

Section 5 Fuel Conversion/Gas Connections

5.1 — Fuel Conversion

The generator was configured for natural gas operation at the factory. Switching over to LP Vapor is a simple procedure.

NOTE: The fuel selection (LP/NG) must be updated, on the controller, during initial power up using the Installation Wizard.

NOTE: The orange fuel conversion knob is located on the top of the fuel mixer on the V-twin engine and under the fuel mixer on the single cylinder engine.

Turn the valve towards the marked fuel source arrow until it stops. If needed, use pliers to break free in correct direction of arrow. Fuel knob will rotate 180° and slide into the mixer body when converting to LP.

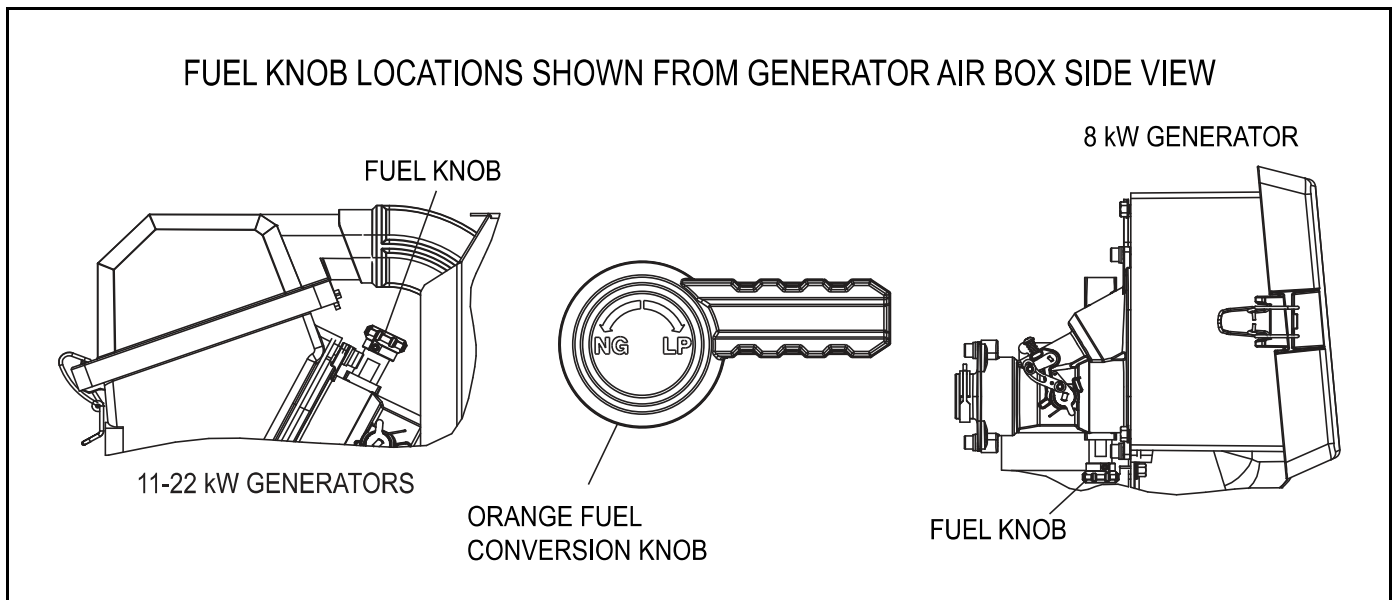


Figure 5-1. Fuel Conversion Knob Locations

5.2 — Fuel Requirements and Recommendations

With LP gas, use only the vapor withdrawal system. This type of system uses the vapors formed above the liquid fuel in the storage tank.

The engine has been fitted with a fuel carburetion system that meets the specifications of the 1997 California Air Resources Board for tamper-proof dual fuel systems. The unit will run on natural gas or LP gas, but it has been factory set to run on natural gas. Should the primary fuel need to be changed to LP gas, the fuel system needs to be reconfigured. See the Fuel Conversion section for instructions on converting the fuel system.

Recommended fuels should have a Btu content of at least 1,000 Btus per cubic foot (37.26 megajoules per cubic meter) for natural gas; or at least 2,500 Btus per cubic foot (93.15 megajoules per cubic meter) for LP gas. Ask the fuel supplier for the Btu content of the fuel.

Required fuel pressure for natural gas is 3.5-7 in water column (7-13 mm mercury). Required fuel pressure for liquid propane vapor is 10-12 in water column (19-22 mm mercury). The primary regulator for the propane supply is NOT INCLUDED with the generator.

NOTE: All pipe sizing, construction and layout must comply with NFPA 54 for natural gas applications and NFPA 58 for liquid propane applications. Once the generator is installed, verify that the fuel pressure NEVER drops below it's required fuel pressure rating. For further information regarding NFPA requirements refer to their website at www.nfpa.org.

Prior to installation of the generator, the installer should consult local fuel suppliers or the fire marshal to check codes and regulations for proper installation. Local codes will mandate correct routing of gaseous fuel line piping around gardens, shrubs and other landscaping to prevent any damage.

Special considerations should be given when installing the unit where local conditions include flooding, tornadoes, hurricanes, earthquakes and unstable ground for the flexibility and strength of piping and their connections.

Use an approved pipe sealant or joint compound on all threaded fittings.

All installed gaseous fuel piping must be purged and leak tested prior to initial start-up in accordance with local codes, standards and regulations.

5.3 — Fuel Consumption

NOTE: Required fuel pressure for natural gas is 3.5-7 in water column (7-13 mm mercury). The required fuel pressure for LP Vapor is 10-12 in water column (19-22 mm mercury).

These are approximate values, use the appropriate spec sheet or owner's manual for specific values.

Generator	Natural Gas		LP Vapor	
	1/2 Load	Full Load	1/2 Load	Full Load
8 kW	78 / 2.21	121 / 3.43	0.87 / 3.29	1.42 / 5.37
11 kW	124 / 3.51	195 / 5.52	1.18 / 4.45	1.92 / 7.28
16 kW	193 / 5.47	312 / 8.83	1.9 / 7.2	3.19 / 12.07
20 kW	205 / 5.8	308 / 8.72	2.08 / 7.87	3.85 / 14.57
22 kW	184 / 5.21	281 / 7.96	2.16 / 8.16	3.68 / 13.94
* Natural gas is in cubic feet per hour / cubic meters per hour. ** LP is in gallons per hour / liters per hour. *** Values given are approximate.				

Verify that gas meter is capable of providing enough fuel flow to include household appliances and all other loads.

⚠ DANGER!



Gaseous fuels such as natural gas and liquid propane (LP) gas are highly explosive. Even the slightest spark can ignite such fuels and cause an explosion. No leakage of fuel is permitted. Natural gas, which is lighter than air, tends to collect in high areas. LP gas is heavier than air and tends to settle in low areas.

NOTE: A minimum of one approved full flow manual shut-off valve must be installed in the gaseous fuel supply line. The valve must be easily accessible. Local codes determine the proper location.

NOTE: The gas supply and pipe MUST be sized at 100% Load BTU / megajoule rating.

5.4 — Fuel Line Sizing

- First, determine what size pipe is required. Refer to NFPA 54 for NG or NFPA 58 for LP for further information.
- Always refer to the owner’s manual for the proper BTU / megajoule and required gas pressures. To calculate BTU or Megajoules:
 - Natural Gas: $BTU = \text{Cubic feet / hour} \times 1000$
 $\text{Megajoules} = \text{Cubic meters / hour} \times 37.26$
 - Liquid Propane Vapor: $BTU = \text{Cubic feet / hour} \times 2500$
 $\text{Megajoules} = \text{Cubic meters / hour} \times 93.15$
- Start by measuring the distance from the generator to the gas source. The generator should be plumbed directly from the source, not off the end of an existing system.
- When measuring the pipe length, add 2.5ft. (.76m) for every angle or bend in the pipe and add that to the overall pipe distance.

5.4.1— Natural Gas Pipe Sizing

To properly use this chart, find the kW rating of the generator in the left column, and trace to the right. The number to the right is the maximum length (measured in feet / meters) allowed for the pipe sizes on top. The pipe sizes are measured by inside diameter (ID) to include any fittings, valves (must be full flow), elbows, tees or angles. Add 2.5 ft (.76 m) per any bend, tee or angle in the pipe to the overall distance.

Pipe Size (in. / mm)					
kW	.75 / 19	1 / 25	1.25 / 32	1.5 / 38	2 / 51
8	55 / 16.76	200 / 60.96	820 / 249.94		
11	20 / 6.1	85 / 25.91	370 / 112.78	800 / 243.84	
16		40 / 12.19	190 / 57.91	425 / 129.54	
20		20 / 6.1	130 / 39.62	305 / 92.96	945 / 288.04
22		20/6.1	130 / 39.62	305 / 92.96	945 / 288.04
For 5-7 in of water column (9-13 mm mercury).					

Pipe Size (in. / mm)				
kW	.75 / 19	1 / 25	1.25 / 32	1.5 / 38
8	20 / 6.1	60 / 18.29	175 / 53.34	
11		30 / 9.14	125 / 38.1	200 / 60.96
16-20		10 / 3.05	60 / 18.29	125 / 38.1
22		10 / 3.05	60 / 18.29	125 / 38.1
For pressures below 5 in of water column (9 mm mercury) down to 3.5" of water column (7mm mercury).				

5.4.2— LP Vapor Pipe Sizing

To properly use this chart, find the kW rating of the generator in the left column, and trace to the right. The number to the right is the maximum length (measured in feet / meters) allowed for the pipe sizes on top. The pipe sizes are measured by inside diameter (ID) to include any fittings, valves (must be full flow), elbows, tees or angles. Add 2.5 ft (.76 m) per any bend, tee or angle in the pipe to the overall distance.

NOTE: Pipe sizes are using a second stage regulator.

NOTE: The minimum LP tank size is 250 gallons (946 L), unless unit calculations dictate use of a larger tank. Vertical tanks, which are measured in pounds (or kilograms), will not usually meet the minimum tank size requirement. A 1050 lb (476 kg) vertical tank size minimum is required.

Pipe Size (in. / mm)			
kW	.75 / 19	1 / 25	1.25 / 32
7-8	165 / 50.29	570 / 173.74	
11	70 / 21.33	255 / 77.72	1000 / 304.8
16	25 / 7.62	130 / 39.62	540 / 164.59
20	15 / 4.57	115 / 35.05	480 / 146.3
22	15 / 4.57	115 / 35.05	480 / 146.3

5.4.3— Gas Installation Summary

Gas pipe sizing is one of the most commonly made mistakes. A properly sized gas pipe is critical to the proper operation of the generator. The generator inlet size has no bearing on the proper gas pipe size.

NOTE: The gas supply and pipe MUST be sized at 100% Load BTU / megajoule rating.

5.5 — Installing and Connecting Gas Lines

NOTE: 8-16 kW unite utilize a 1/2 in connection. 20-22 kW units utilize a 3/4 in connection.

- Both natural gas and LP Vapor are highly volatile substances, so strict adherence to all safety procedures, codes, standards and regulations is essential.

Gas line connections should be made by a certified plumber familiar with local codes. Always use AGA-approved gas pipe and a quality pipe sealant or joint compound.

Verify the capacity of the natural gas meter or the LP tank in regards to providing sufficient fuel for both the generator and other operating appliances.

- Fuel Regulator installed per laws or regulator manufacturer's specifications
 - AGA approved gas pipe
 - Flexible fuel line
 - Do not bend!!!
 - Do not attach directly to generator
 - Check all connections for leaks
 - Sediment trap near generator (if applicable or required by code)
 - Full flow rated shut-off near generator per local jurisdiction or code
- Most applications will require an external manual full flow shutoff valve on the fuel line.