

NCM45x0-2 Series Network Control Module Installation Instructions

MS-NCM4510-2, MS-NCM4520-2

Part No. 24-10249-18, Rev. E

Software Release 6.0

Issued January 30, 2013

Supersedes January 24, 2011

Applications

The NCM45x0-2 Series Network Control Module is a Metasys® supervisory controller that emulates the NCM350/361, yet uses the same hardware platform as the Network Automation Engine (NAE45). The NCM45x0-2 Series is offered in two models: N2 Bus or LON Network. In this document, Network Control Module (NCM) refers to either model. See [Figure 1](#).

North American Emissions Compliance

United States

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canada

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

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

Installation

Follow these guidelines when installing an NCM:

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

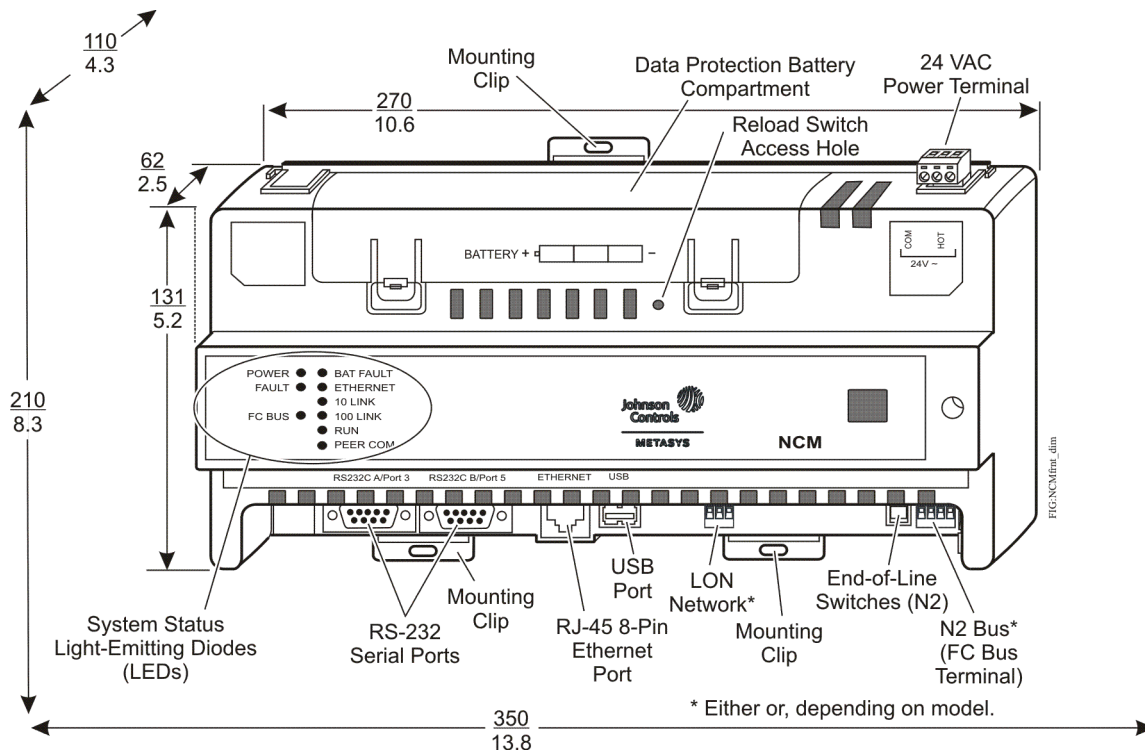
Parts Included

- one NCM with removable terminal plugs
- one data protection battery (installed and connected at the factory)
- one Installation Instructions sheet

Materials and Special Tools Needed

- three fasteners appropriate for the mounting surface (#8 screws or M4 screws), or one 20 cm (8-in.) or longer piece of DIN rail and appropriate hardware for mounting the DIN rail
- small straight-blade screwdriver for securing wires in the terminal blocks

Figure 1: Front of NCM45x0-2 Showing Dimensions (mm/in), Physical Features, and Required Mounting Space around the NCM (mm/in)



Mounting

Location Considerations

Follow these guidelines when mounting an NCM:

- If the NCM is to replace an existing NCM350 or NCM361, see [Legacy NCM Replacement Considerations](#).
- Ensure that the mounting surface can support the NCM and any user-supplied enclosure.
- Mount the NCM in proper orientation ([Figure 2](#)). A horizontal mounting orientation is preferred, but the unit can also be mounted vertically.
- Mount the NCM on an even surface in wall mount applications whenever possible. If you must mount the NCM on an uneven surface, be careful not to crack the mounting clips or NCM housing when tightening the screws. Use shims or washers to mount the NCM evenly on the mounting surface.
- Mount the NCM in areas free of corrosive vapors, and observe the environmental limitations listed in the [Technical Specifications](#) section.
- Allow sufficient space for cable and wire connections ([Figure 1](#)).
- Do not mount the NCM where the ambient temperature may exceed 50°C (122°F).

- Do not mount the NCM on surfaces that are prone to vibration or in areas where electromagnetic emissions can interfere with NCM communication.
- Do not obstruct the NCM housing ventilation holes.
- Do not mount the power transformer below the NCM.

For applications where the NCM is mounted inside a panel or enclosure, follow these additional guidelines:

- Do not install the NCM in an airtight enclosure.
- Do not install heat-generating devices in the enclosure with the NCM that may cause the ambient temperature to exceed 50°C (122°F).

Mounting the NCM

Wall Mount Applications

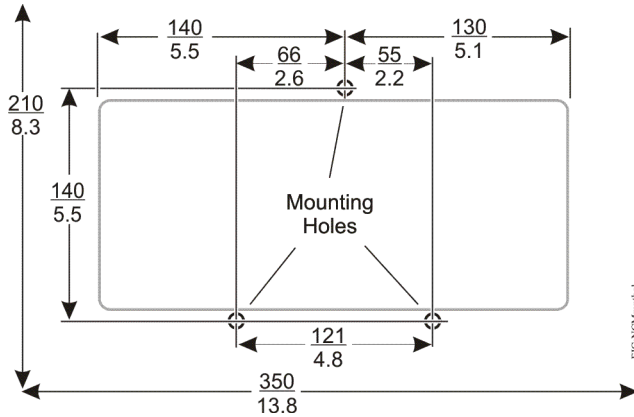
Use the holes in the three mounting clips for wall mount applications.

To mount the NCM on a wall (or other vertical surface):

1. Ensure that all three mounting clips are inserted into the back of the NCM housing. Pull the bottom two clips outward and snap them firmly into the extended position ([Figure 3](#)).
2. Mark the location of the three wall mount holes using the dimensions in [Figure 2](#), or hold the NCM up to the wall as a template and mark the locations.

3. Drill holes in the wall at the locations marked in Step 2 and insert wall anchors (if necessary).

Figure 2: NCM Mounting Screw Hole Dimensions and Mounting Area Requirements (mm/in.)



4. Position the NCM and insert the screws through the holes in the mounting clips, and carefully tighten all the screws.

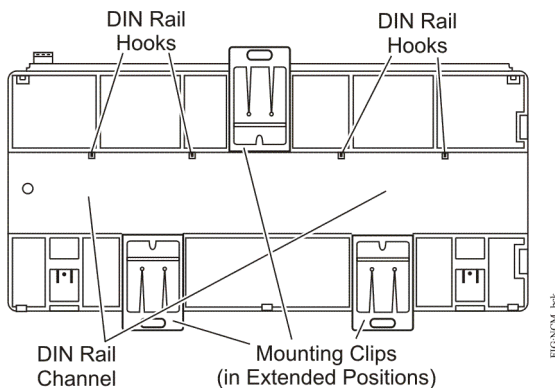
Important: Do not overtighten the mounting screws. Overtightening the screws may damage the mounting clips or NCM housing.

DIN Rail Mount Applications

To mount the NCM on a DIN rail:

1. Securely mount and center an 8 in. (or longer) section of DIN rail in the required space.
2. Ensure that the bottom two mounting clips are pulled outward and snapped firmly into the extended position ([Figure 3](#)).

Figure 3: DIN Rail and Mounting Clip Features on the Back of the NCM



3. Hang the NCM by the DIN rail hooks ([Figure 3](#)) on the top track of the DIN rail, and position the NCM DIN rail channel snugly against the tracks of the DIN rail.

4. Push the bottom mounting clips up to secure the NCM on the DIN rail tracks.

To remove the NCM from the DIN rail, snap the bottom DIN clips to the outward extended position, and carefully lift the NCM off the DIN rail.

Enclosure Mount Applications

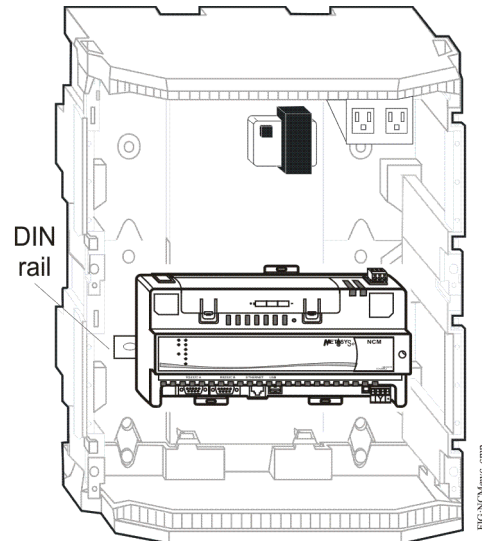
Mount the enclosure per the manufacturer's instructions and mount the NCM in the enclosure following the guidelines in the [Location Considerations](#) and [Mounting the NCM](#) sections.

Legacy NCM Replacement Considerations

Follow these important guidelines if the NCM is to replace an existing NCM350/361 controller:

- The unit size and mounting orientation of the NCM45x0-2 are noticeably different from the NCM350/361. For example, the NCM45x0-2 is designed for DIN-rail mounting on the horizontal plane ([Figure 4](#)), but can also be mounted with screws, either horizontally or vertically. See [Mounting the NCM](#) for details.

Figure 4: Recommended Installation Location of NCM and Transformer in Standard Enclosure



- The wire termination locations on the NCM45x0-2 are different from the NCM350/361 ([Figure 1](#)). Pay close attention to this when routing wires to their new locations on the NCM45x0-2.
- The NCM45x0-2 requires 24 VAC power, whereas the NCM350/361 uses line voltage. See the [Wiring](#) section for steps on installing an appropriate transformer into the NCM enclosure. Also, the existing line voltage cable that was used for the NCM350/361 is no longer needed and should be terminated following local electrician codes.
- The NCM45x0-2 cannot directly replace an:

- NCM100 or NCM200 that is installed in a baseframe enclosure
- NCM that is an Attached Resource Computer Network (ARCNET®) node. A Metasys Ethernet Router may be required if the current network contains ARCNET nodes only.
- NCM that has two N2 Trunks, because the NCM45x0-2 supports one N2 Bus
- The N2 Bus termination on the NCM350/361 is labeled N2 Bus, whereas the N2 Bus termination on the NCM45x0-2 is called Field Controller (FC) Bus. Also, the old N2 connector has three terminals, whereas the connector on the NCM45x0-2 has four terminals, including a termination for shield. If you re-use the N2 Bus connector from the old NCM, be sure to mate the connector toward the correct side of the FC Bus terminal block. If using N2 Bus wiring that includes a shield, refer to the *N2 Communications Bus Technical Bulletin (LIT-636018)* for additional information on terminating a shield.
- The LONWORKS® terminal block on the NCM350/361 is not compatible with the LONWORKS network terminal on the NCM4520-2, so it cannot be reused. Instead, use the new terminal block provided. LON network wires are not polarity sensitive.
- For the NCM45x0-2, the Ethernet and LON Network components are built into the motherboard; separate network cards are not required.
- The serial ports on the NCM45x0-2 are not labeled the same as the serial ports on the NCM350/361. Port 3 on the older models is equivalent to the RS232C A/Port 3 on the NCM45x0-2, and Port 5 is equivalent to RS232C B/Port 5. A device connected to Port 3 on the NCM350/361 can be moved to **RS232C A/Port 3** on the NCM45x0-2. A device connected to Port 5 on the NCM350/361 can be moved to **RS232C B/Port 5** on the NCM45x0-2. Serial Ports 2, 4, and 6 on the NCM350/361 models are not offered on the NCM45x0-2. If a serial port currently in use is no longer supported on the new NCM, database configuration changes are required. Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for details.
- Serial Ports 2, 4, and 6 on the NCM350/361 models are not offered on the NCM45x0-2. If a serial port currently in use is no longer supported on the new NCM, database configuration changes are required. Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for details.
- Before removing the NCM350/361, upload its database to the archive Operator Workstation (OWS) so that it can be edited later and eventually downloaded into the new controller. Refer to the

NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176) for details.

- While the NCM45x0-2 is restarting, the LEDs on the unit are not used to indicate its network address or act as diagnostic indicators of a particular error condition. The only LEDs that indicate failure are the Fault and Batt Fault LEDs.

Wiring

Power Supply, Network, and Communication Connections

See [Figure 1](#) for the location of the power supply terminal, FC or LON terminal, USB port (not used), and Ethernet port on the NCM.

Power Supply

In North America, the NCM requires a dedicated Class 2, 24 VAC, 25 VA minimum power supply. Outside North America, use a 24 VAC Safety Extra-Low Voltage (SELV) transformer at the appropriate rating. The minimum input voltage for the NCM to operate properly is 20 VAC. Maximum power consumption is 25 VA.

FC Bus Terminal (NCM4510-2 Only)

The FC Bus network terminal on the NCM4510-2 model is a 4-position removable, keyed terminal block. Use the FC Bus terminal to connect field controllers that reside on the N2 Communications Bus.

See [Table 1](#) and refer to the *N2 Communications Bus Technical Bulletin (LIT-636018)* for additional information and guidelines on wiring devices on an N2 Bus.

LONWORKS Network Terminal (NCM4520-2 Only)

The LON network terminal on the NCM4520-2 model is a 3-position removable, keyed terminal block. Use the LONWORKS port to integrate LON devices into a Metasys network. The Shield (SHD) connection on the LONWORKS port is an open terminal and is not connected to the NCM.

Serial Ports

Use the RS232C A/Port 3 and RS232C B/Port 5 serial ports ([Figure 1](#)) for direct connections using a standard 9-pin female to 9-pin female Data Terminal Equipment (DTE) to DTE null modem cable.

The RS232C A/Port 3 serial port can be used for a variety of purposes. The supported applications include configured and unconfigured OWS, printer, modem, or Operator Terminal (OT).

Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for information about these different types of direct and dial-up connections to the NCM.

The RS232C B/Port 5 serial port can be used for these applications: configured OWS, printer, modem, OT, or local Network Terminal (NT). Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for more information about these options.

USB Port

The USB port is not used. Do not connect any device to this port.

Ethernet Port

The Ethernet connection (10 or 100 Mb/s) is an 8-pin RJ-45 network port ([Figure 1](#)). Use the Ethernet port to connect to IP networks. An NCM45x0-2 with a 100 Mb/s connection communicates properly with older NCMs that are communicating at 10 Mb/s.

Wiring the NCM

Important: Do not connect 24 VAC supply power to the NCM before finishing wiring and checking all wiring connections. Short circuits or improperly connected wires may result in permanent damage to the equipment.

Important: Use copper conductors only. Make all wiring in accordance with local, national, and regional regulations. The NCM is a low-voltage (<30 VAC) device. Do not exceed the NCM electrical ratings.

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 NCM. Static electric discharge can damage the NCM and void any warranties.

Important: Make sure the building automation network wiring meets the specifications, rules, and guidelines in the [Power Supply, Network, and Communication Connections](#) section in this document.

Important: For the NCM4510-2 model, do not remove the plug that is inserted into the top FC Bus terminal, or install any connector into this port. The port is only used if the unit is migrated to an NAE45 sometime in the future.

Mount the NCM securely before wiring the NCM. See the [Mounting](#) section.

Follow these guidelines when wiring an NCM:

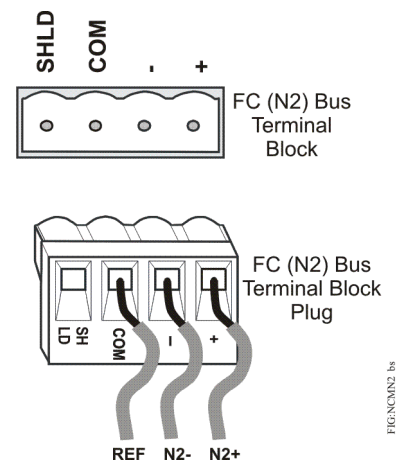
- Route the supply power wires and communication cables at least 50 mm (2 in.) away from the vent slots on the sides of the NCM housing.
- Provide slack in the wires and cables. Keep cables routed neatly around the NCM to promote good ventilation, LED visibility, and ease of service.

To wire the NCM:

- Connect the Ethernet communication cable to the RJ-45, 8-pin Ethernet port shown in [Figure 1](#).
- For the NCM4510-2, connect the three N2 Bus wires to the removable 4-terminal plug as shown in [Figure 5](#) (labeled FC Bus). If a shield is present, follow standard practices for terminating a shield that are discussed in the N2 Bus literature. Refer to the *N2 Communications Bus Technical Bulletin (LIT-636018)*.

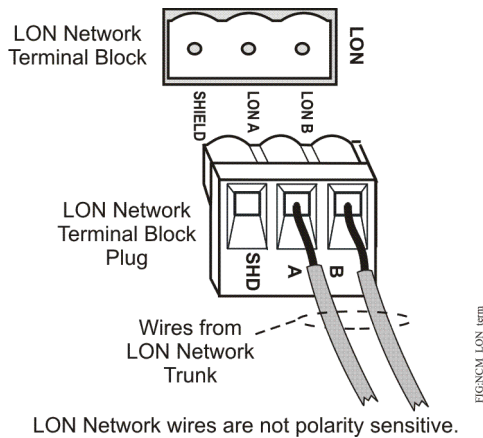
Note: If the NCM is connected to an N2 Bus, you must set the End-of-Line (EOL) switch to the proper position. See the [Setting the End-of-Line Switch](#) section in this document.

Figure 5: N2 Bus Wiring



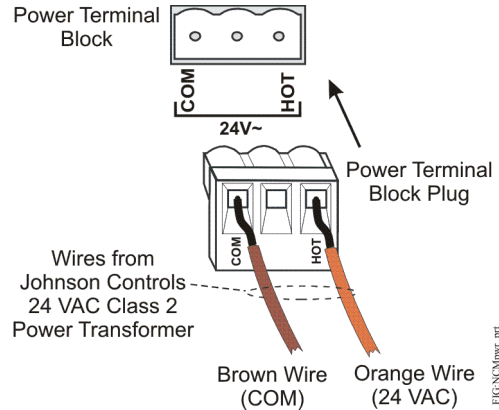
- For the NCM4520-2, connect the wires from the LON network trunk to the removable 3-terminal plug as shown in [Figure 6](#).

Figure 6: Network Terminal Block and Wiring Connections



4. If a dial application is required, connect an external modem to the RS232C port you wish to use.
5. If a direct connect application is required, connect the appropriate computer cable to the RS232C port you wish to use.
6. Connect the 24 VAC supply power wires from the transformer to the removable 3-terminal plug as shown in [Figure 7](#). The middle terminal is not used.

Figure 7: 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 or the project installation drawings.

Note: When connecting 24 VAC power to the NCMs and field devices on the network, be consistent so that transformer phasing is uniform across the devices. Powering devices with uniform 24 VAC supply power phasing reduces noise, interference, and ground loop problems. The NCM 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	One N2 trunk per NCM
	Only daisy-chained devices (with maximum stub length of 3 m [10 ft] to any device)
Number of N2 Devices Supported	100 devices per NCM (60 to 200 TC-9100s) 50 devices per repeater with two repeaters cascaded
Cable 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 an NCM 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 Wire Type and Size	Solid or stranded 18 AWG recommended (24 AWG twisted pair or larger is acceptable)
N2 EOL Terminations	Two N2 devices with EOL switches in the ON position, one at each end of each N2 Bus segment

Table 2: 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	2,700 m (8,850 ft)	2,200 m (7,200 ft)
Belden 8471	2,700 m (8,850 ft)	2,200 m (7,200 ft)

Table 2: 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
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 3: Guidelines for LONWORKS Network Free Topology

Cable Type	Maximum Node-to-Node Distance	Maximum Segment Length with FTT10 and/or LPT10 Devices
Belden 85102	500 m (1,640 ft)	500 m (1,640 ft)
Belden 8471	500 m (1,640 ft)	500 m (1,640 ft)
Level IV 22	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 4: Maximum Number of Devices per LONWORKS Network Segment

Device Type	Maximum Allowed
Free Topology Transceiver (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	$[(FTT10 \times 2) + LPT10] \leq 128$
Terminators:	
Bus Topology	2 bus type EOL terminators required (NU-EOL202-0)
Free Topology	1 free topology terminator required (NU-EOL203-0)
Physical Layer Repeaters	Maximum of 1 per segment

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. The NCM does not have an internal network terminator.

Table 5: NCM Ethernet Network Rules

Category	Rules/Maximums Allowed ¹
General	Point-to-point star topology with network hubs/switches
Number of Devices	Maximum of 100 supervisory devices may be connected to one site
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 10/100BaseT, no line terminators allowed

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

Setup and Adjustments

Data Protection Battery

The NCM is shipped with the data protection battery installed and connected. Do not disconnect the battery for any reason other than to replace a defective battery.

The 24 VAC supply power to the NCM charges the data protection battery. At initial startup, the battery may require a charging period of at least 4 hours before it supports data protection if power fails. Up to three consecutive, back-to-back power failures can occur before a full 15-hour recharging period is required.

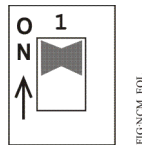
The data protection battery slowly loses charge when 24 VAC power is removed from the NCM. If the battery completely loses charge, the NCM real-time clock stops. The database and code, however, are still retained. (This is different from the NCM300 Series model, in which only 72 hours of backup was provided, after which the unit required a download.)

Whenever an NCM is disconnected from 24 VAC power for over 30 days, ensure that the unit has the correct date and time. Also, keep the NCM powered long enough to recharge the data protection battery.

Setting the End-of-Line Switch

Network and field devices at either end of the N2 Bus must be set as network terminated devices. The NCM has an EOL switch that allows you to set the NAE as a network terminated device. The NCM is shipped with the EOL switch in the factory default, ON (up) position ([Figure 8](#)). Set the EOL switch to the appropriate position for each NCM in your network. For more details, refer to the Setting Terminations section of the *N2 Communications Bus Technical Bulletin (LIT-636018)*.

Figure 8: FC Bus EOL Switch in the Factory Default ON (Up) Position



Turning On the NCM

Apply 24 VAC power to the NCM and verify that the RUN LED begins to flash. This indicates normal operation. If this is a new NCM from the factory, the RUN LED continues to flash, indicating that the unit needs to be commissioned with WNCSETUP. Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for additional information on commissioning an NCM.

Disconnecting Power from the NCM

When 24 VAC supply power to an NCM is disconnected or lost, the NCM is non-operational, but the POWER LED ([Figure 9](#)) remains On and the data protection battery continues to power the NCM for a few minutes while volatile data is backed up in nonvolatile memory. The RUN LED flashes during this process. When complete, all LEDs go Off.

Important: Do not disconnect the battery while the unit is shutting down, or the data being saved may be corrupted.

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

Troubleshooting

LED Status Indicators

The NCM has nine LEDs to indicate power and network communication status. [Figure 9](#) shows the LEDs and describes the LED indications. For the NCM4510-2 model, the FC Bus LED indicates network traffic over the N2 Bus. For the NCM4520-2 model, the LON LED indicates network traffic over the LON Network. All the other LEDs are the same on both models.

Figure 9: NCM LED Designations

NCM4510-2 (N2)				NCM4520-2 (LON)			
POWER	●	BATT FAULT	●	POWER	●	BATT FAULT	●
FAULT	●	ETHERNET	●	FAULT	●	ETHERNET	●
		10 LINK	●			10 LINK	●
FC BUS	●	100 LINK	●	LON	●	100 LINK	●
		RUN	●			RUN	●
		PEER COM	●			PEER COM	●

LED Test Sequence at Startup

When you connect power to the NCM, it initiates a 2-second LED test to verify the operational status of its LEDs. After this test, the operating system is loaded, the NCM application starts, the NCM database is loaded from flash memory (or, if not present, downloaded from the OWS), and NCM initialization occurs. A steady On RUN LED indicates a fully initialized NCM. If the RUN LED continues to blink for several minutes, verify whether the NCM database was successfully downloaded from the archive Operator Workstation. You can also examine the Network Controller (NC) Task Error Log, which may provide useful information for diagnosing startup problems. For details, refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)*. For more information about the other possible behaviors of the NCM LEDs, see [Table 6](#).

Table 6: NCM LED Designations, Normal Status, and Descriptions

LED Designation	Normal Status	Descriptions/Other Conditions
POWER (Green)	On Steady	On Steady = Unit is getting power from either the battery or 24 VAC power. Off Steady = Unit is shut down.
ETHERNET (Green)	Blink	Blink = Data is transferring on the Ethernet connection. Ethernet traffic is general traffic (may not be for the NCM). 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 BUS (Green) or LON BUS (Green)	Blink	Blink = Normal communications; the N2/LON Bus is transmitting and receiving data. Blinks 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 N2/LON Bus in the NCM.
PEER COM (Green)	Off Steady	None. PEER COM is On only during startup.
RUN (Green)	On Steady	On Steady = NCM software is fully initialized. On 1 second, Off 1 second = NCM software is starting up, or controller is waiting to be commissioned and/or requires a data download. On 0.5 seconds, Off 0.5 seconds = NCM software is shutting down.
BATT FAULT (Red)	Off Steady	On Steady = Battery defective. Blink = Data Protection Battery is not installed. Memory cannot be backed up. Connect or install battery.
FAULT (Red)	Off Steady	On Momentarily, then Off = Internal fault has occurred.

Repair Information

If you replace an NCM on a site with a new NCM for any reason or add a new NCM to a site, you must update the system database to ensure that the new NCM is recognized and able to communicate with the site.

Refer to the *NCM45x0-2 Network Control Module Commissioning Guide (LIT-12011176)* for information on removing an NCM from service and configuring a replacement NCM.

Note: Batteries removed from this device must be recycled or disposed of in accordance with local, national, and regional regulations. Only certified technicians or qualified building maintenance personnel should service Johnson Controls products.

Table 7: NCM45x0-2 Ordering Information

Product Code Number	Description
MS-NCM45x0-2 (Base features of each NCM45x0)	Requires a 24 VAC power supply. Each model includes two RS-232-C serial ports, one USB serial port (unused), one Ethernet port, and an MS-BAT1020-0 Data Protection Battery.
MS-NCM4510-2	Supports one N2 trunk (RS-485 port). Up to 100 devices (60 to 200 TC-9100s) are supported on the N2 trunk when a repeater is used.
MS-NCM4520-2	Includes a LonWorks port and supports one LonWorks trunk. Up to 127 devices are supported on the LonWorks port.
MS-NCM4510-2G	Buy American equivalent to MS-NCM4510-2
MS-NCM4520-2G	Buy American equivalent to MS-NCM4520-2
MS-NCM4510-702	Repair for MS-NCM4510-2
MS-NCM4520-702	Repair for MS-NCM4520-2

Table 8: NCM45x0-2 Accessories Ordering Information

Product Code Number	Description
MS-BAT1020-0	Replacement data protection battery: Rechargeable NiMH 3.6 VDC, 500 mAh battery with a typical life of 5 to 7 years at 21°C (70°F) (Higher operating temperatures reduce battery life.)
Y65T31-0	Power transformer family (Class 2, 24 VAC, 40 VA maximum output), no enclosure
AS-XFR050-0	Power transformer (Class 2, 24 VAC, 50 VA maximum output), no enclosure
MS-NC45NTK-0	NCM4500 NT Cable Kit (North American version)
MS-NC45NTE-0	NCM4500 NT Cable Kit (International version). Power adapter has removable plug that can use one of the several different power plugs included in the kit.

Technical Specifications

Table 9: NCM45x0-2 Model

Power Requirement	Dedicated nominal 24 VAC, Class 2 power supply (North America), SELV power supply (Europe), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	25 VAC maximum
Ambient Operating Temperature	0 to 50°C (32 to 122°F)
Ambient Operating Conditions	10 to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Temperature	-40 to 70°C (-40 to 158°F)
Ambient Storage Conditions	5 to 95% RH, 30°C (86°F) maximum dew point
Data Protection Battery	Supports data protection on power failure. Rechargeable NiMH battery: 3.6 VDC 500 mAh, with a typical life of 5 to 7 years at 21°C (70°F); Product Code Number: MS-BAT1020-0
Processor	192 MHz Renesas® SH4 7760 RISC processor
Memory	128 MB Flash nonvolatile memory 128 MB Synchronous Dynamic Random Access Memory (SDRAM) Note: Even though the unit has 128 MB of memory, it is sized to emulate the capacity of an NCM300 Series controller with 10 MB of memory.
Operating System	Microsoft® Windows® CE embedded
Network and Serial Interfaces	One Ethernet port; 10/100 Mb/s; 8-pin RJ-45 connector One optically isolated RS-485 port; 9600 bps; pluggable and keyed 4-position terminal block (FC Bus available on NCM4510-2 model only) One LONWORKS port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LONWORKS port available on NCM4520-2 model only) Two RS232C serial ports with standard 9-pin sub-D connectors that support standard baud rates. One USB serial port with standard USB connector (not used)
Dimensions (Height x Width x Depth)	131 x 270 x 62 mm (5.2 x 10.6 x 2.5 in.) Minimum space for mounting: 210 x 350 x 110 mm (8.3 x 13.8 x 4.3 in.)
Housing	Plastic housing material: ABS + polycarbonate; Protection: IP20 (IEC60529)
Mounting	On flat surface with screws on three mounting clips or a single 35 mm DIN rail

Table 9: NCM45x0-2 Model

Shipping Weight	1.2 kg (2.7 lb)
Compliance 	United States: Underwriters Laboratories Inc. (UL) Listed (PAZX), UL 916, FCC compliant, CFR47, Part 15, Class B Canada: UL Listed (PAZX7), CAN/CSA C22.2 No. 205, Industry Canada compliant Europe: CE Mark - Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. Australia/New Zealand: C-Tick mark compliant

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



Building Efficiency
507 E. Michigan Street, Milwaukee, WI 53202

*Metasys® and Johnson Controls® are registered trademarks of Johnson Controls, Inc.
All other marks herein are the marks of their respective owners. © 2013 Johnson Controls, Inc.*