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CN0216 Shield Evaluation Board User Guide

Overview

CN-0216 is a precision weigh scale signal conditioning system. It uses the AD7791, a low power buffered 24-bit sigma-delta ADC along with dual external ADA4528-2 zero-drift amplifiers. This solution allows for high dc gain with a single supply.

Ultralow noise, low offset voltage, and low drift amplifiers are used at the front end for amplification of the low-level signal from the load cell. The circuit yields 15.3 bit noise-free code resolution for a load cell with a full-scale output of 10 mV.

This circuit allows great flexibility in designing a custom low-level signal conditioning front end that gives the user the ability to easily optimize the overall transfer function of the combined sensor-amplifier-converter circuit. The AD7791 maintains good performance over the complete output data range, from 9.5 Hz to 120 Hz, which allows it to be used in weigh scale applications that operate at various low speeds.

The EVAL-CN0216-ARDZ evaluation board is compatible with the Arduino Shield form factor. This user guide will discuss how to use the evaluation software to collect data from the EVAL-CN0216-ARDZ Evaluation Board **(CN-0216 Board)**

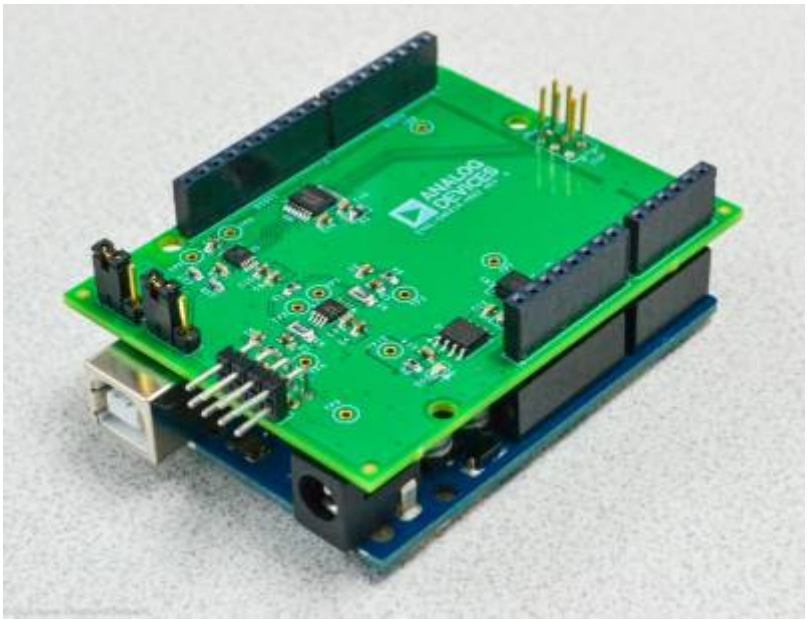
Required Equipment

- EVAL-CN0216-ARDZ Evaluation Board
- Arduino Processor Board (Uno/Mega 2560/Leonardo or Similar)
- LINX Firmware loaded on the Arduino
- CN0216 Shield Evaluation Software
- PC with the following *Minimum Requirements*
  - Windows Vista/7 (32-bit)
  - USB type A Port
  - Processor rated at 1GHz or faster
  - 1GB RAM and 500 MB available hard disk space
- Tedea Huntleigh Model 1042 Load Cell

NOTE - Any 4 or 6 wire load cells can be used with the

CN-0216 Board.
This guide was written with the Tedeah Huntleigh Model 1042 in mind.

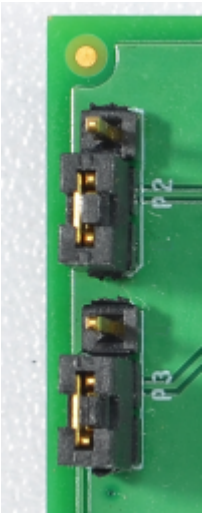
General Setup



- The EVAL-CN0216-ARDZ (CN-0216 Shield Board) connects to a Shield form factor Arduino Board
- Power the system through the Arduino using an external wall wart(7V-12V recommended) for best performance
- Connect the system to the PC using a USB cable
- The Tedeah Huntleigh Model 1042 load cell connects to the EVAL-CN0216-ARDZ via the 8 pin header

Jumper Settings

- “0” Position (shown below)
  - P2 - Connects REFIN+ to Sensor +Sense pin
  - P3 - Connects REFIN- to Sensor -Sense pin

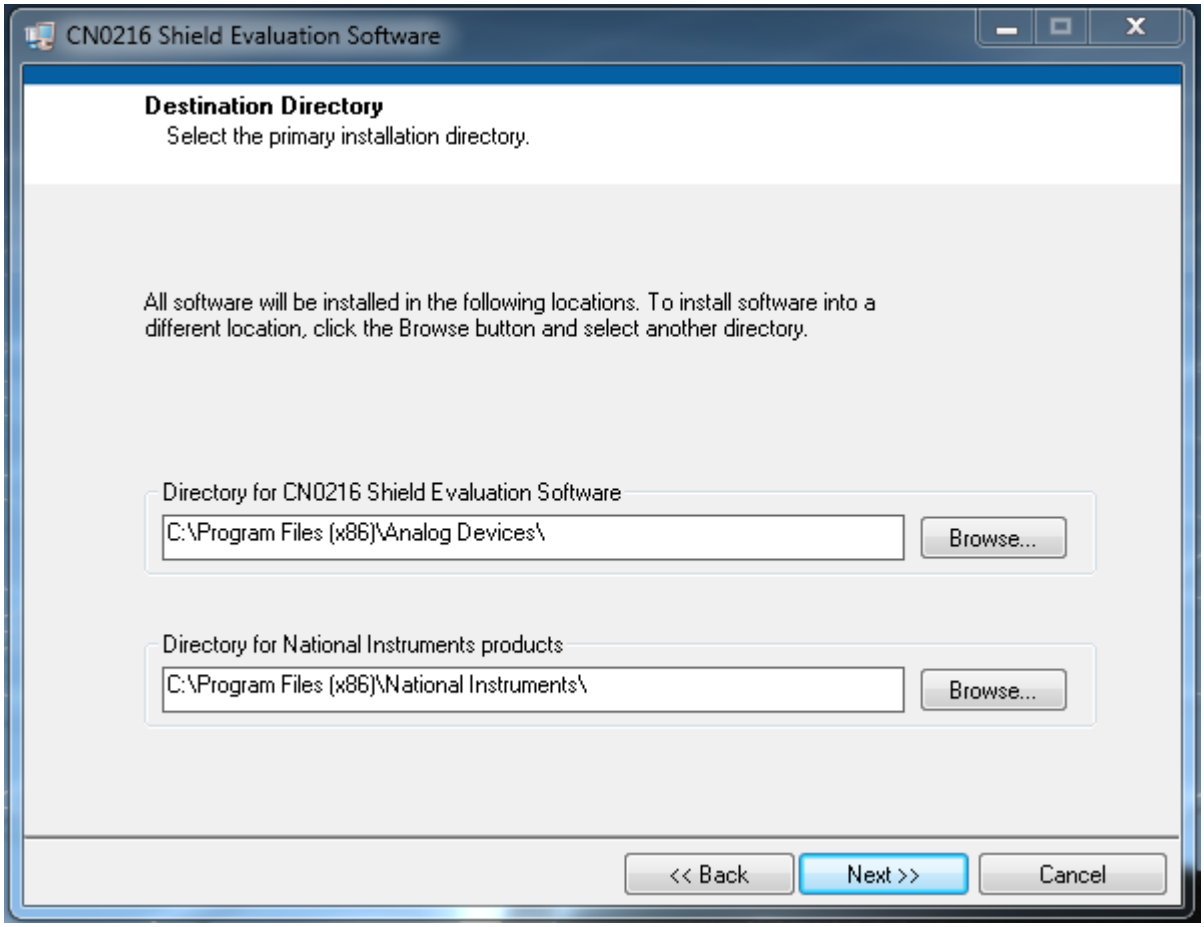


- “1” Position
  - P2 - Connects REFIN+ to 5V supply
  - P3 - Connects REFIN- to GND

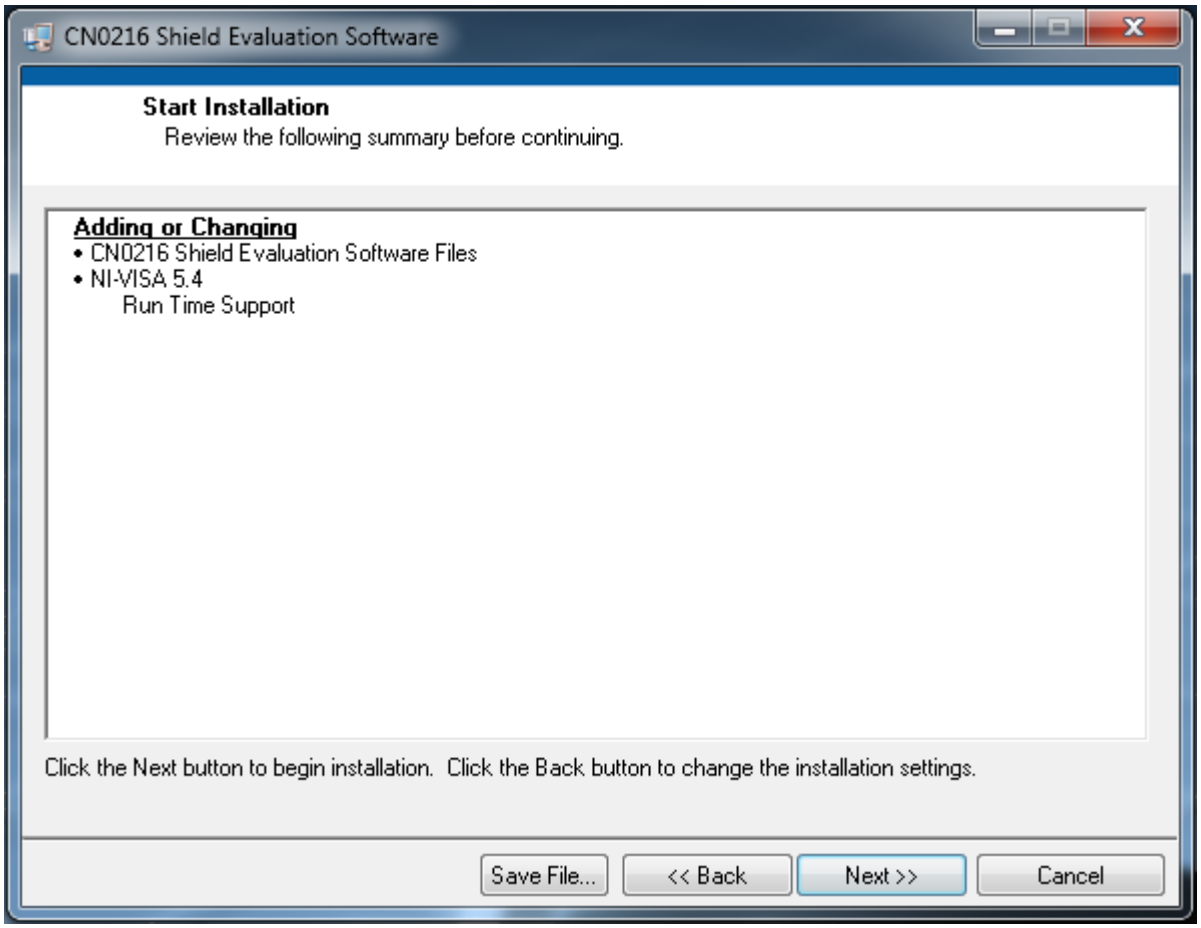
Installing the Software

1. Extract the file **CN0216 Eval Software.zip** and open the file **setup.exe**.

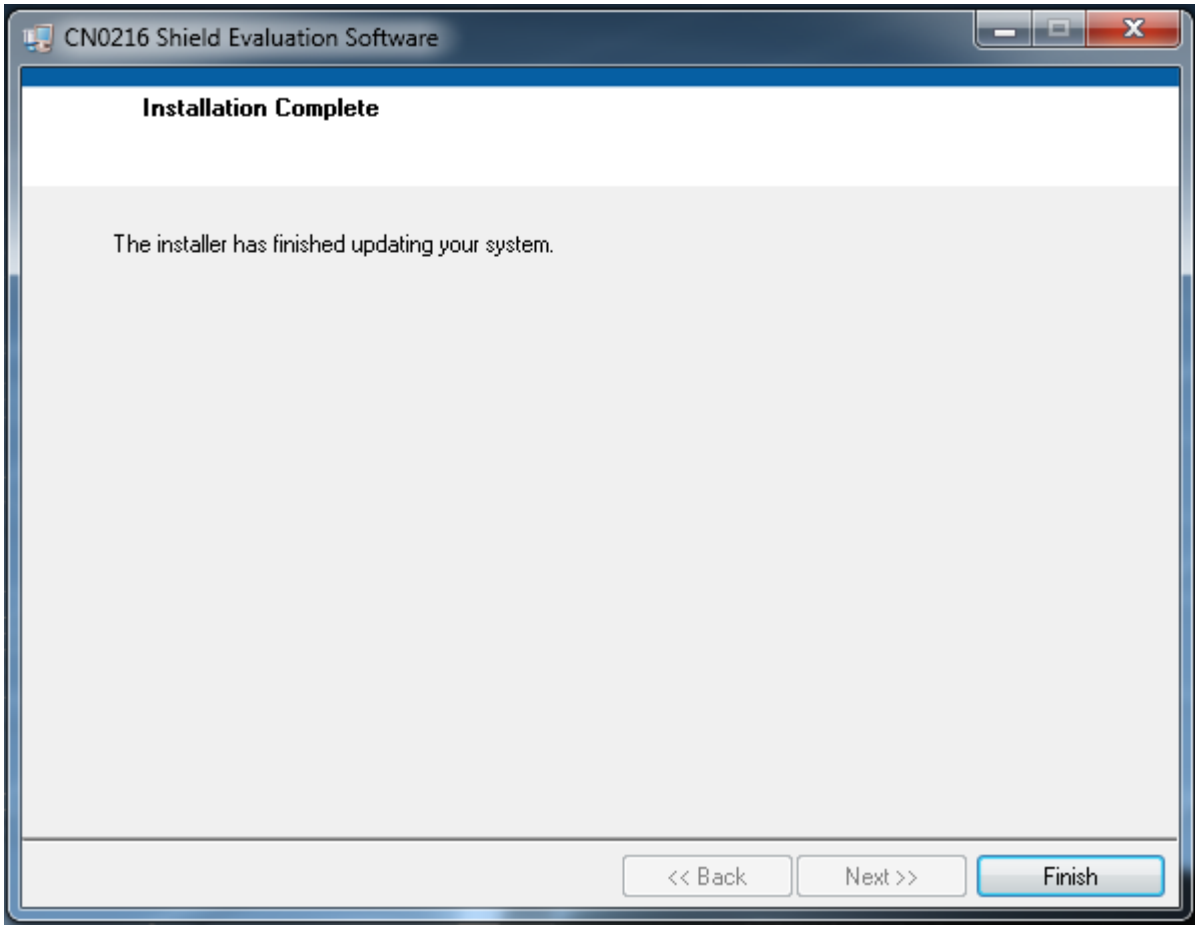
   NOTE: It is recommended that you install the CN0216 Shield Evaluation Software to the default directory path **C:\Program Files\Analog Devices** and all National Instruments products to **C:\Program Files\National Instruments**



2. Click **Next** to view the installation review page



3. Click **Next** to start the installation



4. Click **Finish** to complete the installation.

   Please make sure Arduino USB drivers are installed and your Arduino processor board is flashed with the latest LINX Firmware

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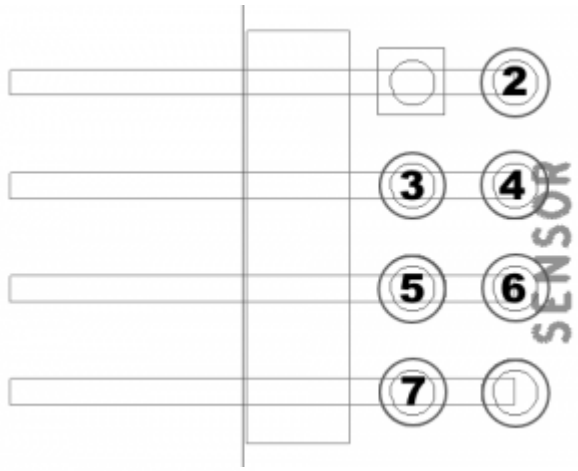
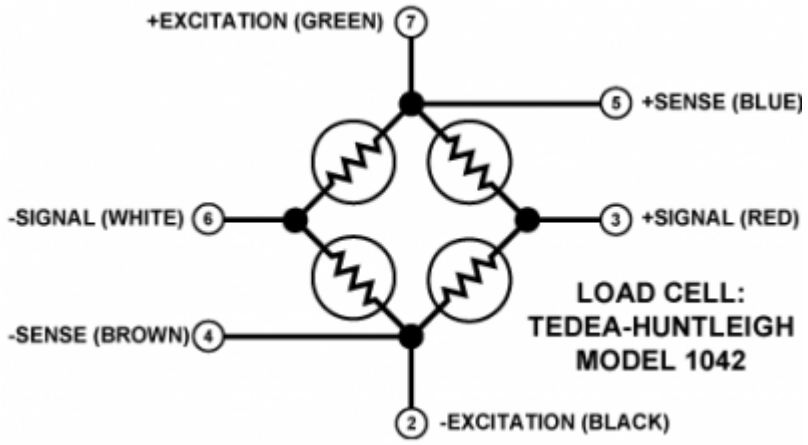
Connecting the Hardware

1. Connect the **Tedeah-Huntleigh (Model 1042)** Load Cell to **8-pin header** of the EVAL-CN0216-ARDZ **(CN-0216 Board)** as depicted below.

   NOTE: If a different Load Cell is used other than the Tedeah-Huntleigh Model 1042, the wiring schematic will be different!

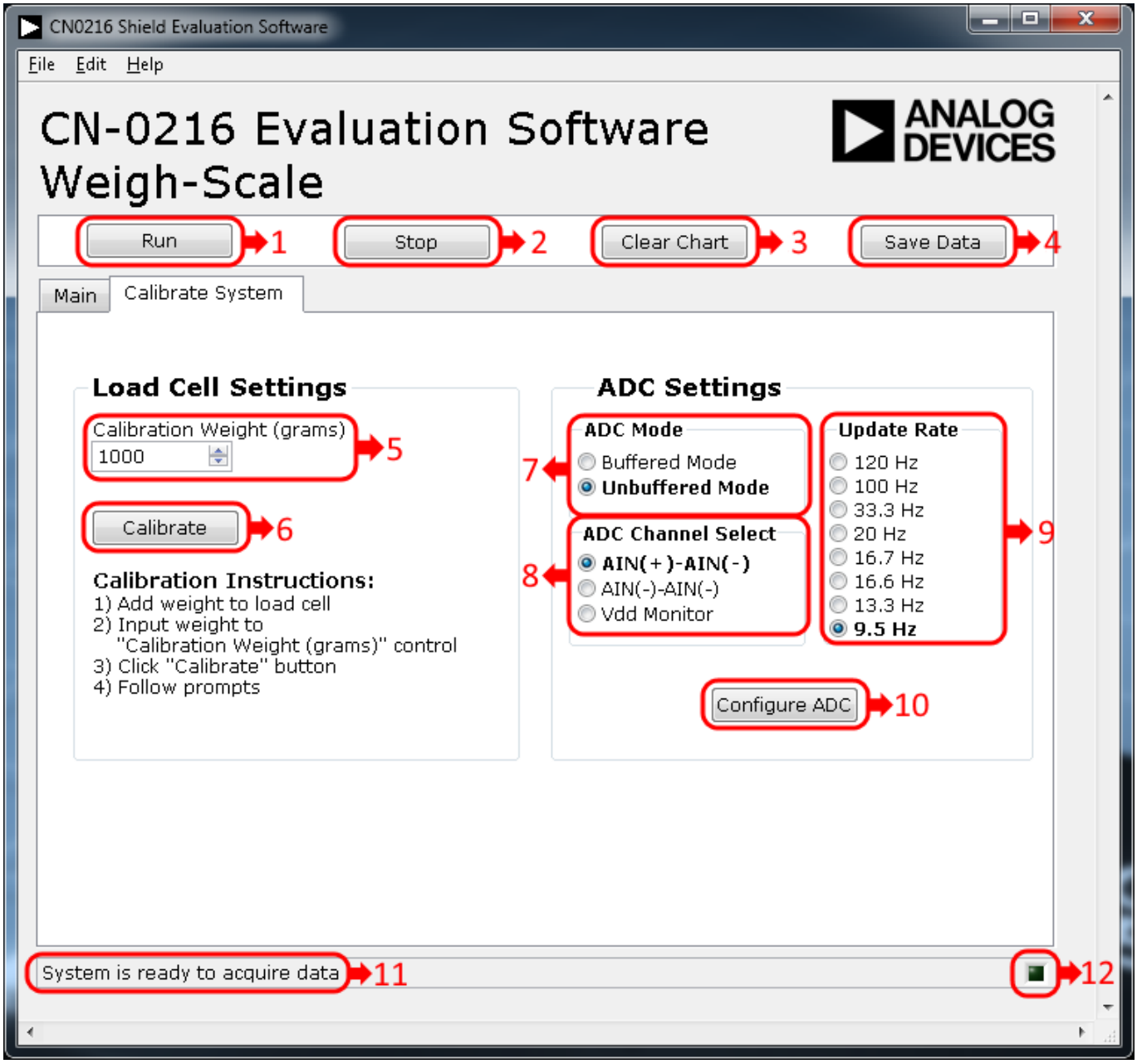
Connector Pin	Load Cell Signal	Wire Color
1		
2	-EXCITATION	BLACK
3	+SIGNAL	RED
4	-SENSE	BROWN
5	+SENSE	BLUE
6	-SIGNAL	WHITE
7	+EXCITATION	GREEN
8		

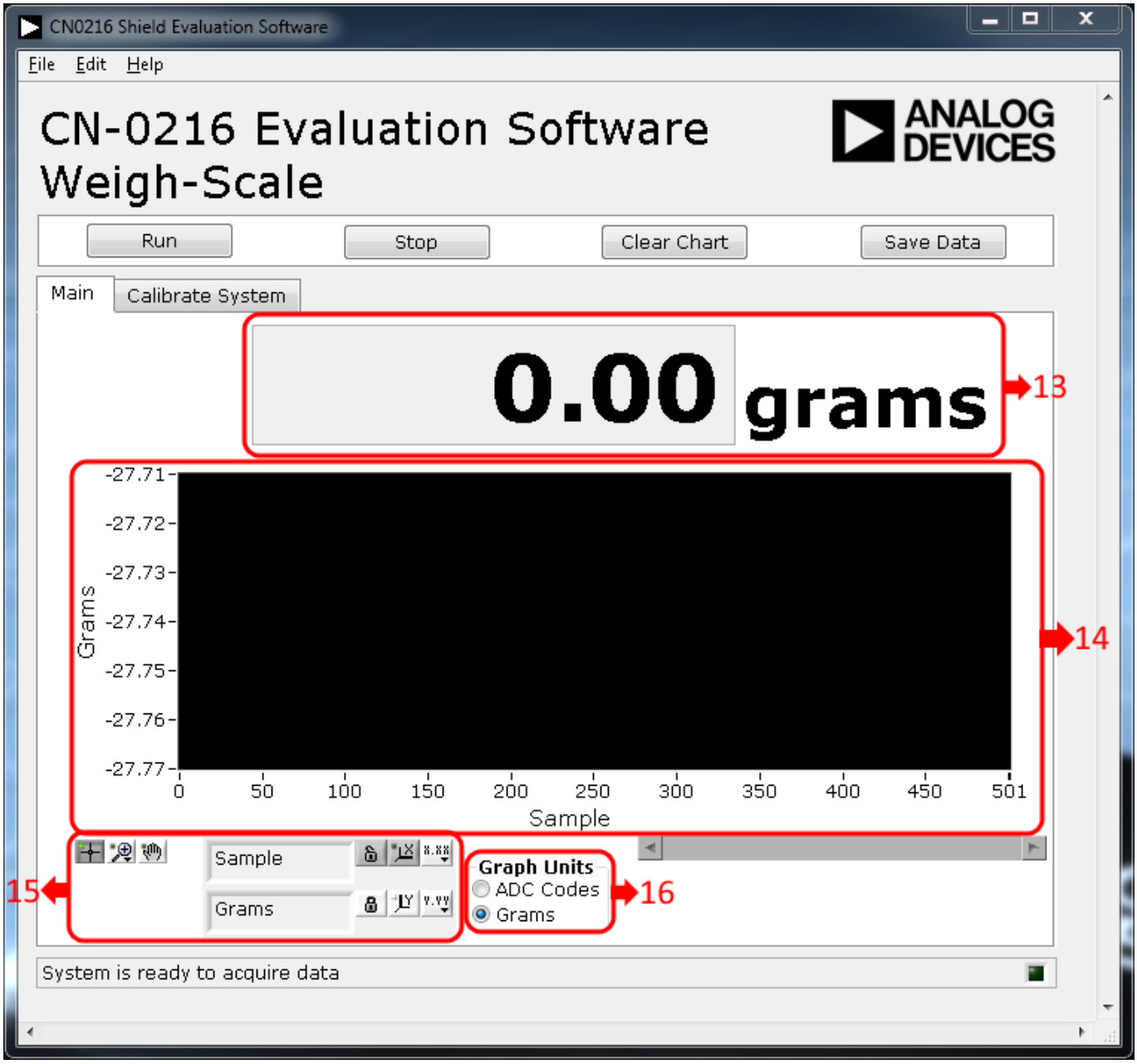




Using the Evaluation Software

Software Controls and Indicators Description


CN0216 Shield Evaluation Software
File Edit Help
CN-0216 Evaluation Software
Weigh-Scale
ANALOG DEVICES
Run
1
Stop
2
Clear Chart
3
Save Data
4
Main
Calibrate System
Load Cell Settings
Calibration Weight (grams)
1000
5
Calibrate
6
Calibration Instructions:
1) Add weight to load cell
2) Input weight to
"Calibration Weight (grams)" control
3) Click "Calibrate" button
4) Follow prompts
ADC Settings
ADC Mode
7
Buffered Mode
Unbuffered Mode
ADC Channel Select
8
AIN(+)-AIN(-)
AIN(-)-AIN(-)
Vdd Monitor
Update Rate
9
120 Hz
100 Hz
33.3 Hz
20 Hz
16.7 Hz
16.6 Hz
13.3 Hz
9.5 Hz
Configure ADC
10
System is ready to acquire data
11
12



1. **Run**
   - When this button is pressed, the system start collecting ADC Data and presents it in the display and chart
2. **Stop**
   - When this button is pressed, the systems stops/pauses data acquisiton
3. **Clear Chart**
   - When this button is pressed, data in the chart is cleared/erased
4. **Save Data**
   - When this button is pressed, it opens a prompt to allow the user to save data to a spreadsheet
5. **Calibration Weight**
   - Allows the user to specify the calibration weight used(in grams)
6. **Calibrate**
   - When this button is pressed, it will start the calibration process and give the user instructions on how to proceed
7. **ADC Mode Radio Buttons**
   - This control is used to set the mode of the AD7791. The default value is Unbuffered Mode and is

highlighted in **bold** on the **Calibrate System Tab**.
    - Buffered Mode - Selecting this mode turns the on-chip analog input channel buffer of the AD7791 **ON**.
    - Unbuffered Mode - Selecting this radio button turns the on-chip analog input channel buffer of the AD7791 **OFF**.
8. **ADC Channel Select Radio Buttons**
    - This control is used to select the analog input channel of the AD7791 for conversion. The default value is AIN(+)-AIN(-) and is highlighted in **bold** on the **Calibrate System Tab**.
        - AIN(+)-AIN(-) - Selecting this radio button allows for normal operation of the AD7791.
        - AIN(-)-AIN(-) - Selecting this radio button shorts the analog input channels of the AD7791.
        - Vdd Monitor - Selecting this radio button monitors the voltage applied to the Vdd pin of the AD7791. The voltage is attenuated by 5 and the resultant voltage is applied to the ∑-Δ modulator using an internal 1.17 V reference for analog to digital conversion.
9. **Update Rate Radio Buttons**
    - This control is used to change the output word rate of the AD7791. The default value is 9.5 Hz and is highlighted in **bold** on the **Calibrate System Tab**.
10. **Configure ADC Button**
    - When this button is pressed the current value of the **ADC Mode Radio Buttons**, **ADC Channel Select Radio Buttons**, and **Update Rate Radio Buttons** are used to configure the AD7791.
11. **System Status String Indicator**
    - This indicator displays a message to the user detailing the current state of the software.
12. **System Status LED Indicator**
    - This indicator displays the current state of the software in the form of an LED. There are three status LED colors.
      Inactive
      Busy
      Error
13. **Current Weight Numerical Indicator**
    - This indicator displays the mass (in grams) on the load cell.
14. **Weight/Code Chart**
    - This indicator displays the data in chart form.
15. **Chart Controls**
    - These controls allow the user to zoom-in, zoom-out, and pan through the data collected.
16. **Select Units Radio Buttons**
    - This control determines the Y-Axis units of the data displayed in the chart.

More Information

- CN-0216 Webpage
- CN0216 Shield Evaluation Software
- AD7791 Product Page
- ADA4528-2 Product Page
- Arduino Official Website
- LINX Firmware Download

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