Network Automation Engine

Product Bulletin

MS-NAE35xx-xxx, MS-NAE45xx-xxx
MS-NAE55xx-xxx, MS-NAE85xx-xxx

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The Network Automation Engine (NAE) brings an entirely new generation of technology into the Metasys® Building Automation System (BAS). The NAE is an automation engine that manages facilities using information and Internet technology.

The NAE uses the communication technologies of the building automation industry, including BACnet® protocol, LONWORKS® network, and the N2 Bus to monitor and supervise Heating, Ventilating, and Air Conditioning (HVAC) equipment, lighting, security, fire, and access control. The NAE55 supports a comprehensive set of supervisory features and functions for large facilities and technically advanced buildings and complexes. The NAE45 and NAE35 extend the power of the NAE to smaller buildings and enable the wider distribution of supervisory functions in larger facilities. The NAE85 is a high-capacity NAE. This device allows the integration of large BACnet systems and can take the place of multiple NAEs.

A single NAE or a network of multiple NAE devices within a building provide monitoring and control, alarm and event management, data exchange, trending, energy management, scheduling, and data storage.

The NAE has an embedded user interface and supports concurrently connected Web browsers with password access control and the security protection technology of the Information Technology (IT) industry.

Figure 1: NAE45xx and NAE35xx

Figure 2: NAE55xx

Table 1: Features and Benefits (Part 1 of 2)

Features	Benefits
Communication Using Commonly Accepted IT Standards at the Automation and Enterprise Level	Allows you to install the system on the existing IT infrastructure within a building or enterprise and use standard IT communication services over the company intranet, Wide Area Network (WAN), or public Internet with firewall protection
Web-Based User Interface	Allows you to access system data in the NAEs from any supported Web browser device connected to the network including remote users connected by dial-up telephone or an Internet Service Provider (ISP)
Site Director Function	Allows you to access all data on one site through one device. The device designated as the Site Director coordinates the display of data from multiple NAE devices for easy navigation through the entire site.
Support for Web Services at the Automation Network Level	Allows you to develop facility-specific advanced data interfaces and applications
User Interface and Online System Configuration Software Embedded in NAE	Allows configuration, commissioning, data archiving, monitoring, commanding, and system diagnosis from any device with Web browser software and does not require separate workstation software

Table 1: Features and Benefits (Part 2 of 2)

Features	Benefits
Supervision of Field Controller Networks Including N2 Bus, LONWORKS Network, and BACnet MS/TP Enabled Devices	Supports connectivity to open network standards for complete flexibility in the selection of field devices. Supported protocols include BACnet Master-Slave/ Token-Passing (MS/TP), LONWORKS, and N2.
Multiple Connection Options for Data Access	Allows connection of a Web browser via the Internet Protocol (IP) network using the Ethernet port or directly to an RS-232 serial port. For a dial-up connection, use the optional internal or external modem.

Figure 3: NAE85 (Rack Mount)

NAE Networking

NAEs have multiple connection port options that allow you to build an extremely flexible network at the automation and enterprise level of your system, as well as at the field controller and data acquisition levels.

Web Browser Access

You access building systems through the NAE with a standard Web browser on a desktop or laptop computer. The computer does not require any special workstation software other than the browser and a standard Java® plug-in. The Web browser accesses the NAE directly over the IP network, or via the Internet or public telephone service.

IP Ethernet Network

The NAE connects directly to an IP Ethernet network running at 10 or 100 Mbps. Multiple NAEs communicate with each other over the network, and one NAE can act as the Site Director. The Site Director controls the point of access to the network on the site from a user interface device. The data transmission on the network uses standard IT protocols, services, and formats.

Networks in different buildings may be interconnected using standard WAN technologies and network service providers. The speed of transmission depends on the technology used.

Remote NAE

The NAE can be accessed remotely over standard WAN infrastructures, the Internet using an ISP line, or over the public telephone network using a modem and the Point-to-Point Protocol (PPP). The NAE offers an optional internal modem or supports an external modem.

Application and Data Server (ADS)/ Extended Application and Data Server (ADX)

The ADS/ADX is an optional software package running on a computing platform that provides a location for storage of the system configuration database, trend logs, alarm logs, and audit trails. Also, the ADS/ADX can be configured as the Site Director to coordinate access to all components on a site via a Web browser connected over the network, Internet, or telephone line via dial-up communication. The software supports standard IT firewall technologies for protection against unauthorized access.

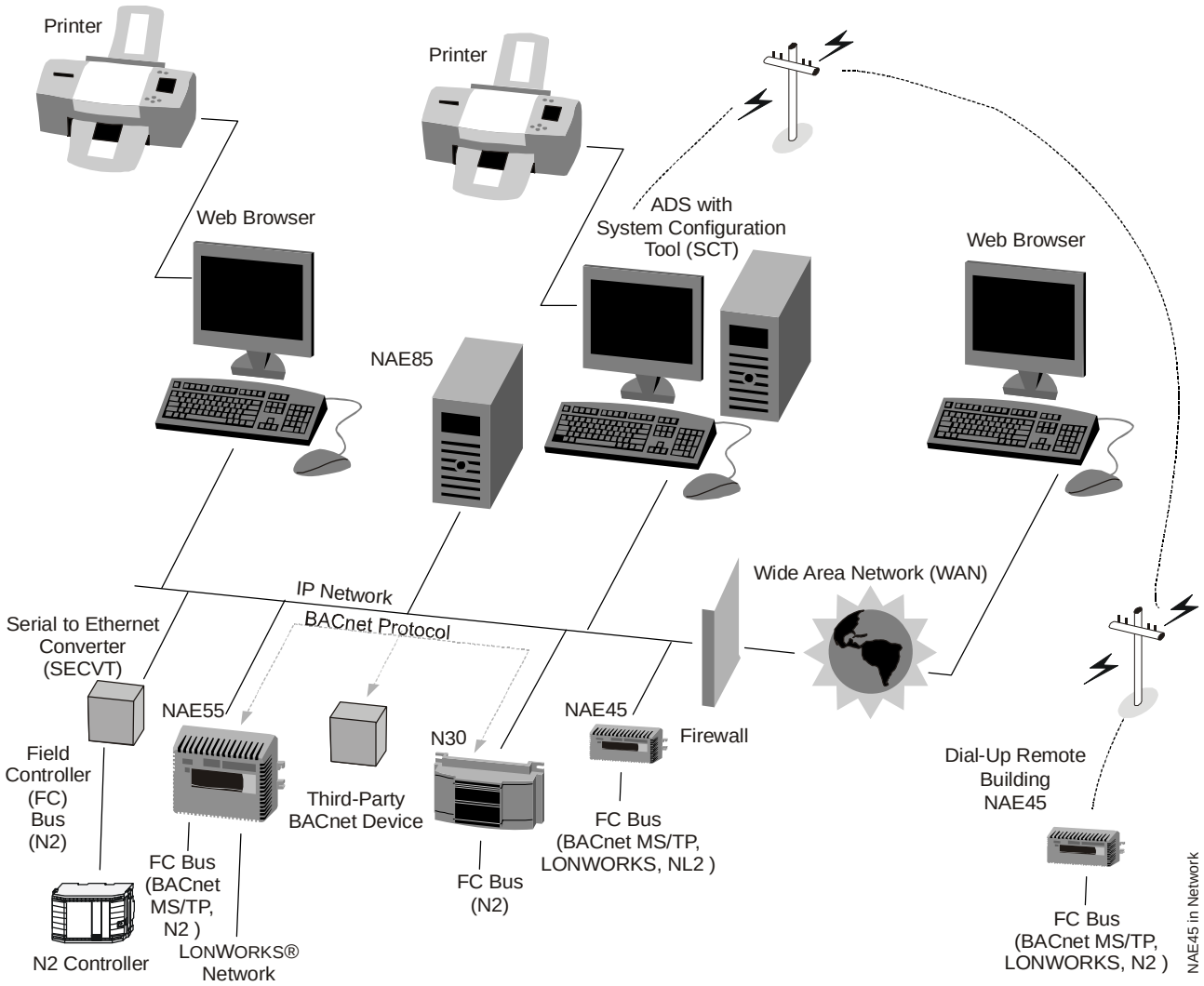

Figure 4: Metasys Network with Multiple NAEs

Field Networks and Protocols

The NAE offers the ability to pass data from one field network to another and transmit data from the field network to the enterprise and automation level of the network. This allows your system to operate as one virtual control network. For specific information on protocol support for each of the engines, please see Table 2.

Automation Level Communication

NAEs communicate internal system data using peer-to-peer messaging over the IP Ethernet network. Thus each NAE device shares data and has access to information on all other NAE nodes on the network to coordinate the overall functions of the building controls.

BACnet Protocol

The automation level communication also supports the BACnet protocol and facilitates the network integration of other systems and devices that use this protocol standard. The Johnson Controls® N30 Supervisory Controller can also be integrated into the NAE network at the automation level using BACnet services.

The NAE supports the BACnet services and objects typically used by a workstation and a field controller device, including BACnet alarm and event services. See the *NAE Protocol Implementation Conformance Statement Technical Bulletin (LIT-1201532)* for detailed information on BACnet conformance and the supported BACnet Interoperability Building Blocks.

The BACnet MS/TP Hardware Field Equipment Controllers (FECs)

The MS/TP bus is based on BACnet standard protocol SSPC-135, Clause 9.

The MS/TP bus is a peer-to-peer, multiple-master protocol in which each master device takes turns originating messages to pass to any other device on the bus. Slave devices can also be on the bus. A slave device does not get the token and only communicates on the bus when data is requested from it by a master device.

With the addition of an MS/TP to Ethernet Converter (MS-MECVT-0), remote MS/TP devices can be connected to the NAE551x models over an IP network. This MS/TP tunneling capability provides greater flexibility in product applications. For more information, refer to the *MECVT Technical Bulletin (LIT-12011214)*.

The N2 Bus

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, Variable Air Volume (VAV) controllers, and VAV Modular Assembly (VMA) devices.

The N2 Bus supports Metasys system compatible devices from other manufacturers and the Metasys Integrator® system. The Metasys Integrator system includes an extensive series of software drivers for the integration of other manufacturers' control devices, including HVAC equipment, power monitoring devices, lighting panels, security, and fire detection systems.

The NAE5512 and NAE5513 models can route communication over an IP network from an ASC or N2-compatible device to the NAE providing greater flexibility in product applications. These models allow you to connect remote N2 devices and the NAE using N2 Tunneling over Ethernet applications. For more information, refer to the *SECVT Technical Bulletin (LIT-1201790)*.

LONWORKS Enabled Devices

The NAE family includes models that can supervise LONWORKS devices. LONWORKS devices are supported 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 NAE supports all current LONMARK certified devices including devices from Johnson Controls such as the LN Series Controllers, the NexSys® controller line, and the LONWORKS enabled programmable Flexible System Controller (FSC).

Software for Efficient Building Operation

System Security

The NAE recognizes legitimate users through the entry of a user ID and a password at the Web browser user interface. User access data are encrypted in the transmission and in the NAE database. The security administrator manages user profiles and accounts at a site or system level. The authorization levels range from configuring the complete system to only viewing one section of the system or site. The system administrator assigns a user ID, password, and specific NAE data access privileges in each user account.

Metasys System User Interface

The embedded NAE user interface provides formatted data and graphic screens to any connected Web browser. Authorized users simply log on to the NAE device from the Web browser to access the user interface. This embedded user interface is ideal for smaller networks and remote locations where a dedicated computer platform to support a user interface is not required.

If an NAE or ADS/ADX has been defined as the Site Director, it provides access to all other NAEs or ADSs/ADXs on the same network and combines data for presentation on a single screen on the connected Web browser. In larger installations, an NAE can pass its data to an ADS/ADX on the network that acts as Site Director. You can access data from an NAE or ADS/ADX at any point in the network with a Web browser.

Basic Access

Basic Access is a mode of operation allowing users with Basic Access user accounts access to a subset of the standard user interface capabilities based on their assigned permissions. Basic Access user accounts are created by Metasys system administrators using the Security Administrator system. Basic Access meets the user interface requirements for most building operators. Basic Access is provided on all of the Metasys system engines and servers but is the primary user interface in the NAE3514, NAE3515, NAE3524, and NAE3525 controllers.

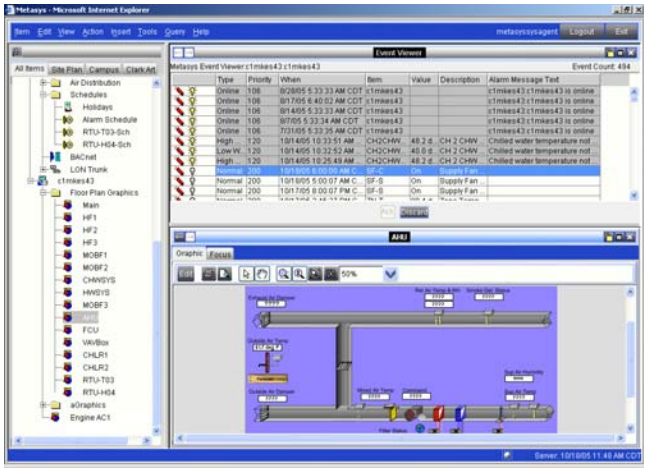

Figure 5: Metasys User Interface Screen

Monitoring and Control

The NAE software is specifically designed to meet the needs of building owners and managers to efficiently monitor and control all the mechanical and electrical systems in a typical building such as:

- HVAC units
- central equipment including chillers and boilers
- lighting and electrical distribution
- power generation and energy monitoring equipment
- interfaces to security and fire detection systems

The NAE monitors equipment by collecting data from the field control devices, then coordinating the required commands and sending them to the equipment at the required priority.

You can access information via a navigation tree that represents the logical grouping of network devices and point data names defined when configuring the system. You can also navigate using graphic images or create a customized tree with groups and names based on device location in the building or on system groups.

Global Search

This enhanced search feature allows you to search the Metasys system for multiple objects that meet specific criteria based on naming and object type. The global search provides you with the ability to manage lists of objects, which can be used by other features for commanding, trending, reporting, and object selection.

Global Command

This additional command feature allows you to send a single command to multiple objects, and view a log of the command results.

Transaction Recording

All user actions performed through the NAE, including logon and logoff, commands to equipment, changes to parameters, and changes to the system configuration are recorded in the NAE audit trail log.

Alarm and Event Processing

When a value exceeds a defined limit or changes to an off-normal state, the NAE sends alarm or event messages to online Web browsers, pagers, e-mail servers, and serial printers. The message routing depends on the source, time, and type of the event. The information is also stored immediately in a local log file on the NAE, later transmitted to a site log file on an ADS/ADX, and can be viewed at a later time from a Web browser to trace the history of alarms and events on the site.

The alarm and event information may include a predefined message to facilitate a fast response to the system problem. If you have the appropriate password authority and you acknowledge or clear an alarm, the site log file is updated.

You may also request a summary of all current alarms in the NAE or review a history of recent events.

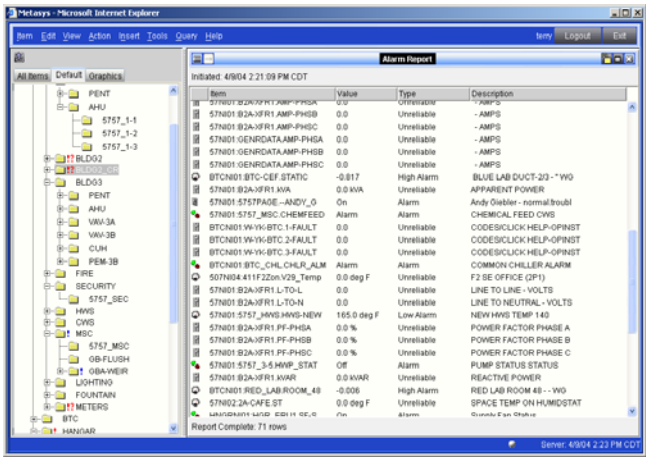

Figure 6: Alarm and Event Screen

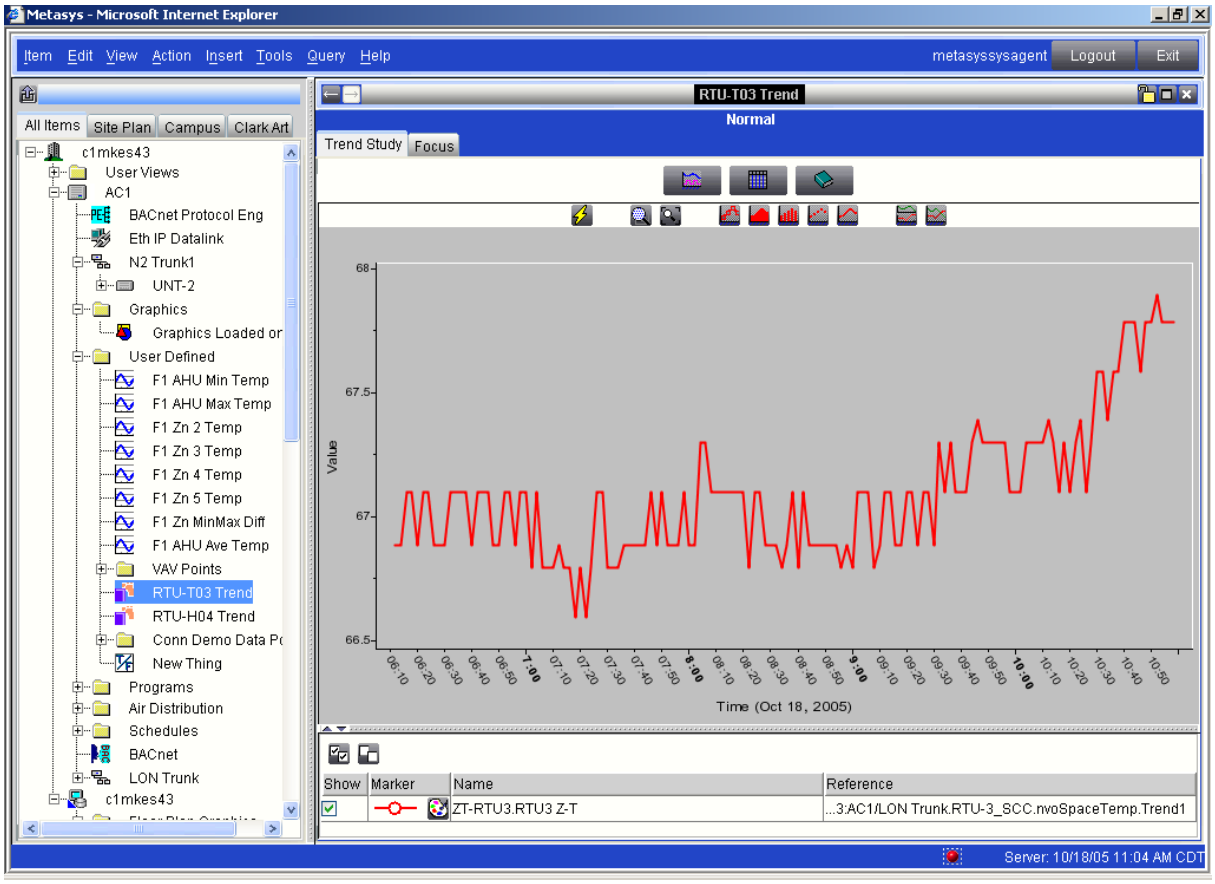

Figure 7: Trend Screen

Historical Trend Data

The NAE supports trending of any monitored value at user-defined periods ranging from a few seconds to one week. Alternatively, trending may be configured based on Change-of-Value (COV) sampling. Initially trend logs are stored in the NAE. Trend log information can be transferred to a historical database on the ADS/ADX at user-defined intervals or when the NAE files are nearly full.

Trend logs are useful for analyzing the performance of building control systems and locating the source of system problems. Historical trend data records are required in many industries, such as pharmaceutical and food processing plants, to document the ambient conditions during manufacture.

Totalization Data

Analog and pulse totalization features in the NAE monitor the use of energy and other consumables. You can generate reports for cost allocation within a facility or to support energy and cost reduction programs.

Event and runtime totalization features, including the number of times specific events occur and how long equipment has been in operation, provide data for servicing and maintenance programs and for early identification of possible system problems.

Trend Viewer for Ad Hoc Trends

This enhanced trend feature allows you to view multiple trend extensions based on the ad hoc selection of items from the results of a global search or from the navigation tree. This trend feature provides another option in trending.

Scheduling

The scheduling feature allows you to define building occupancy periods and the start and stop times for mechanical or electrical equipment. Operating parameters such as temperature setpoints and power consumption limits can be set according to the time of day.

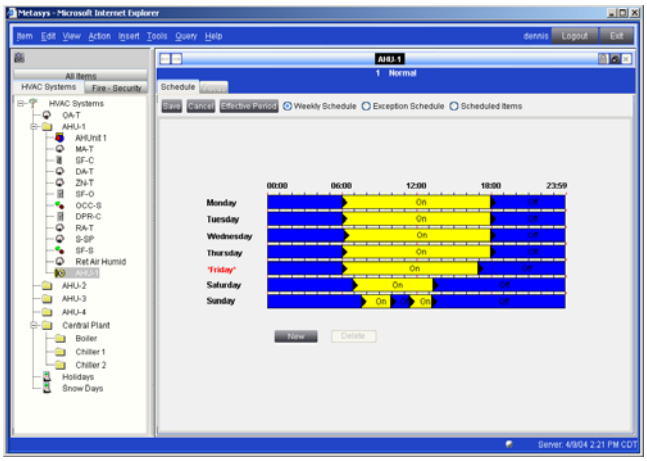

Figure 8: Schedule Screen

You can schedule an event for one or more days of the week, for a holiday, or for particular calendar dates. Schedules can be defined in one NAE for the whole site or for just the equipment controlled by that NAE. Each NAE uses a graphical user interface to simplify setting up the schedules from a Web browser.

Network-Wide System Interlocking

Interlocking enables the NAE to take information from one or more field controllers, make logical comparisons, and issue a set of control instructions to other field controllers anywhere on the network. Interlocking also facilitates sharing analog or binary data between controllers. For example, interlocking can be used to eliminate the need for wiring an outside air temperature sensor to each controller, saving hardware and installation costs.

Optimal Start

Optimal Start automatically determines the correct time to start heating and cooling systems to ensure that the facility is ready for occupants at the scheduled time. It adjusts to seasonal variations and minimizes the energy used.

Database Configuration Management

You can define the database online through a Web browser directly connected to an NAE device, or connected from a remote location via a WAN. Using the System Configuration Tool (SCT), you can define the system configuration and database offline for later download to the NAE over the network. In either case, the database is normally archived on the SCT or ADS/ADX.

All the software required for database configuration resides on the NAE or SCT. You do not need to have a local copy of the database on the Web browser to make authorized changes.

The configuration data for application specific N2 controllers on the field networks can be downloaded through the NAE without affecting system operations.

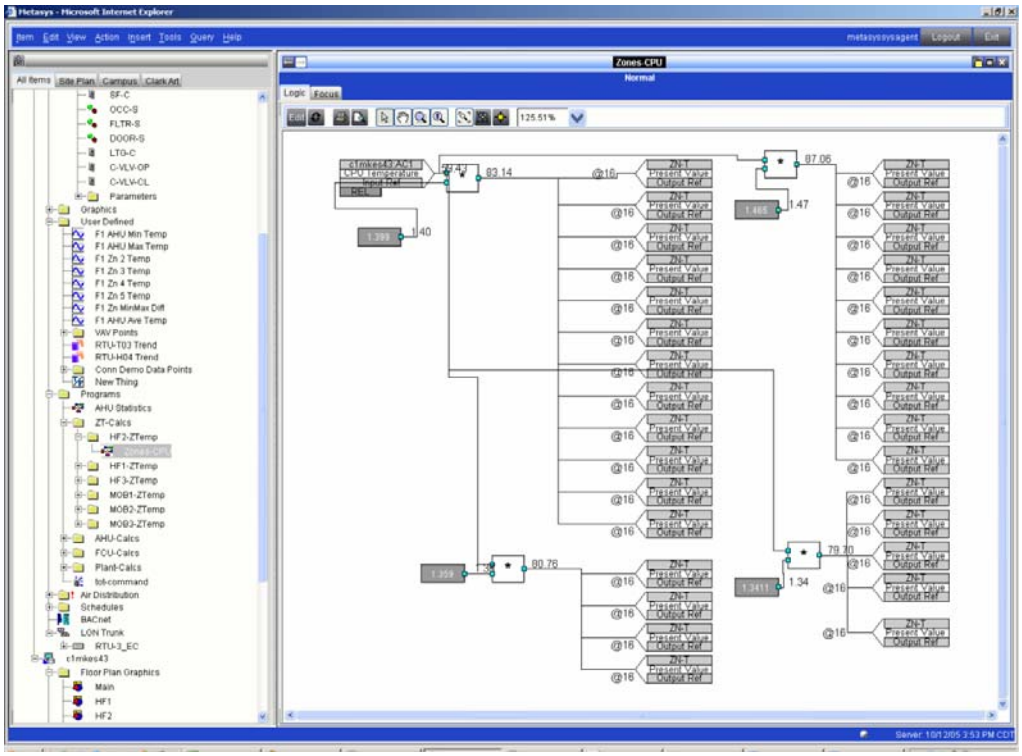

Figure 9: SCT Screen

Hardware Features

NAE35, NAE45, and NAE55

The NAE35, NAE45, and NAE55 provide the following features for the building controls market:

- industrial Single Board Computer (SBC)
- nonvolatile solid-state Flash memory to store all programs and data
- standard Universal Serial Bus (USB) connections
- battery backup to save data from Dynamic Random Access Memory (DRAM) into Flash memory when primary power to the NAE is interrupted
- real-time clock with battery backup
- Light-Emitting Diodes (LEDs) to indicate power, communications, and fault, to allow easy servicing
- optional internal modem
- removable screw terminals for 24 VAC power and N2 Bus network connections
- standard 9-pin sub-D connectors for RS-232-C serial ports
- RJ-11 telephone line connector for internal modem
- RJ-45 connector for Ethernet connection

NAE85

The NAE85 has most of the same functions and capabilities as the NAE35, NAE45, and NAE55, and features a scalable design. The NAE85 is available on two platform configurations:

- 1U rack-mount chassis
- tower desktop chassis

The NAE85 does **not** support:

- BACnet MS/TP Field Controllers
- N2 networks
- LONWORKS networks
- dial-out to an ADS/ADX
- device Reset command in the Metasys system User Interface (UI)
- upgrade using the NAE/NIE Update Tool

NAE Model Comparison

Table 2 contains a brief comparison of the features of the different NAE models.

Table 2: Comparison of Features for NAE Models

Feature	NAE85	NAE55	NAE45	NAE35
Number of N2 or BACnet MS/TP Trunks (Defined in UI)	None	2	1	1
Number of N2 or BACnet MS/TP Devices per Trunk	None	100	100	50
Maximum Number of Objects	25,000[1]	5,000	2,500	2,500
Model with Internal Modem	No	Available	Available	Available
RS-232-C Serial Ports	None	2	1 or 2	1 or 2
USB Serial Ports	2 or 3	2	1	1
RS-485 Ports	None	2	1	Available
Ethernet Ports	2	1	1	1
LONWORKS Network Support (Number of Devices)	No	Available (255)	Available (127)	Available (64)
Smoke Control Applications	No	Available	No	No
N2 Tunneling Over Ethernet Applications	No	Available	No	No
MS/TP Tunneling Over Ethernet Applications	No	Available	No	No

1. Standard is 10,000 objects; 15,000 object upgrade available.

Conclusion

The NAE affirms Johnson Controls position as a leader in the BAS industry and as an innovator of solutions for the complete management of buildings. The integration of Information Technology and Internet standards into the NAE platform, as well as the use of open protocols for field networks, bring the benefits of the global communications and control industries into one system. Web browser-based access from any location is a key to the effective use of the automation network.

The Metasys system continues to be the integrating network within buildings and has now been extended to bridge the gap between traditional control systems and the business and communication network systems of the enterprise. The Metasys Network Automation Engine and Metasys Web-enabled network are wise investments that will yield returns to the building owner and operator far into the future.

Ordering Information

Contact the nearest Johnson Controls representative to order an NAE. Specify the desired product code from Table 3 for the NAE35, Table 4 for the NAE45, Table 5 for the NAE55, Table 6 for the NAE85, and Table 7 for accessories.

Table 3: NAE35 Ordering Information (Part 1 of 2)

Product Code Number[1]	Description
MS-NAE35xx-xxx (Base features of each NAE35)	NAE35 Network Automation Engines: Requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery.
MS-NAE3510-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the RS-485 port.
MS-NAE3511-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NAE3514-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); features Basic Access support; includes an additional RS-232-C serial port for optional external modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.

Table 3: NAE35 Ordering Information (Part 2 of 2)

Product Code Number[1]	Description
MS-NAE3515-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); features Basic Access support; includes an internal modem; supports up to 50 devices on the N2 or BACnet MS/TP trunk.
MS-NAE3520-2	Includes a LONWORKS port and supports one LONWORKS trunk, includes an additional RS-232-C serial port for optional external modem. Supports up to 64 devices on the LONWORKS port.
MS-NAE3521-2	Includes a LONWORKS port and supports one LONWORKS trunk, includes an internal modem. Supports up to 64 devices on the LONWORKS port.
MS-NAE3524-2	Includes a LONWORKS port and supports one LONWORKS trunk, features Basic Access support, and includes an additional RS-232-C serial port for optional external modem. Supports up to 64 devices on the LONWORKS port.
MS-NAE3525-2	Includes a LONWORKS port and supports one LONWORKS trunk, features Basic Access support, and includes an internal modem. Supports up to 64 devices on the LONWORKS port.

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 4: NAE45 Ordering Information

Product Code Number[1]	Description
MS-NAE45xx-xxx (Base features of each NAE45)	NAE45 Network Automation Engines: Requires a 24 VAC power supply. Each model includes one RS-232-C serial port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery.
MS-NAE4510-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an additional RS-232-C serial port for optional external modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NAE4511-2	Supports one N2 or BACnet MS/TP trunk (RS-485 port); includes an internal modem; supports up to 100 devices on the N2 or BACnet MS/TP trunk.
MS-NAE4520-2	Includes a LONWORKS port and supports one LONWORKS trunk, includes an additional RS-232-C serial port for optional external modem; supports up to 127 devices on the LONWORKS port.
MS-NAE4521-2	Includes a LONWORKS port and supports one LONWORKS trunk, includes an internal modem; supports up to 127 devices on the LONWORKS port.

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 5: NAE55 Ordering Information (Part 1 of 2)

Product Code Number[1]	Description
MS-NAE55xx-xxx (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	Simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk.
MS-NAE5510-0U	Simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk. **Note:** This is the only NAE model UL 864 Listed for smoke control applications.

Table 5: NAE55 Ordering Information (Part 2 of 2)

MS-NAE5511-1	Simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; includes an internal modem.
MS-NAE5512-1	MS-NAE5512-1 simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; to support N2 Tunneling, do not configure both trunks for BACnet MS/TP.
MS-NAE5513-1	SMS-NAE5513-1 simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk; to support N2 Tunneling, do not configure both trunks for BACnet MS/TP; includes an internal modem.
MS-NAE5520-1	Includes a LONWORKS port and simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk, and a LONWORKS trunk. Supports up to 255 devices on the LONWORKS port.
MS-NAE5521-1	Includes a LONWORKS port and simultaneously supports two N2 or two BACnet MS/TP trunks, or one of each trunk, and a LONWORKS trunk; includes an internal modem. Supports up to 255 devices on the LONWORKS port.
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 6: NAE85 Ordering Information

Product Code Number	Description
MS-NAE85xx-xxx (Base features of each NAE85)	NAE85 Network Automation Engine: Supports up to 25,000 objects[1].
MS-NAE8500-0	NAE85 model with 1U chassis
MS-NAE8500-1	NAE85 model with tower chassis

1. Standard is 10,000 objects; upgrade is available to 15,000 objects (see Table 7).

Table 7: NAE Accessories Ordering Information

Product Code Number	Description
MS-SECVT-0	Serial to Ethernet Converter (SECVT) for N2 Tunneling over Ethernet Applications
MS-SWCVT-0	Serial to Wireless Converter (SWCVT) 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 NIE55. Rechargeable gel cell battery: 12 V, 1.2 Ah, with a typical life of 3 to 5 years at 21°C (70°F)
MS-BAT1020-0	Replacement data protection battery for NAE35 and NAE45. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 years at 21°C (70°F)
MS-15KUPG-0	15,000 object upgrade for NAE85/NIE85
POWAP-003A	Uninterruptible Power Supply (UPS) for NAE85/NIE85
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

Technical Specifications

NAE35 and NAE45

Product Codes		MS-NAE35xx-xxx and MS-NAE45xx-xxx
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/Clock Battery		Supports data protection on power failure and maintains real-time clock through a power failure. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 10 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 for operating system, configuration data, and operations data storage and backup 128 MB Synchronous Dynamic Random Access Memory (SDRAM) for operations data dynamic memory
Operating System		Microsoft® Windows® CE embedded
Network and Serial Interfaces		One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector One optically isolated RS-485, N2, or BACnet MS/TP port (9,600, 19.2K, 38.4K, or 76.8K baud); pluggable and keyed 4-position terminal block One RS-232-C serial port with standard 9-pin sub-D connectors that support all standard baud rates (A second serial port [only] on models without an optional internal modem supports an optional, user-supplied external modem.) One USB serial port with standard USB connector Options: One telephone port for internal modem; up to 56 Kbps; 6-pin RJ-11 connector (Models with an optional internal modem have one RS-232-C serial port only.)
Housing		Plastic housing Plastic material: ABS + polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
Mounting		On flat surface with screws on three mounting feet or single DIN rail
Compliance	**United States**	UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment FCC Compliant to CFR47, Part 15, Subpart B, Class A
	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
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 NAE45: 210 x 350 x 110 mm (8.3 x 13.8 x 4.3 in.)
Shipping Weight		1.2 kg (2.7 lb)

NAE55 (Part 1 of 2)

Product Code		MS-NAE55xx-xxx
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 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 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. On board 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		256 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup for MS-NAE5510-0U and MS-NIE5510-0U 512 MB Flash nonvolatile memory for operating system, configuration data, and operations data storage and backup for MS-NAE55xx-1 and MS-NIE55xx-1 models 256 MB Synchronous Dynamic Random Access Memory (DRAM) for operations data dynamic memory for all models
Operating System		Microsoft Windows XP embedded
Network and Serial Interfaces		One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector Two optically isolated RS-485, N2, or BACnet MS/TP port (9,600, 19.2k, or 38.4k baud); pluggable and keyed 4-position terminal blocks 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 Options: One telephone port for internal modem; up to 56 Kbps; 6-pin RJ-11 connector One LONWORKS port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LONWORKS port available on NAE552x-xxx 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 DIN rail
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, File S4977, CCN UUKL, UL 864, Control Units and Accessories for Fire Alarm Systems (only for Product Code Number MS-NAE5510-0U, also PAZX Listing)
	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

NAE55 (Part 2 of 2)

Dimensions (Height x Width x Depth)	226 x 332 x 96.5 mm (9 x 13.5 x 3.8 in.) including mounting feet Minimum space for mounting NAE55: 303 x 408 x 148 mm (12 x 16.1 x 5.9 in.)
Shipping Weight	2.9 kg (6.4 lb)

NAE85

Product Code	MS-NAE85xx-xxx
Computer Type	Entry-level Server Class Computer, Intel® SR1325TP1-E
Power Requirement	110-120 VAC
Power Consumption	1U Server Rack model: 5 A Desktop Tower model: 5 A
Ambient Operating Temperature	10 to 35°C (50 to 95°F)
Ambient Operating Conditions	10 to 90% RH
Ambient Storage Temperature	-40 to 70°C (-40 to 158°F)
Ambient Storage Conditions	95% RH, Noncondensing at 35°C (95°F)
Data Protection	User supplied UPS: APC® PowerStack 450 (recommended)
Clock Battery	CR2032 Lithium Ion
Processor	2.6 GHz Intel Pentium® 4 processor
Memory	1GB ECC SDRAM
Hard Drive	RAID 1, 2 ATA, 80 GB
Operating System	Microsoft Windows 2003 Server Web Edition
Network and Serial Interfaces	Two RJ-45 Ethernet Ports • Port 1 is a 1 GB Ethernet Port for communicating with the BAS network • Port 2 is a 100 Mbps Ethernet Port for communicating with an enterprise network One Video port for monitor One 9-pin Serial port 3 USB ports
Housing	1U Server Rack model: Metal Desktop Tower model: Metal and plastic
Mounting	1U Server Rack model: EIA-310D compatible server cabinet Desktop Tower model: Vertical on feet
Dimensions (Height x Width x Depth)	1U Server Rack model: 4.3 x 43 x 58 cm (1.7 x 16.9 x 23 in.) Desktop Tower model: 45 x 24 x 66 cm (17.7 x 9.4 x 26 in.)
Shipping Weight	18 kg (40 lb)

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.

Federal Communication Commission (FCC) Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of 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 or her own expense.

Canadian Compliance Statement

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.

JOHNSON CONTROLS

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