



# **Endura<sup>®</sup> NVR5100 Series Network Video Recorder**



**C1621M-E (9/08)**



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# Regulatory Notices

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

## RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits of 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.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

In order to maintain compliance with FCC regulations shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and television reception.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

# Video Quality Caution

## FRAME RATE NOTICE REGARDING USER-SELECTED OPTIONS

Pelco systems are capable of providing high quality video for both live viewing and playback. However, the systems can be used in lower quality modes, which can degrade picture quality, to allow for a slower rate of data transfer and to reduce the amount of video data stored. The picture quality can be degraded by either lowering the resolution, reducing the picture rate, or both. A picture degraded by having a reduced resolution may result in an image that is less clear or even indiscernible. A picture degraded by reducing the picture rate has fewer frames per second, which can result in images that appear to jump or move more quickly than normal during playback. Lower frame rates may result in a key event not being recorded by the system.

Judgment as to the suitability of the products for users' purposes is solely the users' responsibility. Users shall determine the suitability of the products for their own intended application, picture rate and picture quality. In the event users intend to use the video for evidentiary purposes in a judicial proceeding or otherwise, users should consult with their attorney regarding any particular requirements for such use.

# Description

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The NVR5100 Series network video recorder (NVR) represents a new generation of flexibility and integration for network-based video system recording. It is one of the recording components of Endura®, Pelco's most advanced integrated video security system. The NVR represents the state of the art in scalability, performance, expandability, and reliability. It is ideally suited for mission-critical, enterprise surveillance applications.

The NVR5100 Series recorder is capable of continuous, scheduled, alarm/event, and motion recording. Pre- and post-alarm recording is also available. All recording is fully programmable on a per-channel basis.

The unit includes EnduraStor™ to maximize storage efficiency. EnduraStor improves upon traditional time-lapse recording to achieve longer video retention. While time-lapse recording records everything at a low frame rate, EnduraStor records in real-time for a user-defined delay period. During the delay period, all real-time, high frame rate video is available for search, playback, and export. After the delay period, EnduraStor reduces video from a high frame rate to a lower frame rate. EnduraStor does not reduce alarm and event video.

Designed with reliability in mind, the NVR5100 Series provides performance enhancement and fault tolerance by employing RAID 5 disk management across as many as 12 hard drives. The NVR incorporates two RAID 5 controllers, each managing six hard drives.

**NOTE:** The NVR5100 Series recorder supports hot-swappable hard drives in case of failure; it does not support hot hard drive expansion.

Dual redundant, hot-swappable power supplies add another layer of reliability to the unit. Support for matrix-enabled failover rounds out the reliability aspects of the NVR5100. Diagnostics are systemized with other Endura products so that problems are reported to various network infrastructure-monitoring systems.

The NVR5100 Series recorder is the network-based video recording system of the future. It integrates seamlessly with Pelco's integrated security products to create a robust, secure, and expandable security platform. When combined with Pelco's Endura workstation and stand-alone user interfaces, the NVR5100 Series becomes a powerful search, retrieval, and archival audio/video system. EnduraStor makes real-time video available when users need it most while keeping storage costs under control.

## FEATURES

- Supports up to 48 cameras at 30 frames per second (fps), 4CIF resolution (NVR5148)
- Supplies up to 32 simultaneous playback streams and up to 10 simultaneous queries
- iSCSI-based expandable storage capacity using Pelco's storage expansion boxes (SEB5100 Series)
- Plug-and-play configuration
- Data authentication at time of recording
- Output viewable on up to 32 individual workstations
- Records video, audio, and data streams for every channel
- EnduraStor storage management system
- Hot-swappable hard drives and power supplies
- Fault tolerance and performance enhanced through use of RAID 5
- Redundant power supplies
- Storage locking
- Fully compatible with Pelco's integrated system architecture
- System diagnostics and error logging
- Full over-the-network remote control and administration

## MODELS

Models	Streams*	Drives	Internal Storage	Video Storage
NVR5124-1500	24	6 <sup>†</sup>	1.5 TB	1.16 TB
NVR5124-3000	24	6 <sup>†</sup>	3.0 TB	2.32 TB
NVR5124-6000	24	12	6.0 TB	4.65 TB
NVR5124-9000	24	12	9.0 TB	6.98 TB
NVR5148-1500	48	6 <sup>†</sup>	1.5 TB	1.16 TB
NVR5148-3000	48	6 <sup>†</sup>	3.0 TB	2.32 TB
NVR5148-6000	48	12	6.0 TB	4.65 TB
NVR5148-9000	48	12	9.0 TB	6.98 TB

\*Simultaneous full frame rate/full resolution input streams.

<sup>†</sup>All six-drive models include six empty hard drive carriers.

## OPTIONAL ACCESSORIES

**SEB5100 Series** Each SEB5100 Series storage expansion box adds 1.5 TB to 9.0 TB of external storage, including 1.16 TB to 6.98 TB of video storage, to any NVR5100 network video recorder. Up to eight units can be connected to an NVR5100 for a maximum of 62.8 TB of available video storage.

Models	Streams*	Drives	Internal Storage	Video Storage
SEB5100-1500	Up to 48	6 <sup>†</sup>	1.5 TB	1.16 TB
SEB5100-3000	Up to 48	6 <sup>†</sup>	3.0 TB	2.32 TB
SEB5100-6000	Up to 48	12	6.0 TB	4.65 TB
SEB5100-9000	Up to 48	12	9.0 TB	6.98 TB

\*Simultaneous full frame rate/full resolution input streams; actual number of streams matches NVR5100 model.

<sup>†</sup>All six-drive models include six empty hard drive carriers. When connected to an NVR5100, all SEB5100 models fully support diagnostics and monitoring.

**NVR5000PS** Replacement power supply for NVR5100, SEB5100, and DVR5300 Series units

**HD5000-250** Replacement 250 GB hard drive and carrier for NVR5100, SEB5100, and DVR5300 Series units

**HD5000-500** Replacement 500 GB hard drive and carrier for NVR5100, SEB5100, and DVR5300 Series units

**HD5000-750** Replacement 750 GB hard drive and carrier for NVR5100, SEB5100, and DVR5300 Series units

**HDD1500UP** Video storage upgrade kit; includes six 250 GB hard drives and carriers; adds 1.5 TB to NVR5100, SEB5100, and DVR5300 Series units

**HDD3000UP** Video storage upgrade kit; includes six 500 GB hard drives and carriers; adds 3.0 TB to NVR5100, SEB5100, and DVR5300 Series units

# Before You Begin

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Endura is a network system that requires a continuous amount of bandwidth to transmit true, live video. Therefore, always include your network administrator when planning and installing Endura components.

You will also need the following items:

- Pelco-approved Endura certification
- Access to an Endura network
  - that is an active, Gigabit Ethernet network that supports the full Internet Protocol suite,
  - that is configured with at least one Endura system manager, and
  - that is configured with at least one Endura workstation.

## NOTES:

- Endura components are designed to deliver high-quality, high-frame rate video across a network. For best results, make sure your installation meets the power, environmental, and networking guidelines described in the Endura Installation Guidelines and Best Practices document (C2670M).
- When using one or more network switches on the Endura network, enable autonegotiation on all switches.
- These network requirements represent the minimum standard for a small Endura-capable security network. Please consult the Endura Network Design Guide (C1640M) to make sure your network is properly configured. Your system may be different and may require additional hardware, software, and network resources.

## PARTS LIST

Qty	Description
1	NVR5100 Series network video recorder
1	Hard drive pack: Six-drive (1.5 TB/3.0 TB) models: 6 Filled hard drive carriers, numbered Drive 1 through Drive 6 6 Empty hard drive carriers, numbered Drive 7 through Drive 12 Twelve-drive (6.0 TB/9.0 TB) models: 12 Filled hard drive carriers, numbered Drive 1 through Drive 12
1	Accessory pack: 5 Rubber feet with 8-32 x 0.375-inch, Phillips pan head screws (for desktop mounting, installed) 6 Power cords (2 USA standard, 2 European standard, and 2 UK standard) 2 Front bezel keys 1 Disposable wrist strap for electrostatic discharge (ESD) protection
1	Rack mount kit (included with accessory pack): 2 Chassis mounting brackets with handles and thumbscrews (installed) 12 Screws, 10-32 x 0.25-inch, Phillips pan head (six for each bracket, installed) 2 Adjustable support rail sets (each set includes one front-mounting rail and one rear-mounting rail) 8 Screws, 8-32 x 0.375-inch, Phillips truss head (four for each support rail) 8 Screws, 10-32 x 0.5-inch, Phillips flat head (two for each front rail, two for each rack rail spacer) 4 Screws, 10-32 x 0.75-inch, Phillips pan head (two for each rear rail) 2 Rack rail spacers 14 Cage nuts, 10-32
3	Product serial number labels (attached to unit)
1	NVR5100 Series Installation manual
1	Safety instructions
3	Hard drive inserts



## USER-SUPPLIED PARTS

In addition to the standard tools and cables required for a video security installation, you will need to provide the following items:

<b>Qty</b>	<b>Description</b>
1	Cat5e (or better) cable and connectors for connecting the NVR5100 to the Endura network
1	Power source (110/220 VAC)
1	Small flat-tip screwdriver, if mounting the unit into a rack
1	Small Phillips screwdriver, if mounting the unit into a rack

You also need to provide all network equipment, such as switches, for the Endura network.

# PACKAGE CONTENTS

The following diagrams show the contents of the three boxes. When installing the NVR5100, refer to these diagrams.

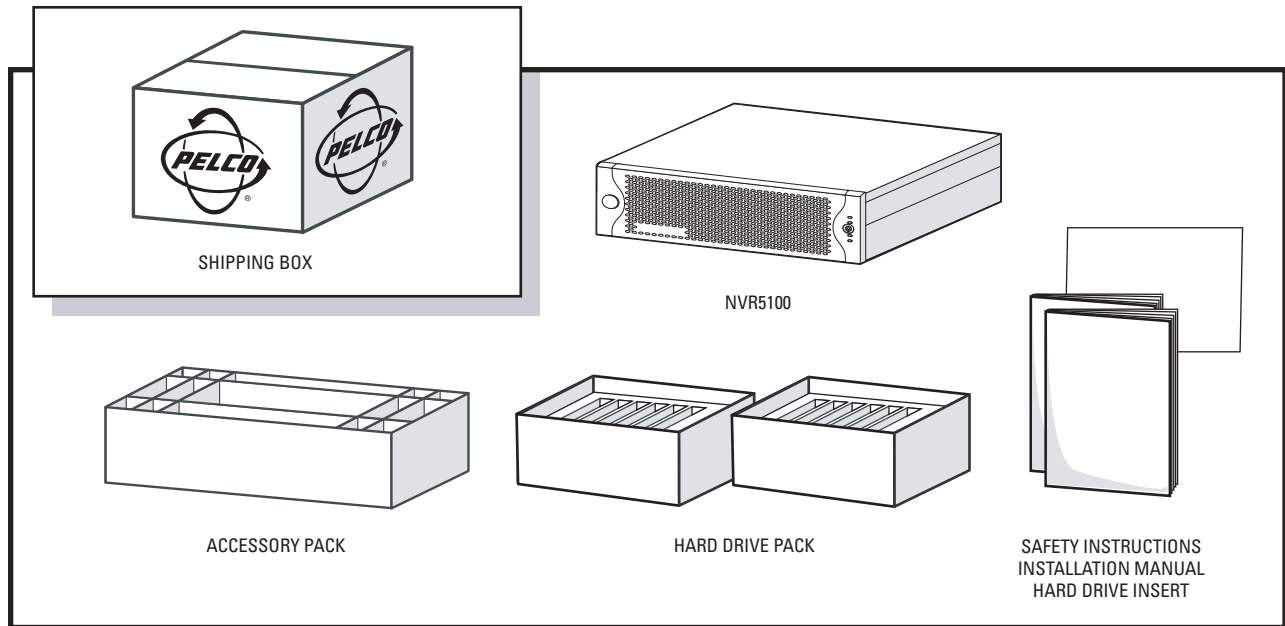


Figure 1. Major Package Components

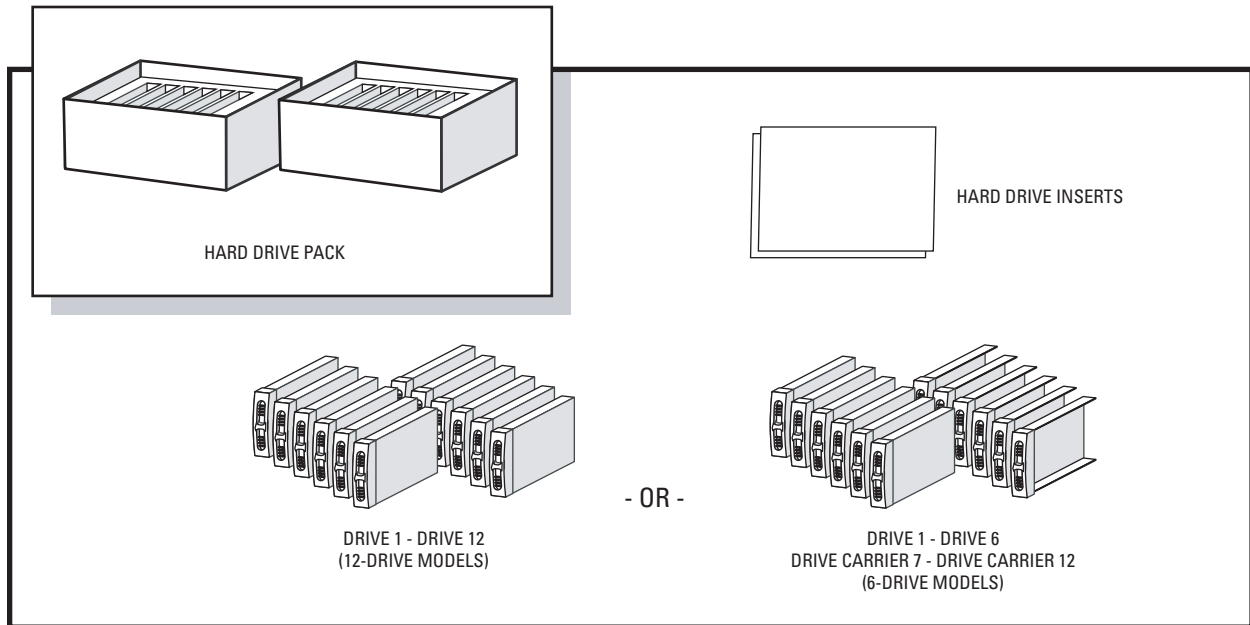
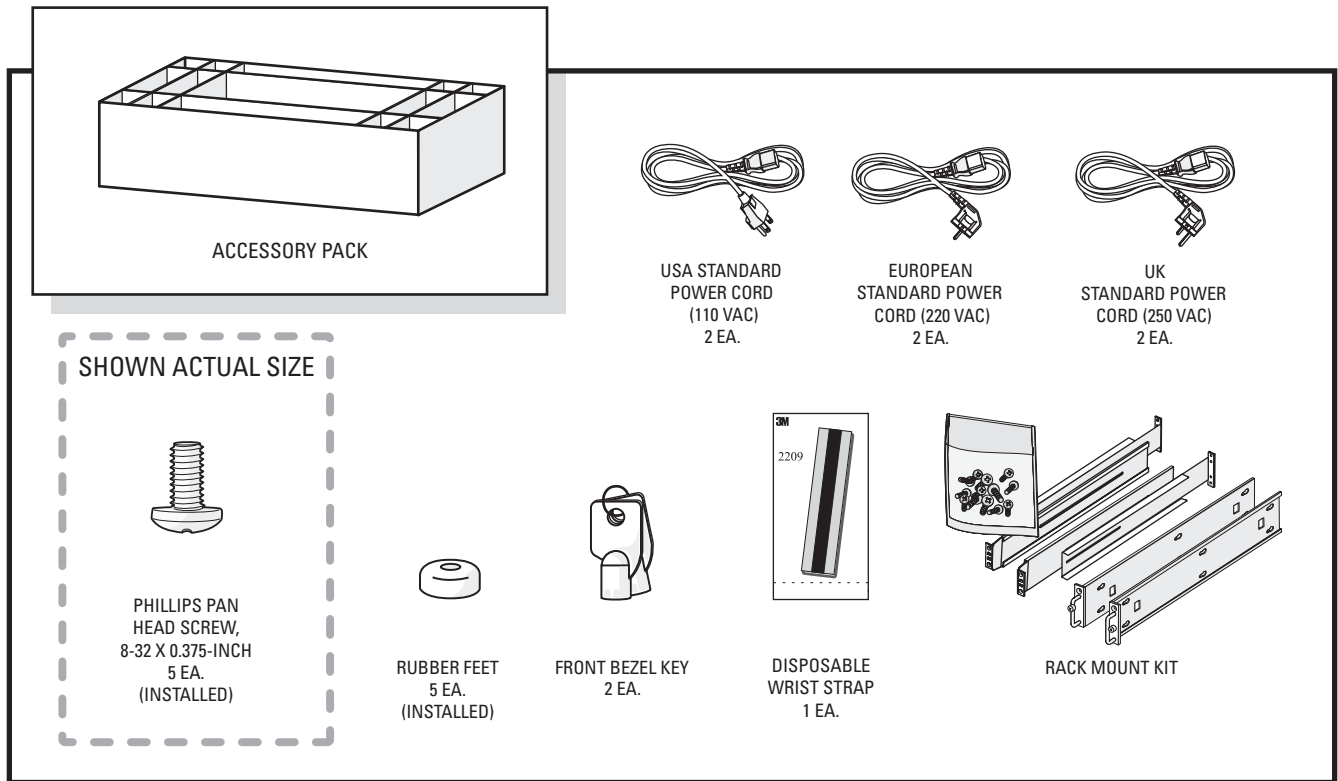
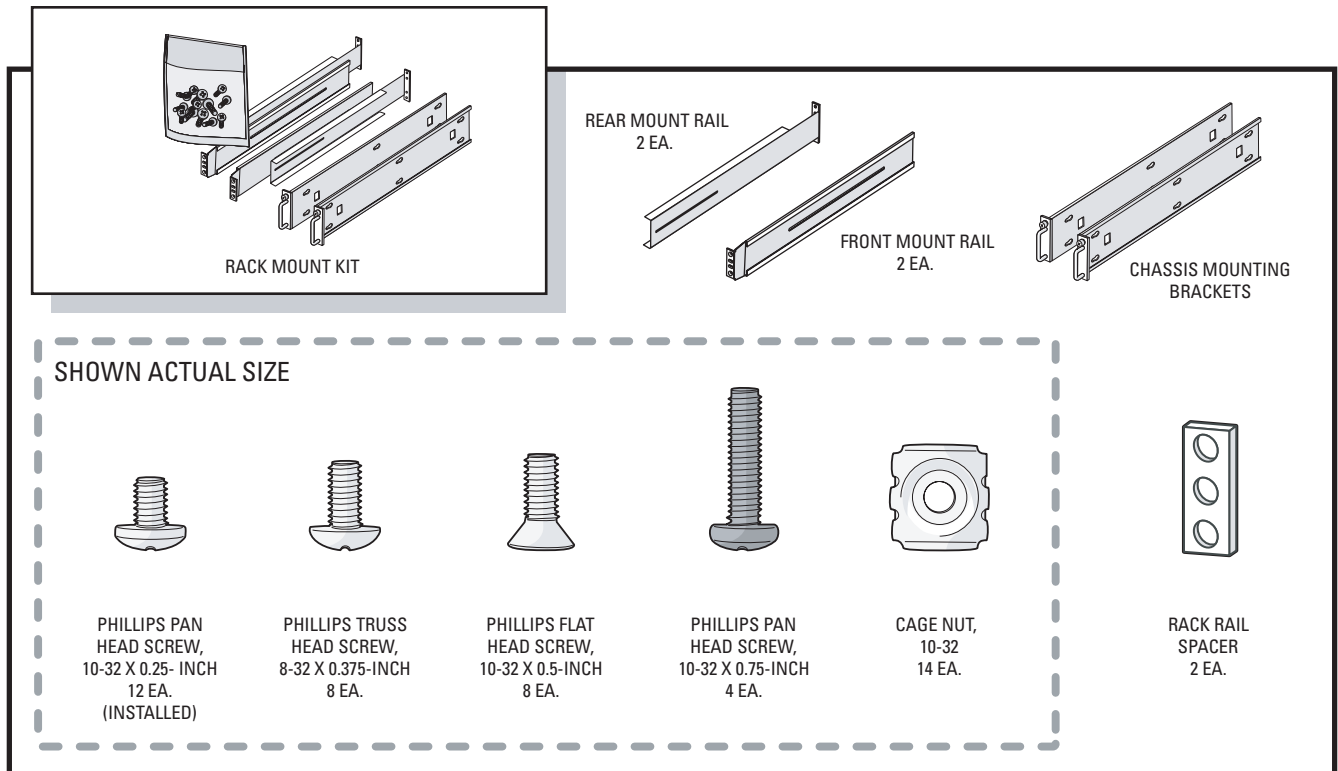


Figure 2. Hard Drive Pack



**Figure 3. Accessory Pack**



**Figure 4. Rack Mount Kit**

# INTEGRATION AND APPLICATION SCENARIO

This section illustrates a potential application scenario featuring the NVR5100 Series NVR.

Figure 5 shows a subnetted, enterprise-wide security system that integrates devices at different geographical locations.

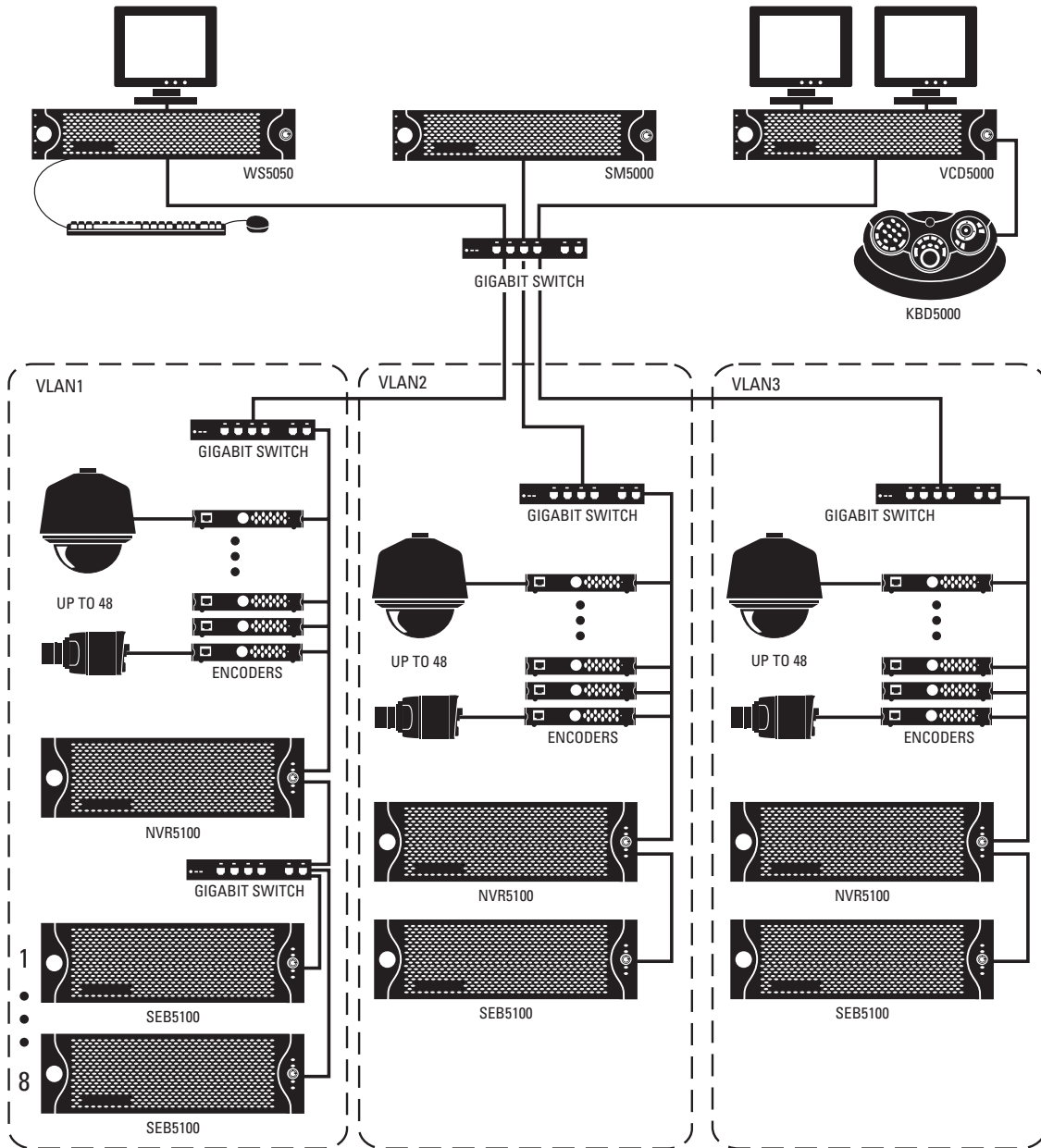


Figure 5. Enterprise-Wide Security Network

**IMPORTANT NOTE. PLEASE READ.** The network implementations in this document are shown as general representations only and are not intended to show detailed network topologies. Your actual network will differ, requiring changes or perhaps additional network equipment to accommodate the systems as illustrated. Please contact your local Pelco Representative to discuss your specific requirements.

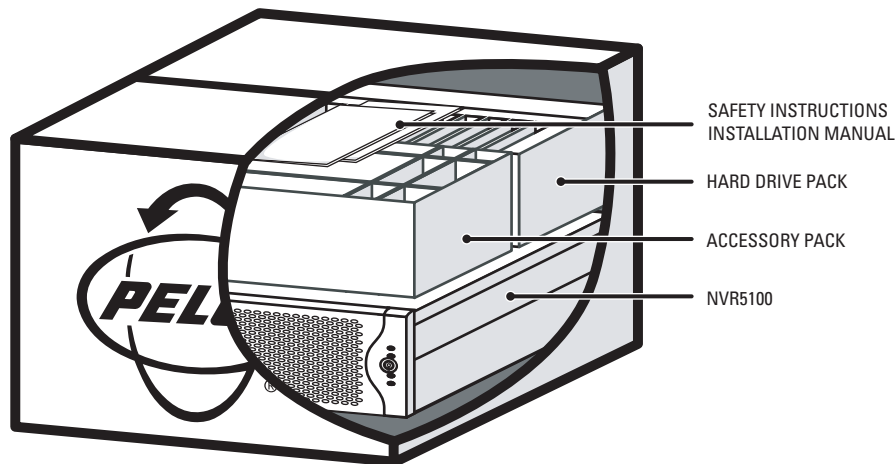
# Equipment Placement and Rack Mounting

The NVR5100 can be placed on a flat surface, such as a desktop, or mounted in an equipment rack.

## UNPACKING THE NVR5100

The NVR5100 recorder ships with two smaller boxes as shown in Figure 6: one contains the hard drive pack, the other contains the accessory pack.

**⚠ WARNING:** Due to the unit's weight and size, do not unpack the NVR5100 alone. Two people are required to unpack and lift the unit.



**Figure 6.** Unpacking the NVR5100 Series

To unpack the NVR5100:

1. Remove the boxes marked HARD DRIVE PACK and ACCESSORY PACK.
2. Use a cloth or pad to protect the workbench or other flat surface.
3. With the help of another person, lift the NVR5100 out of its box and onto the protected surface.

## PRODUCT SERIAL NUMBER LABEL PLACEMENT

Product serial number labels help identify your system and its factory configuration in the event that your NVR5100 or its components require service.

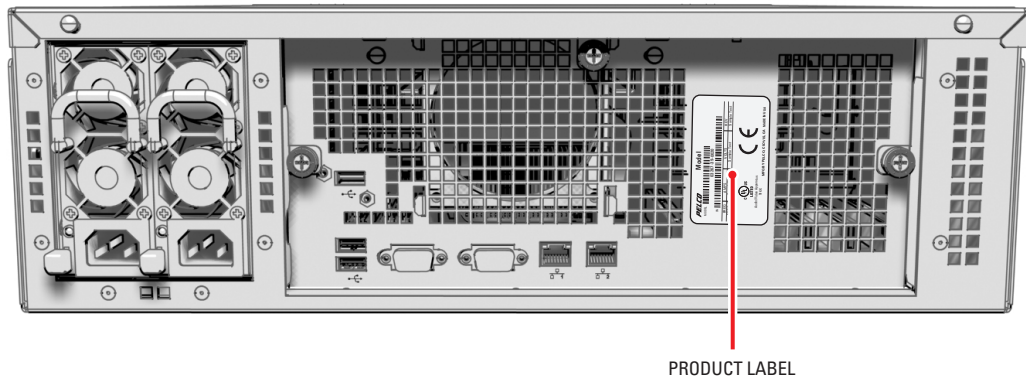
Two labels citing your product's serial number are attached to the unit. One large label is attached to the rear panel. A smaller label is attached to the front panel of the unit, behind the front bezel.

Because rack mounting and other installation options may obscure the factory-applied labels, a third label is provided for you to attach to your product documentation or other product location that will not be obscured by installation.

To use this label:

1. Locate the small label on the top panel of your NVR5100, attached with a yellow sticker that reads, "Extra serial number labels: remove prior to installation."
2. Remove the yellow sticker.

3. Peel away the backing of the small label and attach it to this installation manual, other product documentation, or an unobscured product location.



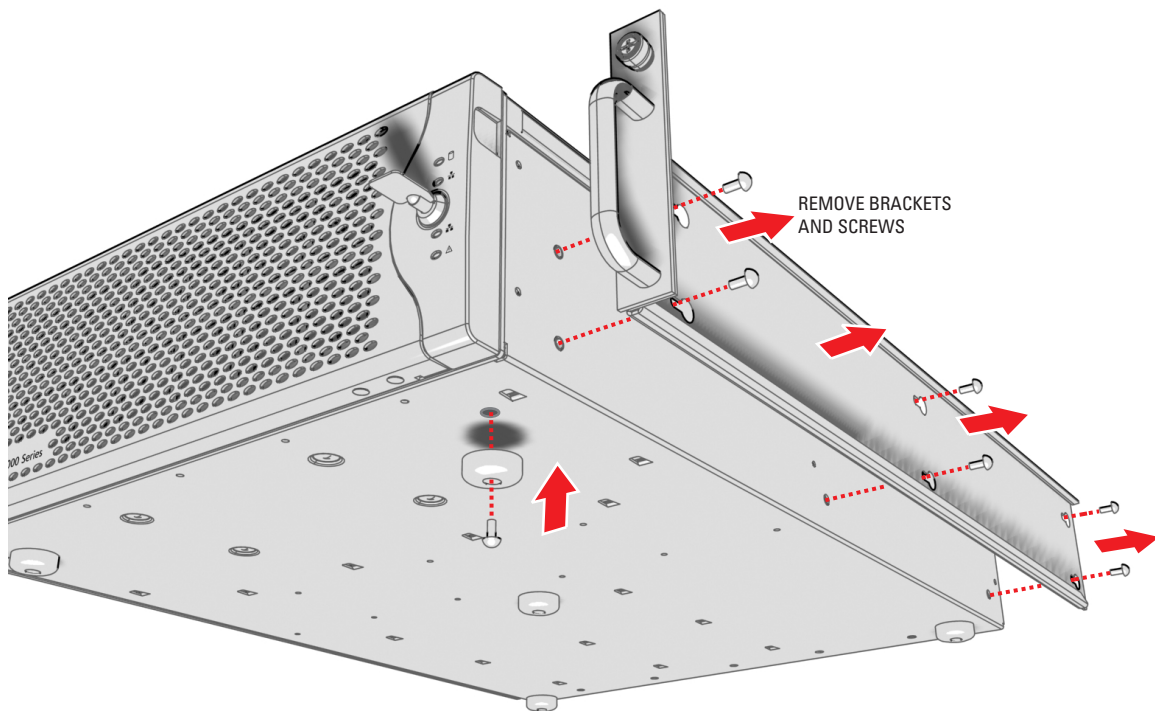
**Figure 7.** Product Serial Number Label

## DESKTOP INSTALLATION

**⚠ WARNING:** Do not place the NVR5100 on its side; in this position, the unit is likely to fall over and may cause equipment damage or personal injury.

To install the NVR5100 on a desktop:

1. Make sure the rubber feet are installed on the unit to prevent surface damage. If not, secure each rubber foot to the indicated locations on the bottom panel of the unit. Use the five 8-32 x 0.375-inch Phillips pan head screws (supplied).
2. Remove the two chassis brackets from the sides of the unit, if they are attached. Remove the 10-32 x 0.25-inch Phillips pan head screws (six per bracket). Save the brackets and screws for possible future use.
3. Position the unit to allow for cable and power cord clearance at the rear of the unit.



**Figure 8.** Installing Rubber Feet and Removing Brackets

## RACK MOUNTING

The NVR5100 mounts into an industry-standard 19-inch (48 cm) equipment rack. The NVR5100 occupies three rack units (5.25 in. or 13.3 cm) of vertical rack space. The hardware necessary to mount the NVR5100 into a rack is supplied with the unit.

The rack must meet the following requirements:

- 19-inch (48 cm) EIA-310-D compliant (rear column required)
- Rack column depth: 24 to 30 inches (61 to 76 cm)
- Column mounting hole provisions: 10-32 UNF-2B threaded holes or square window holes on front and rear columns
- Door systems are acceptable. Front doors must have at least 2 inches (5.1 cm) between the NVR5100 front bezel and the inside of the door. Rear doors may only be used on rack columns that are more than 26 inches (66 cm) deep.

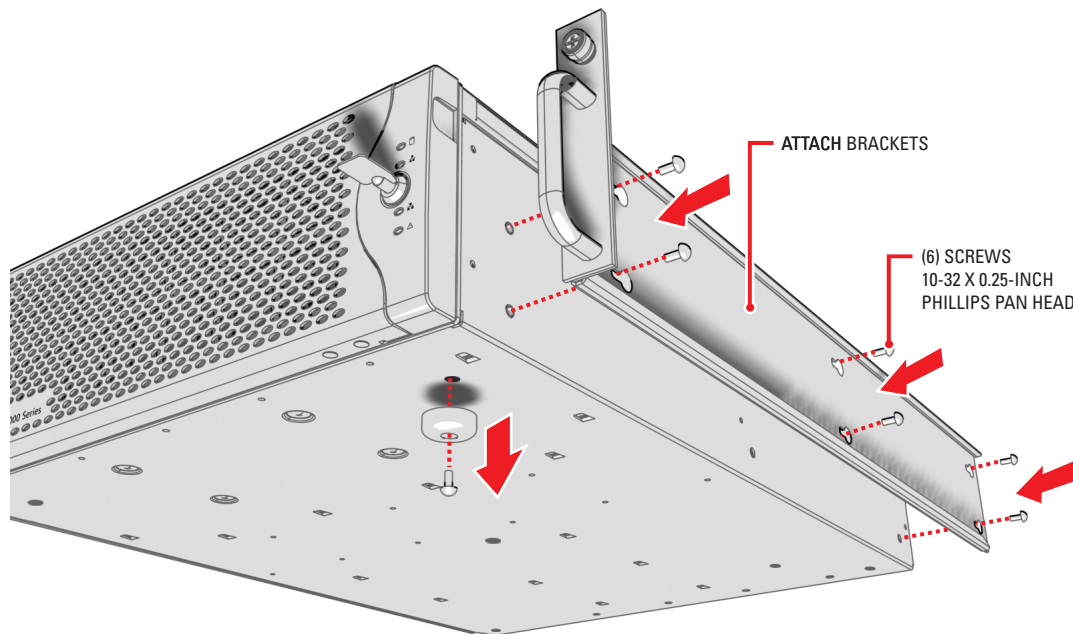
### ⚠ WARNINGS:

- Secure the front and rear screws to the support rails.
- Make sure the NVR5100 is level.
- Slots and openings in the cabinet provide ventilation to prevent the unit from overheating. Do not block these openings. Never place the unit near or over a radiator or heat register. When placing the unit in a rack, be sure to provide proper ventilation.

To install the NVR5100 in a rack:

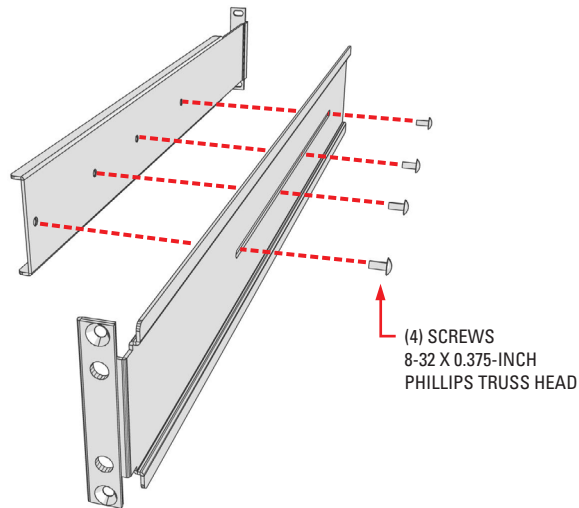
**NOTE:** Figure 4 identifies each piece of hardware for this procedure.

1. *If chassis mounting brackets are not attached:* Attach one mounting bracket to each side of the NVR5100. Use six 10-32 x 0.25-inch Phillips pan head screws for each bracket. Attach the brackets so that the tapered ends are positioned toward the rear of the NVR5100.



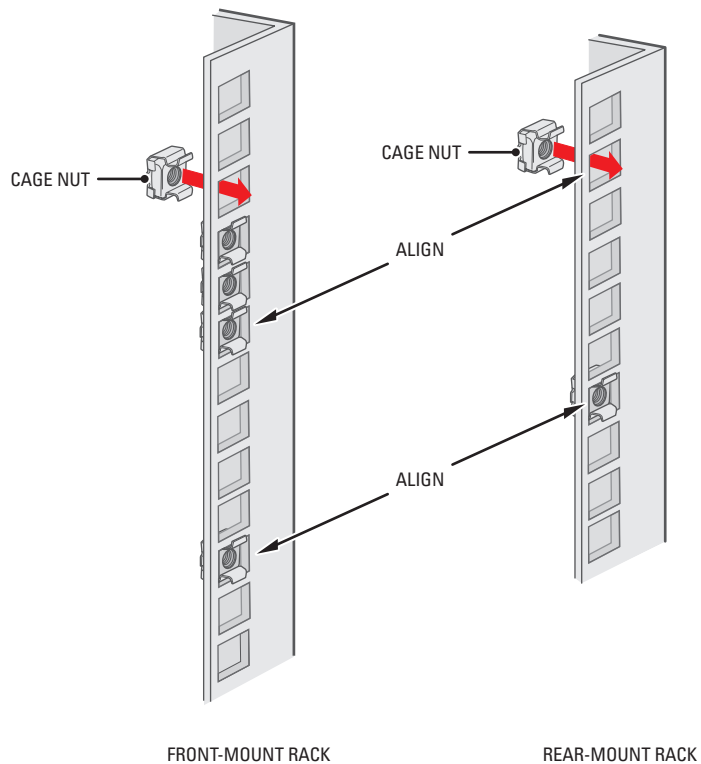
**Figure 9.** Fastening Mounting Brackets to Chassis

2. Remove the rubber feet from the underside of the unit if they are attached.
3. Attach one front-mount rail to one rear-mount rail. Make sure the rails are mounted back to back, as shown in Figure 10. Depending on rack depth, use either three or four 8-32 x 0.375-inch Phillips truss head screws for each rail set. Leave the screws loose until step 10.



**Figure 10.** Assembling a Support Rail

4. Repeat step 3 for the other rail set.
5. *If you are installing the unit into a square-hole rack:* Insert 14 cage nuts into the square-hole rack as shown in Figure 11. Align the bottom cage nuts on the front racks with the bottom cage nuts on the rear racks. Then align the top cage nuts with the front racks as shown.



**Figure 11.** Inserting Cage Nuts

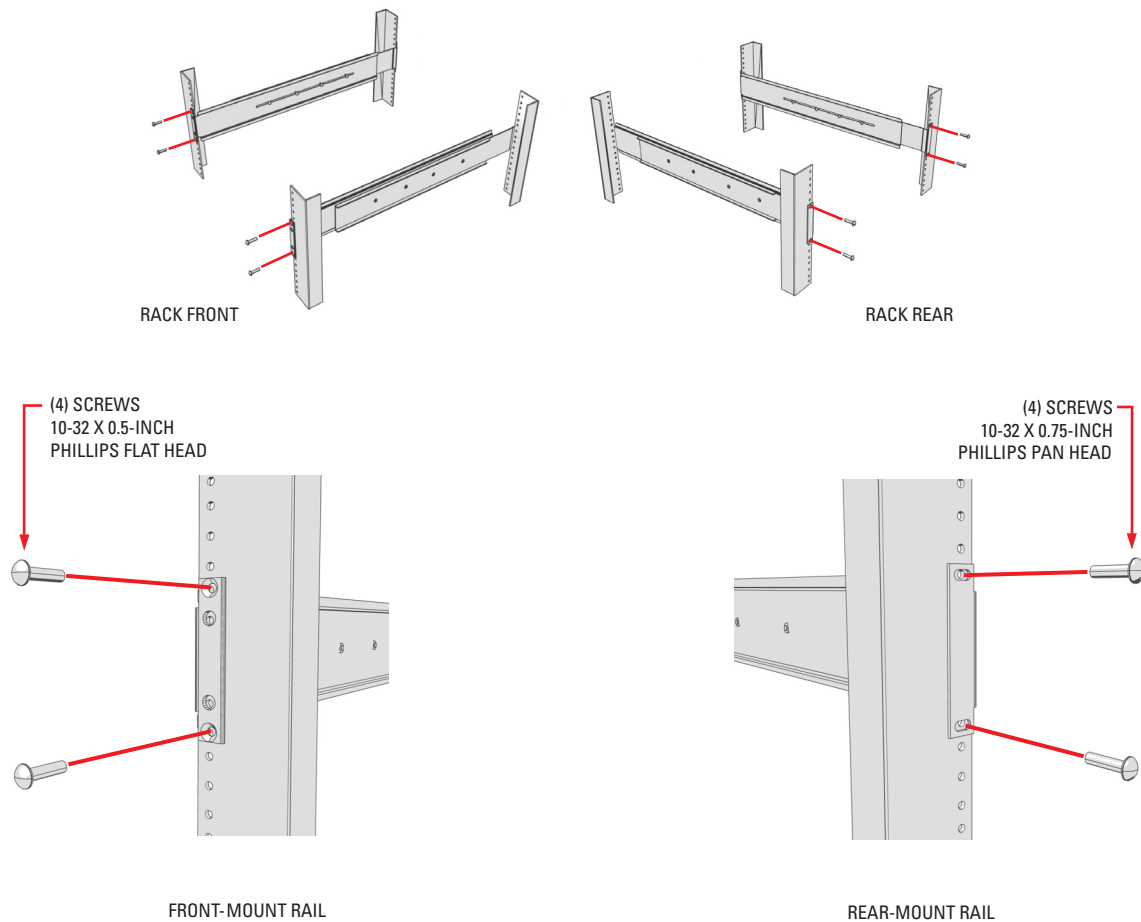


6. Attach one support rail assembly to the equipment rack in the desired location (refer to Figure 12):

**NOTE:** The support rail assemblies are identical and may be used on either the right or left side of the rack.

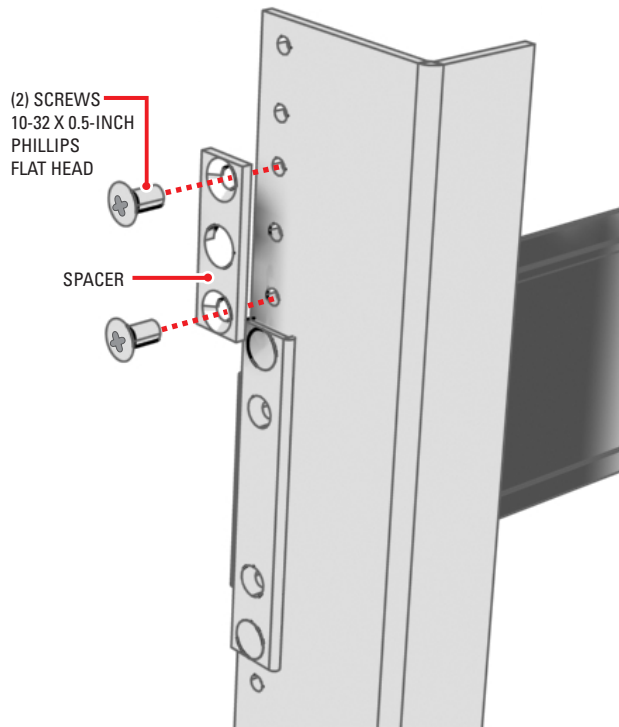
- a. Position the ear of the front-mount rail against the front of the equipment rack. Align the top and bottom holes in the ear of the rail with the threaded holes (or cage nuts) in the rack.
- b. Using two 10-32 x 0.5-inch Phillips flat head screws, attach the ear of the rail to the front of the rack. Insert the screws from the outside of the rack, pointing toward the back of the rack.
- c. Adjust the rails to the correct depth of the equipment rack by sliding the rear-mount rail to the back of the equipment rack.
- d. Position the ear of the rear-mount rail against the rear exterior of the equipment rack. Align the top and bottom holes in the ear of the rail section with the threaded holes (or cage nuts) in the equipment rack.
- e. Using two 10-32 x 0.75-inch Phillips pan head screws, attach the ear of the rail to the rear of the rack. Insert the screws from the outside of the rack, pointing toward the front of the rack.

7. Repeat step 6 for the second support rail assembly.



**Figure 12.** Attaching Support Rails

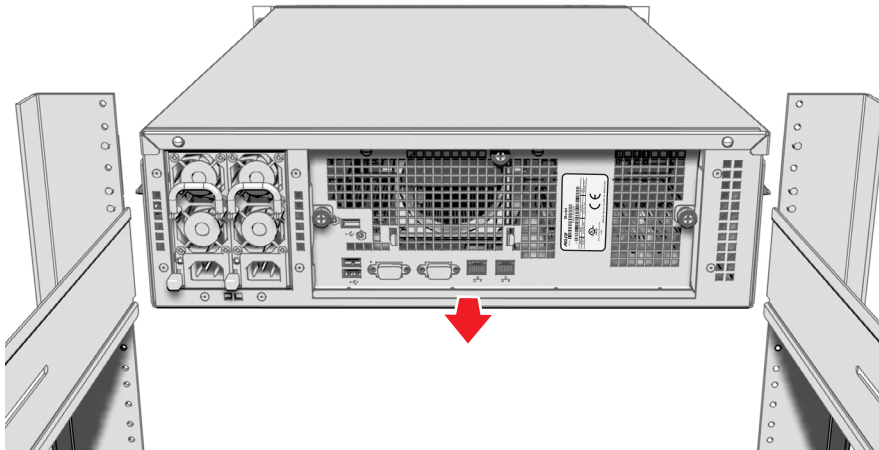
8. Attach one rack rail spacer to the front of the equipment rack (refer to Figure 13):
  - a. Position the bottom hole of the spacer above the ear of the front-mount rail.
  - b. Insert two 10-32 x 0.5-inch Phillips flat head screws into the spacer, one in the top hole and one in the bottom hole. Leave the middle hole empty; the top thumbscrew on the NVR5100 will use it.
  - c. Tighten the two screws to secure the spacer to the rack.



**Figure 13. Attaching Rack Rail Spacers**

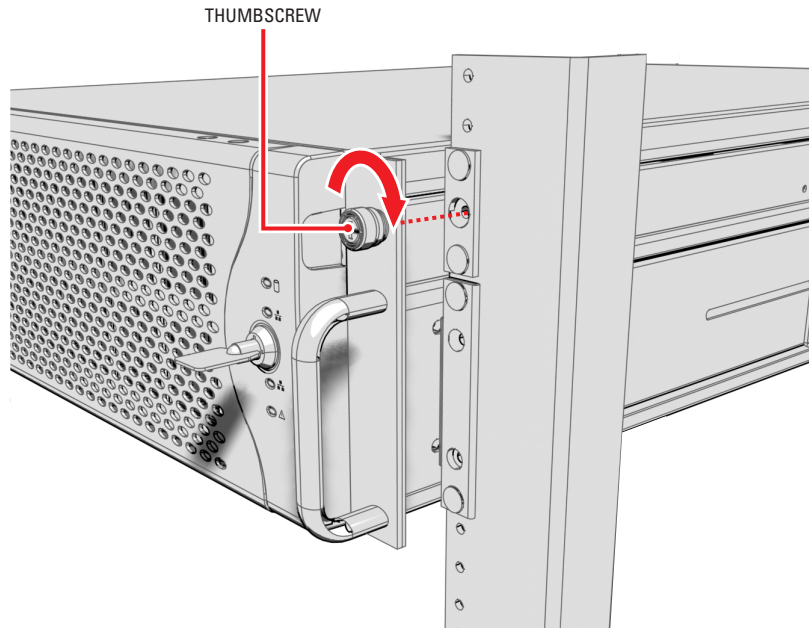
9. Repeat step 8 for the second spacer.
10. Tighten the 8-32 x 0.375-inch Phillips truss head screws that were attached to the front- and rear-mount rails in steps 3 and 4.
11. Place the unit onto the mount rails by sliding the chassis brackets onto the rails. This step may require two people to lift and slide the unit into place. The unit should slide in and out of the rack easily.

**⚠ WARNING:** When sliding out the NVR5100, be careful not to let the unit fall out of the rack.



**Figure 14. Mounting the NVR5100 into the Rack**

12. After the unit is in place, tighten the two thumbscrews to secure the unit to the rack.



**Figure 15.** Tightening the Thumbscrews

# Hard Drive Array Installation

The NVR5100 stores data using RAID (Redundant Array of Independent Disks) technology. All NVR5100 Series recorders operate in a RAID 5 configuration to maximize fault tolerance and enhance disk-access performance.

The unit incorporates two RAID controllers, each managing an independent storage array of six drives. If a drive fails, the unit continues operating and signals the operator that a drive failed and should be replaced.

## INSTALLING HARD DRIVE CARRIERS

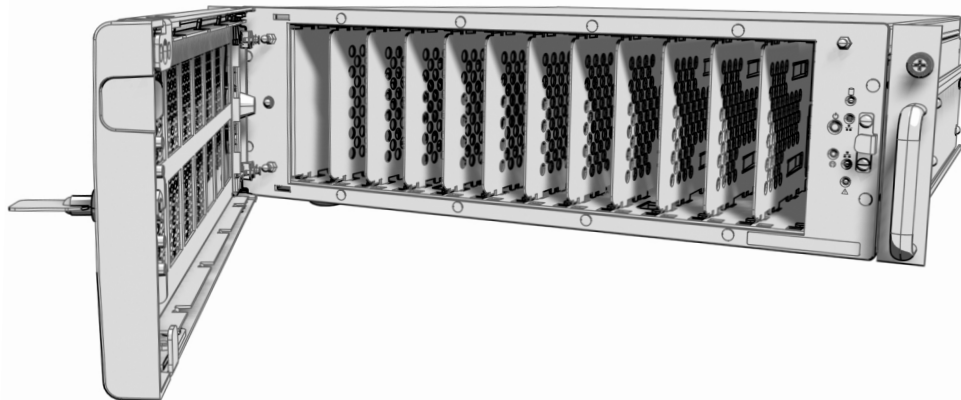
After you have securely mounted the NVR5100, you will install 12 hard drive carriers into the front of the chassis. Each hard drive is already mounted in its own drive carrier so that you can easily insert and remove a hard drive, even while the unit is operating.

**WARNING:** Each hard drive has been preconfigured for a specific drive bay in the NVR5100. If you do not install them in their proper locations, the RAID arrays will be corrupted and the unit will not record.

**NOTE:** You must install all hard drive carriers before you apply power to the NVR5100. Six-drive (1.5 TB/3.0 TB) models include six empty hard drive carriers that you must also install. The drive status indicator is not included on empty drive carriers.

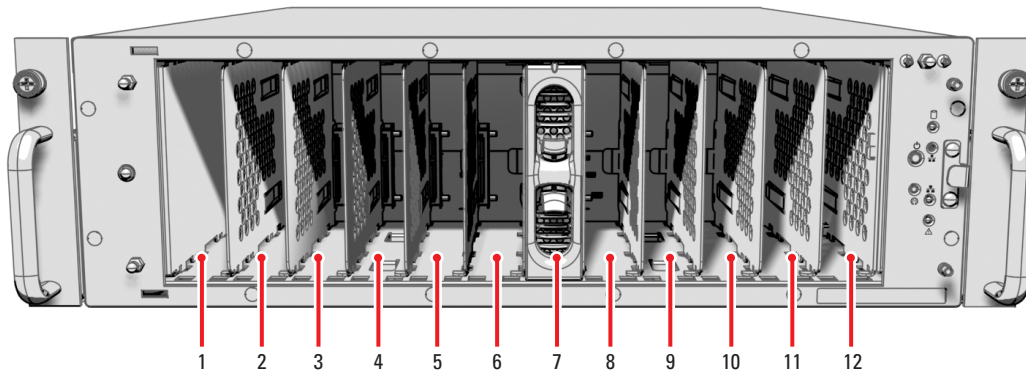
To install the hard drive carriers into the front of the unit:

1. Review all instructions in this section before proceeding.
2. Make sure you protect the unit and its components, which are susceptible to damage from improper handling and ESD. Refer to the Safe Handling of Hard Drives document (C2668M) for more information.
3. Unlock and open the front bezel.



**Figure 16.** Opening the Front Bezel

- Identify the drive bay for each hard drive carrier. The drive bays and drive carriers are numbered from 1 to 12 (refer to Figure 17 and Figure 18).



**Figure 17.** Drive Bay Assignment

On 12-drive models (6.0 TB/9.0 TB), carriers 1 through 12 contain hard drives.

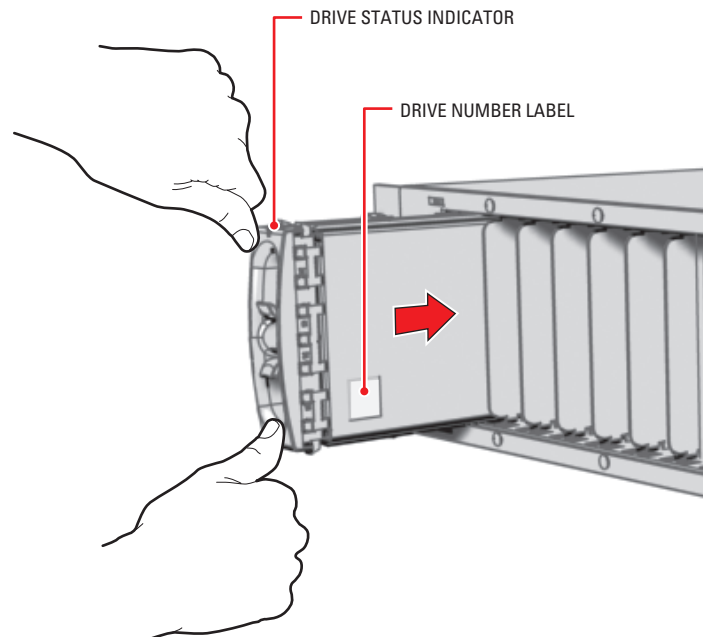
On 6-drive models (1.5 TB/3.0 TB), carriers 1 through 6 contain hard drives. Carriers 7 through 12 do not contain hard drives, but should be installed to maintain proper air circulation in the unit.

Upgrade kits are available that increase the unit capacity of the 6-drive models by 1.5 TB or 3.0 TB. Each upgrade kit includes six filled hard drive carriers. Contact Pelco Product Support at 1-800-289-9100 (USA and Canada) or 1-559-292-1981 (international) for more information.

- Install the first hard drive carrier as follows:

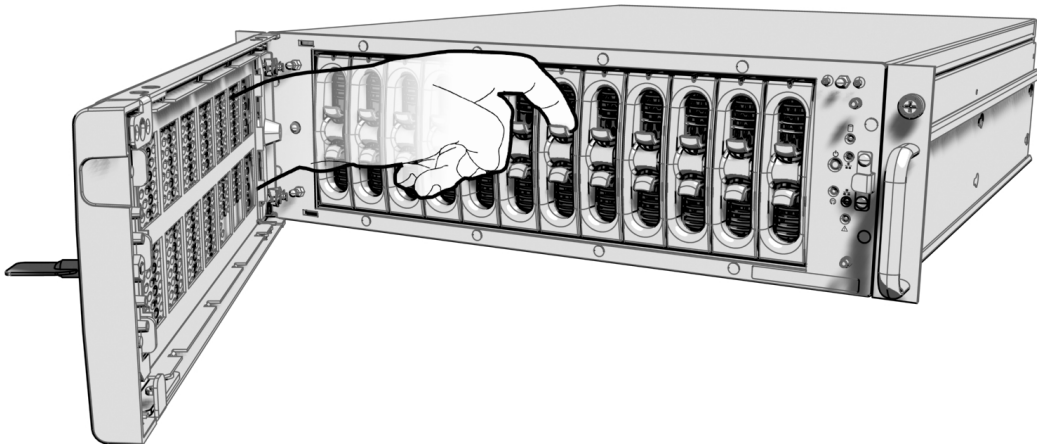
**⚠ WARNING:** The hard drive carrier fits into the unit only one way. If you have difficulty inserting a carrier, remove it and check its orientation.

- Orient the drive carrier so that the drive status indicator is facing up.
- Align the tapered ends of the carrier rails with the correct drive slot opening.
- Slide the drive carrier gently into the unit. Make sure the carrier snaps into place.



**Figure 18.** Hard Disk Drive Carrier Installation

6. Make sure the hard drive carrier has been installed correctly. Without squeezing the spring-loaded release tabs, gently pull the plastic front cover of the carrier away from the chassis. If the carrier does not pull out, the drive is secure.



**Figure 19.** Checking Hard Disk Drive Carrier

7. Repeat steps 5 and 6 for each drive carrier.
8. Close and lock the front bezel.

**NOTE:** During operation, monitor the unit status indicator lights to make sure that all drives are operating properly. In case of failure, system alarms and error messages will also display on Endura workstations and VCD5000 video console displays.

# Connections

Familiarize yourself with the NVR5100 rear panel before connecting any equipment to the unit.

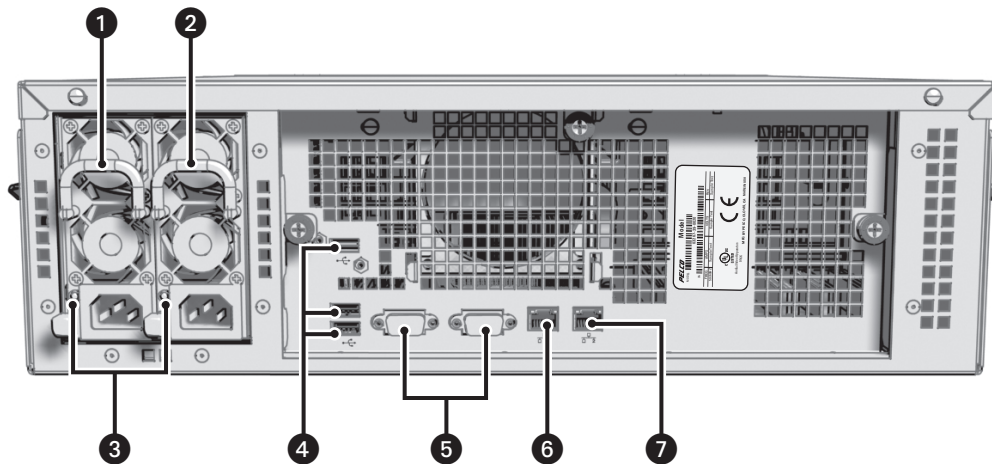


Figure 20. Rear Panel Layout

- |                                  |                               |
|----------------------------------|-------------------------------|
| 1 Primary Power Supply           | 5 Reserved                    |
| 2 Secondary Power Supply         | 6 Primary Network Connector   |
| 3 Power Supply Status Indicators | 7 Secondary Network Connector |
| 4 USB 2.0 Port                   |                               |

## CONNECTING POWER

The NVR5100 is equipped with two hot-swappable power supplies. These autoranging power supplies adapt automatically to voltages between 100 VAC and 240 VAC (50/60 Hz).

You should also install an uninterruptible power supply (UPS), which is not supplied. UPS devices maintain a limited amount of backup battery power in case the main power fails. Refer to *Appendix D: Installing an Uninterruptible Power Supply (UPS)* on page 37 for more information.

**NOTE:** Connect each power supply to a different branch circuit. This ensures optimal performance, reduces possible video loss, and reduces power leakage to a safe level.

Connect two of the supplied US, European, or UK standard power cords to rear of the unit, and then connect each cord to the appropriate power source:



1. Connect one power cord to the back of the primary power supply's power connector.
2. Connect the other end of this power cord to the appropriate power source.
3. Connect the second power cord to the back of the secondary power supply's power connector.
4. Connect the other end of this power cord to the appropriate power source.

When connected, the power supply status indicators glow solid red. As soon as the unit starts, the indicators glow solid green. During operation, if either indicator is dark or glows red, there is a problem with the power supply. Refer to *Appendix E: Troubleshooting* on page 37 for more information.

## CONNECTING TO THE NETWORK

The NVR5100 Series recorder supports remote administration from an Endura workstation. The NVR5100 is compatible with the entire family of Endura-ready devices using TCP/IP and UPnP protocols. Consult your network administrator before installing the NVR5100 to avoid possible network conflicts.


The NVR5100 offers the following two network connectors on the rear panel:

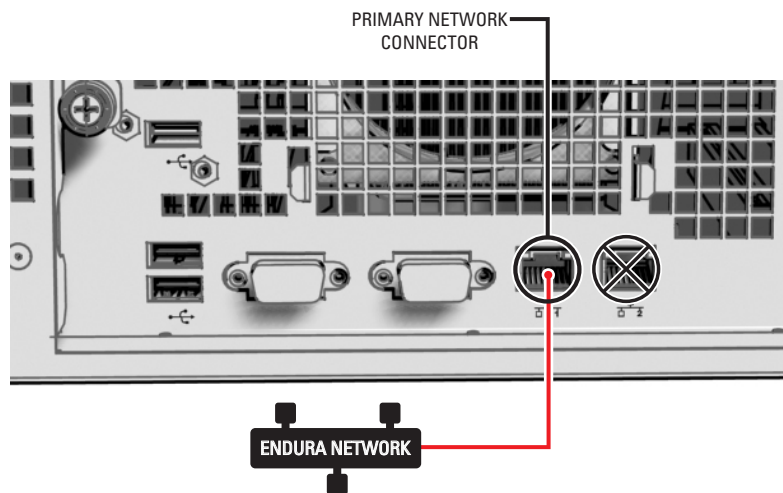
- **Primary network connector**  1  
Use this Gigabit Ethernet adapter port to connect the NVR5100 to the Endura network. This is required for Endura operation.
- **Secondary network connector**  2  
Use this Gigabit Ethernet port to expand the storage capacity of the NVR5100 with one or more SEB5100 storage expansion boxes (refer to *Appendix A: Expanding Video Storage* on page 31).

**NOTE:** For best results, you should only implement an Endura system on a 1000Base-T network. Unless the Endura installation is very small with a dedicated Endura network, a 100Base-T network will not support the necessary data throughput requirements.

To connect the NVR5100 to the Endura network using a switched Gigabit Ethernet network:

1. Connect one end of the unshielded twisted pair (UTP) cable to the primary network connector on the NVR5100 rear panel. Use standard Cat5e or better UTP cable with RJ-45 connectors.

**NOTE:** Do not connect the UTP cable to the secondary network connector .



**Figure 21.** Network Cable Connection

2. Connect the other end of the UTP cable to an available port on a Pelco-approved Gigabit Ethernet switch. Contact Pelco Product Support at 1-800-289-9100 (USA and Canada) or 1-559-292-1981 (international) for a list of approved Gigabit Ethernet switches.

There are two indicators on the network connector on the rear panel. The right indicator glows orange when there is a good connection between the NVR5100 and a Gigabit Ethernet switch that is powered up. If the indicator does not glow, check the cable and the switch. Disregard the left indicator, which shows network activity.



# Operation

Refer to the Endura WS5000 Advanced System Software Operation manual (C1624M) for details on how to access and configure the NVR5100 Series NVR.

**NOTE:** To make sure that all diagnostic messages will appear to a system operator, leave at least one Endura workstation or VCD5000 video console display running at all times.

During operation, monitor the unit status and power supply indicator lights to make sure that all drives are operating properly. In case of failure, system alarms and error messages will also display on Endura workstations and VCD5000 video console displays (refer to *Appendix E: Troubleshooting* on page 37).

## FRONT PANEL CONTROLS AND INDICATORS

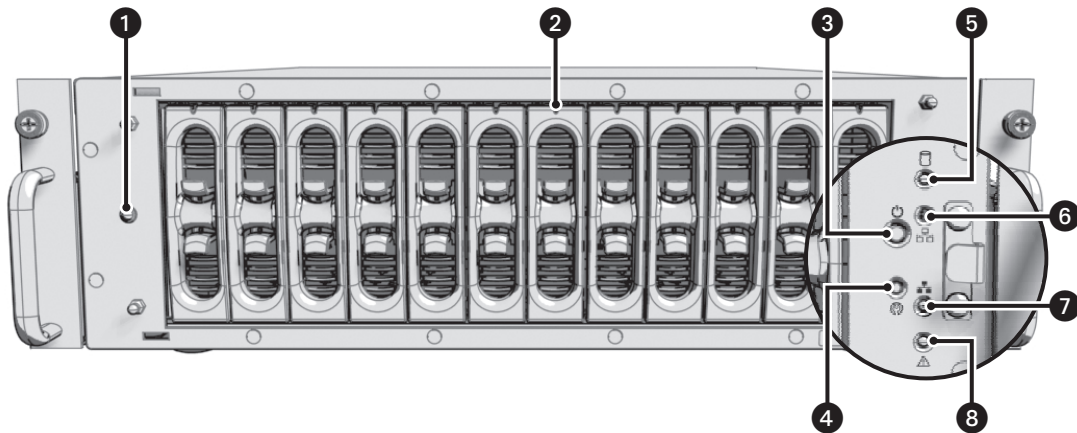


Figure 22. Front Panel Layout

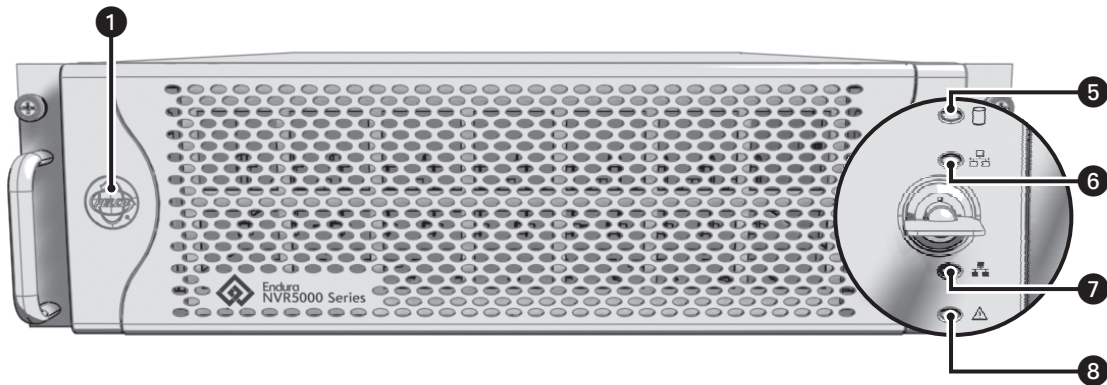





Figure 23. Front Bezel Indicators

- 1 Pelco Badge (power indicator)   
The Pelco badge glows blue when the unit has power. If the front bezel is open, this indicator glows white.
- 2 **Drive status**  
The disk status indicator reports the operating status of each individual hard disk drive, as follows:
  - **Solid Green:** Read or write operation on a specific hard drive.
  - **Solid Red:** Problem with the hard drive.
  - **Flashing Red:** The unit is initializing the hard drive.
- 3 **Power button**   
Use the power button to turn the unit on and off (refer to *Unit Startup* on page 26 and *Unit Shutdown* on page 27).

4 **Reserved** 

5 **CPU activity** 

The CPU activity indicator flashes yellow anytime there is processing activity on the NVR5100. It is not lit anytime there is no processing activity.

6 **Network activity** 

The network activity indicator flashes green whenever the unit is sending or receiving data over the network. The indicator is not lit when there is no network activity present or when a link has been terminated.

7 **Network status** 

Network status (connection and speed) is indicated by one of the following conditions:

- **Off:** The unit is not connected to the network.
- **Solid Green:** The unit is connected to the network using the 1000Base-T standard.
- **Solid Amber:** The unit is connected to the network using the 100Base-T standard.
- **Solid Red:** The unit is connected to the network using the 10Base-T standard.
- **NOTE:** For proper operation, you must use the 1000Base-T standard.

8 **Unit status** 

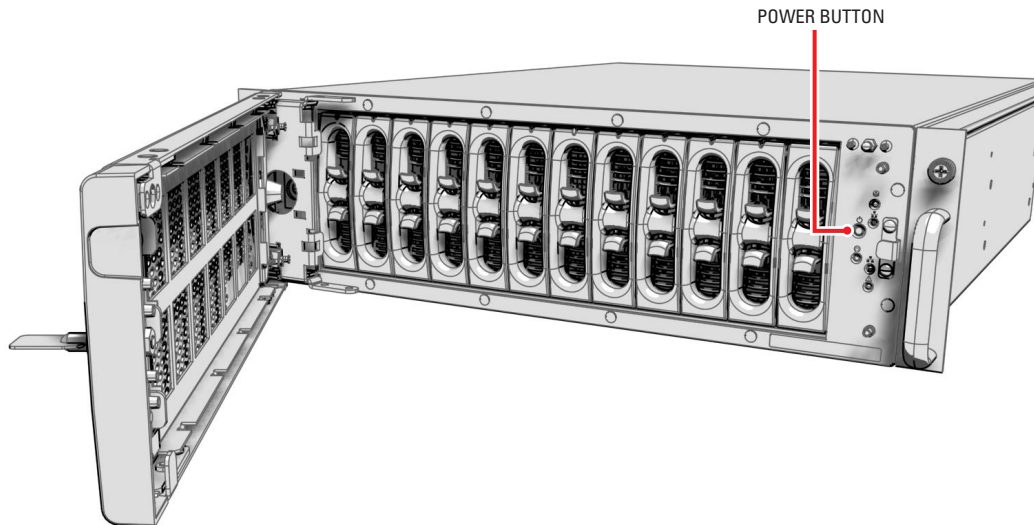
Unit status is indicated by one of the following three colors:

- **Green:** The unit is functioning normally.
- **Amber:** The unit is in configuration mode.
- **Red:** The unit is in an error condition (refer to *Appendix E: Troubleshooting* on page 37).

## UNIT STARTUP

To start the unit:

1. Unlock and open the front bezel.
2. Press the power button. The power indicator glows.
3. Close and lock the front bezel.



**Figure 24.** Opening the Front Bezel

## UNIT SHUTDOWN

You can shut down the NVR5100 in either of two ways.

An orderly shutdown lets the unit close its files and power down without affecting the data files. Use the orderly shutdown in most cases.

An immediate shutdown is the same as disconnecting power and can result in corrupted data files. Only use the immediate shutdown in an emergency or when there is not enough time for an orderly shutdown.

To shut down the unit:

1. Unlock and open the front bezel.
2. Select one of the following options:
  - For an orderly shutdown, press and release the power button quickly.
  - For an immediate shutdown, press and hold the power button until the unit shuts down.
3. Close and lock the front bezel.

# Troubleshooting

If the following instructions fail to solve your problem, contact Pelco's Product Support at 1-800-289-9100 (USA and Canada) or 1-559-292-1981 (international) for assistance.

Access the properties dialog boxes for the NVR5100 on the Endura workstation; refer to the Endura WS5000 Advanced System Software Operation manual (C1624M). Then note the following items before contacting Pelco:

- **Unit serial number:** Located in the Properties window and on the product label
- **Software version:** Located in the Advanced Properties dialog box

**NOTE:** Do not try to repair the unit yourself. Opening it immediately voids any warranty. Leave maintenance and repairs to qualified technical personnel. Exchange the defective unit and return it for repair.

## NVR5100

Problem	Possible Causes	Suggested Remedy
Unit not ready.	Power turned off.	Check that the power indicator is lit.
	Faulty cable connections.	Check all leads, plugs, contacts, and connections.
	Defective encoder.	Check camera on a different encoder.
	Network connectivity issues.	Contact your network administrator.
	Drive carriers not installed properly or not installed in correct order.	Shut down the NVR5100. Verify that all drive carriers are installed correctly and in their correct drive bay slots (1 to 12).
The unit is not ready for operation after firmware upload.	Voltage failure during programming of update file.	Replace the NVR5100 and have it checked by Pelco.
Unit status indicator is red.	Unit fan failure.	Replace the NVR5100 and have it checked by Pelco.
	Power supply output voltage fluctuates more than 8 percent.	Check power supply and line voltage.
Unit status indicator is red and the power supply alarm sounds.	Power loss to either power supply.	Check each power supply, line voltage, and the UPS.
	Power supply module failure.	Replace failed power supply.
Unit status and hard drive indicators are red and the unit alarm sounds.	Hard drive failure.	Replace failed hard drive.

The unit status indicator continues to glow red after you correct the problem. It can be cleared from Endura workstations and VCD5000 video console displays.

## POWER SUPPLY

The primary and secondary power supplies are both equipped with status indicators. Table D describes the status by color and indicator.

Power Supply Status	Power Supply Indicator	Front Panel Status Indicator	Power Supply Audible Alarm
Normal	Solid Green	Solid Green	Silent
Power problem	Solid Red	Solid Red	Alarm Sounds
Power supply failure	Dark	Solid Red	Silent

Replace the appropriate power supply if there is any problem (refer to *Appendix C: Replacing a Power Supply* on page 35).

# Specifications

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## SYSTEM

Operating System	Linux®
User Interface	Remote operation from Endura workstation or VCD5000
Video Storage Capacity	Up to 6.98TB, expandable using SEB5100

## VIDEO/AUDIO

Video Standards	NTSC/PAL/EIA/CCIR composite	
Video Compression	MPEG-4	
Video Resolutions	<u>NTSC</u>	<u>PAL</u>
4CIF	704 x 480	704 x 576
2CIF	704 x 240	704 x 288
CIF	352 x 240	352 x 288

## NETWORK

Interface	2 Gigabit Ethernet RJ-45 ports (1000Base-T)
Security	2 modes: secure mode (device authentication) and unsecure mode

## AUXILIARY INTERFACES

USB 2.0	3 high-speed USB 2.0 ports on rear of unit
---------	--

## FRONT PANEL INDICATORS/FUNCTIONS

Power	Blue
CPU Activity	Yellow
Network Activity	Green
Network Status	Green, amber, red
Unit Status	Green, amber, red
Individual Drive Status	Green, red
Power Button	On, off (soft), off (hard)

## POWER

Power Input	100-240 VAC, 50/60 Hz, autoranging
Power Supply	Internal, dual-redundant, hot-swappable
Cable Type	2 USA (117 VAC), 2 European (220 VAC), 2 UK (250 VAC) All, 3 prongs, molded connector, 6 ft or (1.8 m) cord

Power Consumption (maximum)	<u>Input Voltage</u>	<u>Watts</u>	<u>BTU/H</u>
	100 VAC	339 W	1157
	115 VAC	335 W	1143
	220 VAC	332 W	1133

Each hard drive consumes approximately 13 W (21.7 VA) during normal operation.

## ENVIRONMENTAL

Operating Temperature	50° to 95°F (10° to 35°C) at unit air intake
Storage Temperature	-40° to 149°F (-40° to 65°C)
Operating Humidity	20% to 80%, noncondensing
Maximum Humidity Gradient	10% per hour
Operating Altitude	-50 ft to 10,000 ft (-16 m to 3,048 m)
Operating Vibration	0.25 G at 3 Hz to 200 Hz at a sweep rate of 0.5 octave/minute

**NOTE:** The temperature at the unit air intake can be significantly higher than room temperature. Temperature is affected by rack configuration, floor layout, air conditioning strategy, and other issues. To prevent performance failure and unit damage, make sure the temperature at the unit is continuously within the operating temperature range.

## PHYSICAL

Construction	Steel cabinet
Finish	
Front bezel	Gray metallic with black end caps
Chassis	Black matte finish
Dimensions	24.3" D x 17.0" W x 5.2" H (61.8 x 43.2 x 13.2 cm)
Unit Weight	
Empty (no storage drives)	51 lb (24 kg)
Fully equipped (12 drives)	67 lb (31 kg)
Mounting	Desktop (feet) Rack, 3 RU per unit (Rack ears and screws provided)

## STANDARDS/ORGANIZATIONS

- Pelco is a member of the MPEG-4 Industry Forum
- Pelco is a member of the Universal Plug and Play (UPnP) Forum
- Pelco is a member of the Universal Serial Bus (USB) Implementers Forum
- Pelco is a contributor to the International Standards for Organization/Electrotechnical Commission (ISO/IEC) Joint Technical Committee 1 (JTC1), "Information Technology," Subcommittee 29, Working Group 11
- Compliance, ISO/IEC 14496 standard (also known as MPEG-4)
- Compliant with International Telecommunication Union (ITU) Recommendation G.711, "Pulse Code Modulation (PCM) of Voice Frequencies"

(Design and product specifications subject to change without notice.)

# Appendices

## APPENDIX A: EXPANDING VIDEO STORAGE

You can increase the video storage capacity of the NVR5100 by adding one or more SEB5100 Series storage expansion boxes. Each SEB5100 adds up to 9.0 TB of total capacity (up to 6.98 TB of video storage). You can add up to eight SEB5100 Series units to expand the total capacity for each NVR5100 up to 81 TB of total capacity (up to 62.8 TB of video storage).


You can expand the NVR5100 two ways, depending on your future expansion requirements:

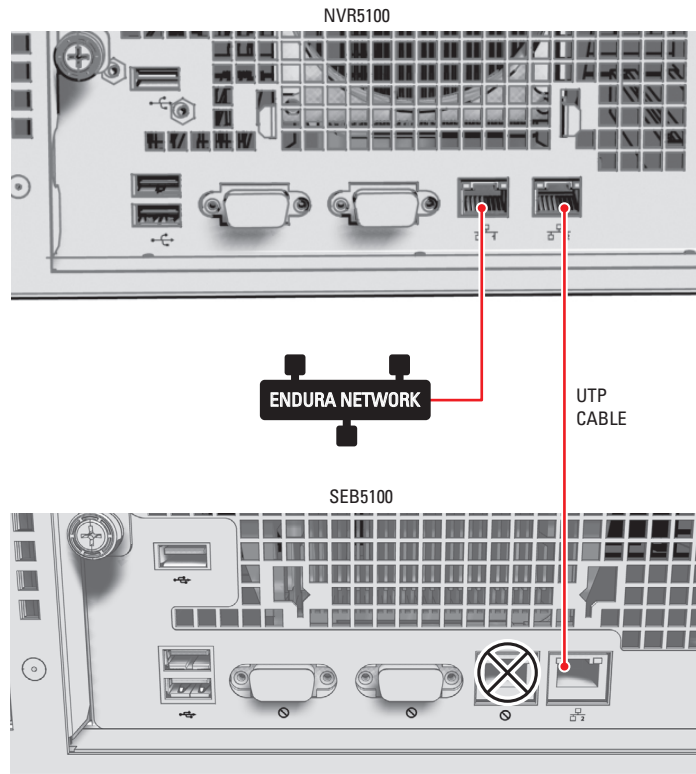
- Add a single SEB5100 to a single NVR5100 using a single cable.
- Add one or more SEB5100 units to a single NVR5100 using a Gigabit Ethernet switch.

### INSTALLING A SINGLE SEB5100 UNIT (CABLE)


To connect a single SEB5100 to a single NVR5100:

1. Connect one end of the UTP cable to the secondary network connector  on the NVR5100 rear panel. Use a standard Cat5e or better UTP cable with RJ-45 connectors.


**NOTE:** Do not connect the UTP cable to the primary network connector  on the NVR5100.



**Figure 25.** Connecting an NVR5100 Directly to an SEB5100

2. Connect the other end of the UTP cable to the network connector  on the SEB5100 rear panel.

#### NOTES:

- You do not have to shut down the NVR5100 to add an SEB5100 with a UTP cable.
- Do not connect the UTP cable to the reserved connector  on the SEB5100.
- To change from a UTP cable to a Gigabit Ethernet switch, you must shut down the NVR5100 and the SEB5100 (refer to *Unit Shutdown* on page 27).


3. Power up the SEB5100 if necessary; refer to the SEB5100 Series Installation manual (C1622M) for more information.
4. Power up the NVR5100 if necessary (refer to *Unit Startup* on page 26).


The NVR5100 automatically recognizes the new SEB5100 unit within two minutes and puts it into service.

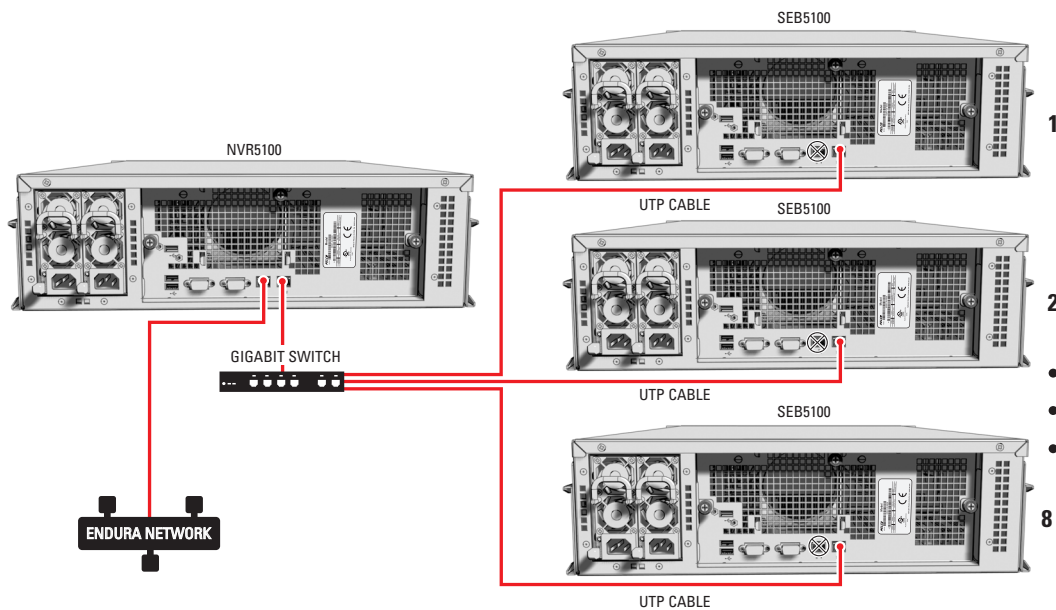
## INSTALLING MULTIPLE SEB5100 UNITS (SWITCH)

Use a dedicated, Pelco-approved Gigabit Ethernet switch to expand the video storage of the NVR5100 quickly and easily. First, connect the NVR5100 to the switch. Then connect up to eight SEB5100 units to the switch. Contact Pelco Product Support at 1-800-289-9100 (USA and Canada) or 1-559-292-1981 (international) for a list of approved Gigabit Ethernet switches.

To connect one or more SEB5100 units to a single NVR5100:

1. Connect one end of the UTP cable to the secondary network connector  2 on the NVR5100 rear panel. Use standard Cat5e or better UTP cables with RJ-45 connectors.


**NOTE:** Do not connect the UTP cable to the primary network connector  1 on the NVR5100.



**Figure 26.** Connecting an NVR5100 to Multiple SEB5100 Units

2. Connect the other end of the UTP cable to a free port on the dedicated network switch.

### NOTES:

- You do not have to shut down the NVR5100 to add an SEB5100 with a network switch.
- Do not connect the network switch for the SEB5100 units to the primary network connector  1 on the NVR5100.
- To change from a single UTP cable to a Gigabit Ethernet switch, you must shut down the NVR5100 and the SEB5100 (refer to *Unit Shutdown* on page 27).

3. Connect a standard Cat5e or better UTP cable from a free RJ-45 port on the switch to the network connector  2 on the rear panel of each SEB5100.

**NOTE:** Do not connect the UTP cable to the reserved connector  on the SEB5100.


4. Power up the Gigabit Ethernet switch if necessary.
5. Power up each SEB5100 if necessary; refer to the SEB5100 Series Installation manual (C1622M) for more information.
6. Power up the NVR5100 if necessary (refer to *Unit Startup* on page 26).

The NVR5100 automatically recognizes the new SEB5100 units within two minutes and puts them into service.



## INSTALLING ADDITIONAL SEB5100 UNITS (EXISTING SWITCH)

To add an SEB5100 unit to an existing NVR5100 with a Gigabit Ethernet switch:

1. Connect one end of a UTP cable to a free RJ-45 port on the switch. Use a standard Cat5e or better UTP cable with RJ-45 connectors.
2. Connect the other end of the UTP cable to the network connector  on the rear panel of the new SEB5100.


**NOTE:** Do not connect the UTP cable to the reserved connector  on the SEB5100.

3. Power up the new SEB5100 if necessary; refer to the SEB5100 Series Installation manual (C1622M) for more information.

The NVR5100 automatically recognizes the new SEB5100 unit within two minutes and puts it into service.

## APPENDIX B: REPLACING A HARD DRIVE

Since the NVR5100 runs continuously, a hard drive may fail at some point. If this happens, the indicator for the failed drive glows red.

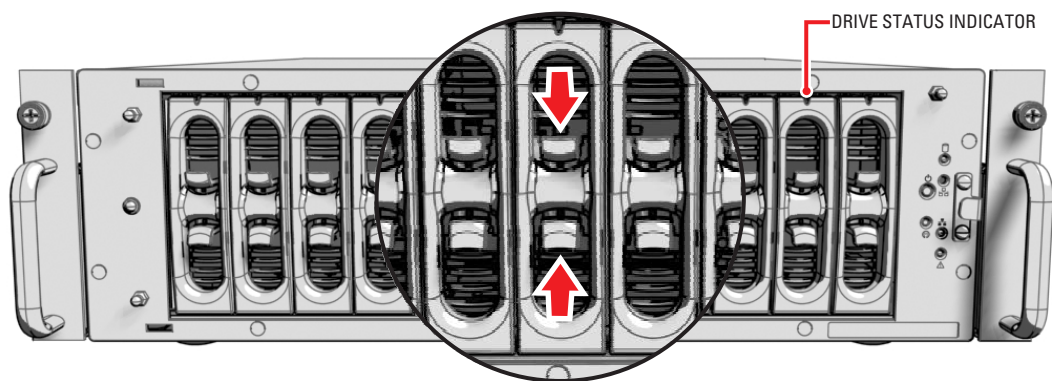
 **WARNING:** If a hard drive fails, replace it as soon as possible to maintain system data redundancy.

### NOTES:

- The HD5000 Series hard drive replacement kit includes a single hard drive carrier with a Pelco-certified hard drive. Using any other hard drive in the drive carrier voids the manufacturer's warranty for the NVR5100.
- You can replace the failed hard drive with a drive of equal or greater capacity. The unit ignores any additional capacity. However, do not install a lower capacity drive, which will corrupt the RAID array.
- You can replace the failed drive without shutting down the unit.
- No tools are required to replace this component.

To replace a hard drive:

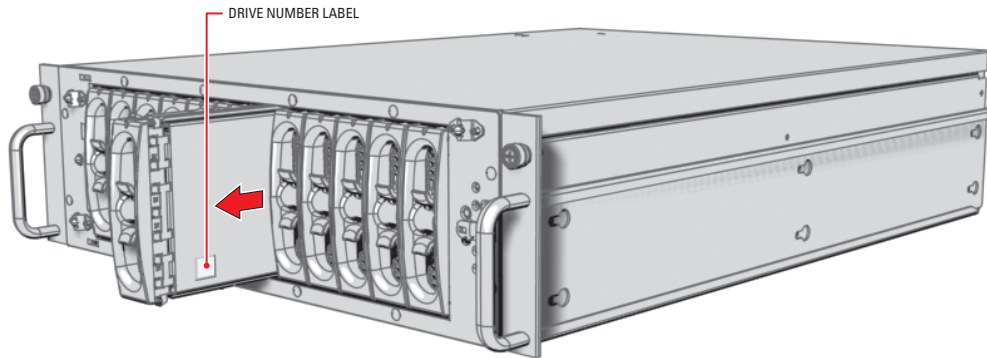
1. Review all instructions in this section before proceeding.
2. Make sure you protect the unit and its components, which are susceptible to damage from improper handling and ESD. Refer to the Safe Handling of Hard Drives document (C2668M) for more information.
3. Unlock and open the front bezel.
4. Identify the failed hard drive. The drive status indicator will be solid red.
5. Squeeze both plastic finger tabs of the carrier's spring-loaded latch.



**Figure 27.** Operating the Latching Mechanism

6. Gently pull the hard drive carrier out of the unit while squeezing the tabs. Note the drive number on the hard drive carrier.

**⚠ WARNING:** *Never* remove more than one drive at a time. Wait until the new drive is fully initialized.



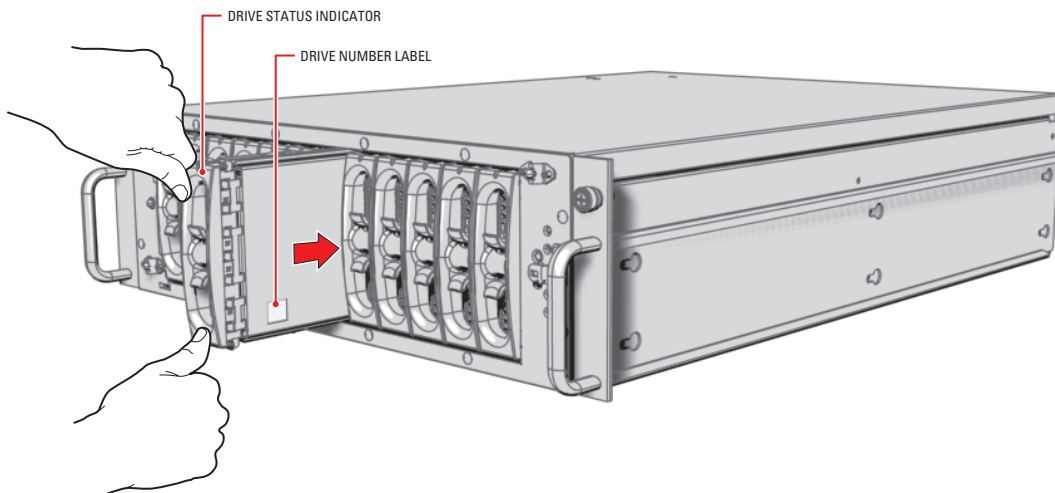
**Figure 28.** Removing the Hard Drive Carrier

7. Copy the drive number onto the drive label on the replacement hard drive carrier.
8. Install the replacement hard drive carrier as follows:

**⚠ WARNING:** The hard drive carrier fits into the unit only one way. If you have difficulty inserting a carrier, remove it and check its orientation.

- a. Orient the drive carrier so that the drive status indicator is facing up.
- b. Align the tapered ends of the carrier rails with the correct drive slot opening.
- c. Slide the drive carrier gently into the unit. Make sure the carrier snaps into place.

The unit alarm stops and drive initialization begins. Drive initialization can take up to 15 hours. During initialization, the drive status indicator flashes red.



**Figure 29.** Installing the Hard Drive Carrier

**NOTES:**

- The unit continues recording properly during hard drive initialization.
- Monitor the unit status indicator lights regularly to make sure that all drives are operating properly. In case of failure, system alarms and error messages will also display on Endura workstations and VCD5000 video console displays.

9. Close and lock the front bezel.

## APPENDIX C: REPLACING A POWER SUPPLY

The NVR5100 incorporates two independent, hot-swappable power supplies. Each power supply acts as a redundant alternate for the other. This level of fault tolerance ensures that the NVR5100 is capable of sustaining uninterrupted operation, even if one power supply fails. If a power supply does fail, the hot-swap feature simplifies replacement without shutting down the unit or interrupting normal operation.

**⚠ WARNING:** If a power supply fails, replace it immediately. Operating the unit with only one active power supply eliminates the system's fault tolerance.

Monitor the power supply indicators regularly to make sure that both power supplies are operating correctly. Check the following items:

- The front panel unit status indicator is not red.
- The green indicator for each power supply is lit. If the indicator is red, the power supply must be replaced.
- Both fans in each power supply are operating.

### NOTES:

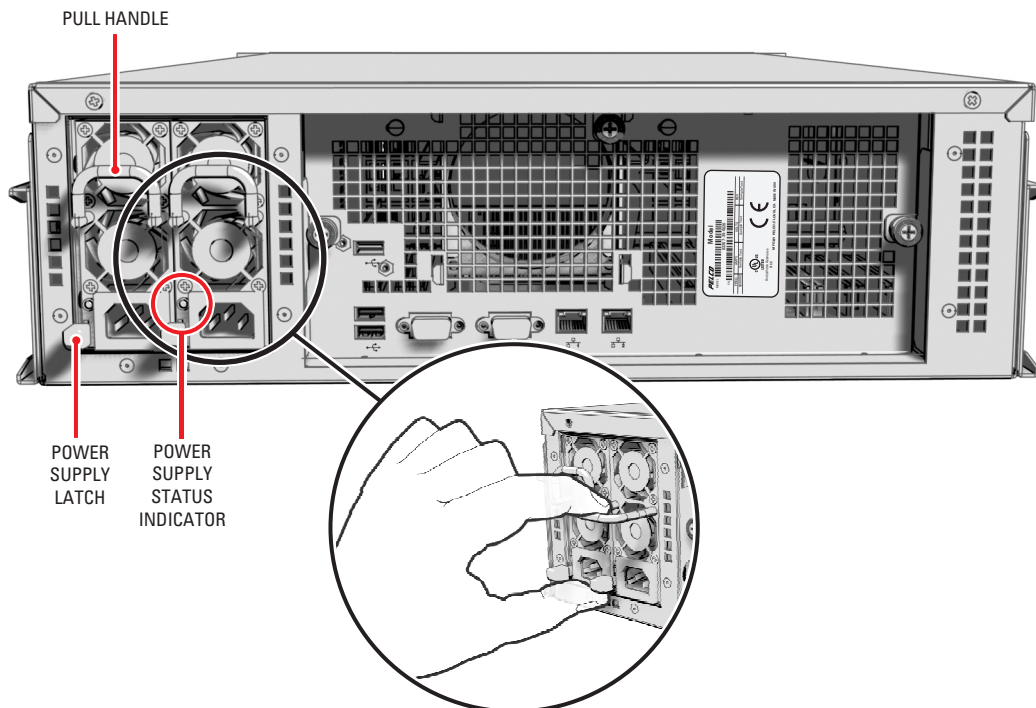
- You can replace one failed power supply without shutting down the unit.
- No tools are required to replace this component.

To replace a power supply:

1. Review all instructions in this section before proceeding.
2. Identify the failed power supply. The status indicator will be red or not lit.
3. Unplug the power cord from the failed power supply as follows:

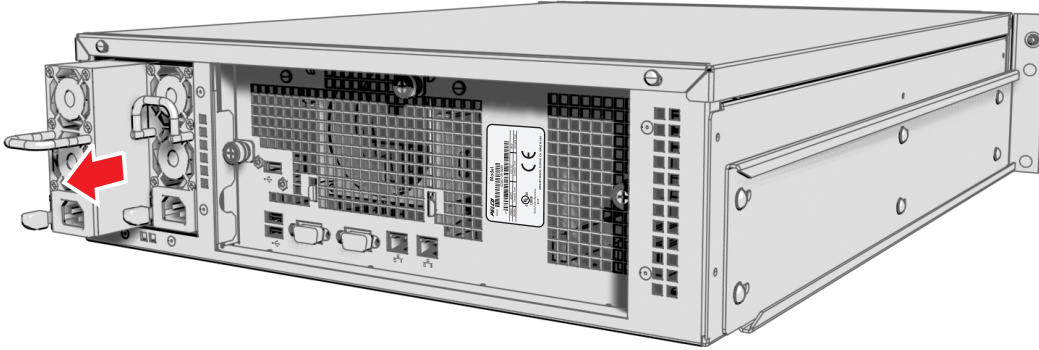
**⚠ WARNING:** For safety, you must unplug the power cord from the wall socket or other power source before unplugging it from the failed power supply on the unit.

- a. Unplug the power cord for the failed power supply from the power source.
  - b. Unplug the power cord from the failed power supply at the rear panel of the unit.
4. Using your thumb, lift the power supply latch while holding the pull handle.



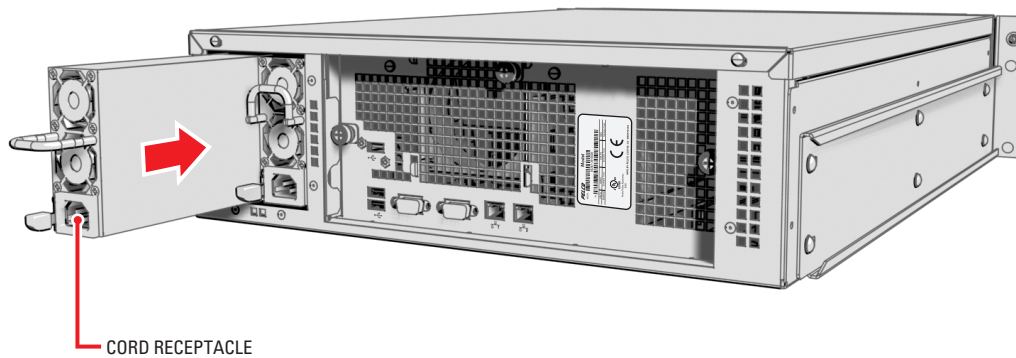
**Figure 30.** Releasing the Power Supply Latching Mechanism

5. Gently pull the failed power supply completely out of the unit.



**Figure 31.** Removing the Power Supply

6. Orient the replacement power supply so that the cord receptacle is at the bottom of the unit.



**Figure 32.** Installing the Power Supply

7. Gently push the replacement power supply into the unit until it locks into place.
8. Connect the power cord for the replacement power supply as follows:
  - a. Plug the power cord into the receptacle on the replacement power supply.
  - b. Plug the power cord into the power source.
9. Verify that the green indicator is lit on the newly installed power supply. Also, the power supply alarm will stop.



**WARNING:** For safety, you must plug the power cord into the power supply before plugging it into the wall socket or other power source.

## APPENDIX D: INSTALLING AN UNINTERRUPTIBLE POWER SUPPLY (UPS)

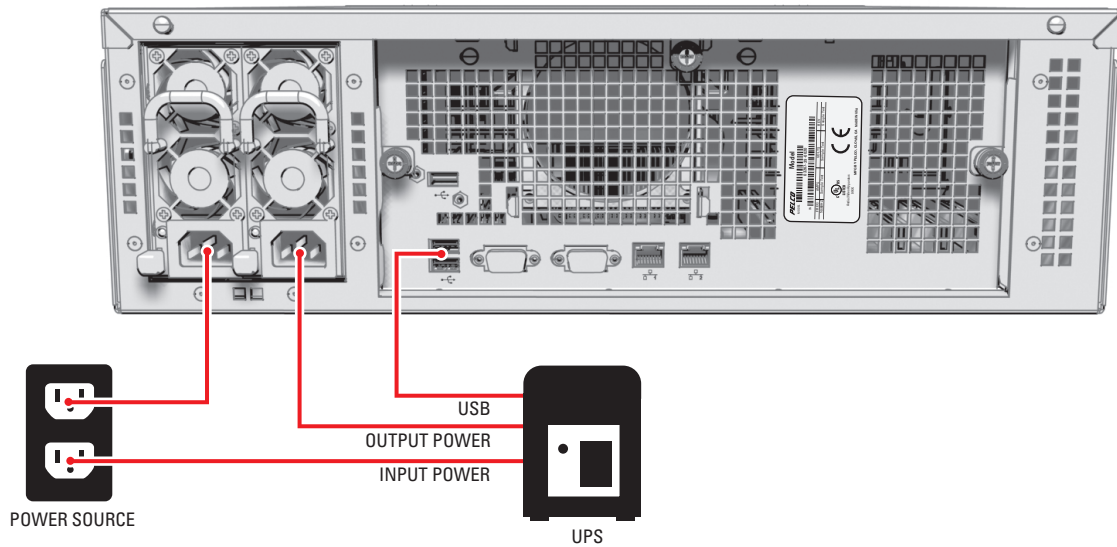
You should connect each NVR5100 to a UPS (not supplied). UPS devices maintain a limited amount of backup battery power in case the main power fails. Nearly any UPS device can be used to supply backup battery power.

**NOTE:** The NVR5100 does not support intelligent UPS devices.

**⚠ WARNING:** Intelligent UPS devices usually include power management software. If you install an intelligent UPS device, do not try to install the power management software on the NVR5100.

To connect communication and power from the UPS to the NVR5100 (refer to Figure 33):

1. Connect a power cord from the UPS to a standard wall socket or other power source.
2. Connect a power cord from the UPS to either the primary or the secondary power supply on the rear panel of the NVR5100. In this configuration, the unit will not lose power if either the power source or the UPS fails.
3. Power up the UPS device.
4. Power up the NVR5100 if necessary (refer to *Unit Startup* on page 26).



**Figure 33.** Connecting a UPS to an NVR5100



## PRODUCT WARRANTY AND RETURN INFORMATION

### WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship **for a period of one year** after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on fiber optic products and TW3000 Series unshielded twisted pair (UTP) transmission products.
- Three years on Spectra® IV products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on DX Series digital video recorders, DVR5100 Series digital video recorders, Digital Sentry® Series hardware products, DVX Series digital video recorders, NVR300 Series network video recorders, and Endura® Series distributed network-based video products.
- Three years on Camclosure® and Pelco-branded fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Three years on PMCL200/300/400 Series LCD monitors.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra III™, Spectra Mini, Esprit®, ExSite®, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit and WW5700 Series window wiper (excluding wiper blades).
- Two years (except lamp and color wheel) on Digital Light Processing (DLP®) displays. The lamp and color wheel will be covered for a period of 90 days. The air filter is not covered under warranty.
- Two years on Intelli-M® eIDC controllers.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners, or preset lenses used in continuous motion applications (preset scan, tour, and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to a Pelco designated location. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental, or consequential damages (including loss of use, loss of profit, and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, sales order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product that does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

### RETURNS

To expedite parts returned for repair or credit, please call Pelco at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair) and designated return location.

All merchandise returned for credit may be subject to a 20 percent restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid.

6-20-08

 **Green** The materials used in the manufacture of this document and its components are compliant to the requirements of Directive 2002/95/EC.



This equipment contains electrical or electronic components that must be recycled properly to comply with Directive 2002/96/EC of the European Union regarding the disposal of waste electrical and electronic equipment (WEEE). Contact your local dealer for procedures for recycling this equipment.

### REVISION HISTORY

Manual #	Date	Comments
C1621M	10/04	Original version.
C1621M-A	5/05	New labeling, rack kit, and specifications. General minor modifications.
C1621M-B	10/05	Updated parts list and specifications. Modified application scenario.
C1621M-C	3/06	Updated for 6.0 TB models. Updated some graphics. General minor modifications.
C1621M-D	5/06	Updated hard drive insertion graphics. Added ESD steps and disposable wrist strap.
C1621M-E	9/08	Updated for 9.0 TB models. Deleted 2.4 TB and 4.8 TB models. Updated some graphics. Updated environmental specs.

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