Load Cell Calculations:

Sensitivity = 17.49 pc/lb - see cal sheet from Kistler, 0-200 lbf range

Amp Settings:

Sensitivity = 17.5 pc/MV \* MV = measure mV unit \rightarrow \text{1 lbf}

Scale = 10 MV/Volt \* for every 10 lbf applied 1 Volt will be output

Note: This will be different w/ in-line charge amp. Ask Patrick about the sensitivity for that equipment

Resolution:

Microcontroller is a 10 bit chip \(\Rightarrow 2^{10} = 1024\) bits
w/ Scale @ 10 lbf/V = 50 lbf max

\[
\frac{50 \text{ lbf}}{1024 \text{ bits}} = \frac{0.049 \text{ lbf}}{\text{bit resolution}}
\]

Analogue to Digital conversion

\[V_{\text{meas}} = \text{Binary} \cdot (V_{\text{range}}/\text{bits}) \]

\[V_{\text{meas}} = \text{Binary} \cdot \left( \frac{5.0 \text{ V}}{1023.0 \text{ V}} \right) \]

Microcontroller reads volts from amp in binary (0-1023), use this equation to convert from binary to voltage.
Cone Dimensions

* ID may be slightly off

Coupler

Side View

- 0.765" ± 0.003"
- 3/32 tapped hole
- 3/8-24 tapped hole

Top View

- 0.765 ± 0.003"
- 3/32 tapped hole
- 3/16-24 tapped hole
- 0.85 ± 0.05"

Assembly

With 3/16" Allen wrench & 3/16" wrench, tighten coupler to load cell via set screw & load cell hex

- 6-32 torsion & tension stop screw
- 3/8-24 x 3/4" set screw
* thread lock set screw into correct position

290° * Make sure set screw doesn't extend more than dimension noted to prevent impact on load cell inner surface (see data sheet)
Power

Microcontroller limits:

RAW input 6V < RAW < 12V = we use current batteries we apply 7.4V
VCC - regulated voltage to 5V

Batteries:
- 3.7 volt Lithium ion battery
  - 3.7 Volt
  - 110 mAh

Charging: 1.0C 100 mA for rapid charge

Note: USB charging chip has been slightly altered from it's default 500mA
charge to the alternative 100mA charge to meet the above specs
If you use one of the smart boards you
MUST do this alteration again. See Hook-up guide on spark plug website

- Only charge one cell at a time, not the two in series
- Never short circuit batteries

Motor:
- Max Voltage = 3.6 V
- Min Voltage = 1V
- Operating Voltage = 100mA
- Nominal Voltage = 3V
- Nominal Voltage = 84 mA
Assembly of connector 1500A57

1. **Attention:** Before stripping the insulation, fit 4, 5 and 8 to 11 onto the cable.
2. Strip the cable insulation as in the drawing (A = screen).
3. Solder the cable to 3 (4 serves as insulation).
4. Firmly screw the cable clamp 6 to 5 with screws 7 (screen is firmly clamped under the cable clamp 6).
5. Insert 3, 4 and 5 into 8.
6. Screw 2 and 8 together.
7. Insert 9 and 10 into 8 and screw up firmly.
8. Fit O-ring 1 onto 3.
Every pin can be used as digital.
Isabelle's notes  August 15th, 2014

Force Link and In-Line Amp:

The nuts holding in the Force Link were personally made by Michelle; she documented their dimensions with her notes.

An explanation for the scale factor of Volts to Pounds:

Force Link sensitivity: 17.49 pC/16F as specified on calibration sheet from Kessler

In-Line Amp: 1050 pC/5V as per outside of amp

Math:
\[
\frac{116F}{124500} = 12.01 \text{ pC/V}
\]

\[
1349 \text{ pC} \quad 5V
\]