

F1000 HEG Option

Installation

NOTE: Steps 1-3 may already be installed on your HEG. If so proceed to step 4.

1. Plug the flat connector on the Thinking Cap cable into the headpiece. The small tabs on the connect should face the Velcro strap on the headpiece. Press the Velcro reinforcement into the head strap to provide extra support for the cable. Use care not to exert excessive force on the printed circuit board in the headpiece.
2. Plug the 9 pin connector on the other end of the cable into the interface box.
3. Plug the flat connector on the short F1000 interconnect cable into the interface box. The small tab on the connector only allows its insertion in one direction.
4. Plug the 8 Pin DIN connector on the other end of the cable into the expansion connector on the rear of the F1000 preamp box. This can be done with power on or off. If power is on, the red LED on the headpiece will light.
5. Insert the HEG software disk in the a:drive. from the C:\prompt type HEGSETUP <enter>
6. This completes the installation.

Initial Trial

1. Attach the Thinking Cap head piece over the forehead using the Velcro headband. At this point it can be centered on the forehead. The white circle on the outside of the headband shows the approximate center of measurement. The headpiece should be sufficiently tight to keep external light from penetrating and to keep the LED light from leaking directly into the sensor. It is also very important to avoid hair under the headpiece. Dark skin blemishes can have a large effect on the readings if they are directly under the LED or sensor.

NOTE: It is a good idea to clip the cable to clothing to prevent stress on the headpiece. Leave sufficient slack to allow head movement.

2. From the F1000 opening screen, select Setups and HEG1. The familiar F1000 screen should appear with the current HEG reading shown at the bottom of the screen.
3. Press <ctrl> F9. After a short delay the HEG display will appear. The bar graph shows percent change from the current reference. Operation is the same as the EDR system.
4. The circular display expands with increasing readings.
5. Record a few minutes of data. Press <alt> S to save, <alt>Q to quit.
6. Select Data Presentation from the opening screen.
7. Select the data file just recorded.
8. Set all plots to N. Set Plot HEG to Y.
9. Press F6 to view the session.

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A Few Comments

These are a few things I have observed in using the HEG. They may provide some initial ideas for use or experimentation.

1. All I can say for sure is that the HEG is measuring the color of the underlying tissue. While surface capillary beds have some effect it seems to be minimal. Whether it is measuring blood flow or blood oxygenation is not clear.
2. I find the system is very responsive and I can make rather large changes in readings easily.
3. Absolute readings seem to be less important than changes. Moving the headpiece around can result in fairly large changes. These seem to be actual changes in the underlying tissue rather than instrumentation artifacts.
4. For me, sensor location has a very noticeable effect. On the left at Fp1 I find I can raise and maintain readings even while interacting with another person. In fact in some cases this seems to enhance the effect. On the right at Fp2 I find that increasing readings requires a state I call "pure feeling" or as someone else mentioned "sensitivity". The feeling is unique in that it doesn't seem to involve any particular emotion. I suspect that some subjects will find it uncomfortable not to "know". At this site any attempt at cognitive processing will result in a decrease.
5. 10 minutes seems to be a good session although Mary has recently tried a bit longer and continued to make increases.
6. At present there is no sound available for the HEG. We intend to add sound soon.

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HEG1 Key Reference (Basic HEG Feedback Screen)

Key	Function
<ctrl> F9	Master HEG Off/On
<ctrl> F7	Reverses direction of HEG ring display default is expand on increase)
<ctrl>F6	Toggles HEGRing Display
<ctrl>F5	Toggles HEG Digit Display
<ctrl>F4	Toggles HEG Bar Display
<ctrl>F3	HEG Bar Range Up
<ctrl>F2	HEG Bar Range Down
<ctrl> F1	Resets the HEG Bar Reference to the current value. Turns off autoref
<ctrl> F11	Resets the HEG Bar Reference to the current value. Turns on autoref
F9	Toggles Temperature Circle
<alt> F9	Toggles EDR Bar (All other EDR keys work as usual)
<shft> del	Toggles EMG Bar.
Ins	Toggles EEG Raw Logging.

Notes:

Monitoring Temperature

Attach the temperature probe as usual. Temperature will be displayed in the status area at the bottom of the screen. Press **F9** to display the temperature circle display. Temperature will be recorded and can be viewed on the Data Presentation screen.

Monitoring EDR

Attach the EDR electrodes as usual. EDR will be displayed in the status area at the bottom of the screen. Press <alt>**F9** to display the EDR bar. EDR will be recorded and can be viewed on the Data Presentation screen.

Monitoring EMG

Use the 3 lead EMG cable to attach electrodes to the area of interest. Plug the cable into the EMG 2 connector on the preamp. Use the wrist strap ground as usual. Press <shft> **del** to display the EMG bar at the bottom of the screen. The range can be changed using the <shft> right or left arrow keys on the numeric keypad.

EMG can be used to determine if the subject is attempting to use muscle contraction to control the HEG. Simply apply the electrodes to the head near the headband. The EMG uses a bandwidth of 100-500 Hz which excludes any possible EEG signals from the measurement.

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HEG2 Key Reference

(Provides simultaneous EEG & HEG Feedback)

Key	Function
<ctrl> F9	Master HEG Off/On
<ctrl> F7	Reverses direction of HEG ring display default is expand on increase)
<ctrl>F5	Toggles HEG Digit Display
<ctrl>F4	Toggles HEG Bar Display
<ctrl>F3	HEG Bar Range Up
<ctrl>F2	HEG Bar Range Down
<ctrl> F1	Resets the HEG Bar Reference to the current value. Turns off autoref
<ctrl> F11	Resets the HEG Bar Reference to the current value. Turns on autoref
<shft> del	Toggles EMG Bar.
del	Toggles Proportional EEG Feedback Display. Control thresholds and sound using the same keys as in the Prop screens.
Ins	Toggles EEG Raw Logging.

Notes:

Monitoring Temperature

Attach the temperature probe as usual. Temperature will be displayed in the status area at the bottom of the screen. Temperature will be recorded and can be viewed on the Data Presentation screen.

Monitoring EDR

Attach the EDR electrodes as usual. EDR will be displayed in the status area at the bottom of the screen. EDR will be recorded and can be viewed on the Data Presentation screen.

Monitoring EMG

In this screen EMG is derived from the EEG electrodes as with the Proportional Screens. The filter is FFT based.

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HEG2 EEG Filter Chart

Key (Use ShftCtrl)	Filter A				Filter B(alt)			
	Filter Band Pass(Hz)		Sound	Chan	Filter Band Pass(Hz)		Sound	Chan
F1	2.0	6.0	Warble	1	13.0	15.0	Harmonic	1
F2	4.0	6.0		1	13.0	15.0		1
F3	4.0	8.0		1	13.0	15.0		1
F4	2.0	6.0		1	15.0	18.0		1
F5	4.0	6.0		1	15.0	18.0		1
F6	4.0	8.0		1	15.0	18.0		1
F7	2.0	6.0		1	15.0	25.0		1
F8	4.0	6.0		1	15.0	25.0		1
F9	4.0	8.0		1	15.0	25.0		1
F10	7.0	10.0		1	15.0	25.0		1
F11	8.0	10.0		1	15.0	25.0		1
F12	4.0	30.0		1	15.0	25.0		1

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HEG3 Key Reference(HEG with EEG Spectral Display)

Key	Function
<ctrl> F9	Master HEG Off/On
<ctrl>F6	Toggles HEGRing Display
<ctrl>F5	Toggles HEG Digit Display
<ctrl>F4	Toggles HEG Bar Display
<ctrl>F3	HEG Bar Range Up
<ctrl>F2	HEG Bar Range Down
<ctrl> F1	Resets the HEG Bar Reference to the current value. Turns off autoref
<ctrl> F11	Resets the HEG Bar Reference to the current value. Turns on autoref
F9	Toggles Temperature Circle
<alt> F9	Toggles EDR Bar (All other EDR keys work as usual)
<shft> del	Toggles EMG Bar.
del	Toggles EEG Spectral Display Off/On
<alt>W	Toggles EEG Spectral Display between wide and narrow
Ins	Toggles Raw Logging

Notes:

Monitoring Temperature

Attach the temperature probe as usual. Temperature will be displayed in the status area at the bottom of the screen. Press **F9** to display the temperature circle display. Temperature will be recorded and can be viewed on the Data Presentation screen.

Monitoring EDR

Attach the EDR electrodes as usual. EDR will be displayed in the status area at the bottom of the screen. Press <alt>**F9** to display the EDR bar. EDR will be recorded and can be viewed on the Data Presentation screen.

Monitoring EMG

Use the 3 lead EMG cable to attach electrodes to the area of interest. Plug the cable into the EMG 2 connector on the preamp. Use the wrist strap ground as usual. Press <shft> **del** to display the EMG bar at the bottom of the screen. The range can be changed using the <shft> right or left arrow keys on the numeric keypad.

EMG can be used to determine if the subject is attempting to use muscle contraction to control the HEG. Simply apply the electrodes to the head near the headband. The EMG uses a bandwidth of 100-500 Hz which excludes any possible EEG signals from the measurement.