

# INSTALLATION, OPERATION & MAINTENANCE MANUAL

FOR  
CATCO CATALYTIC HEATERS 90-XXXX-50X & ACSHX-X-X



## CATCO

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### WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

CATCO catalytic heaters are manufactured to exacting standards to produce safe, flameless heat. Every heater is factory tested to ensure proper performance; each unit is brought up to operating temperature and tested for leaks and consistent heat output. Proper installation and maintenance will guarantee years of trouble-free service. All heaters are warranted against defects in material or workmanship for a period of one year from the date of purchase. All heaters are for indoor installation only and not for use in residential dwellings.

## **INSTALLATION**

Installation of this heater shall conform with local, state, and national regulations and building codes. In the absence of local codes, installation should comply with the National Fuel Gas Code (ANSI Z223.1/NFPA 54) or the Natural Gas and Propane Installation Code (CSA B149.1). In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must be posted either adjacent to the heater thermostat or in another conspicuous location. Appliances are certified for altitudes of 2000 to 4500 ft (610–1370 m) or 0 to 4500 ft (0–1370 m) in Canada. High altitude ratings may be obtained by a change in orifice size in accordance with Standard for Gas-Fired Appliances for Use at High Altitudes, CSA 2.17. Contact your local representative for complete information about high altitude ratings.

**WARNING:** Overhead heaters should be installed so that the minimum clearances marked on the heater will be maintained from vehicles parked below the heater.

### **Public Garages**

Installation in public garages shall conform with the Standard for Parking Structures, NFPA 88A, or the Standard for Repair Garages, NFPA 88B, or the Canadian Natural Gas and Propane Installation Code, CSA B149.1. Heating equipment shall conform to NFPA 90A, NFPA 31, NFPA 54/ANSO Z223.1, NFPA 211, and uniform mechanical code as applicable.

### **Aircraft Hangars**

Installation in aircraft hangars shall conform with the Standard for Aircraft Hangars, NFPA 409. When installed in aircraft storage and servicing areas, heaters shall be installed at least 3 m (10 ft) above the upper surface of wings or the upper surface of the engine enclosures of the highest aircraft that can be housed in the hangar. The measurement shall be made from the wing or engine enclosure, whichever is higher from the floor to the bottom of the heater. In shops, offices, and other sections of aircraft hangars communicating with aircraft storage or servicing areas, the bottom of the heaters shall be installed not less than 2.4 m (8 ft) above the floor. Suspended or elevated heaters shall be located in spaces of aircraft hangars so that they shall not be subject to injury by aircraft, cranes, moveable scaffolding, or other objects. Provision shall be made to ensure accessibility to suspended heaters for recurrent maintenance purposes.

### **Mounting**

For best results, heaters should be mounted with the face in a vertical position. If the face of the heater is to be tilted away from the vertical the angle should not exceed 45°. If it is absolutely necessary to mount the heater in a horizontal position, an angle of at least 10° should be maintained in order to ensure that combustion by-products do not accumulate on the face of the heater and that a sufficient supply of air reaches the catalyst bed. It is essential that heaters be protected from rain, snow and wind by mounting them in a building or enclosure of some type.

## Ventilation

Catalytic combustion occurs when natural gas or propane reacts with oxygen over a catalyst bed to produce water vapor, carbon dioxide and infrared energy. Ventilation must be provided to allow adequate supply of oxygen for the reaction. For every 1.0 ft<sup>2</sup> (0.093 m<sup>2</sup>) of heater surface, approximately 60 ft<sup>3</sup>/hr (1.7 m<sup>3</sup>/hr) of air supply is required. For example, a 12 x 60 heater (30,000 Btu/hr) would require 300 ft<sup>3</sup>/hr (8.49 m<sup>3</sup>/hr) of air to ensure proper operation of the heater.

## Clearances

Minimum Clearance from Combustible Materials (in(mm))						
Models	Up to 12,000 BTU/hr (3.52 kW)			Greater than 12,000 BTU/hr (3.52 kW)		
Burner Angle	Vertical	0-45° Up	0-45° Down	Vertical	0-45° Up	0-45° Down
Radiant Surface	24 (610)	24 (610)	24 (610)	42 (1067)	42 (1067)	42 (1067)
Top	18 (458)	18 (458)	18 (458)	18 (458)	32 (813)	18 (458)
Sides	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)	12 (305)
Bottom	6 (153)	6 (153)	6 (153)	12 (305)	12 (305)	24 (610)

**NOTE:** The stated clearance to combustibles represents a surface temperature of 90°F (50 °C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, triply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.

## Electrical

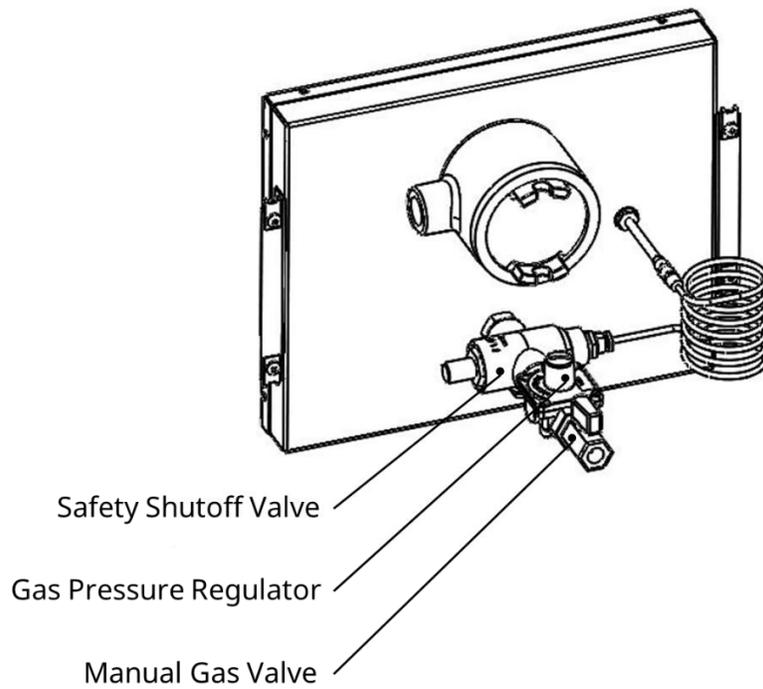
The starting voltage and amperage of a heater can be found on the rating plate. A heater's electrical starting system consists of either one or two 12-, 120-, or 240-volt heating elements. Heaters with an input rating of 6000 BTU/hr and below use a single element with two terminals while those with an input rating above 6000 BTU/hr use two elements with four terminals. 12- and 120-volt heaters have two bus bars connecting the two internal elements in parallel. 24- and 240-volt heaters have one bus bar connecting the two internal elements in series.

Electrical connections to the different configurations are shown in Figure 2. If an external electrical source is utilized, the heater, when installed, must be electrically grounded in accordance with the National Electrical Code (ANSI/NFPA 70 or current Canadian Electrical Code (CSA C22.1)).

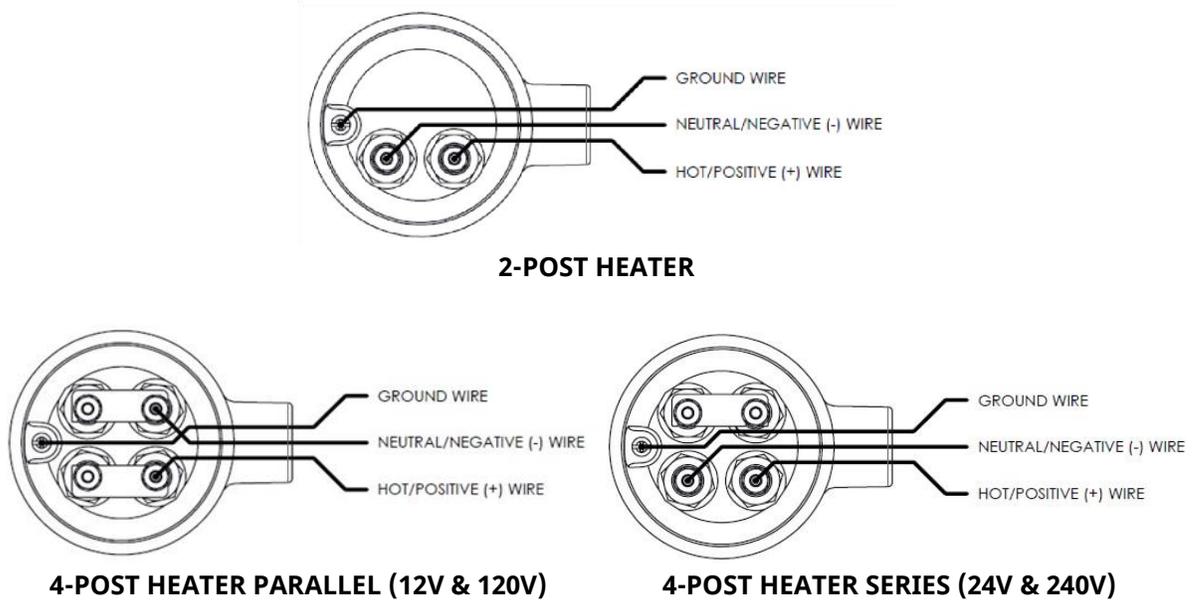
## Piping

The heater expands and contracts during operation. Follow the installation instructions to ensure allowances are made for this movement. The gas supply should be connected to the typical piping configuration shown in Figure 1. A fuel gas filter is strongly recommended when using natural gas fuel to prevent liquids and other foreign matter from clogging the regulators or passing into the heater. A tee with a 1/8" NPT plugged tapping, accessible for test gauge connection, should be installed immediately upstream of the gas supply connection to the heater.

**Figure 1. Piping Configuration**



**Figure 2. Electrical Connections**



## Fuels

Fuel	Standard Input Pressure	Maximum Input Pressure	Minimum Input Pressure
Natural Gas	4.5" w.c.	13" w.c.	5.5" w.c.
Propane	11" w.c.	13" w.c.	12" w.c.

**NOTE:** Catalytic heaters are constructed with specific orifices to allow a specific amount of gas to flow to the catalyst pad and be consumed. Changing the orifice in a heater or enlarging the existing one will **NOT** increase the amount of heat output and may result in a hazardous gas leak. Any modification of the heater may result in a hazard to personnel or property and will void any warranty.

## OPERATION

### STARTING INSTRUCTIONS

1. Install this unit in accordance with the manual and verify the gas supply is turned off.
2. Ensure the electrical supply matches the voltage specified by this label and turn on the electrical supply  
**NOTE:** If jumper cables are used, connect to heater first to avoid hazards from sparking.
3. Wait 10-15 minutes to allow the catalytic bed to preheat.
4. Turn on the gas supply and depress the button on the safety valve then release. The button will return to the extended position, but there will be a significant reduction in spring tension.
5. Continue electrical power until the catalytic reaction is fully established (typically 5-10 minutes), indicated by a rapid rise in face temperature and the emission of hot exhaust gases.
6. Once the reaction is established, turn off the electrical supply. A 5-minute complete shutoff period is required before appliance is relighted.

**NOTE:** If jumper cables are used and removed, disconnect at power source first.

## MAINTENANCE

CATCO catalytic heaters contain no moving parts and maintenance is minimal. The face of the heater should be protected from water and other contaminants so the catalytic pad is not contacted. If an area is being cleaned with high pressure water spray or air pressure, care must be taken to protect any heaters in the area, as the catalyst pad may be damaged or destroyed. When the heater is not in use, it should be stored in a clean, dry area. Heaters should be wrapped in protective material, such as plastic, when not in service to protect them from excessive contaminants and rodent or insect damage.

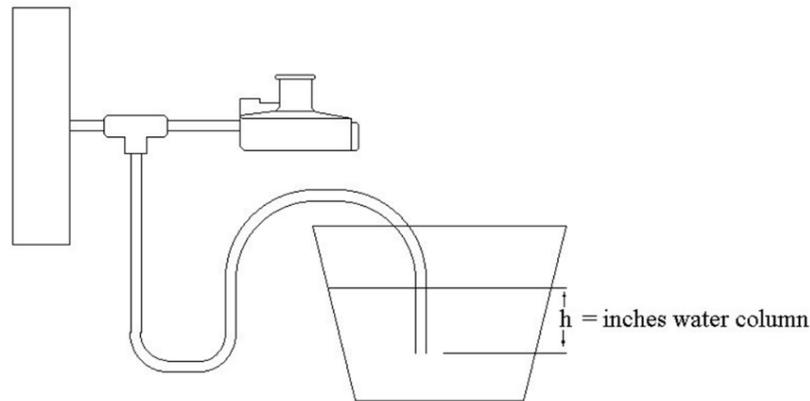
## TROUBLESHOOTING

Once catalytic combustion has begun, the heater will be in normal operation. The catalyst material is not consumed or destroyed by the catalytic reaction, and the reaction will continue as long as the heater is provided with a clean fuel supply and adequate combustion air. If a heater encounters issues during startup or operation, the following checks are recommended:

1. Check the electrical wiring and connections. Connections should be tight and the wiring should be of sufficient capacity to carry the amperage required to start the heater. If a battery is used as the power supply, it should be fully charged.

2. Check the gas supply pressure downstream of the low-pressure regulator by tapping into the pressure tee. Pressure should be 4.5" of water column for natural gas heaters and 11" of water column for heaters fueled by LPG. If a manometer is not available, a simple field expedient can be used as shown in Figure 3.

**Figure 3. Field Test Setup**



1. Submerge hose in water until bubbles cease.
  2. The depth of the hose indicates output pressure.
3. Check the orifice for obstructions.
  4. Check for saturation of the catalyst pad. If it is saturated with water, gas may not be able to reach the catalyst. One evidence of water saturation is rust colored discoloration along the edges of the heater. If the heater is saturated with water, it can often be dried out in a conventional oven by placing it face up at 250-275 degrees for 1-2 hours. Small amounts oil or other hydrocarbons normally will not harm the catalyst; however, if the pad is saturated with oil, the heater will have to be remanufactured or replaced.
  5. Check the thermocouple output. It can be tested by unscrewing its electrical connection from the safety valve and attaching a millivolt tester to the end. After 20 minutes of preheating, the thermocouple should generate 10-15 millivolts.
  6. Check the electrical heating elements for continuity. A lack of continuity indicates a damaged or defective heating element and the heater will have to be replaced or returned to the factory for remanufacture.
  7. If the issue is not identified, contact your local CATCO representative for more information, or contact the factory directly.

## **REMANUFACTURING AND REPAIR SERVICES**

CATCO remanufactures all major brands of catalytic heaters. All heaters are disassembled, cleaned, and reassembled with new catalyst and components. Heaters are thoroughly tested for heat output and leaks. A standard flat price covers the cost of remanufacturing. When downtime is critical, CATCO branded heaters may be available for immediate exchange. Contact your local representative for complete information about remanufactured heaters.