# Two Point Calibration

Introduction

This Synergy Controller application note describes the gain (span) and offset calculations for a two point calibration.

Specifically, when two reference values are known, and compared against the Synergy controller readings, the calculations in this spreadsheet can be used to correct the errors at these points. The two reference points and the two controller points represent two lines in the graph below.
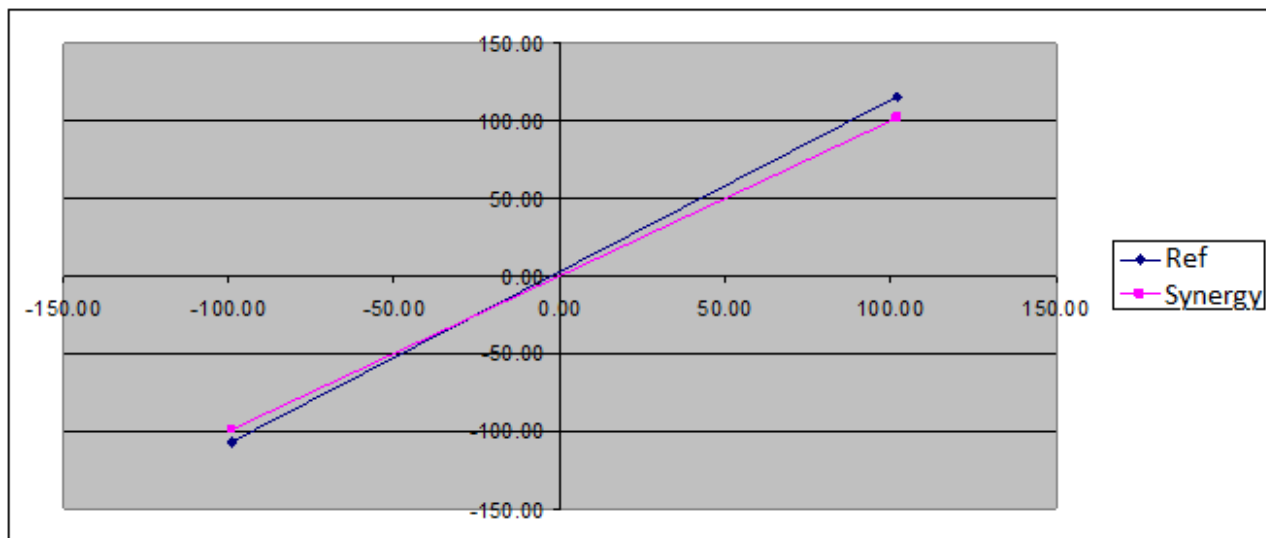
Tidal Engineering's Synergy Controller provides state-of-the-art usability and operating efficiency for Environmental Test Chambers for new and retrofit applications.

Synergy Controller feature include:
- ➔ Color touch screen
- ➔ Ethernet, RS-232 and GPIB communications
- ➔ Built in Data logger
- ➔ Data Acquisition, Up to 64 T-type thermocouples (Optional)
- ➔ Built in Web Server for remote control (Optional)
- ➔ Compatible with Synergy Manager Free Logging and Complete software applications
- ➔ Built in USB port compatible with USB Disk drives for data logging and program transfer.

For more controller information please see the Synergy Controller Technical Manual at:
http://www.tidaleng.com/techmans/Synergy_Controller_Technical_Manual_Rev_F.pdf.

Open Excel and load the file for this application note:

Synergy Controller 2-Point Calibration Calculations REV B.xls

		Synergy Controller	Reference	Corrected Value		New Gain	New Offset			
Synergy Controller 2-Point Calibration Calculations Rev B.xls										
	1	Note the current Gain (Span) and Offset values for the input then set the Gain to 100% and the offset to 0.								
	2	Fill in the Synergy Controller and Reference Values (from Calibrator) in the Yellow boxes below for the two calibration points								
	3	Read the new Gain and Offset in green on the right and enter them for the input.								
		Corrected values show the value expected after the new gain and offset are entered.								
		Synergy Controller	Reference	Corrected Value						
	Point 1	101.10	102.00	102.00						
	Point 2	-100.00	-99.00	-99.00						
						New Gain	New Offset			
						99.95%	0.950273496			
Note:		Gain values under 98% or over 102% percent may indicate an issue with the sensor, the setup, or the controller.								
		Consult Tidal Engineering if values outside this range are calculated by the spreadsheet.								

For example, RTD inputs are calibrated in the Setup\Calibration\Input screen in units of Ohms as shown below:
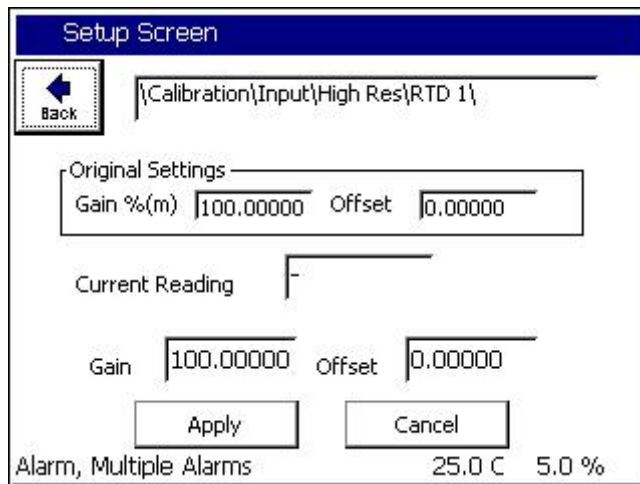
Alternatively, for End-to-End temperature Calibration, a reference temperature reading is compared against the Synergy Controller reading. This takes into account and corrects for the sensor and controller characteristics.

About the Synergy Controller Family

Tidal Engineering's Synergy Controllers including the Synergy Micro 2, Synergy Quattro, and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition. They combine the functions of a chamber controller and a data logger and are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

Synergy Controller feature highlights includes:

➔ Color touch screen
➔ Ethernet, RS-232 and GPIB communications
➔ Built in 100 MB Data logger with USB drive support
➔ Data Acquisition, up to 64 T-type thermocouples (Optional)
➔ Built-in Web Server for remote control; WebTouch Remote ™
➔ Compatible with Synergy Manager for PC based control, monitoring and programming.
➔ Built-in FTP Server for factory automation and test and measurement applications

For more information regarding these controllers please see the Synergy Controller Technical Manual on our website at http://www.tidaleng.com/synergy.htm

About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company is recognized for technical expertise in such areas as environmental test chamber control, Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems.

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