



Manual for Mindball Game and Mindball Core

Mindball Game and Mindball Core are essentially the same products. Mindball Game consists of a Mindball Core but also includes the specific Mindball table top and legs. Customers of Mindball Core build their own version of the table top. **If no specific info is required, both products are referred to as Mindball below.**

Safety Instructions for Mindball

- Read all safety and operating instructions before operating Mindball.
- Retain the safety and operating instructions for future reference.
- Heed all warnings.
- Install it in accordance with the instructions below.
- Follow all operating and use instructions.

WARNING! Potential electric personal injury or or appliance damage

- Mindball should be used with a grounded outlet power cord and plug.
- Do not use Mindball with a damaged cord or plug.
- Make sure all connections to Mindball are made carefully and inserted into the correct locations only.
- Turn off Mindball before unplugging.
- Always unplug Mindball by holding the plug—not the cord.
- Unplug Mindball from the power outlet before servicing.
- Unplug Mindball from the power network during lightning.
- Unplug your display/screen attached to Mindball from the power network during lightning.
- No objects filled with liquids shall be placed on Mindball.
- Mindball shall not be exposed to dripping or splashing.
- Do not handle plugs or appliances with wet hands.
- Keep cord away from heated surfaces.
- Protect the power cord from being walked on or pinched.
- Do not run appliances over cord.
- Do not put any object into openings.
- Do not rapidly turn the power switch on and off.

Mindball hardware precautions

- Refer all servicing to qualified service personnel.
- Do not place Mindball outdoors.
- Do not expose this Mindball to rain or moisture, extreme heat or cold.
- Do not drop, hit, or otherwise abuse Mindball or components.

Unpack and Install Mindball

Mindball Game Includes

One Mindball Game table top

One Mindball Core unit including the whole system; mechanics, electronics, PC and software.

Four table legs of metal

Power cable

Two headbands (as standard)

Two balls (one spare)

A manual

Mount Mindball Game:

1. Place the Mindball Game table gently on a stable surface that allows access to the leg mounts.
2. Screw on the four table legs.
3. Remove the tape holding the glass (the playing area).

Do not place Mindball Game on a surface where the table itself can be nudged while the table legs are stuck to the surface.

Mindball Core Includes

One Mindball Core unit including the whole system; mechanics, electronics, PC and software.

Two rails

Power cable

Two headbands (as standard)

Two balls (one spare)

A manual

Make sure that the reach of the magnet is not prohibited by the type of material (no metal) or thickness (max 25mm) of material you chose for the build.

Install Mindball

- Place Mindball at its dedicated place¹. Make sure that the sockets (Power, HDMI, USB) are at the same side as where you will put the monitor. If you don't, the information in the graphics will be reversed. .
- Connect your monitor to Mindball.
- Connect the power cable to Mindball and to the power outlet. Mindball works with power from 90V to 240V. Make sure that the connection is grounded².
- Connect the two headbands at each end of Mindball. Make sure that the connectors are inserted firmly and fastened by screwing the outer ring.

¹ Mindball registers the brain waves, which are very weak, seen from an electrical point of view. Mindball may therefore be sensitive for EMC/EMI from other exhibits or electrical installations. Please bear that in mind when deciding a suitable place for Mindball.

² Ground refers to a point in an electrical circuit from which voltages are measured, a common return path for electric current. If Mindball is not connected to ground, the system will not work properly.

Functional Description

Mindball is a two-person game controlled by the players' brain waves. The player being most focused wins the game by thus "pushing" a ball into the other player's goal. To be able to focus the brain needs to be mentally relaxed to some extent.

In Mindball, two players sit opposite each other—either at the official table or a custom-built surface for the Core version, wearing headbands with sensors. A ball is moving on the table back and forth until it rolls into one of the player's goals.

The brainwaves are detected by sensors attached to the headbands. The sensors are connected to a biosensor system. The biosensor system registers the electrical activity in the brain and presents the result in terms of graphics on a screen and the movement of a physical ball on the table. The technique used is called EEG.

If the team building accessory Mindball Multiplayer is used, the system calculates a media value of all players' brainwaves connected, playing on the same side.

To finish a game that the players have left unfinished, press and hold the start button for about three seconds. The system will then go to rest and present the idle screen.

Important! If a game is started - the system analyses and provides output from whatever electrical signals that come into the system via the headband sockets.

All headband sockets, including those of the Mindball Multiplayer, if used, **must have either a headband connected or a dummy plug inserted** (applicable to Mindball Multiplayer only). If not, the outcome will be completely random.

If a headband is connected there must be a head in the headband. If not, the outcome will be completely random.

Start Mindball

Start Mindball by turning the power switch on. The red lamp inside the switch is lit.

Put on the headbands and press the start button and your first game has started! The goal is to be more focused than your opponent and thus push the ball away from you into the opponent's goal.

Too long games

Should you prefer to stop a game before it is finished, press, and hold the start button for about three seconds.

By default, any game will timeout after 6 minutes, showing a message on the screen and moving the ball to the nearest goal. To change this setting, see Configure Mindball below.

The duration of a game can't be said to last for about 4 minutes as it all depends on who is meeting whom. The estimated average game time takes 5 minutes, but if one of the players is very much better than the other one, a game can take less than a minute. Also, if the two players are very equal a game can go on until Time Out.

To shorten games, you can increase the speed of the ball. To change this setting, see Configure Mindball below.

Mindball Graphics

If you connect a monitor to Mindball, the graphics with the players' brainwaves will automatically be presented when Mindball is powered up. We recommended that you connect a monitor to Mindball as the graphics are a major part of the experience for the people not playing at the time.

Interpretation of the Standard Graphics

There are three rectangles; One per user and one in the middle showing both players' values simultaneously. The Y-axis shows how well a player is focused. The higher up one the axis, the better focus. The X-axis shows the time (without scale).

The Stress Level - bars indicate the amplitude and amount of electrical signals found over the whole frequency spectrum. If you have a high "Stress Level" (orange or yellow) you can be mentally stressed, or nervous, or giggling – anything but calm really. A green or non-colored bar is the best. (We previously referred to the value as "Energy Level", which is more correct but was hard to relate to for the users.)

The figure Focus Score displayed at the result screen represents each player's personal average focus level for the session. A high Focus Score figure is to strive for. The figure Focus Score can be compared to your own (additional game-results) or other players' result, independent of who you meet and whether you win or lose.

Interpretation of the Floating Ball Graphics

The values in the two rectangles are represented as for the Standard Graphics.

The Stress level is reflected in the net in the background. Yellow and orange represent a stressed level. The high or low "waves" of the net are yet another indicator of the stress level. A calm green net is the best.

The form of the ball in the middle of the graphics kind of floats to one side or the other depending on the players' focus. When a game is over the graphics ball has completely floated to the losers' side.

Maintenance of Mindball Headbands

To keep the headbands fresh, working, and hygienic, there are a few tips to consider:
For cleaning the headbands, use a mild detergent, water, and cloth. Do not use alcohol.
Humid the cloth and rub the headbands gently to clean them.

Caution:

- If the headbands are very dirty, **unscrew them from Mindball**. Then they can be wetted, gently rubbed, and left in open air to dry before attaching again.
- The headbands have wires inside; be careful and do not bend them so that wires disconnect from the sensors.
- When cleaning the headbands, make sure not to wet the connector at the end of the cable.

Troubleshooting Mindball

Symptom: **One side is winning all the time.**

Reason 1: The far most common reason is that a headband is broken.

Action 1: Replace the suspected headband. A technician can make a measurement with an ohmmeter between each sensor and the corresponding pin in the contact. The resistance should be less than 2 Ω for each sensor.

Reason 2: The headband is not correctly connected.

Action 2: Make sure that the headbands are firmly connected to Mindball.

Reason 3: Other electrical installations or cables are disturbing Mindball (e.g. a Tesla coil)

Action 3: Move Mindball or the suspected other installation.

Symptom: **The ball is removed from the playing area and cannot find its place when placed back.**

Reason: The ball is made of steel and is kept in place by a magnet under the tabletop.

Action: Roll the ball slowly along the playing area and it will find the magnet again.

Symptom: **The ball doesn't move or move very little and the Stress level bars in the graphics are both yellow or red.**

Reason: Both players have equally (and) too high energy (In the graphics called Stress Level). Players that are talking, laughing and/or moving around physically will have too high energy and are unable to focus.

Action: Encourage the players to change behavior.

Symptom: **The ball doesn't move or move very little and the Stress Level bars in the graphics are both uncoloured or green.**

Reason: Both players are calm and also have a very equal level of focus.

Action: Do nothing. Let the game go on. Either one of them will eventually win or the game will go to Time Out.

Symptom: **The ball is moving even if there's no one playing.**

Reason: If a game is started - the system analyses and provides output from whatever electrical signals that come into the system via the headband sockets.

Action: Don't start a game without having a headband connected to each socket AND a head in each headband.

Symptom: **One of the curves is presented as a straight line.**

Reason: The headband is not firmly connected.

Action: Make sure that the headbands are firmly connected to the table.

Symptom: **Both curves are following each other.**

Reason: Mindball is not grounded properly.

Action: Make sure you use grounded cords and outlets.

Symptom: **Mindball does not work at all.**

Reason: Potentially the automatic fuse is released to protect the hardware when a spike in your electrical power network has occurred. If so, the small middle of the button has popped out.

Action: Press the button marked "Fuse 1".

Symptom: **Mindball restarts without ever presenting the graphics.**

Reason: Someone has manipulated the 5V contact for the Multiplayer (found beside the headband contact at each short end of Mindball Core - the box) and Fuse 2 is released to protect the hardware.

Action: Press the 'Fuse 2' button. Ensure the 5V contact is protected from future interference.

Symptom: **The table feels unstable.**

Reason: The table legs are not screwed on properly.

Action: Screw on the table legs.

Symptom: **The connected monitor is black.**

Reason: The HDMI contact does not get contact with the PC.

Action: Make sure the HDMI is well inserted.

Reason: The connected monitor is faulty.

Action: Replace the monitor.

Other Symptoms you might experience

- Power Off Mindball and insert a USB to the USB slot on the PC.
- Power Up Mindball and have it run until "Other Symptoms" have occurred.
- Power Off Mindball and retract the USB.
- Move the log-files now automatically stored on the USB to an external PC and send the files to us on support@mindball.se
- Preferably include a personal text in the email regarding the behavior of Mindball.

Configure Mindball

NB! The configuration part of the software is up for an update. Should you have any ideas or feedback, please send us an email at info@mindball.se. The manual corresponds to your Mindball software. As the configuration part is updated we can assist you to update your Mindball software. A current manual will always be found at <https://www.mindball.se/documentation/>

Introduction

To configure Mindball there is a built-in configure program in the Mindball Software. There are (today) four functionalities you can change:

1. **Graphics** - How long the final result screen shall stay on before that system goes back to the start screen.
2. **Calibration** - Calibrating the ball's alignment on the playing area. Only useful when you have purchased a Mindball Core and built your own design.
3. **Calibration** - The speed of the ball (which has an impact on the time a game goes on)
4. **Calibration** - The time you will allow a game to go on.

To configure Mindball you need to connect a monitor and a USB keyboard. For even easier management, also connect a USB mouse. The connections are found at the back long side of the electronic box.

1. Power off Mindball.
2. Connect monitor, keyboard and possibly a mouse.
3. Power up Mindball.
4. Click Esc
5. Right-click on the background and select "Mindball Menu" => "Configure Mindball".

Mindball Configurator

The software has (today) five windows:

Logging – Is locked and will never have to be changed.

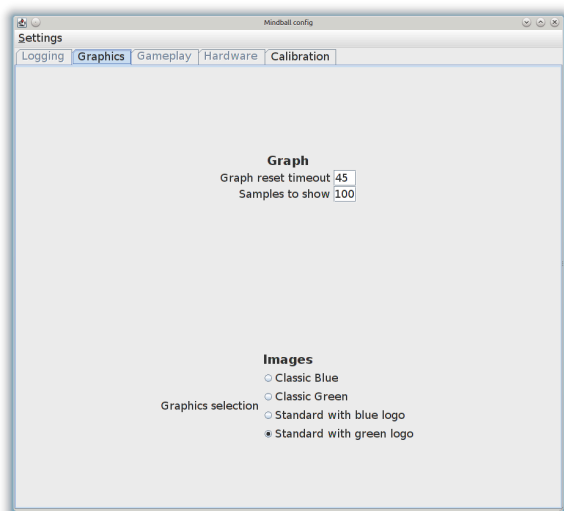
Graphics – Window to configure the graphics type or behavior.

Gameplay - Is locked and will never have to be changed.

Hardware - Is locked and will never have to be changed.

Calibration - Window to configure the balls alignment and some other features..

Graphics This window changes the graphical appearance in Mindball.



Graph

Graph reset timeout: Seconds until the graphs with the players' data are cleared and the graphics returns to the default idle mode after a game is finished.

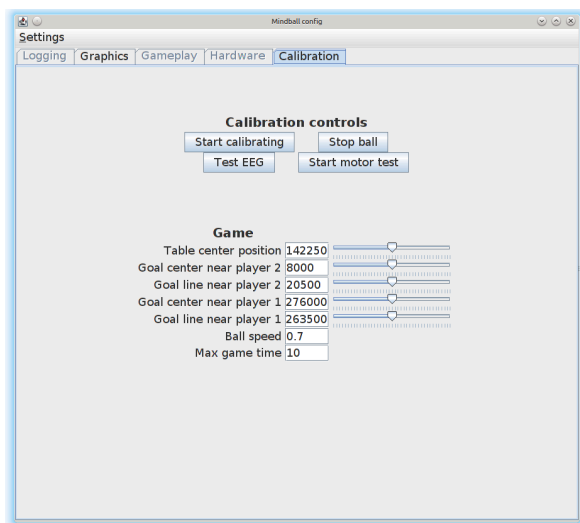
Samples to show: Obsolete—this setting will be removed in a future update.

Images

Graphics selection: If you have a Mindball delivered 2024 or 2025, this setting does not reflect the available graphics in your software. Should you like to change the graphic color or type, please contact us at support@mindball.se

Calibration

This window changes the ball's alignment and some other functionalities. The calibration controls are mainly of use for you if you have purchased a Mindball Core and thus built your own playing area.



Calibration controls

Start calibrating: If you click on the button the ball will move to one of the goals, then stop.

Stop ball, Test EEG and Start motor control: Never mind these for now. It has nothing to do with the calibration.

Game: As you move the sliders, the ball will go to and stop at the position indicated by the slider.

Table center position - the place where the ball goes to when the start button is pressed before the competition starts.

Goal center near player 2

Goal line near player 2 - when the ball passes this position the game is over in favour of player 1.

Goal center near player 1

Goal line near player 1 - when the ball passes this position the game is over in favour of player 2.

Ball speed: The higher speed the shorter games (with the same input from the players).

Max game time: If you have two players that are equally good at focusing, a game can go on "forever". The time is set in minutes. When the time limit is reached the game is interrupted, the ball moves to the nearest goal and the information "Time Out" is shown on the (by you) attached monitor. .

All of the buttons/features described below will be removed from your view, however this is how they work:

Test EEG: Click this button to make sure that the EEG card is connected to the power and PC correctly.

Start motor test: Click this button to make sure that the step motor and the step motor board that are running the wagon with the magnet on the linear unit are working properly.

Stop ball: Click this button to stop the ball moving while performing the motor test.

Save, Close and start Mindball

After configuring Mindball to your preferred settings,

1. chose "Settings" (main heading to the upper left) and "Save all changes"
On saving, the new settings will be used the next time Mindball starts.
2. Close the configuration program (click X to the upper right)
3. Start Mindball with the new settings by right clicking on the background and selecting "Mindball Menu" and then "Start Mindball".

Disclaimer

Mindball gathers and analyzes brain wave signals to provide visual feedback. It is **not a medical device** and is not intended for clinical or therapeutic use.

The Mindball Company makes no warranties, express or implied, including, but not limited to, implied warranties of merchantability or fitness for a particular purpose. It is the user's responsibility to determine whether the product is suitable for their specific needs.

Mindball makes no claims regarding any potential medical or therapeutic benefits. **The system is completely passive** and does not require any physical intrusion into the user.

The Mindball Company reserves the right to modify, correct, or improve the information provided—as well as the products and programs described—at any time without prior notice.