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NAE55/NIE55

Installation Instructions

MS-NAE55xx-x
MS-NIE55xx-x

Part No. 24-10051-35, Rev. A
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Application

The Network Automation Engine (NAE) and Network Integration Engine (NIE) are Web-enabled, Ethernet-based, supervisory devices that monitor and control networks of field-level building automation devices, HVAC equipment, and lighting. Figure 1 shows a typical NAE55 model.

This document describes how to install MS-NAE55xx-x and MS-NIE55xx-x model engines, which are referred to collectively as NAE55 unless specified otherwise.

North American Emissions Compliance

United States

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 designed to provide reasonable protection against harmful interference when this 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/her own expense.

Canada

This Class (A) digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe (A) respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Installation

Follow these guidelines when installing an NAE55:

- Transport the NAE55 in the original container to minimize vibration and shock damage to the NAE55.
- Verify that all the parts shipped with the NAE55. The data protection battery and NAE55 ship together but are packaged separately.
- Do not drop the NAE55 or subject it to physical shock.
- Do not open the NAE55 housing (except the data protection battery compartment). The NAE55 has no user-serviceable parts inside.

Parts Included

- one NAE55
- one data protection battery
- one installation instructions sheet

Materials and Special Tools Needed

- four fasteners appropriate for the mounting surface (M4 screws - Europe, #8 screws - North America)
- two 36 cm (14 in.) or longer pieces of DIN rail for DIN rail mount applications only
- a small straight blade screwdriver for securing communication wires in the terminal blocks

Mounting

Location Considerations

IMPORTANT: UL 864 Listed NAE55/NIE55 models (MS-NAE5510-0U and MS-NIE5510-0U) **must** be mounted in a lockable enclosure.

Follow these guidelines when mounting an NAE55:

- Ensure that the mounting surface can support the NAE55 and any user-supplied enclosure.
- Mount the NAE55 in the proper orientation (Figure 4 and Figure 5).
- Mount the NAE55 on an even surface in wall mount applications whenever possible. If you must mount the NAE55 on an uneven surface, be careful not to crack the wall mount feet or housing when tightening the screws. Use shims or washers to mount the unit securely on the mounting surface.

Johnson Controls

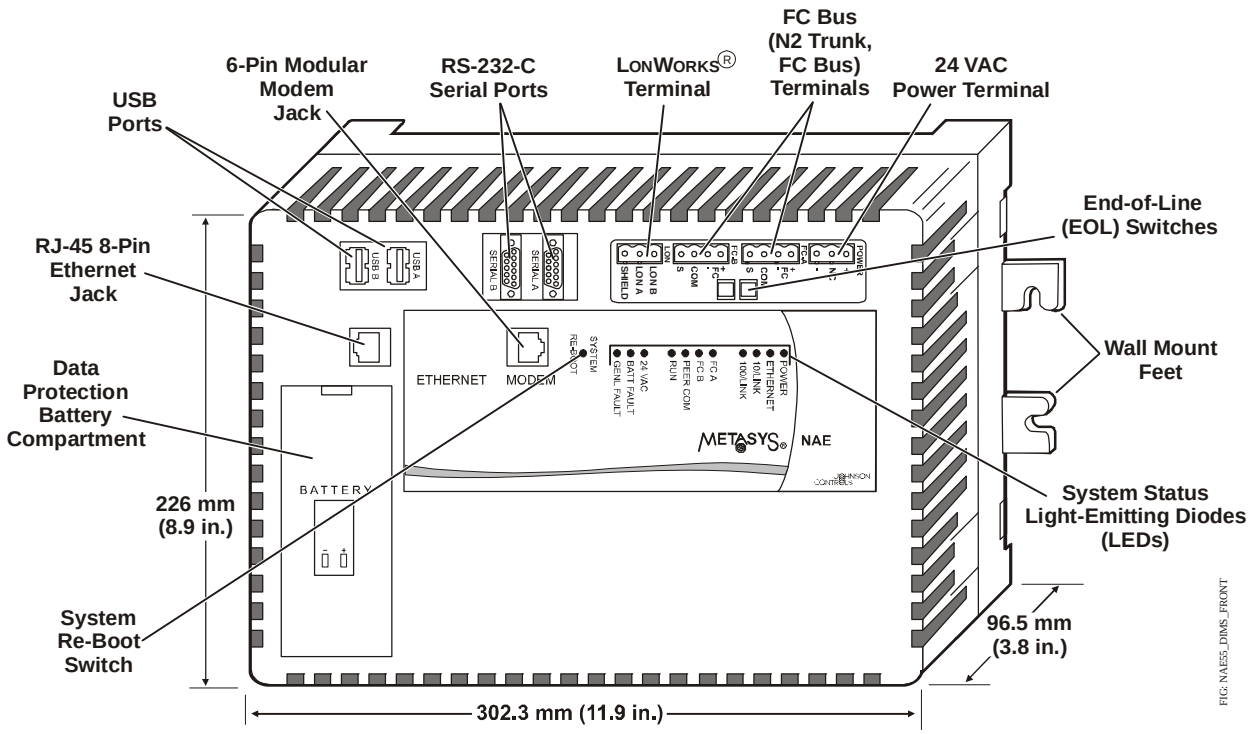


Figure 1: NAE55 Dimensions and Other Physical Features

- Mount the NAE55 in areas free of corrosive vapors and observe the environmental limitations listed in the *Technical Specifications* section.
- Do not mount the NAE55 on surfaces that are prone to vibration, such as duct work, or in areas where electromagnetic emissions from other devices or wiring can interfere with NAE55 communication.
- Allow sufficient space for running cable and wire and making terminal connections (Figure 2).
- Do not mount the power supply below the NAE55.

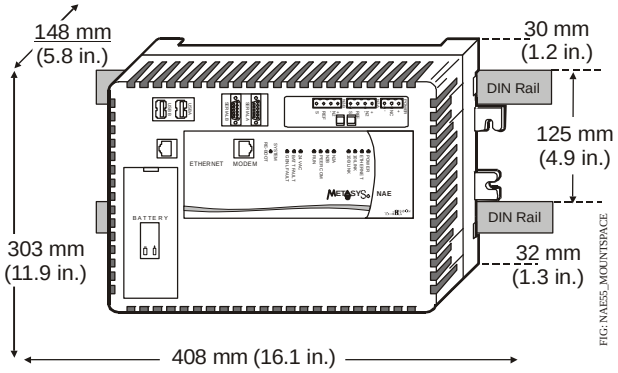


Figure 2: NAE55 DIN Rail Mount and Mounting Space Requirements

On panel or enclosure mount applications, observe these additional guidelines:

- Do not install the NAE55 in an airtight enclosure.
- Mount the NAE55 so that the enclosure wall or the transformer does not obstruct ventilation of the NAE55 housing.

Each NAE55 application is different, and no general guidelines can be given about the heat dissipating devices that may be mounted in an enclosure with the NAE55. Monitor the NAE55 processor temperature for each application to determine the acceptable combinations of devices and proper mounting location for your specific application.

IMPORTANT: Do not add any devices to an enclosure with an NAE55 that could cause the temperature of the NAE55 processor to exceed 77°C (171°F) per the readout of the processor chip's embedded temperature sensor on the NAE55 diagnostics tab. Refer to the *Troubleshooting* section of the *NAE Commissioning Guide (LIT-1201519)*.

Mounting the NAE55/NIE55

Wall Mount Applications

To mount the NAE55 on a vertical surface:

1. Mark the location of the four holes (for the wall mount feet) on the wall using the dimensions in Figure 3 and according to an orientation in Figure 4. (You may also hold the NAE55 up to the wall as a template and mark the hole locations.)

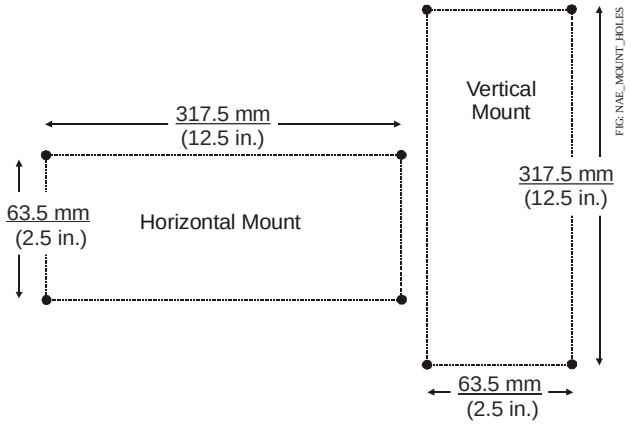


Figure 3: Mounting Screw Hole Dimensions

2. Drill holes in the wall at the marked locations.
3. Insert appropriate wall anchors in all four holes (if necessary) and insert the screws into the top two holes. Leave enough space between the wall surface and the screw head for the wall mount feet.
4. Hang the NAE55 on the screws with the top wall mount feet for horizontal wall mount applications. Hold the NAE55 in place for vertical application.

Note: The wall mount feet are designed to make mounting easier. When the NAE55 is wall mounted in the BEST (horizontal) orientation, you can hang the NAE55 on the screws with the upper two wall mount feet.

5. Insert the screws into the lower two wall mount feet and holes and carefully tighten all of the screws.

> **IMPORTANT:** Do not overtighten the mounting screws. Overtightening the screws can crack the NAE55 wall mount feet or housing.

DIN Rail Mount Applications

To mount the NAE55 on DIN rails:

1. Mount two DIN rails horizontally, so they are 125 mm (4.9 in.) apart on centers (Figure 2).
2. Snap the DIN clips on the bottom of the NAE55 to the outboard position.

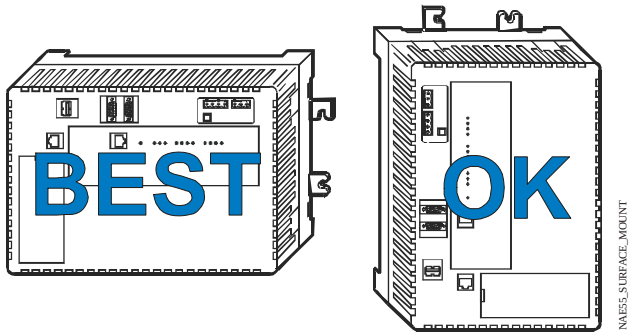


Figure 4: Required Orientations for NAE55 Wall Mount Applications

3. Hang the NAE55 on the DIN rail hooks on the back of the NAE55.
4. Press the DIN clips back into position to secure the unit on the DIN rails.

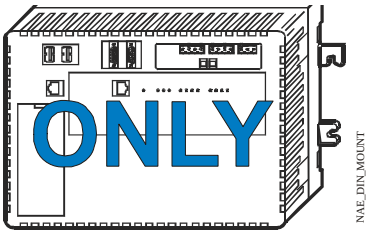


Figure 5: Required Orientation for NAE55 DIN Rail Mount Applications

To remove the NAE55 from the DIN rails:

1. Snap the DIN clips on the bottom of the NAE to the outboard load position.
2. Lift the NAE55 off the DIN rails.

Enclosure Mount

To mount the NAE55 in an enclosure:

1. Mount the enclosure per the manufacturer's instructions.
2. Mount the NAE55 in the enclosure following the guidelines in the *Location Considerations* and *Mounting the NAE55/NIE55* sections of this document.

Wiring

Power Supply, Network, and Communication Connections

See Figure 1 for the location of the power supply terminal, network communication terminals, Ethernet jack, and modem jack.

Power Supply

IMPORTANT: Install the data protection battery before applying 24 VAC power to the NAE55. See the *Installing the Data Protection Battery* section.

In North America, use a Class 2, 24 VAC power supply with a 50 VA minimum output. Outside North America, use a 24 VAC Safety Extra-Low Voltage (SELV) transformer at the appropriate rating. The minimum input voltage for the NAE55 to operate properly is 20 VAC. See the *Technical Specifications* section.

Use a dedicated power supply to the NAE55 only. Do not connect any other loads to the power supply. Additional loads may cause noise interference.

FC Bus Terminal Block

The two Field Controller (FC) Bus connections on the MS-NAE55xx-x models are 4-pin removable, keyed terminal blocks labeled **FC A** and **FC B**.

Note: MS-NIE55xx-x models (NIE55s) do not have FC Bus terminal blocks or LONWORKS® network terminal blocks.

The FC bus connections are optically isolated RS-485 ports with keyed 4-position terminal blocks that communicate at 9600, 19.2k, or 38.4k baud. Use an FC Bus port to integrate an N2 network or a Multidrop-Serial/Token-Passing (MS/TP) FC Bus trunk into the Metasys® system.

Note: N2 and BACnet® MS/TP Buses have different protocols and network requirements. Do not connect N2 and MS/TP devices to the same FC Bus port.

The Shield connections (SHD) on the FC terminal blocks are not connected to any earth ground connection. The FC A and FC B terminal blocks are not interchangeable.

LONWORKS Network Terminal Block

The LONWORKS network connection on the MS-NAE552x-x models (only) is a 3-wire removable, keyed terminal block. The Shield connection (SHD) on the LONWORKS network terminal block is an isolated terminal and is not connected in the NAE552x. Use the LONWORKS terminal block to connect LONWORKS networks to the NAE55.

Computer Serial Ports

IMPORTANT: Do not use computer serial ports in normal product operation for UL 864 Listed smoke control applications.

The RS-232-C serial ports on the NAE55 are for direct connection using a standard 9-pin female to 9-pin female Data Terminal Equipment (DTE) to DTE null modem cable. The NAE55 serial ports **do not** support external modems. The RS-232-C serial ports are labeled **SERIAL A** and **SERIAL B** (Figure 1).

Use the **SERIAL A** port to connect directly to a computer serial port to browse to the NAE55. Use this port only for establishing a Point-to-Point Protocol (PPP) network connection. Refer to the *Metasys System Extended Architecture Direct Connection and Dial-Up Connection Application Note (LIT-1201639)*.

Use the **SERIAL B** port to connect with a VT100 terminal or computer using a VT100 terminal emulator because the **SERIAL B** port outputs the device Internet Protocol (IP) address. Use this port only to obtain the NAE55 IP address at startup. Refer to the *NAE Commissioning Guide (LIT-1201519)*.

Universal Serial Bus (USB) Ports

IMPORTANT: Do not use USB ports in normal product operation for UL 864 Listed smoke control applications.

The two USB ports labeled **USB A** and **USB B** are both configured as managers and are independent of each other. Use the USB A port to connect an optional external modem.

Refer to the *NAE Commissioning Guide (LIT-1201519)* for more information on external modems.

Ethernet Port

The Ethernet connection (10 or 100 Mbps) is an 8-pin RJ-45 network port for connecting the NAE55 to Ethernet IP networks.

On MS-NIE55xx-x models, use the Ethernet port for migration of N1 communications. Refer to the *N1 Migration with the NIE Technical Bulletin (LIT-1201535)*.

If the American Power Conversion (APC®) ProtectNet® model PNET1 Ethernet/token ring port surge protector is necessary as described in the *Metasys System Extended Architecture Smoke Control Wiring Technical Bulletin (LIT-1201753)*, connect the PNET1 output to the NAE55 Ethernet port and connect the external Ethernet cable to the PNET1 input. Ground the PNET1 surge protector according to the APC instructions.

Optional Internal Modem

MS-NAE55x1-x and MS-NIE55x1-x models have an internal modem and a 6-pin modular jack labeled **MODEM**. Connect a standard phone line plug and cable to the to use the internal modem.

For information on commissioning an internal modem, refer to the *NAE Commissioning Guide (LIT-1201519).*

Wiring the NAE55/NIE55

Mount the NAE55 securely before wiring it. Follow these guidelines when wiring the NAE55:

IMPORTANT: Do not apply 24 VAC power to the NAE55 before completing and checking all connections. Short circuits or improperly connected wires may result in permanent damage to the equipment.

IMPORTANT: Do not apply 24 VAC power to the NAE55 before installing the data protection battery. See the *Installing the Data Protection Battery* section in this document.

IMPORTANT: Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations.

IMPORTANT: Do not exceed the NAE55 electrical ratings. The NAE55 is a low-voltage (<30 VAC) device. Do not apply high voltage to any termination on the NAE55. Applying high voltage to the NAE55 may result in permanent damage to the NAE55 and void any warranties.

IMPORTANT: Do not remove the terminal block keys. The terminal block plugs and the terminal sockets are keyed to fit together in the correct configuration only.

IMPORTANT: Prevent any static electric discharge to the NAE55. Static electric discharge can damage the NAE55 and void any warranties.

- Route the supply power wires and communication cables at least 50 mm (2 in.) away from the vent slots in the sides of the NAE55 housing.
- Provide slack in the wires and cables. Keep cables routed neatly around the NAE55 to promote good ventilation, Light-Emitting Diode (LED) visibility, and ease of service.

Note: Make sure the building automation network wiring meets the specifications, rules, and guidelines in the *Wiring Considerations and Guidelines for Network Integrations* section.

To wire the NAE55:

1. Connect the Ethernet cable to the RJ-45, 8-pin Ethernet port shown in Figure 1.
2. Connect the Building Automation System (BAS) network cables to the appropriate ports.
   - For N2 or MS/TP networks, connect the three bus wires to one of the removable 4-terminal plugs labeled FC A or FC B (Figure 6).

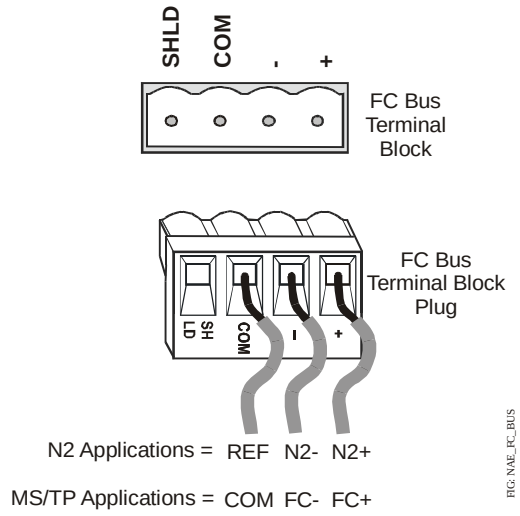
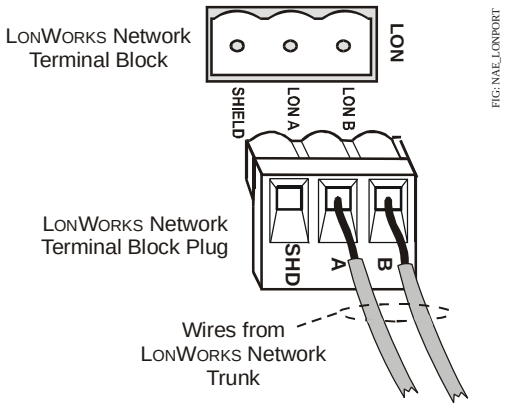


Figure 6: FC Bus Terminal Block and Wiring Connections

   - For LONWORKS compatible networks, connect the wires from the LON network trunk to the removable 3-terminal plug (Figure 7).

Note: If an N2 Bus or MS/TP Bus is connected to the NAE55, you must set the NAE55 End-of-Line (EOL) switches to the proper positions. See the *Setting the End-of-Line Switches* section.

3. If using a modem, connect a telephone line to the modem port or connect an external modem to the USB A as necessary.



LonWorks Network wires are not polarity sensitive.

Figure 7: LonWorks Network Terminal Block and Wiring Connections

4. Make connections to the RS-232 serial ports (if necessary).
5. Connect the 24 VAC supply power wires from the transformer to the removable power terminal block plug, as shown in Figure 8.

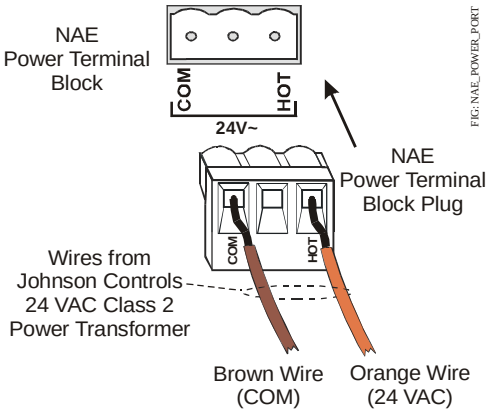


Figure 8: 24 VAC Supply Power Wiring

Note: Power supply wire colors may be different on transformers not manufactured by Johnson Controls. Follow the transformer manufacturer's instructions and the project installation drawings.

Note: The 24 VAC power should be connected to all network devices so transformer phasing is uniform across the devices. Powering network devices with uniform 24 VAC supply power phasing reduces noise, interference, and ground loop problems. The NAE55 does not require an earth ground connection.

Wiring Considerations and Guidelines for Network Integrations

Table 1: Guidelines for N2 Network Topology

Category	Rules/Maximums Allowed
General	MS-NAE55xx-x models (only) support up to two N2 Bus trunks.
	Only daisy-chained N2 devices (with maximum stub length of 3 m [10 ft] to any device)
Number of Devices	MS-NAE551x-x models (only) support up to 100 N2 devices per N2 Bus, with no more than two repeaters between NAE55 and any N2 device and a maximum of 50 devices between repeaters.
Line Length and Type	1,500 m (5,000 ft) twisted pair cable without a repeater
	4,500 m (15,000 ft) twisted pair cable from NAE55 and the farthest N2 device (three segments of 1,500 m [5,000 ft] each, separated by repeaters)
	2,000 m (6,600 ft) between two fiber modems
Cable	Solid or stranded 1.5 mm^2 (18 AWG) 3-wire is recommended. Solid or stranded 0.6 mm (24 AWG) larger 3-wire or 4-wire (two twisted-pairs) is acceptable. **Note:** The + and - bus leads should be a twisted pair. On applications using 4-wire (two twisted-pairs) cable, isolate and insulate unused conductor.
Terminations	**Preferred Termination Configuration:** Two N2 devices with EOL switches in the ON position, one at each end of each N2 Bus segment **Minimally Required Termination Configuration:** At least one N2 device with an EOL switch in the ON position somewhere on each N2 Bus segment

Table 2: Guidelines for BACnet Protocol MS/TP Network Topology

Category	Rules/Maximums Allowed
General	MS-NAE55xx-x models (only) support up to two MS/TP Bus trunks, daisy chain topology only.
Number of Devices	100[1] devices per FC Bus with no more than two repeaters between NAE55 and any device and a maximum of 50 devices between repeaters
Line Length and Type	1,500 m (5,000 ft) cable without a repeater
	4,500 m (15,000 ft) cable from NAE55 to the farthest FC Bus device (three bus segments of 1,500 m [5,000 ft] each, separated by repeaters)
	2,000 m (6,600 ft) between two fiber modems
Cable Type[2]	Stranded 0.6 mm (22 AWG) 3-wire twisted, shielded cable is recommended. Stranded 0.6 mm (22 AWG) shielded 4-wire (two twisted-pairs) shielded cable is acceptable. **Note:** The + and - bus leads should be a twisted pair. On applications using 4-wire (two twisted-pairs) cable, isolate and insulate unused conductor. Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for more information.
Terminations	Two FC devices with EOL switches in the ON position, one at each end of each FC Bus segment

1. If TEC Thermostat Controllers or third-party devices are used on the FC Bus, the maximum total number of devices is 32 and the maximum length is 1,219 m (4,000 ft).
2. Refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)* for information on cable types and lengths.

Table 3: NAE Ethernet Network Rules

Category	Rules/Maximums Allowed[1]
General	Star topology with network hubs/switches
Number of Devices	Maximum of 100 devices can be connected to one site in the Metasys network.
Line Length and Type	2,000 m (6,600 ft) for plastic/glass fiber optic with external adapter
	100 m (330 ft) CAT5 cable
Terminations	For 10/100 BaseT, no line terminators allowed.

1. Refer to the *N1 Ethernet/IP Network Technical Bulletin (LIT-6360175)* for recommended parts and part numbers.

Table 4: Guidelines for LONWORKS Network Bus Topology

Cable Type	Maximum Segment Length with FTT10 Devices Only[1]	Maximum Segment Length with FTT10 and/or LPT10 Devices[1]
Belden® 85102 Cable	2,700 m (8,850 ft)	2,200 m (7,200 ft)
Belden 8471 Cable	2,700 m (8,850 ft)	2,200 m (7,200 ft)
Level IV 22 AWG	1,400 m (4,600 ft)	1,150 m (3,770 ft)
JY (St.) Y 2 x 2 x 0.8	900 m (2,950 ft)	750 m (2,460 ft)

1. For the bus topology, the maximum length stub cable is 3 m (10 ft), and the stub lengths must be calculated into the overall segment length.

Table 5: Guidelines for LONWORKS Network Free Topology

Cable Type	Maximum Node-to-Node Distance	Maximum Segment Length with FTT10 and/or LPT10 Devices
Belden 85102 Cable	500 m (1,640 ft)	500 m (1,640 ft)
Belden 8471 Cable	500 m (1,640 ft)	500 m (1,640 ft)
Level IV 22 AWG	400 m (1,300 ft)	500 m (1,640 ft)
JY (St.) Y 2 x 2 x 0.8	320 m (1,050 ft)	500 m (1,640 ft)

Table 6: Maximum Number of Devices per LONWORKS Network Segment

Device Type	Maximum Allowed
FTT-10 Nodes Only	64 (if repeaters are not used)
FTT-10 Nodes Only	128 (if repeaters are used)
Mixed FTT-10 and LPT-10 Nodes[1]	([FTT10 x 2] + LPT10) ≤ 128
Physical Layer Repeaters	Maximum of 1 per segment
Terminators[2]	
Bus Topology	2 bus type EOL terminators required (NU-EOL202-0)
Free Topology	1 free topology terminator required (NU-EOL203-0)

1. Each LPT10 channel segment (between repeaters) requires its own power supply. Other factors, such as power consumption of individual LPT10 devices, may limit a segment to fewer devices.
2. The MS-NAE552x-x models that support LONWORKS Network trunks do not have an internal network terminator.

Setup and Adjustments

Installing the Data Protection Battery

IMPORTANT: Do not apply 24 VAC power to the NAE55 before installing the data protection battery.

To install the data protection battery:

1. Remove the battery from its packaging. Remove the battery cover on the NAE55 to expose the battery compartment (Figure 1).
2. Carefully plug the NAE55 battery connector from the battery compartment into the connector on the battery cable (Figure 9).
3. Place the battery into the compartment (Figure 9).
4. Slide one end of the battery strap into the hole in the other strap (Figure 9), fasten the hook, and loop the strap tightly around the battery to minimize battery movement.
5. Replace the cover of the battery compartment.
6. Apply 24 VAC power to the NAE55 immediately.

IMPORTANT: The data protection battery must maintain a small residual charge. The battery ships from the factory with a small residual charge. You should connect 24 VAC power to the NAE55 immediately after connecting the battery to ensure that the battery does not completely lose its charge, which may damage the battery.

Note: The 24 VAC power to the NAE55 charges the data protection battery. At initial startup, the battery requires a charging period of at least 2 hours before it supports data protection if power fails. Maximum protection (up to three consecutive power failures without recharging time) requires a 24-hour charging period.

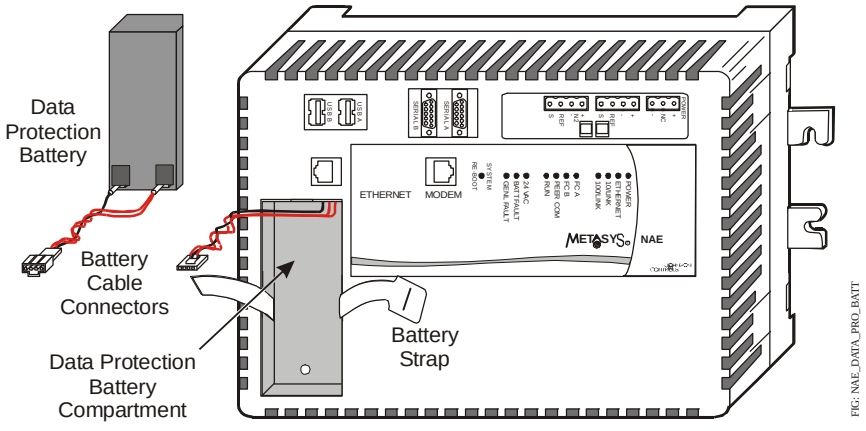


Figure 9: NAE55 and NAE55 Data Protection Battery

Setting the End-of-Line Switches

The network devices at each end of an FC Bus segment must be set as network terminated devices. The NAE55 has two End-of-Line (EOL) switch blocks (one for each FC Port) that enable you to set the NAE55 as a network terminated device.

To set an NAE55 as an FC Bus terminated device, position the two switches on the EOL switch block to the ON positions. Both EOL switches on one block should be ON if the NAE55 is a terminating device on the corresponding FC Bus (Figure 10).

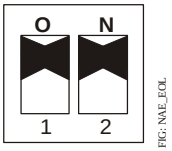


Figure 10: FC Bus EOL Switches in the Initial Factory ON Position

Note: The NAE55 is shipped with the EOL switches in the initial factory position, ON (Figure 10), for both FC ports. If the NAE55 is not a terminated device on the FC Bus network, reposition the switches on the EOL switch block to the 1 and 2 positions.

Set the switch blocks appropriately for the FC A and FC B buses. The NAE55 follows the same rules as other switch-terminating devices listed in the *Setting Terminations* section of the *N2 Communications Bus Technical Bulletin (LIT-636018)* and the *MS/TP Communications Bus Technical Bulletin (LIT-12011034).*

Powering on the NAE55

After applying 24 VAC power, the NAE55 requires up to 5 minutes to start up and become operational. See the *LED Test Sequence at Startup* section.

Startup is complete and the NAE55 is operational when the (green) RUN LED is On steady and the (red) GEN FAULT LED is Off. See Figure 11 for LED locations.

Disconnecting Power from the NAE55

IMPORTANT: The data protection battery must be installed and charged before disconnecting the 24 VAC supply power.

The 24 VAC supply power is disconnected from the NAE55 by removing the terminal block plug from the power terminal port on the NAE55 (Figure 8).

When the 24 VAC supply power to the NAE55 is disconnected or lost, the NAE55 is nonoperational. The POWER LED (Figure 11) remains On, and the data protection battery continues to power the NAE55 for several (1 to 8) minutes so that volatile data can be backed up in nonvolatile memory. The POWER LED goes Off when the data backup is completed.

IMPORTANT: Disconnect the data protection battery (after the POWER LED goes Off) whenever the NAE55's 24 VAC power supply is disconnected for more than 48 hours. An unpowered NAE55 depletes the battery charge, and complete loss of charge may damage the data protection battery.

Troubleshooting

LED Status Indicators

The NAE55 has LEDs to indicate power and communication status. See Figure 11 and Table 7.

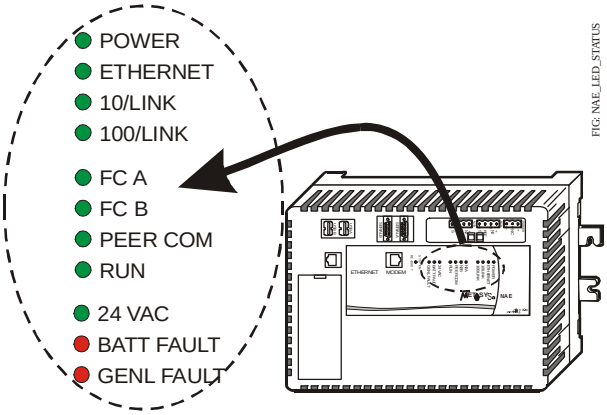


Figure 11: Front of NAE55 with LED Designations

LED Test Sequence at Startup

During startup, the NAE55 automatically initiates an LED test to verify the operational status of the LEDs. Immediately after connecting supply power, the following LED lighting sequence occurs:

1. The PEER COM, RUN, and GENL FAULT LEDs turn on, indicating that the Operating System (OS) is booting up. For NAE55 models, the FC A and FC B LEDs also turn on.
2. The PEER COM, RUN, GENL FAULT LEDs, and the FC A and FC B LEDs (on NAE55 models) shut off. The RUN LED flashes to indicate that the NAE55 software is loading.
3. The LEDs display the operational status of the NAE55. When the RUN LED goes On Steady, the operating system and Metasys application are running and the NAE55 is ready.

The total time to start up the NAE55 depends on the size of the database and can take several minutes.

System Re-Boot Switch

The System Re-Boot switch (Figure 1) forces a manual restart of the NAE55 processor. All data changes made to the system since the last time the NAE55 saved data are lost on restart, including alarm, trend, and audit trail data.

Press the System Re-Boot switch only if the NAE55 fails to respond and cannot be accessed by any user device. Do not press the System Re-Boot switch unless you have tried other reasonable means to fix the problem.

Table 7: NAE55 LEDs Designation, Normal Status, Description, and Other Conditions

LED	Normal	Descriptions/Other Conditions
POWER (Green)	On Steady	On Steady = Unit is getting power from either the battery or 24 VAC power. Also see the 24 VAC LED. Off Steady = Unit is shut down.
ETHERNET (Green)	Flicker	Flicker = Data is transferring on the Ethernet connection. Ethernet traffic is general traffic (may not be for the NAE55). Off Steady = No Ethernet traffic, probably indicates a dead Ethernet network or bad Ethernet connection.
10/LINK (Green)	On Steady	On Steady = Ethernet connection is established at 10 Mbps.
100/LINK (Green)	On Steady	On Steady = Ethernet connection is established at 100 Mbps.
FC A (Green) (NIE55 models do not have FC Bus terminals.)	Flicker	On Steady = Controllers are defined to FC A (FC Bus 1 or N2 Trunk 1) in the NAE55, but none are communicating. (NAE55 transmitting only) Flicker = Normal communications; FC A port is transmitting and receiving data. Flickers are generally in sync with data transmission but should not be used to indicate specific transmission times. Off Steady = No field controllers are defined to FC A (FC Bus 1 or N2 Trunk 1) in the NAE55.
FC B (Green) (NIE55 models do not have FC Bus terminals.)	Flicker	On Steady = Controllers are defined to FC B (FC Bus 2 or N2 Trunk 2) in the NAE55, but none are communicating. (NAE55 transmitting only) Flicker = Normal communications; FC B port is transmitting and receiving data. Flickers are generally in sync with data transmission but should not be used to indicate specific transmission times. Off Steady = No field controllers are defined to FC B (FC Bus 2 or N2 Trunk 2) in the NAE55.
PEER COMM (Green)	Varies (see next column)	Flicker = Data traffic between NAEs. For an NAE55 that is not a Site Director, this LED indicates regular heartbeat communications with the Site Director. For a Site Director NAE55, flashes are more frequent and indicate heartbeat communications from all other NAE devices on the site. For a single NAE55 on a network without an Application and Data Server (ADS), there is no flicker.
Run (Green)	On Steady	On Steady = NAE55 software is running. On 1 second, Off 1 second = NAE55 software is in startup mode. On 0.5 seconds, Off 0.5 seconds = NAE55 software is shutting down. Off Steady = Operating system is shutting down or software is not running.
24 VAC (Green)	On Steady	On Steady = 24 VAC power is present. Off Steady = Loss of 24 VAC power. In the Off Steady condition, the NAE55 can be running on battery power. Also see the POWER LED.
BATT FAULT (Red)	Off Steady	On Steady = Battery fault. Replace the battery. Battery is not connected or cannot be charged. The BATT FAULT LED may remain On for up to 24 hours after initially powering on the NAE55. If the BATT FAULT LED remains on longer than 48 hours after initially powering on the NAE55, check the battery connection or replace the battery.
GENL FAULT (Red)	Off Steady	On Steady = General Fault. Fault conditions are user configurable in software. Preconfigured fault conditions include excessive Central Processing Unit (CPU), flash or memory use, excessive CPU or Printed Wire Board (PWB) temperature, or Battery Fault. In normal operation, the GENL FAULT LED stays on steady for the first half of the startup sequence.

Repair Information

If you replace an NAE for any reason or add a new NAE to a site, you must update the site registration to ensure that the new NAE is recognized and able to communicate.

Refer to the *Replacing an NAE* section in the *NAE Commissioning Guide (LIT-1201519)* for information on replacing an NAE and configuring the new NAE to communicate in a Metasys system site.

Table 8: NAE55 Ordering Information

Product Code Number[1]	Description
MS-NAE55xx-x (Base Features of Each NAE55)	NAE55 Network Automation Engines: Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, two USB serial ports, two RS-485 ports, one Ethernet port, and one MS-BAT1010-0 Data Protection Battery. Supports up to 100 devices on each N2 or BACnet MS/TP trunk.
MS-NAE5510-1	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk).
MS-NAE5510-0U	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). **Note:** This model is UL Listed, UUKL 864 8th Edition Smoke Control Equipment.
MS-NAE5510-1U	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). **Note:** This model is UL Listed, File S4977, UUKL 864 9th Edition Smoke Control Equipment.
MS-NAE5511-1	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem.
MS-NAE5512-1	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). **Note:** MS-NAE5512-1 models supports N2 tunneling on N2 trunks (only).
MS-NAE5513-1	Supports two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. **Note:** MS-NAE5513-1 models supports N2 tunneling on N2 trunks (only).
MS-NAE5520-1	Supports a LONWORKS trunk and two N2 trunks or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 255 devices on the LONWORKS trunk.
MS-NAE5521-1	Supports a LONWORKS trunk, and two N2 trunks or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk); includes an internal modem. Supports up to 255 devices on the LONWORKS trunk.
MS-NAETUNL-8	ToggleTunnel utility for converting an NAE55/NIE55 to an NAE55 model with the N2 Tunneling and Wireless N2 Field Bus features enabled. Not for use with MS-NAE5510-0U or MS-NIE5510-0U.

1. All models are also available in a Buy American version (add a G after the code number). For the European version, add an E after the code number. For repair parts, add -701 after the code number.

Table 9: Accessories Ordering Information

Product Code Number[1]	Description
MS-SECVT-0	Serial to Ethernet Converter (SECVT) for N2 Tunneling Over Ethernet Applications
MS-MECVT-0	MS/TP to Ethernet Converter (MECVT) for MS/TP Tunneling Over Ethernet Applications
MS-BAT1010-0	Replacement data protection battery for NAE55 and NIE models. Rechargeable gel cell battery with a typical life of 3 to 5 years at 21°C (70°F).
AS-XFR100-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), with enclosure
AS-XFR010-1	Power transformer (Class 2, 24 VAC, 92 VA maximum output), no enclosure

1. All models are available in Buy American versions. Add **G** to the end of the Product Code Number for Buy American model. For the European version (with CE Mark and C-Tick Directive), add **E** to the end of the Product Code Number.

Technical Specifications

NAE55 and NIE55 (Part 1 of 2)

Power Requirement	Dedicated nominal 24 VAC, Class 2 power supply (North America), Safety Extra-Low Voltage (SELV) power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0–50°C (32–122°F); 10–90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40–70°C (-40–158°F); –95% RH, 30°C (86°F) maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C (70°F); Product Code Number: MS-BAT1010-0
Clock Battery	Maintains real-time clock through a power failure. Onboard cell; typical life 10 years at 21°C (70°F)
Processor	300 MHz Pentium® class Geode® GX1 MMX enhanced processor for MS-NAE5510-0U and MS-NIE5510-0U 400 MHz Geode GX533 processor for MS-NAE55xx-1 and MS-NIE55xx-1 models
Memory	400 MHz Geode GX533 processor
Operating System	512 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 256 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory
Network and Serial Interfaces	One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector Two optically isolated RS-485 ports; 9600, 19.2k, or 38.4k baud; pluggable and keyed 4 position terminal blocks (RS-485 ports available on NAE55 models only) Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates Two USB serial ports; standard USB connectors support an optional, user-supplied external modem Options: One telephone port for internal modem; up to 56 Kbps; 6-pin modular connector; One LONWORKS port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LONWORKS port available on NAE552x-x models only)
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
Mounting	On flat surface with screws on four mounting feet or on dual 35 mm DIN rail
Dimensions (Height x Width x Depth)	226 x 332 x 96.5 mm (8.9 x 13.1 x 3.8 in.) including mounting feet Minimum space for mounting: 303 x 408 x 148 mm (12.0 x 16.1 x 5.8 in.)
Shipping Weight	2.9 kg (6.4 lb)

NAE55 and NIE55 (Part 2 of 2)

Compliance	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment, FCC Compliant to CFR47, Part 15, Subpart B, Class A UL Listed, UUKL 864 - 8th Edition, Smoke Control Equipment (MS-NAE5510-0U model only) UL Listed, File S4977, UUKL 864 - 9th Edition, Smoke Control Equipment (MS-NAE55x0-1U models only)
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment, Industry Canada Compliant, ICES-003
	Europe: CE Mark, EMC Directive 89/336/EEC, in accordance with EN 61000-6-3 (2001) Generic Emission Standard for Residential and Light Industry and EN 61000-6-2 (2001) Generic Immunity Standard for Heavy Industrial Environment
	Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories™ (BTL) 135-2004 Listed BACnet Building Controller (B-BC)

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Johnson Controls® office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

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