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CerePlex A

Instructions for Use



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What this Manual Covers

The Blackrock CerePlex A provides an interface between the Cerebus/CerePlex Direct recording systems and up to 128 microelectrodes for high fidelity transmission and recording of extracellular spikes and local field potentials from the brain. The Blackrock CerePlex A converts analog signals to digital format which dramatically reduces the noise introduced to the signal during transmission. **Figure 1** – Blackrock CerePlex A Set-up below shows an application overview of how the CerePlex A fits into a complete neural recording system.

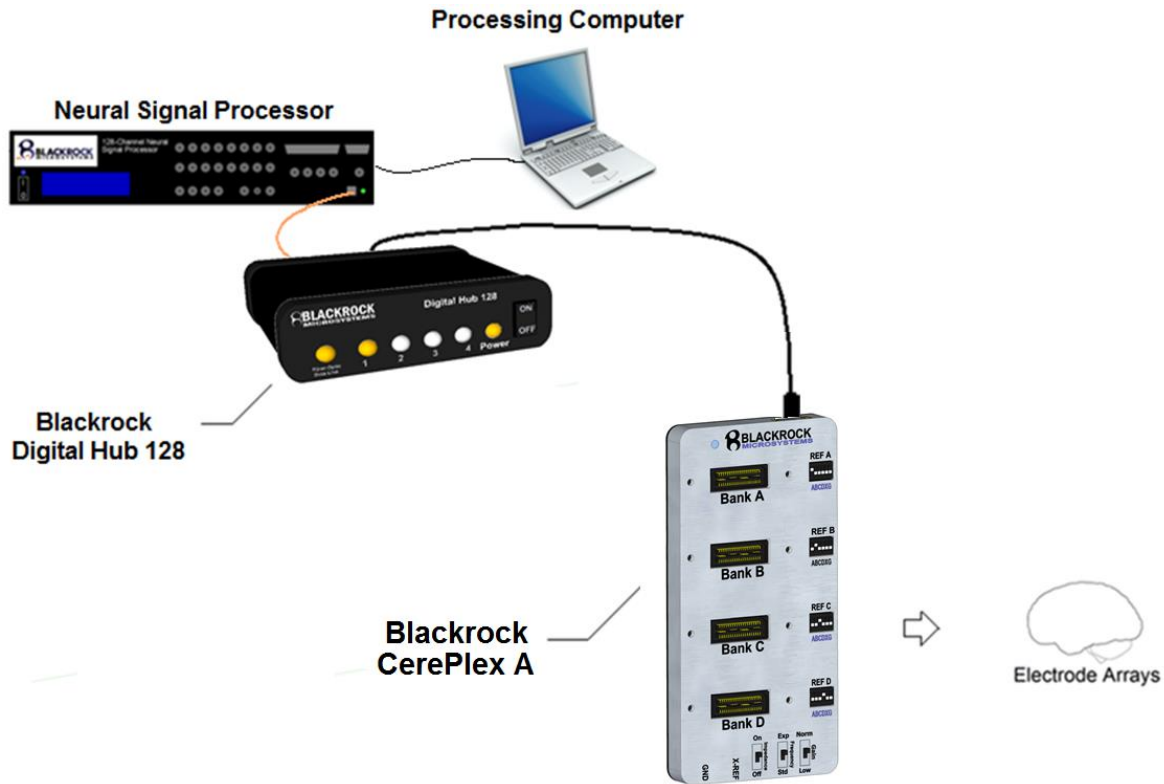


Figure 1 – Blackrock CerePlex A Set-up

* Blackrock Digital Hub, CerePlex Direct and Cerebus Acquisition System are each purchased separately.

Warnings and Precautions

Warnings

- Do not touch any exposed electrical conductors when the CerePlex A connector is attached to devices on subject's head as this may result in inducing electric charge to the neural tissue. Irreversible damage may occur.

- The CerePlex A is NOT to be used as a stimulation source.
- Use caution when connecting and disconnecting the Cable to the CerePlex A to minimize the risk of the cable being accidentally pulled or tugged.
- Do not use the CerePlex A in the presence of flammable anesthetic agents or any other reagents.
- Avoid strong static discharges from sources like television or computer monitors because it can damage the electrical components of the system.
- Keep the CerePlex A away from liquids. Contact with water, shower spray, or wet surfaces can lead to the subject receiving an electrical shock.
- Always use antistatic or electrostatic discharge (ESD) safe gloves when connecting the CerePlex A.
- Use only the supplied Blackrock Microsystems components (Cerebus system, Digital Hub, CerePlex A Cable, headstages such as Quad-IDC, Cabrio). Substitution of components not supplied by Blackrock Microsystems may affect system performance and subject safety.
- Do not leave the subject connected to the CerePlex A when the Cerebus System is not in use.
- 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 A or any other connected devices.
- There is a maximum current rating for each input bank on CerePlex A to supply the connected headstages. Please refer to the “Power Requirements” in the Specifications Section for details. Using a headstage that draws more than the maximum rated current will be subjected to noise, non-functionality, and even device damage. For instance, please use no more than one Quad IDC or Cabrio with a single CerePlex A device.
- There are power pins on the CerePlex A bank connectors, use only Blackrock Microsystems certified headstages/connectors to connect to the CerePlex A and plug in in the right direction to avoid shorting electrode directly to the power pins, which may cause harm to the subject.
- Exam the connectors on both CerePlex A and the headstage prior to connecting, make sure there is no bent pin or bad connector.

Precautions

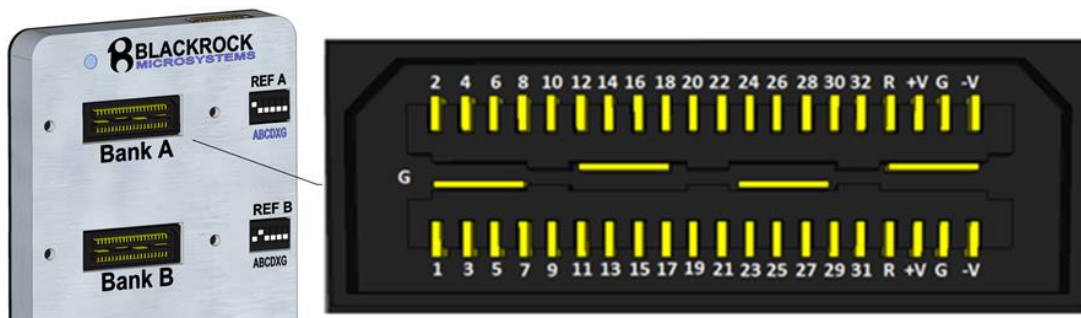
- Read this entire manual prior to using the device.
- This product is for animal research only.

Specifications

Model Name	Blackrock CerePlex A
Power Requirements	+5V@150mA / - 3V@100 mA VDC maximum load (for each bank)
Sampling Frequency	30 ksps
Mode of Operation	Continuous
Input Frequency Range	0.3 Hz – 7.5 kHz / 0.02 Hz – 10 kHz (User selectable)
Input Impedance	1300 MΩ @ 10 Hz, 13 MΩ @ 1 kHz
Maximum Input Range	± 8.192 mV with respect to reference @ normal gain ± 65.536 mV with respect to reference @ low 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, 5 to 100% R.H. (non-condensing)
Resolution	16-bit ADC. 250 nV/bit @ normal gain, 2 μV/bit @ low Gain

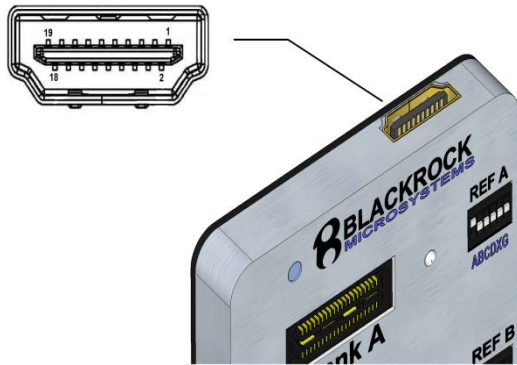
Hardware

Blackrock CerePlex A Pin-out



*G=Ground, R= Reference, +V=+3V, -V=-3V.

Figure 2 – CerePlex A Input Connector Pin-Out



HDMI/D Pin #	Description
10	Clock+
12	Clock-
14	Fast Settle
2, 5, 8, 11, 19	Ground
18	V+ (5V)
17	V- (-3V)
7	Data+
9	Data-

Figure 3 – CerePlex A Output Connector Pin-Out

Note: “Fast Settle” pin is an “active low” digital control input to the CerePlex A device, that uses to help the amplifiers to recover faster if they are saturated due to artifacts from either noise or stimulation.

Reference Selection

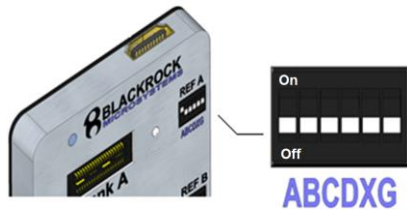


Figure 4 – CerePlex A Ref DIP Switch

Each input bank of the CerePlex A can use a separate reference. The DIP switches can be used to select the reference to be used for each bank on the CerePlex A. Each DIP switch has six jumper selections for each bank (**Figure 4 – CerePlex A Ref DIP Switch**). The X & G positions are for external reference and ground that are connected to the green and red touch-proof jacks at the bottom of the CerePlex A. The default has A at the On position for the

Ref A DIP switch, B at the On position for the Ref B DIP switch, C at the On position for the Ref C DIP switch and D at the On position for the Ref D DIP switch. By using the DIP switches on the CerePlex A, reference can be selected from a different bank. For example, if both bank A and bank B are connected to different electrode arrays. On bank A, to use the reference from bank B instead of its original reference, switch A Off and switch B On, on the bank A DIP switch. This will cause bank B and bank A to share the same reference from connector B. Each bank can use its own reference, the reference from any of the other three banks, the external reference or the external ground by switching the jumper on its corresponding DIP switch. Only one switch for each bank should be in the On position. If multiple switches are on, those references will act in parallel.

Operation Mode Switches

There are three switches on the bottom of the CerePlex A.

1. Impedance

When Impedance is switched to On, the CerePlex A goes into Impedance mode. To return to recording neural signals, toggle the switch back to Off. Because impedance testing requires a driving signal to be delivered to the electrodes, Impedance mode will not work if a headstage is connected between the electrode and the CerePlex A. A passive adapter may be required to connect the CerePlex A to the electrode connector. Contact Blackrock Support to determine the appropriate adapter for the specific electrodes under test.



Figure 5 – CerePlex A Impedance DIP

In Impedance mode, the CerePlex A delivers to each electrode sequentially a 1 kHz, 1 nA peak-to-peak current for 100 ms. In order to obtain accurate impedance values, a 1 ft shielded ribbon cable (Blackrock PN-8819) must be used because the cable capacitance affects the measured impedance. In the Central Software Suite version 6.04 the

following equation must be used to account for the cable impedance. In Central versions 6.05 and later, this calculation is performed automatically.

$$Impedance (k\Omega) = \left(\frac{1}{Measured Value (k\Omega) - 2} - \frac{1}{4900} \right)^{-1}$$

2. Frequency

This switch provides different filter ranges. Exp (Expanded) is from 0.02 Hz to 10 kHz and Std (Standard) is 0.3 Hz to 7.5 kHz.

3. Gain

This switch adjusts the gain of the input signal for all the channels. At Norm (Normal) position, the system gain is 1. At the low position, the gain is 23/183 (~0.126).

Instruction for Assembly

1. Connect CerePlex A to the host device through an HDMI A-A cable.
2. Turn on the power of the connected host device.
3. The LED on the CerePlex A should light up as blue.
4. Plug in the blue shielded cable and screw it down to secure the connection.
5. Connect the other end of the blue shielded cable to a headstage or to the electrode terminal.
6. If different ground and reference are needed, use the two connectors at the bottom of the external ground and reference.
7. Verify that the reference DIP switches for each bank connected bank are set to the desired position.

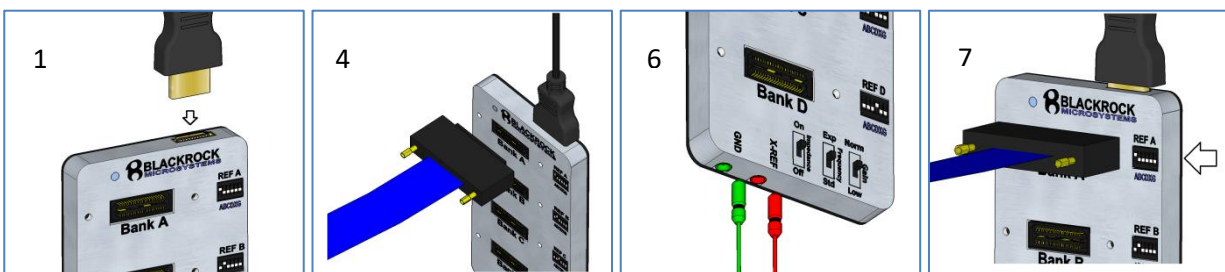


Figure 6 – CerePlex A Assembly Process

****After recording, turn off the power before any disconnection.**

Cleaning, Disinfection, and Maintenance

The CerePlex A device should be kept dry and free of debris. A gentle cleaning with small amounts of isopropyl alcohol can be used to clean the outside of the device if necessary.

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

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.

Issues or Questions

www.blackrockmicro.com/technical-support

support@blackrockmicro.com

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

Notice to the user and/or patient that any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the member state in which the user and/or patient is established.