

# Instruction manual

Version 2.2 dated 13.08.2013

## ZGM 1120 Glossmeter

for the following measuring geometries:

**20°, 20°T, 60°, 45°D,  
75°T, 75°D and 85°**



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## **Exclusion of liability**

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 at 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 are of a pre-production model and/or are computer generated; therefore the design/features on the final version of this instrument 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 or for damages resulting from any errors.

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

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## 1. Description of device

### 1.1 Summary

The ZGM 1120 glossmeters from Zehntner are part of the new generation of precision glossmeters for the determination of all gloss ranges on different surfaces.

For that purpose, light is directed at the surface of the specimen at a defined angle and the reflected light is measured.

Zehntner ZGM 1120 glossmeters are available as 1-, 2- or 3-angle model. Therefore, it is possible to measure with several angles at the same time.

Operation and controlling of the ZGM 1120 is comfortably done by using the "GlossTools" measuring and examination software from your PC via the USB interface.

The multi-language software supports different measuring modes as well as the automatic calculation of statistical values such as minimum, maximum, average, standard deviation and difference to a given reference value. The measurements may be displayed in "GlossTools" or can be exported to Microsoft® Excel for further processing.

Unique diagnosis functions of the software indicate the system's status and inform the user about errors or remind him of necessary calibrations.

#### **Application / application areas:**

- Determination of all gloss ranges for all different surfaces from mat to high gloss in all industries
- For the various needs of production and the demanding requirements in the laboratory

In particular, this instrument has the following **features**:

- Modern, sturdy aluminium design and high quality
- Smallest dimensions and ultra light weight
- Extremely small measuring spot, which allows measurements on very confined areas, curved surfaces and surfaces that are not uniform.
- Easy control, operation and display with the „GlossTools“ software directly on a PC or laptop
- Powered via USB port, which eliminates the need of batteries or accumulators.

## 2. Safety notes

### 2.1 Dangers



#### **Attention!**

This note is included in this instruction manual wherever it is warned about dangers which will arise to life and limb of persons 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 these instruction manual the generally applicable safety instructions and regulations for prevention of accidents have to be taken into account.



#### **Note**

This symbol marks instructions you should take notice of in order to follow directions, specifications, correct working processes and to avoid data loss, damage or destruction of the instrument.

### 2.2 Safety notes



**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 expire.



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



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. For damages resulting thereof the manufacturer is not liable; the risk for this is taken by the user alone.



Reconstruction without permission and modifications of the ZGM 1120 are not permitted. For damages resulting thereof the manufacturer is not liable; the risk for this is taken by the user alone.



All maintenance and repair work which is not explicitly permitted and described in the present instruction manual (see clause 9) shall only be carried out by **Zehntner GmbH Testing Instruments** or your authorized Zehntner agent, otherwise all the guarantee and liability claims will expire.



All maintenance and cleaning work of the ZGM 1120 which is described in the present instruction manual shall be carried out only if the glossmeter is disconnected from the USB port of the PC/laptop. Never immerse the device in water or other liquids: **Danger of short circuit!**

### 3. Delivery of device

#### 3.1 Damages during carriage

During carriage the ZGM 1120 is to be handled with the usual care. To ensure carriage without damages the device is to be transported in the original packaging and under normal freight conditions. If the device was supplied in a carrying case or storage box, this original packaging needs to be used also for later shipments. Pushes during carriage are to be avoided.









At the receipt of the goods, you have to check if there are any visible damages at the outer packaging. If the packing is alright, you can sign the receipt of the documents. If you do suspect by your visual impression that damage has occurred, make a note of the suspected damage on the delivery receipt or freight papers and get the carrier to sign it. Moreover, the forwarding agent/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 forwarding agent / courier service immediately liable in the following way: "When opening the parcel we had to notice that .... etc. etc." This superficial checking of the goods has to be done before the time limit of the forwarding agent / courier service expires, which is normally within 7 days. However, the period could be less. Hence, it is recommended to check the exact time limit when receiving the goods.





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

### 3.2 Standard delivery

The following parts are included in the delivery:

1 Glossmeter	
1 working standard	
1 microfiber cleaning cloth	
1 ACC1074 Zehntner USB flash drive with "GlossTools" measuring and examination software	
1 USB-cable	
1 certificate of manufacturer	
1 certificate of calibration	
1 carrying case	

### 3.3 Options

<ul style="list-style-type: none"> <li>• additional working and intermediate standard</li> </ul>	
<ul style="list-style-type: none"> <li>• ACC193 „GlossTools“ Programmierschnittstelle (.NET API)</li> </ul>	
<ul style="list-style-type: none"> <li>• ACC195 RS232-adaption If this option is ordered, the ZGM 1120 has the following special features:           <ul style="list-style-type: none"> <li>- modification connector (instead of the standard USB-cable, a special RS232 to USB-cable is supplied.)</li> <li>- firmware modifications</li> <li>- adaptation of the transmission protocol</li> <li>- documentation</li> <li>- ACC194 RS232 protocol</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• ACC207 USB-foot switch for starting a measurement</li> </ul>	
<ul style="list-style-type: none"> <li>• ACC490 Labview programming interface</li> </ul>	
<ul style="list-style-type: none"> <li>• Special custom-made holders for reproducible measurements on uneven surfaces or very small surfaces</li> </ul>	



**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 3<sup>rd</sup> party suppliers.



## 4. Handling

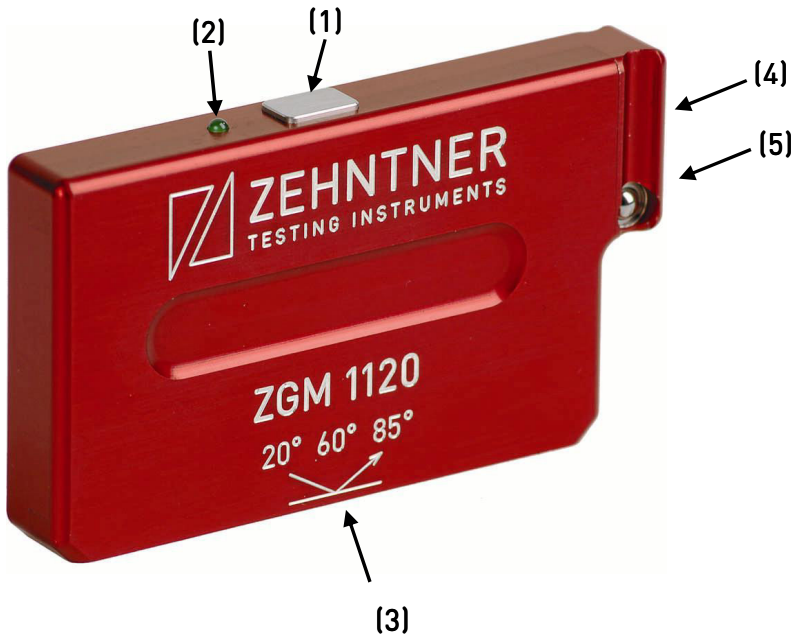
### 4.1 Handling

- ! The ZGM 1120 consists of very sensitive precision optical and electronic parts. Do not drop it and protect it from being bumped or jostled!
- ! Avoid high relative humidity and do not allow water to be performed by condensation.
- ! Protect the device from moisture, chemicals and corrosive vapours.
- ! Do not hold the device by the measurement aperture (3). You should not allow any foreign objects to get into this opening.
- ! Use a soft, moist cloth for cleaning.
- ! For the cleaning of the ZGM 1120 working standard (6) use the supplied microfiber cleaning cloth or alternatively a soft, lint-free cloth as well as window cleaner (must not contain acetone).
- ! Do not store the device in hot or dusty environment. The ZGM 1120 is best stored in the carrying case in which the device has been delivered.

## 5. Operational elements

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

### 5.1 Abridged survey





## 5.2 Key:

- (1) Measuring button: Starts a measurement
- (2) Data transfer indication light
- (3) Opening for measurement, indication of light beam direction
- (4) USB interface – connection to PC/laptop
- (5) Set screw for USB plug
- (6) Zehntner working standard (calibration standard)

## 6. GlossTools software

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



**Do not connect the glossmeter to your PC/laptop unless all installation steps of the "GlossTools" software package have been performed!**

For more information on this unique operating software, please refer to the separate instruction manual.

## 7. Options

### 7.1 ACC193 „GlossTools“programming interface (.NET API)

The ACC193 “GlossTools” 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. Please also refer to the separate instruction manual for “interface API”.

### 7.2 ACC195 RS232-adaption

If the user prefers communication by RS232 interface instead of the USB interface, the optional ACC195 RS232-adaption is required. At this option a modification of the firmware and adaption of the transmission protocol are carried out. Furthermore, a special RS232 to USB-cable is supplied.



If you use the ZGM 1120 with the optional ACC195 RS232-adaption, you need to observe the following additional instructions:

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

## 7.3 ACC207 USB-foot switch for starting a measurement

### 7.3.1 General

By use of the ACC207 USB-foot switch for starting a measurement, you can easily carry out measurements also if both hands are used for holding the ZGM 1120 and the sample. The ACC207 grants facilities especially at small samples or if for precise positioning the ZGM 1120 needs to be held upside down.

### 7.3.2 Configuration

Zehntner configures the ACC207 USB-foot switch for starting a measurement in the way that you only need to connect the ACC207 to your PC/Laptop in order to use it right away.

Please contact Zehntner or your authorized Zehntner agent should you require the configuration instruction regardless.

### 7.3.3 Technical Specifications

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

## 7.4 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. Please also refer to the separate instruction manual for "interface API".

### 7.5 Special custom-made holders for reproducible measurements on uneven surfaces or very small surfaces

Depending on the application area, shape and size of the measuring samples, it is possible that you need a holder or positioning support for the precise positioning of the ZGM 1120. Zehntner may provide such holders or positioning supports. In these cases, you might have to refer to a separate instruction.



## 8. Practical measuring suggestions

### 8.1 How to choose the correct measuring geometry

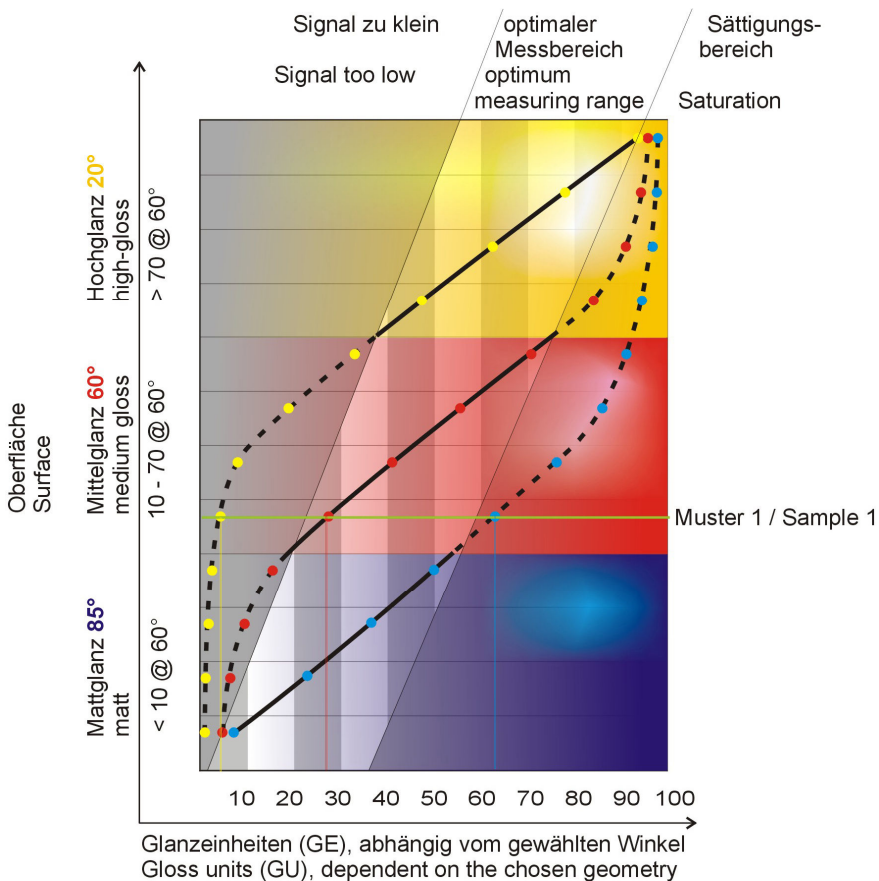
- Medium gloss surfaces are measured by means of the 60° measuring head. This is the convenient geometry for measuring values of 30 to 70 gloss units (in accordance with ISO 2813) or of 10 to 70 gloss units (in accordance with ASTM D 523).
- Surfaces with a gloss value below 30 gloss units should be measured by means of the 85° measuring head.
- For surfaces with a gloss value above 70 gloss units use the 20° measuring head.
- Ceramics and textiles are mostly measured by use of the 45° measuring head.
- The paper industry mostly uses the 75° Tappi T480 or 75° DIN 54502 measuring head. Besides them, also the 20° Tappi T480 and 45° DIN 54502 are common.

All the models of the ZGM 1120 series are equipped with an **automatic adaptation of the measuring range**, which makes them capable of measuring even specimen in the **extended measuring range** with values between 200 and 2000 gloss units. This enables you to **measure** even **specimens with high reflectance** like mirrors or metallic specimens.

The reflectance of non-metallic surfaces increases with the angle of incidence. The reflective properties of metals do not always behave in this manner. Because of double reflection, the light is partially reflected on the coating and partially on the metal underneath. For a complete understanding of the reflective properties of such surfaces, it is recommended to measure them at all geometries.

Basically, proper measurements are only possible on level, **clean** and **unscratched surfaces**.

## 8.2 How to choose the correct measuring geometry in the area of paint industry



If you measure specimen 1 (green line) with a measuring geometry of 60° you will obtain approximately 28 GU. In this case the 60° is the correct measuring geometry.

If you obtain values less than 10 GU, you have to choose the 85° measuring geometry.

If you obtain values higher than 70 GU, you have to choose the 20° measuring geometry.



## 9. Maintenance and cleaning

### 9.1 Maintenance and cleaning work that can be carried out by the user

By the user himself only the following maintenance and cleaning work can be carried out:

- Outer cleaning of the device (see sub-clause 9.2)
- Cleaning of the standard (6) (see sub-clause 9.3)



All other maintenance and repair work shall only be carried out by **Zehntner GmbH Testing Instruments** or your authorized Zehntner agent, otherwise all the guarantee and liability claims will expire.

### 9.2 Cleaning of the device

For cleaning of the **aluminium housing** use a proper, soft cloth and commercially available cleaning agents such as cleaning agent for glass, benzine, acetone or diluent for cellulose lacquers. Do not use strongly acidic or alkaline liquids!



Disconnect the USB-cable from your PC/laptop before cleaning the ZGM 1120. Never immerse the device into water or other liquids!



During cleaning take care that under no circumstances cleaning liquid flows into the interior of the instrument. By this, the function of electrical or optical components could be impaired.

### 9.3 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 a new lint-free cloth, dust-free lens paper or an optical cloth as e.g. the included microfiber cleaning cloth.



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



**Do not use any acetone to clean the standards!**

**10. Technical specification**

geometry	20°	60°	85°
application	<b>automotive, paint, varnish, plastics as well as manufacturing industry</b>		
	high-gloss	semi-gloss	low-gloss
standards	ASTM D 523, ASTM D 2457, BS 3900, EN DIN ISO 2813, DIN 67530		
1-angle	•	•	•
2-angles	•	•	
3-angles	•	•	•
range	0 to 2'000 GU	0 to 1'000 GU	0 to 160 GU
opening area (LxW)	6 x 5 mm (0.24" x 0.2")	8 x 5mm (0.3" x 0.2")	40 x 6 mm (1.6" x 0.24")
measuring area (LxW)	4.2 x 2 mm (0.17" x 0.08")	4.7 x 2mm (0.19" x 0.08")	15 x 2 mm (0.59" x 0.08")
bearing area (LxW)	14.5 x 14.8 mm (0.57" x 0.58")	15.6 x 14.8mm (0.61" x 0.58")	84 x 14.8 mm (3.3" x 0.58")
dimensions (LxWxH)	78 x 56 x 15mm (3.1" x 2.2" x 0.6")	88 x 56 x 15mm (3.5" x 2.2" x 0.6")	99 x 56 x 15 mm (3.9" x 2.2" x 0.6")
For multi-angle versions please refer to the bigger dimension			
weight			
1-angle	76 g (0.168 lbs)	90 g (0.198 lbs)	109 g (0.240 lbs)
2-angles	96 g (0.212 lbs)		-
3-angles	120 g (0.265 lbs)		

geometry	20° Tappi	75° Tappi	45° DIN	75° DIN
application	<b>foils and paper industry</b>			
	high-gloss	low- to high-gloss	high-gloss	low-gloss
standards	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		•		•
range	0 to 2'000 GU	0 to 140 GU	0 to 140 GU	0 to 140 GU
areas:				
opening	30 mm x 12 mm (1.2" x 0.5")		40 mm x 14 mm (1.6" x 0.6")	
measuring (LxW)	10 x 11 mm (0.39" x 0.43")	14 x 6 mm (0.6" x 0.24")	12 mm x 8 mm (0.47" x 0.3")	
bearing (LxW)	128 mm x 19.8 mm (5" x 0.78")			
dimensions	140 mm x 78 mm x 20 mm (5.5" x 3.1" x 0.8")			
weights:				
1-angle	294 g (0.648 lbs)			
2-angles	588 g (1.296 lbs)		588 g (1.296 lbs)	

Interface:	USB1.1 – Universal Serial Bus	
Operating software:	Zehntner GlossTools	
Measuring range:	20°: 0-2'000 GU 60°: 0-1'000 GU 85°: 0-160 GU	
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( $\lambda$ ) adapted	
0 -Directives:	89/336/EEC	
Warranty:	2 years / accumulator without guarantee	

**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
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