NET SAFETY
MONITORING INC.

Unitized Ultraviolet

High Sensitivity Flame Detector

User Manual

Model:

UVU-120-A-H2 or AR-H2

ISO 9001:2000

QMI REGISTERED

Part Number: MAN-0067-00 Rev 3
May 2006

IMPORTANT INFORMATION

This manual is for informational purposes only. Although every effort has been made to ensure the correctness of the information, technical inaccuracies may occur and periodic changes may be made without notice. Net Safety Monitoring Inc., assumes no responsibility for any errors contained within this manual.

If the products or procedures are used for purposes other than as described in the manual, without receiving prior confirmation of validity or suitability, Net Safety Monitoring Inc., does not guarantee the results and assumes no obligation or liability.

Net Safety Monitoring Inc., products are carefully designed and manufactured from high quality components and can be expected to provide many years of trouble free service. Each product is thoroughly tested, inspected and calibrated prior to shipment. Failures can occur which are beyond the control of the manufacturer. Failures can be minimized by adhering to the operating and maintenance instructions herein. Where the absolute greatest of reliability is required, redundancy should be designed into the system.

Warranty

Net Safety Monitoring Inc., warrants its sensors against defective parts and workmanship for a period of 24 months from date of purchase; other electronic assemblies for 36 months from date of purchase.

No other warranties or liability, expressed or implied, will be honoured by Net Safety Monitoring Inc.

Contact Net Safety Monitoring Inc., or an authorized representative for details.

We welcome your input at Net Safety Monitoring. If you have any comments please contact us at the phone/address below or visit our web site and complete our on-line customer survey: www.net-safety.com.

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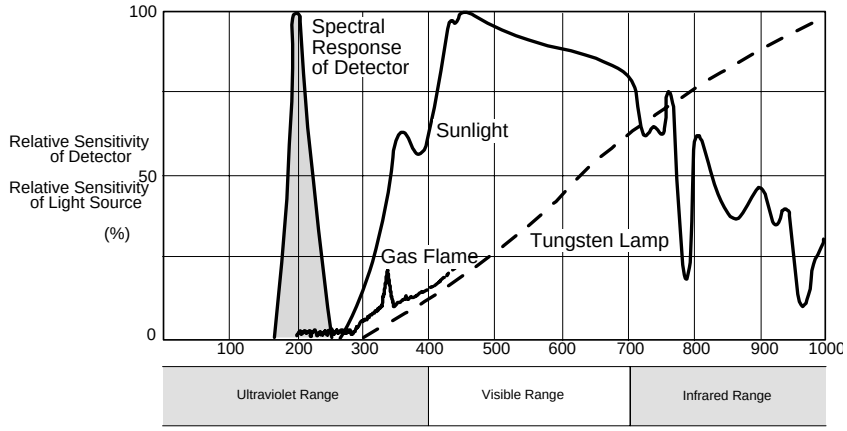
INTRODUCTION

The UVU-120-A/AR-H2 is a smart, stand-alone, high sensitivity ultra-violet flame detector. The detector is especially designed to respond to UV radiation emitted by hydrogen (H2) fires as well as various hydrocarbon based fires. The UVU-120-A/AR-H2-H2 is ideal for a variety of applications and has been proven reliable in even the most extreme environments.

Spectral Sensitivity Range

The UVU-120-A/AR-H2-H2 fire detector responds to UV radiation wavelengths of 185 to 260 nanometres (1850 to 2600 angstroms). Note that UV radiation reaching the earth from the sun does not extend into the sensitivity range of the detector, nor does radiation from normal artificial lighting, such as fluorescent, mercury vapour and incandescent lamps.



Locate Detector

When positioning fire detectors, consider such factors as distance to the fire, type of fuel and temperature as well as any environmental factors which may influence the detector's response to radiation.

Typical applications

- automotive-manufacturing and paint spray booths
- aircraft hangars (commercial and military)
- offshore platforms, refineries, pipelines and production ships
- printing industry facilities
- oil, gas and petrochemical refineries/production/storage/off loading/shipping
- various production, processing and storage facilities
- munitions handling
- warehouses (flammable liquids/toxic gases) and tank farms (floating/non-floating)
- power generation pumps, generators and unmanned stations

Potential ignition sources

The UVU-120-A/AR-H2 was specifically designed to detect Hydrogen fires but also detects metal based fires, sulphur fires and high-pressure Natural Gas fires as well as the following hydrocarbon based fires:

- alcohol
- gasoline
- paint
- aviation fuel
- acetylene
- natural gas
- solvents
- heptane/naptha
- diesel and hydraulic fuel
- liquefied natural gas (LNG)
- liquefied petroleum gas (LPG)
- propane/methane/butane

Potential inhibitors

A potential inhibitor is anything located between the detector and a potential fire source which could prevent the UVU-120-A/AR-H2 from detecting a fire or reduce its sensitivity to a fire. Possible inhibitors include but are not limited to the following:

- Solid objects such as machinery, glass or plexiglass between the detector and potential fire source
- Water, fog, rain, dirt or dust on the detector window or heavy smoke between the detector and potential fire source

Absorbing Gases

A further potential inhibitor may be the presence of UV absorbing gases or chemical vapours between the detector and source of potential fire. Such gases could impede the detector's ability to detect a UV flame source. Small concentrations of these gases may not be sufficient to obstruct the sensor but high concentrations may impede the UV sensor. Moving the detectors closer to the probable fire source and increasing the sensitivity can, in some circumstances, overcome this issue (refer to Appendix A).

Range

The practical application distance is directly related to the intensity of the ultra-violet radiation source.

Table 1: Summary of Distances

Fuel	Size	Distance
n-heptane	1’ x 1’	50 feet
methanol	1’ x 1’	40 feet
diesel	1’ x 1’	40 feet
H2	16” plume	55 feet
JP-4	1’ x 1’	50 feet
lube oil	1’ x 1’	70 feet
propane	16” plume	120 feet
paper	2’ x 2’	70 feet

Field of View (as per FM and NFPA definition)

The area in front of a flame detector, where a standardized flame can be detected and which is specified by distance and angle off the central axis, is the Field of View. The referenced flame is moved to 50% of the maximum on-axis detection distance and then moved off-axis horizontally and vertically to the limit of detection. These off-axis angle limits specify Field of View.

According to this definition the Field of View is 70 degrees vertical and 120 degrees horizontal.

Effective Field of View (up to 120 degrees)

There are numerous factors which contribute to the effective Field of View including the reflected energy from a fire. Note that a flame can be detected well beyond the specified Field of View if it is closer to the detector, if the flame becomes larger, fuel composition changes, temperature shifts or other factors lead to increased intensity of infrared energy reaching the detector.

Installation Considerations

The following should be considered when mounting flame detectors.

- Point detector toward where the flame is expected.
- Ensure an unobstructed view of the area to be monitored.
- Employ more then one detector to ensure the hazard is fully covered.
- Mount the detector a few feet (about 1 metre) below the ceiling so it can respond before being blocked by smoke accumulation at the ceiling.
- If dense smoke is likely to accumulate prior to flame (as in an electrical fire), supplement UV detector(s) with other protection such as Net Safety Monitoring’s Airborne Particle Monitor.
- The detector should be accessible for cleaning the window and reflector surfaces.
- Tilt detector downward a minimum of 10 to 20° to reduce dirt and dust accumulation which could obscure the detector’s viewing window.
- Securely mount detector so as to reduce vibration as much as possible.
- When located outside, detector sensitivity can be reduced by heavy fog, rain and/or ice.
- Consider shortening the time delay settings when smoke is expected to accumulate before or during a fire (refer to "System Sensitivity" on page 7).
- Reduce sensitivity setting if false alarms, related to surrounding activities, occur (refer to "System Sensitivity" on page 7).
- When installed near or on water (such as an off shore platform), be sure to take into account the low horizon level when tilting detector downward.
- UV radiation, other than that produced by an actual fire, is referred to as "background UV". An example of a high level of background UV could be a flare stack situated outside of a building. The UV radiation produced by this flare may be detected as fire when a door to the building is opened. Windows or other reflective surfaces may also cause unusually high levels of UV radiation to enter the building from the flare. In a situation like this, the fire detection system response must be carefully checked and the sensitivity level adjusted high enough so that this "background UV" will not cause false alarms.

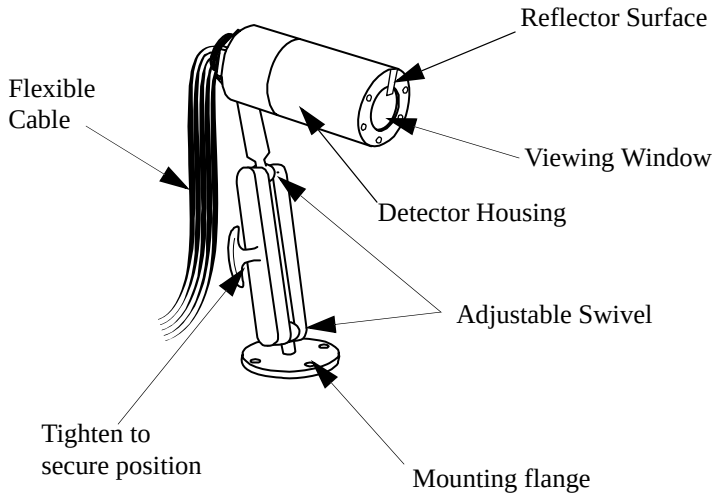
- UV fire detectors respond to radiation other than ultraviolet. X-rays can activate the detector. Since X-rays are often used in industrial inspection it may be necessary to disable the system when inspections are conducted nearby.

UNPACK

Carefully remove all components from the packaging. Check components against the enclosed packing list and inspect all components for obvious damage such as broken or loose parts.

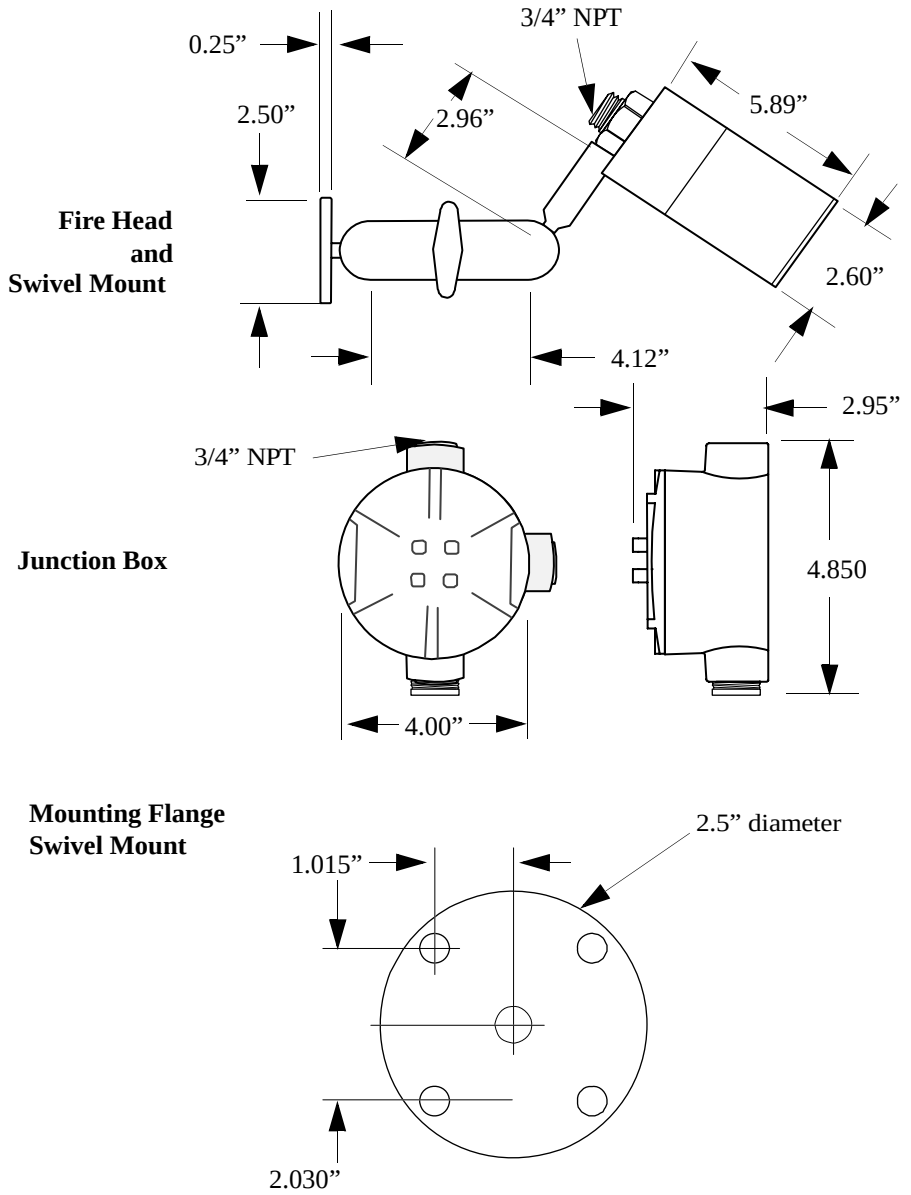
If you find any components missing or damaged, notify the representative or Net Safety Monitoring immediately.

Figure 1: Detector Housing and Swivel Mount



Note: Units are factory sealed.

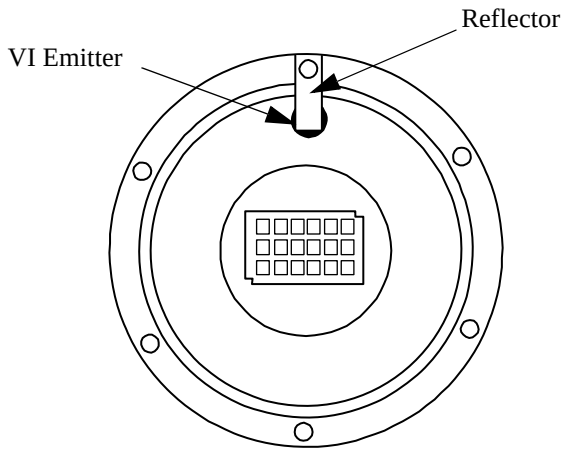
Figure 2: Dimensional Drawing



Positioning

Ensure the external silver Visual Integrity (VI) reflector is placed directly over the VI Emitter (refer to Figure 7, "Detector Viewing Window", on page 8 for VI source location). Also ensure the detector is mounted with the VI reflector in the top position.

Figure 3: Position of VI Reflector/Emitter



FIELD INSTALLATION

WARNING: Compliance with regulations is the responsibility of the installer. Wiring must comply with applicable regulations relating to the installation of electrical equipment in a hazardous area.

WIRING

The use of shielded cable run through conduit is highly recommended for power input and signal wires to protect against interference caused by extraneous electrical 'noise'. Recommended detector cable is four conductor (or greater), shielded 18 AWG rated 300 V for distances up to 150 feet. When wiring cable is installed in conduit, the conduit must not be used for wiring to other electrical equipment. Detectors can be located over 150 feet and up to 2000 feet if 16 AWG shielded conductor is used. The maximum distance between the sensor and controller is limited by the resistance of the connecting wiring, which is a function of the gauge of the wire being used. Refer to Appendix C, " Resistance Table (Ohms)".

Grounding

Proper shielding and grounding procedures, for the specific area of installation, should always be followed.

SEALING

Water-proof and explosion-proof conduit seals are recommended to prevent the accumulation of moisture within the junction box. Seals should be located as close to the device as possible and not more than 18 inches (46 cm) away. Explosion-proof installations may require an additional seal where conduit enters a non-hazardous area. When pouring a seal, use a fibre dam to ensure proper formation of the seal. Seals should never be poured at temperatures below freezing.

The jacket and shielding of the cable should be stripped back to permit the seal to form around the individual wires. This will prevent air, gas and water leakage through the inside of the shield and into the enclosure.

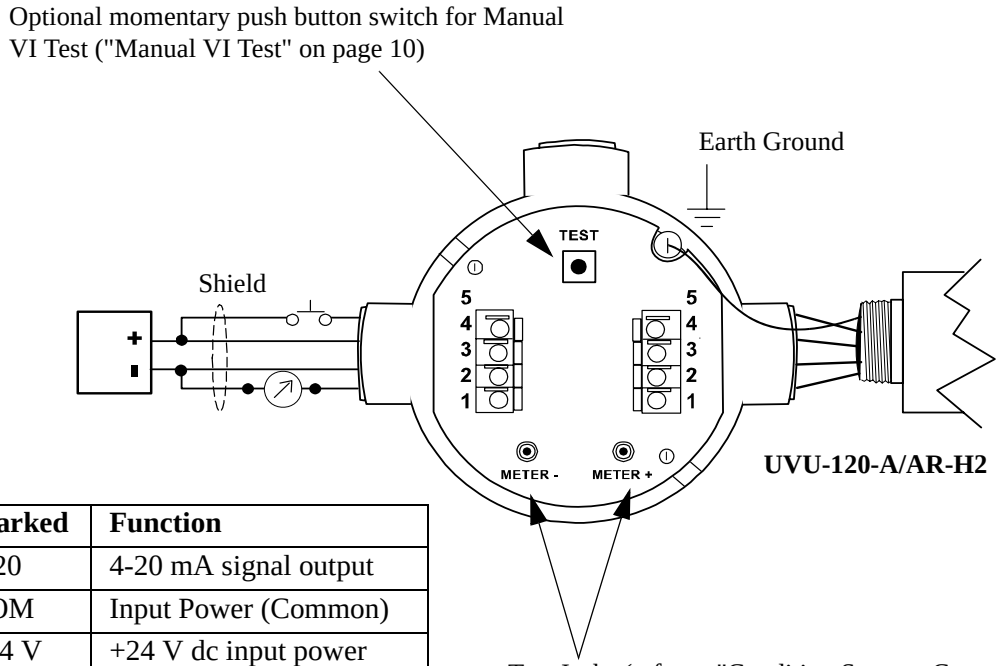
It is recommended that explosion-proof drains and conduit breathers be used. Changes in temperature and barometric pressure can cause 'breathing' which allows moist air to enter conduit. Joints are seldom enough to prevent 'breathing'.

CONNECTING

There are two configurations of the UVU-120-A/AR-H2 available: Analog (A) and Analog/Relay (A/R). Review the following figures for wiring and other settings specific to the A or A/R board configurations.

WARNING: ⚠ Prior to wiring, ensure power is disconnected. Improper wiring can cause damage to the detector.

Figure 4: Junction Box Connection — **ANALOG**

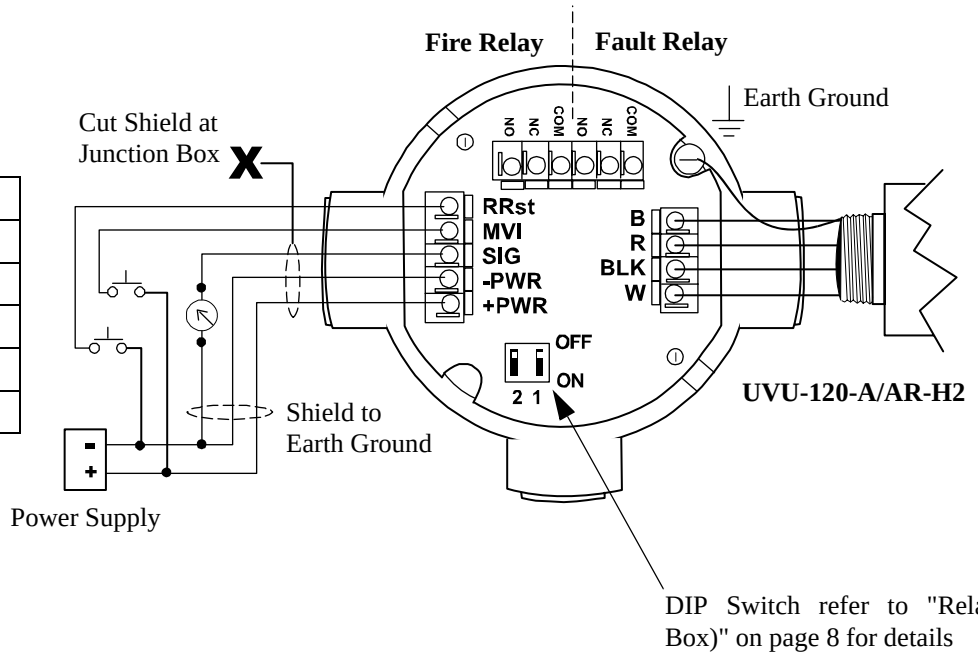


Terminal	Detector Wire	Function
1	Red	Signal Output
2	Black	System Common (-)
3	White	11.0-32 V dc (+)
4	Blue	Manual VI (optional)

Terminal	Marked	Function
1	4-20	4-20 mA signal output
2	COM	Input Power (Common)
3	+24 V	+24 V dc input power
4	MVI	Optional Manual VI (if not used, leave disconnected

Figure 5: Junction Box Connection — **ANALOG/RELAY**

Fire Relay Status				
Condition	**Normally Energized**		**Normally De-energized**	
	NO Contact	**NC Contact**	**NO Contact**	**NC Contact**
No Fire	C	O	O	C
FIre	O	C	C	O
Note: N=Normally / C=Closed / O=Open				



SIGNAL OUTPUT	
R Rst	Optional Remote Reset
MVI	Manual VI (optional)
SIG	4-20 mA signal output
-PWR	-24 V dc input power
+PWR	+24 V dc input power

SIGNAL INPUT		
Blue	B	Manual VI (optional)
Red	R	4-20 mA Signal Output
Black	BLK	System Common (-)
White	W	11.0-32 V dc (+)
Green		Earth Ground

Note: If the 4-20 mA signal is not used, connect a jumper between the terminals for 4-20 mA signal output (SIG) and -24 V dc input power (-PWR) on the Signal Output terminal block.

DETECTOR SETUP

SYSTEM SENSITIVITY

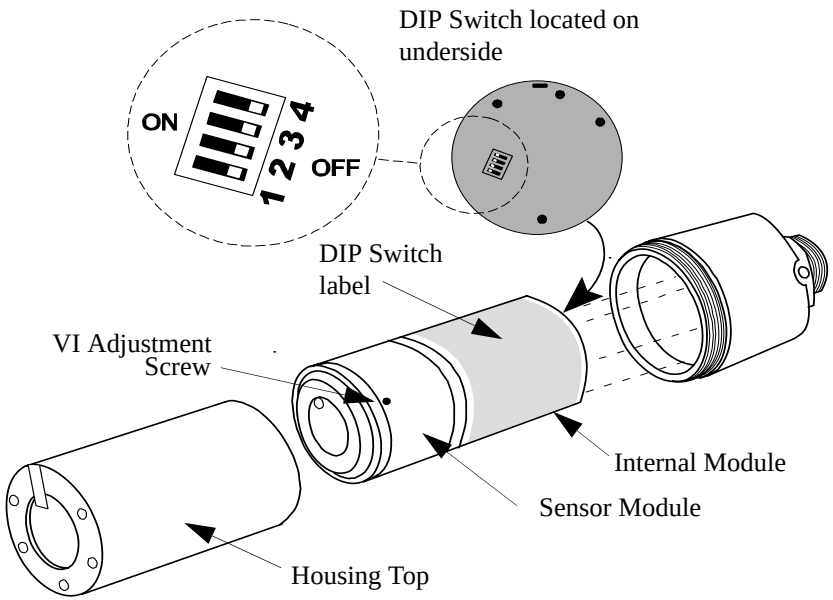
The UVU-120-A/AR-H2 fire detector can be adjusted to various sensitivity levels by setting the detector to respond at a predetermined detector count rate. The count rate is dependent upon the intensity of the ultraviolet radiation reaching the detector, which in turn depends on the type of fuel, temperature, flame size and distance of flame from the detector.

DIP Switch Access (Detector Head)

DIP Switches are used to set the detector's sensitivity and time delay settings. The DIP Switches are located on the Internal module of the UVU-120-A/AR-H2.

1. Unscrew the Housing Top counter clockwise.
2. Slide a DIP Switch to the ON or OFF position. Refer to Figure 6, "DIP Switch Location", on page 7 and Table 2, "Sensitivity and Time Delay Settings (Sensor Module)", on page 7 for DIP Switch positioning instructions.

Figure 6: DIP Switch Location



WARNING: Do not touch internal components other than the DIP Switches (see Appendix B, " Electrostatic Sensitive Device (ESD)").

Sensitivity Setting

The adjustable Sensitivity setting is used to optimize the UVU-120-A/AR-H2 for various installations. In order to effectively detect Hydrogen fires, the UVU-120-A/AR-H2 is set to the highest sensitivity.

Time Delay Setting

Defining the Time Delay allows the Fire alarm signal to delay (for the specified time), before indicating an alarm. This feature can be beneficial depending upon the conditions/activities surrounding the detector.

Table 2: Sensitivity and Time Delay Settings (Sensor Module)

Sensitivity			Time Delay		
	Position 1	**Position 2**		**Position 3**	**Position 4**
8 counts CPS	ON	ON	3 seconds	ON	ON
16 counts CPS	ON	OFF	4 seconds	ON	OFF
24 counts CPS	OFF	ON	5 seconds	OFF	ON
32 counts CPS	OFF	OFF	7 seconds	OFF	OFF

Note: Default settings are Sensitivity set at 8 Counts Per Second (CPS) and a 5 second time delay.

Closing the Housing

When closing the Housing Cover, be sure that the top and bottom are screwed together tightly.

TIP: It is extremely important that the VI reflector is centred over the VI emitter (refer to "Positioning" on page 4 for details).

RELAY SETTINGS (Junction Box)

Coil and Latch Status

The Junction Box (Relay only) has a two-position DIP Switch to define the Coil and Latch Status for the Fire Relay. Refer to Figure 5, "Junction Box Connection — Analog/Relay", on page 6 for DIP Switch location.

Note: The default Fire Relay is normally De-energized/Non-Latching. The Fault Relay is factory set to normally Energized/Non-latching and cannot be modified.

Table 3: Relay Setting (Junction Box)

Coil and Latch Status		
Fire Relay	**Position 1**	**Position 2**
De-energized / Non-latching	ON	ON
Energized / Non-latching	ON	OFF
De-energized / Latching	OFF	ON
Energized / Latching	OFF	OFF

Remote Reset

The UVU-120-A/AR-H2 can be connected to allow for the Remote Reset of a latched alarm. The Latch Status must be set to Latching (refer to "Relay Settings (Junction Box)" on page 8). To reset the latched alarm the terminals marked R.Rst and -PWR on the Junction Box (Relay only) must be momentarily connected.

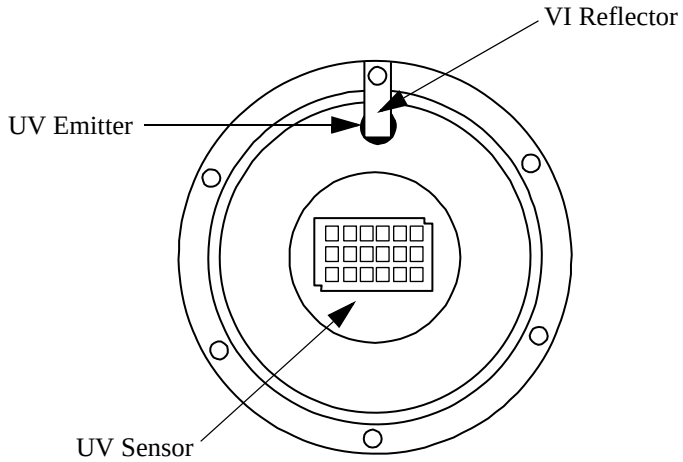
Final Setup

- Ensure all internal settings complete
- Securely close Housing
- Ensure reflector positioned over emitter
- Clean detector lens
- Mount and align detector

DETECTOR FUNCTIONALITY

DETECTOR WINDOW

Figure 7: Detector Viewing Window



START UP PROCEDURE

Once powered up, the UVU-120-A/AR-H2 will begin Normal operation (current output 4 mA).

System Check

Once powered up the system should be checked. Refer to the section entitled "Manual Check Procedure " on page 9 for instructions.

WARNING: When testing the system, ensure all external equipment is disabled to prevent unwanted activation during testing and enabled once testing complete.

MONITOR

The Detector's status can be determined by monitoring the current output.

Condition Status—Current Output

The Current Loop status is measured to determine detector condition.

Test Jacks are available on the Analog board in the Junction Box. The area must be de-classified prior to opening the Junction Box.

Also, the detector can be monitored using the 4-20 mA Signal Output.

Refer to the section entitled "Connecting" on page 5 for wiring instructions.

Table 4: Condition Status—Current Output

Status	Current O/P
Internal Power Fault or system power out of range	1 mA
Automatic or manual VI Test Failure	2 mA
Normal Operation	4 mA
Background UV source	6 mA
Manual VI Testing Adequate	10 mA
Manual VI Testing Good	11 mA
Manual VI Testing Excellent	12 mA
Early Warning - Intermittent UV detected	16 mA
Fire confirmed	20 mA

DETECTOR MAINTENANCE

The UVU-120-A/AR-H2 does not require calibration. Although an automatic testing of the optics is done every 30 seconds, the system should be periodically checked. To maintain maximum sensitivity, the viewing window and reflector should be cleaned on a routine basis depending on the type and amount of contaminants in the area.

TESTING

WARNING: When testing the system, ensure all external equipment is disabled to prevent unwanted activation.

Manual Check Procedure

The whole system should be checked periodically with a Net Safety UV test lamp to make sure that the detectors are not obstructed, that the area covered by the detector has not changed and that there is no fault in the VI circuit.

1. Direct the UV test lamp into the detector viewing window. The current output will change with the amount of radiation being detected (refer to "Condition Status—Current Output" on page 9).
2. Turn off the UV test lamp and repeat steps 1 & 2 for all detectors in the system.
3. After all detectors have been checked, return the system to the normal operating mode and enable any external equipment.

Automatic Visual Integrity (VI) Test

The detector performs an automatic Visual Integrity (VI) test every 30 seconds during normal operation. If the automatic VI Test fails, three consecutive times, current output drops to 2 mA indicating a dirty window, dirty reflector or failed sensor. The detector will remain in this condition until the problem is corrected.

The detector window should be promptly cleaned (refer to "Cleaning Window and Reflector" on page 10) or the obstruction removed. Also refer to Table 5, “Possible Problems and Solutions,” on page 11.

If the obstruction was only temporary, the detector will return to normal operation with the next VI test.

VI Adjustment Screw

The VI adjustment screw (see Figure 6) controls the amount of light released during VI testing. To increase the amount of light, open the orifice by turning the screw counter-clockwise.

Manual VI Test

The test procedure can assist with maintenance planning. The Manual VI test will return one of three current output responses depending upon the cleanliness of the detector window and reflector.

- Adequate (10 mA) clean optical surfaces
- Good (11 mA) no action required - surface moderately clean
- Excellent (12 mA) no action required - surface perfectly clean

The detector has a manual VI input. The manual VI test is performed by:

- connecting Manual VI to system power by a direct connection OR
- connecting a momentary contact push button between system power and the manual VI input OR
- using the Manual VI Test Button, located in the Analog Junction Box (area MUST be de-classified prior to opening the Junction Box).

Note: The manual VI feature is optional on the UVU-120-A/AR-H2-A. If not used, leave the manual VI input unconnected or tied to system common.

WARNING: The detector will stay in the manual VI test mode as long as the manual VI input is held at the system power voltage. During the manual VI test all other detector functions are disabled. It is therefore imperative that after this test is performed the manual VI test input be released.

Test Procedure

1. Connect the manual VI test input terminal to system power by either a direct connection or manual push button or use the Manual VI Test Push Button (once area de-classified).
2. Hold the manual VI input at this voltage for at least two seconds.
3. Two seconds after the test has commenced, the detector will output a current that corresponds to the quality of the VI reading obtained.
4. Release the manual VI test input. The detector will immediately return to normal operation if a VI fault is not present.
5. If a VI fault is present, the current output will indicate 2 mA.

Cleaning Window and Reflector

When cleaning the window and reflector use the cloth and the cleaning solution provided with the detector. Use only the provided cleaning solution as some cleaners can leave a residue.

To minimize dirt accumulation around the VI surface, a product such as Net Safety's Air Shield should be purchased to minimize particulate build up on the viewing window.

WARNING: Always bypass Alarm Output when performing maintenance tasks and ensure all external equipment has been disconnected/ deactivated.

O-ring

The rubber o-ring on the detector housing is used to ensure the detector is watertight. The housing should be opened periodically and the o-ring inspected for breaks, cracks or dryness. To test the o-ring, remove it from the detector housing and stretch it slightly. If cracks are visible, the o-ring should be replaced. If it feels dry to the touch, a thin coating of lubricant should be applied (such as polyalphaolefin grease). When re-installing the o-ring, be sure that it is properly seated in the groove on the housing.

The o-ring must be properly installed and in good condition to prevent water from entering the detector and causing failure. The life expectancy of rubber o-rings varies depending on the type and amount of contaminants present in the area. The person who maintains the system must rely on experience and common sense to determine how frequently the rings should be inspected. A coating of lubricant should also be applied to the enclosure threads before reassembling the detector to help prevent moisture from entering.

TROUBLESHOOT

The occurrence of a false alarm may be due to various factors. In order to determine the source of a false alarm, keep accurate records of alarms including time, date, weather conditions, activities in area, etc.

Consult the following table for possible solutions to false alarm conditions.

Table 5: Possible Problems and Solutions

False Alarm Condition Current O/P	Possible Problem	Possible Solution
0 mA	Shorted signal Output Loss of Power Loose Wire(s)	Check wiring Check fuses (3 AMP fuse on bottom of internal electronics module) (any in-line power fuse) Check power source at unit
1 mA	Internal power fault System power out of range	Check power supply (should be between 11.0-32 V dc)
2 mA	VI (visual integrity) fault	Clean window (use Net Safety Monitoring Lens cleaner only) Check for obstruction(s) within Field of View Check reflector position and alignment Check UV emitter If not using 4-20 output ensure jumper is in correct position (Figure 5, "Junction Box Connection — Analog/Relay", on page 6)
6 mA	Background UV source	Confirm external UV source by covering detector window so it is blind to all radiation. - If signal goes away, background UV is present. Field of View should be cleared of UV sources/activities (i.e., cracked lenses on sodium/mercury vapour bulbs, welding, grinding, flare stacks, etc.); realign detector coverage area; redefine Time Delay; reset Sensitivity setting. - If signal persists, electrical wiring or detector electronics may be at fault
10 mA	Manual VI test (adequate)	Clean all optical surfaces (use Net Safety Monitoring Lens cleaner only)
11 mA	Manual VI test (good)	No action required, optics are moderately clean
12 mA	Manual VI test (excellent)	No action required, all optical surfaces are perfectly clean

How to Return Equipment

A Material Return Authorization number is required in order to return equipment. Please contact Net Safety Monitoring at **(403) 219-0688** before returning equipment or consult our Service Department to possibly avoid returning equipment.

If you are required to return equipment, include the following information:

1. A Material Return Authorization number (provided over the phone to you by Net Safety).
2. A detailed description of the problem. The more specific you are regarding the problem, the quicker our Service department can determine and correct the problem.
3. A company name, contact name and telephone number.
4. A Purchase Order, from your company, authorizing repairs or request for quote.
5. Ship all equipment, prepaid to:

   Net Safety Monitoring Inc
   2721 Hopewell Place NE
   Calgary, Alberta, Canada
   T1Y 7J7

6. Mark all packages: **RETURN for REPAIR**

Waybills, for shipments from outside Canada, must state:

Equipment being returned for repair
All charges to be billed to the sender

Also, please ensure a duplicate copy of the packing slip is enclosed inside the box indicating item 1-4 along with the courier and account number for returning the goods.

All Equipment must be Shipped prepaid. Collect shipments will not be accepted.

Pack items to protect them from damage and use anti-static bags or aluminium-backed cardboard as protection from electrostatic discharge.

Appendix A: Common UV Absorbing Gases

Since the UVU-120-A/AR-H2 fire detector is designed to detect fires by responding to the ultra-violet (UV) radiation they emit, it is very important to be aware of UV absorbing gases that may be present between the detector and the sources of potential fires. Small concentrations of these types of gases may not absorb enough UV radiation to cause a problem, but when higher concentrations of these gases are present the detectors may become blind as not enough ultra-violet radiation can reach them to activate an alarm. Moving detectors closer to the probable source of fire and increasing the sensitivity of the detector can help to overcome this problem in some cases.

The following is a list of common UV absorbing gases:

• Acetaldehyde	• Cumene	• Hydrogen Sulfide
• Acetone	• Cyclopentadiene	• Styrene
• Acrylonitrile	• O-Dichlorobenzene	• Tetrachloroethylene
• Ethyl Acrylate	• P-Dichlorobenzene	• Toluene
• Methyl Acrylate	• Methyl Methacrylate	• Trichloroethylene
• Ethanol	• Alpha-Methylstyrene	• Vinyl Toluene
• Ammonia	• Naphthalene	• Xylene
• Aniline	• Nitroethane	
• Benzene	• Nitrobenzene	
• 1, 3 Butadiene	• Nitromethane	
• 2-Butanone	• 1-Nitropropane	
• Butylamine	• 2-Nitropropane	
• Chlorobenzene	• 2-Pentanone	
• 1-Chloro-1-Nitropropane	• Phenol	
	• Phenyl Clycide Ether	
• Chloroprene	• Pyridine	

Appendix B:
ELECTROSTATIC SENSITIVE DEVICE (ESD)

Electrostatic discharge (ESD) is the transfer, between bodies, of an electrostatic charge caused by direct contact or induced by an electrostatic field.

The most common cause of ESD is physical contact. Touching an object can cause a discharge of electrostatic energy—ESD! If the charge is sufficient and occurs near electronic components, it can damage or destroy those components.

In some cases, damage is instantaneous and an immediate malfunction occurs. However, symptoms are not always immediate—performance may be marginal or seemingly normal for an indefinite period of time, followed by a sudden failure.

To eliminate potential ESD damage, review the following guidelines:

- Handle boards by metal shields—taking care not to touch electronic components
- Wear grounded wrist or foot straps, or ESD shoes or heel grounders to dissipate unwanted static energy
- Prior to handling boards, dispel any charge in your body or equipment
- Ensure components are transported and stored in static safe packaging
- When returning boards, carefully package in the original carton and static protective wrapping
- Ensure ALL personnel are educated and trained in ESD Control Procedures

In general, exercise accepted and proven precautions normally observed when handling electrostatic sensitive devices.

A warning label is placed on the packaging, identifying product using electrostatic sensitive semiconductor devices.

Appendix C: RESISTANCE TABLE (OHMS)

Distance (Feet)	AWG #20	AWG #18	AWG #16	AWG #14	AWG #12	AWG #10	AWG #8
100	1.02	0.64	0.40	0.25	0.16	0.10	0.06
200	2.03	1.28	0.80	0.51	0.32	0.20	0.13
300	3.05	1.92	1.20	0.76	0.48	0.30	0.19
400	4.06	2.55	1.61	1.01	0.64	0.40	0.25
500	5.08	3.20	2.01	1.26	0.79	0.50	0.31
600	6.09	3.83	2.41	1.52	0.95	0.60	0.38
700	7.11	4.47	2.81	1.77	1.11	0.70	0.44
800	8.12	5.11	3.21	2.02	1.27	0.80	0.50
900	9.14	5.75	3.61	2.27	1.43	0.90	0.57
1000	10.20	6.39	4.02	2.53	1.59	1.09	0.63
1250	12.70	7.99	5.03	3.16	1.99	1.25	0.79
1500	15.20	9.58	6.02	3.79	2.38	1.50	0.94
1750	17.80	11.20	7.03	4.42	2.78	1.75	1.10
2000	20.30	12.80	8.03	5.05	3.18	2.00	1.26
2250	22.80	14.40	9.03	5.68	3.57	2.25	1.41
2500	25.40	16.00	10.00	6.31	3.97	2.50	1.57
3000	30.50	19.20	12.00	7.58	4.76	3.00	1.88
3500	35.50	22.40	14.10	8.84	5.56	3.50	2.21
4000	40.60	25.50	16.10	10.00	6.35	4.00	2.51
4500	45.70	28.70	18.10	11.40	7.15	4.50	2.82
5000	50.10	32.00	20.10	12.60	7.94	5.00	3.14
5500	55.80	35.10	22.10	13.91	8.73	5.50	3.46
6000	61.00	38.30	24.10	15.20	9.53	6.00	3.77
6500	66.00	41.50	26.10	16.40	10.30	6.50	4.08
7000	71.10	44.70	28.10	17.70	11.10	7.00	4.40
7500	76.10	47.90	30.10	19.00	12.00	7.49	4.71
8000	81.20	51.10	23.10	20.20	12.70	7.99	5.03
9000	91.40	57.50	36.10	22.70	14.30	8.99	5.65
10 000	102.00	63.90	40.20	25.30	15.90	9.99	6.28

Note: Resistance shown is one way. This figure should be doubled when determining closed loop resistance.

Appendix D: SPECIFICATION

UVU-120-A/AR-H2	UVU-120-A-H2 (Analog)	UVU-120-AR-H2 (Analog/Relay)
Operating Voltage	11.0 to 32.0 V dc	
Power Consumption (at 24 V dc)	Nominal 80 mA/1.7 W Maximum 100 mA/1.92 W	Nominal 100 mA/2.4 W Maximum 120 mA/2.9 W
Inrush Current	250 mA for 2.5 ms	380 mA for 2.5 ms
Operating Temperature	-40°C to +75°C (-40F to +167F)	
Field of View	120 degrees horizontal / 70 degrees vertical	
Spectral Range	UV radiation over the range of 185 to 260 nanometres (1850 to 2600 angstroms)	
Time Delay	DIP switch selectable 3, 4, 5, 7 seconds	
Sensitivity Settings	DIP switch selectable 8, 16, 24 or 32 counts per seconds (Highest sensitivity, 8 cps for Hydrogen detection)	
Enclosure Material	Anodized Aluminum (optional stainless steel)	
Humidity Range	0 to 100% relative humidity, non-condensing	
Weight (with swivel)	2.1 Kg (4.5 lbs)	
Certification	CSA and NRTL/C certified for hazardous locations. Class I, Division 1, Groups B, C and D. Temperature code T4. Enclosure type NEMA 4X. IEC Rating Ex d IIB+H2 T4. Factory Mutual (FM) flame detector performance certification.	
Current Output	0 to 20 mA - Into a maximum loop impedance of 800 Ohms @ 32 V dc or 150 Ohms @ 11.0 V dc. Non-isolated loop supply.	
Relay Output		Form C contacts rated 1 Amp @ 30 V dc, 0.5 Amp @ 125 V ac. Selectable energized/de-energized, latching/ non-latching Fire relay. Fault relay fixed as energized/ non-latching.

Note: Units are factory sealed.

Appendix E: RESPONSE TESTING

Detector Range (high sensitivity)	**Fuel**	**Size**	**Distance**	**Notes**
	n-heptane	1’ x 1’	50 feet	
	methanol	1’ x 1’	40 feet	
	diesel	1’ x 1’	40 feet	
	H2	16” plume	55 feet	
	JP-4	1’ x 1’	50 feet	full burn
	lube oil	1’ x 1’	70 feet	full burn
	propane	16” plume	120 feet	
	paper (crumpled newspaper 10” high)	2’ x 2’	70 feet	full burn
Typical Response Time	Response time for the UVU-120 fire detector is as little as 5 seconds, with a mean response time of 7 seconds depending on conditions such as wind, temperature and smoke.			
False Stimuli Response	**False Alarm Source**	**Immunity Distance**	**Response**	**Flame Source** 2” methanol
	radio frequency interference	2 feet	No Alarm	**AAR**
	vibration	--		
	sunlight (direct/reflected)	--		
	1500 W heater (modulated/unmodulated)	20 feet		
	250 W halogen light	10 feet		
	incandescent light	25 feet		
	fluorescent light	25 feet		
	arc welding	n/a		

Note: AAR = Accurate alarm response

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