



Overview

The **ECP-VAVS and ECP-VAV series** are microprocessor-based programmable variable air volume (VAV) controllers designed to control any variable air volume box. Each controller uses the LonTalk® communication protocol and is LONMARK certified as a Multi-I/O module.

This series contains four models: ECP-VAVS, ECP-VAV, ECP-VVT, and ECP-VAV-N. These models support various input types including resistance, voltage, and digital-based ones. Moreover, they provide digital, floating, pulse width modulation, and proportional control for valves, heating elements, fans, and lighting applications. In particular, the ECP-VAVS and ECP-VAV models have an on-board air flow sensor with a range of 0-1 inches of water column (250 Pascal), as well as a built-in brushless actuator for precise damper positioning for loads requiring up to 35 inch-pounds (4 Newton-meters) of torque.

All controller models work with the EC-Smart-Sensor Series, a line of communicating sensors that can be used for indoor temperature measurement, setpoint adjustment, and occupancy state override. The EC-Smart-Sensor-VAV in particular, can also perform VAV airflow balancing. In addition, all the controllers are Open-to-Wireless® ready, and when paired with the Wireless Receiver, they work with a variety of wireless battery-less sensors and switches.

Each controller can be programmed using either EC-gfxProgram, a state-of-the-art object-oriented graphical programming interface tool, or EC-Program, a user-friendly line-by-line programming tool. Both tools are accessible from any LNS®-based software such as Distech Controls' Lonwatcher 3 or from any multi-protocol platform software that supports LONWORKS devices, such as Distech Controls' EC-Net^{AX}, which is powered by the Niagara^{AX} Framework®.

Applications

- Designed to meet the requirements of single duct VAV zone applications, including:
 - Cooling Only VAV Boxes
 - Cooling with Reheat VAV Boxes
 - Parallel Fan VAV Boxes
 - Series Fan VAV Boxes
 - Dual-Duct VAV Systems
- Improves energy efficiency when combined with:
 - Motion detectors to automatically adjust a zone's occupancy mode from standby to occupied when presence is detected
 - CO₂ sensors as part of a demand-controlled ventilation strategy that adjusts the amount of fresh air intake according to the number of building occupants
 - Light switches to control both lighting and a room's HVAC occupancy / standby mode setting
- Works with a wide range of wireless battery-less sensors

Features & Benefits

- Programmable using EC-gfxProgram or EC-Program, which are accessible in both LNS-based and Niagara^{AX}-based software, allowing you to work with your preferred network management platform
- Available with an optional Wireless Receiver that supports up to 14 wireless inputs, letting you create wire-free installations and use various wireless battery-less sensors and switches
- LONMARK Multi-I/O module certified, guaranteeing interoperability with other manufacturers' LONMARK-approved controllers
- Accurate on-board air flow sensor for precise air flow monitoring and control at low and high air flow rates, permitting you to design for maximum energy efficiency while maintaining an optimal comfort level
- Built-in actuator with a brushless motor and integrated position feedback system eliminates periodic damper re-initialization and ensures worry-free operation, providing increased occupant comfort and extended service life
- Highly accurate universal inputs support thermistors and resistance temperature detectors (RTDs) that range from 100 Ohms to 100 000 Ohms, giving you the freedom of using your preferred or engineer-specified sensors, in addition to any existing ones

Models in this Series



| Model | ECP-VAVS | ECP-VAV | ECP-VVT | ECP-VAV-N |
|--|--------------|--------------|--------------|--------------|
| Points | 7-Point VAV | 12-Point VAV | 11-Point VVT | 11-Point VAV |
| Universal inputs | 2 | 4 | 4 | 4 |
| Built-in flow sensor (0-1 in. W.C.) | ■ | ■ | | ■ |
| Wireless inputs ¹ | 14 | 14 | 14 | 14 |
| Digital (triac) outputs | 2 | 4 | 4 | 4 |
| Digital (0 – 10VDC) LED occupancy output | 1 | 0 | 0 | 0 |
| Universal outputs | 0 | 2 | 2 | 2 |
| Built-in Actuator | ■ | ■ | ■ | |
| Product Number (EC-Program) | CDIP-VASX-02 | CDIP-VAXX-00 | CDIP-VTXX-00 | CDIP-VANX-00 |
| Product Number (EC-gfxProgram) | CDIP-VASG-02 | CDIP-VAXG-00 | CDIP-VTXG-00 | CDIP-VANG-00 |

1. Available when an optional Wireless Receiver is connected to the controller.

Recommended Applications

| Model | ECP-VAVS | ECP-VAV | ECP-VVT | ECP-VAV-N |
|--|----------|---------|---------|-----------|
| Cooling Only VAV Box | ■ | | ■ | |
| Cooling w/Reheat VAV Box | ■ | | ■ | |
| Cooling w/Reheat VAV Box & Perimeter Heating | | ■ | ■ | |
| Parallel Fan VAV Box | | ■ | | |
| Series Fan VAV Box | | ■ | | |
| Dual Duct VAV Box ¹ | ■ | | | |
| Large Damper VAV Box Requiring More Than 35 in-lb (4 Nm) Actuator Torque | | | | ■ |
| Existing Damper Actuator | | | | ■ |
| Room Pressurization | | ■ | | |

1. For a Dual Duct VAV system, two controllers are required or one controller with an external flow sensor and actuator.

Open-to-Wireless Wireless Receiver – Optional



To reduce the cost of installation, and minimize the impact on existing partition walls, the Wireless Receiver enables every controller from this series to communicate with a line of wireless battery-less room sensors and switches.

- Wireless Receiver (315) - Receiver for EnOcean® 315MHz wireless-enabled sensors and switches
- Wireless Receiver (868) - Receiver for EnOcean 868.3MHz wireless-enabled sensors and switches

Note that controllers have one wireless port to support a single Wireless Receiver.

For more information about the EnOcean technology and Open-to-Wireless, refer to the Open-to-Wireless Solution Guide. For more information about the Wireless Receiver module, refer to the Wireless Receiver Datasheet. These documents can be found on our web site at www.distech-controls.com.

Supported Platforms



EC-Net^{AX}

EC-Net^{AX} is a web-enabled multi-protocol integration solution powered by the Niagara^{AX} Framework, establishing a fully Internet-enabled, distributed architecture for real-time access, automation and control of devices. EC-Net^{AX}'s open framework creates a common development and management environment for integration of LONWORKS[®], BACnet[®] and other protocols. Regardless of manufacturer and protocol, the EC-Net^{AX} system provides a unified modeling of diverse systems and data, providing one common platform for development, management and enterprise applications.



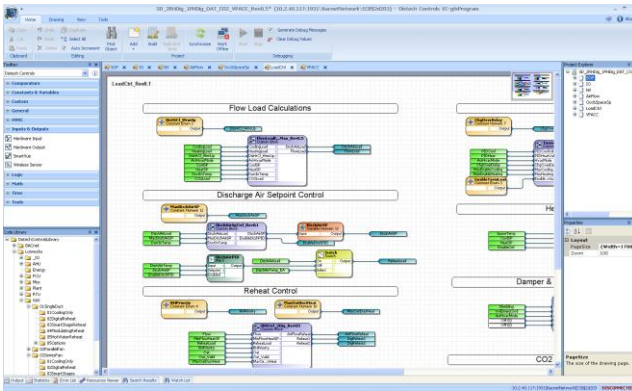
LONWORKS Network Services (LNS)

LNS[®] is a client-server platform that allows multiple users, running different LNS-compatible applications, to access a common source for directory, installation, management, monitoring and control services for the network system being managed. Distech Controls' Lonwatcher is an example of a LNS-based network management tool that can use Plug-Ins to configure and monitor controllers and devices in the control system.

EC-Net^{AX} Wizards and LNS Plug-Ins

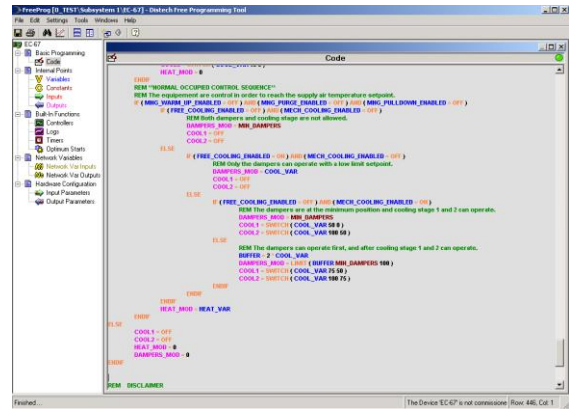
EC-gfxProgram Graphical Programming Tool

Distech Controls' EC-gfxProgram is a programming tool that allows you to quickly create control sequences by "dragging and dropping" block objects and then linking the objects with a simple "click, select and release". Select objects from an extensive library of over 90 commonly used functions as well as create your own custom blocks. With a user-friendly interface and intuitive programming environment, HVAC programming could not be easier. Refer to the EC-gfxProgram datasheet for more information.



EC-Program Programming Tool

Distech Controls' EC-Program is unique in the controls industry because it combines a user-friendly GUI (Graphical User Interface) with the power and flexibility of a code editor and compiler. The EC-Program configuration tool uses a special and simplified version of BASIC that has been developed in-house and that is custom made to suit control requirements. Refer to the EC-Program datasheet for more information.



EC-gfxProgram Software features:

- Program both ECP Series LonWorks and ECB Series BACnet controllers with the same tool
- Supplied as freeware – there are no associated licensing costs
- Block-oriented programming
- Live debugging allows user to view code execution, input/output values and to detect errors in real-time
- Extensive block library of the most commonly used functions divided into 11 convenient categories containing over 90 block objects
- A code library for managing your favorite or most commonly used code or code sections
- Backup / Restore function stores the complete code in the controller allowing the retrieval of all programming code features

EC-Program Software features:

- Line-by-line programming
- Built-in screen to view and configure internal point values such as variables, constants, etc.
- Uses integers ranging from ± 32767
- 18 NVIs and 18 NVOs; changeable type and length
- 2 NVI Fan-in bindings
 - 1 NVI – High and Low selection
 - 1 NVI – Weighted Average
- 10 PID loops
- 4 NVI Schedules. Changeable type and length. Supported types are: SNVT_tod_event; SNVT_occupancy; and SNVT_hvac_mode
- Programming functions such as Reserved Words (SQRT, SWITCH, LIMIT, etc.)
- Up to 24 trend log objects for a total of 12,000 stored events in the controller

Complementary Products

Temperature Sensors

Supported Smart-Sensors (EC-gfxProgram only)



| | |
|-----------------------|---|
| EC-Smart-Sensor-VAV | Communicating sensor with 2-line LCD, setpoint adjustment, occupancy override, room temperature display, and VAV airflow balancing |
| EC-Smart-Sensor-100 | Communicating sensor with 2-line LCD, setpoint adjustment, occupancy override, and room temperature display |
| EC-Smart-Sensor-200 | Communicating sensor with 2-line LCD, setpoint adjustment, fan speed control, occupancy override, HVAC mode selection, and room temperature display |
| EC-Smart-Sensor-FC | Communicating sensor with 2-line LCD, setpoint adjustment, fan speed control, and room temperature display |
| EC-Smart-Sensor-FC-CF | Communicating sensor with 2-line LCD, setpoint adjustment, fan speed control, room temperature display, and °C/°F toggle button |

Allure EC-Sensor

Line of discrete sensors



| | |
|---------------|--|
| EC-Sensor | Room temperature sensor with communication jack |
| EC-Sensor-O | Room temperature sensor with occupancy override button and communication jack |
| EC-Sensor-S | Room temperature sensor with setpoint adjustment and communication jack |
| EC-Sensor-SO | Room temperature sensor with setpoint adjustment, occupancy override button, and communication jack |
| EC-Sensor-SOF | Room temperature sensor with setpoint adjustment, occupancy override button, fan speed selection, and communication jack |

Open-to-Wireless Sensors and Switches (requires Wireless Receiver and EC-gfxProgram)

Allure Wireless Battery-less ECW-Sensor

Line of wireless, battery-less sensors. Available in EnOcean 315MHz and 868.3MHz versions.



| | |
|----------------|--|
| ECW-Sensor | Room temperature sensor |
| ECW-Sensor-O | Room temperature sensor with occupancy override button |
| ECW-Sensor-S | Room temperature sensor with setpoint adjustment |
| ECW-Sensor-SO | Room temperature sensor with setpoint adjustment and occupancy override button |
| ECW-Sensor-SOF | Room temperature sensor with setpoint adjustment, occupancy override button, and fan speed selection |

Wireless EnOcean Sensors and Switches



| | |
|--------|---|
| 41-580 | Wireless solar-cell powered motion detector. Available at 868.3MHz. |
|--------|---|



| | |
|--|--|
| 2-channel Light Switch 4-channel Light Switch | 2-/4-channel wireless light switches (European models). Available at 315MHz or 868.3MHz. |
|--|--|



| | |
|-------------------|--|
| PTM265 PTM265D | 2-/4-channel wireless light switches (North American models). Available at 315MHz or 868.3MHz. |
|-------------------|--|

For a complete list of the Open-to-Wireless EnOcean sensors and switches that are compatible with the controllers in this series, refer to the Open-to-Wireless Solution Guide which can be found on our web site at www.distech-controls.com.

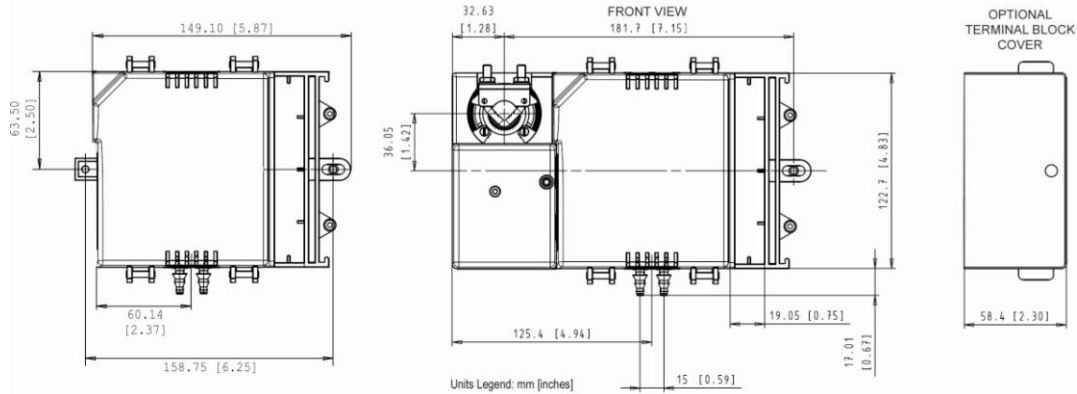
Other



| | |
|----------------------|---|
| Terminal Block Cover | Cover designed to conceal the wire terminals. Required to meet local safety regulations in certain jurisdictions. |
|----------------------|---|

For more information on these or other Distech Controls products please refer to our web site at www.distech-controls.com or contact sales@distech-controls.com.

Controller Dimensions



Product Specifications

Power

| | |
|---------------------|---|
| Voltage | 24VAC; $\pm 15\%$; 50/60Hz; Class 2 |
| Protection | 3.0A user-replaceable fuse for triac outputs when using the internal power supply |
| Typical Consumption | |
| - ECP-VAVS | 12VA; triac outputs (1 valve @ 4VA) & LED occupancy output ON with 20mA load |
| - Other models | 18VA; triac outputs (2 valves @ 4VA) & 2 outputs with 20mA load @ 12VDC |
| Maximum Consumption | |
| - ECP-VAVS | 40VA - if internal power supply is used |
| - Other models | 70VA - if internal power supply is used |

Interoperability

| | |
|-------------------------------------|-----------------------|
| Communication Channel | LonTalk protocol |
| LONMARK Interoperability Guidelines | TP/FT-10; 78Kbps |
| Device Class | Version 3.4 |
| LONMARK Functional Profile | Multi I/O module |
| - Input objects | Open-Loop Sensor #1 |
| - Output objects | Open-Loop Actuator #3 |

Hardware

| | |
|-----------|--|
| Processor | Neuron [®] 3150; 8 bits; 10MHZ |
| Memory | Non-volatile Flash 64K (APB applications) Non-volatile Flash 128K (storage) |

Environmental

| | |
|-----------------------|------------------------------|
| Operating Temperature | 0°C to 50°C; 32°F to 122°F |
| Storage Temperature | -20°C to 50°C; -4°F to 122°F |
| Relative Humidity | 0 to 90% Non-condensing |

Enclosure

| | |
|--------------------------|--|
| Material | FR/ABS |
| Color | Black & blue casing & grey connectors |
| Dimensions (with Screws) | |
| - ECP-VAV-N | 4.8" x 5.9" x 2.5" (122.7mm x 149.1mm x 63.0mm) |
| - Other models | 4.8" x 8.4" x 2.5" (122.7mm x 214.3mm x 63.0mm) |
| Shipping Weight | |
| - ECP-VAV-N | 0.92lbs (0.42kg) |
| - Other models | 2.30lbs (1.05kg) |

Integrated Damper Actuator

| | |
|---------------------|----------------------------------|
| Motor | Belimo LMZS-H brushless DC motor |
| Torque | 35 in-lb, 4 Nm |
| Degrees of Rotation | 95° adjustable |
| Fits Shaft Diameter | 5/16 to 3/4"; 8.5 to 18.2mm |

Inputs

| | |
|-----------------------|---|
| Input Types | Universal; software configurable |
| -Voltage | 0-10VDC |
| -Current | 4-20mA with 249Ω external resistor (wired in parallel) |
| -Digital | Dry contact |
| -Pulse | Dry contact; 500ms minimum ON/OFF |
| -Resistor | |
| <i>Thermistor</i> | 10KΩ Type 2, 3 (10KΩ @ 25°C; 77°F) Range: -40°C to 150°C; -40°F to 302°F |
| <i>Platinum</i> | Pt1000 (1KΩ @ 0°C; 32°F) Range: -40°C to 150°C; -40°F to 302°F |
| <i>Nickel</i> | Pt100 (100Ω @ 0°C; 32°F) Range: -40°C to 135°C; -40°F to 275°F |
| <i>Potentiometer</i> | RTD Ni1000 (1KΩ @ 0°C; 32°F) Range: -40°C to 150°C; -40°F to 302°F |
| Input Resolution | Translation table configurable on several points 16-bit analog / digital converter |
| Differential Pressure | Range: 0 to 250 Pa (0 to 1.0 in. W.C.) Resolution: 0.000162 milli-in. W.C. Accuracy: $\pm 3\%$ full scale |

Outputs

| | |
|------------------------------|---|
| Digital | 24 VAC Triac, digital (on/off), PWM, or floating ¹ ; software configurable |
| | - 0.5A continuous |
| | - 1.0A @ 15% duty cycle for a 10-minute period |
| | - PWM control: adjustable period from 2 seconds to 15 minutes |
| | - Floating control: requires two consecutive outputs ¹ |
| | - Min pulse on/off: 500msec. |
| | - Adjustable drive time period |
| Digital LED occupancy output | External or internal power supply (jumper selectable) |
| Universal | 0-10VDC dedicated output for occupancy sensor LED. Max. 20mA |
| | 0-10VDC, digital 0-12VDC (on/off), floating ¹ or PWM |
| | - PWM control: adjustable period from 2 seconds to 15 minutes |
| | - Floating control: requires two consecutive outputs ¹ |
| | - Min pulse on/off: 500msec. |
| | - Adjustable drive time period |
| | - 20mA max. @ 12VDC |
| | - Minimum load resistance 600Ω |
| Output Resolution | 10-bit digital / analog converter |

Product Specifications (continued)



Wireless Receiver^{2,4}

| | |
|--|--|
| Communication | EnOcean wireless standard |
| Number of wireless inputs ³ | 14 |
| Supported Wireless Receivers | Wireless Receiver (315) Wireless Receiver (868) |
| Cable | Telephone cord |
| - Connector | 4P4C modular jack |
| - Length | 6.5ft; 2m |

Electromagnetic Compatibility

| | |
|--------------|--|
| CE -Emission | EN61000-6-3: 2007; Generic standards for residential, commercial and light-industrial environments |
| -Immunity | EN61000-6-1: 2007; Generic standards for residential, commercial and light-industrial environments |
| FCC | This device complies with FCC rules part 15, subpart B, class B |



- Available only when controller is programmed with EC-gfxProgram.
- Available when an optional external Wireless Receiver is connected to the controller. Refer to the Open-to-Wireless Solution Guide for a list of supported EnOcean wireless modules.
- Some wireless sensors may use more than one wireless input from the controller.
- An EC-Smart-Sensor and Wireless Receiver cannot be used at the same time. However, an EC-Smart-Sensor can be temporarily connected to a controller in wireless mode to perform VAV airflow balancing.
- All materials and manufacturing processes comply with the RoHS directive  and are marked according to the Waste Electrical and Electronic Equipment (WEEE) directive .

EC-Smart-Sensors⁴

| | |
|------------------|--|
| Models Supported | EC-Smart-Sensor-VAV, EC-Smart-Sensor-100 EC-Smart-Sensor-200, EC-Smart-Sensor-FC EC-Smart-Sensor-FC-CF |
|------------------|--|

| | |
|-----------------------------|--------|
| Power & communication | 2-wire |
| Number of sensors supported | 1 |

Agency Approvals

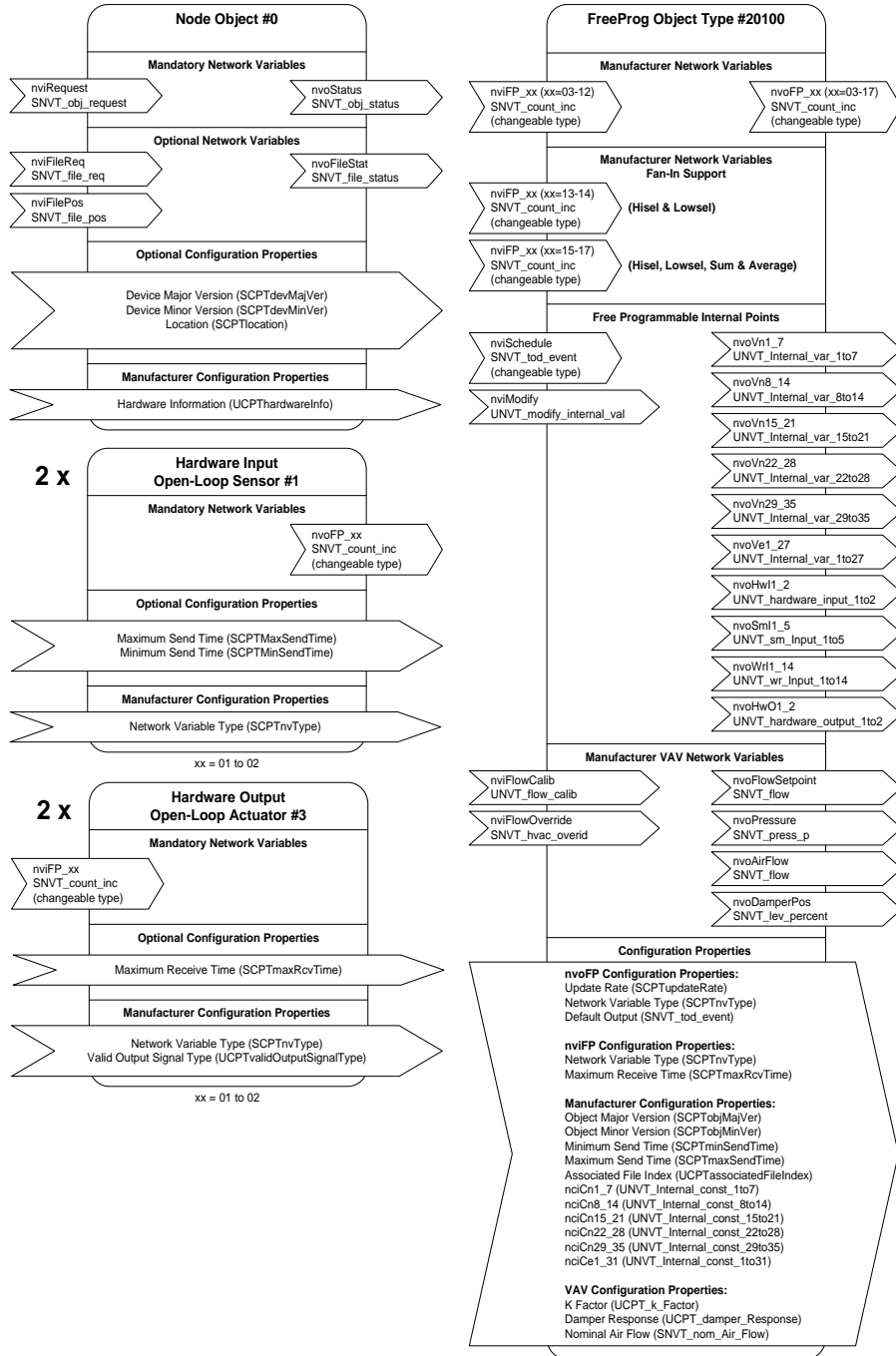
| | |
|-----------------------|-----------------------------------|
| UL Listed (CDN & US) | UL916 Energy management equipment |
| Material ⁵ | UL94-5VA |



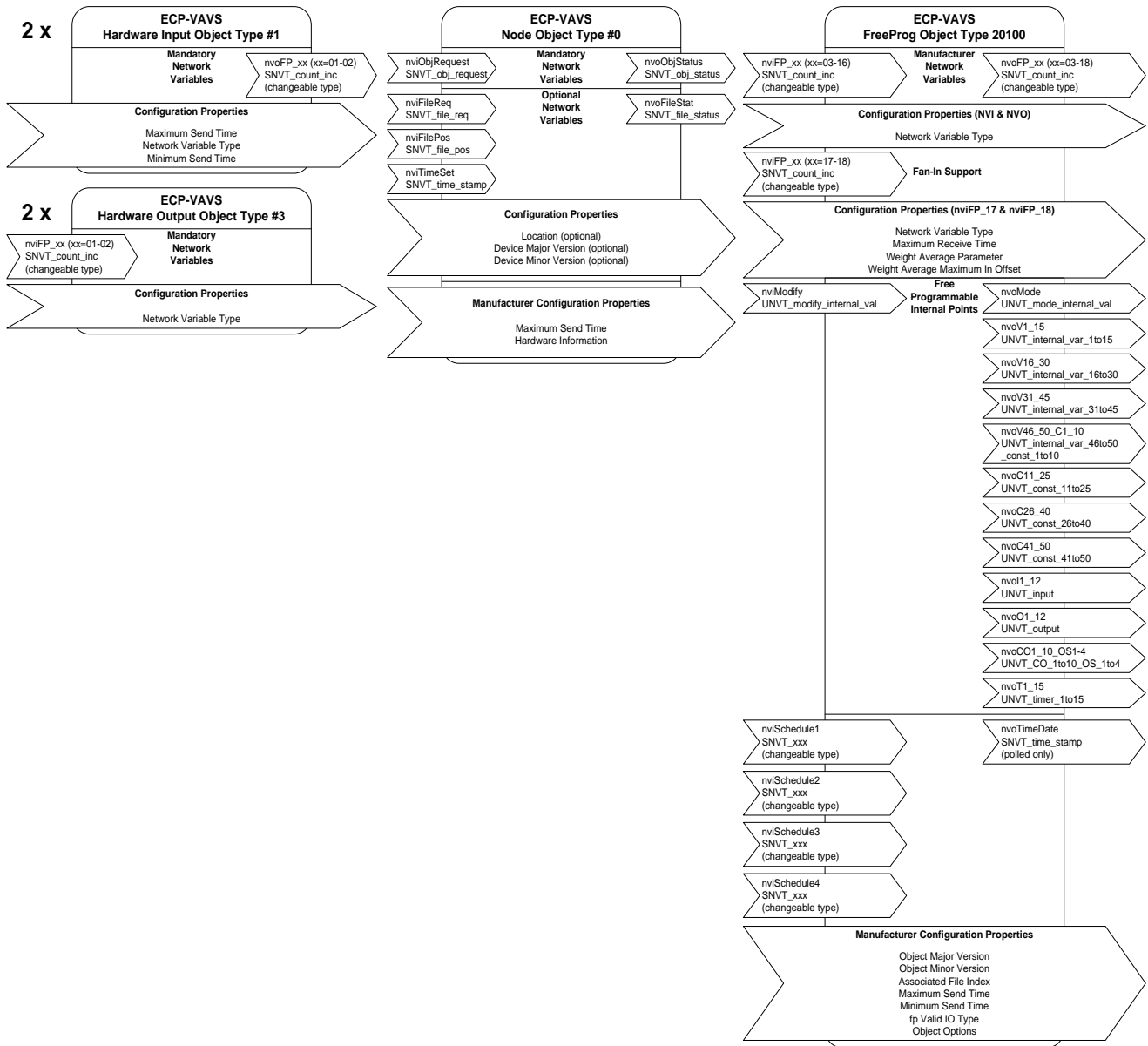
Communication Protocols and Standards



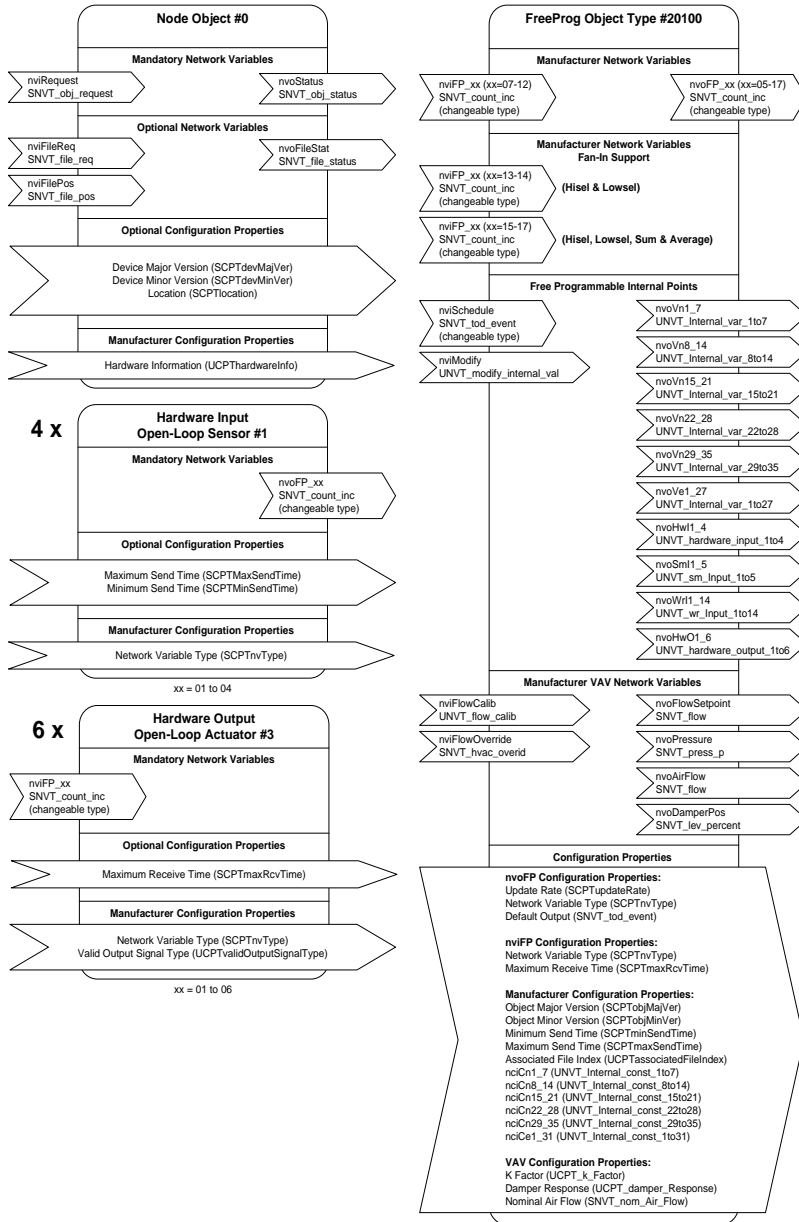
Functional Profile of ECP-VAVS (with EC-gfxProgram)



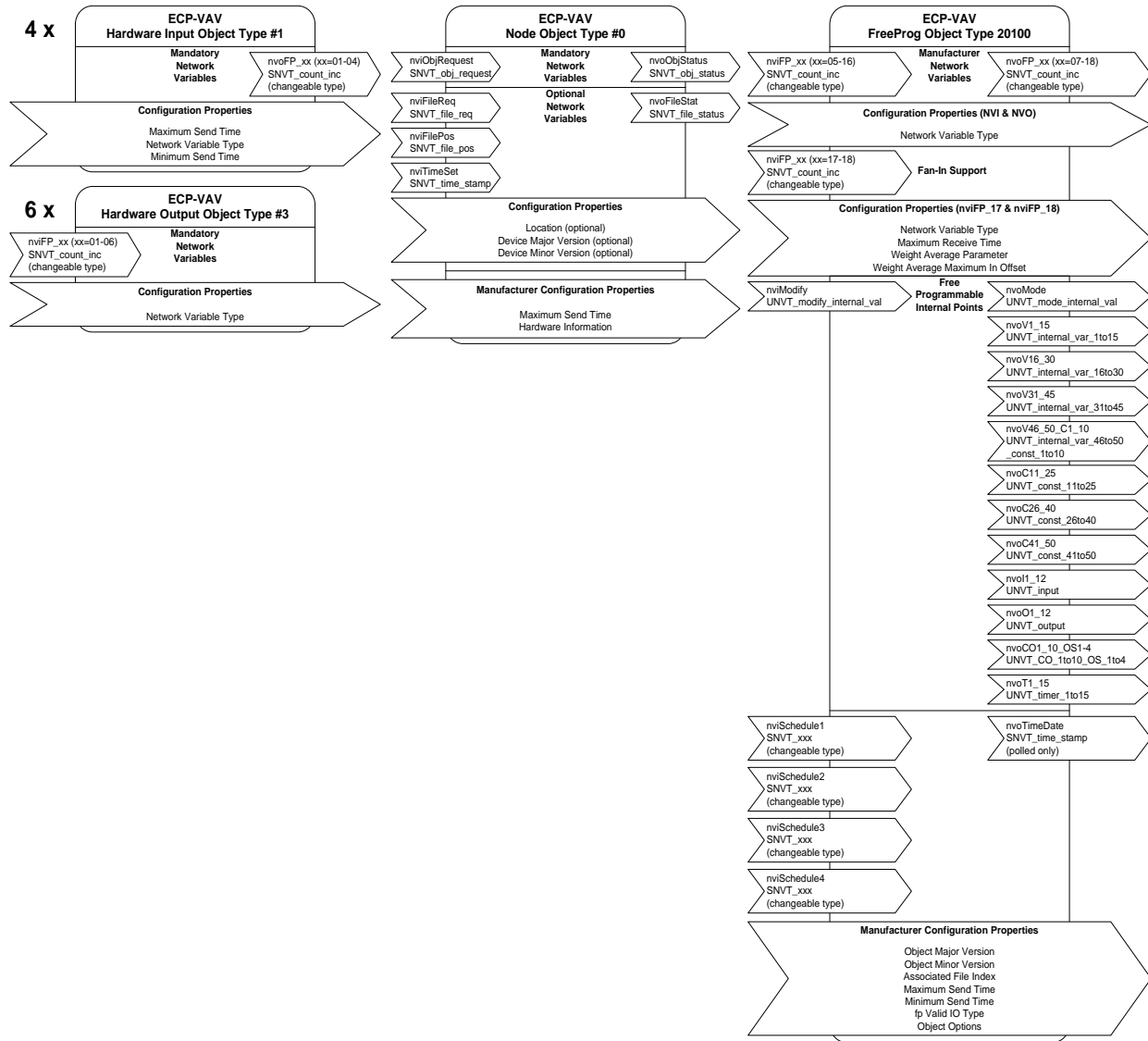
Functional Profile of ECP-VAVS (with EC-Program)



Functional Profile of ECP-VAV, ECP-VVT, and ECP-VAV-N (with EC-gfxProgram)



Functional Profile of ECP-VAV, ECP-VVT, and ECP-VAV-N (with EC-Program)



Specifications subject to change without notice.

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ECP-VAVS and ECP-VAV Series

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