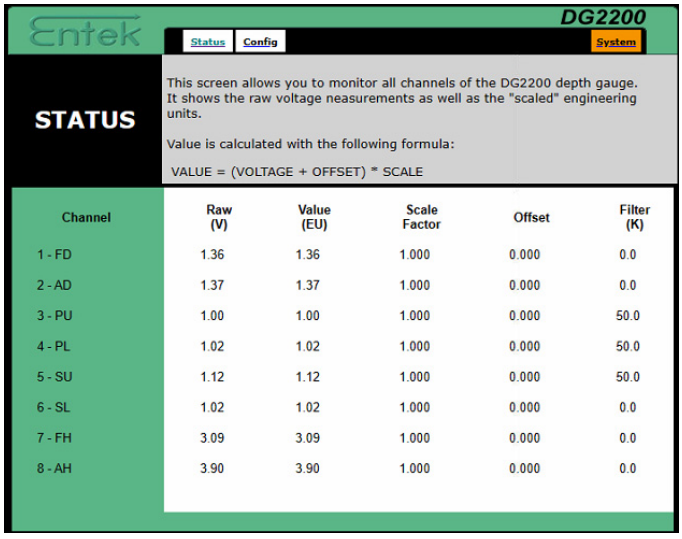
Bubbler System Calibration Tips

By Cristhian Bermudez

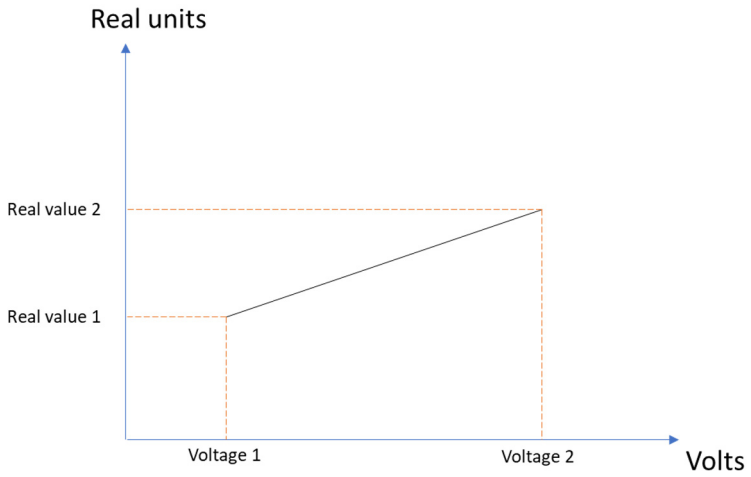
We provide bubbler systems as a solution for hopper dredges. The bubbler system solution combines analog sensors to provide depth, levels, and draft. All the sensors are connected to the PLC that is inside the box:

The sensors require calibration to adjust to dredge conditions. All sensors require two calibration points that are used for transforming voltages into real units. The voltages can be seen in the configuration interface or the drivers in DREDGEPACK®.



Channel	Raw (V)	Value (EU)	Scale Factor	Offset	Filter (K)
1 - FD	1.36	1.36	1.000	0.000	0.0
2 - AD	1.37	1.37	1.000	0.000	0.0
3 - PU	1.00	1.00	1.000	0.000	50.0
4 - PL	1.02	1.02	1.000	0.000	50.0
5 - SU	1.12	1.12	1.000	0.000	50.0
6 - SL	1.02	1.02	1.000	0.000	0.0
7 - FH	3.09	3.09	1.000	0.000	0.0
8 - AH	3.90	3.90	1.000	0.000	0.0

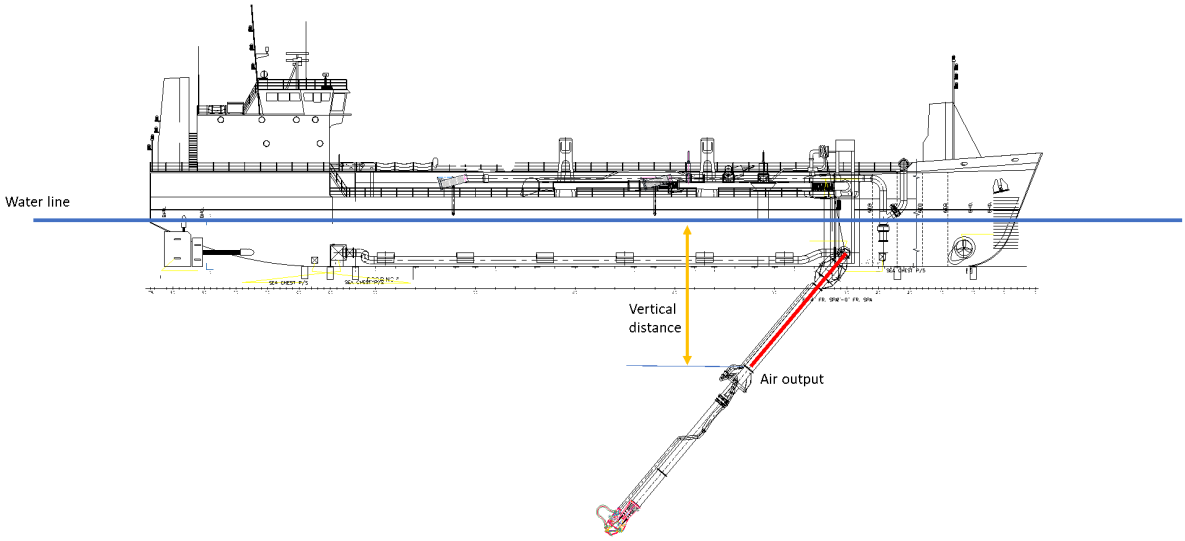
Using the two voltage values, the program can calculate the relation that exists between voltages and real units (depth, level, etc.). It creates an equation for the line y=mx+b. To have better calibration results, we recommend making accurate measurements and repeating the calibration several times for consistent information.



The following describes the calibration processes that need to be performed on each sensor:

A. **Arms**

For the calibration on the arms, you are required to measure the vertical distance from the point the compressed air exits (where it starts bubbling) to the water surface. It is critical to have the measuring tape as perpendicular as possible with respect to the water. If the tape is diagonal, this provides incorrect depth measurements.

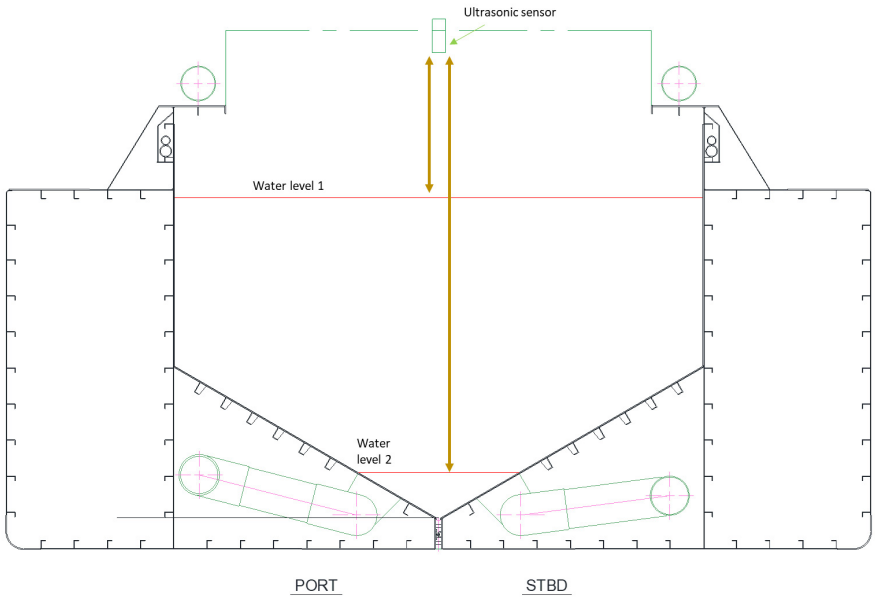


At minimum, two calibration points are needed as describe previously. One must be at the arm shallow, and a second one at the deepest point possible.

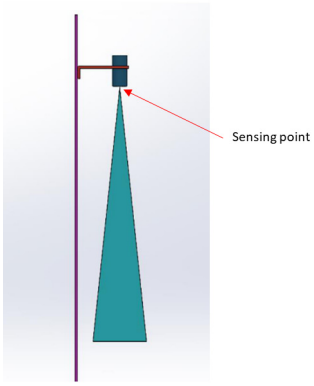
This is the same process for all of the channels associated with the arms.

B. **Hopper Level Sensors**

In this case, it is necessary to measure two calibration points, one with the hopper as high as possible, and one with the hopper almost empty.



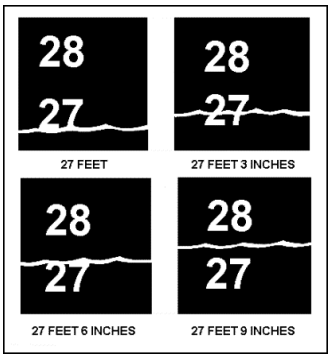
The measurements need to be done from the bottom of the sensor to the water level. Making accurate measurements is critical because it will affect the math on the LDM and in DREDGEPACK®. The sensor should be installed in a location free of obstacles while avoiding water splashes that affect the measurements.

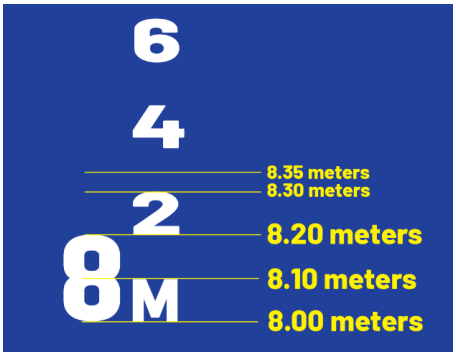


C. **Draft**

The aft and forward will each need two calibration points. One measurement needs to be taken with the minimum draft possible, the second with the maximum draft. It is critical to have draft marks on the hull for a proper reading of the draft:

When calibrating, it is very important to take a proper reading using the following images as a reference:





For all sensors, it is important to take the measurement of the variable and immediately check the voltage reading. For instance, when you are checking the hopper levels, if you wait 10 minutes to record the voltage, the conditions will change in the meantime and the voltage no longer represents the same measurement level.