

## Introduction

The *Metasys*® network engines perform a key role in the *Metasys* system architecture. These network engines provide network management and system-wide control and coordination over one or more networks of equipment controllers, including the following *Metasys* field controllers:

- General Purpose Application MS/TP Controllers (CGMs)
- VAV Box Equipment MS/TP Controllers (CVMs)
- Field Equipment Controllers (FECs) and Advanced Application Field Equipment Controllers (FACs)
- Terminal Equipment Controllers (TECs)
- LN (LonWorks® Network) series equipment controllers
- Legacy *Metasys* controllers, such as Unitary (UNT) controllers, Variable Air Volume Assembly (VMA14xx) controllers, and DX-9100 controllers
- Third-party equipment controllers

These supervisory controllers can be networked together for scaling up on large projects, and they can be networked with an Application and Data Server (ADS), an Extended Application and Data Server (ADX), or an Open Application Server (OAS) for additional functionality and site unification.

Network engines provide building control scheduling, alarm and event management, energy management, data exchange, historical data storage and management, and custom control logic. Network engines include an embedded user interface called the Site Management Portal (SMP). Users access the SMP for system navigation and operation using web browser connections. Network engines are secured from unauthorized access using password protection and permission access control as well as IT security best practices.

In addition to providing general comprehensive equipment monitoring and control, network engines also offer specialized capabilities by series, model, and software release to meet a variety of application requirements.

**Figure 1: Network Engines**



The network engines are identified by three types:

### Small-capacity engines

- Network Automation Engines: NAE35 and NAE45
- Network Control Engine: NCE25

### Large-capacity engine

- Network Automation Engine: NAE55

### Software-only engine

- Network Automation Engine: NAE85

NAEs provide network supervisor capabilities, IP network connectivity, and third-party device integration capabilities. NCEs also provide these three capabilities, but also feature the I/O point connectivity and direct digital control capabilities of an FEC.

For information about the newest family of network engines that are introduced at Release 10.1, refer to the *SNE/SNC Product Bulletin (LIT-12013296)*. In addition, refer to the *Metasys for Validated Environments, Extended Architecture Product Bulletin (LIT-12011326)* for information about which network engines are approved for use at facilities that require regulatory compliance.

## Features and benefits

### Network Engines

The following features and benefits are applicable to all network engines, with specific features that vary by model and software release.

#### Supervision of controller networks including Johnson Controls and third-party protocol devices

Connectivity to open network standards is supported for complete flexibility in the selection of field devices. Supported protocols are model and software release dependent. They include BACnet/IP, BACnet MS/TP, LonWorks, N2 Bus, Modbus RTU, Modbus TCP, M-Bus (EN 13757-3)

serial and IP, KNX IP, SIMPLEX® Fire, Zettler Fire Panel, Tyco C•CURE, and other third-party protocols.

### Building management security with the NAE-S

The NAE-S uses embedded encryption technology with a built-in firewall. The NAE-S functions as a secure network engine that reports to an ADS/ADX Site Director. The NAE-S is Common Criteria Certified and meets the Federal Information Processing Standard (FIPS)-140-2, Level 2.

### Communication using commonly accepted IT standards at the automation and enterprise level

The *Metasys* system is installed on your existing IT infrastructure within a building or enterprise and uses standard IT communication services over the company intranet, WAN, public Internet with VPN tunnel, and firewall protection. Network engines also support the ability to optionally authenticate non-local users through a Remote Authentication Dial-in User Services (RADIUS) server and Syslog Destination Delivery Agent (DDA) for network logging of *Metasys* audits and events.

### Secure web-based user interface

Access system data in the network engines from any supported web browser device connected to the network. All upgraded network engines have self-signed certificates that provide for encrypted communication. Optionally, you can deploy to the network engines trusted certificates that are provided and managed by the customer's IT department or a Certificate Authority (CA).

### Site Director function

If you set up one network engine as a Site Director, you can access all site data from that single device. The device that is designated as the Site Director coordinates the display of data from multiple devices for easy navigation through the entire site. This capability is available to all network engine models.

### Embedded user interface and online system configuration software

Use the password-protected software to enable, configure, commission, archive data, monitor, command, and perform system diagnosis from any device by using a web browser, without the need for separate workstation software.

### Linux® operating system

All network engines run on Linux, which is a robust, widely-accepted, and readily-supported operating system.

### Background file transfer

With this new feature, you can transfer firmware upgrades, archive databases, HTTPS security certificates, and security databases from the

SCT to the NAE55 while the engine remains operational, minimizing system disruptions. Background file transfer is only available to NAE55s at Release 10.1, and to the new family of SNE and SNC network engines that are introduced at Release 10.1. For information about the newest engines, refer to the *SNE/SNC Product Bulletin (LIT-12013296)*.

## Network Control Engines

The following features and benefits are specific to NCEs:

### Integral field controller with 33 I/O Points

The NCE provides field-level control of central plant and large air-handler applications combined with enterprise level IP network connectivity.

### Expandable I/O point capacity, NS sensor connectivity, and VFD control on field controller SA Bus

Connect multiple Input/Output Modules (IOMs), NS Series Network Sensors, and VFDs to the field controller SA Bus, greatly expanding the NCE's field level control capabilities.

## Field equipment network management and integration

*Metasys* network engines provide network management over one or more networks of equipment controllers and other field devices. Network engines feature several optional communication port and protocol selections for integrating not only *Metasys* equipment controllers, but also hundreds of types of non-*Metasys* devices and third-party devices typically found in commercial buildings. The following list includes a brief description of the supported integrations.

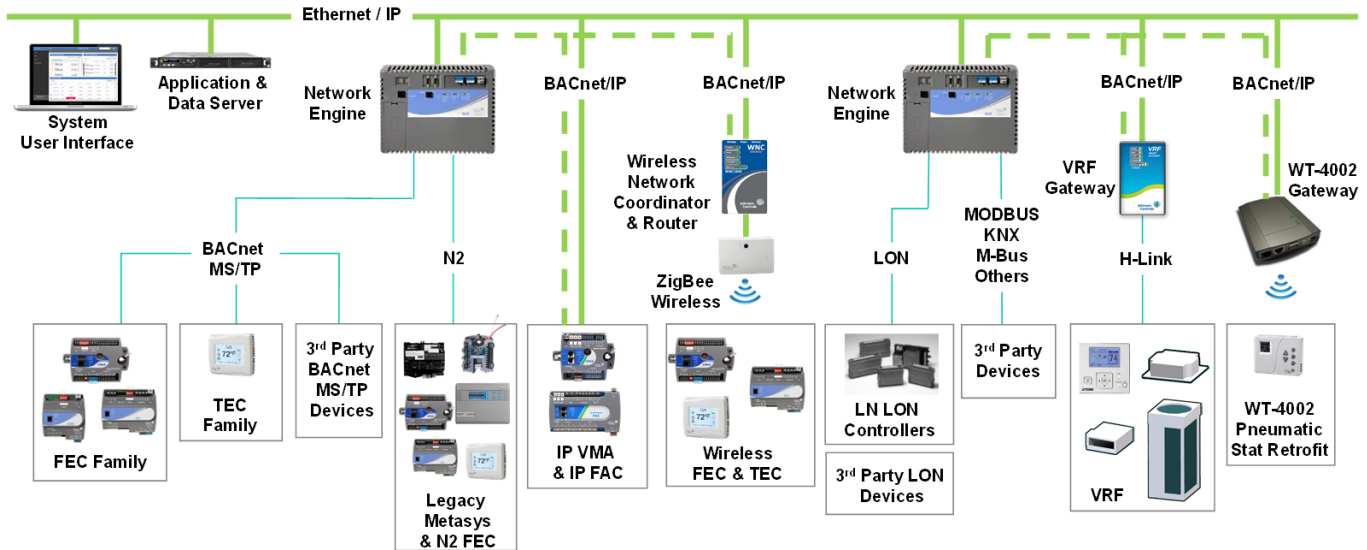
- **BACnet MS/TP**—for *Metasys* field controllers and TEC equipment controllers, non-*Metasys* BACnet controllers, and other third-party BACnet MS/TP devices.
- **BACnet/IP**—for *Metasys* IP-based field controllers, SIMPLEX® Fire Systems, preferred vendor lighting systems, and other third-party BACnet/IP devices.
- **ZFR Pro Wireless Field Bus**—for managing wireless networks of *Metasys* field equipment controllers and TEC3000 equipment controllers.
- **Legacy N2 Bus**—for managing networks of legacy *Metasys* equipment controllers, such as UNTs, VMA1400s, and DX-9100s, and third-party N2 Open devices.
- **LonWorks**—for managing networks of *Metasys* LonWorks (LN) controllers, legacy LonWorks equipment controllers, such as DX-9200s and Terminal Control Units (TCUs), as well as third-party LonWorks devices. For small-capacity network engines, the LonWorks network is supported at *Metasys* system Release 9.0 or earlier (**excluding** Release 9.0.7). For large-capacity engines, the LonWorks network is supported at *Metasys* system Release 9.0 and later (**including** Release 10.1).
- **Modbus**—for managing networks of third-party Modbus devices, such as energy meters and process controllers.

- **KNX (formerly EIB)**—for managing networks of KNX devices, such as window blinds and shading controls, lights, and meters.
- **M-Bus (EN 13757-3)**—for managing networks of M-Bus devices, such as heat meters.
- **Remote Field Bus Applications**—for reducing the installed cost of BACnet MS/TP field devices throughout a facility. Any intra-building, inter-building, or remote location that has IP network connections readily available can use the remote field bus.
- **C•CURE 9000 Access Control System and victor Video Management**—for managing building access control networks and video management systems. These integrations are available with Release 10.0 on the large-capacity network engines only.
- **SIMPLEX® Fire**—for managing a building's fire control system and all of its components.
- **Zettler® Fire Panel**—for interfacing to a Zettler fire detection system to provide secondary monitoring of a building's fire control system and all of its components.

## Metasys Network

The following example is a typical *Metasys* system network showing various integrations.

**Figure 2: Device Integrations for the *Metasys* Network**



### Automated system-wide control and coordination

*Metasys* network engines provide automated system-wide control and coordination over multiple field devices under one or more field device networks. Some examples of the system-wide control coordination capabilities include:

- **Scheduling:** enables network engines to automatically command mechanical or electrical equipment to a desired operational state (such as On/Off, Occupied/Unoccupied, Economy/Comfort, or Heating/Cooling/Economizer/Auto) based on a user-defined schedule. Operating parameters can be set according to time of day, days of the week, holidays, or calendar dates.
- **Alarm and Event Management:** enables the network engines to generate alarms based on user-defined criteria; to send alarm and event messages to web browsers, email servers, and Network Management Systems; and to store and view alarm and event logs on the network engine and transfer the data to an Application and Data Server.
- **Network-Wide System Interlocking:** enables network engines to collect data from field devices, make logical comparisons between the data, and issue relevant commands to other field controllers, anywhere on the network.
- **Transaction Recording:** audits and logs all user actions performed through the network engine. Operators can review these logs to understand what changes have been made to the system, who made them, and when.
- **Historical Data:** can be collected and stored by network engines for any monitored data point value based on user-defined intervals or on a change of value. Network engines can transfer the data logs to the Application and Data Server at defined intervals or when the network engine logs are full.
- **Totalization:** allows network engines to calculate rolling sums of any monitored data point value stream. Operators can use this information to monitor runtime information useful for service, maintenance, and early identification of building system problems.
- **Optimal Start:** enables network engines to automatically determine the best time to start heating and cooling systems to ensure that the facility is conditioned for occupancy. It adjusts to seasonal variations and reduces energy use.
- **Demand Limiting Load Rolling (DLLR):** enables network engines to monitor energy meters (electricity, gas, steam, or water) and automatically shed equipment loads according to user-defined levels. Demand Limiting helps manage utility demand charges, and Load Rolling controls equipment operating levels to reduce total energy consumption. Comfort overrides prioritize equipment shedding.
- **Access Control System Integration:** allows engines to monitor and control systems that notify the security guard when an access badge scan is permitted or denied, when access control devices go offline, and when monitored doors are locked and unlocked. The network engine can use building events to trigger logic and automate access control functions throughout a facility.

- **Video Management System Integration:** enables network engines to access systems that track the health of video system components and reports on a variety of analytics and events. Video streaming directly within the *Metasys* user interface is not available, but the surveillance system can be viewed adjacent to the SMP UI in a separate, browser window.
- **Fire Panel Integration:** exposes the network engine to monitored points in the Simplex fire alarm system to provide better and more effective interaction between the BAS and fire systems.
- **Lighting Control System Integration:** permits network engines access to and control over lighting groups, zones, and spaces without overwhelming the engine with a massive number of points. Options include turning lights on and off, adjusting light levels, and obtaining sensor data that indicates such data as occupancy, ambient light level, and power consumption.

## Scalable

Different network engine models are available, each with different field device capacities, so you can select the model that best meets the size, complexity, and scope of your specific project.

For projects that exceed the capacity of a single engine, *Metasys* network engines may be networked together, and they may be networked with an Application and Data Server/Extended Application and Data Server (ADS/ADX) for additional functionality and site unification. Also, most network engines, when connected to a small number of other network engines, can act as a *Metasys* Site Director without the need for an ADS/ADX.

## Secure

The *Metasys* system uses industry-standard system security and encoding protocols to protect against unauthorized access to data and control systems. The *Metasys* system includes the following security features:

- Support for local users, Active Directory users, Microsoft® Office 365® users, and Remote Authentication Dial-In User Service (RADIUS) users.
- Obscures user names and passwords.
- Enforces strong passwords.
- Provides an optional capability of sending its configured audit log entries and alarm notifications to an external, industry-standard Syslog server, conforming to Internet published RFC 3164.
- Provides Dormant account settings for users and reports. Dormant User Account Reports are available in SMP. Dormant user account events are also included in the Audit Viewer and the Event Viewer.
- HTTPS with TLS 1.2 between *Metasys* components, including the ADS/ADX, ODS, *Metasys* UI, System Configuration Tool (SCT), and network engines. This enhancement ensures the highest level of security to protect your building automation system from unauthorized users and computer hackers.
- Self-signed certificates are installed on supported products, with the option of configuring trusted certificates.

- One of three security shield icons are displayed in the Site Management Portal (SMP), SCT, and ODS UIs to indicate the current level of a connection: trusted, self-signed, or untrusted.

## Network Engine comparisons

**Table 1: Network Engine release support comparison**

Model	Release 9.0.7	Release 10.1
MS-NCE25xx-0	X	
MS-NAE35xx-2	X	
MS-NAE45xx-2		
MS-NAE55xx-2		X
MS-NAE55xx-3		
MS-NAE85xx-1		X

- ⓘ **Note:** The NIEx9 models are no longer offered because the NAE firmware images at Release 9.0.7 and later include the integration files, pre-licensed and ready to use. To obtain these integrations, you may field-upgrade NIE29-0, NIE39-2, and NIE49-2 engines to Release 9.0.7. However, you can upgrade the NIE59-x engine to Release 10.1.
- ⓘ **Note:** Older versions of the network engines, including the NAE35-1, NAE45-1, and NAE55xx-1 models, cannot be upgraded to *Metasys* system Release 9.0.7 or later.

**Table 2: Network Engine integrations available by *Metasys* system release**

Integration	Release 9.0.7	Release 10.1
BACnet/IP	X	X
BACnet MS/TP	X	X
Legacy N2 Bus	X	X
LonWorks		X
Modbus RTU and TCP	X	X
KNX IP	X	X
M-Bus Serial and IP	X	X
C•CURE 9000 and victor		X
SIMPLEX Fire		X
Zettler Fire Panel		X
Preferred Vendor Lighting Systems		X



## Hardware features

### NCE25

Figure 3: NCE25 Network Control Engine



The NCE25 model has an integral Field Equipment Controller (FEC) that provides direct interface to and control of remote field equipment, such as large central cooling and heating plants and large built-up AHUs.

The NCE25 has 33 onboard Input/Output (I/O) control points and a Sensor/Actuator (SA) Bus. The SA Bus allows you to connect Input/Output Modules (IOMs) and increase the I/O control points in your application. You can also connect NS Series network sensors and supported variable-frequency drives (VFDs) to the SA Bus, and integrate state-of-the-art temperature control and motor speed control into your NCE application. You define and configure the 33 I/O points on the NCE and the I/O points and devices on the NCE SA Bus in the Controller Configuration Tool (CCT) software.

Depending on the model, an NCE25 provides the following features for the building controls market:

- available with *Metasys* system Release 9.0.7 firmware
- multiple processors for supervisory and direct digital control
- nonvolatile solid-state Flash memory to store all programs and data
- standard USB connection
- data protection battery to save data and power the real-time clock when primary power to the NCE/NIE is interrupted
- LEDs to indicate power, communications, and device condition, to allow easy servicing
- removable, color-coded, screw terminal blocks for 24 VAC power, communications bus, and I/O point field wiring connections
- standard 9-pin sub-D connectors for RS-232-C serial port
- RJ-45 8-pin modular connector for Ethernet connection
- integral display screen with navigation keypad (on specified models)
- third-party trunk support for two interfaces

### NAE35 and NAE45

Figure 4: NAE45 Network Automation Engine



Depending on the model, an NAE35 and NAE45 provides the following features for the building controls market:

- available with *Metasys* system Release 9.0.7 firmware
- industrial single board computer (SBC)
- nonvolatile solid-state flash memory to store all programs and data
- standard USB connections
- battery backup to save data from dynamic random access memory (DRAM) into flash memory when power to the NAE is interrupted
- real-time clock with battery backup
- LEDs to indicate power, communications, and fault, to allow easy servicing
- removable screw terminals for 24 VAC power and field network bus connections
- standard 9-pin sub-D connectors for RS-232-C serial ports
- RJ-45 connector for Ethernet connection
- third-party trunk support for two interfaces

### NAE55

Figure 5: NAE55 Network Automation Engine



Depending on the model, an NAE55 provides the following features for the building controls market:

- available with *Metasys* system Release 10.1 firmware
- industrial single board computer (SBC)
- nonvolatile solid-state flash memory to store all programs and data
- standard USB connections
- battery backup to save data from dynamic random access memory (DRAM) into flash memory when power to the NAE is interrupted
- real-time clock with battery backup
- LEDs to indicate power, communications, and fault, to allow easy servicing
- removable screw terminals for 24 VAC power and field network bus connections
- standard 9-pin sub-D connectors for RS-232-C serial ports
- RJ-45 connector for Ethernet connection
- third-party trunk support for two interfaces
- BACnet Testing Laboratories™ (BTL)-Listed BACnet Building Controller (B-BC) at Protocol Revision 15 (PR15) at Release 10.0 and Release 10.1

## NAE-S

**Figure 6: NAE-S Secure Network Automation Engine**



The NAE-S (MS-NAE551S-2) model is a secure version of the standard NAE55 Network Automation Engine that uses embedded encryption technology to protect and secure the building management system at the endpoint. Similar to other NAEs, the hardened NAE-S monitors and controls networks of field-level building automation devices, including HVAC equipment, lighting, and security. The engine is Common Criteria Certified and meets the Federal Information Processing Standard (FIPS 140-2) Security Level 2 that specifies the use of a cryptographic module and a tamper-proof housing. At first release, the NAE-S is provided with a *Metasys* Release 8.0 image and is only for sale in the United States and Canada. Refer to the *Secure Network Automation Engine Catalog Page (LIT-1900996)* for more information.

## NAE85

The NAE85 runs on a Windows Server and provides most of the same functions and capabilities as the NAE55 hardware model, but with much higher point capacities. Customers select the NAE85 engine if they need to integrate large numbers of IP devices into their *Metasys* network.

The NAE85 supports virtual environments, including VMWare® and Microsoft Hyper-V™. Refer to *Network and IT Guidance Technical Bulletin (LIT-12011279)* for more information.

The NAE85 software platform features the following:

- available with *Metasys* system Release 10.0 software
- support of up to four supervisory devices when configured as a Site Director
- web-based user interface using HTTPS
- routing of event and alarm notifications to an ADS or ADX (Note: ADS-Lite does not support the NAE85)
- capability to send event and alarm notifications to pager and email destinations directly
- data collection, trend sampling, and audit trail logging
- simultaneous access for up to 10 users
- should use an uninterruptible power supply (UPS) for orderly shutdown in the event of sudden power loss. Order the UPS separately.
- third-party trunk support for up to eight integrations (for example, four Modbus TCP, two M-Bus TCP, and two KNX IP)

The NAE85 does **not** support:

- BACnet MS/TP field controllers directly
- N2 Bus networks
- LonWorks networks
- dial-out to an ADS/ADX
- device Reset command in the *Metasys* Site Management Portal UI
- upgrade using the NAE Update Tool

## NAE and NCE series comparison

Table 3 contains a brief comparison of the features of the different NAE and NCE Series engines. Not all features are available on every model in a series.

**Table 3: Comparison of features for NAE and NCE models**

Features/Maximums	NCE25	NAE35	NAE45	NAE55	NAE85
BACnet MS/TP or N2 Bus	1	1	1	2	None
MS/TP and N2 Bus Devices per Trunk	32	50	100	100	None
MS/TP or N2 Devices per Trunk (if one or many third-party or TUC03 devices are connected)	32	50	50	50	None
Integral FEC with I/O Control Points and SA Bus	33	0	0	0	0
Objects	2,500	2,500	2,500	5,000	10,000 (default) 25,000 (upgrade)
Internal Modem	Not functional at 9.0.7	Not functional at 9.0.7	Not functional at 9.0.7	Not functional at 10.0 or later	N/A
External Modem Support	Not available at 9.0.7	Not available at 9.0.7	Not available at 9.0.7	Not available at 10.0 or later	N/A
RS-232-C Serial Ports	1	1 or 2	1 or 2	2	N/A
USB Serial Ports	1	1	1	2	Depends on hardware
Serial Printing	Not available	Not available	Not available	Not available	N/A
Ethernet Ports	1	1	1	1	Depends on hardware
LonWorks Network Support (Number of Devices)	Not available at 9.0.7	Not available at 9.0.7	Not available at 9.0.7	Available (255)	No
UL/cUL 864 UUKL Listed Smoke Control Applications	No	No	No	Available at Rel. 8.1	No
Third-Party Integrations	2	2	2	2	8



ⓘ **Note:** The LonWorks integration is only supported on NAE35s, NAE45s, and NCE25s with the *Metasys* Release 9.0 software or earlier. The Release 9.0.7 patch update is **not** supported for these LonWorks models; they remain at Release 9.0. However, the LonWorks integration is supported for NAE55s at Release 10.0 or later.

the business and communication network systems of the enterprise.

The *Metasys* network engines and *Metasys* web-enabled network are wise investments that yield returns to the building owner and operator far into the future.

## NCE25 point type counts

**Table 4: NCE25 point type counts**

Point Type	Signals Accepted	Count
Universal Input	Analog Input, Voltage Mode, 0-10 VDC	10
	Analog Input, Current Mode, 4-20 mA	
	Analog Input, Resistive Mode, 0-2k ohm, RTD (1k [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2)	
	Binary Input, Dry Contact Maintained Mode	
Binary Input	Dry Contact Maintained Mode	8
	Pulse Counter/ Accumulator Mode (High Speed), 100Hz	
Configurable Output	Analog Output, Voltage Mode, 0-10 VDC	4
	Binary Output Mode, 24 VAC Triac	
Analog Output	Analog Output, Voltage Mode, 0-10 VDC	4
	Analog Output, Current Mode 4-20 mA	
Binary Output	24 VAC Triac	7

## Repair information

If the network engine fails to operate within its specifications, replace the unit. For a replacement engine, contact the nearest Johnson Controls representative.

## Conclusion

The network engines affirm the position of Johnson Controls as a leader and innovator in the Building Automation System (BAS) industry. The integration of IT and Internet standards into the network engine 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

## Ordering information - NCE25 and NAE5 models

Contact the nearest Johnson Controls representative to order a network engine. The following tables list the product code numbers for all available network engines

based on model. If you receive an NAE55 engine from the factory that is imaged with Release 10.0, you can field-upgrade the engine to Release 10.1. For details, refer to the tables in this section. Also, to order repair parts, add -702 or -703 after the code number (for example, MS-NAE3525-702, MS-NAE4521-702, and MS-NAE5521-703).

**Table 5: NCE25 ordering information (Releases 9.0 or 9.0.7)**

Product Code Number	Release	Description
MS-NCE25xx-x (Base Features on Each NCE25)	N/A	Each NCE25 Series model requires a 24 VAC power supply and includes one RS-232-C serial port, one RS-485 optically isolated SA Bus port, one USB serial port, one Ethernet port, and an MS-BAT1020-0 Data Protection Battery. Each NCE25 Series model has 33 integral I/O points and supports up to 128 additional I/O points on the SA Bus. Supports BACnet IP network.
MS-NCE2500-0 (Europe only)	9.0.7	Base features with no physical field controller trunk connection.
MS-NCE2506-0 (Europe only)	9.0.7	Base features with no physical field controller trunk connection. Includes integral display screen.
MS-NCE2510-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported.
MS-NCE2516-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus, up to 32 devices are supported. Includes integral display screen.
MS-NCE2520-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices.
MS-NCE2526-0	9.0	Supports one LonWorks trunk with up to 32 LonWorks devices. Includes integral display screen.
MS-NCE2560-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported.
MS-NCE2566-0	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one MS/TP Bus. The number of supported devices on the third-party trunk depends on the protocol. For the MS/TP bus, up to 32 devices are supported. Includes integral display screen.

**Table 6: NAE35 ordering information (Release 9.0 or 9.0.7)**

Product Code Number	Release	Description
MS-NAE35xx-x (Base Features of Each NAE35)	N/A	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. Supports a BACnet IP network.
MS-NAE3510-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. <b>i Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NAE3514-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 50 devices are supported. Engine is limited to Basic Access support. <b>i Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.

**Table 6: NAE35 ordering information (Release 9.0 or 9.0.7)**

Product Code Number	Release	Description
MS-NAE3520-2	9.0	Supports one LonWorks trunk; includes an additional RS-232-C serial port for optional external modem. Supports a maximum of 64 devices on the LonWorks port.
MS-NAE3524-2	9.0	Supports one LonWorks trunk; limited to Basic Access support; and includes an additional RS-232-C serial port for optional external modem. Supports a maximum of 64 devices on the LonWorks trunks.

**Table 7: NAE45 ordering information (Release 9.0 or 9.0.7)**

Product Code Number	Release	Description
MS-NAE45xx-x (Base Features of Each NAE45)	N/A	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. Supports a BACnet IP network.
MS-NAE4510-2	9.0.7	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and one N2 Bus or BACnet MS/TP (RS-485) trunk. The number of supported devices on the third-party trunk depends on the protocol. For the N2 Bus or MS/TP trunk, up to 100 devices are supported.  <i>ⓘ</i> <b>Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 9.0.7 or later.
MS-NAE4520-2	9.0	Supports one LonWorks trunk, includes an additional RS-232-C serial port for optional external modem; supports a maximum of 127 devices on the LonWorks trunk.

**Table 8: NAE5510-2U ordering information (Release 8.1 only)**

Product Code Number	Release	Description
MS-NAE55xx-x (Base Features of Each NAE55)	N/A	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 a BACnet IP network.
MS-NAE5510-2U	8.1	Supports two N2 Bus or two BACnet MS/TP (RS-485) trunks (or one N2 Bus trunk and one BACnet MS/TP trunk); supports a maximum of 100 devices on each N2 Bus or BACnet MS/TP trunk.  <i>ⓘ</i> <b>Note:</b> This model is UL 864 <b>10th Edition</b> UUKL/ORD-C100-13 UUKLC Standard for Smoke Control Equipment for Release 8.1 only. Refer to the <i>Metasys® System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System Technical Bulletin (LIT-12012487)</i> for detailed specifications, requirements, and procedures for installing and operating UUKL 864 Listed <i>Metasys</i> system devices. For example, in order to be UL/cUL compliant, this model must be pre-installed and pre-wired in a standard or custom panel built at the Johnson Controls Reynosa factory.

**Table 9: NAE55-3 ordering information (Release 8.1 or 10.1)**

Product Code Number	Release	Description
MS-NAE55xx-x (Base Features of Each NAE55)	N/A	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 a BACnet IP network.
MS-NAE5510-3	10.1	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and two N2 or two BACnet MS/TP (RS-485) trunks (or one N2 trunk and one BACnet MS/TP trunk). Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15).

**Table 9: NAE55-3 ordering information (Release 8.1 or 10.1)**

Product Code Number	Release	Description
MS-NAE5510-3U <sup>1</sup>	8.1	Supports two N2 Bus or two BACnet MS/TP (RS-485) trunks (or one N2 Bus trunk and one BACnet MS/TP trunk). <b>i Note:</b> This model is UL 864 <b>10th Edition</b> UUKL/ORD-C100-13 UUKLC Standard for Smoke Control Equipment for Release 8.1 only. Refer to the <i>Metasys® System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System Technical Bulletin (LIT-12012487)</i> for detailed specifications, requirements, and procedures for installing and operating UUKL 864 Listed <i>Metasys</i> system devices. For example, in order to be UL/cUL compliant, this model must be pre-installed and pre-wired in a standard or custom panel built at the Johnson Controls Reynosa factory.
MS-NAE5511-3	10.0	Supports two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX) and two N2 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 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>i Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.
MS-NAE5520-3	10.1	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/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. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15).
MS-NAE5521-3	10.1	Supports a LonWorks trunk, two third-party trunks (Modbus RTU or TCP, M-Bus, or KNX), or two N2 trunks/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. Supports up to 100 devices on each N2 or BACnet MS/TP trunk. This model is a BACnet BTL-Listed controller at Protocol Revision 15 (PR15). <b>i Note:</b> Modem functions are no longer available after this engine is updated with <i>Metasys</i> Release 10.0 or later.

<sup>1</sup> The older MS-NAE5510-2U model may also be available.

**Table 10: NAE85 ordering information (Release 10.1 only)**

Product Code Number	Release	Description
MS-NXE85SW-0	10.1	License enabling NAE8500 software for new installation; supports a maximum of 10,000 objects. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-NXE85SW-6	10.1	License enabling NAE8500 software for upgrading existing installation; supports a maximum of 10,000 objects. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-15KUPG-0	10.1	License enabling an additional 15,000 objects on NAE8500 or LCS8500 (resulting in supporting a maximum of 25,000 total objects).
MS-COPY-NXE85SW	10.1	DVD copy of unlicensed NAE8500 software.

## Ordering information - NCE25 and NAE<sub>x</sub>5 accessories

Johnson Controls representative to order these accessories.

The following tables list the accessories for all available network engines based on model. Contact the nearest



**Table 11: Network engines accessories ordering information**

Product Code Number	Description
MS-BAT1020-0	Replacement data protection battery for NAE35, NAE45, and NCE25. Rechargeable NiMH battery: 3.6 V 500 mAh, with a typical life of 5 to 7 years at 21°C (70°F)
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)
TL-MAP1810-xx	Pocket-sized web server that provides a wireless mobile user interface to <i>Metasys</i> field controllers, thermostats, and smart rooftop units. Refer to the <i>Mobile Access Portal Gateway Catalog Page (LIT-1900869)</i> to identify the appropriate product for your region. <b>Note:</b> The MAP Gateway serves as a replacement for the BTCVT, which is no longer available but continues to be supported.
MS-MULTENGSW-6	DVD with Network Engine software images for all NAEs and NCEs; for upgrading existing, engine-only (no ADS/X) installations.
MS-EXPORT-0	License enabling <i>Metasys</i> Export Utility software for new installation. Software may be obtained by electronic download from the Licensing Portal or by ordering a DVD copy.
MS-COPY-EXPORT	DVD reproduction of <i>Metasys</i> Export Utility product, unlicensed
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
SC450RM1U (OEM Part No.)	Recommended UPS for NxE85 model: APC Smart-UPS SC 450 VA, 280 W, 120 VAC input/output with NEMA 5-15R output connections

**Table 12: Modbus accessories ordering information**

Product Code Number	Description
IU-9100-8401 (Europe)	RS232-to-RS485 converter, 230 VAC Order this accessory in AOMS from the Essen Distribution Center.
IU-9100-8404 (Europe) or BM485-CIP (North America)	RS232-to-RS485 converter, 24 VAC For the European market, order this accessory in AOMS from the Essen Distribution Center. For the North American market, order this accessory from duTec ( <a href="http://www.interfaceconverter.com">http://www.interfaceconverter.com</a> or 1-800-248-1632), specify vendor #290904

**Table 13: M-Bus accessories ordering information**

Product Code Number	Description
SIS-MBUSSCSL-0E	M-Bus level converter for up to 6 unit loads, 24V AC/DC (RS-232 connection)
SIS-MBUSSCLL-0E	M-Bus level converter for up to 100 unit loads, 24V AC/DC (RS-232 connection)
SIS-MBUSNCLL-0E	M-Bus level converter for up to 100 unit loads; 24 VAC/VDC (IP connection)
SIS-MBUSNCLH-0E	M-Bus level converter for up to 100 unit loads; 230 VAC (IP connection)
SIS-MBUSRPLL-0E	M-Bus repeater for up to 100 unit loads, 24V AC/DC
SIS-MBUSRPLH-0E	M-Bus repeater for up to 100 unit loads; 230 VAC
INT-DX-KAB01	Optional connection cable SUB-D to RJ-12 for use with SIS-MBUSSCLL-0E
<b>Note:</b> Order these accessories in AOMS from the Essen Distribution Center.	

**Table 14: KNX accessories ordering information**

Product Code Number	Description
SIS-KNXNIXL-0E	KNX IP interface module to connect KNX line through Ethernet to a network engine
SIS-KNXNRXL-0E	KNX IP router to connect KNX line through Ethernet to a network engine, including line or area coupler functionality
<b>Note:</b> Order this accessory in AOMS from the Essen Distribution Center.	

## Technical specifications - NCE25 and NAE5 models

**Table 15: NCE25 technical specifications**

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 VA maximum for NCE25 only <i>i</i> <b>Note:</b> The 25 VA rating does <b>not</b> include any power supplied by the NCE to devices connected at the NCE BOs. BO devices connected to and powered by an NCE can require an additional 125 VA (maximum).
Power Source	+15 VDC power source terminals provide 100 mA total current; quantity of inputs: five, located in Universal IN terminals; for active (3-wire) input devices
Ambient Operating Conditions	0°C to 50°C (32°F to 122°F), 10% to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40°C to 70°C (-40°F to 158°F), 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
Processors	<b>Supervisory Controller:</b> 192 MHz Renesas SH4 7760 RISC processor <b>Field Controller:</b> 20 MHz Renesas H8S2398 processor
Memory	<b>Supervisory Controller:</b> 128 MB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup and 128 MB SDRAM for operations data dynamic memory <b>Field Controller:</b> 1 MB flash memory and 1 MB RAM
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)
Network and Serial Interfaces (Depending on NCE model)	<ul style="list-style-type: none"> <li>• One Ethernet port; 10/100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 SA Bus port; with a pluggable and keyed 4-position terminal block (on all NCE25 models)</li> <li>• One optically isolated RS-485 port; with a pluggable and keyed 4-position terminal block (only on NCE25 models that support an N2 Bus or MS/TP bus trunk)</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (only on NCE25 models that support a LonWorks Network trunk). The LonWorks models are supported to run the <i>Metasys</i> Release 9.0 software, <b>but not the Release 9.0.7 patch update.</b></li> <li>• One RS-232-C serial port with a standard 9-pin sub-D connector that supports standard baud rates</li> <li>• One USB serial port with standard USB connector that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NCE is patched with Release 9.0.7.</li> </ul>
Analog Input/Analog Output Point Resolution	<ul style="list-style-type: none"> <li>• Analog Input Points: 16-bit resolution</li> <li>• Analog Output Points: 16-bit resolution and <math>\pm 200</math> mV accuracy on 0-10 VDC applications</li> </ul>
Input/Output Capabilities	<ul style="list-style-type: none"> <li>• 10-Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact</li> <li>• 8-Binary Inputs: Defined as Dry Contact Maintained or Pulse/Accumulator Mode</li> <li>• 4-Analog Outputs: Defined as 0–10 VDC or 4–20 mA</li> <li>• 7-Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power)</li> <li>• 4-Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO</li> </ul>
Dimensions (Height x Width x Depth)	155 mm x 270 mm x 64 mm (6.1 in. x 10.6 in. x 2.5 in.), Minimum mounting space required: 250 mm x 370 mm x 110 mm (9.8 in. x 14.6 in. x 4.3 in.)


**Table 15: NCE25 technical specifications**

Housing	Plastic housing Plastic material: ABS and polycarbonate Protection: IP20 (IEC60529)
Mounting	On a flat surface with screws, on three mounting clips, or a single 35 mm DIN rail
Shipping Weight	1.2 kg (2.7 lb)
Compliance	<p><b>United States:</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p><b>Canada:</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment Industry Canada Compliant, ICES-003</p> <p><b>Europe:</b> CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.</p> <p><b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant</p> <p><b>BACnet International:</b> BTL 135-2010 Listed B-BC, Protocol Revision 12</p>

**Table 16: NAE35 and NAE45 technical specifications**

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 VA maximum
Ambient Operating Conditions	0°C to 50°C (32°F to 122°F); 10% to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40°C to 70°C (-40°F to 158°F); 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 for operating system, configuration data, and operations data storage and backup 128 MB SDRAM for operations data dynamic memory
Operating System	Microsoft Windows Embedded CE 6.0 (Release 9.0) Buildroot 2017.08.2 with Linux kernel 14.4 (Release 9.0.7 patch)
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; connects at 10 or 100 Mbps; 8-pin RJ-45 connector</li> <li>• One optically isolated RS-485 port; 9.6k, 19.2k, 38.4k, or 76.8k baud (depending on protocol); with a pluggable and keyed 4-position terminal block (FC Bus available on NAE351x and NAE451x models only)</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE352x-x and NAE452x models only). The LonWorks models are supported to run the <i>Metasys</i> Release 9.0 software, <b>but not the Release 9.0.7 patch update.</b></li> <li>• One RS-232-C serial port with standard 9-pin sub-D connector that supports standard baud rates.</li> <li>• Second serial port, on models without an internal modem, that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NAE is patched with Release 9.0.7.</li> <li>• One USB serial port with standard USB connector that supports an optional, user-supplied external modem. Modem functions are available with <i>Metasys</i> Release 9.0, but <b>are not</b> available after the NAE is patched with Release 9.0.7.</li> </ul>
Housing	Plastic housing material: ABS polycarbonate UL94-5VB Protection: IP20 (IEC 60529)
Mounting	On a flat surface with screws on three mounting clips or a single 35 mm DIN rail

**Table 16: NAE35 and NAE45 technical specifications**

Dimensions (Height x Width x Depth)	131 mm x 270 mm x 62 mm (5-3/16 in. x 10-5/8 in. x 2-1/2 in.) Minimum space for mounting NAE35 and NAE45: 210 mm x 350 mm x 110 mm (8-3/16 in. x 13-13/16 in. x 4.-5/16 in.)
Shipping Weight	1.2 kg (2.7 lb)
Compliance  	<b>United States:</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A
	<b>Canada:</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	<b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant
	<b>Europe:</b> CE Mark – Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.
	<b>BACnet International:</b> BTL 135-2010 Listed B-BC, Protocol Revision 12


The MS-NAE5510-2U and MS-NAE5510-3U network engines with Release 8.1 software comply with UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control Listing for United States and Canada. Refer to the *Metasys® System UL 864 10th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System Technical Bulletin (LIT-12012487)* for specific UL 864 UUKL listing guidelines that must be followed per UL 864.

**Table 17: NAE5510-2U (Smoke Control) technical specifications**

Power Requirement	Dedicated nominal 24 VAC, Class 2 power supply (North America) at 50/60 Hz (20 VAC minimum to 30 VAC maximum)
Power Consumption	50 VA maximum
Ambient Operating Conditions	0°C to 50°C (32°F to 122°F); 10% to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40°C to 70°C (-40°F to 158°F); 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. Onboard cell; typical life 10 years at 21°C (70°F)
Processor	1.6 GHz Intel Atom® processor
Memory	4 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup. 1 GB SDRAM for operations data dynamic memory for all models
Operating System	Johnson Controls OEM Version of Microsoft Windows Standard 2009 (used by <i>Metasys</i> system Release 8.1)
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; 10/100/1,000 Mbps; 8-pin RJ-45 connector</li> <li>• Two optically isolated RS-485 ports; 9.6k, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4-position terminal blocks</li> <li>• Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB serial ports; standard USB connectors (use is not supported on Smoke Control NAEs)</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate
Mounting	On a flat surface with screws on four mounting feet or on a dual 35 mm DIN rail
Dimensions (Height x Width x Depth)	226 mm x 332 mm x 96.5 mm (8.9 in. x 13.1 in. x 3.8 in.) including mounting feet Minimum space for mounting: 303 mm x 408 mm x 148 mm (12.0 in. x 16.1 in. x 5.8 in.)
Shipping Weight	2.9 kg (6.4 lb)




**Table 17: NAE5510-2U (Smoke Control) technical specifications**

<p>Compliance</p> 	<p><b>United States:</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p>UL Listed, File S4977, UL 864 UUKL/UUKLC 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems Equipment</p>
	<p><b>Canada:</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment, Industry Canada Compliant, ICES-003</p> <p>UL Listed, File S4977, UL 864 UUKL/ORD-C100-13 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems</p>
	<p><b>Europe:</b> CE Mark - Johnson Controls, Inc. declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.</p>
	<p><b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant</p>
	<p><b>BACnet International:</b> BTL 135-2010 Listed B-BC, Protocol Revision 12</p>

**Table 18: NAE55xx-3 (Energy Management) and NAE5510-3U (Smoke Control) technical specifications**

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	50 VA maximum
Ambient Operating Conditions	0°C to 50°C (32°F to 122°F); 10% to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40°C to 70°C (-40°F to 158°F); 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. Onboard cell; typical life 10 years at 21°C (70°F)
Processor	1.46 GHz Intel® Atom® Bay Trail E3815 processor for MS-NAE55xx-3 models
Memory	16 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup for MS-NAE55xx-3 models. 2 GB DDR3 SDRAM for operations data dynamic memory for all models
Operating System	Johnson Controls OEM Version of Microsoft Windows Embedded Standard 7 with SP1 (WES7, Release 9.0) Wind River® Linux LTS 17 (LTS=long-term support) at Release 10.1
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>• One Ethernet port; 10/100/1,000 Mbps; 8-pin RJ-45 connector</li> <li>• Two optically isolated RS-485 ports; 9.6k, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks (RS-485 terminal blocks available on NAE55 models only)</li> <li>• Two RS-232-C serial ports, with standard 9-pin sub-D connectors, that support all standard baud rates</li> <li>• Two USB 2.0 serial ports; standard USB connectors support an optional, user-supplied external modem for engines at Release 9.0 or earlier.</li> <li>• One LonWorks port; FTT10 78 Kbps; pluggable, keyed 3-position terminal block (LonWorks port available on NAE552x-x models only)</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate; Protection: IP20 (IEC 60529)
Mounting	On a flat surface with screws on four mounting feet or on a dual 35 mm DIN rail
Dimensions (Height x Width x Depth)	226 mm x 332 mm x 96.5 mm (8.9 in. x 13.1 in. x 3.8 in.) including mounting feet Minimum space for mounting: 303 mm x 408 mm x 148 mm (12.0 in. x 16.1 in. x 5.8 in.)
Shipping Weight	2.9 kg (6.4 lb)

**Table 18: NAE55xx-3 (Energy Management) and NAE5510-3U (Smoke Control) technical specifications**

<p>Compliance</p> 	<p><b>United States:</b> UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment, FCC Compliant to CFR47, Part 15, Subpart B, Class A</p> <p>UL Listed, File S4977, UL 864 UUKL/UUKLC 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems Equipment (MS-NAE5510-3U model only with Release 8.1 software)</p>
	<p><b>Canada:</b> UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment, Industry Canada Compliant, ICES-003</p> <p>UL Listed, File S4977, UL 864 UUKL/ORD-C100-13 10th Edition Listed, Smoke Control Units and Accessories for Fire Alarm Systems (MS-NAE5510-3U model only with Release 8.1 software)</p>
	<p><b>Europe:</b> CE Mark - Johnson Controls declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive.</p>
	<p><b>Australia and New Zealand:</b> RCM Mark, Australia/NZ Emissions Compliant</p>
	<p><b>BACnet International:</b> BTL 135-2016 Listed B-BC/B-BBMD, Protocol Revision 15</p>

**Table 19: NAE-S technical specifications (North America and Canada only)**

Power Requirements	<p><b>NAE551S-2 Engine:</b></p> <p>Dedicated nominal 24 VAC, Class 2 power supply (North America), at 50/60 Hz (20 VAC minimum to 30 VAC maximum)</p> <p><b>Internal Module with Embedded Encryption Technology:</b></p> <p>Input: Dedicated nominal 100–240 VAC, Class 1 power supply (North America), at 50/60 Hz (85 VAC minimum to 264 VAC maximum)</p> <p>Output: 24 VDC (22 VDC minimum to 26 VDC maximum)</p>
Power Consumption	50 VA maximum
Power Specifications for Encryption Board	Dedicated nominal 24 VDC, input voltage range 85–264 VAC (120–375 VDC), output current 2.0A
Ambient Operating Conditions	0°C to 50°C (32°F to 122°F); 10% to 90% RH, 30°C (86°F) maximum dew point
Ambient Storage Conditions	-40°C to 70°C (-40°F to 158°F); 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 70°F (21°C); 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	1.6 GHz Intel Atom® processor
Memory	4 GB flash nonvolatile memory for operating system, configuration data, and operations data storage and backup 1 GB SDRAM for operations data dynamic memory for all models
Network and Serial Interfaces	<ul style="list-style-type: none"> <li>One Ethernet port; 10/100/1000 Mbps; 8-pin RJ-45 connector</li> <li>Two optically isolated RS-485 ports; 9.6k, 19.2k, 38.4k, or 76.8k baud; pluggable and keyed 4 position terminal blocks (RS-485 terminal blocks available)</li> </ul>
Housing	Plastic housing with internal metal shield Plastic material: ABS + polycarbonate; Protection: IP20 (IEC 60529)
Mounting	Must be mounted in a locked, secure panel using four mounting feet or dual 35 mm DIN rails.
Dimensions (Height x Width x Depth)	226 mm x 332 mm x 96.5 mm (8.9 in. x 13.1 in. x 3.8 in.) including mounting feet Minimum space for mounting: 303 mm x 408 mm x 148 mm (12.0 in. x 16.1 in. x 5.8 in.)
Shipping Weight	3.88 kg (10.4 lb)

**Table 19: NAE-S technical specifications (North America and Canada only)**

Shipping Restriction	The Bureau of Industry and Security of the U.S. Department of Commerce has regulated this shipment under 740.17(b)(2) of the EAR and restricted the shipment of this product to the following countries: Cuba, Iran, North Korea, Sudan, and Syria.
Compliance	<b>United States:</b> UL 508A and CCN NITW Industrial Control Panel Listed, FCC Compliant to CFR47, Part 15, Subpart B, Class A
	<b>Canada:</b> cUL CSA-C22.2 No. 14, CCN NITW7, Industrial Control Equipment; IC Compliant to ICES-003 Class A
	<b>BACnet International:</b> BTL 135-2012 Listed B-BC, Protocol Revision 12

**Table 20: NAE85 software system recommendations for installation or upgrade**

Recommended Computer Platform	IntelXeon E5506, 2.13 GHz, 4 MB Cache 2 x 160 GB 7.2K SATA, 8.9 cm (3.5 in.) Cabled 3 Gbps, RAID 1 configuration with add-in SAS6/iR (SATA/SAS Controller)
Recommended Memory	8 GB RAM minimum
Hard Disk	160 GB minimum
Supported Operating Systems and Software	<ul style="list-style-type: none"> <li>Windows® Server® 2016 with Update (KB4489890) (64-bit)</li> <li>Windows® Server® 2012 R2 with Update (KB2919355) (64-bit)</li> <li>Windows® Server® 2012 with Update (KB3172614) (64-bit)</li> </ul> <p>ⓘ <b>Note:</b> The NAE85 software requires two Windows components: Microsoft .NET Framework Version 3.5 SP1 and Microsoft .NET Framework Version 4.6.1.</p>
Supported Operating Systems for <i>Metasys</i> Client Computers	<ul style="list-style-type: none"> <li>Windows® 10 Pro and Windows 10 Enterprise Editions (version 1809 or later) (64-bit)</li> <li>Windows® 8.1 Pro and Windows 8.1 Enterprise Editions with Update (KB2919355) (64-bit)</li> <li>Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (64-bit)</li> <li>Windows® 7 Professional, Enterprise, and Ultimate Editions with SP1 (32-bit)</li> <li>Apple® OS X® 10.14 Mojave</li> <li>Apple® OS X® 10.13 High Sierra</li> <li>Apple® OS X® 10.12 Sierra</li> <li>Apple® OS X® 10.11 El Capitan</li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>Apple® operating systems are supported for <i>Metasys</i> client computers only.</li> <li>In Apple® OS X®, you cannot view Graphics+ graphics in the SMP UI.</li> </ul>
Internal Optical Drive	DVD ROM, SATA
Recommended Antivirus Software	Symantec Endpoint Protection version 12
Supported Web Browser Software for <i>Metasys</i> Client Computers	<ul style="list-style-type: none"> <li>Windows® Internet Explorer® 11.0.9600.18816 Update version 11.0.47 or later</li> <li>Google® Chrome™ version 72.0.3626.121 or later</li> <li>Apple® Safari® 11 or later</li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>In Internet Explorer 11, select the Use Microsoft compatibility lists option, found under <b>Tools &gt; Compatibility View Settings</b>, to ensure that websites appear and function correctly.</li> <li>Other browsers, such as Mozilla® Firefox®, may also be used but are not fully supported.</li> <li>Use a web browser to download the Launcher application. After you install Launcher, use Launcher, not the web browser, to log on the <i>Metasys</i> SMP UI.</li> </ul>
Supported Virtual Environments	Microsoft Hyper-V™, VMware®
Network Communication	Network Interface: 1 Gbps Ethernet network interface card connects at 10 Mbps, 100 Mbps, or 1 Gbps (100 Mbps or better recommended)

**Table 20: NAE85 software system recommendations for installation or upgrade**

Recommended Data Protection	UPS for NxE85 model: APC Smart-UPS SC 450VA, 280 W, 120 VAC input/output, NEMA 5-15R output connections, OEM Part No. SC450RM1U
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## 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 may cause harmful interference, in which case the users will be required to correct the interference at their 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.

### Single point of contact

APAC	Europe	NA/SA
JOHNSON CONTROLS C/O CONTROLS PRODUCT MANAGEMENT NO. 32 CHANGJIANG RD NEW DISTRICT WUXI JIANGSU PROVINCE 214028 CHINA	JOHNSON CONTROLS WESTENDHOF 3 45143 ESSEN GERMANY	JOHNSON CONTROLS 507 E MICHIGAN ST MILWAUKEE WI 53202 USA

For more contact information, refer to [www.johnsoncontrols.com/locations](http://www.johnsoncontrols.com/locations).

### Software terms

**Use of the software that is in (or constitutes) this product, or access to the cloud, or hosted services applicable to this product, if any, is subject to applicable terms set forth at [www.johnsoncontrols.com/techterms](http://www.johnsoncontrols.com/techterms).** Your use of this product constitutes an agreement to such terms.

### Product warranty

This product is covered by a limited warranty, details of which can be found at [www.johnsoncontrols.com/buildingswarranty](http://www.johnsoncontrols.com/buildingswarranty).

### Patents

Patents: <http://jciapat.com>