

Installation Instructions

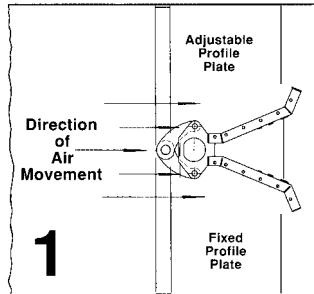
General

Important: Do not discard packing material until all loose items are accounted for.

Avoid bending or damaging the steel mixing plates of your Series NP-LE AIRFLO® Burner during uncrating and installation.

These burners are used for the heating of fresh air in motion. Mount the burners so they fire parallel to and in the same direction as the movement of the air (see sketch 1 at right).

Velocity and flow of air at operating temperature must be uniform. Minimum silhouette profile plates of 6" should be installed in duct to completely surround burner assembly.



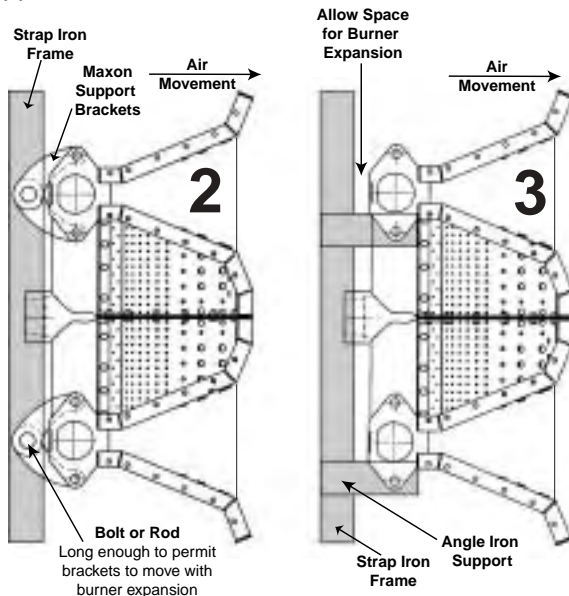
Supports

Series NP-LE AIRFLO® Burner assemblies must be adequately supported and positioned.

Avoid rigid mounting. Burner assembly expands and contracts with temperature variations.

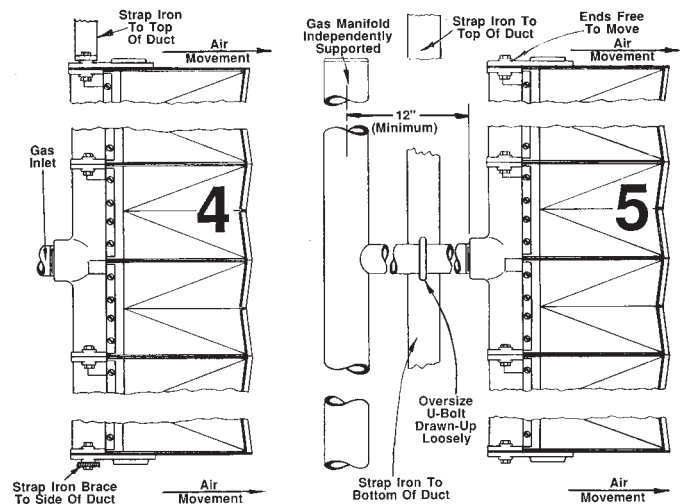
Maintain smooth, even air flow over the burner by designing supports to provide minimum interference, deflection and turbulence.

The sketches below show typical installation and support methods:



Sketch 2 shows the burner suspended from a strap iron frame using Maxon USB support brackets. Note that rigid mounting is avoided by the bracket hole which slips loosely over a bolt or steel rod attached to the support. Gas piping would need independent support.

Sketch 3 shows the burner assembly resting upon angle iron brackets and not attached to them in any way. Be sure the angle iron supports allow the burner flanges to expand and contract. Gas manifolding would be independently supported and prevent forward movement of the burner.



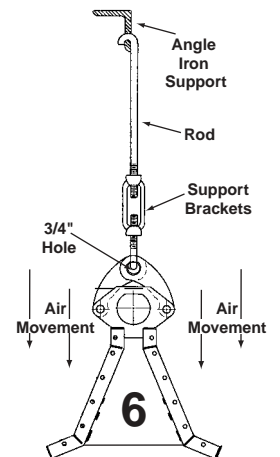
Sketch 4 shows simple strap iron used to support the burner. Note that narrow edge of strap faces air flow to avoid undue turbulence.

Sketch 5 shows gas manifolding used to support the burner. If there are multiple inlets, you must avoid rigid connection by using the oversize U-bolt (loosely drawn up) illustrated.

Support for down-fired burners can be accomplished as shown in the illustration at right. Always avoid rigid mounting.

Sketch 6 shows Maxon USB support brackets suspending the burner from an overhead angle iron.

Sketch 7 shows an alternate arrangement which offers the advantage of more controlled positioning.



Installation Instructions (cont'd.)

Gas Train

See piping layout below to identify various typical system components.

Pipe size of gas line must be large enough to assure ample fuel pressure at maximum system capacity. Burner capacity is totally dependent on fuel differential being maintained. (See capacity/specification data for the actual fuel pressure required at the burner to achieve its rated capacity.)

Clean fuel lines are essential to prevent blockage of pipe train components or burner gas ports. All dirt, scale and pipe dope should be blown out of any gas line before actually connecting to the burner system.

Main shut-off cock should be upstream of both system regulator and pilot line take-off. Use it to shut off fuel to both pilot and main burner during extended shutdown periods. Maxon Control Valves are not intended for tight shutoff. Main system shut-off should always be accomplished with a manual fuel cock.

Main gas regulator is essential to maintain a uniform system supply pressure. A separate regulator should be provided in the branch leading to each burner system if more than one is served by a common main. Size regulator for full system capacity at required pressure, including pipe train losses.

The gas train piping illustrated should be installed as close to the burner as possible.

Pilot take-off should be upstream of main gas regulator, but downstream of main gas cock. It normally includes pilot shut-off cock, pilot gas regula-

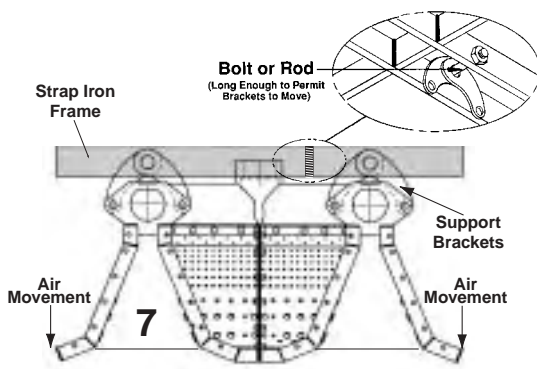
tor and pilot solenoid valves. For pilot adjustment, a fixed orifice, or adjustable orifice is recommended at or near the pilot gas inlet.

Fuel shut-off valves, when properly wired to a safety control system, shuts the fuel supply off when a hazardous operating condition is sensed by your control circuit. Manual reset valves require operator attendance each time the system is started up (or restarted after a trip-out). Motorized shut-off valves permit automatic start/restart when used with appropriate control system.

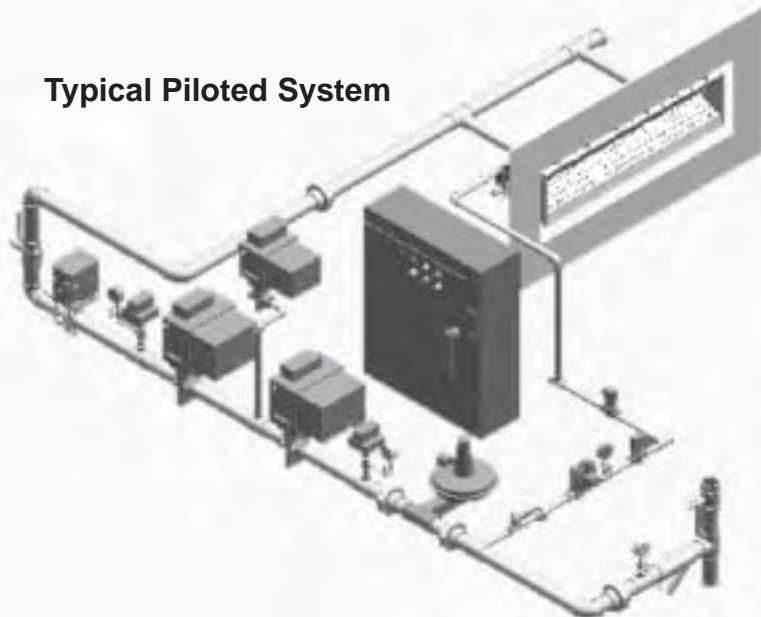
Fuel control valve controls burner heat release by throttling gas flow to it. It should include provision for an adjustable minimum and throttling over a turndown range that matches burner capabilities. The illustration shows a Series "CV" Flow Control Valve; but adjustable gradient SYNCHRO® and/or "Q" Flow Control Valves may be used.

Gas pressure test connections are provided in most Series NP-LE Burner end plate sets, but it is also helpful to provide an additional test connection in the piping between main gas regulator and fuel control valve. All connections must be plugged unless an actual pressure measuring device (gauge or manometer) is being used.

Maxon assumes no responsibility for the use or misuse of the piping layouts shown. Specific piping and wiring diagrams should always be submitted to the appropriate agencies for approval on each application.



Typical Piloted System



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Start-Up Instructions

Read complete instructions before proceeding, and familiarize yourself with **all** the system's equipment components. Verify that your equipment has been installed in accordance with the original manufacturer's current instructions.

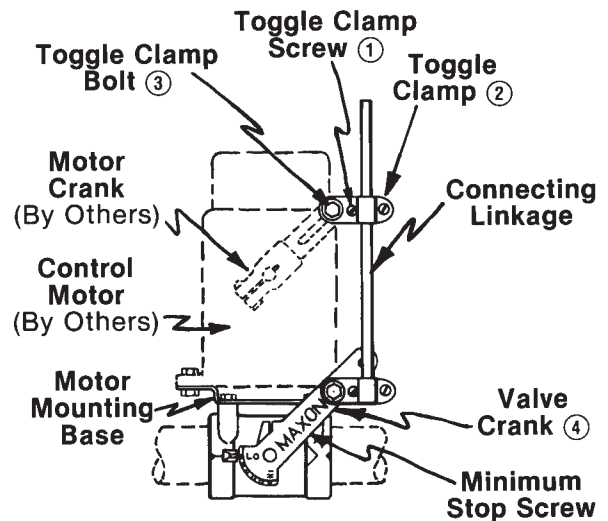
CAUTION: Initial adjustment and light-off should be undertaken only by trained and experienced personnel familiar with combustion systems, with control/safety circuitry and with knowledge of the overall installation. Instructions provided by the company and/or individuals responsible for the manufacture and/or overall installation of complete system incorporating Maxon burners take precedence over these provided by Maxon. If Maxon instructions conflict with any codes or regulations, contact Maxon Corporation before attempting start-up.

For initial system start-up:

1. Close all burner fuel valves and/or cocks. Make preliminary adjustments to fuel regulators.
2. Check all electric circuitry. Verify that all safety devices and interlocks are operable and functioning within their respective settings/ranges. Be sure all manifolds are tight and that test ports are plugged if not being used.
3. Check that all duct and chamber dampers are properly positioned and locked into operating positions.
4. Start main volume air fan. Check for proper motor rotation and impeller direction. Verify all safety interlocks are working. Allow air handling equipment to run adequate purge of manifold and combustion chamber plenums. Verify air volume and velocity across burner element to be within burner operating specifications.

CAUTION: Do not by-pass control panel timers typically controlling sequential operations.

5. Disconnect the automatic control motor linkage from your Maxon Control Valve by loosening the control motor's connecting rod from the valve's toggle linkage. Initial start-up adjustment should only be accomplished during a "manual" control mode. Manually set and secure control valve in its "minimum" position.



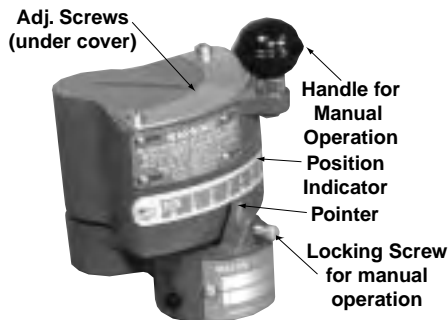
Typical Control Motor

6. To light and adjust gas pilot: Pilot gas regulator should initially be set at 2-5" wc. With pilot gas solenoid valves closed, open main fuel gas and pilot gas cock. Energize spark ignitor and open pilot gas solenoid. Turn adjustable orifice screw out (counter-clockwise) several turns from its fully seated position or adjust regulator pressure when fixed orifice is used. Observe pilot ignition through a sight port and/or by viewing micro-amp signal metered from flame safeguard relay circuit. Refine pilot setting for a hard blue flame (and/or strongest micro-amp signal) by adjusting gas flow through pilot orifice and/or pilot regulator.
7. Prepare to ignite main burner by adjusting main gas regulator to approximately midpoint of its adjustment range. Linkage arrangement for the use of Series "CV" Gas Control Valve is illustrated above for a typical control motor. Arrange accordingly.
8. With control valve at "minimum," ignite main burner by opening main fuel shut-off valves. Adjust main gas regulator to give the desired outlet pressure. Refine pilot adjustment if it has been affected. Adjust burner "minimum" by turning in on the minimum stop screw of the gas control valve until stable flame appears in the narrow zipper channel at the base of burner mixing plates.

Start-Up Instructions (cont'd.)

A good minimum fire should provide uniform flame across the entire burner face, contained within the zipper flame channel at the base of burner mixing plates. Any thin spots or gaps indicate uneven air velocity over the burner which must be corrected or a higher minimum fire established by continuing to turn in on the minimum stop screw. (See drawing on page 5550-S-2.)

NOTE: If your Maxon NP-LE AIRFLO® Burner was furnished with an adjustable gradient type **Series "Q" or SYNCHRO® Control Valve** instead of a **Series "CV" Valve**, refer to **step 8A through 8I** for specific instructions and differences in adjustment procedures. **For Series "CV" Valves, skip to step 9.**



- A. From step #5, the automatic control motor linkage has already been disconnected from your adjustable gradient type control valve and the valve is at its "minimum" position.
- B. Open fuel supply and begin adjustment of appropriate adjustable gradient valve by turning in minimum (or lowest numbered) screw until desired flame is achieved. (Main fuel regulator may need adjusted at this point.)
- C. Once your flame is established and refined at this position, and without advancing the screw carrier quadrant higher, screw all remaining screws down to at least the same level as your first adjusted screw.
NOTE: A preliminary setting can be established with all the remaining adjusting screws. Generally, each succeeding screw needs to be screwed in approximately one full turn deeper than its preceding screw. A smooth "stair-step" gradient pre-set at this point from low to high will simplify the

remaining adjustment steps.

- D. Without advancing the SYNCHRO® Valve quadrant, screw down on #2 screw (one or two turns). Then slowly advance the SYNCHRO® Valve quadrant to the #2 position. Refine flame appearance at this new position #2.
 - E. Turn all higher-numbered screws in at least as far as the one just adjusted, then turn next one in as necessary to achieve desired flame while rotating valve mechanism to that position on indicator strip.
 - F. Repeat for each remaining screw.
NOTE: To avoid possible damage to cam strips, always turn all higher-numbered screws in as far as the last one adjusted.
 - G. Refine adjustment as needed, always turning valve so that position indicator matches screw being adjusted.
For more fuel, turn screw in (clockwise). for less fuel, turn screw out (counter-clockwise). If screws must be turned in flush with carrier casting, increase fuel pressure and readjust by starting at minimum over again.
 - H. Cycle system off and on, and through all firing rates until satisfied with performance.
 - I. Reconnect control motor linkage and check that operator does not "bind" and that all interlocks are performing properly.
9. Adjust burner "high fire" by slowly rotating fuel control valve crank arm towards its maximum. Observe flame characteristics carefully. Flame should remain a bright blue color with a length beyond the mixing plates as indicated in capacity/specification data. If flame becomes long and yellow, gas pressure is too high and/or air velocity is too low.
NOTE: Dust and/or chemicals entrained into passing air stream may effect physical color of flame. In this case, adjust burner for stable flame shape and geometry.
To measure gas pressure, connect water column (manometer) to the test connection in burner's end plate. To determine air velocity, use a velometer at the profile opening. Correct velocities by increasing or decreasing profile opening size.
If flame is too short, gas pressure may be too low and should be increased or velocities are too high and may need to be decreased. **Note that air velocities should be measured only when the fan is handling air at the desired control temperature.**



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Start-Up Instructions (cont'd.)

The desired maximum capacity may be achieved with less than full control valve opening. Mark with a pencil or scribe the point on valve crank arm where the desired maximum is obtained, then return crank arm to low position and shut system off.

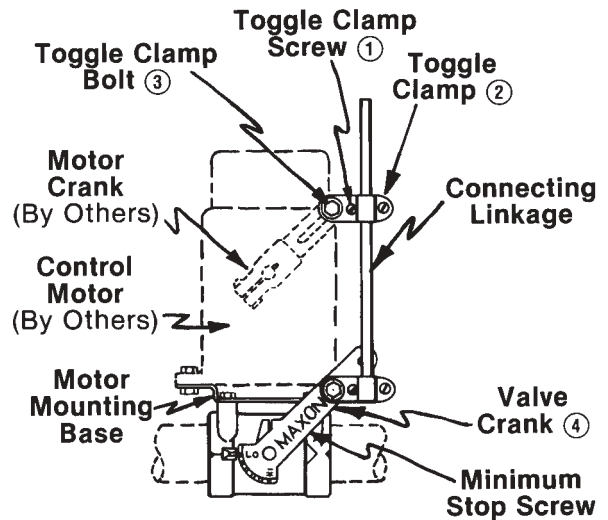
10. **If using Maxon Series "CV" Valve**, reconnect control motor linkage (with control motor in low or minimum position) by loosening toggle clamp screw **1** and moving toggle clamp **2** along the connecting linkage to a point where toggle clamp bolt **3** can be placed at the outermost position of control motor crank slot. Then tighten toggle clamp screw **1**, thus fixing clamp to linkage.

Allowing toggle clamp bolt **3** to slide in the crank arm slot, cycle control motor towards its maximum position and move fuel control valve crank **4** to the previously-determined maximum firing rate position. Tighten toggle clamp bolt **3**, thus fixing clamp to motor crank.

Cycle control motor back to minimum, watching carefully that it does not bind before reaching minimum.

If it is stopped or if minimum is not reached, loosen toggle clamp screw **1** and move toggle clamp along the connecting linkage so both motor and valve can assume their minimum positions. Then retighten toggle clamp screw **1**.

Refine adjustment by cycling several times between low and high control motor position while readjusting toggle clamp bolt **3** as necessary until control motor travels through its full cycle while moving control valve crank arm from its minimum only up to the desired maximum previously determined.



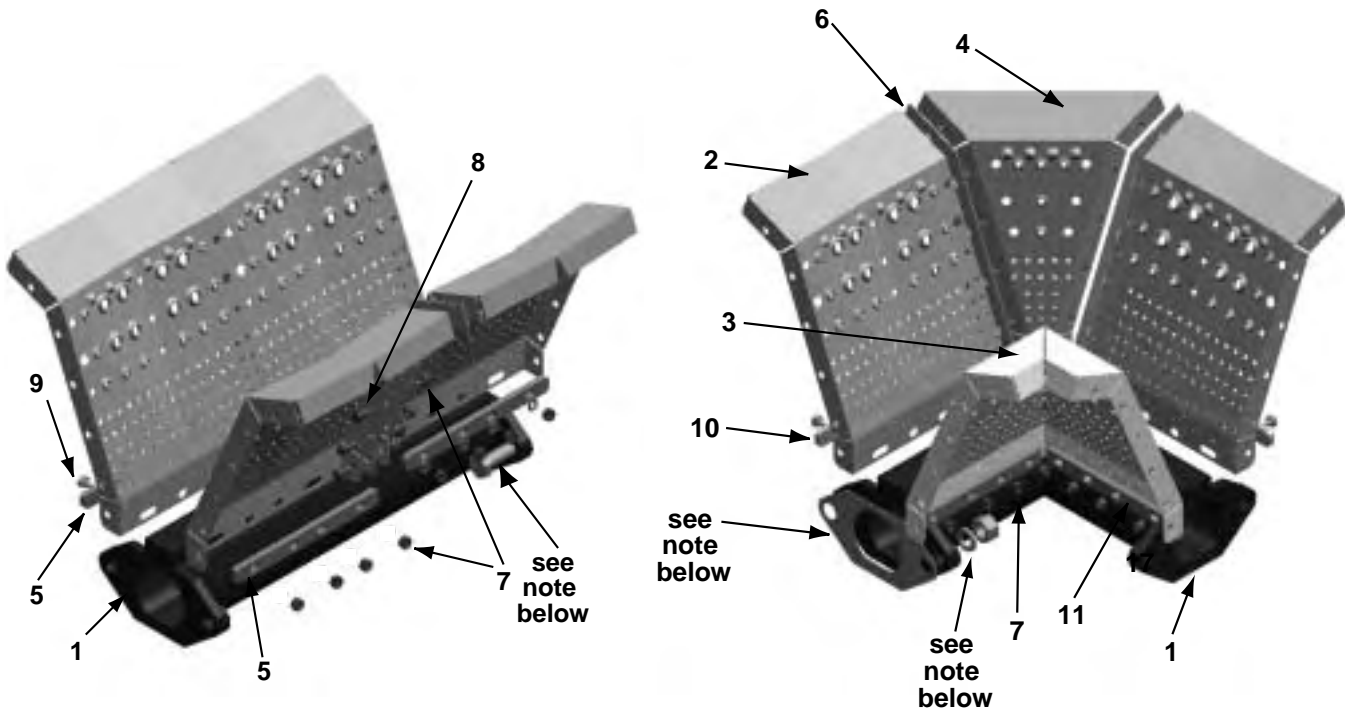
Typical Control Motor

11. Relight burner and cycle control system from low to high fire several times to observe performance. Refine adjustments of pilot and main burner minimum if necessary.

Warning: Test every UV Flame Sensor System for dangerous spark excitation from ignitors and other burners, as well as other possible sources of direct or reflected UV radiation.

12. Check carefully that all interlocks and limits are in full operating condition. Before system is placed into full service, instruct operator personnel on proper start-up, operation and shut-down of system. Establish written instructions for reference.

Maintenance and Component Identification/Spare Parts NP-1-LE



To order replacement parts:

1. See burner nameplate and indicate burner type.
2. Sketch burner arrangement (as viewed from casting side).
3. Specify replacement items required from diagrams above.
4. Specify quantity of each and assembly numbers from table below:

Item No.	Quantity Required for Indicated Section								Part Description	
	6" Str. 1050373	12" Str. 1050376	18" Str. 1050373 + 1050376	24" Str. 1050376	12" x 6" Tee 1050387	6" x 6" Elbow 1050389	12" B.I. 1050385	36" B.I. 1050390	Asby. No.	Burner Body
1										
2	2	4	6	8	2	2	4	4	1049073	Mixing Plate
3					2	1		4	1052004	Mixing Plate: Inside Corner
4						1			1049075	Mixing Plate: Wedge
5	2	4	6	8			4		18049	Back Up Bar
6	2	2	2	4	1	2	2	4	1049071	Gasket/Shim (Metal)
7	4	20	24	48	18	20	20	48	1051567	M5 K-Nut Plated
8		12	12	24	6	12	12	24	1051583	M5 x 10 ISO 4017 Plated Hex Bolt
9	4	8	12	16	12	8	8	24	1051570	M5 x 45 ISO 4017 Plated Hex Bolt
10					2	2		4	1050679	Outside Corner Back Up Bar
11					4	2		8	1050672	Inside Corner Back Up Bar

NOTE: These items included with fastener kits. See pages 5567 & 5568 for fastener kit details.

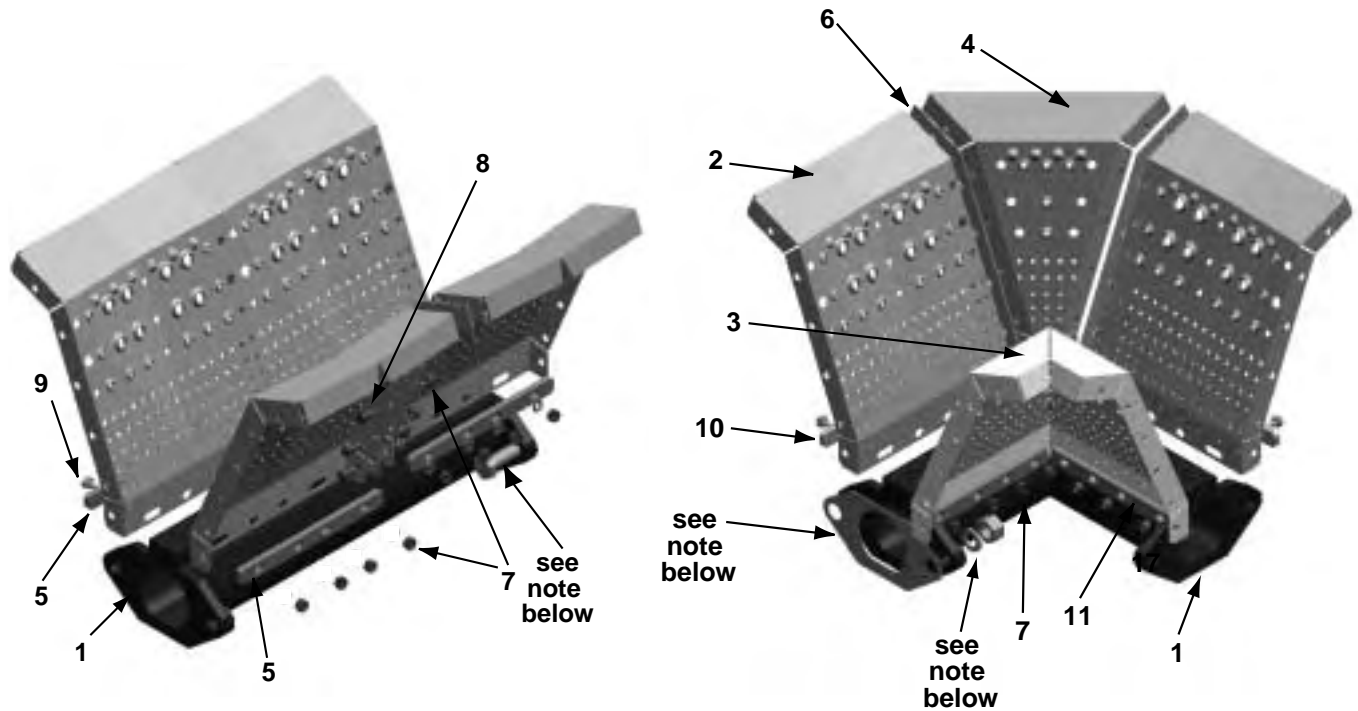


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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Maintenance and Component Identification/Spare Parts NP-1-LE-AL



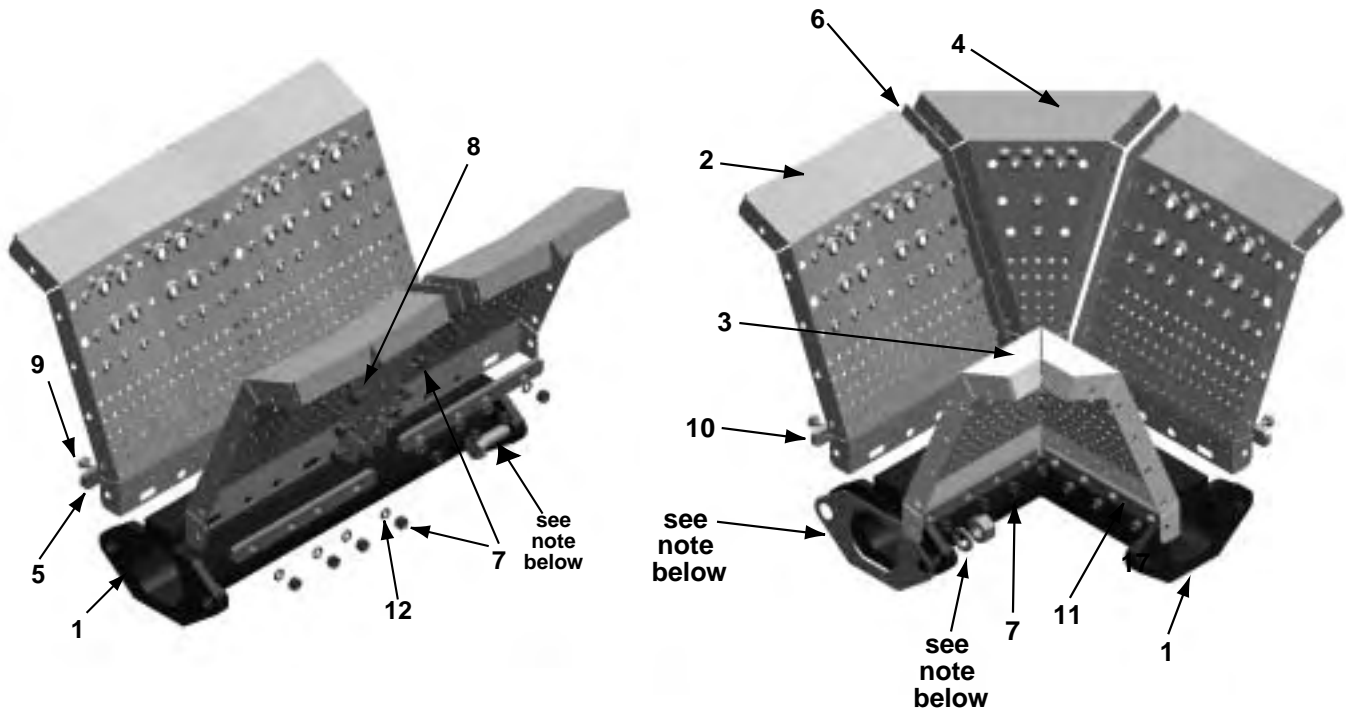
To order replacement parts:

1. See burner nameplate and indicate burner type.
2. Sketch burner arrangement (as viewed from casting side).
3. Specify replacement items required from diagrams above.
4. Specify quantity of each and assembly numbers from table below:

Item No.	Quantity Required for Indicated Section						Part Description	
	6" Str. 1050375	12" Str. 1050384	12" x 6" Tee 1050388	6" x 6" Elbow ---	12" B.I. 1050386	36" B.I. 1050391	Asby. No.	Burner Body
1								
2	2	4	2		4	4	1049073	Mixing Plate
3			2			4	1052004	Mixing Plate: Inside Corner
4							1049075	Mixing Plate: Wedge
5	2	4			4		18049	Back Up Bar
6	2	2	1		2	4	1049071	Gasket/Shim (Metal)
7	4	20	18		20	48	1051567	M5 K-Nut Plated
8		12	6		12	24	1051583	M5 x 10 ISO 4017 Plated Hex Bolt
9	4	8	12		8	24	1051570	M5 x 45 ISO 4017 Plated Hex Bolt
10			2			4	1050679	Outside Corner Back Up Bar
11			4			8	1050672	Inside Corner Back Up Bar

NOTE: These items included with fastener kits. See pages 5567 & 5568 for fastener kit details.

Maintenance and Component Identification/Spare Parts NP-1-LE-AL-SS



To order replacement parts:

1. See burner nameplate and indicate burner type.
2. Sketch burner arrangement (as viewed from casting side).
3. Specify replacement items required from diagrams above.
4. Specify quantity of each and assembly numbers from table below:

Item No.	Quantity Required for Indicated Section						Part Description	
	6" Str. 1050375	12" Str. 1050384	12" x 6" Tee 1050388	6" x 6" Elbow 1050389	12" B.I. 1050386	36" B.I. 1050391	Asby. No.	
1								Burner Body
2	2	4	2		4	4	1049073	Mixing Plate
3			2			4	1052004	Mixing Plate: Inside Corner
4							1049075	Mixing Plate: Wedge
5	2	4			4		45613	Back Up Bar (Aluminum)
6	2	2	1		2	4	1049071	Gasket/Shim (Metal)
7	4	20	18		20	48	1051566	M5 Nut Stainless Steel
8		12	6		12	24	54619	M5 x 10 ISO 4017 Hex Head Screw (Stainless Steel)
9	4	8	12		8	24	1051569	M5 x 45 Hex Head Screw Class A (Stainless Steel)
10			2			4	1050680	Outside Corner Back Up Bar (Aluminum)
11			4			8	1050673	Inside Corner Back Up Bar (Aluminum)
12	4	20	18		20	48	1051853	M5 Stainless Steel Lockwasher

NOTE: These items included with fastener kits. See pages 5567 & 5568 for fastener kit details.

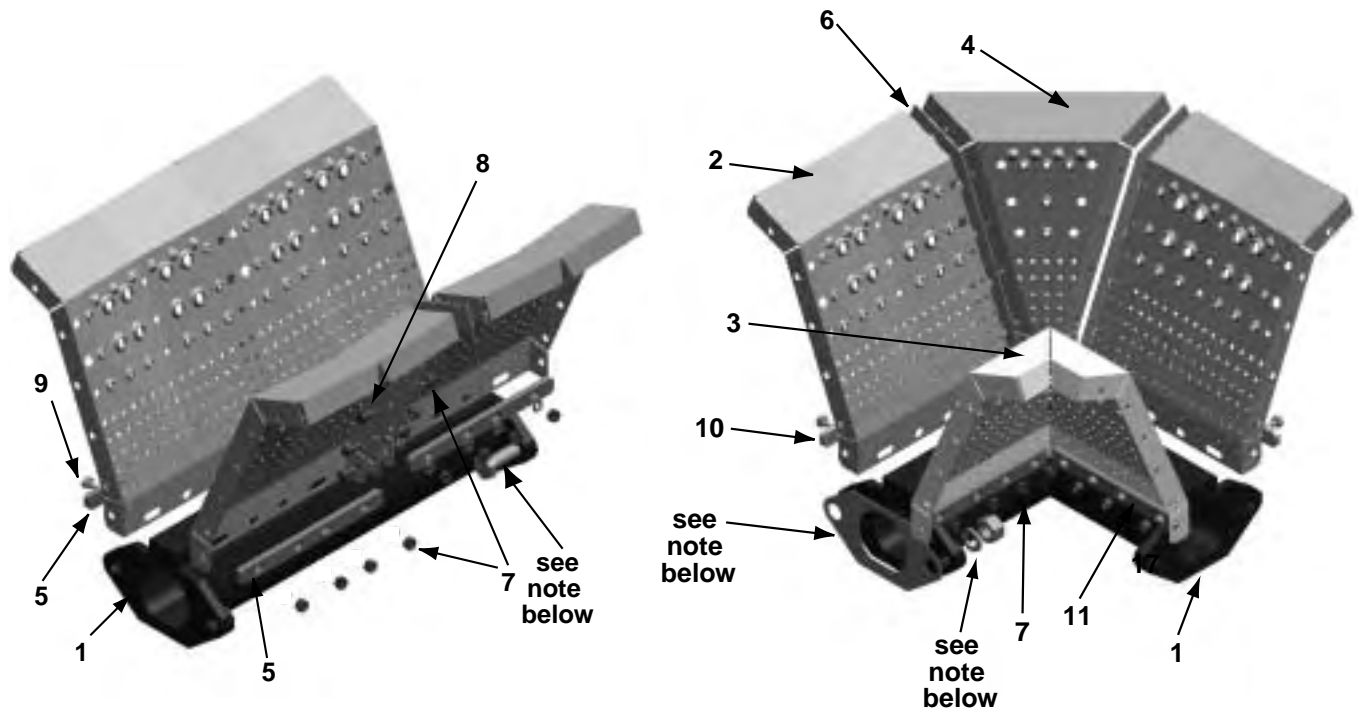


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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES

Maintenance and Component Identification/Spare Parts NP-2-LE



To order replacement parts:

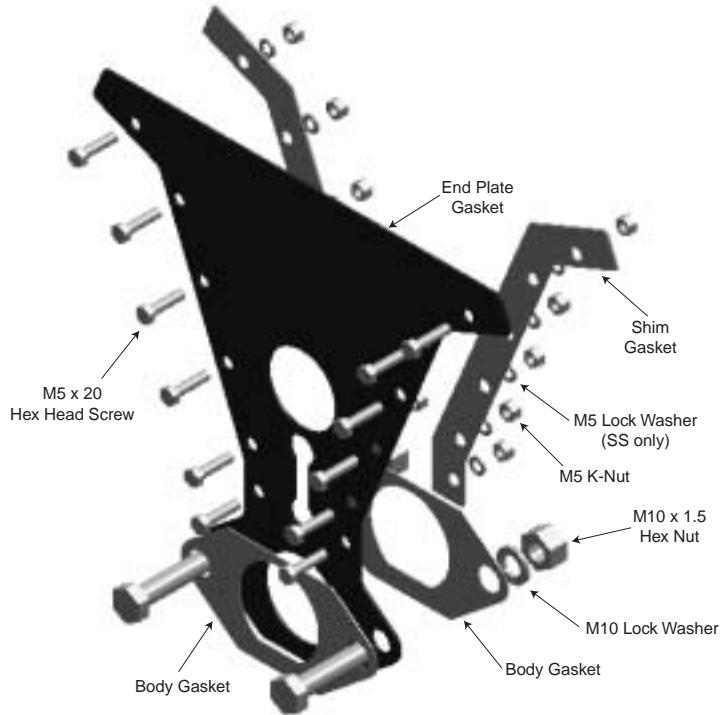
1. See burner nameplate and indicate burner type.
2. Sketch burner arrangement (as viewed from casting side).
3. Specify replacement items required from diagrams above.
4. Specify quantity of each and assembly numbers from table below:

Item No.	Quantity Required for Indicated Section								Part Description	
	6" Str. 1051634	12" Str. 1051636	18" Str. 1051634 + 1051636	24" Str. 1051636 (qty. 2)	12" x 6" Tee 1051640	6" x 6" Elbow 1051644	12" B.I. 1051638	36" B.I. 1051642	Asby. No.	Burner Body
1										
2	2	4	6	8	2	2	4	4	1049073	Mixing Plate
3					2	1		4	1052004	Mixing Plate: Inside Corner
4						1			1049075	Mixing Plate: Wedge
5	2	4	6	8			4		18049	Back Up Bar
6	2	2	2	4	1	2	2	4	1049071	Gasket/Shim (Metal)
7	4	20	24	40	18	20	20	48	1051567	M5 K-Nut Plated
8		12	12	24	6	12	12	24	1051583	M5 x 10 ISO 4017 Plated Hex Bolt
9	4	8	12	16	12	8	8	24	1051570	M5 x 45 ISO 4017 Plated Hex Bolt
10					2	2		4	1050679	Outside Corner Back Up Bar
11					4	2		8	1050672	Inside Corner Back Up Bar

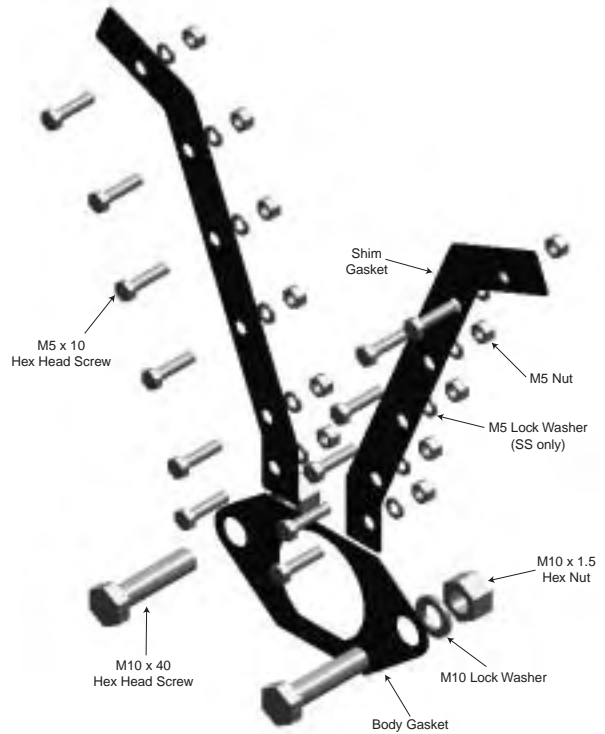
NOTE: These items included with fastener kits. See pages 5567 & 5568 for fastener kit details.

Maintenance and Component Identification/Spare Parts Fastener Kits

End Plate Fastener Kit



Body to Body Fastener Kit



Replacement Items	Assembly Numbers			
	NP1LE	NP1LEAL	NP1LEALSS	NP2LE
Flange to Flange Fastener Kit (includes gaskets)	1051879	1051879	1051880	1051879
End Plate to Flange Fastener Kit (includes gaskets)	1051881	1051881	1051882	1051881
Body Gasket	1050424	1050424	1050424	1050424
Metal Shim Gasket	1049071	1049071	1049071	1049071
Metal End Plate Gasket	1050423	1050423	1050423	1050423
LT Plain End Plate to Flange Gasket Kit	1057896	1057896	N/A	1057896
LT Pilot End Plate to Flange Gasket Kit	1057893	1057893	N/A	1057893
LT - Metal End Plate Gasket - Pilot	1056603	1056603	N/A	1056603
LT - Metal End Plate Gasket - Plain	1056604	1056604	N/A	1056604



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Maintenance Instructions

Periodic maintenance will insure continued trouble-free operation of your Series NP-LE AIRFLO® Burner system.

At least a yearly inspection is recommended for make-up air heating installations and more frequently for process applications in year-round operation. Your own experience is the best guide in determining frequency of inspection. As a minimum, the following procedure should be followed:

1. Shut the system down totally. Disconnect or lock out power supply so there can be no accidental start-up during inspection.
2. Inspect the burners carefully, including upstream and downstream sides of mixing plates as well as burner body face. Any accumulation of scale or foreign material on either side of the mixing plates should be removed with a wire brush. Check

visually that no holes in the mixing plates are blocked. See next page (5550-S-12) for inspection and maintenance instructions for gas ports.

WARNING: Do not enlarge burner ports or performance may be drastically affected.

If any mixing plates are loose or missing fasteners, tighten/replace as necessary. Always use zinc plated or stainless metric fasteners.

3. Put system back into operation and, if possible, view from downstream side while cycling burner through full firing range. This will give a visual check for blocked burner ports.
4. Observe flame pattern and, if necessary, take steps to correct velocity and/ or air distribution problems.

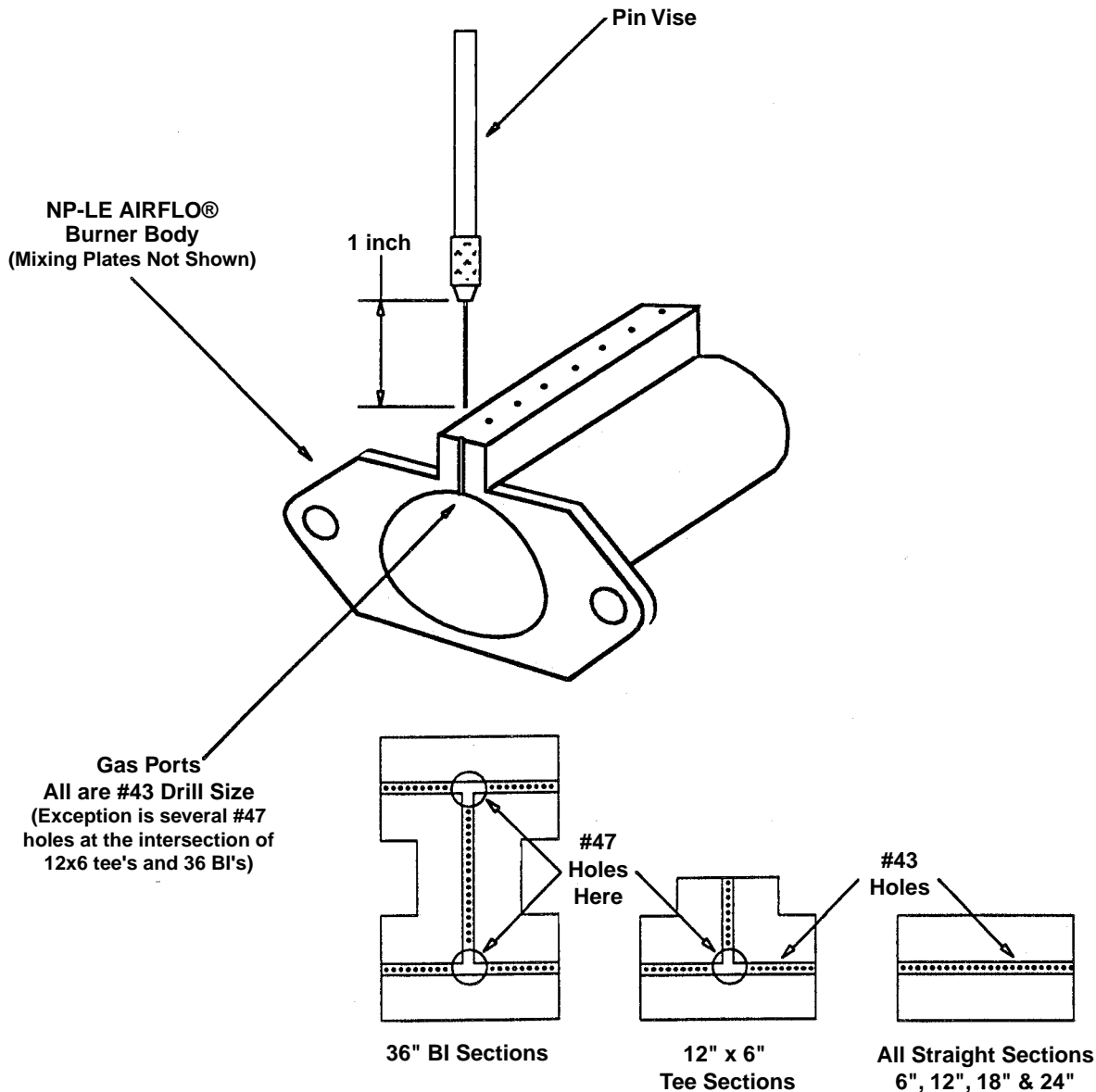
Repair / Replacement Procedures

If adverse operating conditions or accidental damage make it necessary to replace either individual mixing plates or complete burner sections, follow this procedure:

1. Identify necessary replacement parts from component identification drawings on preceding pages, then order required quantities of each. Consider carefully the economics of installing a complete replacement burner instead of replacing individual parts. Once exposed to actual flame temperatures, burner castings harden and the removal and replacing of fasteners can be time consuming and difficult. Accessibility may also be severely limited requiring removal of complete assembly in any case.
2. When necessary parts have been received, remove damaged mixing plates or burner sections, taking care not to damage remaining portion of burner. If new burner bodies are being installed, place body gasket on the mating flanges of loose cast iron bodies. (This is necessary to provide a gas-tight seal after assembly.) Insert new section into place, making sure that both flanges are square and flush, then bolt sections together.
3. Install new mixing plates, back up bars and plate support brackets to the new body castings.
4. If end plate sets must be installed, put in position between mixing plates and insert fasteners loosely. Do not tighten at this time.
5. Tighten burner body bolts making sure that mating cast iron flanges remain square and flush.
6. Align mixing plates and check that body gaskets are in position and properly aligned. Tighten all mixing plate mounting screws and bolts.
7. Double check that all fasteners are secure.
8. Return burner to operation, observing flame carefully at all firing rates.

Inspection and Maintenance of Gas Ports

- Conduct initial inspection within the first month after commissioning. Visually check the gas ports of new burner assemblies for any piping scale or debris. Use Pin Vise with drill bit to remove.
- Annual inspections are normally adequate once the initial piping debris is removed. The operating conditions of the burner will determine how frequently maintenance is actually required.
- Use of an electric drill motor is not suggested unless both Pin Vise and Drill (as shown below) can be chucked up in a vari-speed drill unit. Use caution, because it is easy to snap the bits off in a port when using a drill motor. Removal of broken bits from the gas ports is difficult.
- Contact your Maxon representative to answer questions or address any problems.



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INDUSTRIAL COMBUSTION EQUIPMENT AND VALVES