

# SIGMASCOPE® SMP350

Measuring the Electrical Conductivity of Nonferrous Metals



# Measurement Principle, Applications and Hardware

**Electrical conductivity is an important material property that provides information not only about a metal's ability to conduct electrical currents but also about its composition, micro structure and/or mechanical properties. Using the SIGMASCOPE® SMP350, it is easy and quick to determine the electrical conductivity with precision and accuracy.**

## Measurement principle

The SIGMASCOPE® SMP 350 measures the electrical conductivity using the phase-sensitive eddy current method, which is approved by both DIN EN 2004-1 and ASTM E 1004 for determining conductivity. This kind of signal evaluation allows for contact-free determination of a substrate's electrical conductivity, even under paint or plastic coatings up to 500 µm thick. This method also minimizes the influence of surface roughness.



*Measuring the electrical conductivity is an important element of quality assurance in the manufacture, maintenance and repair of aircraft*



*Sorting aluminum raw materials*

## Applications

The SMP350 can measure the electrical conductivity of any non-magnetic metal. Furthermore, since the electrical conductivity provides data about other material properties, it is effective in a wide range of measuring applications and fields of use, including:

- Quality assurance and sorting of raw materials
- Authenticating of coin alloys (e.g. specific conductivity of coins)
- Assessing hardness and strength of heat-treated materials
- Inspecting for heat damage, material fatigue and cracks
- Estimating the phosphorous content in copper
- Tracking precipitation processes, e.g. for Cu-Cr alloys
- Testing the homogeneity of alloys
- Scrap metal sorting

## Hardware

The SIGMASCOPE® SMP350 is equipped with a Windows™ CE operating system and an intuitive graphical user interface that drives a high-resolution touch-screen operable with stylus or finger. The corresponding probes are suited for different measurement frequencies. For automatic compensation of temperature influences on the measurement, the ambient or specimen temperature can be taken directly with the integrated (or optional external) temperature sensor.



*Quality assurance to prevent color variations in anodized aluminum*

## Features

- Windows™ CE operating system; large touchscreen touchscreen with keyboard
- Customizable user interface
- Very simple calibration via user prompts
- Simple management of measuring applications with user-definable file and folder structure
- Memory for several thousand measuring applications and several thousand readings
- Consideration of each material's conductivity-related temperature coefficient
- Automatic measurement acquisition in free-running mode or with external start
- Graphical presentation of specification limits
- Extensive statistical evaluation of test series with date/time stamp as well as computation of  $C_p$ ,  $C_{pk}$  and histogram presentation
- Manual temperature input
- Monitoring of temperature changes over time ( $\Delta T/\Delta t$ )
- Calibration fine-tuning for instrument calibration with up to 4 standards
- Acoustic signal for measurement acquisition and violation of specification limits; can be turned on/off
- Various languages available

## Technical data

- Measurements pursuant to ASTM E 1004 and DIN EN 2004-1
- Measurement frequencies ranging from 15 kHz to 2 MHz depending on the probe
- Measurement range: 0.5 – 65 MS/m or 1 – 112% IACS
- Measurement precision at ambient temperature:  $\pm 0.5\%$  of reading
- Operating temperature: 0 – 40 °C/32 °F – 104 °F
- Lift-off compensation to 500  $\mu\text{m}$
- Smallest diameter measurement area without noticeable influence on the reading: 13 mm
- Connector for electrical conductivity probe, with or without integrated temperature sensor
- Connector for optional temperature sensor TF100A
- USB communication and printer port
- Power supply via battery or electric plug

## Calibration standards

High-precision measurements are required to determine the electrical conductivity. Because the eddy current method is a comparative measurement method, accurate standards are necessary to calibrate the measuring instrument. Certified standards are available for the entire conductivity range.



Certified standards for calibrating the SIGMASCOPE® SMP350, traceable to internationally-recognized calibration norms

## Order information

Product	Order no.
SIGMASCOPE® SMP350*	605-219
Measurement probe FS40	605-209
Measurement probe FS40HF	605-210
Measurement probe FS40LF	605-211
Optional accessories	
Temperature sensor TF100A	603-237
Rechargeable battery set	604-144

\* Included in the shipment: Carrying case, power supply, battery set, carrying strap and protective cover for the instrument, Cu reference standard, USB cable

Product	Order no.
Calibration standards**	
KAL-N SMP Al 2024/T3511	17.0 MS/m 29.3% IACS 600-373
KAL-N SMP Al 7175/T7351	22.0 MS/m 37.9% IACS 600-374
KAL-N SMP Al 99.5	34.2 MS/m 58.6% IACS 600-376
KAL-N SMP AlMgSi F32	28.0 MS/m 48.3% IACS 600-375
KAL-N SMP Bronze RG7	9.0 MS/m 15.5% IACS 600-380
KAL-N SMP Cu 58 Ms/m	58.0 MS/m 100% IACS 600-377
KAL-N SMP Manganin	2.3 MS/m 4.0% IACS 603-558
KAL-N SMP Brass	15.0 MS/m 25.9% IACS 600-381
KAL-N SMP Nickel Silver	5.0 MS/m 8.6% IACS 600-379
KAL-N SMP NORDIC GOLD	9.6 MS/m 16.5% IACS 602-603
KAL-N SMP Titanium IT31	0.6 MS/m 1.0% IACS 600-378

\*\*Certificates for calibration standards must be ordered separately

**Helmut Fischer GmbH**  
**Institut für Elektronik und Messtechnik**  
71069 Sindelfingen, **Germany**



**IfG-Institute for Scientific Instruments GmbH**  
12489 Berlin, **Germany**

**Fischer Instrumentation (GB) Ltd**  
Lymington, Hampshire SO41 8JD, **England**



**Fischer Technology, Inc.**  
Windsor, CT 06095, **USA**



**Helmut Fischer S. de R.L. de C.V.**  
76230 Querétaro, QRO, **Mexico**

**Helmut Fischer AG and**  
**Helmut Fischer Technologie AG**  
CH-6331 Hünenberg, **Switzerland**



**Fischer Instrumentation Electronique**  
78180 Montigny le Bretonneux, **France**

**Helmut Fischer S.R.L.**  
20099 Sesto San Giovanni (Milano), **Italy**

**Fischer Instruments, S.A.**  
08018 Barcelona, **Spain**

**Helmut Fischer Meettechniek B.V.**  
5627 GB Eindhoven, **The Netherlands**

**Fischer do Brasil**  
04711-030 São Paulo, **Brasil**

**Fischer Instrumentation (Taiwan) Co., LTD.**  
Taipei City 11493, **Taiwan**

**Fischer Instruments K.K.**  
Saitama-ken 340-0012, **Japan**

**Nantong Fischer Instrumentation Ltd**  
Shanghai 200333, **P.R. China**



**Fischer Instrumentation (Far East) Ltd**  
Kwai Chung, N.T., **Hong Kong**

**Fischer Measurement Technologies (India) Pvt. Ltd**  
Pune 411057, **India**

**Fischer Instrumentation (S) Pte Ltd**  
Singapore 658065, **Singapore**

**Helmut Fischer Korea Co., Ltd**  
Seoul City, **Republic of Korea**

**Fischer Technology (M) SDN Bhd**  
47301 Petaling Jaya, **Malaysia**

**Helmut Fischer Thailand Co., Ltd**  
Bangkok 10250, **Thailand**

**Fischer Instruments Middle East FZE**  
P.O.Box Dubai 371100, **United Arab Emirates**



[www.helmut-fischer.com](http://www.helmut-fischer.com)