THORLABS

Application Note

ITC4000 LabVIEW Programming

This is a brief overview of how to get started making a custom program to communicate with an ITC4000 series laser diode and TEC controller. While this application note is written for the ITC4000 combined laser diode and TEC controller, the process is similar for the CLD1000 series laser diode and TEC controller, the LDC4000 series laser diode controller (no TEC control), and the TED4000 TEC controller (no laser diode control). The example program is for reference only; the user is encouraged to extend or modify the program to fit his or her specific needs. The instructions were written for LabVIEW 2014.

Author: Sean Tanner

Date: 16-06-2015

Table of Contents

Author: Sean Tanner

Date: 16-06-2015

Part 1. Preface

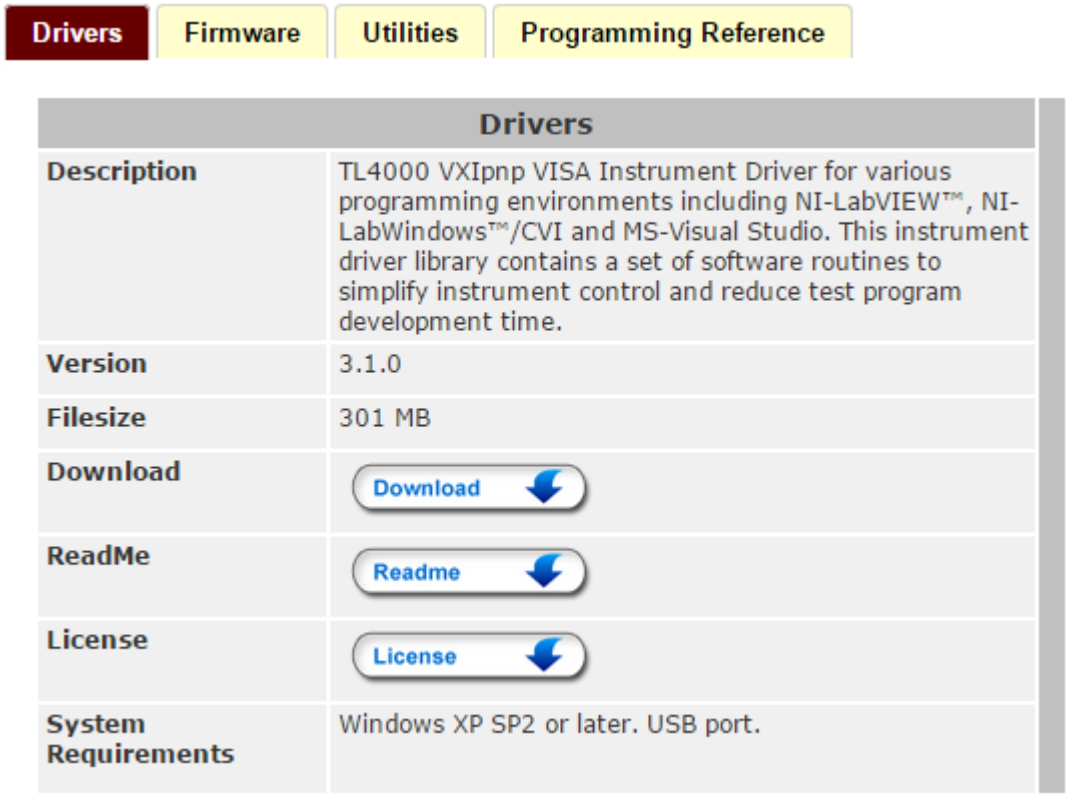
This application note was written for the ITC4001 Benchtop Laser Diode/TEC Controller using the firmware and software versions detailed below. Functionality and procedures may vary when using other controllers or firmware/software versions.

- ITC4001 Firmware: Version 1.7.0
- TL4000 VXIpnp VISA Instrument Driver: Version 3.1.0
- LabVIEW: Version 14.0 (64-bit)

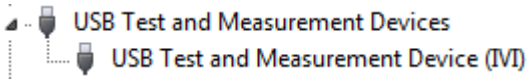
Part 2. Step by Step Instructions

1. Set up the ITC4000 with your laser manually to verify that the diode is working and the ITC4000 settings are correct. Ensure that the laser current limit is set. The sample program will use the settings currently applied to the device.

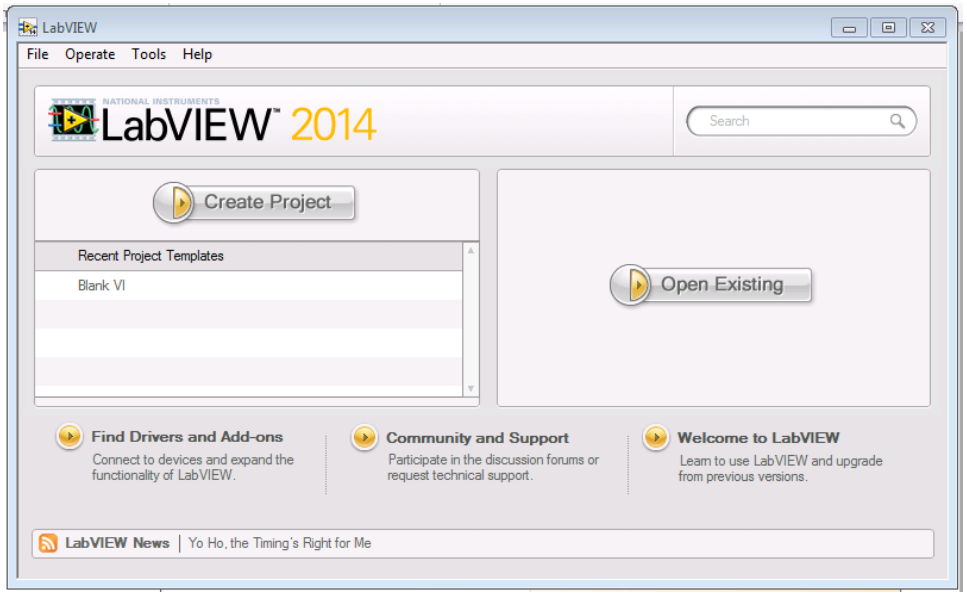
2. Download and install the drivers for the 4000 Series Laser Diode Drivers and the CLD1000 Series Compact Drivers located on the Drivers tab: http://www.thorlabs.com/software_pages/viewsoftwarepage.cfm?code=4000_Series



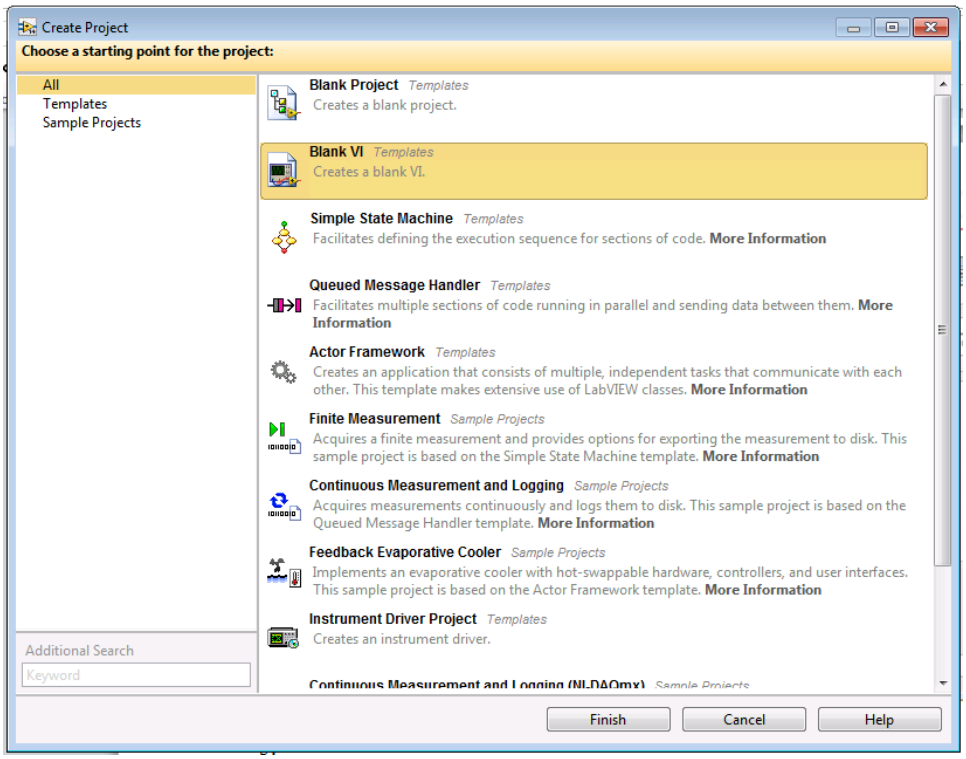
3. Connect the ITC4000 to the computer via USB. Wait for Windows to install the device drivers. When the ITC4000 is ready, it will show up in the device manager as a USB Test and Measurement Device (IVI).



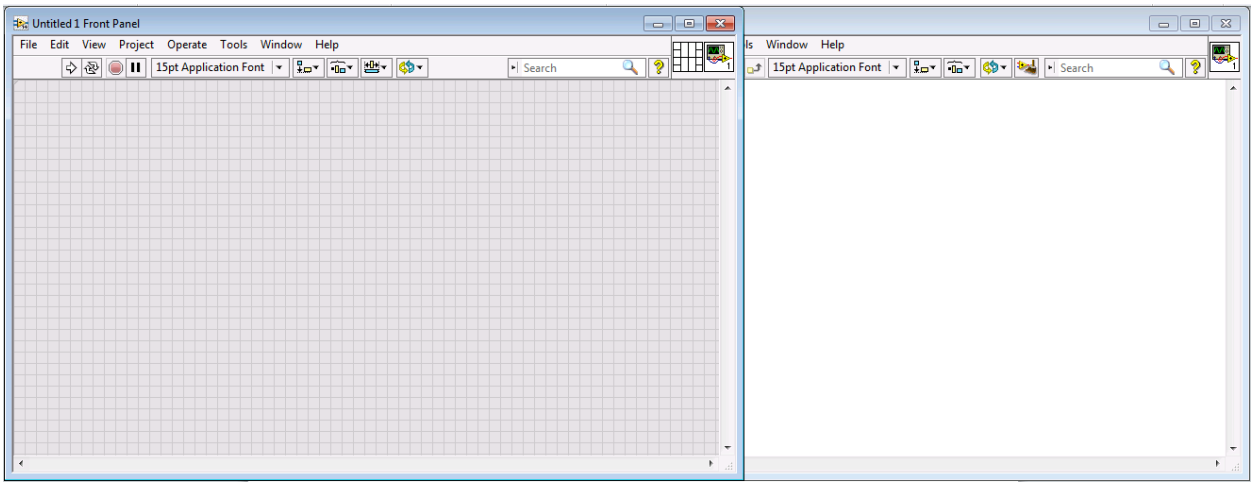
4. Open LabVIEW and select Create Project



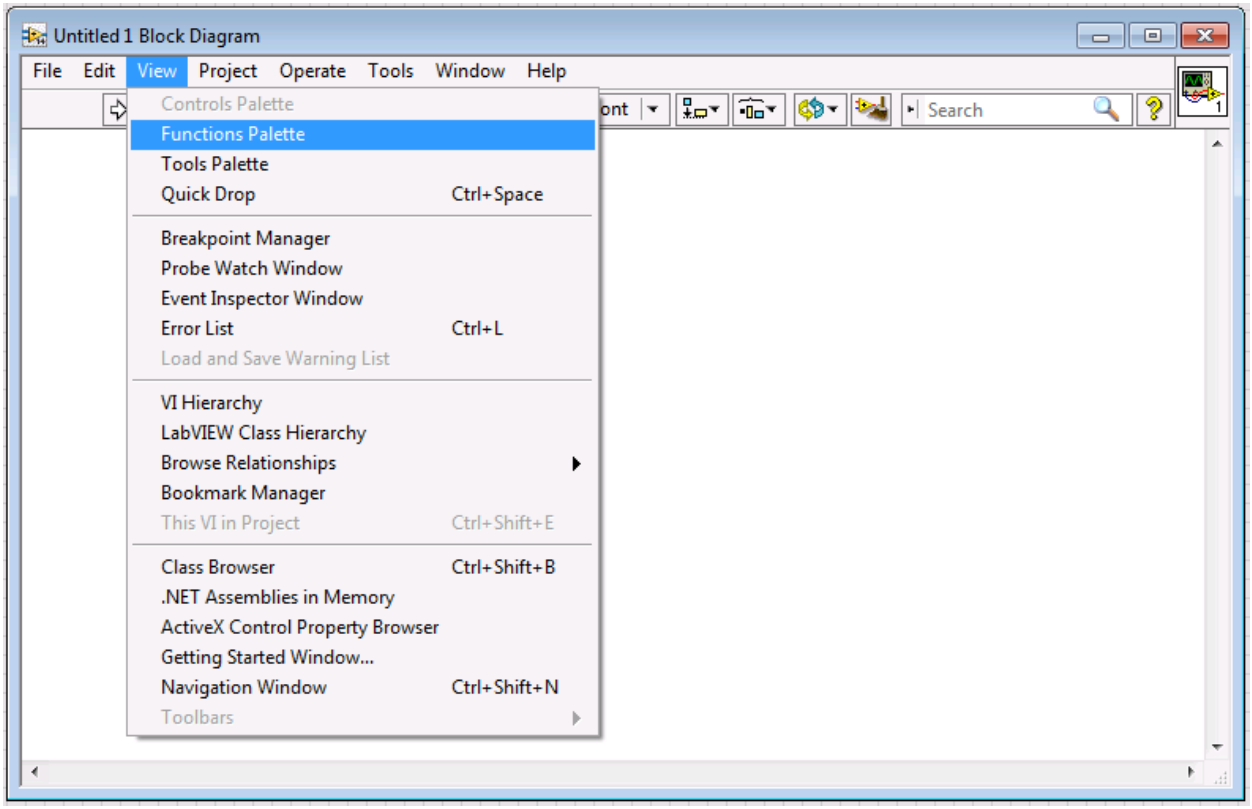
5. Select the Blank VI Template and select Finish.



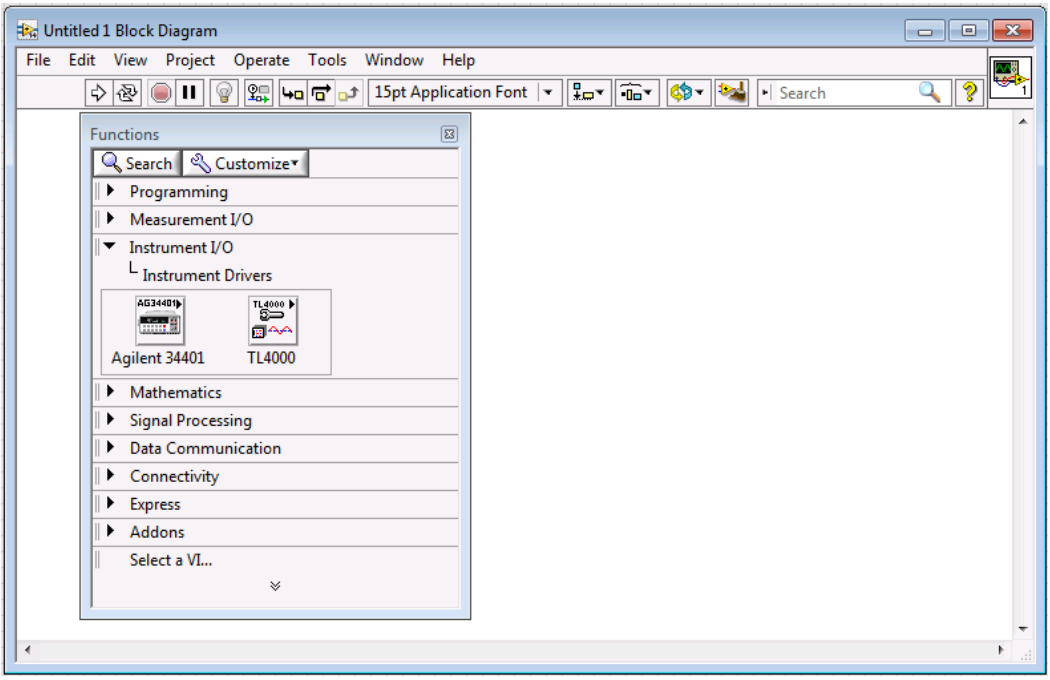
6. The new VI will consist of two empty windows. The Front Panel has a grey grid background and is the user interface to the program. The Block Diagram has a white background and is where the program code will be placed.



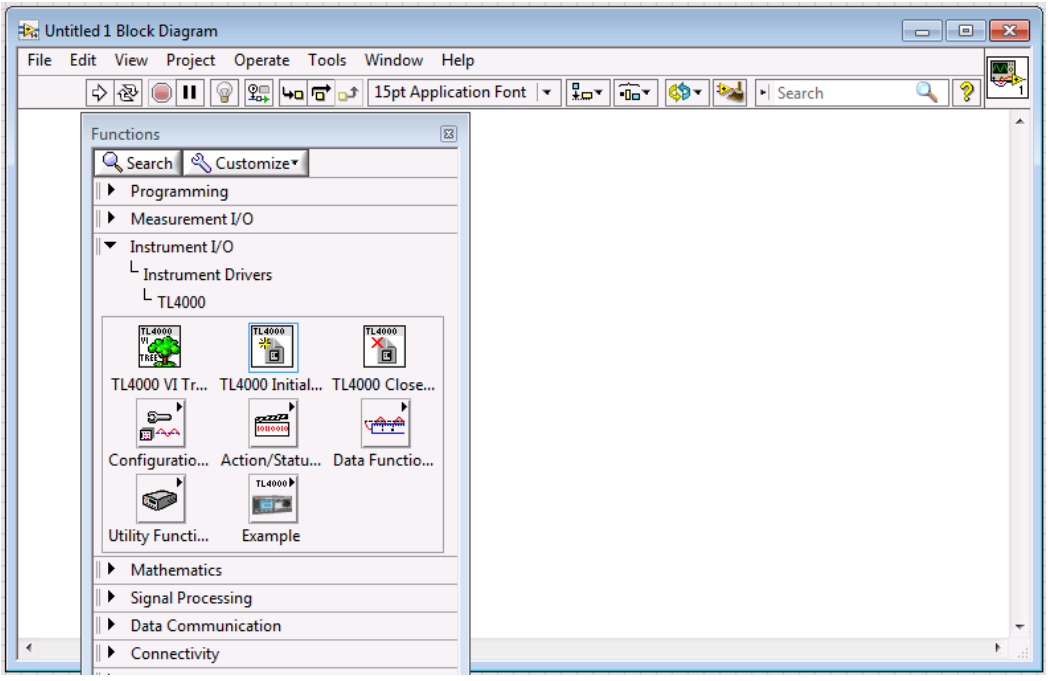
7. Open the Functions Palette from the View menu.



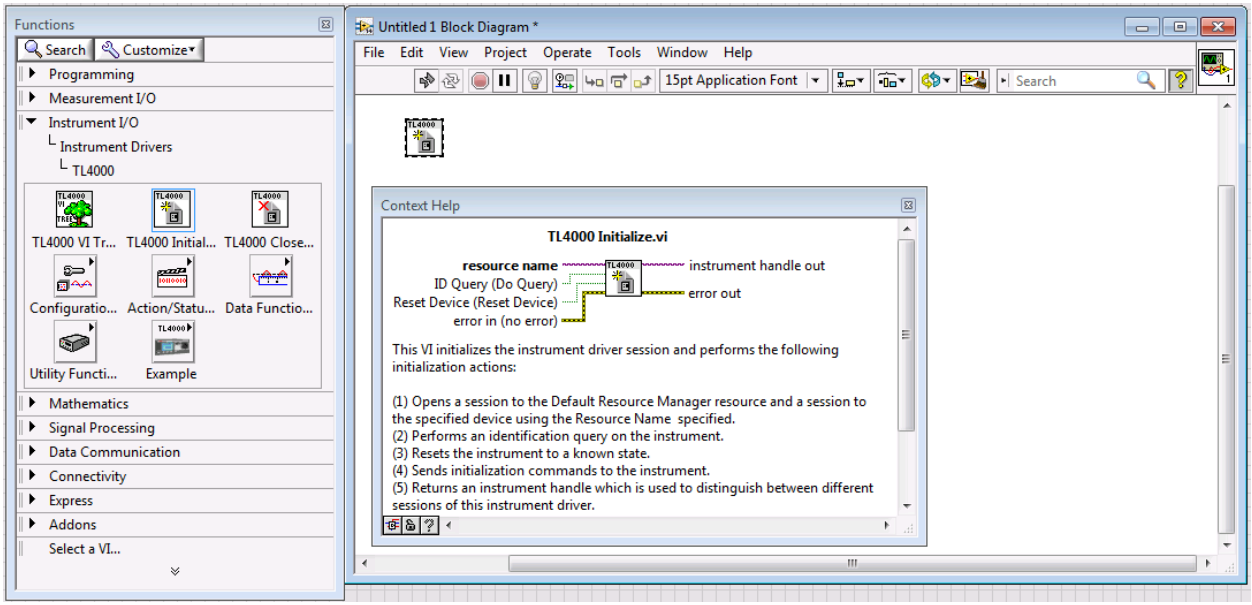
8. In the Instrument I/O>Instrument Drivers folder there should be a folder for the TL4000 subVIs.



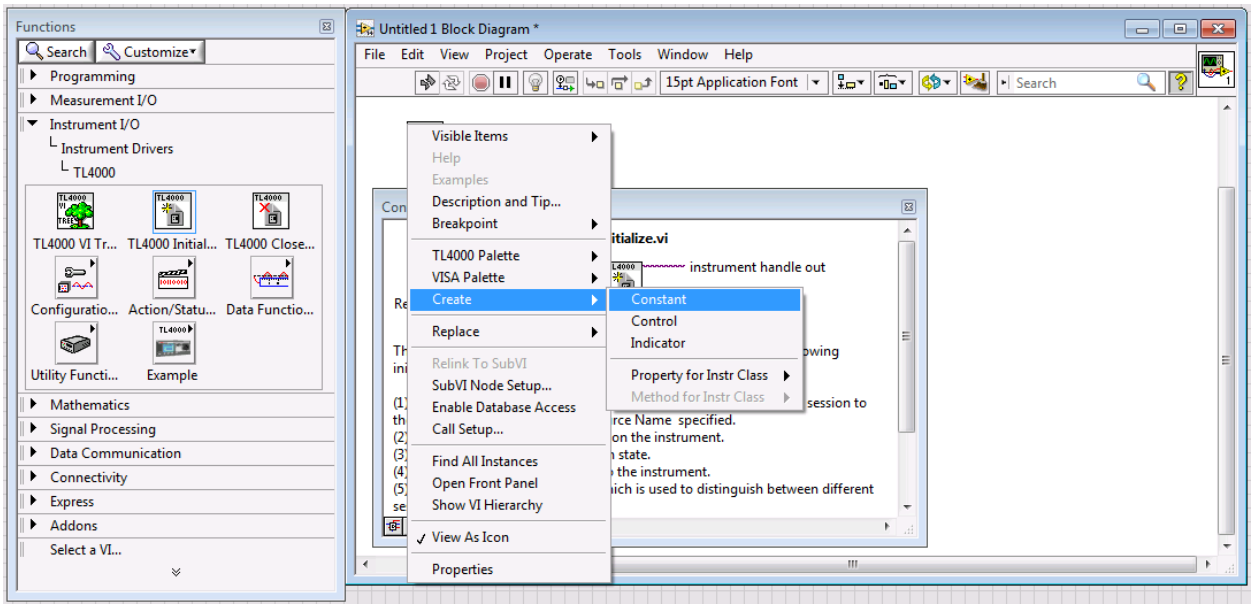
9. In the TL4000 folder select **TL4000 Initialize.vi**.



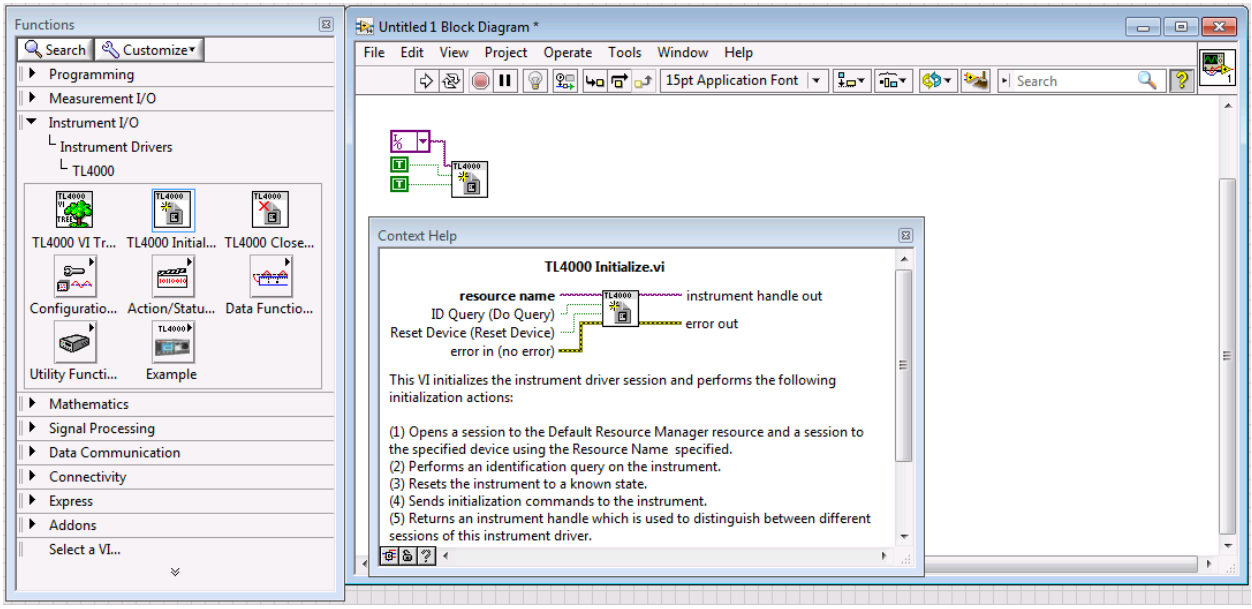
10. Place **TL4000** Initialize.vi on the block diagram. You can press Ctrl+H to open a help window which will show more information about any TL4000 subVI the mouse is hovering over.



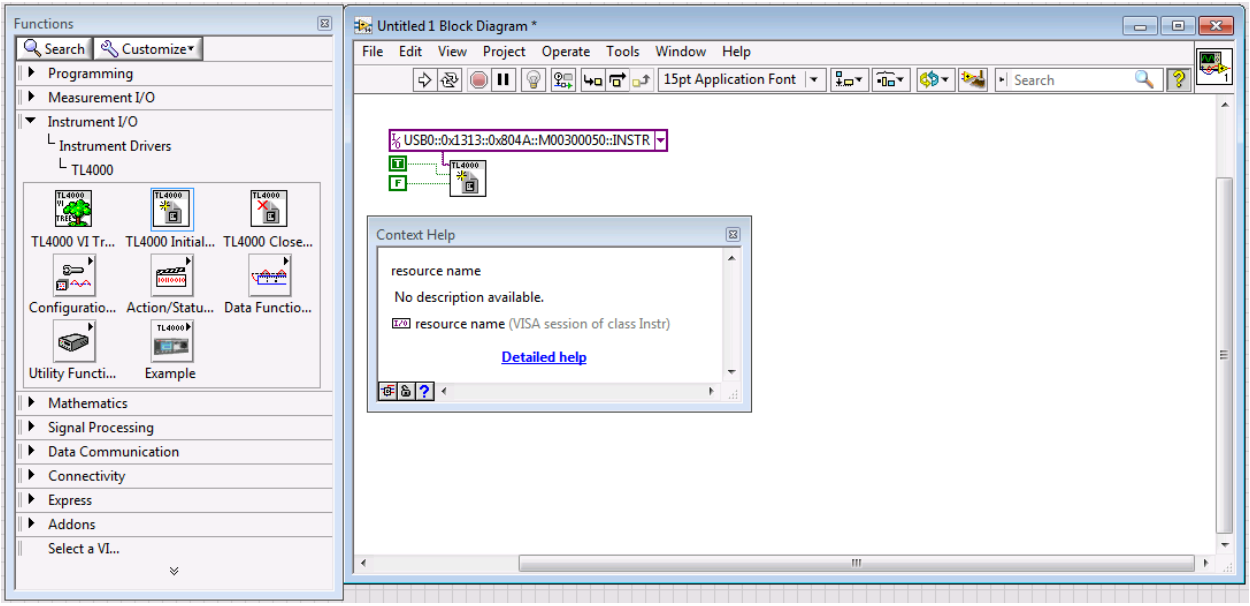
11. Place the cursor over the purple *resource name* node. It should change shape to a spool of wire (). Right-click on the node and select Constant from the Create menu.



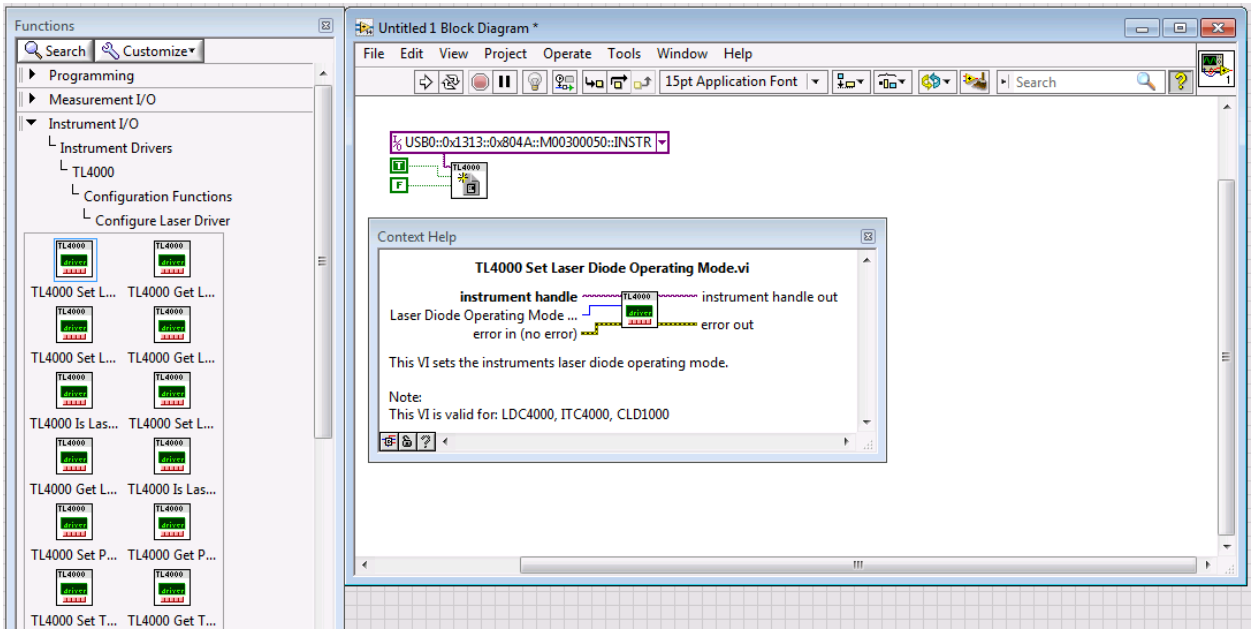
12. Do the same for the green *ID Query* and *Reset* nodes.



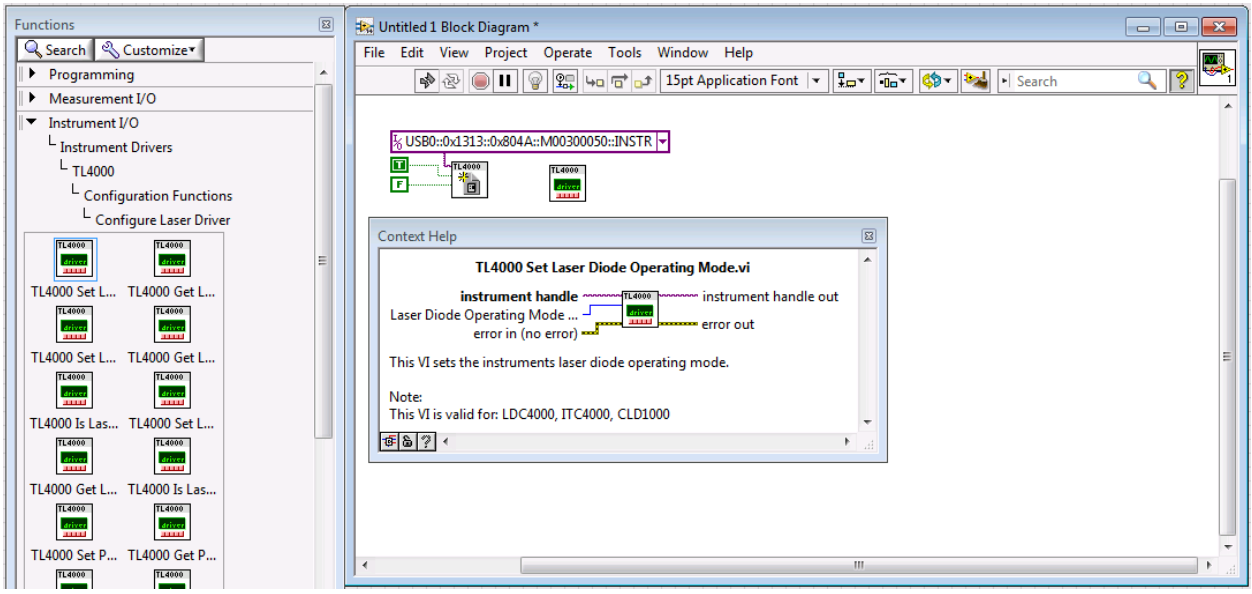
13. Left-click on the resource name constant and select your device resource name. *ID Query* can be left as T (true). Left-click on the *Reset Device* constant to change it to F (false).



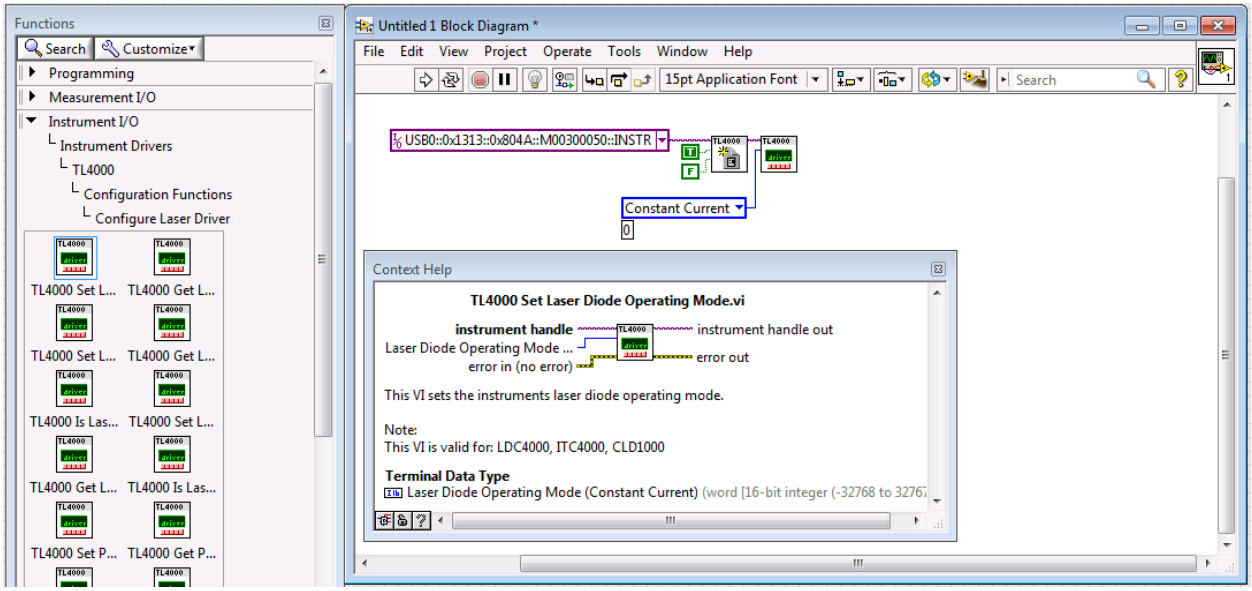
14. From the functions palette select **TL4000 Set Laser Diode Operating Mode.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Configuration Functions>Configure Laser Driver.



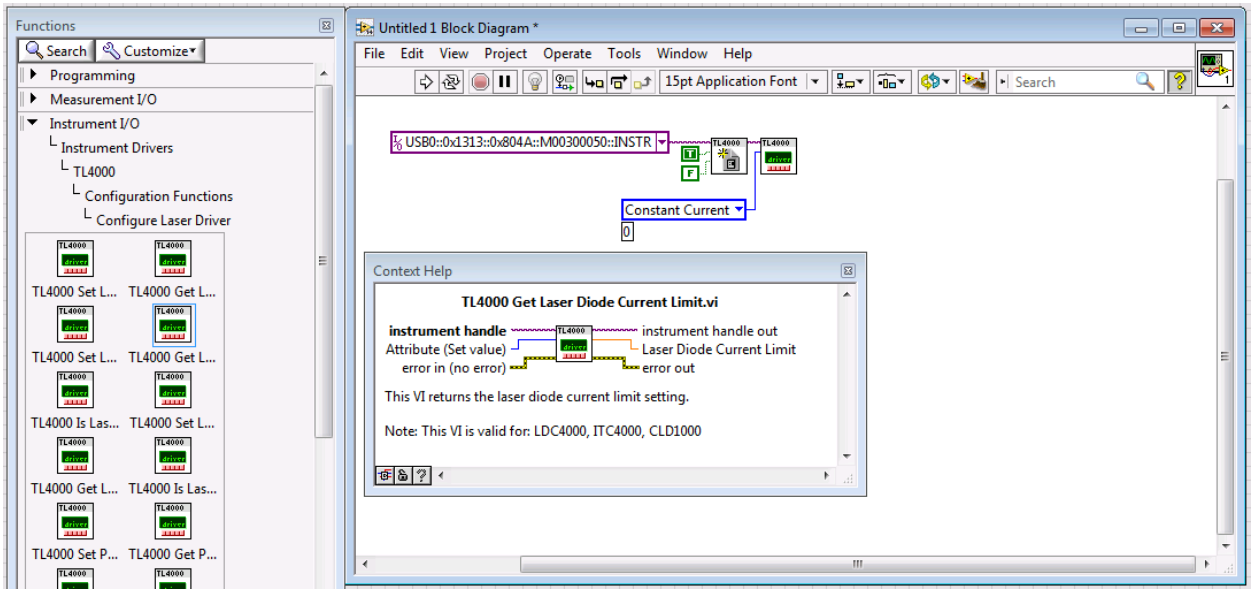
15. Place **TL4000 Set Laser Diode Operating Mode.vi** on the block diagram.



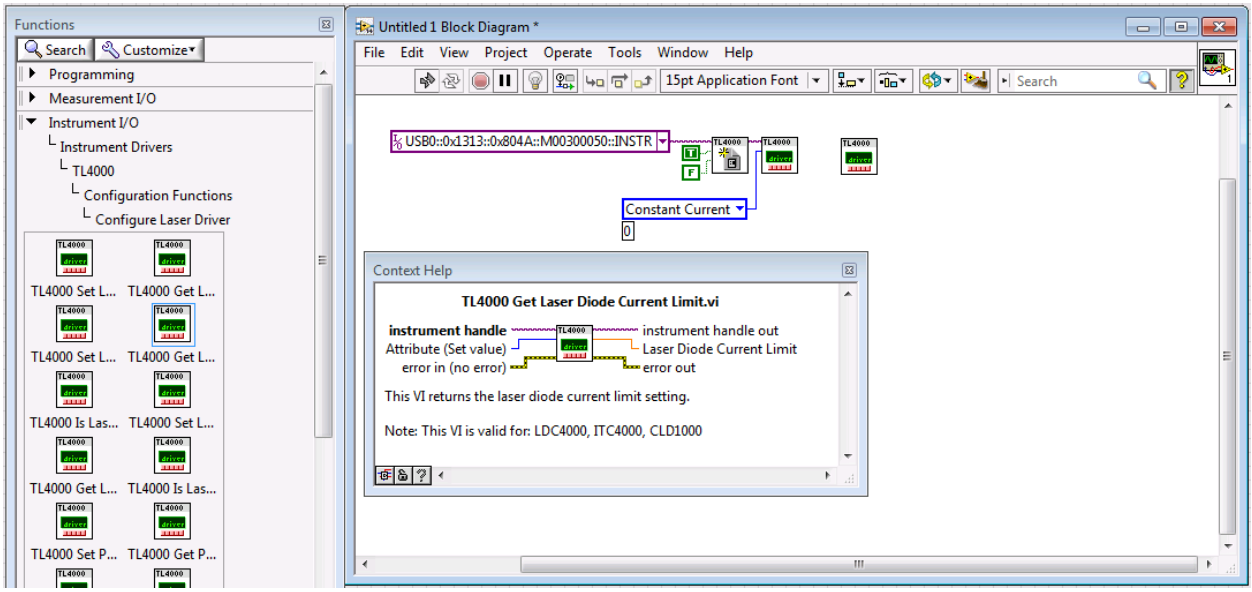
16. Connect the *instrument handle out* node on **TL4000 Initialize.vi** to instrument handle node on **TL4000 Set Laser Diode Operating Mode.vi**. Right-click on the blue *Laser Diode Operating Mode* node on **TL4000 Set Laser Diode Operating Mode.vi** and create a constant. The value should remain Constant Current.



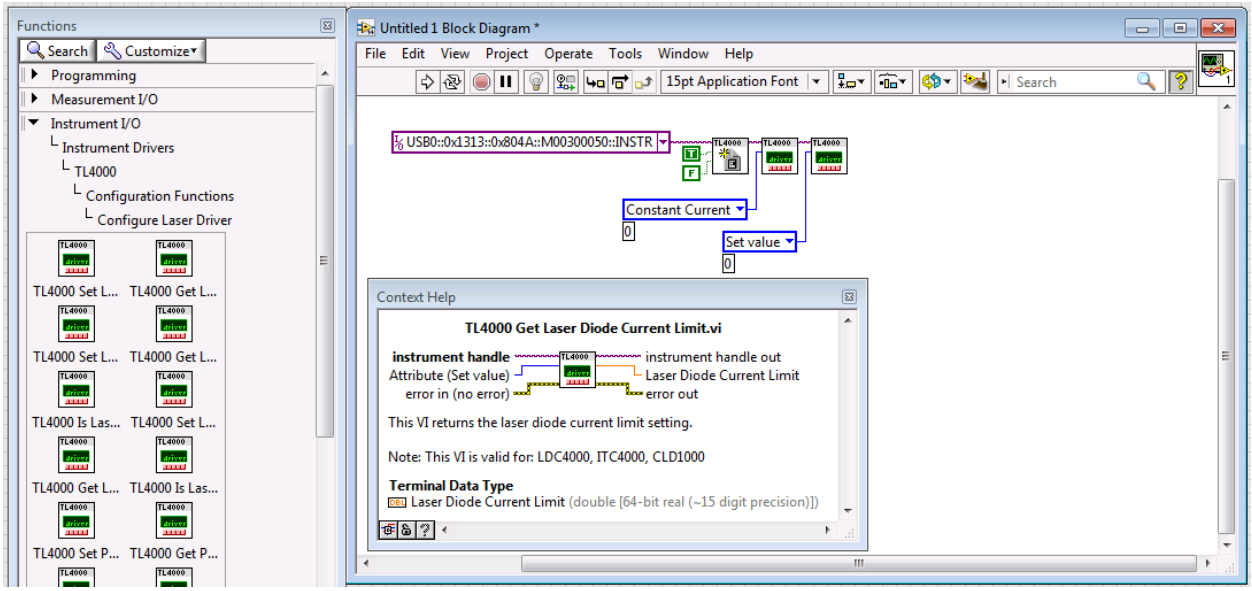
17. From the functions palette select **TL4000 Get Laser Diode Current Limit.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Configuration Functions>Configure Laser Driver.



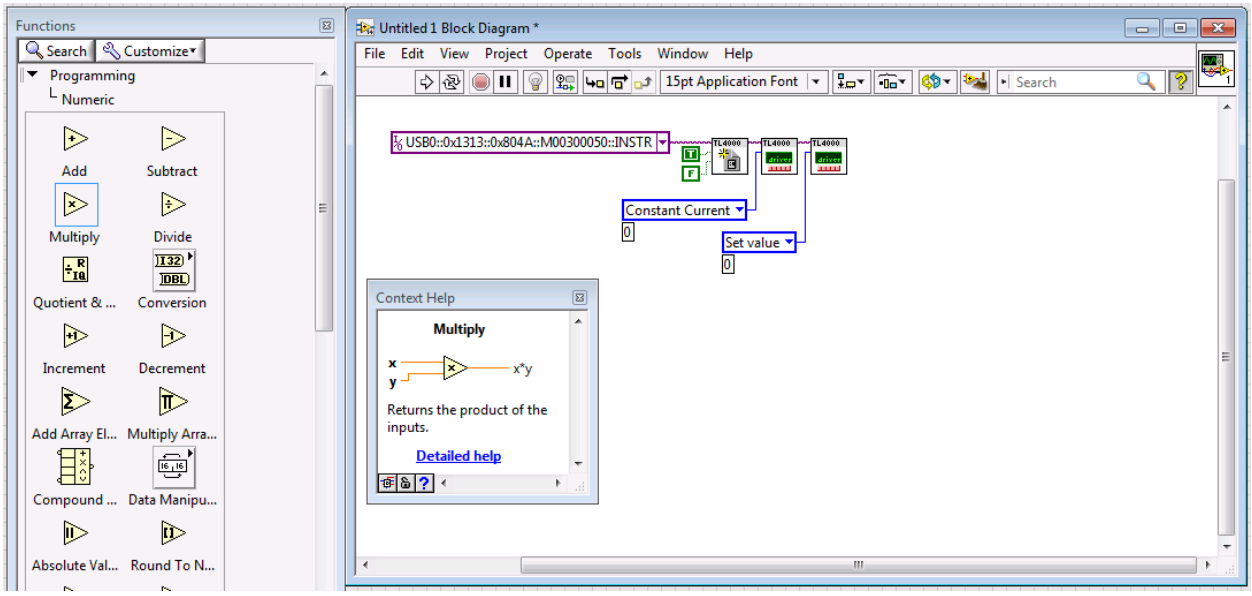
18. Place **TL4000 Get Laser Diode Current Limit.vi** on the block diagram.



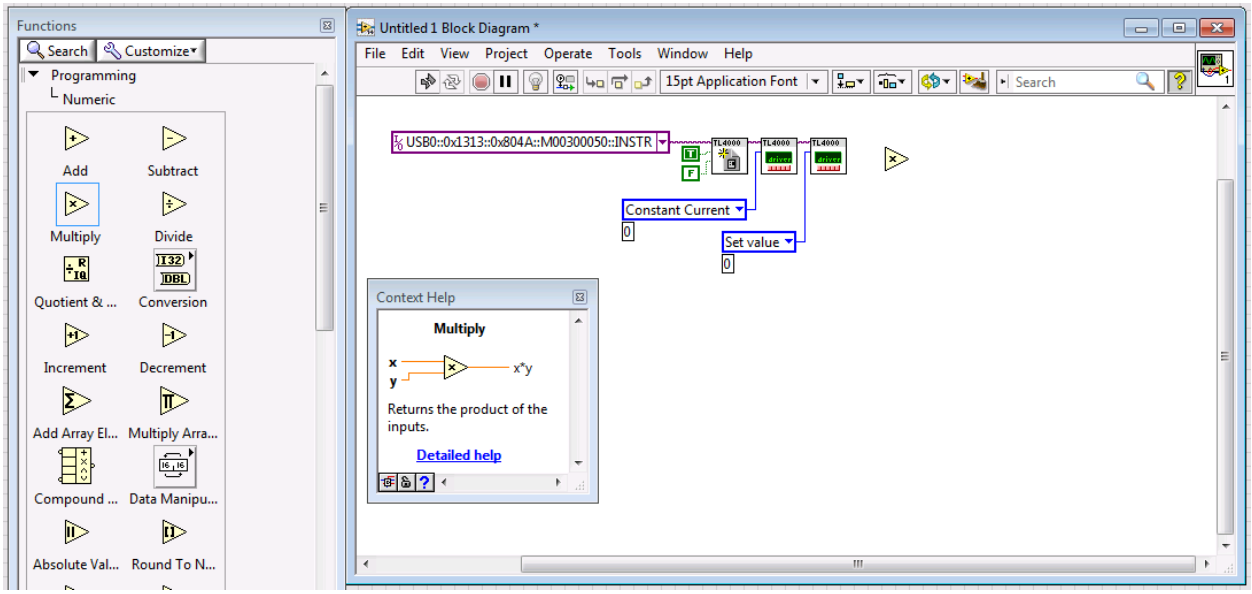
19. Connect the *instrument handle out* node on **TL4000 Set Laser Diode Operating Mode.vi** to *instrument handle* node on **TL4000 Get Laser Diode Current Limit.vi**. Right-click on the blue *Attribute (Set value)* node on **TL4000 Get Laser Diode Current Limit.vi** and create a constant. The value should remain Set value.



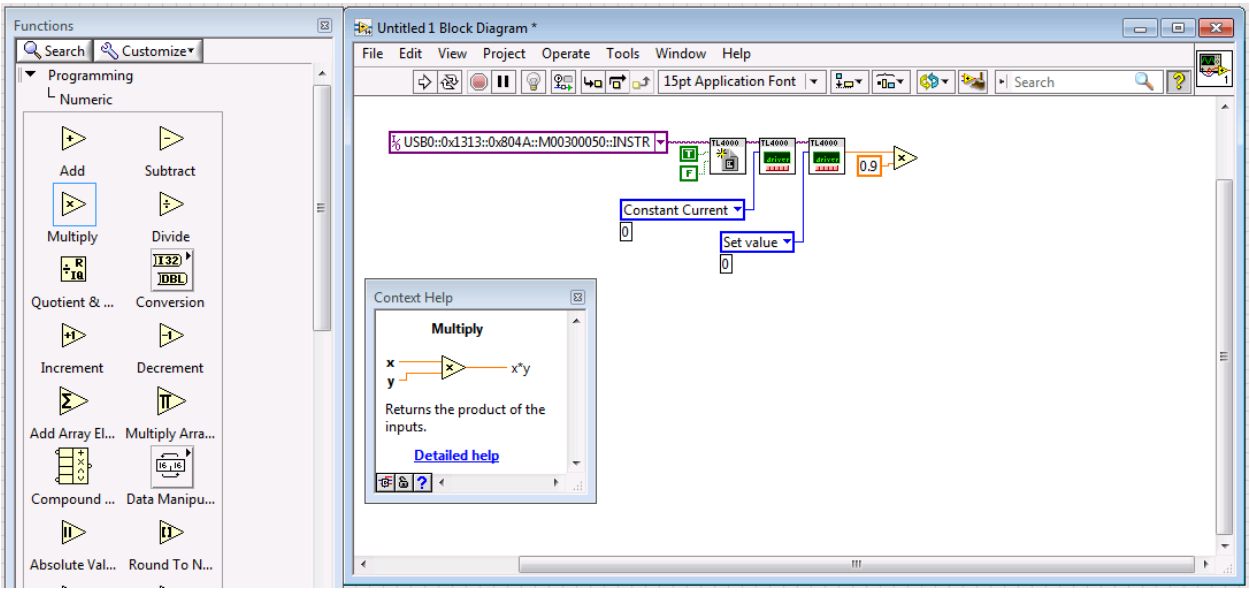
20. From the functions palette select **Multiply**. It is located in Programming>Numeric.



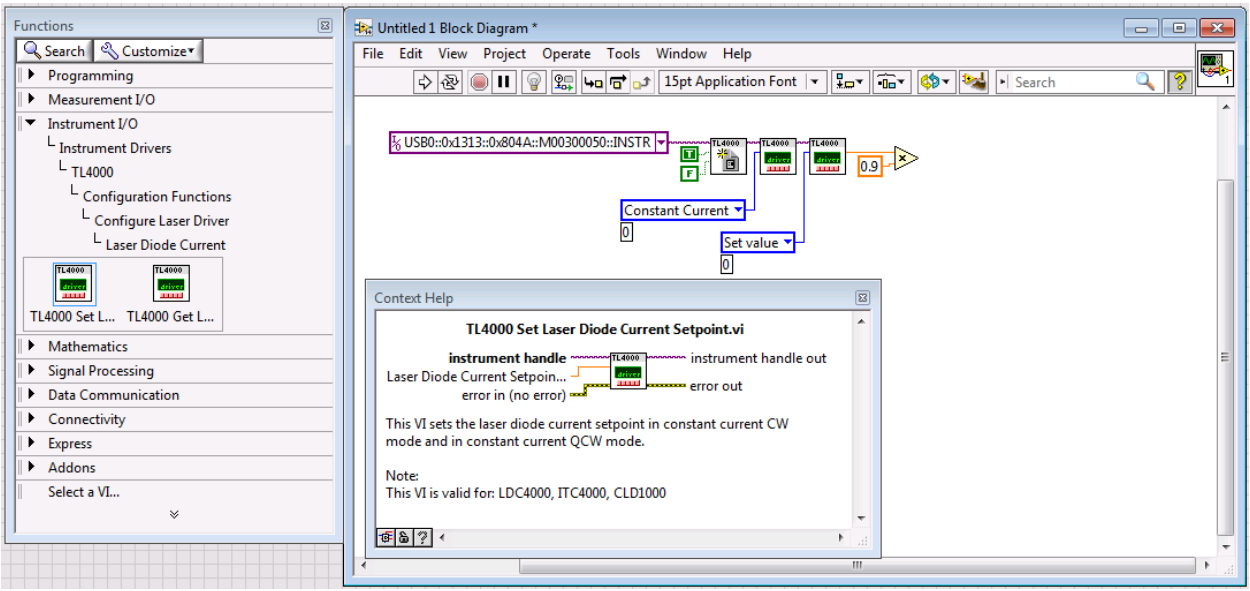
21. Place **Multiply** on the block diagram.



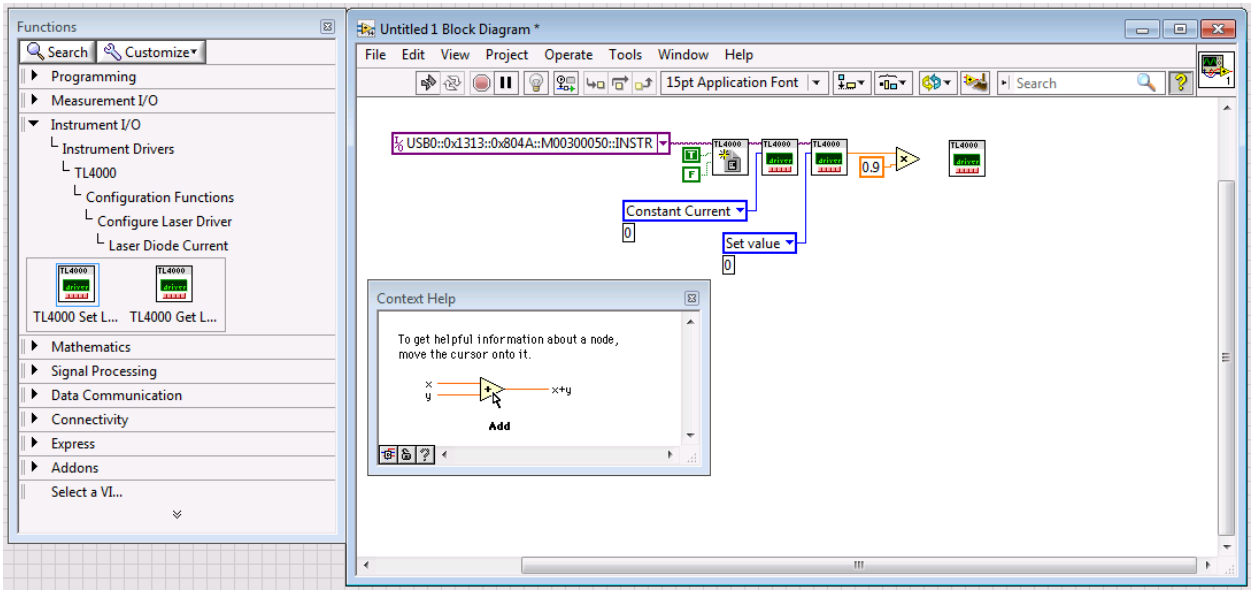
22. Connect the orange *Laser Diode Current Limit* node on **TL4000 Get Laser Diode Current Limit.vi** to one of the input nodes on **Multiply**. Right-click on the other node to create a constant. Double-click on the constant and change the value to 0.9.



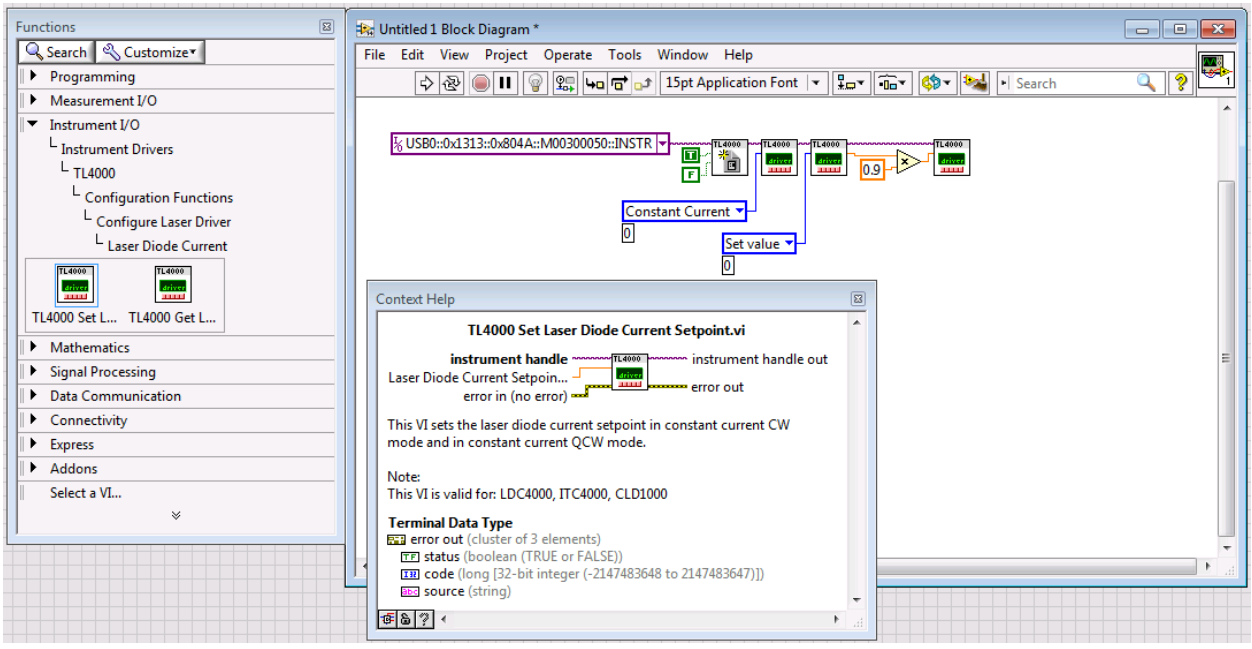
23. From the functions palette select **TL4000 Set Laser Diode Current Setpoint.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Configuration Functions>Configure Laser Driver>Laser Diode Current.



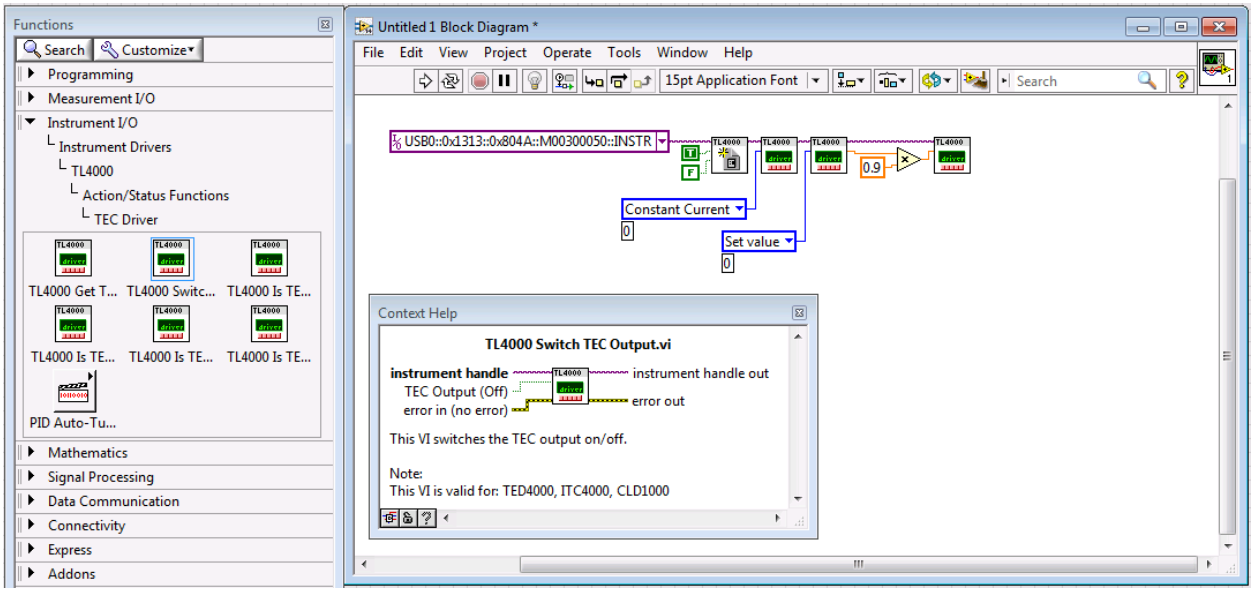
24. Place **TL4000 Set Laser Diode Current Setpoint.vi** on the block diagram.



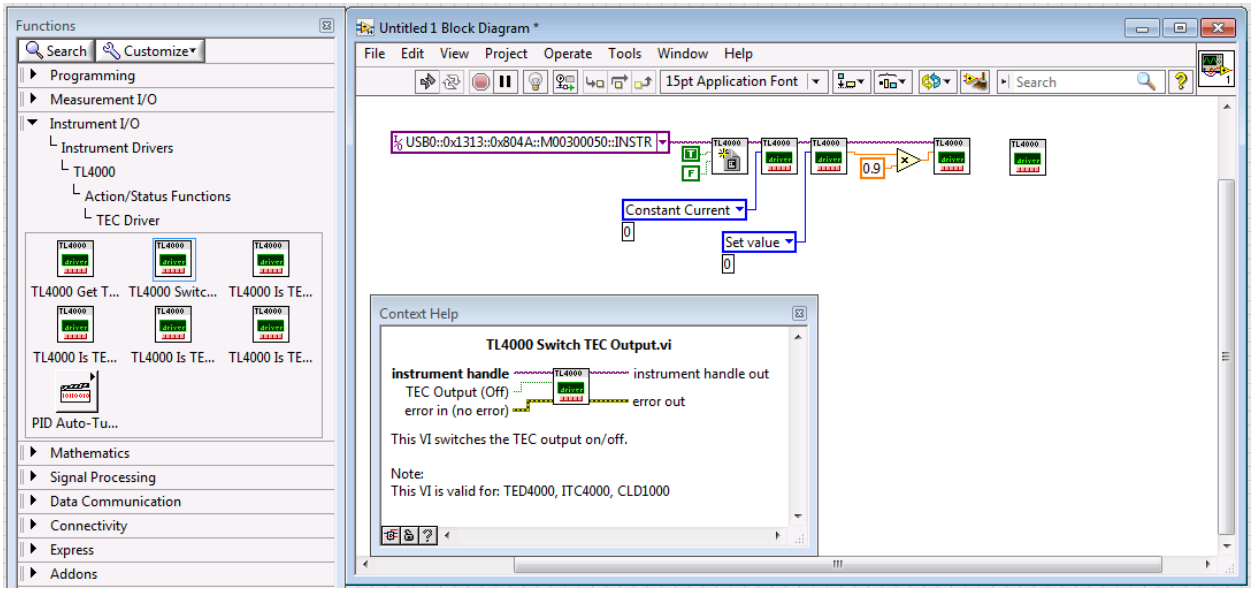
25. Connect the instrument handle out node on **TL4000 Get Laser Diode Current Limit.vi** to *instrument handle* node on **TL4000 Set Laser Diode Current Setpoint.vi**. Connect the result of the **Multiply** function to the orange *Laser Diode Current Setpoint* node on **TL4000 Set Laser Diode Current Setpoint.vi**.



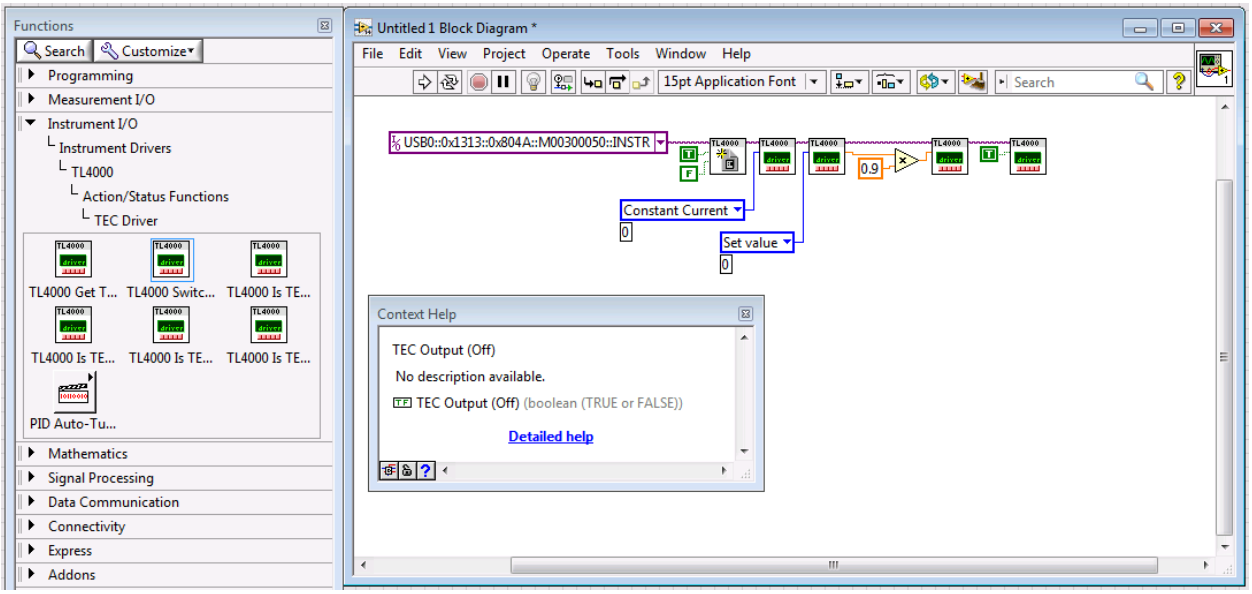
26. From the functions palette select **TL4000 Switch TEC Output.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Action/Status Functions>TEC Driver.



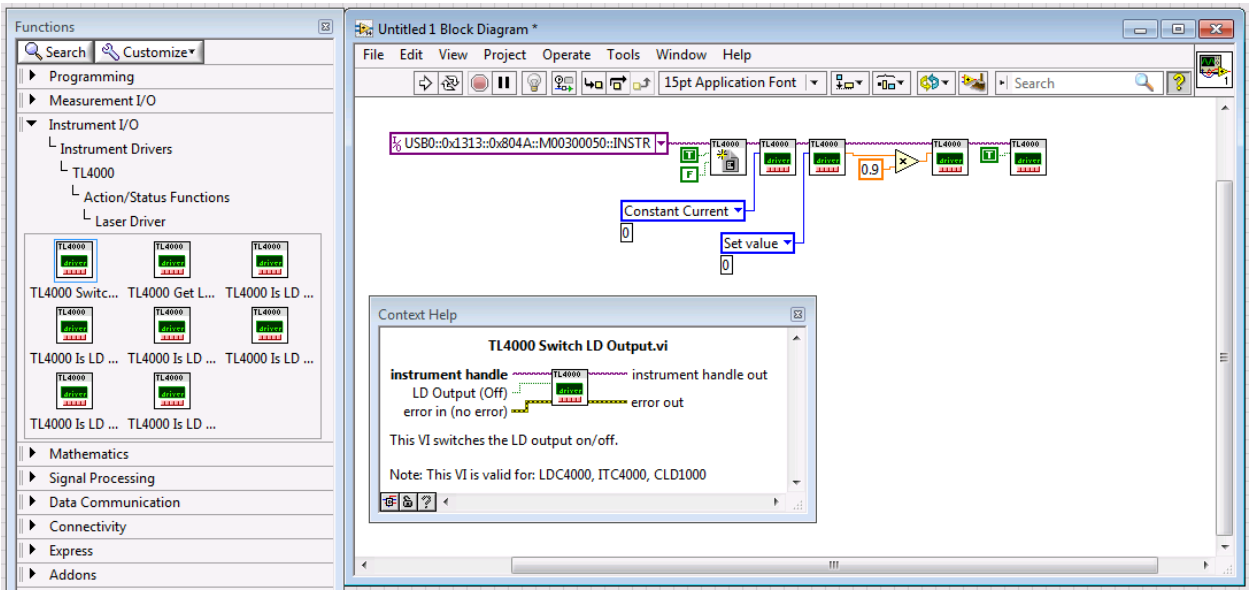
27. Place **TL4000 Switch TEC Output.vi** on the block diagram.



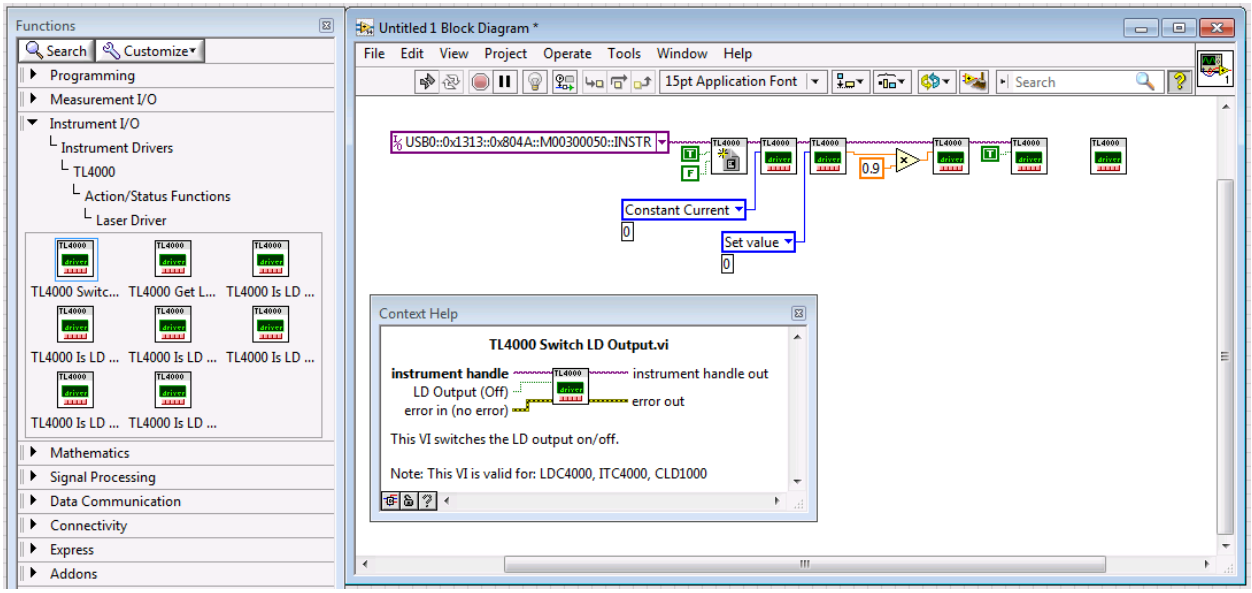
28. Connect the *instrument handle out* node on **TL4000 Set Laser Diode Current Setpoint.vi** to *instrument handle* node on **TL4000 Switch TEC Output.vi**. Right-click on the green *TEC Output* (Off) node on **TL4000 Switch TEC Output.vi** and create a constant. Left-click on the constant to change the value to T (true).



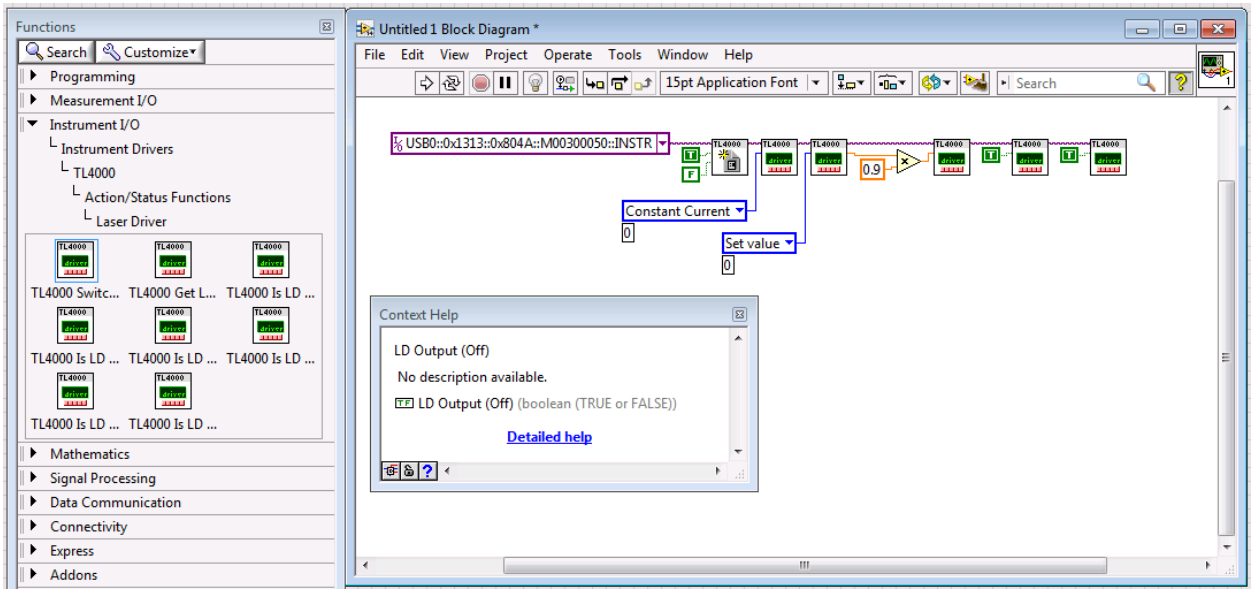
29. From the functions palette select **TL4000 Switch LD Output.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Action/Status Functions>Laser Driver.



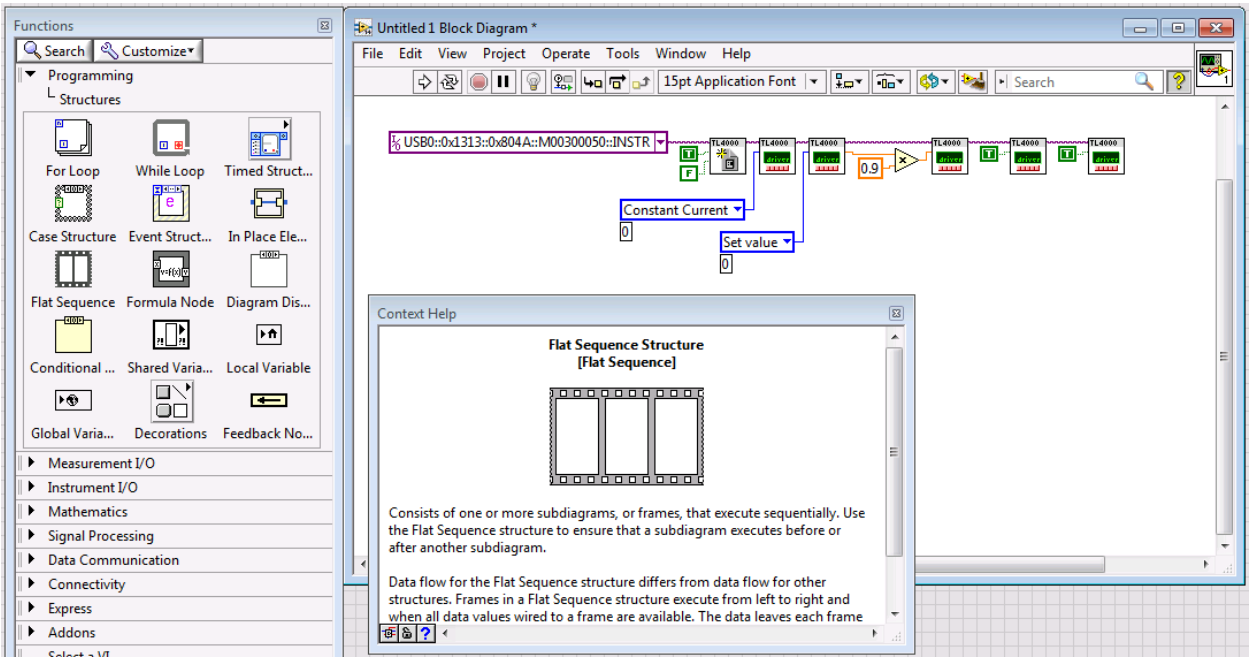
30. Place **TL4000 Switch LD Output.vi** on the block diagram.



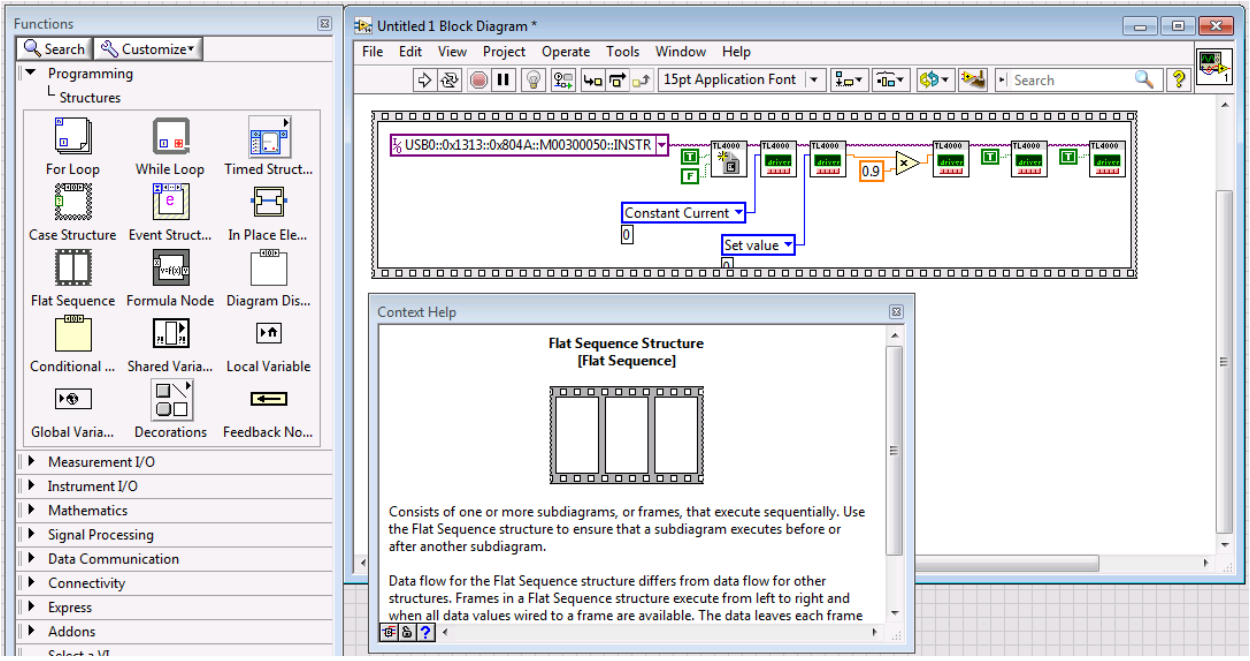
31. Connect the *instrument handle out* node on **TL4000 Switch TEC Output.vi** to *instrument handle* node on **TL4000 Switch LD Output.vi**. Right-click on the green *LD Output (Off)* node on **TL4000 Switch LD Output.vi** and create a constant. Left-click on the constant to change the value to T (true).



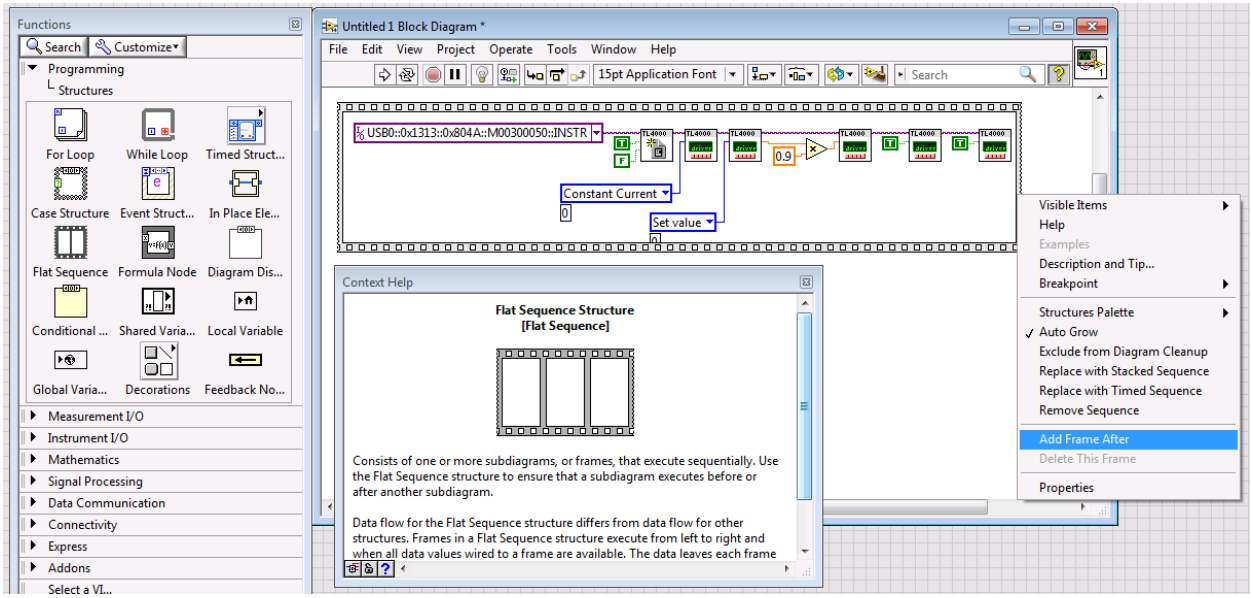
32. From the functions palette select **Flat Sequence Structure**. It is located in Programming>Structures.



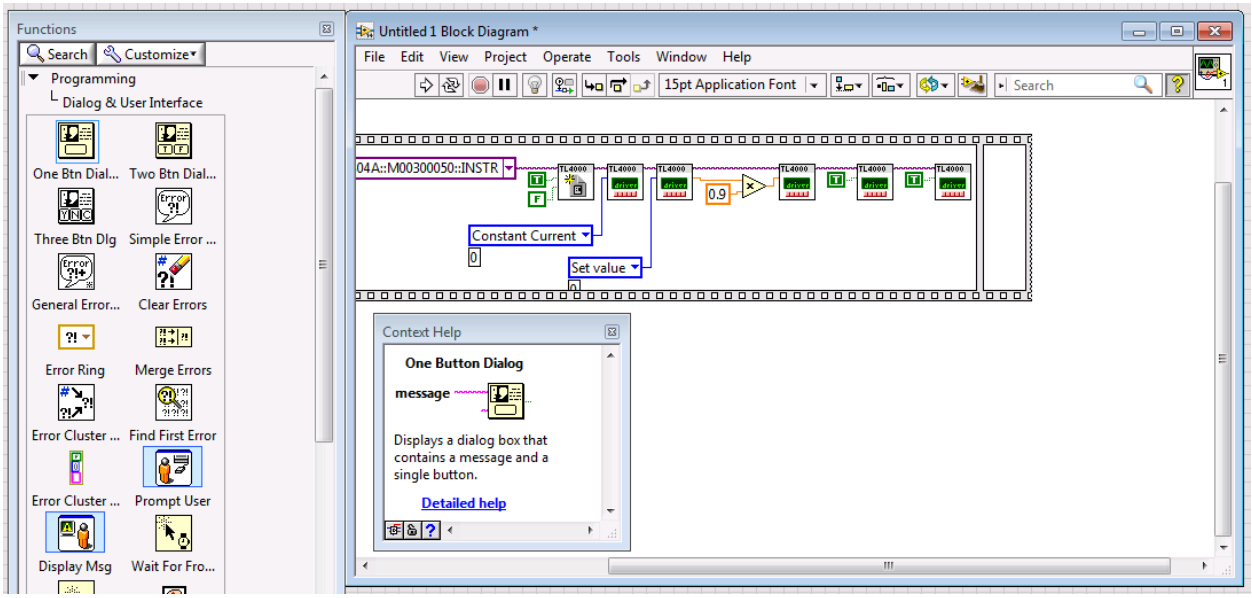
33. Click and drag the **Flat Sequence Structure** over all of the code currently on the block diagram.



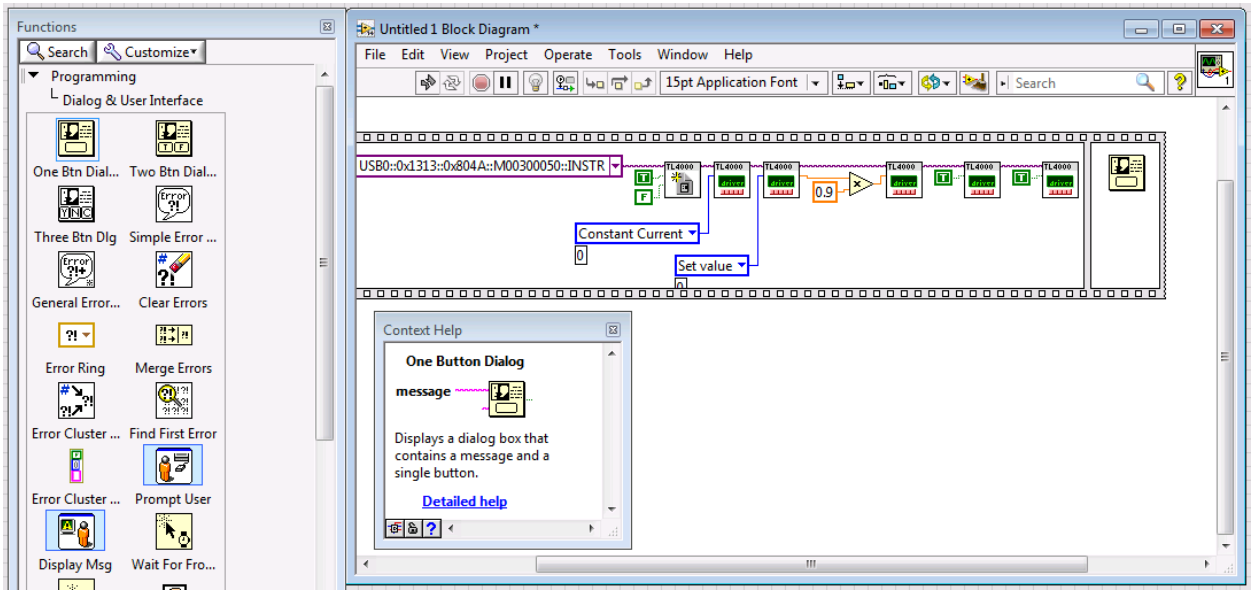
34. Right-click on the right-most border of the **Flat Sequence Structure** and select Add Frame After.



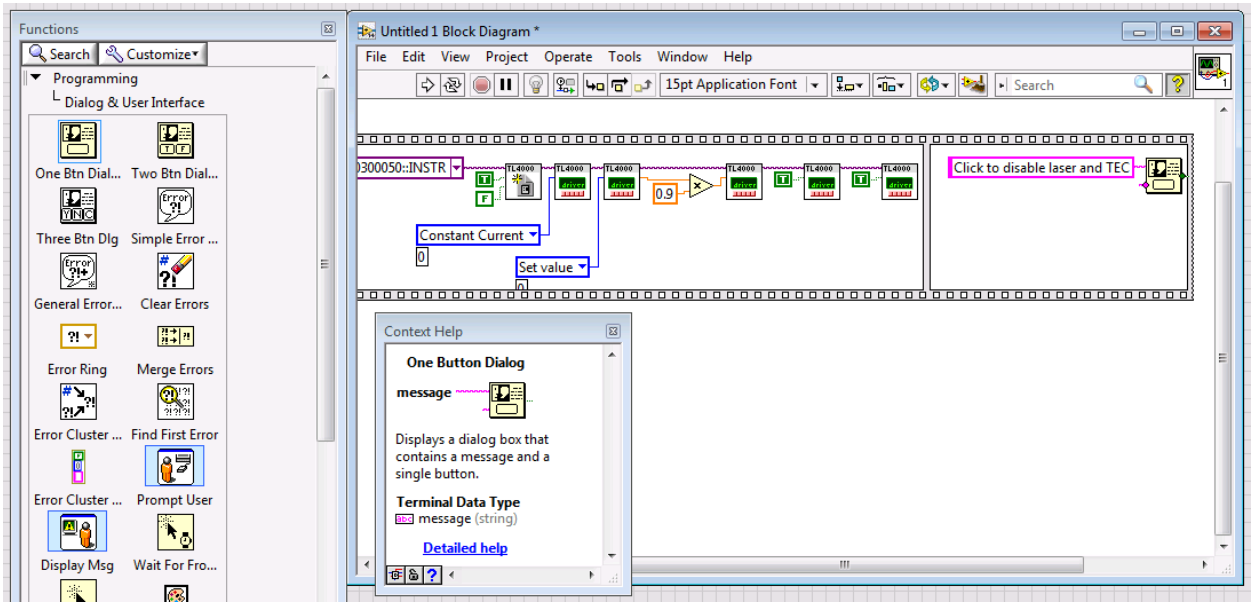
35. From the functions palette select **One Button Dialog**. It is located in Programming>Dialog & User Interface.



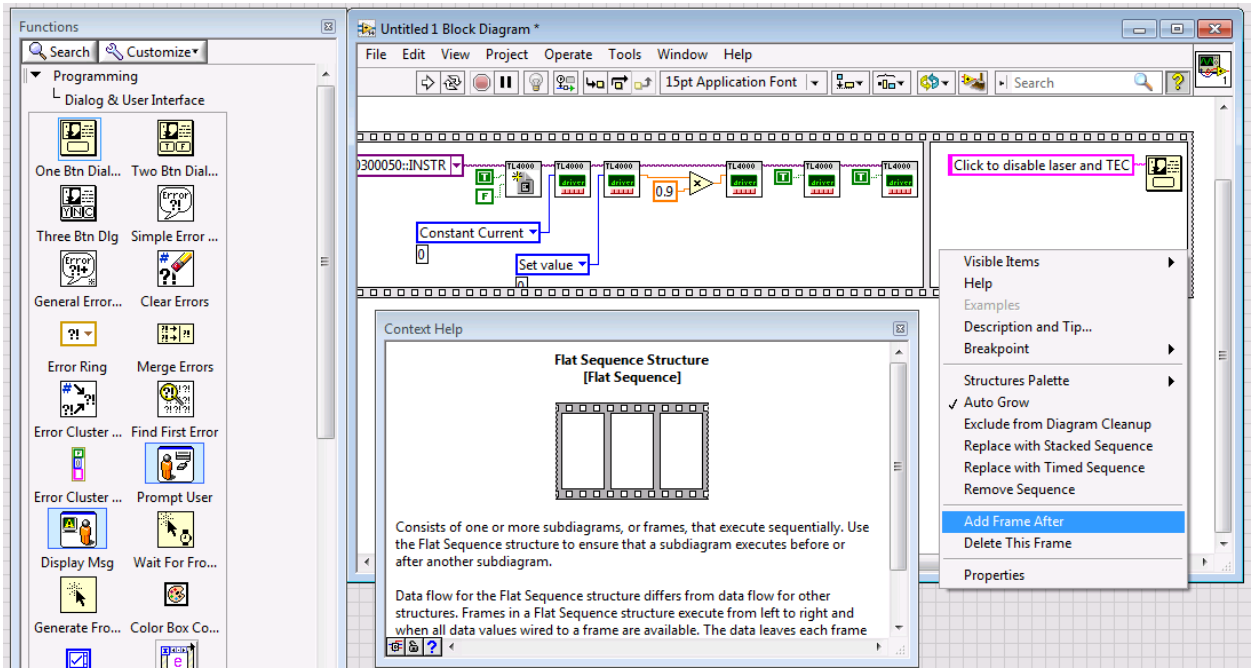
36. Place the **One Button Dialog** on the block diagram in the right-most frame of the **Flat Sequence Structure**.



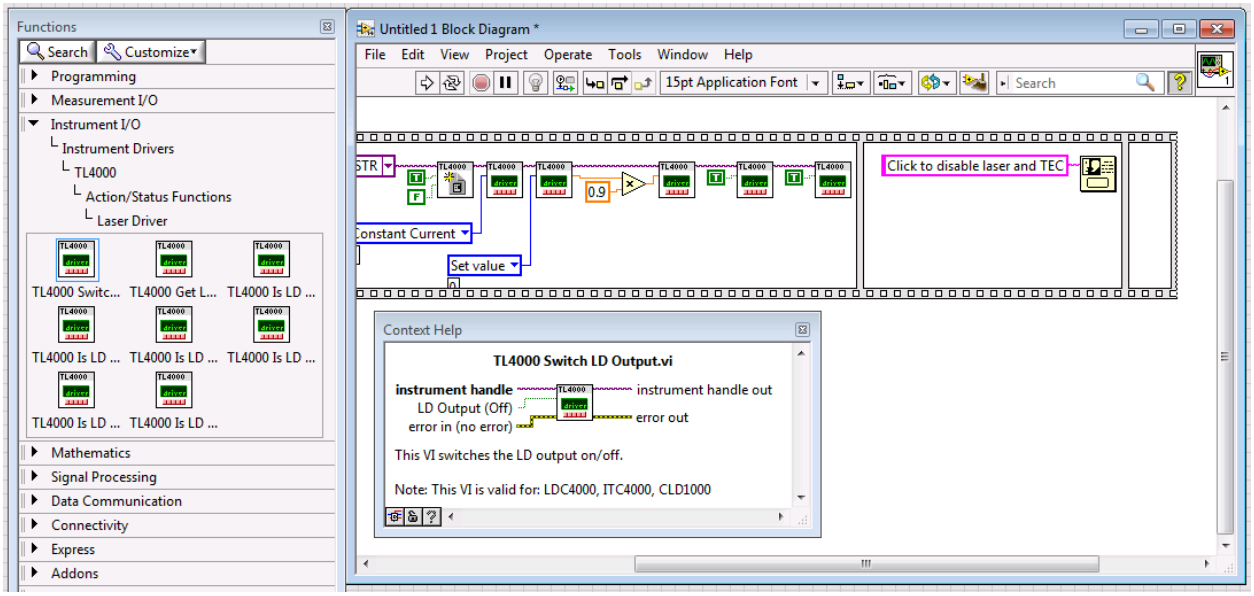
37. Create a constant for the **One Button Dialog** message. Double-click the constant to change its value to an appropriate string.



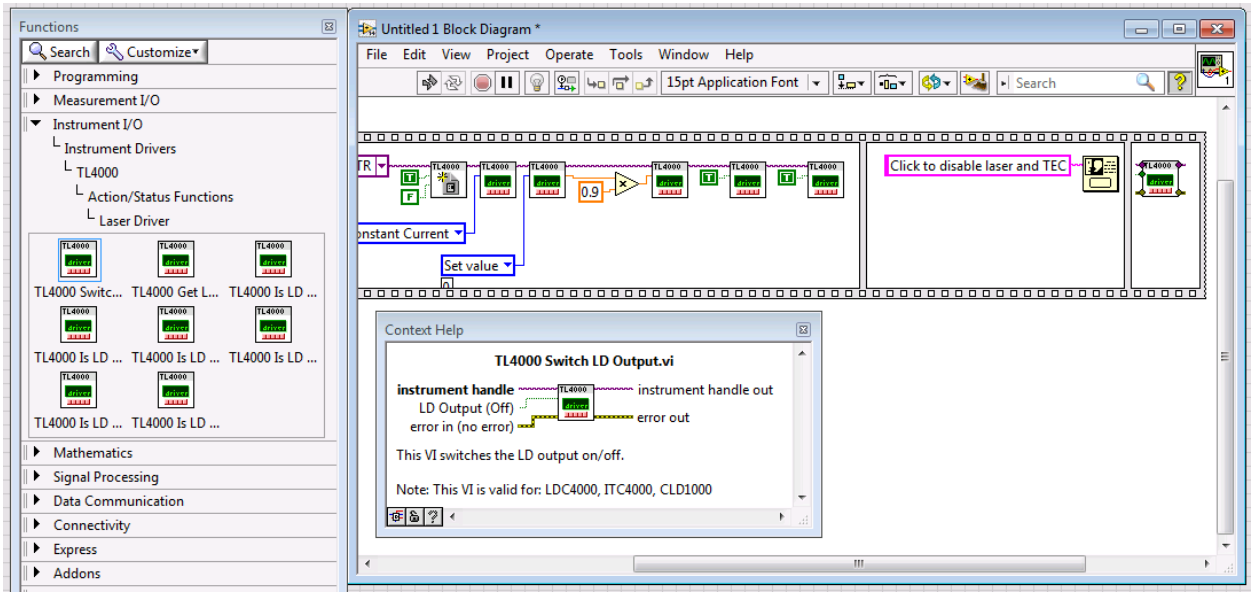
38. Right-click on the right-most border of the **Flat Sequence Structure** and select Add Frame After.



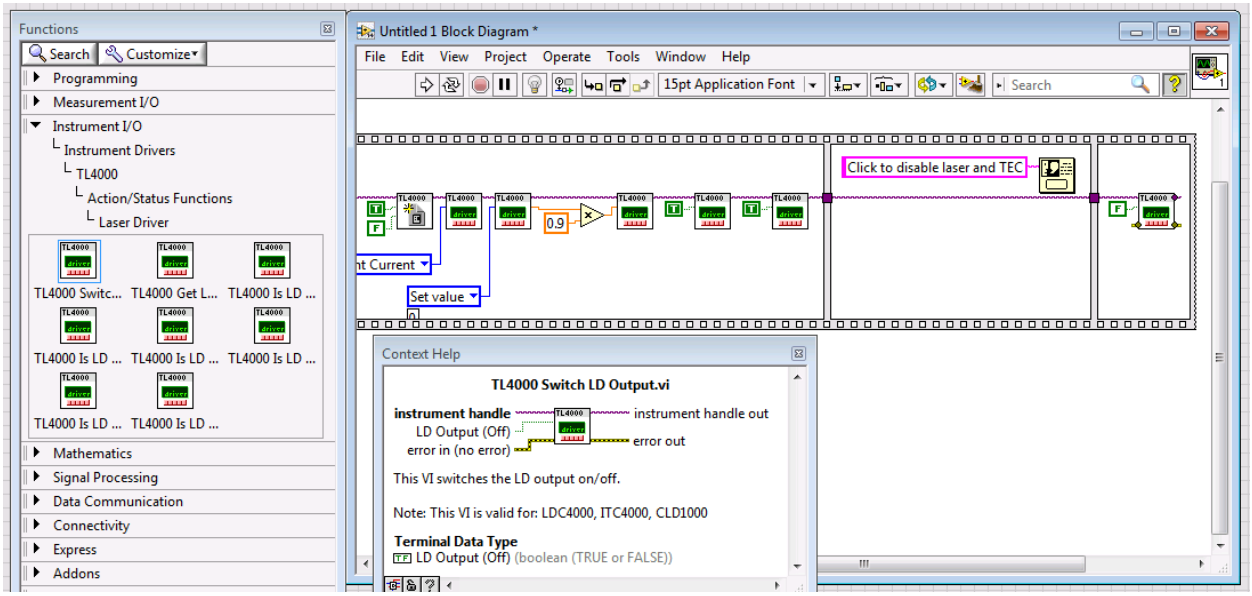
39. From the functions palette select **<u>TL4000 Switch LD Output.vi</u>**. It is located in Instrument I/O>Instrument Drivers>TL4000>Action/Status Functions>Laser Driver.



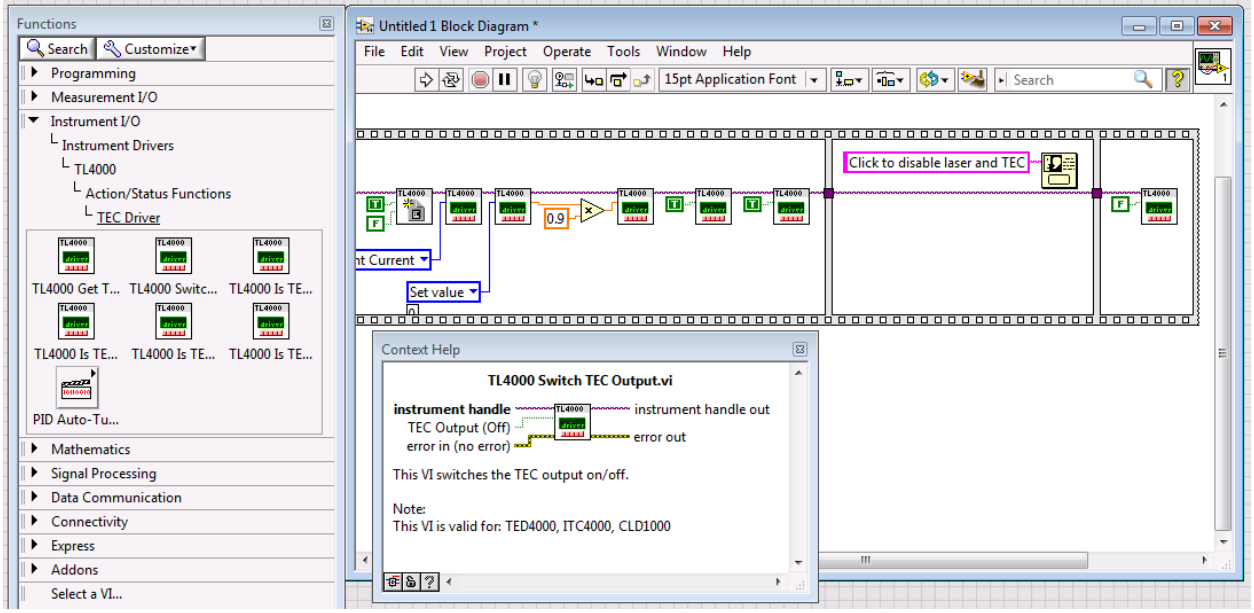
40. Place **TL4000 Switch LD Output.vi** on the block diagram in the right-most frame of the **Flat Sequence Structure**.



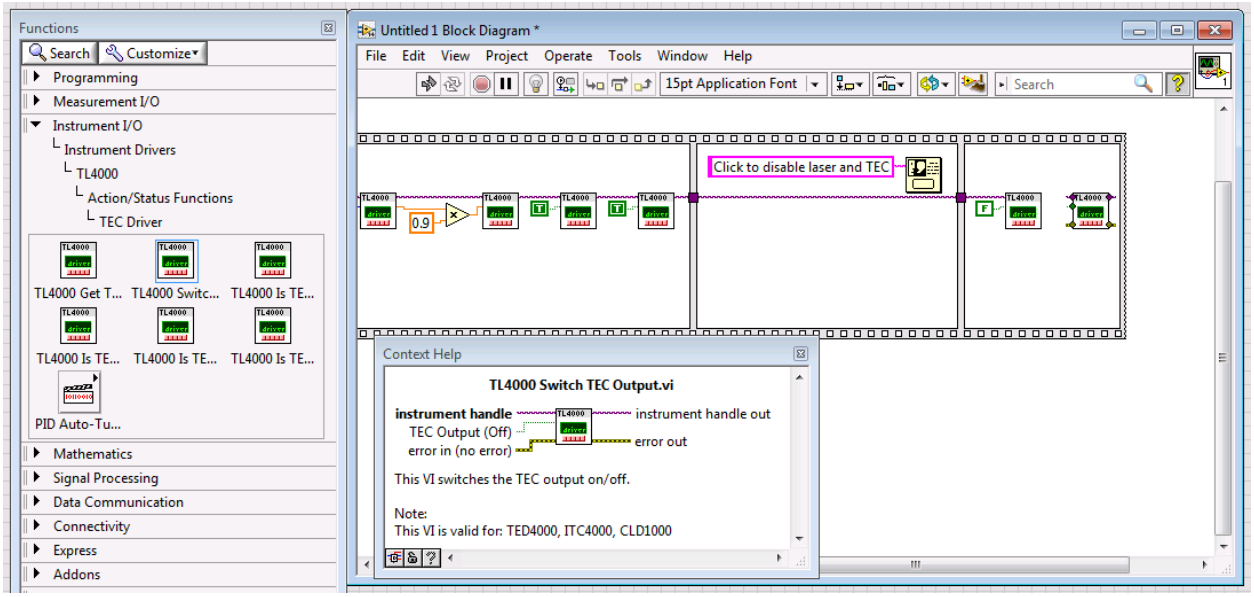
41. Connect the *instrument handle out* node on the first **TL4000 Switch LD Output.vi** to *instrument handle* node on the second **TL4000 Switch LD Output.vi**. Right-click on the green *LD Output (Off)* node on the second **TL4000 Switch LD Output.vi** and create a constant. The value should remain F (false).



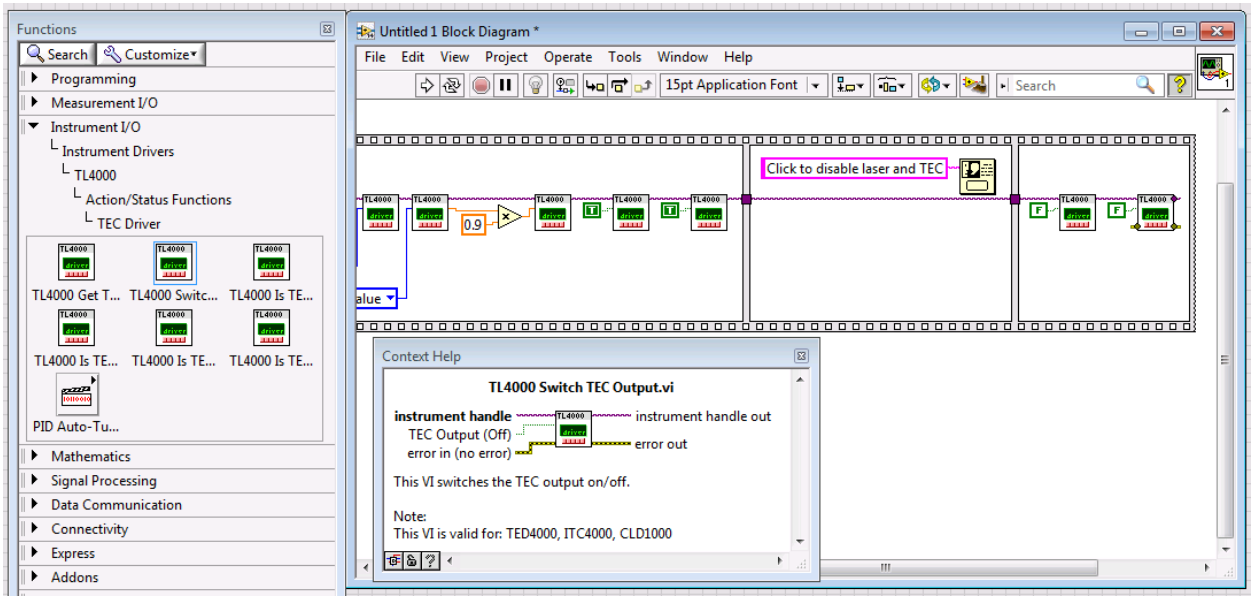
42. From the functions palette select **TL4000 Switch TEC Output.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000>Action/Status Functions>TEC Driver.



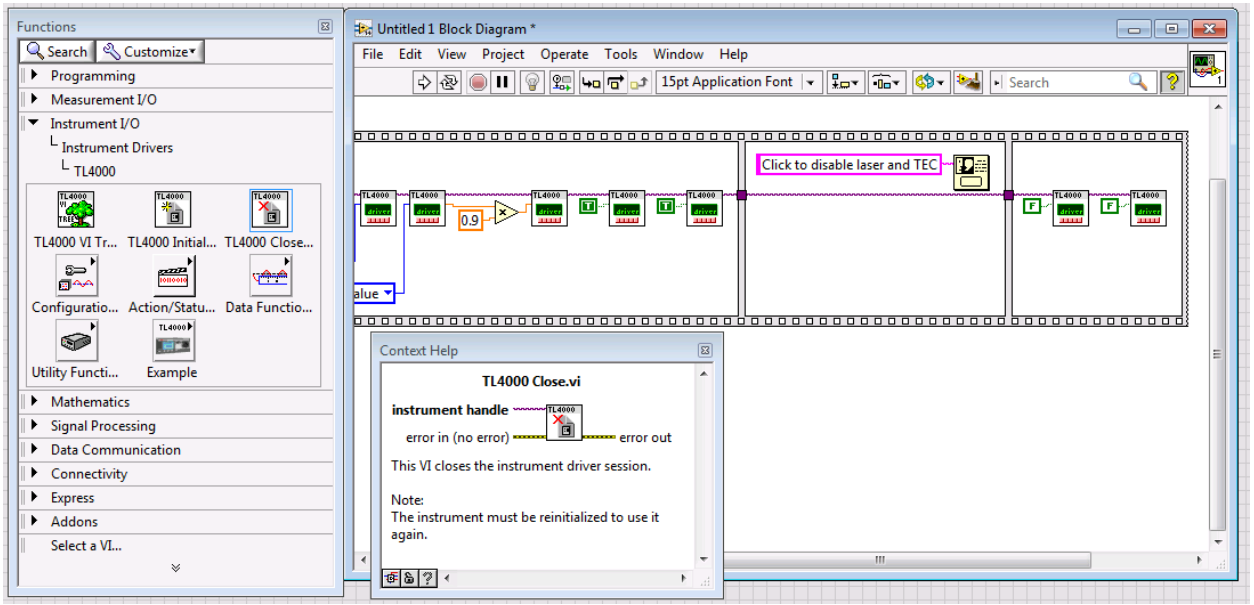
43. Place **TL4000 Switch TEC Output.vi** on the block diagram in the right-most frame of the **Flat Sequence Structure**.



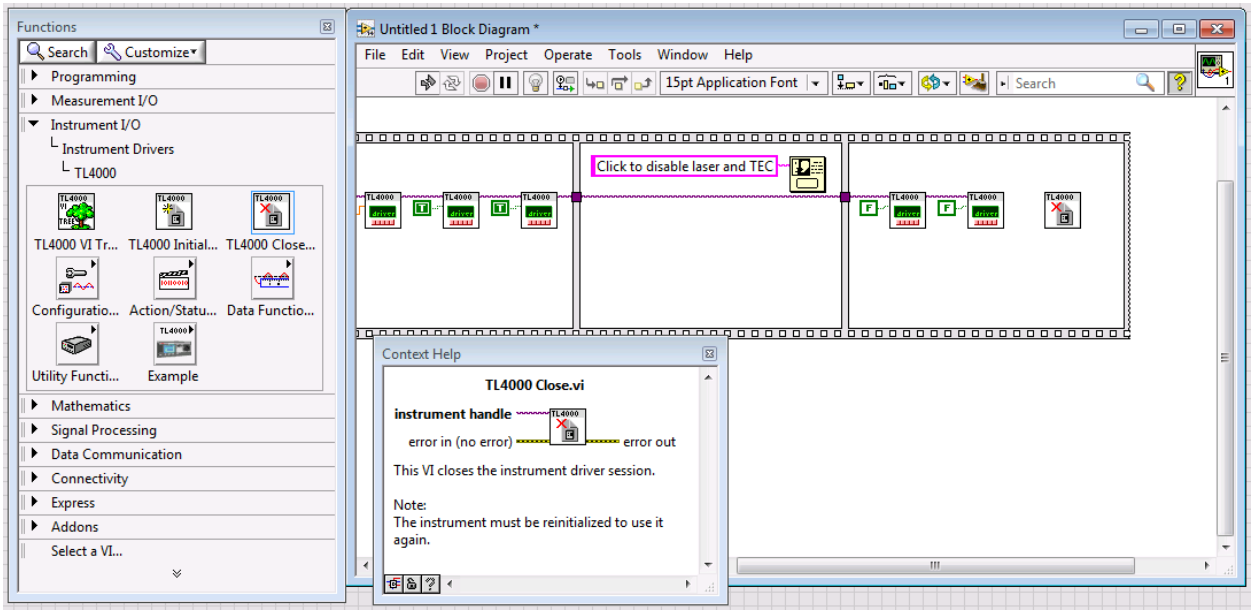
44. Connect the *instrument handle out* node on the second **TL4000 Switch LD Output.vi** to *instrument handle* node on the second **TL4000 Switch TEC Output.vi**. Right-click on the green *TEC Output (Off)* node on the second **TL4000 Switch TEC Output.vi** and create a constant. The value can remain F (false).



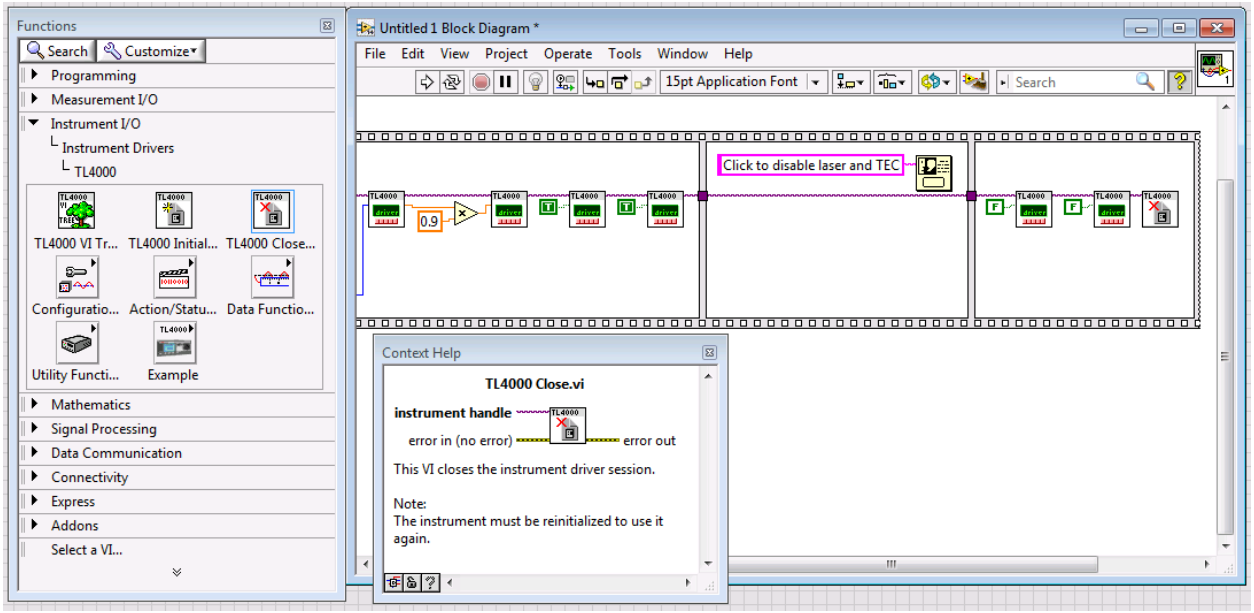
45. From the functions palette select **TL4000 Close.vi**. It is located in Instrument I/O>Instrument Drivers>TL4000.



46. Place **TL4000 Close.vi** on the block diagram in the right-most frame of the **Flat Sequence Structure**.



47. Connect the *instrument handle out* node on the second **TL4000 Switch TEC Output.vi** to *instrument handle* node on **TL4000 Close.vi**.



48. Press the arrow ( ) in the top left to run the program.