Gas testing for “Popping” units with delayed ignition

### Gas Supply Line and Hose Inside Diameter: [Blank] (inches)

**Refer to page 2 if heat exchanger was replaced**

- Delayed ignition occurs typically when air fuel ratio is “Lean” (too little fuel compared to air at point of ignition)
- The Point of ignition occurs at “other” than intended location of spark gap. Also seen as sparking at base of electrode, or direct to burner face cracked ceramic insulators.
- It is the total quantity of components that can affect these two that causes the complexity, from slow opening gas valve (lean fire); inlet gas pressure changes greater than 20% (small gas line), to a damaged and weak ignition module not producing a high enough spark voltage to jump the gap consistently.

### 1. Gas Pressure Hot air (For dynamic pressure check with both air burners running)

<table>
<thead>
<tr>
<th>Pressure Static: [Blank] WC</th>
<th>Pressure Dynamic: [Blank] WC</th>
<th>Pressure Drop %: [Blank]</th>
</tr>
</thead>
</table>

### 2. Top - Hot Air Top

- Meas. Max Co2 [Blank]%
- Meas. Max Power [Blank] μa
- Meas. Min Co2 [Blank]%
- Meas. Min Power [Blank] μa

### 2.2 Bottom Hot Air

- Meas. Max Co2 [Blank]%
- Meas. Max Power [Blank] μa
- Meas. Min Co2 [Blank]%
- Meas. Min Power [Blank] μa

### 3. Please answer the following section:

#### 3.1 Are the air intake hoses, burner compensation hose and connection, burner blower motor premix disc plates, clogged with dirt, distorted, pin holed or damaged? 
- Yes [Blank] No [Blank]

#### 3.2 Check ignition / wires for stray ignition marks check ceramic insulator for cracks or damaged.
- Note: 102/202G hot air for L insulator at bend installed.
- Yes [Blank] No [Blank]

#### 3.3 New spark electrode and on Hot air burner Ground rod used?
- Yes [Blank] No [Blank]

#### 3.4 Ignition electrode gapped at 4mm/6mm Steam burner, 4mm / 9mm Hot air burner, use a torch to heat rods when bending. For 102/202G Hot air burners Reduce gap to 3mm / 5mm
- Yes [Blank] No [Blank]

#### 3.5 Check for “hairs” of burner head sock sticking up under spark electrode position and if need Trim them off carefully.
- Hairs found? [Yes] [Blank] No [Blank]

#### 3.6 Are signs of water, soap, grease in burner chamber? (sign of heat exchanger failure)
- Yes [Blank] No [Blank]

#### 3.7 Listen to spark sound in exhaust pipe is it “Strong and evenly timed” if not recheck wiring, gapping etc. Then Change ignition module.

#### 3.8 If unit has been “Popping Loud” (Think shotgun blast vs. Dog woof) replace gas valve assembly complete with premix discs etc. (this would also apply to if Max / Min Co2 values are not in range see above)

#### 3.9 Identify and adjust „Popping” burner “Start RPM” in basic settings to its highest allowed value, (remember to turn unit off and then back on to write the ignition module with the change before testing) Test unit for “Popping”, if no change, adjust “start RPM” in basic settings to lowest allowed value, restart as above and test again.

#### 3.10 Change Burner head, and redo from 3.1 above, as all would have changed again.
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Final Test: As a Note: if “Popping” in Hot air mode, set unit to Combi Mode 10% Moisture or so, and 525 deg F set point. Run unit to temperature and then open cabinet door for 5 seconds to allow to cool a little, close door and new ignition sequence will result; do this for 30-50 ignition sequences. Hot Air burners are more likely to “pop” at higher temperatures as the air fuel mixture leans out when igniting. Steam burners, do similar... set to Steam mode, and once burner has ignited, open door and close door to maximize ignition cycles when in front of unit.

Hot Air burner Electrode distances:
X Distance ignition electrode – ground electrode. Y: Distance ignition electrode – burner surface

Did you replace the Hot air heat exchanger?
Yes        No

If “YES” then this mandatory procedure applies: After the exchange of the hot air heat exchanger for unit sizes 102 or 202, you must reduce the gas blower speed: CO2 values remain as given in basic settings of unit. Proceed as follows:

- SCC: In service menu > Basic settings > Gas system > gas blower settings Note: Hot air blower only!
- CMP, DIP switch 1: SE15 (hot air top), SE18 (hot air bottom)
- Reduce gas blower speed for Hot Air (top and bottom) for MAX RPM to the lowest possible value, which is approximately 500-800 rpm below the factory settings.
- Switch unit off and on to store the new value(s).
- Perform a mandatory flue gas analysis.

Gas Errors: Can be grouped in 2 sections:

| A | 1-15, 21, 23, 31 more than 5x | more than 5x: change ignition box 87.005.77 as kit for SE/SG/SH/SI |
| 33, 36, 37 and additional Service 32 | change ignition box 87.005.77 as kit for SE/SG/SH/SI |
| B | The following gas errors have most likely a reason in electrode distances, ignition wire or soiled burner head: |
| 17, 18, 27, 28 for more than 5x and additional Service 33 | Change only ignition box if the above components are ok 87.005.77 as kit for SE/SG/SH/SI |
| 19, 29 for more than 5x and additional Service 33 | clean burner, perform flue gas analysis, if error still occurs more than 5x change ignition box 87.005.77 as kit for SE/SG/SH/SI |
| 20, 30 and additional Service 33 | Check 3 wire control cable from ignition box to gas blower for continuity. Change ignition box, if no result, re-install ignition box and change blower. In case an unrealistic height is shown under RPM correction (above 5000rpm), restart Self test. |
| 22, 32 and additional Service 33 | check for gas supply and function of gas valve (22), check electrode distances, ignition wire or soiled burner head |
| 36, 42 for more than 5x and additional Service 32 | check only ignition box if the above components are ok 87.005.77 as kit for SE/SG/SH/SI |
| 34 | L1 – N was changed |
| 35 and additional Service 32 | check voltage and frequency, (unsuitable voltage or HZ), only important when Service 32 was recorded |
| 38 and additional Service 60 | only important when Service 60 was recorded, contact Rational for soft are repair |