

630 Komas Drive | Suite 200
Salt Lake City | UT 84108 | USA
P +1 (801) 582-5533 | F +1 (801) 582-1509
www.blackrockmicro.com



Blackrock Y-Adapter

Instructions for Use



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What this Manual Covers

This manual covers the specifications and usage of the Y-adapter PN 9557, 10051, 10562, and 10563. The Y-adapter is intended to interface a 16 or 32 channel headstage and a CereStim cable with electrodes simultaneously. PN 10562 and 10563 has a higher high-pass cutoff frequency of recorded signals and higher stimulation fidelity than PN 9557 and 10051.

Intended Use and Indications for Use

The Y-adapter is intended to interface both a 32 or 16 channel headstage and a CereStim to Omnetics Cable with electrodes simultaneously. The headstage is to be plugged in to the recording side of the adapter and the CereStim cable should be plugged in to the stimulating side, as indicated on the adapter. The adapter can then be plugged into the recording/stimulating site and the system can be turned on. Pinouts for this adapter are provided below. Pinouts are viewed looking into the connectors.

Contraindications, Warnings, and Precautions

Contraindications

- This product is for animal research only.
- Connection of external instruments to the Y-adapter may compromise electrical safety.

Warnings

- Do not touch any exposed electrical conductors when the adapter connector is attached to devices on the subject's head as this may result in inducing electric charge to the neural tissue. Irreversible damage may occur.
- The patient/subject should not attempt to remove the connections themselves.
- Use caution when connecting and disconnecting the cable to the headstage to minimize the risk of the cable being accidentally pulled or tugged.
- Do not use the Y-adapter 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 Y-adapter away from liquids. Contact with water, shower spray, or wet surfaces can lead to the patient receiving an electrical shock.
- Always use antistatic or electrostatic discharge (ESD) safe gloves when connecting the Y-adapter.
- 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 headstage or any other connected devices.

Precautions

- Read this entire manual prior to using the device.
- Use only the supplied Blackrock Microsystems components (CereStim, CerePlex M or Blackrock FEA). Substitution of components not supplied by Blackrock Microsystems may affect system performance and patient/subject safety.

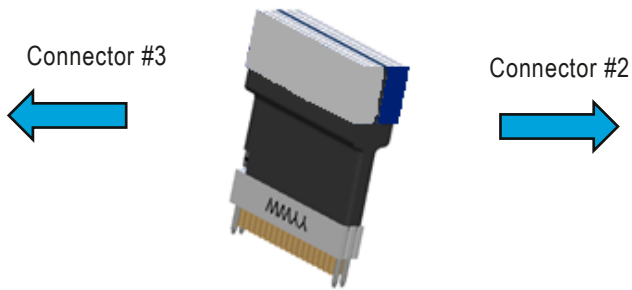
Specifications

	PN 9557	PN 10563	PN 10051	PN 10562
Model Numbers	Omnetics A79023-001, A79024-001		Omnetics A79015-001, A79016-001	
Mode of Operation	Continuous			
Number of Channels	32	32	16	16
High-Pass Cutoff Frequency (Hz)	0.3	3	0.3	3
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)			

Hardware

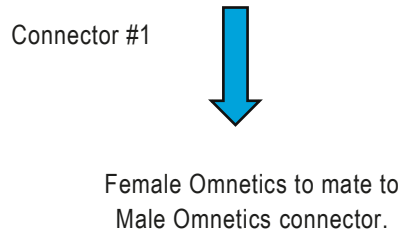
Male Omnetics connector to mate to recording headstage.

Omnetics text on the headstage should face the same direction as the text on this connector.



Male Omnetics connector to mate to CereStim Cable.

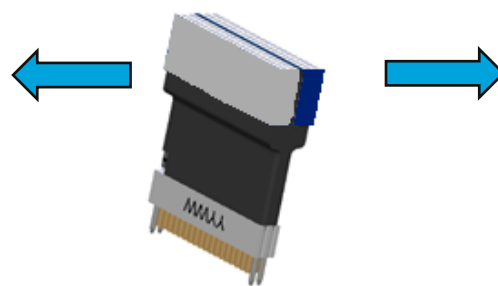
same direction as the text on connector #3 for 32 channel adapters and the same direction as the text on connector #2 for 16 channel adapters.



Record Label

J3	
GND	REF
CH01	CH02
CH03	CH04
CH05	CH06
CH07	CH08
CH09	CH10
CH11	CH12
CH13	CH14
CH15	CH16
CH17	CH18
CH19	CH20
CH21	CH22
CH23	CH24
CH25	CH26
CH27	CH28
CH29	CH30
CH31	CH32
REF	GND

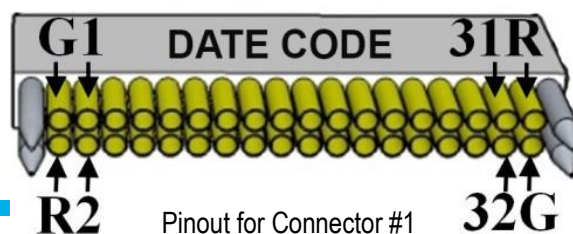
Pinout for Connector #3

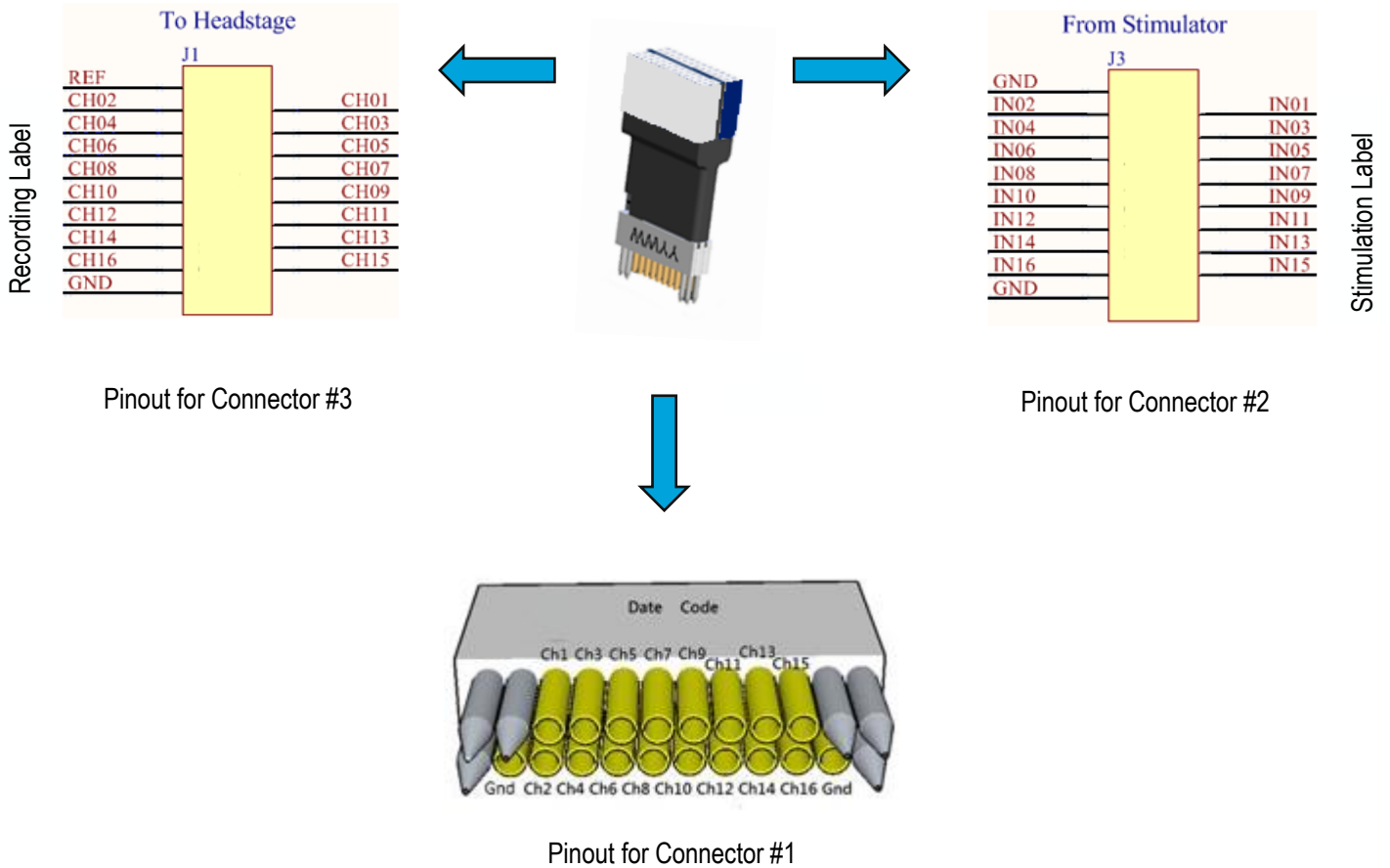


Stimulation Label

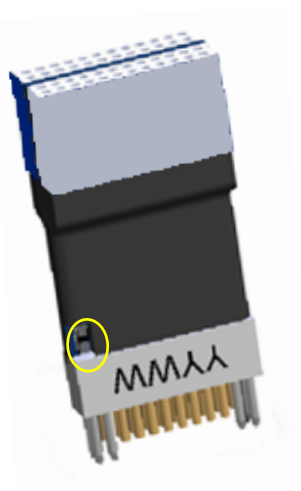
J2	
GND	GND
IN01	IN02
IN03	IN04
IN05	IN06
IN07	IN08
IN09	IN10
IN11	IN12
IN13	IN14
IN15	IN16
IN17	IN18
IN19	IN20
IN21	IN22
IN23	IN24
IN25	IN26
IN27	IN28
IN29	IN30
IN31	IN32
GND	GND

Pinout for Connector #2





An un-epoxied pad is available for attaching an external reference. To do this remove the resistor on the pad and solder the external reference to the pad closest to connector #3. See the figure below:



Stimulation Fidelity

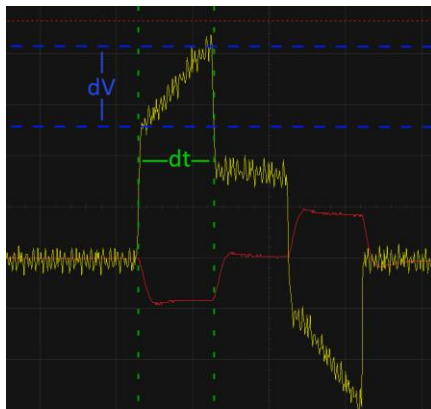
The Y-adapter capacitively isolates stimulating and recording hardware at the electrode. Capacitive elements in the Y-Adapter shunt a portion of the applied stimulation current away from the electrode to the patient protection ground of the headstage. The percent of charge delivered to the electrodes is given in the equations below.

$$\text{PN 9557 and PN 10051: Percent of charge delivered} = \left(\frac{C_e}{1 \text{ nF} + C_e} \right) * 100$$

$$\text{PN 10563 and PN 10562: Percent of charge delivered} = \left(\frac{C_e}{100 \text{ pF} + C_e} \right) * 100$$

C_e – Capacitance of the electrode

The capacitance of each electrode is unique and depends upon the electrode material, geometry, surface coating, and surrounding tissue. The manufacturer’s specification of electrode impedance does not include interactions between the electrode and tissue and is not equivalent to in-vivo electrode impedance. Electrode capacitance values are best determined by applying a constant current stimulation with the CereStim R96 through a complete stimulation/record setup with electrodes attached and implanted. During stimulation, the monitor output voltage may be measured with an oscilloscope. The capacitance of the electrode is given by the following equation where the differential voltage and time can be measured from the monitor port voltage trace.



$$C_e = I_{stim} * \partial t / \partial V$$

∂t – Stimulation phase width in seconds

I_{stim} – Stimulation current in amperes

∂V – Change in monitor port voltage in volts

Figure 1-Oscilloscope trace of the monitor port. Stimulation current shown in red, stimulation voltage shown in yellow

In cases where the electrode has been explanted and capacitance cannot be readily measured, the following equation can be used to calculate electrode capacitance based on impedance values previously measured at 1 kHz.

$$C_e = ((Z_e - 2800)^{-1} - 500000^{-1}) / (2000 * \pi)$$

Z_e = Electrode impedance in ohms

Charge delivered per phase can be estimated from the stimulation current, pulse width, and percent of charge delivered.

$$\text{PN 9557 and PN 10051: Charge delivered per phase} = I_{stim} * T_{stim} \left(\frac{C_e}{1 \text{ nF} + C_e} \right)$$

$$\text{PN 10563 and PN 10562: Charge delivered per phase} = I_{stim} * T_{stim} \left(\frac{C_e}{100 pF + C_e} \right)$$

Cleaning and Maintenance

The Y-adapter should be kept dry and free of debris. A gentle cleaning with small amounts of distilled water can be used to clean the outside of the adapter if necessary.

The Omnetics connectors on the adapter can be fragile. Connect and disconnect with care to prevent bending and breaking the pins.

The Y-adapter can be reused as needed. Follow WEEE standards for disposal of the device.

Magnetic Resonance

The Y-adapter has not been evaluated for safety and compatibility in the MR environment. The Y-adapter has not been tested for heating, migration, or image artifact in the MR environment.

Troubleshooting

If problems arise concerning the recording or stimulus after connecting the adapter, verify that the stimulating and recording systems are plugged into the correct side of the adapter. Refer to the hardware section on page 4 for guidance. If problems continue consult Blackrock's CereStim IFU and applicable headstage IFU.

Warranty

Blackrock Microsystems, LLC ("Blackrock") warrants that 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.

Return Merchandise Authorization (RMA)

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. 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

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 (if applicable), lot number, complainant's name and address, and the nature of the complaint.