
NATIONAL CORAL REEF MONITORING PROGRAM

Standard Operating Protocol

for

Density to Calculate Salinity (Climate)

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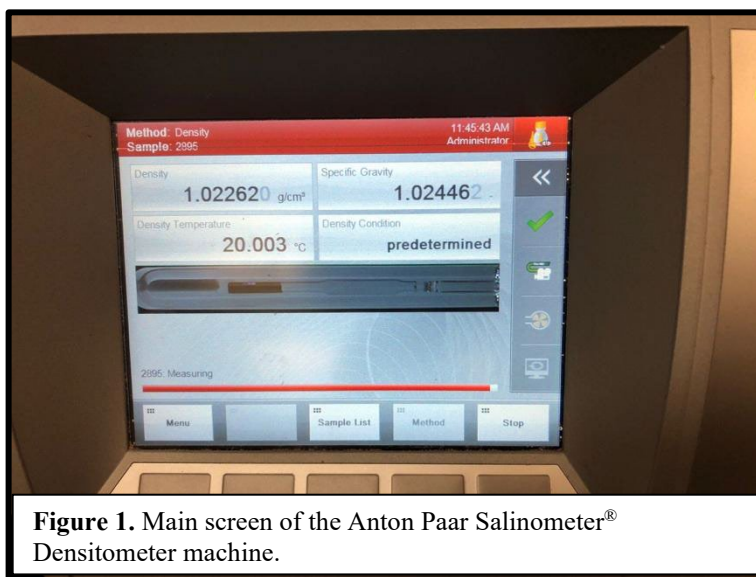


NOAA
CORAL REEF
CONSERVATION PROGRAM

National Coral Reef Monitoring Program Densitometer Procedure

Overview:

- All water samples are run on the densitometer to calculate salinity. The densitometer is a highly precise and delicate instrument therefore Albert Boyd should train users prior to using the instrument.
- Turn the instrument on and allow the instrument to warm up for ~30 min before running samples.
- Water Checks before the start of sample runs and Air Checks after sample runs are crucial to the densitometer protocol.



How to run samples on the Densitometer:

1. Orient yourself with the machine. There is a port on the right side of the Densitometer where the syringe is placed. This is where the samples are loaded into the machine. Be sure to load each sample carefully, being sure to not introduce air bubbles into your sample. (Figure 1).
2. After the machine has been on for ~30 min, you must conduct a water check. Grab a sample of fresh DI water.
3. Using a 1ml syringe that is labeled DI water, prepare a DI water sample and insert it into the cell.
4. Navigate to the menu, then air/water checks/ and select water check. Once the DI water sample has been loaded into the cell then click start. This check takes about ~10 min.
5. If the check passes, then write down the measured value that it passed at into the Densitometer user log book. Once passed, proceed to process samples.
6. In order to run a sample, you must enter the ID for each sample before it is processed.
7. First click on the menu, then click on setup, then measuring system settings.
8. Click on sample list, then sample list/ sample settings. Then click on sample list mode: Sample list. The click on sample name prefix.
9. Then enter the name pertaining to that batch of samples whether it is (“NCRMP”, “ERL” or “BW”, etc.) Hit ok, then ok, again and yes to save the setting. Then go to the home screen.

10. Then when a sample is ready to be run click on the sample list, then enter the bottle ID number by clicking on “A” to begin entering. Then hit enter. Once the ID is entered, return home. (Figure 2).

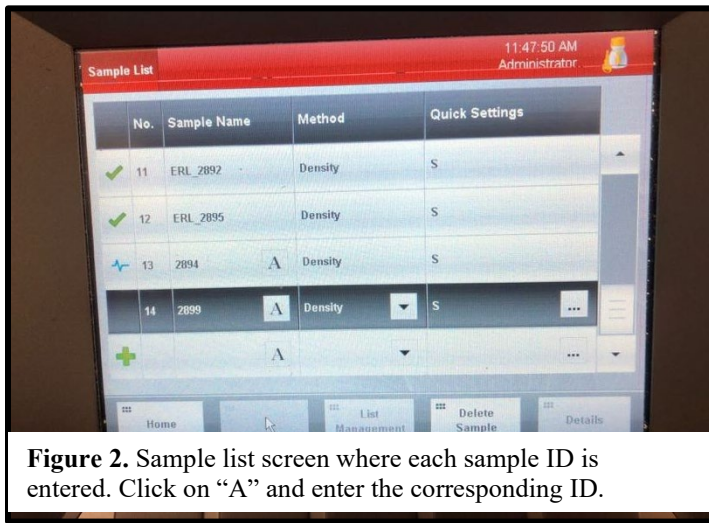
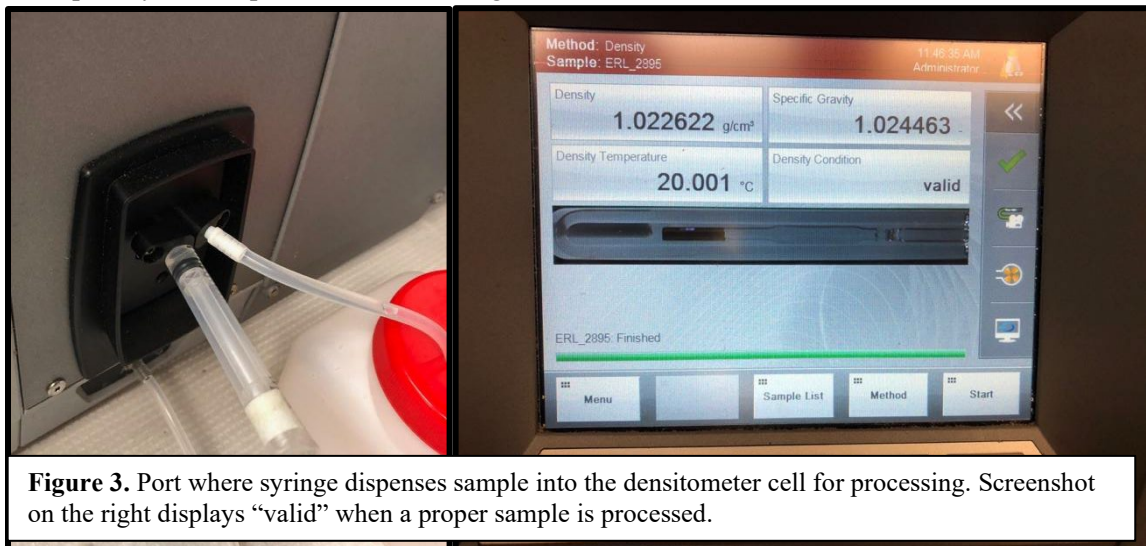


Figure 2. Sample list screen where each sample ID is entered. Click on “A” and enter the corresponding ID.

11. Then place your sample into the cell being sure not to introduce air bubbles into the cell.



12. Then click start to have the sample begin processing. When the sample is done the screen will read finished on the bottom left. Make sure the density condition says “valid” if not then the sample must be run again until it appears “valid”. (Figure 3).
13. To export densitometer data plug flash drive into water chemistry computer for data processing.
14. Click menu then data memory, then measured data, then click filter. Select the sample name containing value (either the cruise name or “NCRMP”, “ERL, etc. then click ok. (Figure 4).

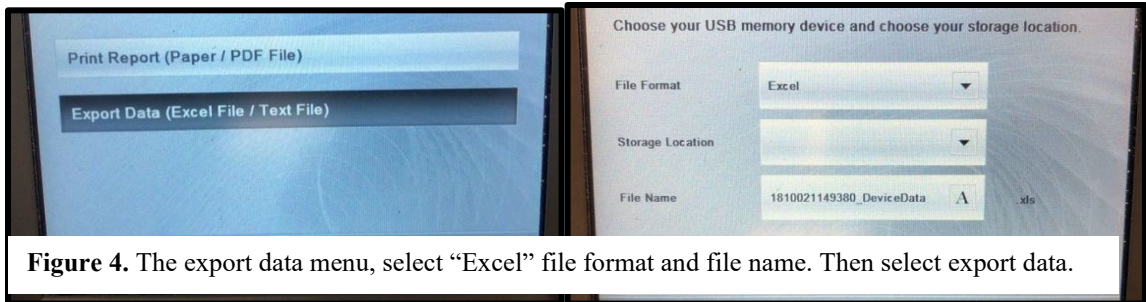


Figure 4. The export data menu, select “Excel” file format and file name. Then select export data.

15. Then select export, then export data and click ok. A file name pops up if you wish to change it you can however, just click ok. Then the data will export on to the USB. A prompt will pop up with then data is done exporting. Then you can remove the USB from the densitometer.
16. After the data has been exported the densitometer must be shut down. But first an air check of the cell must be passed in order to properly shut down the machine. (Figure 5).
17. Navigate to the menu, then air/water checks/ and select air check. Dry the cell for one cycle by replacing the hose in the sample port. Once the cell has been dried then click “start” to begin the air check. This check takes about ~1-3min. If the air check passes then the machine can be shut down.

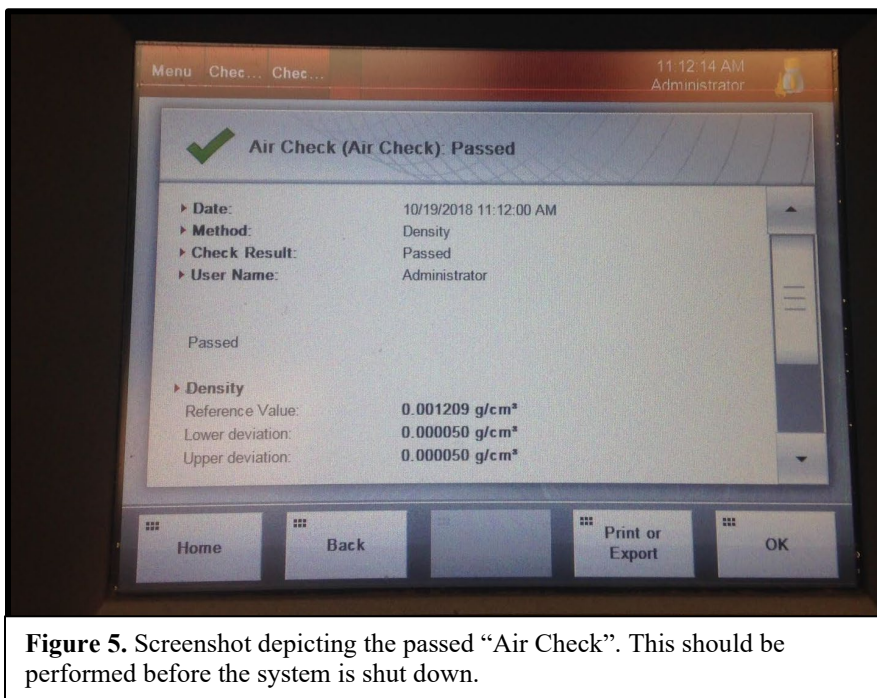


Figure 5. Screenshot depicting the passed “Air Check”. This should be performed before the system is shut down.

Density Calculation Processing:

1. On TA desktop computer, navigate to documents (CORALDEPOT)/ carbonateChemistry/Densitometer/ densitometerData.xlsx file. While in the densitometer folder navigate to the folder (salinityDensityCalculations) and open the file labeled (density to salinity function.xlsm)

- a. Note: the density to salinity file must be OPEN in order for the Densitometer Data file to calculate salinity in the proper column. Open the conversion file prior to opening the data file.
2. Open up the flashdrive folder. Open up file with the data you just ran
 - a. Copy the data rows in the file
 - b. While in the densitometer folder open the (densitometerData.xlsx) file. Navigate to the tab for your project, and copy/paste the densitometer data from your flash drive file into the excel sheet so there's a digital copy of the file.
3. While the density to salinity function document is open, one can calculate the salinity on the density database file by simply dragging down the salinity column. This file being open automatically converts the density into salinity.
4. Once calculated, close the density to salinity function document. Navigate to the bottle database document.
5. Open up the **Density** table in the access database
 - i. Write in your ID-Sample numbers, date, and time of measurement; copy paste the density (make sure you're not pasting specific gravity values) and temperature values
6. Save all work and close windows when finished.

Last Reviewed: April 21, 2023