New!

BYK-mac i Pro

Multi-angle color and effect control of anodized surfaces

Consumer electronics such as smartphones, notebooks and tablets have become our permanent companions. Their look including design and color is most important and follows current fasion trends.
The surface finish of anodized products is influenced by its sandblasting and anodizing process. BYK-mac i Pro combines 3 measurement methods to objectively evaluate process variations:

- Multi-angle color to determine the lightness flop between near specular angles and flop angles.
- Graininess to characterize and control very fine textures created by the sandblasting process.

  Graininess = Uniformity of light and dark areas

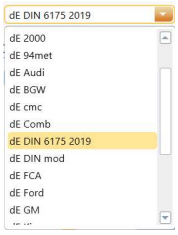
- **NEW** Sparkle index ANO to describe and objectively measure variations of fine surface finishes. Due to the anodizing process the reflection behavior of the fine surface finishes will result in more or less sparkling flashes.

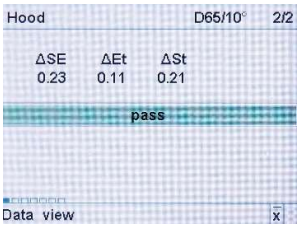
  Sparkle amount ANO = Total amount of light flashes
  Sparkle index ANO = Total area of light flashes

Ergonomic design and easy operation

The shape of the instrument is designed to ensure easy handling and true portability. Due to its intuitive menu quality control of metallic finishes has never been easier.

- Most common weighted color equations for metallics can be selected to achieve best agreement with visual perception
- Designated buttons for standard and sample readings
- Scroll wheel to select menu functions
- Large color display - easy-to-read inside and outside
- Menu guided operation according to your own sampling procedure
- Storage of up to 1000 readings in selectable memories
- Fast USB port for communication with Flake Analyzer software





Reliable readings at any time

In order to guarantee stable positioning, the BYK-mac i Pro is equipped with trigger pins on the bottom plate of the instrument.
If the pins do not have contact with the surface, an error message will be displayed. This ensures reproducible results on test panels as well as curved parts (r > 500 mm).
Additionally, the surface temperature is measured and saved with each measurement.

Outstanding technical performance for reliable color and effect control

The BYK-mac i Pro spectrophotometer uses a LED light source with longterm stability and patented illumination control which provides superior accuracy and low maintenance for many years.

- 10 year warranty on the LEDs - no lamp changes needed
- Stable, long-term calibration - needed only every three months
- Temperature stable between 10 - 40 °C - without calibration
- Excellent agreement between instruments allowing usage of digital standards among the supply chain

Prediction of Lightfastness

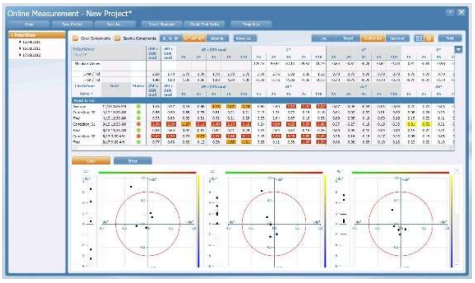
The BYK-mac i Pro informs you of the color's lightfastness. The instrument is equipped with additional sensors to detect fluorescent light excited in the visible range.
A new index, the **Intensity Emission value**, quantifies the fluorescent light and can be used for new color development as well as for batch-to-batch control.
For ease of use the BYK-mac i Pro gives an audio and visual signal when fluorescence is detected.

Color and effect analysis with software smart-chart

BYK-mac i Pro comes with smart-chart software. Dependent on your needs, data analysis can be done with either smart-lab or smart-process.

smart-lab for ONLINE measurement and memory transfer

- Flexibility to change illuminants, observers and color equations to see the impact on Pass/Fail results
- Scatter and Travel graph to show whether all parts are within specification
- Organization of data in projects with easy to share xml files



Scatter graph in smart-lab.

smart-process for a STANDARDIZED QC

- Sampling process with digital standards defined in Organizers
- Powerful sdf database with facilitated data sharing for seamless communication
- Comprehensive data analysis with easy filtering and statistical analysis

Organizer setup in smart-process.

Flake Analyzer Software for Sparkle index ANO

- Analysis of results in data table and line chart
- Measurement values are saved in csv files – images are saved as bitmap files

In compliance with:

Standards

ASTM	D2244, E308, E1164, E2194
DIN	5033, 5036, 6174, 6175
DIN EN ISO	11664
SAE	J 1545

Ordering Information

Cat. No.	Description
7049	BYK-mac i Pro

Comes complete with:
Multi-angle spectrophotometer with protective cap (6336)
Black calibration standard (7044)
White calibration standard with certificate
Color and effect test standards
Cleaning set for bottom plate (6364)
Seal replacement kit (6348)
1 light protection cover (6414)
1 rechargeable Li-ion battery pack (6359)
Online Kit BYK-mac i Pro for online data transfer and charging (7055)
Software with two licensees for download:
smart-lab (4862) or smart-process (4831)
USB stick with Flake Analyzer software
Short instructions
Carrying case
1-day training

Note: After installation both software packages, smart-lab and smart-process, can be used for 30 days free trial. Thereafter, the user needs to decide and register for one software package.

System requirements:
Operating system: Windows® 10 v.1607
Microsoft® .NET Framework 4.72
Hardware: i3, 2.5 GHz; i7 recommended, or equivalent
Memory: 4-8 GB RAM, 16 GB recommended
Hard-disk capacity: 4 GB during installation
Monitor resolution: 1280 x 1024 pixel or higher
Interface: free USB-port

Technical Specifications

Color

Measurement Geometry	45° illumination/ -15°, 15°, 25°. 45°, 75°, 110° aspecular viewing
Aperture Size	23 mm diameter
Spectral Range	400 – 700 nm, 10 nm resolution
Measurement Range	0 – 600% reflectance
Repeatability[1]	0.01 ΔE* (10 readings on white)
Reproducibility[1]	Grey BCRA tiles: avg. ΔE* < 0.10 Chromatic BCRA tiles: avg. ΔE* < 0.25
Color Systems	CIELab/Ch and weighted components
Color Differences	ΔE*, ΔECMC, ΔE94, ΔE99, ΔE2000, ΔEDIN6175 and customer specific equations
Indices	Flop, Int-Em
Illuminants / Observer	A, C, D50, D65, F2, F7, F11, F12 for 2°, 10°

Effect

Measuring Geometry	15°/45°/75° and diffused illumination perpendicular viewing
Aperture Size	23 mm diameter
Effect Parameters for Metallic Paint: ΔS, ΔS_a, Δ_Si, ΔG	
Repeatability[1]	S_a/S_i: 5 % or > 0.50 / G = ± 0.05
Reproducibility[1]	S_a/S_i: 10 % or > 1.00 / G = ± 0.15
Effect Parameters for Anodized Surfaces: Sparkle index ANO, Sparkle amount ANO	
Repeatability[1]	± 250 or 2.5 % (on anodized silver reference)
Reproducibility[1]	± 500 or 5 % (on anodized silver reference)

General Data

Memory	1.000 standards / samples
Interface	Proprietary plug; USB-B (Online Kit)
Battery	Rechargeable battery pack
Dimensions	21.8 x 8.1 x 14.7 cm (8.6 x 3.2 x 5.8 in)
Weight	1.3 kg (2.86 lbs)
Temperature	Operation: +10 - 40°C (+50 - 104°F) Storage: 0 - 50°C (+32 - 122°F)
Relative Humidity	Up to 85% at 35°C, non condensing

[1]Standard deviation

BYK-mac i Pro Training

BYK-Gardner offers you more than just an instrument. We assist you in analyzing your color readings as well as sparkle and graininess data. As a result you will be able to use the BYK-mac i Pro to save time and money, while at the same time improving quality. Therefore, the instrument comes with a one day training course including:

Color and Effect Theory

- Parameters influencing total color impression of anodized surfaces
- Color and effect differences for trouble shooting

smart-process Training

- Standard management
  - Define color families with color equation and limits
  - Exchange digital standards among the global supply chain
- Set-up “Organizer to define a standardized measurement procedure
- Measurement of several products & saving in database
- Data analysis using standard reports:
  - Test Report of a single test series
  - Scorecard as executive summary
  - Trend Report of a specific color/product over selected time range with comparison function
- Dynamic print layout and export of data to Excel®

smart-lab Training

- Standard management
  - Define color families with color equation and limits
  - Exchange digital standards among the global supply chain
- Data analysis using standard reports:
  - Change illuminants, observers and color equations to see impact on Pass/Fail results
  - Scatter graph for Pass/Fail analysis of color and effect data
  - Color & Effect Travel to show performance per measurement angle
- Dynamic print layout and export of data to Excel®

Ordering Information

Cat. No.	Description
7044	Black Standard, BYK-mac i
6336	Protective Cap, BYK-mac i
6359	Battery Pack, BYK-mac i
6364	Cleaning Set, BYK-mac i
6414	Light Protection Cover, BYK-mac i
6348	Seal Set, BYK-mac i
7055	Online Kit, BYK-mac i Pro
4862	Software smart-lab
4831	Software smart-process

Accessories

To perform zero calibration	
Snap on cover to protect optics and interior components	
Rechargeable battery pack	
To clean aperture rubber ring and pin covers from dust and grease	
To measure very bright colors; 10 pieces included	
Inlcuding 3 light protection rubber seals and 8 rubber pin covers	
For online data transfer and charging of BYK-mac i Pro	
Lab QC software for online color & effect control with BYK-mac i Pro	
Process QC software for BYK-mac i Pro, cloud-runner, wave-scan 3 and spectro2profiler	

Note: For replacement of white, color or effect standard, please contact your local service department.