

Measuring and Adjusting CO₂

Models: C1210ESC, C1210ES, C1050ES, C950ES, 940ES, 940ESO, 830ES



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Introduction

NOTE: The CO₂ levels can only be adjusted by a trained gas technician with a calibrated combustion gas analyzer. Please note that a combustion gas analyzer is not the same equipment as a CO detector.

Tools needed:

- ▶ Combustion gas analyzer
- ▶ Flat head screw driver
- ▶ Phillips head screw driver
- ▶ #40 Torx driver

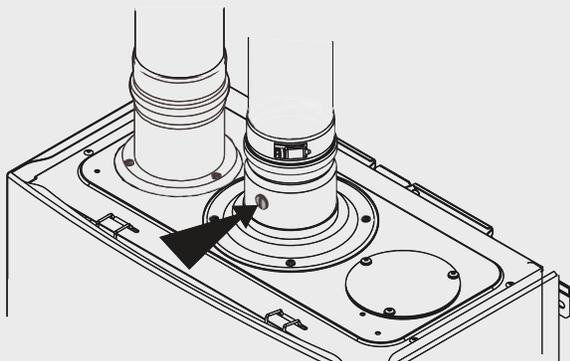
Measure gas pressure

- ▶ One factor that will affect CO₂ levels is improper gas pressure. Please see bulletin *Measuring Gas Pressure* for the procedure to measure gas pressure. Correct any deficiencies in gas pressure before proceeding.

Preparation

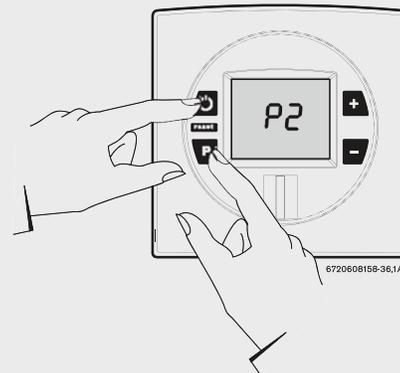
1. Open several hot water taps and let the water heater run for 1-2 minutes. Close hot water taps and return to heater.
2. Push the ON/OFF button to the OFF (O) position.
3. Remove brass flat head screw with gasket on the exhaust collar to reveal measuring port. (Fig. 1)

Figure 1



4. Insert CO₂ analyzer probe into the measuring port. The tip of the probe should be in the center of the flue pipe (approx 1.5" inserted).
5. While pressing the Program (P) button, press the ON/OFF switch to ON (I) position. As soon as '188' flashes on the display, release the program button. The display should now read P2. (Fig. 2)

Figure 2



Measuring CO₂

1. Open enough hot water taps to achieve a flow rate of at least 6 gallons per minute. (1 tub and 2 sinks should be sufficient)
2. Press the (P) button until P1 appears.
3. Record the P1 CO₂ reading below.
P1 CO₂ reading: % CO₂
4. Press the (+) button until P2 appears. Unit will ramp down to low fire and the water flow should decrease.
5. Record the P2 CO₂ reading below (Analyzer reading may take several minutes to stabilize).
P2 CO₂ reading: % CO₂
6. Compare your readings to those found in Table 1. If CO₂ readings are incorrect, make adjustments as outlined in the next section.

Proper CO ₂ readings	Table 1	
	NG	LP
940ES, 940ESO Max input P1	7.0 - 7.6 %	8.3 - 8.9 %
940ES, 940ESO Min input P2	2.3 - 2.6 %	2.5 - 2.8 %
830ES Max input P1	6.9 - 7.5 %	8.1 - 8.7 %
830ES Min input P2	2.3 - 2.6 %	2.5 - 2.8 %
C950ES Max input P1	7.2 - 7.8 %	8.8 - 9.4 %
C950ES Min input P2	1.5 - 1.8 %	1.9 - 2.2 %
C1050ES Max input P1	7.8 - 8.4 %	9.5 - 10.1 %
C1050ES Min input P2	1.5 - 1.8 %	1.7 - 2.0 %
C1210ES, C1210ESC Max input P1	8.3 - 8.9 %	9.9 - 10.5 %
C1210ES, C1210ESC Min input P2	2.1 - 2.4 %	2.5 - 2.8 %

NOTE: Values above are for climate controlled conditions. Inputs such as gas pressure, heating value of the gas, humidity and temperature of combustion air all impact CO and CO₂ values. Changes in these inputs can result in different CO and CO₂ values on the same appliance.

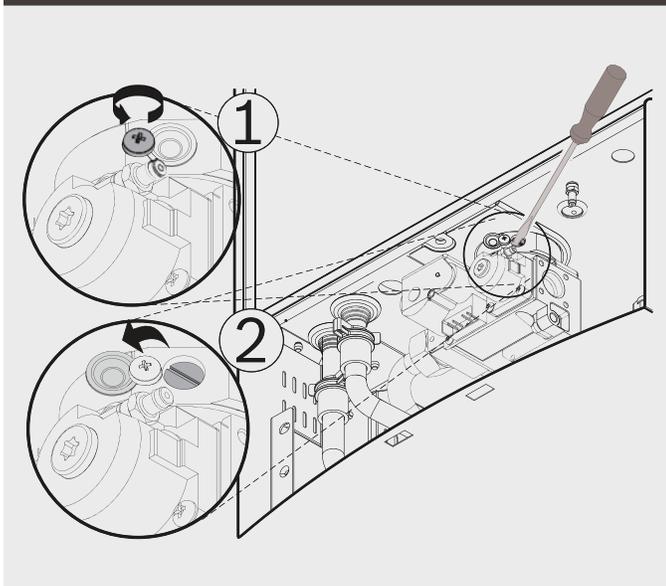
Adjusting CO₂

NOTE: Adjusting P1 CO₂ levels will change the P2 CO₂ levels. Confirm the P1 value BEFORE adjusting the P2 level.

Adjusting P1 CO₂ level

1. Remove front cover per installation manual to access adjustment screws. It is critical that the secondary combustion cover remain on.
2. Loosen yellow painted Phillips screw and cover should rotate down revealing a brass slotted screw. (Fig. 3, pos. 1)
3. Adjusting the brass slotted screw counter-clockwise will raise P1 CO₂ levels and clockwise will lower P1 CO₂ levels. (Fig. 3, pos. 2)

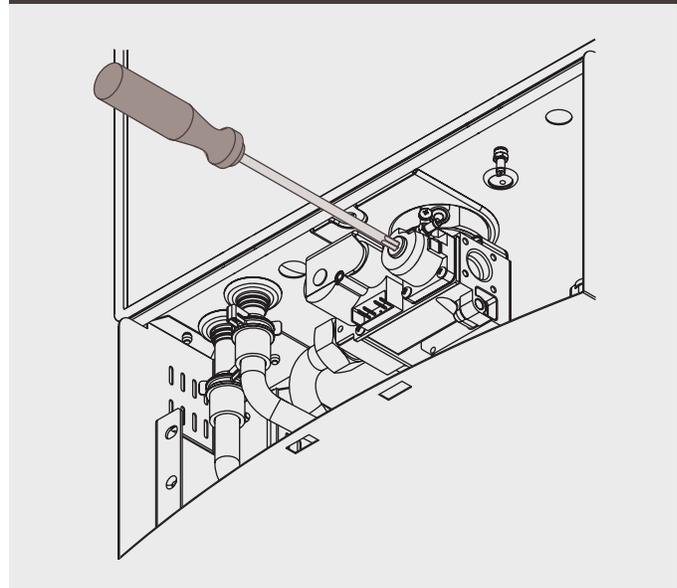
Figure 3



Adjusting P2 CO₂ level

1. Remove yellow painted #40 Torx cover from the front of the gas valve. A plastic #40 Torx screw will be revealed. (Fig. 4)
2. Adjusting the plastic #40 Torx screw counter-clockwise will lower P2 CO₂ levels & clockwise will raise P2 CO₂ levels. (Fig. 4)

Figure 4



NOTE: These screw adjustments are very sensitive and should never require more than a ¼ turn adjustment. Readings may take 1 or 2 minutes to stabilize.

Final readings

1. Verify that both P1 and P2 readings are within the ranges specified in Table 1. Continue adjusting the P1 and P2 levels as necessary until CO₂ values are within the specified ranges.
2. As a safety precaution, measure the Carbon Monoxide (CO) readings in P1. CO levels should not exceed values in Table 2 (follow local codes if more restrictive). If values exceed this limit, inspect vent system and fincoils on the heat exchanger for blockage. To access heat exchanger, see installation manual

Maximum CO readings

Models 830ES, 940ES, 940ESO, C950ES	Max CO
Max input P1	250ppm
Model C1050ES, C1210ES, C1210ESC	
Max input P1	290ppm

Returning to Service

1. Return slotted cover to original position.
2. Reinstall Torx cover.
3. Remove CO₂ analyzer probe and reinstall brass flathead screw with gasket in exhaust collar.
4. Press ON/OFF button to the OFF (O) position and then back to the ON (I) position.
5. Replace front cover. Heater is ready for normal operation.



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