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SERVICE AND INSTALLATION MANUAL

MODELS HDO(I) OIL

Oil-Fired duct furnace for industrial and commercial use.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Installation and service must be performed by a qualified installer, service agency or the oil supplier.

WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow safety warnings exactly could result in serious injury, death or property damage.

Be sure to read and understand the installation, operation and service instructions in this manual.

KEEP THIS MANUAL FOR CONSULTATION.

Improper installation, adjustment, alteration, service or maintenance can cause serious injury, death or property damage.

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1) CODES REGULATING INDIRECT FIRED DUCT FURNACES

IMPORTANT

This appliance is for commercial or industrial use only and that the installation shall be in accordance with the standard for the Installation of Oil Burning Equipment CSA B139, National Fire Codes, Vol. 1, NFPA 31; the National Electrical code, NFPA 70; CSA C22.1; and the requirements of the inspection authorities having jurisdiction. All internal and external electrical installations must comply with electrical diagrams of the heater. To learn more, refer to the instructions starting at the sequence of operations and setup instructions.

IMPORTANT

CLEARANCES TO COMBUSTIBLE

A minimum clearance of **24** inches between the furnace and any combustible material is required on all sides and top of the furnace. On the control side, a minimum clearance of **42** inches is necessary for access and **18** inches all around the chimney. The unit must be on a non-combustible flooring.

Allow sufficient space on both sides of the duct furnace for maintenance and allow sufficient space on the air inlet hood side to prevent snow accumulation and do not block the combustion air inlets.

CAUTION

Improper installation, modification, adjustment or maintenance can cause property damage, injury or death. Read the installation instructions, start-up and maintenance instructions before installing or servicing this equipment.

For units installed indoors, it is mandatory to provide a sufficient amount of outside air for combustion in the mechanical room. Refer to CSA-B139 installation code for further information.

Oil-fired appliances shall be connected to discharge pipes having at all times a sufficient draft to ensure proper and safe operation of the unit.

2) DUCT FURNACE INSTALLATION INSTRUCTIONS

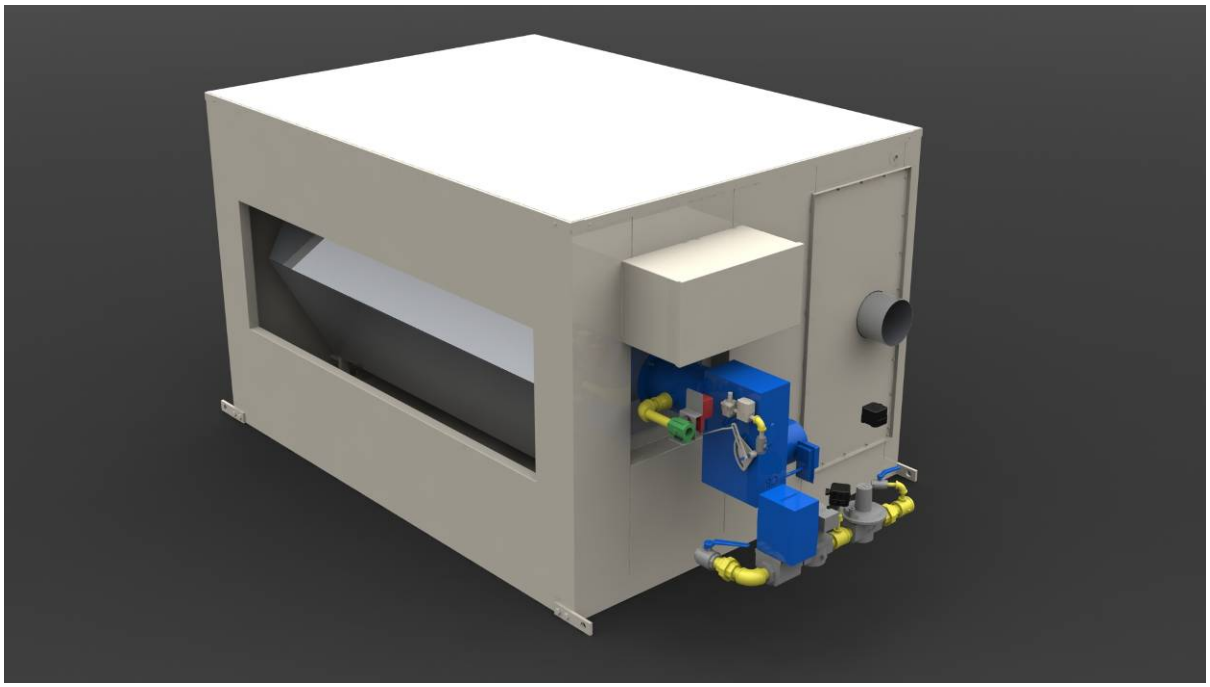
Insert the duct furnace in the unit at the desired location downstream of the fan.

During operation, the units design must assure there will be enough air going through the heat exchanger to keep the temperature rise between 70°F and 120°F and maintain a supply air temperature of less than 150°F. Note the high limit switch is factory adjusted at 160°F.

When fire dampers are used in the duct, they must be equipped with an electric switch wired to the safety control circuit of the unit in order to shut down the air heater when fire is detected in ducts. These electric switches must be wired to re-activate the safety circuit only when the fire dampers are completely opened.

In order to prevent any risk of freezing up pipe or the space, the installer must install a low temperature detector if not supplied with the unit.

Depending on unit size diameter of the flue connection vary between 6 and 12 inches. HD series combustion systems are designed to operate safely against a back pressure of ¼'' water column, with a double wall type PS chimney, either in a vertical arrangement (through the roof) or in a horizontal arrangement (through the wall), or a combination of both.



3) ELECTRICAL CONTROL SENSORS CONNECTIONS

WARNING

The sensors connections must be carried out by a qualified electrician, respecting the unit's electrical diagram and according to local codes. The sequence of operation of the electrical diagram must never be modified without consulting the manufacturer.

Make electrical connections between the duct furnace and the ventilation unit following the wiring diagram supplied with the furnace. Consult manufacturer for any modifications.

4) OIL SUPPLY CONNECTION

REFER TO BURNER MANUAL FOR OIL SUPPLY CONNECTION

5) START-UP INSTRUCTIONS

These instructions must be performed after the ventilation unit has been properly started-up and that air is blowing at the designed flow rate through the heat exchanger.

IMPORTANT

The following start-up information should only be used by a qualified technician for oil equipment installation (with qualification cards) with knowledge in electricity and ventilation.

WARNING

Smoking is not recommended during the heater start-up. Do not try to light the burner if the oil has accumulated, if the combustion chamber is filled with vapors or if it is hot.

➢ **BURNER ADJUSTMENT**

*****REFER TO BURNER MANUAL FOR INSTRUCTIONS*****

WARNING

Do not adjust burner flame only visually. Using a combustion analyzer and combustion instruments is the only recommended method to adequately adjust burner combustion.

6) HDO SERIES CONTROL SEQUENCE

(For indication purpose only)

BURNER START-UP

1. Send a call for heat command to the heating section;
2. Burner combustion air fan starts;
3. Air combustion damper opens completely to perform a complete purge of the exchanger, and returns to closed position;
4. The burner flame ignites;
5. Burner operation is proven when burner fan pressure switch and high temperature limit switch are closed;
6. The burner operates and modulates according to an external signal (0-10 volts or 4-20 ma).
7. When demand for heating is satisfied, the post purge sequence maintains the burner in operation with the combustion air fully opened in order to evacuate all remaining flue gas from heat exchanger;
8. Burner stops and is now ready for a new heat demand.

7) HEATER SHUTDOWN/RESTART

- **EXTENDED SHUTDOWN**

When the heater is not used for a long period, it is recommended to cut the oil supply and electricity.

Before replacing the heater on after a shutdown, it is recommended to make an inspection to ensure that everything is in order.

- **EMERGENCY SHUTDOWN**

When it is necessary to stop the heater in case of emergency, turn the main switch OFF and disconnect the oil supply by closing the manual valve supply to the outside of the heater.

- **RESTART AFTER A FLAME FAILURE ALARM**

Following a flame failure alert, perform the following checks:

  - **FAN (by others)**

1. Place main electrical disconnect to OFF position;
2. Check fan belts; replace or adjust if required;
3. Check filters conditions; replace if necessary;
4. Ensure that nothing obstructs the air inlet and outlet of the heater;
5. Ensure that nothing is restraining inlet or outlet dampers operation.

- **BURNER**

1. Ensure that all gas supply hand valves are opened;
2. Check status of the flame safeguard relay (for problems, refer to troubleshooting section);
3. Check pilot flame rod and spark igniter;
4. Place main electrical disconnect to ON position;
5. Press the reset button of the flame safeguard relay;
6. Ensure that the blower motor is operating;
7. Ensure that the pilot ignites properly;
8. Fix all problems and repeat the start-up procedure.

8) HEATER MAINTENANCE

Perform the following tasks at the prescribed frequency will help keep the duct furnace in good working condition.

Check list	Recommended maintenance frequency			
	Weekly	Monthly	Biannually	Annually
Ensure that no flammable material is stored near the heater	●			
Ensure that nothing obstructs the air inlets and outlet of the heater	●			
Check combustion and flame quality		●		
Check that all safety controls are operational			●	
Check the operation of the high temperature limit thermostat				●
Ensure that there is no oil leaks in piping (fittings & valves).				●
Inspect all electrical connections				●
Inspect the flame detector and igniters electrode; change if necessary				●
Clean burner fan wheel				●
Check burner installation and tighten screws and bolts if required				●

*****REFER TO OIL BURNER MANUAL FOR INSTRUCTIONS*****

9) TROUBLESHOOTING

Refer to burner manual and/or flame safeguard for alarm codes and troubleshooting.

TROUBLESHOOTING CHECK LIST	
SYMPTÔMS	**CORRECTIVE ACTION**
✓ The fan is stopped*. ✓ The burner is off. ✓ Fresh air damper is closed*.	• Turn ON main disconnect switch*. • Check line voltage. • Check secondary circuit fuse (120 volts). • Check selector position on remote control panel; turn it to BURNER position. • If ALARM light of the flame safeguard relay flashes, press the reset button. • Check adjustment of the overload relay of the fan motor; re-adjust if necessary. • Check freeze low temperature thermostat. Its contact opens approximately 300 seconds if supply air temperature remains below 42oF. To restart the heater, turn selector of the remote control panel to STOP, and then back to BURNER position*. • Refer to the manufacturer.
✓ The fan is stopped*. ✓ The burner is off. ✓ Fresh air damper is opened*.	• Ensure that fresh air damper end switch is closed*. • Refer to the manufacturer
✓ The fan is in operation*. ✓ The burner is off. ✓ The flame safeguard relay is operating normally (No flashing lights)	• Check if the auxiliary contact of the main fan motor starter works. • Check the position of the selector on the remote control panel; position it to BURNER*. • Refer to the manufacturer.
✓ Frequency noise (see alarm code on flame safeguard)	• Check for a high voltage source close to the flame safeguard relay. • Check electrical wiring between building distribution panel and the heater. • Refer to the manufacturer.
✓ Flame failure (see alarm code on flame safeguard)	• Check oil supply. • Check ignition transformer. • Check flame signal intensity. • Check if manual and electric pilot oil supply valves are opened. • Check condition of the flame rod ceramic; replace if necessary. • Refer to the manufacturer. • Check the flame safeguard amplifier; replace if necessary. • Perform a combustion test over the entire range of modulation.

*: By others, if applicable.

<table>
<tr><th colspan="3">TROUBLESHOOTING CHECK LIST (suite)</th></tr>
<tr><th>SYMPTÔMS</th><th colspan="2">CORRECTIVE ACTION</th></tr>
<tr><td rowspan="3">✓ Air pressure switch opened.
(see alarm code on flame safeguard)</td><td colspan="2">There are two devices connected in series on the flame safeguard relay.</td></tr>
<tr><td>A) <u>Burner pressure switch</u>
The burner pressure switch proved that the burner is in operation.</td><td><u>Corrective action</u>
• Check burner fan rotation.
• Check for obstruction in chimney.
• Check for obstruction at combustion air intake.
• Check sampling tubes of the pressure switch (installation and adjustment).
• Replace pressure switch if defective.
• Refer to manufacturer.</td></tr>
<tr><td>B) <u>Safety high temperature limit switch</u>
(set at 160oF)
Its contact is normally closed (N.C.) and open when air temperature exceeds 160oF downstream of the heat exchanger.</td><td><u>At start-up or when is in operation</u>
• Check temperature upstream of the heater (safety high temperature limit switch opens when air temperature exceeds 160oF)
• Check burner modulation, all controls and temperature control signal.
• Check oil pressure at burner manifold for maximum fire.
• If required, replace the temperature switch.
• Refer to manufacturer.</td></tr>
<tr><td>✓ Ground fault (frame).
(see alarm code on flame safeguard)</td><td colspan="2">• Check grounding of the heater frame and flame safeguard relay.
• Check for ground default in electrical wiring between the heater and main distribution panel.
• Refer to manufacturer.</td></tr>
<tr><td>✓ Faulty programmer.
(see alarm code on flame safeguard)</td><td colspan="2">• Replace the programmer.
• Refer to manufacturer.</td></tr>
<tr><td>✓ Faulty amplifier.
(see alarm code on flame safeguard)</td><td colspan="2">• Replace amplifier.
• Refer to manufacturer.</td></tr>
<tr><td>✓ Voltage drop.
(see alarm code on flame safeguard)</td><td colspan="2">• Check voltage at the relay while heater is in operation.
• Check relay electrical connections and installation.
• Refer to manufacturer.</td></tr>
<tr><td>✓ Ground fault.
(see alarm code on flame safeguard)</td><td colspan="2">• Check relay grounding.
• Main current and neutral wires inverted.
• Refer to manufacturer.</td></tr>
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10) START-UP REPORT

Company: _____ Project: _____

Technician: _____ Project manager: _____

Contractor: _____ Address : _____

Manufacturer Infos

Model number: _____ Serial number: _____

Burner model : _____ # Serial Burner : _____

Inspection

Oil leak: ☐ Air duct installed: ☐

No wire located upstream of the burner: ☐ Remote panel installed: ☐

Note : _____

Start-up

Flame signal : _____ VDC

Oil pressure : _____ _____

LOW FIRE HIGH FIRE

|_____ INLET OIL PRESSURE _____|

Adjustments

Inlet duct thermostat: _____ºF Pre-purge delay: _____sec.

Low limit stat (freezestat): _____ºF Delay when starting on low fire: _____sec.

High limit thermostat: _____ºF Low limit delay: _____sec.

Start-up completed: ☐ If no, why? (or others):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Combustion Analysis

Ambient temperature : _____ °F

Signal	% CO2	% Oxygen	Temp. Gas °F	% Efficiency	% air excess	PPM CO	Smoke test
0%							
20%							
40%							
60%							
80%							
100%							

Note :

Signature : _____ Date : _____