

Dokumentation Register Measuring System LUCHS V

Register Measuring System for Printing Process Analysis



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This documentation is valid for devices with a serial number above 0500.
Subject to technical modifications.

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1 General Safety Instructions

The intended use of the LUCHS V Register Measuring System is described in this documentation. Any other uses are not permitted. To ensure your personal safety and to ensure the proper handling of your measuring head you should absolutely read and observe the warnings described in this section and the following sections listed below.

Additionally:

- The country-specific safety regulations must be observed. The LUCHS V Register Measuring System may only be operated by trained and instructed personnel.
- Unauthorized changes to the hardware (register measuring head) and to the software will void the warranty.
- The device is only suitable for use inside buildings at altitudes < 2000 m.
- In the intended application environment, the level of pollution must not exceed pollution degree 2.

1.1 Warning Symbols

	ATTENTION! Indicates a danger to the register measuring system and a possible consequential danger to people.
	Important information for operating the register measuring system.
	ATTENTION! Indicates a danger that can indirectly result from the electrical operation of the register measuring head.
	ATTENTION! Indicates a danger that may arise indirectly as a result of the field of view illumination with ultraviolet irradiation from the register measuring head.

2.1 Performance Features and Possible Applications

The LUCHS V Register Measuring System is the further development of the well-known and reliable LUCHS IV/III Register Measuring System. It consists of the register measuring head with a USB port and special software that is installed on a customer PC or notebook. This device represents precise measuring equipment that has been specially developed for the printing industry. It allows for an objective measurement of the geometric position of multiple printing elements to one another. In order to optimally use all the possibilities of the measuring device, special measuring elements have been developed. Single components of this measuring element are printed in the printing process successively on different printing and varnishing units on the substrate. The result is a complete measuring element. Spacing values, or rather spacing differences, inside the measuring element are a measure for the register deviation which the device captures, manages, mathematically links and evaluates.

The printed measuring element includes the sum of all errors and influencing factors from register problems that are the result of different causes from the printing process.

Because of its objective functionality, the high precision and reproducibility of the measured values allows the LUCHS Register Measuring System to have multiple applications. It can be used for quality control, or rather as proof of quality from printed products, and it can be used as a tool for manufacturer-independent press acceptance tests. It can also be useful to quickly and easily make printing press adjustments and settings or to communicate printing error causes to the press manufacturer.

2.2 CE Conformity

The LUCHS V measuring head conforms to the relevant standards.

2.3 Copyrights/Intellectual Property Rights

Patent applications for SID GmbH as well as national applications for foreign countries within Europe exist for the legal protection of the register measurement with the LUCHS Register Measuring System and for the design of the necessary measuring elements.

The measurement methods as well as the algorithms in the analyzing software of the Register Measuring System are copyright protected.

The copyrights to the components used in the LUCHS Register Measuring System including the standard software lie with their respective manufacturers.

The names of the components used in the LUCHS Register Measuring System including the standard software are normally trademarks of their respective manufacturers.

	Only a qualified specialist is allowed to open the device. Before opening the LUCHS V measuring head, it must be ensured that the device is voltage-free and the connecting cable must be removed.
	When it is assumed that a safe operation of the measuring head is not possible, the device must be turned off and must not be turned back on. Secure the device against accidental startup. It can be assumed that a safe operation is not possible when e.g.: <ul style="list-style-type: none"> • The device has visible damages • The device does not function because of non-discernible reasons • The device has been stored in unfavorable conditions for a long period of time • The device has taken severe transport stress • Liquids have entered into the device.
	Do not use the LUCHS V measuring head in areas with a high explosion risk. Adhere to the operating conditions (5 Operating Conditions).
	12 LEDs are installed on the illumination ring of the measuring head which emit UVC irradiation in the varnish register measurement mode. Observe the instructions for the varnish register measurement mode (7.4.2 Instructions About the Varnish Register Measurement Mode)

Further safety information relating to specific operating procedures can be found in the course of the document.

4 Delivery of the LUCHS V Register Measuring System

4.1 Scope of Delivery

The LUCHS V Register Measuring System is delivered in a carrying case with the following components:

- LUCHS V measuring head
- Special two-sided plug USB2.0 cable (LEMO to USB-A)
- software and necessary driver on an internal data stick; prepared for the automatic installation on a customer PC / notebook
- Customer documentation
- Light shield (only with varnish register measurement option)

4.2 Dimensions

Item	Dimensions	Weight
LUCHS V measuring head	140 mm (L) x 50 mm (W) x 90 mm (H)	550 g
LUCHS V special cable	Length 4800 mm	

4.3 Transport

Transporting and storing the LUCHS V measuring head must be done ensuring protection from dust and moisture. Strong shocks and vibrations must be avoided as well as extreme temperatures and temperature fluctuations.

Transport and storage of the device should always be done in the delivered carrying case. For shipping (e.g. in case of sending to the manufacturer for repairs), the carrying case with the measuring head and the cable must be suitably packed as well, e.g.:

- wrapped in foil
- then packed in a single-wall corrugated box
- with embedded foam packing peanuts (surrounded by 5 cm on all sides).

5 Operating Conditions

The LUCHS V measuring head is constructed for continuous operation. It should be protected from dust and moisture.

- Ambient temperature: +5° C to +30° C (+41° F to +86° F)
- Relative humidity: 30 % to 85 %
- Impact stress: ≤ 5 G

6 Technical Construction of the Register Measuring System

6.1 LUCHS V Measuring Head

The LUCHS V measuring head is used for optically scanning a special measuring element. A measurement field of 12 mm x 16 mm is captured. It contains the following functional elements:

- USB2.0 Hub
- 2 Megapixel USB3.0 camera
- Optical elements (lens, prism) to adapt the measurement field size to the chip size
- USB data stick for software and drivers
- Controller for process control
- Light sensor (Fig. 2) which recognizes the placing and lifting of the measuring head
- Hall sensor (Fig. 3) which recognizes the placed light shield (only with the varnish register measurement option)
- Lighting element (Fig. 3) with current control, on-off and half-load functionality
- Control and display panel (Fig. 1) with two illuminated buttons as well 8 informative LEDs
- USB2.0 port (Fig. 1) for communicating with the customer computer

For the rough positioning of the device, there is a specially prepared opening (viewfinder) in the base plate of the measuring head (Fig. 2). With the help of the viewfinder (19mm x 19mm), the measuring head opening can be positioned on top of the measuring element. The informative LEDs give an indication of the positioning direction. Once the measuring element has been found the measurement will take place automatically. A successful measurement is signalled by all 8 informative LEDs shortly blinking.

An acoustic tone from the measuring head confirms a button press and will, in addition to the informative LEDs, give a signal for a measurement taking place. The volume of the acoustic tone is set in the software.

The power supply for the measuring head is given solely by the USB2.0 connection. A prerequisite for this is a computer that has a USB port that can supply 500mA.

6.2 LUCHS V Measuring Head Cable

The USB2.0 connection cable used has a strengthened wire for the power supply due to its length and its necessary power requirements. Furthermore, the measuring head end of the cable has a plug suitable for industrial use.

While connecting the measuring head cable, it is necessary to keep in mind that the plug on the measuring head end has a snap-in locking system. A noticeable snap of the plug is to be ensured when connecting the cable. The cable is unplugged by pulling on the angled plug in the opposite connection direction.

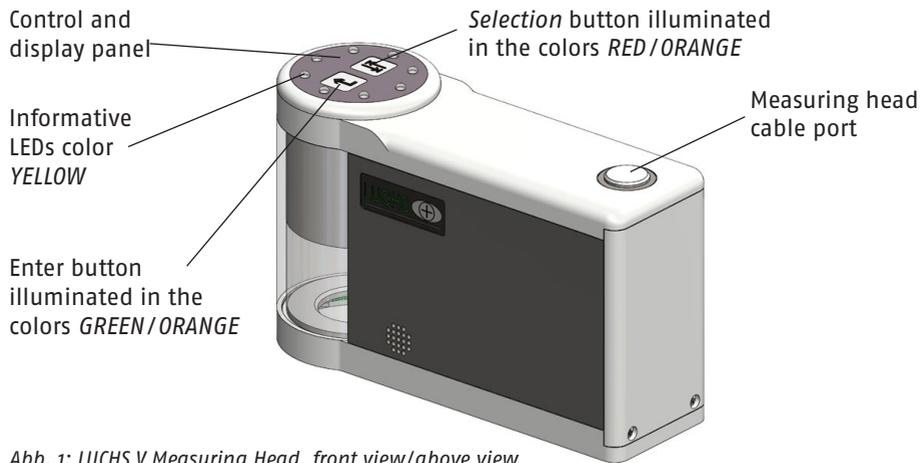


Abb. 1: LUCHS V Measuring Head, front view/above view



Abb. 2: LUCHS V-Measuring Head, base plate view



Abb. 3: LUCHS V-Measuring Head, rear view

6.3 Customer Computer (Requirements)

To operate the Register Measuring System, the customer must prepare a PC or Notebook themselves.

Recommended System Requirements:

- 2,13 GHz Quad Core CPU
- 8 GB RAM
- SSD with min. 500 MB of free storage space
- Windows 10 operating system or higher is necessary (Permitted language versions German or English)
- USB2.0 port with a power rating of 500mA

Minimum System Requirements:

- Min. Min. 2.13 GHz Dual Core CPU
- Min. 4 GB RAM
- Min. 500 MB of free storage space
- Windows 10 operating system or higher is necessary (Permitted language versions only German or English)
- USB2.0 port with a power rating of 500mA

Using the minimum system requirements may lead to limited operation (e.g. stuttering video display).

PCs with a front-panel USB port do not always have the required connection requirements for the LUCHS V measuring head.

7. Application and Operation of the Register Measuring System

7.1 Information About Connecting the Measuring Head to the Computer

- Connect the measuring head to a USB port with a secure contact.
- Pay special attention that the plug is firmly connected.
- Make sure that the plug cannot be accidentally pulled out.
- Lateral tensile loads on the plug that can take place by pulling on the cable, for example, are to be absolutely avoided.
- Never disconnect the measuring head from the computer when the measuring software is in use.
- Wait until after the software has quit and after the measuring head has been removed from the system (all LEDs are turned off, only the red button is illuminated) before disconnecting the measuring head.

7.2 Installing and Updating the Software

7.2.1 Quick Guide, Software Installation

1. Save any open files and close any running programs.
2. Connect the LUCHS V measuring head with the USB plug on your chosen computer. If a desktop PC is being used, please use a USB plug that is in the back of computer and not on the front panel.
3. Press the red illuminated button (Fig. 1) on the measuring head for about 5 seconds until the LEDs blink shortly and an acoustic tone is given.
4. A folder called *LYNXHEAD* will open on the display as a removable disk with the executable file *LynxSystemSetup.exe* shown. If the display does not start automatically, please open Windows Explorer and search for the drive there.
5. Start *LynxSystemSetup.exe* by double-clicking the file.
6. Answer the question as to whether the server should check for updates and download them with Yes if your computer is connected to the Internet. Otherwise, skip this step and answer No.
7. Install the LUCHS software by selecting one of the installation types and then clicking the *Install...* button next to it. You need administrator rights for installation via an installation program, but not for the file copy installation type.
8. If you want to use the register measuring system including the measuring function, you must install the drivers for the camera and interface communication in addition to the LUCHS software, if these are not already installed on your computer. You need administrator rights to install these drivers. Start the installation via the corresponding button *Install...*
9. Once the LUCHS software has been successfully installed, you can run the software directly using the Start Luchs software button.

7.2.2 Starting the Assistance Program LynxSystemSetup

The program can be started via the LUCHS software interface. Under Settings  *Informationen*, press the *Start LynxSystemSetup.exe* button, which closes the LUCHS software and starts *LynxSystemSetup* program.

Another option is to start the program from the measuring head. To do this, proceed as explained in points 3 to 5 of the section *Quick Guide, Software Installation*. Please also read  7.2.4 Synchronisation with the Measuring Head.

7.2.3 Updates

Every time you start the *LynxSystemSetup* program (and the last check for updates was more than 30 seconds ago), you will be asked in a dialogue whether you want to check for server-side updates and download them. If your computer is connected to the Internet and you answer this question with Yes, more up-to-date installation packages than those installed or available locally will be downloaded.

With the exception of the *LynxSystemSetup.exe* program itself, which is updated immediately after downloading, the other installation packages are only stored locally and are ready for installation. This is displayed on the user interface and the corresponding *Install...* button is active.

By clicking on the *Install...* button, you can update the corresponding software component.

The installation programs for the camera and interface drivers may report that it is only possible to install the newer driver if the old driver has been uninstalled first. To do this, you must uninstall the driver yourself via *Control Panel / Programs and Features*.

Please also read  7.2.3 Information about installing the camera driver.

7.2.4 Synchronisation with the Measuring Head

The LUCHS V measuring head has an integrated USB drive on which installation packages can be saved in addition to the calibration data. Whenever the storage of the measuring head is accessible, the installation packages with the latest versions are synchronised between the measuring head drive and the local *LynxSystemSetup* storage after the *LynxSystemSetup* program has been started and updates have been downloaded. This ensures that the latest installation packages are always available locally and on the measuring head after this action. This has the advantage that the required software can be installed and kept up to date on computers without an internet connection using the measuring head as a transport medium.

If you connect a measuring head synchronised with current installation packages to a computer that has LUCHS software of older versions and start *LynxSystemSetup* from the measuring head, the more recent installation packages are transferred to this computer and are available there for installation.

Press and hold the red illuminated *selection* button (Fig. 1) on the measuring head for approx. 5 seconds until the LEDs on the measuring head light up briefly and an acoustic signal sounds to activate access to the measuring head storage. The *LYNXHEAD* drive will then be displayed in your computer's file system. You should, however, carry out this activation before starting *LynxSystemSetup*, as the program only checks the presence of the measuring head storage in the system when the program is started.

To carry out synchronisation with the measuring head, start the *LynxSystemSetup* program from the measuring head as described in the first 6 points of the *Quick Guide, Software Installation* section in Chapter  7.2.1 *Quick Guide, Software Installation*.

7.2.5 Information About Installing the Camera Driver

After installing or updating the camera driver, you may encounter a situation where the video system cannot be initialised when starting the LUCHS software. You will then receive the error message *"Error starting the system..."*. In this case, first try to re-initialise the video system within the LUCHS software under Settings  *Informationen* by deactivating the *Use hardware* checkbox and then activating it again.

After a few seconds, initialisation should be complete and a green entry indicating the detected camera should be visible under *Settings > Information > Video system*.

If this is not successful, restart Windows and try again.

7.3 Information About Verifying the Calibration Data Between the Computer and Measuring Head

7.3.1 Comparing the Calibration Data Between the Computer and Measuring Head

This step is necessary,

- After receiving the measuring head again after maintenance,
- When using a loaned device,
- After moving the measuring head to another computer or
- After calibration.



To measure with a measuring head, the Luchs software requires the current measuring head-specific calibration data stored locally on the computer used. (...*Public Documents/Lynx Essentials/Service/CALC***.INT*)

Comparison Procedure:

- Start the Luchs software with the measuring head connected.
- Go to *Settings > Informationen*.
- Now click on the *Check calibration data on measuring head* button.
- The calibration data stored locally on the computer and on the measuring head are then compared based on their creation date or existence. The older data is overwritten with the newer data or non-existent data is replaced.
- In this context, various information windows open, which then close automatically.

7.3.2 Loading the Camera Default Settings

It is necessary to load the camera's default settings,

- If the video image is inverted (resulting in inability to measure).
- If there are clearly recognisable changes in the video image compared to the last use (e.g. very dark, very bright, excessive red, green or blue), which leads to an inability to measure or poorer measurement capability.

Procedure:

- Go to *Settings > Informationen* and click on the *Service* button.
- A new window opens. Check the *Video settings* checkbox in the left-hand area.
- Now switch to the new *Video settings* tab.
- Click on the *Use factory settings* button.

7.4 Operating the LUCHS V Register Measuring System

7.4.1 The First Measurement with the LUCHS V Register Measuring System

Connect the measuring head with the USB cable to the computer. The measuring head will then automatically initialize. You can recognize that the head is initialized when all the displays and lights blink shortly.

Open the LUCHS V software and select the *Datasource* menu tab with the left mouse button.

Step 1: Selection and Name of the Storage Location

- With the mouse, select a free storage location (grey background when selected).
- By double clicking, you can give the measurement series a description.

Step 2: Measurement

- Switch to the menu tab *Measurement*.
- You will see on the right-hand side of the window a camera image from the measuring head.
- Now place the measuring head with the measurement opening on a measuring element (Fig. 4/5).
- Attention: Measuring elements for LUCHS III (Fig. 5) are only measurable when the top edge of the measuring element is showing to the closed part of the measuring head!
- Once the measuring element is captured, a signal tone is given and the yellow, circle-formed informative LEDs on the measuring head will blink.
- Continue with all further measuring elements in the same way.
- Please make sure that the measuring head is always placed in the same direction (do not turn).
- Once a complete sheet is measured, take the next sheet and continue as explained above. A double acoustic tone is given when a sheet change has been recognized.

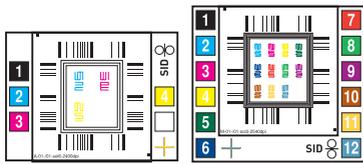


Abb. 4: LUCHS IVIV Measuring Elements

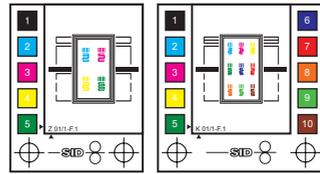


Abb. 5: LUCHS III Measuring Elements

Schritt 3: Viewing Measured Values

- In the left-hand side of the window, a preview of the results is shown once the second sheet measurement has begun. Should that not be the case you can activate it through double clicking on the window with the mouse.
- The important measurement information (number of measuring points, number of measurements, maximum and average standard deviation) is shown in the measured value graph display.

In the "Results" menu tab you can now view the measured value progression and the different statistical evaluation possibilities.

7.4.2 Information About the Varnish Register Measurement Mode

The LUCHS V register measuring system can also be used to measure the register of varnishing units in relation to a reference printing unit in addition to the standard colour register measurement.

This option can be purchased additionally when buying a new measuring head.

The measurement is carried out in much the same way as the measurement of the colour register (→ 7.4.1 The First Measurement with the LUCHS V Register Measuring System). In this case, however, UV light is used to illuminate the field of view and different measuring elements are used.

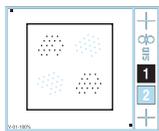


Abb. 6: Measuring element for the varnish register

For this purpose, the illumination ring is equipped with an additional 12 LEDs that emit UV-C irradiation to make the colourless varnish visible. The LEDs are switched on when the measurement mode of the current measurement series is a varnish register measurement.

However, these LEDs are only activated and emit irradiation

- if the light shield has been placed over the measuring head or
- when the measuring head is placed on a flat surface in the area of its light sensor (Fig. 2).

It is therefore only possible to measure the varnish register with the light shield in place. Only the video preview in the Measure view of the software is available for positioning the measuring elements on the measuring sheet.



Although the irradiation of the LEDs used is very weak, prolonged contact with direct irradiation can cause the following damage:

- Damage to the eye, such as conjunctivitis and corneal inflammation.
- Damage to the skin due to damage to the genetic material of skin cells.

Therefore, do not override the protective devices of the measuring head and do not look into the reflected or direct UV irradiation.

7.5 Documentation About the LUCHS V Register Measuring System

The help document is available in PDF format in English and German.

To display the document in the selected software interface language, click on the "H" button at the top right-hand corner of the user interface.

8 Care and Maintenance

8.1 Care Instructions

The LUCHS V measuring head is a precise optical measurement device. It is to be handled carefully. Hard impacts or shocks are to be avoided as well as pulling on the measuring head cable.

To clean the outside of the device, a dry lint-free anti-static cloth should be used. Any printing ink residue on the anodized base plate of the measuring head can be cleaned with a solvent (e.g. Isopropyl) when necessary.

From time to time it is recommended to clean the optics of the measuring head with compressed air. Dust and paper deposits that are in direct contact with the lighting element can also be carefully removed with compressed air.

8.2 Replacing Components

8.2.1 General Information

All LUCHS V register measuring head components are designed for industrial use. In general, any replacements are not necessary when the measuring head is carefully used. Should a replacement nevertheless be necessary after a longer operating lifetime, the following components can be replaced by the end-user which are supplied by the manufacturer:

- Measuring head cable
- Base plate
- Acrylic housing tube

8.2.2 Replacing the Measuring Head Cable

Replace this cable only with one supplied by the manufacturer.



The use of a substandard USB cable can lead to an undefined operating state of the LUCHS V measuring head due to an insufficient power supply. If the internal power of the measuring head falls below a level of 4.4V, the top button will quickly blink between red and orange. The measuring head is not ready for use!

➔ For installation information see 6.2 LUCHS V Measuring Head Cable.

8.2.3 Replacing the Base Plate

1. Remove the four visible base plate screws with a suitable screwdriver. (Pay attention that the tool being used has an exact fit as the screws are very tight. Otherwise, the screw heads will wear out and will make removing the screws impossible.)
2. Carefully remove the base plate.
3. Mount the new base plate and pay attention that the screws are tightly fit and that there is no ridge projecting above the base plate face.



Phillips head screws to be unscrewed

Abb. 7: Base plate replacement

8.2.4 Replacing the Acrylic Housing Tube

1. Remove the back cover of the measuring head with a suitable screwdriver (two Phillips head screws).
2. Dismantle the base plate as described in 8.2.3 Replacing the Base Plate.
3. Unscrew the four identical Phillips head screws M2.5 until a clearance of 2-2.5 mm is given.

4. Carefully pull the upper and lower covers as far apart as allowed by the clearance of the loosened screws.
5. The acrylic housing tube can now be pulled out and replaced.
6. Press the upper and lower covers back together. Pay attention that the fit is correctly engaged.
7. Tighten the four Phillips head screws. Also, pay attention to the correct position of the side sections.
8. Mount the base plate back in place. Pay attention that the screws are tightly fit.
9. Finally attach the back cover.

Pull upper and lower covers 2-2.5 mm apart



Unscrew the four Phillips head screws 2-2.5 mm

Abb. 8: Acrylic housing tube replacement

9 Response in Case of Malfunctions

9.1 In General

First, re-read Section 7.1 Information About Connecting the Measuring Head to the Computer in this handbook.

For hardware malfunctions, first check for obvious problems, for example:

- Loose USB plug connections
- Damaged cable
- Control software has not been started

If these solutions do not solve the problem it is possible to contact the manufacturer support by telephone. An exact as possible error description should then be given.

9.2 Repairs and Service

In case of a defect, the device must be sent to the manufacturer. The owner assumes the risk of damages or loss during transport. Send the device only in its original packaging or equivalent packaging.

10 Warranty

A warranty claim for the LUCHS V measuring head exists within the scope of the contractual agreement. If the device becomes inoperable during the warranty time period it will be repaired or replaced free-of-charge by the manufacturer; exceptions to this are the cases listed below.

- The warranty shall be implemented through repairs, through the exchange of a new measuring head or through the exchange of a different repaired, refurbished measuring head.
- The warranty is void for measuring heads that have been damaged accidentally or purposefully through misuse or natural catastrophe or through unauthorized intervention.
- Damages due to the non-observance of the guidelines presented in this documentation, through improper handling, non-observance of the measurement instructions and changes to the software (e.g. viruses) are excluded from the warranty.
- The warranty exclusively refers to the functionality of the product and not to consequential damages associated with the operation of the register measuring head.

In order to obtain the described warranty, send the device within the warranty time period to the manufacturer. Also in this case the owner assumes the risk for damages or loss during transport. Send the device only in its original packaging or equivalent packaging.

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11 Entsorgung

PITSID Polygraphische innovative Technik Leipzig GmbH is responsible for the disposal of old LUCHS V series devices (measuring heads and accessories) sent in. The latest applicable guidelines and safety regulations must be complied with when disposing of the equipment yourself.



The LUCHS V measuring head must be disposed of as electronic waste in accordance with the applicable laws. PITSID Polygraphische innovative Technik Leipzig GmbH is registered in the WEEE directive (Waste Electrical and Electronic Equipment) register under WEEE reg. No. DE73410149.

12 Technical Data

General Information

Name	LUCHS V Register Measuring System
Serial-No.	31-0105.0/0
Device-No.	See name plate or given in the control software
Manufacturer	PITSID – Polygraphische innovative Technik Leipzig GmbH
Dimensions Measuring Head	145 mm (L) x 50 mm (W) x 90 mm (H)
Length Measuring Head Cable	approx. 4800 mm
Weight Measuring Head w/o Cable	550 g
Weight Measuring Head Cable	210 g
Supply Voltage	5VDC (USB connection)
Power Consumption	< 500 mA
Fuse Type	Self-resetting

Operating Conditions

Operating Temperature 5° C bis +30° C (+41° F to +86° F)

Storage Temperature -10° C bis +50° C (+14° F to +122° F)

Humidity 30 % bis 85 % non-condensing

Optimal Measurement Conditions

Operating Temperature +20° C bis +25° C

Humidity 40 % bis 70 %

13 Replacement Parts List

Replacement Part	Remarks	ID No.	Delivery Time
USB Connection Cable (USB-A plug straight to LEMO; Length 4.8 m)	min. AWG 28/24 (golden contacts)	31-0083.0/0	2 Weeks
Base Plate	Base plate incl. light sensor window	31-0115.0/0	2 Weeks
Acrylic Housing Tube		31-0169.1/0	2 Weeks