Haptic Paddle V2 - Amplifier Documentation

Important!

- Do NOT power the system when the *Motor Control Input (connector P1-1)* is not set to 2.5V via the NI USB 6008!
- Always ask an assistant to check your setup after you've cabled it!

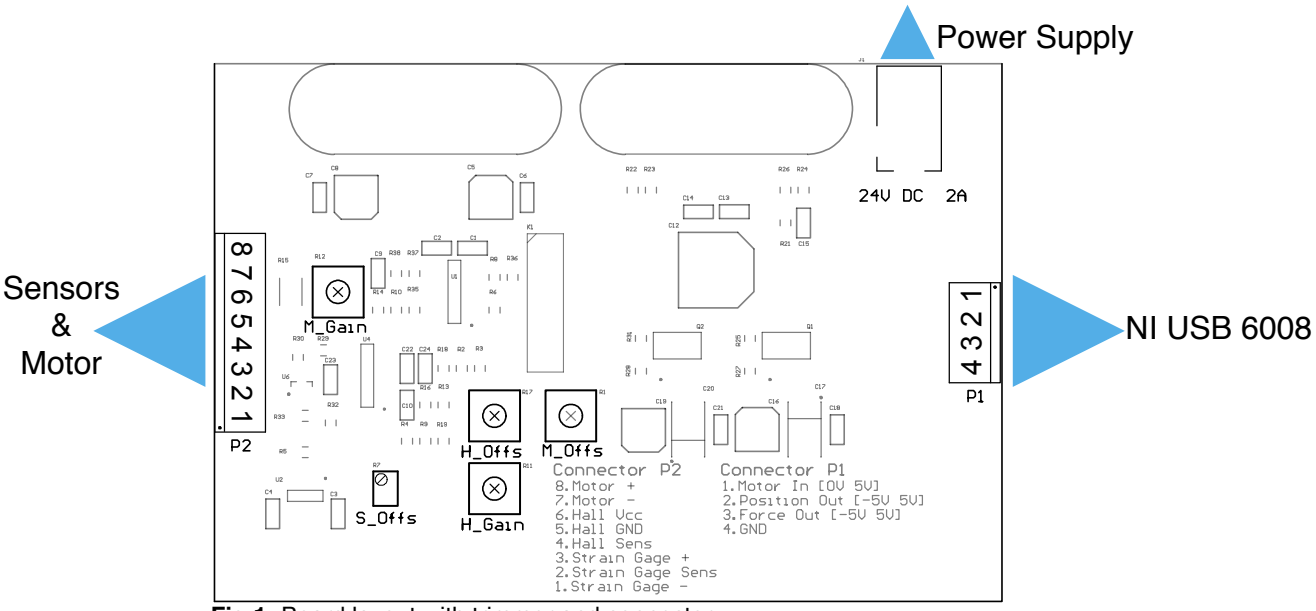

Fig 1: Board layout with trimmer and connector

1. Connector Pinout

Left side connector (8 pins)

8. Motor +
7. Motor -
6. Hall Vcc
5. Hall GND
4. Hall Sens
3. Strain Gage Supply +
2. Strain Gage Sens
1. Strain Gage Supply -

Right side connector (4 pins)

1. Motor Control In [0V 5V]
2. Position Out (Hall sensor) [-5V 5V]
3. Force Out (Strain gage) [-5V 5V]
4. GND

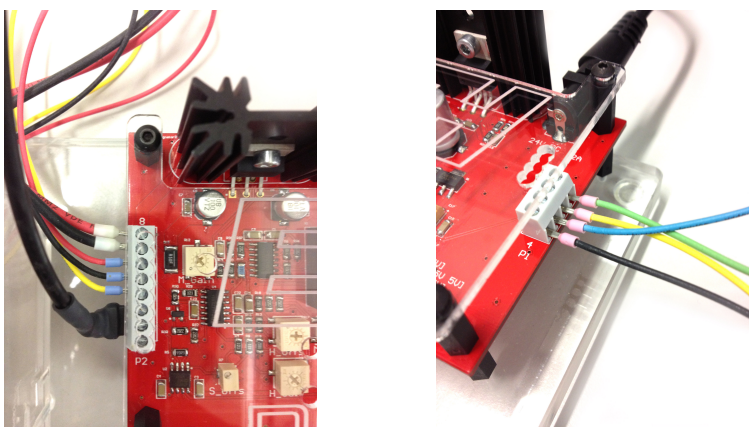

Fig 2: Color code of the cables

2. Adjustments

Five trimmers are located on the amplifier board. They allow minor adjustments to the Hall sensor amplification, strain gage and motor driver circuit.

Hall Sensor

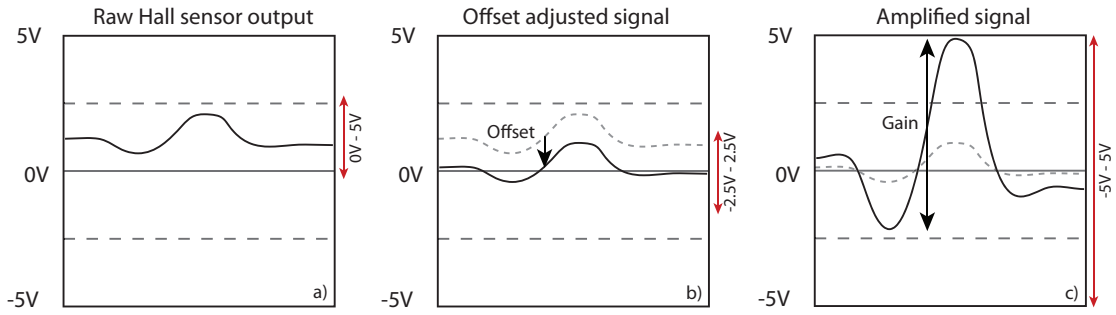

Fig 3: Hall sensor offset adjustment and amplification

- **Offset: H_Offs**
  Fine adjustment of the zero position of the Hall sensor output (Fig. 3b).

  Default: centered

- **Gain: H_Gain**
  Adjusts the gain of the Hall sensor amplification circuit (Fig. 3c).

  Default: full counter clockwise

  Minimum gain: ~2
  Maximum gain: ~4

Motor

- **Offset: M_Offs**
  Adjusts the motor zero point.
  Trim this offset in such a way that when 2.5V are applied at *Motor Control In (P1-1)* the motor does not spin.

  Default: centered

- **Current Gain: M_Gain**
  Adjusts the motor current gain: $I_{Motor} = V_{MotorControl} \cdot CurrentGain$

  Default: full counter clockwise

  Minimum: $I_{out} \approx 0.43 \cdot V_{in}$
  Maximum: $I_{out} \approx 0.85 \cdot V_{in}$

Strain Gage

- **Zero Offset: S_Offs**
  Adjusts the strain gage zero point.
  Trim this offset in such a way that when no force is applied to the paddle the output *Force Out (P1-3)* is zero. **Before performing any adjustment on this circuit you should wait a couple of minutes until the components have reached their operating temperature.**

3. Definitions

Direction of rotation

Clockwise: positive

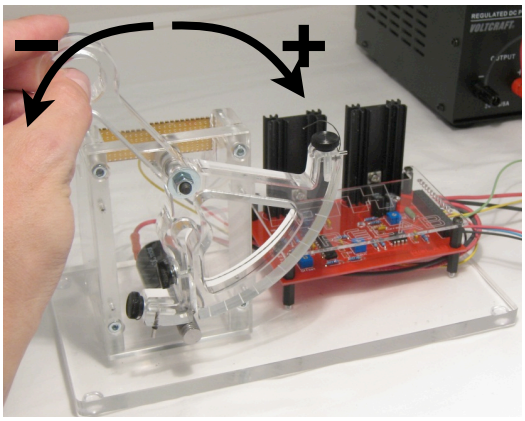

Fig 4: Direction of rotation