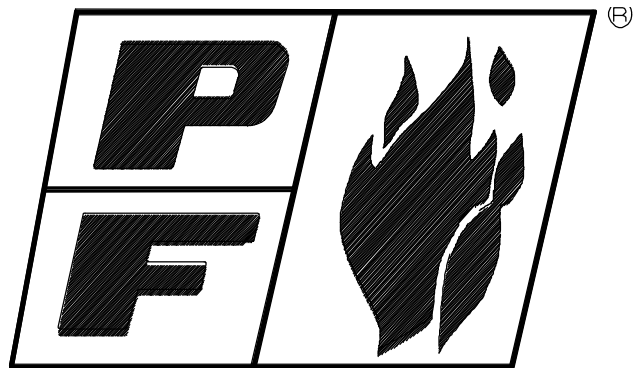


# Power Flame Incorporated



## TYPE FD & FDM INSTALLATION AND OPERATION MANUAL

### ***THE POWER TO MANAGE ENERGY***

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1. GENERAL INFORMATION

The Type FD/FDM burner is designed for high turndown operation firing into heat exchangers for air handling applications or directly into process air streams such as ovens and similar lower temperature industrial applications. The capacity range of the burner is from 30 to 3,500 MBH using natural or propane gas. Input ratings are based on 0.0" w.c. combustion chamber conditions. The Type FD burner has a fixed air inlet and is designed to fire directly into an air stream for a wide range of heating applications with a 30:1 turndown. The Type FDM burner is fitted with moveable air dampers to the inlet of the blower assembly that allows on-ratio control over a 20:1 turndown range. The Type FDM is particularly well suited for indirect fired units requiring high turndowns. The Type FDM burner can also be applied on direct fired applications where on-ratio control may be required.

The complete packaged burner consists of the firing head with gas dispersion manifold, blower housing, control box with primary safety control and modulating air damper. Accommodation for an extended combustion tube (see Section 4.3) is also provided.

2. CAPACITIES & SPECIFICATIONS

Model Number**	FD/FDM75	FD/FDM150	FD/FDM225	FD/FDM250	FD/FDM300	FD/FDM350
Max Rate (MBH)	750	1500	2250	2500	3000	3500
Min Rate (MBH) – Type FD	30	50	75	80	90	105
Min Rate (MBH) – Type FDM	37.5	75	112.5	125	150	175
Blower Wheel Size-Type FDM	5 1/16 x 1 1/2	6 1/4 x 3	7 x 3	7 x 3	7 5/8 x 3	7 5/8 x 3 1/2
Blower Wheel Size-Type FD	5 1/16 x 1 1/2	5 3/4 x 1 1/2	5 3/4 x 2 1/2	5 3/4 x 3	5 3/4 x 3 1/2	5 3/4 x 3 1/2
Blower Motor (HP)	1/4	1/3	1/2	3/4	1	1 1/2
Manifold Pressure (" wc)*						
Natural Gas	2.8	1.9	2.1	2.3	2.9	4.0
Propane	5.6	4.3	4.1	4.1	3.8	7.5
Turndown Ratio (FD/FDM)	30/20	30/20	30/20	30/20	30/20	30/20

\* To achieve maximum rating against 0.0" w.c. chamber pressure

\*\* Model FDMR also includes data in table and the "R" indicates that the burner is mounted in the inverted position i.e. the fan housing is located above the burner blast tube centerline versus below the blast tube centerline.

3. ACCEPTANCE PROCEDURE

Uncrate burner carefully and check all parts received against your computer generated Bill of Material shipped with the burner.

Warranty

The Owners Information envelope packed with the burner contains a Warranty Registration Card. The Warranty Registration Card is also a request form for a Spare Parts List. An on-hand supply of spare parts is highly recommended in case of emergency shutdown. We request that you complete and return the card to Power Flame in the enclosed self-addressed envelope or you can fill out the information online at [www.powerflame.com](http://www.powerflame.com) as soon as possible.

## 4. INSTALLATION

Before Beginning Installation, Carefully Study These Instructions and All Charts, Drawings and Diagrams Shipped With the Burner.

Installation must be in accordance with all local and national codes. In the State of Massachusetts installation of the burner must comply with the regulations as stated in the Commonwealth of Massachusetts #248CMR 6.8.3.

- 4.1 The FD/FDM burner is designed to fire into a heating/combustion chamber or heat exchanger that is at negative, atmospheric or slightly positive pressure. Consult the factory if the combustion chamber or heat exchanger pressure is greater than 0.3" w.c. positive or 2.0" w.c. negative, as special precautions may be required.
- 4.2 The FD/FDM burner can be mounted on the heating/combustion chamber end wall (Figure 1) or through the chamber sidewall in a cross flow configuration (Figure 2). In either configuration, the mounting wall should be designed to properly support the burner assembly and be constructed of suitable fire retardant, insulating materials. The combustion chamber or heat exchanger should be inspected to ensure that the internal surfaces are clean and that, as appropriate, all access doors, cracks or openings are tightly sealed.

Figure 1 FD/FDM Burner L Configuration

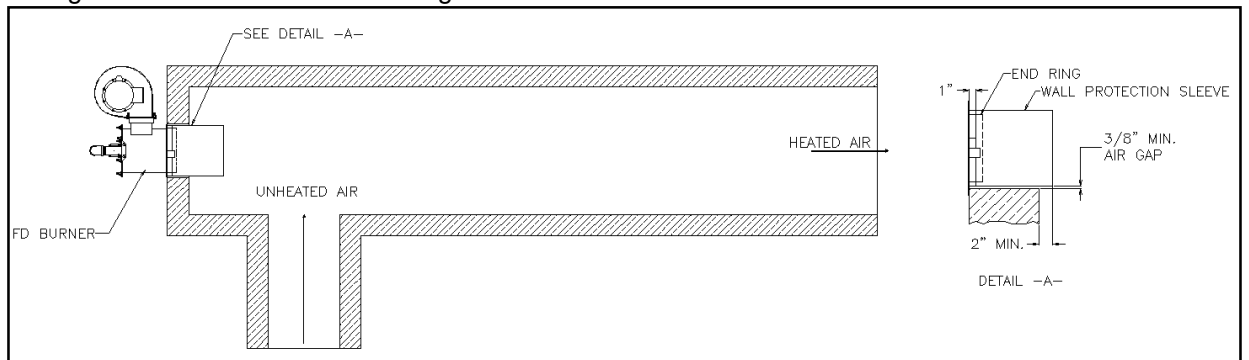
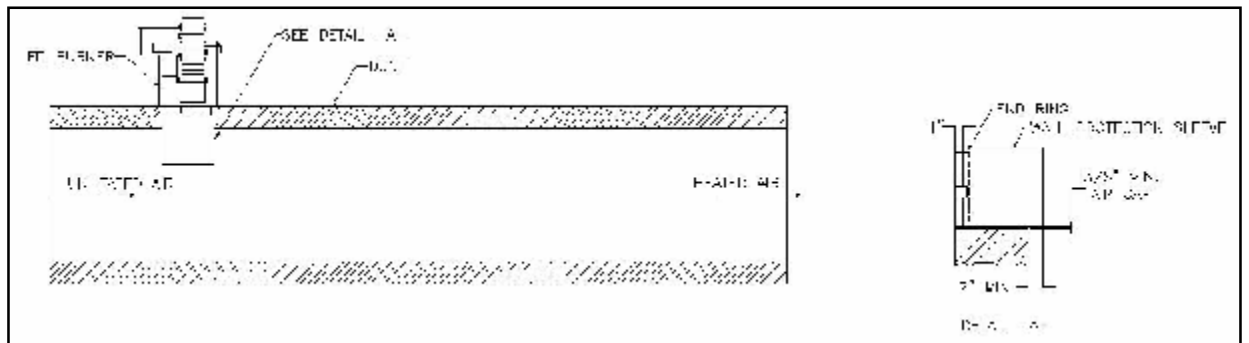


Figure 2 FD/FDM Burner Cross Flow Configuration



- 4.3 The standard burner insertion depth into the heating/combustion chamber sidewall is 2". If there is any concern relating to potential flame impingement on the side or end wall insulation jacket the optional extended combustion tube should be used. The FDM burner is also available with a 4" insertion depth to fit many of today's current heat exchanger designs.
- 4.4 For direct fired, cross flow configurations, the FD or FDM burner assembly should be fitted with the extended combustion tube that extends through the combustion chamber wall and into the process air stream (see Figure 2). The extended combustion tube is constructed from stainless steel and is designed to shield the flame from cross flow air or products of combustion that exceed 20 ft/sec.
- 4.5 Horizontal mounted burner assemblies are designed to withstand high temperatures from hot air blowing back during normal shutdown. Downfired or roof mounted burners may be subjected to higher temperatures during shutdown from the air flowing up through the burner. It may be necessary to mount the fan remote from the burner and connect via ducting.
- 4.6 Bolt the burner assembly rigidly onto the combustion chamber or heat exchanger front wall as shown in Figures 1 and 2. It is important to achieve a tight seal between the burner front flange and the chamber wall. The use of a high temperature gasket is recommended. Mounting flange gaskets are available from Power Flame.
- 4.7 The burner assembly is fabricated from mild steel and has an enamel paint finish. Adequate protection from mechanical damage and corrosive atmospheres must be provided.
- 4.8 Combustion air is drawn through the inlet of the fan assembly. The open area must not be restricted while the burner is operating. Suitable precautions should be taken to keep the burner air inlet system free from excessive airborne dust or other potential fan wheel clogging matter. On the FDM burner the inlet damper assembly must be kept clean so it can move freely.

## 5. GAS PIPING

- 5.1 Contact your local gas service company to ensure that adequate gas service is available and to review applicable installation codes for your area.
- 5.2 Size the main gas line in accordance with Table 2. The figures shown are for straight lengths of pipe at 0.2" w.c. pressure drop, which is considered normal for low pressure systems. Note that fittings such as elbows and tees will add to the pipe pressure drop. For pressure drops and specific gravities other than .2" and .60 appropriate correction factors need to be applied.

Table 2  
Gas Piping Pressure Drop Data

EQUIVALENT LENGTH OF STRAIGHT PIPE IN FEET									
Pipe Size in Inches	20	30	40	50	60	80	100	150	200
CFH NAT. GAS WITH .2" PRESSURE DROP AND .60 S.G.									
1"	300	250	210	190	180	150	135	110	75
1-1/4"	520	425	360	325	300	260	230	190	165
1-1/2"	800	690	560	500	480	410	370	300	260
2"	1700	1400	1200	1100	1000	850	750	600	540
2-1/2"	3000	2500	2100	1900	1800	1550	1375	1100	950

EQUIVALENT LENGTHS OF STANDARD PIPE IN FEET FOR LISTED FITTINGS						
Fitting Type	1	1-1/4	1-1/2	2	2-1/2	Nominal Pipe Size In Inches
Std. Tee	5.5	7.5	9.0	12.0	13.5	
Std. Elbow	2.7	3.7	4.5	5.5	6.1	

- 5.3 Figure 4 and 4A are the typical U.L. required gas train configurations for the FD and FDM burners, respectively.
- 5.4 Mount leakage test and main gas cocks, main automatic gas valve and (where required) auxiliary valves (if not factory mounted) and connect gas valve wires through flexible conduit to control terminal strip in accordance with wiring diagrams and all applicable codes.

- 5.5 Install the pressure regulator directly upstream of main automatic gas valve(s) and fit drip leg and main gas cock upstream of regulator or automatic valve(s).

Figure 4 Typical UL Gas Piping Train for LHL or Modulating FD Burners

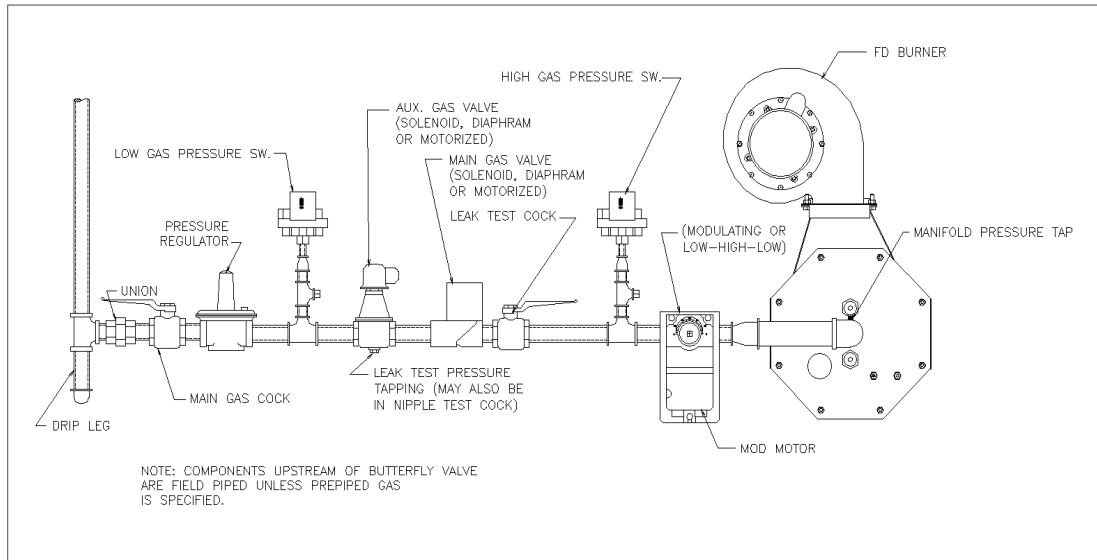
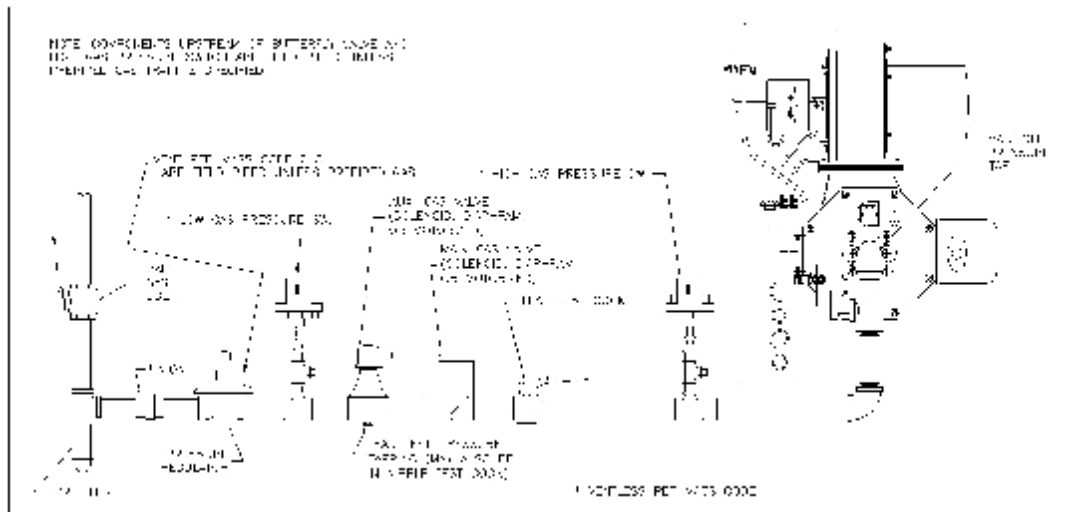


Figure 4A Typical U.L. Gas Piping Train for Modulating FDM Burners



- 5.6 Install vent lines from main gas regulator (if used) and (if applicable) diaphragm gas valve. Vent line should be run to the outside of the building, terminating clear of windows or fresh air intakes. Outside terminal of vent should have a screen to prevent insects from building nests in vent pipe. The vent should terminate in a manner, which will preclude the possibility of water, dirt or other matter from entering the line.
- 5.7 Test gas lines for leaks using soap solution. Your local gas service company may wish to carry out or witness this test.

**CAUTION**

Some gas train components may be rated at a maximum of 14" w.c. pressure. When pressure testing the gas train, make certain that the test pressure used does not exceed any components maximum rating.

## 6. WIRING

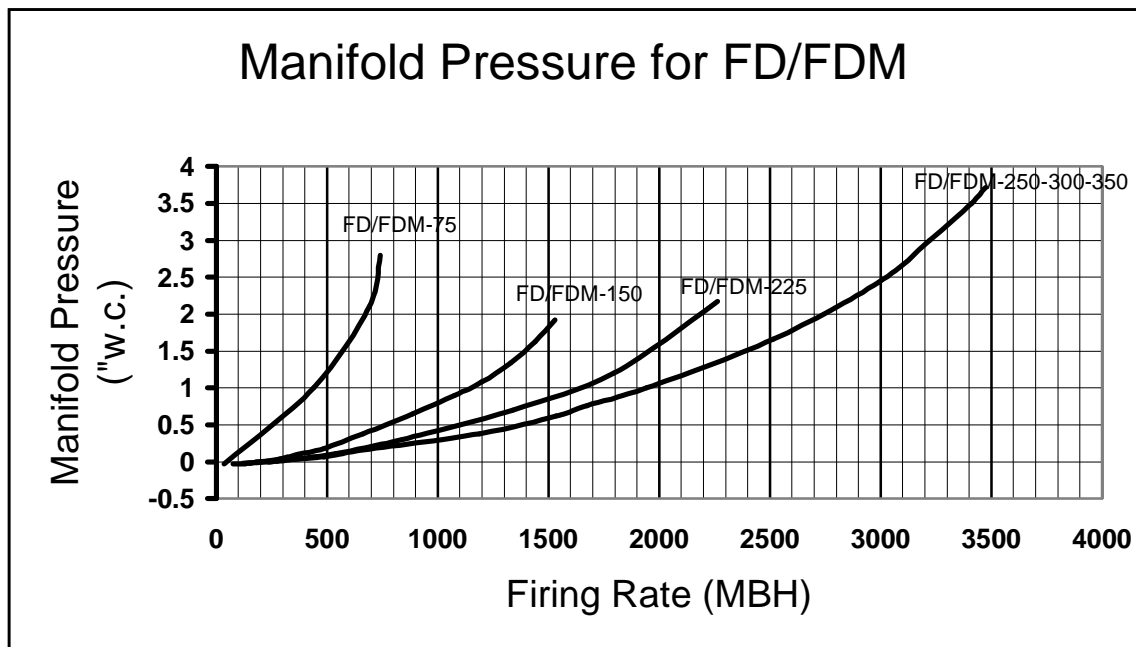
- 6.1 Refer to wiring diagram shipped with burner. (If supplied)
- 6.2 Electrical installation must be made in accordance with National Electrical Code and applicable local codes. If this burner is part of a packaged heat exchanger system – check the wiring diagram as supplied by the system manufacturer.

## 7. START UP

Before attempting start up, thoroughly study and familiarize yourself with the exact sequence of operation and all other details on the specific Flame Safeguard Control System being used. If the FSG system is supplied by PFI this information as well as information on other PFI supplied components will be shipped with the burner. All of these should be used as reference material in burner start up and service. (If not supplied by PFI they may be supplied by the package system manufacturer).

- 7.1 Check all system safety devices for proper installation and function.
- 7.2 Lay out combustion testing equipment (See Section 8).
- 7.3 Attach gas pressure gauge or manometer of appropriate pressure scale to the manifold pressure tap. Refer to Figure 5 for manifold pressures.

Figure 5. Manifold Pressures/Firing Rate for Natural Gas



- 7.4 Check the voltage at the disconnect switch to make certain that it matches that shown on the burner label.
- 7.5 Make certain that all heat exchanger dampers are properly positioned for start up.
- 7.6 Install draft gauge to combustion chamber test point.
- 7.7 Connect DC volt meter or microammeter to Flame Safeguard control as appropriate to determine flame detection system signal values. These values can be found in the FSG Control Technical Bulletin.

- 7.8 With the main and leak test cocks in OFF position, turn on gas cock and meter. Check to make certain that pressure upstream of the main gas shutoff cock does not exceed the maximum pressure rating of any of the gas train components. (Refer to Component Spec Sheets).
- 7.9 Check the spark and flame rod electrodes for proper installation and spark gap settings (See Figures 6 and 7). The spark is to arc against the raised tab of the burner diffuser. If a UV scanner is used, make certain it is securely in place.

Figure 6 FD/FDM Burner Flame Rod

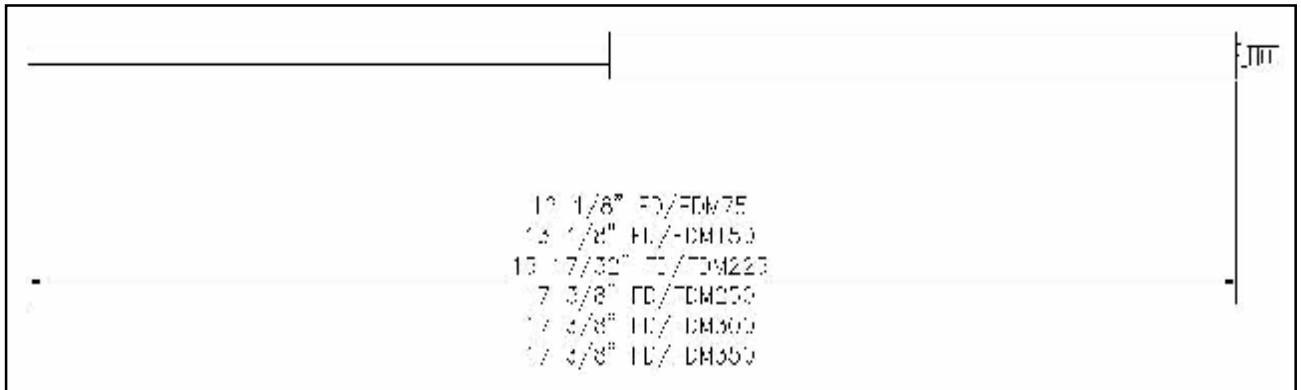
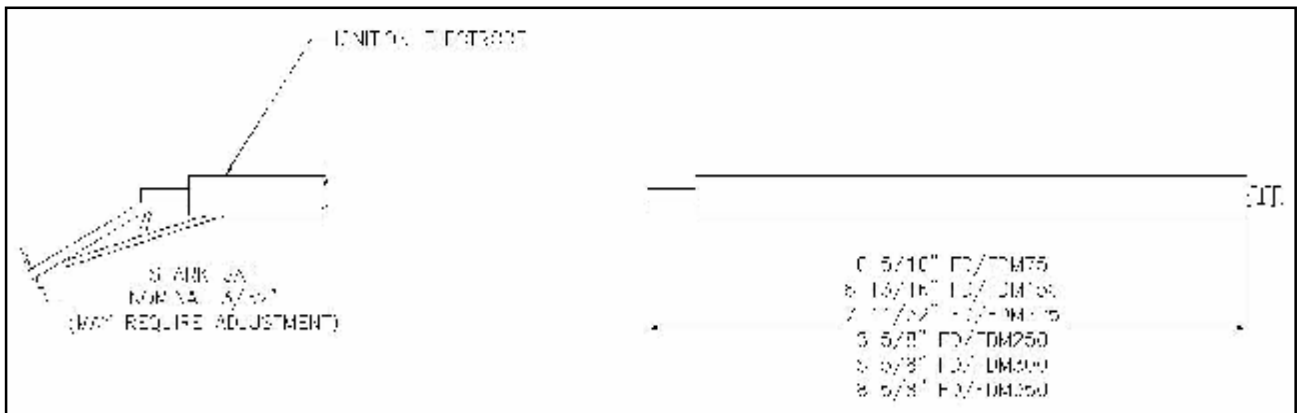


Figure 7 FD/FDM Burner Electrode



- 7.10 With the manual gas cocks closed, turn the burner switch ON. The burner blower will operate and the air damper will be driven to the open position to begin its prepurge cycle. The prepurge cycle may be as short as 30 seconds. At the end of the prepurge cycle the damper will be driven to the low fire position. The ignition transformer and automatic gas valves will energize. With the manual gas cocks closed, the burner should go into a safety lockout condition. The flame safeguard will have to be reset manually.

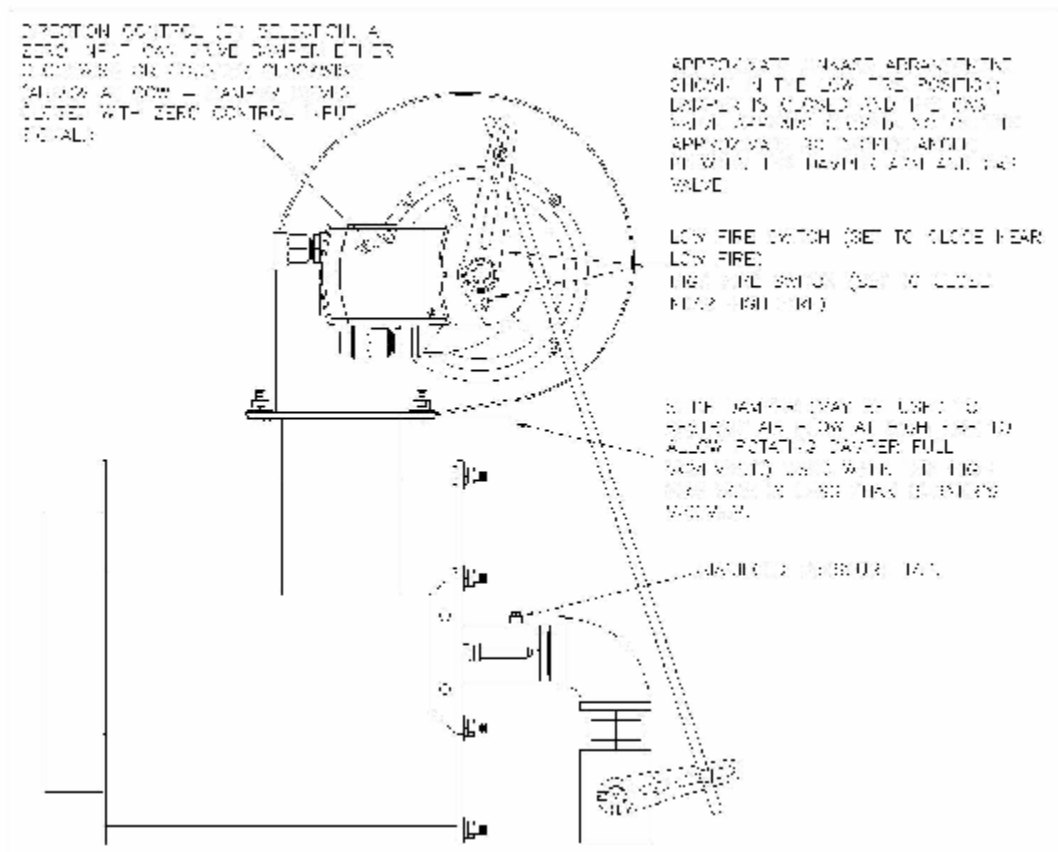
7.11 Burner Light Off Procedure

- A. Prior to start up make certain the gas butterfly valve (BFV) linkage is set to operate in all positions without binding. Refer to Figure 8 (Linkage arrangement)
- B. Start the burner. After the prepurge sequence the low fire end switch will close, indicating low fire position, the ignition transformer and main gas valves will energize. The trial for ignition will be only four seconds. Flame should be established immediately.

- C. At initial start up, air may be trapped in the gas lines so more than one attempt to light off may be required.
- D. Once flame is established, run the mod motor to position the gas butterfly valve wide open. Adjust the gas pressure regulator to provide the recommended pressures at the burner manifold pressure tap (Figure 4). If there is any question as to the actual firing rate – the job site gas meter should be clocked.
- E. Adjust the gas butterfly valve to provide smooth light off and stable combustion throughout the firing range. To achieve the burners' maximum turndown the butterfly valve will be nearly fully closed in the low fire position.
- F. For indirect fired applications, use a combustion analyzer to make certain that the burner settings provides the correct CO<sub>2</sub> or O<sub>2</sub> levels. Generally accepted values for natural gas are 8 ½ to 10% or 5 ½ to 3% O<sub>2</sub>. Equivalent readings on propane gas are 10 to 11 ½% CO<sub>2</sub> or 5 ½ to 3 ½% O<sub>2</sub>. It is important that the CO level is checked and held at minimum for both direct and indirect fired applications.
- G. Once the burner is in operation, set all gas pressure switches and other burner and heat exchanger system control devices for correct operation. Follow all test procedures as recommended by the flame safeguard and other control and device manufacturers.
- H. Record all data (Section 11) for future reference.

\*NOTE: Although Underwriters Laboratories permits higher readings of CO (carbon monoxide) for indirect fired applications, it is desirable to obtain readings between 0 and 100PPM, depending on local codes and heat exchanger manufacturer's recommendations.

Figure 8 Linkage Setup for FDM Burner



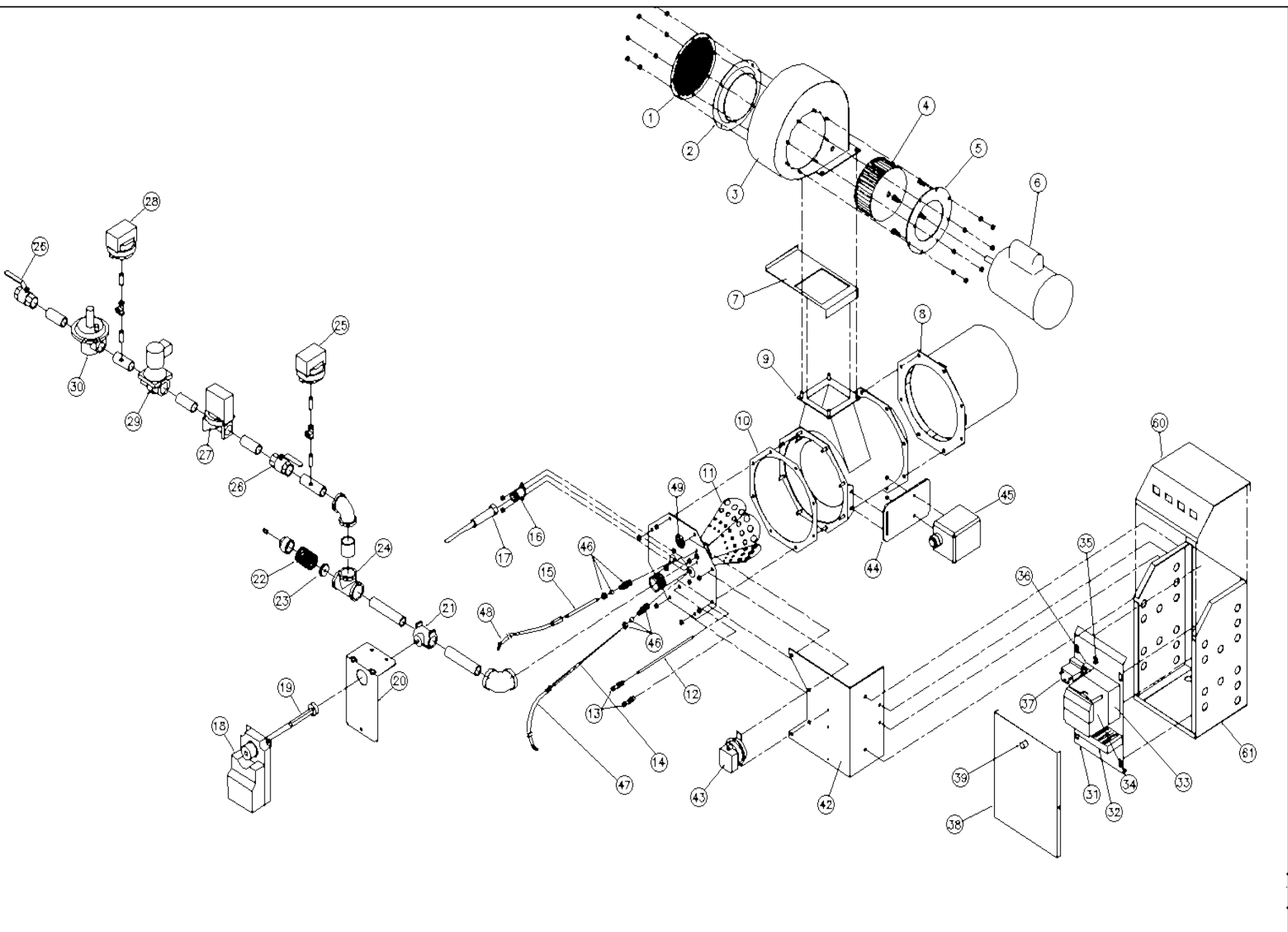
## 8.0 COMBUSTION TEST EQUIPMENT

- 8.1 In order to fire efficiently, the burner requires an adequate supply of combustion air. Ventilation to the combustion equipment should be provided in accordance with applicable codes. The combustion equipment area should not become excessively hot and under no circumstances should be under a negative pressure.
- 8.2 The burner should be set up initially and serviced at regular intervals by a trained Service person using the proper test instruments. Failure to maintain the correct burner settings may result in inefficient gas consumption, premature wear of burner components, explosion or other safety hazards.
- 8.3 Suggested test instruments are:
- A. Combustion analyzer measuring O<sub>2</sub>, CO and NO<sub>x</sub>
  - B. Thermometer (Scale to match process system temperatures)
  - C. Draft gauge or inclined manometer
  - D. U-tube manometer or calibrated 0-10" and 0-35" w.c. pressure gauge
  - E. Combination volt/ammeter
  - F. D.C. Micro-Ammeter or D.C. Volt Meter as required by Flame Safeguard Programmer Selection
- 8.4 Approximate gas flows and pressures are shown above in Figure 8 and in Section 2 for natural gas and propane.

## 9.0 SERVICE SUGGESTIONS

- 9.1 Burner Fails To Start
- 1. Bad fuse or switch open on in-coming power source, or motor overload out.
  - 2. Control circuit has an open control such as operating limit, high limit, airflow proving switch or combustion airflow proving switch.
  - 3. Reset button on motor or flame safeguard programming control open. Push reset button.
  - 4. Loose or faulty wiring. Tighten all terminal screws. Check wiring against wiring diagram furnished with burner.
  - 5. Ensure proof of closure switch and gas pressure switches are made.
- 9.2 Burner Motor Runs, But Does Not Light
- 1. Check visually or by sound for sparking.
  - 2. Check for proper electrode setting (gap).
  - 3. Check good blue spark at ignition transformer.
  - 4. Re-check microamp of D.C. voltage readings. If insufficient, check gas pressure and air damper setting. Check electrodes setting. Flame rod may have to be repositioned.
  - 5. Check ignition cable and electrode porcelain for damage or breaks which could cause short.
  - 6. Check for loose or broken wires.
  - 7. BFV closed too far.
  - 8. Shut-off cock or test cock not open.
- 9.3 Burner Motor runs, but Main Gas Valve Does Not Open
- 1. Check gas valve circuit, main valve and auxiliary gas valve.
  - 2. Main valve opening too slow – adjust bleed on diaphragm valve.
  - 3. Defective main valve.
- 9.4 Process Temperature Fails To Reach Desired Temperature
- 1. Check operating/thermostat settings.
  - 2. Incorrect combustion – check combustion parameters.
  - 3. Ensure inlet gas pressure has not changed.
- 9.5 Poor Flame Signal
- 1. Ensure flame sensing wire is not run into same conduit as high voltage wiring.
  - 2. Reposition flame rod.
  - 3. Replace amplifier in Flame Safeguard Control.
  - 4. Defective UV Scanner.
- 9.6 Refer to Service Information in Component Manufacturers Technical Bulletins.

10. FD Burner Parts List



90P684C

## 10. FD Burner Parts List

- 1 INLET SCREEN ASSEMBLY**  
P/N D20031 FD75  
P/N D20030 FD150, FD225, & FD300  
P/N D20032 FD350
- 2 INLET RING**  
P/N X08654 FD75  
P/N X08655 FD150, FD225, & FD300  
P/N X08681 FD300
- 3 AIR HOUSING**  
P/N D20044 FD75  
P/N D20043 FD150  
P/N D20040 FD225  
P/N D20300 FD300  
P/N D20302 FD350
- 4 BLOWER WHEEL**  
P/N 080010 FD75  
P/N 080020 FD150  
P/N 080000 FD225  
P/N 080040 FD300  
P/N 081100 FD350
- 5 MOTOR PLATE**  
P/N D10414 FD75  
P/N D10404 FD150 & FD225  
P/N D10325 FD300  
P/N C10730 FD350
- 6 BLOWER MOTOR**  
P/N 050000 FD75  
P/N 054120 FD150  
P/N 054160 FD225  
P/N 054180 FD300  
P/N 050370 FD350
- 7 SLIDING DAMPER**  
P/N D10235 FD75  
P/N D10236 FD150  
P/N D10229 FD225  
P/N D10350 FD300 & FD350
- 8 EXTENDED COMBUSTION SHIELD**  
P/N D20050 FD75  
P/N D20060 FD150  
P/N D20070 FD225  
P/N D20090 FD300 & FD350
- 9 BURNER SHELL**  
P/N D20024 FD75  
P/N D20023 FD150  
P/N D20020 FD225  
P/N D20028 FD300 & FD350
- 10 BACK PLATE GASKET**  
P/N X08500 FD75  
P/N X08501 FD150  
P/N X08502 FD225  
P/N X08504 FD300 & FD350
- 11 GUN/BACK PLATE ASSY**  
**NATURAL GAS**  
P/N D20100 FD75, FLAME ROD & U.V.  
P/N D20150 FD150, FLAME ROD & U.V.  
P/N D20200 FD225, FLAME ROD & U.V.  
P/N D20305 FD300 & FD350, FLAME ROD & U.V.  
  
**PROPANE GAS**  
P/N D20101 FD 75, FLAME ROD & U.V.  
P/N D20151 FD150, FLAME ROD & UV  
P/N 20201 FD225, FLAME ROD & U.V.  
P/N 20306 FD 300 & FD350, FLAME ROD & U.V.
- 12 AIR SENSING TUBE**  
P/N D10240 FD75  
P/N D10242 FD150  
P/N D10245 FD225  
P/N D10250 FD300 & FD350
- 13 ¼" BULKHEAD FITTINGS**  
(2 PER BURNER)  
P/N X02674
- 14 FLAME ROD**  
P/N X04202 FD75  
P/N X04204 FD150  
P/N X04206 FD225  
P/N X04238 FD300 & FD350
- 15 IGNITION ELECTRODE**  
P/N X04201 FD75  
P/N X04203 FD150  
P/N X04205 FD225  
P/N X04237 FD300 & FD350
- 16 U.V. SCANNER ASSY.**  
P/N D20025
- 17 U.V. SCANNER**
- 18 DIRECT COUPLED MOD. MOTOR**  
ML9184C MODULATION  
ML6184A LOW-HIGH-LOW  
AM24-MF7  
AMCX24-MF7  
MODULATION  
SIEMENS SQH71  
MODULATION
- 19 DAMPER SHAFT**  
P/N X09103
- 20 MOD. MOTOR BRACKET**  
P/N M15105 1" BFV  
P/N M15100 1 1/4" BFV  
P/N M15104 1 1/2" BFV  
P/N M15106 2" BFV
- 21 BUTTERFLY VALVE**  
P/N 273100, 1" FD75  
P/N 273200, 1 ¼" FD150  
P/N 273300, 1 ½" FD225  
P/N 273400, 2" FD300  
P/N 273400, 2" FD350
- 22 SIDE ORIFICE SPRING**  
PRE-DRILLED  
(AS REQUIRED)
- 23 SIDE ORIFICE**  
PRE-DRILLED  
(AS REQUIRED)
- 24 SIDE ORIFICE TEE AND PLUG** (AS REQUIRED)
- 25 HIGH GAS PRESSURE SWITCH**
- 26 BALL VALVES**

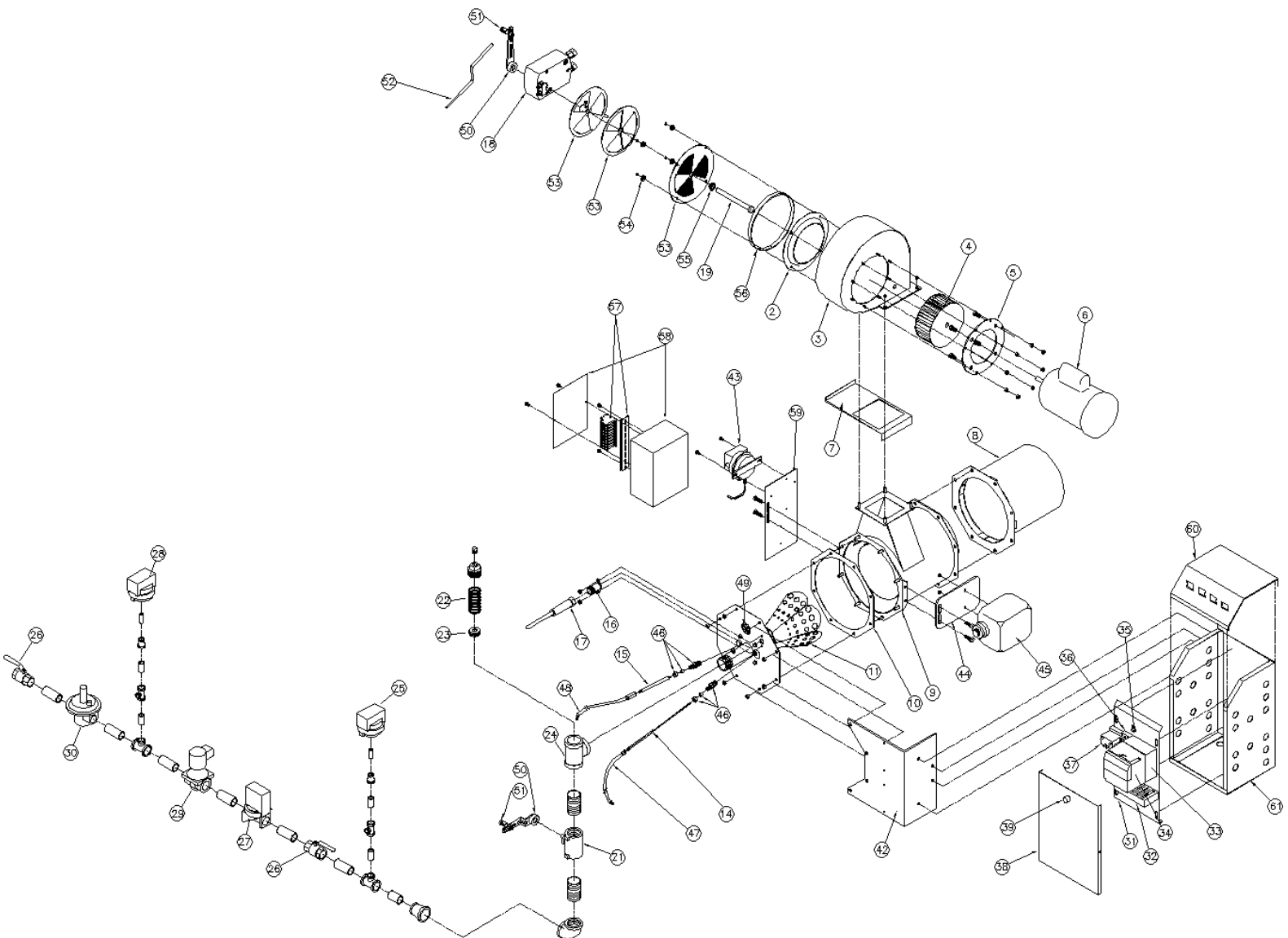
## 10. FD Burner Parts List

(cont'd)

- |  |  |
|--|--|
| <b>27 MAIN GAS VALVE</b><br>SOLENOID<br>DIAPHRAM<br>MOTORIZED  | <b>43 COMBUSTION AIR SWITCH</b><br>P/N 171100  |
| <b>28 LOW GAS PRESSURE SWITCH</b>  | <b>44 IGNITION TRANSFORMER STANDOFF BRACKET</b><br>P/N D10026  |
| <b>29 AUXILLARY GAS VALVE</b><br>SOLENOID<br>DIAPHRAM<br>MOTORIZED   | <b>45 IGNITION TRANSFORMER</b><br>P/N 320000   |
| <b>30 GAS PRESSURE REGULATOR</b>   | <b>46 FLAME ROD &amp; IGNITION ELECTRODE BULK HEAD FITTINGS</b><br>(2 PER BURNER)<br>P/N X02623  |
| <b>31 PANEL BOX CHASSIS</b><br>15.5" x 10"   | <b>47 FLAME ROD CABLE</b><br>P/N Y08000<br>3' NO. 3GTO-15<br>15,000VGTO CABLE<br>P/N 931130<br>AEBF RAJAH FITTING  |
| <b>32 TERMINAL BLOCKS &amp; DIN RAIL</b>   | <b>48 IGNITION CABLE</b><br>P/N Y08000<br>3' NO 3G70-15 15,000V<br>G70 CABLE<br>P/N X09927<br>#2 RAJAH RING<br>TERMINAL<br>P/N 931040<br>SPARK PLUG BOOT |
| <b>33 BURNER FSG CONTROL SUBBASE</b>   | <b>49 SIGHT GLASS</b><br>P/N X09913 – FD75<br>P/N X09912 – FD150-<br>FD350   |
| <b>34 BURNER FSG CONTROL</b><br>RM7800 SERIES  | <b>60 PANEL BOX TOP 10"</b>  |
| <b>35 GROUNDING LUG</b>  | <b>61 PANEL BOX BODY</b><br>15.5" x 10"  |
| <b>36 LOW FIRE START RELAY</b><br>(IF REQUIRED)  |  |
| <b>37 MOTOR GL7 RELAY</b><br>MOTOR CONTACTOR<br>MOTOR STARTER<br>(AS REQUIRED)   |  |
| <b>38 PANEL BOX DOOR</b><br>15.5" x 10"  |  |
| <b>39 DOOR LATCH &amp; KNOB</b>  |  |
| <b>42 FD INTEGRAL PANEL BOX BRACKET</b><br>P/N D10031 FD75<br>P/N D10029 FD150<br>P/N D10039 FD225<br>P/N D10032 FD 300 &<br>FD350<br>(OPTIONAL ALL BURNERS) |  |



# 10A. FDM Burner Parts List



90P683C

## 10A. FDM Burner Parts List

- 2 INLET RING**  
P/N X08654 WITH  
P/N A11795 FDM75  
P/N A11774 FDM150  
P/N X08653 FDM225  
P/N X08681 FDM 300 &  
FDM 350
- 3 AIR HOUSING**  
P/N D20046 FDM75  
P/N D20047 FDM150  
P/N D20039 FDM225  
P/N D20302 FDM 300 &  
FDM 350
- 4 BLOWER WHEEL**  
P/N 080010 FDM 75  
P/N 084900 FDM 150  
P/N 085300 FDM 225  
P/N 081050 FDM 300  
P/N 081100 FDM 350
- 5 MOTOR PLATE**  
P/N D10414 FDM75  
P/N D10404 FDM150  
P/N D10324 FDM225  
P/N C10730 FDM 300 &  
FDM 350
- 6 BLOWER MOTOR**  
P/N 050000 FDM 75  
P/N 054120 FDM 150  
P/N 054160 FDM 225  
P/N 054210 FDM 300  
P/N 050370 FDM 350
- 7 SLIDING DAMPER**  
P/N D10235 FD75  
P/N D10236 FD150  
P/N D10229 FD225  
P/N D10350 FD300 &  
FD350
- 8 EXTENDED  
COMBUSTION SHIELD**  
P/N D20050 FD75  
P/N D20060 FD150  
P/N D20070 FD225  
P/N D20090 FD300 &  
FD350 (REQUIRED FOR  
DIRECT FIRED  
APPLICATIONS)
- 9 BURNER SHELL -  
STANDARD 2" BURNER**  
P/N D20024 FD75  
P/N D20023 FD150  
P/N D20020 FD225  
P/N D20028  
FD300&FD350
- 10 BACK PLATE GASKET**  
P/N X08500 FD75  
P/N X08501 FD150  
P/N X08502 FD225  
P/N X08504 FD300 &  
FD350
- 11 GUN/BACK PLATE  
ASSEMBLY**  
STANDARD 2" BURNER  
**NATURAL GAS**  
P/N D20100 FD75,  
FLAME ROD & U.V.  
P/N D20150 FD150,  
FLAME ROD & U.V.  
P/N D20200 FD225,  
FLAME ROD & U.V.  
P/N D20305 FD300 &  
FD350, FLAME ROD &  
U.V.
- PROPANE GAS**  
P/N D20101 FD 75,  
FLAME ROD & U.V.  
P/N D20151 FD150,  
FLAME ROD & UV  
P/N 20201 FD225,  
FLAME ROD & U.V.  
P/N 20306 FD 300 &  
FD350, FLAME ROD &  
U.V.
- 14 FLAME ROD**  
P/N X04202 FD75  
P/N X04204 FD150  
P/N X04206 FD225  
P/N X04238 FD300 &  
FD350
- 15 IGNITION ELECTRODE**  
P/N X04201 FD75  
P/N X04203 FD150  
P/N X04205 FD225  
P/N X04237 FD300 &  
FD350
- 16 U.V. SCANNER ASSY.**  
P/N D20025
- 17 U.V. SCANNER**
- 18 AM24-MFT DIRECT  
COUPLED MOD  
MOTOR** P/N 060932  
WITH MOUNTING  
BRACKET P/N D10023
- AMCX24-MFT** P/N  
060929
- 19 PIE DAMPER AXLE**  
P/N X01470
- 21 BUTTERFLY VALVE**  
P/N 273100, 1" FDM75  
P/N 273200, 1 ¼" FDM  
150  
P/N 273300, 1 ½"  
FDM225  
P/N 273400, 2" FDM300  
& FDM350
- 22 SIDE ORIFICE SPRING**  
PRE-DRILLED  
(AS REQUIRED)
- 23 SIDE ORIFICE**  
PRE-DRILLED  
(AS REQUIRED)
- 24 SIDE ORIFICE TEE AND  
PLUG**  
(AS REQUIRED)
- 25 HIGH GAS PRESSURE  
SWITCH**
- 26 BALL VALVES**
- 27 MAIN GAS VALVE**  
SOLENOID  
DIAPHRAM  
MOTORIZED
- 28 LOW GAS PRESSURE  
SWITCH**
- 29 AUXIALLIARY GAS  
VALVE**  
SOLENOID  
DIAPHRAM  
MOTORIZED
- 30 GAS PRESSURE  
REGULATOR**

## 10A. FDM Burner Parts List

(cont'd)

- |   |   |   |
|---|---|---|
| <p><b>31 PANEL BOX CHASSIS</b><br/>15.5" x 10"</p> <p><b>32 TERMINAL BLOCKS &amp; DIN RAIL</b></p> <p><b>33 BURNER FSG CONTROL SUBBASE</b></p> <p><b>34 BURNER FSG CONTROL</b><br/>RM7800 SERIES</p> <p><b>35 GROUNDING LUG</b></p> <p><b>36 LOW FIRE START RELAY</b><br/>(IF REQUIRED)</p> <p><b>37 MOTOR GL7 RELAY</b><br/>MOTOR CONTACTOR<br/>MOTOR STARTER<br/>(AS REQUIRED)</p> <p><b>38 PANEL BOX DOOR</b><br/>15.5" x 10"</p> <p><b>39 DOOR LATCH &amp; KNOB</b></p> <p><b>42 FD INTEGRAL PANEL BOX BRACKET</b><br/>P/N D10031 FD75<br/>P/N D10029 FD150<br/>P/N D10039 FD225<br/>P/N D10032 FD 300 &amp; FD350<br/>(USE ILO #59 FOR BURNER MOUNTED PANEL)</p> <p><b>43 COMBUSTION AIR SWITCH</b><br/>P/N 171100</p> <p><b>44 IGNITION TRANSFORMER STANDOFF BRACKET</b><br/>P/N D10026</p> <p><b>45 IGNITION TRANSFORMER</b><br/>P/N 320000</p> <p><b>46 FLAME ROD &amp; IGNITION ELECTRODE BULK HEAD FITTINGS</b><br/>(2 PER BURNER) P/N X02623</p> | <p><b>47 FLAME ROD CABLE</b><br/>P/N Y08000<br/>3' NO. 3GTO-15<br/>15,000VGTO CABLE<br/>P/N 931130<br/>AEBF RAJAH FITTING</p> <p><b>48 IGNITION CABLE</b><br/>P/N Y08000<br/>3' NO 3G70-15 15,000V G70 CABLE<br/><br/>P/N X09927<br/>#2 RAJAH RING<br/>TERMINAL<br/>P/N 931040<br/>SPARK PLUB BOOT</p> <p><b>49 SIGHT GLASS</b><br/>P/N X09913 – FD75<br/>P/N XO9912 – FD150-FD350</p> <p><b>50 BUTTERFLY VALVE DAMPER ARM</b><br/>P/N M80035</p> <p><b>50 AM24 DAMPER ARM</b><br/>P/N P82120</p> <p><b>51 DAMPER CONTROL SWIVEL</b> P/N 911000<br/>(2 REQUIRED PER BURNER)</p> <p><b>52 5/16" LINKAGE ROD</b><br/>P/N Y00470</p> <p><b>53 PIE DAMPER OUTER PLATE</b><br/>P/N L10207 FDM75-FDM250<br/>P/N D10353 FDM300 &amp; FDM 350</p> <p><b>53 PIE DAMPER MID PLATES</b><br/>P/N L10206 FDM75-FDM250<br/>P/N D10352 FDM300 &amp; FDM350</p> <p><b>53 PIE DAMPER INNER PLATES</b><br/>P/N L10205 FDM75-FDM250<br/>P/N D10351 FDM300 &amp; FDM350</p> | <p><b>54 PIE DAMPER RETAINING BUSHINGS</b><br/>P/N X01473<br/>(4 REQUIRED PER BURNER)</p> <p><b>55 PIE DAMPER AXEL BUSHING</b><br/>P/N X02390</p> <p><b>56 PIE DAMPER BAND</b><br/>P/N D10398 FDM75-FDM250<br/>(FDM300 &amp; FDM 350 NOT REQUIRED)</p> <p><b>57 TERMINAL BLOCKS &amp; DIN RAIL</b></p> <p><b>58 8 X 6 HOFFMAN J-BOX</b><br/>P/N X09950</p> <p><b>59 COMUSTION AIR SWITCH &amp; 8 X J-BOX</b><br/>STANDARD BRACKET<br/>P/N D10028</p> <p><b>60 PANEL BOX TOP 10"</b></p> <p><b>61 PANEL BOX BODY</b><br/>15.5" x 10"</p> |
|---|---|---|



## 12. SUGGESTED PERIODIC CHECK LIST

Item	Frequency	Checked by	Remarks
Monitors and indicators	Daily	Operator	Make visual inspection and record Readings in log
Instrument and equipment settings	Daily	Operator	Make visual check against heat exchanger manufacturer's recommended specifications
Firing rate control	Weekly Semiannually Annually	Operator Service Technician Service Technician	Verify heat exchanger manufacturer's settings Verify heat exchanger manufacturer's settings Check with combustion test
Flue, vent, stack or outlet damper	Monthly	Operator	Make visual inspection of linkage, check for proper operation
Combustion air	Monthly	Operator	All sources remain clean and open
Ignition system	Weekly	Operator	Make visual inspection, check flame Signal strength if meter-fitted
Fuel Valves	Weekly	Operator	Open limit switch – make aural and visual check – check valve position indicators if so fitted
Fuel Valves, Main	Annually	Service Technician	Perform valve leak test per valve Manufacturer's instructions
Combustion safety controls			
Flame failure	Weekly	Operator	Close manual fuel supply for main fuel cock and/or valve(s); check safety shutdown timing; log
Flame signal strength	Weekly	Operator	If flame signal meter installed, read and log; for main flames, notify service organization if readings are very high, very low, or fluctuating; refer to flame safeguard manufacturer's instructions.
High limit safety control	Annually	Service Technician	Refer to equipment manufacturer's Instructions
Operating control	Annually	Service Technician	Refer to equipment manufacturer's Instructions
Low draft, fan air pressure and damper	Monthly	Operator	Refer to this manual and control manufacturer's instructions
Inspect burner components	Semiannually	Service Technician	Refer to this manual and control Component manufacturer's instructions
Check blower motor and wheel for cleanliness. Remove and clean as necessary	Annually	Service Technician	Remove and clean

Refer to heat exchanger manufacturer's instructions for general inspection procedures and for specific testing and inspection of safety related devices.

If you have any questions about the procedures listed above or questions relating to components or devices on your unit not specifically covered in the above – contact our Customer Services Department at (620) 421-0480 for assistance.

# 13. OWNER OPERATING INSTRUCTIONS

## FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. Do not touch Electrical switches.
3. Extinguish any open flame.
4. Call you gas supplier Immediately.

## WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to the burner manual for assistance or additional information consult a qualified installer, service agency or the gas supplier.

## IMPORTANT PRECAUTIONS

1. Never attempt to light burner with paper or other materials.
2. Never experiment with the burner.
3. Never change the fuel or air adjustments without consulting with the burner service company.
4. Never attempt to light the burner if combustion Chamber contains any unburned fuel.
5. Never throw waste paper, rags, garbage or other waste materials into the combustion chamber.
6. Never wash out heating equipment area Without first covering the burner with waterproof material.

## START UP

Preparation for Start Up

1. Ensure that the system is in working order.
2. Set the burner control switch to the OFF position.
3. Turn the operating control down to its lower setting.
4. Check fuses and replace as necessary.
5. Depress the flame safeguard programming control reset button.

## Start Up

1. Manually open and close the main gas shutoff cock & leakage cock to determine that they operate freely. Open both cocks. (Reset low gas pressure switch, if supplied)
2. Set the main power switch and burner panel control switch to the ON position. Wait 30 seconds and turn operating control to the desired setting.
4. The burner blower motor will start and after a suitable prepurge period (this will vary with the type of flame safeguard control supplied – but will usually be a minimum of 30 seconds to a maximum of 90 seconds) the burner pilot will light, after which the main flame will be established.

## EXTENDED SHUTDOWN

1. Place main power switch and burner control panel switch to the OFF position.
2. Close all valves in gas lines.
3. Cover burner to protect it from dust and dampness.

## MAINTENANCE

Burner should be maintained and serviced periodically by a qualified service agent. See Service Suggestions section in burner manual for standard trouble shooting procedures.

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Burner Service Company

Date of installation

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Address

Telephone

# POWER FLAME INCORPORATED LIMITED WARRANTY

Power Flame Incorporated, hereinafter called the Seller, of 2001 South 21<sup>st</sup> Street, Parsons, Kansas, hereby warrants its equipment manufactured by it and bearing its nameplate (hereinafter called Warranted Equipment) in the respects and exclusively for the benefit of those users described herein. THIS LIMITED WARRANTY SHALL EXTEND SOLELY TO THOSE PERSONS WHO ARE OWNERS OF THE WARRANTED EQUIPMENT DURING THE WARRANTY PERIOD HEREINAFTER DEFINED AND WHO USE SUCH WARRANTED EQUIPMENT IN THE PROJECT AND FOR THE PURPOSES FOR WHICH SUCH WARRANTED EQUIPMENT WAS ACQUIRED FROM THE SELLER. The Seller warrants its equipment to be free from defects in the material and workmanship under normal use and service for fifteen (15) months from date of shipment. EXCLUDED FROM ANY COVERAGE UNDER THIS WARRANTY ARE DEFECTS IN WARRANTED EQUIPMENT FROM DAMAGE IN SHIPMENT, FAULTY INSTALLATION, MISUSE OR NEGLIGENCE. If any person becomes entitled to a claim under this warranty, such person shall, as a condition precedent to securing warranty performance, return the Warranted Equipment to the Seller's plant, 2001 South 21<sup>st</sup> Street, Parsons, Kansas, transportation prepaid. If the Warranted Equipment thus returned is found by the Seller to be defective for a cause and within a time covered by this Warranty, such equipment shall be repaired or replaced without charge; and returned to its owner or job site at the Seller's cost for transportation and handling. If inspection of the Warranted Equipment discloses defects not covered by the Warranty, the Seller shall notify the owner. Said equipment, at the owner's option (to be determined thirty (30) days from the date of notification), may be repaired or replaced at the

expense of the owner and Seller's regular charges shall apply. Owner shall assume the cost for transportation and handling. Equipment which is repaired or replaced shall carry a warranty equal to the unexpired portion of the original warranty. The Seller will commence inspection of any Warranted Equipment returned to it for warranty claim within seven (7) working days after the arrival of such Warranty Equipment at Seller's plant, and shall complete any repairs required under this warranty within sixty (6) days after such arrival, unless Seller shall sooner notify said owner of reasonable cause for delay beyond control of Seller. Warranty obligations hereunder will be performed only between the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday and excluding holidays. Any person believing himself entitled to warranty performance hereunder is required to notify the Warranty Claims Department of Power Flame, Incorporated, 2001 South 21<sup>st</sup> Street, Parsons, Kansas, prior to return of any Warranted Equipment for repair hereunder. IN ALL EVENTS, SELLER WILL NOT BE LIABLE FOR AND WILL NOT REIMBURSE ANY LABOR, MATERIAL, OR OTHER REPAIR CHARGES INCURRED BY ANYONE OTHER THAN SELLER ON ANY WARRANTY EQUIPMENT, UNLESS SUCH CHARGES HAVE BEEN SPECIFICALLY AUTHORIZED IN ADVANCE IN WRITING BY SELLER. ANY WARRANTY IMPLIED BY LAW WITH RESPECT TO THE MERCHANTABILITY OR FITNESS OF THE WARRANTED EQUIPMENT IS HEREBY LIMITED TO THE DURATION OF THE WARRANTY PERIOD HEREUNDER. THE SELLER WILL NOT IN ANY EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ATTRIBUTABLE TO THE WARRANTED EQUIPMENT.  
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**Power Flame**  
*The Power to Manage Energy*



## Power Flame Incorporated

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