SIERRA SAFETY TECHNOLOGY, INC.

Installation Manual

DCR1-CS1
DCR1-CT1
FLAME DETECTOR MODELS

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DCR1-CS1 & DCR1-CT1
Flame Detector Models

APPLICABILITY & EFFECTIVITY

This manual provides information for the follow products:

Model Highlights

DCR1-CS1: N.O. or N.C. Fire and Fault Relays. Latching Controls.

DCR1-CT1: N.O. or N.C. Fire and Fault Relays. Latching Controls. Sensor Self-Test.

N.O. = Normally Opened Contacts N.C. = Normally Closed Contacts (If N.O. or N.C. is not specified, then both options are included.)

This manual is effective for the above models as of November 1, 2019

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

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1 PRODUCT DESCRIPTION

1.1 Introduction

DCR1-C flame detectors are Factory Mutual 3260 approved short-range detectors that use a multiple spectrum sensor array (see ***FIGURE 7-2***) 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. Many common false sources (spurious energy emissions) are filtered out by these algorithms. Providing continuous and reliable flame detection, the DCR1-C declares an alarm event when the conditions of a fire algorithm are met. The DCR1 series of detectors provide superior resistant to most acids and solvents, including, but not limited to: Hydrofluoric; Sulfuric; Nitric; Phosphoric; Hydrochloric Acids; Piranha-Etch; De-Ionized Water; Ozone; Ammonium Hydroxide; Isopropyl Alcohol; Chromium Phosphate; and, Organic Solvent Base Photo-Resist Strips.

1.2 Configuration

For the detectors listed in ***Table 1-1 Model Configurations***, both the Fire and Fault Relays can be connected as either normally open (N.O.) or normally closed (N.C.) operation using the flying pigtail leads coming from the detector. N.C. and N.O. refers to the relay's configuration during normal operation.

Table 1-1 Model Configurations

Model	Fire Relay	Fault Relay	Sensor Self-Test
DCR1-CS1	N.O. or N.C.	N.O. or N.C.	No
DCR1-CT1	N.O. or N.C.	N.O. or N.C.	Yes

Note: Per NFPA 72 integrity requirements, a Normally Opened fire relay with supervision must be used when a flame detector is connected to a fire alarm panel initiating device circuit.

1.3 Scope

Unless otherwise specified in this document, the words "detector(s)," "flame detector(s)," "device(s)", "DCR1" and/or "DCR1-C" all refer collectively to the various models listed in ***Table 1-1 Model Configurations.*** Devices may also be referred to by only their extension with the "DCR1" name excluded, for example "-CS1" instead of "DCR1-CS1."

1.4 Description

All DCR1 detectors specified in this manual are calibrated to respond to a 4-inch Isopropyl Alcohol (IPA) fire at 12 feet on axis within 3 seconds and have a clear 120° Conical Field-of-View.

All DCR1 electronics are factory sealed inside a housing made of polypropylene, which meets UL 94 Flammability Rating V0 (FRPP). In addition, sapphire windows and FEP jacketed cabling are used to ensure the greatest chemical compatibility and to allow control panels and other fire protection systems that are compatible with Dry "form C" contacts to be easily connected. 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 excellent choice for use in semiconductor manufacturing tools and interior spaces of production and cleaning equipment. 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.

DCR1-CT1 detectors incorporate a UV Self-Test, which tests the integrity of the UV Sensor. A fault is generated when a compromise has been detected.

Using a factory approved interface box and software a trained technician can retrieve the pre-fire spectral data (FireScape™.) This data is recorded when the detector enters Fire Mode. The Fire Relay can be programmed for either latching or non-latching operation. When non-latching operation is chosen, the amount of time the detector waits before unlatching can be modified to meet specific application needs. In Latching Mode, it is important to note that a FireScape™ cannot be overwritten until a detector is power cycled. In Non-latching Mode FireScape™ data will be overwritten if another fire event occurs after the device returns to Normal Mode.

1.5 Fault Diagnostics

The microprocessor in the DCR1 series of detectors 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.

2 OPERATION

2.1 General

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

2.2 Field-of-View

DCR1 detectors have a 120° Field-of-View. In order to declare an alarm, a detector 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.

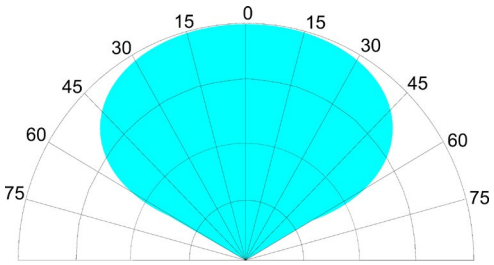

Figure 2-1 Field-of-View

Note: A 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 detectors should be used with overlapping Field-of-Views (FOV.) Flame detectors should not normally 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

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 an IR sensor (0.715 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 qualified P.E. may need to be consulted before deciding on the location of the devices.

2.5 Configuration Settings

The DCR1-C is capable of being configured for either latching or non-latching operation using a factory approved interface box and GoSierra™ computer software.

2.5.1 Latching Controls

DCR1-C devices allow for the detector's fire relay to be set for either latching (factory default) or non-latching operation.

In Latching Mode, the detector and its outputs will remain in the triggered state after entering Fire Mode and stay that way until the detector is reset by cycling power. The FireScape™ data for the fire event is stored in the detector's non-volatile memory and cannot be overwritten until the detector is power cycled.

In Non-latching Mode, the detector and its outputs will reset after 5 seconds (factory default) of a flame no longer being detected and the detector will return to Normal Mode. It is important to note that the non-latching time delay is programable should it be required. Because a non-latching DCR1 returns to Normal Mode, the FireScape™ data stored from a fire event will be overwritten should the device return to Fire Mode.

2.6 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 detectors have four standard modes: Power Up, Normal, Fault and Fire. The LEDs will flash in specific patterns to indicate the detector's status.

2.6.1 Power Up Mode (Detector Reset)

When power is applied or recycled to a DCR1 detector, it enters 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 will begin flashing 2 sequential patterns, thereby providing a quick visual representation of the model type and latching configuration.

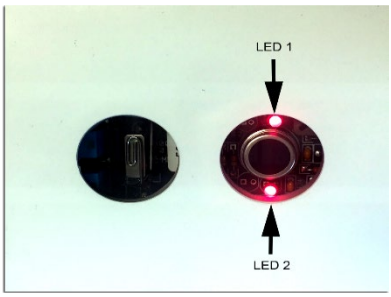

Figure 2-2 LEDs

The first flash pattern indicates the model type. LED 1 will illuminate while LED 2 flashes one time to identify that it is a DCR1-CS1 device. For -CT1 detectors, LED 2 will flash two times rather than one time. Once complete, both LEDs will turn off.

The second flash pattern indicates whether a device is configured for latching or non-latching Fire Relay operation. Again, LED 1 will illuminate, followed by LED 2 flashing once to indicate the device is set to latching and twice to indicate non-latching. Once complete, both LEDs will turn off.

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.

2.6.2 Normal Mode

In Normal Mode, both LEDs will simultaneously flash briefly 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.

2.6.3 Fire Mode

When a DCR1 declares a fire, the Fire Relay energizes and both red LEDs on the face of the detector (see ***Figure 2-2***) come on and stay lit.

If the device was programmed (factory default) for latching operation, and a fire is declared, the detector will remain in Fire Mode until the detector is reset by cycling power.

For non-latching detectors, once the fire falls below the acceptable threshold, the detector will return to Normal Mode after a period without reinitiating Power Up Mode (factory default is 5 seconds.) It is important to note that once a non-latching device returns to Normal Mode, the FireScape™ data stored in the detector's memory will be overwritten upon any subsequent fire event.

2.6.4 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 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 numbered fault is indicated by

the LEDs. If the fault condition is corrected the next highest fault will be indicated until all faults are cured. Please note that although Fire Mode is designed to override a fault indication, some faults, such as “Program Failure” may prevent the reporting of a fire.

2.6.5 FireScape™ Function

When a DCR1 enters Fire Mode, the pre-fire spectral data is stored so it can be retrieved for evaluation and analysis. For latching devices, the internal trigger for FireScape™ is initialized during Power Up Mode and, once a FireScape™ has been triggered by a device that has gone into Fire Mode, it cannot be retriggered until the device is reset by cycling power. This allows the FireScape™ data to be captured and stored when the detector goes into Fire Mode.

For non-latching devices, the internal trigger for FireScape™ is reset internally once the device returns to Normal Mode. This means that if a device reenters Fire Mode, the new pre-fire spectral data will be stored with the original data being overwritten. This allows for only the latest pre-fire spectral data to be stored.

To retrieve the data, a trained technician must use a factory approved interface box and GoSierra™ software, in conjunction with a computer, to communicate with the detector.

2.7 Outputs

The DCR1 has industry standard relay outputs for Fire and Fault. The 14-conductor pigtail cable is provided to connect the detector to most control panels and/or other fire protection systems that are compatible with Dry “form C” contacts.

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

2.7.1 Fire Relay

DCR1 devices provide connections to either the N.O. or N.C. contacts of the Fire Relay. There two sets of wires for N.O., N.C. and Common contacts (see ***Table 8-1 Wiring Connections***).

The Fire Relay energizes when a fire is declared. For latching devices, the relay will stay energized until the detector is reset by cycling power. For non-latching devices, the relay will stay energized until the detector no longer detects the presence of a fire for a period at which time the detector will exit Fire Mode.

Note: Per NFPA 72 integrity requirements, a Normally Opened fire relay with supervision must be used when a flame detector is connected to a fire alarm panel initiating device circuit.

2.7.2 Fault Relay

When a DCR1 is powered on, the Fault Relay is energized. There should be continuity between the N.C. and Common contacts. Conversely, there should be no continuity between N.O. and Common contacts. When a fault occurs, the condition of the relay is reversed. This means the Fault Relay reports a fault state if the detector loses power. See ***Table 8-2 Faults*****.** To determine the type of fault being reported, see ***Section 5.2***.

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 an IP67 rated housing made of polypropylene, which meets UL 94 Flammability Rating V0 (FRPP). 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 installed and/or 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***.) 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

DCR1 detectors have a 14-conductor pigtail cable that is FEP jacketed. The cable 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, which 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 pigtail cable. See ***Table 8-1*** for proper wiring configuration of the specific model being installed.

Extreme care should be 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 cable. With the power supply turned off, connect the Black wire to the negative side of the power supply and the Red wire to the positive side of the power supply (typically 24 VDC.) Check the controller manufacturer's manual for proper connection points.

Table 3-1 Color Codes for Connecting Power

Wire Color	Function	Model
Black	V-	All Versions
Red	V+ (typically 24 VDC)	All Versions

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. Conversely, if insufficient power is applied to a detector, the device will report a Low Voltage Fault, which is user correctable.

3.3.2 Fire Relay

The Fire Relay can be connected to a control panel as either N.O. or N.C. Per NFPA 72 integrity requirements, however, a Normally Opened fire relay with supervision must be used when a flame detector is connected to a fire alarm panel initiating device circuit.

Table 3-2 Color Codes for Fire Relay

Wire Color	Fire Relay Function
Blue	Common
Brown	Common
Yellow	Normally Opened
Orange	Normally Opened
Red / Black	Normally Closed
White / Black	Normally Closed

For a typical installation on a fire alarm panel initiating device circuit (see ***Figure 7-3 Typical Wiring Connections***), 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

When a DCR1 is powered on, the Fault Relay is energized. There should be continuity between the N.C. and Common contacts. Conversely, there should be no continuity

between N.O. and Common contacts. When a fault occurs, the condition of the relay is reversed. This means the Fault Relay reports a fault state if the detector loses power.

Table 3-3 Color Codes for Fault Relay

Wire Color	Fault Relay Function
White	Common
Tan	Common
Green	Normally Closed
Pink	Normally Opened

For a typical installation where the Fault Relay is Normally Closed when turned on (see ***Figure 7-3 Typical Wiring Connections***), the Fault Relay is connected using the White and Green wires at the end of the pigtail. 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.

3.3.4 Communications

For proper use of communications, please refer to the appropriate GoSierra™ software supplement.

Table 3-4 Color Codes for Communications

Wire Color	Communication Function
Purple	RS485 A
Gray	RS485 B

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's 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.)

3.4.1 Pan Fire Testing

To test a detector with a pan fire, use a 4-inch diameter pan with isopropyl alcohol set no more than 12 feet away. The detector should alarm within a few seconds of the fire becoming fully involved.

3.4.2 Alternate Fire Testing

For 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**.

3.4.3 Handheld Test Source Testing

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 at an appropriate distance for the tester being used and activate the device. The DCR1 should alarm within a few seconds.

3.4.4 Handheld UV Detector Testing

It is recommended to periodically use a factory approved handheld UV detector (see “Accessories” document) to verify the UV sensor is 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 sensor is operating properly.

4 MAINTENANCE

In addition to periodic testing as specified by the authority having jurisdiction, 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 2.6.4***), 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, charges may apply.

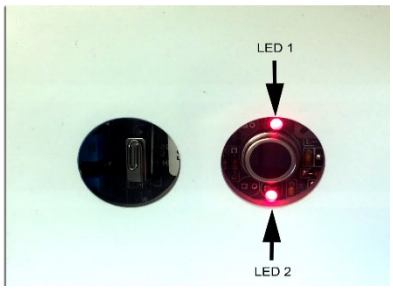

Figure 5-1 LEDs

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 5-1***) 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 8-2***.)

To determine the fault type, look at the two LEDs on the face of the detector (see ***Figure 5-1***.) LED 2 will illuminate briefly and then turn off. LED 1 will then begin blinking. The number of times LED 1 blinks will indicate the Fault Type number. Once the fault type is indicated, LED 1 will turn off and LED 2 will illuminate again. This cycle will continue until the fault condition is cured.

If multiple fault conditions are detected, only the highest numbered fault will be indicated on the LED 1. 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 6 – "Relay Fault"

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

5.2.6 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.

5.2.7 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 a trained technician using a factory approved interface box and software, in conjunction with a computer, to determine if the spectral data that was recorded for the event correlates with an actual fire signature (see ***Section 2.6.5***.) 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 (see ***Section 3.4.4***.) 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

Normally, both the LEDs on the front of the detector illuminate and the Fire Relay triggers when the detector enters Fire Mode (see ***Section 2.6.3***.) To determine if the detector is operating normally, follow the procedure below.

Connect an ohmmeter across the Blue or Brown and Yellow or Orange wires (see ***Section 3.3.2***.) 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 12 Feet on Axis to a 4-Inch Diameter IPA Fire:	3 Seconds or Less
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:	Up to 90%
Input Voltage:	12 to 32 VDC (Typically 24 VDC)
Current Draw:	40 mA Nominal (70 mA Max) Depending on 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, Fault Type and Status
Cabling:	22 AWG, 14 Conductor FEP Jacketed Cable
Enclosure:	FR Rated Polypropylene (FRPP) 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:	3.5 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 – FIGURES

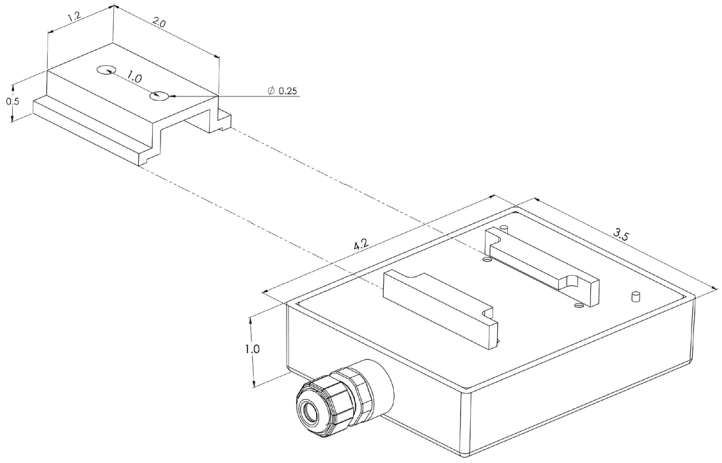

Figure 7-1 DCR1 Housing Dimensions

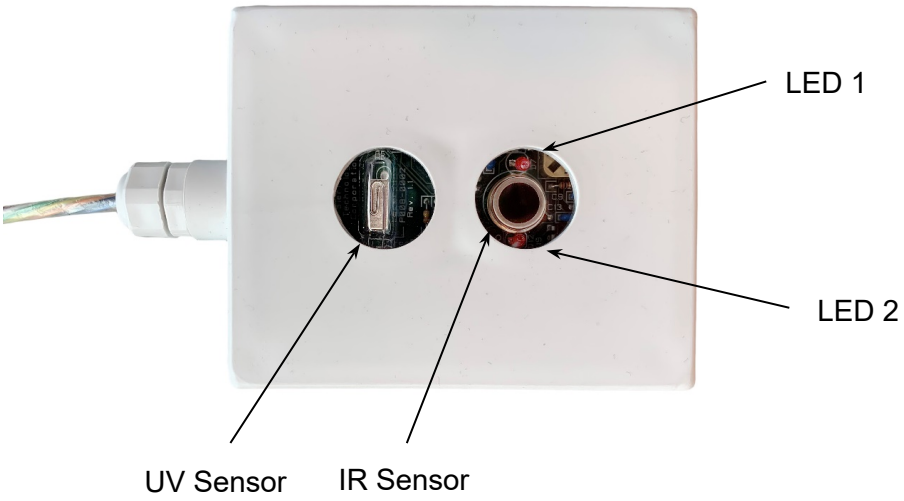

Figure 7-2 DCR1 Layout (Sensors & LEDs)

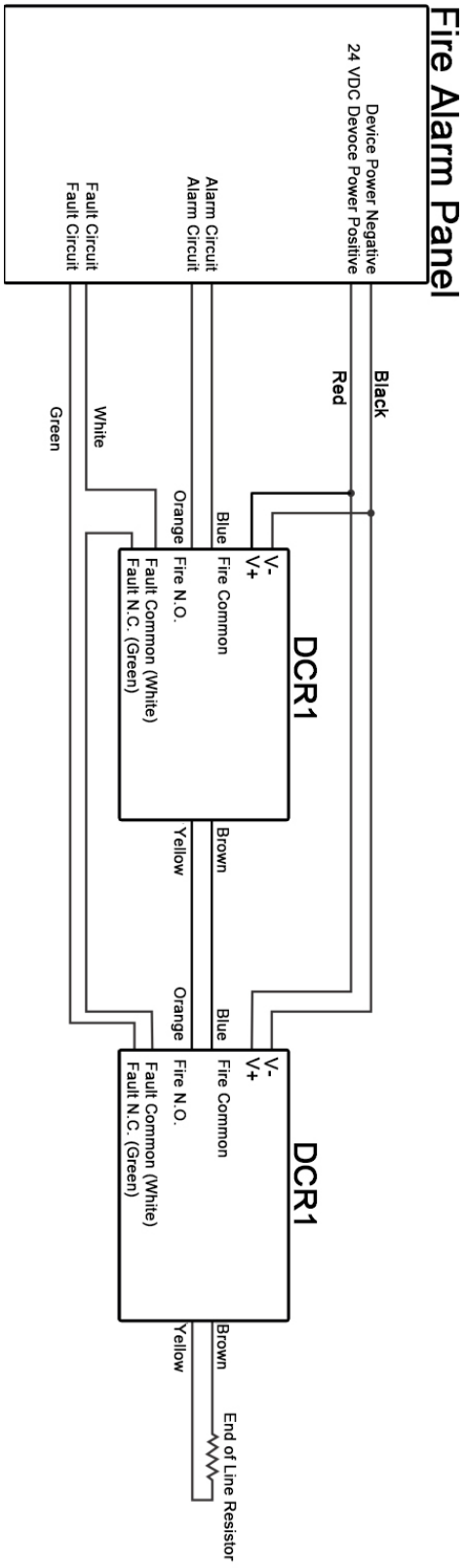

Figure 7-3 Typical Wiring Connections

8 APPENDIX B - TABLES

Table 8-1 Wiring Connections

Wire	Function	Description	Notes
Black	Power	V-	
Red	Power	V+	
White	Fault Relay	Common	
Tan	Fault Relay	Common	
Green	Fault Relay	N.C.*	(a)
Pink	Fault Relay	N.O.*	(a)
Blue	Fire Relay	Common	
Brown	Fire Relay	Common	
Yellow	Fire Relay	N.O.	
Orange	Fire Relay	N.O.	
White / Black	Fire Relay	N.C.	(b)
Red / Black	Fire Relay	N.C.	(b)
Purple	Communications	RS485A	
Grey	Communications	RS485B	

Notes:

(a) The state of the Fault Relay is in reference to when the device is turned on and operating correctly.

(b) Per NFPA 72 integrity requirements, a Normally Opened fire relay with supervision must be used when a flame detector is connected to a fire alarm panel initiating device circuit.

Table 8-2 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	Unused	N/A
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 8-3 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 8-4 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	12 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