

MetaScope 3



For measuring the plating thickness of
tin, silver and nickel coatings
on copper wires

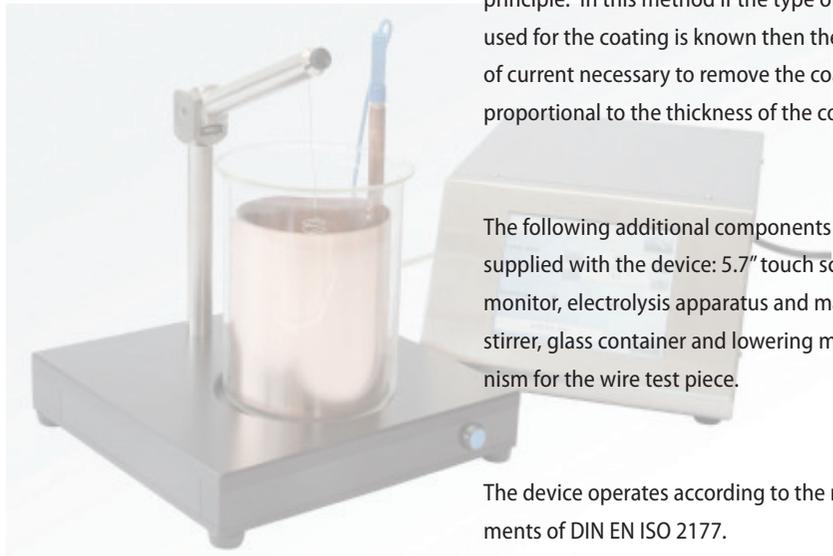
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The MetaScope 3 is a device for measuring the plating thickness of tin, silver and nickel coatings on copper wires using the coulometric principle. In this method if the type of metal used for the coating is known then the amount of current necessary to remove the coating is proportional to the thickness of the coating.

The following additional components are supplied with the device: 5.7" touch screen monitor, electrolysis apparatus and magnetic stirrer, glass container and lowering mechanism for the wire test piece.

The device operates according to the requirements of DIN EN ISO 2177.



Set up

Measuring device with:

- Touch screen monitor
- Magnetic stirrer, with lowering mechanism for the wire test piece
- 1000ml glass container



- 1 - Connect the measuring device to mains voltage
- 2 - Interface for USB memory stick
- 3 - USB interface for PC
- 4 - Connection of magnetic stirrer to measuring device

Using the blue laboratory cable (supplied in the kit) connect the copper cathode to the ferrule on the rear of the magnetic stirrer.

Fill the glass container with 1000ml of electrolyte solution (see page 12) and ensure that the copper cathode is completely submerged. Allow a magnetic stirring rod to sink in the middle of the solution. Once the rod has reached the bottom of the glass jar the magnet stirrer will attract it and hold it in the middle.

Switch the MetaScope 3 on using the switch on the back of the device. After about 20 seconds the device will be ready for use and the home screen will appear on the monitor.

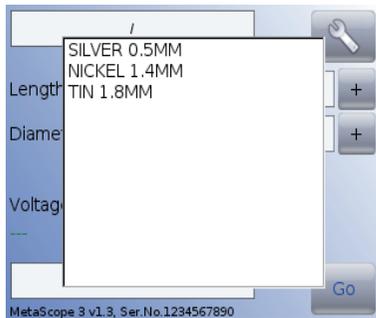


Operation



The home screen shows the following fields:

- 1 - Job reference
- 2 - Length of test piece (mm)
- 3 - Test program
- 4 - Start button
- 5 - Settings



The MetaScope 3 is controlled by the 5.7" colour touch screen monitor. The fields and buttons are touch sensitive and in this manual the operation of these buttons is termed as „clicking“.

The clicking on a button will open a new dialog ...



...or a virtual keyboard.

Testing



1 - Job reference:

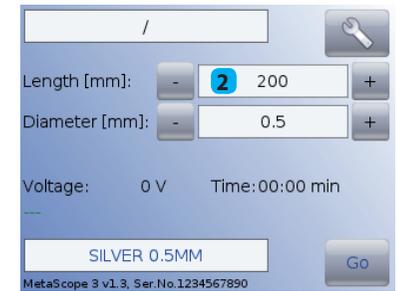
Clicking on this field will open a dialogue to input the following details

- Customer
- Job number
- Name of test

The completion of these fields is optional and tests may be completed with or without these entries.

2 - Input of the exact length of the wire test piece:

The length of the test piece can be input using the virtual keyboard or can be amended by clicking repeatedly on the [-] or [+] buttons.



3 - Selection of test program:

Clicking on this field will open an option to select from the available test programs. Click on the required program in order to open it on the home screen.



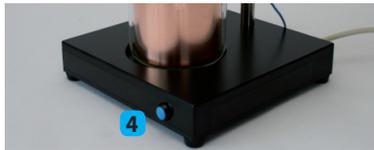
Testing

4 - Cut the wire test piece to the correct length and secure it in the lowering device using the securing screw. When testing very fine and thus longer lengths of wire the sample should be wound into a loose coil and held in place using a clamp (may be ordered separately on page 13).

Ensure that the length of the wire test piece that is immersed in the electrolyte is the same as the length entered in step 2 above and that it does not come into contact with the copper cathode.

The measurement may be started in one of two ways:

By clicking the Start button [Go] on the touch screen display
or by pressing the blue button on the magnet stirrer.



After starting the MetaScope 3 the touch screen display will show „in progress“ and will continually indicate the time of the test and the voltage drop between the test piece and the electrolyte. As soon as the metal coating is completely removed the measurement will stop and the plating thickness in μm or $\mu\text{-inch}$ will be displayed on screen. The value will be saved on the MetaScope 3 along with the date, time and any details entered in the Job reference (step 1) above.

If the voltage drop shows an unusual pattern, possibly caused by the use of a faulty test piece or the wrong electrolyte, and the removal of the metal coating does not run normally, the measurement will be stopped after a preset time. In this case the screen will display „no result“ and the measurement will need to be repeated. In the event of testing heavy plating thicknesses the preset time limit for the test may not be sufficient and the time limit may be amended in the Preset Procedures (page 8).

Pressing the blue button on the magnet stirrer while the test is running will stop the process and the display will then show „canceled“.

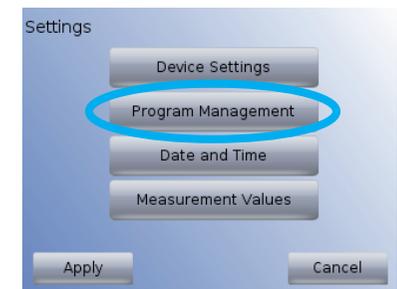
Test programs

5 - The button on the touch screen with the spanner symbol will open the set up menu, allowing for general device settings, program parameters, date and time to be adjusted. In addition this menu will lead to the overview of test results („Measurement Values“).

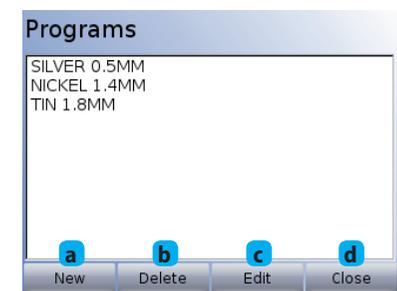


Program Management:

MetaScope 3 is delivered with 3 preloaded measuring programs. Additional programs may be added.



- a - Add a new test program which will appear as „unknown“ in the list of programs.
- b - Delete an existing test program.
- c - Amend a test program. A new window „Settings“ will open (next picture).
- d - Close the program manager.



Test programs



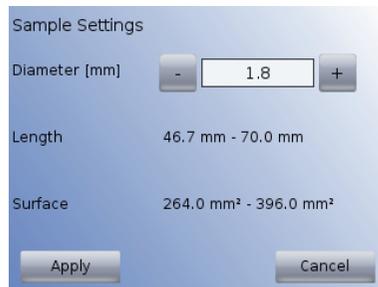
Amending a test program:

- e - The button [Apply] will save the current settings.
- f - Clicking on [Cancel] will revert to the previously saved version.



Common Program Settings:

- „Program Name“ - user definable.
- „Coating“ - shows the relevant measuring algorithm (silver, tin or nickel).
- „Timeout“ - After this defined time limit the measuring programme stops if no plating thickness has been determined.
- „Stirrer Speed“ - Rotation speed of the magnetic rod, setting 0-7.



Sample Settings:

- „Diameter“ - Adjusted by clicking on the buttons [-] and [+] or by using the virtual keyboard.
- „Length“ - Automatically adjusted according to the wire diameter entered above.

Test programs

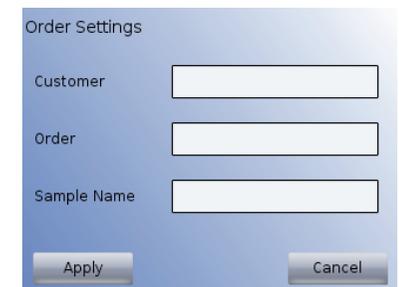


Tolerance Limits:

- There is a defined minimum and maximum tolerance for each programme.
- If the measured plating thickness lies within these tolerances the result will appear in **green**.
- If not it will be displayed in **red**.
- If both values are the same the tolerance limits will be ignored.

Order Settings (optional):

- It is possible to enter additional information and have it saved with the test results in the MetaScope 3. This would, for example, allow the selection of all the test results belonging to a particular job to be saved on to a PC. This is carried out using the virtual keyboard.

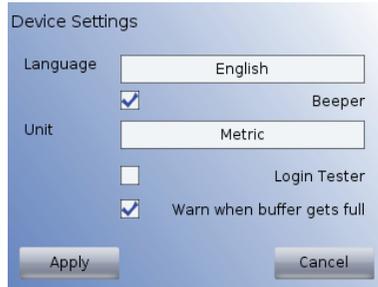


Settings:

- In this section basic setting changes can be carried out as described in the following paragraphs.



Settings



„Language“ - The displayed text can be switched between German and English languages.
 „Beeper“ - If this function is enabled then two short tones will be heard signalling the completion of a successful measurement. A single long tone from the MetaScope 3 signifies that the measurement was interrupted and not completed.
 „Unit“ - The user may opt to have the results displayed in μm (metric) or $\mu\text{-inch}$ (imperial) units.

„Login Tester“ - If this function is enabled the MetaScope 3 will ask for the name or initials of the tester to be entered. This detail is then stored with the measured values and allows test results to be sorted by individual tester's name or initials.
 „Warn when buffer gets full“ - Enabling this function will cause the MetaScope

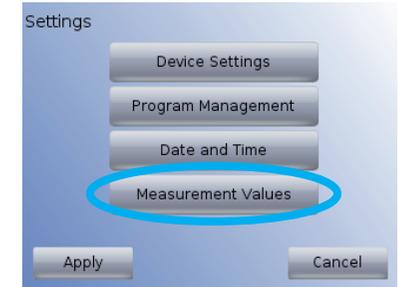
3 to issue a warning as soon as the free storage available falls below 10%. In this case a USB memory stick should be plugged into the USB connector on the back of the device. After a few seconds a dialogue will start and a back up can be carried out copying the test result data on to the removable USB stick thus allowing the freeing up of space on the MetaScope 3 drive. The drive should be able to accommodate around 5000 test results.



Date and Time:
 These values are recorded along with the measured values. In order to have an accurate chronological print out it is imperative that these details are entered correctly.

Measurement values

Measurement Values:
 In the overview the recorded measured results are displayed in the form of a table.



5 set of results are displayed on each screen, and different screen can be seen by clicking on the [Previous] and [Next] buttons. The results displayed include the date, job number, wire diameter, metal and the measured plating thickness.

Measurement Values				
Date	Order	Diam.	Algo	Value
2011-11-28 10:41:53		1.40mm	NiCu	21.40 μm
2011-11-28 10:41:32		1.40mm	NiCu	21.28 μm
2011-11-28 10:41:13		1.40mm	NiCu	22.62 μm
2011-11-28 10:40:02		1.40mm	NiCu	23.11 μm
2011-11-28 10:39:39		1.40mm	NiCu	21.67 μm

The USB interface [2] allows for test results to be exported on to a USB memory stick or for firmware updates to be carried out. The MetaScope 3 can be connected directly to a PC using interface [3].



Electrolyte



Please heed the manufacturer's warnings, safety instructions as well as local regulations with regard to the electrolytes indicated at all times.

- For Tin Plated Wires: chemically pure hydrochloric acid diluted 1:4 with distilled water
- For Nickel Plated Wires: chemically pure hydrochloric acid diluted 1:9 with distilled water
- For Silver Plated Wires: 100g Potassium Fluoride mixed with distilled water to achieve 1000ml of solution

Cleaning:
To avoid corrosion of the copper electrodes it is important not to leave them in the electrolyte for any extended period (e.g. overnight). The electrodes should be removed from the glass container and rinsed under running water and the metal parts dried using paper towels. The unused electrolyte should also be returned to its storage container.

The electrolyte should be replaced when necessary dependant on usage levels. Strong discolouration or cloudiness indicates that the electrolyte is worn out.
When measuring wires finer than 0.1mm it is advisable to test with new, unused electrolyte.

Maintenance

Available accessories for the MetaScope 3:

Electrolyte if required

Part No. 21166
Copper electrodes

Part No. 21189
1000ml Glass container

Part No. 21190
Magnetic stirring rods 6 x 30 cylindrical, PTFE

Part No. 21152
Clamp for securing fine wires

Recommendation:

In order to maintain the accuracy of the MetaScope 3 it is recommended that the device be calibrated on an annual basis. Calibration, repairs and accessories can be arranged through our service partner:

GTS test solutions
Eresburgstr. 24-29
D-12103 Berlin, Germany
Tel: +49 (0)30-7478-1807
Fax: +49 (0)30-7478-1808
E-Mail: info@gts-online.net



Technical data

Measuring device

Dimensions:	140 x 210 x 330mm (height, width, depth)
Weight:	4.3Kg (approx.)
Operating temperature:	15 - 35 °C
Touch screen:	5.7" colour TFT display
Power supply:	230 V 50-60 Hz 115 V 50-60 Hz (optional)
Power consumption:	max 60 W
Interfaces:	230V mains cable connector USB-Host und -Client DSub25 for magnet stirrer
Testing range:	Plating thicknesses from 0.2 – 30 µm

Magnet stirrer

Material:	PVC, black
Dimensions:	140 x 210 x 330mm (height, width, depth)
Weight:	2.4 kg
Lowering mechanism:	Brass, nickel plated
Stirring device:	magnetic rod with step motor
Setting for glass container:	107mm diameter
Interface:	1.5m lead with Dsub25 connector

Revision: June 2012

Details subject to change or update

Technical data

Measuring device



Magnet stirrer



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