ZGM 1120
Glossmeter

Instruction Manual

Exclusion of liability

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The features described in this instruction manual represent the complete technology of this instrument. These features are either included in the standard delivery or available as options at additional costs.

Illustrations, descriptions as well as the technical specifications conform to the instruction manual on hand at the time of publishing or printing. However, Zehntner GmbH Testing Instruments policy is one of continuous product development. All changes resulting from technical progress, modified construction or similar are reserved without obligation for Zehntner to update.

Some of the images shown in this instruction manual may be of a pre-production model and/or are computer generated; therefore the design/features of the delivered product may differ in various aspects.

The instruction manual has been drafted with the utmost care. Nevertheless, errors cannot be entirely excluded. The manufacturer will not be liable for errors in this instruction manual nor for damages resulting from any errors.

The manufacturer will be grateful at any time for suggestions, proposals for improvement and indications of errors.

1	Device description

The ZGM 1120 glossmeters are for measurement of all gloss ranges on all surfaces, including small parts and curved surfaces.

The entire operation and control of the ZGM 1120 is done via the USB interface of your PC by using the GlossTools measuring and examination software.

This instruction manual covers all models of the ZGM 1120 series which includes 1-, 2- or also 3-angle models. Therefore, some pictures or functional descriptions (e.g. selection of measuring geometry) may differ from your model.

In particular, this instrument has the following features:

- Sturdy aluminium design and high quality
- Smallest dimensions and ultra light weight
- Extremely small measuring spot
- Available as 1-, 2- or 3-angle version
- User friendly, multilingual user interface
- Easy control, operation and display with a computer using the GlossTools software
- Powerful stray light compensation allows exact measurement of transparent objects
- Automatic, adjustable prompt for calibration
- Automatic standard recognition
- Long-lasting LED illumination system
- Power is supplied via the USB-interface

2	Safety notes

2.1 Symbols used

⚠️ This note comprises instructions needed to follow directions, specifications, proper working procedure and to avoid data loss, damage or destruction of the instrument.

⚠️ This note signifies a warning about dangers to life and limb if the apparatus is handled improperly. Observe these notes and be particularly careful in these cases. Also inform other users on all safety notes. Besides the notes in this instruction manual the generally applicable safety instructions and regulations for prevention of accidents must be observed.

2.2 Safety notes and hints

⚠️ It is strictly forbidden to open the housing of the ZGM 1120! If not observed, all the guarantee and liability claims to Zehntner GmbH Testing Instruments will be void.

⚠️ The ZGM 1120 Glossmeter is exclusively intended for the determination of gloss ranges of surfaces. Any other use is considered as not being in accordance with the intentions of the manufacturer. The manufacturer is not liable for damage resulting from inappropriate application. The user bears the full responsibility.

⚠️ Unauthorized modifications and changes of the ZGM 1120 are not permitted.

⚠️ Reproduction without permission is not allowed.

⚠️ All maintenance and repair work which is not explicitly permitted and described in the present instruction manual shall only be carried out by **Zehntner GmbH Testing Instruments** or your authorized Zehntner agent, failure to comply voids warranty. Always disconnect the glossmeter from the USB port of the computer before the permitted maintenance.

⚠️ **Zehntner GmbH Testing Instruments** refuses all warranty and liability claims for damages caused by usage of the ZGM 1120 in combination with **non-original accessories**, or accessories from 3rd party suppliers.

⚠️ Never unplug the USB-cable during a measurement or while the green data transfer indication light LED (2) is on.

⚠️ Never immerse the device in water or other liquids: **Danger of short circuit!**

⚠️ Never leave the ZGM 1120 under direct sun exposure. Always store the ZGM 1120 in its carrying case.

⚠️ For the operation of the ZGM 1120 apply all local safety regulations.

3   Delivery of device

3.1 Damages during carriage
On the receipt of the goods, check for any visible damages on the packaging. If it is undamaged you may sign the receipt of the goods. If you do suspect by your visual inspection that damage has occurred, make a note of the visible damage on the delivery receipt and request the courier to countersign it. Moreover, the courier service must be held responsible for the damage in writing.

If a hidden damage is discovered while unpacking, you have to inform and hold the courier liable immediately in the following way: "When opening the parcel we had to notice that ... etc." This superficial checking of the goods has to be done within the time limit set by the carrier, which is normally 7 days. However, the period could vary depending on the courier. Hence, it is recommended to check the exact time limit when receiving the goods.

If there are any damages also inform your authorized Zehntner agent or **Zehntner GmbH Testing Instruments** immediately.

3.2 Shipment
Should the device be transported again, it must be packaged properly. Preferably use the original packaging for later shipments. Additionally use filling material in the package to protect the device from any shock during carriage.

3.3 Standard delivery

The following parts are included in the delivery:

1 ZGM 1120 glossmeter	
1 calibration standard	
1 microfiber cleaning cloth	
1 ACC192 USB-cable	
1 certificate of manufacturer	
1 certificate of calibration	
1 carrying case	

3.4 Options

• additional calibration and intermediate standards	
• special custom-made holders for reproducible measurements on uneven surfaces, also for contactless measuring if ZGM 1120 is equipped with measuring distance	
• ACC742 mounting device suitable for the measuring geometries: 20°, 60° and 85° Also for contactless measuring if ZGM 1120 is equipped with measuring distance	
• ACC935 mounting device for the paper industry, suitable for the measuring geometries: Tappi 20° & 75°, DIN 45° & 75° Also for contactless measuring if ZGM 1120 is equipped with measuring distance	
• ACC195 or ACC195.fast RS232-adaption This option is only available when ordering a new instrument	
• ACC207 USB-foot switch for hands-free triggering of measurements	
• ACC490 Labview programming interface	
• ACC193 „GlossTools" programming interface (.NET API)	

⚠ **Zehntner GmbH Testing Instruments** refuses all warranty and liability claims for damages caused by usage of the ZGM 1130 in combination with **non-original accessories**, or accessories from 3rd party suppliers.

(1)   Measuring button
(2)   Data transfer indication light
(3)   Measurement opening, indication of light beam direction
(4)   USB interface
(5)   Zehntner calibration standard

5	Handling

Operation and control of the ZGM 1120 is entirely done by using the included GlossTools measuring and examination software.

⚠ Do not connect the glossmeter to your PC unless all installation steps of the "GlossTools" software package have been performed.

5.1 Calibration

- Start GlossTools software.
- Insert the ZGM 1120 from the top into the supplied calibration standard until it locks audibly.

- Carry out the calibration according to the instructions of the „GlossTools" manual.

⚠ To ensure precise and valid results the ZGM 1120 must be calibrated by the user on the calibration standard in regular intervals (recommended interval: every 2 days).

⚠ The standard has been measured in the factory and marked with the serial number of the instrument.

5.2 Measuring procedure

- Position the unit on the surface to be measured so that it bears evenly.

- With the ZGM 1120 is also possible to measure upside down. Insert the unit upside-down into the holder of the calibration standard. Small parts can be measured easier in this position. Due to the stray light compensation, you receive correct gloss values even though the measurement opening (3) is not completely covered by the sample.

Measuring upside down

Version with measuring distance for contactless gloss measuring

Measurement on uneven surfaces

- To carry out a measurement follow the instructions in the separate software manual.

❗ The ZGM 1120 consists of sensitive precision optical and electronic parts. Do not drop it and avoid shocks.

❗ Protect the measurement opening of the ZGM 1120 from foreign particles and dust.

6	Practical measuring suggestions

6.1 General

⚠️ Always indicate the used measuring geometry for all measurements.

⚠️ Measurements of different measuring geometries cannot be compared and cannot be "converted" from one geometry into another. Therefore a series of measurement must always be taken with the same measuring geometry.

6.2 How to choose the correct measuring geometry for paints and varnishes

The following explanations apply to smooth coated surfaces, they do not fully apply for metallic and textured coatings or uneven surfaces. They do not apply at all for other surfaces such as foils, metals, textiles and paper.
According to the standard ISO 2813 and ASTM D523 the correct measuring geometry should be determined by a pre - measurement taken at 60°. Related to that the correct measuring geometry can be determined with the table below.

ISO 2813		ASTM D523	
Value @ 60°	Geometry	Value @ 60°	Geometry
>70 GU	20°	>70 GU	20°
10 GU – 70 GU	60°	10 GU – 70 GU	60°
<10 GU	85°	<10 GU	85°

7	Options

7.1 Special custom made holders

Depending on the application area, shape and size of the measuring samples (uneven or very small surfaces), it is possible that a holder or positioning support for the precise positioning of the ZGM 1120 is needed in order to get reproducible measuring values. Zehntner may provide such holders or positioning supports on request.

Positioning support example for measurements on small parts

7.2 ZGM 1120 with measuring distance and the ACC742 mounting device

For contactless measurements, the ZGM 1120 can be equipped with measuring distance. It can be used with or without ACC742 mounting device. In this case, a modified glossmeter and calibration standard is included in the standard delivery. The measuring distance depends on the version: 0,5 mm, 1 mm, 1,5 mm, 2 mm, 3 mm or 4 mm.

ZGM 1120 with adjusted measuring distance without the ACC742 mounting device

> ❗ To ensure reliable measuring results the measuring distance of your glossmeter to the sample has to be maintained within a tolerance of ± 0.1mm.

To facilitate the mounting of your ZGM 1120 at the proper measuring distance, the optional ACC742 mounting device for ZGM 1120 with measuring geometries 20°, 60° and/or 85° is available. The device can be attached to various mounting installations, e.g. a drill rig or other stands.

7.2.1 Mounting the ZGM 1120 into the ACC742 mounting device

• Insert the ZGM 1120 into the mounting device and tighten the knurled screw as shown below:

The ZGM 1120 can be calibrated with the delivered calibration standard without removing it from the ACC742 mounting device.

Special calibration standards for ZGM 1120 with measuring distance

Example for calibration without removing from the mounting device

7.3 ACC193 "GlossTools" programming interface (.NET API)

This programming interface (.NET API) allows the user to easily access and control the Zehntner ZGM 1110 and ZGM 1120 Glossmeters from his own software application. This option can be provided free of charge.

7.4 ACC195 or ACC195.fast RS232 adaption

If communication by RS232 interface instead of USB is preferred, the optional RS232-adaption is required. This includes a modification of the firmware and a special RS232 cable.

Using the ZGM 1120 with the optional ACC195 RS232-adaption, the following additional instructions need to be observed:

- Addendum „Installation instruction for ZGM 1120 Zehntner-Glossmeter with ACC195 or ACC195.fast RS232-adaption (equipped with RS-232 interface)"
- Addendum „Technical documentation for ZGM 1120 Zehntner-Glossmeter with ACC195 or ACC195.fast RS232-adaption (equipped with RS-232 interface)"

7.5 ACC207 USB foot switch for triggering measurements
7.5.1 General
By use of the ACC207 USB-foot switch for triggering measurements, you can easily carry out measurements your hands free for holding the ZGM 1120 and the sample. The ACC207 facilitates especially the measurement of small samples and is useful if the ZGM 1120 needs to be held upside down for precise positioning.
The USB-foot switch comes preconfigured for triggering measurements. However, should you still require the configuration instructions please contact Zehntner or your authorized Zehntner agent.

7.5.2 Technical Specifications
Dimensions: 90 mm x 65 mm x 25 mm
Cable length: 1,5 m
Weight: 150 g
Life cycle: approx. 1 million cyles of operation
Operation systems: Microsoft® Windows 2000 or later

7.6 ACC490 Labview programming interface
The optional ACC490 Labview programming interface (API) allows the user to easily access and control the Zehntner ZGM 1110 and ZGM 1120 Glossmeters from his own labview software application.

8   Maintenance and Cleaning

8.1 Maintenance carried out by the user

You may only carry out the following maintenance and repair by yourself:

- Outer cleaning of the device (see sub-clause 8.2 on page 17)
- Cleaning of the standard (see sub-clause 8.3 on page 17)

⚠ All other maintenance and repair operations may only be done by Zehntner or your authorized Zehntner-agent, otherwise all warranty will be void.

8.2 Cleaning of the aluminium housing

Before cleaning disconnect the USB-cable from your computer. For cleaning of the aluminium housing use a proper, soft and moist cloth. Use exclusively soft cleaning agents.

⚠ Do not use strongly acidic or alkaline liquids.

⚠ Never immerse the device in water or other liquids.

⚠ If the device has to be disinfected, do not use disinfectants that contain sodium hydroxide.

8.3 Cleaning of the standard

The accuracy of measurements can be impaired significantly by using dirty or damaged standards. Since the surface of the standards is highly sensitive, cleaning must be undertaken with great care. To clean standards, use the included microfiber cleaning cloth.

⚠ Apply only slight pressure during cleaning and make sure there are no large particles on the standard or in the cloth that could damage or scratch the surface.

⚠ Do not use any aggressive and abrasive cleaning agents to clean the standard.

geometry	20°	60°	85°	20° Tappi	75° Tappi	45° DIN	75° DIN
application	automotive, paint varnish, plastics as well as manufacturing industry			foils and paper industry			
	high-gloss	semi-gloss	low-gloss	high-gloss	low- to high gloss	high-gloss	low-gloss
standards	ASTM D523, ASTM D2457, BS 3900-D6, DIN EN ISO 2813, DIN 67530			EN ISO 8254-3, Tappi T 653	EN ISO 8254-1, Tappi T 480	EN 14086, DIN 54502	EN ISO 8254-2, DIN 54502
1-angle	•	•	•	•	•	•	•
2-angles	•	•			•		•
3-angles	•	•	•				
Measuring range	0 to 2´000 GU	0 to 1´000 GU	0 to 160 GU	0 to 2´000 GU	0 to 140 GU	0 to 140 GU	
Opening area (LxW)	6 x 5 mm (0.24 x 0.2")	8 x 5 mm (0.3 x 0.2")	40 x 6 mm (1.6 x 0.24")	30 x 12 mm (1.2 x 0.5")		40 x 14 mm (1.6 x 0.6")	
Measuring area (LxW)	4.2 x 2 mm (0.17 x 0.08")	4.7 x 2 mm (0.19 x 0.08")	15 x 2 mm (0.59 x 0.08")	10 x 11 mm (0.39 x 0.43")	14 x 6 mm (0.6 x 0.24")	12 x 8 mm (0.47 x 0.3")	
Bearing area (LxW)	14.5 x 14.8 mm (0.57 x 0.58")	15.6 x 14.8 mm (0.61 x 0.58")	84 x 14.8 mm (3.3 x 0.58")	128 x 19.8 mm (5 x 0.78")			
Dimensions (LxWxH)	78 x 56 x 15 mm (3.1 x 2.2 x 0.6")	88 x 56 x 15 mm (3.5 x 2.2 x 0.6")	99 x 56 x 15 mm (3.9 x 2.2 x 0.6")	140 x 78 x 20 mm (5.5 x 3.1 x 0.8")			
	For multi-angle versions please refer to the larger dimension						
Weight 1-angle	76 g (0.168 lbs)	90 g (0.198 lbs)	109 g (0.240 lbs)	294 g (0.648 lbs)			
Weight 2-angle	96 g (0.212 lbs)			588 g (1.296 lbs)		588 g (1.296 lbs)	
Weight 3-angle	120 g (0.265 lbs)						

Interface: USB1.1 – Universal Serial Bus

Operating software: Zehntner GlossTools measuring and examination
                              software

Precision: Range: 0 – 199.9 GU   200 – 2'000 GU
Repeatability: 0.1 GU   0.1 %
Reproducibility: 0.5 GU   0.4 %

Spectral evaluation: V(λ) adapted

Light source: LED

Power supply: via USB

Ο-Directives: 89/336/EEC

Warranty: 2 years

Ambient conditions for the operation:
Temperature range   5°C to +40°C
Relative humidity: up to 85%, non condensing

Ambient conditions for transport and storage:
Temperature range   - 10°C to +60°C
Relative humidity: up to 85 %, non condensing

Glossary