THORLABS

Application Note

OSA20x LabVIEW Programming

This is a brief overview of how to get started making a custom program to communicate with an OSA20x series Optical Spectrum Analyzer. 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.

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Date: 16-06-2015

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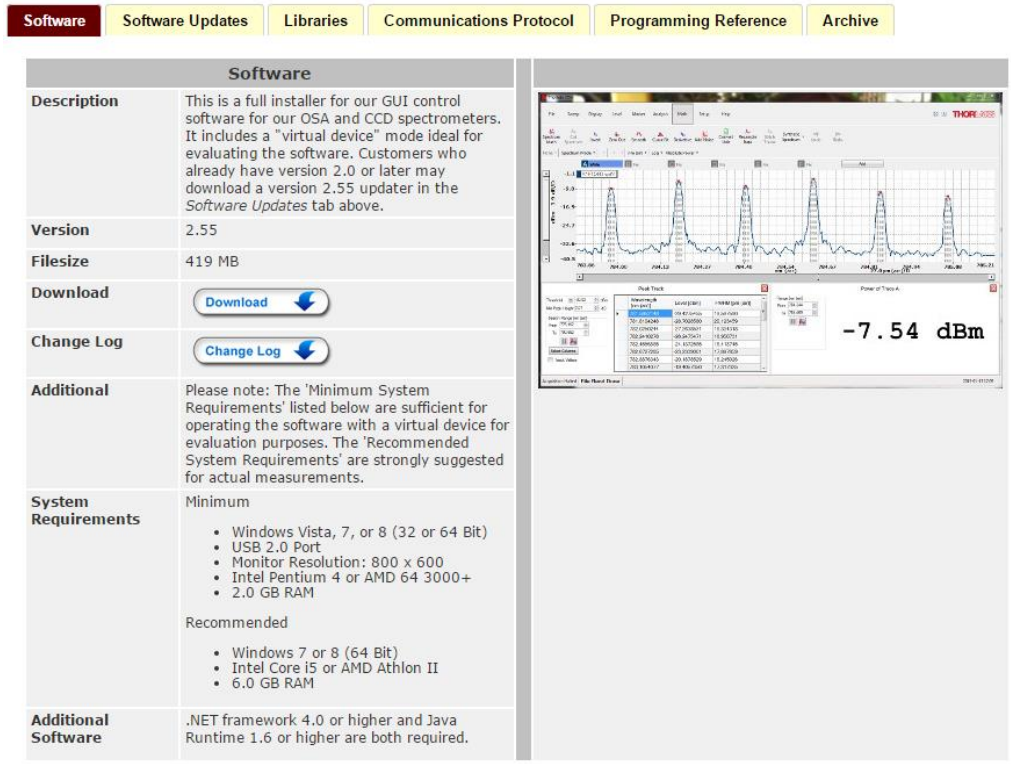
Part 1. Preface

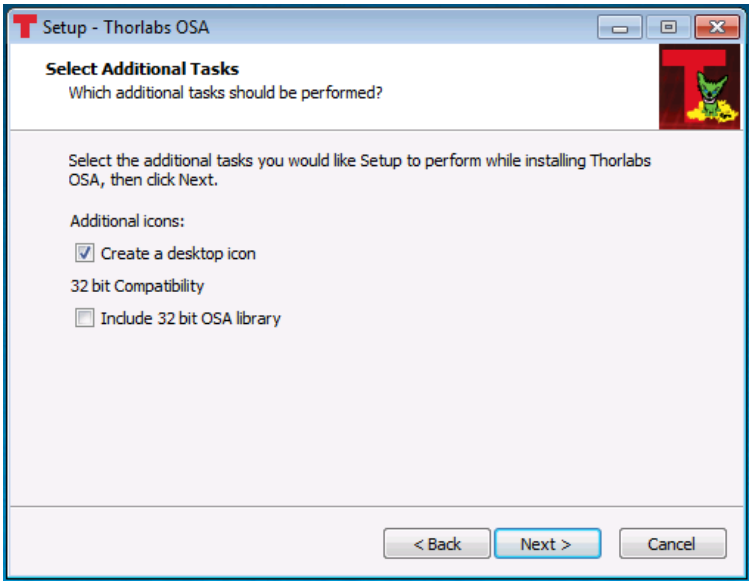
This application note was written for the OSA201 Optical Spectrum Analyzer using the firmware and software versions detailed below. Functionality and procedures may vary when using other controllers or firmware/software versions.

- OSA Software: Version 2.55
- OSA LabVIEW Drivers: 2.50.1249.3032
- LabVIEW: Version 14.0 (64-bit)

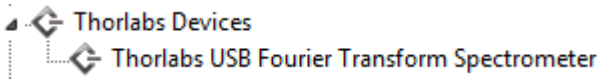
Part 2. Step by Step Instructions

1. Download and install the software for the Optical Spectrum Analyzer and Compact CCD Spectrometers located on the Software tab here: http://www.thorlabs.com/software_pages/viewsoftwarepage.cfm?code=OSA
   If you are using 32-bit LabVIEW on 64-bit Windows, check the box to include the 32-bit OSA library when prompted during installation.





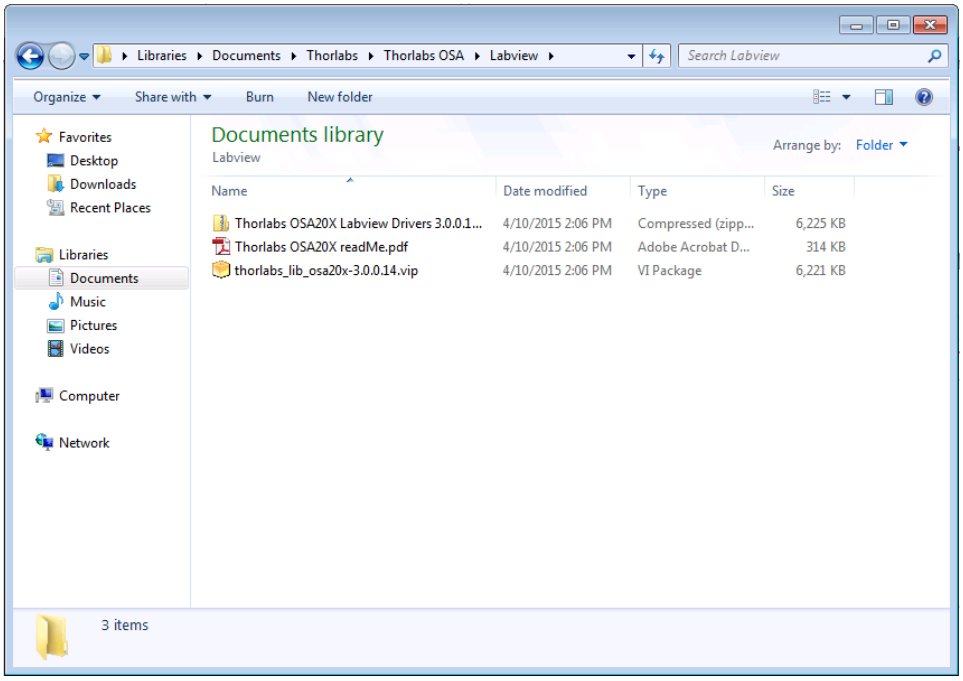
2. Connect the OSA20x to the computer via USB. Wait for Windows to install the device drivers. When the OSA20x is ready it will show up in the device manager as a Thorlabs USB Fourier Transform Spectrometer.



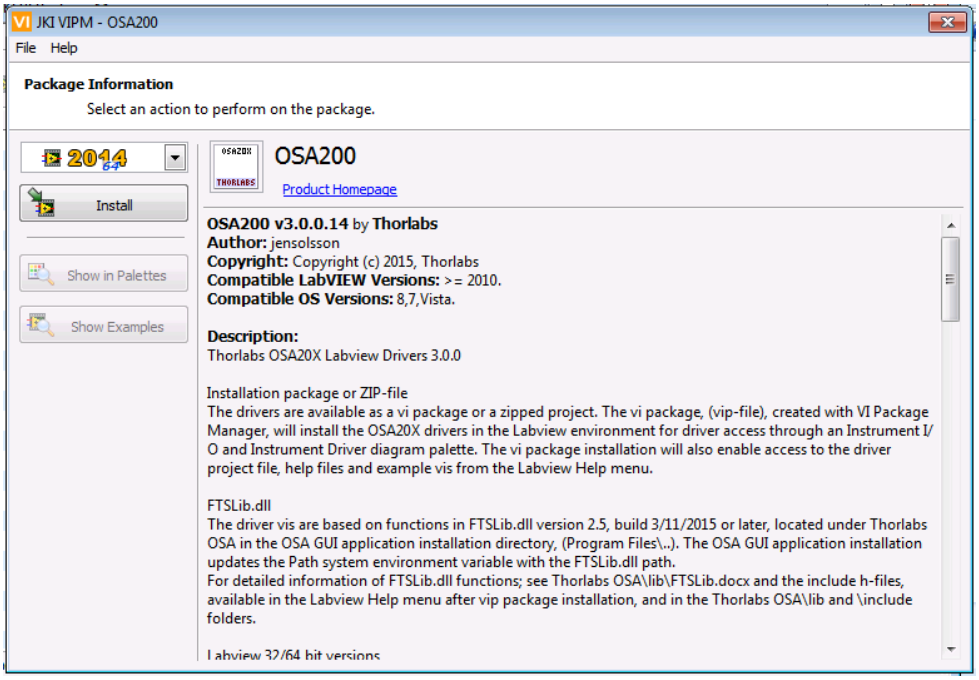
3. Run the OSA software to become familiar with the operation of you Optical Spectrum Analyzer and to verify that it is working with the computer properly. When you are done, make sure to close the OSA software.

4. Download and install the OSA LabVIEW Drivers from the Library tab here: http://www.thorlabs.com/software_pages/viewsoftwarepage.cfm?code=OSA

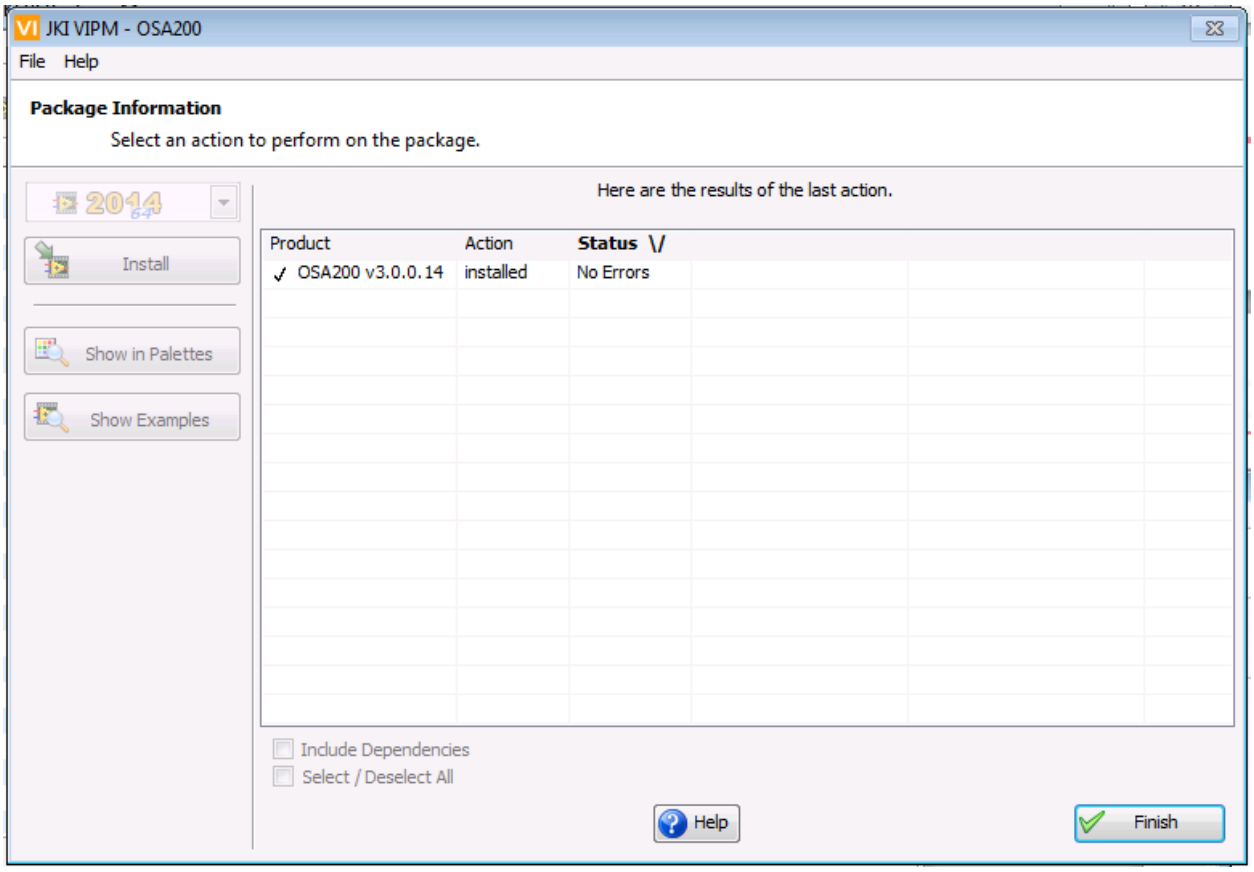
5. Browse to the Libraries>Documents>Thorlabs>Thorlabs OSA>Labview folder on your computer and run thorlabs_lib_osa20x-3.0.0.14.vip. If you have 32-bit LabVIEW, please read Thorlabs OSA20x readMe.pdf before installing.



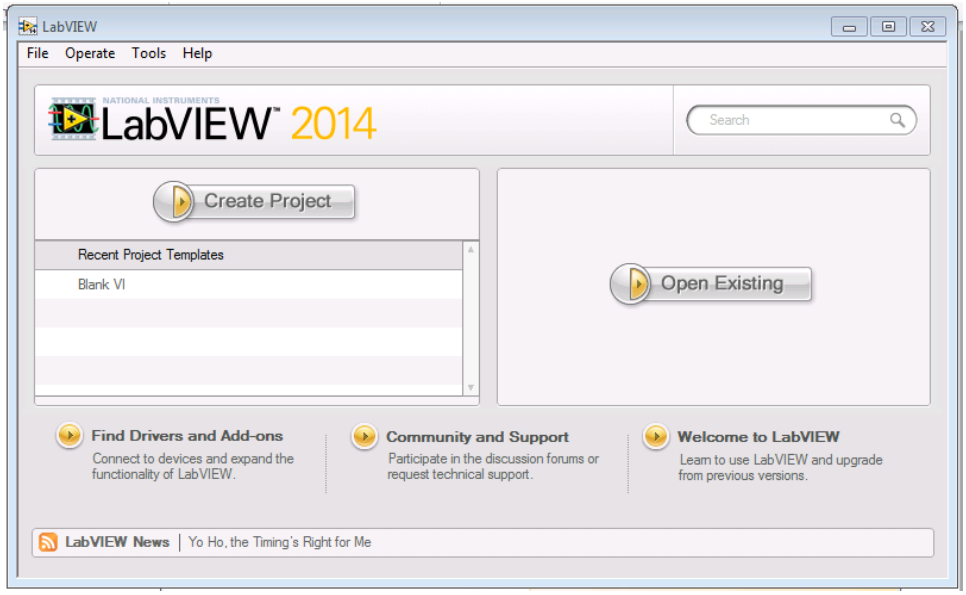
6. Select the version of LabVIEW you would like to install the drivers for and click Install.



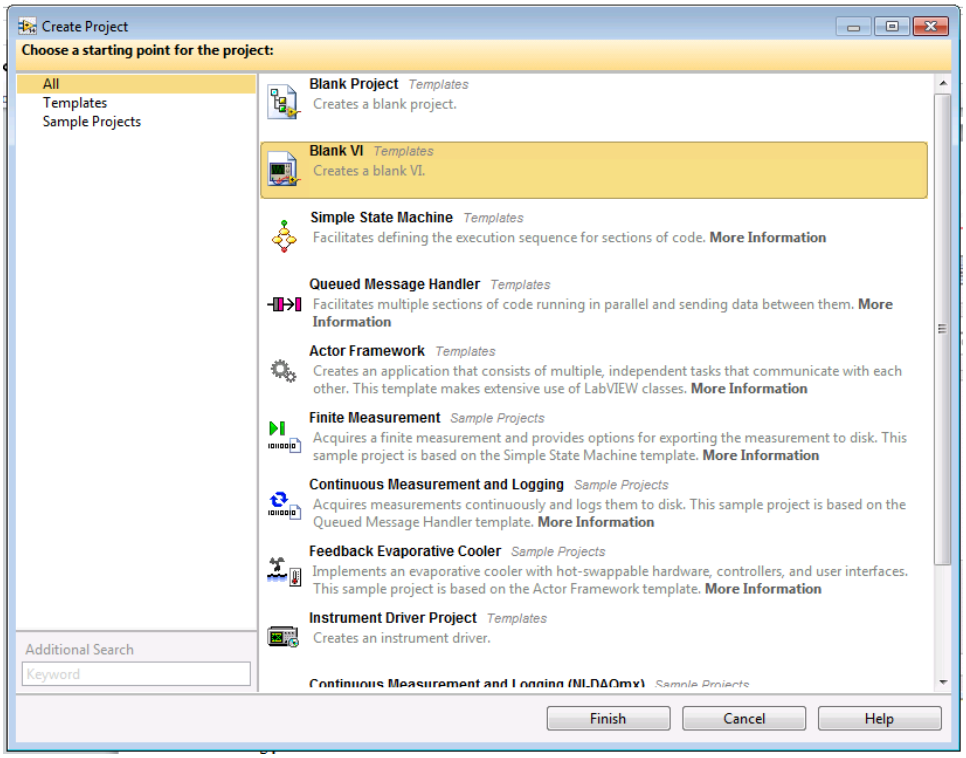
7. When the package has finished installing click Finish and close the package manager.



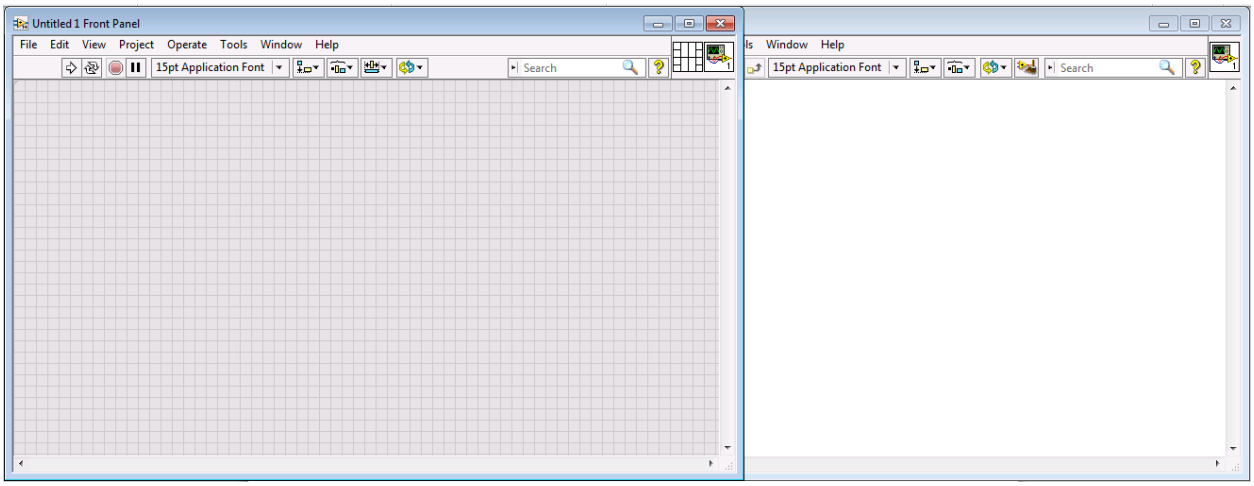
8. Open LabVIEW and select Create Project.



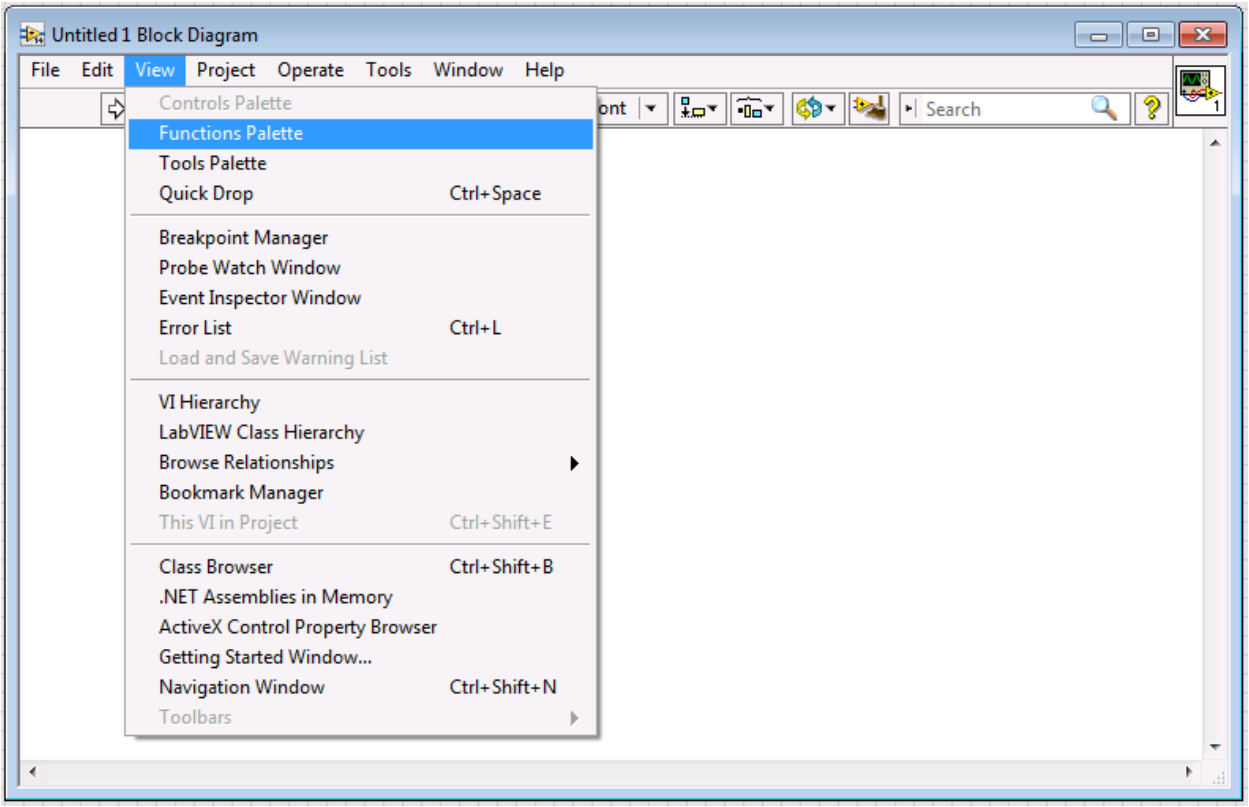
9. Select the Blank VI Template and select Finish.



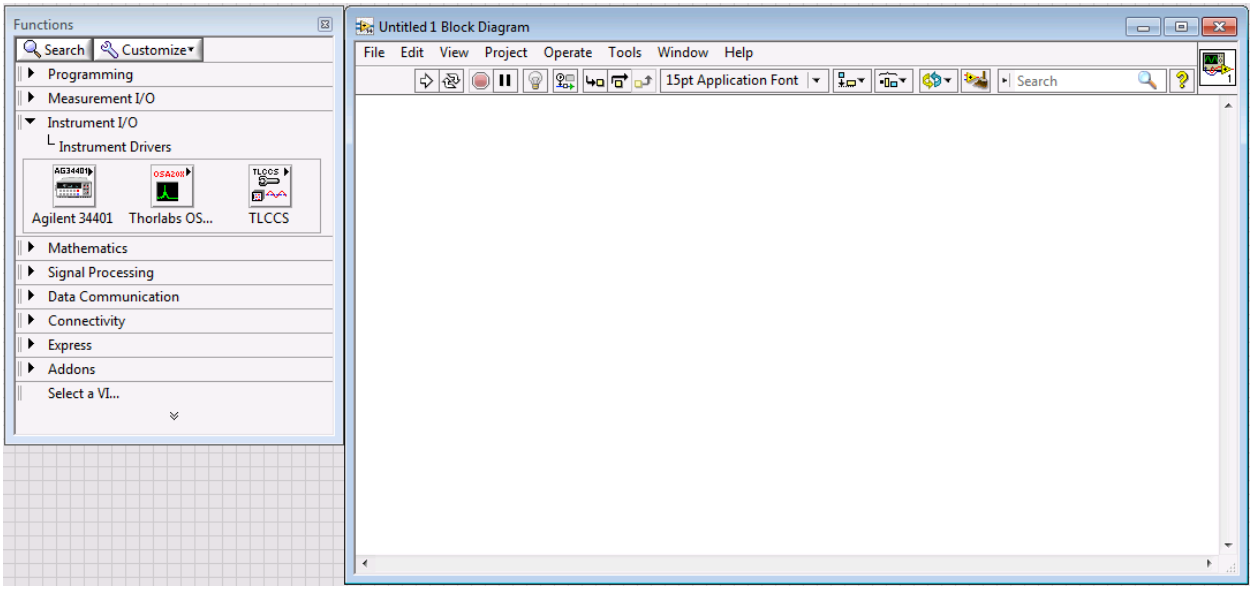
10. The new VI will consist of two empty windows. The Front Panel has a grey grid background and is the user interface to the program. The Block Diagram has a white background and is where the program code will be placed.



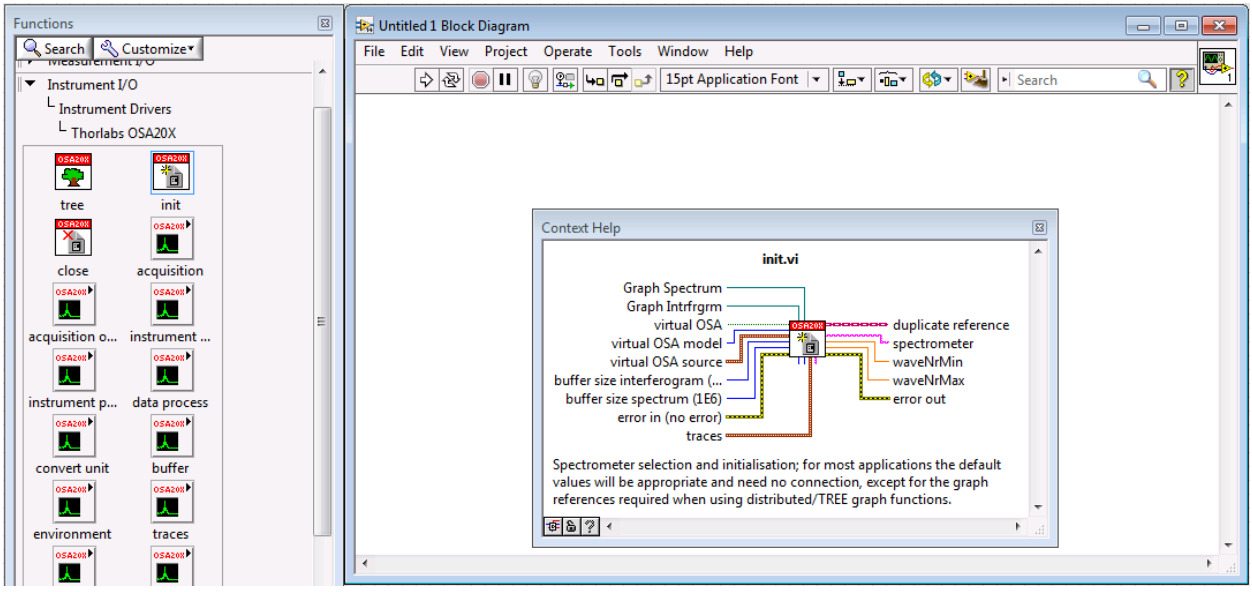
11. Open the Functions Palette from the View menu.



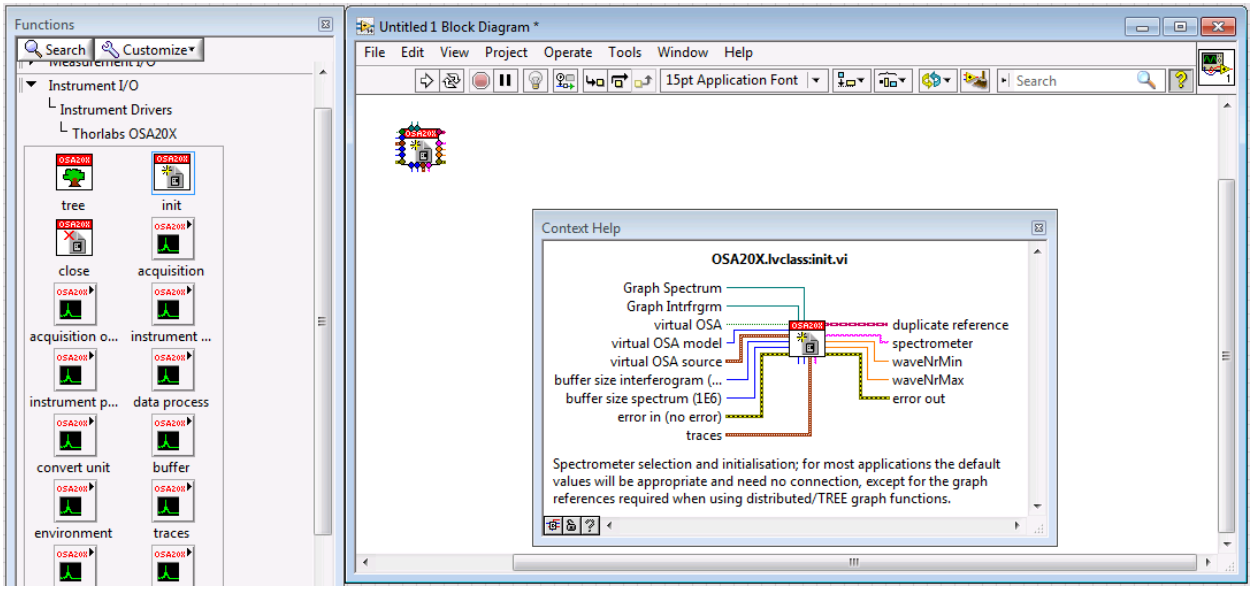
12. In the Functions Palette, Instrument I/O menu, Instrument Drivers folder there should be a folder for the Thorlabs OSA20X VIs. The TLCCS fold would contain VIs for the CCS series CCD spectrometers.



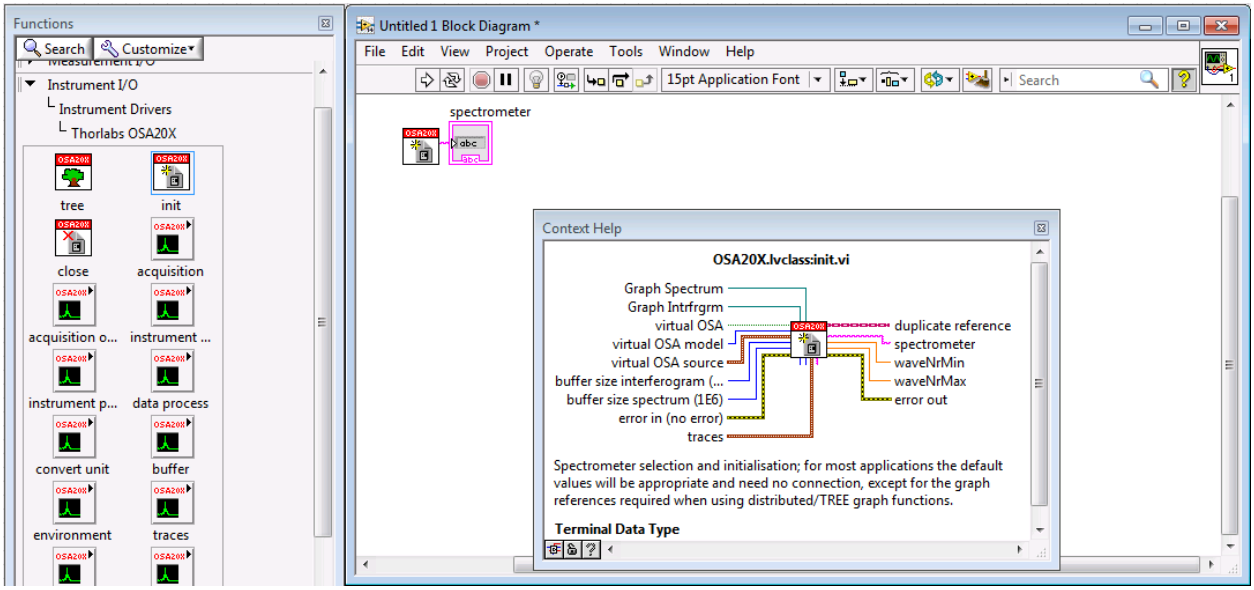
13. From the functions palette select **TLBC1 Get Device Information.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20X. You can press Ctrl+H to open a help window which will show more information about any TLBC1 subVI the mouse is hovering over.



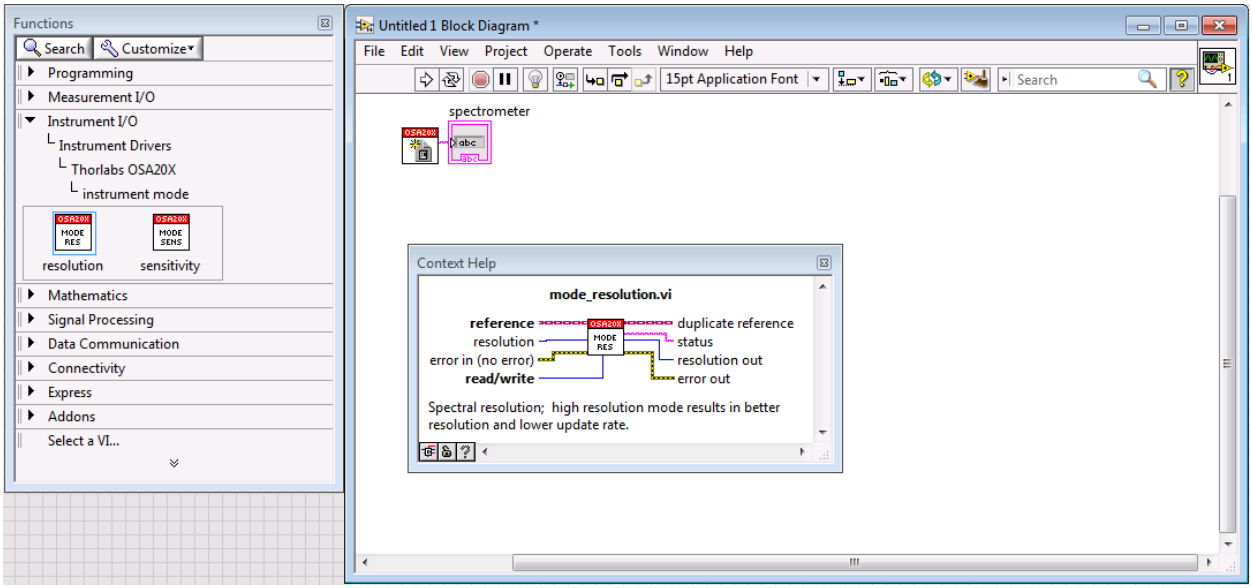
14. Place init.vi on the block diagram. The default settings are appropriate for most situations so the input nodes do not need to be connected.



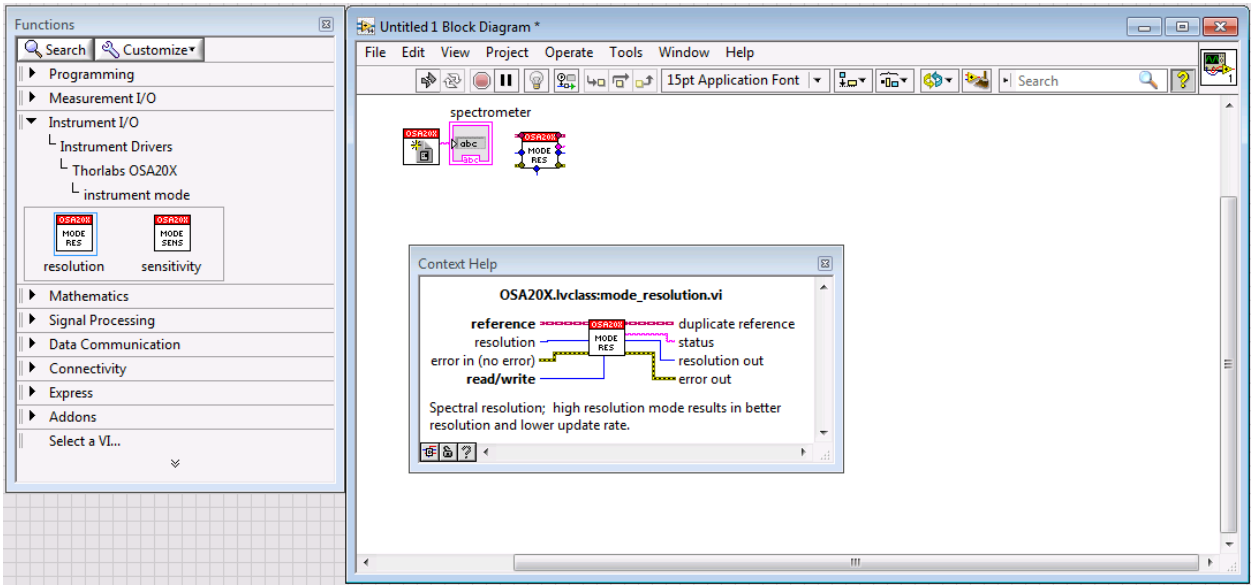
15. Place the cursor over the pink *spectrometer* node. It should change shape to a spool of wire (). Right-click on the node and select Indicator from the Create menu. This will place a display on the Front Panel which will show the connected OSA model.



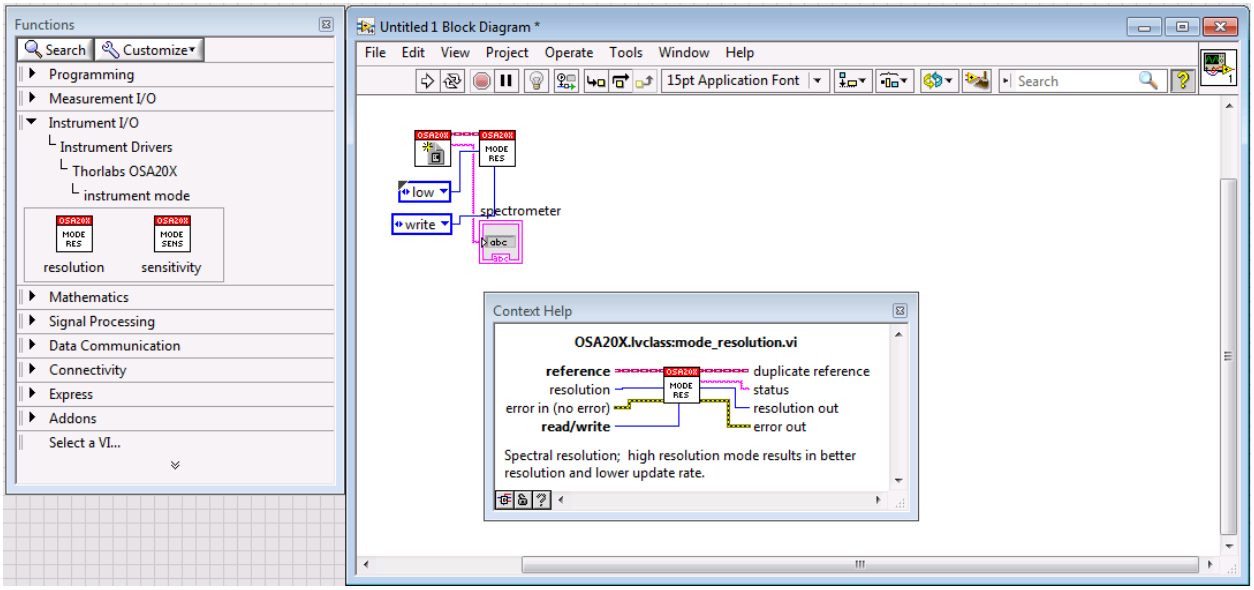
16. From the Functions Palette select **mode_resolution.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>instrument mode.



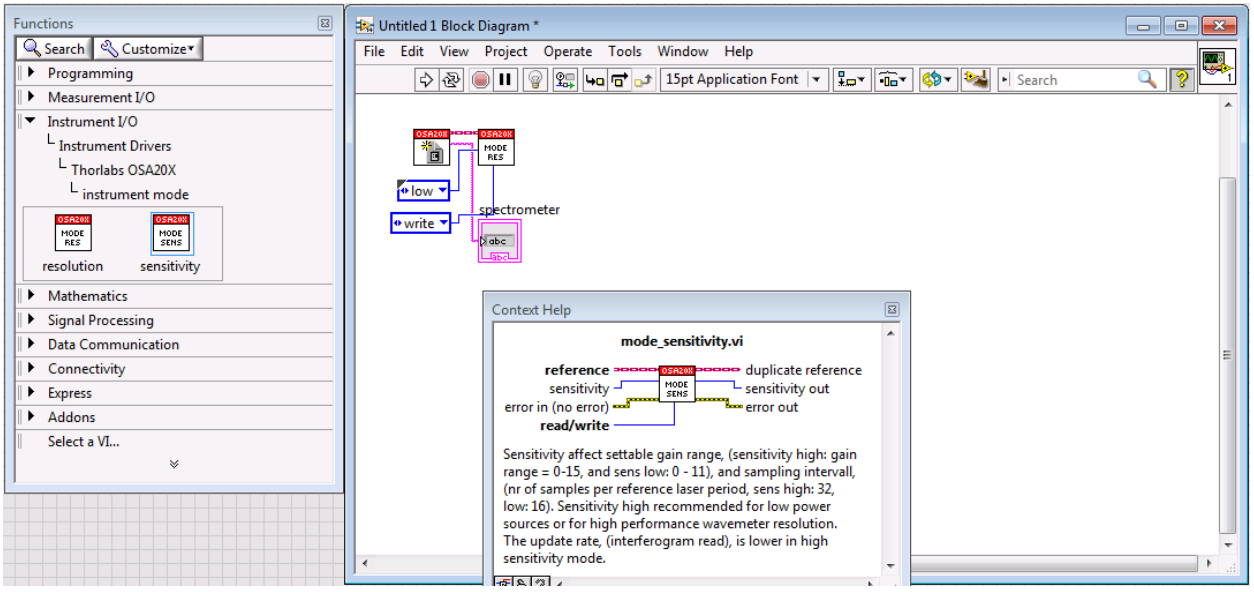
17. Place **mode_resolution.vi** on the block diagram.



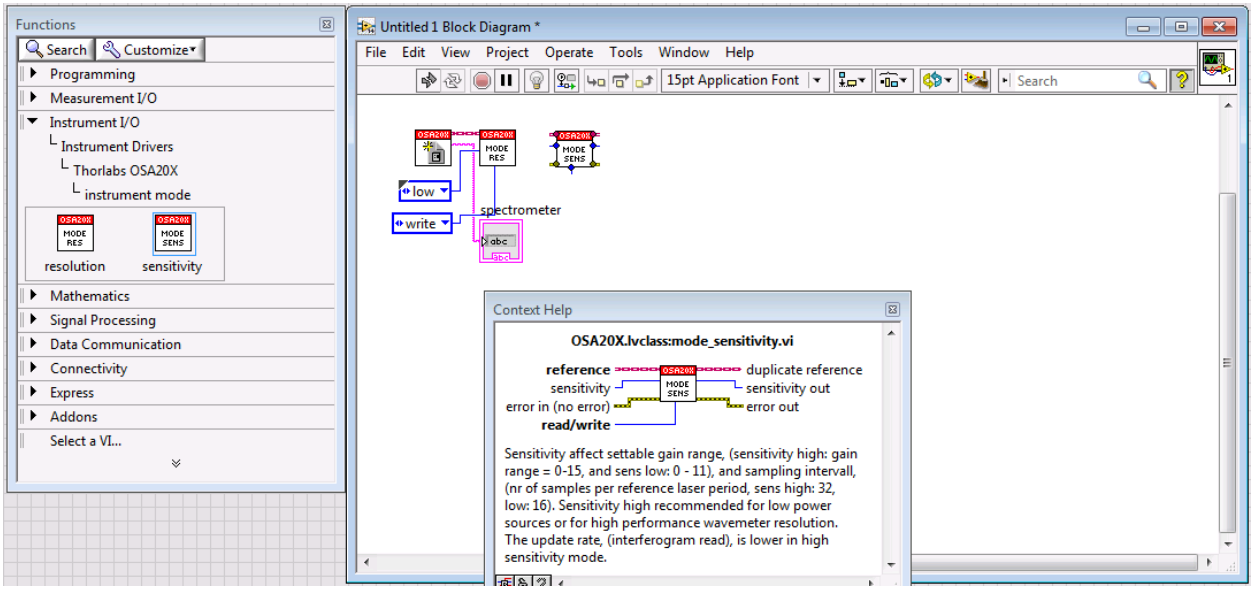
18. Left-click on the maroon *duplicate reference* node on **init.vi** (cursor should be a spool) and connect a wire to the maroon *resource name* node on **mode_resolution.vi**. Right click on the blue *resolution* and *read/write* nodes on **mode_resolution.vi** and create constants (in the same menu as indicator). Left-click on the read/write constant and change it to write.



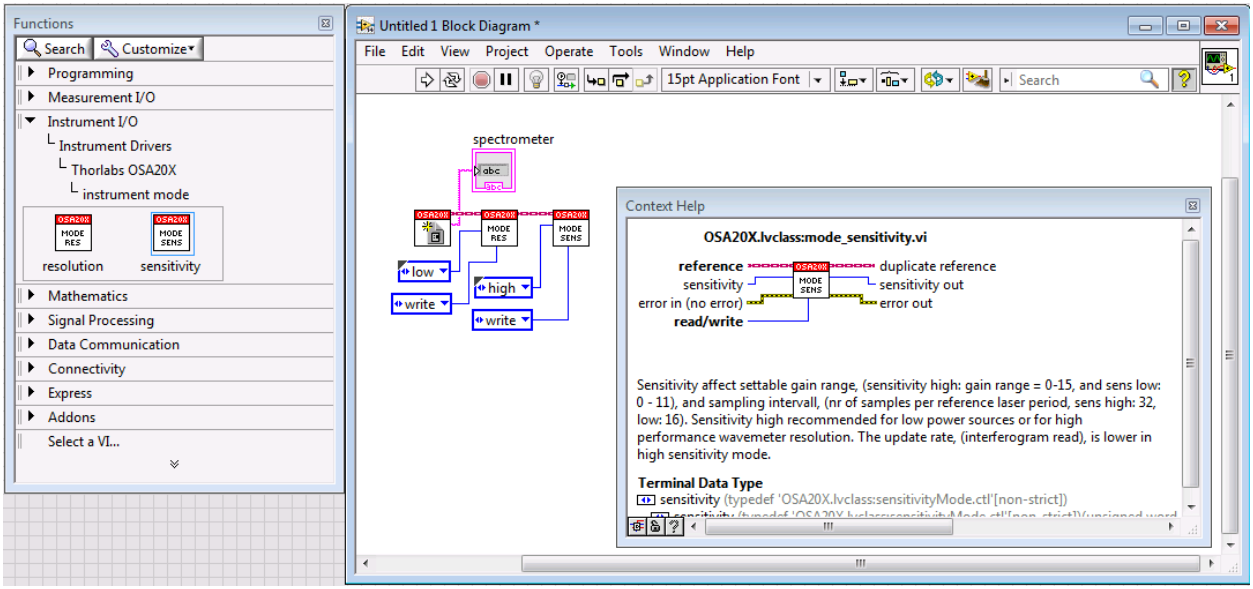
19. From the Functions Palette select **mode_sensitivity.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>instrument mode.



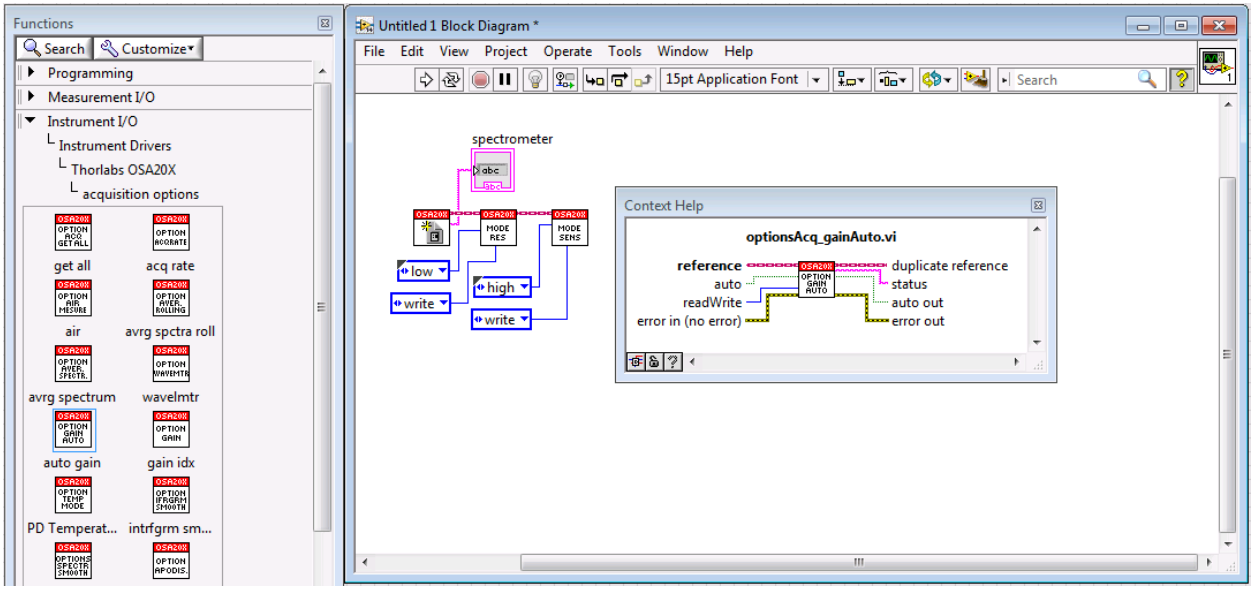
20. Place **mode_sensitivity.vi** on the block diagram.



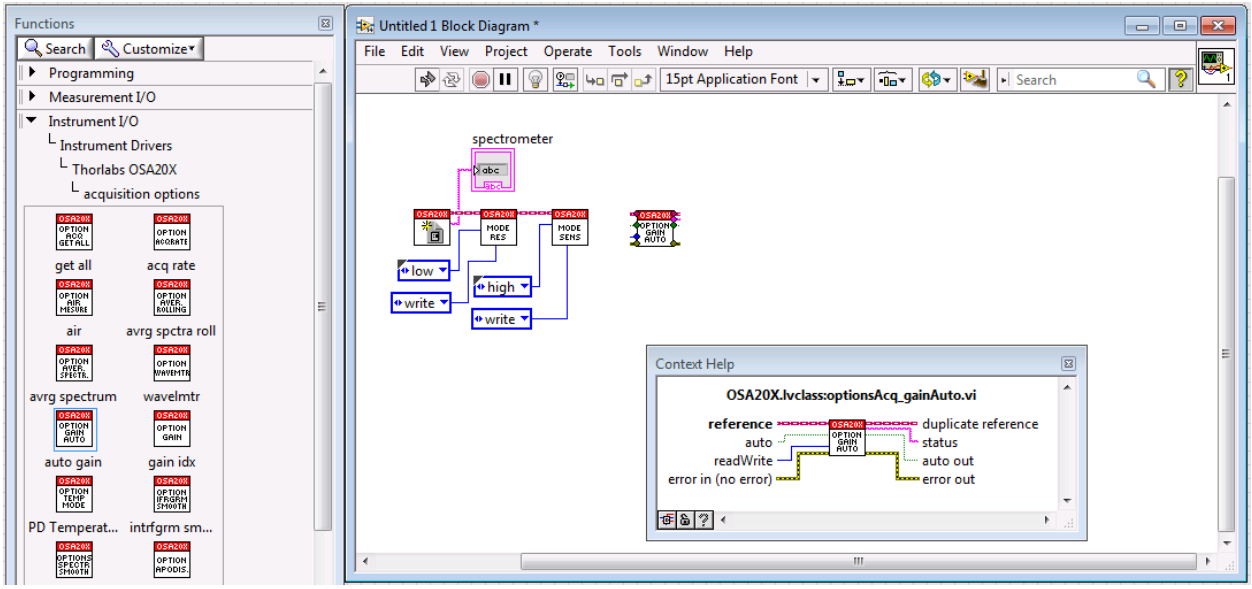
21. Left-click on the maroon *duplicate reference* node on **mode_resolution.vi** and connect a wire to the maroon *resource name* node on **mode_sensitivity.vi**. Right click on the blue *sensitivity* and *read/write* nodes on **mode_ sensitivity.vi** and create constants. Left-click on the read/write constant and change it to write.



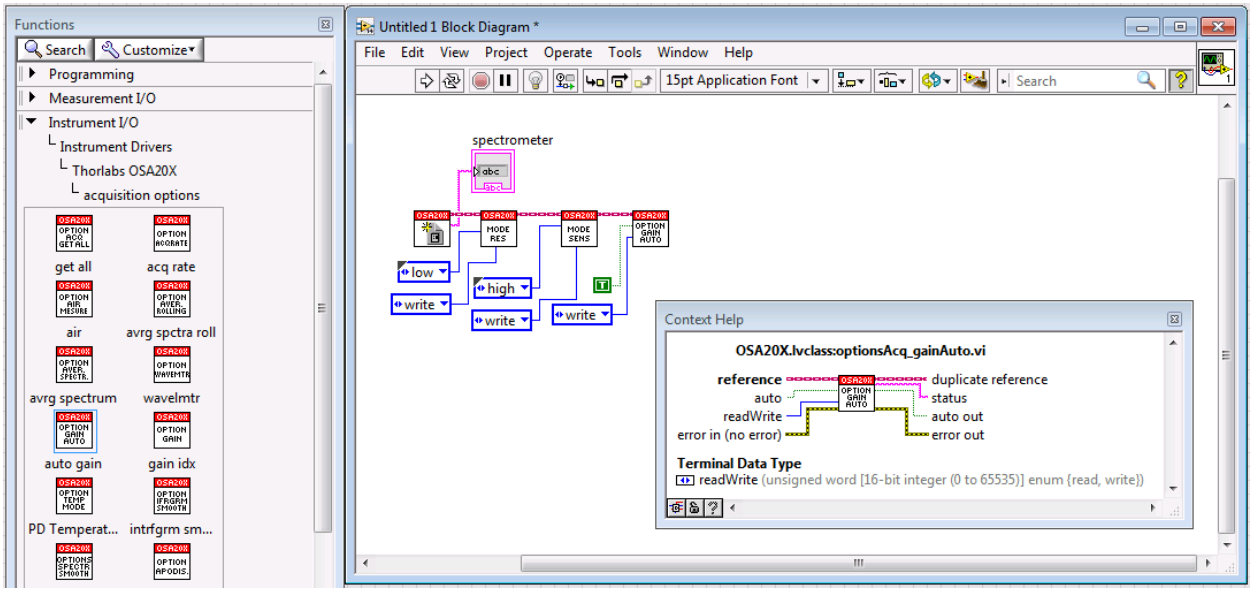
22. From the Functions Palette select **optionsAcq_gainAuto.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>acquisition options.



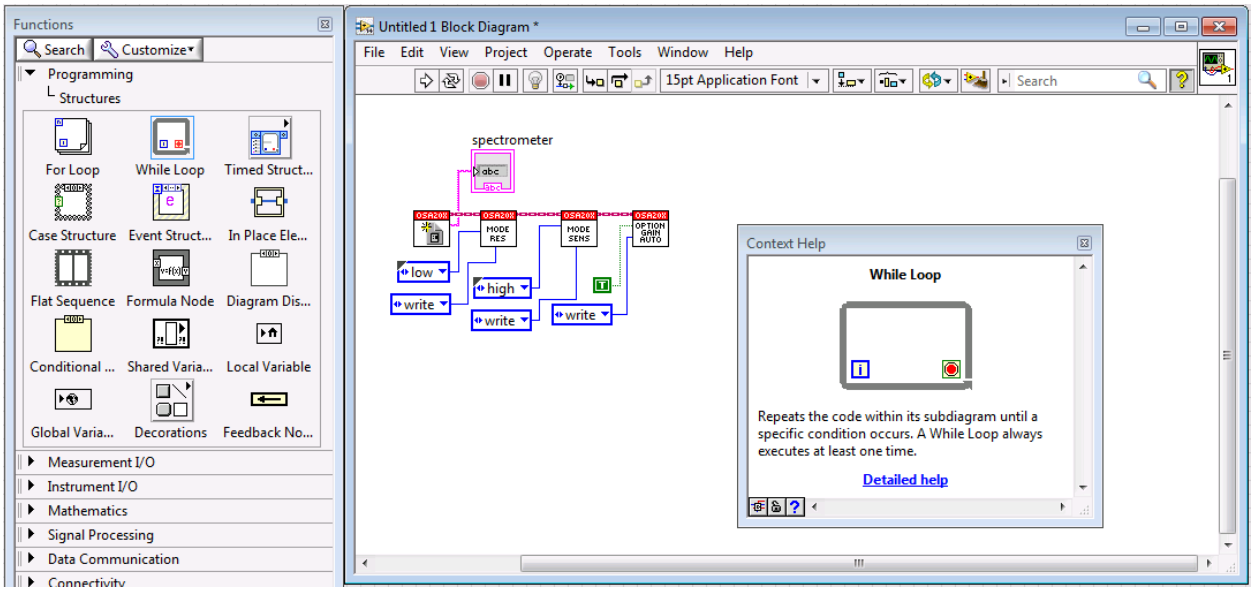
23. Place **optionsAcq_gainAuto.vi** on the block diagram.



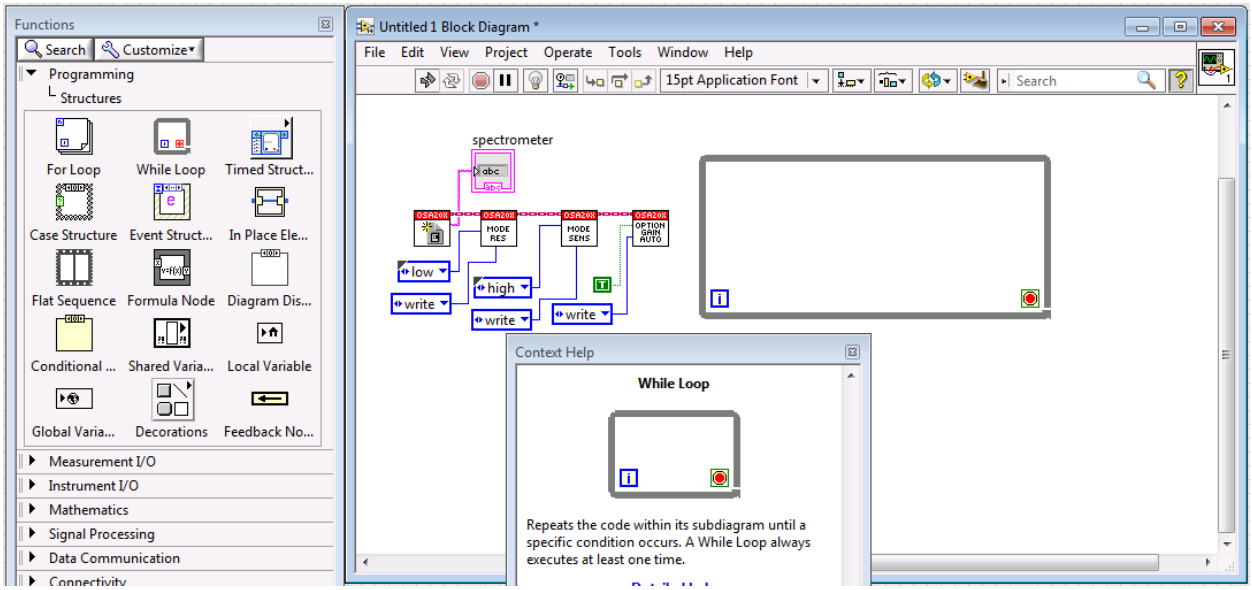
24. Left-click on the maroon *duplicate reference* node on **mode_ sensitivity.vi** and connect a wire to the maroon *resource name* node on **optionsAcq_gainAuto.vi**. Right-click on the green *auto* and blue *read/write* nodes on **optionsAcq_gainAuto.vi** and create constants. Left-click on the auto node to change it to T (true). Left-click on the read/write constant and change it to write.



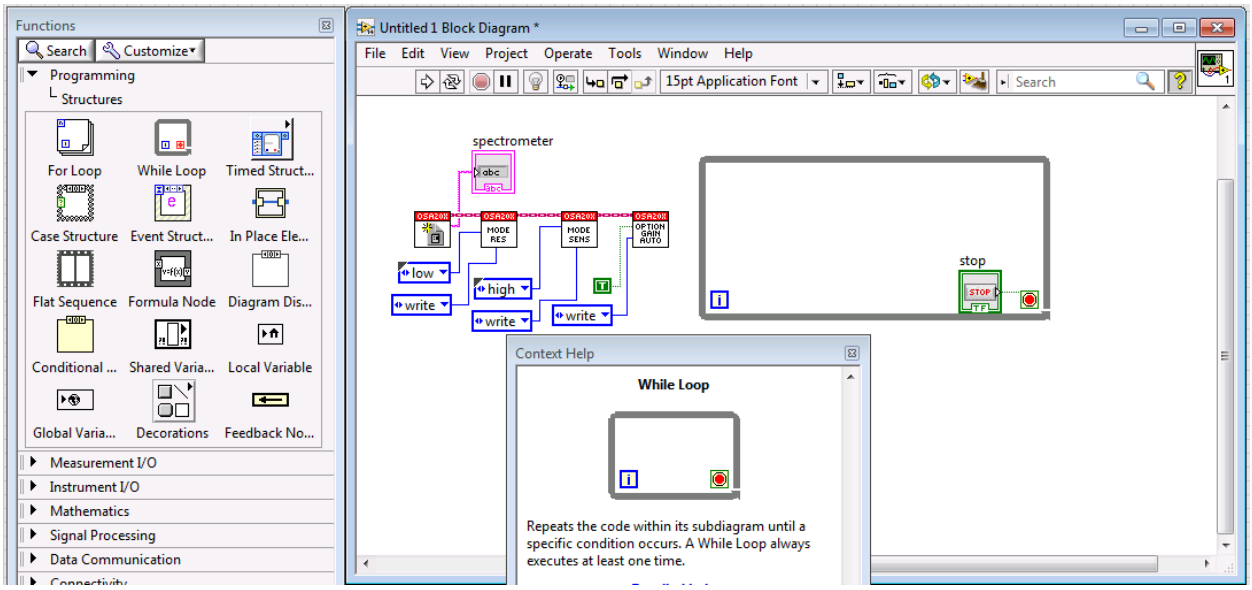
25. From the Functions Palette select a **While** loop. It is located in Programming>Structures.



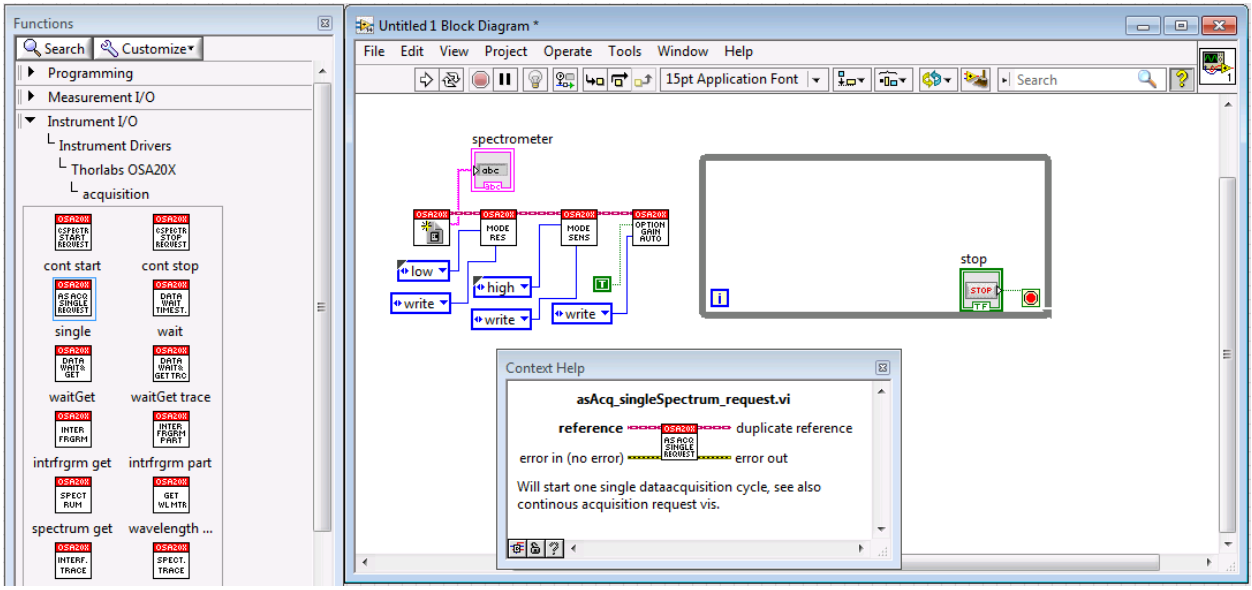
26. Left-click and drag to draw a **While** loop on the Block Diagram.



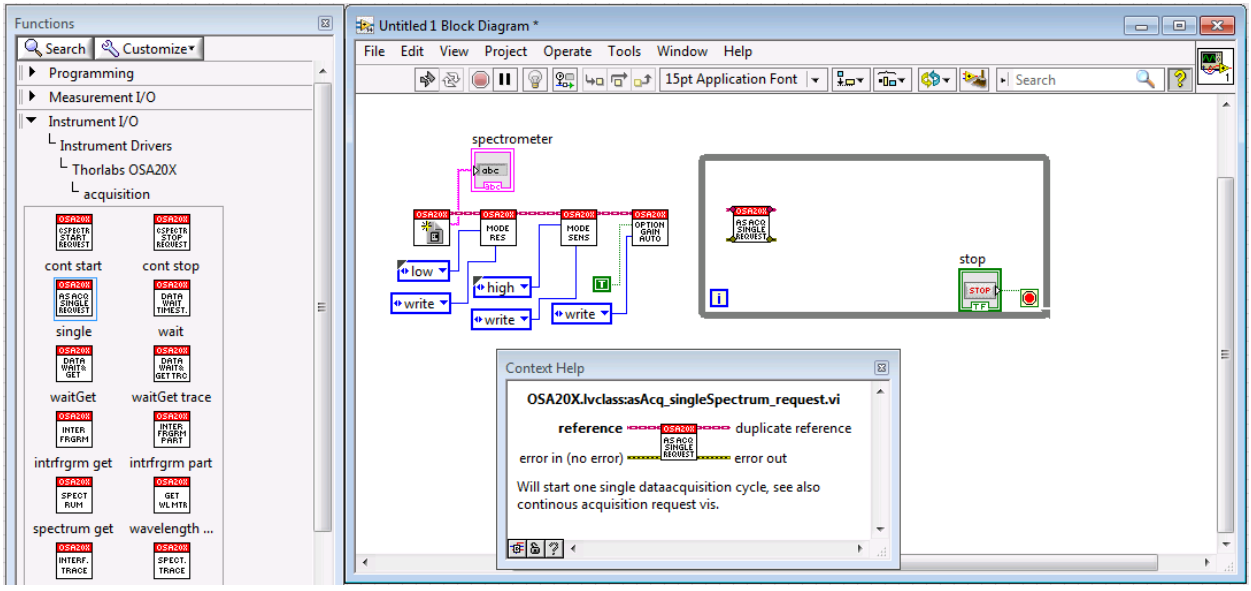
27. Right-click on the loop condition (stop sign) and create a control. This will make a button on the Front Panel which can be used to end the **While** loop.



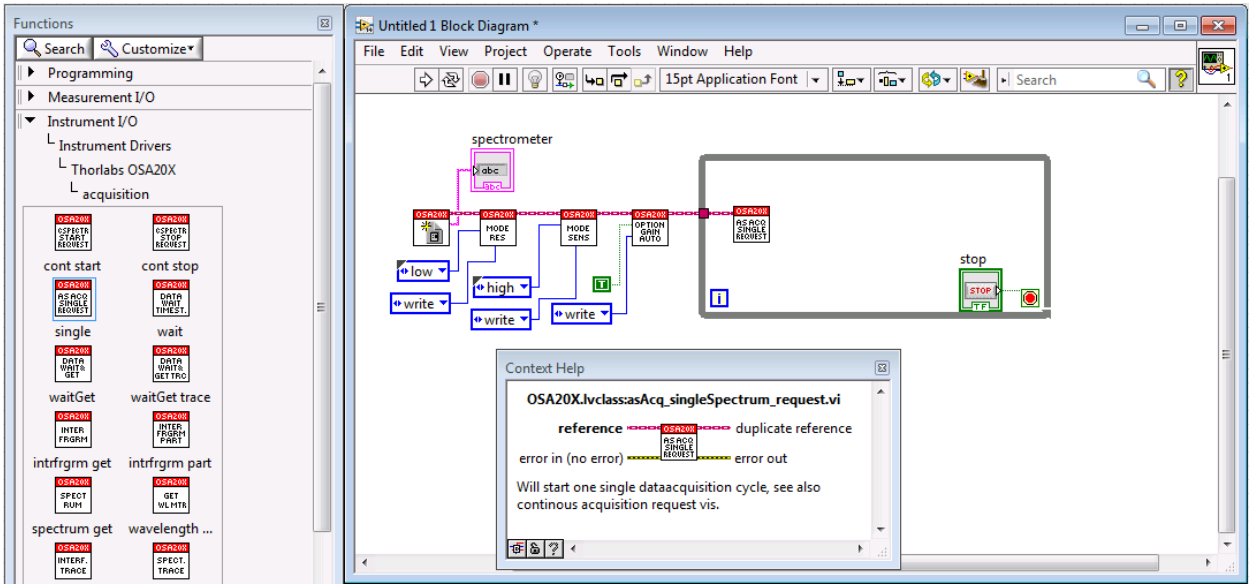
28. From the Functions Palette select **asAcq_singleSpectrum_request.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>acquisition.



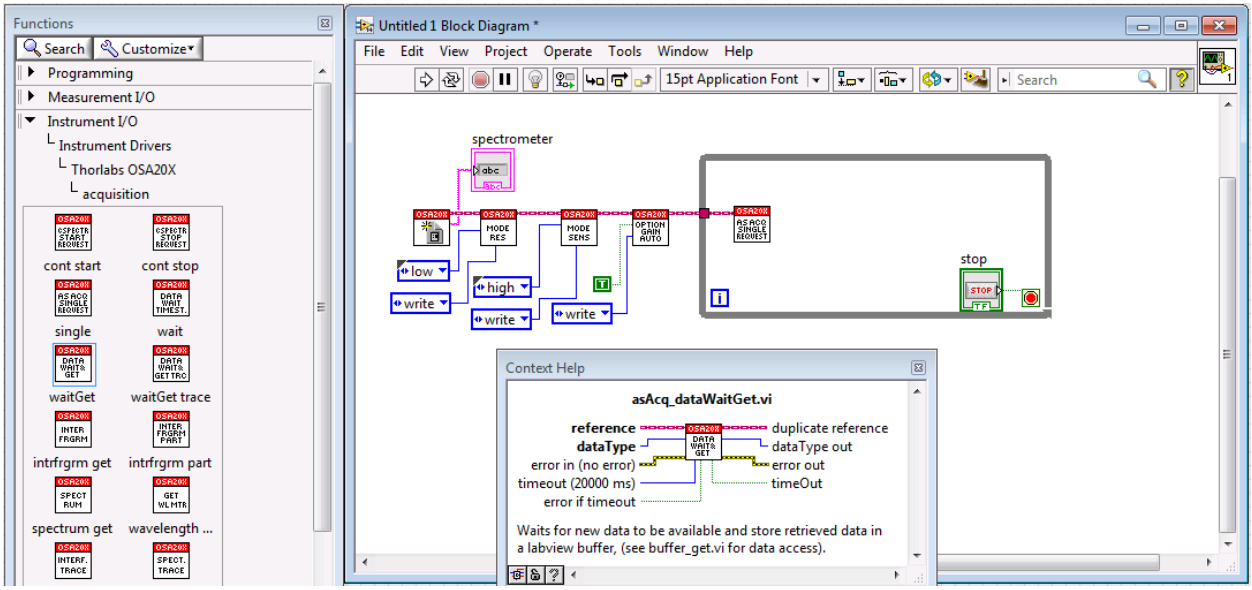
29. Place **asAcq_singleSpectrum_request.vi** on the Block Diagram inside the **While** loop.



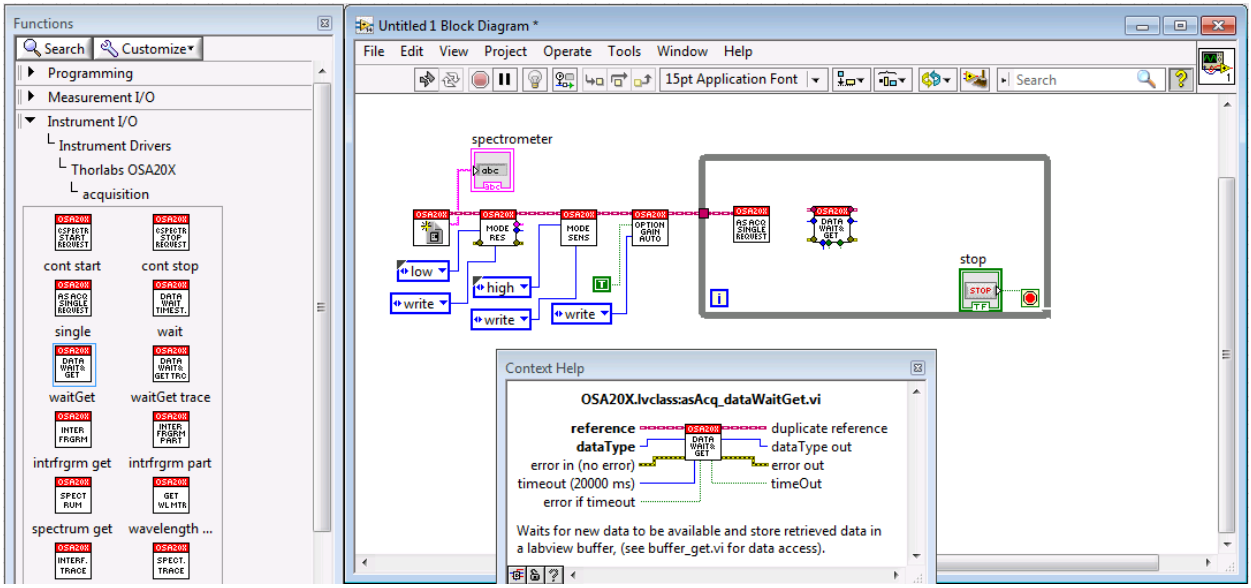
30. Left-click on the maroon *duplicate reference* node on **optionsAcq_gainAuto.vi** and connect a wire to the maroon *resource name* node on **asAcq_singleSpectrum_request.vi**.



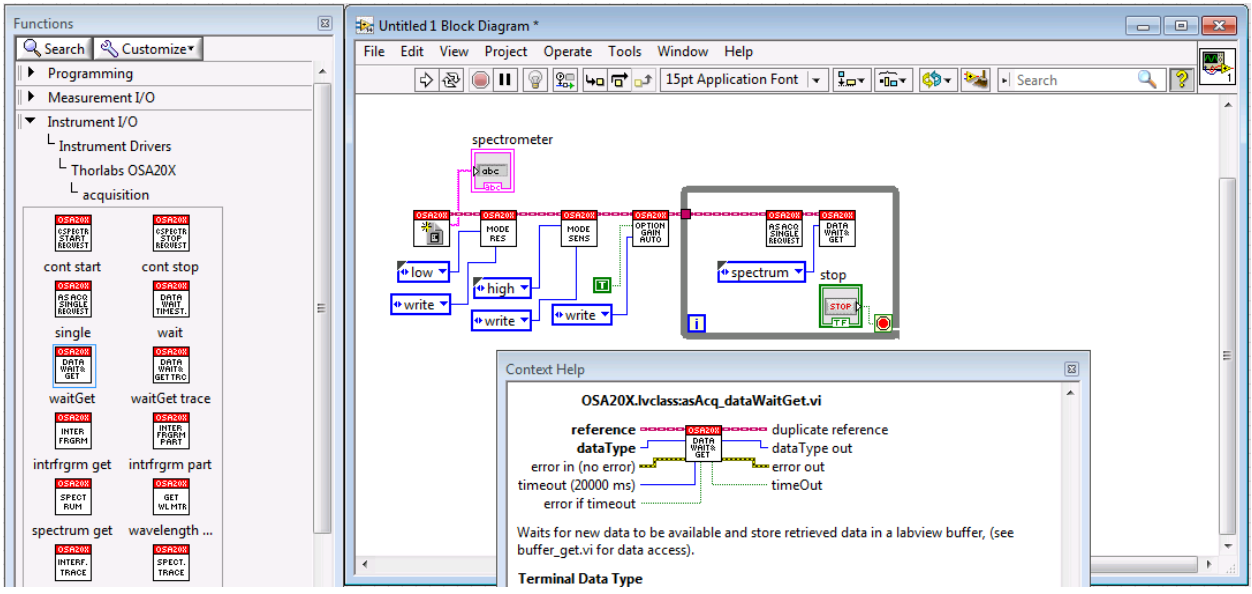
31. From the Functions Palette select **asAcq_dataWaitGet.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>acquisition.



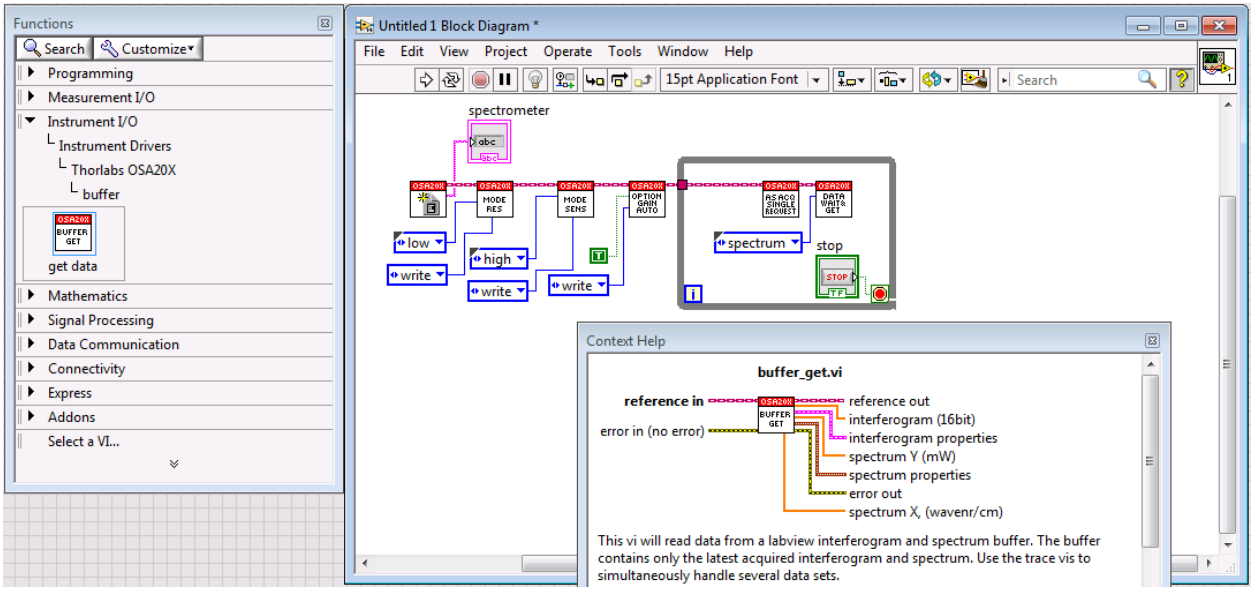
32. Place **asAcq_dataWaitGet.vi** on the Block Diagram inside the **While** loop.



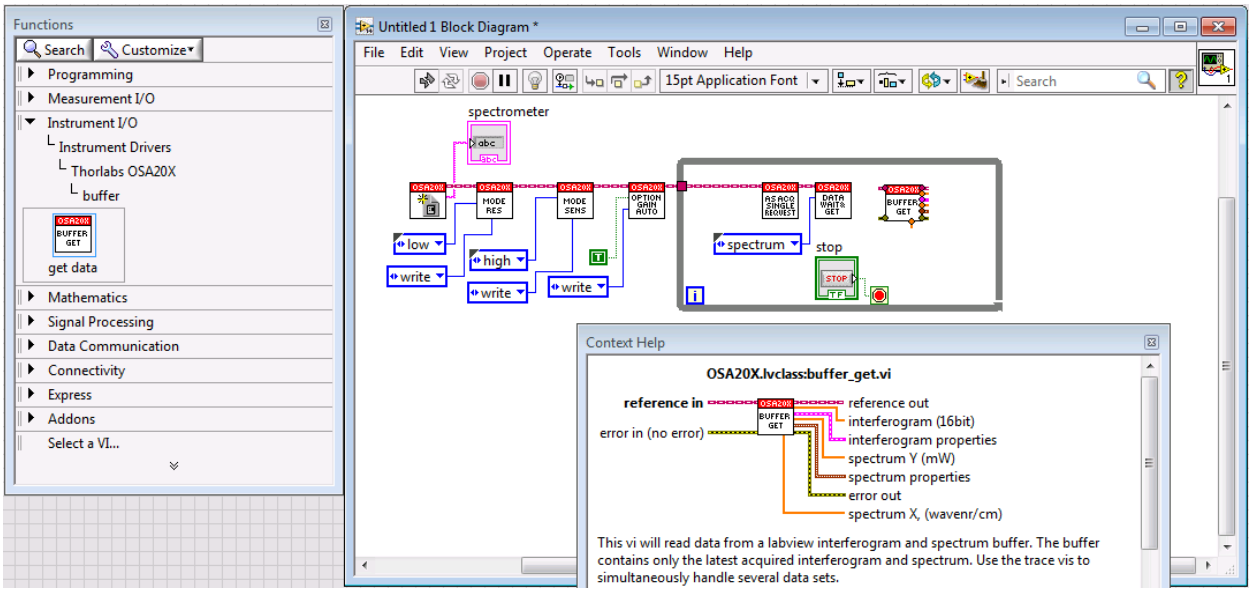
33. Left-click on the maroon *duplicate reference* node on **asAcq_singleSpectrum_request.vi** and connect a wire to the maroon *resource name* node on **asAcq_dataWaitGet.vi**. Right-click on the blue *dataType* node on **asAcq_dataWaitGet.vi** and create a constant. Left click on the constant and change it to spectrum.



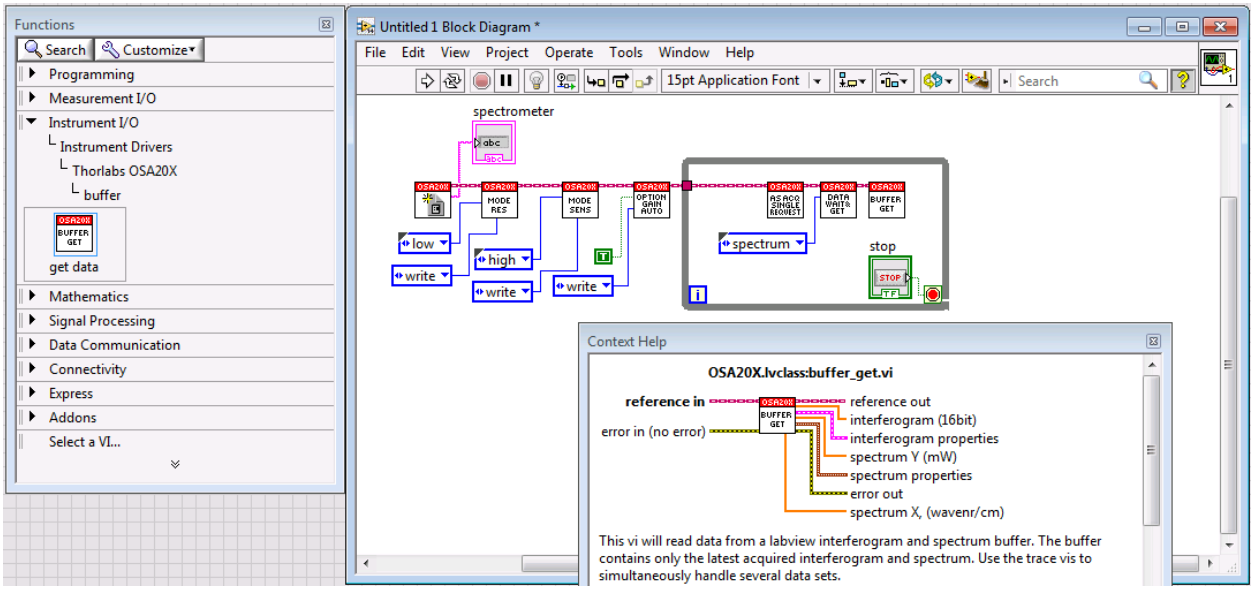
34. From the Functions Palette select **buffer_get.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>buffer.



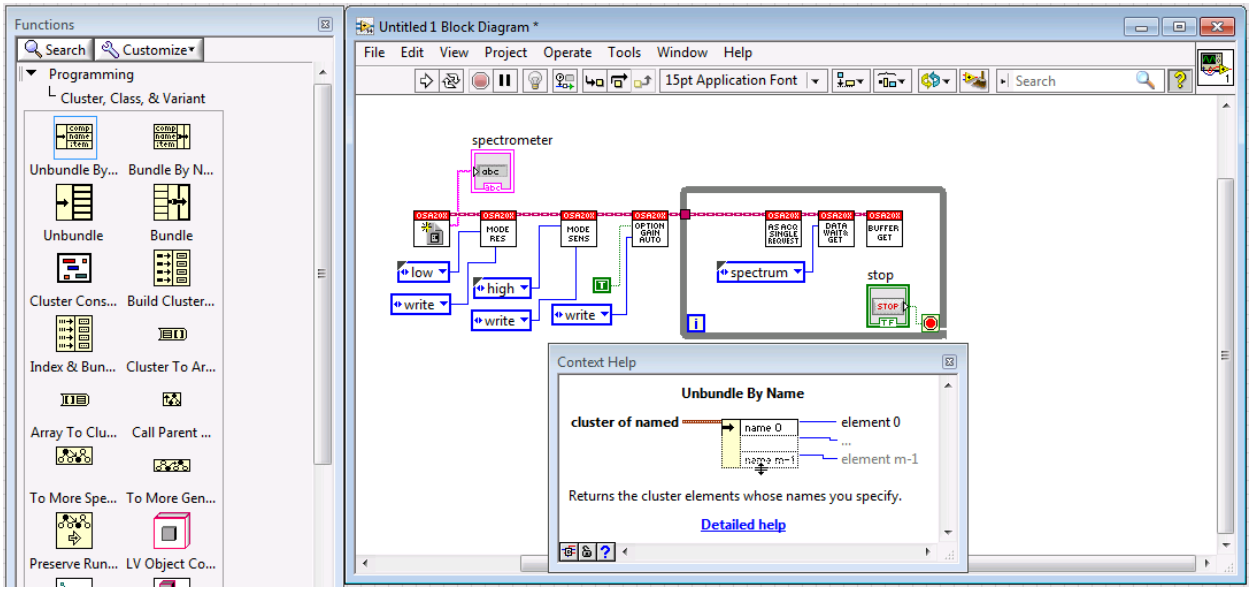
35. Place **buffer_get.vi** on the Block Diagram inside the **While** loop.



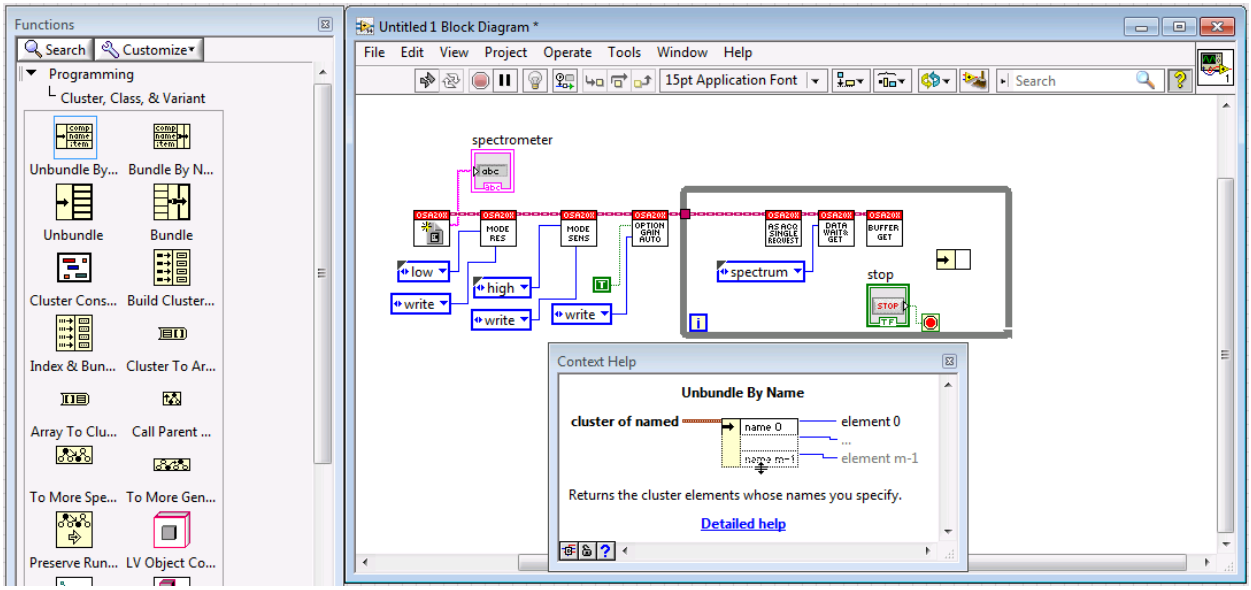
36. Left-click on the maroon *duplicate reference* node on **asAcq_dataWaitGet.vi** and connect a wire to the maroon *resource name* node on **buffer_get.vi**.



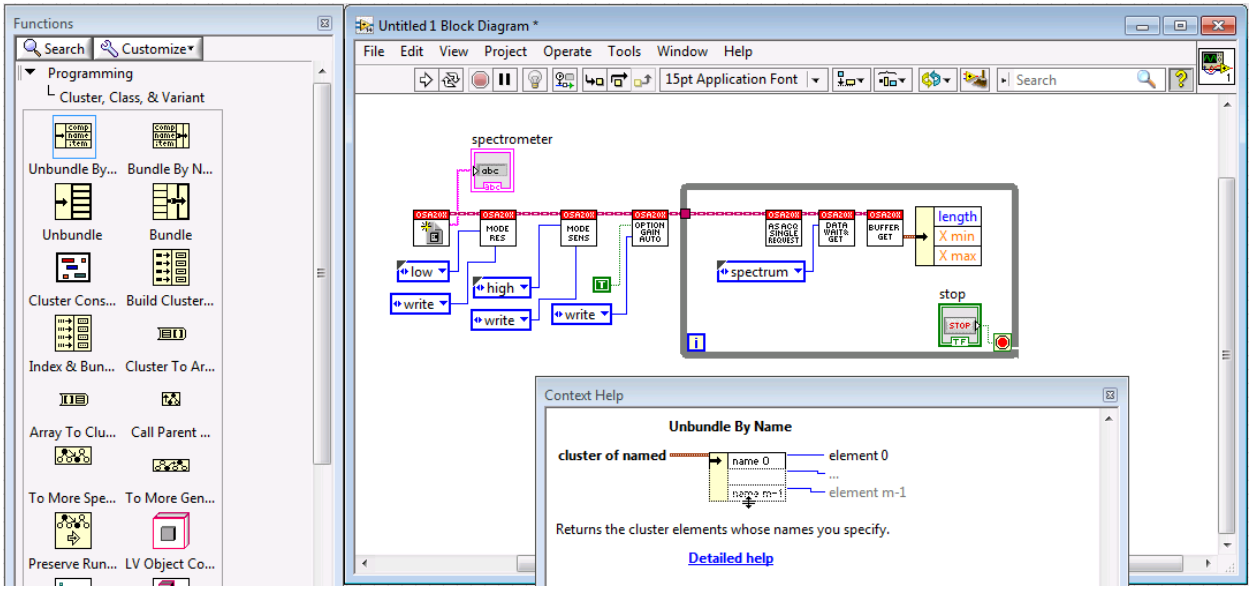
37. From the Functions Palette select **<u>Unbundle By Name</u>**. It is located in Programming>Cluster, Class & Variant.



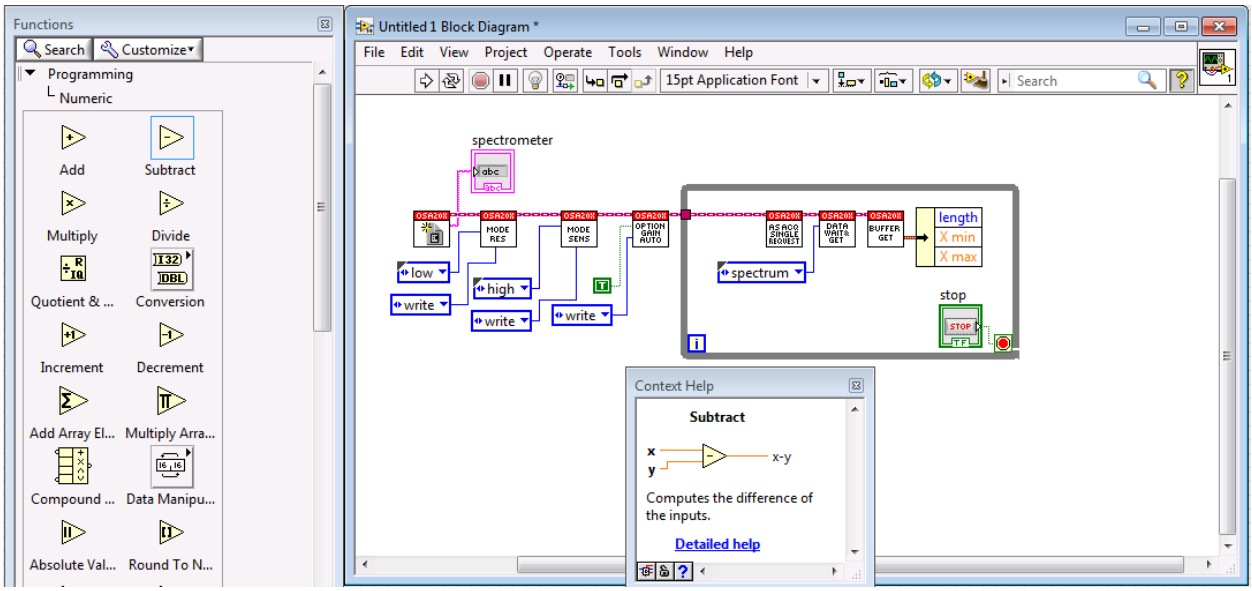
38. Place **Unbundle By Name** on the Block Diagram inside the **While** loop.



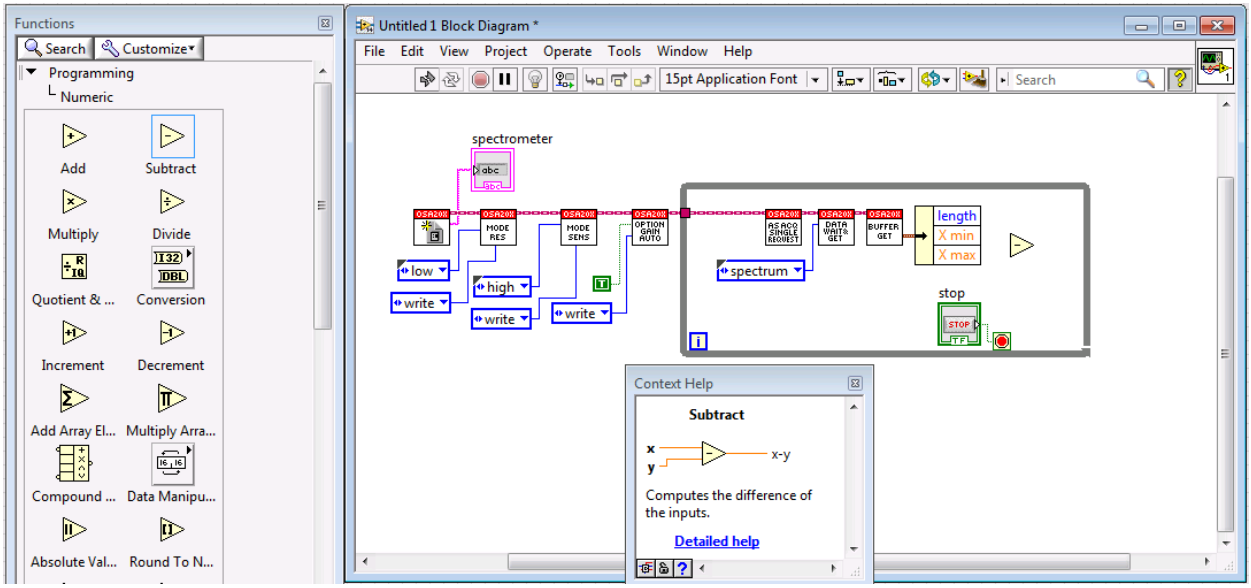
39. Left-click on the brown *spectrum properties* node on **buffer_get.vi** and connect a wire to the brown *cluster of named* node on **Unbundle By Name**. Resize **Unbundle By Name** so that length, X min and X max are visible.



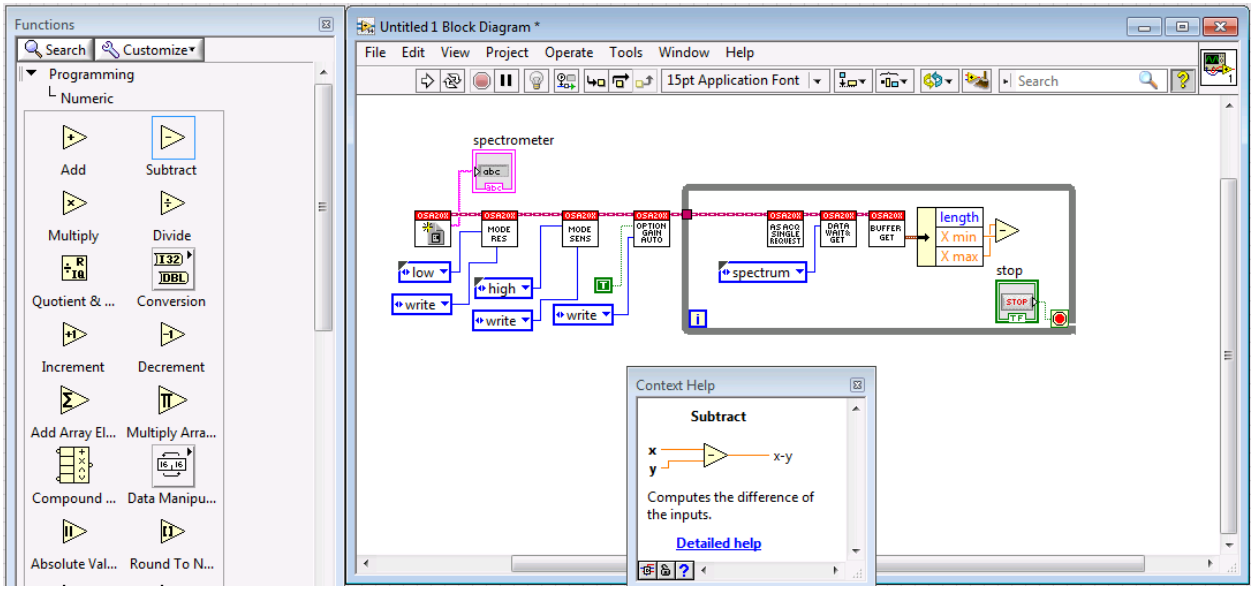
40. From the Functions Palette select **Subtract**. It is located in Programming>Numeric.



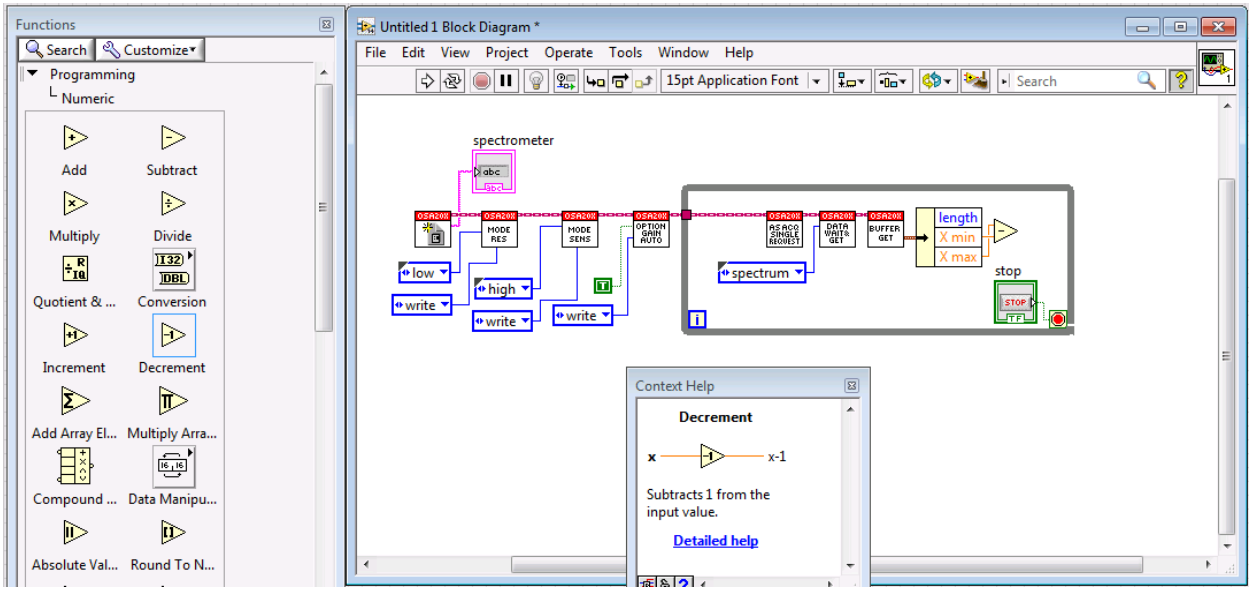
41. Place Subtract on the Block Diagram inside the **While** loop.



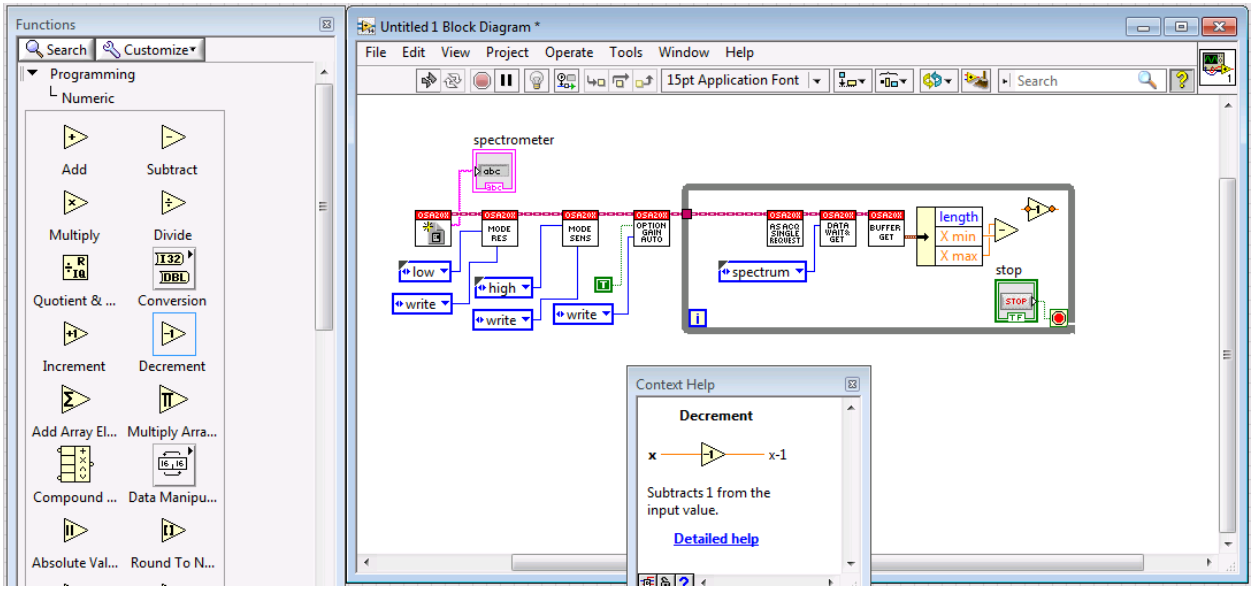
42. Left-click on the orange *X max* node on **Unbundle By Name** and connect a wire to the orange *x* node on **Subtract**. Left-click on the orange **X min** node on *Unbundle By Name* and connect a wire to the orange *y* node on **Subtract**.



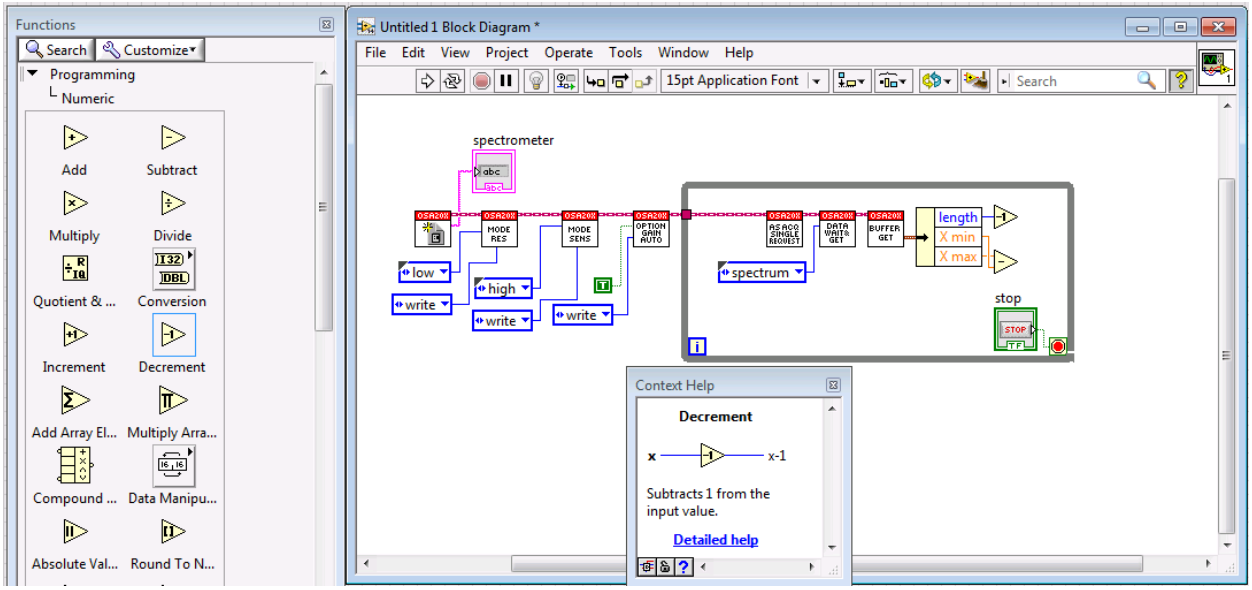
43. From the Functions Palette select **Decrement**. It is located in Programming>Numeric.



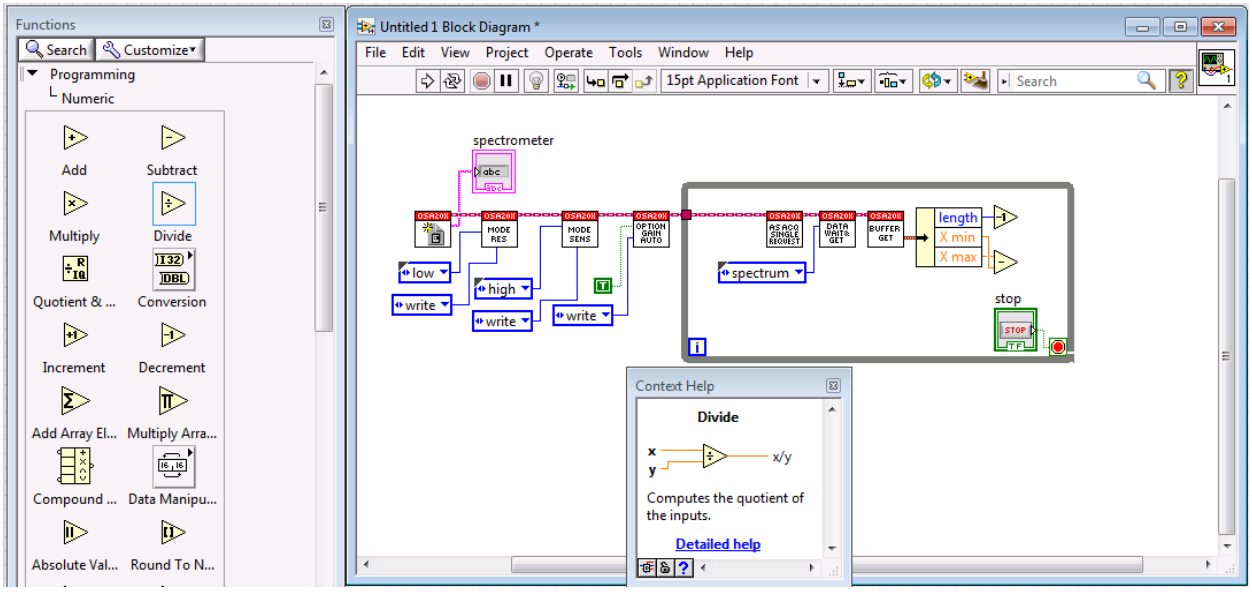
44. Place **Decrement** on the Block Diagram inside the **While** loop.



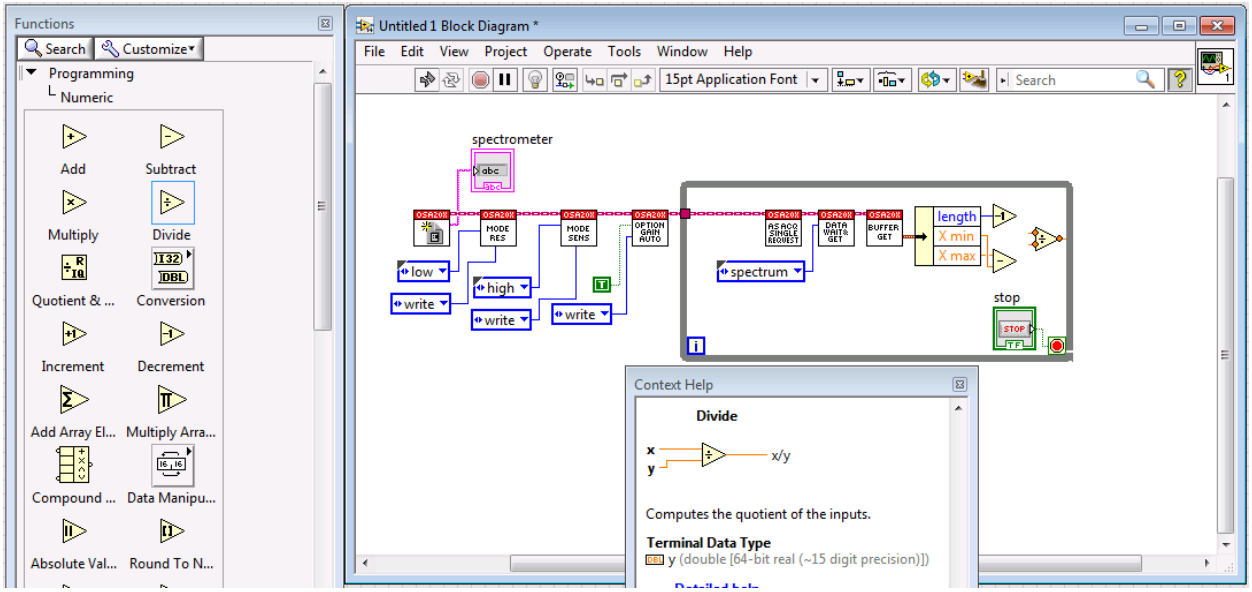
45. Left-click on the blue *length* node on **Unbundle By Name** and connect a wire to the orange *x* node on **Decrement**.



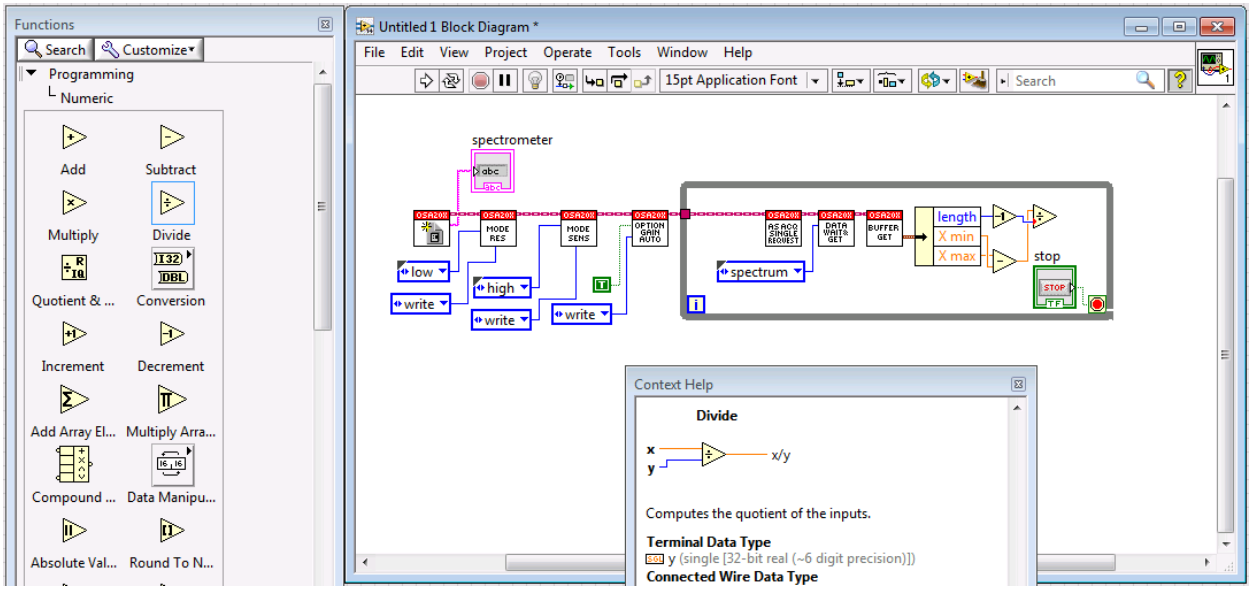
46. From the Functions Palette select **Divide**. It is located in Programming>Numeric.



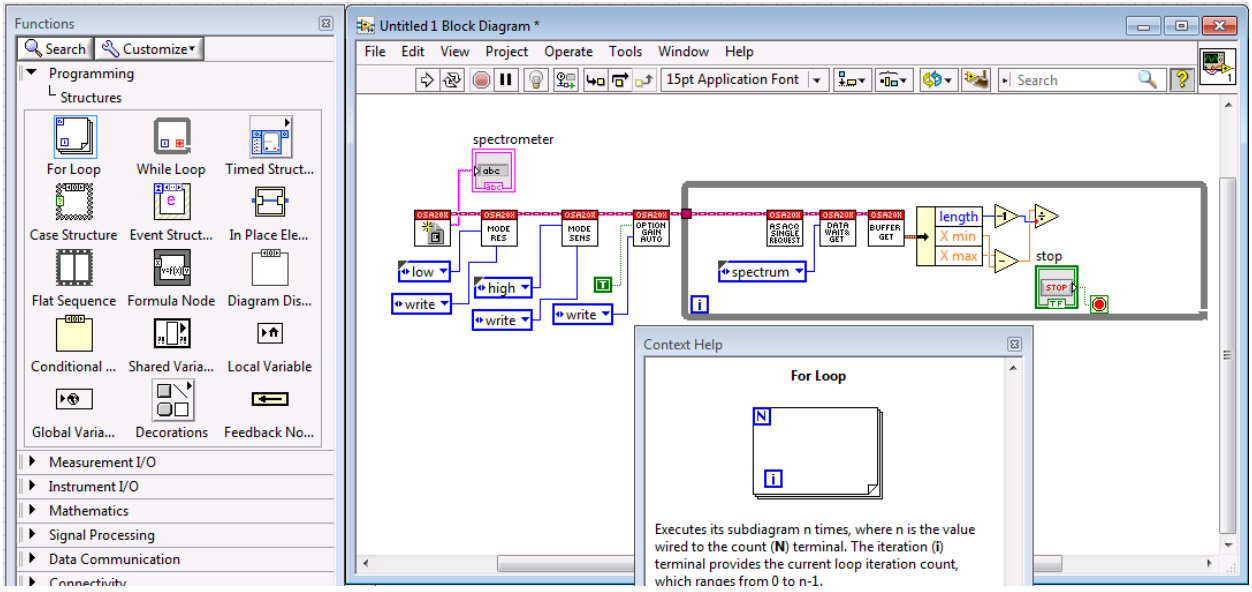
47. Place **Divide** on the Block Diagram inside the **While** loop.



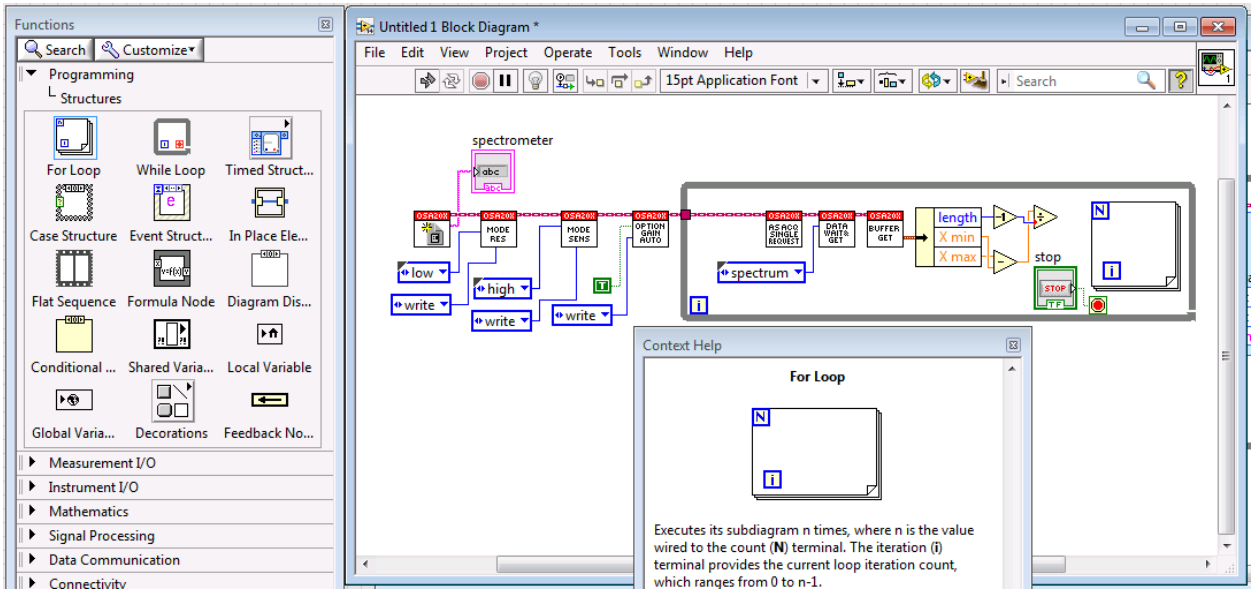
48. Left-click on the orange *x-y* node on **Subtract** and connect a wire to the orange *x* node on **Divide**. Left-click on the blue *x-1* node on **Decrement** and connect a wire to the orange *y* node on **Divide**.



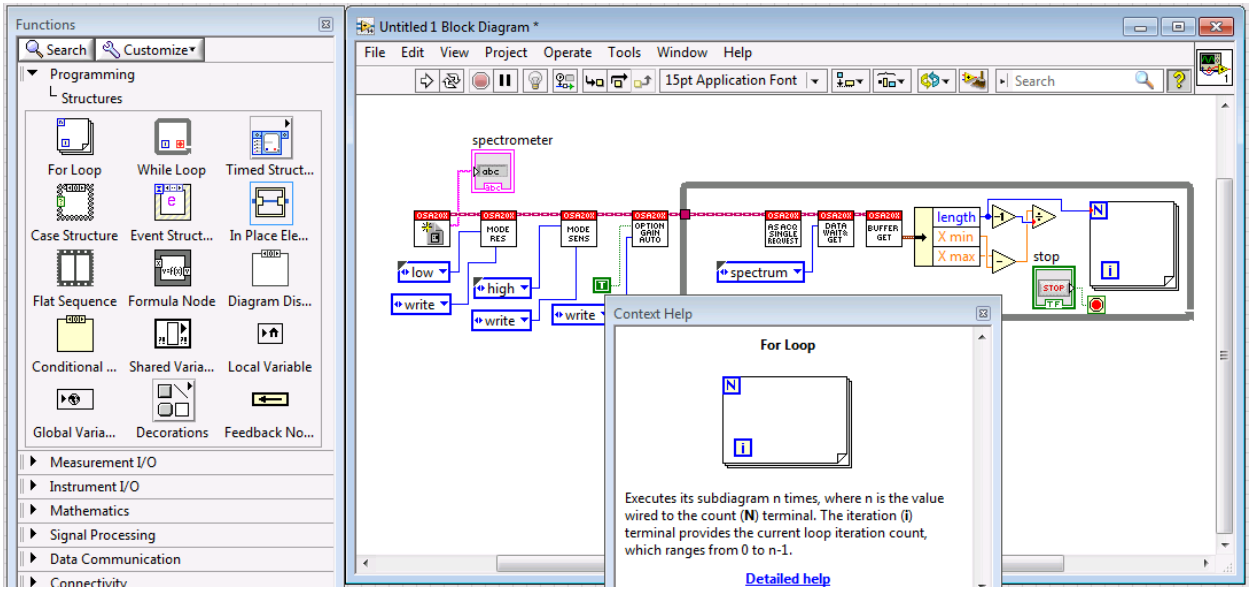
49. From the Functions Palette select **For** loop. It is located in Programming>Structures.



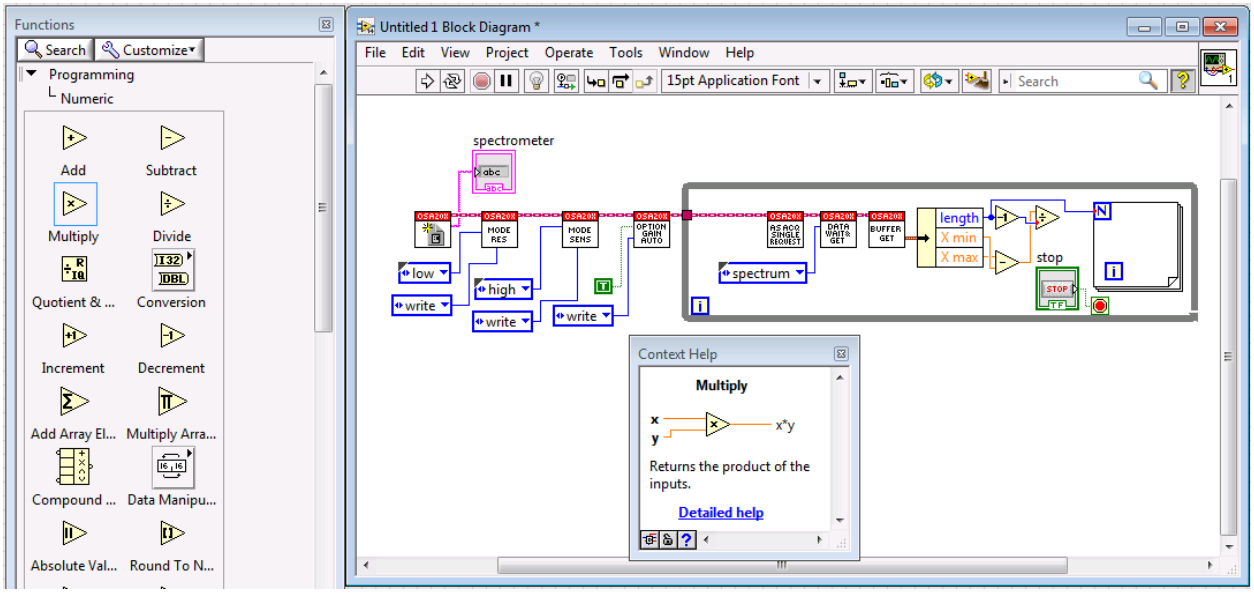
50. Left-click and drag to draw a **For** loop inside of the **While** loop.



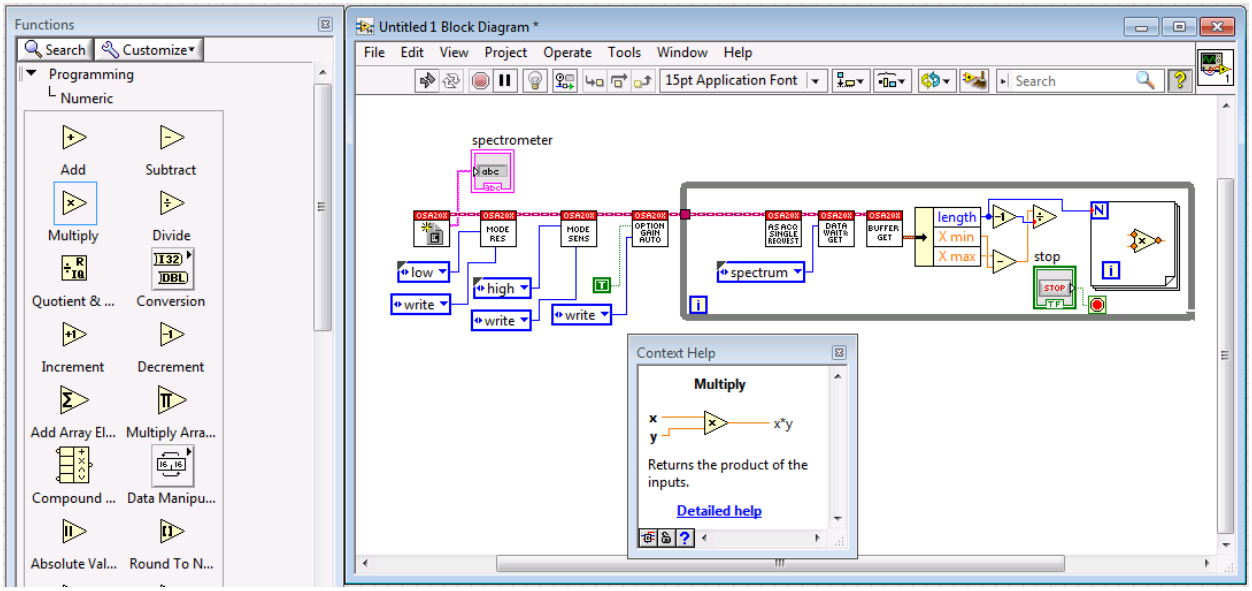
51. Left-click on the blue *length* node on **Unbundle By Name** and connect a wire to the count (N) terminal.



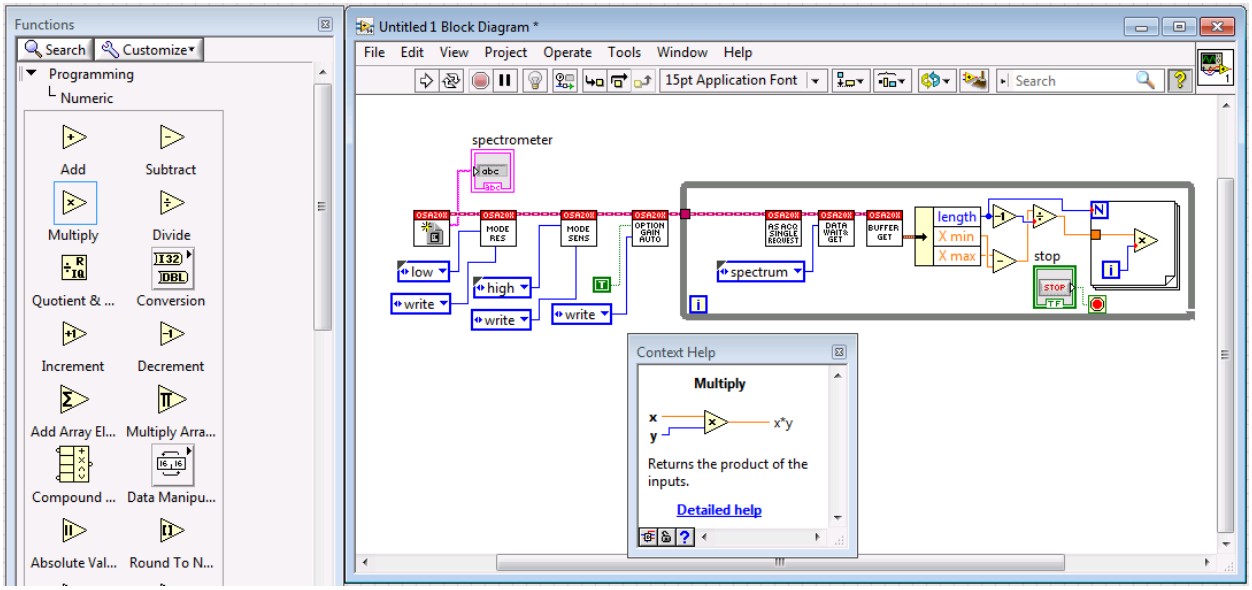
52. From the Functions Palette select **Multiply**. It is located in Programming>Numeric.



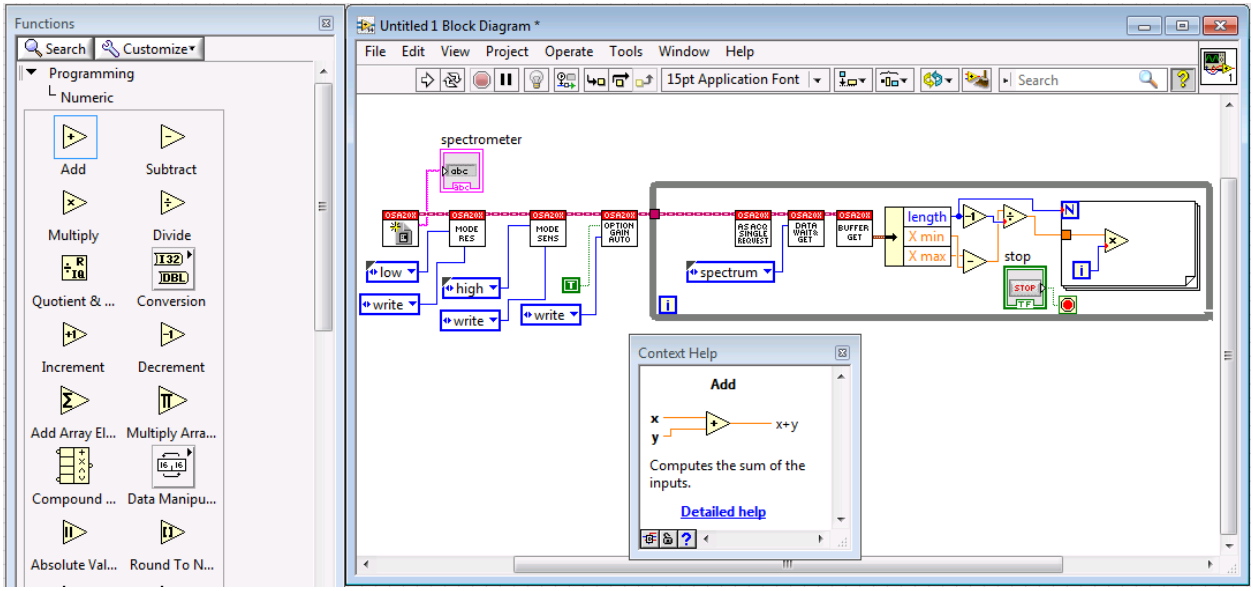
53. Place **Multiply** on the Block Diagram inside the **For** loop.



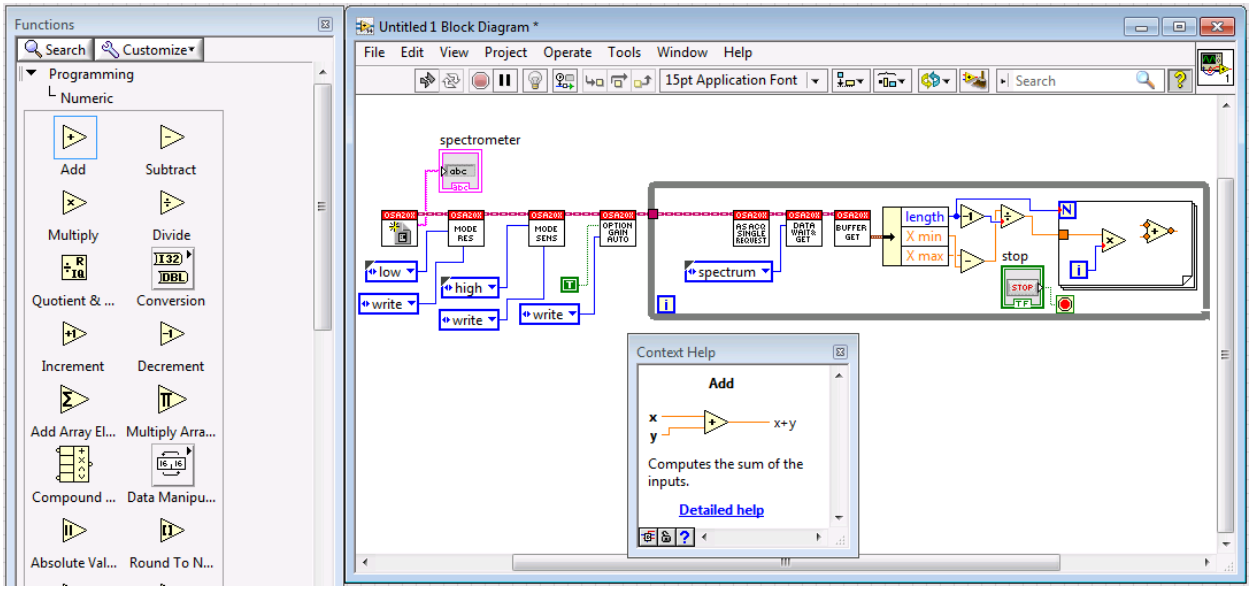
54. Left-click on the orange *x/y* node on **Divide** and connect a wire to the orange *x* node on **Multiply**. Left-click on the blue iteration (i) terminal and connect a wire to the orange *y* node on **Multiply**.



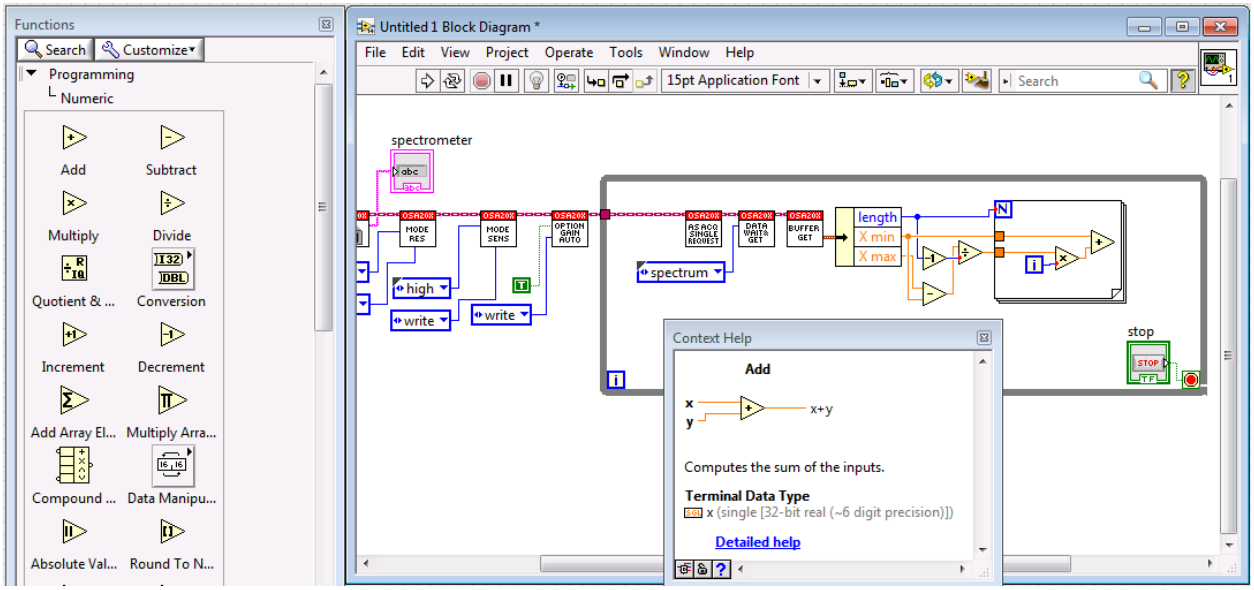
55. From the Functions Palette select **Add**. It is located in Programming>Numeric.



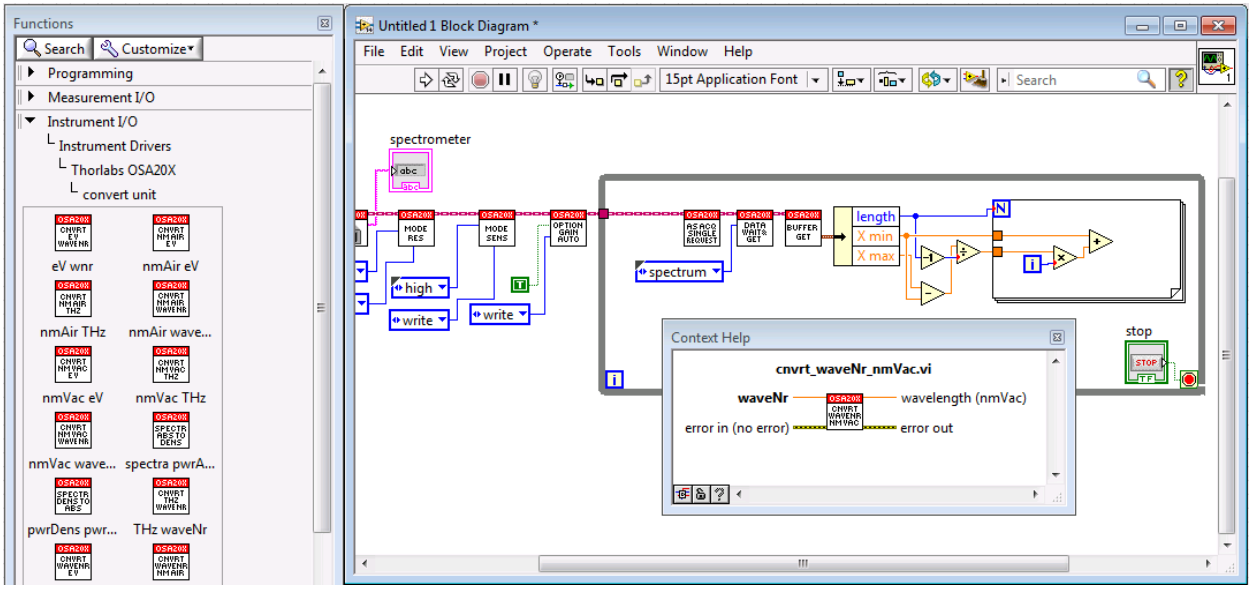
56. Place **Add** on the Block Diagram inside the **For** loop.



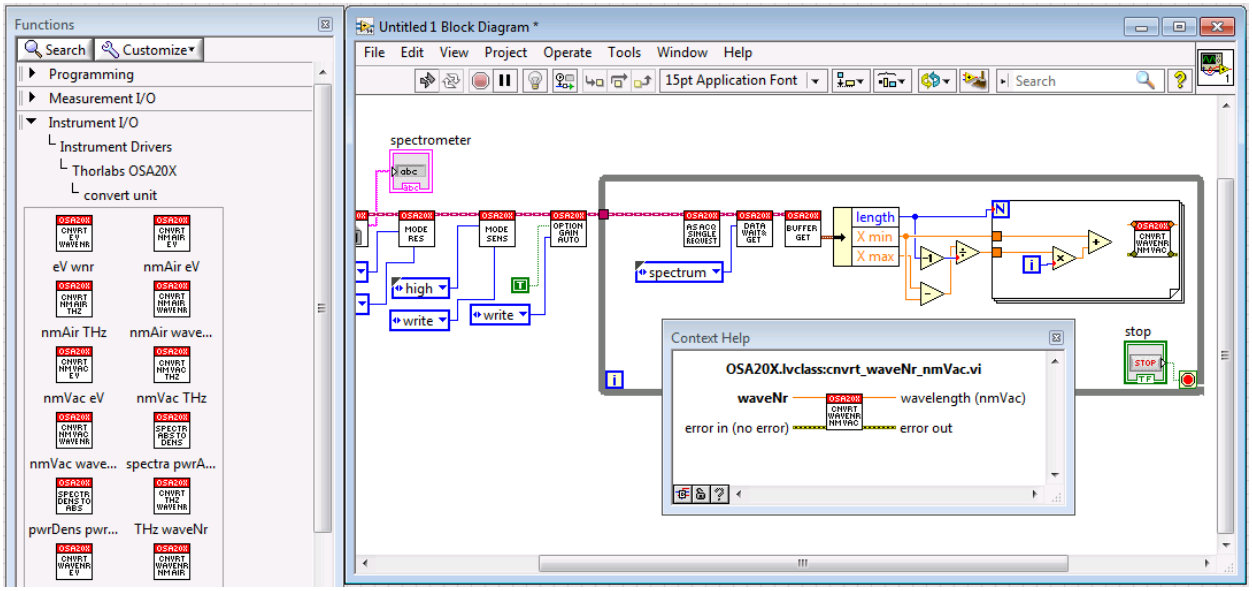
57. Left-click on the orange *X min* node on **Unbundle By Name** and connect a wire to the orange *x* node on **Add**. Left-click on the orange *x*y* node on **Multiply** and connect a wire to the orange *y* node on **Add**.



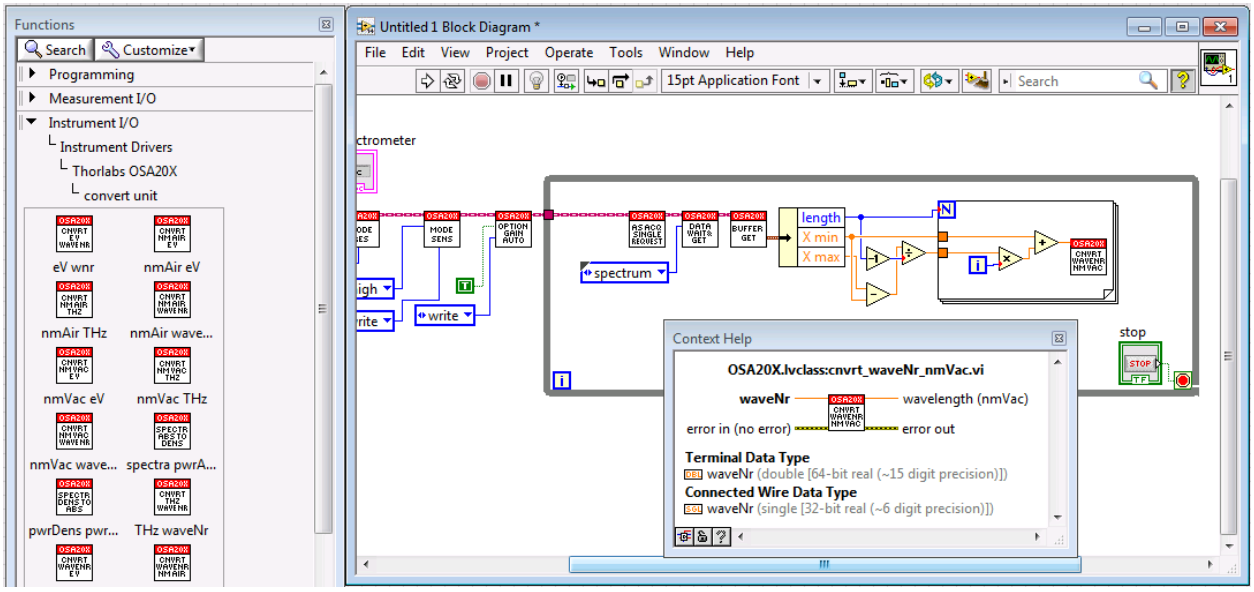
58. From the Functions Palette select **cnvrt_waveNr_nmVac.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20x>convert unit.



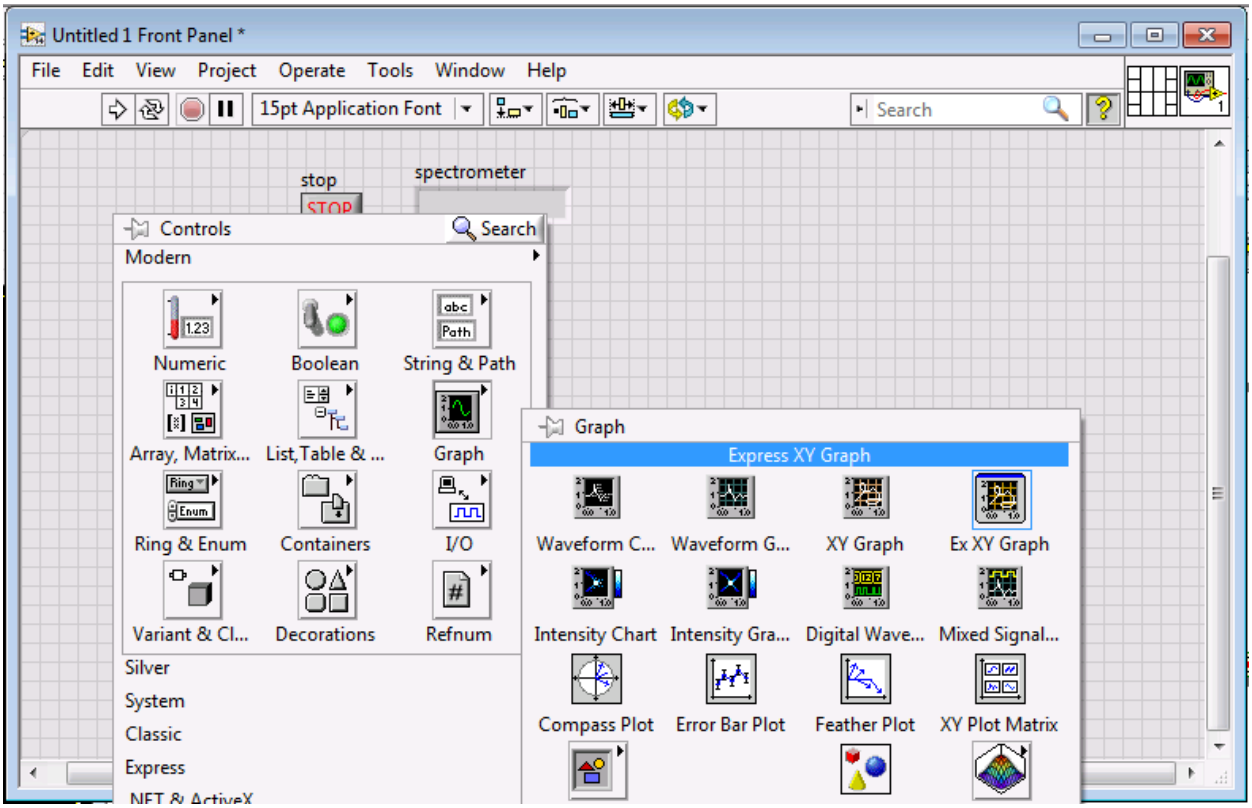
59. Place **cnvrt_waveNr_nmVac.vi** on the Block Diagram outside the **For** loop.



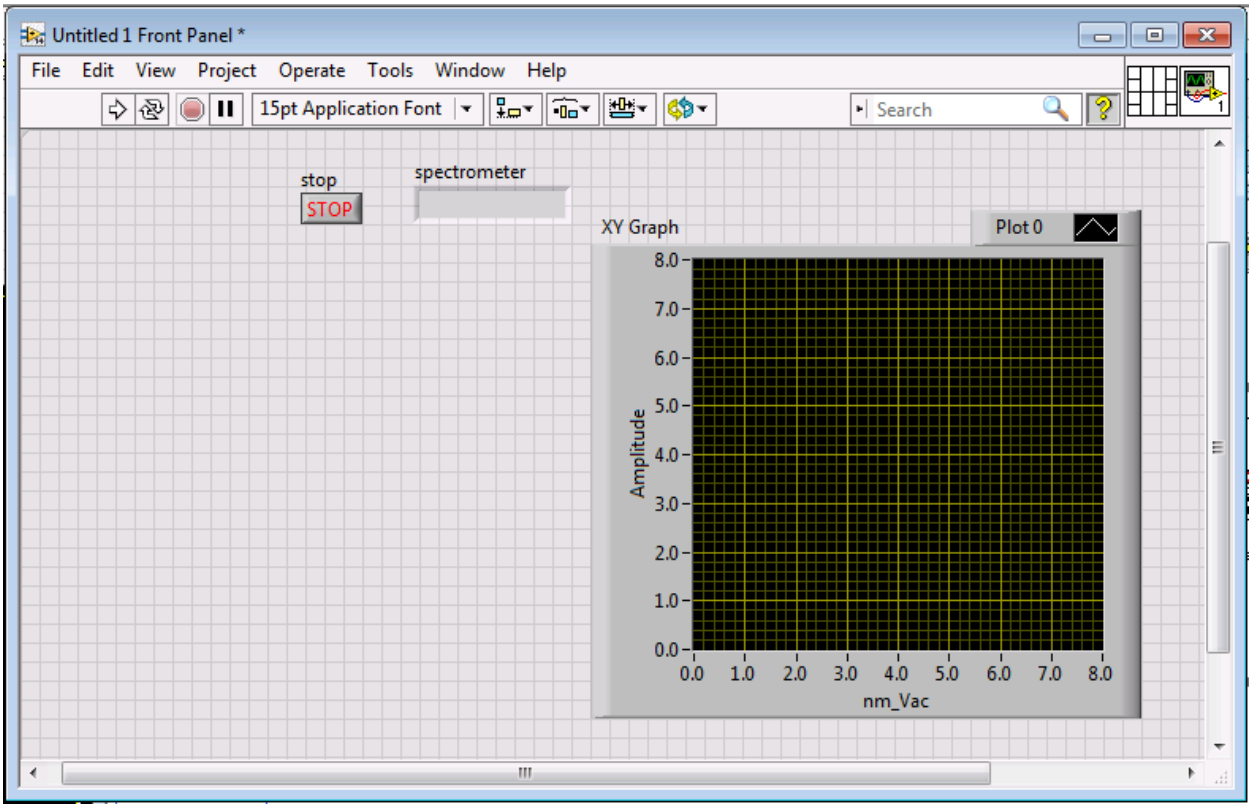
60. Left-click on the orange *x+y* node on **Add** and connect a wire to the orange *waveNr* node on **cnvrt_waveNr_nmVac.vi**.



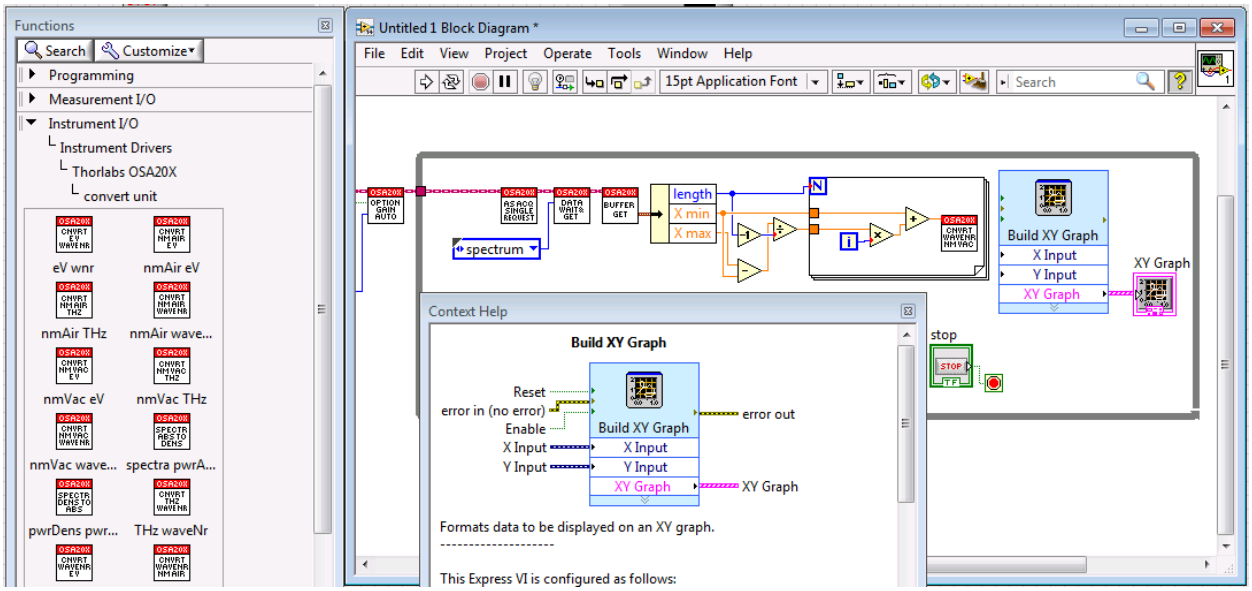
61. Go to the Front Panel and right-click on the background to open the Controls menu. In the Modern>Graph menu select Express XY Graph.



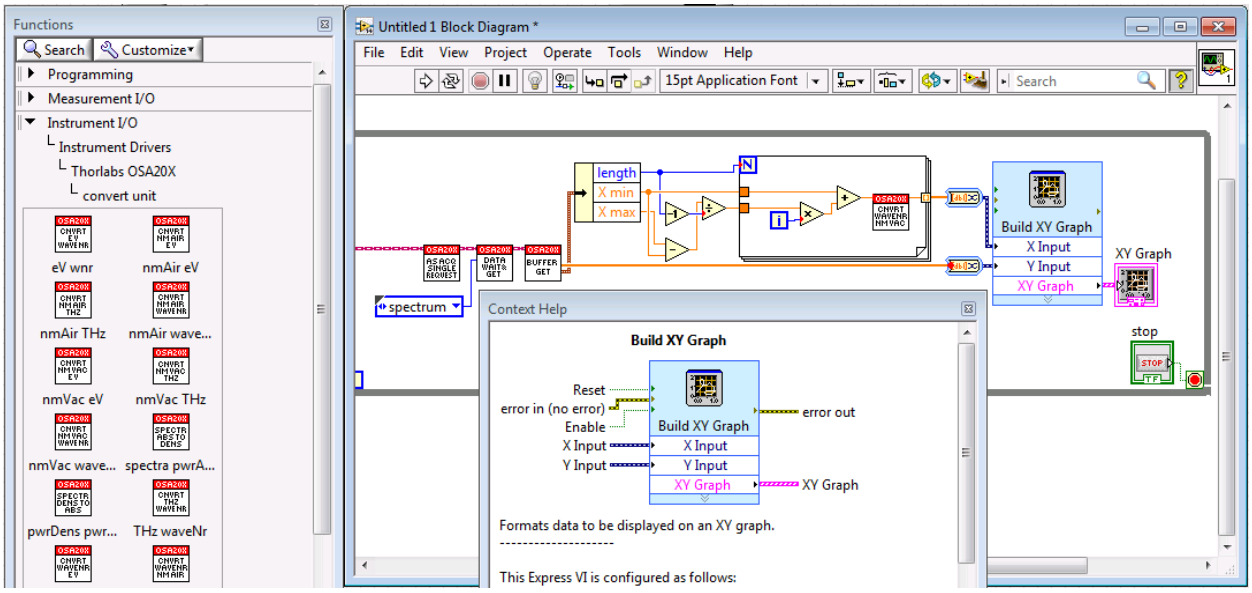
62. Place the **Express XY Graph** on the Front Panel. Double left-click on the x-axis title and change it to nm_Vac.



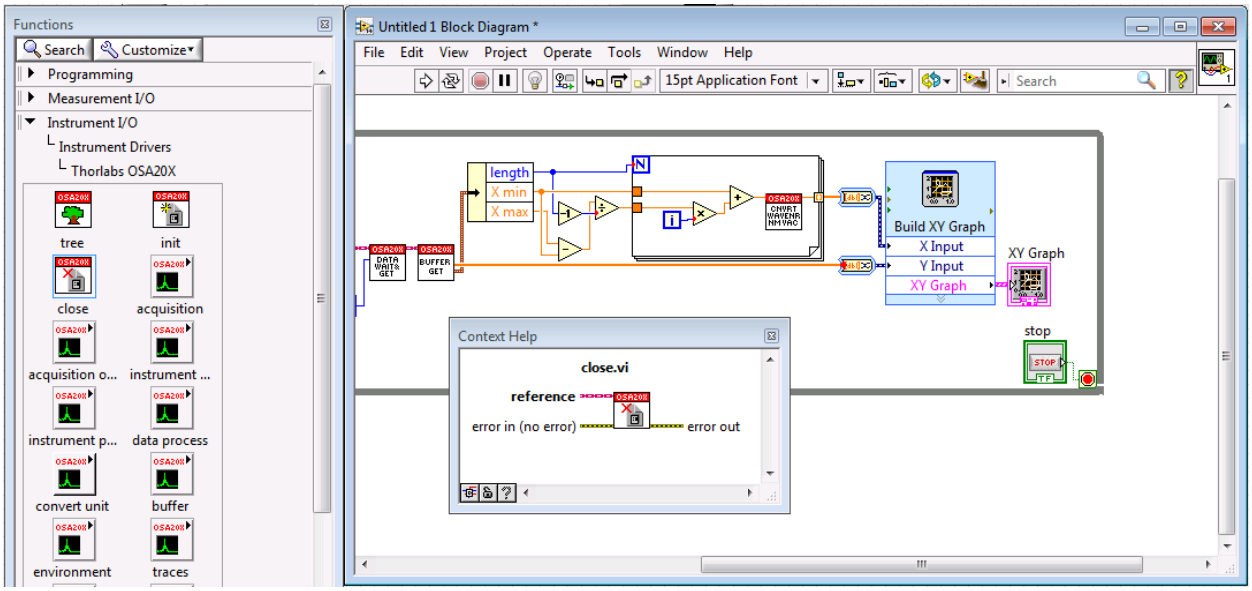
63. Go back to the Block Diagram and drag both parts of the XY Graph into the **While** loop.



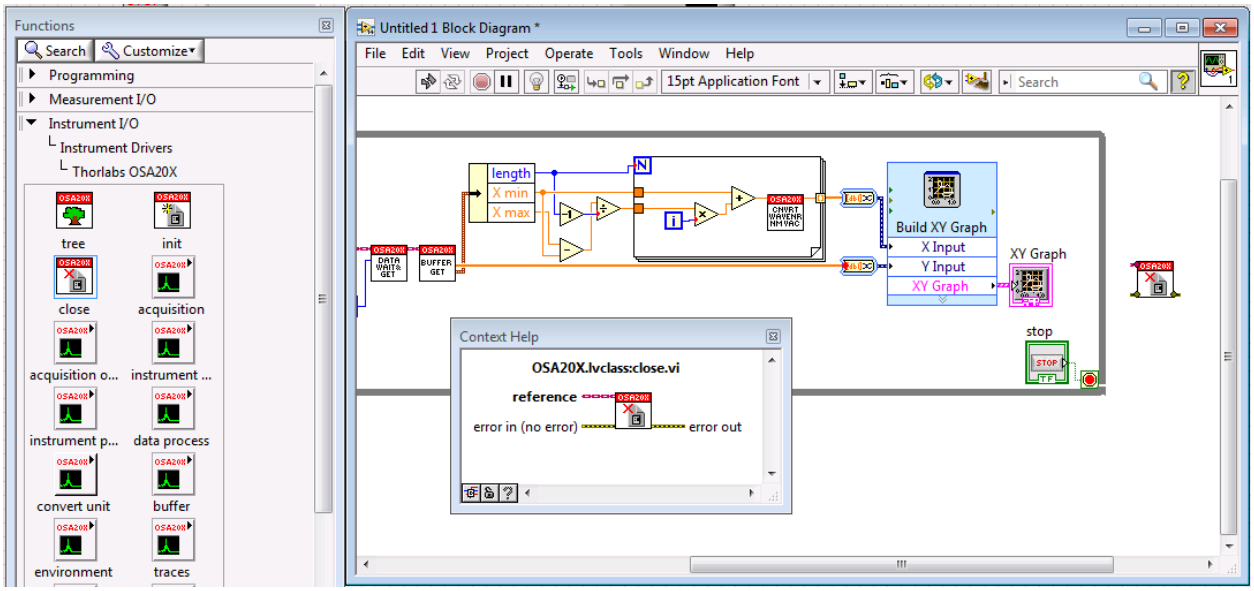
64. Left-click on the orange *wavelength (nmVac)* node on **cnvrt_waveNr_nmVac.vi** and connect a wire to the *X Input* of **Build XY Graph**. Left-click on the orange *spectrum Y (mW)* node on **buffer_get.vi** and connect a wire to the *Y Input* of **Build XY Graph**.



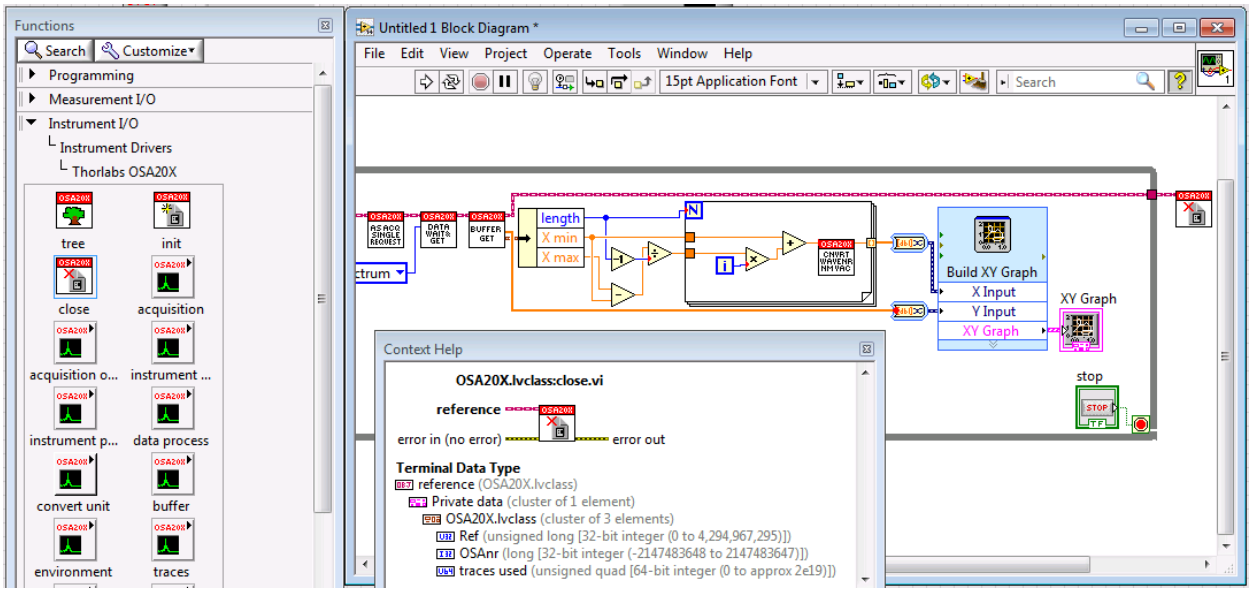
65. From the Functions Palette select **close.vi**. It is located in Instrument I/O>Instrument Drivers>Thorlabs OSA20X.



66. Place **close.vi** on the Block Diagram outside the **While** loop.



67. Left-click on the maroon *duplicate reference* node on **buffer_get.vi** and connect a wire to the maroon *resource name* node on **close.vi**.



68. Press the arrow ( ) in the top left of the front panel to run the program.