FPP-RNAC-8A-4C

EN

Operation and Installation Guide

Remote NAC Power Supply

BOSCH

Notice to Users, Installers, Authorities Having Jurisdiction, and other involved parties:

This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard for Control Units and Accessories for Fire Alarm Systems, UL864, certain programming features or options must be limited to specific values or not used at all as indicated below.

Program Feature or Option	Permitted in UL864? (Y/N)	Possible Settings	Settings Permitted in UL864
Ground Fault Detection disable	N	Jumper in place (enabled) Jumper removed (disabled)	Jumper in place (enabled), only

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1.0 Overview

The FPP-RNAC-8A-4C is a Remote Notification Appliance Circuit (NAC) Power Supply designed to add four additional NACs (NFPA 72 Class B, Style Y or Class A, Style Z) to a Fire Alarm Control Panel (FACP).

The FPP-RNAC-8A-4C is supervised by the control panel. It consists of the controller board, backup batteries, and enclosure.

The FPP-RNAC-8A-4C is also compatible with any UL Listed control unit utilizing:

- reverse polarity supervised notification appliance circuit (NAC) outputs, and
- 12 or 24 VDC regulated outputs.

Each output can be configured individually as a NAC or constant 24 V auxiliary power supply.

1.1 Module Control

1.1.1 Option Bus Control

The FPP-RNAC-8A-4C can connect to the Option Bus of the FPA-1000 or FPD-7024 Fire Alarm Control/Communicator.

Refer to *Section* 3.3 *Option Bus Connections* on page 14 for information on wiring.

1.1.2 Conventional NAC Input Control

For conventional panels, the FPP-RNAC-8A-4C connects using the FACP's NAC outputs that conform to NFPA 72 Class A or B. Please refer to the control panel's NAC compatibility information.

1.2 Output Bell Operation

The FPP-RNAC-8A-4C can generate three pulsed bell patterns on command in addition to steady activation of the output:

- **Pulsed:** 60 PPM (0.5 sec On, 0.5 sec Off)
- **NFPA Temporal:** In compliance with ANSI standard S3.41: 0.5 sec On, 0.5 sec Off, 0.5 sec On, 0.5 sec Off, 0.5 sec On, 1.5 sec Off, and so on.
- **California March:** 120 ppm (0.25 sec on, 0.25 sec off).

You can also implement SYNC protocols:

- Wheelock SYNC Protocol
- Gentex SYNC Protocol
- System Sensor SYNC Protocol

All outputs are synchronized if the conventional inputs are activating the FPP-RNAC-8A-4C.

For option bus synchronization information, refer to the control panel documentation.

1.3 Power Management

The controlling section of the board has un-interruptible power. If AC line voltage is lost, the power supply switches to battery backup.

1.4 Low AC Line Detection

Sensing circuitry detects a line input voltage below 85 VAC, then switches from the primary AC Line voltage to battery backup.

1.5 Ground Fault Monitoring

The option bus and polarity reversal inputs are electrically isolated from the local power supply and indicating circuits. The FPP-RNAC-8A-4C supervises itself for grounded field connections and indicates a fault condition if one is found. This feature can be disabled by opening Switch S4.

For UL864 installations, do not disable ground fault monitoring.

1.6 Circuit Supervision

Each NAC is supervised for short-circuit and open conditions using an end-of-line (EOL) resistor on the loop. Devices on these loops must have a blocking diode on their input so that the EOL supervision resistor can be read when the polarity of the output is reversed in the standby state. The devices activate when the polarity is switched back to normal in an alarm state. The EOL is programmable from 1 kΩ to 20 kΩ. This allows existing systems to be retrofitted.

1.7 Overvoltage Supervision

The power supply output is monitored for overvoltage conditions. If an overvoltage condition exists (30 V or more on battery leads without the battery connected), the trouble relay and EOL relays open. In addition, the trouble LED lights. On the option bus, AC fail, ground fault, and NAC troubles are initiated.

1.8 Expander Supervision

A watchdog supervises the operation of the FPP-RNAC-8A-4C processor and attempts to restart it if it fails. If the processor does not restart, or the power fails entirely, the installer-supplied EOL device disconnects from the input to report the trouble condition. If power is available, the System Trouble LED lights if the system encounters an error.

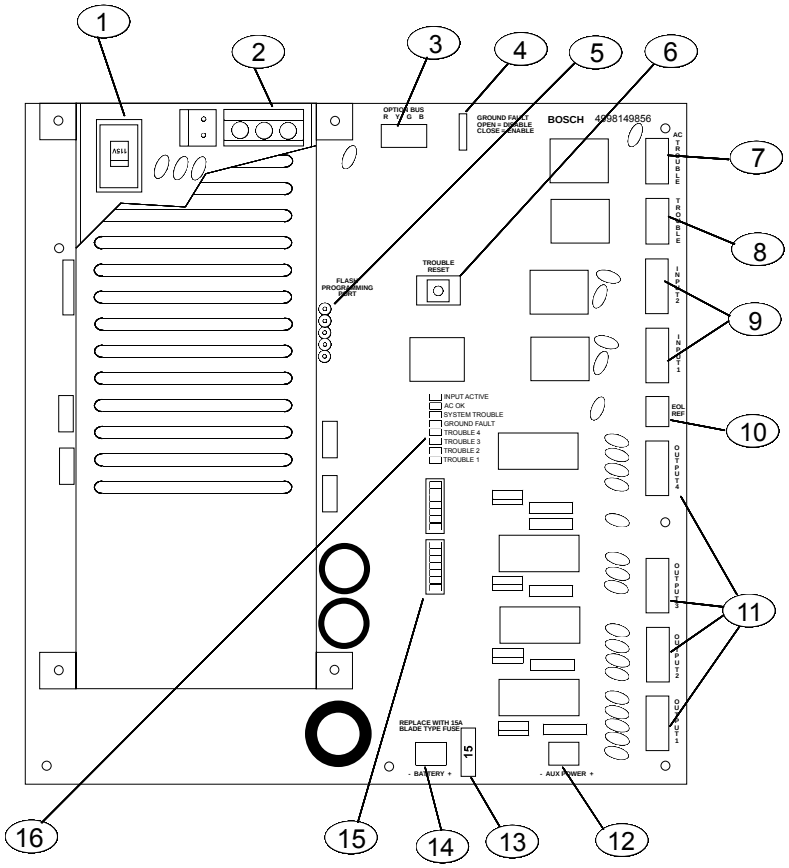
1.9 Auxiliary Power Supply

The FPP-RNAC-8A-4C can be wired to supply unsupervised constant auxiliary power through its NAC outputs. Refer to *Section 3.7.2 Auxiliary Circuits* on page 16 for additional information.

2.0 Installing the FPP-RNAC-8A-4C

The FPP-RNAC-8A-4C board and the enclosure are shipped together. The board, however, needs to be mounted into the enclosure. Hardware for mounting the board in the enclosure is supplied in the hardware pack.

Figure 1: FPP-RNAC-8A-4C Remote NAC Power Supply Board



1 AC Input Select Switch 120/240 VAC	*9 NAC inputs*
2 AC Power Input 120/240 VAC	*10 EOL reference resistor (1kΩ to 20kΩ)*
3 Option bus	*11 NAC outputs*
4 Ground fault switch	*12 Auxiliary 24V filtered and regulated output power*
5 Flash programming port	*13 Replaceable 15A fuse*
6 TROUBLE RESET button	*14 Battery input*
7 AC trouble relay output	*15 Configuration DIP switches*
8 Trouble relay output	*16 Status LEDs*

2.1 FPP-RNAC-8A-4C Board Installation

The FPP-RNAC-8A-4C board is static-sensitive. Touch ground before handling the board. Doing so discharges any static electricity in your body.

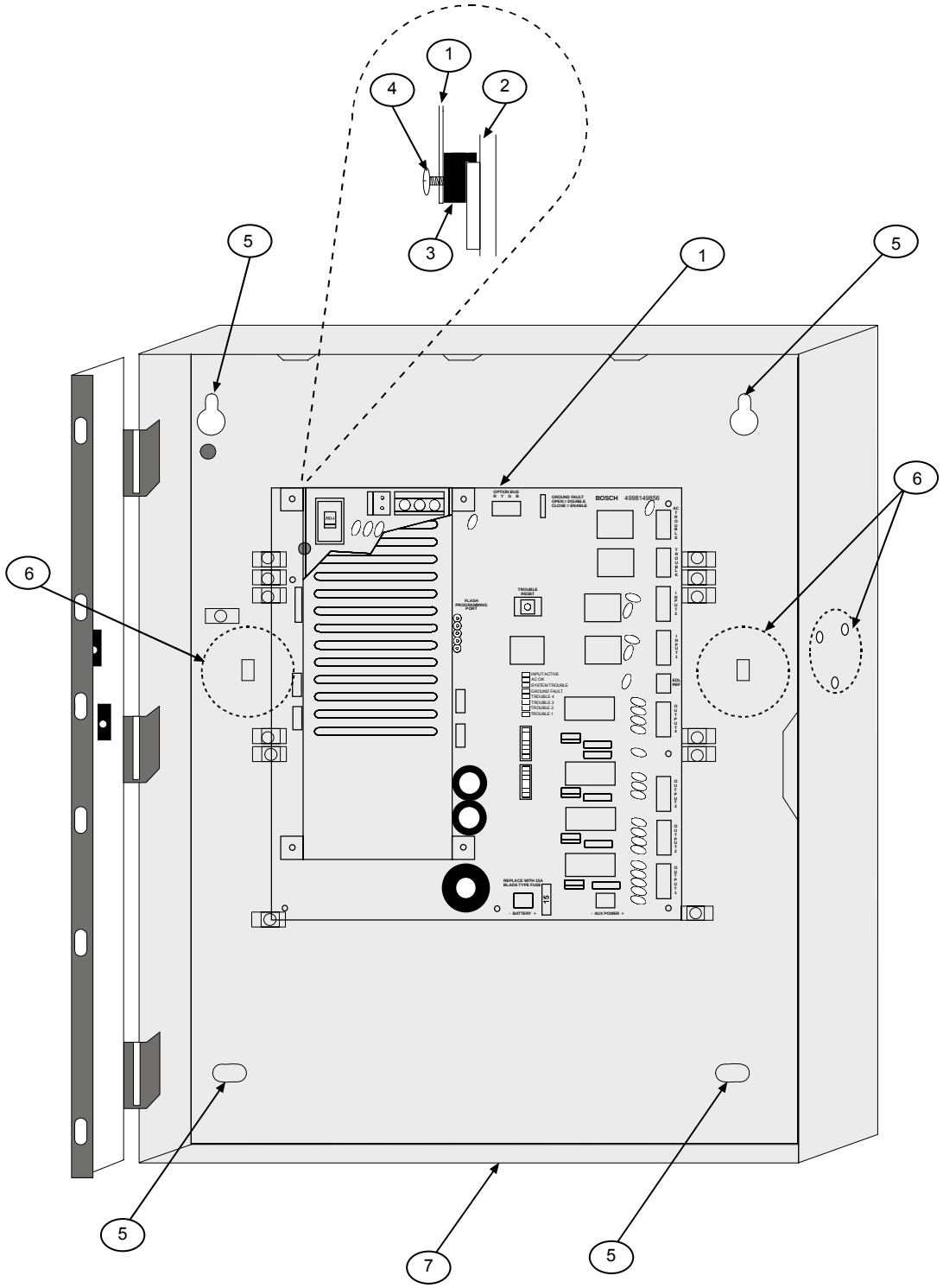
1. Connect the ground wire.
2. Insert the two support posts into the control retainer holes as shown in *Figure 2* on page 7.
3. Slide the top of the board into the retainer tabs (the slots under the top of the frame). When it is in the retainner tabs, the board rests on the two support posts.
4. To secure the bottom of the board, screw the two bottom corners through the support posts and through to the enclosure.

2.2 Enclosure Installation

1. Use the enclosure as a template and mark the top mounting holes on the mounting surface. Ensure that enough clearance exists to open the door for maintenance.
2. Pre-start the mounting screws for the two holes. Slide the enclosure onto the mounting screws so that the screws move up into the thinner section of the holes. Tighten the screws.
3. Screw the remaining two screws into the bottom mounting holes.
4. Knock out the desired wire entrances on the enclosure.

Refer to *Figure 2* on page 7 for details.

Figure 2: FPP-RNAC-8A-4C Enclosure and Board Installation



1	*FPP-RNAC-8A-4C Printed circuit board*	*5*	*Mounting screw holes*
2	*Retainer hole in enclosure*	*6*	*Wire entrance knockouts*
3	*Support post*	*7*	*Enclosure*
4	*Mounting Screw*		

3.0 Wiring the FPP-RNAC-8A-4C

All terminals are fully protected against electrostatic discharge (ESD) and transients.

Use wire gauge based on *Table 1* and *Table 2*. The terminals can accommodate up to 12 AWG (2.0 mm) wire.

Table 1: Wire Gauge Calculations

Line No.	Description	Calculation	Value
1	Guaranteed minimum NAC voltage at full load.		27.4 V
2	Minimum operating voltages (largest value of appliance on circuit)		
3	Maximum wiring voltage drop	Subtract line 2 from line 1.	
4	Total load for a given NAC		
5	Maximum allowable line resistance	Divide line 3 by line 4.	
6	Total wiring run length (feet)		
7	Total wire needed	Multiply line 6 by line 2.	
8	Maximum wire resistance per foot	Divide line 5 by line 7.	
9	Choose a wire size with a resistance per foot less than Line 7.		

Table 2: Wire Gauge Table (based on solid wire)

AWG B&S Gauge	Ohms per Foot
12 (2.0 mm)	0.00162
14 (1.6 mm)	0.00258
16 (1.3 mm)	0.00409
18 (1.0 mm)	0.00651

NFPA 72 requires the use of 18 AWG (1.0 mm) or larger diameter wire in fire applications.

3.1 AC Power Connections

Disconnect all power (AC and battery) before servicing the FPP-RNAC-8A-4C. Wait 60 sec before handling any connections.

AC Power runs to the L (Hot VAC), G (Ground), and N (Neutral) terminals.

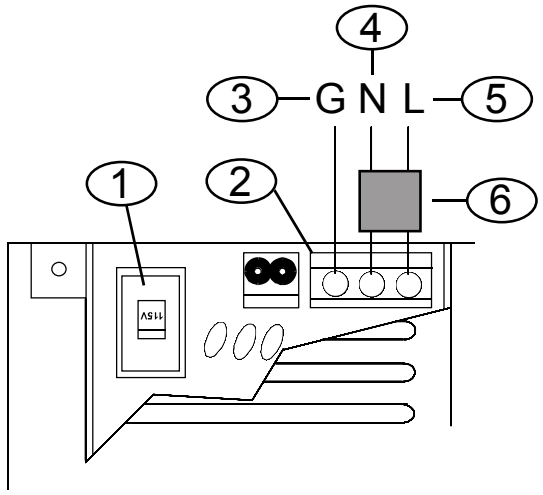
120 VAC or 240 VAC with 8 A capacities should feed the local power supply. The output voltage is a filtered 27.6 VDC (500 mV ripple maximum) under all conditions.

A trouble condition is registered, but not indicated, if AC power fails. A programmable time delay (refer to *Section 4.6 AC Fail Time Delay* on page 20) allows the indication of AC Failure to be delayed by 0, 6, 12, or 24 hrs. The default is 0 hrs.

Refer to *Figure 3* on page 9 for wiring details.

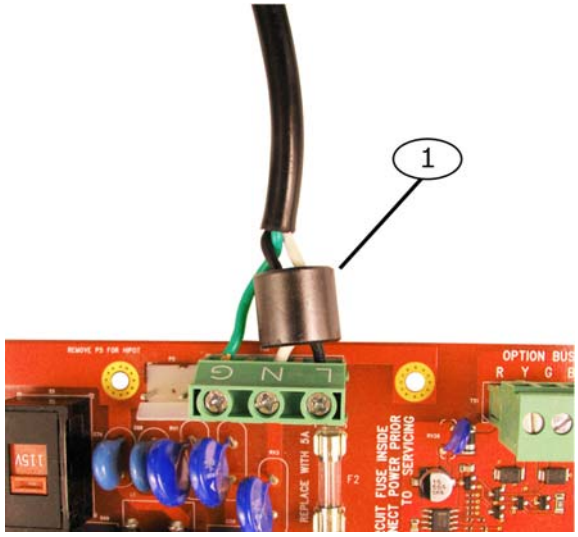
Remember to select the appropriate voltage range for the AC input before applying any power to the product.

Figure 3: AC Power Connections



1 AC input select switch
2 AC power terminal
3 Ground
4 Neutral
5 Line (120 VAC or 240 VAC)
6 Ferrite core

Figure 4: Install Ferrite Core



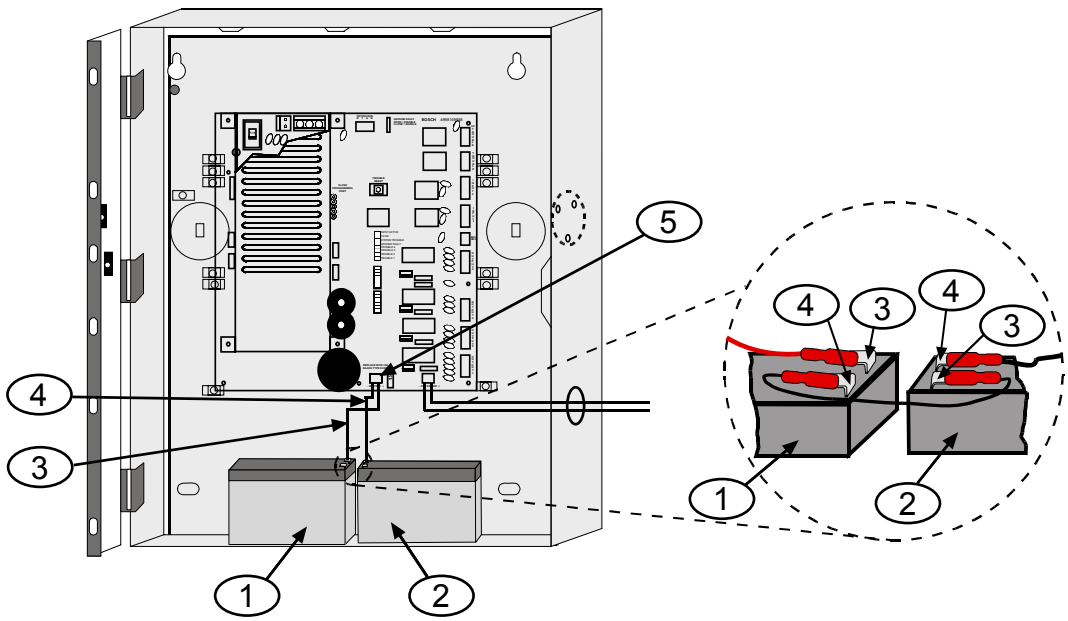
1 Ferrite core

Install the Line and Neutral power connections through the ferrite core as shown in *Figure 4*.

3.2 Battery Connections (24 VDC Only)

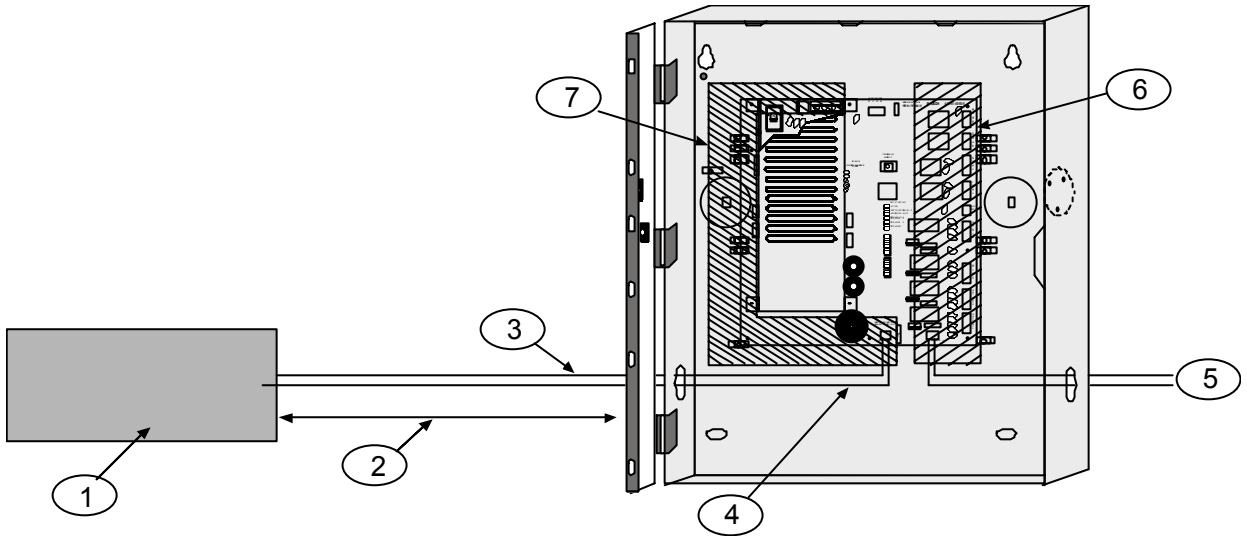
The backup battery plugs into the terminals marked BATTERY+ and BATTERY- at the lower center of the board (refer to *Figure 5*). The FPP-RNAC-8A-4C requires two backup batteries in series.

Figure 5: Battery Connections Inside FPP-RNAC-8A-4C Enclosure



1	*Battery 1*
2	*Battery 2*
3	*Red (+)*
4	*Black (-)*
5	*BATTERY terminals*

Figure 6: Battery Connections Using an External Battery Case



1 BATB-40 Battery Case
2 Conduit, 20 ft (6.1 m) maximum
3 Black wire (-)
4 Red wire (+)
5 To field
6 Power Limited wiring area
7 Non-Power Limited wiring area

Battery wires must be 12 AWG (2.34 mm) minimum.

Ensure that a minimum of ¼ in. (6.4 mm) of space exists between all power wiring and field wiring.

You can use the format in *Table 3* to calculate the required battery size to support the system. Use *Table 4* and *Table 5* on page 13 to estimate the required battery size.

Table 3: Standby Time Calculation

Device	Quantity	Standby Current for Each Device	Total Standby Current for Each Device (Quantity x Standby Current for Each Device)	Alarm Current for Each Device	Total Alarm Current for Each Device (Quantity x Alarm Current for Each Device)
FPP-RNAC-8A-4C Remote NAC Power Supply	1	150 mA	150 mA	150 mA	150 mA
		Grand Total Standby Current		Grand Total Alarm Current	

Table 4: Calculating the Required Battery Size

Descriptions	Calculations
Grand Total Standby Current (in amps [A])	CS
Total Hours of Standby Required (usually 24 or 60)	HS
Total Standby Capacity (multiply CS x HS)	TS = CS x HS
Grand Total Alarm Current (in amps)	CA
Divide by 0.6	CAA = CA ÷ 0.6
Total Hours of Alarm Time Required (usually 0.083 [5 min.] or 0.25 [15 min.])	HA
Total Hours Capacity (multiply CAA x HA)	TA = CAA x HA
Total Alarm Capacity Required (add TA + TS)	TC = TA + TS
Required Capacity with 20% Derating (TC x 1.2)	C = TC x 1.2

Table 5: Standby Load Battery Capacity (in ampere-hours [Ah])

Total Standby Current	Capacity Required for:					
	12 hr	24 hr	36 hr	48 hr	60 hr	72 hr
100 to 300 mA	4.0	7.9	11.9	15.8	19.8	23.8
300 to 500 mA	6.6	13.2	19.8	26.4	33.0	39.6
500 to 700 mA	9.2	18.5	27.7	37.0		
700 to 900 mA	11.9	23.8	35.6			
900 mA to 1.1 A	14.5	29.0				
1.1 to 1.3 A	172	34.3				
1.3 to 1.5 A	19.8	39.6				
1.5 to 1.7 A	22.4					
1.7 to 1.9 A	25.1					
1.9 to 2.1 A	27.7					
2.1 to 2.3 A	30.4					
2.3 to 2.5 A	33.0					
2.5 to 2.7 A	35.6					

Table 6: Alarm Load Battery Capacity (in ampere-hours [Ah]))

Total Alarm Current	Capacity Required for:					
	5 min	10 min	15 min	30 min	45 min	60 min
200 to 500 mA	0.0	0.1	0.1	0.3	0.4	0.6
500 mA to 1.0 A	0.1	0.2	0.3	0.6	0.8	1.1
1.0 to 2.0 A	0.2	0.4	0.6	1.1	1.7	2.2
2.0 to 3.0 A	0.3	0.6	0.8	1.7	2.5	3.3
3.0 to 4.0 A	0.4	0.7	1.1	2.2	3.3	4.4
4.0 to 5.0 A	0.5	0.9	1.4	2.8	4.1	5.5
5.0 to 6.0 A	0.6	1.1	1.7	3.3	5.0	6.6
6.0 to 7.0 A	0.6	1.3	1.9	3.9	5.8	7.7
7.0 to 8.0 A	0.7	1.5	2.2	4.4	6.6	8.8

- For capacities greater than 18 Ah, the batteries require a BATB-40 Battery Case. Connections between the batteries in the Battery Case and the control panel must be in conduit and be no more than 20 ft (6.1 m) from the control panel. All power wiring must exit from the left side of the FPP-RNAC-8A-4C enclosure.
- Battery wires must be 12 AWG (2.3 mm).
- The FPP-RNAC-8A-4C provides a regulated output voltage of 24.1 VDC (500 mV ripple maximum) when operating from the standby batteries under all conditions, including when the batteries are nearly depleted.
- A low battery condition is reported when the battery voltage drops below 20.4 V for the pair.
- The FPP-RNAC-8A-4C fully charges depleted 40 Ah batteries within 48 hr.
- A disconnected battery indicates its state within 1 min.

3.3 Option Bus Connections

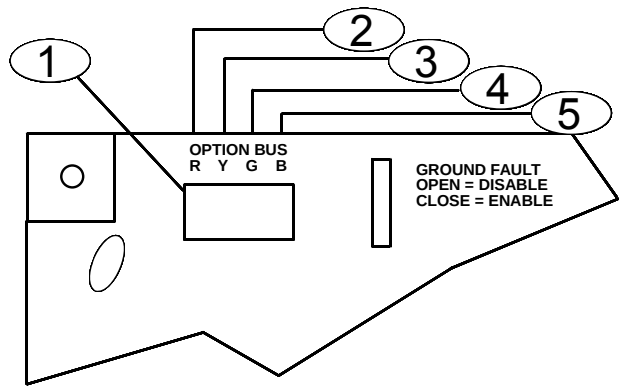
The option bus (if used) runs to the terminals labeled Y, G, B, and R (refer to *Figure 7*).

You can use the option bus connection with a Bosch Security Systems, Inc. FPA-1000 or FPD-7024 Fire Alarm Control/Communicator. The FPP-RNAC-8A-4C is a new option module type that can indicate specific trouble conditions back to the control panel, such as AC, battery, and so on.

Refer to *Section 4.0 DIP Switch and Option Bus Settings* on page 17 to set the address on the FPP-RNAC-8A-4C for use with the option bus.

Refer to the *FPA-1000-UL Installation and Operation Guide* (P/N F01U075420) or the *FPD-7024 Operation and Installation Guide* (P/N F01U008458) for wiring requirements.

Figure 7: Wiring the Option Bus



1 Option Bus
2 Red wire
3 Yellow wire
4 Green wire
5 Black wire

3.4 NAC Input Connections

Two inputs can be used with 12 V or 24 V polarity reversal outputs from a conventional control panel that conform to NFPA 72, Class A or B (used instead of the option bus connection). Refer to the control panel's compatibility information.

Polarity reversal on Input 1 activates NAC Outputs 1 and 2; Input 2 activates NAC Outputs 3 and 4. DIP switch settings allow NAC Input 1 to control all four outputs (refer to *Section 4.0 DIP Switch and Option Bus Settings* on page 17).

If the control panel detects a trouble condition on either set of outputs, the appropriate EOL device is disconnected from the reversal loop. These inputs are electrically isolated from the controlling section of the board.

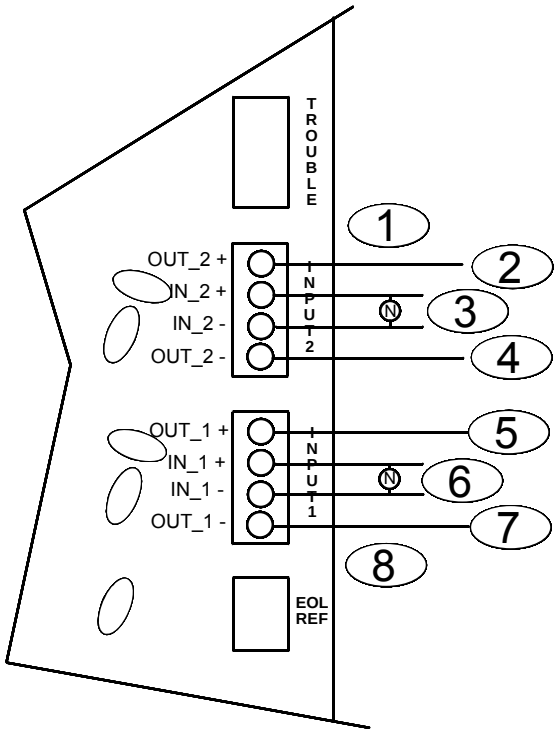
The FPP-RNAC-8A-4C can be placed anywhere on an FACP's NAC circuit.

Refer to *Figure 8* for wiring details.

Connect either the option bus or the NAC Input terminals on the FPP RNAC 8A-4C to the FACP.

Do not connect both.

Figure 8: Wiring the NAC Inputs



1 Class A
2 Return to FACP NAC output
3 From FACP NAC output
4 Return to FACP NAC output
5 To next device or EOL
6 From FACP NAC output
7 To next device or EOL
8 Class B

The EOL resistor value depends on the conventional panel. Select a value from 1 k to 20 k.

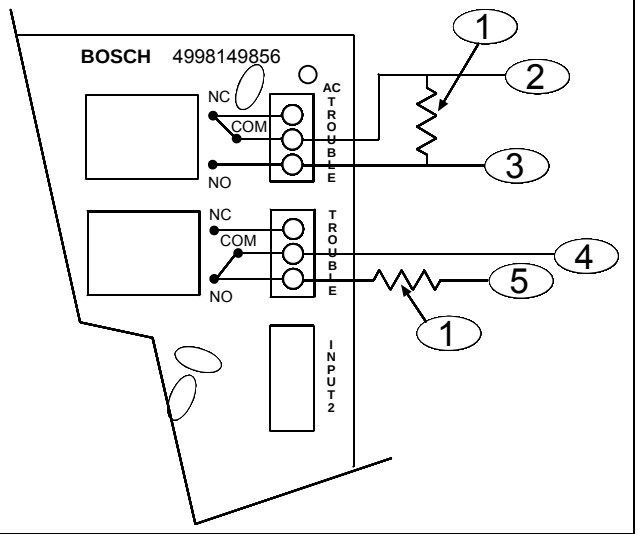
When connecting to the FPD-7024 using the option bus, all FPP-RNAC-8A-4C power supplies must be on the same zone.

3.5 Trouble Relay Connections

The trouble relay provides one set of Form C contacts for connection of an appliance of choice. The relay can be wired in series with the auxiliary output to provide power to the appliance.

The relay deactivates by the controlling section of the board to indicate a fault condition. Refer to *Figure 9* for wiring details.

Figure 9: Wiring the Trouble Relay



*1 EOL**
2 To FACP AC trouble input
3 Supervised
4 To FACP trouble input
5 Supervised

* *EOL supplied by control panel manufacturer (Bosch P/N: 25899)*

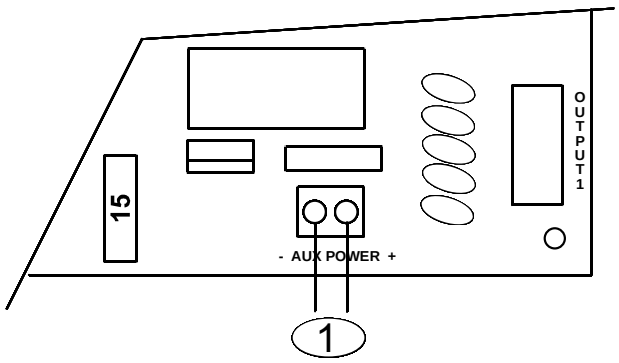
Relays are shown in their normal state.

3.6 Auxiliary Output Connections

The auxiliary output provides a continuous, unsupervised 24 V output to power external devices. It is rated at 0.75 A and can be wired in series with the trouble relay to provide power to the associated appliance.

A short circuit on this output causes a trouble condition but does not affect the operation of the FPP-RNAC-8A-4C in any way. Refer to *Figure 10* for wiring details.

Figure 10: Wiring the Auxiliary Outputs



1 To accessory or device

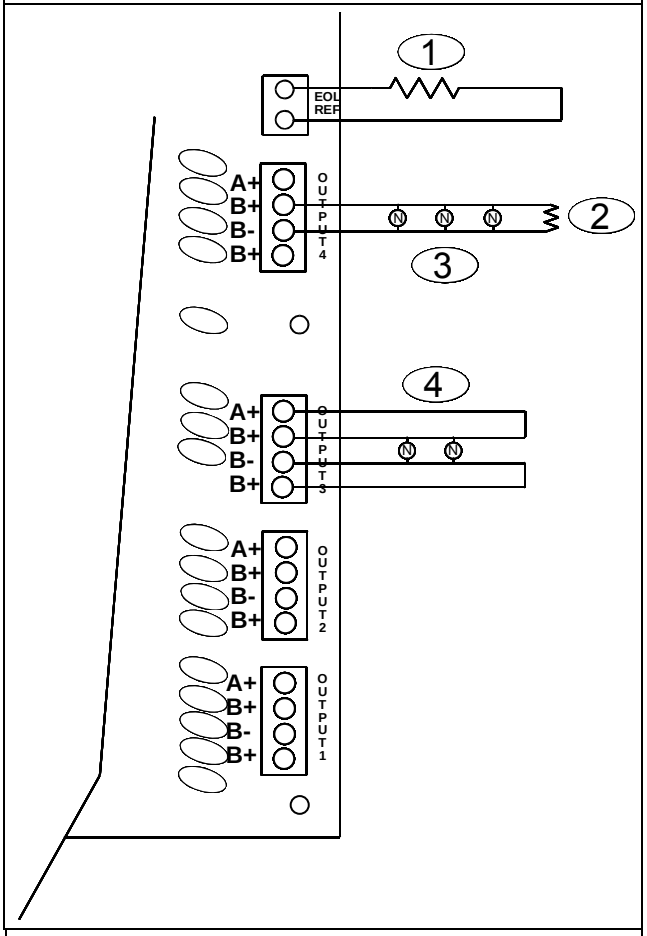
3.7 NAC Output Connections

Each of the four outputs provides up to 2.5 A at 24 V, limited by an overall 8 A capacity.

3.7.1 NAC Circuits

Overload protection interrupts the circuit when given an overload of 3 A or greater. When de-energized, the circuit is supervised, which allows the reporting of an open or shorted output condition. Refer to *Figure 11* on page 16 for wiring details. When the total current draw from all four outputs and auxiliary power exceeds 8 A, the output with the highest current draw is turned off.

Figure 11: Wiring the NAC outputs and EOL



1 1 K to 20 K
*2 EOL**
3 Class B
4 Class A

* *EOL supplied by control panel manufacturer (Bosch P/N: 25899)*

3.7.2 Auxiliary Circuits

The FPP-RNAC-8A-4C can be configured to supply constant auxiliary power through its NAC outputs.

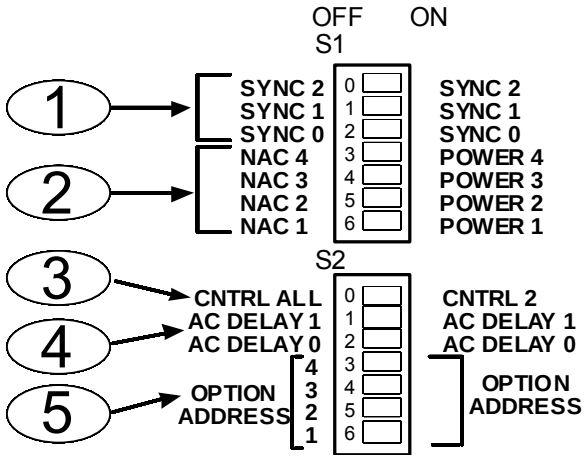
Reverse polarity connections of some notification appliances might not be detected by the FPP-RNAC-8A-4C NAC supervision. Ensure that the notification appliances are connected properly and tested before installation is completed.

Use DIP Switch S1 positions 3, 4, 5, and 6 (refer to *Figure 12*) to make the output always active. When the output is configured as always active, the output is unsupervised and no EOL is needed.

3.7.3 EOL Reference Programming

Add a resistor that matches the value of the EOL used in the notification appliance circuit. This must be in the range of 1 kΩ to 20 kΩ. If no resistor is present, the RNAC defaults to the value of 2.2 kΩ.

Figure 12: Auxiliary Power Configuration



1 Configure SYNC pattern
2 Configure outputs for NAC or power supply
3 Input control
4 AC delay setting
5 Option address bus

4.0 DIP Switch and Option Bus Settings

Use DIP Switch S1 to set the following options:

- Output pattern or protocol
- NAC or power supply mode

Use DIP Switch S2 to set:

- NAC input variable
- AC failure time delay
- Option bus address

Refer to:

- *Figure 1* on page 5 for the location of the DIP switches on the FPP-RNAC-8A-4C board
- *Figure 12* on page 5 for the details of Switches S1 and S2
- *Table 7*on page 17 and *Table 8* on page 18 for the DIP switch positions and settings.

4.1 Switch S1

Positions 0, 1, and 2 on Switch S1 control the bell output pattern or the synchronization (SYNC) protocol.

Positions 3 through 6 on Switch S1 control the output mode.

- If the switch is OFF, the output is in NAC mode.
- If the switch is ON, the output is in power supply (POWER) mode.

Each output can be configured individually to operate in the NAC or power supply mode. When the output is in the NAC mode, it follows either the option bus command or the DIP switch settings depending on the FPP-RNAC-8A-4C connection.

In the power supply mode, the output is turned on all the time and is no longer supervised by an EOL. The commands from the option bus and pattern settings are ignored for any output configured in the power supply mode.

Table 7: DIP Switch S1 Settings

Bell Pattern and Protocol Output Options				Output Mode Options				Notes
Position Name	**SYNC 2**	**SYNC 1**	**SYNC 0**	**NAC 4/ POWER 4**	**NAC 3/ POWER 3**	**NAC 2/ POWER 2**	**NAC 1/ POWER 1**	
Position Number	**0**	**1**	**2**	**3**	**4**	**5**	**6**	
Steady Follower[1]	OFF	OFF	OFF	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
Pulsed[1] Pattern	OFF	OFF	ON	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
California March Time[1]	OFF	ON	OFF	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
Temporal Code Three[1]	OFF	ON	ON	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
Wheelock[2] SYNC Protocol	ON	OFF	OFF	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
Gentex[2] SYNC Protocol	ON	OFF	ON	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	
System Sensor[2] SYNC Protocol	ON	ON	OFF	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	OFF (NAC) ON (PWR)	

1 *When operating in NAC mode (Switch S1, position 3, 4, 5, or 6-= OFF), the FPP-RNAC-8A-4C produces the protocol selected for the output.*

2 *When operating in one of the SYNC protocols, NAC Input 1 controls strobes and Input 2 controls sounders. This protocol allows the sounders to silence while strobes continue to operate. When silenced, the output signal generates the silence pattern for that protocol. Switch S2, Position 1 is ignored.*

4.2 Switch S2

Use Switch S2 to set the following (refer to *Table 8*):

- NAC output control
- AC failure delay time – 0, 1, 3, and 6 hour delay
- Option bus address – Bus Addresses 1 to 14

Table 8: DIP Switch S2 Settings

Position Name	CNTRL ALL/ CNTRL 2	AC DELAY 1	AC DELAY 0	OPTION ADDRESS 4	OPTION ADDRESS 3	OPTION ADDRESS 2	OPTION ADDRESS 1
Position Number	**0**	**1**	**2**	**3**	**4**	**5**	**6**
NAC Output Control Options							
NAC Input 1 controls NAC Outputs 1 and 2. NAC Input 2 controls NAC Outputs 3 and 4.	OFF						
NAC Input 1 controls all four NAC Outputs	ON						
AC Failure Delay Reporting Options							
No delay in AC failure reporting; the unit signals an AC Failure immediately.		OFF	OFF				
AC failure reporting delay = **1 hour**.		OFF	ON				
AC failure reporting delay = **3 hours**		ON	OFF				
AC failure reporting delay = **6 hours**		ON	ON				
		Option Bus Settings					
		Disabled		OFF	OFF	OFF	OFF
		Address 1		OFF	OFF	OFF	ON
		Address 2		OFF	OFF	ON	OFF
		Address 3		OFF	OFF	ON	ON
		Address 4		OFF	ON	OFF	OFF
		Address 5		OFF	ON	OFF	ON
		Address 6		OFF	ON	ON	OFF
		Address 7		OFF	ON	ON	ON
		Address 8		ON	OFF	OFF	OFF
		Address 9		ON	OFF	OFF	ON
		Address 10		ON	OFF	ON	OFF
		Address 11		ON	OFF	ON	ON
		Address 12		ON	ON	OFF	OFF
		Address 13		ON	ON	OFF	ON
		Address 14		ON	ON	ON	OFF
		Address 15		Reserved			

4.3 Conventional (Polarity Reversal) Inputs 1 and 2

Two factors determine how the four NAC outputs respond to input:

- Output protocol set on Switch S1 (refer to *Table 7* on page 17)
- Setting of Position 0 of Switch S2 (refer to *Table 8* on page 18

Table 9 shows the output responses to the input on NAC inputs 1 and 2, based on the combined DIP switch settings.

When an input is OFF, its polarity is reversed.

Table 9: Using Conventional Inputs 1 and 2 to Operate Outputs (Switch 2, Position 0)

When Switch S2, Position 0 = OFF and Protocol is Pulsed, March Time, or Temporal:		
NAC Input 1	**NAC Input 2**	**Output Response**
OFF	OFF	Outputs are off.
OFF	ON	NAC outputs 1 and 2 are off. NAC outputs 3, 4 follow the protocol selected on the DIP switch.
ON	OFF	NAC outputs 1 and 2 follow the protocol selected on the DIP switch. NAC outputs 3 and 4 are off.
ON	ON	NAC outputs 1, 2, 3, and 4 follow the protocol selected on the DIP switch.

When Switch S2 Position 0 = ON and Protocol is Pulsed, March Time, Temporal:		
NAC Input 1	**NAC Input 2**	**Output Response**
OFF	OFF or ON (Setting is ignored.)	Outputs are off.
ON	OFF or ON (Setting is ignored.)	NAC outputs 1, 2, 3, and 4 follow the protocol selected on the DIP switch.

When Protocol is Wheelock, Gentex, System Sensor (Switch S2, Position 0 is ignored)		
NAC Input 1	**NAC Input 2**	**Output Response**
OFF	OFF	Outputs are off.
OFF	ON	Not possible
ON	OFF	Strobe on, sounder off. Outputs follow the selected SYNC protocol but are silenced.
ON	ON	Strobe and sounder are on. Outputs follow the selected SYNC protocol.

4.4 Option Bus Address

To activate a new address, remove the AC and battery power from the FPP-RNAC-8A-4C. Wait 60 sec. Restore the power after it is removed. The new address becomes active after power is restored to the FPP-RNAC-8A-4C.

The FPP-RNAC-8A-4C needs its own address (1 to 14) when using the option bus connection. Use Switch S2, Positions 3 through 6.

Refer to *Figure 13* on page 22 for the correct DIP switch positions.

4.5 NAC Input Variable

Instead of having Input 1 drive NAC Output 1 and 2 and Input 2 drive NAC Output 3 and 4, Input 1 can be set to drive all four outputs. Set Switch S1 to the ON position to select this option.

4.6 AC Fail Time Delay

A trouble condition is registered to the control panel but is not indicated with an LED if the AC falls below 85/105V for more than 5 sec. A programmable time delay allows the indication of AC failure to be delayed by 0, 1, 3, or 6 hr. The default value is 0 hr.

Use Switch S2 positions 1 and 2 for these settings.

UL864 requires that off-premises signaling of AC Trouble is delayed between 60 and 180 minutes.

To comply with this requirement:

- Set the AC Fail Time Delay to 0, and
- Program the FACP to delay the off-premises AC Trouble signal to a value between 60 min and 180 min.

5.0 FPP-RNAC-8A-4C Local Status Display

LED indicators are provided for AC OK (green), inputs active (red), system fault (yellow), ground fault (yellow), and NAC 1-4 troubles (yellow).

Refer to *Figure 1* on page 5 for the location of each LED on the board. Refer to *Table 10* for the label, color, and description of each on-board LED.

The FPP-RNAC-8A-4C has a TROUBLE RESET momentary switch to clear latched trouble conditions. The TROUBLE1 - 4 LEDs (refer to *Figure 13* on page 22) indicate trouble conditions. These trouble LEDs indicate open or shorted outputs and a low or missing battery. A trouble condition registers if the AC main voltage goes below the stated threshold. The output of the power supply is monitored for excessive output voltage, ground fault, and so on.

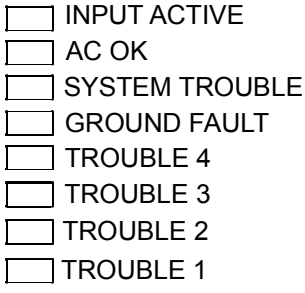
Table 10: Local Status Display LED Functions

LED	Label	Color	Description
1	INPUT ACTIVE	Red	Input Active – This corresponds to active INPUT commanding outputs to turn on. This active input signal can come from either on-board input (or from both inputs), or can be controlled by an option bus command.
			Alternate function: **Reprogramming operation:** The LED should be off. **Reprogramming complete:** The LED blinks the number of the software revision when the programming process completes successfully. The green LED lights to indicate that the user can now read the value. A series of blinks indicates the primary revision number, followed by the secondary revision number. The green LED turns off to indicate the end of the sequence. The display continues until the Flash module is removed from the programming port. For example, revision number 2.04 has two blinks followed by a pause and then four blinks. **Revision number display:** When the TROUBLE RESET button is pressed and held longer than 2 sec, the revision number shows. (Refer to *Reprogramming complete*, above.)
2	AC OK	Green	AC input is OK; the power supply is operating from the AC line. When LED 2 extinguishes, the AC fault relay activates after a programmed delay.
			Alternate function: **Reprogramming operation:** This LED should blink during the operation **Reprogramming complete:** This LED remains on through one sequence of indicating the revision number. After showing the revision number, the LED turns off briefly and then turns on again to indicate that counting the revision should start again. **Reprogramming failed:** This LED continues to blink at a constant rate whenever the Flash module is connected to the Programming port. The programming process typically takes less than 20 sec. If this LED blinks for longer than 30 sec, a problem exists. **Revision number display:** When the TROUBLE RESET button is pressed and held longer than 2 sec, the red LED shows the revision number. (Refer to *Reprogramming complete* in the description of the red LED in this table, above.)

Table 10: Local Status Display LED Functions (continued)

LED	Label	Color	Description	
3	SYSTEM TROUBLE	Yellow	Blink Count (display priority)	Description (The Trouble Relay activates or changes state.)
			1	Any memory fault (RAM, FLASH, watchdog, unexpected interruptions, stack corruption).
			2	Power supply overvoltage.
			3	Low battery or missing battery
			4	Battery charger circuit trouble.
			5	Auxiliary power overcurrent condition – the current is measured at the Auxiliary Power Port output.
			6	System overcurrent – The combined currents measured at each NAC output together with the Auxiliary Power Port output.
			7	Power supply output voltage is low.
			STEADY	The SYS TRBL LED and the Trouble Relay are active when the Flash Programming module is connected.
4	GROUND FAULT	Yellow	Ground Fault - Indicates that the NAC output wiring is not connected properly to an external source or ground. The Trouble Relay is deactivated.	
5	TRBL1	Yellow	Output 1 has an open or shorted EOL The Trouble Relay is deactivated.	
6	TRBL2	Yellow	Output 2 has an open or shorted EOL The Trouble Relay is deactivated.	
7	TRBL3	Yellow	Output 3 has an open or shorted EOL The Trouble Relay is deactivated.	
8	TRBL4	Yellow	Output 4 has an open or shorted EOL The Trouble Relay is deactivated.	

Figure 13: FPP-RNAC-8A-4C LEDs



6.0 Specifications

Table 11: Specifications

Enclosure *(including a keyed lock and mounting hardware)*	
Dimensions (HxWxD)	14.75 in. X 12.75 in. X 3.5 in. (37.5 cm x 32.4 cm x 89 mm)
Material	18-gauge, cold-rolled steel
Environmental	
Storage and Operating Temperature	+ 32°F to + 120°F (0°C to + 49°C)
Power	
Input Power	120 VAC, 60 Hz, 4.2 A maximum or 240 VAC, 50 Hz, 2.5 A
Brown-out Voltage	85 VAC/120 VAC, 105 VAC/240VAC Supervised
Battery (Supervised)	24 VDC nominal, 10.2 A max. charging current
Battery Capacity	40 Ah maximum
Output Voltage	24 VDC Regulated
Output Current	8 A
Load Regulation	400 mV
Line Regulation	200 mV
Ripple Voltage	≤ 250 mV pp
Standby Current Draw	150 mA (use for current calculation)
Ground Fault	< 1.5 kΩ
NAC Input *(compatible with NFPA 72 Class A or B NAC)*	
Non-polarized Input Voltage	12/24 VDC/VAC (RMS)
Input to Output Response Time	≤ 10 ms
Current Draw	15 mA maximum
Option Bus Input	
Voltage	12 V nominal
NAC Outputs (x4) *(NFPA 72 Class B, Style Y NAC or Class A, Style Z)*	
Standby Voltage	5 VDC
EOL Resistor	2.21 kΩ Bosch Security System, Inc. P/N: 25899 or Programmable from 1 kΩ to 20 kΩ
Output Voltage	24 VDC Regulated
Line Resistance	1.36 Ω (maximum). Equivalent to 1.1 volt drop
Maximum Output Current (per output)	2.5 Supervised, Power Limited, Regulated
Auxiliary Output	
Output Voltage	19.7 to 27.5 VDC
Maximum Output Current	750 mA

The total current draw of all NAC outputs and the auxiliary output cannot exceed 8 A.

Table 11: Specifications (continued)

Trouble Relay Output	
Contact Type	Form C
Contact Rating	1.5 A, 30 VDC resistive load
AC Trouble Relay Output	
Contact Type	Form C
Contact Rating	1.5 A, 30 VDC resistive load
Power Output Circuit when Notification Appliance Circuit (NAC) is Configured as a Power Output Circuit	
Output Voltage	24 VDC Nominal
Range for Compatibility	19.6 to 27.5 VDC
Output Current	1.3 A maximum
Ripple Voltage	250 mVpp

Maximum current of 8 A is shared among all notification appliance circuits (NAC), power output circuits, and auxiliary power circuit. Power Limited, Special Application.

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