Integrate the PATsmart™ FlowVPE® and FlowVPX® Systems with the KrosFlo® KR2i System using the Konduit Module

Support Document

Introduction

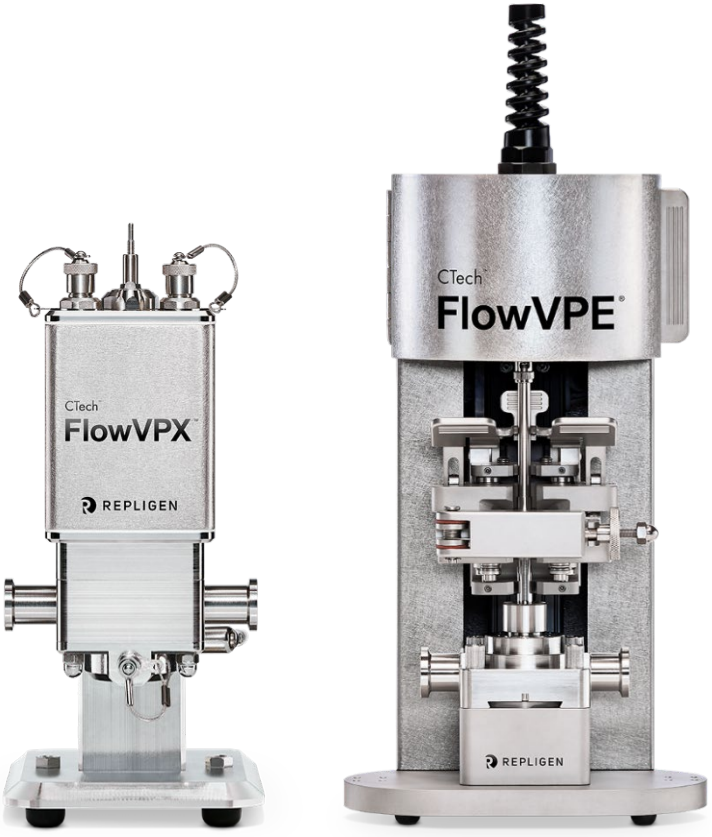
The KrosFlo® KR2i System is designed to automate ultrafiltration and diafiltration (UF/DF) processes in development labs. The system can run automated recipes with little to no user interaction while collecting data from a wide range of sensors and logging to a central data file.

One of the most important elements in these development activities is being able to accurately determine the concentration of the product of interest. The PATsmart™ FlowVPE® and FlowVPX® Systems monitor real-time in-line concentration. These instruments can be paired with the highly flexible and configurable KrosFlo® KR2i System by using the Konduit add-on module for UV, temperature, and conductivity monitoring.

This guide describes how to integrate a FlowVPE or FlowVPX System with a KR2i System via the Konduit module. Once connected, all process data can be viewed on one interface and logged with proper time synchronization for future analysis.

This reference includes the following sections:

1. Configuring the FlowVPE System Output
2. Configuring the FlowVPX System Output
3. Integration with the KR2i System
4. Verification of Integrated Process
5. KF Comm 2 Recipe with and without Flow Meter
6. Log Files Verification



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1. Configuring the FlowVPE System Output

Note: *If using the FlowVPX System, skip this section.*

1.1 Hardware Interface

1. The Konduit connector cable should be installed to the NI 9265 interface box with the following wire positions. **Wire colors may vary**; always confirm the function of each lead before connecting.
    a. Positive (green) – position 0
    b. Negative (red/white) – position 1
    c. *If present*: Ground (red) – position 7
    d. Power supply positive – position 8
    e. Power supply negative – position 9

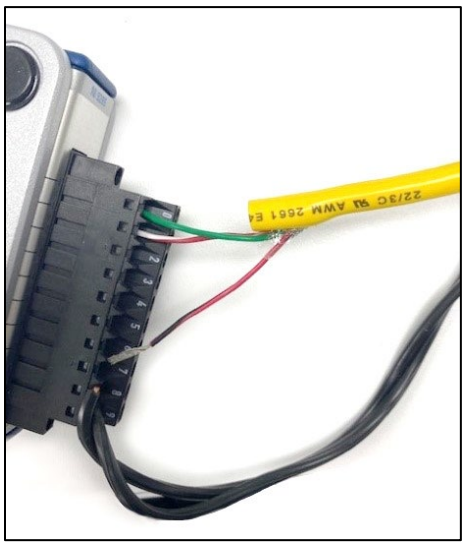

Figure 1. Konduit connector to NI 9265 box.

2. Connect the FlowVPE System's control laptop to the USB port of the NI 9265 box.

Figure 2. Laptop connector to NI 9265 box.

1.2 Software Configuration

3. Open the KF or KQ software by double-clicking the desktop icon and wait for it to fully load. Make sure to follow the proper loading procedure and load the correct FlowVPE Flow Cell and Fibrette® optical component.

4. Click Setup.

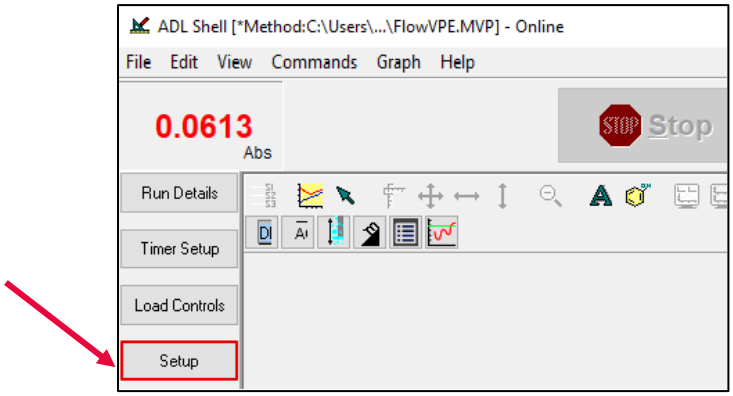

Figure 3. FlowVPE software main screen.

5. In KQ Software: Select Enable Analog Output and type the Wavelength and User EC.

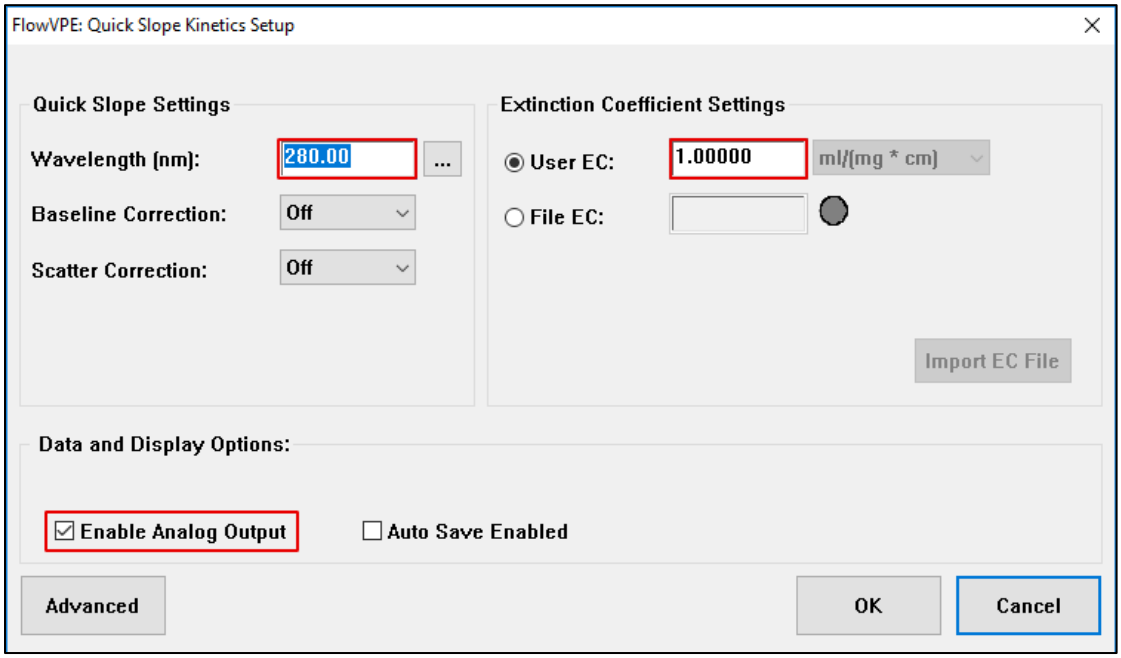

Figure 4. KQ software setup screen.

6. In KF Software:
    a. Select Enable Analog Output and click the ellipses button (…) next to Wavelength List for advanced settings.

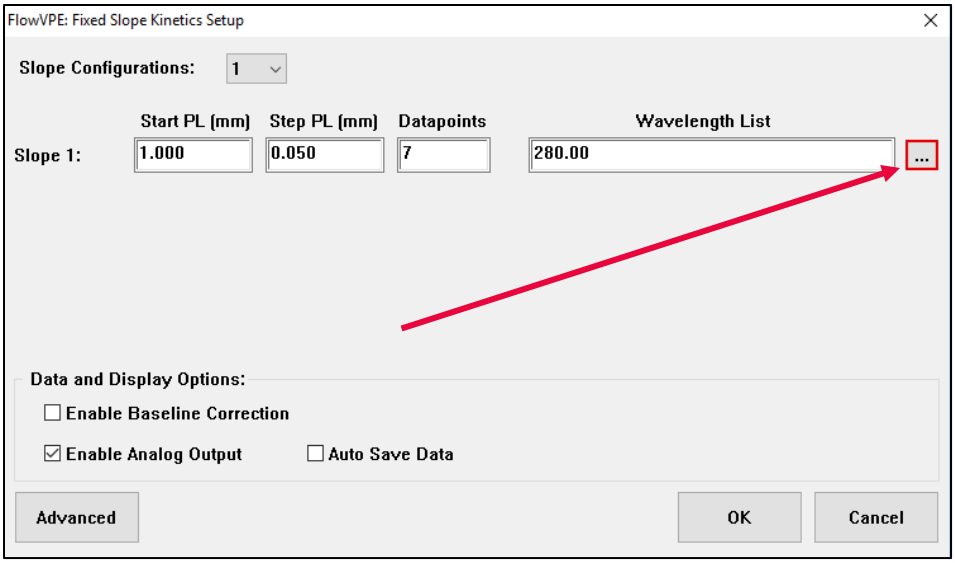

Figure 5. KF software setup screen.

b. Select Plot Concentration vs. Time and click OK.

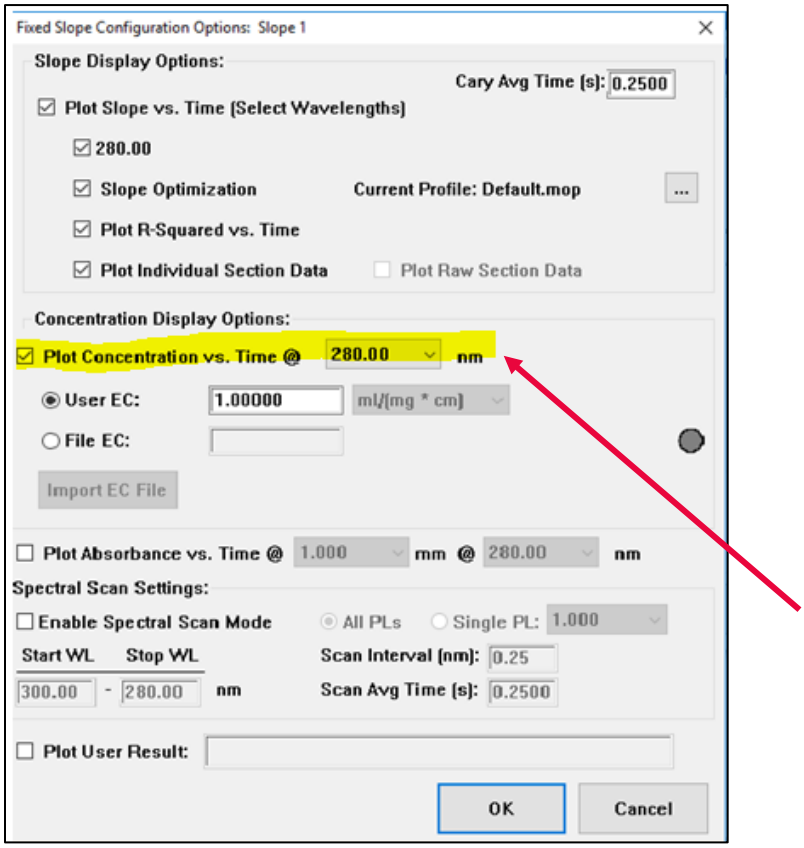

Figure 6. Configuration Options menu.

7. Click AO in the toolbar.

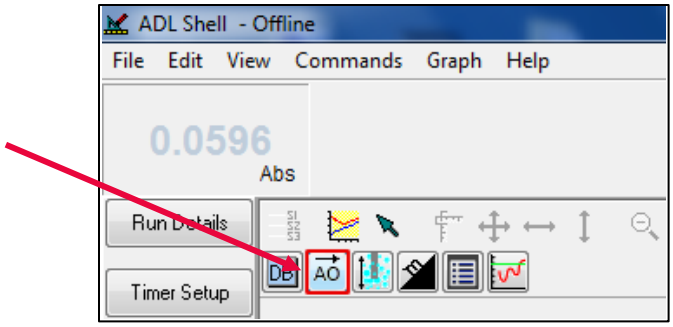

Figure 7. AO button in the toolbar.

8. Under Available Data for Output, select the concentration data. Then click Add Current Output.

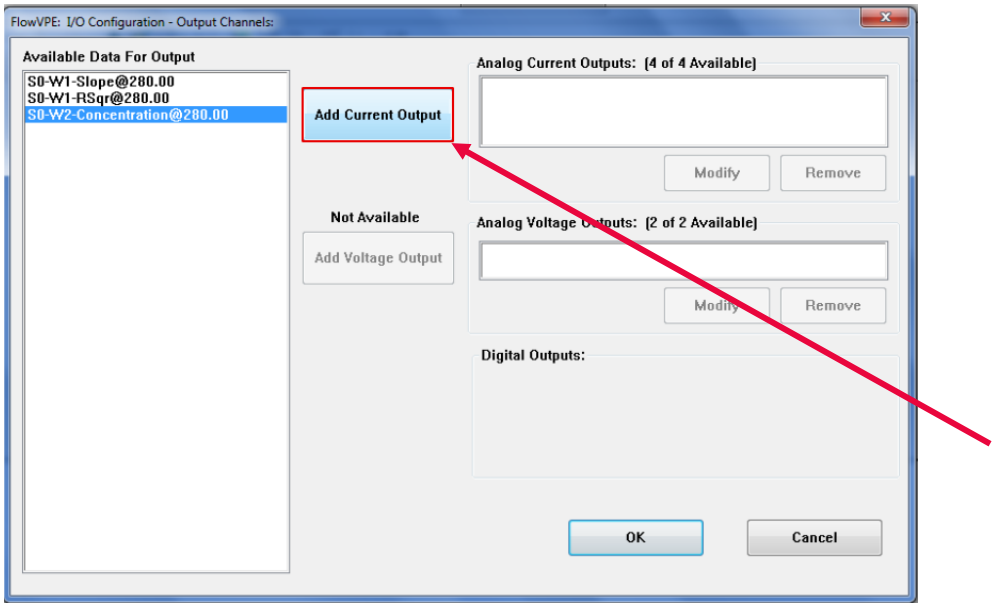

Figure 8. AO configuration screen.

9. Click Modify to bring up the setup screen.

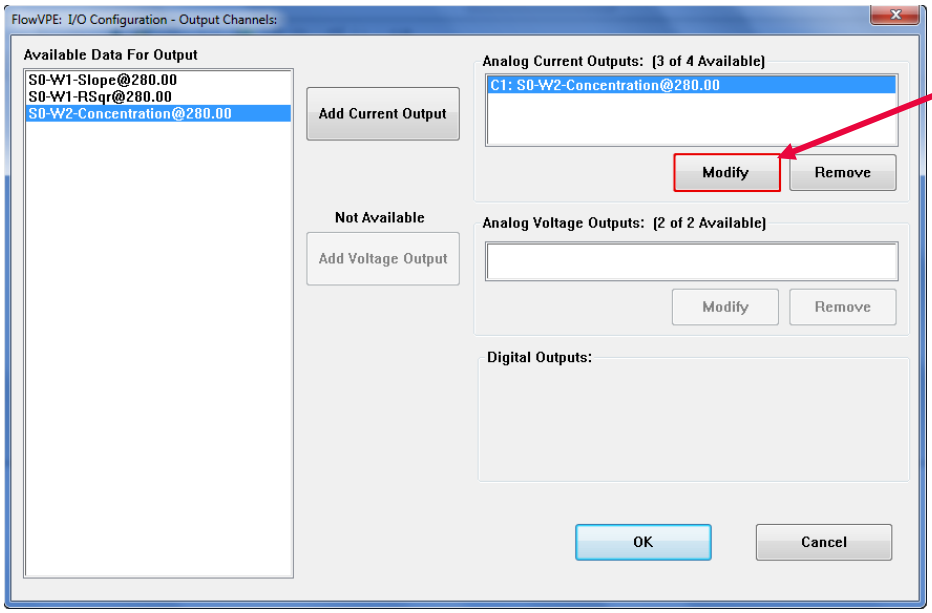

Figure 9. AO setup screen modify.

The following dialog box will appear:

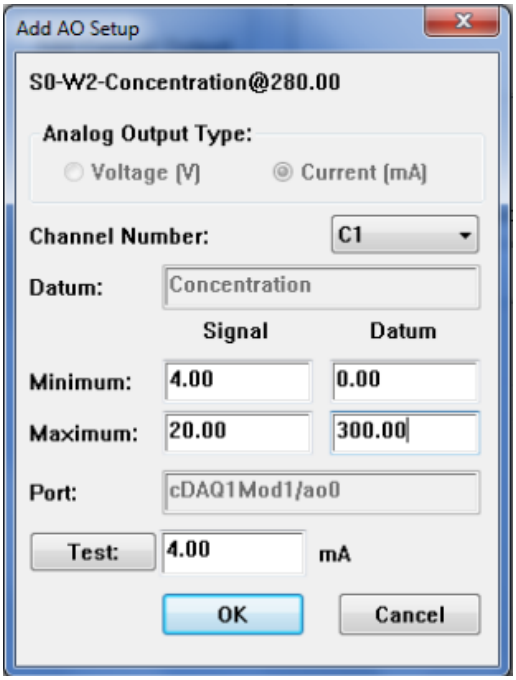

Figure 10. AO modify screen.

10. Enter appropriate parameters:
    a. Signal must be set to 4.00 Minimum and 20.00 Maximum.
    b. The values under Datum should reflect the minimum and maximum concentration values.
11. Click OK once finished.

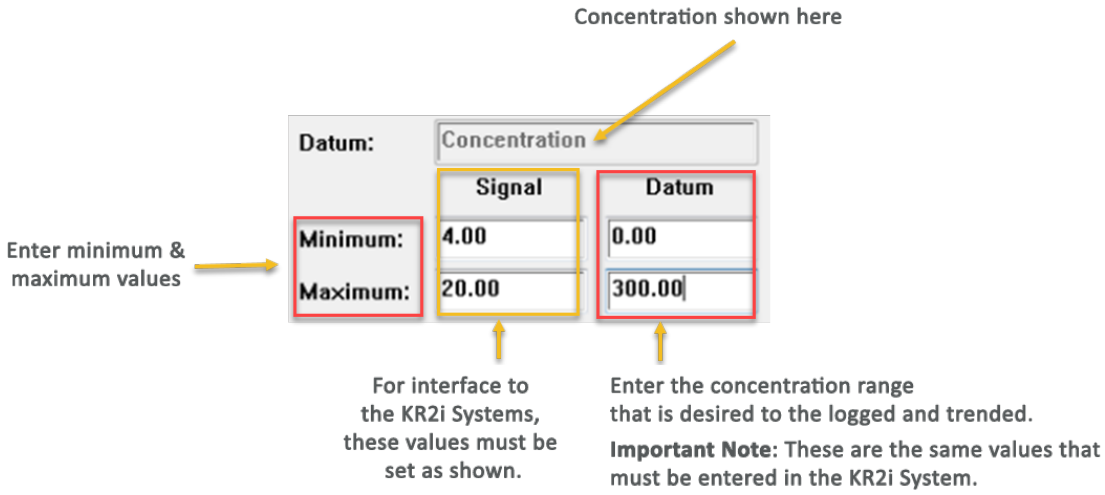

Figure 11. FlowVPE software analog settings.

2. Configuring the FlowVPX System Output

2.1 Hardware Interface

Note: *If using the FlowVPE System, skip this section.*

1. Before making a connection, please ensure both the FlowVPX and the Konduit are powered off.
2. To connect the FlowVPX and Konduit, you will need an RSKV-12 connector cable (part number EC0223).

Figure 12. RSKV-12 Connector cable

3. Connect the RSKV-12 cable with the FlowVPX Power and I/O splitter cable (part number EC0208) as shown.

Figure 13. RSKV-12 cable connection with splitter cable.

4. Connect the Power and I/O splitter cable to the FlowVPX Head as shown.

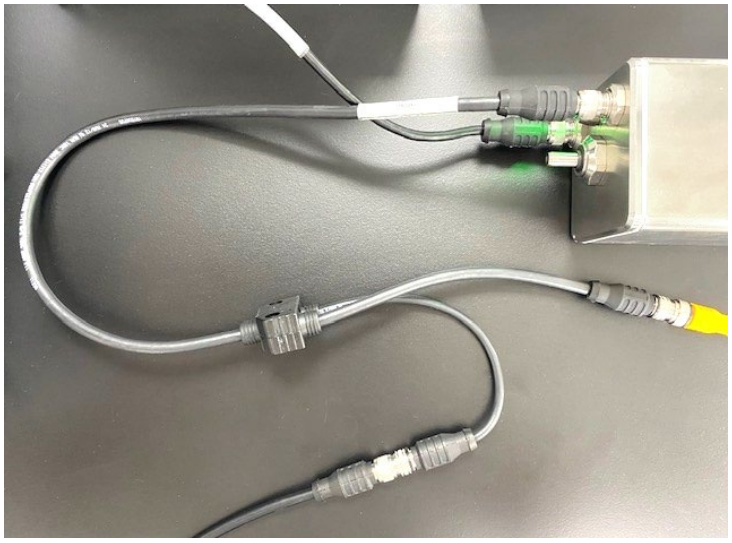

Figure 14. Cable connection to FlowVPX Head.

2.2 Software Configuration

5. Launch PATsmart™ ViPER® ANLYTX software from the desktop. Wait until the software is completely open and VPT OPC Server displays a status of “Ready.”

6. Click the Quick Kinetics application and make sure to follow the proper loading instructions for the Flow Cell and Fibrette.

Figure 15. ViPER software home page.

7. In Quick Kinetics, open the analog settings by clicking the IO button.

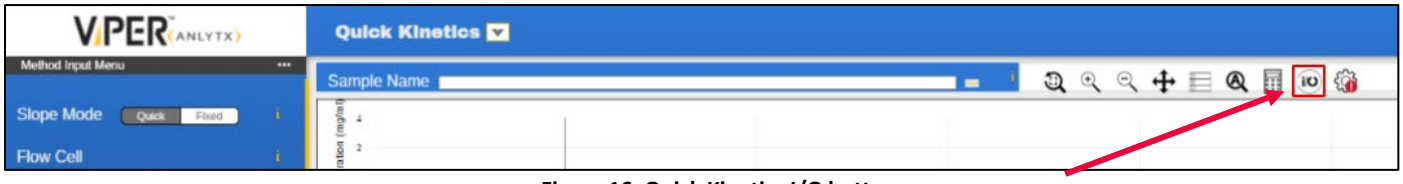

Figure 16. Quick Kinetics I/O button.

8. Turn I/O Configuration on and select the FlowVPX in the top bar of the popup window.
9. Confirm the following: Channel 0, Run Mode, and Unit set to Current.

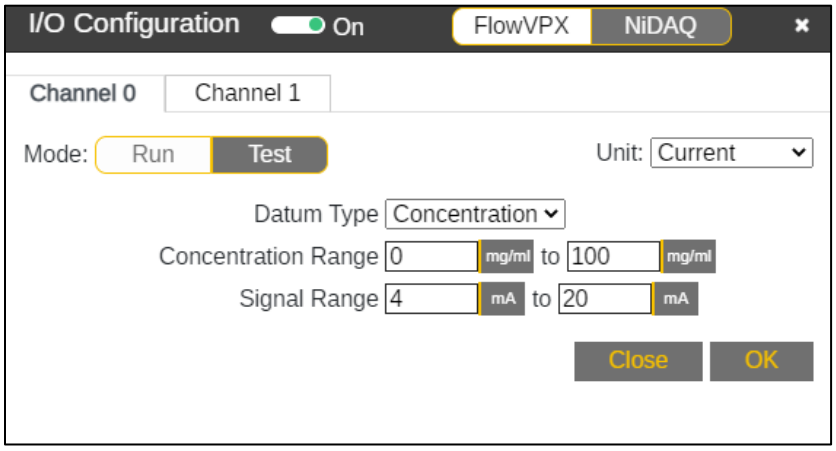

Figure 17. I/O Configuration setup.

10. Set Datum Type to Concentration and enter the concentration range based on the sample.
11. Set the Signal Range as 4 mA to 20 mA.
12. Click OK to confirm the settings.

3. Integration with the KR2i System

1. Confirm the KR2i System is turned off.
2. Connect the other end of the RSKV-12 cable to the Konduit module (Figure 19).

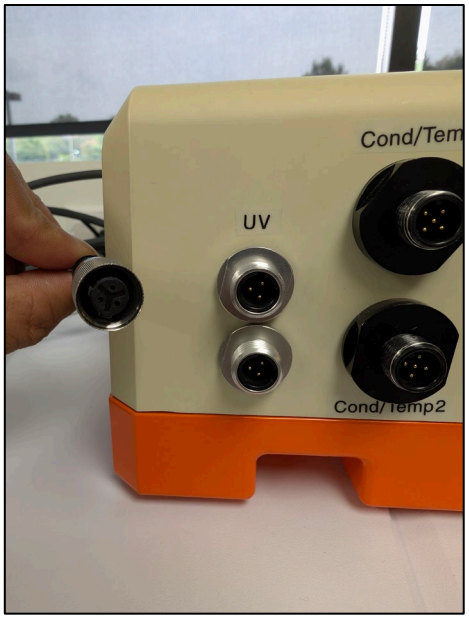

Figure 18. Cable connection to Konduit

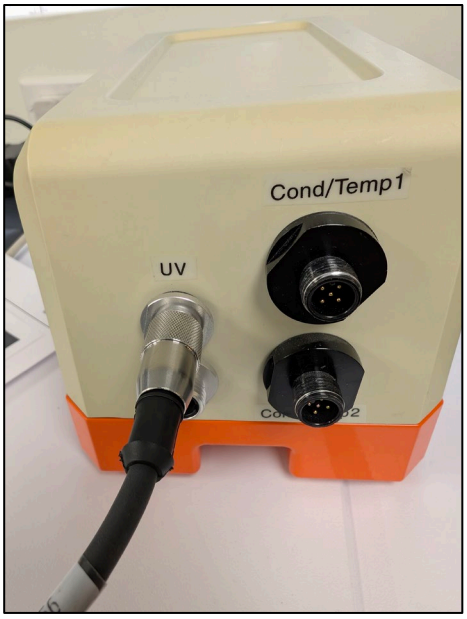

Figure 19. UV Channel 1 Connection

Note: *The RSKV-12 cable may be connected to the Konduit in either UV channel 1 or 2.*

Note: *If using a Flow Meter / FS500, then use channel 2. Flow meter will automatically take channel 1.*

3. Turn on the KR2i System and the Konduit.
4. Start the KF Comm 2 software.
5. Log in using the correct user account.
6. Go to the left side panel of the software and click System Settings.

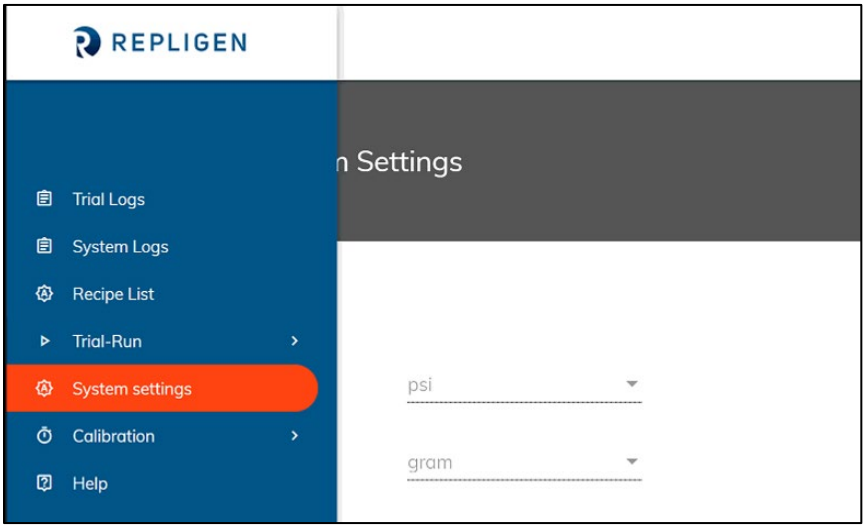

Figure 20. KF Comm 2 software

7. On the top right, click Edit and scroll down to KONDUiT Channel 1. If the RSKV-12 cable was connected to UV channel 2, scroll down to KONDUiT Channel 2 instead.
8. Choose Auxiliary and then choose Protein Concentration.

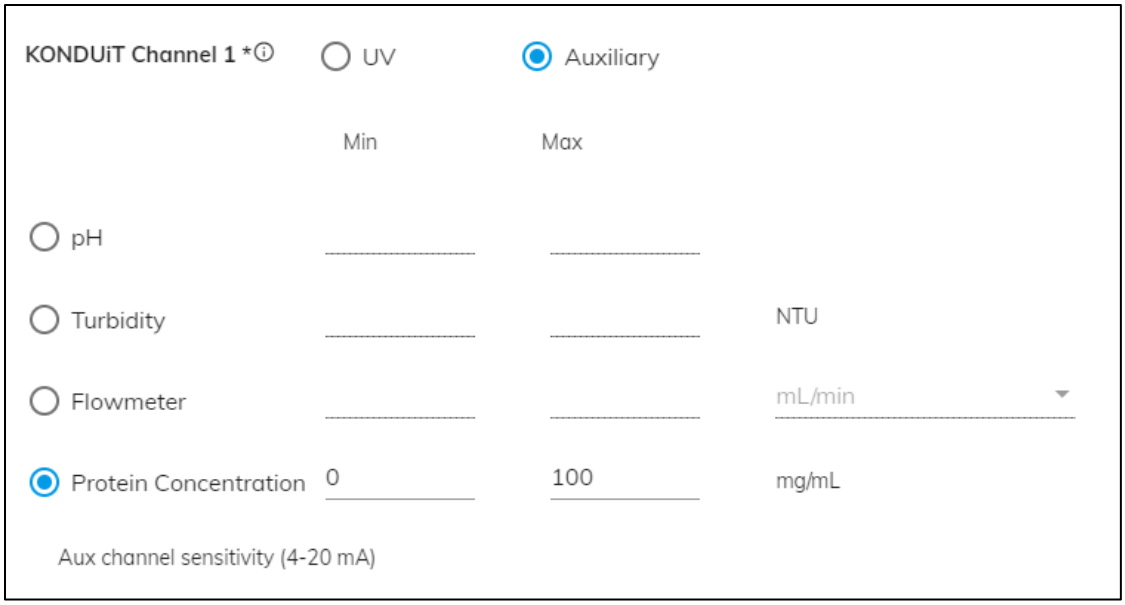

Figure 21. KR2i analog settings.

13. Enter the Min and Max concentration values to match the values entered in the FlowVPE or FlowVPX software.
14. Click Save. The analog input is now set and will be used once you finish creating your method and recipe.
15. In the ViPER software:
    a. Open the Quick Kinetics application.
    b. Load a Flow Cell if not already loaded.
    c. Create a method in the Quick Kinetics application.
16. In the KF Comm 2 software, create a recipe.

4. Verification of Integrated Process

1. Launch ViPER software, open Quick Kinetic application and create a method with I/O configuration.
2. Launch KF Comm 2 software.
3. From the left side panel, select Trial-Run, then Manual Mode.

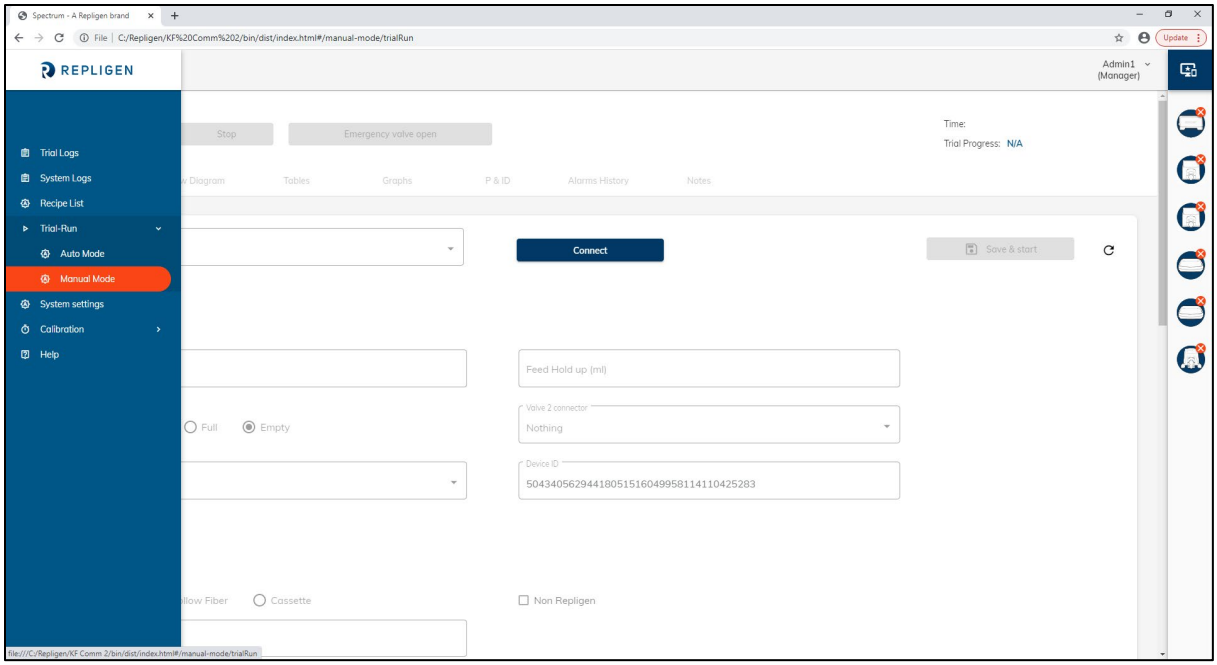

Figure 22. Manual Mode

4. Click Connect to establish the connection with the KR2i system.

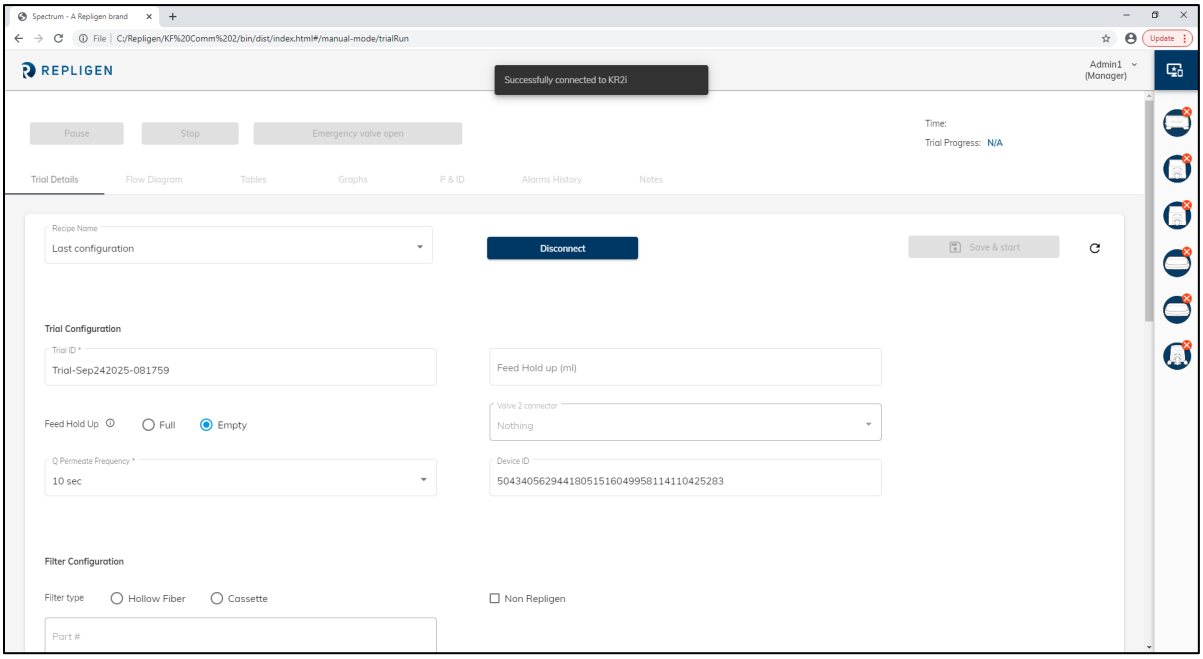

Figure 23. KR2i Connection

5. Click “Save & start” to begin the manual mode run.

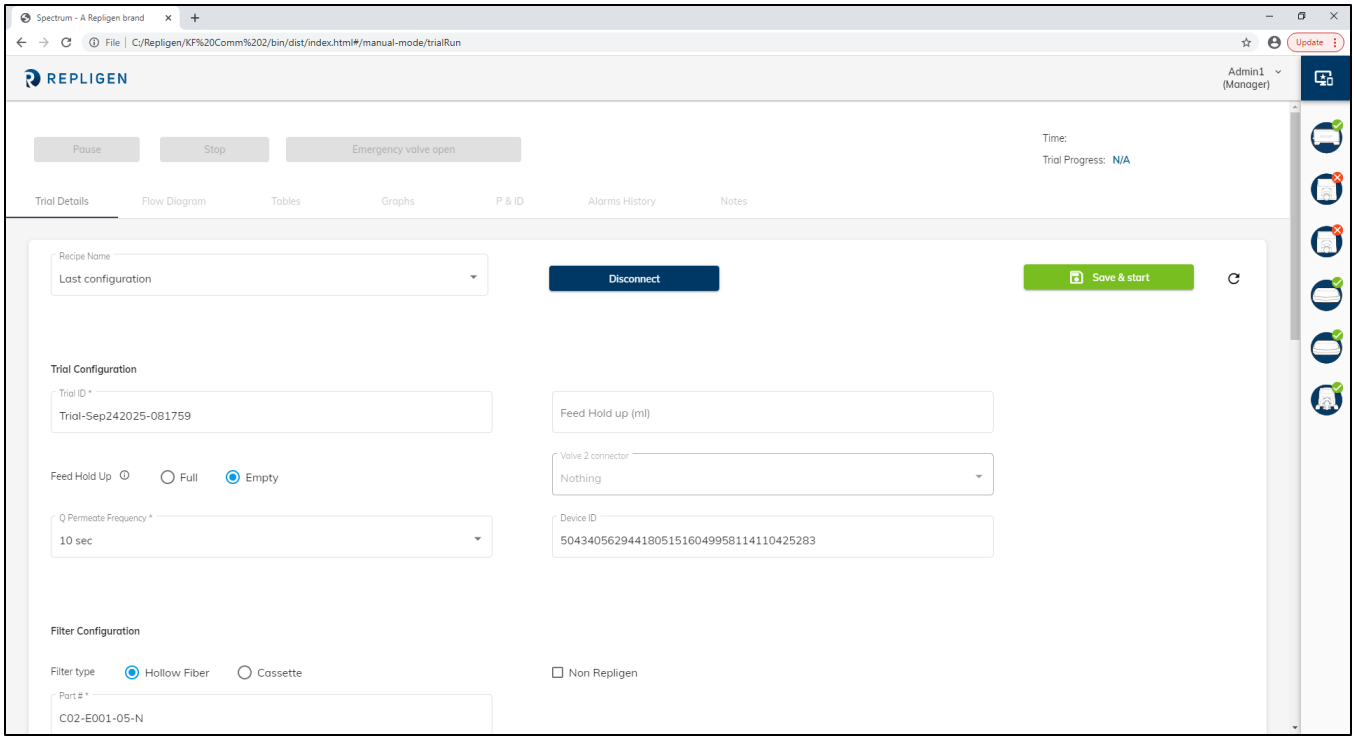

Figure 24. Starting manual mode.

6. In manual mode, click on the flow diagram tab and confirm the KF KONDUiT card is displayed.

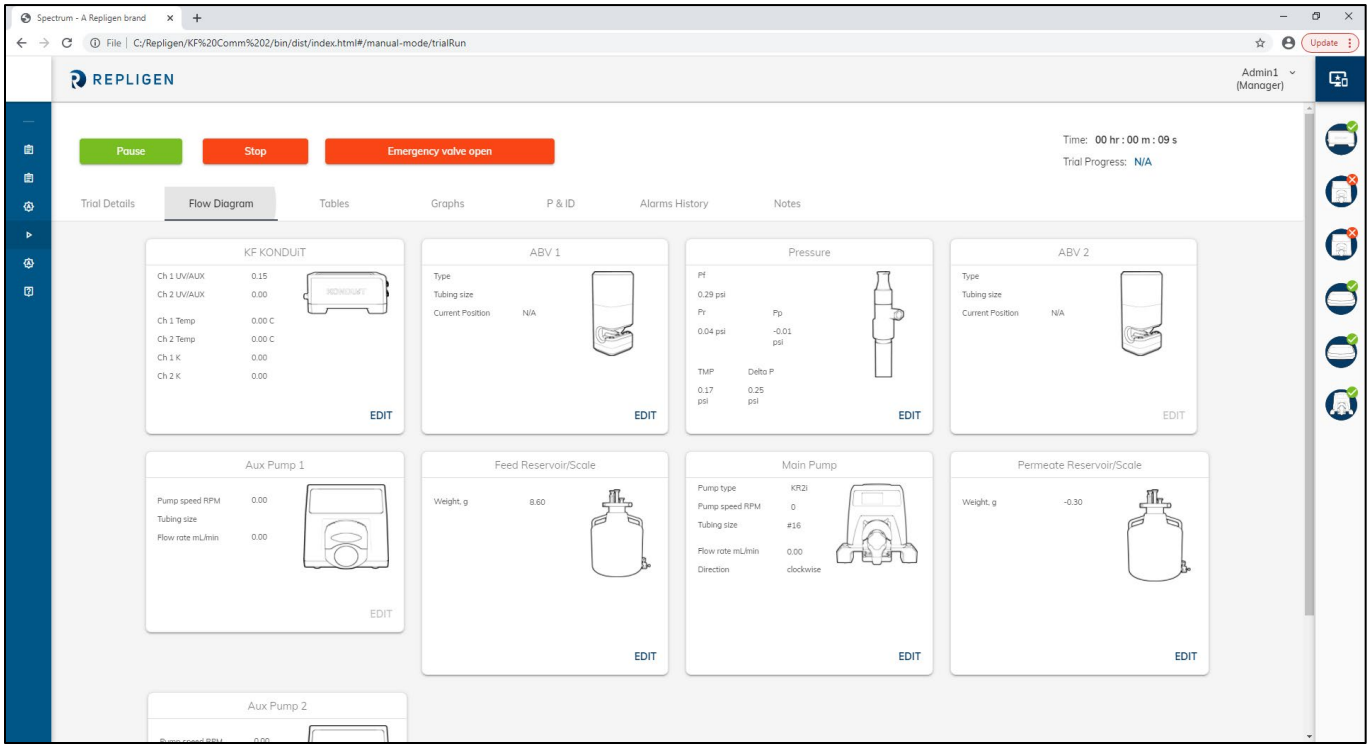

Figure 25. Flow Diagram – KF KONDUiT

7. Go back to the ViPER software and click start to initiate data collection. Wait for some concentration data to be reported in ViPER.
8. In the KF Comm 2 software, confirm the value displayed in channel 1 or 2 of the Konduit, based on the system setup.

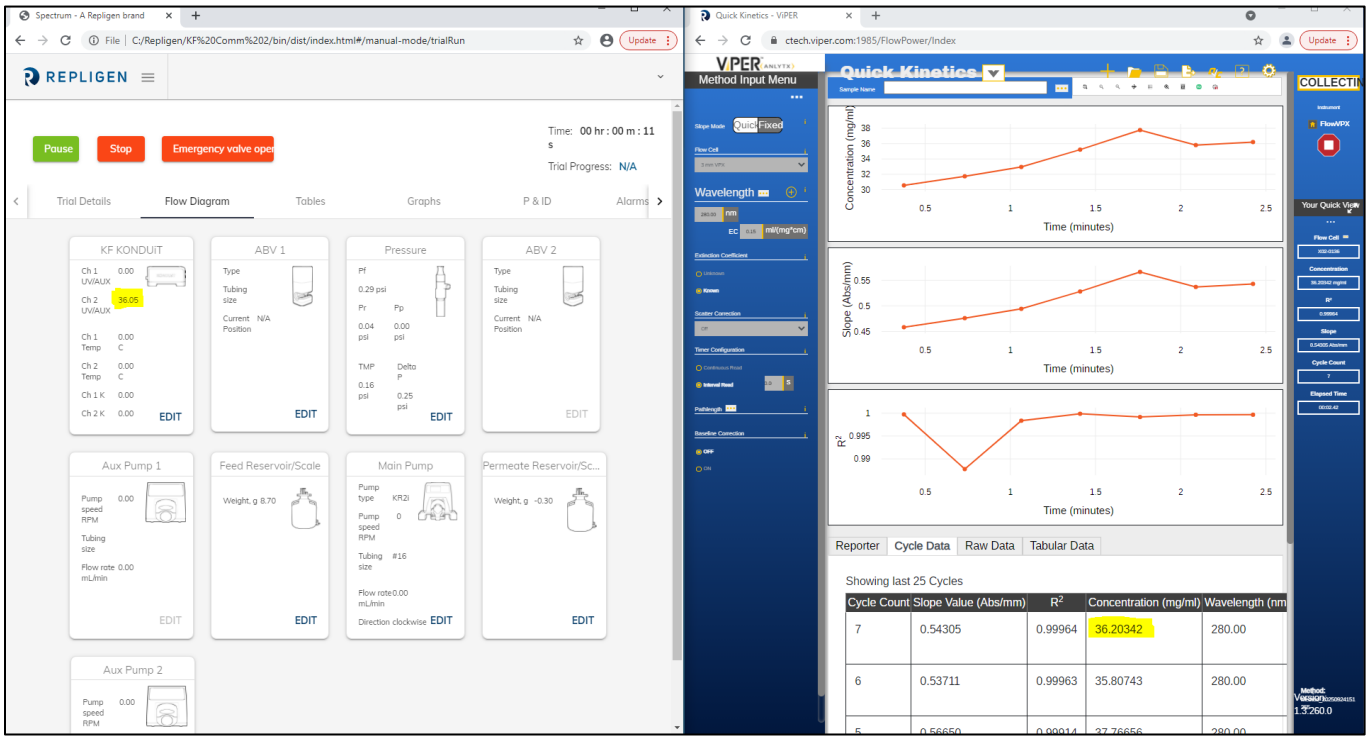

Figure 26. KF Comm 2 and ViPER data side by side.

9. The process will end once the target is reached.
10. Go to ViPER and stop the run.

5. KF Comm 2 Recipe with and without Flow Meter

5.1 Creating a recipe in KF Comm 2 Software Without the Flow Meter

1. When setting up the recipe, for example a C/D/C recipe, set the Concentration Mode End Point Type to Protein Concentration (Figure 27).

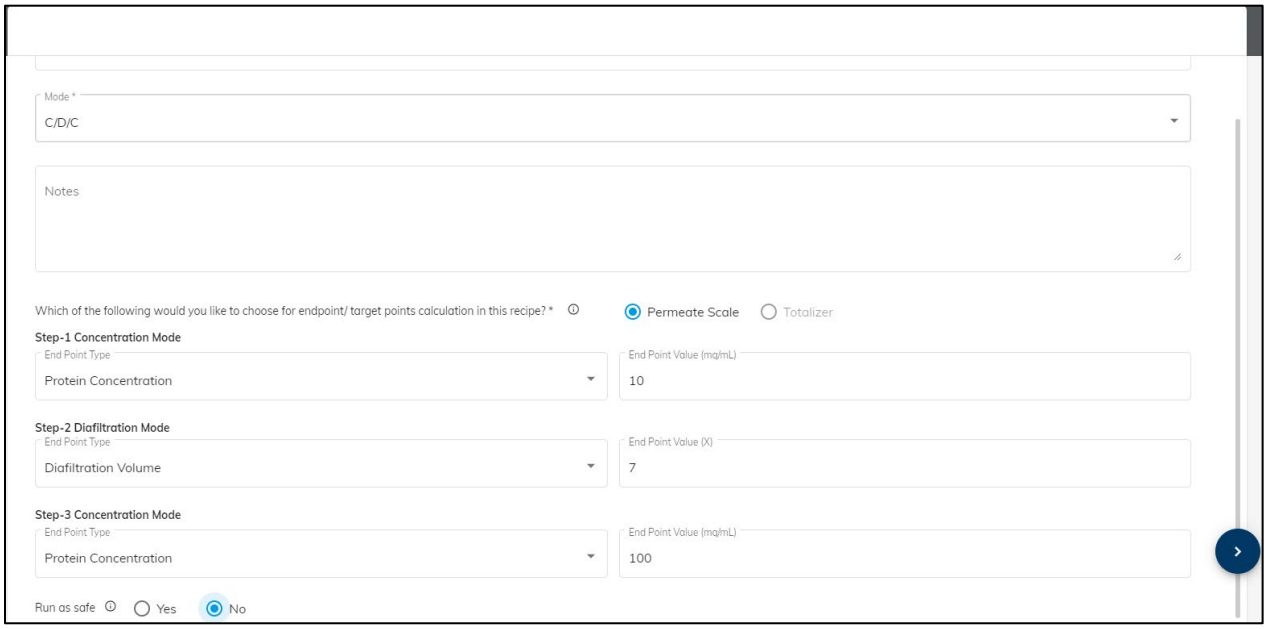

Figure 27. C/D/C recipe without flow meter

2. Enable the Konduit channel corresponding to the port connected to the VPT instrument.

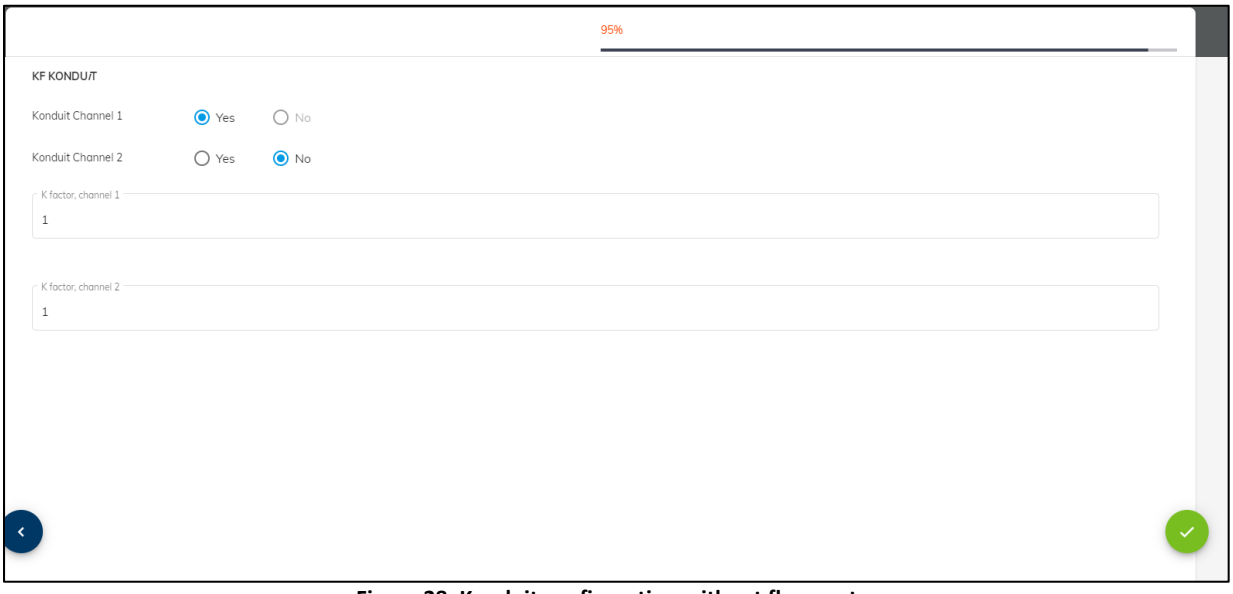

Figure 28. Konduit configuration without flow meter

5.2 Creating a Recipe in KF Comm 2 Software With a Flow Meter

1. When setting up the recipe, for example a C/D/C recipe, set the Concentration Mode End Point Type to Concentration Factor (Figure 29).

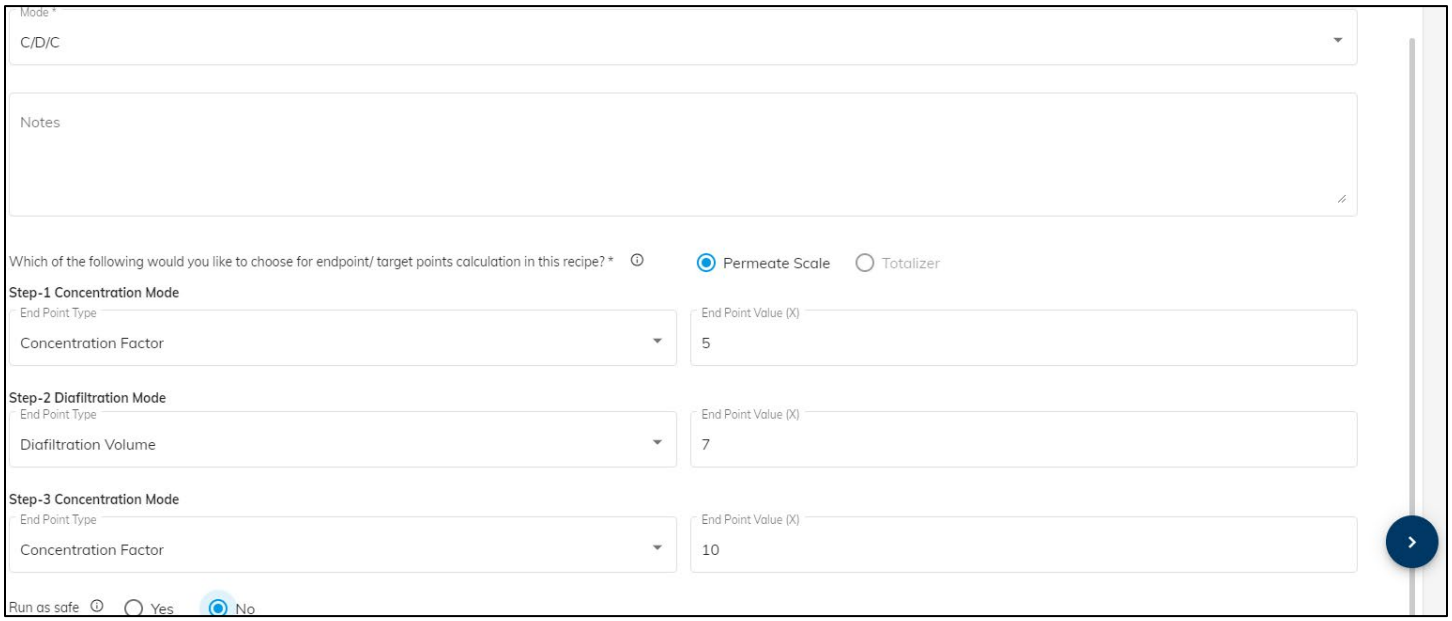

Figure 29. C/D/C recipe with flow meter

2. Enable Konduit channel 2, as the flow meter will automatically take channel 1.

Figure 30. Konduit configuration with flow meter

6. Log Files Verification

The log of the trial run can be accessed in the KF Comm 2 software.

1. In the left side panel, click Trial Logs.

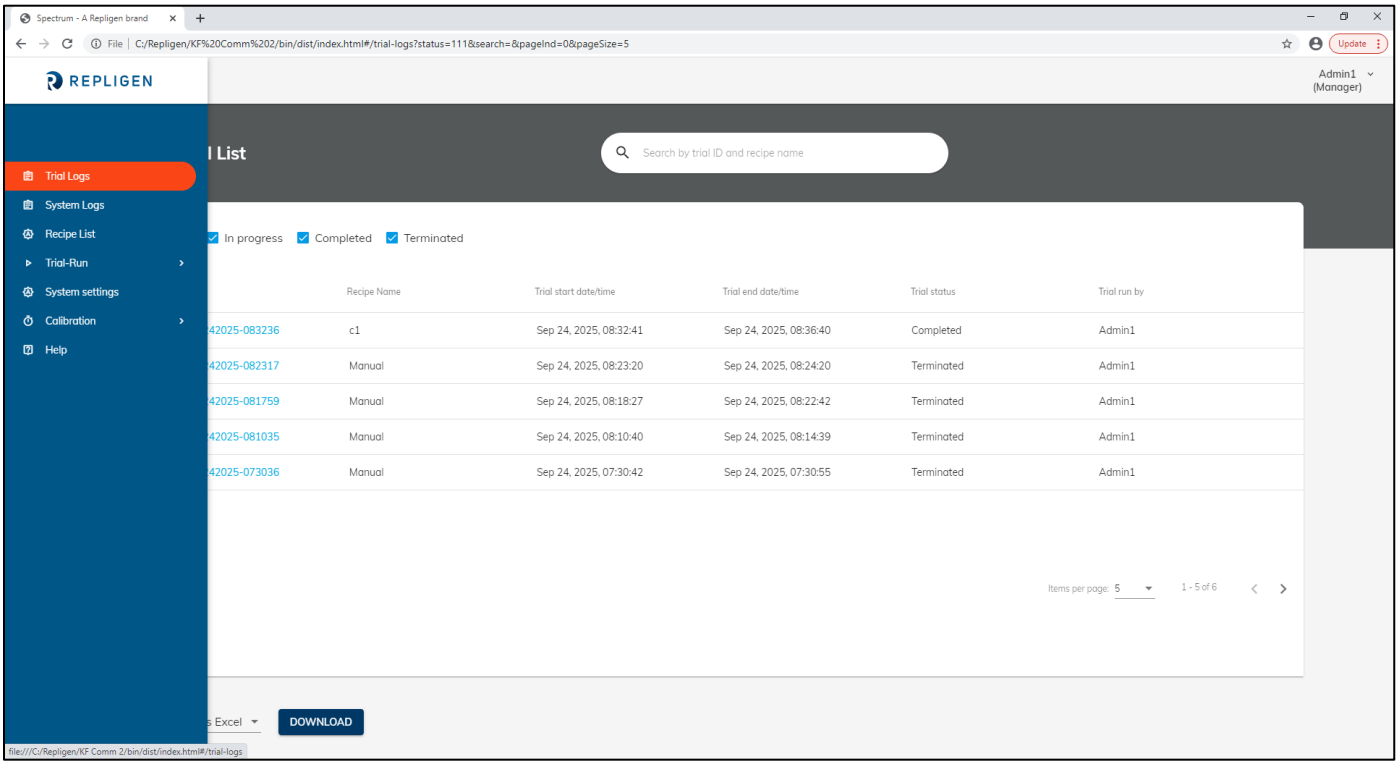

Figure 31. Trial logs

2. Select the trial ID for your run.

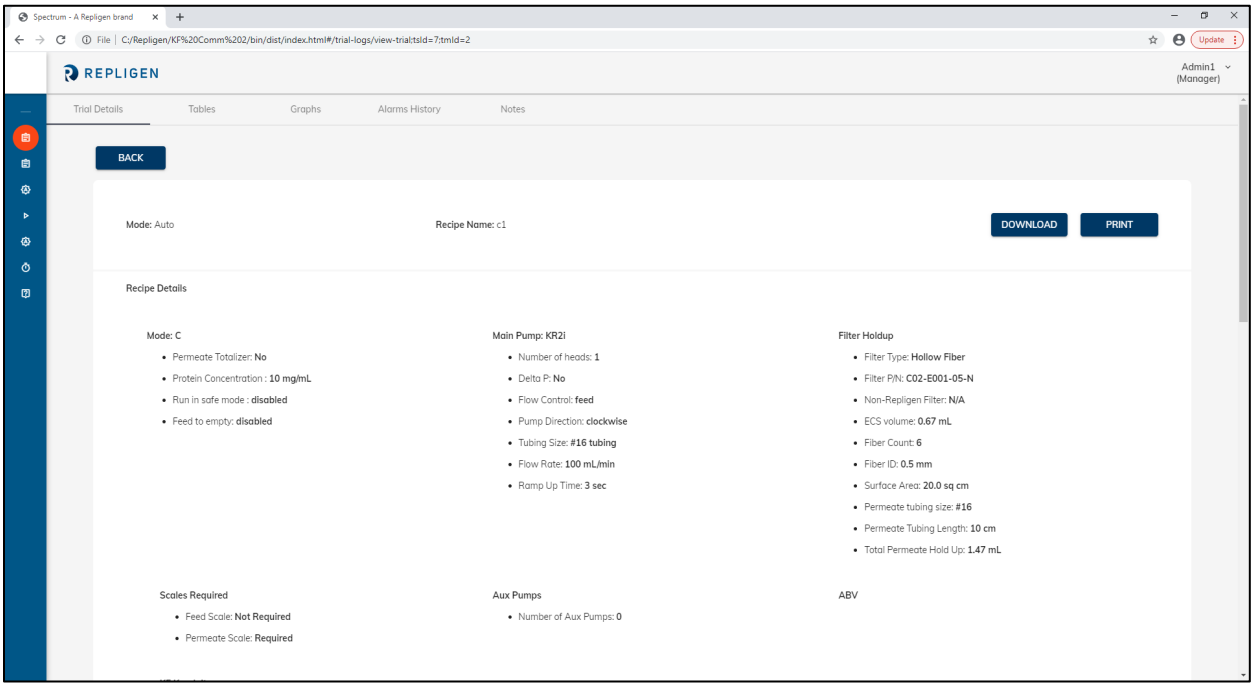

Figure 32. Trial Details.

3. Go to the Tables tab.

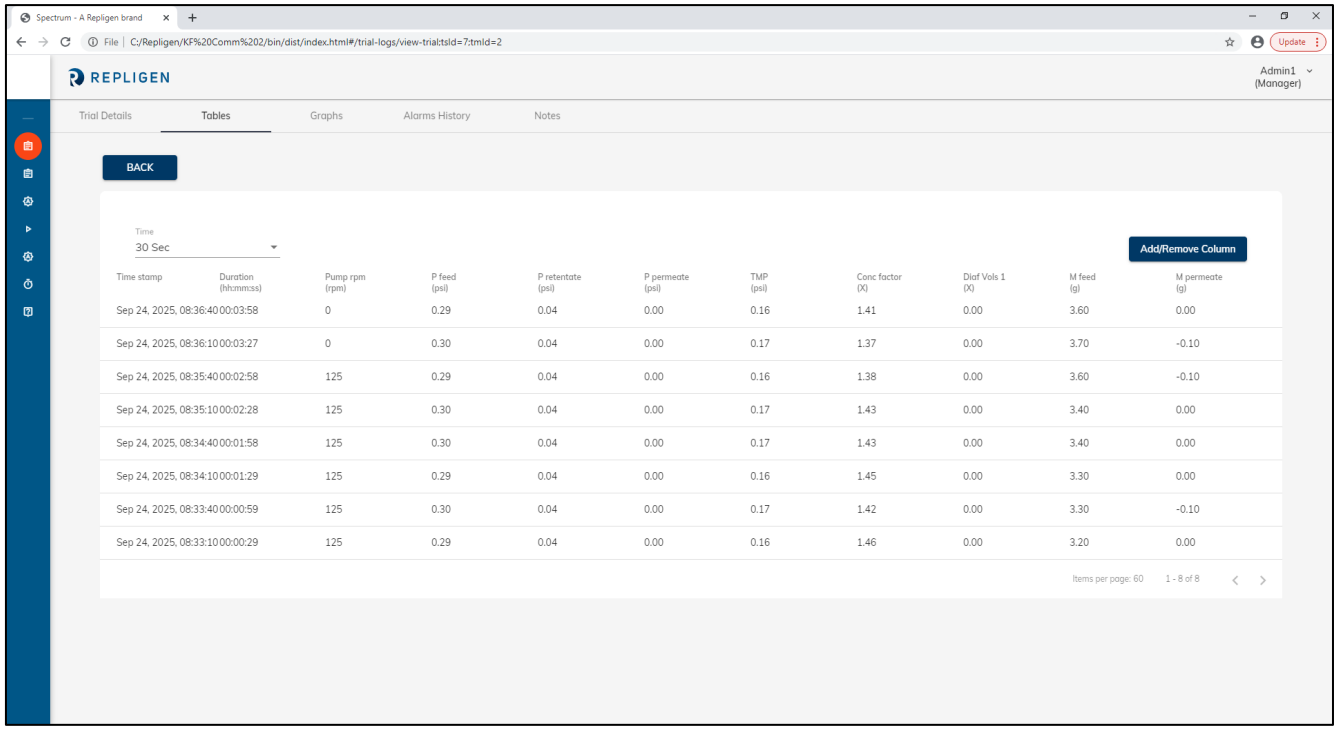

Figure 33. Trial table

4. Click on Add/Remove Column and select **PC Ch 1. mg/mL**, then click Ok. If UV Channel 2 was used, select **PC Ch 2. mg/mL** instead.

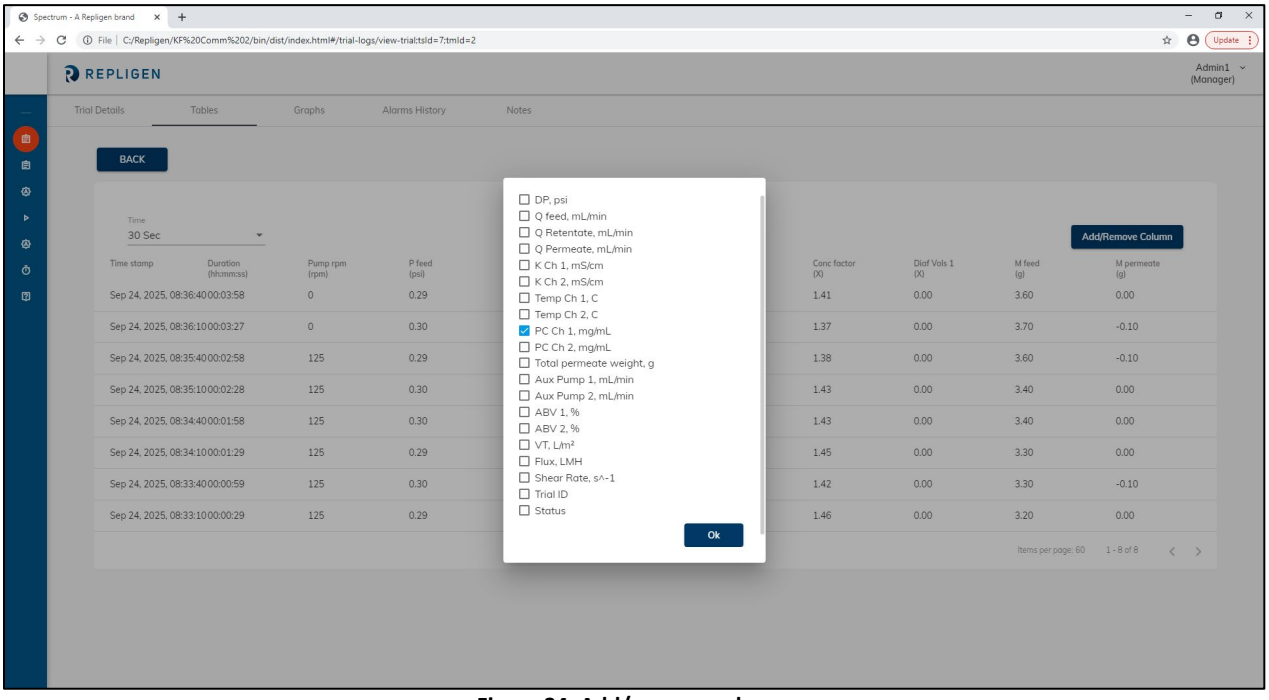

Figure 34. Add/remove column.

5. Confirm a new column was added to the right side of the table. The column will display concentration values as the trial progresses.

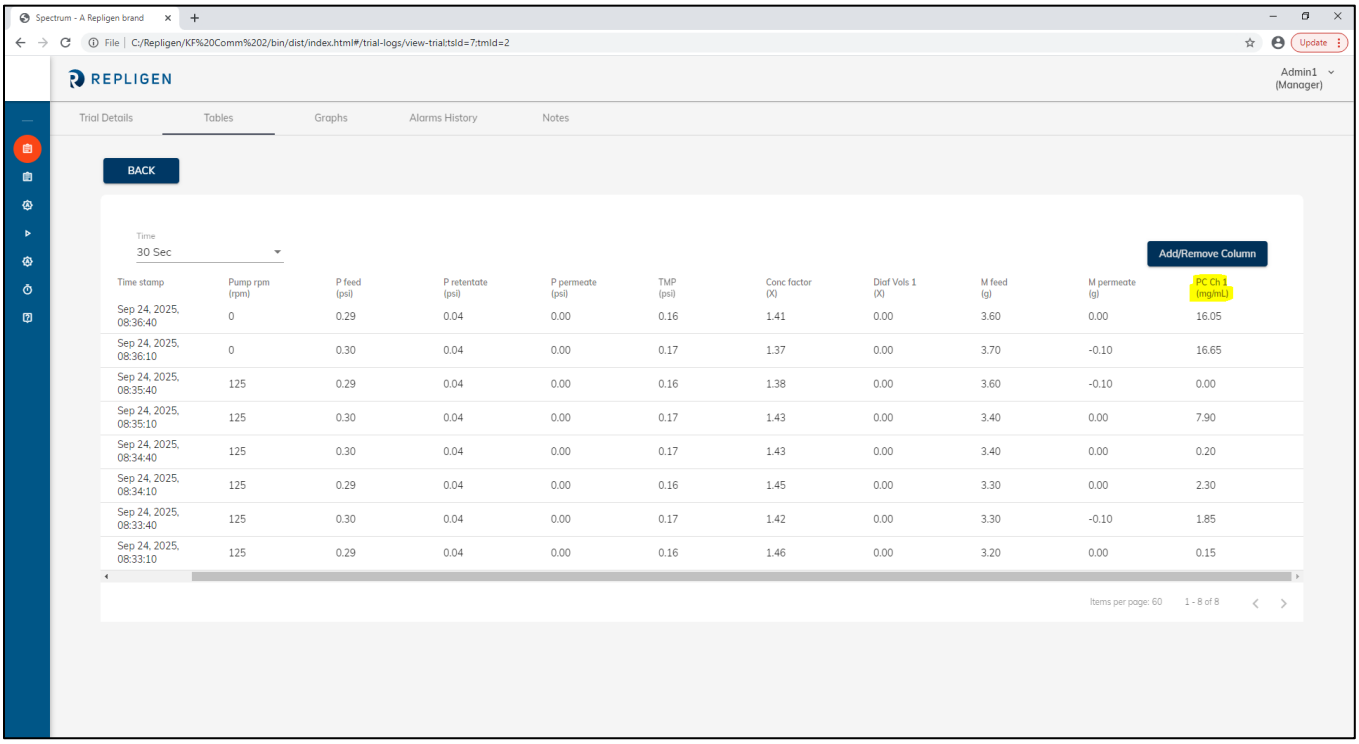

Figure 35. Concentration data display under desired channel.

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