INSTRUCTION MANUAL

ENGLISH

Micro Junior 2

MICRO JUNIOR 2

RAYTECH AG , OBEREBENESTRASSE 11, CH-5620 BREMGARTEN, SWITZERLAND

Contents

1 Warranty Conditions

Raytech AG Switzerland shall at their option and expense, repair or replace any part or parts that prove to be defective within the warranty limitation period- irrespective of the operating time of the test equipment provided that the cause of the defect occurred prior to the time at which the risk was passed.

Warranty claims are subject to a warranty limitation period of 24 months from the date of shipment.

The purchaser is obligated to immediately notify Raytech AG Switzerland in writing of any defects of the supplied test equipment.

Raytech AG Switzerland must always be given the opportunity to rectify a defect within a reasonable amount of time. The purchaser shall grant an adequate amount of time that the test equipment shall be repaired.

Raytech AG Switzerland covers the costs associated with the repair of the defect; especially the costs for the material and work. Cost for sending the faulty test equipment shall be borne by the purchaser. Raytech AG Switzerland shall not be liable for material damage, or financial loss due to the loss of production, loss of data, loss of information, data or interest, regardless of their legal basis.

Warranty claim rights on replacement parts as well as repair of defective parts shall expire after 12 months.

Warranty limitation period shall be extendable according to the price list. The purchaser has the right to extend the warranty period by purchasing additional warranty years.

1.1 Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from:

- Improper and unauthorized modifications or misuse and abuse of the product, negligence, alteration, modification, faulty installation by the customer, customer's agents or employees.

- Attempted or actual dismantling, disassembling, service or repair by any person, firm, or corporation not specifically authorized in writing by Raytech GmbH Switzerland.

- Defects caused by or due to handling by carrier, or incurred during shipment, trans-shipment, or other move.

- Inadequate maintenance by the customer, second source supplied software or interfacing, operation outside the environmental limits, or improper site preparation.

Exclusive remedies provided herein are the customer's sole and exclusive remedies.

Raytech Switzerland shall not be liable for any damages resulting from the use of this equipment whether direct, indirect, special, incidental, or consequential damages, or whether based on contract, tort, or any other legal theory.

INFO:
NO OTHER WARRANTY IS EXPRESSED OR IMPLIED.

1.2 Arbitration

All disputes arising out of or in connection with the contract between the purchaser and Raytech GmbH Switzerland and including those regarding the legal validity of this contract and this arbitration clause shall be settled out of court and shall be referred to arbitration for final decision.

Any disputes between the purchaser and Raytech AG Switzerland shall be settled according to the rules of settlement and arbitration of the chamber of commerce in Zurich by one or more arbitrators appointed also according to the rules of arbitration of the chamber of commerce in Zurich Switzerland.

2 Safety Precautions

The following safety precautions must be observed during all phases of operation, service and repair of this instrument. By purchasing this equipment the purchaser assumes all liability for the operation and use of this equipment. The intended use of the instrument, its design and manufacture, is to be conducted within the precautions or other specific warnings located within this manual. Failure to comply with these precautions and other specific warnings violates the safety standards of design, manufacture, and intended use. Raytech assumes no liability for the operation and use of this equipment.

2.1 Safe operation

Only qualified, knowledgeable persons should be permitted to or attempt to operate this test equipment. All test personnel should fully familiarize themselves with the correct application and operation of this and all test equipment prior to operation. Persons directly and indirectly engaged in the operation of this test equipment should keep clear of all high voltage apparatus while conducting tests and measurements.

WARNING !

Never connect the instrument to an energized Test Object!

2.2 Keep away from live circuits

Operating personnel must not remove instrument covers. Component replacement and internal repairs must be made by qualified service personnel. Do not replace components or service this instrument with the power cable connected. To avoid injuries, always discharge circuits, disconnect power and remove external voltage sources before touching components.

2.3 Do not operate in an expolive atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

2.4 Do not subsitute parts or modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Raytech service department for service to ensure proper operation and that safety features are maintained.

Instruments, which appear damaged or defective, should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

2.5 Before applying power

Read this manual carefully before operating the system.

The Micro Junior 2 is line operated. It operates within a wide range of power input from 100Vac to 250Vac and The system is designed to be used with either 50Hz or 60Hz

Do not vary the input power source voltage level when a variable AC power source is connected.

2.6 Ground the Instrument

To minimize shock hazard, the Ground Terminal on the instrument must be properly connected to an Earth grounded point. In many cases, the quality of the safety ground terminal provided by the power cord does not fulfill the safety requirements.

Also the power cord supplied with the equipment must be connected to an electrical receptacle with an electrical ground (safety earth ground).

3 Unpacking

The Micro Junior 2 consists of the following items:

The Instrument

Test Lead Power Current 2x3m

Test Lead Potential 2x3m

Cable Bag

Power Cord, Charger

User Manual

If any of the above items are missing or damaged, contact your local representative or Raytech AG Switzerland immediately.

3.1 Optional Items

Temperature Probe

Kelvin Probe Set (MJO-201)

Paper rolls

4 Technical Specifactions

The Micro Junior 2 is specially designed for fast and easy field measurement with the well known high precision and quality of Raytech.

Type	Micro Junior 2
Size	L: 410 mm (16.1”) W: 337 mm (13.3”) H: 178 mm (7”)
Weight	6.3 kg (13.88 lbs.)
Ext. Power Unit	100 to 250 VAC 50 / 60 Hz, automatic ranging
Battery	Li-Ion battery pack, 14.8V / 6Ah
Test Current	User Selectable: 10, 1, 0.1, 0.01, 0.001 Ampere
Panel Display	LCD Graphic with back lighting
Front Panel	Sealed anodized with a multi-actuation rotary knob
Interface	9 Pin RS232 serial
Printer	Inernal panel mount printer
Memory Storage	Internally stores up to 2000 complete test results
Operating Temperature	-10°C to 60°C
Storage Temperature	-20°C to 70°C

INFO:

The Micro Junior 2 Fieldcase is a waterproof design with a pressure relief valve. This valve should be slightly open when encountering atmospheric changes; i.e... Airplane Travel, High altitudes, etc... Close the valve when transporting the equipment in wet conditions.

5 Quick Start Guide

WARNING !
Before Operating this or any other test equipment, read all safety warnings and understand them fully

5.1 Operation

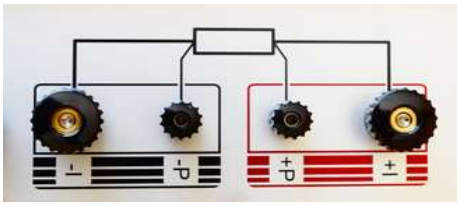
This section describes a typical, step by step, operation of the Micro Junior 2

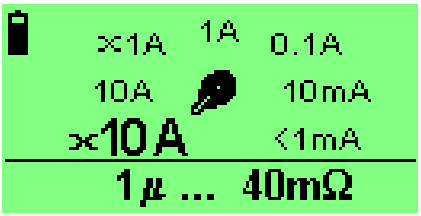
Open the top protection lid of the case and attach the test leads to the test set.

The Two (2) connections on the front plate marked +I & -I are the current leads.

The Two (2) connections on the front plate marked +P & -P are the Potential or Voltage leads.

By connecting a test specimen to the Current leads and applying the potential leads (See figure) across the specimen the resistance readings will be determined.





Turn the Power switch to the “ON” position. The Instrument will make the initial calibration check. Then the Initial Range selection screen will appear.
Select the current or resistance range expected to be measured with the rotary knob.

(Selecting the cross current, X10A & X1A measurement range.)

Press the rotary knob when the indicator is pointing at the resistance and current level to be measured (If unsure of current level, then start at the 1 mA range and increase the current range until a valid reading appears).

After the current range is selected press the rotary knob again. The following measuring modes can then be accessed: **Single**, **Cont...** (Continuous), **Auto** (Automatic), **Inter...** /Interval).

5.2 Single

The "Single" mode allows a single test to be made. Turn the rotary knob until “Single” is highlighted. Press the rotary knob to select. The test set will start a measuring sequence immediately. The system will sense the current output, and if a valid reading is detected, then record the results on the display. The results can then be “Stored” or “Printed”.

5.3 Cont...(Continuous)

The "Cont..." (Continuous) mode allows a single test to be made continuously. The instrument will continuously measure until the operator presses “Stop”.

Turn the rotary knob until “Cont” is highlighted. Press the rotary knob to select. The test set will start measuring immediately. The system will sense the current output and, if it is a valid reading, display the results on the display. If the STOP button is selected the last valid reading displayed will remain on the display.

5.4 Auto (Automatic)

The "Auto" (Automatic) mode will measure and store, automatically, numerous single sequential tests. The instrument will continuously measure multiple tests until the operator selects and presses “Stop”.

For this type of measurement, please use the optional Kelvin probes.

Turn the rotary knob until “Auto” is highlighted. Press the rotary knob to select.

The test set will start measuring immediately and prompt the operator to make Contact with the test probes. The system will sense the current output, and if it is a valid reading, then display the results on the display. The instrument will automatically save this last result in a memory location and then prompt the operator to remove the test probes (Remove Contact). The instrument will then repeat the process. Press the STOP button to end the measuring sequence.

NOTE:

The instrument will halt the measuring process if excessive interference is detected.
If a warning message,”Rx Too High” is displayed, Or if ”+++.+” is displayed, Then return to the “SET UP” screen and select the next higher resistance range.

5.5 Cross Current measurements (Forward / Reverse)

The Micro Junior 2 was designed to allow measurements with the current flow in a forward direction and then in a reverse direction. The current flow through the device under test is reversed (or crossed) automatically during a testing sequence in Ranges **X10 A** and **X1 A**.

When the test is initiated the current flow is first positive (+) DC sourced then automatically switches current flow to negative (-) DC sourced. The potential leads are not reversed.

Measurements are taken from the (+) Positive measurement readings and measurements are taken from the (-) Negative measurement readings. These readings are then combined with the resultant.

value of resistance being very accurate with a resolution of 0.1 μOhm.

6 Introduction

Digital Micro ohm meter, Micro Junior 2, was designed for high degree of accuracy for the measurement of very low resistance. This technology was then packed into a portable test system for use by apparatus manufacturers, rebuild shops, and electrical maintenance crews.

6.1 Ease of use

This intelligent system has an easy to use operation screen, which allows quick selection of the current level and resistance level to be measured. The system has the ability to detect the resistance level and suggest the correct range to select which provides for extremely accurate results.

6.2 Impressive accuracy

The Micro Junior 2 is a high precision, fully automatic, microprocessor based system. This system is designed for highly accurate readings on-site with laboratory precision.

6.3 Unique measuring technique

This newly designed technique of measurement incorporates a high precision measurement circuit which will automatically measure with current flow in one direction, then the system will reverse the current flow and display very accurate results to 0.1μΩ. The system allows long term measurements at 10 A without frequent recharging

6.4 Operation

The Micro Junior 2 applies a preset current level, selected by the user. The results of the test are displayed within a few seconds automatically. The results are reported on the easy to read liquid crystal display.

6.5 Compact design

The Micro Junior 2 is a lightweight system that comes complete with its own rugged waterproof Fieldcase.

6.6 Simple maintenance

There is No maintenance required. There is No calibration procedure (No potentiometers to turn). This is due to the utilization of high precision components in the design.

6.7 Advanced protection

Upon powering on the system initializes itself with a self-calibrating, circuit checking sequence. If any problems are detected during this initialization period, or during operation, the operator is immediately notified. The system constantly monitors the condition when turned on. The Micro Junior 2 has extensive protection built in to the circuitry. This is one of the many reasons we can extend our warranty to 2 years.

7 Advantages & Features

- Microprocessor based system
- Automatic measurements of Low Resistance
- Automatic current reversal mode for greater accuracy
- Internal storage for 2000 test results
- Response time less than 2 seconds
- Single push button operation
- Automatic shut-off to extend battery life
- Lithium Battery power source
- Runs for more than 5 hours continuous at 10 A
- Complete automatic calibration system
- Heavy duty protection circuitry
- Internal Panel Mount Printer
- External connection Port & RS232 (serial) Interface
- 2 Year standard warranty

8 System Details

8.1 Battery check

The instrument is battery operated. Before operating the Micro Junior 2, check the battery indicator located on the upper left hand of the display. The Battery indicator will give a good indication of the battery charge. A full Charge will allow the Micro Junior 2 to operate continuously for 5 Hours at 10-ampere output or (typically) a month of daily usage. Recharge the batteries at any time. The system can be operated while charger is plugged into the mains power (100 to 250 VAC 50 / 60 Hz, automatic ranging).

8.2 Li-Ion Charger

Ext. power Unit 100 to 250 VAC 50/60 Hz, automatic ranging.

8.2.1 Precautions

- This charger is for indoor use only. Do not expose to water or dust.
- To avoid overheating, the charger must not be covered while in use.
- This charger is designed for use with Lithium-Ion Batteries installed in the Raytech Micro Junior 2 only.
- The mains outlet must be easily accessible. Should a faulty Condition occur: remove the plug from the mains outlet immediately.

HIGH VOLTAGE !
Do not remove cover! There are no user serviceable components inside.

8.2.2 Features

- 3-step charge control for safe, fast charging of Lithium-Ion Batteries.
- One voltage level: Quick bulk charge.
- LED-indicator with three different colors show the charge status.
- Built in timer for prolonged charging.

8.2.3 Charging Instructions

1. Connect the charger to the Micro Junior 2 before it is connected to the mains outlet.
2. When charging is complete, disconnect from the mains before removing connections.

8.2.4 Explanation of Charging Function

The External Charger works in three different modes. An LED-indicator with three different colors shows the mode that the charger is in.

LED Indicator Charge Status:

Bulk Charge — Orange — Orange LED. Battery < 95% Capacity.
The charger is in constant current mode. Charge current is maximum.

Balancing Charge — Yellow — Yellow LED. Battery > 95% Capacity.
The charger is in timer/trickle mode. Charge current is less than maximum.

Standby mode — Green — Green LED. Battery at full Capacity.
The charge is stopped. Charge current is zero.

WARNING !
The charger has an internal slow blow glass fuse which will blow if a fault occurs in the charger.
Unit must be repaired by qualified service personnel only.

8.3 Limitations of Resistance Testing

This Test system is capable of sourcing 10 A at 0.9 VDC. The cable leads that carry the test current should have a total resistance not exceeding 40 mΩ. Beyond the 40 mΩ the test set decreases the available output current. A warning message,"Use 1 A range" will be displayed. However, the system will continue to measure and display slightly less accurate results. If the message, "Rx Too High" or "+++.+" is viewed in the display, then mandatory range switching must be complied with.

8.4 Transformer windings

Use of any micro ohm meter for high inductive winding resistance is not recommended.

The inductive characteristics of transformer winding testing require a long period to saturate the winding to get a stable reading. In addition, care must be taken when removing test leads such that a voltage charge does not remain on the winding. Lethal currents may remain and might cause personal injury and damage to the instrument. Specialized test sets with higher potential compliance voltages and current should be considered for winding resistance measurements.

8.5 Low Resistance Testing

The Micro Junior 2 is an extremely useful device for checking Switch Contacts, SF6 Switchgear, Busbars, Splices, Joints, Fuses, Breaker contacts, Railbonds, and Low inductive windings.

The Micro Junior 2 utilizes a 4 wire measuring technique. The Two connections on the front plate marked +I & -I are the current leads. The Two connections on the front plate marked +P & -P are the Potential sense or Voltage measuring leads.

By connecting a test specimen to the Current leads and applying the Potential leads across the resistance to be measured. The points where the potential leads are connected determine the resistance reading.

The test set employs a very simple principle of Ohm's law:

$$R = \frac{V}{I}$$

R = Resistance, **V** = Voltage, **I** = Current

9 Front Panel Description

Power Switch

Turning the switch to the “ON” position applies power to the test set.

Turning the switch to the “OFF” position turns off the instrument.

The switch defaults to the “Automatic off” position and will automatically turn off after being idle for a certain period.

Lithium Ion Charger Input

Connect the ext. Power supply here.

Emergency Stop

Press to Stop any measurement in progress.

Turn clockwise to release

Ground

Earth Ground Terminal

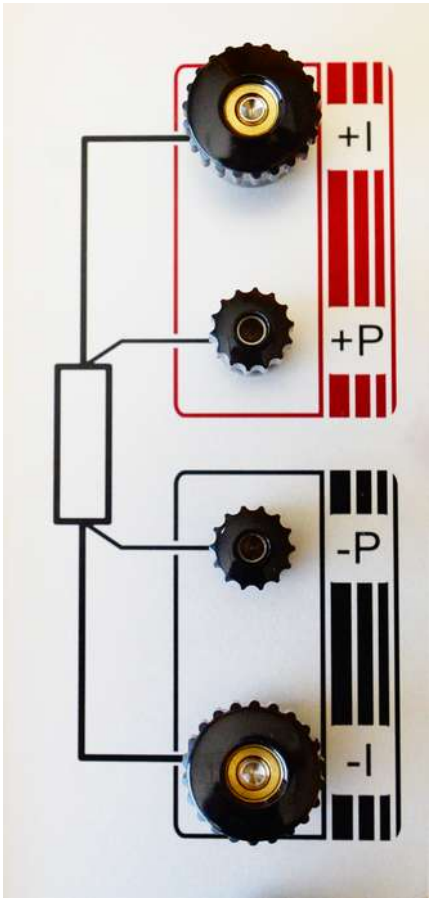
Connect the earth cable here.

External

This port is used for an external connection to the 50A/50V Transformer Winding Resistance Power Supply Option: WR50-1A.

This port can also be used with an optional temperature probe.

Test Connections



+ I : Positive Current Connection
+ P : Positive Potential Connection
- P : Negative Potential Connection
- I : Negative Current Connection

Interface

Serial RS232 Computer and External Printer Connection.

Buttons

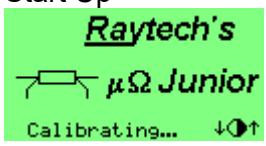
Rotary Encoder with Push-Button.

Printer

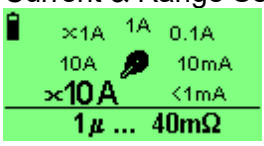
This panel mount printer allows the user to print out stored results or current results.
The single button on the printer is for Form-Feed.
To tear paper, pull paper towards the front of the instrument against the serrated cutting edge.

9.1 Typical display screens

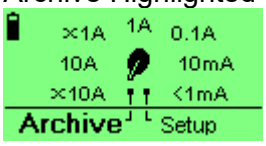
Start Up



Current & Range Selection



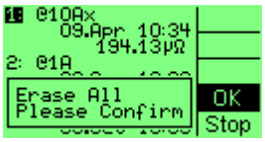
Archive Highlighted



Archive Memory

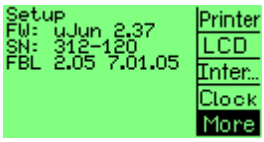
Archive Show Menu

Archive Erase Menu

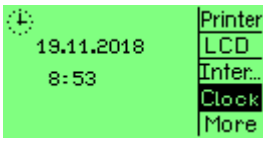


Setup Highlighted

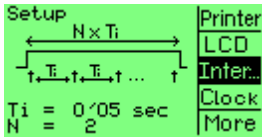
Setup Menu



Setup Clock

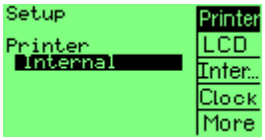


Setup Interval Test

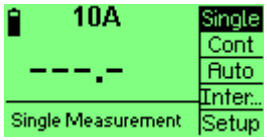


Setup Contrast

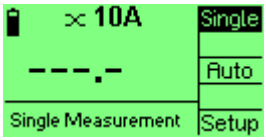
Setup Printer



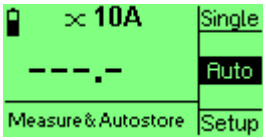
10A Range Test



X 10A Range Reverse Test



10A Range Auto Test



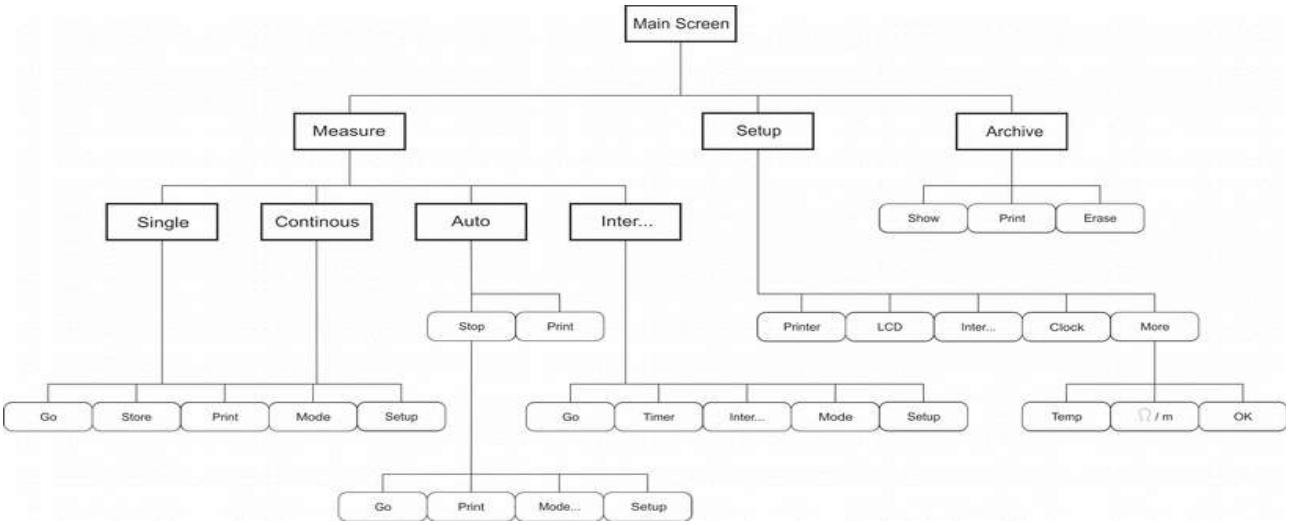
Further details of these menus and screens are located on the following pages.

10 Operation Menu

The instrument software is straight forward and easy to set up and operate. With a few key strokes and selections on the test screen, measurements can be started. See chapter 5 Quick Start Guide on page 10

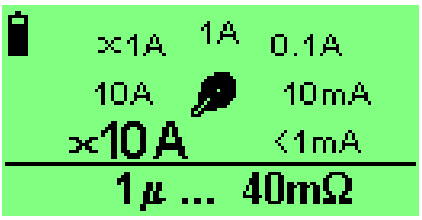
10.1 Menu Structure

Micro Junior 2 menu structured as shown in the figure below.



11 Main Menu

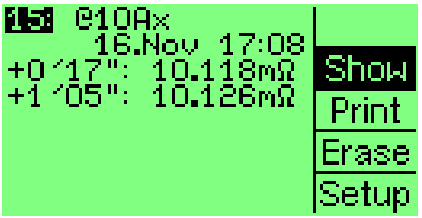
11.1 Range Selection Screen



Allows setting of Resistance & Current levels.
Selection is made by turning the rotary knob to the desired Current or Resistance range then pressing the rotary knob to confirm selection.

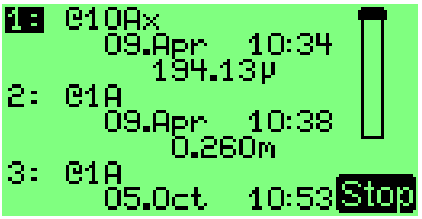
11.2 Archive Screens

This is where the memory locations are kept.
In the "Range selection Screen", position the pointer with the rotary knob to highlight “Archive”.



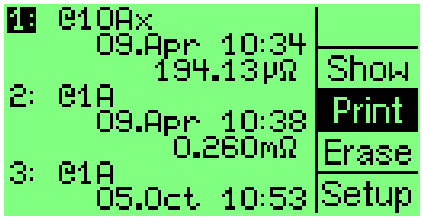
Press the rotary knob to view the "Archive" (memory locations) and this screen will appear:

11.2.1 Show



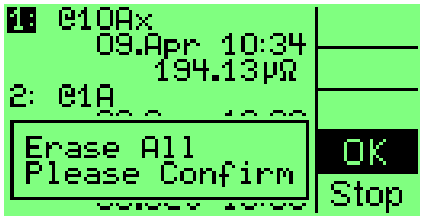
This selection allows viewing of all of the memory locations. Move the rotary knob to scroll through stored tests.
If you want to print a measurement, you must select it in this menu item.
Now Press the rotary knob and you get to the previous menu.

11.2.2 Print



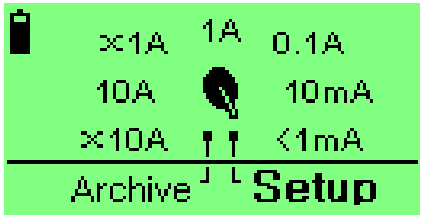
This selection will print the highlighted memory location.
Position the pointer with the rotary knob to highlight “Setup” and return the "Range Selection screen".

11.2.3 Erase

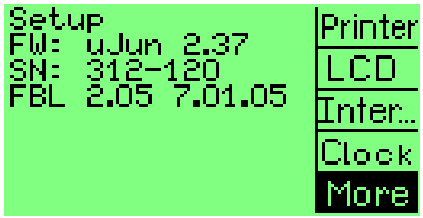


This selection will erase all of the memory locations. Press “OK” to erase all of the stored results.
If you do not wish to erase the stored results, position the pointer with the rotary knob to highlight “Stop” and press the rotary knob to cease this action.

11.3 Setup Menu Screens



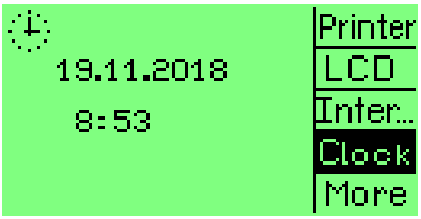
Includes selections for "Printer options", "LCD Contrast", "Interval Test mode" "Clock adjustments" "Temperature Correction" and "Length Corection".
In the "Range Selection Screen", position the pointer with the rotary knob to highlight “Setup”.Press the rotary knob.



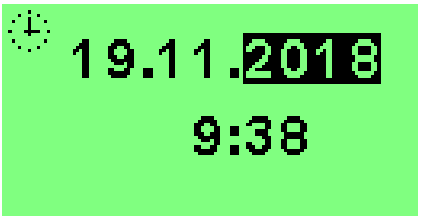
This screen will appear.

- Firmware (FW)
- Serial Number (SN)
- Flash Boot Loader (FBL)
- More: "Temperature Correction" and"Length Correction"

11.3.1 Clock

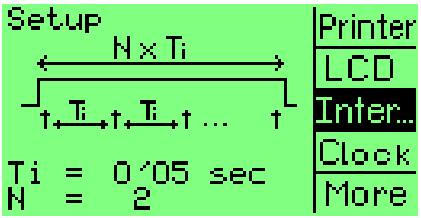


The time can be set by turning the rotary knob and pressing the desired selection. Selections are made in this order: Year, Month, Day, Hour, and Minute.
Press the rotary knob while “Clock” is highlighted.

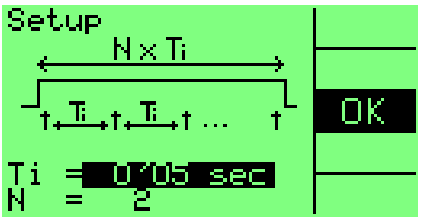


This screen will appear.
You are now able to adjust the Year, Month, Day, Hour, and Minute. Using the rotary knob, turn clockwise or counter-clockwise to change the highlighted number.
Press the rotary knob to proceed to the next number.

11.3.2 Interval Test



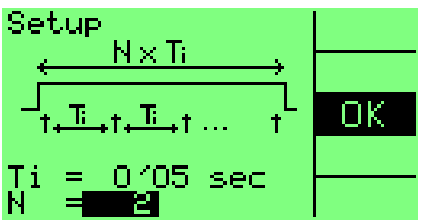
The **"**Inter..." (Interval Testing) mode will measure and store, automatically, numerous single sequential tests at timed intervals that are preset by the operator. The test set measures continuously in this mode.Press the rotary knob while “Inter...” is highlighted to preselect a desired measurement setup.



You are now able to adjust the Time Interval. Use the rotary knob, turn clockwise or counter-clockwise to enter the desired time.Once the desired Time is reached, press OK with the rotary knob.

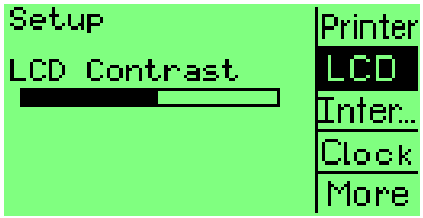
- Ti = Time Interval of Tests
- N = Number of tests to be performed

The minimum amount of time is 5 seconds, maximum of 10 minutes.



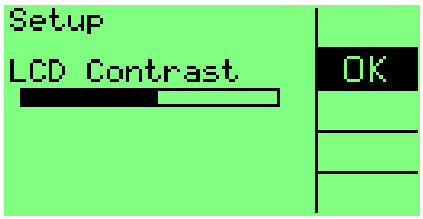
The following screen will appear.
You are now able to adjust the Number of Tests. Use the rotary knob. Once the desired number is reached, press the rotary knob to select “OK”.
The minimum number of tests are 2, maximum of tests 2000.

11.3.3 Contrast



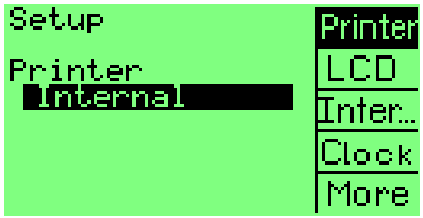
The Contrast (LCD) can be changed by pressing and then turning the rotary knob for the desired view.

While “LCD” is highlighted, press the rotary knob.



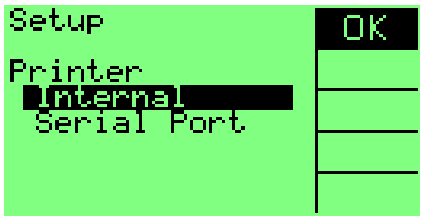
The following screen will appear.
You are now able to adjust the contrast.
Use the rotary knob, turn clockwise or counter-clockwise to adjust the brightness or darkness of the screen.
By pressing the rotary knob, the setting is confirmed.

11.3.4 Printer



This screen allows the user to select either the Internal panel mount Printer or external Serial Printer.

To change Printer setup, press the rotary knob while “Printer” is highlighted.

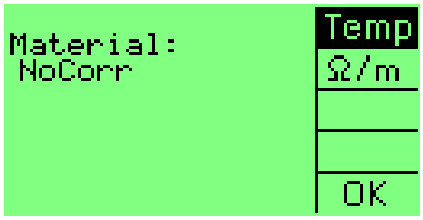


This screen will appear.

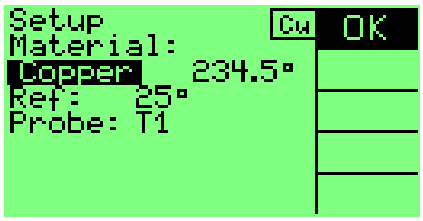
- Internal: Default for the internal panel mount printer.
- Serial: An external printer connected to the 9 Pin RS 232 connector.

Use the rotary knob, turn clockwise or counter-clockwise to select the desired port. By pressing the rotary knob, the setting is confirmed and you get back to the previous menu.

11.3.5 Temperature Correction



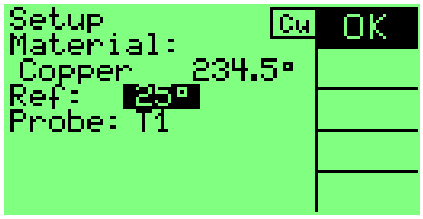
Temp: The Micro Junior 2 can, fully automatic, correct the measured values regarding the temperature.
To activate temperature correction, press the rotary knob while “Temp” is highlighted.



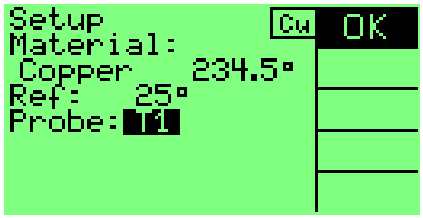
This screen will appear. Use the rotary knob, turn clockwise or counter-clockwise to select the desired Material.

- NoCorr
- Copper Tk: 234.5°
- Alu Tk: 225.0°
- User : Press the rotary knob, turn clockwise or counter-clockwise to set the desired Temperature.

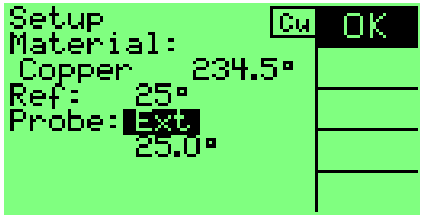
Once the desired Material is reached, press OK with the rotary knob.



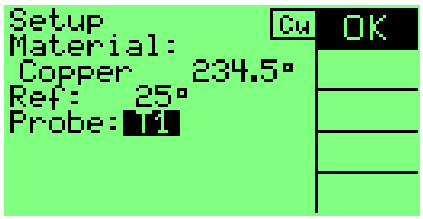
The following screen will appear.
Use the rotary knob, turn clockwise or counter-clockwise to set the desired Ref. Temperature T_{Ref}.
Once the desired reference temperature is set, press OK with the rotary knob.



The following screen will appear.
Connect the Optional temperature probe to the External port, when T1 is selected.



If you dont have a Optional temperature probe. Use the rotary knob, turn clockwise or counter-clockwise to use EXT. Press the rotary knob, and then turn clockwise or counter-clockwise to set the desired temperature you measure with your other temperature probe.



In this example, the measured object is copper and will be corrected to 25 Degrees Celsius based on the measured (temperature probe) temperature.

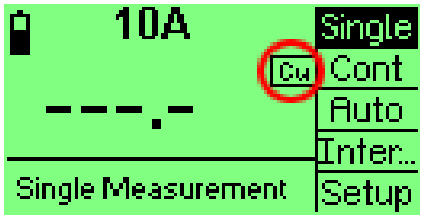
The correction formula:

$$R_{corr} = Rmeas \frac{T_{Ref} + Tk}{T_{Probe} + Tk}$$

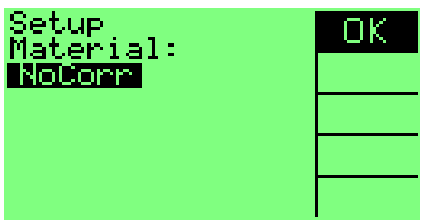
R_{corr}	Resistance corrected
R_{meas}	Measured resistance
T_{Ref}	Desired reference temperature
T_{Probe}	The temperature at which resistance was/is measured
Tk	234.5 for copper
	225.0 for aluminium (aluminium may be as high as 240)

Alternative: Correction with "α_{25}" to calculate Tk with the formula:

$$Tk = \frac{1}{\alpha_{25}} - 25$$

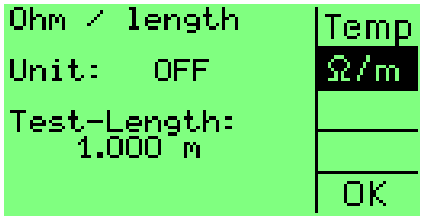


When temperature correction is activated the following screen will appear.

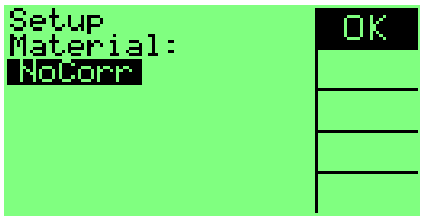


To deactivate the temperature correction go to the Temp Menu.
Use the rotary knob, turn clockwise or counter-clockwise to select NoCorr.
By pressing the rotary knob, the setting is confirmed.

11.3.6 Length Correction (specific Resistance)

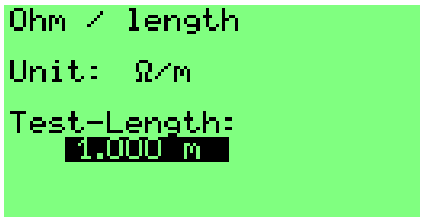


Ω/m:The Micro Junior 2 can, fully automatic, correct the measured values regarding the length.
To activate length correction, press the rotary knob while “Ω/m” is highlighted.



This screen will appear.
Use the rotary knob, turn clockwise or counter-clockwise to select the desired Unit. Once the desired Unit is reached, press OK with the rotary knob.

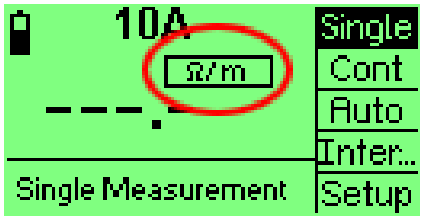
- NoCorr; Ω/m; Ω/100m; Ω/ km; Ω/ft; Ω/100ft; Ω/1000ft



The following screen will appear.
Use the rotary knob, turn clockwise or counter-clockwise to set the desired Test-Length.

- The minimum Test-Length is 1mm, maximum 20 000 m.

By pressing the rotary knob, the setting is confirmed.

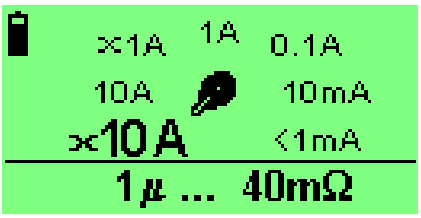


When Length Correction is activated the following screen will appear.

To deactivate the Length Correction go to the Ω/m Menu.
Use the rotary knob, turn clockwise or counter-clockwise to select OFF.
By pressing the rotary knob, the setting is confirmed.

12 Testing Screen Description

12.1 Range Selection



When the Micro Junior 2 is first powered on the following "Range Selection" screen will appear.
Test selections are initially made by turning the rotary knob to the desired selection of current or resistance range then pressing the rotary knob to begin that sequence.

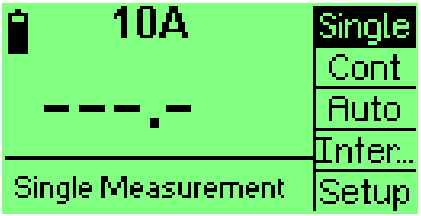
The following Ranges can be selected:

The resistance Ranges are a recommendations.

Current Range	Resistance Range
10 A (F/R)	1 µΩ … 40 mΩ
10 A	1 mΩ … 40 mΩ
1 A (F/R)	1 mΩ … 1 Ω
1 A	10 mΩ … 1 Ω
0.1 A	0.1 Ω … 10 Ω
10 mA	1 Ω … 400 Ω
1 mA	10 Ω ... 400 kΩ

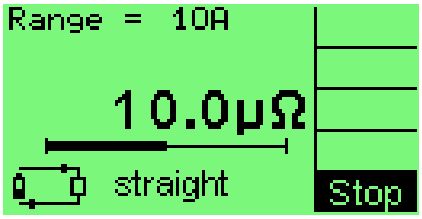
NOTE:
For the descriptions of the various adjustments and options for testing, this manual will use the 10A and x10A Ranges as examples on the following pages.

12.2 Testing



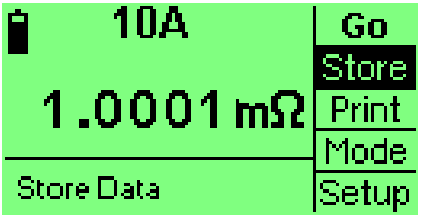
10A Screen
When the 10A range (or any other Range) is selected, the following screen will appear to allow the user to select the type of test mode required:
Selection of “Single” starts a test sequence.

12.2.1 Single



The following screen will appear.

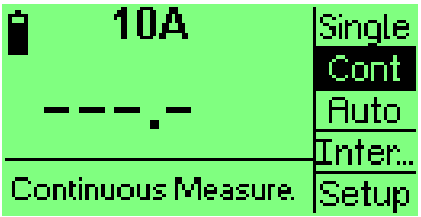
The system will conduct and run a single test on a device. The test measurement sequence completes within a few seconds.



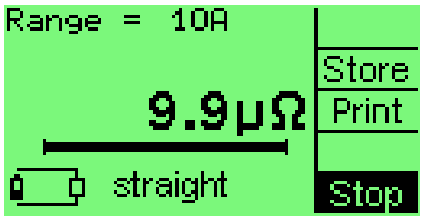
The user has the option to:

- “GO” : Start another test.
- “Store” : allows to save a reading into a Memory location (Archive).
- “Print” : allows to go to the print screen.
- “Mode” : Select another test mode.
- “Setup” allows to go to the Range Selection screen.

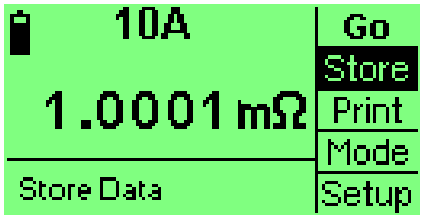
12.2.2 Cont (Continuous)



Cont starts a continuous test sequence.
In the continuous test mode, the test set will measure until the user selects and presses “Stop”.
The test system has an output of current that runs continuously while the resistance measurements are being taken.



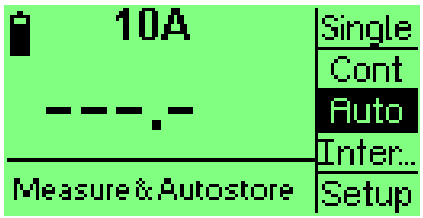
The following screen will appear.
The user can Select “Store” or “Print” at anytime that the system is measuring.
After the user Selects and presses “Stop”.
The test sequence will halt.



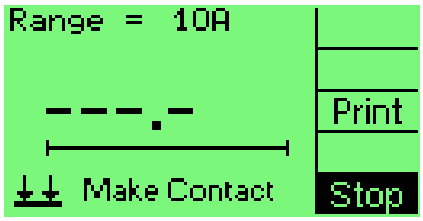
The user has the option to:

- “GO” : Start another test.
- “Store” : allows to save a reading into a memory location (Archive).
- “Print” : allows to go to the print screen.
- “Mode” : Select another test mode.
- “Setup” allows to go to the Range Selection screen.

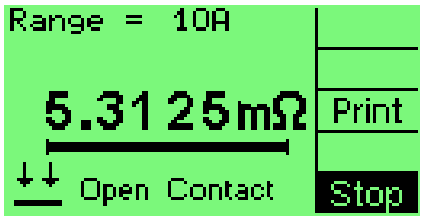
12.2.3 Auto



Selection of “Auto” allows a number of tests to be made then automatically.
The system automatically detects when contact is made to the device under test and begins and ends the measurement.
The data is automatically saved.
For this type of measurement, please use the optional Kelvin probes.



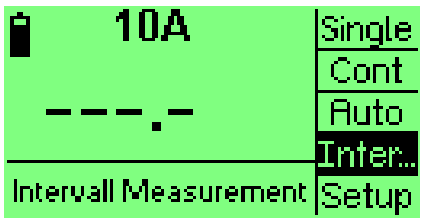
The system prompts the operator to “Make Contact ” to the device under test. The system automatically detects when the contact is made to the device under test and begins the measurement sequence.



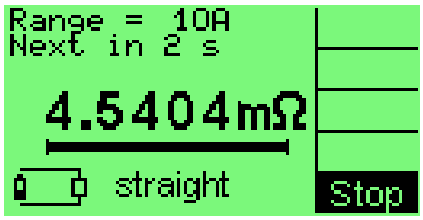
After completion of the test the system saves the results in memory then prompts the operator to “Open Contact” to the device.
Once the contacts have been removed from the device under test it is then detected by the system.

The system then prompts the operator to “Make Contact ” to the device again to repeat the process of the next measurement sequence. The user can Select “Print” or "Stop" at anytime that the system is measuring.

12.2.4 Inter… (Interval)

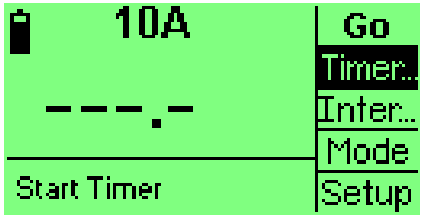


Selection of “Inter…” mode will measure and store, automatically, numerous single sequential tests at timed intervals that are preset by the operator. The test set also measures continuously in this mode.
In this mode, the instrument will continuously measure multiple tests until the operator selects and presses “Stop” or until the number of tests that were pre-selected have been achieved.



The instrument will automatically save test results in a memory location that will increment by a timed interval.
Preselected variables are preset by the operator in the "Setup" menu .
The test system indicates and counts down the time between test results taken and stored.

12.2.5 Timer

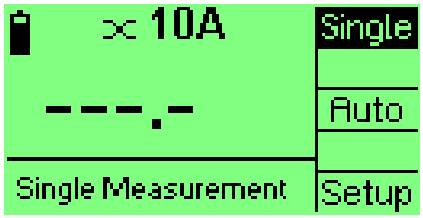


The "Timer" feature is typically used with the transformer Winding Resistance option: WR50-A1.
This feature allows the operator to record the time required to prepare a heated transformer winding (or any heated device) for cooling curve measurements.

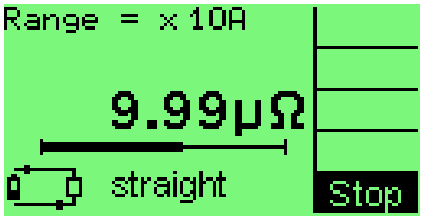
12.3 X10A / x1A (Forward / Reverse test)

12.3.1 Single

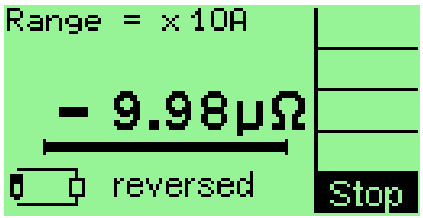
X10 or X1 Ranges are for making measurements where the current is first positive (+) DC sourced then negative (-) DC sourced. Basically, the current flow through the device under test is reversed or crossed. The system measures in both positive and negative sourced modes then the resultant resistance value is displayed. This can be very beneficial when testing in areas with high background interference. This mode also offers the highest degree of resolution.



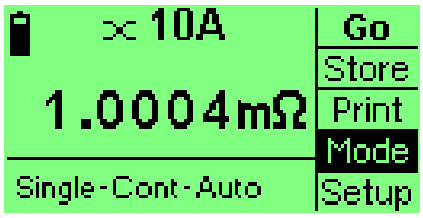
When the X10A range is selected, this screen will appear.
Selection of “Single” starts a Forward/Reverse test sequence.



Straight (+) DC Sourced



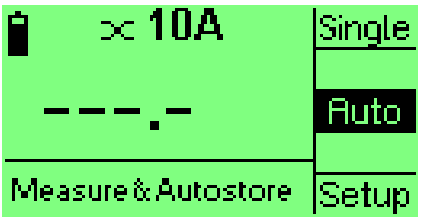
Then; Reversed (-) DC Sourced.
At the end of the test sequence the following screen appears.



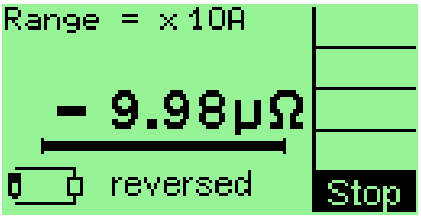
The user now has the option to:

- “GO” :Start another test.
- “Store” : allows to save a reading into a memory location (Archive).
- “Print” : allows to go to the print screen.
- “Mode”: Select another test mode.
- “Setup” : allows to go to the Range Selection screen.

12.3.2 Auto



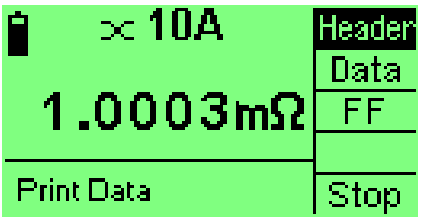
Selection of “Auto” allows a series of tests to be made then automatically saved to memory.
For this type of measurement, please use the optional Kelvin probes.



This mode operates identical to all other test Ranges.

Press stop with the rotary knob. The test will stop

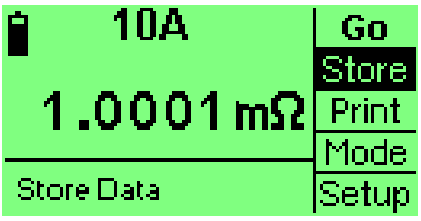
12.4 Print



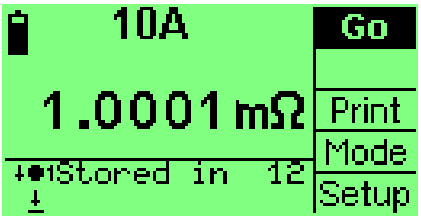
The Print mode is available after each test sequence is run. Selection of “Print” allows the user to print the test results that are displayed on the screen. This screen will appear when “Print” is selected:

- “Header” allows to Print a Header.
- “Data” allows to Print the data.
- “FF” allows to Form Feed the paper.
- “Stop” returns to the Test screen.

12.5 Store



The Store mode is available after each test sequence is run. Selection of “Store” allows the user to store the previous test results that are displayed on the screen to the archive (Memory).
The numbered memory locations are allocated sequentially. The saved data consists of time stamp and date of test, Current Range and Resistance value resultant.



This screen will appear. In this example the data was saved to memory location 12.
Press “Print” to print test results.
Press “Mode” to access other testing modes.
Press “Setup” to go back to the Range Selection screen

13 Measurement Parameters

Current Range	Measuring Range	Accuracy	Resolution
10 A (F/R)	0.00 µΩ … 40 mΩ	± 0.1% Rdg ± 0.1 µΩ	5 Digits or 0.01 µΩ
10 A	0.0 µΩ … 40 mΩ	± 0.1% Rdg ± 1 µΩ	5 Digits or 0.1 µΩ
1 A (F/R)	0.0 µΩ … 1 Ω	± 0.1% Rdg ± 1 µΩ	5 Digits or 0.1 µΩ
1 A	0.000 mΩ … 1 Ω	± 0.1% Rdg ± 10 µΩ	5 Digits or 0.001 mΩ
0.1 A	0.00 mΩ … 10 Ω	± 0.1% Rdg ± 0.1 mΩ	5 Digits or 0.01 mΩ
10 mA	0.0 mΩ … 400 Ω	± 0.1% Rdg ± 1 mΩ	5 Digits or 0.1 mΩ
1 mA	0.0 Ω … 40 kΩ	± 0.1% Rdg ± 0.1 Ω	5 Digits or 0.1 Ω
1 mA	40 kΩ ... 400 kΩ	± 1% Rdg	4 Digits

F/R = automatic **F**orward / **R**everse current measurement

Resistance Range 0.0µΩ to 400kΩ

Appendix

Micro Junior 2

MICRO JUNIOR 2

Appendix

A Troubleshooting

At powering on, the Micro Junior 2 internal calibration and check sequence is performed.

Upon completion of the check sequence the test set will proceed to the “Range Selection“ Screen. Should there be any problem with the test set an error message will appear.

INFO:
The Micro Junior 2 is digned to be trouble free

A.1 System does not dislpay anything

1. Check the display for any Initialization.
2. Plug the test set into a main power outlet to check to see if the battery is completely discharged.
3. Contrast is set too low.

A.2 System powers on but the display fades out or blinks

1. Check the battery charge.

A.3 Test Current cannot be Turned on

1. Does the unit have an external safety switch incorporated? Is it properly operating?
2. Is the system connected in an area with excessive interference?

A.4 Warning Rx too high or "+++.+" is dispayed

1. A warning message,”Rx Too High” or “+++.+” will be displayed if the resistance being measured is too high for the range selected.
2. The current leads total resistance has exceeded the current capability of the instrument. Reduce the current lead length or increase the wire gauge of the current lead used.

A.5 The display Blacklight goes out frequently

1. As the battery charge decrease the display backlight will go out more frequently to reserve the battery power.

A.6 The test set Turns off more frequently

1. As the battery charge decrease the test set will automatically turn off more frequently to reserve the battery power.

A.7 The test set displays +++.+ but current is flowing

1. The test set is not reading any test voltage on the “+P” & “- P” leads.
2. The resistance value is beyond the limit of the selected range (Over Range).

A.8 Erratic or erroneous readings

Possible causes

1. Test lead damaged or not connected.
2. Poor test lead connection.
3. Test set attached to a “Live” load or high interference load.

INFO:
If problems or questions do arise please contact your nearest Dealer or our service support group in the Switzerland under www.Raytech.ch

The Micro Junior 2 is designed to be trouble free.

If problems or questions do arise please contact our service support group.

B System Upgrades

System firmware upgrades are available at no charge from the web site www.raytech.ch.

This firmware is downloaded to a Windows based computer and then can be used to upgrade the Flash EPROM in the Micro Junior 2 via the RS232 link. For further details or assistance please contact our support group.

C Contacts

Raytech Switzerland

Raytech AG
Oberenbenestrasse 11
5620 Bremgarten

Phone: +41 56 648 6010
Fax: +41 56 648 6011

Mail: welcome@raytech.ch
Web: www.raytech.ch

Your Local Representative