

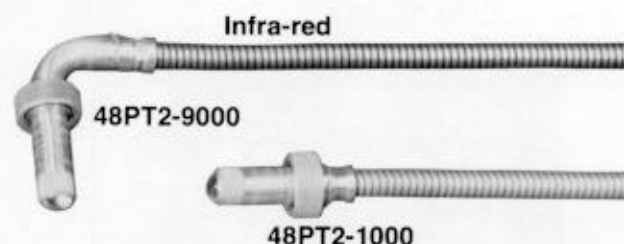
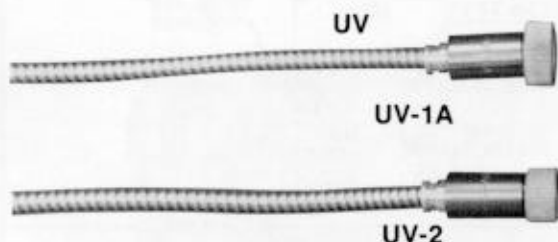


Systems PBC-4
UVC-4

C-SERIES FLAME SAFEGUARD CONTROLS

for semiautomatic and
manually ignited burners.

Flame Scanners



FEATURES:

FIREYE PBC-4, UVC-4 Systems provide ignition and flame failure protection for manually-started oil or gas burners. PBC-4 system utilizes infra-red flame detection; UVC-4 system utilizes ultra-violet flame detection. The control systems are designed to monitor both pilot and main flames. Type 26DF4 Model 5030 and Type 25DU4 Model 5060 provide four (4) seconds (max.) flame failure response timing; Type 26DF4 Model 5131 and Type 25DU4 Model 5161 provide selectable 1 or 4 seconds (max.) flame failure response timing.

The controls provide three (3) SPDT and one (1) SPNO load switches for external loads and starting circuits.

FIREYE PBC-4 and UVC-4 flame safeguard control sys-

tems may be adapted to a simple burner control system or used as a building block with auxiliary devices to provide additional functions.

A test jack is provided for the attachment of a test voltmeter to measure flame signal strength.

FIREYE PBC-4 system features the unique AU-TOCHECK™ solid state amplifier circuit design, a recent breakthrough in increased reliability and safety. The AU-TOCHECK™ circuit will cause the flame relay to dropout and stay out should any component in the electronic circuit susceptible to shorting or opening fail.

All flame scanners are miniaturized.

SPECIFICATIONS:

Control Type 26DF4 Model 5030 and Type 25DU4 Model 5060. Supply voltage: 120 volts (min. 102v; max. 132v) at 50/60 HZ. Flame failure response time: 4 seconds (max.).

Control Type 26DF4 Model 5131 and Type 25DU4 Model 5161. Supply voltage: 230 volts (min. 196v, max. 253v) at 50/60 HZ. Flame failure response time: 1 or 4 (max.) sec. selectable

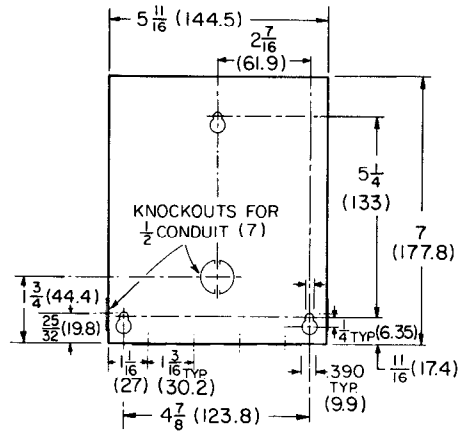
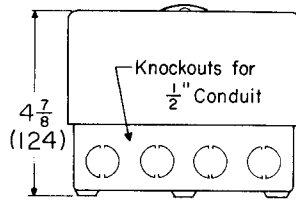
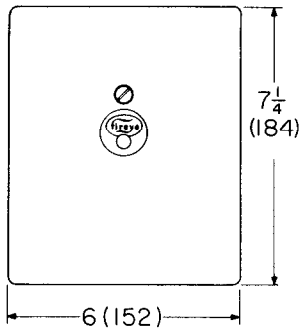
Ambient Limits: Control Type 26DF4, Type 25DU4 — max. 125F (52C), min. 0F (-18C). Scanner Type 48PT2 — max. 125F (52C), min. -40F (-40C). Scanner Types UV1A, UV2, 45UV3 — max. 212F (100C), min. -40F (-40C).

Volt Ampere Rating: Control — Power Consumption (Operating) 12 VA max. Maximum Connected Load: 2000 VA

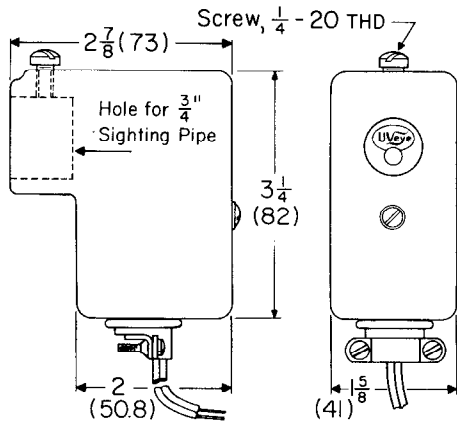
TERMINAL RATINGS

Maximum Rating of each external load terminal:
At 120 volts 5 amps or 125VA Pd.
At 230 volts 2.5 amps or 125VA Pd.

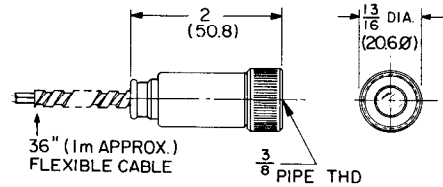
DIMENSIONS



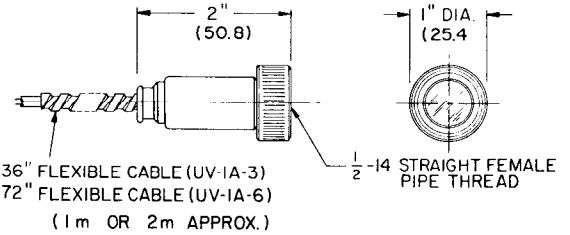
Control



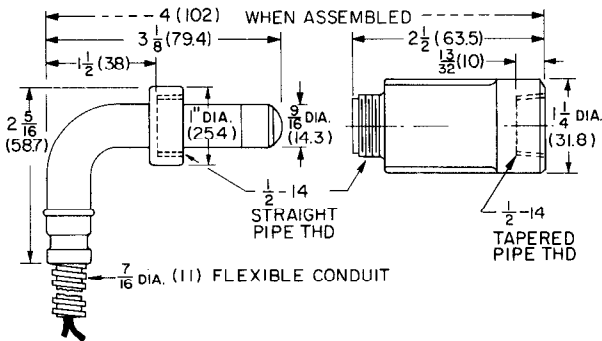
45UV 3



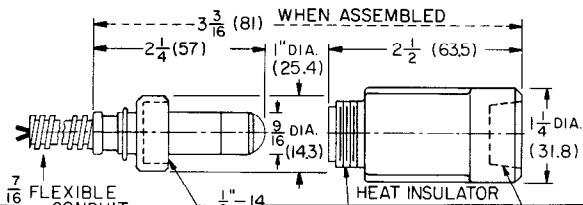
UV-2



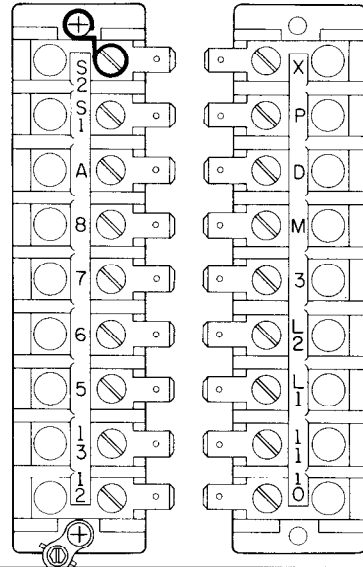
UV-1A

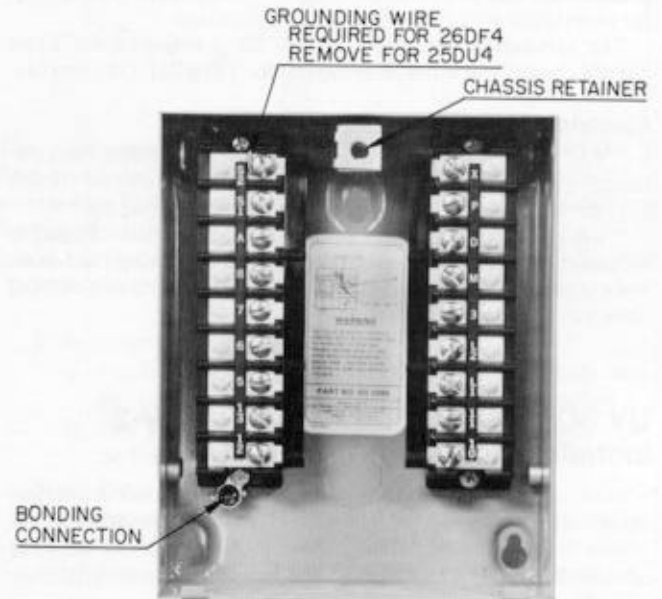
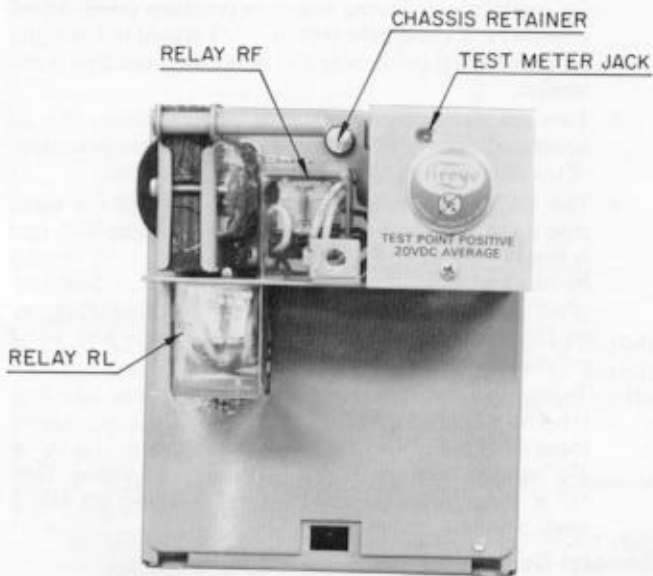
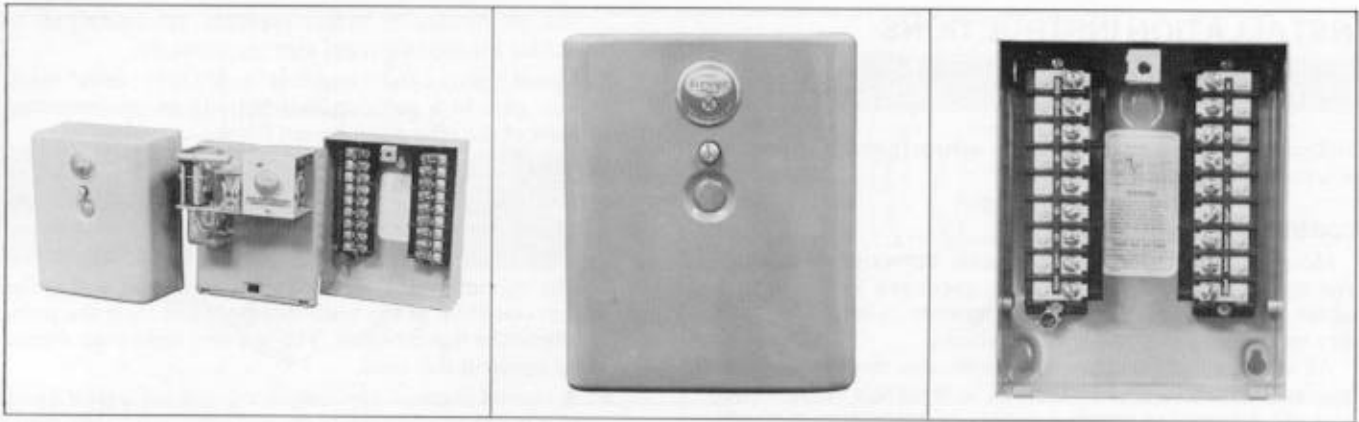


48PT2-9000



GROUNDING WIRE
REQUIRED FOR 26DF4
REMOVE FOR 25DU4





ORDERING INFORMATION

UV SYSTEM	INFRARED SYSTEM
Control and Cover: Type 25DU4 Model 5060 120V-50/60HZ Type 25DU4 Model 5161 230V-50/60 HZ	Control and Cover: Type 26DF4 Model 5030 120V-50/60 HZ Type 26DF4 Model 5131 230V-50/60 HZ
Flames Scanner: UV1A-3 1/2" mount - 3' cable UV1A-6 1/2" mount - 6' cable UV2 3/8" mount - 3' cable 45UV3 3/4" mount - 6' wire	Flame Scanner With Heat Insulator: 48PT2 - 1000 Straight Head 2' Cable 48PT2 - 1003 Straight Head 8' Cable 48PT2 - 1007 Straight Head 4' Cable 48PT2 - 9000 Angle Head 2' Cable 48PT2 - 9003 Angle Head 8' Cable 48PT2 - 9007 Angle Head 4' Cable
Wiring Base: 60-1386 - Standard 60-1466 - Open, for cabinet installation	Wiring Base: 60-1386 - Standard 60-1466 - Open, for cabinet installation

APPROVALS:

INSTALLATION INSTRUCTIONS:

CAUTION: INSTALLER MUST BE A TRAINED SAFETY CONTROL TECHNICIAN.

Follow the burner manufacturer's instructions, if supplied, otherwise proceed as follows:

Control and Wiring Base:

Mount the control wiring base on the burner or on a panel. The location should be free from excessive vibration and within the specified ambient temperature rating. The base may be mounted in any angular position.

All wiring should comply with applicable electrical codes, regulations, and local ordinances. The terminals in the wiring base are designed to permit a variety of connection methods — wire loop, eyelet, lug or quick connect. A grounding terminal is provided for equipment bonding. Circuit recommendations are provided on Pages 6-7. Consult the Factory for assistance with non-standard applications.

The grounding wire on Terminal S2 is required for Type 26DF4 controls; it must be removed for Type 25DU4 controls.

Electrical Ratings

“VA” ratings (not specified as pilot duty) permit the connection of transformers and similar devices whose inrush current is approximately the same as their running current.

“VA pilot duty” ratings permit the connection of relays, solenoid valves, lamps, etc. whose total operating load does not exceed the published rating and whose total inrush current does not exceed 10 times the rating.

UV SCANNER TYPE UV-1A OR UV-2

Installation:

Where possible, obtain the burner manufacturer's instructions for mounting the scanner. This information is available for most standard burners manufactured. The scanner mounting must comply with the following general instructions:

1. Locate the scanner within 18 inches of the flame to be monitored, closer if possible.
2. Select a scanner location that will remain within the ambient temperature limits of the UV-eye scanner (212°F). If cooling is required, use (a) an insulating coupling (Fireeye part no. 35-69) to reduce conducted heat; (b) a window coupling (Fireeye part no. 60-1257) to

seal off furnace or burner pressure; (c) cooling air to reduce the scanner sight pipe temperature.

3. Mount rigidly a short length (4" to 8") of ½" or ¾" black iron pipe in a position that permits an unobstructed view of the pilot and/or main flame.

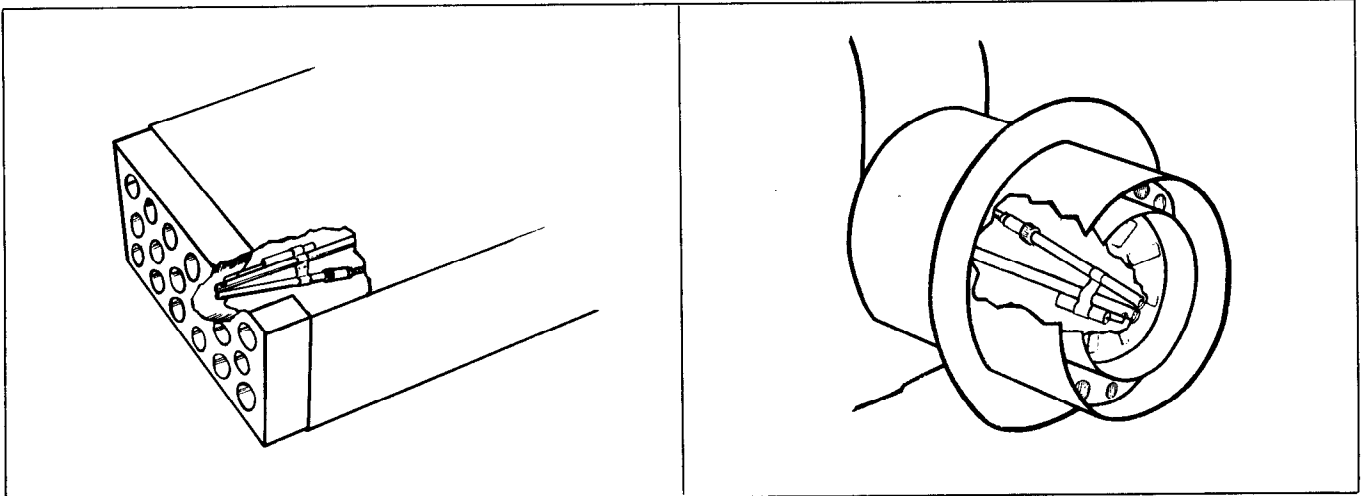
CAUTION

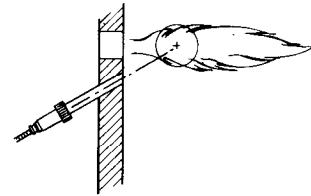
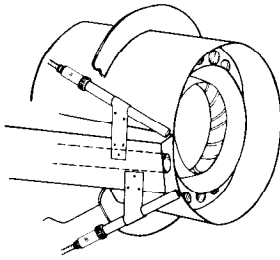
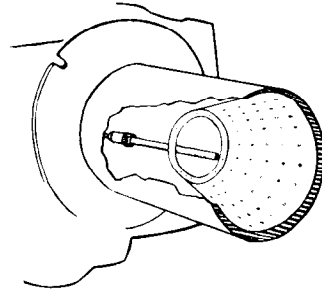
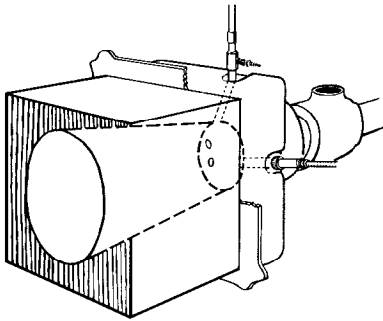
4. The scanner must not sight the spark directly or any part of the burner that can reflect the spark back to the scanner.
5. The maximum UV signal from a flame is found in the first one-third of the visible flame taken from the point where the flame begins. The scanner sight pipe should be aimed at this area.
6. A correct scanner application will not see a pilot flame that is too small to ignite the main flame reliably. Note particularly the test for minimum pilot that is described on Page 7.
7. On installations having negative pressure combustion chambers, a small hole (⅛" or 3/16") drilled in the sight pipe will assist in keeping the pipe clean and free from smoke.
8. Two scanners may be installed on one burner if it is necessary to view two areas to obtain reliable detection of the flame. They should be wired in parallel.
9. The UV-eye scanner is designed to seal off the sight pipe up to pressures of 1 psi when the scanner lock nut is firmly tightened. Pressures in excess of 1 psi should be blocked from the scanner. A quartz lens coupling (Part no. 60-1290) or quartz window coupling (Part no. 60-1257) may be used. Each is rated from -3 to +100 psi max.
10. To increase scanner sensitivity, a quartz lens coupling (Part no. 60-1290) may be used. The quartz lens permits location of the UV-eye at twice the distance. Use ½" x 1½" nipple between UV-1A scanner and union. Use ⅜" x close nipple and ½" x ⅜" bushing on UV-2 applications.

General Requirements

1. As close as possible — 18" or closer.
2. As cool as possible — Not over 212°F.
3. Avoid sighting the spark — Resight scanner, shield between spark and scanner, or orifice to reduce reflected signal from spark.
4. Must see pilot and/or main flame — Scanner view must be unobstructed.
5. Minimum pilot test — See Page 7.

Typical UV-Eye Installations





The maximum UV signal from a flame is found in the first one-third of the visible flame taken from the point where the flame begins. The scanner sight pipe should be aimed at this area.

Wiring:

The UV-1A scanner is supplied with 36" or 72" of flexible cable. The UV-2 scanner is supplied with 36" of flexible cable. If it is necessary to extend the scanner leads, the following instructions apply:

1. *Selection of Type of Wire*
 - a. Use #14, 16, or 18 wire with 75°C, 600 volt insulation for up to 200 foot distance.
 - b. Use shielded wire (Belden #8254 or equal) for each scanner wire up to 500 foot (max.) distance. The ends of the shielding must be taped and not grounded.
 - c. Asbestos insulated wire should be avoided.

2. *Installation of Extended Wiring*

- a. For wiring runs up to 10 feet, the scanner leads may be run with the power wires in a common conduit.
- b. For wiring runs over 10 feet, the scanner leads must be installed in a separate conduit.

3. *Multiple Scanner Installations*

The wiring from Multiple UV Scanners may be installed in a common metallic conduit.

4. High voltage ignition wiring should not be installed in the same conduit with flame detector wires.

INFRARED SCANNER TYPE 48PT2

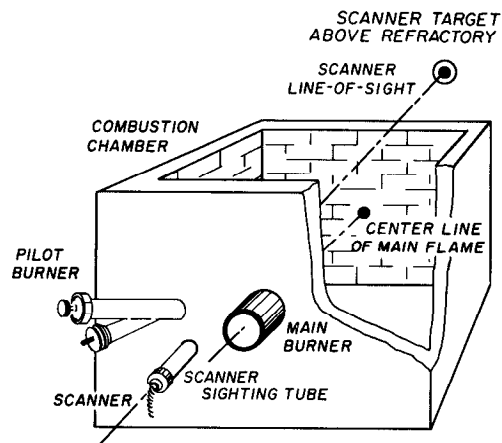
Installation:

Where possible, obtain the burner manufacturer's instructions for mounting the scanner, otherwise proceed as follows:

A single scanner is used to detect both pilot and main flames, the sight pipe on which the scanner mounts must be aimed so that the scanner sights a point at the intersection of main and pilot flames.

Proper scanner positioning must assure the following:

- a. Reliable pilot flame signal.
- b. Reliable main flame signal.
- c. A pilot flame too short or in the wrong position to ignite the main flame reliably must not be detected.
- d. Scanner must have unobstructed view of flame being monitored.
- e. Flame being monitored must completely cover scanner field of view.
- f. To avoid nuisance shutdowns, it is important to avoid sighting hot refractory and to keep scanner temperature low (below 125°F).
- g. When the proper position has been established drill a hole through the furnace wall and install a 4 in. to 8 in. length of threaded black iron pipe on which to mount the 48PT2 scanner.



Scanner must not sight on refractory

- h. When a satisfactory sighting position has been confirmed by operating tests, the sight tube should be firmly welded in place.

Two scanners may be installed on one burner if it is necessary to view two areas to obtain reliable detection of the flame. They are wired in parallel.

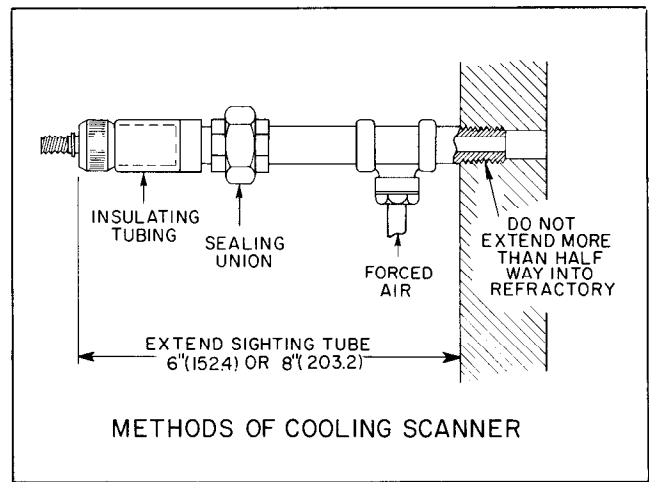
Wiring:

Attach the cable supplied with the scanner to a junction box. Splice the cable wires to a pair of wires not smaller than #18. Install the complete run in a separate conduit to the control. Continuous conduit bonding between scanner and control is mandatory! Scanner may be located up to 100 feet from control. Do not pass scanner wiring through any junction box containing other wires. Do not run other wires through scanner conduit. Asbestos insulated wire should be avoided.

Keeping the Scanner Cool

The Firetron Scanner (Temperature Limit 125°F.) should never get too hot to grasp comfortably in the hand. Keep the scanner cool by one or more of the following methods.

1. Use 6" to 8" length of pipe between scanner and hot furnace front plate.
2. Use insulating tube (Part No. 35-69) on the end of the iron pipe.
3. Force air into sighting tube.
4. Make sure sighting tube does not extend more than half-way into refractory wall.

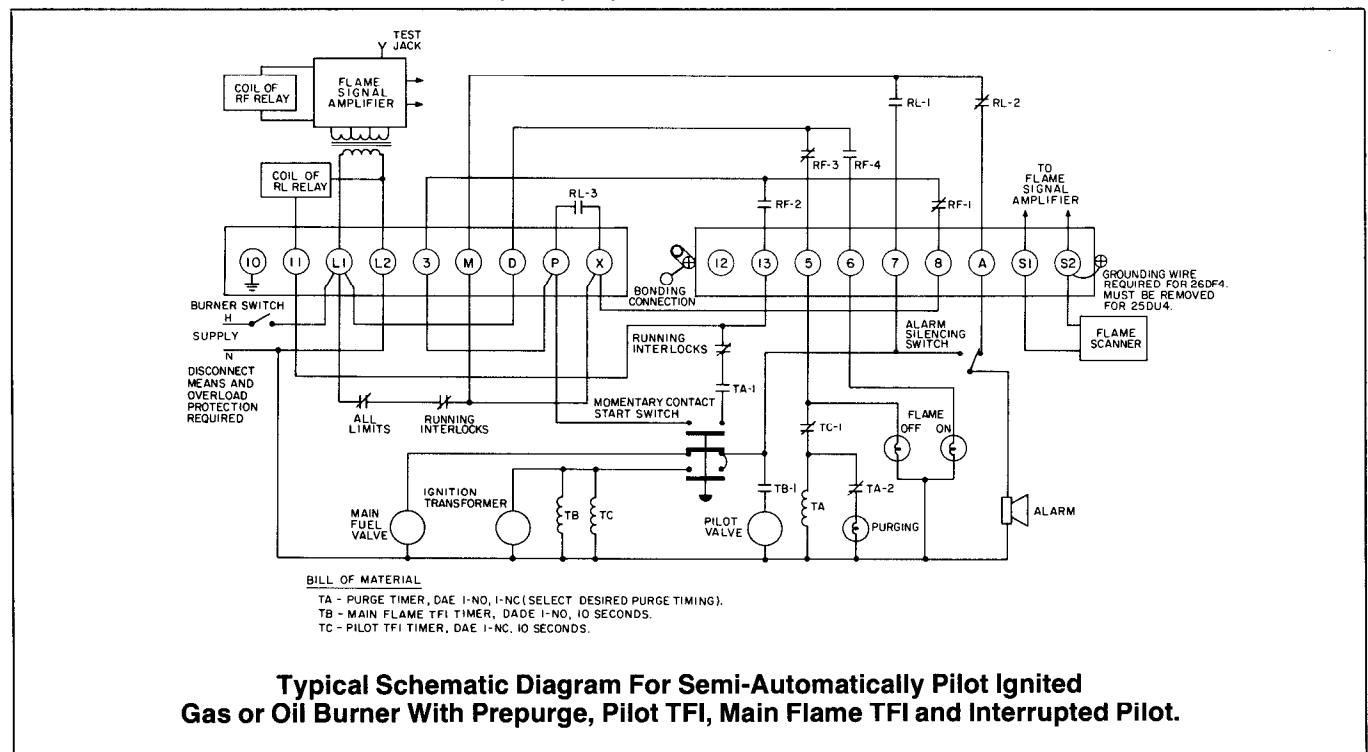


5. Use Fireeye Sealing Union (Part No. 60-801) when using method 3 above.

TYPICAL WIRING ARRANGEMENTS:

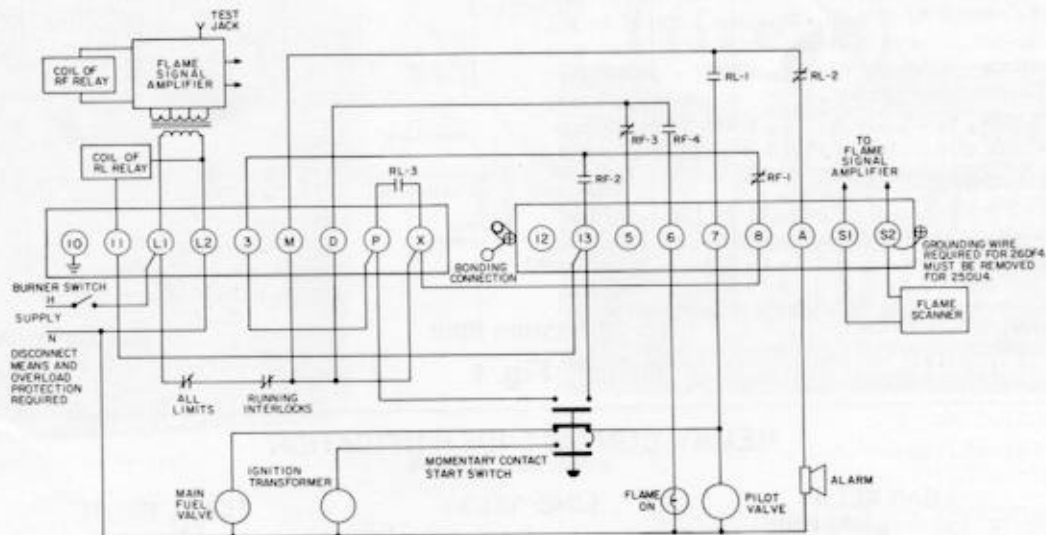
Fireeye PBC-4, UVC-4 controls may be used on a variety of types of fuel burners and provide a variety of functions. The typical schematic diagrams shown below illustrate a simple, and a more complete method of applying the controls to conventional burner installations. Additionally, they may be

used as flame switches, cascaded on multiple burner installations, in redundant arrangements, etc. Contact any Fireeye Sales Office for assistance in designing burner control circuit with additional functions.



DESCRIPTION OF OPERATION OF TYPICAL SINGLE BURNER SYSTEM

1. With power applied, burner switch closed, limit switches closed, air flow and fuel interlocks closed, the "Flame Off" light, the purge timer TA and "Purging" light are energized. The "Alarm Silencing" switch should be switched to the "Silent" position.
2. When the prepurge period expires, contacts TA2 open and de-energize the "Purging" light. Contacts TA1 close. The operator depresses the momentary contact "Start" switch.
3. The circuit to Terminals P and 13 is completed through the starting interlocks and contacts TA, and the RL relay is energized. Terminal 7 is energized. The "Alarm Silencing" switch should be switched to the "Alarm" position.
4. The ignition transformer, timer TB and TC, and the pilot gas valve are energized. Pilot flame is established and detected. Relay RF is energized.
5. The operator releases the "Start" switch. The ignition transformer and timers TB-TC are de-energized. The main fuel valve is energized.
6. When the main flame trial for ignition expires, contacts TB1 open and de-energize the pilot valve.
7. The burner will continue to fire until power is shut off, or the limit and operating control circuit opens, or a flame failure occurs.



Typical Schematic Diagram For Semi-Automatically Pilot Ignited Gas Burner With Proved Intermittent Pilot

NOTE: Controls Type 25DU4-5161 and 26DF4-5131 as supplied have a one (1) second (max.) Flame Failure Response Time. To increase the timing to four (4) seconds (max.)

connect Terminals 10 and 12 together with a wire jumper. 25DU4-5060 and 26DF4-5030 provide a four (4) seconds (max.) flame failure response time.

INSTALLATION — TESTING:

Testing of the PBC-4 and UVC-4 controls for flame signal is accomplished with the use of DC voltmeter (1000 ohm/volt or greater) set on a scale to read a *normal 20 volts*. The test voltage may vary plus or minus 5 volts, but should not fluctuate, with an acceptable flame signal.

Connect the plus (+) test probe to the test jack on the 25DU4 and the minus (-) test probe to any chassis ground.

Connect the minus (-) test probe to the test jack on the 26DF4 and the plus (+) test probe to any chassis ground.

Normal Pilot Test:

1. Manually shut off the main fuel supply.
2. Initiate a normal start.
3. When the pilot flame is present, observe the test meter. If the meter reading is low, or fluctuates, increase the

Minimum Pilot Test:

This test insures that the flame scanner will not detect a pilot flame too small to reliably light the main flame. If should be made by a qualified person on every new installation and following any repositioning of the flame scanner.

1. Manually shut off the main fuel supply.
2. Initiate a normal start up.
3. When the pilot flame is detected, observe the test meter, and reduce the size of the pilot flame put to the point where the flame relay remains energized.
4. Manually turn on the main fuel which must light immediately from the reduced pilot flame.

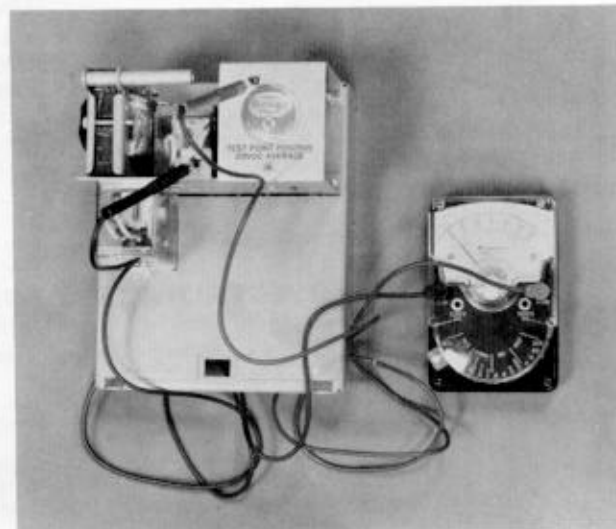
CAUTION: If main flame light off is delayed, shut off the fuel immediately. Realign the flame scanner so that pilot flame detection requires a larger pilot flame. Repeat this test until the main flame lights reliably with a minimum pilot flame.

5. After the minimum pilot test is completed satisfactorily, increase the pilot flame to normal size.

size of the pilot flame, improve the alignment of the sight pipe, move the flame scanner closer to the pilot flame, or verify that the flame scanner is clean.

Test for Spark Pickup (Only Required On UV Controls):

1. Shut off all fuel.
2. Initiate a startup with only the spark ignition energized.
3. Observe the test meter. It should read zero. If a test meter reading reveals that UV from the spark is being detected, realign the sight pipe to eliminate it, relocate the spark or install a shield to obscure the spark signal from the flame scanner.
4. If a flame scanner sighting change has been made, re-check for normal pilot flame detection.



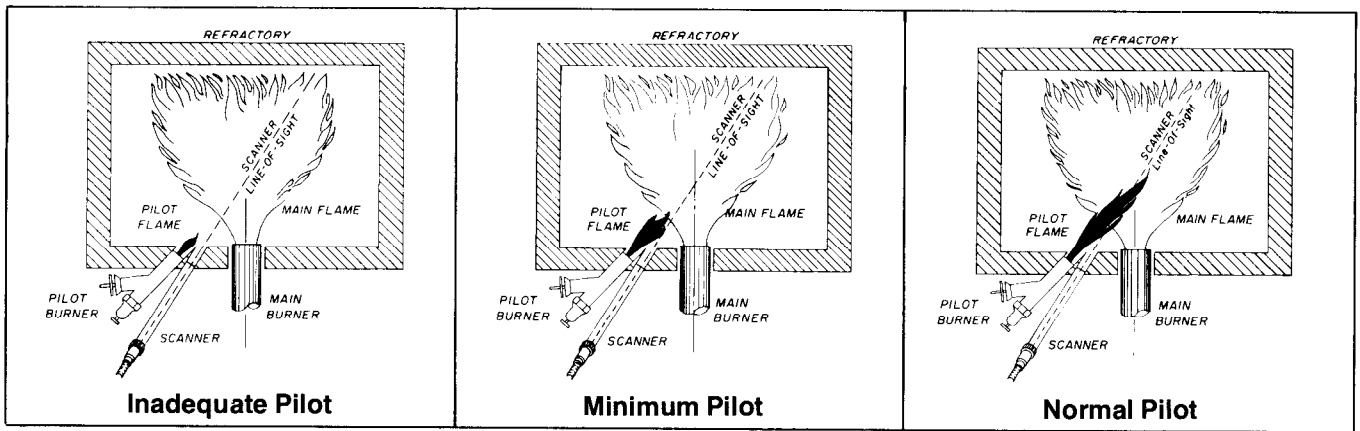
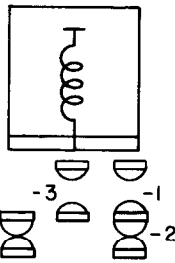


Fig. 1

RELAY CONTACT IDENTIFICATION

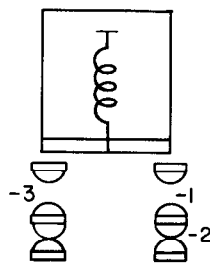
LOAD RELAY

RL

25DU4 - 5060
26DF4 - 5030

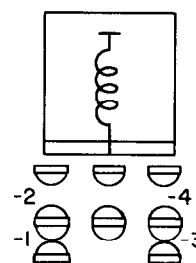
LOAD RELAY

RL

25DU4 - 5161
26DF4 - 5131

FLAME RELAY

RF



ALL UNITS

MAINTENANCE

Humidity Effects:

It is good practice to minimize any possible adverse effects of high humidity by keeping control equipment continuously powered, even during periods when it is not in use.

Contacts:

All contacts are designed with adequate wiping action for self cleaning under normal conditions. Should contact cleaning be required, use a burnishing tool or fine crocus. NEVER FILE, SANDPAPER, OR APPLY LIQUID OR AEROSOL SPRAY CLEANER.

Scanner:

The viewing window must be kept clean. Even a small amount of contamination will reduce the flame signal reaching the flame scanner. A routine schedule should be set up. Wipe the scanner with a clean soft cloth. If necessary, dampen the cloth with concentrated detergent.

RECOMMENDATION: Periodic Safety Checks:

It is recommended that a procedure be established to test, at least once a month, the complete flame safeguard system. This test should verify flame failure safety shutdown, limit switch and interlock function, and positive fuel cutoff when the fuel valves are de-energized.

WARRANTY

We guarantee for one (1) year from date of shipment to replace, or at our option, to repair any products or parts thereof (except lamps, electronic tubes and photocells) which are found defective in material or workmanship or which otherwise fail to conform to the contract description or to any warranty, express or implied.

We make no warranties which extend beyond the description of our product on the face of our sales orders.

The Purchaser's remedies with respect to any product or part sold by us shall be limited exclusively to the right to replacement or repair f.o.b. Cambridge, as above provided. In no event shall we be liable for consequential or special damages of any nature which may arise in connection with such product or part.



ELECTRONICS CORPORATION OF AMERICA

FIREYE DIVISION

One Memorial Drive—Cambridge, Massachusetts 02142

Factory Area Offices: BOSTON • NEW YORK • PHILADELPHIA • ATLANTA • CLEVELAND • DETROIT • CHICAGO • HOUSTON • LOS ANGELES • SAN FRANCISCO

Subsidiaries: ECA (CANADA) LTD., TORONTO • ECA (GREAT BRITAIN) LTD., LONDON • ECA (EUROPE) N.V., BRUSSELS • ECA (FRANCE) S.A., PARIS • ECA (ITALIA) S.p.A., MILAN • ECA (DEUTSCHLAND) G.m.b.H., DÜSSELDORF • ECA (NEDERLAND) N.V., AMSTERDAM