

Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference. Installation by qualified professional technician only. Not for residential use.

Dayton® Gas Unit Heaters with Electronic Ignition

Description

Dayton gas unit heaters are factory assembled, low static pressure type propeller fan heaters designed to be suspended within the space to be heated. THESE HEATERS ARE NOT TO BE CONNECTED TO DUCTWORK. The designs are certified by CSA International as providing a minimum of 80% thermal efficiency, and approved for use in California when equipped with spark ignition. **Do not alter these units in any way.** If you have any questions after reading this manual, contact the manufacturer.

For Your Safety

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

For Your Safety

If you smell gas:

1. Open windows.
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

▲ 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.

NOTE: It is the equipment owners' responsibility to provide any scaffolding or other apparatus required to perform emergency service or annual/periodic maintenance to this equipment.

APPROVED FOR USE IN CALIFORNIA

▲ WARNING Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

Installer's Responsibility

Installer Please Note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**



Figure 1A – Propeller Unit Heater
Unpacking

Inspect shipment immediately when received to determine if any damage has occurred to the unit during shipment. After the unit has been uncrated, check for any visible damage to the unit. If any damage is found, the consignee should sign the bill of lading indicating such damage and immediately file claim for damage with the transportation company.



Dayton® Gas Unit Heaters with Electronic Ignition

Specifications

Table 1 – Standard Propeller Type Unit Heaters – Refer to Figure 1A

Unit Size	30	45	60	75	100	125	150	175	200	225	250	300	350	400
	Nat. 3E366E L.P. 3E379E	3E367E 3E380E	3E406D 3E407D	3E368E 3E381E	3E369D 3E382D	3E370D 3E383D	3E371D 3E384D	3E372D -	3E373D 3E385D	3E374D -	3E375D 3E386D	3E376D 3E387D	3E377D -	3E378D 3E388D
PERFORMANCE DATA														
Input – BTU/Hr* (kW)	30,000 (8.8)	45,000 (13.2)	60,000 (17.6)	75,000 (22.0)	100,000 (29.3)	125,000 (36.6)	150,000 (43.9)	175,000 (51.2)	200,000 (58.6)	225,000 (65.9)	250,000 (73.2)	300,000 (87.8)	350,000 (102.5)	400,000 (117.1)
Output – BTU/Hr (kW)	24,300 (7.1)	36,450 (10.7)	48,600 (14.2)	60,750 (17.8)	80,000 (23.4)	100,000 (29.3)	120,000 (35.1)	140,000 (41.0)	160,000 (46.9)	180,000 (52.7)	200,000 (58.6)	240,000 (70.3)	280,000 (82.0)	320,000 (93.7)
Thermal Efficiency (%)	81	81	81	81	80	80	80	80	80	80	80	80	80	80
Free Air Delivery – CFM (cu. m/s)	750 (0.354)	800 (0.378)	1050 (0.496)	1100 (0.519)	1480 (0.699)	1650 (0.779)	2200 (1.038)	2530 (1.194)	2640 (1.246)	2700 (1.274)	3100 (1.463)	4400 (2.077)	5000 (2.360)	5300 (2.502)
Air Temperature Rise – F Deg. (C Deg.)	30 (17)	42 (23)	42 (23)	50 (28)	50 (28)	56 (31)	50 (28)	51 (28)	56 (31)	61 (34)	60 (33)	50 (28)	52 (29)	56 (31)
Outlet Velocity – FPM (m/s)	700 (3.6)	750 (3.8)	640 (3.3)	672 (3.4)	950 (4.8)	900 (4.6)	1045 (5.3)	1070 (5.4)	1000 (5.1)	950 (4.8)	980 (5.0)	1100 (5.6)	1150 (5.8)	1050 (5.3)
Full Load Amps at 115V	2.1	2.1	2.1	2.1	3.4	3.6	4.8	5.8	5.8	5.8	5.8	8.8	10.8	10.8
MOTOR DATA:														
Motor HP	1/30	1/30	1/30	1/30	1/20	1/10	1/4	1/3	1/3	1/3	1/3	2@1/4	2@1/3	2@1/3
Motor (kW)	(0.025)	(0.025)	(0.025)	(0.025)	(0.037)	(0.075)	(0.186)	(0.249)	(0.249)	(0.249)	(0.249)	(0.186)	(0.249)	(0.249)
Motor Type**	SP	SP	SP	SP	SP	SP	PSC	PSC	PSC	PSC	PSC	PSC	PSC	PSC
R.P.M.	1,050	1,050	1,050	1,050	1,050	1,050	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140
Amps @ 115V	1.3	1.3	1.3	1.3	2.6	2.8	4.0	4.5	4.5	4.5	4.5	8.0	9.0	9.0
DIMENSIONAL DATA—in. (mm) (See Figure 1B)														
"A" Height to Top of Unit	25 ³ / ₄ (654)	25 ³ / ₄ (654)	25 ³ / ₄ (654)	25 ³ / ₄ (654)	31 ¹ / ₄ (794)	31 ¹ / ₄ (794)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)	36 ¹ / ₄ (921)
"B" Width of Unit	14 (356)	14 (356)	17 ¹ / ₂ (444)	17 ¹ / ₂ (444)	17 ¹ / ₈ (454)	20 ⁵ / ₈ (524)	20 ⁵ / ₈ (524)	23 ³ / ₈ (594)	26 ¹ / ₈ (664)	28 ¹ / ₈ (733)	31 ¹ / ₈ (803)	37 ¹ / ₈ (943)	42 ⁵ / ₈ (1083)	48 ¹ / ₈ (1222)
"C" Height to Top of Hanger	27 ¹ / ₂ (698)	27 ¹ / ₂ (698)	27 ¹ / ₂ (698)	27 ¹ / ₂ (698)	33 ¹ / ₄ (845)	33 ¹ / ₄ (845)	38 ¹ / ₄ (972)	38 ¹ / ₄ (972)	38 ¹ / ₄ (972)	39 ¹ / ₈ (994)	39 ¹ / ₈ (994)	39 ¹ / ₈ (994)	39 ¹ / ₈ (994)	39 ¹ / ₈ (994)
"D" Depth to Rear of Housing	27 ³ / ₈ (702)	27 ³ / ₈ (702)	27 ³ / ₈ (702)	27 ³ / ₈ (702)	32 ¹ / ₂ (826)	32 ¹ / ₂ (826)	36 (914)	36 (914)	36 (914)	38 ¹ / ₄ (972)	38 ¹ / ₄ (972)	37 ³ / ₄ (959)	38 ¹ / ₄ (972)	38 ¹ / ₄ (972)
"E" Hanging Distance Width (to €s)	8 ⁵ / ₈ (219)	8 ⁵ / ₈ (219)	14 ¹ / ₈ (359)	14 ¹ / ₈ (359)	14 ³ / ₈ (375)	17 ¹ / ₂ (444)	17 ¹ / ₂ (444)	20 ¹ / ₂ (514)	23 (584)	25 ¹ / ₂ (648)	28 ¹ / ₄ (718)	33 ³ / ₄ (857)	39 ¹ / ₄ (997)	44 ³ / ₄ (1137)
"F" Discharge Opening Width	10 (254)	10 (254)	15 ¹ / ₂ (394)	15 ¹ / ₂ (394)	15 ³ / ₈ (391)	18 ¹ / ₈ (460)	18 ¹ / ₈ (460)	20 ⁷ / ₈ (530)	23 ⁵ / ₈ (600)	26 ¹ / ₈ (670)	29 ¹ / ₈ (740)	34 ⁵ / ₈ (879)	40 ¹ / ₈ (1019)	45 ⁵ / ₈ (1159)
"G" Depth to Unit Side Jacket	19 ³ / ₈ (492)	19 ³ / ₈ (492)	19 ³ / ₈ (492)	19 ³ / ₈ (492)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)	26 ³ / ₄ (679)
"H" Discharge Opening Height	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)	18 (457)
"L" Hanger Location	11 ⁷ / ₈ (302)	11 ⁷ / ₈ (302)	11 ¹ / ₂ (292)	11 ¹ / ₂ (292)	15 ¹ / ₈ (384)	15 ¹ / ₈ (384)	15 ¹ / ₈ (384)	15 ¹ / ₈ (384)	15 ¹ / ₈ (384)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)	16 ¹ / ₄ (413)
"S" Flue Size Dia. – in. (mm)	4 (102)	4 (102)	5 (127)	5 (127)	6 (152)	6 (152)	7 (178)	7 (178)	8 (203)	8 (203)	8 (203)	10 (254)	10 (254)	12□ (305)
Flue Type***	R,V	R,V	R,V	R,V	R,V	R,V	R,H	R,H	R,H	R,H	R,H	OV,H	OV,H	OV,H
Fan Diameter – in.	12	12	14	14	14	16	16	18	18	18	18	2@16	2@18	2@18
Gas Inlet – Natural Gas – in. LP Gas – in.	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4

NOTE: All metric units of measures are shown in parentheses.

(*) Ratings shown are for unit installations at elevations between 0 and 2,000 ft. (610 m). For unit installations in U.S.A. above 2,000 ft. (610 m), the unit input must be derated 4% for each 1,000 ft. (305 m) above sea level; refer to local codes, or in absence of local codes, refer to latest edition of National Fuel Gas Code, ANSI Standard Z223.1 (N.F.P.A. No. 54).

For installations in Canada, any reference to deration in excess of 2,000 ft. (610 m) are to be ignored. At altitudes of 2,000 to 4,500 ft. (610 to 1372 m), the unit must be derated to 90% of the normal altitude rating, and be so marked in accordance with the C.S.A. certification.

(**) SP = Shaded Pole; PSC = Permanent Split Capacitor.

(***) R = Round; OV = Oval; H = Horizontal.

(□) See special details on page 4 for 400 venting.

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Specifications (Continued)

Table 1 – Standard Propeller Type Unit Heaters – Refer to Figure 1A (Continued)

Unit Size	30	45	60	75	100	125	150	175	200	225	250	300	350	400
Nat.	3E366E	3E367E	3E406D	3E368E	3E369D	3E370D	3E371D	3E372D	3E373D	3E374D	3E375D	3E376D	3E377D	3E378D
L.P.	3E379E	3E380E	3E407D	3E381E	3E382D	3E383D	3E384D	-	3E385D	-	3E386D	3E387D	-	3E388D
Approx. Shipping Wt. – lb. (kg)	72 (33)	82 (37)	98 (44)	104 (47)	178 (81)	200 (91)	209 (95)	232 (105)	242 (110)	279 (127)	301 (137)	356 (161)	415 (188)	451 (205)
Net Unit Weight – lb. (kg)	59 (27)	69 (31)	84 (38)	90 (41)	148 (67)	168 (76)	175 (79)	196 (89)	216 (98)	239 (108)	261 (118)	304 (138)	340 (154)	376 (171)

The following terms are used throughout this manual, in addition to CSA International requirements, to bring attention to the presence of potential hazards or to important information concerning the product:

▲ DANGER *Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.*

▲ WARNING *Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.*

▲ CAUTION *Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or property damage.*

NOTE: Used to notify of special instructions on installation, operation or maintenance which are important to equipment but not related to personal injury hazards.

General Safety Information

▲ WARNING *Failure to comply with the General Safety Information may result in extensive property damage, severe personal injury or death.*

Installation must be made in accordance with local codes, or in ab-

sence of local codes, with the latest edition of ANSI Standard Z223 (N.F.P.A. No. 54), National Fuel Gas Code. All of the ANSI and NFPA Standards referred to in these installation instructions are those that were applicable at the time the design of this appliance was certified. The ANSI Standards are available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY, 10036 or www.ansi.org. The NFPA Standards are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. These unit heaters are designed for use in airplane hangars when installed in accordance with ANSI/NFPA No. 409 and in public garages when installed in accordance with NFPA No. 88A and NFPA No. 88B.

If installed in Canada, the installation must conform with local building codes, or in absence of local building codes, with CGA-B149.1 "Installation Codes for Natural Gas Burning Appliances and Equipment" or CGA-B149.2 "Installation Codes for Propane Gas Burning Appliances and Equipment". These unit heaters have been designed and certified to comply with CGA 2.6. Also see sections on installation in "Aircraft Hangars" and "Public Garages".

▲ WARNING *This product must be installed by a licensed plumber or gas fitter when installed within the Commonwealth of Massachusetts.*

▲ WARNING *Do not alter the unit heater in any way. Damage to the unit and/or severe personal injury or death may occur!*

▲ WARNING *Disconnect all power and gas supplies before installing or servicing the heater. If the power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electric shock, or severe personal injury.*

▲ CAUTION *Insure that all power sources conform to the requirements of the unit heater or damage to the unit will result!*

Follow installation instructions CAREFULLY to avoid creating unsafe conditions. All external wiring must conform to applicable current local codes, and to the latest edition of National Electric Code ANSI/NFPA No. 70; in Canada, to the Canadian Electric Code, Part 1 CSA Standard C22.1. All wiring should be done and checked by a qualified electrician, using copper wire only. All gas connections should be made and leak-tested by a suitably qualified individual, per instructions in this manual.

Dayton® Gas Unit Heaters with Electronic Ignition

General Safety Information (Continued)

Use only the fuel for which the heater is designed (see rating plate). Using LP gas in a heater that requires natural gas, or vice versa, will create the risk of gas leaks, carbon monoxide poisoning and explosion.

⚠ WARNING Do not attempt to convert the heater for use with a fuel other than the one intended. Such conversion is dangerous, as it will create the risks listed previously.

Make certain that the power source conforms to the electrical requirements of the heater.

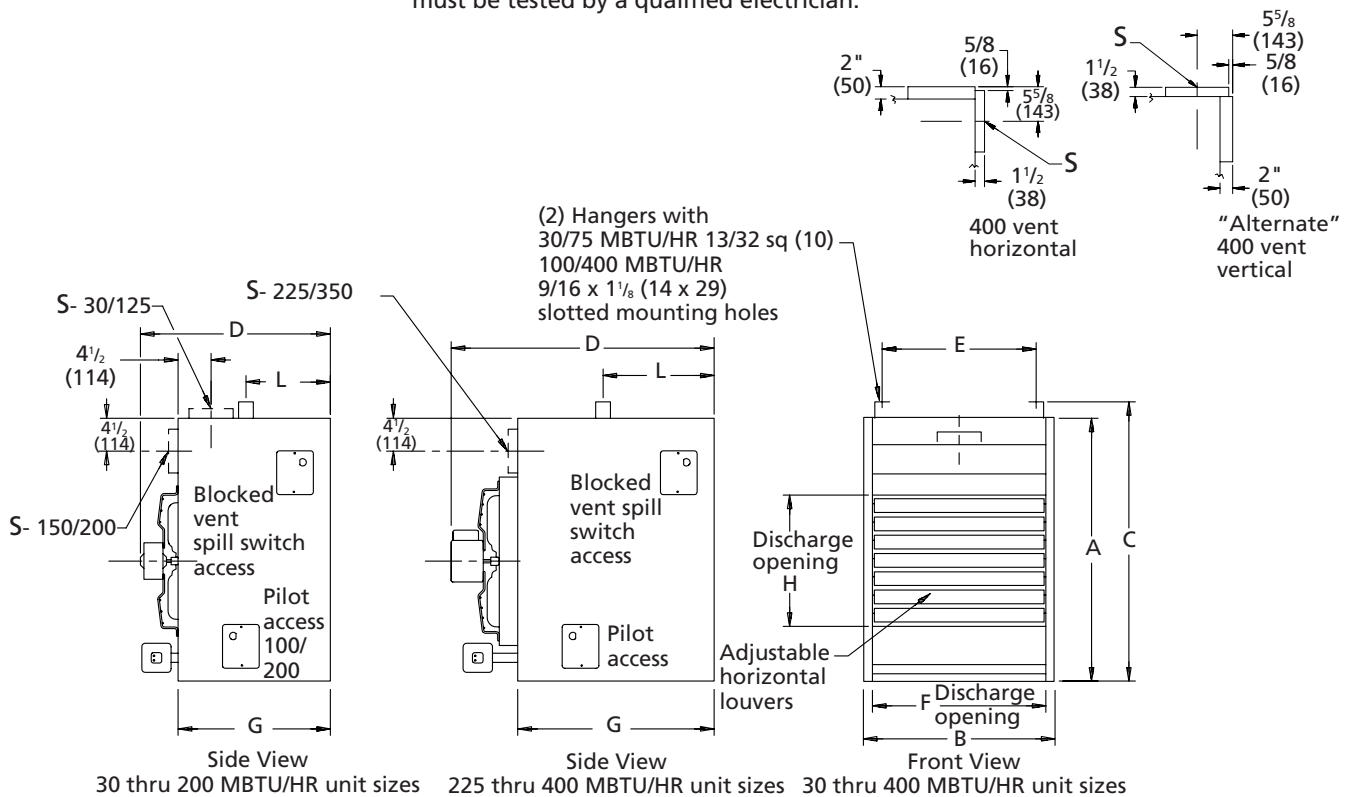
⚠ WARNING Do not depend upon a thermostat or other switch as sole means of disconnecting power when installing or servicing heater. Always disconnect power at main circuit breaker as described previously. Failure to do so could result in fatal electric shock.

Special attention must be given to any grounding information pertaining to this heater. To prevent the risk of electrocution, the heater must be securely and adequately grounded. This should be accomplished by connecting a grounded conductor between the service panel and the heater. To ensure a proper ground, the grounding means should be tested by a qualified electrician.

Do not insert fingers or foreign objects into the heater or fan blade. Do not block or tamper with the heater in any manner while in operation or just after it has been turned off, as some parts may be hot enough to cause injury.

This heater is intended for general heating applications ONLY. It must NOT be used in potentially dangerous locations such as flammable, explosive, chemical-laden or wet atmospheres.

Do not attach ductwork to this product or use it as a makeup air heater. Such usage voids the warranty and will create unsafe operation.



Dimensions "XX" standard units
Dimensions in parenthesis (XX) millimeters

Figure 1B – Dimensions (refer to Table 1)

ENGLISH

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

E
N
G
L
I
S
H

General Safety Information (Continued)

In cases in which property damage may result from malfunction of the heater, a backup system or a temperature sensitive alarm should be used.

CAUTION *The open end of piping systems being purged shall not discharge into areas where there are sources of ignition or into confined spaces UNLESS precautions are taken as follows: (1) By ventilation of the space, (2) control of purging rate, (3) elimination of all hazardous conditions. All precautions must be taken to perform this operation in a safe manner!*

Unless otherwise specified, the following conversions may be used for calculating SI unit measurements:

- 1 gallon = 3.785 L
- 1 foot = 0.305 m
- 1 inch = 25.4 mm
- 1 psiG = 6.894 kPa
- 1 pound = 0.453 kg
- liter/second = CFM x 0.472
- meter/second = FPM ÷ 196.8
- 1000 Btu per hour = 0.293 kW
- 1000 Btu/Cu. Ft. = 37.5 MJ/m³
- 1 inch water column = 0.249 kPa
- 1 cubic foot = 0.028 m³

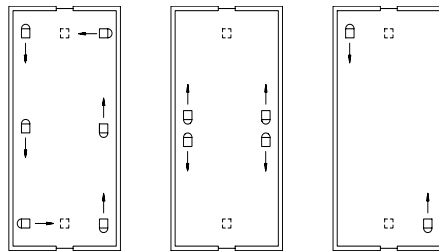
Installation

WARNING *Do not install unit heaters in corrosive or flammable atmospheres! Premature failure of, or severe damage to the unit will result!*

WARNING *Avoid locations where extreme drafts can affect burner operation. Unit heaters must not be installed in locations where air for combustion contains chlorinated, halogenated or acidic vapors. If located in such an environment, premature failure of the unit will occur! Such failure is not covered under warranty.*

When the unit is equipped with an automatic gas ignition system, the unit heater must be installed such that the gas ignition control system is not directly exposed to water spray, rain or dripping water.

NOTE: Location of unit heaters is related directly to the selection of sizes (See Figure 2). Basic rules are as follows:
Figure 2 – Heater Location



MOUNTING HEIGHT

Unit heaters must be installed at a minimum of 8 feet (2.4 m) above the floor, measured to the bottom of the unit. At heights above 8 feet (2.4 m), less efficient air distribution will result. Occasionally unit heaters must be mounted at heights of 12 to 16 feet (3.7 to 4.9 m) in order to clear obstacles. When this is the case, it is advisable to use centrifugal blower unit heaters. **Any unit heater mounted less than 8 feet (2.4 m) above the floor must be equipped with an OSHA approved fan guard.**

AIRCRAFT HANGARS

Unit heaters must be installed in aircraft hangars and public garages as follows: In aircraft hangars, unit heaters must be at least 10 feet (3.1 m) above the upper surface of wings or engine enclosures of the highest aircraft to be stored in the hangar and at least 8 feet (2.4 m) above the floor in shops, offices and other sections of the hangar where aircraft are not stored or housed. Refer to current ANSI/NFPA No. 409, Aircraft Hangars. In Canada, installation is suitable in aircraft hangars when acceptable to the enforcing authorities.

PUBLIC GARAGES

In repair garages, unit heaters must be located at least 8 feet (2.4 m) above the floor. Refer to the latest edition of NFPA 88B, Repair Garages.

In parking structures, unit heaters must be installed so that the burner flames are located a minimum of 18 inches (457 mm) above the floor or protected by a partition not less than 18 inches (457 mm) high. However, any unit heater mounted in a parking structure less than 8 feet (2.4 m) above the floor must be equipped with an OSHA approved fan guard. Refer to the latest edition of NFPA 88A, Parking Structures.

Table 2 – Standard Applications – Refer to Figure 2A

Distance from floor to bottom of unit "H" ft.	Heat Throw Distances (Approximate)													
	Unit Size – BTU/Hr (kW) (multiply by 1000)													
	30	45	60	75	100	125	150	175	200	225	250	300	350	400
8'	33	33	33	40	60	65	70	75	80	85	90	105	110	120
10	28	28	28	35	54	56	60	64	68	72	78	90	95	100
12	NR	NR	NR	NR	44	46	49	57	61	65	68	80	84	90
15	NR	NR	NR	NR	NR	NR	45	49	52	56	60	70	74	80
20	NR	NR	NR	NR	NR	NR	NR	NR	46	50	54	63	66	70

NR = Not recommended. See metric conversion chart on page 4.

Dayton® Gas Unit Heaters with Electronic Ignition

ENGLISH

Installation (Continued)

In Canada, installation must be in accordance with the latest edition of CGA B149 "Installation Codes for Gas Burning Appliances and Equipment."

AIR DISTRIBUTION

Direct air toward areas of maximum heat loss. When multiple heaters are involved, circulation of air around the perimeter is recommended where heated air flows along exposed walls. Satisfactory results can also be obtained where multiple heaters are located toward the center of the area with heated air directed toward the outside walls. Be careful to avoid all obstacles and obstructions which could impede the warm air distribution patterns. Heat throw distances are presented in Table 2.

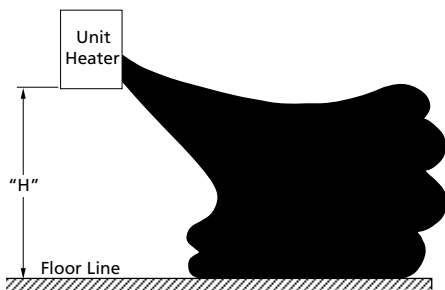


Figure 2A – Heat Throw Distances
(refer to Table 2)

The installation is to be adjusted to obtain an air throughput within the range specified on the rating plate.

Unit heaters should not be installed to maintain low temperatures and/or freeze protection of buildings. A minimum of 50°F (10°C) thermostat

setting must be maintained. If unit heaters are operated to maintain lower than 50°F (10°C), hot flue gases are cooled inside the heat exchanger to a point where water vapor (a flue gas by-product) condenses onto the heat exchanger walls. The result is a mildly corrosive acid that prematurely corrodes the aluminized heat exchanger and can actually drip water down from the unit heater onto floor surface. Additional unit heaters should be installed if a minimum 50°F (10°C) thermostat setting cannot be maintained.

AIR FOR COMBUSTION

The Unit heater shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas, proper venting, and the maintenance of ambient temperature at safe limits under normal conditions of use. The unit heater shall be located in such a manner as not to interfere with proper circulation of air within the confined space. When buildings are so tight that normal infiltration does not meet air requirements, outside air shall be introduced per Sections 1.3.4.2 and 1.3.4.3 of ANSI Z223.1 for combustion requirements. A permanent opening or openings having a total free area of not less than one square inch per 5,000 BTU/HR (1.5 kW) of total input rating of all appliances within the space shall be provided.

NOTE: Unit heater sizing should be based on heat loss calculations where the unit heater output equals or exceeds heat loss.

CLEARANCES

Each gas unit heater shall be located with respect to building construction and other equipment so as to permit access to the unit heater. Clearance between walls and the vertical sides of the unit heater shall be no less than 18 inches (457 mm). A minimum clearance of 6 inches (152 mm) must be maintained between the top of the unit heater and the ceiling. The bottom of the unit heater must be no less than 12 inches (305 mm) from any combustible. However, in order to insure access to the burner compartment, a minimum distance of 21 inches (533 mm) is required. The distance between the flue collector and any combustible must be no less than 6 inches (152 mm). Also see "Air for Combustion" and "Venting" sections.

NOTE: Increasing the clearance distances may be necessary if there is a possibility of distortion or discoloration of adjacent materials.

▲ WARNING *Make certain that the structure to which the heater is to be mounted is capable of safely supporting its weight. Under no circumstances must the gas lines, venting system, or the electrical conduit be used to support the heater; or should any other objects (i.e. ladder, person) lean against the heater, gas lines, venting system, or electrical conduit for support. Failure to heed these warnings may result in property damage, personal injury, or death.*

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Installation (Continued)

CAUTION Unit heaters must be hung level from side to side and from front to back (See Figures 1 through 4). Failure to do so will result in poor performance, noisy operation or premature failure of the unit.

WARNING Insure that all hardware used in the suspension of each unit heater is more than adequate for the job. Failure to do so may result in extensive property damage, severe personal injury or death!

Refer to Figures 1 through 4, and dimensional data in Table 1 for suspension of units.

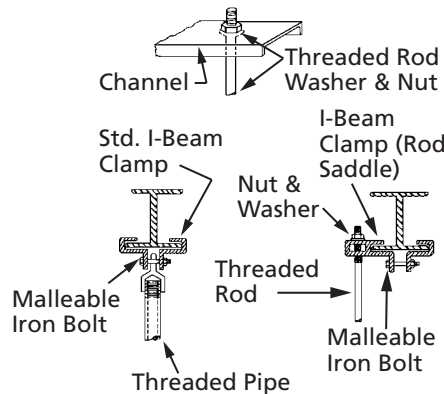


Figure 3 – Heater Mounting – Steel Construction*

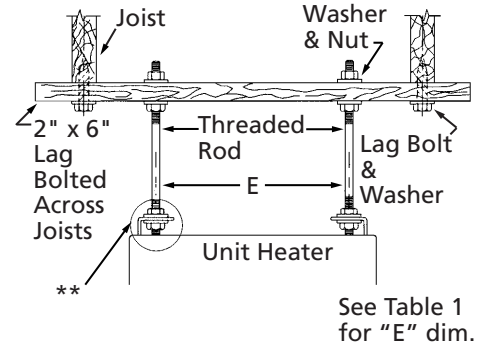


Figure 4 – Heater Mounting 100/400 MBTU Sizes – Wood Construction*

(*) All hanging hardware and wood is not included with the unit (To be field supplied).

(**) 30/75 m btu sizes hanger are positioned opposite as shown.

Table 3A – Gas Pipe Size

Maximum Capacity of Pipe in Cubic Feet of Gas per Hour (Cubic Meters per Hour) for Gas Pressures of 0.5 psIG (3.5 kPa) or Less, and a Pressure Drop of 0.5 Inch Water Column (124.4 kPa), (Based on a 0.60 Specific Gravity Gas)

Nominal iron pipe size, inches	Internal Dia. inches	Length of Pipe in feet (meters)													
		10 (3.0)	20 (6.1)	30 (9.1)	40 (12.2)	50 (15.2)	60 (18.3)	70 (21.3)	80 (24.4)	90 (27.4)	100 (30.5)	125 (38.1)	150 (45.7)	175 (53.3)	200 (61.0)
1/2	0.622	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	61 (1.73)	57 (1.61)	53 (1.50)	50 (1.42)	44 (1.25)	40 (1.13)	37 (1.05)	35 (0.99)
3/4	0.824	360 (10.2)	250 (7.08)	200 (5.66)	170 (4.81)	151 (4.28)	138 (3.91)	125 (3.54)	118 (3.34)	110 (3.11)	103 (2.92)	93 (2.63)	84 (2.38)	77 (2.18)	72 (2.04)
1	1.049	680 (19.3)	465 (13.2)	375 (10.6)	320 (9.06)	285 (8.07)	260 (7.36)	240 (6.80)	220 (6.23)	205 (5.80)	195 (5.52)	175 (4.96)	160 (4.53)	145 (4.11)	135 (3.82)
1 1/4	1.380	1400 (39.6)	950 (26.9)	770 (21.8)	660 (18.7)	580 (16.4)	530 (15.0)	490 (13.9)	460 (13.0)	430 (12.2)	400 (11.3)	360 (10.2)	325 (9.20)	300 (8.50)	280 (7.93)
1 1/2	1.610	2100 (59.5)	1460 (41.3)	1180 (33.4)	990 (28.0)	900 (25.5)	810 (22.9)	750 (21.2)	690 (19.5)	650 (18.4)	620 (17.6)	550 (15.6)	500 (14.2)	460 (13.0)	430 (12.2)
2	2.067	3950 (112)	2750 (77.9)	2200 (62.3)	1900 (53.8)	1680 (47.6)	1520 (43.0)	1400 (39.6)	1300 (36.8)	1220 (34.5)	1150 (32.6)	1020 (28.9)	950 (26.9)	850 (24.1)	800 (22.7)
2 1/2	2.469	6300 (178)	4350 (123)	3520 (99.7)	3000 (85.0)	2650 (75.0)	2400 (68.0)	2250 (63.7)	2050 (58.0)	1950 (55.2)	1850 (52.4)	1650 (46.7)	1500 (42.5)	1370 (38.8)	1280 (36.2)
3	3.068	11000 (311)	7700 (218)	6250 (177)	5300 (150)	4750 (135)	4300 (122)	3900 (110)	3700 (105)	3450 (97.7)	3250 (92.0)	2950 (83.5)	2650 (75.0)	2450 (69.4)	2280 (64.6)
4	4.026	23000 (651)	15800 (447)	12800 (362)	10900 (309)	9700 (275)	8800 (249)	8100 (229)	7500 (212)	7200 (204)	6700 (190)	6000 (170)	5500 (156)	5000 (142)	4600 (130)

- NOTE:**
- Determine the required Cu. Ft. / Hr. by dividing the rated heater input by 1000. For SI / Metric measurements: Convert unit Btu. / Hr. to kilowatts. Multiply the unit input (kW) by 0.0965 to determine Cubic Meters / Hour.
 - For Natural Gas: Select the pipe size directly from the table.
 - For Propane Gas: Multiply the Cu. Ft. / Hr. (Cubic Meters per Hour) value by 0.633; then use the table.
 - Refer to the metric conversion factors listed in General Safety section for more SI unit measurements/conversions.

ENGLISH

Dayton® Gas Unit Heaters with Electronic Ignition

ENGLISH

Installation (Continued)

GAS SUPPLY PIPING/SIZING

▲ WARNING *To avoid equipment damage or possible personal injury, do not connect gas piping to this unit until a supply line pressure/leak test has been completed. Connecting the unit before completing the pressure/leak test may damage the unit gas valve and result in a fire hazard.*

▲ WARNING *Do not rely on a shut off valve to isolate the unit while conducting gas pressure/leak tests. These valves may not be completely shut off, exposing the unit gas valve to excessive pressure and damage.*

PIPE SIZING

To provide adequate gas pressure at the gas unit heater, size the gas piping as follows:

1. Find the cu ft/hr by using the following formula:

$$\text{Cu ft/hr} = \frac{\text{Input Btu/Hr}}{1,000}$$

2. Refer to Table 3A. Match "Length of Pipe in Feet" with appropriate "Gas Input – Cu Ft/Hr" figure. This figure can then be matched to the pipe size at the left of the table.

Example: It is determined that a 67 foot (20.4 m) run of gas pipe is required to

connect a 200 MBTU gas unit heater to a 1,000 Btu/cu. ft (0.29 kW) natural gas supply.

$$\frac{200,000 \text{ Btu/hr}}{1,000 \text{ Btu/cu ft}} = 200 \text{ Cu ft/hr}$$

Using Table 3A, a 1 inch pipe is needed.

NOTE: See "General Safety Information" section for English/SI (metric) unit conversion factors.

NOTE: If more than one gas unit heater is to be served by the same piping arrangement, the total cu ft/hr input and length of pipe must be considered.

NOTE: HEATER INSTALLATION FOR USE WITH PROPANE (BOTTLED) GAS MUST BE MADE BY A QUALIFIED L.P. GAS DEALER OR INSTALLER. HE/SHE WILL INSURE THAT PROPER JOINT COMPOUNDS ARE USED FOR MAKING PIPE CONNECTIONS; THAT AIR IS PURGED FROM LINES; THAT A THOROUGH TEST IS MADE FOR LEAKS BEFORE OPERATING HEATER; AND THAT IT IS PROPERLY CONNECTED TO PROPANE GAS SUPPLY SYSTEM.

Before any connection is made to an existing line supplying other gas appliances, contact the local gas company to make certain that the existing line is of adequate size to handle the combined load.

Pipe Installation

1. Install the gas piping in accordance with applicable local codes.
2. Check gas supply pressure. Each unit heater must be connected to a manifold pressure and a gas supply capable of supplying its full rated capacity as specified in Table 3B. A field LP tank regulator must be used to limit the supply pressure to maximum of 14 inches W.C. (3.5 kPa). All piping should be sized in accordance with the latest edition of ANSI Standard Z223.1 National Fuel Gas Code; in Canada, according to CGA B149. See Tables 1 and 3A for correct gas supply piping size. If gas pressure is excessive on natural gas applications, install a pressure regulating valve in the line upstream from the main shutoff valve.
3. Adequately support the piping to prevent strain on the gas manifold and controls.
4. To prevent the mixing of moisture with gas, run the take-off piping from the top, or side, of the main.
5. A 1/8" NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the appliance.
6. Provide a drip leg in the gas piping near the gas unit heater. A ground joint union and a manual gas shutoff valve should be installed ahead of the unit heater controls to permit

Table 3B

Gas Type	Gas Piping Requirements*	
	Natural Gas	Propane (LP) Gas
Manifold Pressure	3.5 in. W.C. (0.9 kPa)	10.0 in. W.C. (2.5 kPa)
Supply Inlet Pressure	14 in. W.C. Max. (3.5 kPa)	14 in. W.C. Max. (3.5 kPa)
	5.0 in. W.C. Min. (1.2 kPa)	11.0 in. W.C. Min. (2.7 kPa)

(*) For single stage applications only at normal altitudes.

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Pipe Installation (Continued)

servicing. The manual main shutoff valve must be located external to the jacket (See Figure 5).

8. Make certain that all connections have been adequately doped and tightened.

CAUTION Do not overtighten the inlet gas piping into the valve. This may cause stresses that would crack the valve!

NOTE: Use pipe joint sealant resistant to the action of liquefied petroleum gases regardless of gas conducted.

WARNING Check all pipe joints for leakage using a soap solution or other approved method. Never use an open flame or severe personal injury or death may occur.

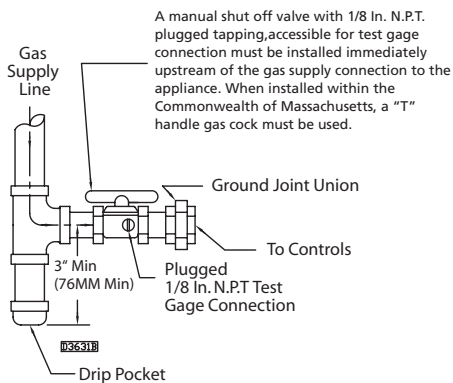


Figure 5 – Pipe Installation, Standard Controls

WARNING Never use an open flame to detect gas leaks. Explosive conditions may exist which would result in personal injury or death.

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psiG (3.5 kPa).

The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psiG (3.5 kPa).

Venting

ALL UNIT HEATERS MUST BE VENTED!

All venting installations shall be in accordance with "Part 7, Venting of Equipment of the National Fuel Gas Code, ANSI Z223.1, or applicable provisions of local building codes." See page 10 for Canadian Installations.*

WARNING CARBON MONOXIDE! Your venting system must not be blocked by any snow, snow drifts, or any foreign matter. Inspect your venting system to ensure adequate ventilation exists at all times! Failure to heed these warnings could result in Carbon Monoxide Poisoning (symptoms include grogginess, lethargy, inappropriate tiredness, or flu-like symptoms).

CAUTION This unit heater is equipped with a blocked vent (spill) shutoff switch. Before start up, push reset button on blocked vent (spill) shutoff switch. If the venting system becomes blocked or there is continuous spillage, the vent shutoff switch will shut off the unit heater. Before resetting the switch, check to see if the vent system is blocked; remove any blockage.

To reset the switch (which is located in the upper corner of the draft diverter), push the reset button after the duct furnace has cooled down.

NOTE: The switch will not reset hot.

Observe the following precautions when venting the unit:

1. Use flue pipe of the same size as the flue connections on the gas unit heater (See Table 1). All heaters should be vented with a UL Listed Type B vent; a factory built chimney or a lined brick and mortar chimney that has been constructed in accordance with the National Building Code.
2. Where two or more gas unit heaters vent into a common flue, the cross sectional area of the common flue must be equal to the largest vent connection, plus 50% of the area of each additional vent connection.
3. Provide as long a vertical run of flue at the gas unit heater as possible. A minimum of five feet (1.5 m) of vertical flue is required. The top of the vent pipe should extend at least two feet (0.6 m) above the highest point on the roof. Install a weather cap over the vent opening.
4. Slope horizontal runs upward from the gas unit heater at least 1/4 inch per foot (21 mm/m). Horizontal runs should not exceed 75% of the vertical height of the vent pipe, or chimney, above the flue pipe connection, up to a maximum length of 10 feet (3 m). Horizontal portions of the venting system shall be supported at maximum intervals of four feet (1.2 m) to prevent sagging (See Figure 6).
5. Use as few elbows as possible.
6. Tape flue pipe joints with fireproof paper or material.
7. Avoid running vent pipe through unheated spaces.

Dayton® Gas Unit Heaters with Electronic Ignition

ENGLISH

Venting (Continued)

8. When this cannot be avoided, insulate the pipe to prevent the condensation of moisture on the inside walls of the pipe.
9. Do not damper the flue piping. Failure to open such a damper prior to operating the gas unit heater will result in the spillage of flue gas into the occupied space, activating blocked vent (spill) switch. See prior instructions.
10. Avoid installing units in areas under negative pressure due to large exhaust fans or air conditioning. When required, a flue vent fan should be installed in accordance with the instructions included with the fan.
11. This optional draftor/power venter is designed to operate as a Category I venting system – when installed

per Installation Instructions to a Category I unit with a draft diverter.

12. Vent connectors serving Category I heaters shall not be connected into any portion of mechanical draft systems operating under positive pressure.

Electrical Connections

▲ WARNING **HAZARDOUS VOLTAGE!** disconnect ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. Failure to disconnect power before servicing can cause severe personal injury or death.

Standard units are shipped for use on 115 volt, 60 hertz single phase electric power. The motor name-plate and electrical rating on the transformer should be checked before energizing the unit heater electrical system. All external wiring must conform to the latest edition of ANSI/NFPA No. 70, United States Na-

tional Electrical Code and applicable local codes; in Canada, to the Canadian Electrical Code, Part 1 CSA Standard C22.1.

▲ CAUTION Do not use any tools (i.e. screwdriver, pliers, etc.) across the terminals to check for power. Use a voltmeter.

▲ CAUTION USE COPPER CONDUCTORS ONLY! UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS. Failure to do so may cause damage to the equipment.

It is recommended that the electrical power supply to each unit heater be provided by a separate, fused and permanently live electrical circuit. A disconnect switch of suitable electrical rating for each unit heater should be located as close to the gas valve and controls as possible. Each unit heater must be electrically grounded in accordance with the latest edition

(*) The following additional instructions apply to Canadian installations in addition to installation and operating instructions:

1. Installation must conform with local building codes, or in absence of local codes, with current CGA B149.1, Installation Codes for Natural Gas Burning Appliances and Equipment, or CGA B149.2, Installation Codes for Propane Gas Burning Appliances and Equipment.
2. Any reference to U.S. standards or codes in these instructions are to be ignored and the applicable Canadian standards or codes applied.

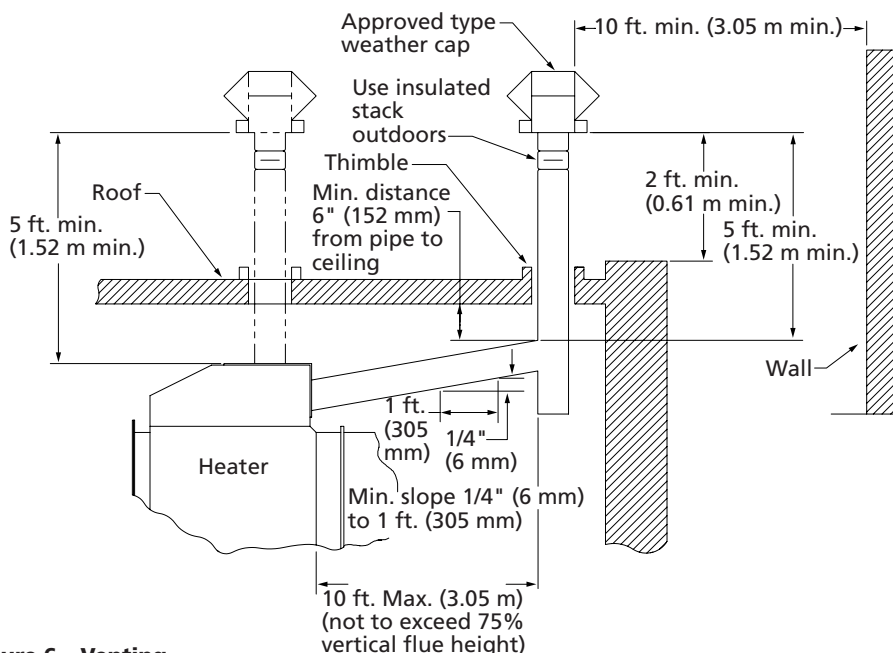


Figure 6 – Venting

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Electrical Connections (Continued)

of the United States National Electrical Code, ANSI/NFPA No. 70 or CSA Standard C22.1. Sample wiring connections are depicted in Figures 7 and 12.

THERMOSTAT WIRING AND LOCATION

NOTE: The thermostat must be mounted on a vertical vibration-free surface free from air currents and in accordance with the furnished instructions.

Mount the thermostat approximately 5 feet (1.5 m) above the floor in an area where it will be exposed to a free circulation of average temperature air. Always refer to the thermostat instructions as well as our unit wiring diagram and wire accordingly. Avoid mounting the thermostat in the following locations:

1. Cold areas – Outside walls or areas where drafts may affect the operation of the control.
2. Hot areas – Areas where the sun's rays, radiation, or warm air currents may affect control operation.
3. Dead areas – Areas where air cannot circulate freely, such as behind doors or in corners.

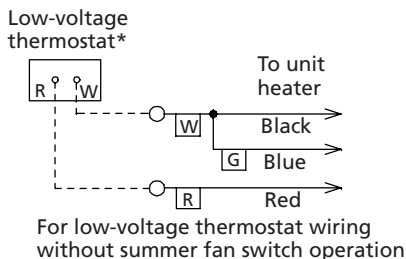


Figure 7

(*) Thermostat wires tagged "W" and "G" must be connected together except when using a general pur-

pose "SPDT" 24 VAC relay and a standard thermostat with subbase.

THERMOSTAT HEAT ANTICIPATOR ADJUSTMENTS

The initial heat anticipator setpoint should equal the thermostat's current amperage draw when the unit is firing. This setpoint should be measured for the best results. Use the recommended ranges as a guide. If further information is needed, consult your thermostat manufacturer's instructions.

Recommended heat anticipator setting ranges:

Gas Ignition Type	25 ft. (7.6 m) T'stat Wiring	50 ft. (15.2m) T'stat Wiring
For Units: with Auto Spark	0.76 to 0.81 A	0.81 to 0.91 A

FAN TIME DELAY CONTROL

Leads from time delay controls are factory wired to the junction box (when ordered as an optional component). The fan control is a time delay relay (approximately 45 seconds ON, 65 seconds OFF). The fan control is rated at 17 amps.

NOTE: The start-up fan delay must not exceed 90 seconds from a cold start.

IMPORTANT: For all wiring connections, refer to the wiring diagram on unit (either affixed to the side jacket or enclosed in your unit's installation instruction envelope). Should any original wire supplied with the heater have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C.

Should any high limit or blocked vent (spill) switch wires have to be replaced, they must be replaced

with wiring material having a temperature rating of 200°C minimum.

Operation

EXPLANATION OF CONTROLS (See Figure 9):

1. The unit heater is equipped with a dual automatic gas valve and electric ignition device (separate from the gas valve on some models) which provide the following functions.
 - a. Pilot solenoid valve is energized and pilot is electrically ignited when thermostat calls for heat.
 - b. Electronic circuitry proves that pilot flame is established, then energizes main gas solenoid valve.
 - c. When thermostat is satisfied, main gas solenoid valve and pilot solenoid valve are de-energized, stopping all flow of gas.
 - d. Pilot solenoid valve also functions as a main gas valve to provide redundancy.
 - e. Pressure regulator provides proper and steady gas pressure to the main burners.
 - f. Manual shutoff valve for service and long term shut-down. (Separate from the automatic valve on some models.)
2. The limit switch interrupts the flow of electric current to the main gas valve in case the heater becomes overheated.
3. The fan switch delays the operation of the fan until the heater is warmed, then keeps the fan running after the gas has been turned off until the useful heat has been removed. **The startup fan delay must not exceed 90 seconds from a cold start.**

Dayton® Gas Unit Heaters with Electronic Ignition

ENGLISH

Operation (Continued)

4. The wall thermostat is a temperature sensitive switch which turns the main gas valve ON or OFF to control the temperature of the space being heated. It must be mounted on vibration-free, vertical surface away from air currents, in accordance with the instructions furnished with the thermostat (also refer to Electrical Section.)

START-UP

1. Open the manual valve supplying gas to the unit heater, and with the union connection loose, purge air from the gas line. Tighten the union and check for gas leaks, using soapy water solution only.

▲ WARNING *Never use an open flame to detect gas leaks. Explosive conditions may exist which would result in personal injury or death.*

▲ WARNING *Before attempting to light or relight the pilot, wait five minutes to allow gas which may have accumulated in the burner compartment to escape. Failure to do so could cause the accumulated gas to ignite rapidly, leading to personal injury or death.*

2. Open the manual valve on the unit heater.
3. Turn on electrical power.
4. The unit should be under the control of the thermostat. Turn the thermostat to the highest point and determine that the pilot and main burners ignite. Turn the thermostat to the lowest point and determine that

the pilot and main burners are extinguished.

5. If pilot adjustment is required, remove the pilot adjustment seal cap and adjust the pilot screw to obtain proper flame. Clockwise rotation decreases pilot flame size. Replace the cap.

SHUT-DOWN

1. Turn the valve selector knob to the "OFF" position.
2. Turn off the electricity.
3. To relight, follow the "START-UP" instructions above.

See Figure 9 for parts/identification.

GAS INPUT RATE

▲ CAUTION *Never overfire the unit heater, as this may cause unsatisfactory operation or shorten the life of the heater.*

Table 4 – Main Burner Orifice Schedule*

Input in 1000 BTU	Type of Gas Heating Value Manifold Pressure (In. WC)	Natural		No. of Burner Orifices	Input in 1000 BTU	Type of Gas Heating Value Manifold Pressure (In. WC)	Propane		No. of Burner Orifices
		1075	2500				1075	2500	
30	Cu. Ft/Hr	28	12	2	175	Cu. Ft/Hr	163	70	7
	Orifice Drill	49	57			Orifice Drill	42	54	
45	Cu. Ft/Hr	42	18	3	200	Cu. Ft/Hr	186	80	8
	Orifice Drill	49	57			Orifice Drill	42	54	
60	Cu. Ft/Hr	56	24	4	225	Cu. Ft/Hr	210	90	9
	Orifice Drill	49	57			Orifice Drill	42	54	
75	Cu. Ft/Hr	70	30	5	250	Cu. Ft/Hr	233	100	10
	Orifice Drill	49	57			Orifice Drill	42	54	
100	Cu. Ft/Hr	96	40	4	300	Cu. Ft/Hr	280	120	12
	Orifice Drill	42	54			Orifice Drill	42	54	
125	Cu. Ft/Hr	120	50	5	350	Cu. Ft/Hr	326	140	14
	Orifice Drill	42	54			Orifice Drill	42	54	
150	Cu. Ft/Hr	140	60	6	400	Cu. Ft/Hr	372	160	16
	Orifice Drill	42	54			Orifice Drill	42	54	

(*) This schedule is for units operating at normal altitudes of 2000 feet (610 m) or less. SPECIAL ORIFICES ARE REQUIRED FOR INSTALLATIONS ABOVE 2000 FEET (610 M).

When installed in Canada, any references to deration at altitudes in excess of 2000 feet (610 m) are to be ignored. At altitudes of 2000 to 4500 feet (610 to 1372 m), the unit heaters must be orificed to 90% of the normal altitude rating, and be so marked in accordance with the C.S.A. certification.

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Operation (Continued)

Check the gas input rate as follows (Refer to general safety section for metric conversions/SI units):

1. Turn off all gas appliances that use gas through the same meter as the unit heater.
2. Turn gas on to the unit heater.
3. Clock the time in seconds required to burn one cubic foot of gas by checking the gas meter.
4. Insert the time required to burn one cubic foot of gas into the following formula and compute the input rate.

$$\frac{3600 \text{ (Sec. Per Hr.)} \times \text{Btu/Cu. Ft} = \text{Input Rate}}{\text{Time (Sec.)}}$$

For example, assume the Btu content of one cubic foot of natural gas equalled 1000 and that it takes 18 seconds to burn one cubic foot of gas.

$$\frac{3600 \times 1000}{18} = 200,000$$

NOTE: If the computation exceeds or is less than 95 percent of the gas Btu/hr. input rating (See "Specifications"), adjust the gas pressure.

Adjust the gas pressure as follows:

NATURAL GAS

Best results are obtained when the unit heater is operating at its full input rating with the manifold pressure of 3.5 inches W.C. (0.9 kPa). Adjustment of the pressure regulator is not normally necessary since it is preset at the factory.

However, field adjustment may be made as follows:

1. Attach manometer at pressure tap plug adjacent to the control outlet.

2. Remove regulator adjustment screw cap, located on combination gas valve.
3. With a small screwdriver, rotate the adjustment screw counterclockwise to decrease or clock-wise to increase pressure. Do not force beyond stop limits.
4. Replace regulator adjustment screw cap.

PROPANE GAS

An exact manifold pressure of 10 inches WC (2.5 kPa) must be maintained for proper operation of the unit heater. If the unit is equipped with a pressure regulator on the combination gas valve, follow steps "a" through "d" above. If the unit is not so equipped, the propane gas supply system pressure must be regulated to attain this manifold operating pressure.

PRIMARY AIR SHUTTER ADJUSTMENT

After the unit has been operating for at least 15 minutes, adjust the primary air flow to the burners. Turn the friction-locked, manually-rotated air shutters clockwise to close, or counterclockwise to open.

For correct air adjustment, close the air shutter until yellow tips in the flame appear. Then open the air shutter to the point just beyond the position where yellow tipping disappears. Refer to Figure 8.

NOTE: There may be momentary and spasmodic orange flashes in the flame. This is caused by the burning of airborne dust particles, and not to be confused with the yellow tipping, which is a stable or permanent situation when there is insufficient primary air.

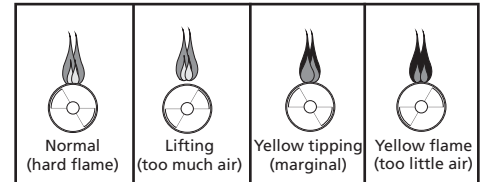


Figure 8 – Main Burner Flames

PILOT ADJUSTMENT

1. Remove the pilot adjustment cap.
2. Adjust the pilot screw to provide a properly sized flame.
3. A proper pilot flame is a soft steady flame that envelops 3/8 to 1/2 inch (9.5 to 12.7 mm) of the thermocouple tip.
4. Replace the pilot adjustment cap.

MANIFOLD PRESSURE ADJUSTMENT

If the manifold pressure requires minor adjustment, remove the cap from the pressure regulator and turn the adjustment screw clockwise to increase the pressure, or counterclockwise to decrease the pressure. The adjusted manifold pressure should not vary more than 10% from the pressures specified in Table 3B.

Maintenance

PERIODIC SERVICE

▲ WARNING *Open all disconnect switches and secure in that position before servicing unit. Failure to do so may result in personal injury or death from electrical shock.*

▲ WARNING *Gas tightness of the safety shut-off valves must be checked on at least an annual basis.*

Dayton® Gas Unit Heaters with Electronic Ignition

ENGLISH

Maintenance (Continued)

To check gas tightness of the gas safety shut-off valves, turn off the manual valve upstream of the appliance combination control. Remove the 1/8 inch pipe plug on the inlet side of the combination control and connect a manometer to that tapping. Turn the manual valve on to apply pressure to the combination control. Note the pressure reading on the manometer, then turn the valve off. A loss of pressure indicates a leak. If a leak is detected, use soap solution to check all threaded connections. If no leak is found, combination control is faulty and must be replaced before putting appliance back in service.

Should maintenance be required, perform the following inspection and service routine:

1. Inspect the area near the unit to be sure that there is no combustible material located within the minimum clearance requirements listed (See "Installation" section of this manual).

CAUTION *Under no circumstances should combustible material be located within the clearances specified in this manual. Failure to provide proper clearance could result in personal injury or equipment damage from fire.*

2. Turn off the manual gas valve and electrical power to the gas unit heater.
3. To clean or replace the main burners, remove the bottom panel, and compress the spring by moving the burner toward the manifold. Slide the opposite end of the burner downward from the locating slot while retaining spring is still compressed. Pull the burners away from the heater.
4. With the burners removed, gently wire brush the inside surfaces of the heat exchanger.
5. Remove any dirt, dust, or other foreign matter from the burners using a wire brush and/or compressed air. Ensure that all passages are unobstructed. Inspect and clean pilot burner if necessary.
6. Reassemble the gas unit heater by replacing all parts in reverse order.
7. Relight the pilot (see lighting instruction plate attached to the unit). Complete the appropriate unit start-up procedure as given in the "Operation" section of this manual.
8. Check the burner adjustment. See the "Primary Air Shutter Adjustment" section of this manual.
9. Check all gas control valves and pipe connections for leaks.
10. Check the operation of the automatic gas valve by lowering the setting of the thermostat, stopping the operation of the gas unit heater. The gas valve should close tightly, completely extinguishing the flame on the main burners.
11. Inspect and service the fan section of the unit. To maintain efficient air flow, inspect and clean the fan blades and guard to prevent build-up of foreign matter.
12. Check and test the operational functions of all safety devices supplied with your unit.
13. Check lubrication instructions on the motor. If oiling is required, add 3 to 4 drops of electric motor oil as follows:
 - a. Light Duty – After 3 years or 25,000 hours of operation.
 - b. Average Duty – Annually after 3 years or 8,000 hours of operation.
 - c. Heavy Duty – Annually after 1 year or at least every 1500 hours of operation.

CAUTION *Never over oil the motor or premature failure may occur!*

Dayton® Gas Unit Heaters with Electronic Ignition

Optional Equipment

DRAFTOR KIT**

Each kit contains drafter, adaptor and relay.

Unit Size (MBH)	Kit Part No.
30/45	ASRM1-030
60/75	ASRM1-060
100	ASRM1-100
125	ASRM1-125
150	ASRM1-150
175	ASRM1-175
200	ASRM1-200
225	ASRM1-225
250	ASRM1-250
300/350	ASRM1-300
400	ASRM1-400

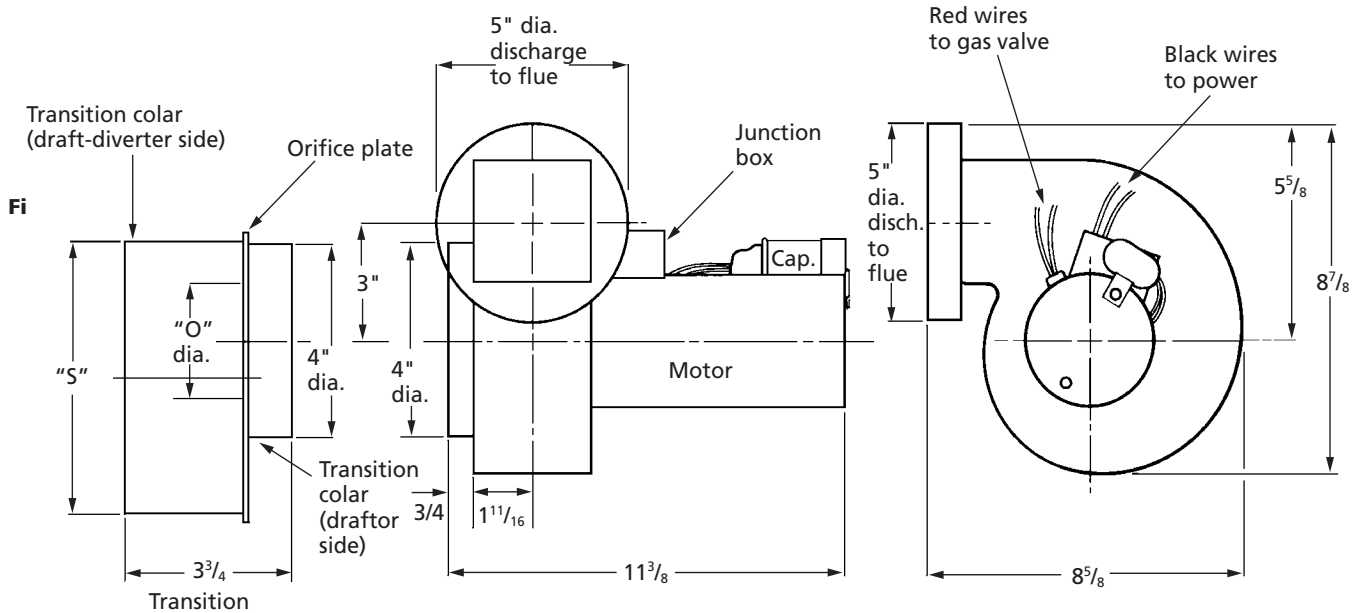
DRAFTOR

A drafter may be used in lieu of, or in conjunction with, a chimney. Where chimneys of sufficient height are impractical, or where distances of heaters to chimney are so great that sufficient draft cannot be created, a mechanical drafter will get rid of the products of combustion from the heater. Plants with minor negative pressure should use mechanical draftors.

The induced drafter is a rugged, well designed air handling exhaust fan. Combined with the proper inlet orifice size for each unit, it provides correct venting and allows use of minimum di-

ameter vent flue. Normally it is started and stopped by the room thermostat and provides pre-purge and post-purge of the products of combustion. A centrifugal switch in the drafter motor operates the electric gas valve. When used on a dual furnace the drafter can operate the electric gas valve and also control the system fan motor usually through a magnetic starter.

Only one size drafter is required for units up to 400,000 BTU input. (See Figure 8A)



NOTE: Not CSA International certified

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For Repair Parts, call 1-800-323-0620

24 hours a day – 365 days a year

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

Address parts correspondence to:

Grainger Parts
 P.O. Box 3074
 1657 Sherman Road
 Northbrook, IL 60065-3074 U.S.A.

BURNER DRAWER – COMMON PARTS:

4. Burner Springs
5. Main Burner Orifice
6. Transformer/Junction Box
7. Pilot Tubing
15. Main Burners
16. Burner Manifold
17. Air Shutters

CONTROLS:

- 8A. Main Gas Valve (Honeywell)
- 8B. Main Gas Valve (White Rodgers)
9. Honeywell Ignitor
10. Honeywell Pilot Burner
- 13.* High Limit
- 14.† Blocked Vent (Spill) Switch
22. Fan Time Delay Switch

(*) This safety device is located on the rear header plate of heat exchanger (inlet air side).
 (†) This safety device access is located in the upper right corner of the right side jacket panel.

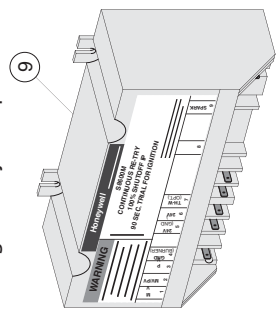
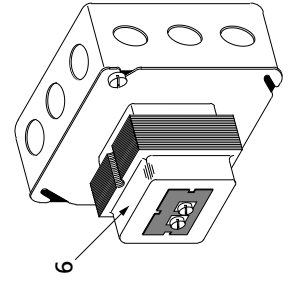
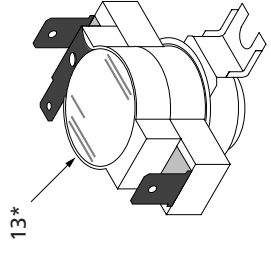
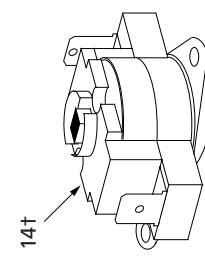
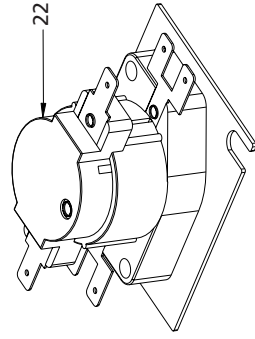
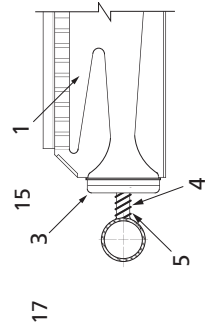
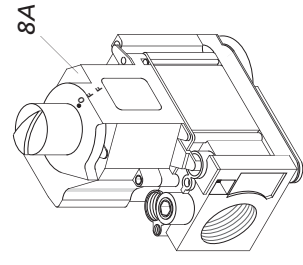
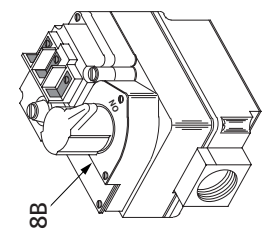
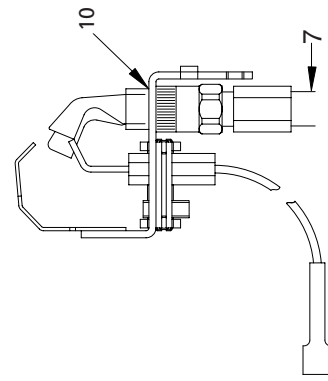
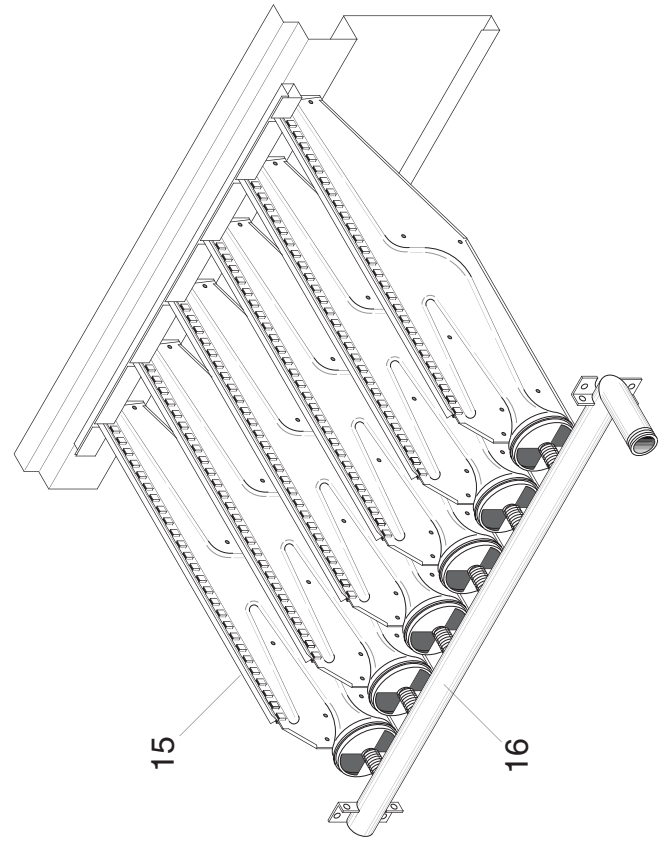


Figure 9 – Burner Components – Intermittent Pilot Ignition
 Also refer to Figures 1B, 11, 12 and 13 for component locations.

Repair Parts List

Ref. No.	Description	Gas Type	Unit Size MBH													
			30	45	60	75	100	125	150	175	200	225	250	300	350	400
6	Transformer, 115/24, 40VA		J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076	J14R03076
7	Pilot Tubing, Auto Spark		257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001	257R04945-001
8A	Honeywell	Nat.	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001	J28R02080-001
	Gas Valve, Auto Spark	LP	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005	J28R02080-005
*88	White-Rodgers Gas Valve, Auto Spark	Nat.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	S8600M Ignitor	Nat.	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722
9	S8600M Ignitor	LP	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722	J28R02722
10	Pilot Burner	Nat.	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001	J38R04578-001
	LP		J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002	J38R04578-002

NOTE:
 (N/A) = Not Applicable
 (*) Alternate

For Repair Parts, call 1-800-323-0620

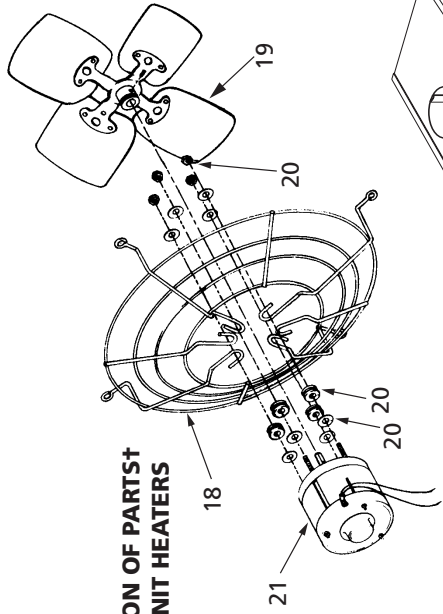
24 hours a day - 365 days a year

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

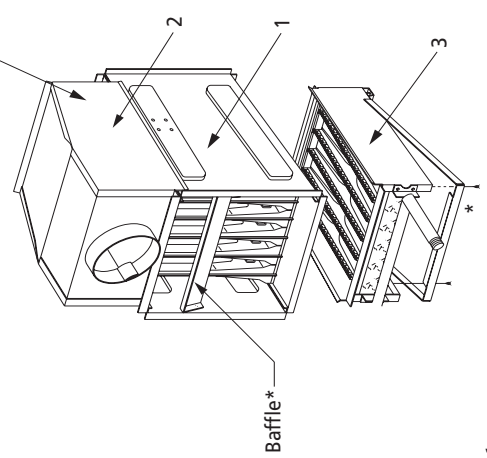
Address parts to:
 Grainger Parts
 P.O. Box 3074
 1657 Shermer R.
 Northbrook, IL

IDENTIFICATION OF PARTS† PROPELLER UNIT HEATERS



- 19 Fan blade
- 20 Hardware
- 21 115/160 Motor
- 18 Fan guard

Figure 10 - Fan/Guard/Motor Assembly



- 1. Heat exchanger
- 2. Draft diverter
- 3. Burner drawer
- 14. Blocked vent (spill) switch location

Figure 12 - Internal Furnace Components
 (†) Additional components are identified throughout this manual.
 (*) 225-400 unit sizes only require a baffle.

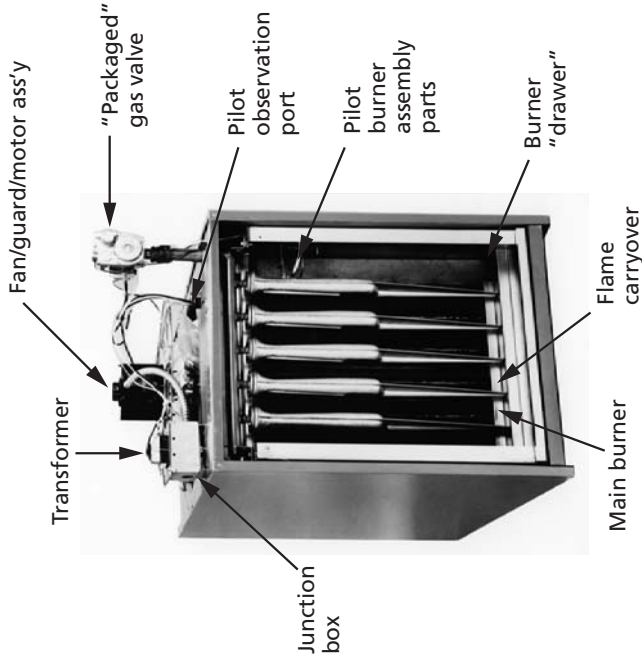


Figure 11 - Components Parts

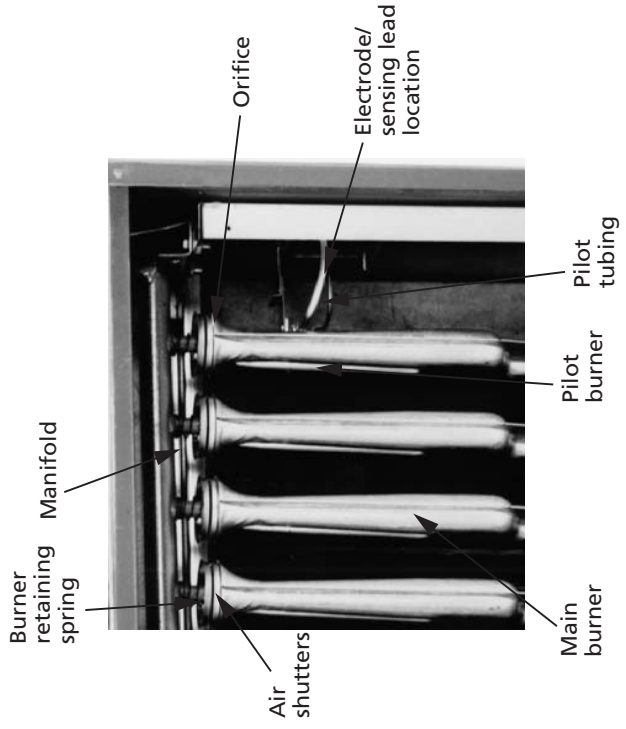


Figure 13 - Burner Assy' Parts

Dayton® Gas Unit Heaters with Electronic Ignition

Troubleshooting Chart

Symptom	Possible Cause(s)	Corrective Action
Flame lifting from burner ports	<ol style="list-style-type: none"> 1. Pressure regulator set too high 2. Defective regulator 3. Burner orifice too large 	<ol style="list-style-type: none"> 1. Reset manifold pressure. Refer to "Operation" 2. Replace regulator section of combination gas valve or complete valve 3. Check with local gas supplier for proper orifice size and replace. Refer to "Operation"
Flame pops back	<ol style="list-style-type: none"> 1. Excessive primary air 2. Burner orifice too small 	<ol style="list-style-type: none"> 1. Close air shutter. Refer to "Operation" 2. Check with local gas supplier for proper orifice size and replace. Refer to "Operation"
Noisy flame	<ol style="list-style-type: none"> 1. Too much primary air 2. Noisy pilot 3. Irregular orifice causing whistle or resonance 4. Excessive gas input 	<ol style="list-style-type: none"> 1. Close air shutter 2. Reduce pilot gas. Refer to "Operation" 3. Replace orifice 4. Reset manifold pressure. Refer to "Operation"; Replace regulator section of combination gas valve or complete valve; or Check with local gas supplier for proper orifice size and replace. Refer to "Operation"
Yellow tip flame (some yellow tipping on propane gas is permissible)	<ol style="list-style-type: none"> 1. Insufficient primary air 2. Clogged main burner ports 3. Misaligned orifices 4. Clogged draft hood 5. Air shutter linted 6. Insufficient combustion air 	<ol style="list-style-type: none"> 1. Open air shutters. Refer to "Operation" 2. Clean main burner ports 3. Replace manifold assembly 4. Clean draft hood 5. Check for dust or lint at air mixer opening and around the air shutter 6. Clean combustion air inlet openings in bottom panel, see "Installation"
Floating flame	<ol style="list-style-type: none"> 1. Blocked venting 2. Insufficient combustion air 3. Blocked heat exchanger 4. Air leak into combustion chamber or draft hood 	<ol style="list-style-type: none"> 1. Clean flue. Refer to "Installation" 2. Clean combustion air inlet openings in bottom panel, see "Installation" 3. Clean heat exchanger 4. Determine cause and repair accordingly
Gas Odor	<ol style="list-style-type: none"> 1. Shut off gas supply immediately 2. Blocked heat exchanger/venting 3. Drafts around heater 4. Negative Pressure in building 5. Blocked draft hood 	<ol style="list-style-type: none"> 1. Inspect all gas piping and repair 2. Clean heat exchanger/flue 3. Eliminate drafts. Refer to "Installation" 4. See "Installation" 5. Clean draft hood

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Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
Delayed ignition	<ol style="list-style-type: none"> Excessive primary air Main burner ports clogged near pilot Pressure regulator set too low Pilot decreases in size when main burners come on Pilot flame too small Drafts around heater Improper venting 	<ol style="list-style-type: none"> Close air shutter. Refer to "Operation" Clean main burner ports Reset manifold pressure. Refer to "Operation" Supply piping is inadequately sized. Refer to "Installation" Clean pilot orifice. Refer to "Operation" Eliminate drafts. Refer to "Installation" Refer to "Installation"
Failure to ignite	<ol style="list-style-type: none"> Main gas off Lack of power at unit Thermostat not calling for heat Defective limit switch Improper thermostat or transformer wiring at gas valve Tripped block vent (spill) switch Defective gas valve Defective thermostat Defective transformer Loose wiring Defective ignition control 	<ol style="list-style-type: none"> Open all manual gas valves Replace fuse or turn on power supply Turn up thermostat Check limit switch with continuity tester. If open, replace limit switch Check wiring per diagrams Check blocked vent (spill) switch and reset. See "Venting" Replace gas valve Check thermostat and replace if defective Be sure 115 volts is supplied to the transformer primary, then check for 24 volts at secondary terminal before replacing Check and tighten all wiring connections per diagrams Replace, if necessary. Also see W, X & Y symptoms
Condensation of water vapor	Improper venting	Refer to "Installation" and "Venting"
Burner won't turn off	<ol style="list-style-type: none"> Poor thermostat location Defective thermostat Improper thermostat or transformer wiring at gas valve Short circuit Defective or sticking gas valve Excessive gas supply pressure 	<ol style="list-style-type: none"> Relocate thermostat away from drafts Replace thermostat Check wiring per diagrams Check operation at valve. Look for short (such as staples piercing thermostat wiring), and correct Replace gas valve Refer to "Operation"

Dayton® Gas Unit Heaters with Electronic Ignition

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
Rapid burner cycling	1. Loose electrical connections at gas valve or thermostat	1. Tighten all electrical connections
	2. Excessive thermostat heat anticipator	2. Adjust thermostat heat anticipator for longer cycles. Refer to "Operation"
	3. Unit cycling on high limit	3. Check for proper air supply across heat exchanger
	4. Poor thermostat location	4. Relocate thermostat. (Do not mount thermostat on unit)
	5. Draft on Pilot	5. Eliminate drafts. Refer to "Installation"
	6. Defective ignitor control	6. Replace ignitor
	7. Unit cycling on high limit	7. Check for proper air supply across heat exchanger
	8. Defective high limit switch	8. Jumper limit switch terminals 1 and 2. If burner operates normally, replace switch
Noise/vibration	1. Fan blades loose	1. Replace or tighten
	2. Fan blades dirty or unbalanced	2. Clean or replace fan blade
	3. Vibration isolators deteriorated	3. Replace vibration isolators
	4. Bearings are dry	4. Oil bearings on fan motor. (Refer to label on motor)
	5. Non-level mounting	5. Ensure level mount side to side and front to back
Pilot will not light or will not stay lit	1. Main gas off	1. Open all manual gas valves.
	2. Pilot adjustment screw turned too low on combination/automatic main gas valve	2. Increase size of pilot flame. Refer to "Operation"
	3. Air in gas line	3. Purge air from gas supply
	4. Incorrect lighting procedure	4. Follow lighting instruction label adjacent to gas valve
	5. Dirt in pilot orifice	5. Remove pilot orifice. Clean with compressed air or solvent. (Do not ream)
	6. Extremely high or low gas pressure	6. Refer to "Operation"
	7. Drafts around unit	7. Eliminate drafts. Refer to "Installation"
	8. Pilot valve not opening (faulty wiring)	8. Inspect and correct all wiring
	9. No spark (faulty wiring)	9. Inspect and correct ignition system wiring. See symptoms W, X & Y
	10. Defective gas valve	10. Replace

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Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
Fan will not run	<ol style="list-style-type: none"> Loose wiring Defective motor overload protector or defective motor Defective fan switch 	<ol style="list-style-type: none"> Check and tighten all wiring connections per diagrams. Thermostat wires tagged "W" and "G" must be connected together (unless special thermostats are used; if so, see thermostat wiring diagram). See "Electrical Connections" Replace motor Check for 24 V across H terminals on fan time delay switch. If 24 V is present, jumper terminals numbered 1 and 3. If motor runs, the fan switch is defective and must be replaced. If 24 V is not present, check wiring per diagrams
Fan motor turns on and off while burner is operating	<ol style="list-style-type: none"> Fan switch heater element improperly wired Defective fan switch Motor overload protector cycling on and off Motor not properly oiled 	<ol style="list-style-type: none"> Be sure fan switch heater terminals are connected per diagrams Replace fan switch Check motor amps against motor name plate rating, check voltage, replace fan motor if defective Refer to label on motor
Fan motor will not stop	<ol style="list-style-type: none"> Improperly wired fan control Main burners not lighting while thermostat calls for heat Defective fan switch 	<ol style="list-style-type: none"> Check all wiring Refer to H & N symptoms Replace fan switch
	<ol style="list-style-type: none"> Incorrect gas input Heater undersized Thermostat malfunction Heater cycling on limit control 	<ol style="list-style-type: none"> Refer to "Operation" This is especially true when the heated space is enlarged. Have the heat loss calculated and compare to the heater output (80% of input). Your gas supplier or installer can furnish this information. If heater is undersized, add additional heaters Replace thermostat There should be NO ducts attached to the front of this heater. Check air movement through heat exchanger. Check voltage to fan motor. Clean fan blade and heat exchanger and oil fan motor

Dayton® Gas Unit Heaters with Electronic Ignition

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
Too much heat	<ol style="list-style-type: none"> 1. Thermostat malfunction 2. Heater runs continuously 	<ol style="list-style-type: none"> 1. Replace thermostat 2. Check wiring per diagrams; Check operation at valve. Look for short (such as staples piercing thermostat wiring), and correct; Replace gas valve; Refer to "Operation"
Cold air is delivered on start up	Fan switch heater element improperly wired	Be sure fan switch heater terminals are connected per diagrams
Cold air is delivered during heater operation	<ol style="list-style-type: none"> 1. Incorrect manifold pressure or input 2. Voltage to unit too high 3. Air throughput too high 	<ol style="list-style-type: none"> 1. Refer to "Operation" 2. Check motor voltage with fan running. Should be 115 volts AC 3. Refer to "Operation"
NO Spark	<ol style="list-style-type: none"> 1. Thermostat not calling for heat 2. No low voltage 3. Spark gap closed or too wide 4. Broken or cracked ceramic on spark electrode 	<ol style="list-style-type: none"> 1. Close thermostat contacts 2. Check for 24 V across 24 V terminals of S8600 3. Set gap to 0.1" 4. Replace pilot assembly
Spark present but pilot does not light.	<ol style="list-style-type: none"> 1. Loose S8600 connections 2. Improper gas pressure 3. Is spark in pilot gas stream? 4. No pilot gas – do not use match to test – presence of gas is easily detected by the odor 	<ol style="list-style-type: none"> 1. Check all connections, term. PV feeds 24 V to pilot valve 2. Check pressure – pressure that is either too high or too low may cause a problem 3. Spark should arc from electrode 4. Check pilot line for kinks. Insure there are no drafts
Pilot lights – Main valve does not energize.	<ol style="list-style-type: none"> 1. Loose S8600 connections 2. Cracked or broken sensor ceramic 3. Check sensor/spark lead for continuity 4. Measure 24 volts from term. MV to term. MV/PV 	<ol style="list-style-type: none"> 1. Check connections, term. MV feeds main valve 2. Replace pilot assembly 3. Replace if needed 4. If present, replace main valve; if not, replace S8600 Igniter
Hi-Limit switch tripping	<ol style="list-style-type: none"> 1. Vertical run of flue is too short 2. Unit is overfiring 3. Air flow too low 4. Defective switch 	<ol style="list-style-type: none"> 1. Lengthen vertical run of flue pipe (See "Venting") 2. Manifold pressure is too high; adjust. Burner orifices may be too large: verify/replace if required 3. Increase air flow; check fan size. Check for proper voltage 4. Replace

Models 3E366E thru 3E368E, 3E369D thru 3E388D, 3E406D and 3E407D

LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY. Dayton® Gas Unit Heaters with Electronic Ignition, models covered in this manual, are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase, with an additional nine-year warranty on the heat exchanger, draft diverter and burners. This warranty does not cover damage caused by operating the unit in a corrosive atmosphere containing chlorinated or halogenated hydrocarbon vapors or any other damaging chemical compounds. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.

LIMITATION OF LIABILITY. To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to and shall not exceed the purchase price paid.

WARRANTY DISCLAIMER. Dayton has made a diligent effort to provide product information and illustrate the products in this literature accurately; however, such information and illustrations are for the sole purpose of identification, and do not express or imply a warranty that the products are MERCHANTABLE, or FIT FOR A PARTICULAR PURPOSE, or that the products will necessarily conform to the illustrations or descriptions. Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in the "LIMITED WARRANTY" above is made or authorized by Dayton.

PRODUCT SUITABILITY. Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, review the product applications, and all applicable national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

PROMPT DISPOSITION. Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Niles, Illinois 60714 U.S.A.

GAS EQUIPMENT START-UP

Customer _____ Job Name & Number _____

PRE-INSPECTION INFORMATION

With power and gas off

Type of Equipment: Unit Heater

Serial Number _____ Model Number _____

Name Plate Voltage: _____ Name Plate Amperage: _____

Type of Gas: Natural LP Tank Capacity _____ lbs. Rating: _____ BTU @ _____ °F
_____ kg _____ kW @ _____ °C

- Are all panels, doors, vent caps in place?
- Has the unit suffered any external damage? Damage _____
- Does the gas piping and electric wiring appear to be installed in a professional manner?
- Has the gas and electric been inspected by the local authority having jurisdiction?
- Is the gas supply properly sized for the equipment?
- Were the installation instructions followed when the equipment was installed?
- Have all field installed controls been installed?
- Do you understand all the controls on this equipment? **If not, contact your wholesaler or rep.**
(DO NOT START this equipment unless you fully understand the controls.)

GENERAL

With power and gas off.

- Make certain all packing has been removed.
- Tighten all electrical terminals and connections.
- Check damper linkages for tightness.
- Check all fans & blowers for free movement.
- Check all controls for proper settings.

GAS HEATING

With power and gas on.

- Inlet gas pressure. _____ in. W.C. or _____ kPa
- Pilot & main burner ignition.
- Manifold gas pressure. _____ in. W.C. or _____ kPa
- Cycle on HIGH LIMIT.
- Cycle firestat and/or freezestat.
- Check electronic modulation. Set at: _____
- Check mechanical modulation. Set at: _____
- Cycle and check all other controls not listed.
- Check operation of remote panel.
- Entering air temp. _____ °F or _____ °C
- Discharge air temp. (high fire) _____ °F or _____ °C
- External static pressure _____ in. W.C.
- Cycle by thermostat or operating control.

Remarks: _____

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