Installation Data Sheet

32-Channel Motorized Commutator

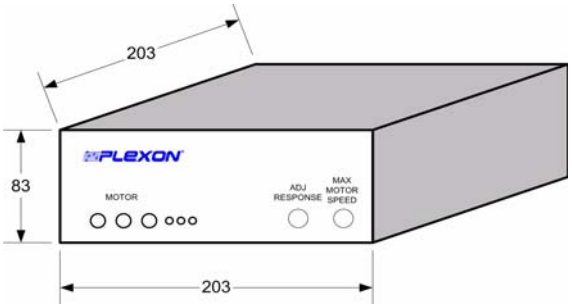
Features

- 32 signal channels, 4 reference channels, and +V, -V, and GND
- Maximum rotation speed is one revolution per second (RPS)
- Three speed ranges with variable speed and adjustable response
- Extremely-low actuation force: 300 µNm
- Contactless actuation that is electrically and acoustically noiseless
- 120V or 220V operation

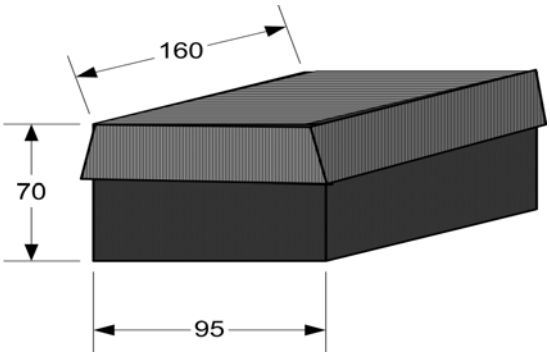
Installation Schematic

Dimensions are in millimeters (mm)

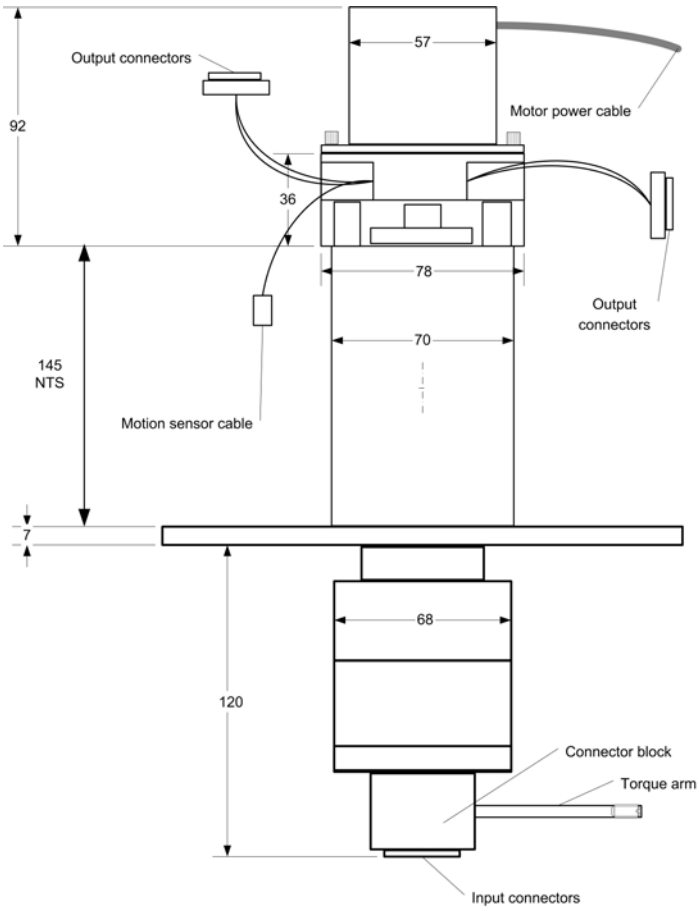
Note: All dimensions are correct at the time of publication. Specifications are subject to change without notice. If you are planning pre-installation work, please contact Plexon to obtain the latest specifications.

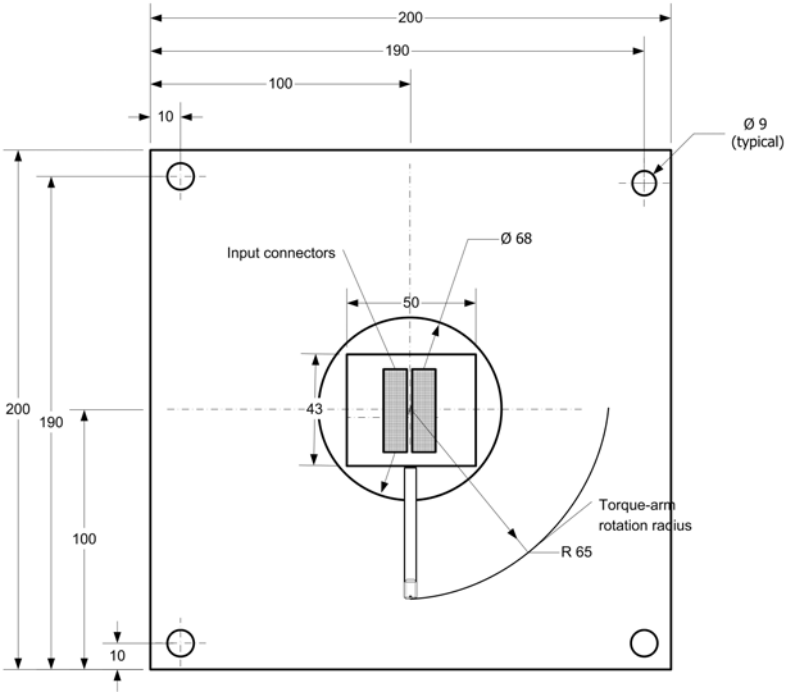


Control Box



Power Supply





Connector Pin Specifications for Harwin Connectors

GND = ground
NC = not connected
Ref = reference channel

Male Connectors (Headstage Connector Block—input):

1 (1-16)

A1 – Channel 1	A2 – Channel 2
A3 – Channel 3	A4 – Channel 4
A5 – Channel 5	A6 – Channel 6
A7 – Channel 7	A8 – Channel 8
A9 – (–V)	A10 – (+V)
A11 – GND	A12 – Ref A1
A13 – NC	A14 – NC
A15 – Channel 9	A16 – Channel 10
A17 – Channel 11	A18 – Channel 12
A19 – Channel 13	A20 – Channel 14
A21 – Channel 15	A22 – Channel 16
A23 – (–V)	A24 – (+V)
A25 – GND	A26 – Ref A2

2 (16-32)

B1 – Channel 17	B2 – Channel 18
B3 – Channel 19	B4 – Channel 20
B5 – Channel 21	B6 – Channel 22
B7 – Channel 23	B8 – Channel 24
B9 – (–V)	B10 – (+V)
B11 – GND	B12 – Ref B1
B13 – NC	B14 – NC
B15 – Channel 25	B16 – Channel 26
B17 – Channel 27	B18 – Channel 28
B19 – Channel 29	B20 – Channel 30
B21 – Channel 31	B22 – Channel 32
B23 – (–V)	B24 – (+V)
B25 – GND	B26 – Ref B2

Female Connectors (Preamp Cables—output):

Brown (1-16)

A2 – Channel 2	← White Dot
A4 – Channel 4	A1 – Channel 1
A6 – Channel 6	A3 – Channel 3
A8 – Channel 8	A5 – Channel 5
A10 – (+V)	A7 – Channel 7
A12 – Ref A1	A9 – (–V)
A14 – NC	A11 – GND
A16 – Channel 10	A13 – NC
A18 – Channel 12	A15 – Channel 9
A20 – Channel 14	A17 – Channel 11
A22 – Channel 16	A19 – Channel 13
A24 – (+V)	A21 – Channel 15
A26 – Ref A2	A23 – (–V)
	A25 – GND

Red (17-32)

B2 – Channel 18	← White Dot
B4 – Channel 20	B1 – Channel 17
B6 – Channel 22	B3 – Channel 19
B8 – Channel 24	B5 – Channel 21
B10 –(+V)	B7 – Channel 23
B12 – Ref B1	B9 – (–V)
B14 – NC	B11 – GND
B16 – Channel 26	B13 – NC
B18 – Channel 28	B15 – Channel 25
B20 – Channel 30	B17 – Channel 27
B22 – Channel 32	B19 – Channel 29
B24 – (+V)	B21 – Channel 31
B26 – Ref B2	B23 – (–V)
	B25 – GND

Installation

Installation of the Plexon 32-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.

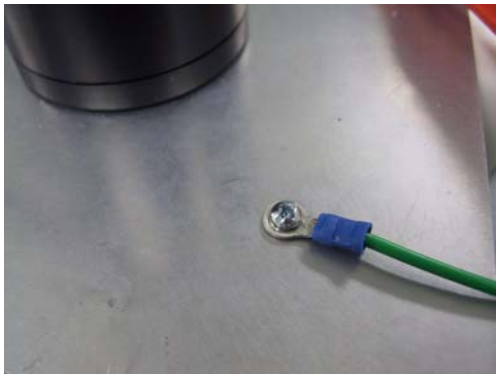
HINT

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 4.

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.

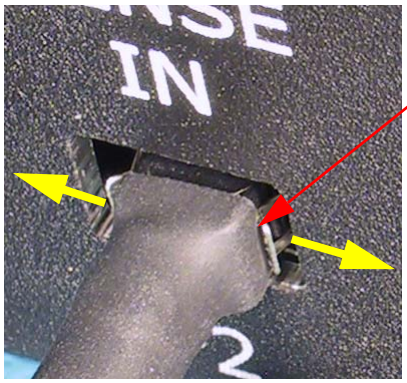


2 Attach the AC cord to the commutator power supply. At the **POWER** connector, make sure the power switch is **OFF**. Plug in the power supply. Connect the power-supply output cable to the **POWER** connector on the rear panel of the commutator control box.

CAUTION

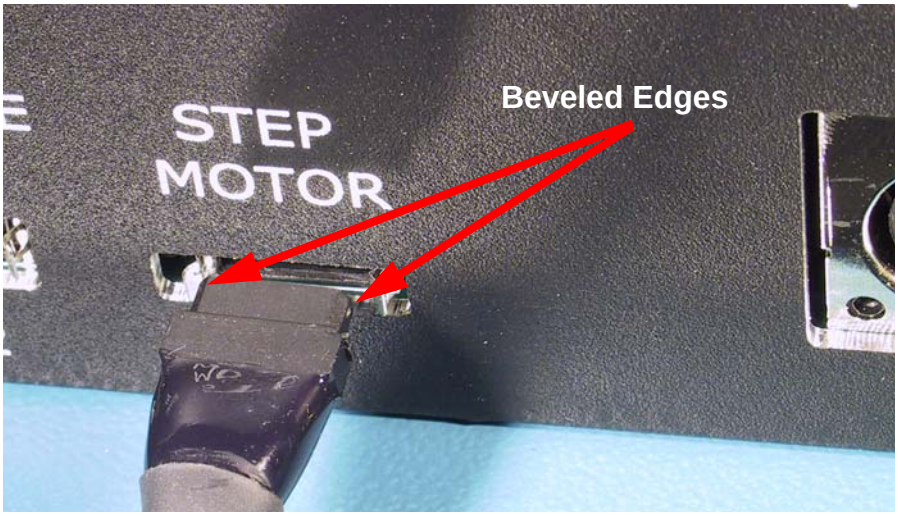
Connector Lock Release

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.

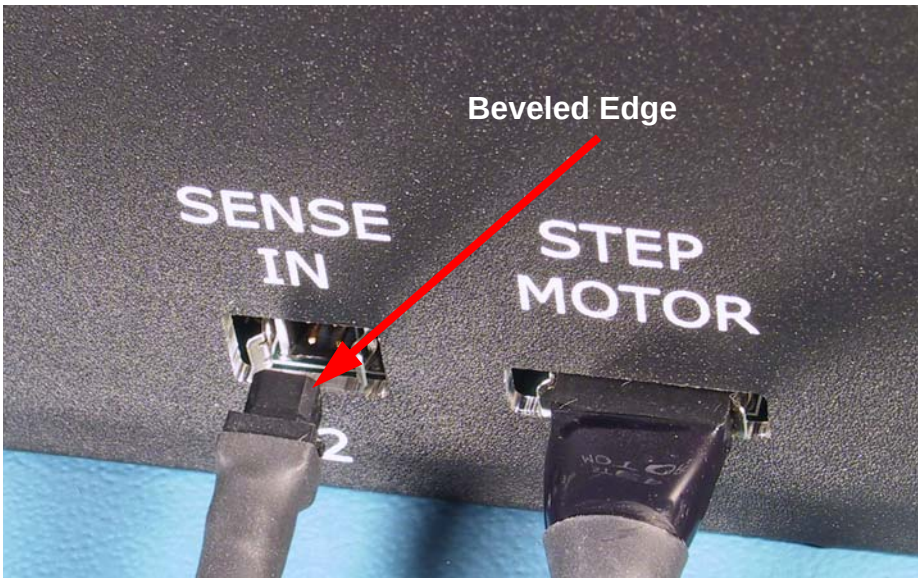


Connector lock release tab. Push out on each side to release cable.

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.



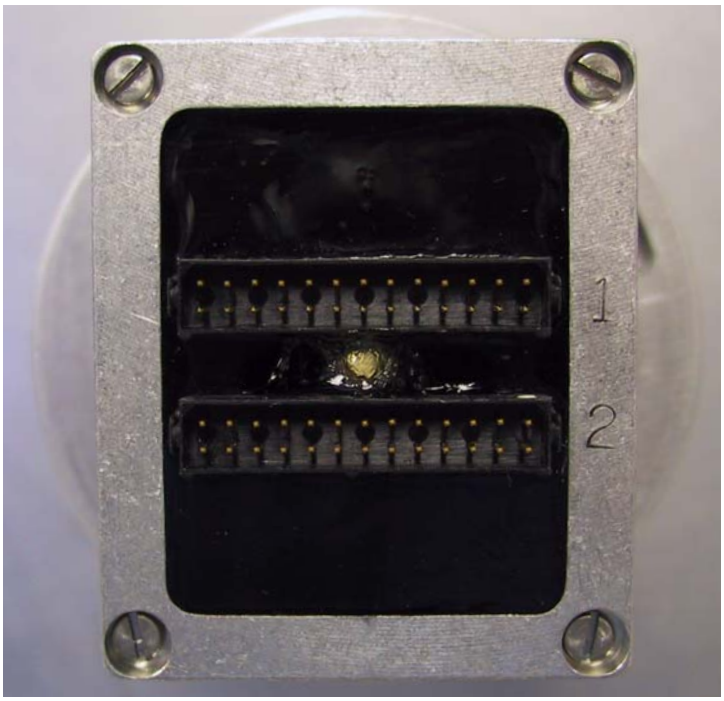
5 Connect each color-coded data cable to its mating board in the preamp. The following table lists the cable colors for each channel range:

Color	Channel Range
Brown	1 to 16
Red	17 to 32

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 matching numbered connectors

on the commutator connector block; see “Connector Pin Specifications” on page 2. The following illustration shows the connector block numbering.



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*.

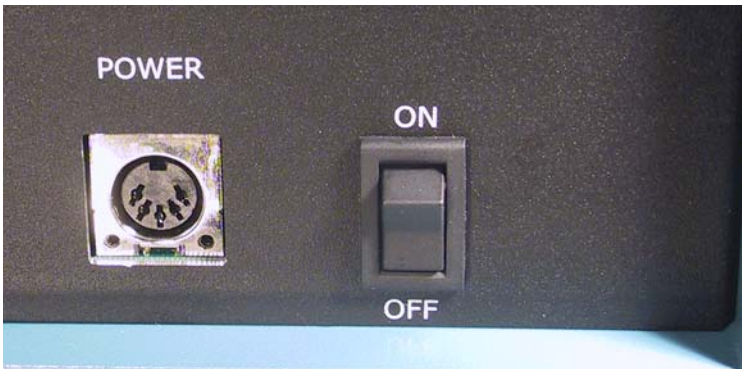
9 Turn the computer on and set up RASPUTIN Sort Client or Recorder to receive signals. Turn the preamp power switch on. Verify that Sort Client or Recorder receives the test signals from the headstage tester unit. If Sort Client or Recorder do not show the signals, connect a headset cable directly to 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.