



## FEATURES

Taoma today is the state of the art of environmental measuring. It is the result of a project that began with two fundamental elements, objective and inalienable: the first is represented by the regulations regarding the exposure of the population and workers to electromagnetic fields. In recent years it has progressively developed and has produced the drawing up of official national and international guidelines for the correct procedure in the execution of measures. The second is implicit in the dizzying evolution of the technologies available that today permit us to work in less time and more efficiently and professionally.

Taoma wants to be a working platform, which by definition is open to various applications, that can be continuously updated and that will remain in the avant-garde growing with the requirements of the professional environmental technician.

Taoma represents a new philosophy of measuring for the environmental technician. The need to operate on the territory in surveying the values of the electromagnetic field in a broad frequency spectrum often means completing the series of data with the temperature and humidity values at the time of the survey and with the values of the GPS georeferentialization of the site in question. Moreover measuring further environmental parameters with additional probes, manage an on-line software that makes it possible to carry out the measuring report on site, being able to transmit via GPRS the complete result of the analysis is translated into a considerable increase in the efficiency of the environmental technician, the reduction of the time required to complete the mission and, consequently, a drastic saving on the relative costs of management.





1



3



4



2

1 • The input connector for the measuring probes has been designed to ensure that the precision and solidity of the coupling are not altered by prolonged use. The antenna of the integrated GPS module is visible next to the connector.

2 • In addition to the alphanumeric keyboard useful in inserting texts, there are keys for direct functions and an integrated trackball to navigate on the screen with the mouse function.

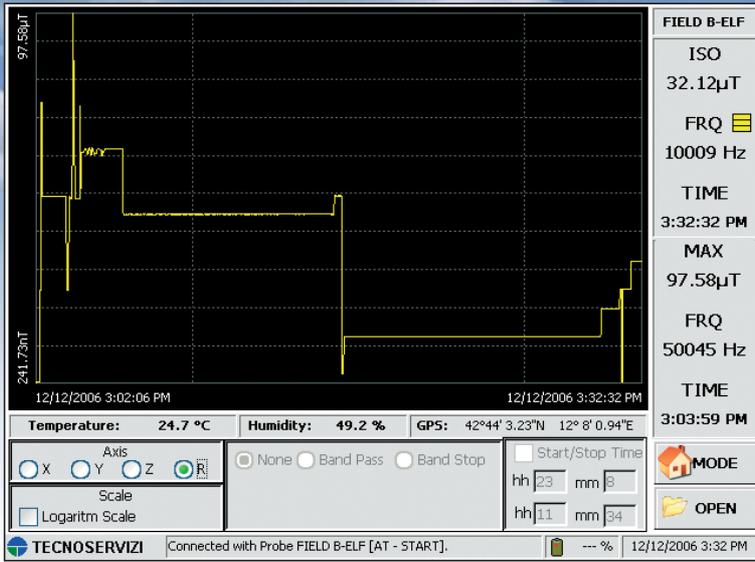
3 • Protected by the rubber sleeve at the sides, the system has 1 slot for a Secure Digital card to be used in memorizing the measuring data and a slot for the insertion of a SIM card in case the integrated GPRS module is present.

4 • The simultaneous presence of different connection interfaces makes it possible to use external mouse and keyboard, a LAN connection, optical fibers and in particular the use of any kind of measuring sensor that requires a powered analogic output.



# USE

The program starts displaying [this screen](#).  
 The user can select one of the modes by clicking on the required icon.



▲ **ACQUIRE** Mode: current ELF measurement graphic displaying instantaneous value (ISO) and maximum value (MAX).

▶ **ACQUIRE** Mode: final measurement graphic displaying median value (MED) and maximum value (MAX).

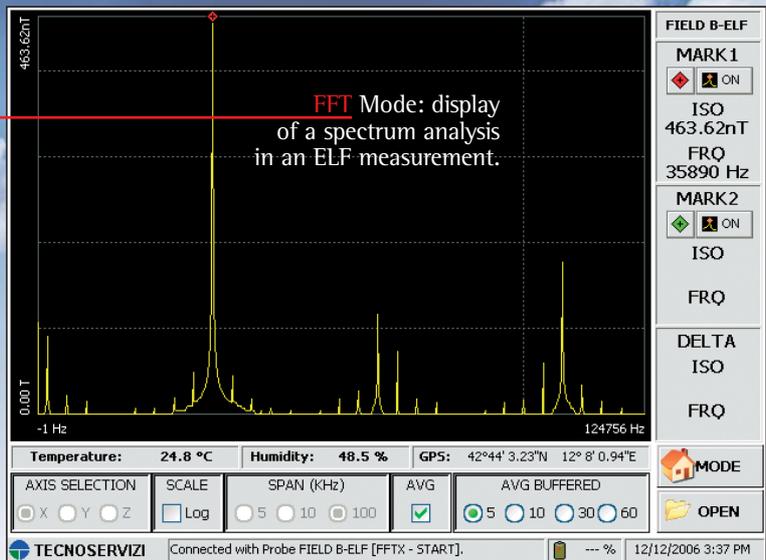


◀ **ACQUIRE** Mode: numerical display of current ELF measurement.

49.26µT

▶ **ACQUIRE** Mode: current RF measurement graphic displaying instantaneous value (ISO), maximum value (MAX) and mobile median value on a six-minute interval (AVG).





**I-BOX Mode:** configuration menu of the I-BOX (Interface Box) device to programme measuring probes to a long term stand-alone monitoring.

VER. 1.00

I BOX

ID

Date-Time  
 Start: 12/7/2006 5:47:05 PM  
 Stop: 12/7/2006 5:47:05 PM

Filter Setting  
 None  Pass Band  Stop Band  
 Start (Hz)  
 Stop (Hz)

T Sample  
 h:mm:ss

Start Del

TECNOSERVIZI 12/7/2006 5:47:07 PM

**REPORT Mode:** example of a table report that can be viewed on instrument display at the end of the measuring cycle.

File Edit View Format Tools Times 10

AOMA (FILE VERSION 1.0.0)

File created: 12/12/2006 3:33:42 PM

Sensor: FIELD B-ELF  
 Mode: AT  
 Sampling Period: 1 second/s  
 Filter: None  
 Start Time: 12/12/2006 - 3:02:06 PM  
 OPS POSITION AT START: 42°44' 3.23"N 12° 8' 0.94"E

MEDIAN  
 VALUE (uT): 2.47263  
 FREQ (Hz): 10009  
 TIME: 3:17:35 PM

DATE/TIME	ISO (uT)	FREQ (Hz)	Bx (uT)	FRQs (Hz)	By (uT)
12/12/2006 - 3:02:06 PM	0.248002	1	0.138038	1	0.150551
12/12/2006 - 3:02:07 PM	0.241726	1	0.127325	1	0.139936
12/12/2006 - 3:02:08 PM	0.243855	1	0.127174	1	0.140354
12/12/2006 - 3:02:09 PM	0.243468	1	0.127476	1	0.140657
12/12/2006 - 3:02:10 PM	0.243626	1	0.127325	1	0.141474
12/12/2006 - 3:02:11 PM	0.243119	1	0.129420	1	0.143229
12/12/2006 - 3:02:12 PM	0.245559	1	0.129717	1	0.143597
12/12/2006 - 3:02:13 PM	0.245923	1	0.129665	1	0.144480
12/12/2006 - 3:02:14 PM	0.247148	1	0.130013	1	0.146149
12/12/2006 - 3:02:15 PM	0.248002	1	0.130896	1	0.147197
12/12/2006 - 3:02:16 PM	0.248532	1	0.131355	1	0.148107
12/12/2006 - 3:02:17 PM	0.247924	1	0.130160	1	0.147718

**SETTINGS Mode:** option to configure instrument accessory modes.

VER. 1.00

Setting

Date Time Dialing Internet Option Network and Dial-Up SD Card

Date/Time Properties

Date/Time

December 2006

S	M	T	W	T	F	S
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Current Time  
 5:36:52 PM

Time Zone  
 (GMT-08:00) Pacific Time (US & Canada); Tjz

Automatically adjust clock for daylight saving

Apply

TECNOSERVIZI 12/7/2006 5:36:52 PM



## FUNCTIONS

### FULL COMPLIANCE TO THE NORMATIVE STANDARDS

Taoma was designed and built in conformity with the Italian and international normative standards. More in detail the instrument can be used to verify respect of the D.M. 381 of 10/09/1998, the D.P.C.M. of 08/07/2003 and the new European guidelines 2004/40/CE in course of adoption in the single countries. Moreover the procedure for the use of Taoma faithfully respects the international guidelines for the exact procedure in measuring low and high frequencies.

### BROADBAND MEASURING IN ELECTROMAGNETIC FIELDS

The primary function of Taoma is the measuring of electromagnetic fields in broadband mode. The system handles various probes in function of the measuring parameter (magnetic induction, magnetic field and electric field) and the relative frequency bands. The standard configuration of Taoma allows low and high frequencies broadband measurements and low frequency selective measurements (FFT). The revolutionary feature of this solution is the extensive graphic color display available to the operator to analyze all the data regarding the measurements. In a single screen it is possible to read the numerical value of the field measured according to the modality chosen (instantaneous, average, max), the frequency value of the most important contribution to the field in the case of ELF measurement, the hour the measurements were begun, dynamic span/time graphic, used selective filter or notch, spatial axes X, Y, Z that may have been enabled in addition to the isotropic value, temperature and humidity values in the point measured, GPS coordinates. The measuring instrument automatically acquires the values collected and visualized from the start command and memorizes all the data in a provisory memory area of its own. This permits subsequent analysis using markers on the graphic available or verifying the numerical and chronological table of the event. This philosophy eliminates therefore the problem of transferring the data acquired onto an external PC and subsequent elaboration. The presence of a removable SD card makes the management of an important mass of data immediate and flexible. Taoma measures, visualizes, acquires and elaborates.

### INTELLIGENT AND ACCURATE PROBES

The Taoma probes are the result of a totally innovative project aimed at increasing the typical accuracy of the broadband probes used up to now and to make their use more flexible. Two sensors for temperature and humidity are incorporated which, taking the values at the moment of analysis of the field, allow for the automatic compensation of the probes themselves. In environmental conditions distant from the typical calibration setup, this function ensures greater trustworthiness to the data provided.

Moreover all the probes can be configured by the base instrument to operate separately on an amagnetic supporting tripod and acquire data automatically and continuously for over 24 hours. This is possible by using an optional device, the "Interface Box", which makes installation on the tripod possible. This device has a power supply unit for the probe and an optical interface for connection of Taoma via fiber optic cables to execute the programming. This function makes it possible to use several identical probes at the same time, previously configured by a single Taoma unit, for the electromagnetic mapping of an extensive area for analysis.

### LOW FREQUENCY: BROADBAND AND FFT

Taoma can do magnetic induction and electric field analyses (depending on the probe used), calculating the total field value, or in FFT modality, in the frequency band from 5 Hz to 100kHz. In the first case a dynamic amplitude/time graphic is provided that permits analysis in real time of the course of the signal. In the second case a amplitude/frequency graphic is provided that visualizes the contribution of each individual frequency to the resulting field and is indispensable in the search for anomalous components, the analysis of harmonics or in following the behavior of frequencies that are not standard of particular apparatus that are being tested.

At the end of every cycle of acquisition Taoma automatically also furnishes a table of results visualized by the WordPad function of the instrument itself which can also if necessary be exported as a .txt file.

### HIGH FREQUENCY: BROADBAND

Above the value of 100kHz Taoma can manage various probes for electric and magnetic fields to do broadband measurements up to extremely high frequencies. In this application it is possible to visualize the amplitude/time graphic, the numerical values of the measurements and obviously it is possible to visualize the mobile average value (already configured at a six minute interval but that can also be programmed differently), an indispensable parameter in verifying whether the current regulations have been respected. The probe for measuring the electric field in the 100kHz to 6Ghz frequency range is absolutely innovative. It is in fact the first probe available on the market that can measure the contributions of the telecommunication and broadcasting sources, including those regarding the Wifi and Wimax services.

### GPS AND GPRS MODULES

Taoma is the first handheld solution for environmental measuring that can use a GPS integrated module to supply georeferentials of the measurements taken. Indeed characterizing the outdoor measurements with the relative geographic coordinates to be used in the final job reports is by now a good technical procedure. This result is very useful above all when the electromagnetic background at the new base radio stations is evaluated, when the environmental impact of a transformation cabin is characterized and each time that the mapping of exposure in an extensive geographic area is done. It is no longer necessary to use an external device. Taoma measures and automatically refers the field values with the coordinates of the points in which they were taken. Moreover Taoma can use a GPRS module to use a constantly available wireless connection to transmit the data acquired at the measuring site in real time to an office, a control center, a colleague or wherever an immediate check of the activity done in the field by a designated technician is needed.



## TECHNICAL DATA

### EASY TO USE IN THE OFFICE AS WELL

The large number of available interfaces makes using Taoma in an office easy. Through the USB sockets present it is possible to connect an external mouse and/or keyboard and use the unit to draw up texts and reports to accompany the previously memorized measurements.

### A COMPLETE SOLUTION

The Taoma solution can be enhanced by the following optional accessories:

- Amagnetic tripod in wood
- Interface Box for programming and stand-alone use of the measuring probes
- Optic fiber cables in various lengths
- Integrated GPRS module for data transmission
- Laser distance meter for measurements up to 100 meters
- Laser telemeter for measurements up to 400 meters
- Laser telemeter for measurements up to 1000 meters

## ORDERING CODES

<b>TS/001/UB</b>	Taoma basic unit including transportation case, battery charger, SD reader for PC, instruction handbook, calibration certificate
<b>TS/002/BLF</b>	Probe for magnetic induction (B) with 5Hz-100kHz frequency range
<b>TS/003/ELF</b>	Probe for electric field (E) 5Hz-100kHz frequency range
<b>TS/004/EHF</b>	Probe for electric field (E) with 100kHz-6GHz frequency range
<b>TS/101/IBox</b>	Interface Box for programming probes including fiber optic cable (5 meters long) and charger
<b>TS/301/GPRS</b>	Integrated GPRS module for data transmission
<b>TS/120/FOC</b>	Optic fiber cable 20 meters long
<b>TS/140/FOC</b>	Optic fiber cable 40 meters long
<b>TS/201/TRP</b>	Amagnetic wooden tripod
<b>TS/202/TLS</b>	Telescopic support
<b>TS/501/DST</b>	Laser distance meter up to 100 meters
<b>TS/502/TML</b>	Laser telemeter up to 400 meters
<b>TS/503/TML</b>	Laser telemeter up to 1000 meters

### TAOMA BASIC UNIT

Intel XScale PXA255 400MHz Processor  
VGA Colour TFT 6.4" display, 640x420 pixel resolution  
MS™ Windows CE.Net 4.2 operative system  
Alphanumerical keyboard with access keys for the functions  
Integrated trackball  
IP-54 protection  
Powered by rechargeable Li-Ion battery pack or by AC line  
Battery duration 7 hours (standard battery pack), 12 hours (high capacity battery pack)  
Interface for e.m. field probe from 5Hz to 40Ghz  
Other interfaces available: serial RS-232 electric, serial RS-232 optical, 3xUSB (2 client, 1 host), analogic input 0-5V, RJ-45 for Ethernet, SD card slot  
Integrated temperature sensor  
Integrated humidity sensor  
Integrated GPS module  
Integrated GPRS module (optional)  
Real time measurements with simultaneous visualization of the numerical values (Instantaneous, Average, Max) and of the amplitude/time graphic  
Isotropic or single axis measuring function  
Identification of the frequency value of the signal with highest bandpass contribution to the total field (ELF)  
Band-pass, selective and notch filters that can be configured by the user (ELF)  
FFT (ELF) analyses in instantaneous mode and averaged on an programmable elaboration cycles  
Markers for graphic analyses  
Long term monitoring function  
Tables and graphics of the results for post measuring analyses  
Memorization of the measurements on 512MB SD card (included)  
Memory capacity for numerical data and relative graphics for more than 250 hours of measuring with sampling at 1 second (512MB).  
Dimensions in mm 280 x 185 x 50  
Weight 1.045 Kg  
Operating temperature from -10°C to +50°C

### PROBE FIELD B TS/002/BLF

Isotropic and single axis measuring  
Frequency range: 5Hz-100kHz  
Measuring range: 10nT-10mT  
Overload limit: 20mT  
Resolution: 1nT  
Total uncertainty: ± 1dB

### PROBE FIELD E TS/003/ELF

Isotropic and single axis measuring  
Frequency range: 5Hz-100kHz  
Measuring range: 1V/m-100kV/m  
Overload limit: 200kV/m  
Resolution: 0,1V/m  
Total uncertainty: ± 1dB

### PROBE FIELD E TS/004/EHF

Isotropic and single axis measuring  
Frequency range: 100kHz-6GHz  
Measuring range: 0,2V/m-400V/m  
Overload limit: 600V/m  
Resolution: 0,01 V/m  
Total uncertainty: ± 1.5dB  
Linearity error: ± 0,5dB  
Frequency response error: ± 1.3dB (1MHz-6GHz)  
Isotropy error: ± 0,5dB

### INTERFACE BOX TS/101/IBOX

Rechargeable integrated battery with up to 7 day autonomy  
LED indication of the battery charge  
Optical interface with status LED  
Internal processor for managing the activity  
Optic fiber cable 5 m long  
Battery charger  
Threading for installation on tripod



## CALIBRATION AND TRACEABILITY

In agreement with the guidelines and current regulations, the Taoma system is furnished with a calibration certificate for every measuring probe. The standard certificate documents a calibration according to a UNI ISO IEC EN 17025 quality method with SIT referability. It is carried out with SIT traceable sampling instruments applying controlled ISO quality methods as defined above. Upon request a SIT accredited calibration with regards to the intensity of the electric field, the magnetic field and the density of the electromagnetic power for the high frequency range is available, also documented by a relative certificate.



# TECNOSERVIZI

Via delle Sette Chiese, 146  
00145 Roma  
Tel. +39 06.51.60.46.09  
Fax +39 06.51.88.3527  
[www.tecnoservizi-sas.it](http://www.tecnoservizi-sas.it)  
[tecnoservizi@tecnoservizi-sas.it](mailto:tecnoservizi@tecnoservizi-sas.it)

