63249-401-200/A4
03/2005

Instruction Bulletin

POWERLINK TM G3 Controller

NF1000G3 for use with POWERLINK G3 Systems

Retain for future use.

SQUARE D

NOTICE

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an immediately hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.

NOTE: Provides additional information to clarify or simplify a procedure.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. This document is not intended as an instruction manual for untrained persons. No responsibility is assumed by Square D for any consequences arising out of the use of this manual.

Class A FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

U.S. Patent Statement

The products described herein are protected under one or more of the following U.S. Patents: 4,901,219; 4,964,058; 5,028,853; 4,940,903; 4,623,859; 4,965,694; D317,906; 5,083,103; 5,180,051; 5,184,278; 5,231,565; 5,233,511; 5,249,115; 5,253,159; 5,315,499; 5,323,307; 5,455,760; 5,532,660; 5,892,449; 5,909,180; 6,055,144;6,612,873; and 6,813,525. Additional patents pending.

TABLE OF CONTENTS

CHAPTER 1—INTRODUCTION

OVERVIEW

This bulletin explains how to install and operate the POWERLINK® G3 NF1000G3 Controller, which is used to control the operation of a POWERLINK G3 system. The controller uses remotely operated circuit breakers to control up to 168 remotely operated branch circuits. Control signals originate externally from dry-contact inputs, from the internal time scheduler, or from commands received via the communications network. Typical control devices include low voltage pushbutton wall switches, occupancy sensors, photocell controllers, and security and building management systems.

KIT CONTENTS

The following items are provided for installation of the POWERLINK NF1000G3 controller:

- NF1000G3 controller
- Class 2 barrier
- Connector hardware kit
  - 8 three-terminal connectors
  - 1 five-terminal connector
  - 1 two-terminal connector
- Miscellaneous hardware kit
  - screwdriver
  - tie wrap
  - panelboard reference label

FIRMWARE

This bulletin also describes the features and operation of a controller using version 5 firmware. To find your controller's firmware version, see "Viewing Controller Information" .

FRONT PANEL OVERVIEW

Figure 1–1 shows the parts of the controller's front panel. A brief description of each part follows in Table 1–1.

Figure 1–1: Controller Front Panel

A. LCD Screen
B. Wiring Compartment Cover
C. RS-232 Port
D. Plus Key/Enter Key
E. Minus Key
F. Next Key
G. Back Key
H. Reset Button

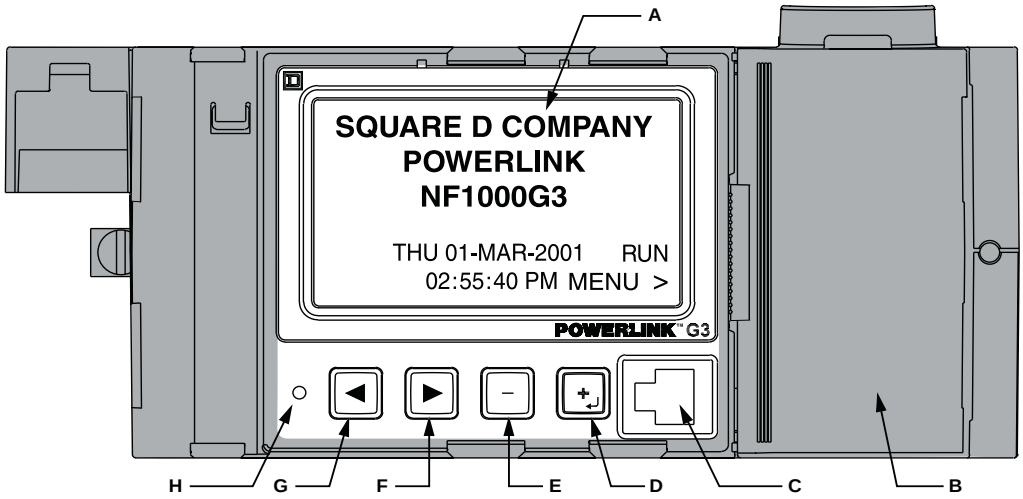


Table 1–1: Parts of The Controller Front Panel

Component	Description
A. LCD Screen	The LCD screen displays the information to set up and operate programs for the controller.
B. Wiring Compartment Cover	The wiring compartment cover protects the input and communications port terminals located in the Class 2 wiring compartment. See "Wiring Compartment Overview" on page 9 for an overview of the wiring compartment terminals.
C. RS-232 Port	The RS-232 serial communications port is used for a temporary connection to a PC. To connect to a PC, the controller front panel serial cable NFFPCG3 is required.
D. Plus Key/Enter Key	The Plus key/Enter key scrolls through the choices for an option on the LCD screen and selects items on the screen. If the cursor is on a numeric field, the Plus key/Enter key increases the value.
E. Minus Key	The Minus key scrolls through the choices for an option on the LCD screen and deselects items on the screen. If the cursor is on a numeric field, the Minus key decreases the value.
F. Next Key	The Next key moves the cursor to the next option on the LCD screen.
G. Back Key	The Back key moves the cursor to the previous option on the LCD screen.
H. Reset Button	The Reset button reboots the controller.

WIRING COMPARTMENT OVERVIEW

Figure 1–2 shows the parts of the controller's wiring compartment. A brief description of each part follows in Table 1–2.

Figure 1–2: Controller Wiring Compartment

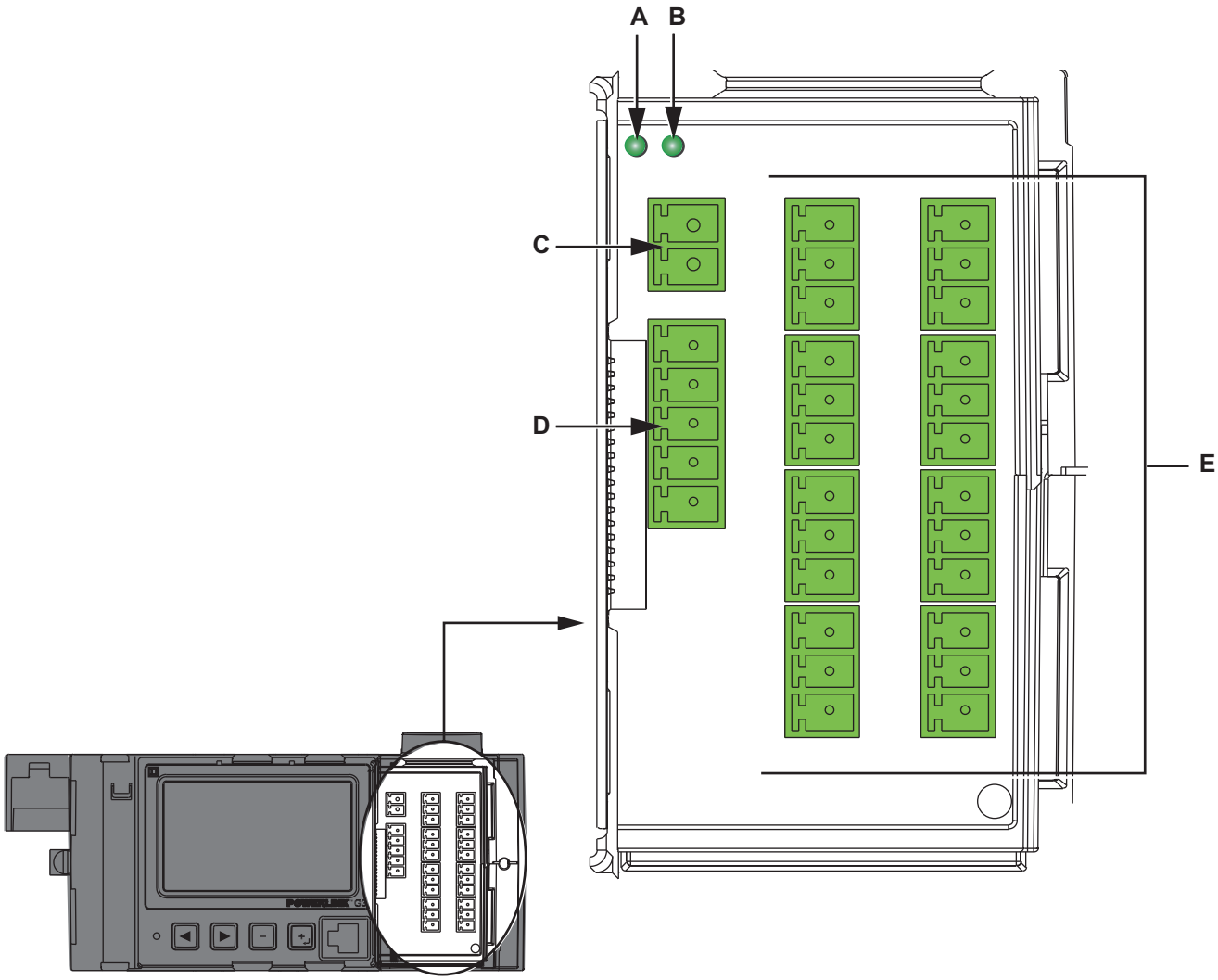


Table 1–2: Wiring Compartment Components

Component	Description
A. Status Power LED	When lit, indicates that the status feedback power source is operating properly.
B. Auxiliary Power LED	When lit, indicates that the 24 Vdc auxiliary power source is operating properly.
C. Auxiliary Power Terminals	Use these terminals to supply 24 Vdc at 100 mA (maximum) power to external devices.
D. Communications Terminals	Use these terminals to connect to external RS-232 or RS-485 communication circuits.
E. Input Terminals (1–16)	Use these terminals to connect to an external dry-contact switching device.

CHAPTER 2 — SAFETY PRECAUTIONS

IN THIS CHAPTER

This chapter contains important safety precautions that must be followed before attempting to install, service, or maintain electrical equipment. Carefully read and follow the safety precautions below.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must be installed and serviced only by qualified electrical personnel.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.
- Before energizing panelboard, all unused spaces must be filled with blank fillers.

Failure to follow this instruction will result in death or serious injury.

CHAPTER 3—QUICK START GUIDE

INTRODUCTION

This chapter is a quick reference listing the steps necessary to install an NF1000G3 controller in a POWERLINK G3 system. The steps in this chapter are provided as an installation checklist. For complete installation instructions, refer to the chapter listed.

QUICK START CHECKLIST

Use the following table as a quick start checklist for the controller:

Table 3–1: Quick Start Checklist

Steps	Reference
1. Install all POWERLINK G3 components according to their instructions. Typical components include, but are not limited to, the following: • circuit breakers • controller • control bus • power supply • slave address selector	See appropriate instruction bulletins. **Chapter 4—Installation** on page 15
2. Wire all POWERLINK G3 components according to their instructions. If necessary, connect the controller to a communications network or a modem.	See appropriate instruction bulletins. **Chapter 5—Input Wiring** on page 17 **Chapter 6—Communications Wiring** on page 27
3. Install the class 2 barrier installation.	**Chapter 6—Communications Wiring** on page 25
4. Set up the controller for program operation. This includes configuring circuit breakers and zones to respond to inputs, setting up communications, setting up control buses, creating schedules, and assigning special days.	**Chapter 8—Operation** on page 42
5. If networked or using with software, set the address for each controller, and enter the communications parameters.	**Chapter 8—Operation, "Setting Up Communication Parameters" on page 51**
6. If your POWERLINK G3 system does not operate as expected, verify that everything is installed and programmed correctly.	**Appendix A—Troubleshooting** on page 93

CHAPTER 4—INSTALLATION

INSTALLING THE CONTROLLER

Follow these steps to install the controller in an NF panelboard (refer to Figure 4–2):

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Turn off all power supplying this device and the equipment it is installed before working on it.
- Use a properly rated voltage sensing device to confirm that power is off.

Failure to follow this instruction will result in will result in death or serious injury.

1. Turn off all power supplying this device and the equipment it is installed.
2. Remove the panelboard cover and deadfront. Verify that the power is off using a properly rated voltage sensing device.
3. Insert the controller's two bus connectors into the vertical bus connections on the right control bus if provided (see Figure 4–2).

   NOTE: If you are using a standard NF panelboard, the controller is installed at the top of the right control bus. If you are using a column-width NF panelboard, the controller is installed at the top of the panelboard (see Figure 4–2).

Figure 4–1: Controller Installation

A. Captive screw
B. Panelboard bus bar
C. Mounting feet
D. Controller
E. Bus connectors
F. Vertical bus connections
G. Right control bus
H. Vertical bus connections

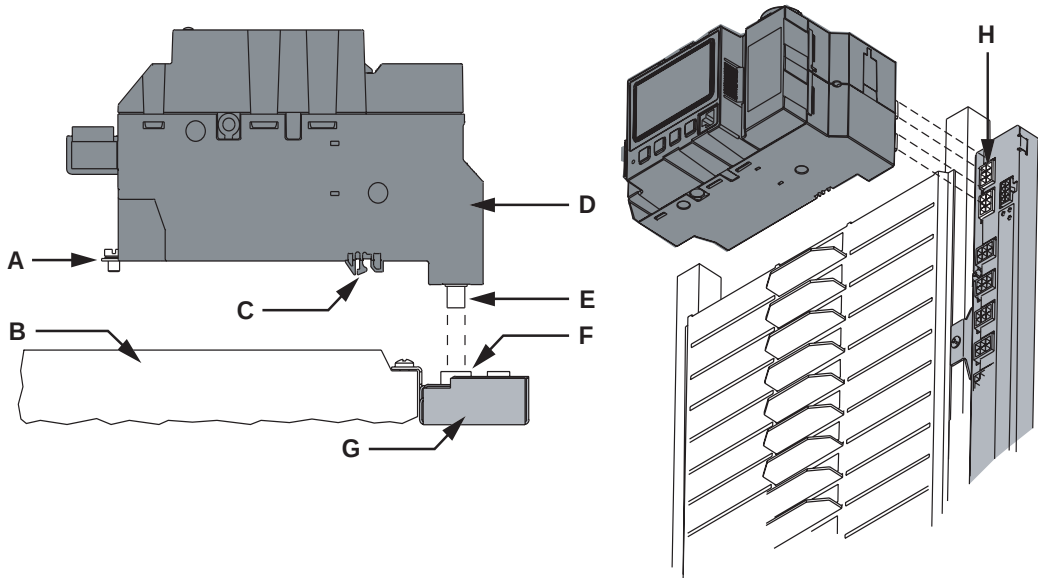
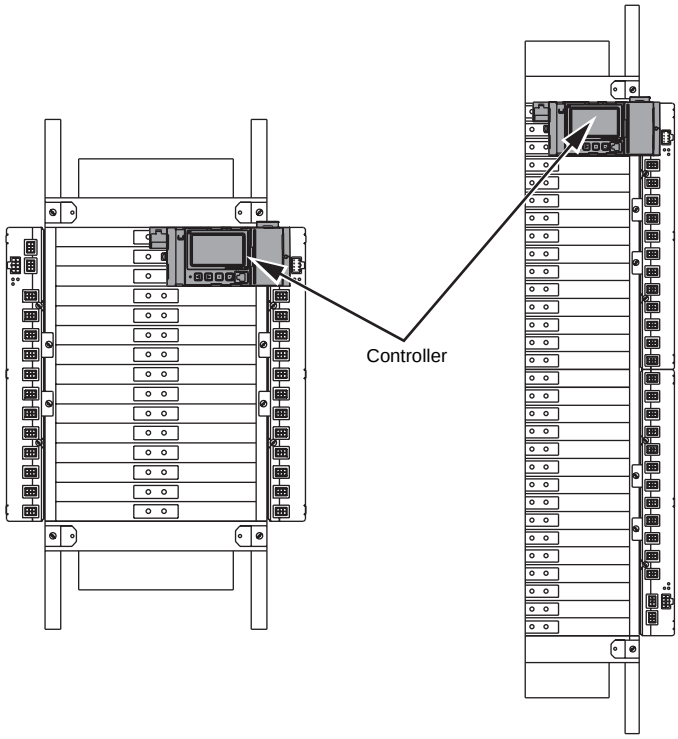


Figure 4–2: Controllers On Standard and Column-width Panelboards



4. Push the controller onto the control bus until the mounting feet snap onto the panelboard interior.

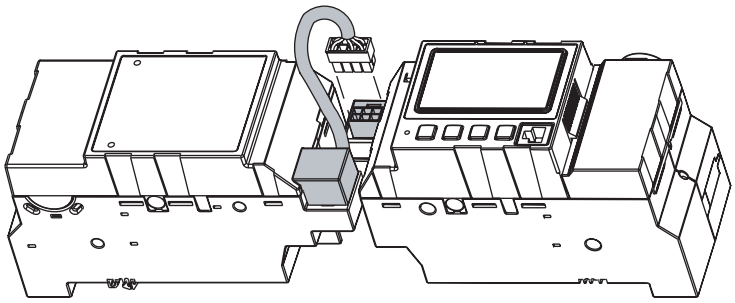
   A captive screw on the left side of the controller is lined up with a hole on the panelboard interior. Use a screwdriver to secure the screw. Torque to 20–30 in-lbs.

   NOTE: If not already installed, install the power supply according to its instruction bulletin.

5. Push the power supply connector plug into the power connection on the controller (see Figure 4–3).

   NOTE: If you are using a column-width NF panelboard, the column-width controller cable NFCWG3 is required to connect the power supply and controller.

Figure 4–3: Connecting The Power Supply to The Controller



REMOVING THE CONTROLLER

To remove the controller, follow these steps:

1. Turn off all power supplying this device and the equipment it is installed.
2. Remove the panelboard cover and deadfront. Verify that power is off using a properly rated voltage sensing device.
3. Unplug the controller's power supply connector from the power supply.
4. Loosen the controller's captive screw from the panelboard interior.
5. Grasping the controller by the edges, lift straight out until the controller disengages.

NOTE: POWERLINK G3 control buses include a mode where all POWERLINK G3 circuit breakers are turned ON approximately 10 minutes after communication is lost with a controller as long as the control buses are still receiving power.

CHAPTER 5— INPUT WIRING

INTRODUCTION

POWERLINK G3 controllers provide a local set of Class 2 terminals for wiring to external control devices such as wall switches, photocells, occupancy sensors, relays, and pilot lights. These terminals provide the following connection points:

- **Physical Inputs** — All POWERLINK G3 controllers provide 16 input connection points and eight 24 Vdc source voltage points so that the dry-contacts of an external control device can act as a control source for an associated zone. These input terminals are designed to work with two-wire and three-wire switching devices. Eight of these terminals are bi-directional and are shared with the output function, described below. See “Physical vs. Communications” below for a comparison between physical inputs and communication inputs.
- **Outputs** — All POWERLINK G3 controllers provide eight status outputs that can be used to operate pilot lights or relays. The output terminal is bi-directional and is not available for use as an output when it is used as an input connection. The total current for all outputs combined is 60 mA. This limits the current available for each output to 7.5 mA, if all eight outputs are used. Choose devices that are capable of operating within these parameters. The ouput voltage rating is 24 Vdc.
- **Auxiliary Power** — All POWERLINK G3 controllers provide a 24 Vdc, 100 mA auxiliary power source for use with occupancy sensors or other external devices. Review the power requirements of the external device to determine whether this power source is suitable.
- **Communication Inputs** — All POWERLINK G3 controllers provide 64 communication inputs. These inputs do not exist physically, but are control points that receive commands from the communications network. ON or OFF commands may be written to POWERLINK G3 by any device that supports the industry-standard Modbus open protocol. Typical devices with Modbus capability are Building Automation Systems (BAS) and programmable logic controllers (PLC). See “Physical vs. Communications” below for a comparison between physical inputs and communication inputs.

Physical vs. Communications

The controller supports up to 16 physical inputs and up to 64 communication inputs. Physical inputs receive their signals to turn ON or OFF from dry-contact type switches (such as wall switches and occupancy sensors) that are wired to a controller’s input terminals. Communications inputs do not exist physically, rather they receive commands to turn ON or OFF across the communications network. For example, a building management system can send a command (by writing to a specific register in the controller) to turn a communication input ON or OFF across serial communications.

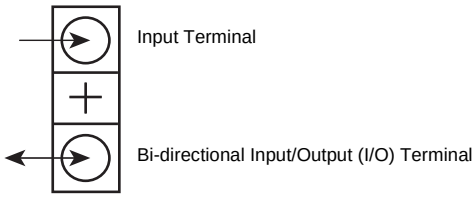
All inputs (1-64) on POWERLINK G3 controllers can be controlled via the communications network. For example, even though a wall switch wired to input 1 is ON, you can use the controller or PCS101 to turn input 1 OFF via communications.

Because inputs 17–64 do not exist physically, no input type configuration is available. However, input timers, zone override capabilities, and the “default action on comms loss” feature are available for all 64 inputs.

CONNECTIONS

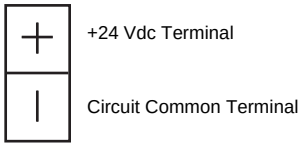
A connector plug is provided for each of the eight sets of terminals. The wiring compartment label identifies each terminal as shown below in Figure 5–1.

Figure 5–1: Input/Output Connector Diagram



The auxiliary power connector provides access to the 24 V Class 2 power supply. An auto-resetting overcurrent protection device limits the current available from this terminal to 100 mA. The wiring compartment label identifies each terminal as shown below in Figure 5–2.

Figure 5–2: Auxiliary Power Connector



EXTERNAL DEVICE WIRING

External control devices, such as wall switches, photocells, occupancy sensors, and relays can be easily connected to the controller's input terminals. Most of these devices have a single set of contacts that provide a control signal, requiring two wires for connection (see Figure 5–3). Some devices use two sets of contacts to provide a control signal, requiring three wires for connection (see Figure 5–3). The contact closure activity is monitored by the controller and is interpreted according to an input type configuration setting that is appropriate for the external device. The bi-directional terminal shown in Figure 5–3 is used as an input when a 3-wire device is used.It also can be used as an independent input, as shown in Figure 5–4

Figure 5–3: 2- and 3-wire Input Connections, Inputs 1–8

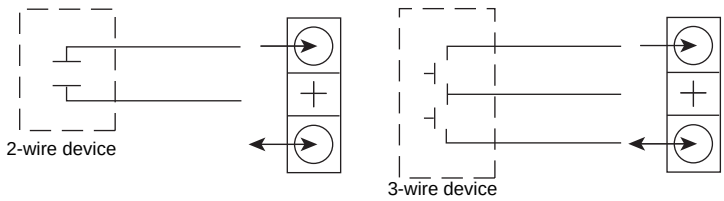
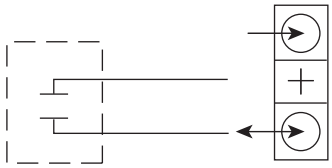


Figure 5–4: 2-wire input connection to a bi-directional terminal, Inputs 9–16

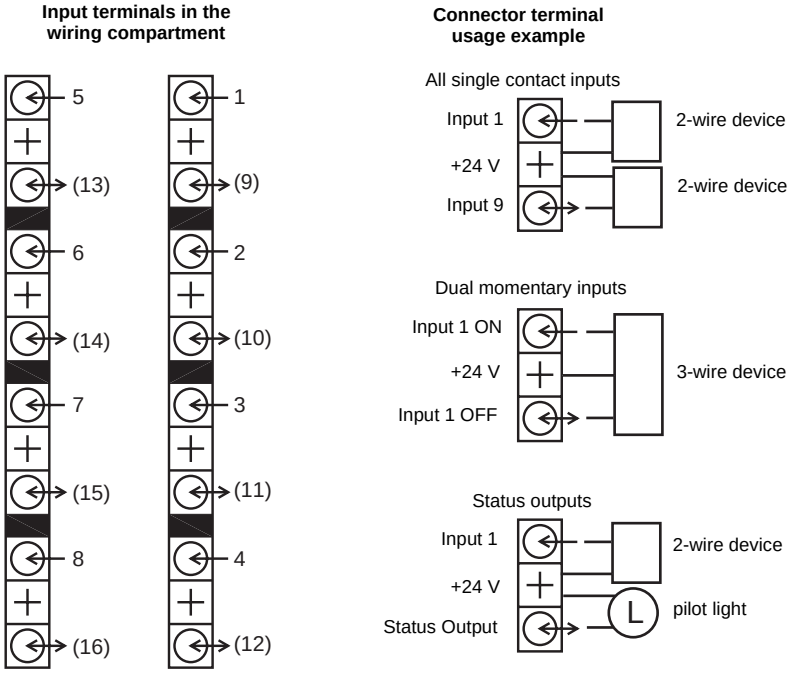


A pilot light, relay, or other device that requires an output from the controller uses the bi-directional terminal as an output. The output function, shown in Figure 5–5, is only available if the bi-directional terminal is not being used as an input. Use this connection to obtain a powered signal representing the zone status of the input located on the same 3-terminal connector.

Terminals

The diagram below illustrates the position of each connector in a controller. Numbered terminals are input terminals. Numbered terminals in parenthesis can be used as either input or output terminals, allowing for up to 16 inputs.

Figure 5–6: Terminal Diagram



In the figure above, a connector can be used three different ways:

1. **Single contact inputs**: A device is connected to input 1, and/or a second device is connected to the bi-directional I/O terminal. The bi-directional I/O terminal is used by the controller as input 9. If the second connector was used, input 2 and/or input 10 also would be single contact inputs.
2. **Dual momentary inputs**: A three-wire device is connected to the connector. The bi-directional I/O terminal is not available for configuration as an independent input or status output.
3. **Status outputs**: The bi-directional I/O terminal is used as an output terminal for a status output, such as an LED pilot light. Input 1 is used to connect an input, and input 9 is configured to provide a status output.

NOTE: In order to operate as intended, the input type must be set up. See“Setting Up Inputs” for instructions.

COMMON INPUT TYPES

Table 5-1 describes the types of typical input configurations used in POWERLINK G3 systems. The contact activity of the external device is monitored by the controller and is interpreted according to the selected input type configuration.

Table 5–1: Common Input Types

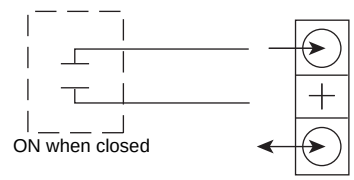
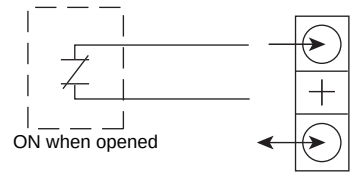
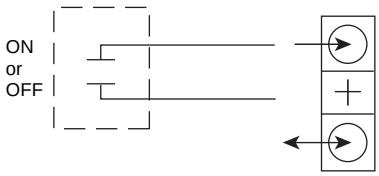
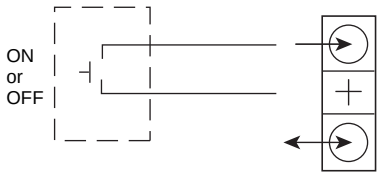
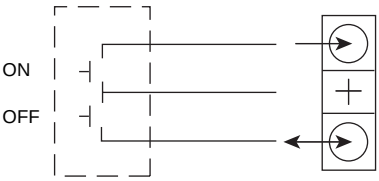
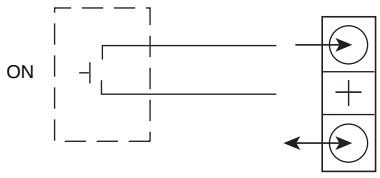
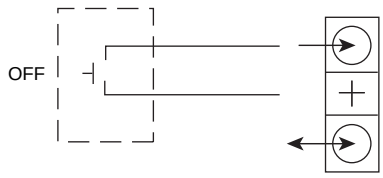
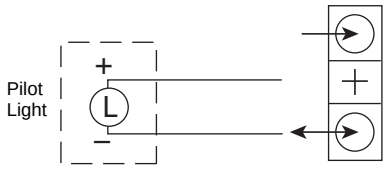
Input Type	Application	Operation	Connection Diagram
Maintained Normally Open	External control devices such as photocells, time clocks and occupancy sensors that contain a normally open contact.	The input state is commanded ON when the contacts are closed and is commanded OFF when the contacts are opened.	
Maintained Normally Open with Blink	Notifies an occupant when the lights are about to turn OFF.	Same as above. Associated breakers will blink (if configured with Blink Type) in response to an OFF command.	
Maintained Normally Closed	External control devices such as photocells, time clocks and occupancy sensors that contain a normally closed contact.	The input state is commanded OFF when the contacts are closed and is commanded ON when the contacts are opened.	
Maintained Normally Closed With Blink	Notifies an occupant when the lights are about to go OFF.	Same as above. Associated breakers will blink (if configured for Blink Notice) in response to an OFF command.	
Maintained Toggle	Maintained switches used to switch lights ON and OFF	The input state alternates between ON and OFF each time the switch changes position.	
Momentary Toggle	Pushbutton switches used to switch lights ON and OFF.	The input state alternates between ON and OFF each time the contacts are closed.	
Dual Momentary	Dual pushbutton or return-to-center momentary switches in which one contact is used to turn lights ON and the other is used to turn lights OFF.	The input state is commanded ON or OFF depending on which contacts are closed. (3-wire device.)	
Momentary ON	Pushbutton switches used with a timer to switch lights ON for a preset period.	The input state is commanded ON when the contacts are closed. Typically used with a timer.	

Table 5–1: Common Input Types

Input Type	Application	Operation	Connection Diagram
Momentary OFF	Pushbutton switches used with a timer to switch lights OFF for a preset period.	The input state is commanded OFF when the contact is closed. Typically used with a timer.	
Status Output	Used to annunciate the ON/OFF state of the lights when they are not visible from the position of the control device.	The bi-directional terminal provides a status output voltage for use with a pilot light or relay.	

Inputs 1–16 of the NF1000G3 controller can be configured from the front panel. Inputs 9–16 are limited to 2-wire input types and are not available if the other input on the same connector plug is configured as dual momentary. To use any of the bi-directional terminals as an output it must be specifically configured for status output. This terminal will then provide a powered signal representing the zone status of the input located on the same 3-terminal connector.

INPUT TIMERS

Any input can be configured with a timer that will automatically turn OFF or ON the input after a period of time. The duration of the input timer can be set for up to 18 hours. See Table 5–2 for a description of the available timer types.

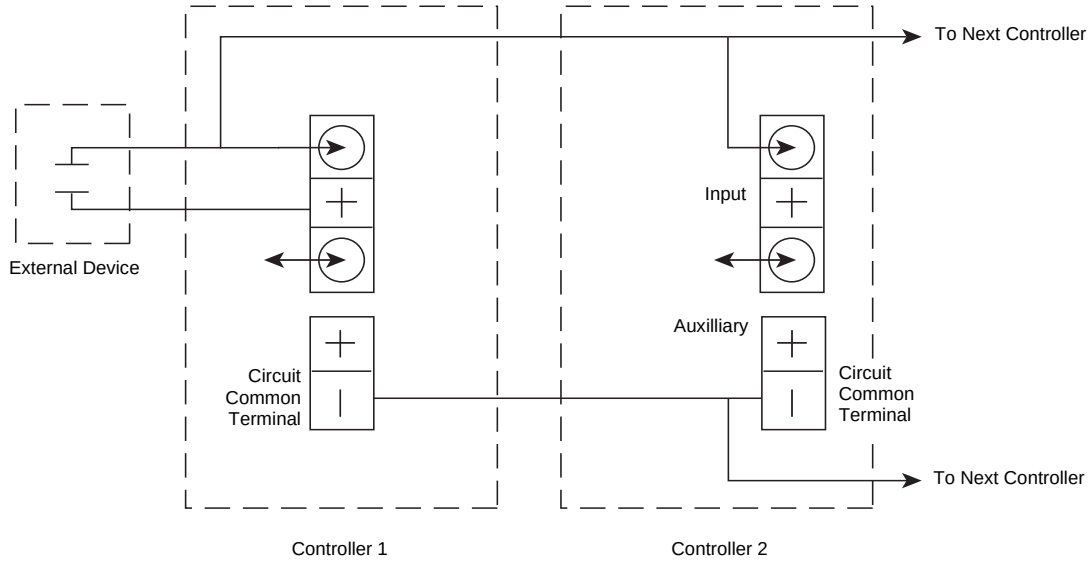
Table 5–2: Timer Types

Timer Type	Operation
No Timer	The input is not affected by the timer.
Timed ON	The timer countdown starts or restarts whenever the input is turned ON. The input is commanded OFF when the timer value reaches zero.
OFF Delay	The timer countdown starts or restarts whenever the input is commanded OFF, but the input remains ON until the timer reaches zero.
ON-Delay	The timer countdown starts or restarts whenever the input is commanded ON, but the input remains OFF until the timer reaches zero.

WIRING AN EXTERNAL DEVICE TO TWO OR MORE CONTROLLERS

An external device may be wired to multiple controllers. It is recommended that the source voltage be provided to the external device by one controller. The input signal from the external device and the circuit common terminal on the auxiliary power connector are connected to the other controllers.

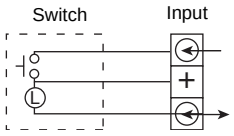
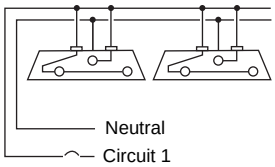
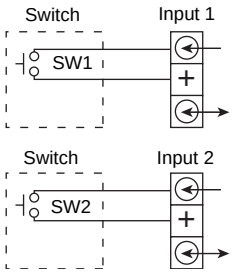
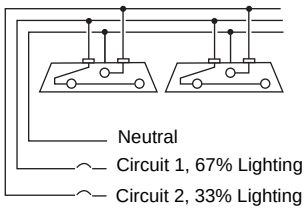
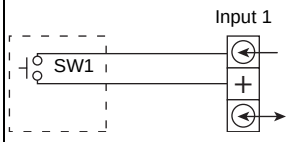
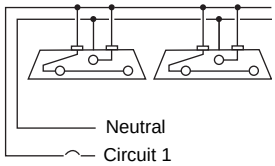
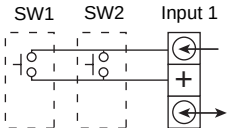
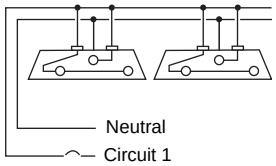
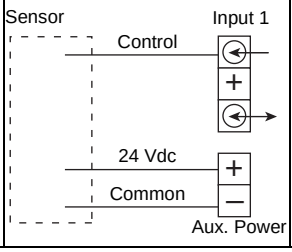
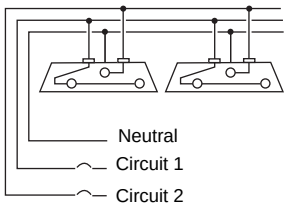
Figure 5–7: Connecting an External Device To Multiple Controllers



APPLICATIONS FOR COMMON INPUT TYPES

The following table shows how the input configuration types can be used in common applications.

Table 5–4: NF1000G3 Common Input Applications

Application	Switch Type/Input	Switch Diagram	Branch Circuit Diagram①	Action
ON/OFF wall switch	Momentary Switch (configured for momentary toggle)			Switch toggles lights ON and OFF.
Multi-level switching	Momentary Switch Input 1: Momentary Toggle Input 2: Momentary Toggle			SW1 is mapped to Circuit 1 for 67% level lighting. Successive presses of SW1 will switch Circuit 1 ON and OFF. SW2 is mapped to Circuit 2 for 33% level lighting. Successive presses of the SW2 will switch Circuit 2 ON and OFF. Use SW1 and SW2 to turn ON both circuits for 100% lighting.
Time clock with wall switch override	Internal time clock with logic type set to OR Momentary switch wired to Input (configured for momentary toggle with timer)			Zone 1 is programmed with a schedule. Lights will remain ON during programmed time periods. Zone 1 is mapped to Circuit 1. Toggling SW1 has no control during scheduled ON periods, However, during OFF periods, SW1 will toggle lights ON/OFF. A timer on SW1 will switch lights OFF after preset period, unless they are manually toggled OFF.
Two switches controlling the same group of lights (such as typical 3-way line voltage switch arrangement)	Two momentary switches (configured for momentary toggle)			Either switch SW1 or SW2 will toggle lights ON and OFF.
Occupancy sensor controlling a group of circuit breakers	Occupancy-rated sensor wired to Input 1 (configured for maintained N.O.) Control power supplied by auxiliary power supply.			Input 1 is mapped to Circuit 1 and Circuit 2. When motion is detected, the occupancy sensor contact will close, causing circuit breakers 1 and 2 to close.

① Circuit numbers are based on circuit numbering in a panelboard.

N.O. = Normally Open

N.C. = Normally Closed

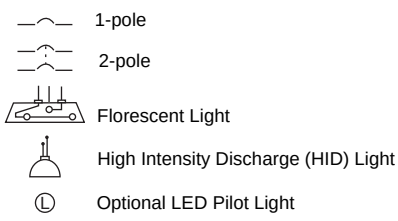
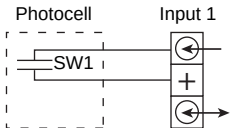
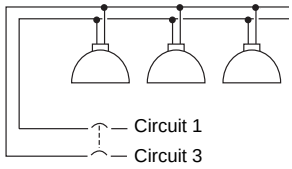
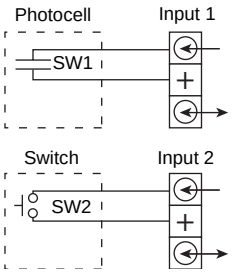
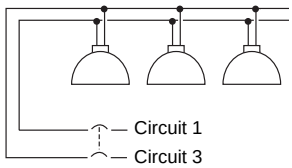
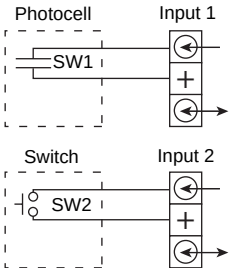
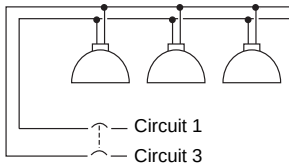


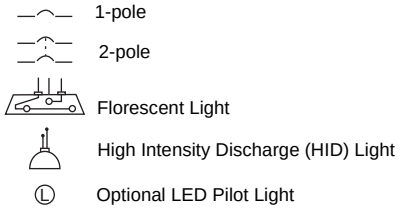
Table 5–4: NF1000G3 Common Input Applications

Application	Switch Type/Input	Switch Diagram	Branch Circuit Diagram①	Action
Photo sensor	Photo controller contact N.O. wired to Input 1 (configured for maintained N.O.)			When SW1 closes, the circuit breaker that feeds circuits 1 and 3 will switch ON and remain ON until SW1 contact opens.
Photo sensor with manual override and timer	Photo controller contact N.O. wired to Input 1 (configured for maintained N.O.) Momentary Switch wired to Input 2 (configured for momentary toggle with timer)			When SW1 closes, the circuit breaker that feeds circuits 1 and 3 will switch ON and remain ON until SW1 contact opens. Override SW2 is provided to switch lights ON for periods when photo controller has open contact. Timer prevents override from remaining ON indefinitely.
Photo sensor with clock override	Internal time clock with logic type set to AND, and with Input 1 wired to a N.O. photo controller (configured for maintained N.O.) Momentary switch wired to Input 2 (configured for momentary toggle with timer)			Internal time clock prevents photo cell from switching lights ON during preset scheduled periods. SW2 provides a timed override.

① Circuit numbers are based on circuit numbering in a panelboard.

N.O. = Normally Open

N.C. = Normally Closed



CHAPTER 6 — COMMUNICATIONS WIRING

INTRODUCTION

Modbus

The NF1000G3 controller includes MODBUS communications as a standard feature. ASCII and RTU slave modes are supported . A computer or building automation system (BAS) may be connected to a controller in one of the following ways:

- A temporary local connection using the front panel RS-232 serial port and a NFFPCG3 front panel cable accessory
- A permanent connection, either to a local computer or to a remote computer via modem that is wired into the wiring compartment's RS-232 or RS-485 serial port.

DMX512

The NF1000G3 controller includes DMX512 communication protocol as a standard feature. See "RS-485 Controller Connections Using DMX512" on page 35 and "Using a G3 Controller with DMX512 Systems" on page 103 for detailed information.

NOTE: All connection methods share the same serial port. Potential communication errors may occur if multiple computers access any controller's serial port at the same time. DO NOT attempt to communicate through the front panel connection while a permanent computer connection, such as a BAS, is actively communicating with the controller.

POWERLINK G3 COMMUNICATIONS OVERVIEW

The POWERLINK G3 system contains two levels of communication networks, *subnet* and *automation*, as illustrated in Figure 6–1.

The first level of communications is the device-level network called the *subnetwork, or subnet*. The subnet connects these POWERLINK G3 components:

① controller

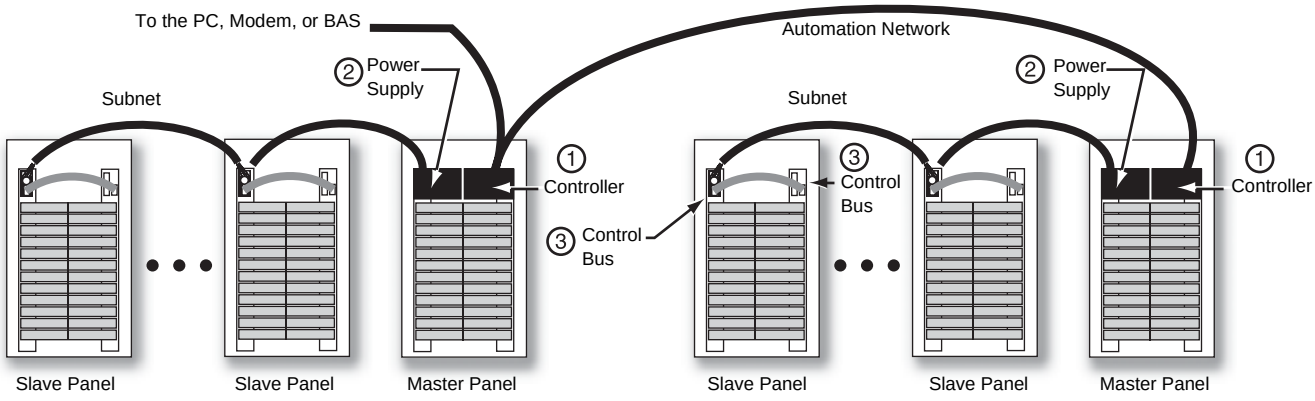
② power supply

③ control buses

Up to eight control buses, which can be located in multiple panelboards, can be controlled from a single controller. The subnet carries command signals from the controller to the appropriate control bus, which in turn, instructs the proper circuit breakers to remotely switch. Through the subnet, the controller also polls the control buses for the status of the remotely operated circuit breakers. In addition to providing the communications path to the control buses, the subnet wiring also provides a 24 Vdc source for powering the control buses and providing power to operate the remotely operated circuit breakers.

The second level of the communication network connects the system (one or more controllers) to devices such as personal computers, modems, or a building management system with the appropriate interface drivers. This communication network is referred to as the *automation network* (see Figure 6–1).

Figure 6–1: Automation and Subnet Communications Networks



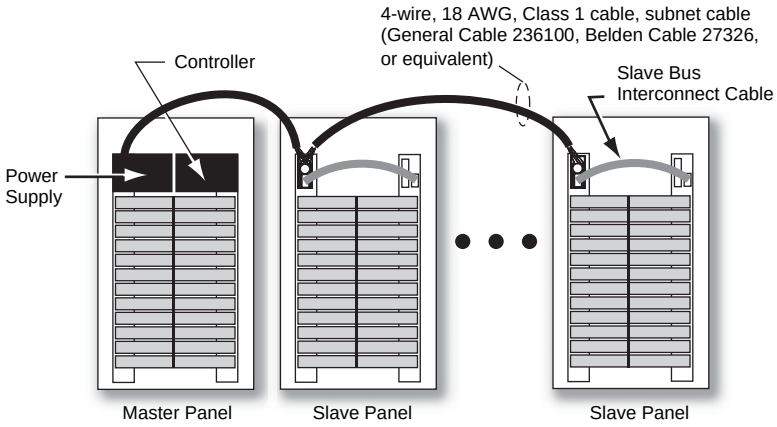
SUBNET COMMUNICATIONS

A subnet communications network is necessary whenever two or more panels are to be controlled from a single controller.

Subnet Components

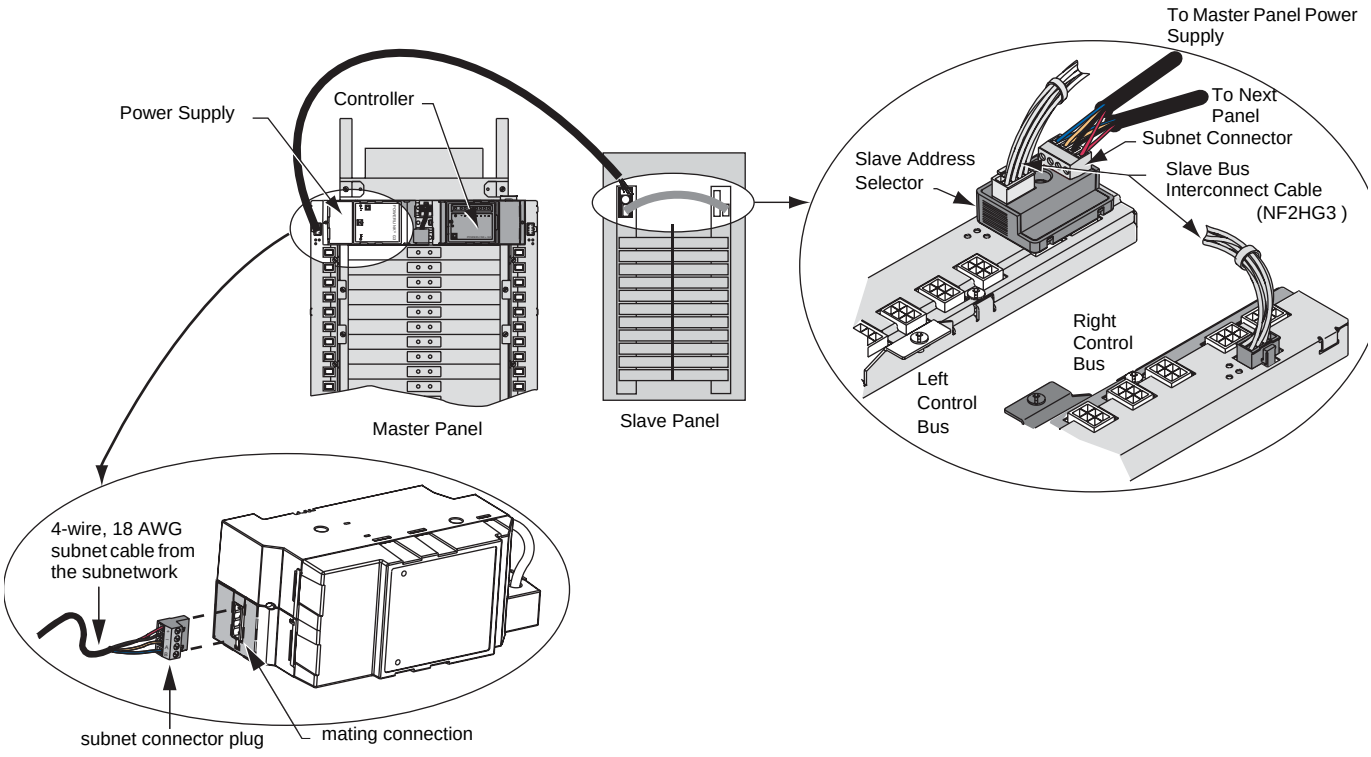
In a subnet network, the master panel contains the controller and power supply. Other panels connected to the controller are referred to as slave panels. Figure 6–2 illustrates these components.

Figure 6–2: Subnet System Communications Wiring



The components of the subnet communications wiring are the controller, power supply, control buses, slave address selectors, and slave bus interconnect cable as illustrated in Figure 6–3.

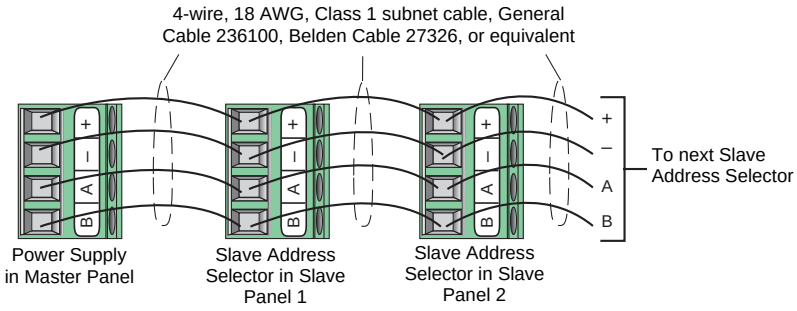
Figure 6–3: Detail of the Components in Subnet Communications Wiring



Subnet Wiring

The power supply, located in the master panel, is connected to each slave address selector in a daisy chain as shown in Figure 6–4. Only one slave address selector is required for each slave panel.

Figure 6–4: Subnet Wiring Detail

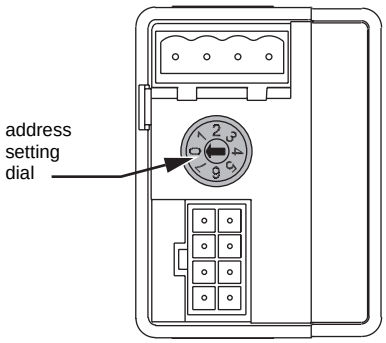


Wiring the controller to the subnet is not necessary. The connection between the controller and the power supply provides the subnet communications for the controller.

Slave Address Selector

The slave address selector enables you to set the address of the slave panel. A dial switch on the face of the selector is labeled 0–7, with each number representing a unique address. Address 0 is reserved for the master panelboard. If the power supply or controller is plugged into any control bus on the subnet, address 0 should not be used as a slave address.

Figure 6–5: Dial Switch On The Address Selector



Only two control buses may be connected to a slave address selector. If a second control bus is located in the same slave panelboard, a slave bus interconnect cable is required for connecting the slave address selector to the second bus (see Figure 6–3 on page 29). For proper operation of the system, always install the slave address selector on the left control bus. Each slave address selector must also have its own unique address. If two or more selectors contain the same address, improper operation will result.

Subnet Conductors

The National Electrical Code (NEC) classifies the POWERLINK G3 subnet communications wiring as a Class 1 circuit. Thus, the conductors must be sized and insulated from the line voltage of the panelboard. To meet Class 1 requirements, conductors should be 18 AWG and installed in conduit or an appropriate raceway.

Four conductors are required for the subnet. Two conductors carry 24 Vdc power to the control buses, while the other two are used for the data path. Approved cables are 4-wire, 18 AWG, Class 1 subnet cables such as General Cable 236100, Belden 27326, or equivalent.

The total distance of the conductor length from the power supply to the farthest control bus depends on the power supply voltage. Table 1 list maximum wiring distances based on nominal voltages.

Table 6–1: Maximum Wiring Distances

Nominal Voltage①	Power Supply Part Number	Maximum Cable Length
120 V	NF120PSG3	400 ft (122 m)
220 V	NF240PSG3	100 ft (30 m)
240 V	NF240PSG3	400 ft (122 m)
277 V	NF277PSG3	400 ft (122 m)

① Phase to neutral voltage

NOTE: If you are using a T- connection to connect the power supply to the subnet, the subnet distance limits above apply to each direction of the T-connection. Star connections are not recommended

With the exception of setting the slave address selectors, no additional setup is required for commissioning the subnet communications network.

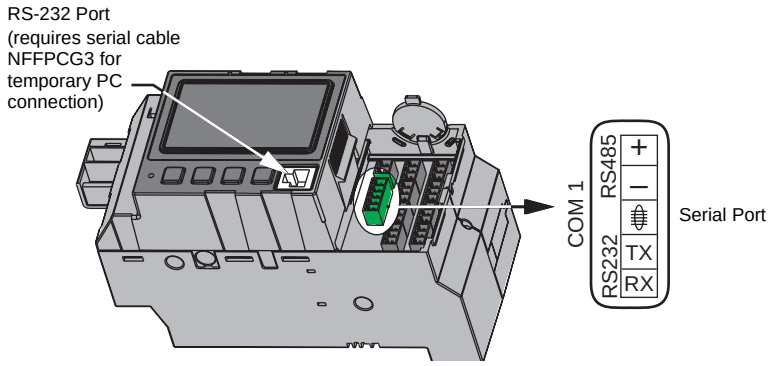
AUTOMATION NETWORK COMMUNICATIONS

All POWERLINK G3 controllers feature an automation network for communicating with other controllers. communication ports are available on the controller: RS-232 RS-485 as shown in Figure 6–6.

The RS-232 and RS-485 ports are connected internally to the same controller serial communication port. Therefore, only one master device can be connected through one of the ports to the controller. For example, you cannot simultaneously connect a computer to the RS-485 port and a PC to the RS-232 serial port. Attempting to do so may result in improper operation.

An internal RS-232 communication port also is available externally. The NFFPCG3 front panel serial cable is required to temporarily connect the controller to a notebook computer. Refer to the “Controller Front Panel Serial Cable” instruction bulletin 63249-405-01 for the serial cable installation procedures.

Figure 6–6: Ports On The Controller



RS-485 Communications

Multiple controllers can be networked together by wiring the system using the RS-485 port on the controllers. Figure 6–7 illustrates a typical configuration where three master panels are shown (each controlling its own independent subnet.)

A maximum of 247 controllers can be connected together. Use a line repeater for each group of 32 controllers. The maximum cable distances at various baud rates are listed in Table 6–2.

Figure 6–7: RS485 Automation Level Communications Wiring

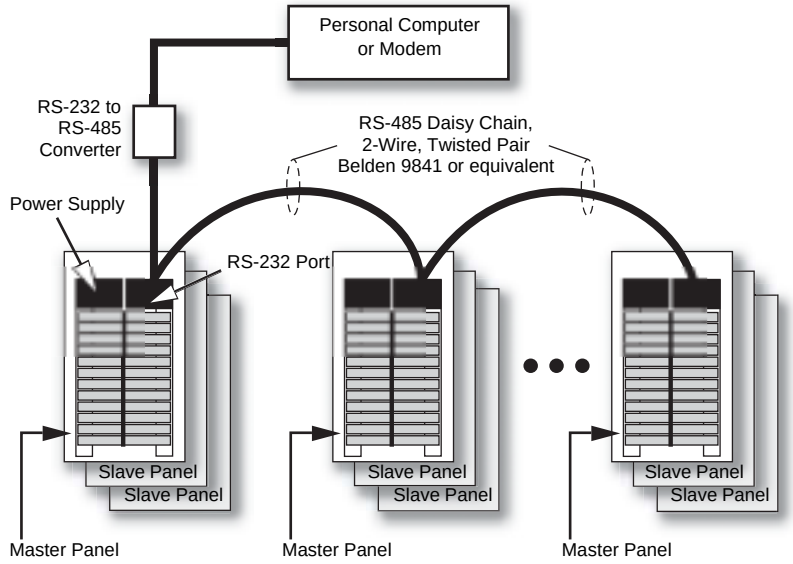


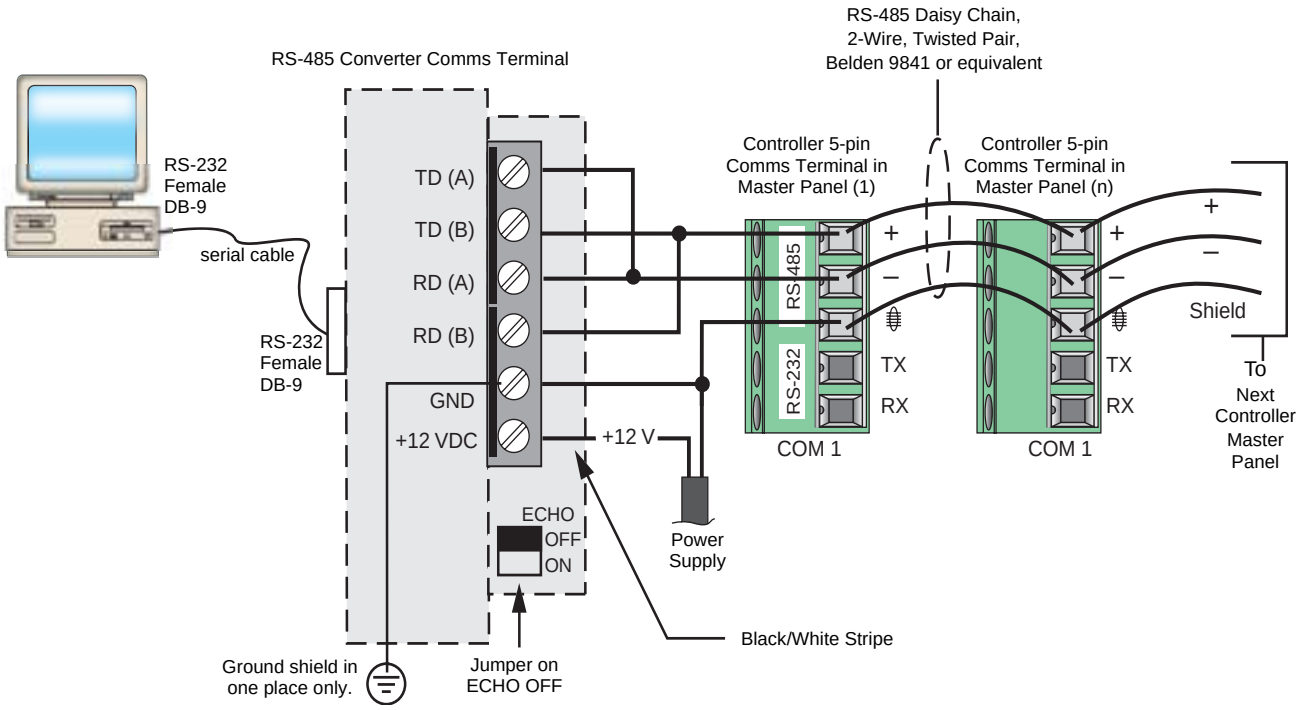
Table 6–2: Maximum Communication Cable Distances

Baud Rate	Maximum Distances		
	1–8 Controllers	9–16 Controllers	17–32 Controllers
38,400	4,000 ft (1,219 m)	4,000 ft (1,219 m)	3,000 ft (914 m)
19,200	5,000 ft (1,524 m)	4,000 ft (1,219 m)	4,000 ft (1,219 m)
9,600	5,000 ft (1,524 m)	5,000 ft (1,524 m)	4,000 ft (1,219 m)
4,800	5,000 ft (1,524 m)	5,000 ft (1,524 m)	4,000 ft (1,219 m)
2,400	5,000 ft (1,524 m)	5,000 ft (1,524 m)	4,000 ft (1,219 m)
1,200	5,000 ft (1,524 m)	5,000 ft (1,524 m)	4,000 ft (1,219 m)

RS-485 Controller Connections Using a RS-232/485 Converter

Connection from the network to a personal computer, modem, or a building management system with the appropriate interface drivers often requires the use of a converter that will convert the RS-485 signal to an RS-232 signal. When the automation network is connected to the serial port (comms port) on the computer, the POWERLINK Controller Software (PCS-101) can be used. A female DB9 to female DB9 cable is required for the connection from the computer serial port to the converter. Square D offers a standard RS-232/485 converter kit that includes the converter, power supply, and serial cable (Square D catalog number 6382RS485G3KIT). Connection of this kit to the automation network is shown in Figure 6–8. The communication wires are daisy-chained from one controller RS-485 port to the next in the following manner: positive to positive (+ to +), negative to negative (– to –), and shield to shield.

Figure 6–8: 2-wire, RS-485 Connection Using a Converter Kit



Other types of third-party converters are available, depending on the application needs. When using a third-party converter, make sure it has biasing configurable by the user.

RS-485 Controller Connections Using DMX512

A DMX512 master may be connected to the controller via the internal RS485 port. See “Using a G3 Controller with DMX512 Systems” on page 103 for more information

NOTE: All connection methods share the same serial port. Potential communication errors may occur if multiple computers access any controller’s serial port at the same time. Do not attempt to communicate through the front panel connection while a permanent connection, such as a DMX512 console, is actively communicating with the controller.

Table 6–3: DMX512 Communications Wiring Setup

Use	5 Pin XLR PIN #	DMX512 Function	Controller
Cross reference	1	Data Link Common	COM 1 ⊖
Primary Data Link	2	Data 1 -	COM 1 –
	3	Data 1 +	COM 1 +
Secondary Data Link (Optional)	4	Data 2-	Not used
	5	Data 2 +	Not used

Automation Communications Wiring Specifications

The National Electric Code (NEC) classifies automation communications wiring as a Class 2 circuit. Conductors may range in size from 24 to 18 AWG and consist of a single set of twisted pair conductors with a shield (Belden 9841 or equal). Maximum wiring distance should not exceed 5000 ft (1524 m) at 19,200 baud for eight controllers. See Table 6–2 on page 33 for the maximum communication cable distances at various baud rates.

Shielding and Grounding

The automation network shield should be grounded in one place only, typically at the RS-232/485 converter as shown in Figure 6–9 on page 36.

The controller circuitry and associated Class 2 wiring is electrically isolated from all system voltages and earth ground. Maintaining the integrity of this isolation is important for proper operation and performance.

The controller’s input terminals and auxiliary power source are part of the Class 2 circuitry. External devices connected to the controller must meet the isolation requirements and other Class 2 wiring standards. Do not connect the controller to external voltage sources or earth ground.

The RS-485 network communications circuit is also part of the Class 2 circuitry. In most applications, the shield of each communications cable will be interconnected at the center terminal of the communications connector. This connection ensures networked controllers are tied together to a common reference potential. The shield must be grounded at only one point in the system. Grounding the shield at multiple points will create a “ground loop” that may disrupt communications or cause damage to the controller circuitry.

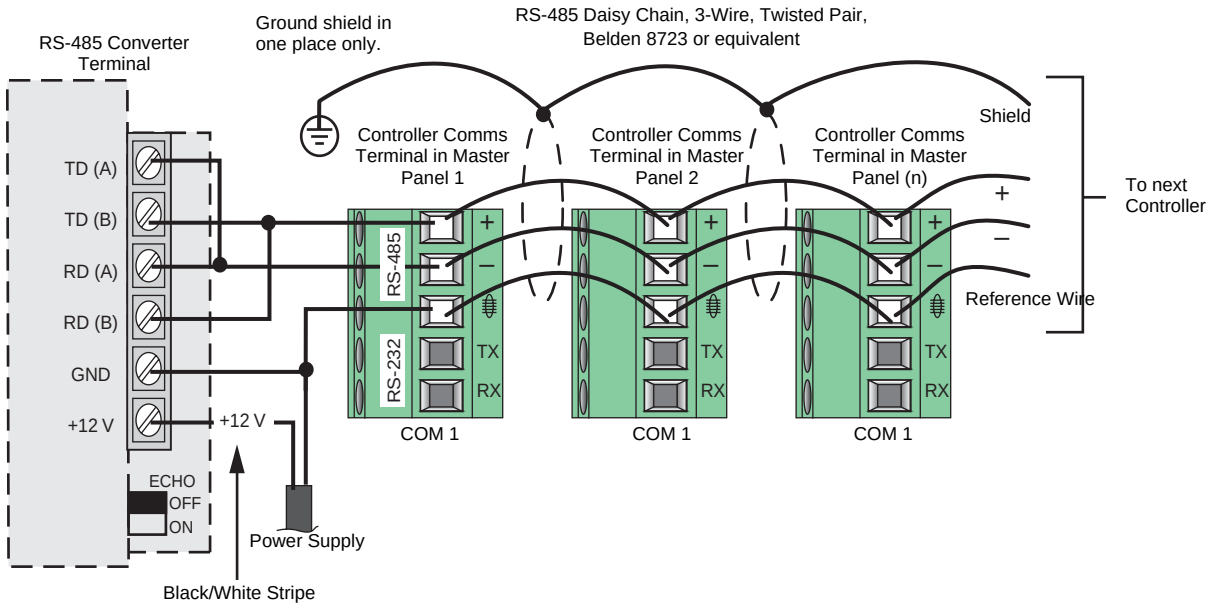
Alternate RS-485 Wiring

An alternate RS-485 wiring scheme that uses a third reference wire is preferred in certain applications:

- When you cannot avoid connecting the Class 2 input circuitry to earth ground.
- When an external device's isolation from ground is minimal.
- When the controller is installed on a network with non-isolated devices.

This 3-wire method uses a separate reference wire, or pair of wires, to interconnect the center terminal of all communications connectors (Figure 6–9). The shield should remain isolated from the controller and should not be connected to this point. Instead, interconnect the shields using a wire nut. Connect the shield to ground at only one point.

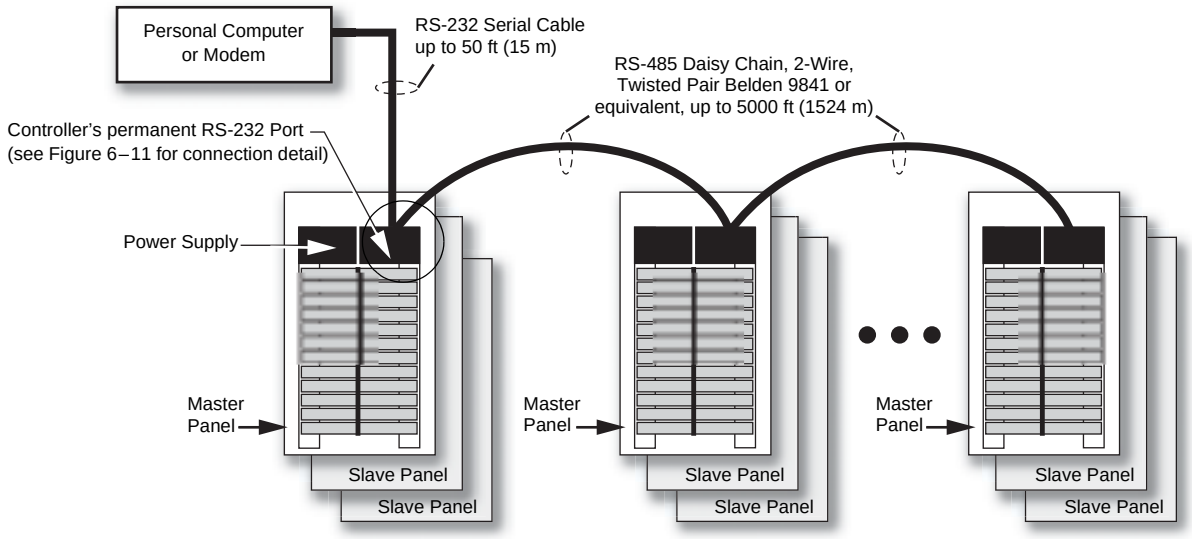
Figure 6–9: Alternate Controller Communications Wiring Detail for 3-wire, RS-485 Systems



RS-232 Serial Communications

In addition to the RS-485 communications port, the controller has an RS-232 port for direct connection to personal computers, modems, or other devices that support MODBUS ASCII or RTU communications as shown in Figure 6–10. Because it is a direct RS-232 connection, no converter is required. However, the total length of the RS-232 wiring should not exceed 50 ft (15 m).

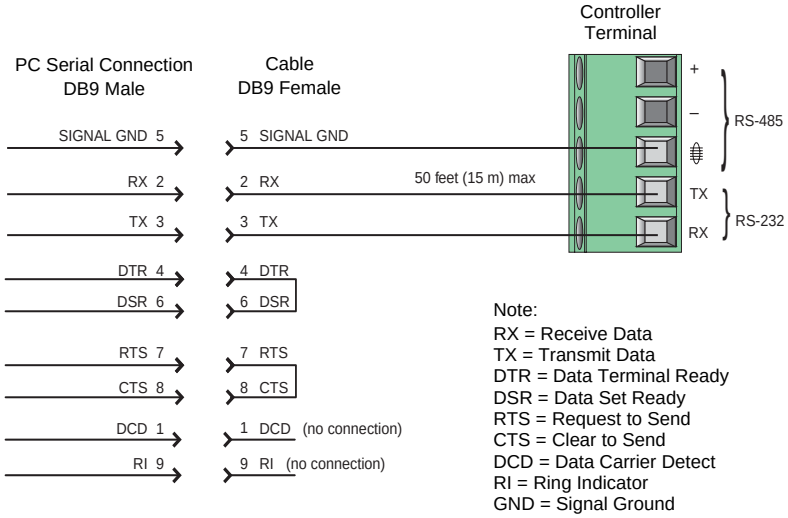
Figure 6–10: RS-232 Controller Serial Connections



RS-232 Connection to a Personal Computer

To make the serial communications connection using the RS-232 port of the controller, use a standard RS-232, 9-pin DB-9 connector and serial cable. Figure 6–11 shows these connections.

Figure 6–11: RS-232 Controller Serial Connection Detail



CHAPTER 7—CLASS 2 BARRIER INSTALLATION

INTRODUCTION

All connections to the wiring compartment of the NF1000G3 are classified as Class 2 circuits. As such, these circuits must be separated from Class 1, electric light, and power circuits. There are two ways to separate the wiring. The first is to maintain a minimum amount of spacing between the circuits. The second is to install a Class 2 barrier.

A flexible barrier is provided with the NF1000G3 controller. The barrier provides circuit separation in situations where maintaining minimum spacing is not practical.

INSTALLING THE CLASS 2 BARRIER

Follow the instructions below to install the Class 2 barrier.

⚠ DANGER

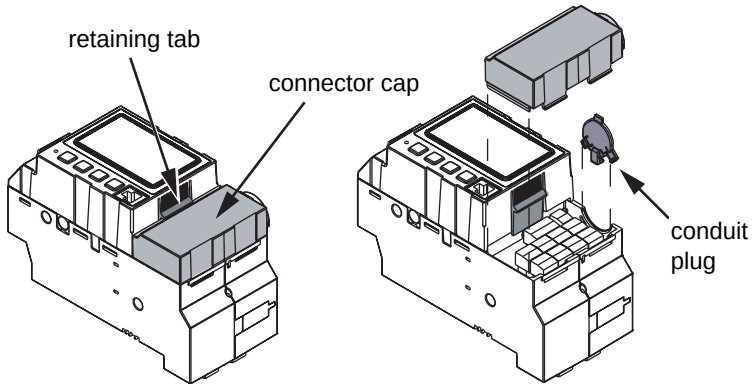
DANGER OF ELECTRIC SHOCK, BURN OR ARC FLASH

- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.

Failure to follow this instruction will result in death or serious injury.

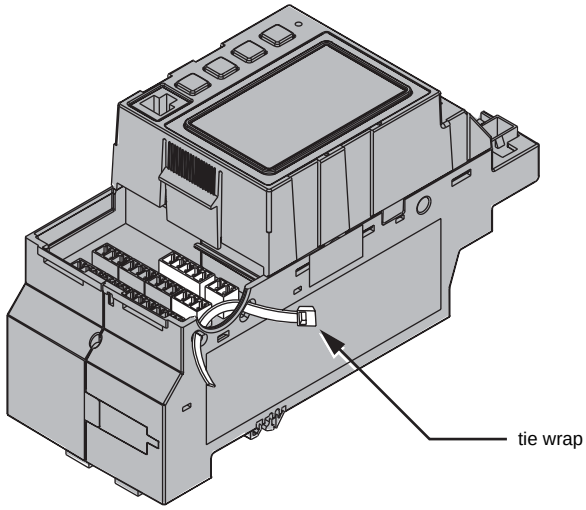
1. Turn off all power supplying this device and the equipment it is installed. Verify that the power is off using a properly rated voltage sensing device.
2. Remove the connector cap by pressing down on the retaining tab that secures the cap, then slide the cap up and away from the controller (see Figure 7–1).
3. Remove the conduit plug by pulling down and out on the conduit plug.

Figure 7–1: Removing The Connector Cap



4. Thread the supplied tie wrap through the holes on the controller (see Figure 7–2).

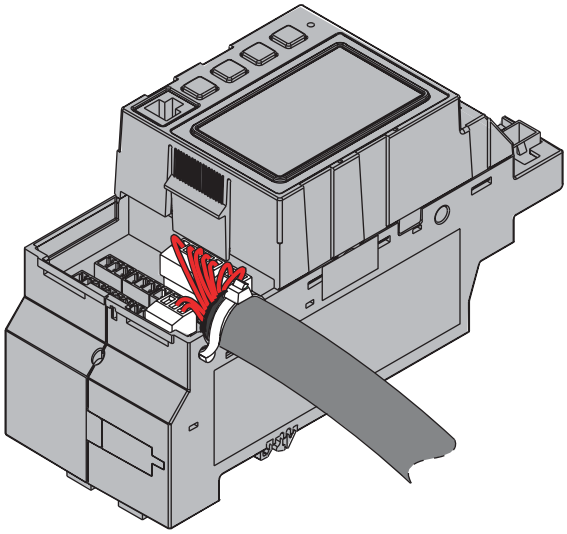
Figure 7–2: Threading The Tie Wrap Through The Controller



5. Locate and remove a knockout on the top of the panelboard near the controller.
6. If not using a conduit, apply a fitting where the knockout was removed. This will protect the wires coming into the panelboard.
7. Pull the Class 2 wires into the panelboard through the hole in the panelboard.
8. Determine the length of the barrier by measuring the distance from where the wires enter the panelboard to the controller wiring compartment.
9. Cut the barrier slightly longer than the measured length to allow enough of the barrier to enter the wiring compartment.
10. Thread the wires into the barrier and slide the barrier up to the hole in the panelboard.
11. Cut the wires to length and terminate them according to the input wiring and communication wiring requirements, as described in “Input Wiring” on page 19 and “Communications Wiring” on page 27.

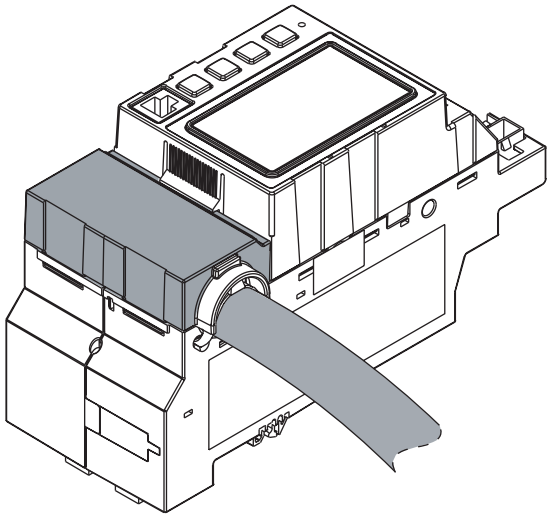
12. Close the tie wrap around the barrier to secure the wires and barrier to the controller (see Figure 7–3).

Figure 7–3: The Secured Tie Wrap



13. Slide the connector cap on until it snaps into place.

Figure 7–4: The installed Class 2 Barrier

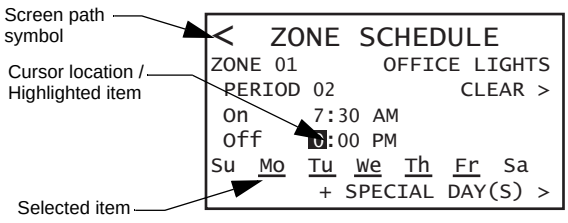


CHAPTER 8—OPERATION

OPERATING THE DISPLAY

The LCD screen displays information as dark text against a light background. The cursor position is indicated by light text against a dark background. Placing the cursor on a screen path symbol (< or >) allows you to move between screens, and placing the cursor on a value field allows you to change that value. Underlined text indicates a selected item (or items) in a group of multiple choices (see Figure 8–1 for examples of these features).

Figure 8–1: Typical Screen



Using the Keys

The four keys on the display let you navigate and change information on each screen, as well as move from screen to screen. Table 8–1 shows the keys and their descriptions.

Table 8–1: Keys of a controller

Key Name	Key	Key Application
Back Key	◀	The Back key moves the cursor to the previous option, changeable value, or over a screen path symbol (< or >)*.
Next Key	▶	The Next key moves the cursor to the next option, changeable value, or over a screen path symbol (< or >)*.
Minus Key	−	The Minus key is used to perform the following actions: • Scroll down through the choices of the highlighted item • Decrease the value of the highlighted item • Act as a shortcut key by moving the cursor to the left-pointing screen path symbol (<) when it is on any right-pointing screen path symbol (>)*
Plus Key	+ ↵	The Plus key is used to perform the following actions: • Scroll up through the choices of the highlighted item • Increase the value of the highlighted item • Enter a screen when a screen path symbol is highlighted (< or >)*

* The right-pointing screen path symbol (>) is used to move to a lower level screen, and the left-pointing screen path symbol (<) is used to move to a higher level screen.

Selecting a Screen

To select a screen or to return to a previous screen, follow these steps:

1. **To view a screen:**
   a. Press the Back key or Next key to highlight the right-pointing screen path symbol (>).
   b. Press the Plus key to view the screen.

   In the screen examples below, the cursor in the MAIN MENU screen is highlighting the CONTROLLER screen path symbol, leading to the CONTROLLER MENU screen.

```
<     MAIN  MENU
                ACCESS >
                STATUS >
                  ZONE >
            CONTROLLER >
                 TOOLS >
```

```
< CONTROLLER  MENU
             TIME/DATE >
          SPECIAL DAYS >
              BREAKERS >
         CONTROL BUSSES >
         COMMUNICATIONS >
```

2. **To return to the previous screen:**
   a. Press the Back key or Next key to highlight the left-pointing screen path symbol (<).

   NOTE: If the cursor is on a screen path symbol, you can press the Minus key as a shortcut to the left-pointing screen path symbol (<).
   b. Press the Plus key to go back one screen.

   The cursor returns to the previous screen (the MAIN MENU in this example). In the right screen example, the cursor position lets you return to the MAIN MENU screen when the Plus key is pressed.

Screen Navigation

To indicate multiple screen navigation, this manual uses the following format:

1. From the MAIN MENU, select SOURCE > INPUTS > INPUT SYNC.

This means you would select SOURCE from the MAIN MENU screen, then select INPUTS from the SOURCE MENU screen, and finally select INPUT SYNC from the INPUTS screen.

Changing a Value

To change a screen option value, follow these steps:

1. Use the Back key or Next key to navigate through the screen options and place the cursor over the value you want to change.
2. Press the Minus key or Plus key to change the value. The Plus key increases the value; the Minus key decreases the value.

   In the example below, the cursor position allows you to scroll to the desired Minutes value.

```
<     TIME/DATE
Time             03:25:42 PM
Date             28-Mar-2004
Sunrise             05:35 AM
Sunset              06:02 PM
DST Begins:01-Apr     SYNC >
DST Ends:  28-Oct    SETUP >
```

Entering or Changing a Name

To enter or change a name, follow these steps:

1. Use the Back key or Next key to place the cursor over each character you want to enter or change.
2. Press the Minus key or Plus key to scroll backward or forward to the desired character.

   In the example below, the cursor position lets you change the letter “T” in “THANKSGIVING.”

   NOTE: Valid characters include A–Z, 0–9, + - ‘ # / ( ) & , . “ @ =.

```
< SPECIAL DAY NAME
Special Day 01
Name THANKSGIVING

   Place cursor on
   character.  Use
   + - keys to change.
```

Selecting from a List

If you are selecting from a list, note that there are two types of lists:

1. **Scrolling List** – only ONE choice is displayed at a time
   a. Press the Back key or Next key to move the cursor over the option you want to change.

      This highlights the first item in a scrolling list.

   b. Use the Minus key or Plus key to scroll through the available choices.

      The highlighted text changes each time to indicate the next choice. In the example below, SINGLE is selected from four different choices.

```
<    BLINK  TYPE
BUS 2L           SOUTH SIDE
BKR 03         FRONT OFFICE

Blink Type          SINGLE
```

2. **Marked List** – all available choices are displayed; selected options are marked with an underline
   a. Press the Back key or Next key to move the cursor over an item in the list.
   b. To select the item, press the Plus key while the item is highlighted.

      The item is now underlined. In the example below, the days Monday through Friday are selected.

   c. To deselect an item, press the Minus key while the item is highlighted.

      The underline disappears from the item.

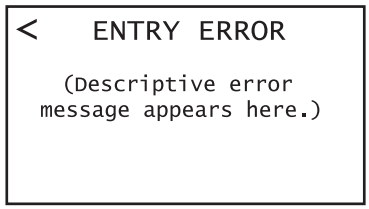
```
<   ZONE SCHEDULE
ZONE 09     PRODUCT MARKET.
 Period 01          CLEAR >
 On     07:30 AM
 Off    05:00 PM
Su  Mo  Tu  We  Th  Fr  Sa
         + SPECIAL DAY(S) >
```

Saving Your Changes

Changes to controller data are saved automatically when you exit a screen. For example, if changing an ON time from 7:00 AM to 7:30 AM, after highlighting “00” and changing it to “30,” the new time becomes valid after you exit the screen.

Pop-up Error Screen

The controller automatically checks your changes and alerts you to data entry errors with an error screen. Examples of data entry errors are entering illegal dates, such as February 31, or placing an end date prior to a start date. In these instances, upon exiting the screen, an ENTRY ERROR screen (see below) displays with a message describing the error. The screen path symbol leads you to the previous screen so you can correct the error.

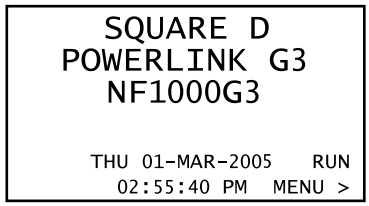


SCREEN OVERVIEW

This section explains the available controller screens, and it briefly describes the general use of the screens.

Main Screen

The Main screen is the first screen you see before using the controller. This screen is automatically displayed if none of the keys are pressed during a 5 minute period.



The current time and date are displayed. The Rx (receive) and Tx (transmit) indicators show communications activity (they are blank at other times). The RUN or HALT mode is displayed next to the time and day fields (see “Selecting the Operating Mode” on page 88 for more information about RUN and HALT modes).

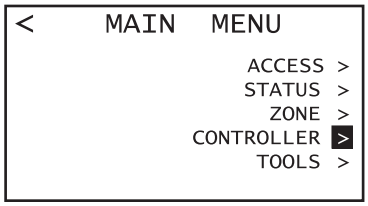
NOTE: To assign a name for this controller, see the section “Entering a Controller Name” on page 89.

Accessing the Menu Screens

Upon power-up or reset, the Main screen displays.To view the MAIN MENU screen, do as follows:

1. From the Main screen, select MENU.

   The MAIN MENU screen displays.



2. From the MAIN MENU screen, select the menu you want to view.

Main Menu Screens

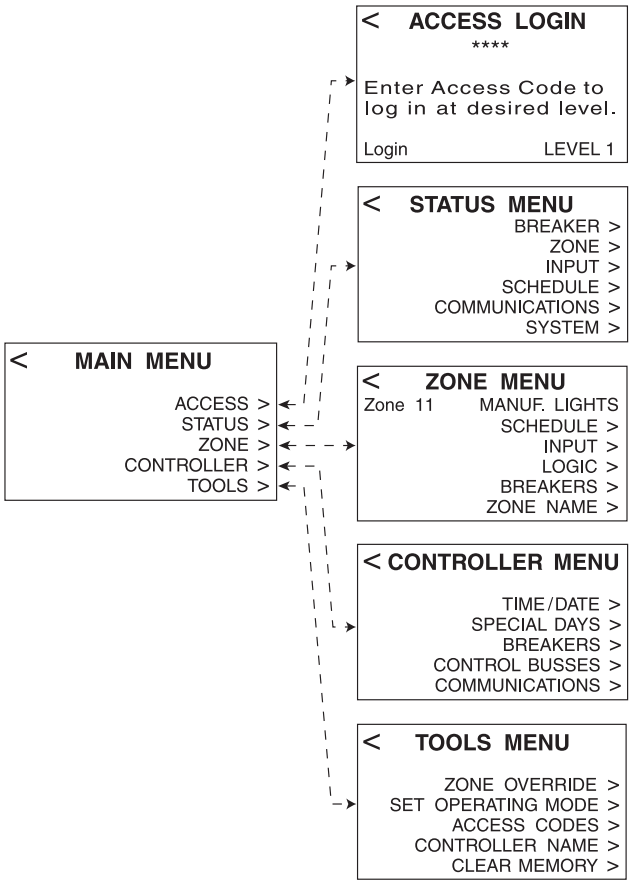
The MAIN MENU screen provides paths to all other screens. Each of the MAIN MENU sub-headings represents a major topic. Except for ACCESS, each sub-heading leads to another menu screen (see Figure 8–2 for illustrations of the various menu screens. Each sub-heading is described briefly below:

- **ACCESS**: From this screen you can enter an access code, which allows access to various levels of screen operation.

  NOTE: If this sub-heading does not appear upon entering this screen, no access codes are currently set, allowing access to all screens.

- **STATUS**: From this menu, you can view the live status of circuit breakers, zones, inputs, schedules, communications, and systems.
- **ZONE**: From this menu, you can add or delete circuit breakers from a zone, set up zone inputs, and schedule zone priorities for both normal and special days.
- **CONTROLLER**: From this menu, you can set up the various functions of the controller, including the time and date, special days, circuit breakers, control buses, and communications.
- **TOOLS**: From this menu, you can override zones, change the operating mode, set access codes, enter a controller name, and clear the controller memory.

Figure 8–2: Main Menu Screens



Screen Access Level

Every screen has a fixed assigned access level. An access level enables or disables access to certain controller screens. To control user access, an

access level must be assigned an access code. Once an access code is defined, you will need to login to use the controller's screens. For example, Level 1 has an access code of 1234, and Level 2 has an access code of 9876. You must login using 1234 to gain Level 1 access, or you must login using 9876 to gain Level 2 access. If you are unable to provide any of the correct access codes, you will not be able to use the controller.

Level 1 is the highest access level. It provides access to all controller functions. Defining an access code for Level 1 is like setting a master password for a controller. A Level 1 code of 0000 (the default) disables access code protection. Once you've changed the Level 1 access code to something other than 0000, you must enter the Level 1 code to change access codes.

The functions accessible by access level are as follows:

- **Level 1** (highest) — Setting access codes, all setup functions, clearing counters, advanced functions
- **Level 2** — Setting clock, access to overrides, schedules
- **Level 3** (lowest) — Viewing status (no configuration)

See Table 8–2 on page 48 for the access level of each screen.

If you define a lower-level access code and leave a higher-level code undefined (0000), the defined lower-level code will inherit the undefined higher-level access permissions.

Example: If you enter an access code of 5555 for Level 2, but leave Level 1 as 0000, then Level 2 inherits Level 1 access permissions.

Two important points regarding controller access:

- The Access Codes limit access to controller functions from the front panel of a controller only. Access codes are not required to use any PCS functions.
- In addition to using Access Codes to limit access to specific functions from the controller's front panel, you can disable front panel access to a controller altogether. See Disabling Controller Front Panel Access for instructions.

NOTE: To set each of the controller access codes (requires Level 1 access), see "Setting Access Codes" on page 89.

Table 8–2: Controller screen access levels

Main Screens		Sub-screens			Access Level 1	2	3
Main Menu	Access Login				X	X	X
	Status Menu	Breaker Status	Breaker Details		X	X	X
			Clear Breaker Run-time Counters		X		
		Zone Status			X	X	X
		Input Status	Input Details		X	X	X
			Direct Input Control ②		X	X	
			Input Sync Status		X	X	X
		Schedule Status			X	X	X
		Comms Status	Serial Status		X	X	X
			Clear Serial Status Counters ①		X		
			Sub-Net Status		X	X	X
			Clear Sub-net Status Counters ①		X		
		System Status	Controller Status		X	X	X
			Ctrl Bus Status		X	X	X
	Zone Menu	Zone Schedule	Clear Schedule		X	X	
			+ Special Days		X	X	
		Zone Input	Zone Input Setup		X		
			Zone Input Sync		X		
		Zone Logic	Zone Priority		X		
		Zone Breakers	View/Edit Breakers		X		
			Test Breakers		X		
			Clear Breakers		X		
			Learn Breakers	Add Breakers	X		
				Delete Breakers	X		
		Zone Name			X		
	Controller Menu	Time/Date	Clock Setup		X	X	
		Special Days	Special Day Name		X	X	
			Start/End Date		X	X	
		Breakers	Blink Type		X		
			Circuit Name		X		
			Timing		X		
		Control Buses	Control Bus Name		X		
		Communications	Serial Comms	Comms Loss Action	X		
	Tools Menu	Zone Override			X	X	
		Direct Brkr Ctrl			X	X	
		Operating Mode			X	X	
		Access Codes			X		
		Controller Name			X		
		Clear Memory			X		

① The Clear function is not an individual screen, but is listed because of the different login level required.

② The Control function is not an individual screen, but is listed because of the different login level required.

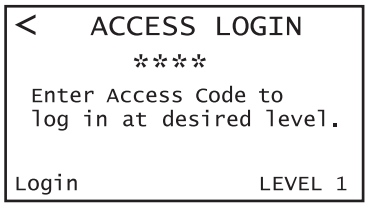
Entering Access Codes

To enter your access code, follow these steps:

1. From the MAIN MENU screen, select ACCESS.

   NOTE: If the ACCESS sub-heading does not appear on the MAIN MENU screen, access codes are not currently set, allowing access to all screens (see "Setting Access Codes" on page 89).

   The ACCESS LOGIN screen displays.



On entering this screen, the current login access code is not shown (**** is displayed). Access codes are 4 digits in length.

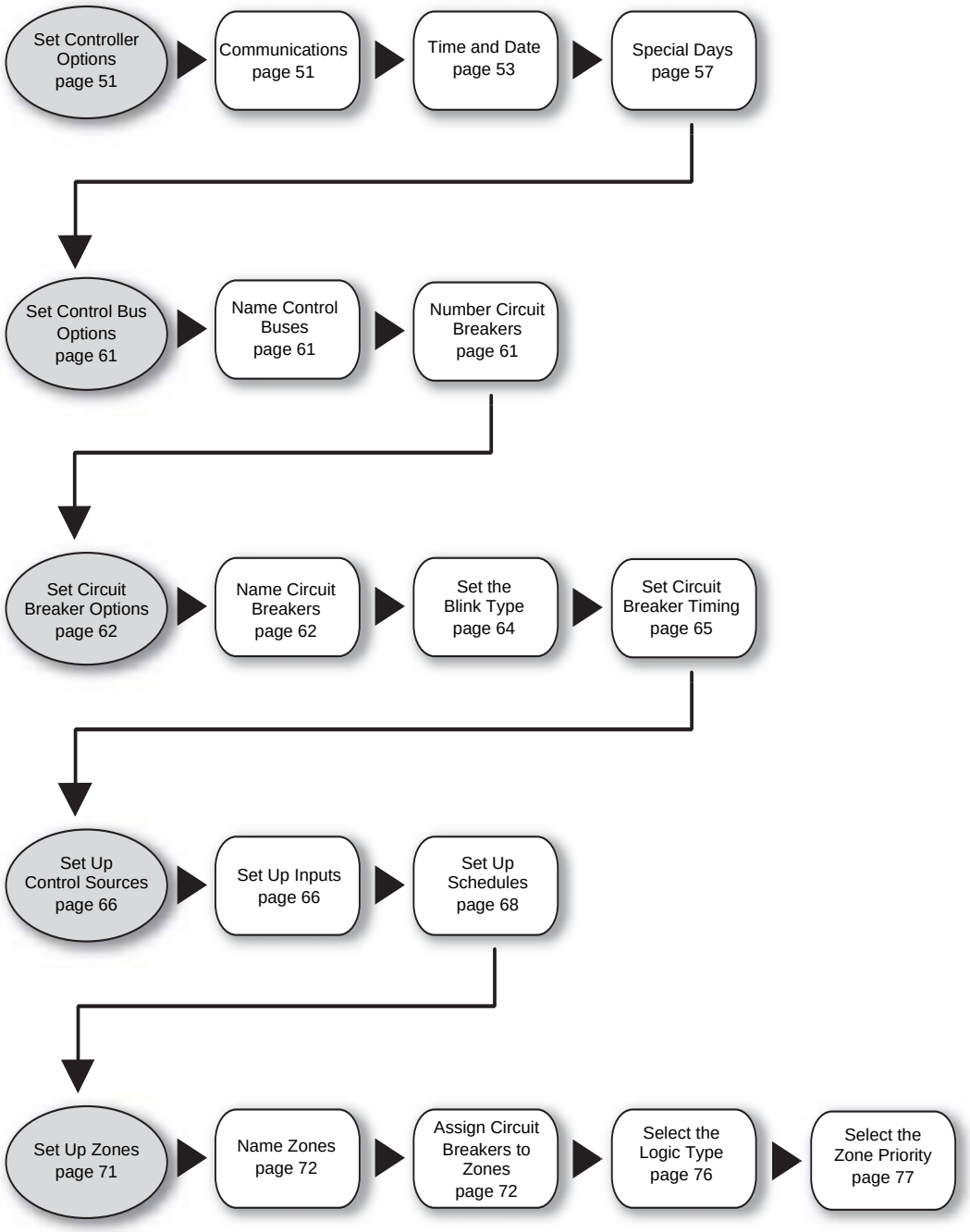
2. Position the cursor over each digit, using the Plus key or Minus key to increase or decrease the number.
3. Move the cursor to the left-pointing screen path symbol to save your code entry.

   The entered access code is compared to the access code table, and the login level is displayed.

   NOTE: A 5-minute timer restarts every time a key is pressed. When this timer expires, the entered access code is cleared and the user is logged out.

PROGRAMMING A NEW SYSTEM

Use a top-down approach to controller setup and programming. The following flowchart shows a recommended sequence of tasks.



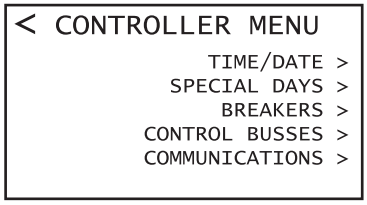
SETTING UP CONTROLLER OPTIONS

To set up items in the controller not specific to any zone, you use the CONTROLLER MENU. To access the CONTROLLER MENU, do as follows:

NOTE: For information about zones, see the section "Setting Up Zones" on page 71.

From the MAIN MENU screen, select CONTROLLER.

The CONTROLLER MENU screen displays.



From this screen, you can access all controller setup screens, from which you can do the following tasks:

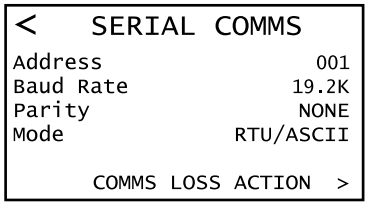
- Set the time and date and the clock options
- Enter special days information
- Set up circuit breaker parameters
- Set up control bus parameters
- Set up communication parameters

Setting Up Communication Parameters

To set up communication parameters for the controller (refer to Table 8–3 for communications option descriptions), follow these steps:

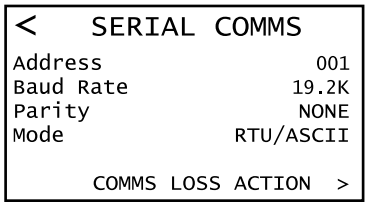
1. From the CONTROLLER MENU screen, select COMMUNICATIONS.

   The SERIAL COMMS screen displays.



   NOTE: The control module has a port that is used for both the front panel and the wiring compartment connections.

2. Select the communications options described in Table 8–3.



To setup Serial Communications using DMX512 Mode:

See Appendix C — "Using a G3 Controller with DMX512 Systems" on page 103 .

Table 8–3: Communications options

Option	Value	Description
Address	1*–247	Device address of the controller. Make sure the number you select is used only for this controller. Address 58 is reserved for protocol automatic detection.
Baud Rate	1200, 2400, 4800, 9600, 19.2K*, 38.4K	Speed at which the devices communicate.
Parity	None*, Even, or Odd	Parity at which the controller communicates.
Mode	RTU/ASCII* or 7-bit ASCII, or DMX512	RTU/ASCII setting automatically adjusts to either RTU or 8-bit ASCII message types; the other option provides 7-bit ASCII communications; provides support for DMX512 communications.

*Default value

Enabling Comms Loss Action

POWERLINK G3 controllers allow you to set the action of a zone in the event of an extended loss of communications with a building automation system (BAS).

NOTE: This feature should be enabled only when the controller is being used as part of a BAS and the BAS is continuously communicating to the controller.

Setting Comms Loss Action

1. From the SERIAL COMMS screen, select COMMS LOSS ACTION.

   The COMMS LOSS ACTION screen displays.

```
< COMMS LOSS ACTION
Enable                YES
Delay Duration   10:00 min
Delay Value       9:59 min
ZONE 06       SALES LIGHTS
 Action on comms loss:
       MAINTAIN LAST STATE
```

2. Configure the options listed in Table 8–4.

Table 8–4: COMMS LOSS ACTION screen options

Option	Description
Enable	• Selecting YES enables comms loss action. • Selecting NO disables comms loss action.
Delay Duration	This value refers to the maximum time allowed between communication transactions before the comms loss action is triggered for all zones.
Delay Value	This value shows the time left on the delay timer.
Zone	Shows which zone has comms loss action enabled or disabled.
Action on comms loss	This option indicates which action is to be performed during a loss of communications. This action occurs once the Delay Duration is exceeded. See Table 8–5 on page 53 for a list of actions.

Table 8–5: Action on communications loss options

Comms Loss Action	Description
RUN (default setting)	Releases zone override, if set. The zone will respond normally to schedules and inputs.
MAINTAIN LAST STATE	The zone will be continuously overridden to maintain the last state.
FORCE ZONE ON	The zone will be continuously overridden ON.
FORCE ZONE OFF	The zone will be continuously overridden OFF.
NO ACTION	

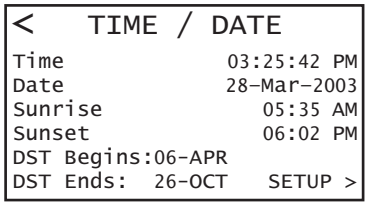
NOTE: The comms loss action of each zone is individually selectable. If communications times out, the zone state is affected according to the action selected.

When communication is restored, all overrides for all zones remain in effect. The BAS will need to restore the correct operating condition when it detects the controller is back on line.

Setting Time and Date

1. From the CONTROLLER MENU screen, select TIME/DATE.

   The TIME/DATE screen displays.



2. Configure the Time/Date options described in Table 8–6.

Table 8–6: TIME/DATE screen options

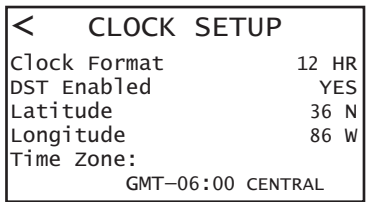
Option	Description
Time	The Time option allows you to set the hours, minutes, and seconds where the controller is located. *NOTE: The AM/PM suffix is displayed only if the 12 HR clock format is set.*
Date	The Date option allows you to set the current date for the controller. *NOTE: The time format, the calculated Sunrise and Sunset times for the current day, and the calculated DST Begins and Ends dates for the current year are displayed based on information entered in the CLOCK SETUP screen (see "Setting the Clock" on page 54).*
Sunrise	The Sunrise option allows you to set when the sun rises.
Sunset	The Sunset option allows you to set when the sun sets.
DST Begins	The DST Begins option allows you to set when Daylight Savings Time begins for the current year.
DST Ends	The DST Ends option allows you to set when Daylight Savings Time ends for the current year.

Setting the Clock

To set up the clock, follow these steps:

1. From the TIME / DATE screen, select SETUP.

   The CLOCK SETUP screen displays.



2. Configure the options described in Table 8–7.

Table 8–7: CLOCK SETUP screen options

Option	Value	Description
Clock Format	12 HR (AM and PM) 24 HR.	The Clock Format option lets you select how time is displayed.
DST Enabled	YES = ON NO = OFF	The DST Enabled option lets you select whether Daylight Savings Time is ON or OFF.
Latitude	0–64 degrees North or South	The Latitude option lets you enter the latitude of the controller's location. Used with the Longitude value, it enables the controller to more accurately calculate sunrise and sunset. For the latitude of major cities in the United States and other countries, refer to Table 8–9 on page 56. *NOTE: The latitude range is limited so that sunrise and sunset always occur on the same day.*
Longitude	0–180 degrees East or West	The Longitude option lets you enter the longitude of the controller's location. Used with the Latitude value, it enables the controller to more accurately calculate sunrise and sunset. For the longitude of major cities in the United States and other countries, refer to Table 8–10 on page 56.
Time Zone	See Table 8–8 on page 55	The Time Zone option lets you select the time zone for the controller. The time zone typically shows the hours offset from Greenwich Mean Time (GMT), although names appear for times zones located in the US and Canada.

NOTE: Selecting the correct time zone is important if the controller is remotely accessed from another time zone. All time zones in this table have selected cities listed for reference.

Table 8–8: Time zones

GMT +/- Offset	Time Zone Name	Selected Locations
GMT–12:00		Eniwetok, Kwajalein
GMT–11:00		Midway Island, Samoa
GMT–10:00	HAWAII	Honolulu
GMT–09:00	ALASKA	Anchorage
GMT–08:00	PACIFIC	(United States and Canada), Tijuana
GMT–07:00	MOUNTAIN	(United States and Canada)
GMT–06:00	CENTRAL	(United States and Canada), Mexico City, Tegucigalpa, Saskatchewan
GMT–05:00	EASTERN	(United States and Canada), Bogota, Lima, Quito
GMT–04:00	ATLANTIC	(Canada), Caracas, La Paz, Barbados
GMT–03:30	NEWFNDLND	Newfoundland
GMT–03:00		Buenos Aires, Georgetown
GMT–02:00		(Mid-Atlantic)
GMT–01:00		Azores, Cape Verde Island
GMT		Dublin, Edinburgh, Lisbon, London, Casablanca, Monrovia
GMT+01:00		Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Ljublijana, Prague, Brussels, Copenhagen, Madrid, Paris, Vilnius, Sarajevo, Warsaw, Zagreb
GMT+02:00		Athens, Istanbul, Minsk, Bucharest, Cairo, Harare, Pretoria, Israel, Helsinki, Riga, Tallinn
GMT+03:00		Baghdad, Kuwait, Riyadh, Moscow, St. Petersburg, Nairobi
GMT+03:30		Tehran
GMT+04:00		Abu Dhabi, Muscat, Baku, Tbilsi
GMT+04:30		Kabul
GMT+05:00		Ekaterinburg, Islamabad, Karachi, Tashkent
GMT+05:30		Bombay, Calcutta, Madras, New Delhi
GMT+06:00		Almaty, Dhaka, Columbo
GMT+07:00		Bangkok, Hanoi, Jakarta
GMT+08:00		Bejing, Chongqing, Hong Kong, Perth, Singapore, Taipei
GMT+09:00		Osaka, Sapporo, Tokyo, Seoul, Yakutsk
GMT+09:30		Adelaide, Darwin
GMT+10:00		Brisbane, Canberra, Melbourne, Sydney, Guam, Port Moresby, Hobart, Vladivostok
GMT+11:00		Magadan, Solomon Islands, New Caledonia
GMT+12:00		Aukland, Wellington, Fiji, Kamchatka, Marshall Islands

Table 8–9: Latitude and longitude reference of selected U.S. cities

City and State	Lat.	Long.	City and State	Lat.	Long.	City and State	Lat.	Long.	City and State	Lat.	Long.
Akron, OH	41° N	81° W	Columbus, OH	40° N	83° W	Joplin, MO	37° N	94° W	Peoria, IL	41° N	89° W
Albany, NY	42° N	73° W	Concord, NH	43° N	71° W	Juneau, AK	58° N	134° W	Philadelphia, PA	40° N	75° W
Albuquerque, NM	35° N	106° W	Dallas, TX	32° N	96° W	Kalamazoo, MI	42° N	85° W	Phoenix, AZ	33° N	112° W
Allentown, PA	41° N	75° W	Dayton, OH	40° N	84° W	Kansas City, MO	39° N	94° W	Pittsburgh, PA	40° N	80° W
Amarillo, TX	35° N	102° W	Daytona Beach, FL	29° N	81° W	Knoxville, TN	36° N	84° W	Pocatello, ID	43° N	112° W
Anchorage, AK	61° N	150° W	Denver, CO	39° N	105° W	Lancaster, PA	40° N	76° W	Portland, ME	43° N	70° W
Ann Arbor, MI	42° N	83° W	Des Moines, IA	41° N	93° W	Las Vegas, NV	36° N	115° W	Portland, OR	45° N	122° W
Asheville, NC	36° N	82° W	Detroit, MI	42° N	83° W	Lincoln, NE	41° N	96° W	Providence, RI	42° N	71° W
Atlanta, GA	33° N	84° W	Debuque, IA	42° N	90° W	Little Rock, AR	35° N	92° W	Provo, UT	40° N	111° W
Augusta, GA	33° N	82° W	Duluth, MN	46° N	92° W	Los Angeles, CA	34° N	118° W	Reno, NV	39° N	119° W
Austin, TX	30° N	97° W	Durham, NC	36° N	79° W	Louisville, KY	38° N	85° W	Richmond, VA	37° N	77° W
Baltimore, MD	39° N	76° W	El Paso, TX	31° N	106° W	Macon, GA	33° N	83° W	Rochester, NY	43° N	77° W
Bangor, ME	44° N	68° W	Eugene, OR	44° N	123° W	Madison, WI	43° N	89° W	St. Louis, MO	38° N	90° W
Baton Rouge, LA	30° N	91° W	Fairbanks, AK	65° N	147° W	Memphis, TN	35° N	90° W	Salt Lake City, UT	40° N	112° W
Biloxi, MS	30° N	89° W	Fargo, ND	47° N	96° W	Miami, FL	25° N	80° W	San Francisco, CA	37° N	122° W
Birmingham, AL	33° N	87° W	Flagstaff, AZ	35° N	111° W	Milwaukee, WI	43° N	88° W	Santa Fe, NM	35° N	106° W
Bismarck, ND	46° N	100° W	Fort Wayne, IN	41° N	85° W	Minneapolis, MN	45° N	93° W	Savannah, GA	32° N	81° W
Boise, ID	43° N	116° W	Fort, Worth, TX	32° N	97° W	Mobile, AL	30° N	88° W	Seattle, WA	47° N	122° W
Boston, MA	42° N	71° W	Gainesville, FL	30° N	82° W	Montgomery, AL	32° N	86° W	Shreveport, LA	32° N	93° W
Brattleboro, VT	43° N	72° W	Galveston, TX	29° N	94° W	Montpelier, VT	44° N	72° W	Sioux Falls, SD	43° N	96° W
Bridgeport, CT	41° N	73° W	Gary, IN	42° N	87° W	Nashville, TN	36° N	86° W	Syracuse, NY	43° N	76° W
Buffalo, NY	43° N	79° W	Grand Rapids, MI	43° N	85° W	Newark, NJ	40° N	74° W	Tallahassee, FL	30° N	84° W
Butte, MT	46° N	112° W	Green Bay, WI	44° N	88° W	New Haven, CT	41° N	73° W	Texarkana, TX	33° N	94° W
Casper, WY	43° N	106° W	Greenville, SC	35° N	77° W	New Orleans, LA	30° N	90° W	Topeka, KS	39° N	95° W
Charleston, SC	32° N	80° W	Harrisburg, PA	40° N	77° W	New York, NY	40° N	74° W	Tulsa, OK	36° N	96° W
Charlotte, NC	35° N	81° W	Hartford, CT	42° N	72° W	Niagara Falls, NY	43° N	79° W	Tucson, AZ	32° N	111° W
Chattanooga, TN	35° N	85° W	Honolulu, HI	21° N	158° W	Nome, AK	64° N	165° W	Utica, NY	43° N	75° W
Cheyenne, WY	41° N	105° W	Houston, TX	29° N	95° W	Norfolk, VA	37° N	76° W	Washington, DC	39° N	77° W
Chicago, IL	42° N	87° W	Indianapolis, IN	39° N	86° W	Oakland, CA	37° N	122° W	Wichita, KS	37° N	97° W
Cincinnati, OH	39° N	84° W	Iowa City, IA	42° N	91° W	Oklahoma City, OK	35° N	97° W	Wilmington, DE	40° N	75° W
Cleveland, OH	41° N	81° W	Jacksonville, FL	30° N	81° W	Omaha, NE	41° N	96° W			

Table 8–10: Latitude and Longitude reference of selected world cities

City	Lat.	Long.	City	Lat.	Long.	City	Lat.	Long.
Bangkok, Thailand	13° N	100° E	Kingston, Ont., Canada	44° N	76° W	Port Arthur, Ont., Canada	48° N	89° W
Belém, Brazil	1° S	48° W	La Paz, Bolivia	16° S	68° W	Quebec, Que., Canada	46° N	71° W
Bogotá, Columbia	4° N	74° W	Lima, Peru	12° S	77° W	Rio de Janeiro, Brazil	23° S	43° W
Buenos Aires, Argentina	34° S	58° W	London, Ont., Canada	43° N	81° W	Salvador, Brazil	13° S	38° W
Calgary, Alba, Canada	51° N	114° W	Manila, Philippines	14° N	121° E	Santiago, Chile	33° S	70° W
Caracas, Venezuela	10° N	67° W	Mazatlán, Mexico	23° N	106° W	Sao Paulo, Brazil	23° S	46° W
Cayenne, French Guiana	4° N	52° W	Mexico City, Mexico	19° N	99° W	Singapore, Singapore	1° N	104° E
Chihuahua, Mexico	28° N	106° W	Montreal, Que., Canada	45° N	73° W	St. John, N.B., Canada	45° N	66° W
Córdoba, Argentina	31° S	64° W	Moose Jaw, Sask., Canada	50° N	105° W	Taipei, Taiwan	25° N	121° E
Guatemala City, Guatemala	14° N	90° W	Nelson, B.C., Canada	49° N	117° W	Toronto, Ont., Canada	43° N	79° W
Guayaquil, Ecuador	2° S	80° W	Ottawa, Ont., Canada	45° N	75° W	Vancouver, B.C., Canada	49° N	123° W
Iquique, Chile	20° S	70° W	Panama City, Panama	9° N	79° W	Winnipeg, Man., Canada	50° N	97° W

SETTING UP SPECIAL DAYS

Special Days are exception periods that override normal day operation. A special day period can range from one day to several days. A special day starts at 12:00 AM (midnight) and ends at 12:00 AM (midnight). Up to 32 special days can be defined in a controller

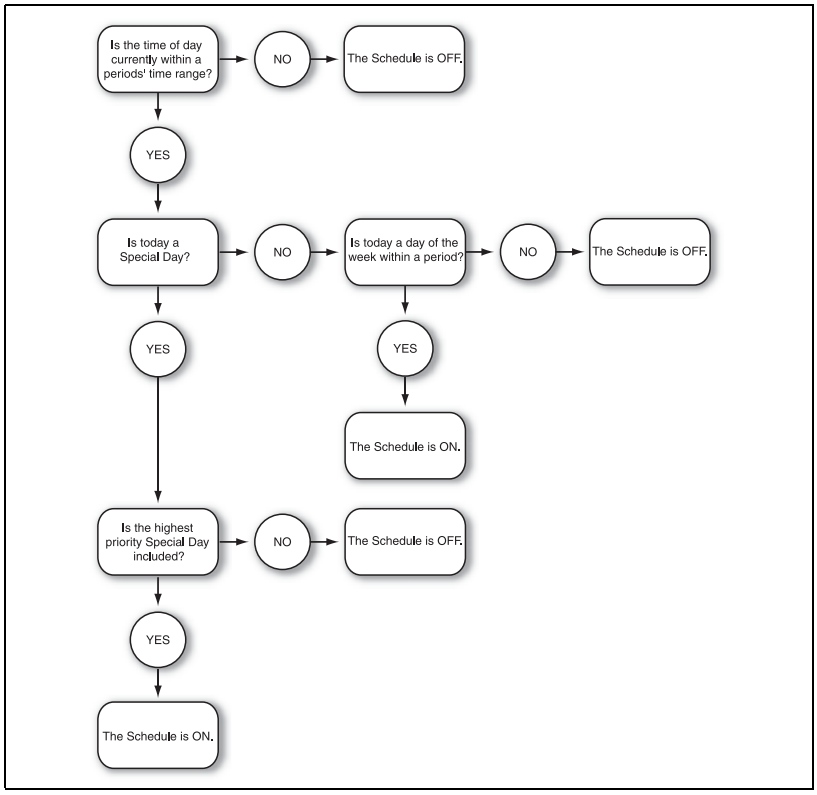
Table 8–11: Considerations when setting up Special Days

• Defining a special day affects ALL schedules. Schedules that do not include the special day will be OFF on the special day.
• Special days take effect immediately when they are sent to a controller. Circuits may turn OFF if sending a special day configuration on a day that matches the special day description. Before sending special days, be sure to also configure schedules that include the special day if circuits are to remain ON.
• Special days can use priority levels. This allows special days inside other special day periods.
• Special day periods can last longer than one day.

After a Special Day is created, only time periods defined to run on that Special Day operate. All other time periods are controlled OFF. For example, if you want to define a Special Day on which no circuit breakers are ON, define the Special Day, but do not include it in any time periods. However, if you want a defined time period to run every day, include *all* Special Days. If you include all Special Days and a Special Day falls on a day not included in the defined time period, the time period runs on that Special Day.

Each schedule has a list of up to 24 time periods. These periods can be set to occur during a normal day, a Special Day, or both. The controller looks at the current time of day, the schedule time periods, and the Special Day configuration to determine if the schedule is ON or OFF. Refer to Figure 8–3 to see how Special Days operate.

Figure 8–3: Special Days and How They Affect Time Periods

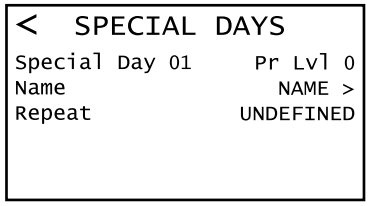


NOTE: If a calendar day is a member of more than one Special Day, the highest priority Special Day is the only Special Day used. All other Special Days in a period are ignored.

To set up special days, follow these steps:

1. From the CONTROLLER MENU screen, select SPECIAL DAYS.

   The SPECIAL DAYS screen displays.



2. Configure the options listed in Table 8–12 and Table 8–13.

Table 8–12: SPECIAL DAYS screen options

Option	Value	Description
Special Day	1 to 32	The Special Day value indicates the Special Day that is being viewed or modified.
Pr Lvl	0 to 2 (highest = 2)	If two or more Special Days overlap or they are grouped together, the Special Day with the highest priority is used by the controller. The default value is 0.
Name	Up to 16 alpha-numeric characters	Shows the name of the Special Day (see “Assigning Special Day Names” below).
Repeat	See Table 8–13 on page 58	Indicates how often the Special Day is repeated.

NOTE: To schedule the Special Day ON and OFF times for individual zone schedules, see “Setting Up Schedules” on page 68.

Table 8–13: Special day types

Special Day Type	Special Day Description	Screen example	Steps for special day type
UNDEFINED	Special Day is not defined	< SPECIAL DAYS Special Day 01 Pr Lvl 0 Name NAME > Repeat UNDEFINED	The rest of the screen remains blank.
EVERY WEEK	Repeats every week on a specific day for an indefinite period of time For example: Every Wednesday for 1 day.	< SPECIAL DAYS Special Day 01 Pr Lvl 0 HALF DAY NAME > Repeat EVERY WEEK On FRI For 1 day (s)	1. In the On field, select a day of the week. 2. In the For field, select the number of days the Special Day is enabled.
EVERY WEEK	Repeats every week on a specific day with start and end dates ① For example: Every Friday for 1 day starting April 1, 2004 and ending June 1, 2004	< SPECIAL DAYS Special Day 01 Pr Lvl 0 HALF DAY NAME > Repeat EVERY WEEK On FRI with START/END DATES	1. In the On field, select a day of the week. 2. In the For field, select the number of days the Special Day is enabled. 3. In the With field, select START/END DATES to configure the dates the Special Day begins and ends.

① Start and end dates may be applied to the special day to create a one-time special day or special day schedule extending for several years for special days occurring on different dates every year.

② An end date may be applied to the repeating period.

Table 8–13: Special day types

Special Day Type	Special Day Description	Screen example	Steps for special day type
EVERY MONTH	Repeats every month on a specific date or range of dates for an indefinite period of time For example: From the 1ST through the 3RD of every month	< SPECIAL DAYS Special Day 04 Pr Lvl 0 MAINTENANCE NAME > Repeat EVERY MONTH From the 1ST thru 3RD	1. In the “From the” field, select the numerical days for the event range.
EVERY MONTH	Repeats every month on a specific date or range of dates with start and end dates ① For example: From the 27th through the 28th of every month, starting January 1, 2004 and ending December 31, 2006	< SPECIAL DAYS Special Day 05 Pr Lvl 0 INVENTORY NAME > Repeat EVERY MONTH From the 27th thru 28th Starting 01-JAN-2004 Ending 31-DEC-2006	1. In the “From the” field, select the numerical days for the Special Day’s range. 2. In the Starting field, select when the Special Day is enabled. 3. In the Ending field, select the last day the Special Day is enabled.
EVERY MONTH	Repeats every month on a specific day of a specific week for an indefinite period of time For example: Every first Friday of the month and continuing for 3 days	< SPECIAL DAYS Special Day 06 Pr Lvl 0 INVENTORY NAME > Repeat EVERY MONTH On the 1st FRI For 3 day(s)	1. In the first “On the” field, select a week of the month (1ST, 2ND, 3RD, 4TH, LAST). 2. In the second “On the” field, select a day of the week. 3. In the For field, enter the number of days the Special Day is enabled.
EVERY MONTH	Repeats every month on a specific day of a specific week for a duration of 1–31 days with start and end dates① For example: Every third Monday of the month and continuing for 5 days, starting on March 2, 2004, and ending on October 7, 2004	< SPECIAL DAYS Special Day 08 Pr Lvl 0 SAFETY INSPECT NAME > Repeat EVERY MONTH On 3rd MON For 5 day(s) With START/END DATES >	1. In the first “On the” field, select a week of the month (1ST, 2ND, 3RD, 4TH, LAST). 2. In the second “On the” field, select a day of the week. 3. In the For field, select the number of days the Special Day is enabled. 4. In the With field, select START/END DATES to configure the dates the Special Day begins and ends.
EVERY YEAR	Repeats every year on a specific date or range of dates for an indefinite period of time For example: Every year on July 4	< SPECIAL DAYS Special Day 04 Pr Lvl 0 WINTER BREAK NAME > Repeat EVERY YEAR From 15-DEC thru 15-JAN	1. In the From field, select the numerical days and the months to define the Special Day’s range.
EVERY YEAR	Repeats every year on a specific date or range of dates with start and end dates ① For example: Every year from December 24 through December 26, starting December 24, 2004 and ending December 26, 2006	< SPECIAL DAYS Special Day 05 Pr Lvl 0 CHRISTMAS NAME > Repeat EVERY YEAR From the 24th thru 26th Starting 24-DEC-2004 Ending 26-DEC-2008	1. In the “From the” field, select the numerical days for the Special Day’s range. 2. In the Starting field, select when the Special Day is enabled. 3. In the Ending field, select the last day the Special Day is enabled.

① Start and end dates may be applied to the special day to create a one-time special day or special day schedule extending for several years for special days occurring on different dates every year.

② An end date may be applied to the repeating period.

Table 8–13: Special day types

Special Day Type	Special Day Description	Screen example	Steps for special day type
EVERY YEAR	Repeats every year on a specific day of a specific week of a specific month for a duration of 1–31 days For example: Every fourth Thursday in November for the next 2 days	< SPECIAL DAYS Special Day 06 Pr Lvl 0 THANKSGIVING NAME > Repeat EVERY YEAR On the 4th THU in NOV For 002 day(s)	1. In the first “On the” field, select a week of the month (1ST, 2ND, 3RD, 4TH, LAST). 2. In the second “On the” field, select a day of the week. 3. In the third “On the” field, select a month of the year. 4. In the For field, select the number of days the Special Day is enabled.
EVERY YEAR	Repeats every year on a specific day of a specific week of a specific month for a duration of 1–31 days with start and end dates ① For example: Every fourth Thursday in November for 2 days, starting November 25, 2004 and ending November 29, 2008	< SPECIAL DAYS Special Day 06 Pr Lvl 0 THANKSGIVING NAME > Repeat EVERY YEAR On the 4th THU in NOV For 002 day(s) With START/END DATES >	1. In the first “On the” field, select a week of the month (1ST, 2ND, 3RD, 4TH, LAST). 2. In the second “On the” field, select a day of the week. 3. In the third “On the” field, select a month of the year. 4. In the For field, select the number of days the Special Day is enabled. 5. In the With field, select START/END DATES to configure the dates the Special Day begins and ends.
BY PERIOD	Repeats every nn days for an indefinite period of time For example: Every 10 days, starting on May 1, 2004	< SPECIAL DAYS Special Day 05 Pr Lvl 0 TEST ONE NAME > Repeat BY PERIOD Every 10 day(s) Starting 01-MAY-2004	1. Select the number of days. 2. Select a Starting date, on which the special day is enabled and is used as a reference for the period counter.
BY PERIOD	Repeats every nn days with an end date ② For example: Every 10 days, starting on May 1, 2004 and ending June 10, 2008	< SPECIAL DAYS Special Day 11 Pr Lvl 0 MAINTENANCE NAME > Repeat BY PERIOD Every 10 day(s) Starting 01-MAY-2004 Ending 10-JUN-2008	1. Select the number of days. 2. Select a Starting date, on which the special day is enabled and is used as a reference for the period counter. 3. Select an Ending date, after which the repeating period is disabled.

① Start and end dates may be applied to the special day to create a one-time special day or special day schedule extending for several years for special days occurring on different dates every year.

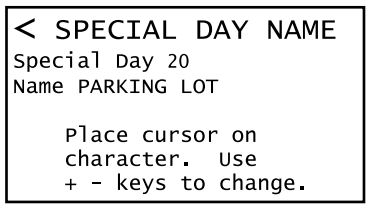
② An end date may be applied to the repeating period.

Assigning Special Day Names

To assign or change special day names, follow these steps:

1. From the SPECIAL DAYS screen, select NAME.

   The SPECIAL DAY NAME screen displays.



2. Enter the name of the Special Day (see “Entering or Changing a Name” on page 44).

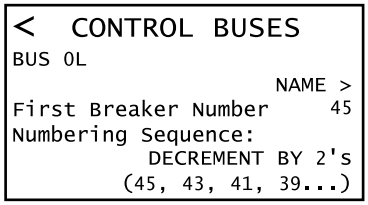
SETTING UP CONTROL BUSES

The CONTROL BUSES screen enables you to set up the controller's circuit breaker programming to match the physical numbering of the panelboard.

To set up control bus parameters, follow these steps:

1. From the CONTROLLER MENU screen, select CONTROL BUSES.

   The CONTROL BUSES screen displays.



   In this screen, the control bus number is 0L, and the control bus name is blank. If the control bus had a name, it would appear under the BUS line.

2. Select the desired BUS (control bus) number.

   The control bus name (if entered) displays. The NAME screen path symbol leads to the BUS NAME screen.

3. To assign or change a control bus name, see "Naming Control Buses" in the section below.

4. Select the desired First Breaker Number, starting at the vertical bus connection end of the control bus.

5. Select the Numbering Sequence for the other circuit breakers on the bus. Sequence and pattern examples are listed in Table 8–14.

   NOTE: The choices listed depend on the selected first breaker number, and the selected option sets the numbering pattern.

Table 8–14: Circuit breaker display numbering

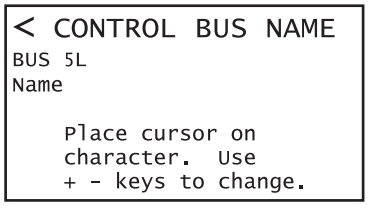
Numbering Sequence	Numbering Pattern
1, 3, 5, 7...	Increase by twos from first circuit breaker (1)
1, 2, 3, 4...	Increase by ones from first circuit breaker (1)
42, 40, 38, 36...	Decrease by twos from first circuit breaker (42)
21, 20, 19, 18...	Decrease by ones from first circuit breaker (21)

Naming Control Buses

To assign or change control bus names, follow these steps:

1. From the CONTROL BUSES screen, select NAME.

   The CONTROL BUS NAME screen displays.



   The BUS number selected (5L) in the CONTROL BUSES screen indicates you are assigning a name to the left control bus in panelboard five.

2. Enter the control bus name (see “Entering or Changing a Name” on page 44).

```
< CONTROL BUS NAME
BUS 5L
Name LP5A

    Place cursor on
    character.  Use
    + - keys to change.
```

NOTE: Typically, the control bus name is set to the panelboard designation as a useful reference.

SETTING UP CIRCUIT BREAKERS

To set up individual circuit breaker parameters, do as follows:
From the CONTROLLER MENU screen, select BREAKERS.

The BREAKERS screen displays.

```
<      BREAKERS
              BLINK TYPE >
          CIRCUIT NAME >
                TIMING >
```

From this screen, you can do the following tasks:

- Assign a circuit breaker name
- Set the circuit breaker blink type
- Set the circuit breaker timing

NOTE: To assign circuit breakers to a zone, see the section “Setting Up Zones” on page 71.

Naming Circuit Breakers

1. From the BREAKERS screen, select CIRCUIT NAME.

   The CIRCUIT NAME screen displays.

```
<    CIRCUIT NAME
BUS 5L              LP5 A
Breaker 12
Name
      Place cursor on
     character.   Use
     + - keys to change.
```

   In the screen above, circuit breaker 12 on control bus 5L (named LP5A) does not have a name.

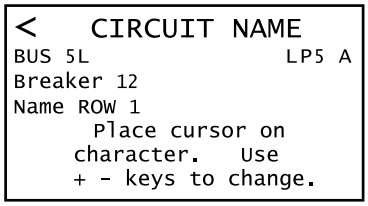
2. Select the desired BUS number.

   The BUS name displays (see “Naming Control Buses” on page 61).

3. Select the desired Breaker (circuit breaker) number.

   The circuit breaker Name (if one is entered) appears.

4. Enter the circuit breaker name (see “Entering or Changing a Name” on page 44).



Blink Notice

Controllers can be configured to notify occupants that circuits have been commanded OFF. Typically, this feature is used to give notice that the lights will turn OFF in a specified amount of time. Circuits blink according to the blink type selected for the circuit during configuration (see “Blink Type” below).

NOTE: Breakers should not be configured for blink notice if blink notice is not desired.

Blink Type

The blink type refers to the behavior of circuit breakers when they are commanded OFF.

Table 8–15: Circuit breaker blink types

Blink Type	Description
None	The circuit breaker turns OFF immediately, without a blink notice (default setting).
Single	The circuit breaker blinks once to notify that the circuit breaker will turn OFF in a specified amount of time, unless it is commanded back ON.
Double	The circuit breaker blinks twice to notify the circuit breaker is about to turn OFF. A second blink occurs one minute prior to the circuit turning OFF.
Delay only	The circuit will turn OFF in the specified amount of time, but will not blink. This is typically used for loads that you cannot blink, such as high intensity discharge (HID) lights. These loads are generally assigned to the same zone with loads that can blink. For example, in a factory setting both the HID lights and normal lighting are assigned to the same zone. The normal lighting has a blink type of SINGLE, and the HID lighting has a blink type of DELAY ONLY. At the end of the scheduled time period, the normal lighting blinks, signaling that the lights will be turned OFF; the HID lighting does not blink, and the lighting remains ON. The occupant can turn ON the zone's override switch to keep both types of lighting ON. Otherwise, both sets of lights will turn OFF at the end of the countdown (see “Setting Up Circuit Breaker Timing” on page 65).
Pulse OFF*	The circuit breaker is turned OFF for a predetermined time and then returns to the ON state.
Pulse Repeat*	The circuit breaker is turned OFF based on a preset amount of time.

* These blink type options are provided for use with a sweep switch. See “Using a Controller with Sweep Switches” .

Using a Controller with Sweep Switches

A sweep switch, such as a Sentry® [1]switch, is a line-voltage wall switch that will automatically reset itself to the OFF position when power is interrupted. The Pulse OFF and Pulse Repeat blink types are provided for use with a sweep switch.

Effect on Circuit Voltage

Remotely operated circuit breakers normally turn ON or OFF in response to a command. When Pulse OFF or Pulse Repeat is selected, circuit voltage will remain ON at all times, with the following exceptions:

- The brief time of the OFF pulse. A single, momentary OFF pulse will occur whenever the breaker state is commanded OFF. When Pulse Repeat is selected, additional pulses will occur at the pulse repeat frequency as long as the breaker remains commanded OFF.
- When first configuring a blink type as either Pulse OFF or Pulse Repeat. If the breaker is OFF when the blink type is selected, it will remain OFF until it is commanded ON. It will remain ON thereafter, except during an OFF pulse.

[1] Sentry® is a trademark of Sentry LLC.

Configuration

Here are examples for the two Pulse blink types:

Pulse OFF Application: A schedule is created to sweep the lights OFF during unoccupied hours. The controller requires a gap in time schedule periods to produce a change to the OFF state. A series of time periods with one-minute gaps should be configured. For example, a facility that has normal operating hours from 7am to 7pm could use this schedule:

Table 8–16: Example controller schedule using a sweep switch

Start Time	End Time	Description
7:00 AM	7:00 PM	Sweep @ 7PM
7:01 PM	9:00 PM	Sweep @ 9 PM
9:01 PM	12:00 AM	Sweep @ Midnight

Pulse Repeat Application: A schedule is created that only includes the normal operating hours, but it is desired that repetitive OFF sweeps occur during the unscheduled time. The Pulse Repeat blink type is selected and the interval is set to 120 minutes.

Table 8–17: Example controller schedule using PULSE REPEAT blink type

Start Time	End Time	Description
7:00 AM	7:00 PM	Sweep @ 7PM And every 2 hours thereafter until 7:00 AM

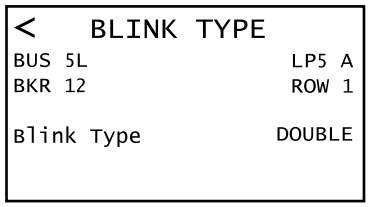
Setting a Blink Type

See “Setting Up Circuit Breaker Timing” on page 65 to set the time period between a blink and a circuit turning OFF.

To set the blink type, follow these steps:

1. From the BREAKERS screen, select BLINK TYPE.

   The BLINK TYPE screen displays.



   In this screen, the Blink Type for circuit breaker 12 (named ROW 1) on control bus 5L (named LP5A) is set to DOUBLE.

2. Select the BUS (control bus) number and the BKR (circuit breaker) number.

   If set up, the BUS and BKR names display.

3. Select a Blink Type (see Table 8–15 for descriptions of the six different blink types).

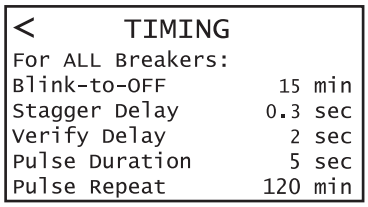
Setting Up Circuit Breaker Timing

Circuit breaker timing settings are used to control the length of time between a blink notice and when the breakers are turned OFF, the minimum amount of time between successive switching operations, and the amount of time the controller waits to verify that a circuit breaker is in its commanded state (ON or OFF).

To set up circuit breaker timing, follow these steps:

1. From the BREAKERS screen, select TIMING.

   The TIMING screen displays.



2. Configure the Timing options listed in Table 8–18.

Table 8–18: Circuit breaker blink time options

Timing Option	Description
Blink-to-OFF	The time delay between the blinking of the circuits and the time the circuit breakers are to turn OFF. Default = 5 minutes Range = 2–30 minutes
Stagger Delay	The time period between circuit breaker operations when multiple circuit breakers are requested to change at the same time. Default = 0.1 seconds Range = 0.1–1 seconds
Verify Delay	The time delay between the switching of circuit breakers and the verification that the circuit breakers reached the commanded state. Default = 1 second Range = 1–8 seconds
Pulse Duration*	The amount of time that power is interrupted to a sweep switch, allowing the switch to reach the OFF state before the circuit breaker returns to an ON state. Default = 5 seconds Range = 1–10 seconds
Pulse Repeat*	The amount of time assigned between pulse intervals. Turns the sweep switch OFF allowing the circuit breaker to return to an ON state.

* These blink time options are provided for use with a sweep switch. See “Using a Controller with Sweep Switches” on page 63.

NOTE: These values apply to all circuit breakers in the system.

SETTING UP CONTROL SOURCES

A control source contributes to a controller's decision to turn a zone ON or OFF. NF1000G3 controllers have two control sources per zone. Schedule 1 and Input 1 are the control sources for Zone 1; Schedule 2 and Input 2 are the control sources for Zone 2; Schedule 3 and Input 3 are the control sources for Zone 3; and so on, through Schedule 16 and Input 16 for Zone 16. The logic type you choose when setting up the zone determines how the schedules and inputs are combined to control the zone. This section describes how to set up schedules and inputs.

Setting Up Inputs

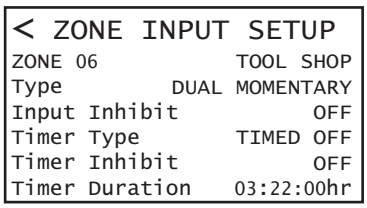
The input function combines dry-contact input activity with timers to determine a logical ON/OFF state for each input.

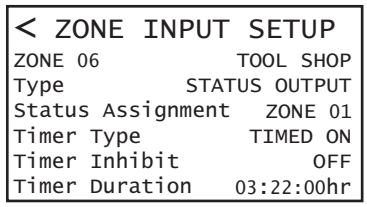
To set up zones to respond properly to inputs, follow these steps:

1. From the MAIN MENU screen, select ZONE > INPUT > ZONE INPUT.

   The ZONE INPUT SETUP screen displays.

   NOTE: The STATUS OUTPUT is shown for reference only and cannot be changed.





   The ZONE line displays the previously selected zone and nametag. See Table 8–20 for input types and their abbreviations. Refer to Table 8–19 for all other screen options.

2. Set up the input options listed in Table 8–19.

NOTE: Setup is limited to inputs 1–16. Because inputs 17–64 do not exist physically, no input type configuration is available. Inputs 9–16 do not have the choice of Dual Momentary, but they do have the choice Status Output.

Table 8–19: Zone input options

Option	Value	Description
Input Type	See Table 8–20.	Your choice of input type depends on your particular application. See **Chapter 5—Input Wiring** on page 17 for more information.
Input Inhibit	ON or OFF	When Input Inhibit is set to ON, the contact activity is ignored.
Status Assignment	ZONE	This is shown for reference only.
Timer Type	TIMED ON, OFF-DELAY, NO TIMER, or ON-DELAY	If TIMED ON is selected, a timer is used to automatically turn the circuit OFF when the timer expires. If OFF-DELAY is selected, the ON time is extended when the circuit is turned OFF. If ON-DELAY is selected the OFF time is extended when the circuit is turned ON.
Timer Duration	00:00:00 hr to 18:00:00 hr (in 1-second increments)	This is the specified amount of time loaded into the input timer when the input is turned ON.
Timer Inhibit	ON or OFF	When set to ON, the timer value is reset to zero (as if no timer was selected).

Table 8–20: Input types and descriptions

Input Type	Description
MAINTAIN NO (default)	Maintained N.O. (normally open). Input state is commanded ON when the contacts close. Input state is commanded OFF when the contacts open.
MAINTAIN NC	Maintained N.C. (normally closed). Input state is commanded ON when the contacts open. Input state is commanded OFF when the contacts close.
MOMENTARY TOGGLE	Momentary Toggle (2-Wire Momentary). Input state alternates between ON and OFF on subsequent contact closures.
MOMENTARY ON	Momentary ON. Input state is commanded ON when the contact is closed.
DUAL MOMENTARY	Dual Momentary (3-Wire Momentary). Input state is commanded ON or OFF, according to which contact is closed.
MOMENTARY OFF	Momentary OFF. Input state is commanded OFF when the contact is closed.
MAINTAIN NO+BLNK	Maintained N.O. with blink. Same as Maintained N.O., but allows blink notice when input turns OFF.
MAINTAIN NC+BLNK	Maintained N.C. with blink. Same as Maintained N.C., but allows blink notice when input turns OFF.
MAINTAIN TOGGLE	Maintain Toggle. The input state alternates between ON and OFF each time the switch changes position.
STATUS OUTPUT	Status Output (Inputs 9–16 only). Output status appears at the terminal.

Setting Up Schedules

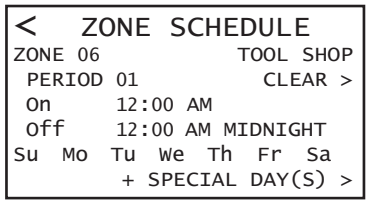
The NF1000G3, NF2000G3, and NF3000G3 controllers have internal time clocks that allow you to create schedules of operation. Each controller supports up to 16 schedules. Each schedule supports up to 24 time periods, which are labeled simply as periods. The controller logically “ORs” the periods to determine if a schedule is ON. In other words, a schedule is ON if any of its periods are ON. You can specify two types of days in a schedule: normal days and special days. Normal days refer to particular days of the week. Special days refer to a set of conditions, and are exceptions that have priority over normal days.

NOTE: Normal day schedule periods will not execute on special days unless the special day is included in that period. See “Creating Special Day Schedules” on page 69

To create a schedule for a zone, follow these steps:

1. From the MAIN MENU screen, select ZONE > SCHEDULE.

   The ZONE SCHEDULE screen displays.



   The ZONE line displays the selected zone number (06) and nametag (TOOL SHOP).

2. For the Period, select the desired time period for this zone (range: 1–24).
3. Select the ON and OFF hours and minutes.

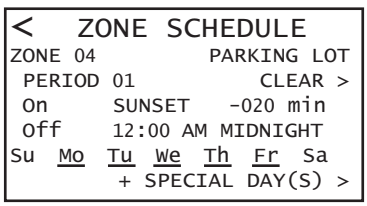
   The AM/PM suffix will only be displayed if using 12-hour time.

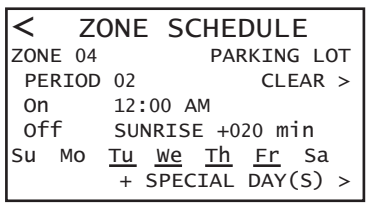
   NOTE: A one-day period starts at 12:00 AM and ends at 12:00 AM (midnight). The OFF time may not be set earlier than the ON time. You may select SUNRISE or SUNSET as an ON or OFF time (see Step 4).

4. To use SUNRISE or SUNSET as the ON or OFF time, scroll the hours digit until SUNRISE or SUNSET displays, as well as a field for minutes offset (before or after SUNRISE or SUNSET).

   If you desire an offset, enter the desired number of (+/-) minutes offset.

   NOTE: If you use SUNSET as the ON time, you must use a separate period to use SUNRISE as the OFF time, because this scenario involves two days. For example, to set up a schedule to turn parking lot lights (Zone 4) ON at 20 minutes before SUNSET and OFF at 20 minutes after SUNRISE every Monday through Friday (through the night), you would set up the schedule as follows:





   NOTE: When 12:00 AM is chosen as the OFF time, MIDNIGHT displays as a visual reference to mark the end of a one-day period.

5. If this is a normal day schedule, select one or more days of the week by highlighting each day of the week, and select (+) or deselect (-) the day.

   If this is a Special Day schedule, do not select any days of the week. See *"Creating Special Day Schedules"*.

   The days assigned to the schedule will be underlined. If any Special Day is selected, "+SPECIAL DAY(S)" will be underlined.

   NOTE: At least one day of the week or a Special Day must be selected for a schedule period to be valid. (For the + SPECIAL DAY(S) and CLEAR screen paths, see "Creating Special Day Schedules" below and "Clearing the Schedule" on page 70.)

Creating Special Day Schedules

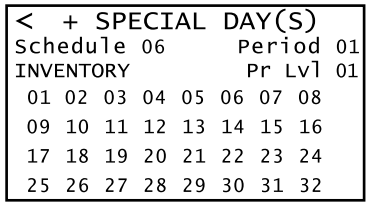
Because special days are exceptions to normal days, no time periods will be valid on special days unless the special day is included in a time period. A time period may also be created that is valid only on a special day to create a unique special day time period.

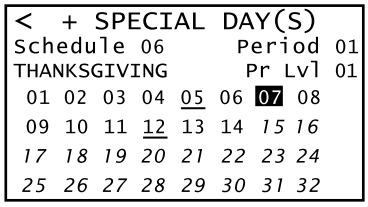
NOTE: A special day affects all periods in all schedules.

To create a special day schedule or to include a special day in a time period, follow these steps:

1. From the ZONE SCHEDULE screen, select SPECIAL DAY(S).

   The SPECIAL DAY(S) screen displays.

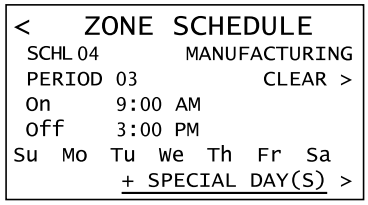


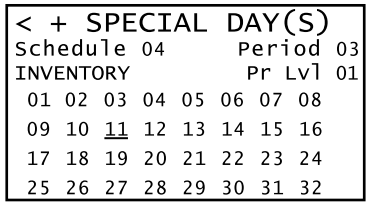


   All 32 possible special day numbers appear (see the left screen above), including the configured special days, which are set up in the section *"Setting Up Control Sources" on page 66*. Numbers for Special Days that are not italicized, and UNDEFINED SPECIAL DAY appears when you highlight the number. If a Special Day is configured, the number is in regular text. When a number is highlighted the Special Day name and the priority level appears. For example, in the image above, highlighting number 07 reveals that it is a configured special day named THANKSGIVING with a priority level of 01. The underlines indicate that special day numbers 05 and 12 are included in the schedule period.

2. To create a unique special day schedule, select a configured special day number for the schedule period, making sure the schedule has no days of the week selected.

   In the example below, the ZONE 04 , PERIOD 03 screen is a special day schedule for performing inventory in the Manufacturing department. To validate the schedule: On the + SPECIAL DAY(S) screen, select 11, which is the number for the configured special day named INVENTORY. The schedule is set up as follows:



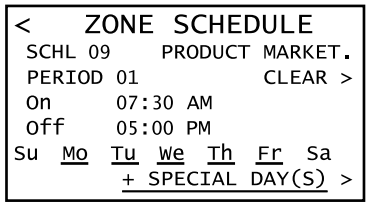


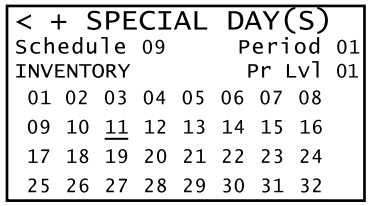
3. To include a special day in a normal day schedule period, select one or more configured special days for that schedule. To remove one or more special days from the schedule period, deselect the number.

   The numbers are either selected (underlined) or deselected (no underline).

   In the example below, the ZONE 09 , PERIOD 01 screen is a normal day schedule for the Product Marketing department. Special day 11, however, has been set up for the Manufacturing department's scheduled inventory (refer back to Step 2). On that special day, you desire to have the Product Marketing circuits follow the normal schedule.

   To make sure the circuits turn ON as normal: On the + SPECIAL DAY(S) screen, select special day 11(INVENTORY) to be included in the ZONE 09 , PERIOD 01 schedule. The schedule is set up as follows:



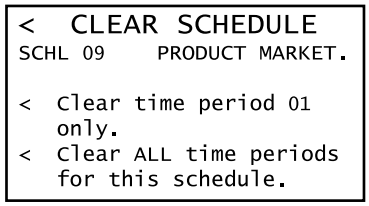


Clearing the Schedule

To clear the zone schedule for one or more time periods, follow these steps:

1. From the ZONE SCHEDULE screen, select CLEAR.

   The CLEAR SCHEDULE screen displays.



   The ZONE line displays the selected zone and nametag.

2. To delete the schedule for this time period only, do as follows:

   In the "Clear time period XX only" line (XX is the period number selected in the ZONE SCHEDULE screen), select the corresponding screen path symbol (<), and press the Plus key to return to the previous screen.

3. To delete ALL time periods for this zone, do as follows:

   For the "Clear ALL time periods for this zone" line, select the corresponding screen path symbol (<), and press the Plus key to return to the previous screen.

SETTING UP ZONES

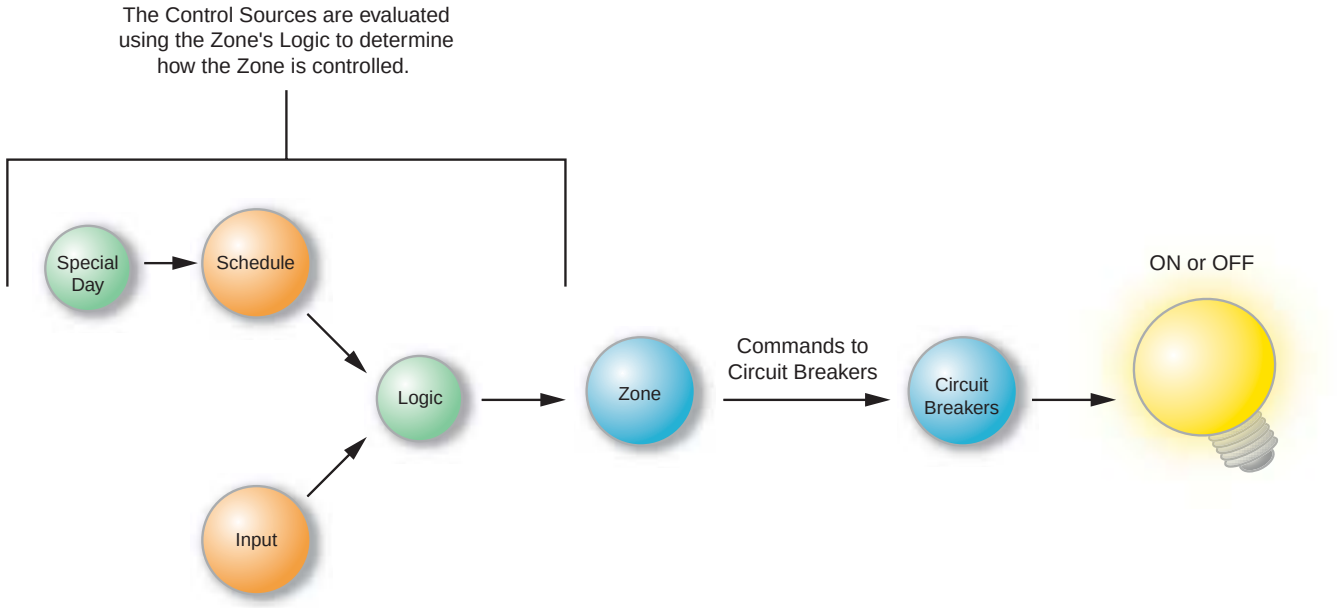
A zone is comprised of circuit breakers from one or more panelboards connected to the controller. You can define up to 64 zones for each controller at a location. Controller's make the decision to turn a zone ON or OFF by monitoring the status of control sources. A circuit breaker must be assigned to a zone to respond to a control source.

Zones 1-16 have two control sources per zone. Schedule 1 and Input 1 are the control sources for Zone 1; Schedule 2 and Input 2 are the control sources for Zone 2; Schedule 3 and Input 3 are the control sources for Zone 3; and so on, through Schedule 16 and Input 16 for Zone 16. The logic type you choose when setting up the zone determines how the schedules and inputs are combined to control the zone. The exception to this rule is when Input Synchronization is used. When Inputs 1 - 16 are set up to sync to Schedule 1 - 16, the schedule is automatically disconnected from the zone logic. The schedule will still affect the zone indirectly through the input. This allows the input to fully control the zone and be coordinated with the schedule.

Zones 17-64 have one control source per zone — a communication input. Input 17 is the control source for Zone 17, Input 18 for Zone 18, Input 19 for Zone 19, and so on.

When Inputs 1 - 16 are set up to sync to Schedule 1 - 16, the schedule is automatically disconnected from the zone logic. The schedule will still affect the zone indirectly through the input. This allows the input to fully control the zone and be coordinated with the schedule.Figure 8–4 on page 71 illustrates how control sources relate to a zone in the controller.

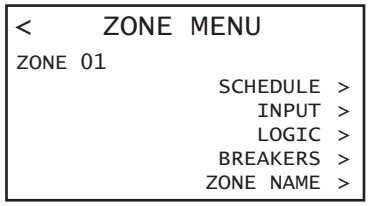
Figure 8–4: Zone diagram



To set up zones for the controller, follow these steps:

1. From the MAIN MENU screen, select ZONE.

   The ZONE MENU screen displays.



From this menu, you can do the following tasks:

- Enter zone names
- Assign circuit breakers to a zone
- Set up zone inputs
- Schedule zones
- Select the zone logic type

2. Select the Zone number for the zone you want to set up.

   The Zone name (if one is assigned) displays.

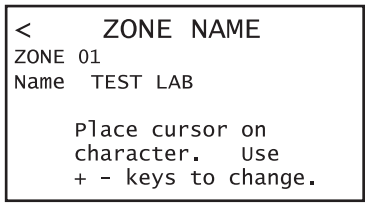
   NOTE: The SCHEDULE, INPUT, and LOGIC menu choices are not assignable for zones 17–64. The INPUT menu choice is unavailable for Zones 9–16 if the corresponding input 1–8 is dual momentary. However, Zones 9–16 are available as communication inputs, and the logic and schedule menu choices are available if the physical input is used by inputs 1–8. (Refer to "Physical vs. Communications" on page 17 for more information.)

Naming Zones

To assign or change zone names, follow these steps:

1. From the ZONE MENU screen, select ZONE NAME.

   The ZONE NAME screen displays.

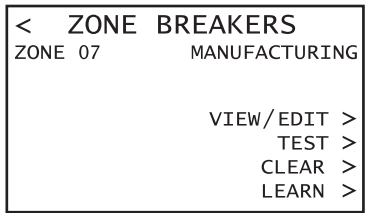


2. To assign or change a zone name, use the Back and Next keys to move to each desired character, and use the Plus and Minus keys to change each character at the cursor location.
3. Move the cursor away from the characters to save the new name.

Assigning Circuit Breakers to a Zone

To assign circuit breakers to a zone, do as follows:
From the ZONE MENU screen, select BREAKERS.

The ZONE BREAKERS screen displays.



From this screen, you can do the following tasks:

- Use the view/edit screen to add or delete circuit breakers from a zone
- Use the unique, self-learning feature to add or delete circuit breakers from a zone
- Test circuit breakers to verify zone setup
- Clear circuit breakers from a zone

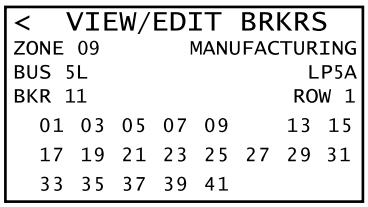
NOTE: A circuit breaker may be assigned to more than one zone. If a circuit breaker is commanded ON by any zone, it will respond according to the zone priority setting.

Viewing and Editing Circuit Breakers

To view and edit circuit breakers, follow these steps:

1. From the ZONE BREAKERS screen, select VIEW/EDIT.

   The VIEW/EDIT BRKRS. screen displays.



   The Zone line displays the selected zone number and nametag, the Bus line displays the selected bus number and nametag, and the circuit breakers for the selected zone and control bus display.

   NOTE: The Bkr line displays only when the cursor is over a circuit breaker position.

2. Change the Bus number to show the zone members for that bus.

   The circuit breakers assigned to the zone are underlined.

3. Use the Back and Next keys to position the cursor over a circuit breaker number, and use the Plus or Minus keys to add or remove a circuit breaker from zone membership.

   The circuit breaker at the cursor position displays on the Bkr line.

   NOTE: The circuit breaker numbering shown here is an example. The displayed numbering sequence may be modified to match the panel (see "Setting Up Circuit Breakers" on page 62).

Using Learn Mode to Add or Delete Circuit Breakers from a Zone

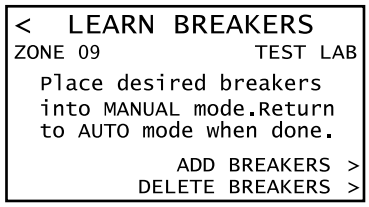
You can use the self-learning feature as an alternative method for assigning circuit breakers to a zone. “Learn” refers to the controller’s ability to automatically add to or delete circuit breakers from a zone based on a user manually toggling the circuit breaker handles.

NOTE: The controller learns which circuit breakers are to be added or deleted by monitoring voltage changes at the circuit breaker load terminal. As such, panelboards must be energized while creating zones.

To automatically add or delete circuit breakers from a zone, using the self-learning feature, follow these steps:

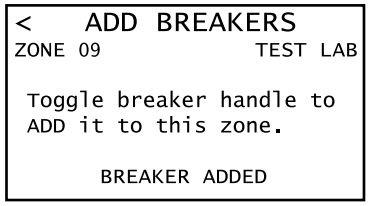
1. From the ZONE BREAKERS screen, select LEARN.

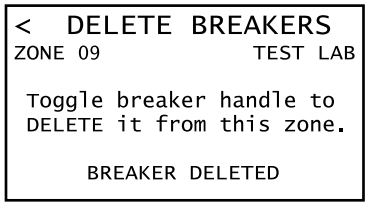
   The LEARN BREAKERS screen displays.



2. Place the desired circuit breakers in manual mode (see “Changing Circuit Breakers from Auto to Manual Mode” on page 75).
3. From this screen, select ADD BREAKERS or DELETE BREAKERS.

   The ADD BREAKERS or DELETE BREAKERS screen displays.





   The controller is placed in the LEARN mode upon entering either of these screens. Any circuit breaker that changes state while on the ADD BREAKERS screen or DELETE BREAKERS screen is either ADDED or DELETED from the zone’s circuit breaker map.

   NOTE: When in the LEARN mode, control operation is disabled to prevent circuit breakers from switching.

4. Toggle the circuit breaker handle back and forth to either add to or delete the circuit breaker from the zone.

   *NOTE: *A visual indication appears briefly on the screen to indicate the circuit breaker change was “seen” by the controller.*

5. Return the circuit breakers to auto mode.

Changing Circuit Breakers from Auto to Manual Mode

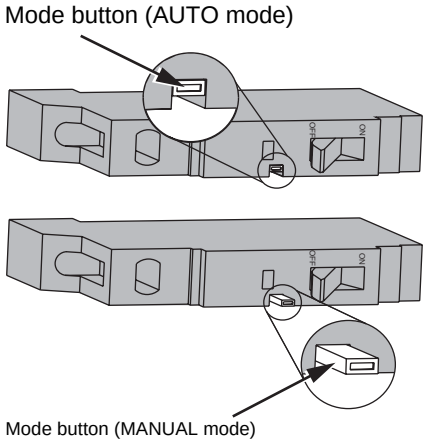
To use the self-learning feature to add or delete circuit breakers from a zone, the circuit breakers must be in MANUAL mode. The panelboard cover and deadfront should be in place while using this feature.

NOTE: All panelboards that are assigned to a zone must have power.

To change circuit breakers between AUTO mode and MANUAL mode, follow these steps:

1. To place the desired circuit breakers into MANUAL mode, release the white Mode buttons with a small screwdriver or similar tool (see Figure 8–5 on page 75).
2. To place the circuit breakers back into AUTO mode, return the white buttons to the depressed position.

Figure 8–5: Changing circuit breakers from AUTO to MANUAL mode



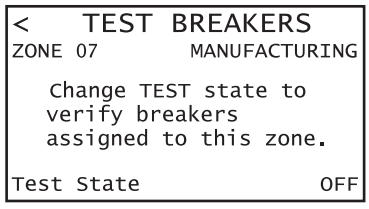
Testing Circuit Breakers

You can use the “Test” feature to verify circuit breakers assigned to a zone.

To test circuit breakers in a zone, follow these steps:

1. Verify that all circuit breakers you want to test are in AUTO mode. If they are not, return the white Mode buttons to the depressed position using a small screwdriver or similar tool according to Figure 8–5 on page 75.
2. From the ZONE BREAKERS screen, select TEST.

   The TEST BREAKERS screen displays.



   The Zone line displays the selected zone number and nametag.

3. Change Test State from OFF to ON or from ON to OFF to operate the circuit breakers assigned to this zone.

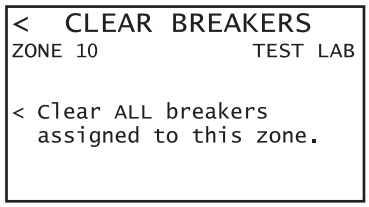
   NOTE: Circuit breakers will switch ON and OFF in response to changing the test state. The circuit breakers will return to their original states upon leaving this screen.

Clearing Circuit Breakers

To clear circuit breakers from a zone, follow these steps:

1. From the ZONE BREAKERS screen, select CLEAR.

   The CLEAR BREAKERS screen displays.



   The Zone line displays the selected zone number and nametag.

2. To clear all circuit breakers from this zone, select the “Clear ALL breakers assigned to this zone” screen path symbol (<), and press the Plus key to exit the screen.

Selecting the Logic Type

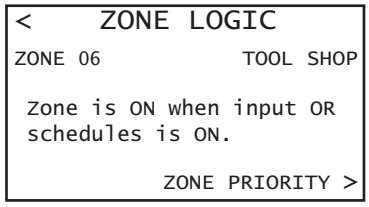
The Logic Type determines how inputs and schedules will be combined to control a zone. The zone function combines the ON/OFF states of the input and schedule into a single zone state, according to the logic type setting. The zone state is then applied as the desired state for all circuit breakers assigned to that zone.

If a circuit breaker belongs to more than one zone and the desired states are in conflict, any circuits desired to be ON by any zone will be commanded ON.

To select the logic type, follow these steps:

1. From the ZONE MENU screen, select SOURCES. Select the edit LOGIC TYPE field and then ENTER.

   The ZONE LOGIC screen displays.



   The ZONE line displays the previously selected zone and nametag.

2. Select the appropriate logic type: AND, OR, or LAST EVENT.

   The display shows the following choices:

   - Zone is ON when input OR schedule is ON.
   - Zone is ON when input AND schedule is ON.
   - Zone follows LAST input or schedule change.

   NOTE: Applies to zones 1–16 only.

Selecting the Zone Priority

The Zone Priority setting determines how a circuit breaker responds if it is included in more than one zone. For most zones the Zone Priority will remain at the default setting of Normal ON.

When zones are set to the Normal ON priority level, a circuit breaker belonging to more than one zone will be ON if any of the zones are ON. The circuit breaker will only turn OFF when all of the zones are OFF.

If a zone is set to Priority OFF, any circuit breaker belonging to the Priority OFF zone will be forced OFF whenever the zone is ON. Otherwise, the circuit breaker will not be affected.

If a zone is set to Priority ON, any circuit breaker belonging to the Priority ON zone will be forced ON whenever the zone is ON, even if it belongs to an active Priority OFF zone. Otherwise, the circuit breaker will not be affected.

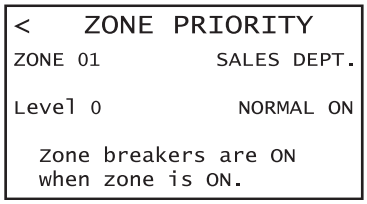
For example, you want to turn OFF a portion of the office lights in response to a load-shed signal. (You are required to reduce your energy consumption to avoid peak demand charges or in response to a directive from the utility company.) Create a zone containing the non-essential lighting circuits and set the zone priority to Priority OFF. Turning this zone ON via a contact closure or communications command will force OFF the non-essential lights.

However, you want all lights to turn ON in response to a fire or security alarm. This condition must have priority over the load-shed signal. Create another zone containing all lighting circuits and set the zone priority to Priority ON. Turning this zone ON via a contact closure or communications command will unconditionally force all lights ON.

To select the logic type, follow these steps:

1. From the ZONE LOGIC screen, select ZONE PRIORITY.

   The ZONE PRIORITY screen displays.



   The ZONE line displays the previously selected zone and nametag.

2. Select the appropriate priority level:

   - **Level 0 — Normal ON**: When the zone is ON, then any breaker assigned to that zone is ON. If no zones are commanding a breaker ON, then that breaker turns OFF.
   - **Level 1 — Priority OFF**: When the zone is ON, then any breaker assigned to that zone is forced OFF. The blink notice will not operate in this mode.
   - **Level 2 — Priority ON**: When the zone is ON, than any breaker assigned to that zone is forced ON. If a breaker receives forced ON and forced OFF commands at the same time, then the forced ON command has priority. The blink notice, if set, will operate when Priority ON is released.

   Table 8–21 below summarizes Zone Priority selections.

3. Exit the ZONE PRIORITY screen to save your changes.

Table 8–21: Zone priority selections

Selection	Zone State	Behavior①	Priority②
Level 0 — Normal ON	ON	ON	Normal
	OFF	Release	Normal
Level 1 — Priority OFF	ON	Force OFF	High
	OFF	Release	High
Level 2 — Priority ON	ON	Force ON	Highest
	OFF	Release	Highest

① Deals with application of zone state to a breaker.

② Deals with priority of overlapping zones.

SYNCHRONIZING INPUTS

Synchronizing inputs allows you to associate a zone's input with a zone's schedule. This lets you better coordinate and refine how they work together in more complex lighting schemes. The input sync feature has three main functions:

- **Input sync** —You can turn an input ON or OFF when an event occurs. The event is the ON or OFF action of the zone's schedule. For example, you could sweep a wall switch OFF at night when the input is synchronized with a schedule.
- **Input Inhibit** — You can disable or enable an input based on an event. For example, you could inhibit a wall switch in a public area during the day when it is synchronized with the schedule for that area.
- **Timer Inhibit** — If a timer is set up for the input, you can disable the input timer based on an event. For example, disable the timer during the day, but allow it to operate as a timed override at night.

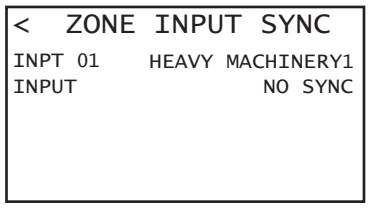
The input and the event are limited to a single grouping. For example, only zone 1 and input 1 can be synchronized to schedule 1, zone 2 and input 2 can be synchronized to schedule 2, etc. In addition, the relationship of the action is always ON to ON, or OFF to OFF. For example, when the schedule is ON, the input must be ON.

Setting Up Input Synchronization

To set up input synchronization, follow these steps:

1. From the MAIN MENU screen, select ZONE > ZONE INPUT > SYNC.

   The ZONE INPUT SYNC screen displays.



2. Select the INPT number of the input you want to synchronize.
3. Configure the input synchronization options using the information in Table 8–22.

Table 8–22: Synchronization screen examples

Synchronization Type	Synchronization Method	Screen Example	Description
INPUT	ON events	< INPUT SYNC INPT 01 HEAVY MACHINERY1 INPUT ON events Input is turned ON when SCHL 1 turns ON	1. Select the input's action when the synchronization source turns ON (the input "is turned ON" or "is turned OFF" when the synchronization source turns ON). 2. Select the synchronization source.
	OFF events	< INPUT SYNC INPT 01 HEAVY MACHINERY1 INPUT OFF events Input is turned OFF when SCHL 1 turns OFF	1. Select the input's action when the synchronization source turns OFF (the input "is turned ON" or "is turned OFF" when the synchronization source turns OFF). 2. Select the synchronization source.
	ALL events	< INPUT SYNC INPT 01 HEAVY MACHINERY1 INPUT ALL events Input is turned OFF when SCHL 1 turns ON Input is turned ON when SCHL 1 turns OFF	1. Select the input's action when the synchronization source turns ON or OFF (the input "is turned ON" or "is turned OFF" when the synchronization source turns ON or OFF). 2. Select the synchronization source.
INPUT INHIBIT	ALL events	< INPUT SYNC INPT 01 HEAVY MACHINERY1 INPUT INHIBIT ALL events Input is enabled when SCHL 1 turns ON Input is disabled when SCHL 1 turns OFF	1. Select the input's action when the synchronization source turns ON or OFF (the input "is enabled" or "is disabled" when the synchronization source turns ON or OFF). 2. Select the synchronization source.
TIMER INHIBIT	ALL events	< INPUT SYNC INPT 01 HEAVY MACHINERY1 TIMER INHIBIT ALL events Input Timer is disabled when SCHL 1 turns ON Input Timer is enabled when SCHL 1 turns OFF	1. Select the input timer action when the synchronization source turns ON or OFF (the input timer "is enabled" or "is disabled" when the synchronization source turns ON or OFF). 2. Select the synchronization source.

NOTE: All synchronization types have a NO SYNC synchronization method. If selected, the input is not synchronized with any synchronization source.

VIEWING STATUS

This section explains how you can view status data of the various controller functions.

To view the various status screens, follow these steps:

1. From the MAIN MENU screen, select STATUS.

   The STATUS MENU displays.

```
<    STATUS MENU
                    BREAKER >
                       ZONE >
                      INPUT >
                   SCHEDULE >
             COMMUNICATIONS >
                     SYSTEM >
```

   From this screen, you can view the following status functions:

   - Circuit breaker status
   - Zone status
   - Input status
   - Schedule status
   - Communications status
   - System status (including controller status and control bus status)

Viewing Circuit Breaker Status

To view circuit breaker status, follow these steps:

1. From the STATUS MENU screen, select BREAKER.

   The BREAKER STATUS screen displays.

```
<  BREAKER STATUS
BUS 6R     HEAVY MACHINERY1
BREAKERS PRESENT:
  01 02 03 04 05 06 07 08
  09 10 11 12 13 14 15 16
  17 18 19 20 21 22 23 24
       BREAKER DETAILS >
```

2. Select the Bus number.

   The Bus nametag appears.

3. Select the status type from the following choices:

   - BREAKERS PRESENT:
   - NON-RESPONDING BREAKERS:
   - ACTUAL STATE = ON:
   - ACTUAL STATE = OFF:

   The circuit breaker display is blanked according to the status selected. For example, when BREAKERS PRESENT is selected, all locations where circuit breakers are not present are blanked. For ACTUAL STATE = ON, all circuit breakers that are not ON are blanked.

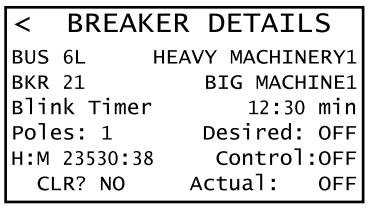
   NOTE: The breaker numbering shown here is an example. The numbering sequence may be modified to match the panel. Also, only the motorized poles are displayed on 2- and 3-pole breakers.

Viewing Circuit Breaker Details

To view detailed status of individual circuit breakers, follow these steps:

1. From the BREAKER STATUS screen, select BREAKER DETAILS.

   The BREAKER DETAILS screen displays for the previously selected circuit breaker. See Table 8–23 for descriptions of the circuit breaker status options



2. Select the desired BUS (control bus) number.
3. Select the desired BKR (circuit breaker) number.

   If the desired circuit breaker is not present, all fields specific to the circuit breaker are blanked. If the circuit breaker is present, all circuit breaker options are displayed.

4. To clear accumulated run-time hours for the selected circuit breaker, select YES for the CLR? option.

   NOTE: The CLR? option appears with Level 1 access only.

Table 8–23: BREAKER DETAILS screen data

Data	Description
BUS	The control bus number and nametag where the circuit breaker you want to view is located.
BKR	The circuit breaker number and nametag you want to view.
Blink Timer	The countdown time left until the circuit breaker turns OFF after a blink notice
Poles	The number of poles on the circuit breaker (1-, 2-, or 3-pole)
H:M	The accumulated run-time hours and minutes for the selected circuit breaker
CLR?	• Clears the accumulated run-time hours for the selected circuit breaker • Requires Level 1 access

Table 8–23: BREAKER DETAILS screen data

Data	Description
Desired	The commanded state of the circuit breaker as determined by the zone logic.
Control	The control state is the last commanded state of a circuit breaker. This value should match the Actual state. If the Actual and Control states do not match, a circuit breaker is not responding to commands.
Actual	The actual state of the circuit breaker, as indicated by true voltage measurement. This value should match the Control state. If the Actual and Control states do not match, a circuit breaker is not responding to commands.

Viewing Zone Status

To view zone status follow these steps:

1. From the STATUS MENU screen, select ZONE.

   The ZONE STATUS screen displays.

```
<    ZONE STATUS
ZONE 06    HEAVY MACHINERY1
Status                  OFF
Override Active         YES
Override Timer   06:25:32 hr
Level 1        PRIORITY OFF
Logic Type       LAST EVENT
```

2. Select the desired Zone number.

   The zone nametag, status, override active state, override timer value, priority level, and logic type for this zone are displayed. See Table 8–24 for descriptions of the zone status options

Table 8–24: ZONE STATUS screen data

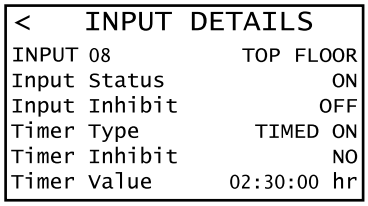
Data	Description
ZONE	The zone number and nametag of the zone you are viewing.
Status	Displays whether the zone is ON or OFF.
Override Active	Determines whether or not the zone state is affected by an override.
Override Timer	Indicates the time until the override expires.
Level (Priority)	Indicates the current priority level for the current zone.
Logic Type	Indicates the logic type used for control source comparison (AND, OR, or LAST EVENT).

Viewing Input Status

The Input Status screen displays the actual status of inputs defined for the selected controller.To view input status, follow these steps:

1. From the STATUS MENU screen, select INPUT > DETAILS.

   The INPUT DETAILS screen displays.



NOTE: The displayed settings reflect the values you entered in the ZONE INPUT screen in the section "Setting Up Inputs" on page 66.

2. Select the desired ZONE number.

   The status for the zone's input is displayed. Some options may not appear, depending on the current settings for the selected zone.

   NOTE: The status of all 64 inputs is available. Inputs 17–64 are used to display virtual input status. The input object state and timer value lines will display the actual real-time value of these variables. The Input Inhibit line is only visible for physical inputs (inputs 1–16).

Table 8–25: INPUT STATUS screen data

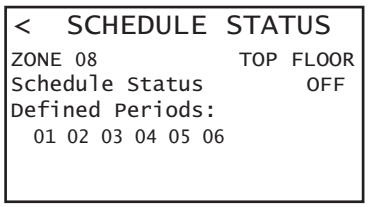
Data	Description
Input Status	This field displays the current state of the input; it can be either ON or OFF. Pressing + or – while the cursor is over this field will toggle the state of the input.
Input Inhibit	This field shows whether the Input Inhibit feature is ON or OFF. You can inhibit physical inputs only, not communication inputs. When Input Inhibit is ON, the controller will ignore changes to the contacts wired to the input. This effectively disables the switch, photo cell, or other device wired to the input.
Timer Type	This field shows the timer type for the input. If TIMED ON is selected, a timer is used to automatically turn the circuit OFF when the timer expires. If OFF-DELAY is selected, the ON time is extended when the circuit is turned OFF.
Timer Inhibit	This field shows whether the timer inhibit is ON or OFF. If this field is ON, the timer will be disabled, and the Timer Value field will be reset to 0. This must be OFF for the input timer to operate.
Timer Value	When an input is configured to use a timer (see Setting Up Inputs), this value shows the remaining time (in hours:minutes:seconds) that the input will be ON (range 0 to 18 hours).

Viewing Schedule Status

The SCHEDULE STATUS screen lets you see at a glance which scheduled periods and which special days are currently active. To view schedule status, follow these steps:

1. From the STATUS MENU screen, select SCHEDULES.

   The SCHEDULE STATUS screen displays.



2. Select the desired ZONE number.

The screen displays the zone nametag, the current schedule status, and the period number of any defined periods in the schedule. Review Table 8–26 for a description of the screen options.

Table 8–26: SCHEDULE STATUS screen data

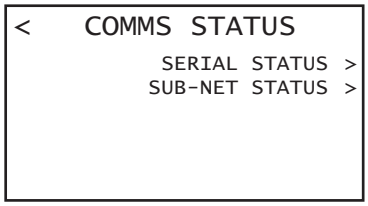
Data	Description
Schedule Status	Displays whether a schedule is ON or OFF.
Defined Periods	Displays the periods that have been defined for the schedule. Active periods are marked with an underline.

Viewing Communications Status

The COMMS STATUS screen displays the actual status of communications. To begin viewing communications status, do this step:

1. From the STATUS MENU screen, select COMMUNICATIONS.

   The COMMS STATUS screen displays.



From this screen you can:

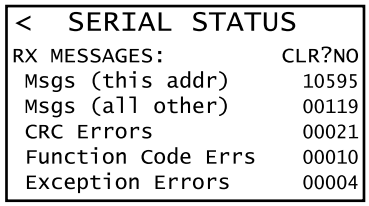
- View the status of serial communications
- View the status of sub-net communications

Viewing Serial Status

To view serial communications status, follow these steps:

1. From the COMMS STATUS screen, select SERIAL STATUS.

   The SERIAL STATUS screen displays. See Table 8–27 for descriptions of the serial status options



2. To clear all messages, highlight the CLR? option, and change NO to YES.

   NOTE: The CLR? option appears with Level 1 access only.

Table 8–27: Serial Communications Status

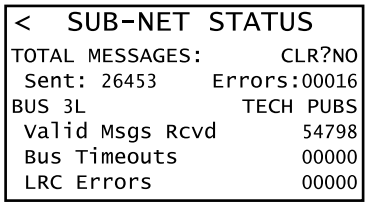
RX Messages	Description
CLR?	Clears all controller serial communications messages
Msgs (this addr)	Messages sent to this controller
Msgs (all other)	Messages sent to all other controllers
CRC Errors	Messages received with bad checksum/CRC
Function Code Errs	Messages received with an illegal opcode/function code
Exception Errors	Messages received with an illegal address

Viewing Sub-net Communications

To view Sub-net communications, follow these steps:

1. From the COMMS STATUS screen, select SUB-NET COMMS.

   The SUB-NET COMMS screen displays. See Table 8–28 for descriptions of the sub-net communications status options.



   This screen displays the total number of messages sent by the master to the sub-net, and the total number of errors.

2. Select the desired BUS (control bus) number.

   The screen displays the number of good messages received, the number of bus timeouts, and the number of LRC errors.

3. To clear messages for the selected control bus, highlight the CLR? option, and change NO to YES. If you want to clear all messages for all control buses, change NO to ALL.

   NOTE: The CLR? option appears with Level 1 access only.

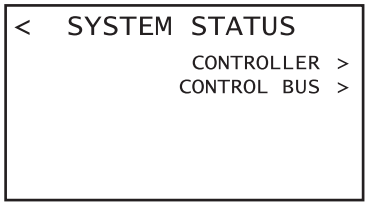
Table 8–28: Sub-net Communications Status Options

Messages/errors	Description
CLR?	Clears sub-net comms messages for the selected control bus (select YES option) or for all control buses (select ALL option).
Sent	Total number of messages sent
Errors	Total number of errors that have occurred
BUS	The selected bus number
Valid Msgs Rcvd	The number of valid messages received by the selected bus
Bus Timeouts	The number of timeouts for the selected bus
LRC Errors	The number of errors with bad checksum/LRC

Viewing System Status

To begin viewing controller and control bus system status, do as follows:
From the STATUS MENU screen, select SYSTEM.

The SYSTEM STATUS screen displays.



From this screen you can:

- View the controller status
- View the control bus status

Viewing Controller Information

To view controller status, do as follows:

From the SYSTEM STATUS screen, select CONTROLLER.

The CONTROLLER STATUS screen displays.

```
< CONTROLLER STATUS
Model Number          NF1000G3
Serial Number         15005765
Hardware Series           A125
Date of Mfg       09-JUN-2004
Firmware      Program:  05.00
Boot: 01.60     Dwnld:  01.50
```

This screen displays manufacturing information for this controller.

Viewing Control Bus Status

To view control bus status, follow these steps:

1. From the SYSTEM STATUS screen, select CONTROL BUS.

   The CTRL BUS STATUS screen displays.

```
< CTRL BUS STATUS
BUS 2L      STOCK ROOM LEFT

Model Number          NF21SBR
Firmware                01.01
```

2. Select the desired BUS (control bus) number (range is 0L, 0R, 1L, 1R ... 7L, 7R.)

   The control bus Model Number and Firmware version is displayed. If the selected bus is not present, these fields are blanked. Only currently installed buses are displayed.

   NOTE: The bus model type is displayed as catalog #, i.e. NF12SBR, NF12SBL, NF18SBR, NF18SBL NF21SBR, NF21SBL, etc.

CONTROLLER TOOLS

To access the TOOLS MENU screen, go to the MAIN MENU screen and select TOOLS. The TOOLS MENU screen displays.

```
<      TOOLS MENU
              ZONE OVERRIDE >
  DIRECT BREAKER CONTROL >
           OPERATING MODE >
             ACCESS CODES >
           CONTROLLER NAME >
             CLEAR MEMORY >
```

From this menu, you can do the following tasks:

- Override zones
- Direct breaker control
- Set the operating mode
- Set access codes
- Enter a controller name
- Clear the controller memory.

Overriding Zones

Overrides can be enabled or disabled (released) to force the state of a zone ON or OFF. For example, if a zone override is enabled and the override

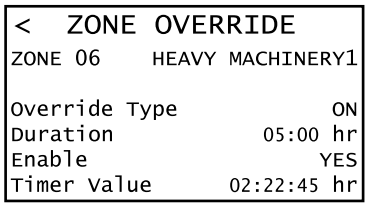
state is set to ON, the zone will be forced ON. It remains ON until either the override is disabled, the Timer Value (if used) expires, or the zone is overridden OFF.

NOTE: If the controller is in HALT mode when you attempt to execute a zone override, no circuit breaker switching will occur. This is because the HALT command freezes the circuit breakers in their current position. When the controller is put back into RUN mode, the circuit breakers in the zone will switch.

To temporarily or continuously override zones, follow these steps:

1. From the TOOLS MENU screen, select ZONE OVERRIDE.

   The ZONE OVERRIDE screen displays.



   In the screen above, the “Enable” option is set to YES, and the Override Type (override state) is set to ON, enabling an override and forcing Zone 6 ON for a duration of five hours. The Timer Value indicates that 2 hours, 22 minutes, and 45 seconds remain. See Table 8–29 on page 87 for descriptions of the zone override options.

2. Select the desired ZONE number.
3. Select the Override Type as ON or OFF.
4. Select the Duration time, if desired.

   Use a time setting of zero for a continuous override.

5. For the Enable option, change NO to YES to enable the override timer.

   The timer is re-started whenever Enable changes from NO to YES. The Enable option automatically changes back to NO when the timer expires.

Table 8–29: Zone override options

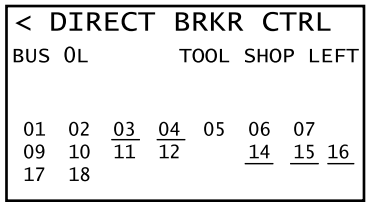
Override Option	Description
Override Type	Selecting ON or OFF overrides the zone either ON or OFF.
Duration	This is the amount of time the override is active.
Enable	Selecting YES enables the override; selecting NO disables it.
Timer Value	Time remaining for override if active.

Selecting Direct Breaker Control

Direct circuit breaker control is used as a temporary one-time override. It allows you to test an individual circuit breaker, or temporarily change the circuit breaker state until the next control event initiates based on the zone's logic.

1. From the TOOLS MENU screen, select DIRECT BREAKER CONTROL.

   The DIRECT BRKR CTRL screen displays.



   The circuit breakers for the first control bus is displayed by default. Underlined circuit breaker numbers indicate circuit breakers that are ON.

2. Select the desired BUS (control bus) number.

   The circuit breakers for the selected control bus appear.

3. Select a circuit breaker number.

   The BKR (breaker) line displays.

4. Select the number of the circuit breaker you want to control, then press the Plus key or Minus key to command ON or OFF the circuit breaker.

   The selected circuit breaker is commanded ON or OFF, depending on its previous state.

Selecting the Operating Mode

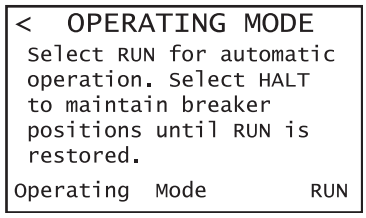
There are two operating modes: RUN and HALT. In RUN mode (the default), all circuit breaker programs that have been set up operate automatically. In HALT mode, system operation is stopped.

NOTE: The controller's operating mode displays on the Main screen.

To select the operating mode, follow these steps:

1. From the TOOLS MENU screen, select OPERATING MODE.

   The OPERATING MODE screen displays.



2. Highlight the Operating Mode, then change between the RUN and HALT modes.

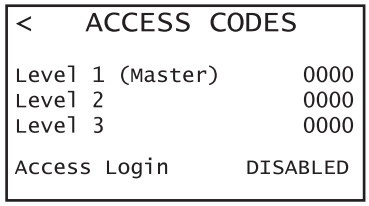
Setting Access Codes

To set access codes, follow these steps:

NOTE: Setting or changing any of the controller access codes requires Level 1 access (see "Entering Access Codes" on page 48).

1. From the TOOLS MENU screen, select ACCESS CODES.

   The ACCESS CODES screen displays.



   The screen displays the current codes for each of the three levels. The screen above is the default ACCESS CODES screen.

   NOTE: If at least one of the access level codes have been set, the Access Login is set to ENABLED. If none of the codes have been set (all are set to 0000), the Access Login is set to DISABLED, allowing unprotected access to all controller screens and functions.

2. Use the Back and Next keys to move the cursor over the desired digits, then use the Plus and Minus keys to change each number (0–9) at the cursor position.
3. Save the new codes by moving the cursor away from the password area.

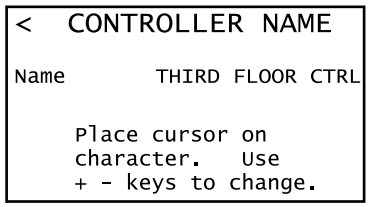
NOTE: Be sure to record your access code. You will not be able to access the controller without this code.

Entering a Controller Name

To enter a descriptive name for the controller, follow these steps:

1. From the TOOLS MENU screen, select CONTROLLER NAME.

   The CONTROLLER NAME screen displays.



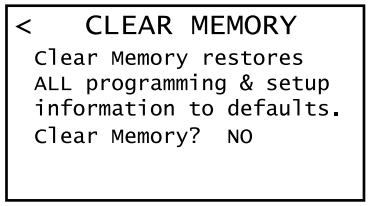
2. To assign or change a controller name, use the Back and Next keys to move the cursor over the desired character positions, then use the Plus and Minus keys to change each character.
3. Move the cursor away from the Name field to save the controller name.

Clearing the Memory

To clear the controller memory and restore all factory defaults, follow these steps:

1. From the TOOLS MENU screen, select CLEAR MEMORY.

   The CLEAR MEMORY screen displays.



   NOTE: As stated in this screen, clearing the memory will delete ALL programming and setup information, except for communications setup parameters (see "Setting Up Communication Parameters" on page 51).

2. To clear the controller memory, highlight the first choice, and change NO to YES. The default value for both choices presented is NO.
3. To confirm the clearing of memory, highlight the Clear memory NOW screen path symbol (<), and press the Plus key to exit the screen.

CHAPTER 9 — LOGGING

INTRODUCTION

Logs are files stored in the nonvolatile memory of the controller. When an event occurs it is written to the event log. The event log can store up to 512 event records. When the event log is full and a new event occurs, the oldest event is deleted to make room for the new entry. This circular recording method is more commonly known as FIFO: when space is needed for a new record, the **F**irst item **I**n is the **F**irst item **O**ut.

NOTE: Viewing event log information is possible only with PCS software. For more information, see the PCS Help file.

EVENT LOG

The event log records the following status changes:

- Schedule Object State (1–16)
- Input Object State (1–64)
- Zone State (1–64)
- Remote Source State (1–32)
- Remote Source Time-out (1–32)
- Zone Override Enable (1–64)
- Zone Override Type (1–64)
- Override Time-out Enable (1–64)
- Timer Inhibit (1–64)
- Input Inhibit (1–64)
- Latched Input State (1–64)
- Non-responding Breaker State
- Breaker Present
- Bus Present
- Communications Time-out
- Halt Mode
- Front Panel Access
- Power Outage

The controller does not need to be configured to record the event conditions above, but the event log is viewable only with PCS software. For more information about the event log, refer to the PCS Help file.

APPENDIX A — TROUBLESHOOTING

TROUBLESHOOTING THE CONTROLLER

Use the following table if you need to troubleshoot the NF1000 G3 controller:

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must be installed and serviced only by qualified electrical personnel.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.

Failure to follow this instruction will result in death or serious injury.

Table A–1: NF1000G3 Controller Troubleshooting

CONDITION	POSSIBLE CAUSES	SOLUTION
No display on LCD screen.	Power supply is not energized.	Verify that the power supply's LED status indicators are ON. The indicator marked CL2 must be ON for the controller to operate. If it is not ON and your power supply obtains its power from the panelboard bus, verify that the main power to the panelboard is properly connected and turned ON. Also verify that the power supply line terminal is secured. If your power supply is connected to an external power source, such as a UPS, verify that the power supply is properly connected to the external power source and that this source is turned ON. Refer to the Power Supply instruction bulletin for installation and safety information.
	The wrong power supply is installed.	The POWERLINK G3 power supply may not be the proper model for your system's voltage. Verify that the proper power supply is installed. Refer to the Power Supply Instruction Bulletin for more information.
	Controller is not connected to the power supply.	The power supply must be plugged into the controller. Verify that the power supply connector is seated properly in the controller's mating connector. Refer to **Chapter 4—Installation** for more information.
Controller is not communicating.	Baud rate, address, or other communications parameters are not set up properly.	Verify that all controller communications setup information matches your software settings. Refer to **Chapter 8—Operation** for more information on how to set these parameters from the controller front panel.
	Communications wiring errors.	Verify that your network or serial communications connections are wired properly and the proper signal polarity is observed. Ensure that the TX and RX wires are not reversed. Refer to **Chapter 6—Communications Wiring** for more information.
Controller keys will not access screens.	Controller keys are locked.	The controller panel has been intentionally disabled. Connect to the controller using POWERLINK Controller Software (PCS). Clear the Front Panel Disable setting found on the PCS Setup screen, and send the updated configuration to the controller. This re-enables local front panel access.
Pilot light on switch connected to input does not illuminate.	Wiring error.	Verify wiring of inputs with respect to the external switching device and its pilot light. An LED pilot light must be wired observing the proper polarity. Refer to **Chapter 5—Input Wiring** for more information.
	Excessive current draw.	The total draw of all devices connected to all status feedback terminals must not exceed 60 mA. The status feedback power source is internally protected and will shut down if this limit is exceeded. A status indicator LED for this source is located in the upper-left corner of the wiring terminal compartment. Refer to **Chapter 5—Input Wiring** for more information.
	Incorrect device rating	The system is designed for devices rated at 24Vdc.

Table A–1: NF1000G3 Controller Troubleshooting

CONDITION	POSSIBLE CAUSES	SOLUTION
Circuit breaker does not respond to *INPUT* change or does not respond as desired.	Controller or power supply is not powered or operating properly.	Verify that both the controller and power supply are energized by observing that all power LEDs are illuminated and the LCD display is ON. Verify that the controller is operating by observing that the time is changing.
	Circuit breaker handle is OFF.	Turn circuit breaker handle to ON.
	Circuit breaker is tripped.	Reset the circuit breaker by turning it OFF and back ON.
	Circuit breaker Manual mode is engaged.	Restore the circuit breaker to Auto mode by engaging the white button located on the face of the circuit breaker.
	Input is not connected or wired properly.	Verify that the input wiring is properly connected. Wiring specifics depend on the type of external switching device being used. Refer to **Chapter 5—Input Wiring** for more information.
	Input is inhibited.	Re-enable the input. Refer to **Chapter 8—Operation** for more information on how to setting the Input Inhibit option.
	Input is not configured properly.	Verify that the input commands the correct zone by manually operating the external switching device and observing on the Input Status screen whether the corresponding input status changes when the input is ON. An input's proper response may require it to be re-configured for your switching device. Refer to **Chapter 5—Input Wiring** and **Chapter 8—Operation** for more information.
	Circuit breaker is not included in zone, or circuit breaker is incorrectly included in zone.	To test all circuit breakers assigned to a zone, refer to the "Testing Circuit Breakers" section in **Chapter 8—Operation**. If the circuit breakers are not responding as desired, refer to the "Adding or Deleting Circuit Breakers from a Zone" section for more information on how to add or delete a circuit breaker from a zone.
	Circuit breaker is included in more than one zone.	Circuit breakers assigned to more than one zone remain on until all zones commanding the circuit breakers are off. In many cases, this is desired operation. If not desired, review the circuit breaker assignment of all zones, and delete circuit breakers from any incorrect zone. Refer to **Chapter 8—Operation** for more information.
	Circuit breaker is overridden from communications or the front panel.	A zone can be overridden from either communications or the front panel. To clear the override, refer to **Chapter 8—Operation**.
	Sub-net wiring error.	Circuit breakers in slave panels must have properly wired sub-net communications and power. Refer to **Chapter 6—Communications Wiring**, as well as instruction bulletins for the control bus, power supply, and slave address selector, for more information.
	Sub-net addressing error.	Each slave panel must have a unique address. Verify that no two slave address selectors have the same address setting and that no slave address selector is set to zero, unless the power supply and controller are remotely mounted with no control bus attached. Refer to the Slave Address Selector instruction bulletin for more information.
	Time schedule conflict.	If the circuit breaker is assigned to a zone with a time schedule, the time schedule may be holding the circuit breaker ON or OFF, according to schedule status and the logic type setting.
	Circuit breaker is overridden by comms loss action.	Comms loss action should be disabled unless this type of action is desired.

Table A–1: NF1000G3 Controller Troubleshooting

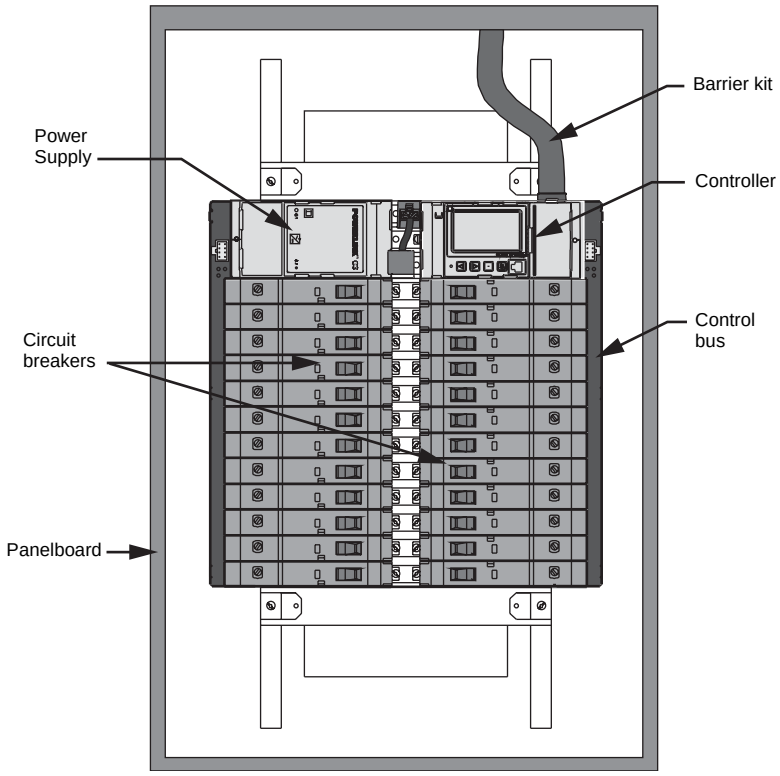
CONDITION	POSSIBLE CAUSES	SOLUTION
Circuit breaker does not respond to *SCHEDULE* change or does not respond as desired.	Circuit breaker handle is OFF.	Turn circuit breaker handle to ON.
	Circuit breaker is tripped	Turn circuit breaker handle OFF and then ON again.
	Circuit breaker Manual mode is engaged.	Restore the circuit breaker to Auto mode by engaging the white button located on the face of the circuit breaker.
	Circuit breaker is not included in zone, or circuit breaker is incorrectly included in zone.	To test all circuit breakers assigned to a zone, refer to **Chapter 8—Operation**. If the circuit breakers are not responding as desired, refer to the “Adding or Deleting Circuit Breakers from a Zone” section for more information on how to add or delete a circuit breaker from a zone.
	Circuit breaker is overridden from either communications or the front panel.	A zone can be overridden from either communications or the front panel. To clear the override, refer to **Chapter 8—Operation**.
	Sub-net wiring error.	Circuit breakers in slave panels must have properly wired sub-net communications and power. Refer to **Chapter 6—Communications Wiring**, as well as instruction bulletins for the control bus, power supply, and slave address selector, for more information.
	Circuit breaker is overridden by comms loss action.	Comms loss action should be disabled unless this type of action is desired.
	Error in schedule/time period setup.	Review each time period for the zone’s schedule and make sure that the selected times and days match the desired operation.
	No day selected.	Either a normal day or a special day must be selected for a time period to be valid. The time period will be valid whenever the current day matches a selected day.
	Special day(s) are configured but not included.	Special days are user-defined exceptions to normal days. Therefore, a special day has priority over a normal day. A time period will not be valid during any special day unless the special day is specifically included in the time period.
	Improper logic type setting.	If the circuit breaker is assigned to a zone that is also controlled by an input, the input may be holding the circuit breaker ON or OFF, according to the input status and logic type setting.
	Circuit breaker blink type is set to Pulse OFF or Pulse Repeat.	Circuit will always remain ON except when pulsing OFF. Choose another blink type if this behavior is not desired.

APPENDIX B — SYSTEM COMPONENTS

POWERLINK G3 SYSTEM COMPONENTS

The POWERLINK G3 system consists of control buses, a panelboard, remotely operated circuit breakers, a power supply, and a controller. If external control wiring is needed, a Class 2 barrier kit is required. Figure B–1 identifies main components which are described in this appendix.

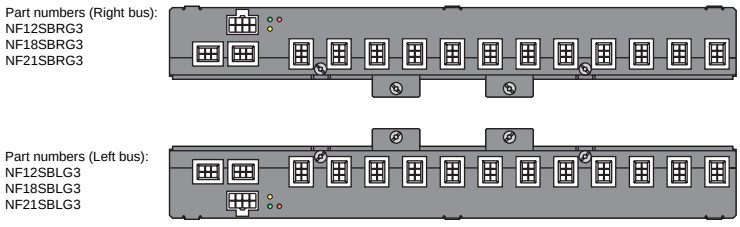
Figure B–1: POWERLINK System Components



Control Bus

The control buses provide control and data monitoring for POWERLINK G3 remotely operated circuit breakers and are connected to the POWERLINK G3 power supply and controller. Installed control buses will not interfere with the installation of standard circuit breakers into the panelboard.

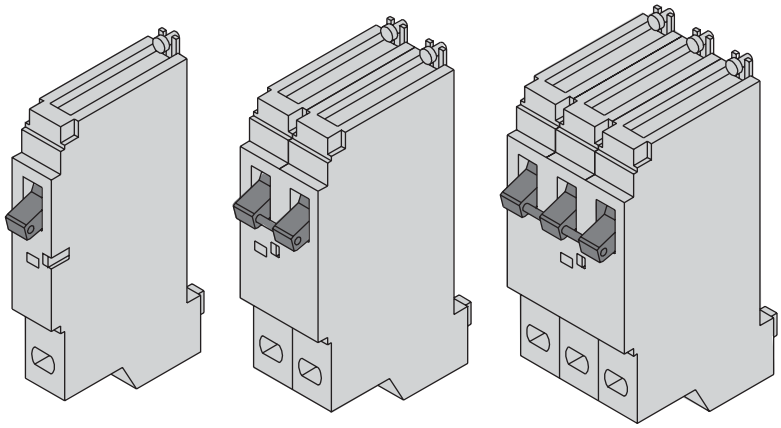
Figure B–2: Control Buses



Remotely Operated Circuit Breakers

POWERLINK G3 Remotely Operated Circuit Breakers provide the same overcurrent protection as standard circuit breakers, and have an integral operator that can remotely switch the circuit breaker ON and OFF. The circuit breaker works with the POWERLINK G3 controller, power supply, and control buses to provide a remote power switching system in a panelboard.

Figure B–3: Remotely Operated Circuit Breakers



Part numbers:
ECB14015G3
ECB14020G3
ECB14030G3

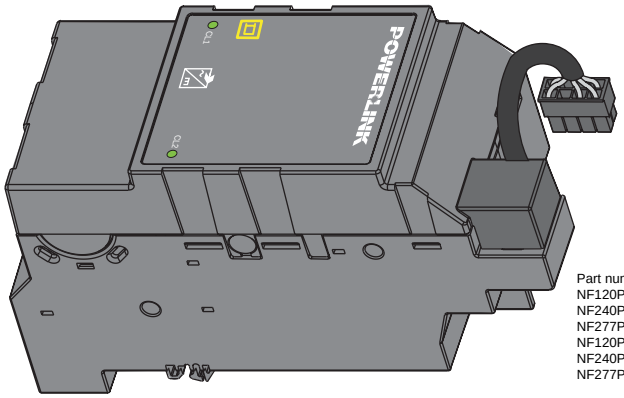
Part numbers:
ECB24015G3
ECB24020G3,
ECB24030G3

part numbers:
ECB34015G3,
ECB34020G3,
ECB32030G3

Power Supply

The POWERLINK G3 Power Supply provides power to the POWERLINK G3 system.

Figure B–4: Power Supply

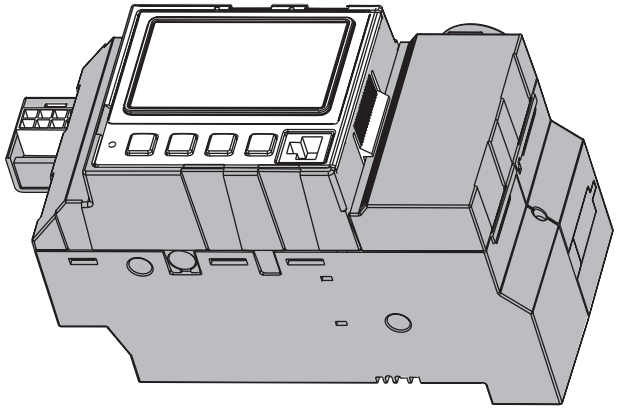


Part numbers:
NF120PSG3
NF240PSG3
NF277PSG3
NF120PSG3L
NF240PSG3L
NF277PSG3L

Controller

The POWERLINK G3 NF1000G3 Controller provides control logic for the operation of a POWERLINK G3 system. The controller uses remotely operated circuit breakers to control up to 168 remotely operated branch circuits. Also, it provides input channels for connecting external dry-contact control devices, a keypad and display for setting up features, and external ports for connecting to a computer directly or through a modem.

Figure B–5: Controller



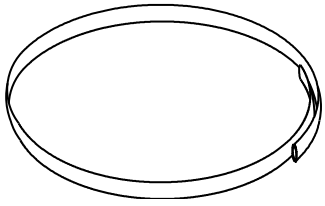
Part number: NF1000G3

Barrier Kit

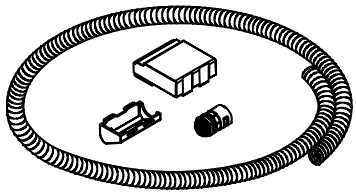
If external control wiring is used, a Class 2 barrier is recommended. Two types of barrier kits (shown below) are available: standard and fixed. The standard barrier kit ships with the controller, while the fixed barrier kit is optional.

The fixed barrier kit provides an expanded wiring compartment and fittings for a wider range of barrier types. A piece of corrugated plastic conduit is included with the kit.

Figure B–6: Class 2 Barrier Kits



Standard barrier kit

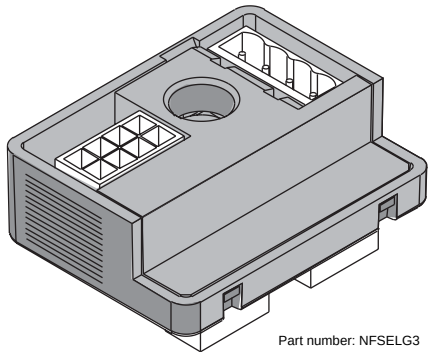


Fixed barrier kit
Part number: NFASBKG3

Slave Address Selector

The slave address selector is used to set an address for a slave panelboard in a POWERLINK G3 subnetwork. A slave panelboard can have an address setting from 0–7.

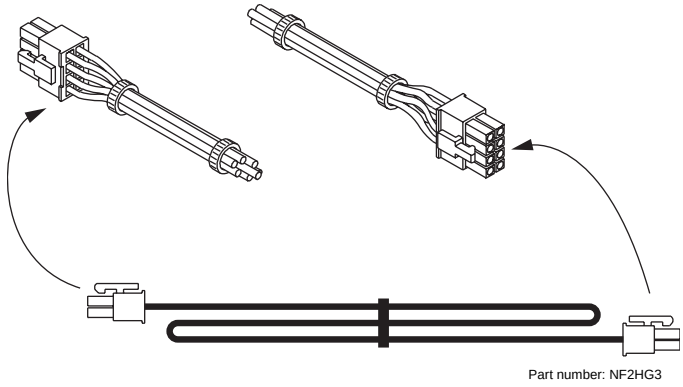
Figure B–7: Slave Address Selector



Slave Bus Connect Harness

The slave bus connect harness (NF2HG3) is used to connect a right control bus to the slave address selector on the left control bus so that the right control bus is able to communicate with the rest of the subnetwork components. The tie wrap on the cable can be removed if the cable is not at the required length.

Figure B–8: Slave Bus Connect Harness



CONTROLLER SPECIFICATIONS

The following sections list the specifications for the controller:

Table B–1 Controller Specifications

Inputs	independently configurable dry-contact inputs
Input Types	• 2-wire maintained N.O. • 2-wire maintained N.C. • 2-wire maintained toggle • 2-wire momentary pushbutton • 2-wire momentary timed ON • 2-wire momentary delayed OFF • 3-wire dual momentary
Input Timer	1 second to 18 hours
Status Output	• 24 Vdc (60mA maximum load for all outputs combined) • available for 2-wire input types only
Auxiliary Power Supply	24 Vdc (100mA maximum current)
Communication Interface	COM 1 (four methods of connection): • RS-485 (2-wire MODBUS ASCII/RTU) inside terminal compartment • RS-485 (2-wire DMX512) inside terminal compartment (see“Using a G3 Controller with DMX512 Systems” on page 103) • RS-232 (MODBUS ASCII/RTU) inside terminal compartment • RS-232 (MODBUS ASCII/RTU) on front panel
Circuit Breaker Blink Notice	• No blink (default) • Single blink (2–30 minutes) • Dual blink (1st blink: 2–30 minutes; 2nd blink: 1 minute) • Delay with no blink (2–30 minutes) • Pulse duration (1-10 seconds) • Pulse repeat (1-240 minutes)
Circuit Breaker Stagger Delay	0.10 second (default) to 1 second
System Logic	Zones are configured for logical operation. • AND, OR, LAST EVENT
Terminals	• Inputs (removable Phoenix): #24–18AWG • Auxiliary Power (removable Phoenix): #24–18AWG • Network (removable Phoenix): #24–18AWG • Front Panel: RJ-11
Environmental Standards	• Operating Temperature: –5°C to +65°C (internal panelboard temperature) • Storage Temperature: –20°C to 85°C • Operating Humidity: 5% to 95%
Standards	UL Listed 916 Energy Management Equipment
ESD Immunity	IEC 1000, Level 4
RF Susceptibility	IEC 1000, Level 3
Electrical Fast Transient Susceptibility	IEC 1000, Level 3
Electrical Surge Susceptibility – power line	IEC 1000, Level 4
Electrical Surge Susceptibility – data line	IEC 1000, Level 3
Certifications	California Title 24
FCC—Part 15, Class A	

APPENDIX C — USING A G3 CONTROLLER WITH DMX512 SYSTEMS

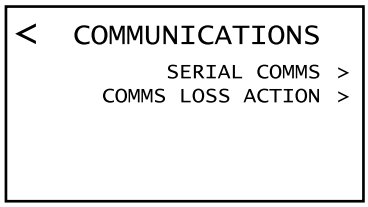
INTRODUCTION

This appendix describes communications setup, configuration, and relationships to inputs, zones, and comms loss feature when using controllers with DMX512 systems.

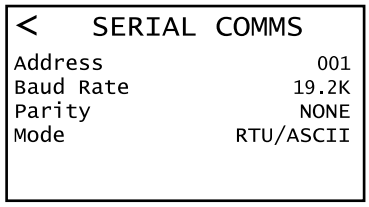
SETTING UP COMMUNICATIONS PARAMETERS

Follow the steps below to set up communication parameters when using a controller with DMX512.

1. From the CONTROLLER MENU screen, select COMMUNICATIONS. The COMMUNICATIONS screen displays.



2. In the COMMUNICATIONS screen select SERIAL COMMS. The SERIAL COMMS screen displays.



3. Select the DMX512 option under MODE. The controller screen will automatically change to show setup fields for the DMX512 mode. Enter in the desired starting slot and low and high thresholds.

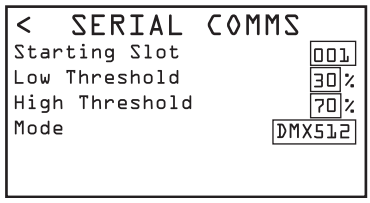


Table C–1 on page 104 shows the default threshold settings for the DMX512 mode.

CONFIGURATION WHEN USING DMX512

The minimal required configuration is to assign desired breakers to zones. This is all that needs to be done in many instances when using DMX512. All normal controller functions and logical capabilities continue to be available when the DMX512 mode is selected. Combining DMX512 with controller features, such as local inputs or schedules, may be desired in some applications.

NOTE: The default input type is set to Maintained Normally Open. Inputs 1–16, when configured for Maintained Normally Open or Normally Closed contact, will synchronize to current contact state when the controller is powered up. This behavior may or may not be desired when using DMX512, especially where no contacts will be connected to an input. To disable power up synchronization, it is recommended that the input configuration be changed to Momentary Toggle.

Table C–1: DMX512 Communications Options

Option	Value Range	Description
Starting slot	1-449	64 continuous slots from start position are addressed automatically.
Low threshold	0 – High Threshold	Percentage at which breaker shall change from ON state to OFF state. Default = 30%
High threshold	Low Threshold – 100%	Percentage at which breaker changes from OFF state to ON state. Default = 70%

No change in state will occur when percentage is between the high and low threshold.

DMX512 RELATIONSHIP TO INPUTS

The controller responds to 64 contiguous DMX512 slots. These slots correspond to inputs 1 – 64 in the controller. When a DMX512 slot increases beyond the high threshold, then the corresponding input will change to ON. When a DMX512 slot decreases below the low threshold, then the corresponding input will change to OFF. DMX512 changes interact with input changes from other sources on a last-event basis.

DMX512 RELATIONSHIP TO ZONES

Zones that are configured to respond to an input will respond to the corresponding DMX512 slot. By default on all controllers, Zone 1 is mapped to Input 1, etc. The zone to input relationship is fixed on the 1000 controller.

DMX512 RELATIONSHIP TO COMMS LOSS FEATURE

The comms loss feature is available when using the DMX512 mode. Unlike the standard mode behavior, where an override that was triggered by a data loss will remain set when data is restored, overrides will be released when data resumes when in the DMX512 mode. The following table summarizes the differences in behavior:

Table C–2: DMX512 with Comms Loss feature

Loss Behavior			**Resumption Behavior**	
Default Action	Standard	DMX	Standard	DMX
ON	Override set to ON	(Same)	No change to override state.	Override released.
OFF	Override set to OFF	(Same)	No change to override state.	Override released.
LAST STATE	Override set to current state, ON or OFF	(Same)	No change to override state.	Override released.
NO ACTION	No change to override state	(Same)	No change to override state.	Override released.
RUN	Override released	(Same)	No change to override state.	Override released.

BLINK NOTICE

DMX512 mode allows blink notice to occur on circuits when they are configured for blink notice and are commanded OFF. See “Blink Notice” on page 63

NOTE: Breakers should not be configured for blink notice if blink notice is not desired.

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295 Tech Park Drive, Suite 100
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www.SquareD.com

Bulletin No. 63249-401-200/A4 03/2005 replaces 63249-401-200/A3