

Read this document and understand it completely before you attempt to assemble or operate the new equipment.

The new 'Series 11' equipment is designed to meet standards for combustion controls defined by the National Fire Protection Association (NFPA) and standards for electrical equipment defined by the National Electrical Code (NEC). This equipment was designed and constructed to meet current safety standards. Changes or Modifications to any part of the new equipment will be treated the same as willful violations of Hotwork Safety Rules.

Setup and operation are slightly different from previous versions of Hotwork equipment.

Changes from previous versions include:

- 1. All electrical connections have been changed to a standard connection specified by the National Electrical Manufacturers Association (NEMA).
 - a. Twist-lock Electrical connections on 'new' extension cords, on the burners, blowers, and fuel control sets DO NOT work with older Hotwork equipment.
- 2. All fuel hoses are flexible stainless steel 'gas rated' hose with a protective covering.
 - a. Stainless hose cannot be crushed or kinked; it will not 'recover'.
 - b. It cannot be exposed to electrical arc-it will rupture at the point of the arc and cannot be repaired.
- 3. Fuel hoses are different sizes and have specific 'gas-rated' connections on them. Modification or removal of hose connections is direct violation of safety rules.
 - a. Two inch diameter hose is used ONLY for supply and has Hansen spring loaded quick disconnect couplers similar to those Hotwork uses for fuel oil.
 - i. The female end of the set has a positive shut-off incorporated into the fitting.
 - ii. The male end is 'open' and will release any pressure stored when disconnected. It is critical that hoses be verified at ZERO Pressure before disconnecting them.
 - iii. IT WILL BE DIFFICULT TO CONNECT A HOSE TO A PRESSURIZED OR 'LIVE' FEMALE HOSE CONNECTION.
 - iv. DO NOT RELY ON THE STOP VALVE IN THE FITTING AS THE ONLY ISOLATION FOR A PRESSURIZED LINE. Always use upstream valves to isolate or shut off fuel supply and bleed the line before disconnecting any Hansen fitting.
 - b. 1½ inch diameter hose is used ONLY between control cabinet and burner and is equipped with 2¼ inch ACME thread fittings.
 - i. The control cabinet outlet and the burner inlet have matching fittings and will only fit the 1¹/₂ inch hose fittings.
- 4. The Control Cabinet has an internal 'basket' installed for shipment of accessories and cords.
 - a. AT NO TIME IS ANYTHING TO BE PLACED OR SHIPPED ON TOP OF THE PLUMBING INSIDE THE CABINET. THE FILTER SET IS STORED ON THE CABINET FLOOR FOR TRANSIT. ALL OTHER PARTS AND ACCESSORIES MUST BE SHIPPED IN THE BASKET TO AVOID DAMAGE TO THE CABINET WIRING.
 - b. The basket can be lifted and locked against the cabinet lid for short periods for observation. Do not attempt to close the lid with the basket 'raised and locked'. Do not leave the basket and lid 'locked together' in the open position. Unexpected attempt to close the cabinet lid will damage the assembly and may result in injury.
- 5. The control cabinet is shipped with a strainer. Use of the strainer is mandatory. One side of the strainer has a Hansen fitting that matches the two inch supply hose. The other side of the strainer has a 3½ inch ACME fitting that matches ONLY the inlet side of the control box. Strainer MUST be set with 'leg down' to allow gravity to move larger particles to the bottom of the screen. <u>NEVER</u> ATTEMPT TO OPEN THE PLUG ON THE STRAINER LEG WHILE IT IS SERVICE.



- 6. The control cabinet has a new Fireye BurnerLogix flame management system. This IS NOT interchangeable with any other system currently in use at Hotwork. The optional display is installed and indicates problems within the system, including purge times and reasons for shutdown.
 - a. Do not attempt to change the internal program of the BurnerLogix Unit. Unsafe operation can result from improper programming.
 - b. The BurnerLogix utilizes the same ultraviolet scanner as previous equipment.
 - c. The black [Reset] button on the face of the BurnerLogix unit is disabled. Use the toggle switch marked [Fireye Reset] to reset the unit.
 - d. The BurnerLogix system requires that the electric valves be 'proven' closed before it will start pilot try for ignition sequence. Switches for this purpose have been incorporated into each of the four electric valves.
- 7. The Control Cabinet has been fitted with 'Double Block' pilot and main valves—two of each. The 'Maxon' valve remains in place and works the same as previous equipment.
 - a. Second 'main' valve and both pilot valves have red Light Emitting Diode (LED) lamps incorporated into the switch assemblies. Upper lamp indicates [Open]. Lower lamp indicates [Closed]
- 8. The Control Cabinet has a Combustion Air switch connection, Low Gas Pressure limit switch and a High Gas Pressure switch incorporated into the plumbing and electrical systems.
 - a. Low Gas and High Gas are set at time of installation and are not to be modified or changed for any reason.
 - b. Combustion air switch is located at the burner and connects to the control cabinet with an extension cord.
 - c. 'Limits Made' lamps for each of the three conditions are on the electrical control panel. Gas Switches are wired sequentially. Combustion Air Switch IS wired on a separate circuit.
 - i. 'Low Gas' requirement must be met to allow 'High Gas' limit to engage.
 - ii. Combustion Air Limit Made lamp will light as soon as the low limit is met.
- 9. The blower has safety features incorporated into the control sets. See Hotwork Document 11184 Blower Instructions (currently attached to each blower) for details of operation.
 - a. Electrical cabinet door must be kept securely closed during operation.
 - b. Master shut-off switch is installed and isolates ALL power in control cabinet.
 - c. Motor phase protection is installed and will shut down motor operation on loss of phase.
 - d. Magnetic motor starter is installed and will shut down motor on power 'bump'. Motor must be restarted by pushing [Blower Start] button once power is restored after 'bump'
 - e. Blower cabinet and all buttons, gauges, and connections (when closed) are weather-tight.
 - f. Fuses have been replaced with circuit breakers.
- 10. The Burner has a combustion air switch connection installed. Combustion air switch is mandatory and should be shipped in the basket inside the control cabinet.
 - a. Burner utilizes the same ignition transformer, spark rod, and ignition wire as previous versions.
 - b. Burner and blower utilize the same combustion air hose and clamp system as previous versions.
 - c. Burner utilizes same burner 'nozzle' or 'cone' mounting system as previous versions.
 - d. Burner electrical and fuel connections are different from previous versions of equipment making burner non-interchangeable with previous versions of equipment.

Setup isn't much different from previous versions. Procedures remain the same as published in the Technician Training Manual. See manual for details. Deviations from published procedures exist:

1. Combustion air damper is on the blower instead of the burner and should be checked to verify 100% open prior to connecting air hose to blower.



- 2. The supply hoses are fitted with Eaton-Hansen HK-12 quick-connect fittings. After each fitting is connected, a zip-tie must be snugly placed on the female fitting in the gap between the retractable ring and the hex portion of the fitting to prevent accidental disconnect.
 - a. Do not abuse Hansen fittings on supply hose. If female coupler ring is 'out-of-round' and does not operate, do not attempt to use hose, mark it with a red tag for repair, and return it with the equipment.
 - b. Client supply fitting will be supplied with necessary bell or reducer fitting. Recover all plumbing parts supplied to client and return with equipment.
 - i. Not all client fuel valves seat completely resulting in a slow leak at the valve. If this condition exists, be aware that pressure may accumulate between the client valve and the Hansen fitting. Advise the person installing/removing the fitting that this possibility exists and to take steps to safely deal with this condition at time of installation.
 - ii. New fittings are considerably more expensive than previous versions. DO NOT leave them behind because you believe "Hotwork will be back again'.
- 3. Threaded fuel connections do not require tie-wire or zip-ties to secure them. As always, inspection of each connection is expected at time of assembly.
 - a. Do not over-tighten connections with ACME threads. If a wrench is required, use only enough force to tighten the connection. If gasket is damaged or missing, look in spare parts box for replacements. Replacement of gasket in ACME threaded fittings is similar to previous version fuel connections.
- 4. Install combustion air switch and connect to the control cabinet with extension cords supplied with control cabinet.
- 5. DO NOT use the valves in the Hansen fittings as isolation valves.

Startup also differs slightly.

- 1. Turn fan on, set blower damper to 100% open and run blower for twenty minutes immediately prior to startup.
- 2. Close the [Power] switch on the electrical panel in the Control Cabinet. Combustion Air "Limits Made" lamp should light at this time.
- 3. Verify that pilot valve, main burner valve, primary shut off valve, and all in-line valves are in the closed position.
- 4. Notify customer contact person when preparing to connect to gas supply to light burners.
- 5. Advise any contractors that all personnel should be away from the furnace and not near vessel openings.
- 6. Connect gas line to customer supply. Verify that the 'slip rings' on all supply hoses are fully seated and secured with nylon zip-ties.
- 7. Turn on the gas at the customer line.
- 8. Check for leaks in the fuel gas lines to the Control Cabinet at each connection fitting.
 - a. Immediately shut fuel supply off and take steps to repair any leaks discovered in this step.
 - b. <u>DO NOT</u> attempt to disconnect any hose while pressurized.
 - c. Open all valves in the supply line to the nearest control cabinet.
 - d. Use the [Line Bleed] switch and the pilot valve to bleed pressure to zero in fuel line prior to disconnecting for repairs.
 - e. Once leaks are repaired, return to step 3 and continue procedure.



- 9. Verify that the pressure gage in the Control Cabinet reads zero pressure. This should indicate that the Controls cabinet main shutoff valve is closed and not leaking.
- 10. Open main cutoff valve in the Control cabinet. The pressure gage should read line pressure and all three "Limits made" lamps should light up.
- 11. Close the [Fireye] toggle switch. If the system does not immediately begin counting a fifteen second purge period, close and hold the [Fireye Reset] toggle switch for four seconds. The toggle switch is the only working 'reset' available and will reset any fault in the Fireye circuit.
- 12. The display on the Fireye BurnerLogix unit will display 'Pilot Try For Ignition (PTFI)' at the end of the purge cycle. This indicates the electric pilot valves are open and the ignition circuit is energized.
- 13. You have five seconds to open the pilot hand valve enough to establish flame in the burner. The last five seconds of PTFI hold the pilot valve without a spark to verify ignition.
- 14. When the burner ignites, the Fireye scanner will sense the flame. The BurnerLogix will display 'flame on' and indicate a signal strength, usually above 20 and less than 60. Too many variables exist to depend on definite minimum acceptable signal strength. Use this for informational purposes only. The higher the number, the stronger the signal.

WARNING: if the pilot should fail to light before the end of the 10 second Fireye ignition cycle, close the pilot hand valve, turn off the Fireye switch, and make an inspection of the equipment. If satisfied that the equipment is set up correctly, return to step 11 and try again to light the pilot follow procedure. Try one more time. If the pilot fails to light after three attempts, refer to the troubleshooting chart in the Technician Training Manual. Follow each step in the flow chart to locate the problem.

- 15. Verify that combustion air damper on the blower is 100% open.
- 16. Close the pilot valve slowly until the flame-on light goes out. Reset the Fireye by holding the [Fireye Reset] toggle switch closed for four seconds. The system will purge for fifteen seconds as soon as you release the [Fireye Reset] toggle switch. Once the system begins Pilot Try for Ignition (PTFI), reopen the pilot hand valve until the 'flame on' lamp lights again. Repeat these steps once. After the second time open the pilot valve up to ¼ turn more. The pilot flame is now properly adjusted. No further adjustment should be made to the pilot valve, up or down.

There will be a five second delay after flame is detected before the electric main valve opens and the Maxon is operable. Once the Maxon is operable, grasp the lever on the side of the Yellow Maxon valve. It will move easily on one direction. Pull the lever against resistance to the opposite side. The flame failure alarm will sound. Open the [Alarm Silence] switch to silence the alarm. The burner is now operating properly.

WARNING: If at any time, and for any reason, known or unknown, the equipment is shut down, immediately close the customer's fuel gas supply valve and main shut off valve in the Control Cabinet.

Safe Shutdown Sequence is the same as previous versions of Hotwork equipment.

- 1. Shut fuel off at client supply.
- 2. Verify line pressure is at ZERO. Open [Fireye] switch and close [Line Bleed] switch as necessary to bled line pressure to ZERO
- 3. Immediately disconnect fuel line from client supply.
- 4. Damper combustion air to 25% open.
- 5. Remove burner from furnace and let cool with combustion air.