



# TYPE 85UVF/IRF Integrated Flame Scanner with Internal Flame Relay

Para uma cópia deste manual em língua Portuguesa (Brasil) escaneie o QR Code



exida  
FMEDA  
SIL3



SEE TABLE 1 ON PAGE 3

## DESCRIPTION

The Fireye Phoenix type 85UVF/IRF flame scanners are microprocessor based devices utilizing a solid state flame detection sensor. The Phoenix flame scanners incorporate an internal flame relay with automatically set ON/OFF thresholds, thereby eliminating the need for a remote flame amplifier or flame switch.

Phoenix scanners detect the amplitude of the modulations (the flame “flicker”) that occur within the targeted flame, over a wide frequency. During the scanner setup procedure, the amplitudes of the target flame are automatically stored by the flame scanner, together with optimum ON/OFF criteria. The appropriate sensor gain is automatically selected. Phoenix scanners incorporate full self diagnostics and electronic self checking.

The Phoenix 85UVF/IRF is available in multiple models differentiated by spectral range, levels of hazardous area certifications and agency approvals. Refer to Table 1 on page 3 for an overview of model numbers versus product certifications.

The Phoenix 85UVF/IRF flame scanner is powered by 24Vdc. Electrical connection is via an 8-pin electrical quick-disconnect (QD). An analog 4 to 20mA output of flame strength is standard.

***Note:** The Phoenix QD models with electrical quick-disconnect have replaced the original models equipped with ten feet of captive cable. The QD models (with 59-546-x cables) are suitable for use in Class I Division 2 hazardous areas, thereby eliminating the need for “EX” models. The “CEX” models remain unchanged for use in Ex II 2 G/D hazardous areas.*

## APPLICATION

Fireye Phoenix 85UVF self-checking scanners are used to detect 295 to 340 nanometers wavelength ultra-violet emissions. The Fireye Phoenix 85UVF1-1QDK3 and 85UVF1-1CEX-K3 Flame Scanners are derivatives of the standard Phoenix product but utilizing an advanced optical filter. This filter adjusts the optical sensitivity of the detection cell to pick up wavelengths of light from the standard 310 nm range up to 500 nm.

**Typical Applications:** Duct Burners, Industrial Gas Burners, Refinery Applications, Low NO<sub>x</sub> Burners, Waste Gas Units and Incinerators. The K3 scanner is particularly suited to measure the light emissions from steel plant applications such as burners firing blast furnace gas and coke oven gas.

Fireye Phoenix 85IRF self checking scanners are used to detect 830 to 1100 nanometers wavelength infra-red emissions. They are suited for application to duct burners, industrial gas burners, refinery applications ignition systems and Low NO<sub>x</sub> detection and for continuous or non-continuous burner operation.

**Typical Applications:** Duct Burners, Industrial Oil Burners, Refinery Applications, Waste Oil Units and Incinerators. **NOTE:** Because the sensors in the Phoenix are solid state devices they can perform well with many different fuels. For example UV is typically used on gaseous fuels but can also be applied to oils and heavy oils. To be 100% sure of correct application a test should be performed.

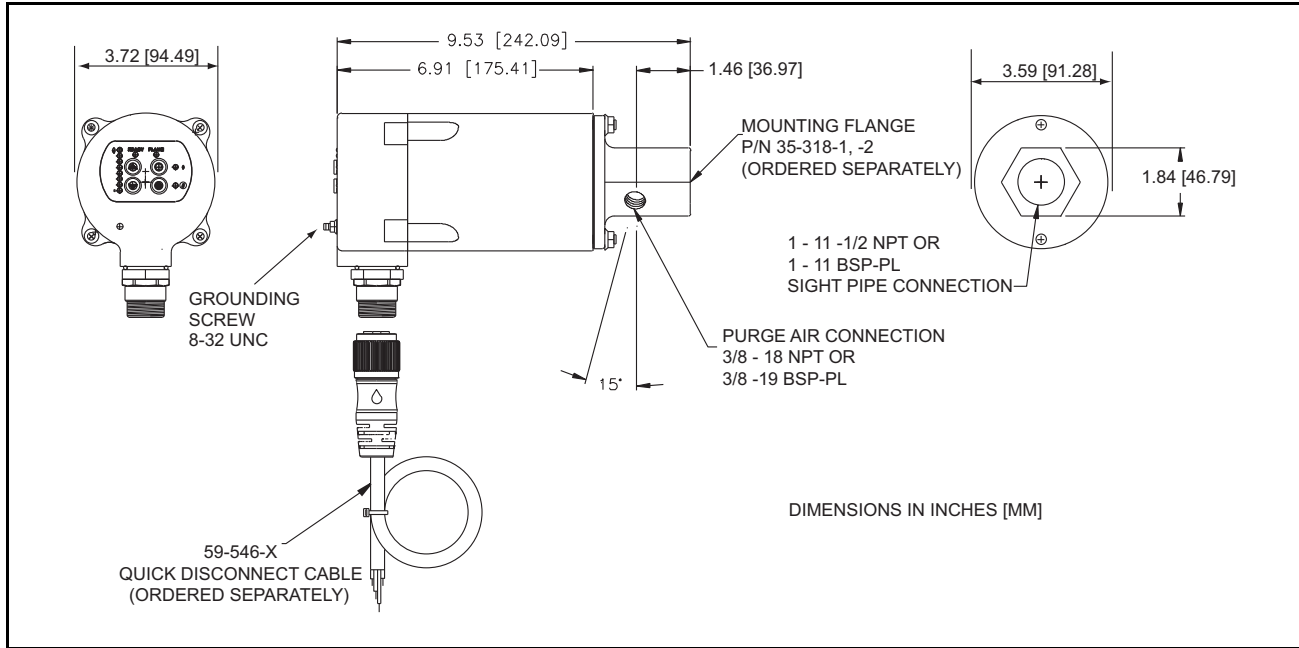
*We DO NOT recommend the Phoenix scanner for use on small pilot flames or obstructed sighting.*

## OPERATOR & SYSTEM INTERFACE

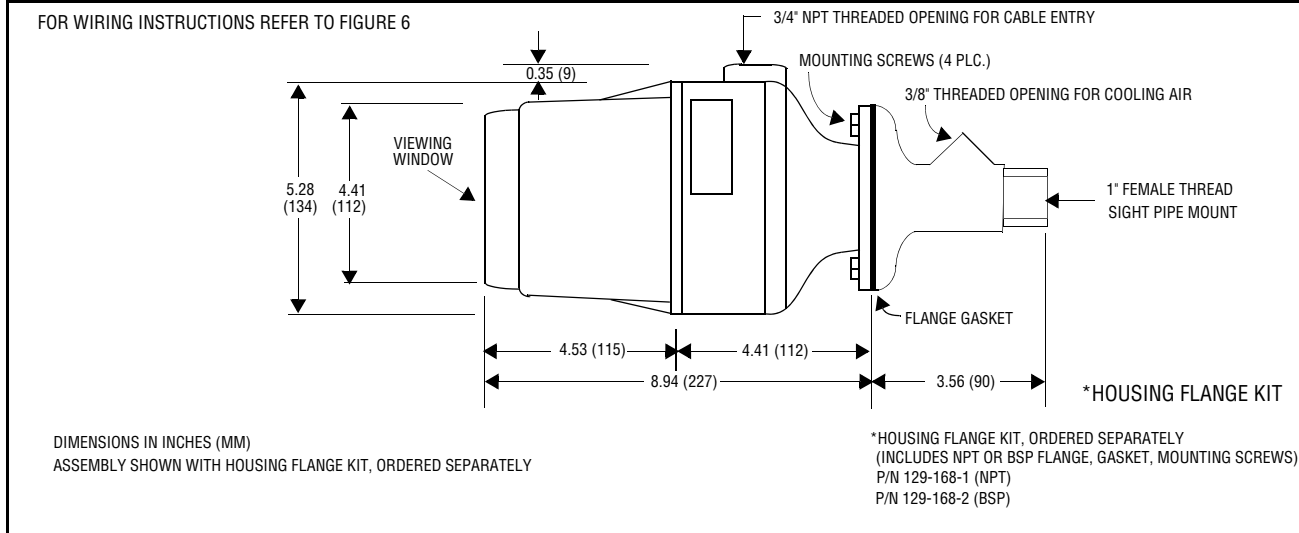
Operator interface to the Phoenix scanner is via a pushbutton keypad and informative LEDs. These provide continuous indication of flame signal, flame relay status, scanner status as well as selected mode of operation. Simplified keystroke routines are used for setup and this can be completed in seconds. For remote interface, outputs are provided for flame switch, fault relay and 4 to 20mA flame strength.

# SPECIFICATIONS

**FIGURE 1. DIMENSIONS**



**FIGURE 2. PHOENIX SCANNER in ATEX HAZARDOUS AREA HOUSING (mounting flange kit ordered separately)**



All models of the Phoenix 85UVF1/IRF1-1CEX and 85UVF1-1CEX-K3 flame scanners are housed within an ATEX approved housing for application in Ex II 2 G/D hazardous rated environment. In addition the ATEX housing is designed to meet the requirements of IP66 (NEMA 4X).



## SCANNER PART NUMBERS AND APPROVALS

Table 1:

SCANNER MODEL	AGENCY APPROVALS (note 1)										ATEX / IECEx	
	FM	UL C/US	CE	CLASS I DIV 2			NEMA 4X	IP66	DVGW	DIN CERTCO	Ex II 3 G Ex ic nA nC IIC T4 Gc	Ex II 2G Ex db IIC T6 Ex II 2D Ex tb IIC T85°C
85UVF1-1QD	X	X	X	X		X	X	X	X	X	X	
85UVF1-1CEX		X	X			X		X	X	X		X
85UVF1-1CEX-K3		X	X			X		X	X	X		X
85IRF1-1QD	X	X	X	X		X	X	X	X	X	X	
85IRF1-1CEX		X	X			X		X	X	X		X
85IRF1-2QD	X	X	X	X		X	X	X	X	X	X	
85UVF1-2QD	X	X	X	X		X	X	X	X	X	X	
85UVF1-1QDK3	X	X	X	X		X	X	X	X	X	X	
85UVF1-2QDK3	X	X	X	X		X	X	X	X	X	X	
85IRF4-1QDWR	X	X	X	X		X	X	X			X	
85IRF4-2QDWR	X	X	X	X		X	X	X			X	
85UVF4-1QDWR	X	X	X	X		X	X	X			X	
85UVF4-1QDK3WR	X	X	X	X		X	X	X			X	
85UVF4-2QDWR	X	X	X	X		X	X	X			X	
85UVF4-2QDK3WR	X	X	X	X		X	X	X			X	

X = CERTIFICATION IN HAND

ATEX - DEMKO 15 ATEX 1624X / CESI 13 ATEX 021X

IECEX - IECEX UL 15.0149X / IECEX CES 13.0004X

InMetro - UL-BR 16.0276X, UL-BR 13.0138X (CEX models)

CE = 2009/142/EC Gas Appliance directive-EN298:2012

Note 1: Based on Exida's FMEDA report no. 08/04-57 R001 dated March 17, 2010, Fireye certifies that the 85 Series Phoenix scanners are suitable for installations up to and including SIL3

LABEL EXAMPLE:

By

### MODEL 85XXF1-XQD

INPUT POWER: 24 VDC, 0.2A  
 CONTACT RATING: 2A MAX. RESISTIVE @ 230VAC/30VDC  
 AMBIENT TEMPERATURE: -40°F/-40°C ≤ T<sub>a</sub> ≤ 150°F/+65°C

ATEX - DEMKO 15 ATEX 1624X  
IECEX - IEC Ex UL 15.0149X

TYPE 4; 4X  
IP66

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NG-4131B00476

0085B00475

5F210

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INPUT POWER: 24 VDC, 0.2A,  
CONTACT RATING: 2A MAX.  
RESISTIVE @ 230VAC/30VDC

CLASS I, DIVISION 2, GROUPS A, B, C AND D,  
HAZARDOUS LOCATIONS, T4 -40°C TO 65°C

SECTION OF PRIMARY  
SAFETY CONTROL  
FOR HAZARDOUS LOCATIONS  
EHS077

**FIREYE**  
 3 Manchester Road, Derry, New Hampshire 03038  
 Made in USA



## ACCESSORIES

Table 2:

PART NUMBER	DESCRIPTION	NOTES
35-318-1	<b>Standard</b> , non-metallic 1" NPT Thread mounting flange for basic (-1QD) models	
35-318-2	<b>Standard</b> , non-metallic 1" BSP Thread mounting flange for basic (-1QD) models	
129-195-1	<b>Optional</b> , aluminum 1" NPT mounting flange kit for basic (-1QD) models	
129-195-2	<b>Optional</b> , aluminum 1" BSP mounting flange kit for basic (-1QD) models	
129-168-1	1" NPT Housing flange kit for CEX models	
129-168-2	1" BSP Housing flange kit for CEX models	
60-2685-25	24 VDC Switching Power Supply, 100-240 vac 50/60 Hz. input, 2.5 A output at 24 vdc. Powers up to five scanners. Dimensions: 3.7"(95mm) high x 1.6" (40mm) wide x 4.3"(108mm) deep See bulletin CU-118	1
60-2685-50	24 VDC Switching Power Supply, 100-240 vac 50/60 Hz. input, 5.0 A output at 24 vdc. Powers up to ten scanners. Dimensions: 4.5" (115mm) high x 2.0" (50mm) wide x 4.8" (121mm) deep. See bulletin CU-118	1

Fireeye recommends the use of the P/N 35-127 Heat Insulating Nipple.

*Notes:* 1. Rated output is when power supply is vertically mounted, and with an ambient temperature of 104°F (40°C) maximum.

## SCANNER CABLES

Table 3:

PART NUMBER	DESCRIPTION	LENGTH	
		METERS	FEET
59-546-3	8-Conductor 3-meter cable assembly with 8-pin female connector.	3 meters	9 feet, 10 inches
59-546-6	8-Conductor 6-meter cable assembly with 8-pin female connector.	6 meters	19 feet, 8 inches
59-546-9	8-Conductor 9-meter cable assembly with 8-pin female connector.	9 meters	29 feet, 3 inches
59-546-12	8-Conductor 12-meter cable assembly with 8-pin female connector.	12 meters	39 feet, 4 inches
59-546-15	8-Conductor 15-meter cable assembly with 8-pin female connector.	15 meters	49 feet, 2 inches
59-546-30	8-Conductor 30-meter cable assembly with 8-pin female connector.	30 meters	98 feet, 5 inches
59-546-45	8-Conductor 45-meter cable assembly with 8-pin female connector.	45 meters	147 feet, 7 inches
59-546-60	8-Conductor 60-meter cable assembly with 8-pin female connector.	60 meters	196 feet, 10 inches
59-546-90	8-Conductor 90-meter cable assembly with 8-pin female connector.	90 meters	295 feet, 3 inches
59-546	8-Conductor cable <b>without connector</b> . Sold by the foot for use as extension cable from a junction box.	As required	As required

## Safety Information / Conditions for Safe Use



### **WARNING**

Risk of Explosion. Do not disconnect cable from flame scanner after installation unless replacing entire scanner. Maintenance or service is not permitted.

The equipment described in this manual is capable of causing property damage, severe injury, or death. It is the responsibility of the owner or operator to ensure that the equipment described is installed, operated and commissioned in compliance with the requirements of all national and local legislation, which may prevail.

When this equipment is fitted to an appliance, due regard must also be given to the requirements of that appliance.

Before attempting to install, commission or operate this equipment, all relevant sections of this document must be read and fully understood. If in doubt about any requirements consult Fireye.

Installation, commissioning or adjustment of this product **MUST** be carried out by suitably trained engineers or personnel qualified by training and experience.

After installation or modifications to the installation all functions of the equipment **MUST** be checked to ensure safe and reliable operation of the Phoenix scanner.

The manufacturer of this equipment accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation, commissioning or adjustment of operating parameters of the equipment. There are no user serviceable parts.

Before attempting any work on this equipment or any equipment controlled by or connected to this equipment, all related electrical supplies **must** be isolated.

Safety interlocks **must not** be removed or overridden. Any faults once detected **must** be corrected before the control is operated.



### **WARNING**

Risk of electrostatic discharge. Make sure that all personnel and equipment are correctly grounded when installing, handling, or using the keypad on the Phoenix scanner in potentially explosive atmospheres.



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## SPECIFICATIONS

### MECHANICAL, BASIC MODELS (-1QD) and FIBER OPTIC MODELS (-2QD):

- Housing Material:** Engineered material - GE Valox
- Scanner Weight:** 30 lbs (1.5kg)
- Mounting Flange:** P/N 35-318-1, **Standard**, non-metallic, 1" NPT female pipe mount flange with 3/8" NPT female cooling air connection  
(Ordered Separately)
- P/N 35-318-2, **Standard**, non-metallic, 1" BSP female pipe mount flange with 3/8" BSP female cooling air connection
- P/N 129-182-1, **Optional**, aluminum, 1" NPT kit for basic (-1QD) models (InSight / Paragon style flange), with 3/8" NPT female cooling air connection.
- P/N 129-182-2, **Optional**, aluminum, 1" BSP kit for basic (-1QD) models (InSight / Paragon style flange), with 3/8" BSP female cooling air connection.

### ENVIRONMENTAL:

- Temperature Rating:** -40°F/-40°C [ Ta [ 150°F/+65°C; -40°F/-40°C [ scanner internal temperature  
[ 180°F/82°C
- Humidity:** 0% to 95% relative humidity, non-condensing
- Pollution Degree:** 2
- Overvoltage Category:** III

### COOLING/ PURGE AIR REQUIREMENTS:

- Source:** Clean, dry, cool
- Volume:** 4 SCFM (113 l/min) at 3/8" threaded mounting flange, or 1 inch "Y" fitting, mounted on scanner sight pipe. Temperature near the upper limit of the scanner operating range and/or use with dirty/dusty fuels may require up to 15 SCFM (425 l/min).
- Pressure:** Adequate to overcome furnace or windbox pressure

### ELECTRICAL:

- Input Power:** 24 Vdc nominal, +20%, -15% supply current 200 mA
- Electrical Connection:** 8-PIN quick-disconnect
- Relay Outputs:** FLAME RELAY, SPST (N.O.)  
FAULT RELAY, SPST (N.C.)
- Contact Rating:** Minimum: 10 mA @ 5 Vdc  
Maximum: 2 A @ 30 Vdc, 2 A @ 230 Vac (Resistive load)
- Analog Output:** Optically isolated 4 to 20mA dc current referenced to 24 Vdc common, maximum connected load: 750 Ohms. Fireye recommends the 60-2685-X 24 Vdc power supply for best performance and for a SELV rating of the 4-20mA analog output leads.
- Status Indication:** Multiple LED indication for flame signal strength, flame relay, ready, target, background select and fault codes

### MECHANICAL, CEX MODELS:

- Housing Material:** Aluminum, painted finish
- Housing Rating:** Ex II 2 G/D rated, ATEX certified
- Scanner Weight:** 45 lbs (4.3kg)
- Mounting Flange:** P/N 129-168-1, 1" NPT female pipe mount flange with 3/8" NPT female cooling air connection  
(Ordered Separately)
- P/N 129-168-2, 1" BSP female pipe mount flange with 3/8" BSP female cooling air connection
- OPTICAL:** UV models - 295 to 340 nanometers  
IR models - 830 to 1100 nanometers  
K3 models - 310 to 500 nanometers



## CABLE SPECIFICATION:

### Specification: P/N 59-546:

Multi-core, 8 conductor (color coded), with foil wrap and overall braided shield.  
PLTC-ER rating  
Eight #18 AWG  
Temperature Rating: -40° F to +221°F (-40°C to +105°C)  
Cable Jacket: PVC  
Nominal O.D. 0.44" (11.2 mm)  
Maximum O.D. 0.48" (12.2 mm)

## INSTALLATION NOTES

The Phoenix flame scanners determine the presence or absence of flame by monitoring the amplitude of the flame across a wide flicker frequency spectrum. The scanner should initially be mounted so that the primary combustion zone is within the scanner's line of sight.

The location and sighting instructions listed in the following sections are rough guidelines for the location of the scanner. The scanner provides feedback via LEDs and the 4-20ma output to assist in the adjustment and proper alignment of the flame scanner. Refer to the set-up procedures described in this bulletin.

*Note: An acceptable scanner location must ensure the following:*

Reliable main flame and/or igniter flame detection at all air flow and furnace loads (ranges of fuel firing).

Rejection of the igniter flame if too short or in the wrong position to ignite the main flame reliably, thus prohibiting the delivery of fuel to the burner.

*Note: Ensure the correct FFRT (Flame Failure Response Time) is selected prior to commissioning.*

## INSTALLATION PROCEDURE



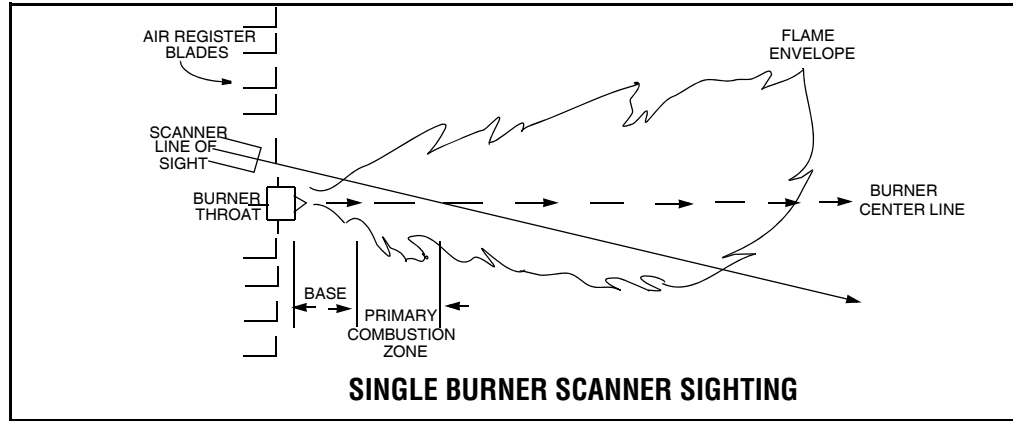
**WARNING: Protective filtered lenses should be worn when viewing flame; infrared and ultraviolet energy from the flame can be damaging to the eyes.**

1. The best results are obtained when the scanner is aimed so that the scanner's line of sight intersects the burner center at a slight angle (e.g. 5 degrees) and sees a maximum of the primary combustion zone, as shown in Figure 3. If only one scanner is used per burner, the line of sight should also intersect the igniting flame.
2. For installations where separate scanners are used to monitor main and igniter flames, the main flame scanner should be sighted so it does not detect the igniter flame.
3. The scanner should have an unrestricted view of flame as far as possible. Physical obstructions such as air register blades, interfering vanes, or other hardware should be cut away or notched so they do not fall within the scanner's line of sight as shown in Figure 3.

*Note: Always check with the burner manufacturer **before** you trim the register blades.*

*Note: When installing flange 35-318-1 or 35-318-2, only torque to 60 in/lbs (5 ft/lbs or 6.8Nm) on the sight pipe or damage can occur. (Hand tight plus 1 turn max)*

FIGURE 3.

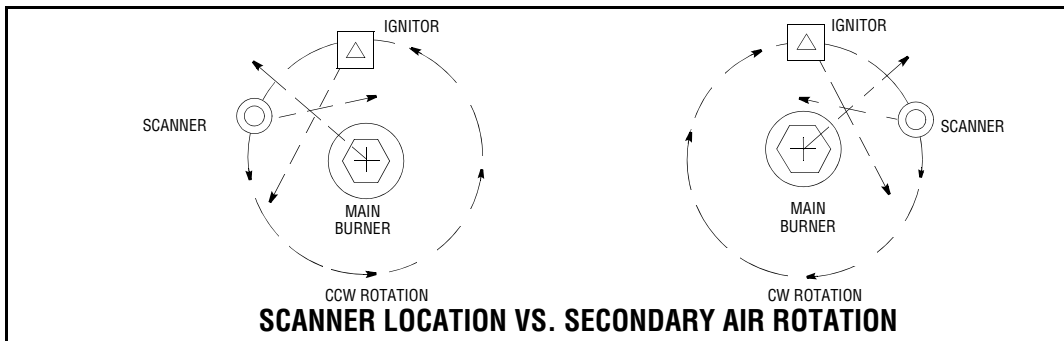


4. AN ACCEPTABLE SCANNER LOCATION MUST ENSURE THE FOLLOWING:

- Reliable pilot flame detection.
- Reliable main flame detection.
- Rejection of pilot flame too short or in the wrong position to ignite the main flame reliably, thus prohibiting main fuel admission.

*Note: Reliable signals must be obtained at all air flows and furnace loads (ranges of fuel firing).*

FIGURE 4.



5. If combustion air enters the furnace with a rotational movement of sufficient velocity to deflect pilot flame in direction of rotation, position the scanner 0 to 30 degrees downstream of the pilot burner and close to the periphery of the throat where the ultraviolet radiation is at a maximum. (See Figures 3 and 4).

Having determined an appropriate location for the sight tube, cut a clearance hole for a 2 inch pipe through the burner plate. If register vanes interfere with the desired line of sight, the interfering vane(s) should be trimmed to assure an unobstructed viewing path at all firing levels, see example shown below.

*Note: Always check with the burner manufacturer **before** you trim register vanes.*



**FLAME MUST COMPLETELY COVER SIGHT OPENING**



6. The preferred method for mounting surface mounted scanners requires the use of a swivel mount, P/N 60-1664-3 (NPT), shown in Figure 5. Center the swivel mount over the two inch hole in the burner plate and secure using three hexed cap screws (not provided). Install the sight pipe on the swivel mount. If a swivel is not used, insert the end of the sight pipe into the hole, align the hole to the desired viewing angle and tack weld (welding must be adequate to temporarily support the weight of the installed scanner). The sight pipe should be arranged to slant downward so that dirt and dust will not collect inside.



**CAUTION: Use no more than one foot of one inch diameter sight pipe. Increase the sight pipe diameter one inch for every additional foot of sight pipe length used to avoid restricting the scanner's field of view.**

7. When a satisfactory sighting has been confirmed by operational testing, secure the swivel mount's ball position in place by tightening the three hex head cap screws located on the swivel mount ring.
8. For ease of use, the scanner should be installed on the sight pipe so the LED display can easily be read.

*Note: Operation of the LED display is independent of position.*

9. The scanner lens must be kept free of contaminants (oil, ash, soot, dirt) and the scanner housing temperature must not exceed its maximum rating of 150° F (65° C). Excessive temperatures will shorten scanner life. Both requirements will be satisfied by a continuous injection of purge air at either the 3/8" housing inlet or the 1" "Y" connection ahead of the swivel mount as shown in Figure 5.

The scanner mounting may be made with provision for purge air through only the 3/8" opening or for purge air through either the 3/8" opening or the 1" "Y" connection. In the latter arrangements, normally only one of the two connections is provided with purge air and the other connection is plugged. When a sealing coupling is used, the 1" "Y" connection is used for the purge air and the 3/8" opening is plugged.

It is good practice to use the sealing coupling (P/N 60-1199-x with NPT threads) on all installations to insure against unwanted furnace pressures from damaging the scanner lens.

Under normal conditions, with clean burning fuels and moderate ambient temperature conditions, purge air flow of approximately 4 SCFM (113 l/min) is generally adequate. Up to 15 SCFM (425 l/min) may be required for fuels that produce high levels of ash or soot, or for hot environments to maintain the scanner's internal temperature within specification.



**CAUTION: To ensure safe and reliable detection it is the responsibility of the commissioning engineer to carry out flame failure testing after programming the scanner.**

**Ensure that the scanner correctly detects the target flame (Flame On condition) and recognizes the target flame off (Flame Off condition).**

**FIGURE 5.**

