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.

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Description

Dayton residential/commercial tubular gas fired unit heaters are factory assembled, power vented, low static pressure type propeller fan unit heater designed to be suspended within the space to be heated. THESE HEATERS ARE NOT TO BE CONNECTED TO DUCTWORK. These Residential/Commercial Tubular Unit Heaters are design certified under ANSI Z83.8 for Industrial/Commercial use and CSA .10.96 U.S. (2nd ed.) "Unit Heaters for Residential Installations". The designs are certified by ETL as providing a minimum of 82+% thermal efficiency, and approved for use in California. **Do not alter these units in any way.** If you have any questions after reading this manual, contact the manufacturer. See identification of parts throughout this manual.

FOR YOUR SAFETY

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

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

Do not try to light any appliance.
Do not touch any electrical switch; do not use any phone in your building.
Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
If you cannot reach your gas supplier, call your fire department.

⚠ 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.

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.

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.

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 problem that may be found.**

Figure 1 – Tubular 30 thru 120 Propeller Unit Heaters

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.

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Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters
(For Residential and Commercial Installations)

ENGLISH

Specifications

Table 1 – Performance and Dimensional Data – Tubular 30 thru 120 Propeller Unit Heater – Refer to Figure 2

Unit Size Model Numbers Type of Gas Nat. Type of Gas L.P.	30 2RYU7 2RYV5	45 2RYU8 2RYV6	60 2RYU9 2RYV7	75 2RYV1 2RYV8	90 2RYV2 2RYV9	105 2RYV3 2RYW1	120 2RYV4 2RYW2
PERFORMANCE DATA†							
Input – BTU/Hr.	30,000	45,000	60,000	75,000	90,000	105,000	120,000
(kW)	(8.8)	(13.2)	(17.6)	(22.0)	(26.4)	(30.8)	(34.2)
Output – BTU/Hr.	24,900	37,350	49,800	61,500	73,800	86,100	98,400
(kW)	(7.2)	(10.9)	(14.5)	(18.0)	(21.6)	(25.2)	(28.8)
Thermal Efficiency (%)	83	83	83	82	82	82	82
Free Air Delivery – CFM	370	550	740	920	1,100	1,300	1,475
(cu. m/s)	(.175)	(.260)	(.349)	(.434)	(.519)	(.614)	(.696)
Air Temperature Rise – Deg. F	60	60	60	60	60	60	60
(Deg. C)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
Full Load Amps at 120 V	3.0	3.0	4.1	4.1	6.4	6.4	6.4
Maximum Circuit Capacity	3.5	3.5	4.8	4.8	7.5	7.5	7.5
MOTOR DATA: Motor HP	1/20	1/20	1/12	1/12	1/10	1/10	1/10
Motor (kW)	(0.04)	(0.04)	(0.06)	(0.06)	(0.075)	(0.075)	(0.075)
Motor Type	SP	SP	SP	SP	SP	SP	SP
R.P.M.	1650	1650	1050	1050	1050	1050	1050
Motor Amps @ 115 V	1.9	1.9	2.6	2.6	4.2	4.2	4.2
DIMENSIONAL DATA – in. (mm)							
"A" Jacket Height	12 3/8	12 3/8	15 7/8	15 7/8	22 5/8	22 5/8	22 5/8
	(314)	(314)	(403)	(403)	(574)	(574)	(574)
"B" Overall Height	13 1/4	13 1/4	16 13/16	16 13/16	23 9/16	23 9/16	23 9/16
	(337)	(337)	(427)	(427)	(598)	(598)	(598)
"C" Overall Depth	25 7/8	25 7/8	26 3/16	26 3/16	26 3/8	26 3/8	26 3/8
	(632)	(632)	(665)	(665)	(670)	(670)	(670)
"D1" Center Line Height of Flue*	8 1/2	8 1/2	10 3/8	10 3/8	13 5/8	13 5/8	13 5/8
	(216)	(216)	(263)	(263)	(346)	(346)	(346)
"D2" Center Line Height of Air Intake	8 1/2	8 1/2	8	8	8 5/8	8 5/8	8 5/8
	(216)	(216)	(203)	(203)	(219)	(219)	(219)
"E" Fan Dimension	10	10	14	14	16	16	16
	(254)	(254)	(356)	(356)	(406)	(406)	(406)
"F" Discharge Opening Height	10 13/16	10 13/16	14 7/16	14 7/16	21 3/16	21 3/16	21 3/16
	(275)	(275)	(367)	(367)	(538)	(538)	(538)
"G" Flue Vent Connection Diameter (Min.)	4	4	4	4	4	4	4
	(102)	(102)	(102)	(102)	(102)	(102)	(102)
"H1" Center Line of Flue Connection From Side	7 1/4	7 1/4	7 1/4	7 1/4	7 3/4	7 3/4	7 3/4
	(184)	(184)	(184)	(184)	(197)	(197)	(197)
"H2" Center Line of Air Intake From Side	2 3/4	2 3/4	2 3/4	2 3/4	3 1/2	3 1/2	3 1/2
	(70)	(70)	(70)	(70)	(89)	(89)	(89)
Vent Size Requirements							
	(102)	(102)	(102)	(102)	(127)	(127)	(127)
Category III Horizontal	4	4	4	4	4	4	4
	(102)	(102)	(102)	(102)	(102)	(102)	(102)
Category I & III Vertical	4	4	4	4	4	4	4
	(102)	(102)	(102)	(102)	(102)	(102)	(102)
Vent Size Requirements – Separated Combustion							
Exhaust Diameter	4	4	4	4	5	5	5
	(102)	(102)	(102)	(102)	(127)	(127)	(127)
Intake Air Diameter	4	4	4	4	5	5	5
	(102)	(102)	(102)	(102)	(127)	(127)	(127)
Unit Weight –lbs.	60	65	80	85	95	105	110
(kgs)	(27)	(29)	(36)	(39)	(43)	(48)	(50)
Shipping Weight – lbs.	70	75	90	95	110	115	120
(kgs)	(32)	(34)	(41)	(43)	(50)	(52)	(54)

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

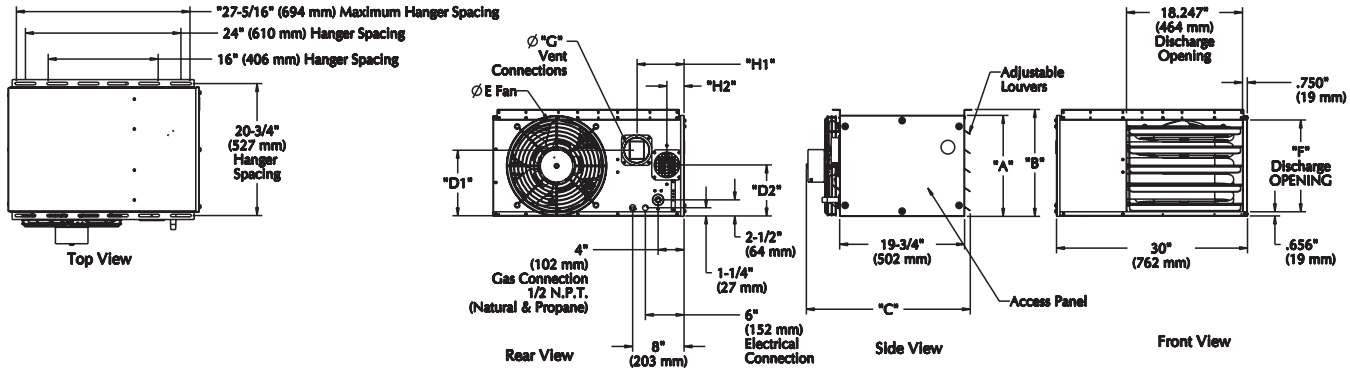
* For all installations, the flue collar is included with the unit and should be field installed per the instructions included with the unit.

† Ratings shown are for unit installations at elevations between 0 and 2,000 ft (0 to 610m). For unit installations in U.S.A. above 2,000 ft. (610m), the unit input must be field derated 4% for each 1,000 ft. (305m) above sea level; refer to local codes, or in absence of local codes, refer to the latest edition of the National Fuel Gas Code, ANSI Standard Z223.1 (N.F.P.A. No. 54), (also refer to Table 8).

For installations in Canada, any reference to deration at altitudes in excess of 2,000 ft. (610m) are to be ignored. At altitudes of 2,000 ft. to 4,500 ft. (610 to 1372m), the unit must be field derated and be so marked in accordance with the ETL certification. See Table 8 for U.S.A. and Canadian field deration information.

Models 2RYU7 thru 2RYW2

Specifications (Continued)



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

Figure 2 – Dimensional Drawing – Tubular 30 thru 120 Propeller Unit Heater

General Safety Information

INSTALLATION CODES

The following terms are used throughout this manual, in addition to ETL 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.

SPECIAL PRECAUTIONS

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

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

Installation must be made in accordance with local codes, or in absence of local codes, with the latest edition of ANSI Standard Z223.1 (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 CSA Information Services 1-800-463-6727. The NFPA Standards are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

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

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

General Safety Information (Continued)

⚠ 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 ***Ensure 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 the latest addition of National Electrical Code ANSI/NFPA No. 70. In Canada, all external wiring must conform to the Canadian Electrical 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. Also follow procedures listed on "Gas Equipment Start-Up Sheet" located in this manual.

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 risk of gas leaks, carbon monoxide poisoning, and explosion.

⚠ WARNING ***Conversion to a fuel other than that listed on the rating plate is permitted only with a factory supplied, ETL approved conversion kit.***

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 above. 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 ground conductor between the service panel and the heater. To ensure a proper ground, the grounding means must be tested by a qualified electrician.

Do not insert fingers or foreign objects into heater or its 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.

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

⚠ WARNING ***Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.***

⚠ 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 the 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 foot = 0.305 m
1 inch = 25.4 mm
1 gallon = 3.785 L
1 pound = 0.453 kg
1 psiG = 6.894 kPa
1 cubic foot = 0.028 m^3
1000 BTU/cu. ft. = 37.5 MJ/m^3
1000 BTU per hour = 0.293 kW
1 inch water column = 0.249 kPa
liter/second = CFM x 0.472
meters/second = FPM ÷ 196.8

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.***

Models 2RYU7 thru 2RYW2

Installation (Continued)

Since 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. Basic rules are as follows:

MOUNTING HEIGHT

If the unit heater is installed in a garage, it must be installed with a minimum clearance above the floor of 18 inches (457 mm).

AIR DISTRIBUTION

Direct air towards 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.

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.

⚠ WARNING ***Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and replace any gas control which has been underwater.***

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 air 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 (NFPA 54) 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 vertical walls and the vertical sides of the unit heater shall be no less than 1 inch (25.4 mm). However, to ensure access to the control box and fan, a minimum of 18" (457 mm) is required for the control box side. A minimum clearance of 1 inch (25.4 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 1 inch (25.4 mm) from any combustible. The distance between the flue collector and any combustible must be no less than 1 inch (25.4 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.

HEATER MOUNTING

Unit heater may be mounted with the vent outlet, gas and electrical connections to the right or left of the air moving fan. The Unit Heater is shipped with the connections to the right of the fan when looking in the direction of the air flow. If connections to the right are required, remove the (4) screws from the front top edge and the (5) screws from the rear top edge of the heater. Mount the hanging brackets (shipped loose in bottom of the carton) using the removed screws. If connections to the left are required, invert the heater (180°), mount the hanging brackets as above, and remove, invert, and replace the control access panel and the air discharge louvers.

Unit heater may be mounted by fastening the hanging brackets directly to ceiling joists or by suspending from four rods (See Figures 3A, 3B and 3C).

⚠ WARNING ***Make certain that the lifting methods used to lift the heater and the method of suspension used in the field installation of the heater are capable of uniformly supporting the weight of the heater at all times. Failure to heed this warning may result in property damage or personal injury!***

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Installation (Continued)

⚠ WARNING ***Make sure that the structure to which the unit heater is to be mounted is capable of safely supporting its weight. Under no circumstances must the gas lines, the 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 the electrical conduit for support. Failure to heed these warnings may result in property damage, personal injury, or death.***

⚠ CAUTION ***Unit Heaters must be hung level from side to side and from front to back (See Figures 3A, 3B and 3C). Failure to do so will result in poor performance, noisy operation or premature failure of the unit.***

⚠ WARNING ***Ensure 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 3A, 3B, and 3C for suspension of units.

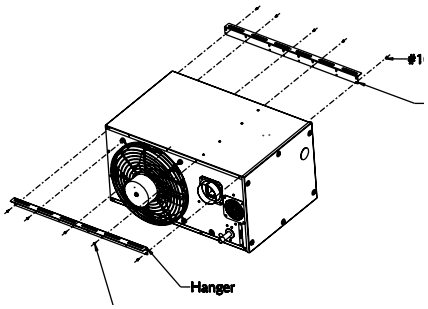


Figure 3A – Low profile tubular units – 30/120 MBH sizes (*Hanger bracket installation instructions)

(*) Install front and rear hangers as shown using existing #10 x 1/2" screws.

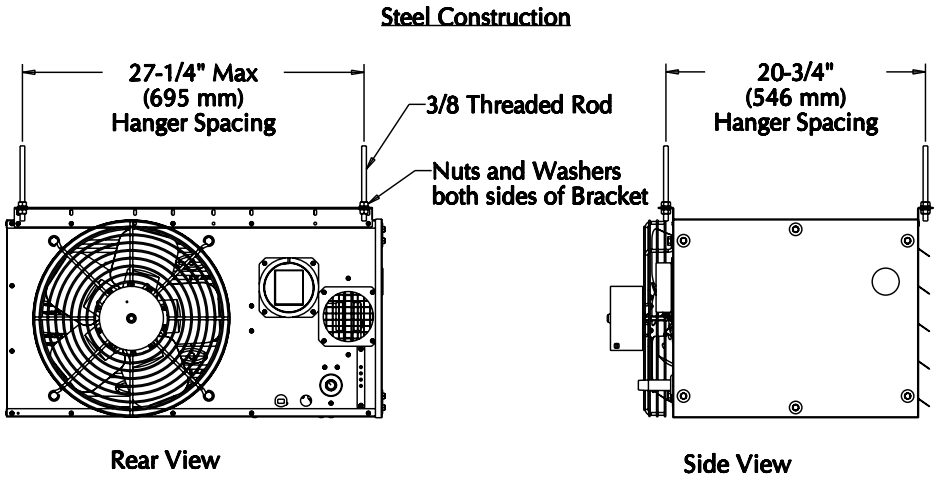


Figure 3B – Heater Mounting (Steel Construction)

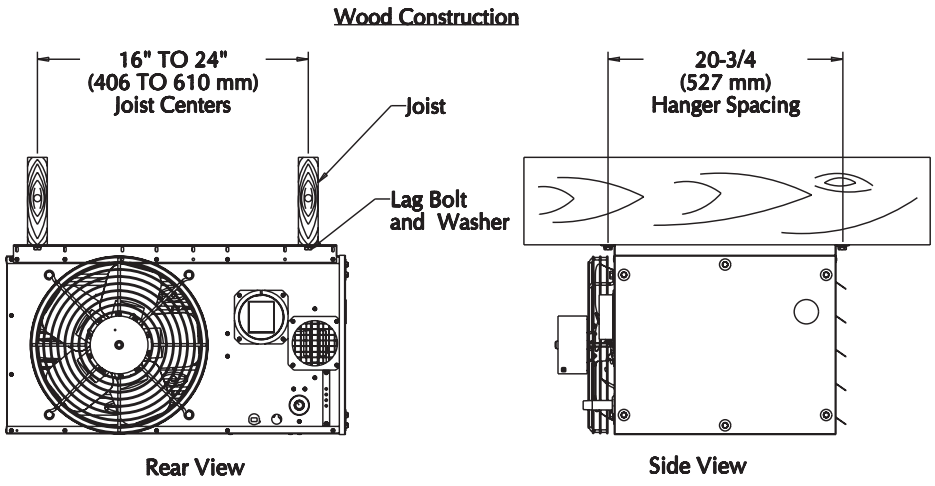


Figure 3C – Heater Mounting (Wood Construction)

Models 2RYU7 thru 2RYW2

Installation (Continued)

GAS PIPING

⚠ WARNING ***To avoid 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 gas valve to excessive pressure and damage.***

PIPE SIZING

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

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

$$\text{Cu. ft./hr.} = \frac{\text{Input BTU/Hr.}}{\text{1000 BTU/Cu. Ft.}}$$

2. Refer to Table 2. Match "Length of Pipe in Feet" with appropriate "Gas Input – Cu. Ft./Hr." figure. This figure can then be matched to the pipe size in the first column of table.
   Example:
   It is determined that a 67 foot (20.4 m) run of gas pipe is required to connect a 75 MBTU gas unit heater to a 1,000 BTU/cu. ft. (0.29 kW) natural gas supply.

$$\frac{\text{75,000 BTU/Hr.}}{\text{1,000 BTU/cu. ft.}} = \text{75 Cu. ft./hr.}$$

   Using Table 2, a 3/4 inch pipe is needed.

NOTE: See "General Safety Information" section for English/Metric unit conversion factors.

NOTE: If more than one 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 LP GAS

Table 2 – 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)
1¼	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)
1½	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)
2½	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:
1. Determine the required Cu. Ft./Hr. by dividing the Btu./Hr. input by 1000. For SI/Metric measurements: Convert Btu./Hr. to kilowatts. Multiply the unit input (kW) by 0.0965 to determine Cubic Meters/Hour.
2. For Natural Gas: Select the pipe size directly from the table.
3. For Propane Gas: Multiply the Cu. Ft./Hr. value by 0.633; then use the table.
4. Refer to the metric conversion factors listed in "General Safety" section for SI unit measurement conversions.

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Installation (Continued)

DEALER OR INSTALLER. HE 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 THE HEATER; AND THAT IT IS PROPERLY CONNECTED TO THE PROPANE GAS SUPPLY SYSTEM.

NOTE: Propane tank must be properly sized for outdoor temperature and BTU requirement. (See NFPA 58.)

Before any connection is made to the existing line supplying other gas appliances, contact the local gas company to make sure 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 manifold pressure and gas supply pressure. Each unit heater must be connected to a gas supply capable of supplying its full rated capacity as specified in Table 3. A field LP tank regulator must be used to limit the supply pressure to a 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, (NFPA 54) National Fuel Gas Code; in Canada, according to CSA-B149. See Tables 1 & 2 for correct gas 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. Standard unit heaters are supplied with a combination valve which includes:
   a. Manual “A” valve
   b. Manual “B” valve
   c. Solenoid valve
   d. Pressure regulator

   Pipe directly into the combination valve (See Figure 4).
6. Gas valve has a pressure test post requiring a 3/32” hex head wrench to read gas supply and manifold pressures. Open 1/4 turn counterclockwise to read, turn clockwise to close and reseat. A 5/16” ID hose fits the pressure post.
7. 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 servicing. The manual shutoff valve must be located external to the jacket (See Figure 4).
8. Make certain that all connections have been adequately doped and tightened.

Table 3

Gas Piping Requirements*		
Gas Type	**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 altitudes below 2,001 feet.

⚠ CAUTION ***Do not over tighten the inlet gas piping into the valve. This may cause stresses that will 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!***

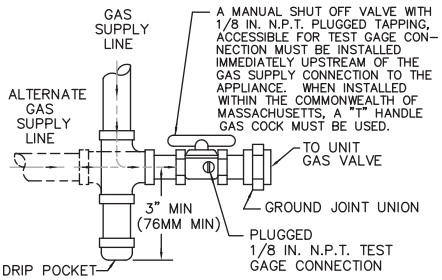


Figure 4 – Pipe Installation, Standard Controls

⚠ WARNING ***Never use an open flame to detect gas leaks. Explosive conditions may exist which may 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 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).

Models 2RYU7 thru 2RYW2

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 nameplate and electrical rating of 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 National 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 terminals to check for power. Use a voltmeter.***

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 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 of the National Electrical Code, ANSI/NFPA No. 70, or CSA Standard C22.1. Refer to Figures 5A, 5B, and 5C.

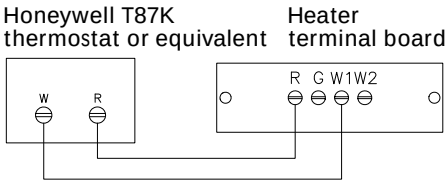


Figure 5A – Two-wire Thermostat

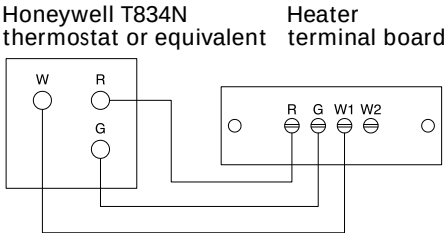


Figure 5B – Three-wire Thermostat

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 the operation of the control.
3. Dead Areas – Areas where the air cannot circulate freely, such as behind doors or in corners.

NOTE: The start-up fan delay should not exceed 30 seconds from a cold start.

IMPORTANT: For all wiring connections, refer to the wiring diagram on your unit (either affixed to the side jacket or enclosed in the installation instructions 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.

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Electrical Connections (Continued)

NOTE: See Figures 5A and 5B for connecting the thermostat to the unit heater. If using a standard low voltage (24 V) thermostat with a sub-base switch for fan control, connect the G terminal of the thermostat to the G terminal of the unit heater.

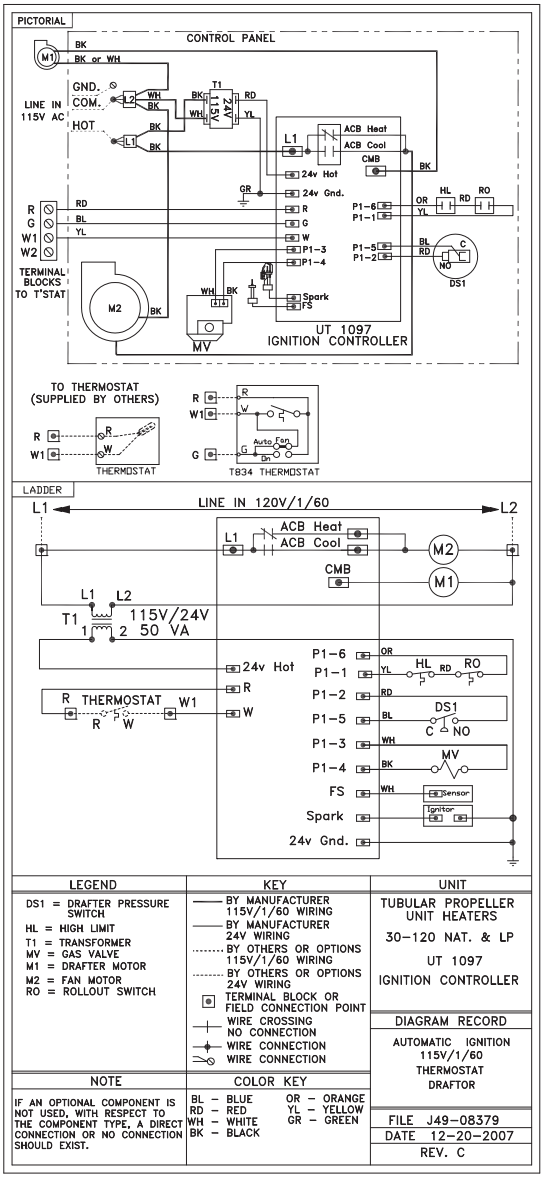


Figure 5C – Tubular Propeller Units 30 thru 120 with Natural and Propane (LP) Gas with Single Stage Gas

Models 2RYU7 thru 2RYW2

Venting

ALL UNIT HEATERS MUST BE VENTED!

All venting installations shall be in accordance with the latest edition of Part 7, Venting of Equipment of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54), or applicable provisions of local building codes. All venting of residential tubular unit heaters must comply with CSA International requirement 10.96 U.S. for Unit Heaters for Residential Use (2nd edition).

ADDITIONAL REQUIREMENTS FOR CANADIAN INSTALLATIONS

The following instructions apply to Canadian installations in addition to all other installation and operating instructions noted within this manual:

1. Installation must conform with local building codes, or in the absence of local codes, with current CSA-B149.1, Installation Codes for Natural Gas Burning Appliances and Equipment, or CSA-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.

⚠ 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).***

⚠ WARNING ***Never use vent pipe (flue size) of a diameter other than specified in Table 1! Never use PVC, ABS or other non-metallic pipe for venting. To do so may result in serious damage to the unit, and or severe personal injury or death!***

When an existing heater is removed or replaced in venting system, the venting system may not be properly sized to vent the attached appliances. An improperly sized vent system can cause formation of condensate or leakage or spillage of flue gases.

The following steps shall be followed with each appliance connected to the venting system placed in operation, while any other appliances connected to the venting system are not in operation:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) and these instructions. Determine that there is no blockage or restriction, leakage, corrosion or other deficiencies, which could cause an unsafe condition.
3. In so far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any exhaust fans, such as range hoods and bathroom exhausts, so they shall operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace damper.
4. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so that the appliance will operate continuously.
5. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous condition of use.
6. If improper venting is observed during any of the above tests, the venting system must be corrected immediately so that the system conforms with the United States National Fuel Gas Code, ANSI Z223.1 (NFPA 54). When resizing any portion of the venting system, the venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54).

The unit heater shall be connected to a factory built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction. **Venting into an unlined masonry chimney is prohibited.**

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters
(For Residential and Commercial Installations)

ENGLISH

Venting (Continued)
VENTING CATEGORIES

ANSI now organizes vented appliances into four categories.

	Non-Condensing	Condensing
Negative Vent Pressure	I	II
Positive Vent Pressure	III	IV

Category I
Includes non-condensing appliances with negative vent pressure, like the traditional atmospheric unit heater.

Category II
Groups condensing appliances with negative vent pressure.

Category III
Appliances are non-condensing and operate with a positive vent pressure.

Category IV
Covers condensing appliances with positive vent pressure.

NOTE: Category II and IV do not apply to equipment specified within this manual.

The following guidelines apply to all categories to follow.

Table 4 - Vent Systems Termination Clearance Requirements

Structure/Object	Minimum Clearances for Termination Locations	
	USA	Canada
Door, window, or gravity vent inlet; combustion air inlet for other appliances	9 inches for 10,000 to 50,000 BTU/Hr. input; 12 inches for input exceeding 50,000 BTU/Hr.	9 inches (230mm) for 10,000 to 50,000 BTU/Hr. input; 12 inches (305mm) for input exceeding 50,000 BTU/Hr.
Forced air inlet within 10 feet	3 feet above	6 feet (1.8m)
Adjoining building or parapet	10 feet	10 feet (3.04m)
Adjacent public walkways	7 feet above grade	7 feet (2.1m) above grade
Electric, gas meters and regulators	4 feet horizontal	3 feet (0.9m) horizontally from meter/regulator assembly. 6 feet (1.8m), any direction, from a gas service regulator vent outlet
Above grade level*	1 foot	1 foot (0.3m)

*Minimum above maximum snow depth, or per local code, whichever is greater.

Do not damper or add heat recovery devices to 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.

Avoid installing units in areas under negative pressure. When required, a flue vent fan should be installed in accordance with the instructions included with the fan.

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

Maintain clearance between the vent pipe and combustible materials according to vent pipe manufacturer's instructions.

Models 2RYU7 thru 2RYW2

Venting (Continued)

STANDARD COMBUSTION VERTICALLY VENTED UNIT HEATERS (CATEGORY I) - Figure 6

Observe the following precautions when venting the unit:

1. Use flue pipe of the same size as the flue connection(s) on the gas unit heater 4" (102mm). All heaters must be vented with a UL 1738 listed, double or single wall vent, 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. All tables and dimensions assume double wall for the flue and single wall pipe or double wall for the connector.
2. **Each unit must have an individual vent pipe and vent terminal.** Unit **must not** be connected to other vent systems or to a chimney.
3. A minimum vertical rise of 5 feet (1.5m) is required for Category I venting. The top of the vent pipe should extend at least 2 feet (0.61m) above the highest point on the roof. Consideration should be made for anticipated snow depth. Install an Amerivent Americap or Metalbestos vent cap over the vent opening.
4. Slope horizontal runs upward from the gas unit heater at least 1/4-inch per foot (21mm/m) minimum. Horizontal Vent Connector length should not exceed 75% of the vertical height of the vent pipe. Maximum vent connector length is 10 feet (3m). For exceptions see Ch. 10 of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54). Horizontal portions of the venting system shall be supported at minimum intervals of 4 feet (1.2m) (in Canada, support at 3 foot intervals (1m) minimum intervals). Maintain clearance between the vent pipe and combustible materials per vent pipe manufacturer's instructions.
5. Use as few elbows as possible.
6. Seal all vent pipe joints and seams to prevent leakage. Use General Electric RTV-108, Dow-Corning RTV-732, or equivalent silicone sealant with a temperature rating of 500 deg. F, or 3M #425 aluminum foil tape (or equivalent). See Figure 6A.
7. Avoid running vent pipe through unheated spaces. When this cannot be avoided, insulate the pipe to prevent condensation of moisture on the walls of the pipe. Insulate vent pipe runs longer than 10 ft (3m). Insulation should be a minimum of 1/2" (12.7 mm) thick foil faced.

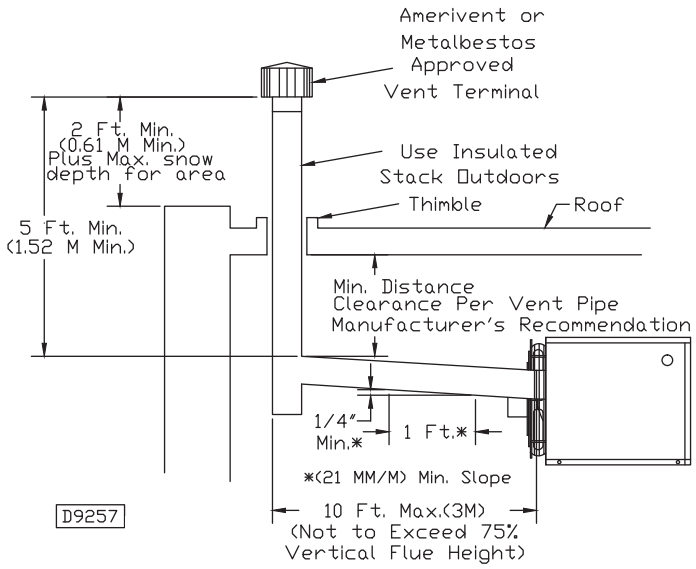


Figure 6 – Vertically Vented, Category I

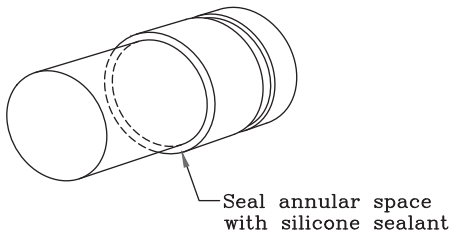


Figure 7B – Double Wall Draft Hood Connector

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters
(For Residential and Commercial Installations)

Venting (Continued)

STANDARD COMBUSTION HORIZONTALLY VENTED UNIT HEATERS (CATEGORY III) - FIGURES 7, 8A & 9A

Observe the following precautions when venting the unit:

1. Use flue pipe of the same size as the flue connection(s) on the gas unit heater, 4" (102mm). All heaters must be vented with a single or double wall pipe listed for category III positive pressure vent systems. (UL 1738 listed AL29-4C.)
2. **Each unit must have an individual vent pipe and vent terminal.** Unit MUST NOT be connected to other vent systems or to a chimney.
3. Category III units are limited to a maximum of 40 feet (12.19m) equivalent length of vent pipe. Equivalent length is the total length of straight sections PLUS 5 feet (1.5m) for each 90 degree elbow and 2.5 feet (.75m) for each 45 degree elbow.
4. An Amerivent Americap or Metalbestos vent cap must be supplied by the customer for each power vented unit. The vent pipe diameter must be 4 inches (102mm).
5. The vent terminal must be at least 12 inches (305mm) from the exterior of the wall that it passes through to prevent degradation of the building materials by flue gasses.
6. Through the wall venting for these appliances shall not terminate over public walkways, or over an area where the condensate or vapor could create a nuisance, hazard, or could be detrimental to the operation of regulators, relief valves, or other equipment, see Figures 7, 8A and 9A.
7. Maintain clearance between the vent pipe and combustible materials according to vent pipe manufacturer's. instructions.
8. The vent system must be installed to prevent collection of condensate. Pitch horizontal pipes downward 1/4 inch per foot (21mm per meter) toward the outlet for condensate drainage. Install a tee with a condensate drain at the low point of the pipe (see Figure 7). As an alternate, a 3/8 inch diameter hole may be drilled at the low point of the pipe for condensate drainage.
9. Horizontal portions of the venting system shall be supported at minimum intervals of 4 feet (1.2m) to prevent sagging (in Canada, support at 3 foot (1m) minimum intervals).
10. Avoid running vent pipe through unheated spaces. When this cannot be avoided, insulate the pipe to prevent condensation of moisture on the walls of the pipe.

Models 2RYU7 thru 2RYW2

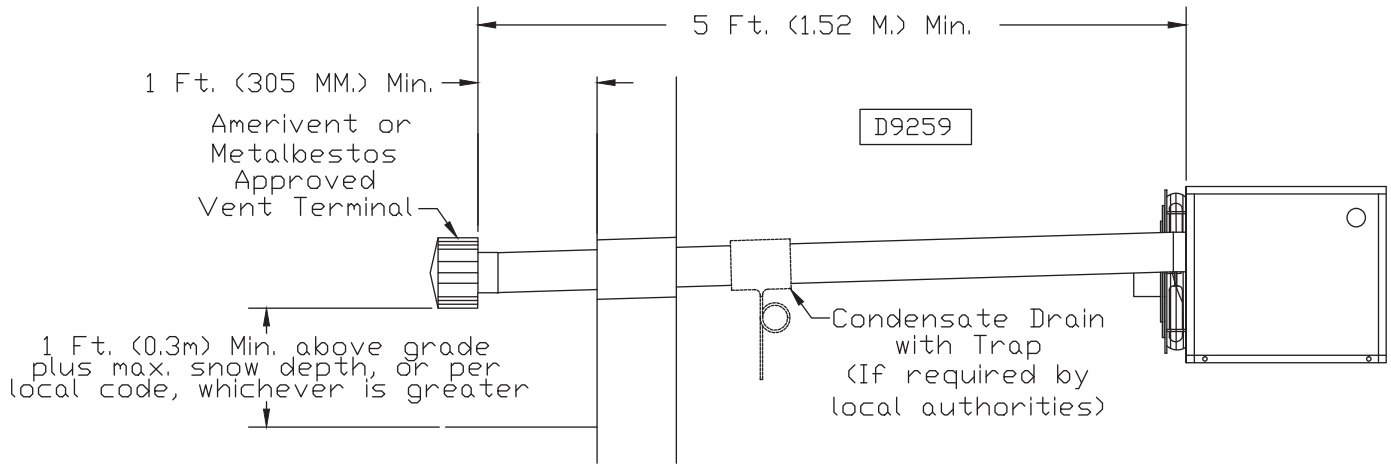


Figure 7 – Category III Horizontal Venting Requirements Using Single Wall Vent Pipe

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Venting (Continued)

STANDARD COMBUSTION VERTICALLY VENTED UNIT HEATERS (CATEGORY III) FIGURES 8, 8B & 9B

Observe the following precautions when venting the unit:

1. Use flue pipe of the same size as the flue connection(s) on the gas unit heater, 4" (102mm). All heaters must be vented with a UL 1738 listed single or double wall pipe listed for positive pressure vent systems.
2. **Each unit must have an individual vent pipe and vent terminal.** Unit MUST NOT be connected to other vent systems or to a chimney.
3. Category III units are limited to a maximum of 40 feet (12.19m) equivalent length of vent pipe. Equivalent length is the total length of straight sections PLUS 5 feet (1.5m) for each 90 degree elbow and 2.5 feet (.75m) for each 45 degree elbow.
4. The top of the vent pipe should extend at least 2 feet (0.61m) above the highest point on the roof. Consideration should be made for anticipated snow depth. Install an Amerivent Americap or Metalbestos vent cap over the vent opening. Slope horizontal runs upward from the gas unit heater at least 1/4-inch per foot (21mm/m) minimum. Horizontal portions of the venting system shall be supported at minimum intervals of 4 feet (1.2m) (in Canada, support at 3 feet (1m) minimum intervals). (See Figures 8, 8B and 9B)
5. Avoid running vent pipe through unheated spaces. When this cannot be avoided, insulate the pipe to prevent condensation of moisture on the walls of the pipe.

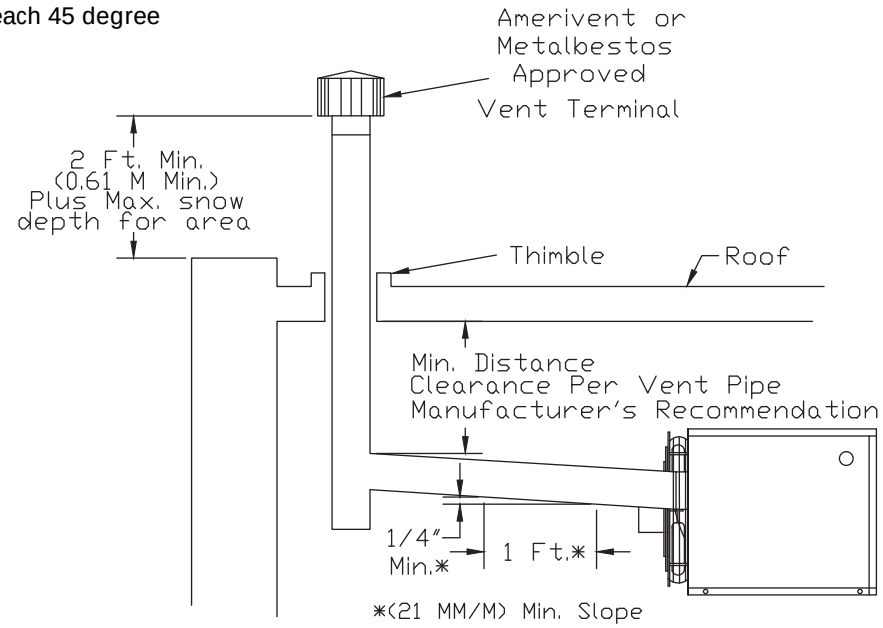


Figure 8 – Vertically Vented, Category III

Models 2RYU7 thru 2RYW2

Venting (Continued)

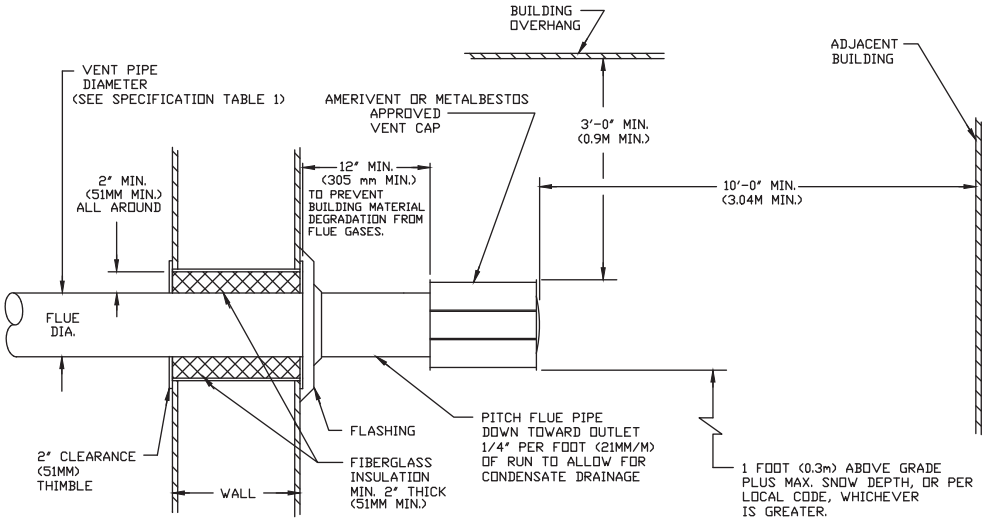


Figure 8A – Horizontal Arrangement – Single Wall Vent System to Single Wall Termination

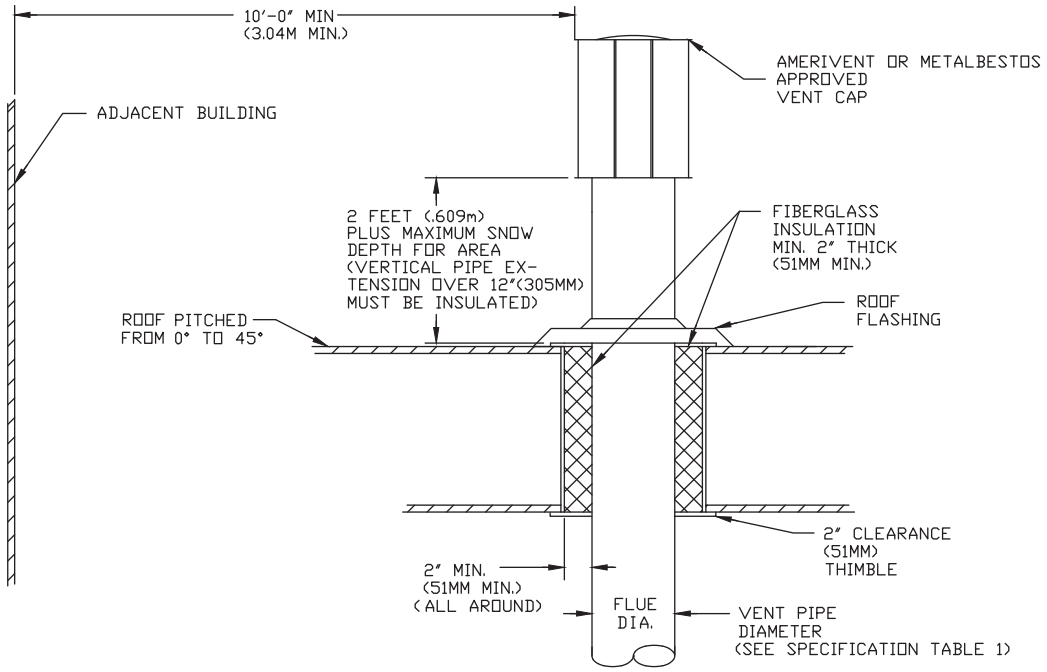


Figure 8B – Vertical Arrangement – Single Wall Vent System to Single Wall Termination

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Venting (Continued)

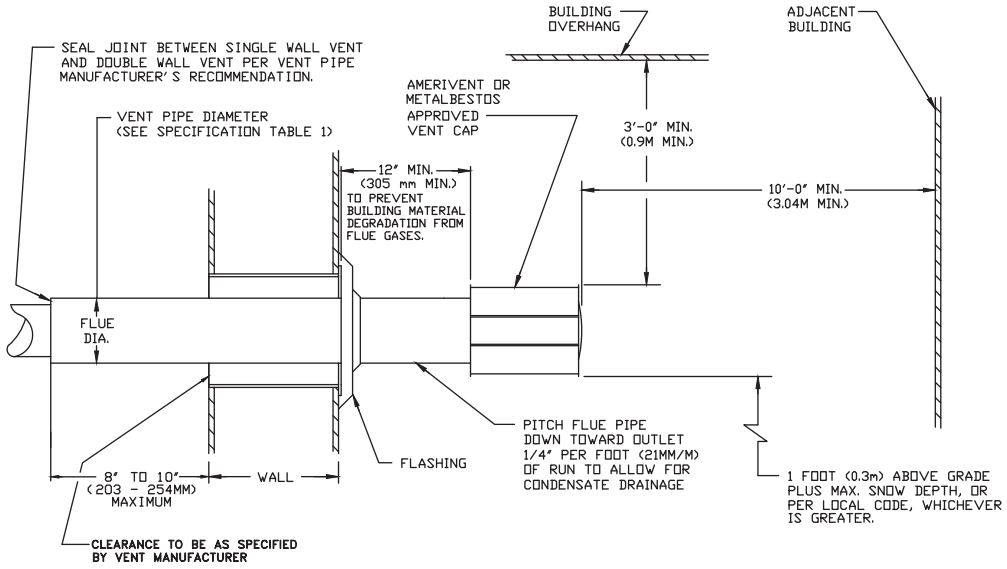


Figure 9A – Horizontal Arrangement – Single Wall Vent System to Double Wall Termination

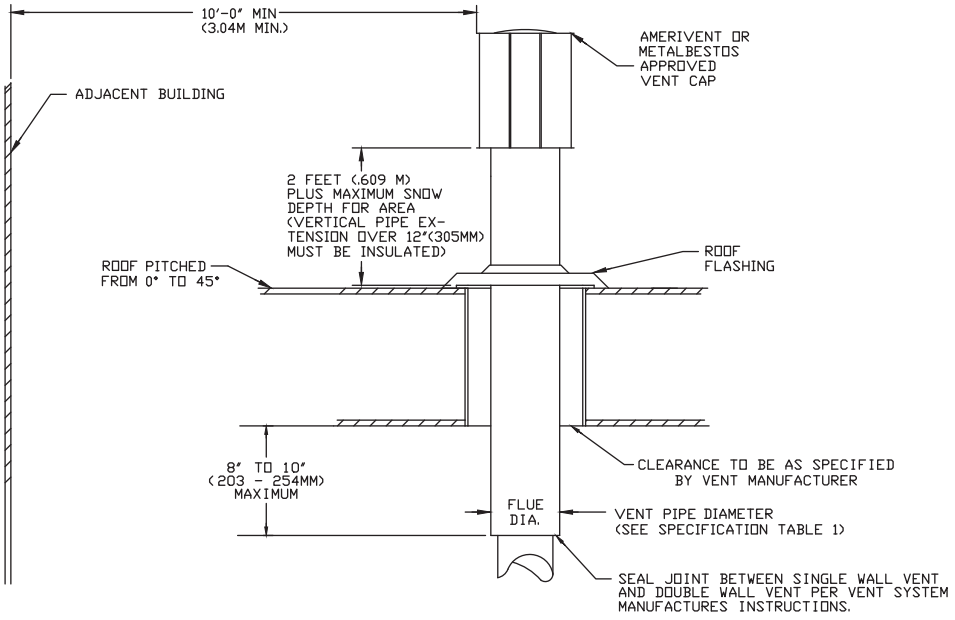


Figure 9B – Vertical Arrangement – Single Wall Vent System to Double Wall Termination

Models 2RYU7 thru 2RYW2

Venting (Continued)

SEPARATED COMBUSTION VENTED UNIT HEATERS (CATEGORY III)

NOTE: IF THE UNIT HEATER IS TO BE INSTALLED AS, OR FIELD CONVERTED TO, SEPARATED COMBUSTION, THE APPROPRIATE COMBUSTION AIR INLET KIT MUST BE USED – SEE TABLE 5. THE FOLLOWING SEPARATED COMBUSTION VENTING INSTALLATION INSTRUCTIONS MUST BE FOLLOWED, IN CONJUNCTION WITH INSTRUCTIONS SUPPLIED WITH THE COMBUSTION AIR INLET KIT.

Table 5 - Combustion Air Inlet Kit Usage

Dayton Model No.	Corresponding Combustion Air Inlet Kit
2RYU7 / 2RYV5	5ZJU1
2RYU8 / 2RYV6	
2RYU9 / 2RYV7	
2RYV1 / 2RYV8	
2RYV2 / 2RYV9	5ZJU2
2RYV3 / 2RYW1	
2RYV4 / 2RYW2	

COMBUSTION AIR

⚠ WARNING ***Never operate unit heaters without combustion air and flue gas piping in place or severe personal injury or death may occur!***

⚠ 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).***

1. The combustion air system installation must be in accordance with the current edition of the National Fuel Gas Code-NFPA 54 or ANSI Z223.1 National Fuel Gas Code. In Canada, installation must be in accordance with CSA-B149.1 "Installation Code for Natural Gas Burning Appliances and Equipment" and CSA-B149.2 "Installation Code for Propane Burning Appliances and Equipment".
2. The combustion air inlet box, inlet air screen, deflector disk, and vent terminal provided with the unit heater must be installed at the termination point of the combustion air/vent system. See Figures 10, 11, 12 and 13 and Table 6.
3. Each unit heater MUST have its own combustion air system. It MUST NOT be connected to other air intake systems.
4. Combustion air intake duct may be PVC, CPVC, Type B vent, single wall, double wall, or other material approved by local code authority. Never use duct size other than diameter stated in Table 1.
5. Long runs of single wall combustion air piping passing through an unheated space may require insulating if condensation becomes noticeable.

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters
(For Residential and Commercial Installations)

ENGLISH

Venting (Continued)

6. The combustion air system must be installed to prevent collection of condensate. Pitch horizontal pipes downward 1/4 inch per foot toward the inlet cap to facilitate drainage. Vertical combustion air pipes should be piped as depicted in Figure 11.
7. The equivalent length of the combustion air system must not be less than 5 feet (1.5m) and must not exceed 30 feet (9m). Equivalent length equals the total length of straight pipe plus 5 feet (1.5m) for each 90° elbow and 2.5 feet (0.76m) for each 45° elbow.

NOTE: For optimum performance keep the combustion air system as straight as possible.

8. Each slip joint must be secured with at least three corrosion resistant screws. Two full turns of 3M #425 Aluminum Foil Tape or its equivalent must then be used to seal each joint. General Electric RTV-108, Dow-Corning RTV-732 or an equivalent silicone sealant with a temperature rating of 500°F may be used instead of the tape.
9. For horizontal combustion air systems longer than 5 feet (1.5m), the system must be supported from overhead building structures at 4 foot (1.2m) intervals in the U.S. and at 3 foot (0.91m) intervals in Canada.

EXHAUST VENTING

NOTE: Every Separated Combustion unit to be installed MUST use the Factory supplied Concentric Vent Kit. If you do not have this kit, contact the manufacturer ASAP to obtain one prior to installation. See See Table 5 for appropriate kit.

⚠ WARNING ***Never operate unit heaters without combustion air and flue gas piping in place or severe personal injury or death may occur!***

1. Vent system installation must be in accordance with the current National Fuel Gas Code-NFPA 54 or ANSI Z223.1 National Fuel Gas Code. In Canada installation must be in accordance with CSA-B149.1 “Installation Code for Natural Gas Burning Appliances and Equipment” and CSA-B149.2. “Installation Code for Propane Burning Appliances and Equipment”.
2. **The Combustion Air Inlet Kit (which includes a combustion air inlet box, air inlet screen, deflector collar, vent terminal and inlet air collar) available for the heater by the manufacturer MUST be installed at the termination point of the combustion air/vent system.** See Figures 10, 11, 12 and 13 and Table 6.
3. Each unit heater MUST have it’s own vent system. It MUST NOT be connected to other vent systems or to a chimney.
4. Use UL 1738 listed single wall pipe for the vent system. For installations in Canada, use corrosion resistant and gas-tight, listed vent pipe conforming with local building codes, or in the absence of local building codes, with current CSA-B149.1, Installation Codes for Natural Gas Burning Appliances and Equipment or CSA-B149.2, Installation Codes for Propane Gas Burning Appliances and Equipment. For residential installations in the United States, vent pipe approved for Category III appliances must be used between the appliance and the combustion air inlet box.

⚠ WARNING ***Never use pipe other than diameter stated in Table 1. Never use PVC, ABS or any other non-metallic pipe for venting! To do so may result in serious damage to the unit and or severe personal injury or death!***

5. Any run of single wall vent pipe passing through an unheated space must be insulated with an insulation suitable to 550° F.
6. The vent system must be installed to prevent collection of condensate. Pitch horizontal pipes downward 1/4 inch per foot (21mm per meter) toward the vent cap to facilitate drainage. Vertical vent pipes should be piped as depicted in Figure 11.
7. The equivalent length of the vent system must not be less than 5 feet (1.5m) and must not exceed 30 feet (9m). The equivalent length equals the total length of straight pipe plus 5 feet (1.5m) for each 90° elbow and 2.5 feet (0.76m) for each 45° elbow.

Models 2RYU7 thru 2RYW2

Venting (Continued)

8. For horizontal vent systems longer than 5 feet (1.5m), the system must be supported from overhead building structures at 4 foot (1.2m) intervals in the U.S. and at 3 foot (0.91m) intervals in Canada.
9. The exhaust vent system must remain at a minimum distance of 1 inch (25mm) from all combustible materials. Any part of the vent system that passes through a combustible material must be properly insulated.

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

Table 6 - Combustion Air Inlet Box Dimensions

Unit Size	Dimensions - Inches (Nominal)					
	A	B	C	D	E	G
30	4 3/4	4	6	8	5	12
45						
60						
75						
90	5 3/4	5	8	12	5	15
105						
120						

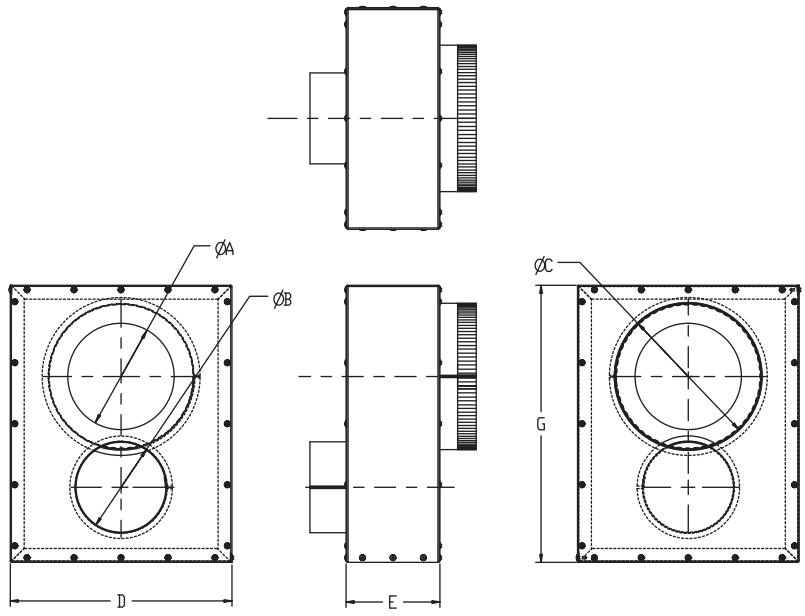


Figure 10 – Combustion Air Inlet Box

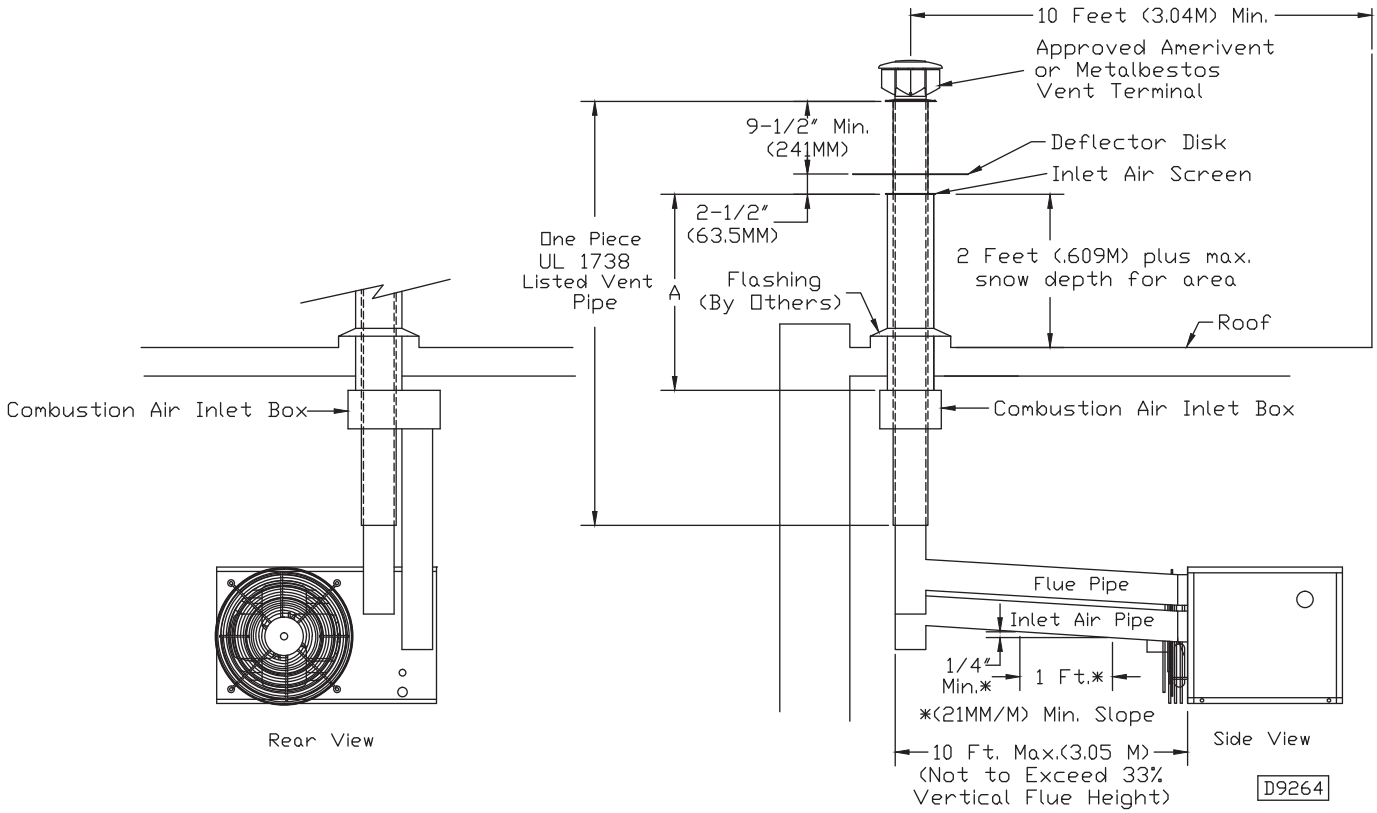


Figure 11 – Vertical Intake/Vent Installation

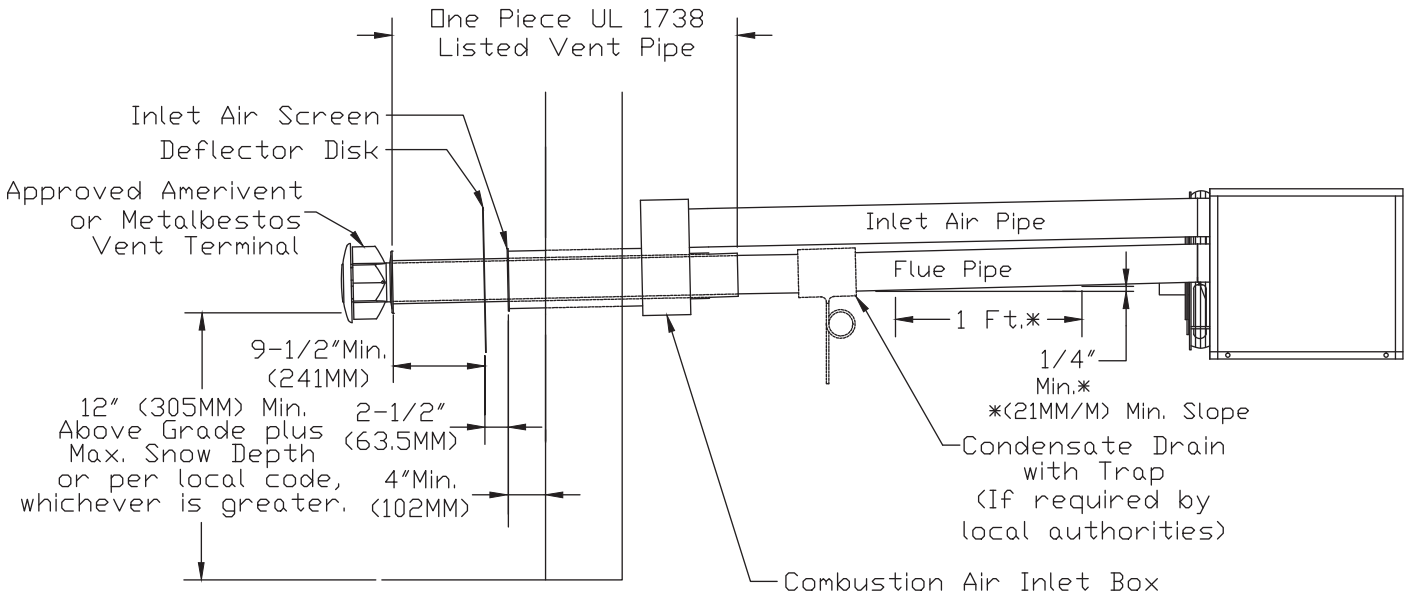


Figure 12 – Horizontal Intake/Vent Installation

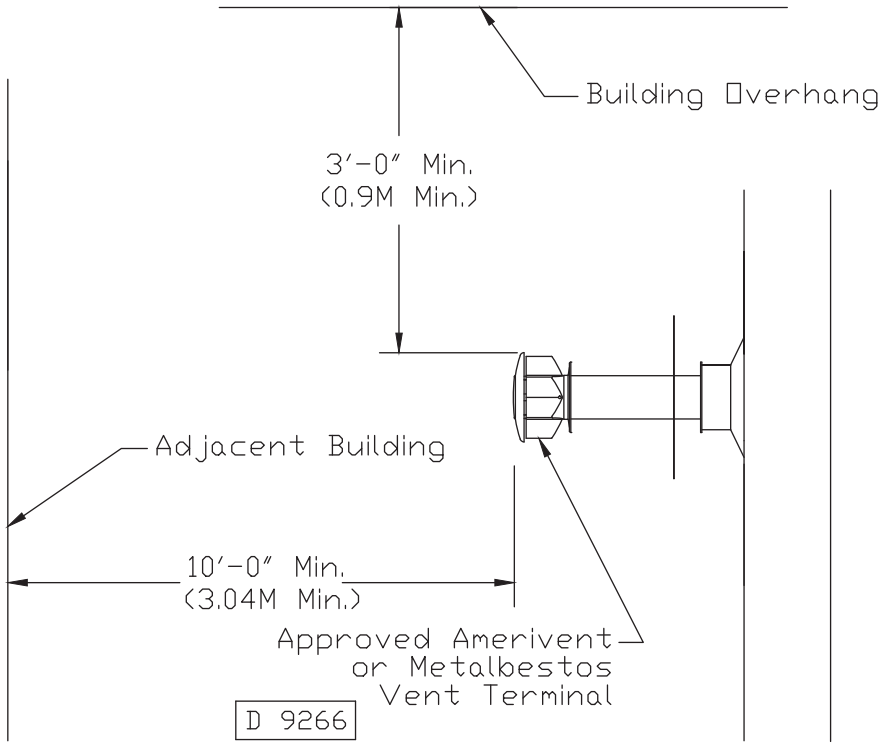


Figure 13 – Horizontal Intake/Vent Installation

ENGLISH

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Venting (Continued)

NOTE: IF THE UNIT HEATER IS TO BE INSTALLED AS, OR FIELD CONVERTED TO, SEPARATED COMBUSTION, THE APPROPRIATE COMBUSTION AIR INLET KIT MUST BE USED – SEE TABLE 5. THE FOLLOWING SEPARATED COMBUSTION VENTING INSTALLATION INSTRUCTIONS MUST BE FOLLOWED, IN CONJUNCTION WITH INSTRUCTIONS SUPPLIED WITH THE COMBUSTION AIR INLET KIT.

AIR INLET COLLAR

Remove screen and mounting plate from air inlet on rear panel of unit by removing 4 screws. Secure inlet collar and gasket to inlet opening re-using the 4 screws removed in previous step.

EXHAUST AIR COLLAR

Secure 5-4" reducer to flue collar on rear panel of unit sizes 090, 105 and 120. Seal per exhaust venting instructions.

VERTICAL TERMINATION

Select location on roof for vent terminal, ensuring adequate space inside the building/structure for combustion air inlet box. Terminal must be at least 10 feet (3.04m) from any wall or adjoining building. See Figure 11 and Table 4.

Cut a hole through the roof for combustion air pipe. Combustion air inlet box is to be suspended from the underside of the roof using suitable brackets (field supplied). Before mounting box, cut a length of 6 inch (152mm) (sizes 030-075) or 8 inch (203mm) (sizes 090-120) pipe so that dimension A, Figure 11, is equal to the dimension from the top of the box to the roof surface plus 2 feet (0.61m), plus expected snow depth. Fasten pipe to combustion air inlet connection of combustion air inlet box and seal joint. Insert pipe through roof and fasten vent box in place. Flash and/or caulk pipe to roof. Install inlet air screen assembly and fasten to pipe with screws.

Insert a 5 foot length of UL 1738 listed metal vent pipe through the combustion air inlet box opening (detail A, Figure 10) with the "UP" arrow pointing up. Position the pipe to extend 12 inches beyond the inlet air screen. Seal the space between the vent pipe and opening of the combustion air inlet box using high temperature silicone sealant. Install deflector disk on UL 1738 listed vent pipe 2-1/2 inches above inlet air screen and fasten with screws. Seal joint between deflector disk and pipe with silicone sealant. Install vent terminal on top of UL 1738 listed vent pipe, fasten with screws and seal joint.

Connect flue pipe and combustion air pipe from combustion air inlet box to unit, following combustion air and exhaust venting instructions. Joint between double wall vent pipe and single wall vent pipe must be sealed with high temperature silicone sealant. Collars on unit and on combustion air inlet box are sized so that crimped ends of combustion air pipes go toward the unit and crimped ends of flue pipes go away from the unit.

HORIZONTAL TERMINATION

Select a location on outside wall for vent terminal. In most applications, the terminal should be on level with the flue outlet of the unit less a 1/4 inch per foot pitch for condensate drainage toward the outside of the building. See Figure 12 and Table 4 for terminal clearance.

Cut a hole through the wall for a 6 inch (152mm) sizes (030-075) or 8 inch (203mm) sizes (090-120) combustion air pipe. Install thimble if required by local codes or type of wall construction. Combustion air inlet box may be fastened directly to wall or spaced away from wall using suitable brackets (field supplied). Cut a length of pipe so that it will protrude 4 inches (102mm) through the wall when the box is mounted in position. Fasten pipe to box with sheet metal screws, using at least three screws per joint. Seal joint with high temperature silicone sealant.

Insert pipe through wall and fasten adapter box in place so that the pipe pitches downward 1/4 inch per foot (21mm/m) toward the outside. Flash and/or caulk pipe on outside wall. Install inlet air screen assembly and fasten to pipe with screws. Insert a continuous length of 4 inch (sizes 030-075) or 5 inch (sizes 090-120) UL 1738 listed vent pipe through the combustion air inlet box opening (detail A, Figure 10). Position the pipe to extend a minimum of 12 inches beyond the inlet air screen. Seal the space between the vent pipe and opening of the combustion air inlet box using high temperature silicone sealant. Install deflector disk on UL 1738 listed vent pipe 2-1/2 inches (63.5mm) from inlet air screen and fasten with screws. Install vent terminal on end of UL 1738 listed vent pipe, fasten with screws and seal joint.

Connect flue pipe and combustion air pipe from combustion air inlet box to unit, following combustion air and exhaust venting instructions. Joint between double wall vent pipe and single wall vent pipe must be sealed with high temperature silicone sealant. Collars on unit and on combustion air inlet box are sized so that crimped ends of combustion air pipes go toward the unit and crimped ends of flue pipes go away from the unit.

Models 2RYU7 thru 2RYW2

Operation

DIRECT SPARK IGNITION SYSTEM

EXPLANATION OF CONTROLS

1. The unit heater is equipped with a power venter system consisting of a power venter motor and blower, pressure switch, and sealed flue collector in place of the conventional draft diverter.
2. The power venter motor is energized by the room thermostat through the integrated control board when a demand for heat is sensed. The pressure switch measures the flow through the vent system and energizes the direct spark ignition system beginning the pre-purge timing when the flow is correct.

⚠ WARNING ***The pressure switch MUST NOT be by-passed. The unit MUST NOT be fired unless the power venter is operating. An unsafe condition could result.***

3. The direct ignition system consists of an ignition control module and a gas valve. When the pre-purge period ends, the spark ignition system is energized, and the gas valve opens to supply gas to the burners. When the thermostat is satisfied, the vent system is deenergized and the valve closes to stop the flow of gas to the unit.
4. The limit switch interrupts the flow of electric current to the control board, interrupting the flow of gas to the gas valve in case the heater becomes overheated.
5. The flame roll-out switch interrupts the flow of electric current to the control board, interrupting the flow of gas to the heater in the event of sustained flame roll-out from the burner area. **If this switch trips, DETERMINE AND CORRECT THE CAUSE of the flame roll-out.** (See "Troubleshooting Chart", Symptoms D and G.)
6. Once the thermostat is satisfied, or the limit switch interrupts the flow of electric current to the control board, the unit will begin a post-purge period. When the post-purge period ends, the power venter motor is de-energized.
7. The fan operation is delayed 30 seconds once the thermostat is closed, and continues operation for 30 seconds after the thermostat opens. **The start-up fan delay must not exceed 30 seconds from a cold start.**
8. The wall thermostat (supplied optionally) is a temperature sensitive switch which operates the vent system and the ignition system to control the temperature of the space being heated. It must be mounted on a vibration free, vertical surface away from air currents, in accordance with the instructions furnished with the thermostat (also refer to "Electrical" section).

START-UP (Also refer to lighting instruction plate equipped on the unit)

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.

⚠ WARNING ***Never use an open flame to detect gas leaks. Explosive conditions may exist which could result in 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 power venter motor starts, and the burners ignite. Turn the thermostat to the lowest point and determine that the power venter motor shuts off and the burners are extinguished.
5. Turn the thermostat to the desired position.
6. See "Gas Input Rate" and "Adjustments" sections.

SHUT DOWN

1. Turn the valve selector lever to the OFF position.
2. Turn off the electricity.
3. To relight, follow the "start-up" instructions.

See Figure 14 for parts/identification.

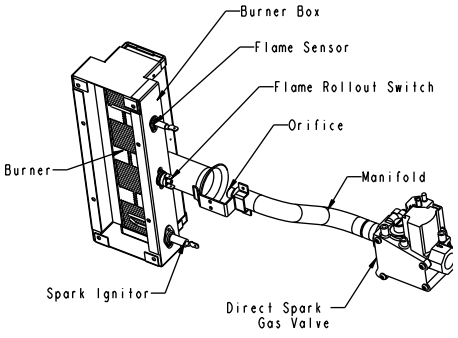


Figure 14 – Parts Identification, Direct Spark Igniton System

Dayton®

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

ENGLISH

Operation (Continued)

GAS INPUT RATE

Check the gas input rate as follows (Refer to "General Safety Information" section for metric conversions).

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

1. Turn off all gas appliances that use gas through the same meter as the unit heater.
2. Turn the gas on to the unit heater.
3. Clock the time in seconds required to burn 1 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.

$$\frac{\text{3600 (Sec. per Hr.) x BTU/Cu. Ft.}}{\text{Time (Sec.)}} = \text{Input Rate}$$

For example:

Assume the BTU content of one cubic foot of natural gas is 1000, and that it takes 48 seconds to burn one cubic foot of gas.

$$\frac{3600 \times 1000}{48} = 75{,}000$$

NOTE: If the computation exceeds, or is less than 95% of the gas BTU/hr. input rating (See Table 1), 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 rated in-put 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 the pressure tap plug below the control outlet.
2. Remove the regulator adjustment screw cap, located on the combination gas valve.
3. With a small screwdriver, rotate the adjustment screw counterclockwise to decrease pressure, or clockwise to increase pressure.
4. Replace regulator adjustment screw cap.

PROPANE GAS

An exact manifold pressure of 10 inches W.C. (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 1 through 4 above. If the unit is not so equipped, the propane gas supply system pressure must be regulated to attain this manifold operating pressure.

The adjusted manifold pressure should not vary more than 10% from pressure specified in Tables 7 and 8.

Table 7 – Burner Orifice Schedule*

Input in 1000 BTU	Type of Gas Heating Value Manifold Pressure	Natural 1050 BTU/Ft³ (39.1 MJ/m³) 3.5" W.C. (0.87 kPa)	Propane 2500 BTU/Ft³ (93.1 MJ/m³) 10" W.C. (2.49 kPa)	No. of Burner Orifices
30	Cu. Ft./Hr.	28	12	1
	Orifice Drill	38	52	
45	Cu. Ft./Hr.	42	18	1
	Orifice Drill	31	48	
60	Cu. Ft./Hr.	56	24	1
	Orifice Drill	27	43	
75	Cu. Ft./Hr.	70	30	1
	Orifice Drill	20	40	
90	Cu. Ft./Hr.	84	36	1
	Orifice Drill	16	36	
105	Cu. Ft./Hr.	98	42	1
	Orifice Drill	11	32	
120	Cu. Ft./Hr.	112	48	1
	Orifice Drill	6	3.1MM	

(*) This schedule is for units operating at normal altitudes of 2000 feet (610 m) or less.

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 field derated and be so marked in accordance with ETL certification. See Table 8 for U.S.A. and Canadian field deration information.

Models 2RYU7 thru 2RYW2

Tubular Unit Heater High Altitude Deration

NOTICE: This Tubular Unit Heater has been manufactured utilizing standard burner orifices and a normal manifold pressure setting as per the specification shown on your unit data plate.

All unit deration must be done through field adjustments by a qualified technician. Once the proper adjustments are made in the field, attach label #J17-06459 to the unit, and record adjusted manifold pressure, altitude of the unit installation and the technician's name and date on the label using a permanent marker.

Refer to Installation Instruction section on Adjustments-Gas Input Rate for adjusting the manifold pressure.

Table 8 – High Altitude Deration

UNITED STATES						
Altitude		Manifold Pressure				BTU Output [1]
		Natural Gas [2]		Liquid Propane [3]		
Feet	Meters	Inches W.C.	Pa	Inches W.C.	Pa	Percentage
0-2,000	0-610	3.5	872	10	2,491	100%
2,001-3,000	611-915	3.2	797	9.2	2,292	96%
3,001-4,000	916-1,220	2.9	722	8.4	2,092	92%
4,001-5,000	1,221-1,525	2.7	673	7.7	1,918	88%
5,001-6,000	1,526-1,830	2.4	598	7	1,744	84%
6,001-7,000	1,831-2,135	2.2	548	6.4	1,594	80%
7,001-8,000	2,136-2,440	2	498	5.7	1,420	76%
8,001-9,000	2,441-2,745	1.8	448	5.1	1,270	72%
9,001-10,000	2,746-3,045	1.6	399	4.6	1,145	68%

NOTE:
(1.) Deration based on ANSI Z223.1 (NFPA 54).
(2.) Table based on heating value of 1,050 BTU/Cu. ft. at sea level.
(3.) Table based on heating value of 2,500 BTU/Cu. ft. at sea level.
(4.) Consult local utility for actual heating value

CANADA						
Altitude		Manifold Pressure				BTU Output [1]
		Natural Gas [2]		Liquid Propane [3]		
Feet	Meters	Inches W.C.	Pa	Inches W.C.	Pa	Percentage
0-2,000	0-610	3.5	872	10	2,491	100%
2,001-3,000	611-915	3.2	797	9.2	2,292	96%
3,001-4,000	916-1,220	2.9	722	8.4	2,092	92%
4,001-4,500	1,221-1,371	2.8	697	7.9	1,968	90%

NOTE:
(1.) Deration based on CGA 2.17-M91
(2.) Table based on heating value of 1,050 BTU/Cu. ft. at sea level.
(3.) Table based on heating value of 2,500 BTU/Cu. ft. at sea level.
(4.) Consult local utility for actual heating value

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

Troubleshooting Chart

Symptom	Possible Cause(s)	Corrective Action
A. Flame pops back.	1. Burner orifice incorrect.	1. Check for proper orifice size. Refer to "Operation".
	2. Low manifold Pressure.	2. Test and reset manifold pressure.
B. Noisy Flame.	1. Irregular orifice causing whistle or resonance.	1. Replace orifice.
	2. Excessive gas input.	2. Test and reset manifold pressure.
C. Yellow tip flame (some yellow tipping on LP gas is permissible).	1. Clogged burner.	1. Clean main burner ports.
	2. Misaligned orifice.	2. Align manifold assembly.
	3. Insufficient combustion air.	3. Clean combustion air inlet openings.
	4. Possibly over fired.	4. Check gas input and manifold pressures.
D. Floating flame.	1. Blocked venting.	1. Clean Flue. Refer to "Installation".
	2. Insufficient combustion air.	2. Clean combustion air inlet openings.
	3. Blocked heat exchanger.	3. Clean heat exchanger. Refer to "Installation".
	4. Air leak into combustion chamber or draft hood.	4. Determine cause and repair accordingly.
E. Gas odor. **Shut off gas supply immediately!**	1. Gas pipe leak.	1. Inspect all gas piping and repair.
	2. Leaking gas test port on valve.	2. Check to ensure gas test ports are seated.
	3. Blocked heat exchanger.	3. Clean heat exchanger/flue.
	4. Blocked draft hood.	4. Clean flue collector.
	5. Negative pressure in the building.	5. See "Installation".
F. Delayed ignition.	1. Improper ground.	1. Check grounding wires and spark bracket connections.
	2. Bad or broken spark cable.	2. Inspect spark cable connections and cuts.
	3. Faulty control.	3. Check to ensure spark is energized after pre-purge period.
	4. Pressure regulator set too low.	4. Test and reset manifold pressure refer to "Operations".
	5. Main burner orifice dirty.	5. Clean or replace orifice.
	6. Improper venting.	6. Refer to "Installation".
G. Failure to ignite.	1. Gas supply is off.	1. Open all manual valves **"check for leaks"**.
	2. No power supply to unit.	2. Turn on power supply, check fuses and replace if bad.
	3. Thermostat not calling.	3. Turn up thermostat, Check for 24v on terminals R and W1 on terminal strip.
	4. Defective high limit.	4. Check switch for continuity if open with no heat present, replace.
	5. Defective drafter prove switch.	5. Check switch operation to ensure switch closes after draftor purge period. If it does not make/check tubing connections/ blockage.
	6. Loose wiring.	6. Check all wiring per diagram.
	7. Improper ground.	7. Check all ground wires and connections.

Models 2RYU7 thru 2RYW2

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
G. Failure to ignite. *(continued)*	8. Improper thermostat or transformer wiring.	8. Check both, for wiring according to diagram.
	9. Ignitor defective/damaged	9. Replace ignitor.
	10. Misaligned ignitor.	10. Resecure ignitor bracket.
	11. Defective gas valve.	11. Check for 24V at gas valve terminals during trial for ignition period. If present with no manifold pressure. Replace valve.
	12. Blown fuse.	12. Refer to symptom “Q”.
H. Condensation.	1. Improper venting.	1. Refer to “Installation, Venting”.
	2. Unit under fired.	2. Check gas supply pressures to unit. Refer to “Installation”.
	3. Building too cold.	3. Refer to “Installation”.
I. Burners will not shut off.	1. Thermostat located incorrectly.	1. Relocate thermostat away from outside wall or drafts.
	2. Improper thermostat wiring.	2. Check thermostat circuit for open and close on terminal strip on heater “R” and “W”.
	3. Shorted circuit.	3. Check thermostat circuit for shorts “staples piercing wires”.
	4. Defective sticking gas valve.	4. Check for 24v on gas valve terminals when thermostat is not calling.
	5. Excessive gas supply pressure.	5. Refer to “Installation”.
J. Rapid burner cycling.	1. Loose electrical connections at thermostat or gas valve.	1. Tighten all electrical connections.
	2. Excessive thermostat heat anticipator setting.	2. Adjust heat anticipator setting for longer cycles. Refer to “Electrical Connections”.
	3. Unit cycling on high limit.	3. Check for proper air supply across heat exchanger and proper gas supply.
	4. Poor thermostat location.	4. Relocate thermostat .
K. Noisy power ventor.	1. Power ventor wheel loose.	1. Replace or tighten.
	2. Power ventor wheel is dirty.	2. Clean power ventor wheel.
	3. Power ventor wheel is rubbing on the housing.	3. Realign power ventor wheel.
L. Fan will not run.	1. Loose electrical connections.	1. Check and tighten wires on fan circuit.
	2. Defective motor or overload.	2. Test for 115v on terminal ACB Heat and “L2” if voltage is present replace motor.
	3. Defective control board.	3. Test for 115v on terminal ACB Heat and “L2” on the control board, if voltage is not present 45 seconds after trial for ignition replace board.
	4. Blown fuse.	4. Replace fuse

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters
(For Residential and Commercial Installations)

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
M. Fan motor turns on and off while burner is operating.	1. Motor overload protection is tripping.	1. Check motor amps against motor name plate, check voltage, replace if found defective.
	2. Loose wiring or connection.	2. Check for 115v between motor leads.
	3. Control board is defective.	3. Check terminal ACB Heat for voltage if voltage not constant, replace board.
N. Fan will not stop.	1. Control Board is in flame failure mode.	1. Turn 115v power off to the unit, wait 10 seconds and reapply voltage to the unit.
	2. Fan improperly wired.	2. Check wiring of fan circuit to wiring diagram.
	3. Defective board.	3. If unit is not calling for heat and board is not in a flash code mode, replace board.
O. Not enough heat.	1. Incorrect gas input.	1. Refer to “Operation”.
	2. Heater undersized.	2. Is the heater output sized correctly for heat loss of the space. Has the space been enlarged.
	3. Thermostat malfunction.	3. Check thermostat circuit, 24v on terminals “R” and “W” on terminal strip.
	4. Heater cycling on limit.	4. Check air movement across heat exchanger. Check voltage and amps at the fan motor. Check gas input to ensure unit is not over fired. Check heat exchanger to ensure unit is not dirty.
	5. Incorrect orifice size.	5. Check orifice size, replace if undersized.
P. Too much heat.	1. Unit is over fired.	1. Refer to “Operation”. Check orifice size. If too big replace.
	2. Thermostat malfunction.	2. Check thermostat for operation, to ensure circuit open and closes.
	3. Heater runs continuously.	3. Check wiring per diagram; check operation at the gas valve, look for a short in thermostat circuit.
Q. Blown Fuse.	1. Electrical short.	1. Refer to wiring diagram.
	2. Improper ground.	2. Check grounding wires.
	3. Defective gas valve.	3. Replace.
R. Cold air is delivered during heater operation.	1. Incorrect manifold pressure or input.	1. Refer to “Operation”.
S. High limit tripping.	1. Unit is over fired.	1. Burner orifices may be too large, verify and replace.
	2. Air flow is low.	2. Check for proper voltage, ensure fan blade is correctly positioned 1/3 inside venturi.
	3. Defective switch.	3. Check operation of switch, did the switch open when unit is running or is the switch open during start-up.
	4. Defective control board.	4. Check for 24v on line side of the high limit. Constant voltage should be recorded if not control board is suspect. Check flash code.

Models 2RYU7 thru 2RYW2

Troubleshooting Chart (Continued)

Symptom	Possible Cause(s)	Corrective Action
T. Power ventor will not run.	1. Loose wiring or connections.	1. Check all wring in the power vent circuit to ensure good connection, including "Neutral".
	2. Motor overload is tripped or bad motor.	2. Check for 115v between motor leads and check amp draw of motor. Replace if needed.
	3. Bad control board.	3. Check for continuous 115v on terminal "CBM Blower" and neutral during call for heat. If not present and all checks are normal, replace.
U. Power ventor turns on and off during operation.	1. Power ventor improperly wired.	1. Check power ventor circuit per wiring diagram.
	2. Motor overload cycling or defective motor.	2. Check motor voltage and amp draw to motor name plate, replace if motor found defective.
	3. Defective control board.	3. Check for continuous 115v on terminal "CMB Blower" during call for heat, replace board if found defective.
V. Power ventor will not stop.	1. Power ventor improperly wired.	1. Check power ventor circuit per wiring diagram.
	2. Main burner did not light on call for heat.	2. Heater is in lockout mode check flash code table for problem.
	3. Defective control board.	3. No flash codes present along with no call for heat, replace control board.
	4. Loss of pressure. Pressure switch not made.	4. Check venting for blockage. Check tubing for blockage or hole. Check spud for blockage.

Dayton® Tubular Gas Fired Direct Spark Propeller Unit Heaters

(For Residential and Commercial Installations)

DAYTON ONE-YEAR LIMITED WARRANTY

DAYTON ONE-YEAR LIMITED WARRANTY. *All Dayton® product 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. If the Dayton product is part of a set, only the portion that is defective is subject to this warranty. Any product or part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton or Dayton's designee designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced with a new or reconditioned product or part of equal utility or a full refund given, at Dayton's or Dayton's designee's option, at no charge. For limited warranty claim procedures, see "Warranty Service" below. This warranty is void if there is evidence of misuse, mis-repair, mis-installation, abuse or alteration. This warranty does not cover normal wear and tear of Dayton products or portions of them, or products or portions of them which are consumable in normal use. This limited warranty gives purchasers specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.*

WARRANTY DISCLAIMERS AND LIMITATIONS OF LIABILITY RELATING TO ALL CUSTOMERS FOR ALL PRODUCTS

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To obtain warranty service if you purchased the covered product directly from W.W. Grainger, Inc. ("Grainger"), (i) write or call or visit the local Grainger branch from which the product was purchased or another Grainger branch near you (see www.grainger.com for a listing of Grainger branches); or (ii) contact Grainger by going to www.grainger.com and clicking on the "Contact Us" link at the top of the page, then clicking on the "Email us" link; or (iii) call Customer Care (toll free) at 1-888-361-8649. To obtain warranty service if you purchased the covered product from another distributor or retailer, (i) go to www.grainger.com for Warranty Service; (ii) write or call or visit a Grainger branch near you; or (iii) call Customer Care (toll free) at 1-888-361-8649. In any case, you will need to provide, to the extent available, the purchase date, the original invoice number, the stock number, a description of the defect, and anything else specified in this Dayton One-Year Limited Warranty. You may be required to send the product in for inspection at your cost. You can follow up on the progress of inspections and corrections in the same ways. Title and risk of loss pass to buyer on delivery to common carrier, so if product was damaged in transit to you, file claim with carrier, not retailer, Grainger or Dayton. For warranty information for purchasers and/or delivery outside the United States, please use the following applicable contact information:

Dayton Electric Mfg. Co.,
100 Grainger Parkway, Lake Forest, IL 60045 U.S.A.
or call ***+1-888-361-8649***

Models 2RYU7 thru 2RYW2

Maintenance

PERIODIC SERVICE

NOTE: The heater and vent system should be checked once a year by a qualified technician.

All Maintenance/Service information should be recorded accordingly on the Inspection Sheet provided in this manual.

⚠ WARNING ***Open all disconnect switches and disconnect all electrical and gas supplies 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.***

To check gas tightness of the safety shut-off valves, turn off the manual valve upstream of the appliance combination control. Remove the 3/32 inch hex head 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 a 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 in this manual.

⚠ WARNING ***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 unit heater.
3. Remove service panel.
4. To clean or replace the burners, remove the four screws holding the manifold to the burner box and pull the manifold back slightly to disengage the orifices from the burners. Remove each burner by holding it against the tab on the burner bracket, then rotate the inlet end of the burner toward the fan side of the unit and slide the burner off the tabs.
5. With the burners removed, wire brush the inside surfaces of the heat exchanger.
6. 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.
7. Reassemble the unit heater by replacing all parts in reverse order.
8. Complete the appropriate unit startup procedure as given in the "Operation" section of this manual. (See lighting instruction on the unit nameplate.)
9. Check the burner adjustment.
10. Check all gas control valves and pipe connections for leaks.
11. 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 burners.
12. Inspect and service motor/fan assembly. To maintain efficient air flow, inspect and clean the fan blades and guard to prevent buildup of foreign matter.
13. Check lubrication instructions on motor. If oiling is required, add 1 or 2 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 1500 hours of operation.

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

14. Check and test the operational functions of all safety devices supplied with your unit.

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

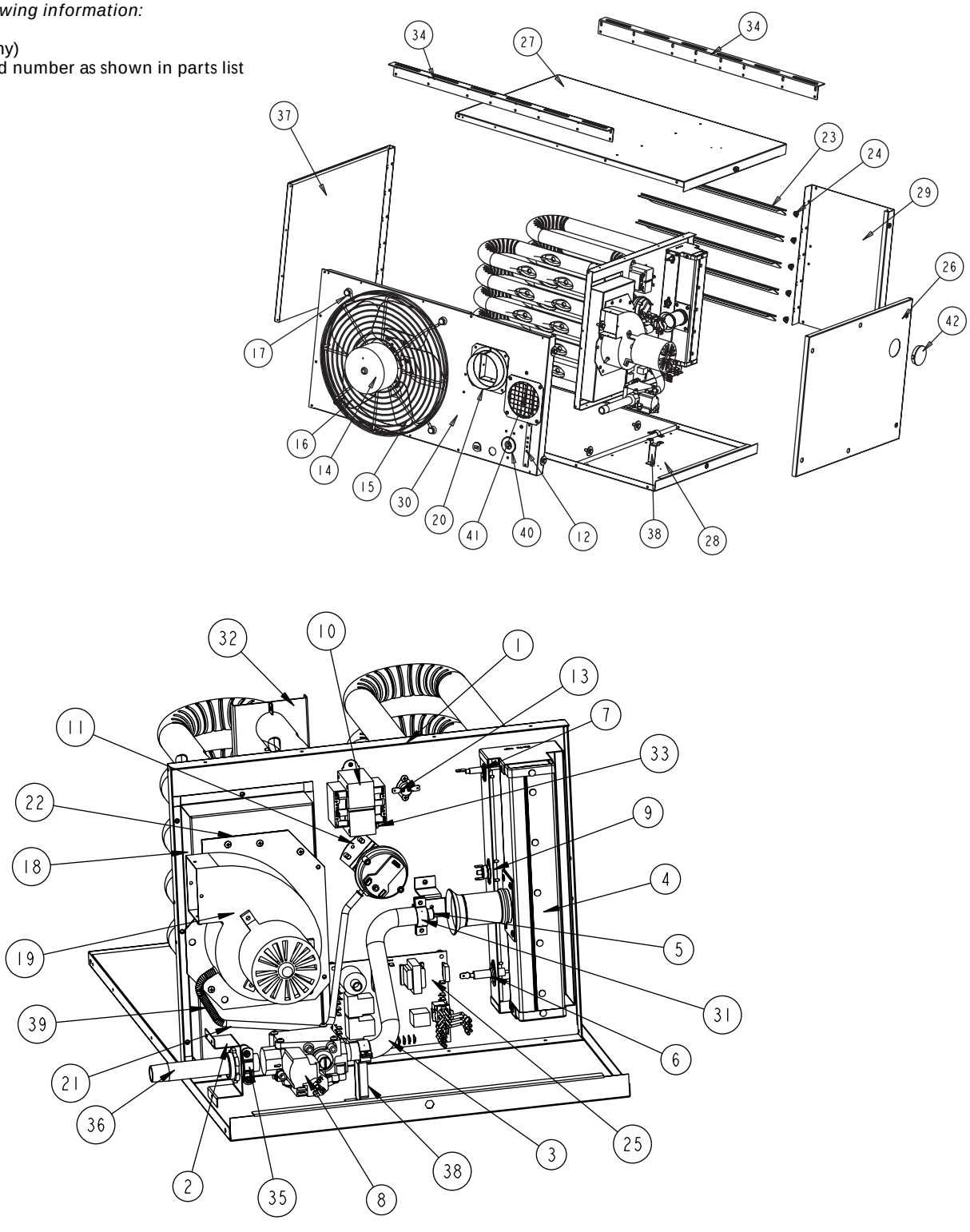


Figure 15 – Identification of Parts – Residential Tubular 30-120 MBH Unit Sizes

Repair Parts List (Refer to Figure 15)

Ref. No.	Description	Nat. L.P.	Part Numbers for Model 2RYU7 2RYV5	2RYU8 2RYV6	2RYU9 2RYV7	2RYV1 2RYV8	2RYV2 2RYV9	2RYV3 2RYW1	2RYV4 2RYW2
	Number of Tubes Per Model		2	3	4	5	6	7	8
1	Vestible Panel/Tube Assembly Heat Exchanger		11501R08350-001	11501R08351-001	11501R08352-001	11501R08353-001	11501R08354-001	11501R08355-001	11501R08356-001
2	Bracket/Gas Train (Rear Panel Mounted)		11252R08463	11252R08463	11252R08463	11252R08463	11252R08463	11252R08463	11252R08463
3	Manifold		11J37R08320-030	11J37R08320-030	11J37R08320-030	11J37R08320-030	11J37R08320-190	11J37R08320-190	11J37R08320-190
4	Burner Assy (Flame Sensor, Rollout Switch & Ignitor Sold Separately)		11502R08493-030	11502R08493-045	11502R08493-060	11502R08493-075	11502R08493-090	11502R08493-105	11502R08493-120
5	Standard Orifice [orifice size]	Natural Gas	11J36R04694-018 [#38]	11J36R04694-023 [#31]	11J36R04694-005 [#27]	11J36R04694-022 [#20]	11J36R04694-016 [#16]	11J36R04694-024 [#11]	11J36R04694-039 [#6]
	Qty. per model size = 1 (all sizes)	Propane (LP) Gas	11512R08532-011 [#52]	11512R08532-012 [#48]	11512R08532-008 [#43]	11512R08532-023 [#40]	11512R08532-009 [#36]	11512R08532-021 [#32]	11512R08532-022 [3.1MM]
6	Spark Ignitor		11J38R06891-003	11J38R06891-003	11J38R06891-003	11J38R06891-003	11J38R06891-003	11J38R06891-003	11J38R06891-003
7	Flame Sensor		11J38R06890-003	11J38R06890-003	11J38R06890-003	11J38R06890-003	11J38R06890-003	11J38R06890-003	11J38R06890-003
8	Gas Valve, Single Stage	Natural Gas	11J28R06892-001	11J28R06892-001	11J28R06892-001	11J28R06892-001	11J28R06892-001	11J28R06892-001	11J28R06892-001
		Propane (LP) Gas	11J28R06892-002	11J28R06892-002	11J28R06892-002	11J28R06892-002	11J28R06892-002	11J28R06892-002	11J28R06892-002
9	Manual Rollout Safety Switch		11J11R04849-003	11J11R04849-003	11J11R04849-003	11J11R04849-004	11J11R04849-004	11J11R04849-004	11J11R04849-004
10	Transformer, 50 VA, 115/24		11J14R03245-012	11J14R03245-012	11J14R03245-012	11J14R03245-012	11J14R03245-012	11J14R03245-012	11J14R03245-012
11	Air Pressure Switch - Standard Altitude (0-4,999 ft)		11J11R06779-001	11J11R06779-001	11J11R06780-008	11J11R06780-008	11J11R06780-004	11J11R06779-002	11J11R06779-002
	Air Pressure Switch - High Altitude (5,000 ft. +)		11J11R06780-001	11J11R06780-001	11J11R06780-009	11J11R06780-009	11J11R06780-006	11J11R06780-002	11J11R06780-002
12	Terminal Block Plate		11J09R04609	11J09R04609	11J09R04609	11J09R04609	11J09R04609	11J09R04609	11J09R04609
13	High Limit Switch		11J11R08365-002	11J11R08365-002	11J11R08365-001	11J11R08365-001	11J11R08365-001	11J11R08365-001	11J11R08365-001
14	Fan Motor (ODP)		11J31R04766	11J31R04766	11J31R04091	11J31R04091	11J31R04092	11J31R04092	11J31R04092
15	OSHA Fan Guard		11J32R04884	11J32R04884	11J32R08327-002	11J32R08327-002	11M32R06163	11M32R06163	11M32R06163
16	Fan Blade		11J34R06999-016	11J34R06999-017	11J34R06999-006	11J34R06999-007	11J34R06999-114	11J34R06999-115	11J34R06999-103
17	Fan/Guard/Motor Mount Hardware Kit		11261R04963-001	11261R04963-001	11261R04963-002	11261R04963-002	11261R04963-002	11261R04963-002	11261R04963-002
18	Flue Collector (Includes Gasket)		11507R08312-130	11507R08312-145	11507R08312-160	11507R08312-175	11507R08311-190	11507R08311-105	11507R08311-120
19	Power Venter (Drafter) Assembly (Includes Gasket)		11J35R04700	11J35R04700	11J35R08510	11J35R08510	11J35R04581	11J35R04581	11J35R04581
20	Flue Collar (Includes Gasket and Hardware)		11257R08337	11257R08337	11257R08340	11257R08340	11257R08340	11257R08340	11257R08340
21	Vinyl Tubing (Pressure Switch) - 19 inches long		11H07R01471-019	11H07R01471-019	11H07R01471-019	11H07R01471-019	11H07R01471-019	11H07R01471-019	11H07R01471-019
22	Power Venter Mounting Plate (Includes Gasket)		N/A	N/A	N/A	N/A	11252R08315	11252R08315	11252R08315
23	Louver (Qty. Required Per Model)		11257R04587-113 (3)	11257R04587-113 (3)	11257R04587-113 (5)	11257R04587-113 (5)	11257R04587-113 (7)	11257R04587-113 (7)	11257R04587-113 (7)
24	Louver Spring (Qty. Required Per Model)		11J26R01960 (3)	11J26R01960 (3)	11J26R01960 (5)	11J26R01960 (5)	11J26R01960 (7)	11J26R01960 (7)	11J26R01960 (7)
25	Control Board		11J28R06881	11J28R06881	11J28R06881	11J28R06881	11J28R06881	11J28R06881	11J28R06881
26	Access Panel (Includes Hardware)		11251R08308-030	11251R08308-030	11251R08308-060	11251R08308-060	11251R08308-090	11251R08308-090	11251R08308-090
27	Top Jacket Panel w/Insulation		11251R08303	11251R08303	11251R08303	11251R08303	11251R08303	11251R08303	11251R08303
28	Bottom Jacket Panel w/Insulation		11251R08303	11251R08303	11251R08303	11251R08303	11251R08303	11251R08303	11251R08303
29	Front Jacket Panel		11251R08306-030	11251R08306-030	11251R08306-060	11251R08306-060	11251R08306-090	11251R08306-090	11251R08306-090
30	Rear Jacket Panel		11251R08318-030	11251R08318-030	11251R08318-060	11251R08318-060	11251R08318-090	11251R08318-090	11251R08318-090
31	Bracket Cap, Manifold		11252R08466	11252R08466	11252R08466	11252R08466	11252R08466	11252R08466	11252R08466
32	Tube Support Bracket Kit		11252R06882	11252R06883	11252R06884	11252R06885	11252R08364-090	11252R08364-105	11252R08364-120
33	Green Ground Screw		11J21R05120-001	11J21R05120-001	11J21R05120-001	11J21R05120-001	11J21R05120-001	11J21R05120-001	11J21R05120-001
34	Hanger Bracket		11252R08347	11252R08347	11252R08347	11252R08347	11252R08347	11252R08347	11252R08347
35	Manifold Clamp		11J09R08500	11J09R08500	11J09R08500	11J09R08500	11J09R08500	11J09R08500	11J09R08500
36	Pipe Nipple (6" Length)		11J40R00601-010	11J40R00601-010	11J40R00601-010	11J40R00601-010	11J40R00601-010	11J40R00601-010	11J40R00601-010
37	Left Side Panel w/Insulation		11251R08345-030	11251R08345-030	11251R08345-060	11251R08345-060	11251R08345-090	11251R08345-090	11251R08345-090
38	Manifold Support Bracket Kit		11252R08492-030	11252R08492-030	11252R08492-030	11252R08492-030	11252R08492-090	11252R08492-090	11252R08492-090
39	Spring (For Vinyl Tubing)		11J26R06480	11J26R06480	11J26R06480	11J26R06480	11J26R06480	11J26R06480	11J26R06480
40	Grommet		11J07R02872-001	11J07R02872-001	11J07R02872-001	11J07R02872-001	11J07R02872-001	11J07R02872-001	11J07R02872-001
41	Inlet Air Screen Assembly (Includes Hardware)		11507R08596	11507R08596	11507R08596	11507R08596	11507R08595	11507R08595	11507R08595
42	Burner Box View Port		11J07R08348-001	11J07R08348-001	11J07R08348-001	11J07R08348-001	11J07R08348-001	11J07R08348-001	11J07R08348-001
43	Molex Connector Assembly		11J11R06887-001	11J11R06887-001	11J11R06887-001	11J11R06887-001	11J11R06887-001	11J11R06887-001	11J11R06887-001
N/S	Ignition Cable (Orange) - 14 inches long		11J28R06971-001	11J28R06971-001	11J28R06971-001	11J28R06971-001	11J28R06971-001	11J28R06971-001	11J28R06971-001
N/S	Flame Sensor Wire (White) - 21 inches long		11260R08248-001	11260R08248-001	11260R08248-001	11260R08248-001	11260R08248-001	11260R08248-001	11260R08248-001

(N/S) - Part not shown.

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

ENGLISH

IDENTIFICATION OF PARTS (REFER TO REPLACEMENT PARTS LIST ON PREVIOUS PAGE)
TUBULAR 30-120 UNIT HEATERS

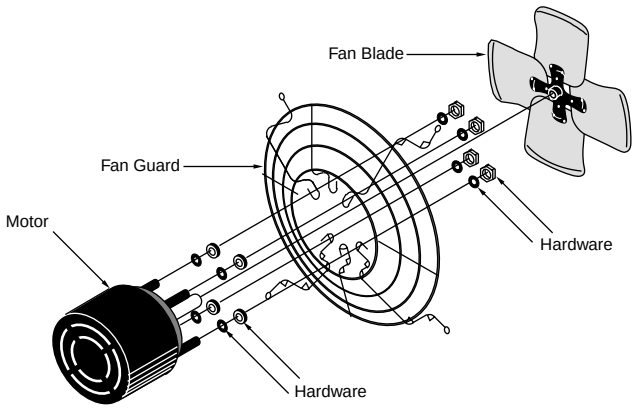
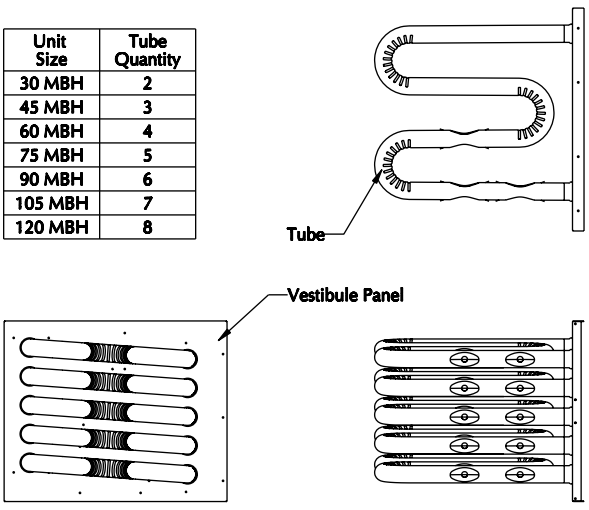


Figure 16 – Propeller Parts

NOTE: No rubber grommets are equipped with the 30 and 45 unit sizes.

Unit Size	Tube Quantity
30 MBH	2
45 MBH	3
60 MBH	4
75 MBH	5
90 MBH	6
105 MBH	7
120 MBH	8



Heat Exchanger Assembly

Figure 17 – Internal Furnace Components

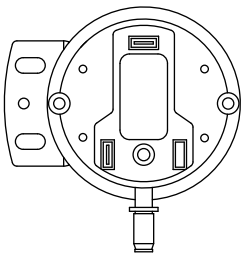


Figure 18 – Air Pressure Switch

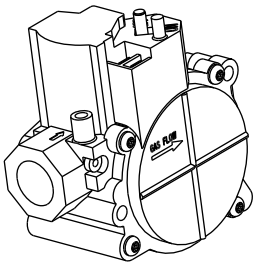
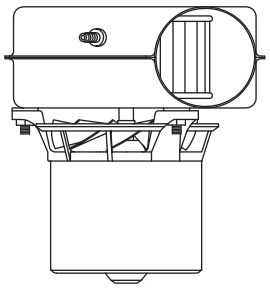


Figure 19 – Gas Valve



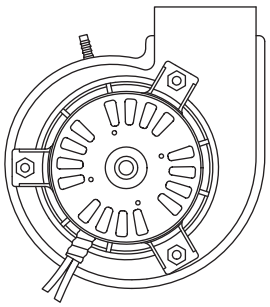


Figure 20 – Power Ventor Assembly

Models 2RYU7 thru 2RYW2

Troubleshooting with LED Indicator Assistance for UT Control Board

⚠ WARNING ***Line voltage power can cause product damage, severe injury or death. Only a trained experienced service technician should perform this troubleshooting.***

1. Check the system thermostat to make sure it is calling for heat. (Do not cycle the thermostat on and off at this time.)
2. Remove the access panel. Do not interrupt power to the control board by opening any electrically interlocked panels.
3. Observe the LED indicator on the control board (a green LED labeled "ok" indicates system faults); check and repair system as noted in the chart to the right.

***NOTE: Air flow proving switch and power venter hose barbs must be free of any dust or debris at all times. Periodically check these openings and/or if any problems occur.**

LED Status	Indicates	Check/Repair
Slow Flash	Control OK, no call for heat.	Not Applicable
Fast Flash	Control OK, call for heat present.	Not Applicable
Steady Off	Internal control fault, or no power.	1. Line voltage on terminals 120 and C on transformer. 2. Low voltage (24V) on terminals 24 and C on transformer. 3. 5 Amp fuse on circuit board.
Steady On	Control internal failure or bad ground.	1. Common side of transformer grounded to chassis. 2. Loose spark ignitor.
2 Flashes	In lockout from failed ignitions or flame losses.	1. Gas supply off or gas supply pressure too low. 2. Flame sense rod contaminated or loose wire. 3. Gas valve switch is off or wires are not connected. 4. Broken or cracked porcelain on flame probe or spark ignitor.
3 Flashes	Pressure Switch open with inducer on or closed with inducer off.	1. Obstructions or restrictions in appliance air intake or flue outlet are preventing proper combustion airflow. 2. Moisture or debris in tubing that connects pressure switch and draft inducer. 3. Airflow switch jumpered or miswired.
4 Flashes	Limit or rollout switch is open.	1. Open manual reset rollout switch. 2. Gas pressure too high, over fire condition. 3. Incorrect airflow due to blockage or motor not operating.
5 Flashes	Flame sensed while gas valve is off.	Flame probe miswired or shortened.
6 Flashes	On-board microprocessors disagree.	Thermostat is interfering with control board.

Notes

Notes

GAS EQUIPMENT START-UP

Customer _____ **Job Name & Number** _____

PRE-INSPECTION INFORMATION
With power and gas off.

Type of Equipment: Unit Heater

ENGLISH

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 all fans & blowers for free movement.
- ❒ Check all controls for proper settings.

FAN
With power on and gas off.

- ❒ Check voltage. L1 _____ L2 _____ L3 _____
- ❒ Check rotation of main fan.
- ❒ Check motor amps. L1 _____ L2 _____ L3 _____

GAS HEATING
With power and gas on.

- ❒ Inlet gas pressure. ____ in. W.C. or ____ kPa
- ❒ Burner ignition.
- ❒ Manifold gas pressure. ____ in. W.C. or ____ kPa
- ❒ Cycle and check all other controls not listed.
- ❒ Cycle by thermostat or operating control.
- ❒ Entering air temperature _____ °F or ____ °C
- ❒ Discharge air temperature (high fire) ____ °F or ____ °C
- ❒ Combustion Reading:
  Carbon Monoxide:____ PPM.
  Carbon Dioxide:____ %

Remarks: _____