

Neuralynx Inc

Manual Cyborg Drive Electrode Pusher Users Manual

© Neuralynx, Inc.
2434 N. Pantano Rd. Tucson AZ
Phone 520.722.8144 • Fax 520.722.8163
www.Neuralynx.com
support@Neuralynx.com

Table of Contents

Chapter 1 - Introduction	3
Chapter 2 - The Telescoping Probe	5
Chapter 3 - Practical Usage of the Pusher	6
Chapter 4 - Replacement of the Pusher Wire	8

Chapter 1 - Introduction

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Introduction

This manual describes the theory of design and operation of the Neuralynx Manual Cyborg Drive Electrode Pusher. It is intended for users of the Neuralynx Warp and Cyborg electrode holders.

Neuralynx Manual Electrode Pusher Description

The Manual Cyborg Electrode Pusher device is used for pushing, or advancing, electrodes loaded in any “wire-in-cannula” electrode drive/holder; this would cover such products as the Neuralynx Cyborg Drive, Warp Drive and the smaller 16 Channel Warp drive.

This device consists of a very high quality Starrett Digital Micrometer Head which is coupled to a telescoping series of cannula, micro-spring and .005” polished stainless steel wire. The Starrett micrometer has the traditional 0 to 1” mechanical scale reading graduations (which we will ignore for depth adjustments) and a high resolution digital readout LCD display (which will be used for setting depth adjustments during pushing operations).

Please read the enclosed Starrett User’s Manual on the operation of the digital controls and readout of the micrometer.



Chapter 2 – The Telescoping Probe

The probe that is attached to the bottom side of the micrometer head is used for insertion into the Warp/Cyborg drive cannula to push the electrodes down the cannula. This probe has been developed to provide very accurate depth adjustment.

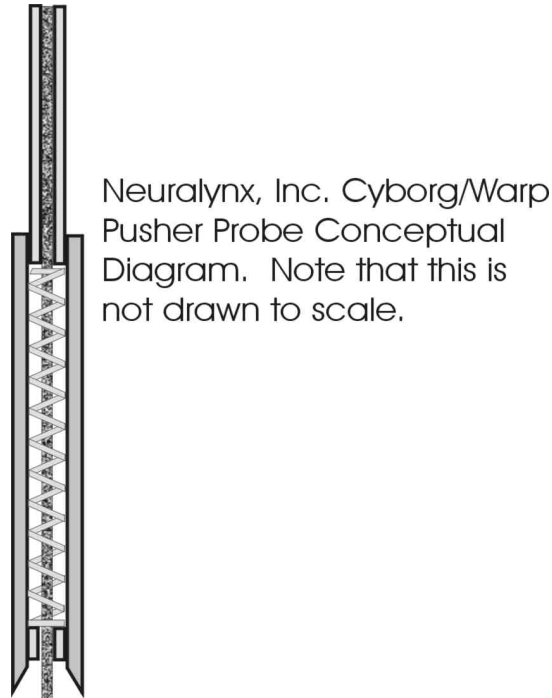


Figure 2. Cyborg Pusher Probe Conceptual Diagram

The Probe is designed to give the most accurate pushing depth for the electrodes possible. This design was developed in conjunction with the Dr. Bruce McNaughton at the University of Arizona during the Cyborg Drive Automated Robotic electrode pushing system.

The design consists of the lower 23 gage cannula (which is placed over the 30 gage cannula of the drive) and the .005” stainless steel wire which is used to push on the top of the electrode which is inside the Cyborg Drive cannula. The .005” wire is not strong or stiff enough to apply anymore that a small amount of force on the electrode without bending or deflection. Therefore the probe design uses a 30 gage cannula on the upper portion to support the wire and a long micro-spring which fills the space between the 23 gage cannula and the section of the .005 wire inside the 23 gage cannula. The 30 gage cannula “plug” at the lower tip of the 23 gage cannula is used to retain the micro-spring and may also provide a “bottom indexing stop” for the pusher depth positioning. Use of the bottom plug is dependant on the design and length of the 30 gage cannula tops of the individual Warp/Cyborg drive..

The probe components, such as the .005” wire, are very small and delicate and MUST be treated with extreme care. It is very easy to bend the .005” wire if it is exposed during insertion or extraction in/out of the Drive’s cannula. If the .005” wire is bent or kinked the .005” wire and upper 30 gage cannula must be replaced. If the wire is kinked it may not properly retract or it may damage the micro-spring inside the 23 gage cannula.

Chapter 3 – Practical Usage of the Pusher

The Digital Micrometer is usually used for measuring the thickness of material and therefore the “Zero” reading is at the location of maximum protrusion of the micrometers spindle. Note that the micrometer head’s zero reading is closest to the probe end of the device. Therefore, to keep track of Depth, the micrometer spindle is fully retracted so that the micrometer reading indicates 0 with the Thimble set to 1.000” as shown below. This will be the “zero depth” setting for micrometer “calibration”. To calibrate the zero position, as shown below, the button controls on the digital display portion of the micrometer head are used to set the Zero position of the micrometer.



Figure 3. Micrometer Setting for 5 micron depth setting. Note the position of the Micrometer Thimble which is set to the fully retracted position of 1” and indicates the setting of “.0-0”. Note that the digital display shows a value of -0.005 millimeters (5 microns).

Note that as the spindle of the micrometer is extended, by turning/screwing in the thimble “IN”, and as it is extended the reading on the display gets progressively more Negative. Users will have to remember that there are no “negative depths” for electrode adjustments and therefore the negative value shows the actual depth. Simply ignore the minus sign of the display. The least significant digit on the display is in 1/1000 of millimeters, or Microns.

The operation of advancing electrodes is called “Pushing Electrodes”.

To push electrodes you will need to record and track the following data:

- Electrode number
- Current depth from top of Cannula

The current depth is usually saved in units of Microns and it should be the current reading from the digital micrometer display.

There are two methods of pushing electrodes: “**Slow and Safe**” or “**Fast**”.

To perform an electrode push with the “Slow and Safe” method

- 1) Position the pusher probe over the drive cannula;
- 2) Extend the micrometer spindle and pusher wire by rotating the micrometer thimble to extend the wire out of the pusher probe and down into the Cyborg/Warp Drive cannula. It will eventually contact and push the electrode down the drive cannula. During this time the animal should be restrained or at least very quiet.
- 3) After the electrode depth has been adjusted the micrometer spindle/probe wire is extracted back to the zero setting and the Manual Pusher is disengaged from drive. Note that during this process the wire is never exposed and care much be taken to keep the probe in line and parallel to the drive cannula or the .005” pusher wire may be bent.

To perform an electrode push with the “Fast” method:

- 1) extend the pusher wire the desired amount;
 - 2) insert the pusher wire down the drive cannula and fully insert the wire until the pusher probe fully seats on either the drive PC board surface or the Pusher Probe 30 gage Plug cannula meets the top of the drive cannula.
 - 3) Remove the probe and wire from the drive cannula;
 - 4) Retract the pusher wire to protect the wire.
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Chapter 4 – Replacement of the Pusher Wire

Please contact Neuralynx for this operation if necessary.

