Via S. Silvestro, 92 21100 Varese
Tel + 39 0332 - 213045
212639- 220185
Fax +39 0332 - 822553
www.assicontrol.com
e-mail: info@assicontrol.com
C.F. e P.I. 02436670125
STRUMENTI & SERVIZI
per il sistema qualità

Table of contents

MP - 2000

X / 2009

INTRODUCTION

You have chosen the

MP -2000

magnetic field meter and you have done so for a good reason, because you have bought a device that is not only designed and manufactured according to the state of the art, but is above all light and convenient to operate.

The devices are manufactured exclusively in Germany.

We have made every effort to make this operating manual as short and as clear as possible.

Nevertheless, if you should have any questions about operation, please contact our competent service technicians, who are always ready to help. They will be pleased to assist you.

Which magnetic fields can the MP-2000 measure?

The **MP-2000** field meter measures all practically occurring magnetic fields, both DC and AC, in a range from 0.1 to 40,000 A/cm (Oersted).

The device has two measurement ranges:

0 - 199.9 A/cm (Oersted)

200 - 40,000 A/cm (Oersted) DC / 200 - 20,000 A/cm(Oersted) AC

(1 A/cm = 0.1 kA/m = 1.256 Oe(Gauss) = 0.1256 mT)

Measurement range switching takes place automatically.

The measuring unit can be switched between A/cm – kA/m - Gauss – mT.

DC fields, AC fields (effective value RMS) or peak value are displayed with storage.

Either a **P-T2 / PT-4** tangential field probe, a **P-A2 / P-A4** axial field probe or the special **P-Z2 / P-Z4** reed probe (0.7 mm thick) can be connected to the device.

A calibration standard is available on request for checking the calibration of the device.

And what is really unique:

For the first time, the **MP-2000** uses measuring probes in which an integrated micro-controller digitises and linearizes the special analogue signals directly in the probe. This new technique is highly immune to interference and permits extremely precise measurements even with high magnetic field strengths, where Hall probes no longer operate linearly.

The built-in rapid peak value memory can measure pulse fields down to 0.1 msec.

In this device, the probe cable is pluggable at both ends (display device and probe) and is therefore particularly service-friendly, because the customer can simply replace the cable in the event of a cable breakage.

The convenient menu operation in several languages allows simple operation of the device for the most part without an operating manual.

The **MP-2000** offers the possibility to create up to 100 measurement storages (total memory capacity: 10,000 measured values). Statistical evaluation takes place either on the display or by connecting a printer or PC.

In addition to that, the **MP-2000** has an analogue display with automatic measuring range selection in order to quickly visualise changes or tendencies in magnetic fields.

For evaluation via a PC, a USB wireless interface is built into the device which, in conjunction with the USB radio receiver supplied with the device, allows wireless communication with a PC.

Various evaluation programs are available on request.

FAST START

- Connect the probe cable to the measuring probe and device.
- Switch on the **MP - 2000** with the ON-OFF key. Automatic zero balancing takes place when the device is switched on, therefore the probe should not be in a magnetic field when doing so. The last measured value appears briefly on the display, followed by the current measured value.
- To change the language (English is preset) press the MENU key:

DC/AC/PEAK
Display
Batch
Print+PC
Setup

→

DC/AC/PEAK
Display
Batch
Print+PC
Setup

→

Language
LCD-Light
Unit
Bat. Voltage
Reset

→

German
English
Spanish
Netherlands

Scroll through the menu using the arrow keys; confirm your selection using the OK key.

FUNCTIONS OF THE OPERATING KEYS

Serial interface connection fpr printer MEGA-PRINT

Port for the connection of the probe

Battery display (3 bars)
Serial data transmission for MEGA-PRINT printer
USB wireless data transfer

DC = DC Field Range
AC = AC Field Range
PEAK = Peak Hold

Measurement value
Measurement unit
Polarity N-S

-0- = Zero Point Setting
MENU = Call up Menu
MEM = Save current measured value

Select menu options using the key arrows, confirm selection by pressing OK

Cancel menu entry

Switch the device on / off

IMPORTANT NOTES

1. Retention of the Stored Measured Values when changing the Battery

The stored measured values are retained even after switching off the device or storing it without a battery.

2. Power Supply

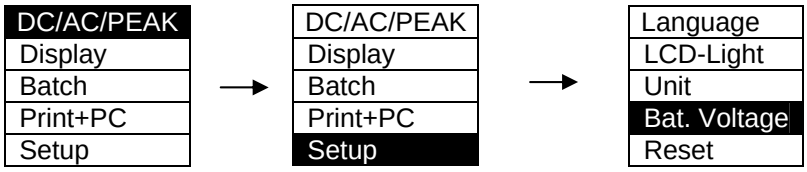
The device is supplied as standard with three 1.5 V (Mignon) batteries. However, it can optionally be powered by three 1.2 V NiCd rechargeable batteries. A suitable charger is available from the factory and is connected to the serial interface.

Charging time: 8 – 10 hours.

The charger can also remain permanently connected!

3. Checking the Batteries or Rechargeable Batteries

The batteries must be replaced or the rechargeable batteries charged up as soon as only 1 bar appears on the battery display when the device is switched on. If the message ‘replace batteries’ additionally appears on the display, then the device switches itself off automatically for protection if the battery voltage is too low. The exact battery voltage can additionally be displayed for checking purposes:



The battery voltage should be greater than 3.0 V!
Used batteries are special waste and must be disposed of accordingly!

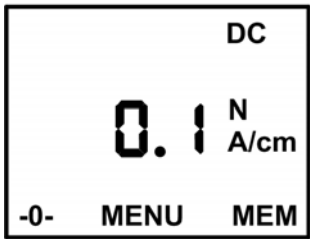
7. Automatic Power-Off

The device switches itself off automatically 2 minutes after the last measurement if the measured value does not change.

8. Changing the Probe

To change the measuring probe, switch off the device first, connect the desired measuring probe to the probe cable and then switch on the device again. If no measuring probe is connected to the device, or if the probe cable has no connection to the device, a message is displayed when the device is switched on and the device switches itself off again automatically.

I. MENU OPERATION



-*0*- key – Zero Point Setting

Zero point adjustment takes place after pressing the ***-0-*** key. The probe must not be in a magnetic field during this time! After the zero balancing is complete, the display shows $\pm$ *0.2* (influence of the earth's magnetic field when moving the measuring probe).

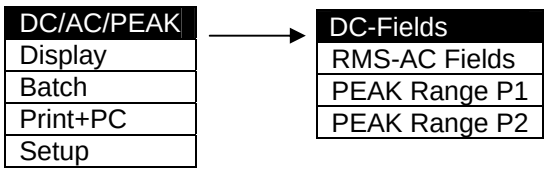
***MEM* key – Save Measured Value**

After pressing the ***MEM*** key, the current measured value is saved in the selected batch memory.

***MENU* Key**

The various functions of the device are controlled via a menu. After switching on the device, press the ***MENU*** key in order to call up the menu.
The arrow keys are used to select the menu item; the current selection has a black background. The selected menu item is called up via the *OK* key; either a sub-menu or the selected device function appears.
The *C* key is used to quit the device menu; the main menu field is selected with the central blue key.

1. DC / AC / PEAK Selection



***DC* Field**

Switch to the ***DC*** steady field range in order to measure static fields. The ***DC*** symbol is shown behind the current measured value on the display.

***RMS-AC* Field**

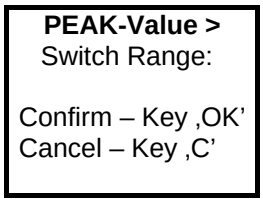
Switch to the ***AC*** alternating field range in order to measure alternating fields The ***AC*** symbol is shown behind the current measured value on the display.

In the case of sinusoidal AC fields, the respective effective value (true RMS) is displayed.

The respective conversion factors for full-wave and half-wave rectification are given in the DIN standard 54 131 Part 1.

PEAK* Measuring Range *P1 / P2

Switch to the peak value memory range ***P1*** in order to measure peak fields **< 500 A/cm (G)** or **< 50.0 kA/m (mT).** The ***PEAK*** symbol is shown behind the current measured value on the display. If the measurement range is exceeded, the display shows:



You can switch to the peak value memory range ***P2*** with the ***OK*** key; after that, repeat the measurement!

Switch to the peak value memory range ***P2*** in order to measure peak fields **>= 500 A/cm (G)** or **>= 50.0 kA/m (mT)**. If no peak value is displayed in the peak value memory ***P2***, this means that the peak value is < 500 A/cm (< 50 kA/m); in this case select the peak value range ***P1***!

If there is already a measured value in the peak value memory and a higher measured value is recorded, then the old measured value will be overwritten by the new one. A short acoustic signal is sounded when the measured value is exceeded.

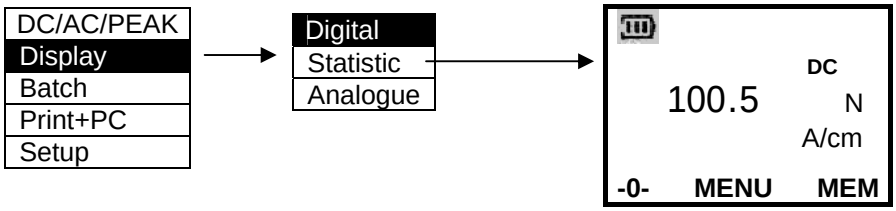
The peak value memory is reset via the ***-0-*** key.

When measuring AC fields in peak value memory mode, the peak value and not the effective value will be saved if the AC field is sinusoidal!

2. Display

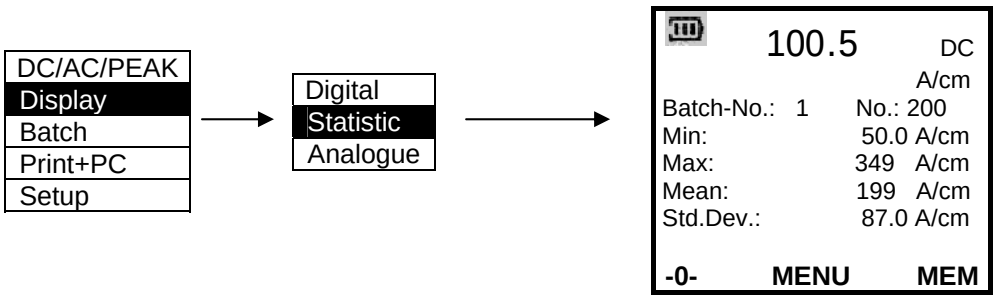
The various display functions of the **MP - 2000** can be selected here (Digital / Statistics / Analogue). The operation is as follows:

- Digital:



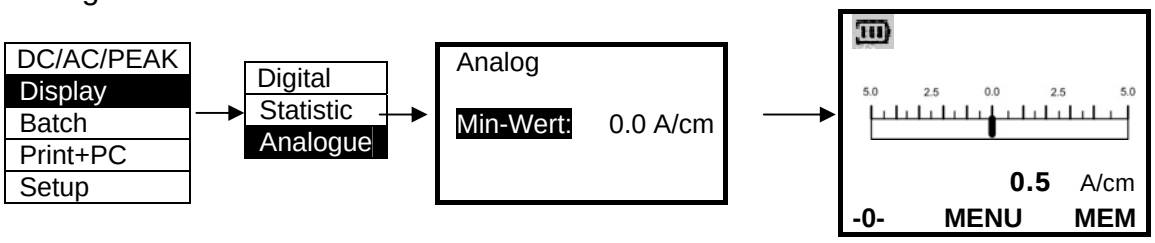
The normal digital display is activated as standard. The current measured value is displayed here. Press once the right hand blue ***MEM*** key to save the current measured value in the batch memory. Zero setting is carried out via the ***-0-*** key.

- Statistics:



When the statistics display is activated, the current measured value is displayed at the top and the statistical parameters are additionally displayed. Press once the right hand blue ***MEM*** key to save the current measured value in the batch memory. Zero setting is carried out via the ***-0-*** key.
To delete the last measured value, select ***MENU – Memory – Delete – Delete last value***.

- Analogue:



After activating the analogue display, the start of the measuring range is input first (min. value), after which the analogue display is shown in the centre on the display with the preselected start of the measuring range. The maximum measuring range value is automatically adjusted according to the size of the current measured value.

Press once the right hand blue ***MEM*** key to save the current measured value in the batch memory. Zero setting is carried out via the ***-0-*** key.

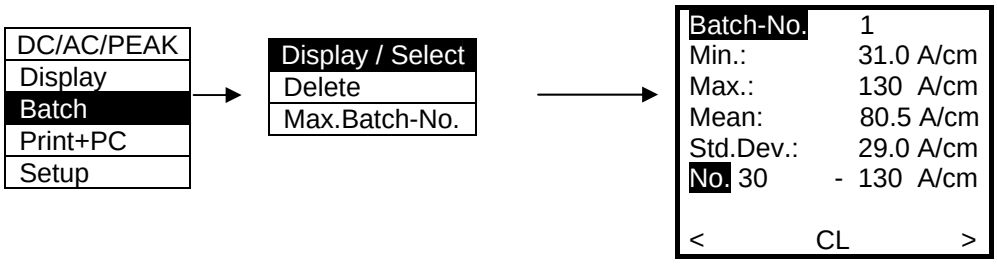
3. Memory:

The **MP–2000** contains a maximum of 100 different application memories for the saving and statistical evaluation of object-related series of measurements.

A maximum of 10,000 measurements can be saved in all. The maximum number of measurements per application memory depends on the number of memories created.

First of all the required number of memories should be selected, after which the current memory number in which the measured values should be saved is activated in the *Display/Select* sub-menu. The operation of the individual memory options is as follows:

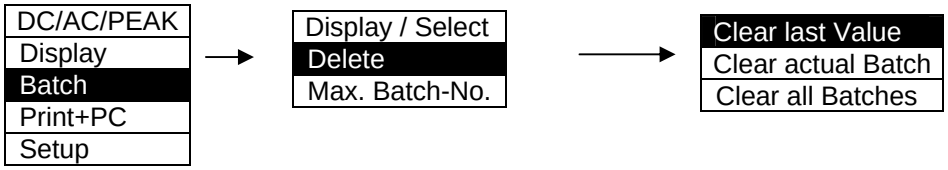
- Display / Select:



The memory contents are displayed or the current memory is selected here. At the same time, any measured value in the memory can also be deleted here, upon which the statistics will be automatically updated.

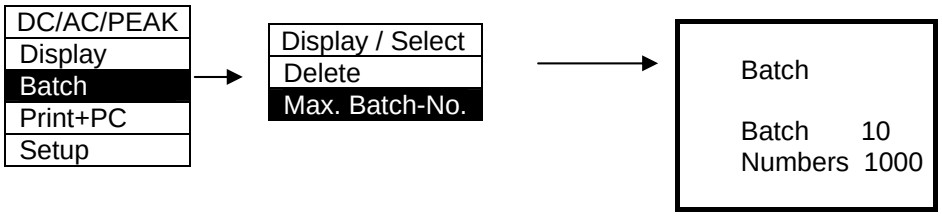
Any measured value can be selected using the arrow keys (measured value no. has a black background) and the selected measured value is deleted using the centre blue key if required. The memory number is selected using the left and right blue keys.

- Memory:



Here you can delete either the last measured value from the current batch memory, all stored measured values in the currently set memory or all measured values in all memories.

- Select max. number:

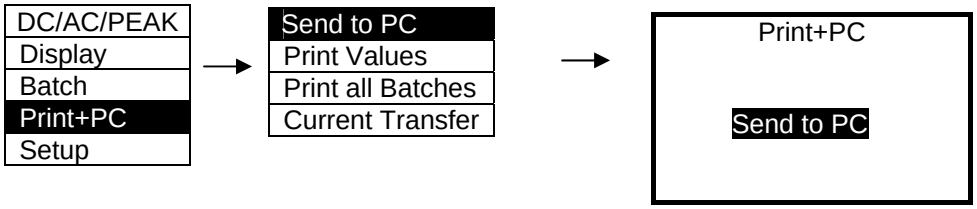


The required number of batch memories is selected here; the max. number of measured values that can be saved per memory is displayed at the same time.

4. Print + PC

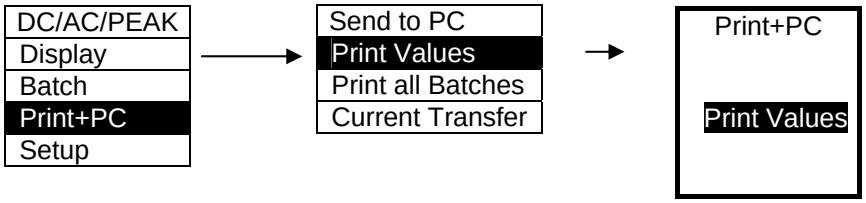
This menu item serves exclusively to send the stored measured data via the serial interface to the ***MEGA-PRINT*** printer or via the USB wireless interface to the ***PC***.
In addition there is a possibility to send the current measured value to the ***PC*** every 0.5 sec. in combination with our ***STAT-6*** or ***TRANSFER-EXCEL*** program for the evaluation of measurement curves.

- Send to PC:



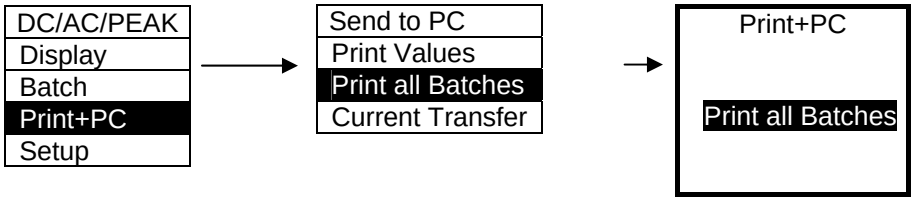
Send the statistical evaluation & measured values from the current memory to the PC via the USB wireless interface and our serial interface. Start the data transfer in the PC program first!

- Print Measured Values:



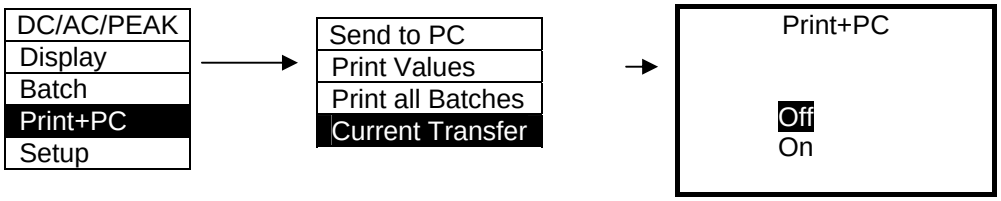
Transfer the statistical evaluation & measured values from the current memory to the ***MEGA-PRINT*** printer.

- Print All Memories:



Transfer all measured values and statistics from all selected memories to the printer.
Caution: this option should only be selected if there are not too many memories or if there are not many measured values stored in the memories, as otherwise the printer's paper consumption will be very high and the data transfer will take a very long time!

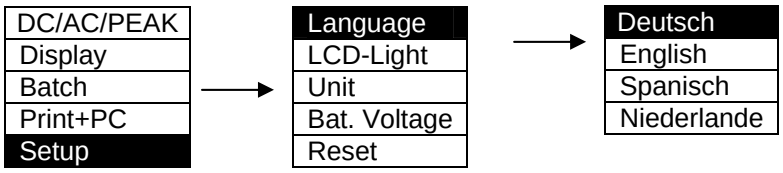
- Current Transfer:



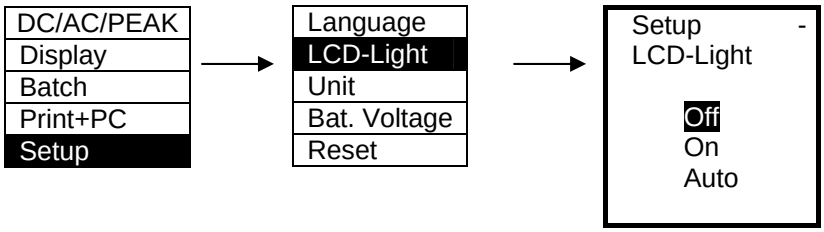
If this function is activated, the current measured value will be sent to the USB wireless interface and the serial interface every 0.5 sec.

5. Setting - options

- Select Language:



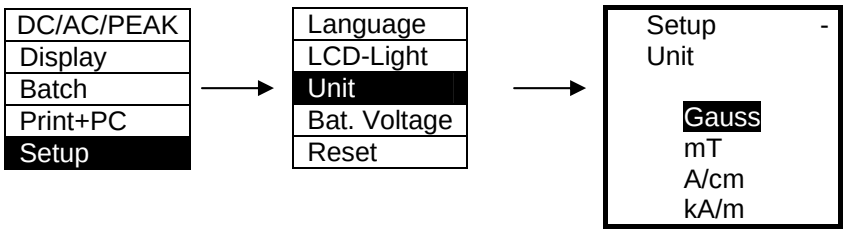
- Switch LCD Lighting on/off:



Off: Switch off LCD lighting
On: LCD lighting always switched on
Auto: LCD lighting is switched on for approx. 2 sec. during the measurement and when a key is pressed; after that it switches off to save the battery.

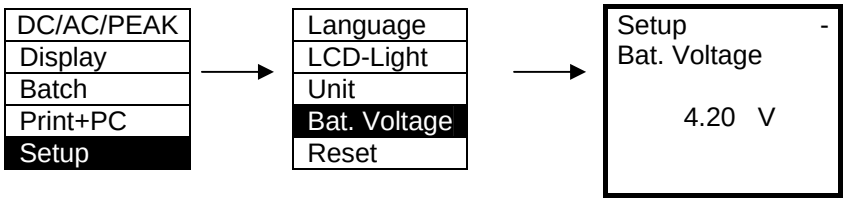
Note: The battery lifetime will be shortened considerably if the LCD lighting is always switched on! The LCD lighting switches itself off automatically at a battery voltage of 2.9 V or less in order to save the battery!

- Select measuring unit (Gauss – mT – A/cm – kA/m switching):



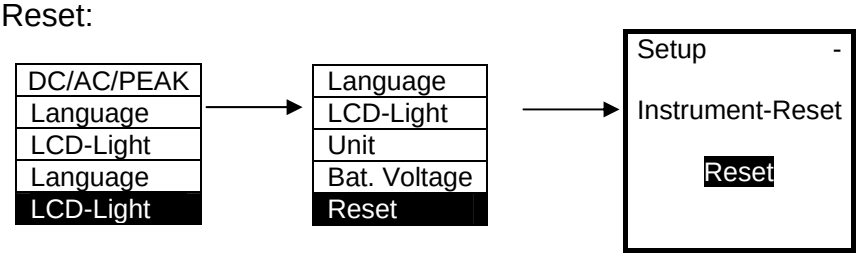
(1 A/cm = 0.1 kA/m = 1.256 Oe(Gauss) = 0.1256 mT)

- Display battery voltage:



The battery voltage should be greater than 3.0 V!

- Reset:



Reset returns all device settings to the factory settings. This function should be used if settings have been changed and the device does not work properly or if the calibration of the probe does not work properly.

II. MEASURING PROBES

Either a **P-T2 / PT-4** tangential field probe, a **P-A2 / P-A4** axial field probe or the special **P-Z2 / P-Z4** reed probe (0.7 mm thick) can be connected to the device. These are distinguished by their design and measuring range as follows:

Table of available measuring probes:

Probe type	Measuring range [A/cm / Gauss]	Dimensions
Axial field probes		
P-A2	0 – 20.000 A/cm / Gauss	
P-A4	0 – 40.000 A/cm / Gauss	
Tangential field probes		
P-T2	0 – 20.000 A/cm / Gauss	
P-T4	0 – 40.000 A/cm / Gauss	
Reed probes		
P-Z2	0 – 20.000 A/cm / Gauss	
P-Z4	0 – 40.000 A/cm / Gauss	

(1 A/cm = 0.1 kA/m = 1.256 Oe(Gauss) = 0.1256 mT)

A calibration standard is available on request for checking the calibration of the device.

III. CHECKING OF THE MP-2000 WITH THE PRECISION CALIBRATION STANDARD:

It is not necessary to calibrate the device. The measuring probes are pre-calibrated and are interchangeable.

A precision calibration standard with **180 A/cm** is optionally available in order to check the device with a measuring probe.

Tangential field probe:

Insert the probe, with the lettering N = north pole pointing upwards, into the slot of the calibration standard until the probe latches at the front. Compare the displayed value with the value of the calibration standard.

Axial field probe:

Insert the probe vertically into the cut-out with the red recess of the calibration standard and rotate it until the maximum value is displayed. Compare the displayed value with that of the calibration standard.

IV. OPERATION WITH THE PRINTER

The device's interface parameters have been set in the factory so that the MEGA-PRINT data printer available from us can be connected without having to change the interface parameters.

Operating instructions

1. **Connect the printer cable to the device socket (RS 232C) and the printer.**
2. **Switch on the MP-2000; the printer then switches on automatically.**
3. **See menu operation item 4 – Transfer & PC**

V. INTERFACE SETTINGS

The device's interface parameters are set as standard for the USB wireless interface. The USB interface driver included in the software must be installed so that a virtual COM port can be assigned to the USB interface. If necessary you can check under System Settings – Device Manager which COM port number is being used by the USB interface so that you can set the correct COM port in the software.

VI. SOFTWARE

TRANSFER data read-in program

The TRANSFER read-in program runs under Windows XP and Vista 32-bit. It reads the measured values into a file and displays them on the screen. Refer to the software instruction manual for more details.

TRANSFER-EXCEL data transfer program

This program automatically reads the measured values into an existing Excel file.

STAT-6 statistics program

This specially developed program features a graphical evaluation of the measured values as a bar and line chart with statistical evaluation and runs under Windows XP and Vista 32-bit.

You can also measure ***online*** using the STAT-6 program in conjunction with the **MP - 2000**. The current measured value is shown in large characters on the screen so that you can follow all measured data and the entire course of the test. Refer to the software instruction manual for more details.

TECHNICAL DATA

Model	MP - 2000
Display:	Illuminated graphics display:
Measuring units:	kA/m – A/cm – Gauss(Oe) – Tesla selectable
Measuring ranges:	DC: 0 – 4000 kA/m DC: 0 – 40.000 A/cm (Gauss/Oe) DC: 0 – 4000 mT AC: 20 – 20.000 A/cm (Gauss/Oe) AC: 20 – 2000 kA/m AC: 20 – 2000 mT Automatic measuring range selection
Resolution:	0 – 200 A/cm (Gauss): 0.1 A/cm (G) > 200 A/cm (Gauss): 1 A/cm (G) > 10,000 A/cm (Gauss): 1 kA/m (G) 0 – 20 kA/m (mT): 0.01 kA/m(mT) > 20 kA/m (mT): 0.1 kA/m (mT) > 1000 kA/m (mT): 1 kA/m (mT)
Accuracy (in homogeneous field)	DC/AC range - 0-2000 kA/m ± 2 % > 2000 KA/m ± 3 %
AC frequency range: (AC = effective value RMS)	10 Hz – 5 KHz
Peak value memory (PEAK HOLD):	Impulse duration > 0.1 msec.
For use with measuring probes:	Axial and tangential field probes: P-A2 / P-T2 / P-Z2 P-A4 / P-T4 / P-Z4 (see Page 12)
Power supply:	3 x 1.5V AA Mignon, alternatively 3 x 1.2V AA rechargeable
Operating time:	Approx. 100 hrs.
Automatic switch-off:	2 min. if no change in measurement
Battery indication:	X
Measurement store:	10,000 measurements
Applications memory:	max. 100
Multilingual menu navigation	X
Statistical evaluation (MAX. MIN. MEAN. NO. STD.DEV.	X
Display of statistics and stored measure-ments:	X
Analogue & digital measured value display with automatic range selection:	X
RS232 interface:	X
Radio –USB interface:	X
Dimensions:	198 x 92 x 35 mm
Weight with batteries:	265 g
Warranty:	Display device: 12 months Measuring probe: 3 months

MEGA-PRINT DATA PRINTER

Technical data

Printing method:	Thermal printer
Characters/line:	20
Transfer speed:	1200 baud
Printing speed:	Max. 20 lines/sec.
Interface:	Serial
Paper:	Thermal paper 57 mm wide – max. 10 m long
Power supply:	Ni-Cad rechargeable battery (approx. 60 hours of operation per charge)
Dimensions:	110 x 80 x 45 mm
Weight	240 g
Mains charger:	230 V/50 Hz / 6.0 V – 0.5 A

Charging the built-in Ni-Cad rechargeable battery

When delivered new, the Ni-Cad rechargeable battery in the MEGA-PRINT must be charged up before first-time use.

The built-in Ni-Cad rechargeable battery is charged up with the mains charger supplied. The cable from the mains charger is plugged into the connection socket on the right hand side.

The charging time should be at least 4 hours.

The green LED blinks during the charging process; it lights steadily when the battery is fully charged. The charger then switches automatically to maintenance charging mode.

The capacity of the rechargeable battery is sufficient for approx. 60 hours of operation.

Notes on operation

1. The operation of the **MEGA-PRINT** printer in conjunction with the **MP-2000** magnetic field meter is explained under *Menu Operation item 4 – Transmit & PC* in the **MP-2000** operating manual.

2. The printer is switched on automatically when the connecting cable between the **MP-2000** and the **MEGA-PRINT** is connected (the green LED blinks every 2 sec). If the meter is switched off, the **MEGA-PRINT** also switches off automatically (the green LED remains off).

3. The paper is manually transported using the ‘Paper feed’ button. After completion of the printout, the paper strip is transported out of the housing by pressing this button and can then be cut off cleanly.

4. Faulty printout

The **MEGA-PRINT** must be charged up again if individual lines of the printout are not printed correctly.

Inserting a new paper roll

- Open the cover
- Insert the paper roll
- Pull out the end of the paper
- Close the cover