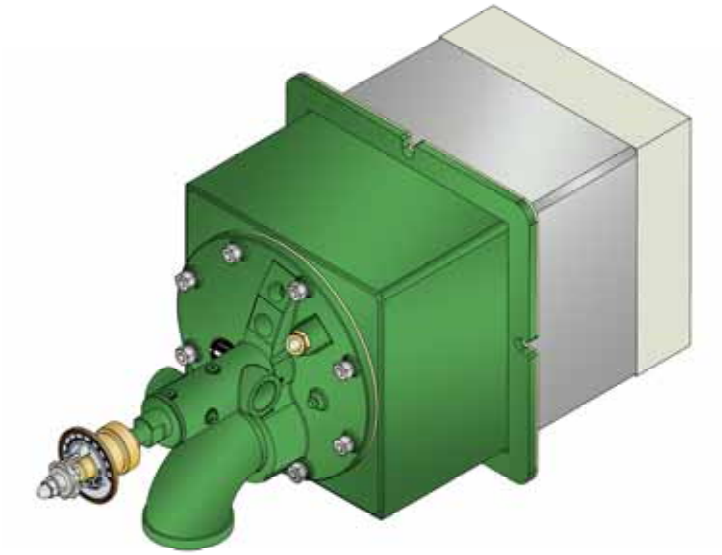
SVC SUPER VERSATILE COMBINATION BURNER



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

TABLE OF CONTENTS

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.

WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The SVC Super Versatile Combination Burner is designed for applications that require dual fuel burner flexibility without sacrificing the advantages of combustion gas recirculation, increased efficiency and improved temperature uniformity resulting from the high exhaust gas exit velocity. The SVC Super Versatile Combination Burner fires any clean industrial fuel gas or No. 2 fuel oil. The air staging design produces lower NO_x emissions.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

			MODEL NUMBER				
SPECIFICATIONS			**115**	**120**	**125**	**130**	**140**
HIGH FIRE	**Max. Input @ 10% Excess Air (Btu/hr)**		**407,000**	**626,000**	**1,050,000**	**1,220,000**	**2,170,000**
	Max. Air Flow @ 16 osig	(scfh)	4,210	6,480	10,900	12,600	22,500
	Max. Excess Air	(%)	1,450	1,200	1,460	1,930	4,000
	Flame Length @ Max. Input	(in.)	24	24	30	46	62
LOW FIRE	**Max. Input @ 10% Excess Air (Btu/hr)**		**56,100**	**90,800**	**117,000**	**135,000**	**251,000**
	Air Flow @ 0.17 osig	(scfh)	580	940	1,210	1,400	2,600
	Max. Excess Air	(%)	650	400	430	730	500

NOTES:

1. Capacities based on natural gas with HHV of 1034 Btu/ft^3, 0.59 S.G., and an stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure.
2. Air and gas flows based on 60°F @ sea level.
3. Static air pressures measured at the burner air inlet pressure tap.
4. Flame lengths measured from the end of the burner tile.
5. All data based on industry standard air and gas piping practices.
6. A lean air/fuel ratio is recommended at low fire.
7. Burners can be operated up to a static air pressure of 20 osig; consult Hauck.

Table 1. Capacities for Natural Gas Operation

C. CAPACITIES (Continued

			MODEL NUMBER				
SPECIFICATIONS			**115**	**120**	**125**	**130**	**140**
HIGH FIRE	**Max. Input @ 10% Excess Air (kW)**		**108**	**166**	**278**	**323**	**574**
	Max. Air Flow @ 6900 Pa	(nm^3/hr)	113	174	292	338	603
	Max. Excess Air	(%)	1,450	1,200	1,460	1,930	4,000
	Flame Length @ Max. Input	(mm)	610	610	762	1,170	1,580
LOW FIRE	**Max. Input @ 10% Excess Air (kW)**		**14.8**	**24**	**30.9**	**35.7**	**66.4**
	Air Flow @ 73 Pa	(nm^3/hr)	15.5	25.2	32.4	37.5	69.6
	Max. Excess Air	(%)	650	400	430	730	500

NOTES:

1. Capacities based on natural gas with LHV of 36.74 MJ/nm^3, 0.59 S.G., and an stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure.
2. Air and gas flows based on 0°C @ sea level.
3. Static air pressures measured at the burner air inlet pressure tap.
4. Flame lengths measured from the end of the burner tile.
5. All data based on industry standard air and gas piping practices.
6. A lean air/fuel ratio is recommended at low fire.
7. Burners can be operated up to a static air pressure of 8620Pa; consult Hauck.

Table 2. Metric Capacities for Natural Gas Operation

C. CAPACITIES (Continued

	SPECIFICATIONS		MODEL NUMBER				
			115	**120**	**125**	**130**	**140**
HIGH FIRE	**Max. Input @ 20% Excess Air**	**(Btu/hr)**	**348,000**	**558,000**	**929,000**	**1,110,000**	**1,870,000**
	Max. Air Flow @ 16 osig	(scfh)	4,060	6,500	10,800	12,800	21,800
	Max. Excess Air	(%)	270	250	390	325	240
	Flame Length @ Max. Input	(in)	21	26	32	36	46
LOW FIRE	**Max. Input @ 20% Excess Air**	**(Btu/hr)**	**67,800**	**113,000**	**180,000**	**236,000**	**438,000**
	Air Flow	(scfh)	790 (@ 0.3 osig)	1,320 (@ 0.3 osig)	2,100 (@ 0.6 osig)	2,750 (@ 0.6 osig)	5,100 (@ 0.6 osig)
	Max. Excess Air	(%)	20	95	100	110	185

NOTES:

1. Capacities based on No. 2 fuel oil with HHV of 141,146 Btu/gal, 0.87 S.G., and a stoichiometric ratio of 1371.1 ft^3 air/gal No. 2 fuel oil with burner firing into chamber under no pressure.
2. Air and oil flows based on 60°F @ sea level; capacities for preheated air will differ from those shown.
3. Static air pressures measured at the burner air inlet pressure tap.
4. Flame lengths measured from the end of the burner tile.
5. All data based on industry standard air and oil piping practices.
6. A lean air/fuel ratio is recommended at low fire.
7. Excess fuel firing not recommended on No.2 fuel oil.
8. Burners can be operated up to a static air pressure of 20 osig; consult Hauck.

Table 3. Capacities for No. 2 Fuel Oil Operation

C. CAPACITIES (Continued

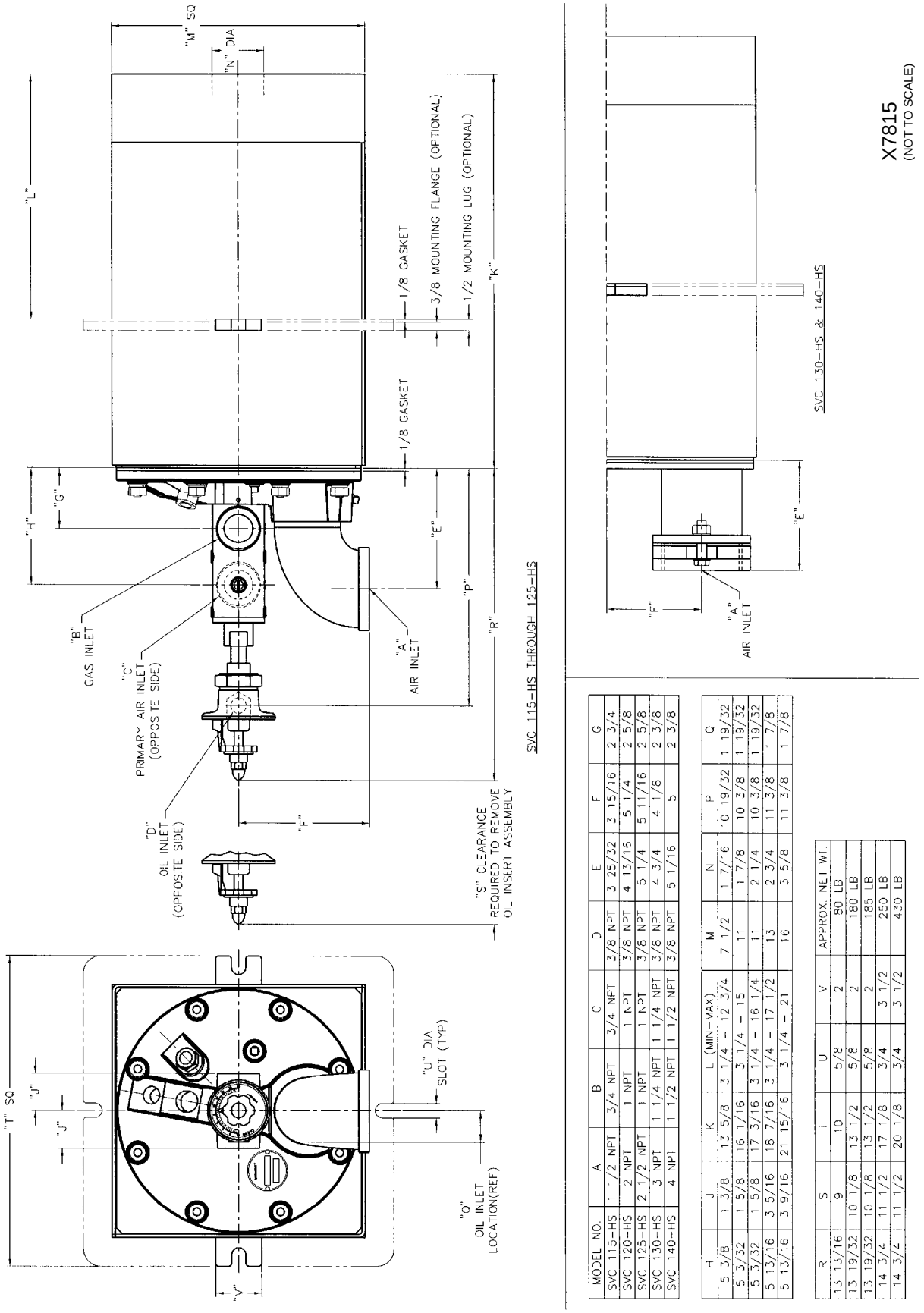
			MODEL NUMBER				
SPECIFICATIONS			**115**	**120**	**125**	**130**	**140**
HIGH FIRE	**Max. Input @ 20% Excess Air (kW)**		**95.9**	**154**	**256**	**306**	**515**
	Max. Air Flow @ 6900 Pa	(nm^3/hr)	109	174	289	343	584
	Max. Excess Air	(%)	270	250	390	325	240
	Flame Length @ Max. Input	(mm)	533	660	813	914	1,170
LOW FIRE	**Max. Input @ 20% Excess Air (kW)**		**18.7**	**31.1**	**49.6**	**65**	**121**
	Air Flow	(nm^3/hr)	21.2 (@ 129 Pa)	35.4 (@ 129 Pa)	56.3 (@ 259 Pa)	73.7 (@ 259 Pa)	137 (@ 259 Pa)
	Max. Excess Air	(%)	20	95	100	110	185

NOTES:

1. Capacities based on No. 2 fuel oil with LHV of 36.99 MHJ/liter, 0.87 S.G., and a stoichiometric ratio of 9.70 nm^3 air/liter No. 2 fuel oil with burner firing into chamber under no pressure.
2. Air and oil flows based on 0°C @ sea level and oil flows based on 15.5°C @ sea level; capacities for preheated air will differ from those shown.
3. Static air pressures measured at the burner air inlet pressure tap.
4. Flame lengths measured from the end of the burner tile.
5. All data based on industry standard air and oil piping practices.
6. A lean air/fuel ratio is recommended at low fire.
7. Excess fuel firing not recommended on No.2 fuel oil.
8. Burners can be operated up to a static air pressure of 8620 Pa; consult Hauck.

Table 4. Metric Capacities for No. 2 Fuel Oil Operation

D. DIMENSIONS



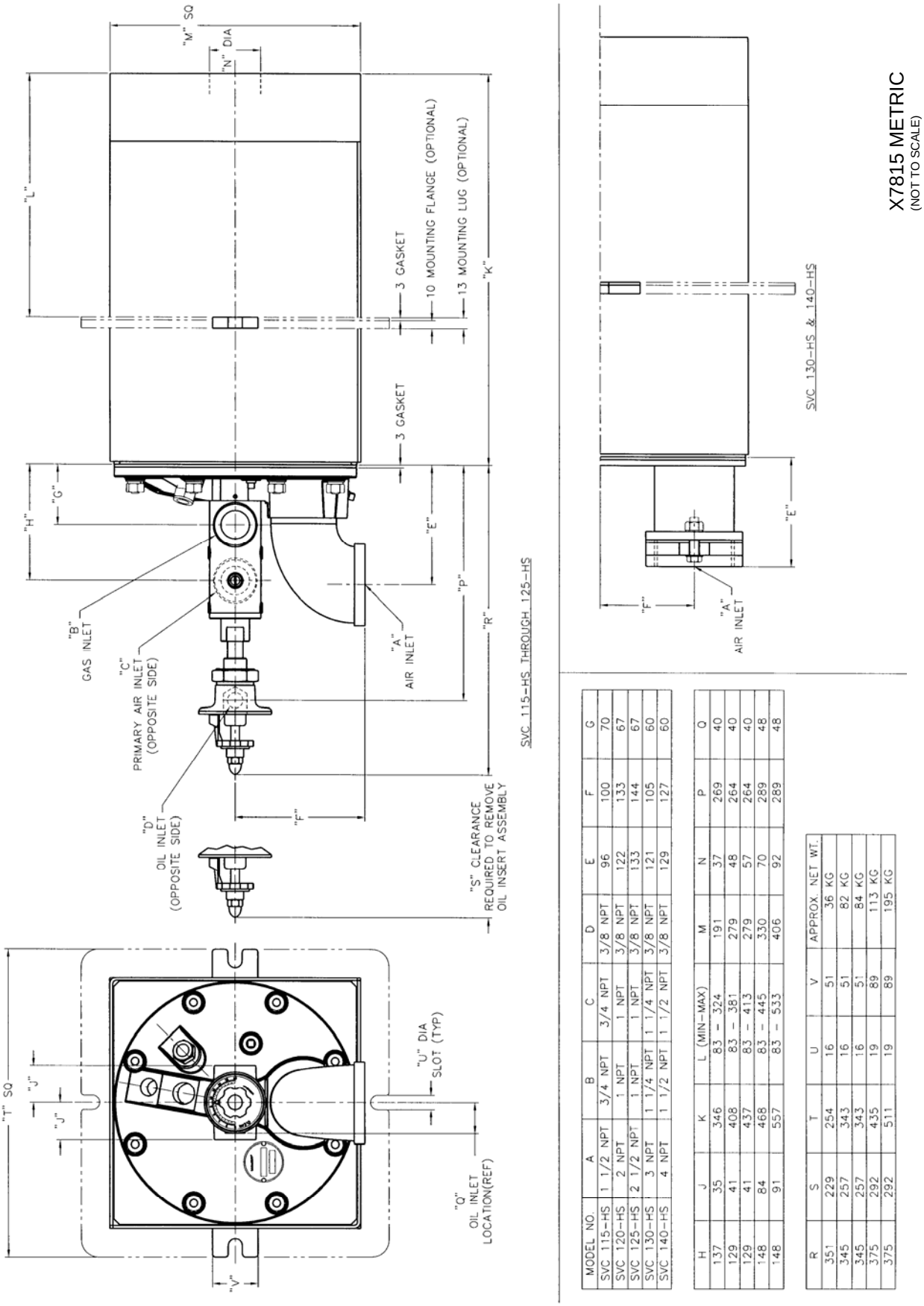
MODEL NO.	A	B	C	D	E	F	G
SVC 115-HS	1 1/2 NPT	3/4 NPT	3/4 NPT	3/8 NPT	3 25/32	3 15/32	2 3/4
SVC 120-HS	2 NPT	1 NPT	1 NPT	3/8 NPT	4 13/16	5 1/4	2 5/8
SVC 125-HS	2 1/2 NPT	1 NPT	1 NPT	3/8 NPT	5 1/4	5 11/16	2 5/8
SVC 130-HS	3 NPT	1 1/4 NPT	1 1/4 NPT	3/8 NPT	4 3/4	4 1/8	2 3/8
SVC 140-HS	4 NPT	1 1/2 NPT	1 1/2 NPT	3/8 NPT	5 1/16	5	2 3/8

H	J	K	L (MIN-MAX)	M	N	P	Q
5 3/8	1 3/8	13 5/8	3 1/4 - 12 3/4	7 1/2	1 7/16	10 19/32	1 19/32
5 3/32	1 5/8	16 1/16	3 1/4 - 15	11	1 7/8	10 3/8	1 19/32
5 3/32	1 5/8	17 3/16	3 1/4 - 16 1/4	11	2 1/4	10 3/8	1 19/32
5 13/16	3 5/16	18 7/16	3 1/4 - 17 1/2	13	2 3/4	11 3/8	1 7/8
5 13/16	3 9/16	21 15/16	3 1/4 - 21	16	3 5/8	11 3/8	1 7/8

R	S	T	U	V	APPROX. NET WT.
13 13/16	9	10	5/8	2	80 LB
13 19/32	10 1/8	13 1/2	5/8	2	180 LB
13 19/32	10 1/8	13 1/2	5/8	2	185 LB
14 3/4	11 1/2	17 1/8	3/4	3 1/2	250 LB
14 3/4	11 1/2	20 1/8	3/4	3 1/2	430 LB

Figure 1. Dimensions

D. DIMENSIONS (Continued)



X7815 METRIC
(NOT TO SCALE)

MODEL NO.	A	B	C	D	E	F	G
SVC 115-HS	1 1/2 NPT	3/4 NPT	3/4 NPT	3/8 NPT	96	100	70
SVC 120-HS	2 NPT	1 NPT	1 NPT	3/8 NPT	122	133	67
SVC 125-HS	2 1/2 NPT	1 NPT	1 NPT	3/8 NPT	133	144	67
SVC 130-HS	3 NPT	1 1/4 NPT	1 1/4 NPT	3/8 NPT	121	105	60
SVC 140-HS	4 NPT	1 1/2 NPT	1 1/2 NPT	3/8 NPT	129	127	60

H	J	K	L (MIN-MAX)	M	N	P	Q
137	35	346	83 - 324	191	37	269	40
129	41	408	83 - 381	279	48	264	40
129	41	437	83 - 413	279	57	264	40
148	84	468	83 - 445	330	70	289	48
148	91	557	83 - 533	406	92	289	48

R	S	T	U	V	APPROX. NET WT.
351	229	254	16	51	36 KG
345	257	343	16	51	82 KG
345	257	343	16	51	84 KG
375	292	435	19	89	113 KG
375	292	511	19	89	195 KG

Figure 2. Metric Dimensions

E. INSTALLATION

WARNING

Adjustment of this equipment, and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

NOTE

Installation detail shown to emphasize burner tile/port geometry. Furnace wall shown as typical refractory construction; refractory and wall construction details and fabrication methods should be completed by qualified personnel. The burner tile and/or rammed refractory port must be protected from mechanical stress.

1. Furnish an opening in the furnace shell 1/2" larger than the refractory block. SVC burners can be mounted in the roof or side walls of a furnace.

2. For installation in an existing hard or soft wall furnace (see Figure 3), make the hole in the insulating material, where the burner tile will be installed, 3 to 6" (76 to 152mm) larger than the outside dimensions of the tile.

3. Wrap tile with two layers of 1" (25mm) fiber rated for a higher temperature than the furnace. Secure fiber wrap with tape or twine to compress the ceramic fiber wrap by 25% to retain the fiber during installation. Pack additional fiber to fill any remaining openings completely. It is important to make sure the fiber is well packed around the burner tile. Fiber must be repacked after the initial firing of the burner.

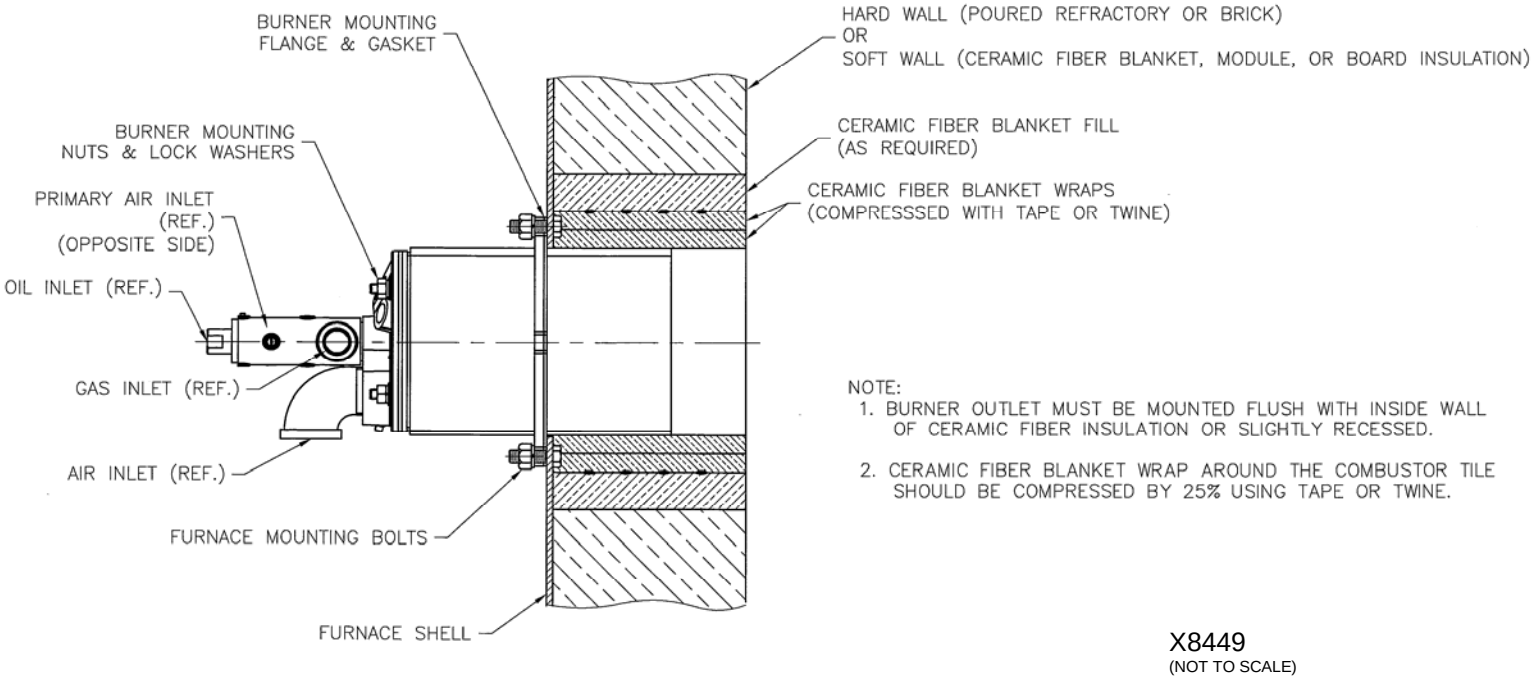


Figure 3. Burner Installation

E. INSTALLATION (Continued)

4. For installations where it is desired to ram or cast refractory around the burner, allow 3 to 6" (76 to 152mm) around the tile block and pack as outlined in item 3.

5. The burner should be positioned with the ultraviolet (UV) flame detector connection located above the horizontal centerline of the burner to prevent debris from accumulating on the lens.

> **NOTE**
> If the burner is operated in adverse conditions, Hauck recommends installing a cooling/cleaning air line to the UV detector. Typically, this can be accomplished by installing a 1/2" pipe tee between the UV detector and the UV connection on the burner backplate. Connect a clean, ambient air source of 1-2 cfm to the tee. Conditions such as preheated air, dirty combustion air, hot ambient air or high moisture dictate this change.

6. If the integrated air differential pressure taps are to be used for airflow measurement, install a pipe nipple in the threaded tap connection that is at least 4 times the length of the pipe size. For example, if the main air connection is 2", then the minimum size pipe nipple connected to the tap should be 8" long.

7. Bolt the burner to the furnace-mounting studs.

CONECTION	SPECIFICATION
Main Air	Pressure Range: 0.3" to 34.6"wc.
Main Oil	Depending on discharge of oil regulator.
Main Gas	Dependent on discharge of gas regulator.
Primary Air	Fixed Pressure: 32 osi for oil firing 2" wc for gas firing
Pilot Air	Pressure: 32 osi.
Pilot Gas	Fixed pressure of 1 psi maximum to pilot manifold.
Pilot Spark	Standard coil type or half-wave ignition transformer.
UV Detector	Per Application, Optional 1-2 cfm cooling air connection.

Note: The Primary Air and Main Gas connections can be field rotated to any position that does not interfere with the pilot connection or flame supervision port.

Table 5. Piping Connections To The Burner

> **IMPORTANT**
> Filters should be installed in the following locations:
> 1. Oil Filter: Hauck Edge Plate Filter in each control zone.
> 2. Oil Filter: Ten micron filter at each burner.
> 3. Blower inlet filter at the primary air blower.
>
> ALL OIL PIPING MUST BE CLEANED BEFORE CONNECTION TO THE BURNER. DIRT AND DEBRIS IN THE OIL LINE CAN INTERRUPT OIL FLOW THROUGH THE OIL FLOWMETER, MICROVALVE AND NOZZLE, CAUSING ERRATIC BURNER PERFORMANCE. DIRT IN THE AIR LINES CAN ALSO CONTRIBUTE TO ERRATIC BURNER PERFORMANCE.

8. Once the burner is installed on the furnace wall, the air, fuel and pilot connection can be made.

9. Connect the main air to the burner. Use a flex connection in the line to alleviate vibration and expansion of piping. Avoid elbows and abrupt directional changes in the air piping where possible, as turbulence can affect airflow measurement accuracy, and REDUCE air pressure at the burner.

10. Connect the main oil line to the oil flow meter on the burner. Be sure that the oil is supplied "up" to the burner. That is, the oil should be supplied from below the centerline of the burner. A flex connection in the oil line is recommended. Hauck recommends installation of a union or quick disconnect close to the burner for ease of maintenance and cleaning. **The oil shutoff valve should be installed as close to the burner as possible. Do not exceed four inches from the oil inlet connection.**

11. Connect the main gas line to the burner. A flexible connection should be used in the gas line. The gas connection can be rotated to any position that does not obstruct the pilot or observation port.

12. Connect the primary air supply to the burner. A flexible connection should be used in the primary air line. The primary air connection can be rotated to accommodate any position that does not obstruct the other burner connections.

    To adjust the position of the primary air inlet tee, (see Figure 4) accomplish the following:

    a. Loosen the (13B) setscrew on the gas tee and the setscrew attaching the oil inset to the primary air inlet tee (13A).

    b. Rotate the primary air tee to the desired position.

    c. Verify that the primary air assembly is inserted flush into the gas assembly.

    d. Tighten the setscrews (13A & 13B).

13. Insert the pilot into the pilot connection port. The pilot should just bottom out against the burner cup, do not over tighten. Supply gas and air to the pilot gas manifold. Terminate the ignition wire at the pilot spark plug. A Rajah type connector is recommended.

14. For cross-connected ratio systems, connect an impulse line from the main air line at the burner to the gas and oil ratio regulators. If pulse fire or fuel-only control will be used for gas firing consult Hauck for set-up.

F. GAS PILOT IGNITION

The SVC comes equipped with a Hauck IPG spark ignited gas pilot. For detailed operating instructions on the IPG pilot, see Hauck sheet IPG-9.

G. INITIAL BURNER SETUP

CAUTION
Initial adjustment and burner start-up should be undertaken only by trained and experienced personnel familiar with combustion systems, control and safety circuitry and overall installation procedures.

CAUTION
Ensure that all safety equipment and limits are working properly before proceeding.

CAUTION
Failure to achieve ignition of pilot or main flame within a safe period (10 sec.) could result in a build-up of a combustible gas mixture which could lead to an explosion. In the event that the pilot or main flame does not light within the above time period, shut off fuel valves and re-purge the chamber before attempting further adjustment.

Upon completing the installation, the burner is ready for initial setup. Typically, the SVC burner will be operated with an automatic control system. Begin the initial setup by completing all the necessary interfacing with the control system.

The specific operation of the burner will depend on the individual system components in the entire combustion system. Refer to the instruction sheets that accompany each individual component.

H. BURNER OPERATION

1. Main Combustion Air

The initial setting is the main combustion air. Set the main combustion air valve at the desired position for high and low fire. Main air pressure ranges from approximately 0.17 osig (minimum rating) to 20 osig (maximum rating) static pressure at the burner inlet. Use a manometer on the air pressure tap to obtain an accurate pressure reading. Adjust the combustion air valve linkage to obtain the desired valve travel. Refer to the individual burner capacity tables, for burner airflow at various combustion air pressures.

IMPORTANT
Minimum static air pressure at the burner inlet tap should be 0.17 osig (0.3"wc) or greater above furnace pressure to prevent overheating and potential carbon formation at low fire. Higher excess air levels are recommended for low fire operation.

2. **Primary Air**
   Manually set the primary air valve to obtain a constant 32 osig (2 psig) air pressure for oil firing; for gas firing, 2"wc constant primary air pressure is required. A pressure tap is located 180° from the inlet connection

3. Nominal natural gas pressure required at the burner is 12"wc. Actual pressure required may vary, see individual supplemental data sheets.

4. Nominal oil pressure required at the inlet to the burner oil micro valve is 10 psig. Actual pressure required may vary, see individual supplemental data sheets.

5. Refer to Hauck sheet IPG-9 for IPG gas pilot instructions.

6. Ignite the burner by proceeding as follows:
   a. BE SURE all fuel shutoff valves are closed and all control valves are in the LOW FIRE position.
   b. Start the combustion air blower.
   c. Ensure that the pilot gas cock is closed.
   d. Turn the pilot air cock to the full open position.
   e. Energize the ignition transformer.
   f. Open the pilot gas cock.
   g. Once the pilot flame has been established, (confirm using observation port), discontinue the spark.
   h. Slowly open the main fuel shutoff valve(s).
   i. **BE SURE THAT THE BURNER IS BEING IGNITED UNDER LOW FIRE CONDITIONS (MINIMUM GAS AND AIR FLOWS).** Ignite the burner(s). When the burner(s) is ignited, keep the burner at low fire for 30 seconds on oil and 10 seconds on gas before modulating the combustion air to high fire.
   j. Close the pilot gas cock, while leaving the pilot air cock open.

7. When the combustion air is at the desired high fire position, adjust the LVG or oil-metering valve to achieve the desired fuel flow at high fire.

8. Verify the air/fuel ratio using the oil flow meter or a gas orifice meter in the fuel line. Air flow can be obtained by measuring the static air pressure at the air inlet tap.

9. Modulate the burner to the low fire position and verify that the settings are consistent. If any adjustments are made at low fire, verify that the high fire settings have not changed by driving the burner to the high fire position and checking the air and fuel flows.

10. To shut down the burner system:
    a. Return the burner to the low fire position.
    b. Close all fuel shutoff valves.
    c. Allow the furnace cool to 800°F or less before shutting off the combustion air blower.

Daily Operation

1. The specific operation of the burner will depend on the individual system components comprising the combustion system. Refer to the instruction sheets and system piping schematics which accompany the individual items.

2. The burner should always be ignited under low fire conditions.

3. Once properly installed and initially set, the SVC is ready for operation. The SVC burner is designed to operate with the air and fuel pressure best suited to the application. Capacities are listed in Section "C" and SVC-2.

4. If the burner ignition tile is exposed to excessive moisture or extended periods of dampness, **allow at least 30 minutes of low fire drying before beginning normal operation. Failure to do so will cause any moisture present to expand rapidly causing damage to the refractory.**

I. MAINTENANCE

Other than the oil metering valve and flow meter, the SVC has no moving parts, however, there are some items that require periodic maintenance. For burners that are fired primarily on oil, periodically clean the oil nozzle.

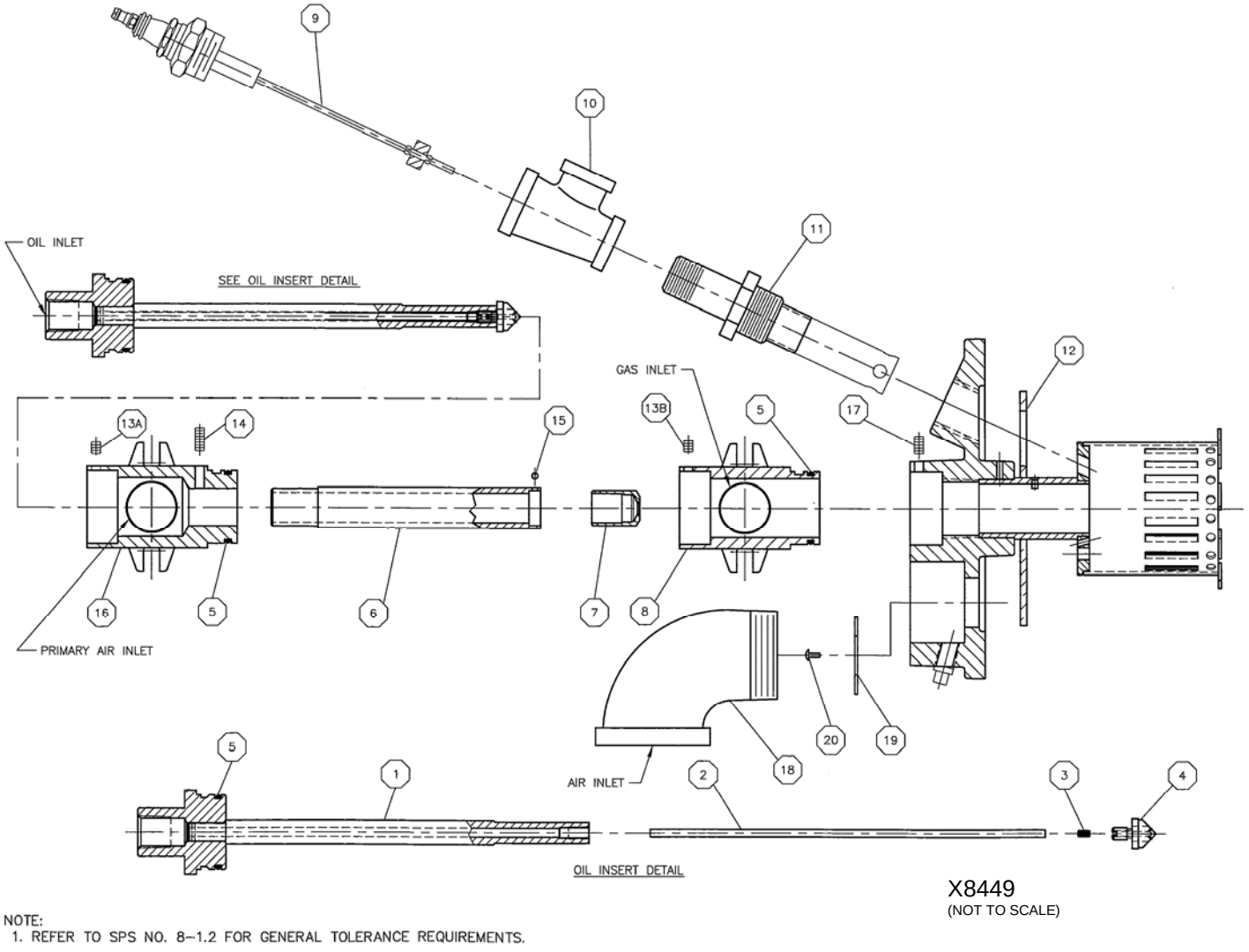


Figure 4. Components

To remove the oil nozzle, (see figure 4).

1. Disconnect the oil supply connection from the flow meter and drain residual fuel.

2. Remove the screw (13A) on the primary air tee holding the oil insert in place.

3. With the screw removed, the oil insert should slide out of the burner. Clean the vanes of the nozzle with a plastic bristle brush and solvent. Verify that all the holes in the nozzle are clean and clear of carbon or other debris.

4. Unscrew the nozzle (4) from the oil tube (1). **BE SURE NOT TO STRIP OR MAR THE NOZZLE OR OIL TUBE. USE CARE WHEN REMOVING NOZZLE, A DISPLACEMENT ROD (2) IS INSIDE THE OIL TUBE AND WLL SLIDE OUT WHEN THE NOZZLE IS REMOVED.**

5. Once the nozzle is removed, inspect the threaded end for debris. Clean as necessary. Within the threaded end is an screw (3). Remove the screw to access the nozzle internals. Clean as necessary.

If the nozzle is thickly coated with carbon, the primary air assembly of the burner should be removed and cleaned.

To remove the primary air assembly:

1. Disconnect the primary air line from the burner.

2. Remove the screw from the gas tee (13B)

3. Slide the primary air section out of the gas body.

4. Clean the primary air assembly. **BE CAREFUL NOT TO DULL ANY OF THE SHARP EDGES ON THE ASSEMBLY.**

If the inside of the primary air tube requires cleaning, accomplish the following:

1. With the primary air tube (6) connected to the primary air tee (16), remove the setscrew (14) holding the air tube on the assembly.

2. Slide the tube out of the primary air body.

3. Clean the tube as necessary.

REASSEMBLY

Oil Assembly

1. Insert the screw (3) into the threaded end of the nozzle (4) and tighten.

2. Slide the displacement rod (2) into the oil tube (1).

3. Thread nozzle (4) on oil tube (1) and tighten.

Primary Air Assembly

1. Slide the oil insert assembly (5) into the primary air tee (16), all connections should be snug.

2. Tighten the setscrew (13A) that holds the oil assembly to the primary air tee (16).

3. Slide the primary air tube (6) into primary air tee (16).

4. Tighten setscrew (14).
5. Slide the primary air tee (16) into the gas tee (8).
6. Align the air connection.
7. Tighten the setscrew (13B) holding the primary air tee to the gas tee.
8. Tighten setscrew (17) holding the gas tee (8) to burner (12).
9. Reconnect primary air and oil to the burner.

All connections must be flush. If "O" rings are damaged, replace.

Prolonged operation at or above the maximum excess fuel rating or extended low fire operation with very low airflow when firing oil, may result in carbon formation in the tile. Exercise care when cleaning carbon out of the burner tile.

IPG IGNITION GAS PILOTS
BACK-LOADED GAS

WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

TABLE OF CONTENTS

WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The Hauck Series IPG Blast Type Back-Loaded Gas Pilot provides a means of lighting the flame of Hauck burners and many other industrial gas or oil burners. IPG pilots are engineered for exceptional flame stability and long life, even under the most severe and adverse operating conditions. IPG pilots are designed for electric spark ignition. The standard IPG Back-Loaded Pilots are suitable for firing into neutral, negative or positive pressure applications.

The back-loaded feature offers the capability to compensate the pilot air/fuel ratio for variations in furnace or burner pressure.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

SPECIFICATIONS		PILOT SIZE 1	2	3
Port Area	(in^2)	0.069	0.122	0.254
Input @ Stoichiometric Air/Fuel	**(Btu/hr)**	**21,800**	**40,800**	**80,500**
Air Flow @ 27.7"wc	(scfh)	205	385	760

NOTES:

1. Capacities based on natural gas with HHV of 1034 Btu/ft^3, a stoichometric air/gas ratio of 9.74:1 with a 6"wc mixture pressure and the pilot firing into burner.

2. Ambient combustion air is required at a constant air pressure to the inlet of the mixing tee in the 14 - 55"wc range; capacities listed based on static air pressure of 27.7"wc.

3. Ambient gas should be supplied to the inlet of the gas regulator at a nominal 14"wc; maximum gas supply pressure is 27.7"wc.

Table 1. IPG Capacities

SPECIFICATIONS		PILOT SIZE 1	2	3
Port Area	(nm^2)	44.5	78.7	164
Input @ Stoichiometric Air/Fuel	**(kW)**	**5.8**	**10.8**	**21.3**
Air Flow @ 6.9 kPa	(nm^3/hr)	5.5	10.3	20.4

NOTES:

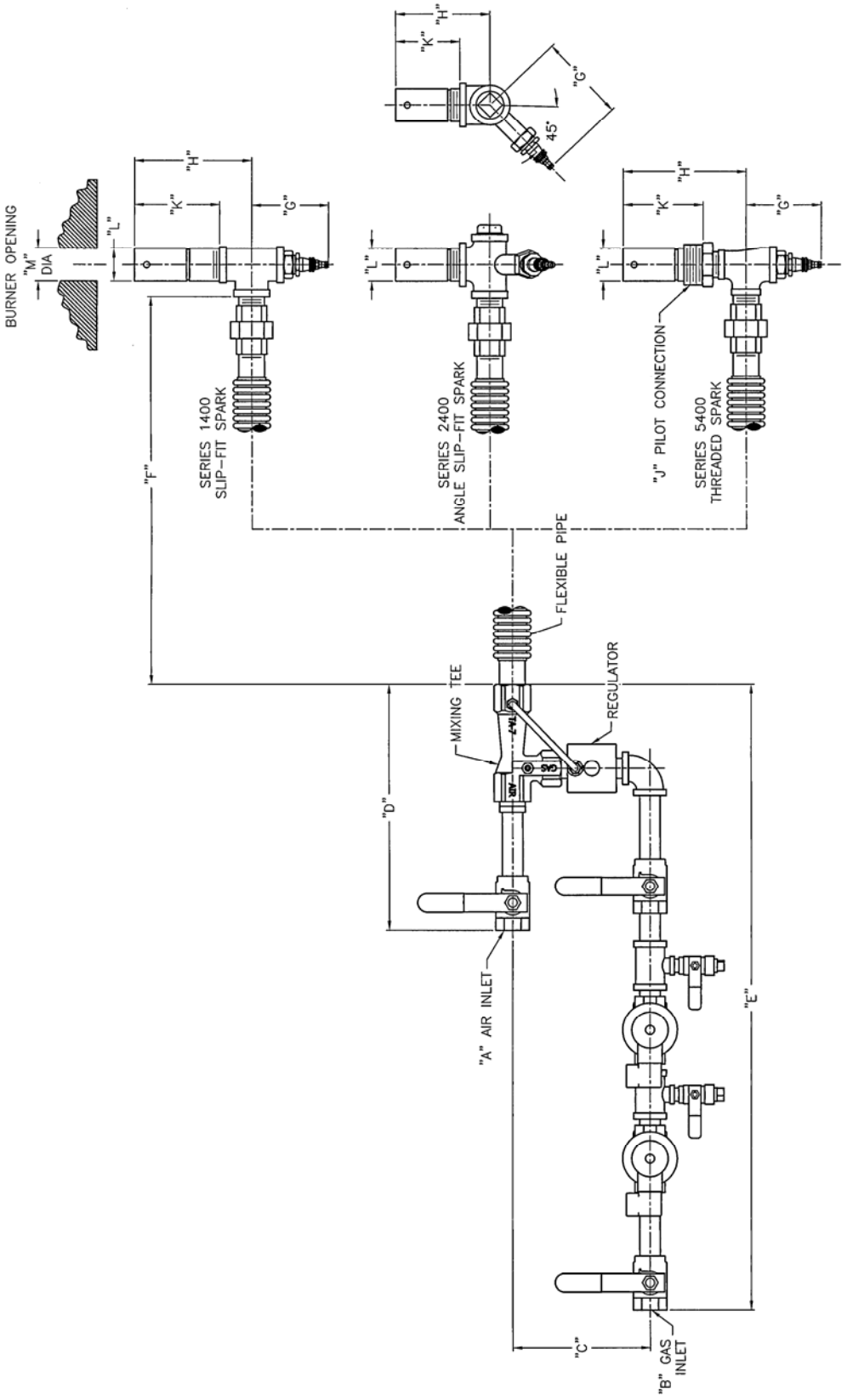
1. Capacities based on natural gas with LHV of 36.74 MJ/nm^3, a stoichometric air/gas ratio of 9.74:1with a 1.5 kPa mixture pressure and the pilot firing into burner.

2. Ambient combustion air is required at a constant air pressure to the inlet of the mixing tee in the 3.5 - 14.7 kPa range; capacities listed based on static air pressure of 6.9 kPa.

3. Ambient gas should be supplied to the inlet of the gas regulator at a nominal 3.5 kPa maximum gas supply pressure is 6.9 kPa.

Table 2. IPG Metric Capacities

D. DIMENSIONS

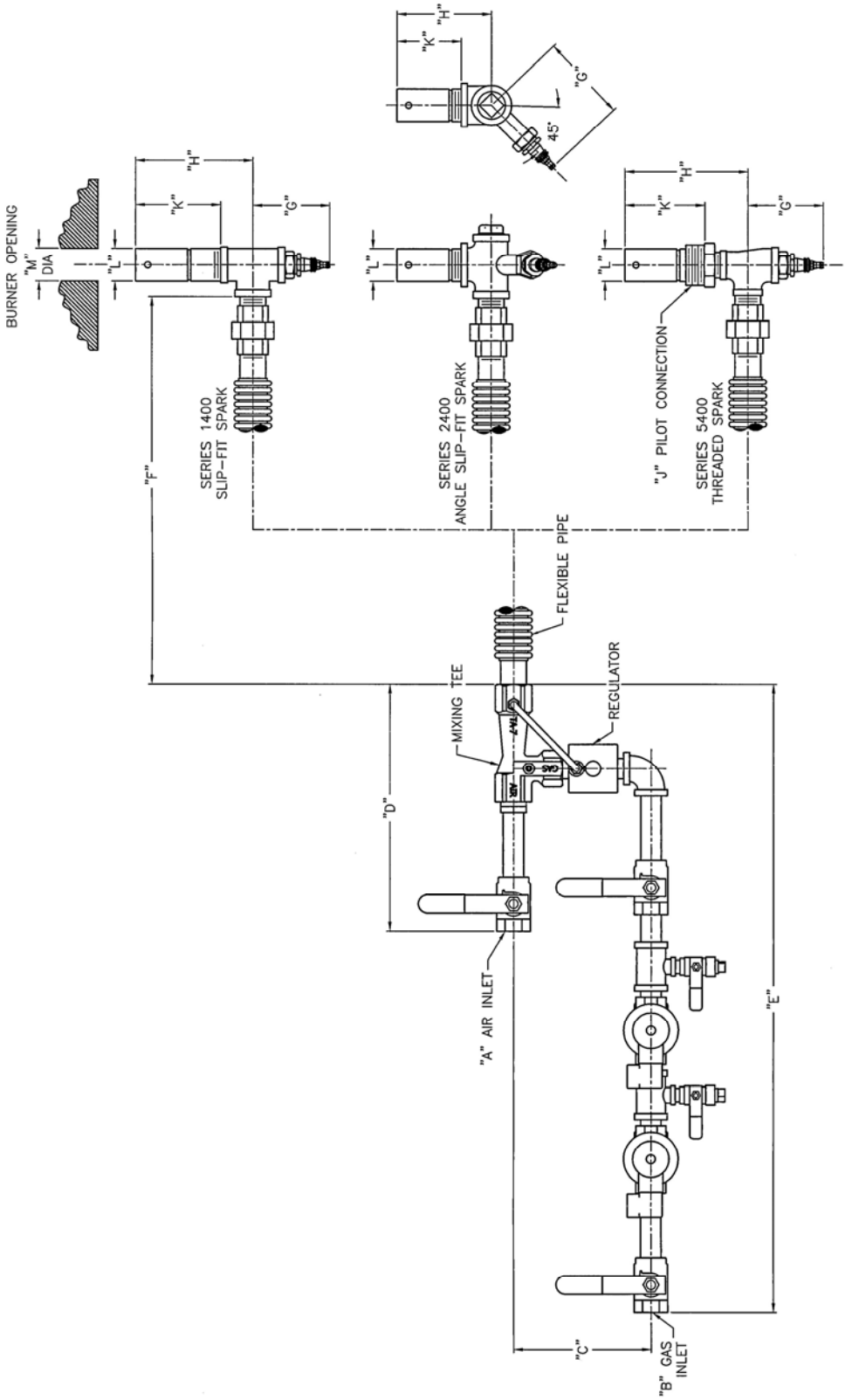


MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN–MAX)
1411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	26 13/16	5 5/8	2 15/16	3 1/2	–	2 7/16	27/32	.862–.856
1412	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	4 3/8	–	3	1 1/16	1.072–1.066
1413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	5	–	3 7/16	1 5/16	1.337–1.331
2411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	26 13/16	5 5/8	3 1/16	3 1/2	–	2 7/16	27/32	.862–.856
5411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	25 3/4	5 5/8	2 15/16	4 3/8	3/4 NPT	2 9/16	27/32	–
5413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	5 3/8	1 1/4 NPT	2 15/16	1 11/32	–

Y8131
(NOT TO SCALE)

Figure 1. Dimensions Back-Loaded Gas

D. DIMENSIONS (Continued)



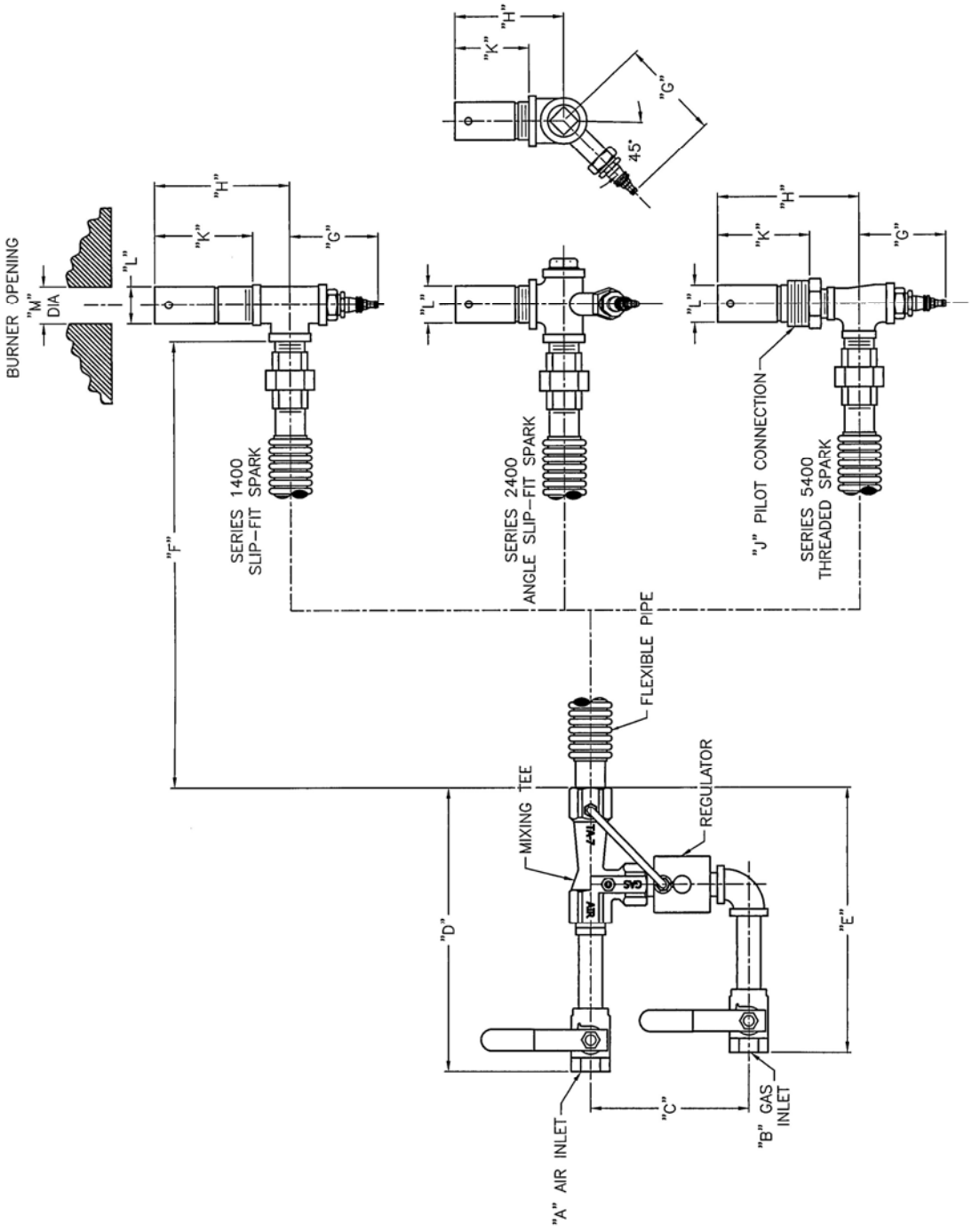
MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN–MAX)
1411	3/8 NPT	3/8 NPT	87	205	681	143	75	89	–	62	21	21.9–21.7
1412	1/2 NPT	1/2 NPT	143	257	654	159	76	111	–	76	27	27.2–27.1
1413	1/2 NPT	1/2 NPT	143	257	654	159	76	127	–	87	33	34.0–33.8
2411	3/8 NPT	3/8 NPT	87	205	681	143	78	89	–	62	21	21.9–21.7
5411	3/8 NPT	3/8 NPT	87	205	654	143	75	111	3/4 NPT	65	21	–
5413	1/2 NPT	1/2 NPT	143	257	654	159	76	137	1 1/4 NPT	75	34	–

Y8131 METRIC
(NOT TO SCALE)

NOTES:
1. DIMENSIONS AIR IN MM.

Figure 2. Metric Dimensions Back-Loaded Gas

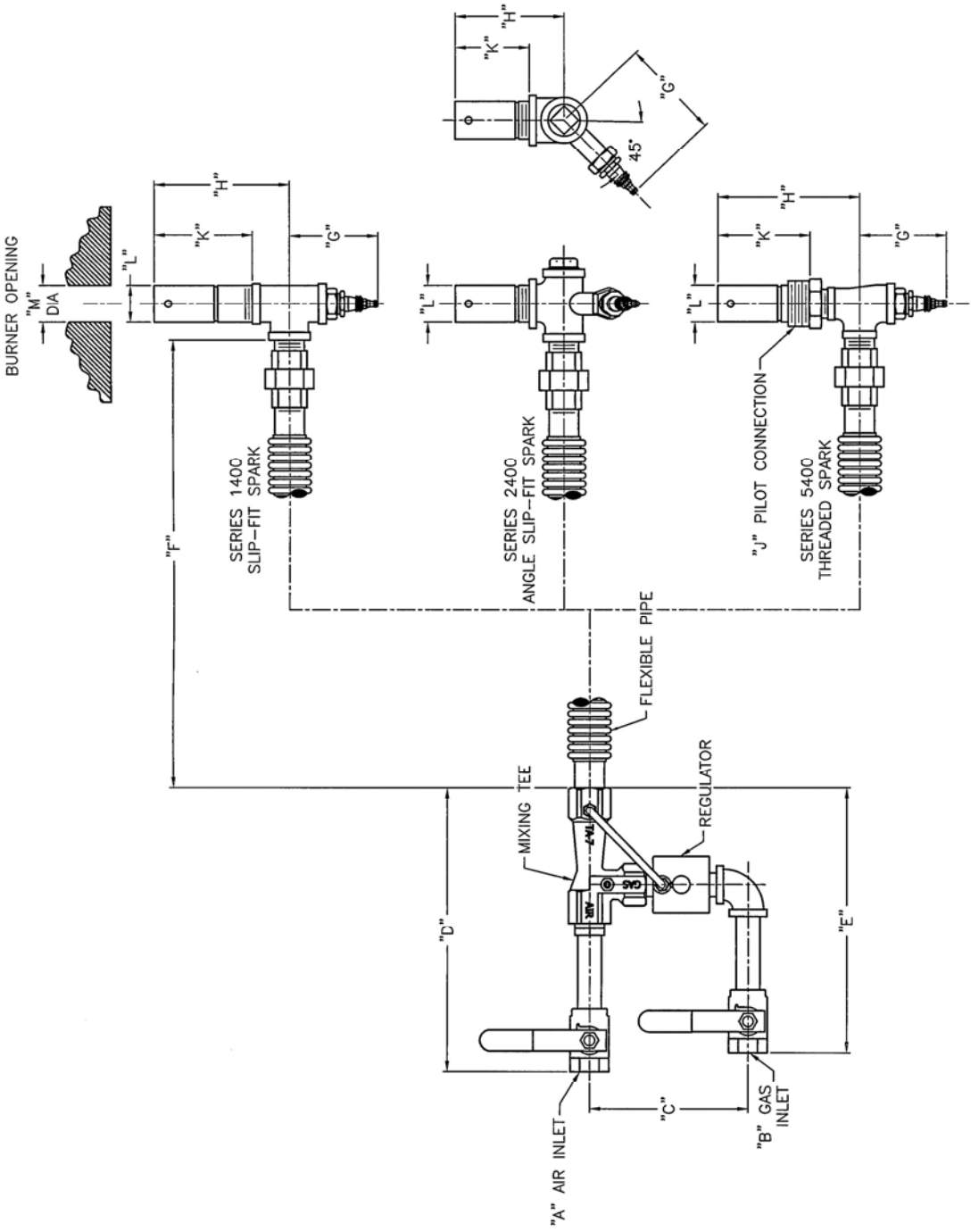
D. DIMENSIONS (Continued)



MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN–MAX)
1411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	11 1/16	5 5/8	2 15/16	3 1/2	–	2 7/16	27/32	.862–.856
1412	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	4 3/8	–	3	1 1/16	1.072–1.066
1413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	5	–	3 7/16	1 5/16	1.337–1.331
2411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	11 1/16	5 5/8	3 1/16	3 1/2	–	2 7/16	27/32	.862–.856
5411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	9 7/16	5 5/8	2 15/16	4 3/8	3/4 NPT	2 9/16	27/32	–
5413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	5 3/8	1 1/4 NPT	2 15/16	1 11/32	–

Figure 3. Dimensions Back-Loaded Gas Less Solenoid Valves

D. DIMENSIONS (Continued)



MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN–MAX)
1411	3/8 NPT	3/8 NPT	87	205	281	143	75	89	–	62	21	21.9–21.7
1412	1/2 NPT	1/2 NPT	143	257	240	159	76	111	–	76	27	27.2–27.1
1413	1/2 NPT	1/2 NPT	143	257	240	159	76	127	–	87	33	34.0–33.8
2411	3/8 NPT	3/8 NPT	87	205	281	143	78	89	–	62	21	21.9–21.7
5411	3/8 NPT	3/8 NPT	87	205	240	143	75	111	3/4 NPT	65	21	–
5413	1/2 NPT	1/2 NPT	143	257	240	159	76	137	1 1/4 NPT	75	34	–

Y2375 METRIC
(NOT TO SCALE)

Figure 4. Metric Dimensions Back-Loaded Gas Less Solenoid Valves

E. INSTALLATION

1. Ensure that all components of the factory assembled pilot are present and properly connected. The pilot unit consists of a low pressure gas regulator, air ball valve, gas ball valve, gas mixer, pilot nozzle assembly, union (threaded pilots only), and flexible pipe nipple.
2. Install the pilot assembly in the air and gas lines. The gas pressure regulator is used as a zero governor and is suitable for any mounting position without restriction.
   a. Connect the air piping to the inlet side of the air ball valve. Low pressure air should be supplied at a constant pressure ranging from 14 - 55"wc (3.5 - 13.7 kPa) at the inlet of the ball valve.
   b. Connect the gas piping to the inlet side of the gas ball valve. Low pressure gas should be supplied at approximately 14"wc (3.5 kPa) at the inlet of the regulator. The regulator is designed to operate from 13.8 - 27.7"wc (3.4 - 6.9 kPa); maximum allowable inlet pressure is 1 psig (6.9 kPa).
   c. Ensure that the air and gas ball valves are fully closed.

F. IGNITION

WARNING

Adjustment of this equipment by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

NOTE

To reduce pressure losses, use adequate sized pipe and minimize elbows in the air and gas lines to the pilot assembly. It is recommended that the air and gas supply be equal to or greater than their respective pilot air and gas connection sizes. If the pilot is installed at the end of a long run of pipe or will be operated in a dirty environment, it is recommended that a sediment trap be installed in the pilot air line.

1. Be sure the spark plug is set as shown in Figure 5. Ideally, initial pilot set-up should be done with the pilot outside of the burner.

2. Connect a 5000/6000 volt standard coil type ignition transformer to the spark plug on the spark igniter using a high voltage ignition wire. Ensure that the spark plug's wire electrode is centered in the pilot nozzle.

F. IGNITION Continued)

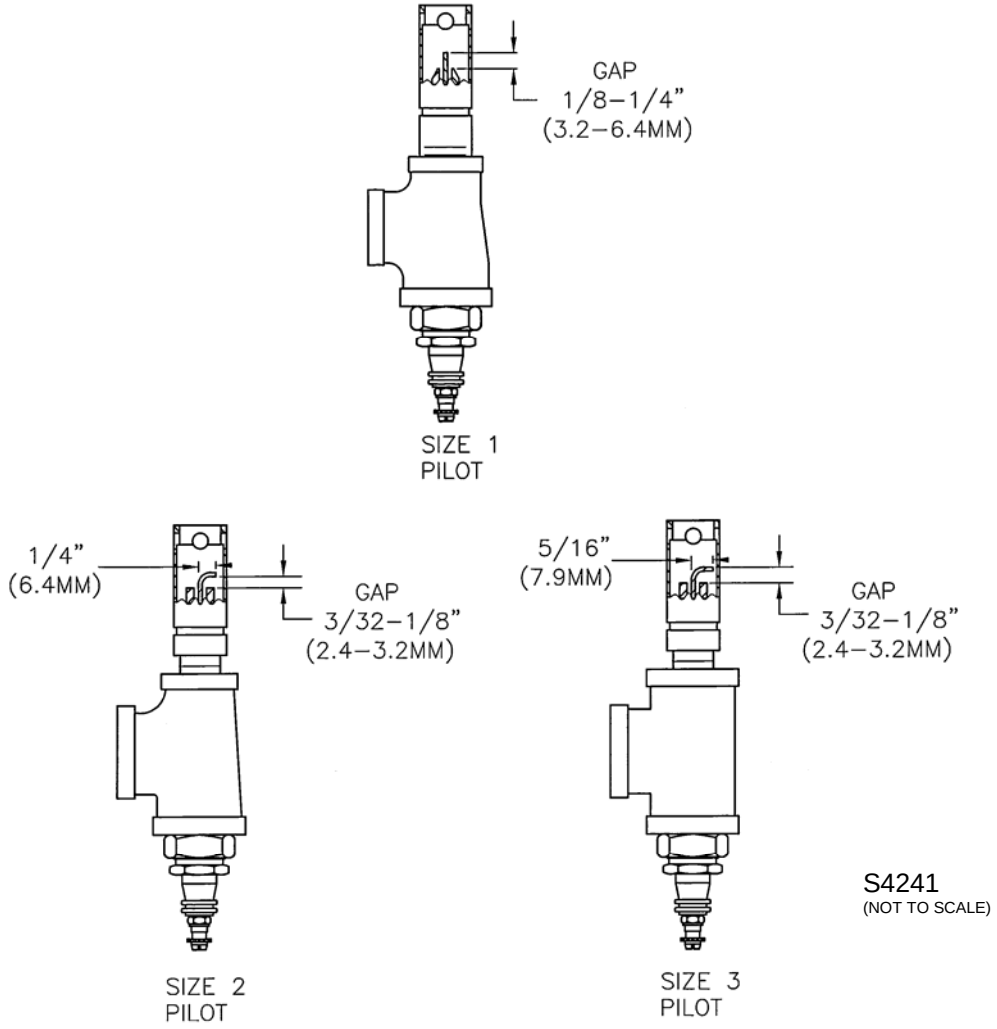


Figure 5. Spark Gap Setting and Electrode Positioning

NOTE

Ensure pilots are properly grounded to prevent equipment damage or personal injury. Exercise care to avoid over-tightening the spark plug holding nut as this may crack the ceramic insulator of the plug. Avoid, where possible, the use of long ignition wires. Long ignition wire can cause rapid spark plug wear or erosion. Suggested methods to avoid this problem are explained in Application Sheet GJ57.

CAUTION

Ignition of the pilot results in a high voltage spark in excess of 5000 volts and an open flame. Remain clear of ignition wire, spark plug and pilot nozzle while firing the pilot.

3. Ensure that the gas ball valve is closed.

4. Start the blower or air supply.

5. Open the air ball valve to the full open position.

6. Energize the ignition transformer and verify that an adequate spark is produced.

7. **Open the gas ball valve fully. This ball valve should be open fully at all times when the pilot is burning.**

> **NOTE**
> When lighting grouped pilots, as soon as one pilot in a group (supplied by one large mixer) is ignited, light the others in the group at once before starting a new group or igniting the main burners.

8. Adjust the pilot until the proper flame is achieved. The best flame is a sharp, high velocity, blast type, blue flame. The tangential holes around the nozzle should have small sharp flames coming out of them and the edges of the nozzle should begin to glow red. However, if this flame is achieved when the nozzle is outside of the burner port, the pilot can burn rich (i.e., excess fuel) when properly seated in the burner. Therefore, when adjusting the pilot outside of the burner port, a slightly lean (i.e., excess air) flame is recommended. When the pilot nozzle is inserted into the burner, the flame will burn 'on ratio' (i.e., stoichiometric air/fuel ratio) and have the characteristics desired.

   Air/Fuel ratio adjustment is accomplished as follows:
   a. Loosen the lock nut on the mixer.
   b. Rotate the mixture adjusting screw **clockwise for a leaner flame** or **counterclockwise for a richer flame.**
   c. Tighten the lock nut.

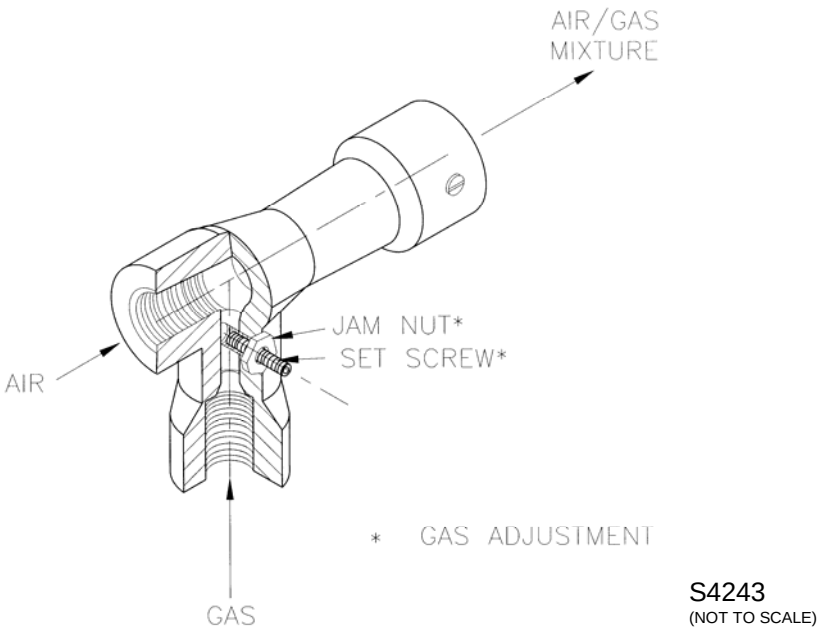


Figure 6. Pilot Mixer Adjustment

9. To extinguish the pilot:
   a. Close gas ball valve first.
   b. Close air ball valve last (if desired).

10. Insert a slip-fit pilot into the burner and tighten the setscrew on the burner to lock the pilot nozzle in place (if applicable).

11. Insert a threaded pilot as follows:
    a. Disconnect the union between the pilot nozzle and flex nipple.
    b. Thread the pilot into the port and wrench tighten until snug.
    c. Reconnect the union.

> **NOTE**
> The pilot nozzle tip should be located slightly behind the main burner nozzle discharge area so that it will not obstruct or be affected by the air/fuel discharge of the main burner.

G. OPERATION

When properly adjusted, the pilot should produce a sharp, high velocity, blast type, blue flame. If adjustment is necessary, refer to the Ignition section.

H. SHUTOFF VALVE LEAK TESTING

Both safety shutoff valves in the gas pilot manifold should be leak tested on a yearly basis at minimum. Refer to the gas pilot piping diagram for leak testing shown in Figure 7.

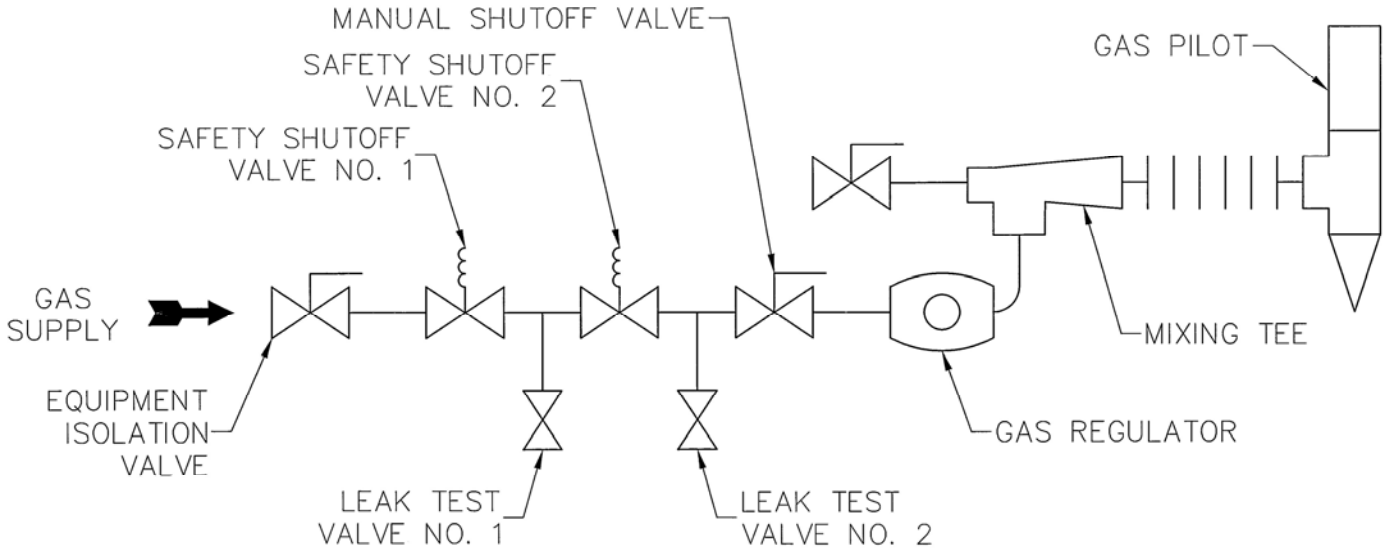


Figure 7. Gas Pilot Piping Diagram for Leak Testing

H. SHUTOFF VALVE LEAK TESTING (Continued)

1. Shutoff the burner (s) and furnace.
2. Close the manual shutoff valve downstream of Safety Shutoff Valve No. 2.
3. Open the equipment isolation valve downstream of Safety Shutoff Valve NO. 2
4. Bleed off trapped gas by opening **both** Leak Test Valves No. 1 and No. 2.
5. Close Leak test Valve No. 2.
6. Connect 3/16" (4.8mm) ID tubing to Leak Test Valve No. 1 and immerse the open end of the tubing in a container of water. Hold the tubing vertically 1/8 to 1/4" (3 to 6mm) below the surface. If bubbles appear, record the leakage rate in bubbles/min and refer to the **IMPORTANT** note at the end of this section.
7. Close Leak Test Valve No. 1 and apply auxiliary power to open Safety Shutoff Valve No. 1.
8. Wait several minutes so that any leakage through Safety Shutoff Valve No. 2 will have time to fill the pipe between Safety Shutoff Valve No. 2 and the manual shutoff valve.
9. Connect the tubing to Leak Test Valve No. 2 and immerse the open end in water as before. Open Test Valve No. 2. If bubbles appear, record the leakage rate in bubbles/min and refer to the **IMPORTANT** note at the end of this section.
10. When no leaks are detected, open the shutoff valve at the outlet of the PGM and return to normal operation.

IMPORTANT

The fact that bubbles are present during the leak test does not necessarily mean that a safety shutoff valve is not functioning properly in the closed position. Refer to the National Fire Protection Association's publication NFPA 86 for acceptable leakage rates for a given pipe size per UL, ANSI, CSA, FM or EN standards. **If the acceptable bubbles/min leakage rate is exceeded, the safety shutoff valve is leaking and the manufacturer's instructions should be referenced for corrective action.**

WARNING

Do not attempt to operate the combustion system until all leaks are repaired.

I. MAINTENANCE

All components of the pilot assembly are engineered to provide relatively maintenance free operation. It is sometimes necessary, however, to clear the mixer jet of any debris as this causes mixer capacity to diminish. The mixer jet is easily cleaned by removing the air piping downstream of the air ball valve and running a wire into the mixing tee opening through the jet. The gas inlet of the mixer can also be cleaned by the same method. Fully removing the adjustment screw also provides access to clean the mixer.

The pilot nozzle may become plugged with debris or carbon buildup. To clean the nozzle, remove the pilot assembly from the burner. Disconnect the nozzle from the pilot assembly and remove the spark plug assembly. **Check carefully to ensure the ceramic insulator is not broken.** Clean the small tangential holes that surround the main hole and blow the nozzle out with air when complete. Reassemble the pilot assembly, test fire, and reinsert the pilot into the burner (see Figure 8).

Periodically remove and inspect the spark plug. If the ceramic insulator is cracked or broken, replace it. Clean the unit of any carbon buildup. **When replacing the plug, avoid over-tightening the nut holding the plug to avoid cracking the plug's ceramic insulator.** Before use, ensure the plug's wire electrode is centered in the pilot nozzle (see Figure 5 for setting spark plug).

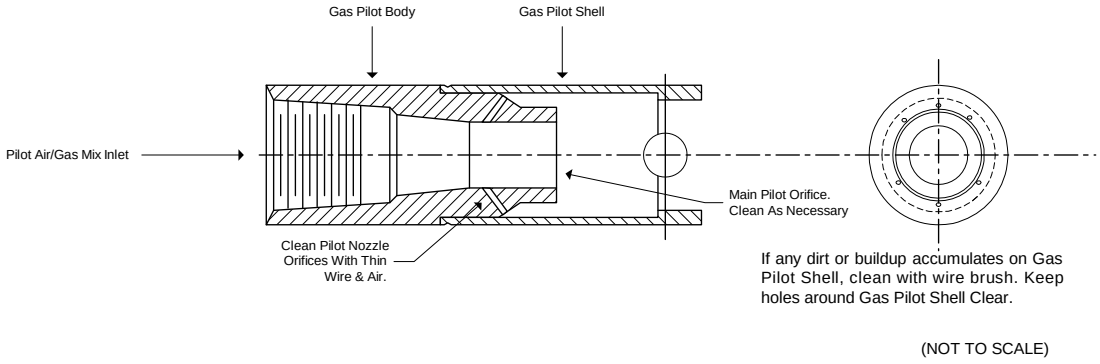


Figure 8. Cleaning Pilot Nozzle and Piloting Holes

This page left intentionally blank.