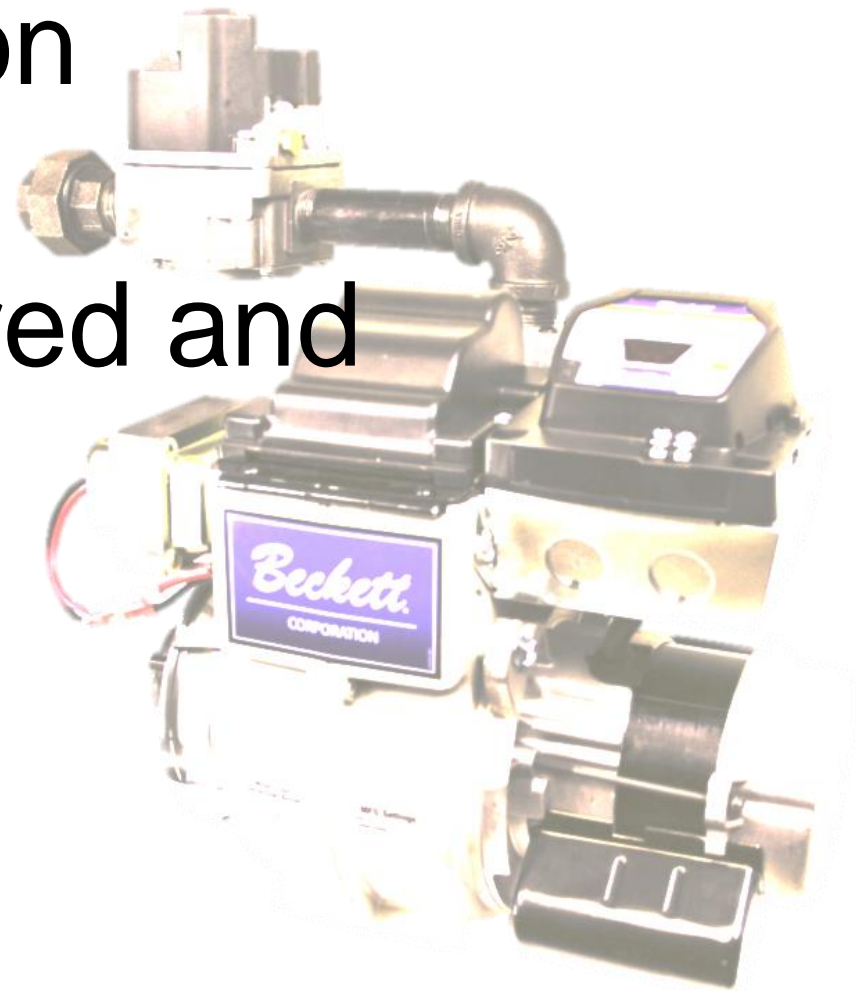


**THIS QUICK TUTORIAL  
WILL GUIDE YOU  
THROUGH THE  
COMBUSTION SET-UP  
PROCEDURE FOR THE  
CG4 POWER GAS  
BURNER**

# Combustion

- Setting Combustion

Equipment required and  
Test procedures



# Combustion

## **NOTICE**

Always use calibrated test instruments to set combustion levels. Verify that test instruments are calibrated and in good working condition. If not already provided, drill test access holes in the flue pipe near the breech (or upstream of the boiler breech damper, if applicable) and in the front mounting plate area for firebox pressure. Be careful not to damage any water-backed surface.

# Combustion

Draft – Set the stack or over-fire draft to the level specified by the appliance manufacturer.

**Natural Draft Applications;** typically over-fire draft is -0.01” or -0.02” W.C.

**Direct Venting;** typically may not require draft adjustment.

**High Efficiency/Positive Pressure Appliances;** (see manufacturer’s recommendations).

# Combustion

**Oxygen** – It is recommended that you measure the oxygen (O<sub>2</sub>) early in the test sequence because high levels of carbon monoxide can be created at very low or even very high O<sub>2</sub> levels. The typical operating range is between 3% – 5%

# Combustion

**Carbon monoxide (CO)** – An operating range of 0 - 50 PPM is recommended for the CG4 burner. The maximum carbon monoxide (CO) level permitted in the flue gas by the UL 795 Standard is 400 PPM (.04%).

# Combustion

**Stack Temperature** – The stack temperature must be within the range specified by the appliance manufacturer. Generally a 325°F stack temperature is high enough to avoid corrosive condensation in the vent system, however a large cross sectional flow area chimney or a very tall chimney may require a higher temperature. See ANSI Z 223.1/NFPA 54 for design requirements.

# Recommended Combustion Adjustment Procedure

- 1. Initiate a call for heat.**
- 2. Adjust the draft or breech pressure to the appliance manufacturer's recommended level after flame has stabilized. A breech pressure that does not exceed -0.04 to -0.06" W.C. is generally acceptable.**



# Recommended Combustion Adjustment Procedure

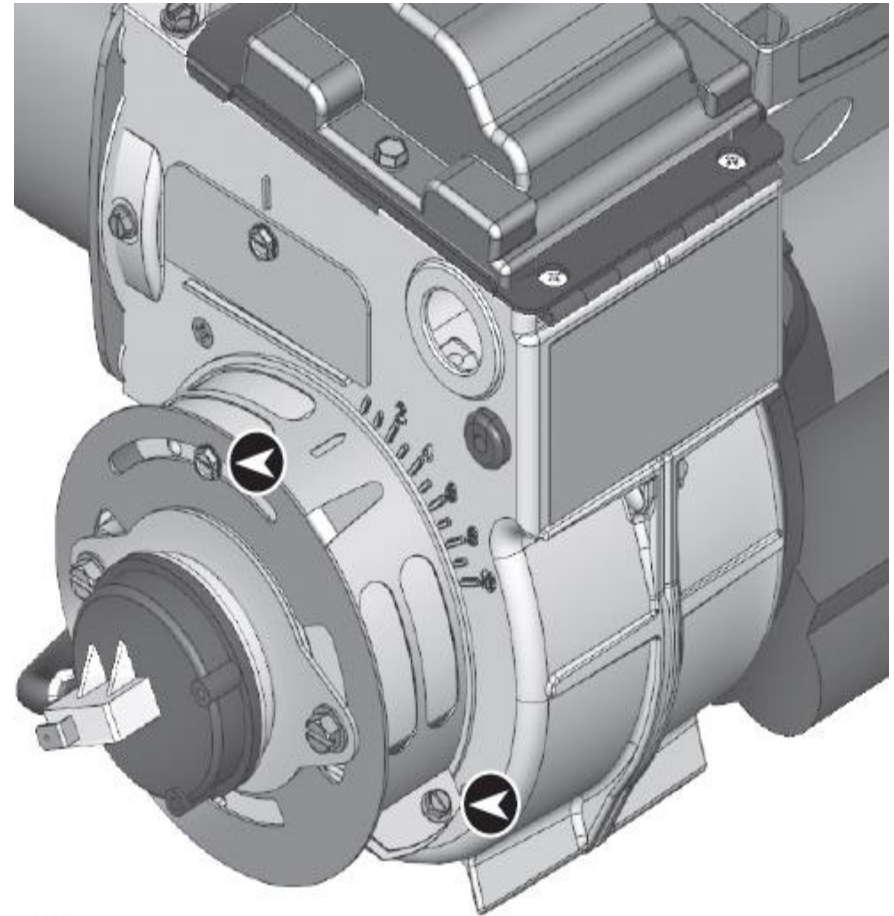
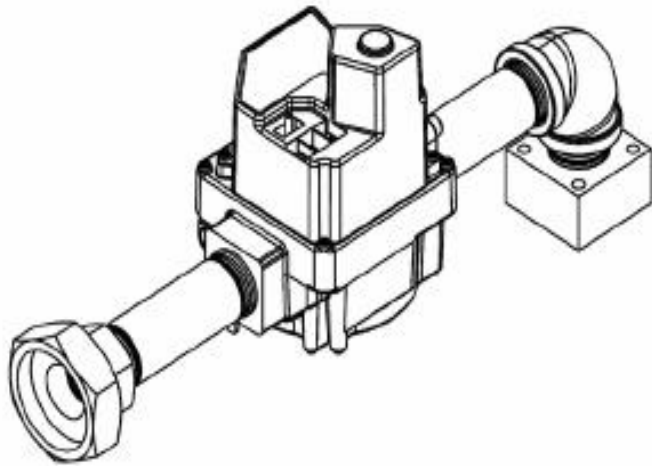
3. Measure the carbon monoxide level and adjust air settings, if necessary, to temporarily raise CO to about **50 PPM for a test point**.
4. Measure the O<sub>2</sub> or CO<sub>2</sub> at the 50 PPM CO level. For this discussion, assume the O<sub>2</sub> is 1.5% (11% CO<sub>2</sub> for Natural Gas).


# Recommended Combustion Adjustment Procedure

- 5. Open the air adjustment until the O<sub>2</sub> level is increased by at least 1% or to 3% O<sub>2</sub> (whichever is higher). This should reduce the CO level and provide a margin of reserve air to accommodate variable conditions.**
- 6. Sample the CO level again. It should be in the 0 to 20 PPM range.**

# **Recommended Combustion Adjustment Procedure**

- 7. Check the draft to ensure it still meets specifications. If a major change in draft is required, repeat the above steps.**
- 8. Check draft regulator for spillage. Confirm the condition of the chimney if spillage is present.**
- 9. Verify stack temperature meets appliance manufacturer's recommendations.**



 = Tighten locking screws securely after adjustments have been made

**10. Perform any final adjustments and lock the air settings securely.**

### Contractor Start-Up Form

Installation Name: \_\_\_\_\_ Installation Date: \_\_\_\_\_  
 Installation Address: \_\_\_\_\_  
 Start-Up Company's Name \_\_\_\_\_ Phone: \_\_\_\_\_  
 Name of Technician \_\_\_\_\_

■ **Appliance** *(Below information can be obtained from appliance name plate)*

Manufacturer: \_\_\_\_\_  
 Type (circle one): [ **Boiler / Furnace / Other** ] Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_  
 Input MBH: \_\_\_\_\_ Original Appliance Designed for (circle one): [ **Oil / Natural Gas / Propane** ]  
 Output MBH: \_\_\_\_\_

Limits	Limit Model No. <small>(Indicate n/a if not required by the appliance manuf.)</small>	Operation Verified
Temperature		YES / NO
Pressure		YES / NO
LWCO		YES / NO
Other Limits		YES / NO / n/a

■ **Burner**

Fuel: [ **Natural Gas / Propane** ] Model #: \_\_\_\_\_ Serial #: \_\_\_\_\_  
 Combustion Head: [ **F3G / F4G / F6G** ] Fuel Orifice Size: \_\_\_\_\_ Air Shutter Setting: \_\_\_\_\_  
 Air Band Setting: \_\_\_\_\_ [ **or Blank Band Installed** ] Baffle: [ **Installed / Not Required** ]

■ **Chimney/Smoke Pipe**

Chimney Type: [ **Masonry / Metal Vent / Direct Vent** ] Location (circle one): [ **Inside / Outside** ]  
 Chimney Height: \_\_\_\_\_ Flue Pipe Size: \_\_\_\_\_ Flue Pipe Length: \_\_\_\_\_  
 Number of Elbows: \_\_\_\_\_ Confirm Double Acting Draft Regulator Installed: [ **Yes / No** ]  
 Thermal Safety Switch Installed [ **Yes / No** ] Voltage: [ **120V / 24V** ]

**Gas Supply Piping**

Pipe Diameter: \_\_\_\_\_ Length of Pipe from Burner to Meter: \_\_\_\_\_ Number of Elbows: \_\_\_\_\_  
 Gas Pressure to Burner Gas Valve While Burner is Operating \_\_\_\_\_ Inches W.C.

■ **Combustion Readings**

O<sub>2</sub>: \_\_\_\_\_ % CO: \_\_\_\_\_ PPM CO<sub>2</sub>: \_\_\_\_\_ % Stack Temperature (325°F MIN.): \_\_\_\_\_ °F  
 Manifold Gas Pressure: \_\_\_\_\_ (Inches W.C.) Draft at Breech: \_\_\_\_\_ W.C.

**11. Record the combustion performance readings.**

**Keep Tag with Burner**

<b>Appliance</b>	TYPE (include size)	MODEL	INPUT RATE IN BTU/h FROM APPLIANCE RATING PLATE †
	Boiler / Furnace / Other	SERIAL NUMBER:	
<b>Burner</b>	ORIGINAL APPLIANCE DESIGNED FOR:	OFFICE SIZE USED † :	AIR SHUTTER SETTING (after set up & calibration):
	Oil / Natural Gas / Propane	Natural Gas / Propane	AIR GARD SETTING (after set up & calibration):
<b>Combustion Readings</b>	CO OR CO2 (specify) (Range X to Y, A to B):	CO PPM (10 PPM MAX):	STACK TEMPERATURE (325F MIN.):
	VALVE OUTLET GAS PRESSURE (INCHES WC) Must be between XX and YY*		

\* If this criteria can not be met, remove the burner. Conversion is not possible.  
 † Resulting rate after conversion must be at least 85% of appliance rating plate.

TEMPERATURE AND/OR PRESSURE LIMIT CONTROL MANUFACTURER(S) AND OTHER LIMITS:		
LIMITS	LIMIT MODEL, NO. (include full # not required by the appliance manufacturer)	OPERATION VERIFIED
TEMPERATURE		Yes / No
PRESSURE		Yes / No
EMCO		Yes / No
OTHER LIMITS		Yes / No / n/a

**WARNING!** Failure to maintain proper stack temperature could result in flue gas condensing and cause chimney damage which could result in Carbon Monoxide leakage into dwelling.

CHIMNEY TYPE:	
Masonry Direct Vent / Metal Vent	
CHIMNEY LAYER INSPECTED (see manual)	CHIMNEY CONFORMANCE TO CODE VERIFIED (see manual for min. requirements)
Yes* / No	Yes* / No
DOUBLE ACTING BAROMETRIC DAMPER WITH NON-RESEALABLE SPILL SWITCH INSTALLED (see manual)	
Yes* / No	

\*Limits, Double Acting Barometric Damper, Spill Switch, and Chimney Inspections/operation verifications must be completed before placing burner into service.

HOMEOWNER OR BUSINESS:	INSTALLATION DATE:
INSTALLATION ADDRESS:	
NAME OF INSTALLER/COMMISSIONER COMPANY:	PHONE:
NAME OF INSTALLER/COMMISSIONER TECHNICIAN:	

**⚠️ WARNING Risk of CO Poisoning or Equipment Damage.**  
 Combustion data must be taken before completing the CG4 installation and checked annually. If unacceptable CO readings are measured, the CG4 burner must either be re-calibrated or removed from service (see CG4 instruction manual). Failure to do this will void all warranties and all manufacturer's remedies.

**The installing contractor must completely fill out this card and attach it to the appliance before placing the burner into service.**

QR Code

CG4 Burner

Service History - Burner Must Be Inspected Annually			
Date	Company	Services Performed	Technician's Initials

**Keep Card with Burner**

**12. Hang the start-up tag in a prominent, safe location on or near the burner for future reference.**