



List-Magnetik

Manual

MP-U, MPU-ST



TABLE OF CONTENTS

MP-U

I. General Description	Page 2
II. Functions of Operating Keys	Page 3
III. Operating Instructions	Page 4
IV. General Remarks	Page 5
Battery Control	
Automatic Switch-off	
Switching over the units of measurement	
V. Checking the MP-U with Calibration Standard	Page 5
VI. Technical Data	Page 6
VII. Internet Inquiry	Page 7

I. General Description

The Magnetic Field Meter MP-U measures all existing magnetic fields, both DC and AC fields, in the range of 0.1 to 2000 A/cm (Oersted).

The instrument has two measuring ranges:

0 - 200 A/cm (Oersted)

0 - 2.000 A/cm (Oersted)

Switching over the ranges is performed automatically.

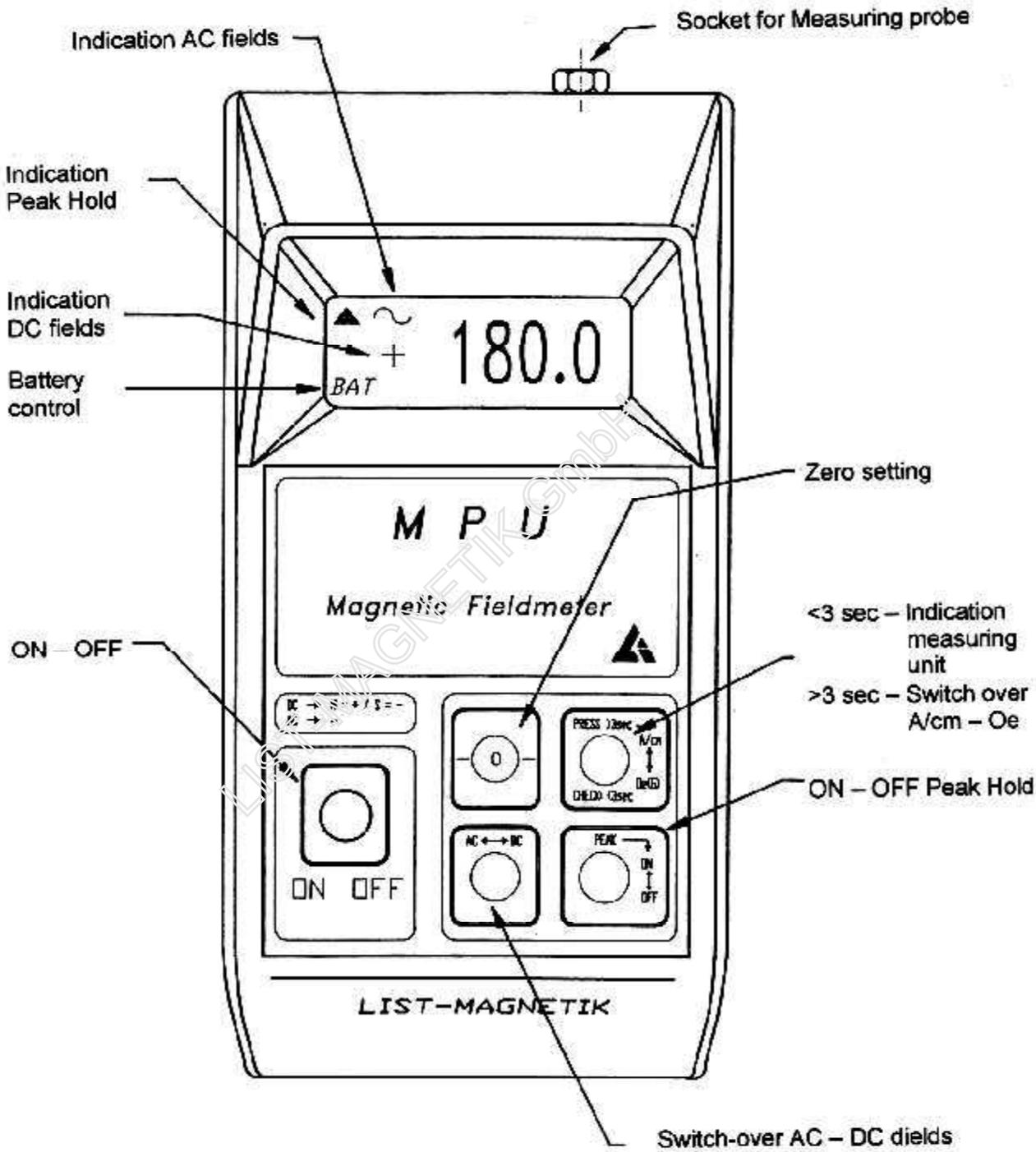
The instrument indicates DC fields, r.m.s. AC fields or peak value with memory.

The MP-U can be equipped with a tangential field probe (1.6 mm thick), a special reed probe (0.7 mm thick) or an axial field probe (\varnothing 6 mm).

A standard block to check the calibration of the instrument is available on request.

LIST-MAGNETIK GmbH

II. Functions of Operating Keys



III. Operating Instructions

1. Connect the probe to the instrument.

2. Switch on the instrument using the ON-OFF key:

When the instrument is switched on zero is automatically set (indication *FO*) and calibration is checked (indication *CAL*). The probe should not be exposed to any magnetic field.

3. Zero Setting:

Press key **-0-** → indication *FO* (function --0-) appears.

When zero has been adjusted the indication ± 0.2 is displayed (influence of the earth's magnetic field when the probe is moved) and zero setting is confirmed by an acoustic signal.

4. Calibration:

Calibration of the instrument is not necessary. The probes are pre-calibrated and mutually interchangeable.

5. AC-Range:

Press key **AC-DC**. The symbol for AC field appears on the display. In the case of sinusoidal AC fields the relevant r.m.s. is indicated.

6. DC-Range:

Press key **AC-DC** until the sign + or – appears on the display.

In the case of DC fields the north polarity is shown by +, the south polarity by –.

The tangential field probe has a polarity mark (N = north pole) which must be on the opposite side of the measuring spot.

When measuring pulsing DC fields the value shown consists of the DC field and the r.m.s. value of the AC field.

The relevant conversion factors for full-wave or half-wave rectification are stated in DIN 54 131 part 1.

7. Peak Hold:

After having set -0- (*FO*) the Peak Hold is switched on with key **PEAK**.

If a value is already stored in the Peak Hold and a higher value is recorded, the new value will cancel the old one. An acoustic signal is emitted when the value is overwritten.

Switch off the Peak Hold by pressing key **PEAK** once more.

When using Peak Hold in the AC-range and in the case of sinusoidal AC fields the peak value is indicated.

IV. General Remarks

1. Battery Control

With the instrument switched on as soon as the symbol *BAT* appears continuously on the display the battery must be replaced.

2. Automatic Switch-off

The instrument switches off automatically ten minutes after the last measurement provided no key has been pressed meanwhile.

3. Switching over the units of measurement

In its basic setting the instrument measures in A/cm. To switch over to Oe (Gauss) press key **A/cm-OERSTED** (>3 sec). The new measuring unit appears on the display.

Pressing the same key shortly, the actual measuring unit is indicated.

V. Checking the MP-U by means of a Calibration Standard

Tangential-Field Probe

Insert the probe with the mark N = North pole pointing upwards into the slot of the calibration standard until the front of the probe locks in.

Compare the indicated value with the value of the calibration standard.

Axial Field Probe

Insert the probe vertically in the red marked slot of the calibration standard and turn it until the max. value is displayed.

Compare the indicated value with the one of the calibration standard.

VI. Technical Data

Measuring Range:	0 - 200 A/cm 0 - 2.000 A/cm switchable to Oe (G) Automatic range selection
Resolution:	0.1 A/cm (Oe)
Indication:	LCD display 3 ½ digits
Accuracy::	AC-Range 50 - 2000 A/cm: } ± 2 % from measured value at 22° C DC-Range 0 - 2000 A/cm: }
Max. Limit Frequency:	2 kHz
Power Supply:	9 V battery (IEC 6 LF 22)
Measuring Time:	approx. 60 hours
Automatic Zero Setting	
Automatic Switch off	
Dimensions:	160 x 80 x 27 mm
Weight:	250 g incl. one probe
Calibration standard:	not required on request 180 A/cm

VII. Internet Inquiry Customer's Satisfaction

We would like to point out to the form in our homepage www.list-magnetik.de. We would be grateful if you take a little time and fill it out. You can help us to reach our quality target regarding ISO 9001-2000.

THANK YOU !

LIST-MAGNETIK GmbH

TABLE OF CONTENTS

MPU-ST

General Description	Page	2
Functions of Operating Keys	Page	3
I. Operating Instructions	Page	4 1.- 4.
AC Range	Page	4 5.
DC Range	Page	4 6.
PEAK Hold	Page	5 7.
Manuel and Automatic Range Selection	Page	5 8.
II. Statistics		
Operation	Page	6 1.
Evaluation	Page	6 2.
Clearing Last Reading	Page	6 3.
Clearing Memory	Page	6 4.
III. Operation with Printer	Page	7
IV. Setting Interface	Page	7
V. Analog Output	Page	8
VI. Software	Page	8
VII. General Remarks		
Changing Battery	Page	8 1.
Battery Control	Page	8 2.
Automatic Switch-off	Page	9 3.
Switching over the unit of measurement	Page	9 4.
VIII. Checking Calibration with Calibration Standard	Page	9
Technical Data	Page	10
Table Interface Parameters	Page	11
Data Printer MEGA-PRINT	Page	12
Internet Inquiry	Page	14

General Description

The Universal Field Meter MPU-ST measures all existing magnetic fields, both DC and AC fields, in the range of 0.1 to 20.000 A/cm (Oersted).

The instrument has three measuring ranges:

0 - 200 A/cm (Oersted)

0 - 2.000 A/cm (Oersted)

0 - 20.000 A/cm (Oersted)

Just by switching over the instrument indicates DC fields, r.m.s. AC fields or peak value with memory. The Field Meter MPU-ST has a built-in microprocessor for storing up to 2000 readings and for statistical evaluation.

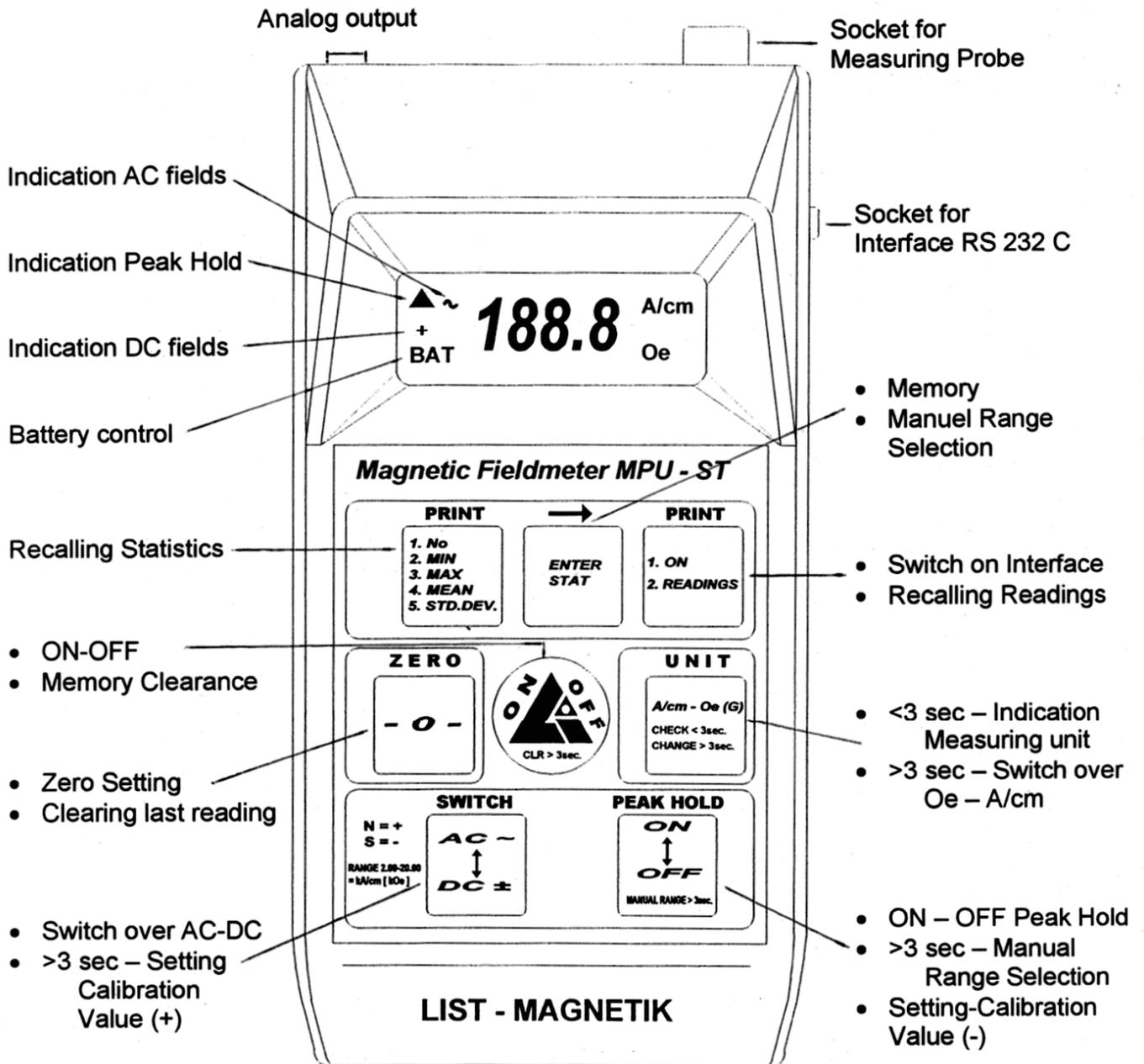
A serial interface makes it possible to transfer readings and statistical evaluation to a printer or an IBM compatible PC.

As all Hall probes are not linear at higher field strength (10 kA/cm - 20 kA/cm) automatic linearisation of the Hall probes has been built-in in the range of 20 kA/cm which makes conversion by means of graphs unnecessary.

The instrument can be equipped with a tangential field probe (1.6 mm thick), a special reed probe (0.7 mm thick) or an axial field probe (\varnothing 6 mm).

A standard block to check calibration of the instrument is available on request.

Functions of Operating Keys



I. Operating Instructions

1. Connect the probe to the instrument.

2. Switch on the instrument using the ON-OFF key

When the instrument is switched on zero is automatically set (indication *CAL*). The probe should not be exposed to any magnetic field.

3. Zero Setting

Press key **-0-** → indication *FO* (function --0-) appears.

When zero has been adjusted the indication ± 0.2 appears (influence of the earth's magnetic field when the probe is moved).

4. Calibration

Calibration of the instrument is not necessary. The probes are pre-calibrated and are mutually interchangeable.

If one nevertheless wants to influence the calibration, a standard block with a known value is required. In this case proceed as follows:

- Press key **AC-DC** (>3 sec). The last calibration value entered is indicated.
- By pressing the key **AC-DC** or the key **PEAK** again the desired calibration value can be entered.
- Place the probe in the calibration field. The indication *CAL* appears and the calibration value is displayed.
- To return to the calibration originally set by the factory remove the battery for about 20 minutes. (The stored readings will be cleared.)

5. AC-Range

Press key **AC-DC**. The symbol for AC field appears on the display. In the case of sinusoidal AC fields the relevant r.m.s. is indicated.

6. DC-Range

Press key **AC-DC** until the sign + or – appears on the display.

In the case of DC fields the north polarity is shown by +, the south polarity by –.

The tangential field probe has a polarity mark (N = north pole) which must be on the opposite side of the measuring spot.

When measuring pulsing DC fields the value shown consists of the DC field and the r.m.s. value of the AC field.

The relevant conversion factors for full-wave or half-wave rectification are stated in DIN 54 131 part 1.

7. Peak Hold

After having set -0- (*FO*) the peak hold is switched on with key **PEAK**.

When using the peak hold the desired measuring range must be preselected manually (see 'manual range selection'). The value stored in the peak hold is canceled by pressing key -0-.

If a value is already stored in the peak hold and a higher value is recorded, the new value will cancel the old one.

Switch off the peak hold by pressing key **PEAK** once more.

8. Manual and Automatic Range Selection

The range selection can also be effected manually, as the automatic range selection requires about 1 sec to switch over.

If the range is exceeded or reset automatically three horizontal bars are shown on the display.

When using the peak hold the measuring range must be preselected manually.

Manual Range Selection:

Press key **PEAK** (>3 sec) until the figure 199,9 appears on the display. The measuring range is indicated by the decimal point:

199,9	= range	0 - 199,0	A/cm (Oersted)
1999	= range	0 - 1999	A/cm (Oersted)
19,99	= range	0 - 19,99	kA/cm (kOersted)

The desired range is preselected by pressing key **PEAK**. Then press key **ENTER-STAT** to store the range selection.

When the instrument has been switched off the measuring range preset manually is canceled, so that the most sensitive range of the automatic range selection is activated when the instrument is switched on again.

II. Statistics

(Transfer of readings to the memory)

1. Operation

The current reading in the memory is transferred by pressing key **ENTER-STAT** (when using peak hold the stored reading).

When entering the reading to the memory the number of stored readings is briefly indicated. A maximum of 2000 readings can be stored, above this number the indication *FULL* appears (full memory).

2. Evaluation

Evaluation of stored readings is carried out by using key **(PRINT) No..**

Press once = Number of stored readings (*No.*)

Press twice = Minimum value (*MIN*)

Press three times = Maximal value (*MAX*)

Press four times = Mean value (*MEAN*)

Press five times = Standard deviation (*STD.DEV.*)

After the last indication (*STD.DEV.*) the instrument reenters the measuring mode by pressing key **(PRINT) No..** again.

A measurement carried out while evaluation is taking place is ignored.

After having connected the printer and switched on the interface the statistics can be printed out.

3. Clearing Last Reading

If one or several wrong measurements are to be cleared during a series of measurements proceed as follows:

- Press key **(PRINT) No..** once until the number of readings is shown (*No.*)
- Press key **-0-** once, the last value is cleared.

When clearing several readings this procedure must be repeated.

4. Clearing Memory

All readings stored in the memory are cleared as follows:

- Keep key **ON-OFF** pressed (>3 sec) until *CLR* appears on the display and disappears after about 3 sec. Only then all readings stored are cleared.

III. Operation with Printer

The interface parameters have been set in the factory for the printer MEGA-PRINT.

If the instrument is to be connected to another printer or to a PC the interface parameters can be changed (see section IV).

Operating Instructions

1. **Connect the printer cable to the instrument socket (RS 232 C) and to the printer.**
2. **Switch on MPU-ST, the printer switches itself on automatically.**
3. **Printing out readings while measuring:**
Press key **PRINT** once. The interface is switched on. When transferring readings to the memory (by pressing key **ENTER-STAT**) the readings together with its polarity and the current measuring unit are printed out.
4. **Printing out all stored readings:**
Press key **PRINT** again. The stored readings are printed out in consecutive numbered form.
5. **Printing out statistics:**
Press key **(PRINT) No..** repeatedly (*No.- MIN - MAX - MEAN - STD.DEV.*). Afterwards press it again to reenter the measuring mode.
The interface is switched off by key **ON-OFF** (no further printing.)

IV. Setting Interface

The interface parameters of the serial interface RS 232 C can be altered at random. This is necessary if the instrument is to be connected to a PC (personal computer) or to a printer with fixed interface.

The parameters are set as follows:

- Switch on the instrument with key **ON-OFF**.
- Press key **PRINT** (>3 sec) until the indication *B:12* appears (baudrate 1200 baud).
- The parameters are set according to the table on page 12.

By pressing key **ENTER-STAT** the next parameter is obtained or after waiting 2 ½ min. this is done automatically. To set the desired parameter press key **AC-DC** or **PEAK**.

V. Analog Output

The Fieldmeter MPU-ST has an analog output to connect it to an oscillograph or X-Y plotter. A connecting cable with BNC socket is available on request. The analog output is located directly behind the analog amplifier of the Hall probe. Therefore an automatic correction of the linearisation in the range 0 - 20 kA/cm is not possible.

Resolution of the measuring ranges: see Technical Data 'Analog Output'.

The internal resistance of the instrument connected should be more than 1 M Ω .

VI. Software

Data Transfer Program TRANSFER

To transfer data to a PC an interface cable with 9 pins centronics plug and the data input compact disk TRANSFER are available.

Data Input Software TRANSFER EXCEL

The Software TRANSFER-EXCEL transfers the data directly in an existing Excel file.

Statistics Program STAT-6

This especially developed program contains a graphic evaluation of the readings as bar and line diagram.

All programs run on WIN 98 / 2000 / XP.

VII. General Remarks

1. Changing Battery

Keeping calibrations and readings stored when changing battery:

The calibration and the readings remain stored even after switching off the instrument and even during a battery change provided this is carried out within five minutes.

If the instrument is stored for a longer period of time without a battery, the indication *BAT* is displayed when the instrument is switched on. This means that because of the long interruption in the flow of current the stored data are cleared.

2. Battery Control

With the instrument switched on as soon as the symbol *BAT* appears continuously on the display the battery must be replaced.

3. Automatic Switch-off

The instrument switches off automatically ten minutes after the last measurement provided no key has been pressed meanwhile.

4. Switching over the units of measurement

In its basic setting the instrument measures in A/cm. To switch over to Oe (Gauss) press key **A/cm-OERSTED** (>3 sec). The new measuring unit appears on the display.

Pressing the same key briefly, the actual measuring unit is indicated.

VIII. Checking Calibration with Calibration Standard

Tangential-Field Probe

Insert the probe with the mark N = North pole pointing upwards into the slot of the calibration standard until the front of the probe locks in. Compare the indicated value with the value of the calibration standard.

Axial Field Probe

Insert the probe vertically in the red marked slot of the calibration standard and turn it until the max. value is displayed. Compare the indicated value with the one of the calibration standard.

Technical Data

Measuring Range:	0 - 200 A/cm 0 - 2.000 A/cm 0 - 20.000 A/cm switchable to Oersted (Gauß) Automatic and manual range selection
Indication:	LCD display 3 ½ digits
Accuracy:	± 2 % at 22° C
Max. Limit Frequency:	approx. 2 kHz
Power Supply:	9 V battery (IEC 6 LF 22)
Measuring Time:	approx. 60 hours
Memory:	max. 2.000 readings
Statistical Evaluation:	Number of readings, minimum value, maximum value, mean value, standard deviation
Automatic Zero Setting	
Automatic Switch off	
Dimensions:	160 x 80 x 27 mm
Weight:	250 g incl. one probe
Interface:	RS 232 C (V24), 5 V TTL level
Analog Output:	Range 0 - 199,9 A/cm: 1 A/cm = 1 mV Range 0 - 1999 A/cm: 10 A/cm = 1 mV Range 0 - 19,99 kA/cm: 100 A/cm = 1 mV Internal Resistance: 1 MΩ
Adjustable Parameter:	Baudrate: 75 - 9600 baud Data bits: 1 or 2 stop bits 7 or 8 data bits Parity adjustment Delay after signal and line: 0 - 1000 msec Line feed: ASCII or HEX
Data Format:	Printer MEGA-PRINT, RS 232 C (for compatible printer or PC)
Calibration standard:	not required on request 180 A/cm

Table Interface Parameter

Settings for Data Printer MEGA-PRINT:

Key	Parameter:	Indication:	Meaning:
3sec → <input type="button" value="PRINT"/> ↓ Set by : <input type="button" value="PEAK"/> <input type="button" value="ENTER STAT"/> ↓	1.) <u>Baudrate:</u>	b.75 b.3 b.6 <input type="text" value="b.12"/> b.24 b.48 b.96	75 Baud 300 Baud 600 Baud 1200 Baud 2400 Baud 4800 Baud 9600 Baud
Set by : <input type="button" value="PEAK"/> <input type="button" value="ENTER STAT"/> ↓	2.) <u>Data and stop bits:</u>	d.71 <input type="text" value="d.81"/> d.82	7 1 8 1 8 2
Set by : <input type="button" value="PEAK"/> <input type="button" value="ENTER STAT"/> ↓	3.) <u>Delay after signal:</u>	<input type="text" value="C.00"/> C.01 C.02 C.04 C.06 C.10	0 msec. 10 msec. 20 msec. 40 msec. 60 msec. 100 msec.
Set by : <input type="button" value="PEAK"/> <input type="button" value="ENTER STAT"/> ↓	4.) <u>Delay after line:</u>	L.01 L.02 L.04 <input type="text" value="L.10"/> L.20 L.40 L.60 L.99	10 msec. 20 msec. 40 msec. 100 msec. 200 msec. 400 msec. 600 msec. 1000 msec.
Set by : <input type="button" value="PEAK"/> <input type="button" value="ENTER STAT"/> ↓	5.) <u>Line feed :</u>	C.LF <input type="text" value="C.- -"/>	CR and LF (ASCII 0D hex and 0A only CR(ASCII 0D hex))
Set by : <input type="button" value="PEAK"/>	6.) <u>Operation with printer or PC-computer:</u>	.Pr .PC <input type="text" value="P.dA"/>	Printer PC-computer Printer MEGA-PRINT
<input type="button" value="ENTER STAT"/> →	→ <u>back to measuring mode</u>		

Data Printer MEGA-PRINT

Technical Data:

Type of Printer:	Thermo printer
Characters/Line:	16
Data Transfer Rate:	1200 baud
Printing Velocity:	max. 20 lines/sec.
Interface:	serial
Paper:	Thermo paper 57 mm wide, max. 10 m long
Power Supply:	Rechargeable NiCad battery (approx. 60 hours operation/charge)
Size:	110 x 80 x 45 mm
Weight:	approx. 240 g
Charging Unit:	230 V/50 Hz / 6.0 V – 0.5 A

Charging the built-in NiCad Battery

Before using MEGA-PRINT for the first time the built-in NiCad battery must be charged.

The built-in NiCad battery is charged with the charging unit supplied with the printer. The cable of the charging unit is connected at the right-hand socket of MEGA-PRINT.

The charging time should be at least 4 hours.

Operating Instructions

1. The operation of MEGA-PRINT together with the Magnetic Field Meter MPU-ST is explained in the operating instructions of MPU-ST (Page 7).
2. When the printer MEGA-PRINT is connected to the Magnetic Field Meter MPU-ST MEGA-PRINT switches on automatically (the green LED flashes every 2 sec). When switching off MPU-ST, the printer is switched off automatically (the green LED remains switched off).
3. The manual paper feed is performed with the key „Paperfeed“. When the printout is finished the paper stripe is transported out of the casing by pressing this key and can be neatly turned off.

4. Faulty print out

Incorrect printed lines mean that the printer should be recharged.

Insert a new paper roll

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



Internet Inquiry Customer's Satisfaction

We would like to point out to the form in our homepage www.list-magnetik.de. We would be grateful if you take a little time and fill it out. You can help us to reach our quality target regarding ISO 9001-2000.

THANK YOU !