EIO-3148 Manual

Contents

1 Introduction

The EIO-3148 network base IO expander device enables comprehensive access and control of remote opto-isolated inputs and non-polarised outputs over an Ethernet network. In applications where an Ethernet network already exists, this is a significant cost-saver as it does away with the requirement for cabling. Through the **CathexisVision** software control, opening and closing of integrated relay contacts can be incorporated into any response of a critical event.

a. Specifications

Ethernet interface	1
Ethernet specification	Class 4 PoE+ (15 W) The unit may be powered via POE, as per the above specification.
Relay (non-polarised) outputs	4
Opto-isolated inputs	8
Input Interface	Isolated inputs sense contact open or closed.
Input Isolation	2500 V rms for 1 minute, per UL 1577
Contact material	Ag Au clad, AgNi Au clad
Contact rating	0.5A/125VAC, 1A/30VDC, 0.3A/60VDC
Maximum carrying current	Contact Rating (Res. load): 0.5A/125VAC, 1A/30VDC, 0.3A/60VDC
Maximum switching power	30W 62.5VA
Maximum switching voltage	See Contact Rating
Power Consumption	5 Watts
Supply Voltage	9-36V DC and is protected against the application of incorrect polarity.
Software	CathexisVision 2016. Backwards compatible with previous releases that support the EIO-1148 (on which it will function as an EIO-1148).
Physical dimensions	145x107x28 (w x l x h)
Mounting options	Flanges with 2x slotted mounting holes, and DIN rail mounting option.
Enclosure / Environment	High temperature, ROHS compliant, plastic housing. The enclosure is not waterproof, and should only be installed indoors.
Maximum EIO-3148 encoders per NVR	32

b. Summary

This encoder has 8 opto-isolated alarm inputs and four relay (non-polarised) outputs. The encoder is powered by a 9 to 32 VDC power source. It sends and receives data via an Ethernet cable connected to a network.

These encoders are fully integrated within the NVR software, with up to 32 EIO-3148 encoders possible per NVR unit. Setup and operation is by means of **CathexisVision** software. The unit IP addresses and firmware are manageable via the **CathexisVision** Encoder Utility.

c. Alarm Inputs

Each EIO-3148 encoder has 8 opto-isolated alarm **inputs** that may be used to trigger automated system responses.

A **relay** is an electrical switch that opens and closes under the control of another electrical circuit. **CathexisVision** can treat the switching of these states as an Event action, and reacts with multiple possible event actions.

The **input** is a signal indicating to the system that a change has taken place and requires a response.

Each input has two terminals that can be closed by means of the switch.

Examples of Alarm Inputs

Anything that can be switched can be treated as an alarm input.

- **Panic buttons** - pressed by someone who needs help.
- **Passive Infrared (PIR) sensors** - invisible infrared beams that cause switching when broken.

Other examples include magnetic loops, pressure pads, and door switches.

d. Relay Outputs (non-polarised)

Each EIO-3148 encoder has four non-polarised relay **outputs**, which may be used to switch wired utilities such as door relays, lights alarms, etc.

A relay is an electrical switch that opens and closes under the control of another electrical circuit. In the case of the EIO-3148, the opening and closing of the relays is controlled by **CathexisVision** in two possible ways:

1. Manually by an operator (e.g. manually switch on the facility floodlights when investigating an alarm), or;
2. Automatically, as an event action in response to an event trigger (e.g. switch on a passageway light when there is movement in the passageway).

Note: You need to connect a voltage source in series with your output device and the relay contacts. Devices usually require an independent electrical source.

Examples of Relay Outputs

- Sirens and buzzers.
- Indicator lamps.
- Solenoid door locks – used a lot by receptionists, who can look at **Live** camera display of a door, and then open the door from the **CathexisVision** user interface.
- Lights.
- Audio recordings – for example, an audio message in response to someone pressing a buzzer after hours.
- Almost any electrical device.

You could connect a relay output to an alarm input, and configure the input as an event trigger to trigger multiple Event actions. In this way you would have a manual means of triggering automated **CathexisVision** Event actions.

e. Opto-isolator

To protect the internal devices from external voltage spikes and harmful signals an opto-isolator is used to separate the external current from the internal electronics.

It uses a short optical transmission path to transfer a signal between elements of a circuit, typically a transmitter and a receiver, while keeping them electrically isolated — since the signal goes from an electrical signal to an optical signal back to an electrical signal, electrical contact along the path is broken.
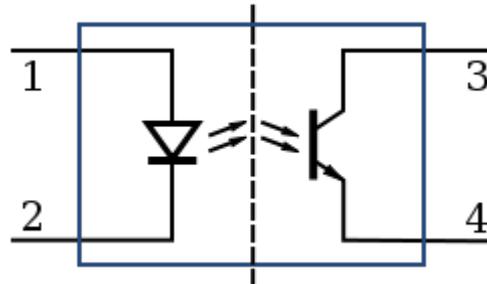
A schematic of an extremely simple opto-isolator device. The dashed line in the centre represents the isolation barrier, over which no electrical contact can be permitted.

f. Hardware requirements

Power Sourcing Equipment	9 to 32 VDC source (ensure power cables are correctly connected example + to +, - to -).
Full duplex switch	A switch that can handle a duplex communication system that is composed of two connected devices that can communicate with one another in both directions.
Single or multiple Cathexis NVRs.	This will vary depending on your site.
Category 6 Ethernet Cable (recommended)	Commonly referred to as "Cat-6", this is a cable standard for Gigabit Ethernet and other network protocols that is backward compatible with the Category 5/5e and Category 3 cable standards. Cat-6 features more rigorous specifications for crosstalk and system noise. The cable standard provides performance of up to 250 MHz and is suitable for 10BASE-T / 100BASE-TX and 1000BASE-T (Gigabit Ethernet). Category 6 cables can be identified by the printing on the side of the cable sheath.

g. Physical requirements

1. For mounting consideration, the EIO-3148 is relatively small, light and robust, with dimensions 145x107x28 (w x l x h) mm.
2. If the EIO-3148 encoder is installed outdoors, it should be placed in a 3rd party enclosure because it is not weatherproof.
3. The encoder is not designed for mobile applications, so it should be subjected to no more than transitory shock during transportation.
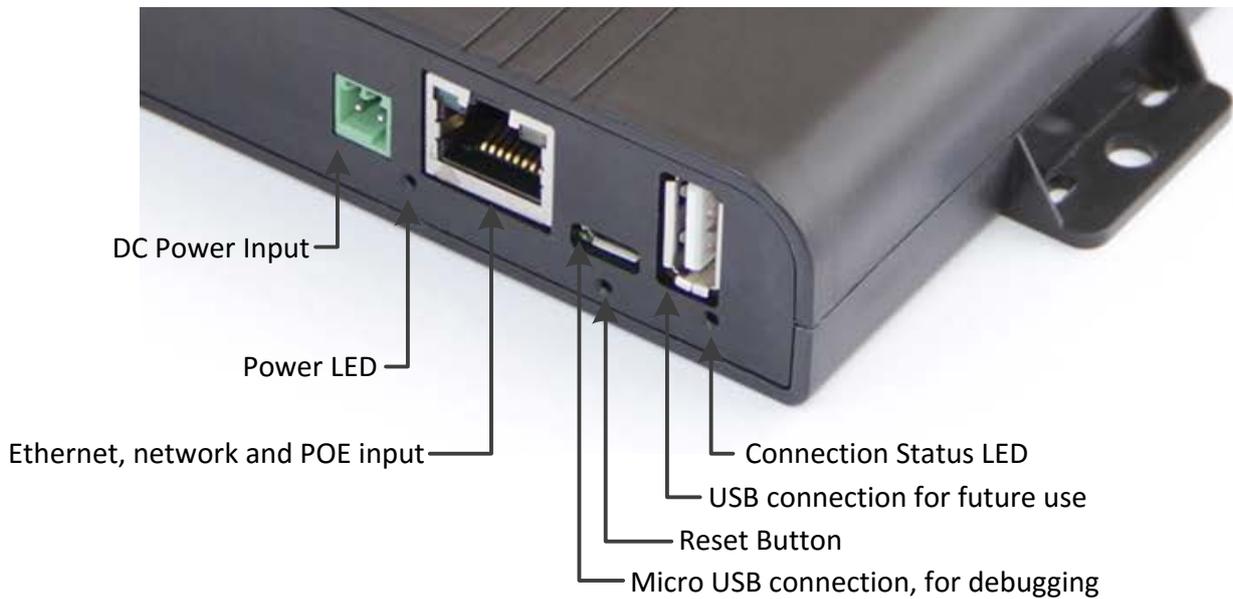4. For mounting, it has flanges.

h. Software requirements

- Each Encoder / IP camera requires an IP Address on the network. This can be assigned by means of the Encoder Setup Utility ⚙.
- **CathexisVision 2016**. While this device is backward compatible with **pre-CathexisVision 2016** systems, it will only function as an EIO-1148 on the 2016 system.

i. Network requirements

The network topology must be thoroughly understood, and the effects of the encoders on network performance well considered before any decisions are taken on installing encoders.

j. Connector Layout and LEDs

DC Power Input

Power LED

Ethernet, network and POE input

Connection Status LED

USB connection for future use

Reset Button

Micro USB connection, for debugging

Front and Back Panel Layout

The connections on the front, and back, panel of the EIO-3148 are as such:
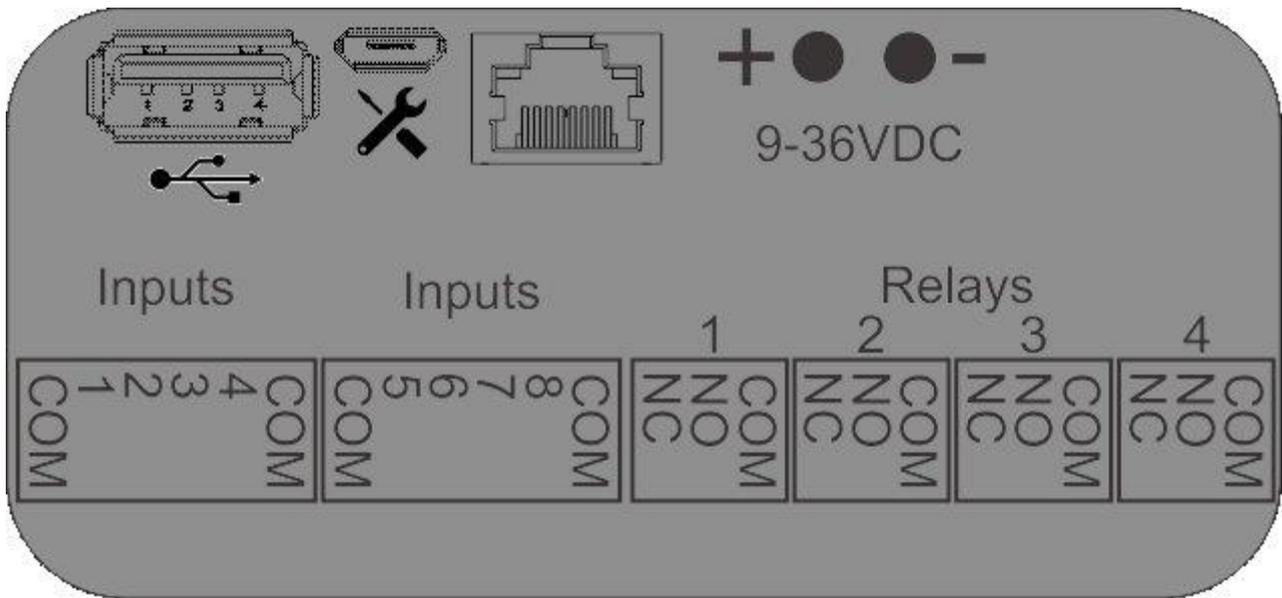
LEDs

There are two LEDs on the EIO-3148.

Red LED: While the unit is booting the red led will flash on for 2s, then off for 0.5s. Once the unit is booted, and the software is running, the red LED stays on.

Green LED: the green led will flash on 1s and off 1s while the software is running.

2 Encoder Setup

Before you can add your EIO to **CathexisVision** you need to be able to find it. Each unit has its own IP address which identifies it on the network. The EIO will also need to have the right firmware. These setups can be done via the CatEncoder Setup Utility. This is a separate application, which is installed when you install **CathexisVision**.
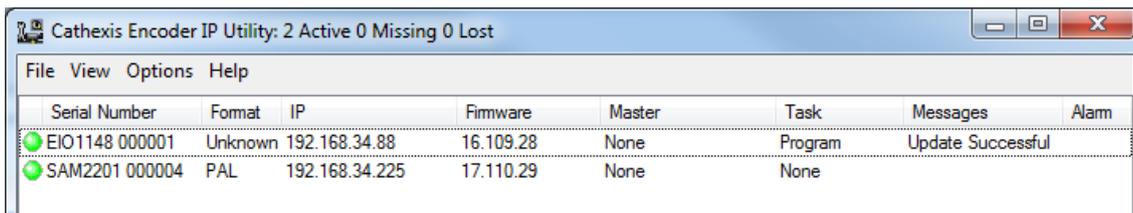
The **CathexisVision** Encoder IP Utility has a number of features, which are useful in setting up your EIO:

1. Automatically searches the local physical network (behind firewall and/or router) and lists all CatEncoders on the network.
2. Indicates connection status for each CatEncoder.
3. Automatically lists all CatEncoders on the local network.
4. Displays Format (NTSC or PAL, where applicable).
5. Displays the IP address of each CatEncoder.
6. Displays the local Gateway IP address for each CatEncoder.
7. Displays the subnet of each CatEncoder.
8. Displays each CatEncoder's MAC address, and whether it is valid.
9. Displays each CatEncoder's Firmware version.
10. Displays each CatEncoder's current Temperature.
11. Displays the current task being performed by each CatEncoder.
12. Displays messages per CatEncoder (e.g. "connected", "20% completed", "failed").
13. Displays alarm messages per CatEncoder (e.g. connection "Missing", connection "Lost", "MAC Invalid").
14. Multiple IP Address assignment from the interface, without the need to power-cycle CatEncoders.
15. Multiple firmware-updates from the interface, without the need to power-cycle.

The core features that will be used here are **Setting the unit's IP address**, and **upgrading the firmware**, if necessary.
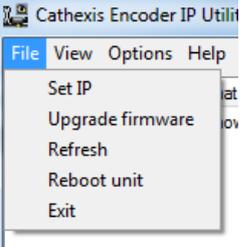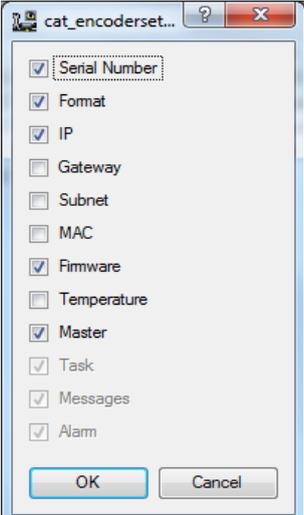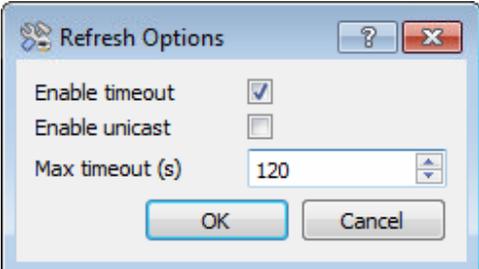
a. The CatEncoderSetup Interface

Run the utility; after a few seconds you will see the interface with a list of all CatEncoders that it recognises:

Icons 🟢 🟡 🔴

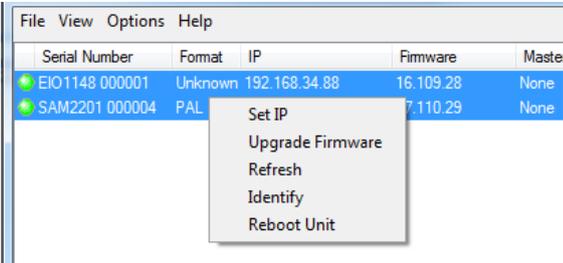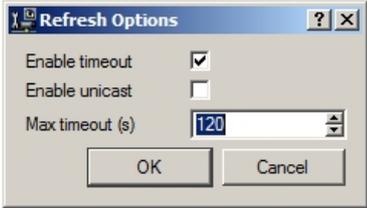|		
🟢	A green icon indicates a functional connection.	The connection status is derived from the utility polling (pinging) the network.
🟡	A yellow icon indicates that the connection is missing. Under the alarm column, you will simultaneously see the word "missing".	When it receives no response from an encoder, it displays a yellow icon for that encoder for 30 seconds, until the next ping. If still no response, it displays a red icon for 30 seconds, until the next ping. If still no response, it drops the encoder from the list. You can also manually poll / ping / refresh (right-click > Refresh).
🔴	A red icon indicates that the connection is **lost**. Under the alarm column, you will simultaneously see the word "Lost".	

Menus

File Menu	The file menu item provides access to maintenance functions for the CatEncoders that have been selected in the list. **Note**: These functions are also accessible by right clicking on the selected encoders.
View Menu	View>Columns is the means of hiding-and-showing columns: Select (tick) to show, and de-select to hide columns. By default, the **Gateway**, **Subnet**, **MAC addresses**, and **Temperatures** are hidden. The **Temperature** column displays current temperature of the encoder. The **Firmware** column shows the firmware details. The **Master** column displays the IP address of the NVR/DVR unit that is connected to the Encoder, the Master Controller. (This only works on Firmware versions up to and including **5042d5**.) The **Task**, **Messages** and **Alarm** columns cannot be hidden.
Options: Refresh options Menu	Pings the listed encoders , updates the information. **Enable timeout** Tick this to enable a random timeout of up to 10 seconds, for spreading encoder ping responses (to avoid all encoders responding simultaneously to ping queries, this enables them to randomly respond to a ping query within a 10s period). **Enable unicast** This enables the encoder to respond to the unicast address from where the initial broadcast originated. **Max timeout (s)** Specifies the period within which successive pings (refresh queries) should occur.
Help Menu	Click Help>**About** to display the Software version of the CatEncoderSetup. Click Help>**Help** to display the Help file.

Columns

Serial number	As manufactured.
Format	The format of the video (E.G. PAL, NTSC).
IP	IP Address. This can be individually changed, or you can simultaneously change multiple encoder IP addresses.
Gateway	The software automatically identifies the gateway for this local physical network.
Subnet	The software automatically identifies the subnet mask/s used.
MAC	The encoder's MAC address.

|	
	Note: if this is invalid, you will see a "**MAC invalid**" alarm under the Alarm column. When booting an encoder in its factory default, you will see this alarm, but can ignore it.
Firmware	Here you will either see the firmware version (for the SAM3) units, or the firmware code (for older units).
Temperature	Current temperature of the encoder.
Task	The current task being performed by the encoder. e.g. "Setting IP", "Upgrading firmware".
Messages	Further information relating to the task. e.g. "45% complete", "connected", "failed".
Alarm	Indicator (in red text) of technical dysfunction. e.g. Missing, Lost, MAC invalid, Could not connect, Could not open upgrade file, Unit already connected to [IP address]. **MAC invalid**: When booting an encoder in its factory default, you will see this alarm. This is standard, and should be ignored. Once you have reprogrammed the encoder (updated firmware) in default, and then restarted normally, the message will disappear.

File Menu and Right Click Options.

Right-click menu	
Set IP	See **Set Encoder IP Address/s with the CatEncoderSetup utility** ([below](#)).
Upgrade firmware	***IMPORTANT:*** Please contact support for the upgrading of this device's firmware.
Refresh	Pings the listed encoders and updates the information. **Enable timeout** Tick this to enable a random timeout of up to 10 seconds for spreading encoder ping responses (to avoid all encoders responding simultaneously to ping queries, this enables them to randomly respond to a ping query within a 10s period). **Enable unicast** This enables the encoder to respond to the unicast address from where the initial broadcast originated. **Max timeout (s)** Specifies the period within which successive pings (refresh queries) should occur.

b. Set Encoder IP Address/s with the CatEncoderSetup utility

**Note**: The utility will only pick up encoders that are on the same network as the computer that is running the utility.

Set a single CatEncoder IP address

1. Ensure that the Task column does not show "Program" (indicating a firmware upgrade in progress).
   Note: If you attempt to change IP Address during a firmware upgrade; 1) the IP address will change, 2) the connection will drop, 3) the firmware update process will be interrupted, and will have to be re-started, and 4) if you power off at this point, the encoder will lose its configuration and have to be factory defaulted, and then re-programmed (firmware-updated).
2. Click to select the CatEncoder, then right-click it (or click the **File** menu), and select "Set IP", and select "Set Unit IP", to display the "Single IP" window:
3. Change the "Unit IP" to the new IP address.
4. If necessary, also modify the "Subnet" and "Gateway" fields.
5. Click "OK".
6. The list refreshes itself approximately every 2 seconds – once refreshed, check that the encoder is now displaying the new details.
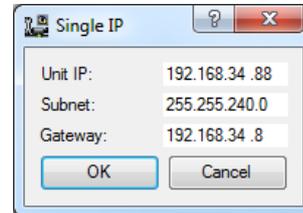
Set multiple IP Addresses simultaneously

1. Ensure that the Task column does not show "Program" (indicating a firmware upgrade in progress) against any of these CatEncoders.

   Note: If you attempt to change IP Address during a firmware upgrade; 1) the IP address will change, 2) the connection will drop, 3) the firmware update process will be interrupted, and will have to be re-started, and 4) if you power off at this point, the encoder will lose its configuration and have to be factory defaulted, and then re-programmed (firmware-updated).
2. Select multiple CatEncoders (use Shift-click or CTRL-click).
3. Right-click, and select "Set Multiple IPs" from the menu, to display the "Multiple IPs" window:
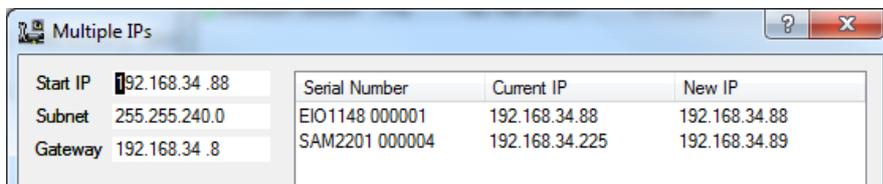
4. Anticipating an automatic series of IP addresses, re-order the listed CatEncoders:
   4.1. Select a CatEncoder.
   4.2. Use the up and down arrows ∧ ∨ to move it to a new position in the list.
   4.3. Repeat this process until you have the CatEncoders listed in the series that you require.
5. Change the "Start IP" to the first IP address of the series that you require. You will immediately see the new list of IP addresses under the "New IP" column, in numerical order.
6. If necessary, also modify the "Subnet" and "Gateway" fields.
7. Check that all is correct and then click "OK".

Troubleshoot IP Address assignment

If the process fails, an error message will inform you to troubleshoot:
1. Right-click the encoder and select **Reboot Unit** to reboot the associated NVR.
2. Attempt the procedure again. If this fails, contact the Support Desk.

3 CathexisVision Setup

To setup an EIO-3148 in the **CathexisVision** software follow these steps.

Note: This unit is designed to work with **CathexisVision 2016** and onwards. On earlier software versions it will function as an EIO-1148, and will be setup as such.

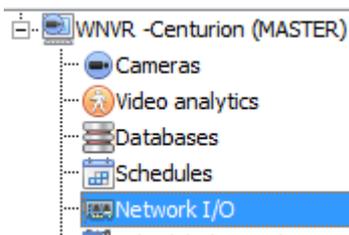## a. Open the Network I/O Setup

- *First Open Your Site*

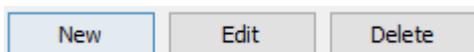**File → Open Site → site_Name**

- *Then Open the Setup Tab for that Site*

Site → Open Tab → Setup

- *Open the Network I/O Setup*

File → Your_Site_Name → Open Tab → Setup → [icon] → Server → Network I/O.

b. Add/Edit an EIO-3148

To Add/Edit an EIO-3128 click on one of the options at the base of the Network I/O panel.

After clicking on New/Edit the setup dialogue will open. There are two tabs, the Settings tab and the I/O tab.

Settings Tab

Select the relevant **Type** from the drop-down menu.

Give the unit a descriptive **name.**

Fill in the **IP address** which was assigned via the Encoder setup utility (see the previous section).

Fill in the **login** details. (default username = admin, default password = admin).

I/O Tab

The I/O tab is where the user may define certain aspects of the Inputs and Outputs.

Inputs
The inputs may be **enabled/disabled**, as well as **named**.

Outputs
The outputs may be **enabled/disabled**, and **named**.

The user may also **control** an output from this panel with the following options:

The user may also set the output's **pulse duration**.