BLACKROCK®
MICROSYSTEMS

CerePlex M

Instructions for Use

Revision 7.00 / LB-0398 – CerePlex M Instructions for Use

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What this Manual Covers

Blackrock Microsystems offers multiple headstages in our CerePlex line. The CerePlex M, or CerePlex Mini, is a small headstage that contains a preamplifier, amplifier, and analog to digital converter on a single board. The Blackrock CerePlex M converts analog signals to digital signals at the recording site which dramatically reduces the noise introduced to the signal during transmission. The CerePlex M allows recording of distortion-free spikes and field potentials from high impedance microelectrodes in a variety of preparations such as freely moving rodents.

There are a number of models of the CerePlex M due the variety of channel count offerings. Additionally, there have been multiple revisions to the device. The table below shows these models by part number (PN):

Channel Count	Revision 1	Revision 2	Revision 3	Revision 4
16	8189	9359	10130	10531
32	6956	9360	10129	10532
64	6957	9361	-	10533
96	6958	9362	-	10534
128	-	9043	-	10535

Intended Use and Indications for Use

The CerePlex M is designed to allow for recording of action potentials and local field potentials from microelectrodes implanted in animal models.

Contraindications, Warnings, and Precautions

Warnings

Only handle the CerePlex M by gripping the narrow sides of the board. Putting pressure on the circuit board components may cause device functional failure.

Do not touch any exposed electrical conductors when the CerePlex M connector is attached to devices on the subject's head. This may result in inducing electric charge to the neural tissue and damaging neural tissue.

Do not use the CerePlex M in the presence of flammable anesthetic agents or any other flammable reagents. The CerePlex M is not tested for use in these environments.

Avoid strong static discharges. These may cause functional failure of the device.

Keep the CerePlex M away from liquids. Contact with water can lead to subject or operator receiving electrical shock or damage to the device.

Only use the CerePlex M with supplied Blackrock Microsystems components. Substitution of components not supplied by Blackrock Microsystems may compromise subject safety or system performance.

Do not leave the subject connected to the CerePlex M when the system is not in use. Failure to remove the CerePlex M when the animal is not supervised may result in damage to the device.

Use caution when placing cables and other connectors to minimize the likelihood of tripping or accidentally pulling on cables. Pulled cables may cause damage to the CerePlex M or any other connected devices.

Precautions

Read this entire manual prior to using the device.

This product is for animal research only.

Specifications

Model Name	CerePlex M
Power Requirements	150 mA maximum load
Resolution	16-bit ADC. 250 nV/bit @ normal gain
Sampling Frequency	30 kSps per channel
Mode of Operation	Continuous
Input Frequency Range	0.3 Hz – 7.5 kHz

Input Impedance Range	1300 M Ω @ 10 Hz, 13 M Ω @ 1kHz
Maximum Input Voltage	8.192 mV with respect to reference @ normal gain
Water Ingress Protection	Ordinary Equipment, not fluid resistant, IP20
Operating Environment	10 ˚ C to 40 ˚ C, 5 to 95% R.H. (non-condensing)
Storage Environment	-20 ˚ C to 50 ˚ C, 50 to 100% R.H. (non-condensing)
Connector Model	A79027-001 (36 pin)
Size	25 mm x 19mm x 3 mm (for center board)
Input Referred Noise	< 3 microvolt RMS

Hardware Overview

Pinout

The CerePlex M utilizes banks of 32 channels with each bank beyond the first appearing as a separate board connected by a flexible ribbon to the primary board. These banks are labeled A, B, C, and D. The number of additional boards used depends on the number of channels. Each bank utilizes a 36 pin Omnetics connector with 32 channels, 2 reference channels that are independent for each bank of 32, 2 ground channels, and 4 guide pins that are not inputs. The exception to the above is the 16-channel board which uses a smaller connector and has six guide pins. The pinouts for each version of the CerePlex M are shown below.
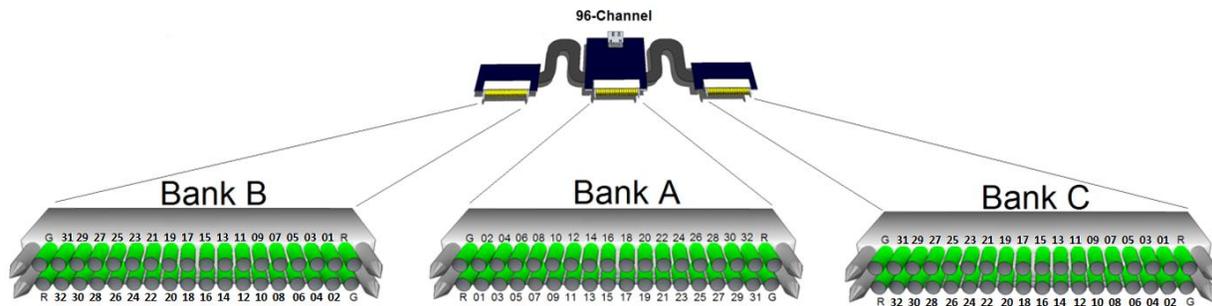

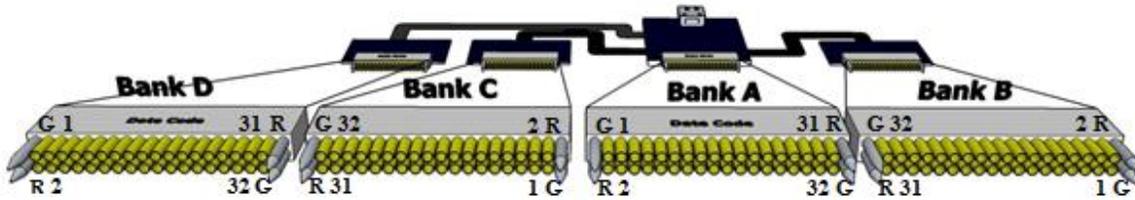**Figure 1 - CerePlex M Revision 1 Input Connector Pin-Out**

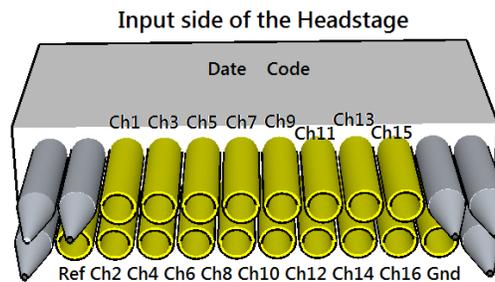**Figure 2 - CerePlex M Revision 2, 3, and 4 Input Connector Pin-Out**

Figure 3 - 16-Channel CerePlex M Revision 1, 2, 3, and 4 Input Connector Pin-Out

The CerePlex M has an output connecter that is used to communicate the digitized neural signal from the CerePlex M towards the processor. The pinout of this connector is show below for reference, but it will not need to be utilized by most users since interface cables are provided by Blackrock Microsystems.
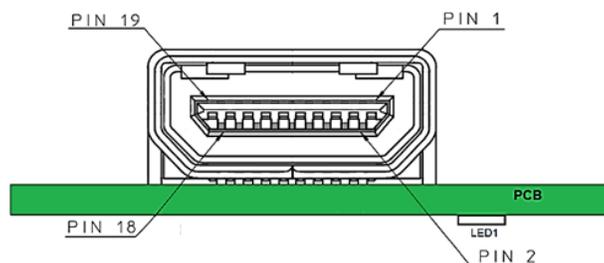

Figure 4 - Pin Numbering of Digital Data Connector

Digital Data Connector Pin Number	Revision 1 and Revision 2
1	Ground
2	Fast Settle
4, 7, 10, 13	Shield Ground
6	Data +
8	Data -
12	Clock +
14	Clock -
17	Patient Ground
18	V +
19	V +
3, 5	NC
9, 11	Reserved

Impedance Mode Switch

All versions beyond Revision 1 of the CerePlex M have the capability of measuring impedances of the electrodes to which they are connected. To enable impedance mode on the CerePlex M, switch the impedance mode switch from the OFF to the ON position. The impedance mode switch can be found on the back of the CerePlex M, near the digital data output connector.
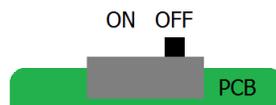

Figure 5 - Impedance Mode Switch Position Indicator

The CerePlex M headstage should only be in impedance mode when using the impedance checking application within the Central Software. Using the impedance mode during recording will result in the user observing the 1 kHz, 10 nA current bursts instead of the expected neural signal.

Attaching the CerePlex M

As shown above, the CerePlex M is composed of multiple boards connected to a primary board through flexible ribbon connectors. When the CerePlex M is connected to an electrode termination board, it is necessary to bend these flexible ribbons in the proper direction to ensure the expected association between electrodes and data channels.

The instructions below are for a 128 channel CerePlex M, but the placement of each bank is applicable to lower channel count versions of the CerePlex M.

Before attaching or detaching the CerePlex M, ensure that the device is unpowered.
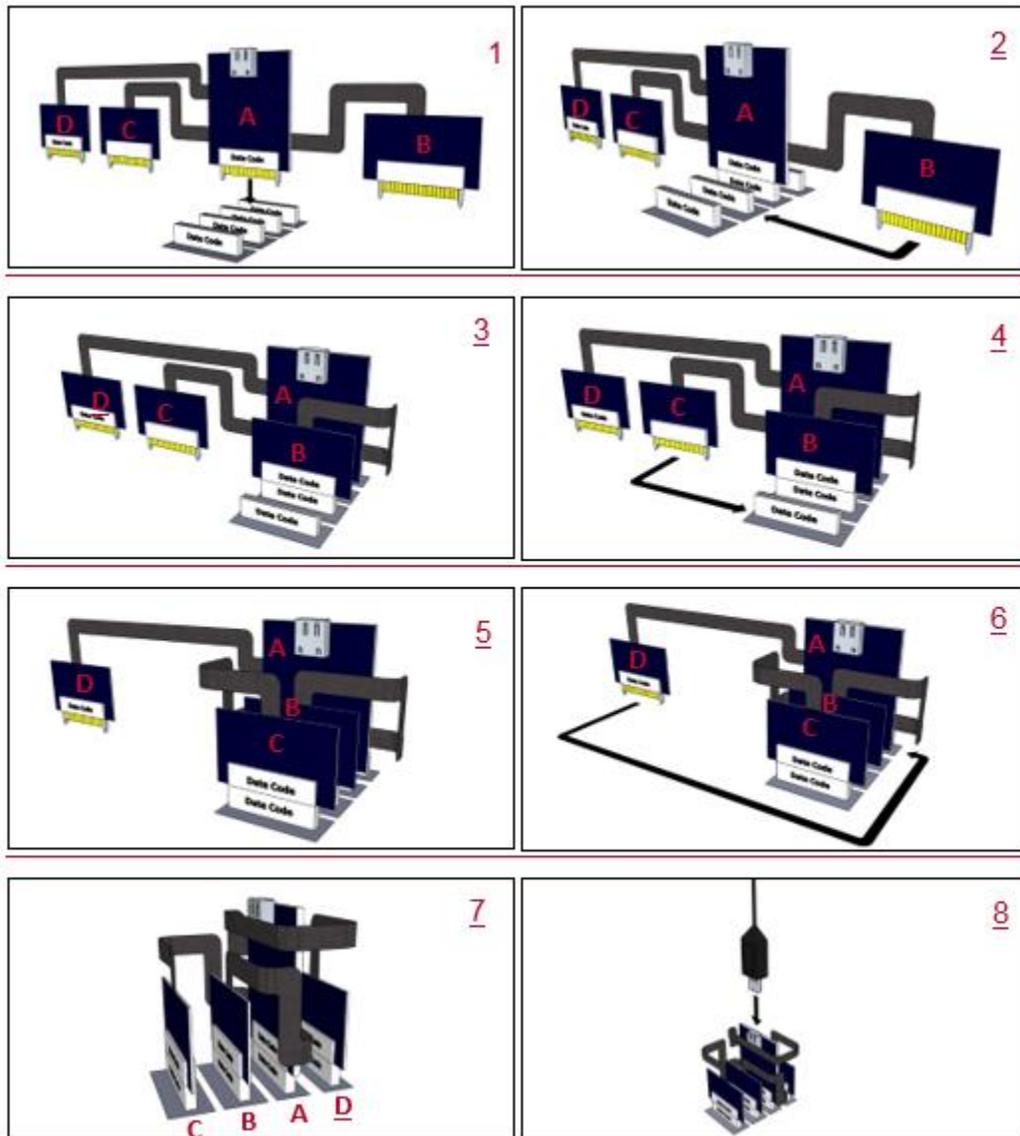
Figure 6 - Attachment of the CerePlex M to an Electrode Termination Board

Cleaning, Maintenance, and Disposal

Cleaning

The CerePlex M can be cleaned by commonly used laboratory cleaners such as alcohol, diluted bleach, and enzymatic cleaners. Care should be taken when cleaning around the

connectors to ensure that the connector pins are not bent or damaged. Before use, allow the device to dry completely, especially within the pins of the connectors.

The CerePlex M should not be submerged in liquid or exposed to sonication during cleaning. Either of these may damage the device.

Maintenance

The CerePlex M does not require any maintenance or calibration.

Disposal

The CerePlex M is an electronic device with a printed circuit board (PCB). It does not contain a battery.

No special care needs to be taken for disposal beyond those guidelines for general electronics disposal.

Return Merchandise Authorization

In the unlikely event that your device needs to be returned to Blackrock for repair or maintenance, do not send any equipment back without a Return Merchandise Authorization Number (RMA). An RMA number will be issued to you by a Blackrock representative. If you need to obtain an RMA number, you may contact a product support representative at +1 (801) 582 5533 or by emailing support@blackrockmicro.com.

Once an RMA number has been issued, it is important to safely pack the returned item for shipping back to Blackrock. It is preferred that you save the original boxes and packing materials that your system arrived in for return shipment. Please address the package as follows:

Blackrock Microsystems, LLC

ATTN: RMA#

630 S. Komas Dr., Suite 200

Salt Lake City, UT 84108 USA

Tel: +1 (801) 582 5533

Warranty

Blackrock Microsystems ("Blackrock") warrants its products are free from defects in materials and manufacturing for a period of one-year from the date of shipment. At its option, Blackrock will repair or replace any product that does not comply with this warranty. This warranty is voided by: (1) any modification or attempted modification to the product done by anyone other than an authorized Blackrock employee; (2) any abuse, negligent handling or misapplication of the product; or (3) any sale or other transfer of the product by the original purchaser.

Except for the warranty set forth in the preceding paragraph, Blackrock provides no warranties of any kind, either express or implied, by fact or law, and hereby disclaims all other warranties, including without limitation the implied warranties of merchantability, fitness for a particular purpose, and non-infringement of third-party patent or other intellectual property rights.

Blackrock shall not be liable for special, indirect, incidental, punitive, exemplary or consequential damages (including without limitation, damages resulting from loss of use, loss of profits, interruption or loss of business or other economic loss) arising out of non-compliance with any warranty. Blackrock's entire liability shall be limited to providing the remedy set forth in the previous paragraph.

Support

Blackrock prides itself in its customer support. For additional information on this product or any of our products, you can contact our Support team through the contact information below:

Manuals, Software Downloads, and Application Notes

www.blackrockmicro.com/technical-support

Issues or Questions

www.blackrockmicro.com/technical-support

support@blackrockmicro.com

U.S.: +1 (801) 582-5533

Complaints

When filing a complaint, please provide the product description, product number, software version, lot number, complainant's name and address, and the nature of the complaint.