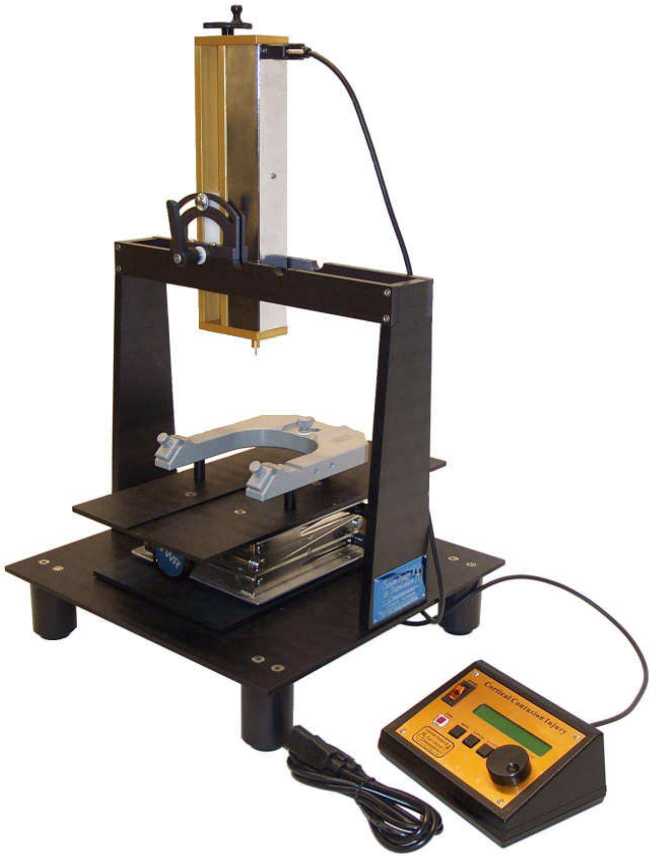
Custom Design & Fabrication, Inc.

electric Cortical Contusion Injury

*e*CCI-6.3 Quick-Start Guide



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Assembly:

The *e*CCI device ships fully assembled with the exception of electrical connections.

Electrical Connections:

1) Place the power switch in the off (down) position.

2) Connect the Impact Head to the Control base using the high-density DB-15 cable.

3) Select the appropriate power cord and connect the Control base to AC power.

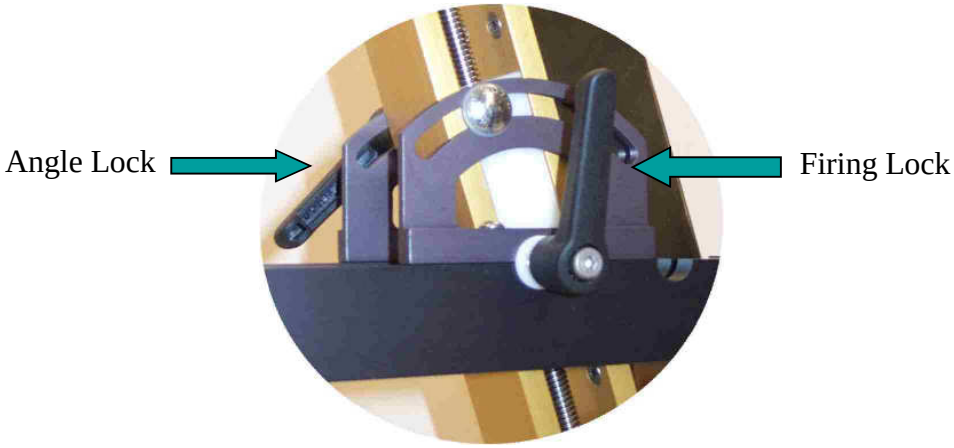
The base will accept input power of 110-120VAC 50-60Hz or 210-240VAC 50-60Hz. Detection is automatic and requires no switch settings.

Adjustments:

Loosen the locking levers to allow head positioning.

The upper lever is the Angle lock. This locks the head angle while still allowing vertical movement. This lever should be used to control the friction against head rotation and should not be over tightened.

The lower lever is the Firing lock . This lever draws the frame against the head preventing any movement of the head.



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Initialization and Calibration:

The Calibration firing will be used to determine the maximum velocity the device can consistently reproduce, the current range of motion, and the amount of hyper-extension that occurs during a full velocity impact.

1) Turn the power switch on. The anvil should retract if not already in the home (fully retracted) position. The device should initialize and request a Calibration firing.

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Test Fire Required for
     Calibration
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2) Clear the impact area and press Accept. The device will charge for firing.

You can verify that there is sufficient clearance by manually moving the anvil to full extension. This can be done at any time and will not harm the device or interfere with its operation as long as you return it to the home position before proceeding.

3) Once fully charged, the device will be armed and ready to fire. Press the blinking Fire key.

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>>> Device is Armed <<<
  Press Fire when ready
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After Calibration, the display will indicate the Velocity limit. This is the highest velocity that the device can consistently produce in it's current configuration. Many factors influence this maximum velocity value. If you are using velocity settings near the limit value then a calibration firing should be performed any time you change anvils or make a significant change to the head angle.

Firing Options:

There are several firing parameters that can be accessed through the menu. The **Adjust** knob is used to scroll through the options of each menu and to adjust the values of selected parameters. Press ACCEPT to store the desired value. The value will become the new default value and be restored even after the device has been turned off.

Following is a brief description of their function and default values.

Parameter	Description	Default*
Dwell	Dwell is the time in milliseconds that the anvil is held at full stroke before retracting.	100ms
Velocity(limit)	This is the maximum reproducible velocity obtained during calibration firing. It is based on the velocity obtained while accelerating as it approaches the impact depth range.	5.34m/s
Velocity(target)	This is the desired impact velocity. The eCCI will attempt to accelerate the anvil to this velocity and maintain it through the remainder of the stroke.	Velocity (limit)
Velocity(impact)	This is the actual velocity reading obtained as the anvil passes through the point of initial contact.	none
Depth	Depth is the distance beyond the point of initial contact that the anvil will travel to reach the end of stroke. This value includes the hyper-extension that occurs as the shock from sudden deceleration is absorbed at the end of stroke.	3mm
Position	This is the current position of the anvil with relation to the point of initial contact. Negative numbers indicate the anvil is above the point of impact. Positive numbers indicate the anvil is below the point of impact (closer to end of stroke).This is not an adjustable parameter.	none

* The default values are loaded only when the device determines that the saved settings are corrupt otherwise the device will use the values entered from the menu and from the last firing.

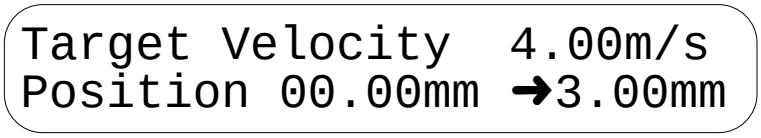
The eCCI is under constant development and many of the device parameters can be modified without making hardware changes. Contact Custom & Fabrication if your research requires functions or setting outside the current device parameters.

Firing:

1) Locate and accept the Prepare for Firing menu option.

2) Accept the request to extend then manipulate the eCCI head and the subject to bring the anvil in contact with the target impact site.

When you verify it is safe, the anvil will be extended to the point where it should make initial contact with the target. In this example the a depth of 3.00mm is used so the anvil will be held 3.00mm from the end of stroke. The initial contact point is always position zero. The depth value will be blinking to indicate that it can be adjusted. Depth changes made here will be used for this firing only unless you press the Accept key to store the setting.



If you pull the anvil to the end of stroke you notice that the position reading does not reach 3.00mm as you might expect. This discrepancy is due the compensation for the hyper-extension that occurs as the motor reaches the end of stroke and components deform to absorb the energy of the impact. The hyper-extension is typically 0.15mm at full velocity.

3) Lock the head in place by tightening the Firing Lock lever.

The Firing Lock lever clamps the frame tightly to the head providing a very stable lock without introducing movement of your setup.

4) Locate and accept the Arm for Firing menu option.

The anvil will retract and the device will charge. Once charging completes you can fire the device or cancel.

5) Press the Fire button to Fire the eCCI.

After firing the display reads the actual velocity measured as the anvil reached the point of initial contact and the measured travel beyond that point. .

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Impact Velocity  4.04m/s
Peak Impact Depth 3.02mm
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6) Optional viewing or exporting of "The Motion Profile".

The display only shows the velocity where the anvil reached the target. In most cases this will be all the information you need as changes in velocity through the end of stroke will be negligible. The device does however, record velocity readings beginning well before impact and continuing into the end bounce. This is referred to as the motion profile.

The motion profile is accessed through the Utilities menu. You can either view the profile or export it using the RS-232 port on the back of the base.

Viewing the profile sends the recorded data as a stream of velocities to the LCD display. This gives you a quick verification that nothing unusual occurred during firing.

Exporting the profile sends the recorded data out the RS-232 port. Use can use a terminal program set for 19200BAUD, 8 bit data, no parity, and one stop bit to view or copy the profile to a file.

The motion profile consists of 320 velocity readings taken every 0.085mm for approximately the last 35mm of travel. This provides a good picture of the motion as the device regulates velocity coming into and throughout the impact. Near the end of the profile the velocity readings will suddenly fluctuate as the device hits the stop at the end of stroke and bounces.

The motion profile is also recorded during calibration and is accessed in the same manner. The calibration profile differs in that velocities are recorded every 0.339mm to allow recording of the entire stroke.

For Information, Service, or Orders Contact:

Custom Design & Fabrication, Inc.
P.O. Box 969
Sandston, VA 23150
Guy M. Blankinship III
Telephone: 1-804-932-3933
Email: gblankin.cdf@gmail.com
URL: https://www.http://cdf-products.com/