

# FROST *Fight*er

## INDIRECT FIRED SPACE HEATERS DIESEL/FUEL OIL



MODEL IDH500QR  
MODEL IDH350-IIQR  
MODEL IDH350QR

### Installation - Operation/Maintenance Instructions and Parts List

READ INSTRUCTIONS PRIOR TO STARTING HEATERS



FROST FIGHTER INC.  
100-1500 NOTRE DAME AVE  
WINNIPEG, MANITOBA  
CANADA R3E 0P9  
TEL : (204) 775-8252  
FAX: (204) 783-6794

[WWW.FROST-FIGHTER.COM](http://WWW.FROST-FIGHTER.COM)  
TOLL FREE 1-888-792-0374

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## FROSTFIGHTER WARRANTY

Frost Fighter Inc. warrants the Frostfighter heater to be free from defects in workmanship and materials for a period of twelve (12) months from date of initial service not to exceed fifteen (15) months from date of shipment.

If during the warranty period, the heat exchanger fails under normal use and service due to a defect in material or workmanship said heat exchanger will be repaired or replaced free of charge F.O.B. the Winnipeg Factory..

All mechanical and electrical components are covered by a one (1) year limited warranty. Normal maintenance items are excluded under the warranty. The warranty does **NOT** include any freight, labor or sales taxes incurred by the purchaser and is subject to the following conditions:

1. The heater shall be operated in accordance with the manufacturer's operating and maintenance manual.
2. The heater shall be subject to normal use in service and shall not have been misused, neglected, altered or otherwise damaged.
3. The unit shall be operated within the rated capacities and with the prescribed fuel.
4. The unit has not been allowed to exceed its proper temperature limits due to control malfunction or inadequate air circulation.
5. There is no evidence that the unit has been subject to tampering or deliberate destruction.
6. The heat exchanger shows no signs of an implosion or explosion.

No representative of Frost Fighter Inc., nor any of its distributors or dealers, is authorized to assume for Frost Fighter Inc. any other obligations or liability in connection with this product, nor alter the terms of the warranty in any way. This warranty is limited to the express provisions contained herein and does not extend to liability for labor costs incurred in replacing defective parts.

Parts can be obtained from Frost Fighter Inc, Winnipeg, Manitoba on the basis that credit will be issued if the defective parts returned qualify for replacement pursuant to the terms and conditions of this warranty. Authorization to return any alleged defective parts must be first obtained from the factory prior to transporting the part. An R.G.A.# must be provided from an Frost Fighter Inc representative. The transportation charges for the alleged defective part must be prepaid by the owner. Frost Fighter Inc. will not accept charges for parts purchased unless the conditions of this warranty have been satisfied and prior authorization to purchase the parts has been received from the factory.






100-1500 NOTRE DAME WINNIPEG, MANITOBA  
R3E 0P9, (204) 775-8252

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## SPECIFICATIONS

| MODEL                        | IDH350QR                                                                            | IDH350-IIQR                                                                         | IDH500QR                                                                              |
|------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>MAXIMUM INPUT</b>         | 350,000 BTU/HR                                                                      | 350,000 BTU/HR                                                                      | 420,000-500,000 BTU/HR                                                                |
| <b>NOZZLE SIZE</b>           | 1.75 - 2.00 USGPH<br>45° B (SOLID)                                                  | 1.75 - 2.00 US GPH<br>45°B (SOLID)                                                  | 2.25 - 3.00 USGPH<br>60°B (SOLID)                                                     |
| <b>PUMP PRESSURE</b>         | 125 P.S.I.                                                                          | 125 P.S.I.                                                                          | 140 P.S.I.                                                                            |
| <b>FUEL TANK CAP.</b>        | 35 IMP GALS.<br>42 US GALS.                                                         | 35 IMP GALS.<br>42 US GALS.                                                         | 35 IMP GALS.<br>42 US GALS.                                                           |
| <b>ELECTRICAL SUPPLY</b>     | 115 VOLT<br>15 AMP                                                                  | 115 VOLT<br>20 AMP                                                                  | 115 VOLT<br>20 AMP                                                                    |
| <b>HEATED AIR (W/O DUCT)</b> | 4800 CFM                                                                            | 4800 CFM                                                                            | 4800 CFM                                                                              |
| <b>APROX. RUN TIME</b>       | 13 HOURS                                                                            | 13 HOURS                                                                            | 11 HOURS                                                                              |
| <b>APPROVAL AGENCY</b>       |  |  |  |
| <b>DRY WEIGHT</b>            | 510 LBS.                                                                            | 510 LBS.                                                                            | 510 LBS.                                                                              |

**PLEASE REFER TO PAGE 7 IF KEROSENE IS NOT BEING USED.**

Flue size-6" on all units

NOTE: -These heaters are intended for use primarily as temporary heating of buildings under construction, alteration or repair

### MAXIMUM ALLOWABLE DUCT LENGTHS

**IDH350QR / IDH350-IIQR**  
(350,000 BTU/HR)

100 feet 16" outlet ducting without inlet ducting  
75 feet 16" outlet ducting w/ 25 feet 16" inlet ductng  
50 feet 16" outlet ducting w/ 50 feet 16" inlet ducting

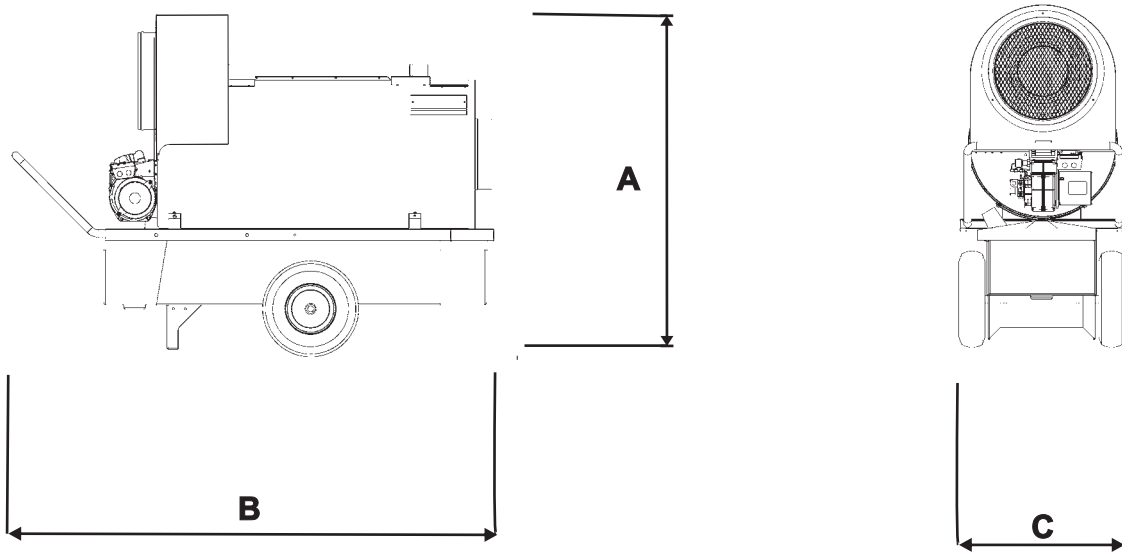
**IDH500QR**  
(420,000 - 500,000 BTU/HR)

**OR**

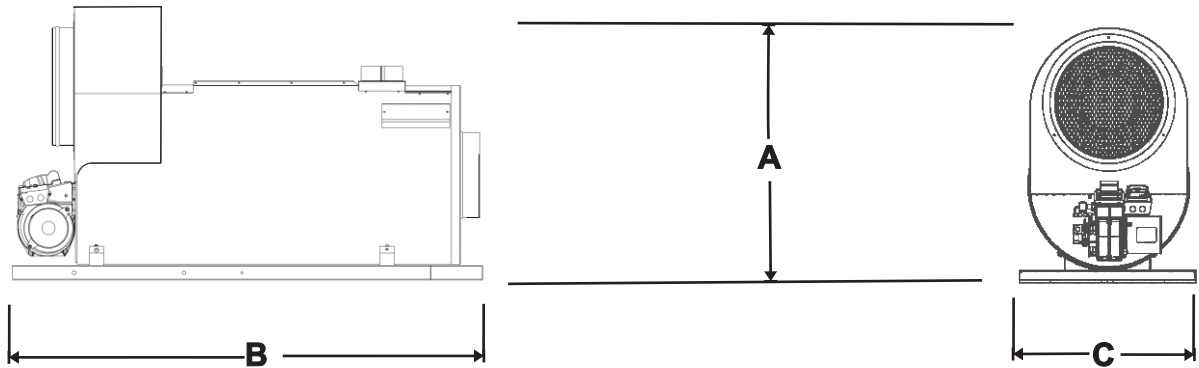
100 feet 2 x 12" outlet ducting w/ 0 feet 16" inlet ducting  
75 feet 2 x 12" outlet ducting w/ 25 feet 16" inlet ducting  
50 feet 2 x 12" outlet ducting w/ 50 feet 16" inlet ducting

100 feet 16" outlet ducting w/ 0 feet 16" inlet ducting  
50 feet 2 x 12" outlet ducting w/ 0 feet 16" inlet ducting

## Dimensions of IDHQR series of heaters



| Heater Only |     |         |     | With Packaging |     |     |         |              |
|-------------|-----|---------|-----|----------------|-----|-----|---------|--------------|
| MODEL       | A   | B       | C   | WEIGHT (LBS)   | L   | W   | H       | WEIGHT (LBS) |
| IDF350      | 51" | 76 1/2" | 27" | 510            | 83" | 38" | 52 1/2" | 562          |
| IDF500      | 51" | 76 1/2" | 27" | 510            | 83" | 38" | 52 1/2" | 562          |



| Heater Only |         |         |     | With Packaging |         |     |         |              |
|-------------|---------|---------|-----|----------------|---------|-----|---------|--------------|
| MODEL       | A       | B       | C   | WEIGHT (LBS)   | L       | W   | H       | WEIGHT (LBS) |
| IDF350      | 29 1/2" | 65 1/2" | 25" | 325            | 70 1/2" | 32" | 35 1/4" | 375          |
| IDF500      | 29 1/2" | 65 1/2" | 25" | 325            | 70 1/2" | 32" | 35 1/4" | 375          |

# INSTALLATION INSTRUCTIONS

1. The recommendations of local authorities having jurisdiction must be followed. For recommended Installation practices refer to C.S.A. Standard B139 (CANADA) or NFPA 54 (US)
2. When firing the unit in an enclosed area 3 square feet must be provided to allow the free entry of the air required for operation.
3. For electrical supply, use 3 wire receptacle with "U" ground.
4. Do not operate the unit in partly ventilated areas without a flue pipe or in close proximity to combustible surfaces or materials.

## INSTALLATION CLEARANCES

NOTE: Installation clearances are as follows:

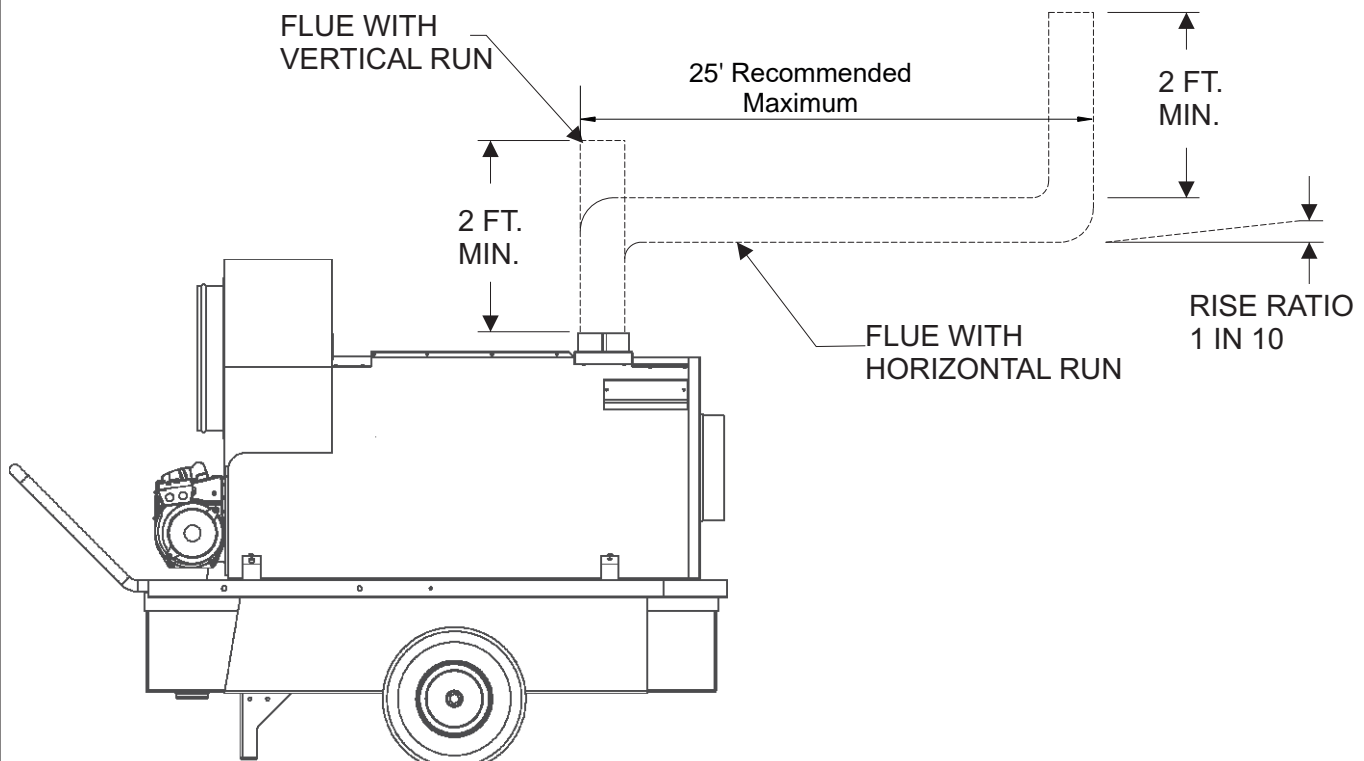
Top - 3 inches  
Sides - 24 inches  
Burner End - 4 feet

Discharge End - 10 feet Vent  
Venting/Flue - 24 inches  
Floor - Combustible

## FLUE PIPE CONNECTIONS

**The heater can be used indoors when properly vented to the outdoors.**

When the heater is connected to a flue pipe the flue pipe shall terminate in a vertical section at least two feet long. Horizontal runs should have rise ratio of 1 in 10 away from the heater. The chimney should have .02" W.C. draft to ensure safe operation of the unit. Where down drafts are liable to occur a vent cap should be used. Vent/Rain caps are always recommended to prevent excess intrusion of water/snow. All venting should correspond with the CSA B149 (CANADA), NFPA 54 (US) standard and/or all local codes.



## HEAT EXCHANGER CLEANING.

1. Remove front cap. (48205 or 48205A)
2. Remove outer and inner cover panel (jacket to front). (48119A & 48119B)
3. Remove the fan intake screen and reach inside fan housing to loosen clamp and gasket on burner tube where it inserts into the heat exchanger. It is recommended that a new gasket be used when re-installing.
4. Remove fan switch/high limit cover on outer jacket at the discharge end of the heater. Loosen fan switch 48111B and remove it & feeler from the jacket. Remove the 48110A limit switch and feeler from the jacket.
5. Slide heat exchanger out of the jacket and place on the floor.
6. Use a pressure washer to nozzle through the burner opening to clean the inner chamber and use a pressure washer nozzle through the flue to clean the outer chamber.
7. If heat exchanger is extremely dirty or plugged, disassembly of the heat exchanger may be required. Contact your distributor or Frost Fighter for further information regarding this procedure.

## COMBUSTION AIR ADJUSTMENTS

\*\*\*\*For proper combustion air adjustment a calibrated gas analyzer and smoke tester should be used to ensure complete combustion. Air adjustment should be made at the correct input and be adjusted to achieve 10% CO<sub>2</sub>. For optimum combustion efficiency the combustion air control should be set to provide no more than a No. 1 smoke (Bacharach Scale). The Beckett burner has a calibrated air band, which will assist in adjusting the primary air for a good oil/air mixture. Adjust air band supply by loosening lock screws and moving air shutter (B48254) and if necessary the bulk air band. Begin by reducing the air until the unit begins to produce smoke. Increase air until no smoke is produced. Check for excessive heat build up in the heat exchanger. Insufficient air will cause flame impingement and reduced heat exchanger life. Increase air until heat build up has been eliminated. Check for proper ignition. Once satisfied re-tighten all screws and locking mechanisms.

This adjustment is to be carried out while the unit is operating and after 5 minutes of firing. Rotating the air shutter on the burner housing makes the adjustment.

| RECOMMENDED AIR SETTINGS |                   |      |                   |      |              |
|--------------------------|-------------------|------|-------------------|------|--------------|
|                          | ABOVE 5°F (-15°C) |      | BELOW 5°F (-15°C) |      |              |
| UNIT MODEL               | SHUTTER           | BAND | SHUTTER           | BAND | BURNER MODEL |
| IDH350QR                 | 10                | 6    | 8                 | 6    | CF 375       |
| IDH350-IIQR              | 4                 | 0    | 3                 | 0    | CF 500       |
| IDH500QR                 | 10                | 0    | 8                 | 0    | CF 800       |

SEE PAGE 9 FOR AIR SHUTTER AND AIR BAND DESCRIPTION AND LOCATION

Note: The above settings are based upon clean and properly adjusted equipment in proper working order, correct fuel pressures and at altitudes below 2000 feet ASL.

Combustion air adjustments can vary with location, altitude and type of fuel used. Less air may be required in extreme cold conditions. More air / less fuel may be required for increased altitudes.

**Burner input must be de-rated by 4% per every 1000 ft. (300 m.) ASL when above 2000 ft. (600 m.)**

Example operating at 5000 ft. (1500 m.) ASL, the burner input must be de-rated by  $.04 \times 5 = .20 = 20\%$

Due to the increased density of #2 & #1 oil at colder temperatures, kerosene fuel must be used or the oil nozzle change as follows at temperatures below 8°F/-10°C. Frost Fighter heaters are factory shipped with these nozzles to ensure reliable operation in cold ambient conditions up to 2000 ft. (600 m.) above sea level.

| Model                | Nozzle (USGPH)      |
|----------------------|---------------------|
| IDH350QR/IDH350-IIQR | 1.75 X 45°B Delevan |
| IDH500QR             | 2.25 X 60°B Delevan |

# OPERATING INSTRUCTIONS

## TO START HEAT WITH GENISYS CONTROL

1. Ensure unit is on flat, level ground before starting, canopy and fan guards must be in place.
2. Ensure the switch is in the "OFF" position.
3. Check fuel level (4 gallons to start).
4. Plug in supply cord to 115 VAC outlet with sufficient capacity rating. (20A for IDH500QR).
5. Flip the switch to "MANUAL" position or "THERMOSTAT" position for use with a thermostat connected.
6. There will be a 3-5 second delay for the control self-check and then a 45 second "pre-purge" delay after the burner motor begins to run and the fuel will also be pumping fuel back to the return line

## IF HEATER FAILS TO START

1. Press manual reset button on burner relay.
2. Check for low voltage condition and 115 volt supply.
3. Check fuel filter, suction tubing and nozzle assembly. The fuel should appear in the clear line with a minimal amount of bubbles or air.

**NOTE:** If unit has been reset a number of times without ignition there will be an accumulation of oil in the combustion chamber! Do the Following:

1. Make sure unit is sitting on level ground to ensure excess oil drain out of secondary exchanger (via small drain hole located on outer shell of heat exchanger by burner end).
2. Allow unit to drain for 15-20 minutes or until all oil has drained out.
3. Upon ignition excessive amounts of smoke will be present until all excess oil has been burnt from the heat exchanger.
4. When the unit has stabilized and the burner set up to operate properly, shut off the switch. Let the fan cool down the chamber and stop.

## IF UNIT STILL DOES NOT START REFER TO THE TROUBLE SHOOTING GUIDE PAGE 12

### CAUTION

1. Do not start heater when excess oil has accumulated in chamber.
2. Do not fill tank while unit is operating.
3. Do not shut off by disconnecting supply cord. The heat exchanger should be properly cooled before power shutdown.
4. In no case should extension cords be smaller than 12 A.W.G. If cord is longer than 50' use 10 A.W.G. minimum.
5. Do not use gasoline, crankcase oil or heavier than No. 2 furnace oil.
6. Always maintain adequate fuel supply.

### ELECTRICAL REQUIREMENTS:

15 amp circuit IDH350QR  
20 amp circuit IDH350-IIQR  
20 amp circuit IDH500QR

## TO STOP HEATER

Flip switch to "OFF" position. The burner motor will continue to run for 2 minutes to help cool the heat exchanger and electrodes. The supply fan will continue to operate until the heat exchanger has sufficiently cooled. Do not disconnect main power until supply fan has stopped running.

**WARNING!: BEFORE MOVING ANY GUARDS OR SAFETIES DISCONNECT THE MAIN POWER AS THE SUPPLY FAN WILL CYCLE AUTOMATICALLY.**



## IDH MAINTENANCE INSTRUCTIONS

**!WARNING!:** Heaters should be fully serviced annually to ensure proper performance. Maintenance should be performed by trained personnel only. Incorrect maintenance may result in improper operation and serious injury.

### **HIGH LIMIT SWITCH**

It is recommended that the limit switch be checked every heating season to ensure the burner will shutdown if temperature exceeds 220° F. This can be done by restricting the air flow through the unit. After tests are complete, remove the restrictions.

### **FAN SWITCH**

The fan switch has been selected to allow for preheating of the heat exchanger to ensure that only heated air is allowed to enter the space. Upon satisfying the need for heat, the fan switch will continue to run the supply fan until the heat exchanger has cooled sufficiently. This feature will help prolong the life of your heat exchanger.

### **FUEL FILTER**

Replace cartridge (48164 or 48164A) once every week of normal usage or sooner, depending on fuel quality.

### **FLAME DETECTOR**

To test the cad cell, start the burner and before the safety lock-out timing period ends, disconnect the cad cell wires from the F-F terminals on the control. Next, jumper the F-F terminals with a piece of wire. This will allow the burner to continue running so that you will be able to check the cad cell resistance during the run cycle. If you did not get the F-F terminals on the control jumpered before the burner locked out, wait 3-5 minutes before attempting this again. With the burner running, connect the ohmmeter across the cad cell leads. Your signal should be between 250-1200 ohms. If higher, please clean the cad cell eye or replace.

### **BURNER**

The electrode spacing must be checked and adjusted, if necessary after every nozzle change. Nozzle should be replaced annually or sooner if burner cannot be set up to operate properly. Nozzle size and type are marked on the rating plate.

### **ELECTRICAL**

Ensure all conduit (BX) connectors are tight. Check inside connections in control box to ensure good connections. Check marrettes.

**FAN** Check for dust or dirt build up on blades. Check for tightness of the set screw. Run heater to check for excess vibration. If physical damage is seen or noticed, replace fan.

### **MOTORS**

No lubrication is necessary since the bearings are the sealed type. Clean motor of existing dust or dirt.

### **FUEL SYSTEM**

Periodically remove fuel tank drain plug and clean tank. Do not store unit containing furnace oil for long periods. **The quality of fuel oil will affect light off at low ambient temperatures, #1 fuel oil or kerosene are recommended for temperatures below -10° C/8°F.** (see page 7 for recommended settings if using #2 fuel oil in cold temperature)

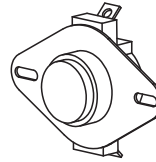
### **FUEL PUMP**

Check fuel pump pressure on a regular basis. This should be checked at the bleeder screw. **WITH THE CLEAN CUT PUMP ADD 10 LBS TO THIS READING TO GET THE TRUE PRESSURE.** There is a pressure loss when fuel passes through solenoid valve. Example: IDH350 pressure should be read on the guage at 135 PSI, reading at nozzle line will then be 125. Units with the Suntec A2YA7916, pressure reading can be checked at the guage port. This will provide a true reading.

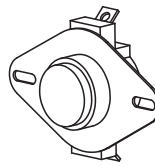
### **HEAT EXCHANGER**

If a smoky condition continues even after adjusting the air band assembly, the heat exchanger may need to be cleaned

# LIMITS, FAN SWITCHES AND TEMPERATURE FEELERS



ADJUSTABLE FAN SWITCH 90°-130°F ( 48111B)  
ALL MODELS



IDH HIGH LIMIT  
C9648  
L220 - 40F (48110A)  
220°F



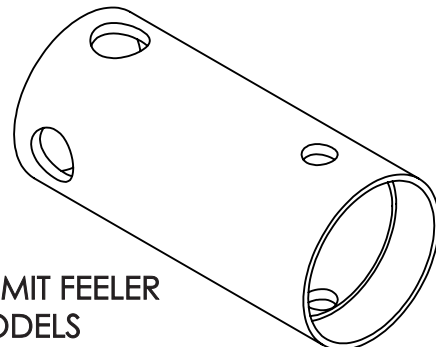
FAN FEELER  
ALL MODELS  
(48171)

## Indoor and outdoor settings of fan switch

Indoors & if surrounding air is warm i.e. -5°C/23°F-Fan switch should be set to 115°F or higher so as to shut down unit when heat exchanger is properly cooled, also keeps fan motor from excessive running on when discharging cooler air.

Outdoor-Fan switch should be set between 90° - 100°F. The colder the temperature the lower the setting.

PLEASE NOTE THAT THERE IS A LONGER TEMPERATURE FEELER ON THE AUTOMATIC HIGH LIMIT. THIS SHOULD NOT BE ADJUSTED.



HIGH LIMIT FEELER  
ALL MODELS  
15030

## FAN TEMPERATURE FEELER ADJUSTMENT

THE TEMPERATURE FEELER IS ATTACHED TO THE FAN SWITCH.

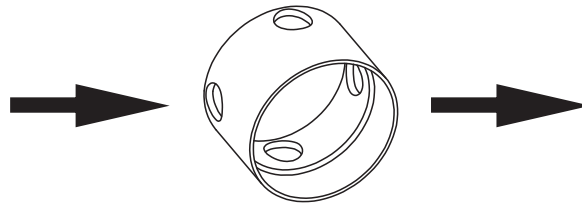
**ALWAYS MAKE SURE THAT THE TEMPERATURE FEELER IS TOUCHING THE HEAT EXCHANGER!!**

The temperature feeler provides air flow over the fan switch, which regulates the cycling of the fan. The temperature feeler can be adjusted for different outside temperatures, by rotating the location of the temperature feeler holes. This will provide optimum performance of the unit in different applications, and will reduce or eliminate unnecessary fan cycling.

IF SURROUNDING AIR IS WARM (EG.,  $-5^{\circ}\text{C}$  or  $23^{\circ}\text{F}$ , indoor application):

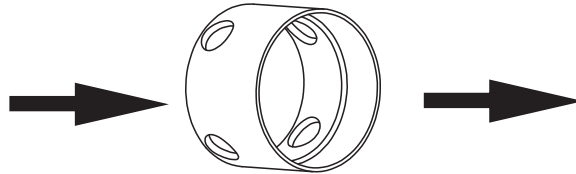
TURN THE TEMPERATURE FEELER SO THAT THE HOLES ARE PARALLEL WITH THE HEAT EXCHANGER, AND ENSURE THAT NOTHING IS BLOCKING THE AIR FLOW (EG., SCREWS).

BY DOING THIS THE FAN SWITCH WILL REMAIN COOL AND NOT OVERHEAT. (SEE FOLLOWING)  
The fan switch is located under the high limit/fan cover which is mounted on the jacket close to front of unit. The switch can be adjusted by using a flat-headed screw driver and turning it clockwise or counter clockwise to desired temperature.



IF SURROUNDING AIR IS COLD (EG., Below  $-5^{\circ}\text{C}$  or  $23^{\circ}\text{F}$ )

TURN THE TEMPERATURE FEELER SO THAT THE HOLES ARE CLOSED OFF AS THE AIR GOES OVER THE HEAT EXCHANGER, THIS WILL REDUCE FAN CYCLING, UNIT SHUTDOWN, ETC. (SEE FOLLOWING)

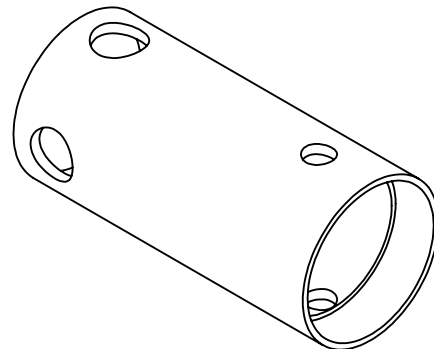


### Indoor and outdoor settings of fan switch

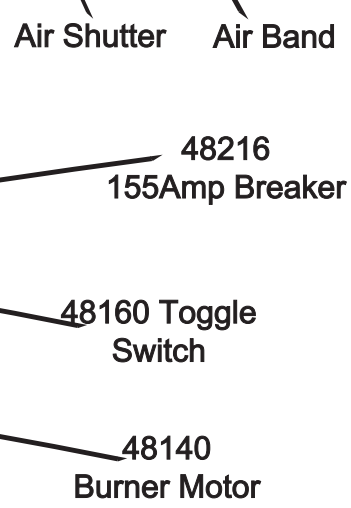
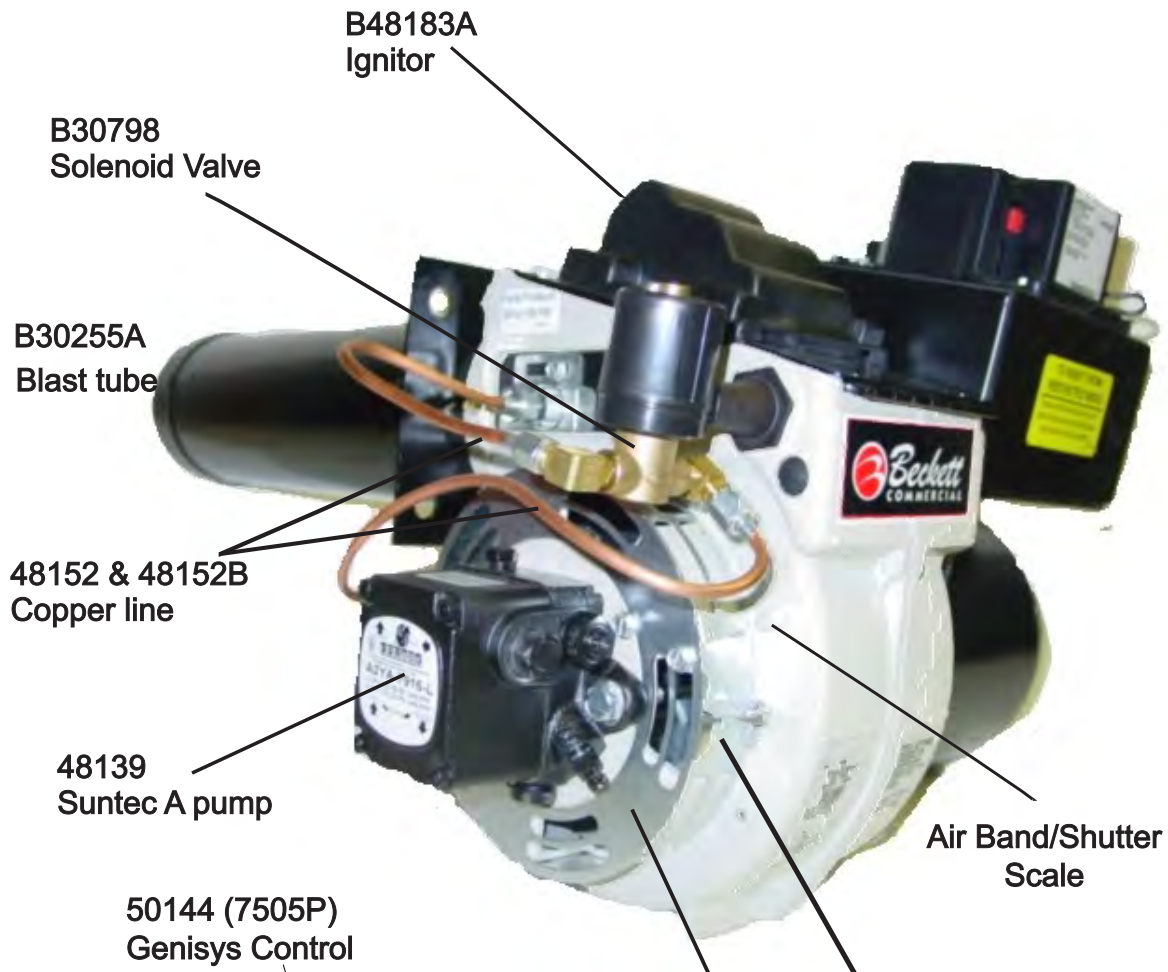
Indoors & if surrounding air is warm i.e.  $-5^{\circ}\text{C}/23^{\circ}\text{F}$ -Fan switch should be set to 115' or higher so as to shut down unit when heat exchanger is properly cooled, also keeps fan motor from excessive running on when discharging cooler air.

Outdoor-Fan switch should be set between  $90^{\circ}$ - $100^{\circ}\text{F}$ . The colder the temperature the lower the setting. Very cold ambient conditions may require the fan switch to be set lower to prevent excessive fan cycling.

PLEASE NOTE THAT THERE MAY BE A LONGER TEMPERATURE FEELER ON THE AUTOMATIC HIGH LIMIT. THIS SHOULD NOT BE ADJUSTED.



# IDH350-IIQR& IDH500QR BURNER COMPONENTS



## ACCESSING BURNER NOZZLE AND ELECTRODES

1



Remove fuel line connection from burner inlet.

2



Move copper fuel line tube away from burner

3



Removed splined nut from burner inlet connection.

4



Place splined nut in safe location such as on fuel line tube.

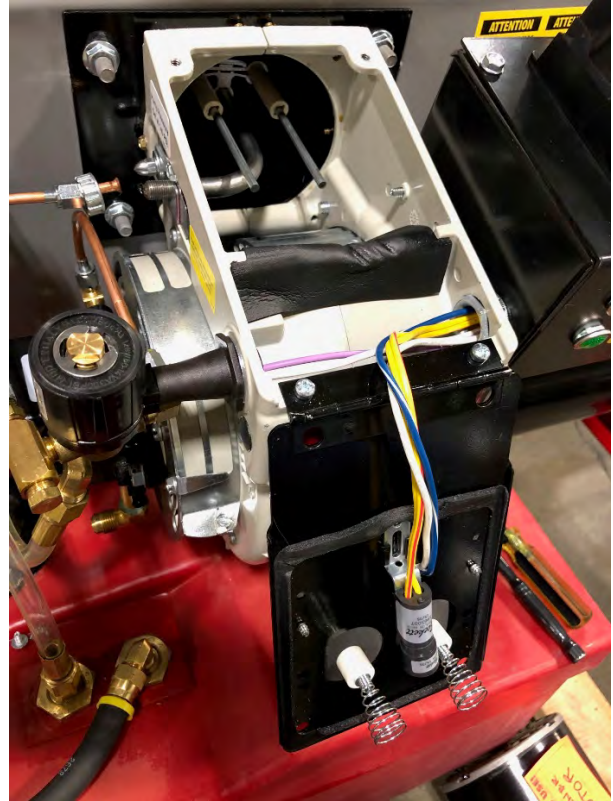
## ACCESSING BURNER NOZZLE AND ELECTRODES

5



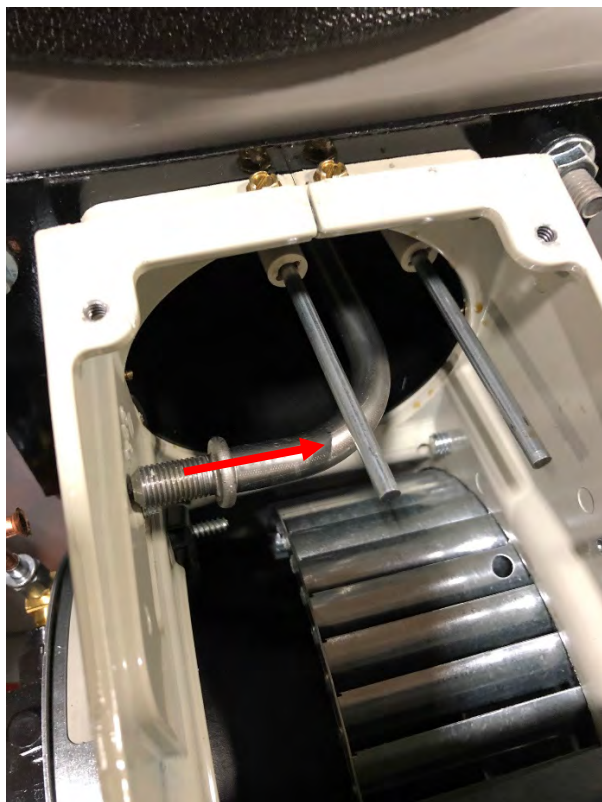
Remove ignitor retaining screws with 5/16" socket or wrench.

6



Swing open hinged igniter plate.

7



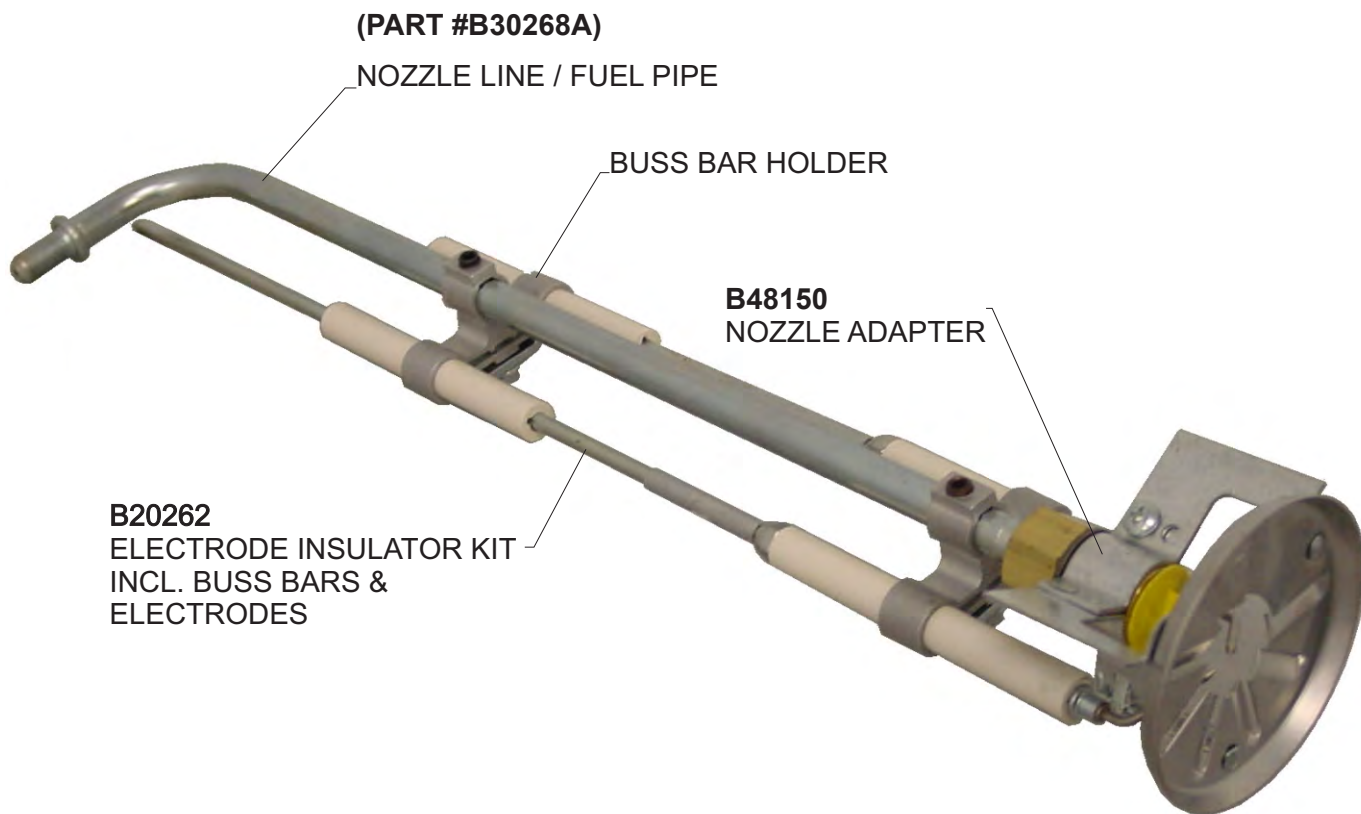
Move drawer assembly to the side in order to slide burner fuel pipe connection out of the housing.

8



Slide entire drawer assembly out of the burner to reveal the fuel nozzle and electrodes.

# IDH350-IIQR & IDH500QR CF BURNER ELECTRODE ASSEMBLY (DRAWER ASSEMBLY)



(PART #B30268A)

NOZZLE LINE / FUEL PIPE

BUSS BAR HOLDER

**B48150**  
NOZZLE ADAPTER

**B20262**  
ELECTRODE INSULATOR KIT  
INCL. BUSS BARS &  
ELECTRODES

NOZZLE

For Correct Nozzle Size/Type see Page 1

See Page 4 for temperature/altitude considerations



Nozzle Flow, Type and Spray Angle  
are indicated on the nozzle sides.

ie. "2.25 60 B" indicates that the nozzle will supply  
2.25 GPH @ 100 PSI & is a 60 degree spray  
angle type B (solid cone)

# SETTING OF THE ELECTRODES AND "Z" DIMENSION

## IDH350QR, IDH350-IIQR & IDH500QR

### (CF800 and CF500 Burner)

(Adjust When Required or After Disassembly)

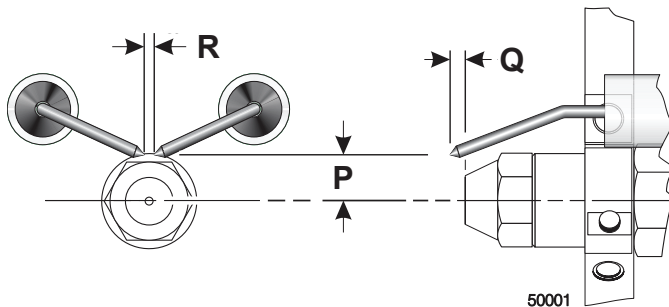
#### **WARNING** Maintain Electrode Specifications

**Failure to properly maintain these specifications could cause ignition malfunction, puff-back of hot gases, heavy smoke, asphyxiation, explosion and fire hazards.**

Adjust the electrode gap and position in relation to the nozzle to the following specifications.

Check, and adjust if necessary, the critical dimensions shown in **Figure 5**. Verify that the oil tube assembly and electrodes are in good condition, with no cracks or damage.

**Figure 5 - Nozzle and nozzle line assembly**



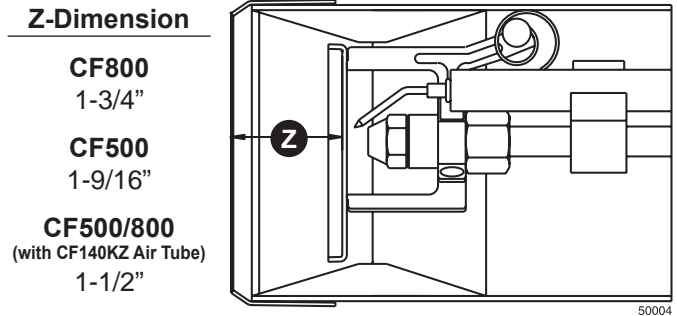
Legend (Figure 5)

- P Nozzle centerline to electrode tip = 3/16"
- Q Nozzle face to electrode tip = 1/4"
- R Electrode spacing = 1/8" - 3/16" gap

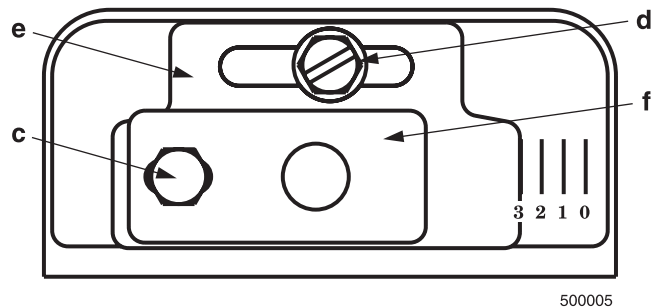
#### Install nozzle line assembly

Insert the nozzle line assembly (Drawer Assembly) into the burner air tube. Reference **Figure 6**. Slide the secondary adjusting plate (**Figure 7**, item **f**) completely to the left on the indicator adjusting plate (item **e**). Finger tighten acorn nut (item **c**) to secure the two plates together. Slide both plates completely to the right (Indicator Plate will read 0). Tighten fastener (item **d**). Install the spline nut on the end of the nozzle line, leaving the nut loosely placed so the plates can be moved.

**Figure 6 - Nozzle line assembly in burner**



**Figure 7 - Adjusting plate assy.**



Legend (Figures 7)

- c Bottom acorn nut
- d Fastener
- e Indicator adjusting plate
- f Secondary adjusting plate

#### Set dimension Z

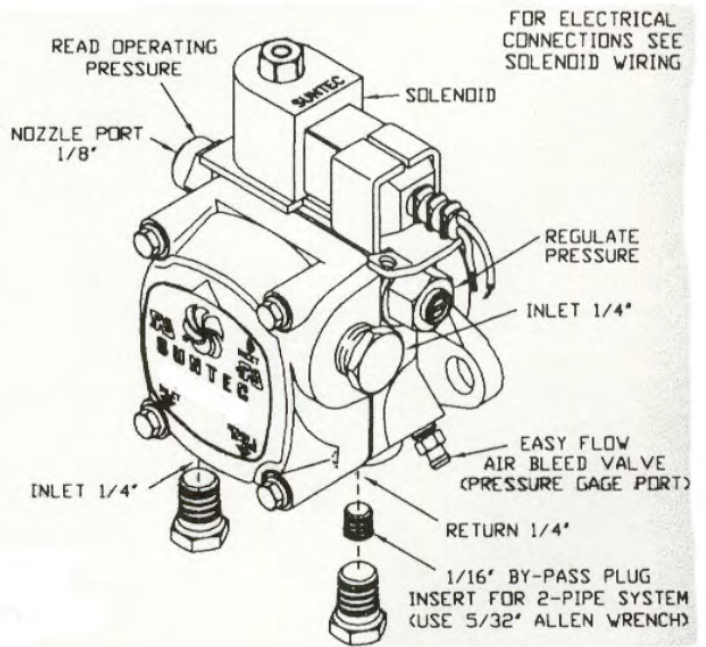
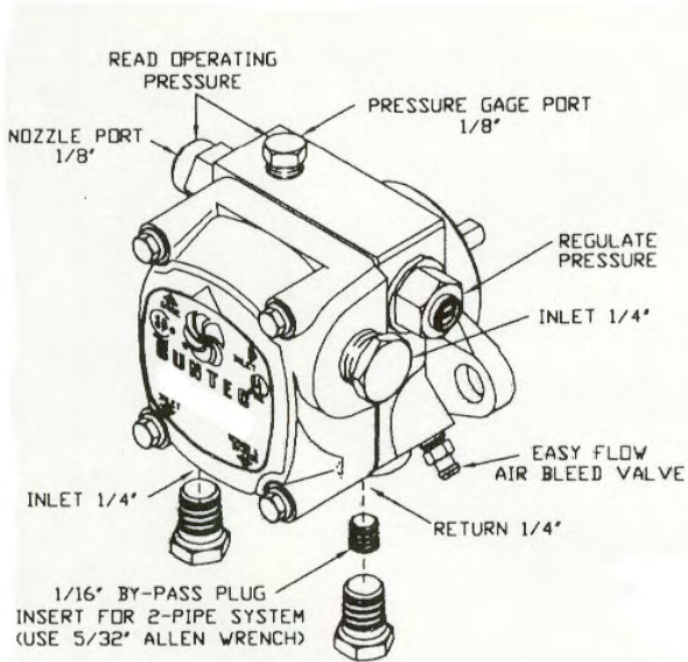
- Loosen fastener **c** in **Figure 7**. Slide the nozzle line and plate assembly until dimension **Z** in **Figure 6** is:
  - CF500 - 1-9/16" ±1/16"
  - CF800 - 1-3/4" ±1/16"
  - CF500/800 (with CF140KZ Air Tube) - 1-1/2" ±1/16"
- When dimension **Z** (from end of air tube to flat area of front face of head) is correctly set, tighten acorn nut (item **c**).
- Attach the oil line from the oil valve to the nozzle line end. Tighten securely.
- Before proceeding, check dimension **Z** once again. Loosen acorn nut **c** if necessary to reposition the nozzle line. Once dimension **Z** is set, **do not loosen the acorn nut (item) c again**. Note that for the setting of fastener **d**, refer to the initial head position procedure under "Start-up Checklist" section (Pg.18).



## FUEL PUMP & FILTER

**“A” PUMP (#48139)  
IDH350-IIQR & IDH500QR  
CF800 & CF500 Burners**

**CLEAN CUT PUMP (B20139)  
IDH350QR  
CF375 Burner**



When replacing a fuel pump, ensure 1/16" by pass plug is installed in return port. Use 5/32" allen wrench

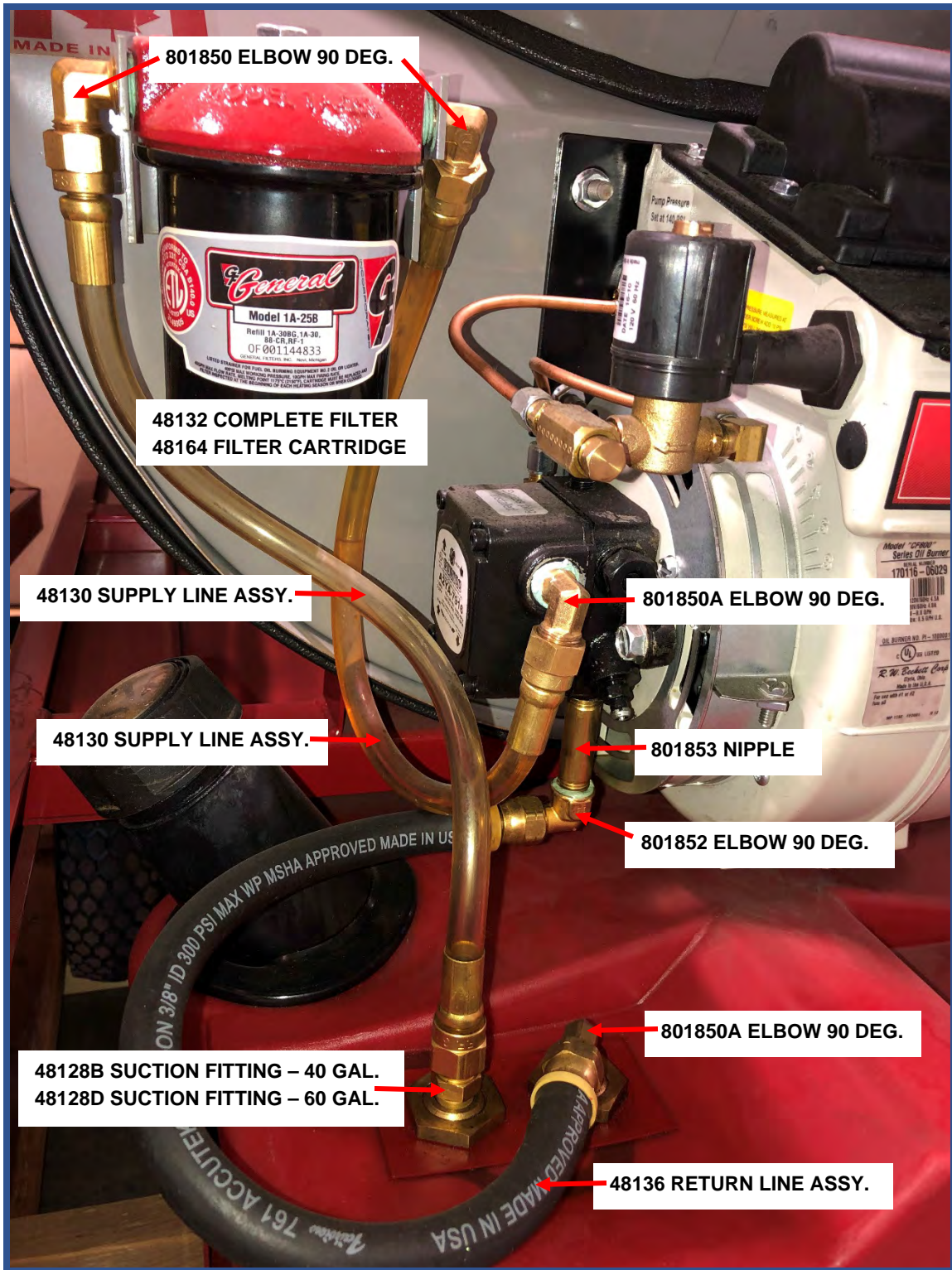
**Pump fuel internal filter can be accessed if needed by removing 4 cover retaining bolts.**

This filter would only need to be accessed if it is suspected that it may be restricted or clogged typically caused by the absence of proper primary filtering.

**TYPICAL PRIMARY FUEL FILTER SUPPLIED ON ALL MODELS**



FUEL LINES AND FITTINGS – IDF AND IDH HEATERS



# FUEL LINE CONNECTIONS & PRECAUTIONS

## CONNECTING THE OIL SUPPLY/ RETURN LINES

Install the oil tank lines in accordance with all applicable codes.

Use continuous lengths of reinforced fuel rated hose routed away from and protected from traffic, where possible.

Install a high quality shut-off valve in an accessible location on the oil supply line. Locate one valve close to the tank.

## WARNING

Install the oil lines using the following guidelines. Failure to comply could lead to equipment damage and present a risk of severe personal injury, death or substantial property damage due to leakage of oil and potential fire hazard.

Use only flare fittings at joints and connections. Never use compression fittings.

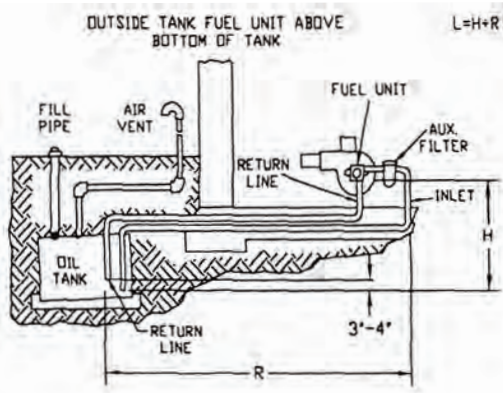
Install fittings only in accessible locations to assure any leak will be detected.

Where joint sealing is needed, use only pipes dope. Never use Teflon tape. Tape strands can break free and damage the fuel unit.

On two-pipe oil systems verify that the suction line vacuum does not exceed the fuel manufacturer's recommendation.

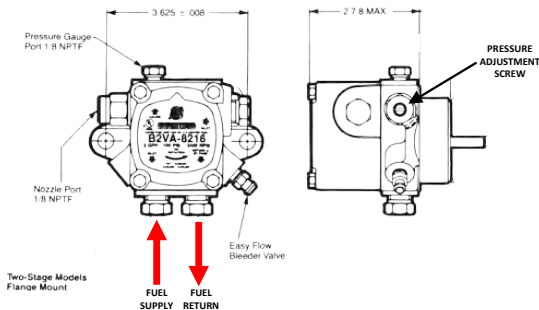
Do not operate the burner unless a return line or a by-pass loop is installed. Failure to follow this guideline and/or restricting or closing off the return line will cause damage to the fuel seals and consequent fuel leakage. This could result in severe personal injury, death or substantial property damage.

### TWO-PIPE SYSTEM - (Bypass plug installed in pump)



### TWO-STAGE TWO-PIPE MAXIMUM LINE LENGTH (H + R)

| Lift "H" | 3450 RPM Pump Speed    |
|----------|------------------------|
|          | 3/8" OD Tubing @ 7 GPM |
| 0'       | 80'                    |
| 2'       | 73'                    |
| 4'       | 66'                    |
| 6'       | 59'                    |
| 8'       | 52'                    |
| 10'      | 45'                    |
| 12'      | 38'                    |
| 14'      | 31'                    |
| 16'      | 80'                    |



FUEL FLOW DIAGRAM

## IDH TROUBLESHOOTING GUIDE

**ALWAYS DOUBLE CHECK FOR SUFFICIENT POWER , GAUGE OF CORD (SEE TOP OF PAGE #5) AND PROPER FUEL SUPPLY. POWER AND FUEL SUPPLY MUST BE SHUT OFF/DISCONNECTED BEFORE REMOVING OR REPLACING ANY COMPONENTS ON THE HEATER.**

### **1. Unit is turned on, nothing happens after 5 second safe start.**

- a. Ensure proper voltage coming in, 115V AC.
- b. Check for power on both sides of burner fuse. If no power, then check toggle switch. If power on one side, replace fuse. If power on both sides, go to **c**.
- c. Check black wire from primary control. If no power there, remove high limit cover & check for power on both sides of high limit. If power on one side only, replace high limit. If power on both sides, go to **d**.
- d. Ensure thermostat contacts on primary control (T and T) have a jumper across them.
- e. Make sure light on primary control is not flashing. If so, push button to reset.
- f. Check manual reset button on motor and wiring connection to motor. If reset pushed and power is going to motor, but nothing is happening, the burner motor may need replacement.
- g. On neutral line (white wires) make sure all connections are tight and secure, and unit is properly grounded. With AC voltage tester check that there is proper power supplied to the unit.
- h. If power coming into black wire on primary control, but no power out to orange wire, when the burner motor should be operating, replace primary control.
- i. If green (Flame) light on primary control stays on, check to ensure ignitor door is closed properly as cad cell is detecting light. If light stays on and no obvious areas are open, check OHM reading across two yellow wires. If you get a reading lower than 1 megohm, replace cad cell.

### **2. Burner motor starts but unit will not fire.**

- a. Check for power on blue wire on primary control going to ignitor. If no power there, replace primary control if powered, go to **b**.
- b. Remove electrode assembly and check isolators for cracks or chips in the porcelain. Make sure electrode setting is proper. For electrode adjustments, please turn to page 9 Clean assembly if there is any excess soot or oil..
- c. The nozzle should be checked and ensure it is not clogged or blocked. Make sure nozzle is not loose and is the correct size and type.
- d. Ensure air shutters are properly set to factory specifications. See page 4
- e. Check for power on violet line on primary control. After pre-purge, if no power sent to violet line, replace primary control. If power on violet line, remove copper fuel line at electrode assembly to ensure fuel is coming out. If no fuel there, replace solenoid valve.
- f. At the bleeder screw, check for proper out pump pressure (see maintenance section). If low or no pressure, go to **g**.
- g. Check oil filter, oil pick up tube and oil lines to ensure free flow and they are not clogged or dirty.
- h. Check electrical polarity and grounding.

### **3. Burner fires then locks out.**

- a. Check oil pressure to ensure solenoid valve is opening. Check oil flow system, filter, pick up tubes and lines.
- b. The nozzle should be checked to ensure it is clean and emitting a good spray pattern, as this could affect the cad cell operation.
- c. Cad cell (flame detector) could be defective. Disconnect yellow cad cell wires from primary control. Start unit and when it fires, connect jumper across connections on primary control. If unit continues to run, then check cad cell alignment with burner, clean the face with a soft cloth and ensure no external light is affecting it.
- d. With an ohmmeter, check resistance across cad cell leads with machine running and primary control cad cell leads jumpered out. If resistance over 1200 OHMS, cad cell should be replaced. If unit locks out with jumper, replace primary control.

## IDH TROUBLESHOOTING GUIDE CONTINUED

3. **If unit locks out three times in succession, it will go into restricted lock out Mode. To reset, hold down reset button for 30 seconds until “Pump Prime” indicator flashes. The unit will then resume in normal operating mode.**
  - e. After verifying primary control is not in lockout & light continues to flash, replace primary control.
  - f. Check polarity, ground & voltage must be between 108-132v AC.
  - g. Make sure high limit is functioning properly.
4. **Smoky fire**
  - a. Check nozzle, make sure is tight and not clogged.
  - b. Check combustion chamber for cracks or burnt out.
  - c. Check air band settings. (Air shutter and/or air band may be closed too much-restricting combustion air.
  - d. Check pump pressure.
  - e. Check slide plate to make sure it is in correct position.( See page 9 for settings)  
If necessary, open slightly.
  - f. Check recommended settings if using #2 fuel in cold ambient temperatures
5. **Delayed ignition**
  - a. Check for proper electrode setting.
  - b. Check the isolators for cracks or a conducting coat of soot or oil. Cracks sometimes occur under the electrode bracket, causing a short circuit.
  - c. Check to see that the air shutter is not overly open-too much air will blow out flame.
  - d. Check to ensure pump pressure is properly set.
  - e. Change nozzle.
  - f. Check fuel filter, replace if necessary.
  - g. Ensure draft or wind is not blowing out flame-add 3' stack.
6. **Main fan will not come on, unit shuts down on high limit.**
  - a. Check temperature feeler, make sure it is in properly.
  - b. Jumper out fan switch to test motor. If you have voltage to motor and still does not start, replace motor. Check line voltage to ensure proper voltage. Also checks amp draw on motor. Motor may be running too hot and not run due to thermal overload being tripped.
  - c. Replace fan switch if you have power on one side after unit heating up it does not make
  - d. Replace high limit as it may be tripping too soon and not giving fan switch time to engage.
  - e. Ensure fan switch temperature is correct for weather conditions ( see page 7 & 8 for settings)
7. **Unit on, but cycles on high limit**
  - a. Check air flow, ensure both ducts are in place and clear of obstruction and straight.
  - b. Check pump pressure, unit could be over firing.
  - c. Check nozzle that proper size of nozzle is installed.
  - d. Change high limit.
  - e. See page 1 for maximum duct lengths. Excessively long lengths can trip the high limit
  - f. Fuel type- #2 will increase BTU output @cold ambient temperatures resulting in overheating.
8. **Combustion chamber turns red.**
  - a. Nozzle may be firing sideways (replace or adjust)
  - b. Clogged nozzle (replace)
  - c. Temperature feeler not on properly or missing (Must be touching heat exchanger)
  - d. High limit not functioning (replace)
  - e. Excessive pump pressure. Check and reset if necessary
  - f. Fuel type-see page 7 for recommended settings.

## Sequence of Operation for Genisys Controller



### **Burner States**

**Standby:**

The burner is idle, waiting for a call for heat.

**Valve-On Delay:**

The igniter and motor are on while the control delays turning on the oil solenoid valve for 45 seconds..

**Trial For Ignition:**

The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time ("lockout time").

**Lockout:**

The control has shut down for one of the following safety reasons:  
a. The trial for ignition (lockout) time expired without flame being established.

b. The cad cell detected flame at the end of the Valve On Delay state. To reset the control from lockout click the button 1-second.

**NOTE:**

A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a Hard Lockout state that must be reset only by a qualified service technician. To reset from Hard Lockout, hold the reset button for 15 seconds until the yellow light turns on.

**Ignition Carryover:**

Once flame is established, the igniter remains on to ensure flame stability.

**Run:**

The flame is sustained until the call for heat is satisfied. The burner is then sent to Motor-Off Delay, if applicable, or it is shut down and sent to Standby.

**Recycle:**

If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to Recycle each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into Hard Lockout instead of recycle. This feature prevents excessive accumulation of oil in the appliance firing chamber.

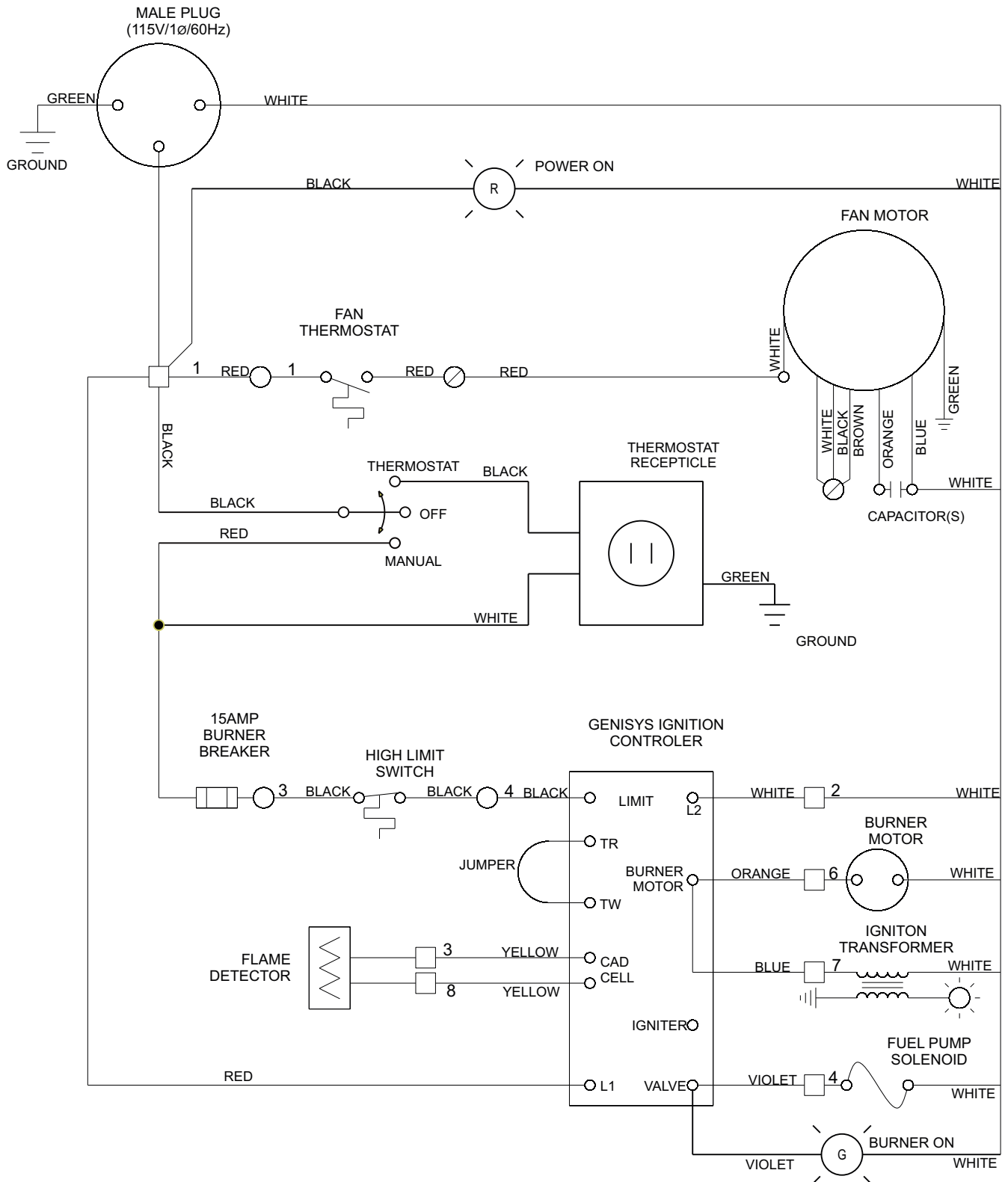
**Motor-Off Delay:**

If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set motor-off delay time before the control returns to standby.

**Pump Prime:**

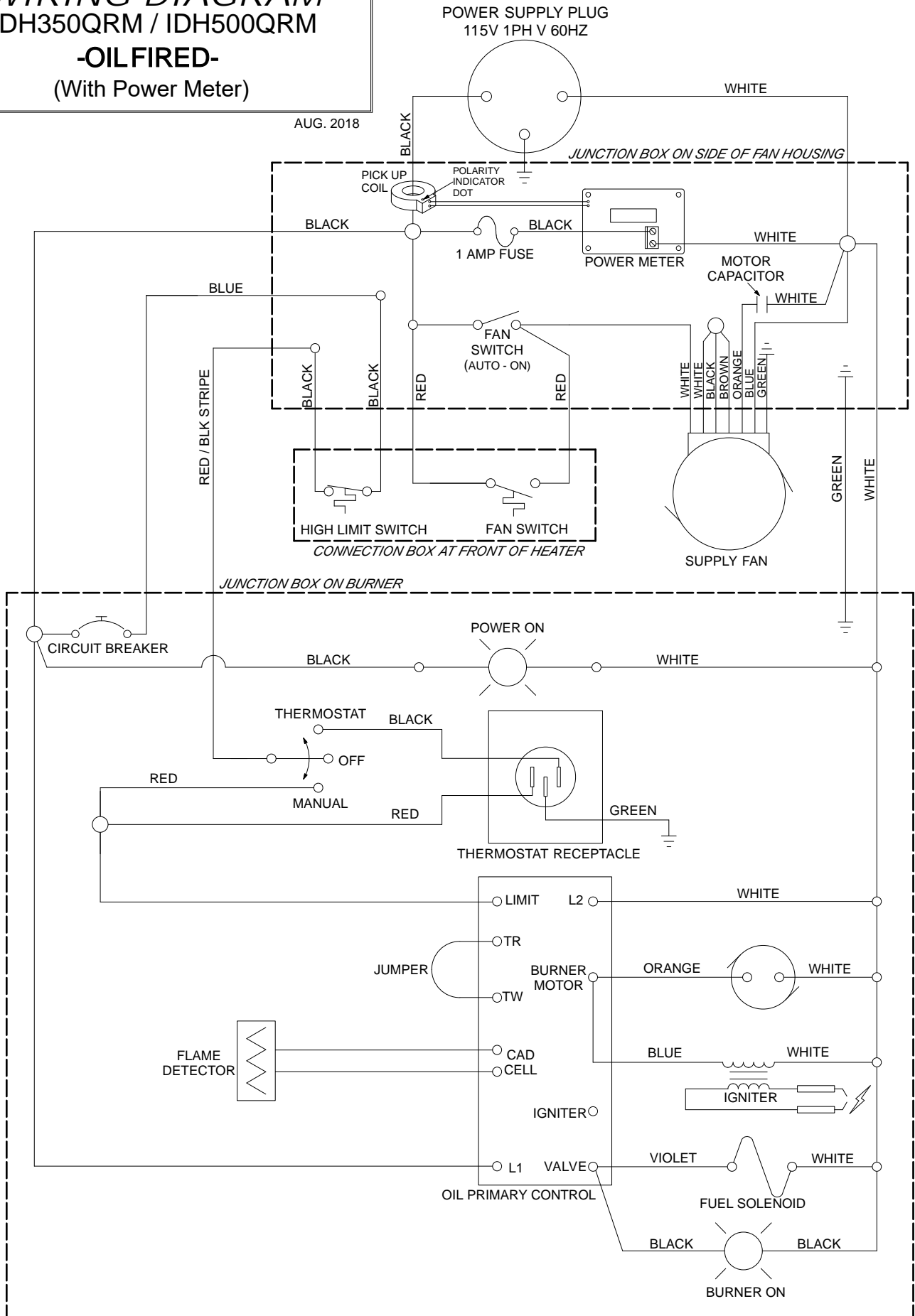
The igniter and motor are on with the oil solenoid valve energized for 4 minutes. During Pump Prime mode, the cad cell is disregarded, allowing the technician to prime the pump without having to jumper the cad cell.

# IDH 350QR, IDH-II350QR & IDH500QR WIRING DIAGRAM



# WIRING DIAGRAM IDH350QRM / IDH500QRM -OIL FIRED- (With Power Meter)

AUG. 2018





Frost Fighter IDH-QR Heaters after June 2018 may be equipped with optional power meter providing a real time display of critical information about the electrical power that is being supplied to the heater as well as heater's function and performance.

A bright 0.36"/9.2mm LED display is readable from up to 15 feet away which indicates the supply voltage, total amps, total watts or the line frequency by simply selecting which you wish to view. The display can also be set to continuously cycle through all four measurements.

Voltage measurement range is 85-264 VAC at 47-63HZ  
 Wattage is measured up to 9999 watts max.  
 Current is 0-32A with 0.01A resolution.

Display will accurately indicate real power and true rms current values of standard sine waves, triangle waves, square waves and other irregularly shaped waves with an accuracy of  $\pm 1\%$  full scale.

**DISPLAY SCREEN**  
 INDICATES SUPPLY VOLTAGE, TOTAL AMPS, TOTAL WATTS OR LINE FEQUENCY




**INDICATOR LIGHTS**  
 ILLUMINATES TO SHOW WHAT IS BEING MEASURED & DISPLAYED

**SELECTOR BUTTON**  
 ALLOWS USER TO SELECT WHAT VALUE TO READ OR CAN BE SET TO SCROLL

Momentarily touching "SEL" button each time will cycle the display to the next measurement.  
 Holding the "SEL" button for 3 seconds will set the meter to continuously cycle through each measurement and display them for 3 seconds. The display will indicate "AUTO" "ON" for scrolling or "AUTO" "OFF" for single value display.

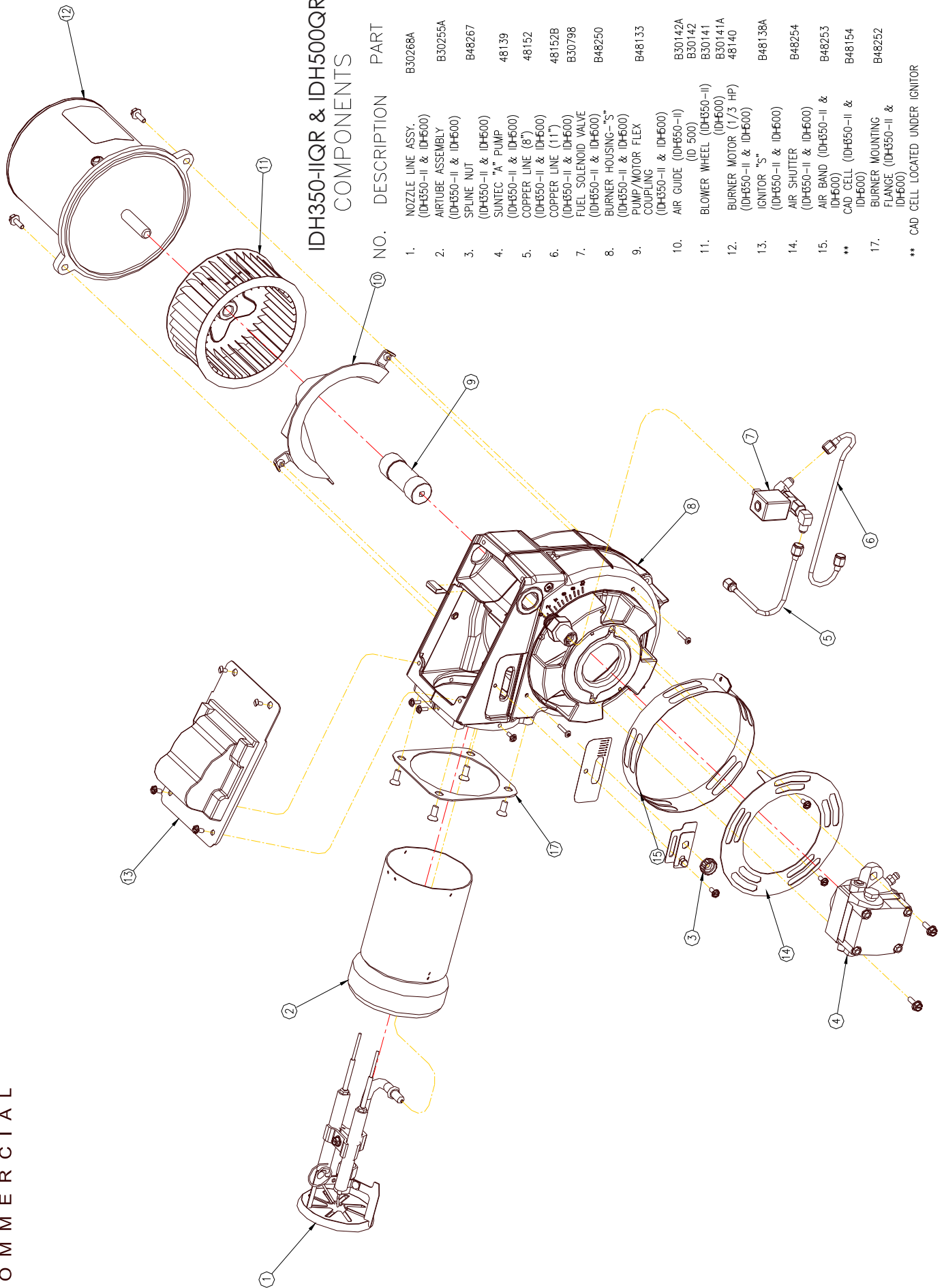
The meter can also be configured to always display the desired specific measurement such as amps or watts each time the heater is powered up. This is accomplished by setting the meter to the desired measurement reading and leaving it to display that reading without touching the "SEL" button for at least 60 seconds. Then each time the unit is powered up it will display that measurement.



**POWER METER**

**FAN SELECTOR SWITCH**

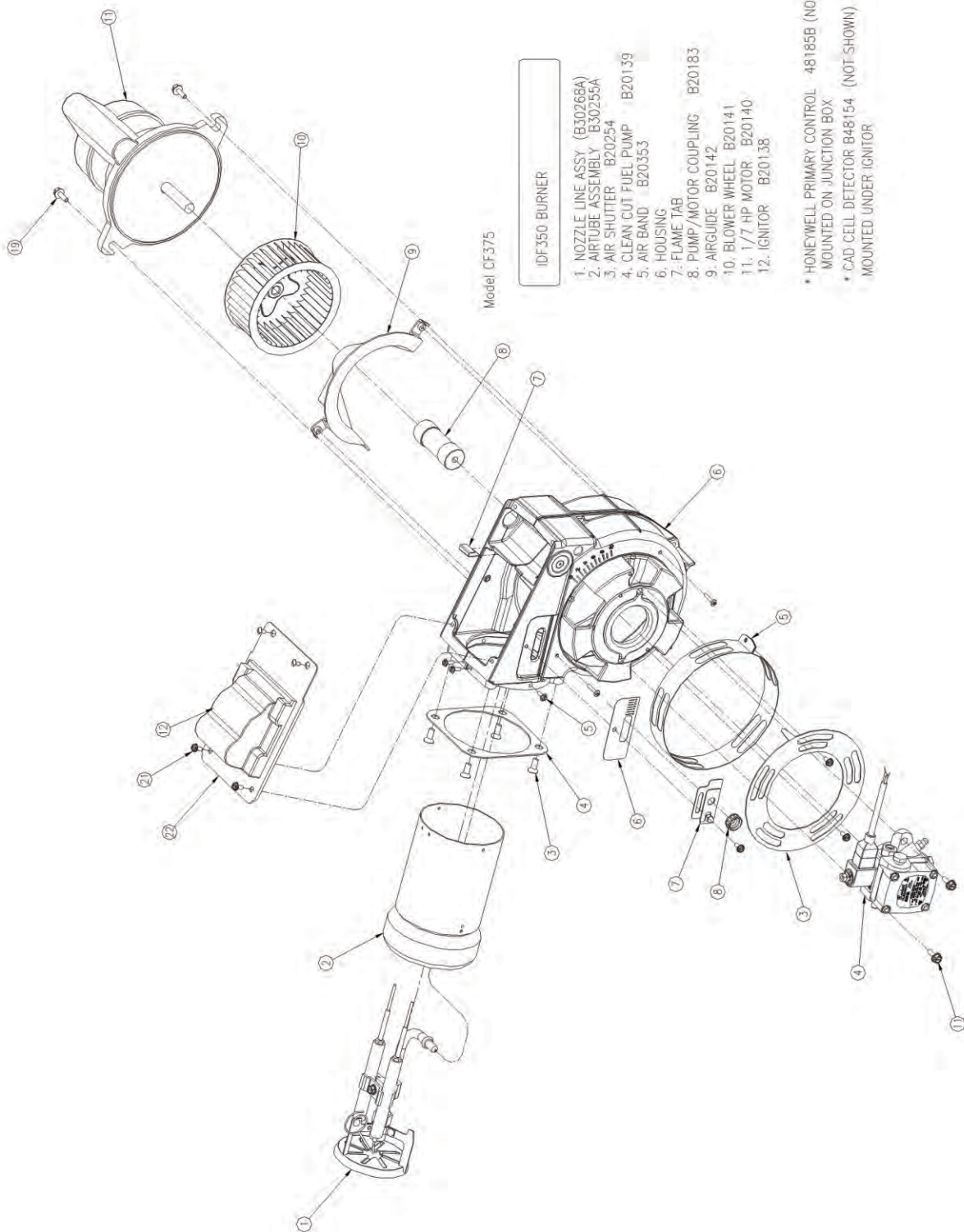
"AUTO" Normal Temperature Controlled Operation  
 "ON" Continuous Operation



### IDH350-IIQR & IDH500QR COMPONENTS

| NO. | DESCRIPTION                                         | PART                       |
|-----|-----------------------------------------------------|----------------------------|
| 1.  | NOZZLE LINE ASSY.<br>(IDH350-II & IDH600)           | B30266A                    |
| 2.  | AIR TUBE ASSEMBLY<br>(IDH350-II & IDH600)           | B30255A                    |
| 3.  | SPLINE NUT<br>(IDH350-II & IDH600)                  | B48267                     |
| 4.  | SUNTEC "A" PUMP<br>(IDH350-II & IDH600)             | 48139                      |
| 5.  | COPPER LINE (8")<br>(IDH350-II & IDH600)            | 48152                      |
| 6.  | COPPER LINE (11")<br>(IDH350-II & IDH600)           | 48152B                     |
| 7.  | FUEL SOLENOID VALVE<br>(IDH350-II & IDH600)         | B30798                     |
| 8.  | BURNER HOUSING-"S"<br>(IDH350-II & IDH600)          | B48250                     |
| 9.  | PUMP/MOTOR FLEX<br>COUPLING<br>(IDH350-II & IDH600) | B48133                     |
| 10. | AIR GUIDE (IDH350-II & IDH600)<br>(ID 500)          | B30142A<br>B30142          |
| 11. | BLOWER WHEEL (IDH350-II & IDH600)                   | B30141<br>B30141A<br>48140 |
| 12. | BURNER MOTOR (1/3 HP)<br>(IDH350-II & IDH600)       | B48138A                    |
| 13. | IGNITOR "S"<br>(IDH350-II & IDH600)                 | B48254                     |
| 14. | AIR SHUTTER<br>(IDH350-II & IDH600)                 | B48253                     |
| 15. | AIR BAND (IDH350-II & IDH600)                       | B48154                     |
| **  | CAD CELL (IDH350-II & IDH600)                       | B48252                     |
| 17. | BURNER MOUNTING<br>FLANGE (IDH350-II & IDH600)      | B48252                     |

\*\* CAD CELL LOCATED UNDER IGNITOR



Model CF375

**IDF350 BURNER**

- 1. NOZZLE LINE ASSY B30268A
- 2. AIR TUBE ASSEMBLY B30255A
- 3. AIR SHUTTER B20254
- 4. CLEAN CUT FUEL PUMP B20139
- 5. AIR BAND B20353
- 6. HOUSING
- 7. FLAME TAB
- 8. PUMP/MOTOR COUPLING B20183
- 9. AIRGUIDE B20142
- 10. BLOWER WHEEL B20141
- 11. 1/7 HP MOTOR B20140
- 12. IGNITOR B20138

\* HONEYWELL PRIMARY CONTROL 48185B (NOT SHOWN)  
 MOUNTED ON JUNCTION BOX  
 \* CAD CELL DETECTOR B48154 (NOT SHOWN)  
 MOUNTED UNDER IGNITOR

# HEAT EXCHANGER FOR OIL UNITS

P/N 50200-ALL IDH 350/500

COMBUSTION CHAMBER  
ASSEMBLY C/W INNER SHELL

FLUE COLLAR ASSEMBLY  
P/N 50113-ALL UNITS

P/N 50207-IDH MODELS



OUTER SHELL  
P/N 50206-ALL IDH MODELS



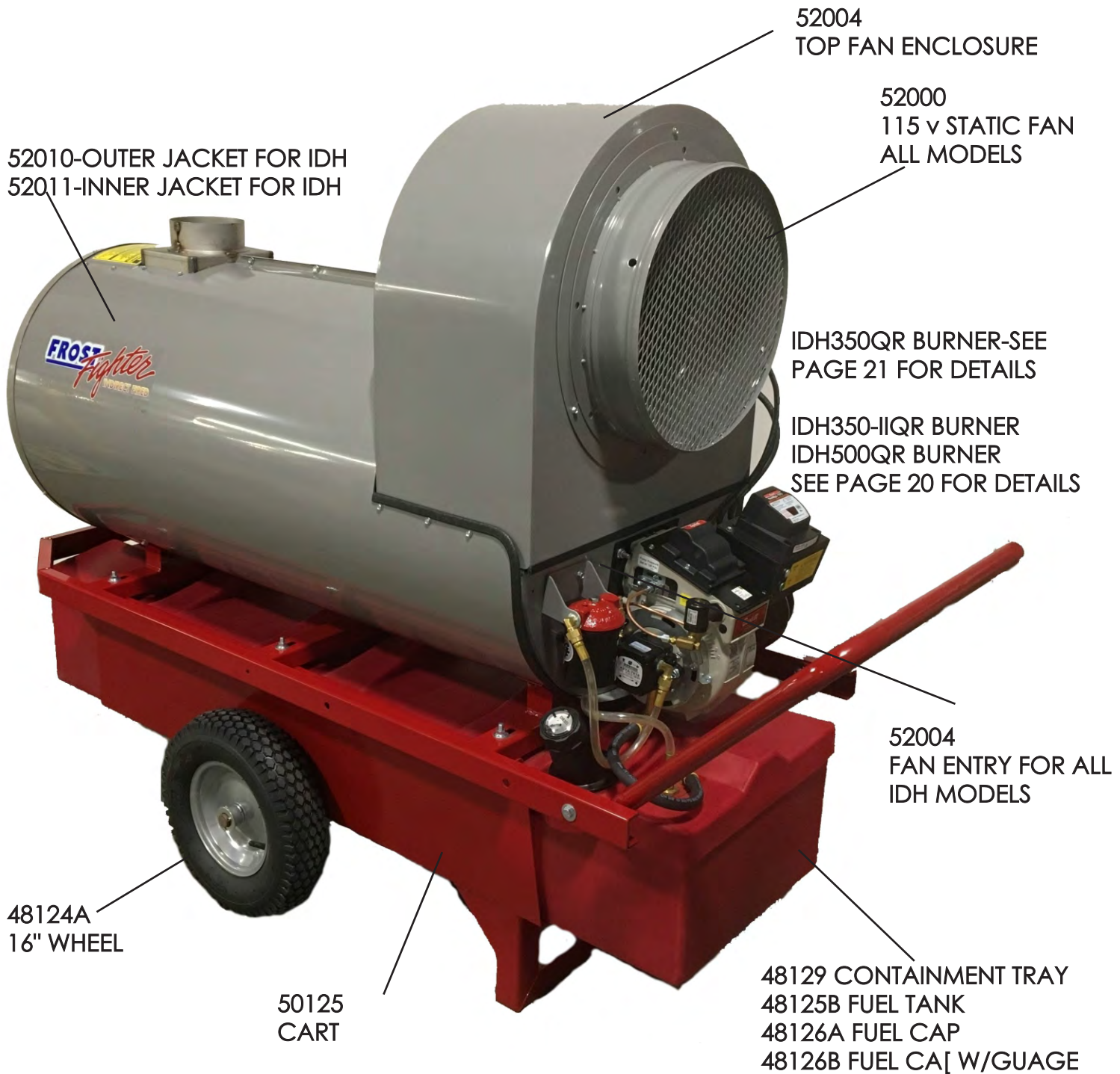
CAP RING  
2 PER ASSEMBLY  
P/N 50115 ALL IDH MODELS

RETAINER BOLT  
W/WASHER  
24 PER UNIT  
P/N 48116 ALL UNITS



**\*COMBUSTION CHAMBER ASSEMBLY &  
INNER SHELL ALL ONE PIECE**

## IDH350QR AND IDH500QR BACK VIEW



## FRONT OF IDH500QR & IDH350QR HEATERS

UNDER COVER  
100  $\mu$ F  
CAPACITOR

UNDER COVER  
48111B ADJUSTABLE FAN SWITCH  
48110A HIGH LIMIT SWITCH

48119A OUTER COVER PANEL  
48119B INNER COVER PANEL

