

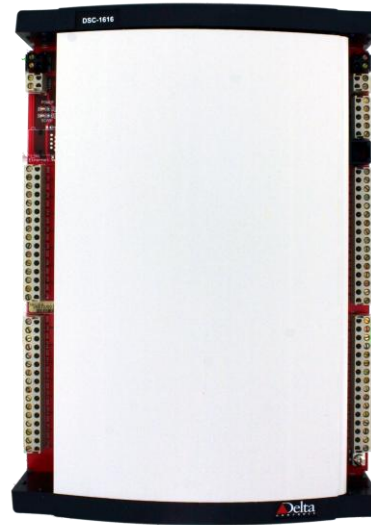
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## Product Description

The DSC-1616 is a fully programmable, Native BACnet™ Building Controller that communicates on Twisted Pair Ethernet 10-BaseT using BACnet IP and BACnet over Ethernet, or on an RS-485 LAN using the BACnet MS/TP protocol.

The controller includes an easy to mount enclosure and is designed for a wide range of applications requiring no more than 16 inputs and 16 outputs, including but not limited to Roof Top Units, Air Handlers, Boilers or Chillers, etc. A second RS-485 port may be configured as an MS/TP SubLAN or a LINKnet network that supports up to 12 Delta BACstats or other Delta LINKnet controllers.

The 16 universal inputs are jumper configurable and the 16 analog outputs have an option of coming with monitored Hand-Off-Auto switches.



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## Important Information



ORCAview OWS and controller firmware must all be of the same version number to be compatible. When upgrading any of these products from older versions (i.e. 3.22 or 3.30), you must upgrade all the remaining products. Exception: UL 864 model, DSC-1616E-UL864 can be used with V3.33 and V3.40 firmware.

## Package Contents

- Product: DSC-1616
- DSC-1616 Installation Guide

## Related Documents

- Delta Controls Wiring Guidelines
- ORCAview Operator Guide
- ORCAview Technical Reference Manual
- Release Notes for related Firmware

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## UL864 Specific Considerations



Wiring to and from the device shall be through power-limited circuits.

Use only Core Components transformer, Model No. 120-024-100-2TF-CB, by Lectro Components Inc. to power the device. (Delta Part # 440008)

Use only UL Listed Class 2 Power Supplies for auxiliary field devices.

Use only UL Recognized Ethernet Switch, 571-580, by Siemens for Smoke Control Systems that utilize Ethernet communications.

Impedance value for which ground faults are detected is zero ohms.

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## Cautions or Warnings



This controller is an Electro-statically sensitive device. Proper ESD protection (ground strap) should be used when installing this product so that damage to the product does not occur.

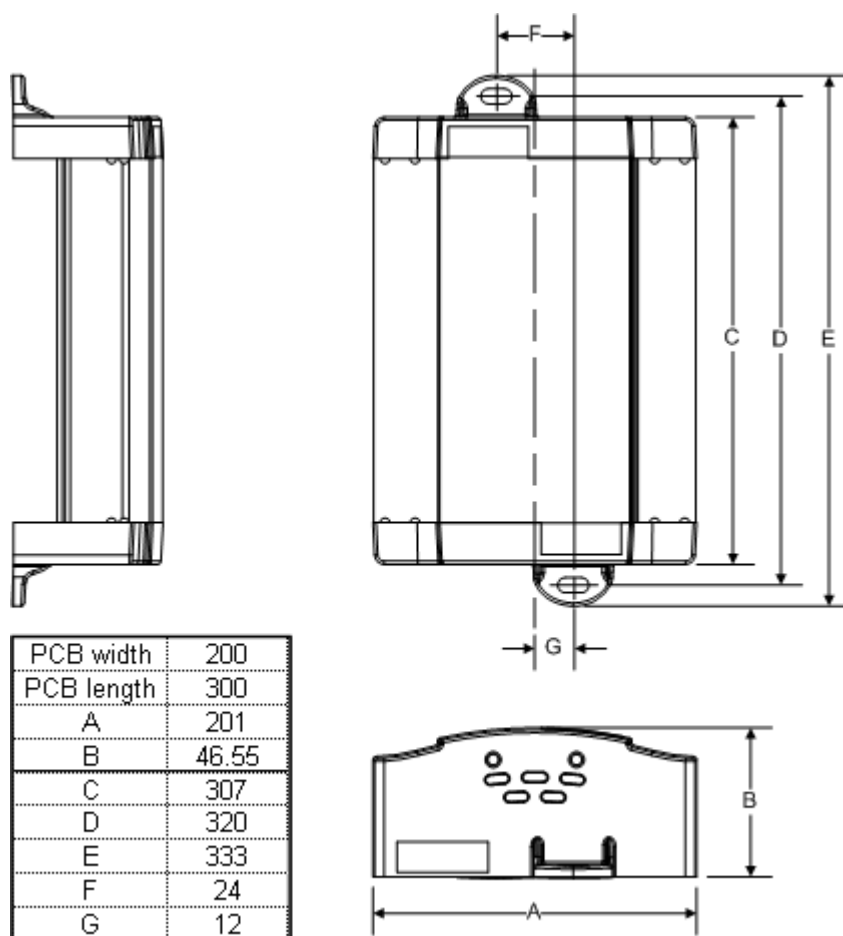
Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Replace the battery with type CR2032.

Equipment damage or loss of data may occur if these procedures are not followed as specified.

**Installations requiring CE conformance:** All wiring for CE rated products must use an extra low voltage (SELV) or protective extra low voltage (PELV) transformer. Use safety-isolating transformers, (Class II transformer) per EN61558. The transformer must be rated for 100% duty cycle.

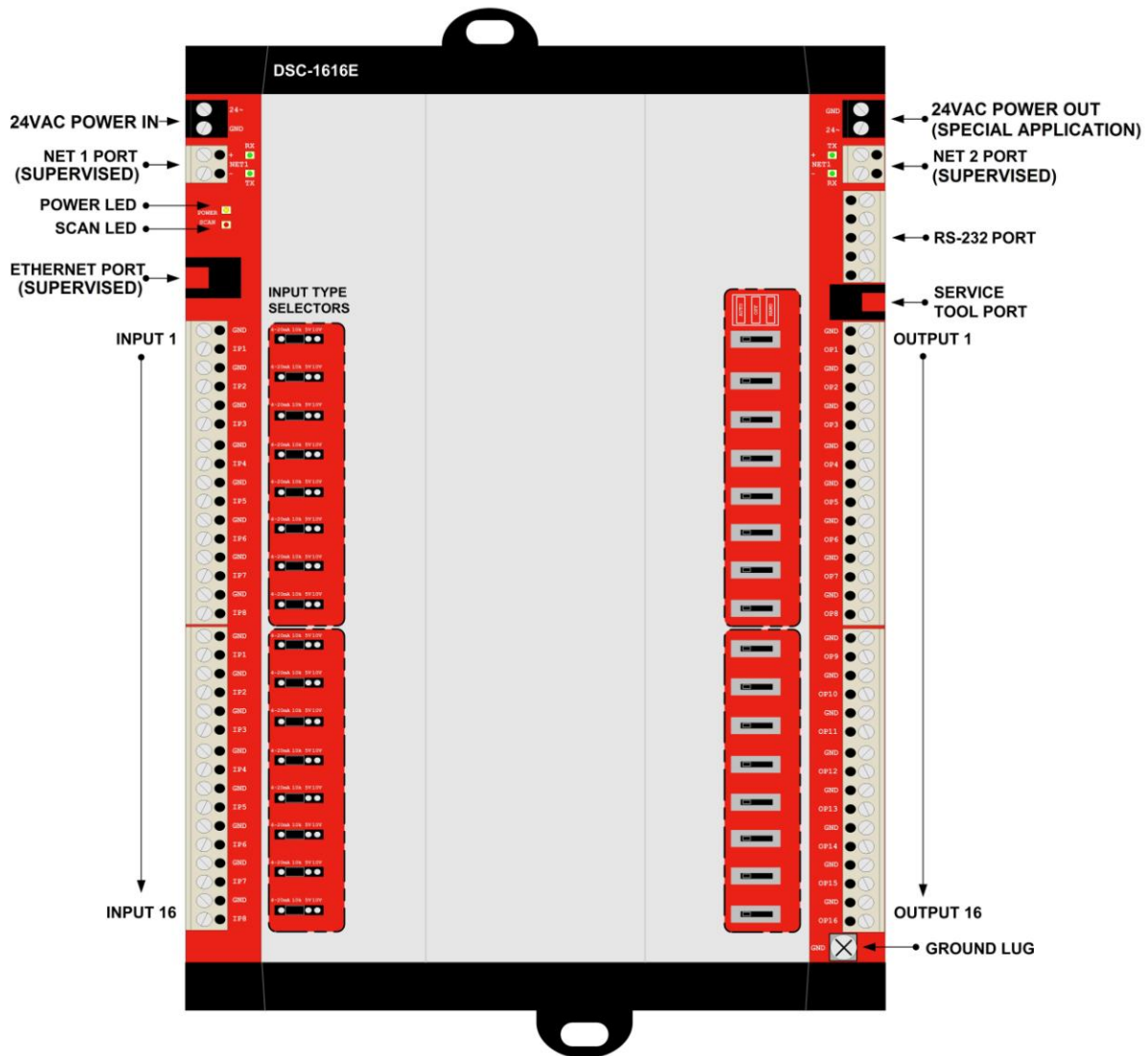
## Mounting

The DSC-1616 includes a plastic enclosure that can be quickly mounted with two screws (not provided). This controller should be mounted in an appropriate location within packaged equipment or another enclosure that meets code requirements.



All dimensions are in mm (+/- 0.5mm)

## Board Layout



## Controller Configuration

### Controller Type

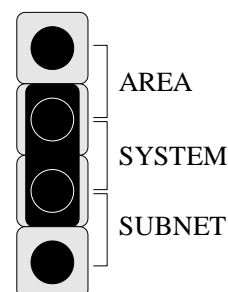
Various products have the capability of being configured as one of several possible controller types, which represents the network level that it will reside on in the network architecture (Area, System, Subnet). Other than the one controller acting as a router, all other controllers on the same network segment must be configured the same.

**Area** - Configures the controller as an Area level controller on a network. This is an option only on the Ethernet model and is the setting when the controller is connected to an Ethernet network (typically between buildings) and is acting as a router from one LAN to either a network of System controllers or Subnet controllers.

**System** - Configures the controller as a System level controller on a network of System controllers. This is the setting when the controller is connected to an Ethernet or BACnet MS/TP network with other System controllers or is a single head-end controller for a network of Subnet controllers.

**Subnet** - Configures the controller as a Subnet level controller on a Subnet of similar controllers. This is the setting when the controller is connected to a BACnet MS/TP network with other Subnet controllers.

**Note:** This also determines where the DIP or MAC address is mapped into the controllers BACnet address and which other portions of its BACnet address are inherited when DNA is enabled.



### Derived Network Addressing

The **DNA jumper** comes ON by default. This allows the controller to automatically configure a BACnet controller address. This should NOT be removed unless you are assigning a BACnet controller number through software. The BACnet controller number should not be confused with the DIP switch setting, and each controller must still have a unique dip switch address even when using software to define the controller number.



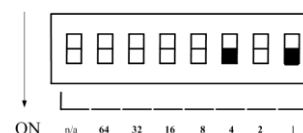
### Controller Addressing

The Dip Switch is a binary switch. Each individual DIP switch represents a unique value, which forms the controller address when added together.

To set the address, simply move the switches that add up to the controllers desired address to the ON position.

Example: If the controller is to be address 5 on the network, set the switch numbered 4 and the switch numbered 1 (equals 5) to the On position.

**Note:** Each controller on the same MS/TP segment must have a unique DIP switch address.



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## Wiring General

All wiring must conform to NEC and local codes and regulations. Use earth ground isolating step-down Class 2 transformers. Do not use autotransformers. Determine supply transformer rating by summing total VA of product and output loads.



### Risk of Electric Shock or Fire

- More than one disconnect switch may be required to de-energize the equipment before servicing.
- Input Class 2 Power Supplies are interconnected. Use only Class 2 sources suitable for interconnections.



- All terminals are acceptable for Class 2 Circuit connections only
- Use copper conductors only
- Apply minimum 6.0 lb-in torque for tightening field wires into the terminal blocks

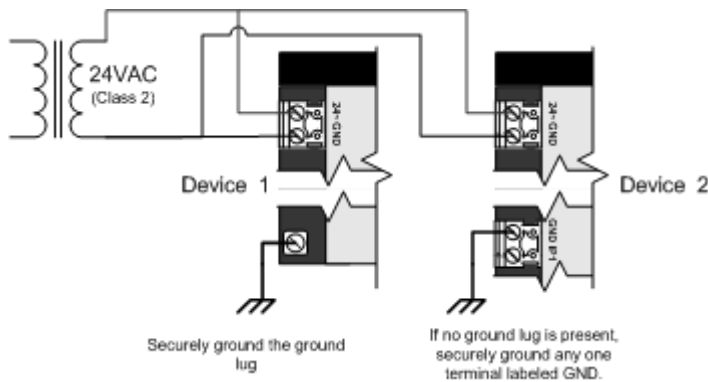
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## Power

This product is designed to use a 24 VAC, Class 2 power supply. The proper specified cabling must be used. (18 – 16 AWG, 2-conductor wire)

A single transformer may be used to power multiple controllers and/or auxiliary field devices (actuators, etc.) provided the following conditions are met:

- All devices **MUST** be ½ wave rectified. Mixing power between ½ wave and full wave rectified devices will damage both the transformer and connected equipment.
- The transformer is properly sized, including line losses for the total VA requirements.
- Polarity is observed between controllers (with respect to 24~ and Gnd).
- Each controller is grounded as shown in the diagram below. This is important to protect equipment and ensure a common ground reference for RS-485 communications.
- The transformer secondary is fused for its maximum rated load (4A max for Class 2 circuits).



Make sure to ground the controller using the ground lug that is available on the controller.

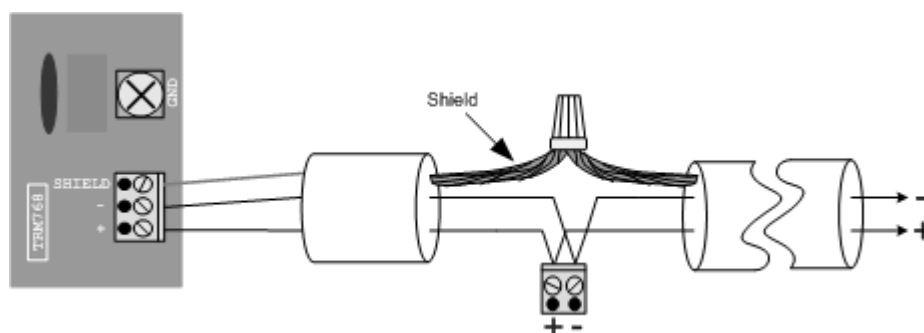
## Network Communication

The controller communicates on Twisted Pair Ethernet 10-BaseT using BACnet IP and BACnet over Ethernet, or on an RS-485 LAN using the BACnet MS/TP protocol. Refer to *Delta Controls Wiring Guidelines* for further details.

### MS/TP (RS-485) Wiring

For detailed information on MS/TP and LINKnet wiring refer to *Delta Controls Wiring Guidelines*.

- The proper specified cabling must be used to ensure reliable communications. (22 AWG twisted pair, 100-120 ohms impedance, 17 pF/ft or lower capacitance, with a braided or aluminum foil shield.)
- Controllers should always be wired together in a daisy-chain fashion. Attempting to connect them using a starred or bus configuration will cause problems on the network.
- Networks with a total length greater than 4000 ft or with more than 50 controllers require a repeater (RPT-768).
- LINKnet networks that have only 1-2 controllers, and have less than 100 ft of cable length do not require network terminators.



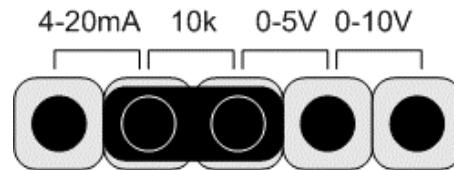
## Input and Output Wiring

Inputs and outputs on the DSC-1616 controller follow the same general wiring requirements as other Delta Controls products. Recommended cable types should be used as listed below. Refer to the *Delta Controls Wiring Guidelines* for more details.

Recommended Cable Type	Where to Use
2 Conductor, 18 AWG, Unshielded	All outputs and 4-20mA, 10K $\Omega$ , and 10V input types
2 Conductor, 22 AWG, Shielded	Inputs configured for 5V

### Input Configuration

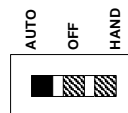
The input must be configured to accept the signal used by the input device. Place the jumper for each input in the correct location on the Input Type Selector Block. The diagram to the right shows the factory default selection of 10 K $\Omega$ .



- 4-20mA   ▪     For sensors that use a 4 to 20 mA signal.
- 10K       ▪     For 10 K $\Omega$  Thermistor temperature sensors, as well as Dry Contact binary inputs.
- 5V        ▪     For sensors that use a 0 - 5 VDC signal.
- 10V       ▪     For sensors that use a 0 -10 VDC signal.

### Output Configuration

Each HOA switch is HAND, OFF, AUTO from right to left. The HAND position allows a user to manually force the output on, the OFF position allows a user to manually force an output off, and the AUTO position allows the output to be controlled automatically by the controller.





## Indicators

LED	Function	Description
Power	Controller Power Indicator	This yellow LED turns on to indicate that the controller has power applied.
Scan	CPU Scan Indicator	This red LED flashes at a rate relative to the CPU scan rate.
Network (Ethernet)	Ethernet Communication Status Indicators	The green LNK LED is turned on when a link is established between two Ethernet devices. (for example, controller, computer, switch, etc.) The green ACT LED flashes when communications are active.
Network (NET1)	MS/TP (RS485) Communication Status Indicators	The green LED flashes to indicate when the controller is transmitting out the port, and the red LED flashes to indicate when the controller is receiving data through the port. If communication is good, both LEDs will flash at a high rate.
Network (NET2)	MS/TP (RS485) Communication Status Indicators	The green LED flashes to indicate when the controller is transmitting out the port, and the red LED flashes to indicate when the controller is receiving data through the port. If communication is good, both LEDs will flash at a high rate.
Inputs (IP1 – IP16)	Input Status Indicators	A corresponding red LED varies in intensity and is brightly lit when the associated input is receiving a low voltage input signal (i.e. a closed contact, 0 VDC, 0mA or a high temperature reading or low resistance).
Outputs (OP1 – OP16)	Output Status Indicators	A tri-color LED is used. Under automatic control, the corresponding output LED is green and is on or off to match the status of an associated binary output. The LED will also vary in intensity relative to the output signal for an analog output. With HOA switches, the output LED is red in the OFF position and yellow in the HAND position.

## Product Specifications

<b>Power Requirements</b>		24 VAC, 60Hz, Class 2
<b>Power Consumption</b>		30 VA
<b>Ambient Ratings</b>		32° to 131°F (0° to 55°C), 10 to 90% RH (non condensing)
<b>Communication Ports</b>	<b>Ethernet</b>	<ul style="list-style-type: none"> <li>10 BaseT @ 10Mbps</li> <li>BACnet IP, BACnet over Ethernet</li> </ul>
	<b>NET1</b>	<ul style="list-style-type: none"> <li>BACnet MS/TP (RS-485)</li> <li>Communication: 9600, 19200, 38400, 76800 bps (Default)</li> <li>Maximum of 99 controllers</li> </ul>
	OR	
		<ul style="list-style-type: none"> <li>LINKnet</li> <li>Communication: 76800 bps</li> <li>Maximum of 12 LINKnet controllers including up to two DFM controllers</li> </ul>
	<b>NET2</b>	<ul style="list-style-type: none"> <li>BACnet MS/TP (RS-485)</li> <li>Communication: 9600, 19200, 38400, 76800 bps (Default)</li> <li>Maximum of 99 controllers</li> </ul>
	OR	
		<ul style="list-style-type: none"> <li>LINKnet</li> <li>Communication: 76800 bps</li> <li>Maximum of 12 LINKnet controllers including up to two DFM controllers</li> </ul>
	<b>Serial</b>	<ul style="list-style-type: none"> <li>RS-232</li> <li>BACnet PTP</li> <li>Communication: 9600, 19200, 38400 (default)</li> </ul>
	<b>Service Port</b>	<ul style="list-style-type: none"> <li>RJ-11 Jack</li> <li>Used with Delta Controls service tool devices (for example, CON-768)</li> </ul>
<b>Inputs</b>		16 Universal Inputs (10 bit), jumper configurable for the following input types: <ul style="list-style-type: none"> <li>0-5 VDC</li> <li>0-10 VDC</li> <li>10 K<math>\Omega</math> Thermistor</li> <li>Dry Contact (using 10 K<math>\Omega</math> Thermistor jumper setting)</li> <li>4-20 mA</li> </ul>
<b>Outputs</b>		16 Universal Outputs c/w LED status indication (including HOA status) <ul style="list-style-type: none"> <li>0-10 VDC @ 20 mA maximum per output</li> <li>Software configurable as binary or analog</li> <li>Hand/Off/Auto Switches (c/w position feedback)</li> </ul>
<b>Technology</b>		32 bit processor 2 MB (16 megabit) Flash Memory 512 KB SRAM memory
<b>Listings</b>		UL 916 Listed BTL Listed UL 864 Listed (DSC-1616E-UL864 model only)
<b>Compliance</b>		CE FCC

# CE - DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Delta Controls

Manufacturer's Address: 17850 56<sup>th</sup> Avenue  
Surrey, British Columbia  
Canada  
V3S 1C7

declares that the product (s):

Product Name: 16 x 16 Controllers

Model Numbers: DSC-1616, DFM-1616

Product Options: All

conforms to the following Product Specifications:

EN 50081-1:1992	Generic Emission Standard Part 1: Residential	
EN 55022:1998	Radiated and Conducted Emissions	Class A
EN 61000-3-2:1999	Power Line Harmonics	Class A
EN 61000-3-3:1998	Power Line Fluctuations	$P_{st} < 1$ , $P_{lt} < 0.65$
EN 50082-1:1997	Generic Immunity Standard Part 1: Residential	
EN 61000-4-2:1995	ESD Immunity	Level B
EN 61000-4-3:1996	RF Electromagnetic Field Immunity	Level A
ENV 50204:1995	RF Electromagnetic Field Immunity (Keyed Carrier)	Level A
EN 61000-4-4:1995	EFT/Burst Immunity	Level B
EN 61000-4-5:1995	Surge Immunity	Level B
EN 61000-4-6:1996	Conducted Immunity	Level A
EN 61000-4-11:1994	Voltage Dips / Interruptions	Level A/B/B/B

Supplementary Information

The product(s) herewith comply with the requirements of the EMC Directive 89/336/EEC. The product(s) were tested in a typical configuration.

Lee Dickson  
Quality Assurance Manager



### **FCC Compliance Information**

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 the 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 own expense.

### **Industry Canada Compliance Statement**

ICES-003 This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations

Cet appareil numérique de la Classe A Respecte toutes les exigences du Règlement sur le matériel brouiller du Canada.



This product conforms to the following UL requirements:

UL916: Energy Management Equipment

UL864\*: Control Units and Accessories for Fire Alarm Systems, 9<sup>th</sup> Edition

\* - Applicable to DSC-1616E-UL864 model only