OPERATION MANUAL

FLUXMETER

FLUX-CHECK 250

Firmware Version 740 and up

2025-03

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INTRODUCTION

The compact List-Magnetik **FLUX-CHECK 250** fluxmeter is a handheld instrument of this size for determining the magnetic flux Φ (Phi) of a magnet system or a single magnet.

When testing a permanent magnet or magnetic system, the key question is what is the quality of the magnet and how strong is the magnetization of the magnet. Measuring the magnetic field strength with a magnetic field meter is only possible at certain points and does not take into account the volume of the magnet. This task is performed by a fluxmeter. Technically, the **FLUX-CHECK 250 fluxmeter** is an electronic digital voltage integrator.

In combination with the List-Magnetik **Helmholtz Torque Coil HM-2**, the magnetic flux of permanent magnets can be determined very precisely, since the entire volume of the magnet is measured, regardless of its position. The effect of the magnet on the coil is measured as an electrical voltage and converted to a flux value. In addition to the Helmholtz **HM-2** torque coil, all types of coils or coil probes can be connected to the instrument. The **FLUX-CHECK 250 fluxmeter** has a very high input resistance of 33 kΩ, so that the measuring error is negligible when connecting any coil probes, even with high internal resistance.

In addition to the magnetic flux Phi, other information about the coil and the measured magnet can be recorded in the instrument and used to calculate additional information:

- The number of turns of the coil (n) - this is used to calculate the "real flux".
- The coil constant of the Helmholtz coil - this is used to calculate the "magnetic moment".
- The volume of the magnet - this is used to calculate the flux density B

It offers flexible data storage, a combined digital and analog display, and peak-to-peak measurement. The wireless interface allows data to be transferred to a Windows PC and to apps for Android and iOS. The USB interface allows permanent connection to an external power source.

WARNINGS AND HAZARDS

Do not use the unit in an explosive environment.

The manufacturer is not liable for any consequential damage resulting from the use of this equipment.

Please read the entire instruction manual before using the equipment.

We reserve the right to make changes to this manual and the product without prior notice.

QUICK START GUIDE

- First connect the probe cable to the coil and the instrument.
- Switch on the **FLUX-CHECK 250** with the red on/off button.
- An automatic zero adjustment is performed when the instrument is switched on. There must be no magnet in the coil.

GENERAL INFORMATION ON MEASURING UNITS

Four different values can be determined with the FLUX-CHECK 250 fluxmeter. The four values have different units and are therefore not comparable. These values are included separately in the statistics so that a minimum/maximum/average value can be analyzed.

MAGNETIC FLUX Φ (FLX)

Magnetic flux Φ (Phi) is a scalar physical quantity used to describe the magnetic field. It can be thought of as the sum of all magnetic field lines or the "strength" of a magnet.

The unit of magnetic flux is the SI unit Wb (Weber) or the identical volt-second, which is also commonly used. Both are expressed with a factor of 10^{-3} (milli-), i.e. mWb or mVs.

Magnetic flux measurements are displayed in memory and statistics with the abbreviation FLX.

REAL FLUX (FLN)

The real flux value is the magnetic flux divided by the number of turns of the connected coil.

Real flux value Φ (FLN) = flux value Φ (FLX) / number of turns N

The unit of the real flux is mWb/n or mVs/n, for high numbers of turns it makes sense to change to the next smaller unit 10 -6 (micro-): µWb/n or µVs/n.

Measured values of the real flux are displayed in the memory and statistics with the abbreviation FLN.

MAGNETIC MOMENT (FLM)

The **magnetic moment** (dipole moment) is a physical quantity that describes how strongly a system responds to an external magnetic field. It is a vector quantity that indicates both the direction and the strength of a magnetic field at a given point. The magnetic moment can be calculated if the measurement constant of the connected coil is known.

*Magnetic dipole moment (Φ*cm) =*
*Flux value Φ (FLX) * coil measuring constant [cm]*

Units for the magnetic moment are mVs·cm and mWb·cm, as well as the next smaller unit 10^{-6} (micro-) µVs-cm and µWb-cm.

Measured values of the magnetic moment are displayed in memory and statistics with the abbreviation FLM.

MAGNETIC FLUX DENSITY (FLD)

Magnetic flux density B, also known as magnetic induction or magnetic field, is a physical quantity that describes the strength and direction of a magnetic field at a given point. It indicates how strong the magnetic field **Br** of a magnet is. The Br and I_Hc values of the magnet material are always given in the magnet manufacturer's specifications (hysteresis curve). The Br value can be calculated using a fluxmeter and a Helmholtz coil; the magnetic volume of the magnet must be entered into the fluxmeter.

Magnetic flux density B (mT) (FLD) =
Coil measuring constant [cm] x flux value Φ (FLX) / magnetic volume [cm³]

The flux density can be displayed in A/cm and mT. The factor between A/cm and mT is 1.256 (as a rule of thumb: 4 A/cm ~ 5 mT).

Measured magnetic flux density values are displayed in memory and statistics with the abbreviation FLD.

DISPLAY STRUCTURE

The display is divided into 5 sections.

The **status bar** shows the title of the current menu position and the battery status.

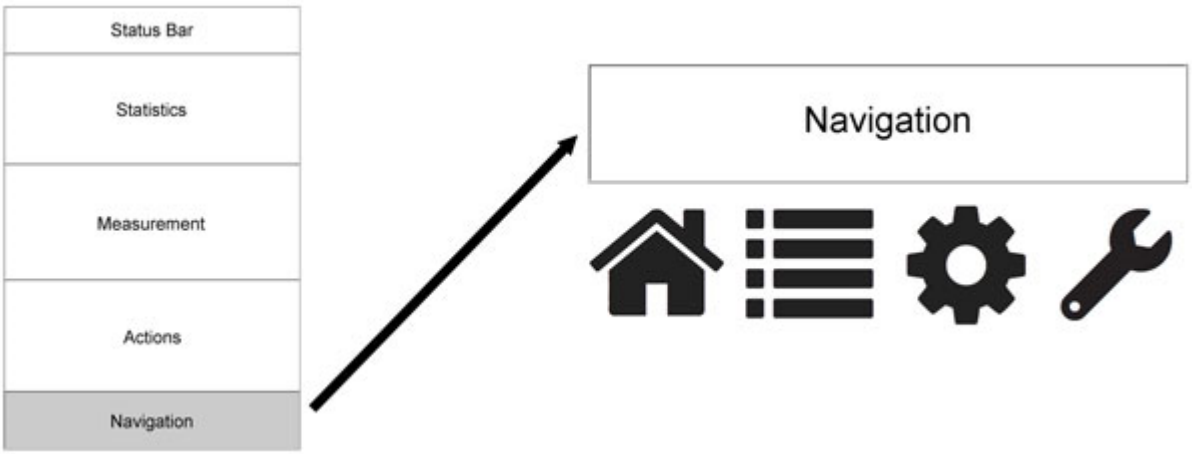
The **statistics** area displays statistics for a series of measurements. If no memory batch is active, the List-Magnetik logo is displayed here.

In the center is the **measurement** display with the current measurement and additional information about it.

Depending on the current display, there are symbols in the **action** area that trigger appropriate processing and special functions.

NAVIGATION

At the bottom of the screen is the **navigation** area. Here it is possible to jump to different service areas.



	Measurement "Home": Here you can always return to the measurement
	Data Log The individual measurements of the currently active memory batch or, if the data logger is off, of the last active memory batch are displayed.
	Setup This section allows you to set the language, unit of measure, and other measurement and display parameters, as well as power management settings.
	Info and System Turn off the unit, view hardware and software status, or perform a factory reset.

MEASUREMENT

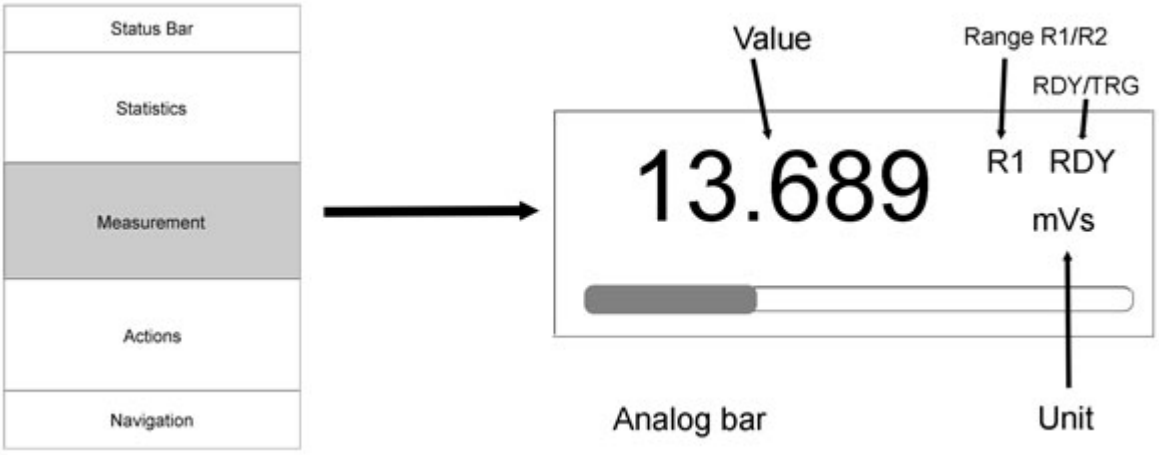
	**This icon in the navigation will take you directly to the measurement**

The measured value, measuring range and unit of measurement are displayed in the middle section.

The color of the reading is black. If limit values are set, the measured value is displayed in blue if it is below the lower limit value and in red if it is above the upper limit value.

Below the reading is an analog bar graph. **When limits are set, the bar represents the range between the lower and upper limits.** The bar is complete when the value falls below the lower limit or exceeds the upper limit.

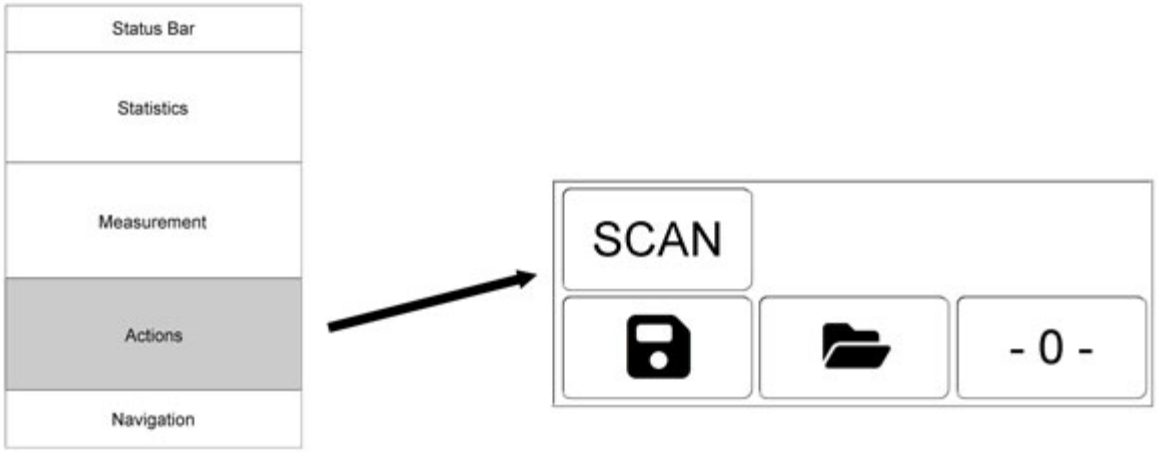
If you want to store a measurement, you can add the current measurement to the current memory batch by briefly touching the diskette icon. This is confirmed by a beep. The statistics of this memory batch are displayed in the area above the measurement display as in normal measurement.



If you have activated a memory batch, the statistics for this memory batch will be displayed in the area above the reading instead of the logo.

Actions

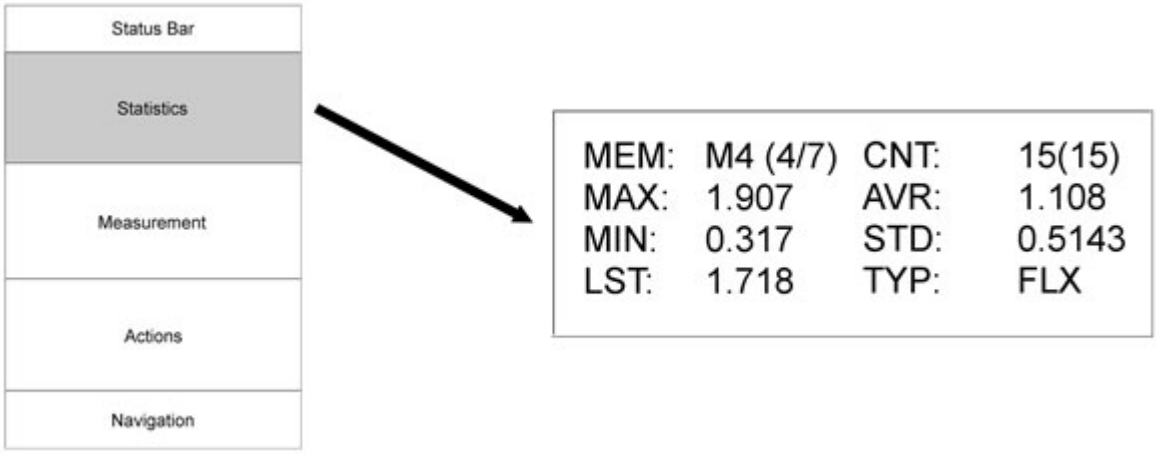
Overview of the action area in the measurement display.



	When the floppy disk icon is displayed in normal color like the other buttons, you can tap it to save a measurement. If the floppy disk icon is not visible, no memory batch is active. **Please note when using Lima Connect:** If the floppy disk symbol is active and the device is connected to the Lima Connect app (Windows, Android, iOS), the measured values are transferred immediately and are available as an online measured value in the app. If the floppy disk symbol is inactive, no online measurement can take place.
- 0 -	Zeroing the measurement.
	To activate a memory batch, switch to data log management with this icon "Folder". From the moment of activation, measurements can be stored
SCAN	Special Function Scan Measurement See separate chapter " Special Measurement Methods ".

Statistics display

Only when a memory batch is active, a statistical evaluation of the previous readings of this memory batch is created.



The statistics shown in the example state:

Memory batch number 4 is active (M4). There are 7 memory batches in total (4/7).

A total of 15 values are stored in this batch 4.

Maximum, minimum, average and standard deviation are calculated from these 15 values.

The last stored value was 1.718

The measured values are of type FLX (flux measurement in mVs or mWb)

MEMORY MANAGEMENT

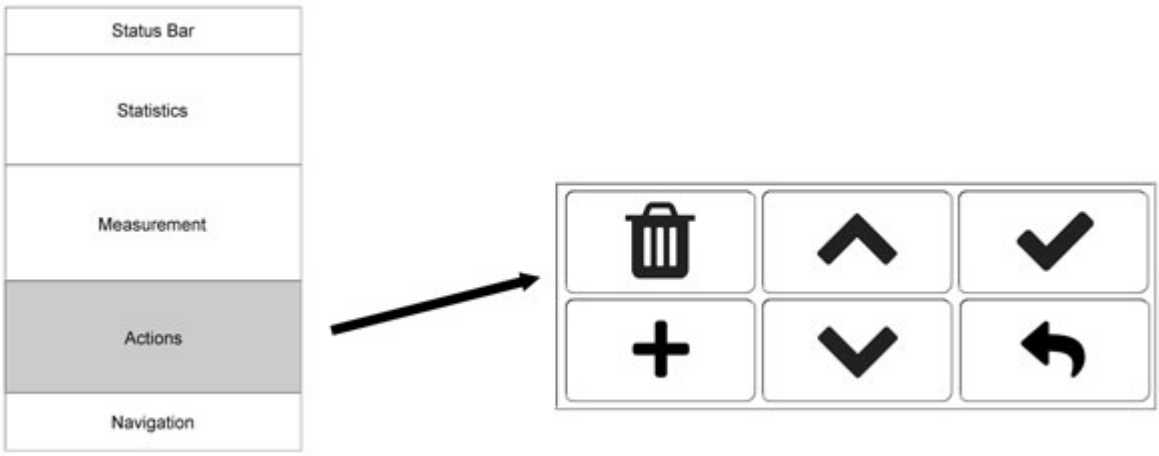
Memory batches hold both automatically stored single measurements and values actively stored during continuous measurement. The scan batches are separately managed memory batches and are not considered here.

You can create any number of memory batches. The batches are assigned a unique free number and a leading "M". A maximum of 10,000 measurements can be stored in the M memory batches.

If you have not created or activated a memory batch, the floppy disk icon will not be visible during the measurement.

Actions

Overview of the action area in the data log.



	Back to measurement
	Create a new memory batch. You can enter additional text to describe the new series of measurements. The newly created memory batch is active immediately. After returning to the display, the disk symbol is highlighted and the next measurement is recorded in the memory batch.
	Scroll through the memory batches. The additional text entered will be displayed. You can view the individual values by clicking on the navigation icon of the data log. 
	Select a memory batch for immediate use
	Delete the currently displayed memory batch

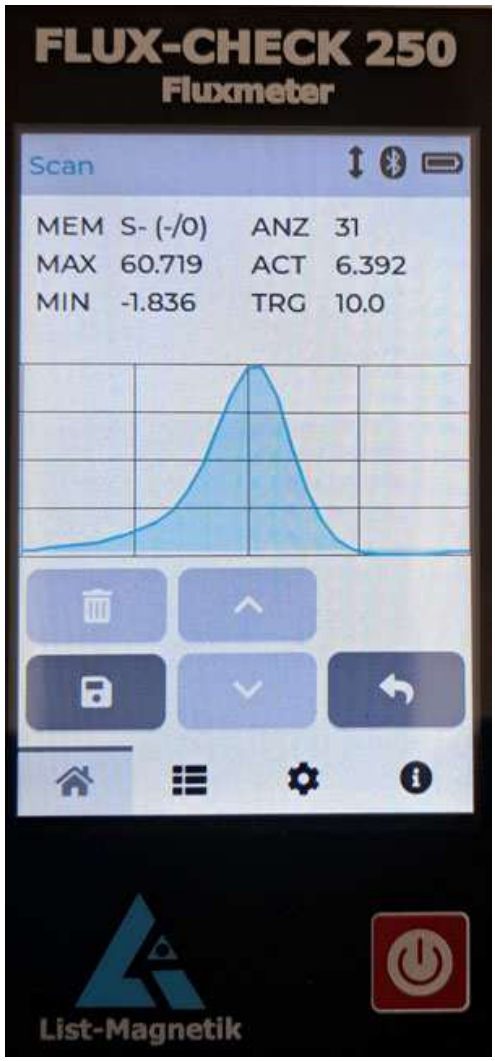
SPECIAL MEASUREMENT METHODS

SCAN

The scan measurement function records the pulse curve of the induced voltage, the area highlighted in blue gives the integral value with the flux value **ACT**. It is a detailed display of the flux curve Φ.
During the scan measurement, only the flux value is displayed, not the values converted from it.

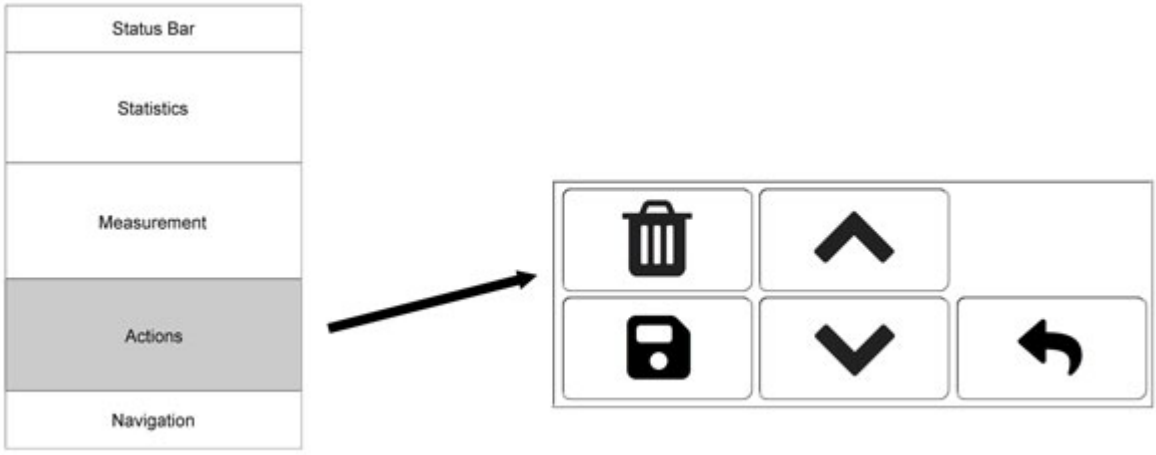
Insert the magnet into the Helmholtz coil. You will then see the pulse curve with the underlying area of the curve, the integral of the flux value. This area corresponds to the measured value in mVs or mWb.

ACT indicates the current integrated flux value. **MAX** and **MIN** indicate the maximum and minimum values of the pulse curve. The TRG value is the currently set trigger level from Setup / Probe Settings.



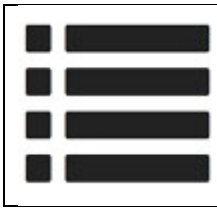
Actions

Overview of the action area in the scan measurement display.



	Back to normal measurement
	Save the scan process. You can enter a short text that will be displayed later when scrolling below the statistics. You can create as many scan memories as you like. The memory batches are given a unique free number and a prefixed "S"
	Browse through the saved scans. The statistics, short text, and graphical progress curve are displayed
	Delete the currently displayed scan

DATA LOG

	**This icon in the navigation takes you directly to the data log.**

When you navigate to the data log, the measurements of the current M memory batch are displayed. The current M batch is the same as the one shown in the reading display on the left, whose statistics are displayed above the reading.

For each entry, the current number, date and time of the measurement are displayed in the format MM-DD hh:mm (month, day, hour, minute), the DC/AC field type, and the measured value.

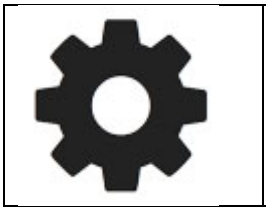
"PDC" and "PAC" indicate that the measurement was a DC peak or an AC peak, respectively.

The color of the reading is black. If limit values are set, the measured value is displayed in blue if it is below the lower limit value and in red if it is above the upper limit value.

Tapping a line inactivates the reading and marks it for deletion; it changes color and is crossed out. Tap again to reactivate the reading.

	8 readings are displayed per page. You can use the scroll buttons to view the next/last 8 values.
	The trash can icon deletes the entire series of measurements. The memory batch remains active, however, so that further measurements will be written to this memory batch.
	If an individual reading is inactive, it can be permanently deleted by clicking the scissors icon.

SETUP

	**This icon in the navigation takes you directly to the setup.**

DISPLAY

Language, backlight and volume can be adjusted in the display menu.

LANGUAGE

The available languages are English, German, Italian, French and Spanish.

After changing the language, the unit will shut down and must be restarted.

BACKLIGHT

You can use the slider to make the display brighter or darker. Higher brightness uses more power.

VOLUME

Use the slider to adjust the volume of the beep.

POWER

You can set the automatic shutdown time: 5 minutes, 10 minutes, 30 minutes or "never off" if you do not want the device to turn off automatically.

The power save mode switches the brightness back to 10% after 1 minute.

PROBE SETTINGS

TRIGGER LEVEL

The instrument operates digitally and has no drift as in analog instruments; a trigger value is specified from which the measurement starts. The previous drift value is automatically taken as the zero value and used as the offset. This results in a very high accuracy of the measurement without the need to manually reset the measurement to zero.

In the vast majority of cases, measurements can be made with a trigger value of 1.0; only for very low flow values (less than 1.0 mVs) can the trigger value be set to 0.2.

RANGE

The device has 2 measuring ranges that must be preselected.
Range 1 measures from 0 - 10 mVs,
Range 2 measures from 10 - 250 mVs,
If the measuring range is changed, the trigger level may need to be adjusted.

MODE

4 different measurement types are possible. These measurement types are described in the introduction. Here you can choose whether flux (magnetic flux), flux/n (real flux), magnetic moment or flux density should be determined.

UNITS

The unit selection options depend on the selected measurement type.

Magnetic flux can be displayed in the SI unit Wb (Weber) or in the identical volt-second unit. Both are displayed with a factor of 10^{-3} (milli-), i.e. mWb or mVs.

In the case of real flux, where the number of turns is included in the measurement, you can choose between mVs/n and mWb/n, as well as the next smaller unit 10^{-6} (micro-) for high numbers of turns.
The unit 10^{-6} (micro-) can be selected.

For the magnetic moment, mVs·cm and mWb·cm can be selected, as well as the next smaller unit 10^{-6} (micro-).

Flux density can be displayed in A/cm and mT. The factor between A/cm and mT is 1.256 (rule of thumb: 4 A/cm ~ 5 mT).

PARAMETER

In the Parameters menu, constants can be set that describe the Helmholtz coil or magnet used and are required to determine the real flux, magnetic moment and flux density.

The coil constant in cm and the number of turns, are fixed values that can be found in the technical data sheet of the coil.

The volume in cm^3 describes the measured magnet, this value is included in the flux density.

LIMITS

Setting an upper and lower limit influences the display of the measured values. The values must always be entered in the selected unit of measurement.

Upper limit value exceeded: measured value red
Falling below the lower limit: measured value blue

The color change occurs both in the measurement display and in the data log.

AUTO SAVE

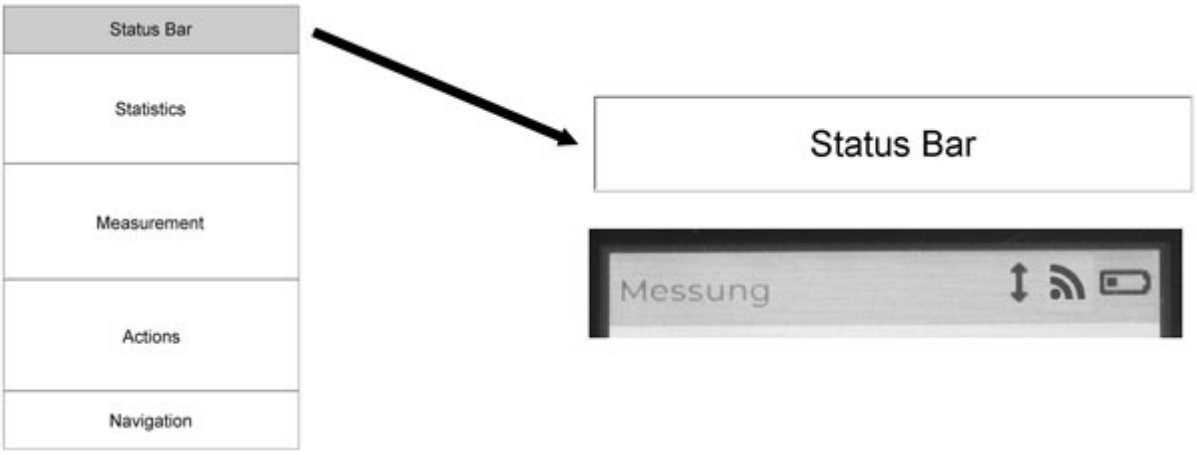
If "Auto Save" is active (slider to the right, black switch), every measurement is saved.

If "Auto Save" is inactive (slider to the left, gray switch), the measurement is only saved when the floppy disk icon is pressed.

INFO AND SYSTEM

	This icon in the navigation takes you directly to the info and system functions.

STATUS BAR



The system display includes the contents of the status line. The status line shows the menu position on the left, and there are three symbols on the right for probe, wireless and power supply.

The symbol for the probe and for wireless is highlighted when an action takes place: for the probe a measurement, for wireless a data transfer.

The power supply is either an external power supply via USB or a battery with an approximate remaining capacity.

POWER OFF

There are two ways to turn off the unit: press and hold the red on/off button until you hear the beep, or use the System Menu to turn off the unit.

DATE & TIME

Date and time can be set manually or via the PC application **Lima Connect**.

When setting manually, please note the notation xxxx-xx-xx (with hyphens) for the date and xx:xx:xx (with colons) for the time.

DELETE MEMORY

All memory batches from individual measurements, trigger or scan are cleared. Settings will not be cleared.

FACTORY RESET

The factory reset restores all pre-installed settings of the instrument. All memories (data logger and calibration profiles) are erased. This function should be used when settings have been changed and the instrument does not work properly or the calibration of the probe does not work properly.

SYSTEM

The device data shows, for example, the serial number, the firmware version, the current battery voltage and the MAC address for the wireless connection. This data helps in the event of support.

Battery voltage must be above 2.8V. Below 2.8V, the unit will automatically shut down.

TECHNICAL DATA

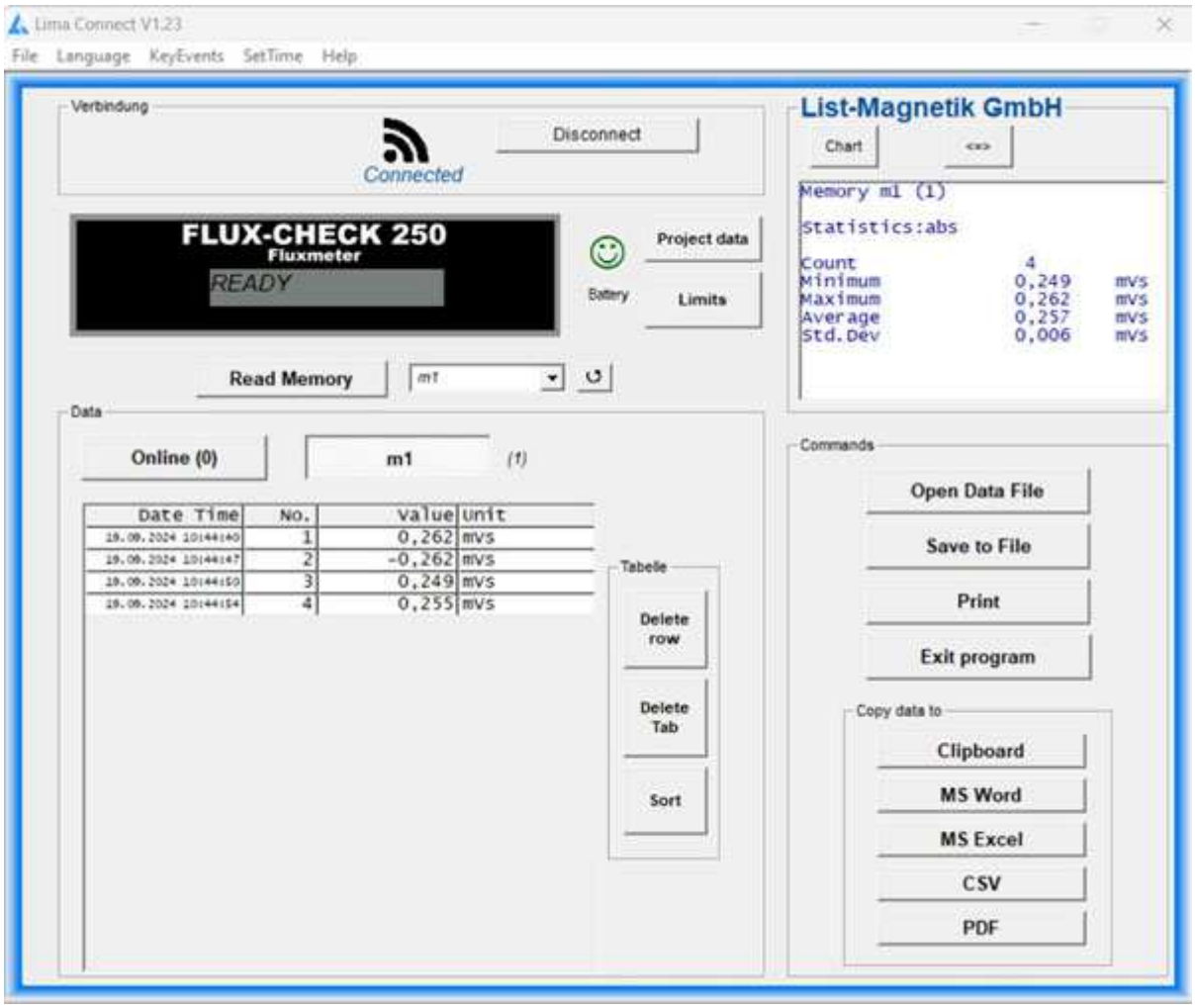
Measuring units:	Magnetic flux mVs (milli-Volt-second, corresponds to the SI unit mWb / milli-Weber) Measuring ranges: 0-10 mVs and 0-250 mVs, automatic or manual range switching Real flux: mVs / n Magnetic moment: mVs * cm Flux density: A/cm or mT
Accuracy:	2%
Repeatability:	1%
Resolution:	0.001 mVs
Input resistance:	33 kOhm
Ambient temperature range:	0 - 50° C
Display:	LCD touch panel color 320x480 pixel
Multilingual menu navigation:	German, English, Italian, French, Spanish
Data logger:	10,000 measurements, flexibly divisible
Statistics:	Count / Maximum / Minimum / Average / Standard deviation
Interface:	wireless interface for communication with Android, iOS and Windows
App for Android, iOS, Windows:	free of charge via Google Play Store, Apple App Store, List-Magnetik website
External control:	via USB and SCPI communication interface
Power supply:	3x 1.5 V AA Mignon. External power supply can be connected via USB
Operating time:	approx. 25 hours with battery, unlimited with external power supply
Dimensions:	150 x 85 x 35 mm
Weight:	320 g with batteries

APPLICATIONS FOR WINDOWS, ANDROID, IOS

LIMA CONNECT FOR WINDOWS

The free Lima Connect application for data transfer to the PC can be downloaded from https://www.list-magnetik.com/en/lima-connect.

With Lima Connect you can connect to a Windows PC using wireless technology, take online measurements or read out the device's memory, statistically evaluate the data and display it as a graph. You can print the results or transfer them to subsequent applications such as Microsoft Word and Microsoft Excel.



LIMA CONNECT FOR ANDROID AND IOS

To further process your measurement data, you can also pair your device with mobile Android and iOS devices. You can measure online or read the device memory with Lima Connect for Android and iOS. Exclusively in these two mobile versions you can manage projects and assign the measuring points on a photo. The measurement results can be statistically evaluated and displayed graphically. The app for Android and iOS is also free.


Lima Connect
Version V1.0.14
List-Magnetik
FLUX-CHECK 250
Fluxmeter
Disconnect device
Project data
Limit
Voice output on
Set Time
Info
German
English
Menu
Data
Online
Chart
Lima Connect
Version V1.0.14
List-Magnetik
Mark measure point in Picture
-2906,146 µVs/n
Font size
20
Clear Pic
Save Pic
-3076,969 µVs/n
Menu
Data
Online
Chart
Memory
Online
List-Magnetik
Online
Delete
1 to 11 out of 11
Datum
Number
Value
Unit
1 3007,250 µVs/n FLX
2 -2906,146 µVs/n FLX
3 -2848,886 µVs/n FLX
4 2849,125 µVs/n FLX
5 3167,771 µVs/n FLX
6 -151,177 µVs/n FLX
7 -2734,724 µVs/n FLX
8 3329,490 µVs/n FLX
9 -2892,969 µVs/n FLX
10 2983,771 µVs/n FLX
11 -3076,969 µVs/n FLX
Count 11
Min 151,177
Max 3329,49
Mittel 907,52
Std.Dev 1390,88
Menu
Data
Online
Chart

Android	iOS

SCPI COMMUNICATION INTERFACE

SCPI (Standard Commands for Programmable Instruments) is a standardized protocol for controlling and querying instruments such as multimeters, oscilloscopes, or spectrum analyzers via various interfaces such as GPIB (General Purpose Interface Bus), USB, RS-232, or Ethernet. It enables standardized and easy communication between computers and instruments, regardless of the manufacturer.

The List-Magnetik instruments **MP-4000 (magnetic field measurement)**, **FerroPro compact (permeability measurement)**, **MEGA-CHECK DX (coating thickness measurement)**, **FERRITE-CHECK 240 (ferrite content measurement)** and **FLUX-CHECK 250 (fluxmeter)** are equipped with an SCPI interface, which allows the instrument to perform remote measurements in line operation and to provide measured values. The connection is made via USB, which also ensures power supply and continuous operation.

Basic SCPI Commands

SCPI commands consist of keywords that are organized hierarchically. They can be optionally parameterized. The commands are usually written in uppercase letters, but shorter forms of the keywords can be used if they are unique.

Examples of basic SCPI commands

- *IDN?: Get device identification.
- MEAS:VOLT:DC?: Measure DC voltage.
- CONF:CURR:AC: Configure the instrument to measure AC current.
- READ? Read the current measurement.

Special implementation for List-Magnetik meters

- Setting the Date and Time
- Set measurement unit
- Setting of measurement types (Magnetic Field measurement: DC/AC, auto range, range 1 or 2, peak on/off. Coating thickness measurement: automatic, FE only, NF only, duplex)
- Zero calibration, also two-point calibration for coating thickness measurement
- Retrieve measured value (Coating thickness measurement: spot or continuous)

Documentation and Application Examples

On our website you will find further documentation, an example application based on LabView and a LabView runtime environment to test the possibilities.

Contents of the "SCPI Demo" installation package

The SCPI Demo installation package contains: a runtime environment for LabView, a sample application (EXE) for each of the three devices MP-4000, FerroPro compact and MEGA-CHECK DX as well as the sources (SRC) for these three applications. To be able to read and edit the sources, however, a license for LabView is required, which is not included. The installation package can be unpacked to any Windows directory. The LabView runtime environment "ni-labview-2024-runtime-engine_24.1.0_offline.iso" must be installed so that the sample applications (e.g. "LabView MEGA-CHECK DX.exe") can be started.

IMPORTANT INSTRUCTIONS

PRESERVE STORED MEASUREMENTS WHEN CHANGING THE BATTERY

The saved measured values are retained even after the device is switched off or when the device is stored without a battery.

CHANGING THE PROBE

To replace the measuring probe, switch off the device beforehand. Connect the desired measuring probe to the probe cable, then switch the device on again.

We supply:

- Coating Thickness Meters
- Magnetic Field Meters
- Devices for Materials Testing
  (Permeability and Ferrite content)

We provide expert advice and design metrology solutions tailored to your specific needs.

Fast calibration and repair service

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QM-System
ISO
9001:2015
zertifiziert