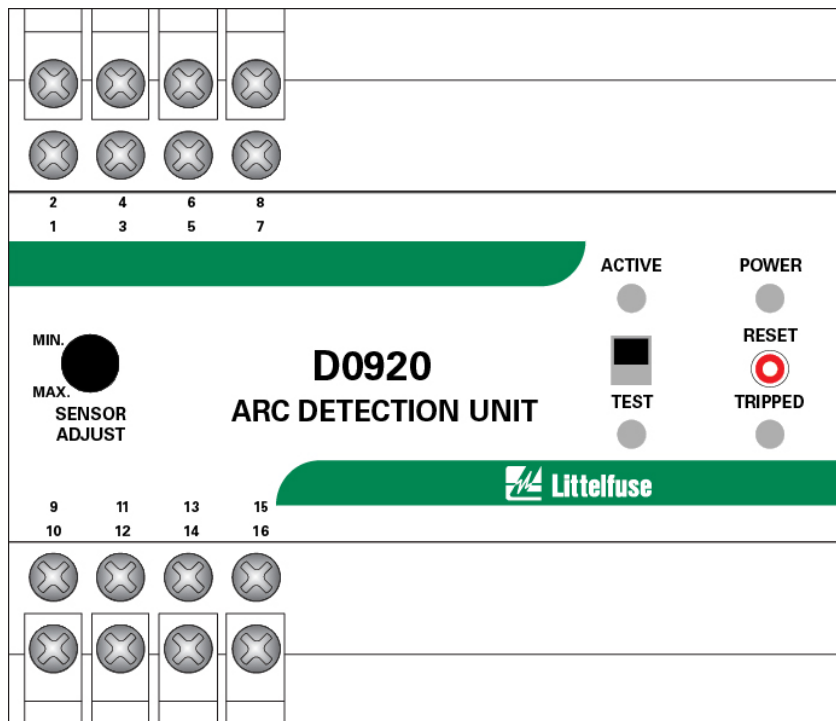


D0920
ARC-DETECTION UNIT
 REVISION 0-D-070616



Document Number: PM-1410-EN

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1 INTRODUCTION

1.1 General

The D0920 Arc Detection Unit is a high-speed arc-detection device for electrical power-distribution systems. The D0920 requires a 230 Vac supply and supports up to three point sensors (A0220) mounted in a switchboard.

On the occurrence of an arc fault, the D0920 detects the fault and pulses the trip output in less than 1 ms. The fast trip time reduces the risk of personal injury and equipment damage.

The D0920 is typically supplied from the switchboard main power. The AC voltage may fail when an arc fault develops. The D0920 uses energy stored in an internal capacitor to trip the circuit breaker. The storage capacitor is an extremely long-life electrolytic capacitor with a specified life time of more than 30 years at an ambient temperature of 50°C (121°F). The trip energy stored is sufficient for circuit breakers with a 220/250 Vdc shunt trip coil.

The D0920 has one output indication relay with an isolated normally-open contact, and one output indication relay with an isolated normally-closed contact. Additional features include power and trip indication, test mode, and sensitivity adjustment.

NOTE: Dangerous voltage is present at the storage capacitor (terminals 4, 7, and 8) even after the relay has been disconnected from the supply voltage. The capacitor has a self-discharge circuit which will discharge it to a safe voltage level within two minutes after disconnection from the supply voltage.

1.2 A0220 Point Sensor

The A0220 point sensor is a photoelectric sensor with a sensitivity range of 180 degrees. It has a transparent polycarbonate enclosure that is IP65 rated. Each point sensor includes 10 m (33 ft) of shielded 2-wire, 24 AWG (0.2 mm²) cable. The cable length can be extended to a maximum of 50 m (164 ft), however use shielded 2-wire, 20 AWG (0.5 mm²) cable.

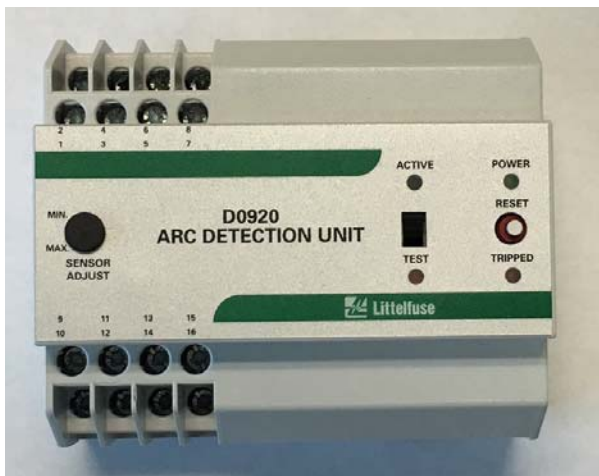


FIGURE 1. D0920 Arc Detection Unit.



FIGURE 2. A0220 Point Sensor.

2. OPERATION

2.1 Front-Panel Controls and Indication

2.1.1 Sensor Adjust

The D0920 sensitivity default is 6 mA of sensor output current to cause a trip. This is equivalent to a light intensity of 12,000 lux on a single sensor or 6,000 lux on each of two sensors. This means that the total light intensity on all sensors installed has to exceed 12,000 lux to cause a trip.

The sensitivity is adjustable from 1 to 12 mA (2,000 to 24,000 lux) using the SENSOR ADJUST dial.

2.1.2 ACTIVE and TEST Mode

The D0920 has a two-position switch, marked ACTIVE and TEST.

The green LED labelled ACTIVE indicates that the ACTIVE mode has been selected. In the ACTIVE mode, the D0920 is configured for normal operation and will trip the trip coil if an arc flash occurs. In ACTIVE mode, the relay K2 contact (terminals 11 and 12) will be open unless supply voltage is removed. Ensure that the D0920 is normally set to the ACTIVE mode.

The red LED labelled TEST indicates that the TEST mode has been selected. In the TEST mode, the D0920 and any connected point sensors can be tested without tripping the trip coil. In TEST mode, relay K2 will be closed. See Fig. 4.

2.1.3 Power

The green LED labelled POWER indicates the presence of supply voltage.

2.1.4 Tripped

The red LED labelled TRIPPED indicates a trip.

A trip remains latched until the RESET button is pressed. External circuit breakers or other devices will have to be reset manually.

2.2 Auxiliary Relays

2.2.1 Trip Indication

The D0920 has one normally-open contact (K1, terminals 9 and 10) that closes during a trip. It can be used for trip indication.

2.2.2 Remote Signalling

The D0920 has one normally-closed contact (K2, terminals 11 and 12) that closes during loss of supply, or when the D0920 is in the TEST mode. It can be used for remote signalling.

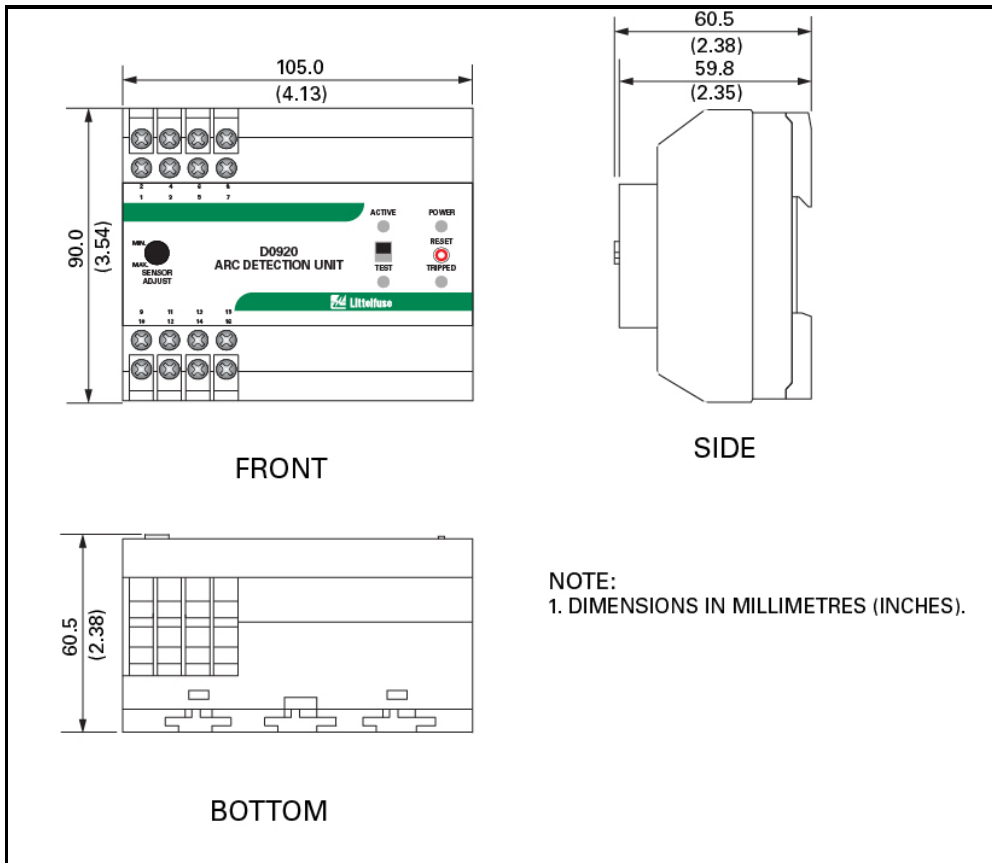


FIGURE 3. D0920 Outline and Mounting Details.

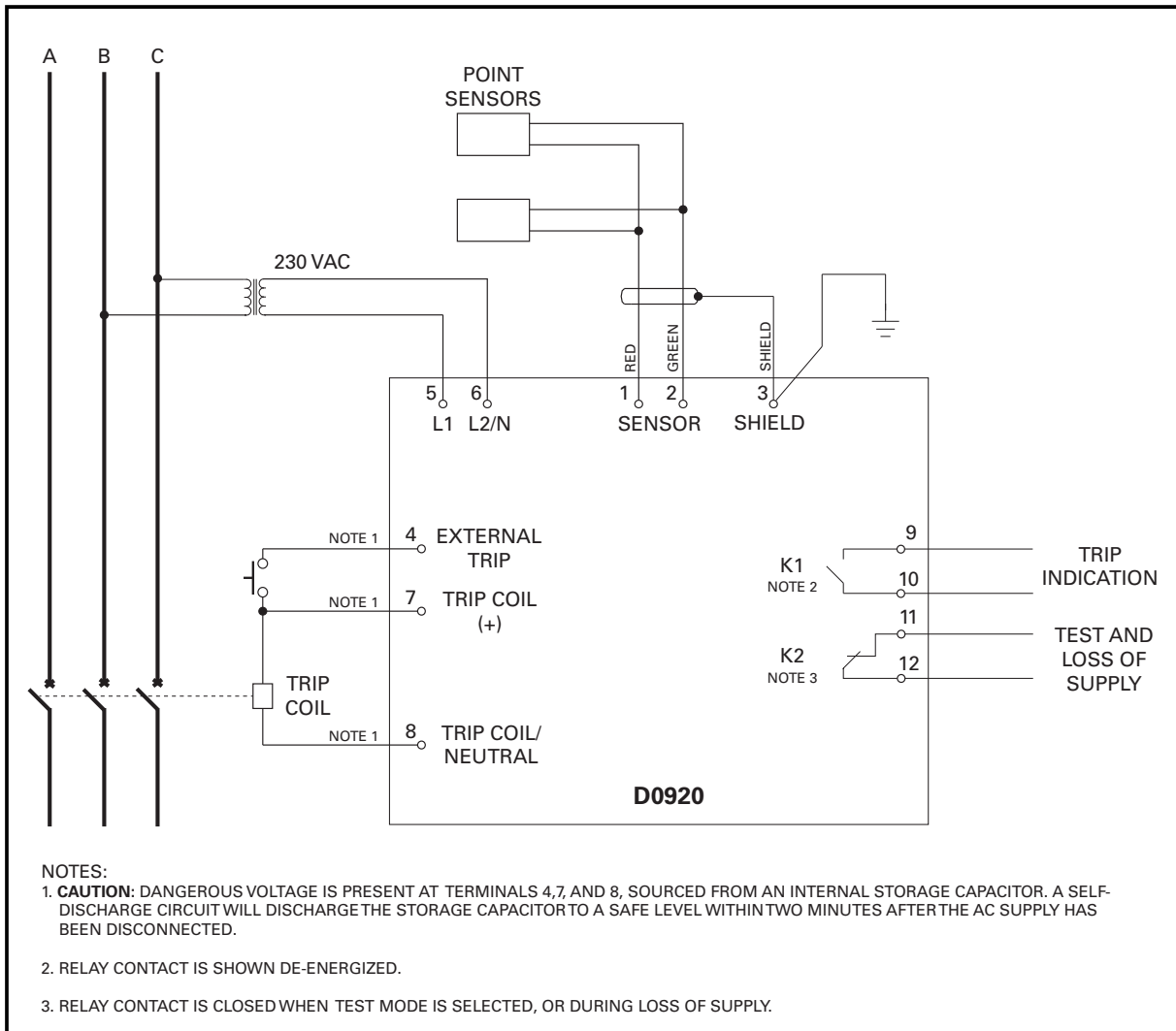


FIGURE 4. D0920 Typical Wiring Diagram.

3 INSTALLATION

3.1 D0920 Arc-Detection Unit

Outline and connection details are shown in Fig. 3. The D0920 can be DIN-rail mounted only. A typical wiring diagram is shown in Fig. 4.

Connect supply voltage to terminals 5 (L1) and 6 (L2/N). The nominal supply voltage is 230 Vac.

Connect the 230/250 Vdc trip coil from a circuit breaker to terminals 7 (TRIP COIL +) and 8 (TRIP COIL NEUTRAL). The trip coil output is not isolated from the 230 Vac supply input. To initiate an external trip, install a normally-open momentary (250-Vac-rated) switch between terminals 4 (EXTERNAL TRIP) and 7 (TRIP COIL +). Limit the time the switch is closed to one second.

Do not install modules or sensors which have been damaged in transport.

NOTE: Dangerous voltage is present at the storage capacitor (terminals 4, 7, and 8) even after the relay has been disconnected from the supply voltage. The capacitor has a self-discharge circuit which will discharge it to a safe voltage level within two minutes after disconnection from the supply voltage.

3.2 A0220 Point Sensor

Outline and connection details are shown in Fig. 5. Connect the red wire to terminal 1, the green wire to terminal 2, and the shield to terminal 3. If more than one sensor is connected, do not mix wire colors. Each sensor has an adhesive-backed drill template for surface-mount installation. Place the drill template where the sensor is to be mounted. See Fig. 6.

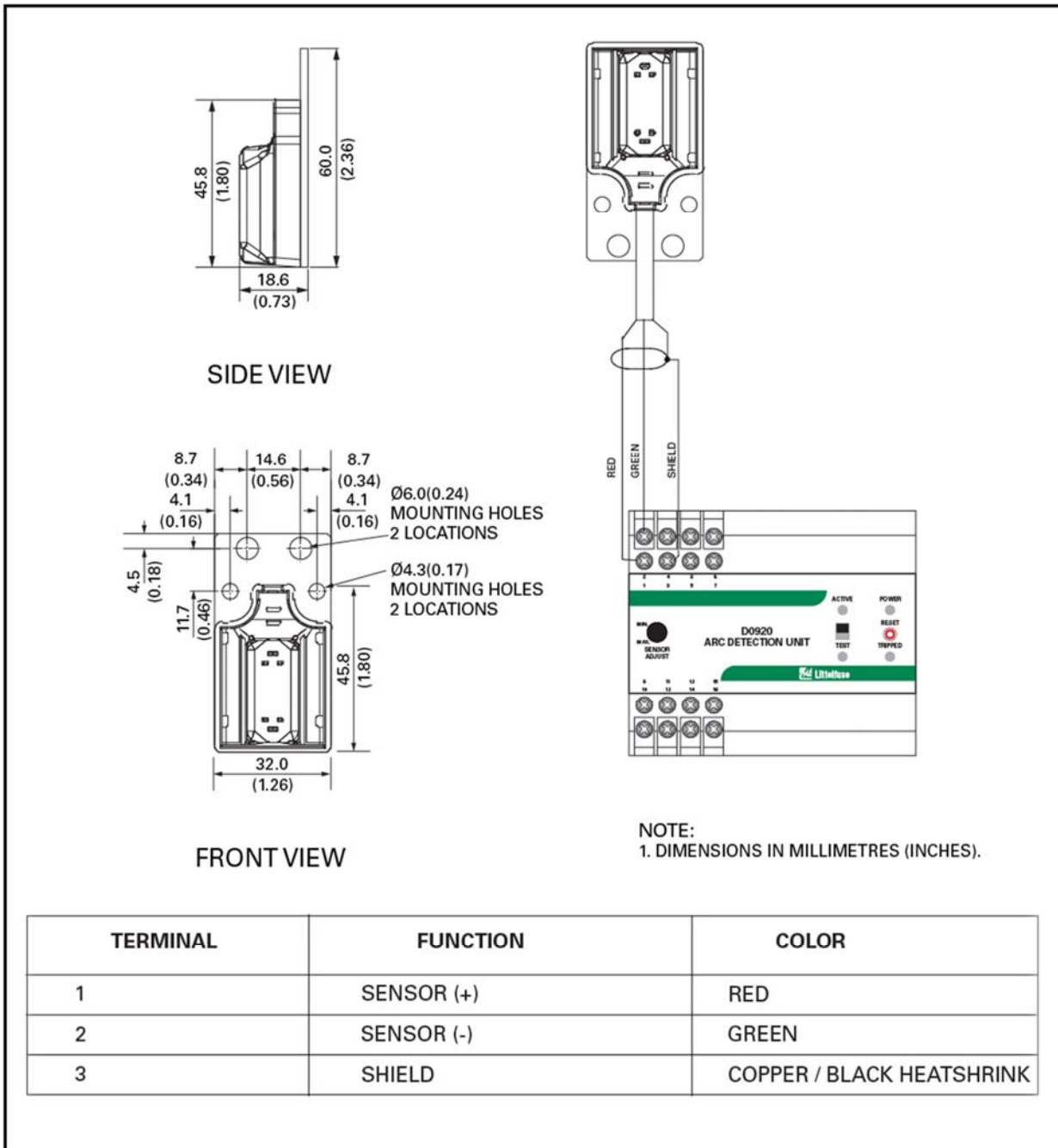


FIGURE 5. A0220 Outline and Connections.

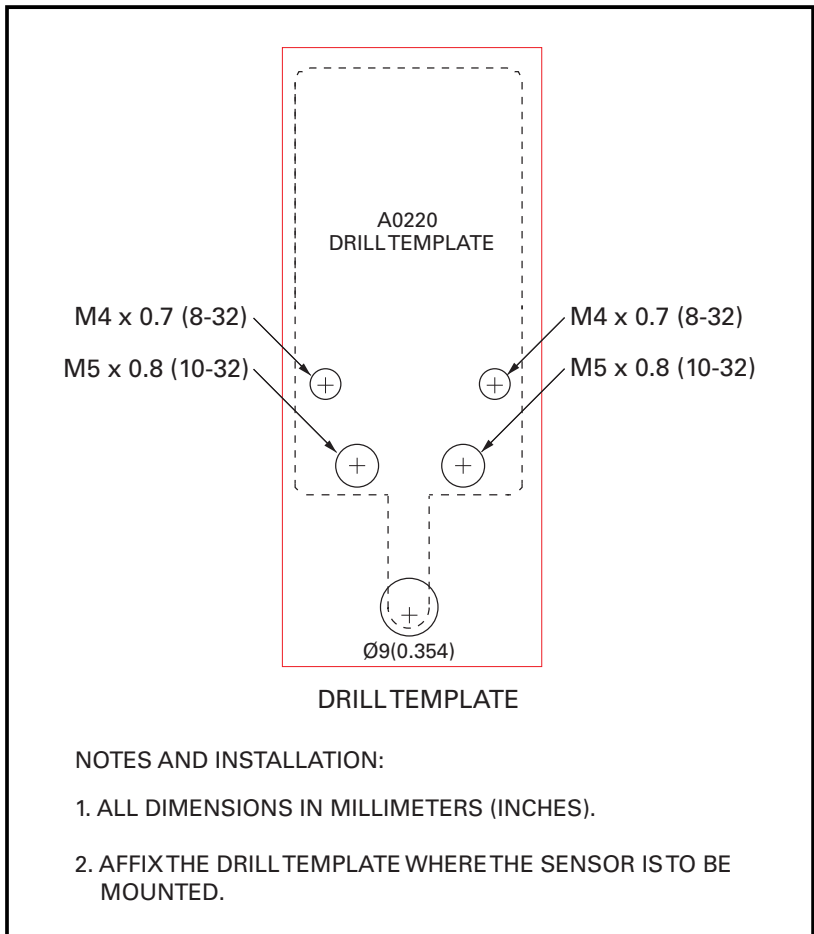


FIGURE 6. A0220 Mounting Details.

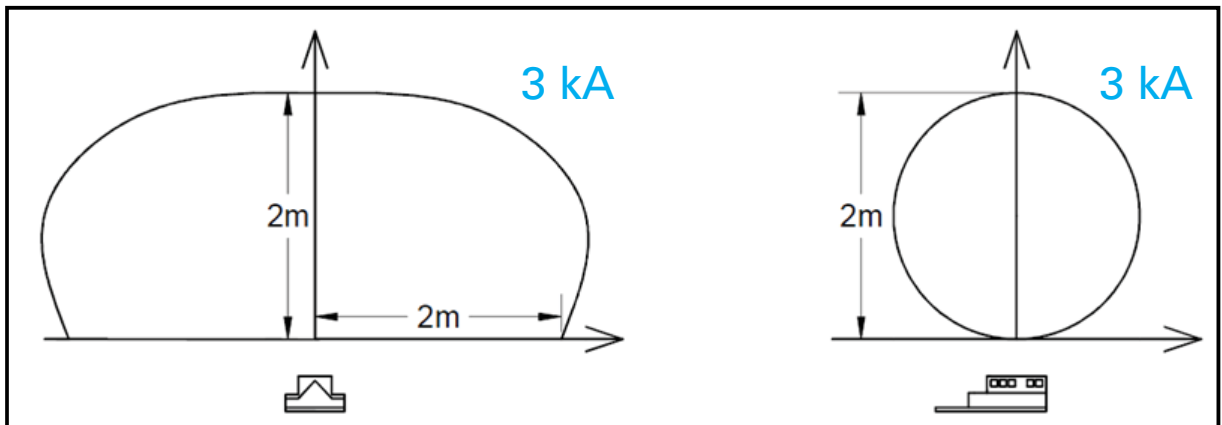


FIGURE 7. A0220 Detection Range for a 3 kA Fault.

4 TECHNICAL SPECIFICATIONS

4.1 D0920

Supply:	230 Vac (+15, -30%), 50/60 Hz
Sensor Sensitivity:	1 to 12 mA (2 to 24 klux)
Maximum Number of Sensors:	2
Nominal Trip Energy:	3.5 Ws (Joule) at 325 Vdc, 68 μ F capacitance
Trip Level Accuracy:	5%
Trip Time:	1 ms maximum
External Trip:	Active when Terminals 4 and 7 connected, limit to 1 s (exceeding the 1 s time limit may damage the trip coil or the D0920)

Output Relays:

Trip Coil:

Contact Configuration:	Normally Open
Voltage:	325 Vdc Peak at 230 Vac supply
Nominal Energy:	3.5 Ws (Joule) at 325 Vdc, 68 μ F capacitance
Mode:	Close on Trip
Terminals:	7, 8

Relay K1:

Contact Configuration:	Form A, Normally Open
Mode:	Close on Trip
Rating:	120 Vac, 5 A
Terminals:	9, 10

Relay K2:

Contact Configuration:	Form B, Normally Closed
Mode:	Close on Loss of Supply or Test Mode
UL Rating:	150 Vac, 0.46 A, 65 Vdc, 0.46 A
Terminals:	11, 12

Unused Terminals: 13-16

Dimensions:

Height:	90 mm (3.5")
Width:	105 mm (4.1")
Depth:	60.5 mm (2.4")



Environment:

Operating Temperature:	-25 to 70°C (-13°F to 158°F)
Storage Temperature:	-25 to 70°C (-13°F to 158°F)
Humidity:	93% Non-Condensing

EMC Tests:

Verification tested in accordance with EN60255-26:2009.

1 MHz Burst:	IEC 60255-22-1 ± 1 kV differential mode (line-to-line) ± 2.5 kV common mode
Electrostatic Discharge:	IEC 60255-22-2 ± 6 kV Contact Discharge (direct and indirect) ± 8 kV Air Discharge
Radiated RF Immunity:	IEC 60255-22-3 10 V/m, 80-1,000 MHz, 80% AM (1 kHz) 10 V/m, 1.4 to 2.7 GHz, 80% AM (1 kHz)
Fast Transient:	IEC 60255-22-4 Class A: ± 4 kV (on AC mains and I/O lines)
Surge Immunity:	IEC 60255-22-5 ± 1 kV differential mode (on AC lines) ± 2 kV common mode (on AC lines) ± 1 kV differential mode (on I/O ports)
Conducted RF Immunity:	IEC 60255-22-6 10 Vrms, 0.15-80 MHz, 80% AM (1 kHz)
Power Frequency:	IEC 60255-22-7 Class A – 150 V Differential Class A – 300 V Common Mode

Magnetic Field Immunity:	IEC 61000-4-8 50 Hz and 60 Hz 30 A/m and 300 A/m
Current Harmonics and Voltage Fluctuations:	IEC 61000-3-2 and IEC 61000-3-3 Class A
Radiated and Conducted Emissions:	CISPR 22:2008-09 / EN 55022:2010 Class B
Voltage Interruptions:	IEC 60255-11 and IEC 60255-29 Interrupts 30%, 25 Cycles x 3 Interrupts 60%, 10 Cycles x 3 Interrupts 100%, 250 Cycles x 3
Certification:	CE, European Union   EMC standards: EN60255-26 IEC 61010-1:2010 (3 rd Edition) Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part I
4.2 A0220 Point Sensor	
Sensor Type:	Photo electric
Sensitivity:	0.5 mA / klux
Sensitivity Range:	2 to 30 klux
Sensitivity Area:	180 degrees, see Fig. 7
Cable Type:	Shielded 2-wire, 24 AWG (0.2 mm ²)
Cable Length:	10 m (33 ft) included, 50 m (164 ft) maximum, use shielded 2-wire 20 AWG (0.5 mm ²) when extending length
IP Rating:	IP65
Operating Temperature:	-25 to 70°C (-13°F to 158°F)
Storage Temperature:	-25 to 70°C (-13°F to 158°F)

5 ORDERING INFORMATION

D0920.
0060 Arc-Detection Unit

Accessories:

A0033.0010	Point Sensor Cable, shielded 2-wire, 24 AWG (0.2 mm ²), 100 m (328 ft)
A0220.0010	Point Sensor, includes 10 m (33 ft) cable
A0220.0020	Point Sensor, includes 15 m (49 ft) cable
PGA-1100	Diode Logic Unit

6 WARRANTY

The D0920 Arc-Detection Unit is warranted to be free from defects in material and workmanship for a period of 5 years from the date of purchase.

Littelfuse will (at Littelfuse's option) repair, replace, or refund the original purchase price of a D0920 that is determined by Littelfuse to be defective if it is returned to the factory, freight prepaid, within the warranty period. This warranty does not apply to repairs required as a result of misuse, negligence, an accident, improper installation, tampering, or insufficient care. Littelfuse does not warrant products repaired or modified by non-Littelfuse personnel.

7 PERFORMANCE TEST

Testing of a completed installation can be done with a 100W light bulb or a photo flash. Use an incandescent lamp as this has light and heat radiation (infrared) that closely matches the sensitivity characteristic of the point sensor. The point sensor has its maximum sensitivity at a wave length of 850 nm which is in the infrared (invisible) range. In the middle of the visible region of 550 nm the sensitivity is down to approximately 50%. This means that both light and heat radiation from an arc contribute to the point sensor current that triggers the D0920.

If a photo flash unit is used it is essential that it is set to the 'MANUAL' mode. If it is used in 'AUTO' mode, the light emission will be dependent on random reflections and will change with the position from which it is fired.

A test-record form is provided for recording the date and the final results of the performance tests. The following system tests are to be conducted by qualified personnel:

- a) Switch on the supply voltage to the D0920. Ensure that the green POWER LED is on, and press the RESET button to clear an existing trip.
- b) Move the switch to the TEST position. This will allow testing of the D0920 and point sensors without causing the trip coil to trip. Relay K2 (terminals 11 and 12) will be closed when the D0920 is in test mode.
- c) Trip the D0920 by moving a light source close to a point sensor. When a trip occurs, the red TRIPPED LED will be on. Relay K1 (terminals 9 and 10) will be closed when the D0920 has tripped.
- d) Press the RESET button to reset the D0920. Relay K1 (terminals 9 and 10) will open.



- e) Repeat steps c) and d) for each installed point sensor.
- f) Move the switch to the ACTIVE position and close the external circuit breaker.
- g) Repeat step c). The circuit breaker will trip, and K1 (terminals 9 and 10) will be closed.
- h) Repeat step d).
- i) Record the date and the results of the test on the attached test-record form.

TABLE 1. TEST RECORD

DATE	TEST RESULTS

Retain this record for the authority having jurisdiction.

**APPENDIX A
D0920 REVISION HISTORY**

MANUAL RELEASE DATE	MANUAL REVISION	HARDWARE REVISION (REVISION NUMBER ON PRODUCT LABEL)
July 6, 2016	0-D-070616	03
March 11, 2015	0-C-031115	
January 10, 2014	0-B-011014	02
October 21, 2013	0-A-102113	

MANUAL REVISION HISTORY

Revision 0-D-070616

D0920 front panel updated.

Section 1

Fig.1 updated.

Section 2

Multiple sections updated.

Section 3

Fig. 5 updated.

Section 4

CCC certification added.

Section 5

Ordering information updated.

Section 7

Performance test procedure updated.

Revision 0-C-031115

Section 4

K1 rating updated.

Appendix A

Revision history updated.

Revision 0-B-011014

Section 4

Supply voltage and output relay specifications updated.

Appendix A

Revision history updated.

Revision 0-A-102113

Initial release.

HARDWARE REVISION HISTORY

Hardware Revision 03

Improved TEST and RESET switches added.

Hardware Revision 02

Changed transformer and transorb values.

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