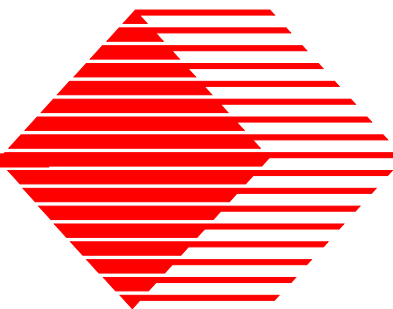


MOUSE MOTION

UNIVERSAL MOBILE DATA LOGGER

Operating Instructions



www.infra-e-motion.de

INFRA MOTION

activity monitoring systems

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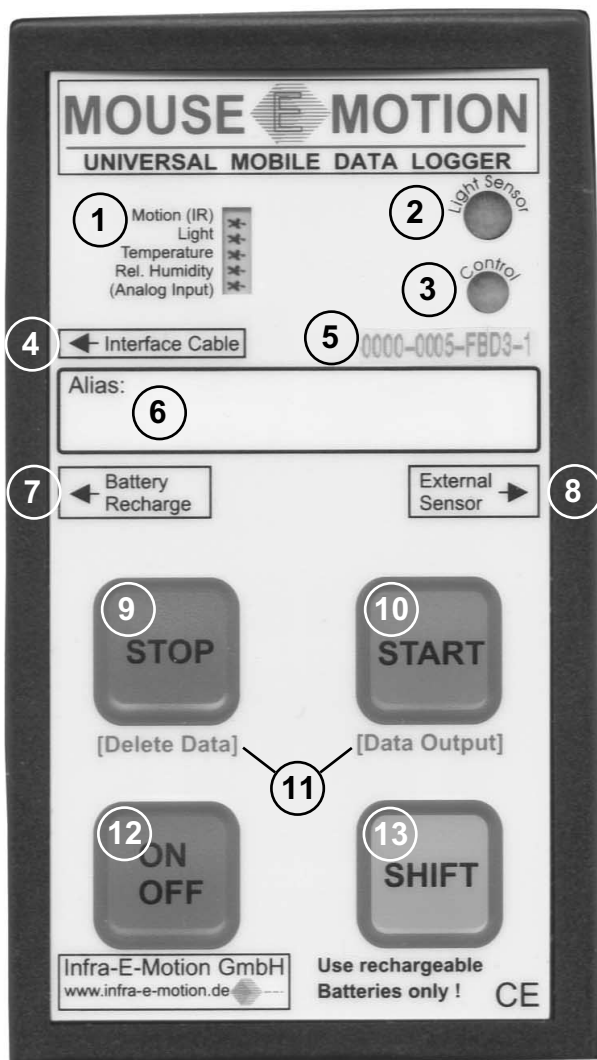
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1. FEATURES

The MOUSE-E-MOTION Universal Data Logger is a battery-powered system capable of monitoring the motion of bodies and objects emitting warmth radiation in the infrared range. The collected log data are stored in the internal non-volatile data memory. The log data are permanently retained, unaffected of the power status of the data logger. There is no risk of losing data if the data logger runs out of power. Logging is possible up to a maximum period of about 5 months (battery runtime limit). The log data can be easily transferred to a PC via a serial communication cable using the MOUSE-E-MOTION software.

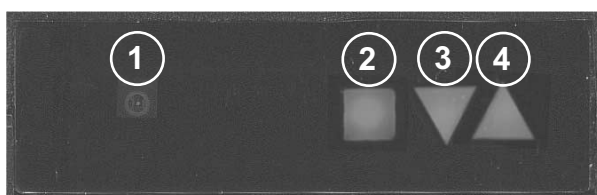
2. NAMES AND FUNCTIONS OF PARTS

Top view:



- 1 Denotes the sensor equipment of the logger
- 2 Location of the light sensor (if built-in)
- 3 Control LED (green/red)
- 4 Serial communication cable connector
- 5 Serial number
- 6 Area to label the data logger (e.g. with a user-defined alias name)
- 7 Connector for battery charge
- 8 Connector for an external (analog) sensor
- 9 STOP button (stops logging)
- 10 START button (starts logging)
- 11 Alternate functions (if SHIFT button is pressed additionally)
- 12 Power ON / OFF
- 13 SHIFT button (causes alternate functions of STOP and START button)

Front view:



- 1 Communication LED
- 2 Square LED
- 3 Reversed triangle LED
- 4 Upright triangle LED

Bottom view:



- 1 Notch for the mounting unit
- 2 Motion sensor (passive infra-red sensor)
- 3 Battery compartment

Open battery compartment:



- 1 Red switch:
ON = built-in motion sensor ON
OFF = built-in motion sensor OFF

(See also 6.3 *External motion sensor*)

Brown switch: (functionless)

2.1 Default Configuration Settings:

Sensor activation state:

- *Activity*
- *Temperature*
- *Relative humidity*
- *Light intensity*
- *External analog input*

ON

OFF

OFF

OFF

OFF

LED-indication *Battery level*:

OFF

LED-indication *Motion detection*:

ON

Recording interval:

240 seconds = 4 minutes

Interval granularity:

1 second

Internal clock:

GMT +01:00 (unless otherwise stated)

Communication speed (baud rate):

9600 Bit/s

Red switch (inside battery compartment):

ON = built-in motion sensor on

3. POWER SUPPLY

3.1 Battery Usage

1.5V x 2 (Mignon / AA / IEC R6 or equivalent, 2000-2400mAh)
Use rechargeable batteries only. NEVER use normal alkaline batteries!

A T T E N T I O N !

NEVER try to charge normal alkaline batteries as there is the risk of explosion!

Place the batteries into the compartment in the rear bottom part of the data logger. Make sure that the polarity of the batteries (+/-) coincides with the respective marks on the bottom of the compartment. The data logger is ready after a period of 10 seconds and the square LED will begin flashing. Wrong insertion of batteries causes a failure of the functionality of the data logger and batteries will be totally discharged after about one hour, but the data logger will not be damaged.

3.2 Battery Charge

To charge the batteries, plug the cord of the AC power adaptor to the power connector of the data logger. The data logger will switch off automatically. The normal charging period is 3.5 hours. The electronic charging system ensures that the batteries are always completely charged and never will be over-charged. Use the supplied power adaptor only, otherwise the internal electronics may be damaged!

The charging process is indicated by flashing of the square-LED on the front of the data logger. The LED will extinguish if charging is completed.

Very deeply discharged batteries cannot be recognized by the electronic charging system and thus will not be charged. Please remove such batteries and charge them with a suitable battery charger.

IMPORTANT NOTE:

The *effective* capacity of the utilized batteries is critical for the operating span of the data logger. The effective capacity of rechargeable batteries decreases inevitably over time, even with constantly thorough handling. Rechargeable batteries with an indicated capacity of 2000mAh, for example, will have an effective capacity of only about 1500mAh after permanent usage for two years. So, regardless of the quality of maintenance, the effective capacity is just about 75% of the original value. With insufficient care the effective capacity can even go far below 50% of the indicated capacity. Correspondingly, the operating span of the MOUSE-E-MOTION Universal Data Logger is significantly reduced when such batteries are used.

4. MODES

The MOUSE-E-MOTION Universal Data Logger is operating in two modes, *stand-by mode* and *logging mode*.

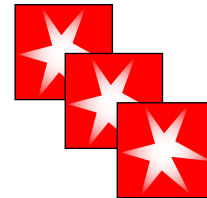
In *stand-by* mode the data logger is ready to respond to the user's commands, e.g if one of the buttons on the top is pressed or, if connected to a PC, a command from the MOUSE-E-MOTION software is received. The battery charge is indicated by up to 3 pulses of the square LED. To start logging, to initiate log data output and to delete log data is possible only if the data logger is in *stand-by* mode.

When logging has been started the data logger changes to *logging* mode. Depending on its configuration, the data logger will wait for its actual start time (if logging has been started with the MOUSE-E-MOTION software and a start time for data logging further in the future has been specified), wait for an initial delay period to pass, or immediately begin data logging. Now, the data logger will respond only to the STOP command (pressing the red STOP button) which will terminate the respective process. It is also possible to switch off the data logger at any time.

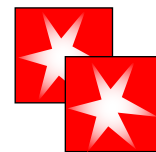
4.1 Stand-By Mode

The battery charge is indicated by pulses of the square LED:

3 pulses:
Battery charge is at least 75%



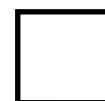
2 pulses:
Battery charge is more than 50 %
but less than 75%



1 pulse:
Battery charge is more than 25%,
but less than 50%



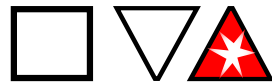
No pulse (but still periodically flashing of the communication LED
indicating that the data logger is switched on):
Battery charge is less than 25%



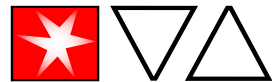
It is not recommended to start a new logging task when the battery charge is less than 75%.

4.2 Logging Mode

During logging, each single motion detection is indicated by a flash of the upright triangle LED:



This signal can be turned off with the MOUSE-E-MOTION software. Additionally an indication for the state of charge of the batteries of the data logger can be turned on. If this is the case, the square LED flashes once a second as long as the battery charge is more than 25%.



5. Operation

5.1 Power

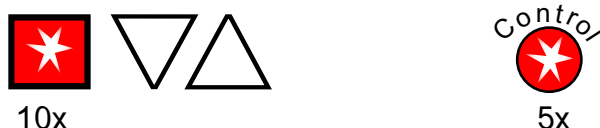
Press the blue ON/OFF button to switch the data logger ON and OFF.

5.2 Starting Data Logging

Press the green START button. The square LED and the upright triangle LED will light up and the control LED will light green for 1 second:

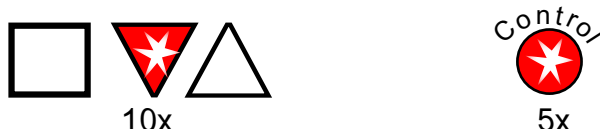


Data logging will begin after the LEDs have extinguished or, if an initial delay period is specified, when that period has passed. The running mode of the data logger changes to *logging* mode then. It is not possible to start logging if there are currently log data stored in the data memory of the data logger. If this is the case, the square LED flashes 10 times and the control LED is blinking red 5 times:



The stored log data have to be deleted (see 5.5) prior to be able to start logging.

It is also not possible to start logging if the data memory is not completely erased, e.g. when the data deletion process has been interrupted or for other reasons has not successfully been completed. If this is the case, the reversed triangle LED flashes 10 times and the control LED is blinking red 5 times:



The deletion procedure must be initiated again (see 5.5). Make sure that the process is successfully completed this time, otherwise logging cannot be started.

5.3 Stopping Data Logging

Press the red STOP button for at least 2s. The square LED will light up when logging has been terminated:



It is also possible to just switch off the data logger with the blue ON/OFF button at any time. This does not affect the collected log data in any way.

5.4 Log Data Output

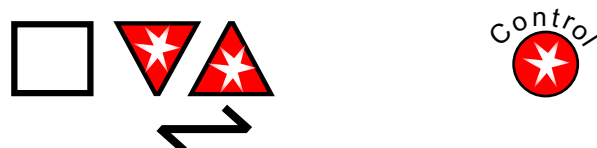
The data logger has to run in *stand-by* mode in order to be able to initiate the data output. If the data logger runs in *logging* mode, you have to stop logging by pressing the red STOP button or switching the data logger off and on again with the blue ON/OFF button (see 5.3). Press the grey SHIFT and the green START button simultaneously until the reversed triangle LED lights up and the control LED lights green:



Log data output will continue as long as the LEDs are active, so ensure that the connection to the PC is not disrupted. When the log data output has been completed the data logger returns to *stand-by* mode.

5.5 Deleting Log Data

Press the grey SHIFT and the red STOP button simultaneously until the triangle LEDs begin to flash alternately and the control LED flashes red:



When the flashing has stopped the data memory of the data logger memory is ready to store new log data.

Stored log data cannot be deleted until log data output has been performed at least once. This will be indicated by flashing of the upright triangle LED for 10 times and red flashing of the control LED for 5 times:



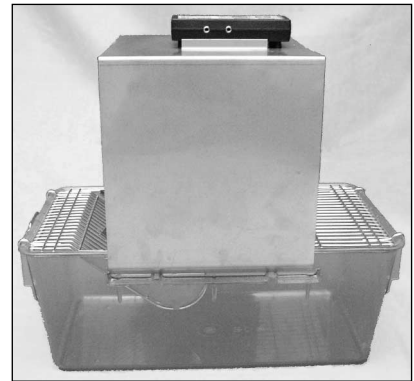
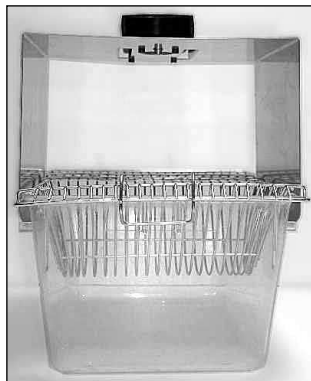
If you have collected some log data which are of no use for you and thus should be deleted without preceding log data output, it is necessary to press the grey SHIFT plus the red START button and wait until the log data output has been completely finished to be able to delete these log data. If the log data output has not been carried out using the MOUSE-E-MOTION software, it is necessary to press the SHIFT plus STOP buttons for at least **8** seconds. (This has been implemented to minimize the risk of unintended deletion of log data which have not been downloaded with the MOUSE-E-MOTION software.)

6. USAGE

The MOUSE-E-MOTION Universal Data Logger is especially designed to be applied with the commonly used type 2 or type 2L mouse cages. Usage of the data logger and the metal mounting unit in combination with this cage type will exclude false detections of movements outside the cage. If you are in doubt with your special situation, perform a test in place.

6.1 Usage on Top of a Cage

For type 2 or type 2L mouse cages the corresponding stainless steel mounting unit can be used. Press the rubber feet into the 4 pre-drilled holes of the mounting unit. Place the mounting unit on top of the cage. The lateral straps fit into the gaps of the cage. Ensure that the side with the screw faces the front side of the cage. Place the data logger with the motion sensor directed to the bottom onto the rubber feet of the mounting unit. Pay attention to the screw of the mounting unit: to ensure proper positioning of the data logger above the cage, it has to fit exactly into the little notch on the bottom front side of the data logger.



Notice that objects placed on top of the cage (e.g. food pellets, water bottles, etc.) might influence the correct motion detection and cause false values.

6.2 Stand-Alone Usage

The MOUSE-E-MOTION Universal Data Logger is capable of monitoring all kinds of motion occurrences that can be detected by a passive infrared sensor. In general, all warmblooded organisms (mammals and human beings, birds) and nearly all material objects having a temperature significantly higher than the surrounding will trigger a detection signal.

The maximum detection distance of the motion (infrared) sensor is about 5m. The detection range has an angle of at least 19 degrees in the longitudinal direction and 11 degrees in the cross direction (also see 8.0). Thus, the area covered has a rectangular shape.

Organisms or objects whose temperature is usually not significantly different from the surrounding (cold-blooded animals like fish, amphibia and reptiles, or insects, spiders, crustaceans, snails, etc., that is, organisms that do not produce body heat), or objects moving very slowly, are not suited to be monitored with the MOUSE-E-MOTION Universal Data Logger.

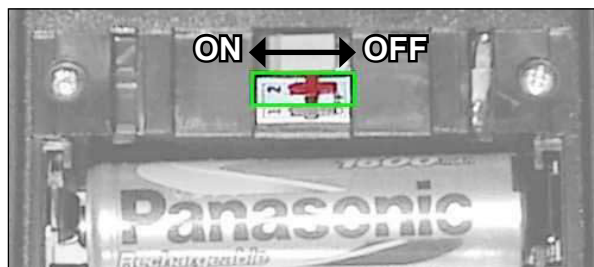
6.3 External Motion Sensor

The MOUSE-E-MOTION Universal Data Logger can be used with the built-in motion sensor or, alternatively, with an external motion sensor.

The external motion sensor has to be plugged in at the 9-pin connector at the right side of the data logger:



To exclusively use an external motion sensor the built-in motion sensor has to be disabled, so that only data of the external motion sensor will be noticed. For this purpose, move the red switch (accessible after opening the battery compartment) to the OFF position:



It is necessary to move it back to the ON position and to disconnect the external motion sensor, if you want to exclusively use the built-in motion sensor again. If an external motion sensor is connected and the built-in motion sensor is not switched off, the signals of both sensors are mixed and it is not possible to differentiate which sensor contributed to what extent to the resulting value of a recording interval.

7. CONNECTING TO A PC AND TRANSFERRING LOG DATA

To transfer collected log data to a PC for analysis, connect the data logger to an unused serial port of your IBM-compatible PC with the supplied serial communication cable.

Start the MOUSE-E-MOTION software or start MS Excel and load the MOUSE-E-MOTION add-in (refer to the MOUSE-E-MOTION software documentation on how to install and use the software). Click the ‚AutoDownload‘ button to automatically download log data with the predefined default parameters or click the ‚Download...‘ button if you want to customize the log data download.

After a successful log data download you can delete the log data stored in the data memory of the data logger, if required (see 5.5).

8. TECHNICAL SPECIFICATIONS With the settings of the preset default configuration of the data logger the motion (infrared) sensor will detect movements once a second. Every 240 seconds (4min), the motion detections are stored as a summed value in the data memory of the data logger. The MOUSE-E-MOTION Universal Data Logger is capable of storing up to 32,760 single values. The data are permanently stored, unaffected by the power status of the data logger, so there is no risk of losing data if the system runs out of power. The internal realtime clock of the data logger can be synchronized with the system clock of a PC with the MOUSE-E-MOTION software (refer to the MOUSE-E-MOTION software documentation).

Batteries:	2 x Mignon/AA/IEC R6, 2000mAh
Charging period:	3.5 hours
Charging current:	0.9A

Batteries with higher capacity can be used, but 100% charge is not guaranteed as the electronic charging system terminates charging after 3.5 hours. High-capacity batteries might not be fully charged after this period.

Power adaptor:	Switching power supply, 5V, 1A, wide range input 110V to 240V
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Operating span with completely charged batteries:	150 days
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Temperature Range:	
Operation:	-10°C to +40°C
Storage:	-20°C to +50°C

Precision of internal clock:	10 ppm at 20 °C (5min per year)
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For further information visit the INFRA-E-MOTION website:

www.infra-e-motion.de

or send an e-mail to:

contact@infra-e-motion.de

9. REVISION HISTORY

<i>Date</i>	<i>Version</i>	<i>Changes</i>
February 2004	1.00	First release
April 2004	1.01	Various small additions
June 2004	1.02	Various small modifications, Introduced revision history
July 2004	1.03	Some minor corrections
September 2004	1.04	Battery charge note added
October 2004	1.05	Some minor changes
December 2004	1.06	Additions and modifications

The latest version of this document can be found at:
www.infra-e-motion.de/download