NCM45x0-2 Network Control Module Product Bulletin

MS-NCM4510-2, MS-NCM4520-2

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The NCM45x0-2 Series Network Control Module is a fully user-programmable supervisory controller. It is responsible for monitoring and controlling networks of field-level building automation devices and HVAC equipment. See *Figure 1*.

The NCM45x0-2 is functionally similar to the NCM350/361 controllers. The primary differences between these controllers are the support for one N2 trunk and two Network Control Module (NCM) types: General with Network Terminal (NT) and General with Operator Terminal (OT). The NCM45x0-2 is available with the N2 Bus or LON Trunk interface.

The NCM45x0-2 communicates with all other Metasys® Network Control Units (NCUs) over the N1 Network. Systems with Person-Machine Interface (PMI) Software Release 12.04 and the M-Series Workstation Software products at Release 5.4 support the NCM45x0-2.

The NCM45x0-2 uses the same hardware design as the NAE45 Series controllers and can be optionally upgraded to an NAE45 as part of a migration strategy to the Metasys system extended architecture.

Figure 1: NCM45x0-2

Table 1: Features and Benefits

Features	Benefits
Compatibility with All Existing Controllers on the Network	Installs on the same N1 Ethernet Network as the legacy NCM products and can communicate with NCM100s and NCM200s when the NCM45x0-2 is installed on the Ethernet side of the network.
NCM350/361 Controllers Replacement	Provides for a manageable replacement strategy for older NCM350/361 models.
Current Level of Software and Tool Support	Is compatible with PMI Software Release 12.04 and M-Series Workstation Software at Release 5.4 and existing Metasys software tools.
Supervision of Field Controller Networks	Supports connectivity to open network standards for complete flexibility in the selection of field devices. Supported protocols include Metasys N2 Bus and LonWorks® network.
Field-Upgradable to an NAE45	Provides an easy migration path to the Metasys system extended architecture.

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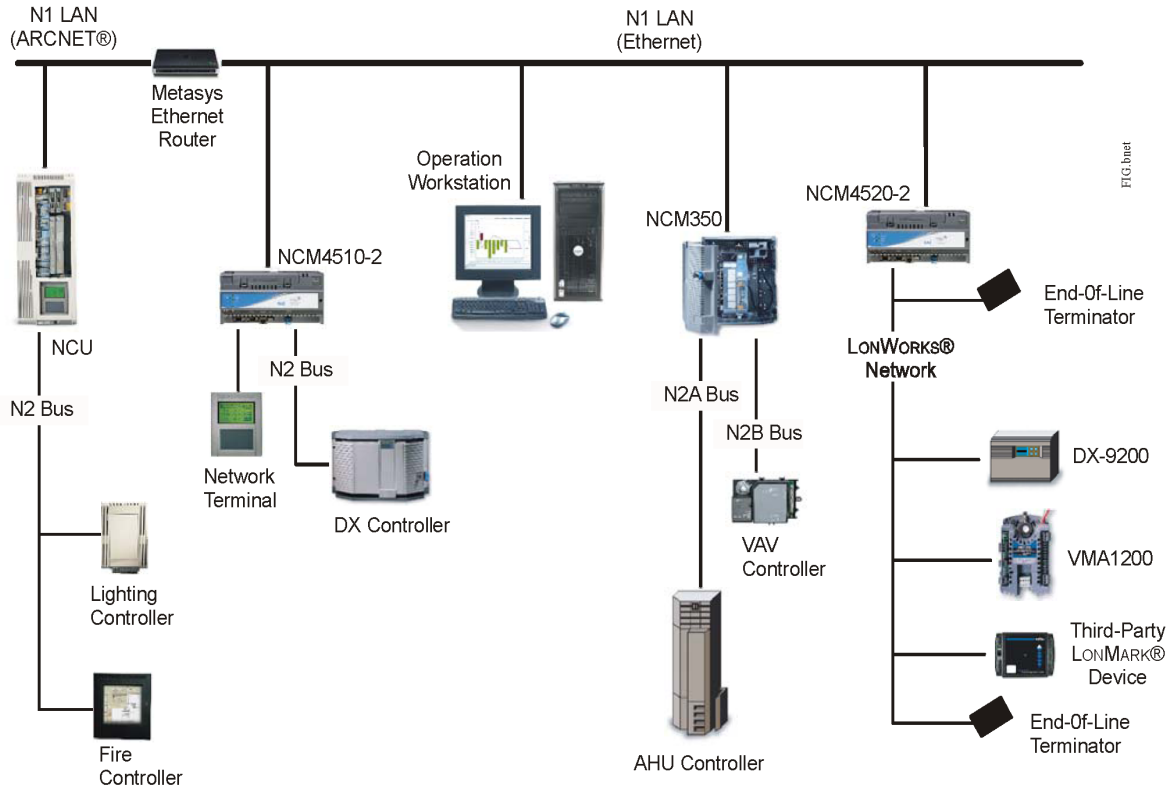
Figure 2: Metasys Network with Multiple Network Automation Engines (NAEs)



Distributed Network of Controllers

The NCM is a stand-alone controller that connects directly to an IP Ethernet network running at 10 or 100 Mbps. The NCM communicates with other NCMs, NCUs, and operator devices over this network and through the Metasys Ethernet Router to the Attached Resource Computer Network (ARCNET®) Local Area Network (LAN), if present.

The NCM45x0-2 can share its information with the other NCMs and NCUs on the network. Unlike other systems, this sharing is unlimited and allows the NCM access to any information available to any other NCM. This capability makes practical the ability to totally integrate every facet of a building's operation on a single network.

The NCM can also serve as the network operator interface. The NCM organizes information for operator reports and responds to operator's commands and program changes. Since each NCM has total access to all NCM data on the N1 LAN, operator access through one NCM is the same as access to all NCMs.

Communicate with N2 Bus or LON Network Devices

We offer two models of the NCM45x0-2 that support communication with N2 Bus devices or LON Network devices.

The N2 Bus is the Johnson Controls® field communications trunk that links Application Specific Controllers (ASCs) to a supervisory controller. ASCs include the DX-9100, Air Handling Unit (AHU), Unitary (UNT) Controller, VAV controllers, and VAV Modular Assembly (VMA) devices. The NCM can coordinate the activities of all these devices.

The NCM can also supervise LONWORKS devices. The NCM supports LONWORKS devices if the network interface follows current LONMARK® guidelines, preferably with the LONMARK certification, and uses the Free Topology Transceiver FTT10.

The LONWORKS network interface in the NCM supports all current LONMARK certified devices, including devices from Johnson Controls, such as the LN Series Controllers and the LONWORKS enabled programmable Flexible System Controller (FSC).

NCM Fits the Needs of Any Size Facility

The NCM45x0-2 is a high-performance supervisory controller that can handle a wide array of control duties.

In small facility applications, an NCM serves as the primary supervisor for field controllers. Using a combination of resident applications and custom user-written programs, the NCM operates equipment at peak efficiency while maintaining optimum occupant comfort. The NCM communicates to the building manager through local override controls, an easy to use NT, and local or remote graphic Operator Workstations (OWSs) and printers.

Medium and large facilities use several NCMs, each of them controlling a portion of the facility, yet sharing information and data as necessary. In each system, the NCM coordinates a local network of ASCs as they perform HVAC, fire, and access control functions. In this application, the NCM provides alarm monitoring and integrated control functions for the stand-alone controllers.

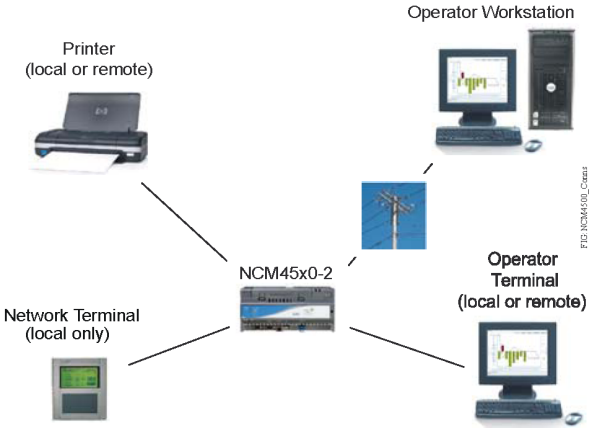
Carrying out even one of these many functions would be a major accomplishment for many controllers, but the Metasys NCM handles them all with ease.

Simple Versatile System Access

The building operator has access to the entire Metasys network through a family of operator interface devices attached to the NCM. Two standard RS-232-C ports are available for use by a wide variety of operator devices. These devices include the OWS, OT, NT, and Printer.

An OWS can connect locally or remotely via a modem to one of the RS-232-C ports, enabling access to the entire network. Other choices include the OT (local or remote) and NT (local only). Each of these user devices can be used for object monitoring, overrides, setpoint adjustments, schedule changes, and parameter modifications. Also, a local or remote printer can connect to the RS-232-C port for recording important events in the system.

Figure 3: Support for Multiple User Devices



Software Features

The NCM provides many software features that coordinate system-wide efficiency, keeping you informed and in control while ensuring occupant safety and comfort. The application programs, user databases, and point histories are stored in the NCM and backed up by a long-lasting, rechargeable battery.

Scheduling

Scheduling provides a long-term, system-wide means for issuing commands to objects (for example, on/off or setpoint adjustment). Establish control on a time-of-day, day-of-week, or calendar basis. Virtually any number of commands may be scheduled per object.

Totalization

Capabilities of the NCM include Runtime Totalization, which keeps track of total operation hours for fans, pumps, and other equipment monitored or controlled with a binary object. Analog Totalization and Pulse Totalization monitor the consumption of chilled water, steam, gas, electricity, or other variables measured by either analog or pulse input sensors. Event Totalization counts how many times something has occurred, such as a compressor cycling on and off.

Demand Limiting

Demand Limiting monitors your building's electrical meters and predicts the electrical demand. Should the prediction exceed a target value, the feature temporarily turns off non-essential equipment. The Load Rolling feature cycles equipment on and off to reduce electrical power consumption.

Control Processes

User-written control processes allow programming of additional application features into the NCM. With the powerful Graphic Programming Language (GPL), even a non-programmer can write specialized programs for optimal start time control, night setback, outside air economizer programs, chiller plant optimization, and more. Enter these energy-saving programs from an OWS, then load them into the NCM over the N1 LAN or through the direct RS-232-C connection.

Password Protection

The NCM provides password protection by assigning an eight-character password ID to each operator. The ID is programmed to indicate which level of command authority is granted, and to which groups of objects the operator has access.

Trending

Trending monitors changes in an object's value over time as a means to collect data when the system is operating properly, and to help diagnose problems in your facility.

Hardware Features

The NCM45x0-2 provides the following features for the building controls market:

- nonvolatile solid-state Flash memory to store all programs and data
- battery backup to save data from Dynamic Random Access Memory (DRAM) into Flash memory when primary power to the NCM is interrupted
- real-time clock with battery backup
- LEDs to indicate power, communications, and fault, to allow easy servicing
- plug-in screw terminals for 24 VAC power, N2 Bus or LON network connections
- standard 9-pin sub-D connectors for RS-232-C serial ports
- RJ-45 connector for Ethernet connection

Easy Migration to the New Architecture

We designed the NCM45x0-2 with your future in mind. Whenever you are ready, you can field-upgrade the NCM45x0-2 into an NAE45, the supervisory controller that is part of the Metasys system extended architecture. After a simple flash download, you are on your way to discovering the exciting Web browser interface that our new architecture provides. (For details on the NAE45, refer to the *Network Automation Engine Product Bulletin [LIT-1201160])*.

Conclusion

The NCM45x0-2 provides for the needs of any facility, large or small. The entire Metasys family of products affirms the Johnson Controls position as a leader in the building automation industry and as an innovator of solutions for the complete management of buildings.

Ordering Information

Contact the nearest Johnson Controls representative to order an NCM45x0-2. Specify the desired product code from *Table 2*.

Table 2: NCM45x0-2 Ordering Information

Product Code Number[1]	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 Universal Serial Bus (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 or up to 63 VMAs) are supported on the N2 trunk with the use of a repeater.
MS-NCM4520-2	Includes a LonWorks port and supports one LonWorks trunk. Up to 127 devices are supported on the LonWorks port.

1 All models are also available in a Buy American version (add a G after the code number). For repair parts, replace the **-2** suffix with **-702**.

Table 3: 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.)
AS-XFR050-0	Power transformer (Class 2, 24 VAC, 50 VA maximum output), no enclosure

Table 3: NCM45x0-2 Accessories Ordering Information

Product Code Number	Description
MS-NC45NTK-0	NCM4500 NT Cable Kit (North American version)
MS-NC45NTE-0	NCM4500 NT Cable Kit (International version)

Technical Specifications

Table 4: NCM45x0-2 Model

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	25 VA 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 32-bit 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 Release 5.0
Metasys Features	One N2 or LON Trunk, Dial-up access, local printer, JC-BASIC, Demand Limiting Load Rolling (DLLR), Trend, Totalization, Scheduling, Point History, Report Router and Alarm Management, Duty Standby (both models must be NCM45x0-2s), N1 on Ethernet, Pass-through download and upload of ASCs, DX-9100s, and VMA-1400s, Battery backup of data
Network Communication Module (NCM) Types	General with NT, General with OT
Network and Serial Interfaces	One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector One optically isolated RS-485 port; 9600 bps; pluggable and keyed 4-position terminal block (Field Controller (FC) Bus terminal, used for N2 Bus, is 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 RS-232-C 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 (DIN rail mount recommended)

Table 4: NCM45x0-2 Model

Shipping Weight	1.2 kg (2.7 lb)
Agency Listings CE	United States • UL Listed (PAZX), UL 916 • Federal Communications Commission (FCC) compliant, CFR47, Part 15, Class B Canada • UL Listed (PAZX7), CAN/CSA C22.2 No. 205 • Industry Canada: ICES-003 European Union • CE Mark – Johnson Controls declares that the NCM45 Controllers are in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. Australia/New Zealand • C-Tick Mark based on EMC Directive, 89/336/EEC

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.

United States Emissions Compliance

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.

Canadian Emissions Compliance

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.

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