

# Installation Data Sheet

## 64-Channel Motorized Commutator

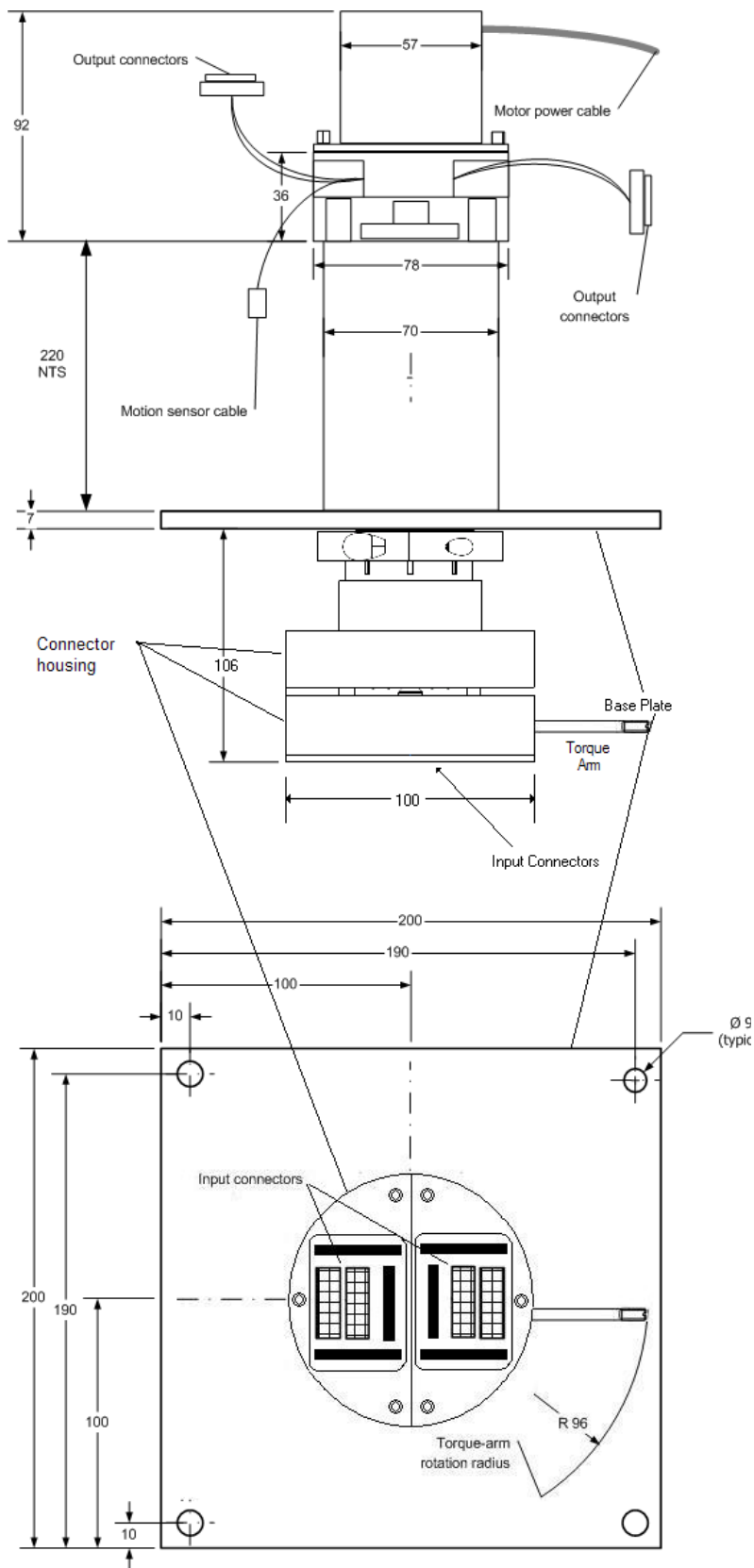
### Features

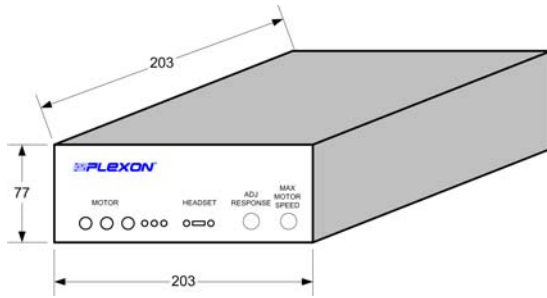
- 64 data channels plus one channel for the motor control
- Maximum rotation speed is one revolution per second (RPS)
- Three speed ranges with variable speed and adjustable response
- Extremely-low actuation torque: 500  $\mu$ Nm
- Contactless actuation that is electrically and acoustically noiseless
- 120V or 220V operation

### Installation Schematic

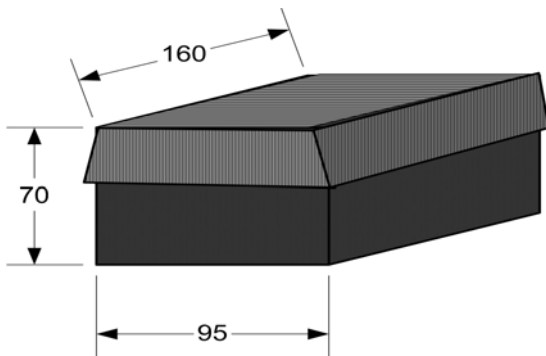
Dimensions are in millimeters (mm)

**Note:** All dimensions were correct at the time of publication. Specifications are subject to change without notice. If you are planning pre-installation work, please contact Plexon to obtain the latest specifications





**Control Box**



**Power Supply**

## Connector Pin Specifications for Harwin Connectors

### Male Connectors (Input):

#### Brown

- A1 – Channel 1
- A3 – Channel 3
- A5 – Channel 5
- A7 – Channel 7
- A9 – (-V)
- A11 – GND
- A13 – NC
- A15 – Channel 9
- A17 – Channel 11
- A19 – Channel 13
- A21 – Channel 15
- A23 – (-V)
- A25 – GND



- A2 – Channel 2
- A4 – Channel 4
- A6 – Channel 6
- A8 – Channel 8
- A10 – (+V)
- A12 – Ref A1
- A14 – NC
- A16 – Channel 10
- A18 – Channel 12
- A20 – Channel 14
- A22 – Channel 16
- A24 – (+V)
- A26 – Ref A2

#### Yellow

- D1 – Channel 49
- D3 – Channel 51
- D5 – Channel 53
- D7 – Channel 55
- D9 – (-V)
- D11 – GND
- D13 – NC
- D15 – Channel 57
- D17 – Channel 59
- D19 – Channel 61
- D21 – Channel 63
- D23 – (-V)
- D25 – GND



- D2 – Channel 50
- D4 – Channel 52
- D6 – Channel 54
- D8 – Channel 56
- D10 – (+V)
- D12 – Ref D1
- D14 – NC
- D16 – Channel 58
- D18 – Channel 60
- D20 – Channel 62
- D22 – Channel 64
- D24 – (+V)
- D26 – Ref D2

#### Red

- B1 – Channel 17
- B3 – Channel 19
- B5 – Channel 21
- B7 – Channel 23
- B9 – (-V)
- B11 – GND
- B13 – NC
- B15 – Channel 25
- B17 – Channel 27
- B19 – Channel 29
- B21 – Channel 31
- B23 – (-V)
- B25 – GND



- B2 – Channel 18
- B4 – Channel 20
- B6 – Channel 22
- B8 – Channel 24
- B10 – (+V)
- B12 – Ref B1
- B14 – NC
- B16 – Channel 26
- B18 – Channel 28
- B20 – Channel 30
- B22 – Channel 32
- B24 – (+V)
- B26 – Ref B2

#### Orange

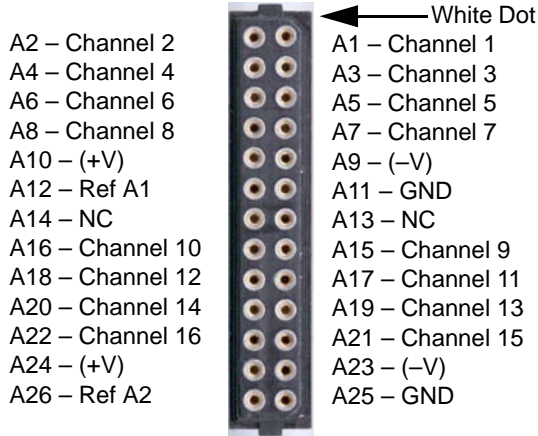
- C1 – Channel 33
- C3 – Channel 35
- C5 – Channel 37
- C7 – Channel 39
- C9 – (-V)
- C11 – GND
- C13 – NC
- C15 – Channel 41
- C17 – Channel 43
- C19 – Channel 45
- C21 – Channel 47
- C23 – (-V)
- C25 – GND



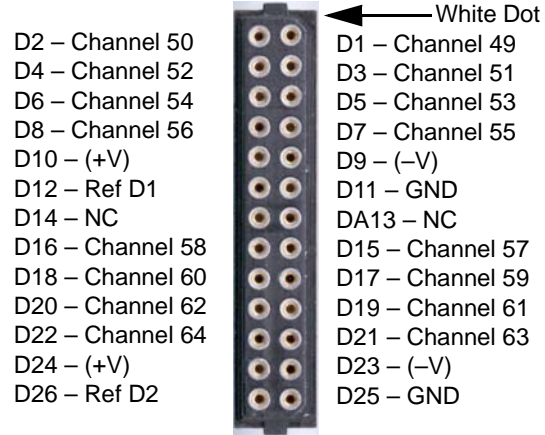
- C2 – Channel 34
- C4 – Channel 36
- C6 – Channel 38
- C8 – Channel 40
- C10 – (+V)
- C12 – Ref C1
- C14 – NC
- C16 – Channel 42
- C18 – Channel 44
- C20 – Channel 46
- C22 – Channel 48
- C24 – (+V)
- C26 – Ref C2

**Female Connectors (Output):**

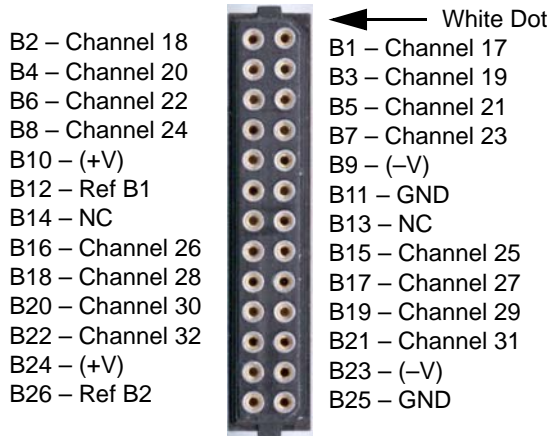
**Brown**



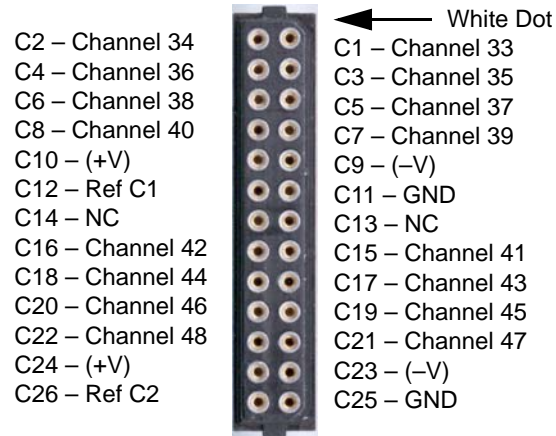
**Yellow**



**Red**



**Orange**



**Legend:**

Revision 0:

GND = ground

NC = not connected

## Installation

Installation of the Plexon 64-Channel Motorized Commutator consists of three major steps:

- 1 Mounting the commutator to the enclosure or experimental arena
- 2 Connecting the components
- 3 Adjusting the settings and testing the installation

### 1) Mounting the commutator

- 1 Carefully review the installation schematic on Page 1 to make sure you have adequate clearance for the commutator body, the wire bundles, and the torque-arm rotation. To minimize interference, ensure adequate clearance for the motor power cable and route it as far as practical from the signal cables.
- 2 In your experimental enclosure, provide an opening and mounting holes that match the dimensions in the installation schematic. Choose a mounting location that, when combined with the length of the headset cable, provides the animal with adequate range of movement for the requirements of your experiment.
- 3 Secure the commutator to the surface of the enclosure with suitable fasteners.

**Note:** The commutator uses a stepper motor to provide incremental movement. The vibration from the stepper motor can eventually loosen normal fasteners. To secure the commutator, consider the use of prevailing-torque fasteners (nylon-insert lock nuts, stover nuts, etc.) or a thread-locking compound such as Loctite®.

- 4 When you have completed mounting the commutator, proceed with connecting the components.



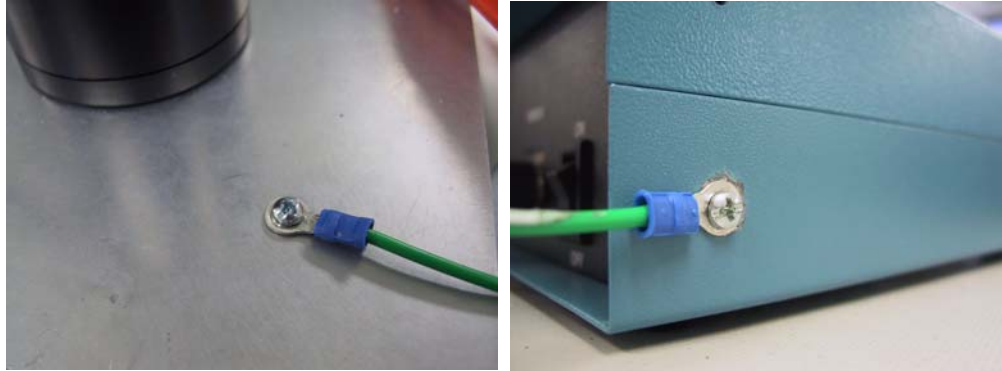
### HINT

#### Avoiding noise on signal channels

To avoid picking up unwanted ambient noise from the lab environment, the commutator must be properly grounded. Make sure you connect the green ground wire specified in [Step 1 on page 1-6](#).

2) Connecting the components

- 1 Attach the green ground wire between the ground screw on the commutator mounting base and the ground screw at the rear of the commutator control box. Make sure you use the ground screw at the left rear corner of the box, which has the paint removed around it to provide a good ground.



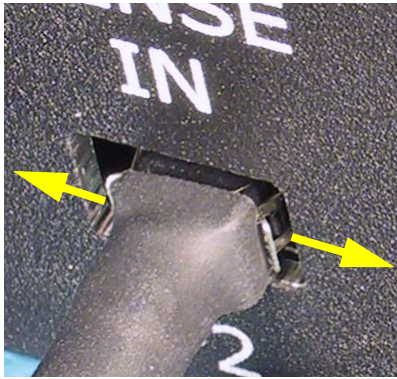
- 2 Attach the AC cord to the commutator power supply. At the **POWER** connector, make sure the power switch is **OFF**. Plug in the power supply. Connect the power-supply output cable to the **POWER** connector on the rear panel of the commutator control box.



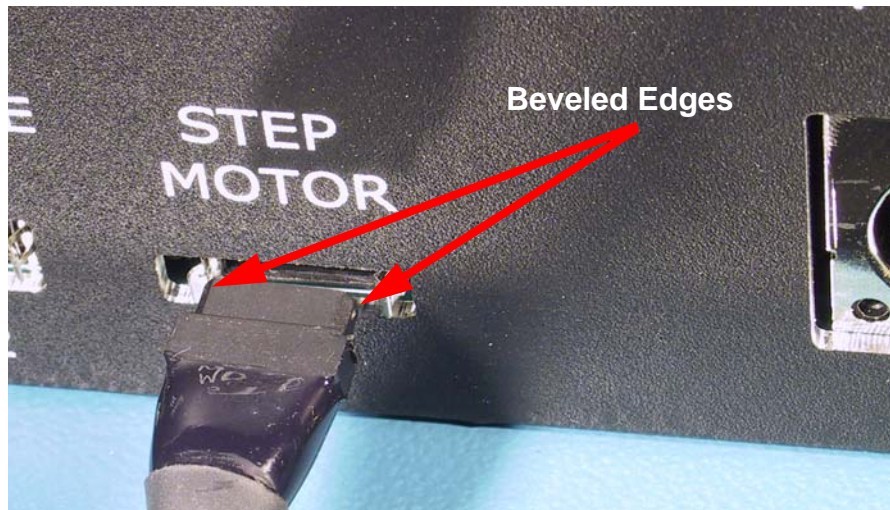


## CAUTION Connector Lock Release

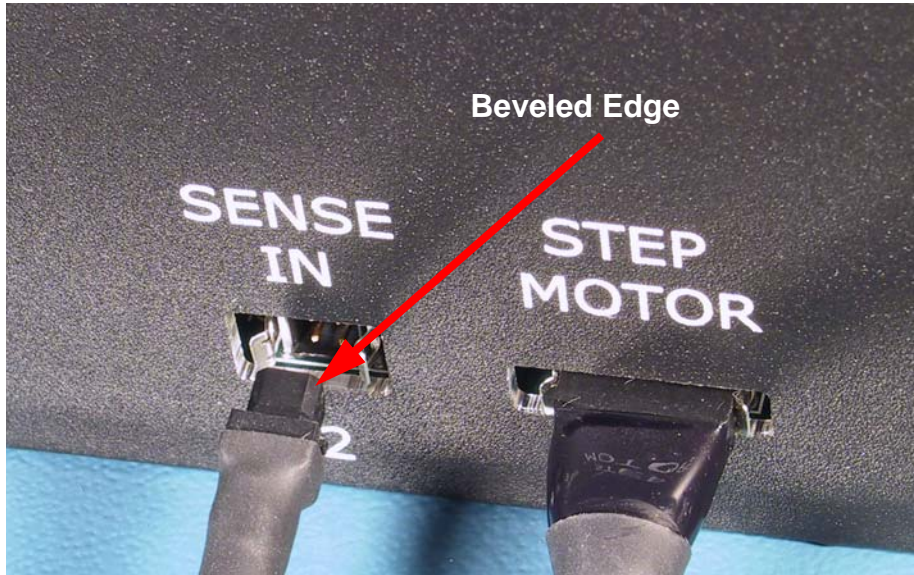
The control box connectors for the SENSE IN and STEP MOTOR cables feature spring-loaded locks on each side. These locks secure the cable by grasping a raised tab on the cable connector. Before you remove these cables from the control box, use a small blunt instrument such as a blade screwdriver to release the locks. Avoid damage to the connectors. Before you remove the cables, always release the locking tabs.



- 3 Eight external (outside) cables connect the commutator to the control box and the preamp: six signal cables, a motor power cable, and a motion-sensor cable. At the back panel of the control box, make sure the beveled edges on the connector face up, then connect the motor power cable to the **STEP MOTOR P1** connector.



- 4 Make sure the beveled edge on the connector faces up and to the right, then connect the motion sensor cable to the **SENSE IN P2** connector.



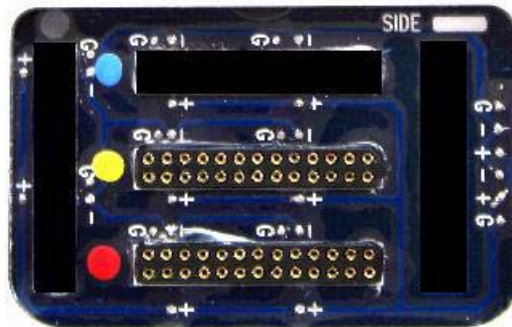
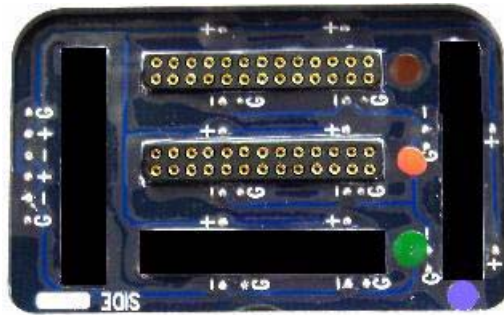
- 5 Connect each color-coded data cable to its mating board in the preamp. The following table lists the cable colors for each channel range:

Color	Channel Range
Brown	1 to 16
Red	17 to 32
Orange	33 to 48
Yellow	49 to 64

**Note:** When you route the cables, keep the data cables as far as possible from the motor power cable.

- 6 The internal (input) signal cables connect the headstages to the commutator. Inside the experimental enclosure, plug the headstage cables into the connectors with matching colors

indicated by the colored circles on the commutator connector block; see “Connector Pin Specifications” on page 2.



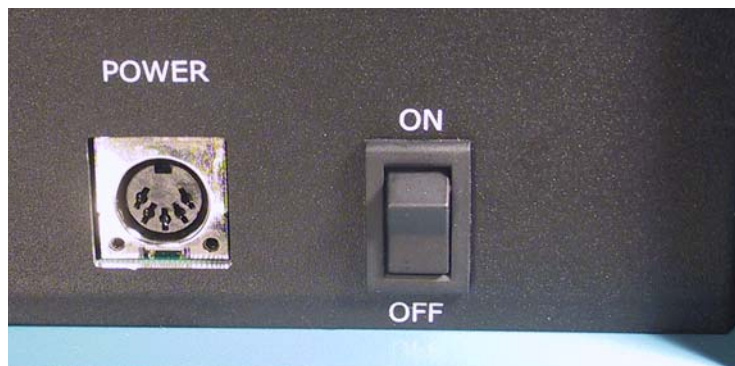
- 7 Connect the other ends of the cables to the headstages.
- 8 Connect the headstages to Plexon headstage tester units. Connect the headstage tester units to the computer and provide a signal to the headstages.  
**Note:** If you are not familiar with the Plexon headstage tester unit, refer to the Plexon *RASPUTIN User's Guide*.
- 9 Turn the computer on and set up RASPUTIN Sort Client or Recorder to receive signals. Turn the preamp power switch on. Verify that Sort Client or Recorder receives the test signals from the headstage tester unit. If Sort Client or Recorder do not show the signals, connect a headset cable directly to the preamp to verify that signals are being transmitted. Reconnect the headset cable to the commutator. If the signals still do not appear in Sort Client or Recorder, contact Plexon customer service for assistance.
- 10 You have completed connecting the components. Turn the preamp power off.

3) Adjusting settings and testing the installation

- 1 On the control box front panel, set the motor function switch to **DISABLE**.



- 2 At the **POWER** connector, turn the power **ON**.



- 3 On the front panel, set both the **MOTOR STEP SIZE** switches **MS1** and **MS2** to 1.
- 4 Set **MAX MOTOR SPEED** fully counter-clockwise to the slowest setting. Set **ADJ RESPONSE** fully counter-clockwise to the lowest setting.



**CAUTION**

**Possible Cable Damage**

If the Hall-effect sensor is disabled, the commutator turns independently and it can quickly twist the headset cables. Before you set the **MOTOR** switch to **ENABLE**, *always* make sure you can see the headset cables. If the commutator begins to twist the cables, immediately set the **MOTOR** switch to **DISABLE** and check the cable connections.

- 5 Set the **MOTOR** switch to **ENABLE**. Turn **ADJ RESPONSE** clockwise to increase the response at the connector block. Gently push the block back and forth to gauge the response. Set the **ADJ RESPONSE** control to allow some connector block movement in each direction without engaging the motor.

- 6 Turn the **MAX MOTOR SPEED** clockwise to increase the rotation speed of the connector block. Gently push the block toward its full travel in one direction to gauge the rotation speed. Set the **MAX MOTOR SPEED** to the desired setting for your experiment.
- 7 You can also change the rotation speed by changing the step size. The various positions of the two **MOTOR STEP SIZE** switches provide three settings. Set both switches to **1** for the smallest step size, and hence the slowest and smoothest rotation. Set both switches to **0** for the largest step size, and hence the fastest rotation speed. Use **MAX MOTOR SPEED** to fine tune the speed in each range. See the following chart for the motor speed settings:

Speed Range Switch Positions MS1 - MS2	Approximate Max Rotation Speed (rps)*
1 - 1 (1/8 step)	1/4 rps
0 - 1 (1/4 step)	1/2 rps
1 - 0 (1/2 step)	1 rps
0 - 0 (1/2 step)	1 rps

**The optimum motor speed can:**

- Reduce acoustical noise produced by the motor shaking the experimental enclosure (i.e., metal cages)
- Reduce electrical noise produced by mechanical vibration of components
- More closely match animal behavior

\* varies somewhat depending on ADJ RESPONSE setting

- 8 To test the response and the rotation speed, attach the headstages to your experimental animal and observe the performance of the commutator. Adjust the response and rotation speed to provide the lowest level of interference for the animal.

**Note:** Slower speed ranges use smaller steps, which reduce electrical noise and mechanical vibration. In general, use the slowest speed range that is adequate for your experiment, then adjust the speed with the MAX MOTOR SPEED control.

