ABB MEASUREMENT & ANALYTICS | 2108077MNAB

Batch Log Application Guide

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Additional information

Additional free publications are available for download at www.abb.com/upstream.

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1 Overview

The Batch Log application provides data logging functionality in addition to what is built-in with the following ABB Totalflow applications:

- Measurement applications built-in logs
- Trend Application
- IEC for Liquid Transfer Application 2

IMPORTANT NOTE: The Batch Log application is available in PCCU 7.73 (and later) and embedded customer packages: RMC-100 Standard (2105452-040), RMC-100 Lite (2106260-011), XFC^{G5} (2105808-012), XRC^{G5} (2105880-012), μFLO^{G5} (2105409-032) and later.

1.1 Batch Logs for measurement applications (tubes)

The Batch Log application provides logging functions similar to the built-in hourly and daily logs provided by the measurement applications. It also adds the following new capabilities:

- Supports multiple daily logs with different contract hour start times
- Supports weekly and monthly logs
- The logs can be extended and customized. The Batch Log application can log all the information included in built-in hourly and daily logs, but also allows users to add their custom data points.
- The logs can be commanded to “Split”. For example, a user may want to save a volume-to-date snapshot when the Totalflow sensors are calibrated, or when a new liquid meter factor is entered, or when a new K-factor is entered.

1.2 Batch Logs for trends

The Batch Log application provides logging functions similar to those available with the Trend Application. It adds the following new capabilities:

- The Batch log app allows the user to define the desired data points to log.
- The Batch Log app can log string (text) data:
  - String data can be persistent, that is, logged the same for each ticket. For example: Meter ID or Well API number or,
  - String data can change for each ticket. For example: Truck ID, Driver ID, Seal ID, etc.
- The Batch Log app shows current running values. For example: a monthly log shows the current volume-to-date.

1.3 Batch logs for the IEC Liquid Transfer application

The Batch Log application provides logging functions similar to those available with the IEC Liquid Transfer application. It adds the following new capabilities:

- The Batch Log app logs can be saved using PCCU Collect mode.
  - Save logs to laptop file
  - Save logs to spreadsheet file
- Truck driver data can be saved as either number or strings (text).
- The transfer ticket can include custom data such as: snapshot, average, or accumulated total.

2 Description

The Batch Log is available to be added and enabled from the PCCU Application and License Management tab, like other ABB Totalflow applications. A device can support multiple Batch Log instances. The number of instances depends on the customer requirements. The number of groups and logs in each instance depends on how the customer needs to organize and identify the data each log records.

There is flexibility to create multiple custom logs and to group them as needed. While each device is unique in its configuration, ABB recommends no more than 100 logs in a device with Batch Log functionality enabled (across a single or multiple batch log instances). For most devices, it is recommended that the Average Processor Usage value does not exceed 50%. Take this into consideration when configuring batch logs in conjunction with other applications running on the device.

2.1 Organization

The Batch log application supports the definition and configuration of groups and logs. It organizes the logs into groups. Each group has attributes applicable to all of its logs. Each log can be defined to log records for pre-defined data points from a measurement tube or for user-defined data points. The group setup provides options for defining when the logging starts, stops or splits.

2.2 Log data collection

The device supports the collection of batch logs using the PCCU Collect utility. Batch log data is automatically included in the laptop file or on a separate spreadsheet file if this option is selected before the collection is performed. The devices also support Batch log data for CFX outputs.

2.3 General guidelines

The batch log application allows for the definition of several groups and associated logs. Please review the following guidelines to help plan the creation or update of app instances, groups and log properties.

The following applies when using the Batch log application:

- Logs are maintained after a warm start.
- Logs are lost after a cold start. A Save/Restore will also cause data loss. To avoid batch log data loss, it is always recommended to perform a batch log collect before loading a new configuration on the device. See sections 3.7 or 4.7 for details on log collection.
- Logs will “roll” or “split” when:
  - The log group’s trigger type is changed
  - The log group’s contract hour, minute, day of week, or day of month changes
  - The device’s time is changed past or before the period of the log
  - Commanded by the user
- While a device is down, both the log period time and the log flow time will not increment.
- Deleting a Batch log app instance or group will delete all associated logs.
- Changes to a log group’s “Number of Record Values” or “Number of Record Strings” will delete the group’s logs.
- Changing the Log Name will split the current group’s logs.
- Changing the log group’s “Maximum Number of Log Records” (capacity) will:
  - Delete the group’s logs if the new number is less than the current number of active records.
  - Maintain the logs if the new number is greater than the current number of active records.

3 Batch Logs for measurement apps

To illustrate the Batch Log use for measurement apps, this section describes the creation of a custom daily log for an API liquid tube. The log is defined with a different contract hour start time than the one supported by the built-in daily log.

The Batch Log application has one log group defined by default. This example creates a new group for the non-default daily contract hour start time and a specific log for the tube.

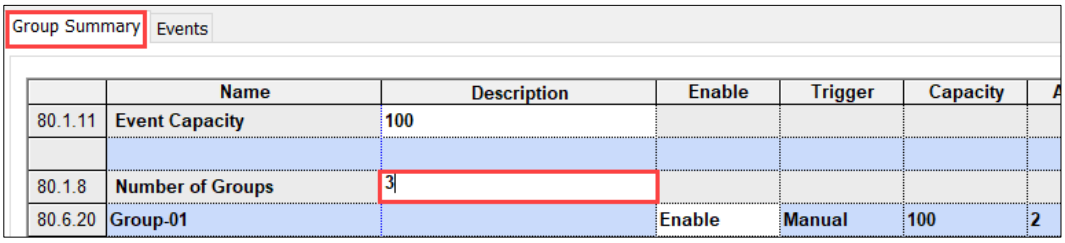
This procedure assumes the API Liquid tube the log is defined for is already instantiated and properly configured on the device. The application should be enabled and active for the log to record valid values.

3.1 Create a new log group

To create a new group:

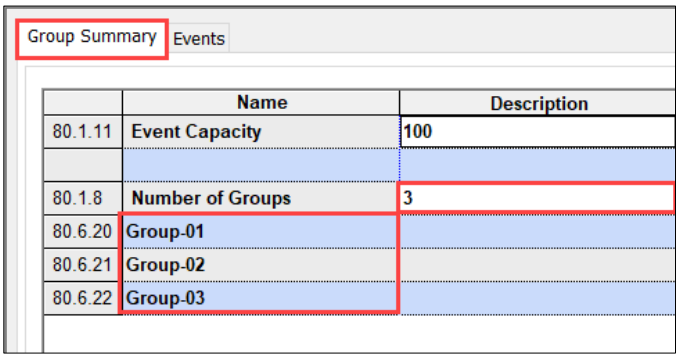
1. Select the Batch Log instance on the navigation tree. The Group Summary tab displays.
2. Add an additional group if necessary:
   a. Update the value of the Number of Groups as required. In this example, two groups are added to the existing default one. One group for the custom daily log is created in this section and another to reserve for future logs. If not planning additional groups, set the number of groups to 2.

Figure 3-1: Adding log groups to the Batch log instance: Increase Number of Groups



b. Click Send. The new group(s) displays with a default name (Figure 3-2).

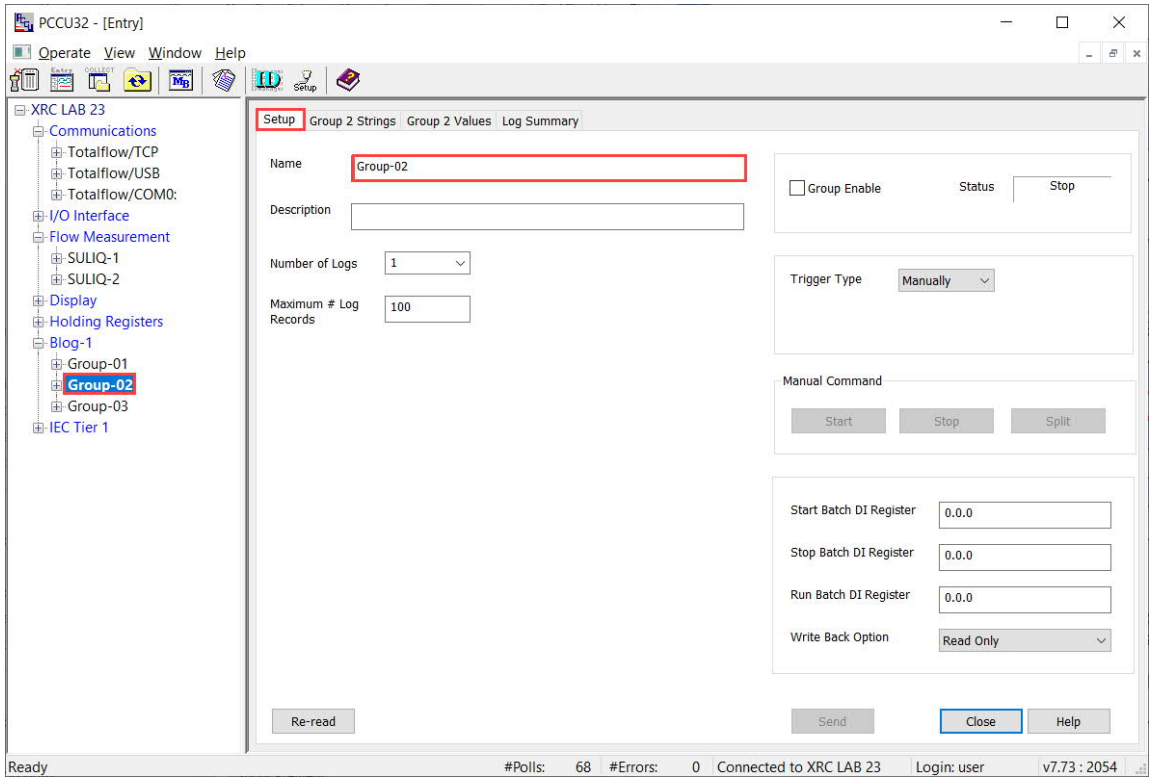
Figure 3-2: New log groups: Default names



3.2 Set up the log group

1. Select the new group on the navigation tree. The Setup tab displays (Figure 3-3).

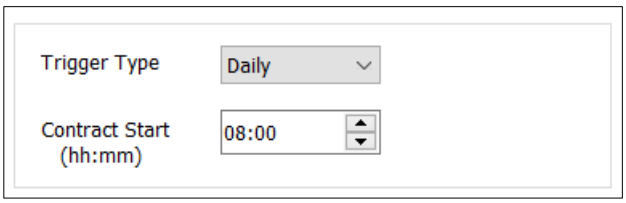
Figure 3-3: Group Setup tab



2. Configure a different name and group description as required. Unique names and descriptions can be useful when expecting several groups and logs.
3. Select the Trigger Type drop-down list and then select: Daily (Figure 3-4).

4. Set the contract start time (hh:mm) to the desired time.
   a. Select the hours (hh) and click the arrow to display the desired hour.
   b. Select the minutes (mm) and click the arrow to display the desired minute.

Figure 3-4: Configure log for a daily record (at 8 am)



5. Click Send.

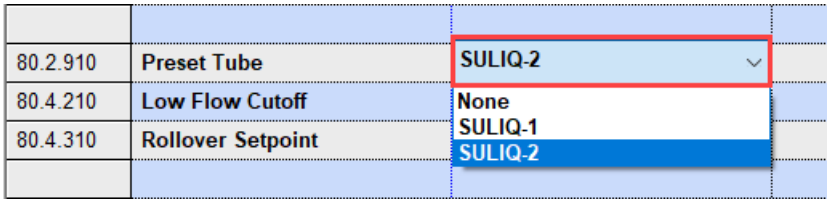
3.3 Set up the custom log for the app

New groups have a single log created by default. This example configures the default log with the custom settings.

To set up the log:

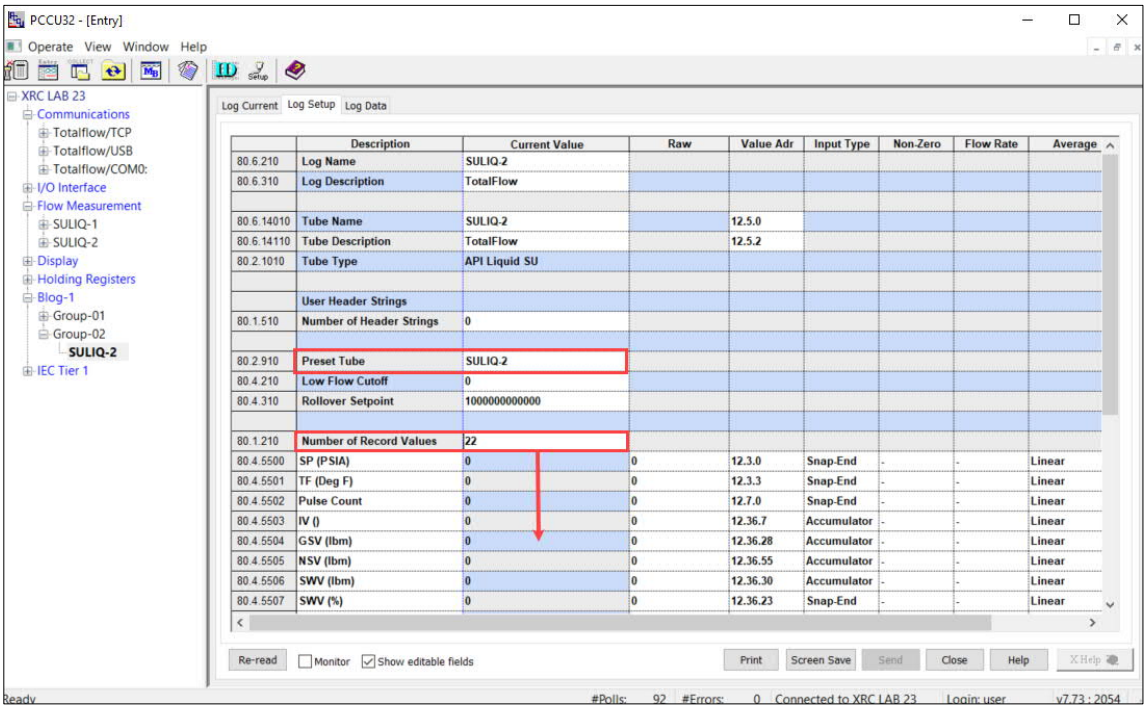
1. Select the Log from the navigation tree. The Log Current tab displays.
2. Select the Log Setup tab.
3. Select the Preset tube Current Value field to display available tubes on the device (Figure 3-5).

Figure 3-5: Selecting a tube to preset in the log setup



4. Select the API Liquid instance the log will record data for.
5. Click Send. A pre-defined number of Record (data point) values displays (Figure 3-6). The log data will reflect these values. For the API Liquid app, there are 22 pre-defined values. This example assumes that these are the only data points needed for this log. Additional values can be added if necessary. The general log information, such as name and description, reflect the preset tube. In this example, the preset tube is the second API Liquid instance on the device. General log information displays default names as assigned to the associated tube; they can also have user-defined names.

Figure 3-6: Example of preset tube and its record values



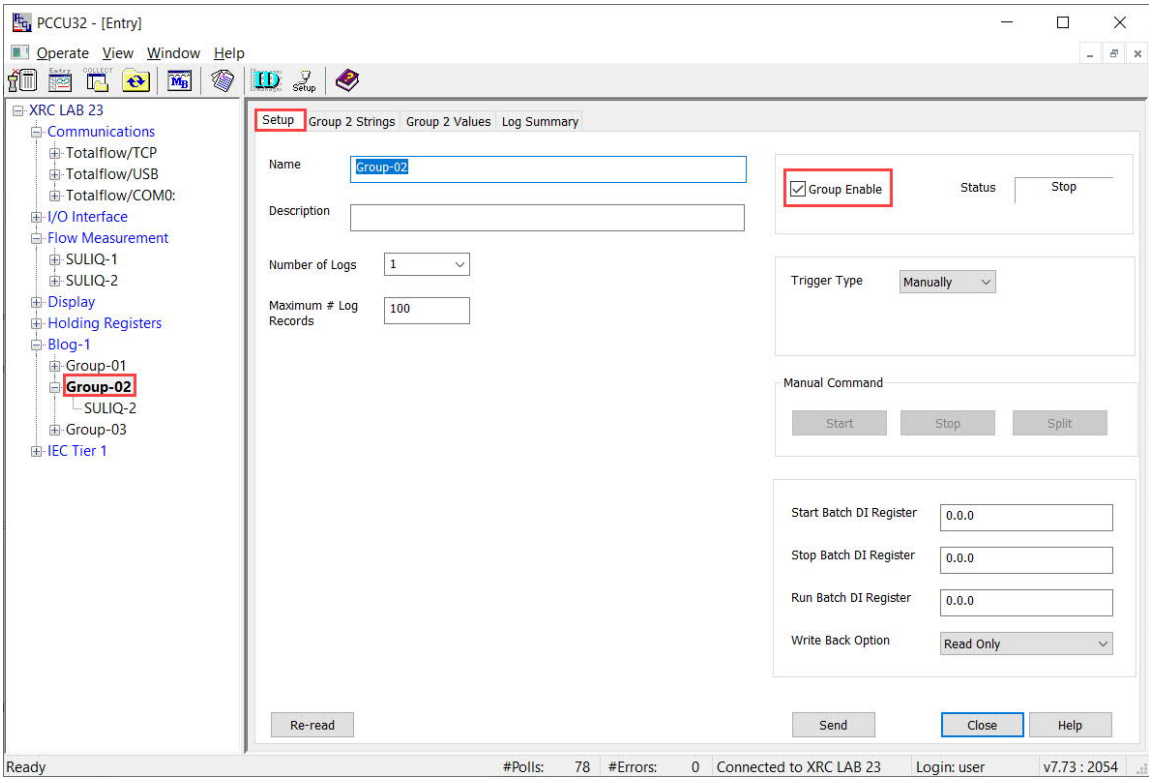
3.4 Start the log

Data logging must be enabled for the group.

To start the data logging:

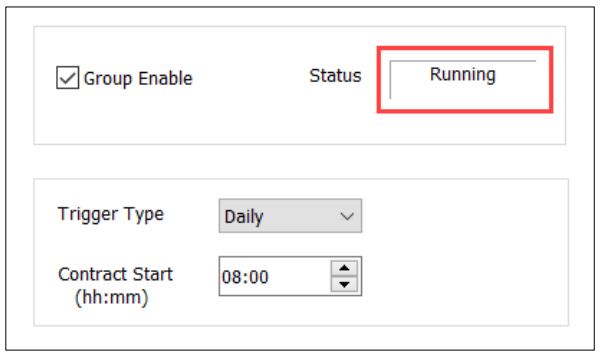
1. Select the group from the navigation tree. The Setup tab displays.
2. Select Group Enable (Figure 3-7).

Figure 3-7: Enable Log Group



3. Click Send.
4. Verify that the group Status displays: Running (Figure 3-8).

Figure 3-8: Verify log group status

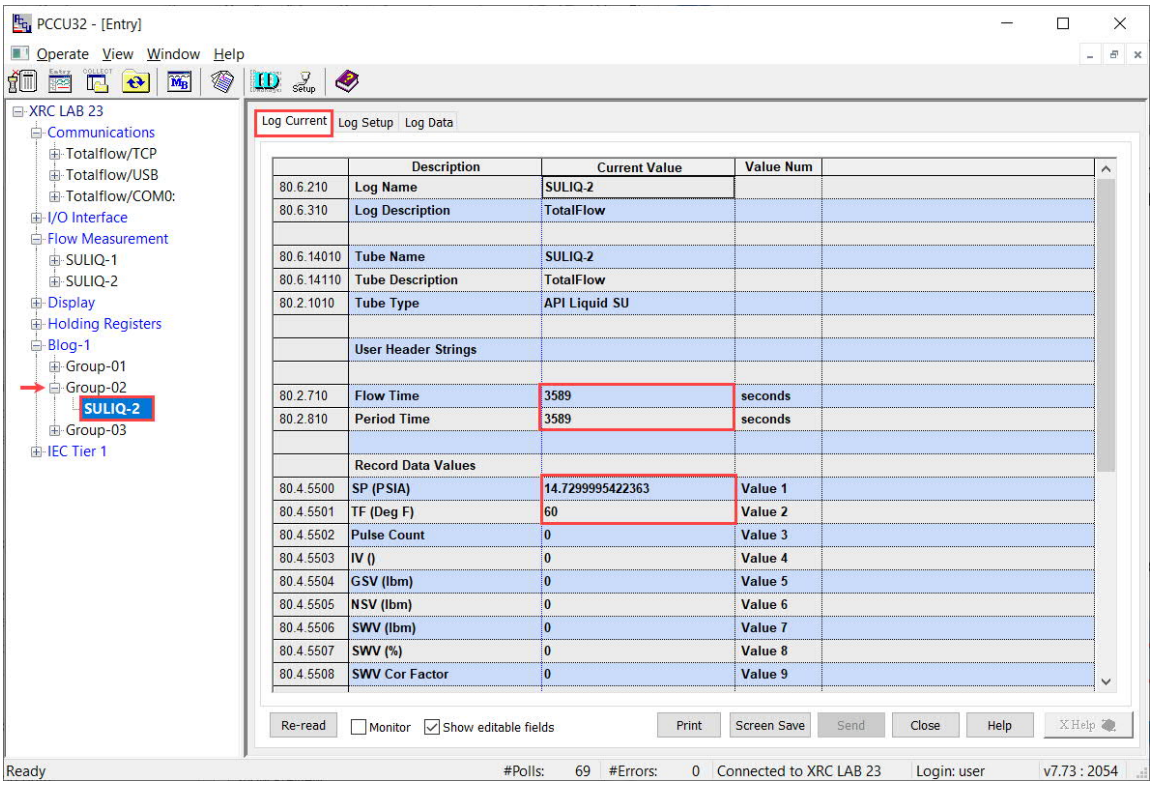


3.5 Verify current log values

After the logging is enabled, monitor current log values. Current values for the pre-defined tube variables should display as the log starts running. To view the log current values:

1. Select the log from the navigation tree again. The Log Current tab displays (Figure 3-9).
2. Verify that values display for the pre-defined tube data points. Click Re-read to refresh the screen. Note that the Flow Time and Period Time values should increment while the log is running.

Figure 3-9: Verify Log current values



3.6 Verify log data

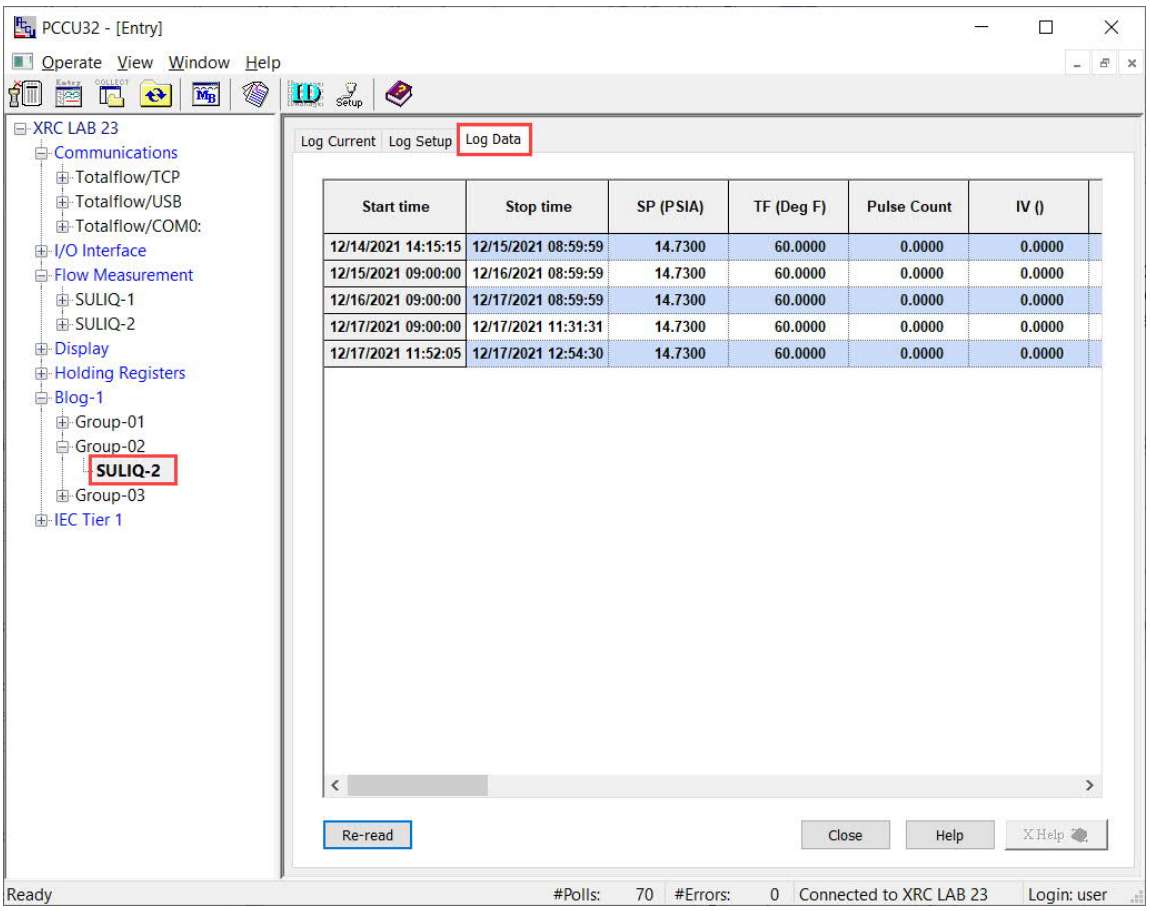
After the logging has run for a while, verify that the log displays data as expected. There should be at least one log after the log is initially enabled. The number of logs depends on the logging frequency defined and the logging period. For the daily log created above, there should be one record.

To view the log data:

1. Select the log from the navigation tree.

2. Select the Log Data tab (Figure 3-10).
3. Verify that logs display.

Figure 3-10: Verify the Log Data



3.7 Collect batch log data

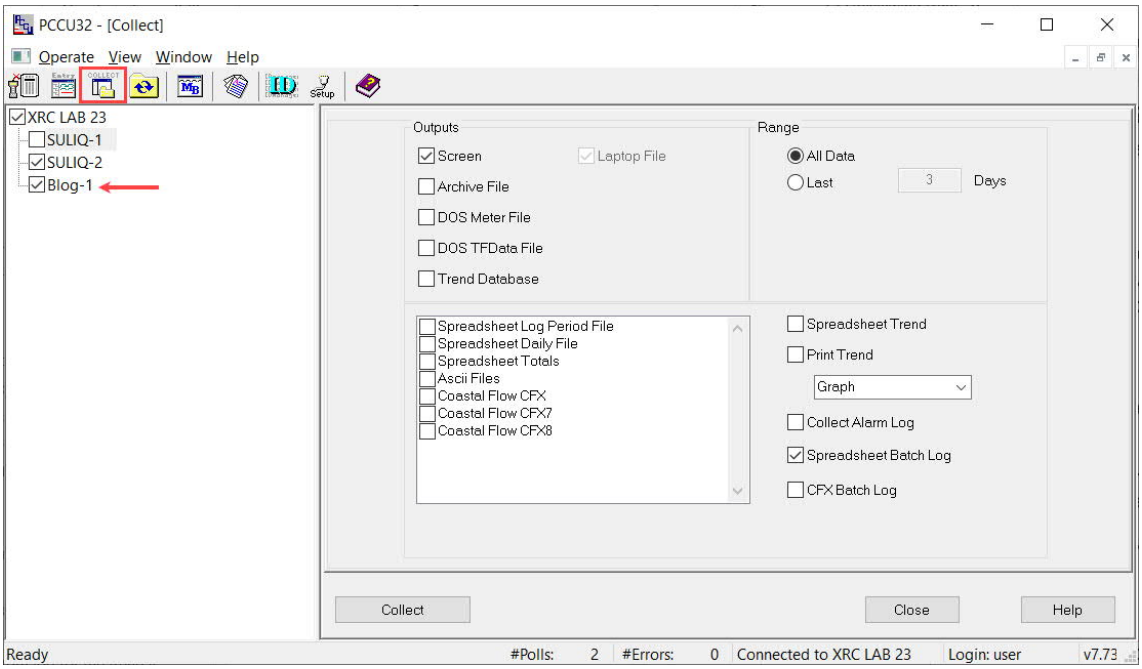
Batch log data is recorded in the laptop file created when the collect is performed. Batch log instances are automatically selected for collection.

IMPORTANT NOTE: The Batch Log data can be collected separately from any tube associated with the logs, except when the required output file is CFX format. For this type of output, the associated tubes must also be selected for collection. See sections 6 Support for Batch CFX outputs and 7 Generate a batch CFX output for more details.

To collect batch logs:

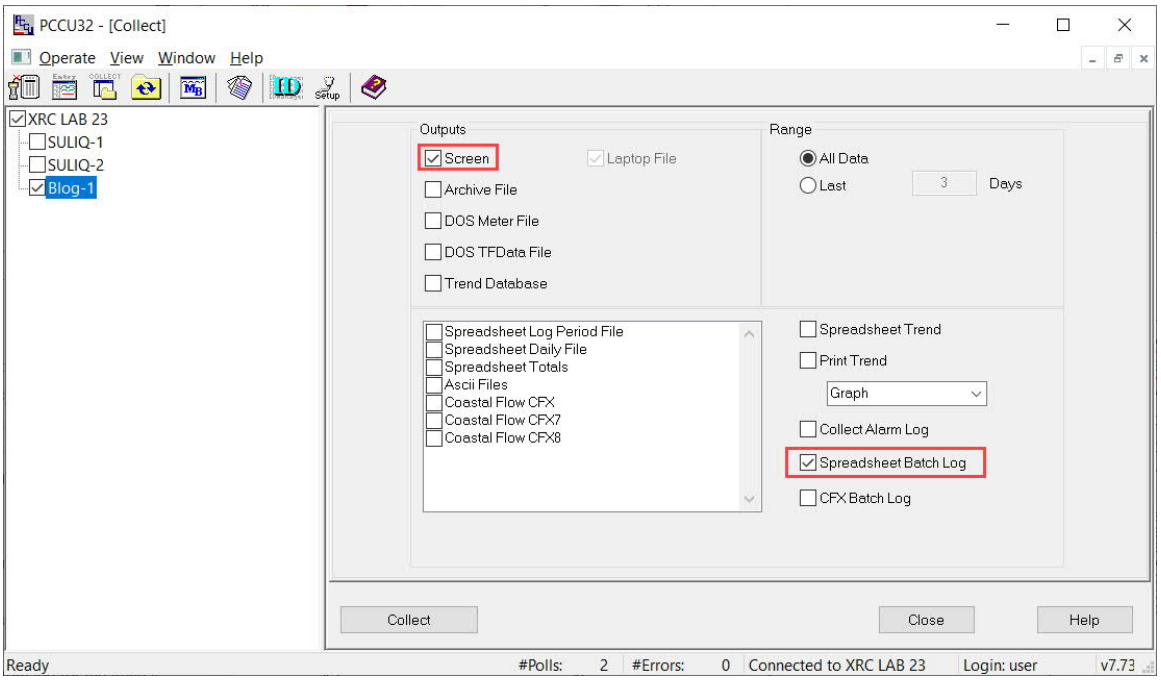
1. Click the PCCU Collect utility icon. Batch log instances display on the navigation tree in the collect screen with the other applications on the device. In this example, there is only one batch instance and it is selected by default (Figure 3-11).

Figure 3-11: Batch Log instance: Collect Screen



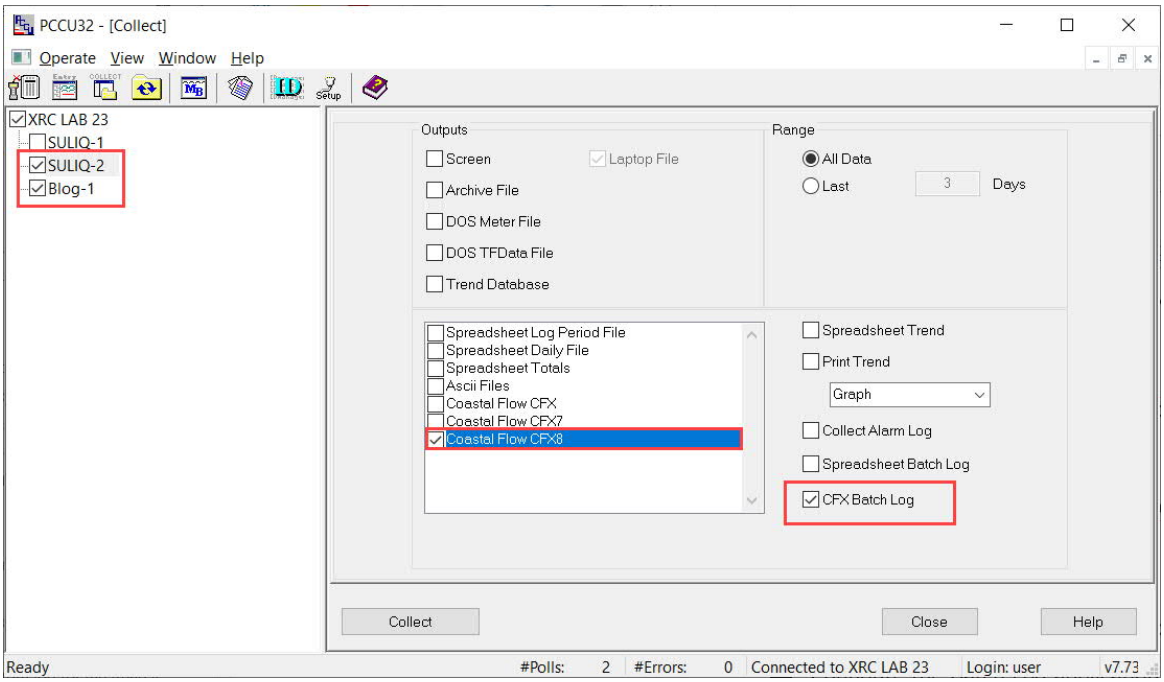
2. Collect batch log data (Figure 3-12):
   a. To view the batch log data on the screen, select Screen as an output option.
   b. To save batch log data on a spreadsheet file, select Spreadsheet Batch Log as an output option.
   c. Click Collect.

Figure 3-12: Batch Log collect output options



3. To save batch log data for a CFX output, select CFX Batch Log as an output option. Make sure the tube that the log is for is also selected (Figure 3-13).

Figure 3-13: Select tube when collecting log (CFX output)



4 Batch logs for value trends

To illustrate the Batch log use for monitoring value trends, this section describes the creation of a custom log for specific user-selected data points for an API Liquid tube. The user manually configures only the application data points of interest in the log. This example configures a log to record monthly values for the average pressure, maximum pressure, and average temperature (3 record values).

The Batch Log application has one log group defined by default. This example creates a new group for the trend variables.

This procedure assumes that the trend values are from an application already instantiated and properly configured on the device. The application should be enabled and active for the log to display valid values.

4.1 Create a new log group for the trends

If there is an extra group (not in use) available, skip this section. An extra group was created in section 3.1 Create a new log group. This group will be used for the configuration example of the trend values custom log.

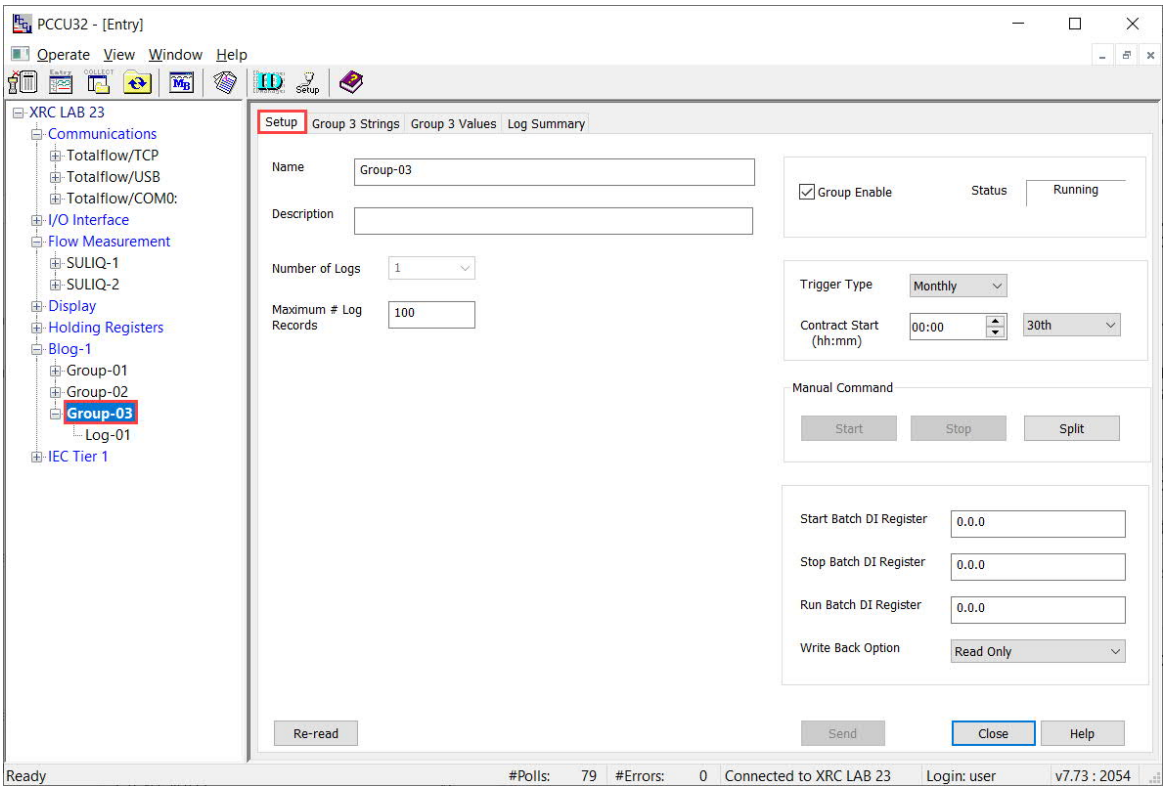
To create a new group:

1. Select the Batch Log instance on the navigation tree. The Group Summary tab displays.
2. Add an additional group if necessary:
   a. Update the value of the Number of Groups as required.
   b. Click Send. The new group displays with a default name.

4.2 Set up the log group

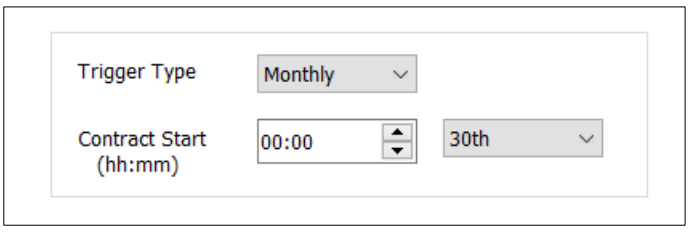
1. Select the new group on the navigation tree. The Setup tab displays (Figure 4-1).

Figure 4-1: Log Group Set tab



2. Configure a different name and group description as required. Unique names and descriptions can be useful when expecting several groups and logs.
3. Select the Trigger Type drop-down list and then select: Monthly (Figure 4-2).
   a. Set the contract start time (hh:mm) to the desired time.
      i. Select the hours (hh) and click the arrow to display the desired hour. This example sets the hour to midnight (00:00).
      ii. Select the minutes (mm) and click the arrow to display the desired minute.
   b. Select the day of the month the data is recorded in the log. This example sets the log for the 30th of every month.

Figure 4-2: Configure log for monthly records (at midnight on the 30th)



4. Click Send.

4.3 Set up the custom log for the trend values

This procedure configures the log for the trend values of interest for the first API Liquid app instance on the device. The custom log in this example records 3 values: average and maximum flowing pressure values and average flowing temperature values.

This procedure configures the value names and the register addresses for those data points. In this example, the register addresses for the Flowing Pressure and Flowing Temperature are required to determine average and maximum values. The application number for the API Liquid application in this example is 11. The register addresses are:

— For the Flowing pressure: 11.36.78

— For the Flowing temperature: 11.3.3

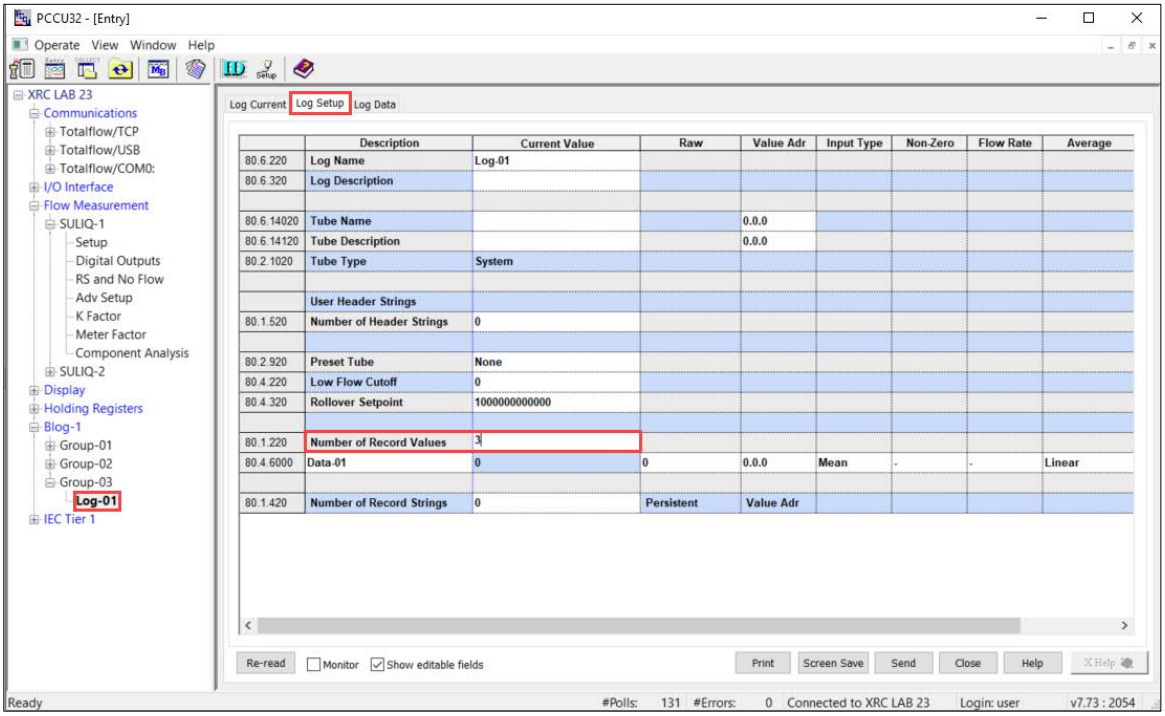
Note that the average flowing and maximum pressure values are both calculated using the value read for Flowing Pressure on register: 11.36.78.

When a new group is created, a single log is created by default. This example uses the default log.

To set up the log:

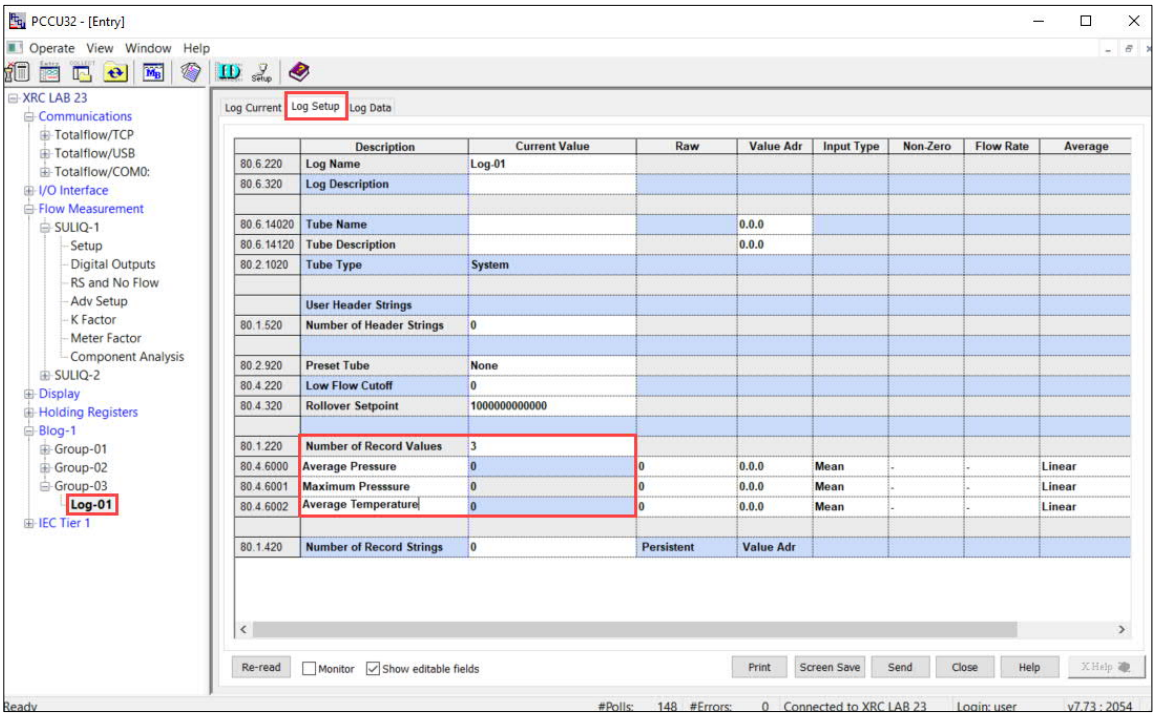
1. Select the Log from the navigation tree. The Log Current tab displays.
2. Select the Log Setup tab (Figure 4-3).
3. Set the Number of Record Values to at least 3. Three record values are of interest for this log.

Figure 4-3: Log Setup tab



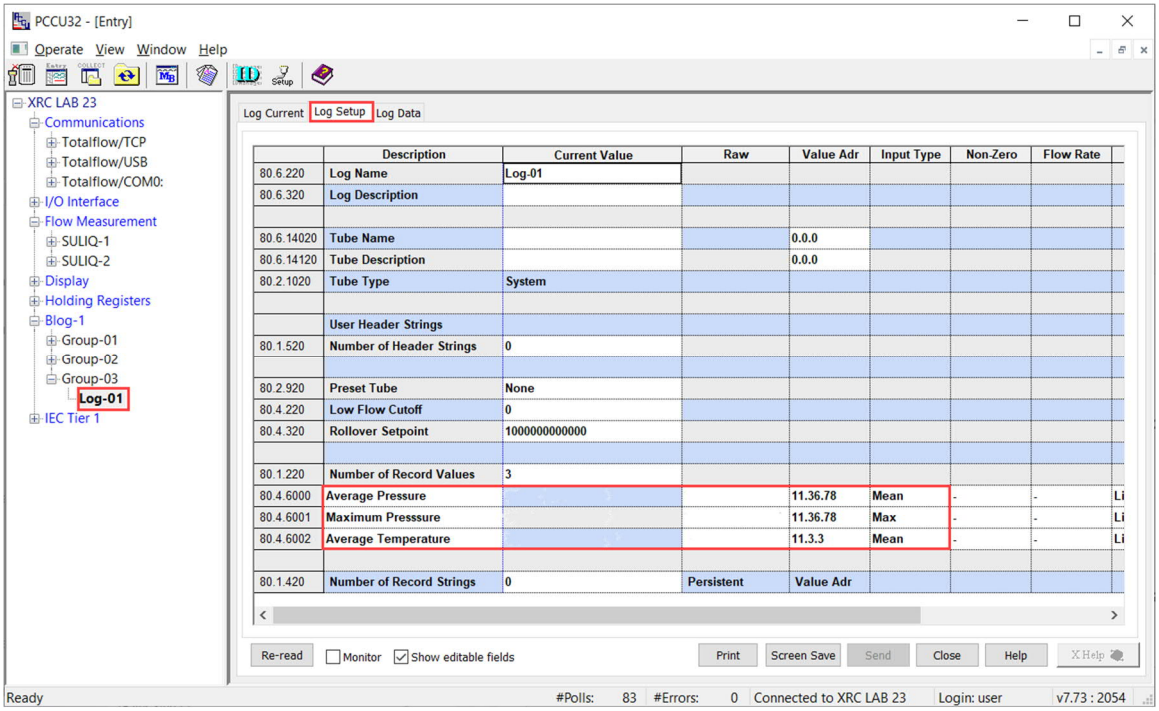
4. Click Send. Three record values display with default names.
5. Change these names to the trend value names. Select the description field and update the text (Figure 4-4):
   a. Type: Average Pressure.
   b. Type: Maximum Pressure.
   c. Type: Average Temperature.

Figure 4-4: Configure number of record values and their names



6. In the Value Adr field for each record value, type the required register. In this example:
   a. Type 11.36.78 for the Average Pressure.
   b. Type 11.36.78 for the Maximum Pressure.
   c. Type 11.3.3 for the Average Temperature
7. Select the Input Type field for each record value and select the calculation:
   a. Select Mean for the Average Pressure.
   b. Select Max for the Maximum Pressure.
   c. Select Mean for the Average Temperature.
8. Click Send. Verify that the values display with the correct attributes: source register addresses and Input Type (calculation).

Figure 4-5: Custom log for trend values

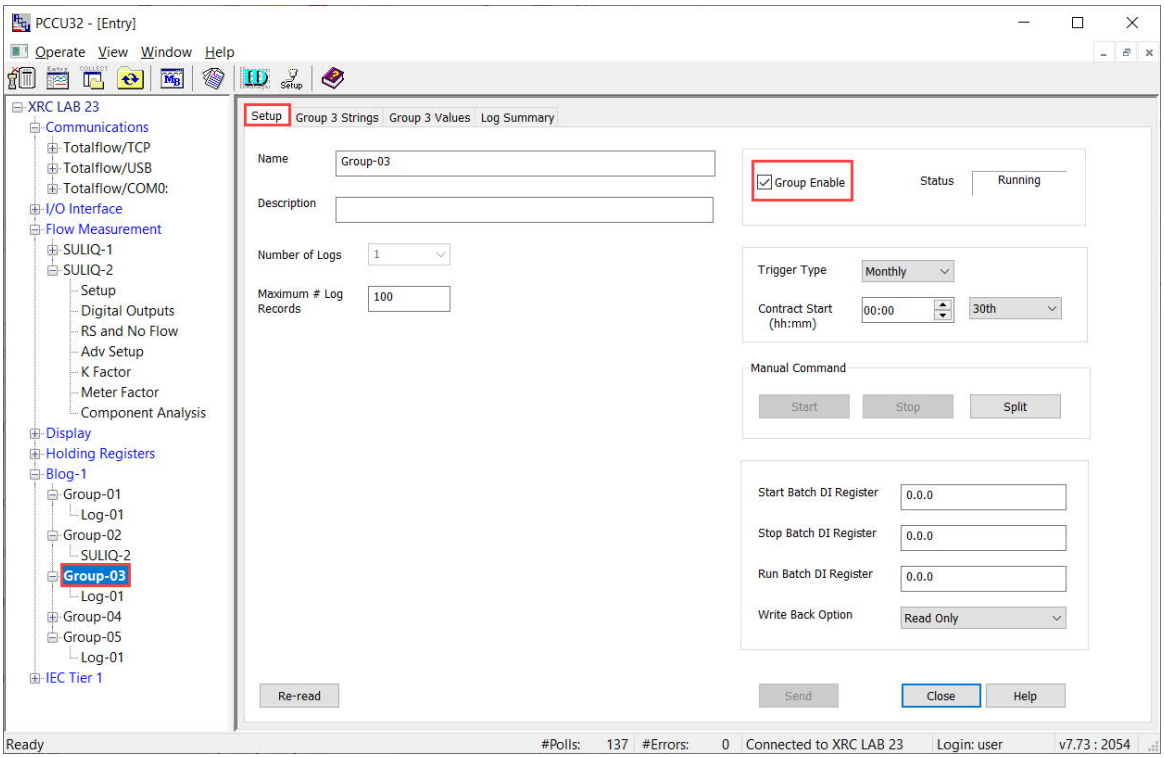


4.4 Start the log

Data logging must be enabled for the group:

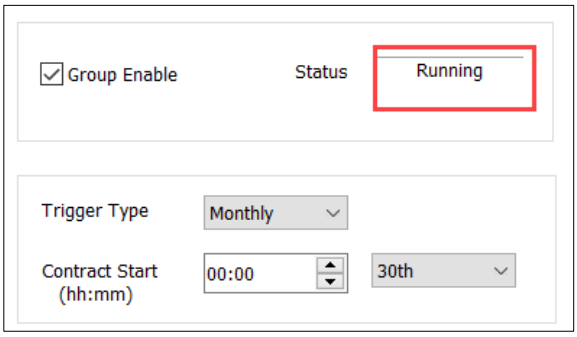
1. Select the group from the navigation tree. The Setup tab displays.
2. Select Group Enable (Figure 4-6).

Figure 4-6: Enable Log Group



3. Click Send.
4. Verify that the group Status displays: Running (Figure 4-7).

Figure 4-7: Verify log group status

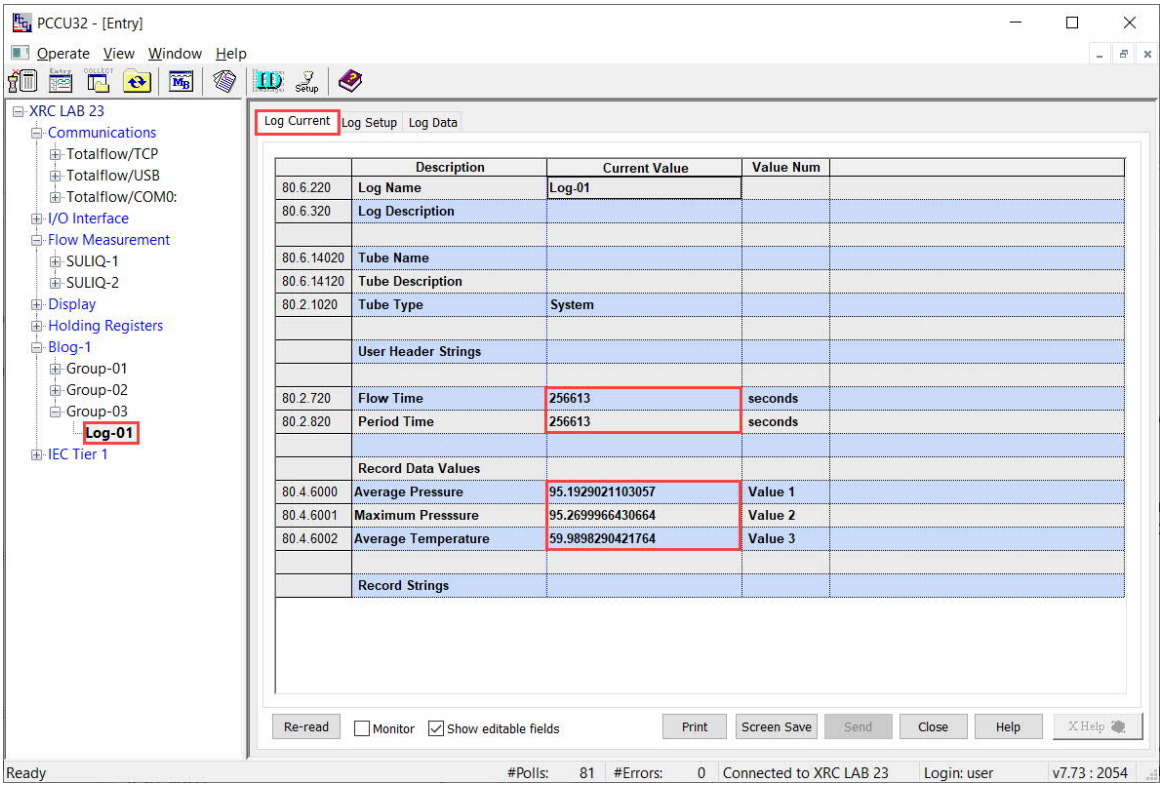


4.5 Verify current log values

After the logging is enabled, monitor current log values. Current values for user-defined trend variables should display as the log starts running. To view the log current values:

1. Select the log from the navigation tree again. The Log Current tab displays (Figure 4-8).
2. Click Re-read to refresh the screen. Verify that values display for the trend variables. Note that the Flow Time and Period Time should increment while the log is running.

Figure 4-8: Log Current values tab



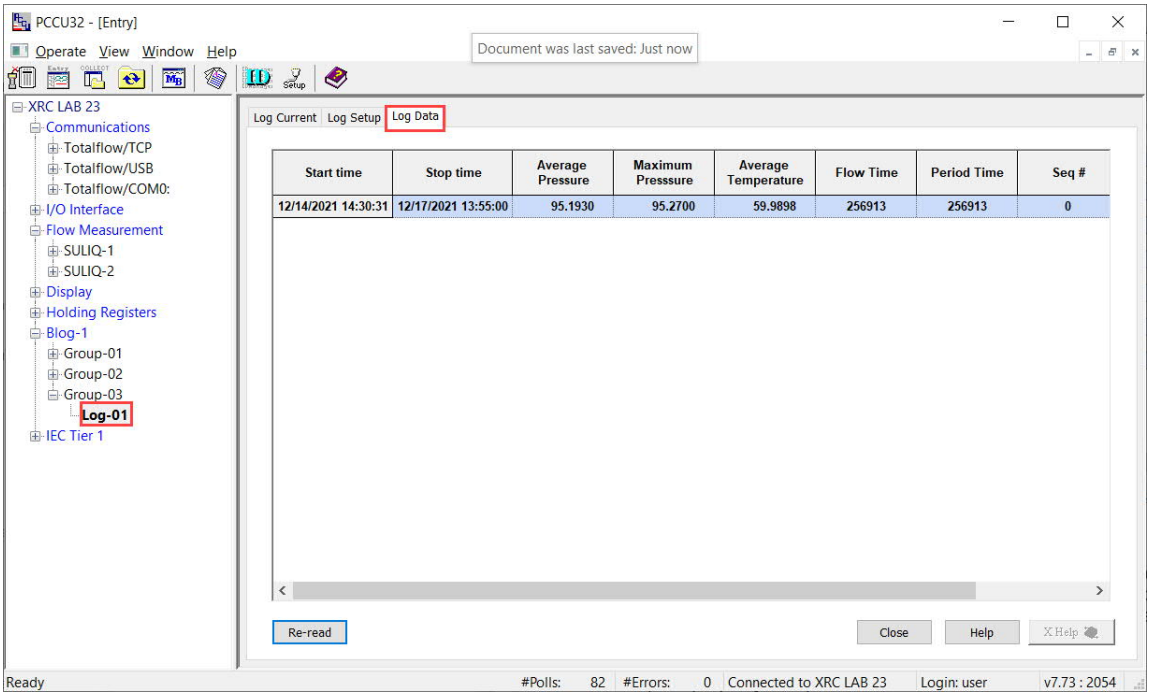
4.6 Verify log data

After the logging has run for a while, verify that the log displays data as expected. There should be at least one log after the log is initially enabled. The number of logs depend on the logging frequency defined and the logging period. For the log created above, there should be one record per month.

To view the log data:

1. Select the log from the navigation tree again.
2. Select the Log Data tab.
3. Verify that logs display (Figure 4-9).

Figure 4-9: Log data: one monthly record



4.7 Collect batch log data

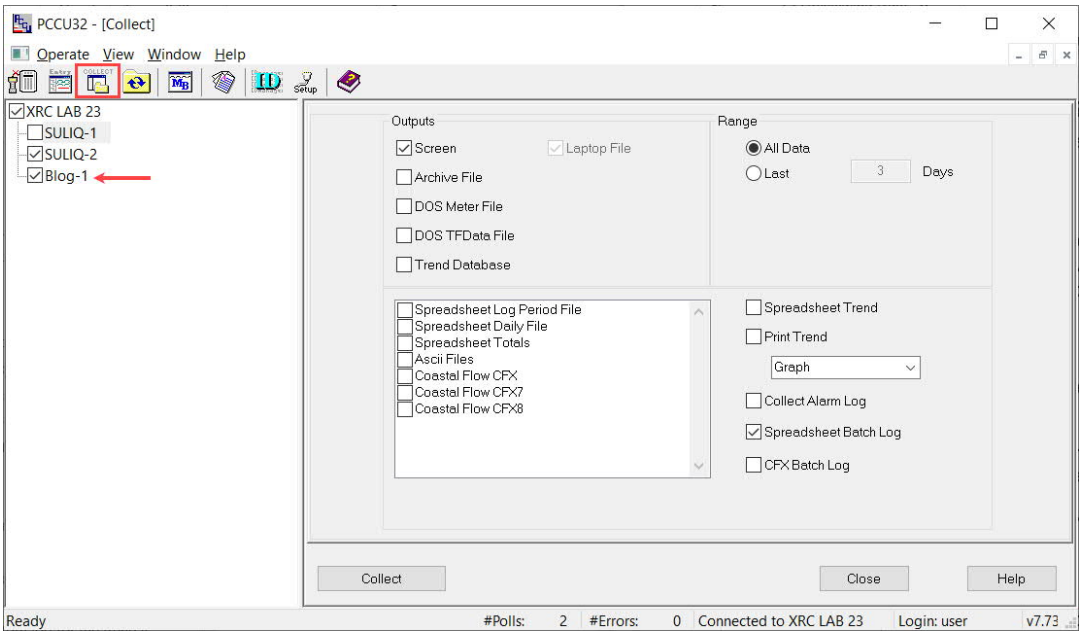
Batch log data is saved in the laptop file created when the data collection is performed. Batch log instances are selected for collection by default.

IMPORTANT NOTE: The Batch Log data can be collected separately from any tube associated with the logs, except when the required output file is CFX format. For this type of output, the associated tubes must also be selected for collection. See sections 6 Support for Batch CFX outputs and 7 Generate a batch CFX output for more details.

To collect batch logs:

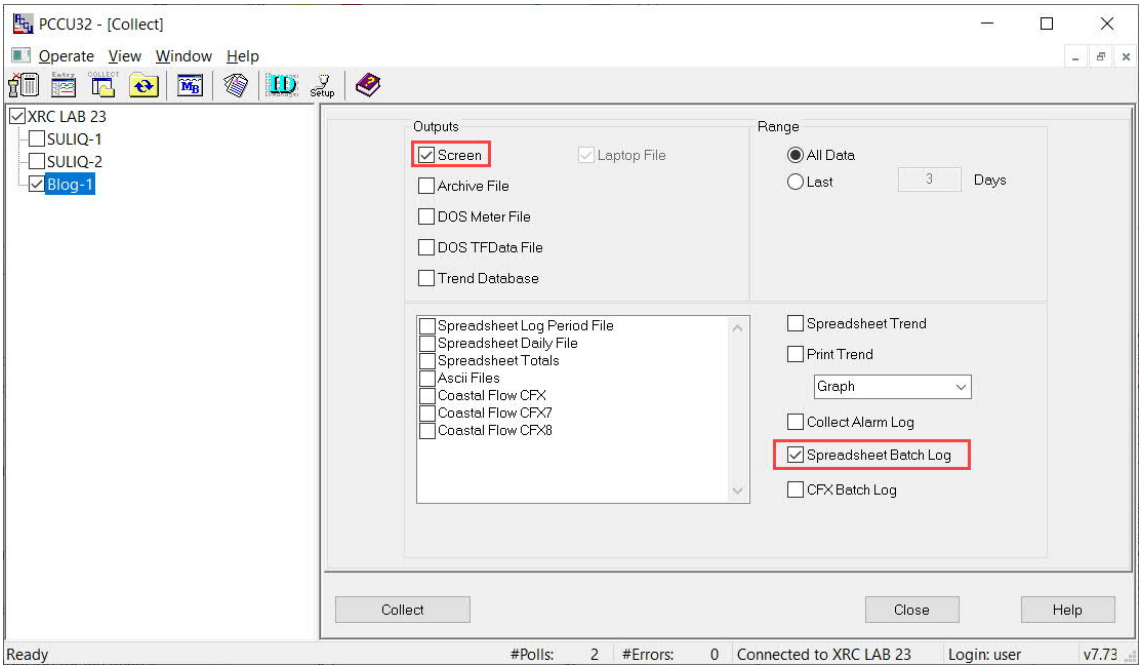
1. Click the PCCU Collect utility icon. The Batch log instance displays in the collect screen with the other applications on the device.

Figure 4-10: Batch log collect



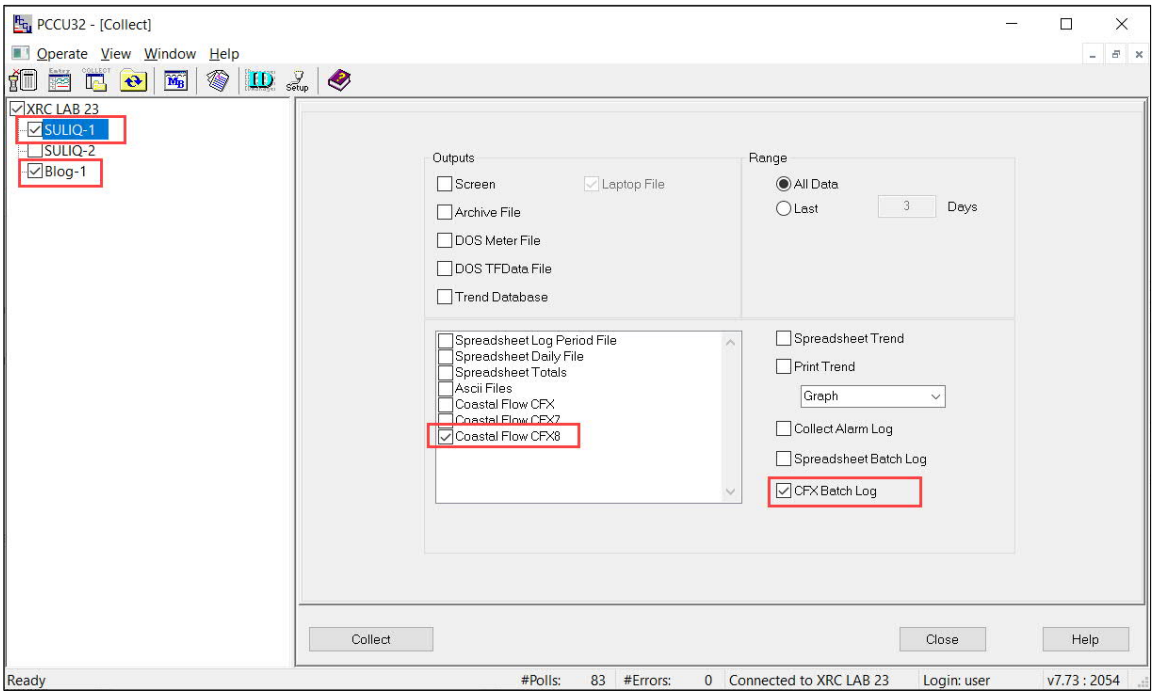
2. Collect batch log data:
   a. To view the batch log data on the screen, select Screen as an output option.
   b. To save batch log data on a spreadsheet file, select Spreadsheet Batch Log as an output option.
   c. Click Collect.

Figure 4-11: Batch log collect output options (non-CFX outputs)



3. To save batch log data for a CFX output, select CFX Batch Log as an output option. Make sure the tube that the log is for is also selected. In this example, the batch log data for the CFX output is associated with the first instance of API Liquid app. This app instance is selected as required.
4. Click Collect.

Figure 4-12: Batch log collect output options (CFX outputs)



5 Batch logs for the Liquid Transfer app

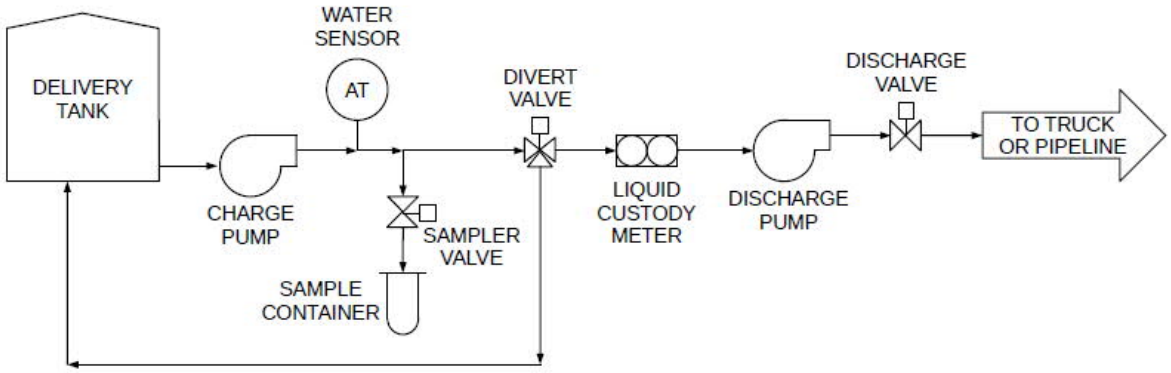
The Liquid Transfer 2 (part number 2519047) is an ABB Totalflow add-on IEC application. This application is designed to be paired with the Batch Log application.

This section describes how to:

- Configure the IEC Liquid Transfer 2 app to automate the valves and pumps for the liquid transfer
- Configure the Batch Log application to record the custody transfer tickets for the liquid transfer

Figure 5-1 shows a high-level diagram with the main components or elements in a liquid transfer system. Totalflow devices with the liquid transfer application control and keep track of the flow volume measured from the custody meter. The batch log configured in conjunction with liquid transfer records flow activity as customized by the operator.

Figure 5-1: Liquid Transfer main components



5.1 Configuration overview

This scenario requires the following applications to be instantiated on the flow computer or remote controller:

- API Liquid SU: To measure the volume from the liquid transfer meter

- Batch Log: To record the individual load and unload transactions from the API Liquid SU app
- IEC Tier 1 instance: To run the Liquid Transfer 2 IEC app that controls the valves and pumps for the load and unload operation

A custom batch log will be defined to track data from the API Liquid SU instance associated with the custody meter. The Liquid Transfer IEC app will be configured to automate (start and stop) the logging of the data associated with liquid transfer events or transactions. The procedures include verification of configuration and tests to ensure the applications work as expected before placing the system into service. Note that the Liquid Transfer application may be programmed to allow operator action from a front panel display. The application can be operated from the panel or from PCCU.

Review the procedures in this section carefully before attempting configuration. Sections 5.2 Normal liquid transfer sequence and 5.3 Liquid Transfer fault states provide additional details to help you monitor and troubleshoot the liquid transfer process during configuration and once in service.

WARNING – Bodily injury. De-energize all pumps and valves before configuring the Liquid Transfer application. Test the configuration thoroughly for the correct behavior before energizing the pump and valves.

5.2 Normal liquid transfer sequence

The following is the normal liquid transfer start / stop sequence (no alarms):

- Idle: pumps stopped, discharge valve closed
- Log Starting: start command sent to batch log app
- Load Starting: pumps stopped, discharge valve open
- Running: pumps running, discharge valve open
- Load Stopping: pumps stopped, discharge valve open
- Waiting - Low Flow: pumps stopped, discharge valve closed, low flow shutoff timer
- Completed and Waiting: pumps stopped, discharge valve closed, extra data wait timer
- Log Stopping: stop command sent to batch log app
- Idle: pumps stopped, discharge valve closed

Table 5-1: Liquid Transfer Sequence from Start to Stop (one transaction shown)

Liquid Transfer State Sequence	Pumps*	Discharge Valve	Logging	Low- Flow shutoff timer	Extra data wait timer
Idle	Stopped	Closed			
Log Starting			Start**		
Load Starting	Stopped	Open			
Running	Running	Open			
Load Stopping	Stopped	Open			
Waiting–Low Flow	Stopped	Closed		Started	
Completed and Waiting	Stopped	Closed			Started
Log Stopping			Stop**		
Idle	Stopped	Closed			

*Charge or discharge pumps, **The IEC has sent Start or Stop commands to the Batch Log app.

5.3 Liquid Transfer fault states

The following are the fault states of the liquid transfer:

- Running Diverted: charge pump running, discharge pump stopped, divert valve diverting, discharge valve open
- Stopped, Waiting for Permissive: both pumps stopped, divert valve transferring, discharge valve closed
- Stopped, Permissive Lost: both pumps stopped, divert valve transferring, discharge valve closed
- Shutdown: Both Pumps stopped, discharge valve closed

Table 5-2: Liquid Transfer fault states

IEC Liquid Transfer	Charge Pump	Discharge pump	Divert Valve	Discharge Valve
Running Diverted	Running	Stopped	Diverting	Open
Stopped-Waiting for Permissive	Stopped	Stopped	Transferring	Closed

IEC Liquid Transfer	Charge Pump	Discharge pump	Divert Valve	Discharge Valve
Stopped-Permissive Lost	Stopped	Stopped	Transferring	Closed
Shutdown	Stopped	Stopped		Closed

If the Liquid Transfer state is: Shutdown, check the alarm under the System Shutdown Status section on the Current Batch Data tab. See section 5.7.3 Energize DIs for more details.

5.4 Verify device credits

Table 5-3 shows the type and number of credits for each of the required applications. Check the number of credits available in the device as shown in this section. If the required credits are not available, transfer credits from the credit key to the device.

If the credit key does not have the required credits, you can purchase additional credits and add them to the key for transfer to the device.

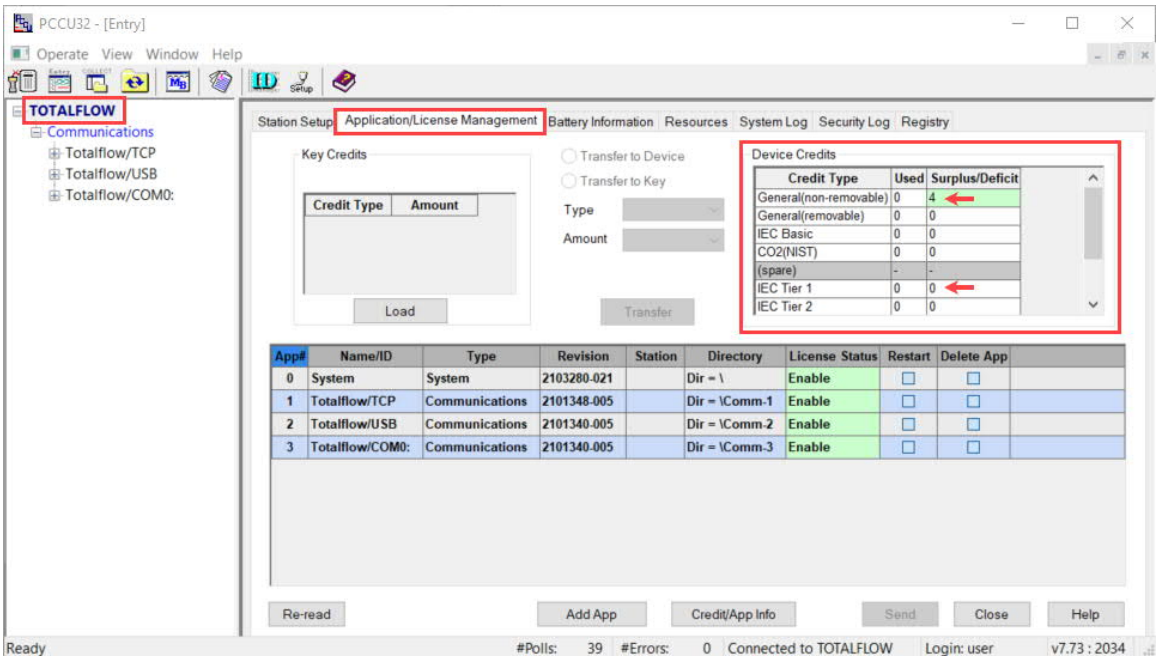
Table 5-3: Required application credits

Application	Type of Credit	Required Number of Credits
API Liquid SU	General	1
Batch Log	General	1
IEC Tier 1	IEC Tier 1	1

Check the device credits:

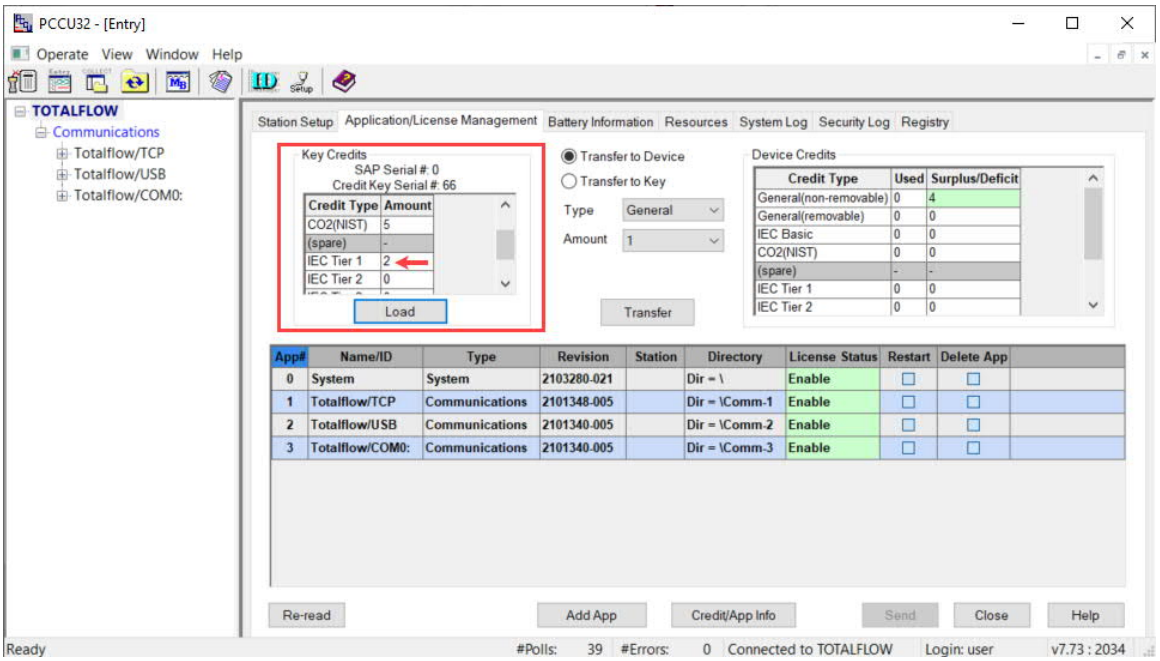
1. Connect to the device using PCCU on Entry mode.
2. Select the top node on the navigation tree (Station ID).
3. Select the Application/License Management tab.
4. Under Device Credits (Figure 5-2):
   a. Check if the device has two general credits available to instantiate the Batch Log and the API Liquid SU. Figure 5-2 shows there are 4 general credits in the device. Two of these 4 can be used to instantatiate the API Liquid SU and Batch Log apps.
   b. Check if the device has one IEC Tier 1 credit availble to instantiate the Liquid Transfer app. Figure 5-2 shows no IEC Tier 1 credit available.

Figure 5-2: Verify available device credits



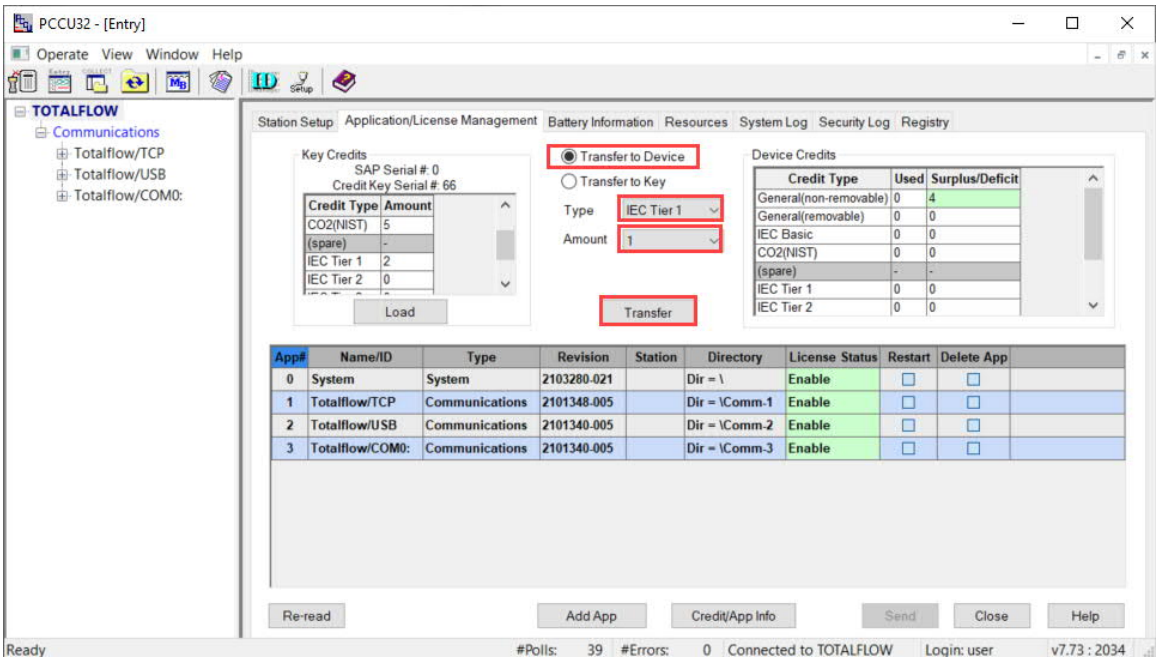
5. If the device has enough credits to support the required apps, go to the next section. If not, transfer credits from the credit key:
   a. Insert the credit key into a USB port in your laptop.
   b. Click Load to display credits available in the key.
   c. Determine if the required credits are available.

Figure 5-3: Verify available key credits (on USB credit key)



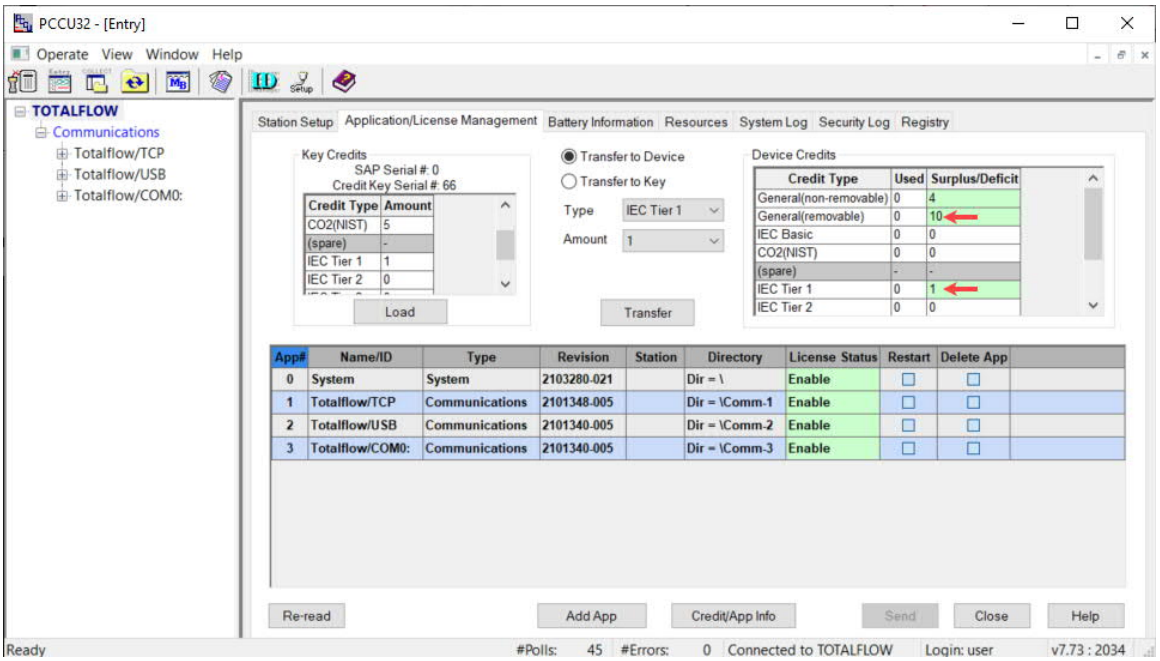
   d. Set up for credit transfer (Figure 5-4):
      i. Ensure Transfer to Device is selected.
      ii. Select credit type from the Type drop-down list. In this example, one IEC Tier 1 credit is selected.
      iii. Select the amount from the Amount drop-down list.
   e. Click Transfer.

Figure 5-4: Transfer credits from key to device



6. Verify Device Credits again. The additional credits should reflect for each type transferred. In Figure 5-5, additional General credits and the required IEC Tier 1 credits show available in the device.

Figure 5-5: Verify device displays transferred credits



5.5 Add required applications

The following procedure adds the required applications by the liquid transfer system: API Liquid SU, Batch Log, and an IEC Tier 1 instance.

This procedure assumes that the flow computer or remote controller has enough credits to support the required apps. Check or add available credits in the device as described in section 5.4 Verify device credits.

To add the applications:

1. Connect to the flow computer or controller with PCCU on Entry mode.
2. Select the top node on the navigation tree, then select the Application/License Management tab.
3. Check the Device Credits list to verify the flow computer or remote controller has enough credits for the required apps. If there are not enough credits, add the credits needed.
4. Click Add App.
5. Select the Application to add drop-down list.
6. Locate the Batch Log app and then select it. Take note of the application # (App # column in the app table).
7. Click OK. The Batch Log app displays in the application table as: Blog-n, where n is the application instance number (the first Batch Log instance is added as Blog-1).
8. If the Liquid or the IEC applications have not been added, repeat steps for each to add them. Remember to take note of the application # for each app.

5.6 Configure the batch log app for liquid transfer

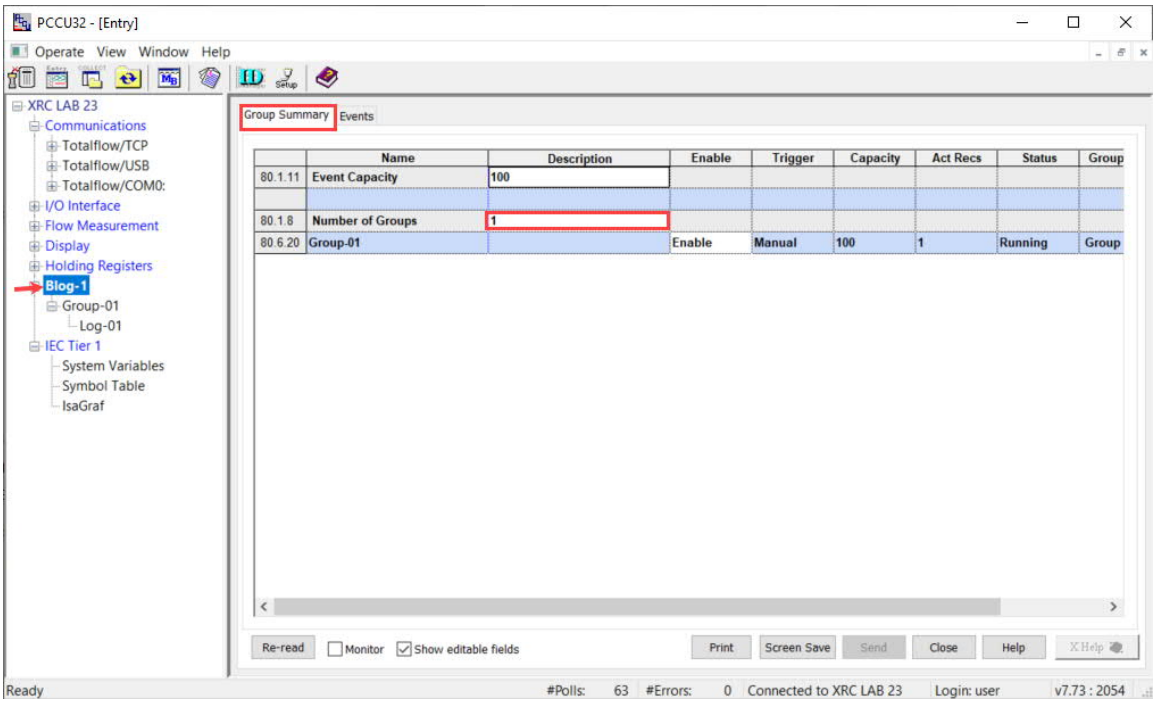
This procedure configures one batch log group for the liquid transfer app. Note that the Batch application supports multiple group definition and configuration. The application has one single group created as a default; additional groups can be added as necessary. This procedure uses the default group for the liquid transfer.

IMPORTANT NOTE: Data logging is disabled by default when the Batch log app is first instantiated. Logging must be disabled before configuration. Ensure the Group Enable checkbox on the group's Setup tab is not selected.

5.6.1 Create or configure batch log group

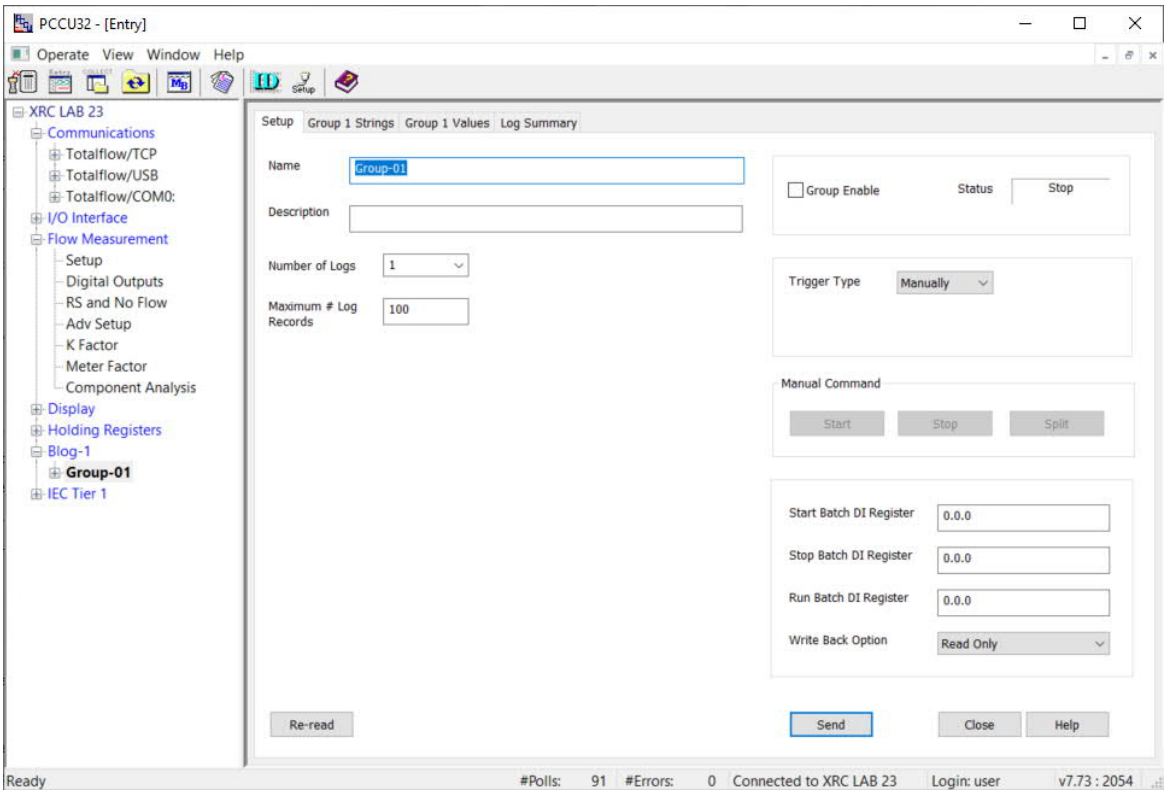
1. Expand the Batch Log instance from the navigation tree. The Group Summary tab displays. The default number of groups is 1. This example configures one log group. If planning additional log groups, increase the number as necessary.

Figure 5-6: Batch Log with default group



2. Select the default group from the navigation tree (the group displays with its default name, Group-0n). The group's Setup tab displays.

Figure 5-7: Group Setup tab

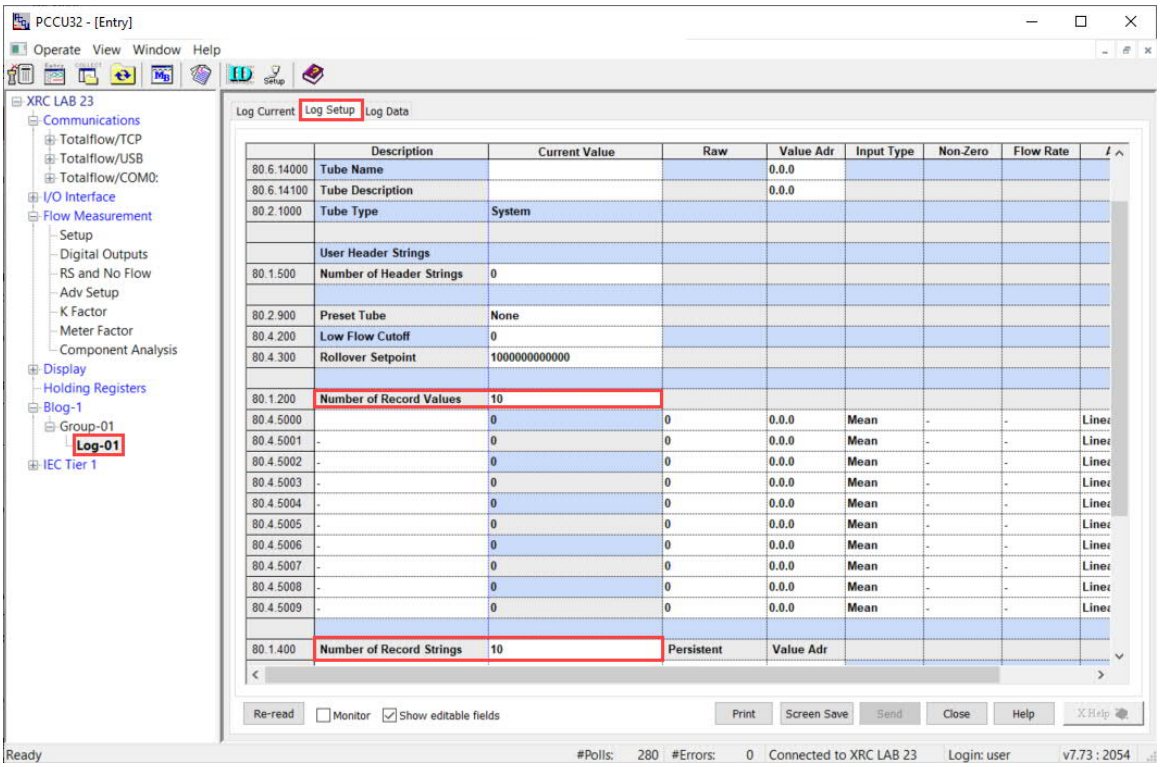


3. Click the Number of Logs drop-down list and select 1 to create one log for the group.
4. Click Send.
5. Expand the group the navigation tree. The group log just created in the previous step displays on the navigation tree. The default log name is Log-0n (where n=1 for the first group).
6. Select the Log on the navigation tree (Log-01 in this example).
7. Select the Log Setup tab (Figure 5-8):

a. Set the Number of Record Values to 10.

b. Set the Number of Record Strings to 10.

Figure 5-8: Configure the number of record values and strings



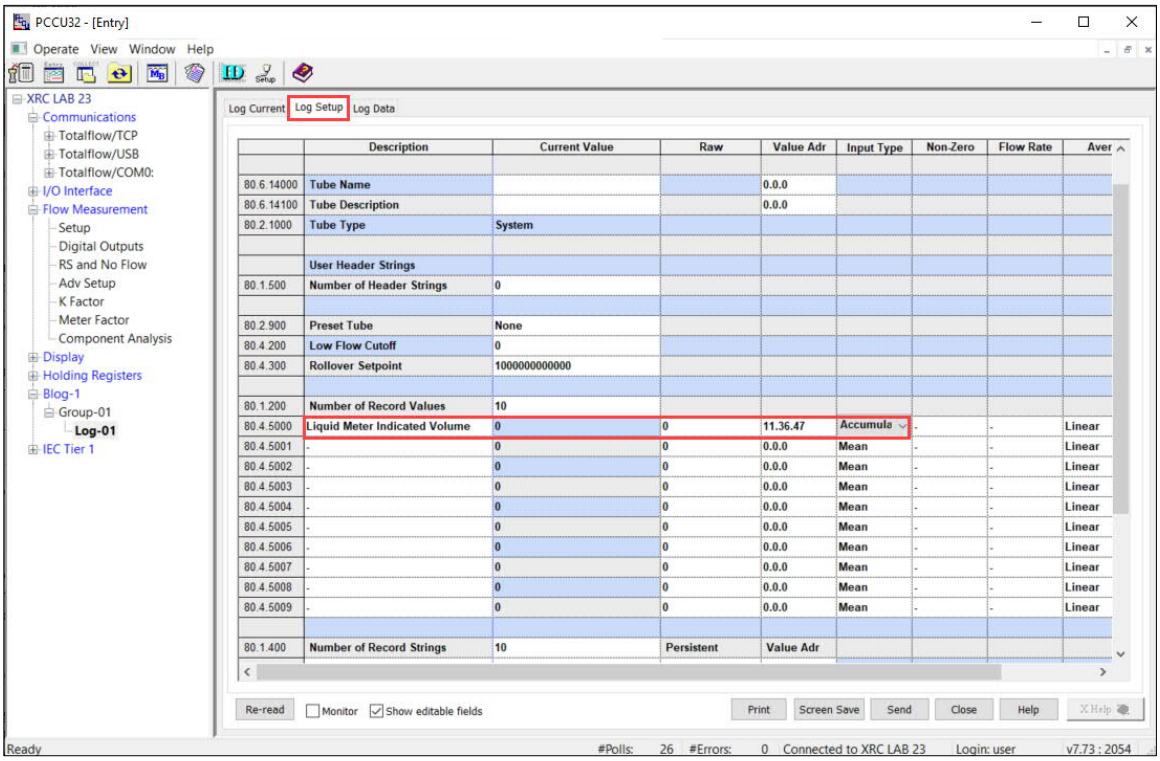
8. Click Send.
9. Configure record liquid custody meter volume value next.

5.6.2 Configure log to record volume during liquid transfer

The batch log application can be configured to record the volume from the Liquid Custody meter. This volume is calculated by the API Liquid app instance. To record the volume, the batch log must be configured to obtain the value from the register address assigned to this value in the Liquid app:

1. Select the log (Log-01 in this example) from the navigation tree, then select the Log Setup tab.
2. Configure the first value under Number of Record Values (Figure 5-9):
   a. Type the description: Liquid Meter Indicated Volume.
   b. Type the register address to read the volume value from. In this example, the API SU Liquid app was assigned app #11 when instantiated. The register address for the indicated volume is therefore: 11.36.47.
   c. Select the Input Type drop-down list and then select Accumulator.

Figure 5-9: Configure Liquid Custody meter volume as a record value (data point)



3. Click Send.

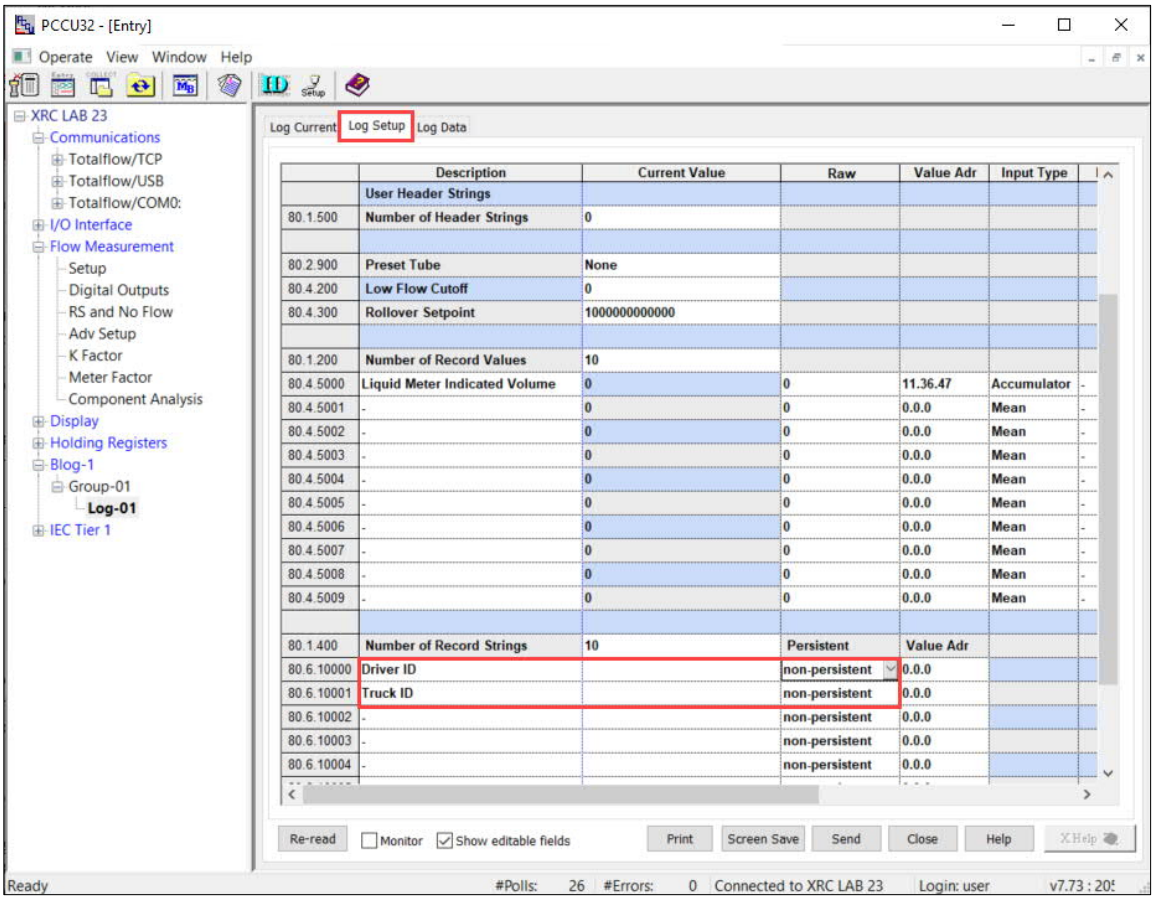
5.6.3 Configure log to record additional information

The Batch log application can be configured to record additional data. This data depends on log data requirements. For example, for the liquid transfer application, information such as driver and truck identification can be added to provide detail views and reports (tickets). In the case of driver and truck IDs, since there may be different trucks and drivers, the IDs may not be the same for every liquid transfer period. Each log may have different information and therefore this type of data is non-persistent.

To define additional data (record strings):

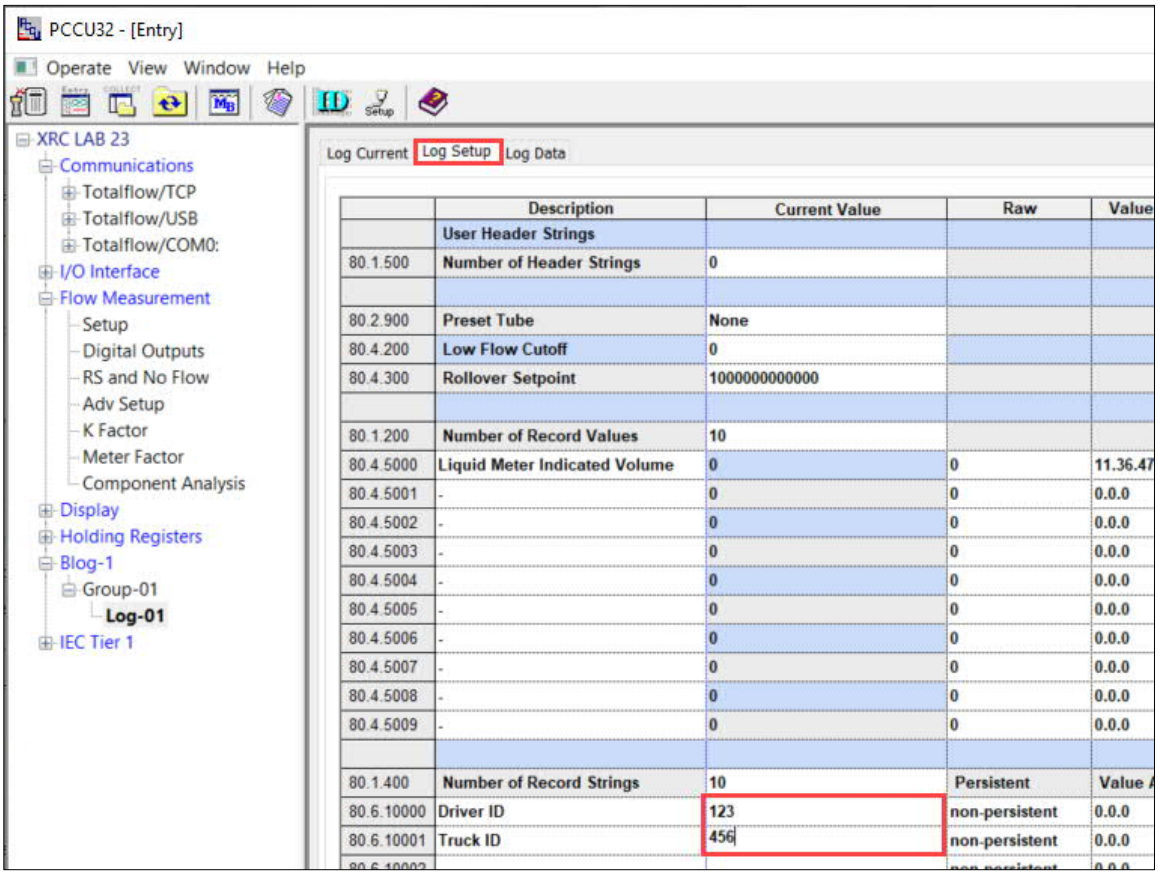
1. Configure the desired record strings under the Number of Record Strings section in the Log Setup tab:
   a. Type the desired description for the first string, for example: Driver ID.
   b. Click the corresponding field under the raw column and select: Non-persistent.
   c. Type the desired description for the second string, for example: Truck ID.
   d. Click the corresponding field under the raw column and select: Non-persistent.
2. Click Send. The defined record strings display (Figure 5-10).

Figure 5-10: Record strings for additional data (Example: Driver and Truck IDs)



3. To verify that the additional record strings are included in the log when the configuration is tested in procedure 5.6.4 Test batch logging, configure dummy IDs. Figure 5-11 shows generic ID values configured as an example.

Figure 5-11: Configure values for record strings from the Log Setup tab



IMPORTANT NOTE: The IEC application can be programmed to take input for string values from a front panel on the flow computer or remote controller. Information such as the driver and truck IDs would need to be entered before the liquid transfer and logging begin.

5.6.4 Test batch logging

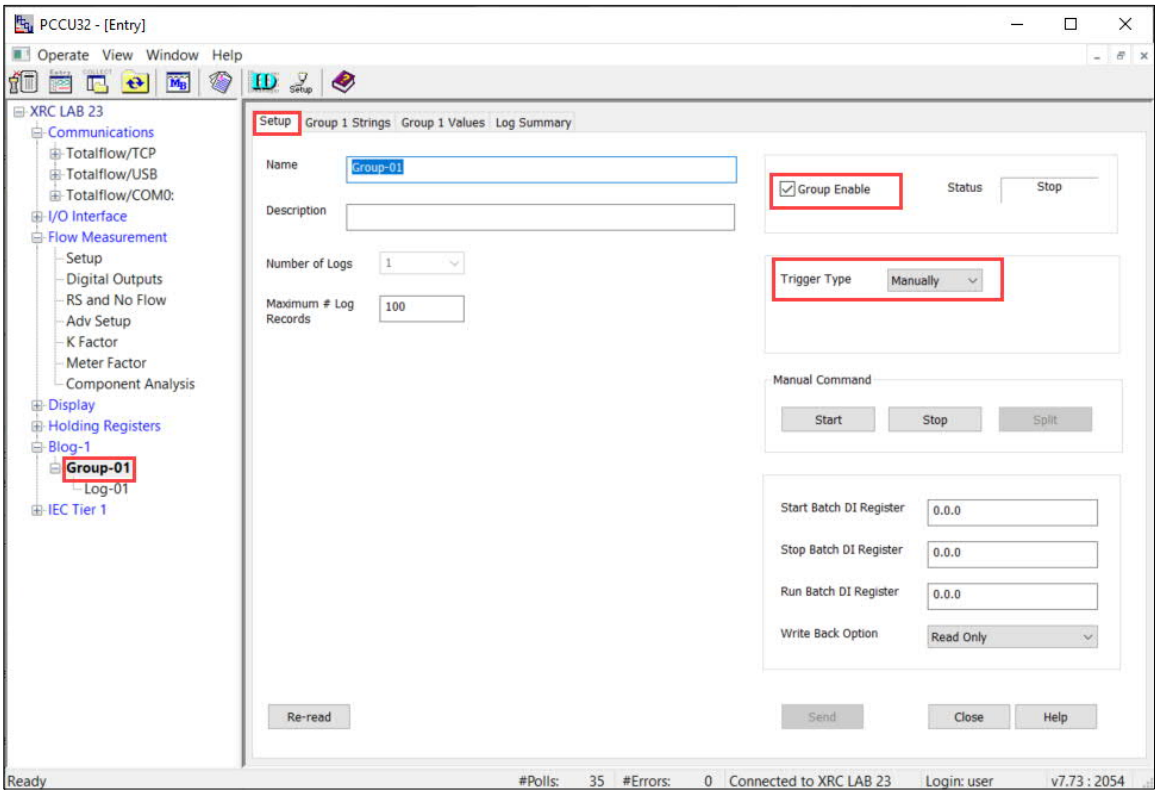
The Batch Log application offers many options to trigger the data logging. In this procedure, the logging is triggered manually to test the application configuration. Logging is started and stopped manually to verify that the desired log data is captured and it is correct.

If the log does not display or does not display the expected values or defined variables, check the log configuration and make necessary corrections. The log must be correctly configured before proceeding with the configuration of the IEC app instance in later sections in this document.

To test the log manually:

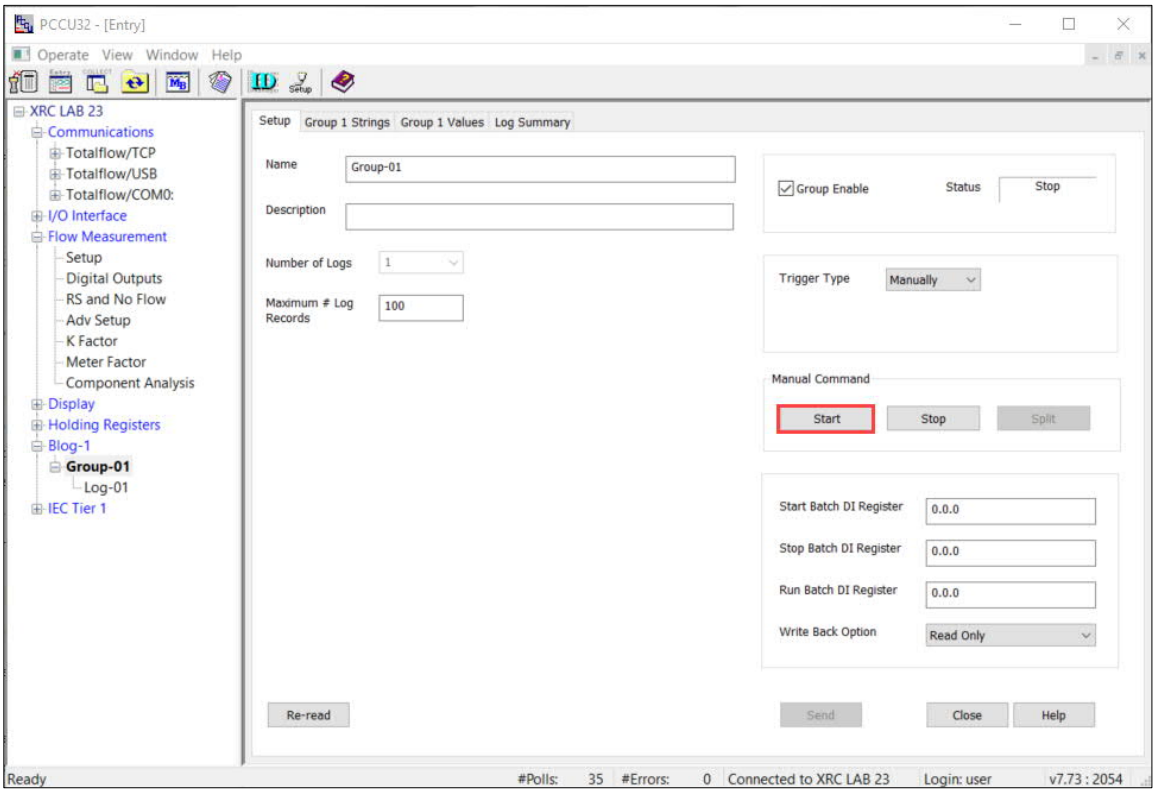
1. Select the group on the navigation tree. The Setup tab displays.
2. Select Group Enable (Figure 5-12).
3. Verify that Trigger Type is set to: Manually. Manual trigger type is the default. If for some reason it is set differently, click on the drop-down menu and select: Manually.

Figure 5-12: Enabling the batch group



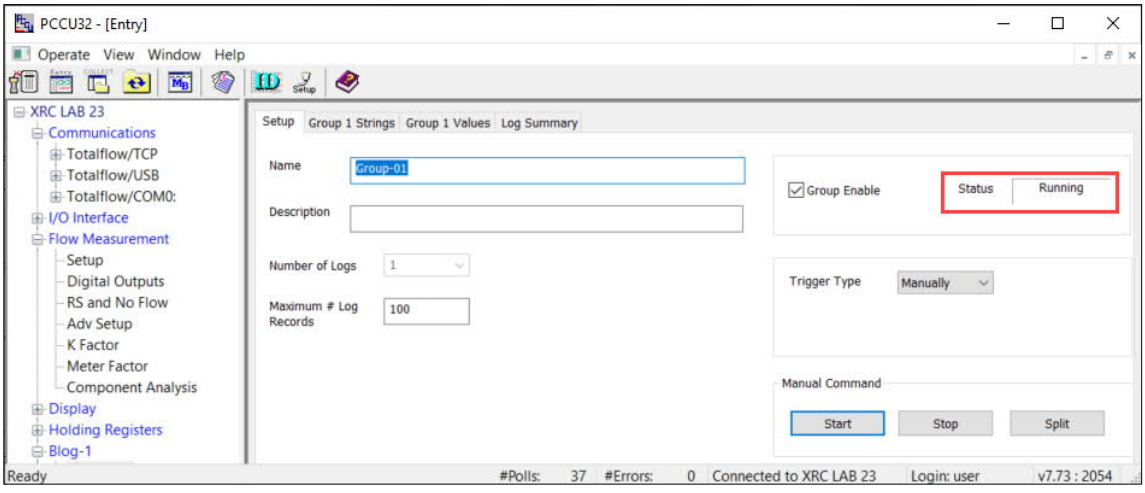
4. Click Send.
5. Click Start (Figure 5-13).

Figure 5-13: Start logging



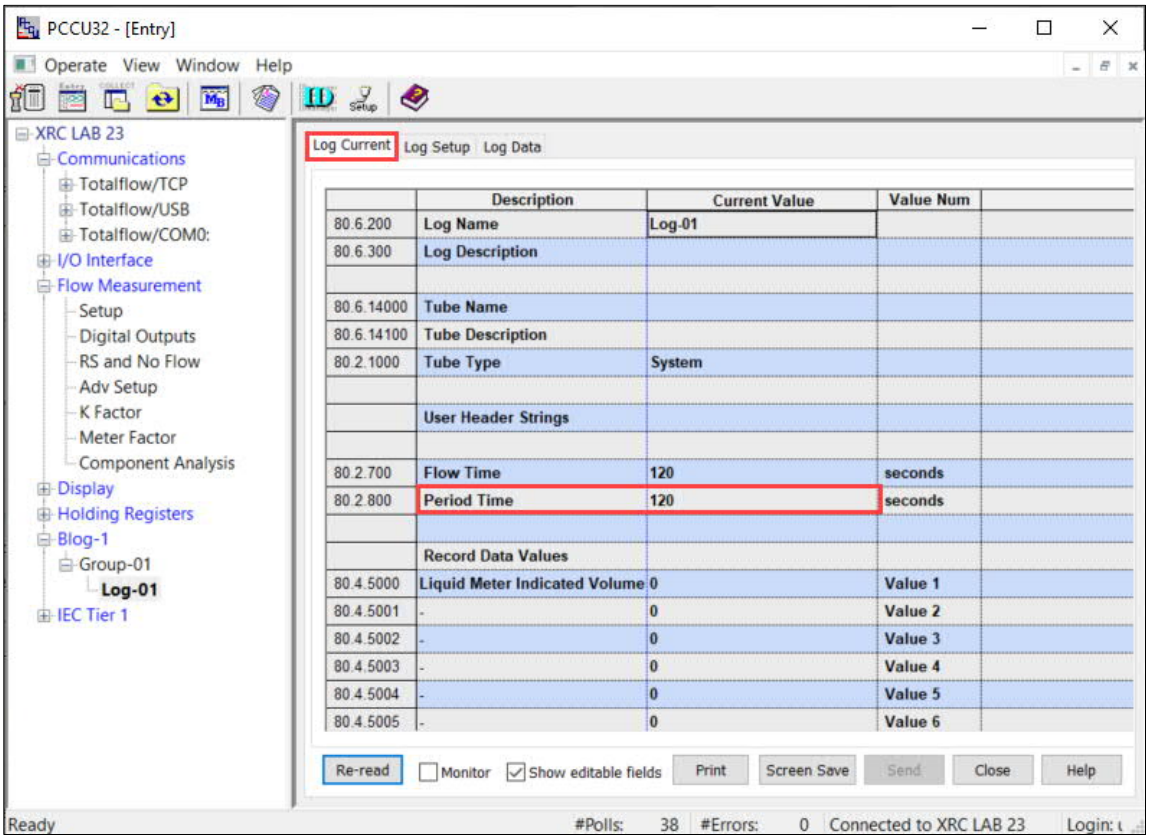
6. Verify that the Status displays: Running (Figure 5-14). This indicates that the data logging has started and will continue until manually stopped.

Figure 5-14: Verify logging is running



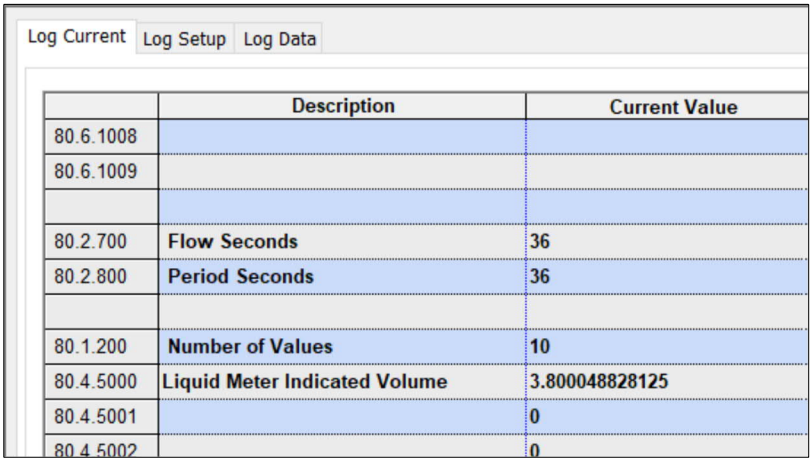
7. Select the log on the navigation tree.
8. Select the Log Current tab (Figure 5-15).
9. Click Re-read or check Monitor to verify that the Period Seconds value is incrementing.

Figure 5-15: Verify logging period increments after logging starts



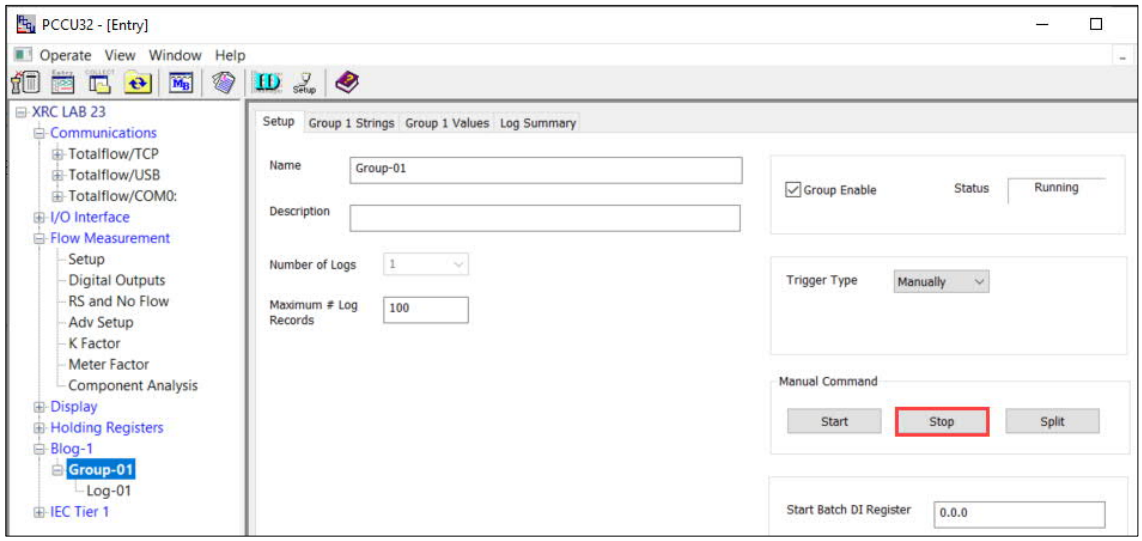
10. Under Number of Record Data Values, verify that the Current Value of the Liquid Meter Indicated Volume increments when the liquid is flowing (Figure 5-16).

Figure 5-16: Verify custody meter volume increments



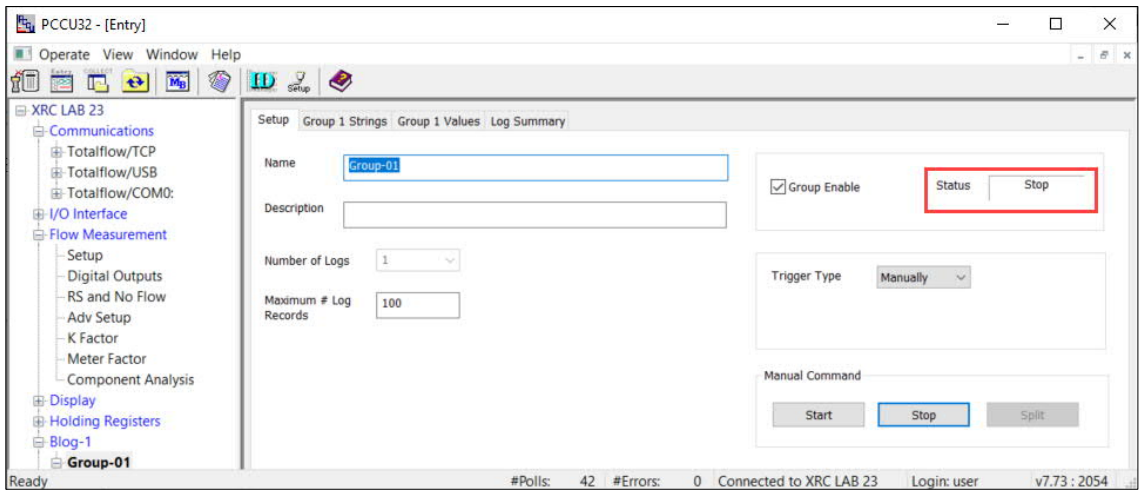
11. Select the group from the navigation tree again to return to the Setup tab.
12. Click Stop (Figure 5-17).

Figure 5-17: Stop logging



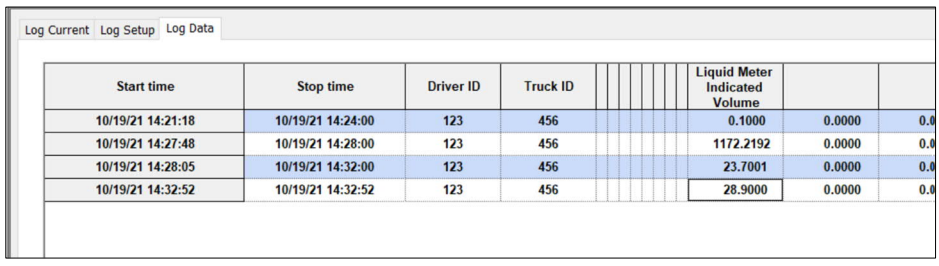
13. Verify that the Status displays: Stop (Figure 5-18).

Figure 5-18: Verify Group logging status displays Stop



14. Select the log again on the navigation tree and then select the Log Data tab.
15. Verify that the desired data is logged (Figure 5-19). For this example:
    a. Verify that the Driver ID displays.
    b. Verify that the Truck ID displays.
    c. Verify the Liquid Meter Indicated Volume value. This is the volume measured by the Liquid Custody meter while the batch was running. Use the scroll bar to move to the right and locate the volume values. The table is long and variables values may not be visible when the screen first displays.

Figure 5-19: Verify logged data



Start time	Stop time	Driver ID	Truck ID	Liquid Meter Indicated Volume		
10/19/21 14:21:18	10/19/21 14:24:00	123	456	0.1000	0.0000	0.0
10/19/21 14:27:48	10/19/21 14:28:00	123	456	1172.2192	0.0000	0.0
10/19/21 14:28:05	10/19/21 14:32:00	123	456	23.7001	0.0000	0.0
10/19/21 14:32:52	10/19/21 14:32:52	123	456	28.9000	0.0000	0.0

5.7 Configure the Liquid Transfer app

This section describes the configuration of the IEC application for liquid transfer using the batch log application as configured in the previous sections.

The example assumes that the field hardware devices are wired to TFIO DI/DO I: 00 (TFIO rotary switch position 0).

WARNING – Bodily injury. De-energize all pumps and valves before configuring the Liquid Transfer application. Test the configuration thoroughly for the correct behavior before energizing the pump and valves.

5.7.1 Verify the Liquid Transfer application is ready

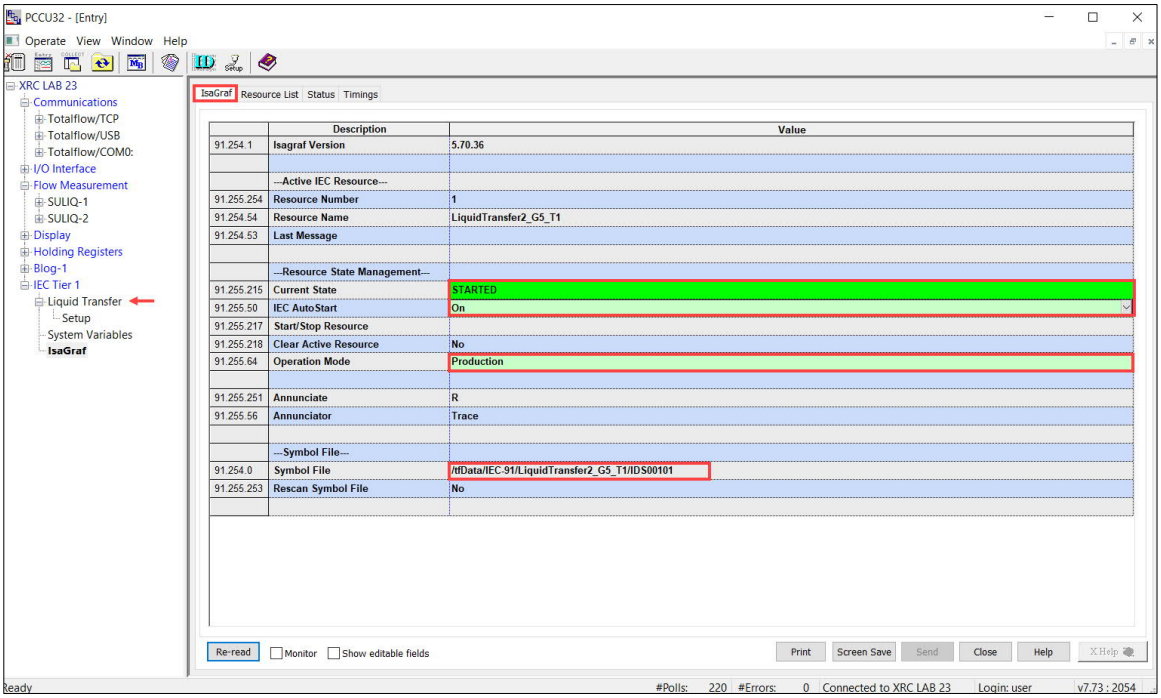
This procedure verifies that the application is ready for use, that is, started correctly. Note that an IEC application is also referred to as a “resource” in PCCU.

It is assumed that the steps to load the application in the device and to incorporate the ini file for application access from PCCU have been completed. Refer to the Load Pre-compiled IEC applications guide (link listed in Additional information) for complete instructions.

To verify that the Liquid Transfer resource has started properly:

1. Expand the IEC tier 1 instance on the navigation tree.
2. Select IsaGraf
3. Under the Resource State Management section (Figure 5-20), verify the following:
   a. The Current State value displays: STARTED.
   b. The IEC Auto Start is set to: On.
   c. The Operation Mode is set to: Production
   d. Verify that the navigation tree displays the application-specific node under the IEC tier 1 instance. In this example, the node for Liquid Transfer displays. This indicates that the associated ini file has been correctly incorporated into PCCU, making application-specific screens available for configuration and operation. Note that the Symbol File, under the Symbol File section, displays the application name and the slot number (#91) for this example.

Figure 5-20: Verify the Liquid transfer state



5.7.2 Configure the digital inputs (DIs)

This procedure sets up the Digital inputs which the IEC Liquid Transfer app uses to start or stop the truck loading. It configures the I/O interface registers associated with the TFIO module DI terminals wired for ESD (Emergency Shutdown) and Truck Ground on the Liquid Transfer app. This is required for the Liquid Transfer app to communicate with the I/O interface app for the control functions. In this example, ESD is wired to DI-1 and Truck Ground is wired to DI-2. Obtain the register numbers for these two points from the I/O Interface Digital Inputs tab for the corresponding module.

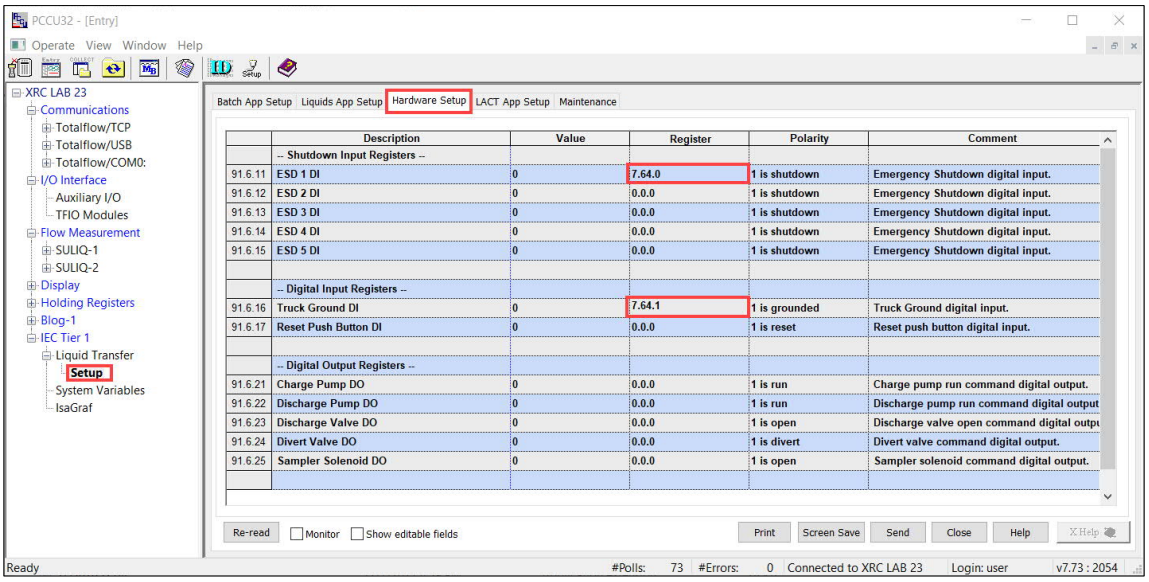
This procedure assumes that all related hardware has been wired correctly, that the I/O interface has successfully detected the TFIO DI/DO module, and that the module is online. Refer to the TFIO User Manual for details on wiring and the I/O Interface application guide for additional details.

WARNING – Bodily injury. De-energize all pumps and valves before configuring the Liquid Transfer application. Test the configuration thoroughly for the correct behavior before energizing the pump and valves.

To set up digital inputs:

1. Expand Liquid Transfer on the navigation tree, then select Setup.
2. Select the Hardware Setup tab (Figure 5-21).
3. Set ESD 1 DI to 7.64.0 (TFIO DI-1). Please note that for this DI, the default polarity is set to: 1 is shutdown. This configuration is user-selectable. Configure as needed.
4. Set Truck Ground DI to 7.64.1 (TFIO DI-2). Please notes that for this DI, the default polarity is set to: 1 is grounded. This configuration is user-selectable. Configure as needed.

Figure 5-21: Set digital input registers



5.7.3 Energize DIs

This procedure temporarily energizes the DIs by pressing the device's ESD (Emergency shutdown) button and connecting the truck ground. These actions should result in the change of the DI states and the display of alarm conditions for digital shutdown and truck ground:

- The DI states for the TFIO module are verified on the I/O interface app (on the Digital Inputs tab).
- The associated alarms are verified on the Liquid Transfer app (on the Current Batch Data tab).

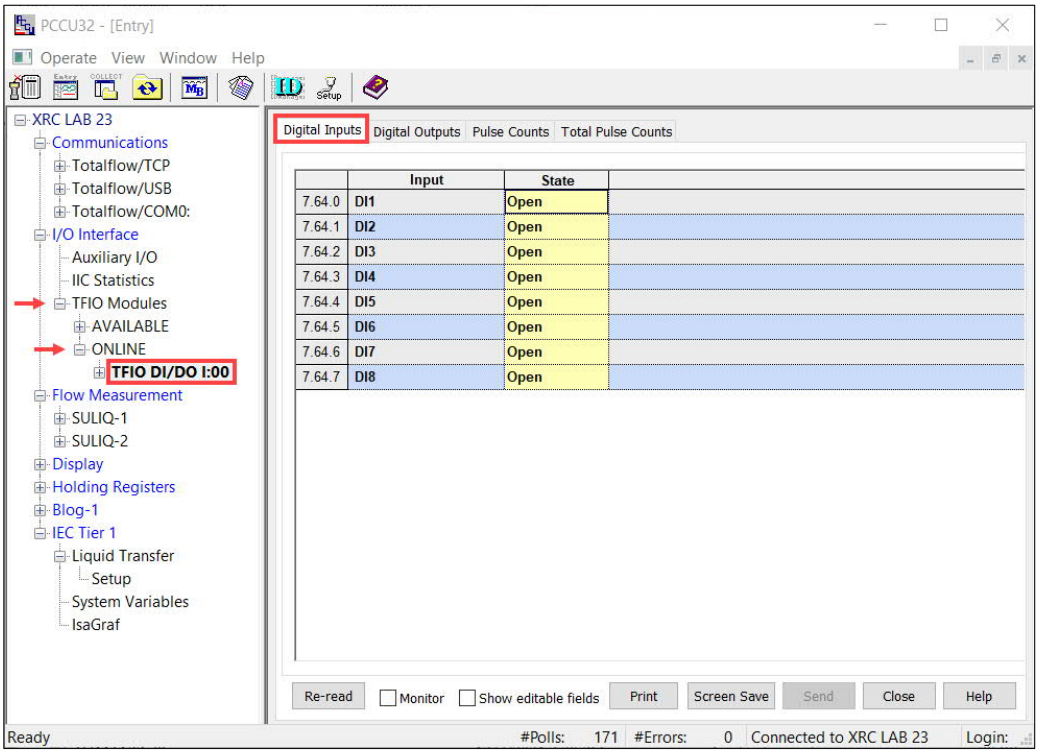
If the alarms reflect the change, the Liquid Transfer app is communicating successfully with the I/O interface app.

To energize and verify DI states and related alarms:

1. Select Liquid Transfer again on the navigation tree.

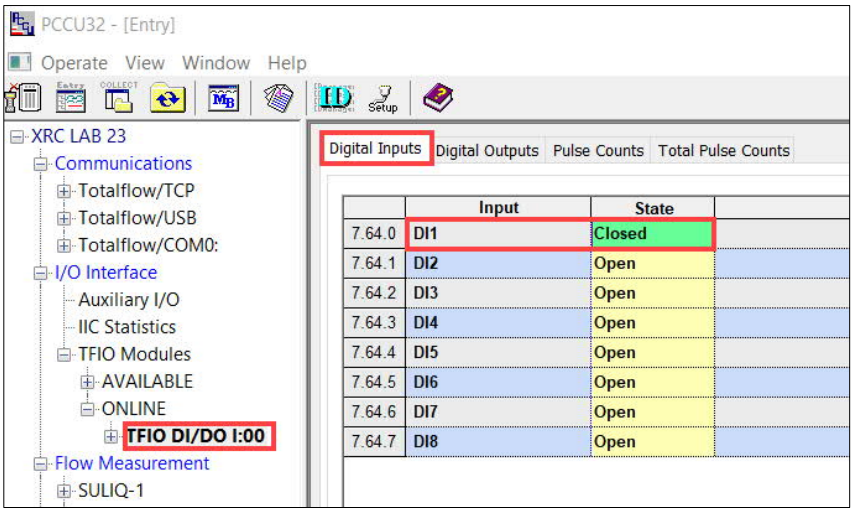
2. Select the Current Batch Data tab to monitor the DI states.
3. Expand I/O Interface on the navigation tree.
4. Expand TFIO Modules, then expand ONLINE.
5. Select the TFIO module used. In this example TFIO DI.DO I:00 (Figure 5-22).

Figure 5-22: Default Digital Inputs state



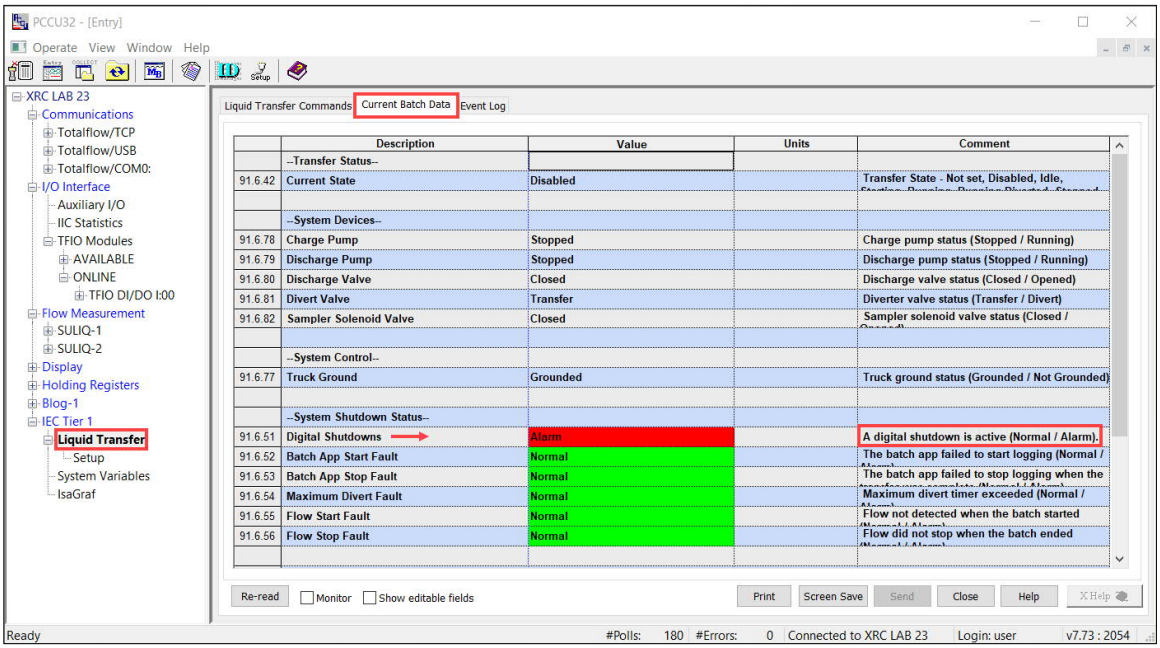
6. Energize TFIO DI-1 by pressing the ESD button. DI-1 should reflect a state change. For the configuration of the DI-1 polarity in this example, the DI-1 state should change from an Open to a Closed state (Figure 5-23).

Figure 5-23: Energized DI1 state



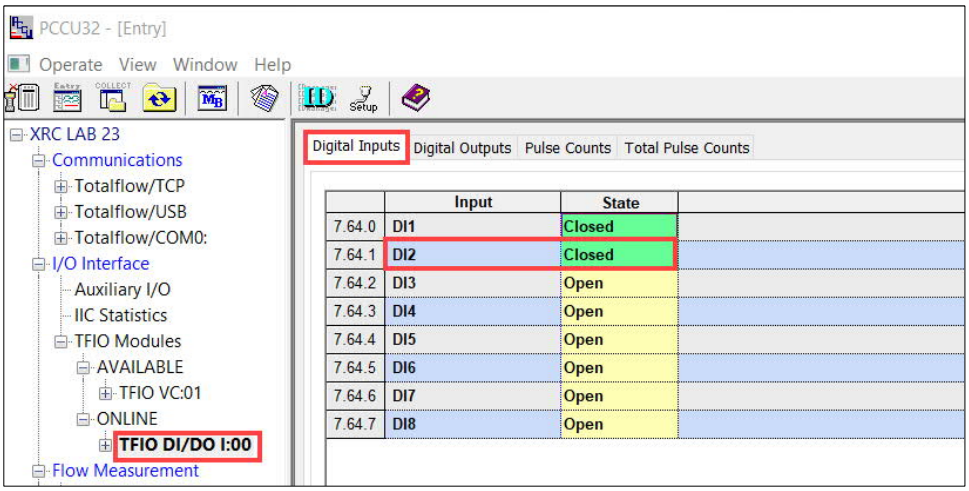
7. Select Liquid Transfer on the navigation tree.
8. Select the Current Batch Data tab to monitor the DI1 state (Figure 5-24).
9. Verity that Digital Shutdowns displays: Alarm.

Figure 5-24: Digital Shutdowns state alarm



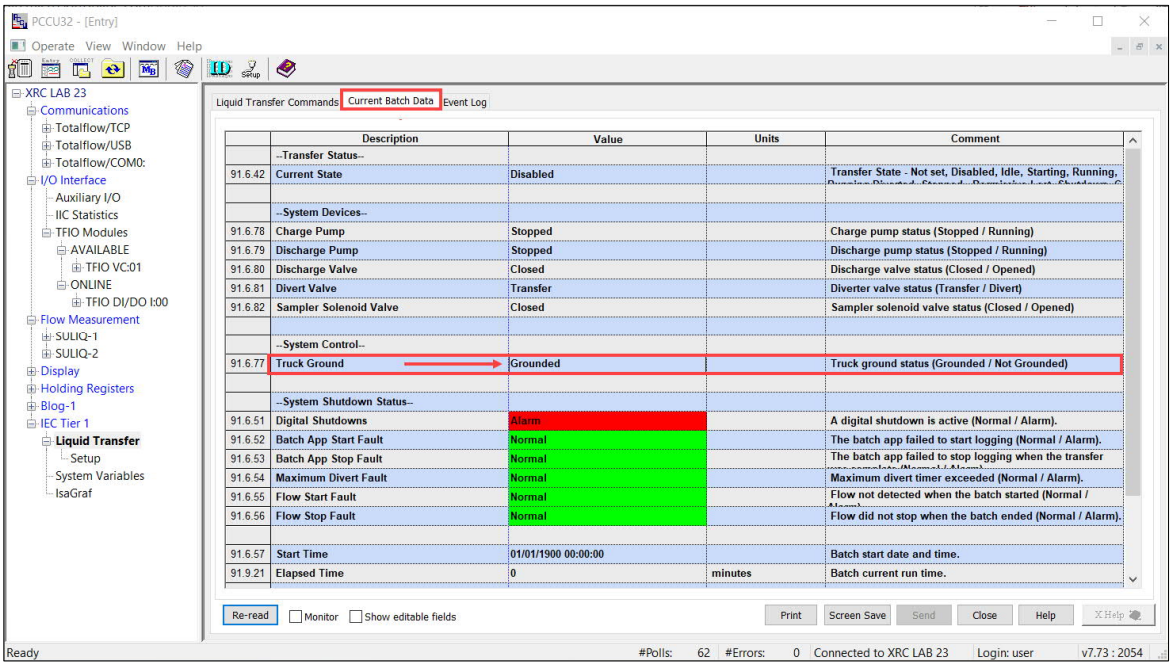
10. Energize TFIO DI-2 by connecting the truck ground. DI-2 should reflect a state change. For the configuration of the DI-2 polarity in this example, the DI-2 state should change from an Open to a Closed state (Figure 5-25).

Figure 5-25: Energized DI2 state



11. Select Liquid Transfer on the navigation tree again.
12. Select the Current Batch Data tab to monitor the DI2 state (Figure 5-26).
13. Verify that Truck Ground displays: Grounded.

Figure 5-26: Truck Ground State



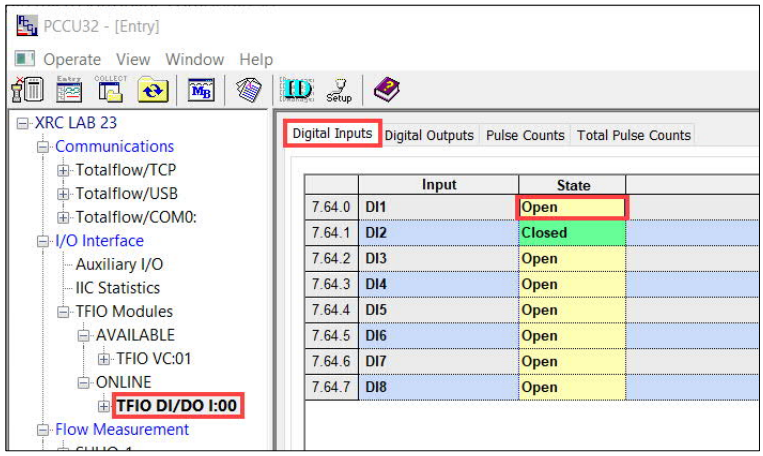
5.7.4 De-energize DIs

This procedure de-energizes the DIs to set them back to the default state. The I/O interface app reflects the state change automatically. The digital shutdown and truck ground states should be manually reset.

To de-energize DIs and reset DI states:

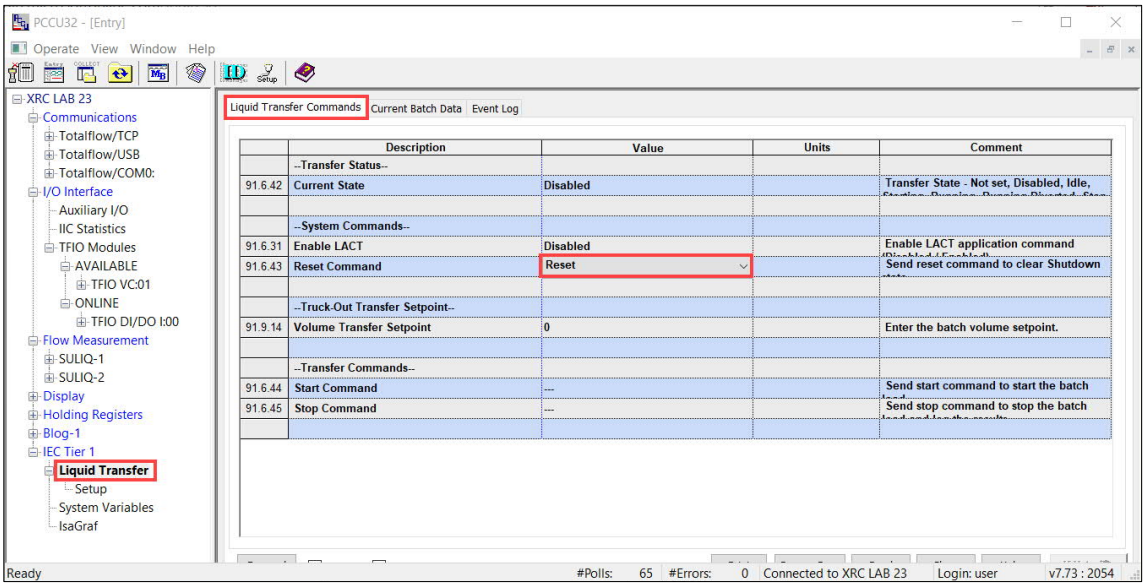
1. De-energize TFIO DI-1 by releasing the ESD button. In this example, DI-1 should reflect a state change from Closed to back to Open. Click Re-read to refresh the screen.

Figure 5-27: De-energized DI1



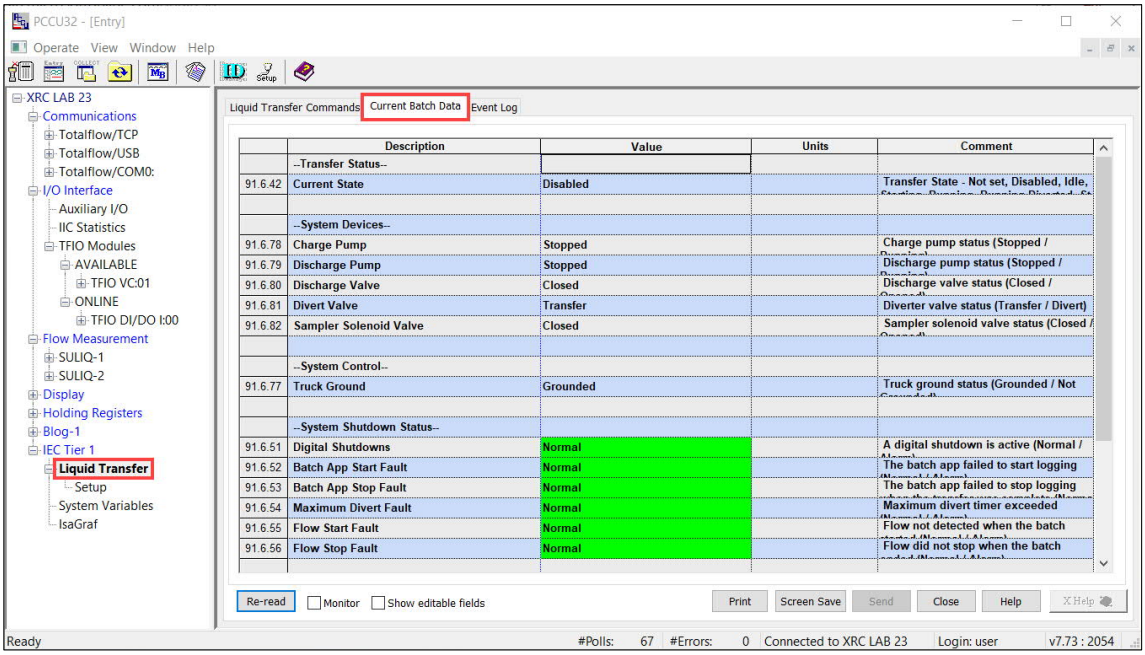
2. Select Liquid Transfer on the navigation tree. The Liquid Transfer Commands tab displays.
3. Under the System Commands section, click the Reset Command drop-down list and select: Reset.

Figure 5-28: Reset Shutdowns alarm



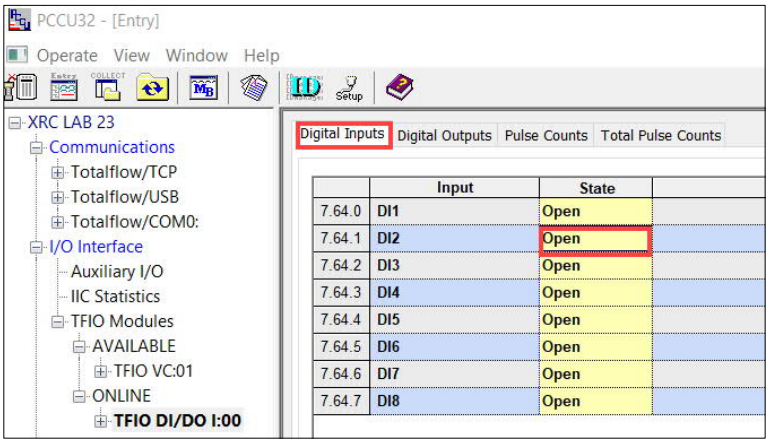
4. Click Send.
5. Select the Current Batch Data tab (Figure 5-29).
6. Click Re-read to refresh screen.
7. Verify that Digital Shutdowns displays: Normal.

Figure 5-29: Verify Digital Shutdown Status



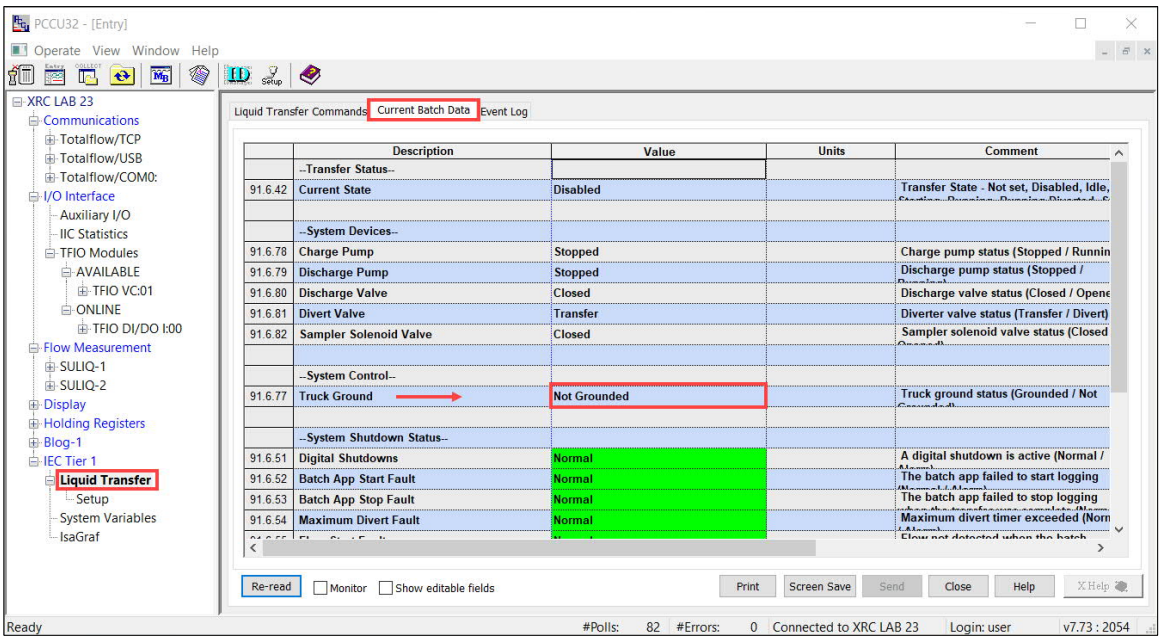
8. Stay on the Current Batch Data tab.
9. De-energize TFIO DI-2 by disconnecting the truck ground. In this example, DI-2 should reflect a state change from Closed to back to Open (Figure 5-30). Click Re-read to refresh the screen.

Figure 5-30: De-energized DI2



10. Select Liquid Transfer on the navigation tree again.
11. Select the Current Batch Data tab (Figure 5-31).
12. Click Re-read to refresh the screen.
13. Verify that Truck Ground displays: Not Grounded.

Figure 5-31: Verify Truck Ground state



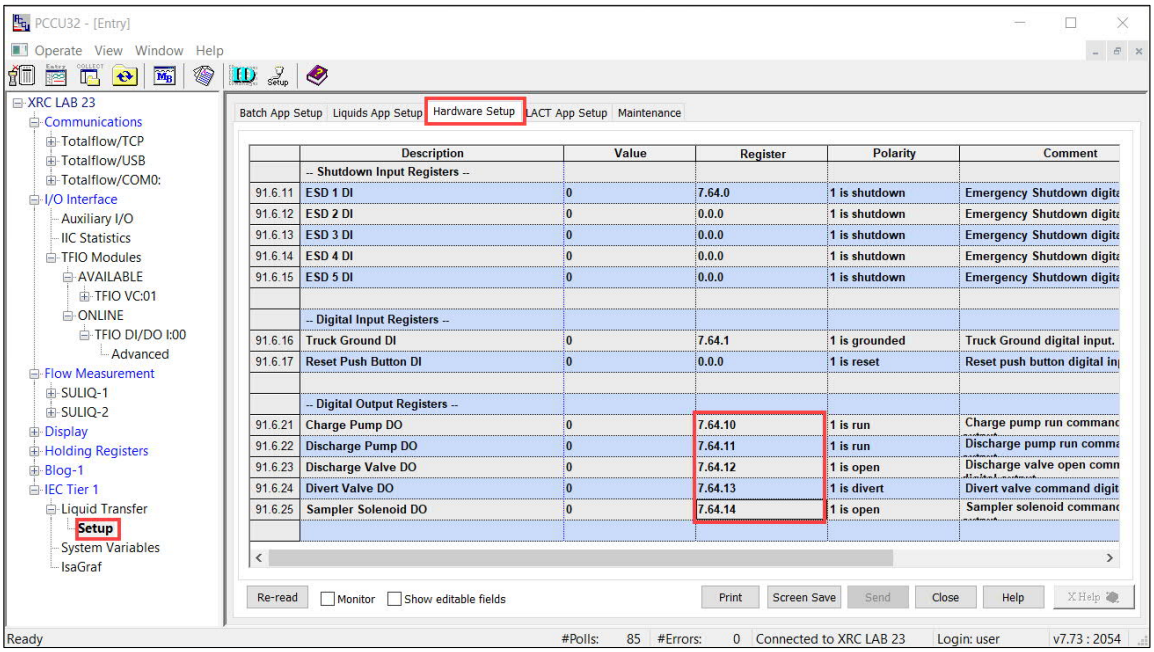
5.7.5 Configure Digital Outputs (DOs)

This procedure sets the Digital outputs which the IEC Liquid Transfer app uses to control the different peripherals connected to the flow computer or controller: pumps, valves, etc. The I/O interface registers associated to each required DO are configured into the Liquid Transfer app.

To set up DOs:

1. Select Liquid Transfer > Setup on the navigation tree. Then select the Hardware Setup tab.
2. Set the Digital Output Registers as follows:
   - Charge Pump DO: 7.64.10 (TFIO DO-3).
   - Discharge Pump DO: 7.64.11 (TFIO DO-4).
   - Discharge Valve DO: 7.64.12 (TFIO DO-5).
   - Divert Valve DO: 7.64.13 (TFIO DO-6).
   - Sampler Solenoid DO: 7.64.14 (TFIO DO-7).

Figure 5-32: Configure Digital outputs for IEC pump and valve control



3. Click Send.

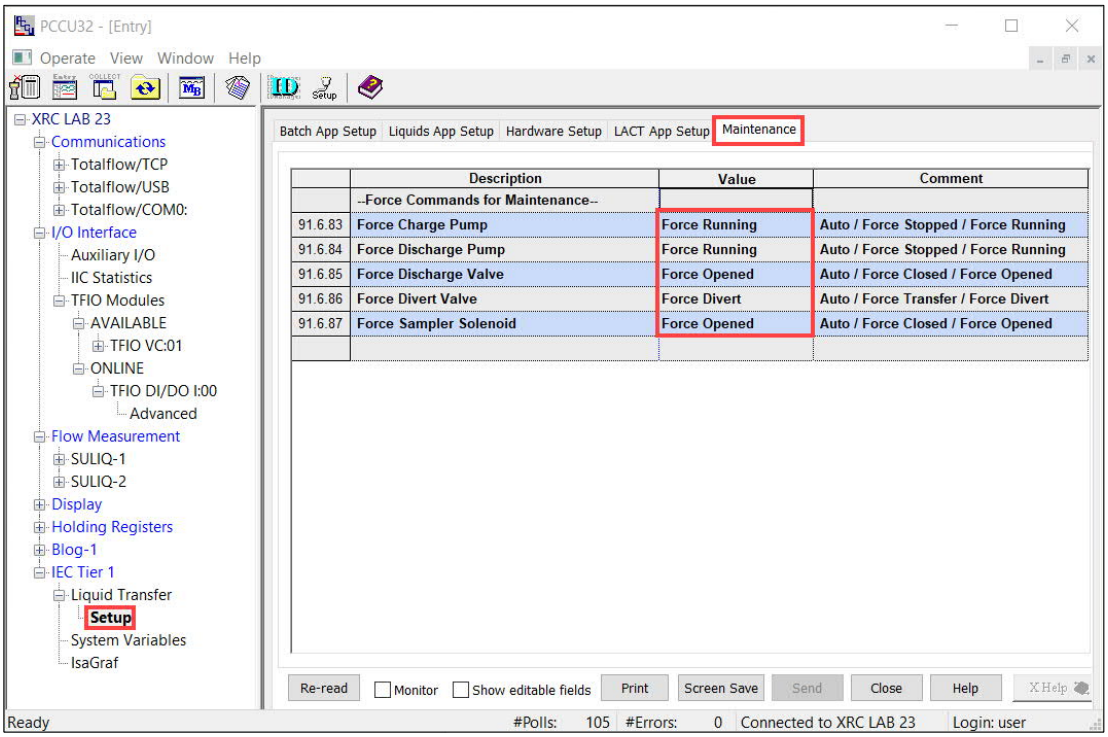
5.7.6 Manually test the Liquid Transfer commands

This procedure tests if the DOs are configured correctly. This verifies that the IEC is properly communicating with the IO Interface. Manually activating DOs from the IEC should be reflected in the I/O Interface application. The commands are temporarily set to manual for the purpose of testing. They should be set back to Auto in section 5.7.7 Set the Liquid Transfer commands back to Auto.

For expediency, this procedure sets all commands and verifies all DOs at once. You can also set commands and verify the associated DO one at a time.

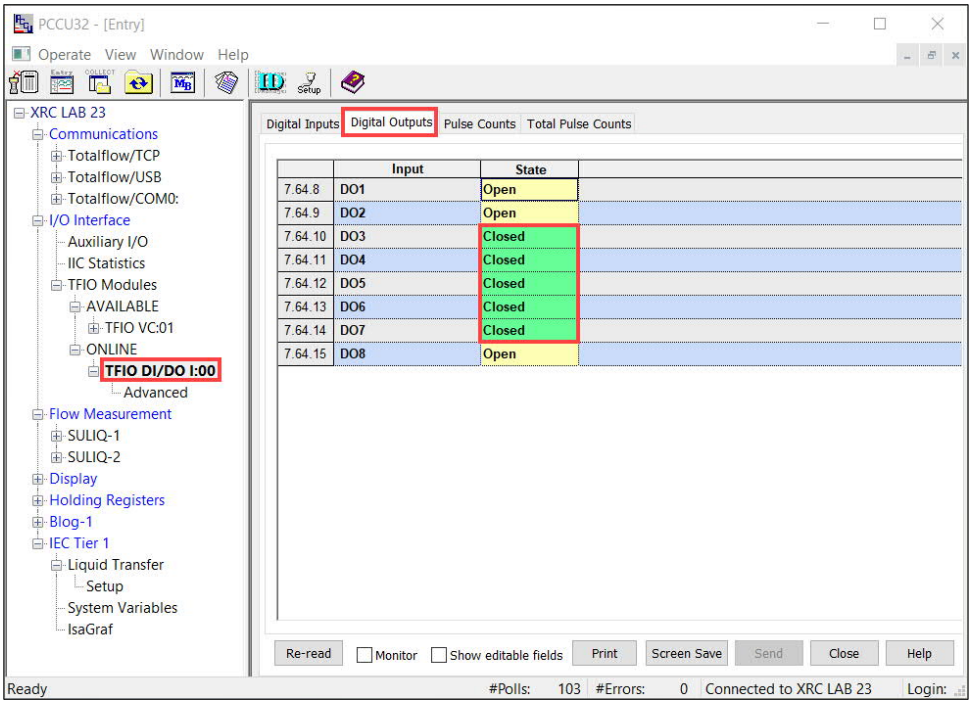
1. Select Liquid Transfer > Setup on the navigation tree. Then select the Maintenance tab and set the following (Figure 5-33):
   - Force Charge Pump to: Force Running.
   - Force Discharge Pump to: Force Running.
   - Force Discharge Valve to: Force Opened.
   - Force Divert Valve to: Force Divert.
   - Force Divert Valve to: Force Opened.

Figure 5-33: Liquid Transfer commands setup for testing



2. Select the TFIO module used. In this example TFIO DI.DO I:00
3. Select the Digital Outputs tab.
4. Verify that the DO states are as follows:
   - TFIO DI/DO I:00 DO3 displays: Closed.
   - TFIO DI/DO I:00 DO4 displays: Closed.
   - TFIO DI/DO I:00 DO5 displays: Closed.
   - TFIO DI/DO I:00 DO6 displays: Closed.
   - TFIO DI/DO I:00 DO7 displays: Closed.

Figure 5-34: Verify DOs



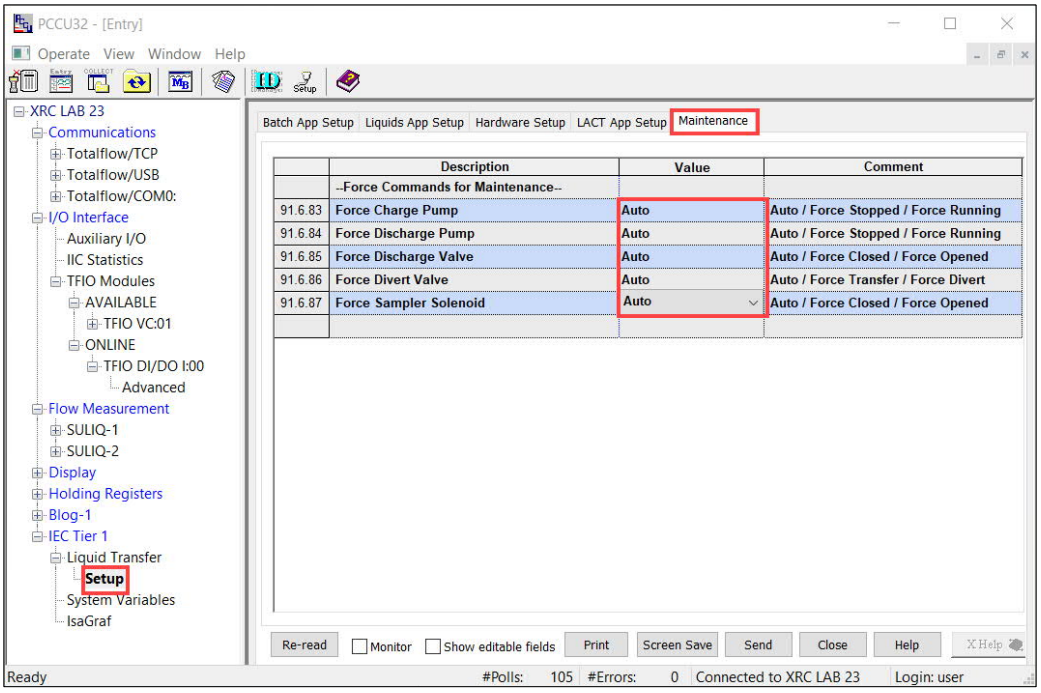
5.7.7 Set the Liquid Transfer commands back to Auto

Liquid Transfer commands must be set back to the default Auto state.

To set to Auto:

1. For each force command, select the corresponding value field and set:
   - Force Charge Pump: Auto.
   - Force Discharge Pump: Auto.
   - Force Discharge Valve: Auto.
   - Force Divert Valve: Auto.
   - Force Sampler Solenoid: Auto.

Figure 5-35: Set Force Commands for Maintenance back to default state: Auto



2. Click Send.

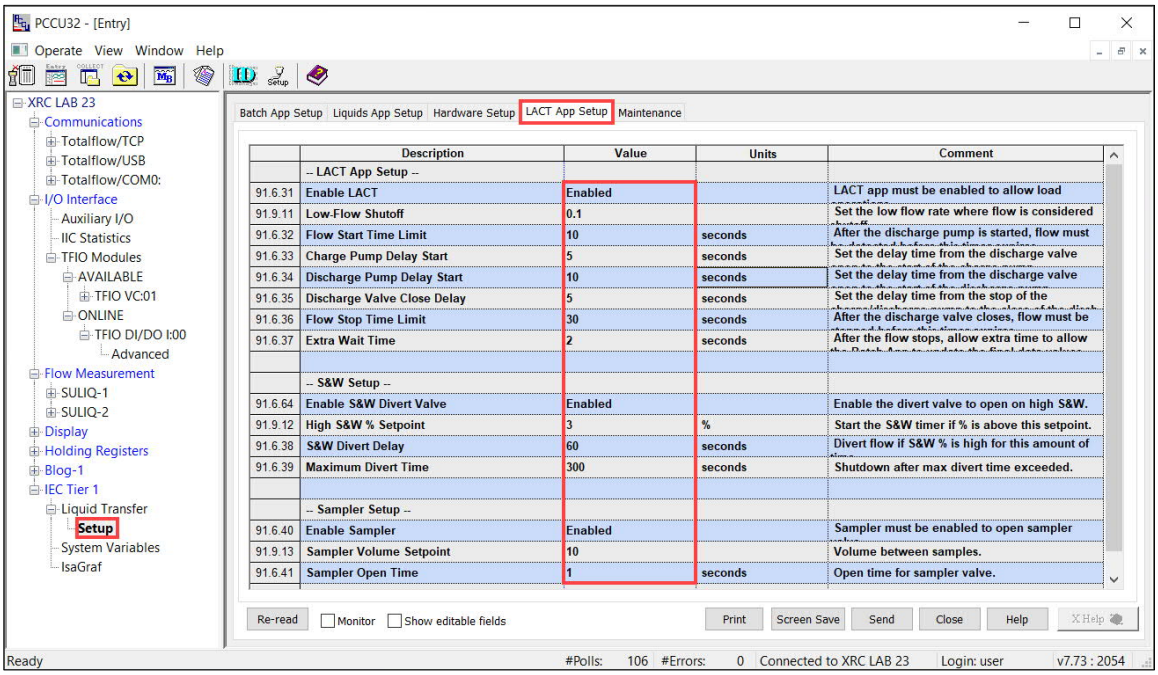
5.7.8 Set up the IEC Liquid Transfer application parameters

This section provides parameters as examples. Adjust the values based on your specific requirements.

To set app parameters:

1. Select Liquid Transfer > Setup on the navigation tree.
2. Select the LACT App Setup tab (Figure 5-36).
3. Set the following:
   - Enable LACT: Enabled.
   - Low-Flow Shutoff: 0.1.
   - Flow Start Time Limit: 10.
   - Charge Pump Delay Start: 5.
   - Discharge Pump Delay Start: 10.
   - Discharge Valve Close Delay: 5.
   - Flow Stop Time Limit: 30.
   - Extra Wait Time: 2.
   - Enable S&W Divert Valve: Enabled.
   - High S&W % Setpoint: 3.
   - S&W Divert Delay: 60.
   - Maximum Divert Time: 300.
   - Enable Sampler to: Enabled.
   - Sampler Volume Setpoint: 10.
   - Sampler Open Time: 1.

Figure 5-36: Configure Liquid transfer parameters



4. Click Send.

5.7.9 Set up the liquid measurement app

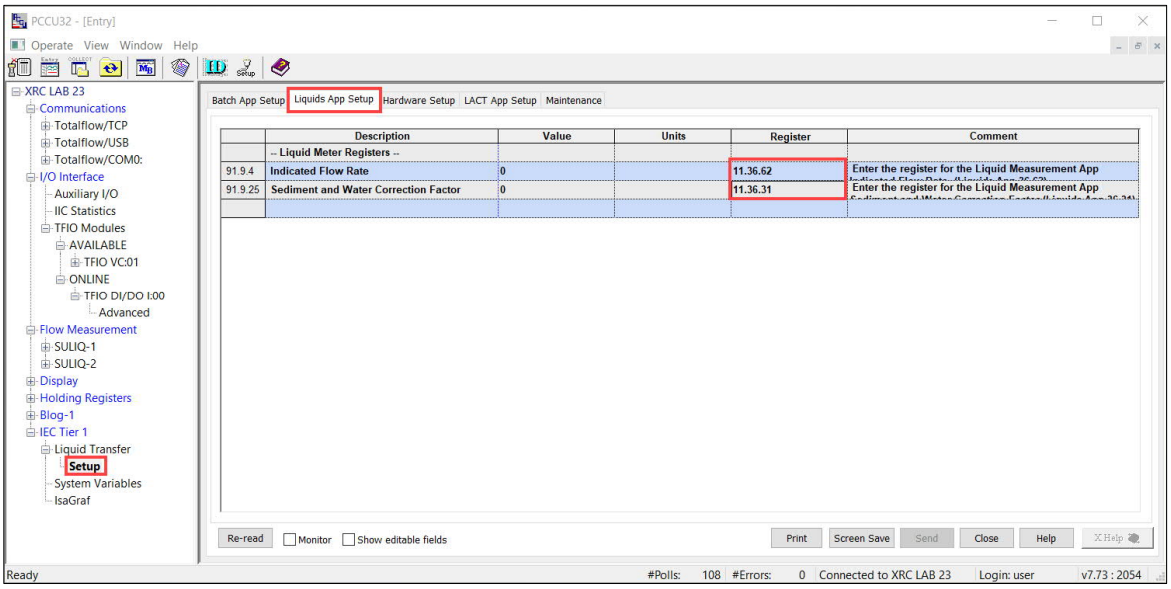
This procedure configures the register addresses of the liquid measurement instance the Liquid Transfer uses to determine the flow quantities. To control the system components and transactions, the Liquid Transfer app monitors the volume and flow rate values calculated for the meter.

This procedure assumes that the liquid application number is 11. Check the application number on the Application/License Management tab. Select the correct application.

To configure registers:

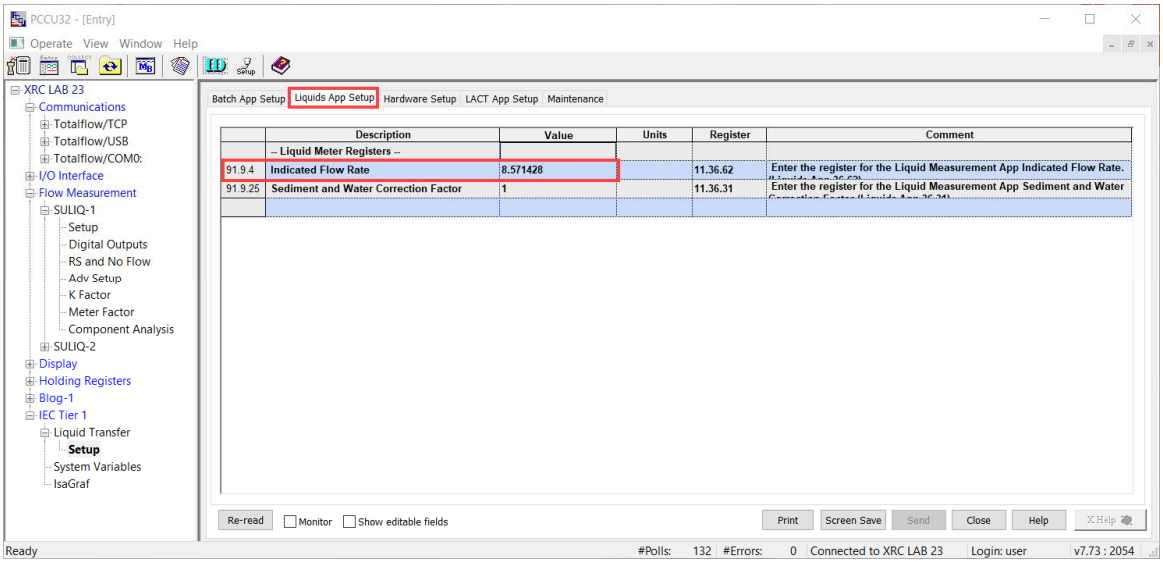
1. Select Liquid Transfer > Setup.
2. Select the Liquids App Setup tab.
3. Set the following:
   - Indicated Flow Rate register to 11.36.62.
   - Sediment and Water Correction Factor register to 11.36.31.

Figure 5-37: Configure liquid measurement registers for required values



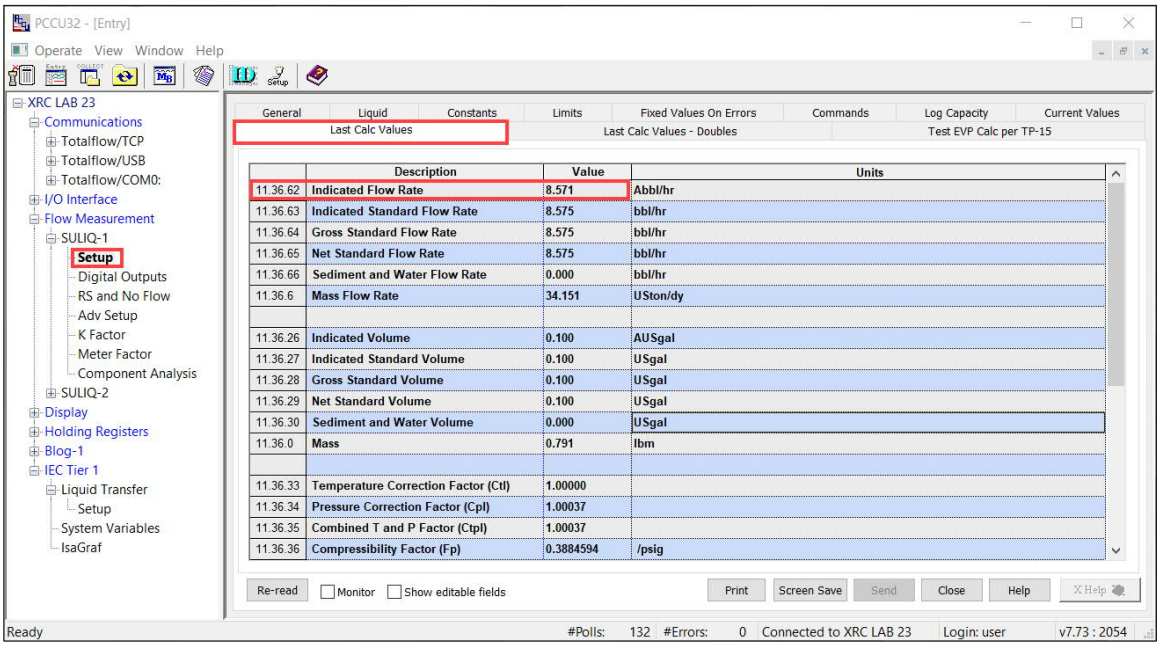
4. Verify that the API Liquid SU app and the IEC Liquid App Set tab both display the same value for the Indicated Flow Rate:
   a. Click Re-read to refresh the Liquids App Setup tab. The values for Indicated Flow Rate and the Correction factors should update.
   b. Take note of the Indicated Flow Rate value (register address 91.9.4).

Figure 5-38: Liquid Transfer 2 Indicated Flow Rate value



   c. Select API Liquid app > Setup > Last Calc Values tab.
   d. Take note of the Indicated Flow Rate value (register address 11.36.62).

Figure 5-39: API Liquid Indicated Flow Rate value



e. Make sure the Indicated Flow Rate values are the same.

5.7.10 Set up the Batch Log app

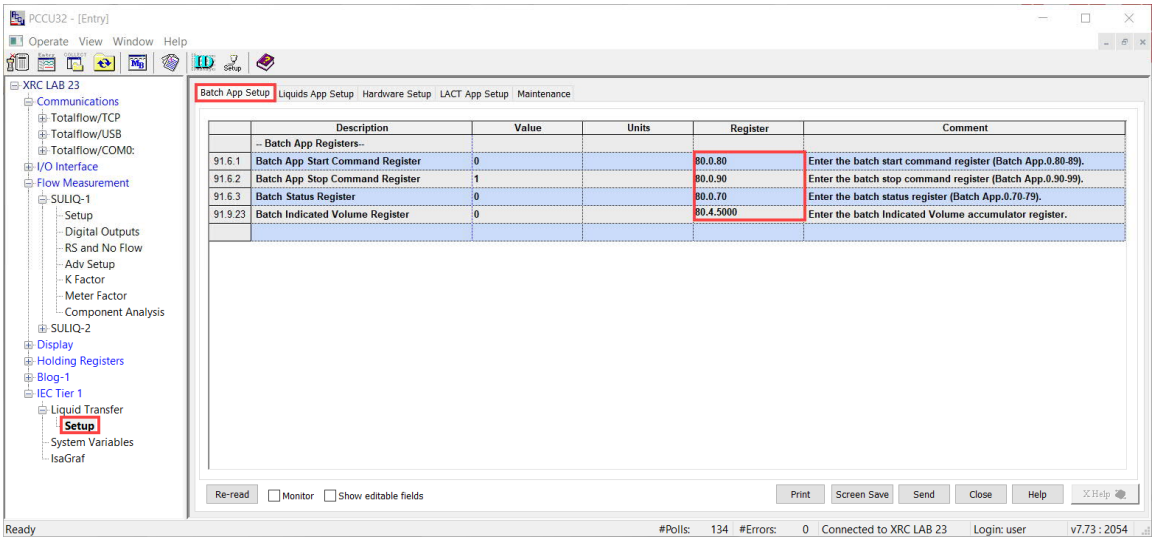
This procedure configures the register addresses of the Batch Log instance that Liquid Transfer uses to manage the data logging.

To set register addresses, use the Batch Log app number used in the device. The app number is displayed in the Application / License Management tab. In this example, the application or slot number of the Batch Log App is 80.

To set up the batch log app:

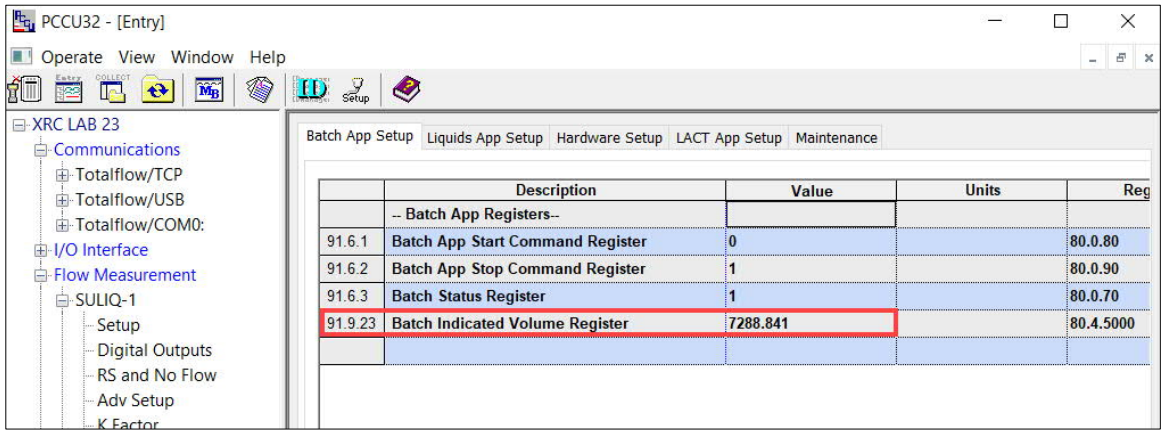
1. Select Liquid Transfer > Setup > Batch App Setup tab.
2. Set the following:
   - Batch App Start Command Register to 80.0.80.
   - Batch App Stop Command Register to 80.0.90.
   - Batch Status Register to 80.0.70.
   - Batch Indicated Volume Register to 80.4.5000.

Figure 5-40: Configure Batch Log registers in the Liquid Transfer app



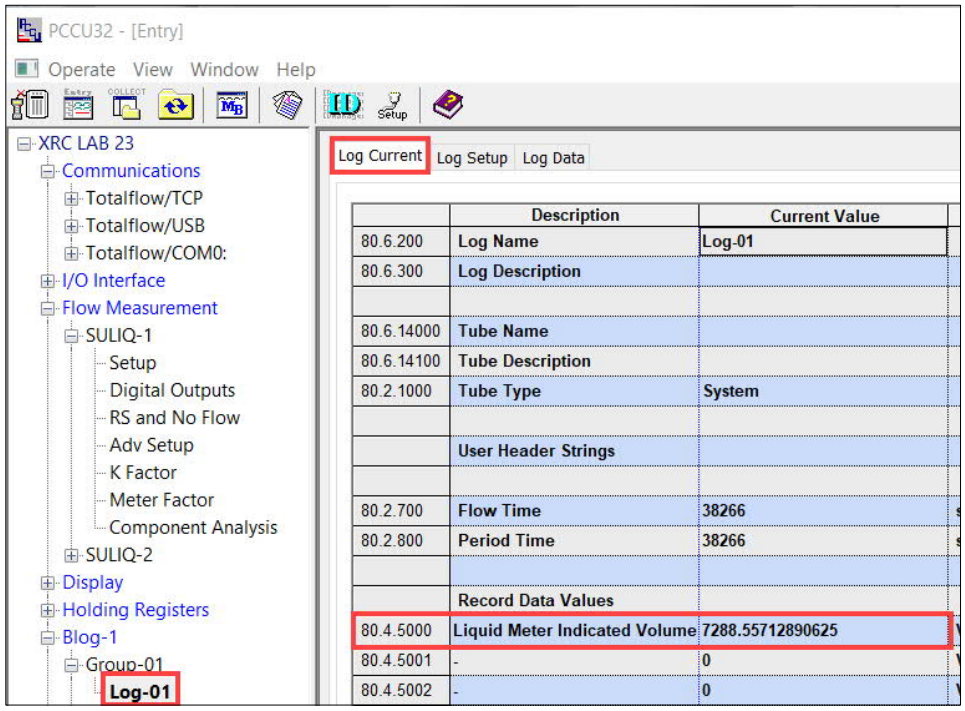
3. Click Send.
4. Click Re-read to refresh the screen.
5. Take note of the Batch Indicated Volume Register value (register address 91.9.23) (Figure 5-41).

Figure 5-41: Indicated Volume Value on the Batch App Setup screen



6. Select the associated log on the navigation tree then the Log Current tab.
7. Take note of the Indicated Volume value (register address 80.4.5000) (Figure 5-42).
8. Make sure both Indicated Volume values are the same.

Figure 5-42: Indicated Volume Value on the Log Current screen



5.8 Complete an actual liquid transfer

This procedure completes a liquid transfer cycle and verifies that data is properly logged.

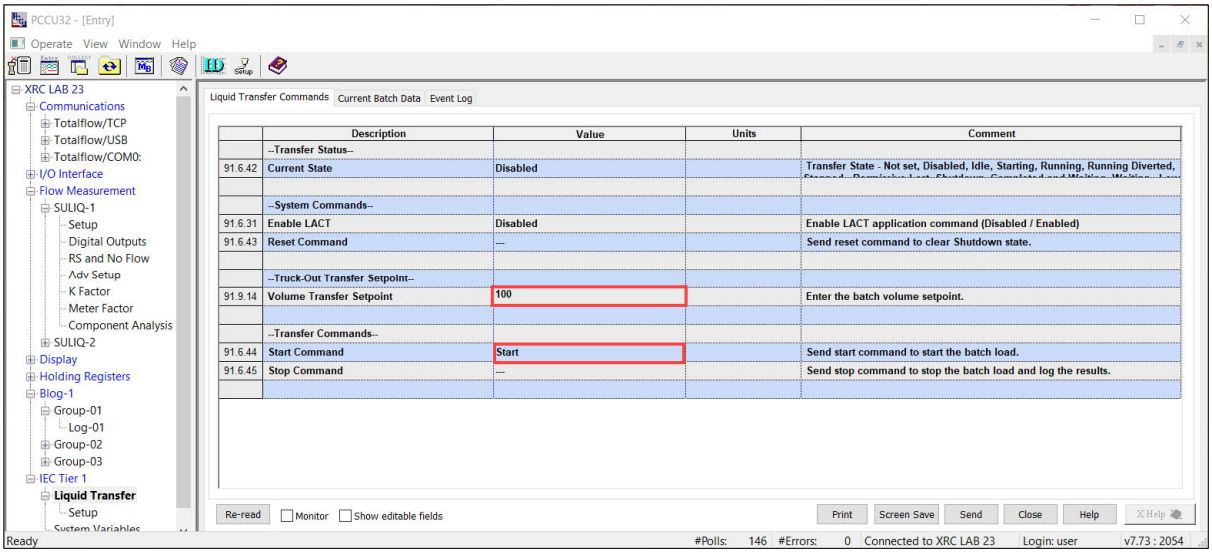
WARNING – Bodily injury. De-energize all pumps and valves before configuring the Liquid Transfer application. Test the configuration thoroughly for the correct behavior before energizing the pump and valves.

1. Select Liquid Transfer > Liquid Transfer Commands tab.
2. Set the following (Figure 5-43):

- Volume Transfer Setpoint to 100.
- Start Command to Start.

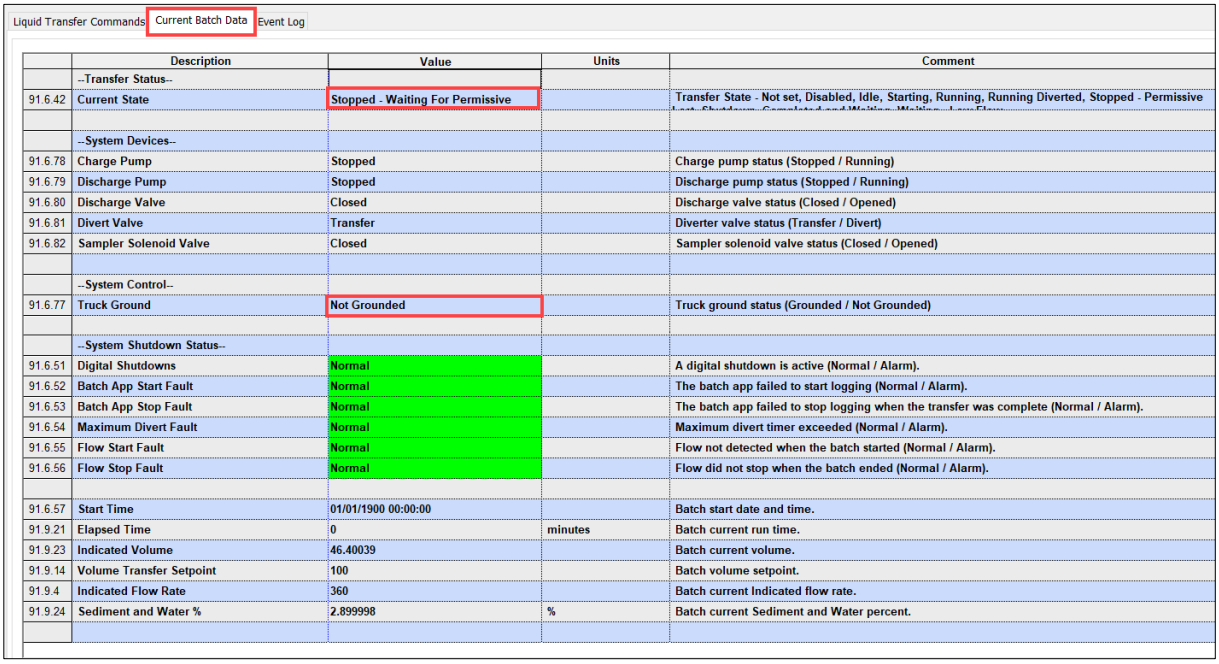
IMPORTANT NOTE: The Volume Transfer Setpoint value must be configured based on the units selected for the associated liquid application. Note that the IEC application does not provide the ability to configure, change or view those units. If you need to determine or update the liquid app's units, select the device ID at the top of the navigation tree, then select the Selectable Units Setup tab. Select the Advanced checkbox to display the current unit setup. Select any of the volume tabs. These tabs show the units for the volume measurements. The units for other relevant measurement variables are available in other tabs.

Figure 5-43: Set Liquid Transfer Commands



3. Click Send.
4. Select the Current Batch Data tab (Figure 5-44).
5. Verify that Truck Ground displays: Not Grounded.
6. Verify that Current State displays: Stopped - Waiting For Permissive.

Figure 5-44: Current Batch Data



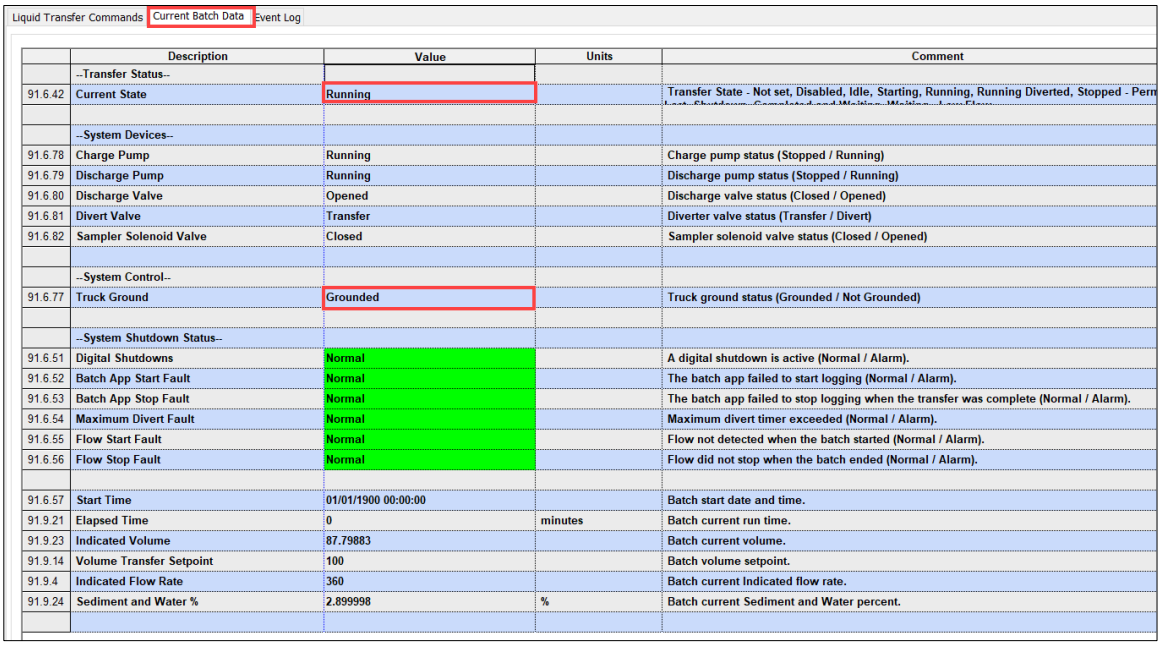
Liquid Transfer Commands | Current Batch Data | Event Log

	Description	Value	Units	Comment
	--Transfer Status--			
91.6.42	Current State	Stopped - Waiting For Permissive		Transfer State - Not set, Disabled, Idle, Starting, Running, Running Diverted, Stopped - Permissive
	--System Devices--			
91.6.78	Charge Pump	Stopped		Charge pump status (Stopped / Running)
91.6.79	Discharge Pump	Stopped		Discharge pump status (Stopped / Running)
91.6.80	Discharge Valve	Closed		Discharge valve status (Closed / Opened)
91.6.81	Divert Valve	Transfer		Diverter valve status (Transfer / Divert)
91.6.82	Sampler Solenoid Valve	Closed		Sampler solenoid valve status (Closed / Opened)
	--System Control--			
91.6.77	Truck Ground	Not Grounded		Truck ground status (Grounded / Not Grounded)
	--System Shutdown Status--			
91.6.51	Digital Shutdowns	Normal		A digital shutdown is active (Normal / Alarm).
91.6.52	Batch App Start Fault	Normal		The batch app failed to start logging (Normal / Alarm).
91.6.53	Batch App Stop Fault	Normal		The batch app failed to stop logging when the transfer was complete (Normal / Alarm).
91.6.54	Maximum Divert Fault	Normal		Maximum divert timer exceeded (Normal / Alarm).
91.6.55	Flow Start Fault	Normal		Flow not detected when the batch started (Normal / Alarm).
91.6.56	Flow Stop Fault	Normal		Flow did not stop when the batch ended (Normal / Alarm).
91.6.57	Start Time	01/01/1900 00:00:00		Batch start date and time.
91.9.21	Elapsed Time	0	minutes	Batch current run time.
91.9.23	Indicated Volume	46.40039		Batch current volume.
91.9.14	Volume Transfer Setpoint	100		Batch volume setpoint.
91.9.4	Indicated Flow Rate	360		Batch current Indicated flow rate.
91.9.24	Sediment and Water %	2.899998	%	Batch current Sediment and Water percent.

5.8.1 Energize TFIO DI-2

1. Energize TFIO DI-2 by connecting the truck ground.
2. Verify that Truck Ground displays: Grounded (Figure 5-45).
3. Verify that Current State displays: Load Starting.
4. Verify Discharge Valve displays: Opened.
5. Wait 5 seconds.
6. Verify Current State displays: Running.
7. Verify Charge Pump displays: Running.
8. Wait 5 seconds.
9. Verify Discharge Pump displays: Running.

Figure 5-45: Current Batch Data: Liquid Transfer in progress



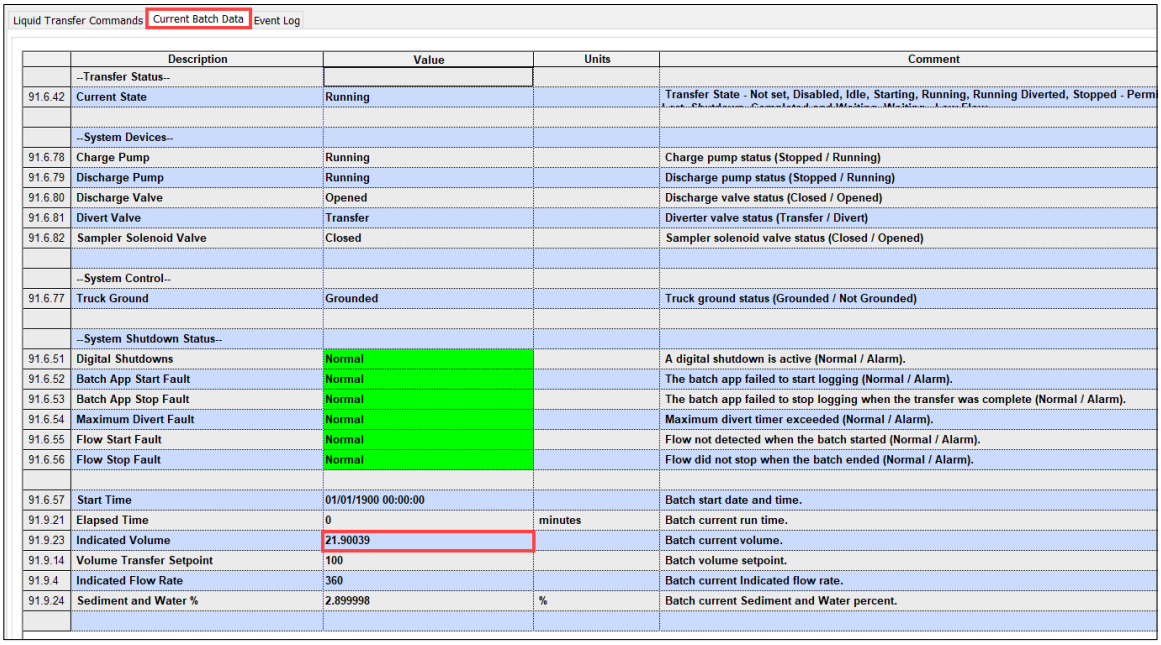
Liquid Transfer Commands | Current Batch Data | Event Log

	Description	Value	Units	Comment
	--Transfer Status--			
91.6.42	Current State	Running		Transfer State - Not set, Disabled, Idle, Starting, Running, Running Diverted, Stopped - Perm
	--System Devices--			
91.6.78	Charge Pump	Running		Charge pump status (Stopped / Running)
91.6.79	Discharge Pump	Running		Discharge pump status (Stopped / Running)
91.6.80	Discharge Valve	Opened		Discharge valve status (Closed / Opened)
91.6.81	Divert Valve	Transfer		Diverter valve status (Transfer / Divert)
91.6.82	Sampler Solenoid Valve	Closed		Sampler solenoid valve status (Closed / Opened)
	--System Control--			
91.6.77	Truck Ground	Grounded		Truck ground status (Grounded / Not Grounded)
	--System Shutdown Status--			
91.6.51	Digital Shutdowns	Normal		A digital shutdown is active (Normal / Alarm).
91.6.52	Batch App Start Fault	Normal		The batch app failed to start logging (Normal / Alarm).
91.6.53	Batch App Stop Fault	Normal		The batch app failed to stop logging when the transfer was complete (Normal / Alarm).
91.6.54	Maximum Divert Fault	Normal		Maximum divert timer exceeded (Normal / Alarm).
91.6.55	Flow Start Fault	Normal		Flow not detected when the batch started (Normal / Alarm).
91.6.56	Flow Stop Fault	Normal		Flow did not stop when the batch ended (Normal / Alarm).
91.6.57	Start Time	01/01/1900 00:00:00		Batch start date and time.
91.9.21	Elapsed Time	0	minutes	Batch current run time.
91.9.23	Indicated Volume	87.79883		Batch current volume.
91.9.14	Volume Transfer Setpoint	100		Batch volume setpoint.
91.9.4	Indicated Flow Rate	360		Batch current Indicated flow rate.
91.9.24	Sediment and Water %	2.899998	%	Batch current Sediment and Water percent.

10. Observe the Indicated Volume value.

11. Verify that the Indicated Volume increments while the Liquid is flowing.

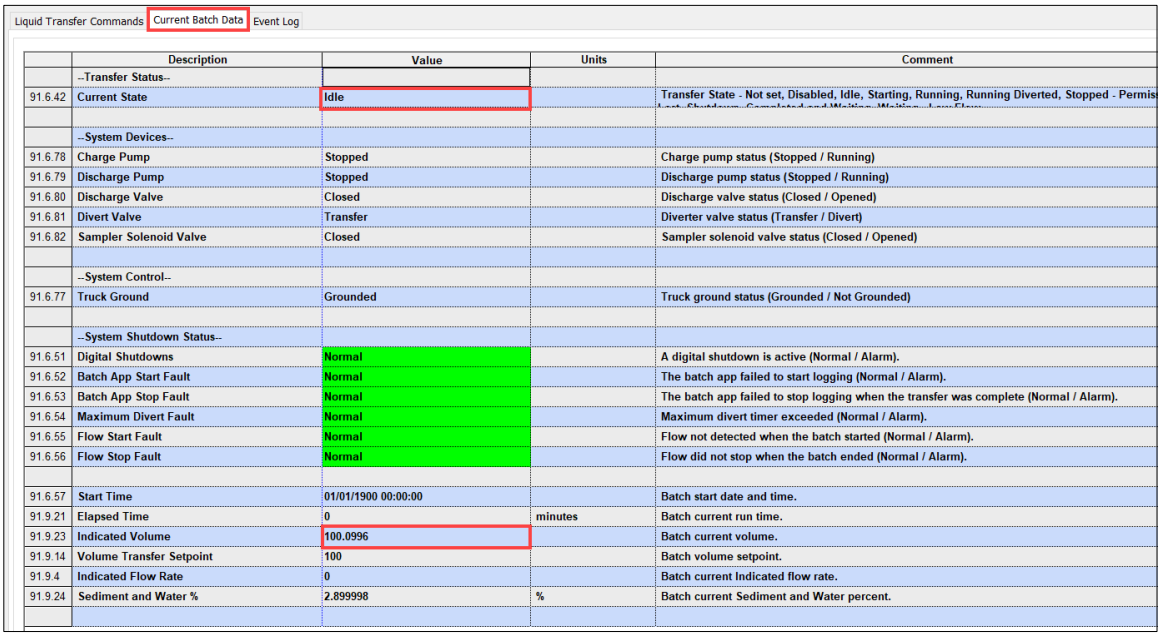
Figure 5-46: Monitor Indicated volume while liquid is flowing



	Description	Value	Units	Comment
	--Transfer Status--			
91.6.42	Current State	Running		Transfer State - Not set, Disabled, Idle, Starting, Running, Running Diverted, Stopped - Perm
	--System Devices--			
91.6.78	Charge Pump	Running		Charge pump status (Stopped / Running)
91.6.79	Discharge Pump	Running		Discharge pump status (Stopped / Running)
91.6.80	Discharge Valve	Opened		Discharge valve status (Closed / Opened)
91.6.81	Divert Valve	Transfer		Diverter valve status (Transfer / Divert)
91.6.82	Sampler Solenoid Valve	Closed		Sampler solenoid valve status (Closed / Opened)
	--System Control--			
91.6.77	Truck Ground	Grounded		Truck ground status (Grounded / Not Grounded)
	--System Shutdown Status--			
91.6.51	Digital Shutdowns	Normal		A digital shutdown is active (Normal / Alarm).
91.6.52	Batch App Start Fault	Normal		The batch app failed to start logging (Normal / Alarm).
91.6.53	Batch App Stop Fault	Normal		The batch app failed to stop logging when the transfer was complete (Normal / Alarm).
91.6.54	Maximum Divert Fault	Normal		Maximum divert timer exceeded (Normal / Alarm).
91.6.55	Flow Start Fault	Normal		Flow not detected when the batch started (Normal / Alarm).
91.6.56	Flow Stop Fault	Normal		Flow did not stop when the batch ended (Normal / Alarm).
91.6.57	Start Time	01/01/1900 00:00:00		Batch start date and time.
91.9.21	Elapsed Time	0	minutes	Batch current run time.
91.9.23	Indicated Volume	21.90039		Batch current volume.
91.9.14	Volume Transfer Setpoint	100		Batch volume setpoint.
91.9.4	Indicated Flow Rate	360		Batch current Indicated flow rate.
91.9.24	Sediment and Water %	2.899998	%	Batch current Sediment and Water percent.

12. Continue to monitor the Indicated Volume value.
13. When the Indicated Volume reaches the Volume Transfer Setpoint, verify that:
    a. Current State displays: Load Stopping.
    b. Charge Pump displays: Stopped.
    c. Discharge Pump displays: Stopped.
14. Wait 5 seconds and then verify that:
    a. Current State displays Waiting - Low Flow.
    b. Discharge Valve displays: Closed.
15. Wait until the Indicated Flow Rate is less than 0.1.
16. Verify that Current State displays: Completed and Waiting.
17. Wait 2 seconds and verify that Current State displays: Log Stopping.
18. Wait 5 seconds and verify that Current State displays: Idle (Figure 5-47). At this point, the transfer is stopped and the log data should be available.

Figure 5-47: Current Batch Data: Liquid transfer complete



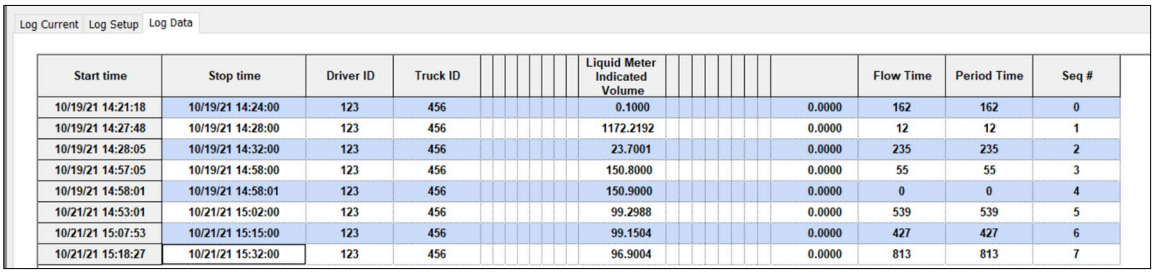
	Description	Value	Units	Comment
	--Transfer Status--			
91.6.42	Current State	Idle		Transfer State - Not set, Disabled, Idle, Starting, Running, Running Diverted, Stopped - Permis
	--System Devices--			
91.6.78	Charge Pump	Stopped		Charge pump status (Stopped / Running)
91.6.79	Discharge Pump	Stopped		Discharge pump status (Stopped / Running)
91.6.80	Discharge Valve	Closed		Discharge valve status (Closed / Opened)
91.6.81	Divert Valve	Transfer		Diverter valve status (Transfer / Divert)
91.6.82	Sampler Solenoid Valve	Closed		Sampler solenoid valve status (Closed / Opened)
	--System Control--			
91.6.77	Truck Ground	Grounded		Truck ground status (Grounded / Not Grounded)
	--System Shutdown Status--			
91.6.51	Digital Shutdowns	Normal		A digital shutdown is active (Normal / Alarm).
91.6.52	Batch App Start Fault	Normal		The batch app failed to start logging (Normal / Alarm).
91.6.53	Batch App Stop Fault	Normal		The batch app failed to stop logging when the transfer was complete (Normal / Alarm).
91.6.54	Maximum Divert Fault	Normal		Maximum divert timer exceeded (Normal / Alarm).
91.6.55	Flow Start Fault	Normal		Flow not detected when the batch started (Normal / Alarm).
91.6.56	Flow Stop Fault	Normal		Flow did not stop when the batch ended (Normal / Alarm).
91.6.57	Start Time	01/01/1900 00:00:00		Batch start date and time.
91.9.21	Elapsed Time	0	minutes	Batch current run time.
91.9.23	Indicated Volume	100.0996		Batch current volume.
91.9.14	Volume Transfer Setpoint	100		Batch volume setpoint.
91.9.4	Indicated Flow Rate	0		Batch current Indicated flow rate.
91.9.24	Sediment and Water %	2.899998	%	Batch current Sediment and Water percent.

5.8.2 Verify logged data

To verify logged data:

1. Select Batch Log n > Group-0n > Log-0n.
2. Select the Log Data tab.
3. Verify that the transfer ticket data is logged.

Figure 5-48: Log data tab: verifying transfer ticket logs



Start time	Stop time	Driver ID	Truck ID	Liquid Meter Indicated Volume		Flow Time	Period Time	Seq #
10/19/21 14:21:18	10/19/21 14:24:00	123	456	0.1000	0.0000	162	162	0
10/19/21 14:27:48	10/19/21 14:28:00	123	456	1172.2192	0.0000	12	12	1
10/19/21 14:28:05	10/19/21 14:32:00	123	456	23.7001	0.0000	235	235	2
10/19/21 14:57:05	10/19/21 14:58:00	123	456	150.8000	0.0000	55	55	3
10/19/21 14:58:01	10/19/21 14:58:01	123	456	150.9000	0.0000	0	0	4
10/21/21 14:53:01	10/21/21 15:02:00	123	456	99.2988	0.0000	539	539	5
10/21/21 15:07:53	10/21/21 15:15:00	123	456	99.1504	0.0000	427	427	6
10/21/21 15:18:27	10/21/21 15:32:00	123	456	96.9004	0.0000	813	813	7

4. Collect data as necessary. Batch Log data collection is available from the PCCU collect utility. To save Batch Log data in a separate spreadsheet file, make sure this option is selected on the collect screen. For CFX outputs, make sure the associated API liquid measurement app instance is selected. See section 3.7 Collect batch log data for more instructions for collection.

5.8.3 Verify that the ESD button can stop pumps and close valves

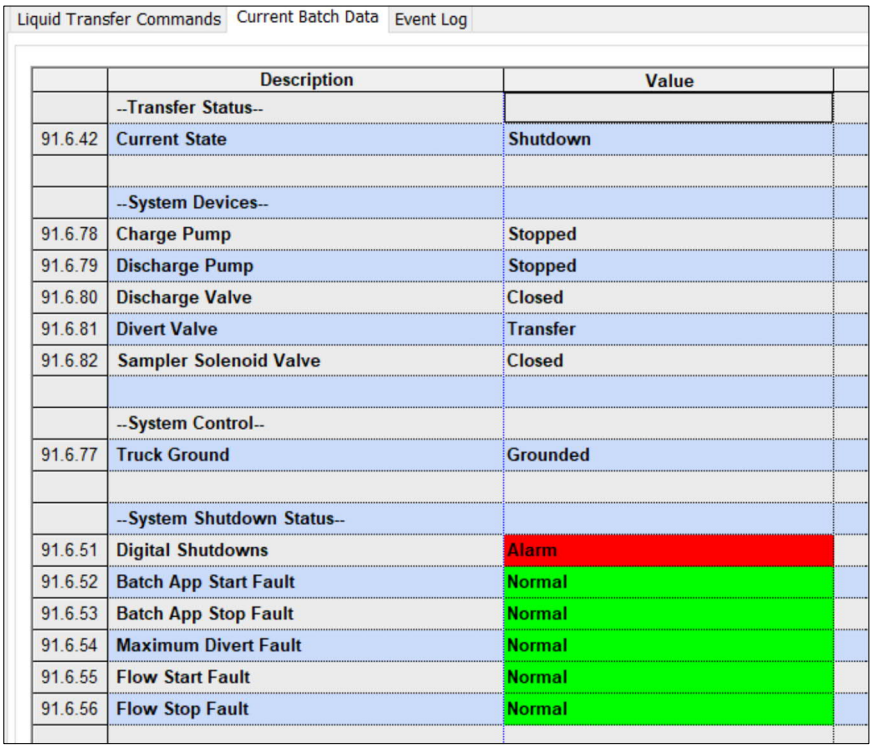
This test verifies that the ESD (Emergency Shutdown) button will properly stop the pumps and valves. DI1 (assigned for ESD) is energized for the test and then de-energized after test is completed. The shutdown alarm associated with ESD will need to be reset once the test is completed.

To test:

1. Energize TFIO DI-1 by pressing the ESD button.
2. Select Liquid Transfer > Current Batch Data tab (Figure 5-49).
3. Verify that:
   a. Current State displays: Shutdown.
   b. Charge Pump displays: Stopped.
   c. Discharge Pump displays: Stopped.

d. Discharge Valve displays Closed.
e. Digital Shutdowns displays: Alarm.

Figure 5-49: ESD button tested to stop pumps and close valves



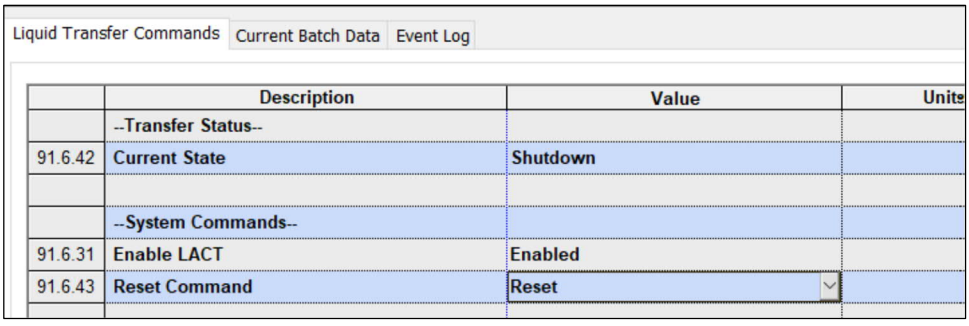
	Description	Value
	--Transfer Status--	
91.6.42	Current State	Shutdown
	--System Devices--	
91.6.78	Charge Pump	Stopped
91.6.79	Discharge Pump	Stopped
91.6.80	Discharge Valve	Closed
91.6.81	Divert Valve	Transfer
91.6.82	Sampler Solenoid Valve	Closed
	--System Control--	
91.6.77	Truck Ground	Grounded
	--System Shutdown Status--	
91.6.51	Digital Shutdowns	Alarm
91.6.52	Batch App Start Fault	Normal
91.6.53	Batch App Stop Fault	Normal
91.6.54	Maximum Divert Fault	Normal
91.6.55	Flow Start Fault	Normal
91.6.56	Flow Stop Fault	Normal

4. De-energize TFIO DI-1 by releasing the ESD button.

To reset Digital Shutdown Alarm:

1. Select the Liquid Transfer Commands tab.
2. Set Reset Command to Reset.

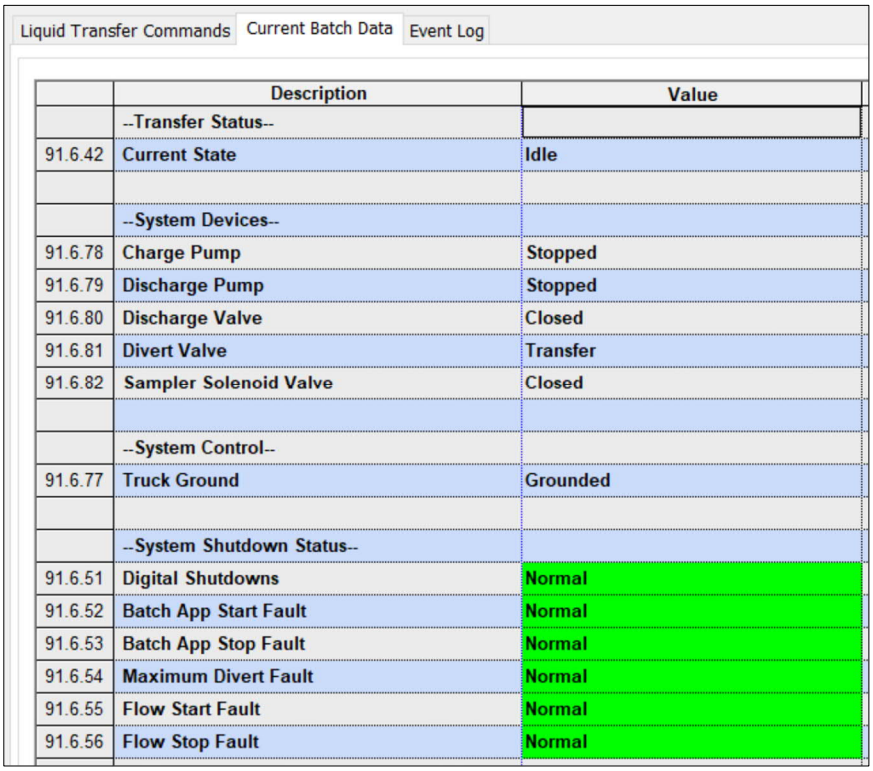
Figure 5-50: Liquid Transfer Commands



	Description	Value	Units
	--Transfer Status--		
91.6.42	Current State	Shutdown	
	--System Commands--		
91.6.31	Enable LACT	Enabled	
91.6.43	Reset Command	Reset	

3. Click Send.
4. Select the Current Batch Data tab and verify the following:
   a. Current State displays: Idle.
   b. Digital Shutdowns displays: Normal.

Figure 5-51: Digital Shutdowns state



	Description	Value
	--Transfer Status--	
91.6.42	Current State	Idle
	--System Devices--	
91.6.78	Charge Pump	Stopped
91.6.79	Discharge Pump	Stopped
91.6.80	Discharge Valve	Closed
91.6.81	Divert Valve	Transfer
91.6.82	Sampler Solenoid Valve	Closed
	--System Control--	
91.6.77	Truck Ground	Grounded
	--System Shutdown Status--	
91.6.51	Digital Shutdowns	Normal
91.6.52	Batch App Start Fault	Normal
91.6.53	Batch App Stop Fault	Normal
91.6.54	Maximum Divert Fault	Normal
91.6.55	Flow Start Fault	Normal
91.6.56	Flow Stop Fault	Normal

6 Support for Batch CFX outputs

This section describes the basic setup of batch logs for which CFX outputs will be generated. The Batch log application supports CFX outputs based on the CFX 8.5.0 specification. This specification defines multiples sets of values or variables of interest which are applicable to a liquid application. Note that value sets are referred to as “sections”, and the individual values, as “fields”. For example, there is a Batch Report section in the requirements. It contains the field, Observed Density as one of the required values to log.

There is also a description of a data mapping file used by PCCU to determine what data to include when generating CFX outputs. This file is included with the installation files for PCCU versions 7.73 and later. Section 6.2 Batch data mapping file describes in detail the contents of the file. Review this section if the CFX outputs require optional data.

Sections 6.4 Setup to support CFX Batch report and string data and 6.5 Setup to support optional CFX data describe how to configure the batch logs to ensure that CFX outputs contain the required data. In the procedures, three different logs are created and used for the required CFX output record values:

- The first log (Log #1) supports the automatic definition of CFX Batch Report and Batch String data. It maps Totalflow data to CFX Batch Report and Batch String data record values.
- The second log (Log #2) supports the definition of optional record values. It maps Totalflow data to CFX Volume Mass Analysis (VMA) record values.
- The Third Log (Log #3) supports the definition of optional record values. It maps Totalflow data to CFX Custom Batch Data (CBD) as well as Batch Report fields not included in Log #1.

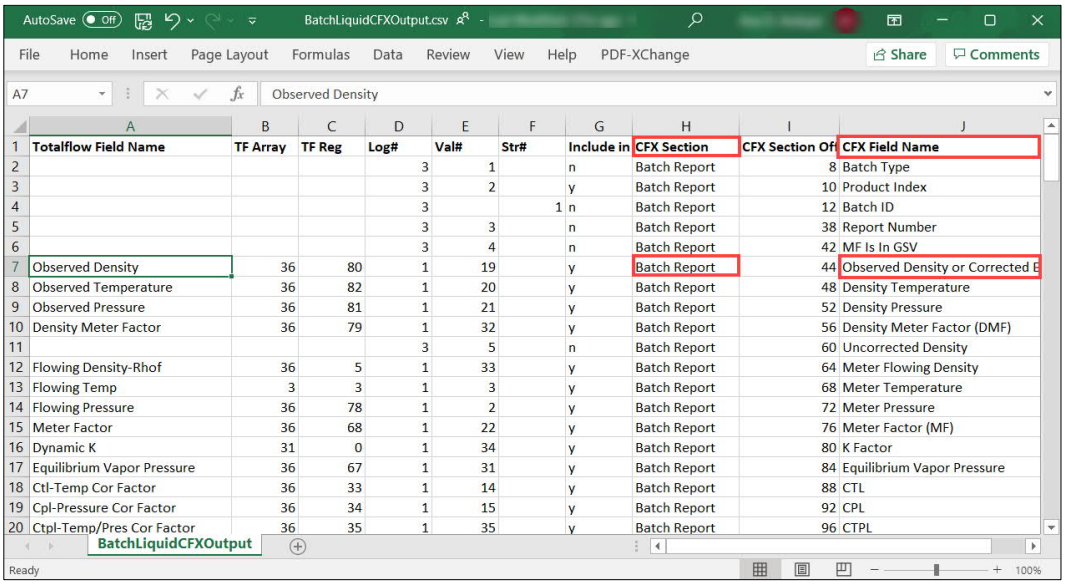
Section 6.2.1 CSV file row description: CFX sections and fields

Each row in the csv file corresponds to a CFX field in a CFX section. CFX sections include:

- Batch Report (required)
- Batch Liquid Volume Analysis (optional)
- Batch Liquid Mass Analysis (optional)
- Custom Batch Data (optional)
- Batch String Data (optional)

Figure 6-2 shows a portion of the Batch Report section (rows 2 to 13). Several values or fields are visible for example: Observed Density, Density Temperature, etc. Additional sections are included further down. Scroll down the file to locate the other sections listed above.

Figure 6-2: CSV file sections and fields



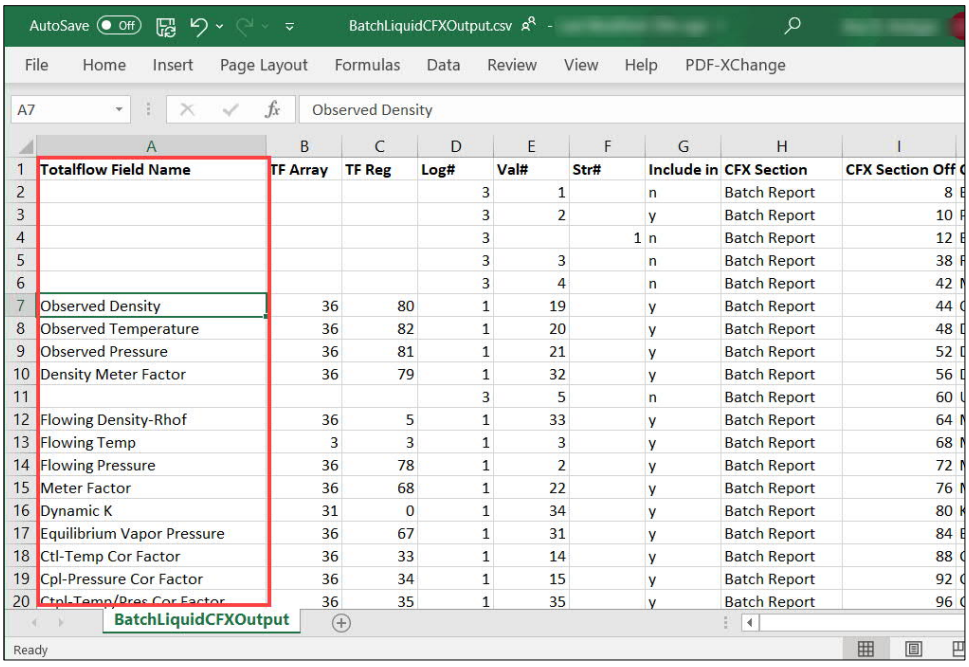
	A	B	C	D	E	F	G	H	I	J
1	Totalflow Field Name	TF Array	TF Reg	Log#	Val#	Str#	Include in	CFX Section	CFX Section Off	CFX Field Name
2				3	1		n	Batch Report	8	Batch Type
3				3	2		y	Batch Report	10	Product Index
4				3		1	n	Batch Report	12	Batch ID
5				3	3		n	Batch Report	38	Report Number
6				3	4		n	Batch Report	42	MF Is In GSV
7	Observed Density	36	80	1	19		y	Batch Report	44	Observed Density or Corrected E
8	Observed Temperature	36	82	1	20		y	Batch Report	48	Density Temperature
9	Observed Pressure	36	81	1	21		y	Batch Report	52	Density Pressure
10	Density Meter Factor	36	79	1	32		y	Batch Report	56	Density Meter Factor (DMF)
11				3	5		n	Batch Report	60	Uncorrected Density
12	Flowing Density-Rhof	36	5	1	33		y	Batch Report	64	Meter Flowing Density
13	Flowing Temp	3	3	1	3		y	Batch Report	68	Meter Temperature
14	Flowing Pressure	36	78	1	2		y	Batch Report	72	Meter Pressure
15	Meter Factor	36	68	1	22		y	Batch Report	76	Meter Factor (MF)
16	Dynamic K	31	0	1	34		y	Batch Report	80	K Factor
17	Equilibrium Vapor Pressure	36	67	1	31		y	Batch Report	84	Equilibrium Vapor Pressure
18	Ctl-Temp Cor Factor	36	33	1	14		y	Batch Report	88	CTL
19	Cpl-Pressure Cor Factor	36	34	1	15		y	Batch Report	92	CPL
20	Ctpl-Temp/Pres Cor Factor	36	35	1	35		y	Batch Report	96	CTPL

6.1.1 CSV file column description

The columns in the csv file describe the following data:

- Totalflow data (Figure 6-3):
  - Totalflow Field Name: a description of the Totalflow field or value (may be different than the name used for the CFX field name)
  - TF Array: The array number part of the app.array.register address storing the field value
  - TF Reg: The register number part of an app.array.register address storing the field value

Figure 6-3: Totalflow data (variable names and their array and register numbers)



	A	B	C	D	E	F	G	H	I
1	Totalflow Field Name	TF Array	TF Reg	Log#	Val#	Str#	Include in	CFX Section	CFX Section Off
2				3	1		n	Batch Report	8
3				3	2		y	Batch Report	10
4				3		1	n	Batch Report	12
5				3	3		n	Batch Report	38
6				3	4		n	Batch Report	42
7	Observed Density	36	80	1	19		y	Batch Report	44
8	Observed Temperature	36	82	1	20		y	Batch Report	48
9	Observed Pressure	36	81	1	21		y	Batch Report	52
10	Density Meter Factor	36	79	1	32		y	Batch Report	56
11				3	5		n	Batch Report	60
12	Flowing Density-Rhof	36	5	1	33		y	Batch Report	64
13	Flowing Temp	3	3	1	3		y	Batch Report	68
14	Flowing Pressure	36	78	1	2		y	Batch Report	72
15	Meter Factor	36	68	1	22		y	Batch Report	76
16	Dynamic K	31	0	1	34		y	Batch Report	80
17	Equilibrium Vapor Pressure	36	67	1	31		y	Batch Report	84
18	Ctl-Temp Cor Factor	36	33	1	14		y	Batch Report	88
19	Cpl-Pressure Cor Factor	36	34	1	15		y	Batch Report	92
20	Ctpl-Temp/Pres Cor Factor	36	35	1	35		y	Batch Report	96

Batch CFX output files: filenames and location provides details on the output file naming convention so they can be located and identified.

Section 6.5.3 Control display of individual log values describes how to configure a log record or string value individually.

IMPORTANT NOTE: Batch log CFX outputs are supported only for batch logs associated with an enhanced SU API Liquid tube. It is assumed that the liquid tube instance for which the CFX output is required is already added and configured in the Totalflow device.

6.2 Batch data mapping file

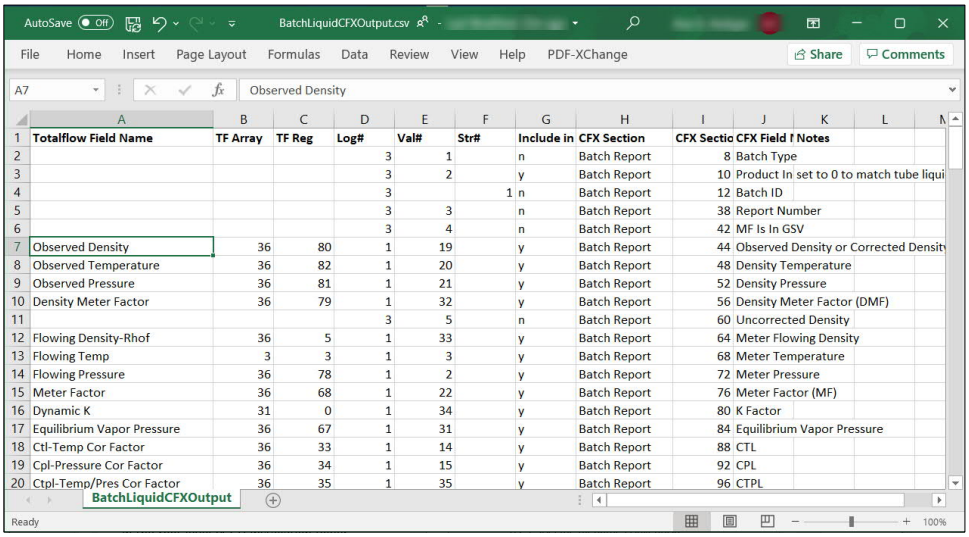
PCCU includes a comma separated value (csv) file, BatchLiquidCFXOutput.csv (Figure 6-1), to map data from the SU Liquid application to fields defined in the CFX 8.5.0 sections. This csv file is installed in the root level PCCU installation folder.

IMPORTANT NOTE: The csv file is available for viewing but should not be edited.

The csv file is used to map data from an SU API Liquid tube to a batch CFX output file. The file can be used as a reference for setting up required and optional batch logs.

Refer to the csv file when configuring logs for which CFX outputs will be required. The procedures in section 6.5 Setup to support optional CFX data provide specific instructions. The following sections describe the contents of the csv file. The file reflects compliance with the CFX 8.5.0 specification and provides a long list of fields. Locate the file and open it to review and become familiar with the fields. Scroll down to locate fields of interest and the several sections available.

Figure 6-1: BatchLiquidCFXOutput.csv file included with PCCU



	A	B	C	D	E	F	G	H	I	J	K	L
1	Totalflow Field Name	TF Array	TF Reg	Log#	Val#	Str#	Include in	CFX Section	CFX Sectio	CFX Field I	Notes	
2				3	1		n	Batch Report	8	Batch Type		
3				3	2		y	Batch Report	10	Product In	set to 0 to match tube liqui	
4				3		1	n	Batch Report	12	Batch ID		
5				3	3		n	Batch Report	38	Report Number		
6				3	4		n	Batch Report	42	MF Is In GSV		
7	Observed Density	36	80	1	19		y	Batch Report	44	Observed Density or Corrected Density		
8	Observed Temperature	36	82	1	20		y	Batch Report	48	Density Temperature		
9	Observed Pressure	36	81	1	21		y	Batch Report	52	Density Pressure		
10	Density Meter Factor	36	79	1	32		y	Batch Report	56	Density Meter Factor (DMF)		
11				3	5		n	Batch Report	60	Uncorrected Density		
12	Flowing Density-Rhof	36	5	1	33		y	Batch Report	64	Meter Flowing Density		
13	Flowing Temp	3	3	1	3		y	Batch Report	68	Meter Temperature		
14	Flowing Pressure	36	78	1	2		y	Batch Report	72	Meter Pressure		
15	Meter Factor	36	68	1	22		y	Batch Report	76	Meter Factor (MF)		
16	Dynamic K	31	0	1	34		y	Batch Report	80	K Factor		
17	Equilibrium Vapor Pressure	36	67	1	31		y	Batch Report	84	Equilibrium Vapor Pressure		
18	Ctl-Temp Cor Factor	36	33	1	14		y	Batch Report	88	CTL		
19	Cpl-Pressure Cor Factor	36	34	1	15		y	Batch Report	92	CPL		
20	Ctpl-Temp/Pres Cor Factor	36	35	1	35		y	Batch Report	96	CTPL		

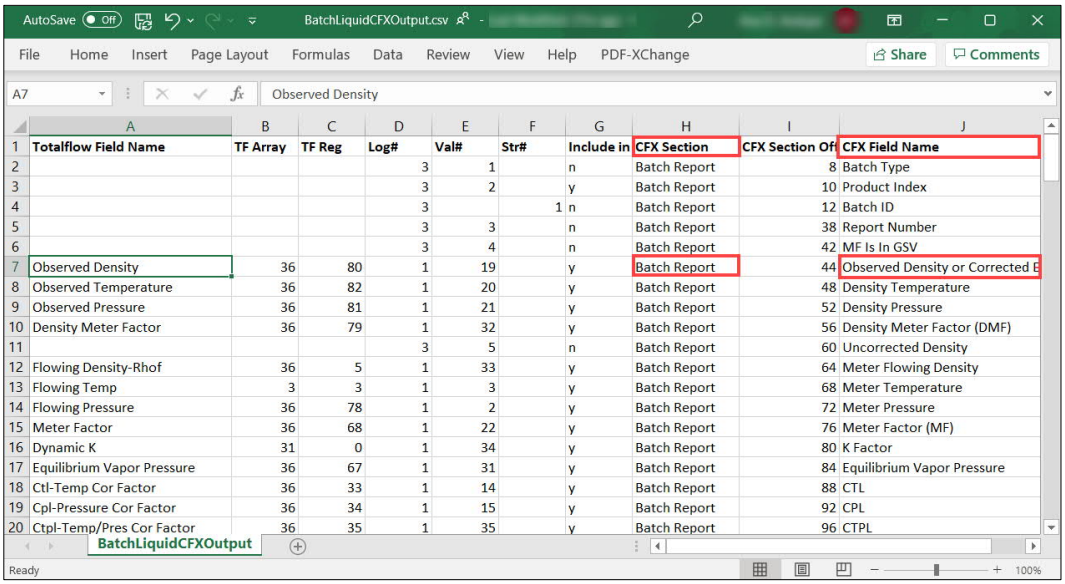
6.2.1 CSV file row description: CFX sections and fields

Each row in the csv file corresponds to a CFX field in a CFX section. CFX sections include:

- Batch Report (required)
- Batch Liquid Volume Analysis (optional)
- Batch Liquid Mass Analysis (optional)
- Custom Batch Data (optional)
- Batch String Data (optional)

Figure 6-2 shows a portion of the Batch Report section (rows 2 to 13). Several values or fields are visible for example: Observed Density, Density Temperature, etc. Additional sections are included further down. Scroll down the file to locate the other sections listed above.

Figure 6-2: CSV file sections and fields



	A	B	C	D	E	F	G	H	I	J
1	Totalflow Field Name	TF Array	TF Reg	Log#	Val#	Str#	Include in	CFX Section	CFX Section Off	CFX Field Name
2				3	1		n	Batch Report	8	Batch Type
3				3	2		y	Batch Report	10	Product Index
4				3		1	n	Batch Report	12	Batch ID
5				3	3		n	Batch Report	38	Report Number
6				3	4		n	Batch Report	42	MF Is In GSV
7	Observed Density	36	80	1	19		y	Batch Report	44	Observed Density or Corrected E
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9	Observed Pressure	36	81	1	21		y	Batch Report	52	Density Pressure
10	Density Meter Factor	36	79	1	32		y	Batch Report	56	Density Meter Factor (DMF)
11				3	5		n	Batch Report	60	Uncorrected Density
12	Flowing Density-Rhof	36	5	1	33		y	Batch Report	64	Meter Flowing Density
13	Flowing Temp	3	3	1	3		y	Batch Report	68	Meter Temperature
14	Flowing Pressure	36	78	1	2		y	Batch Report	72	Meter Pressure
15	Meter Factor	36	68	1	22		y	Batch Report	76	Meter Factor (MF)
16	Dynamic K	31	0	1	34		y	Batch Report	80	K Factor
17	Equilibrium Vapor Pressure	36	67	1	31		y	Batch Report	84	Equilibrium Vapor Pressure
18	Ctl-Temp Cor Factor	36	33	1	14		y	Batch Report	88	CTL
19	Cpl-Pressure Cor Factor	36	34	1	15		y	Batch Report	92	CPL
20	Ctpl-Temp/Pres Cor Factor	36	35	1	35		y	Batch Report	96	CTPL

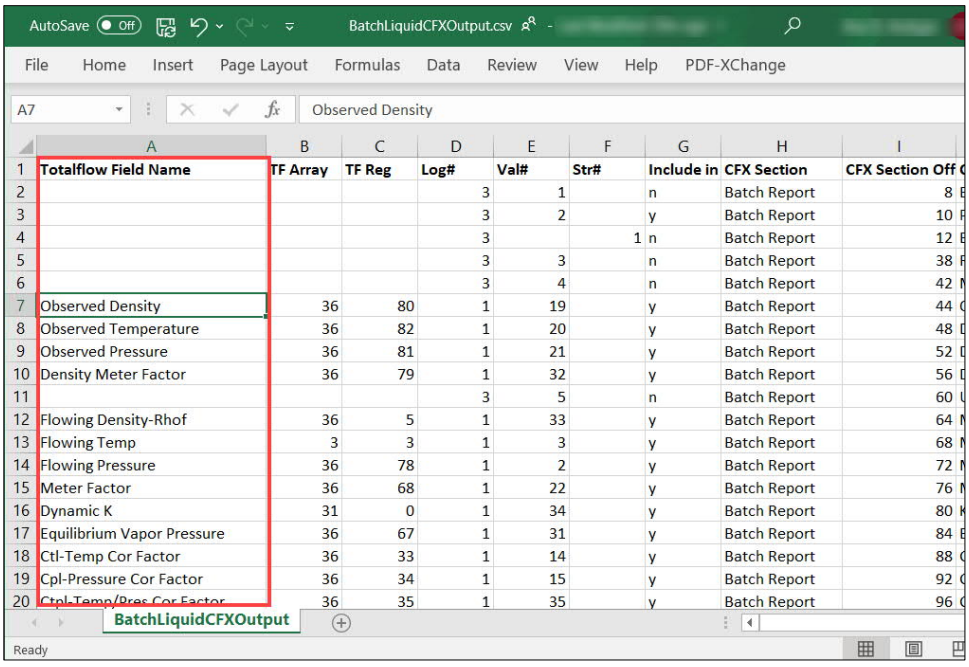
6.2.2 CSV file column description

The columns in the csv file describe the following data:

— Totalflow data (Figure 6-3):

- Totalflow Field Name: a description of the Totalflow field or value (may be different than the name used for the CFX field name)
- TF Array: The array number part of the app.array.register address storing the field value
- TF Reg: The register number part of an app.array.register address storing the field value

Figure 6-3: Totalflow data (variable names and their array and register numbers)



	A	B	C	D	E	F	G	H	I
1	Totalflow Field Name	TF Array	TF Reg	Log#	Val#	Str#	Include in	CFX Section	CFX Section Off
2				3	1		n	Batch Report	8
3				3	2		y	Batch Report	10
4				3		1	n	Batch Report	12
5				3	3		n	Batch Report	38
6				3	4		n	Batch Report	42
7	Observed Density	36	80	1	19		y	Batch Report	44
8	Observed Temperature	36	82	1	20		y	Batch Report	48
9	Observed Pressure	36	81	1	21		y	Batch Report	52
10	Density Meter Factor	36	79	1	32		y	Batch Report	56
11				3	5		n	Batch Report	60
12	Flowing Density-Rhof	36	5	1	33		y	Batch Report	64
13	Flowing Temp	3	3	1	3		y	Batch Report	68
14	Flowing Pressure	36	78	1	2		y	Batch Report	72
15	Meter Factor	36	68	1	22		y	Batch Report	76
16	Dynamic K	31	0	1	34		y	Batch Report	80
17	Equilibrium Vapor Pressure	36	67	1	31		y	Batch Report	84
18	Ctl-Temp Cor Factor	36	33	1	14		y	Batch Report	88
19	Cpl-Pressure Cor Factor	36	34	1	15		y	Batch Report	92
20	Ctpl-Temp/Pres Cor Factor	36	35	1	35		y	Batch Report	96

6.3 Batch CFX output files: filenames and location

The following describes the naming convention and location of the Batch Log CFX output files. The file is generated if the option for CFX Batch is selected when the batch log data is collected or when the Output option is selected from the Laptop File Utilities. Batch CFX outputs are supported only for the batch log associated with an enhanced API Liquid SU tube.

The following applies:

- Batch CFX files are created in the Coastal Flow CFX8 Output Path as set in the PCCU System Setup Directory Paths tab.
- The PCCU System Setup Misc tab contains a checkbox for CFX Meter-Based Naming. If this checkbox is selected, then Batch CFX files will have meter-based filenames. If not selected, then it will have date-based filenames.

6.3.1 Meter-based filename convention

Meter-based filenames have the form DeviceID_Batch_Group_Log.cfx where:

- DeviceID is the device ID of the associated liquid application.
- Batch is the batch application instance number.
- Group is the batch group number within the batch application.
- Log is the batch log number within the batch group.

Meter-based filenames are saved in the Coastal Flow CFX8 Output Path. For example, PCCU7\CFX8\SULIQ-2E_B001_G01_L01.cfx

6.3.2 Date-based filename convention

Date-based filenames are derived from the batch application collect time and will have the form YYMMDDSS.cfx where:

- YY = 2-digit year
- MM = 2-digit month (1 – 12)
- DD = 2-digit day (1 – 31)
- SS = 2-digit sequence number (00 – 99)

Date-based filenames are saved in the Coastal Flow CFX8 Output Path in the form DeviceID\BatchLogName where:

- DeviceID is the device ID of the associated liquid application.
- BatchLogName is the batch log name.

For example, PCCU7\CFX8\ SULIQ-2E \Batch Log-2\22020900.cfx

6.4 Setup to support CFX Batch report and string data

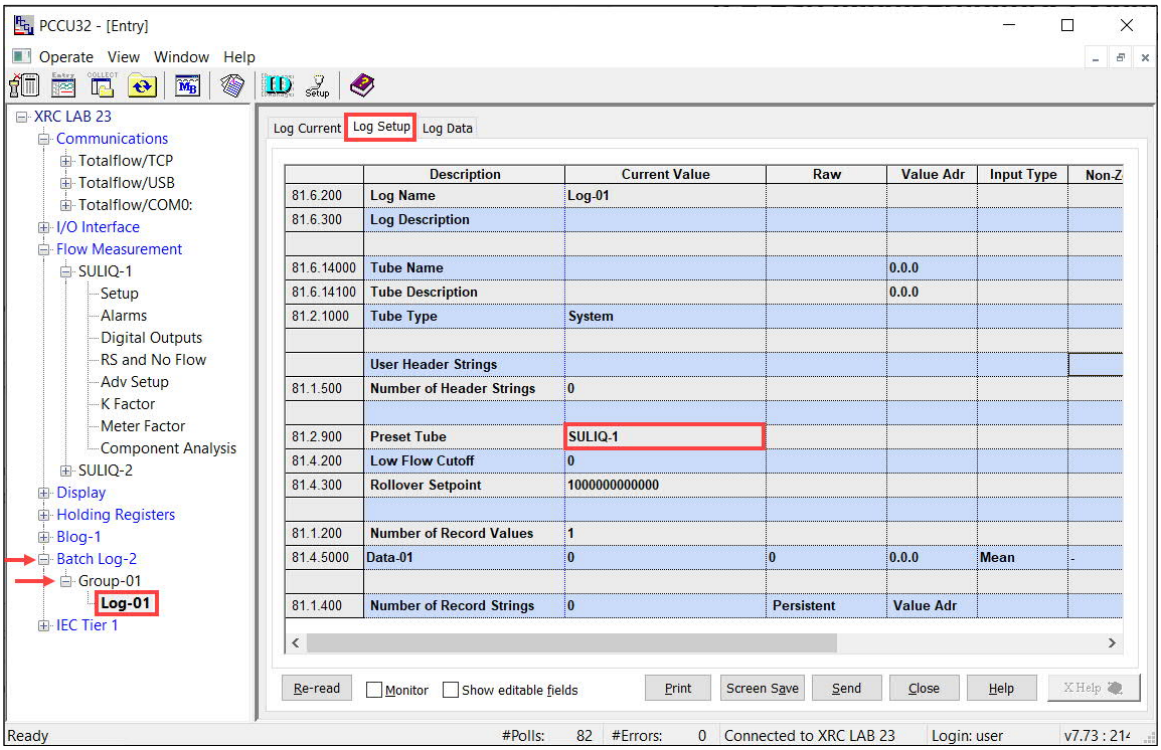
This procedure sets up a batch log to record the data required in the Batch Report and Batch String data sections of CFX 8.5.0. Using the preset tube function, the values required are automatically populated.

IMPORTANT NOTE: When the associated tube is preset, the Log Name and the Tube Name are automatically configured. Do not edit any of these default names. The default names are used to tie the 3 batch logs together. For example, if the enhanced liquid tube is SULIQ-1, then the batch logs must be named SULIQ-1, SULIQ-1-VMA, and SULIQ-1-CBD.

To configure the log:

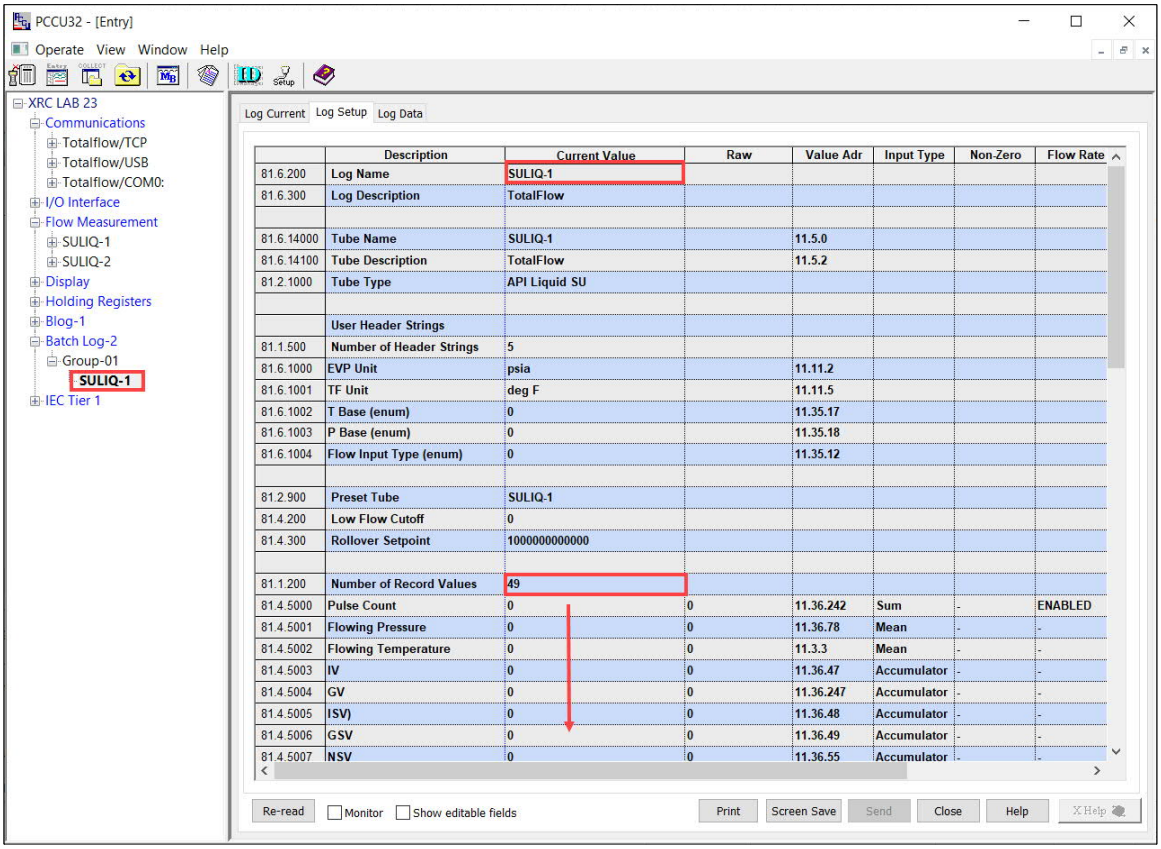
1. Add a Batch Log application instance.
2. Expand the Batch Log instance from the navigation tree.
3. Select the default group. The Setup tab displays.
4. Configure the trigger type and the corresponding contract start time/date.
5. Expand the group.
6. Select the default log.
7. Select Log Setup tab.
8. Select the Preset Tube drop-down list. All instantiated tubes display.
9. Select the enhanced liquid tube instance required (Figure 6-4).

Figure 6-4: Batch Log setup supporting CFX output (preset enhanced liquid tube)



10. Click Send. The batch log automatically configures to record the data defined by the CFX 8.5.0 requirement in the CFX Batch Report section and the Batch String Data section. Figure 6-5 shows 49 record values automatically configured after the liquid tube instance is preset.

Figure 6-5: Automatically configured CFX8 output record values



11. If the default record values are all that is required, enable logging:
    a. Select the group on the navigation tree again. The group's Setup tab displays.
    b. Select Group Enable and then click Send to start data logging.
    c. To generate a CFX output, see section 7 Generate a batch CFX output.
12. If values of the optional sections of the CFX8 specification are required, proceed to section 6.5 Setup to support optional CFX data.

6.5 Setup to support optional CFX data

If the logging of data defined in the CFX 8.5.0 optional sections is required, additional logs need to be defined. The number of additional logs depends on whether one or both the Batch Volume Mass Analysis and the Custom Batch Data sections are required. If both are needed, a log to support each of these sections must be defined.

In this procedure, the number of logs for the batch group is increased from 1 to 3. The second log is configured to support Volume Mass Analysis Data and the third log is to support Custom Batch Data.

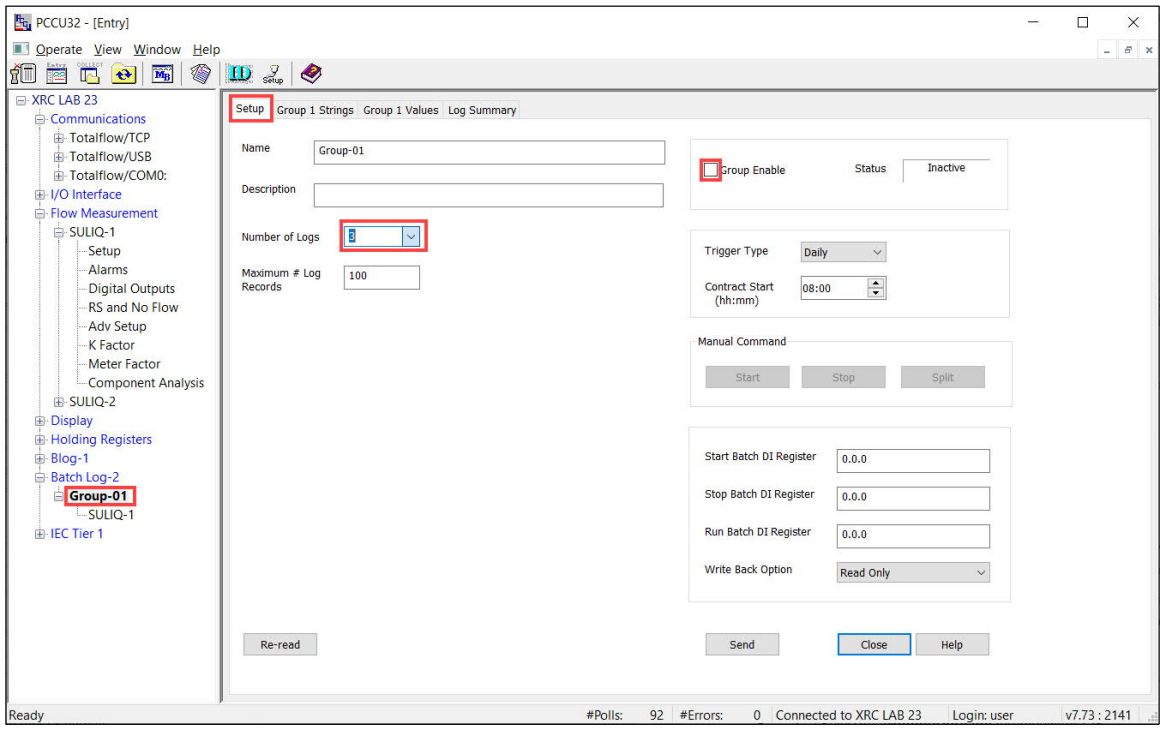
The third log contains 50 record values and 9 record strings. The Custom Batch Data fields are mapped from record values 40 to 50 and record strings 2 to 9. Record values 1 to 39 and record string 1 are reserved for future implementation of Batch Report fields not currently used.

IMPORTANT NOTE: This procedure assumes that the associated liquid application Component Analysis has already been configured.

To set up the additional logs:

1. Disable data logging for the group:
    a. Select the batch group to display the group's Setup tab.
    b. Clear Group Enabled.
    c. Click Send.
2. Select the Number of Logs drop-down list.
3. Select 3.

Figure 6-6: Create additional logs for optional CFX data

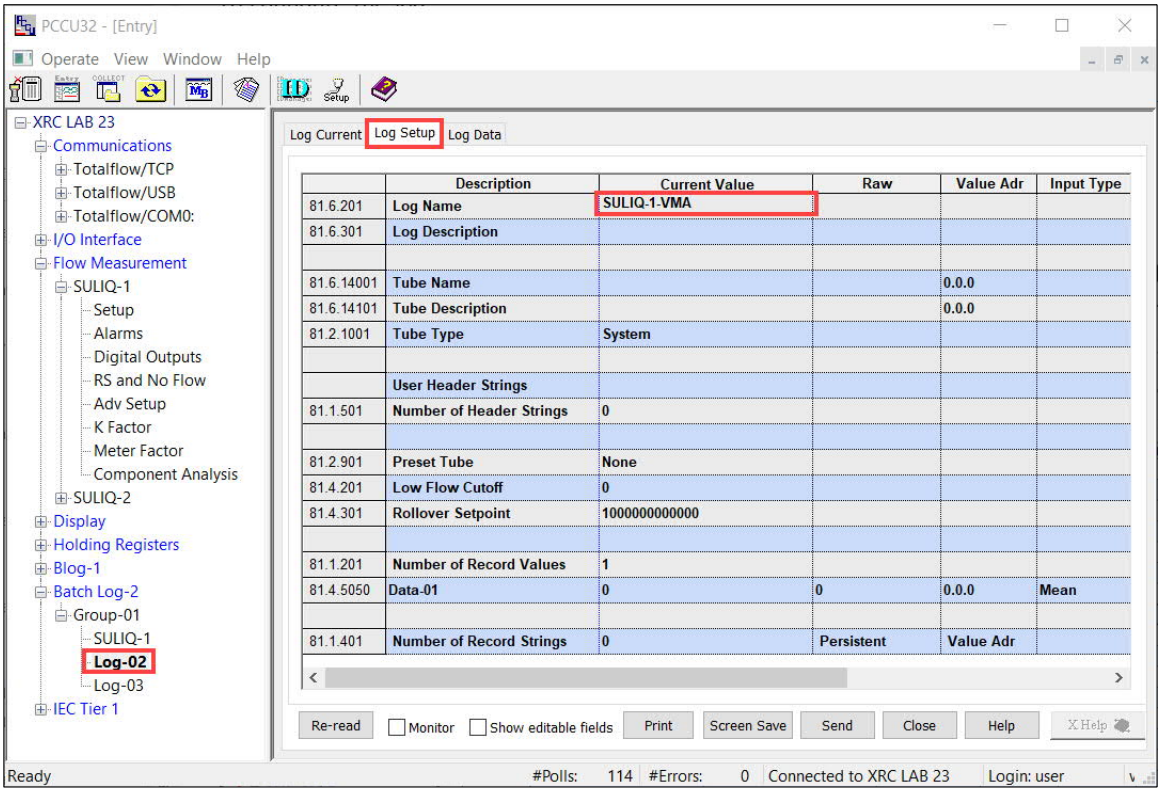


4. Click Send.
5. Click Yes to confirm. Two additional log groups display on the navigation tree under the group.

6.5.1 Configure a log for Volume Mass Analysis data

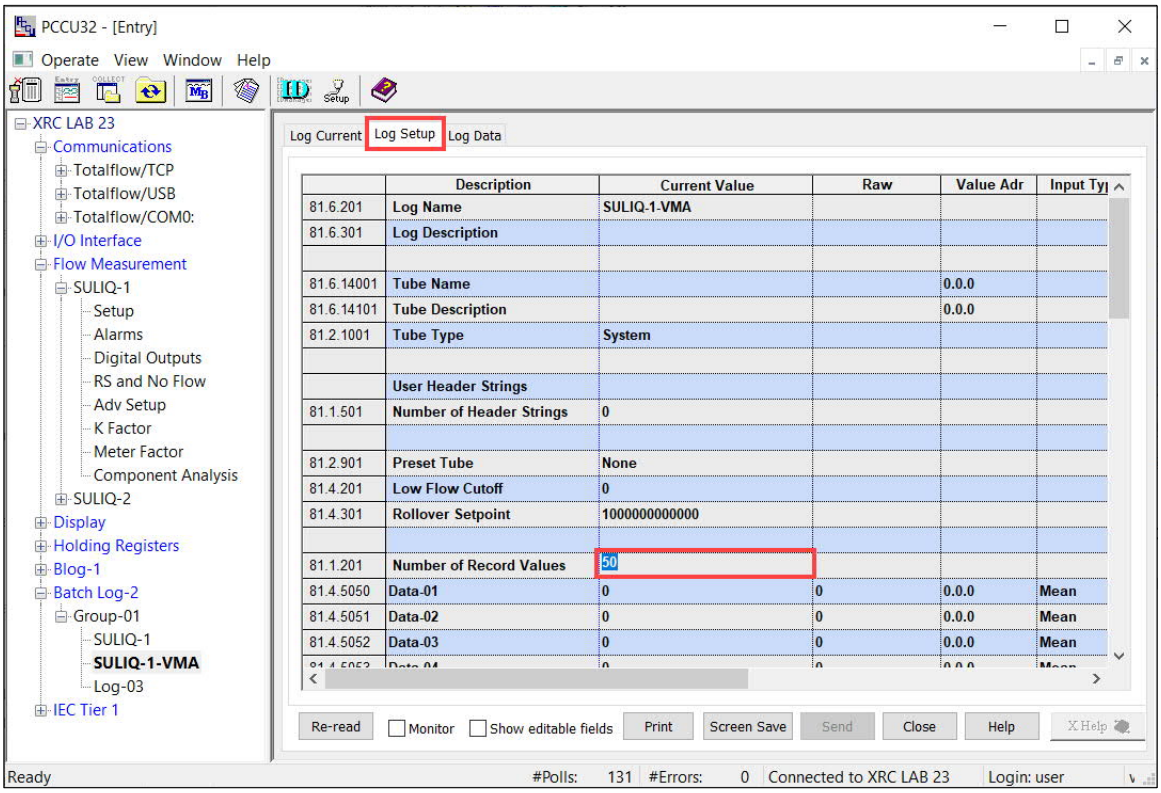
1. Select one of the newly created logs. In this example, the second log in the group.
2. Select the Log Setup tab.
3. Type a log name that has the associated liquid tube name and the type of data. In this example, the log name reflects the name of the liquid tube and the Volume Mass Analysis (VMA) data it records: SULIQ-1-VMA. Where SULIQ-1 matches exactly the name of the associated tube and the name of the first log created.

Figure 6-7: Example of log name for volume mass analysis data



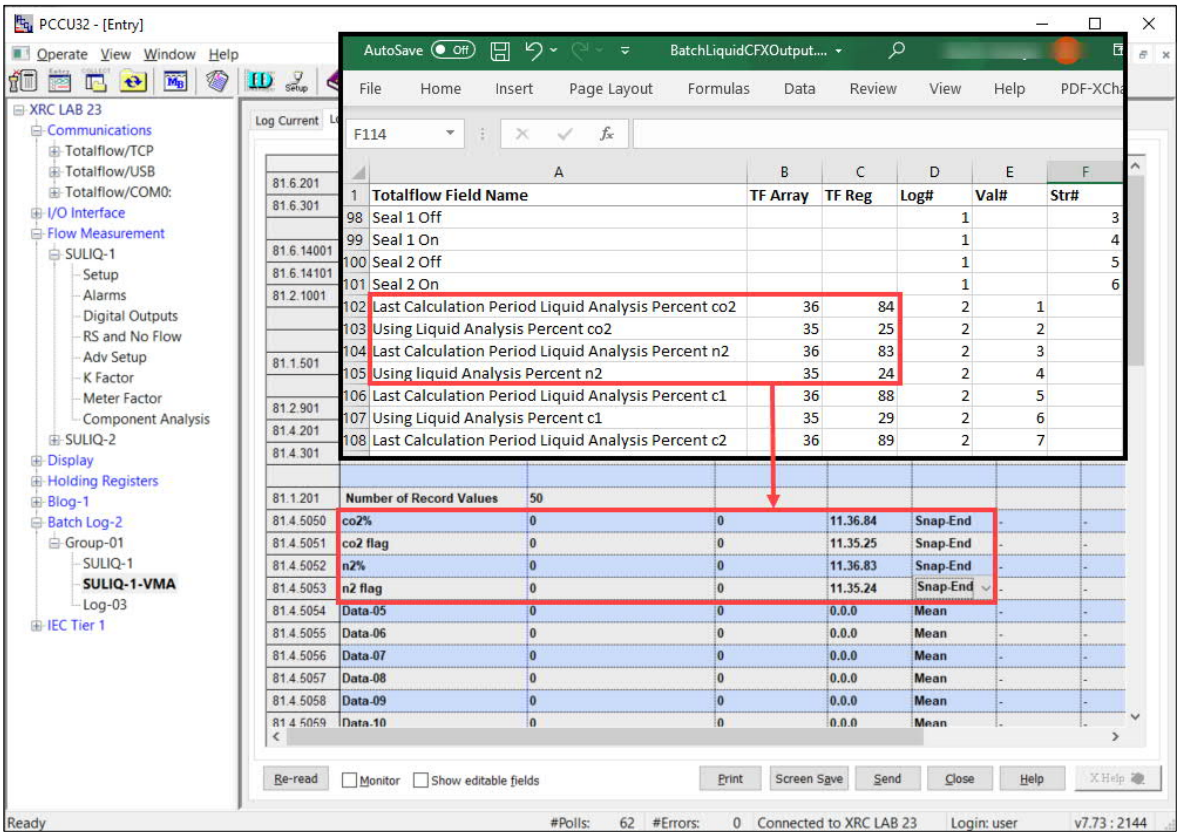
4. Set the Number of Record Values to 50.

Figure 6-8: Define the Number of record values



5. Click Send.
6. Click Yes to confirm. Record value with generic names display.
7. Use the CSV file as a guide to define each record value (insert in Figure 6-9). Set each of the values as shown in (Figure 6-9). Note that for each of the possible analysis components there is also a flag. Make sure you include the flag as record value.
   a. Type the component name (record value description). For example, the first record value is the percentage of CO_2. The second is the corresponding CO_2 flag.
   b. Type the register number in the Value Adr field for each component. The array.register is part of the address is provided in the map file. For example, the array.register for CO_2 is 36.84. The associated liquid app tube number in this example is 11. The full address then is 11.36.84. Use the application number assigned in your device.
   c. Select the Input Type for each component.

Figure 6-9: Set each analysis component record value



Once you add all components the record values should show as displayed in Figure 6-10 and Figure 6-11. It is recommended that you define all record values even if not used initially. If you need to add analysis for additional components later, the component will already be defined in the list and will automatically update values when batch logging is enabled.

Figure 6-10: Set each analysis component record value and its flag

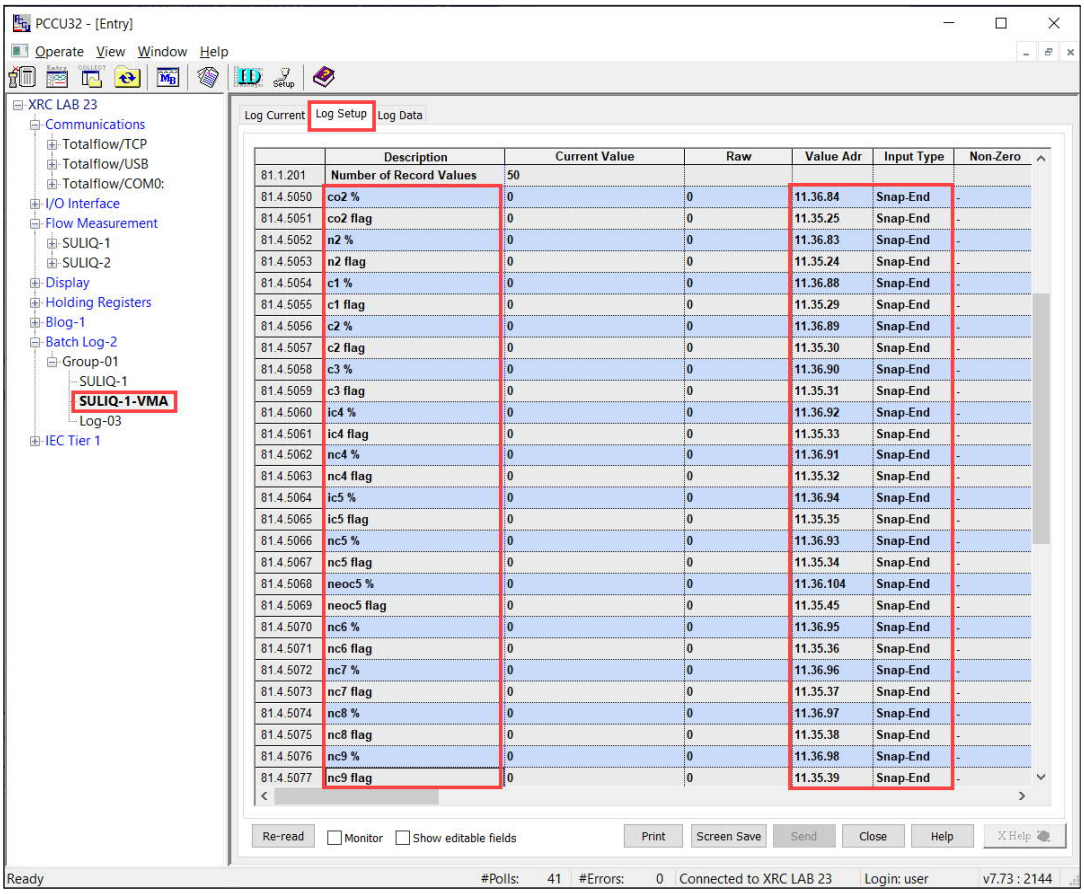
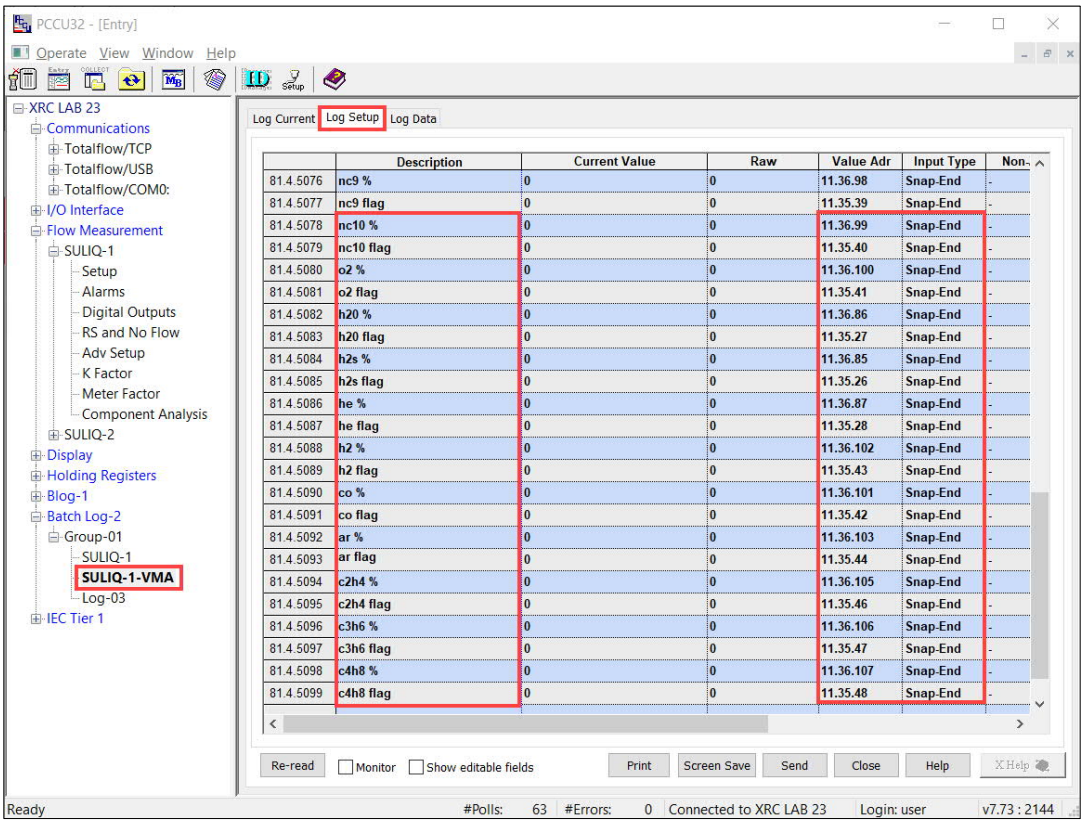


Figure 6-11: Set each analysis component record value and its flag (Cont'd)



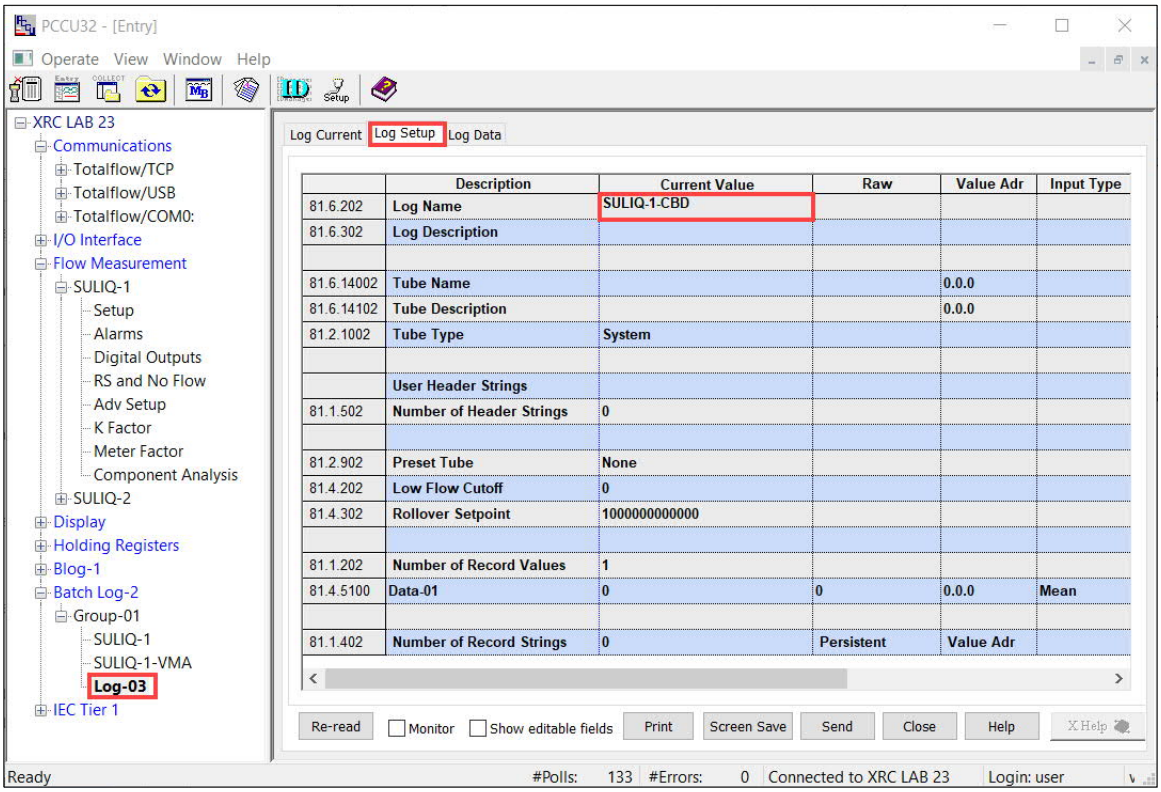
8. Click Send.

6.5.2 Configure a log for custom batch data

Configure an additional log to support custom batch data:

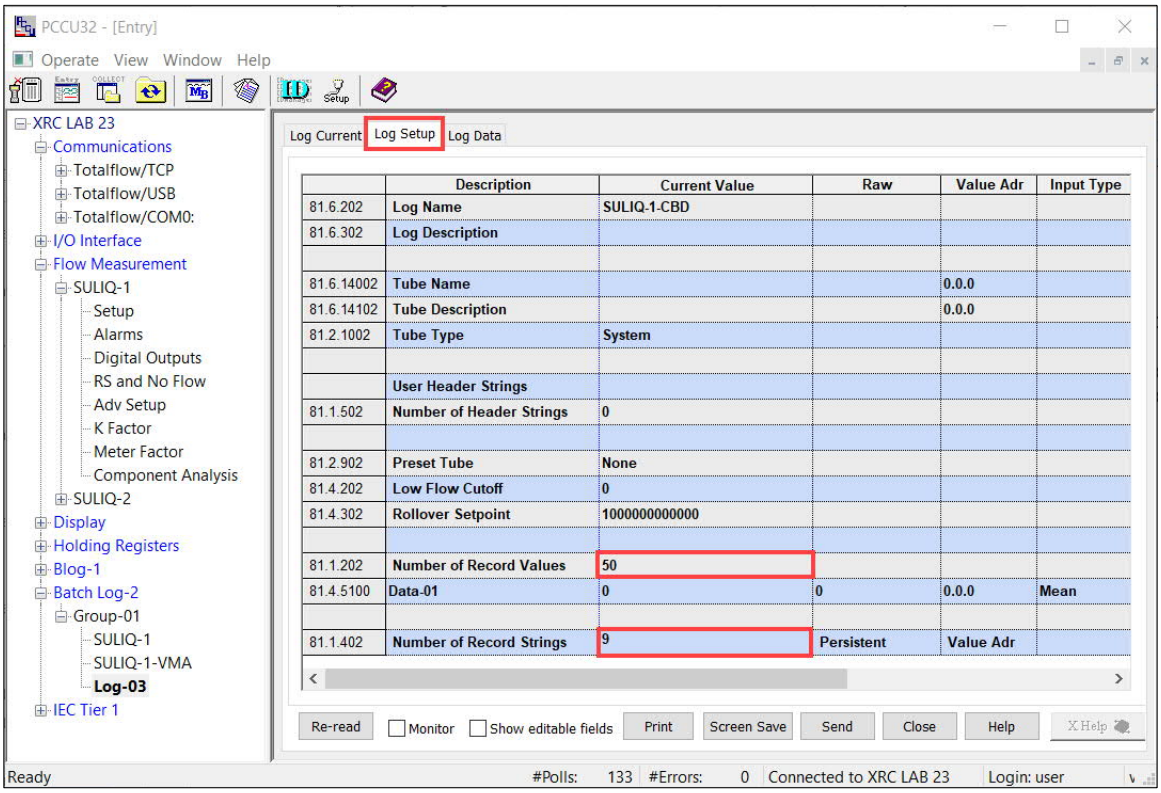
1. Select one of the newly created logs. In this example, the third log in the group.
2. Select the Log Setup tab.
3. Type a log name that has the associated liquid tube name and the type of data. In this example, the log name reflects the name of the liquid tube and the Custom Batch Data (CBD) it records: SULIQ-1-CBD (Figure 6-12). Where SULIQ-1 matches exactly the name of the associated tube and the name of the first log created.

Figure 6-12: Example of log name for custom batch data



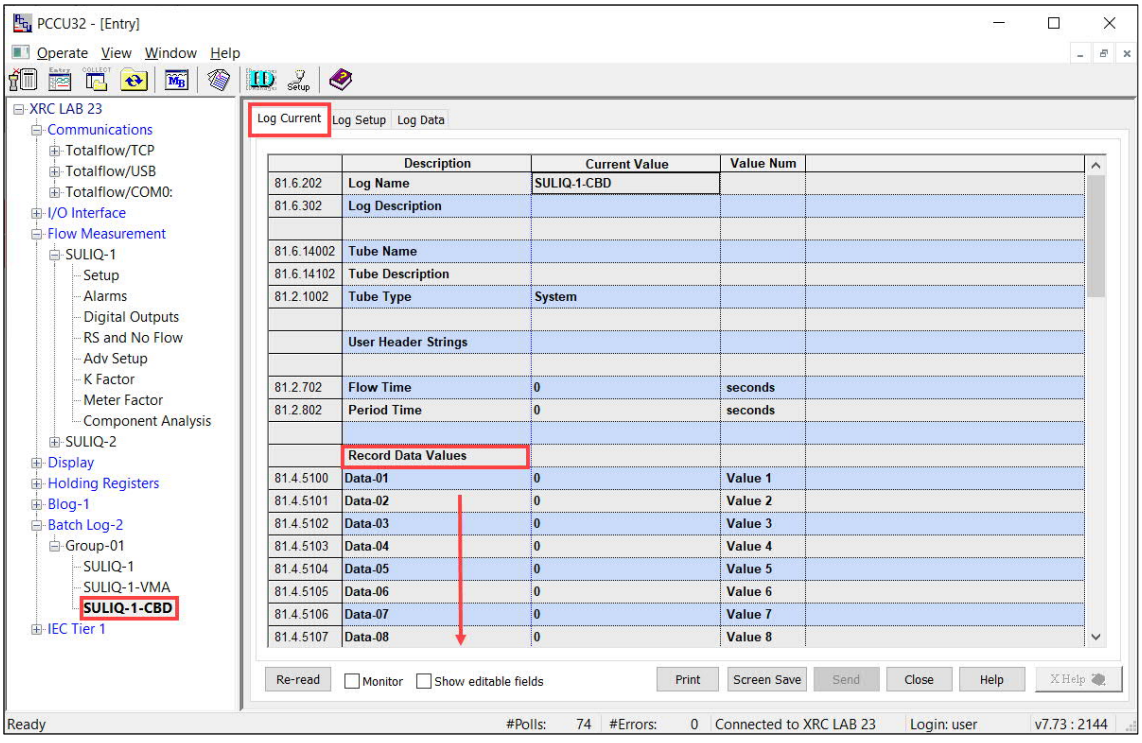
4. Set the Number of Record Values to 50.
5. Click Yes to confirm.
6. Set the Number of Record Strings to 9.

Figure 6-13: Define the number of record values and strings



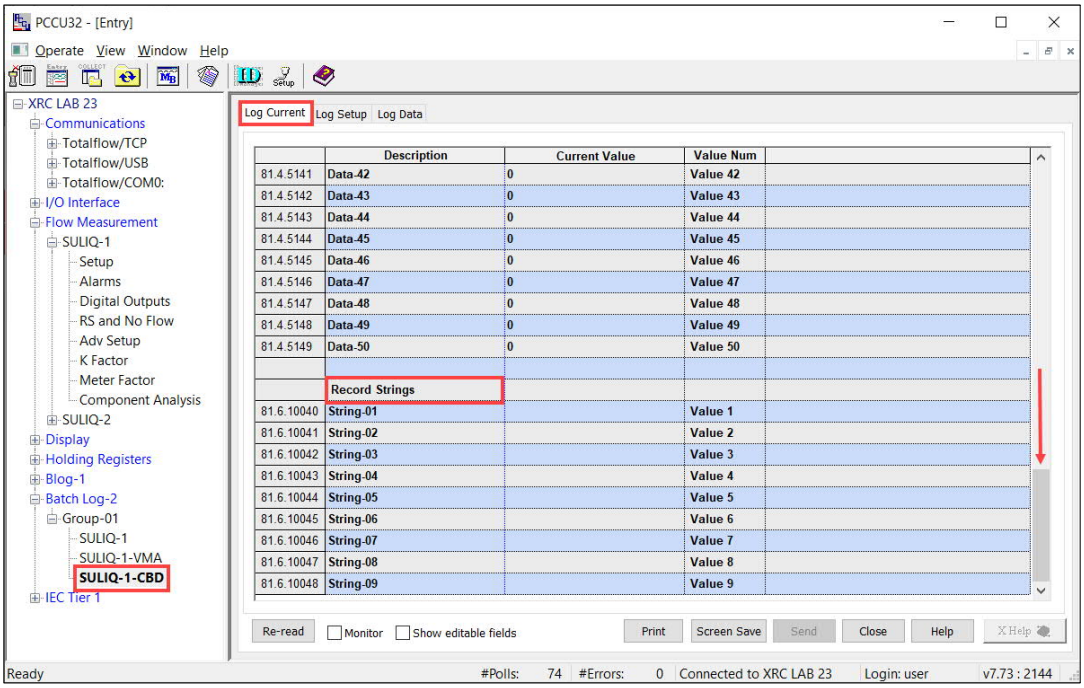
7. Click Send.
8. Click Yes to confirm.
9. Select the log again. The Log Current tab displays and Record Values displays with generic names (for example Data-01 is the name of the first record value in the list, Figure 6-14).

Figure 6-14: Default Record Data Values



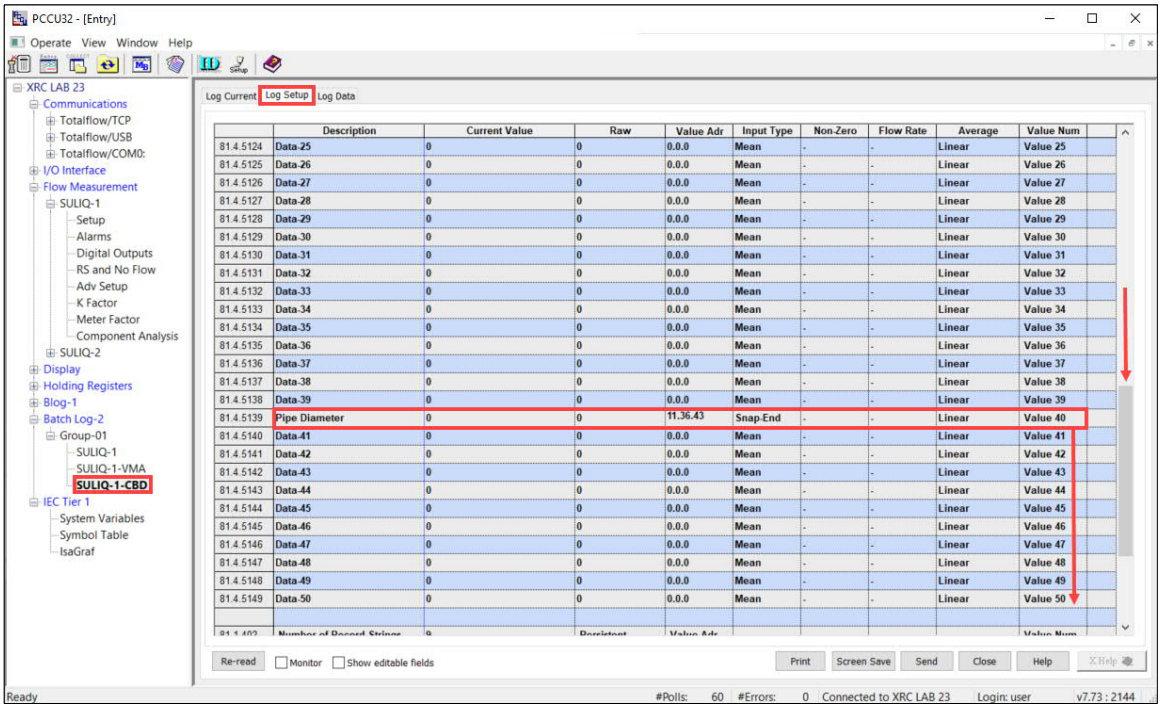
10. Scroll down the screen to locate the Record String section to verify that the generic rows for Record Strings display also (Figure 6-15).

Figure 6-15: Default Record Strings



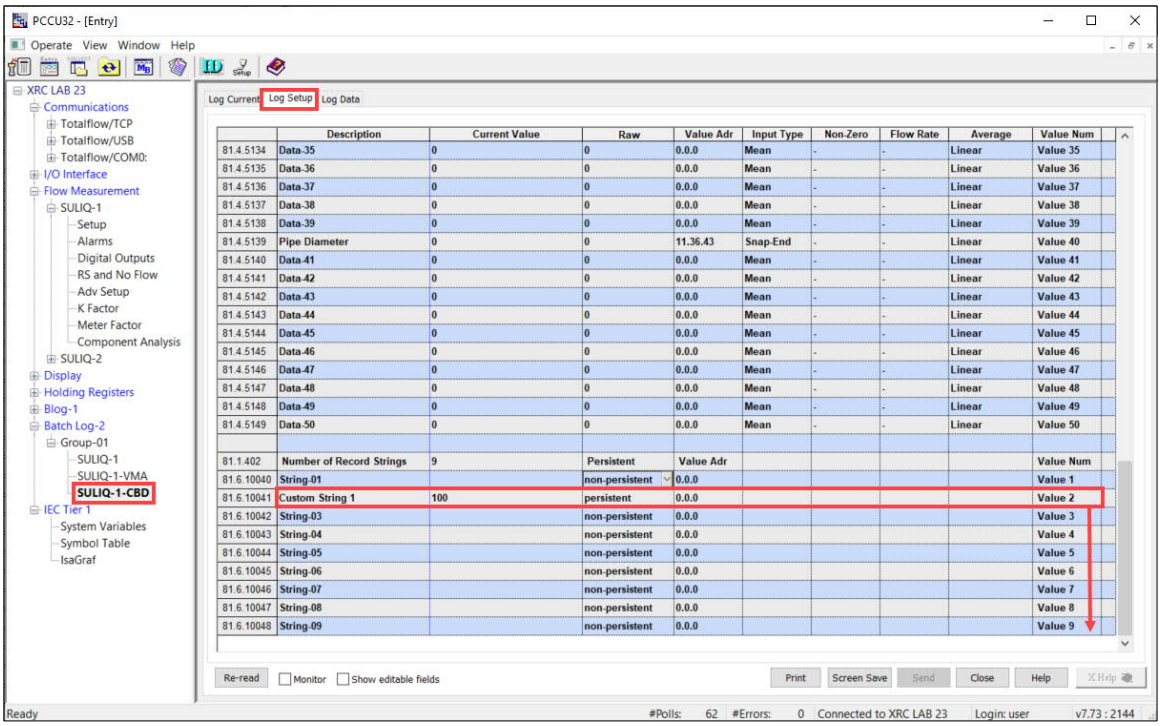
11. Select the Log Setup tab.
12. Configure each Custom Batch Data Record Value in the rows for values 40 to 50. Scroll down to locate value 40 and begin your definitions on that row (Figure 6-16):
    a. Type the record name or description.
    b. Type a constant value in the Raw column or use the Value Adr to set a value's address.
    c. Select the Input Type column to choose its input type.

Figure 6-16: Example of custom record value



13. Scroll down the screen to locate the record strings section.
14. Configure each Custom Batch Data Record String in the rows for values 2 to 9. Scroll down to locate value 2 and begin your definitions on that row (Figure 6-17):
    a. Type the string name or description.
    b. Type a string value in the Current Value column or an address in the Value Adr column.
    c. Configure if the value is persistent or not:
        – Persistent: the value is maintained when the log record ends from the previous value. Used when value rarely changes, such as Site Name, etc.
        – Non-persistent: the value is cleared when the log record ends. Used when user must enter a new value for each record, for example: Truck number, etc.

Figure 6-17: Example of custom record string



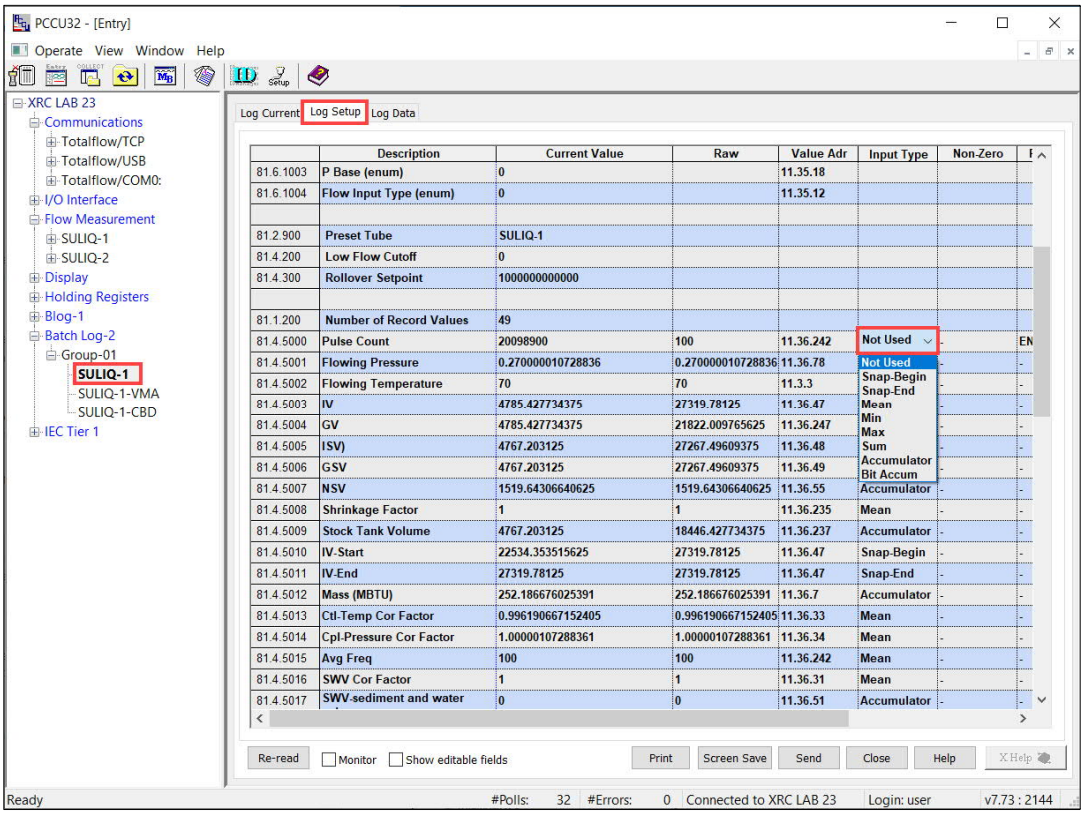
15. Go to the next procedure to enable logging.

6.5.3 Control display of individual log values

Control what values (fields) are included in the CFX batch output from the Log Setup tab. Sections 6.4 and 6.5 assume that all possible values will be included in the CFX output. If not all fields from the defaults are required, you can disable the ones that are not needed as follows:

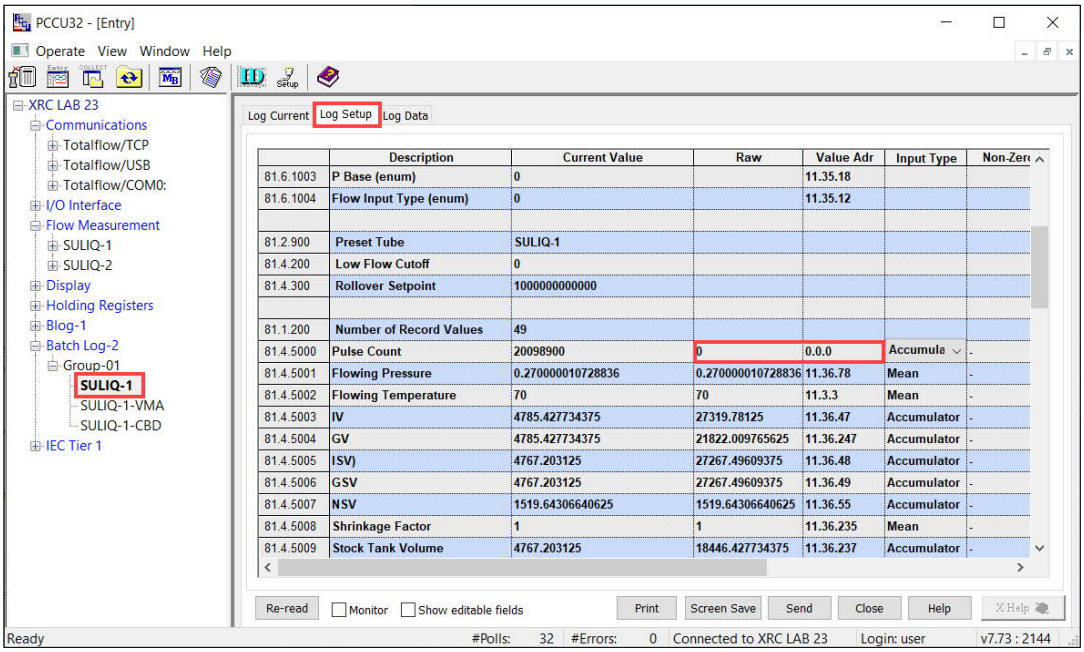
1. Select the log from the navigation tree.
2. Select the Log Setup tab.
3. Locate the record value in the list. You may need to scroll down to locate the value of interest. For numeric record values follow step 4. For string values follow step 5.
4. Disable the display of a numeric record value. (Select method a or b below.)
    a. To use the Input type setting (Figure 6-18):
        i. Select Input Type for the record value.
        ii. Select Not Used.
        iii. Click Send.

Figure 6-18: Disabling record value inclusion with Input Type



b. To use the Value Adr and Raw value fields (Figure 6-19):
   i. Set the Value Adr to 0.0.0.
   ii. Clear the Raw value field.
   iii. Click Send.

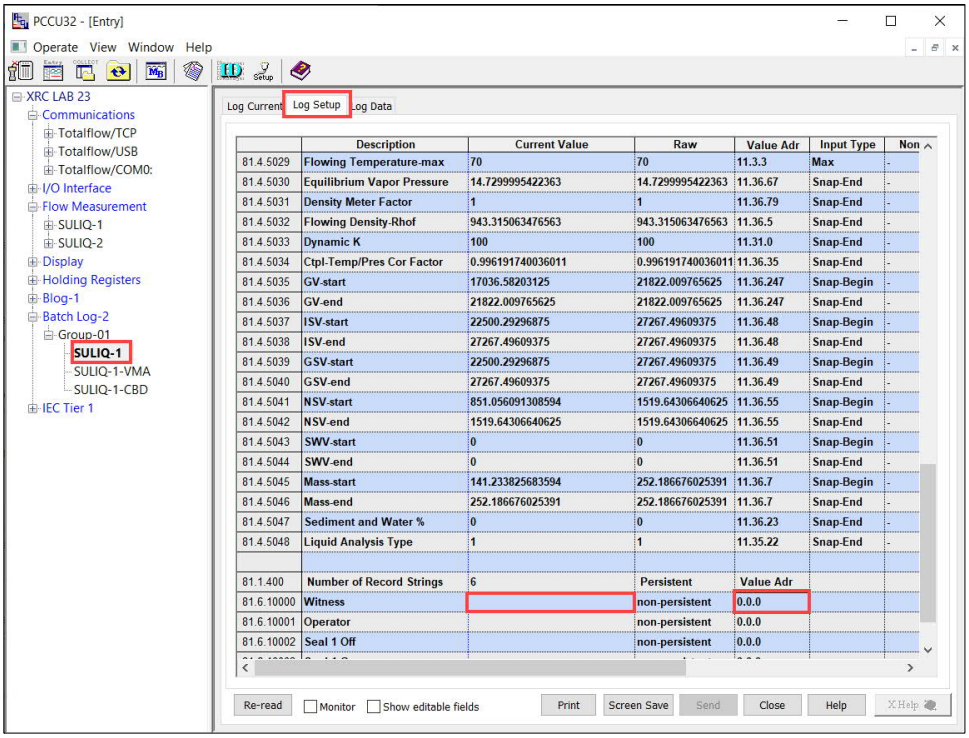
Figure 6-19: Disable record value inclusion with Value Adr set to 0.0.0.



5. Disable the display of a string record value (Figure 6-20) .
   a. Set the Value Adr to 0.0.0.
   b. Clear Current Value.

c. Click Send.

Figure 6-20: Disable string inclusion with Value Adr set to 0.0.0.

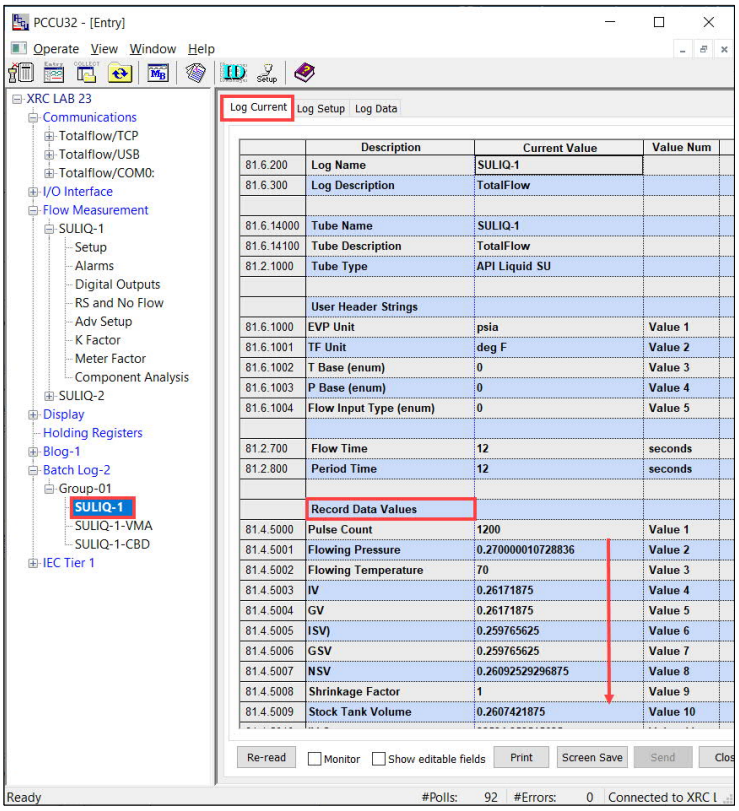


6.6 Enable data logging

When the log configuration is completed, enable logging:

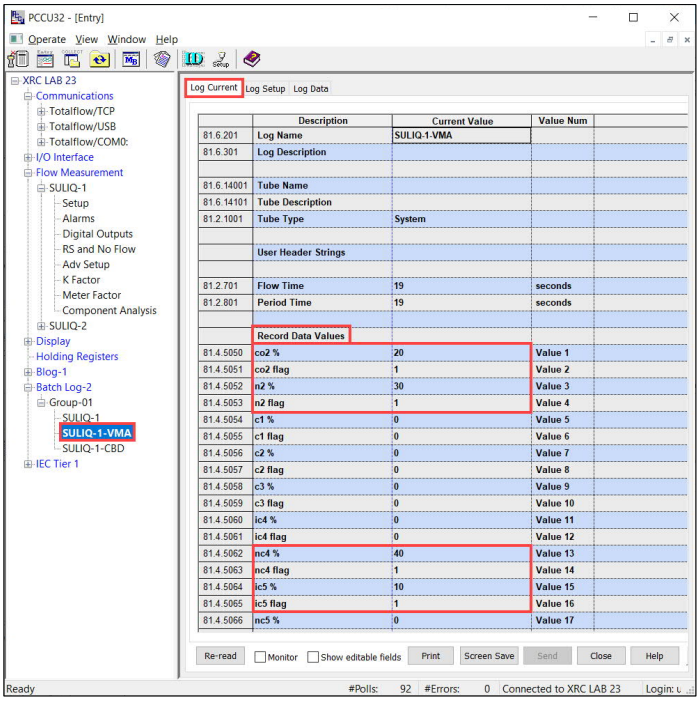
1. Select the group on the navigation tree to display the group's Setup tab.
2. Select Group Enable.
3. Click Send.
4. Select the log for the batch report and string data (log # 1 in this example). The Log Current tab displays.
5. Locate the Record values section to verify if values for defined records are displayed and update (Figure 6-21).

Figure 6-21: Verify batch report and string data (log #1)



6. Select the log for the volume mass analysis data (log #2 in this example). The Log Current tab displays.
7. Locate the Record Data values section to verify if the defined records have the current analysis configuration (Figure 6-22). In this example, the components configured for analysis are CO_2, N_2, NC_4, and iC_5. Each of these components show the percentage as defined for the associated tube and its corresponding flag.

Figure 6-22: Verify volume mass analysis log data (log #2)



8. Go to the next procedure to generate the CFX output.

7 Generate a batch CFX output

Batch CFX outputs can be generated at the time of data collection or after. Always make sure the liquid tube instance associated with the batch log you are generating an output for is selected before you perform the collection. The following sections describe how to generate the output during collection or from the laptop file utilities.

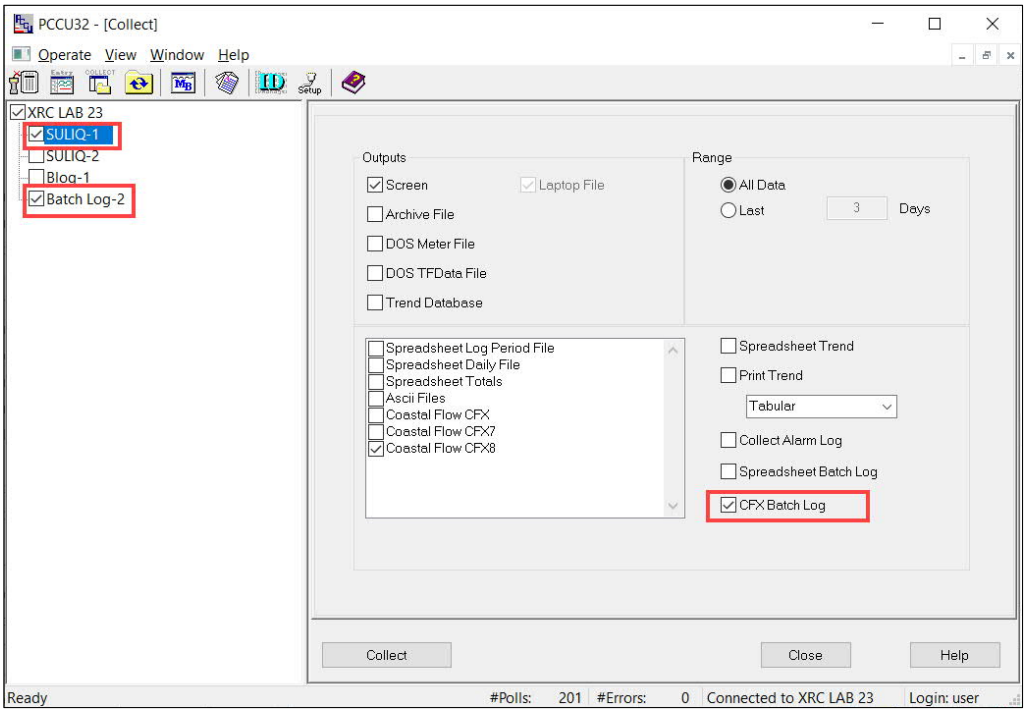
7.1 Generate batch CFX output from the collection screen

To generate Batch CFX Output, it is required to collect the configuration data from the liquid tube associated with the batch log. Therefore, collecting the liquid tube data in addition to the batch log data is required. In addition to the batch app instance, the associated liquid tube must be selected on the collection screen before the collect is triggered.

To collect data:

1. Click the Collect icon on the top PCCU menu. The Collect screen displays. By default, all data is selected for collection. If you do not wish to collect all data, select only what is required.
2. Select the required batch app instance on the navigation tree.
3. Make sure to select the Liquid app instance associated with the Batch app instance the data is being collected for. In the example shown in Figure 7-1, the enhanced liquid tube SULIQ-1 is selected along with the Batch Log-2 instance.
4. Select the output option: CFX Batch Log checkbox.

Figure 7-1: Collecting batch data (enhanced liquid tub)



5. Click Collect.

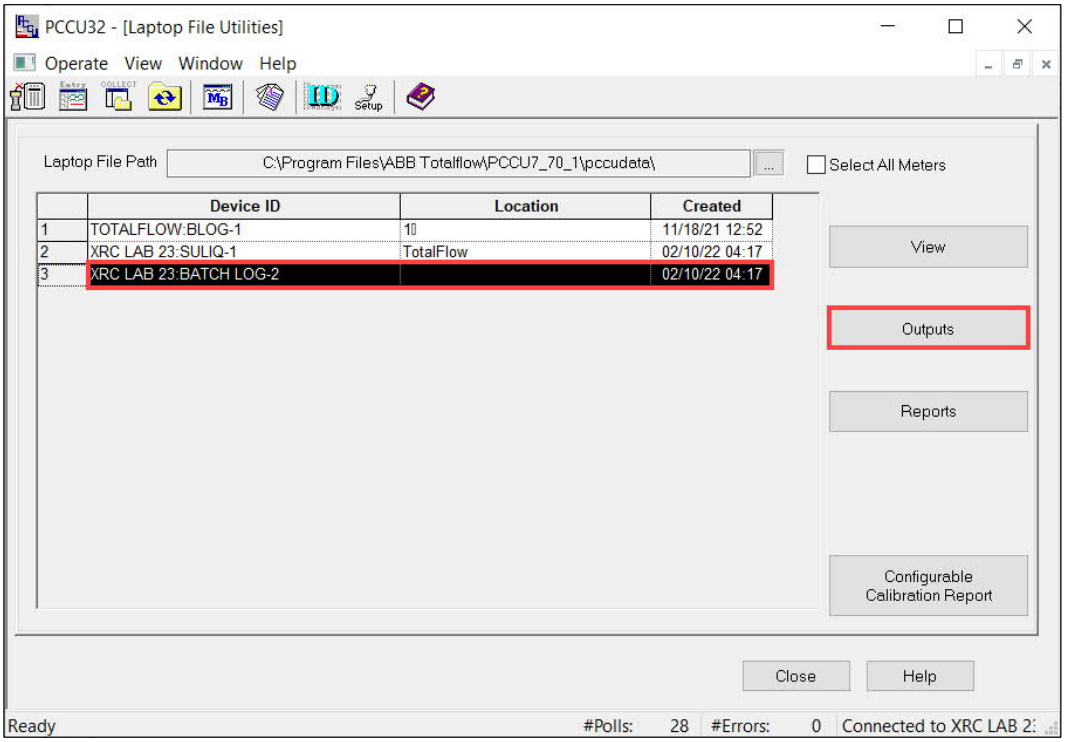
7.2 Generate batch CFX output from Laptop File Utilities screen

A batch CFX output can also be generated after data collection using the Laptop File Utility as follows:

1. Click the Laptop File Utilities icon on the PCCU top menu. The list of application instances displays.
2. Select the batch log instance of interest from the list (Figure 7-2).
3. Click Outputs.

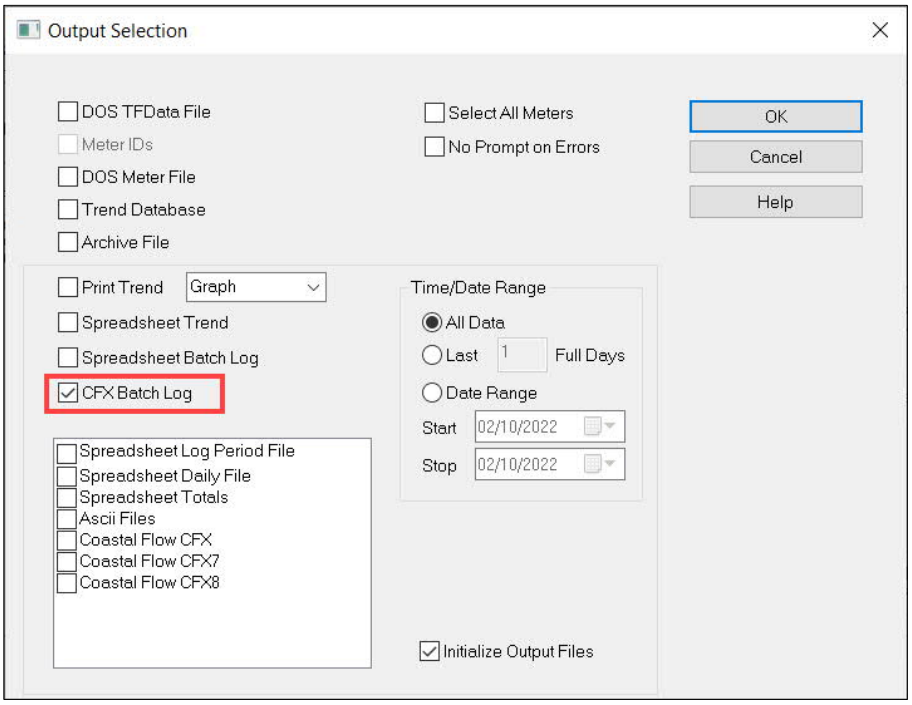
IMPORTANT NOTE: The associated liquid application tube must be listed in the laptop file utilities screen. If it does not show, the tube data is not available and the utility cannot generate the batch CFX output correctly. This procedure assumes that the tube was selected for data collection along with the batch app instance it is associated with. See section 7.1 Generate batch CFX output from the collection screen.

Figure 7-2: Generating outputs from the Laptop File Utilities screen



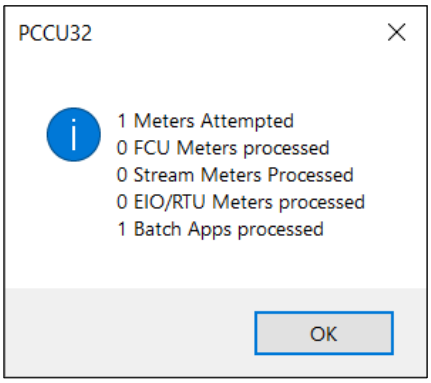
4. Select only the required data if you do not wish to collect all data. All data is selected for collection by default.
5. Select CFX Batch Log on the Output Selection dialog (Figure 7-3).

Figure 7-3: Select CFX Batch Log as output



6. Click OK. A message displays to indicate the number of batch app instances processed (Figure 7-4).

Figure 7-4: Apps processed



7. Click OK.
8. Locate and verify the generated files with the appropriate third-party viewers apps.

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Pleasanton, TX 78064
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