



G21Q "PULSE21"® SERIES UP-FLO GAS FURNACES

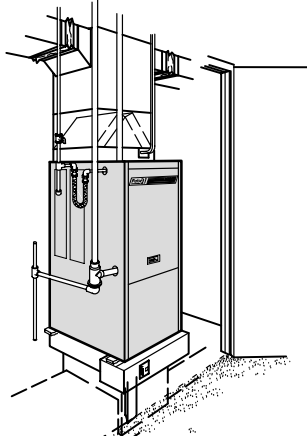
11.4 to 27.8 kW (39 000 to 95 000 Btuh) Output
Add-On Cooling 5.3 thru 17.6 kW (1-1/2 thru 5 Tons) Nominal

G21Q

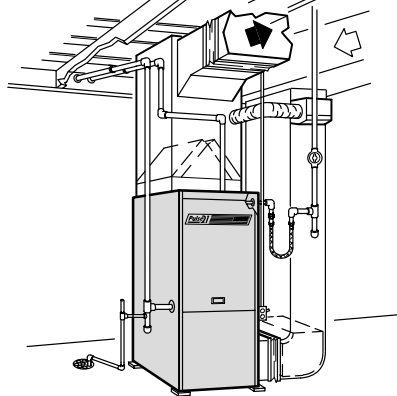
Bulletin #490051

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Typical Applications



Closet Installation
With cooling coil and
electronic air cleaner



Utility Room Installation
With cooling coil and humidifier



Application — Lennox G21 series gas furnaces are available in five models (natural gas or propane) with input capacities of 11.7, 17.6, 23.4 and 29.3 kW (40 000, 60 000, 80 000 and 100 000 Btuh). Units operate on the pulse combustion principle and do not require conventional pilot burner, main burners, flue or chimney. Standard size cabinet with side or bottom return air entry permits installation in a basement, utility room or closet. Lennox add-on evaporator coils, electronic air cleaners and power humidifiers can easily be added for a total comfort all-season system. Replacement of furnaces manufactured by Lennox in the last twenty-five years can be done with only minor modification to duct work or add-on coils.

High efficiency of the G21 series is achieved with a unique heat exchanger design which features: finned cast iron combustion chamber, temperature resistant steel tailpipe, aluminized steel exhaust decoupler section and a finned stainless steel tube condenser coil. Moisture, during the process of combustion, is condensed in the coil, extracting almost all usable heat out of the gas. Most of the combustion heat is utilized in the heat transfer from the coil, producing flue vent temperatures as low as 38°C to 54°C (100°F to 130°F) which allows the use of polyvinyl chloride (PVC) pipe for venting. Furnace can be vented through a side wall, roof or to the top of an existing chimney with up to 9.0m (35 feet) of polyvinyl chloride (PVC) pipe and up to four 90 degree elbows. Condensate created in the coil (PH ranges from 4.0 to 6.0) is not harmful to standard household plumbing and can be drained into city sewers and septic tanks without damage.

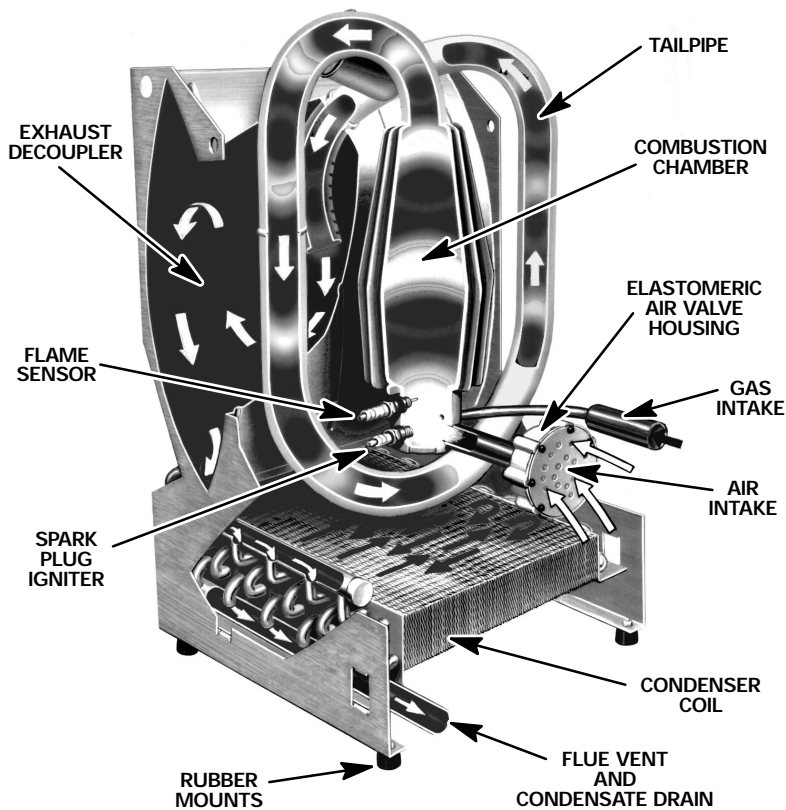
NOTE — Specifications, Ratings and Dimensions subject to change without notice.

The G21 furnace has no pilot light or burners. An automotive type spark plug is used for ignition on the initial cycle only, saving gas and electrical energy. In the pulse combustion process, the use of atmospheric burners is eliminated, with combustion confined to heat exchanger combustion chamber. Sealed combustion system virtually eliminates the loss of conditioned air due to combustion and stack dilution. Combustion air is piped to the furnace with same type polyvinyl chloride (PVC) pipe as used for exhaust gases.

Furnace is equipped with standard type redundant gas valve in series with gas expansion tank and gas intake flapper valve. Also factory installed are an air intake flapper valve, purge blower, spark plug igniter, flame sensor with solid-state control, fan and limit control, high and low voltage terminal strip, 30VA transformer and cleanable air filter. Furnished for field installation are a flexible gas line connector, (4) isolation mounting pads, base insulation pad and condensate drip leg.

Optional equipment available: flue vent/air intake line roof or wall termination installation kits, propane conversion kits, mufflers, furnace twinning kit, external filter mounting kit and thermostat.

G21 units are shipped completely factory assembled with all controls installed and wired. Units are test fired at the factory before shipment.



PROCESS OF COMBUSTION

The process of combustion begins as gas and air are introduced into the sealed combustion chamber with the spark plug igniter. Spark from the plug ignites the gas/air mixture, which in turn causes a positive pressure buildup that closes the gas and air inlets. This pressure relieves itself by forcing the products of combustion out of the combustion chamber through the tailpipe into the heat exchanger exhaust decoupler and on into the heat exchanger coil. As the combustion chamber empties, its pressure becomes negative, drawing in air and gas for the next pulse of combustion. At the same instant, part of the pressure pulse is reflected back from the tailpipe at the top of the combustion chamber. The flame remnants of the previous pulse of combustion ignite the new gas/air mixture in the chamber, continuing the cycle. Once combustion is started, it feeds upon itself allowing the purge blower and spark plug igniter to be turned off. Each pulse of gas/air mixture is ignited at a rate of 60 to 70 times per second. Almost complete combustion occurs with each pulse. The force of these series of ignitions creates great turbulence which forces the products of combustion through the entire heat exchanger assembly resulting in maximum heat transfer.

FEATURES

Sequence of Operation — Room thermostat, on a demand for heat, will initiate purge blower operation for a pre-purge cycle (30 seconds) followed by energizing and opening of the gas valve. As ignition occurs, the flame sensor reacts to proof of ignition and de-energizes the spark plug igniter and purge blower after 8 seconds. Furnace blower operation is initiated at 30 to 45 seconds after combustion ignition. When thermostat is satisfied, gas valve is closed and purge blower is re-energized for a post-purge cycle (34 seconds). Furnace blower will remain in operation until preset fan control temperature of 32°C (90°F) is reached. Should loss of flame occur before thermostat is satisfied, flame sensor controls will initiate 5 attempts at re-ignition before locking out unit operation. Additionally, loss of either combustion intake air or flue exhaust will automatically terminate system operation.

Heat Exchanger Assembly — Lennox developed heat exchanger assembly consists of combustion chamber, tailpipe, exhaust decoupler section and condenser coil. Combustion chamber contains the spark plug igniter, flame sensor and combustion air and gas intake manifolds. Cast iron construction provides excellent radiation of heat over entire surface area. Finned "teardrop" shape design permits total air coverage of all surfaces with low resistance. Tailpipe connects the combustion chamber to the exhaust decoupler section. Precisely sized and shaped tailpipe is constructed of combination stainless and aluminized steel for superior resistance to high temperatures. Aluminized steel resonator on tailpipe minimizes combustion sound. Heavy gauge aluminized steel exhaust decoupler section has large surface area for maximum heat transfer. Air foil shape design results in complete air coverage with minimum air resistance. Condenser coil intake header connects to bottom of exhaust decoupler section. Large face area and circuiting of coil provides high heat transfer, minimum air resistance and proper moisture drainage. Coil is constructed of exactly spaced ripple-edged aluminum fins fitted to stainless steel tubes. Flared collars on fins grip tubes for maximum contact area. Flared tubing connections and high temperature soldering provide

tight, leakproof joints. Combined flue vent and condensate drain outlet is located on the coil. Coil is factory tested for leaks. All components are mounted in a heavy gauge steel frame and installed in the furnace cabinet on resilient rubber mounts assuring quiet, vibration free operation. Heat exchanger has been laboratory life cycle tested.

Rugged Cabinet — Constructed of heavy gauge cold rolled steel. Cabinet is subject to a five station metal wash process resulting in a perfect bonding surface for a paint finish of baked-on enamel. The paint solution and metal are given opposite electrical charges resulting in positive adhesion and even coverage of the paint to the metal surfaces. Heat exchanger section is completely lined with thick 24 kg/m³ (1-1/2 lb./ft.³) density foil faced fiberglass insulation. Blower compartment is completely lined with thick 24 kg/m³ (1-1/2 lb./ft.³) density black mat faced fiberglass insulation. This results in quiet and efficient operation due to the excellent acoustical and insulating properties of fiberglass. Complete service access is accomplished by removing heating section and blower access panels. Removable panel is provided in vestibule panel for access to the spark plug and flame sensor. Holes are located in the base for cabinet leveling. Leveling bolts and nuts are not provided and must be ordered extra. Safety interlock switch automatically shuts power off to unit when blower access panel is removed. Blower assembly may be completely removed from unit for servicing. Electrical inlets, gas line inlets, air intake and exhaust air outlets are provided in both sides of cabinet. Combustion air inlet opening is located in cabinet cap. Return air duct connection can be made on either side or bottom of cabinet.

Powerful Blowers — Units are equipped with quiet multi-speed direct drive blowers. Each blower assembly is statically and dynamically balanced. Multiple-speed motor is resiliently mounted. A choice of blower speeds is available on each blower. See blower performance tables. Change in blower speed is easily accomplished by simple wiring change.

FEATURES

Cleanable Air Filters — Washable or vacuum cleanable frame type filter is furnished as standard. Polyurethane media is coated with oil for maximum efficiency. Filter is readily accessible in unit for quick and easy removal for servicing.

Combustion Air Intake Box — Contains the purge blower, air intake flapper valve and air valve housing. The 40, 60 and 80 units have a single differential pressure switch mounted inside the unit cabinet. The 100 models have a single differential pressure switch mounted on the vestibule panel. Box is located on vestibule panel. Purge blower is equipped with a permanently lubricated motor. Blower operates only during pre-purge and post-purge cycles. Air is drawn through the blower during the combustion cycle by negative pressure in the combustion chamber. Pressure switches terminate unit operation in case of air intake or flue exhaust blockage. Flapper valve air housing is constructed of an elastomeric non-metallic polymer which reduces operating sound levels. Flapper valve section of the box is completely lined with 25mm (1 inch) thick 96 kg/m³ (6 lb./ft.³) density duct liner board, black neoprene coated fiberglass. Valve opening and closing is actuated by back pressure and negative pressure in combustion chamber during the heating cycle.

Fan and Limit Controls — Factory installed and accurately located on vestibule. Fixed limit control provides positive protection from abnormal operating conditions. Manual reset. Fan control energizes blower 30 to 45 seconds after combustion ignition and shuts blower off at preset temperature of 32°C (90°F).

Ignition Control — Solid-state control provides power for spark plug igniter. Also controls pre-purge and post-purge cycles and re-ignition sequence if loss of flame occurs. Ignition control is factory installed on the vestibule panel.

OPTIONAL ACCESSORIES (Must Be Ordered Extra)

Thermostat (Optional) — Heating thermostat is not furnished and must be ordered extra. See Thermostats section in Lennox Price Book. For all-season applications, heating-cooling thermostat is available with the condensing unit.

In-Line Mufflers (Optional for G21Q3-40 and -60 Models) — Two mufflers LB-52057CA (67F81) are optional and must be ordered extra. Mufflers field install, vertical or horizontal, one in the intake line and one in the exhaust line. See dimension drawings. Two mufflers are furnished with the -80 and -100 units.

Propane Conversion Kits (Optional) — For propane models a conversion kit is available for field changeover from natural gas. Kit is not furnished and must be ordered extra. See Specifications tables.

Furnace Twinning Kit (Optional) — Field Installed kits are available to operate two furnaces simultaneously. Two kits are available — Twinning Kit for Continuous Low Speed Blower LB-63093C (35J93) or Twinning Kit for Non-Continuous Low Speed Blower LB-63093B (64H88). Kits consists of heavy gauge steel control box and two auxiliary limit controls. Control box has electrical inlet knockouts and contains low voltage and high voltage terminal strips, blower control relay, heat relays, door interlock relay and 24 volt control transformer. All controls are factory installed and wired. Limit controls are field installed in each furnace. Holes for mounting control box are provided. Box may be field installed in any convenient location adjacent to or on one of the furnaces.

External Filter Mounting Kit (Optional) — Kit is available for installing air filter external to unit cabinet on side return air applications. Heavy gauge cold rolled steel filter rack assembly field installs on either side of unit cabinet with existing screws. Rack has flanges for ease of duct connection. Filter is not furnished. Kit utilizes existing filter supplied with G21 unit. See Specifications tables and dimension drawing.

Automatic Gas Valve, Expansion Tank and Gas Intake Flapper Valve — 24 volt redundant dual gas control valve combines gas pressure regulation and manual main shutoff valve into one compact combination control. Dual valve design provides double assurance of 100% close off of gas on each heating cycle. Expansion tank is located downstream from the gas valve and absorbs any pressure pulsations. Gas intake flapper valve is installed in the combustion chamber intake manifold between the orifice and expansion tank. Valve is opened by entering gas pressure and closed by back pressure from combustion pulse during the heating cycle.

Wiring Junction Box — Power supply and thermostat connections are made at the wiring junction box located on the vestibule panel. Box contains 30 VA transformer, high and low voltage terminal strips and blower cooling relay. Fuse is located on the junction box to protect the transformer. Terminal strip permits easy connections for optional power humidifiers and electronic air cleaners. Blower cooling relay activates blower operation for add-on air conditioning cooling.

Installation Recommendations — Lennox recommends the following installation procedures to minimize any vibration transmitted from furnace during operation. Place (4) neoprene rubber isolation mounting pads (furnished) and/or base insulation pad (furnished), 25mm (1 inch) thick 24 kg/m³ (1-1/2 lb./ft.³) density fiberglass, under the unit. Install flexible duct connectors in the supply air plenum and return air plenum or duct connection. Insulate 25mm (1 inch) thick, 24 to 48 kg/m³ (1-1/2 to 3 lb./ft.³) density, mat faced fiberglass supply and return air plenums through take-off or duct elbow. Use flexible gas connector (furnished) in gas supply piping where allowed by local codes. Insulate (refrigerant piping insulation or equivalent) all straps and hangers used in suspending ducts, electrical conduit, gas piping, combustion air intake piping and flue exhaust piping. In addition, use plastic pipe or tubing for drain line from the heat coil condensate drain leg (furnished) to the drain, do not use copper tubing.

Concentric Vent/Intake Air Roof/Wall Termination Kit (Optional) — Facilitates installation of combustion air intake pipe and flue exhaust pipe. Kit LB-49107CE (60G77) contains concentric termination assembly, mounting clamp, roof flashing, reducer bushing and 45 degree elbow. Kit requires single hole penetration of roof or wall for installation. Kit must be ordered extra for field installation. See dimension drawings.

Vent/Intake Air Roof Termination Kit (Optional) — Facilitates installation of combustion air intake pipe and flue exhaust pipe. Kit contains two neoprene rubber roof flashings and 457mm (18 inch) insulation sleeve for sealing and isolating intake and exhaust piping penetration in roof. Kit LB-49107CC (15F75) must be ordered extra for field installation. See dimension drawings.

Vent/Intake Air Wall Termination Kit (Optional) — Facilitates installation of combustion air intake pipe and flue exhaust pipe. Kit must be ordered extra. Select one of the following:

- 1 — Kit LB-49107CB (15F74) contains 2 stainless steel outside seal caps, 2 galvanized steel inside seal caps, 4 seal rings for the caps and 457mm (18 inch) insulation sleeve for sealing and isolating intake and exhaust piping penetration of wall. Maintain a maximum of 152mm (6 inches) between the inlet and outlet openings in the installation of the pipes. See dimension drawings.
- 2 — Kit LB-49107CD (22G44) consists of close-couple side-by-side polyvinyl chloride (PVC) piping with galvanized steel wall cover plate for sealing and isolating piping penetration of the wall. Piping spacing and length is sized for proper wall installations. See dimension drawings.

SPECIFICATIONS

| Model Number | G21Q3-40 | G21Q3-60 | G21Q3-80 |
|------------------------------------------------------------------|----------------------------|----------------------------------|--------------------|
| **Input — kW (Btuh) | 11.7 (40 000) | 17.6 (60 000) | 23.4 (80 000) |
| **Output — kW (Btuh) | 11.4 (39 000) | 16.3 (55 500) | 21.7 (74 000) |
| Temperature rise range — °C (°F) | 19 — 36 (35 — 65) | 22 — 39 (40 — 70) | 25 — 41 (45 — 75) |
| Maximum external static pressure — Pa (in. wg.) | 124 (0.50) | 124 (0.50) | 124 (0.50) |
| Gas Connection — Natural or *Propane — iron pipe size — mm (in.) | 13 (1/2) | 13 (1/2) | 13 (1/2) |
| Vent/Intake air pipe size connection — mm (in.) | 51 (2) | 51 (2) | 51 (2) |
| Condensate drain connection — mm (in.) SDR11 | 13 (1/2) | 13 (1/2) | 13 (1/2) |
| Blower wheel diameter x width — mm (in.) | 254 x 203 (10 x 8) | 254 x 203 (10 x 8) | 254 x 203 (10 x 8) |
| Blower motor output — W (hp) | 373 (1/2) | 373 (1/2) | 373 (1/2) |
| Number and size of filters | mm | (1) 406 x 635 x 25 | (1) 406 x 635 x 25 |
| | in. | (1) 16 x 25 x 1 | (1) 16 x 25 x 1 |
| Nominal cooling that can be added — kW (Tons) | 5.3 — 10.6 (1-1/2 — 3) | 5.3 — 10.6 (1-1/2 — 3) | 7.0 — 10.6 (2 — 3) |
| Shipping weight — kg (lbs.) | 113 (250) | 113 (250) | 113 (250) |
| Number of packages in shipment | 1 | 1 | †2 |
| Electrical characteristics | 220/240V — 50 hz — 1 Phase | | |
| *Propane kit (optional) | LB-83176CR (76H95) | LB-83176CE (66H97) | LB-83176CF (66H98) |
| Twinning Kits (optional) | Non-continuous low speed | LB-63093B (64H88) (All models) | |
| | Continuous low speed | LB-63093C (35J93) (All models) | |
| External Filter Mounting Kit (optional) | Part No. | LB-81871CA (16H36) | |
| | •Filter size — mm (in.) | (1) 406 x 635 x 25 (16 x 25 x 1) | |

•Filter is not furnished with kit. Filter kit utilizes existing filter supplied with G21 unit.

*Propane kit must be ordered extra for field changeover.

†Packages consist of assembled unit and (2) in-line mufflers.

**High Altitude Derate — For elevations higher than 600m (2000 ft.) above sea level, unit must be derated 4% per 300m (1000 ft.) above sea level.

SPECIFICATIONS

| Model Number | G21Q5-80 | G21Q5-100 | |
|------------------------------------------------------------------|----------------------------|----------------------------------|----------------------------------|
| **Input — kW (Btuh) | 23.4 (80 000) | 29.3 (100 000) | |
| **Output — kW (Btuh) | 22.0 (75 000) | 27.8 (95 000) | |
| Temperature rise range — °C (°F) | 19 — 36 (35 — 65) | 22 — 39 (40 — 70) | |
| Maximum external static pressure — Pa (in. wg.) | 124 (0.50) | 124 (0.50) | |
| Gas Connection — Natural or *Propane — iron pipe size — mm (in.) | 13 (1/2) | 13 (1/2) | |
| Vent/Intake air pipe size connection — mm (in.) | 51 (2) | 51 (2) | |
| Condensate drain connection — mm (in.) SDR11 | 13 (1/2) | 13 (1/2) | |
| Blower wheel diameter x width — mm (in.) | 305 x 305 (12 x 12) | 305 x 305 (12 x 12) | |
| Blower motor output — W (hp) | 746 (1) | 746 (1) | |
| Number and size of filters | mm | (1) 508 x 635 x 25 | |
| | in. | (1) 20 x 25 x 1 | |
| Nominal cooling that can be added — kW (Tons) | 14.1 — 17.6 (4 — 5) | 14.1 — 17.6 (4 — 5) | |
| Shipping weight — kg (lbs.) | 135 (297) | 135 (297) | |
| Number of packages in shipment | †2 | †2 | |
| Electrical characteristics | 220/240V — 50 hz — 1 Phase | | |
| *Propane kit (optional) | LB-83176CF (66H98) | LB-83176CP (73H62) | |
| Twinning Kits (optional) | Non-continuous low speed | LB-63093B (64H88) (All models) | |
| | Continuous low speed | LB-63093C (35J93) (All models) | |
| External Filter Mounting Kit (optional) | Part No. | LB-81871CB (16H37) | LB-81871CB (16H37) |
| | •Filter size — mm (in.) | (1) 508 x 635 x 25 (20 x 25 x 1) | (1) 508 x 635 x 25 (20 x 25 x 1) |

•Filter is not furnished with kit. Filter kit utilizes existing filter supplied with G21 unit.

*Propane kit must be ordered extra for field changeover.

†Packages consist of assembled unit and (2) in-line mufflers.

**High Altitude Derate — For elevations higher than 600m (2000 ft.) above sea level, unit must be derated 4% per 300m (1000ft.) above sea level.

BLOWER DATA

G21Q3-40, G21Q3-60 AND G21Q3-80 BLOWER PERFORMANCE

| External Static Pressure | | Air Volume at Various Blower Speeds | | | | | | | |
|--------------------------|----------|-------------------------------------|------|-------------|------|------------|-----|-----|-----|
| | | High | | Medium-High | | Medium-Low | | Low | |
| Pa | in. w.g. | L/s | cfm | L/s | cfm | L/s | cfm | L/s | cfm |
| 0 | 0 | 670 | 1420 | 550 | 1165 | 455 | 965 | 365 | 775 |
| 25 | 0.1 | 655 | 1390 | 540 | 1140 | 445 | 940 | 345 | 735 |
| 50 | 0.2 | 640 | 1360 | 525 | 1115 | 430 | 915 | 330 | 695 |
| 75 | 0.3 | 625 | 1320 | 510 | 1080 | 420 | 885 | 305 | 645 |
| 100 | 0.4 | 605 | 1280 | 495 | 1045 | 400 | 850 | 285 | 600 |
| 125 | 0.5 | 580 | 1230 | 475 | 1005 | 380 | 805 | 255 | 545 |
| 150 | 0.6 | 555 | 1180 | 450 | 950 | 355 | 750 | 230 | 490 |

NOTE — All air data is measured external to the unit with the air filter in place.

G21Q5-80 AND G21Q5-100 BLOWER PERFORMANCE

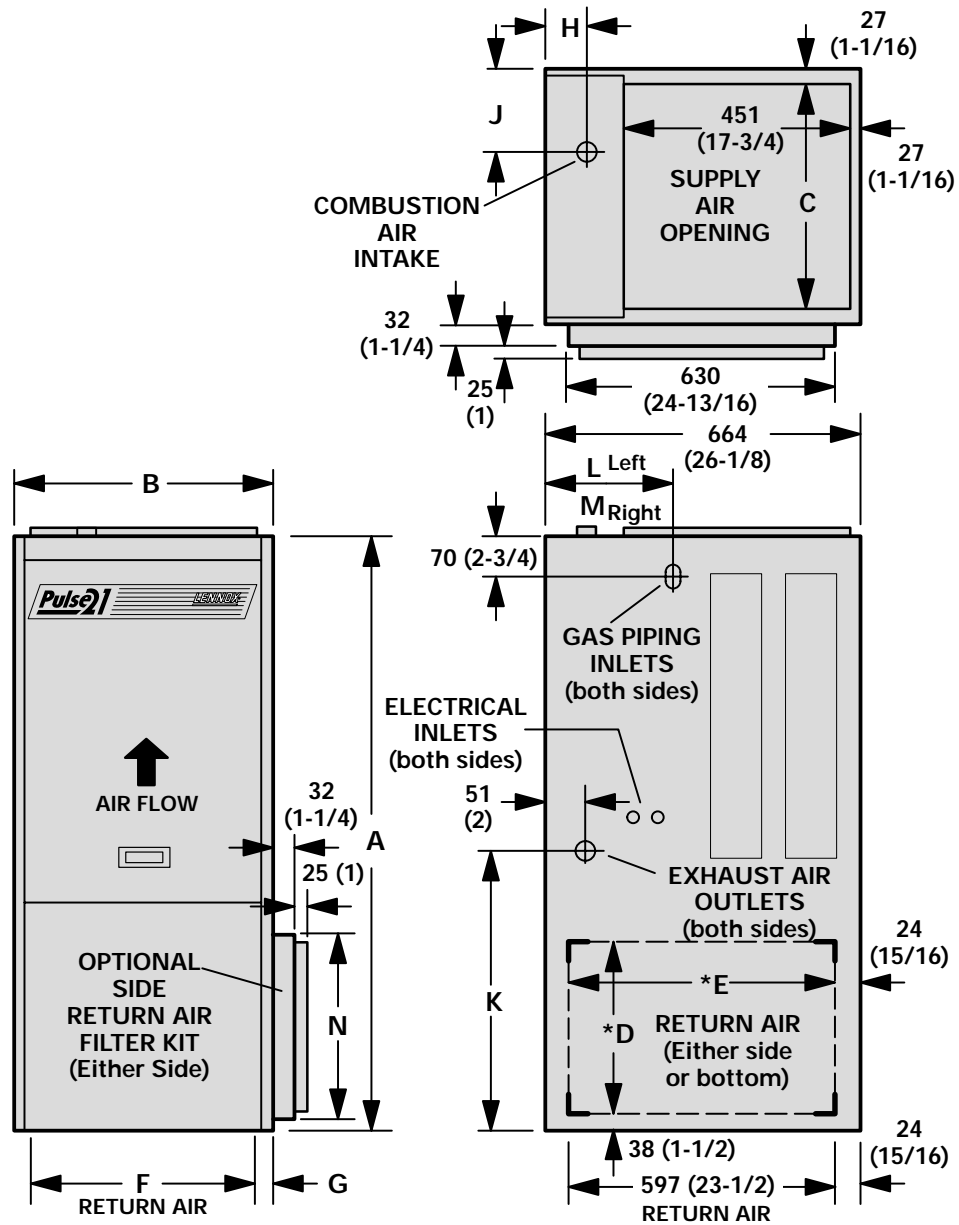
| External Static Pressure | | Air Volume at Various Blower Speeds | | | | | |
|--------------------------|----------|-------------------------------------|------|--------|------|-----|------|
| | | High | | Medium | | Low | |
| Pa | in. w.g. | L/s | cfm | L/s | cfm | L/s | cfm |
| 0 | 0 | 1135 | 2405 | 1025 | 2170 | 885 | 1875 |
| 25 | 0.1 | 1115 | 2365 | 1005 | 2125 | 865 | 1830 |
| 50 | 0.2 | 1090 | 2315 | 980 | 2080 | 840 | 1780 |
| 75 | 0.3 | 1070 | 2265 | 960 | 2030 | 820 | 1735 |
| 100 | 0.4 | 1045 | 2215 | 935 | 1980 | 795 | 1680 |
| 125 | 0.5 | 1015 | 2155 | 910 | 1925 | 770 | 1630 |
| 150 | 0.6 | 990 | 2100 | 880 | 1870 | 745 | 1575 |

NOTE — All air data is measured external to the unit with the air filter in place.

INSTALLATION CLEARANCES

| | |
|-------------------|--------------------------------|
| Sides | 25 mm (1 inch) |
| Rear | 25 mm (1 inch) |
| Top | 25 mm (1 inch) |
| Front | 25 mm (1 inch) |
| Floor | Combustible |
| Exhaust Pipe | 0 mm (0 inch) |
| Exhaust Pipe Side | 152 mm (6 inches) service only |

DIMENSIONS — mm (inches)

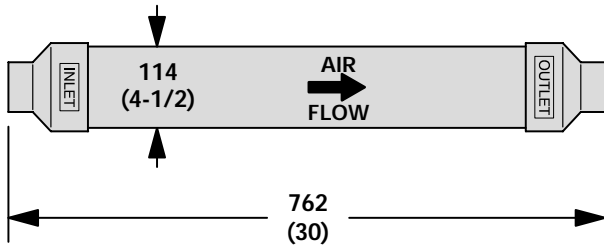


*Unit or Optional External Side Return Air Filter Kit

| Model Number | | A | B | C | D | E | F | G | H | J | K | L | M | N |
|--------------|-----|------|--------|--------|--------|--------|--------|-------|-------|-------|--------|-------|-------|-----|
| G21Q3-40 | mm | 1245 | 540 | 486 | 368 | 470 | 368 | 86 | 114 | 216 | 514 | 184 | 133 | 406 |
| G21Q3-60 | in. | 49 | 21-1/4 | 19-1/8 | 14-1/2 | 18-1/2 | 14-1/2 | 3-3/8 | 4-1/2 | 8-1/2 | 20-1/4 | 7-1/4 | 5-1/4 | 16 |
| G21Q3-80 | | | | | | | | | | | | | | |
| G21Q5-80 | mm | 1346 | 667 | 613 | 470 | 597 | 470 | 98 | 64 | 279 | 616 | 117 | 117 | 508 |
| G21Q5-100 | in. | 53 | 26-1/4 | 24-1/8 | 18-1/2 | 23-1/2 | 18-1/2 | 3-7/8 | 2-1/2 | 11 | 24-1/4 | 4-5/8 | 4-5/8 | 20 |

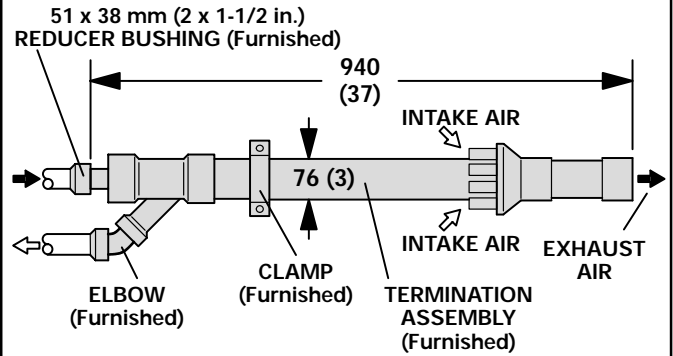
IN-LINE MUFFLERS
(Optional for G21Q-40 and -60)
(LB-52057CA)

NOTE — Two mufflers are furnished per order number.

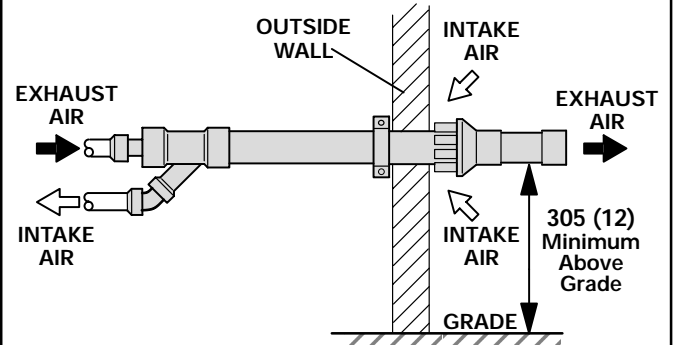


NOTE — (2) Mufflers are furnished with G21Q3-80, G21Q5-80 and G21Q5-100.

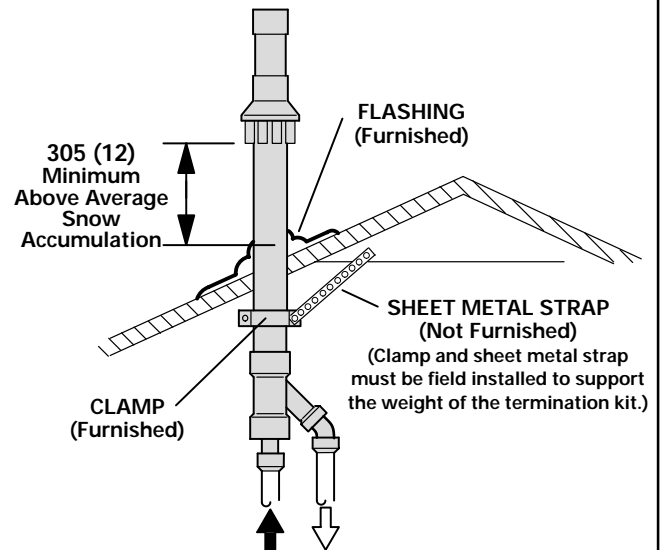
CONCENTRIC ROOF/WALL TERMINATION KIT
(LB-49107CE)



CONCENTRIC WALL TERMINATION APPLICATIONS



CONCENTRIC ROOF TERMINATION APPLICATIONS



ROOF TERMINATION KIT
(LB-49107CC)

