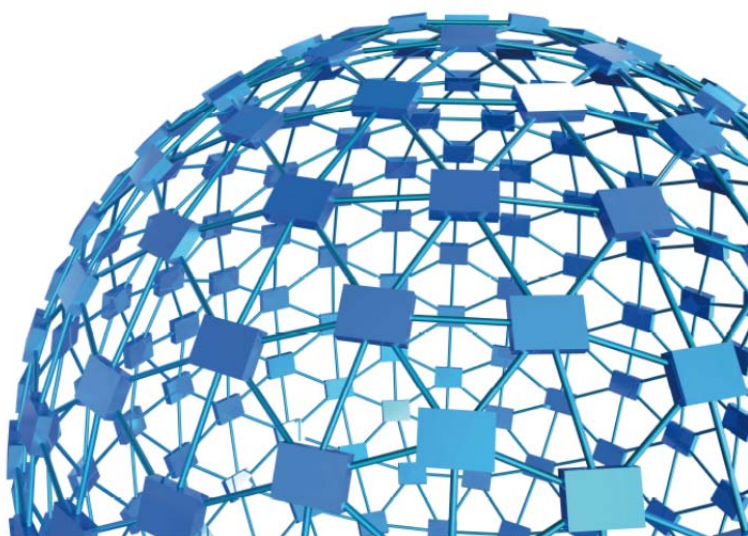




instruction manual

Plethysmometer
Cat. No. 37140



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instruction manual

Plethysmometer
Cat. No. 37140

Serial No.

SAFETY CONSIDERATIONS

ALTHOUGH THIS INSTRUMENT HAS BEEN DESIGNED WITH INTERNATIONAL SAFETY STANDARD, THIS MANUAL CONTAINS INFORMATION, CAUTIONS AND WARNINGS WHICH MUST BE FOLLOWED TO ENSURE SAFE OPERATION AND TO RETAIN THE INSTRUMENT IN SAFE CONDITIONS.

SERVICE AND ADJUSTMENTS SHOULD BE CARRIED OUT BY QUALIFIED PERSONNEL, AUTHORIZED BY UGO BASILE ORGANIZATION.

ANY ADJUSTMENT, MAINTENANCE AND REPAIR OF THE OPENED INSTRUMENT UNDER VOLTAGE SHOULD BE AVOIDED AS MUCH AS POSSIBLE AND, WHEN INEVITABLE, SHOULD BE CARRIED OUT BY A SKILLED PERSON WHO IS AWARE OF THE HAZARD INVOLVED.

CAPACITORS INSIDE THE INSTRUMENT MAY STILL BE CHARGED EVEN IF THE INSTRUMENT HAS BEEN DISCONNECTED FROM ITS SOURCE OF SUPPLY.

Plethysmometer

Cat. No. 37140

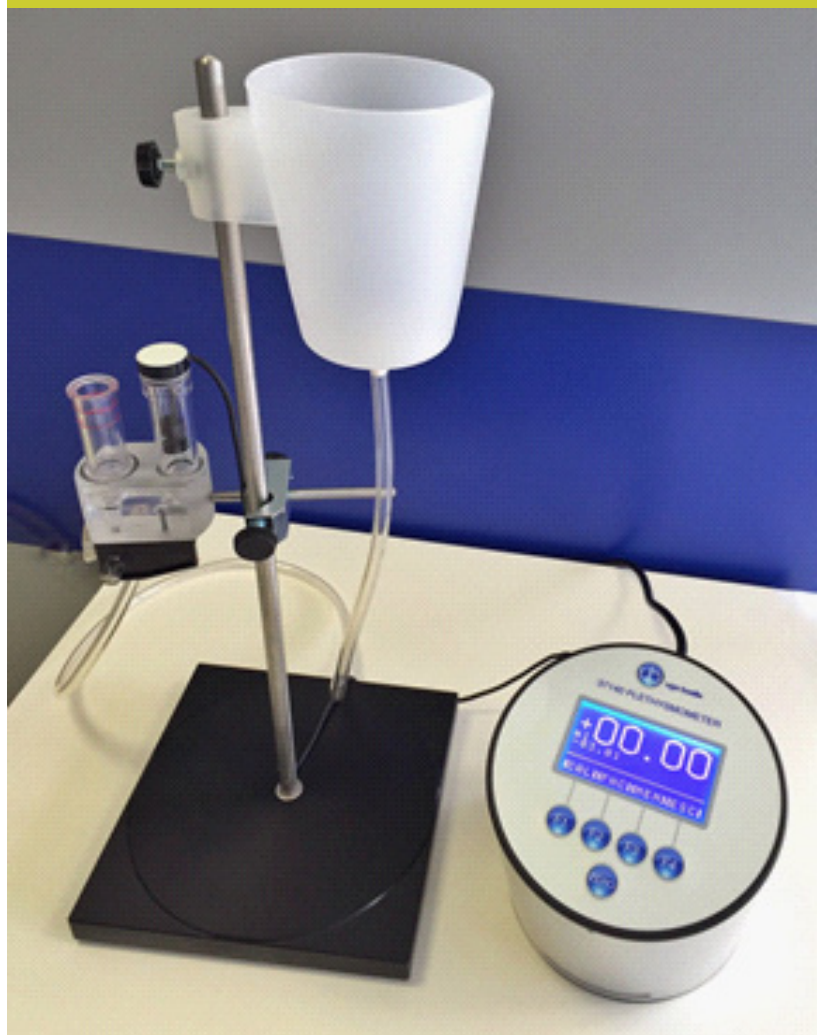
General

In research on rheumatoid arthritis, the central development of oedema, and its modifications by pharmacological processes, it has proved of great value to measure inflammatory processes in the rat paw.

Our **Plethysmometer 37140** displays the exact paw volume on the graphic LCD read-out. Small differences are detected by a transducer of original design.

The 37140 is provided with a pedal holding-command which freezes the reading, enabling the operator to concentrate its attention to the paw dipping.

The paw volume is shown on the multifunction graphic display in four digits, with 0.01 ml resolution. A zero key is provided to zero the meter before each measurement.



Including
measuring cell
for both
RAT & MOUSE paw!!

FOR ACCURATE MEASUREMENT OF:

- RAT paw oedema
- MOUSE paw oedema

MICROPROCESSOR Controlled Instrument. Main Features:

- Computer compatibility : direct connection to PC (via the 52050 Software included)
- Read-out : multifunction graphic display
- Print-out : by optional thermal MiniPrinters 57145



CHECK-LIST

- ☐ **37140** Plethysmometer (1.8cm cell)
☐ **37140-25** Plethysmometer (2.5cm cell)
☐ **37140-35** Plethysmometer (3.5cm cell)

CLIENTE / CUSTOMER _____

Ordine No. / Order No. _____ Data / Date ____ / ____ / ____

UB code	CAT.No.	✓	Q.ty	DESCRIPTION	DESCRIZIONE
	7141		1	ELECTRONIC BLOCK	BLOCCO ELETTRONICA
E-WP 008			1	MAINS CORD EUROPE	CAVO RETE EUROPE
E-WP 008-1				U.S.A.	U.S.A.
	7153-L		1	CONDUCTANCE TRANSDUCER (LEMO CONNECTOR)	TRASDUTTORE (CONNETTORE LEMO)
	7140-154		1	WATER RESERVOIR	SERBATOIO
	7160		1	WETTING COMPOUND	IMBIBENTE
	7155		1	SET CALIBRATION VOLUMES: 0.1ml (yellow) 0.2ml (orange) 0.5ml (pink) 1ml (grey) 2ml (blue) 4ml (green)	SET VOLUMI CALIBRAZIONE: 0.1ml (giallo) 0.2ml (arancio) 0.5ml (rosa) 1ml (grigio) 2ml (blu) 4ml (verde)
	7168		1	CELL SIMULATOR	SIMULATORE CELLA
M-TF 011-F			1	STRETCH OF TYGON TUBE (2 MT)	SPEZZONE TUBO TYGON 2 MT
M-CM 458-F-1	37215-303		1	PEDAL SWITCH	PEDALE
E-FT 008-1			2	FUSES (T 800 mA)	FUSIBILI (T 800 mA)
	37140-210		1	STAND	STATIVO
	4003		1	CLAMP	CLAMP
E-AU 041	37140-302		1	INSTRUCTION MANUAL	MANUALE DI ISTRUZIONE
USB pen-drive	52050-02			CUB SOFTWARE	SOFTWARE CUB
	52010-320		1	SERIAL TO USB CONVERTER	CONVERTITORE DA SERIALE A USB
	52010-322		1	SERIAL CABLE	CAVO SERIALE
WATER CELLS					
37140	7152-G		1	1.8cm water cell for Rat	Cella Ratto da 1.8cm
	7186		1	Mouse Tube (1.3cm) for 7152	Tubo Zampa Topo (1.3cm) per cella 7152
37140-25	7157-G		1	2.5cm water cell for Rat	Cella Ratto da 2.5cm
37140-35	7159-G		1	3.5cm water cell for Rat	Cella Ratto da 3.5cm

DATE / /	Serial No.	IMBALLATO DA / PACKED BY
Universal Input 85-264 VAC, 50-60Hz		
IMPORTANT/IMPORTANTE:		
Check the shipment for completeness immediately after receipt: should you find any discrepancy, please fill in the following part and transmit it to our fax no. +39 0332 745488 Al ricevimento della merce controllate che la spedizione sia completa: in caso di discrepanza, completate il formulario di seguito riportato ed inviatelo al nostro fax no. 0332 745488		
FROM: Name	Company/Institution	
DATE	REF.	
NOTE		
MOD.04 REV 0		

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Plethysmometer

Cat. 3 7 1 4 0

1 GENERAL

In research on rheumatoid arthritis and the central development of oedema and its modifications by pharmacological processes, it has proved of great value to measure inflammatory processes in the rat paw.

The Ugo Basile Plethysmometer 37140 is a volume meter, designed for accurate measurements of the rat paw swelling.

It consists of a water filled Perspex cell into which the rat paw is dipped. A transducer of original design, which records small differences in water level caused by volume displacement, operates a graphic LCD read-out which shows the exact volume of the paw (control or treated).

The 37140 is a microprocessor controlled unit, featuring direct connection to the PC for data transfer via the data acquisition software provided as standard, and to optional Mini-Printer Cat. 57145 (see paragraph 12.3), in order to print the obtained data.

The Plethysmometer enables a rapid screening of a large number of rats, providing:

- A. evaluation of small volume differences
- B. comfortable reading on the graphic display
- C. direct connection to: PC (paragraphs 6 & 8) and Mini Printer

1.1 Principle of Operation

The measuring cell consists of two vertical interconnected Perspex tubes, the larger of which is used to measure displacement. The water level in the smaller tube, which contains the transducer, follows that of the large one and is therefore proportional to the volume dipped in the large tube.

We have developed an **original transducer** which measures the conductance between two vertical Pt-Ir wire electrodes located in the small tube upper section (LEVEL ELECTRODES). Conductance is linearly proportional to the water level but it is also affected by water conductivity, which in turn depends on its ion contents and temperature.

Another pair of electrodes (COMPENSATION ELECTRODES) is therefore positioned, to keep them always fully immersed, in the lower tube section, to make them sensitive to conductivity only.

A sophisticated electronic circuit, monitored by the compensation electrodes, corrects the level electrode “readings”, thus generating a signal proportional to the level only and hence to the dipped volume (see Paragraph 2 of this sub-heading).

2 INSTRUMENT DESCRIPTION

The 37140 Plethysmometer basically consists of the following elements:

- D. the **Electronic Unit 7141**, see paragraph 2.1
- E. a **Water Cell**, see paragraph 2.2
- F. a **Water Reservoir** Cat. No. **7140-154**
- G. a **Stand** Cat. No. **4210**, provided with **Clamp** Cat. No. **4003**, for positioning the cell and water reservoir conveniently.
- H. the software Cat. **52050-02**, with serial and USB cables

2.1 The Electronic Unit 7141

The Plethysmometer Electronic Unit, lodged in a resilient aluminium cylindrical vessel, is a microprocessor controlled unit, which has the capability to store a great number of measurements and features direct connection to the PC for data transfer via the data acquisition software provided as standard.

The experimental data are shown on the multifunction graphic display, in four digits, with 0.01 ml resolution.

All connections are located on the back of the electronic unit, see paragraph 3.4, except the connector to the MiniPrinter, which is positioned on the bottom of the vessel.

A communication software kit Cat. **52050-02**, is included in the standard package, see paragraphs 6-DATA AQUISITION and 8-DATA PRINT-OUT AND CONNECTION TO PC.

2.2 The Water Cell

The standard package **37140** includes a Standard Water Cell for Rat, diam. 1.8 cm, Cat. No. **7152**, provided with an extra paw tube diam. 1.3 cm (cat. No. 7186), for measuring the mouse paw volume.

The Plethysmometer can be ordered with a different Water Cell. The additional available configurations are:-

- I. **37140-25**, including a **2.5cm** diam. **Water Cell**
- J. **37140-35**, including a **3.5cm** diam. **Water Cell**

37140-25 & 37140-35 include all the Plethysmometer standard accessories.



2.3 Calibration Volumes

Each cell is complete with a 7155 Calibration Kit, including the following Calibration Volumes:

- K. 0.1 ml** (yellow)
- L. 0.2 ml** (orange)
- M. 0.5 ml** (pink)
- N. 1 ml** (grey)
- O. 2 ml** (blue)
- P. 4 ml** (green)

See also paragraph 5-CALIBRATION for reference.

3 INSTALLATION

3.1 Unpacking & Preliminary Check

Check the contents of the shipment for completeness, packing list to hand, and visually inspect the instrument as soon you take it out of the packaging. Use the **Check List** supplied.

If the instrument is damaged, inform the shipping agent or carrier immediately, notifying our company.

Inspect the instrument for damages such as scratches, broken or loose parts. If after having tested it, the instrument fails to meet rated performances, contact our company immediately, see paragraph 10.5-Customer Support.



Protect the environment!

Dispose of packaging properly, according to existing and applicable waste management rules and regulations.

3.2 Notes on the Instruction Manual

The 37140-302 Instruction Manual, can be found on the USB Key provided with the standard package. We recommend reading the manual with attention, as it is essential for the correct installation and operation of the instrument.

Please save the manual, ready to be consulted by the qualified personnel who use the instrument. Print it, only if necessary.

Our Instruction Manuals are available as free download on our web. For any additional information and/or assistance, you are welcome to contact our Service Department (see paragraph 10.5-Customer Support), specifying the serial number of the instrument.

3.3 Setting-Up The Plethysmometer

Position the Electronic Unit and the Stand on a stable and reasonably flat bench/table (stand, clamp and reservoir may differ from what featured in the picture).

Fasten the water cell to the laboratory stand by the open-side boss-head, both provided with the standard package.

Insert the water reservoir on the same stand, and fix it by the black plastic screw. See figure 1 "Plethysmometer Ste-Up, on the right.

The cell is fitted with a slide valve provided with two side pipe connections. Branch them by the a stretches of the tube provided to the water reservoir and to a sink.

Keep the valve wings **horizontal (SHUT)** and fill the reservoir with a solution prepared in a separate vessel, see paragraph 3.3.1-Preparing the Dipping Solution.

Combine a gentle push and rotation of the transducer head to make sure it is properly fitted to the smaller tube.

Fill the cell by turning the valve winged cap approx. 45° leftwards or rightwards, according to the side to which the reservoir is linked.



Figure 1 "Plethysmometer Set-Up"

Reposition the valve cap horizontally to stop the flow and turn it otherwise to drain; fill and drain a couple of times to practice and to purge the system form air bubbles. Adjust the water level in the marked range, close to the lower red line.

3.3.1 Preparing the Dipping Solution

Add to distilled water:

- **2-3 ml/l of wetting compound** (provided with standard package) which minimizes drop and meniscus build-up, leading to more accurate measures;
- About 6 millimoles of easily available **NaCl** (0.8-0.9 g/l, that is 0.5-0.6 g for the 0.7 litre reservoir), or any univalent alkali metal chloride (NaCl, LiCl, KCl, RbCl, CsCl). Conductivity attained by this molarity provides optimum transducer performances.

Stir!

As the transducer works satisfactorily up to 12-15 mMoles per litre, any solution alteration brought about by rat droppings, in most cases increasing conductivity, does not impair its operation.



The solution must always be fresh!

See also paragraph 4.1.1.

3.4 Connections

The following scheme exemplifies the Plethysmometer connections:

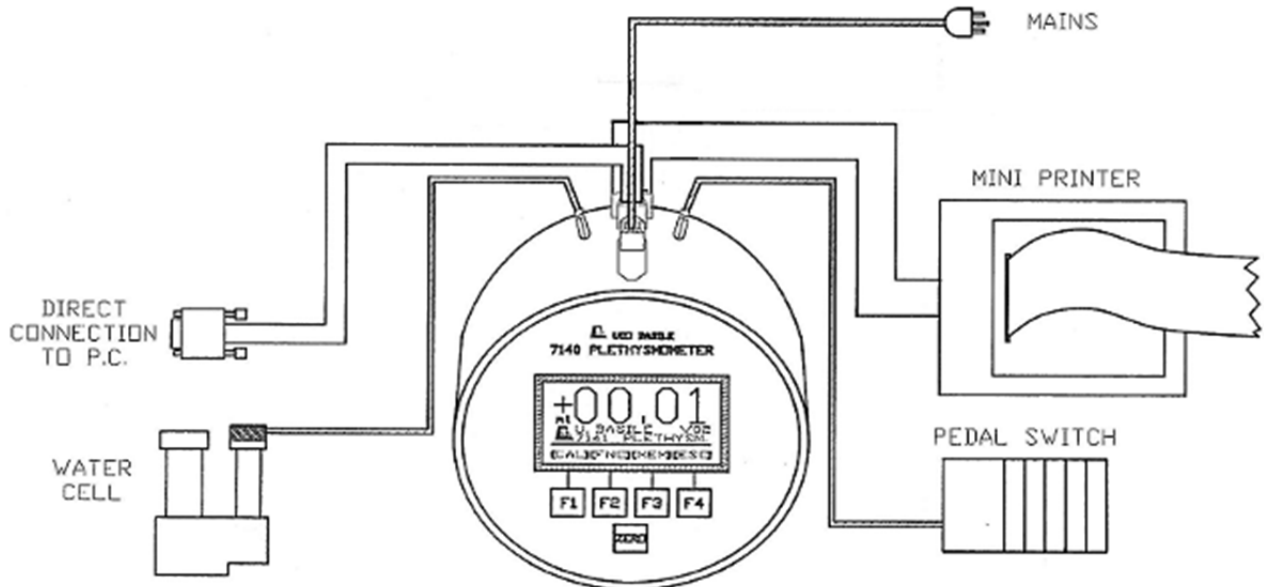


Figure 2 "Connection Scheme"

3.4.1 On The Back Side

First of all, connect the water cell and the pedal switch. The two outtakes, apparently identical, are placed to the left and right of the mains module.

Mismatching the connection is prevented by a different pin arrangement.

The 9-pin delta connector enables direct communication with a PC via its serial port, using a standard serial cable.

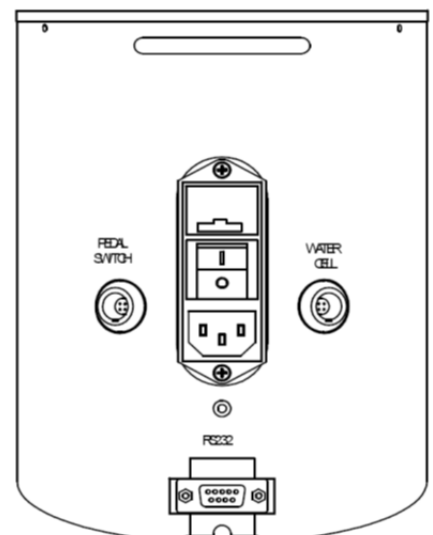
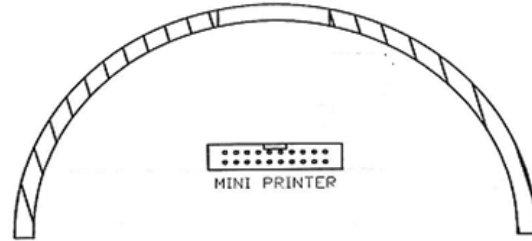


Figure 3 "Back Panel"

3.4.2 On The Bottom Side

The 20-pin connector enables the **MiniPrinter 57145** to be connected to the Plethysmometer.

The flat cable slips out via the hollow indentation on the lower rim of the vessel.



3.5 Before Applying Power

Consider the Power Module on the back side of the Plethysmometer Control Unit, which includes (from top to bottom):

- the fuse holders
- the mains switch
- the inlet connector of the mains cord



Figure 4 "Power Module"

3.5.1 Fuse Holder

The instrument is provided with 2 fuses, on both neutral and live. To replace fuses, if necessary, pull out the fuse slide, see paragraph 10.1.1.

It is recommended to use fuses type T800 (800 mA); spares are provided with the standard package.

Make sure that only fuses with the required rated current and of the specified types are used for replacement. The use of repaired fuses and the short circuiting of the fuse holders must be avoided.

3.5.2 Main Switch

This two-pole toggle switch, which complies with international safety standards, provides visual cue, to signal the:

- **OFF** position by a **O**
- **ON** position by a **I**

3.5.3 Mains Cord

Connect the instrument via its power cord to a suitable power outtake provided with a reliable earth connection.

3.6 Installation of CUB software

The CUB software is contained in the USB pen-drive provided with the instrument. Install it on your PC.

At the first installation, a code will be generated: send the code to registration@ugobasile.com to receive an **activation key**.

From the installation, you have 30 days to enter the activation key; when the 30 days trial period expires, it will not be possible to activate the software and it will be necessary to uninstall and install it again (ask for instruction at our Customer Support, see paragraph 10.5).

3.7 Intended Use

The Plethysmometer is intended for investigation use on laboratory animals only.

3.8 General Safety Instructions

The following guidelines must be followed to ensure safe operation.

- ! **DO NOT** attempt to open or perform any service work
- ! **DO NOT** connect up human subjects



3.9 Additional Safety Consideration

- a. Place the instrument on a steady and flat surface
- b. Use original accessories and spare parts only, see also paragraph 12-ORDERING INFORMATION.
- c. Immediately disconnect and replace a damaged mains cable.
- d. Do not operate in hazardous environments or outside prescribed environmental limitations (i.e. +10C° / +40C°, 95% relative humidity, non-condensing).
- e. Do not spray any liquid on the connectors



Ugo Basile does not accept any responsibility for problems or harm caused to things or persons arising from:

- incorrect electrical supply;
- incorrect installation procedure;
- incorrect or improper operation or, in any case, not in accordance with the purpose for which the instrument has been designed and the warnings stated in the instruction manual supplied with the instrument;
- replacement of original components, accessories or parts with others not approved by the manufacturer;
- servicing carried out by unauthorized personnel.

4 OPERATION

4.1 Switching On

Switch on; the graphic display lights and shows for some seconds the logo “UGO BASILE” and the firmware version which is actually installed, e.g., V02, which appears on the right side of the screen at the intermediate level (see drawing).

IMPORTANT: please note the firmware version and specify it in any communication with us for operational or after sales assistance.

After some seconds the display shows the configuration of the previous experiment. The operator can maintain it, if convenient, without the need of a fresh setting.

A warm up period of 2-3 minutes is recommended, in order to improve the measurement precision and to minimize drift.

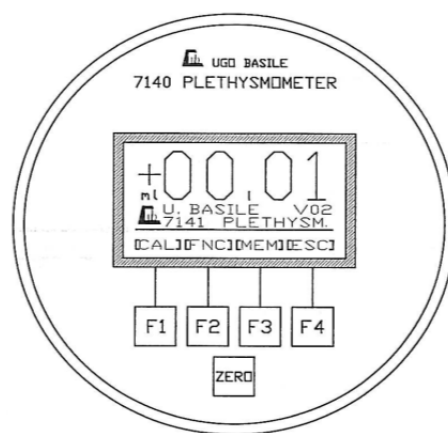
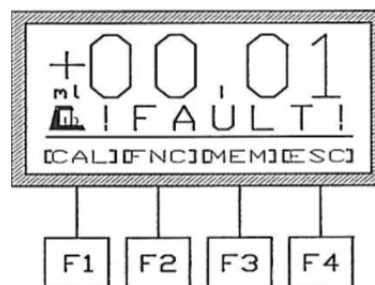


Figure 5 “Top Panel”

4.1.1 “FAULT” Message

In case the “FAULT!” caption appears on the display, this may be due to:

- f. Transducer not properly connected
- g. Empty cell
- h. Either too low or too high solution molarity See also paragraph 3.3.1.
- i. Solution level outside the two red marks



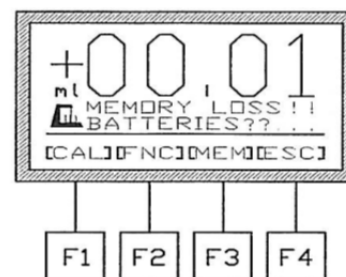
The last inconvenient (i.) can be fixed immediately. Once the solution level is within the correct range, Depress the ZERO key (see paragraph 4.4).

When the display shows the caption FAULT!, the operation of the instrument is inhibited; the fault must be detected and its causes removed.

4.1.2 “MEMORY LOSS!” Message

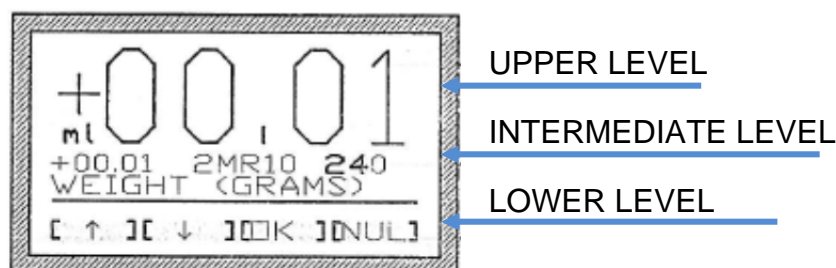
In case the caption “MEMORY LOSS!! BATTERIES!” appears on the display, it means that the internal watch-type-batteries (non rechargeable), which maintain the memory, are down and consequently have to be replaced, see paragraph 10.1.2-Battery Replacement.

The data saved in the memory are lost. Once the batteries have been replaced, the operator has to set again date, time (see paragraph 9.2) and the experiment configuration including sequence number, animal number, etc. (see paragraph 8.2).



4.2 Graphic Display

The graphic display is basically divided into three levels of characters.



The upper level shows the volume in ml, in large characters.

The intermediate level, generates “information strings” which monitor the status of the instrument and supplies date, time, animal sequence, volume (in ml) sent to the PC, etc.. In medium size characters on a single line or in small characters on two lines.

The lower level, separated by a horizontal line, indicates in square brackets the function of the keys **F1**, **F2**, **F3**, **F4**.

4.3 The Function Keys

The function keys or “soft Keys” **F1**, **F2**, **F3**, **F4** form the top row of the keyboard; the function of these keys is different, according to what the corresponding display section is showing, see Figure 5 “Function Key Diagram”.

Each function menu has a different subroutine software; in order to enter a fresh software level, the corresponding function key should be depressed. To leave a menu and to go back to the previous software level, depress the **F4 (ESC)** key (see paragraph 4.3.1).

If a key is kept depressed more than one second, the command is repeated at a higher speed. This helps to introduce numerical data.

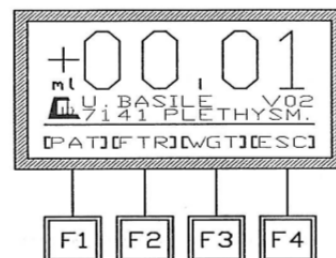


4.3.1 F4 Key

The **F4** key, which has the function of **ESCAPE** key, enables the operator to go back to previous menu.

If F4 is depressed in sequence from the main menu, the intermediate level of the display shows:

- The UGO BASILE logo with the software version actually installed
- Date and time
- Data-output printing format with sequence number, if preset, etc.



The F4 loops, and comes back to the main menu, showing the logo.

4.3.2 Function Key Abbreviations

(All)	All (serial + mini printer)
(B-R)	Baud rate
(CAL)	Calibration
(CLK)	Clock setting
(DAT)	Date setting
(DIS)	Display contrast
(ENT)	Enter
(ESC)	Escape
(FNC)	Function selection
(FTR)	Feature setting
(MEM)	Memory
(NO)	No
(NUL)	Annulment
(OK)	Confirmation
(OUT)	Data output format and features
(PAT)	Output path (PC and/or MiniPrinter)
(PRN)	MiniPrinter
(RES)	Reset
(SER)	Serial
(TIM)	Time setting
(VW)	Data view
(WGT)	Weight
(YES)	Yes

4.4 The Zero Key

The ZERO key has a kind of “right of way”, in the sense that it zeroes the measure irrespective of the subroutine which manages the instrument at the moment.

By depressing the ZERO key the meter is automatically zeroed, provided the water is in the marked range (red lines on the cell tube) and the instrument warmed up.

The display shows:

+/- 00.00 or **+/- 00.01**

5 CALIBRATION

When the 37140 is put in operation for the first time, it requires calibration via a volume probe.

Calibration is also necessary if the instrument has been off duty for a long time or after having changed the solution, replaced the cell, or replaced the transducer, etc.

Use the calibration probes provided with the standard package:-

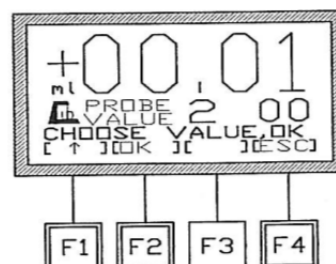
0.5 ml	(pink)	or	1 ml	(grey)	for cell 7152, with the mouse tube 7186
1 ml	(grey)	or	2 ml	(blue)	for cell 7152, with rat tube
2 ml	(blue)	or	4 ml	(green)	for cells 7157 and 7159

Note: the yellow (0.1ml) and orange (0.2ml) volumes are not used for calibration, but only for reference)

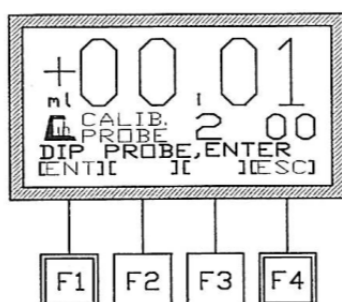
To calibrate, depress the **F1 (CAL)** key, from the main menu; the display is automatically zeroed and shows:-

Select the calibration volume by the **F1 (UP ARROW)** key, choosing the value in the sequence loop 0.5, 1, 2, 4.0 ml.

Confirm the choice by depressing the **F2 (OK)** key.



The display shows:-



Dip the selected calibration probe into the cell, wait for a few seconds until the value indicated on the display is stable and then depress the **F1 (ENTER)** key.

The software updates the display with the correct value and then goes back to the main menu.

This operation may take 1-2 seconds.



Notes:

Before making a second test, do not forget to **zero the 7140** and to dry the probe with a cloth: despite the wetting agent, the probe takes out some drops. If not dried, the second measure will show the volume of this probe plus the volume of these drops.

Also space the measures by at least 10 second intervals, either when calibrating or evaluating the oedema. This will let the water film formed on the tube wall by the water column oscillations to settle down and will give time to the electrodes/solution interface to recover steady conditions.

5.1 Quick Calibration

Before each working session, it is advisable to check the calibration: simply zero the display and dip the suitable calibration probe into the cell, then read the value shown by the instrument.

If the “quick calibration” is not successful, it is possible that the solution is somewhat degraded. Never use a solution older than 2-3 days, see also paragraph 3.3.1.

6 DATA AQUISITION

The **37140 Plethysmometer** is microprocessor controlled and features direct PC output. Internally-stored data can be routed via a 9-pin D-type connector (52010-322) to the PC serial port (RS232). A serial to USB adaptor (52010-320) is supplied with the Plethysmometer for connection to the USB port of your PC.

The **dedicated communication software Cat. 52050-02** facilitates data output from the Plethysmometer to the PC.

The **52050-02** is a Windows® based Data Acquisition Software Package, which enables the researcher to store the data as individual files, ready to be easily managed by most statistical analysis packages available on the market.

Ask for details!

7 MEASUREMENT

Once calibrated, the Plethysmometer is ready to carry out accurate measurements.

Depress the ZERO key, dip the animal paw (control or treated) into the cell, paying attention to the position of the paw in the cell. It has been found useful to mark the paw with a soft pencil at the point to which it is first immersed, as this will avoid mistakes when the paw is subsequently dipped after treatment.

Depress the pedal switch: this holding device “freezes” the figures, thus enabling the operator to concentrate his attention to the task of dipping the paw in the cell, without keeping an eye on the display at the same time.

Pressing the pedal switch will also send the data to the PC or to the MiniPrinter, if connected.

Release the pedal switch when the measurement is over and the value has been recorded.

The data are saved in the internal memory, able to store up to 500 measurements and the 37140 is ready for a new measurements, see also paragraph 7.2-“FULL MEMORY” Message.

Now proceed with the experiment.

7.1 Notes

- 1) The display may show a slightly negative value when the paw is withdrawn, which indicates the volume of water taken out by the paw.

Therefore, before measuring another paw, remember to depress the ZE-RO key!

- 2) Before making a second test, do not forget to dry the paw with a cloth and to space the measures by at least 10 second intervals, to avoid a measuring error (see final Note on Paragraph 5-CALIBRATION).

- 3) **Before starting a new experimental session**, we suggest you to consider the following:-

- the memory may contain some data saved after a previous experimental session. If is is the case, enter the MEMORY menu and reset it (see paragraph 9-MEMORY MANAGEMENT).
- in case the animal sequence number is used, is can be necessary to modify the animal number, which otherwise starts from the last tested animal number. See paragraph 8.2.1.

7.2 “FULL MEMORY” Message

When the memory is fully loaded, the display shows: “FULL MEMORY” and further measurements are inhibited.

At this point the user has two choices:-

- 4) If the researcher is not interested in the data saved in the memory, he/she may simply depress the **F3 (RESET)** key and confirm by answering **YES** to the question: “**ARE YOU SURE**” (see also 9.1-Memory Reset).
- 5) If on the contrary the data saved in the memory are necessary, proceed as indicated in paragraph 9-MEMORY MANAGEMENT.

7.3 Restoring Water Level

The water reservoir has been provided for easing the task of water level restoring, which may be necessary after having processed 20-30 rats, In fact each paw takes away some drops of water when withdrawn from the cell.

It is also recommended to purge and refill the cell in case the water gets fouled by animal's droppings.

Operate the slide-valve (see paragraph 3.3) until the level is restored.

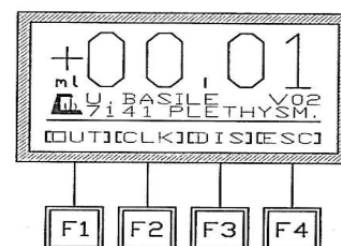
Depressing the ZERO key (see paragraph 4.4) enables the instrument to start the measure at any level in the appropriate range.

8 DATA PRINT-OUT AND CONNECTION TO PC

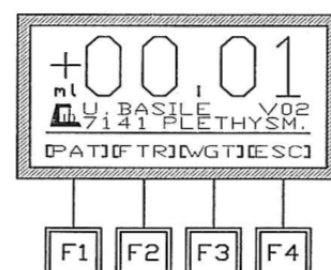
8.1 How to Set The Data Output Path

In case of operation in conjunction with the optional MiniPrinter or with a PC, it is necessary to select the data-output path menu.

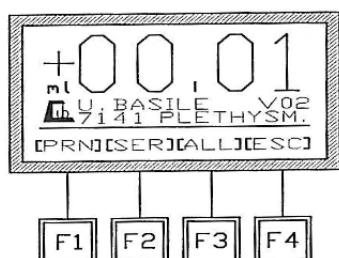
From the main menu, depress the **F2 (FNC)** key; the display will show:



Now select the **F1 (OUT)** key; the display will show:



Depressing the **F1 (PAT)** key from this menu, the display will show:



The **F1 (PRN)** key enables the operator to print out the data on the MiniPrinter **57145** (see paragraph 12.3-Thermal Mini-Printer).

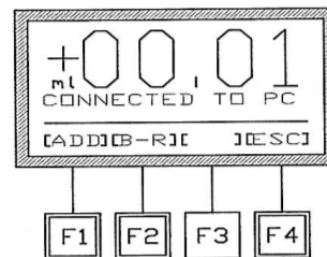
Note that if the MiniPrinter is not connected, this key is not operational.

The **F2 (SER)** key allows direct connection to a PC (see paragraph 6-DATA AQUISITION).

By depressing the **F3 (ALL)** key, the researcher will select both output paths (MiniPrinter and PC) simultaneously.

The **F4 (ESC)** key goes back to the previous menu.

When the **(SER)** or **(ALL)** key are selected, the PC must be correctly connected to the 37140; this is confirmed the message "CONNECTED TO PC", appearing on the display:



In case the operator wants to cancel one of the previously activated choices (PRN and/or SER), it is necessary to enter the "PAT" menu (**F2** then **F1** from the main menu) and depress the **F4 (ESC)** key, having selected no option.

8.1.1 Address and Communication Speed

From this menu the operator can set the address of the Plethysmometer in use and the communication speed with the PC (baud-rate); The **default address is 01; baud-rate is 300**.

In case the factory set parameters are OK, simply depress the **F4 (ESC)** key.

If on the contrary it is necessary **to modify the address**, press the **F1 (ADD)** key; select the address of the 37140 in question (from **1** to **99**), by the up and down arrow keys, then depress the **F4 (ESC)** key.

To change the factory set **baud-rate** depress the **F2 (B-R)** key; select the desired value in the loop which includes **300, 600, 1200, 2400** and **4800** Bps, by the up or down arrow keys. Then depress the **F4 (ESC)** key.

The baud-rate must be identical to what has been set on the CUB software (see the related manual).

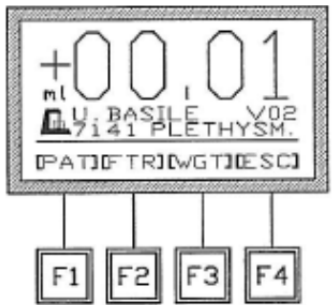
8.2 How to Customize the Customized Experimental Data

It is possible to customize the basic experimental datum as it appears on the print-out, which consists of the volume in ml only, by combining it with the following additional details (included in a loop), related to the test and/or the animal:

- **sequence number**
- **experiment number**
- **animal gender**
- **right or left paw**
- **alternate L+R**
- **L+R averaging**

From the main menu, depress the **F2 (FNC)** key, followed by the **F1 (OUT)** key.

The display shows:-

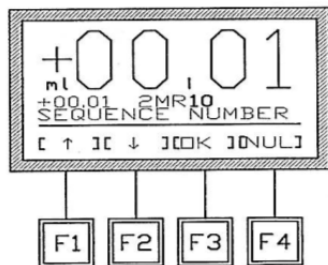


Select the FEATURES menu by the key **F2 (FTR)**; scan the features in the loop (see paragraphs 8.2.1 to 8.2.6) and enter the value for each step; depress the **F3 (OK)** key to confirm the value shown in the highlighted section of the display.

Avoid one or more features by depressing the **F4 (NUL)** key.

The selected features will be kept in the memory even if the instrument is turned off.

8.2.1 Sequence Number



The first feature to be defined is the sequence number.

Use the **F1 (UP)** key and **F2 (DOWN)** keys to set the desired sequence number (from 01 to 99), then depress the **F3 (OK)** key to confirm the choice.

The sequence number in the intermediate level will automatically trip when the pedal is released, increasing by one digit at any subsequent measurement. It indicates the fresh animal be measured.



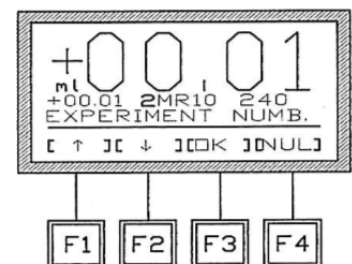
IMPORTANT:

When starting a fresh experimental session, the sequence number be carried on from the previous trial or a fresh sequence number, can be started, from this menu level, for example starting from 01 again.

8.2.2 Experiment Number

The second feature to be defined is the experiment (or group number), selectable from 1 to 9.

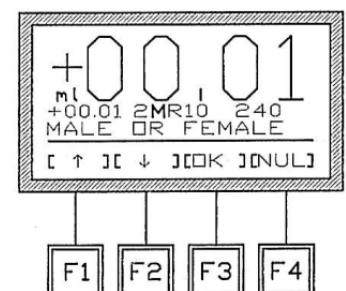
Act on the **F1 (UP)** key and **F2 (DOWN)** keys to select it (from 1 to 9), then depress the **F3 (OK)** key to confirm the choice.



8.2.3 Animal Gender

Proceed with the selection of the gender, of the animal which has to be processed.

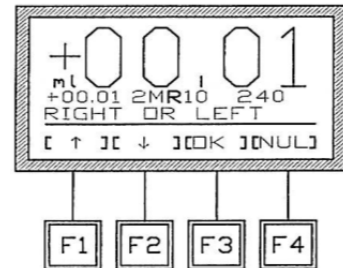
By **F1 (UP)** key and **F2 (DOWN)** keys select male (M) or female (F), then depress the **F3 (OK)** key to confirm the choice.



8.2.4 Right or Left

Now select the paw of the animal which has to be measured.

Use the **F1 (UP)** key and **F2 (DOWN)** keys to select right (R) or left (L), then depress the **F3 (OK)** key to confirm the choice.



8.2.5 Alternate L+R

This feature enables the operator to measure both left and right paw (treated and control paw) of the same animal.

The sequence number (see paragraph 8.2.1) trips every two measurements, i.e., after measuring both animal's paws, starting from the left.

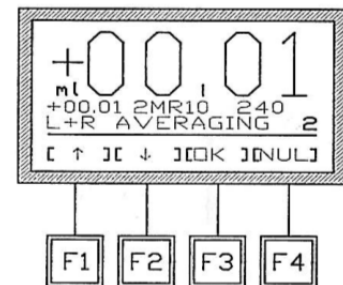
Activate this option by depressing the **F3 (YES)** key.



8.2.6 L+R Averaging

If the averaging function has been activated, the software will ask the operator to set how many times he wants to measure the treated plus the control paw of the same animal.

Use the **F1 (UP)** key and **F2 (DOWN)** keys to select the value (from 1 to 9), then depress the **F3 (OK)** key to confirm the choice.



If, for example, the set value is 3, the sequence number changes after 6 measurements (3 sequences of left plus right paw).

+01.18	1MR01	148
+01.42	1MR02	167
+01.06	1MR03	194
+01.22	1MR04	153
+01.44	1MR05	170
+01.24	1MR06	195
+01.26	1MR07	182

This can be useful to calculate the average of more measurements on the same animal.

8.3 Printing Format

The following is a sample of the printing format:

182 = weight in grams
07 = sequence number
R = paw (right)
M = gender (male)
1 = experiment or group number
+01.26 = datum proper

In case the data are sent to a PC, each printed string begins with the address of the instrument preset by the operator in order to identify from which instrument the data are coming: default value is 01, see paragraph 8.1.1.

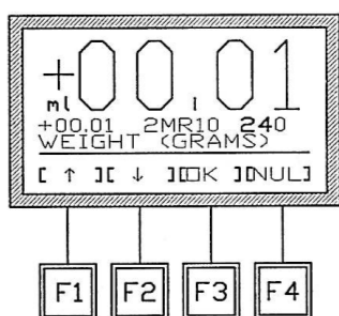
If the operator has selected the combined printing of the datum with and time, see paragraph 9, this information appears on a second line:

+01.26 1MR07 182 ----- (data string)
 '11-05-28 08:53:23a----- (date and time)

8.4 Animal Weight

The output data can be combined with the weight of the animal, which can be entered manually.

From the menu, depress **F2 (FNC)**, then **F1 (OUT)** and finally **F3 (WGT)** keys. The display shows:



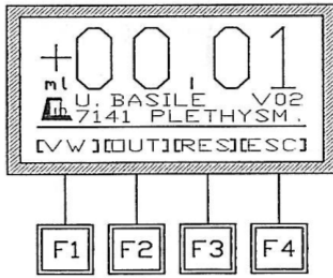
To enter the weight simply depress (momentarily or longer) the arrow keys which set the value in steps of 10 grams, then confirm by the **F3 (OK)** key and proceed with the measurement as usual.

Enter the weight for each individual animal to be measured.

9 MEMORY MANAGEMENT

The memory menu can be reached by depressing the **F3 (MEM)** key from the main menu.

The memory menu also appears automatically when the memory is fully loaded (see paragraph 7.2-“FULL MEMORY” Message). The display shows:-

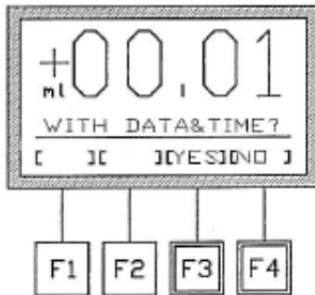


The **F1 (VW)** key enables the operator to visualize on the display the data stored in the memory.

Use the **up** and **down** function keys to scan the data. By momentarily depressing the key, the displayed datum will increase (or decrease) of one measurement. By keeping the key depressed longer, the data will be scanned at higher speed.

The **F4 (ESC)** key recalls the previous menu, unless in case of “MEMORY FULL” (again, see paragraph 7.2).

Via the **F2 (OUT)** it is possible to export to the PC, or to print on the MiniPrinter, the data previously collected and stored in the memory. The display shows:-

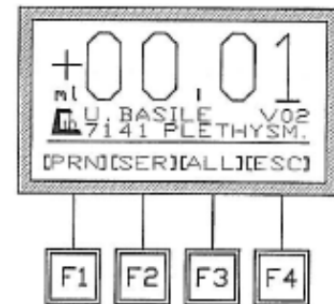


At this point the operator has to confirm if he/she is interested to combine the data with the related date and time or not.

Answer with **F3 (YES)** or **F4 (NO)** keys.

The display then shows:-

Follow the instructions outlined in 8.1-How to Set The Data Output Path to print the data or send them to the PC.



9.1 Memory Reset

Via this option, it is possible to reset memory and cancel the data stored therein. This command can be useful, for instance, before starting a new experimental session, if the operator prefers to cancel the data related to previous experiments.

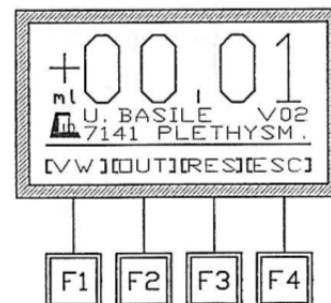
From the Memory menu, press the **F3 (RES)** key, then answer **YES (F3)** or **NO (F4)** to the question “**ARE YOU SURE?**”. This question has been added to avoid the accidental loss of all stored data.

In case of fully loaded memory, as outlined in paragraph 7.2-“FULL MEMORY” Message, the **F3 (RES)** key resets the memory with and enables the user to complete the session.

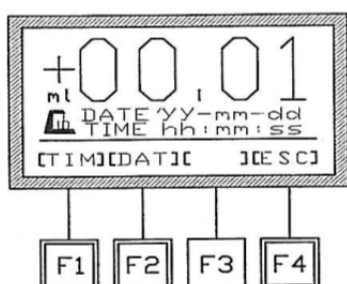
It is also possible to “ignore” the indication of fully loaded memory and go on with the experiment by depressing the **F4 (ESC)** key. The data collected from this moment on will not be saved; the memory remains fully loaded and the display reminds it by showing the “FULL MEMORY” message every time the 37140 is switched on.

9.2 Setting Time and Date

From the main menu depress the **F2 (FNC)** key, then the **F2 (CLK)** key.



The display shows:-



Select **F1 (TIM)** to set time; use the **F3** horizontal arrow key to highlight, on the intermediate level of the display, the time section (hours, minutes, seconds, mode) which has to be set.

Depress the arrow key momentarily to increase the numerical value of one step, longer for higher speed selection.

Also remember to set the clock mode: **00** = 24 hour mode

01 = a.m.

02 = p.m.

Confirm the time setting by the **F4 (ENT)** key which saves the setting and goes back to the previous menu.

Follow the same procedure to set the date, selecting **F3 (DAT)** key. Select the year, month and day by the arrow keys, and enter the day of the week:

01 = Monday

02 = Tuesday

03 = Wednesday

04 = Thursday

05 = Friday

06 = Saturday

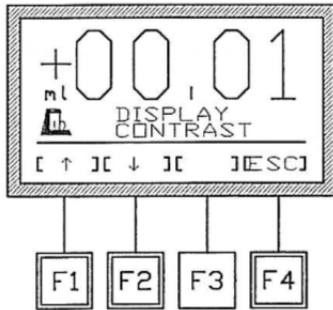
07 = Sunday

Depress the **F4 (ENT)** key to confirm the setting.

9.3 Display Contrast

To modify the display contrast, from the main menu depress in sequence the **F2 (FNC)**, then the **F3 (DIS)** keys.

The display shows:-



Act on the arrow keys **F1 (UP)** and **F2 (DOWN)** until the desired display contrast is reached.

The readability of the liquid crystal display depends on the angle of view: select the ideal contrast according to the height of the table, the operators distance and so on.

Confirm by the **F4 (ESC)** key.

10 MAINTENANCE

While service of any instrument is to be carried out by Ugo Basile personnel or by qualified personnel, authorized by UGO BASILE organization, this section of the instruction manuals describes normal maintenance procedures which can be carried out at the customer's facility.



UNPLUG THE MAINS CORD BEFORE CARRYING OUT ANY MAINTENANCE JOB!

10.1 Electronic Block

The 7141 Electronic Block has no mechanical or moving part and requires practically no maintenance. The very reliable electronics is assembled on two compact plug-in boards, one of them containing the display.

In the remote event of some malfunction, these can be replaced en bloc.

10.1.1 Replacing the Fuses

To inspect and/or replace the fuses, **disconnect the mains cable first!** Insert a miniature screwdriver in the slot indentation, see paragraph 3.5.1, and snap out the slide which houses the fuses.

It is recommended to use fuses type T800 (800 mA); spares are provided with the standard package.

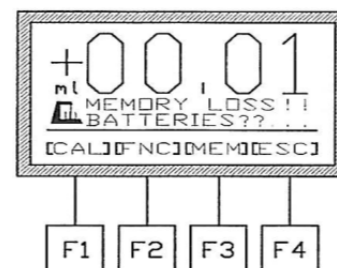
Make sure that only fuses with the required rated current and of the specified types are used for replacement. The use of repaired fuses and the short circuiting of the fuse holders must be avoided.

Snap in the fuse slide: the mechanical "click" ensures that it is locked. Check the voltage flag before applying electrical power.

10.1.2 Battery Replacement

The 7141 memory is supported by two watch-type batteries **Silver 1.55V SR43W**. Always use the same type of batteries for replacement.

When the batteries are down, the display shows:-



NOTE : When the caption “**MEMORY LOSS!! BATTERIES??**” appears, the internal memory is lost. To avoid the loss of relevant data, we suggest saving them before exiting any experimental session.

Switch off the unit and disconnect the mains cable. Remove the 3 screws positioned on the upper rim of the cylinder, which fasten the display & PCB to the vessel.

Extract the panel/circuit block carefully. The cables connecting the panel to the electronics are long enough to enable the drawing of the board, without disconnecting them.

The batteries are located on the electronic board; **replace them**. Reposition the board, fix the screws.

At this point, set again DATE and TIME, see paragraph 9.2 and carry out the CALIBRATION procedure (see paragraph 5).

10.2 Cell

To clean the cell, remove the transducer first, by lifting its plastic head, after having freed the connection cable from its clamp.

Avoid the use of organic solvents as they are liable to damage the Perspex surface. Use tap water, a test tube brush and a soapy solution or a mild detergent.

The large and small tubes of all cell models are detachable. Close tolerances, dimensionally stable Perspex and a carefully designed O-ring seal provide mechanical stiffness and perfect water tightness without any clamping or fastening device.

To detach the tubes, in case replacement becomes necessary, exert pull and rotation as when uncorking a bottle, see paragraph 12.2-Other Available Water Cells and Accessories for catalogue numbers.

To insert new tube/s, some drops of a soapy solution or silicone oil on the O-Ring may ease insertion.

10.3 Transducer

Thanks to its Platinum-Iridium alloy wires immune from corrosion, the **7153 Conductance Transducer** provides years of trouble free operation if not mechanically damaged by accidental knocks.

Handle it with care and never poke with the nail or some improvised “tool” (pencil, lab. spatula, etc.) to “feel” the wires, this may just lead to spoil their parallelism which is pivotal for the linearity of the instrument.

Grease spots caused by finger contact when handling the transducer and/or traces of organic wastes dropped by paws and diffused through the water in the long run may form a film over the wires, which may decrease the transducer efficiency.

To clean the transducer, keep its plastic head between forefinger and thumb and shake it in a Becker vessel, filled with alcohol. Keep the transducer head and cable dry. To remove particles, use a small soft water-colour type brush. Make a final quick rinsing, using acetone and let the transducer dry in air before repositioning it in the cell.

10.4 Long Inactivity

The instrument does not require any particular maintenance after long inactivity, except cleaning.

10.5 Customer Support

For any further information you may desire concerning the use and/or maintenance of the Plethysmometer and accessories, please do not hesitate to contact our **service department** (or our local distributor) either directly or via our support page <http://www.ugobasile.com/support.html> :

**UGO BASILE s.r.l.**

Via G. Di Vittorio 2
21036 GEMONIO – Varese, ITALY

**Phone : +39 0332 744574**

service@ugobasile.com
logistics@ugobasile.com
sales@ugobasile.com

Before sending any instrument to our factory for repair, please contact our logistics department to obtain a return authorization number (RMA) and shipping/packing instructions.

We may not be held responsible for damages during transport due to poor packing; whenever possible, please use the original packing.

11 SPECIFICATIONS

Operation

Power Requirement	Universal input 85-264 VAC, 50-60Hz, 40 W max.
Data Read-out	multifunction graphic display
Data Format	4 digits (2 integers, 2 decimals)
Resolution	0.01 ml
Commands	via soft-buttons
Connection to PC	direct connection to PC USB port, via serial cable and serial to USB adaptor. Software included
Data Print-Out	via the optional MiniPrinter 57145
Operating Temperature	10° to 40° C
Sound Level	negligible

Physical

Total Weight	4.8Kg
Shipping Weight	8.1Kg approx.
Packing Dimensions	67x42x53cm

Warranty

Warranty	37140 is covered by a 24-month warranty.
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12 ORDERING INFORMATION

37140 **Plethysmometer**, standard configuration, including following components and accessories:

7141	Electronic Block
7152-S	Standard Water Cell, diam. 1.8 cm, with 7186 Mouse paw tube, diam. 1.3 cm
7153-L	Conductance Transducer
7140-154	Water Reservoir
7155	Set of Calibration Probes (0.1, 0.2 , 0.5, 1, 2, 4ml)
7160	Wetting Compound, 100ml bottle
7165	Stretch of Tube M-TF 011-F (for connection cell-reservoir & drain vessel)
7168	Cell Simulator
37215-303	Pedal Switch
52010-320	Serial to USB converter
52010-322	Serial Cable
4210	Three Claw Stand, 10mm diam. upright, with Open Side Boss-Head 4003
E-WP 008	Mains Cord
E-FT 008-1	Fuses (T 800 mA)

- E-AU 041** USB Pen drive, including:
37140-302 Instruction Manual (on USB pen drive)
52050-02 CUB Dedicated Software

12.1 Other Available Configurations

37140-25 Plethysmometer, complete with water cell diam. 2.5 cm & standard accessories

37140-35 Plethysmometer, complete with water cell diam. 3.5 cm & standard accessories

12.2 Other Available Water Cells and Accessories

- 7157** Special Water Cell, diam. 2.5 cm, complete with 7153-L
7159 Special Water Cell, diam. 3.5 cm, complete with 7153-L
7157-G Special Water Cell, diam. 2.5 cm, without transducer
7159-G Special Water Cell, diam. 3.5 cm, without transducer
7182 1.8 cm Displacement Tube for the rat paw
7186 1.3 cm Displacement Tube for the mouse paw
7187 2.5 cm Displacement Tube for the rat paw
7189 3.5 cm Displacement Tube for the rat paw

12.3 Thermal MiniPrinter

The Mini-Printer 57145 is a thermal array device, for easy connection to the 37140 Plethysmometer, and other Ugo Basile devices, to print experimental data on its 58mm wide paper Cat. 37400-305.



It is complete with connection cable 7178.

It features:-

- **very** quiet printing
- **easy** paper loading
- fast **print**-out of several information strings

57145 Thermal MiniPrinter

37400-305 Thermal Paper Roll for 7145 -004

7178 Connection Cable Plethysmometer to MiniPrinter

13 BIBLIOGRAPHY

13.1 Papers Mentioning Ugo Basile Plethysmometer

- T. Keränen et alia: **"Anti-Inflammatory Effects of β 2-Receptor Agonists Salbutamol and Terbutaline Are Mediated by MKP-1"** PLoS ONE, February 5, 2016
- A. Horváth et alia: **"Transient Receptor Potential Ankyrin 1 (TRPA1) Receptor is Involved in Chronic Arthritis: in Vivo Study Using TRPA1-Deficient Mice"** Arthritis research & therapy 18(6), 2016
- F. Bonezzi et alia: **"An Important role for N-Acylethanolamine Acid Amidase in the Complete Freund's Adjuvant Rat Model of Arthritis"** J Pharmacol. Exp. Ther. **jpet.115.230516**, 2016
- T. Iannitti et alia: **"Adiponectin-Mediated Analgesia and Anti-Inflammatory Effects in Rat"** PLoS ONE, Sept. 9th, 2015
- D.B. Vendramini-Costa et alia: **"Anti-inflammatory and antinociceptive effects of racemic goniiothalamine, a styryl lactone"** Life Sciences 139: 83-90, 2015
- F. Vincenzi et alia: **"A2A Adenosine Receptors Are Differentially Modulated by Pharmacological Treatments in Rheumatoid Arthritis Patients and Their Stimulation Ameliorates Adjuvant-Induced Arthritis in Rats"** PLoS ONE 8(1): e54195, 2013
- T. Bertaim et alia: **"Dose and Administration Schedule Effect of Tiludronate on Joint Damage in the Model of Complete Freund Adjuvant Induced Monoarthritis in Rats"** Open Journal of Rheumatology and Autoimmune Diseases 3: 18-25, 2013
- E. Borbély et alia: **"Role of Tachykinin 1 and 4 Gene-Derived Neuropeptides and the Neurokinin 1 Receptor in Adjuvant-Induced Chronic Arthritis of the Mouse"** PLoS ONE 8(4): e61684, 2013
- R. Korhonen et alia: **"Attenuation of TNF production and experimentally induced inflammation by PDE4 inhibitor rolipram is mediated by MAPK phosphatase-1"** Br. J. Pharmacol. 169 (7): 1525-1536, 2013
- A. Finlay et alia: **"Sphingosine 1-Phosphate Mediates Hyperalgesia via a Neutrophil-Dependent Mechanism"** PLoS ONE 8(1): e55255, 2013
- Zs. Helyes et alia: **"Involvement of transient receptor potential vanilloid 1 receptors in protease-activated receptor-2-induced joint inflammation and nociception"** Eur. J. of Pain 14 (4): 351-358, 2010
- D. Piomelli et alia: **"Anandamide suppresses pain initiation through a peripheral endocannabinoid mechanism"**. Nature NSC, 2010

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[illegible]

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CE CONFORMITY STATEMENT

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Phone n. +39 0332 744574
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We hereby declare that

Instrument. **PLETHYSMOMETER**
Catalog number **37140**

*It is manufactured in compliance with the following European Union Directives
and relevant harmonized standards*

- *2006/95/CE relating to electrical equipment designed for use within certain voltage limits*
- *2004/108/CE relating to electromagnetic compatibility*
- *2011/65/UE on the restriction of the use of certain hazardous substances in electrical and electronic equipment*

Account Manager

Adriano Basile

Nome / Name

April 2014

Date

Firma / Signature