



# Navien Combination Boiler

Model

**NCB-150E/180E/210E/240E**

This boiler is configured for Natural Gas from the factory. If conversion to Propane Gas is required, the conversion kit supplied with the boiler must be used.

## WARNING

This conversion kit shall be installed by a qualified service agency\* in accordance with Navien's instructions and all applicable codes and requirements of the authority having jurisdiction. The information in these instructions must be followed to minimize the risk of fire or explosion or to prevent property damage, personal injury or death. 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 the manufacturer's instructions supplied with the kit.

\* A qualified service agency is any individual, firm, corporation or company which either in person or through a representative is engaged in and is responsible for the connection, utilization, repair or servicing of gas utilization equipment or accessories; who is experienced in such work, familiar with all precautions required, and has complied with all of the requirements of the authority having jurisdiction.

**In Canada:** The conversion shall be carried out in accordance with the requirements of the provincial authorities having jurisdiction and in accordance with the requirements of the CAN-B149.1 and CAN1-B149.2 Installation Code.

### Tools Required:

- Phillips Screwdriver
- Flathead Screwdriver
- <sup>5</sup>/<sub>32</sub> in or 4mm Allen Wrench
- Combustion Analyzer or Dual Port Manometer
- Gas Leak Detector

### Included Items:

- Gas Orifice (refer to below table)

Model	NG		LP	
	1STAGE	2STAGE	1STAGE	2STAGE
NCB-150E	Ø5.10	Ø5.80	Ø4.10	Ø4.50
NCB-180E	Ø4.80	Ø5.95	Ø3.80	Ø4.70
NCB-210E	Ø6.10	Ø6.30	Ø4.50	Ø4.80
NCB-240E	Ø6.10	Ø6.30	Ø4.50	Ø4.80

Table 1. Orifice Size

- Gas Pressure and Conversion Kit Number Labels

9. Use a Phillips screwdriver to remove the two screws at location A - the connection below the gas valve where it connects to the pipe. See Figure 3 for reference. Once the screws are removed, carefully separate the pipe from the gas valve.

10. Once the gas inlet pipe is detached from the gas valve, find location B - the connection above the gas valve where it is attached to the fan motor assembly. Carefully remove the four screws by hand using a Phillips screwdriver and pull the gas valve away from the fan assembly to access the gas orifice.

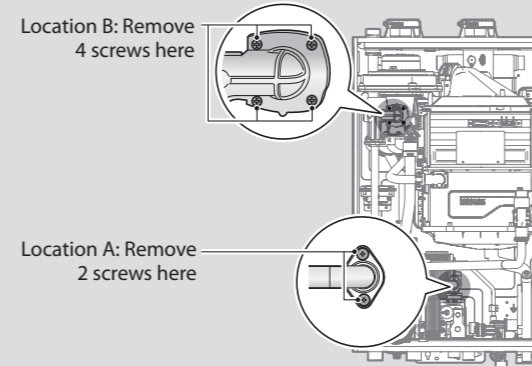


Figure 3. Detaching Gas Valve from Gas Inlet Pipe and Fan Motor Assembly

11. Once the Gas Orifice is exposed, remove the two screws that hold the part in place. Remove the Gas Orifice from its housing and prepare the new Gas Orifice for the LP conversion for installation.

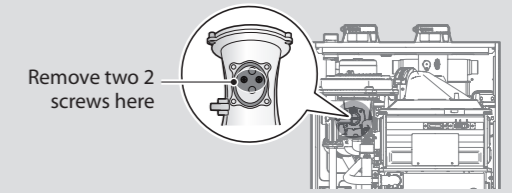


Figure 4. Access to Gas Orifice in Fan Assembly

## WARNING

- DO NOT adjust or attempt to measure gas valve outlet pressure. The gas valve is factory-set for the correct outlet pressure. This setting is suitable for natural gas and propane, requiring no field adjustment.
- Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury, death or substantial property damage. Navien NCB-E boilers are shipped ready to fire natural gas ONLY.

### Procedure:

1. Turn off both gas and water supply to the boiler.
2. Unclasp the 3 buckles that fix the cover to the boiler, and then remove the cover by lifting it and pulling it outward. See Figure 1 for illustration of the front cover on the unit.

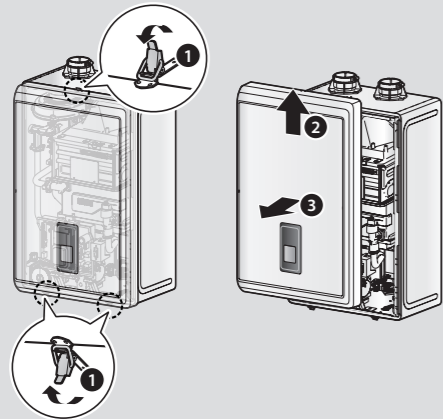
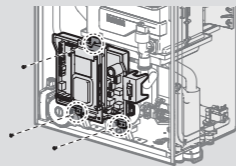


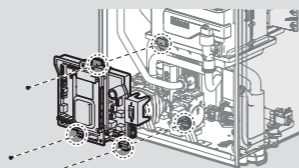
Figure 1. NCB-E Series Front cover

3. Once the front cover is removed, place it in a safe location to prevent accidental damage.
4. Label all the wires on the PCB.
5. Disconnect all the wires.

6. Loosen the three screws indicated in the figure.



7. Remove the PCB assembly.



8. With the internal components exposed, locate the gas inlet pipe and the gas valve in the middle of the unit, as shown in Figure 2.

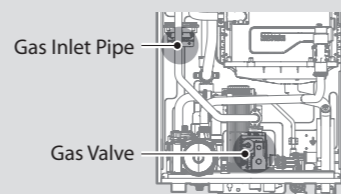


Figure 2. NCB-E Series Internal Components

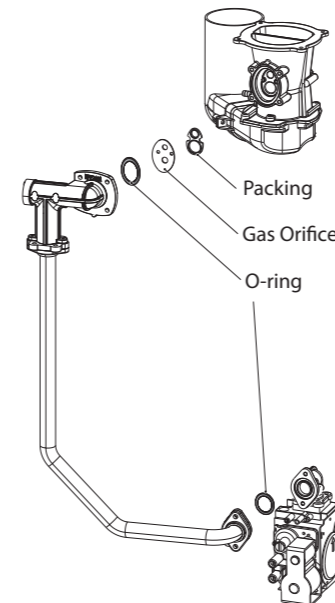


Figure 5. Exploded View of Gas Pipe Assembly

## DANGER

See Figure 5. Inspect the O-ring between the gas valve and gas valve inlet adapter whenever they are disassembled. The O-ring must be in good condition and must be installed. Failure to comply will cause a gas leak, resulting in severe personal injury or death.

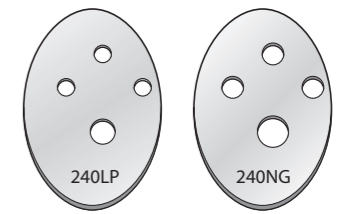
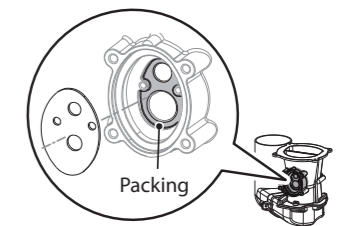


Figure 6. Orifice Identification

12. Remove the Gas Orifice, ensure that the packing is properly seated inside the port, and then install the new Gas Orifice for use with LP gas. Ensure that the Orifice is properly seated on the packing inside the port before proceeding to the next step.



13. Replace the gas inlet pipe to its original position and use all screws to secure all connections.

- Note** Do not overtighten as this may damage or crack the components.

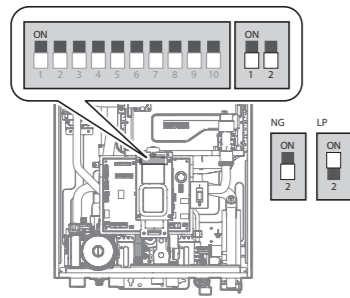
**! DANGER**

Inspect the O-ring between the gas valve and gas valve inlet adapter whenever they are disassembled. The O-ring must be in good condition and must be installed. Failure to comply will cause a gas leak, resulting in severe personal injury or death.

14. Place the PCB assembly back on to the boiler and tighten the three screws.
15. Check the labels carefully and then connect all the wires.
16. Set the front panel Dip Switch to change the gas type. For LP, set Dip Switch 2 #2 to On. For NG, set DIP SW2 #2 to Off.

**! WARNING**

Ensure that you have turned off the power to the boiler before accessing the DIP switches.



**! DANGER**

- When conversion is required, be sure to set the front panel DIP switches according to the supply gas type.
- Failure to properly set the DIP switches could cause carbon monoxide poisoning, resulting in severe personal injury or death.

17. Turn on the gas and water supply to the boiler.

18. Measure and adjust the gas/air ratio.

Option 1. Using Combustion Analyzer (recommended)

- a. Loosen the screw, rotate the plate and remove the gasket to access the emissions monitoring port as shown in Figure 7.
- b. Insert the analyzer into the port (Figure 7).

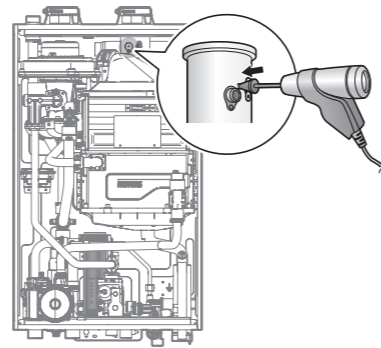


Figure 7. Insert the Analyzer

Option 2. Using Digital Manometer

- a. Open the offset pressure port by loosening the screw two turns as shown in Figure 9.

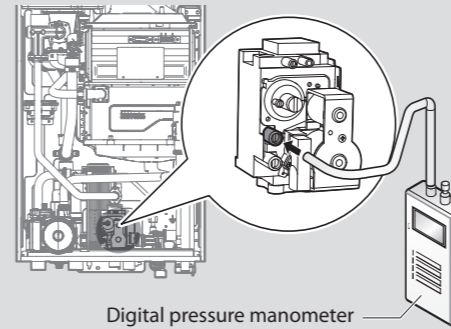


Figure 9. Connect Digital Pressure Monometer

- b. Connect a manometer to the offset pressure port. For dual port manometers, use the positive pressure side.

Model	Kit Part No.	Gas Type	Offset
NCB-150E	NAC-N5	NG	-0.04 in ±0.01 in
	NAC-L5	LP	-0.03 in ±0.01 in
NCB-180E	NAC-400	NG	-0.04 in ±0.01 in
	NAC-04	LP	-0.03 in ±0.01 in
NCB-210E	NAC-500	NG	-0.04 in ±0.01 in
	NAC-05	LP	-0.02 in ±0.01 in

Model	Kit Part No.	Gas Type	Offset
NCB-240E	NAC-600	NG	-0.04 in ±0.01 in
	NAC-06	LP	-0.02 in ±0.01 in

Table 3. Offset value for low fire

- c. Fully open a hot water fixture and set the boiler to operate at 1-stage MIN mode (refer to table 2). Measure the offset value at low fire and compare it to the values in Table 3. If the offset value is out of range, the gas valve set screw will need to be adjusted. If adjustment is necessary, locate the set screw as shown in Figure 10. Using a 5/32 in or 4mm Allen wrench, turn the set screw no more than 1/4 turn clockwise to raise or counterclockwise to lower the offset value.

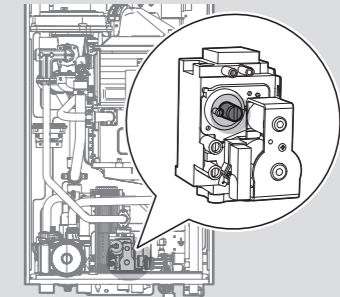


Figure 10. Set Screw Location

**Note** The set screw is located behind the screw-on cover. This must be removed first.

5 7  
6 8

Model	Fuel	High fire	Low fire
		%CO <sub>2</sub>	%CO <sub>2</sub>
NCB-150E	NG	8.9	9.5
	LP	10.2	10.8
NCB-180E	NG	8.9	9.5
	LP	10.2	10.8
NCB-210E	NG	8.9	9.5
	LP	10.2	10.8
NCB-240E	NG	8.9	9.5
	LP	10.2	10.8

Table 2. CO<sub>2</sub> value

(CO<sub>2</sub> values must be within 0.5% of the values listed.)

- c. Fully open several hot water fixtures and set the boiler to operate at 1-stage MIN mode.

**Note** For operation mode selection, refer to "10.4 Setting the Operation Mode" on page 55.

Measure the CO<sub>2</sub> value at low fire. If the CO<sub>2</sub> value is not within 0.5% of the value listed in Table 2, the gas valve set screw will need to be adjusted. If adjustment is necessary, locate the set screw as shown in Figure 8. Using a 5/32 in or 4 mm Allen wrench, turn the set screw no more than 1/4 turn clockwise to raise or counterclockwise to lower the CO<sub>2</sub> value.

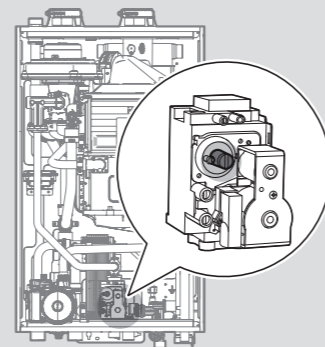


Figure 8. Set Screw Location

**Note** The set screw is located behind the screw-on cover. This must be removed first.

- d. Fully open several hot water fixtures and set the boiler to operate at 2-stage D. MAX mode.(refer to "10.4 Setting the Operation Mode" on page 55) Measure the CO<sub>2</sub> value at high fire. If the CO<sub>2</sub> values do not match Table 2 at high fire, do not adjust the gas valve. Check for the proper Gas Orifice.

**! DANGER**

Improper gas valve settings can cause severe personal injury, death or substantial property damage.

- d. At high fire, do not check the offset value and never adjust the gas valve.

**! DANGER**

Improper gas valve settings can cause severe personal injury, death or substantial property damage.

19. Once the CO<sub>2</sub> or offset values have been confirmed, apply the included conversion stickers to show that the appliance has been converted to propane gas. Place these labels adjacent to the rating plate as shown in Figure 11.

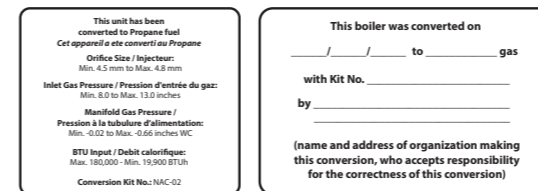
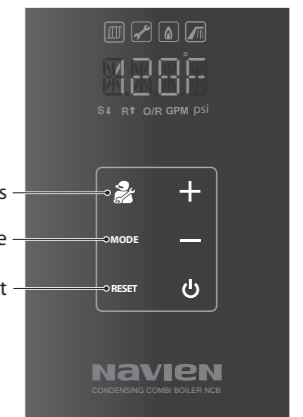


Figure 11. Proper Placement of Gas Conversion Labels

**Setting the Operation Mode**

1. Using the Front Panel, press and hold the Diagnostics Button or over 5 seconds until "1.PAR" is displayed.
2. Press the + (Up) button two to change the display to "3. OPR".
3. Press the Information Button once to access the Operation Mode menu.
4. Press the + (Up) button once to set the boiler to operate at 1-stage MIN ("MIN.1").
5. To set the boiler to operate at DHW 2-stage MAX, press the + (Up) button 4 times or until "D.MX.2" is displayed.
6. To exit the Operation Mode and return the boiler to normal operation, press the Reset button twice.



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