RHOPOINT INSTRUMENTS

RHOPOINT Q

Rhopoint IQ

- • 20/60/85° Glossmeter
- • DOI meter
- • Haze meter
- • Goniophotometer

PREMIUM FINISH | ALL ALUMINIUM CONSTRUCTION

The Rhopoint IQ

The Rhopoint IQ Gloss, Haze & DOI Meter quantifies surface quality problems that are invisible to a standard glossmeter and profiles *how* light is reflected from a surface.

The Rhopoint IQ can measure:

- 20/60/85° Gloss
- RSPEC
- Reflectance haze
- Reflected image quality (RIQ)
- Distinctness of Image (DOI)
- Goniophotometric curves

Glossmeters are usually used to measure the "shininess" of a surface but are not sensitive to common effects which reduce appearance quality.

IQ GLOSS measurements are fully compatible with existing Novo-Gloss and Micro-TRI-gloss results.

Dualgloss 20/60° or Trigloss 20/60/85° versions are for maximum accuracy and resolution in all gloss applications.

What does the Rhopoint IQ measure?

Gloss is measured by shining a known amount of light at a surface and quantifying the reflectance
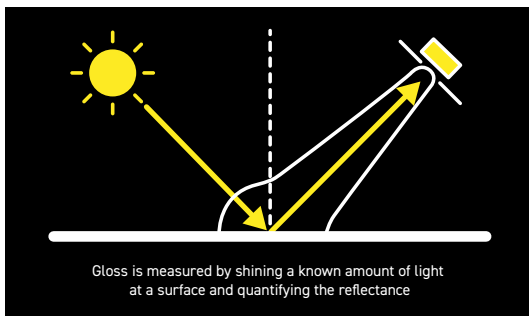
1. Gloss

A measurement proportional to the amount of light reflected from a surface.

Geometry: The correct measurement geometry should be used according to the sample finish – matt: 85°, mid gloss: 60°, high gloss: 20°

2. RSPEC

The peak gloss measured over a very narrow angle.

Usage: It is very sensitive to surface texture and can be used to identify subtle differences in smooth surfaces.

3. Distinctness of Image (DOI)

A measure of how clearly a reflected image will appear in a reflective surface.

Orange peel dramatically reduces appearance quality without affecting gloss readings. These two test panels measure identically with a standard glossmeter. The Rhopoint IQ with RIQ/DOI measurement can quantify the differences.

4. Reflected Image Quality (RIQ)

RIQ is used to quantify effects such as orange peel and surface waviness. This new parameter gives higher resolution results compared to Distinctness of Image (DOI) measurement and better mimics human perception of surface texture, especially on high quality finishes such as automotive.

Symptoms of poor RIQ: Orange peel, brush marks, waviness or other structures visible on the surface. Reflected images are distorted.

Causes: Application problems, incorrect coating flow, coating viscosity too high/low, sag or flow of coating before curing, incorrect particle size/distribution, overspray, improper flash/recoat time, inter-coat compatibility, incorrect cure times and cure temperature.
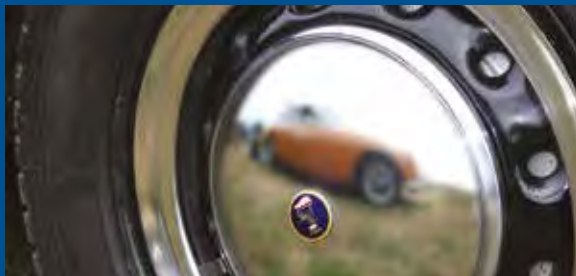
5. Reflectance Haze

An optical effect caused by microscopic texture or residue on a surface.

Visible symptoms: A milky finish is apparent on the surface with a loss of reflected contrast. Halos and patterns can be seen around reflections of high intensity light sources.

Causes: Poor dispersion, raw material incompatibility, additive migration, vehicle quality, stoving/drying/curing conditions, polishing marks, fine scratches, ageing, oxidisation, poor cleanliness/surface residue.

Haze is a common problem associated with coatings and polished materials. Surfaces with haze have a milky finish with a shallow reflected image. This important characteristic is directly measured with the Rhopoint IQs.

On surfaces with haze, halos are visible around the reflections of strong light sources
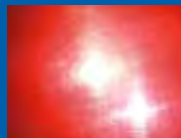
Low Haze   Higher Haze

Reflectance haze compensation

The instrument compensates for reflection from within the coating for highly reflective pigments, metallic coatings and speciality pigments, allowing the haze of any painted surface to be measured.

Why measure gloss?

Gloss is an aspect of the visual perception of objects that is as important as colour when considering the psychological impact of products on a consumer.

It has been defined as 'The attribute of surfaces that causes them to have a shiny or lustrous, metallic appearance.' The gloss of a surface can be greatly influenced by a number of factors, for example the smoothness achieved during polishing, the amount and type of coating applied or the quality of the substrate.

Manufacturers design their products to have maximum appeal: from highly reflective car body panels to glossy magazine covers or matt finish automotive interior trim.

This is especially noticeable where parts may be produced by different manufacturers or factories but will be placed adjacent to one another to create the finished product.

Gloss can also be a measure of the quality of the surface, for instance a drop in the gloss of a coated surface may indicate problems with its cure, leading to other failures such as poor adhesion or lack of protection for the coated surface.


It is important therefore that gloss levels are achieved consistently on every product or across different batches of products.

It is for these reasons that many manufacturing industries monitor the gloss of their products, from cars, printing and furniture to food, pharmaceuticals and consumer electronics.

How is gloss measured?

Gloss is measured by shining a known amount of light at a surface and quantifying the reflectance.
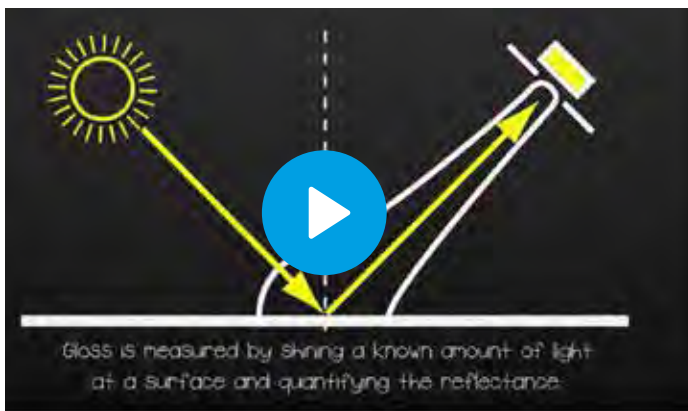

The angle of the light and the method by which the reflectance is measured are determined by the surface material and which aspect of the surface appearance is to be measured.

## Which angle should I use for my application?

ISO 2813 and ASTM D523 (the most commonly used standards) describe three measurement angles to measure gloss across all surfaces.

Gloss is measured in gloss units (GU) and is traceable to reference standards held at NIST (USA).
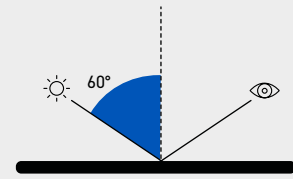
**Universal Measurement Angle: 60°**
All gloss levels can be measured using the standard measurement angle of 60°. This is used as the reference angle with the complimentary angles of 85° and 20° often used for low and high gloss levels respectively.
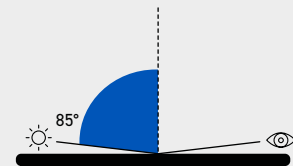
Low Gloss: 85°
For improved resolution of low gloss a grazing angle of 85° is used to measure the surface. This angle is recommended for surfaces which measure less than 10GU when measured at 60°.

This angle also has a larger measurement spot which will average out differences in the gloss of textured or slightly uneven surfaces.
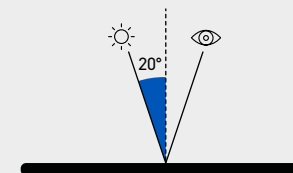
High Gloss: 20°
The acute measurement angle of 20° gives improved resolution for high gloss surfaces. Surfaces that measure 70GU and above at the standard angle of 60° are often measured with this geometry.

The 20° angle is more sensitive to haze effects that affect the appearance of a surface.

Why measure haze?

Haze can be described as *near specular* reflection. It is caused by a microscopic surface structure which slightly changes the direction of a reflected light causing a bloom adjacent to the specular (gloss) angle. The surface has less reflective contrast and a shallow milky effect.

In the coatings industry, this microscopic surface texture is often due to poorly dispersed raw materials, incompatible raw materials or oxidisation and weathering. For polished metal surfaces, haze is often associated with polishing marks or chemical residue.

Haze

Haze is light that has been reflected by small surface structures adjacent to the main specular component.

Reflectance haze – An optical effect caused by microscopic texture or residue on a surface.

$$Haze \propto \frac{Haze\ reflectance}{Incident}$$
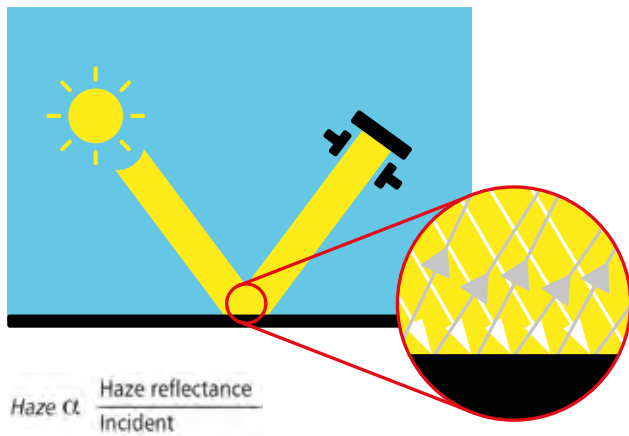
Reflection haze

Reflection haze is an optical phenomenon usually associated with high gloss surfaces.

It is a common surface fault that reduces appearance quality. A hazy surface has a visibly shallower reflection with a milky finish and halos appear around reflections of strong light sources.
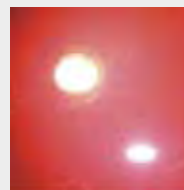
Sample 1
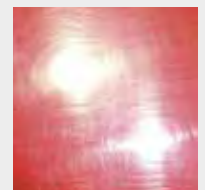No Haze, deep reflection

Sample 2
High Haze, 'shallow' finish

A high gloss finish with haze exhibits a milky finish with low reflective contrast, reflected highlights and lowlights are less pronounced.

Sample 3
Low Haze

Sample 4
Higher Haze

On surfaces with haze, halos are visible around the reflections of strong light sources.
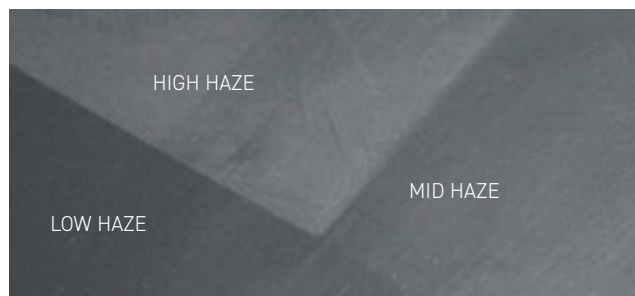
Causes of Haze

Coating & Raw Materials
· Dispersion
· Pigment properties
· Particle size
· Binder compatibility
· Influence and migration of additives
· Resin types and quality

Curing
· Drying conditions
· Cure temperature

Post Coating
· Polishing marks
· Cleanliness
· Ageing and oxidisation

HIGH HAZE

MID HAZE

LOW HAZE

Haze: Often visible as milky finish on high gloss surfaces

Gloss and haze measurement with array technology

The Rhopoint IQ uses a 512 element linear diode array which profiles reflected light in a large arc from 14° to 27°. The instrument processes this high resolution data, selecting individual elements within the array that equate to the angular tolerences outlined in international measurement standards.

In a single 20° measurement, the following calculations are made:

$$\text{Gloss} = \frac{\sum \text{Pixels between } 20° \pm 0.9° \text{ (sample)}}{\sum \text{Pixels between } 20° \pm 0.9° \text{ (standard)}}$$

$$\text{Haze} = 100 \times \frac{\sum \text{Pixels from } 17° \text{ to } 19° \text{ (sample)} + \sum \text{Pixels from } 21° \text{ to } 23° \text{ (sample)}}{\text{Specular Gloss (standard)}}$$

$$\text{logHaze} = 1285 \,(\log 10((\text{Haze}/20)+1))$$

Curved surface adjustment

A major advantage of the Rhopoint IQ is that it automatically compensates for curved or textured sample surfaces by virtually adjusting the measurement position. Conventional gloss-hazemeters have fixed optics which can make measurement unreliable as any sample curvature will reflect light away from the centre of the measurement sensor causing errors.

The Rhopoint IQ automatically adjusts the sensor position by detecting the peak of the reflected light. The laws of reflection state that the incident angle is equal to the reflection angle thus the peak equates exactly to the 20° gloss angle.

Light source

Diode array

Incident light

Gloss

Haze
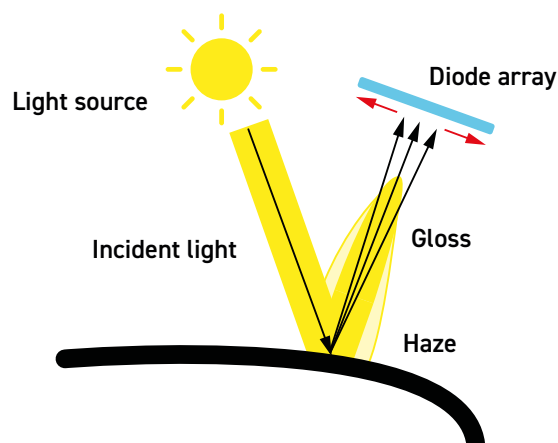
The Rhopoint IQ automatically adjusts for non-flat surfaces by sensing the reflected peak and virtually adjusting the position of the sensor.

Incident light

Gloss and Haze component

Diffused light

Yellow pigment in paint film
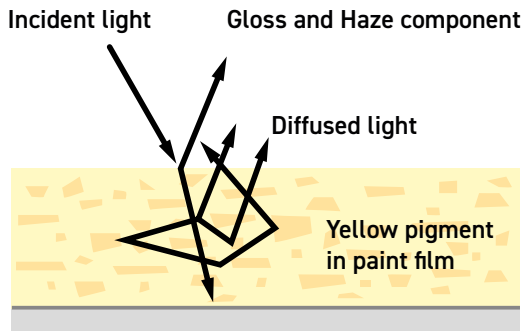
The Rhopoint IQ compensates for reflection from within the coating for highly reflective pigments, metallic coatings and speciality pigments, allowing the haze of any painted surface to be measured.

Diffuse corrected measurement with array technology*

Reflection haze is caused by micro texture on a surface which causes a small amount of light to be reflected adjacent to the gloss angle.

For white surfaces, bright colours and metallics, a certain amount of diffuse light, reflected from within the material, is also present in this region.

This diffuse light exaggerates the haze signal for these surfaces causing higher than expected readings.

* Only enabled when the instruments is set to haze measuring mode of ASTM E430

Corrected haze measurement on metallic coatings

For non metallic surfaces, the diffuse component is Lambertian: it is equal in amplitude at all angles in relation to the sample surface. Conventional gloss-hazemeters measure diffuse reflection using a luminosity sensor positioned away from the gloss angle. Luminosity is subtracted from the haze signal allowing non metallic surfaces to be measured independently of their colour.
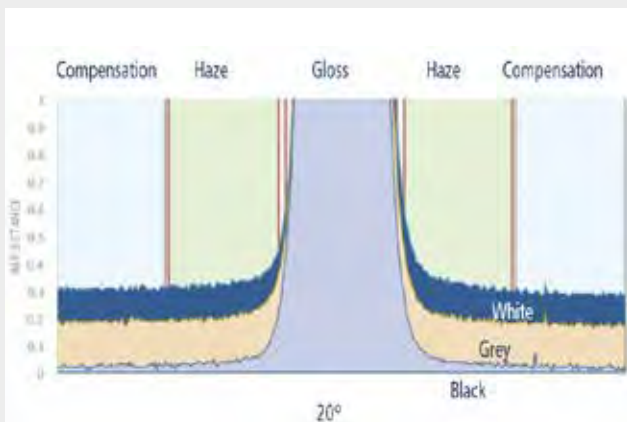
Goniophotometric information profiling the reflection from white, grey and black panels with an identical topcoat.

Light source

Diode array

Incident light

Gloss

Metallic reflection

Metallic coating
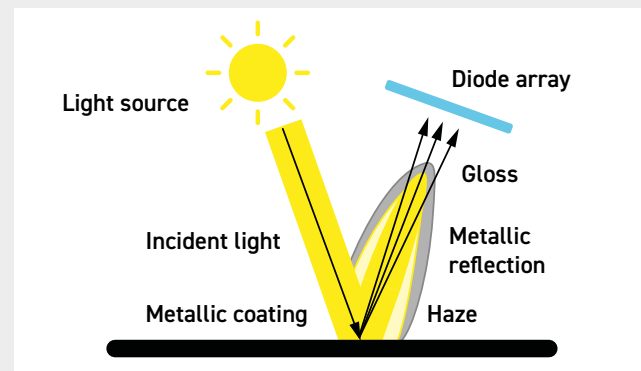
Haze

The Novo-Gloss 20/60/85 version with haze captures compensation information from a region adjacent to the haze measurement angle. This means it can be used on metallic coatings which reflect light.

An advantage of the Rhopoint IQ is that unlike a conventional instrument, compensation is calculated using a region adjacent to the haze angle. This technique gives compatible readings on solid colours but also compensates for directional reflection from metallic coatings and speciality pigments.

Features

Trigloss + IQ

▼MENU ▲CURVE ▶START   n=72

20°	80°	85°
87.9	94.0	99.7
DOI	logHzC	RIQ
96.5	6.3	85.6

BATCH001   18/07/2020   2:27
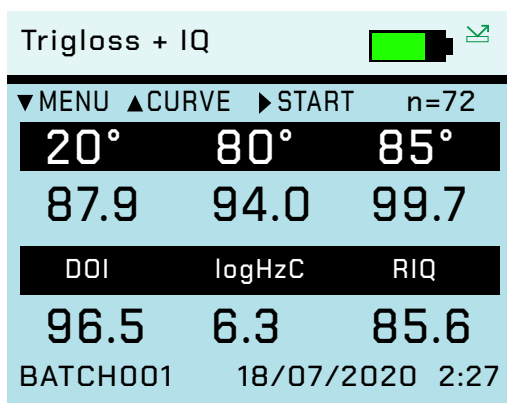
Measurement
Simultaneous measurement of all parameters, date and time stamped.

Statistics 1

◀⌂ ▼STAT ▶GRAPH   n=72

	20°	80°	85°
	87.9	94.0	99.7
Max	106.0	111.2	100.6
Min	44.1	54.1	38.5
Mean	85.5	92.9	94.8
SD	11.5	6.5	12.3
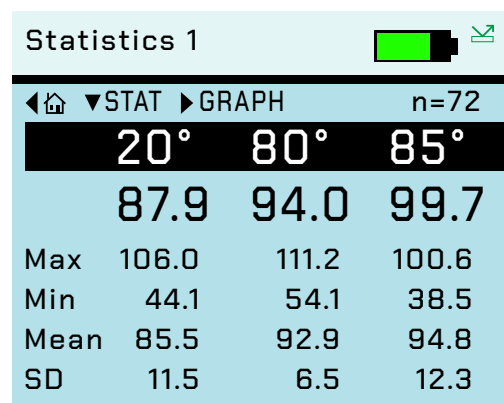
Statistics
Displays full statistics for the readings in the current batch.

Graph 2 - All

◀STAT ▲GLOSS ▼DOI ▶⌂   n=72

DOI
logHzC
RIQ
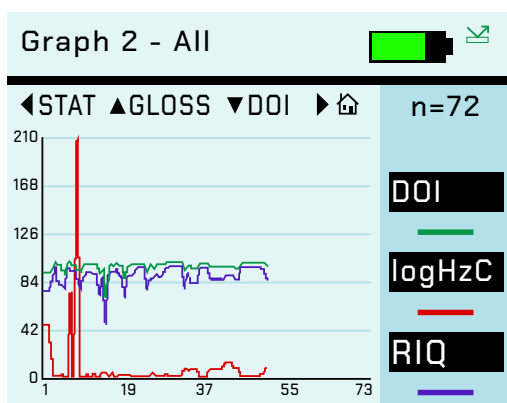
Graphs
Graphical reporting for quick trend analysis.

Stored Data

◀▶   ▼ BATCH ▲   ●⌂   Mean

20°	60°	85°
74.5	88.3	99.3
RIQ	Hz (E)	Rspec
96.0	1.6	72.6

BATCH001   18/07/2020   2:27
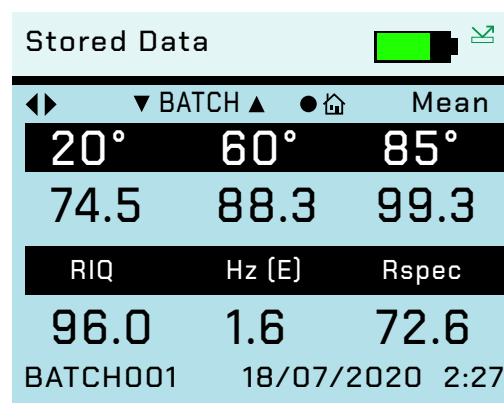
Stored data
View and inspect data saved on the instrument.

IQ Reflectance 20°

◀⌂ ▶🔍

Gloss	87.9
DOI	96.5
logHzC	6.3
RIQ	85.6
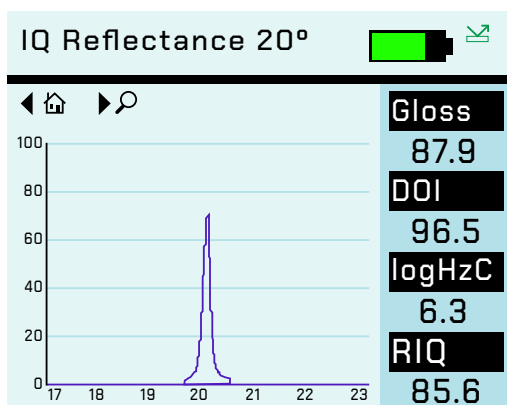
Goniophotometric Curves
Different types of surface textures produce identifiably shaped reflectance profiles. This goniophotometric data can be downloaded to PC for further analysis and comparison via the USB cable or BT data widget.

Trigloss + IQ

▼MENU ▲CURVE ▶START   n=72

20°	80°	85°
85.6	93.9	99.9
DOI	logHzC	RIQ
97.2	5.9	89.5

BATCH001   18/07/2020   2:27
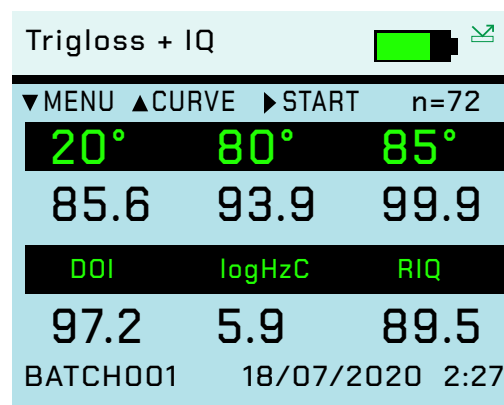
Parameters
Pass / fail parameters can be defined for instant identification of nonconformances.

Data Transfer Options

Software-free data transfer

USB connection to PC instantly recognises the device as a drive location which facilitates the quick transfer of .csv files using Windows Explorer or similar.

| Batch	BatTime	Date	Time	Pass / Fail	GLOSS 20	GLOSS 60	GLOSS 85	HAZE	LOG HAZE	DOI	RSPEC	Cdiode	CALIBRATED	CERTIFIED	SERIAL NO	RIQ	PCB. temp	Env. temp. deg C
001	10:50:30	02/07/19	10:50:30	N/A	100.35	99.6	99.5	0	0.34	99.07	97.17	230	02/07/19	02/07/19	1181180	96.62	26.83	26.56
001	10:50:30	02/07/19	10:50:32	N/A	100.43	99.63	99.5	0	0	99.07	97.16	230	02/07/19	02/07/19	1181180	96.63	26.64	26.56
001	10:50:30	02/07/19	10:50:34	N/A	100.43	99.57	99.43	0.01	0.17	99.08	97.09	230	02/07/19	02/07/19	1181180	96.62	26.64	26.62
001	10:50:30	02/07/19	10:50:36	N/A	100.47	99.63	99.4	0	0	99.08	97.08	230	02/07/19	02/07/19	1181180	96.64	26.83	26.69
001	10:50:30	02/07/19	10:50:38	N/A	100.52	99.6	99.45	0	0	99.08	97.06	230	02/07/19	02/07/19	1181180	96.65	27.01	26.69
001	10:50:30	02/07/19	10:50:40	N/A	100.51	99.6	99.43	0.01	0	99.08	97.16	230	02/07/19	02/07/19	1181180	96.63	26.83	26.75
001	10:50:30	02/07/19	10:50:42	N/A	100.47	99.6	99.43	0	0.01	99.08	97.14	230	02/07/19	02/07/19	1181180	96.62	26.83	26.76
001	10:50:30	02/07/19	10:50:44	N/A	100.54	99.6	99.47	0	0	99.09	97.18	230	02/07/19	02/07/19	1181180	96.65	26.83	26.75
001	10:50:30	02/07/19	10:50:46	N/A	100.47	99.57	99.34	0	0	99.08	97.18	230	02/07/19	02/07/19	1181180	96.63	27.01	26.81
001	10:50:30	02/07/19	10:50:48	N/A	100.54	99.6	99.4	0	0	99.09	97.19	230	02/07/19	02/07/19	1181180	96.64	26.73	26.81
002	10:54:33	02/07/19	10:54:33	N/A	100.47	99.6	99.4	0	0	99.08	97.15	230	02/07/19	02/07/19	1181180	96.68	27.01	26.81
002	10:54:33	02/07/19	10:54:35	N/A	100.39	99.6	99.43	0.01	0.26	99.08	97.14	230	02/07/19	02/07/19	1181180	96.68	27.01	26.88
002	10:54:33	02/07/19	10:54:37	N/A	100.5	99.6	99.4	0	0	99.07	97.16	230	02/07/19	02/07/19	1181180	996.67	27.01	26.94
002	10:54:33	02/07/19	10:54:39	N/A	100.6	99.57	99.4	0	0	99.06	97.16	230	02/07/19	02/07/19	1181180	96.68	27.01	26.04
002	10:54:33	02/07/19	10:54:41	N/A	100.52	99.58	99.4	0	0	99.07	97.19	230	02/07/19	02/07/19	1181180	96.68	27.01	26.94
002	10:54:33	02/07/19	10:54:43	N/A	100.57	99.5	99.45	0	0	99.09	97.18	230	02/07/19	02/07/19	1181180	96.63	27.01	27
002	10:54:33	02/07/19	10:54:45	N/A	100.55	99.48	99.47	0	0	99.08	97.18	230	02/07/19	02/07/19	1181180	96.62	27.19	27
002	10:54:33	02/07/19	10:54:47	N/A	100.61	99.14	99.4	0	0	99.08	97.18	230	02/07/19	02/07/19	1181180	96.62	27.19	27
002	10:54:33	02/07/19	10:54:49	N/A	100.5	99.5	99.47	0.01	0.28	99.09	97.15	230	02/07/19	02/07/19	1181180	96.64	27.19	27
002	10:54:33	02/07/19	10:54:51	N/A	100.21	99.6	99.4	0.01	0.17	99.07	97.18	230	02/07/19	02/07/19	1181180	96.64	27.01	27.06
002	10:54:33	02/07/19	10:54:53	N/A	100.87	99.61	99.44	0	0	99.12	97.20	230	02/07/19	02/07/19	1181180	96.66	27.19	27.06

Direct data input via BT wireless

Instantly transmit measured readings directly to programs such as MS Excel on your PC / tablet to greatly simplify the reporting process.

	1	2	3	4	5	6
DATE	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19
TIME	11:16:24	11:16:42	11:17:17	11:17:37	11:17:58	11:18:29
20	10.4	10.4	10.6	10.6	10.6	10.6
60	40.6	40.6	40.3	40.4	40.3	40.3
85	66.2	66.2	65.6	65.6	65.6	65.6
LogHAZE	222.2	221.9	225.5	225.7	225.5	225.5
DOI	10.4	10.4	9.7	9.7	9.7	9.8
RIQ	6.6	6.5	7.1	7.0	7.2	7.2
Cdiode	227	227	223	223	223	223
Calibrated	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19
Serviced	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19	02/07/19
S/N	1181180	1181180	1181180	1181180	1181180	1181180

Statistical analysis via Novo-Gloss Multi Gauge software

The included software provides an easy means to measure, import and compare data and export the measurements into several other file formats, e.g. PDF, Excel® or CSV.
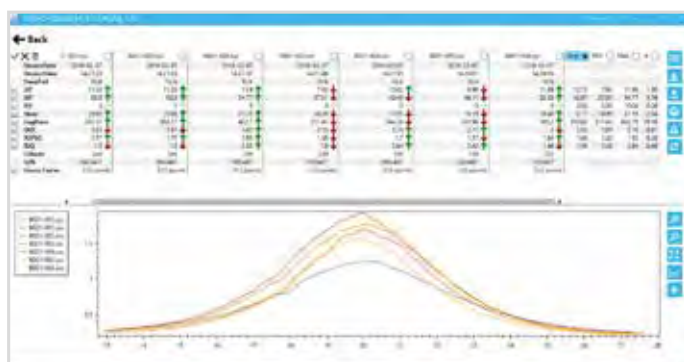
Applications

The DOI, Haze and RSPEC values measured by the Rhopoint IQ allow the user to quantify and control the surface textures that reduce the perceived quality of manufactured products.

The meter is widely used throughout many industries to assess the reflective qualities of products, in particular automotive exteriors and interiors.

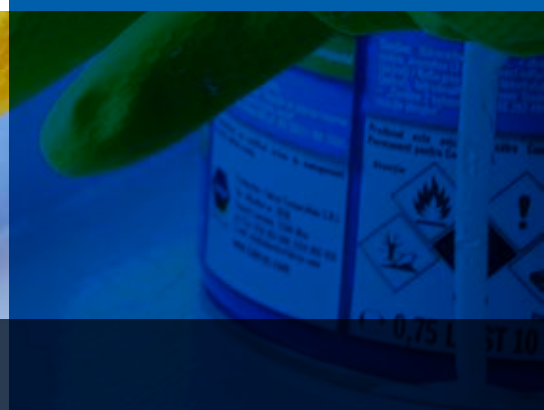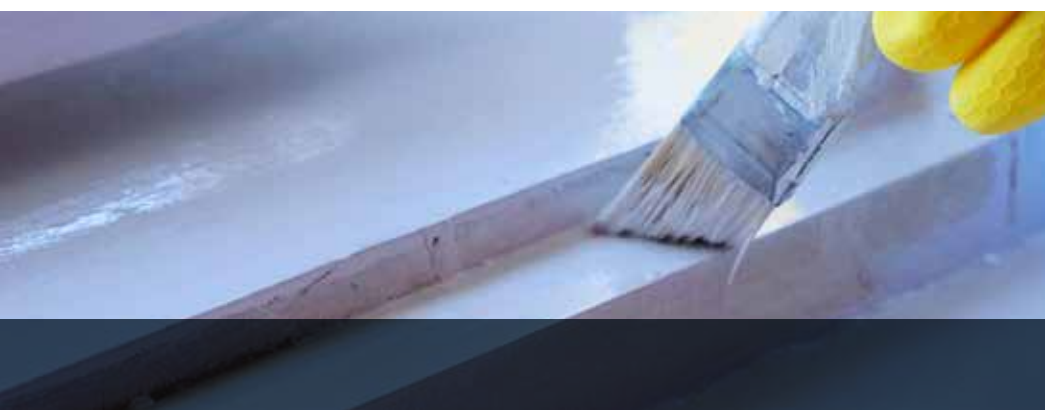|			
Automotive	Printed Cartons	Printing Ink	Powder Coating
Automotive Re-finish	Yacht Manufacturers	Paints and Coatings	Smart Devices, PC & Laptop Covers
Furniture	Aerospace	Plastics Industry	Wood Coatings
Metal Polishers	Polished Stone		

Specifications

20° Gloss		
Range (GU)	0–100	100-2000
Repeatability	0.2 (GU)	0.2 %
Reproducibility	0.5 (GU)	0.5 %
Resolution (GU)	0.1	
Measurement Area	6.0 x 6.4 (mm)	
Standards	ISO 2813 ASTM D523 ISO 7668 ASTM D2457 IN 67530 JIS Z 8741	

Recommended product

- Rhopoint IQ 20/60/85
- Rhopoint IQ 20/60

60° Gloss			
Range (GU)	0–10	10–100	100–1000
Repeatability	0.1 (GU)	0.2 (GU)	0.2%
Reproducibility	0.2 (GU)	0.5 (GU)	0.5 %
Resolution (GU)	0.1		
Measurement Area	6.0 x 12.0 (mm)		
Standards	ISO 2813 ASTM D523 ISO 7668 ASTM D2457 IN 67530 JIS Z 8741		

Recommended product

- Rhopoint IQ 20/60/85
- Rhopoint IQ 20/60

85° Gloss		
Range (GU)	0–100	100–199
Repeatability	0.2 (GU)	0.2 %
Resolution (GU)	0.1	
Measurement Area	4.4 x 44.0 (mm)	
Standards	ISO 2813 ASTM D523 ISO 7668 ASTM D2457 IN 67530 JIS Z 8741	

Recommended product

- Rhopoint IQ 20/60/85

Haze	
Range (Log HU)	0-500
Repeatability (Log HU)	1
Reproducibility (Log HU)	10
Resolution	0.1
Measurement Area	6.0 x 6.4 (mm)
Standards	ASTM E430 ASTM D4039

Recommended product

- Rhopoint IQ 20/60/85
- Rhopoint IQ 20/60

	RSPEC	DOI	RIQ
Range (GU)	0-2000 GU	0-100	0-100
Repeatability (Log HU)	0.2%	0.2	0.2
Reproducibility (Log HU)	0.5%	0.5	0.5
Resolution	0.1	0.1	0.1
Measurement Area	6.0 x 6.4 (mm)	6.0 x 6.4 (mm)	6.0 x 6.4 (mm)
Standards	Rhopoint	ASTM E430	Rhopoint

Recommended product

- Rhopoint IQ 20/60/85
- Rhopoint IQ 20/60

Specifications

Instrument Information

Battery Type	Rechargeable lithium ion
Operation (hours)	17+
Readings per charge	20,000+
Memory	8MB, 2,000 readings
Operating Temperature	15-40°C (60-104°F)
Operating Humidity	Up to 85%, non condensing
Commodity Code	9027 5000

Dimensions & Weights

Dimensions	140mm x 50mm x 65mm (L x W x D)
Weight	390g
Packed weight	1.75 kg
Packed dimensions	360mm x 290mm x 140mm (L x W x D)

Included Accessories

Certificates	• Instrument calibration certificate • Tile calibration certificate
Cables	• USB data & mains cable • Wrist strap
USB Containing:	• Instruction manual • Bluetooth data app • Example Excel spreadsheets • Novo-Gloss Multi Gauge software • Instructional videos
Calibration tile	HIgh gloss calibration tile with cleaning cloth
Sample positioning template	
Quick start guide	

Order Codes

Rhopoint IQ 20/60	A6000-013
Rhopoint IQ 20/60/85	A6000-011

Free extended warranty: Please register your product at **www.rhopointinstruments.com/instrument-registration**

Free light source warranty: Guaranteed for the life of the instrument

Calibration and service: Fast and economical service via our global network of accredited calibration and service centres. Please visit **www.rhopointinstruments.com/support** for detailed information.

Languages:

Ethically Sustainable

The Rhopoint IQ is made from an all aluminium construction which means it can be recycled at the end of its long life.

Certificate No. FS 695372
BS EN ISO 9001:2015

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