5-9	3065-6-18	3065-7-38	3065-7-32	3065-7-28	3065-7-20	3065-7-12	-
-3-A	3065-3-11	3065-4-8	3065-6-24	3065-6-13	3065-7-36	3065-7-30	3065-7-24	3065-7-15	-	-
-3-B	3065-3-6	3065-5-15	3065-6-18	3065-7-36	3065-7-30	3065-7-20	3065-7-4	-	-	-
-4-A	3065-4-16	3065-6-22	3065-7-38	3065-7-28	3065-7-18	-	-	-	-	-
-4-B	3065-4-10	3065-6-14	3065-7-30	3065-7-16	-	-	-	-	-	-
-4-C	3065-4-8	3065-6-9	3065-7-28	3065-7-4	-	-	-	-	-	-
-5-A	3065-5-14	3065-7-34	3065-7-16	-	-	-	-	-	-	-

For additional information on premix systems and premix system design, see the following sheets:

- Series 4651, 4659, and 4682 Burner Nozzles, Sheet 4600-1
- North American Air/Gas Ratio Regulators, Bulletin 7218/7219A
- Air/Gas Ratio Regulators, Instructions 7218-2
- Premix Burners, Handbook Supplement 288
- Straight pipe run requirements, Handbook Supplement 14
- Jiffy Sheet, Handbook Supplement 288
- Piping Practice for Industrial Burner Systems, Handbook Supplement 46
- Prevent "Pooped" Pilots, Handbook Supplement 289
- Practical Pointers (Industrial Burner Control Systems)

# Sizing 3065 Aspirator Mixers - Chart 1A

Chart 1A. Air Capacities for Selected Small North American 3065 Aspirator Mixers vs. Pressure Drop Across Mixer ("wc) (Differential Pressure)  
 (see Table 3 for Data on all 3065 sizes)  
 (for Btu/h, multiply by 100)

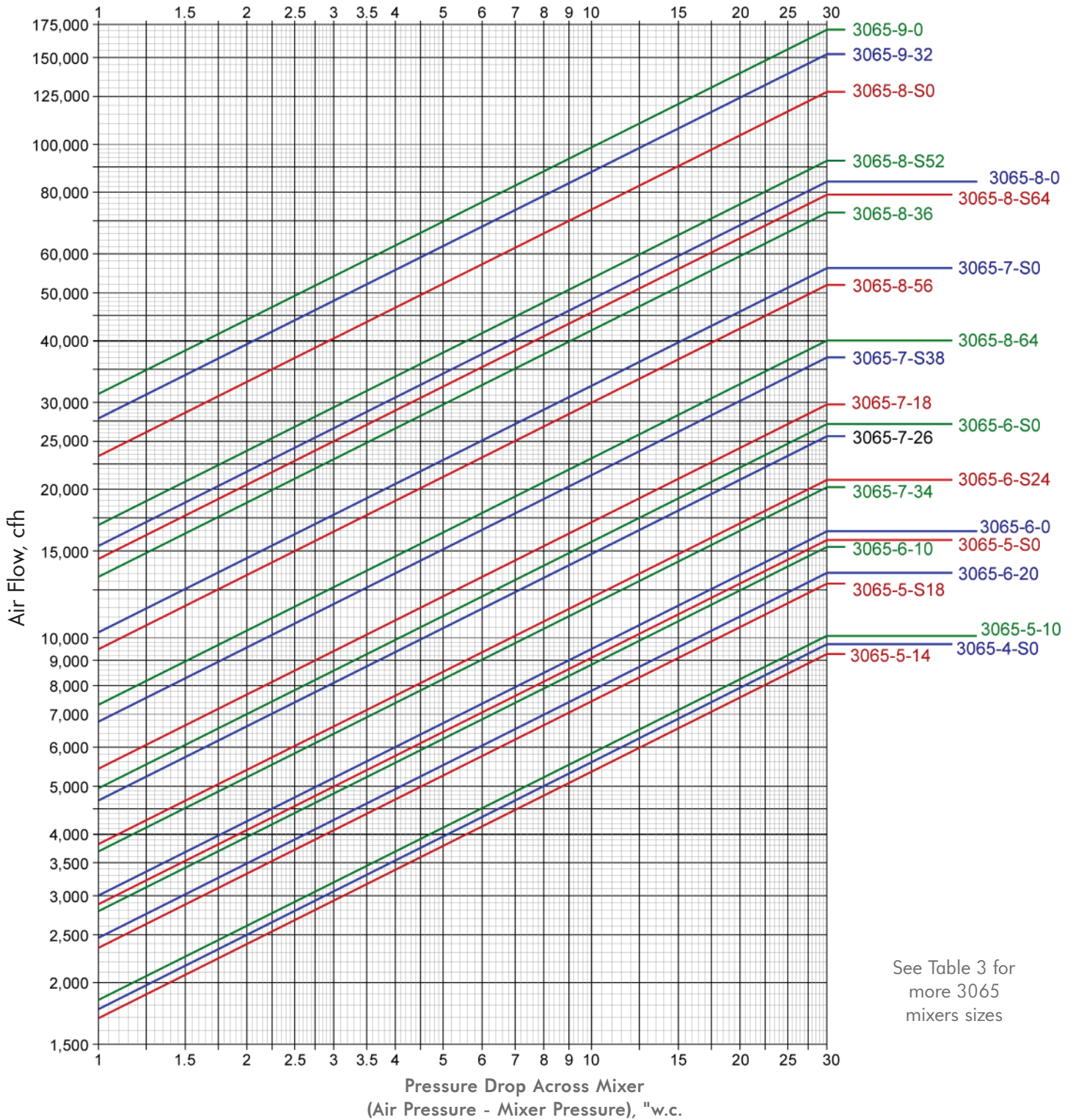


See Table 3 for more 3065 mixers sizes

Flow through 3065 mixers is 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.

# Sizing 3065 Aspirator Mixers - Chart 1B

**Chart 1B. Air Capacities for Selected Large North American 3065 Aspirator Mixers vs. Pressure Drop Across Mixer ("wc) (Differential Pressure)**  
 (see Table 3 for Data on all 3065 sizes)  
 (for Btu/h multiply by 100)



See Table 3 for more 3065 mixers sizes

Flow through 3065 mixers is 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.

# Sizing 3065 Aspirator Mixers - Table 3A

**Table 3A. 3065 Mixer Throat Areas & Capacities, scfh air @ 1" and 30" wc Differential Pressure**  
 (Pressure Drop Across Mixer = Air Pressure - Mixture Pressure)  
 (for Btu/h, multiply by 100)

## 3065(S) Mixers

3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc	3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc	3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc
-0-0	0.100	216	1 180	-3-S9	0.497	1 065	5 830	-5-16	0.691	1 583	8 670
-0-5	0.091	179	980	-3-S10	0.483	1 026	5 620	-5-17	0.666	1 525	8 350
-0-6	0.083	162	890	-3-S11	0.467	984	5 390	-5-18	0.639	1 464	8 020
-0-7	0.073	143	780	-3-S12	0.449	939	5 140	-5-S0	1.227	2 893	15 800
-0-8	0.061	120	660	-3-S13	0.430	892	4 890	-5-S6	1.200	2 828	15 500
-0-9	0.048	95	520	-3-S14	0.409	842	4 610	-5-S8	1.178	2 777	15 200
-1-0	0.151	295	1 620	-4-0	0.645	1445	7 910	-5-S9	1.165	2 746	15 000
-1-4	0.138	271	1 480	-4-5	0.626	1391	7 620	-5-S10	1.150	2 712	14 900
-1-5	0.131	258	1 410	-4-6	0.617	1373	7 520	-5-S12	1.117	2 651	14 500
-1-6	0.123	241	1 320	-4-7	0.607	1 350	7 400	-5-S13	1.098	2 605	14 300
-1-7	0.113	222	1 210	-4-8	0.596	1 325	7 260	-5-S14	1.077	2 556	14 000
-1-8	0.102	199	1 090	-4-9	0.583	1 296	7 100	-5-S15	1.055	2 503	13 700
-1-9	0.089	173	950	-4-10	0.568	1 273	6 970	-5-S16	1.031	2 464	13 500
-1-10	0.074	145	790	-4-11	0.552	1 228	6 720	-5-S17	1.006	2 404	13 200
-1-11	0.058	113	620	-4-12	0.534	1 188	6 510	-5-S18	0.979	2 339	12 800
-2-0	0.277	552	3 020	-4-13	0.515	1 146	6 280	-6-0	1.289	2 995	16 400
-2-4	0.265	528	2 890	-4-14	0.494	1 100	6 020	-6-6	1.261	2 931	16 100
-2-5	0.258	514	2 810	-4-15	0.472	1 050	5 750	-6-7	1.251	2 908	15 900
-2-6	0.250	497	2 720	-4-16	0.448	968	5 300	-6-9	1.227	2 851	15 600
-2-8	0.228	454	2 490	-4-17	0.423	941	5 150	-6-10	1.212	2 837	15 500
-2-9	0.215	428	2 350	-4-18	0.396	875	4 790	-6-12	1.178	2 758	15 100
-2-10	0.200	399	2 190	-4-22*	0.273	604	3 310	-6-13	1.159	2 713	14 900
-2-11	0.184	367	2 010	-4-S0	0.785	1 786	9 780	-6-14	1.138	2 684	14 700
-2-12	0.167	332	1 820	-4-S5	0.766	1 743	9 540	-6-15	1.116	2 650	14 500
-2-13	0.147	294	1 610	-4-S6	0.758	1 723	9 440	-6-16	1.092	2 611	14 300
-2-14*	0.127	253	1 380	-4-S7	0.748	1 701	9 320	-6-18	1.040	2 504	13 700
-3-0	0.406	836	4 580	-4-S8	0.736	1 675	9 170	-6-20	0.982	2 380	13 000
-3-4	0.394	810	4 440	-4-S10	0.709	1 612	8 830	-6-22	0.918	2 193	12 000
-3-5	0.387	796	4 360	-4-S11	0.693	1 575	8 630	-6-24	0.847	2 011	11 000
-3-6	0.378	779	4 270	-4-S12	0.675	1 535	8 410	-6-S0	1.996	4 936	27 000
-3-7	0.368	758	4 150	-4-S13	0.656	1 491	8 170	-6-S6	1.968	4 868	26 700
-3-8	0.357	735	4 020	-4-S14	0.635	1 444	7 910	-6-S7	1.958	4 843	26 500
-3-9	0.344	702	3 850	-4-S15	0.613	1 394	7 630	-6-S9	1.933	4 782	26 200
-3-10	0.329	678	3 710	-4-S16	0.589	1 340	7 340	-6-S10	1.919	4 746	26 000
-3-11	0.313	645	3 530	-4-S17	0.564	1 282	7 020	-6-S12	1.885	4 663	25 500
-3-12	0.296	608	3 330	-4-S18	0.537	1 221	6 690	-6-S13	1.866	4 615	25 300
-3-13	0.276	569	3 120	-5-0	0.887	2 004	10 970	-6-S14	1.845	4 564	25 000
-3-14	0.256	531	2 910	-5-6	0.860	1 941	10 630	-6-S15	1.823	4 509	24 700
-3-S0	0.559	1 235	6 770	-5-8	0.838	1 893	10 370	-6-S16	1.799	4 450	24 400
-3-S4	0.547	1 208	6 620	-5-9	0.825	1 863	10 210	-6-S18	1.747	4 292	23 500
-3-S5	0.540	1 193	6 530	-5-10	0.811	1 830	10 030	-6-S20	1.689	4 149	22 700
-3-S6	0.532	1 165	6 380	-5-12	0.777	1 767	9 680	-6-S22	1.624	3 991	21 900
-3-S7	0.522	1 135	6 220	-5-13	0.758	1 724	9 440	-6-S24	1.554	3 817	20 900
-3-S8	0.510	1 101	6 030	-5-14	0.737	1 689	9 250				
				-5-15	0.715	1 638	8 970				

Note: Some 3065 mixers are available with additional special rod sizes.



# Sizing 3065 Aspirator Mixers - Table 3B

**Table 3B. 3065 Mixer Throat Areas & Capacities, scfh air @ 1" and 30" wc Differential Pressure**  
 (Pressure Drop Across Mixer = Air Pressure - Mixture Pressure)  
 (for Btu/h, multiply by 100)

## 3065(S) Mixers

3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc	3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc	3065(S) Mixer Size	Mixer Throat Area in <sup>2</sup>	Air Flow @1"wc	Air Flow @30"wc
-7-0	2.405	5 949	32 600	-7-S24	3.318	8 813	48 300	-8-S0	8.621	23 325	127 800
-7-4	2.393	5 919	32 400	-7-S26	3.241	8 556	46 900	-8-S15	8.448	22 718	124 000
-7-10	2.329	5 760	31 500	-7-S28	3.159	8 285	45 400	-8-S16	8.424	22 514	123 300
-7-12	2.295	5 676	31 100	-7-S30	3.070	8 000	43 800	-8-S20	8.314	22 081	120 900
-7-14	2.255	5 577	30 500	-7-S32	2.975	7 703	42 200	-8-S24	8.179	21 587	118 200
-7-15	2.233	5 522	30 200	-7-S34	2.873	7 393	40 500	-8-S28	8.019	21 033	115 200
-7-16	2.209	5 464	29 900	-7-S36	2.766	7 071	38 700	-8-S32	7.835	20 420	111 800
-7-18	2.157	5 335	29 200	-7-S38	2.652	6 737	36 900	-8-S36	7.626	19 750	108 200
-7-20	2.098	5 190	28 400	-8-0	5.940	15 381	84 200	-8-S40	7.393	19 146	104 900
-7-24	1.963	4 857	26 600	-8-15	5.767	15 030	82 300	-8-S44	7.136	18 478	101 200
-7-26	1.887	4 667	25 600	-8-16	5.743	15 063	82 500	-8-S48	6.853	17 747	97 200
-7-28	1.804	4 462	24 400	-8-20	5.633	14 867	81 400	-8-S52	6.547	16 844	92 300
-7-30	1.715	4 213	23 100	-8-24	5.498	14 602	80 000	-8-S56	6.215	16 095	88 200
-7-32	1.620	3 953	21 700	-8-28	5.338	14 178	77 700	-8-S60	5.859	15 271	83 600
-7-34	1.519	3 681	20 200	-8-32	5.154	13 689	75 000	-8-S64	5.479	14 461	79 200
-7-36	1.411	3 444	18 900	-8-36	4.946	13 217	72 400	-8-S68	5.074	13 224	72 400
-7-38	1.298	3 188	17 500	-8-40	4.712	12 594	69 000	-8-S72	4.644	12 027	65 900
-7-S0	3.760	10 236	56 100	-8-44	4.455	11 906	65 200	-9-0	10.682	31 033	170 000
-7-S4	3.748	10 203	55 900	-8-48	4.172	11 151	61 100	-9-24	10.241	29 239	160 000
-7-S10	3.683	10 027	54 900	-8-52	3.866	10 331	56 600	-9-32	9.897	27 765	152 000
-7-S12	3.650	9 935	54 400	-8-56	3.534	9 446	51 700	-9-40	9.455	26 526	145 000
-7-S14	3.610	9 827	53 800	-8-60	3.178	8 336	45 700	-9-48	8.915	25 011	137 000
-7-S15	3.587	9 766	53 500	-8-64	2.798	7 292	39 900	-9-56	8.277	23 221	127 000
-7-S16	3.564	9 642	52 800	-8-68	2.393	6 237	34 200	-9-64	7.541	21 155	116 000
-7-S18	3.511	9 443	51 700	-8-72	1.963	5 117	28 000	-9-72	6.706	17 812	98 000
-7-S20	3.453	9 229	50 500					-9-80	5.774	14 856	81 000

## SIZING EXAMPLES

**Note:** Most premix burner pressure specifications are rated in inches water column. Most North American, blower and mixer air pressure specifications, are rated in osi: 1 osi = 1.73"wc.

**Example A:** Select a mixer for a single 4651-2-D burner with 16 osi (27.7"wc.) air and 8"wc mixture pressure, with zero governor ratio control for natural gas.

— Since this is a standard burner nozzle size with zero governor ratio control, use **Table 1**. Find the -2-D burner and pick a **3065-2-0** mixer from the list to the left. Per **Table 3A**, the **3065-3-13** has the same mixer throat area, and offers more sizing options if field conditions require a new displacement rod choice.

**Example B:** Select a mixer for feeding six (6) 4651-2-A burners, with zero governor ratio control for natural gas.

— Since these are standard size burner nozzles with zero governor ratio control, use **Table 2**. Find the -2-A burner row move right and find the 6 burner column. Pick the **3065-6-20** Mixer from the list.

**Example C:** Select a mixer for a 4682-6-C burner with 8 osi (14" w.c.) air and 8"wc mixture pressure. This arrangement necessitates a cross-connected regulator and high gas pressure because air pressure drop is <66% of its air pressure.

— Capacity of a 4682-6-C at 8" w.c. mixture pressure is 1,200,000 Btu/h. (divide by 100= 12,000 scfh air) Pressure drop across the mixer = 8 osi (14"wc) minus 8" w.c. mp = 6" w.c. From the capacity **Chart 1B**, a 3065-6-S0 Mixer would serve the purpose, as would a 3065-7-20. For minimum cost and size (both mixer and burner nozzle are 3" NPT) use the **3065-6-S0** mixer. The gas pressure required upstream of the ratio regulator = 14" w.c. + 6" w.c. = 20" wc = 11.5 osi (use 12-16 osi)

**Example D:** Select a mixer for 3,000 scfh air burner with 8 osi air and 8" w.c. mixture pressure. (This arrangement necessitates a cross-connected regulator and 12-16 osi gas pressure.) Pressure drop across the mixer = 8 osi (14" w.c.) minus 8"wc mixture pressure = 6" w.c.

— From the capacity **Chart 1A**, a **3065-3-S0** or a **3065-4-8** could be used. Which mixer to choose depends on a number of factors.

- The **3065-3-S0** uses 1½" pipe and the **3065-4-8** uses 2" pipe
- If at any time the system capacity needs to be increased, the capacity of the **3065-4-8** can be increased by using a smaller displacement rod. The **3065-0-S0** with its -0 rod is already is at the maximum capacity.
- In most cases pick the mixer with the same pipe size as the burner, but the **3065-4-8** mixer offers more sizing options if field conditions require a new displacement rod choice.

**Example E1:** An existing system uses a **3065-5-17** mixer to feed four (4) 4682-2-A burner nozzles, with a zero governor ratio control for natural gas. What mixer is needed if the burners are changed to four (4) 4682-2-B burner nozzles to increase the system capacity?

— Since these are standard size nozzles with zero governor ratio control, use **Table 2**. Find the -2-B nozzle row move right and find the 4 nozzle column. Find the **3065-5-12** Mixer from the list. Since the mixers are both the 3065-5 size, only the displacement rod needs to be changed.

**Example E2:** An existing system uses a **3065-5-17** mixer to feed four (4) 4682-2-A burner nozzles with a zero governor ratio control for natural gas. What mixer is needed if the burners are changed to four (4) 4682-2-D burner nozzles to increase the system capacity.

— Since these are standard size burner nozzles with zero governor ratio control, use **Table 2**. Find the -2-D burner row, move right and find the 4 burner column. Pick the **3065-6-18** mixer from the list. This is a new mixer size which requires larger pipe (but maybe a 3065-5-S\_ will work) from **Table 3B**, the orifice throat area of a **3065-6-18** is (1.040 in<sup>2</sup>). A **3065-5-S15** is (1.055 in<sup>2</sup>). So use the **3065-5-S15** because only the mixer needs to be changed and not the piping. **Note:** The other system components still need to be checked to see if they are suitable for use with the higher capacity. Due to more pressure drop through the piping it may be necessary to cross connect the ratio regulator.

**Example G:** Select a mixer for a 2,300,000 Btu/h (divide by 100= 23,000 scfh air) burner with 8 osi air and 4" w.c. mixture pressure. (zero governor ratio control for natural gas) Pressure drop across the mixer = 8 osi (14" w.c.) minus 4"wc mp = 10" w.c.

— From the capacity **Chart 1B**, a **3065-8** with between a **#56** and a **#64** rod or a **3065-7-S** with between no rod and a **#38** rod (21,000 cfh capacity) could be used. For minimum cost and size, use a **3065-7-S**.

Effective mixer throat area = for a **3065-7-S38** = 2.652 sq. in. (from **Table 3B**)

$$\frac{(A), \text{Throat area, unknown mixer}}{\text{Throat area, known mixer}} = \frac{\text{Capacity, unknown mixer}}{\text{Capacity, known mixer}}$$

$$\frac{(A)}{2.652} = \frac{23,000 \text{ scfh}}{21,000 \text{ scfh}}$$

$$A = 2.90 \text{ sq. in.}$$

From **Table 3B** use **3065-7-S34** mixer.

# External Dimensions 3056 Aspirator Mixers - Table 4

## DIMENSIONS

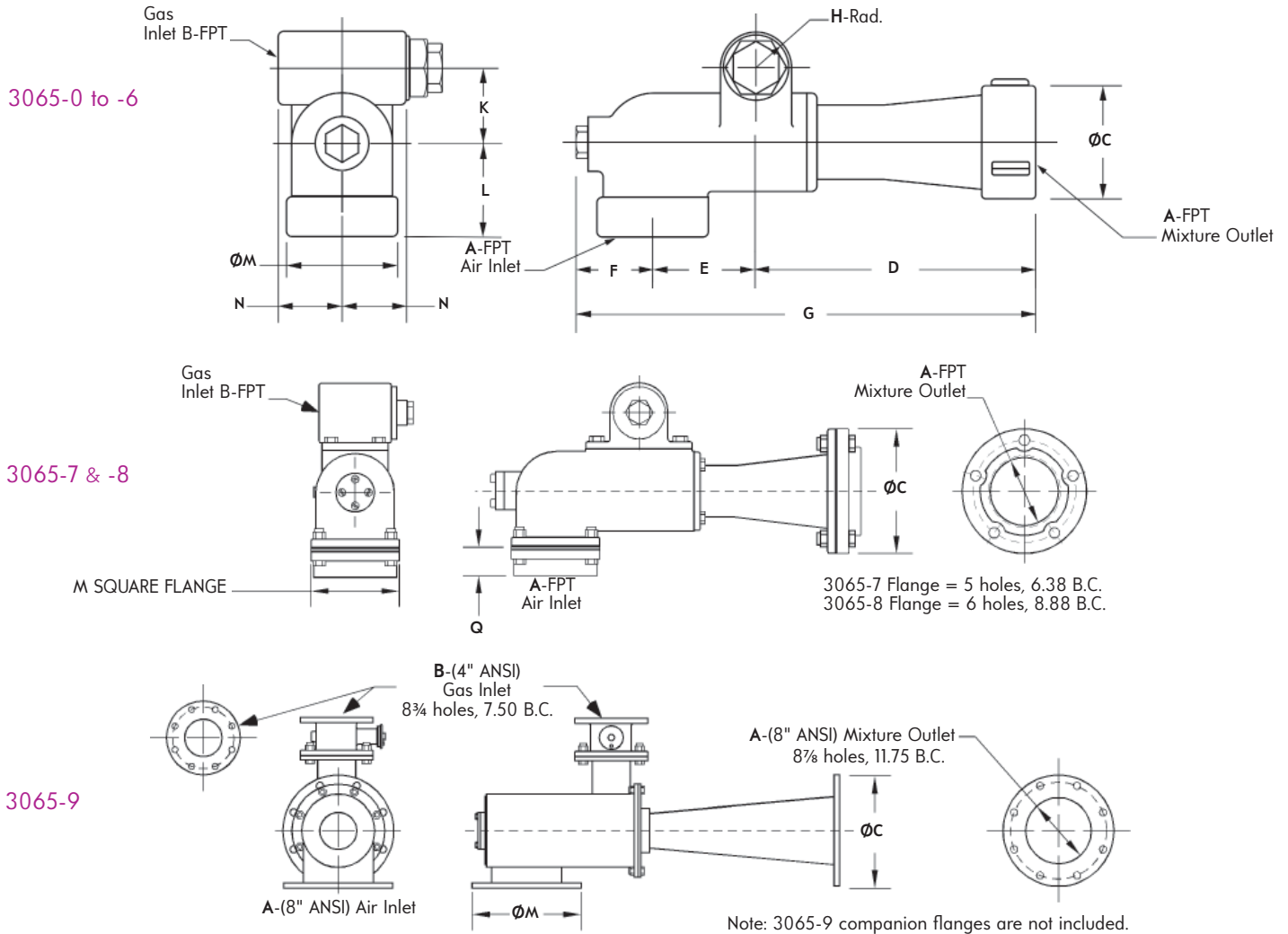


Table 4.

Mixer designation	Dimensions in inches														Wt, lb.	Gas ADJ Allen wrench size
	A	B	C	D	E	F	G	H	K	L	M	N	P	Q		
3065-0	3/4	1/2	1.56	4.03	1.75	1.50	7.28	0.63	1.19	1.66	1.56	1.25	2.00	-	4	3/32
3065-1	1	3/4	1.93	4.13	1.81	1.50	7.44	0.75	1.38	1.88	1.93	1.28	2.03	-	5	5/32
3065-2	1 1/4	1	2.25	5.88	2.06	1.69	9.63	0.88	1.66	2.03	2.38	1.47	2.22	-	7	5/32
3065-3	1 1/2	1	2.63	6.50	2.44	1.81	10.75	0.84	1.75	2.16	2.63	1.50	2.25	-	8	5/32
3065-4	2	1 1/4	3.00	8.38	3.50	2.06	13.93	1.13	2.19	2.63	3.00	1.56	2.38	-	14	5/32
3065-5	2 1/2	1 1/2	3.75	10.31	4.06	2.31	16.69	1.22	2.50	3.13	3.75	1.63	2.63	-	18	5/32
3065-6	3	2	4.38	10.50	4.56	3.13	18.19	1.50	2.93	3.38	4.38	2.00	3.06	-	27	7/32
3065-7	4	2 1/2	7.75	13.93	5.19	3.56	22.69	1.81	4.81	4.93	5.50	2.25	3.53	1.50	48	7/32
3065-8	6	3	10.38	17.44	8.81	4.93	31.19	2.19	6.00	6.19	8.25	2.93	4.56	1.75	125	7/32
3065-9	8	4	13.50	27.69	10.50	6.25	44.44	-	8.69	6.75	13.50	-	-	-	170	N/A

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.



# Internal Dimensions 3056 Aspirator Mixers - Tables 5, 6, and 7

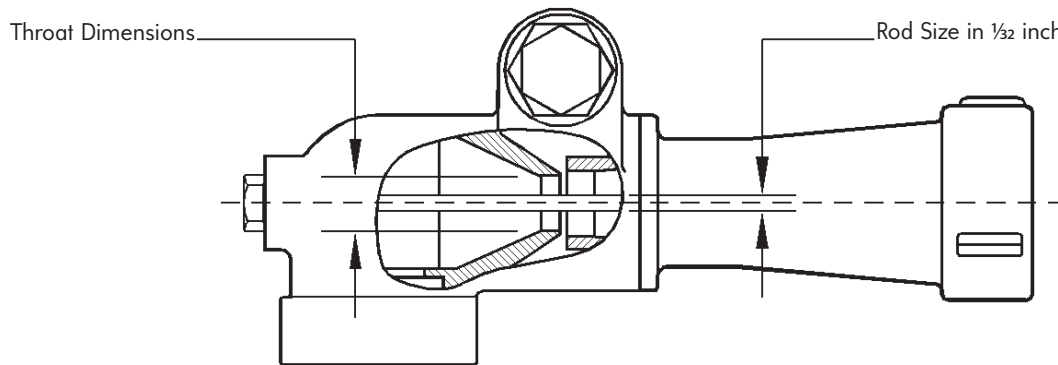
**Table 5. Mixer Throat Dimensions**

Mixer Size	Throat Dia. Inches	Throat Area Sq. Inches
4037 #	0.156	0.019
4031 #	0.209	0.034
3065-0	0.375	0.110
3065-1	0.438	0.150
3065-2	0.594	0.277
3065-3	0.719	0.406
3065-3-S	0.844	0.559
3065-4	0.906	0.645
3065-4-S	1.000	0.785
3065-5	1.063	0.887
3065-5-S	1.250	1.227
3056-6	1.281	1.289
3065-6-S	1.594	1.995
3056-7	1.750	2.405
3065-7-S	2.188	3.758
3065-8	2.750	5.940
3065-8-S	3.313	8.618
3065-9	3.688	10.680

**Table 6. Mixer Rod Dimensions**

Rod Size	Rod Area Square Inches	Rod Size	Rod Area Square Inches
0	0.000	24	0.442
4	0.012	26	0.518
5	0.019	28	0.601
6	0.028	30	0.690
7	0.038	32	0.785
8	0.049	34	0.887
9	0.062	36	0.944
10	0.077	38	1.108
11	0.093	40	1.227
12	0.110	44	1.485
13	0.130	48	1.767
14	0.150	52	2.074
15	0.173	56	2.405
16	0.196	60	2.761
17	0.222	64	3.142
18	0.249	68	3.547
20	0.307	72	3.976
22	0.371	80	4.909

# The 4031 and 4037 are small mixers commonly used for small premix pilot tips.



$$\text{Mixer Orifice Area} = \text{Throat Area} - \text{Rod Area}$$

**Table 7. Available Rod Sizes**

Mixer	Rod Part Numbers = 3065-__ _RA																
3065-0	0	5	6	7	8	9											
3065-1	0*	4	5	6	8	9	10	11									
3065-2	0*	4	5	6	8	9	10	11	12	13							
3065-3	0*	4	5	6	7	8	9	10	11	12	13	14					
3065-4	0*	5	6	7	8	10	11	12	13	14	15	16	17	18			
3065-5	0*	6	8	9	10	12	13	14	15	16	17	18					
3065-6	0*	6	7	9	10	12	13	14	15	16	18	20	22	24			
3065-7	0*	4	10	12	14	15	16	18	20	24	26	28	30	32	34*	36*	38*
3056-8	0*	15	16	20	24	28	32	36	40*	44*	48*	52*	56*	60*	64*	68*	72*
3065-9	0	24	32	40	48	56	64	72	80								

Rod Sizes #15 and smaller are solid, #16 (1/2"Ø) and larger are tubular.

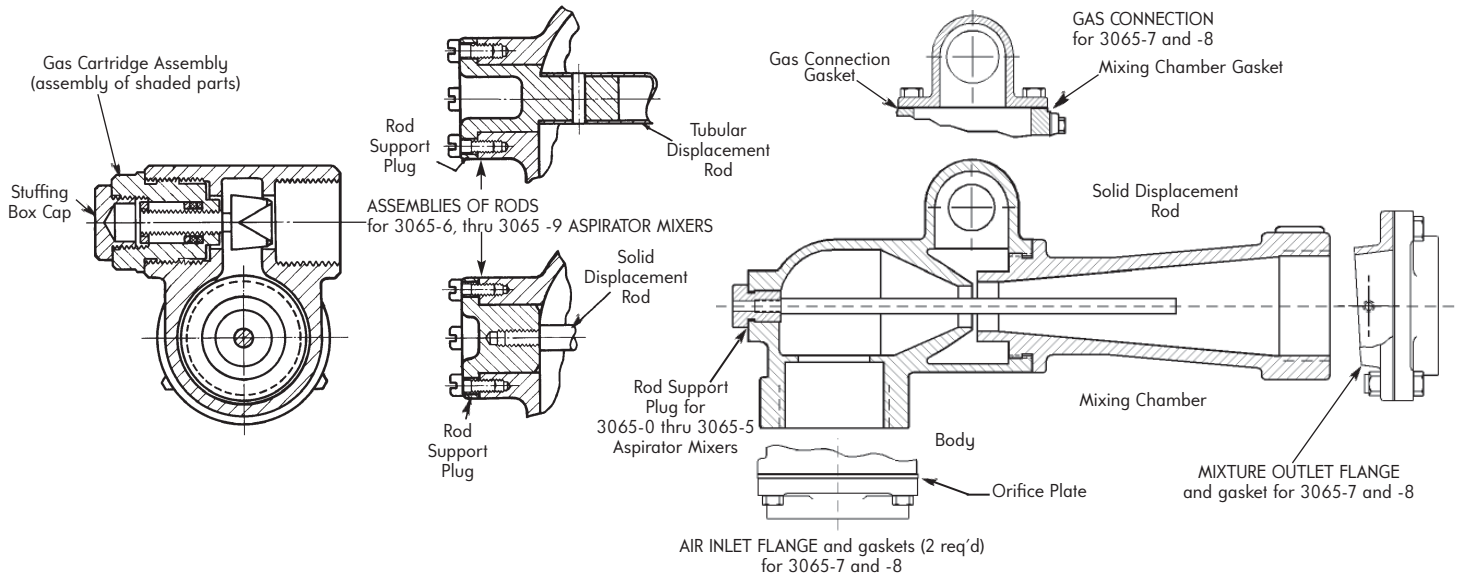
The "0" size is a plug only.

\*These rods are available with a centerline observation port.

To order a mixer with an observation port add "OP" to the part number. *Example: 3065-7-S36OP*

To order a Rod only with observation port ad "OP" to the part number. *Example: 3065-8-68RAOP*

# Part List 3056 Aspirator Mixers - Table 8



**Table 8. 3065, 3065- -S and 3065- -K (All Iron/Steel) PARTS LIST**

Part Name	Mixer designation									
	3065-0 3065-0-K	3065-1 3065-1-K	3065-2 3065-2-K	3065-3 3065-3-K	3065-4 3065-4-K	3065-5 3065-5-K	3065-6 3065-6-K	3065-7 3065-7-K	3065-8 3065-8-K	3065-9 3065-9-K
Body (3065)	4-1452-2	4-0762-2	4-0787-2	4-0789-3	4-0791-3	4-0793-3	4-0796-4	4-1147-1	4-1137-4	4-2305-1
Body (3065- -S)	—	—	—	4-0789-4	4-0791-4	4-0793-4	4-0796-5	4-1147-2	4-1137-2	—
Displacement Rod and Support Nut Assembly	Order by specifying, "3065-(code size)-(rod size RA)." Example: 3065-1-5RA -- Rod Size #5. Rod size is its diameter in thirty-seconds of an inch. (For the nut only, specify 3065-1-0RA), #16 (1/2") and larger "rods" are tubes. Rods are not available without nuts. See below for rod sizes available for each size mixer.									
Displacement Rod Plug Gasket	—	—	—	—	—	—	4-3153-1	4-31520-1	4-31530-3	4-32909-1
Flange/Air Inlet (Sq.)	—	—	—	—	—	—	—	2-2310-7	2-2310-8	—
Gasket/Air Inlet (Sq.) 2 req'd	—	—	—	—	—	—	—	4-31521-3	4-31521-4	—
Flange/Mixture (Round)	—	—	—	—	—	—	—	2-0855-1	2-0471-1	—
Gasket/Mixture (Round)	—	—	—	—	—	—	—	4-31522-2	4-31522-3	—
Gas Cartridge Assembly (3065)	4-6062-0	4-6062-1	4-6062-2	4-6062-3	4-6062-4	4-6062-5	4-6062-6	4-6062-7	4-6062-8	†
Gas Cartridge Assembly (3065- -K)	4-6065-0K	4-6065-1K	4-6065-2K	4-6065-3K	4-6065-4K	4-6065-5K	4-6065-6K	4-6065-7K	4-6065-8K	—
O-Ring ‡ (Viton)	R520-4166-V	R520-4207-V	R520-4428-V	R520-4428-V	R520-4430-V	R520-4309-V	R520-4436-V	R520-4440-V	R520-4447-V	—
Cap‡ (3065)	4-6085-1	4-6086-1	4-6086-1	4-6086-1	4-6086-1	4-6086-1	4-6087-1	4-6087-1	4-6087-1	—
Cap‡ (3065- -K)	4-6085-2	4-6086-2	4-6086-2	4-6086-2	4-6086-2	4-6086-2	4-6087-2	4-6087-2	4-6087-2	—
Gas Connection	—	—	—	—	—	—	—	4-1148-3	4-1145-3	—
Gas Connection Gasket	—	—	—	—	—	—	—	4-31523-1	4-31523-2	4-32909-2
Mixing Chamber (3065)	4-0910-1	4-0759-1	4-0788-1	4-0790-1	4-0792-1	4-0794-1	4-0797-1	4-1144-3	4-1138-5	4-1886-1
Mixing Chamber (3065- -S)	—	—	—	4-0790-2	4-0792-2	4-0794-2	4-0797-2	4-1144-4	4-1138-4	—
Mixing Chamber Gasket	—	—	—	—	—	—	—	4-31519-1	4-31529-1	4-31557-1
Orifice Plate (3065)	—	—	—	—	—	—	—	4-1151-1	4-1154-2	—
Orifice Plate (3065- -S)	—	—	—	—	—	—	—	4-1154-3	—	—
Observation port (-OBS)	—	8790-01	8790-01	8790-01	8790-01	8790-01	8790-01	R530-2028	R530-2028	—
Observation port holder (-OBS)	—	—	—	OA4-2445-3	—	—	4-54573-1	4-54573-2	4-54573-3	—

† Gas adjustment for 3065-9 Mixer is an 1122-7-F Limiting Orifice Gas Valve -- mixer price includes valve. 3065-9 price does not include companion flanges.  
 ‡ Included in Gas Cartridge Assembly, or can be ordered separately.

3065 or -S Rod Only Part Numbers = 3065- - RA  
 (Mixer not included) ————— Rod sizes (0 - 80 see Table 4 on Sheet 3065-2\_dims-pl)  
 For use in mixer size (0 -9\_)

# Aspirator Mixer Identification Guide

The intent of this section is to help people identify North American 3065 aspirator mixers. There are a number of things to know about North American product designations, and markings on castings.

1. Numbers cast into North American products are usually not product numbers. They are casting part numbers which are often used for multiple products, and machined differently.

2. Most North American products have a four digit product number. If the product is available with different capacities the number will be followed by a dash and a second one or two digit number (like 3065-3). The product is a 3065 and the capacity size is a -3. Extra characters in a product designation denote other options.

3. North American products prior to the 1970's had only two or three digit product numbers, the 3065 mixers were originally known as "65" mixers.

4. The North American capacity code is based on the air inlet pipe size:

- 0 = ¾" pipe
- 1 = 1" pipe
- 2 = 1¼" pipe
- 3 = 1½" pipe
- 4 = 2" pipe
- 5 = 2½" pipe
- 6 = 3" pipe
- 7 = 4" pipe
- 8 = 6" pipe
- 9 = 8" pipe

For -10 and above the "-" size equals the air inlet size in inches. Normally only even numbers are used.

5. Knowing the pipe size and using the dimension sheets are very helpful for identifying mixers, but sometimes there are multiple sizes with the same pipe size code.

Example: 3065-7-S mixers have higher capacity than 3065-7 mixers, but the only way to know the difference is to examine the mixer for an "S" stamp or measure the throat dimension.

## 4014 PILOT with INTEGRATED 3065 MIXER

4014 gas boosted pilots are supplied with an integrated 3065 mixer. Instead of a displacement rod there is a hollow gas tube that supplies raw boost gas to the center of the pilot, which lengthens the pilot flame. They are available in pilot sizes from 1¼" to 2½". Note that the 4014-3-BT and 4014-4-T sizes use special modified 3065 mixers, while the smaller sizes use standard 3065 mixers.

Table 9.

4014 Pilot Designation	4014 Pilot Exit Thread Size	Mixer Designation	Mixer Inlet Thread Size
4014-1-T	1¼"	3065-1	1"
4014-2-AT	1½"	3065-2	1¼"
4014-3-AT	2"	3065-3	1½"
4014-3-BT	2"	3065-4-#3	2"
4014-4-T	2½"	3065-4-#2	2"

For more information see the following product bulletins:  
Sheet 4014



4014-4-T pilot ready to ship

# Aspirator Mixer Identification

- The 4-#### number cast into the mixers are casting identification numbers, which can be machined internally to different sizes. So these numbers alone do not always identify the mixer size, see table below.
- The product number "3065" or "65" and the North American pipe code is cast into the side close to the air pressure tap.
- "S" type 3065 mixers are machined with larger interior orifices to provide higher premix capacities. They should have an "S" stamped after the 3065 or 65 cast numbers, but the most reliable way to determine if a 3065 is an "S" type is to measure the air throat diameter.



3065-5



3065-3-S



**3065-Mixer displacement rods:** Mixer displacement rods are used to fine tune the capacity of the 3065 mixers.

- Rods have a number stamped on the mounting nut or flange which represents the rod diameter in 32<sup>nd</sup>'s of an inch.
- A "0" stamped on the rod mounting means there is no displacement rod attached.

Table 10.

Mixer Designation	Body Casting Number	Gas Connection Casting Number	Mixing Chamber Casting Number	Gas Cartridge*/Valve Casting Number	Body Casting Throat Diameter	Inlet Orifice Diameter
3065-0	4-1452	4-0910	—	—	0.375	5/8"
3065-1	4-0762	4-0759	—	—	0.438	13/16"
3065-2	4-0787	4-0788	—	—	0.594	1"
3065-3	4-0789	4-0790	—	—	0.719	1 1/4"
3065-3-S	4-0789	4-0790	—	—	0.844	1 7/64"
3065-4	4-0791	4-0792	—	—	0.906	1 5/8"
3065-4-S	4-0791	4-0792	—	—	1.000	1 5/8"
3065-5	4-0793	4-0794	—	4-0931	1.063	1 15/16"
3065-5-S	4-0793	4-0794	—	4-0931	1.250	2 5/8"
3065-6	4-0796	4-0797	—	4-1459	1.281	2 13/32"
3065-6-S	4-0796	4-0797	—	4-1459	1.594	3.23"
3065-7	4-1147	4-1144	4-1148	4-1364	1.750	3 5/32"(plate)
3065-7-S	4-1147	4-1144	4-1148	4-1364	2.188	3 1/4"(plate)
3065-8	4-1137	4-1138	4-1145	4-1468	2.75	4 3/4"(plate)
3065-8-S	4-1137	4-1138	4-1145	4-1468	3.313	No Plate
3065-9	None	None	—	2-3805	3.688	No Plate

Note: \*Some gas cartridge castings do not have visible identifying numbers.

# 3/4" 4000 Series Pilot Mixer Identification

Pilot mixers are small aspirator mixers used to supply an air/gas premix to a burner pilot. Multiple pilot tips are sometimes feed from a single 3065 aspirator mixer, but it is more common and reliable to feed small 3/4" pilot tips with a single small 3065 or a 4000 series pilot mixer.



For more information see the following product bulletins:

- Bulletin 4011/4021
- Sheet 4031-1

**4031** 3/4" pilot mixer, it has the following characteristics:

- 3/4" NPT air inlet labeled "AIR"
- 3/4" NPT premix outlet labeled with an arrow showing flow direction
- 3/8" NPT gas inlet labeled "GAS"
- 1/8" NPT pressure taps for air inlet and outlet premix pressures
- A slotted screw and locking nut for gas adjustment
- The classic round NA logo with a flame
- The text "PILOT MIXER" and "4-6131"
- The 4-6131 number is a casting identification number

The 4031 is the most popular North American pilot mixer, and is suitable for use with all North American 3/4" premix pilot tips when cross-connected to a pilot regulator like the 7350.

The mixers below are obsolete and can be replaced with the 4031



**4035-01 / 4031V-01** 3/4" pilot mixer:

- 1/2" NPT air inlet labeled "AIR"
- 1/2" NPT premix outlet labeled with an arrow showing flow direction
- 3/8" NPT gas inlet labeled "GAS"
- A red rectangle tag with the text "4035" and "PILOT MIXER"
- On one side the text "NORTH AMERICAN MFG. CO."
- On the other side the text "CLEVELAND OHIO"
- The casting identification part number "4-3337"
- The "4035V-01" type has a screw to adjust gas flow

**4035-02 / 4035V-02 / 152 / 153** 1/2" pilot mixer:

- 3/8" NPT air inlet labeled "AIR"
- 1/2" NPT premix outlet labeled with an arrow showing flow direction
- 1/4" NPT gas inlet labeled "GAS"
- On one side the text "NORTH AMERICAN MFG. CO."
- On the other side the text "CLEVE OHIO"
- The "4035V-02" type has a screw to adjust gas flow
- The casting identification part number "4-2729"

**WARNING:** Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

## CONTACT US:

