

Connecting ProSample to Amazon

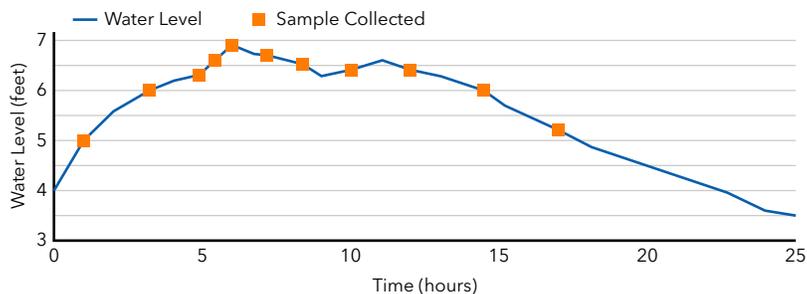
FLOW-PACED SAMPLE

INTRODUCTION

In this guide, a user will learn how to set up a connection between the **Amazon bubbler** and the **ProSample**, how to calibrate the 4-20 mA current loop, how to set up a trigger event, and how to program the ProSample to use the trigger event.

FLOW-PACED SAMPLE

A user may have a sampling scenario in which a sample is collected once every sample pacing unit. Sample pacing is a volume of water that passes by the sensor and has no relation to time. For example, a project may trigger sampling to begin at a stage of 5 feet and collect a sample every time that 25,000 cubic feet of water is recorded to have passed by the sampler. The following graph depicts this scenario. The x-axis shows time steps, but note that the samplers are not collected at even time steps. The samples are collected by pacing. As more flow passes by the bubbler, the sample intervals are closer together. As the flow recedes, the sample intervals are further apart. Sampling ceases once the stage drops below 5 feet.



Interested in using the ProSample and Amazon in other scenarios? How-to guides are available at [YSI.com/ProSample](https://www.ysi.com/ProSample).

THINGS YOU WILL NEED

- ProSample
- Amazon Bubbler
- Flow Signal Cable
- *Optional: Power Supply for Battery (Solar Panel, Regulator)*
- (2) 12 V Batteries
- Additional Wire
- Wire Strippers/Cutters



Figure 1: ProSample PM-12 and Amazon Bubbler

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ASSEMBLING THE 4-20 mA CURRENT LOOP

A 4-20 mA current loop must be set up because the ProSample battery does not provide enough power to the Amazon for the current to travel through the loop for the full range of 4-20 mA.

- 1 Connect the Amazon power terminal blocks to the first 12 V battery.
- 2 Connect the regulator to the battery, and then the solar panel to the regulator. *If not using a solar panel and regulator, skip this step.*
- 3 Connect Flow Signal Cable to the Signal-Input port on ProSample.
 - a. This is the only port available on the P and PM.
 - b. This is the top port on the P-12 and PM-12.
 - c. Align the notch in the cable with the connector plug.
- 4 Connect the grey wire on the Flow Signal Cable to the negative terminal on the second 12 V battery.
 - a. Note: The 4-20 mA Current Loop needs to maintain close to 24 V in order for enough current to run through the circuit, so a solar panel should be used if the sampler is to be deployed for an extended duration.
 - b. Additional wiring can be exposed by cutting back the outside layer of the flow signal cable. Be sure to avoid cutting the internal wires.
 - c. An additional option if the wire length is not long enough to connect to the battery is to cut a portion of wire long enough to reach the battery and splice the wires together.
- 5 Connect the brown wire on the Flow Signal Cable to the 4-20 mA (-) terminal port.
- 6 Cut a piece of wire long enough to go from the positive terminal on the second 12 V battery to the 4-20 mA (+) port and install the wire.

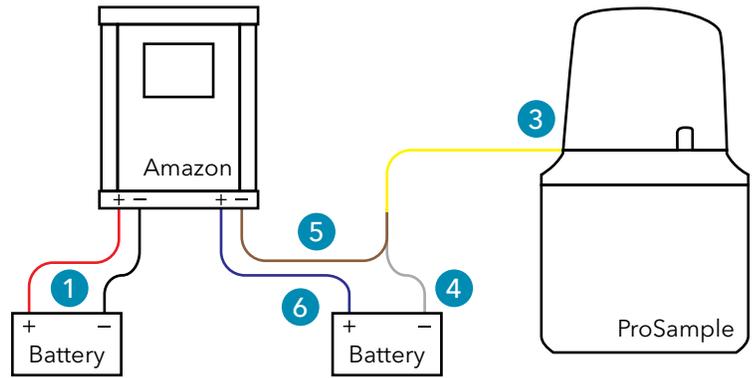


Figure 2: Wiring diagram for a ProSample to an Amazon Bubbler.



Wire Color	Input Signal
Brown	Analog +
White	Analog -
Grey	Com
Yellow	Digital
Green	Event

Figure 3: Flow signal cable and wiring information.

After this setup takes place, there will be enough power from the ProSample and the battery to allow for enough current to travel through the loop.

AMAZON SETUP

1 From the menu, select **4 to 20 mA Menu**.

2 Adjust the Min Level and Max Level to the possible readings that may occur.

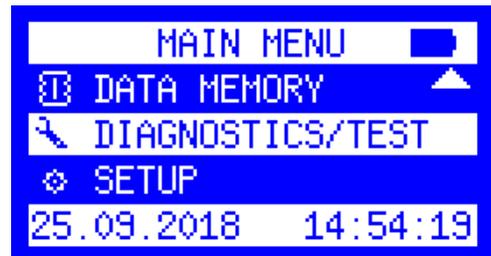
In the example scenario listed above, the stream bottom may be at 0.0 feet, which would be the minimum possible water level. The maximum possible water level may be 10 feet based on historically recorded flooding.

PROSAMPLE SETUP

Verifying the Connection

Before programming the sampler, a user should ensure that the Amazon 4-20 mA signal is being recognized by the ProSample. This series of steps explains how to verify this connection.

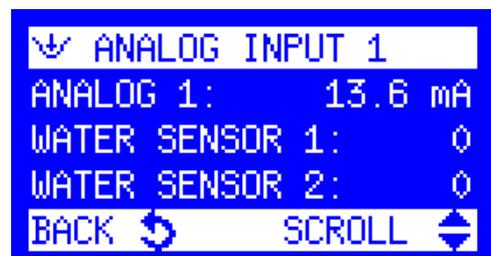
1 From the Main Menu, select **Diagnostics/Test**.



2 Select **Analog Inputs**.



3 If the stage has been set on the Amazon and is in between the Minimum and Maximum levels, the Analog 1 reading will be between 4 and 20 mA.

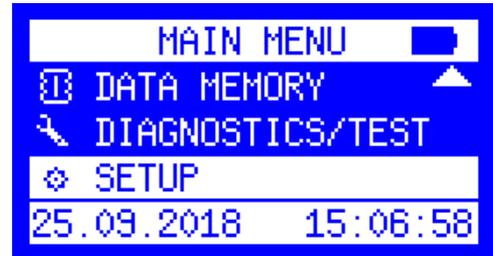


If the reading is 0.0 mA, verify that all of the connections are tight, there is power, and the water level currently being measured by the Amazon is greater than the value that was set up in the Amazon.

Calibrating the 4-20 mA Connection

The ProSample 4-20 mA channel needs to be calibrated in order to ensure that the ProSample correctly reads the current input coming from the Amazon.

1 Go back to the Main Menu, select **Setup**.



2 Select **System Settings**.



3 Select **Analog Signal**.



4 Choose **Analog 4-20 mA**.



5 Select **Calibration**.



6 Make sure **Analog 4-20 mA** is checked, select **Next**.



7

Change the level on the Amazon to the Minimum Level from the Amazon Setup steps.

8

On the ProSample screen, the Measured Value should be near 4.0 mA. Select **Confirm**.



9

Change the level on the Amazon to the Maximum Level from the Amazon Setup steps.

10

On the ProSample screen, the Measured Value should be near 20.0 mA. Select **Confirm**.



11

The calibration completed screen will appear. Select **Continue**.



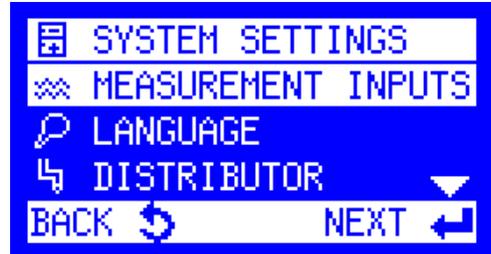
*****TROUBLESHOOTING TIP:** If the measured value during the 20 mA calibration does not stabilize, there is not enough power running through the current loop and additional power needs to be inserted into the loop, or a charging system like a solar panel and regulator needs to be connected to the system if an appropriate battery size has already been installed.

Setting Up the Trigger Point

The next step in programming the ProSample is to set up a trigger threshold that will cause a sampling program to initiate. First, the maximum and minimum water levels will be programmed into the ProSample, mimicking the values that were set up in the Amazon earlier. Then, a water level value that sampling will start at will be programmed into the sampler. In this example, that trigger threshold is a water level of 5 feet.

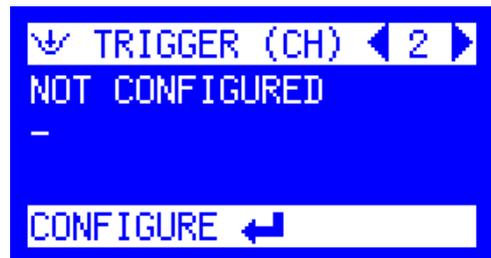
1

Return to the System Setting menu, select **Measurement Inputs**.



2

Choose the Channel for input by scrolling left and right. When the correct channel is displayed, select **Configure**.



3

Select the Analog Channel that the Amazon is connected to and select **Choice**.



4

Choose the units and select **Choice**.



5

Enter the value of the 4 mA output - Minimum Value from Amazon Setup - select **Next**.

In this example, our minimum water level value should be 0.0 feet since that is the value recorded by the Amazon when a 4mA signal is sent.



6

Enter the value of the 20 mA output - Maximum Value from Amazon Setup - select **Next**.

In this example, our maximum water level value should be 10.0 feet since that is the 20mA output stage in the Amazon.



7

Select a Limit Value - High Setpoint, Low Setpoint, No Detection.

- a. **High Setpoint** - If a user wants to collect a sample after a water level goes above a certain value, this option will be selected. For example, if a user wants to collect a sample when the value goes above 5 feet, 'high setpoint' would be selected and 5.0 entered as the value.
- b. **Low Setpoint** - If a user wants to collect a sample after a water level goes below a certain value, this option will be selected. For example, if a user wants to collect a sample when the value goes below 5 feet, 'low setpoint' would be selected and 5.0 entered as the value.
- c. **No Detection** - There is no threshold determined for collecting a sample.



8

If High or Low Setpoint is chosen, enter the threshold value, select **Choice**.



9

Enter a Deadband value, if desired, and select **Choice**.

- a. **High Setpoint Deadband** - This is the calculated value which the signal must fall below before sampling will stop. For example, sampling starts when the water level goes above 5 feet but a user does not want the sampling to stop until the water level reaches 4.8 feet. The difference between the starting trigger point and the sampling event ending is -0.2 feet. Therefore, the high setpoint deadband would be -0.2 feet.
- b. **Low Setpoint Deadband** - This is the calculated value which the signal must rise above before sampling will stop. For example, sampling starts when the water level goes below 5 feet but a user does not want the sampling to stop until the water level rises above 5.4 feet. The difference between the starting trigger point and the sampling event ending is +0.4 feet. Therefore, the low setpoint deadband would be 0.4 feet.
- c. If the event should be disabled at the same value it was enabled, the Deadband would be 0.0 feet.



10

On the Trigger Channel menu, select **Event**. This will allow channel 1 to be used as an event trigger when programming the sampler.



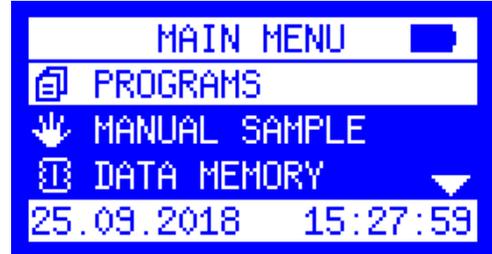
All analog setups have now been completed. The next section will explain how to set up a sampling program using the event trigger that has just been programmed.

FLOW-PACED SAMPLE TRIGGERED BY EVENT

In this instance, the sampler will begin collecting samples after the trigger threshold has been reached and will continue to collect samples after a certain amount of water has passed through the system. For example, a sample should be collected every 15,000 m³ if the level is above 5 feet.

1

From the Main Menu, select **Programs**.



2

Highlight **Change** and select **Next**.



3

Select the program to change by scrolling right and left, then select **Next**.



4

On the Program Mode screen, choose **Event Analog** by highlighting it and selecting **Next**.



5

Enter a sampling time interval and select **Next**.

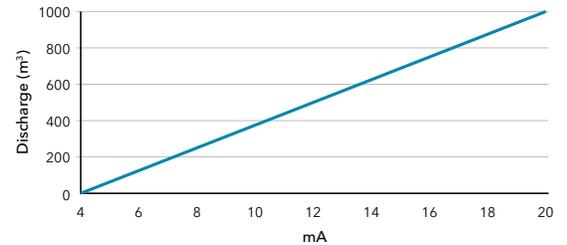
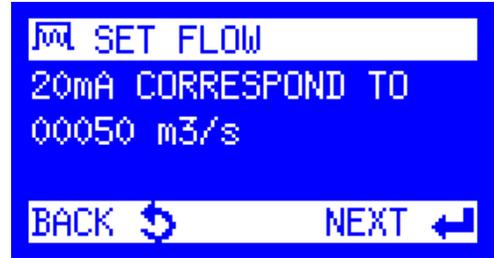


6

Enter the flow rate for the 20 mA setting. Select **Next**.

- a. The flow rate at the 20 mA setting will be the maximum flow for the instrumentation to build a discharge rating curve from.
- b. The discharge rating built into the ProSample will prorate from 0 at the 4 mA setting to the maximum flow rate at the 20 mA setting.
- c. Example: Maximum gage height is 10 feet. At 10 feet, the corresponding discharge is 1,000 m³. 10 feet is equivalent to 20 mA. Flow rate at 20 mA is therefore 1,000 m³. Discharge rating is shown in graph below.

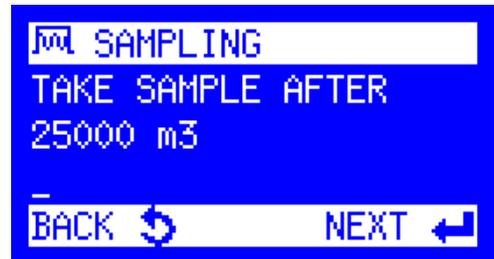
Example: The maximum water level at a location is 10 feet, which corresponds to a discharge of 1,000m³, and is also the 20 mA output from the Amazon. Flow rate at 20 mA is therefore 1,000 m³. The example discharge rating is shown in the graph to the right. Discharge ratings in the ProSample will be linear and will always start at 0 m³ as alluded to above.



7

Enter the flow pacing desired and select **Next**.

- a. A sample will be collected after the ProSample has calculated that this amount of water has passed based on input from the Amazon.



8

Enter the sample volume to be collected during each sample and select **Next**.



9

Choose a Fill Mode by highlighting it and selecting **Next**.

- a. **Time Related** - User chooses the duration of time to sample over with no set number of samples.
- b. **Sample Related** - User chooses the maximum number of samples to be collected when the program is selected.



10

If **Time Related** is chosen, enter the Bottle Fill Time and select **Next**. Then, enter the Bottle Size Limitation, which is the maximum sample volume that can go into each bottle, whether composite or discrete. Select **Next**.

- a. Composite Bottle - Bottle fill time determines how long the program will run. Example: If Sampling Interval is set to 15 minutes, Sample Volume is set to 100 mL, Bottle Fill Time is set to 2 hours, then the ProSample will collect 100 mL of sample every 15 minutes for 2 hours resulting in 800 mL collected.
- b. Discrete Bottles - Bottle fill time determines how many times each bottle in the program will be filled. Example: If Sampling Interval is 15 minutes, Sample Volume is 100 mL, and Bottle Fill Time is 15 minutes, then each bottle is only filled once and each bottle will have 100 mL of sample. The length of the program is determined by the number of bottles that will be filled. Example 2: Sampling Interval is 15 minutes, Sample Volume is 100 mL, Bottle Fill Time is 45 minutes. Each bottle will be filled 3 times and each bottle will contain 300 mL.



11

If **Sample Related** is chosen, enter the number of samples to be collected and select **Next**.



12

Choose the Fill Function - Drop Samples or Switch Bottles.

- a. **Drop Samples** is for composite
- b. **Switch Bottles** is for discrete



13

Selecting **Settings Complete** will return the user to the Programs menu.





After following the setup steps for the Amazon and ProSample, and subsequently setting up a trigger point, a user will likely want to test the program to ensure that it will work correctly before leaving the sampler. To do this, manually change the stage in the Amazon by going into the Bubbler menu tab and adjusting the current level. This will change the 4-20mA reading and will trigger the sampler accordingly. After testing the program, stop the program and restart it to ensure that the forced sample start does not get included in sample counts.

Following the approach in the steps listed above will ensure that the ProSample collects samples in a timely and accurate manner based on current conditions at a sampling location. Videos and additional written documentation are available online at [YSI.com/ProSample](https://www.ysi.com/ProSample) and [YSI.com/Amazon](https://www.ysi.com/Amazon).

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