Rockland Scientific International Inc.
520 Dupplin Road, Victoria, B.C. V8Z 1C1
Canada

web: www.RocklandScientific.com
tel: +1-250-370-1688 | fax: +1-250-370-0234
Business No.: 82695-5544

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Shear Probe Calibration Report

Probe Details

Probe SN:	M2257
Probe PN:	12-023-20
Description:	Shear Probe, 3/8", SMB
sens:	$\mathbf{0.0797}\frac{V}{m^2s^{-2}}$

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:	0.989 nF
Measured Resistance:	> 200.0 GΩ

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

Least Squares Regression:

$$\frac{V_{rms}}{U^2} = S(0)\sin 2\alpha + c\sin^3 2\alpha$$

$$S(0) = 0.0797$$
$$c = 0.027688$$

Units:

$$[S(0), c] \equiv \frac{V}{m^2s^{-2}} \qquad [\alpha] \equiv {}^\circ$$

Calibration data and results shown on next page.

Calibrated Probe

This probe is extremely fragile! Do not touch probe tip with any solid object.

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

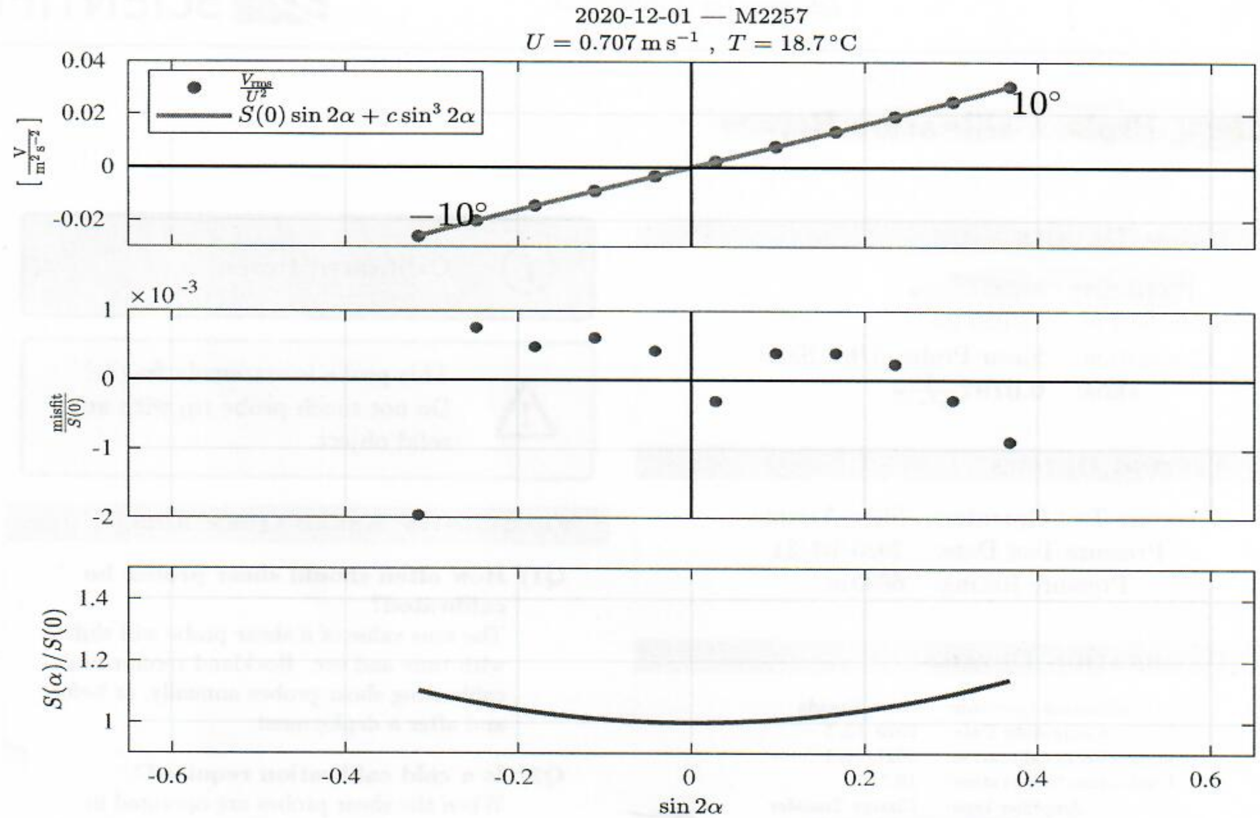

Figure 1: Upper panel: Least squares (LSQ) regression of the acquired shear amplitude data against the sine of the angles. Middle panel: Difference between fitted and actual shear amplitude measurements using the LSQ fit. Lower panel: Angular variability of the sensitivity.

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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 SBE3F, 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. β, β_1, β_2, and/or T_0) for a first or second-order regression to the Steinhart-Hart equation (given below).

First-Order Model:

$$\frac{1}{\hat{T}} = \frac{1}{\hat{T}_0} + \frac{1}{\beta}\log_e\left(\frac{R_T}{R_0}\right)$$

Second-order Model:

$$\frac{1}{\hat{T}} = \frac{1}{\hat{T}_0} + \frac{1}{\beta_1}\log_e\left(\frac{R_T}{R_0}\right) + \frac{1}{\beta_2}\left(\log_e\left(\frac{R_T}{R_0}\right)\right)^2$$

$$[\hat{T}] \equiv \mathrm{K}, \quad T \equiv \hat{T} - 273.15\ [^\circ\mathrm{C}]$$

Uncalibrated Probe

This probe is extremely fragile! Do not touch probe tip with any solid object.

Frequently Asked Questions

Q1) Why is the FP07 thermistor uncalibrated?
The FP07 is designed to be a fast thermistor not a stable thermistor. Due to the lack of stability, it is best to perform an *in situ* calibration. For more information see *Technical Note 047: Why Calibrate the FP07 Thermistor*, available for download on Rockland's website.

Q2) How to perform an *in situ* temperature calibration?
To perform the *in situ* temperature calibration, use the appropriate function supplied in either Zissou Essentials or the ODAS Matlab Library. Details are provided in Technical Note 039 titled "A Guide to Data Processing".

Q3) How to request a calibration of an FP07 thermistor probe?
To request a calibration of your FP07 Thermistor Probe, please contact support@rocklandscientfic.com. This may be necessary if ancillary CTD data is not available.

Q4) What is the time response of the FP07 thermistor probe?
The time response of the FP07 thermistor is probe specific. Please see Sommer et al. (JTECH, 2013) for a discussion on this topic.

If you have questions or you suspect a FP07 thermistor probe may be broken, please contact support@rocklandscientific.com