Technical Support & Installation Manual

MODEL DCR1

FLAME DETECTORS

Sierra Safety Technology, Inc.
(775) 782-7946 ● www.SierraSafety.com

Sierra Safety Technology, Inc.
(775) 782-7946 ● www.SierraSafety.com

MODEL DCR1

Flame Detectors

APPLICABILITY & EFFECTIVITY

This manual provides instruction for the follow products:

Highlights

DCR1-AS1: N.O. Fire Relay / N.C. Fault Relay / FEP Cable
DCR1-AS3: N.O. Fire Relay / N.O. Fault Relay / FEP Cable
DCR1-AT1: N.O. Fire Relay / N.C. Fault Relay / Optical Self-Test / FEP Cable
DCR1-AT3: N.O. Fire Relay / N.O. Fault Relay / Optical Self-Test / FEP Cable
DCR1-S1: N.O. Fire Relay / N.C. Fault Relay / Cable & Tubing
DCR1-S3: N.O. Fire Relay / N.O. Fault Relay Cable & Tubing
DCR1-T1: N.O. Fire Relay / N.C. Fault Relay / Optical Self-Test / Cable & Tubing
DCR1-T3: N.O. Fire Relay / N.O. Fault Relay / Optical Self-Test / Cable & Tubing

N.O. = Normally Open Contacts N.C. = Normally Closed Contacts

This manual is effective for the above models as of September 1, 2017

Document Name: D008G1
Revision: 1.3

FM APPROVED 3260 Intertek 5007142 CE EN 50130-4:2011 IP67 EN 60529

Table of Contents

1 PRODUCT DESCRIPTION

1.1 Introduction

DCR1 flame detectors use a multiple spectrum sensor array (see ***FIGURE 7-5***) to sense temperature, ultraviolet (UV) and infrared (IR) energy. The internal microprocessor, using state-of-the-art fire algorithms, evaluates these sensor inputs with flame signature analysis. This is performed by algorithms which evaluate spectrum signatures to detect most hydrocarbon fires, as well as other fuel types (i.e. Silane, Hydrogen, Heptane, IPA and MEK). These signatures correlate the intensity values, change of intensity values, relationship of intensity values, and frequency distribution of the sensor inputs. Most common false sources (spurious energy emissions) are filtered out by these algorithms. Providing continuous and reliable flame detection, the DCR1 declares an alarm event when the conditions of a fire algorithm are met. The DCR1 series of detectors are resistant to most acids and solvents, including, but not limited to: Hydrofluoric, Sulfuric, Nitric, Phosphoric, and Hydrochloric Acids; Piranha-Etch; De-Ionized Water; Ozone; Ammonium Hydroxide; Isopropyl Alcohol; Chromium Phosphate; and, Organic Solvent Base Photo-Resist Strips.

Figure 1-1 DCR1-A Flame Detector

1.2 Configuration

Table 1-1 Model Configurations

Model	Fire Relay	Fault Relay	Optical Self-Test	FEP Cable	Cable with Tubing
DCR1-AS1	Normally Open	Normally Closed	No	Yes	No
DCR1-AS3	Normally Open	Normally Open	No	Yes	No
DCR1-AT1	Normally Open	Normally Closed	Yes	Yes	No
DCR1-AT3	Normally Open	Normally Open	Yes	Yes	No
DCR1-S1	Normally Open	Normally Closed	No	No	Yes
DCR1-S3	Normally Open	Normally Open	No	No	Yes
DCR1-T1	Normally Open	Normally Closed	Yes	No	Yes
DCR1-T3	Normally Open	Normally Open	Yes	No	Yes

1.3 Description

All DCR1 detectors specified in this manual are calibrated to respond to a 4 inch Isopropyl Alcohol (IPA) fire at 10 feet on axis within 3 seconds and have a 120° Conical Field-of-View.

All DCR1 models are factory sealed in an FR rated polypropylene housing (meets UL 94 Flammability Rating V0) with sapphire windows. Designed and tested to comply with the EN 60529 IP67 standard, the DCR1 provides protection against a wide variety of acids and solvents, thereby making it an ideal choice for use in semiconductor manufacturing tools. In addition, all models of the DCR1 are approved for installation in Class 1 Division 2 Groups A, B, C, D T4 hazardous locations, such as gas cabinets.

The DCR1-A series of detectors use a PVDF (polyvynaladene fluoride) cable gland and a factory installed FEP jacketed pigtail cable to provide for easy installation with most control panels that use Dry “form C” contacts and or other fire protection systems.

Those version of the DCR1 without the “-A” are fitted with a polypropylene 1/4 inch NPT tube fitting and include a factory installed PVC jacketed pigtail cable that is ran inside a 3/8 inch polypropylene tube, which must be sealed by using a fitting (not included) at the junction box or the plenum wall.

A FireScape™ is recorded when the DCR1 enters Fire Mode. The pre-fire spectral data is stored in the detector’s nonvolatile memory so it can be retrieved for later evaluation and analysis at the factory. Once a detector is reset by cycling power, the FireScape™ data will be overwritten the next time the detector enters Fire Mode.

1.4 Fault Diagnostics

The microprocessor in the DCR1 looks for fault conditions that could impair the detector’s ability to accurately detect a flame and declare an alarm. By continuously monitoring many of the detector’s key metrics and systems (i.e. input voltage, sensor circuits, relay circuits, internal temperature, defined calibration constants, etc.) the DCR1 can detect the occurrence of fault conditions. Also, on select models, the DCR1 has an integrated Optical System Self-Test feature to periodically check the integrity of the optical system.

2 OPERATION

2.1 General

When power is applied to a DCR1, the onboard microprocessor begins by checking both the model and relay configuration. Next, the detector is initialized and a series of self-tests are performed to ensure the detector is functioning properly. Upon successful completion Power Up Mode, the DCR1 will go into Normal Mode, which means it is ready to detect a fire.

2.2 Field-of-View

All DCR1 detectors have a 120° Field-of-View. In order to declare an alarm, a DCR1 must be able to "see" a fire. Any obstruction between the detector and the threat area will impair the detector's ability to cover the threat area effectively. An obstruction is considered as anything that is not transparent to the energy being detected.

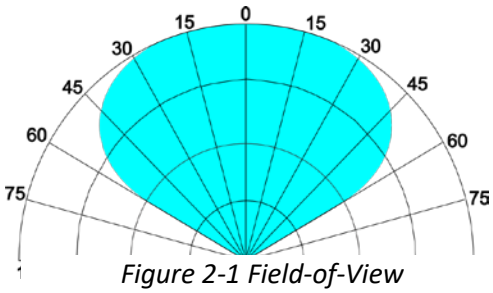

Figure 2-1 Field-of-View

Note: The DCR1's sensors are not able to detect the spectral energy produced by a fire through most types of glass or plastic. This may include glass or plastic that is visually transparent.

To provide coverage to a large area, multiple DCR1 detectors should be used with overlapping Field-of-Views (FOV). Flame detectors should never be located so that they are looking down as the products of combustion may stratify in the enclosed volume. Such stratification may severely impact the detector's ability to respond to a fire.

2.3 Range

The range of the DCR1 is a function of the degree of obstruction, presence of spurious energy sources, type of fire, position of the fire, fire size and rate of fire growth. As illustrated in ***Figure 2-1,*** the response is affected by the angle at which the fire is located from the face of the detector. For example, a 1 square foot Heptane fire on axis can be detected at 40 feet, whereas the same fire located 60° off axis will be detected at approximately 20 feet. The type of materials that constitute the threat will also affect the detector's range. Different materials and environmental conditions produce different amounts of the radiant energy, which is used by the detector to "see" the fire.

2.4 Environment

All optical flame detectors sense radiant energy at some frequency or frequencies within their Field-of-View. Any source that radiates energy at the same frequency or frequencies used by the detector to sense a fire may impact the detector's ability to "see" the fire. The DCR1 uses a UV sensor (180 – 260 nm) and a IR sensor (.715 to 3.5 microns). Care should be taken to minimize radiant energy sources within the detector's Field-of-View. Because of the variety of environments and conditions, a trained technician or qualified P.E. may need to be consulted before deciding on the location of the devices.

2.5 Relay Configuration

DCR1 detectors are factory pre-configured for either Normally Open or Normally Closed Fault Relay connections (see ***Table 8-2***), as well as cable lengths. These options are internally made and cannot be changed once sealed.

2.6 Latching Control

All DCR1 detectors are Latching, which means the detector's LEDs and relay outputs, after entering Fire Mode, will remain in the triggered state until the detector is reset by cycling power.

2.7 LED Operation, Detector Modes & FireScape™ Function

The status of a DCR1 can be determined from the two LEDs located on the face of the detector. All DCR1 devices have four standard modes: Power Up, Normal, Fault and Fire.

The LEDs will either flash at intervals or remain lit to indicate the detector's status.

2.7.1 Power Up Mode (Detector Reset)

A DCR1 detector is reset once it enters Power Up Mode. Power must be cycled to a device for it to enter Power Up Mode. Upon entering Power Up Mode, all internal flags and triggers are re-initialized and self-tests are initiated to ensure the proper operation of the detector's systems. In addition, both red LEDs (see ***FIGURE 2-2***) will begin flashing 2 sequential patterns, thereby providing a quick visual representation of the model type and Fault Relay configuration.

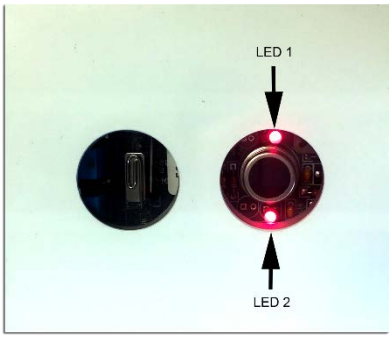

Figure 2-2 LEDs

The first flash pattern indicates the model type. LED 2 will illuminate while LED 1 flashes one or more times to identify the model (see ***TABLE 2-1***). Once complete, both LEDs will turn off.

Table 2-1 Model LED Blink Chart

Model	Optical Self-Test	Blinks
DCR1-AS1, DCR1-AS3, DCR1-S1, DCR1-S3	No	1
DCR1-AT1, DCR1-AT3, DCR1-T1, DCR1-T3	Yes	2

The second flash pattern indicates the Fault Relay configuration. Again, LED 2 will illuminate, followed by LED 1 flashing one or more times to indicate the Fault Relay configuration (see ***TABLE 2-2***). Once complete, both LEDs will turn off.

Table 2-2 Fault Relay LED Blink Chart

Model	Fire Relay	Fault Relay	Blinks
DCR1-AS1, DCR1-AT1 DCR1-S1, DCR1-T1	Normally Open	Normally Closed	1
DCR1-AS3, DCR1-AT3, DCR1-S3, DCR1-T3	Normally Open	Normally Open	3

When Power Up Mode has successfully completed, the DCR1 should go into Normal Mode to indicate that the detector is ready to detect a fire.

2.7.2 Normal Mode

In Normal Mode, the LEDs will briefly flash every 8 seconds. When a detector is in Normal Mode it is constantly monitoring the environment and ready to detect a fire. If a detector goes into a different mode, the appropriate output is triggered and the "flash every 8 seconds" LED indication is suspended until the detector returns to Normal Mode.

2.7.3 Fire Mode

When a DCR1 declares a fire, the Fire Relay triggers and both red LEDs on the face of the detector (see ***FIGURE 2-2***) will illuminate and stay lit. The detector will remain in Fire Mode until the detector is reset by cycling power.

2.7.4 Fault Mode

When powered on, the DCR1 continuously monitors several of its internal systems to ensure proper functionality is maintained. When a fault is detected, the device immediately enters Fault Mode and de-energizes the Fault Relay. The two LEDs on the face of the detector (see ***FIGURE 2-2***) provide a visual indication to help identify the type of fault being reported (see ***TROUBLESHOOTING***). Only the highest number of fault is indicated on the LEDs. If the fault condition can be corrected by the user, the next highest fault will be indicated until all faults are cured. Although Fire Mode is designed to override a fault indication, some faults, such as “Program Failure” may prevent the reporting of a fire.

2.7.5 FireScape™ Function

When a DCR1 enters Fire Mode, the pre-fire spectral data is stored in nonvolatile memory so it can be retrieved for evaluation and analysis. Because devices are sealed, only a factory technician can retrieve the data (charges may apply) and your distributor must be contacted to arrange for the device to be returned for evaluation. Once a detector has been reset by cycling power, the previous FireScape™ data will be overwritten if the detector enters Fire Mode.

2.8 Outputs

The DCR1 has industry standard relay outputs for both Fire and Fault. The 8 conductor pigtail cable (see ***FIGURE 7-3*** & ***FIGURE 7-4***) is provided to connect the detector to most control panels that use Dry “form C” contacts and or other fire protection systems.

Note: All DCR1 detectors are factory sealed. This means all internal relay and wire connections cannot be modified or changed.

2.8.1 Fire Relay

The DCR1 provides connection to the Normally Open contacts of the Fire Relay. When a fire is declared, the Fire Relay will energize. The relay will stay energized until the detector’s power is cycled. There are 2 sets of wires for each of the Fire Relay contacts to allow for the daisy-chaining of DCR1 detectors to a control panel.

2.8.2 Fault Relay

When a DCR1 is powered on, the Fault Relay is normally energized. When a fault occurs, the Fault Relay will de-energize. This means the Fault Relay reports a fault state if the detector loses power. The DCR1 is factory configured for either Normally Open or Normally Closed contacts for the Fault Relay (see ***TABLE 8-2***). One wire is provided for each of the Fault Relay contacts.

3 INSTALLATION

3.1 General Precautions

All wiring and installation should be done in accordance with the NFPA 70 and 72 standards and must comply with any codes specific to the application or location. Contact the local authority having jurisdiction and, if applicable, the company safety engineer, for information on codes which may apply.

3.2 Housing

All DCR1 electronics are factory sealed inside of a FR rated polypropylene housing (meets UL 94 Flammability Rating V0) and are IP67 rated. In addition, all models of the DCR1 are approved for installation in Class 1 Division 2 Groups A, B, C, D T4 hazardous locations. If the factory seal is broken or if the cable gland connector is not properly tightened, the IP67 and or hazardous location ratings will be void and any resulting damage is not covered under factory warranty.

3.2.1 Mounting the Housing

The housing should be mounted by using the bracket located on the back of the detector (see ***FIGURE 7-1*** & ***FIGURE 7-2***). The detector should be mounted securely to a flat surface and the mounting location must be strong enough to support the weight of the detector. The best orientation of the detector is with the connector pointed down so debris and or fluids fall away from the connector. Remove the bracket from the housing by sliding the bracket down. The bracket may be welded (plastic weld) or screwed to the mounting surface. All mounting hardware should be compatible with the agents that may be found in the environment. For applications that require the detector to be pointed at a specific area, a mounting adapter may be used (see “Accessories” document).

Although the DCR1 is not overly sensitive, it should not be exposed to excessive vibration as it may damage its components and will void factory warranty. The detector has been tested to FM’s Approval Standard Class 3820, Sept. 1979 (.022” displacement, 10 Hz to 30 Hz sweep cycled at 2 cpm for 4 hours).

3.2.2 Cabling

All DCR1 detectors have an 8-conductor pigtail cable (see ***FIGURE 7-3*** & ***FIGURE 7-4***).

The DCR1-A cable is FEP jacketed and may be passed into the wall where the cabling is to be run or into a junction box.

For those version of the DCR1 without the “-A”, a PVC jacketed pigtail cable inside of a 3/8 inch polypropylene tube is used. The tubing must be sealed using a fitting (not included) at either the junction box or plenum wall.

The cable and or tubing should be cut to fit the needs of the application. However, once the cable is cut it can only be replaced at the factory if a longer length is required.

Note: Cable and or tubing that has been cut to an improper length, which requires factory replacement is not covered under warranty.

3.3 Wiring Connections

With power turned off, all wiring connections should be made to a control panel or junction box using the factory installed pigtail cable (see ***FIGURE 7-3*** & ***FIGURE 7-4***).

Table 3-1 Wiring Connections

Wire Color	Description	Internal Connection
Red	Power (DC+)	V+
Black	Power (DC-)	V-
Blue	Fire Relay In	Fire Relay Common
Orange	Fire Relay In	Fire Relay N.O.
Brown	Fire Relay Out	Fire Relay Common
Yellow	Fire Relay Out	Fire Relay N.O.
White	Fault Relay	Fault Relay Common
Green	Fault Relay	Fault Relay N.C. or N.O.

It is imperative to make sure extreme care is taken to ensure all wiring is properly connected to the correct terminals before powering the device on. Using the device in excess of its listed specifications or miswiring the device could result in serious damage to the device and/or control panel and will void the factory warranty.

Note: To maintain the IP67 rating, extreme care must be taken to ensure all connectors are adequately tightened and strain is not placed on the connector ends. Failure to prevent fluid from entering the detector housing may result in damage to the detector and is not covered under factory warranty.

3.3.1 Power

Power to the DCR1 detector is supplied via the Red and Black wires at the end of the pigtail cable (see ***FIGURE 7-3*** & ***FIGURE 7-4***). With the power supply turned off, connect the Red wire to the positive side of the power supply (typically 24 VDC) and the Black wire to the negative side of the power supply. Check the controller manufacturer's manual for proper connection points.

Note: Exceeding the specified input voltage rating for the detector will result in a High Voltage fault. This type of fault is a permanent condition and the detector must be sent back to the factory for evaluation. The evaluation, as well as any resulting damage to the detector, is not covered under factory warranty.

3.3.2 Fire Relay

The Fire Relay is connected using the Blue, Orange, Brown, and Yellow wires at the end of the pigtail (see ***FIGURE 7-3*** & ***FIGURE 7-4***).

For a typical installation (see ***FIGURE 7-8***), connect the Blue wire to one side of the Fire Signal Circuit and the Orange wire to the other side of the Fire Signal Circuit. Next, connect the Brown wire to the Blue wire of the next detector and the Yellow wire to the Orange wire of the next detector in the chain. Finally, connect an EOL resistor (if used) across the Brown and Yellow wires on the last detector in the chain. The Fire Relay wires are not polarized. The Blue and Brown wires are connected internally to one side of the Fire Relay and the Orange and Yellow wires are connected internally to the other side of the Fire Relay. Refer to the controller manufacturer's manual for proper connection points and value of the EOL resistor, if required.

3.3.3 Fault Relay

For a typical installation (see ***FIGURE 7-8***), the Fault Relay is connected with the White and Green wires at the end of the pigtail (see ***FIGURE 7-3*** & ***FIGURE 7-4***). Connect the White wire to one side of the Fault Signal Circuit and the Green wire to the other side of the Fault Signal Circuit or to the Green wire of the next device if detectors are being daisy chained. The Fault Relay wires are not polarized. Refer to the controller manufacturer's manual for proper connection points.

3.4 Testing

DCR1 installations should be inspected and tested in accordance with NFPA 72 standards and or any codes specific to the application or location. Contact the local authority having jurisdiction and, if applicable, the company safety engineer, for information on specific testing requirements and recommended frequency.

Functional testing a DCR1 will cause the detector to enter Alarm Mode. Therefore, if the detector is connected to an extinguishing system, the outputs to the system should be disconnected prior to testing to avoid accidental discharge.

The DCR1 can be tested with a pan fire, a lighter or a factory approved handheld test source (see “Accessories” document).

To test with a pan fire, use a 4 inch diameter pan with isopropyl alcohol set no more than 10 feet away. The detector should alarm within a few seconds of the fire becoming fully involved.

For end-to-end functional testing, use a lighter with an approximate 1 inch high flame. Hold the lighter approximately 2 feet directly in front of the detector’s face and wiggle it slightly (approximately 2 – 4 Hz). The detector should alarm within a few seconds.

Note: Because of the dangers involved with fire testing, the use of a factory approved handheld test source (see “Accessories” document) is strongly recommended.

Prior to using a factory approved handheld test source, it is important to check that the battery is installed correctly and producing enough power to ensure proper operation and maximum performance. In addition, a factory approved handheld UV detector (see “Accessories” document) may be used to verify proper operation of the handheld test source. To test a DCR1 using a handheld test source, hold the tester directly in front of the detector’s face at the distance specified on the tester and activate the device. The DCR1 should alarm within a few seconds.

It is recommended to periodically use a factory approved handheld UV detector (see “Accessories” document) to verify the UV sensors are not self-exciting due to blunt force, excessive vibration or other damage.

After placing a detector into alarm with a handheld test source, cover the face of the DCR1 and turn the handheld UV detector on to verify there are no other sources of UV in the immediate area. Next, unblock the face of the DCR1 and point the handheld UV detector directly at the face of the DCR1, holding it a few inches away, and turn the handheld UV detector on. If the handheld UV detector detects UV, it is recommended that further testing be conducted to verify the DCR1 UV sensors are operating properly.

4 MAINTENANCE

In addition to periodic testing, it is recommended to occasionally clean the lenses of the DCR1 to remove any grease, dust or other particulates that may hinder the detector's ability to operate correctly.

4.1 Lens Cleaning

Regular cleaning of the DCR1 lenses is strongly recommended. The frequency of cleaning depends on the cleanliness of the area where the detector is installed and mounted. An area which has a lot of dust or oil particulates will require more frequent cleanings than an area with a clean environment.

To clean the lenses, wipe the surface with a clean lint free cloth. If more extensive cleaning is required, denatured or Isopropyl alcohol may be used with a clean lint free cloth. Do not use any silica-based solvents, which can commonly be found in most glass cleaners, as this may damage the lenses. Scratched and or damaged lenses are not covered under factory warranty.

5 TROUBLESHOOTING

If a problem is detected during installation or if the DCR1 enters Fault Mode (see ***SECTION 2.7.4***), the following procedures are recommended. If the actions listed below do not correct the problem, contact your distributor for further diagnostic instructions or to obtain an authorization to return the detector for evaluation. For issues which fall outside the scope of the factory warranty, fees will apply.

5.1 No LED blink or erratic LED blink

Once power is turned on and the detector is in Normal Mode, the two red LEDs on the face of the detector (see ***FIGURE 2-2***) should blink simultaneously every 8 seconds. If they do not blink or if they should begin blinking in an abnormal fashion, check the power connections to ensure the Red wire is connected to positive and the Black wire is connected to negative on the power supply. The voltage between the Red and Black wires should be within the input voltage specifications (see ***SECTION 6***). Providing the detector is not indicating a fault condition and the input voltage is correct, the detector should be returned to the factory for evaluation if the problem persists.

5.2 Detector Indicates Fault

The DCR1, when powered on, continuously monitors several of its internal systems. When a fault is detected, the device immediately enters Fault Mode and deenergizes the Fault Relay. In addition, the two LEDs on the face of the detector provide a visual indication to help identify the type of fault being reported (see ***TABLE 8-3***).

To determine the fault type, look at the two LEDs on the face of the detector (see ***FIGURE 2-2***). LED 1 will illuminate briefly and then turn off. LED 2 will then begin blinking. The number of times LED 2 blinks will indicate the Fault Type number. Once the fault type is indicated, LED 2 will turn off and LED 1 will illuminate again. This cycle will continue until the fault condition has been cured.

If multiple fault conditions are detected, only the highest numbered fault will be indicated on the LED 2. If the fault condition can be corrected by the user, the next highest fault will be indicated, if one exists. Once all faults have been cured, the DCR1 should enter Normal Mode.

To determine the best course of action to resolve a fault condition, use the Fault Type number to reference the appropriate section below.

5.2.1 Fault Type 1 – "UV Self-Test Fault"

This fault only applies to detectors with the Optical Self-Test feature. Clean lenses per section 4.1. Reset the detector by cycling power. If the fault persists it may indicate a bad UV sensor or source which will require factory service.

5.2.2 Fault Type 2 – "Program Failure"

There is an error in the firmware. There is no corrective action. Factory service is required.

5.2.3 Fault Type 3 – "Calibration Fault"

Calibration settings are corrupted. There is no corrective action. Factory service is required.

5.2.4 Fault Type 4 – "Low Voltage Fault"

The input voltage does not meet the minimum device specification. Measure the voltage between the Red and Black wires and verify the voltage is within the input voltage range (see ***SECTION 6***). If the voltage is inadequate, check the external wiring and power supply. There should not be more than 1 Volt of AC ripple at 24 VDC. If the measured voltage is within specification and there is no AC ripple, then factory service is required.

5.2.5 Fault Type 5 – "Sensor Fault"

The infrared sensor did not pass an internal self-test. Ensure the lenses are clean by following the instructions provided in section 4.1. Reset the device by cycling power. If the fault persists, factory service is required.

5.2.6 Fault Type 6 – "Relay Fault"

One or more of the relay coils are not functioning correctly. There is no corrective action. Factory service is required.

5.2.7 Fault Type 7 – "High Voltage Fault"

The detector was exposed to a voltage that exceeded its listed specifications (see ***SECTION 6***). There is no corrective action. Factory service is required.

Note: Using a device in excess of its specifications or miswiring a device could result in serious damage to the device and/or control panel. Any resulting damage is not covered under factory warranty.

5.2.8 Fault Type 8 – "Temperature Out-of-Range Fault"

The internal measured temperature exceeded listed specifications (see ***SECTION 6***). There is no corrective action. Factory service is required.

Note: Any damage caused to a detector resulting from abuse or improper use, or from exceeding its specifications, is not covered under factory warranty.

5.3 Detector Goes into Alarm but No Fire Appears to be Present

After a detector goes into alarm, the FireScape™ data can be retrieved and evaluated by the factory (fees apply) to determine if the spectral data that was recorded for the event correlates with an actual fire signature (see ***SECTION 2.7.5***). In addition, a factory approved handheld UV detector (see "Accessories" document) may be used to determine if there are any spurious UV sources in the environment, which may have contributed to the alarm event. For further diagnostics and information, contact your distributor.

5.4 Detector Appears to Operate Normally but Will Not Alarm to a Fire or Test Source

Both the LEDs on the front of the detector illuminate and the Fire Relay triggers when the detector enters Fire Mode (see ***SECTION 2.7.3***). To determine if the detector is operating normally, follow the procedure below.

Connect an ohmmeter across each set of Fire Relay In and Fire Relay Out wires (see ***FIGURE 7-3*** & ***FIGURE 7-4***) and perform a fire test (see ***SECTION 3.4***). If the relay closes (0 ohms on the meter) and the LEDs come on, then the detector is operating normally. Check external alarm initiating circuit wiring. If the relay closes and the LEDs remain off, or the relay remains open and the LEDs come on, factory service is required. If the relay remains open and the LEDs remain off, factory service is required.

6 SPECIFICATIONS

Sensitivity at 10 Feet on Axis to a 4 Inch Diameter IPA Fire:	3 Seconds or Less
Standard Test Fuels:	Heptane, Hydrogen, Silane, MEK, Polypropylene and Isopropyl Alcohol
Chemical Compatibility:	Resistant to Most Acids and Solvents
Field-of-View:	120° Full Cone (NFPA)
Sensor Responsivity:	Ultraviolet: 185 to 260 nm Infrared: 0.715 to 3.5 µm
Humidity Range:	10% to 90%
Input Voltage:	12 to 32 VDC (Typically 24 VDC)
Current Draw:	15 to 50 mA Nominal Depending on Model, Mode of Operation and Device Status
Relay Outputs:	1.0 A @ 30 VDC Resistive
Temperature Range:	Operating (Tamb): -40° C to 85° C
LEDs:	2 Red LEDs Display Model, Relay Configuration, Fault Types and Fire Status
Cabling:	24 AWG, 8 Conductor Cable DCR1-A: PVDF Cable Gland and FEP Jacketed Cable DCR1: PP Tube Fitting, PVC Jacketed Cable, PP Tubing 6 Foot is Standard Length. Longer Cable and or Tubing Lengths are Available
Enclosure:	FR Rated Polypropylene Housing with Sapphire Windows. EN 60529 IP67 Rated. Housing Meets UL 94 Flammability Rating V0
Hazardous Area Classification:	Class 1 Division 2 Groups A, B, C, D T4 Class 1 Zone 2 Groups A, B, C, D T4
Housing Dimensions:	3.4 x 4.2 x 1.0 Inches
Approvals:	FM 3260 and EN 60529 ETL Conforms to ANSI/ISA 12.12.01 CE (EMC 2014/30/EU) Conforms to EN 50130-4:2011

7 APPENDIX A - DRAWINGS

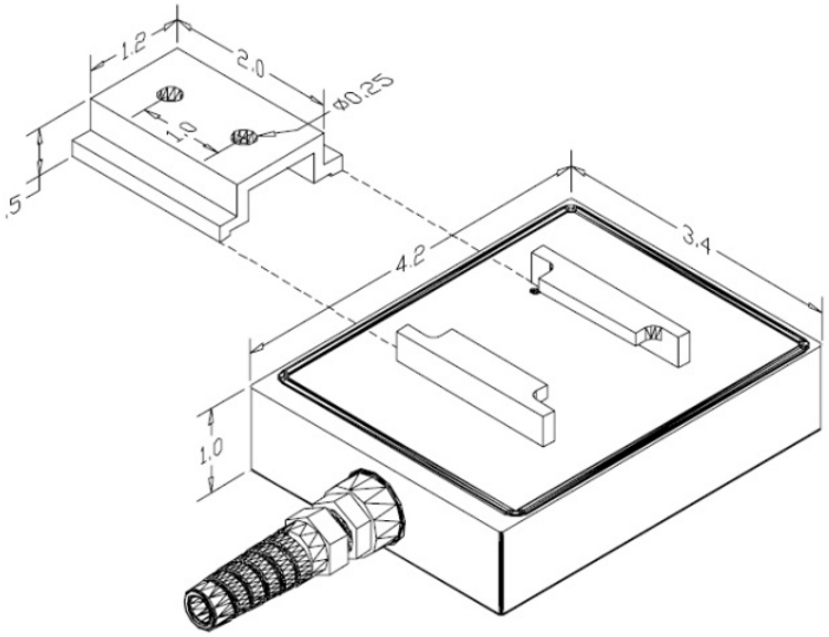

Figure 7-1 DCR1-A Housing Dimensions

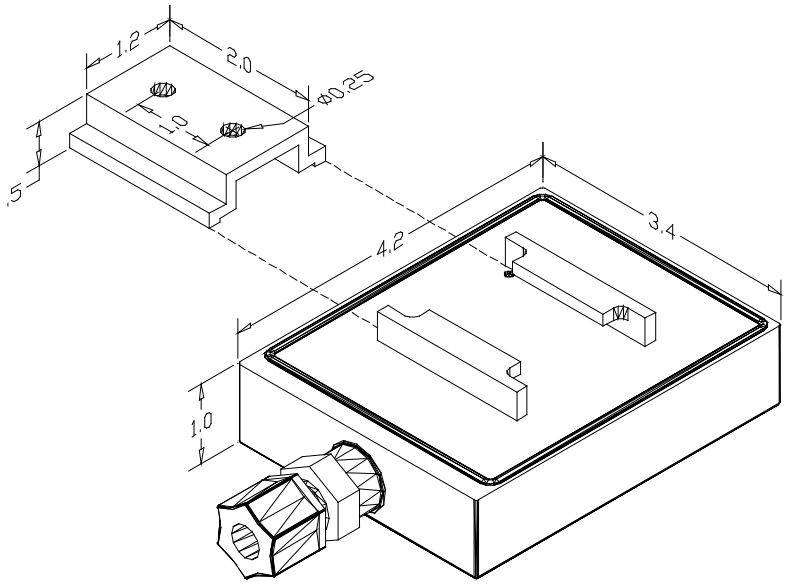

Figure 7-2 DCR1 Housing Dimensions

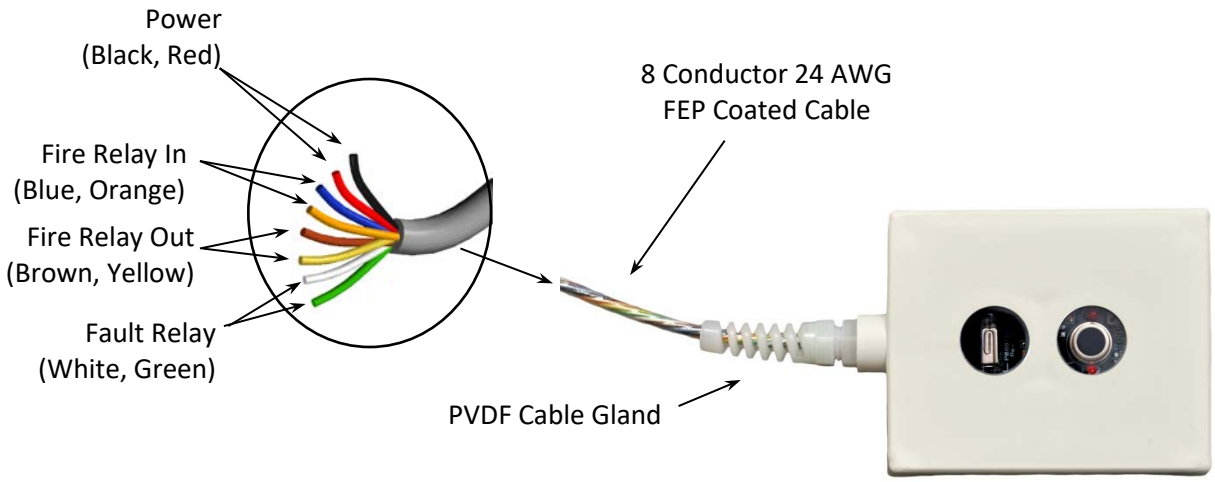

Figure 7-3 DCR1-A Cabling

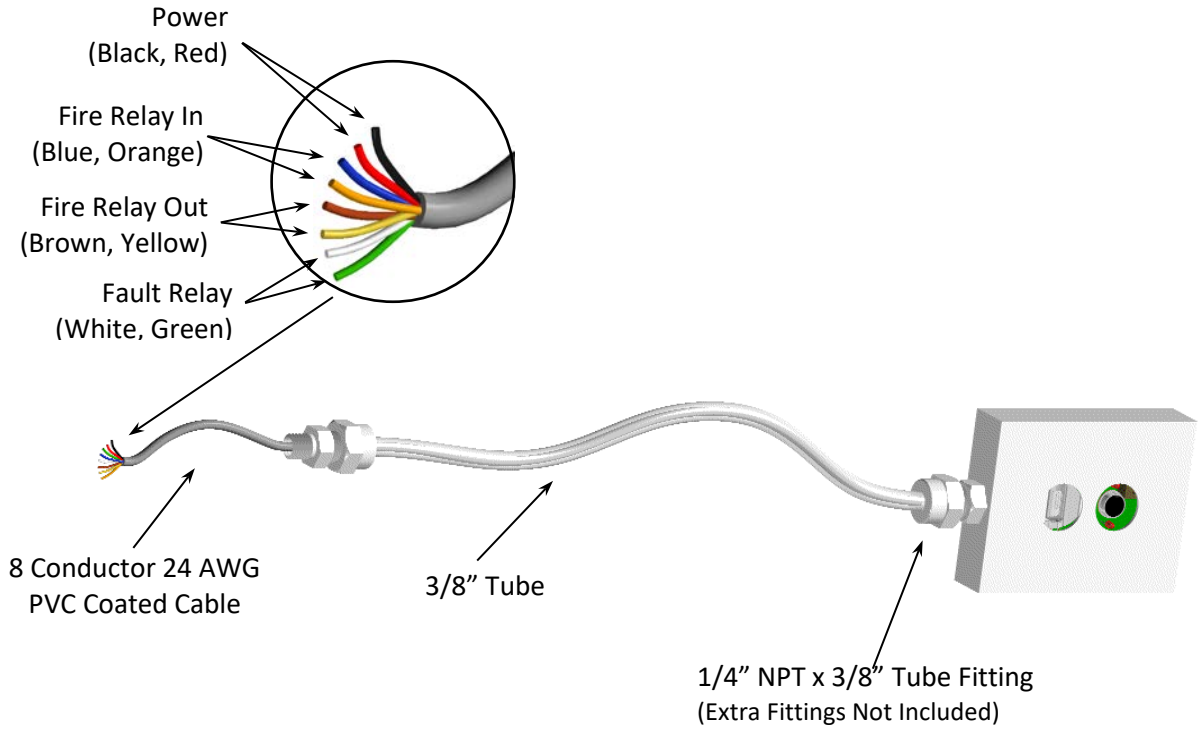

Figure 7-4 DCR1 Cabling

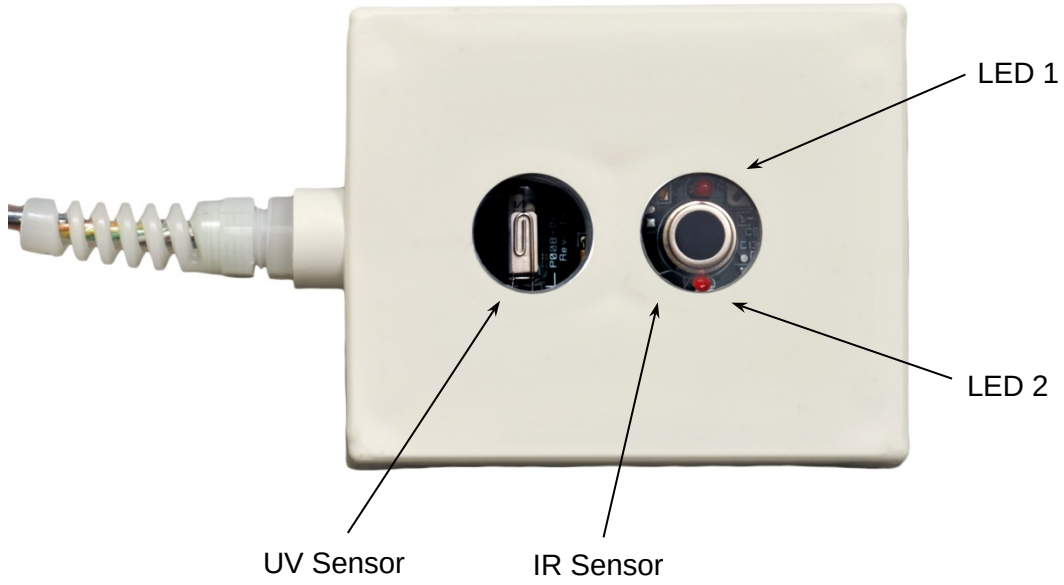

Figure 7-5 DCR1-A Layout (Sensors & LEDs)

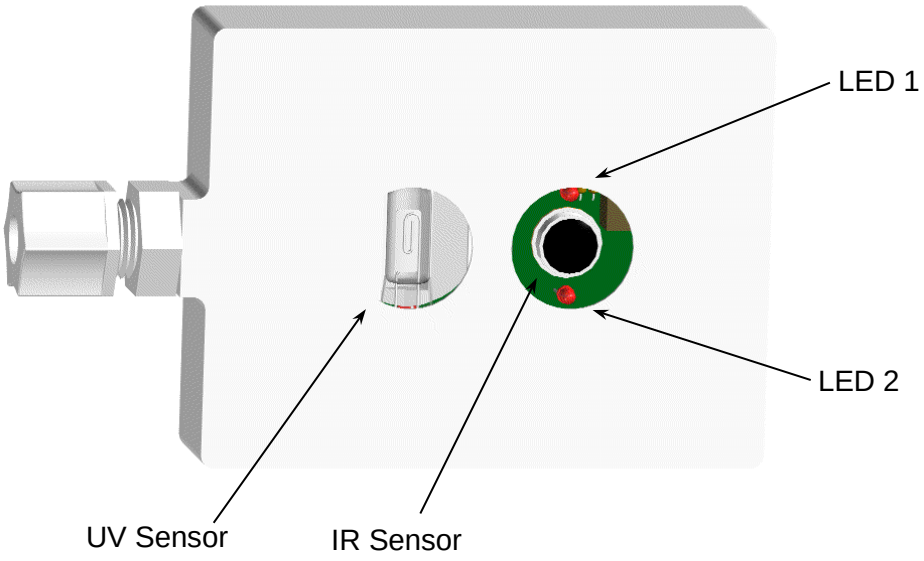

Figure 7-6 DCR1 Layout (Sensors & LEDs)

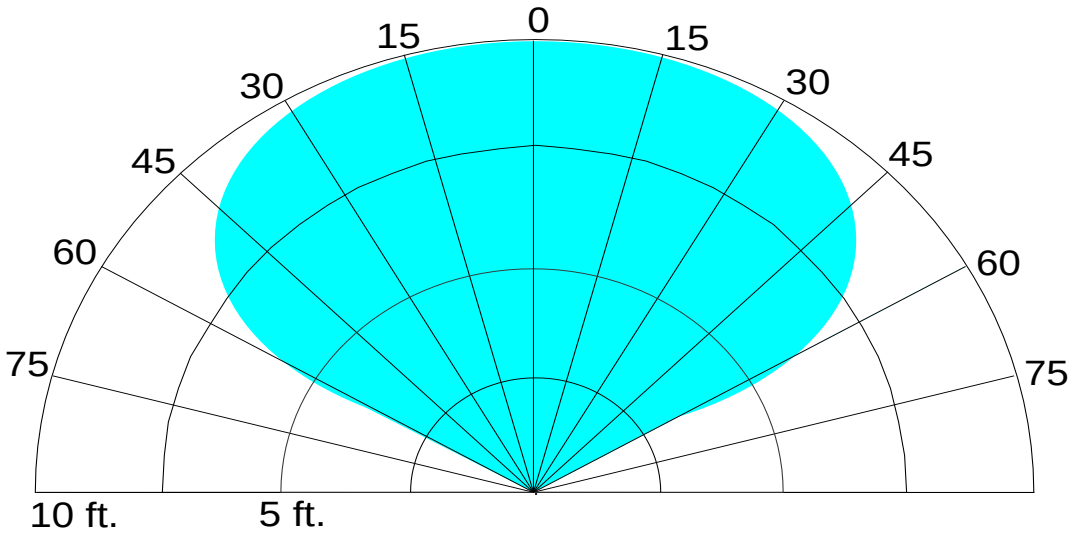

Figure 7-7 Field-of-View for a 4" Dia. Alcohol Fire

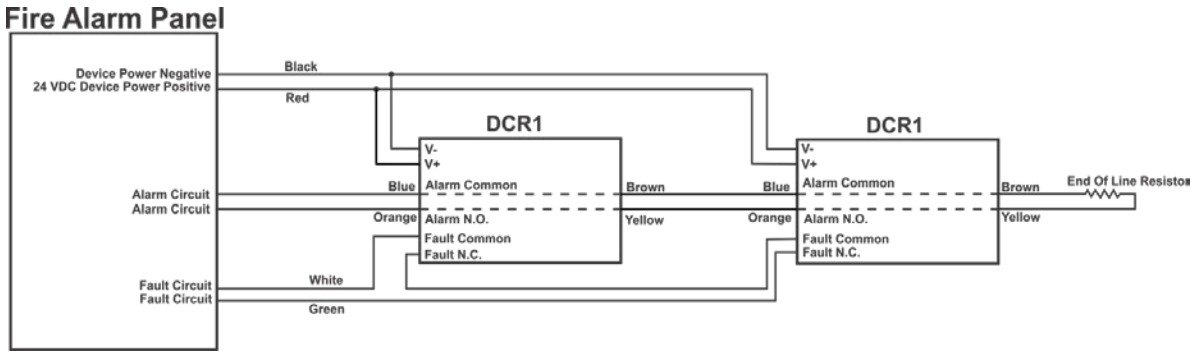

Figure 7-8 Wiring Connections

8 APPENDIX B - MISC. TABLES

Table 8-1 Wiring Connections

Wire	Description	Internal Connection
Red	Power (DC+)	V+
Black	Power (DC-)	V-
Blue	Fire Relay In	Fire Relay Common
Orange	Fire Relay In	Fire Relay N.O.
Brown	Fire Relay Out	Fire Relay Common
Yellow	Fire Relay Out	Fire Relay N.O.
White	Fault Relay	Fault Relay Common
Green	Fault Relay	Fault Relay N.C. or N.O.

Table 8-2 Relay Configurations

Model #	Fire Relay	Fault Relay
DCR1-AS1 **DCR1-AT1** **DCR1-S1** **DCR1-T1**	Open Contacts	Closed Contacts
DCR1-AS3 **DCR1-AT3** **DCR1-S3** **DCR1-T3**	Open Contacts	Open Contacts

Table 8-3 Faults

Fault #	Fault Type	Description
1	UV Self-Test Fault (Optical Test Models Only)	UV Sensors Did Not Detect Enough UV from the Internal Source
2	Program Failure	Firmware Error
3	Calibration Fault	Device Calibration Corrupted
4	Low Voltage Fault	Insufficient Input Voltage
5	Sensor Fault	IR Sensor Did Not Pass Internal Self-test
6	Relay Fault	Relay Coil Circuit is Open
7	High Voltage Fault	Input Voltage Exceeded Specifications
8	Temperature Out of Range Fault	Internal Device Temperature Went Outside Specifications

Table 8-4 False Alarm Stimuli

FALSE ALARM RESPONSE This Table Shows the Detector's Ability to Tolerate Both Modulated and Unmodulated False Alarm Stimuli. All Tests Used a 1.75 Inch Diameter IPA Can Fire at 6 Feet.			
False Alarm Source	**Distance**	**Unmodulated**	**Modulated**
Resistive Electric Heater 1320 Watt	6 Feet	No Response	No Response
Fluorescent Lights (2) 40 Watt Bulbs	6 Feet	No Response	No Response
Halogen Light 500 Watt	10 Feet	No Response	No Response
Incandescent Light 100 Watt	6 Feet	No Response	No Response
Direct Sunlight	93 Million Miles	No Response	No Response

Table 8-5 Detector Response to Fuels

Detector Response to Various Fuels			
Fuel	**Distance**	**Fire Size**	**Average Response Time**
Polypropylene	8 Feet	4 Inch Diameter	2.32 Seconds
Hydrogen	15 Feet	18 Inch Jet	2.11 Seconds
Silane (5 psig)	30 Feet	18 Inch Jet	1.85 Seconds
IPA	10 Feet	4 Inch Diameter	2.62 Seconds
Heptane	40 Feet	1 Square Foot	2.76 Seconds
MEK	15 Feet	4 Inch Diameter	1.82 Seconds