

## Installation Guide

### 1.0 Notice

These instructions are for installing Radionics' D9078 LED Driver Module in a fire alarm system controlled by Radionics' D8024 or D10024 Fire Alarm Control Panels (FACP). The D9078 LED Driver Module is a module installed on a two-wire Class "A" or "B" circuit connected to the FACP through a D9051 RS-485 Bus Module. It receives 24 VDC power from the FACP or from an auxiliary power supply. See the *Analog Fire Alarm Control Panels Programming Guide* (P/N: 38789) for programming instructions. Consult each panel's Operator's Manual and Installation Guide for operating and installation instructions.

Install, test and maintain the D9078 according to these instructions, NFPA 72, Local Codes and the Authority Having Jurisdiction. Failure to follow these instructions may result in failure of the device to operate properly. Radionics is not responsible for improperly installed, tested or maintained devices.



**These instructions contain procedures to follow in order to avoid personal injury and damage to equipment.**



**NFPA 72 requires a complete system-wide functional test be performed following any modifications, repair, upgrades or adjustments made to the system's components, hardware, wiring, programming and software/firmware.**

**Note:** Make sure that the supply current is sufficient enough for full load conditions when installing this unit.

**Note:** A D9051 RS-485 Bus Module must be installed on the FACP in order to use the D9078 LED Driver Module.

### 2.0 Device Description

The D9078 LED Driver Module is a graphic annunciator driver board that interprets alarm and trouble data from the Control/Communicator. The D9078 then displays the data on individually programmed LEDs. A typical application employs the D9078 LED Driver Module as a graphic annunciator. The D9078 can also be used to turn on remote relays.

The D9078 provides an LED logic driver for graphic displays, and is compatible with those manufactured by Light Engineered Displays, WSA, Space-Age Electronics and other manufacturers. It is supported by software revision 610B-U0 or higher.

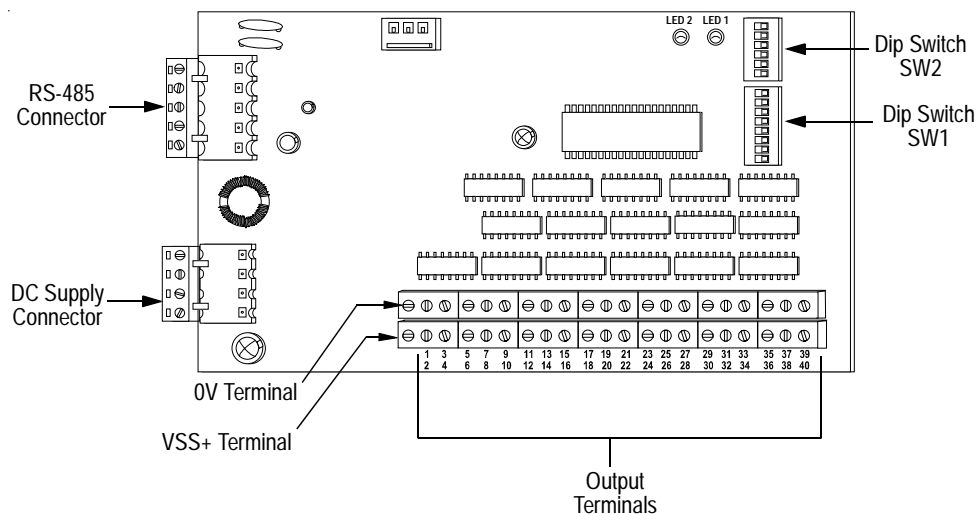


Figure 1: D9078 LED Driver Module

# D9078

## Installing the D9078

### 3.0 Installing the D9078



Inform the operator and the local authority before installing the D9078 in an existing system. Disconnect all power to the FACP before installing the D9078.

### 3.1 Mounting the D9078 LED Driver Module

Mount the D9078 on the D9013 Analog Modules Mounting Skirt (see the *D9013 Installation Guide*, P/N: 41379, for mounting instructions) in a suitable enclosure such as the D8109. If the D9078 is to be mounted in a graphics display enclosure, then consult the manufacturer's installation instructions.

The D9078 can be installed up to 4,920 ft. (1,500 m) from the control panel. Use a Radionics' D9073 High Integrity RS-485 Bus Module for greater distances.

### 3.2 Circuit Wire Connections

The D9078 communicates with the FACP over an RS-485 circuit connected to the D9051 RS-485 Bus Module. This peripheral circuit can mix D9078 LED Driver Modules and other peripheral devices such as Radionics' D9072 NAC Module, D9073 High Integrity RS-485 Bus Module and D9069 and D9070 Fire System Controllers and Annunciators.

To make circuit wire connections to the D9078, use the following procedure:

- 1) Remove AC power from the system at the dedicated 120 VAC breaker and remove the standby battery power before making or removing any connections to the FACP.
- 2) Connect the input "A" wire to the bottom terminal of the terminal block.
- 3) Connect the "B" wire to the next terminal (485 IN). The output "A" and "B" wires to the next peripheral device connect to the next two terminals (485 A and B OUT).

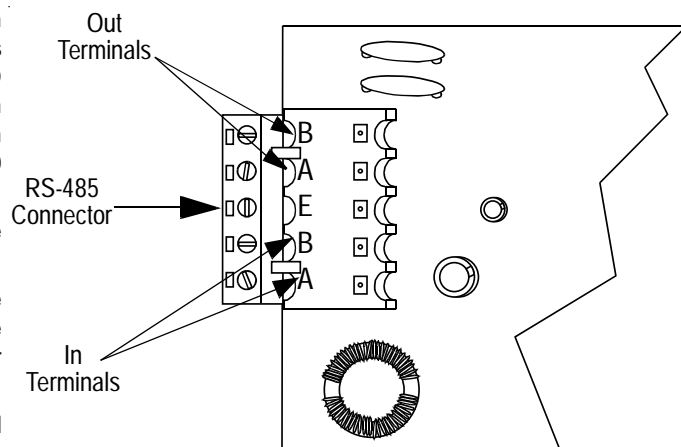


Figure 2: D9078 Circuit Wiring Connections

**Note:** The "A" and "B" wires must connect to their respective terminals. Crossing the terminal connections (connecting the "A" wire to the "B" terminal) will result in the FACP receiving corrupted data.

**Note:** The last D9078 in a Class "B" (two-wire) circuit must have a 150 ohm, ¼ watt pull-up resistor across the RS-485 OUT "A" and "B" terminals.

For more information, see Figure 9.

### 3.3 24 VDC Power Connections

A DC supply in the range of 18 V to 28 V, typically 24 V, rated at 300 mA minimum, is required to power the D9078 LED Driver Module. An on-board switch mode power supply isolates this input from all communication circuitry. An adequate DC supply can be obtained from the FACP's auxiliary 24 V output (see the FACP's installation manual for location of the auxiliary power output). An earth ground should be connected to the D9078's RS-485 connector from the FACP.

The D9142F 24 VDC Power Supply is suitable for this application.

**Note:** Make sure that the supply current is sufficient for full load conditions when installing this unit.

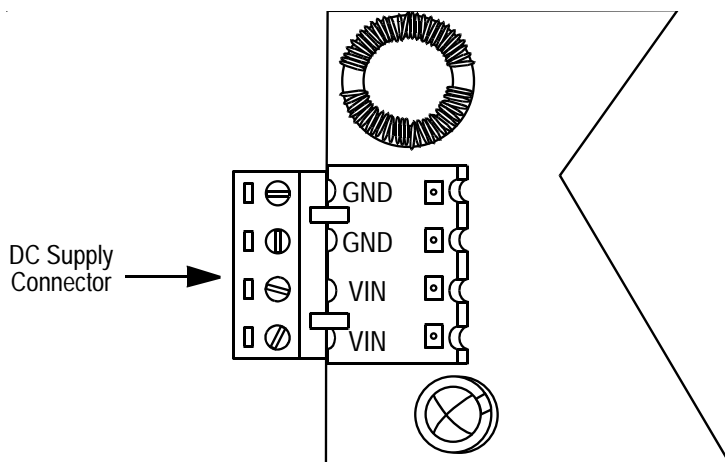


Figure 3: Location of D9078 DC Supply Connector

Table 1 shows the current consumption in the idle state and in the fully loaded (all outputs active) state for three input voltage ranges.

State	18 VDC	24 VDC	28 VDC
Idle State (mA)	19	29	39
Full Load State (mA)	370	277	247

Table 1: Current Consumption Rates

### 3.4 Output Connections

Each output on the D9078 will drive one or two LEDs when connected in a series configuration without the need for any external limiting resistors. Attempting to drive more than two LEDs will result in a noticeable reduction in the brightness of the LEDs on that output. See Figure 4 for wiring details.

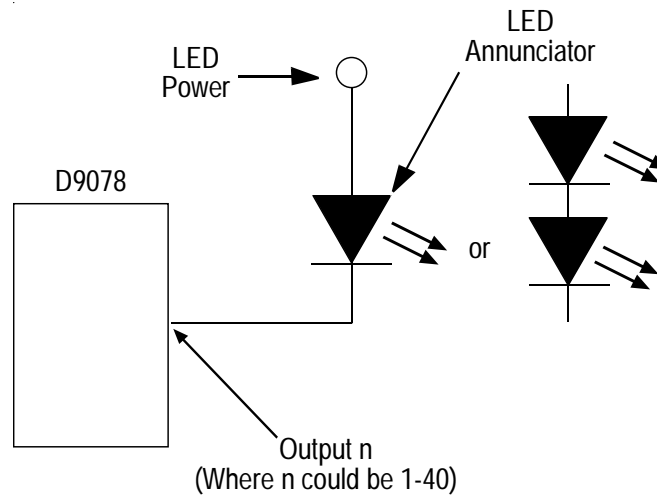
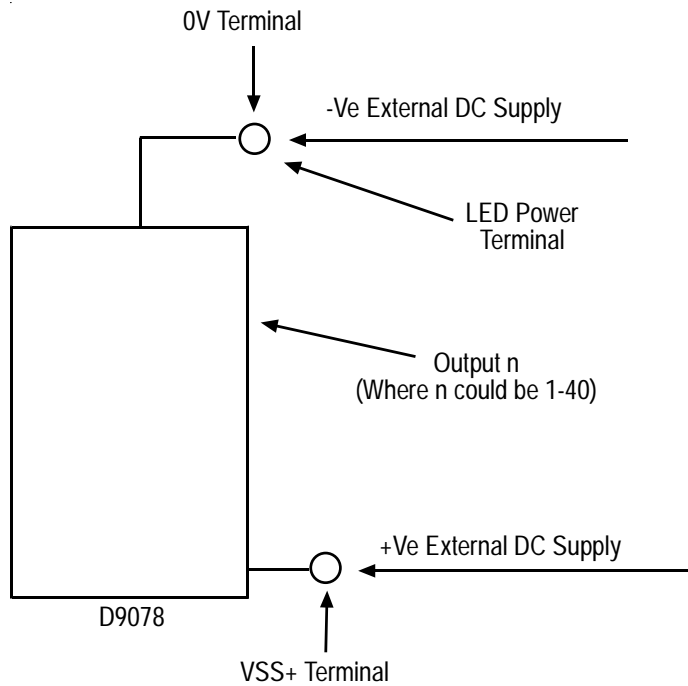


Figure 4: Wiring LEDs in a Series Configuration

If more than two LEDs per output are required, then an external power supply must be provided. The (+)24 VDC of the DC supply must be connected to the LED Power terminal, and the GND to the 0 V terminal.

# Installing the D9078



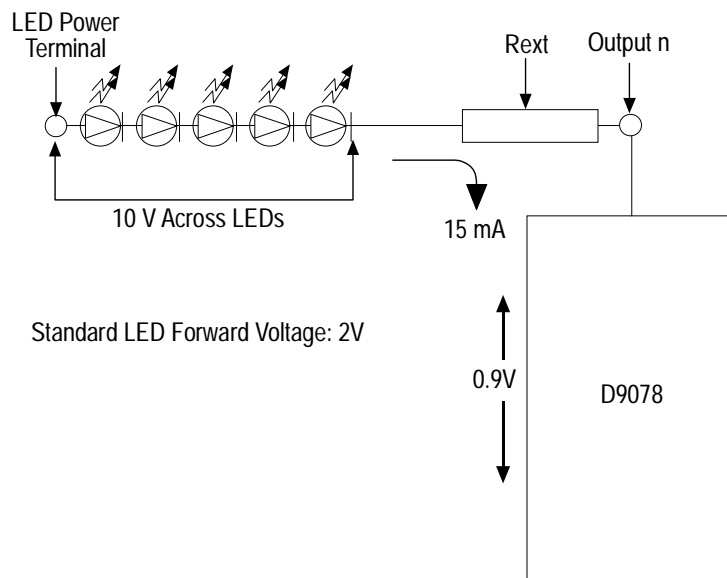
**Figure 5: Connecting an External Power Supply to the D9078**

**Note:** Polarity must follow the pattern shown in Figure 5 or the D9078 may be damaged. A current limit resistor must be used to avoid damaging the D9078 if more than two LEDs per output are required.

External limiting resistors must be calculated depending on the number of LEDs used in order that each output is limited to 15 mA maximum.

Figure 6 shows how to calculate an external power source to supply up to five LEDs per output and their relative limiting resistors.

Voltage developed across the internal 270 Ω resistor when 15 mA is following is 4.05 V. Therefore, the LED power will need to be at least 4.05 + 0.9 + 10.0 = 14.95 V. If an external power supply is to be 24 V, then  $R_{ext}$  would be  $(24 - 14.95) / 15 \text{ mA} = 603 \text{ Ω}$ .



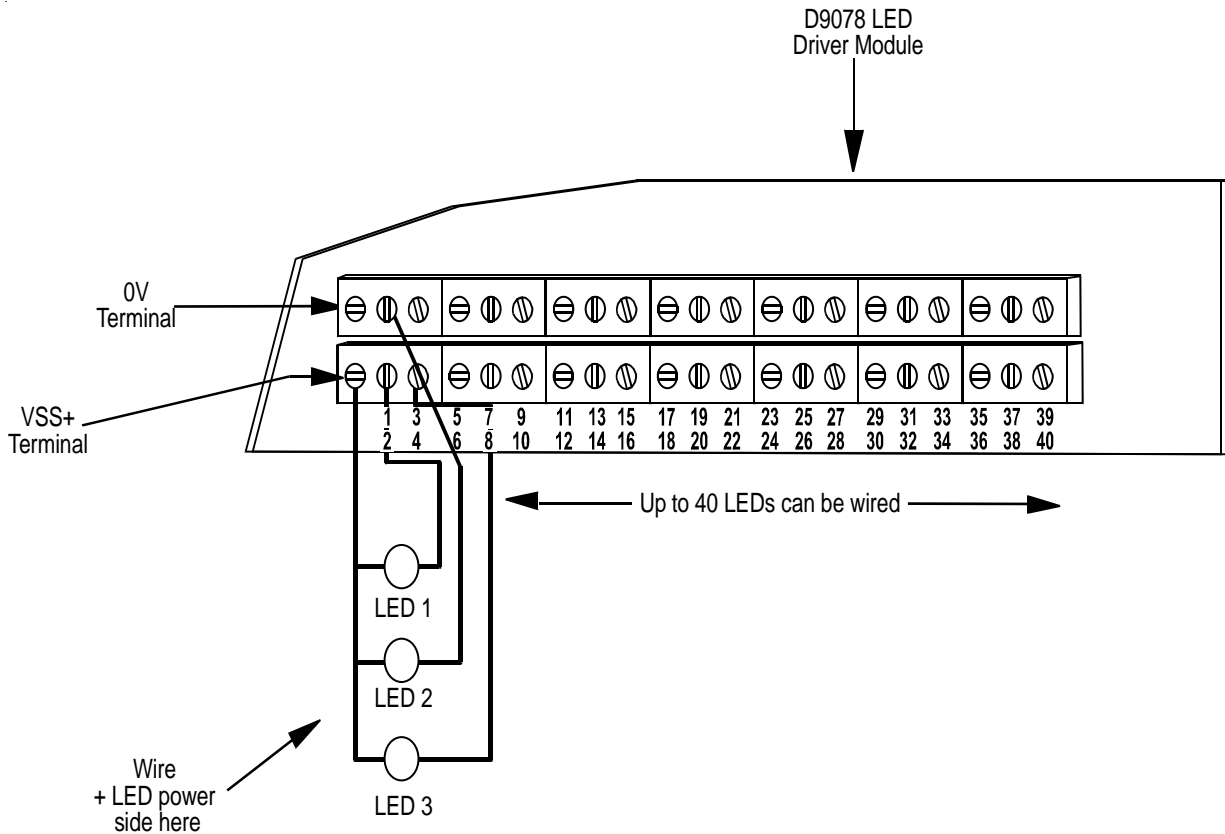
**Figure 6: Calculating External Limiting Resistors**

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Table 2 gives suggested externally applied LED power ratings with related external limiting resistors.

LEDs per Output	Suggested R <sub>ext</sub>	Power Rating
5	620 ohms	0.25 watts
4	750 ohms	0.5 watts
3	910 ohms	0.5 watts

**Table 2: Suggested External Limiting Resistors**



**Figure 7: Wiring LEDs to the D9078 LED Driver Module**

The externally supplied LED power must not fall below 8 VDC or exceed 40 VDC.

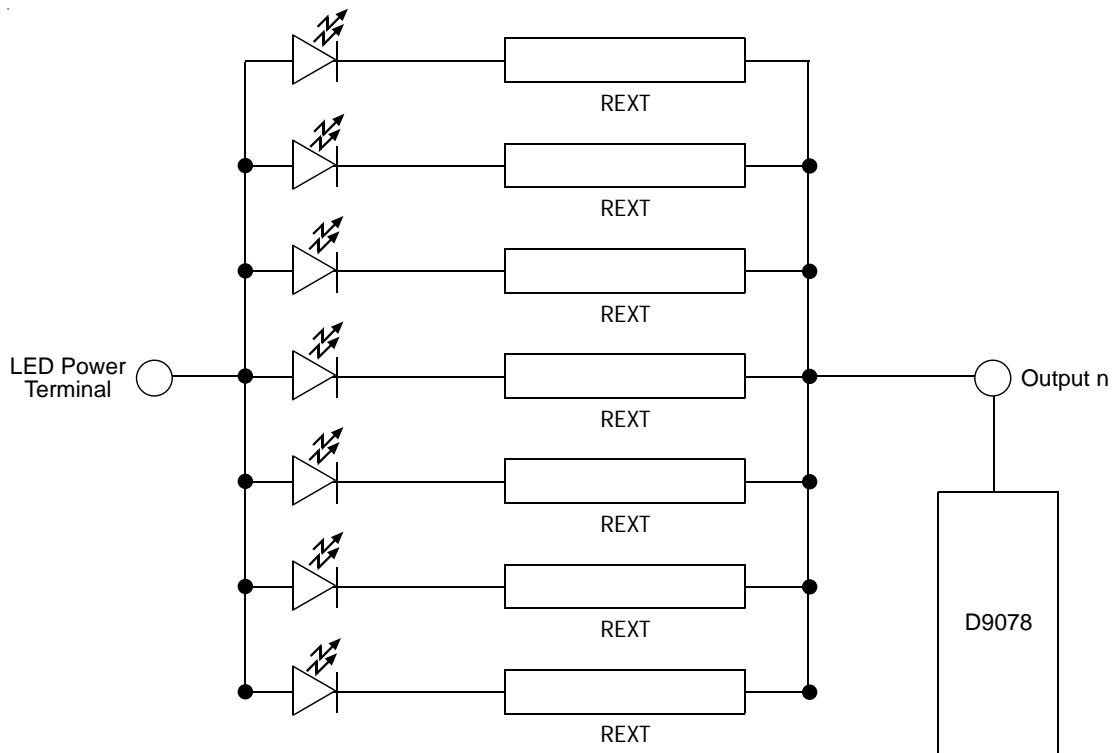
Fitting resistor values lower than the suggested values may result in damage to the D9078 LED Driver Module.

An external LED power supply **must not** be derived from the FACP auxiliary supply.

When wiring LED outputs to the D9078, be sure to wire each LED negative wire to the output terminal 1-40. See Figure 7 for the wiring location of the 9 V LED power supply.

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### 3.5 Parallel Connection of Low Current LEDs



**Figure 8: Parallel Connection of Low Current LEDs**

Low current LEDs with a forward current of 2 mA can be used as an alternative to standard LEDs. The lower forward current will allow these LEDs to be connected in a parallel configuration. The advantage of using such LEDs is that up to seven LEDs can be connected to each output using the internal LED power supply. This configuration allows for the same external resistor value per LED regardless of the number of LEDs connected.

Forward voltage of low current LEDs is typically 1.8 V. Each Rext will be in the range of 1880 to 2000  $\Omega$ . See Figure 8 for more details.

### 3.6 Connecting the D9078 LED to the Analog FACPs

The D9078 LED Driver Module can be connected to the D8024 and D10024 Fire Alarm Control Panels (FACP) in order to provide graphic annunciation or to turn on remote relays. See Figure 9 for wiring details.

**Note:** Although Figure 9 shows the D8024 Control Module, the same connections are made when wiring the D9078 LED Driver Module to the D10024 FACP.

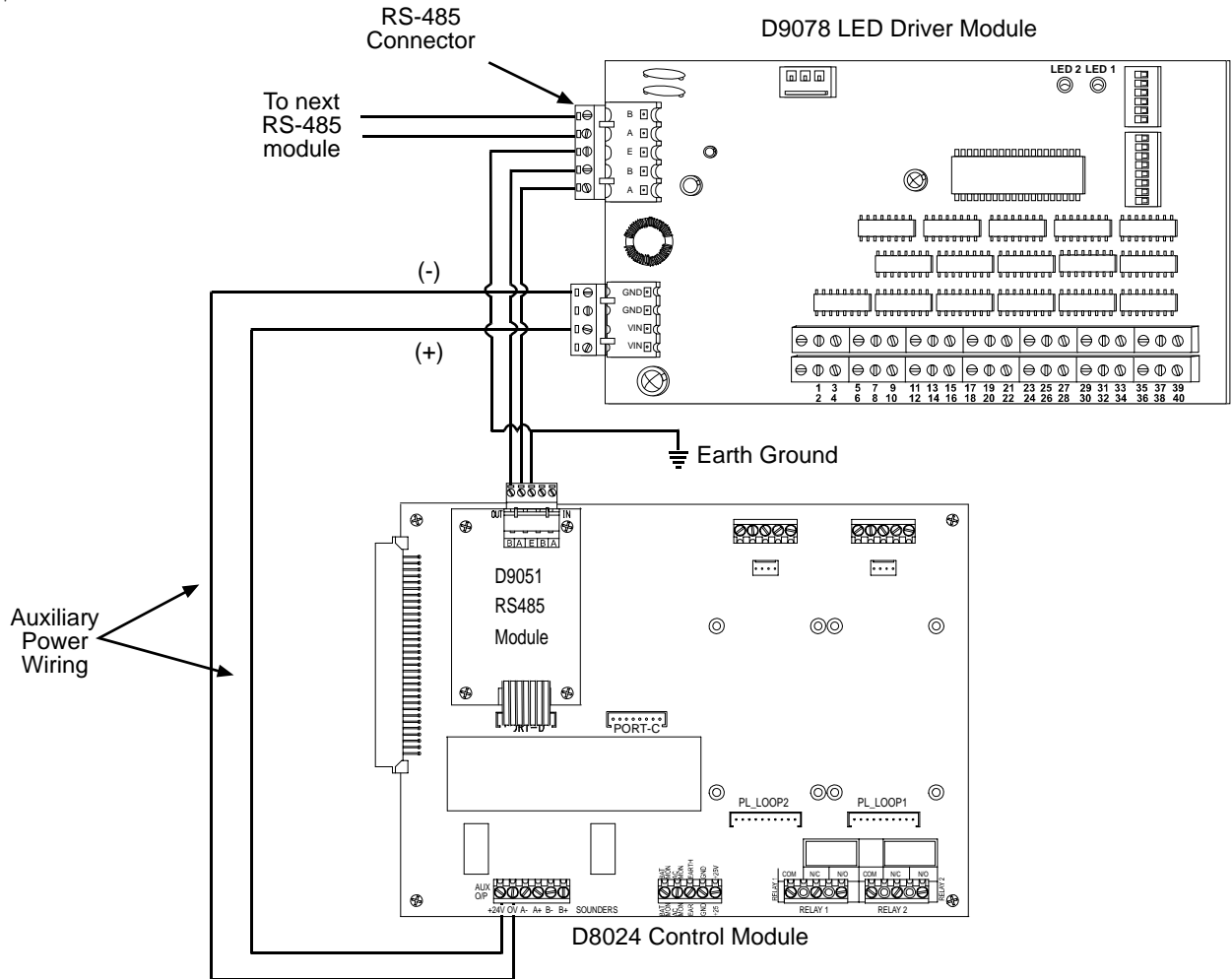


Figure 9: Connecting the D9078 to the Analog FACPs

# D9078

## Using the D9078 as a Relay Driver

### 4.0 Using the D9078 as a Relay Driver

The D9078 LED Driver Module can be used to drive high sensitivity relays, such as the Altronix ALTRBST. Figure 10 shows how the D9078 can be used in such a way.

**Note:** Using the D9078 as a relay driver has not been evaluated by Underwriters Laboratories, Inc.

**Note:** Back EMF protection diodes are included on the D9078 module. Maximum coil power rating for 12 V relays is 180 mW. Maximum coil power rating for 24 V relays is 360 mW.

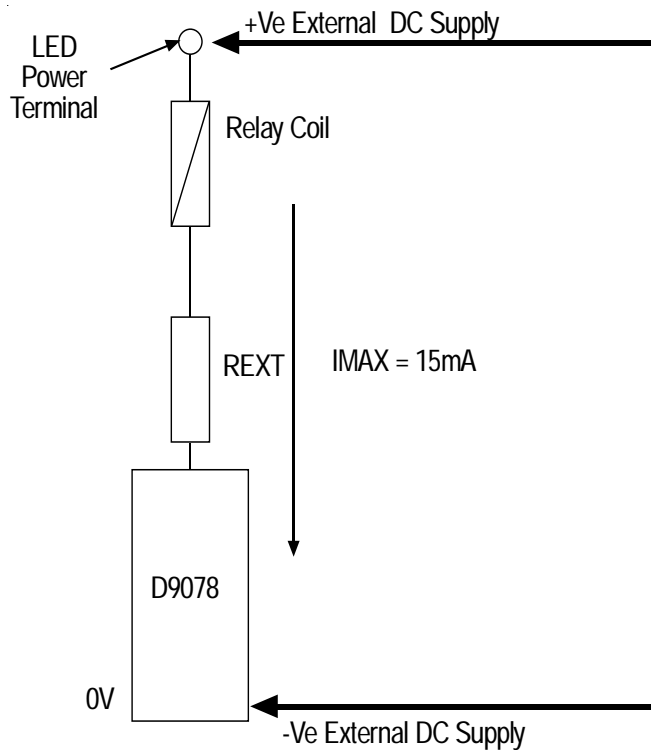


Figure 10: Using the D9078 as a Relay Driver

### 5.0 Restoring Power to the FACP

When all wiring connections have been made, restore power to the FACP by connecting the standby batteries and closing the 120 VAC dedicated breaker that controls the power input to the FACP. The green AC Power LED on the panel display lights to show that the 120 VAC power supply is on and the standby power supply is connected.

### 6.0 LED Programming

See the *Analog Fire Alarm Control Panels Programming Guide* (P/N: 38789) for instructions on programming LED output functions.



## 7.0 D9078 Features

### 7.1 LED Indicators

Table 3 describes the actions of the LEDs on the D9078.

LED Color	Description
Yellow	Flashes when the D9078 receives valid RS-485 data.
Green	Flashes at a rate of 1 second on, 1 second off when the D9078 has a DC supply and is operating.

**Table 3: D9078 LED Actions**

### 7.2 Zone/Event and Range Selection

The D9078 can be configured to display either “zone” or “event” information by setting DIP switch SW2.

See Table 4 for a summary of SW2 DIP switch settings and outputs.

### 7.3 D9078 Address Selection

The D9078 LED Driver Module has an eight-position DIP switch (SW1) for address selection. Select a peripheral address that does not conflict with any other devices in the address range of 1 to 126. Once installed, follow the procedure in the FACP's programming guide for learning peripherals.

When the D9078 has been learned into the system, it is ready for use.

See Table 5 for address information.

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## D9078 Zone/Event Information

SW2, pos 1	SW2, pos 2	SW2, pos 3	SW2, pos 4	SW2, pos 5	SW2, pos 6	Zone Outputs	Event Outputs
OFF	OFF	OFF	OFF	OFF	OFF	1 - 40	-
ON	ON	OFF	OFF	OFF	OFF	41 - 80	-
OFF	ON	OFF	OFF	OFF	OFF	81 - 120	-
ON	ON	OFF	OFF	OFF	OFF	121 - 160	-
OFF	OFF	ON	OFF	OFF	OFF	161 - 200	-
OFF	OFF	OFF	OFF	OFF	ON	-	1 - 40
ON	OFF	OFF	OFF	OFF	ON	-	41 - 80
OFF	ON	OFF	ON	OFF	ON	-	81 - 120
ON	ON	OFF	OFF	OFF	ON	-	121 - 160
OFF	OFF	ON	OFF	OFF	ON	-	161 - 200
ON	OFF	ON	OFF	OFF	ON	-	201 - 240
OFF	ON	ON	OFF	OFF	ON	-	241 - 280
ON	ON	ON	OFF	OFF	ON	-	281 - 320
OFF	OFF	OFF	ON	OFF	ON	-	321 - 360
ON	OFF	OFF	ON	OFF	ON	-	361 - 400
OFF	ON	OFF	ON	OFF	ON	-	401 - 440
ON	ON	OFF	ON	OFF	ON	-	441 - 480
OFF	OFF	ON	ON	OFF	ON	-	481 - 520
ON	OFF	ON	ON	OFF	ON	-	521 - 560
OFF	ON	ON	ON	OFF	ON	-	561 - 600
ON	ON	ON	ON	OFF	ON	-	601 - 640
OFF	OFF	OFF	OFF	ON	ON	-	641 - 680
ON	OFF	OFF	OFF	ON	ON	-	681 - 720
OFF	ON	OFF	OFF	ON	ON	-	721 - 760
ON	ON	OFF	OFF	ON	ON	-	761 - 800

Table 4: SW2 Zone and Event Information

# D9078 Address Selections

Use the following table to set the D9078's address. A checkmark (√) in the switch column indicates that the switch is ON.

Address Value	Switch								Address Value	Switch								Address Value	Switch							
	1	2	4	8	16	32	64	NA		1	2	4	8	16	32	64	NA		1	2	4	8	16	32	64	NA
1	√								43	√	√		√		√			85	√		√		√		√	
2		√							44			√	√		√			86		√	√		√		√	
3	√	√							45	√		√	√		√			87	√	√	√		√		√	
4			√						46		√	√	√		√			88			√	√		√		√
5	√		√						47	√	√	√	√		√			89	√		√	√		√		√
6		√	√						48				√	√				90		√		√	√		√	
7	√	√	√						49	√			√	√				91	√	√		√	√		√	
8				√					50		√		√	√				92		√	√	√		√		√
9	√			√					51	√	√		√	√				93	√		√	√	√		√	
10		√		√					52			√	√	√				94		√	√	√	√		√	
11	√	√		√					53	√		√	√	√				95	√	√	√	√	√		√	
12			√	√					54		√	√	√	√				96					√	√		√
13	√		√	√					55	√	√	√		√	√			97	√				√	√		√
14		√	√	√					56			√	√	√				98		√			√	√		√
15	√	√	√	√					57	√		√	√	√				99	√	√			√	√		√
16					√				58		√	√	√	√				100		√			√	√		√
17	√				√				59	√	√		√	√	√			101	√		√		√	√		√
18		√			√				60			√	√	√	√			102		√	√		√	√		√
19	√	√			√				61	√		√	√	√	√			103	√	√	√		√	√		√
20			√		√				62		√	√	√	√	√			104			√		√	√		√
21	√		√		√				63	√	√	√	√	√	√			105	√			√		√	√	
22		√	√		√				64							√		106		√		√		√	√	
23	√	√	√		√				65	√						√		107	√	√		√		√	√	
24				√	√				66		√					√		108			√	√		√	√	
25	√			√	√				67	√	√					√		109	√		√	√		√	√	
26		√		√	√				68			√				√		110		√	√	√		√	√	
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28			√	√	√				70		√	√				√		112				√	√	√		√
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38		√	√			√			80				√			√		122		√		√	√	√		√
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40				√		√			82		√		√			√		124			√	√	√	√		√
41	√			√		√			83	√	√		√			√		125	√		√	√	√	√		√
42		√		√		√			84			√	√			√		126		√	√	√	√	√		√

Table 5: Peripheral Analog Device Address Table

## 8.0 D9078 Specifications

D9078	
Supply Voltage	Typically 24VDC @ 300mA. See Table 1 for more information.
LED Displays	DC supply/operation; RS-485 Receive Data
Communication	RS-485
Length	6.3 in. (16.0 cm)
Width	4.4 in. (11.2 cm)
Depth	1.1 in. (2.8 cm)
Weight	8 oz. (226 g.)