# Hardware User's Manual

# Automated black & white test box


**References:**
LE816 (76-0008), LE818 (76-0010)

**Version:**
V23/10/2014

Panlab | Harvard Apparatus

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Some symbols may have more than one interpretation by professionals unaccustomed to their usage.
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# 1. SYMBOLS TABLE

Recognising the symbols used in the manual will help to understand their meaning:

| DESCRIPTION | SYMBOL |
|---|---|
| Warning about operations that must not be done because they can damage the equipment |  |
| Warning about operations that must be done, otherwise the user can be exposed to a hazard. |  |
| Protection terminal ground connection. |  |
| Warning about a hot surface which temperature may exceed 65ºC |  |
| Warning about a metal surface that can supply electrical shock when it's touched. |  |
| Decontamination of equipments prior to disposal at the end of their operative life |  |
| Waste Electrical and Electronic Equipment Directive (WEEE) |  |

# 2. GOOD LABORATORY PRACTICE

Check all units periodically and after periods of storage to ensure they are still fit for purpose. Investigate all failures which may indicate a need for service or repair.

Good laboratory practice recommends that the unit be periodically serviced to ensure the unit is suitable for purpose. You must follow preventive maintenance instructions. In case equipment has to be serviced you can arrange this through your distributor. Prior to Inspection, Servicing, Repair or Return of Laboratory Equipment the unit must be cleaned and decontaminated.

**Decontamination prior to equipment disposal**

In use this product may have been in contact with bio hazardous materials and might therefore carry infectious material. Before disposal the unit and accessories should all be thoroughly decontaminated according to your local environmental safety laws.

# 3. UNPACKING AND EQUIPMENT INSTALATION

**WARNING: Failure to follow the instructions in this section may cause equipment faults or injury to the user.**

A. No special equipment is required for lifting but you should consult your local regulations for safe handling and lifting of the equipment.
B. Inspect the instrument for any signs of damage caused during transit. If any damage is discovered, do not use the instrument and report the problem to your supplier.
C. Ensure all transport locks are removed before use. The original packing has been especially designed to protect the instrument during transportation. It is therefore recommended to keep the original carton with its foam parts and accessories box for re-use in case of future shipments. Warranty claims are void if improper packing results in damage during transport.
D. Place the equipment on a flat surface and leave at least 10 cm of free space between the rear panel of the device and the wall. Never place the equipment in zones with vibration or direct sunlight.
E. Once the equipment is installed in the final place, the main power switch must be easily accessible.
F. Only use power cords that have been supplied with the equipment. In case that you have to replace them, the spare ones must have the same specs that the original ones.
G.  Make sure that the AC voltage in the electrical network is the same as the voltage selected in the equipment. **Never connect the equipment to a power outlet with voltage outside these limits.**

**WARNING**

**For electrical safety reasons you only can connect equipment to power outlets provided with earth connections**  .
This equipment can be used in installations with category II over-voltage according to the General Safety Rules.

The manufacturer accepts no responsibility for improper use of the equipment or the consequences of use other than that for which it has been designed.

## PC Control

Some of these instruments are designed to be controlled from a PC. To preserve the integrity of the equipment it is essential that the attached PC itself conforms to basic safety and EMC standards and is set up in accordance with the manufacturers' instructions. If in doubt consult the information that came with your PC. In common with all computer operation the following safety precautions are advised.

**WARNING**

- To reduce the chance of eye strain, set up the PC display with the correct viewing position, free from glare and with appropriate brightness and contrast settings

- To reduce the chance of physical strain, set up the PC display, keyboard and mouse with correct ergonomic positioning, according to your local safety guidelines.

**Class A equipment is intended for use in an industrial environment.**

**WARNING**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with these instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

# 4. MAINTENANCE

**WARNING: Failure to follow the instructions in this section may cause equipment fault.**

- PRESS KEYS SOFTLY – Lightly pressing the keys is sufficient to activate them.
- Equipments do not require being disinfected, but cleaned for removing urine, faeces and odour. To do so, we recommend using a wet cloth or paper with soap (which has no strong odour). NEVER USE ABRASIVE PRODUCTS OR DISSOLVENTS.
- NEVER pour water or liquids on the equipment.
- Once you have finished using the equipment turn it off with the main switch. Clean and check the equipment so that it is in optimal condition for its next use.
- The user is only authorised to replace fuses with the specified type when necessary.

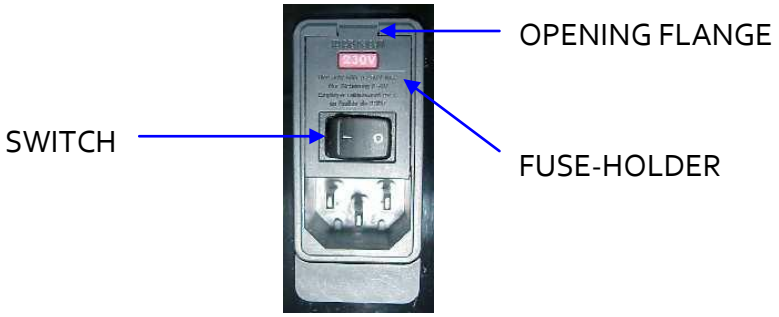


**Figure 1. Power inlet, main switch and fuse holder.**

## FUSE REPLACEMENT

In case of an over-voltage or other incident in the AC net making it impossible to turn on the equipment, check fuses according to the following procedure.

1 Remove power cord from the power inlet

2 Open fuse-holder by pulling the flange with a regular screwdriver

**Figure 2. Open fuse-holder door.**

3 Extract fuse holder using the screwdriver.

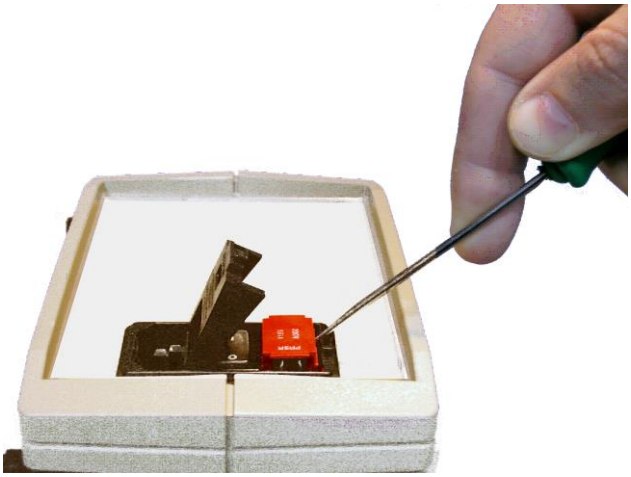

**Figure 3. Extract fuse-holder.**

4 Replace fuses if necessary. Insert fuses in the fuse-holder in the correct position.

CORRECT INCORRECT

**Figure 4. Fuses position.**

5 Insert again fuse-holder, both possible positions are correct because power supply is universal.

6 If the fuses blow again unplug the equipment and contact technical service.

**WARNING** **For electrical safety, never open the equipment. The power supply has dangerous voltages.**

# 5. TABLE OF CONTENTS

# 6. INTRODUCTION

Numerous behavioural paradigms using several conflict procedures, social interaction or exploration of novel environments have been proposed as animal anxiety models. B Costall et al have described (Pharmacol Biochem Behav. 32(3): 777-785, 1989) a new model based on the aversive properties of the open field in which anxiolytic drug-induced ease of exploratory activity is compared between light and dark-coloured compartments.

This model permits simple and quick evaluation of anxious behaviour and its modification by pharmacological agents. Panlab has developed a complete system to carry out this experiment including both cages for the experimental subjects and the appropriate control instrumentation.

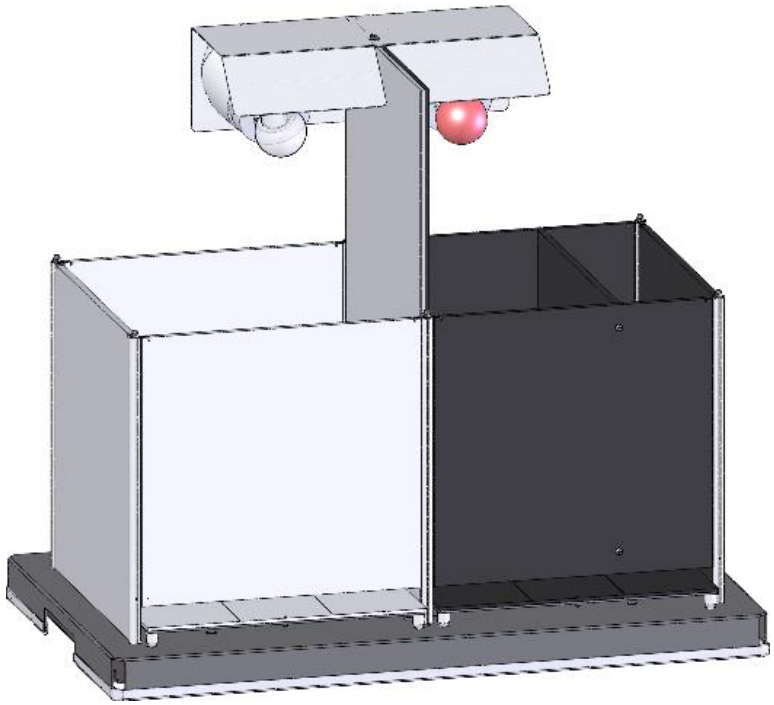

**Figure 5. Black and White Test Box.**

The cages are composed of 2 compartments with walls 24 cm high. One of the compartments is smaller, and coloured black, and the other is larger and coloured white.

Both compartments are separated by a higher wall (to act as a separator) with an opening to allow the animal to pass from one side to the other. This wall also supports the lighting system: a 40W white bulb on the white side and a 25W red bulb on the black side.

The two floors are easily removable. They are made of Perspex in the same colour as their respective compartments and are marked in 9 sectors by lines. The cages do not have a top lid.

# 7. EQUIPMENT DESCRIPTION

## 7.1. CONTROL UNIT FRONT PANEL

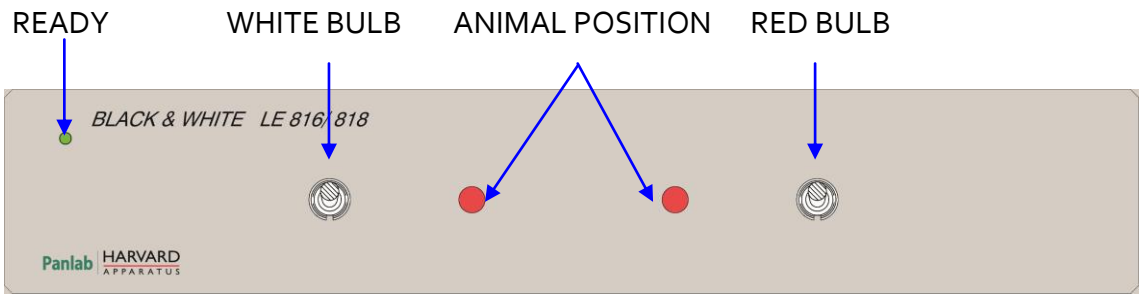


**Figure 6. Control Unit Front Panel.**

- **READY:** When you turn on the control unit, the ready led will flash a few seconds while the system is auto-balancing. When the system is ready to work, the ready led stays on continuously.

- **WHITE BULB:** This switch is used to turn the white bulb in the white compartment on and off.

- **ANIMAL POSITION:** These 2 red leds indicate the animal position. The animal position is detected through load cells.

- **RED BULB:** This switch turns the red bulb in the black compartment on and off.

## 7.2. CONTROL UNIT REAR PANEL

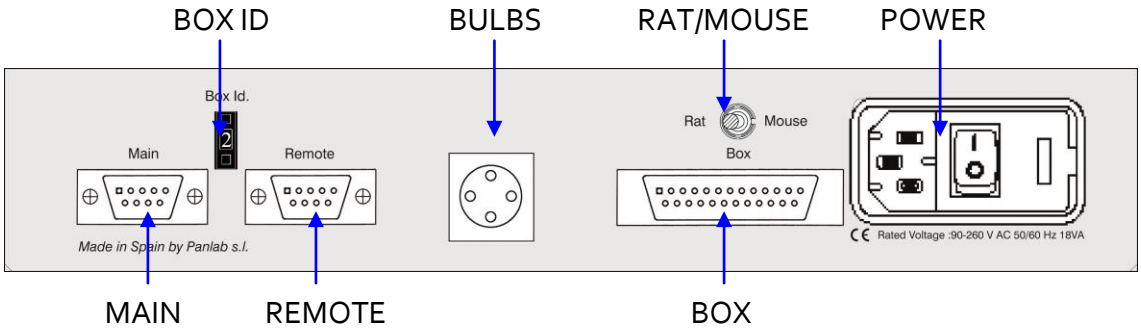


**Figure 7. Control Unit Rear Panel.**

- **BOX ID:** Decimal selector used to identify the cage. When several cages are connected to the same computer, no 2 cages can have the same Id number.

- **MAIN:** DB9 female connector used to connect the control unit to the serial port of the computer. When the computer controls several control units connected in cascade, the serial port of the computer is connected to the MAIN port of the first control unit, and the MAIN port of next unit is connected to the REMOTE port of the previous control unit. The REMOTE port of the last unit is left free.

- **REMOTE:** DB9 male connector used to connect the control unit to the MAIN port of the next control unit when several cages are controlled by a computer. The REMOTE port of the last unit is left free.

- **BULBS:** 4-pin connector used to power the white and red bulbs.

- **BOX:** DB25 female connector used to connect the control unit to the experimentation cage. It transmits load cell signals.

- **RAT/MOUSE:** Selector used to set the model of cage being used (rat or mouse).

- **POWER:** Power inlet, main switch and fuse holder.

## 7.3. EXPERIMENTATION CAGE

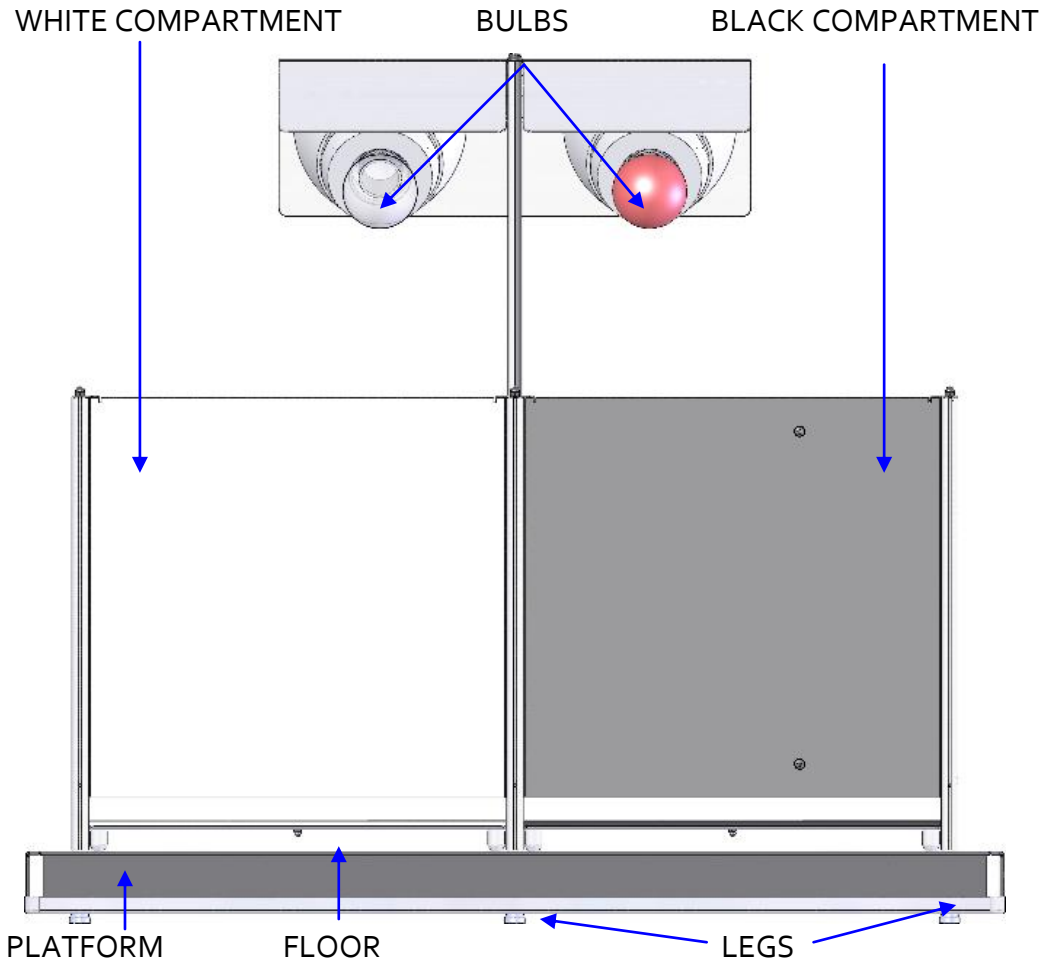


**Figure 8. Experimentation Cage.**

The experimentation cage has two compartments. The left compartment is larger, and coloured white. The right compartment is smaller and coloured black. The floors have the same colour as the walls of their respective compartments and are divided into 9 sectors with lines.

The experimentation cage is mounted on a platform. Inside the platform there are 2 load cells that detect animal position. The floor transmits weight to the load cell with 4 legs. The floor is easily removable for cage cleaning. Two bulbs are installed at the upper part of the cage: a 40W white bulb for the white compartment and a 25W red bulb for the black compartment.

| Model | Animal | Compartments | | Shared Wall | Opening |
|---|---|---|---|---|---|
| | | Black | White | | |
| LE 816 | Mouse | 16 x 25 x 24 | 25 x 25 x 24 | 47 x 25 | 7 x 7 |
| LE 818 | Rat | 20 x 31 24 | 31 x 31 x 24 | 56 x 31 | 10 x 10 |

*Dimensions are in cm.

The dimensions of the Rat and Mouse Experimentation Cages are listed in the foregoing table.

# 8. EQUIPMENT CONNECTION

## 8.1. CONTROLLING 1 CAGE

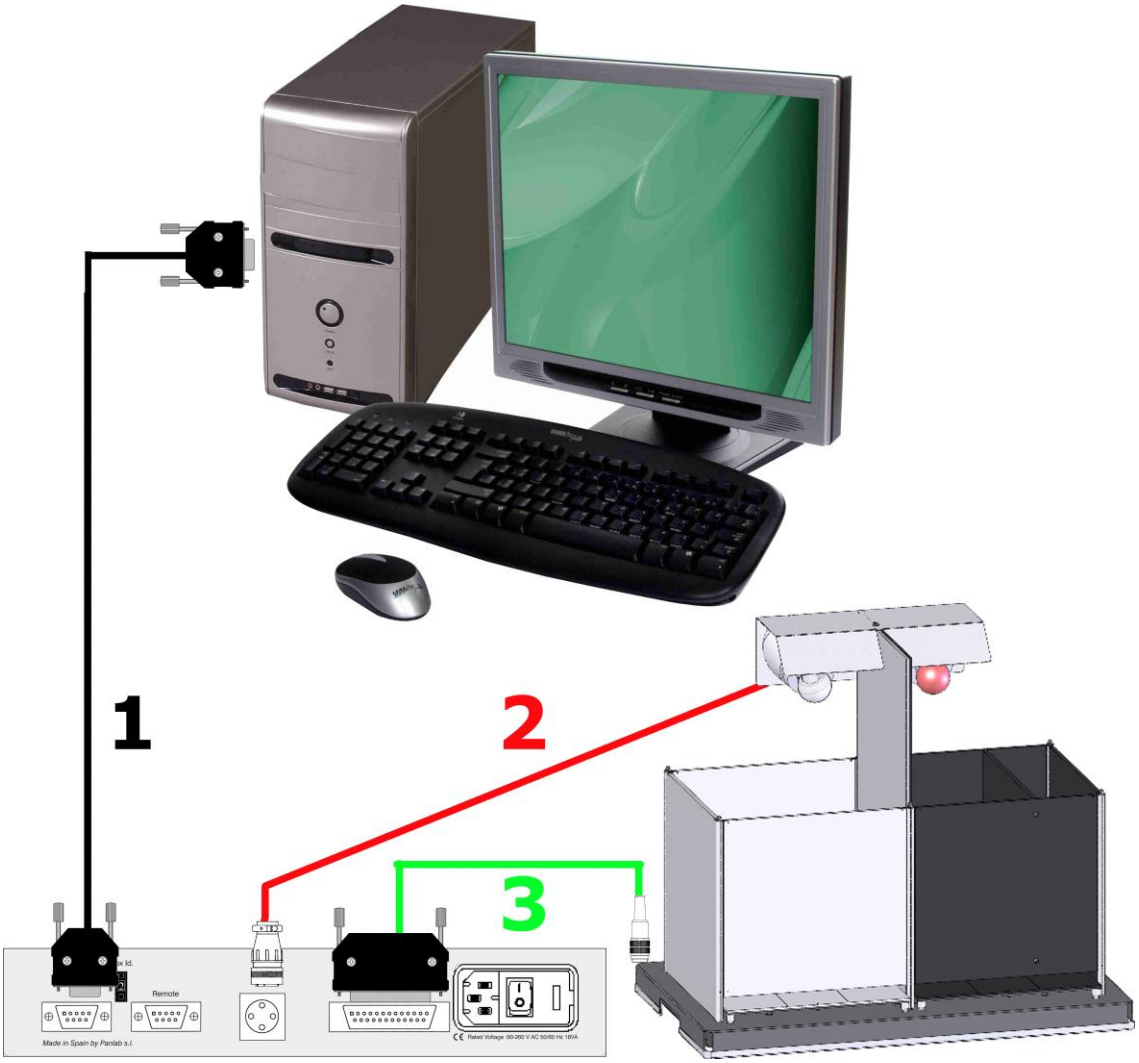


**Figure 9. Equipment Connections.**

Figure 9 shows the connections used when working with one cage. The necessary cables are outlined in the next table.

| | FROM | TO | CABLE |
|---|---|---|---|
| 1 | Control unit MAIN | Computer Serial Port | RS-232 cable |
| 2 | Control Unit BULBS | Cage Bulbs | 4 pins cable |
| 3 | Control Unit BOX | Cage platform | DB25 to DIN 7 cable |

## 8.2. CONTROLLING SEVERAL CAGES

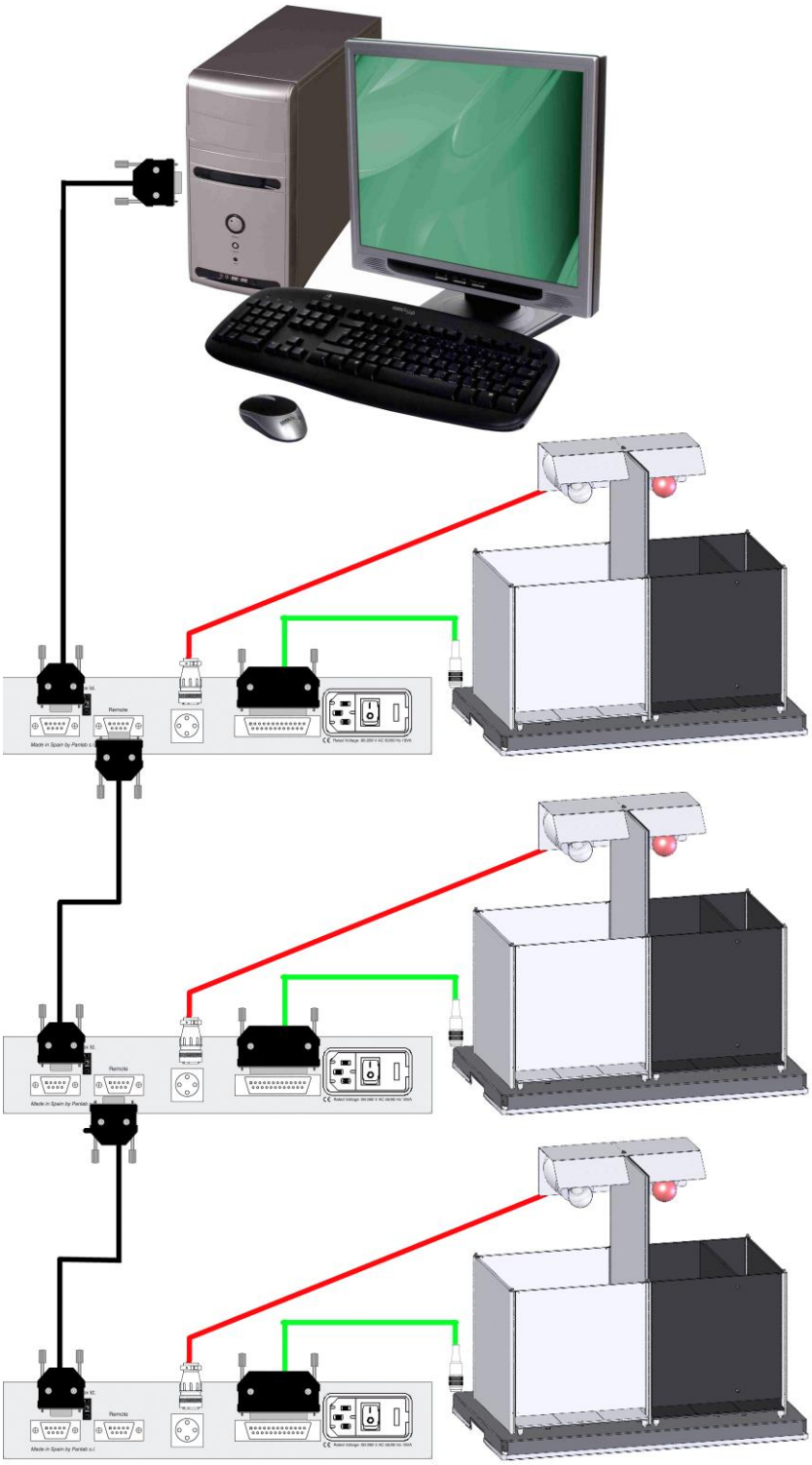

**Figure 10. Connections controlling several cages.**

A computer can control up to 8 cages. The connection between control units and the computer is as follows when working with several cages (
Figure 10 shows an example of a 3-cage connection).

Some important guidelines must be followed when working with more than one cage:

- All the units must have different IDs for the computer to identify them.
- It is not necessary for all ID numbers to be correlative. For example it will be as correct to work with cages 1, 2 and 3 as it will be to work with cages 1, 5 and 7.
- It is not necessary for cages to be physically located in the order of their ID number. For example it will be equally correct to work with cages 1-2-3, 1-3-2, 2-1-3, 2-3-1, 3-1-2 or 3-2-1.
- The computer serial port is always connected to the MAIN port of the first control unit.
- The REMOTE port of every unit is always connected to the MAIN port of the next control unit.
- The REMOTE port of the last control unit is left free.

# 9. WORKING WITH THE EQUIPMENT

## 9.1. CONDUCTING AN EXPERIMENT

The following procedure must be followed to work with the equipment:

1. Connect all the cables (see chapter 8 in this manual).
2. Connect the control unit to the AC network and turn it on.
3. Wait a few seconds until the READY led stays continuously on. It will flash during auto-calibration.
4. If you are working with a rat's cage you must select **Rat** on the rear panel selector. If you are working with a mice cage you must select **Mouse** on the same selector.
5. Place the experimental subject in the cage.
6. Follow the **PPCWin** program indications for experimenting with the animal.
7. Remove the experimental subject from the cage.
8. To work with the next animal return to point number 5 and repeat procedure.
9. Once the experiment has finished, turn off the control unit and clean the cage.

## 9.2. AUTOMATIC ERROR WARNING

The system checks if the cable between the rear panel connector labelled **Box** and the cage is connected.

If the system detects this error it will warn you by flashing the 2 red position leds on the front panel (see Figure 6). The system will be waiting for the problem to be solved (connect the cable). After the problem is solved, the user must turn on the system again.

Once the cable is connected if the system detects that a load cell is damaged it will warn the user by flashing the red led that belongs to this load cell (see Figure 6).

# 10. RECOMMENDATIONS

1. It will be periodically necessary to clean the experimentation cage.

2. Floors can be removed for cleaning. Prior to removing them, turn off the control unit and gently lift them up to free the 4 legs form the load cell holes in the platform.

3. Once you return floors to the cage check that they are correctly placed (the four legs of the floor must be in the load cell supports to correctly transmit weight to the load cell).

4. System auto-balance must be done without animals on the floor (the system detects floor weight during auto-balance and balances it to detect animal weight).

5. Although this is not strictly necessary, it is better to wait 10 minutes after having turned on the equipment before placing animals on the floor (the system will reach a permanent thermal state in this period).

## 10.1. WALLS CLEANING

To clean the walls you can use a lightly wet cloth and then dry them with a dry cloth. If they're too dirty you can wet the cloth with a soapy solution to clean them, then remove foam with a wet cloth and finally dry them with a dry cloth.

## 10.2. FLOORS CLEANING

To clean the floors you can use a lightly wet cloth and then dry them with a dry cloth. If they're too dirty you can wet the cloth with a soapy solution to clean them, then remove foam with a wet cloth and finally dry them with a dry cloth.

# 11. TROUBLESHOOTING

This table features instructions to solve the most frequent problems.

| PROBLEM | SOLUTION |
|---|---|
| The equipment does not start up. | • Ensure that the voltage of mains is the same as that selected in the fuse holder.<br>• Check the condition of the fuses. |
| The two red position leds are blinking. | • Ensure that the cable DB25 to DIN7 connects the cage and control unit.<br>• Check that the floors are correctly placed.<br>• If the cable is connected and all is correctly placed this means both load cells are damaged. |
| One of the red position leds is blinking. | • The load cell is damaged or blocked. |
| The light stimuli do not work. | • Check that 4 pins cable is connected.<br>• Check that DB25 to DIN7 cable is connected.<br>• Check that **Ready** led is on.<br>• Check that bulbs are not melt. |
| The control unit does not detect animal position. | • Check that **Ready** led is on.<br>• Check that floors are correctly placed.<br>• Check that the RAT/MOUSE switch is in the correct position. (Rat weight threshold detection is 30gr, if you work with mice the equipment will not be able to detect them). |
| The equipment does not communicate with **PPCWin**. | • Make sure your equipment is connected to PC via RS-232.<br>• Check that **PPCWin** settings so that the serial port is correct.<br>• Restart the equipment and the PC to do a RESET in communications.<br>• Check in the rear panel of control unit that the ID number is the same that the one set in **PPCWin.** |

# 12. PREVENTIVE MAINTENANCE

| | EXPERIMENT | WHEN NECESSARY |
|---|---|---|
| WALLS CLEANING | ☑ | |
| FLOORS CLEANING | ☑ | |
| CHECK FLOORS PLACING | ☑ | |
| BULBS REPLACING[1] | | ☑ |

[1] Bulbs must be replaced by ones with the same specs (see especifications)

# 13. TECHNICAL SPECIFICATIONS

| | |
|---|---|
| POWER SUPPLY | |
| Input voltage: | Universal 100-240 VAC |
| Frequency: | 50/60Hz |
| Fuse: | 2 fuses 5mm*20mm 2A 250V Fast |
| Maximum power: | 18W |
| Conducted noise: | EN55022 /CISPR22/CISPR16 class B |
| ENVIRONMENTAL CONDITIONS | |
| Operating temperature: | 10°C to +40°C |
| Operating relative humidity: | 0% to 85% RH, non-condensing |
| Storage temperature: | 0°C to +50°C, non-condensing |
| LIGHT | |
| White Bulb: | 40W 230V screw E27 |
| Red Bulb: | 25W 230V screw E27 |
| POSITION DETECTION | |
| Rat: | 30 gr |
| Mouse: | 7 gr |
| CONNECTOR BULB | |
| Pin | Function |
| A | AC voltage |
| B | Right switch |
| C | Not connected |
| D | Left switch |
| CONNECTOR MAIN, REMOTE | |
| Pin | Function |
| 2 | Rxd |
| 3 | Txd |
| 5 | Gnd |
| 7 | Rts |
| 9 | Cts |
| COMUNICATIONS OUTPUT | |
| Standard Interface: | RS232C |
| Connector: | Delta 9 contacts connector |
| Transmission speed: | 19200 bauds, 8 bits, no parity |
| CONNECTOR BOX | |
| Pin | Function |
| 10 | Transducer left S- |
| 11 | Transducer left S+ |
| 12 | Transducer Right S+ |
| 13 | Transducer left S- |
| 23 | Transducer +Exc (10V) |
| 24 | Transducer - Exc |
| 25 | Gnd |

| | |
|---|---|
| DIMENSIONS (CONTROL UNIT)<br>Width x Height x Depth:<br>Weight: | <br>285mm x 70mm x 250mm<br>1.84 kg |

DIMENSIONS (TEST BOX)[2]

| Model | Animal | Compartments | | Shared Wall | Opening |
|---|---|---|---|---|---|
| | | Black | White | | |
| LE 810 | Mouse | 16 x 25 x 24 | 25 x 25 x 24 | 47 x 25 | 7 x 7 |
| LE 812 | Rat | 20 x 31 24 | 31 x 31 x 24 | 56 x 31 | 10 x 10 |

[2] Dimensions are expressed in centimetres.

## DECLARACIÓN DE CONFORMIDAD
## DECLARATION OF CONFORMITY
## DECLARATION DE CONFORMITÉ

| | |
|---|---|
| Nombre del fabricante:<br>Manufacturer's name:<br>Nom du fabricant: | **Panlab s.l.u.**<br>www.panlab.com<br>info@panlab.com |
| Dirección del fabricante:<br>Manufacturer's address:<br>Adresse du fabricant: | Energía, 112<br>08940 Cornellà de Llobregat<br>Barcelona SPAIN |
| Declara bajo su responsabilidad que el producto:<br>Declares under his responsibility that the product:<br>Déclare sous sa responsabilité que le produit: | **BLACK & WHITE TEST BOX** |
| Marca / Brand / Marque: | **PANLAB** |
| Modelo / Model / Modèle: | **LE 816 – LE 818** |

Cumple los requisitos esenciales establecidos por la Unión Europea en las directivas siguientes:
Fulfils the essential requirements established by The European Union in the following directives:
Remplit les exigences essentielles établies pour l'Union Européenne selon les directives suivantes:

| | |
|---|---|
| **2006/95/EC** | Directiva de baja tensión / Low Voltage / Basse tensión |
| **2004/108/EC** | Directiva EMC / EMC Directive / Directive CEM |
| **2012/19/EU** | La Directiva de Residuos de Aparatos Eléctricos y Electrónicos (WEEE) / The Waste Electrical and Electronic Equipment Directive (WEEE) / Les déchets d'équipements électriques et électroniques (WEEE) |
| **2011/65/EU** | Restricción de ciertas Sustancias Peligrosas en aparatos eléctricos y electrónicos (ROHS) / Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (ROHS) / Restriction de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques (ROHS) |
| **2006/42/EC** | Directiva mecánica / Machinery directive / Directive mécanique |

Para su evaluación se han aplicado las normas armonizadas siguientes:
For its evaluation, the following harmonized standards were applied:
Pour son évaluation, nous avons appliqué les normes harmonisées suivantes:

| | |
|---|---|
| Seguridad / Safety / Sécurité: | **EN61010-1:2011** |
| EMC: | **EN61326-1:2012 Class A**[1] |
| Safety of machinery: | **EN ISO 12100:2010** |

[1]This equipment complies with the limits for class A equipment in accordance with CISPR 11 definition and is classed as a Class A digital device, pursuant to CFR Title 47 part 15 of the FCC Rules and is intended to be used in an industrial environment.

En consecuencia, este producto puede incorporar el marcado CE:
Consequently, this product can incorporate the CE marking:
En conséquence, ce produit peut incorporer le marquage CE:

CE

En representación del fabricante:
Manufacturer's representative:
En représentation du fabricant:

Carme Canalís
General Manager
Panlab s.l.u., a division of Harvard BioScience

Cornellà de Llobregat, Spain
30/04/2014

## (GB) *Note on environmental protection:*

After the implementation of the European Directive 2002/96/EU in the national legal system, the following applies:
Electrical and electronic devices may not be disposed of with domestic waste.Consumers are obliged by law to return electrical and electronic devices at the end of their service lives to the public collecting points set up for this purpose or point of sale. Details to this are defined by the national law of the respective country. This symbol on the product, the instruction manual or the package indicates that a product is subject to these regulations. By recycling, reusing the materials or other forms of utilising old devices, you are making an important contribution to protecting our environment.

## (E) *Nota sobre la protección medioambiental:*

Después de la puesta en marcha de la directiva Europea 2002/96/EU en el sistema legislativo nacional, Se aplicara lo siguiente:
Los aparatos eléctricos y electrónicos, así como pilas y baterías, no se deben tirar a la basura doméstica. El usuario está legalmente obligado a llevar los aparatos eléctricos y electrónicos, así como pilas y baterías, al final de su vida útil a los puntos de recogida municipales o devolverlos al lugar donde los adquirió. Los detalles quedaran definidos por la ley de cada país. El símbolo en el producto, en las instrucciones de uso o en el embalaje hace referencia a ello. Gracias al reciclaje, a la reutilización de materiales i a otras formas de reciclaje de aparatos usados, usted contribuirá de forma importante a la protección de nuestro medio ambiente.

## (F) *Remarques concernant la protection de l'environnement :*

Conformément à la directive européenne 2002/96/CE, et afin d'atteindre un certain nombre d'objectifs en matière de protection de l'environnement, les règles suivantes doivent être appliquées.
Elles concernent les déchets d'équipement électriques et électroniques. Le pictogramme "picto" présent sur le produit, son manuel d'utilisation ou son emballage indique que le produit est soumis à cette réglementation. Le consommateur doit retourner le produit usager aux points de collecte prévus à cet effet. Il peut aussi le remettre à un revendeur.En permettant enfin le recyclage des produits, le consommateur contribuera à la protection de notre environnement. C'est un acte écologique.

## (D) *Hinweis zum Umweltschutz:*

Ab dem Zeitpunkt der Umsetzung der europäischen Richtlinie 2002/96/EU in nationales Recht gilt folgendes:
Elektrische und elektronische Geräte dürfen nicht mit dem Hausmüll entsorgt werden. Der Verbraucher ist gesetzlich verpflichtet, elektrische und elektronische Geräte am Ende ihrer Lebensdauer an den dafür eingerichteten, öffentlichen Sammelstellen oder an die Verkaufstelle zurückzugeben. Einzelheiten dazu regelt das jeweilige Landesrecht. Das Symbol auf dem Produkt, der Gebrauchsanleitung oder der Verpackung weist auf diese Bestimmungen hin. Mit der Wiederverwertung, der stofflichen Verwertung oder anderer Formen der Verwertung von Altgeräten leisten Sie einen wichtigen Beitrag zum Schutz unserer Umwelt.

## (I) *Informazioni per protezione ambientale:*

Dopo l'implementazione della Direttiva Europea 2002/96/EU nel sistema legale nazionale, ci sono le seguenti applicazioni:
I dispositivi elettrici ed elettronici non devono essere considerati rifiuti domestici. I consumatori sono obbligati dalla legge a restituire I dispositivi elettrici ed elettronici alla fine della loro vita utile ai punti di raccolta collerici preposti per questo scopo o nei punti vendita. Dettagli di quanto riportato sono definiti dalle leggi nazionali di ogni stato. Questo simbolo sul prodotto, sul manuale d'istruzioni o sull'imballo indicano che questo prodotto è soggetto a queste regole. Dal riciclo, e re-utilizzo del material o altre forme di utilizzo di dispositivi obsoleti, voi renderete un importante contributo alla protezione dell'ambiente.

## (P) *Nota em Protecção Ambiental:*

Após a implementação da directiva comunitária 2002/96/EU no sistema legal nacional, o seguinte aplica-se:
Todos os aparelhos eléctricos e electrónicos não podem ser despejados juntamente com o lixo doméstico Consumidores estão obrigados por lei a colocar os aparelhos eléctricos e electrónicos sem uso em locais públicos especficos para este efeito ou no ponto de venda. Os detalhes para este processo são definidos por lei pelos respectivos países. Este símbolo no produto, o manual de instruções ou a embalagem indicam que o produto está sujeito a estes regulamentos. Reciclando, reutilizando os materiais dos seus velhos aparelhos, esta a fazer uma enorme contribuição para a protecção do ambiente.