VSI Device Manager
User Guide

Document Revision 1.4
(Updated June 16, 2021)

Contents

<u>License Agreement</u>

Before using any Vital System, Motion Controller and accompanying software tools, please take a moment to go thru this License agreement. Any use of this hardware and software indicate your acceptance to this agreement.

It is the nature of all machine tools that they are dangerous devices. In order to be permitted to use any Vital System Motion Controller on any machine you must agree to the following license:

I agree that no-one other than the owner of this machine, will, under any circumstances be responsible, for the operation, safety, and use of this machine. I agree there is no situation under which I would consider Vital Systems, or any of its distributors to be responsible for any losses, damages, or other misfortunes suffered through the use of any Vital System Motion Controller and its software. I understand that Vital System Motion Controllers are very complex, and though the engineers make every effort to achieve a bug free environment, that I will hold no-one other than myself responsible for mistakes, errors, material loss, personal damages, secondary damages, faults or errors of any kind, caused by any circumstance, any bugs, or any undesired response by the board and its software while running my machine or device.

I fully accept all responsibility for the operation of this machine while under the control of a Vital System Motion Controller, and for its operation by others who may use the machine. It is my responsibility to warn any others who may operate any device under the control of a Vital System Motion Controller of the limitations so imposed.

I fully accept the above statements, and I will comply at all times with standard operating procedures and safety requirements pertinent to my area or country, and will endeavor to ensure the safety of all operators, as well as anyone near or in the area of my machine.

> **WARNING:** Machines in motion can be extremely dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the system. VITAL Systems shall not be liable or responsible for any incidental or consequential damages. By using the HICON motion controller, you agree to the license agreement.

Introduction

The VSI Device Manager application for VSI Motion Controllers, is mainly used to re-program (Flash) the board software (Firmware), re-program the FPGA, optionally set the device IP, configure firmware parameters, and to enable standalone mode if necessary.

Supported Devices:
- (pn7752) HiCON OEM
- (pn7866) HiCON Integra
- (pn7763) DSPMCv3
- (pn77E4) HiCON Mini
- (pnEC01) Ethercat Motion Controller
- (pn9732) ASI PLC for Conveyor Systems

The latest Firmware and FPGA files are available from their corresponding product webpages on the Vital System Inc. website. Files are downloaded in compressed zip format packages, so unzipping the required files is necessary before programming.

The application can be downloaded from here.

> **NOTE:** Before programming the Firmware, close all programs (e.g., Mach4, or any custom software application) that are communicating with your VSI Motion Controller. This includes programs running on other computers that are connected to the VSI Motion Controller over Ethernet (Local Area Network).
>
> **Also make sure that the Drives are powered down.**

Scanning VSI Devices

1. Open the "VSI Device Manager application. The following window appears:
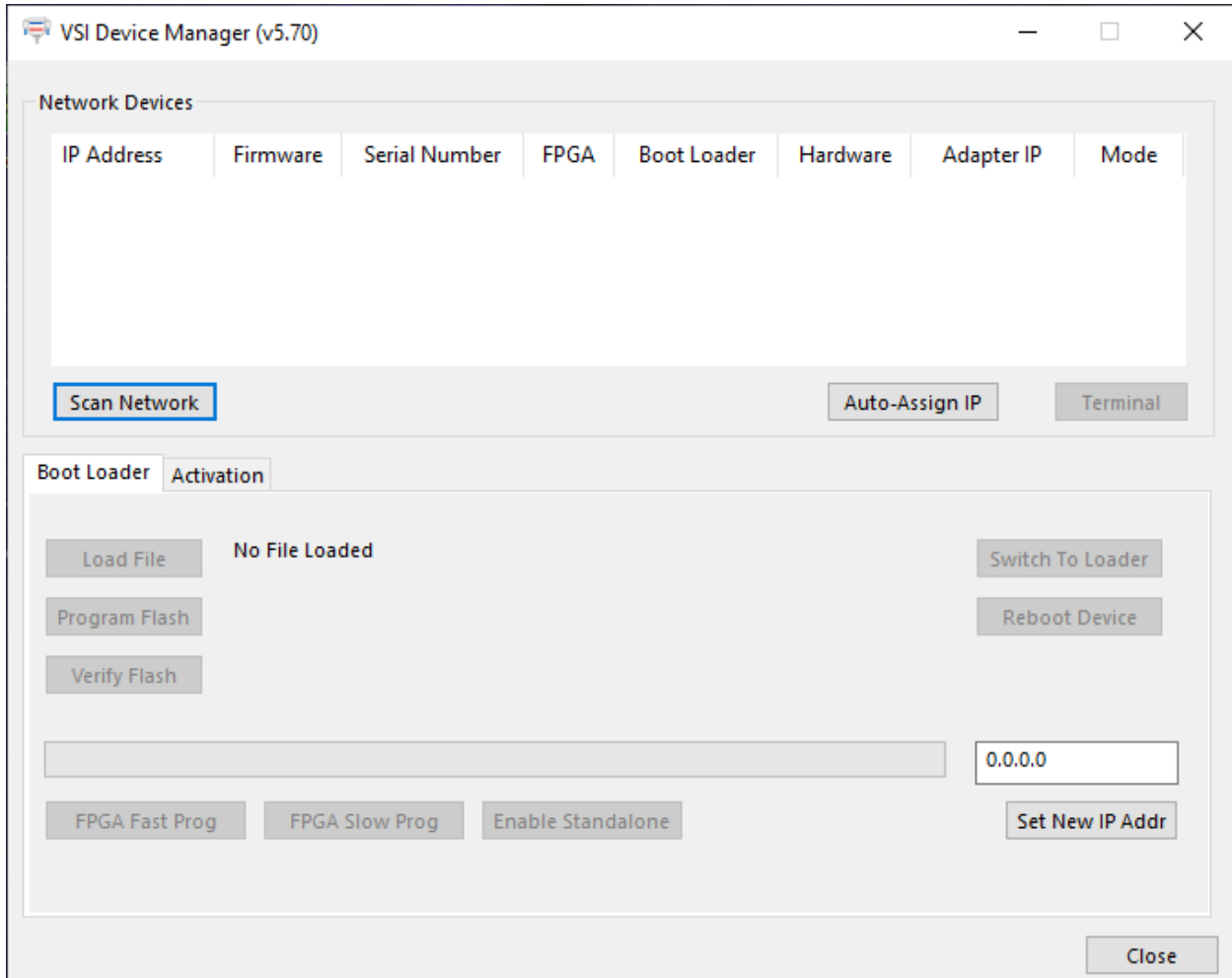
> **NOTE:** *The desired VSI Motion Controller can be identified by the **part number** listed in the "**Hardware**" field.*
> - *(7752) HiCON OEM*
> - *(7866) HiCON Integra*
> - *(7763) DSPMCv3*
> - *(77E4) HiCON Mini*
> - *(EC01) Ethercat Motion Controller*
> - *(9732) ASI PLC for Conveyor Systems*

2. Click on the "Scan Network" button to setup the connection. All VSI Motion Controllers (HiCON's or DSPMC's) on the network will be detected and listed.
3. The state of the device are color coded. Green – Firmware Mode and Red – Bootloader.
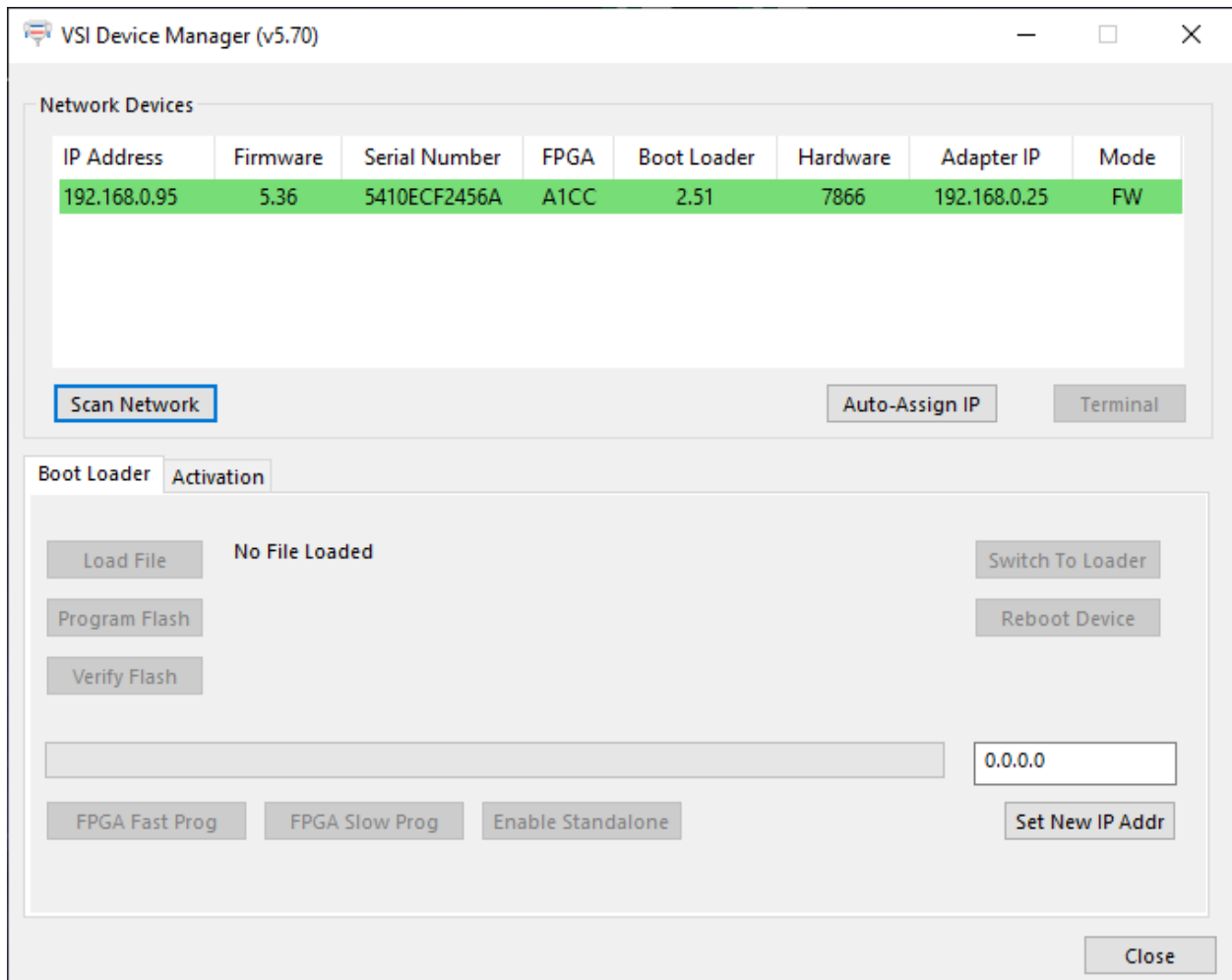
NOTE:

- If the device cannot be found, please refer to "**Network Connection Setup**" section in the device's user manual to setup network communication with the device. You can also click on **Auto-Assign IP.** If the device is connected directly then you need to change the adapter IP in windows network settings first.

- On some machines, it may be required to run the VSI Device Manager Application with administrator privileges (issues with scanning and the GUI not working correctly).

- In rare cases, the windows firewall / Antivirus firewall may also need to be disabled as it can interrupt network communication with the device.

How to Change the Default IP Address

The following steps apply to these devices:
- (pn7752) HiCON OEM
- (pn7866) HiCON Integra
- (pn7763) DSPMCv3
- (pn77E4) HiCON Mini
- (pnEC01) Ethercat Motion Controller
- (pn9732) ASI PLC for Conveyor Systems

> **NOTE:** *The following procedure may be unnecessary if the VSI Motion Device can already communicate with the VSI Device Manager application, and other software applications such as Mach4.*

1. Follow the steps for Scanning VSI Motion Devices.

2. Select the motion controller, from the entry list, whose IP address will be changed.

3. Type in the desired IP Address in the lower right and click "**Set New IP Addr**".

> **NOTE:** ***DO NOT use the network adapter IP Address***, *otherwise connection issues due to conflicting IP addresses on the network will occur.*
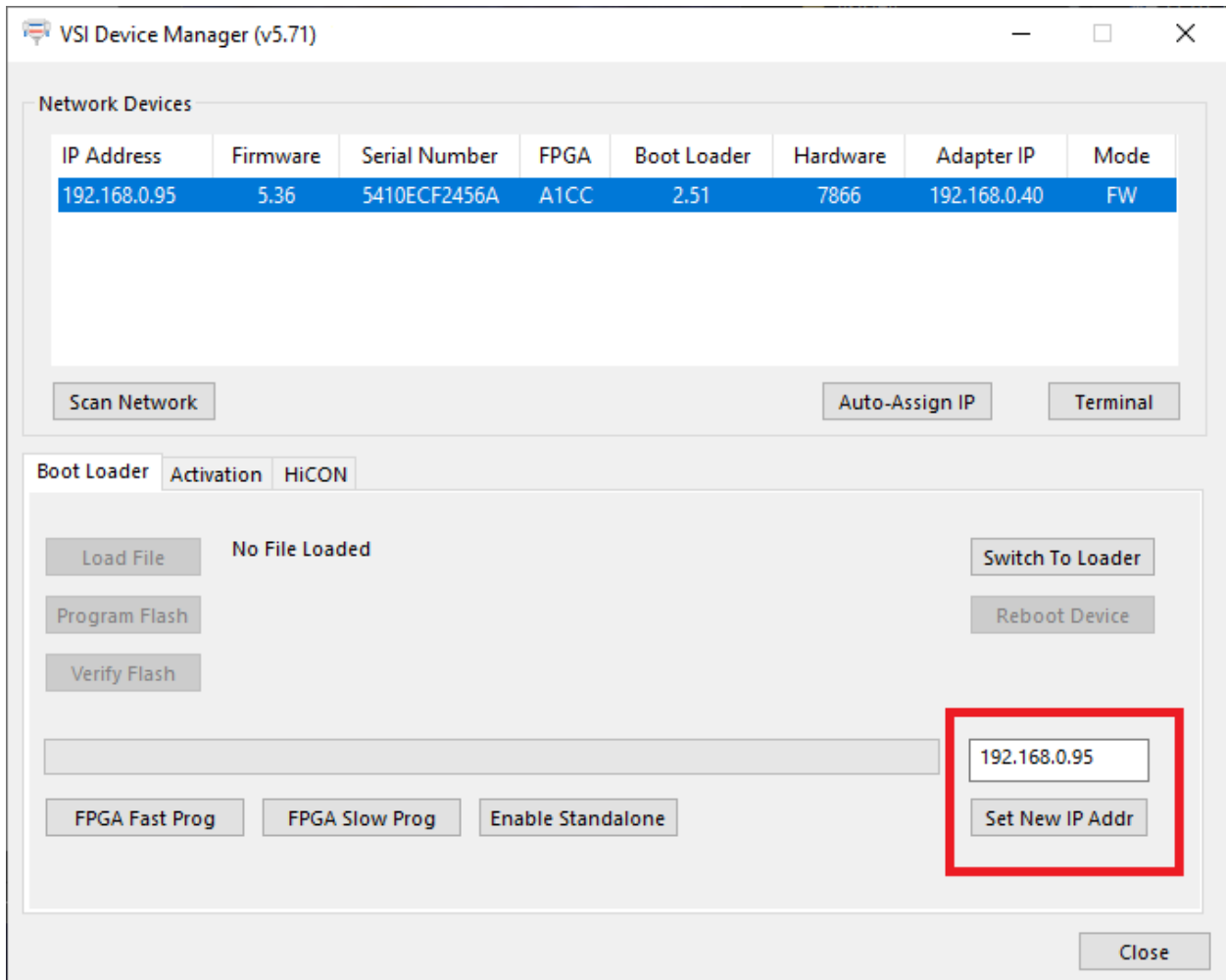
4. The new address will be saved on the VSI Device and will take effect after the power is cycled on the unit.

WARNING: If no VSI Motion Controller is selected from the list, then the new IP Address will be assigned (via UDP Broadcast) to all VSI Motion Controllers (HiCONs or DSPMCs) on the network. In this case, it is advised to have only one VSI Motion Controller on the network. This action is only recommended if the VSI Motion Controller has an unknown IP Address that is on a different network from the PC.
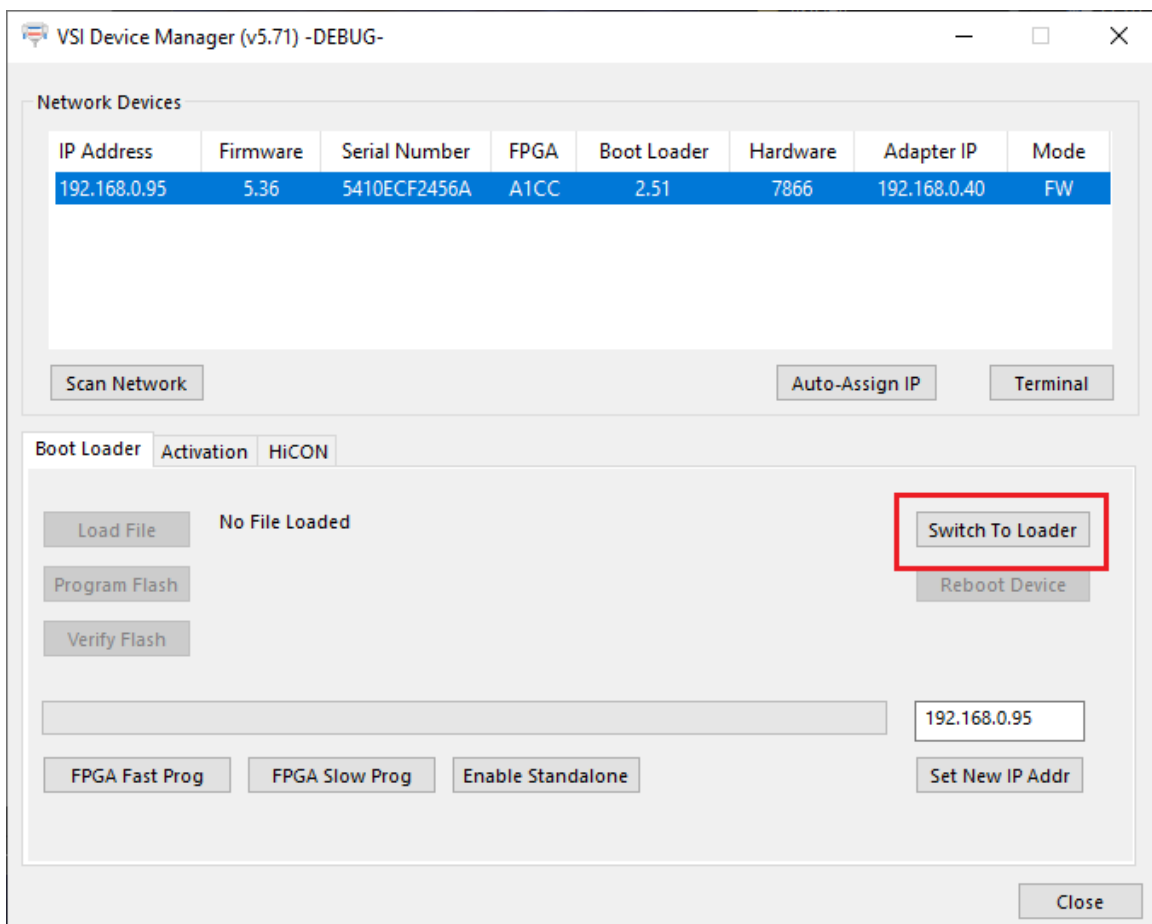
How to Program the FPGA

The following steps apply to these devices
- (7752) HiCON OEM
- (7866) HiCON Integra
- (7763) DSPMCv3
- (77E4) HiCON Mini
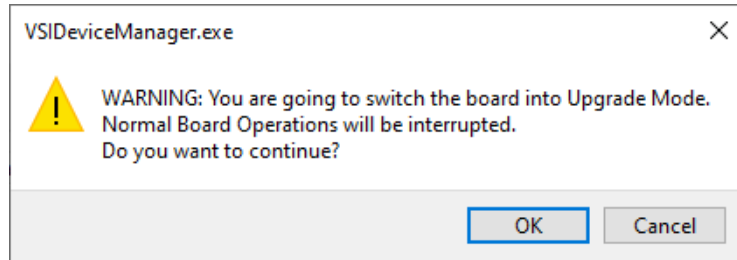- (EC01) Ethercat Motion Controller

CAUTION: *Please follow these instructions carefully if upgrading the FPGA. A missed or wrong action could, in some rare cases, brick your unit.*

Bricked units will have to be shipped back to Vital Systems Inc. for reprogramming and testing.

1. Follow the steps for Scanning VSI Motion Devices

2. Select a HiCON from the listed entries to choose which HiCON to program and click on the "**Switch to Loader**" button to put the HiCON into "**Bootloader mode**".
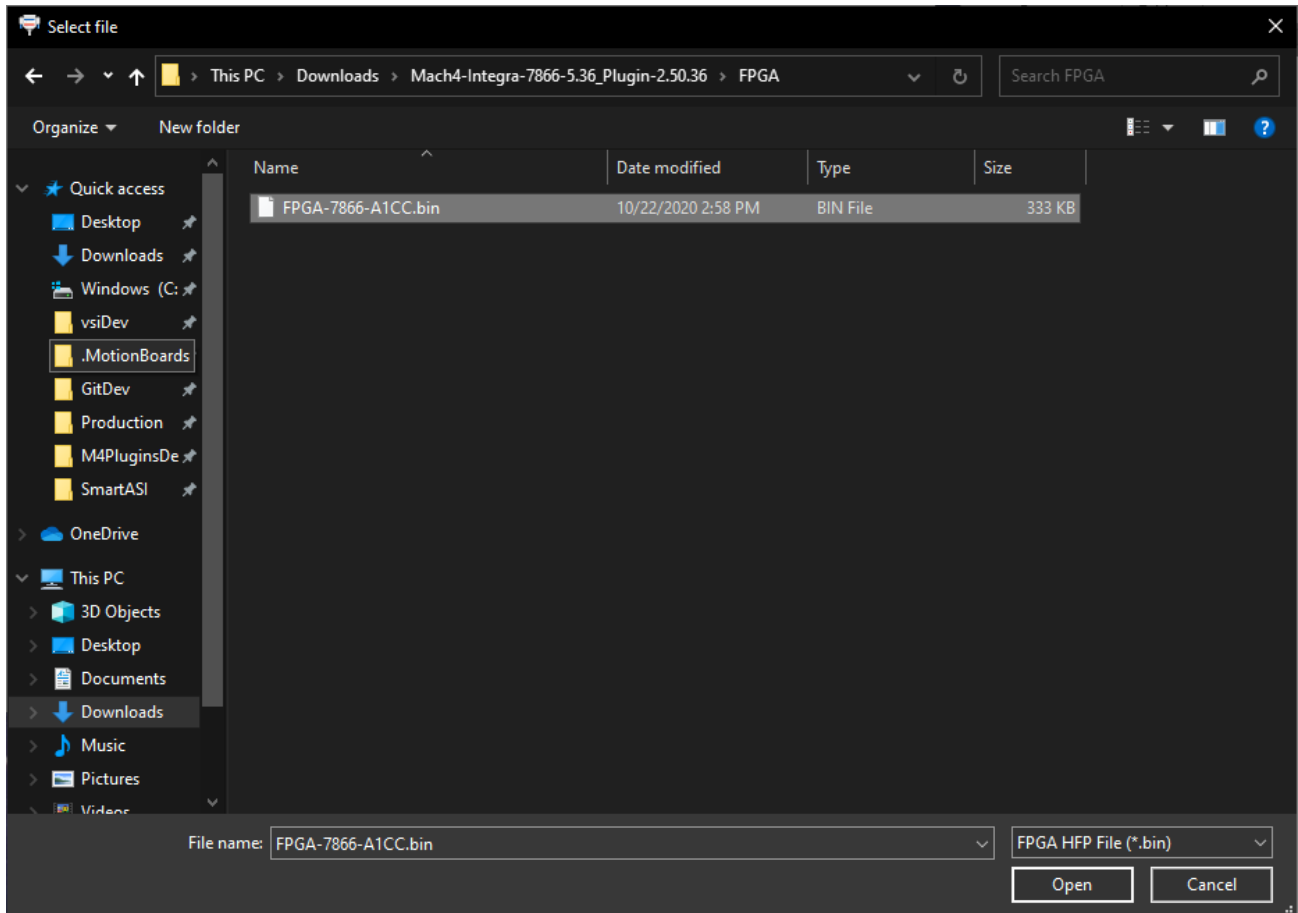
When in bootloader mode, all software applications communicating with the HiCON will be interrupted and normal operations will be suspended. Only in this state can the HiCON firmware and FPGA can be upgraded.

VSIDeviceManager.exe ✕

⚠ WARNING: You are going to switch the board into Upgrade Mode.
Normal Board Operations will be interrupted.
Do you want to continue?

OK   Cancel

NOTE: *The HiCON "CPU" LED should be blinking rapidly to indicate that it is in Bootloader mode. The Device will also show up in Red on the device manager.*

3. Select the device to work with from the listed entries. Afterward, click on the "**FPGA Fast Prog**" button and select the FPGA file. (FPGA file is located in FPGA folder of the zip file).
Note: If the device is 7766 click on Slow Prog.

Select file ✕

← → ˅ ↑ > This PC > Downloads > Mach4-Integra-7866-5.36_Plugin-2.50.36 > FPGA   ˅ ↻   Search FPGA   🔎

Organize ▾   New folder   🔳 ▾   ▥   ❓

Name ^	Date modified	Type	Size
📄 FPGA-7866-A1CC.bin	10/22/2020 2:58 PM	BIN File	333 KB

✓ ⭐ Quick access
  🖥 Desktop 📌
  ⬇ Downloads 📌
  🖳 Windows (C: 📌
  📁 vsiDev 📌
  📁 .MotionBoards
  📁 GitDev 📌
  📁 Production 📌
  📁 M4PluginsDe 📌
  📁 SmartASI 📌
> ☁ OneDrive
✓ 🖥 This PC
  > 📦 3D Objects
  > 🖥 Desktop
  > 📄 Documents
  > ⬇ Downloads
  > 🎵 Music
  > 🖼 Pictures
  > 🎞 Videos

File name: FPGA-7866-A1CC.bin   ˅   FPGA HFP File (*.bin)   ˅

Open   Cancel

Ensure that the board power supply does not get interrupted during this process. Click on the OK button to start. If you are not sure, click CANCEL and provide a stable power supply before attempting the programming process.

4. The FPGA programming process may take around 3- 5 minutes. The program and the device may be unresponsive during this process please wait for the process to finish
(The CPU LED should be in slow blink indicating that it is currently in normal operation mode).

NOTE: *Should any programming error occur during the programming process,* **DO NOT reboot the unit or cycle the power**. *Reattempt the programming process instead and contact your vendor if repeated attempts still produce errors.*
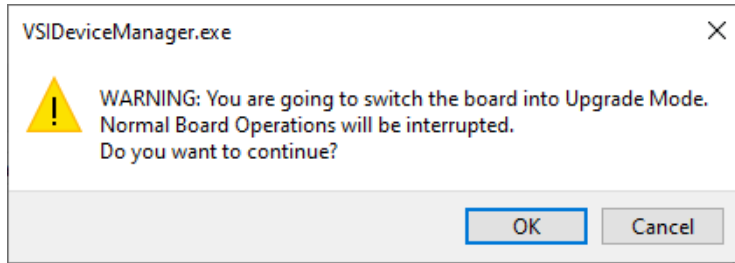
How to Upgrade the Firmware

The following steps apply to these devices
- (7752) HiCON OEM
- (7866) HiCON Integra
- (7763) DSPMCv3
- (77E4) HiCON Mini
- (EC01) Ethercat Motion Controller
- (pn9732) ASI PLC for Conveyor Systems

1. Follow the steps for Scanning VSI Motion Devices.

2. Select a HiCON from the listed entries to choose which HiCON to program and click on the "**Switch to Loader**" button to put the HiCON into "**Bootloader mode"**.
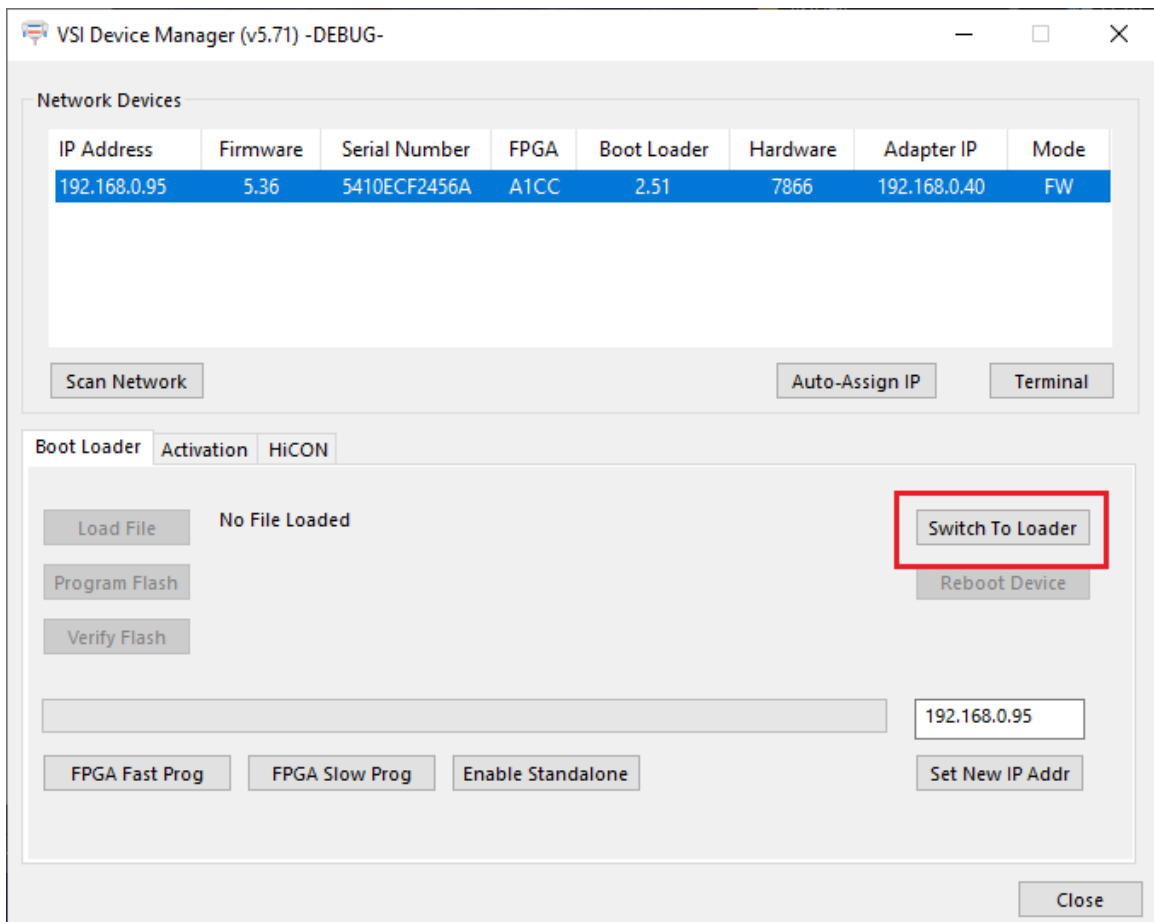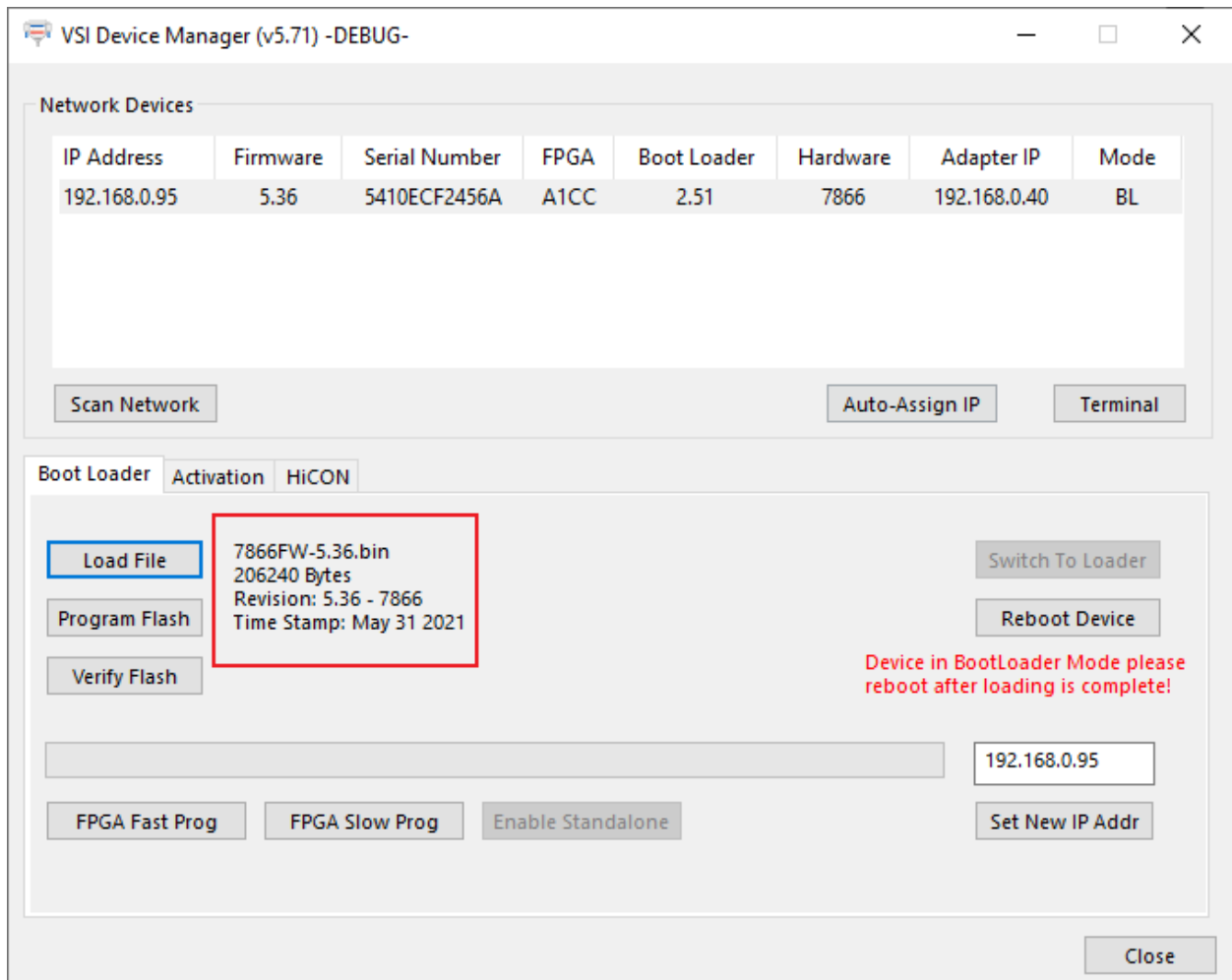

When in bootloader mode, all software applications communicating with the HiCON will be interrupted and normal operations will be suspended. Only in this state can the HiCON firmware and FPGA can be upgraded.

3. Click on the "Load File" button and select the firmware version (.bin file) you wish to download to the VSI device.


The version number and time-stamp of the firmware file you opened is shown on the main window. Please make sure this is the correct version you intend to flash.

4. Click on the **Program Flash** Button. Ensure that the board power supply does not get interrupted during this process. Click on the OK button to start. If you are not sure, click CANCEL and provide a stable power supply before attempting the programming process.

VSIDeviceManager.exe ✕

⚠ WARNING:
Make Sure Power is not interrupted during programming.
Do you want to continue?

OK   Cancel
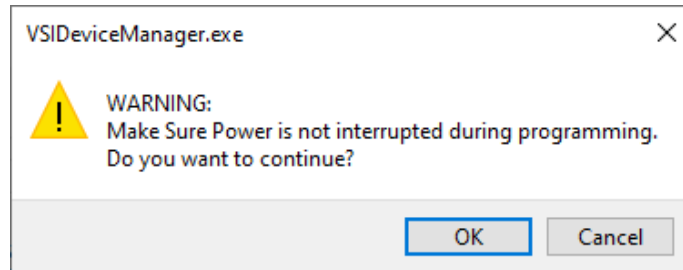
Upon clicking OK, the programming process will start. The progress bar will show the programming progress. After programming, the software will perform a verification to check if the programming is successful. A 'SUCCESS' message is displayed if firmware programming and verification is successful as shown below.

VSIDeviceManager.exe ✕

ⓘ SUCCESS: Firmware Programming Complete

OK
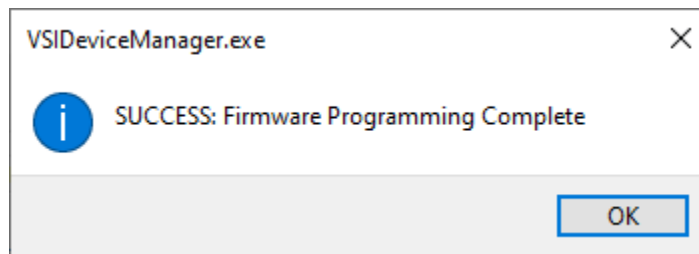
The VSI device must be rebooted after a successful programming to apply the new changes.

VSIDeviceManager.exe ✕

⚠ Reboot now to launch the new firmware?

OK   Cancel
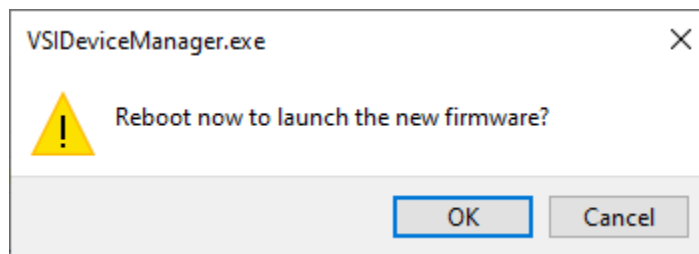
NOTE: *The "CPU" LED should be blinking in a **heartbeat** manner to indicate that it has resumed normal operation.*
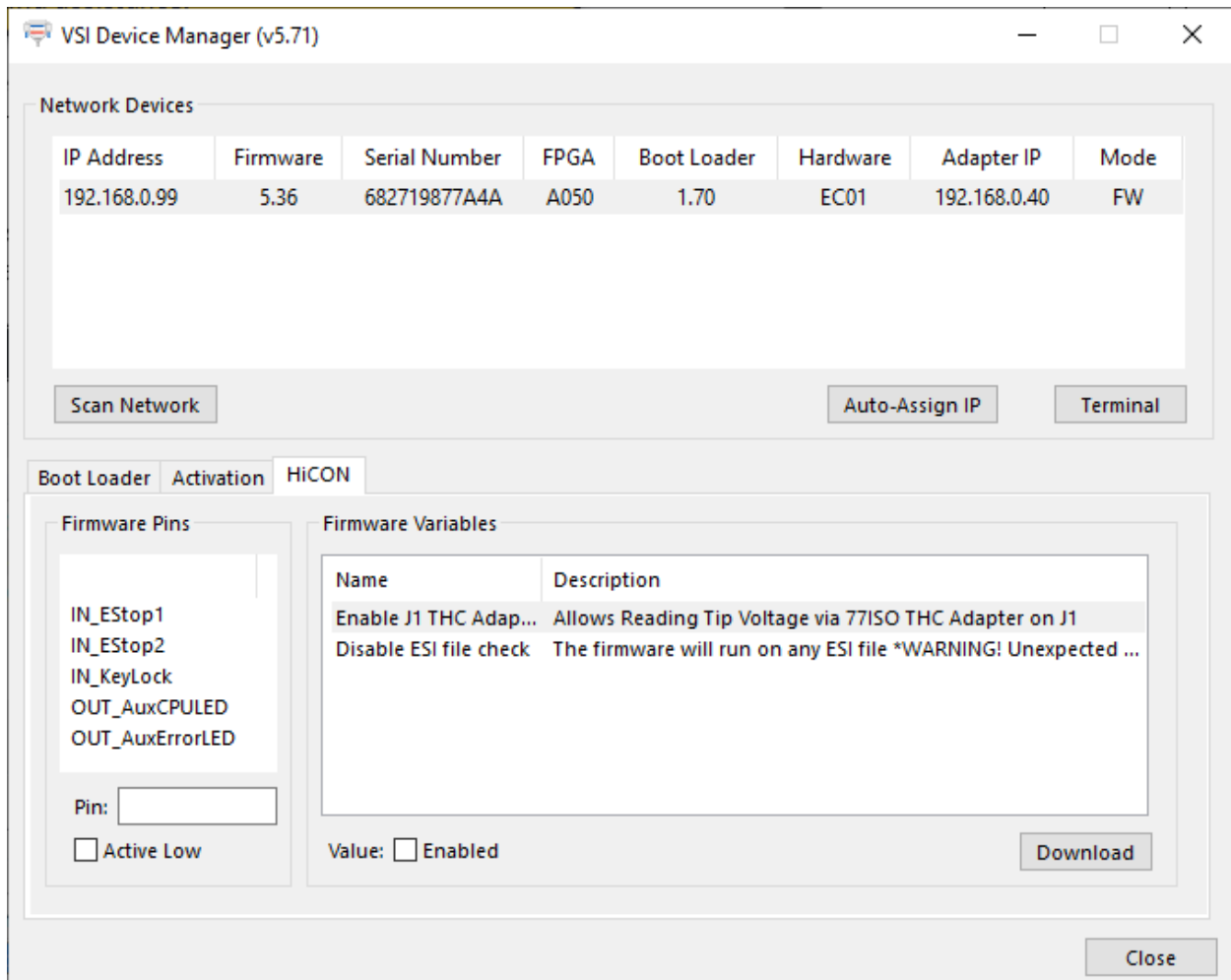
How Configure HiCON Firmware Parameters

The following steps apply to these devices:
- (7752) HiCON OEM
- (7866) HiCON Integra
- (7763) DSPMCv3
- (77E4) HiCON Mini

> **NOTE:** *These settings are configured in-factory based on order specifications, and as such are not required to be configured. If configuring these parameters becomes absolutely necessary, please contact your vendor or Vital System Inc. for questions and assistance.*

Firmware parameters are settings that are configured directly on the HiCON firmware. These settings affect the device's behavior, particularly behavior on a hardware basis (e.g., pin layout changes, hard-mapped input signals, etc.).

These changes can be accessed on the **HiCON** Tab as shown below. Clicking the **Download** button applies the changes to the firmware, otherwise the changes are not saved.

VSI Device Manager (v5.71)

Network Devices

IP Address	Firmware	Serial Number	FPGA	Boot Loader	Hardware	Adapter IP	Mode
192.168.0.99	5.36	682719877A4A	A050	1.70	EC01	192.168.0.40	FW

Scan Network   Auto-Assign IP   Terminal

Boot Loader | Activation | HiCON

Firmware Pins

IN_EStop1
IN_EStop2
IN_KeyLock
OUT_AuxCPULED
OUT_AuxErrorLED

Pin: [   ]
☐ Active Low

Firmware Variables

Name	Description
Enable J1 THC Adap...	Allows Reading Tip Voltage via 77ISO THC Adapter on J1
Disable ESI file check	The firmware will run on any ESI file *WARNING! Unexpected ...

Value: ☐ Enabled   Download

Close

Firmware Pins

Firmware pins are digital I/O pins which are hardware-mapped to perform a specific function regardless of what software configuration is present (such as Mach3 or Mach4 I/O mapping).

Value	Description
-1	Disable the setting
0 - 63	Digital I/O pin the setting is mapped to <table><tr><th>Port</th><th>Input pins</th><th>Output pins</th></tr><tr><td>P11</td><td>0 – 15</td><td>0 – 7</td></tr><tr><td>P12</td><td>16 – 31</td><td>8 – 15</td></tr><tr><td>P13</td><td>32 – 47</td><td>16 – 23</td></tr><tr><td>P14</td><td>48 – 63</td><td>24 – 31</td></tr></table> **Example**: To hard-map relay output 5 (**P14, pin 7)** as the **Auxilliary Error LED Output**, a value of 31 will be assigned.

The pins can also be configured as active-high or active-low as necessary.

Estop Inputs
These settings allow Digital Input pins to be hard-mapped in the firmware as E-Stop signals. If an input pin is assigned to this setting, activating the input will automatically place the controller into an Estop state on the hardware level.

Keylock Input
This setting hard-maps a digital input pin to act as a key lock trigger which prevents the system from arming, unless the signal is currently active.

Auxiliary CPU LED Output
This setting hard-maps a digital output pin to mirror the state of the CPU LED. This is useful for display purposes such as showing the CPU LED state without having to open the controls cabinet.

Auxiliary Error LED Output
This setting hard-maps a digital output pin to mirror the state of the ERROR LED. This is useful for display purposes, as well as more functional ones such as triggering an action when an Error is incurred (such as an Estop).

Firmware Variables

The listed features are not available on all models

Enable J7 Step/Dir Channels
This setting controls the pin layout of port J7 on the HiCON Integra. For more information see the pin layout for J7 in the pn7766 User Guide

Value	Description
Enabled	Used when connecting a **7737 Differential Step/Dir and Encoder board**. See J7 pin layout for connecting the 7737 board.
Disabled	Used when connecting a 7535 Digital I/O board. See J7 pin layout for connecting the 7535 board.

Enable J8 Step/Dir Channels
This setting controls the pin layout of port J8 on the HiCON Integra. For more information see the pin layout for J8 in the pn7766 User Guide

Value	Description
Enabled	Used when connecting a **7737 Differential Step/Dir and Encoder board**. See J8 pin layout for connecting the 7737 board.
Disabled	Used when connecting a 7535 Digital I/O board. See J8 pin layout for connecting the 7535 board.

Enable J7 THC Adapter
This setting controls the function of port J7 to use the 77ISO Tip Voltage Adapter.

Value	Description
Enabled	Used when connecting a **77ISO THC Adapter board**.
Disabled	Used when connecting a 7535 Digital I/O board. See J7 pin layout for connecting the 7535 board.

Enable J7 THC Adapter
This setting controls the function of port J7 to use the 77ISO Tip Voltage Adapter on the EC01 EtherCAT motion Controller.

| Value	Description
Enabled	Used when connecting a **77ISO THC Adapter board**.
Disabled	Used when connecting a 7535 Digital I/O board. See J7 pin layout for connecting the 7535 board.

How to Activate a Feature

The following steps apply to these devices:
- (pn7752) HiCON OEM
- (pn7866) HiCON Integra
- (pn7763) DSPMCv3
- (pn77E4) HiCON Mini
- (pnEC01) Ethercat Motion Controller
- (pn9732) ASI PLC for Conveyor Systems

NOTE: *Activating features requires the corresponding Activation Key. To obtain an Activation Key, please contact your vendor, or Vital System Inc.*

In this example, the Extended I/O feature is being activated for the HiCON Integra.
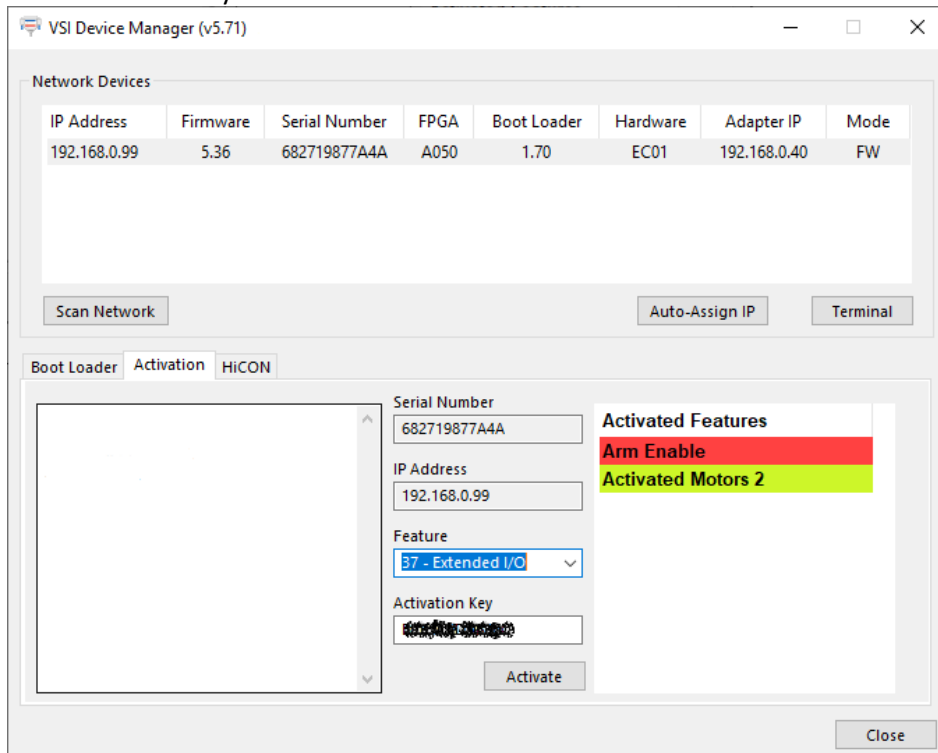
1. Follow the steps for Scanning VSI Motion Devices.

2. Select the desired motion controller, from the entry list (*in this case, HiCON Integra*).

3. Click on the "**Activation**" tab. The currently activated features for the selected device should be displayed on the right-hand view.
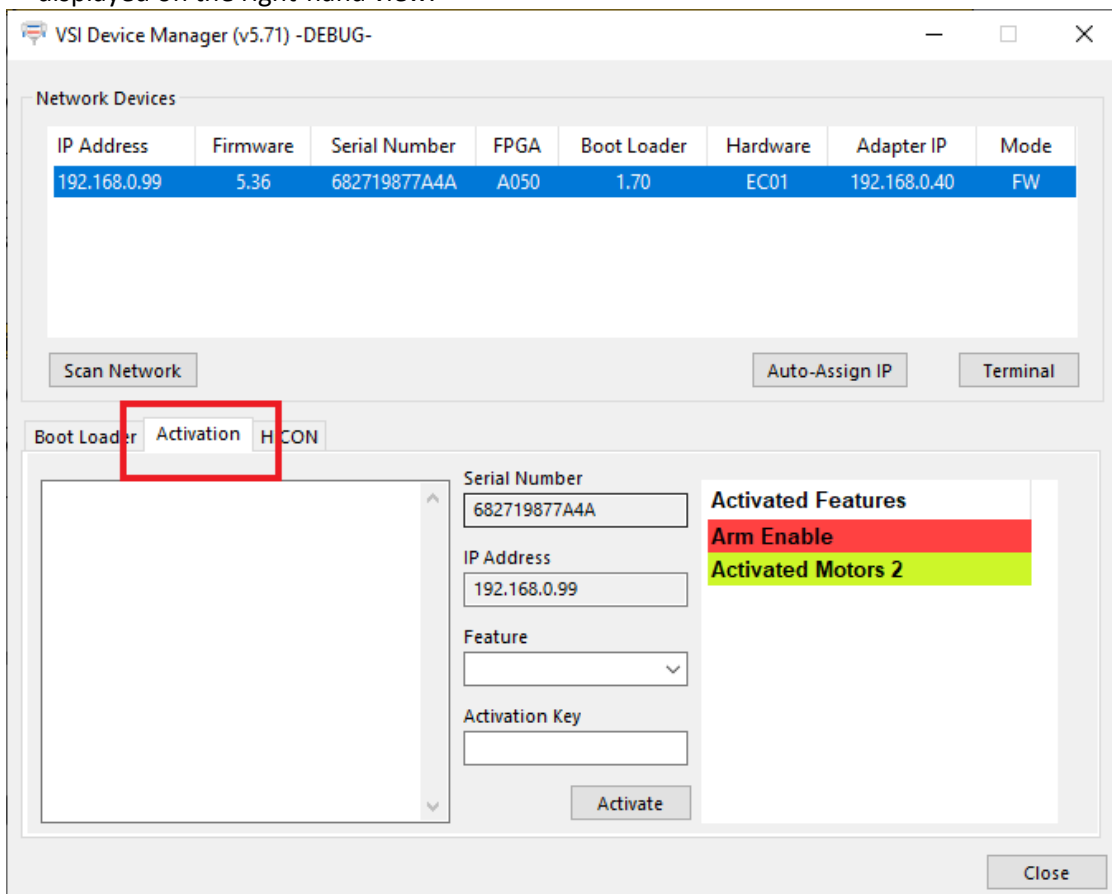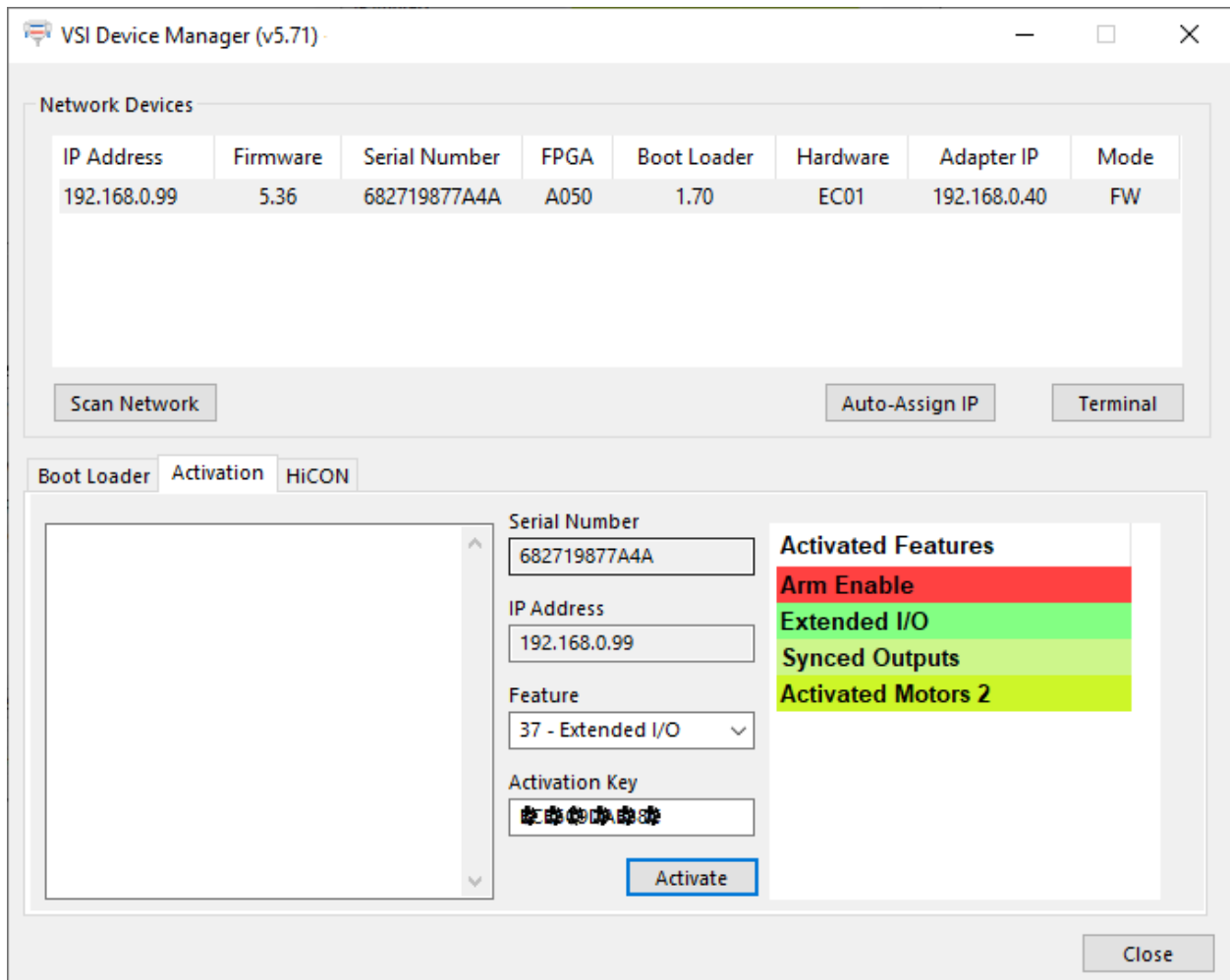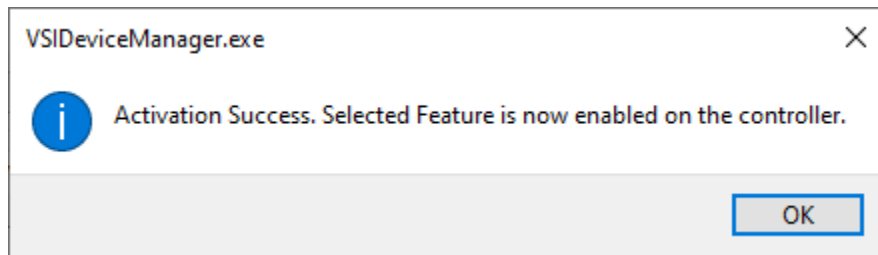
4. Select the feature to activate.
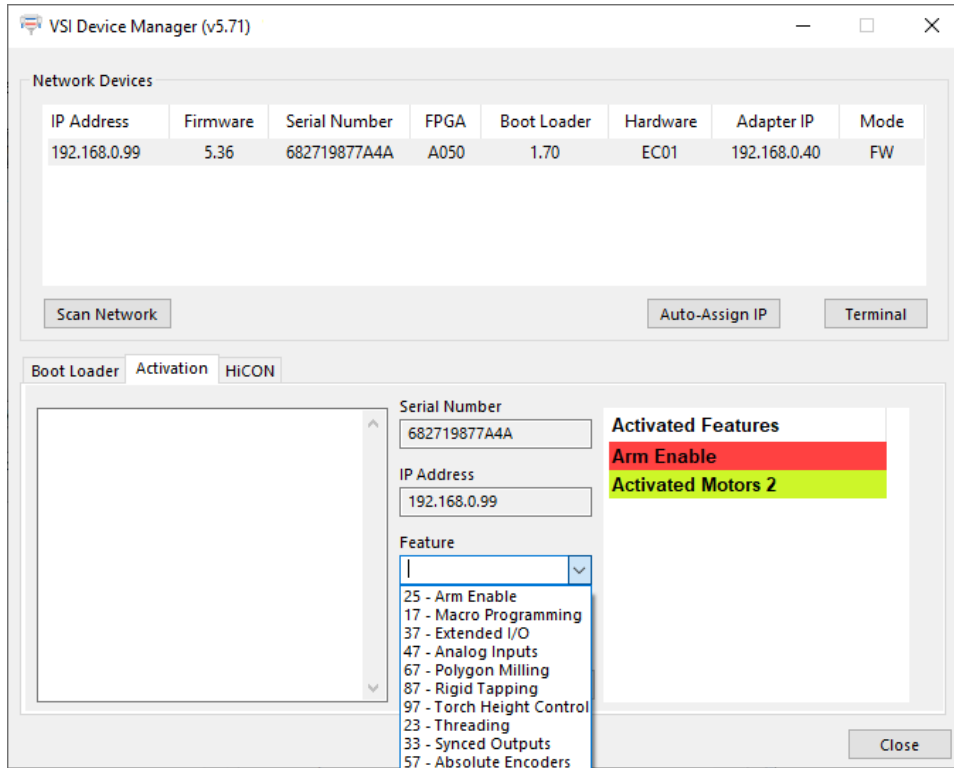
5. Input the activation key and click on the "**Activate**" button.

A message should be displayed if the activation was successful, and the activated feature should now be included in the list of activated features.

How to Enable Standalone Mode

Standalone mode is an optional tool that allows the HiCON to operate without PC control. In this mode, the HiCON will utilize the configuration from Mach3 or Mach4 (saved in flash) and a HiCON Basic or C Macro (programmed on the device) to perform motion and I/O control.

The following steps apply to these devices:
- (pn7752) HiCON OEM
- (pn7766) HiCON Integra (BLUE)
- (pn7866) HiCON Integra
- (pn7763) DSPMCv3

NOTE: *Before beginning Standalone mode, make sure that a HiCON Basic/C Macro is present on the HiCON. For more information on this, see the "HiCON Basic Manual".*

1. Open Mach3 or Mach4 and configure the HiCON via the plugin config (System Config and Axis Config) and the Mach3/Mach4 config window.

2. Arm Mach3 or Mach4 to force the configuration to download. Perform simple test moves such as jogging, or test motion from the plugin config window to verify that the configuration was successfully downloaded.

3. Open the VSI Device Manager application and follow the steps for Scanning VSI Motion Devices.

4. Select the HiCON from the entry list, and click "Enable Standalone" to save the configuration into the flash memory.

5. If the downloaded HiCON Basic Macro had been set to **autorun**, the HiCON should be able to execute the macro on power up.

How to Configure ASI Network Config

ASI boards have additional network configuration that can be set using the device manager.

1. Open the VSI Device Manager application and follow the steps for Scanning VSI Motion Devices

2. Select the ASI device from the list and switch to ASI tab

3. You can now configure the ASI specific settings here.