



# List-Magnetik

**Manual**

**Ferrite-Check 140**

# OPERATION MANUAL

## FERRITE CONTENT METER

### FERRITE-CHECK 140

Firmware version 1.000.0 and up

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# **1 INTRODUCTION**

With FERRITE-CHECK 140 you can easily and quickly measure the ferrite content in steels according to ISO 8249.

ISO 8249 particularly focuses on austenitic steel and duplex steel (ferritic / austenitic) to be evaluated for welding operations: if the ferrite content is too low, the weld metal becomes susceptible to cracking; if the ferrite content is too high, toughness and corrosion resistance are reduced. For duplex steels, a lack of ferrite at the weld causes a reduction in strength.

The determined ferrite number is a description of the ferrite content in a weld metal, which is determined in a standardized procedure. Instead of the ferrite number (FN), the ferrite content (Fe%) can also be determined. The conversion is about 70% of the FN value. The ferrite content determined as Fe% does not necessarily correspond to the actual or absolute ferrite content. Therefore, the ferrite number is more commonly used.

Uneven or round surfaces (as on rods), as well as contamination of the surface, can lead to incorrect or inaccurate measured values

FERRITE-CHECK 140 is pre-calibrated, but is supplied with three calibration standards for easy recalibration. The instrument is calibrated before delivery using calibration standards provided by the National Institute of Standards and Technology (NIST).

The "FN140" standard placed on the left in the case has a bright steel surface and is to be used for zero calibration (base calibration) during two-point calibration.

In the center and right of the case are two standards covered with copper foil. They represent different ferrite numbers (approx. 6, approx. 18). The exact value is written on the respective standard.

The standard with the higher FN number (approx. 18) is also used for the two-point calibration, the second step, called FN calibration.

## **2**      **QUICK START GUIDE**

**The instrument is factory calibrated and ready for immediate use.**

**Switch on:**      Press the red button for a long time, the display shows **Ready**

**Measure:**      Place the device with measuring probe on the object to be measured and wait until a signal tone confirms the measurement.

**Switch off:**      Press red key until display goes dark

## **3**      **OPERATING THE DEVICE WITH THE RED BUTTON**

Press the key briefly to scroll through the menu functions, press and hold the key (with signal tone) to activate the desired menu function.

The menu functions can only be called up if the measuring probe is not placed on an object.

At the end of each submenu there is a display < **back** that allows you to exit the submenu and return to the next higher level.

After 10 seconds of inactivity without pressing any key, the device always returns to the measurement display.

In the delivery state, English is preselected as the language.

## 4 MEASUREMENT DISPLAY

The standard display shows the FN value of a single measurement



By changing the measuring unit (**Setup / Unit**), the measurement can be displayed in Fe%.



When the measurement type is changed to the average value measurement (**Mode / Average**), the current single value and the average value of the measurement series are displayed, since the last time the probe was placed on the object.



You can also use the average measurement with unit Fe%.



## 5 MENU FUNCTIONS

### 5.1 SWITCH OFF



By pressing the key for a long time (long signal tone), the device is switched off manually.

The automatic turnoff time is 30 minutes in the delivery state and can be changed under the menu item **Setup / Switch Off Time**.

### 5.2 CALIBRATION



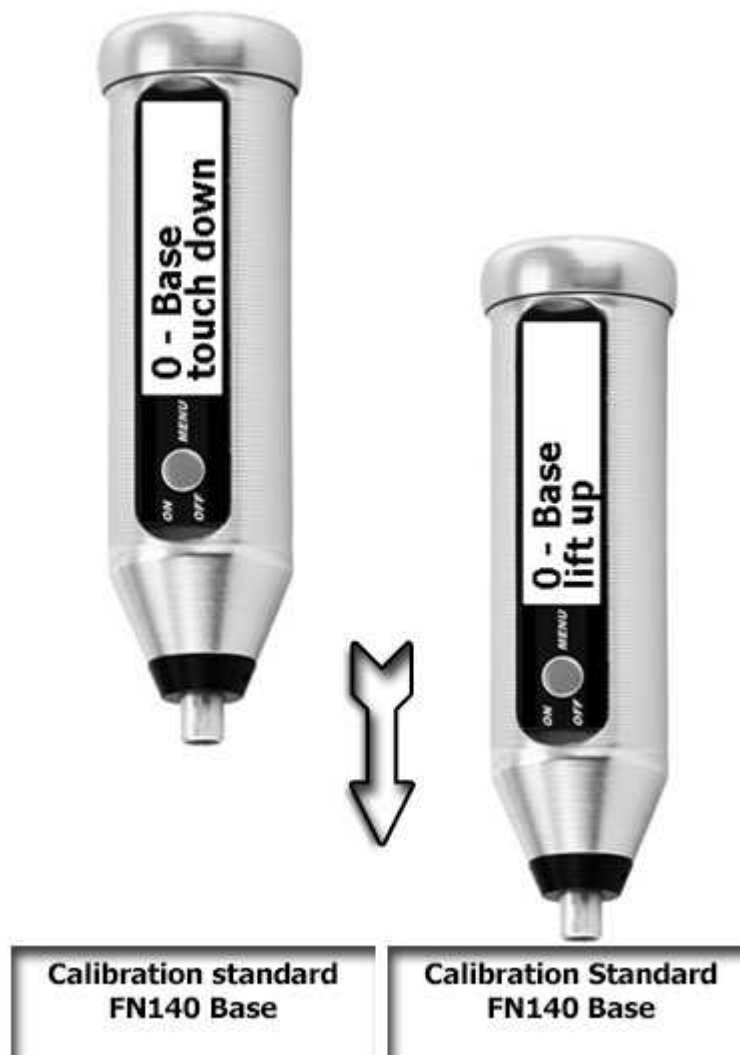
You can recalibrate the instrument at any time on the supplied calibration standards with a two-point calibration.

## 5.2.1 0 – BASE CALIBRATION



The base calibration is called zero calibration, although its result is not FN 0, but FN 140. FN 140 corresponds to 100% Fe and is the value of full iron or saturated ferrite material.

In the off-hook state, select in the menu **0 - Base Calibration**, then place the instrument with the measuring probe on the FN140 calibration standard. Now wait until the FN140 value is displayed and confirmed by a signal tone, and then lift the instrument again.





## 5.2.2 FN CALIBRATION

The FN calibration is the second calibration point for the accurate calibration of the device (two-point calibration).



The FN calibration is normally performed on the calibration standard with the higher specified FN value.

Select **FN Calibration** in the off-hook state, then place the instrument with the measuring probe on the calibration standard and wait until the FN value is displayed and confirmed by a signal tone.



### 5.2.3 FN ADJUST

The two supplied calibration standards with copper foil have different standard values, the exact value is written on the standard. If you exchange it or use the lower standard for two-point calibration, this value must be adjusted in the device.



Entry: Press long to enter the function.



First step: the bar is under **OK**. Now press briefly until the bar is under a field that you want to change.



Second step: the bar is under a number. Now press and hold, the number starts to flash. Now press briefly until the desired value is reached.



Then press and hold again to accept the new value. The bar moves under the next field.



With a last long press at **OK** you will leave the FN adjustment.

## 5.3 PROBE MODE



As probe mode, the average measurement can be activated, or you can return to the preset normal measurement.

The active probe mode is displayed with an asterisk (\*) behind the entry.

### 5.3.1 NORMAL MEASUREMENT



A single value is displayed for the normal measurement is displayed and confirmed by a signal tone.

### 5.3.2 AVERAGE MEASUREMENT



With the average value measurement, measured values are permanently recorded and arithmetically averaged. In this way, you can drag the device over a workpiece and see the current value as well as the average value of all previously measured values. After lifting the probe and placing it on the workpiece again, the average value is reset.

## 5.4 MEMORY

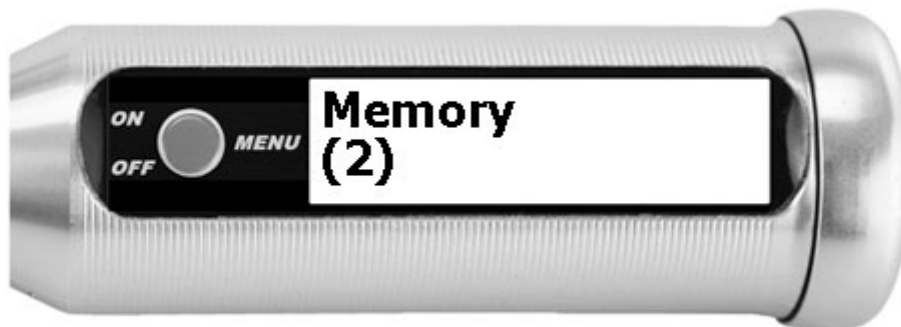
The storage of the measured values is switched on when either a new memory batch is created or an existing one is activated.

A maximum of 9 memory batches are possible, which can be filled almost arbitrarily (approx. 4000 measured values). If the total possible memory space is exceeded, a warning message is issued that no more values can be stored.

To indicate that the memory is switched on, the symbol **M** appears at the top left of the measurement display followed by the number of the active memory batch, for example **M2** for memory batch number 2.

Switching the device off and on does not change the setting, the status of whether and which memory batch is active, is retained.

With the **Disable Mem** function, you can switch off the storage again.



Under the word **Memory** the number of currently available memory batches is displayed - here: 2 memory batches are created.

### 5.4.1 DELETE LAST VALUE



Deleting the last stored measurement value:

Example: You have performed an incorrect measurement and want to remove it from your measurement series immediately. The function can be repeated and then deletes the second to last value, the third to last value and so on.

Deletion is only possible for values of the current memory batch (here: batch 2).

## 5.4.2 DISABLE MEMORY



With the **Disable memory** function, you can explicitly switch off the storing of measurement values.

The memory function is then automatically switched on again when either a new memory is created or an existing one is activated.

## 5.4.3 MEMORY BATCH M1 / M2 / M3 ETC.



The created memory batches are listed one after the other in the menu.

The number of the batch (here: batch number 2) and the number of the values contained in it (here: 15) are displayed in the bottom line in a slightly smaller size.

To view and manage the memory batch in detail, press the red button long.

To jump to the next memory batch, press the red button briefly.

#### 5.4.3.1 Activate



With activation, all measurements are written to this memory batch from now on. All other batches remain unchanged.

This memory batch is active until the storage is generally terminated (disable memory), another batch is activated, or the batch is deleted.

#### 5.4.3.2 Statistics



The display of the statistics shows successively by keystroke these values in the selected batch:

Count	– number of stored measurement values *
Minimum	– smallest stored measurement value
Maximum	– biggest stored measurement value
Mean	– average value
Std.Dev	– standard deviation (corrected sample variance)

\* A displayed **Count 15 (13)** means that there are two crossed-out but not yet optimized (and so finally deleted) values in the batch. Only the 13 values that are active are taken into account in the statistics (see chapter: Optimize).

### 5.4.3.3 Browse



In the browse function, all measurement values of the batch are displayed. Always 2 values are displayed and by pressing the key it is scrolled by one value. The upper line is marked with a triangle on the left.



This measurement value marked with the triangle can be deleted by a long keystroke. It is then displayed crossed out. A crossed-out / inactive value is no longer included in the statistics and is no longer transferred to the PC or mobile app.



A deleted value can be reactivated by pressing and holding the key again. The crossed-out value is only finally deleted by **Optimize**.

To exit the function, please wait until the display returns to the menu after a few seconds.



#### 5.4.3.4 Optimize



The memory batch is cleaned up. Deleted measurement values are removed and are no longer visible when scrolling. The numbering of the measurement values is now again ascending without gaps from number 1.

#### 5.4.3.5 Clear values



The memory batch is emptied. All measurement values are removed. However, the memory remains and is not deleted. If the memory was last active, it remains active and is filled again from the next measurement.

#### 5.4.3.6 Delete



The memory batch is deleted. The batch number (here number 2) can be reused later by creating a new memory batch.

#### **5.4.4 NEW MEMORY BATCH**



A new memory batch is created.

It is assigned the lowest free number (1-9) and is empty at the beginning. This new memory batch is activated automatically: the next following measurement is written into this batch.

If the maximum 9 batches have already been created, this menu item is not displayed.

#### **5.4.5 DELETE ALL BATCHES**



All memory batches are deleted.  
The storage is switched off.

The next memory batch that is newly created is again assigned the number 1.

## 5.5 SETTINGS



In the settings menu, you can set the language, measuring unit, switch-off time, volume and contrast for your device. These settings are retained even after the device is switched off. These settings are deleted during a factory device reset.

### 5.5.1 LANGUAGE



English, German, French, Italian, Spanish, Hungarian, Polish and Dutch are available on the device.

### 5.5.2 UNIT



Change the unit of measurement between FN and Fe%.  
The active unit is displayed with an asterisk (\*) behind the entry.

Conversion from FN to Fe% is a simple formula with a constant factor.  
FN 140 = 100% Fe, the factor is always 1.4.

### 5.5.3 SWITCH-OFF TIME



Selection of the automatic switch-off time of the device (5 minutes / 10 minutes / 30 minutes / off = the device is always switched on). **Off** should only be selected in special cases, as this can greatly increase the power consumption.

The active switch-off time is displayed with an asterisk (\*) after the entry.

### 5.5.4 BEEP VOLUME



Selection of the volume of the signal tone (off / 20% / 40% / 60% / 80% / 100%). The active beep volume is displayed with an asterisk (\*) behind the entry.

### 5.5.5 CONTRAST



The contrast of the display font can be set on a scale from 0 (low contrast, dark) to 4 (high contrast, bright).

The active contrast is displayed with an asterisk (\*) behind the entry.

## 5.6 SYSTEM



The system menu displays values that are important for information or diagnostics, but cannot be changed. Resetting the device to factory settings is also possible here. The information provided is:

- Revision number of the firmware version. This information could be requested from you by our technicians when searching for an error
- Date and time. The values cannot be changed in the device itself, but they can be changed via the List-Magnetik apps for Windows, Android and iOS.
- Battery voltage: If the value is below 1.2 volt, you should change the battery. If the value falls below approx. 1.15 volts, a warning message is also displayed regularly. Below 1.1 volts, the device will no longer work.
- Factory device reset: the measurement parameters set at the time of factory delivery are restored as they may have been destroyed by an error. The measurement batches and settings are completely deleted. The instrument switches off.
- Serial no: The serial number of your FERRITE-CHECK 140 is written on the cap of the housing. It was also entered here when the device was set up.
- MAC address: The MAC address is a unique identification of the device and its Bluetooth component. When searching for the device in the **Lima Connect** application, this unique identifier is displayed, so you can distinguish several devices within range.

## **6      BATTERY REPLACEMENT**

As soon as the battery voltage warning („▲ Voltage 1,15V ") appears when the device is switched on, the battery should be replaced.

The device switches off automatically when the battery voltage is less than 1.1 V.

If the display is unclear when the device is switched on, or if an error message **Error-202** is displayed and then the device switches off, the battery is too weak.

**Please use only leak-proof batteries.**

### **6.1    USING A RECHARGEABLE BATTERY**

If you want to use a rechargeable battery instead of a 1.5V AA battery, do not use a NiMH battery. The output voltage of 1.2V is too low. Voltage fluctuations may even alter the memory in the device.

We have had good experience with rechargeable Li-ion batteries that can be charged via USB cable and have an output power of 1.5V.

## **7**      **TECHNICAL DATA**

Application	Measurement of ferrite content in austenitic and duplex steels
Measuring range	1 - 100 Fe% 1 - 140 FN
Measuring method	Single measurement or continuous measurement with averaging
Smallest measuring area	∅ 2 mm
Resolution	until 10: 0.01 above 10: 0.1
Ambient temperature	0 – 50 °C
Display	illuminated high-contrast graphic OLED display
Menu navigation	English, German, French, Italian, Spanish, Hungarian, Polish, Dutch
Data logger	4000 measured values flexibly divisible
Statistics	Count / Maximum / Minimum / Average / Standard deviation
Interface	Bluetooth Low Energy for communication with PC and TOP-CHECK App
App for Android, iOS, Windows	free of charge via Google Play Store, Apple App Store, List-Magnetik website
Power supply	1x 1.5 V AA Mignon
Operating time	approx. 30 hours
Dimensions	∅ 28 x 94 mm
Weight	72 g (with battery)

## 8 AVAILABLE APPLICATIONS

### 8.1.1 LIMA CONNECT FOR WINDOWS

On [www.list-magnetik.com](http://www.list-magnetik.com), in the category **Applications**, you may obtain the free of charge data transfer application **Lima Connect**, to transfer measurement data to your PC.

With **Lima Connect**, you can measure online or read the device's memory, you can evaluate the data statistically or visualize as chart. You can print the results or hand over the data to applications like Microsoft Word and Microsoft Excel.

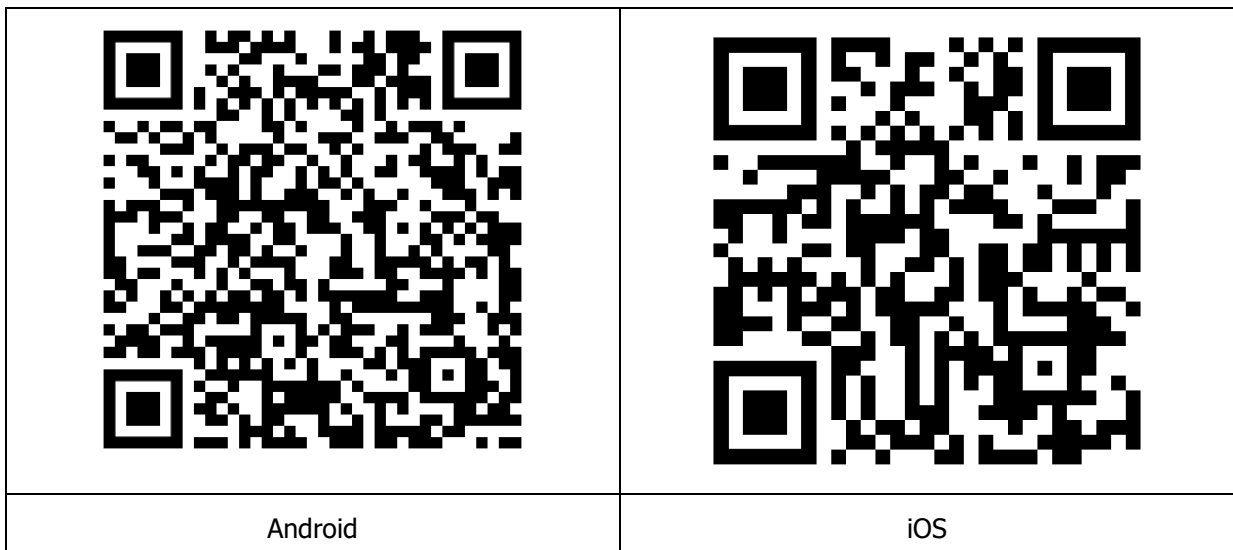
You can also use it to set the time on your device that will be used during data transfer (Menu „Set Time“)

Date Time	No.	value	unit
02.02.2000 05:42:58	1	53,4	FN
02.02.2000 05:43:12	2	53,2	FN
02.02.2000 05:43:26	3	51,6	FN
02.02.2000 05:43:29	4	53,4	FN
02.02.2000 05:43:22	5	52,6	FN
02.02.2000 05:43:25	6	49,9	FN



## 8.1.2 LIMA CONNECT APP FOR ANDROID AND IOS

To further process your measurement data, you can pair your TOP-CHECK with mobile Android and iOS devices. This is made possible by Bluetooth Low Energy (BLE) technology. With the **Lima Connect** app you can manage projects and assign the measuring points on a photo. The measurement results can be statistically evaluated and graphically displayed. The app for Android, iOS and Windows is free of charge.



## **INSTALLING THE BLUETOOTH USB DONGLE**



The installation of this software can be necessary for the communication between TOP-CHECK and a Windows PC.

First of all, please try, if the connection between TOP-CHECK and your PC via Bluetooth works without software installation, by plugging in the Bluetooth receiver.

If this does not work immediately, please install the driver software available on <https://www.list-magnetik.com> in the category **Download**.

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