ClareVision
Network Video Recorder
Installation Guide

Model CV-M161620-04

Last modified: 09/29/16

DOC ID - 621 • Rev 04

Note: The figures shown in this manual are for reference only. The appearance and interface of the device are subject to the actual model.

Content

NVR pre-installation

This NVR is a piece of highly advanced surveillance equipment that should be installed with care. Follow these precautionary steps before the installation of the NVR.

- Keep all liquids away from the NVR.

- Install the NVR in a well-ventilated and dust-free area.

- Ensure environmental conditions meet factory specifications.

- Install a manufacturer recommended HDD.

Package contents

1 X 16 channel NVR appliance

1 X AC power cord

1 X optical mouse

1 X remote control

2 X rack mount ears

16 X mounting screws

1 X 2 ft. hard drive cable

2 X 1 ft. hard drive cable

NVR installation

When installing the NVR:

- Use brackets for rack mounting.

- Ensure there that there is ample room for audio and video cables.

- When routing cables, ensure that the bend radius of the cables are no less than five times than its diameter.

- Connect both the alarm and RS-485 cable. (Optional)

- Allow at least .75 in. (2 cm) of space between racks mounted devices.

- Ensure that the NVR is grounded.

- Environmental temperature should be within the range of 14 to 131 ⁰F (-10 to 55 ⁰C).

- Environmental humidity should be within the range of 10 to 90%.

Hard disk installation (optional)

Additional SATA hard disks can be installed in your NVR. Disconnect the power from the NVR before installing a hard disk drive (HDD). A factory recommended HDD should be used for this installation.

Up to 8 SATA hard disks can be installed on your NVR.

Tools required: Philips head screwdriver.

To install the hard disk drive into the NVR:

1. Remove the cover from the NVR by unfastening the screws on the back and side panel.

   When installing a SATA hard disk drive, we recommend that the installer wear anti-static gloves and a grounding wrist-strap.

2. Connect one end of the data cable to the motherboard of the NVR and the other end to the HDD.
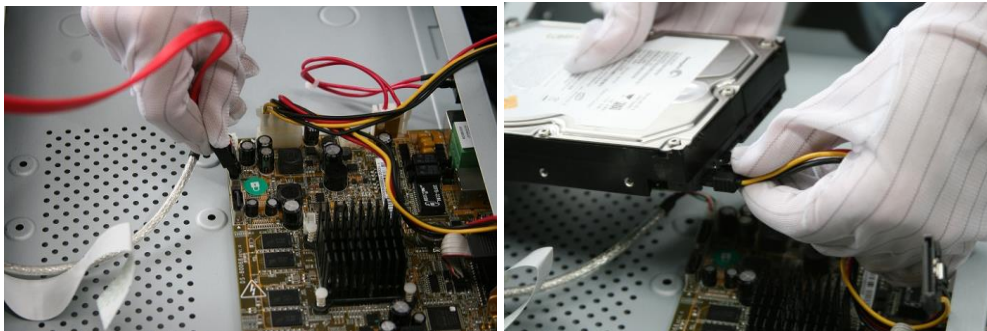
3. Connect the power cable to the HDD.

4. Place the HDD on the bottom of the device, and then fasten the screws on the bottom to attach the HDD.

Front panel

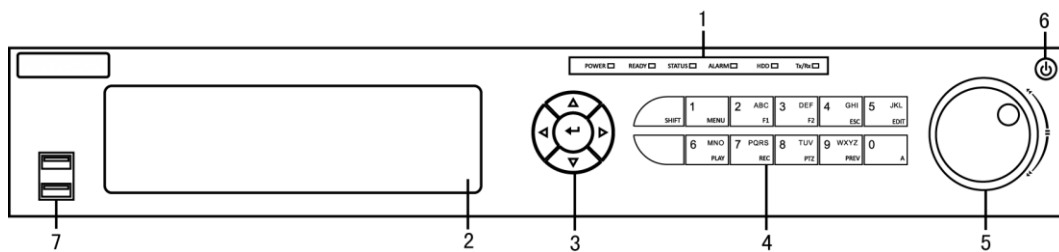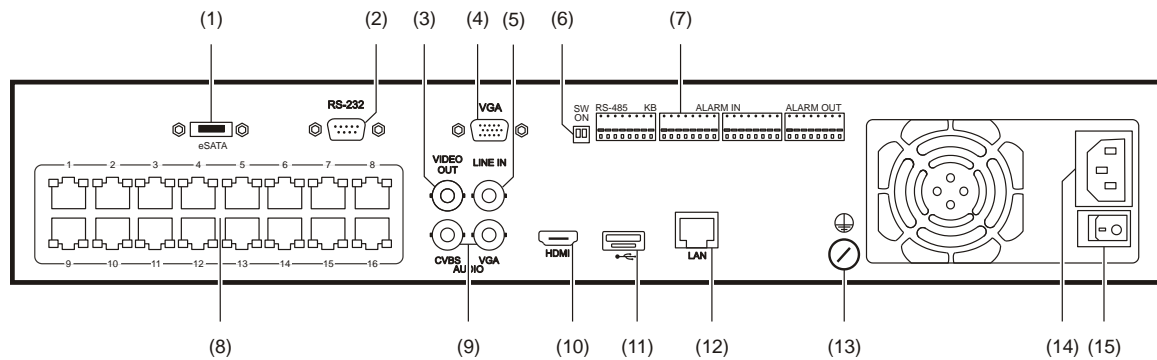| No.	Name	Setting	Function Description
1	Status indicators	POWER	Turns green when the NVR is powered up.
		READY	The LED is green when the device is running normally.
		STATUS	The light is green when the IR remote control is enabled.
			The light is red when the function of the composite keys (SHIFT) are used.
			The light is out when none of the above conditions are met.
		ALARM	The light is red when there is an alarm occurring.
		HDD	Blinks red when the HDD is reading/writing.
		Tx/Rx	Blinks green when the network connection is functioning normally.
2	DVD-R/W		Slot for the DVD-R/W
3	Control buttons	DIRECTION	In Menu mode, the direction buttons are used to navigate between different fields and items and select setting parameters.
			In Playback mode, the Up and Down buttons are used to speed up and slow down record playing, and the Left and Right buttons are used to move the recording 30 seconds forwards or backwards.
			In the image setting interface, the Up and Down button can adjust the level bar of the image parameters.
			In Live View mode, these buttons can be used to switch channels.
		ENTER	The Enter button is used to confirm the selection in menu mode; or used to select the checkbox fields and the ON/OFF switch.
			In Playback mode, it can be used to play or pause the video.
			In Single-frame Play mode, pressing the Enter button will play the video by a single frame.
			In Auto Sequence View mode, the buttons can be used to pause or resume auto sequence.

No.	Name	Setting	Function Description
4	Composite keys	SHIFT	Switch between the numeric or letter input and functions of the composite keys. (Input the letters or numbers when the light is out; realize functions when the light is red.)
		1/MENU	Enter the numeral "1"
			Access the main menu interface.
		2/ABC/F1	Enter the numeral "2".
			Enter the letters "ABC".
			The F1 button, when used in a list field, will select all items in the list.
			In PTZ Control mode, it will turn PTZ light on/off and when the image is zoomed in, the key is used to zoom out.
		3/DEF/F2	Enter the numeral "3".
			Enter the letters "DEF".
			The F2 button is used to change the tab pages.
			In PTZ control mode, it zooms into the image.
		4/GHI/ESC	Enter the numeral "4".
			Enter the letters "GHI".
			Exit back to the previous menu.
		5/JKL/EDIT	Enter the numeral "5".
			Enter the letters "JKL".
			Delete characters before cursor.
			Select the checkbox and select the ON/OFF switch.
			Start/stop the record clipping in playback.
		6/MNO/PLAY	Enter the numeral "6".
			Enter the letters "MNO".
			Playback, for direct access to playback interface.
		7/PQRS/REC	Enter the numeral "7".
			Enter the letters "PQRS".
			Open the manual record interface.
		8/TUV/PTZ	Enter the numeral "8".
			Enter the letters "TUV".
			Access the PTZ control interface.
		9/WXYZ/PREV	Enter the numeral "9".
			Enter the letters "WXYZ".
			Multi-channel display in the Live View.
		0/A	Enter the numeral "0".
			Shift the input methods in the editing text field. (Upper and lowercase, alphabet, symbols or numeric input).
			Double press the button to switch the main and auxiliary output.

No.	Name	Setting	Function Description
5	JOG SHUTTLE control		Move the active selection in a menu. It will move the selection up and down.
			In Live View mode, it can be used to cycle through different channels.
			In the Playback mode, it can be used to jump 30 seconds forward/backward in video files.
			In PTZ control mode, it can control the movement of the PTZ camera.
6	POWER ON/OFF		Power on/off switch.
7	USB interfaces		Universal Serial Bus (USB) ports for additional devices such as USB mouse and USB Hard Disk Drive (HDD).

Rear panel

No.	Item	Description
1	eSATA (Optional)	Connects an external hard drive.
2	RS-232 Interface	Connector for the RS-232 devices.
3	VIDEO OUT	BNC connector for the video output.
4	VGA	VGA output 15 pin connector. Displays the local video output and the menu.
5	LINE IN	BNC connector for the audio input.
6	Termination Switch	RS-485 termination switch. The up position is not terminated. The down position is terminated with 120 Ω resistance.
7	RS-485 Interface	Connector for the RS-485 devices. The T+ and T- pins connect to the R+ and R- pins of the PTZ receiver respectively.
	Controller Port	The D+, and the D- pin connects to the Ta, and the Tb pin of the controller. For cascading devices, the first NVR's D+, D- pin should be connected with the D+, D- pin of the next NVR.
	ALARM IN	Connector for alarm input.
	ALARM OUT	Connector for alarm output.
8	Network Interfaces with PoE function	Network interfaces for the cameras and to provide power over Ethernet (PoE).
9	CVBS AUDIO OUT	BNC connector for the audio output. This connector is synchronized with the CVBS video output.
	VGA AUDIO OUT	BNC connector for the audio output. This connector is synchronized with the VGA video output.
10	HDMI	HDMI video output.
11	USB interface	Universal Serial Bus (USB) ports for additional devices such as USB mouse and USB Hard Disk Drive (HDD).
12	LAN Interface	One network interface provided.
13	GROUND	Ground (must be connected when the NVR starts.)
14	AC 100 V to 240 V	AC 100 V to 240 V power input.
15	POWER	Switch for turning the device on/off.

Peripheral connections

Wiring of alarm input

The alarm input is an open/closed relay. To connect the alarm input to the device, use the following diagram.
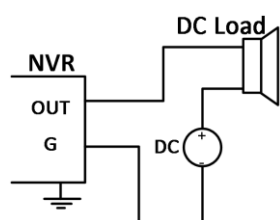
Note: If the alarm input is not an open/close relay, connect an external relay between the alarm input and the device.
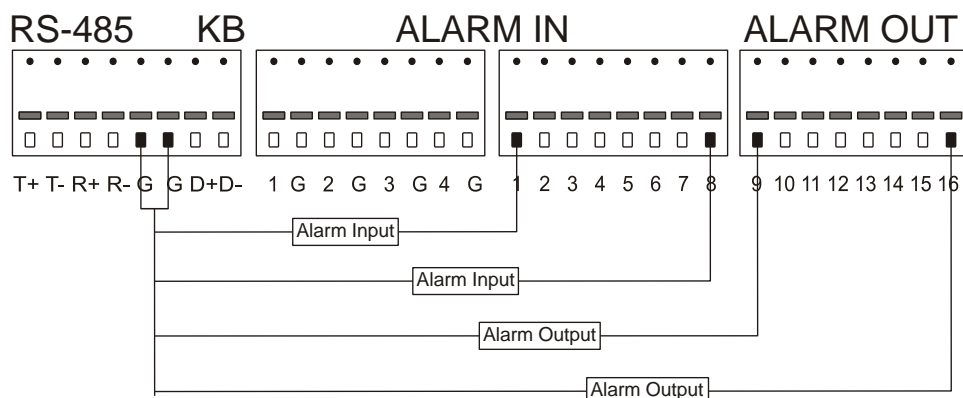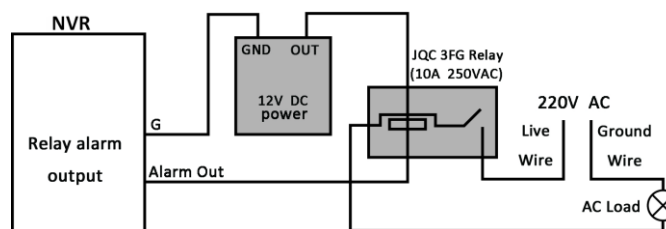

Wiring of alarm output

Note: Connect to a security system zone.

To connect to an alarm output (AC or DC load), use the following diagram.

DC Load Connection Diagram   *AC Load Connection Diagram*

For DC load, the jumpers can be used within the limit of 12 V/1A safely.

To connect an AC load, the jumpers should be left open (you must remove the jumper on the motherboard in the NVR). Use an external relay for safety (as shown in the figure above).

There are four jumpers (JP1, JP2, JP3, and JP4) on the motherboard, each corresponding with one alarm output. By default, jumpers are connected. To connect an AC load, the jumpers should be removed.

Example*:*

If you connect an AC load to the alarm output 3 of the NVR, then you must remove the JP3 jumper.

Using of alarm connectors

To connect alarm devices to the NVR:

1. Disconnect the terminal block from the ALARM IN/ ALARM OUT port.

2. Unfasten the stop screws from the terminal block, insert signal cables into the slots, and then fasten the stop screws. Ensure the signal cables are tight.

3. Connect the terminal block back into the port.

Controller connection
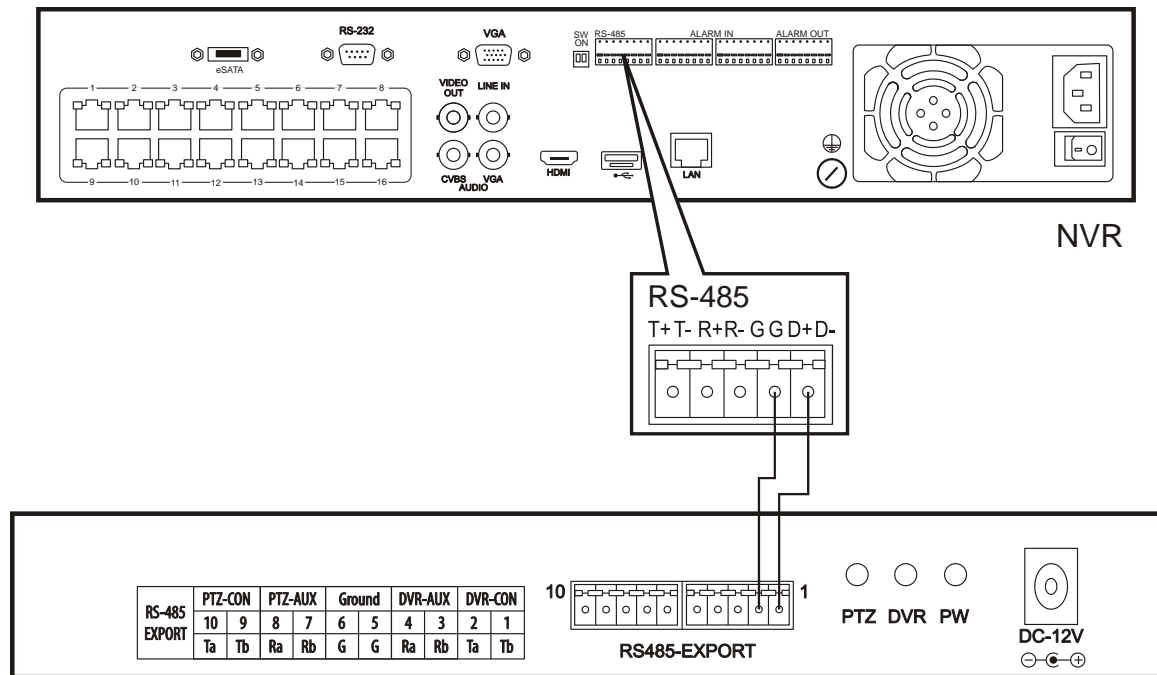
To connect a controller to the NVR:

1. Disconnect the terminal block from the port.

2. Unfasten the stop screws from the D+, D- terminal block, insert the signal cables into the slots, and then fasten the stop screws. Ensure the signal cables are in tight.

3. Connect Ta on the controller to D+ on the terminal block and Tb on the controller to D- on the terminal block. Fasten the stop screws.

4. Connect the terminal block back into the port.

Note: Make sure both the controller and NVR are grounded.

HDD storage calculation chart

The following chart shows an estimation of storage space used based on recording at one channel for an hour at a fixed bit rate.

Table 1: Storage calculation chart

Bitrate	Storage Used
96 K	42 M
128 K	56 M
160 K	70 M
192 K	84 M
224 K	98 M
256 K	112 M
320 K	140 M
384 K	168 M
448 K	196 M
512 K	225 M
640 K	281 M
768 K	337 M
896 K	393 M
1024 K	450 M
1280 K	562 M
1536 K	675 M
1792 K	787 M
2048 K	900 M
4096 K	1800 M
8192 K	3600 M
16384 K	7200 M

Note: The values supplied for the storage space used is only for reference. The storage values in the chart are estimated by formulas and may be different from the actual value.

Menu operation

Menu structure
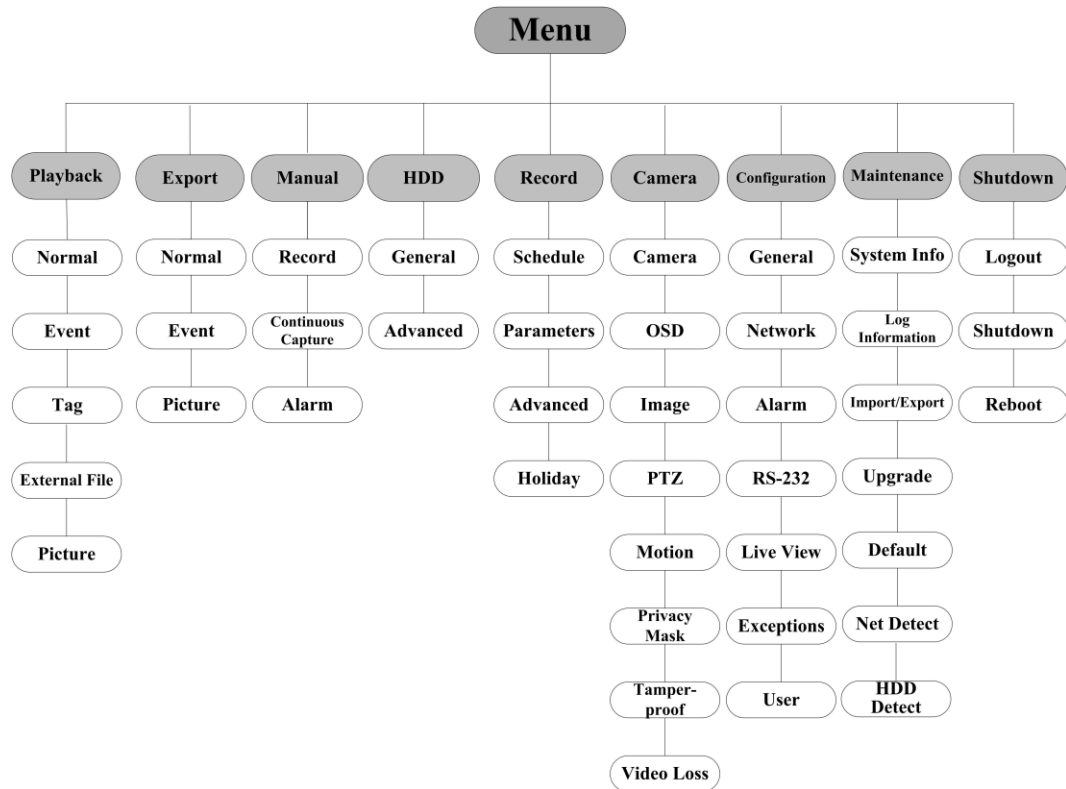
Startup and shutdown

Proper startup and shutdown procedures are crucial to expanding the life of the NVR.

To start your NVR:

1. Connect to a monitor and use VGA or HDMI.

2. Check that the power supply is plugged into an electrical outlet, and then flip the power switch on the back of the NVR to ON. We highly recommend that you use an Uninterruptible Power Supply (UPS) in conjunction with the device.

3. Press the POWER button on the front panel. The Power LED should turn green as the unit starts.

To shut down the NVR:

1. Enter the Shutdown menu (**Menu** > **Shutdown**).
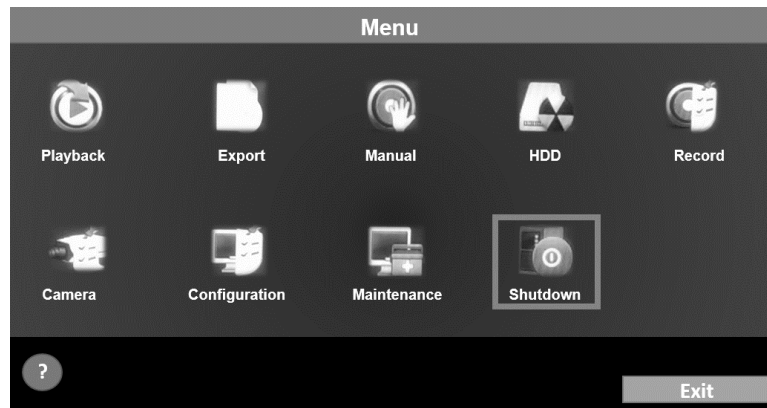
2. Select **Shutdown**.
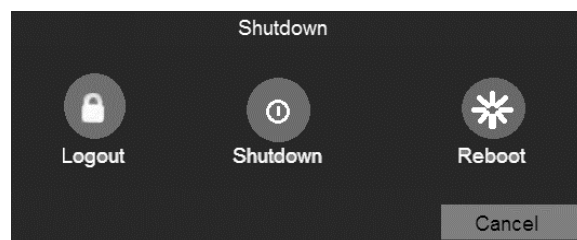
3. Click **Yes**.

Using the Setup Wizard
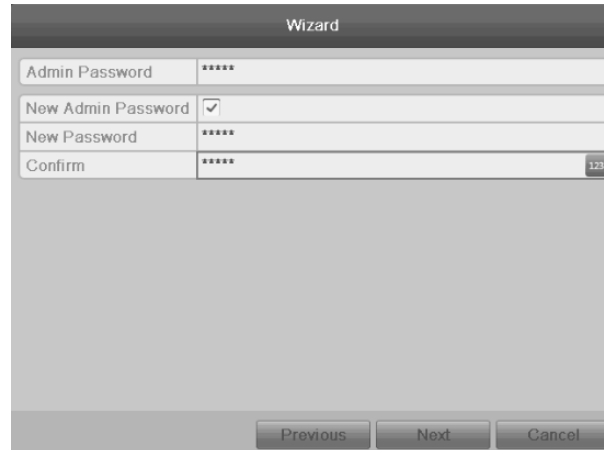
By default, the Setup Wizard starts once the NVR has loaded.

To operate the Setup Wizard:

1. The Setup Wizard can walk you through some important settings of the NVR. If you don't want to use the Setup Wizard at this time, click **Cancel**. You can also choose to use the Setup Wizard the next time by selecting the **Start wizard when device starts?** checkbox.

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2. Click **Next** on the Wizard window to enter the Login window.

3. Enter the Admin Password. By default, this password is "secure7."

   Note: We strongly recommend changing the admin password the first time you use the device. Record your new password and store in a secure place. If the new password if lost, a factory reset is required to gain access to the NVR.

4. To change the Admin Password, select the **New Admin Password** checkbox. Enter the new password and confirm the password in the given fields.

5. Click **Next** to enter the date and time settings window.

6. Enter the correct time zone, date, and time for your location in their corresponding fields.

7. Click **Next** to enter to the Network Setup window.

The internal NIC IPv4 address should be configured for the cameras connecting to the PoE network interface of the NVR.

8. Click **Next** to enter the HDD Management window.

9. To initialize the desired HDD, select its corresponding checkbox. Click **Init.,** initialization removes all of the data saved in the HDD.

    Note: The HDDs are initialized at the factory and ready to record out of the box.

10. Click **Next**. You will enter the Adding IP Camera interface.

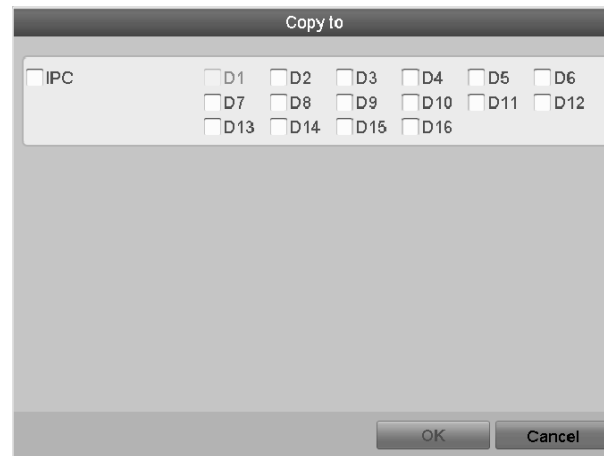11. Click **Search** to find the online IP Camera.

12. Select the IP camera to be added, and then click **Add**.
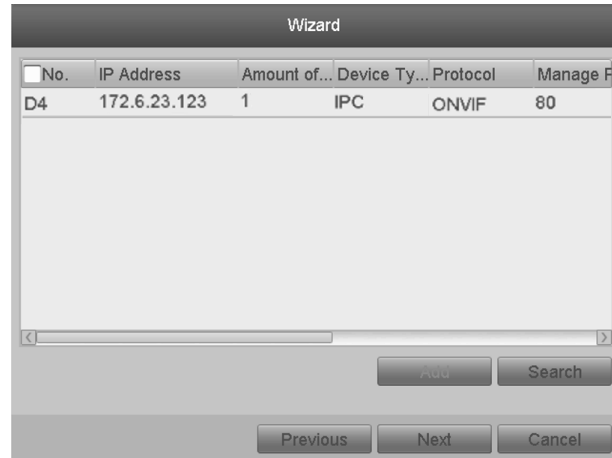
13. Click the **Next** button. Configure the recording settings for the searched IP Cameras.

14. Click **Copy** to copy the settings to other channels.

15. Click **OK** to complete the Setup Wizard and return to Live View.

Live View

Some icons are provided on screen in Live View mode to indicate different camera status. Icons appear at the top right of the screen for each channel. They show the status of the record and alarm in the channel so that you can identify problems quickly.

Table 2: Live View icons

| Icon	Description
	Alarm (video loss, tampering, motion detection or sensor alarm)
	Record (manual record, schedule record, motion detection or alarm triggered record)
	Alarm and Record

Adding and configuring IP cameras

You should add and configure the online IP cameras to enable the Live View and Recording function.

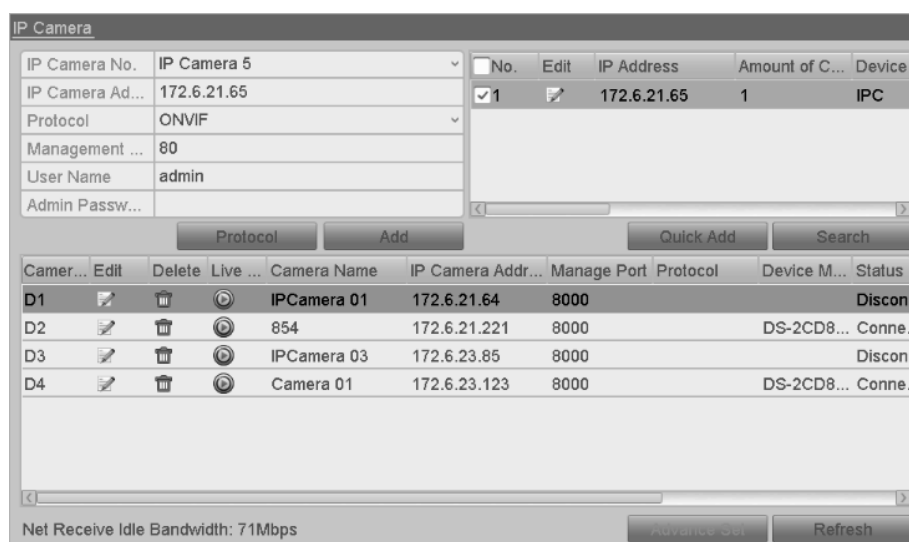You can search and add the online IP cameras by following the Startup wizard, or according to the following steps.

To add IP cameras:

1. Right click to enter the Camera Management interface (**Menu** > **Camera** > **Camera**).
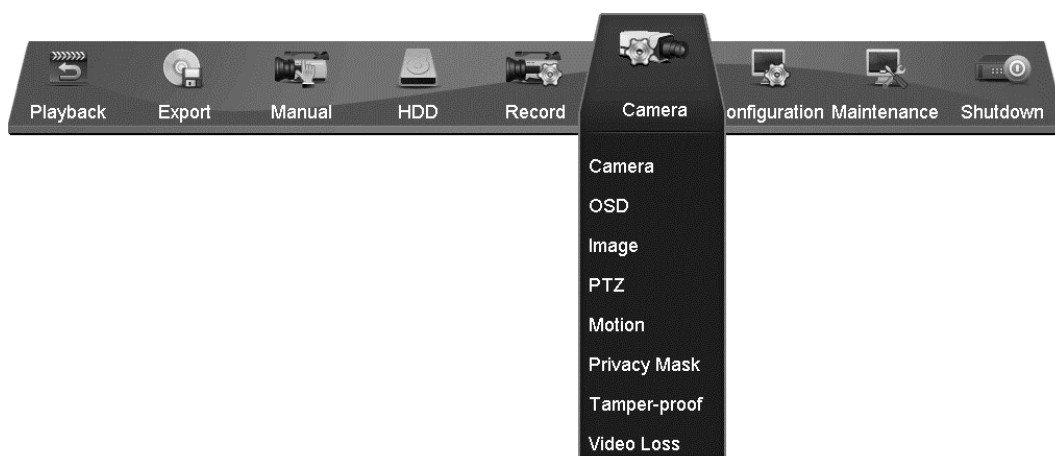
To add the online cameras with same network segment:

1. Click **Search** to search for the online cameras.

2. Select the checkboxes for the cameras to be added.

3. Click **Quick Add** to add the cameras.

To add other IP cameras:

1. In the left side of the window, enter the IP address, protocol, management port, and other information for the IP camera.

2. Click **Add** to add the camera.

Configuring basic parameters of IP cameras

After the adding the IP camera, the basic information displays on the page. You can configure the basic parameters of the IP camera.

Table 3: Basic icons

Icon	Description
	Edit basic parameters of the camera
	Delete the IP camera
	Get the live view of the camera

To configure basic parameters:

1. Click the icon to edit the parameters. You can edit the IP address, protocol, and other parameters.

Edit IP Camera	
IP Camera No.	D2
IP Camera Address	172.6.21.221
Protocol	ONVIF
Manage Port	80
Channel No.	1
User Name	admin
Admin Password	

Apply   OK   Cancel

2. Click **Apply** to save the settings, and then click **OK** to exit the editing interface.

To edit more parameters:

1. Click the **Advance Set** icon.

Advance Set	
Network Password	
IP Camera No.	D4
IP Camera Address	172.6.23.123
Manage Port	8000

Apply   OK   Cancel

2. You can edit the network information and the password of the camera.

3. Click **Apply** to save the settings, and then click **OK** to exit the interface.

PTZ control

Before you begin, ensure the PTZ is properly connected to the NVR through RS-485 interface.

PTZ settings

To set PTZ:

1. Enter the PTZ Settings interface (**Menu** > **Camera** > **PTZ**).

General	More Settings	
Camera	IP Camera 2	˅
Baud Rate	9600	˅
Data Bit	8	˅
Stop Bit	1	˅
Parity	None	˅
Flow Ctrl	None	˅
PTZ Protocol		˅
Address	0	
Address range: 0~255		

2. Choose the camera for the desired PTZ setting in the Camera drop-down.

3. Enter the parameters of the PTZ camera.

   Note: All of the parameters should match the PTZ camera parameters.

4. Click **Copy** if you want to copy the same settings to other PTZ cameras.

5. Click **Apply** to save and exit the interface.

PTZ control

To enter the PTZ panel in the Live View mode, press the PTZ Control button on the front panel or on the remote, or choose the PTZ Control icon .
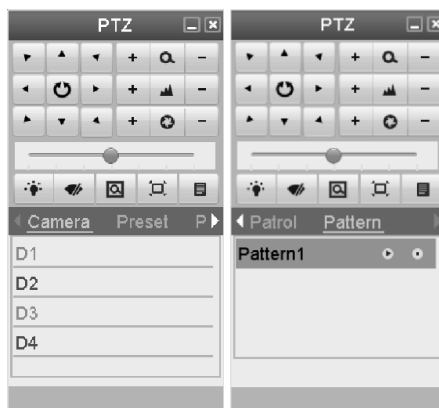

Table 4: PZT control icons

Icon	Description
	Direction button and the auto-cycle button
	The speed of the PTZ movement
	3D-Zoom
	Patrol
	Previous item
	Stop the patrol or pattern movement
	Zoom+, Focus+, Iris+

☀	Light on/off
▫	Image centralization
Pattern	Pattern
▶	Next item
▬	Minimize windows
-	Zoom-, Focus-, Iris-
◢	Wiper on/off
Preset	Preset
▤	Menu
▶	Start pattern/patrol
✖	Exit

Playback

Play back the record files of a specific channel in the Live View menu.

Instant playback by channel

Choose a channel under Live View using the mouse, and then click the 🖼 button in the shortcut operation menu.

Note: Only the record files recorded during the last five minutes on this channel will be played back.

Playback by channel

To playback by channel:

1. Enter the Playback menu.

    Mouse: Right-click a channel in Live View mode and select 🖼 from the menu.

Front Panel: Press PLAY to play back record files of the channel under single-screen Live View.

Under multi-screen Live View, record files of the selected channel will be played back.

Note: Pressing numerical buttons will switch the playback to related channels during the playback process.

Playback management

The toolbar in the bottom part of Playback interface can be used to control the playback process.

Check the channel or channels to switch playback to another channel or execute simultaneous playback of multiple channels.

Backup

Recorded files can be backed up to various devices, such as USB flash drives, USB HDDs, or a DVD writer.

To back up recorded files:

1. Enter Video Export interface (**Menu** > **Export** > **Normal**).

2. Select the channel(s) you want to back up, set search condition, and then click **Search** to enter the search result interface.

Normal								
☑IPC	☑D1	☑D2	☑D3	☑D4	☑D5	☑D6	☑D7	☑D8
	☑D9	☑D10	☑D11	☑D12	☑D13	☑D14	☑D15	☑D16
Start/End time of record	2013-07-09 15:02:22 -- 2013-08-23 16:45:03							
Record Type	All							
File Type	All							
Start Time	2013-08-23			📅	00:00:00			🕐
End Time	2013-08-23			📅	23:59:59			🕐

3. In the Search Result interface, select the record files to back up and click **Export**.

4. Enter the Export interface, choose a backup device, and then click **Export** to start exporting.

   Note: You can choose to export the record file(s) and the related log file(s), or the player.

5. Check the backup results. Choose the record file in the Export interface, and then press ⊚ to check it.

Understanding camera capacity in an NVR

When setting up your NVR and cameras, you may notice that some of the camera images may not display in Live View. This most often occurs when you are displaying images in 1+5 mode, or 1+7 mode because the total bit rate for all cameras is exceeding the NVR's capacity. The actual capacity depends on the total bit rate from all the cameras. However, it is good practice to allow some headroom for machine operations, such as remote streaming.

NVR model	Capacity
4-channel	20 Mb
8-channel	40 Mb
16-channel	80 Mb
32-channel	160 Mb
64-channel	160 Mb

To fully understand NVR capacity, it is necessary to understand the concepts of streaming video, resolution, quality, and bit rate. Streaming video is content sent in compressed form over a network and processed in real time, that is, as it is received.

Streaming video types

- Main Stream: the high quality video that is being recorded and may be streamed.

- Sub Stream: never recorded; intended for streaming only. Default is 704 × 480, 584 Kbps at 8 fps.

- This can be video alone, or video and audio compressed together. Audio requires very little bandwidth.

The combination of the main stream and sub streams make up the total bit rate of each camera. This is expressed in Kbps (kilobits per second) or Mbps (megabits per second).

Bit rate is determined by the selected resolution (1280 × 720, 1920 × 1080, 2560 × 1920, etc.), frame rate (frames per second), and video quality (the amount of compression being applied to each camera).

Example

32 channels of 720P cameras at 15 fps with good image quality will have 32 x (1536 + 512) = 65536 Kbps (about 66Mbps), so the 32-channel NVR can support them.

Each channel can support a different camera, as long as they do not exceed the total bit rate limit. It is entirely possible to mix 5 MP cameras with 4CIF IP cameras, etc. Generally, 5 MP at 30 fps requires around 20 Mbps for best quality. A 4-channel NVR is currently limited to 16 Mbps.

Adjusting settings

Be aware of your NVR's capacity and make adjustments, if necessary. Adjust the bit rate by lowering the resolution, frame rate, or video quality setting.

To adjust the setting:

1. Enter the Live View settings interface.
2. Adjust the Resolution, Frame Rate, and Video Quality settings.

Specifications

Video/Audio input	IP video input	16-ch
	Two-way audio	1-ch, BNC (2.0 Vp-p, 1k Ω)
Video/Audio output	Recording resolution	5 MP /3 MP /1080P /UXGA /720P /VGA /4CIF /DCIF /2CIF /CIF /QCIF
	Frame rate	Main stream: 25 fps (P) / 30 fps (N)
		Sub-stream: 25 fps (P) / 30 fps (N)
	CVBS output	1-ch, BNC (1.0 Vp-p, 75 Ω) Resolution: 704 × 576 (PAL); 704 × 480 (NTSC)
	HDMI output	1-ch, resolution: 1920 × 1080P / 60 Hz, 1920 × 1080P / 50 Hz, 1600 × 1200 / 60 Hz, 1280 × 1024 / 60 Hz, 1280 × 720 / 60 Hz, 1024 × 768 / 60 Hz
	VGA output	1-ch, resolution: 1920 × 1080P / 60 Hz, 1600 × 1200 / 60 Hz, 1280 × 1024 / 60 Hz, 1280 × 720 / 60 Hz, 1024 × 768 / 60 Hz
	Audio output	2-ch, BNC (linear, 600 Ω)
	Playback resolution	5 MP /3 MP /1080P /UXGA /720P /VGA /4CIF /DCIF /2CIF /CIF /QCIF
	Synchronous playback	16-ch
Hard disk	SATA	4 SATA interfaces for 2 HDDs + 1 DVD-R/W, or 4 HDDs
	eSATA	1 eSATA interface
	Capacity	Up to 4 TB capacity for each HDD
External interface	Network interface	1 RJ-45 10 /100 /1000 Mbps self-adaptive Ethernet interface
		16 independent 100 Mbps PoE network interfaces
	Serial interface	RS-232; RS-485; Keyboard
	USB interface	3 × USB 2.0
	Alarm in	16
	Alarm out	4

Others	Power supply	100 to 240 VAC, 6.3 A, 50 to 60 Hz
	Consumption (without hard disk or DVD-R/W)	≤ 40 W
	Working temperature	14 to 131ºF (-10 to 55 ºC).
	Working humidity	10 to 90 %
	Chassis	19-inch rack-mounted 2U chassis
	Dimensions (W × D × H)	17.5 × 15.4 × 3.5 (44.5 × 39.0 × 9.0 cm)
	Weight	≤ 8.82 lb (4 Kg) (without hard disk or DVD-R/W)

Regulatory information

DISCLAIMER

Underwriters Laboratories Inc. (UL) has not tested the performance or reliability of the security or signaling aspects of this product. UL has only tested for fire, shock or casualty hazards as outlined in UL's Standards for Safety, UL60950-1. UL Certification does not cover the performance or reliability of the security or signaling aspects of this product. UL MAKES NO REPRESENTATIONS, WARRANTIES OR CERTIFICATIONS WHATSOEVER REGARDING THE PERFORMANCE OR RELIABILITY OF ANY SECURITY OR SIGNALING RELATED FUNCTIONS OF THIS PRODUCT.

FCC	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.
CE	This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the Low Voltage Directive 2006/95/EC, the EMC Directive 2004/108/EC, the RoHS Directive 2011/65/EU
	2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see www.recyclethis.info.
	2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see www.recyclethis.info.

Warranty information

Clare Controls offers a three (3) year limited warranty on original Clare Controls components, from the date of shipment from Clare Controls. To view complete limited warranty details, including limitations and exclusions, www.clarecontrols.com/warranty.

Scan the code to view product warranty details.

Contact information

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