

**SUPPLEMENT START-UP INSTRUCTIONS
SYSTEM 4
VARIABLE SPEED APPLICATION
POST MIXING "LVFD" SYSTEM
"L" NO_x SYSTEMS**

FACILITY
COMPANY/ADDRESS: _____

PHONE: _____

CONTACT: _____

BOILER MODEL NO.: _____

FUEL: _____ **SALES ORDER NO.** _____

SERIAL NO.: _____

DATE: _____

INSTALLING CONTRACTOR: _____

These supplemental start up instructions must be used in conjunction with the normal Installation and Start Up Check Off Sheets for Parker Hot Water, Steam or Thermal Fluid Heaters. (Bulletins ISCS 101-5, ISCS 201, or ISCS 207.)

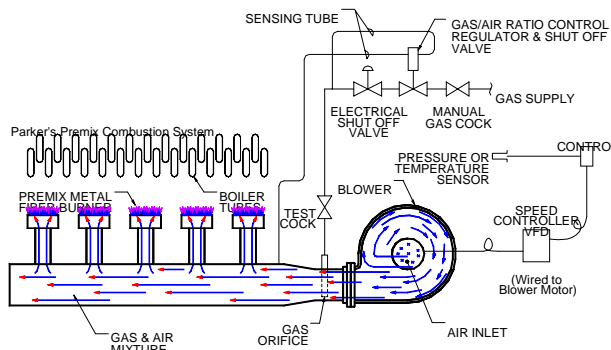
These instructions are to be followed after the Installation and Check Off Sheet have been completed to the Start Up Section. The start up portion of ISCS 101-5, ISCS 201 or ISCS 207 should also be followed in addition to these instructions (some items may be redundant).

Read complete instructions before proceeding, and familiarize yourself with all the system's components. Verify that your equipment has been installed in accordance with the Manufacturer's current instructions.

CAUTION: Initial adjustment and light-off should be undertaken only by trained and experienced personnel familiar with combustion systems, control/safety circuitry, and with thorough knowledge of the overall installation.

Start up technician should be familiar with the installation so proper air fuel ratios can be set. Check the permit conditions so NO_x and CO values can be set to satisfy the job requirement. Combustion Analyzer with NO_x, CO and O₂ measurement is required.

**SUPPLEMENTAL START-UP INSTRUCTIONS
SYSTEM 4
VARIABLE SPEED APPLICATION
POST MIXING "LVFD" SYSTEM**



VARIABLE SPEED APPLICATION
POST MIXING "LVFD" SYSTEM
PARKER PREMIX BURNER SYSTEM

	For "L" Systems Initial Premix Metal Fiber Burner System Start-up:	Y	N
1.	Check all electric circuitry. Verify that all control devices and interlocks are operable and functioning within their respective settings/ranges. Be sure all air and gas manifolds are tight and that test ports are plugged if not being used. Tighten all terminals and conduit. Refer to normal start-up sheets		
2.	All boiler gas valves turned off.		
3.	Notify Boiler Inspection Jurisdiction if required.		
4.	Remove cabinet door on pilot side.		
5.	Insure that all burners are straight and level. Insure that no shipping damage has occurred.		

	For "L" Systems Initial Premix Metal Fiber Burner System Start-up: (continued)	Y	N
6.	Look for dirt or metal flakes on burner surface. If present blow off with air, or vacuum burners with soft brush.		
7.	Insure carryover tube, ignitor & flame rod or scanner are in proper position.		
8.	Check Blower for solid mounting, motor firmly bolted to base, shaft in proper position, shaft tight on impeller, check all bolts for tightness. Unit supported off floor if required, outlet bolts tight.		
9.	Insure that stack or roof jointing compound or sealant is not present inside stack so if heat is applied to stack no sealant will drip onto burners.		
10.	Gas line blown out, thoroughly cleaned, tested for leaks. Install gas pressure gauges of proper ranges upstream and at gasorifice inlet test tap.		
11.	System installer, plumber, owner and/or Gas Co. technician shall if safe turn on gas at meter and bleed air from gas line to proper safety standards if required to allow safe gas flow to boiler.		
12.	Gas line size proper.		
13.	Shut-off valve with handle and union installed ahead of boiler.		
14.	Gas pressure at test opening on boiler inlet to Manufacturer's specifications.		
15.	On Steam Boilers open water supply and boiler feedwater valves. Never operate the boiler feed pump with any valve in the suction or discharge piping closed as this will damage the pump. Check for water and proper float valve level in return tank. (see ISCS 101-5).		
16.	For Hot Water Boilers, Water Heaters or Thermal Fluid Heaters insure proper circulation.		
17.	Check electrical service or services to boiler voltage and phase as they must match nameplate and wiring diagram. Incoming wires must land on proper terminals. If incorrect voltage is connected to boiler, damage may result. Do not apply power to boiler.		
18.	Confirm proper disconnect (s) and Fusingo .		
19.	With boiler control switch and main burner switch off, apply power to boiler and reconfirm voltage.		
20.	With Boiler Control Switch off, turn on electrical to boiler if safe, hot lead (black wire) should read 115 VAC to ground, neutral white wire should read 0 VAC to ground. (Not applicable if 3 Phase power is provided.) Check for proper voltage and disconnet.		
21.	Turn Boiler Controls Switch, on. Main Burner Switch, off. On Steam Boilers pump will be energized. Check boiler feed pump for proper start, stop and rotation. Fill and flush boiler (see ISCS 101-5).		
22.	Check low water cutoff control or controls for proper installation and operation. Test for proper manual reset function.		
23.	Open upstream main gas cock. Downstream gas valve and pilot gas valve closed. Reset gas pressure switches if required.		
24.	Verify all pressure tap lines off of the Siemens SKP 70 are and tight and in proper position.		
25.	Confirm power to VFD drive by ---- on LED.		

Siemen's SKP 70 Operation Theory and Adjustment

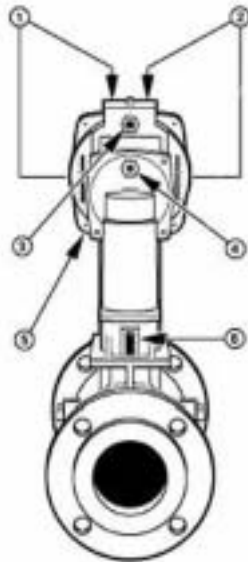
The Siemens SKP70 & variable speed drive fan provides a gas air ratio controlled system for the Parker burners & manifold. These components work together to provide a reliable and repeatable Low NOx Burner System. With this system, the fan speed is regulated based on pressure or temperature of the boiler. As fan speed is changed, the Siemens SKP70 ratio control valve senses the presssure in the premix manifold and adjust gas flow accordingly.

The VFD (Variable Frequency Drive) provides fan motor soft start, speed control, overload protection, digital readout of fan speed & diagnostics. Refer to O & M manual for the drive & Bulletin 123ACTECH.

Note that the VFD is the heart of the system and the proper parameters for that particular model of boiler have been pre-programmed into the drive at the Parker Factory. **Do not apply power to the drive more than twice per minute.** If the drive has sat idle, unpowered for over a year, do not attempt to run the boiler. The drive must be reformed. Refer to Drive O & M Manual.

When a call for heat is experienced in the boiler, the flame safeguard will signal for fan to start. When this occurs, the faceplate of the VFD will start to ramp up to the proper low fire frequency. This controls blower speed. When first starting the unit, observe LED readout on VFD faceplate. The numbers should gradually increase to the low fire or light off speed. This is typically 18-30 hertz, depending on boiler model.

The Siemens SKP 70 performs three functions. (1) gas pressure regulator (2) safety shutoff valve (3) gas air ratio control.



- ① Adjustment and indication of the gas to air ratio
- ② Adjustment and indication of the bias
- ③ Connection for the combustion chamber pressure sensing line
- ④ Connection for the gas pressure sensing line
- ⑤ Connection for the air pressure sensing line
- ⑥ Stroke indication

The pressure ratio and bias adjustment screws are located on top of the regulator under a sealable cover plate. The actual settings can be seen through windows on each side of the regulator.

Note: The burner capacity is controlled by the fan speed. The combustion quality (air/gas ratio) is controlled by the settings on the SKP 70 regulator (the + and – indications relate to the change in gas flow). Adjustment in clockwise direction decreases the gas flow.

(A): Check the reading of the gas to air ratio off the indicator (1). This should be factory set. Normal settings are between 1.6 to 2.4. Adjust this pressure ratio screw (1) at high fire only or when burner is off. Note gas is added by turning the screw counter clockwise. This will increase NOx and lower CO.

(B): Check the reading of the bias ratio off of the indicator. It should be factory set at 0.1 to -0.1. Adjust the bias screw at low fire only. Note the bias screw provides a fine tune of the gas air ratio and is an added or subtracted value.

(C): Adjust screws based on flue gas analysis. The boiler may have to be ramped to the high and low fire position several times and adjusted in order to complete combustion adjustments.

(D): Note that the Siemens SKP-70 is only set at the high and low fire positions. In intermediate firing rates, the pressure ratio is controlled by the valve and the NOx and CO are adjusted automatically.

For “L” Systems Initial Premix Metal Fiber Burner System Start-up: (Continued):		Y	N
26.	With pilot and downstream gas valves shut, flame switchguard run, check switch in the check position and with boiler controls switch on turn on main burner switch. Watch VFD hertz ramp up slowly and observe fan wheel rotation. If rotation is incorrect, turn off all power sources and switch 2 wires coming out of the VFD.		
27.	Insure there is no fan grinding or rubbing or vibration of the blower.		
28.	Confirm proper rotation. Observe and note low fire or light off blower speed.		
29.	Turn off all switches, switch flame safeguard to run position. Open cabinet doors on boiler. As flame rollout may occur on initial boiler firing, insure that no personnel are near boiler area. Insure safety of all present.		
30.	With pilot and downstream gas valves closed attempt to fire boiler. (I.E. Turn Boiler Controls and Main Burner Switch on). Boiler should purge and the fan speed will increase to the low fire or light off position. Ignitor should spark, but no pilot will be established. Check for flame failure lockout.		
31.	With upstream and pilot gas cocks open and downstream gas valve closed, attempt to light pilot burner. Repeat procedure as necessary until pilot ignites as air might have to be bled out of fuel supply lines before reliable pilot flame is established.		
32.	After pilot ignition before main flame period, turn flame safeguard to check position, adjust pilot flame for good stable flame. Adjust pilot to give the strongest and most stable flame signal through flame safety circuit. Normally 6" W.C. gas pressure is required at pilot. The signal strength (or range) will be determined by the specific type of flame safeguard you have with your boiler. Check positioning of stringer pilot tubes to insure good carryover from tube to tube.		

For "L" Systems Initial Premix Metal Fiber Burner System Start-up: (Continued):		Y	N
33.	Re-light and refine pilot gas adjustment and light off's as necessary to get reliable pilot ignition. With pilot established, the flame safeguard should now power your main fuel shut-off valve(s) if (run, check) switch where turned to run position. CAUTION: After completing the steps above, re-check all interlocking safety componenets and circuitry to prove that they are properly installed, correctly set, and fully operational. If in doubt, shut the system down, close gas valves and contact a responsible individual before proceeding further.		
34.	Set low fire hold switch to low fire or adjust operating control for low fire hold.		
35.	Light main burners as follows: First turn off all switches and turn flame safeguard to run position. Pilot & upstream gas valves open downstream gas valve closed. Cabinet door off. Turn on boiler controls & main burner switch. Pilot will light, as soon as it does, open downstream gas valve. Open downstream gas within 10 seconds first pilot ignition. There is a 10 second pilot establishing period and there is a 10 second trial period for main flame establishment. If boiler does not ignite upon first attempt, observe gas pressure at inlet to orifice. Low fire valves should be between .4 to 1.2" W.C. Increase gas to air ratio slightly (screw counterclockwise on (1)).		
36.	Insure gas inlet pressure to boiler holds during the burner main flame trial for ignition.		
37.	NOTE: At this point, it is more important to get any kind of flame as soon as possible. The flame geometry can be adjusted and refined as needed later.		
38.	Cycle boiler at low fire position for assured good light off of all burners.		
39.	Ensure even flame on all combustion surfaces.		
40.	Ensure no excessive heat roll-out from cabinet at this point will cause fire sprinkler or smoke alarm to be set off. Minimize firing with cabinet doors off.		
41.	Allow boiler to run up to the high fire. Look for blue even flame, not orange. Ensure uniform flame on all burners. Look for gas leaks.		
42.	Replace cabinet and door.		
43.	Again, start boiler and drive it to Hi fire. Check gas pressure and set gas pressure to match boiler nameplate and Bill of Materials. Confirm high fire hertz. Normally 43-55. Look for blue even flame not orange. Measure O2, CO, and NOx in the flue gas below draft control. Check draft, adjust ratio screw (1) until optimum NOx and CO values are obtained. Check gas pressure set NOx to desired valve.		
44.	After high fire adjustment, return to Low fire and adjust bias screw. (2) To obtain desired flame shape and NOx and CO values.		
45.	Set draft for draft hood units 0.01-0.02" W.C. Set draft for barometric damper units to 0.04-0.06"W.C. Always check high fire heat roll-out around cabinet bottom when setting draft. In some instances, stack blocks may be required.		
46.	Check hi fire and low fire NOx and CO and move back and fourth between the two firing positions. Perform adjustments as needed. Adjust bias only at low fire and gas/air ratio screw only at high fire.		
47.	Allow boiler to reach temperatures and refine adjustments.		
48.	Record all data as shown in sample settings and combustion analysis form.		
49.	Plug all test connections not in use to avoid fuel leakage. Replace equipment cover caps and tighten screws.		
50.	Check out overall system operation by cycling through light-off at low fire and allowing control system to cycle burner from minimum to maximum and return adjust modulating or hi-low controls. (Note: Manual/auto rate control operation should be verified at this time.)		
52.	Re-check all safety system interlocks for proper setting and operation. WARNING: Test every UV installation for dangerous spark excitation from ignitors and other possible sources of direct or reflected UV radiation. Use only gas-tight scanner connections.		
53.	Before system is placed into full service, instruct operating personnel on proper start-up, operation, and shut down of system. Establish written instructions for their future reference.		
54.	Completely go through installation and start up check off sheet and include this document as well as combustion report forms with start up sheet for file copy and owner.		

VII. List any items that are not approved as satisfactory or that may be questionable:

1. _____
2. _____
3. _____
4. _____
5. _____