2.12 Allowance for Expansion

Allowances must be made for the system to expand as detailed in the Heater Expansion Chart on this page. The supplied stainless-steel, flexible gas connector is recommended. If, however, local codes require rigid piping to the heater, a swing joint can be used.

HEATER EXPANSION CHART				
Exchanger length and gas input will determine overall expansion. Heaters in a typical installation will expand towards both the burner and vent ends. Review for proper flexible gas connector installation.				
EXCHANGER LENGTH FEET / METERS		FIXED OR HIGH-FIRE GAS INPUT BTUh	EXPANSION LENGTH INCHES	MILLIMETERS
10	3.1	25,000	1/2	12.7
15	4.6	32,000	3/4	19.1
20	6.1	40,000	1	25.4
20	6.1	50,000	1 1/4	31.8
20	6.1	60,000	1 1/2	38.1
20	6.1	75,000	1 3/4	44.5
20	6.1	100,000	1 7/8	47.6
30	9.2	50,000	1 1/4	31.8
30	9.2	60,000	1 1/2	38.1
30	9.2	75,000	1 3/4	44.5
30	9.2	100,000	1 7/8	47.6
30	9.2	125,000	2	50.8
40	12.2	75,000	1 1/2	38.1
40	12.2	100,000	1 7/8	47.6
40	12.2	125,000	2 1/8	54.0
40	12.2	150,000	2 1/2	63.5
40	12.2	175,000	2 3/4	69.9
50	15.3	100,000	2	50.8
50	15.3	125,000	2 1/8	54.0
50	15.3	150,000	2 3/8	60.3
50	15.3	175,000	2 1/2	63.5
50	15.3	200,000	2 3/4	69.9
60	18.3	125,000	2 1/2	63.5
60	18.3	150,000	2 3/4	69.9
60	18.3	175,000	3	76.2
60	18.3	200,000	3 1/4	82.6
70	21.4	175,000	3 3/8	85.7
70	21.4	200,000	3 1/2	88.9
80	24.4	200,000	3 1/2	88.9

2.13 Electrical Requirements

1. Heaters operate on 120 volts, 60 Hz, single phase. The maximum amperage requirement (starting current) is 1.7 amps per heater. The running current is 1.1 amps.

2. Heater must be grounded in accordance with the Canadian Electrical Code C22.1 (latest edition).

3. Wiring must not be exposed to direct radiant output.

2.14 Thermostat Wiring:
One Two-Stage Thermostat and
One Two-Stage Series Heater

The Burner box contains a 24 volt transformer that operates the control circuits. The thermostat is part of this circuit. When installing a “snap action” CE-2S or “mercury cell” 1F37-408 thermostat a three wire connection is required.

- 24 volt terminal from the heater to the thermostat terminal (R).
- 1st stage 24 volt from the thermostat (W1) to heater number 1 low.
- 2nd stage 24 volt from the thermostat (W2) to heater number 2 high.
  See Figure 2.13.1.

When utilizing a thermostat that requires a constant 24 volt power supply such as the HL 201 or other programmable thermostat, a fourth wire will be required. Attach this wire to heater chassis. See Figure 2.13.1.

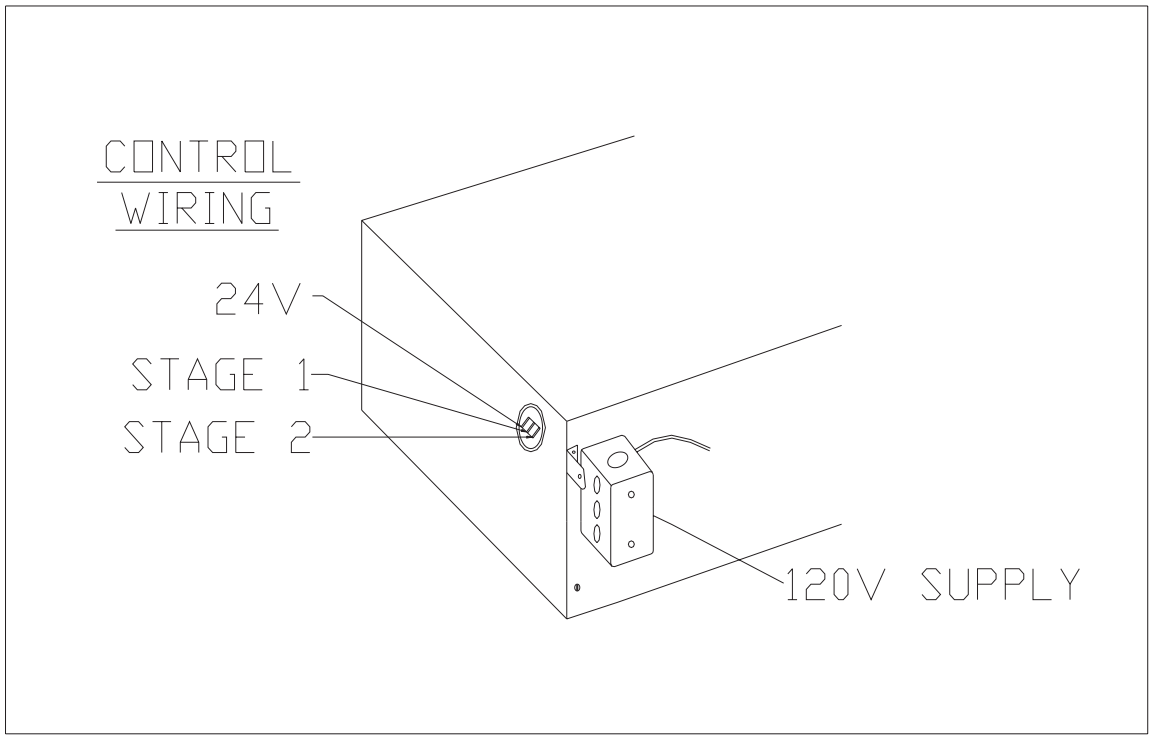


Figure 2.13.1

2.15 Thermostat Wiring: One Two-Stage Thermostat and Multiple Two-Stage Series Heaters

The Burner box contains a 24 volt transformer that operates the control circuits. When more than one heater is operated with a single thermostat, the 24 volt control circuit of each heater must be isolated. A factory supplied isolation relay HL-RB must be installed. See Figure 2.15.1 for internal wiring. Heaters with factory installed relay boards are labeled “Equipped with HL-RB”. See Figure 2.15.2. The thermostat is not part of the burner control circuit, therefore an external (installer-supplied) 24 volt transformer will be required to operate all HL-RB’s. Each HL-RB draws .03 amps. All heaters equipped with the HL-RB will use three wires to operate the relays:

- Connect Line 24 volt from installer supplied transformer to thermostat terminal (R).
- Connect common 24 volt from installer supplied transformer to the 24 volt spade on the heater.
- 1st stage 24 volt from the thermostat (W1) to heater number 1 low.
- 2nd stage 24 volt from the thermostat (W2) to heater number 2 high.
  See Figure 2.15.2.

Wiring from thermostat to heater does not change due to thermostat type. Wiring from external transformer to thermostat may change. Refer to thermostat installation instructions.

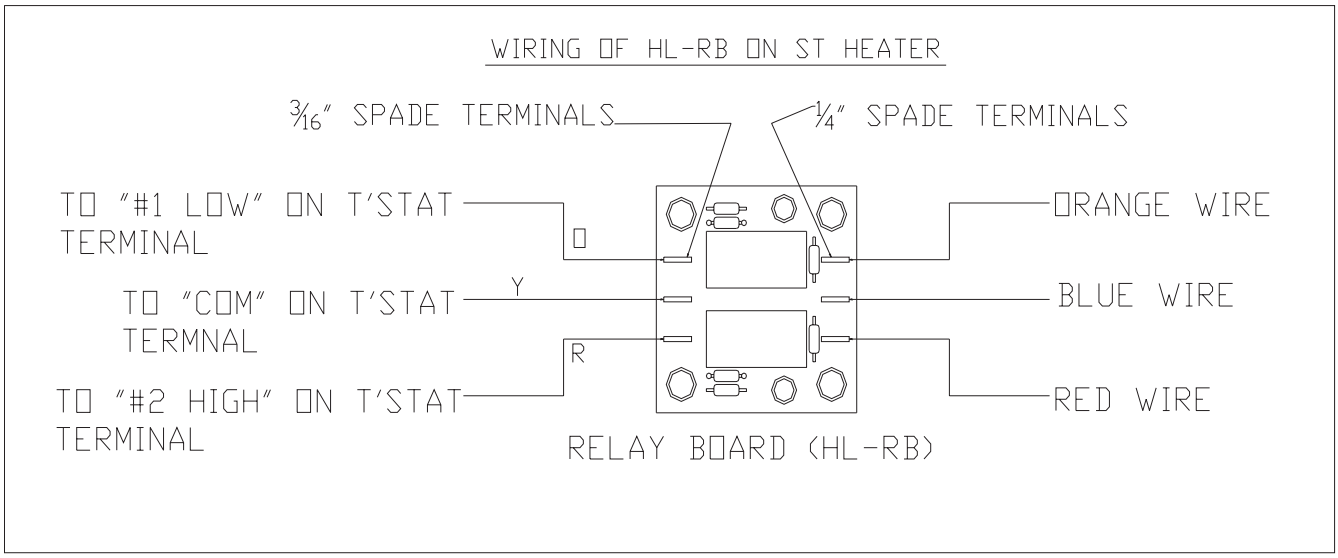


Figure 2.15.1

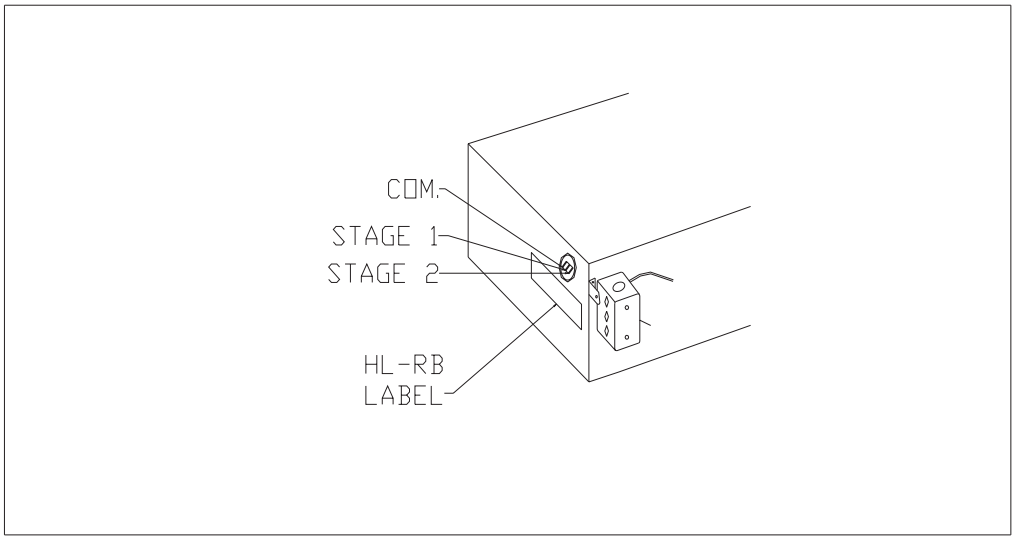


Figure 2.15.2

2.16 Lighting Instructions

1. Purge main gas supply line at start-up.
2. Rotate heater's manual gas valve knob to the "ON" position.
3. Close electrical circuit.
4. If heater fails to light, turn off gas and wait five minutes before repeating the above procedure.

Instructions pour l'allumage

1. Purger la conduite d'alimentation en gaz principale.
2. Tourner le bouton du robinet de gaz a commande manuelle jusqu'a ce qu'il se trouve en position de marche ("ON").
3. Fermer le circuit electrique.
4. Si l'appareil de chauffage ne s'allume pas, attendre 5 minutes avant de suivre de nouveau les instructions ci-dessus.

2.17 Shutdown Instructions

1. Open electrical circuit.
2. Rotate heater's manual gas valve knob to the "OFF" position.

Pour eteindre l'appareil

1. Ouvrir le circuit electrique.
2. Tourner le bouton du robinet de gaz a commande manuelle de l'appareil de chauffage jusqu'a ce qu'il se trouve en position d'arret ("OFF").

3 THEORY OF OPERATION

3.1 ST Models

STARTING CIRCUIT (FIGURES 3.1.1 & 3.1.2)
When the two-stage thermostat signals the low-fire circuit, the fan relay is energized. When the operational static pressure is achieved the normally open pressure switch closes initiating ignition sequence. After a 7 second pre-purge, the spark electrode and gas valve are energized simultaneously. The trial for ignition is 15 seconds.

Stage two on the gas valve is powered directly from the second stage of the thermostat. The gas valve will not pass gas unless the first stage sequence of operation has been completed. The thermostat will determine which stage is required to maintain the desired comfort level.

RUNNING CIRCUIT
After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within the 15 second trial for ignition within the three try cycle, the unit will lock out. If lockout occurs, the control can be reset by briefly interrupting the power source.

SHUTDOWN
When the thermostat is satisfied the fan will enter into a 120 second post-purge cycle.

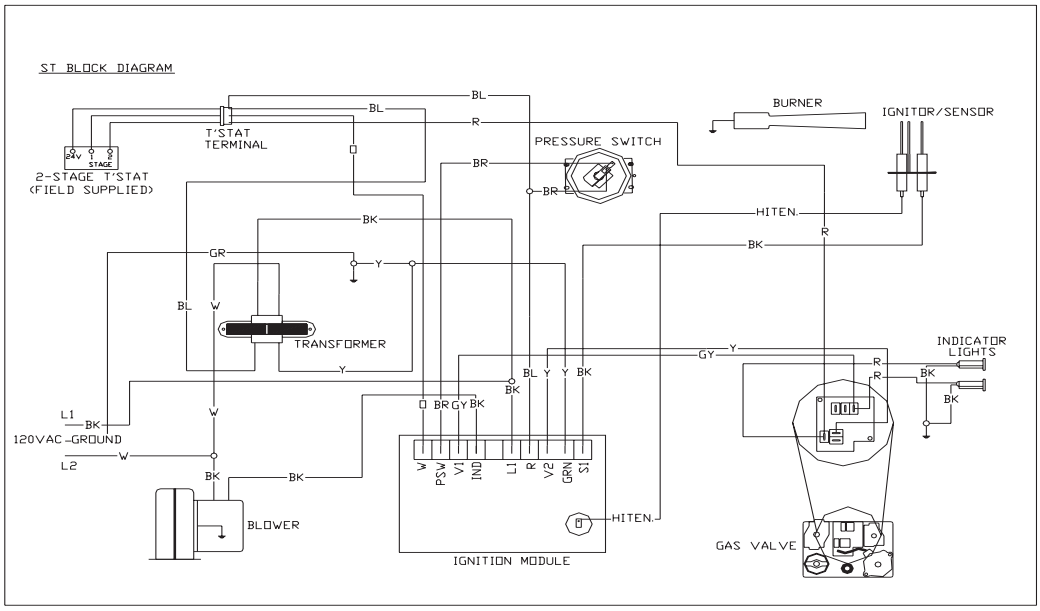


Figure 3.1.1

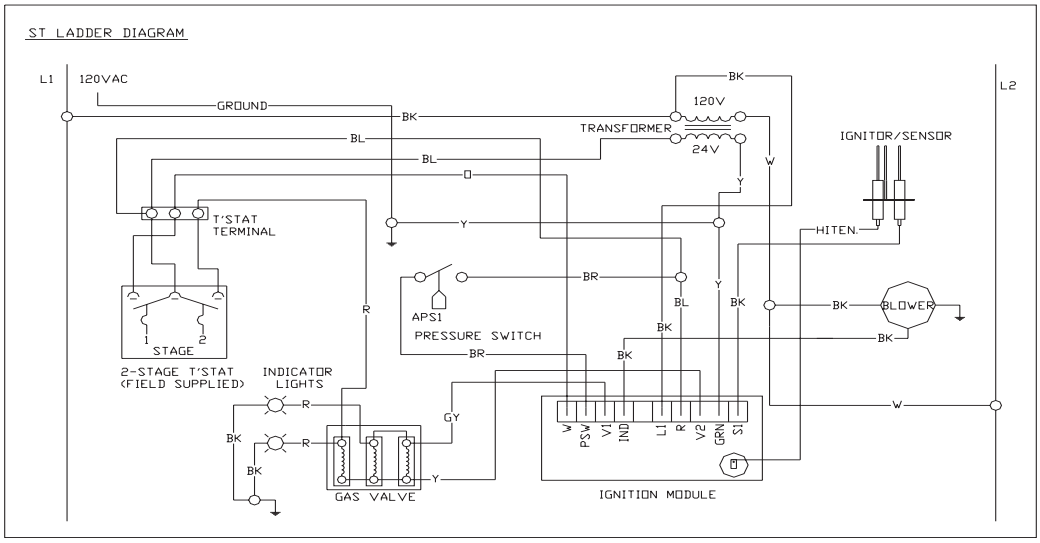


Figure 3.1.2

4 SERVICE

4.1 Maintenance

The gas fired infra-red heaters require a minimum of routine maintenance to keep them operating at peak performance.

1. Prior to the heating season heater operation must be verified by qualified service personnel.

2. Ensure that the blower impeller is kept clean. If dirt becomes a problem, installation of outside air intake ducts for combustion is recommended. Oiling the blower motor will extend bearing life beyond the 30,000 hour minimum.

3. Keep the aluminum reflectors from accumulating deposited material.

WARNING

Use protective glasses when cleaning the heater.

4.2 GENERAL TROUBLE SHOOTING

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Thermostat closed, fan does not operate.	1. Blown fuse. 2. Faulty thermostat. 3. Disconnected wire. 4. Faulty fan.	1. Replace. 2. Replace. 3. Repair. 4. Replace.
Thermostat closed. Fan operates. No spark.	1. Loose or disconnected wire. 2. Box lid or gasket not in place. 3. Plugged pressure switch lines. 4. Plugged or restricted exhaust vent. 5. Faulty pressure switch. 6. Faulty circuit board. 7. Faulty electrode.	1. Repair. as required. 2. Put in place. 3. Clean as necessary. 4. Remove foreign matter. 5. Replace only. Do not adjust. 6. Replace circuit control. 7. Replace.
Thermostat closed. Fan operates. Heater sparks. After 7 seconds electrode shuts off. No reignition.	1. Closed gas supply. 2. Dirty or resisted orifice. 3. Faulty valve. Disconnected wire. 4. Inlet pressure exceeds 14" W.C.P. 5. Improper electrode gap.	1. Open all gas connections. 2. Remove and clean with a soft object. 3. Replace or repair. 4. Lower inlet pressure. 5. Confirm gap size is between 3/16" & 1/4".
Thermostat closed. Fan and electrode operate. Ignition occurs. Burner cycles off and will not recycle.	1. No electrical ground. 2. Faulty circuit control. 3. Low gas pressure. 4. Open circuit control connection.	1. Connect electrical ground to junction box. 2. Replace. 3. Provide required gas pressure. 4. Repair or replace.
Thermostat closed. Fan and electrode operate. Ignition occurs. Burner cycles off. Burner cycles on.	1. Low gas pressure. 2. Baffle improperly positioned. 3. Faulty pressure switch. 4. Restricted flue vent. 5. Improper electrode gap.	1. Provide required gas pressure. 2. Reposition baffle at vent end. 3. Replace. 4. Remove foreign matter. 5. Confirm gap size is between 3/16" & 1/4".
Loss of heater efficiency.	1. Low gas pressure. 2. Dirty or restricted orifice. 3. Foreign matter inside burner. 4. Unit cycles on and off. 5. Reflector is sooted and has lost its reflective ability. 6. Reflector not in place. 7. Clogged fan blower.	1. Provide required gas pressure. 2. Remove and clean with a soft object. 3. Clean as necessary. 4. Check previous symptom. 5. Clean with aluminum cleaner and soft wiping colth. 6. Put in place. 7. Clean.
Radiant tube leaking burnt gases.	1. Loose tube connections. 2. Holes or cracks in radiant tubes.	1. Assure that tube is fully inserted into flared end and properly clamped. 2. Replace.
Condensation.	1. Stack length too long. 2. Light gauge flue stack used. 3. Contaminated combustion air.	1. Shorten stack. 2. Minimum of 26 gauge vent pipe required. 3. Provide fresh air inlet duct.
Tube Bowing.	1. Insufficient combustion air. 2. Overfired. 3. Contaminated combustion air. 4. Heater unable to expand properly.	1. Provide 2 sq. in. of free air per 5000 BTUh of input. 2. Check gas pressure and orifice size. 3. Provide fresh air inlet duct. 4. Remount with flexible inlet or vent pipe.
Tube corroding.	1. Contaminated combustion air.	1. Provide fresh air inlet duct.
Visual inspection of burner operation not possible.	1. Dirty or sooted sight glass. 2. Unit mounted upside down.	1. Remove, clean or replace. 2. Mount correctly.
Stack sooting.	1. Insufficient combustion air. 2. Improper gas.	1. Provide 1 sq. in. of free air for every 5000 BTUh of input. 2. Correct with proper gas input.
Odor or fumes in space.	1. Vaporized solvents decomposing when contacting radiant tubes. 2. Evaporation of oils/solvents at floor levels. 3. Lift trucks. 4. Loose tube connections.	1. Address ventilation concerns. 2. Address ventilation concerns. 3. Address ventilation concerns/repairs. 4. Tighten to 50-100 lb.-ft.

5.1 BASIC PARTS LIST

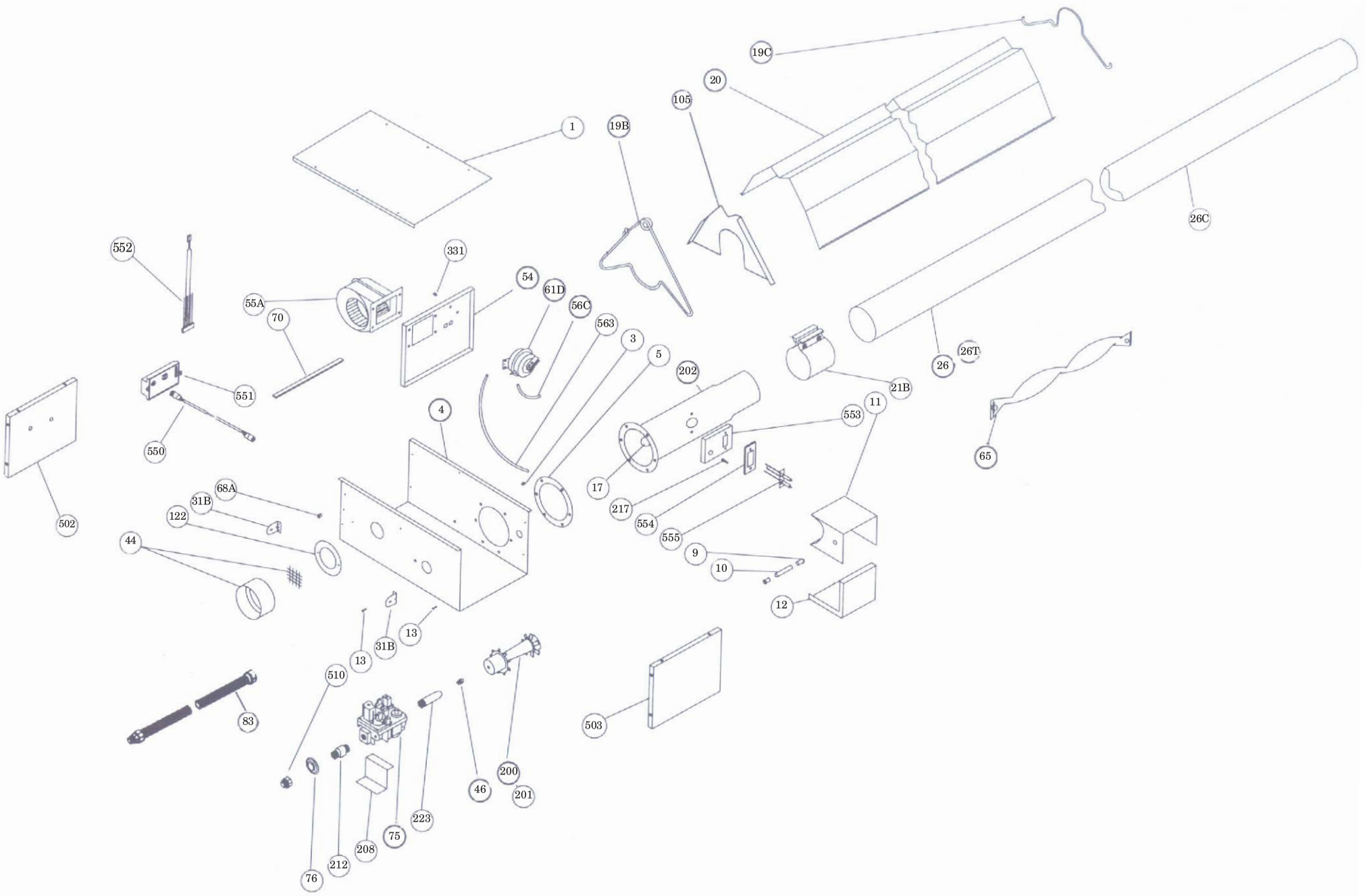
Part No.	*Description*
TP-1	Control Box Cover
TP-3	#8 x 1/4" Sheet Metal Screw
TP-4	Control Box
TP-5	Flange Gasket
TP-7	1/4-20 x 1/2" Machine Screw
TP-7A	1/4-20 Hex Nut
TP-9	Conduit Coupling
TP-10	Conduit 1/2" x 4"
TP-11	Electrode Box
TP-12	Electrode Box Cover
TP-13	#8 x 1/2" Self-Drilling Screw
TP-14	Sight Glass Gasket
TP-15	Sight Glass
TP-16	Sight Glass Washer
TP-17	1/4-20 x 3/8" Thread-Cutting Screw
TP-19B	Tube/Reflector Hanger (BR-4HGR)
TP-19C	Reflector Center Support (BR-4IH)
TP-20	Refector (120")
TP-21B	Butt Clamp
TP-26	10 ft. Radiant Tube Aluminized
SE-26C	10 ft. Radiant Tube, Straight
TP-26T	10 ft. Radiant Tube, Straight (AL-TI)
TP-31B	Control Box Bracket
TP-41	1/4-20 Keps Nut
TP-44	Inlet Air Orifice w/Screen
TP-46	Orifice
TP-54	Burner Box Divider
TP-55/N	Fan Blower
TP-56C	¼ " Atmosphere Tube (Vinyl)
TP-59	#8 Hex Nut/ Lock Washer

Part No.	*Description*
SE-61D	Burner Pressure Switch
TP-62	#8 x 1/2" Machine Screw
TP-65	Heat Diffuser (Baffle)
TP-68A	Strain Relief Bushing
TP-70	Control Box Gasket
HL-75	Gas Valve
TP-76	Rubber Grommet
TP-80	#6-32 x 1" Machine Screw
TP-81	#6-32 Hex Nut
TP-83	Flexible Gas Connector
TP-101	1/2" Adapter Fitting
TP-104	1/2" x 2" Manifold
TP-105	Reflector End Cap (BR-ECR)
TP-106	Reflector Clip (BR-ECRC)
TP-122	Air Inlet Gasket
TP-200	Burner (50,000 to 100,000 BTUH)
TP-201	Burner (125,000 to 200,000 BTUH)
SE-202	16" Burner Tube (ST-16P)
TP-208	"Z" Bracket
TP-212	3" X 1/2" Pipe Nipple
TP-217	Pressure Barb Fitting
TP-223	Manifold
TP-550	High Volt Wire (SE-HVW)
TP-551	Circuit Control (ST-CC)
TP-552	Wiring Harness (ST-WH)
TP-553	Electrode Bracket (SE-EB)
TP-554	Electrode Gasket (SE-EG)
TP-555	Electrode (SE-E)
TP-563	Pressure Tube Hose

NOTE: When ordering heater parts, please state the model and serial number of heater.

5.2 Optional Parts

Item No.	*Description*
SK-4VC	Vent Cap (Required For Sidewall Venting on 200,000 BTU)
BR-VCF	Exhaust Vent w/Flapper (Required on Unvented Models)
BR-VC	Wall Inlet Vent w/Screen
BR-4-VK	Side Wall Venting Kit (also SK4-VK)
TF-9	Truck Exhaust Terminal for Side Wall Venting
SK-6VC	Vent Cap (Required for Dual Side Wall Vents)
BR-NIR	Side Shield Extension
BR-PS60	Radiant Tube Protective Screen 60"
BR-4UA	180° 4" Radiant Pipe
BR-4EA	90° 4" Elbow
TP-33B	Gas Cock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