Electrical Installation Instructions for Delayed Egress Exit Devices

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dormakaba Group

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Planning the installation

Contents

These electrical installation instructions describe how to electrically operate your PHI Delayed Egress Exit Device. Topics covered include:

Site survey

Use the following survey to record information about the installation site. You need this information to determine how to prepare the door for the lock.

Door information

Door handing and bevel:

- ❏ Left hand, reverse bevel (LHRB)
- ❏ Right hand, reverse bevel (RHRB)

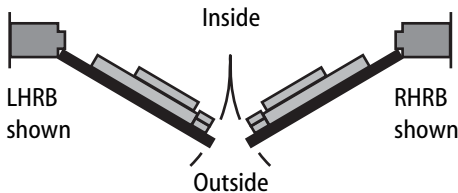Door thickness: _____ inches (1 3/4″ to 2 1/4″)

Figure 1   Door handing diagram

Electrical specifications

Spec	Rating
Voltage	24 VDC regulated and filtered
Current armed	3.2 amps for 0.2 sec, then 0.2 amps steady state
Current disarmed	0.1 amps
Alarm relay contacts	1 amp @ 24 VDC
Secure relay contacts	1 amp @ 24 VDC
Time delay period	standard: 15 seconds optional: 30 seconds is available where approved by the authority having jurisdiction. **This setting is NOT field selectable.**

PS160-6 Power Supply Battery Backup features

- ■ Built-in charger for sealed lead acid batteries.
- ■ Automatic switch over to stand-by battery when AC fails.
- ■ The maximum charge current 0.7 amp.
- ■ Zero voltage drop when switching over to battery backup.
- ■ The PS160-6 enclosure accommodates up to two (2) 12VDC/7AH batteries.

Two 12-volt, 7-amp batteries connected in series will provide 2 hours of stand-by time.

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Installing components

1 Install necessary components

Prepare the opening for the selected application using the proper templates. Install the Delayed Egress (DE) exit device according to the installation instructions supplied.

The DE device is intended to be installed as described herein.

> *Caution:* **Disconnect power prior to making any connections!**

The DE device requires the UL-approved Precision Hardware power supply: Model PS160-6. This power supply is available with battery back-up.

1 **Required**: Install the electrical (conduit) transfer device (electric hinge, door loop, EPT, etc) according to the manufacturer's instructions. Machine the hinge stile of the door according to template number 02187-11.

2 **Required**: Connect the DE device to the fire alarm system according to prevailing Codes. The fire alarm connection can be made at the power supply or the DE device.

The number of external components determines the number of conductors used in the wire run. All power wires must be 18 AWG or larger. All signal wires must be 22 AWG or larger.

Use the following chart to determine the wire gauge needed for your installation.

Table 1   Minimum Wire Gauge for 24 Volts DC

	Distance in feet from power source to farthest locking device				
Feet:	25′	50′	75′	100′	150′
AWG (wire gauge)	18	16	16	14	12

Installing components

3 **Optional**: Install any optional external components (card readers, remote switches, voice modules, etc) according to the manufacturer's instructions (not verified by UL).

   Caution: **Make sure all devices connected to the DE device are UL listed equipment.**

4 Apply the included label "**Push until alarm sounds. Door can be opened in 15 seconds**" centered on the door and one foot above the DE device as shown in Figure 2.

   Note: *Depending on your application, the label you may have received with the DE Device could state that the door can be opened in 30 seconds instead of 15 seconds.*
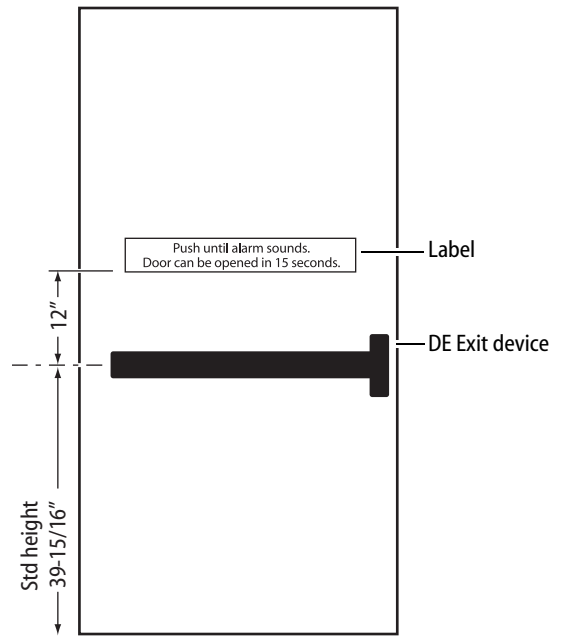

Figure 2   Door showing the application of the label.

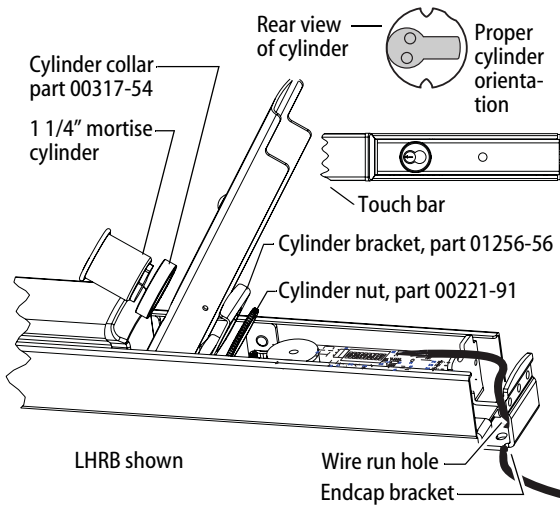*Figure 3   Installing the key cylinder*

When fire termination is not required at the exit device, connect the green and white wires using the connector provided. See "Connect fire internal circuit" on page 6.

Figure 4   Accessing the electronics, showing the splice connector
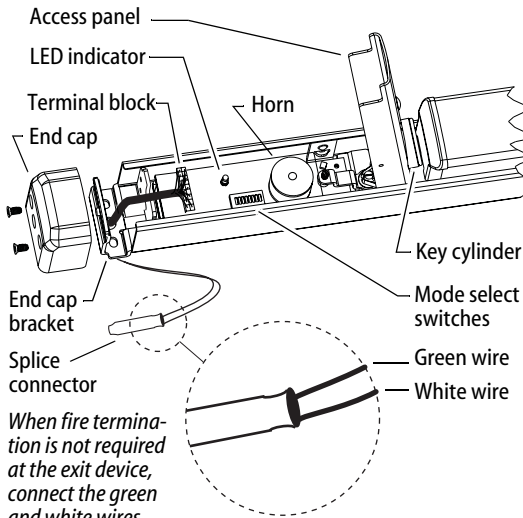
Installing components

2 Install key cylinder

■ Insert the key cylinder through the cylinder collar, the access cover, then the cylinder bracket and secure with the cylinder nut. The keyway should be toward the touch bar. See Figure 3.

3 Access electronics

1 Remove the end cap security screws and pull away the end cap as shown in Figure 4.

2 Pull the access panel toward the end cap bracket and away from the device.

4 Pull wire to device and plug in the wire harness

If not already done, plug the wire harness into the device board and pull the wire through the end cap bracket to the door as shown in Figure 5.
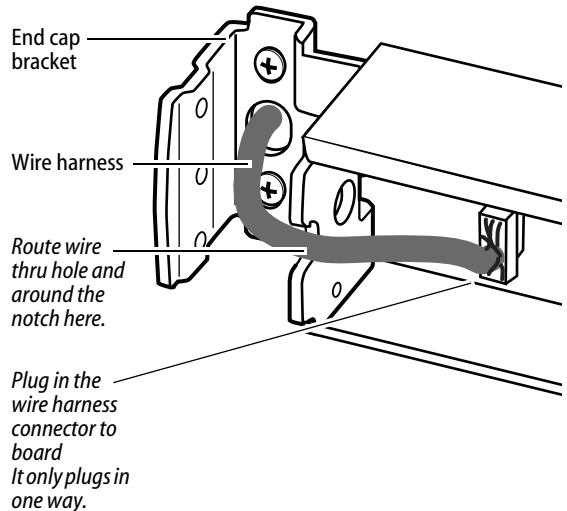

Figure 5   Pulling the wire harness to the device

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Installing components

Wiring harness description

Use the following table to identify wires and their function.

Table 2   Wiring harness descriptions, colors and wire gauge sizes

Pin loc	Wire description	Wire color	Wire gauge (AWG)
1	– 24 VDC	Black	22
2	+24 VDC	Red	22
3	Fire alarm 1	Green	22
4	Fire alarm 2	White	22
5	External inhibit	Red/white	24
6	External inhibit	Green/white	24
7	Devnet +	Orange	24
8	Devnet –	Orange/white	24
9	Devnet_ref	Black/white	24
10	S Relay (NC)	Brown	24
11	S Relay (NO)	Gray	24
12	S Relay (Com)	Violet	24
13	A Relay (NC)	Brown/white	24
14	A Relay (NO)	Gray/white	24
15	A Relay (Com)	Violet/white	24
16	Door position switch	Blue	24
17	Door position switch	Blue/white	24

Located on the underside of the access panel. See Figure 4.

Actual size of the wiring harness label

Enlarged

Delayed Egress Wiring Harness

J3

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18

Pin Location	Pin Description	Wire Color
1	-24VDC	BLACK
2	+24VDC	RED
3	FIRE1	GRN
4	FIRE2	WHT
5	EXTINHIB	RED/WHT
6	EXTINHIB	GRN/WHT
7	DEVNET+	ORG
8	DEVNET-	ORG/WHT
9	DEVNET_REF	BLK/WHT
10	SRELAYNC	BRN
11	SRELAYNO	GRY
12	SRELAYC	VIO
13	ARELAYNC	BRN/WHT
14	ARELAYNO	GRY/WHT
15	ARELAYC	VIO/WHT
16	DPSSW	BLU
17	DPSSW	BLU/WHT
18		

Figure 6   Wiring harness label actual size (top) and enlarged.
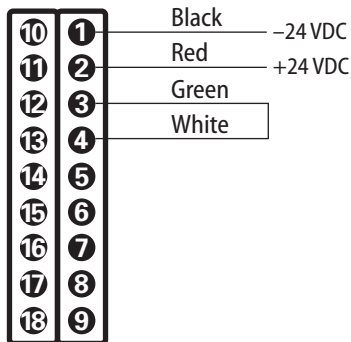
Connecting wires to terminals

Figure 7   Simple Delayed Egress device with fire alarm

5   Connect power and fire

Connect power

Connect the device to the UL-approved Precision Hardware Model PS160-6 power supply.

> **Note:** *Connect no more than a maximum of four (4) DE Exit Device units to one PS160-6 power supply.*

1   Connect the RED wire to +24 VDC.

2   Connect the BLACK wire to −24 VDC.

Connect fire internal circuit

For most applications follow this step. But see "Door position with Fire alarm" on page 14 for an alternate fire application.

> **Note:** *Make sure that all connections between DE Exit Devices and the fire panel are **set to fail-safe mode**.*

■ Connect the GREEN and WHITE wires as shown in Figure 7. Connect the contact of the fire circuit to the power supply. See installation instructions for the power supply.

Description of operation: When there is a fire alarm the DE device will lose power and act as a normal exit device.

Connecting wires to terminals

6 Make other connections

Device networking

1 Connect the ORANGE wire of one DE device to the ORANGE wire of another DE device as shown in Figure 8.

2 Then connect the ORANGE/WHITE wire of one DE device to the ORANGE/WHITE wire of another DE device.

3 Connect the BLACK/WHITE wire of one DE device to the BLACK/WHITE wire of another DE device as shown in Figure 8.

4 Set the mode select switches as necessary. See "Set mode select switches" on page 10.

Description of operation: This feature allows a DE device to arm, alarm, reset, and disarm all DE devices on the connected circuit. Each DE device will continue to operate independently for momentary egress.

Note: *Failure of the interconnected wiring results in independent operation or the unit will be fail-safe.*
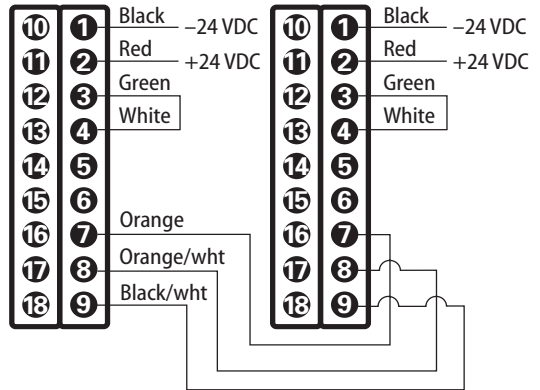
Figure 8   Two DE networked devices with fire alarm
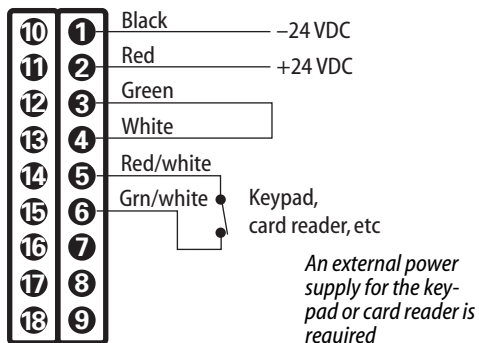
Connecting wires to terminals

Figure 9   Connecting a card reader, keypad, or other external inhibiting input device

Figure 10   Connecting a secure relay lamp

External inhibit

■ Connect the RED/WHITE and GREEN/WHITE wires to an external inhibiting device such as a card reader, keypad or other input as shown in Figure 9.

Description of operation: When the switch contact is closed during the alarm mode the DE device will reset to the armed mode.

When the switch contact is closed during the off mode the DE device will reset to the armed mode **(when approved by the local authority having jurisdiction)**.

When the switch contact is closed during the armed mode the DE device will remain unarmed until the contact opens. The DE device will then relock and be armed after the contact opens.

Secure relay

■ Connect the BROWN and VIOLET wires to an indicator (such as a light) as shown in Figure 10.

Description of operation: In this example the secure relay is used to control a lamp that indicates an unsecure opening. This internal SPDT relay will toggle when the device is armed.
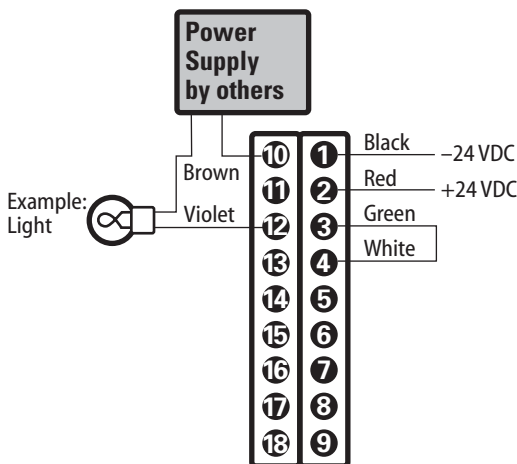
The internal relay is rated for 1 amp @ 24 VDC.

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Connecting wires to terminals

Alarm relay

■ Connect the GRAY/WHITE and VIOLET/WHITE wires to an indicator (such as a horn) as shown in Figure 11.

Description of operation: In this example the alarm relay is used to control a remote powered horn. This internal SPDT relay will toggle when the device is alarmed.

The internal relay is rated for 1 amp @ 24 VDC.

Door position switch

1 Connect the BLUE/WHITE and BLUE wires to a door position switch as shown in Figure 12.

2 Set the mode select switch #7 to ON.

Description of operation: When this input is used the device cannot be armed when the door is opened and if armed it will alarm the DE device if the door is opened. Also, the arm/re-arm time will end when the door is closed.
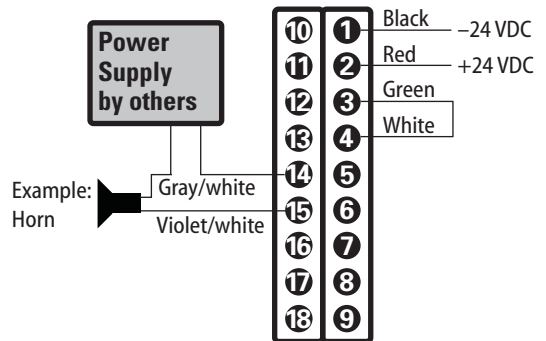
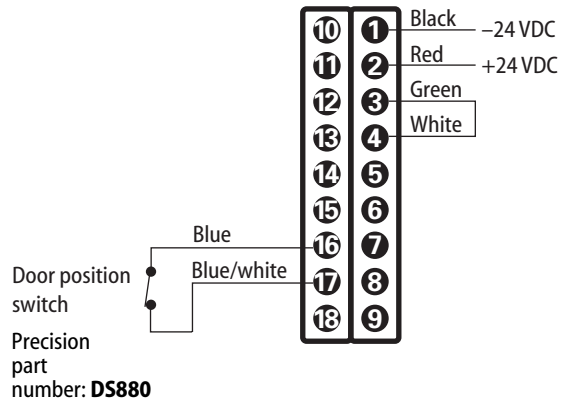*Figure 11   Connecting an alarm relay sounder*

Figure 12   Connecting a door position switch

Setting mode select switches


```
9–10   Device number
  8    Power-up state
  7    Door position switch
  6    Device network termination
4–5    Arm/rearm time
2–3    Nuisance delay
  1    Device networking
```
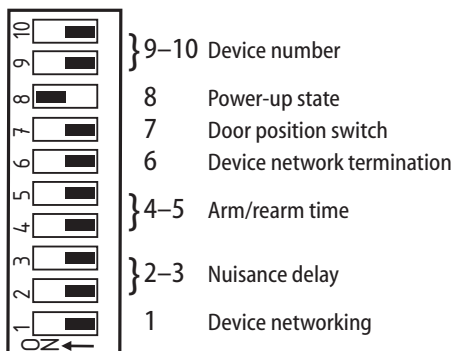
Figure 13   Mode select switch (default positions shown)

7 Set mode select switches

DE devices can be configured to operate in different ways and with features on or off. The following three features can be configured while the DE device is powered and in disarmed mode. In other words, you don't have to power down the device to set these features.

Configurable powered features include:

■ nuisance delay
■ arm/re-arm time
■ door position sensing

Caution: **Make sure to turn off power to the DE device before changing the following mode select switches:**

■ power-up state
■ device networking (if you have more than one device)

Use the table on the following page to determine how to set the mode select switches. See Figure 4 on page 4 to locate the mode select switches.

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Setting mode select switches

Table 3   Setting the mode select switches

Switch no	Function	Description	Settings			Factory default Setting
1	Device networking	Enables communication between DE devices. Ignore if you have only one device. **Note**: See pins 9 and 10 to make sure you set each device with its own device number.	Set to ON only if you have more than one device. **Caution**: Power down the device before changing these switches.			No networking
2–3	Nuisance delay	Helps to avoid inadvertent activation. The alarm will sound when the touchbar is pressed, but the alarm sequence will stop unless the touchbar is held for more than the programmed time.	**Pin 2** OFF OFF ON ON	**Pin 3** OFF ON OFF ON	**Delay** 0 sec 1 sec 2 sec 3 sec	0 seconds
4–5	Arm/re-arm time	Allows momentary egress of authorized personnel without alarming the DE device. At the end of the time period, the device will relock and re-arm.	**Pin 4** OFF OFF ON ON	**Pin 5** OFF ON OFF ON	**Re-arm** 0 sec 10 sec 20 sec 30 sec	0 seconds
6	Device networking termination	Enables device networking termination. Use this if switch one is set to ON.	Set to ON if switch 1 is set to on. Set to OFF if switch 1 is set to OFF.			No networking
7	Door position switch	Enables door position sensing.	Set to ON only if a door position switch is installed and wired to the device.			No door position switch
8	Power-up state	Determines if the device will be armed or unarmed when power is applied.	Set to OFF only if you want the device to be unarmed when powering-up the device. **Caution**: Power down the device before changing these switches.			Device will be armed when powered up
9–10	Device number	Identifies the DE device with a number when more than one device is connected to a single power supply. Each device must have a unique device number. This staggers the arming of devices in device number sequence at 0.2 sec intervals.	**Pin 9** OFF OFF ON ON	**Pin 10** OFF ON OFF ON	**Number** 0 1 2 3	**Delay (sec)** 0.0 (default) 0.2 0.4 0.6

Operating the DE Device

Operating the DE Device

You can use all functions of the Delayed Egress Device by turning the cylinder either clockwise or counter-clockwise.

Use the following table to determine how to:

- Arm the device
- Get momentary egress
- Reset the alarm after the alarm has sounded
- Disarm the device

Function	Diagram[a]	Description
Arm the device	○ — LED	With the power applied, turn the key clockwise.[b] The LED indicator will flash red and the touchbar will lock (factory default operation). See page 13 for a description of LEDs.
Get momentary egress	○	With the DE device armed and the arm/ re-arm time activated, turn the key clockwise. The LED indicator will flash green and the touchbar will unlock for the selected amount of time. See "Set mode select switches" on page 10 to set the momentary egress time for 10, 20 or 30 seconds. See page 13 for a description of LEDs.
Reset the alarm	○	When the DE device is alarming, it can be reset by turning the key clockwise[b], returning the device to the armed state. See page 13 for a description of LEDs.
Disarm the device	○	With the DE device armed, turn the key counter-clockwise[b]. The LED indicator will light green and the touchbar will unlock, acting as a normal exit device. See page 13 for a description of LEDs.

a. RHRB shown.
b. Turn and hold the key for 2 seconds to send the function command to other networked devices.

Operating the DE Device

LED Indicators

Use this table to determine what the colored LED light mean.

LED	Meaning
Flashing GREEN	Arm/re-arm time is active. See arm/re-arm time function on page 11. **Note**: The DE device's default is no arm/re-arm time function. So this function must be activated before this LED function will be visible.
Flashing RED	Device is armed. *This is the normal LED function.*
Solid GREEN	Device is unarmed.
Solid RED	*Alarm*: unauthorized exit Device needs to be reset. See page 12.
None	No power or fire alarm.

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Typical applications

Typical applications

Door position with Fire alarm

This application uses a door position switch. When using the momentary egress the device will re-arm as soon as the door closes. The fire alarm is tied directly into the DE device. This routes the power for the DE device through the fire alarm contact. When a fire alarm occurs the DE device will lose power and will act as a normal exit device.

Note: *Make sure to set switch #7 to ON. See "Set mode select switches" on page 10 and Figure 16 below.*

120VAC

3 x 14 AWG

PS160-6 Power Supply

2 x 18 AWG

Fire alarm panel

Door position switch

2 x 18 AWG

2 x 18 AWG

See "Minimum Wire Gauge for 24 Volts DC" on page 2 to determine the proper gauge of wire.

Figure 14   Door position with fire alarm wiring application.

Figure 16   Setting DIP switch 7 to ON to enable door position sensing. (DIP switch 8 is set to ON as a factory default.)

Red — −24 VDC
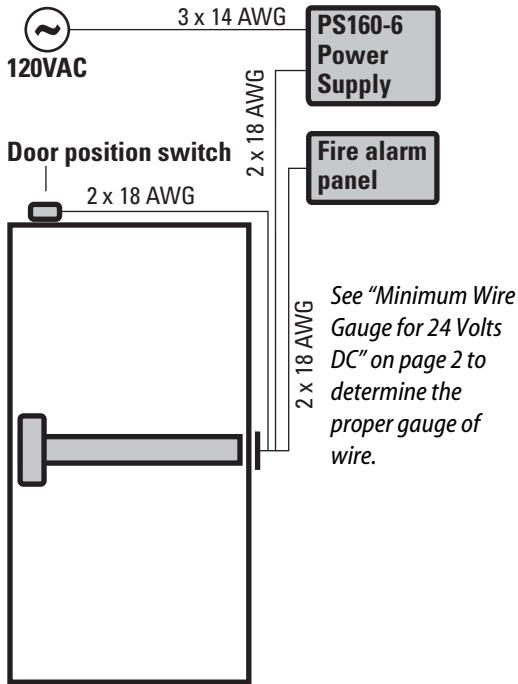Black — +24 VDC
Green
White — Fire alarm
Blue
Blue/white
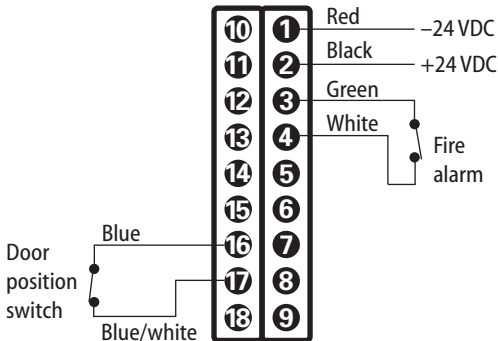
Door position switch

Figure 15   Connecting a door position switch and fire alarm panel

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Typical applications

Simple delayed egress with fire alarm

This simple application will delay egress when armed and will be a normal exit device when disarmed. 24 volts DC is fed through a power transfer and the fire alarm is wired at the power supply.
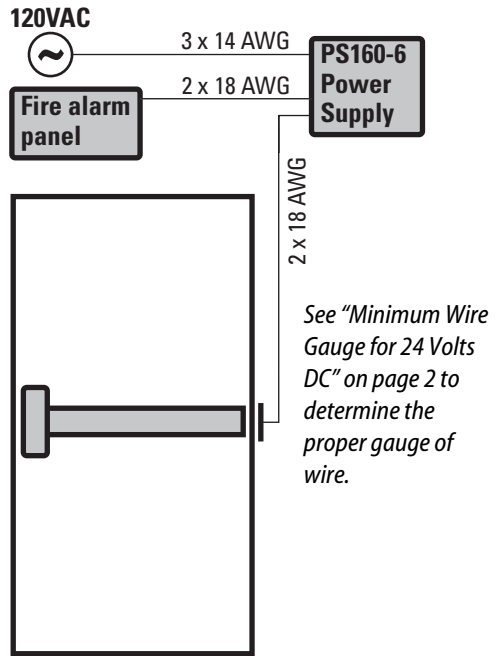
120VAC

3 x 14 AWG

PS160-6 Power Supply

2 x 18 AWG

Fire alarm panel

2 x 18 AWG

See "Minimum Wire Gauge for 24 Volts DC" on page 2 to determine the proper gauge of wire.

Figure 17   Simple DE with fire alarm wiring application

⑩ ❶ Black   −24 VDC
⑪ ❷ Red   +24 VDC
⑫ ❸ Green
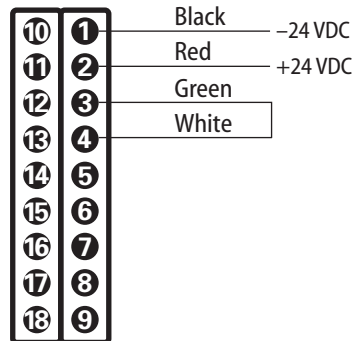⑬ ❹ White
⑭ ❺
⑮ ❻
⑯ ❼
⑰ ❽
⑱ ❾

Figure 18   Connecting power and fire alarm

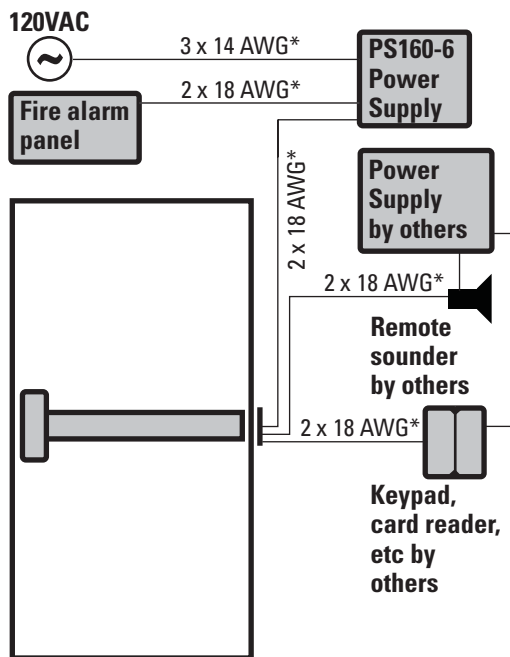   T93654_A

Typical applications

Figure 19   Remote arm/disarm and remote monitoring with fire alarm wiring application

Remote arm/disarm and remote monitoring

This application allows remote arm/disarm and remote monitoring of the delayed egress exit device. The exit device will delay egress when armed and will function as a normal exit device when disarmed. The 24 VDC remote switch and horn are fed through a power transfer and the fire alarm is wired at the power supply.

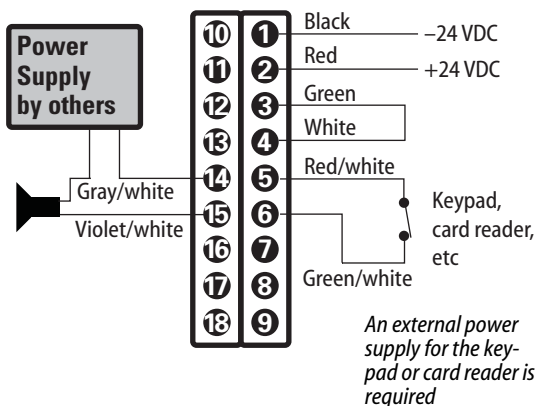*See "Minimum Wire Gauge for 24 Volts DC" on page 2 to determine the proper gauge of wire.*

*Figure 20   Connecting a card reader and an alarm output*

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Troubleshooting

Networking two DE devices

This application uses the networking feature. When one device's alarm sounds, the other device will also sound. The fire alarm is wired at the power supply.

Note: *You can network up to four DE devices on one PS160-6 power source.*

Note: *Make sure to set switches 1 and 6 to ON. See "Set mode select switches" on page 10 and Figure 23 below.*
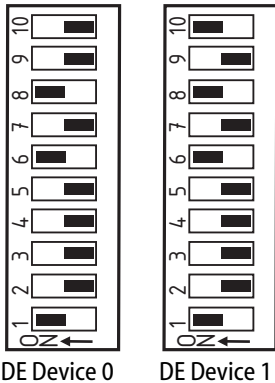
*See "Minimum Wire Gauge for 24 Volts DC" on page 2 to determine the proper gauge of wire.

DE Device 0   DE Device 1

Figure 23   Setting DIP switches 1 and 6 to ON to enable device networking. Switches 9 and 10 shown are set to number the device. The device on the left is set to zero (0) and the device on the right is set to one (1).

Troubleshooting

Use the table on the following page to isolate the cause of the problem.

Caution: **There are no user serviceable parts in the electronics or the locking mechanism. The internal touch bar monitoring switch is adjusted at the factory. Tampering with this switch can cause the device to malfunction in an emergency.**

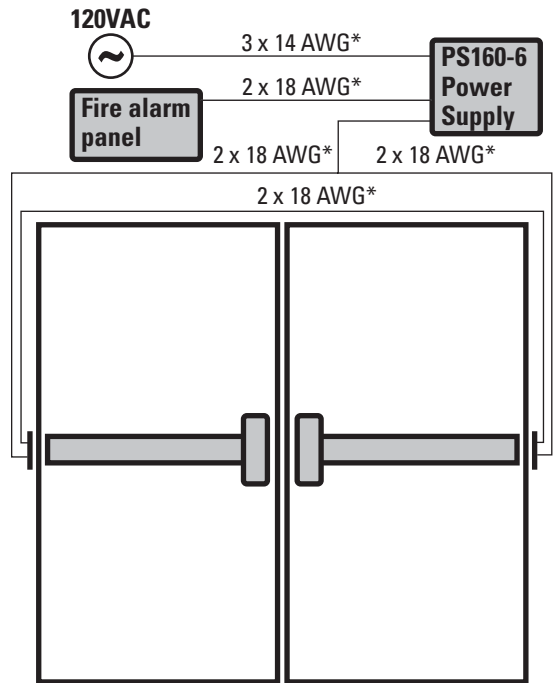*Caution:* **Make sure to test the device periodically for proper operation.**

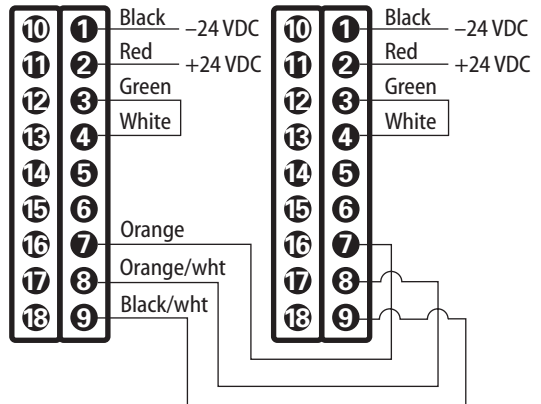*Figure 21   Two DE networked devices with fire alarm wiring application*

Figure 22   Connecting two DE networked devices with fire alarm

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Troubleshooting

Problem	Possible resolutions
No power	**Check** the circuit breakers.
	Check for 120 VAC at the input of the power supply.
	Check for 24 VDC at the DE device by placing the probes of a volt meter across the red and black wires.
	Check the fire alarm condition: is the fire alarm contact open? The power for the DE device is routed through the fire alarm contacts.
Device will not arm; Touch pad will not lock	**Check** for power, LED should be green if the mode select switch 8 is set to OFF. If switch 8 is set to ON, LED should be flashing red. See "LED Indicators" on page 13.
	If a door position switch is being used, **check** for a closed contact across the blue and blue/white wires.
	Check for proper position of switch 7. See "Setting the mode select switches" on page 11.
	Check the key cylinder for proper installation. See "Install key cylinder" on page 4
Nuisance delay is not working	**Check** for proper position of switch 2 and 3. See "Setting the mode select switches" on page 11.
	Check that the proper model DE device is being used. Optional DE devices are configured with the nuisance delay disabled to meet code requirements (BOCA).
Momentary egress time is improper	The DE device is factory-shipped with the arm/re-arm time set to off.
	Check switch 4 and 5. See "Setting the mode select switches" on page 11.
	If a door position switch is being used, **check** for a closed contact across blue and blue/white wires.
	Check for proper position of switch 7. See "Setting the mode select switches" on page 11.
Delayed egress time is improper	**Check** that the proper model DE device is being used. Optional DE devices are configured with the delayed egress time set to 30 seconds (not 15 seconds).
Device will not reset after alarming	If a door position switch is being used, **check** for a closed contact across blue and blue/white wires.
	Check for proper position of switch 7. See "Setting the mode select switches" on page 11.

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