

## C7061A, C7061F2 dynamic self-check ultraviolet flame detector

### OPERATING INSTRUCTIONS

· Edition 04.24 · EN · 32-00281-01



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### 1 SAFETY

#### 1.1 Please read and keep in a safe place



Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at [www.docuthek.com](http://www.docuthek.com).

#### 1.2 Explanation of symbols

**1**, **2**, **3**, **a**, **b**, **c** = Action

→ = Instruction

#### 1.3 Liability

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

#### 1.4 Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:



#### DANGER

Indicates potentially fatal situations.



#### WARNING

Indicates possible danger to life and limb.



#### CAUTION

Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

#### 1.5 Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

## 2 APPLICATION

The C7061A and C7061F2 are dynamic self-checking flame detectors for sensing the ultraviolet radiation generated by the combustion of gas, oil, or other fuels.

## 3 CHECKING THE USAGE

Incorporates UV sensor tube checking feature; used with R7861 dynamic self-check amplifiers.

### C7061A

Housing meets NEMA 4 enclosure standards.

### C7061F2

Housing designed to be explosion-proof and Underwriters Laboratories Inc. listed for use in hazardous locations; Class I, groups C and D; and Class II, groups E, F and G.

Viewing window rated for 100 psi (690 kPa).

### C7061A and C7061F2

-40°F (-40°C) rated ultraviolet sensing tube.

## 4 FEATURES

- Oscillating shutter interrupts ultraviolet radiation reaching the UV sensing 12 times per minute to provide the UV sensing tube checking function. Amplifier circuitry components' are checked from the microprocessor in the 7800 SERIES.
- Detectors can be mounted horizontally, vertically or at any other angle. The self-checking C7061 models require faceplate alignment and have integral locating reference points to assure proper shutter mechanism operation.
- Ultraviolet radiation sensing tube and quartz viewing window are field replaceable.
- Threaded conduit fitting and color-coded leadwires allow rapid electrical installation.
- Models available using Molex/Woodhead 1R5006A20A120 (formerly Brad Harrison 41310) connector.
- Two flame detectors can be wired in parallel to reduce nuisance shutdowns in difficult flame sighting applications.
- Protective heat block built into mounting flange.

## 5 TECHNICAL DATA

The specifications in this publication do not include normal manufacturing tolerances. Therefore, this unit may not exactly match the specifications listed. This product is tested and calibrated under closely controlled conditions, and minor differences in performance can be expected if those conditions are changed.

### Models

C7061A dynamic self-check ultraviolet flame detector.

C7061F2 dynamic self-check ultraviolet flame detector. Same as C7061A except with explosion-proof housing for use in hazardous locations.

### Electrical ratings

Voltage and Frequency: The C7061 SERIES are powered from the flame safeguard unit that delivers the necessary voltages to operate the tube and shutter.

### Temperature ratings

Operating temperature: -40°F to +175°F (-40°C to +80°C).

Storage temperature: -60°F to +175°F (-50°C to +80°C).

### Housing

C7061A: Violet, cast-aluminum cover. Separate mounting flange (with heat block) and faceplate provide heat insulation and sealoff.

Meets NEMA 4 enclosure requirements.

C7061F2: Explosion-proof, two-piece, violet, cast aluminum.

### Pressure rating of quartz viewing window

C7061A: 20 psi (138 kPa), see replacement parts.

C7061F2: 100 psi (690 kPa).

### Replacement parts

The web app PartDetective for selecting spare parts is available at [www.adlatus.org](http://www.adlatus.org).

### Pressure rating of quartz focusing lens

20 psi (138 kPa), see page 14 (12 Accessories).

### Mounting:

C7061A: Mounting flange with 1" NPT internal threads for attaching to sight pipe.

C7061A Series are supplied with a 1" MNPT to 3/4" FNPT bushing adapter.

C7061F2: Pipe union with 1 inch NPT internal threads for attaching to sight pipe.

### Wiring connections

Models with leadwires only. NEC Class 1 color coded. Length: 8 ft (2.4 m).

Threaded leadwire faceplate opening: 1/2-14 NPSM internal threads for attaching conduit.

Connector:

C7061A (receptacle models only). Meets Molex/Woodhead 1R5006A20A120 (formerly Brad Harrison 41310).

### Weight

C7061A: 2.6 lbs (1.2 kg),

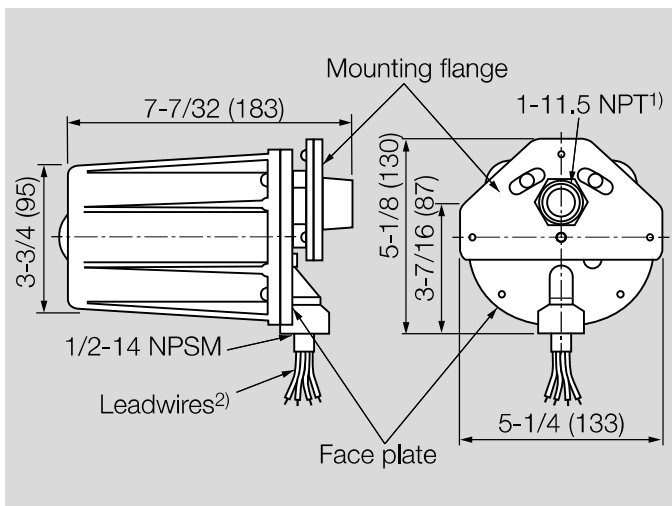
C7061F2: 14.5 lbs (6.6 kg).

### Serviceability

C7061A: Field replaceable ultraviolet sensing tube, viewing window, and self-checking coil and shutter assembly.

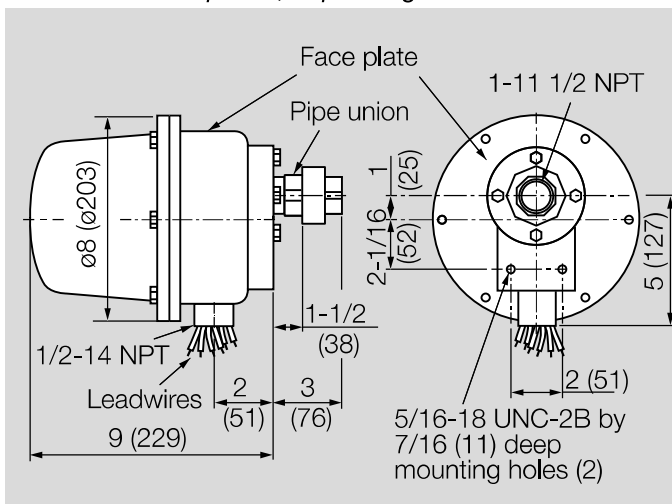
C7061F2: Field replaceable self-checking coil and shutter assembly and ultraviolet sensing tube.

## 5.1 Dimensions



Dimensions of C7061A in inches (mm).

- 1) C7061A: 1" NPT with bushing adapter for 3/4" pipe mounting.
- 2) C7061A: 8 ft (2.4 m) lead wires, terminal connection board or receptacle, depending on model.



Dimensions of C7061F2 in inches (mm).

## 6 INSTALLATION

### 6.1 When installing this product ...

- Installer must be a trained experienced, flame safeguard control technician.
- After installation is complete, check product operation as provided in these instructions.

### ⚠ CAUTION

Equipment damage hazard.  
Sensing tube can fail to discriminate between flame conditions.

- Change sensing tube after 40,000 hours of continuous use.

### ⚠ WARNING

Electrical shock hazard.  
Can cause serious injury or death.

- Disconnect power supply before beginning installation to prevent electrical shock and equipment damage. More than one disconnect may be involved.

- Do not connect these detectors to non-Honeywell manufactured controls (primaries, programmers, multiburner systems, and burner management systems).
- All wiring must be NEC Class 1 (line voltage).
- Voltage and frequency of the power supply connected to this detector must agree with the values marked on the detector.
- Sight the detector so it does not respond to ignition spark.
- On multiburner installations, each detector must respond only to the flame of the burner it is supervising.
- Do not connect more than two C7061 flame detectors in parallel.

Proper flame detector installation is the basis of a safe and reliable flame safeguard installation. Refer also to the burner manufacturer instructions. Carefully follow all instructions for the best possible flame detection application.

→ Per industry standards, a conduit seal or a cable type that is sealed is required to be installed in a device that can result in flammable gas or flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

### 6.2 Basic requirements

The combustion flames of most carbon-based fuels emit sufficient ultraviolet radiation to enable the C7061A, C7061F2 UV flame detector to prove the presence of a flame in a combustion chamber. The detector is mounted outside the combustion chamber with its mounting flange or union threaded to one end of a sight pipe inserted through the wall of the combustion chamber. The ultraviolet sensing tube in the flame detector sights the flame through the pipe.

When a flame is present, the UV tube in the C7061A, C7061F2 senses the ultraviolet radiation emitted. The C7061A, C7061F2 then produces a signal that is sent to the amplifier in the flame safeguard control. The amplified signal causes the flame relay of the controller to be pull in, to prove proper system operation.

For applications whose response to ignition spark cannot be avoided, the Q624A, ET401A or ET402A solid-state ignition transformer may eliminate the ignition spark response.

The Q624A, ET401A, or ET402A, when properly installed, prevents ignition spark response by alternately activating the spark generator and the UV sensing tube, see datasheet [Q624 Solid state spark generator](#) and [ET401 Ignition transformers](#). Because it is necessary for the UV sensing tube to actually see the flame, it is best to locate the detector as close to the flame as physical arrangement, temperature, and other restrictions permit. These restrictions are described in detail in the following paragraphs.

### 6.3 Determining the location

Before beginning the actual installation, determine the best location for mounting the detector. Carefully consider the factors discussed in this section before deciding on the location.

#### Temperature

- Install the C7061A, C7061F2 where the ambient temperature (outside the housing) stays within the ambient operating temperature ratings. To keep the C7061A, C7061F2 below its maximum rating, it may be necessary to add additional insulation between the wall of the combustion chamber and the detector.
- A shield or screen can be added to reflect radiated heat away from the detector. If the detector continues to get too hot, cooling is necessary, see page 6 (6.15 Sight pipe ventilation).

#### Vibration

- If the C7061A, C7061F2 is subject to excessive vibration, use an antivibration mount (not provided by Honeywell). If you use this mount, install it before you position and sight the detector.

#### Clearance

- Make sure there is enough room to easily mount the sight pipe, detector, and all required fittings, and to remove the detector for troubleshooting and servicing.

### 6.4 Radiation sources

Examples of radiation sources (other than flame) that could actuate the detection system:

#### Ultraviolet sources

- Hot refractory above 2300°F (1260°C)
- Spark:
  - Ignition transformers
  - Welding arcs
  - Lightning
- Welding flames
- Bright incandescent or fluorescent artificial light
- Solar radiation
- Gas lasers
- Sun lamps
- Germicidal lamps
- Bright flashlight held close to the sensing tube

#### Gamma ray and X-ray sources

- Diffraction analyzers
- Electron microscopes
- Radiographic X-ray machines
- High voltage vacuum switches
- High voltage condensers
- High voltage coronas
- Radioisotopes
- Except under unusual circumstances, none of these sources except hot refractory and ignition spark would be present in or near the combustion chamber.

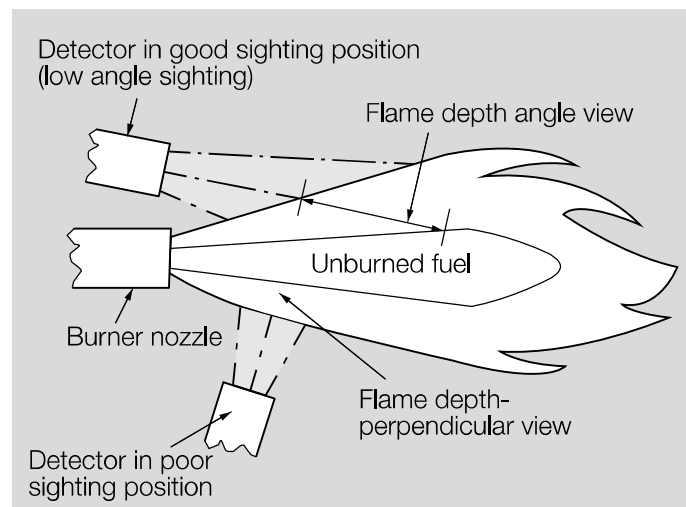
- The detector can respond to hot refractory above 2300°F (1260°C) if the refractory surface represents a significant percentage of the detector field of view. If the temperature of the hot refractory causes the flame relay (in the flame safeguard control) to pull in, realign the sight pipe so the detector views a cooler area of the refractory.
- The Ignition spark is an intense source of ultraviolet radiation. When installing the detector, make sure it does not respond to ignition spark.

### 6.5 Single burner requirements

The detector must have an unobstructed view of a steady part of the flame it is supervising. This requires a proper sighting angle and minimized ultraviolet radiation attenuation effects. However, when supervising only one burner, sighting requirements are simplified.

### 6.6 Sighting angle

The first 30% of a flame closest to the burner nozzle (the flame root) emits the most ultraviolet energy. Also, if the detector sights the flame at an angle instead of perpendicularly, it views more flame depth. Therefore, the best sighting angle is nearly parallel to the axis of the flame, permitting the detector to view a large portion of the first 30% of the flame closest to the burner nozzle.



*Detector sighting angle*

Low angle sighting permits the detector to view a greater depth of flame, thus reducing the effects of instabilities in the flame pattern. Also, the environment near the burner nozzle is usually cleaner than at any other part of the combustion chamber. This provides a clearer line of sight and can keep the viewing window cleaner, thus reducing the maintenance required.

- When possible, it is desirable to tilt the detector and sight pipe downward to prevent the buildup of soot in the pipe or on the viewing window. In most installations, the detector needs to respond to the pilot flame alone, then the pilot and main burner flame together, and finally the main burner flame alone.

The detector must meet all sighting requirements that apply:

- Pilot flame alone: The smallest pilot flame that can be detected must be capable of reliably igniting the main burner.
- Pilot and main burner flame together: The detector must sight the junction of both flames.
- Main burner flame alone: The detector must sight the most stable part of the flame for all firing rates.

### 6.7 Parallel flame detectors

Shifting flame patterns, commonly encountered on burners with high turndown ratios, can require two parallel detectors to prove the flame at the highest and lowest firing rates and for modulation in between.

In this case, one detector supervises the pilot (interrupted) and both detectors supervise the main burner flame.

- During the main burner run period, either detector is capable of maintaining system operation.
- A maximum of two C7061A, C7061F2 detectors can be connected in parallel.

In addition to assuring more reliable flame detection, parallel detectors facilitate maintenance during burner operation. Each detector can be removed, in turn, without shutting down the supervised burner.

- However, a flame simulating failure occurring in the flame signal amplifier or in either detector will cause a shutdown.

### 6.8 Screening effects

- Smoke, oil mist, dirt and dust are masking agents that attenuate the ultraviolet radiation that the flame emits.

If they absorb too much radiation, the amount of ultraviolet radiation reaching the detector is reduced. The flame signal can then become too low to hold in the flame relay, resulting in burner shutdown.

- The problem can be eliminated by diluting the contaminants.

A strong flow of air through the sight pipe will clear a viewing path through the attenuating material, see page 6 (6.15 Sight pipe ventilation).

It is also desirable to sight the detector at an area containing fewer masking agents such as near the burner nozzle or near the entrance of the combustion air.

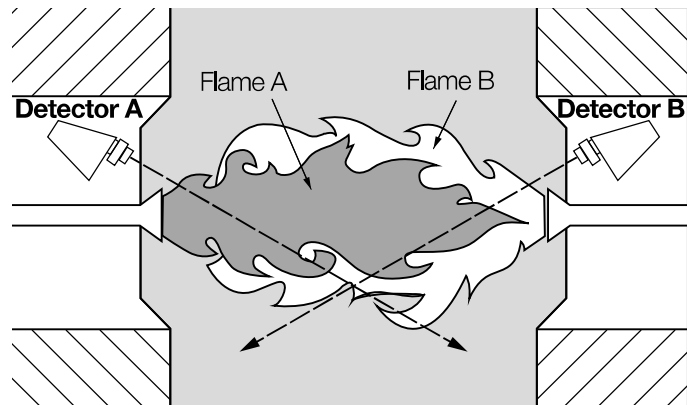
Increasing the viewing area of the detector by shortening the sight pipe or by increasing the diameter of the sight pipe also reduces the attenuating effects of masking agents.

### 6.9 Multiburner requirements (flame discrimination)

In addition to meeting the requirements for a single burner, a multiburner installation requires discrimination between flames. Flame discrimination can be defined as locating all flame detectors so that each detector responds only to the flame of the burner it is supervising.

- In multiple burner systems, not every detector can be positioned so its line-of-sight does not intercept flames from other burners. For example, this situation occurs in front-fired boiler-furnaces having more than one row of burners, or in multilevel opposed-fired furnaces where the burners face each other.

When planning such an installation, locate each flame detector so that it has the best possible view of the first 30% closest to the burner nozzle (the flame root) it is supervising, and the worst possible view of all other flames.



Example of flame discrimination problem (opposed fired burners)

The figure above illustrates a critical detector application that requires flame discrimination. Flame discrimination is accomplished for detector A by repositioning it until the flame relay (in the flame safeguard control) does not respond to flame B. Note that detector A is aimed at the first 30% of flame A where the ultraviolet radiation is most intense. It sights the tip of flame B, but it is not aimed at the first 30% of flame B where UV is intense. Detector A is repositioned to assure maximum response to flame A while rejecting flame B. Similarly, detector B is positioned to assure maximum response to flame B while rejecting flame A. If you reposition a detector and still cannot achieve flame discrimination, try reducing the viewing area by increasing the length or decreasing the diameter of the sight pipe, or adding an orifice plate.

## 6.10 Installing the sight pipe

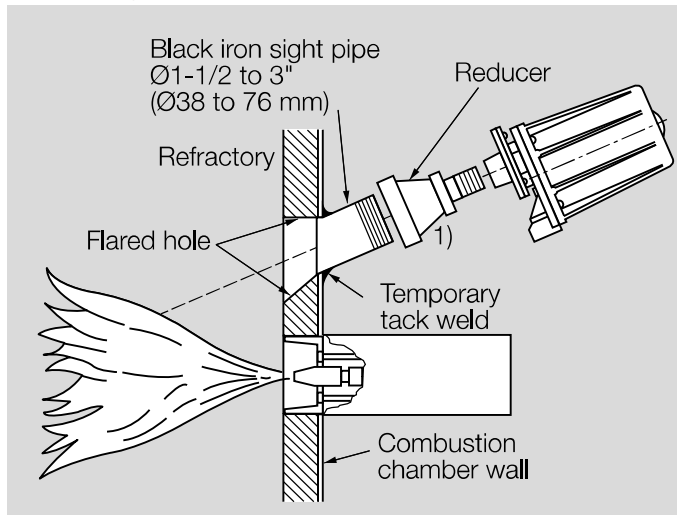
After you have determined the location and sighting angle, select the sight pipe.

→ A black iron pipe with a diameter of at least 1-1/2" (38 mm) is recommended.

Do not use stainless steel or galvanized pipe because they reflect ultraviolet radiation internally and complicate aiming the pipes.

Sight pipes with diameters 2 to 3" (51 to 76 mm) produce better results for horizontal rotary burners, which require wide viewing angles.

A wide viewing angle can also be obtained by using a short sight pipe.



Typical mounting

1) If ventilation of the sight pipe is required, add pipe tee, perforated nipple or other suitable device for ventilation.

## 6.11 Preparing hole in combustion chamber wall

Cut or drill a hole of the proper diameter for the sight pipe in the wall of the combustion chamber at the selected location. Flare the hole to leave room for small adjustments of the sighting angle.

→ The taper of the hole should be about 1" for every 3" (25 mm for every 76 mm) of wall thickness.

## 6.12 Mounting sight pipe

- 1 Thread one end of the pipe to fit the mounting flange, union, or required coupling.
- 2 Cut the pipe to the desired length (as short as practical) and at an angle so it fits flush with the wall of the combustion chamber.
- 3 Tack weld the pipe to the wall in a trial position. Do not weld the sight pipe permanently in place until after completing the page 10 (8 Adjustments and checkout).

→ If you use a swivel mount, see from our IFM portfolio [Industrial Flame Monitoring](#), and you are positive about the location and sighting angle, you can permanently weld the pipe.

## 6.13 Installing fittings

In some cases, the sight pipe does not directly fit the C7061A, C7061F2 mounting flange or union. Also, it may be desirable or necessary to ventilate the sight pipe. You may also want to use a swivel mount or an antivibration mount.

Each of these cases can require additional fittings, see page 14 (12 Accessories).

## 6.14 Reducer

For sight pipes of larger diameter than the mounting flange connector or union, install a reducer as illustrated in Typical mounting, see page 6 (6.10 Installing the sight pipe).

## 6.15 Sight pipe ventilation

It may be necessary to ventilate the sight pipe to cool the detector or to clear a viewing path through UV radiation attenuating material.

For a negative pressure combustion chamber, drilling a few holes in the section of the sight pipe outside of the combustion chamber allows air at atmospheric pressure to flow through the sight pipe and into the chamber.

A perforated pipe nipple between the sight pipe and the detector can also be used.

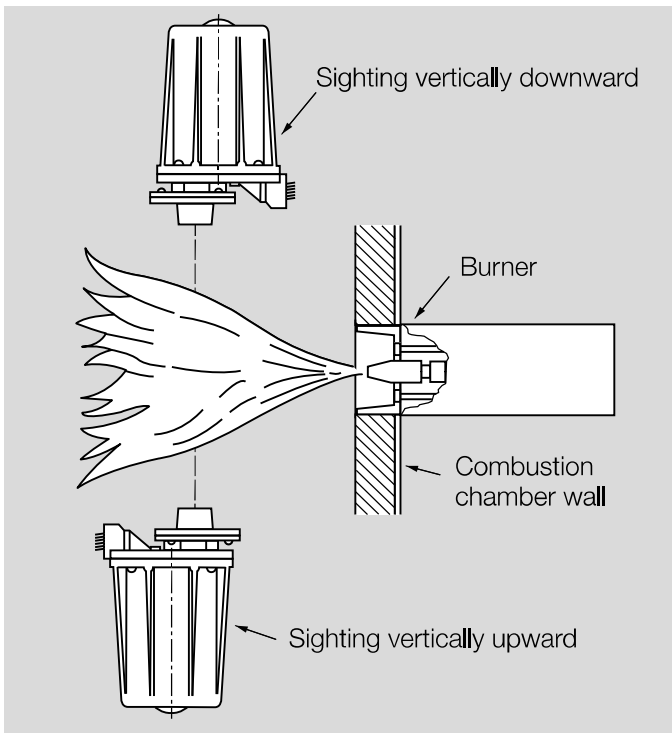
For a positive pressure combustion chamber, connect a supply of pressurized air from the burner blower to flow through the sight pipe and into the chamber. The air pressure must be greater than the chamber pressure.

## 6.16 Antivibration mount

The detector withstands normal burner vibration. If the vibration is excessive, use an antivibration mount to avoid damage to the flame detector. If you use this mount, install it before positioning and sighting the detector.

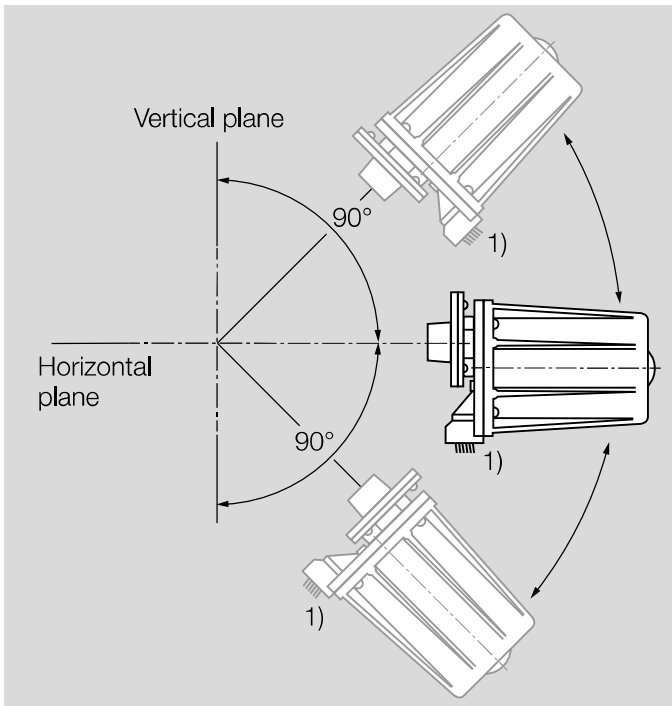
## 6.17 Mount the detector

Mount the detector onto the sight pipe, reducer or other fitting, see previous instructions. The C7061 Self-Checking flame detectors incorporate an oscillating shutter mechanism and, therefore, require special consideration for mounting positions other than vertically sighting downward or upward, as illustrated in following.



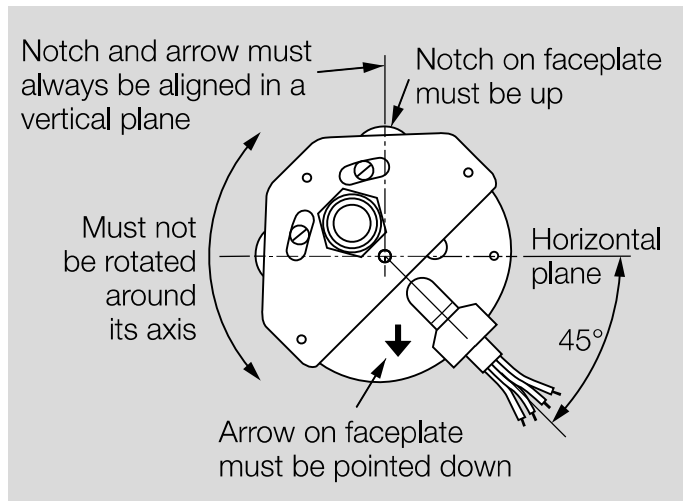
Vertical mounting of C7061A

The C7061 must be mounted with the conduit opening located approximately 45 degrees below the horizontal.



Mounting positions of C7061A

→ Note downward positioning of conduit opening. The C7061 have notch and arrow indicators on the faceplate to facilitate mounting in positions other than vertically sighting downward or upward.

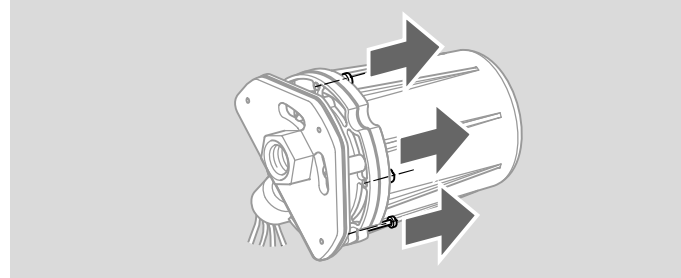


Notch and arrow

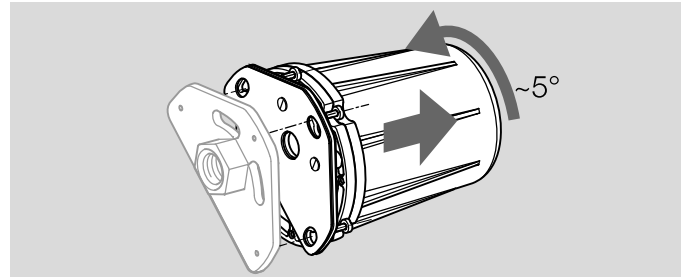
→ The notch and arrow on the faceplate must be vertically aligned with the notch in the up position and the arrow pointing downward.

### To mount a C7061A

**1** The mounting flange is in two pieces. Loosen (but do not remove) the three screws holding the flange together.

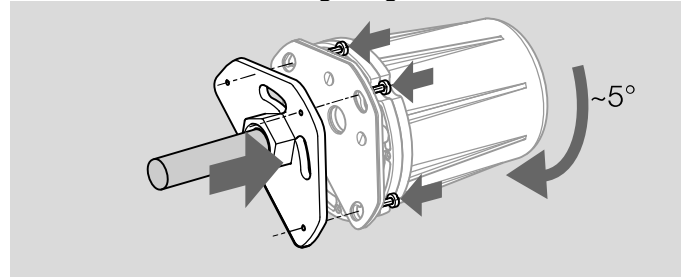


**2** Slightly rotate the detector so the slots in the back section of the mounting flange clear the screws in the front section; then separate the two sections.



**3** Screw the front section of the mounting flange onto the sight pipe, reducer, or other fitting.

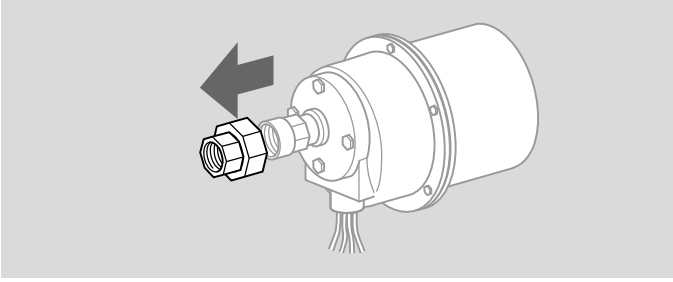
**4** Fit the slots in the back section of the mounting flange (with the detector) over the three screws in the front section, and rotate the detector so the screws hold the flange together.



**5** Tighten the screws securely.

## To mount a C7061F2

- 1 Unscrew the collar on the pipe union and remove the coupling section.



- The collar and coupling are in two pieces; do not separate them.
- 2 Screw the coupling onto the sight pipe, reducer, or other fitting.
  - 3 Mount the remainder of the pipe union (with the detector) onto the coupling and securely tighten the collar.

## 7 WIRING

### CAUTION

Equipment damage hazard!

Improper wiring can permanently damage amplifier.

- When using a C7061A with an R7861 dynamic self-check amplifier, be careful not to short the white shutter leadwires together (by wiring incorrectly, leaving an incorrect jumper wire, or stripping the insulation too much so the bare leadwires can touch).

- Per industry standards, a conduit seal or a cable type that is sealed is required to be installed in a device that can result in flammable gas or flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

- 1 All wiring must comply with applicable local electrical codes, ordinances, and regulations. Use NEC Class 1 wiring.
  - 2 Keep the flame signal leadwires as short as possible from the flame detector to the terminal strip or wiring subbase.
- Capacitance increases with leadwire length, reducing the signal strength. The maximum permissible leadwire length depends on the type of leadwire and conduit type and diameter. The ultimate limiting factor in flame signal leadwire length is the signal current, see page 11 (8.3 Flame signal).
- 3 The detector has color-coded plastic-insulated, AWG 18 leadwires, 8 ft (2.4 m) long, rated for 221°F (105°C). These wires must be run in a conduit.
  - 4 If the leadwires are not long enough to reach the terminal strip or wiring subbase, make the required splices in a junction box.
  - 5 If splicing is necessary, use moisture-resistant AWG 14 wire suitable for at least 167°F (75°C) if the detector is used with a flame safeguard

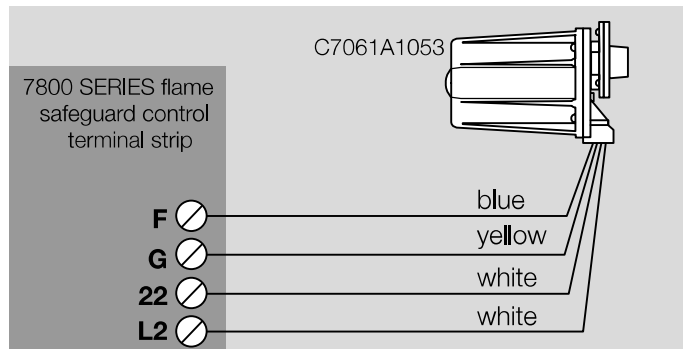
primary control, or at least 194°F (90°C) if used with a flame safeguard programming control.

- 6 For high temperature installations, use heat resistant wire. For the other leadwires, use moisture-resistant AWG 14 wire selected for a temperature rating above the maximum operating temperature.
- Do not run the flame detector wiring in the same conduit with high voltage ignition transformer wires.

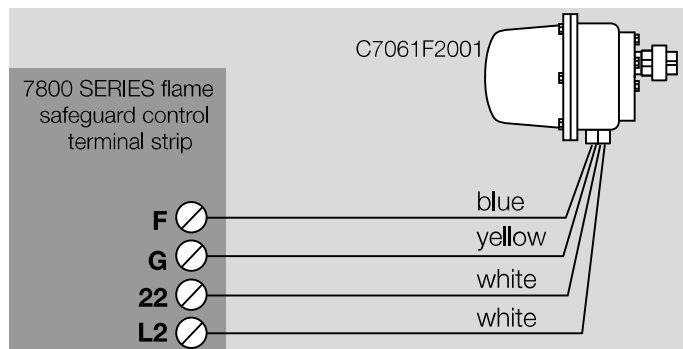
### Wiring diagrams for C7061 detectors with 7800 SERIES

- The voltage (0.0–5.0 V DC) of the flame signal can be made visible by using the display module S7800, by measuring the voltage (0.0–5.0 V DC) on the test terminals of the flame amplifier with a multimeter or by reading the applicable Modbus registers (000 h–255 h), see the dedicated pages in the instruction sheets [S7800A Keyboard Display Module](#) or [7800 SERIES S7800A2142 4-Line LCD Keyboard Display Module](#).
- An R7861 dynamic self-check amplifier must be used.
- Voltage of the C7061 must match the power supply of the flame safeguard control.
- Two C7061A or two C7061F2 detectors can be connected in parallel to the same terminal.

#### C7061A1053

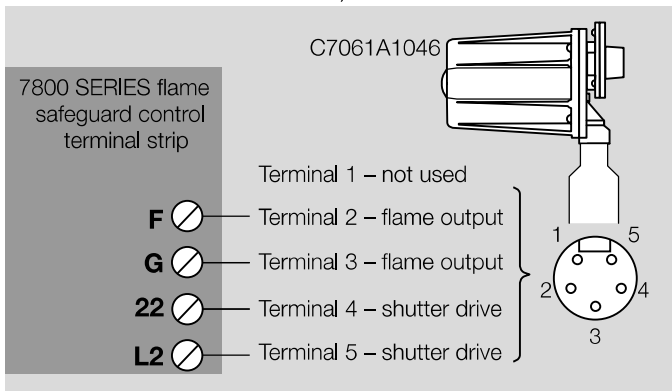


#### C7061F2001



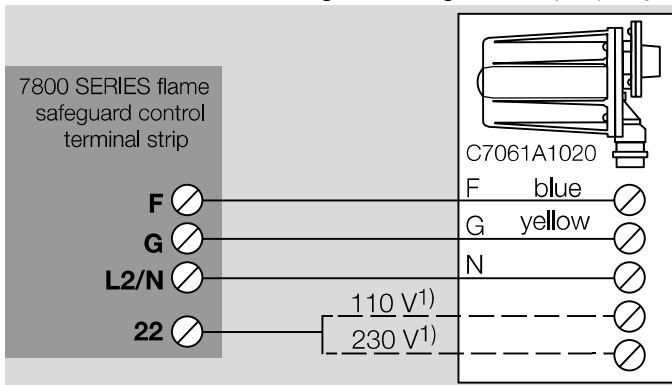
### C7061A1046

- C7061A1046 only: keyed connector allows connection in only one position.
- C7061A1046 only: reference 1R5006A20A120 Molex/Woodhead (formerly Brad Harrison 41310) connector.
- Mating connector can be 105000A01F0302 or 105000A01F0602 Molex/Woodhead (formerly Brad Harrison 41306N).



### C7061A1020

- C7061A1020 only: Use appropriate cable and make sure the cable gland is tightened properly.

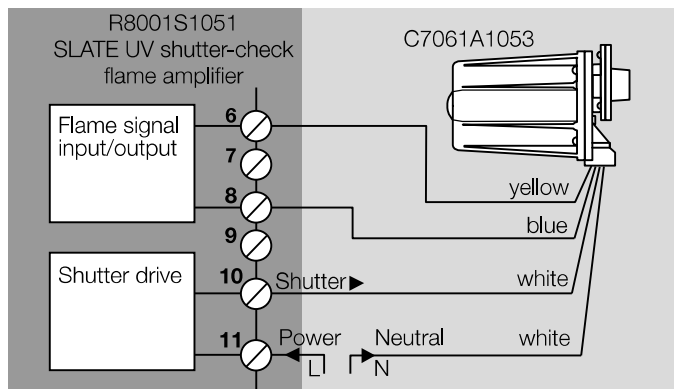


- 1) 7800 SERIES EC78xx: Use 230 V.  
7800 SERIES RM78xx: Use 110 V.

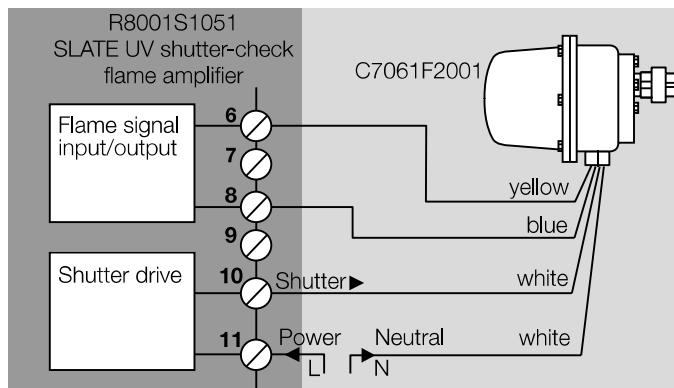
### Wiring diagrams for C7061 detectors with SLATE

- An R8001S1051 dynamic self-check amplifier must be used.
- Voltage of the C7061 must match the power supply of the of terminal 11 of the flame amplifier module.
- Two C7061A or two C7061F2 detectors can be connected in parallel to the same terminal. The voltage (0.0–8.0 V DC) of the flame signal can be made visible only on the display via the wiresheet configuration.

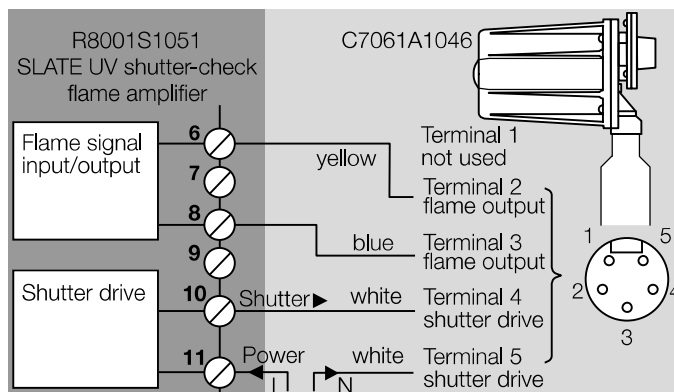
### C7061A1053



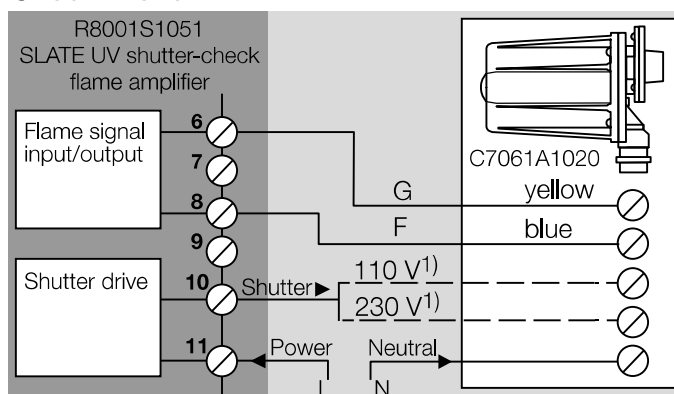
### C7061F2001



### C7061A1046



### C7061A1020



- 1) When the voltage on terminal 11 is 230 V AC, select 230 V terminal of C7061A1020.  
When the voltage on terminal 11 is 110–120 V AC, select 110 V terminal of C7061A1020.

## 7.1 Connecting detectors in parallel

For a flame that is difficult to sight, using two parallel C7061 flame detectors reduces nuisance shut-downs. If only one of the parallel detectors loses the flame signal, the other indicates the presence of the flame and keeps the burner running. When two parallel C7061 detectors are used, a flame-simulating failure in either detector causes the burner to shut down. Two C7061 detectors can be connected in parallel to the same terminals on line voltage flame safeguard controls.

To avoid exceeding the rating of the solid-state shutter switch in the R7861 flame signal amplifier, do not connect more than two C7061 detectors in parallel. Do not connect more than two C7061 detectors in parallel.

When the flame detectors are connected in parallel, the low level background signals are additive. Also, the background signal increases as the temperature decreases. Because of this, the minimum ambient operating temperature must be increased from -40°F (-40°C) to -10°F (-23°C) when C7061 flame detectors are connected in parallel.

- Voltage rating of the C7061 must match the power supply of the flame safeguard control.

## 8 ADJUSTMENTS AND CHECKOUT

Do not put the system into operation until all checkout tests in the instructions for the appropriate flame safeguard control and any others specified in the burner installation instructions are satisfactorily completed.

### 8.1 UV sensing tube test

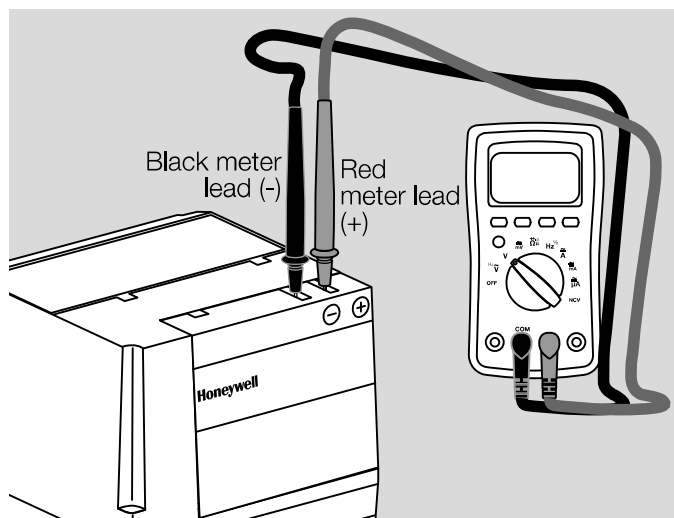
- For initial burner light-off, consult the burner manufacturer instructions or the flame safeguard control instructions.
- If the system does not start during the initial burner light-off, check the UV sensing tube in the flame detector.
- If a reddish glow appears when there is no flame present, replace the UV sensing tube.
- When performing this test, make sure there are no extraneous sources of ultraviolet radiation in the test area, see page 4 (6.4 Radiation sources).

### 8.2 Adjusting the detector sight

With the flame detector installed and the burner running, adjust the sighting position of the detector for optimum flame signal.

### Flame signal measurement with 7800 SERIES controls

It is suggested to use a multimeter with a minimum sensitivity of 1 MΩ/volt and a scale of 0 to 5 or 10 V DC for measurements with the R7861 flame amplifier.



Measurement with 7800 SERIES control

- Be careful to make the proper connections of positive (red) meter lead to positive (+) control jack and negative (black) meter lead to negative (-) or (COM) jack with 7800 SERIES controls.
- When the 7800 SERIES control has a keyboard display module, a 0 to 5 V DC voltage is displayed on the module.
- The shutter operation causes fluctuations in the voltage reading. Read the average stable reading, disregarding the peaks.
- The flame signal must be steady (or stable as described).
- Move the detector and sight pipe around to sight the flame from various positions and angles.
- Try to get a maximum steady (or stable) reading on the meter that is above the minimum acceptable voltage, see page 11 (8.3 Flame signal).
- Measure the flame signal for the pilot alone, the main burner flame alone, and both together (unless monitoring only the pilot flame when using an intermittent pilot, or only the main burner flame when using direct spark ignition).
- Also measure the flame signal at low and high firing rates and while modulating in between (as applicable).
- With the detector in its final position, all required flame signals must be steady (or stable) and as specified, see page 11 (8.3 Flame signal).
- If you cannot obtain the proper signal, see page 11 (9 Troubleshooting).

### 8.3 Flame signal

#### Flame signal for 7800 product family

Flame detector	Plug-in flame signal amplifier	7800 SERIES flame safeguard control(s)	Minimum <sup>1)</sup> acceptable steady voltage (V DC)	Maximum expected voltage (V DC)
C7061A, C7061F2	R7861 dynamic self-check <sup>1) 2)</sup>	All except RM7890A or EC7890A	1.25	5.0

#### Flame signal for SLATE product family

Flame detector	SLATE flame signal amplifier	Minimum <sup>1)</sup> acceptable steady voltage (V DC)	Maximum expected voltage (V DC)
C7061A, C7061F2	R8001S1051 SLATE UV shutter-check flame amplifier <sup>1)2)</sup>	Configurable	8.0

1) Shutter operation of the C7061 causes fluctuations in the voltage reading. Read the average stable voltage, disregarding the peaks.

2) Shutter operates at 12 cycles per minute.

#### 8.4 Pilot turndown test

If the detector is used to prove a pilot flame before the main fuel valve(s) can be opened, perform a pilot turndown test. Follow the procedures in the instructions for the appropriate flame safeguard control and the burner manufacturer instructions.

#### 8.5 UV and ignition spark response test

Test to be sure that ignition spark is not actuating the flame relay in the flame safeguard control.

- 1 Close the pilot and main burner manual shutoff valves.
- 2 Start the burner and run through the ignition period. Ignition spark should occur, but the flame LED must not light. The flame signal should not be greater than 0.25 V DC.
- 3 If the flame relay does pull in, reposition the detector farther from the spark or relocate/resight the detector to eliminate/reduce the detector response to reflected UV radiation. It may be necessary to construct a barrier to block the ignition spark from the detector view. Continue adjustments until the flame signal due to ignition spark is less than the flame signal values indicated in step 2.

#### 8.6 Response to other ultraviolet sources

Some sources of artificial light produce small amounts of UV. Under certain conditions, an ultraviolet detector cannot distinguish flames from the artificial sources.

Do not use an artificial light source to check the response of an ultraviolet detector. To check for proper flame detector operation, test for flame failure response under all operating conditions.

#### 8.7 Weld the sight pipe

- 1 When the flame signal is acceptable after all adjustments are made, remove the flame detector and weld the sight pipe in its final position.
- If you are using a swivel mount, the pipe may already be welded.

- 2 Then reinstall the flame detector.

#### 8.8 Final checkout

- 1 Before putting the burner into service or after performing any service, repairs or maintenance, verify the installation using the procedures in the checkout sections of the appropriate flame safeguard control.
- 2 After completing the checkout, run the burner through at least one complete cycle to verify correct operation.

## 9 TROUBLESHOOTING



### WARNING

Electrical shock hazard.

Can cause serious injury or death.

- Open the master switch to disconnect power before removing or installing the detector or its cover. More than one disconnect may be involved.

#### Equipment required

A multimeter with a minimum sensitivity of 1 MΩ/volt and a scale of 0 to 5 or 10 V DC scale is suggested. When the keyboard display module is included with the control, a flame signal is displayed on the module. For the replacement of the spare parts, see page 12 (11 Service).

**Replacement parts:** The web app PartDetective for selecting spare parts is available at [www.adlatus.org](http://www.adlatus.org).

#### UV sensing tube test

See page 10 (8.1 UV sensing tube test).

## Unsatisfactory flame signal

If a satisfactory flame signal cannot be obtained while adjusting the sighting position of the detector, follow these procedures. If you encounter other problems in the system, refer to the Troubleshooting section in the instructions for the appropriate flame safeguard control.

→ For instructions to replace the viewing window, sensing tube, see page 12 (11 Service).

### 9.1 Preliminary inspection

- 1 Check for proper line voltage. Make sure the connections are correct and power supply is of the correct voltage and frequency.
- 2 Check detector wiring for defects:
  - Incorrect connections
  - Wrong type or size of wire
  - Deteriorated wire
  - Open circuits
  - Short circuits
  - Leakage paths caused by moisture, soot or dirt
- 3 With the burner running, check the temperature at the detector. If it exceeds 80°C (175°F):
  - Add additional insulation between the wall of the combustion chamber and the detector.
  - Add a shield or screen to reflect radiated heat away from the detector or
  - add cooling, see page 6 (6.15 Sight pipe ventilation).

### 9.2 Removing detector from sight pipe

- See also page 6 (6.17 Mount the detector).
- 1 Loosen the three screws holding the mounting flange
  - 2 Rotate the detector slightly so the screws clear the slots in the back section of the flange.
- The detector is free when the collar is unscrewed. Do not drop it.
- 3 Separate the flange.
  - 4 Pull off the back section (with the UV sensor).

### 9.3 Procedure for zero meter reading

- 1 Replace the plug-in amplifier. Then recheck the flame signal.
  - 2 Replace the ultraviolet sensing tube (see page 12 (11 Service)). Then recheck the flame signal.
  - 3 If you still cannot obtain a meter reading, replace the detector.
- At the completion of troubleshooting, be sure to perform the procedures page 10 (8 Adjustments and checkout).

## 10 SPARE PARTS

The web app PartDetective for selecting spare parts is available at [www.adlatus.org](http://www.adlatus.org).

For the replacement of spare parts, see page 12 (11 Service).

## 11 SERVICE



### WARNING

Electrical shock hazard!

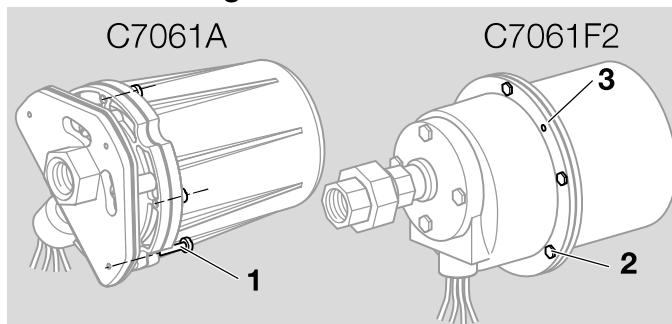
Can cause serious injury or death.

- Disconnect power before removing or installing the detector or its cover. More than one disconnect can be involved.

### 11.1 Maintenance

- 1 Clean the viewing window (or focusing lens) when necessary. Remove the detector, see Troubleshooting, page 12 (11.1.1 Removing detector cover), and use a clean cloth over the eraser end of a pencil.
- Do not remove the window (or lens) to clean it.
- If it is broken or damaged or if it is coated with a substance that cannot be removed, replace it, see page 13 (11.1.3 Replacing quartz viewing window (or focusing lens)).
- 2 Keep the flame detection system adjusted for the smoothest, most reliable operation as recommended by the burner manufacturer.
  - 3 Replace the sensing tube, coil, or viewing window only when necessary to obtain proper operation.

#### 11.1.1 Removing detector cover

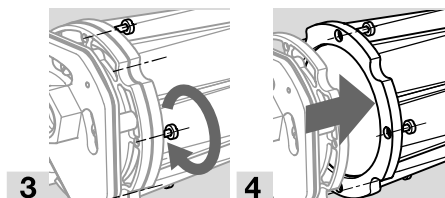


#### Legend

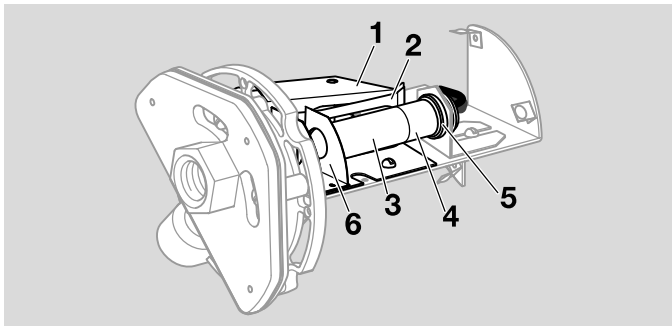
- 1 4 x Captive cover screws
- 2 6 x Hex-head cover bolt
- 3 Hole keyed to pin on body flange

#### Removing cover

- 1 Open the master switch.
- 2 Unscrew the screws and carefully slide off the cover. (Example below.)



### 11.1.2 Replacing UV sensing tube



#### Legend

- 1 Shutter assembly
- 2 Flexible shutter
- 3 Sensing tube
- 4 Tube base
- 5 Tube socket
- 6 Alignment guide

#### Replacing

- 1 Open the master switch and remove the detector cover, see page 12 (11.1.1 Removing detector cover).
- 2 Locate the UV sensing tube.

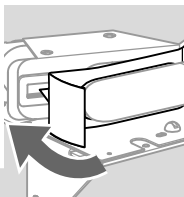


#### CAUTION

Damage!

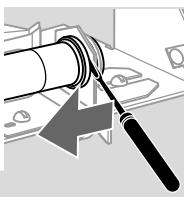
Be very careful not to kink or otherwise damage the flexible shutter.

- Gently bend the alignment guide just enough to free the tip of the tube.



3

- 4 Insert a screwdriver between the tube base and the socket, and gently pry the tube out of its socket.



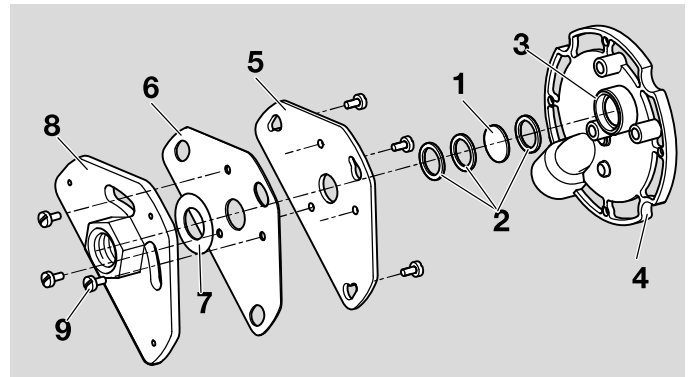
5

- 6 Pull the tube completely out of its socket.
- 7 Insert the new tube through the openings in the shutter assembly.
- 8 Align the three pins on the new tube with the holes in the socket.
- 9 Carefully push the new tube firmly into the socket until the alignment guide snaps into place around the tip of the tube.
- 10 Make sure the new UV sensing tube is seated securely.
- 11 Ensure the dome of the tube is completely through the hole of the metal spring that keeps the tube aligned with the view opening of the enclosure.
- 12 Replace the detector cover.

### 11.1.3 Replacing quartz viewing window (or focusing lens)

#### C7061A

- Use quartz window or lens. Ordinary glass absorbs or filters out ultraviolet radiation.



#### Legend

- 1 Quartz viewing window, 20 psi (138 kPa) or 50 psi (345 kPa) or quartz focusing lens, 20 psi (138 kPa)
- 2 3 x Ribber mounting gaskets
- 3 Window aperture
- 4 Faceplate
- 5 Back section of mounting flange
- 6 Fiber-neoprene gasket
- 7 Red rubber washer
- 8 Flange
- 9 3 x Mounting screws

#### Replacing

- Viewing window can be replaced with either side toward.
- Only one gasket on each side of the focusing lense.

  - 1 Open the master switch, remove the detector from the sight pipe and remove the detector cover, see page 12 (11.1.1 Removing detector cover).
  - 2 Reinstall the sensing tube, see page 13 (11.1.2 Replacing UV sensing tube).
  - 3 Loosen the 3 screws holding the back section of the mounting flange to the faceplate.
  - 4 Carefully remove and keep together the 3 screws, the gray fiber-neoprene gasket, the red rubber washer, and the back section of the mounting flange.

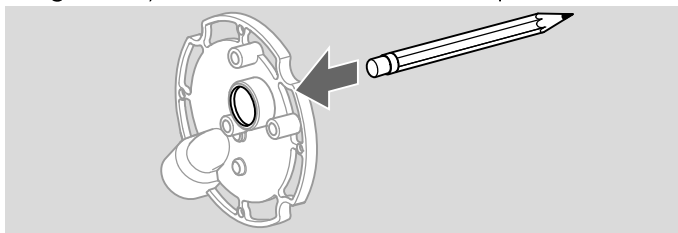
  - Move the shutter assembly out of the way to push out the viewing window.



#### CAUTION

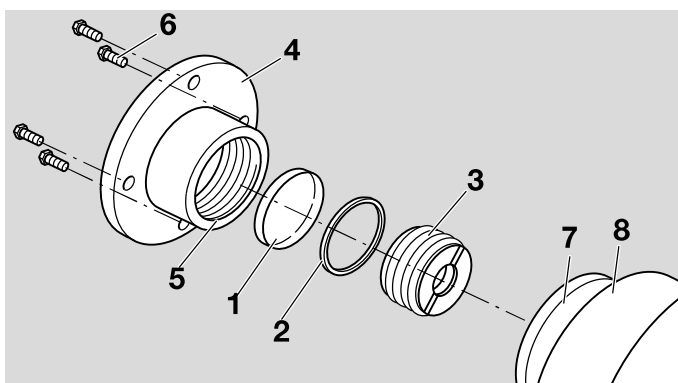
Be very careful not to kink or otherwise damage the flexible shutter.

- Using the eraser end of a pencil, push out the viewing window (with its rubber mounting gaskets) from the inside of the faceplate.



- Insert one rubber mounting gasket into the window aperture in the faceplate.
  - Insert the new quartz viewing window (or focusing lens) into the window aperture with either side toward the flame.
  - Insert two rubber mounting gaskets (only one gasket when replacing a focusing lens) into the aperture.
  - Put the back section of the mounting flange, red rubber washer, and fiber-neoprene gasket in place on the faceplate and securely tighten the three mounting screws.
- Make sure the red rubber washer between the gray fiber-neoprene gasket and the back section of the mounting flange does not protrude over the window aperture or otherwise obscure the detector line-of-sight.
- Clean both sides of the viewing window (or focusing lens) using a clean cloth placed over the eraser end of a pencil.
  - Reinstall the sensing tube, see page 13 (11.1.2 Replacing UV sensing tube).
  - Replace the detector cover and reinstall the detector on the sight pipe.

#### C7061F2



#### Legend

- Quartz viewing window, 100 psi (690 kPa)
- Retaining ring seal (rubber O-Ring)
- Retaining ring
- Seal-off flange
- Window aperture
- 4 x Hex-head bolt
- Faceplate
- Body

#### Replacing

- Open the master switch, remove the detector from the sight pipe and remove the detector cover, see page 12 (11.1.1 Removing detector cover).
- Unscrew the four hex-head bolts holding the seal-off flange to the faceplate and remove the flange.
- Put the bolts in a safe place.
- Unscrew the retaining ring (with its rubber O-ring seal) from the seal-off flange.
- Tip the flange and let the viewing window fall into your hand.
- Insert either side of the new quartz viewing window into the window aperture.
- Screw the retaining ring (with O-ring seal) into the seal-off flange and tighten securely.
- Clean the viewing window on both sides with a clean cloth placed over the eraser end of a pencil.
- Put the seal-off flange back into place on the faceplate and securely tighten the four hex-head bolts.
- Reinstall the detector on the sight pipe.

## 12 ACCESSORIES

#### C7061A

124204 quartz focusing lens, rated for 20 psi (138 kPa); increases the detector-sensed ultraviolet radiation.

204341 mirror assembly.

ISO-UNIT sealing union 1 to 1" NPT internal threads with quartz viewing window and 1/2" NPT purge port. Not sold separately, is always included with C7061A

M-701-2 swivel mount 1 to 2" NPT internal threads.

R-518-CL12-HTG quick disconnect pipe coupler, with 1" NPT internal threads. Needs R-518-PT12.

R-518-CL12-PG quick disconnect pipe coupler with purge port, with 1" NPT internal threads and 1/2" NPT. Needs R-518-PT12.

R-518-PT12 ULTEM insulating locking coupler adapter, with 1" NPT external threads. Needs R-518-CL12-HTG or R-518-CL12-PG.

## 13 APPROVALS

### 13.1 Swiss Re (formerly Industrial Risk Insurers) acceptable

### 13.2 C7061F2: For use in hazardous locations

Certificate number E34649, Report reference E34649-2000-11-03, Date 2022-01-11

Standards for safety:

UL 1203 - explosion-proof, and dust ignition-proof electrical equipment for use in hazardous (classified) locations,

CAN CSA C22.2 No. 30- M1986, explosion- proof enclosures for use in Class I hazardous locations, and

CAN CSA C22.2 No. 25-1966, enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations.

### 13.3 C7061A: UL-listed



Certificate number MP268, Report reference MP268-19920427, Issue date 2020-09-17

Standard(s) for safety:

UL 372 Primary safety controls for gas- and oil-fired appliances, and

CAN/CSA-C22.2 No. 199 Combustion safety controls and solid state igniters for gas- and oil-burning equipment

### 13.4 C7061A: Factory Mutual Global



Factory Mutual approved: 14740.01

### 13.5 SIL 3 capable



The C7061A and C7061F2 are SIL 3 capable approved in a properly designed safety instrumented system, when used with:

- 7800 SERIES with R7861 self-check flame amplifier, see [product certification RM/EC7800 Burner Controller Series 1000/2000](#).
- SLATE with R8001S1051 self-check flame amplifier, see [product certification SLATE Burner Control System](#).

### 13.6 CE



CE approved in combination with :

- 7800 SERIES with R7861 self-check flame amplifier.
- SLATE with R8001S1051 self-check flame amplifier.

## 14 DISPOSAL

Devices with electronic components:

### WEEE Directive 2012/19/EU – Waste Electrical and Electronic Equipment Directive



At the end of the product life (number of operating cycles reached), dispose of the packaging and product in a corresponding recycling centre. Do not dispose of the unit with the usual domestic refuse.

Do not burn the product.

On request, old units may be returned carriage paid to the manufacturer in accordance with the relevant waste legislation requirements.