Shear Probe Calibration Report

**Probe Details**
- Probe SN: M2257
- Probe PN: 12-023-20
- Description: Shear Probe, 3/8", SMB
- Sens: \(0.0797 \text{ m}^2\text{s}^{-2}\)

**Testing Details**
- Pressure Test Operator: Shiro Yasuda
- Pressure Test Date: 2020/03/31
- Pressure Rating: 6000 m

**Calibration Details**
- Calibration Operator: Shiro Yasuda
- Calibration Date: 2020/12/1
- Recommended re-calibration: 2021/12/1
- Calibration temperature: 18.7°C
- Amplifier type: Charge Transfer
- Measured Capacitance: 0.396 mF
- Measured Resistance: > 200.0 GΩ

The shear probe is calibrated using a vertical jet of water at speed \(U\). The angle of attack, \(\alpha\), is then varied from approximately -10° to +10° in steps of 2° and the output signal, \(V_{\text{rms}}\), generated from the rotating probe is measured.

Least Squares Regression:

\[
\frac{V_{\text{rms}}}{U^2} = S(0) \sin 2\alpha + c \sin^2 2\alpha
\]

\[
S(0) = 0.0797
c = 0.027588
\]

Units:
\(S(0), c \equiv \frac{V}{\text{m}^2\text{s}^{-2}}\)

\(\alpha \equiv ^\circ\)

*Calibration data and results shown on next page.*

**Frequently Asked Questions**

**Q1** How often should shear probes be calibrated?
The sens value of a shear probe will shift with time and use. Rockland recommends calibrating shear probes annually, or before and after a deployment.

**Q2** Is a cold calibration required?
When the shear probes are operated in cold water (below 5°C) the sensitivity of the probe changes. Therefore, Rockland offers a cold-calibration option, which involves calibrating the probes in both room temperature water (20°C) and cold water (between 0 to 5°C). Two calibration reports will be supplied.

**Q3** What are the basic operating requirements of the shear probe?
To produce useable data, shear probes require a flow past the probe greater than 0.2 m s\(^{-1}\). The recommended flow is between 0.6 m s\(^{-1}\) and 0.8 m s\(^{-1}\). The angle of attack of the shear probe must be less than or equal to 10 degrees. Shear probes perform best when installed on low-vibration platforms.

If you have questions or you suspect a shear probe may be broken, please contact support@rocklandscientific.com
Figure 1: Upper panel: Least squares (LSQ) regression of the acquired shear amplitude data against the sine of the angles. Middle panel: Difference between fitted and actual shear amplitude measurements using the LSQ fit. Lower panel: Angular variability of the sensitivity.
FP07 Temperature Probe Production Report

**Probe Details**
- Probe SN: T2043
- Probe PN: 012-024-20
- Connector: SMB
- Thermistor Resistance: 2.398 kΩ at 20.8 °C

**Pressure Testing Details**
- Operator: Shiro Yasuda
- Date: 2020-04-01
- Depth Rating: 6000 m

**Dip Test Details**
- Operator: Shiro Yasuda
- Date: 2020-04-03
- Voltage (Measured): 0.0040 V
- Resistance (Calculated): 749 GΩ

**Calibration Method**
This FP07 thermistor was NOT calibrated at the Rockland Production Facility. It is recommended that an in situ calibration be performed using data collected by a CTD-quality thermometer (usually a Sea-Bird 8SE or a JAC-CT) included on your Rockland instrument or on a nearby platform. Functions are available in Zissou Essentials and the ODAS Matlab Library to determine the coefficients (i.e. $\beta$, $\beta_1$, $\beta_2$, and/or $T_0$) for a first or second-order regression to the Steinhart-Hart equation (given below).

First-Order Model:

$$\frac{1}{T} = \frac{1}{T_0} + \frac{1}{\beta} \log_e \left( \frac{R_T}{R_0} \right)$$

Second-order Model:

$$\frac{1}{T} = \frac{1}{T_0} + \frac{1}{\beta_1} \log_e \left( \frac{R_T}{R_0} \right) + \frac{1}{\beta_2} \left( \log_e \left( \frac{R_T}{R_0} \right) \right)^2$$

$[T] = K, \quad T \equiv \hat{T} - 273.15 [°C]$