

## EnviroMentor has both the measuring instruments and the expertise

EnviroMentor AB is a young, knowledge-based company, yet is one of the oldest in its sector. All of our measuring instruments have been developed in very close co-operation with researchers at Chalmers University of Technology in Göteborg. All information about our current range of products for the electrical environment can be found on EnviroMentor's various product sheets. Please feel free to contact us for additional information. You can also visit our website: [www.enviromentor.se](http://www.enviromentor.se)



Enviro  Mentor

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Mentor  
  
Enviro

English



User instructions  
Field Finder





## Report form for measuring electric fields around an object

|                                    |       |       |  |
|------------------------------------|-------|-------|--|
| <b>Electric field, 30 Hz–2 kHz</b> |       |       | Measuring equipment: <b>Field Finder</b> |
| Object:                            |       |       | Model:                                   |
| Address:                           |       |       | Room:                                    |
| Measured by:                       |       |       | Date:                                    |
| Measurement distance               | 30 cm | 50 cm | Comments                                 |
| 0°                                 | V/m   | V/m   |  |
| 90°                                | V/m   | V/m   |  |
| 180°                               | V/m   | V/m   |  |
| 270°                               | V/m   | V/m   |  |
|                                    |       |       |  |
| Background field                   | V/m   | V/m   |  |

## Notes

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# 1 Introduction



*Field Finder measuring instrument.*

Thank you for buying a Field Finder from EnviroMentor AB.

**The equipment comprises:**

- Field Finder electric/magnetic field meter
- User instructions
- Case
- Calibration document
- Interface cable
- Earth cable
- Earth cable contact
- CD with software

Field Finder measures electric or magnetic alternating fields and presents the reading on an LCD. The reading is updated every second. During direct measurement, Field Finder sends out the readings every second via the RS232 port, for transmission to a computer that has communication software loaded. The analysis program enables you to analyse and document the series of measurements in a way that has not previously been possible.

Field Finder measures the electric field in the direction of the measurement surface on the instrument's front short side.

Field Finder measures an RMS value of the magnetic fields in the X, Y and Z directions, irrespective of the direction in which the instrument is pointing in relation to the magnetic fields. The instrument stores series of measurements at intervals of between 1 and 150 seconds, and can store up to 8,192 readings. This means that you can take series of readings lasting more than two weeks without stopping. The measurement process can be started and stopped at any time – the instrument stores a measurement series for every start and stop until the memory is full.

Field Finder only stores measurement series of magnetic fields.

You can use Field Finder whenever you want to measure or document magnetic or electric fields, such as from electrical installations, power cables, monitors, computers and other electrical equipment in the office, industrial and home environments.

Field Finder retains all measurement readings, even if the battery runs out or is removed.

Field Finder has a band-pass filter for measuring magnetic and electric fields with a frequency of 50 Hz. The filter can be engaged and disengaged at any time, both during direct measurement and logging.

The electric fields from an appliance are influenced by the design of the instrument. Field Finder is intended to perform simple, general measurements. If you want to carry out a more precise analysis of the electrical environment, you should use an instrument that has been designed in accordance with MPR II. Field Finder does not satisfy the requirements of MPR II, but the instrument has been calibrated to produce the same results when measuring electric fields at a distance of 50 cm from a monitor. Some measurement objects may emit alternating fields with frequencies other than those that Field Finder can manage.

### Report form for measuring electric fields in a room

| <b>Electric field, 30 Hz–2 kHz</b> |                          | Measuring equipment: <b>Field Finder</b> |          |
|------------------------------------|--------------------------|--|----------|
| Object:                            |                          | Model:                                   |          |
| Address:                           |                          | Room:                                    |          |
| Measured by:                       |                          | Date:                                    |          |
| Measurement points                 | Measurement reading* V/m | Background field **V/m                   | Comments |
| Measurement point 1                |                          |  |          |
| Measurement point 2                |                          |  |          |
| Measurement point 3                |                          |  |          |
| Measurement point 4                |                          |  |          |
| Measurement point 5                |                          |  |          |
| Measurement point 6                |                          |  |          |
| Measurement point 7                |                          |  |          |
| Measurement point 8                |                          |  |          |
| Measurement point 9                |                          |  |          |
| Measurement point 10               |                          |  |          |
| Measurement point 11               |                          |  |          |
| Measurement point 12               |                          |  |          |

\* in the direction of the arrow on the sketch. T stands for ceiling, G stands for floor.

\*\* You do not need to measure the background field at all measurement points.

### Notes

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## Report form for measuring electric fields in a room

Sketch of the room with measurement points marked.



## 2 Technical data

|                       |   |
|-----------------------|---|
| Measurement range E   | 0-1000 V/m  |
| Accuracy E            | ±10% ±2 V/m at 50 cm  |
| Measurement range B   | 0.05 µT-100 µT  |
| Accuracy B            | ±10% ±0.05 µT   |
| Frequency range       | 30 Hz–2 kHz (-3dB)  |
| Band-pass filter      | 4 <sup>th</sup> power, Q value 3.2<br>Connection time 3 s.  |
| Measurement method    | Triaxial, RMS effective value   |
| Memory locations      | 8,192   |
| Measurement interval  | Manual, 1–150 s   |
| Dimensions, L x W x H | 152 x 83 x 34 mm  |
| Weight                | 260 g (incl. batteries)   |
| Batteries             | 2 x 1.5 V LR6<br>Lithium batteries<br>CR2032 or F2A WS<br>for the clock                                       |
| Communication         | Serial RS232, 9600<br>baud, 8 bits, no<br>parity, no handshake  |
| Power consumption     | 10 mA in clock<br>mode, 38 mA<br>during measurement<br>and 45 mA during<br>transmission                       |
| Temperature range     | -10 to +50 °C   |
| Miscellaneous         | Microprocessor, 10<br>bit A/D-converter,<br>three-dimensional<br>sensor, EEPROM<br>memory, clock,<br>calendar |



**CE assurance**

Our product satisfies the demands of the Low Voltage and EMC directive as well as the following EMC standards:

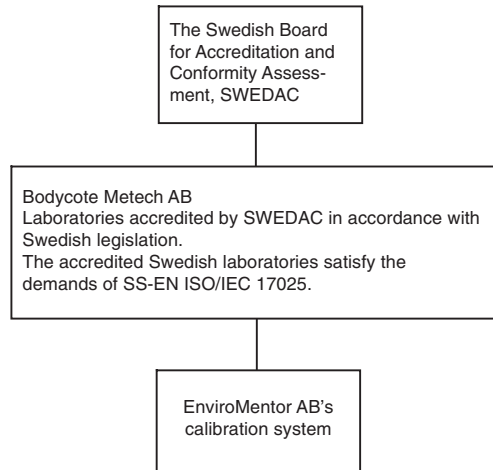
EN 50 081-1:1992 Emissions standard class B

EN 50 082-1 Immunity standard

Manufacturer EnviroMentor AB  
Drottninggatan 9  
SE-411 14 Göteborg,  
Sweden

**Traceability**

Traceability means that it should be possible to relate a measurement result to national or international standards via an unbroken chain of comparisons.



Traceability chart.

**Report form for measuring/registering magnetic fields in a room**

|                                    |       |       |       |  |      |          |               |     |
|------------------------------------|-------|-------|-------|--|------|----------|---------------|-----|
| <b>Magnetic field, 30 Hz–2 kHz</b> |       |       |       | Measuring equipment: <b>Field Finder</b> |      |          |               |     |
| Object:                            |       |       |       | Model:                                   |      |          |               |     |
| Address:                           |       |       |       | Room:                                    |      |          |               |     |
| Measured by:                       |       |       |       | Date:                                    |      |          |               |     |
| Direct measurement $\mu\text{T}$   |       |       |       | Registration $\mu\text{T}$               |      |          |               |     |
| Height above floor                 | 0.2 m | 1.0 m | 1.8 m | Start                                    | Stop | Int. (s) | average value | Max |
| Measurement point 1                |       |       |       |  |      |          |               |     |
| Measurement point 2                |       |       |       |  |      |          |               |     |
| Measurement point 3                |       |       |       |  |      |          |               |     |
| Measurement point 4                |       |       |       |  |      |          |               |     |
| Measurement point 5                |       |       |       |  |      |          |               |     |
| Measurement point 6                |       |       |       |  |      |          |               |     |
| Measurement point 7                |       |       |       |  |      |          |               |     |
| Measurement point 8                |       |       |       |  |      |          |               |     |
| Measurement point 9                |       |       |       |  |      |          |               |     |
| Measurement point 10               |       |       |       |  |      |          |               |     |
| Measurement point 11               |       |       |       |  |      |          |               |     |
| Measurement point 12               |       |       |       |  |      |          |               |     |

**Notes**

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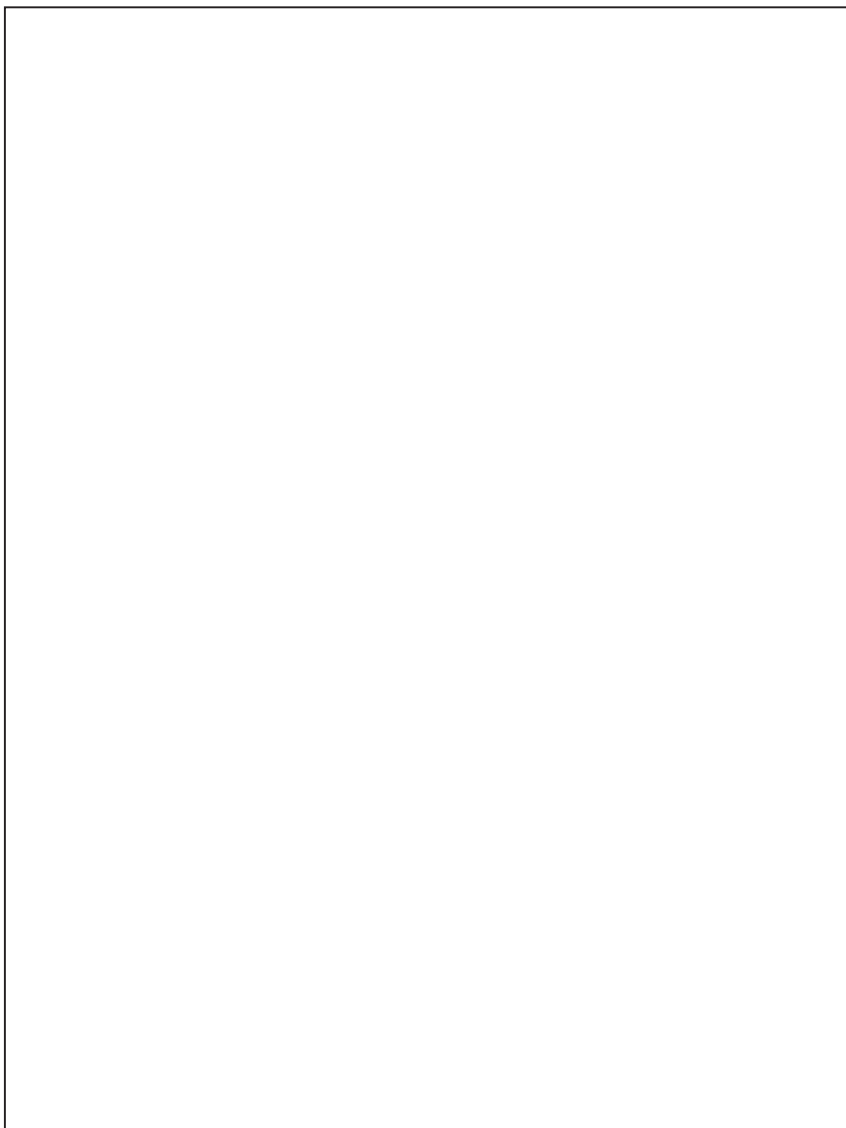
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## Report form for measuring/registering magnetic fields in a room



Sketch of the room with measurement points marked.



Protokoll 986fB, Magnetic Field Logger © EnviroMentor AB, Göteborg

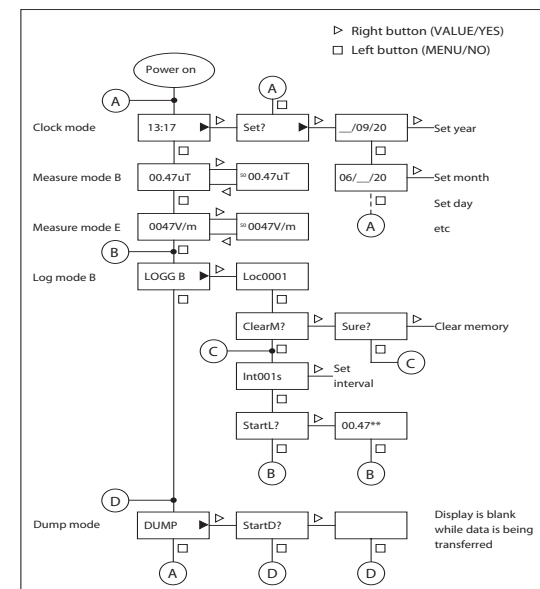
## 3 Use

### General

Field Finder is fully compatible with the analysis program Field Analyzer v1.11. The functions EM-1 and MM-1 are used for logging in the computer when measuring electric or magnetic fields. The function for ML-1 is used to retrieve and analyse the magnetic field that has been logged in the instrument.

### 3.1 Menu

Field Finder has a menu in which you can move around using the two function keys. The main menu contains five submenus - clock mode, measurement mode B, measurement mode E, registration mode and transmission mode. The full menu tree is shown below. You can use this for reference purposes once you are familiar with the instrument. This section describes step by step how to use the various functions.



Menu structure in Field Finder.

**3.1.1 Direct measurement of magnetic fields**

- Start up the instrument with the switch
- Press the NO button once.
- Press Yes once if you want to engage the 50 Hz filter
- Press the YES button again to disengage the 50 Hz filter

Field Finder now measures the magnetic fields and displays the effective value in  $\mu T$ . The reading is updated every second. Field Finder can be pointed in any direction in relation to the magnetic field source as it has a three-dimensional sensor. “50” is displayed before the measurement reading in the display if the filter is engaged.

**3.1.2 Direct measurement of electric fields**

- Start up the instrument with the switch
- Press the NO button twice.
- Press Yes once if you want to engage the 50 Hz filter
- Press the YES button again to disengage the 50 Hz filter

Hold the instrument in the required direction. The instrument now measures the electric field in the direction in which it is currently pointing, and displays the effective value in V/m. The reading is updated at 1 second intervals.

Note that the field can be influenced by objects in the vicinity of the instrument, as well as by the person holding it. The instrument has to be held still in order to achieve a stable reading. When measuring electric fields from appliances, the instrument should be earthed. Connect the accompanying earth cable to the output.


## 7 Report forms

Report form for measuring electric fields around an object

|                             |       |        |                                   |  |
|-----------------------------|-------|--------|-----------------------------------|--|
| Electric field, 30 Hz-2 kHz |       |        | Measuring equipment: Field Finder |  |
| Object:                     |       | Model: |                                   |  |
| Address:                    |       | Room:  |                                   |  |
| Measured by:                |       | Date:  |                                   |  |
| Measurement distance:       | 30 cm | 50 cm  | Comments                          |  |
| 0°                          | V/m   | V/m    |                                   |  |
| 90°                         | V/m   | V/m    |                                   |  |
| 180°                        | V/m   | V/m    |                                   |  |
| 270°                        | V/m   | V/m    |                                   |  |
| Background field            | V/m   | V/m    |                                   |  |

Notes

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 \_\_\_\_\_  
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Report form for measuring electric fields.

On the following pages you will find report form templates for measuring electric and magnetic fields. Copy the templates, fill them out and then file them in a folder. You can then go back and make comparisons with previous measurements.


Section 4 gives examples of how to carry out measurements, while subsection 4.4 details how to fill out the report forms.

Report form for measuring magnetic fields around an object

|                             |         |         |                                   |  |
|-----------------------------|---------|---------|-----------------------------------|--|
| Magnetic field, 30 Hz-2 kHz |         |         | Measuring equipment: Field Finder |  |
| Object:                     |         | Model:  |                                   |  |
| Address:                    |         | Room:   |                                   |  |
| Measured by:                |         | Date:   |                                   |  |
| Measurement distance:       | 30 cm   | 50 cm   | Comments                          |  |
| 0°                          | $\mu T$ | $\mu T$ |                                   |  |
| 90°                         | $\mu T$ | $\mu T$ |                                   |  |
| 180°                        | $\mu T$ | $\mu T$ |                                   |  |
| 270°                        | $\mu T$ | $\mu T$ |                                   |  |
| Background field            | $\mu T$ | $\mu T$ |                                   |  |

Notes

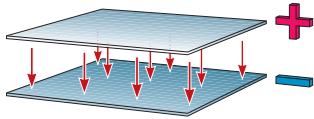
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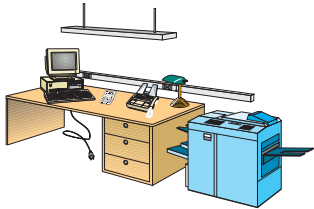
Report form for measuring magnetic fields.



## 6 How electric fields arise



Electric field.



Electric fields from our surroundings.

An electric field arises between two objects with different electric potentials. If two plates made of electrically conductive material are connected to a voltage source, one of the plates will have a positive charge while the other will have a negative charge. A voltage arises between the plates and thereby an electric field. The strength of the field depends on how high the voltage is and the distance between the objects.

In a similar way, we are continually exposed to electric fields from appliances and electrical installations in our surroundings.

The sizes of the fields around us are difficult to predict as they depend on the connection between the sources of the fields, the people and earthing. There are often a number of different sources of varying strengths in a single room.

Objects that are not connected to electricity can also be affected by electric fields. A metal object can be capacitively charged by nearby cabling or other objects connected to electricity. In simple terms, the metal object acts as an antenna, capturing the electric field and helping it to grow. Examples of such objects include desk frames and electrical appliances with non-earthed metal casings. Some types of building material (plasterboard walls, chipboard) can also capture electric fields and increase their spread. When measuring fields in a room that has plasterboard walls, the fields sometimes spread out along an entire wall surface, with the highest readings being concentrated around sockets and switches.

Electric fields can be reduced through screening and earthing. It is possible to use shielded cabling or to place screening material around the object that is to be screened off. In order for the screening to be effective, it is important for the screening material to be properly earthed. If this is not the case, screening can have the opposite effect – the fields increase in size.

The instrument can also be used without connecting the earth cable. In this event, hold your finger against the earth output on the left side of the instrument. The fields you then measure are those to which the user is exposed in the current situation. These fields are dependent on the user's and the sources' connection to each other and to earth.

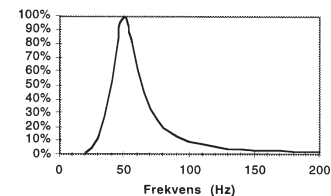
### Software settings:

|   |           |
|---|-----------|
| Transfer speed  | 9600 baud |
| Data bits   | 8         |
| Parity  | none      |
| Flow regulation/handshake   | none      |
| You also have to select the correct serial communications port in the software (COM1, COM2...). |           |

### 3.1.3 Transmission during direct measurement

During direct measurement, the readings are transmitted via the RS232 port at one second intervals. The readings can be received by a computer with communication software or similar terminal program. In the computer, the readings are stored as a text file on the hard disk. From there, they can be imported into a calculation program and used to produce diagrams or statistical calculations for the measurement. Connect the accompanying cable between RS232 on the instrument and one of the ports (COM 1, COM 2 or COM 3) on the computer. The settings for the communication software are listed in subsection 3.1.4 below.

Band-pass filter



The band-pass filter has the  $Q$  value 3.2, which means that the signal is attenuated approximately 30 times at 150 Hz.

### 3.1.4 Transmission protocol during direct measurement

During direct measurement, the readings are transmitted as in the following example: 01.75 01.74 012.0, i.e. Field Finder separates each reading with a space. Most communication programs can receive measurement data, e.g. Terminal in Windows.

### 3.2 Setting the clock

When the instrument is connected, it will be in clock mode. To set the clock:

- Press YES. *Set?* appears in the display.
- Press YES.

*YY/MM/DD* appears on the display

- Press YES until the correct year is displayed, then press NO
- Press YES until the correct month is displayed, then press NO
- Press YES until the correct day is displayed, then press NO

*HH:MM* appears on the display

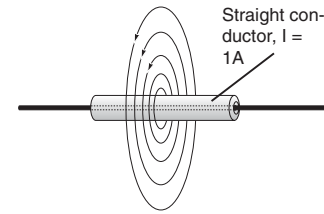
- Press YES until the correct hour is displayed, then press NO
- Press YES until the correct minute is displayed, then press NO

The clock is now set (the seconds are always set to zero) and the instrument reverts to clock mode in the main menu.

### 3.3 Registering readings (magnetic fields) (Logging)

- Start up the instrument
- Press NO twice. *LOGG* appears.
- Press YES. *LocXXXX* shows how many memory locations have been used. *Loc8192* means that the memory is full.
- Press NO. *ClearM* appears.
- Press NO if you want to store additional readings or YES if you want to delete the memory. *IntXXX* now appears, which is the current measurement interval.

## 5 How magnetic fields arise



At 1 m from the conductor, the magnetic flux density is  $0.2\ \mu\text{T}$ .

Magnetic fields are generated by electrical currents and always occur in continuous closed paths around the currents that generate them. A live conductor gives rise to a magnetic field, the strength of which is always proportional to the current in the conductor. Magnetic fields are usually depicted with the aid of field lines. The strength of the magnetic field is constant along the conductor in closed paths around the live conductor. In the event of other sources, magnetic fields tend to have a complicated appearance that cannot normally be calculated, but has to be measured instead. The unit used to measure the magnetic flux density is called the tesla (T).

Magnetic fields can be caused by electrical appliances and installation cables. In certain cases, stray currents can give rise to magnetic fields. In Sweden, for example, the electricity systems generally comprise four conductors leading to each building, which can result in major problems with currents of this type. The decay current can pass through the neutral conductor as intended, but it can also pass through the earth conductor and into the plumbing pipework to the transformer's earth point. This increases the magnetic field both along the path of the stray current and along the supply cable. It is also commonplace for stray currents to exist in computer networks. As well as causing magnetic fields, they can also lead to communication problems. In industrial environments, common sources include welding equipment, electric motors and cable clusters.

#### 4.4 Example of report form for measuring electric and magnetic fields


When you measure magnetic fields, you should produce a report form that can act as a basis for any remedial action. Below is an example of a completed report form. Report form templates that you can copy can be found at the back of these user instructions. Once you have filled out the forms, they should be filed in a folder. You can then go back and make comparisons with previous measurements.

Report form for measuring magnetic fields around an object

|                                    |       |  |              |
|------------------------------------|-------|--|--------------|
| <b>Magnetic field, 30 Hz-2 kHz</b> |       | Measuring equipment: <b>Field Finder</b> |              |
| Object: Copymachine                |       | Model:                                   |              |
| Address: Elm street 2              |       | Room: caretaker's office                 |              |
| Measured by: P. Svensson           |       | Date: 06-03-10                           |              |
|                                    | 30 cm | 50 cm                                    | Comments     |
| 0°                                 | 20 µT | 10 µT                                    | Being copied |
| 90°                                | 30 µT | 10 µT                                    |              |
| 180°                               | 40 µT | 20 µT                                    |              |
| 270°                               | 30 µT | 10 µT                                    |              |
| Background field                   | 3 µT  | 3 µT                                     |              |

**Notes**  
 The background field is OK, but we should perhaps do something about the cable routing.

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 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Example of a completed report form for measuring electric fields around an object.

| [s] | maximum measuring time |
|-----|------------------------|
| 1   | 2 hrs 17 min           |
| 2   | 4 hrs 33 min           |
| 3   | 6 hrs 50 min           |
| 4   | 9 hrs 6 min            |
| 5   | 11 hrs 23 min          |
| 10  | 22 hrs 46 min          |
| 20  | 1 day 21 hrs 46 min    |
| 40  | 3 days 19 hrs 12 min   |
| 80  | 7 days 14 hrs 24 min   |
| 100 | 9 days 11 hrs 34 min   |
| 150 | 14 days 5 hrs 20 min   |

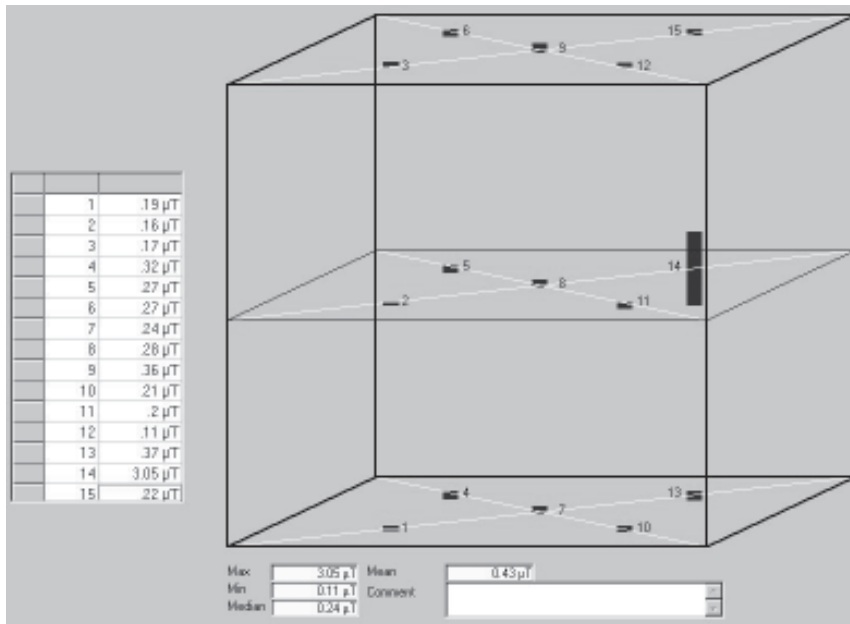
Maximum measuring time at different measurement intervals [s].

- Press YES until the desired interval is displayed. You can select from Manual, 1, 2, 3, 4, 5, 10, 20, 40, 80, 100 and 150 seconds.
- Press NO when you have selected the interval. *StartL* now appears?
- Press YES to start registration.
- Press Yes once if you want to engage the 50 Hz filter.
- Press the YES button again to disengage the 50 Hz filter.

Field Finder now measures the magnetic field and updates the reading in the display at the selected interval. After the reading, \*\* appears, which indicates that registration is in progress. When the 50 Hz filter is engaged, "50" appears before the reading in the display. When engaging and disengaging the filter, it takes approximately 3 seconds for the reading to stabilise.

- Press NO if you want to interrupt registration. The instrument reverts to the measurement mode in the main menu.

You can now commence a new measurement series, provided you have sufficient memory space. Press NO until *LOGG* appears, then repeat the above procedure. If you want, you can select a different interval. The maximum measuring time depends on the measurement interval you have selected. The table to the left shows the maximum measuring times for measurement series with different intervals.



Example of the presentation of 15 point measurement in the analysis program "Field Analyzer".

### 3.4 Manual registration of readings (15 point measurement)

Set the interval manually and commence registration in accordance with subsection 3.4. Field Finder now measures the magnetic field and updates the reading in the display at 1 s intervals.

\*> appears after the reading on the display, which means that Field Finder is in waiting mode.

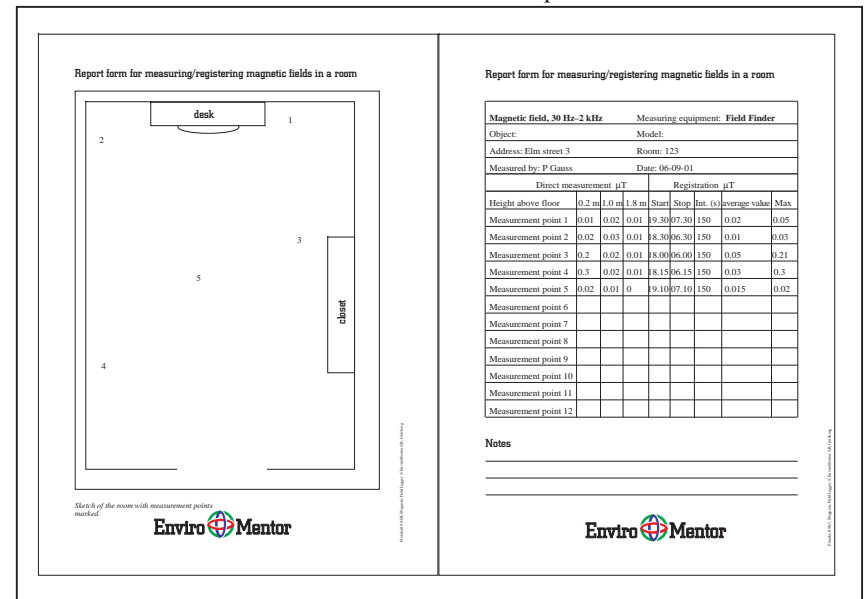
- Press YES to register the first point. 01 now appears after the reading on the display for a short period, before the display reverts to \*>.
- Press YES again to register the second point. 02 now appears on the display.

When the 15<sup>th</sup> and final point has been registered, the instrument reverts automatically to the LOGG menu.

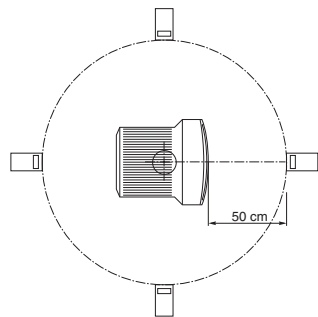
### 4.3 Logging magnetic fields

Below is a suggestion as to how to register the magnetic field's variations in a room within the frequency range 30 Hz to 2,000 Hz.

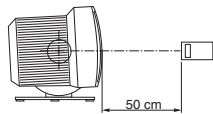
1. Draw a sketch of the room and mark the points where you want to register the variations in the field strength.
2. Check that the clock is set and that the battery is charged.
3. Position the instrument at measurement point 1, mark this on the sketch and note the start time on the report form.
4. Set the measurement interval and start the registration process (see subsection 3.4).
5. Conclude registration after e.g. a day and proceed in the same manner with the other measurement points.



Example of a completed report form for measuring/registering magnetic fields in a room.



Overhead view.



Side view.

## 4.2 Magnetic fields

To measure a magnetic field in a room within the frequency range 30 Hz to 2,000 Hz:

1. Start by taking a preliminary reading with all the electrical appliances switched on and make a rough estimate of the field sources present in the room. Draw a sketch of the room. Then measure a number of points at 1-3 m intervals and write down the measured readings on the sketch. Measure the magnetic field at floor level as well as 0.8 and 2 metres above the floor.
2. Then take a reading with all the appliances switched off to get an idea of the background fields in the room. Remember that switching off the appliances is probably not sufficient – you will usually need to unplug them to completely eliminate the fields. In some cases, the background magnetic fields can be more powerful than the magnetic fields from the appliances in the room.
3. Connect the appliances one at a time and measure the magnetic fields in the directions 0°, 90°, 180° and 270° at distances of 30 cm and 50 cm from the outer edge of the appliances in question (see figure) or in the direction the operator is facing. Summarise the measurement readings in the report form. An example of how to fill out a report form can be found on page 18. You must not subtract the background values of the magnetic fields from the measured readings. They should always be noted as a comparison.
4. Analyse the readings and assess the need for action, such as rearranging the furniture and/or moving appliances. The sources of the magnetic fields may be located some distance away, and magnetic fields can penetrate almost all building materials.



Field Finder connected to a computer.

### Note!

The instrument retains the stored readings, even if the batteries run out or are removed from the instrument.

### Note!

The analysis program can process a maximum of 20 measurement series.

## 3.5 Transmitting measurement series (Dumping)

To transmit measurement series to a computer:

- Connect Field Finder to the computer using the accompanying cable and the adapter if required. Use the COM 1, COM 2 or COM 3 port on the computer.
- Start up the instrument.
- Press NO three times. *DUMP* appears.
- Press YES. *StartD* appears.
- Start up the analysis program on the computer
- Select the “Data transmission” menu
- Select the correct serial communication port (COM 1, COM 2 or COM 3) in the software
- Select “Data transmission” again
- Select “start transmission”. The program is now ready to receive series of measurements.
- Press YES on Field Finder. Transmission starts immediately. The display remains blank while transmission is in progress. Transmission takes place at a rate of around 50 readings a second. Once transmission is completed, the instrument reverts to transmission mode in the main menu.

### 3.5.1 Transmission protocol during dumping

The data transmission during dumping comprises ASCII characters, i.e. normal text in accordance with the following:

Every measurement series begins with a plus sign. At the 100 s interval “00” appears, at 150 s “50” appears, and during manual logging “15” appears.

This is followed by the start time, date and interval for the measurement series as well as a space. These are followed by the readings in  $\mu\text{T}$ , separated by spaces. A complete series is concluded with a space, with the next series beginning with a plus sign. The final series is concluded with an asterisk.

Example:

+301514070601 00.08 00.07 00.06 .....

.....00.10 +020915070640 00.05 00.45

...00.33 \*

indicates that the first measurement series began at 15.30 on 14/07/2006 with a measurement interval of 1 second and produced the readings 0.08  $\mu\text{T}$ ; 0.07  $\mu\text{T}$ ; 0.06  $\mu\text{T}$ ... 0.1  $\mu\text{T}$ , while the final measurement series began at 09.02 the following day with a measurement interval of 40 seconds and produced the series 0.05  $\mu\text{T}$ ; 0.45  $\mu\text{T}$  ... 0.33  $\mu\text{T}$ .

### 3.6 Deleting the memory

Once you have transmitted the readings to the computer, it may be a good idea to delete the memory.

- Follow the instructions under point 3.4 (registering readings) until *Clear?* appears.
- Press YES. *Sure?* appears.
- Press YES. The memory has now been deleted.
- Press NO twice to revert to the measurement mode in the main menu.

### 3.7 Changing the batteries

When the battery symbol is displayed to the left of the measurement reading, the batteries should be replaced (2 x 1.5 V LR6). If the batteries run out while logging is in progress, the logging process will be interrupted but the readings will be saved. If the batteries start to run low while Field Finder is connected to a computer via the interface cable, it may be impossible to exit the direct measurement mode. This is because power consumption is considerably higher during transmission. In this case, the instrument goes back up in the menu in order to prevent transmission errors. Disconnect the RS232 cable and check that it is possible to advance to the DUMP mode in the menu. If the problem recurs when you reconnect the cable, the batteries should be replaced. The instrument has an integral back-up battery that enables you to replace the batteries without losing any data.

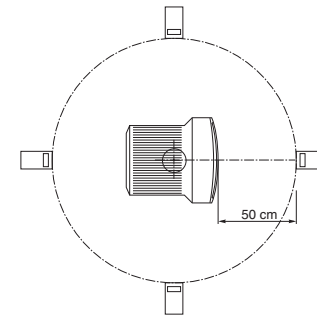


The battery symbol.

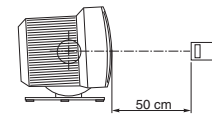
#### Note!

Remember that power consumption is considerably greater when the RS232 port is in use.

## 4 Measurement examples



Overhead view.



Side view.

### 4.1 Electric fields

To measure an electric field in a room within the frequency range 30 Hz to 2,000 Hz:

1. Start by taking a preliminary reading with all the electrical appliances switched on and make a rough estimate of the field sources present in the room. Draw a sketch of the room. Then measure a number of points at 1-3 m intervals by taking readings in all directions in a circle around you. Write down the highest reading at each point on the sketch. Using an arrow, mark the direction in which you obtained the reading you have written down. Ideally, note the field levels towards the ceiling and the floor.
2. Then take a reading with all the appliances switched off to get an idea of the background fields in the room. Remember that switching off the appliances is probably not sufficient – you will usually need to unplug them to completely eliminate the fields. In some cases, the background fields can be as high as the fields from the appliances in the room.
3. Connect the appliances one at a time and measure the electric fields in the directions 0°, 90°, 180° and 270° at distances of 30 cm and 50 cm from the outer edge of the appliance in question (see figure) or in the direction the operator is facing. Summarise the measurement readings in the report form. An example of how to fill out a report form can be found on page 18. You must not subtract the background values of the electric fields from the measured readings. They should always be noted as a comparison.
4. Analyse the readings and assess the need for action, such as rearranging the furniture and/or moving appliances. The sources of electric fields may be located in adjacent rooms. Certain non-metal materials, such as plasterboard and chipboard, can also act as antennas, capturing fields and increasing their spread.