CADET

CEH Industrial Unit Heater

Owner's Guide

http://www.cadetheat.com/products/garage-heaters/CEH

Benefits You Can Depend On

- Commercial grade high temperature manual reset for safety
- High mass, tubular element for longer life
- Fan delay eliminates cold draft on startup and disperses residual heat on shutdown
- Rugged die formed construction for durability
- Wire single or three phase to suit the application
- Vertical or horizontal delivery
- Your Cadet heater has been thoroughly tested and is guaranteed with a **5 year extended warranty**

CEH Models			
Line Voltage	**Model without thermostat**	**Watts**	**Amps**
240 (1)	**CEH005P**	**5000**	**20.83**

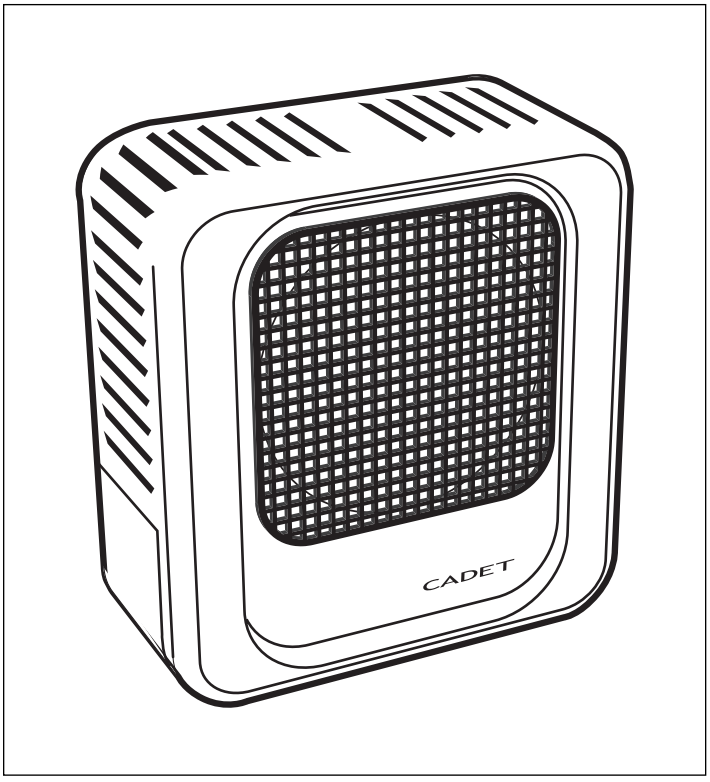
(1) 240 volt models can be used at 208 volts. Wattage equals 75% of 240v rated wattage.

Recommended for elevations under 7500 feet.

New installation requires a thermostat (sold separately): Model Numbers CEKTB1 and CEKTB2 are optional built-in thermostat kits.

New installation requires mounting hardware (sold separately): Model Numbers CEKM1 and CEKWM are optional brackets.

WARRANTY 5 YEAR



UL LISTED

TOOLS REQUIRED:
- Phillips Screwdriver
- Straight Screwdriver
- Wire Strippers
- Crescent Wrench
- Appropriate Fasteners
- Insulated Wire Connectors
- (1) Strain Relief Connector

SAVE THESE INSTRUCTIONS

IMPORTANT INSTRUCTIONS

⚠WARNING
When using electrical appliances, basic precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

1. Read all instructions before installing or using this heater.

2. **⚠WARNING**
Risk of Fire. This heater is hot when in use. Caution—High Temperature. Risk of Fire. Keep electrical cords, drapery, furnishings, and other combustibles at least 3 feet from the front of the heater and 6 inches above and on both sides.

3. **⚠WARNING**
Burn Hazard. To avoid burns, do not let bare skin touch hot surfaces. Extreme caution is necessary when any heater is used by or near children or invalids and whenever the heater is left operating and unattended.

4. **⚠WARNING ⚠**
Risk of Electrical Shock. Do not operate any heater after it malfunctions. Disconnect power at service panel and have heater inspected by a qualified electrician before reusing.

5. **⚠WARNING**
Do not use outdoors.

6. To disconnect heater, turn controls to off, and turn off power to heater circuit at main disconnect panel.

7. **⚠WARNING ⚠**
Risk of Electrical Shock. Do not insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or fire, or damage the heater.

8. **⚠WARNING**
Risk of Fire. To prevent a possible fire, do not block air intakes or exhaust in any manner.

9. **⚠WARNING**
Fire or explosion may occur. A heater has hot and arcing or sparking parts inside. Do not use it in areas where gasoline, paint, or flammable vapors or liquids are used or stored.

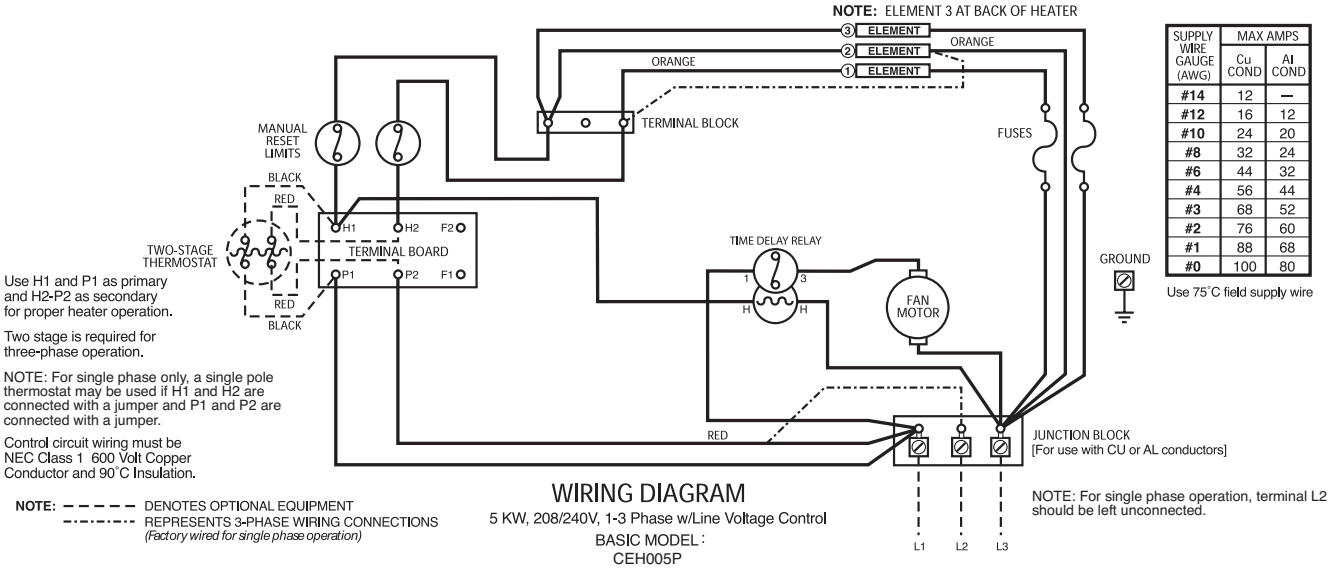
10. Use this heater only as described in this manual. Any other use not recommended by the manufacturer may cause fire, electrical shock, or injury to persons.

11. The heater must be properly installed before it is used.

12. **⚠WARNING ⚠**
Risk of Electrical Shock and Fire. Do not operate without grill.

13. Save these instructions.

Wiring Diagram



SUPPLY WIRE GAUGE (AWG)	MAX AMPS Cu COND	MAX AMPS Al COND
#14	12	—
#12	16	12
#10	24	20
#8	32	24
#6	44	32
#4	56	44
#3	68	52
#2	76	60
#1	88	68
#0	100	80

Use 75˚C field supply wire

WIRING DIAGRAM
5 KW, 208/240V, 1-3 Phase w/Line Voltage Control
BASIC MODEL :
CEH005P

SAVE THESE INSTRUCTIONS

Before you begin, you should know...

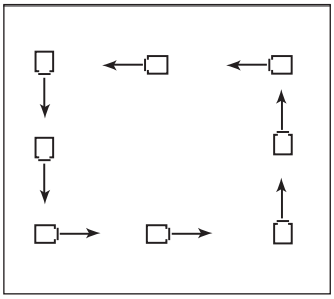


Figure 1

...where to place your CEH heater

Install the CEH unit heater vertically or horizontally. Brackets are also available for ceiling mount or wall mount applications.

...the thermostat requirements

For single-phase only, a line voltage thermostat is required for operation. For three-phase, a two-stage or modulating thermostat is required. A Cadet wall thermostat is recommended for ultimate control and comfort.

...recommendations for horizontal delivery

Heaters should be located so that the air streams of the individual units “wipe” the exposed walls of the building without blowing directly against the wall. Recommended spacing between the units is 12 feet. Locate heaters so their air streams are not subjected to interference from columns, partitions, machinery, etc. (See Figure 1).

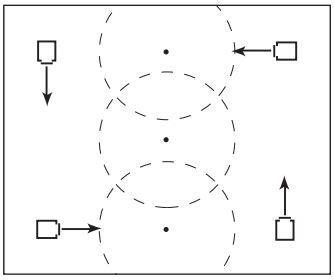


Figure 3

...recommendations for vertical delivery

In buildings with high ceilings or bays, vertical delivery unit heaters are recommended to produce comfort in central areas. They are best used when the perimeter heat loss is adequately controlled. In combination with horizontally discharged units, they aid in providing good air mixture (See Figure 3).

Vertical discharging units are mounted high above machinery, assembly lines, etc.

In an application where only vertical discharging units will be used, the air streams must overlap to blanket outside walls and provide good heat distribution (See Figure 4).

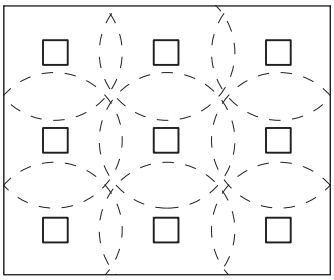


Figure 4

...some general safety tips

- The ceiling or wall on which the heater is to be mounted must be of adequate strength to support the heater. Plaster or suspended ceilings will not support this type of heater. For greater stability, we recommend the use of threaded rods.
- Do not mount the heater where volatile liquids or gases will be present or where it will be exposed to rain or mist. All combustible materials should be kept at least 3 feet away from front of the heater.
- In an area where the air temperature will be maintained at less than 68˚F, the heater should be mounted in a position that will not blow directly on people working in the area.
- A minimum clearance for each heater (both horizontal and vertical mount) is listed in Figures 2 and 5. Please follow these recommendations to avoid potential problems with the function and safety of the heater.

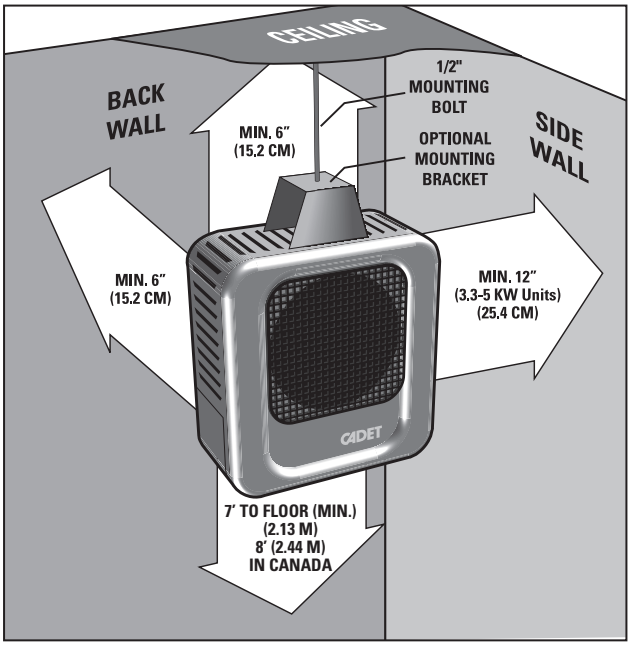


Figure 2 Horizontal mounting clearances with optional bracket (CEKM1)

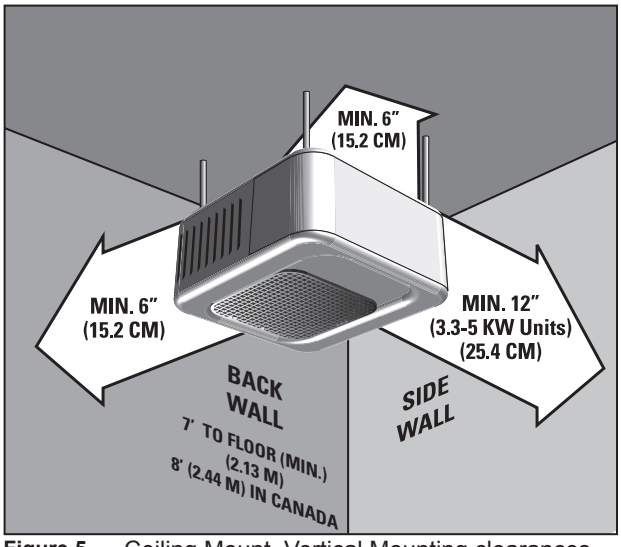


Figure 5 Ceiling Mount. Vertical Mounting clearances.

INSTALLATION INSTRUCTIONS

1. ⚠ **WARNING**
Verify that the electrical supply wires are the same voltage as the heater.
2. If replacing an existing heater, check the label of the old heater.
3. All electrical work and materials must comply with the National Electric Code (NEC), the Occupational Safety and Health Act (OSHA), and all state and local codes.
4. If you need to install a new circuit or need additional wiring information, consult a qualified electrician.
5. Copper conductors are preferred. If aluminum conductors are used, follow appropriate precautions and instructions detailed on Page 5.
6. ⚠ **WARNING** ⚠
Risk of Electrical Shock. DO NOT install the heater directly above bathtub or sink. DO NOT install in shower stall area (Manufacturer recommends a minimum 2 foot clearance).
7. ⚠ **WARNING**
Risk of Fire. DO NOT install the heater in a floor, in the ceiling, below a towel bar, behind a door, or anywhere the air discharge may be blocked in any manner.
8. ⚠ **WARNING**
Fire or Explosion May Occur. A heater has hot and arcing or sparking parts inside. Do not use it in areas where gasoline, paint, or flammable vapors or liquids are used or stored.
9. ⚠ **WARNING** ⚠
Risk of Electrical Shock. Connect grounding lead to grounding lug provided. Keep all foreign objects out of heater.
10. ⚠ **WARNING**
Risk of Fire. This heater is hot when in use. Caution—High Temperature. Risk of Fire. Keep electrical cords, drapery, furnishings, and other combustibles at least 3 feet from the front of the heater and 6 inches above and on both sides.

Mounting the CEH Unit Heater

CAUTION: THE CEILING OR WALL MOUNTING STRUCTURE AND ANCHORING PROVISIONS MUST BE OF SUFFICIENT STRENGTH TO SUPPORT THE COMBINED WEIGHT OF THE HEATER AND MOUNTING BRACKETS.

Horizontal Discharge *see Figure 2 for minimum clearances*

OPTION 1 **Mounting with rod from ceiling or superstructure (Figure 6):**

a. Remove the four factory installed bolts from the top of the unit and screw them into the threaded holes in the back.

b. Install four 5/16-18 threaded rods in holes and secure in place using lock (jam) nuts.

c. Attach the four mounting rods to the ceiling or overhead structure and anchor securely.

OPTION 2 **Mounting with optional bolt-on ceiling bracket CEKM1 (Figure 2):**

a. Bolt mounting bracket on top of unit using the four factory installed bolts.

b. Suspend the unit from ceiling or overhead structure using a 1/2 inch threaded rod or bolt, allowing a minimum 6 inches clearance from the ceiling. Using lock (jam) nut, anchor securely.

OPTION 3 **Mounting with optional wall hanger arm CEKWM and ceiling bracket CEKM1 (Fig. 13):**

See Parts List items #8 and #9.

a. Bolt mounting bracket on top of unit using four factory installed bolts.

b. Attach the wall hanger arm to wall using four 3/8 inch bolts or masonry fasteners.

c. Suspend the unit from hanger arm using 1/2 inch bolt. Place the rubber washer provided between the mounting brackets.

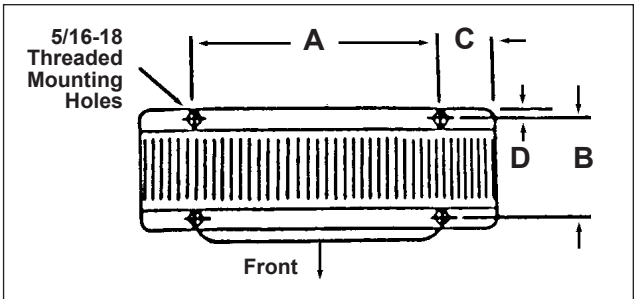


Figure 6

MOUNTING ROD DIMENSIONS					
UNIT KW	ROD THREAD	A	B	C	D
5.0	5/16-18	6" (15.2 cm)	6.75"	4.04"	.75"

Horizontal Discharge Rod Spacing

Vertical Discharge *see Figure 5 for minimum clearances*

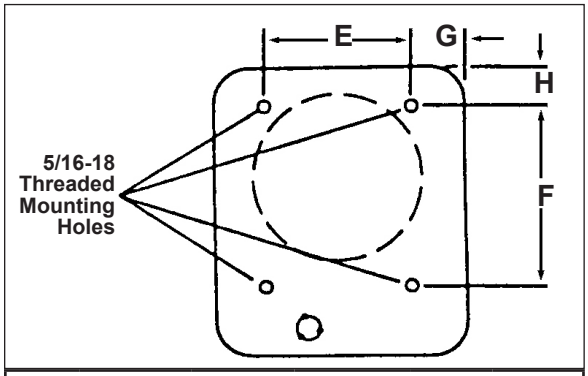
STEP 1

Install four 5/16-18 threaded rods into the threaded holes in the back of the heater and secure in place using lock (jam) nuts (Figure 7).

STEP 2

Attach the four mounting rods to ceiling or overhead structure and anchor securely.

NOTE: When mounting for vertical discharge, position unit so that access door opens away from nearest wall. This permits maximum access to wiring compartment (Figures 2 and 5).



MOUNTING ROD DIMENSIONS					
UNIT KW	ROD THREAD	E	F	G	H
5.0	5/16-18	6" (15.2 cm)	9.63" (24.5 cm)	4.04" (10.3 cm)	2.10" (5.3 cm)

Vertical Discharge Rod Spacing **Figure 7**

MAXIMUM MOUNTING HEIGHT TO BOTTOM OF UNIT		
MODEL	HORIZONTAL DISCHARGE	VERTICAL DISCHARGE
CEH005P	9'	10'

Figure 8

WIRING INSTRUCTIONS

CAUTION: TO AVOID ELECTRICAL SHOCK, BE SURE ELECTRICITY IS TURNED OFF AT ELECTRICAL PANEL BOARD BEFORE WIRING. Connect grounding lead to grounding lug provided. All electrical work and materials must comply with the National Electric Code (NEC), the Occupational Safety and Health Act (OSHA), and all state and local codes.

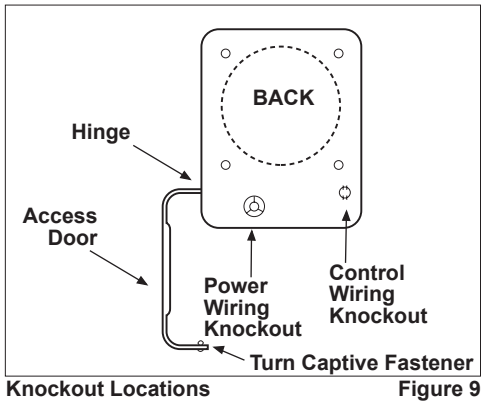
NOTE: Connect heater only to a branch circuit with the voltage and frequency specified on the nameplate.

CAUTION – READ THESE INSTRUCTIONS CAREFULLY WHEN USING ALUMINUM WIRING
1. Carefully strip insulation from aluminum conductors and coat ends of conductors with suitable corrosion inhibitor ("Pentrox A" or equivalent).
2. Wire brush aluminum surface, removing corrosion; re-coat with corrosion inhibitor.
3. Connect aluminum wiring and tighten connection securely. CAUTION: Do not exceed pressure needed for making a typical copper connection.
4. Coat entire connection with inhibitor.
5. All connections using aluminum conductors should be periodically re-checked for tightness.
6. NOTE: DO NOT JOIN ALUMINUM CONDUCTORS DIRECTLY TO COPPER.

DUAL RATED 240/208 VOLT MODELS: All 240 volt models may be operated at 208 volts with a corresponding reduction in output.

Branch Circuit Connections (Power):

1. Wiring compartment access door is hinged. To open, turn single screw on the side until the door swings away from the heater (See Figure 9). Do not try to remove screw.
2. A knockout is provided in the back of the unit for field wiring (See Figure 9). This is a multiple diameter knockout. Use the diameter that fits the required conduit size.
3. A grounding lug is provided near the junction block for field wiring. The grounding lug should be connected before any other connections.
4. The junction block is equipped with box terminals sized to accept the correct power supply wire. Wire rated at 600 volts and 75˚C is satisfactory for branch circuit connections. Either copper or aluminum conductors may be used. NOTE: the center box terminal on the three pole junction block is used only for 3-phase operation.
5. Each heater has a wiring diagram on the inside of the access door. Consult this diagram before making any field connections.



Knockout Locations — Figure 9

3-Phase Connections

Single or 3-phase power connections may be used on 240/208 volt, 5 KW models. These units come factory wired for single-phase power but may be wired for 3-phase power by reconnecting two wires. This is done as follows:

Models with Line Voltage Control (See Figures 10 and 11):

a. Disconnect the orange wire from the junction block terminal and connect it to the orange wire on the small terminal block and,

b. Disconnect the red wire from the junction block and connect it to the terminal in the center of the block.

NOTE: Supply wires must feed direct from breaker to junction block. Thermostat wires connect to terminal board. See wiring diagram.

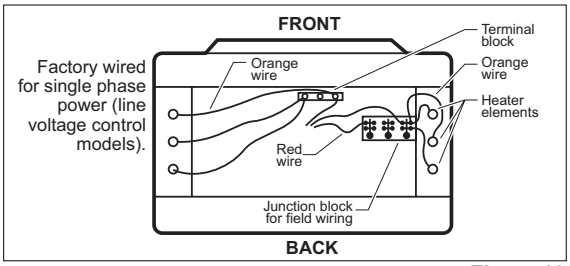


Figure 10

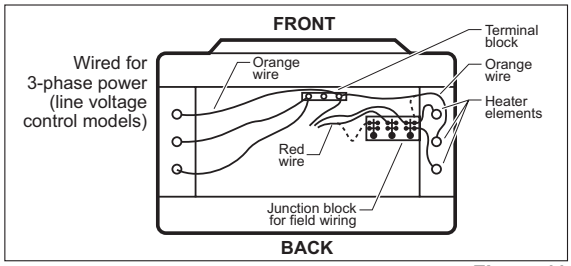


Figure 11

Control Voltage Wiring

1. A knockout is also provided in the back of the unit for control wiring. This knockout is sized for 1/2" conduit (See Figure 12).
2. Thermostat wire shall be as follows:
Line voltage control: Use NEC Class 1, 600V, 90˚C, AWG #10 wire with copper conductor or same gauge wire as supply line.
3. Install wall thermostats in accordance with the installation instructions supplied with the thermostat.

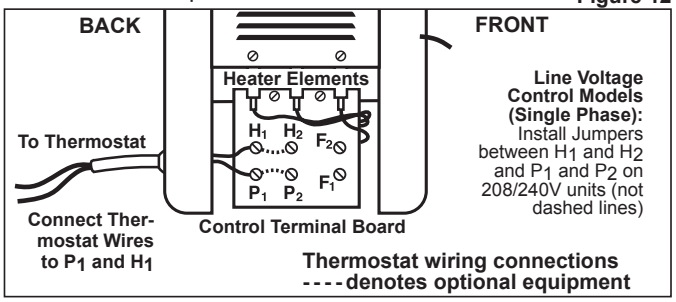
NOTE: Do not locate thermostat in an area exposed to unusual temperature conditions or poor air circulation.

NOTE: Line voltage control model of 5KW rating that is 208 and 240 volt, wired for 3-phase operation, should not be used with a wall thermostat.

This model comes factory wired for single phase. When this model is converted in the field to 3-phase, control hookup should be provided by a CEK-TB2 (built-in thermostat). A 2-stage or modulating wall thermostat can be used if hooked up correctly and according to wiring diagram.

4. Connect the thermostat wires to terminals H1 and P1 as shown in Figure 12. On 240 volt, single-phase model with line voltage control, install jumpers as shown in Figure 12.

Figure 12



OPERATING INSTRUCTIONS

⚠**WARNING** Risk of Electrical Shock and Fire.
The heater must be properly installed before it is used.
1. Do not operate without grill.
2. Keep electrical cords, drapery, furnishings and other combustibles at least 3 feet away from the front of the heater and 6 inches away from the sides.
3. Do not tamper with the over temperature limit control.
4. If the heater over temperature limits trip more than once per day, the heater must be replaced.
5. Clean heater at least every six months.
6. After allowing the heater to cool, turn power off at circuit breaker panel before removing grill.
7. Using a compressor, blow air through the outer cabinet louvers and finned element areas. (Do not touch sharp surfaces on elements). While holding fan blade (to avoid damage or bending) carefully blow inside the fan motor area.
8. Install the grill before turning on power.

⚠**WARNING:** Any other service not detailed in this Owner's Guide should be performed by an authorized service representative.

How to Operate Your Heater
Turn your built-in or wall thermostat to the desired setting. The heater will run for approximately 20 seconds before the fan comes on. The heater will then run until the thermostat setting is reached. Fan will continue to run with elements shut off for approximately 70 seconds and then will shut off. This cycle will continue as needed based on thermostat setting. Do not use breaker panel or fuse box to control heater. Be sure power to heater is constant all the time.

About the Manual Reset Temperature Limit Controls
Two independent manual reset thermal limits are factory installed on all models. The limits are located on the front of the heater. The manual reset limits will not reset until the heater has cooled down and the buttons are pushed.

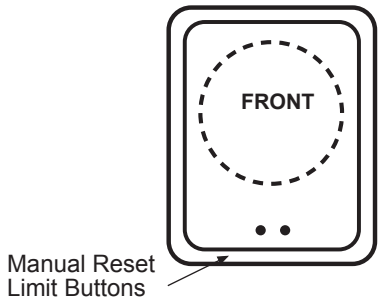
Resetting the Manual Reset Limit Controls

Resetting the Manual Reset Temperature Limit Controls

If one or both of the manual reset limit controls has opened a heater circuit due to excessive operating temperatures, the heater will not work until both of the manual reset limit buttons are pressed.

The manual reset limit buttons are located on the front of your heater.

After allowing the unit to cool for at least 10 minutes and resolving the problem causing the limit or limits to trip (typically the heater is blocked or needs cleaning); use a narrow object such as a ball-point pen to access the manual reset limit buttons. Press each button independently, and FIRMLY, and be sure to listen and feel for a click, indicating it has been reset. If only one of the manual reset limit controls has tripped, only one of the manual reset limit buttons will click.



Warranty

For more effective and safer operation and to prolong the life of the heater, read the Owner's Guide and follow the maintenance instructions. Failure to properly maintain the heater will void any warranty and may cause the heater to function improperly. Warranties are non transferable and apply to original consumer only. Warranty terms are set out below.

LIMITED FIVE-YEAR WARRANTY: Cadet will repair or replace any Industrial Unit Heater (CEH) found to be defective within five years after the date of purchase.

These warranties do not apply:
1. Damage occurs to the product through improper installation or incorrect supply voltage;
2. Damage occurs to the product through improper maintenance, misuse, abuse, accident, or alteration;
3. The product is serviced by anyone other than Cadet;
4. If the date of manufacture of the product cannot be determined;
5. If the product is damaged during shipping through no fault of Cadet.
6. CADET'S WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT AS SET OUT HEREIN. CADET SHALL NOT BE LIABLE FOR DAMAGES SUCH AS PROPERTY DAMAGE OR FOR CONSEQUENTIAL DAMAGES AND/OR INCIDENTAL EXPENSES RESULTING FROM BREACH OF THESE WRITTEN WARRANTIES OR ANY EXPRESS OR IMPLIED WARRANTY.
7. IN THE EVENT CADET ELECTS TO REPLACE ANY PART OF YOUR CADET PRODUCT, THE REPLACEMENT PARTS ARE SUBJECT TO THE SAME WARRANTIES AS THE PRODUCT. THE INSTALLATION OF REPLACEMENT PARTS DOES NOT MODIFY OR EXTEND THE UNDERLYING WARRANTIES. REPLACEMENT OR REPAIR OF ANY CADET PRODUCT OR PART DOES NOT CREATE ANY NEW WARRANTIES.
8. These warranties give you specific legal rights, and you may also have other rights which vary from state to state. Cadet neither assumes, nor authorizes anyone to assume for it, any other obligation or liability in connection with its products other than as set out herein.

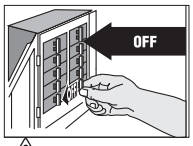
If you believe your Cadet product is defective, please contact Cadet Manufacturing Co. at 360-693-2505, during the warranty period, for instructions on how to have the repair or replacement processed. Warranty claims made after the warranty period has expired will be denied. Products returned without authorization will be refused.

Parts and Service
Visit http://www.cadetheat.com/parts_service.php for information on where to obtain parts and service.

Reduce-Reuse-Recycle
This product is made primarily of recyclable materials. You can reduce your carbon footprint by recycling this product at the end of its useful life. Contact your local recycling support center for further recycling instructions.

MAINTAINING YOUR HEATER

Maintenance As Needed, or every six months minimum.



⚠ **WARNING!** Before removing grill, turn the electrical power off at the electrical panel board (circuit breaker or fuse box). Lock or tag the panel board door to prevent someone from accidentally turning the power on while you are working on the heater. Failure to do so could result in serious electrical shock, burns, or possible death.

⚠ **WARNING:** Any other service not detailed in this Owner's Guide should be performed by an authorized service representative.

1. It is important that you verify power has been turned off and no power is going to the heater before proceeding. Circuit breakers are often not marked correctly and turning the wrong breaker off could mean electricity is flowing to the heater, even if the heater does not appear to be working. If you are uncomfortable working with electrical appliances, unable to follow these guidelines, or do not have the necessary equipment, consult a qualified electrician.
2. Once you verify the power has been turned off correctly, proceed to the next step.
3. Remove front diffuser grill or 3 of the center louvers in front of fan area.
4. Using a compressor, blow air through the outer cabinet louvers and finned element areas. (Do not touch sharp surfaces on elements). While holding fan blade (to avoid damage or bending) carefully blow inside the fan motor area.
5. Carefully wipe off the fan blade without damaging or bending it.
6. Reinstall front diffuser grill or 3 of the center louvers.
7. Turn thermostat to desired setting.
8. Turn power back on at the electrical panel board.

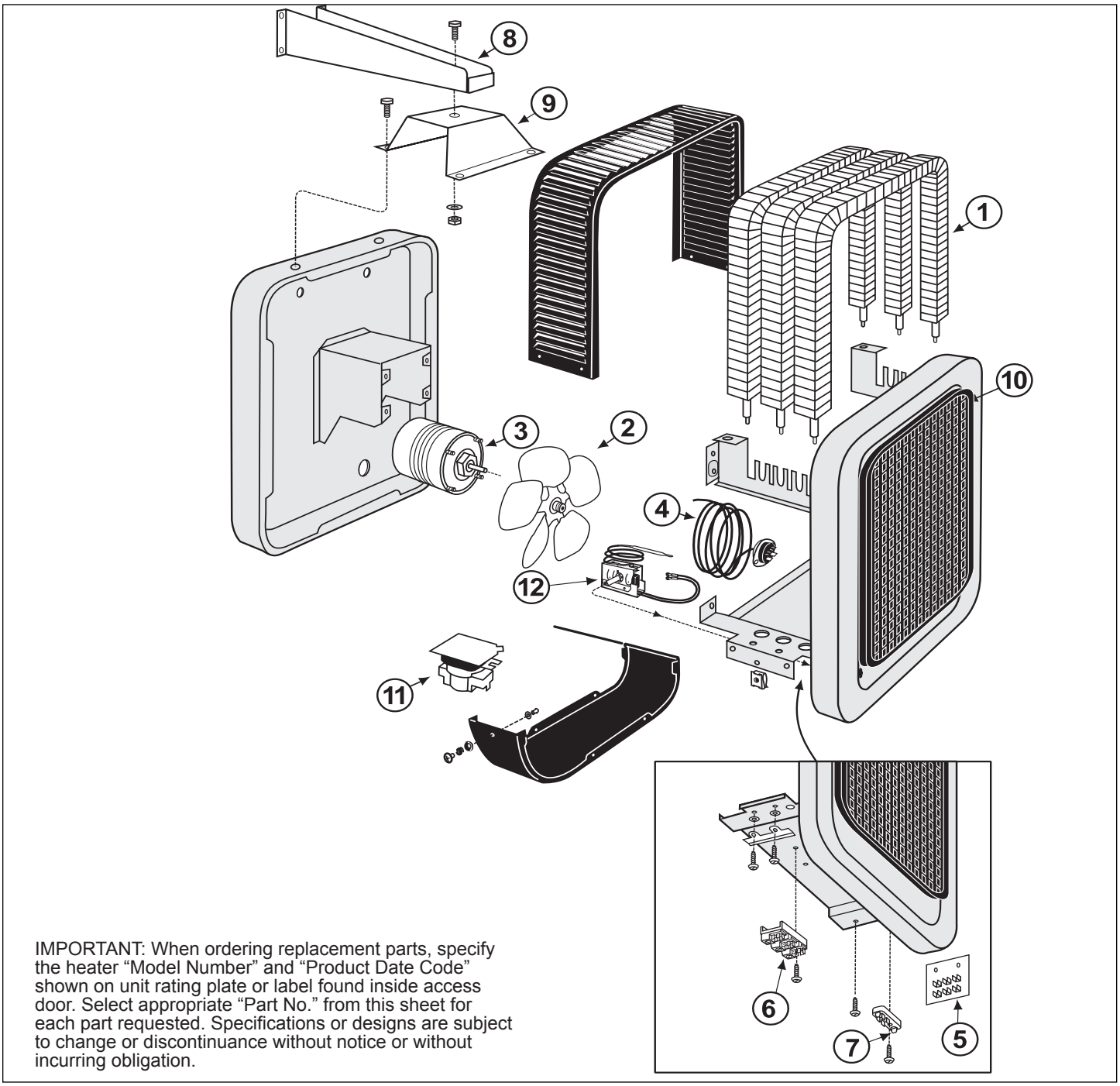
Troubleshooting Chart

***CONSULT LOCAL ELECTRICAL CODES TO DETERMINE WHAT WORK MUST BE PERFORMED BY QUALIFIED ELECTRICAL SERVICE PERSONNEL.**

Symptom	Problem	Solution
Heater does not operate.	1. Voltage not correct for application.* 2. In line thermostat used. 3. Heater is or has been blocked. 4. Thermostat set too low. 5. Circuit breaker is off. 6. Defective manual reset limit control(s).	1. Check voltage with voltmeter and/or consult an electrician. 2. Thermostat wires connect at terminal board; supply wires connect at junction block (see wiring diagram). 3. Remove obstruction. Push both manual reset limit buttons in front (See "Operating" section for instructions). 4. Turn knob past sound of click. 5. Turn circuit breaker on. 6. Replace manual reset limit control(s).
Element heats, fan does not operate.	1. Defective time delay relay. 2. Bad motor or wire connection. 3. Fan hitting or rubbing.	1. Replace the time delay relay. 2. Replace motor and/or check wire connection. 3. Adjust blade as needed.
Heater fan operates, but does not discharge warm air.	1. Manual reset limit(s) tripped. 2. Defective heater elements.* 3. Wire loose from elements. 4. Temperature rise on heater is 40°.	1. Allow heater to cool, then push both manual reset limit buttons in front (See "Operating" section for instructions). 2. Check with ohmmeter and replace if needed. 3. Check and correct loose wire. 4. Close doors or windows. Provide additional insulation and/or heaters. Wait for room to warm up.
Heater will not shut off.	1. Heat loss from area is greater than heater capacity.* 2. Defective thermostat.	1. Close doors and windows. Provide additional insulation, or install a higher wattage heater or multiple heaters if necessary. (If your circuit is rated for more capacity.) 2. Replace thermostat.
Heater discharges smoke, or emits a burnt odor.	1. Dust, dirt and lint accumulated inside the heater. 2. Jammed fan blade. 3. Poor or loose electrical connections.	1. Clean heater. (See "Maintenance" section for instructions). 2. Remove obstruction. 3. Turn off power at circuit breaker. Inspect all supply and heater wire connections to make sure nothing is loose or poorly connected. Secure or reconnect all loose connections. Do not reset circuit breaker until all connections have been checked and repaired.
Fan blade does not turn.	1. Jammed fan blade. 2. Defective motor.* 3. Defective time delay relay.	1. Remove obstruction. 2. Replace fan motor. 3. Replace the time delay relay.
Heater continually trips the manual reset temperature limit control(s).	1. Overheating. 2. Overheating at shutdown if circuit breaker is turned off. 3. Overheating from excessive dust, dirt or lint particles. 4. Overheating due to location elevation above 7500 feet. 5. Power outages or interruptions.	1. Check all clearance requirements. 2. Discontinue use of breaker to control heater, or replace time delay relay. Push both manual reset limit buttons in front (See "Operating" section for instructions). 3. Clean heater. (See "Maintenance" section for instructions). 4. Heater is recommended only for elevations under 7500 feet. 5. Power to heater needs to be constant. Push both manual reset limit buttons in front (See "Operating" section for instructions).

MAINTAINING YOUR HEATER (continued)

Parts List



IMPORTANT: When ordering replacement parts, specify the heater “Model Number” and “Product Date Code” shown on unit rating plate or label found inside access door. Select appropriate “Part No.” from this sheet for each part requested. Specifications or designs are subject to change or discontinuance without notice or without incurring obligation.

Figure 13

Parts List

1.	402028	ELEMENT SET, CEH005P
2.	001601	FAN BLADE, CEH005P
3.	051408	FAN MOTOR, CEH005P
4.	050326	LIMIT, CEH005P
5.	052403	TERMINAL BOARD
6.	052402	JUNCTION BLOCK CEH005P
7.	052401	TERMINAL BLOCK
8.	09670	CEKWM, WALL MOUNTING ARM KIT (OPTIONAL, REQUIRES CEKM1)
9.	09660	CEKM1, HAT BRACKET (OPTIONAL)
10.	410102	AIR DIFFUSER
11.	050520	FAN DELAY RELAY - 240 VOLT
12.	09610	CEKTB1, SINGLE POLE BUILT-IN THERMOSTAT (OPTIONAL)
	09615	CEKTB2, TWO STAGE BUILT-IN THERMOSTAT (OPTIONAL)