



WAYNE COMBUSTION SYSTEMS
801 GLASGOW AVE.
FORT WAYNE, IN 46803

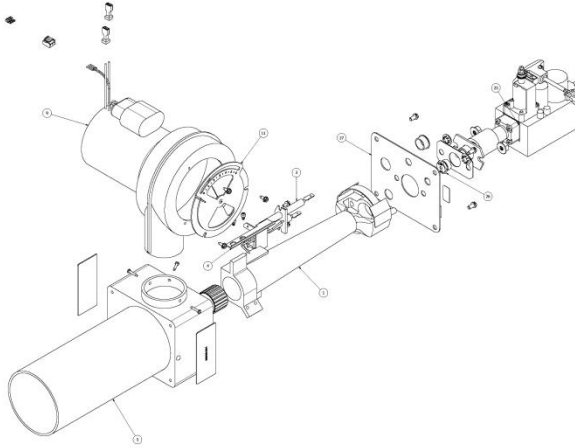
PHONE: (260) 425-9200
(800) 443-4625
FAX: (260) 424-0904

www.waynecombustion.com

iHEAT SYSTEM

Manual 64659-001 | Revision B | Publication Date: 05/12/2020

NOTE: Dimensions in () are informational only. English values take priority.



	<u>P250</u>	<u>P265</u>
Maximum Input	250,000 Btu/hr (73 kW)	200,000 Btu/hr (59 kW)
Minimum Input	15,000 Btu/hr (4.4 kW)	15,000 Btu/hr (4.4 kW)
Turndown	5:1	5:1
Fuels	Natural & L.P. Gas	Natural & L.P. Gas
Maximum Inlet Pressure	14" w.c. Natural 14" w.c. LP	14" w.c. Natural 14" w.c. LP
Minimum Inlet Pressure	5.5" w.c. Natural 11" w.c. LP	5.5" w.c. Natural 11" w.c. LP

Electrical power supply: 120V/60Hz 1 Ph.

MOUNTING: Adjustable flange is standard.



READ THIS MANUAL BEFORE USING THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS AND SAFETY PRECAUTIONS IN THIS MANUAL CAN RESULT IN SERIOUS INJURY OR DEATH. KEEP THIS MANUAL FOR FUTURE REFERENCE. INSTALLER: LEAVE THIS MANUAL WITH THE END USER.



INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FUEL GAS CODE ANSI Z223.1/NFPA54, AND IN COMPLETE ACCORDANCE WITH ALL LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.

A QUALIFIED INSTALLER IS THE PERSON WHO IS RESPONSIBLE FOR THE INSTALLATION AND ADJUSTMENT OF THE EQUIPMENT AND WHO IS LICENSED TO INSTALL GAS-BURNING EQUIPMENT IN ACCORDANCE WITH ALL CODES AND ORDINANCES.

CSA CERTIFICATE NUMBER: 1156769



INSTALLATION LOG

BURNER MODEL:	SPECIFICATION NUMBER:	FUEL (NATURAL OR PROPANE):	GAS ORIFICE DRILLED SIZE:
INLET GAS PRESSURE (in. w.c.):	CO₂(%):	O₂(%):	CO (PPM):
INSTALLER'S NAME:	CONTRACTOR NAME:	CONTRACTOR ADDRESS:	CONTRACTOR PHONE NUMBER:
CONTRACTOR LICENSE #:	DATE OF INSTALLATION:		
COMMENTS ABOUT INSTALLATION/START UP:			

BURNER/APPLIANCE SERVICE LOG

SERVICE DATE	TECHNICIAN	COMPANY / ADDRESS	CONTRACTOR LICENSE #	WORK PERFORMED
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THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER OR ADJACENT TO THE APPLIANCE.

OVERVIEW OF SAFETY WARNING SYSTEM AND YOUR RESPONSIBILITIES

The safety of you and others depends upon you thoroughly reading and understanding this manual. If you have questions or do not understand the information presented in this manual, **please call Wayne Combustion System or see www.waynecombustion.com**.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. The meaning of this safety alert symbol is as follows: **Attention! Become alert! Your safety may be at risk.** The message that appears next to the warning describes the hazard, which can be either written or pictorially presented. **NEVER** remove or tamper with the warning labels, safety devices or guards fitted on the unit.

Wayne Combustion System is **NOT** responsible for any bodily injury and/or property damage that may result from operation outside of the stated operating conditions for which this unit was intended.

Hazard Definitions:



Indicates a hazardous situation, which, if not avoided, will result in **death or serious bodily injury**.










Indicates a hazardous situation, which, if not avoided, could result in **death or serious bodily injury**.





Indicates a hazardous situation, which, if not avoided may result in **minor or moderate bodily injury**.



Indicates a situation that may result in equipment-related damage.

Hazard Level	Pictogram	Type	Free Text
		Fire or Explosion	<p>Failure to follow safety warnings exactly could result in serious injury, death or property damage. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.</p> <p>WHAT TO DO IF YOU SMELL GAS:</p> <ul style="list-style-type: none"> • Open windows. • Do not try to light any appliances. • Do not touch electrical switches; do not use any phone in your building. • Extinguish any open flame. • Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. • If you cannot reach your gas supplier, call the fire department.
		Electric shock or burn	Always disconnect power supply before working on the unit. Failure to follow safety warnings could result in serious injury or death.
		Overheating	<p>SHOULD OVERHEATING OCCUR:</p> <ul style="list-style-type: none"> • Shut off the manual gas control to the appliance. • DO NOT shut off power to the equipment, allow blower to continue running.
		Carbon Monoxide Poisoning	<p>CARBON MONOXIDE IS A COLORLESS, ODORLESS GAS THAT CAN KILL. FOLLOW THESE RULES TO CONTROL CARBON MONOXIDE.</p> <ul style="list-style-type: none"> • Do not use this burner if in an unvented, enclosed area. Carbon monoxide may accumulate. • Do not adjust the pressure regulator. High pressures produce carbon monoxide. • Check flue gases for carbon monoxide. This check requires specialized equipment. • Allow only qualified burner service persons to adjust the burner. Special instruments and training are required. • Read the burner manual before using. <p>CARBON MONOXIDE POISONING: Early signs of carbon monoxide poisoning are similar to the flu with headaches, dizziness, weakness, nausea, vomiting, sleepiness, and confusion. If you suspect carbon monoxide poisoning, get outside to fresh air immediately, and then call 911. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anemia, those under the influence of alcohol, and those at high altitudes. Propane/LP gas and natural gas are both odorless. An odor-making agent is added to each of these gases. The odor helps you detect a gas leak. However, the odor added to these gases can fade. Gas may be present even though no odor exists.</p>

Hazard Level	Pictogram	Type	Hazard Explanation
		Special Requirements	When contacting Wayne Combustion Systems for service information, please have the burner specification number and model number when calling or writing.
		Proposition 65 material	This product can expose you to chemicals, including lead, nickel, carbon monoxide and sulfur dioxide, which are known to the State of California to cause cancer or birth defects or other reproductive harm. For more information, go to www.p65Warnings.ca.gov .

If any instructions in the manual are not clear, contact Wayne Combustion Systems at 1-260-425-9200 for assistance.

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DESCRIPTION OF SYSTEM AND COMPONENTS

System Description

iHEAT is an electronically controlled gas/air modulation system that can be utilized by P250 or P265 burners to provide a variable heat source for an appliance. The components of the system include: a fan-assisted gas burner, a modulating gas valve, and an electronic control module that varies the speed of the burner fan and the gas flow rate through the gas valve.

The thermostat on the OEM's appliance controls the temperature by sending a variable electrical signal to the iHEAT control, which responds to the signal by adjusting the speed of the combustion air blower and by changing the gas flow to the burner via a variable voltage to the modulating gas valve. These changes in combustion air and gas flow result in a variable heat source that responds to the appliance's call for heat.

Component Functions

iHEAT control – The control receives a 4-20 mA input signal from the appliance's thermostat. Based on the value of this input, the control generates outputs to the combustion air blower (combustion air) and the modulating gas valve (gas flow). The proper ratio of combustion air to gas is specific for the type of gas used, natural or propane. The ratios are stored in the memory of the control and are selected by positioning dip switches accessed through an opening on the face of the iHEAT control. See setup information for the proper settings of the switches. The control also incorporates a series of lights that signify the operating state of the system and assist in the diagnosis of the system should it require repair. In the event of improper combustion air blower speed, the control will act to shut off the flow of gas by de-energizing the ignition control. The solenoid portion of the gas valve is powered by the ignition control and no gas will flow.

Combustion air blower – The purpose of the combustion air blower is to provide the proper amount of air to the heating zone of the burner. The speed of the combustion air blower is controlled and monitored by the iHEAT control. The RPM is measured through a 3-wire plug connecting the combustion air blower to the control. There is also an adjustable air shutter on the inlet side of the blower. Refer to the Setup section for the recommended air shutter setting.

Modulating gas valve – The gas valve used in the iHEAT system has two functions built into one valve body. The first function is a solenoid valve that, when energized, allows gas to flow to the burner. The second function is the modulation of gas flow to the burner. Based on an input voltage from the iHEAT control, the modulating portion of the valve will vary the gas flow between an upper set point and a lower set point. The valve is designed with flange connections on the inlet and outlet making it easy to service should this become necessary.

An alternate flange with a smaller profile is used on some models per OEM specifications. The dimensions for the alternate flange are shown below.

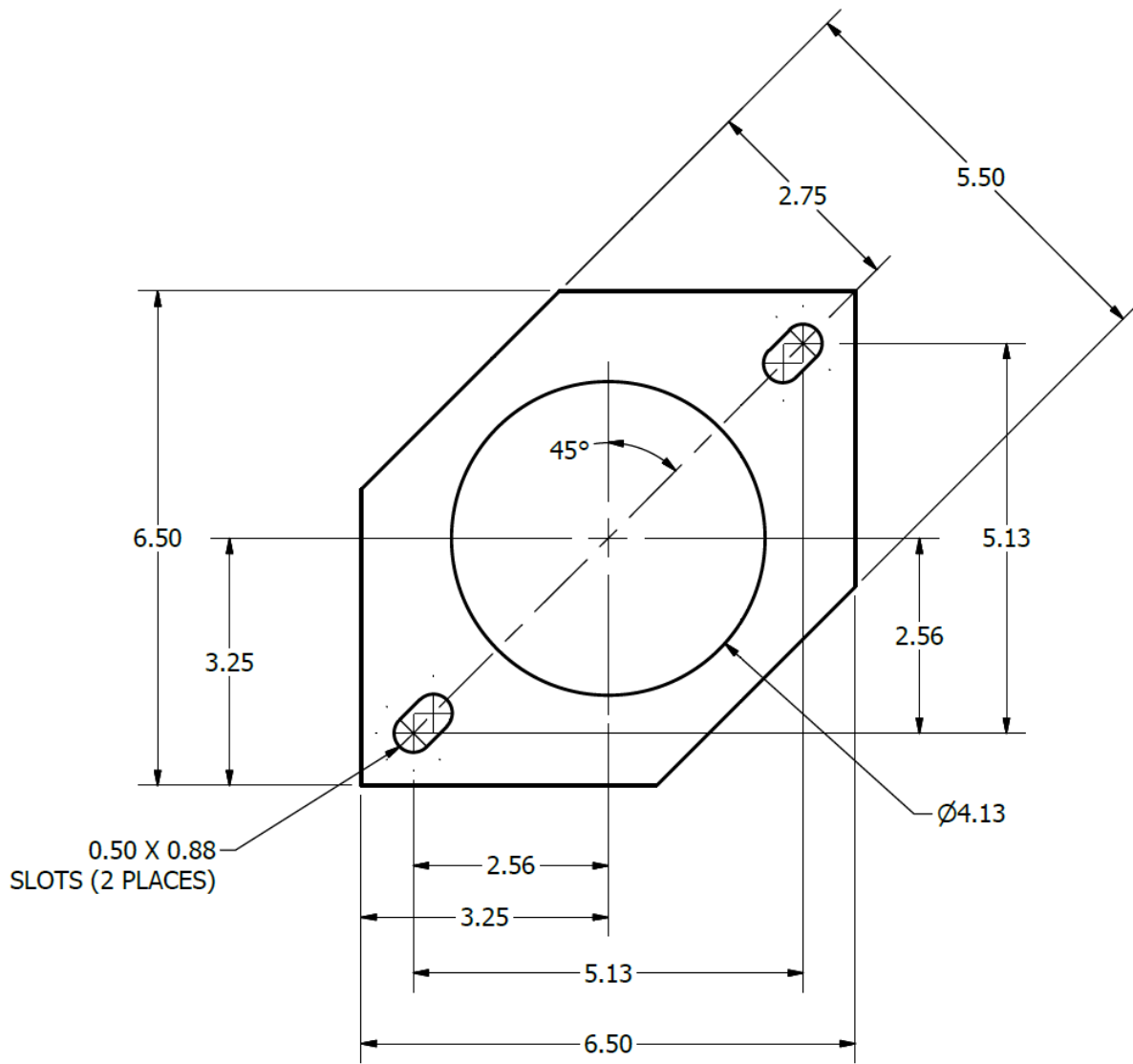


Figure 2 - Alternate Flange Dimensions

Sizing and Inspection of Gas Piping



GAS LEAK HAZARD

Liquefied petroleum gas is heavier than air. All connections should be checked for leaks using a soapy solution applied to gas connections. Leaking gas will settle in low lying areas such as basements and trenches. Failure to comply with the precautions and instructions, can result in death, serious bodily injury or burns, property damage or loss from fire or explosion, and/or asphyxiation due to lack of adequate air supply or carbon monoxide poisoning.

The gas piping must be properly sized to deliver adequate gas pressure to the burner during operation of the burner and any other gas appliances. The information supplied herein is to be used as a guideline for the proper sizing and configuration of the gas piping system. All piping must comply with local codes and ordinances or the National Fuel Gas Code ANSI Z223.1/NFPA No. 54. A sediment trap or drip leg must be installed in the supply line to the burner. A union shall be installed in the gas line upstream from the control manifold and downstream from the sediment trap or drip leg (See Figure 4). A 1/8" NPT plugged tapping port accessible for test gauge connection shall be installed immediately upstream of the gas supply connection for the purpose of determining the gas supply pressure to the burner. A manual shutoff valve shall be installed in the gas supply line external to the appliance (See Figure 3).

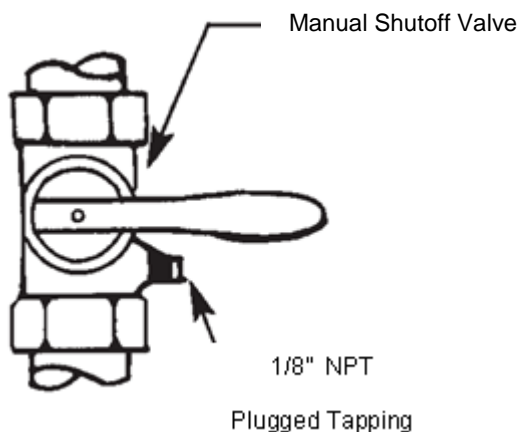


Figure 3 - Manual Shutoff Valve

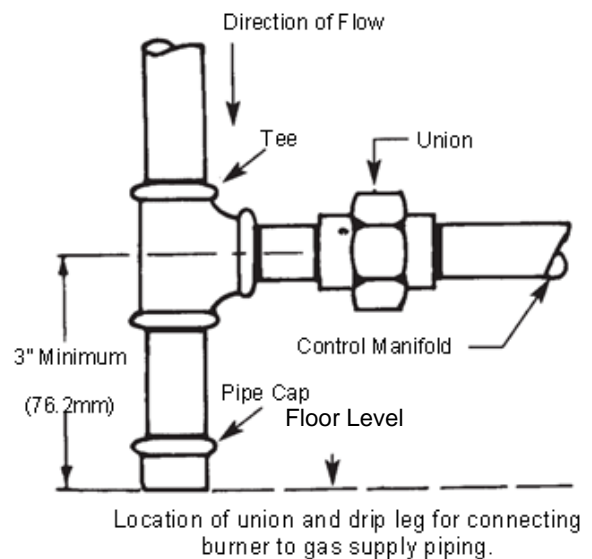


Figure 4 - Pipe Union and Fittings

The piping should be so installed as to be durable, substantial and gas tight. It should be clear and free from cutting burrs and defects in structure or threading. Aluminum tubing should not be used for the main gas supply. Joint compounds (pipe dope) should be used sparingly on male threads only and be approved for all gases.

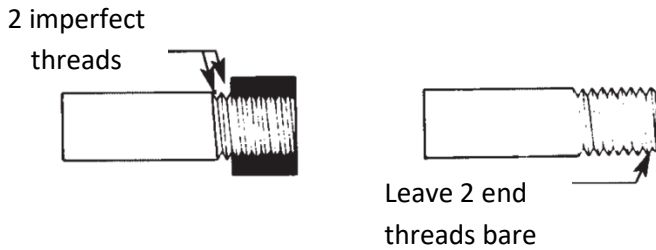


Figure 5 - Proper Piping Practice

Pipe Size Inch (mm)	Effective Length of Thread Inch (mm)	Overall Length of Thread Inch (mm)
3/8 (9.5)	3/8 (9.525)	9/16 (14.29)
1/2 (12.7)	1/2 (12.7)	3/4 (19.05)
3/4 (19.0)	1/2 – 9/16 (14.29)	13/16 (20.64)
1 (25.4)	9/16 (14.29)	1 (25.4)

Table 1 - Pipe Thread Length

It is recommended that Table 2, Table 3, and Table 4 be used to determine the size pipe to use from the meter to the burner. The building structure should not be weakened by installation for the gas piping. The piping should not be supported by the other piping, but should be firmly supported with pipe hooks, straps, bands or hangers. Butt or lap welded pipe should not be bent. **Note: Each elbow, union, and tee adds approximately 2.5 feet of pipe.**

The gas piping should be so installed as to prevent an accumulation of condensation and must be protected against freezing. A horizontal pipe should be pitched so that it grades toward the meter and is free from sags. The pipe should not be run through or in an air duct. The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressure over 1/2 psig (3500 PaG). The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3500 PaG).

Pipe Sizing Chart for Natural Gas (0-0.5 psi) with Straight Schedule 40 Metal Pipe

This table is based on **0-0.5 psi** inlet pressure, specific gravity of **0.6**, and a pressure loss of **0.5" w.c.**

Maximum Capacity of Pipe Size in Btu per Hour

Length of Pipe (ft)	1/2"	3/4"	1"	1 1/4"	1 1/2"
10	175,000	360,000	680,000	1,400,000	2,100,000
20	120,000	250,000	465,000	950,000	1,460,000
30	97,000	200,000	375,000	770,000	1,180,000
40	82,000	170,000	320,000	660,000	990,000
50	73,000	151,000	285,000	580,000	900,000
60	66,000	138,000	260,000	530,000	810,000
70	61,000	125,000	240,000	490,000	750,000
80	57,000	118,000	220,000	460,000	690,000
90	53,000	110,000	205,000	430,000	650,000
100	50,000	103,000	195,000	400,000	620,000
150	40,000	84,000	160,000	325,000	500,000
200	35,000	72,000	135,000	280,000	430,000

Table 2 - Natural Gas Pipe Capacity

Pipe Sizing Chart for Liquid Propane (11" w.c.) with Straight Schedule 40 Metal Pipe
 The following chart is based on 11" w.c. inlet pressure and a pressure drop of 0.5" w.c..
Special use: Piping sizing between single or second stage (low pressure regulator) and appliance.

Maximum Capacity of Pipe Size in Btu per Hour

Pipe Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"
Actual ID	0.622	0.824	1.049	1.38	1.61	2.067	3.068
Length of Pipe (feet)	Maximum Capacity in Btu/hr						
10	291,000	608,000	1,145,000	2,352,000	3,523,000	6,786,000	19,119,000
20	200,000	418,000	787,000	1,616,000	2,422,000	4,664,000	13,141,000
30	160,000	336,000	632,000	1,298,000	1,945,000	3,745,000	10,552,000
40	137,000	287,000	541,000	1,111,000	1,664,000	3,205,000	9,031,000
50	122,000	255,000	480,000	984,000	1,475,000	2,841,000	8,004,000
60	110,000	231,000	434,000	892,000	1,337,000	2,574,000	7,253,000
80	94,000	197,000	372,000	763,000	1,144,000	2,203,000	6,207,000
100	84,000	175,000	330,000	677,000	1,014,000	1,952,000	5,501,000
125	74,000	155,000	292,000	600,000	899,000	1,730,000	4,876,000
150	67,000	140,000	265,000	543,000	814,000	1,568,000	4,418,000
200	58,000	120,000	227,000	465,000	697,000	1,342,000	3,781,000
250	51,000	107,000	201,000	412,000	618,000	1,189,000	3,351,000
300	46,000	97,000	182,000	373,000	560,000	1,078,000	3,036,000
350	42,000	89,000	167,000	344,000	515,000	991,000	2,793,000
400	40,000	83,000	136,000	320,000	479,000	922,000	2,599,000

Table 3 - LP Pipe Capacity

Pipe Sizing Chart for Liquid Propane (11" w.c.) with Copper Tubing

The following chart is based on 11" w.c. inlet pressure and a pressure drop of 0.5" w.c..

Maximum Capacity of Tube Size in Btu per Hour

Pipe Size	1/2"	5/8"	3/4"	7/8"
Length (feet)	Maximum Capacity in Btu/hr			
10	110,000	206,000	348,000	536,000
20	76,000	141,000	239,000	368,000
30	61,000	114,000	192,000	296,000
40	52,000	97,000	164,000	253,000
50	46,000	86,000	146,000	224,000
60	42,000	78,000	132,000	203,000
70	38,000	71,000	120,000	185,000
80	36,000	67,000	113,000	174,000
90	33,000	62,000	105,000	161,000
100	32,000	59,000	100,000	154,000

Table 4 - LP Copper Tubing Capacity

NOTE: Copper tubing shall comply with standard type K or L of ASTM B 88 or ASTM B 280.

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic feet test dial and allowing 5 minutes to show any movement, or by soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs and repeat the above test. Defective pipes or fittings should be replaced and not repaired. **Never use a flame** or fire in any form to locate gas leaks, use a soap solution.

After the piping and meter have been checked completely, purge the system of air. Be sure to relight all the gas pilots on other appliances.

ELECTRICAL WIRING OF BURNER

Electrical components for the burner are mounted on a sub plate which ships with the burner. The wiring diagram in Figure 13 shows how to wire the burner to the sub plate and where to connect line voltage. The wiring to the utilized outlet must conform to the National Electric Code or the code legally authorized in the locality where the installation is being made. The burner, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the latest edition of the National Electrical Code, ANSI/NFPA No. 70.

SETUP

Proper setup of the burner system requires:

1. Installing the proper orifice
2. Setting the air shutter
3. Calibrating the blower
4. Setting the dip switches on the control board
5. Adjusting the modulating valve

The orifice, air shutter, and dip switches may all be set before installation. Adjusting the modulating valve and calibrating the blower require that power be connected to the burner system and gas be connected to the inlet pipe.

Orifice

Proper burner setup requires selection of an orifice size and air shutter setting based on the expected maximum Btu/hr required for the application using Table 5. The high-fire rate produced by the iHEAT burner system in a given appliance will be determined by the size of the gas orifice installed in the burner. The burner ships from the factory with a 1/8" orifice, which will fire natural gas at a maximum firing rate of 50,000 Btu/hr. The iHEAT system is capable of a 5:1 turndown, thus the resulting low-fire rate with this orifice would be 10,000 Btu/hr.

Selecting the proper gas orifice size is important for optimal system performance. If the selected orifice produces a high-fire rate that is more than necessary for the appliance during loaded operation, the iHEAT system will operate at the very low end of the firing rate a majority of the time. The best system performance will be obtained when the selected orifice results in a firing rate that heats the appliance from a cold start to temperature in the longest acceptable time, and is able to maintain appliance temperature under max load conditions.



CARBON MONOXIDE HAZARD

A qualified technician must use a combustion analyzer to properly set up any burner system. Check flue gases for carbon monoxide. This check requires specialized equipment.

The air shutter settings given here are for use with dip switch settings 5 (natural gas) and 6 (propane gas). These settings were determined based on lab testing and should give a good starting point for adjustment in a new application. When commissioning an appliance, some adjustment of the air shutter from these values is required for safe and efficient operation of the burner.

Table 5 - Orifice Sizes and Approximate Air Shutter Settings to Achieve a Given Firing Rate

Natural gas				Propane gas			
Btu/hr	Letter/ Number	Decimal (in.)	Air shutter	Btu/hr	Letter/ Number	Decimal (in.)	Air shutter
50,000	1/8	0.1250	0.50	50,000	45	0.0820	0.25
60,000	30	0.1285	0.50	60,000	44	0.0860	0.50
65,000	29	0.1360	0.50	65,000	43	0.0890	0.50
70,000	28	0.1405	0.50	70,000	3/32	0.0940	0.75
75,000	26	0.1470	0.50	75,000	40	0.0980	1.00
80,000	24	0.1520	0.50	80,000	37	0.1040	1.00
85,000	5/32	0.1562	0.50	85,000	36	0.1065	1.25
100,000	17	0.1730	1.00	100,000	35 (7/64)	0.1100	1.25
110,000	14	0.1820	1.25	110,000	31	0.1200	1.50
120,000	10	0.1935	1.50	120,000	3.1 mm	0.1220	1.50
130,000	7	0.2010	1.50	130,000	1/8	0.1250	2.00
140,000	5 (13/64)	0.2055	1.75	140,000	30	0.1285	2.50
150,000	4	0.2090	2.00	150,000	29	0.1360	2.75
160,000	3	0.2130	2.50	160,000	28 (9/64)	0.1405	2.75
170,000	1	0.2280	2.75	170,000	27	0.1440	3.00
175,000	A	0.2340	2.75	175,000	26	0.1470	3.00
185,000	B	0.2380	3.00	185,000	25	0.1500	3.25
190,000	C	0.2420	3.00	190,000	24	0.1520	3.25
200,000	E (1/4)	0.2500	3.25	200,000	22 (5/32)	0.1570	3.50
210,000	F	0.2570	3.50	210,000	20	0.1610	3.75
220,000	G	0.2610	3.75	220,000	19	0.1660	4.00
230,000	H	0.2660	4.00	230,000	18	0.1695	4.25
240,000	I	0.2720	4.00	240,000	11/64	0.1720	4.25
250,000	J	0.2770	4.25	250,000	16	0.1770	4.50

This table shows the recommended orifice sizes and air shutter settings based on Btu/hr required. For example, an application running propane gas that needs 157,000 Btu/hr would use an orifice drilled with a #28 drill bit. This orifice would have a 0.1405" hole. The air shutter would be set to the 2.75 position.

Air Shutter

Use Table 5 to determine the general air shutter setting based on the orifice size. Use a ¼" wrench to loosen the screw on the shutter's numerical scale. Position the shutter so that the center of the screw lines up with the desired number on the scale, then re-tighten the screw. The air shutter settings given in Table 5 are intended as a starting point. A combustion analyzer must be used to set the shutter at the maximum firing rate.

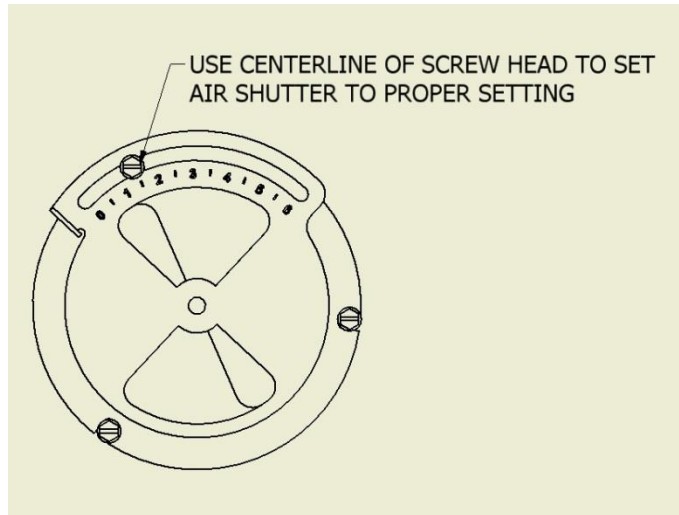


Figure 6 – Air Shutter. This picture shows the air shutter adjusted to the 1.5 position.

Calibrating the Blower

- Turn off power to the burner system, and wait for LEDs on the iHEAT board to go out.
- Position the dip switches on the iHEAT board such that dip switch 8 is on and all others are off.
- Turn on power to the burner system. The iHEAT control is now in a calibration mode. During this calibration process, the lights on the control board will illuminate in the following manner: FLASH – flash, T-INPUT – off, VALVE – off, BLOWER – on, 24V/CAL – flash. The calibration process will take about 8 minutes. The end of calibration is indicated by continuous illumination of the 24V/CAL light.

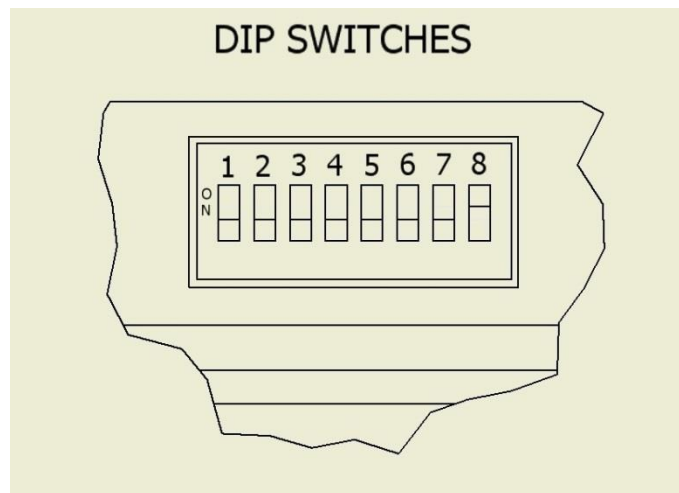


Figure 7 - Dip switch positions to calibrate blower: switch 8 on, all others off. Turn off power to the board before adjusting dip switches.

Dip Switches

Note: When power is first applied to the iHEAT control system, a 30 second delay will occur before the system will initiate an attempt to light the burner. No gas will flow during this wait time.

The dip switches at the bottom right corner of the iHEAT board allow changes to the board's configuration to be made in the field without reprogramming, including switching from natural gas to propane. To change these settings, turn off power to the board, then set the dip switches according to the table below.

Switch	Usage
1	Natural gas, OEM specific, burner always on, slower fan speed
2	LP gas, OEM specific, burner always on, slower fan speed
3	Natural gas, OEM specific, burner off as needed, slower fan speed
4	LP gas, OEM specific, burner off as needed, slower fan speed
5	Universal, natural gas, maximum fan speed
6	Universal, LP gas, maximum fan speed
7	Low fire setting used for gas pressure setting
8	Blower motor calibration

Table 6 - Dip Switch Settings

Modulating Valve

Adjusting the modulating valve requires that power be connected to the control board and gas be connected to the valve. Use a manometer to measure the outlet pressure. Set the high pressure setting before the low pressure setting. The valve must be mounted with the modulating coil horizontal.

NOTICE

The maximum rated inlet pressure to the gas valve is ½ psi (14" w.c.). The valve will be damaged if higher gas pressure is applied.

The gas valve controls the pressure of the gas supplied to the burner in order to adjust the burner's firing rate. The gas valve will not be able to supply enough gas to achieve the desired firing rate if the gas line feeding it does not have sufficient pressure. The table below lists the supply pressures necessary to support different firing rates.

Min. Inlet Pressure required for Natural Gas		
Orifice (in.)	Firing Rate (Btu/hr)	Min. Inlet P (in. w.c.)
0.250	200,000	8.4
0.228	170,000	6.6
0.2055	140,000	6.3
0.193	120,000	5.9
0.186	115,000	5.6
0.182	110,000	5.5

Table 7 - Minimum Inlet Pressure for Natural Gas Burners

Min. Inlet Pressure required for LP Gas		
Orifice (in.)	Firing Rate (Btu/hr)	Min. Inlet P (in. w.c.)
0.147	175,000	11.5
0.136	150,000	11.0
0.1285	140,000	11.0
0.122	120,000	11.0
0.120	110,000	11.0

Table 8 - Minimum Inlet Pressure for LP Burners

To measure the pressure:

- Locate the appropriate pressure tap:
The pressure taps are on top of the valve near the modulating coil (see illustration). The manifold pressure is measured from the tap nearest to the valve outlet. The other tap can be used to check inlet pressure.
- Shut off gas to the appliance.
- Unscrew the manifold pressure tap screw 1.5 to 2 turns counterclockwise.
- Slip the measuring hose of the manometer over the tap.

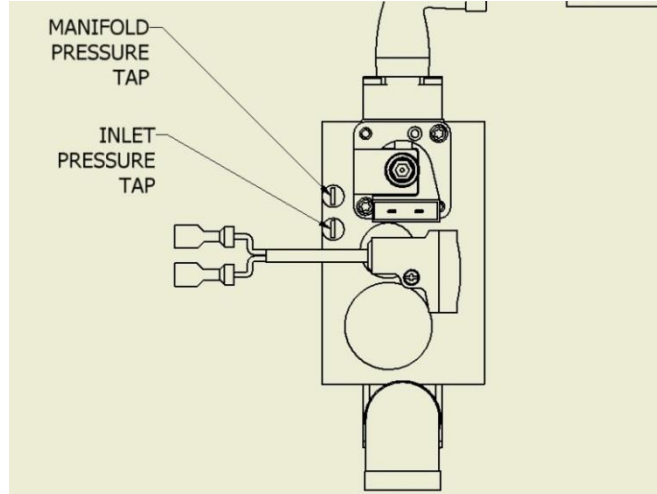


Figure 8 - Pressure Tap Locations

To set the high pressure setting:

- Determine the recommended manifold gas pressure setting based on table at right.
- Locate the 8mm high pressure adjustment nut. This is the larger nut located on the valve coil.
- Set the appliance to call for full fire.
- After the burner ignites, turn the high pressure nut counterclockwise until the outlet gas pressure is below the desired outlet gas pressure setting, then turn clockwise until desired pressure is achieved.
- Careful! Do not over-tighten. Stop if additional clockwise turning does not noticeably increase the outlet pressure.

	Natural gas	Propane gas
High pressure setting	4.5" w.c.	10.0" w.c.

Table 9 - Recommended Manifold Pressure Settings

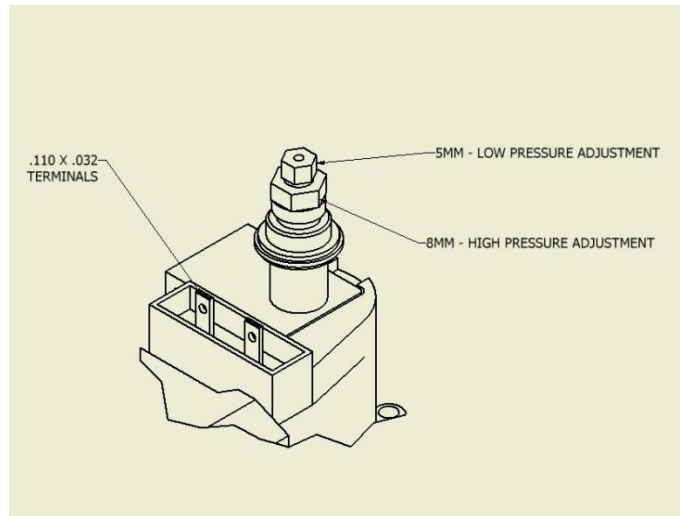


Figure 9 - Gas Pressure Adjustments

To set the low pressure setting:

- Determine the recommended manifold gas pressure setting based on the table at right.
- Locate the 5mm low pressure adjustment nut. This is the smaller nut located on the valve coil.
- Set the appliance to call for full fire and run for five minutes.
- Turn off power to the burner, set the dip switches so that only #7 is on (see Figure 10), and turn burner power back on.
- Run in this low fire mode for one minute.
- Turn the low pressure nut counterclockwise to reduce the pressure; turn clockwise to increase the pressure. Adjust until the desired pressure setting is achieved.
- Careful! Reducing the pressure too much or too quickly may cause the burner to go out. If this happens, turn the small nut clockwise $\frac{1}{4}$ to $\frac{1}{2}$ a turn then repeat the steps above.

	Natural gas	Propane gas
Low pressure setting	0.4" w.c.	0.8" w.c.

Table 10 - Recommended Manifold Pressure Settings

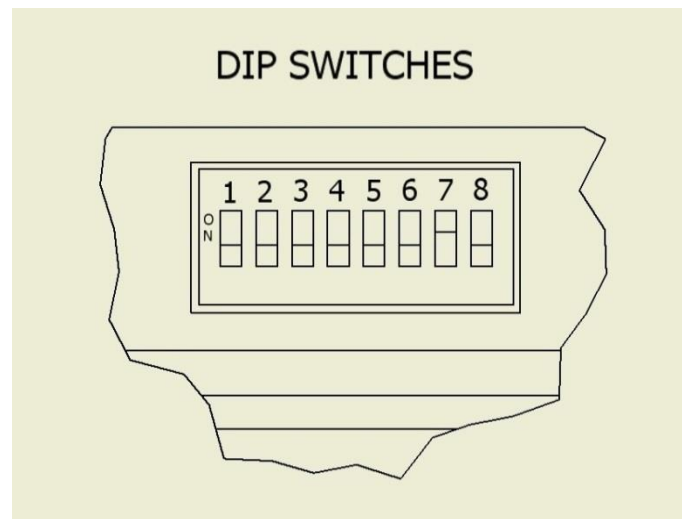


Figure 10 - Dip switch positions to make the appliance fire at the lowest rate: switch 7 on, all others off. Turn off power to the board before adjusting dip switches.

After setting the high and low pressure settings:

- Turn off the appliance.
- Close the manual gas valve on the gas supply line.
- Remove the manometer hoses and tighten the pressure tap screws where the hoses were.

Final Steps of Setup

Turn off power to the burner system and wait for all lights on the iHEAT board to go off. Set the dip switches on the board in the proper positions for normal operation according to the table given in the Dip Switches section.

Run the appliance at full fire for ten minutes, and then check the burner exhaust with a combustion analyzer. For natural gas, it is desirable to set the burner to achieve a CO₂ reading between 8% to 10%, an O₂ reading of 3% or above, and a CO reading of less than 100 ppm. The CO reading should never be above 400 ppm. Increasing the air shutter opening will generally decrease the CO₂ and CO readings. The desired range for propane gas is a CO₂ reading of between 10% to 12%, an O₂ reading of 3% or above, and a CO reading of less than 100 ppm.

SEQUENCE OF OPERATION

On a call for heat, the ignition control's diagnostic LED will flash rapidly while the ignition control begins sparking. After successful ignition, the LED will light green and remain lit as long as a flame is detected. If the burner fails to light, the control will wait for the interpurge time, then spark again. During this time, the diagnostic LED will flash green at a rate of twice per second. If the burner does not light after three trials for ignition, the ignition control will be locked out, and the diagnostic LED will flash red. If this happens, remove power from the control, then try again. The number of LED flashes indicates the type of failure that occurred (see table below). If the burner lights, but loses flame, the ignition control will attempt to relight immediately without a purge.

Number of flashes	Problem
1	No flame during trial for ignition
2	Flame sense fail
3	Gas valve relay failure
4	Multiple flame loss
7	Input voltage error

Table 11 - Ignition Control Error Codes

Trial for ignition	4 seconds
Interpurge time	30 seconds

iHEAT BOARD FEATURES

On/Off Feature

In order to maintain temperature at the low end of the range of temperature set points, the iHEAT system incorporates an on/off feature. When the iHEAT system has modulated down to the minimum heat input, but the set temperature is not maintained, the iHEAT system will turn the burner off. This will be indicated by the Valve light, as it will flash during the burner off cycle. When the appliance temperature reduces a few degrees below the temperature set point, the iHEAT will bring the burner back on. The iHEAT system will continue to cycle the burner on and off to maintain the set temperature.

In some appliances, it may not be necessary for the iHEAT system to employ the on/off feature. This will depend upon the heat loss of the appliance, the load to be heated, the desired operating temperature, and the low firing rate of the iHEAT system in the particular application. The on/off feature is disabled when the iHEAT board's dip switches are set for a manual configuration (switch 1 or 2 on).

Diagnostic Lights

The iHEAT control provides 5 diagnostic lights that display the status of the iHEAT system and aid in diagnosing possible system component problems during the repair process. The lights and their functions are:

Flash – Flashing light indicates the control is functioning properly.

T-input – Each time the appliance is turned on, the control verifies an input signal from the thermostat. A solid light indicates the thermostat signal was verified upon start-up. A flashing light indicates a problem with the thermostat signal.

Valve – The control contains a set of contacts used to provide power to the ignition control. The Valve light indicates the position of the relay contacts; illuminated when the contacts are closed, and off when the contacts are open. A flashing light indicates that the board's on/off feature has turned the valve off. The valve contacts will open when an abnormal condition is sensed: combustion air blower RPM out of spec, either the line voltage or the 24 volt inputs to the iHEAT control are absent, the iHEAT control is in calibration mode, or the thermostat signal is absent upon start up.

Blower – The Blower light illuminates when the combustion blower is operating properly. A non-illuminated Blower light indicates: a bad electrical connection between the combustion blower and the iHEAT control, a bad motor on the combustion blower, or an absence of the line voltage or 24 volt inputs to the iHEAT control.

24V/CAL – This light serves two purposes. During the normal run mode, illumination of this light indicates that 24 volts AC is present at the 24 Vac connection to the iHEAT control. During the combustion air blower calibration, this light indicates status of the calibration process. A flashing light indicates calibration is occurring; a solid light indicates the calibration process is completed.

TROUBLESHOOTING GUIDE

Symptom	Lights					Possible Corrections
	Flash	T-Input	Valve	Blower	24V/Cal	
Appliance runs but iHEAT system does not run; combustion motor does not turn on, no heat to appliance.	Off	Off	Off	Off	Off	1. Check to make sure burner switch is on.
						2. With burner switch on, check for 120 volts across L1 and Neutral terminals; repair if necessary.
						3. With burner switch on, check for 24 volts across 24Vac terminals; repair if necessary.
	Flash	Flash	Off or Flash	Off	On	1. Indicates signal from t-stat is absent or not in proper range. Check wiring connections at COM(-) and 0-24V(+) or 4-20mA(+) terminals.
						2. Check t-stat for proper output.
	Flash	On	Off or Flash	Flash	On	1. Check wiring connections at MOTOR L and MOTOR N terminals.
						2. Check wiring connections at the three TACH terminals.
						3. Replace motor/blower.
Flash	Off	Off	Off	Off	Check dipswitches for proper position.	
Flash	Off	Off	On	Flash	System is in calibration mode. Refer to Calibrating the Blower section.	

Symptom	Lights					Possible Corrections
	Flash	T-Input	Valve	Blower	24V/Cal	
Appliance runs but iHEAT system does not run; combustion motor turns on, no heat to appliance	Flash	On	On	On	On	1. Check wiring connections at RELAY COM and RELAY N.O. terminals.
						2. Check wiring connections on ignition control. Verify 24 Vac input to ignition control and 24 Vac at valve terminals on ignition control during call for heat.
						3. Check wiring connections at VALVE (+) and VALVE(-) terminals on iHEAT control. Check wiring connections on white solenoid coil of gas valve.
						4. Check for proper connection of black rectifier plug on gas valve.
						5. Verify gas flow during ignition trial. If gas flows but ignition does not occur, correct ignition problem. If gas does not flow during ignition trial, diagnose problem with gas valve.
Appliance runs, temperature well over t-stat set point, will not control appliance temperature	Flash	On	On	On	On	1. Check wiring connections at 4-20 mA(+) and COM(-) terminals making sure + and - connections from the control enclosure are in the corresponding + and - connections at the iHEAT control.
						2. With the burner in the full fire condition, check the inlet gas pressure using the appropriate pressure tap on the gas valve. Check the adjustment of the modulating gas valve's high pressure setting. Refer to System Set-up, Modulating Gas Valve section.

Symptom	Lights					Possible Corrections
	Flash	T-Input	Valve	Blower	24V/Cal	
Appliance runs, oven temperature at or near t-stat set point, slowly increases above set point over time	Flash	On	On	On	On	1. Verify proper gas orifice size for desired firing rate and type of gas.
						2. Check low pressure setting of modulating gas valve; adjust as necessary.
Appliance runs, temperature at t-stat set point slowly decreases when appliance is loaded	Flash	On	On	On	On	1. Verify proper gas orifice size for desired firing rate and type of gas.
						2. Check high pressure setting of modulating gas valve; adjust as necessary.
Appliance runs, temperature cycling above and below t-stat set point by approximately +/- 5°F	Flash	On	On or Flash	On	On	1. This is normal operation for iHEAT control with V53 and later software. A flashing Valve light indicates the burner has been turned off to maintain appliance temperature.
						2. Verify proper dip-switch position for appliance and gas type.
						3. Check low pressure setting of manual gas valve; adjust as necessary.
Appliance runs and iHEAT system is running	Flash	Off	Flash	On	Flash	System is in low gas pressure calibration mode. Refer to Modulating Valve section.

Electrode Position – Factory Setting

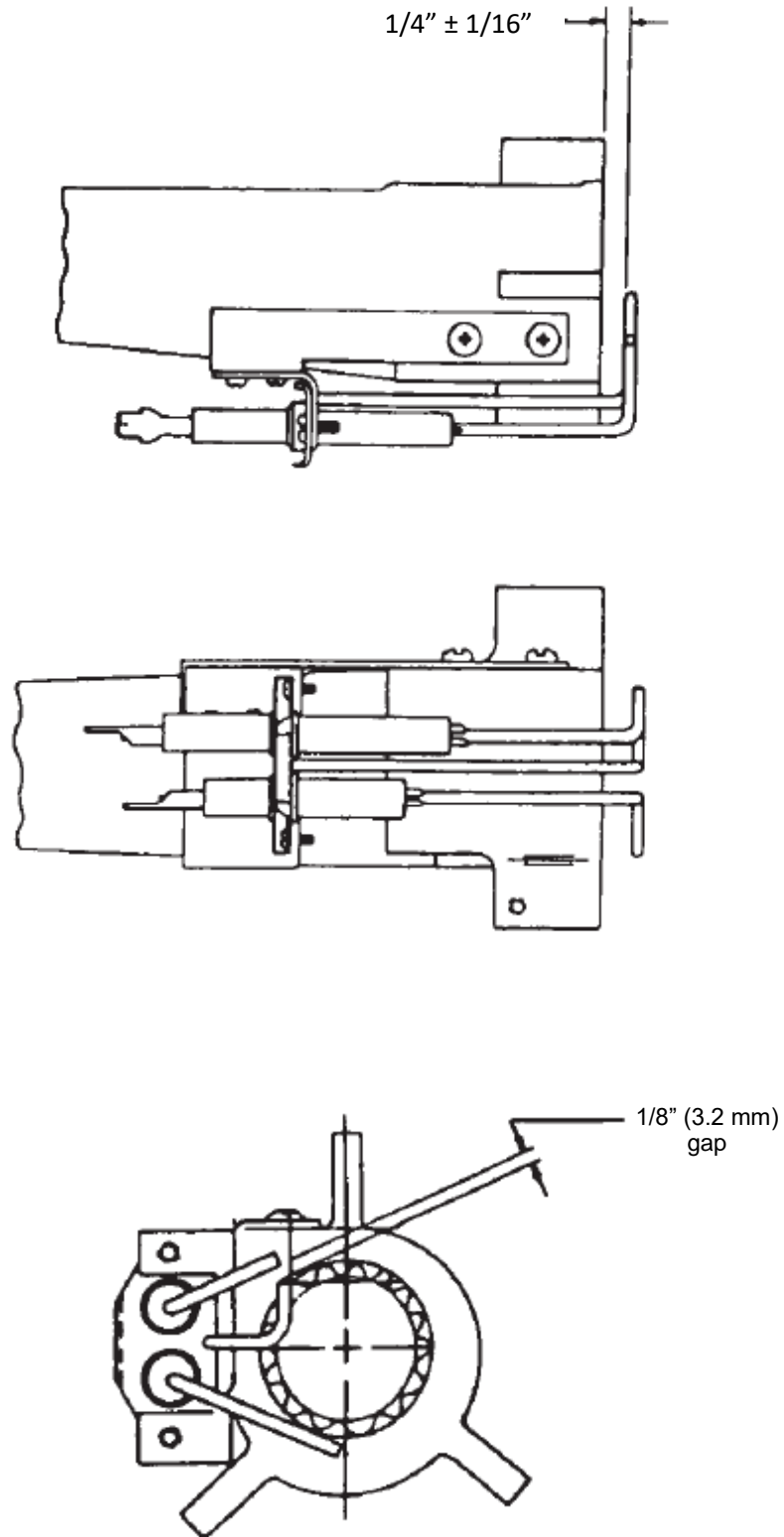


Figure 11 – P250 Electrode Positions, Factory Setting

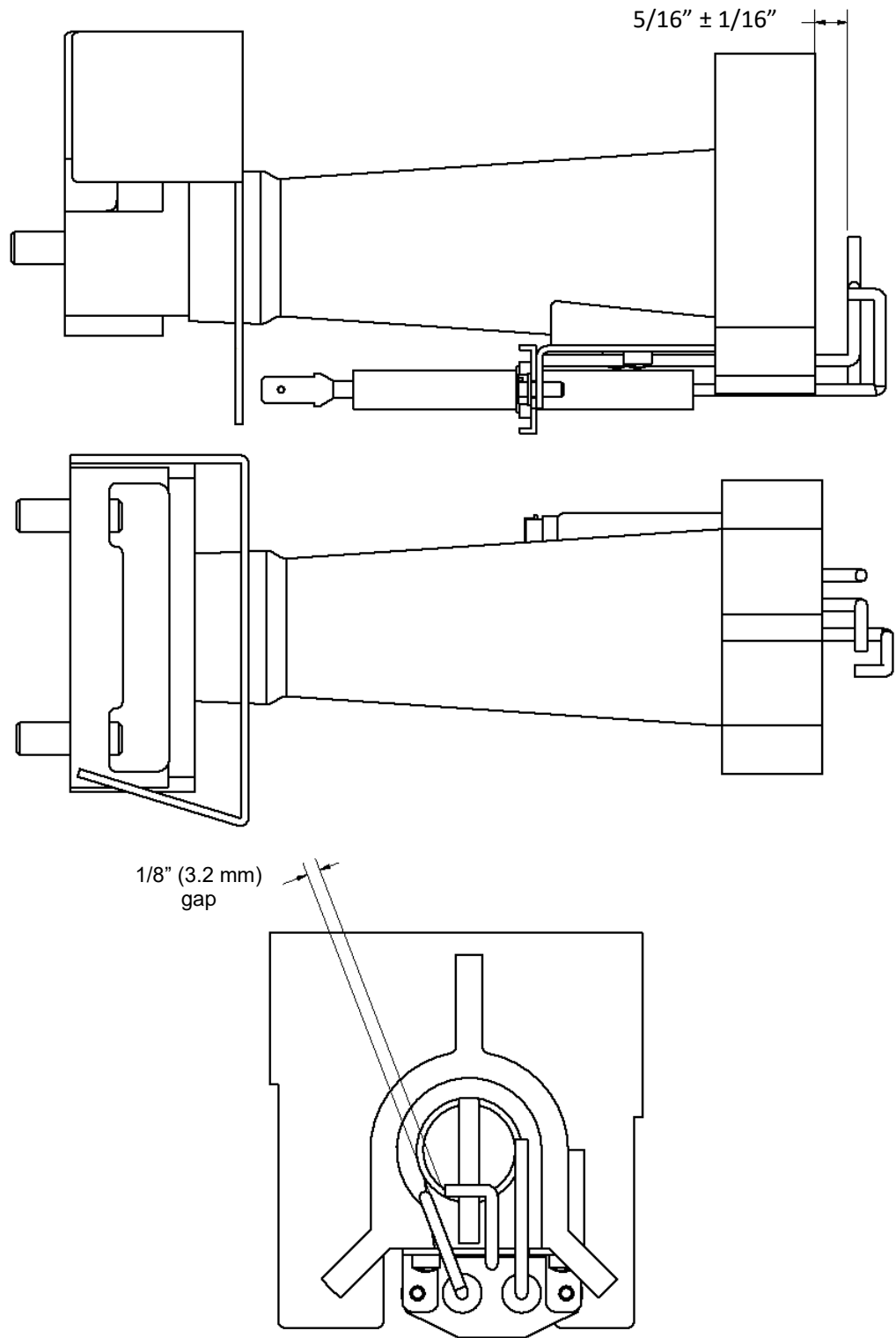


Figure 12 - P265 Electrode Positions, Factory Setting

Wiring Diagram

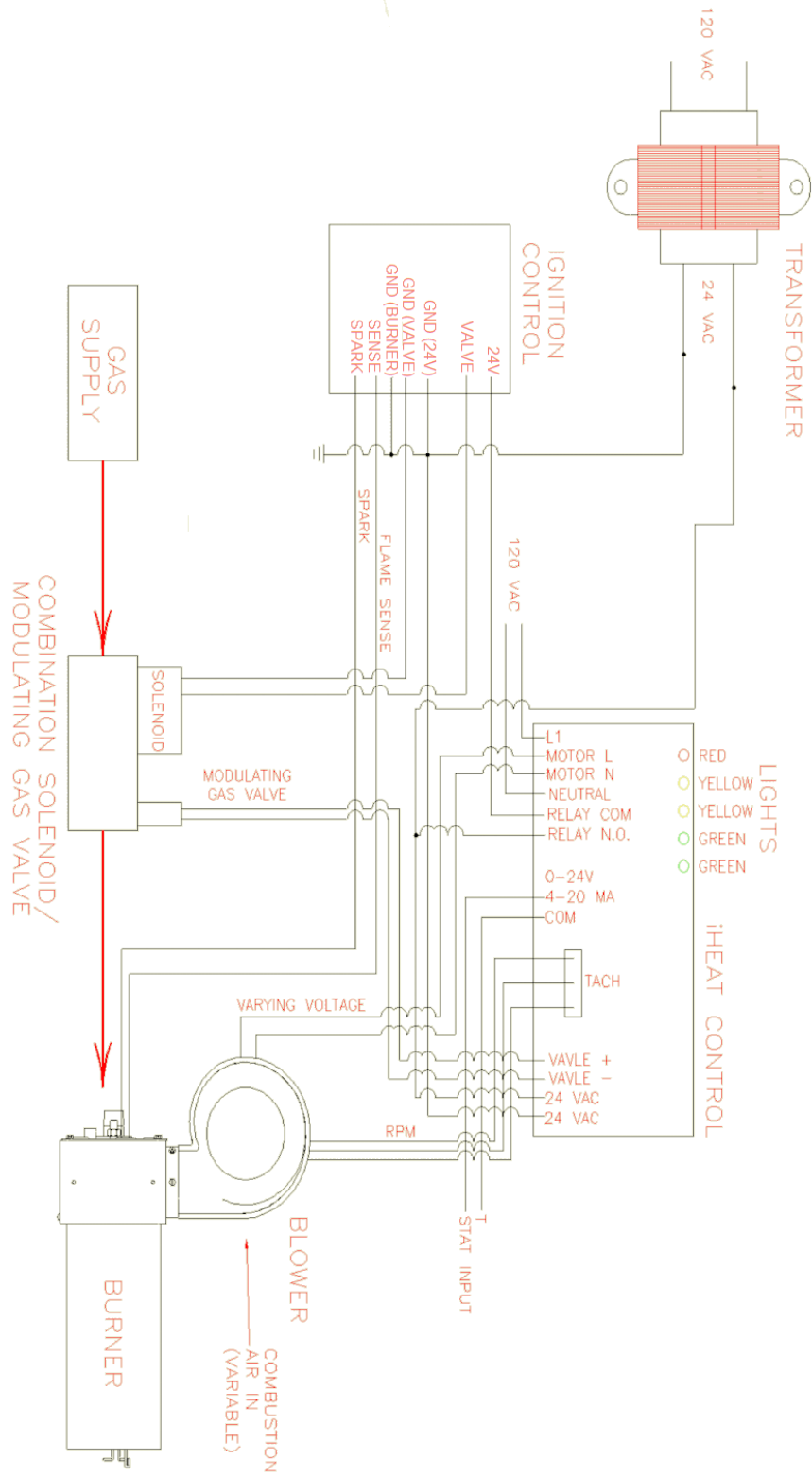
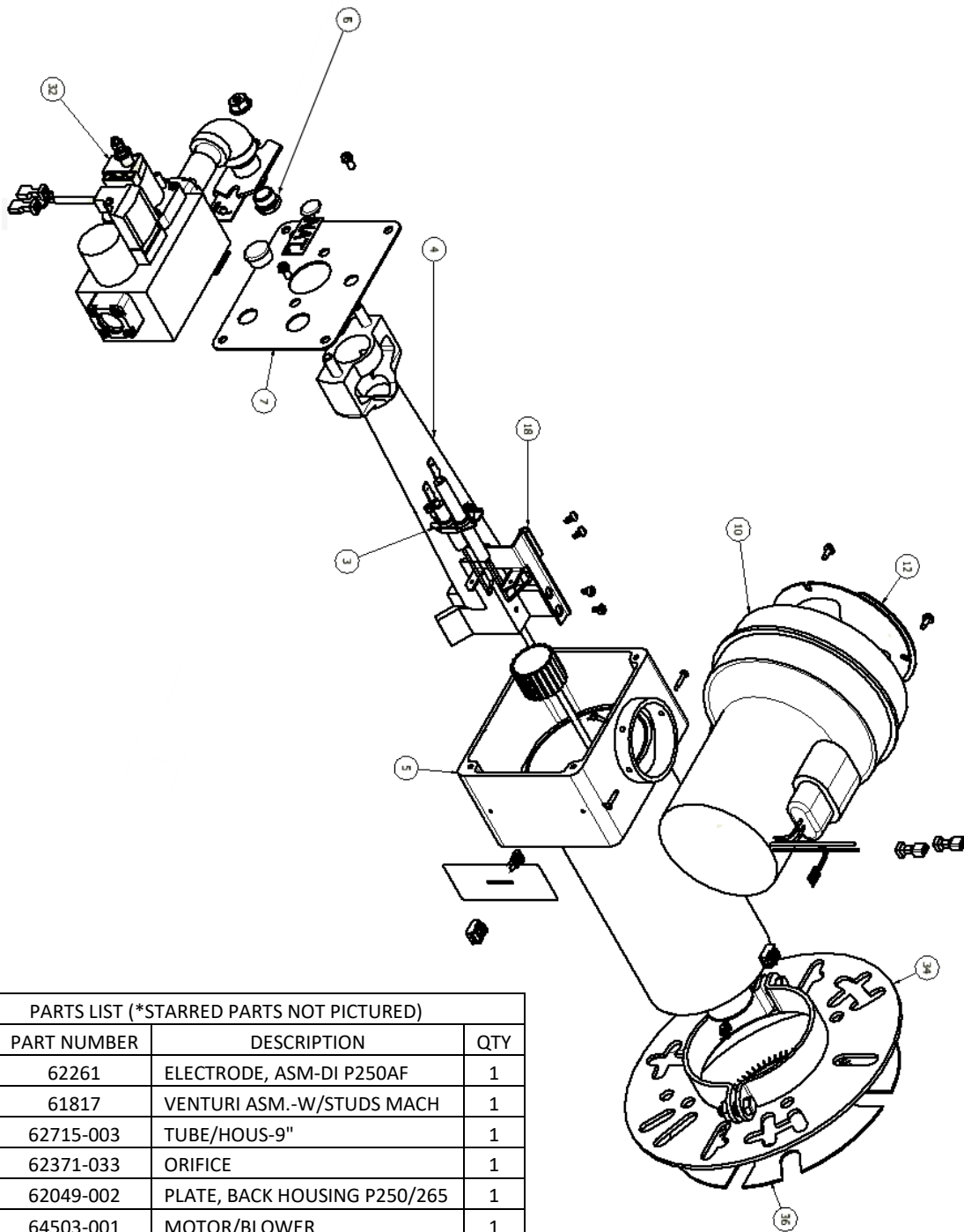


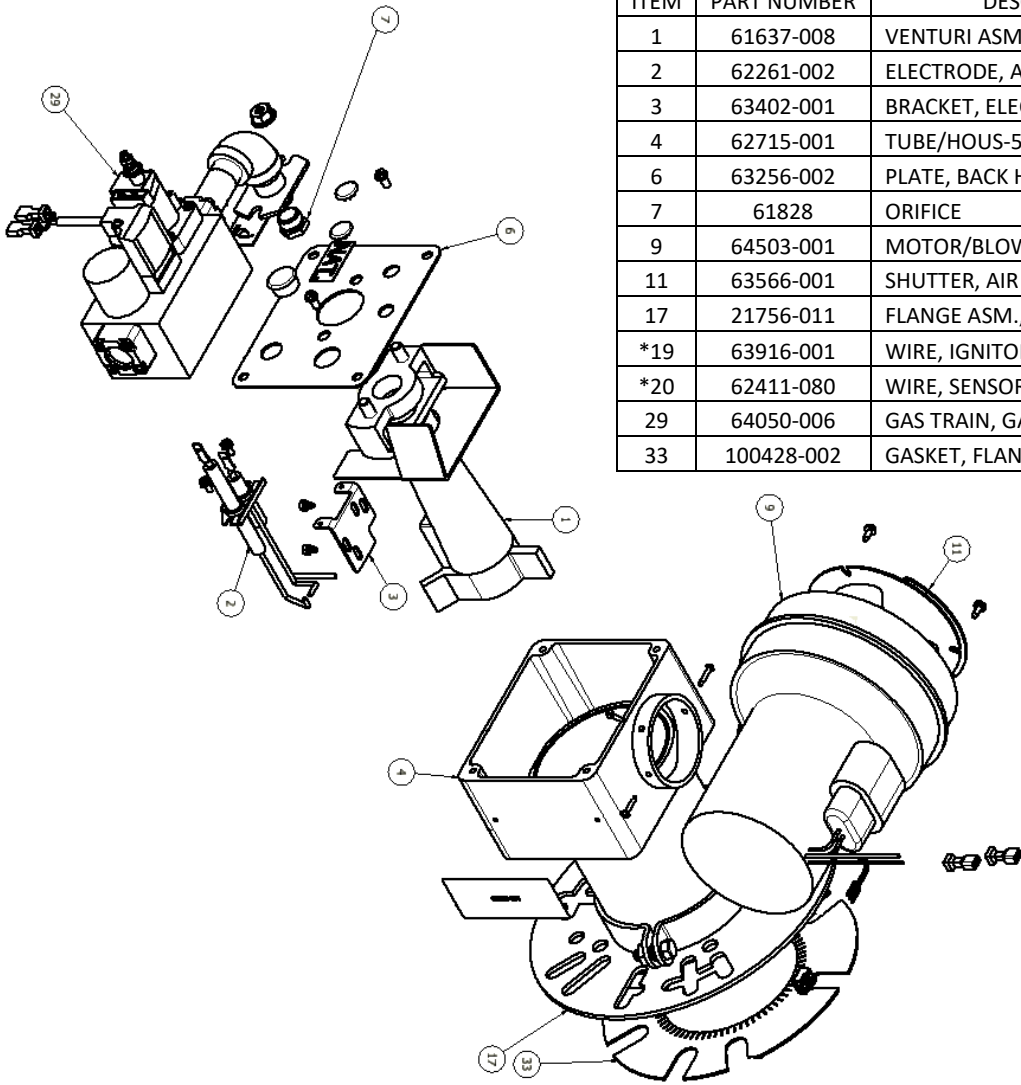
Figure 13 - Wiring Diagram

Exploded Views



PARTS LIST (*STARRED PARTS NOT PICTURED)			
ITEM	PART NUMBER	DESCRIPTION	QTY
3	62261	ELECTRODE, ASM-DI P250AF	1
4	61817	VENTURI ASM.-W/STUDS MACH	1
5	62715-003	TUBE/HOUS-9"	1
6	62371-033	ORIFICE	1
7	62049-002	PLATE, BACK HOUSING P250/265	1
10	64503-001	MOTOR/BLOWER	1
12	63566-001	SHUTTER, AIR ASM-(PIE STYLE)	1
18	62556-002	BRACKET, ELECTRODE MOUNT-DI	1
*19	63916-001	WIRE, IGNITOR LEAD-5MM 27"L	1
*20	62411-080	WIRE, SENSOR-24" BLUE	1
32	64050-006	GAS TRAIN, GAS/AIR MOD	1
34	21756-011	FLANGE ASM., ADJ-BLACK	1
36	100428-002	GASKET, FLANGE STD 4" ID	1

Figure 14 - Exploded View of P250 Burner



PARTS LIST (*STARRED PARTS NOT PICTURED)			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	61637-008	VENTURI ASM.-P265 NAT DI	1
2	62261-002	ELECTRODE, ASM-DI P265	1
3	63402-001	BRACKET, ELECTRODE MOUNT-DI	1
4	62715-001	TUBE/HOUS-5"	1
6	63256-002	PLATE, BACK HOUSING P250/265	1
7	61828	ORIFICE	1
9	64503-001	MOTOR/BLOWER	1
11	63566-001	SHUTTER, AIR ASM-(PIE STYLE)	1
17	21756-011	FLANGE ASM., ADJ-BLACK	1
*19	63916-001	WIRE, IGNITOR LEAD-5MM 27"L	1
*20	62411-080	WIRE, SENSOR—24" BLUE	1
29	64050-006	GAS TRAIN, GAS/AIR MOD	1
33	100428-002	GASKET, FLANGE STD 4" ID	1

Figure 15 - Exploded View of P265 Burner

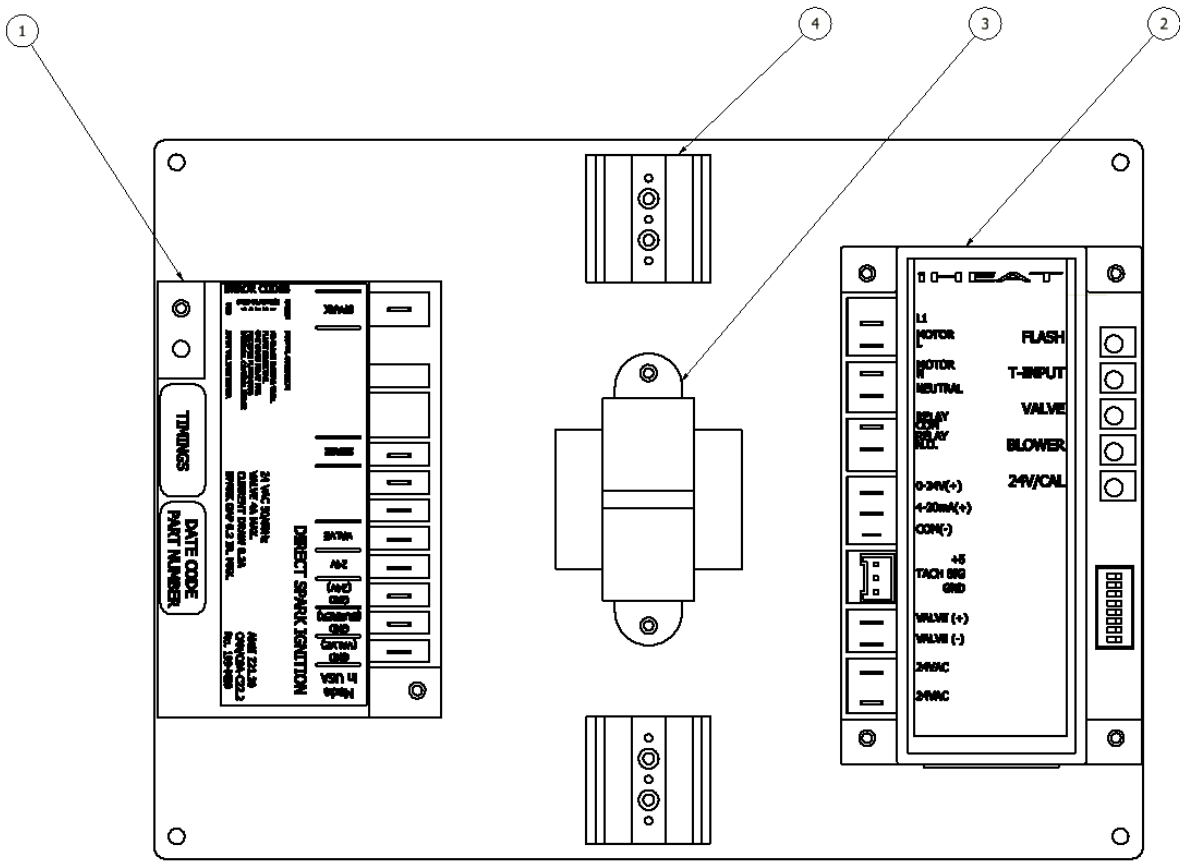


Figure 16 - Mounting Plate View

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	64528-001	CONTROL, IGN -WAYNE-0 PREPURGE	1
2	64054-006	IHEAT, CONTROL BOARD GAS/AIR	1
3	60186-004	TRANSFORMER 120V/24V/30VA	1
4	63592-003	TERMINAL BLOCK, 3 POLE LC	2

WARRANTY



LIMITED WARRANTIES FOR OIL AND GAS BURNERS, MADE BY WAYNE AND USED IN RESIDENTIAL INSTALLATIONS

WAYNE COMBUSTION SYSTEMS ("WAYNE") warrants to those who purchase its **Oil Burner Models** for resale or for incorporation into a product of resale, that its burner is free from defects in material and workmanship under normal use and service for thirty-six (36) months from the date of manufacture. **ALL GAS BURNERS** manufactured by "WAYNE" will be similarly warranted for eighteen(18) months from date of manufacture except where original manufacture offers a greater warranty. (Reference #6 below) **THESE LIMITED WARRANTIES DO NOT APPLY UNLESS THE BURNER COVERED BY IT IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN, WHO IS LICENSED WHERE STATE AND/OR LOCAL CODES PREVAIL, AND WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS,** in accordance with NFPA #31 of the national fire protection association and in accordance with all local, state and national codes.

Any **IN-WARRANTY** burner component which is defective in material or workmanship will be either repaired or replaced as follows:

1. Fuel pumps, motors, transformers, gas valves, and controls should be returned to an authorized service station or distributor of WAYNE for determination of applicability of this LIMITED WARRANTY as to either repair or replacement, where said service station or distributor is reasonably available in the customer's locality. The manufacturers of burner components regularly publish and distribute listings showing the locations of their network of service stations. Where such local service is NOT available for the burner components described above or other burner parts are involved, these items should be returned, freight prepaid, to WAYNE Service Department, 801 Glasgow Ave, Fort Wayne, Indiana 46803.
2. Burners and/or component(s) determined to be covered under this LIMITED WARRANTY by WAYNE shall be repaired or replaced at WAYNE's sole option.
3. WAYNE is not responsible for any labor cost for the removal and replacement of said burner or burner components and equipment associated therewith.

4. A burner so repaired will then carry the LIMITED WARRANTY equal to the unexpired portion of the original burner LIMITED WARRANTY.
5. If inspection by WAYNE does **NOT** disclose any defect covered by this LIMITED WARRANTY, the burner or burner component(s) will be either repaired or replaced at the expense of the customer and WAYNE'S regular charges will apply.
6. If the original manufacturer of a burner component offers a warranty greater than either of our LIMITED WARRANTIES described above, then this portion will be added to our LIMITED WARRANTY.

This LIMITED WARRANTY does **NOT** cover products which have been damaged as the result of accident, abuse, misuse, neglect, improper installations, improper maintenance or failure to operate in accordance with WAYNE's written instructions.

These LIMITED WARRANTIES do not extend to anyone except the first purchaser at retail and only when the burner is in the original installation site.

IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL BE LIMITED TO THE DURATION OF THE LIMITED EXPRESS WARRANTIES CONTAINED HEREIN. WAYNE EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY NATURE FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Also, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. WAYNE neither assumes or authorizes any person to assume for WAYNE any other liability or obligation in connection with the sale of these products. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

