NVE Series
Hardware Manual

UDP Technology

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Safety Precautions

Users are strongly advised to adhere to directions and recommendations offered in this manual. Failure to do so may result in problems during operation.

- Make sure the correct voltage is being supplied before turning the power ON.
- Do not install with the power turned ON. Doing so may cause an electric shock.
- Do not install in a very humid environment. Doing so may cause an electric shock.
- Do not install in an area exposed to sun light or heat. Doing so may cause deformation or damage.
- Do not remove the product cover. Doing so may expose you to a hazard like electric shock.
- Do not use in areas containing inflammable materials like propane gas and gasoline or in areas that generate dust. Doing so may cause an explosion or fire.
- Do not dismantle, repair or modify the product. Doing so may cause damage or an electric shock. Refer all servicing to qualified personnel.
- Do not use water, thinner or organic solvent for cleaning the product exterior. Doing so may cause damage or an electric shock. Use a dry cloth instead and turn OFF the power before cleaning.

1. Introduction

NVE100, NVE1000, NVE2000 and NVE4000 compress video/audio data and transmit the compressed video/audio data through the network in real time. NVE provides a high quality video image with a limited bandwidth and storage capacity. These products are ideally suited for a wide range of surveillance and remote monitoring applications. Main features are highlighted below.

Main features

- High Quality Compression in real time streaming
- NVE provides high quality MPEG-4 and MJPEG encoding at D1 in real time.

Network

- RTP/RTSP and unicast/multicast are supported.

Streaming

- NVE2000 and NVE4000 support dual streaming mode such as different codec/resolution/bit rate and so on.
- NVE supports de-interlacing by hardware.

Video/Audio

- Loop out is supported (NVE4000 requires a T-BNC connector).
- NVE4000 supports quad view in external monitor.
- NVE supports two ways audio (NVE100 supports only audio input)
  Transmits to client - G.711 by software
  Receives from client - one digital audio

Additional Features

- RS-485 serial port for Pan/Tilt/Zoom. (Except NVE100)
- RS-232C serial port for some devices like a POS terminal. (Except NVE100)
- Motion detection by hardware.
- On Screen Display (OSD) by hardware.

SDK

- Three types (RTSP, UDA5,and HTTP-API) are provided for application development.

2. Product Description

2.1. Specifications

NVE series specification is shown as following Table 1.

		NVE100	NVE1000	NVE2000		NVE4000	
		1ch MPEG-4 25/30fps@D1	1ch MPEG-4 25/30fps@D1	2ch MPEG-4 50/60fps@D1		4ch MPEG-4 100/120fps@D1	
				Single Mode	Dual Mode	Single Mode	Dual Mode
Video	Input channel	1ch	1ch	2ch	1ch	4ch	2ch
	Output Channel	-	1 Loop Out	-	1 Loop Out	1 Quad	2 Loop Out
	Compression	MPEG-4, MJPEG Selectable per Channel					
	Resolution	D1, 2CIF, CIF, QCIF					
	Compression FPS	25/30fps@D1	25/30fps@D1	50/60fps@D1		100/120fps@D1	
Audio(Optional)	Input/Output Channel	1/- ch	1/1ch	2/1ch	1/1ch	4/1ch	2/1ch
	Data Format	PCM(software compression : G.711, uLaw)					
Network		10/100 Base-T					
DI/DO			2/2	2/2		4/4	
RS-232C		-	Supported				
RS-485		-	Supported				
Power over Ethernet		Optional					
De-interlacing		Supported by hardware					
Motion Detection		Supported by hardware					
OSD		Supported by hardware					
Video Stream Encryption		AES					
Protocols		SNTP, DHCP, UDP, TCP, RTP, RTSP(unicast/ multicast)					

Table 1. Specification for NVE 1000, 2000 and 4000

2.2. Functions

2.2.1. Front Panel

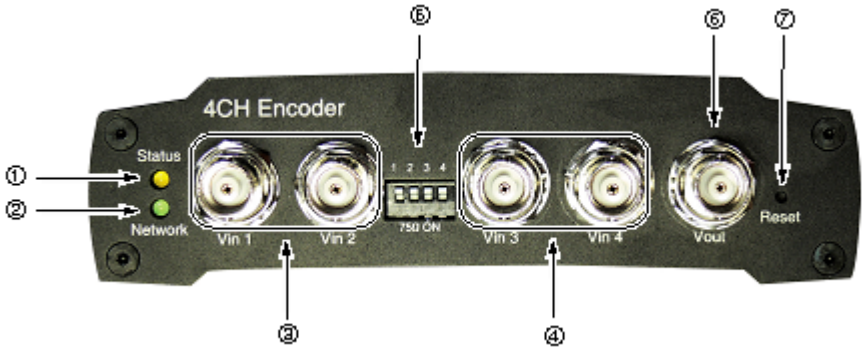

Figure 1. Front Panel of NVE4000

①, ② Indicator LED (Status, Network)
Status (Orange) and Network (Green) indicators display the following system information:

	Status (Orange)	Network (Green)
Power OFF	OFF	OFF
Booting in progress	ON	OFF
Successful network connection	ON	Blinking
Failed network connection	ON	OFF
Data transmission in progress	Blinking(Slow)	Blinking (Fast)

Table 2. Status of the NVE Series Indicator LED

1. System initialization and booting

When power is supplied to NVE4000, it is initialized for approximately 1 second. During this time, the orange Status LED is turned on. After completion of booting, for a successful network connection, the green Network LED blinks indicating that data is being transmitted. If network connection fails, please check the LAN cable is connected or restart NVE.

2. Video streaming service

When an application runs, the Status LED blinks each second. The Network LED blinks at a rate proportional to the amount of data being transmitted.

③, ④, ⑧ Video Input BNC Connector (Vin 1, Vin 2, Vin 3 and Vin 4)
It is mainly used for video inputs, however it can be used for video loop-out some case as following Table 3.

Model	Single Stream		Dual Stream	
	Video Input	Video Loop-out	Video Input	Video Loop-out
NVE100	Vin1	-	-	-
NVE1000	Vin1	Video Loop-out	-	-
NVE2000	Vin1, Vin2	T-BNC Connector	Vin1	Vin2
NVE4000	Vin1, Vin2, Vin4	T-BNC Connector	Vin1, Vin3	Vin2, Vin4

Table 3. Video Connector Usage

Termination Resistor DIP Switch may be applied, when Video Input BNC Connector is used for video loop-out.
T-BNC connector is not included in NVE package.

⑤ Termination Resistor DIP Switch (75Ω ON)
A switch to turn ON/OFF a 75Ω termination resistor is provided for each video input. Factory default setting is ON. If impedance is mismatched between video inputs and outputs that are connected together, you need to turn this DIP switch on/off to match the impedance to 75Ω.

⑥ Video Output BNC Connector (Vout - Only NVE4000)
Vout is used for NVE4000 to display quad, switching view in external monitor.

⑦ Reset Switch (Reset)
Reset switch is used for restarting NVE or resetting NVE as Factory Default (FD). Refer to '4.1. Factory Default Settings' for detailed procedures.

2.2.2. Rear Panel

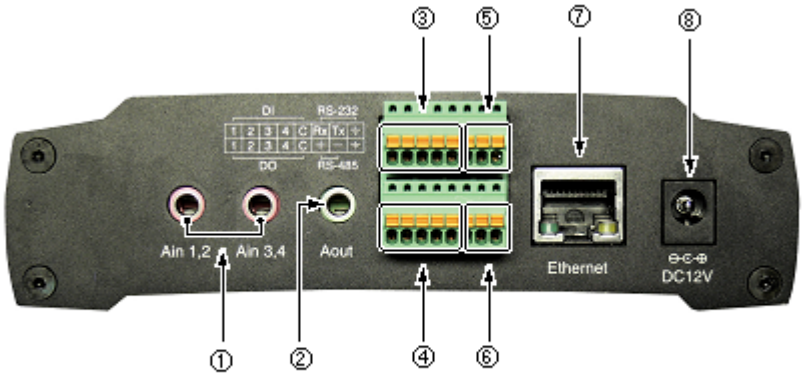

Figure 2. Rear Panel of NVE4000

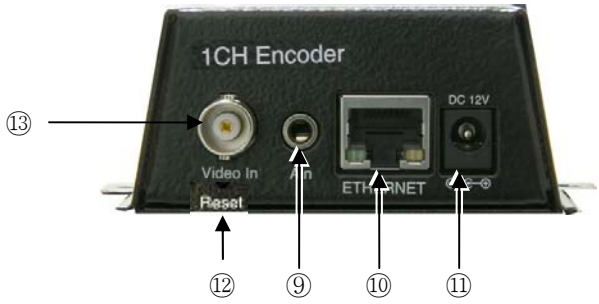

Figure 3. Rear Panel of NVE100

①, ⑨ Audio Input Jack (Ain 1,2 and Ain 3,4)

NVE2000 and NVE4000 have mono audio input channels using stereo audio socket. Therefore, a special cable is needed to connect audio devices. There are two kinds of cables. Stereo cable is a stereo jack to 2 RCA connectors (for NVE2000/4000) and Mono cable is a mono jack to 1 RCA connector (for NVE100 and NVE1000).

NVE1000 and NVE100

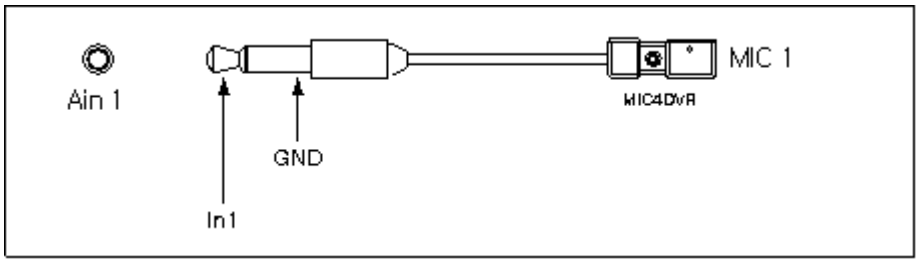

Figure 4. NVE1000 Audio Input Connection

NVE2000

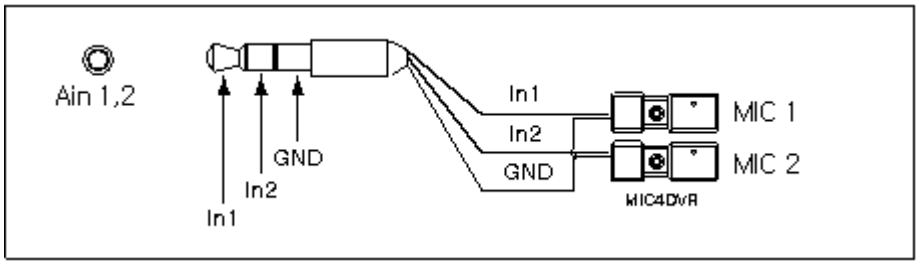

Figure 5. NVE2000 Audio Input Connection

NVE4000

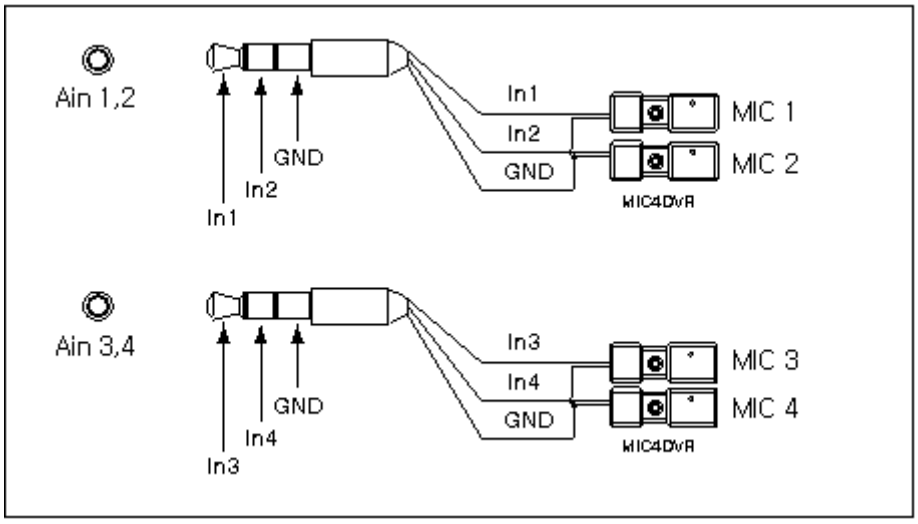

Figure 6. NVE4000 Audio Input Connection

Please pay attention to electric characteristics during installation.
(Detailed instructions are being prepared.)

② Audio Output Jack (Aout)

NVE provides one mono audio by using the stereo socket. Even if a stereo speaker is connected, the both side have the same sound (mono output).

NVE audio outputs very low-watt, therefore it requires amplifier speaker (Do not use headphone /earphone directly)

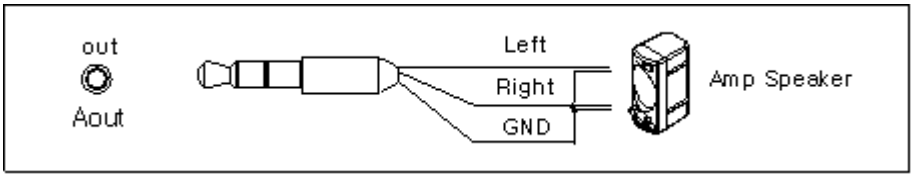

Figure 7. NVE Audio Output Connection

③ Digital Input (DI 1~4)

NVE1000/2000 use 6 port terminal block for 2 channel Digital Outputs. NVE4000 uses 8 port terminal block for 4 channel Digital Outputs as shown Figure 3. It can be connected either voltage type sensor or relay type sensor as following Figure 9 and Figure 10.

Do not use voltage and relay type sensor together.

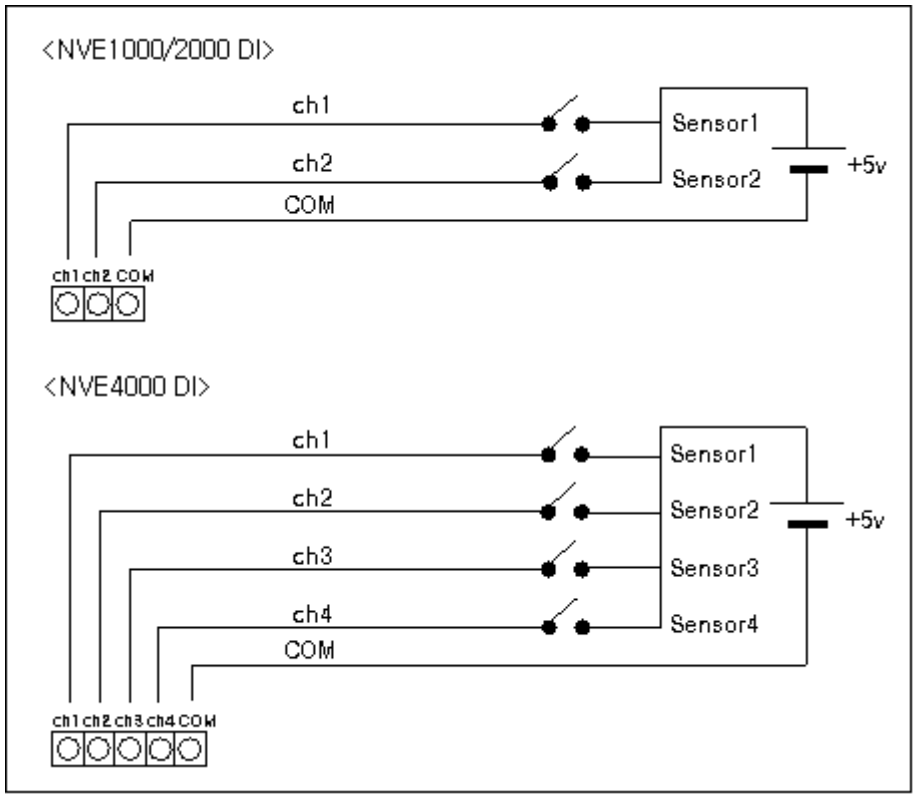

Figure 8. Voltage Type Digital Input Connection

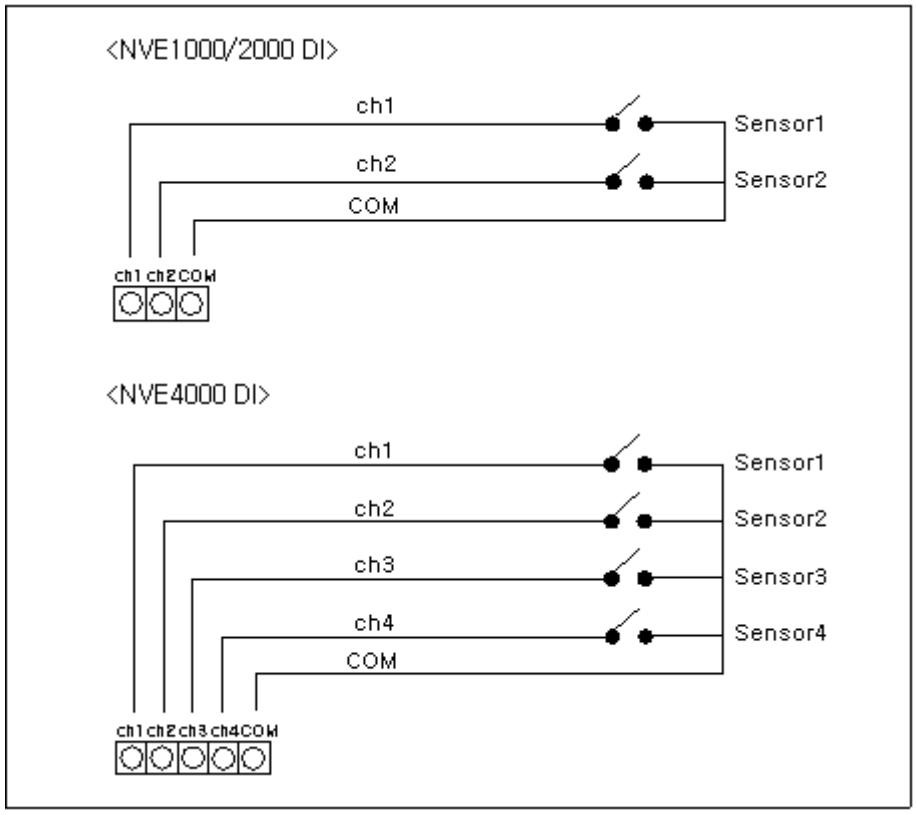

Figure 9. Relay Type Digital Input Connection

Please pay attention to electric characteristics during installation.
(Detailed instructions are being prepared.)

④ Digital Output (DO 1~4)

NVE1000/2000 use 6 port terminal block for 2 channel Digital Outputs. NVE4000 uses 8 port terminal block for 4 channel Digital Outputs as shown Figure 3. DO devices can be connected as following Figure 11.

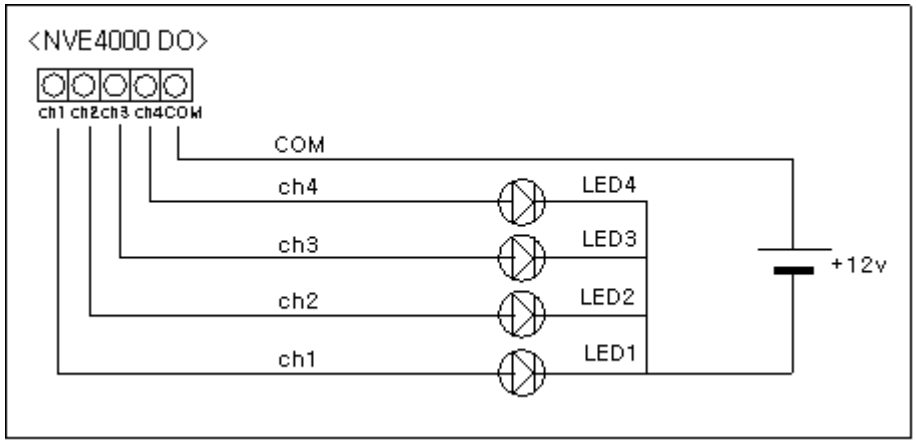

Figure 10. Digital Output Connection

Please pay attention to electric characteristics during installation.
(Detailed instructions are being prepared.)

⑤ RS-232C Terminal Block (RS-232C)
RS-232C Terminal Block is used for some devices such as POS terminal block.

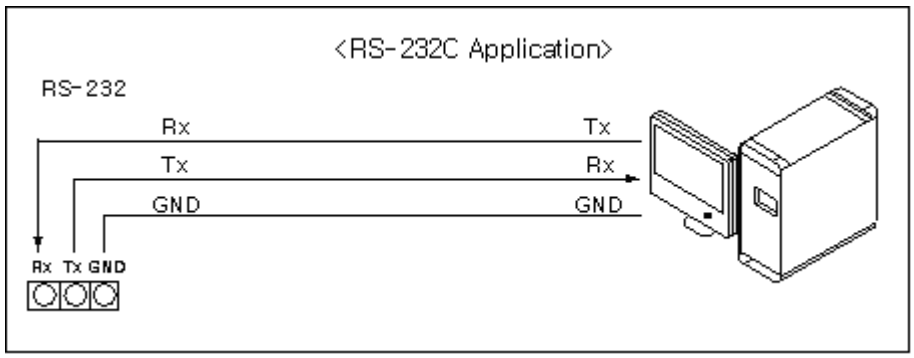

Figure 11. RS-232C Connection

⑥ RS-485 Terminal Block (RS-485)
The RS-485 serial port consists of DATA+, DATA- and GND as following Figure 13.

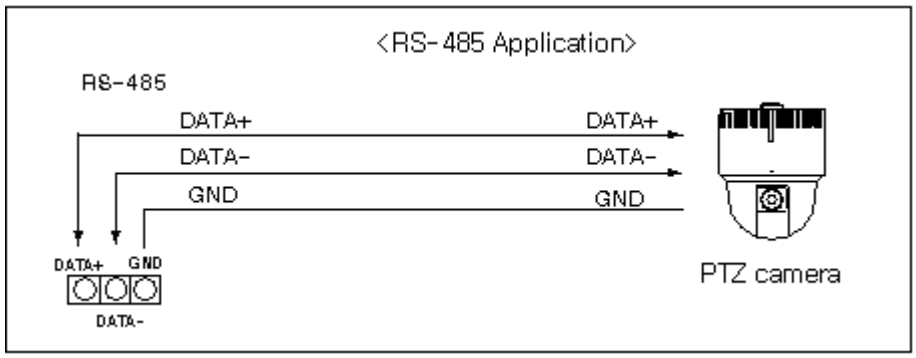

Figure 12. RS-485 Connection

⑦, ⑩ LAN Connector (Ethernet)
This is a RJ45 LAN connector for 10/100 Base-T Ethernet.

⑧, ⑪ Power Adaptor Connector (DC 12V)
NVE4000 needs a DC 12V 3A adapter for power supply, and NVE1000/2000 uses a DC 12V 1A adapter.

⑫ Reset Switch (Reset)
Reset switch is used for restarting NVE or resetting NVE as Factory Default (FD). Refer to '4.1. Factory Default Settings' for detailed procedures.

⑬ Video Input BNC Connector (Vin)
This connector is used for video input.

2.3. Serial Number / MAC Address

Serial number and MAC address is attached on the bottom as shown in Figure 14.

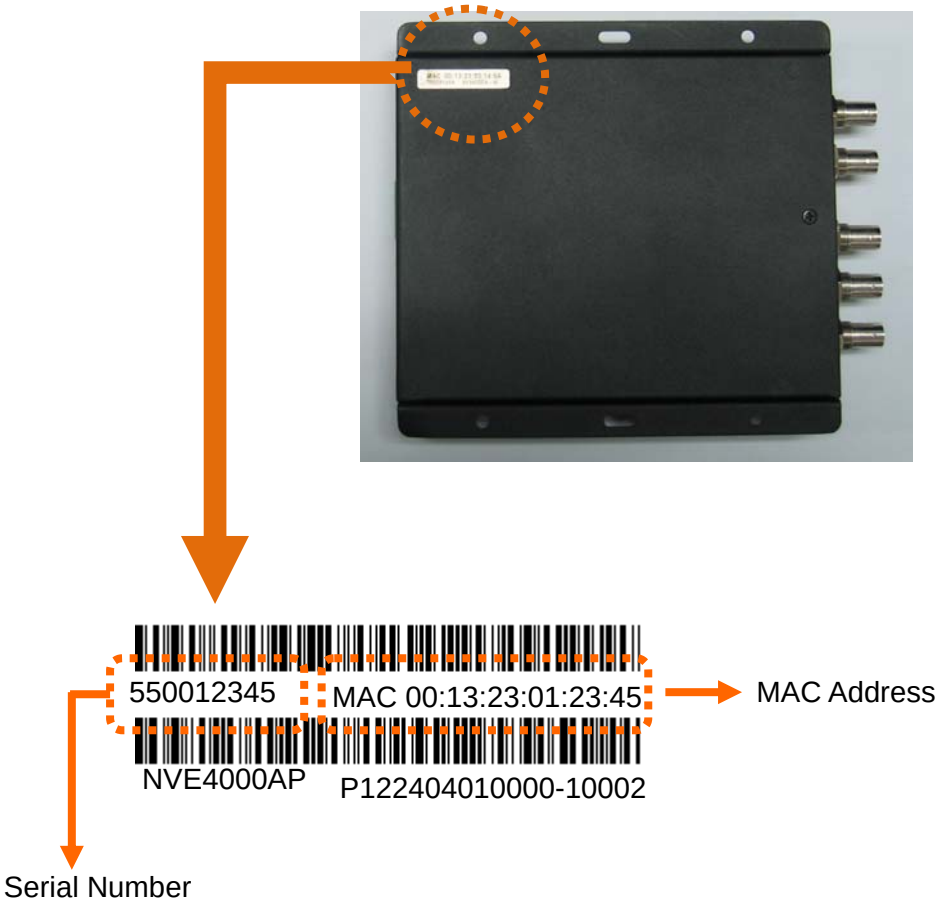

Figure 13. Serial Number/ MAC Address

3. Installation

3.1. Basic Connections

Figure 15 and Figure 16 illustrate the basic connection of NVE4000.

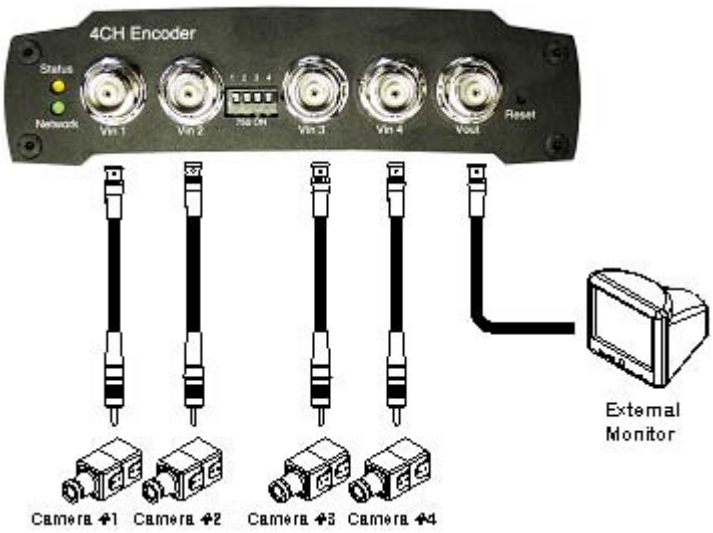

Figure 14. Front Panel Connection

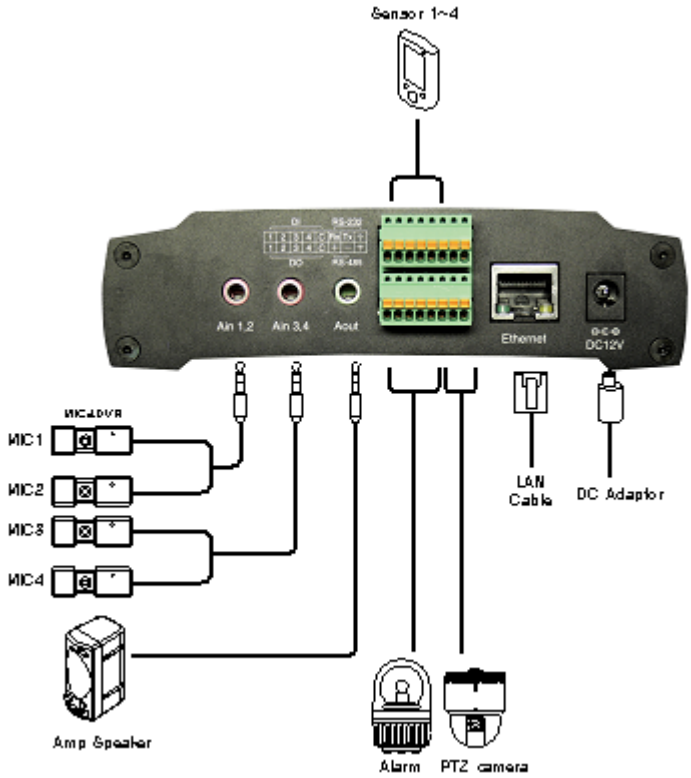

Figure 15. Rear Panel Connection

3.2. Package Contents

NVE Assembly

-1ea (NVE4000, NVE2000 or NVE1000)

NVE100

NVE1000

NVE2000

NVE4000

Audio Cable

- Only cable for audio input is provided
- Except NVE100 and NVE1000

LAN Cable

- Cross type 1m cable 1 ea

Terminal Block Plug

- Except NVE100

Power Adapter

- AC100 ~ AC 240V power cable is included

NVE4000 uses a 12V 3A adaptor.
NVE100, NVE1000 and NVE2000 use a 12V 1A adaptor.

NVE4000 uses 8 port x 2ea terminal blocks.
NVE1000 and NVE2000 use 6 port x 2ea terminal blocks.

3.3. Installation Example

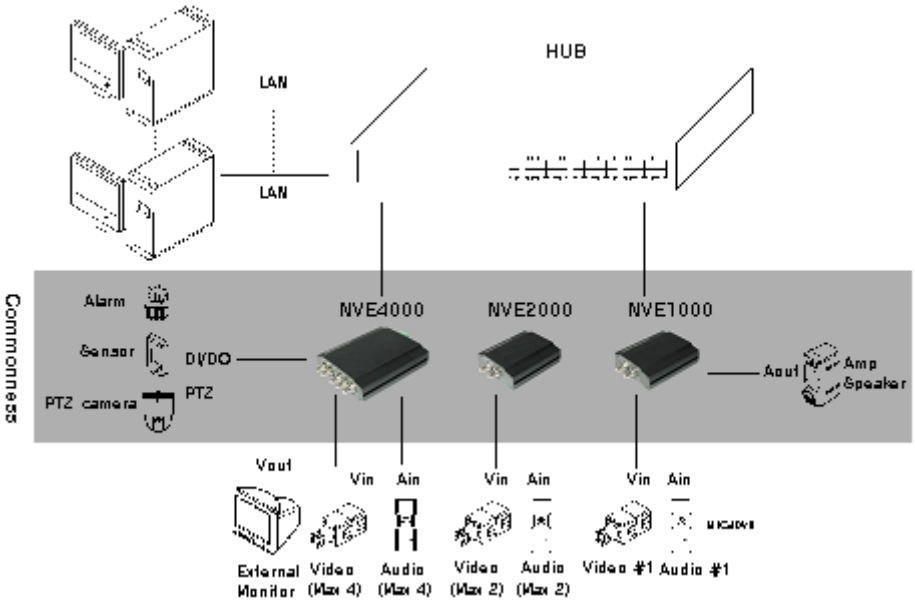

Figure 16. NVE Series Application Example

Normal operation may not be possible if temperature or humidity exceed levels recommended in the NVE specification. Problems may also occur in wireless environments.

4. Operation Description

4.1. Factory Default Settings

Factory default settings are as follows:

- IP address: 192.168.xx.yy (refer to 2.3 Serial Number / MAC Address)
- Mask: 255.255.0.0
- Gateway: 192.168.0.1
- User ID: root
- Password: pass

MAC address = 00-13-23-01-23-45 → IP address = 192.168.35.69

Convert the Hexadecimal number to Decimal number

Factory Default (FD) initialization procedure is as follows:

Figure 17. Indicator LEDs and Reset Switch

1. Turn ON the power.
2. Press “Reset” button when Status LED starts blinking rapidly.
3. Release “Reset” button when Status LED blinks slowly. (About 5 seconds after booting)

4.2. Rebooting

Reset can be carried out as follows:

1. Press Reset for 1 second.
   When Reset function is activated, Status LED and Network LED will blink together, twice. User may stop pressing Reset at this point.

2. When “Reset” function has been completed, LEDs will stop blinking.

5. Power over Ethernet (PoE)

The PoE module used in NVE is commercially available module without modification. The standard NVE does not include PoE module in it. PoE module is included on the request of a customer. For the detailed information, please contact sales person.
The PoE module is designed to extract power from a conventional twisted pair Category 5 Ethernet cable, conforming to the IEEE 802.3af Power-over-Ethernet (PoE) standard.
IEEE 802.3af allows for two power options for Category 5 cables and the PoE module have two pairs of power inputs pins: - VA1&2 and VB1&2 to accommodate this.
The PoE module signature and control circuit provides the PoE compatibility signature and power classification required by the Power Sourcing Equipment (PSE) before applying up to 15W power to the port. The PoE module is compatible with Class 0 to Class 3 equipment.
The high efficiency DC/DC converter operates over a wide input voltage range and provides a regulated low ripple and low noise output. The DC/DC converter also has built-in overload and short-circuit output protection.

5.1. Features

- IEEE802.3af compliant
- Small SIL package size - 56mm (L) x 14mm (H)
- Overload and short-circuit protection
- 1500V isolation (input to output)

5.2. Mechanical characteristics

Dimension: 56mm (L) x 14mm (H)

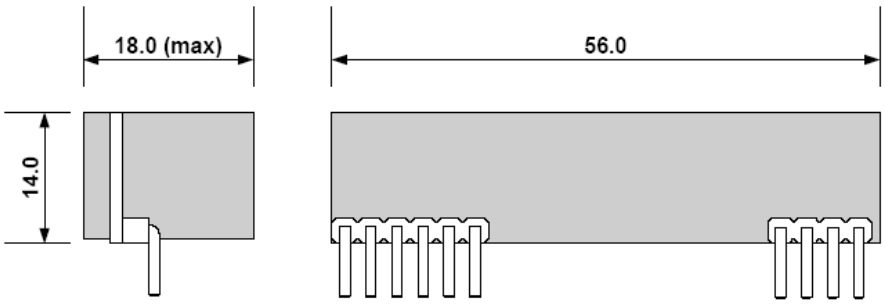

Figure 18. Dimension of PoE module

The following pictures show PoE module installed in the products.

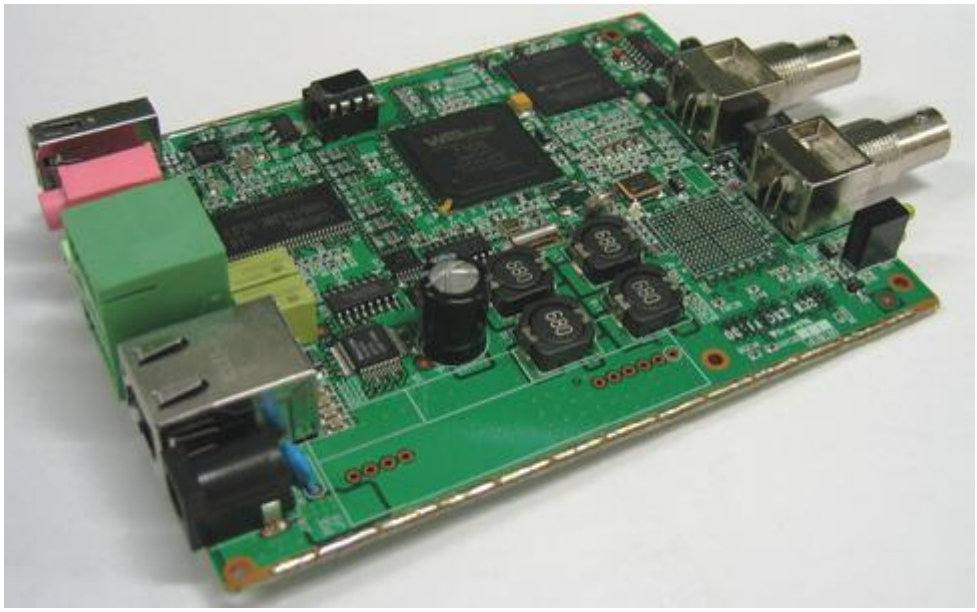

Figure 19. NVE1000 without PoE module

Figure 20. NVE1000 with PoE module installed

5.3. PoE compatibility

With non Power Sourcing Equipment (PSE)

When it is connected with non PSE, the power adaptor should be connected.

With power adaptor

Connecting both PSE and power adaptor does not do any harm to the products. Disconnecting power adaptor while it is operating does not stop operation. The product continues to work without rebooting.

5.4. Power classfication

The PoE Power Class supported by IPC/NVE is as following Table 4.

Model	Power Class
IPC1100 IPC3100 IPC3500 NVE100 NVE1000 NVE2000 NVE4000	0
IPC4100 IPC4500 IPC5100	Not applicable

Table 4. Power Class supported by IPC/NVE

Table 5 shows IEEE 802.3af power classes.

Class	Usage	Minimum Power Levels Output at the PSE	Maximum Power Levels at the Powered Device
0	Default	15.4W	0.44 to 12.95W
1	Optional	4.0W	0.44 to 3.84W
2	Optional	7.0W	3.84 to 6.49W
3	Optional	15.4W	6.49 to 12.95W
4	Reserved for Future Use	Treat as Class 0	Reserved for Future Use

Table 5. IEEE 802.3af PSE and Powered Device Power Classifications

6. Electrical characteristics

6.1. Operating conditions

Parameters		Min	Typical	Max	Units
Video input range	Peak to peak amplitude	0.5	1	1.35	V
	Sync amplitude	143	286	386	mV
	Horizontal lock range	-	-	±6.2	% of line length
	Color sub-carrier Lock-in range	-	-	±450	Hz
Audio input range		0.01	1	2.5	Vp-p
Ambient Operating Temperature		0	-	60	°C
Ambient Operating Humidity		20	-	80	%
D/O (isolated)	On-state current	-	-	100	mA
	Operating Voltage	-	-	30	VDC

Table 6. Operating conditions

Overvoltage and overcurrent will cause a severe damage to the device or even a fire.

6.2. Power consumption

	NVE100	NVE1000	NVE2000	NVE4000
Input Voltage	12 V			
Current	330 mA	413 mA	547 mA	848 mA
Consumption	3.96 W	4.96 W	6.56 W	10.18 W

Table 7. Power consumption

Revision history

Rev.	Date	Description
A	2006-06-16	Created.
B	2006-08-11	The Function of FD (Factory Default) Reset button is not implemented yet.
C	2006-09-20	Added FD (Factory Default) function
D	2006-12-12	Modified the process of FD
E	2007-02-03	Changed to new document format. Added PoE.
F	2007-03-13	Added the specification of NVE100
G	2007-05-23	Added when to use the termination resistor DIP switch
H	2007-06-08	Default settings for User ID and Password have been changed from admin/admin to root/pass
I	2007-06-11	Added Power classification
J	2007-09-12	Changed POE classification
K	2007-11-14	Added the electric characteristics of D/O
L	2008-04-18	Production description info corrected Serial number label location changed Reset hole added
M	2008-10-14	Power consumption is changed
N	2008-11-25	The video input range of electrical characteristics corrected
O	2009-05-04	Resolution modified (Half D1 - > 2CIF)