

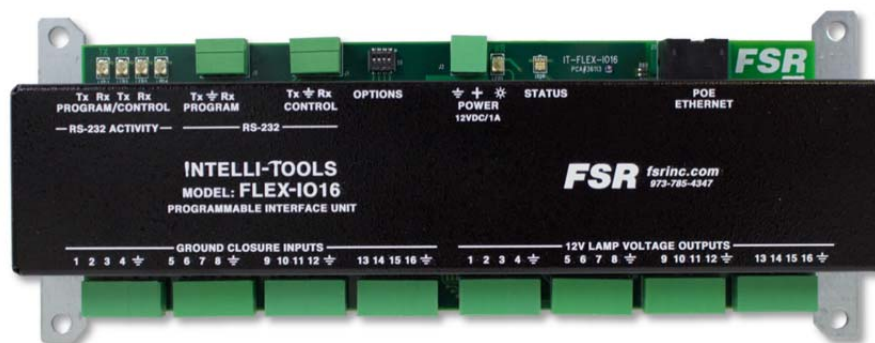


## Flex-IO Builder

# Installation and Operating Guide

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Based on firmware revision 1.22



244 Bergen Blvd. Woodland Park NJ 07424 973-785-4347

## **PROPRIETARY INFORMATION**

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- Specifications may be changed without any notice in order to improve the function of the product.

## LIMITED WARRANTY

The FLEX-IO16 module is warranted against failures due to defective parts or faulty workmanship for a period of three years after delivery to the original owner. During this period, FSR will make any necessary repairs or replace the unit without charge for parts or labor. Shipping charges to the factory or repair station must be prepaid by the owner, return-shipping charges (via UPS Ground) will be paid by FSR.

This warranty applies only to the original owner and is not transferable. In addition, it does not apply to repairs done by other than the FSR factory or Authorized Repair Stations.

This warranty shall be cancelable by FSR at its sole discretion if the unit has been subjected to physical abuse or has been modified in any way without written authorization from FSR. FSR's liability under this warranty is limited to repair or replacement of the defective unit.

FSR will not be responsible for incidental or consequential damages resulting from the use or misuse of its products. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Warranty claims should be accompanied by a copy of the original purchase invoice showing the purchase date (if a Warranty Registration Card was mailed in at the time of purchase, this is not necessary). Before returning any equipment for repair, please read the important information on service below.

### SERVICE

Before returning any equipment for repair, please be sure that it is adequately packed and cushioned against damage in shipment, and that it is insured. We suggest that you save the original packaging and use it to ship the product for servicing. Also, please enclose a note giving your name, address, phone number and a description of the problem.

NOTE: all equipment being returned for repair must have a Return authorization (RMA) Number. To get a RMA Number, please call the FSR Service Department (1-800-332-FSR1). Please display your RMA Number prominently on the front of all packages.

### CONTACT INFORMATION

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## **SURGE PROTECTION DEVICE RECOMMENDED**

This product contains sensitive electrical components that may be damaged by electrical spikes, surges, electric shock, lightning strikes, etc. Use of surge protection systems is highly recommended in order to protect and extend the life of your equipment.

## **SAFETY**

- All the safety and user manual should be read before the appliance is operated.
- The safety and operating instructions should be retained for future reference.
- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Do not use this equipment near wet place.
- This product should be operated only from the type of power sources indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your local power company.
- This equipment may be equipped with a 3 wire grounding-type plug, a plug having a third (grounding) pin. This pin will only fit in to a grounding type power outlet. This is a safety feature. If you are unable to insert the plug in to the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding-type plug.
- Openings on the case are provided for ventilation and to ensure reliable operation of the equipment and to protect it from overheating. The openings should never be blocked.
- Do not use any damaged power cords or plugs, or loosed outlets, this may cause electrical shock or fire.
- Do not put heavy articles such as other equipment on this product. Keep it away from liquid, magnetic and flammable substances.

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## DESCRIPTION

The Flex-IO16 is a fully programmable control system component that provides an interface between virtually any equipment having an RS-232 or Ethernet port and an external control panel with up to 16 switches and lamps. This extremely versatile unit can be used to expand the IO capabilities of the FSR Flex-LT control products or any 3rd party control system. It can also be used to add IP connectivity to equipment that only has an RS- 232 port.

Configuration of the Flex-IO16 is accomplished through the use of the Flex-IO Builder GUI. The Flex-IO builder can create, edit, debug, upload and download projects, and can also be used to verify wiring and control in installed systems. The Flex-IO builder connects to the Flex-IO16 via the second dedicated RS-232 “Program” port, or Ethernet.

Each of the 16 switch inputs can be configured to execute command strings up to 250 characters in length upon the press, hold, or release of the switch, or they can alternate between two different strings when set to alternate action mode. The 16 lamp outputs can be independently configured to turn on, off, blink or toggle state in response any of the switch input events, or they can be remotely commanded via serial or IP. The short circuit

protection and automatic reset feature of the lamp outputs makes the Flex-IO16 very robust and prevents damage due to typical field wiring errors. High output drive capability allows direct control of external 12 volt relays.

The unit can be powered locally with an external IT-PS1 12 volt supply, or remotely via POE from a POE network switch or midspan injector.

More complex control requirements can be satisfied by combining the Flex-IO16 with any of the Flex-LT control products using virtual switch commands to the Flex-LT.

The FLEX-IO16 I/O Expansion Unit can be used with the FSR HuddleVU HV-T6 and HV-T3 Table Box models to convert button presses into serial or IP commands. This allows control of various devices within a FLEX Controlled environment, while also providing LED feedback. When used in conjunction with FSR’s line of T3-MJ Table Mic Boxes, you can easily connect up to 16 boxes and have LED feedback when the mute circuits are activated on a 3rd Party DSP Controller.

## FEATURES

- 16 switch inputs
- Accommodates momentary or maintained N.O.  
or N.C. switches
- 16 Lamp/Relay drive outputs with short circuit  
protection/auto-reset feature
- Power locally or via POE Ethernet
- Configure via Serial or IP
- Full featured GUI supports system configuration & debug
- Independent serial ports for Program and Control
- Indicators for serial/IP activity, power and status
- Fully programmable

## APPLICATIONS

- Add IP capability to legacy RS-232 equipment
- General purpose interface between hardwired  
control panels and AV equipment
- I/O expansion for Flex-LT controllers
- Expansion unit for HuddleVU collaboration system
- Contact closure to RS-232 interface
- Contact closure to IP interface

## INSTALLATION CHECKLIST

The following steps are a loose outline to install the software and connect the Flex-IO hardware:

- 1) Install Flex-IO Builder software.  
This is the GUI program for the Flex-IO 16.
- 2) Install Flex Control Builder software.  
This is required if you want to have access to the Control Libraries for Serial and IP Devices within the Flex-IO Builder.
- 3) Connect Flex-IO 16 via Program Port to PC  
It is recommended that you initially communicate with the Flex-IO through a Serial Cable to its “Program Port”. It is easier to initially connect and configure the device via Serial (rather than IP).

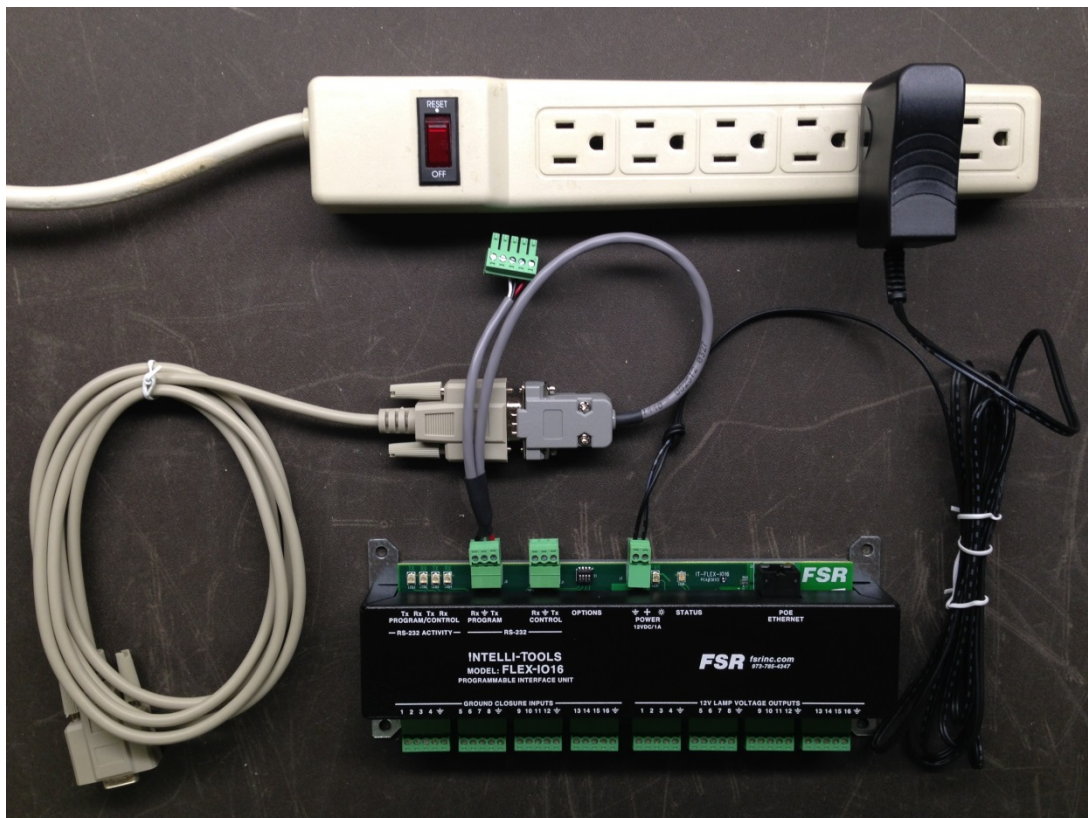


Figure 1 – Example of connecting the Flex-IO 16 to the serial cable and serial cable adapter of the “FLEX-PRGM FLEX PROGRAM KIT”. (Power adapter is also shown.)



If you are trying to connect the Flex-IO via IP first, you will need enough understanding and system privileges on the PC to change the PC's "Local Area Connection" settings to allow the PC to communicate with Flex-IO's factory default IP settings (shown below):

IP address: 192.168.5.80  
Subnet mask: 255.255.255.0  
Gateway: 192.168.5.48

- 4) Verify the Firmware version and possible Upgrade of Firmware
- 5) Program, Download, and Test the various Actions required for the various Flex-IO Channels.  
Sample commands are shown below:  
GPI 1 LOW  
GPO 1 ON  
WAIT 1000  
SER 'passed serial string <0D>'  
IP 200.30.4.5:345 "ACTION = VPRESS DESKTOP 1 BUTTON 1<0D>"  
IP 200.30.4.5:345 "<01 57 7F 03 4D 55 54 30 08 20 09 21 0A 20 10 21 1F 2C 02>"

## SERIAL CONNECTION DETAILS

The Flex-IO Builder program has the serial control settings programmed in to communicate via the “Program Port”.

If you would like to use your choice of terminal software (e.g. HyperTerminal, PuTTY, etc.) to communicate with the Flex-IO hardware directly through the “Program Port”, these are the serial settings:

Baud rate:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Handshake:	None

The serial settings for the “Control Port” are potentially changed on each “Download Project” based on the settings for the “Control Port” in the Project.

If no Project has been downloaded, the default serial settings of the “Control Port” are:

Baud rate:	115200
Data bits:	8
Parity:	None
Stop bits:	1
Handshake:	None

## ETHERNET CONNECTION DETAILS

The Flex-IO Builder program has the Ethernet (or IP) control settings programmed in to communicate via the “Ethernet Port” provided the IO 16’s IP Address is configured.

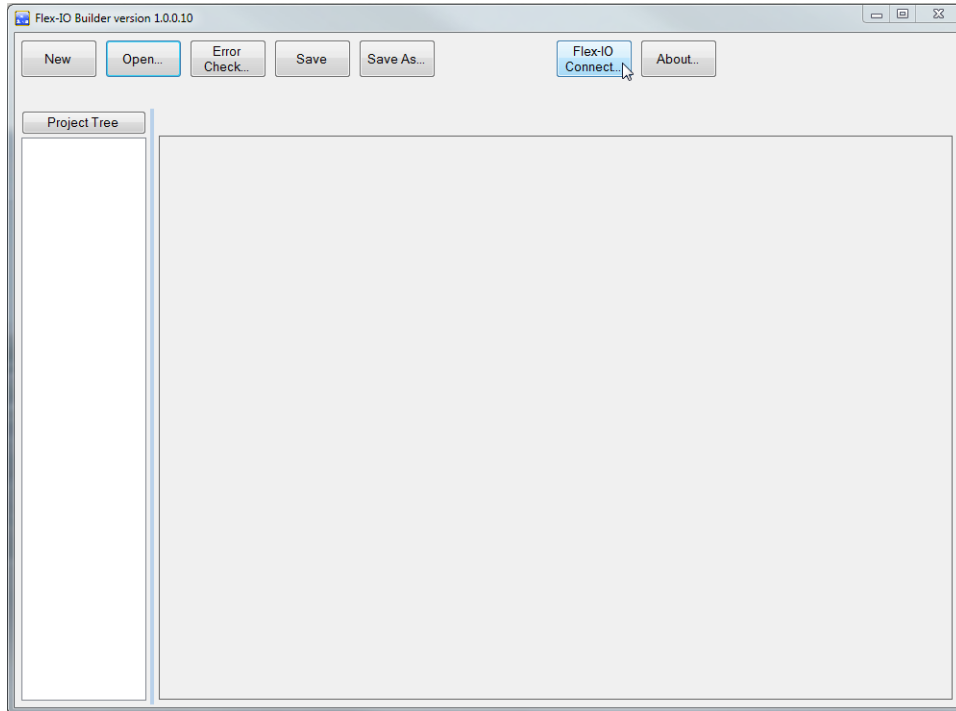
If you would like to use another program (such as TELNET) to communicate with the Flex-IO over Ethernet, use Port 16001 (not 23).

When connecting to the IO16 via IP, the IO16 will terminate the session after *5 seconds* of inactivity. Inactivity is defined as no data of any kind, typically ASCII characters when typing at a telnet terminal. (Each operation performed by the Flex-IO Builder program on the “Connect” dialog opens a connection, sends commands, and closes the connection within 5 seconds.)

## USAGE AND TROUBLE SHOOTING

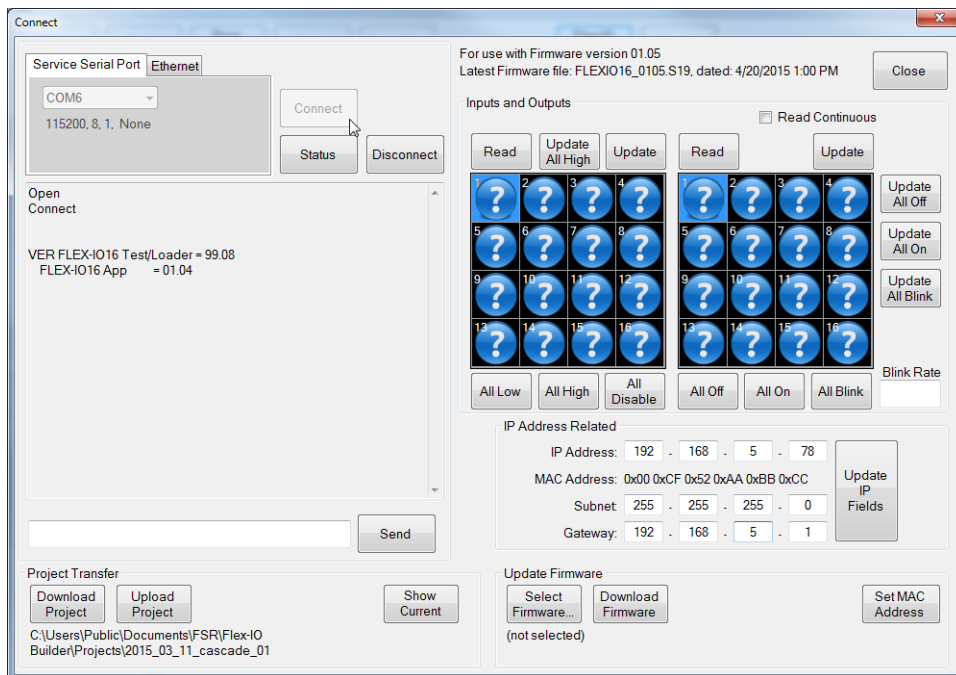
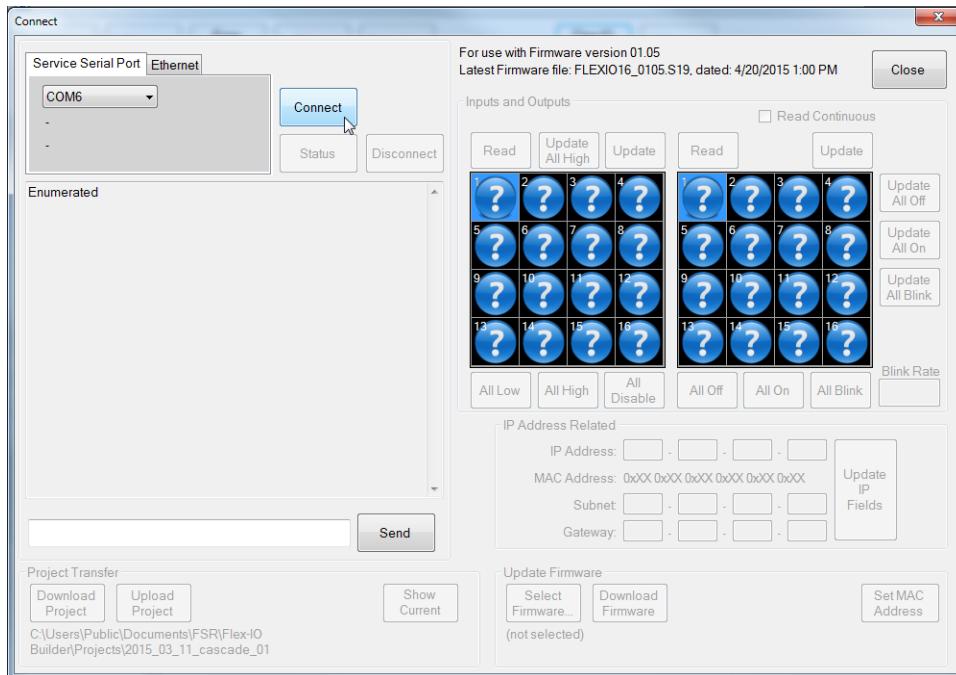
### EXAMPLE OF SUCCESSFUL CONNECTION VIA SERIAL CABLE

Use the “Flex-IO Connect” dialog in the Flex-IO Builder software to verify you can connect to the Flex-IO 16 unit.



Select the Serial port from the drop down control in the “Service Serial Port” tab.  
Click the “Connect” button

The following sample shows connecting by Serial cable:



Note: The existing Serial Ports on the PC are shown in the drop down control. If you have multiple Serial Ports on your PC, you may test each. (The limited number of ports makes it easier to connect to a Flex-IO 16 than using TCP/IP (which requires you to enter the correct IP Address)).

## PING TEST FOR ETHERNET

Connecting the Flex-IO hardware via Ethernet requires knowledge of the network being connected.

Complete details of Ethernet Network Trouble Shooting is beyond the scope of this guide. Setting the IP Address, Subnet, and Gateway for the Flex-IO hardware is easier to do via a Serial connection.

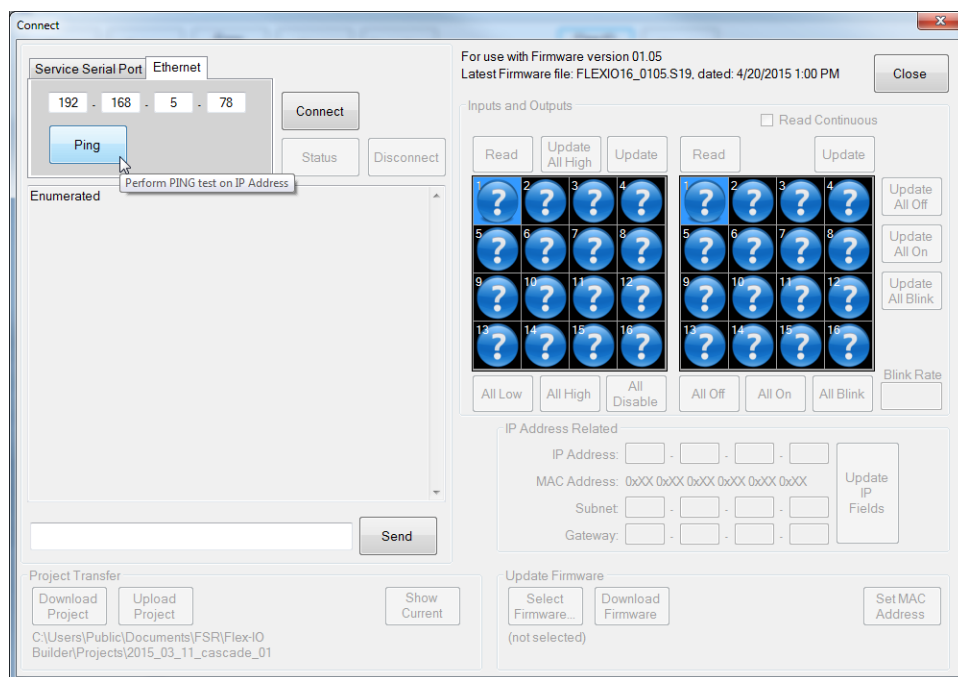
However the Flex-IO Builder does provide a built in Ping Test to assist in determining if the hardware is connected and configured correctly.

To run a Ping Test after the system has been connected and configured, the following must be done in the Flex-IO Builder:

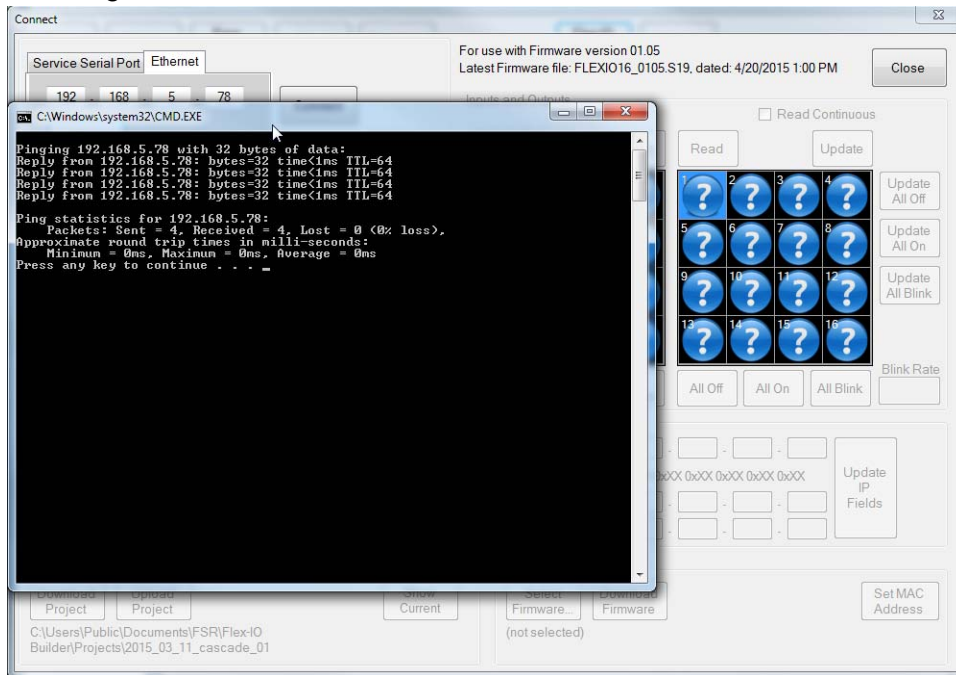
Click the “Ethernet” tab

Enter the IP Address of the Flex-IO unit

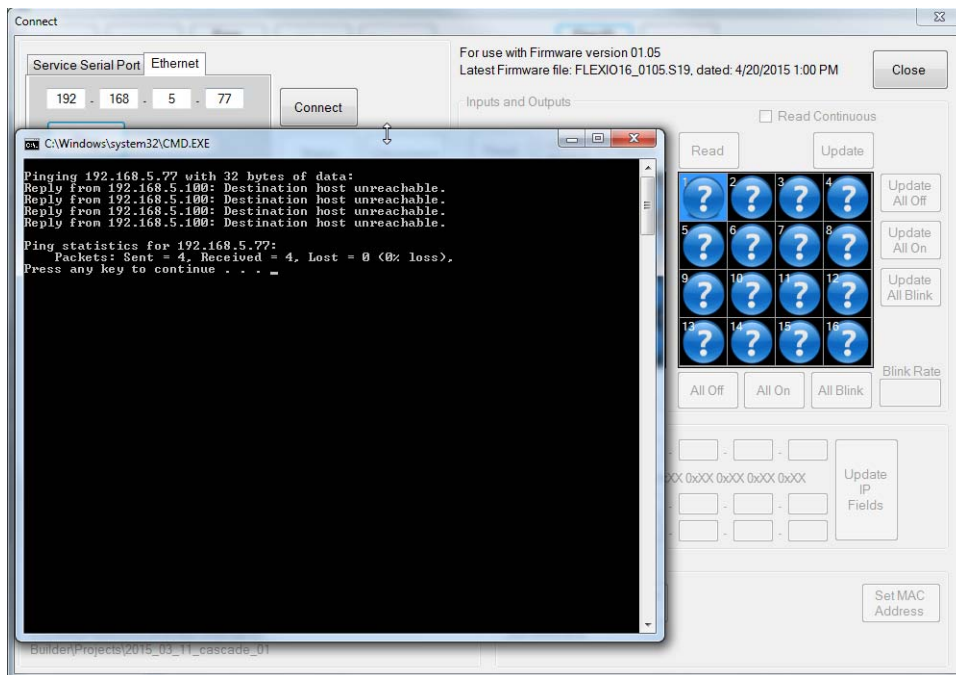
Click the “Ping” button



If the hardware and configuration is correctly configured, you will see results that look like the following



If configured incorrectly, you will see results as shown below:



Note that the difference between these 2 tests was the last number of the IP Address was different by 1.

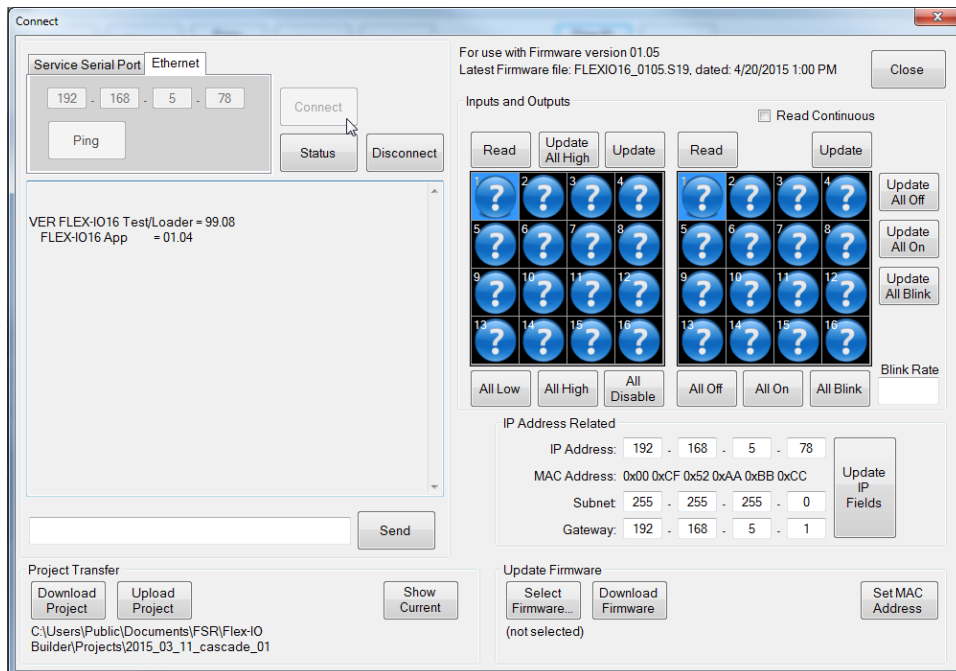
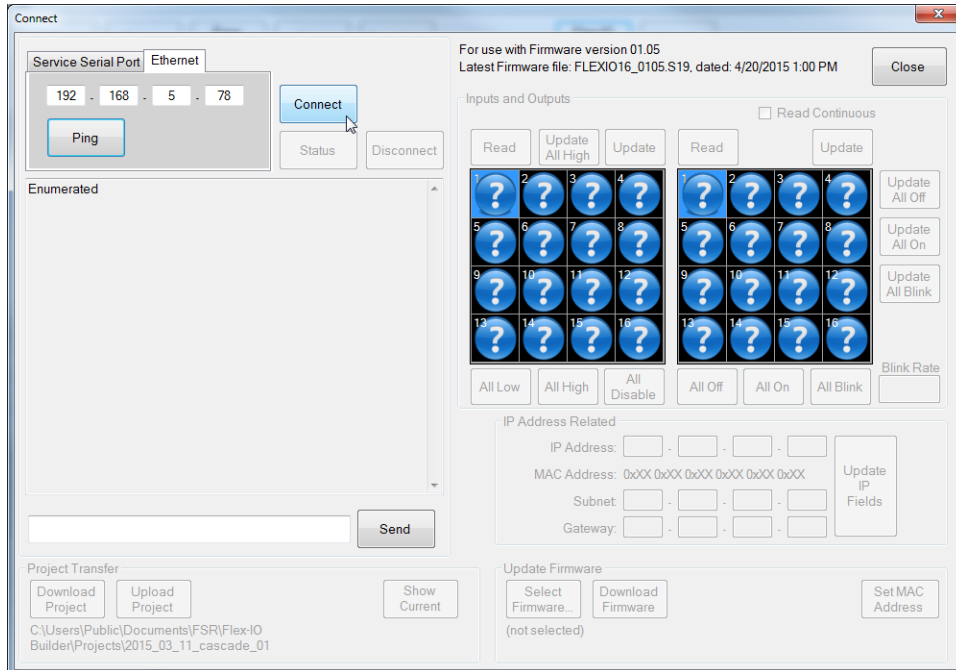
## EXAMPLE OF SUCCESSFUL CONNECTION VIA TCP/IP

To connect to the Flex-IO via TCP/IP, the following must be done:

Click the “Ethernet” tab

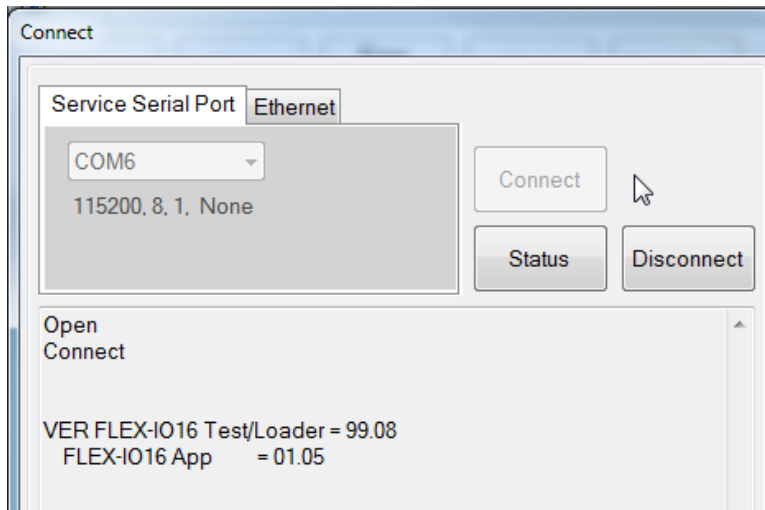
Enter the IP Address of the Flex-IO unit

Click the “Connect” button

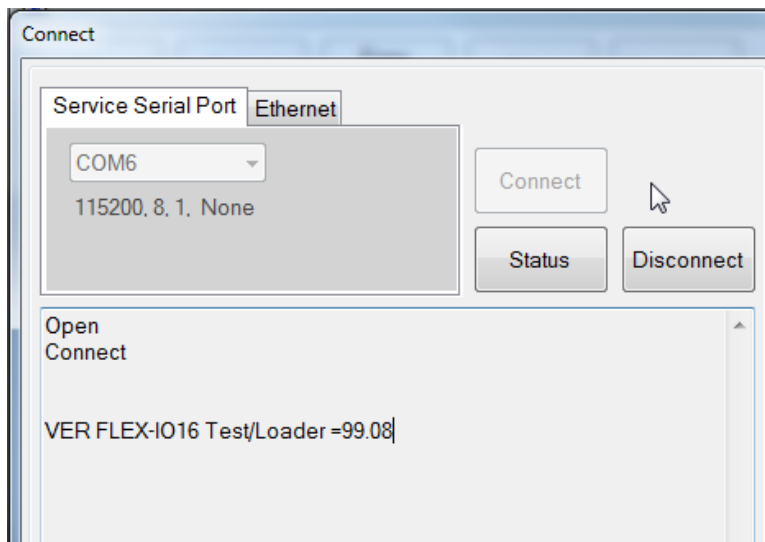


## FIRMWARE VERSION AND BOOTCODE VERSION STRINGS

The Firmware Version is always displayed after a successful Connect and appears here in the Connect dialog. The following screen shows how the Bootcode & Firmware Version strings look at Connect when both are loaded on the Flex-IO hardware:



This is how the strings appear when the Firmware is no longer present:



This is the typical result of turning off the Flex-IO hardware in the middle of a Firmware Download before it completes. It can be fixed by performing the Firmware Upgrade Procedure and letting it run until completion.

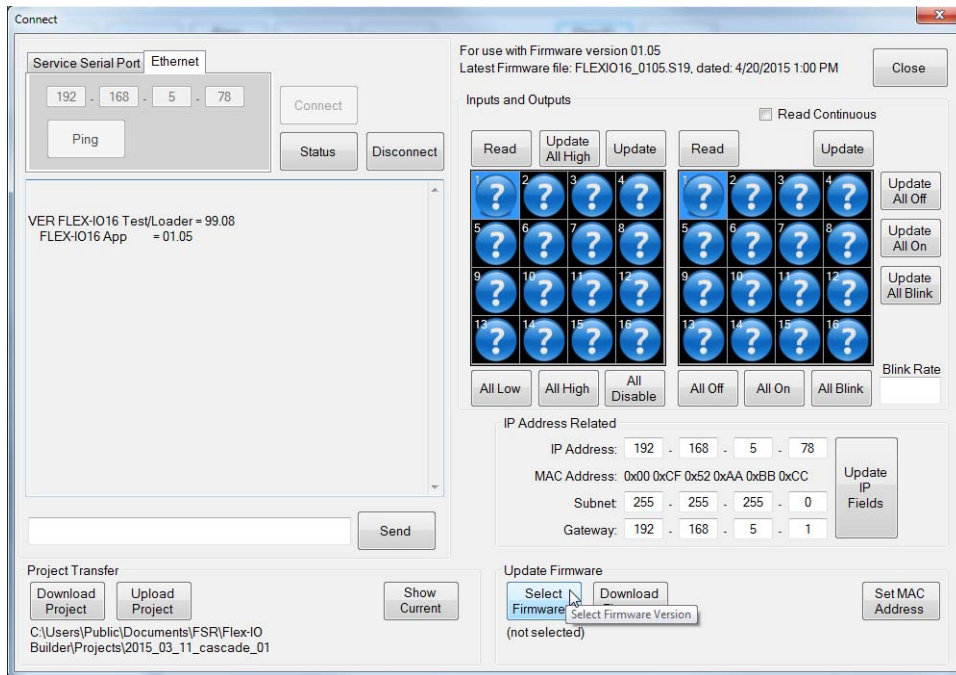


## FIRMWARE UPGRADE PROCEDURE

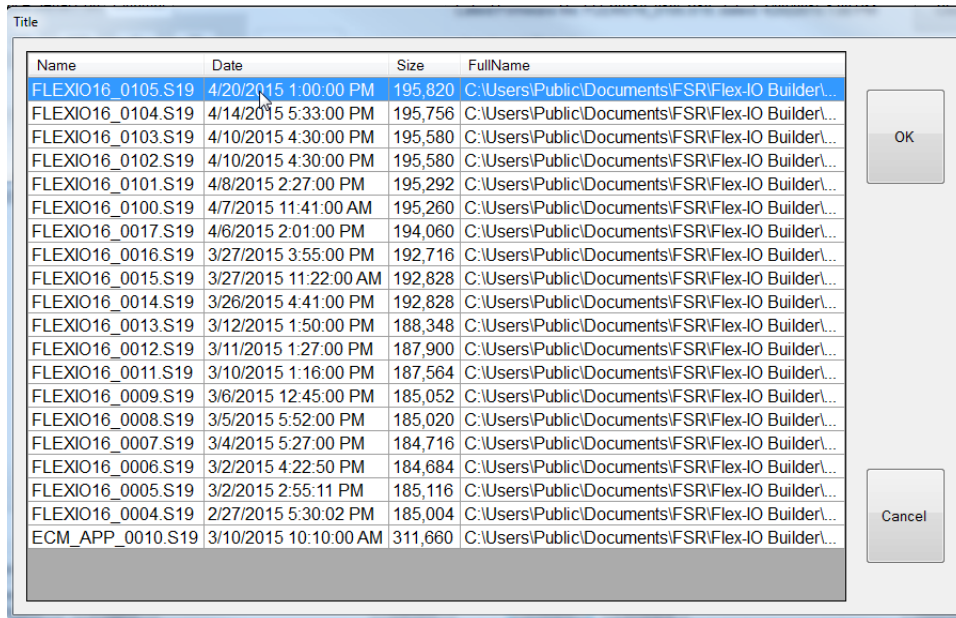
The following screens shows the procedure for upgrading the Firmware.

The procedure requires that a Serial or Ethernet connection already be established. (Either one is fine.)

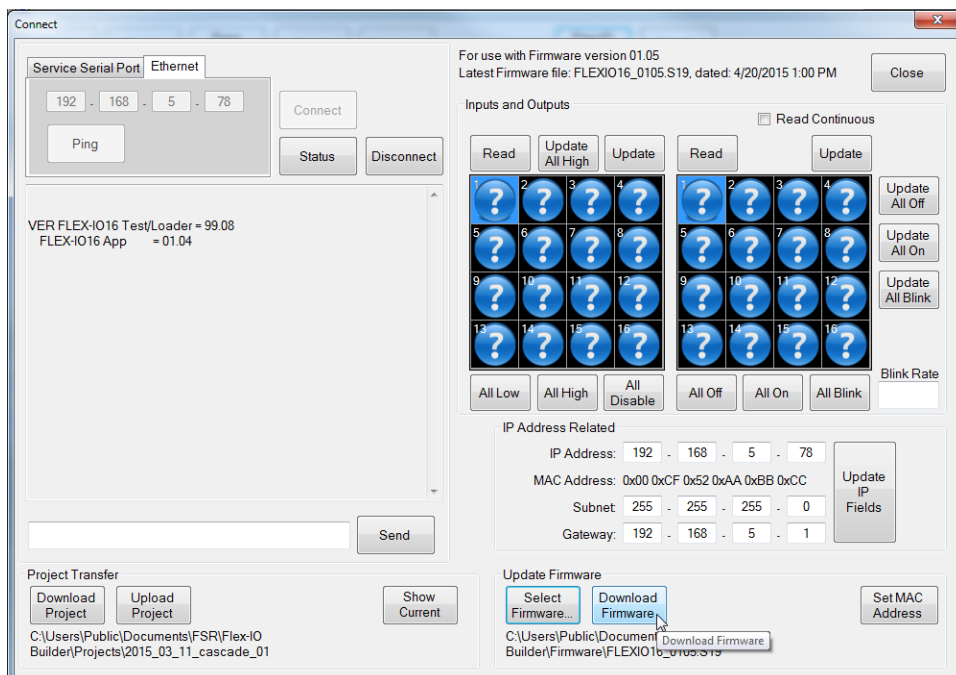
Then, select click the “Select Firmware...” button



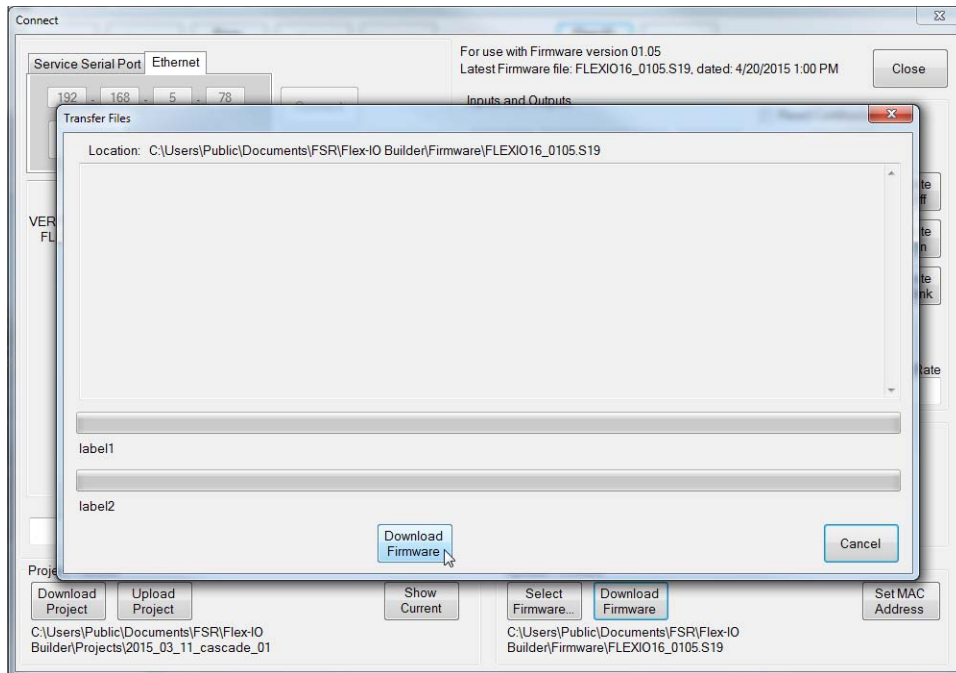
Select the Firmware version file. (Typically the latest file which appears at the top of the file selection list as shown below.)



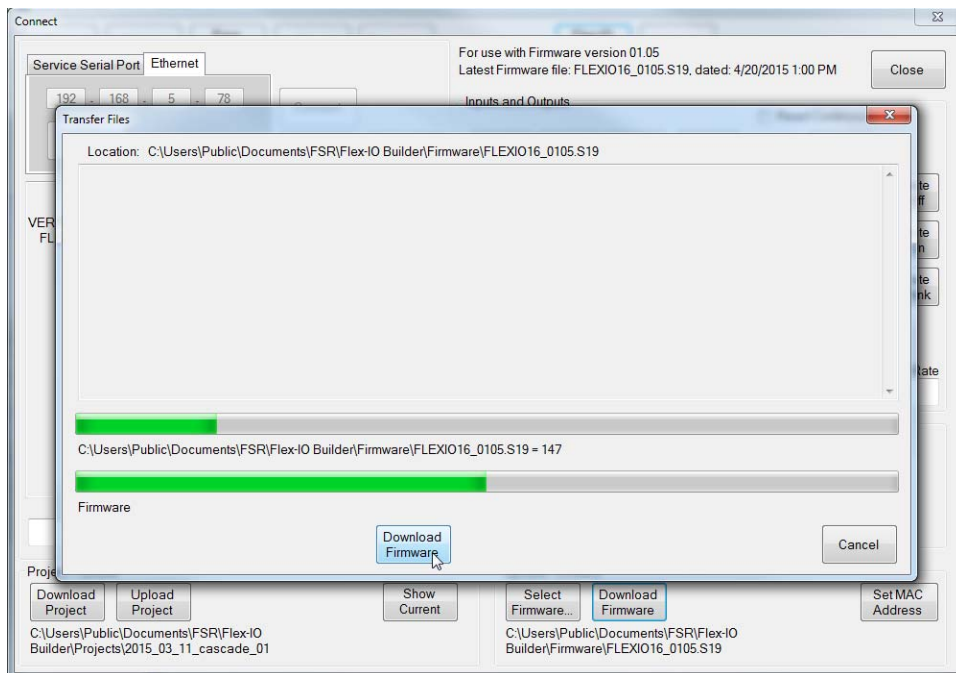
Click the “OK” button to select the File and close the dialog.



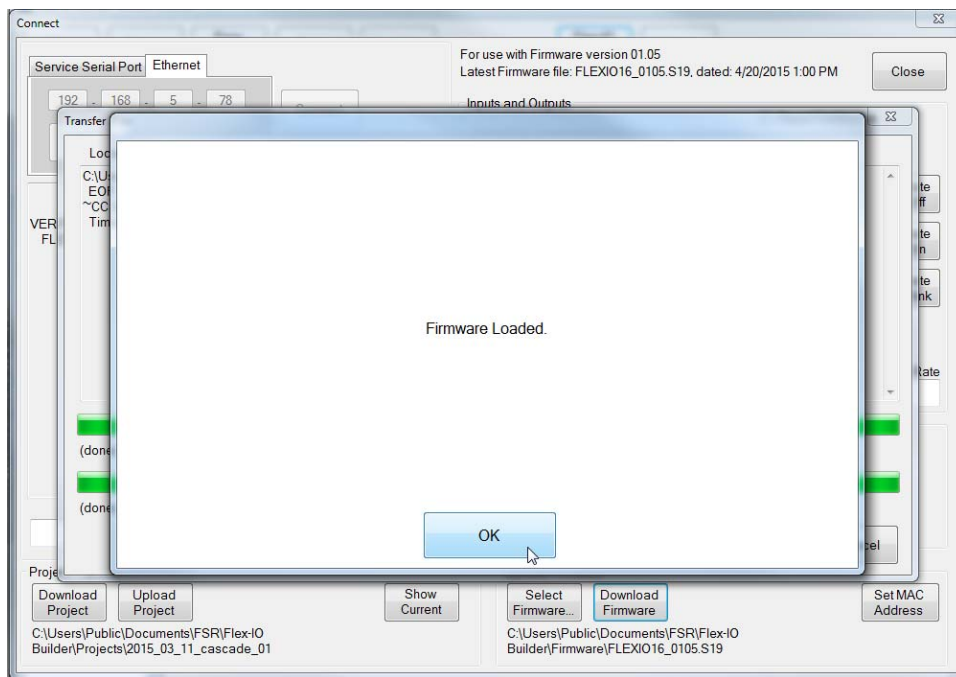
Click the “Download Firmware” button.



Click the “Download Firmware” button and a progress bar will appear to show the download's progress.



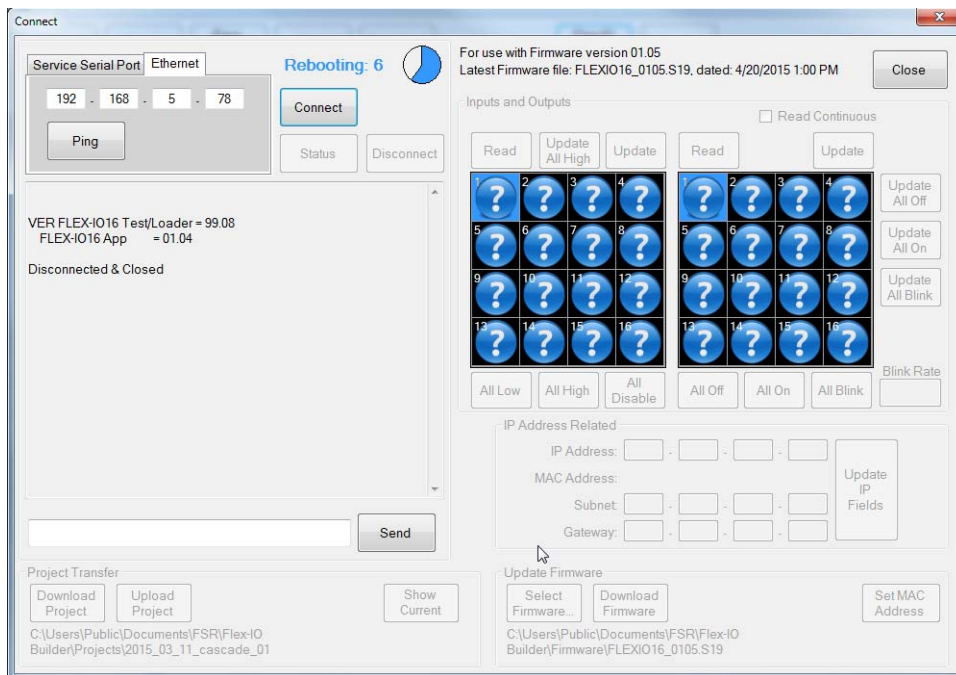
Provided the firmware successfully downloads, the following dialog will appear. (If it does not appear, restart the procedure. The Flex-IO hardware may require a reboot and “Connect” may need to be closed and re-opened.)



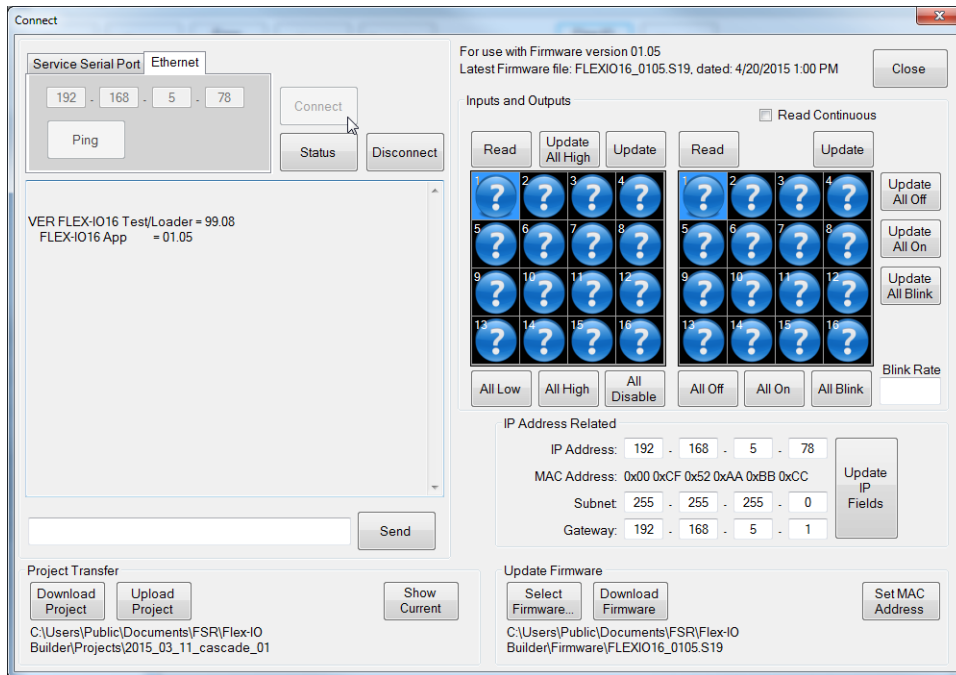
Click “OK” to close this dialog.

The Flex-IO hardware will reboot.

Wait for the timer displayed in the “Connect” dialog has counted off 10 seconds.



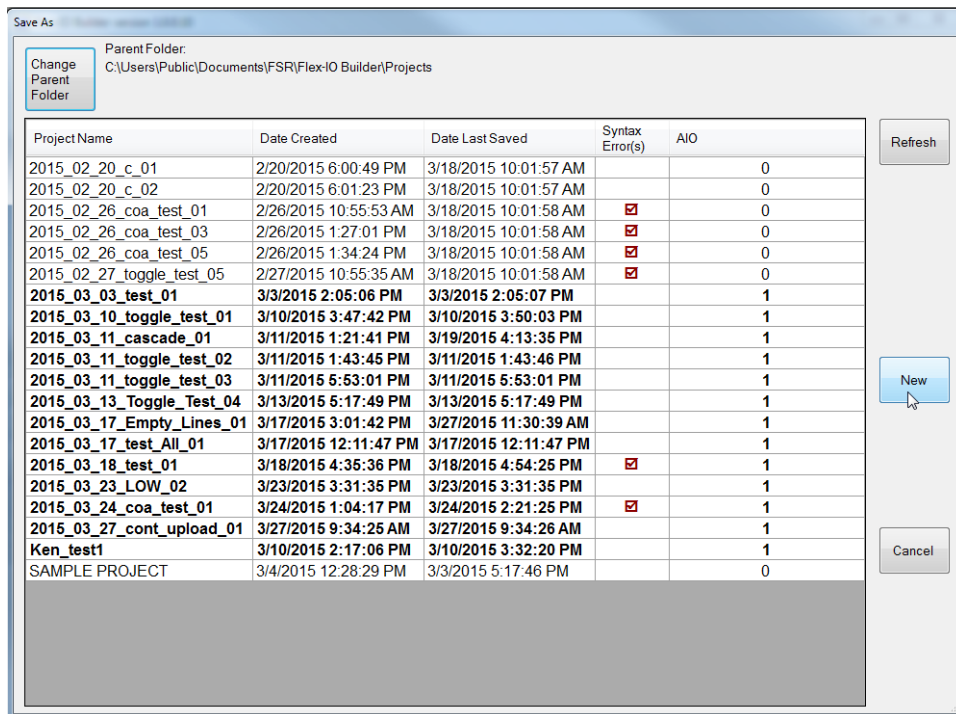
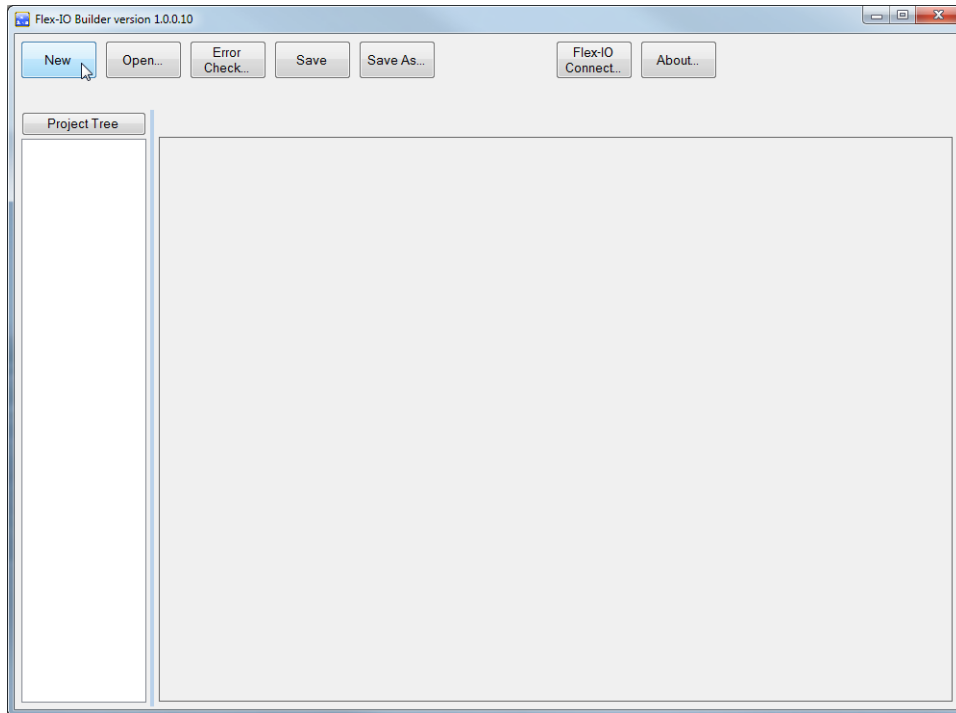
Then press the “Connect” button to confirm the new Firmware version number appears.

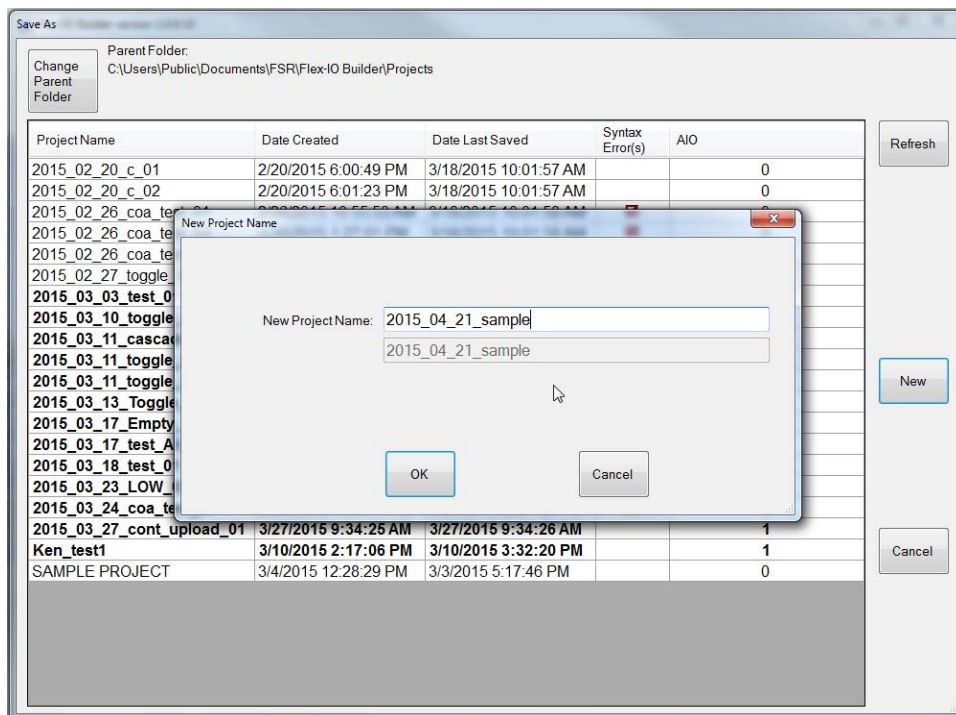
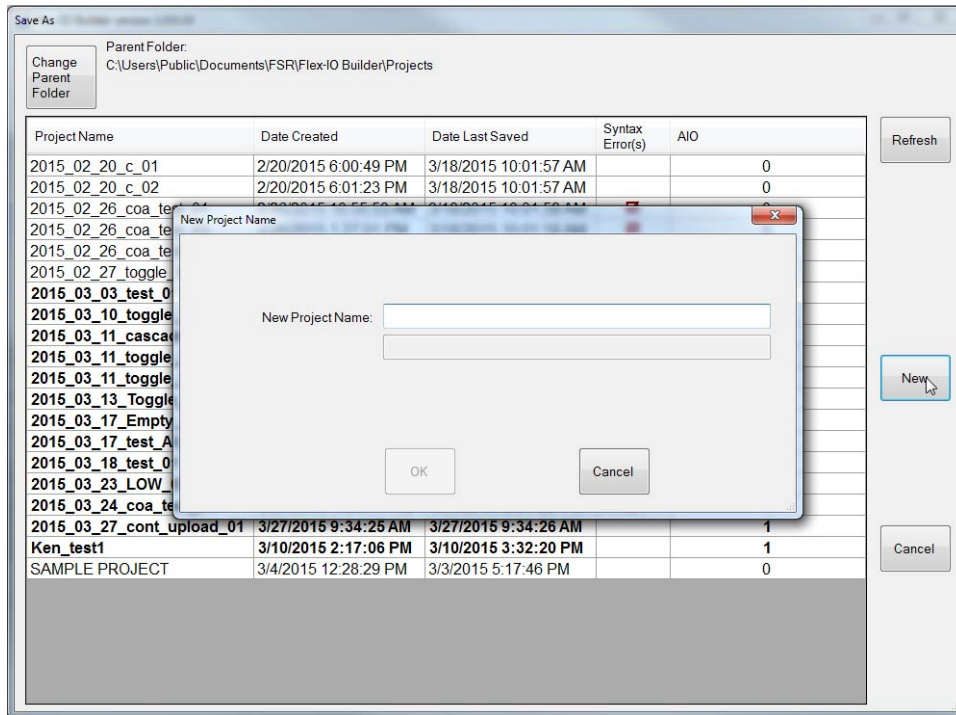


# FLEX-IO BUILDER

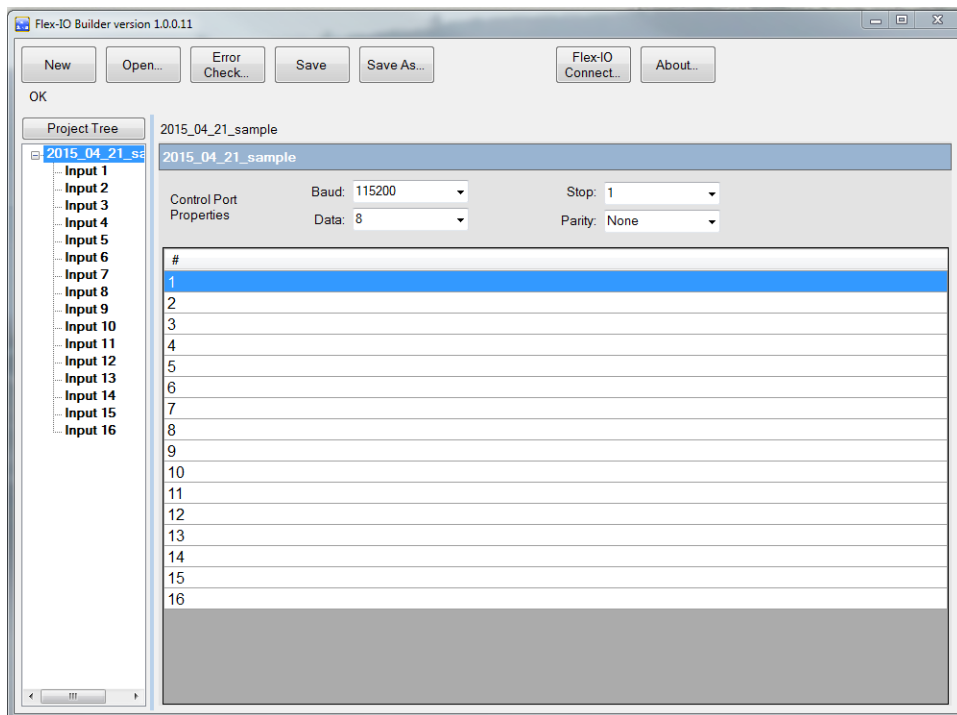
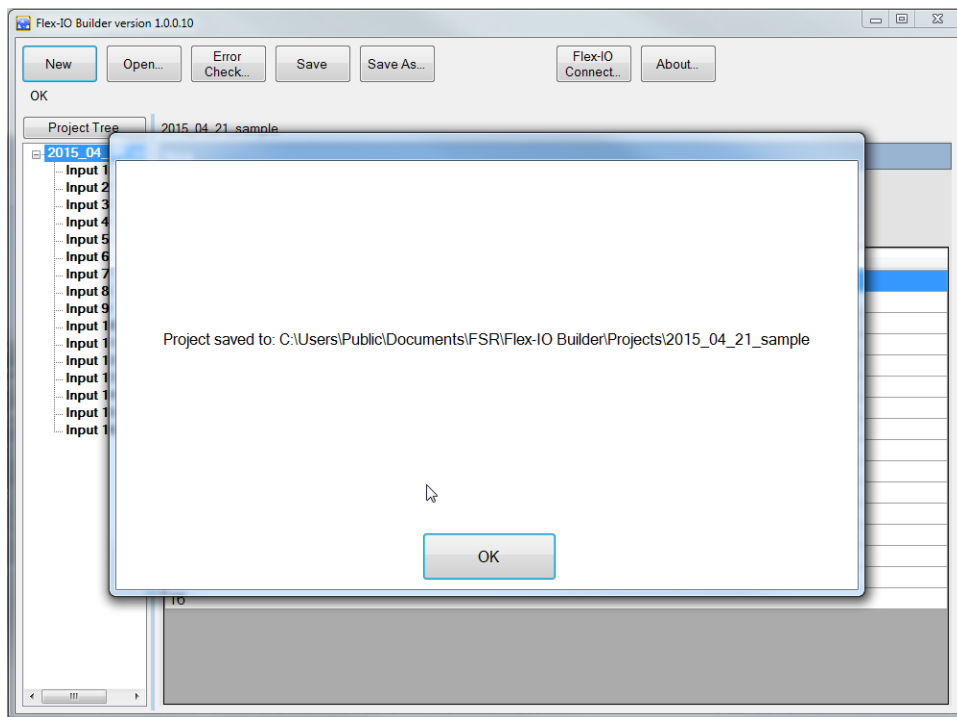
## NEW PROJECT

The following screen shots so the sequence for making a New Project.







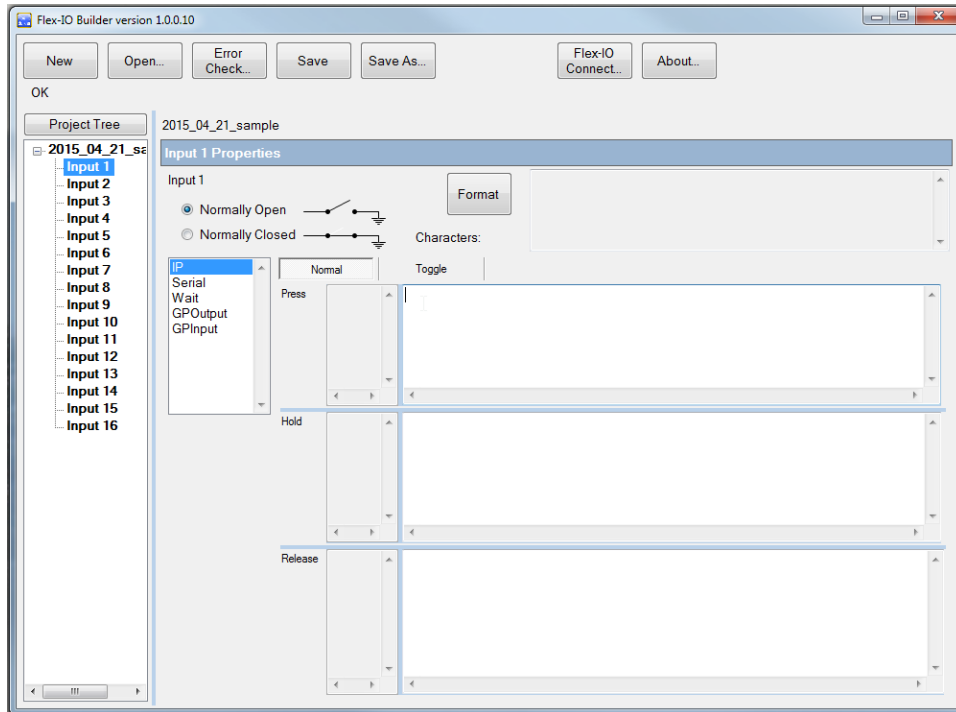




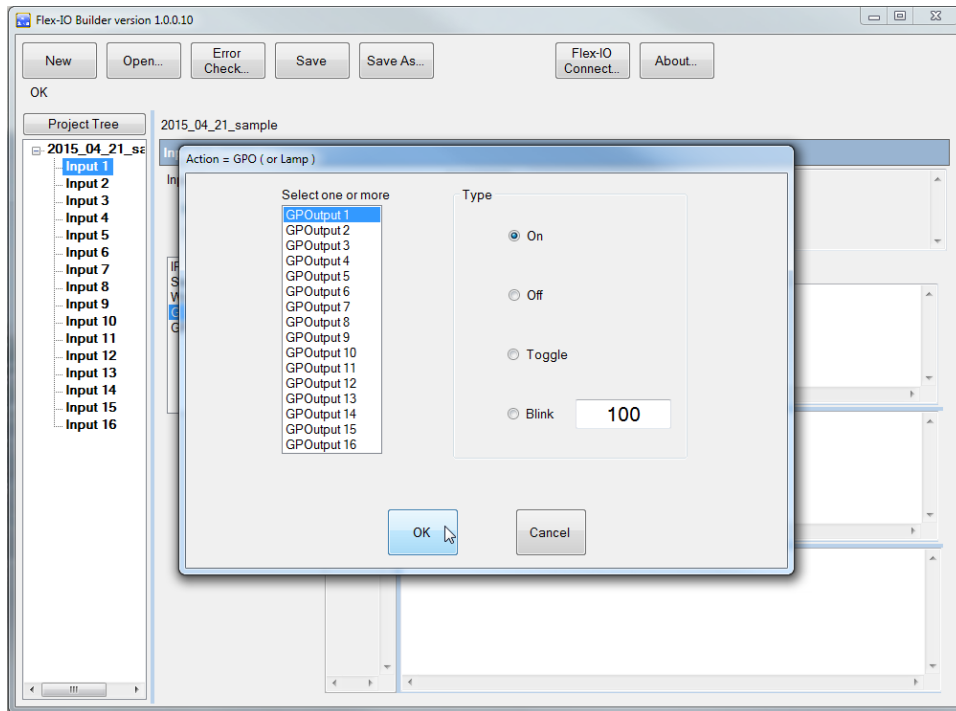
## ENTERING CHANNEL COMMANDS

To select a Channel, click the number in the TreeControl.

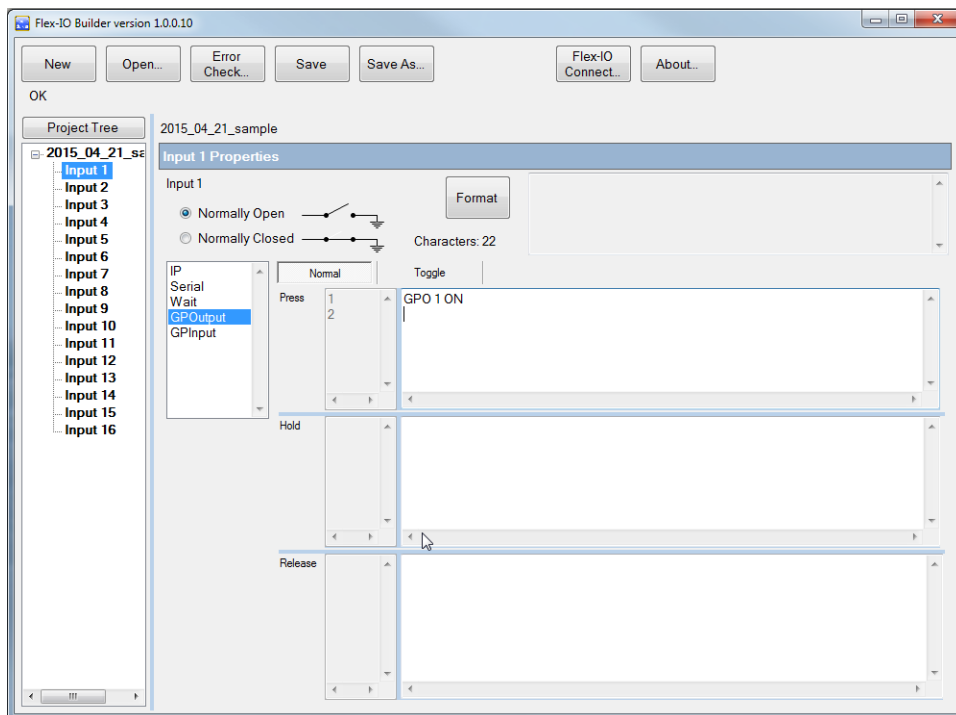
Click into the TextBox corresponding to whether you want the Action to be applied to the OnPress, OnHold, or OnRelease event. (Toggles may also be selected by clicking the “Toggle” tab.)



Select the Action by clicking on the one wanted. This example is for a “GPOutput”.



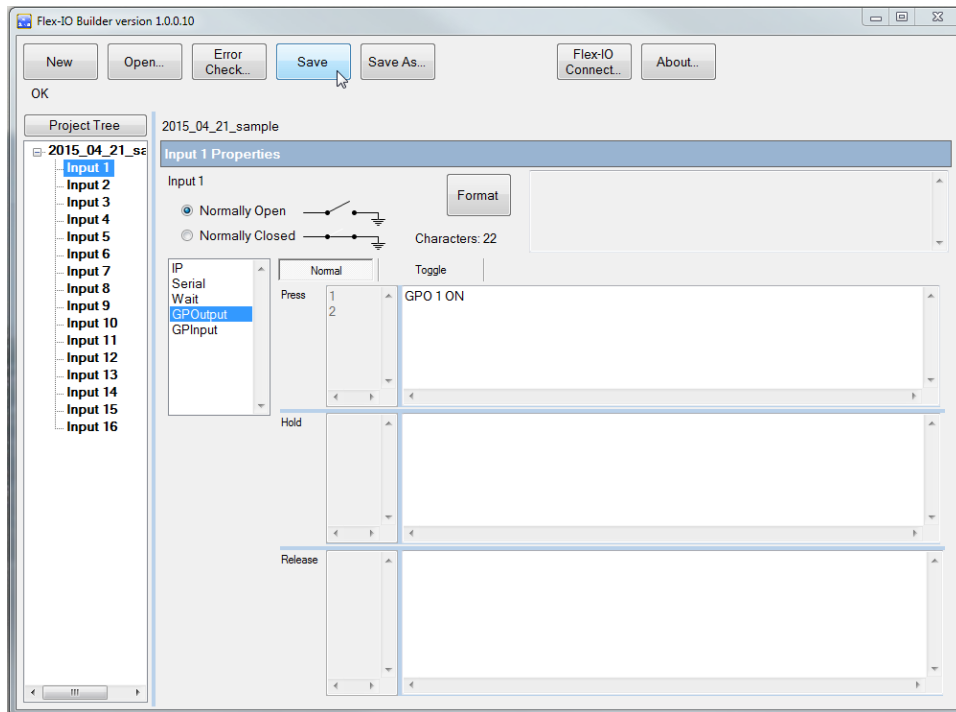
Select from the options and click “OK” to close the dialog.  
The text of the Action should appear in the Event originally chosen.



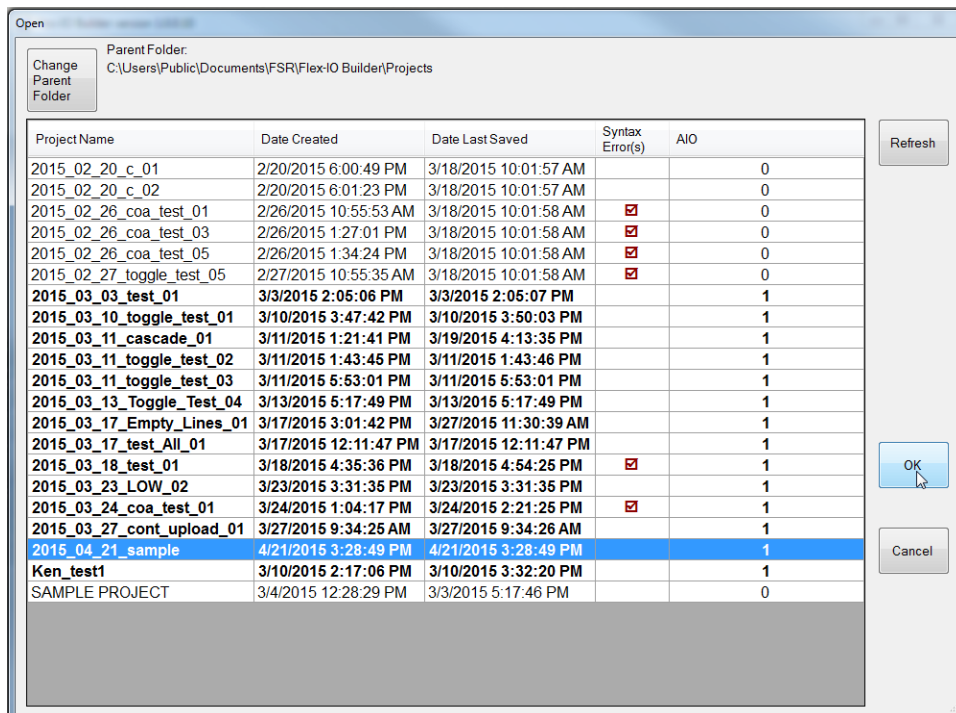
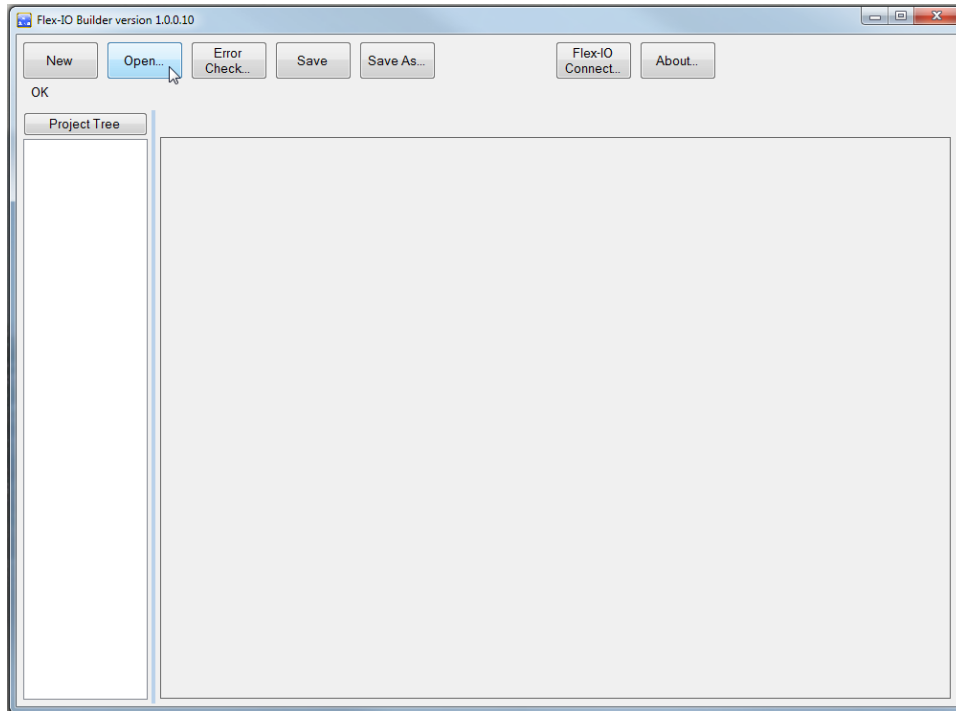
## SAVE PROJECT

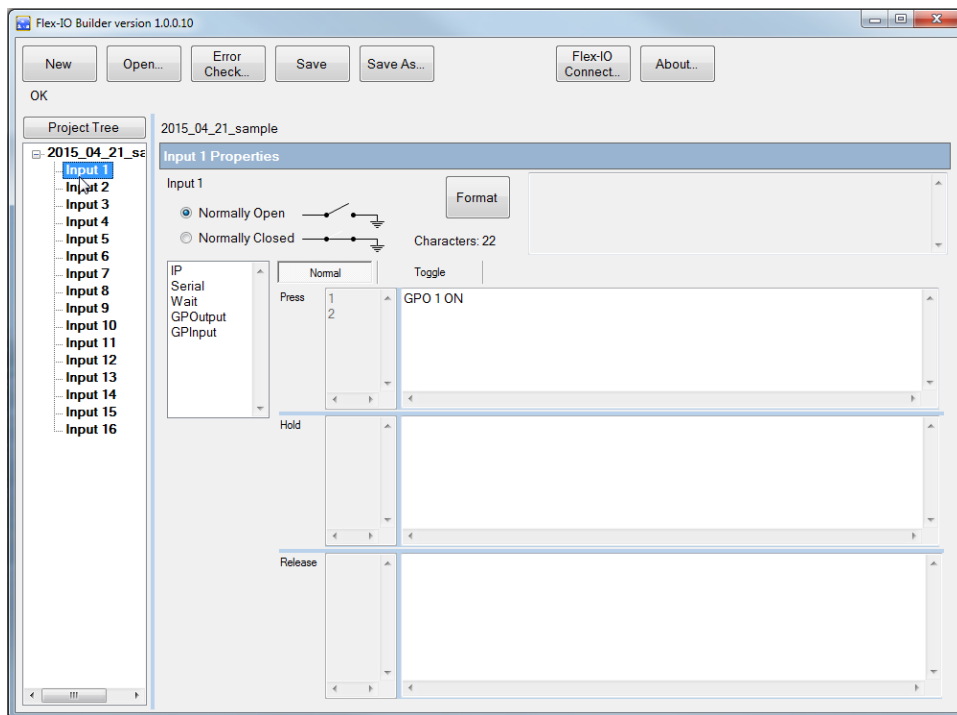
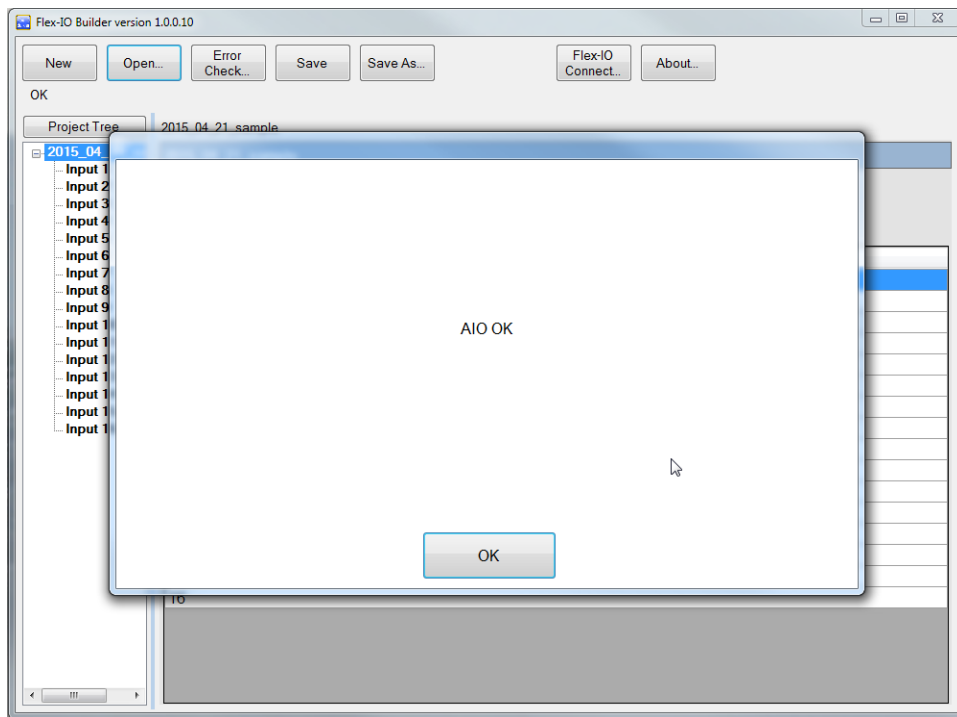
Click the “Save” button to save your work.

Alternatively you may click the “Save As” button to open a dialog to create a new Project to save your work in.



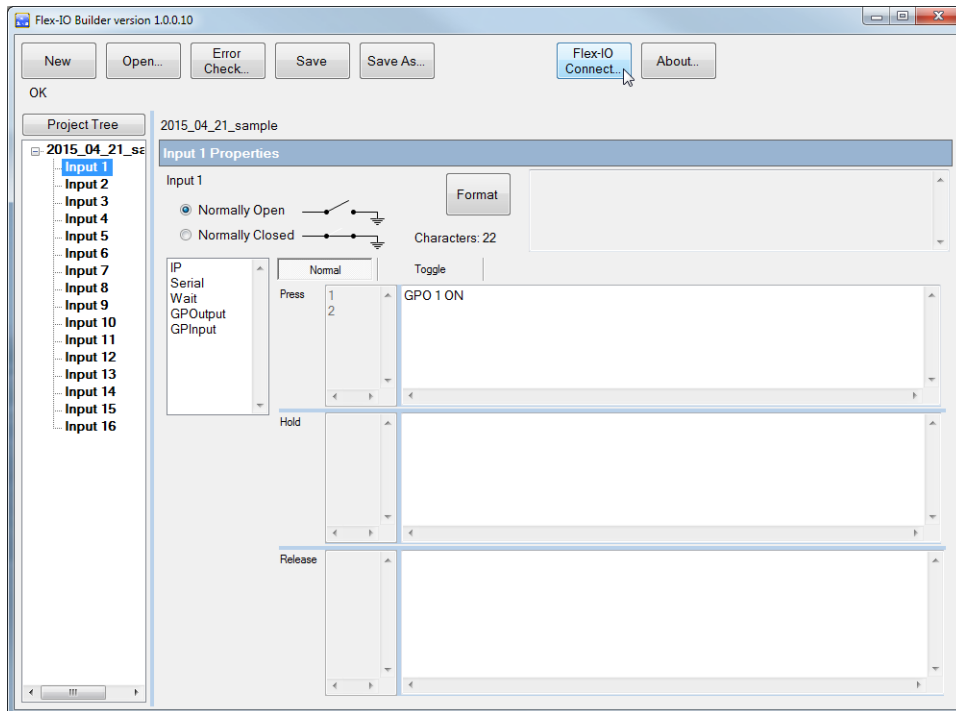
## OPEN AN EXISTING PROJECT



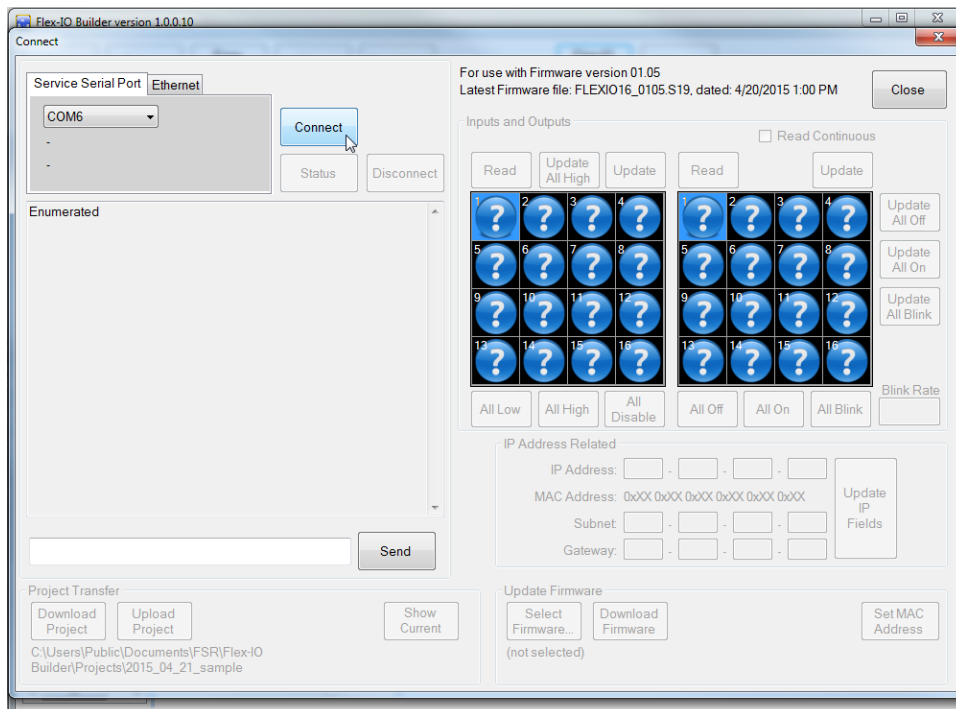


## DOWNLOADING PROJECT TO FLEX-IO

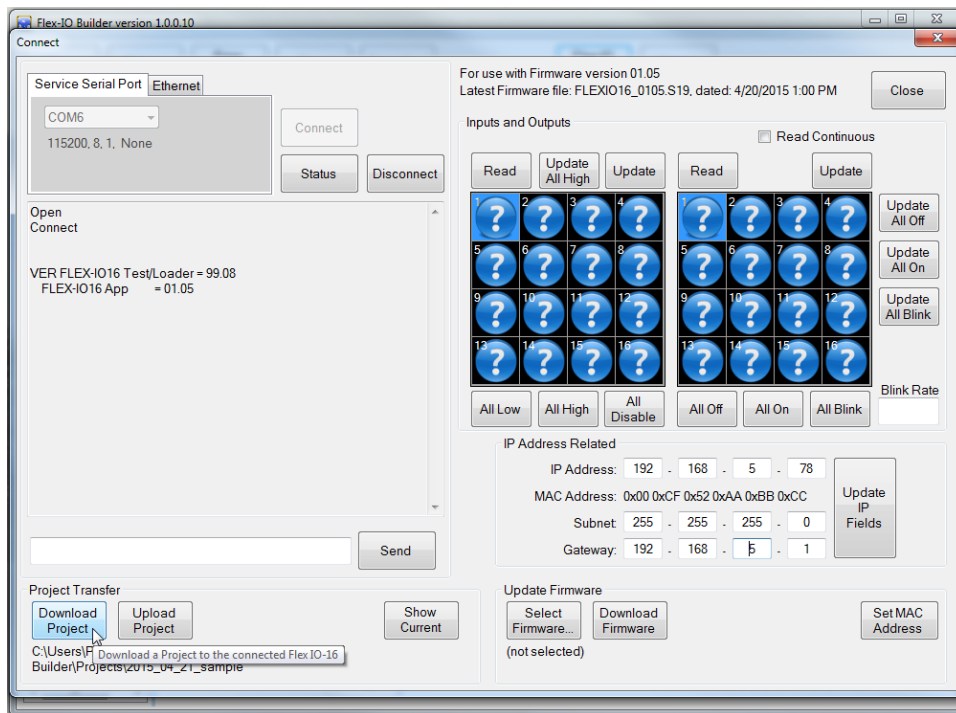
Open the “Flex-IO Connect” dialog.



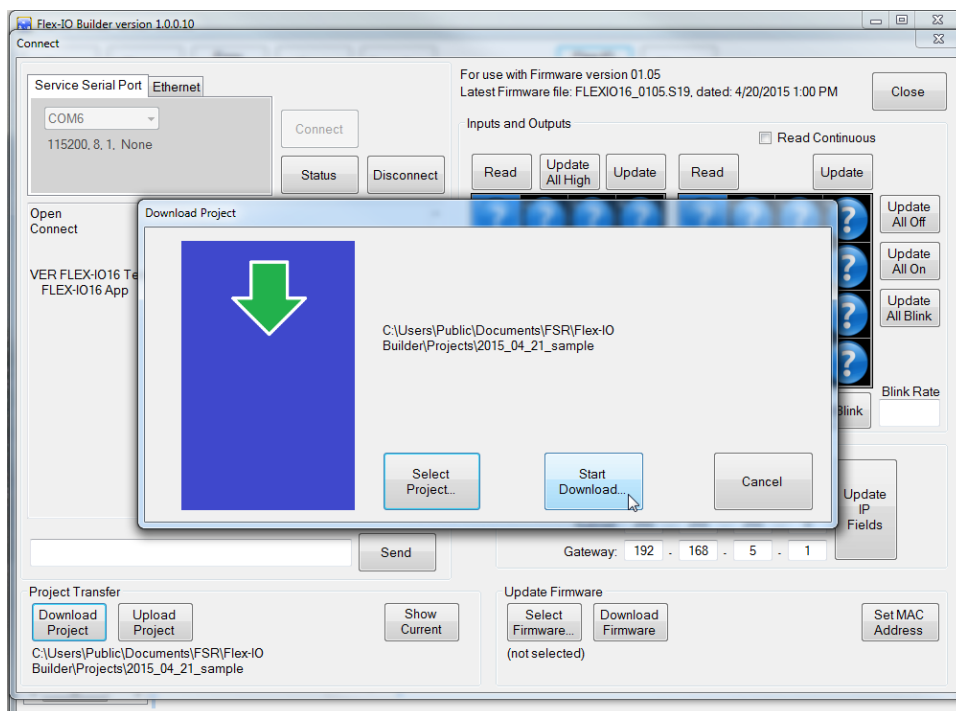
Connect to the Flex-IO via Serial or Ethernet.

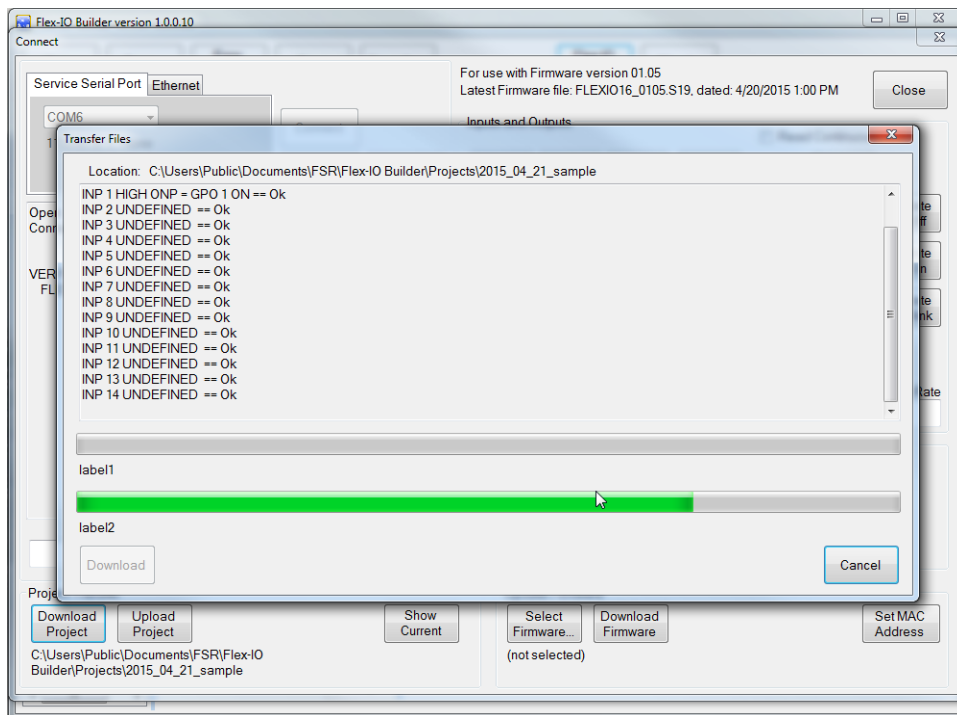


Click the “Download Project” button.

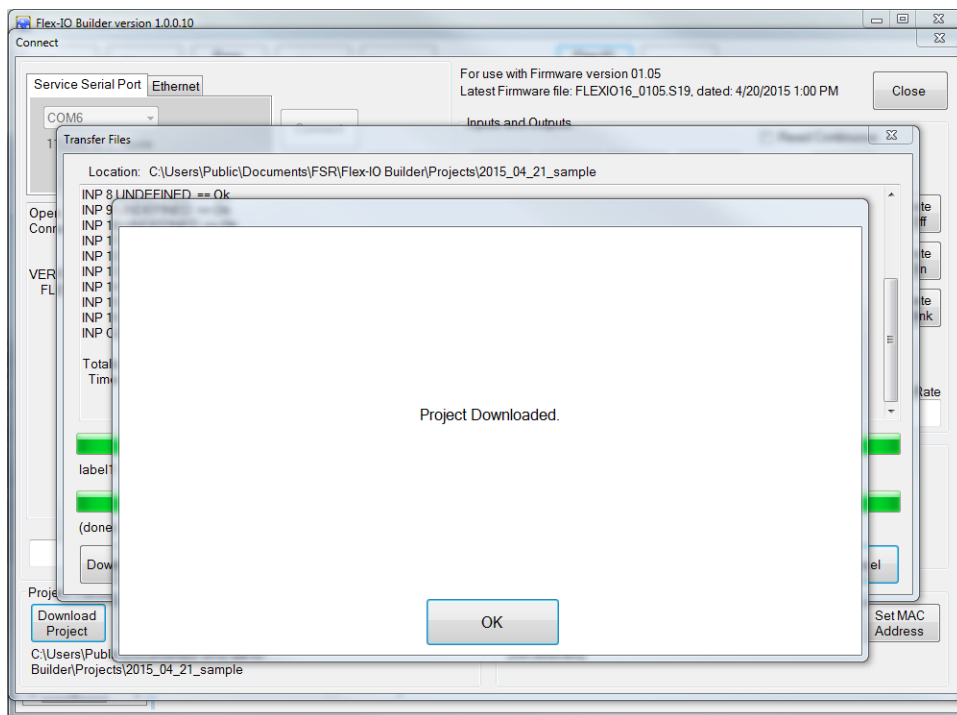


Click the “Start Download” button.



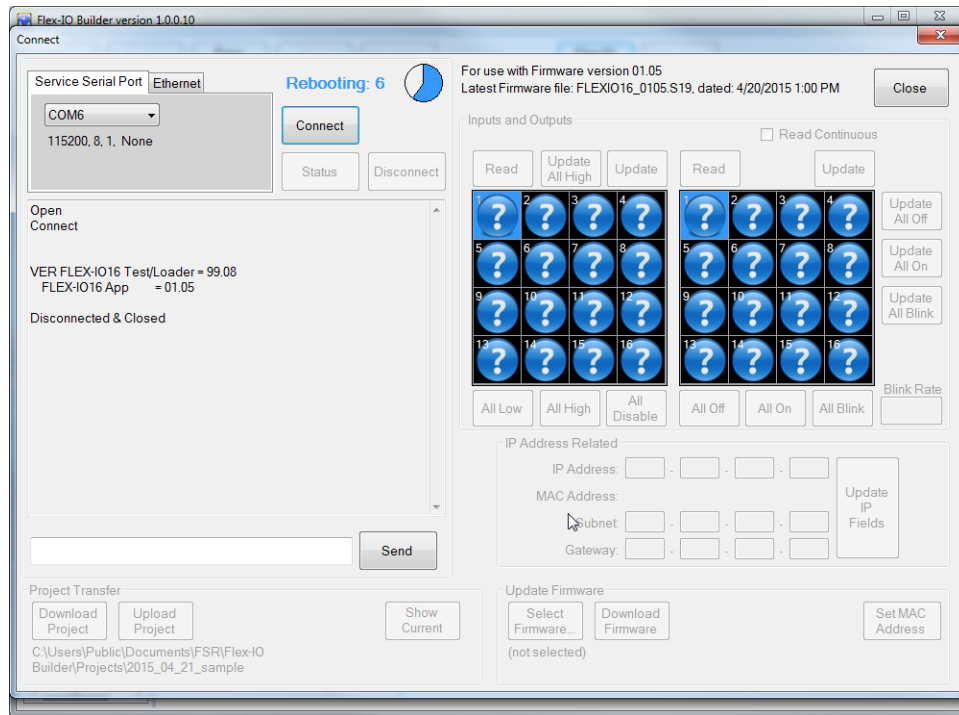


Click the “OK” button.

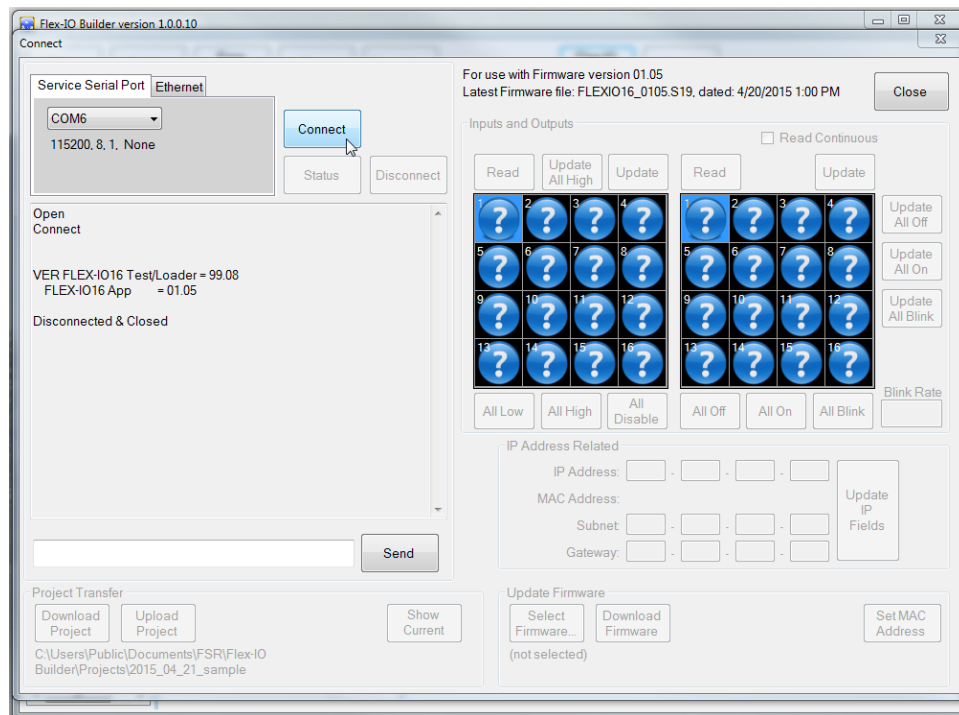


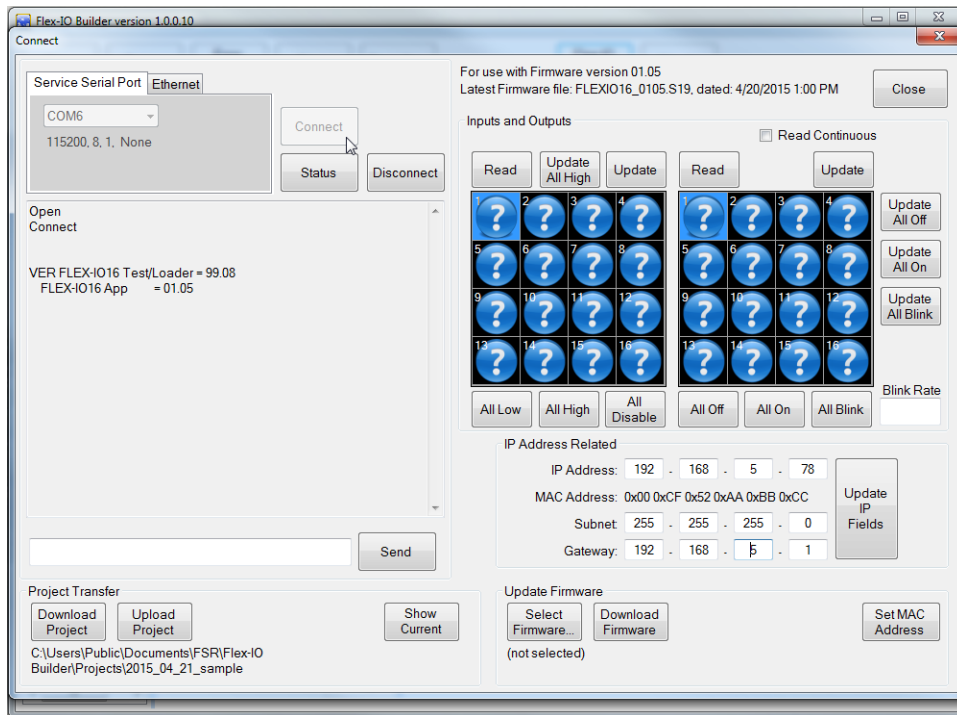


Wait for the reboot of the Flex-IO hardware to finish.

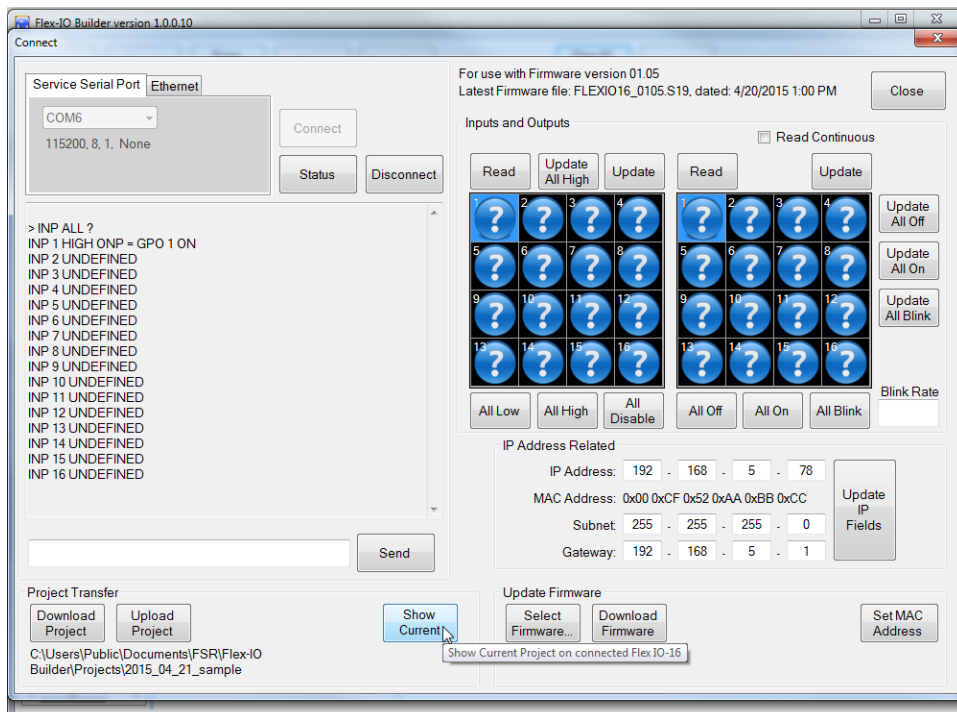


Click the “Connect” button.





Click the “Show Current” button to see a list of the commands currently loaded into the Flex-IO hardware.



## **UPLOADING PROJECT FROM FLEX-IO**

Open the “Connect” dialog.

Connect to the Flex-IO via Serial or Ethernet.

Click the “Upload Project” button.

Enter a unique name for the Project. (The “Start Upload...” button will not enable until the Project Name is unique.)

Click the “Start Upload...” button.

(Watch the progress bar.)

Click the “OK” button.

Close the “Connect” dialog.

The newly Uploaded Project may be opened by clicking the “Open” button.

## FLEX-IO ACTION COMMANDS

### GPI

Queries or sets the specified General Purpose Input.

GPI     number\_or\_number\_sequence     state\_or\_query

number\_or\_number\_sequence

each channel has to be in the range of 1 of to 16.

Can be a single channel. ( Example: 4 )

Can be a range of channels separated by a dash. ( Example: 1 – 8 )

Can be a series of single channels or ranges of channels separated by commas. (Example: 1 – 3, 6, 10 – 12 )

state\_or\_query

HIGH = pulses the HIGH setting once in software (see accompanying Table)

LOW = pulses the LOW setting once in software

E = enable

D = disable = Once a channel is Disabled, it must be Enabled before it can be set HIGH.

? = request current state for specified channel(s)

Samples:

GPI 2 HIGH

GPI 1-8 D

GPI 1, 3-8, 11-16 E

Channel Type	HIGH	LOW
<b>“Normally Open”</b>	Executes Actions	(nothing)
<b>“Normally Closed”</b>	(nothing)	Executes Actions

“Executes Actions” details:

“Normal” tab = fires “Press” and “Release” Actions. (“Hold” Actions within the IO-16 cannot be executed programmatically.)

“Toggle” tab = fires either the “Odd” or “Even” Actions.

## **GPO**

Queries or sets the specified General Purpose Output.

GPO     number\_or\_number\_sequence     state\_or\_query

number\_or\_number\_sequence

each channel has to be in the range of 1 of to 16.

Can be a single channel. ( Example: 4 )

Can be a range of channels separated by a dash. ( Example: 1 – 8 )

Can be a series of single channels or ranges of channels separated by commas. (Example: 1 – 3, 6, 10 – 12 )

state\_or\_query

ON = sets the output state to ON

OFF = sets the output state to OFF

TOGGLE = toggles the output state

BLINK = sets output state to blink at default 500 millisecond rate

BLINK @ blink\_rate\_in\_msec = sets output to blink at requested rate

          blink\_rate\_in\_msec = Blink rate in milliseconds. Must be in range 100 to 5000.

? = request current output state for specified channel(s)

Samples:

GPO 10 ON

GPO 1-8 OFF

GPO 1, 3-8, 11-16 BLINK @ 1000

## **WAIT**

Wait a given number of milliseconds. Range is 0 to 100000 milliseconds.

Sample:

WAIT 1000

## **SER COMMAND**

Send a string to the Control Serial Port.

Beginning and end of the string is marked by either single or double quotes.

Control characters (such as a carriage return) can be embedded in "<" and ">" characters.

Samples:

SER 'passed serial string 1<0D>'

SER "passed serial string 2<0D>"

## **IP INLINE ACTION**

Send a string to the specified IP Address (and optional Port).

Beginning and end of the string is marked by either single or double quotes.

Control characters (such as a carriage return) can be embedded in "<" and ">" characters.

Flex Commands require the keywords: "ACTION = "

Syntax will depend on the device the string is being sent to.

Sample:

IP 200.30.4.5:345 'ACTION = VPRESS DESKTOP 1 BUTTON 1<0D>'

IP 200.30.4.5:345 "ACTION = VPRESS DESKTOP 2 BUTTON 1<0D>"

## **IP COMMAND**

Send a Control Library command string to the specified IP Address (and optional Port).

Beginning and end of the string is marked by either single or double quotes.

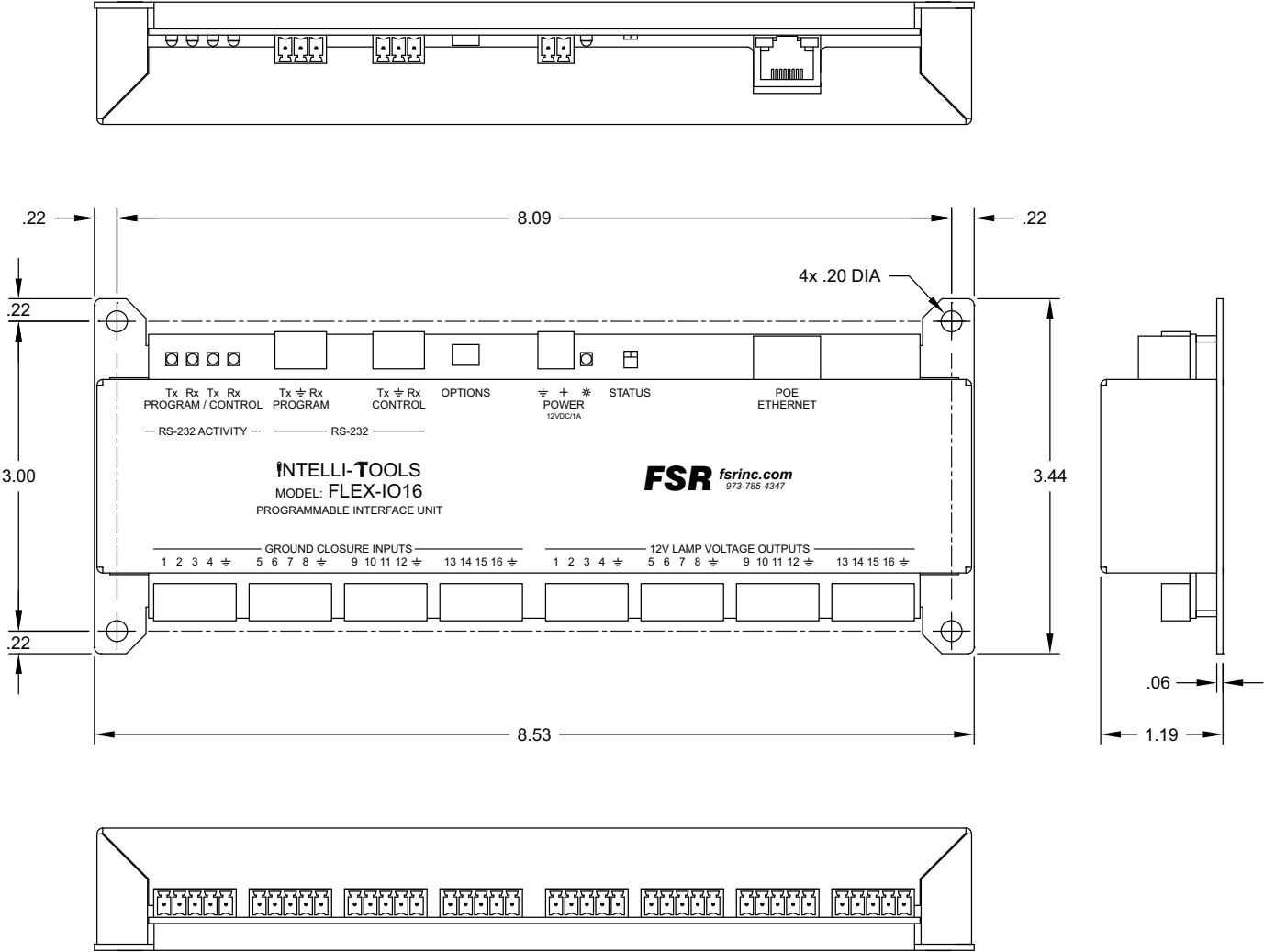
Control characters (such as a carriage return) can be embedded in "<" and ">" characters.

Sample:

IP 200.30.4.5:345 '<01 57 7F 03 4D 55 54 30 08 20 09 21 0A 20 10 21 1F 2C 02>'

IP 200.30.4.5:345 "<01 47 6F 04 4D 55 54 30 08 20 09 21 0A 18 1F 2C 02>"

DIMENSIONS







## SPECIFICATIONS

Switch inputs:	16 momentary ground closure inputs
Open Circuit voltage:	12 VDC through 4.75k (>3mA current through external switch)
Minimum closure time to ensure detection:	0.1 seconds
Maximum allowable closure time:	Unlimited*
Lamp outputs:	16 active high outputs with short circuit and thermal protection. Automatic recovery approximately 1 second after removal of short circuit.**
Output voltage when active:	10.2V typical at 10 mA load current
Maximum allowable output current for any single output:	300mA
Maximum combined current for each bank of 8 outputs:	600mA
Maximum combined current for all outputs:	800mA
RS-232 ports:	2; One for IO-16 configuration, one for external device control. Control port supports baud rates from 2400 to 115200, 5-8 data bits, 1, 1.5, 2 stop bits, odd, even, mark, space, or no parity.
Network port:	10/100 Ethernet
Power Supply input options:	12VDC at 1 Amp from IT-PS1 power supply or POE Ethernet connection (802.3af).
Power consumption:	2W idle power plus any external loading conditions.

\*Note that external switches are expected to be momentary, normally open type but normally closed or maintained switch inputs can also be accommodated in most applications.

\*\*Lamp outputs can be used to drive external relays or other devices. Note that the short circuit protection on each individual output has a

trip threshold of approximately 350 mA with a response time of less than 1  $\mu$ S.

Highly capacitive loads or tungsten filaments will trip the protection circuit at significantly lower steady state levels. With Tungsten filaments, the maximum load is approximately 40 mA

