

IndigoVision 4-Channel Rack Hardware Guide



IndigoVision

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1 ABOUT THIS GUIDE

This Hardware Guide is written for users of the 4-Channel Rack.

It details how to configure the cards installed in the 4-Channel Rack, and install the 4-Channel Rack into a cabinet.

It also provides specification and LED details for the 4-Channel Rack and interface cards.

Safety Notices

This guide uses the following formats for safety notices:



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in moderate injury, damage the product, or lead to loss of data.



Indicates a hazardous situation which, if not avoided, may seriously impair operations.



Additional information relating to the current section.

2 PRODUCT OVERVIEW

4-Channel Rack Overview

The 4-Channel Rack is comprised of the following components:

- **Rack chassis** (includes backplane, power supply unit, serial adaptor cable and Administrator software)
- **Network switch card**
- **Four transmitter and/or receiver card(s)**

It is used to convert up to four analog video and/or audio signals into digital format and place them on a network. It can also be used to decode digital video/audio and output it to an analog monitor and/or suitable audio device.

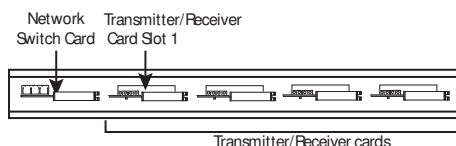


Figure 1 4-Channel Rack (front panels removed)

The 4-Channel Rack allows up to four analog cameras or analog monitors to be connected and accessed by other products in the IndigoVision range. These include Control Center and Network Video Recorders (NVR). This modular software can be added at any stage during the system's lifetime.



The 4-Channel Rack contains two internal fans for cooling purposes. To prevent the unit from overheating, the vents at each end of the 4-Channel Rack must not be obstructed.

Network Switch Card Overview

The Network Switch card provides:

- Three 10/100/1000 Base-Tx uplink ports
- A dedicated 100Mbps Full-Duplex connection to each individual Rack slot

This gives increased network bandwidth, network redundancy (using two of the uplink ports), Gigabit Ethernet capability, and the option of connecting directly to other IndigoVision products in a local network (using the third uplink port).

Notice *The Ethernet link type of the Transmitter and/or Receiver cards must be configured to Full-Duplex. Failure to do this will result in poor quality video and audio.*



The 4-Channel Rack must be powered down before the Network Switch Card is inserted or removed.

Transmitter Card Overview

These cards, depending on the installed firmware, can digitize, compress and transmit either a MPEG-4 (8000 Series cards) or H.264 (9000 Series cards) video stream from a PAL/NTSC video source to an IP network.

Audio data is full duplex, therefore analog audio can be input, digitized, compressed and transmitted simultaneously with another audio stream being received, decompressed, converted to analog and output to a suitable device.

Alarm and RS232/422/485 serial data can be accessed via the built-in terminal block connector.

You can configure these cards using a PC either with the Control Center application, any Web browser, or using a serial cable and a terminal emulator.



Transmitter Cards are hot swappable - they can be inserted or removed while the 4-Channel Rack is powered.

Receiver Card Overview

These cards can receive, decode and render an MPEG-4 or H.264 video stream from a corresponding Transmitter card.

The output analog signal is composite video (either PAL or NTSC dependent on the format of the stream being received) which can be output directly to a suitable analog monitor or VCR.

Audio data is full duplex, therefore analog audio can be input, digitized, compressed and transmitted simultaneously with another audio stream being received, decompressed, converted to analog and output to a suitable device.

Alarm and RS232/422/485 serial data can be accessed via the built-in terminal block connector.

You configure these cards using a PC either with the Control Center application, any Web browser, or using a serial cable and a terminal emulator.



Receiver Cards are hot swappable - they can be inserted or removed while the 4-Channel Rack is powered.

3

INSTALLATION AND CONFIGURATION

This chapter contains the following information:

- *"Before You Begin" on page 11*
- *"IP Configuration" on page 11*
- *"Resetting the Rack Card to Factory Defaults" on page 18*

Before You Begin

Before you start installing the 4-Channel Rack, please ensure that you have the following:

- A PC with a web browser for configuring the card(s)
- A power supply unit for the 4-Channel Rack
- A serial cable or CAT5 network cable (depending on the method used for IP configuration)

IP Configuration

This section takes you through the steps required to start using the 4-Channel Rack.

You must complete the following steps, which are explained in more detail below.

1. Configuring Transmitter and/or Receiver Cards.
2. Attaching a video source and connecting alarms and audio (if required).
3. Installing the 4-Channel Rack into a 19" cabinet (if required).
4. Installing the 4-Channel Rack onto a flat surface (if required).

Step 1: Configuring Transmitter/Receiver Cards

You can configure the Transmitter and/or Receiver cards over the network or using an RS232 serial interface. Both methods are explained.

The Transmitter and/or Receiver cards in the 4-Channel Rack are supplied with their IP addresses set to 10.5.1.11, 10.5.1.12, 10.5.1.13 and 10.5.1.14, for cards in slot 1 to 4 respectively. The subnet mask is set to 255.0.0.0 and default gateway 10.0.0.1 for all cards. If these addresses are acceptable on your network, you do not need to change them and can proceed to *"Step 2: Interfacing to Video, Alarm I/O, Serial and Audio Signals"* on page 16.

Individual Transmitter and/or Receiver cards can be supplied by IndigoVision. These cards have their IP address, subnet mask and gateway set to 10.5.1.10, 255.0.0.0 and 10.0.0.1 respectively.

If these settings conflict with your network, you must not connect these cards to your network until you have changed the settings to suit your network.

If required, you can reset the IP values back to their defaults. See *"Resetting the Rack Card to Factory Defaults"* on page 18.

Network Configuration

Before you change the factory defaults of your Transmitter and/or Receiver cards, you may first need to (temporarily) modify your PC's network settings.



Please note the original value of all settings that are to be changed so that you can re-enter them when you have completed the initial device configuration.

Before you begin:

1. Close all open applications on your PC.
2. Power up the 4-Channel Rack.
3. Disconnect your PC from the current network. Connect your PC to the Network Switch card either directly using a cross-over

network cable or through an isolated switch. The Link LED on the Network Switch card should light up.

To change your PC's settings:

Use the Windows Network Settings configuration application to set the PC's IP address and subnet mask, as follows:

1. In Windows Explorer, right-click **Network Neighborhood** and select **Properties**.
2. Right-click **Local Area Network** and select **Properties**.
3. Right-click **Internet Protocol (TCP/IP)** and select **Properties**.
4. Set the IP address to an address close to the factory IP address, for example, 10.5.1.2 and change the PC's subnet mask to 255.0.0.0 (the same as the factory default).
5. Click **OK**, then **OK** again.

Configure Cards

Once you have changed your PC's network settings, you can change the IP settings of the rack cards from the factory defaults.

To change these values:

1. Open the Internet Explorer application.
2. Select **File > Open** and enter the IP address of the card to be configured (10.5.1.11, 10.5.1.12, 10.5.1.13, etc.), then click **OK**.

The Configuration Home page opens.

3. Click the **Network** link on the left of the page.
4. The fields are as follows:
 - **Use DHCP** — Select to assign the following network parameters via a DHCP Server:
 - IP Address
 - Subnet Mask
 - Default Gateway
 - Hostname
 - Network Time Server Address

Notice *IndigoVision recommends that if you are using DHCP, you should configure the DHCP server to assign a given IP address based on the unit's MAC address. Also, if the unit does not receive any response from the DHCP server it will default to using the network parameters supplied by the last completed DHCP request.*

If you are not using DHCP, you must enter the information manually.

- **Host Name**— Enter a name for the camera to identify the camera.
- **Location** — Enter a location to identify the camera.
- **IP Address** — Enter the IP address of the camera.
- **Subnet Mask** — Enter the IP network subnet mask.



Caution

Ensure that you enter the correct values. Once you change from the defaults, the camera is no longer configurable by the PC with its current network settings.

- **Gateway** — This is the appropriate default gateway for remote network access and is only required if the cameras are to be accessed from a different subnet.
- **NTP Server Address**— Address of NTP time server (if available).
- **Ethernet Interface** — Select: 1 - 100Mbps Full-Duplex.

When you have entered the configuration data, click **Submit** to apply the changes.

Notice *IndigoVision recommends that you make a note of the new IP address and subnet mask, or label the card with its new details.*

5. To configure another card, repeat steps 2-5, using a different IP address for each card.



Caution

Ensure that no two cards share the same IP address (or that of the PC).

- When you have configured all your cards, return the PC to its original settings, or change them as appropriate for your network.



Please ensure that each video card's new IP details do not clash with your PC's settings before connecting any cards to your network. Contact your network administrator if you require further assistance.

If required, you can reset the IP values back to their defaults. See *"Resetting the Rack Card to Factory Defaults"* on page 18.

Using the Serial Port Connection

- Connect the supplied serial cable to the 4-Channel Rack.
- Connect the 9-way DSUB end of the serial cable to a PC serial port using a standard null modem serial cable, as shown in **Figure 2** on page 15.

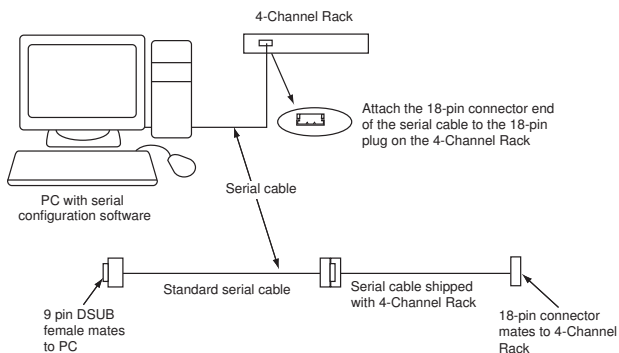


Figure 2 Serial port connection

- On the PC, use a Terminal Emulation program such as Windows HyperTerminal and set the serial port parameters as follows:
 - 115200 baud
 - 8 bits
 - No parity
 - 1 stop bit
 - Flow Control: None

4. Power up the 4-Channel Rack. Wait for 1 minute to allow the card to complete the boot sequence.
5. Connect to the unit and press **Enter**. You should see a login prompt.
6. Log in to the unit using the username "config" and password "config". The unit prompts you to enter the new configuration values. At each prompt, press **Enter** to accept the current value.
 - **Use DHCP (y/n)** — Enter **y** to use DHCP for IP configuration, or **n** for manual IP configuration.
 - **IP Address** — Enter the IP address of the unit.
 - **Subnet Mask** — Enter the IP network subnet mask.
 - **Default Gateway** — Enter the appropriate default gateway for remote network access: this is only required if the cameras are to be accessed from a different subnet.
 - **Host name** — Enter a name to describe the unit.
 - **Location** — Enter a name to describe the location of the unit.
 - **Link type** — Select: 1 - 100Mbps Full-Duplex.
 - **Reset Network Security to factory defaults (y/n) ?** — Enter **y** to reset the unit's password and network security settings. This will enable unrestricted access to the configuration pages, and is the only way to reset the password on the unit. Enter **n** if you do not want to make changes to the unit's network security.

Repeat these steps for each slot in the rack.

You are now ready to attach the 4-Channel Rack.

Step 2: Interfacing to Video, Alarm I/O, Serial and Audio Signals

1. Connect a video source to the Video In BNC connector on the back plane (**Figure 3** on page 17).

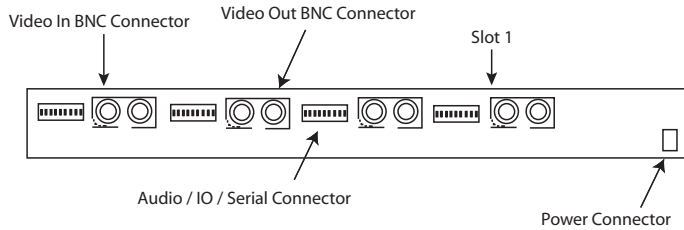


Figure 3 Rear view of 4-Channel Rack with Transmitter cards fitted

Notice *When Transmitter cards are fitted to the 4-Channel Rack, Video Out is a buffered version of the analog video input connected to the Video In BNC connector.*

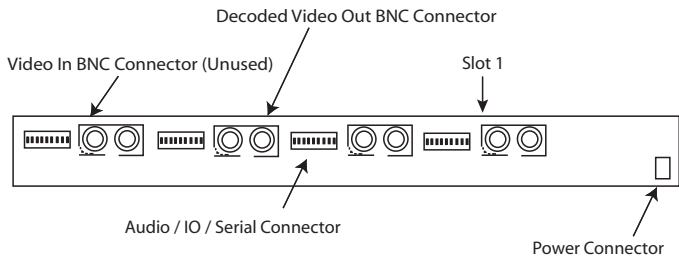


Figure 4 Rear view of 4-Channel Rack with Receiver cards fitted

Notice *When Receiver cards are fitted to the 4-Channel Rack, Decoded Video Out is a composite video signal generated from the decompressed digital video received from the network. The Video In connector is not used.*

2. Connect alarms, audio and serial interfaces if using these features. See "Connector Pinouts" on page 21 and "Wiring The Binary Input and Output" on page 27 for wiring information.

Step 3: Installing the 4-Channel Rack into a Cabinet

1. Insert the 4-Channel Rack device into a 19" Rack cabinet.

2. Attach the 4-Channel Rack to the cabinet using four screws (not included).
3. Connect the power supply to the unit (see **Figure 3** on page 17).

Notice *The 4-Channel Rack does not have a power switch. When power is connected, the system is on. To turn the unit off, disconnect the power.*

You have now completed configuration of the 4-Channel Rack.

Step 4: Installing the 4-Channel Rack onto a Flat Surface

1. Attach the surface mount lugs to the 4-Channel Rack using the screws supplied.
2. Fix the 4-Channel Rack to the flat surface using either the two locating slots (127mm apart) or the three holes (82.5mm apart) on the surface mounting lugs (screws are not included).
3. Connect the power supply to the unit (see **Figure 3** on page 17).

Notice *The 4-Channel Rack does not have a power switch. When power is connected, the system is on. To turn the unit off, disconnect the power.*

You have now completed configuration of the 4-Channel Rack.

Resetting the Rack Card to Factory Defaults

If necessary, you can reset the network security information (password and IP firewall) for the Rack video cards. To do this, follow the instructions in "Serial Configuration" on page 1 and reset the network security settings when prompted.

4 CONFIGURING REDUNDANCY

Configuring of Network Redundancy

Network redundancy must be provided by the network switches connected to the 4-Channel Rack. These switches must support the Rapid or standard Spanning Tree Protocol. This protocol quickly reconfigures the network when a failure occurs, preventing network loops which may otherwise occur if two switch ports on the 4-Channel Rack are connected.

If Spanning Tree is not enabled on the network, network redundancy cannot be provided to the 4-Channel Rack and only one of the network ports should be connected to the network.



Caution

If your network does not support the Spanning Tree Protocol, connecting your network to two ports may cause a network loop and excessive network traffic.

IndigoVision recommends that two of the 4-Channel Rack switch ports are connected to different network switches, ensuring that if one switch fails, the other will maintain network connectivity (**Figure 5** on page 19):

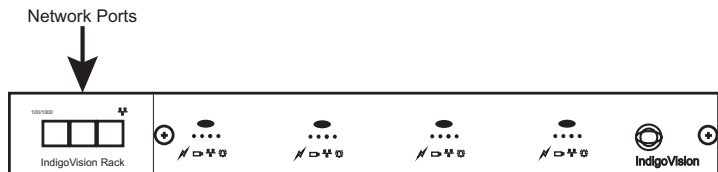


Figure 5 4-Channel Rack connects to two switches for redundancy purposes — Spanning Tree enabled on switches

Both switches should be configured to turn on Spanning Tree for network redundancy and IGMP snooping for efficient multicast operation. If there is a router on the network, ensure that IGMP snooping is enabled on each switch. If there is no router on the network, you should also ensure IGMP querying is enabled on the switch with the lowest IP address on the subnet.

Notice *The Network Switch card is an unmanaged switch, and does not support multicast filtering. Any multicast traffic received on any port of this switch, either from the Transmitter cards or from the network will be forwarded to all other ports, reducing the total network bandwidth available on each port correspondingly. It is recommended that the network ports of the Network Switch Card are connected to switches that support multicast filtering. This will limit the multicast traffic to each of the Transmitter and/or Receiver cards to that transmitted or received by the cards themselves. This maximizes the total available network bandwidth across the chassis backplane.*

5 SPECIFICATIONS

This chapter contains the specifications for the 4-Channel Rack and the video cards. It also details the device's approvals.

Connector Pinouts

BNC Connector

Video In Connector

- Video In (Transmitter Cards)
- Signal format: Composite Video, NTSC or PAL

Video Out Connector

- Video Loop Out (Transmitter Cards)
- Decoded Video Out (Receiver Cards), Composite Video, NTSC or PAL

Terminal Block Connections

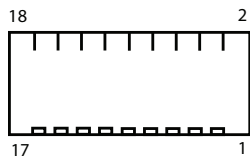


Figure 6 Terminal Block

Table 1 Terminal Block Pinout

Pin Number	I/O	Description
1	I	Serial: RS232/RS422 Rx/RxP
2	O	Serial: RS232/RS422 Tx/TxN
3	I	Serial: RS232/RS422 CTS/RxN
4	O	Serial: RS232/RS422 RTS/TxP
5	-	GND
6	-	GND
7	I	Binary I/O: Input -
8	I	Binary I/O: Input +
9	-	Binary I/O: R.1 (Output Relay Contact)
10	-	Binary I/O: R.2 (Output Relay Contact)
11	I	Serial: Console Port Rx
12	O	Serial: Console Port Tx
13	-	GND
14	-	GND
15	I	Audio: Dynamic Microphone Input
16	I	Audio: Stereo Line Input Right
17	O	Audio: Mono Output
18	I	Audio: Stereo Line Input Left

Console RS232 Serial Settings

RS232 console port at 115200 baud, 8 bits, No parity, 1 stop bit, no flow control.

Mechanical

Dimensions

No Lugs Fitted 44(h) x 225(d) x 445(l) mm

Rack Mount Lugs Fitted 44(h) x 225(d) x 484(l) mm

Weight 3.4kg**Finish** Blue**Construction** Metal chassis

Power Consumption

Power Consumption 35W (max.)**Input Voltage** 12VDC**Input Current** 2.83A

Transmitter/Receiver Card Specifications

Table 2 Transmitter/Receiver Card Specifications

	<p>Video In BNC</p> <p>1 NTSC/PAL (BNC) input, composite video, 75Ω, 1Vp-p (Transmitter Cards)</p> <p>Video Out BNC</p> <p>1 NTSC/PAL (BNC) loop out, composite video, 75Ω, 1Vp-p (Transmitter Cards)</p> <p>1 NTSC/PAL (BNC) decoded video output, composite video, 75Ω, 1Vp-p (Receiver Cards)</p>
Video	
Video Codec	<p>8000 Series: ISO14496-2 Standard MPEG-4 Simple Profile</p> <p>9000 Series: ISO14496-10 Standard H.264 Baseline Profile</p> <p>User-configurable bit rate</p> <p>User-configurable frame rate</p> <p>“4:2:0” YUV color space</p>
Dimensions	160(d) x 70(h) mm
Weight	0.11kg
Video Resolution	<p>SIF: 352 x 288 (PAL)</p> <p>SIF: 352 x 240 (NTSC)</p> <p>2SIF: 704 x 288 (PAL)</p> <p>2SIF: 704 x 240 (NTSC)</p> <p>4SIF: 704 x 576 (PAL)</p> <p>4SIF: 704 x 480 (NTSC)</p>
Audio Compression	<p>MPEG-4 Advanced Audio Encoding</p> <p>16 kHz Sampling</p> <p>Selectable 32, 48, 64 Kbps bit-rate</p> <p>100 - 7000 Hz Bandwidth</p>
Power	3.3V DC at 1.5A
Operating Temperature	0°C to 55°C (32°F to 131°F)
Storage Temperature	-20°C to 70°C (-4°F to 158°F)

4-Channel Rack Approvals

- EN 55022 (1994) ITE emission standard - Class A
- EN 61000-3-2 (1995) mains harmonics - Class A
- EN 55024 (1998) ITE immunity standard
- EN 6100-3-3 (1995) voltage fluctuation
- CFR47 (1995) Part 15 subpart B - Class A (US Federal Code of Regulations)
- EMC – Rolling Stock Railway applications
 - BS EN50121-3-2:2006
 - BS EN50155:2007
- EMC – Trackside Railway applications
 - BS EN50121-4:2006
- Shock and Vibration with optional mounting plate
 - BS EN60068-2-64



In accordance with the EC Waste Electrical and Electronic Equipment (WEEE) directive 2002/96/EC this product must be sent to a recycling plant for proper disposal at the end of its use.

A WIRING THE BINARY INPUT AND OUTPUT

Binary Input

Binary I/O Voltages less than 24 volts

The Binary input on the Rack Video Cards allows you to connect external trigger sources to the device.

Notice For information on configuring alarms from binary inputs, please see the *IndigoVision Web Configuration Guide*.

For supply voltages less than 24Vdc, no external resistor is required as the unit has an internal resistor fitted. The input voltage (V_{IN}) must be less than 1Vdc, or open circuit, for a logic low, and greater than 4Vdc for a logic high.

Example 1 — Normally Closed Contact

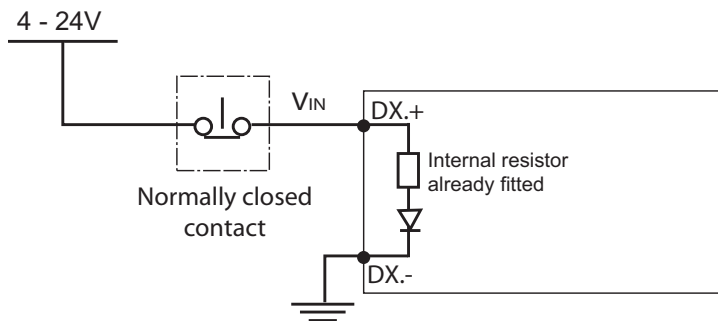


Figure 7 Normally closed contact

In **Figure 7** on page 27, when the switch is pushed, the binary input changes from high to low. When the switch is released, the binary input changes from low to high.

Example 2 — Normally Open Contact

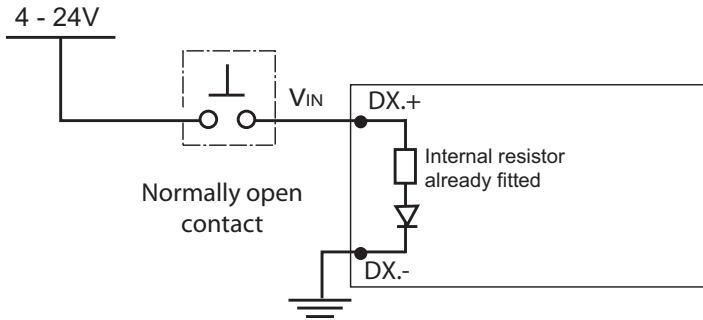


Figure 8 Normally open contact

In **Figure 8** on page 28, when the switch is pushed, the binary input changes from low to high. When the switch is released, the binary input changes from high to low.

Binary I/O Input Voltages greater than 24 volts

For input voltages greater than 24Vdc, an external resistor is required in series with the input pin. The value of this resistor can be calculated as:

$R = [100 * (V_{ON} - 1) - 1500]$ ohms rounded down to the nearest preferred resistor value, where V_{ON} is the desired voltage for a logic high.

eg. for $V_{ON} = 48Vdc$

$$\begin{aligned} R &= [100 * (48 - 1) - 1500] \\ &= 4700 - 1500 = 3200 \\ &\sim 3K \end{aligned}$$



Input voltages above 50Vpk at V_{IN} will irrevocably damage the unit.

Example 3 — Normally Closed Contact (48V input)

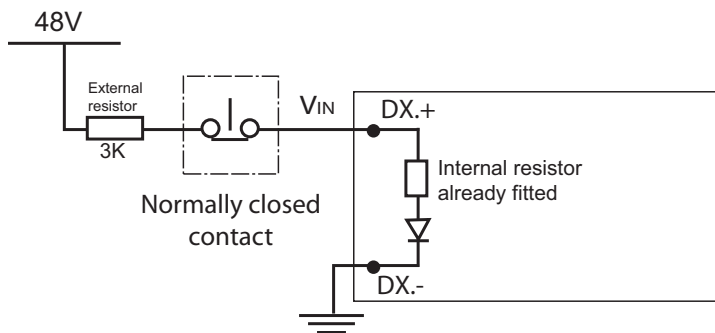


Figure 9 Normally closed contact

In **Figure 9** on page 29, when the switch is pushed, the binary input changes from high to low. When the switch is released, the binary input changes from low to high.

Binary Output

The switching of the video card's Rx.1 and Rx.2 binary ports is controlled via your software applications. These ports are electronically switched and are either open-circuit or closed. Once closed, the effective resistance between Rx.1 and Rx.2 is not greater than $2\ \Omega$. A typical example is shown in **Figure 10** on page 30.

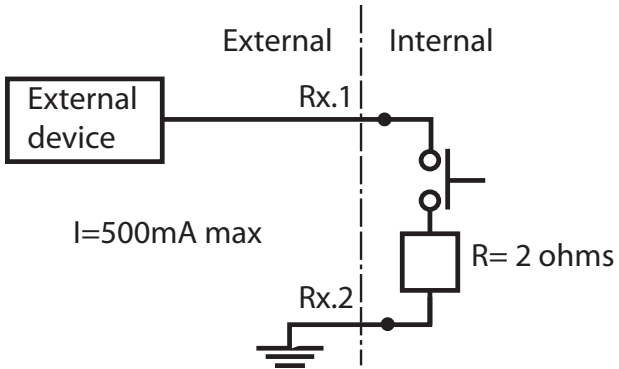


Figure 10 Example binary output



This port is not a voltage source. The maximum current permitted through this port is 500mA at 25 degC, derated to 350mA at 55 degC.

B INTERFACE CARD LEDs

Transmitter/Receiver Card LEDs

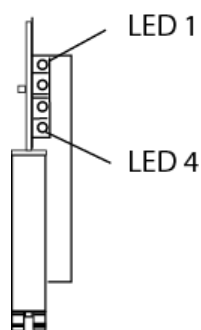


Figure 11 LEDs

Table 3 LEDs description

Name	Color	Description	Details
LED 1	Green	Power/Active	Flashes regularly when the card is powered and functioning
LED 2	Green	Video	OFF = no video ON (Solid) = video streaming from the card over the network
LED 3	Yellow	Network	Flashes with network activity
LED 4	Red	Alarm	Lit when fault is detected and card is rebooting.

Network Switch Card LEDs

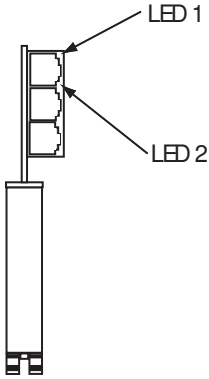


Figure 12 Network Switch Card LEDs

Table 4 Network Switch Card LEDs description

Name		Color	Connection type
LED1	Denotes connection speed	Green	100Base-TX (unlit) 1000Base-TX (lit)
LED2	Denotes link status and activity	Green	Link (lit) Link and traffic (blink) No link (unlit)

10Base-TX connections are supported, but these connections are not recommended.