ACCESSORY KIT INSTALLATION MANUAL

PROPANE CONVERSION – MODEL: S1-1NP0703

FOR USE WITH SINGLE PACKAGE GAS/ELECTRIC UNITS
SERIES: PCG*A and PHG*A

⚠ WARNING

This conversion kit shall be installed by a qualified service agency in accordance with these instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, an explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in these instructions supplied with the kit.

⚠ CAUTION

The conversion of new certified central heating gas appliances must conform to directions outlined in this instruction. Installation must be made in accordance with American National Standard National Fuel Gas Code, ANSI Z223.1 — latest edition, unless superseded by local codes.

For Canadian installations, the conversion shall be carried out in accordance with the requirements of the Provincial authorities having jurisdiction and in accordance with the CAN1-B149.1 and.2 installation codes.

The manufacturer accepts no responsibility for malfunctions due to improper conversions.

GENERAL

This kit is intended for the conversion of new equipment only. The kit is for converting the unit from natural gas to propane gas operation at altitudes below 2,000 feet.

All unit installations above 2,000 feet (610 meters) require derating the burner gas input by 4% per 1,000 feet of elevation above sea level. Derating may require the use of smaller-sized gas orifices, which must be obtained from Source 1 parts department. Refer to information contained in the unit installation instructions or the National Fuel Gas Code for details on the proper orifice size to use.

The instructions in this manual cover the gas conversion of the unit when it is equipped with a White Rodgers gas valve. The Installation Instructions supplied with the unit is to be used for all other aspects of the unit installation.

⚠ WARNING

Improper installation, adjustment, service or maintenance can cause injury or property damage; therefore, only a qualified installer or qualified service personnel should perform this conversion.

IMPORTANT

These instructions are for the use of qualified individuals specially trained, experienced and certified in the installation of this type of equipment and related systems components. Installation and service personnel are required by some states to be licensed. Persons not qualified shall not install this equipment nor interpret these instructions.

⚠ This is a safety alert symbol. When you see this symbol on labels or in manuals, be alert to the potential for personal injury.

Understand and pay particular attention to the signal words DANGER, WARNING, or CAUTION.

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result in death or serious injury**.

WARNING indicates a potentially hazardous situation, which, if not avoided, **could result in death or serious injury**.

CAUTION indicates a potentially hazardous situation, which, if not avoided **may result in minor or moderate injury**. It is also used to alert against unsafe practices and hazards involving only property damage.

CONTENTS OF KIT

DESCRIPTION	PART NUMBER	QTY
Propane Gas Burner Orifice, #54	029-26831-000	4
Gas Line Pressure Switch	024-27688-001	1
Tapped Gas Pipe Nipple	029-22152-000	1
Wire Harness	025-47185-000	1
White Rogers 36J Valve Spring Kit	025-25463-000	1
Label, Propane Conversion	035-24122-001	1
Accessory Kit Installation Manual	035-24605-001	1
Wire Tie	025-27642-000	1

⚠ WARNING

An overpressure protection device, such as a pressure regulator, which conforms to the National Fuel Gas code, ANSI Z223.1 (U.S.) or CAN-B149.1 or.2 (Canada) and acts to limit the downstream pressure to value that does not exceed 0.5 PSI (14" w.c.), must be installed in the gas piping system upstream of the furnace. Failure to do so may result in a fire or explosion or cause damage to the furnace or some of its components.

FURNACE CONVERSION

⚠ CAUTION

The gas supply shall be shut off prior to disconnecting the electrical power before proceeding with the conversion.

NOTICE

Do not remove the Low NOx screens from the heat exchanger tubes.

1. Shut off gas supply at shutoff valve upstream of the unit or at meter as required.
2. Remove the access panel to the gas heat compartment.
3. Carefully remove the wires from the gas valve, and note their location so they may be properly replaced. Remove the screws that hold the manifold to the manifold brackets, and slide the manifold off the burners.
4. Remove the main burner orifices from the manifold, and retain for future use.
5. Install the propane main burner orifices in the manifold, and tighten them. After installing a propane orifice in each location, any leftover orifices may be discarded.
6. Reinstall the manifold in the assembly by reversing the removal process.
7. Reconnect the wires to the proper terminals on the gas valve.
8. When installing gas piping, insert tapped gas pipe nipple (supplied with kit) into inlet fitting of gas valve. Tighten until the 1/8 inch tapped hole in the gas pipe nipple is located in the side facing outward toward where the door is to be installed.

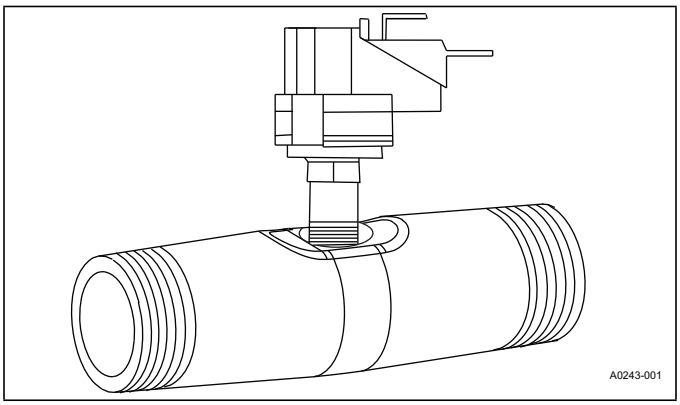

FIGURE 1: Tapped Gas Pipe Nipple

9. Install (thread) the gas line pressure switch (supplied with kit) into the 1/8 NPT tapped hole in nipple applying pipe joint compound to the switch fitting prior to installation. Using a 7/16 inch open end wrench, tighten the switch making sure the connection does not leak. Electrical connections should be facing the right.
10. Rotate the tapped gas pipe nipple a 1/4 turn so the pressure switch is positioned on top of the gas pipe. Refer to Figure 1.

NOTICE

The gas line pressure switch will cause the furnace to lock out if the gas supply pressure drops below 6" w.c. The ignition control will display a fault code 7 and will reset after one hour.

11. Disconnect the wire from the flame sensor.
12. Using the wire harness (supplied with kit) connect the wire from the flame sensor into the insulated male connector; connect the two 1/4" insulated terminals to the pressure switch; and connect the remaining insulated flag terminal to the flame sensor.
13. Convert the gas valve for LP (propane) gas operation by following the instructions and using the components supplied in the envelope. Apply the label supplied in the kit to the gas valve to show that it has been converted.
14. Ensure that all gas connections are tight.
15. Turn on gas supply to unit, and check all gas connections with suitable leak detector.
16. Install the propane gas conversion label as described in the LABELS section of this instruction.
17. Refer to the unit installation instructions to complete the installation before continuing with these procedures.

LABELS

1. Remove conversion rating plate label from the shipping box.
2. On the gas appliance conversion label, write the following:
   a. Kit number, located on the outside of the kit box.
   b. Stamp or write in the name of the organization making conversion, address, city, state, month, and year.
3. Remove label backing, and affix label adjacent to the rating plate.

TESTS AND ADJUSTMENTS

⚠ DANGER

PROPANE AND HIGH ALTITUDE CONVERSION KITS

Make sure that the correct kit and/or gas orifices for the altitude and the type of gas is used for the furnace installation.

Only use natural gas in furnaces designed for natural gas. Only use propane (LP) gas for furnaces that have been properly converted to use propane (LP) gas. Do not use this furnace with butane gas.

Incorrect gas orifices or a furnace that has been improperly converted will create an extremely dangerous condition resulting in premature heat exchanger failure, excessive sooting, high levels of carbon monoxide, personal injury, property damage, a fire hazard and/or death.

High altitude and propane (LP) conversions are required in order for the appliance to satisfactorily meet the application.

An authorized distributor or dealer must make all gas conversions.

In Canada, a certified conversion station or other qualified agency, using factory specified and/or approved parts, must perform the conversion.

The installer must take every precaution to insure that the furnace has been converted to the proper gas orifice size when the furnace is installed. Do not attempt to drill out any orifices to obtain the proper orifice size. Drilling out a gas orifice will cause misalignment of the burner flames, causing premature heat exchanger burnout, high levels of carbon monoxide, excessive sooting, a fire hazard, personal injury, property damage and/or death.

Inlet and manifold gas pressure may be measured by connecting the “U” tube manometer to the gas valve with a piece of tubing. Follow the appropriate section in the instructions below. Refer to Figure 2 for the locations of the pressure ports on the gas valve.

Turn gas off at the ball valve or gas cock on gas supply line before the gas valve. Find the pressure ports on the gas valve marked Out P and In P.

1. The manifold pressure must be taken at the port marked OUT P.
2. The gas inlet line pressure must be taken at the port marked IN P.
3. Using a 3/32” (2.4 mm) hexagonal wrench, loosen the set screw by turning it 1 turn counter clockwise. DO NOT REMOVE THE SET SCREW FROM THE PRESSURE PORT.

Read the inlet gas pressure

Connect the positive side of the manometer to the IN P Tap on the gas valve. Do not connect any tubing to the negative side of the manometer, as it will reference atmospheric pressure. Refer to Figure 2 for inlet pressure port location.

1. Turn gas and electrical supplies on, and follow the operating instructions to place the unit back in operation.

TABLE 1: Inlet Gas Pressure Range

INLET GAS PRESSURE RANGE		
	Natural Gas	Propane (LP)
Minimum	4.5” W.C. (1.12 kPa)	8.0” W.C. (1.99 kPa)
Maximum	10.5” W.C. (2.61 kPa)	13.0” (3.24 kPa) W.C.

IMPORTANT

The inlet gas pressure operating range table specifies what the minimum and maximum gas line pressures must be for the furnace to operate safely.

*The gas line pressure **MUST BE** a minimum of*

- *7” W.C. (1.74 kPA) for Natural Gas*
- *11” W.C. (2.74 kPA) for Propane (LP) Gas*

in order to obtain the BTU input specified on the rating plate and/or the nominal manifold pressure specified in these instructions and on the rating plate.

2. Once the correct gas inlet pressure has been established, refer to Table 1, turn the gas supply to OFF, and turn the electrical supply switch to OFF; then remove the flexible tubing from the gas valve pressure tap, and tighten the set screw using the 3/32” (2.4 mm) hexagonal wrench.
3. Turn the electrical and gas supplies back on, and with the burners in operation, check for gas leakage around the gas valve pressure port for leakage using an approved non-corrosive gas leak detection fluid, or other non-flammable leak detection methods.

Read the manifold gas pressure

Connect the positive side of the manometer to the OUT P Tap on the gas valve. Do not connect any tubing to the negative side of the manometer as this is the port where it references atmospheric pressure. Refer to Figure 3 for connection details.

IMPORTANT

The cover screw for the pressure regulator must be removed entirely to gain access to the adjustment screw. Loosening or tightening the cover screw does not adjust the flow of gas.

1. Refer to Figure 2 for location of pressure regulator adjustment cap, and adjustment screw on main gas valve.
2. Turn gas and electrical supplies on, and follow the operating instructions to place the unit back in operation.
3. Adjust manifold pressure by adjusting gas valve regulator screw for the appropriate gas per the following:

SINGLE STAGE GAS VALVE MODELS

1. Refer to Figure 2 for location of pressure regulator adjustment cap, and adjustment screw on main gas valve.
2. Turn gas and electrical supplies on, and follow the operating instructions to place the unit back in operation.
3. Adjust manifold pressure by adjusting gas valve regulator screw for the appropriate gas per the following table.

TABLE 2: Nominal Manifold Pressure - Single Stage Valve

Manifold Pressures (in wc)				
		Altitude (feet)		
		0-7999	8000-8999	9000-9999
Gas Heating Value (BTU/cu ft.)	2500 (LP)	10.0	8.2	7.5
Manifold Pressures (kpa)				
		Altitude (meters)		
		0-2437	2438-2742	2743-3048
Gas Heating Value (MJ/cu m)	93.2 (LP)	2.49	2.03	1.86

⚠ DANGER

An overpressure protection device, such as a pressure regulator, must be installed in the gas piping system upstream of the furnace and must act to limit the downstream pressure to the gas valve so it does not exceed 0.5 PSI (14" w.c.) (3.48 kPa). Pressures exceeding 0.5 PSI (14" w.c.) (3.48 kPa) at the gas valve will cause damage to the gas valve, resulting in a fire or explosion or cause damage to the furnace or some of its components that will result in property damage and loss of life.

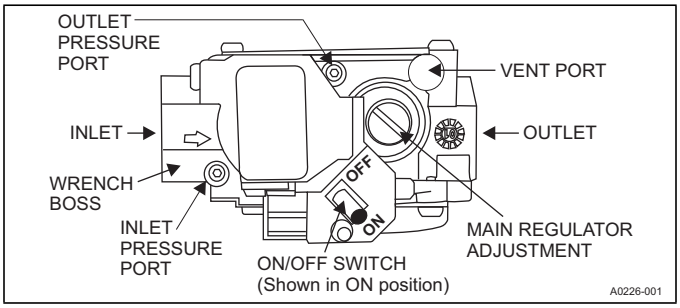

FIGURE 2: Gas Valve

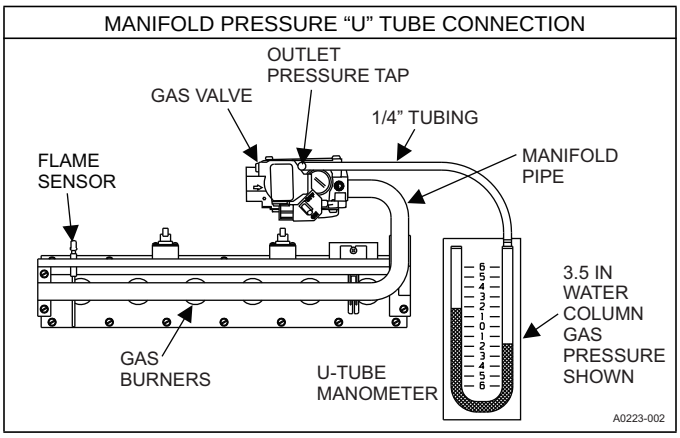

FIGURE 3: Reading Gas Pressure

The following tests must be performed at the time of conversion:

1. Connect a manometer to the manifold pressure tap on the gas valve. Connect a power supply and a propane gas supply to the unit, if not already connected.
2. Turn on the propane gas supply, and bleed air from the gas supply lines at a point as close to the inlet of the gas valve as is practical. Move gas valve switch to the "ON" position.
3. Set the thermostat to call for "HEAT" or connect a jumper between "R" and "W" on the ignition control board to simulate a call for heat.
4. Make sure unit electrical disconnect switch is in the "OFF" position, and then energize the power supply to the disconnect switch.
5. Turn unit electrical disconnect switch "ON." Verify that the combustion blower starts and that the ignitor starts sparking.
6. Main burner ignition may be delayed on the first ignition cycle due to air in the gas manifold.
7. Observe several ignition cycles. The main burners must ignite without delayed ignition or burning at the orifices.
8. Adjust the manifold pressure in accordance with Table 2 with gas supplied to the unit at a pressure of 11 to 14 inches WC.

NOTICE

INLET GAS PRESSURE MUST BE AT 11-14" WC AT FURNACE.
SET MANIFOLD PRESSURE PER TABLE 2.

9. With main burners ignited, check for gas leaks, especially in the following locations: gas valve inlet and outlet connections, manifold union in the burner compartment, and main burner orifices where they thread into the manifold. Repair any leaks found, and recheck. DO NOT CHECK WITH OPEN FLAME.
10. With main burners off, disconnect the manometer, and tighten pressure tap set screw. Check for gas leaks at this plug.
11. Remove jumpers, and replace access panel.

TWO STAGE GAS VALVE MODELS

1. Refer to Figures 4 and 5 for location of regulator cover screws and regulator adjustment screws on main gas valve.
2. To convert the two stage gas valve from natural gas to L.P. gas, remove power from equipment, and verify that gas is turned off.
3. Remove the high pressure regulator cover screw (from side marked HI).
4. Remove regulator adjustment screw (from beneath where the cover screw was mounted).
5. Remove Natural Gas regulator spring from regulator sleeve.

NOTICE

Do NOT remove or replace the spring on the low pressure side.

TABLE 3: Nominal Manifold Pressure - Two Stage Valve (Low Fire)

First Stage Manifold Pressures (in wc)				
		Altitude (feet)		
		0-7999	8000-8999	9000-9999
Gas Heating Value (BTU/cu ft.)	2500 (LP)	4.1	3.8	3.5
First Stage Manifold Pressures (kpa)				
		Altitude (meters)		
		0-2437	2438-2742	2743-3048
Gas Heating Value (MJ/cu m)	93.2 (LP)	1.03	0.95	0.87

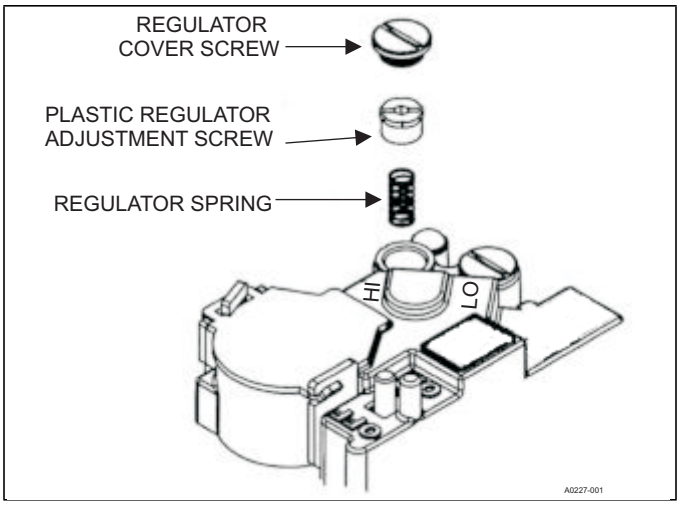

FIGURE 4: High Pressure Regulator Spring

6. Insert the L.P. regulator spring (provided in the conversion kit) into the high pressure regulator sleeve.
7. Replace the regulator adjustment screw.

NOTICE

The high stage regulator adjustment must be set first before setting the low stage regulator adjustment.

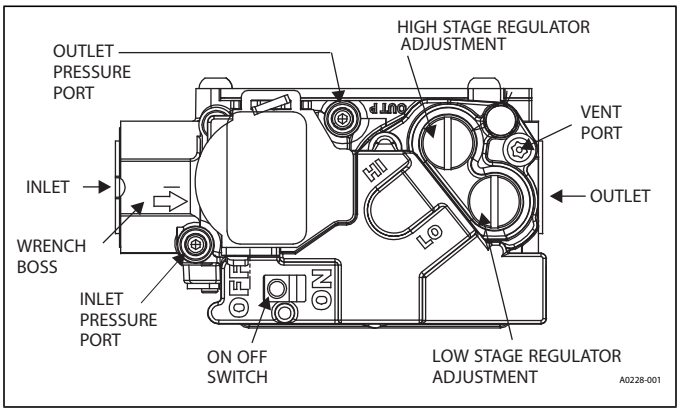

FIGURE 5: Two Stage Gas Valve

IMPORTANT

If gas valve regulator adjustment screw is turned in (clockwise), manifold pressure is increased. If adjustment screw is turned out (counterclockwise), manifold pressure is decreased.

⚠ WARNING

The manifold pressure must be checked with the cover screw installed over the regulator adjustment screw. If not, the manifold pressure setting could result in an over-fire condition. A high manifold pressure will cause an over-fire condition, which could cause premature heat exchanger failure. If the manifold pressure is too low, sooting and eventual clogging of the heat exchanger could occur. Be sure that regulator cover screw is installed and burner box to gas valve pressure reference hose is connected.

8. Set staging jumper on control board to off. Disconnect thermostat wiring from control board.
9. Install temporary low voltage jumper wire from R to W1 and W2 on ignition control board.

⚠ WARNING

Low fire manifold pressure must be set only after setting the high fire manifold pressure.

10. Restore power to equipment allowing it to operate high fire.
11. Adjust manifold pressure to appropriate high fire LP pressure. Refer to Table 2.
12. Replace high pressure adjustment cover screw. Confirm high fire LP pressure.

13. Remove power from equipment.
14. Remove low voltage jumper from W2. Verify that R to W1 is jumpered.

NOTICE

The unit switches to low fire after lighting in high fire and the flame is established for 10 seconds.

15. Restore power to equipment allowing it to operate low fire.
16. Adjust manifold pressure to appropriate low fire LP pressure. Refer to Table 3.
17. Replace low pressure adjustment cover screw. Confirm low fire LP pressure.
18. Remove power from equipment. Remove temporary low voltage jumper wire. Set staging jumper back to its correct position and connect thermostat wiring.
19. Re-calculate the furnace input to make sure the specified input on the rating plate is not exceeded. Refer to the appropriate gas calculating procedures “CALCULATING THE FURNACE INPUT (NATURAL GAS) or (L.P. GAS)” and the calculation formulas on page 7.
20. After the correct BTU (kW) input has been established, turn the gas valve to OFF, and turn the electrical supply switch to OFF. Disconnect the manometer from the gas valve by removing the flexible tubing from the gas valve pressure tap. Tighten the pressure tap plug using the 3/32” (2.4 mm) hexagonal wrench. Turn the electrical and gas supplies back on.
21. With the burners in operation, check for gas leakage around the gas valve pressure port for leakage using an approved gas detector, a non-corrosive leak detection fluid, or other leak detection methods.
22. Attach the WARNING label (provided in the kit) to the gas valve where it can be readily seen. Attach the small round L.P. label to the top of the regulator cover screw. Refer to LABELS procedure on page 8.

CALCULATING THE FURNACE INPUT (NATURAL GAS)

NOTICE

Burner orifices are sized to provide proper input rate using natural gas with a heating value of 1030 BTU/Ft^3. If the heating value of the gas is significantly different, it may be necessary to replace the orifices.

1. Turn off all other gas appliances connected to the gas meter.
2. At the gas meter, measure the time (with a stop watch) it takes to use 2 cubic ft. (0.0566 m^3) of gas.
3. Calculate the furnace input by using one of the following equations.

CALCULATING THE FURNACE INPUT (PROPANE GAS)

NOTICE

Burner orifices are sized to provide the proper input rate using propane gas with a heating value of 2500 BTU/Ft^3. If the heating value of the gas is significantly different, it may be necessary to replace the orifices with different size orifices. Follow the procedure below to calculate the furnace input.

1. Turn off all gas appliances connected to the gas meter.
2. Start the furnace.
3. Use a stop watch to measure the time it takes for the furnace to burn 1 cubic ft. of gas.
4. Calculate the furnace input by using one of the following equations.

In the USA use the following formula to calculate the furnace input.

For natural gas multiply the heat content of the gas BTU/SCF or Default 1030 BTU/SCF (38.4 MJ/m^3), times 2 cubic ft. (0.056 m) of gas measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time (In seconds) it took to measure 2 cubic ft. (0.056 m) of gas from the gas meter.

For propane (LP) gas multiply the heat content of the gas BTU/SCF or Default 2500 BTU/SCF (93.13 MJ/m^3), times 1 cubic ft. (0.028 m) of gas measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time (In seconds) it took to measure 1 cubic ft. (0.028 m) of gas from the gas meter.

The formula for US input calculation using a cubic foot gas meter:

$\frac{\text{BTU/ft}^3 \times 2 \text{ cu.ft.} \times 0.960 \times 3600}{\text{Seconds it took to measure the 2 cu.ft. of gas}}$	=	BTU/H	$\frac{\text{BTU/ft}^3 \times 1 \text{ cu.ft.} \times 0.960 \times 3600}{\text{Seconds it took to measure the 1 cu.ft. of gas}}$	=	BTU/H
NATURAL GAS INPUT CALCULATION EXAMPLE: $\frac{1030 \times 2 \times 0.960 \times 3600}{90.5}$ Natural Gas BTU/SCF 1030	=	78,666.90	**PROPANE (LP) GAS INPUT CALCULATION** EXAMPLE: $\frac{2500 \times 1 \times 0.960 \times 3600}{108}$ Propane Gas BTU/SCF 2500	=	80,000.00

In Canada you will use the following formula to calculate the furnace input if you are using a cubic foot gas meter.

For Natural Gas multiply the Heat content of the gas MJ/m^3 (or Default 38.4), times 2 cubic ft. of gas x 0.028 to convert from cubic feet to cubic meters measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time it took to measure 2 cubic ft. (0.056 m) of gas from the gas meter.

For Propane (LP) Gas multiply the Heat content of the gas MJ/m^3 (or Default 93.13), times 1 cu. ft. of gas x 0.028 to convert from cubic feet to cubic meters measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time it took to measure 1 cubic ft. (0.028 m) of gas from the gas meter.

The formula for metric input calculation using a cubic foot gas meter:

$\frac{\text{MJ/m}^3 \times 2 \text{ cu.ft.} \times 0.028 \times 0.960 \times 3600}{\text{Seconds it took to measure the 2 cu.ft. of gas}}$	=	MJ/H	x	0.2777	=	kW	x	3412.14	=	BTU/H
NATURAL GAS INPUT CALCULATION EXAMPLE: $\frac{38.4 \times 2 \times 0.028 \times 0.960 \times 3600}{90.5}$ Natural Gas BTU/SCF 1030 = 38.4 MJ/m^3	=	82.12	x	0.2777	=	22.80	x	3412.14	=	77,796.80
PROPANE (LP) GAS INPUT CALCULATION EXAMPLE: $\frac{93.13 \times 1 \times 0.028 \times 0.960 \times 3600}{108}$ Propane Gas BTU/SCF 2500 = 93.13 MJ/m^3	=	83.44	x	0.2777	=	23.17	x	3412.14	=	79,063.70

In Canada use the following formula to calculate the furnace input if you are using a gas meter that measures cubic meters.

For Natural Gas multiply the Heat content of the gas MJ/m^3 (or Default 38.4), times 0.10 m^3 of gas measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time it took to measure 0.10 m^3 of gas from the gas meter.

For Propane (LP) Gas multiply the Heat content of the gas MJ/m^3 (or Default 93.13), times 0.10 m^3 of gas measured at the gas meter, times a barometric pressure and temperature correction factor of 0.960; times 3600, then divided by the time it took to measure 0.10 m^3 of gas from the gas meter.

The formula for metric input calculation using a cubic foot gas meter:

$\frac{\text{MJ/m}^3 \times \text{m}^3 \times 0.960 \times 3600}{\text{Seconds it took to measure the 0.10 m}^3 \text{ of gas}}$	=	MJ/H	x	0.2777	=	kW	x	3412.14	=	BTU/H
NATURAL GAS INPUT CALCULATION EXAMPLE: $\frac{38.4 \times 0.1 \times 0.960 \times 3600}{160}$ Natural Gas BTU/SCF 1030 = 38.4 MJ/m^3	=	82.94	x	0.2777	=	23.03	x	3412.14	=	78,581.60
PROPANE (LP) GAS INPUT CALCULATION EXAMPLE: $\frac{93.13 \times 0.1 \times 0.960 \times 3600}{387}$ Propane Gas BTU/SCF 2500 = 93.13 MJ/m^3	=	83.17	x	0.2777	=	23.09	x	3412.14	=	78,805.20

DO NOT ADJUST the manifold pressure regulator if the actual input is equal to or within 8% less than the furnace input specified on the rating plate or if the furnace rise is above the specified rise range on the rating plate.

If the actual input is significantly higher than the furnace input specified on the rating plate then replace the gas orifices with the gas orifices of the proper size for the type of gas you are using.

LABELS

1. Remove conversion rating plate label from the shipping box. Check the natural gas to propane box. If in Canada, check the appropriate box for respective conversion station.
2. Place the conversion rating plate label as close to the rating plate as possible.
3. On the gas appliance conversion label, write the following:
   a. Kit number, located on the outside of the kit box.
   b. Stamp or write in the name of the organization making conversion, address, city, state, month, and year.
4. Remove label backing and affix label adjacent to the rating plate.

035-24605-001-B-0616
Supersedes: 035-24605-001-A-0316

York International Corp.
5005 York Drive
Norman, OK 73069