LabVIEW Pump Control Program Using RS232 and USB

TELEDYNE ISCO
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Overview

The current Teledyne ISCO D-Series USB pump controllers (identification number 62-1240-114 and higher) can be controlled remotely using an RS232 or USB serial port. The new Teledyne ISCO supplied LabVIEW Remote Pump Control program will install a runtime version of National Instrument LabVIEW and software to remotely control, communicate, and store data from the Teledyne ISCO syringe pumps.

The following items are required:

- Executable Installer (discussed in this technical bulletin)
- LV2014 Source (See Technical Bulletin 06)
- Computer running Microsoft Windows 7 or above
- RS232 cable (p/n 480-7996-00) <u>or</u>
- USB cable (p/n 68-1247-504)

Please note new controllers, detailed above, come with an accessory cable kit included, 60-1247-168. This contains 2 cables, one for connecting the controller to a USB port and the second option to connect it to Ethernet.

Connecting the Computer to Pump Controller

To connect one controller, either use a serial modem cable (p/n 480-7996-00) or USB cable (p/n 68-1247-504).
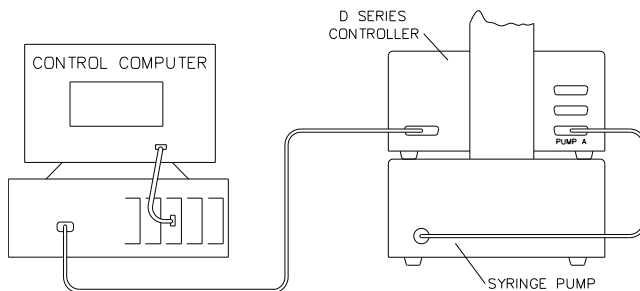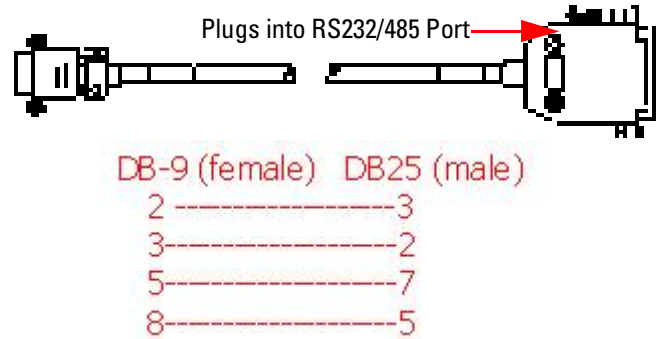

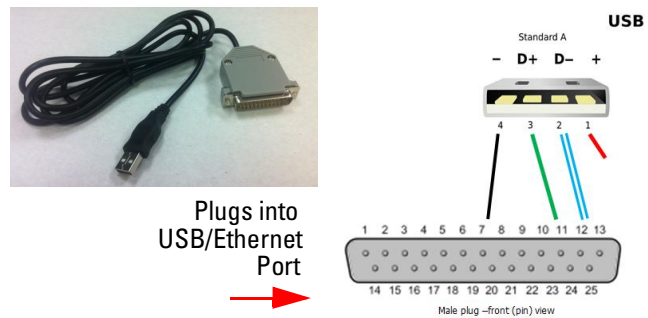**Figure 1: Drawing of cable connection**

For RS232 Cable

To us the RS232 cable connection a 9 to 25 pin Serial Modem cable is needed (p/n 480-7996-00).

Figure 2: Serial Cable 480-7996-00, cable wiring, and plug location on controller rear panel

For USB Cable

The USB cable is a special USB Type A to 25 pin sub-D connector (p/n 68-1247-504).

Figure 3: USB cable 68-1247-504, wiring, and plug location on controller rear panel

Installing Driver Software

Before the USB cable can be used a special driver software must be installed on your computer. The software may be downloaded from the Teledyne ISCO website:
http://www.teledyneisco.com/en-us/pumps/pumps-software-and-firmware

1. Click on USB DRIVERS to download the driver file.

Figure 4: USB drivers on www.isco.com website

2. Open the downloaded file and extract the file to a known location on your computer.
3. Search for and then run the file TI_WDF_US-BUART_SINGLE_DRIVER_V6.7.2.0_WHQL.exe.

The following screens will appear as the USB driver software installs on your computer:
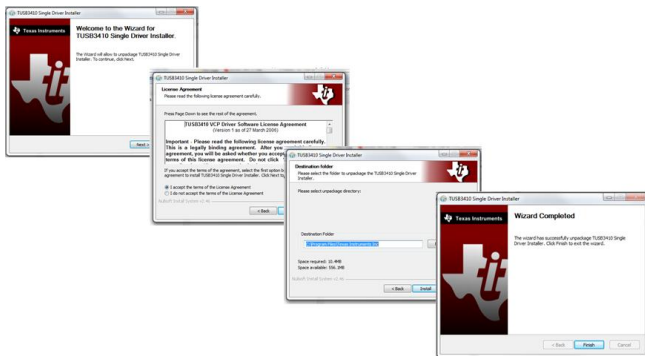

Figure 5: USB driver installation screens

4. Plug the USB cable in to the controller and computer.
5. Start the device manager or type the following command (without the quote marks) into the search box "mmc devmgmt.msc". This will open the device manager.
6. Click on the twisty in front of the Ports (COM & LPT).
7. Locate the listing for the TUSB3410 and note the COM port.
8. Write this number down because you will need to enter it when you first start the program (Figure 5).

Changing the COM Port Number

If you need to change the COM port number:
1. Click on the TUSB3410 listing in the device manager to open it's properties window.
2. Click the PORT SETTINGS tab and then click on ADVANCED. This will open the ADVANCED SETTINGS.
3. Click on the COM Port number window to change the COM port.

4. Click OK twice and the new COM port selected should be shown in the device manager.
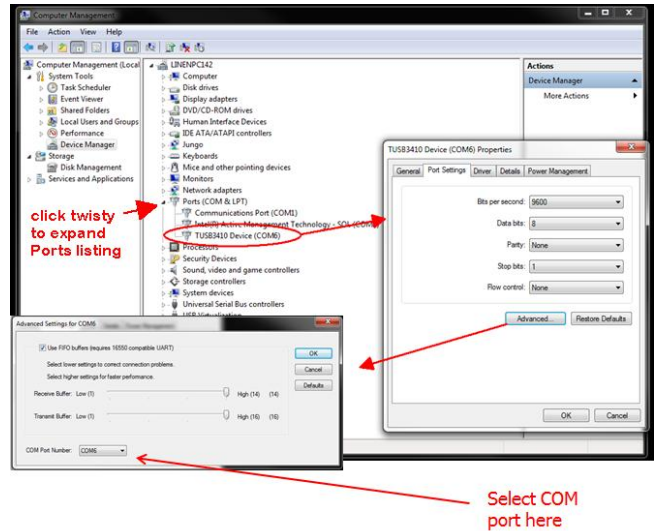
**Figure 6: Changing COM port in device manager for the USB drive**

Installing the LabVIEW Software

If you received the program on a CD simply insert the disk in the drive.

If you received the software as a zip file:
1. Copy the file to your computer.
2. Extract the files to a known location.
3. Open the executable installer file and click on the file named setup or setup.exe to start the installation.

The first screen will show where the programs will be installed. It is possible to change these locations, but it is not recommended.
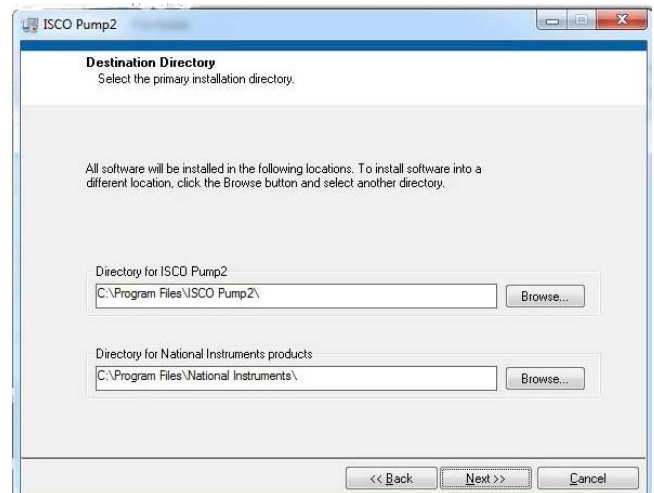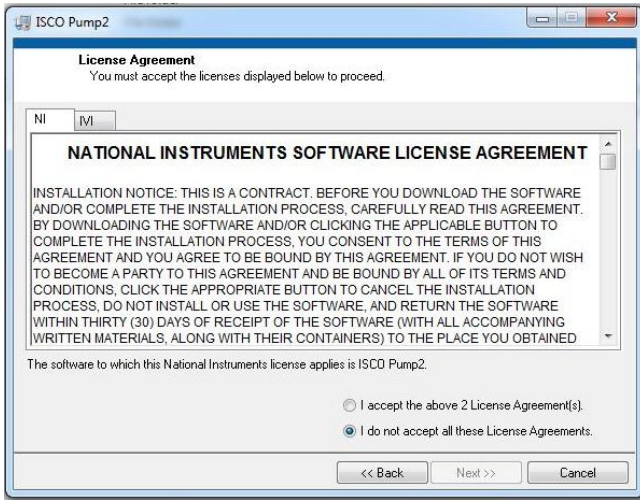

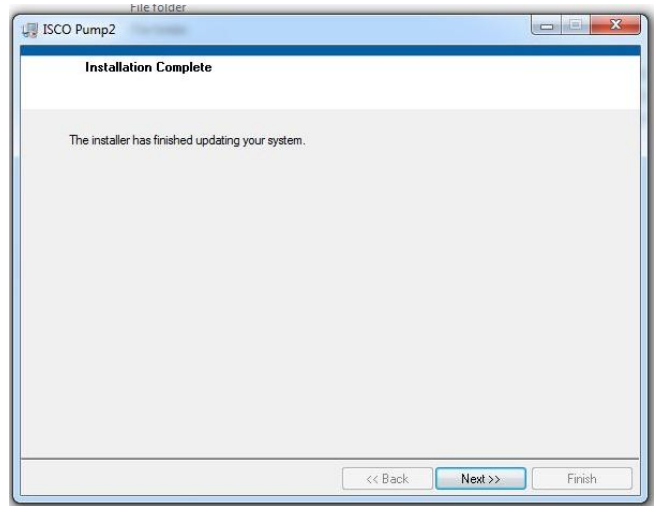**Figure 7: Directory selection**

Figure 8: License Agreement
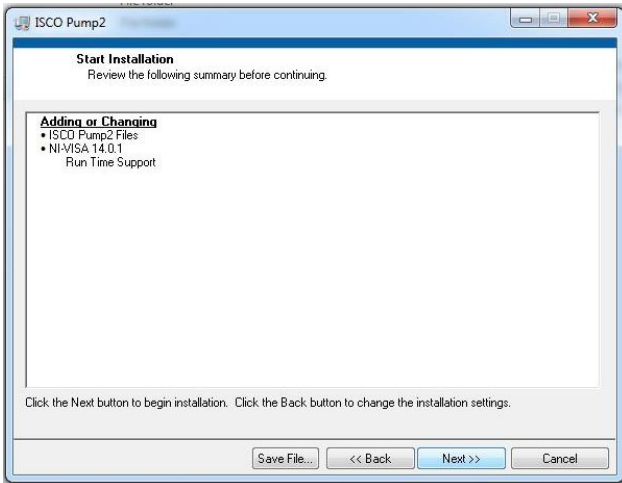

Figure 9: Start installation

Figure 10: Installation progress

Figure 11: Installation complete

Figure 12: Restart computer so registry is read

4. Make sure the pump controller is connected to the computer using the USB cable and that power is turned on.
5. Start the program press the Windows key and enter Isco Pump Control in the search box and then press ENTER.
6. The main screen will open along with the Serial Port dialog window (Figure 13). The Serial Port dialogue window will only open if there is no communication.
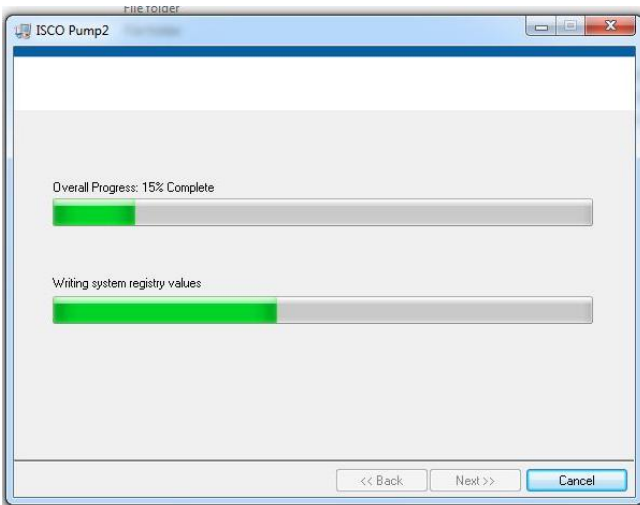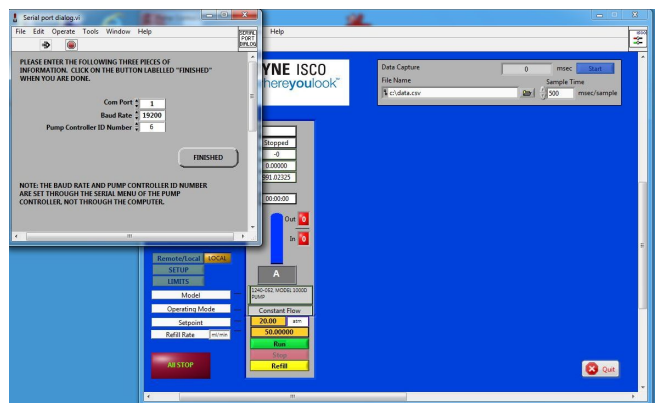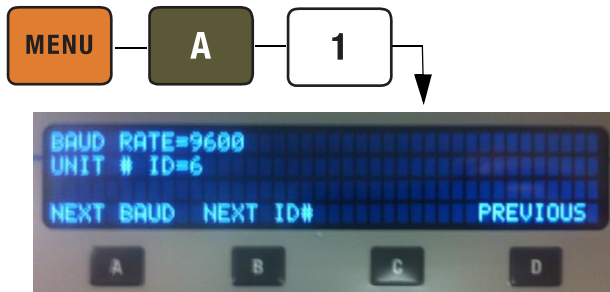

Figure 13: Serial entry

7. The COM port should be changed to match the number you recorded earlier (Device Manager-Com & LPT).

8. The Baud Rate and Pump Controller ID should be set to match those in the controller. To check the pump controller settings press MENU, A, 1 to show the serial setting screen (Figure 14). It is recommend to use the 38, 4000 setting for the Baud Rate.


Figure 14: Controller serial values entry screen

9. When all the values match press the FINISHED key.

The program then displays all pumps connected and is in local mode (Figure 15). In local mode the values are constantly updated but no changes can be made from the computer.
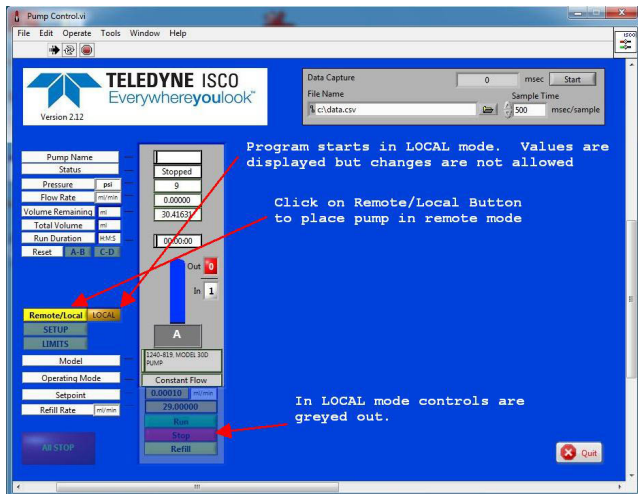
**Figure 15: Main screen in local mode**

10. Pressing the Remote/Local key switches to the Remote mode (Figure 16). Items on colored backgrounds can now be selected or the values changes.
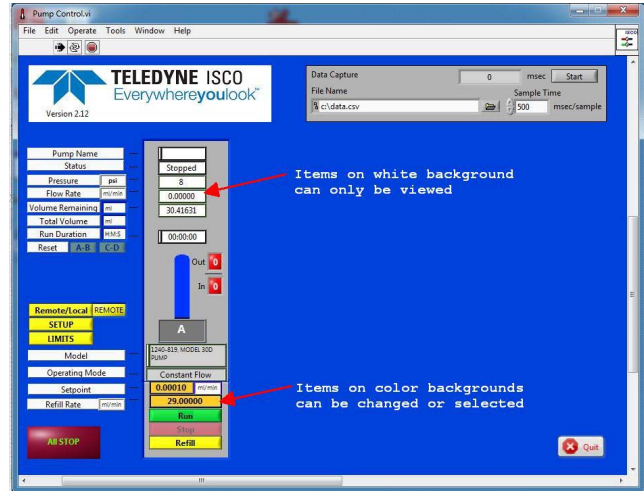
Figure 16: Main screen in remote mode

11. Clicking the SETUP button will switch to the setup screen (Figure 17).

12. On this screen you can give the pump a name, select the units for flow rate and pressure, the serial parameters, and the operating mode of the pumps.

In Figure 17 the drop down arrow for the mode select for pump A has been selected and the 4 options are shown. The check mark shows the currently selected mode and the yellow highlight show the mode that will be selected if ENTER or the mouse button is clicked.
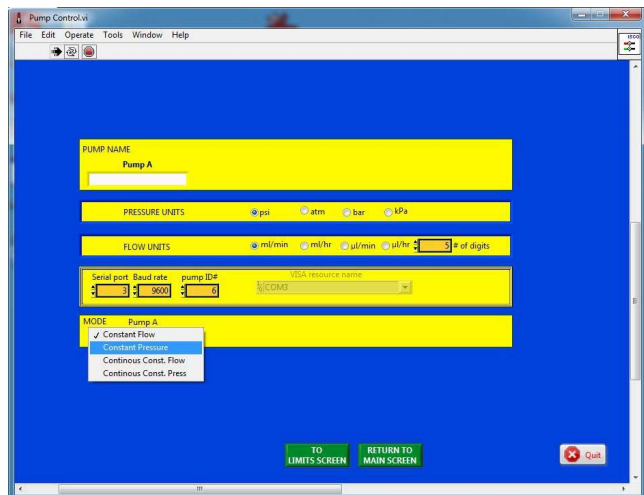

Figure 17: Setup Screen

The limits screen (Figure 18) allows the setting of the upper and lower pressure and flow rate limits, maximum flow rate when pump is in constant pressure mode, and selecting the various alarm functions. (See section 3.8.7 *LIMITS in D series Installation and Operations Guide* for details on limits and alarms).

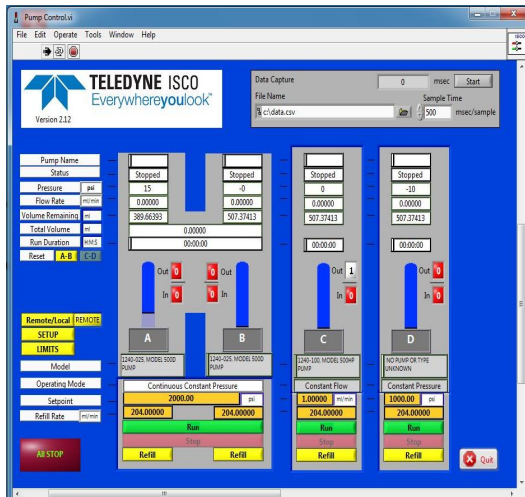To save any changes, the APPLY CHANGES button must be clicked.
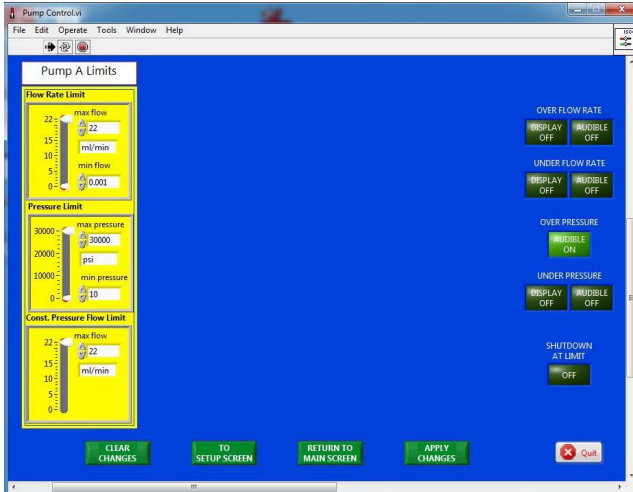
Figure 18: Limits screen

If additional pumps are connected to the controller they will also appear as shown in Figure 19.

☑ *Note*

Pumps A & B are linked because they are in continuous constant pressure mode. Pumps C and D are shown in independent mode.

**Figure 19: Main screen with 4 pumps connected. A&B are in continuous mode.**

If four pumps are connected and run as two continuous flow systems the screen would appear (Figure 20). In this example, Pumps A&B are in continuous constant pressure and Pumps C&D are in continuous constant flow.
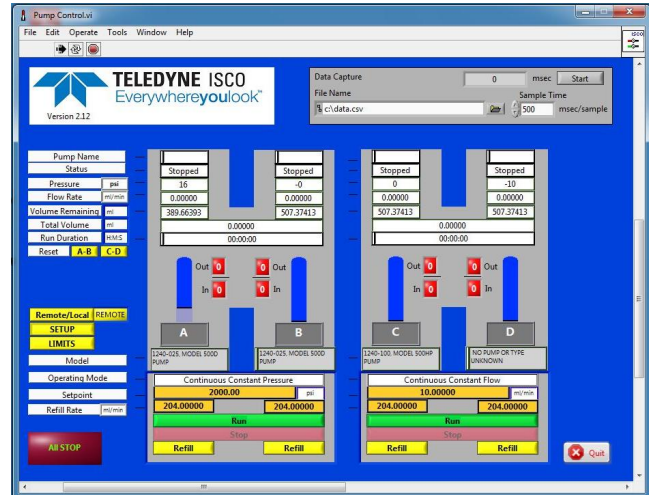
**Figure 20: Main screen when two continuous flow systems are in use**

The fluid level in pump and valve status are shown for each connected pump as shown in Figure 21.
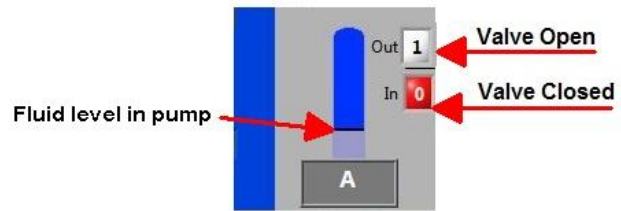
Figure 21: Valve and pump symbols

Pump Data Capture

Pump data can be captured and stored in a .csv file for later analysis. The name of the file can be entered and the time between samples selected. The maximum data rate depends on the communications baud rate and the overall speed of the computer, but typically should be 200 msec or higher. The parameters are set in the upper right corner of the run screen (Figure 22). When imported into Excel, the data will appear as shown in Figure 22. The column labels are stored in the file each time the START button is pushed.
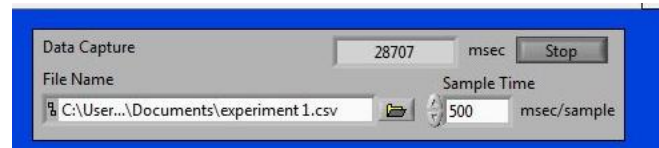
Figure 22: Data capture entry on run screen

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Time Sample Interval	Pressure A	Pressure B	Pressure C	Pressure D	Analog A	Analog B	Analog C	Analog D	Analog E	Analog F	Flow Rate A	Volume A	Operation Status A	Control Status A
33	15.4	853	-179	-239	1.3018	-0.0314	0.3692	0.4992	0.9764	-0.16	0	389.6639	Run	REMOTE
884	15.4	853	-179	-239	1.302	-0.0312	0.3694	0.4994	0.9766	-0.1596	0	389.6639	Run	REMOTE

P	Q	R	S	T	U	V	W	X	Y	Z
Problem Status A	Flow Rate B	Volume B	Operation Status B	Control Status B	Problem Status B	Flow Rate C	Volume C	Operation Status C	Control Status C	Problem Status C
NO PROBLEM	0	507.374132	Stopped	REMOTE	NO PROBLEM	0	507.37413	Stopped	REMOTE	TRANSDUCER DISC(
NO PROBLEM	0	507.374132	Stopped	REMOTE	NO PROBLEM	0	507.37413	Stopped	REMOTE	TRANSDUCER DISC(

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
Flow Rate D	Volume D	Operation Status D	Control Status D	Problem Status D	Flow Rate AB	Pressure AB	Volume AB	Flow Rate CD	Pressure CD	Volume CD	Date/Time
0	507.3741	Stopped	REMOTE	TRANSDUCER DISCO	0	15.4	0	0	-178	0	2015-12-23 15:04:57.960
0	507.3741	Stopped	REMOTE	TRANSDUCER DISCO	0	15.4	0	0	-178	0	2015-12-23 15:04:58.811

Figure 23: .CSV data file after import to Excel