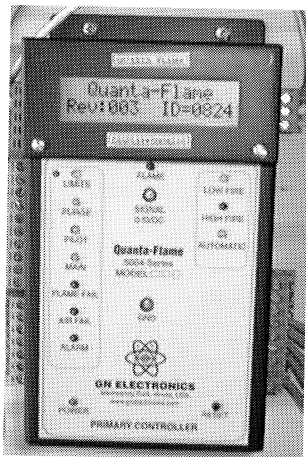
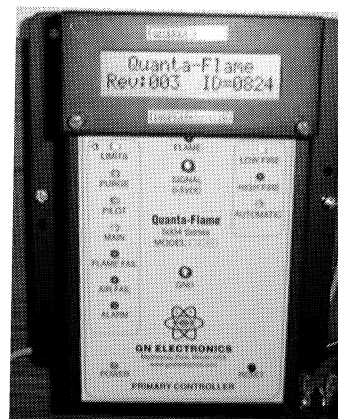


GN Electronics Inc.

5004 Quanta-Flame Primary Control



PANEL MOUNTED VERSION



BACKBOX MOUNTED VERSION

USER MANUAL

Patent Pending

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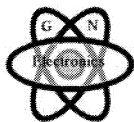
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Note: All rights and privileges to the design of this product including the circuit layout and software are the exclusive property of GN Electronics, Inc. No part of which can be sold, used, or modified without the expressed written permission of GN Electronics Inc



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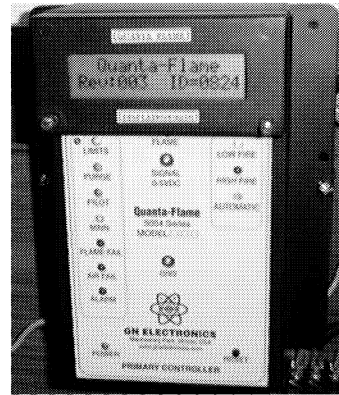
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DESCRIPTION

Quanta-Flame 5004

This is a microcomputer-controlled primary burner management control system.

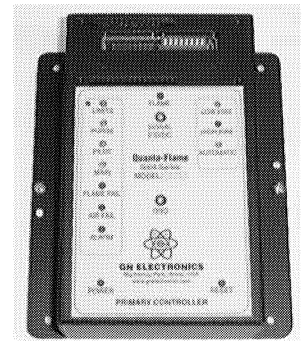


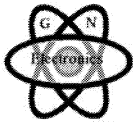
5004 Features

- Interface to Quanta-Max 5003 for up to 16 burner multi-burner systems
- High immunity to Electrical Noise
- Built-in 120 VAC 50/60 Hz supply
- Isolated 10 Amp relay alarm contact
- Easy mounting in control panels
- Pilot Test Mode
- Selectable Trial for Ignition times (3, 5, 10, or 15)
- Selectable interrupted or intermittent pilot
- Selectable Recycle or Non-recycle modes
- Every unit interfaces to infra-red, ultraviolet or flame rod sensors

5004 Options

- 2 X 16 Character Backlit LCD Local Display (5004-216)
- 2 X 16 Character Backlit LCD Remote Display (5004-216R)
- Custom Messages available
- RS 485 Communication Interface
- Software for multi-burner configurations using the 5003 Quanta-Max system

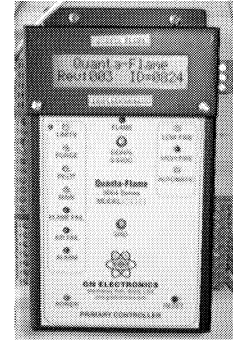




Quanta-Flame 5004 Models

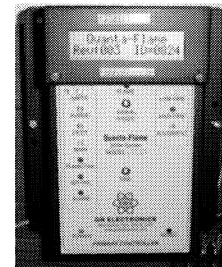
The 5004 series is available in two styles:

The Panel Mounted Version



The panel-mounted version is normally mounted on a sub panel within an electrical enclosure. (This model is denoted by a -1 after the model number) This control has external connections on both side of the control, which connects on removable terminal plugs for easy access and troubleshooting.

The Back box Mounted Version



The back box version is mounted on its own wiring base, which houses and covers all the electrical connections. This enables the control a wider variety of mounting configurations within an electrical enclosure.

Both Styles offer three types of controls:

No purge (5004-N): This control has no internal purge timer and no capacity for starting a combustion fan, monitoring the combustion air switch or sequencing an actuator to high fire purge or low fire start

Purge (5004-P): This control has an internal purge timer and the capacity for starting a combustion fan and monitoring the combustion air switch, but not sequencing an actuator to high fire purge or low fire start

Modulation (5004-M): This control has an internal purge timer and the capacity for starting a combustion fan and monitoring the combustion air switch, It can also sequence an actuator to high fire purge and back to low fire start.

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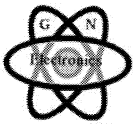
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LED indicators

The 5004 has LED indicators located on the front on the control.



Interlocks (red)- Indicates the presence of all the necessary interlock switches in order to begin the burner sequence

Purge (yellow)(purge and mod only)- Indicates the burner is now in the purge portion of the sequence and that the combustion fan is running

Pilot (yellow)- indicates that the pilot valve is energized

Main (yellow- indicates that the main gas valve is energized

Flame Fail (red)- indicates the burner failed to light

Air Fail (red) (purge and mod only)- indicates that there is insufficient air for the burner to operate properly

Alarm (red)- indicates a lockout condition has occurred

Power (red) indicates that power is applied to the unit

Flame (red) indicates the presence of a flame signal at the control

Low Fire (green) (mod only)- indicates that the unit is in the low fire mode

High Fire (red)(mod only)- indicates that the unit is in the high fire mode

Automatic (yellow) (mod only)- indicates the unit is in the automatic mode



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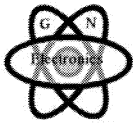
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Inputs

Limits- Input that receives all of the per missives and the burner start signal switch or contact

POVC (Proof of Valve Closure)- This input is where the POVC switch on the main valve is wired

Air Switch- The combustion air-proving switch is wired into this input. (Not used on No Purge Model)

High Temperature- The high temperature cut out switch is wired here to shut the burner down. **(This is an optional input not available as standard)**

High Pressure- The high pressure cut out switch is wire here to shut the burner down. **(This is an optional input not available as standard)**

Remote Reset- A switch wired into this input will reset the control. This is to enable the user to install a panel-mounted switch for easy resetting of the control with out opening a panel door.

Low fire switch input- This low fire proving switch is connected there to prove low fire before the pilot will light. (Used only on Modulation Model)

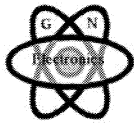
High fire switch input- The high fire purge proving switch is connected here to prove high fire position before the high fire purge will start. (Used only on Modulation Model)



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Outputs

Pilot- Output to energize the burner pilot valve

Main- Output to energize the burner main valve

Fan- This is a dry contact output for operating the combustion air fan or blower.
(Not used on No Purge Model)

Alarm- This is a dry contact output, which closes when an alarm condition occurs.

Modulation Contacts (Used only on Modulation Control)- These are internal contacts which can be used to sequence an air actuator to High fire for the High Fire purge part of the sequence and then back to low fire for low fire start. The terminals connected to these contacts are:

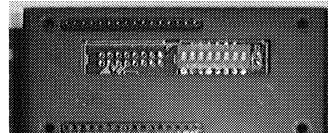
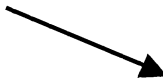
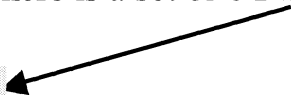
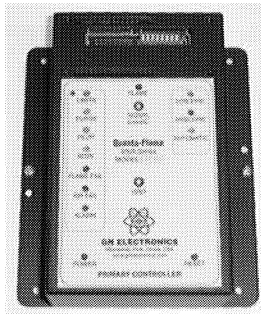
Low Fire
High Fire
Automatic
Common





Control Configuration:

Setup Dipswitches: There is a set of 8 Dipswitches under the top cover on the 5004.



Dipswitches 1 through 4 set the amount of purge time needed in the system.

DIPswitch one selects either 30 seconds of purge or no purge. Dip Switches 2 through 4 are multiplier switches to increase the purge time.

For example: If Switches 1 and 2 are turned off then the purge time is 30 times 2 or 60 seconds long (1 minute).

If switches 1, 2, and 4 are turned off then the purge time is 30 times 2 times 5 or 300 seconds long (5 minutes).

The maximum purge time with all the switches off is 30 times 2 times 3 times 5 or 900 seconds (15 minutes).

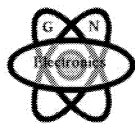
Dipswitches 5 and 6 set the desired trial for pilot ignition time.

This value can be 3, 5, 10 or 15 seconds

Dipswitch 7 selects Non-Recycle or Recycle mode.

Recycle mode permits the controller to shut down and start the burner startup sequence again when a flame failure or air failure has occurred during the burner run cycle. In order for this to occur the main burner has to be up and running for 50 seconds before a recycle can occur. A flame or air failure that happens before that time results in a lockout regardless if recycle is selected or not.



**Dipswitch 8 selects interrupted or intermittent (non-interrupted) pilot.**

An interrupted pilot will ignite during the trial for ignition time and be shut off 10 seconds after the main gas valve opens to light the main flame.

An intermittent pilot will ignite during the trial for ignition time and will stay lit when the main valve is open. It will remain on as long as the main burner is on and will shut down at the end of the main burner cycle.

DIP Switch Setup Table

DIP Switch Number	Purge Time				OFF Position		On Position	
1	Purge Time Multipliers				30 sec		No Purge Time	
2					Times 2		Times 1	
3					Times 3		Times 1	
4					Times 5		Times 1	
	TFI Time	3 sec	TFI Time	5 sec	TFI Time	10 sec	TFI Time	15 sec
5	Off		On		Off		On	
6	Off		Off		On		On	
	Non -Recycle		Recycle					
7	Off		On					
	Interrupted		Intermittent					
8	Off		On					

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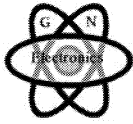
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Quanta-Flame 5004 Specifications

MECHANICAL:

Enclosure: 5 7/8" H by 4 3/8" W by 1 5/8" D

ELECTRICAL:

Voltage: 120 VAC 50/60Hz, Power consumption: 2VA

Temperature Range: -40°F to +140°F (-40°C to +60°C)

Trial for Ignition time

Dipswitch

Selectable

3 sec

5 sec

10 sec

15 sec

Flame Failure Response Time: 2.5 to 3.5 seconds

Purge time (Purge & Modulating Models):

Selectable from 0 seconds to 12 minutes

Output connected load ratings

Pilot, Main, and Alarm Outputs: 10 amps resistive (1/4 HP inductive)

Fan: 10 amps resistive (1/2 HP inductive)

Note: Total connected load must not exceed 15 amps

Shipping weight: 2 Lbs for all models

Inputs: UV Sensor, Flame Rod, and Infrared



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Feature and Function Descriptions

Combustion Air switch shorted check- This feature monitors the air switch input and checks the proper operational sequence of the switch as it opens and closes and opens again during the burner start up and run cycle.

Proof of main valve closure- Verifies the closed Main Valve before and after the burner run cycle. In addition it also verifies the proper operation of the POVC switch by detecting that the valve switch opens when the main valve is energized.

Proven low fire start- Proves the low fire position prior to ignition and light off of the burner

Proven High Fire purge- Proves the high fire position of the combustion blower before the high fire purge can begin. This insures a proper high fire purge.

Recycle Mode- When selected, the control will recycle the burner through purge and startup when the main burner has shutdown with an air failure or flame failure alarm. The recycling of the burner will only occur after the main burner has been in operation for more than 50 seconds. There is no recycle on pilot flame failure.

Pilot turndown test mode- This mode permits the pilot to ignite and remain burning regardless if interrupted or intermittent pilot has been selected. The main burner will not be ignited as long as the control is in this mode. This permits the service technician to adjust and inspect the pilot flame

Interrupted pilot- The pilot will ignite and be turned off 10 seconds after the main burner valve is opened

Intermittent (non interrupted pilot)- The pilot will ignite and remain lit for the entire duration of the main burner run cycle

Pilot Verification feature- The ignition will be de-energized 5 seconds before the main valve is energized to insure the pilot flame is stable before lighting the main burner

Post Purge- After the main burner shuts down a 10 second post purge will occur.



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Pilot Test Mode – When the control is in pilot test, the control sequence will start up and continue until the pilot is ignited and verified. At this point the sequence is put on hold by the control and the main valve is not energized. This permits the technician to examine and adjust the pilot flame. To enter this mode press and hold the reset button on the front of the control for 10 seconds. A flashing limit light indicates the pilot test mode. If the optional display is installed, the word “TEST” will appear

Purge Modulation feature (Modulation Models only)- This feature sequences internal contacts, which can be used to in the high fire purge control circuit. The internal contacts are connected to control terminals and sequence as follows:

Control Status	Terminal Connection Status
Control is not powered	AUTO (automatic) to COM
Control is powered, limits are open	L FIRE (low fire) to COM
High Fire Purge	H. FIRE (high fire) to COM
Low Fire Start	L FIRE (low fire) to COM
Control Releases to Automatic Mode	AUTO (automatic) to COM
Alarm Lockout	L FIRE (low fire) to COM





Installation Notes

- All installation, wiring, or service activities must only be performed by knowledgeable and qualified technicians.
- All system wiring should be run in accordance with the National Electrical Code and all local code requirements.
- Always remove all power to the system before wiring.
- Do not run control wiring, ignition wiring, or sensor wiring in the same conduit.
- **No Purge models do not use the following connections**
 - L.F. Switch
 - H.F. Switch
 - Low Fire
 - High Fire
 - Auto
 - Com
 - Air Switch
 - Fan
- **Purge models do not use the following connections**
 - L.F. Switch
 - H.F. Switch
 - Low Fire
 - High Fire
 - Auto
 - Com



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Wiring Considerations

Depending on the output option used the wiring requirements will vary somewhat.

Output type	Suggested wire	Wiring run considerations
Contact	14 to 16 AWG	THHN or equivalent Nothing special- can be run with other wires in conduit
0 to 12VDC RS 485	14 to 16 AWG	THHN if wire is run in separate conduit
		Shielded cable if multiple wires are in one conduit
		Coax cable if long distance runs are required or if high level of electrical noise is present

Note

All wiring runs to the field on, or near, hot surfaces should be rated for 90°C (195°F) or at least 25°C (50°F) higher than the surface temperature.



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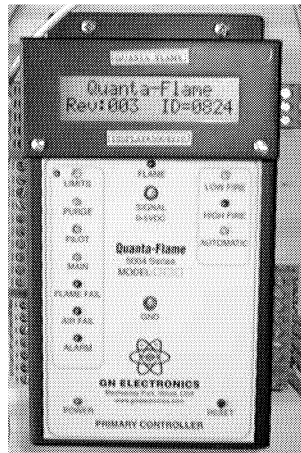
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Wiring Connections- Panel Mounted Version

FR-H FR-L SHLD UV-L UV-H	SENSORS-IN
LINE LINE FAN FAN LIMIT LIMIT LIMIT IGNITION PILOT MAIN	POWER-OUT
POVC AIR-SW HI. TEMP HI. PRES RESET	SAFETY-IN
COM N.O.	ALARM OUT



**High Temp &
High Pres
inputs are
optional**

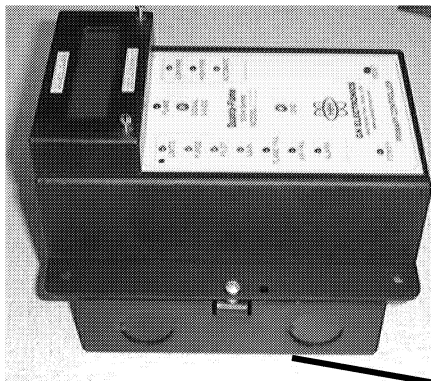
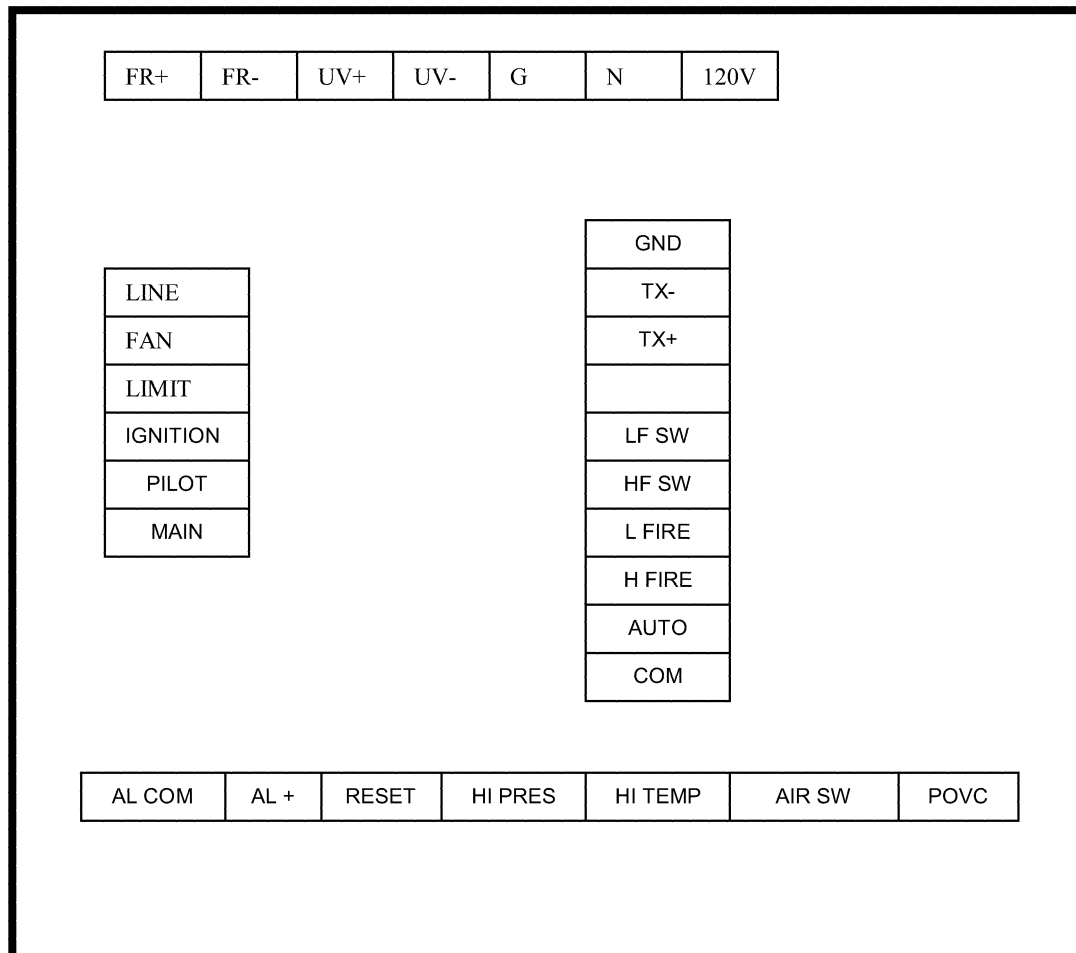
120V	01-LINE 02-NUT 03-G
COMMS	GND TX- TX+
MODULATION	L.F.SW H.F.SW L.FIRE H.FIRE AUTO COM

**Communication
is optional**

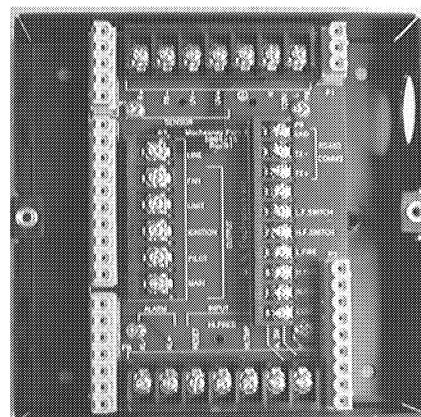




5004 Back box terminal layout



Dimensions: 5 inches X 5 inches X 1 ½ inches



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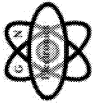
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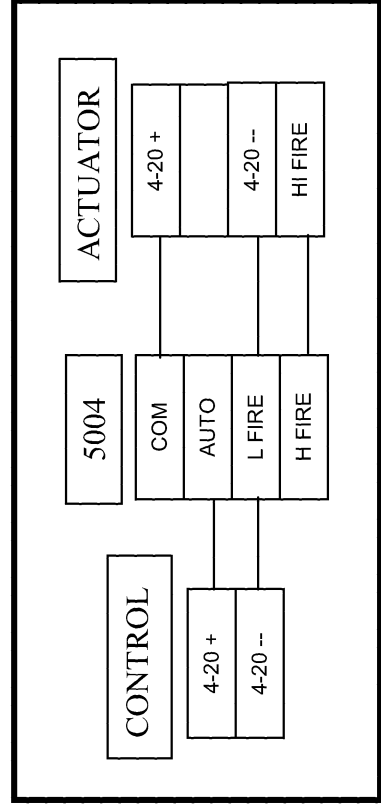
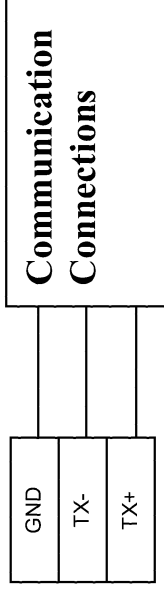
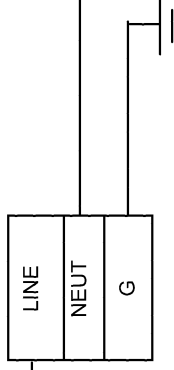
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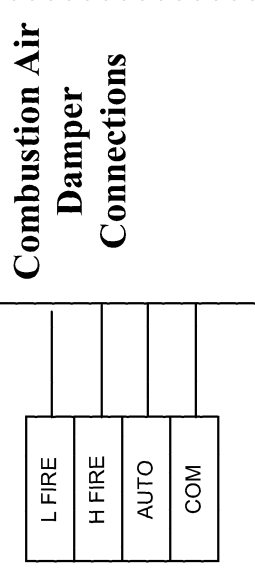
120 VOLTS AC

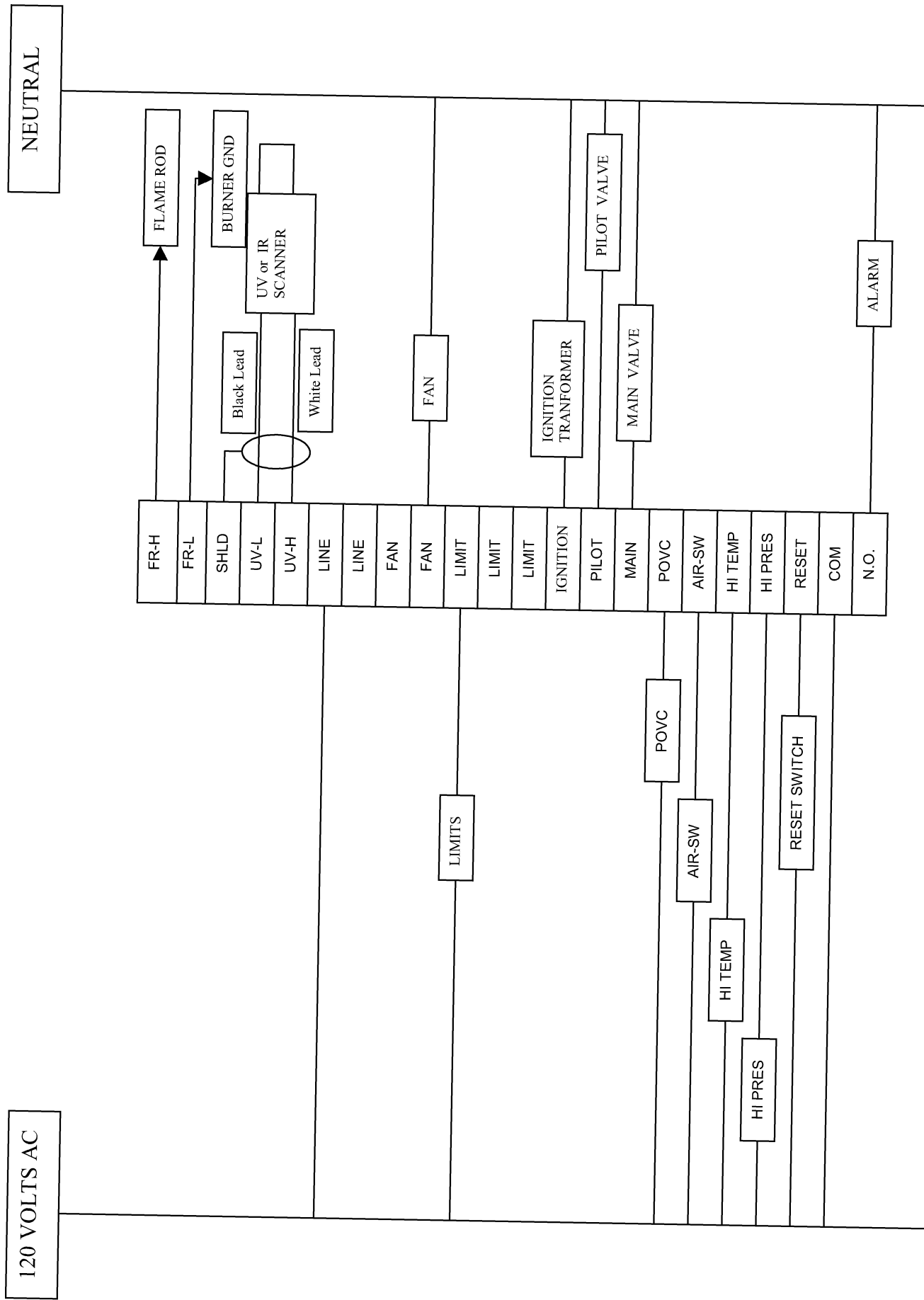
Page 17

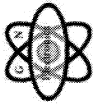
NEUTRAL



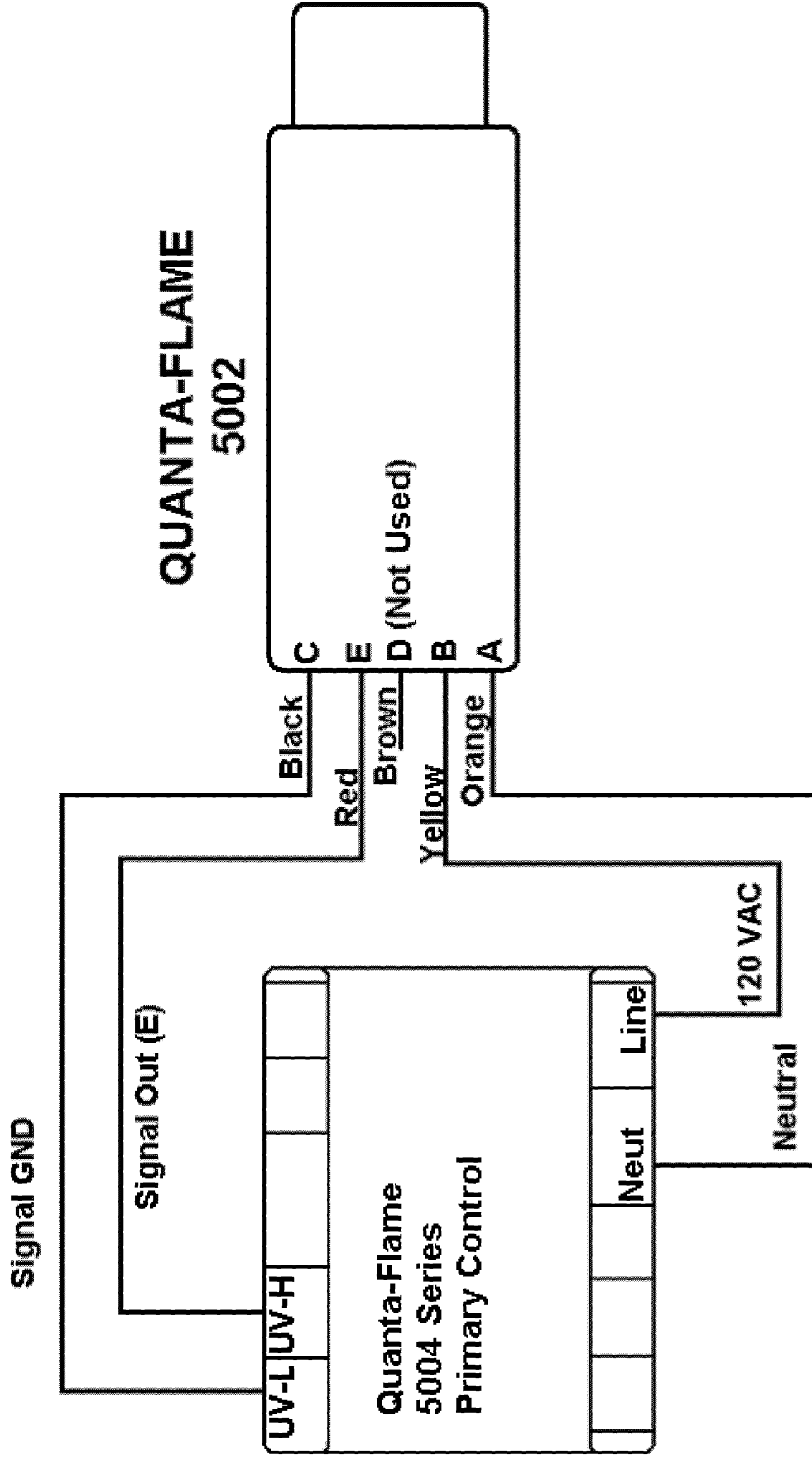
Typical Actuator Connection Example

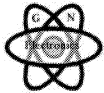






Connection Diagram for the 5002 series Self-Check Scanner





Testing the Installation

This section describes the test procedures that must be performed after installation to insure that the 5004-795 and the connected sensor is operating properly; **these procedures are mandatory.**

These tests are to be performed after any installation of the 5004 control, regardless if it is a new installation or a replacement installation for an existing control

Insert the positive probe of a 0-10 VDC, digital voltmeter into the test point on the front cover of the 5004; insert the negative probe to ground point. Good flame signal strength will read between 2 and 5 VDC; anything below 1 VDC is inadequate. Also, the red flame light illuminates when a flame signal is indicated.

Minimum Pilot Test

Run the following test procedures to ensure that the sensor will not detect a pilot flame too small to reliably light the main flame:

- 1) Manually shut off the fuel supply to the burner, but not to the pilot.
- 2) Start the system normally.
- 3) To enter the pilot test mode, press and hold the reset button for ten seconds on the front of the 5004 control.
- 4) The control will hold the operating sequence at the pilot flame step. Measure signal strength as described above.
- 5) Reduce pilot fuel until the flame relay drops out. Increase pilot fuel until the flame signal is greater than 1 VDC, and flame relay just manages to pull in.
This is the minimum pilot. If you don't think this flame will be able to safely light the main burner, realign the sensor so that it requires a larger pilot flame and repeat steps 2 through 5.
- 6) Push the reset button located in the lower right corner on the front cover to reset the control into the normal and begin the normal start-up sequence again.
- 7) When the sequence reaches the main flame trial for ignition, smoothly restore the fuel supply to the burner. If the main burner does not light within five seconds, immediately shut off the burner supply to shut down the system.
Realign the sensor so that it requires a larger pilot flame. Repeat steps 1 through 6 until the main burner lights off smoothly and reliably.





Pilot Flame Failure Test

- 1) Manually shut off the fuel supply to the pilot and the main burner.
- 2) Place system in pilot test mode
- 3) Start the system normally. The controller should lock out; if it doesn't, then the controller is detecting a false flame signal. Find the problem and correct it before resuming normal operation.

Main Flame Failure Test

- 1) Manually shut off the fuel supply to the main burner but not to the pilot.
- 2) Start the system normally. This should ignite the pilot and lock out after pilot interruption. If the system does not lock out, the controller is detecting a false flame signal. Find the problem and correct it before resuming normal operation.

Spark Sighting Test

- 1) Manually shut off the fuel supply to the pilot and the main burner.
- 2) Start the system normally.
- 3) Measure the flame signal.
- 4) If a flame signal greater than 1 VDC is measured for more than three seconds during the trial for ignition, then the sensor is picking up a signal from the spark plug

Note: Periodically check all interlock and limit switches by manually tripping them during burner operation to make sure they cause the system to shut down.

Warning: Never operate a system that is improperly adjusted or has faulty interlocks or limit switches. Always replace faulty equipment with new equipment before resuming operation. Operating a system with defective safety equipment can cause explosions, injuries, and property damage.



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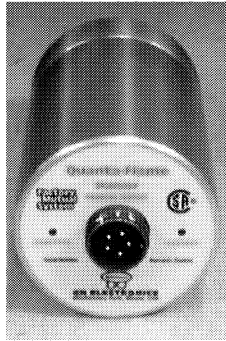
Web: www.terracene.com

Phone: 1-780-443-2299

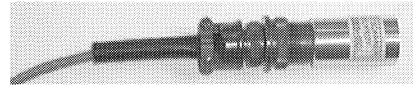
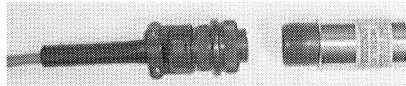
Toll Free: 1-888-433-2299

Fax: 1-780-484-6074

e-mail: info@terracene.com



SENSORS



Infrared Model (Model 5004-11) The IR sensor detects light emitted from the flame within the Infrared light spectrum. In addition it requires a frequency or “flicker” from the flame in order to differentiate the IR light from an actual flame as opposed to the radiated IR light from a hot object or refractory wall.

Ultraviolet (Model 5004-01) The UV sensor detects light emitted from the flame within the Ultraviolet light spectrum.

Ultraviolet Self-Check (Model 5002-01) The UV Self-Check sensor detects light emitted from the flame within the Ultraviolet light spectrum. This sensor is intended for applications which continuously operate the burner (24 hours). The Self-check scanner interrupts the UV light from the burner every ten seconds to verify the proper operation of the sensing element and the internal components.

Flame Rod The flame rod works on the principle of Flame rectification and senses a small direct current flowing through the flame between the flame rod and the burner ground.

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Instrumentation Sales, Design, and Service.

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Warranty and Returns

The model 5004 control is warranted for one (1) year from the date of delivery.
GN Electronics standards terms and conditions apply.
Defective units should be returned to G N Electronics. Controls should be well packed in a suitable container encased in appropriate stuffing.

All products should **be shipped prepaid to:**

**G N Electronics Inc
9958 N. Alpine Rd Suite #104
Machesney Park, IL 61115**

**Tel: (815) 637-8624
Fax: (815) 637-8626**

[www. gnelectronics.com](http://www.gnelectronics.com)

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