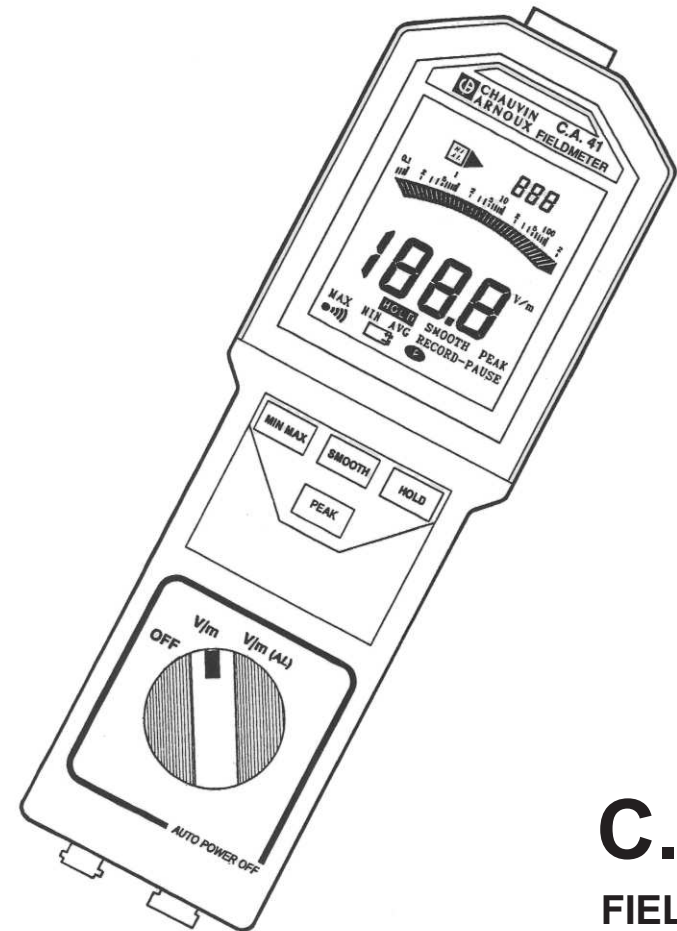


MESUREUR DE CHAMP ÉLECTRIQUE LARGE BANDE
ELECTRIC FIELD METER WIDE BAND
BREITBANDMESSGERÄT FÜRELEKTRISCHE FELDSTÄRKEN



11 - 2006

Code 906120275 - Ed. 2



C.A 41
FIELDMETER

Mode d'Emploi

User's Manual

Bedienungsanleitung



READ THE INSTRUCTIONS BEFORE USING YOUR INSTRUMENT



SAFETY PRECAUTIONS

In order to keep the instrument in its accuracy class and to obtain optimum use, we advise against leaving the C.A 41 permanently exposed to fields higher than 300 V/m or 100 A/m. Before making a measurement, as soon as the instrument is switched on, check that the low battery symbol is not shown on the display. If it is, change the battery.

TO ORDER

C.A 41 FIELDMETER P01.1670.01B

Consisting of the C.A 41 unit and the measurement probe (Isotropic probe EF2A).

Supplied with the instrument :

- 1 set of 5 adhesive labels, simplified User instructions (5 languages), to stick to the back of the instrument.
 - 1 User's manual.
- Complete in carrying case.

Telecom reference **N7 : 812 979W**

Accessorie :

Shockproof holster (for C.A 41) P01.2980.09B

Spare parts :

Isotropic probe EF2A P01.1672.02B

9V battery P01.1006.20



In the composition of Field-meter C.A 41, polarized probe EF1 is replaced by Isotropic Probe EF2A.

SUMMARY

	Page
DESCRIPTION	26
Case	26
Display	26
PRESENTATION	27
USE	28
On/Off function	28
Special functions	28
OPERATION	29
RECORD of MIN MAX and AVERAGE	29
HOLD the digital value on the display	30
SMOOTH the measurement	31
PEAK measurement	32
ALARM function V/m	32
Sound demodulation function	33
Analogue output	33
Memo on operation of C.A 41	35
MEASUREMENT PROBES	36
General	36
Use of probe EF1	36
Use of probe EF2	36
SPECIFICATIONS	37
Electrical specifications	37
Mechanical specifications	39
OPERATING PROCEDURE	40
MAINTENANCE	44
Changing the battery	44
Cleaning	44
WARRANTY	44

DESCRIPTION

CASE

- 1 Connector for the measurement probe,
- 2 **HOLD** button
. storage in memory of the last digital value displayed,
. permanent operation.
- 3 **PEAK** button
. measurement of the peak values and 50Hz filter OFF.
- 4 Demodulation control,
- 5 BNC socket for analogue output,
- 6 3 position rotary switch,
- 7 **MIN MAX** button
. recording of min, max and average values,
. buzzer OFF
- 8 **SMOOTH** button
. measurement filtering.

Notes : Under the case is the battery compartment and a ¼" UNC lug (KODAK size) for mounting the C.A 41 on a photographic type support.

DISPLAY

- 9 Alarm function ON,
- 10 Alarm threshold crossed,
- 11 Display of the remaining service life as a % of capacity,
- 12 Fixed log scale,
- 13 Analogue bargraph display,
Beyond end of scale,
- 15 Unit of measurement in Volts per metre,
- 16 Set decimal point,
- 17 Digital measurement in SMOOTH values,
- 18 Measurement of PEAK values,
- 19 RECORD temporarily stopped,
- 20 MAX, MIN and AVG recording ON,
- 21 Instrument permanently ON,
- 22 Digital readout of AVG,
- 23 Low battery,
- 24 Buzzer ON,
- 25 Digital readout of the MAX memory,
- 26 Digital readout of the MIN memory,
- 27 HOLD the last measurement,
- 28 2000 count digital display.

PRESENTATION

Pollution of the radio-electric environment is becoming more and more severe, which leads to problems of malfunctioning in many types of electrical equipment, especially since the use of sequential logic and the development of microprocessors.

These modern techniques are used in practically all types of industrial equipment which makes them particularly sensitive to interference and electromagnetic disturbances.

The C.A 41, manufactured by CHAUVIN ARNOUX, allows the user to measure these levels of disturbance.

Measurements are of two types :

Measurement of atmosphere (susceptibility)

This measurement indicates the value of the electromagnetic field in which equipment is located, in order to check that this field does not exceed the permitted limits in accordance with standards 801-3 and IEC 1000-4-3 or similar.

Measurement of emissivity (radiation)

This measurement indicates the value of the electromagnetic field emitted by equipment which is switched ON, and consequently its class of electromagnetic compatibility in accordance with the applicable standard.

The C.A 41 is a small portable instrument that measures the electric field present in the atmosphere surrounding its measurement probe.

This probe consists of an aerial combined with a high frequency detector. The wide passband of this unit enables the measurement of electrical fields from 0.1 V/m to 200 V/m for frequencies between 100 kHz and 2.5 GHz.

The connection between the measurement probe and the base instrument is made via a socket which allows the measurement probe to be removed during transportation.

The use of microprocessors for measurement, calculations and management of the display makes the instrument simple to use and very accurate.

The large dimensions of the LCD comprise a 2000 count digital display, a logarithmic 40-segment bargraph and a display of the different measurement symbols that provide easy reading for the user.

An analogue output allows the measurement to be controlled at a distance for recording on a plotter or an analogue recorder with a minimum impedance of 100 k Ω.

USE

The rotary switch controls switching ON the C.A 41 and measurement with or without alarm.

It has three positions: OFF, V/m and V/m (AL).

ON/OFF FUNCTION

The OFF position of the rotary switch mechanically cuts off the power supply of the instrument. Turning the switch to one of the two ON positions (V/m (AL) or V/m) applies the battery voltage to the circuits of the instrument, for a duration of 10 minutes.

When switched ON with the rotary switch, all the segments of the display light up for 1 second. The digital display (11), for three seconds also displays the remaining service life of the battery, as a percentage of its maximum capacity.

A system for saving battery power switches the instrument OFF after 10 minutes, if :

- . no buttons have been pressed,
- . the rotary switched has not been turned.

Before this automatic switching OFF, the field meter emits a beep at 2 kHz for 65 ms, the measurement display flashes for 1 minute then it switches OFF.






To switch ON again, either press any of the buttons, or turn the rotary switch to one of the positions next to its OFF position. The display will light up again and the instrument will start taking measurements again without taking into account the function of the button which was pressed to switch it ON.

SPECIAL FUNCTIONS

There are special functions which can only be accessed when the field meter is switched ON from the OFF position.

These functions are summarized in the table below.

If several buttons are pressed, none of the functions of these buttons are validated.


BUTTON	FUNCTION
No button pressed	Switched ON for 10 minutes
	ON permanently  is shown on the display
	Switched ON without buzzer (The ) symbol is not shown).
	The alarm threshold can be accessed via the battery compartment. Press and hold throughout the adjustment procedure.


OPERATION

The C.A 41 has four buttons which provide access to specific functions for recording, filtering or holding the measurement value.


Each press on a button sets off a beep at 2 kHz for 65 ms. In all cases, the response time for one press is less than 50 ms.

RECORDING OF MIN, MAX and AVG:

The  button allows recording of the minimum, maximum and average values of the measurement. A brief press (less than 2 seconds) on this button places the instrument in record mode (the RECORD symbol lights up).

The RECORD and  symbols on the display mean that the instrument is in permanent recording mode (the AUTO OFF function is not in operation).

MIN value

When  is pressed the displayed value is memorised in the MIN register. Each time that a measurement is less than that contained in the register, it is transferred into the MIN register and a 1 kHz beep is emitted for 125 ms.

MAX value

A measurement value greater than that contained in the memory will update it. At each modification of the MAX memory, a 2 kHz beep is emitted for 125 ms.

AVG value*

Initially, the memorised value is zero. The instrument inputs the digital value every second, then it takes the sum of all the values input since the start of the record instruction and divides the total by the number of seconds that have passed.

The result (the average value) is stored in memory.


Thus the contents of the AVG memory are reset every second.

Readout of the MAX, MIN and AVG memories

The display of the values contained in the MIN, MAX and AVG registers is produced by successive presses on .

The circular display successively indicates the maximum value reached (MAX symbol), the minimum value reached (MIN symbol), the average value (AVG symbol) then the current value of the measurement.

Switching OFF the MIN, MAX and AVG functions

The MIN, MAX and AVG recording functions are switched OFF by pressing the  button for more than 2 seconds (1 kHz beep for 250 ms).

- Notes :**
- During reading of the MIN, MAX and AVG memories, the recording of new minimum, maximum and average values is taken into account.
 - When the RECORD and SMOOTH symbols are displayed, the smoothed values are recorded (MIN, MAX and AVG) with a measurement constant of 4 seconds.
 - Similarly, when the RECORD and PEAK symbols are displayed, the peak values are recorded (MIN, MAX and AVG), with a measurement constant of 1 ms.
 - In all cases, the analogue display (BARGRAPH) constantly displays the current measurement with updating of the display every 20 ms.

HOLD THE DIGITAL VALUE ON THE DISPLAY

One press on the **HOLD** button allows the user to hold the digital display on the last measurement displayed whilst the analogue display continues to show the instantaneous value of the measurement. HOLD is displayed. Pressing **HOLD** again returns the instrument to instantaneous measurement mode and HOLD disappears from the display.

HOLD in MIN, MAX and AVG recording mode.

When **HOLD** is pressed whilst RECORD is displayed :

- HOLD and PAUSE light up.
- recording is stopped and the values contained in the MIN ,MAX and AVG memories are the last values before **HOLD** .
- the digital display shows the value of the last measurement, or even the MIN, MAX or AVG value if the instrument was displaying these values.
- the analogue display continues to show the current measurement.

Press **HOLD** again to stop recording of MIN, MAX and AVG:

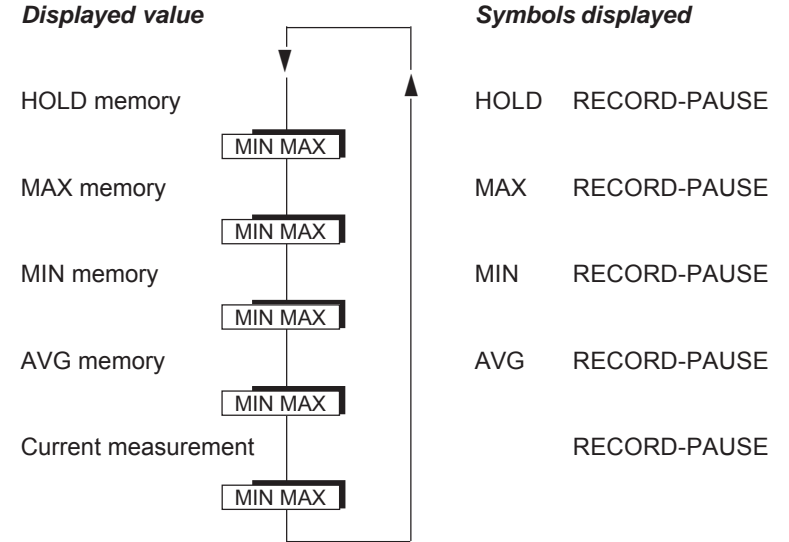
- the HOLD and PAUSE symbols go out.
- the digital display shows the current measurement or the contents of MIN, MAX or AVG memory.
- the instrument is again in MIN, MAX and AVG mode but the memories have not been reinitialised and they contain the MIN, MAX and AVG values present before

HOLD .

When the HOLD and RECORD-PAUSE symbols are displayed, it is still possible to display, successively, the values of the memories and the instantaneous measurement by brief

presses on **MIN MAX** .

The bargraph still shows the current value of the measurement.



Whatever the position of the display :

- one press on **HOLD** stops the recording without reinitialising the memories.
- one press on **MIN MAX** for more than 2 seconds cancels the record function.

Note : In normal measurement (without recording, so without RECORD symbol) if, after having pressed HOLD, the user starts recording by pressing the MIN MAX button and if the readout of the contents of the MIN or MAX or AVG memories is needed during this HOLD, the display will show three lines - - -. The contents of these memories is not significant because the instruction to record is made during the HOLD function, which blocks the reinitialisation of these memories.

SMOOTHING THE MEASUREMENT

A first press on the **SMOOTH** button triggers smoothing of the measurement (SMOOTH is displayed). The digital value displayed is then the result of a sliding average calculated over the last 10 measurements (i.e. approx. 4 seconds).

The bargraph still shows the instantaneous measurement.

A second press on **SMOOTH** turns OFF the filtering and the SMOOTH symbol goes out. Switching ON or OFF the SMOOTH mode during a MIN MAX recording cancels the MIN, MAX and AVG values already stored in the memory.

Note : When the RECORD and SMOOTH symbols are displayed, the smoothed values (MIN, MAX and AVG) are recorded with a measurement constant of 4 seconds.

PEAK MEASUREMENT

The PEAK function allows the user to take measurements with an acquisition speed of 1 ms for peak measurements.

The 50 Hz filter for the rejection of low frequency fields is switched OFF. The C.A 41 becomes sensitive to the power supplies of electrical equipment, to mains cable runs,...

A first press on the PEAK button switches ON the function and the PEAK symbol appears on the display.

- The bargraph indicates the average value of the highest peak values measured during 100 ms.
- The digital display indicates the average value of four measurements of the bargraph. This corresponds to the average of the 16 peak values measured during 400 ms. A second press on PEAK switches OFF rapid acquisition and the PEAK symbol goes out.

Note : When the RECORD and PEAK symbols are displayed, the peak values are recorded (MIN, MAX and AVG) with a measurement constant of 1 ms.

ALARM FUNCTION

When the rotary switch is positioned on the V/m (AL) symbol, the alarm function is ON and the HI AL symbol appears on the display.

All the measurements are compared to the threshold value preset by the user (see below). If the value measured is greater than or equal to this threshold value displayed in inverse video on the bargraph, then the buzzer is permanently ON (at F = 4 kHz) and a triangle appears on the display, on the right of the HI AL symbol.

Adjusting the alarm threshold

The alarm threshold is preset at the factory : 3 V/m.

To modify the alarm threshold :

- with the instrument switched OFF, open the battery compartment on the back of the instrument with a coin (tool release screw).
- the adjustment potentiometer is accessible via a hole located in the upper left corner of the battery compartment.
- check that the battery is still correctly attached to the instrument.
- turn the rotary switch to the V/m or V/m (AL) position whilst pressing the PEAK button (the present threshold value is displayed).
- keep the PEAK button pressed and vary the value of the alarm threshold by turning the potentiometer.
- once the value is displayed, leave the potentiometer in position and release the PEAK button.
- close the cover.

SOUND DEMODULATION FUNCTION

The demodulation function allows the amplitude modulation which may be present on the HF signal to be heard on an internal loud speaker. This detection of modulation is limited to the audible frequencies between 500 Hz and 5 kHz inclusive.

The best result is obtained for fields measured between 5 V/m and 30 V/m inclusive with a modulation depth of 50% minimum. As a result of the filtering constants of the instrument, this function is only available on PEAK mode.

This function is controlled by a switch coupled to a single turn potentiometer (4) of the instrument. The potentiometer allows adjustment of the sound volume as a function of the field and the depth of modulation.

Note : The power consumed by the internal speaker greatly reduces the service life of the battery. Please only use this function for real applications. We recommend switching OFF the demodulation function with switch (4) as soon as it is no longer used.

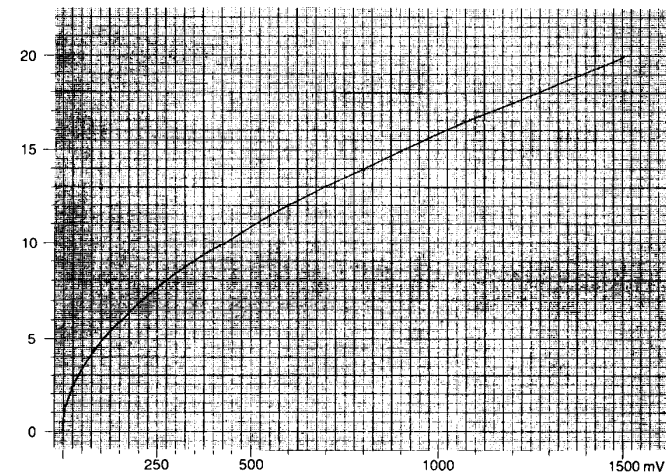
ANALOGUE OUTPUT

The analogue output makes it possible to record data on a plotter, graphic recorder... with a minimum impedance of 100 k Ω .

An analogue amplifier adapts the voltage output from the sensor to obtain a proportional DC signal in accordance with a pseudo-quadratic law.

The output connector allows connection to screened cable in order to maximize the elimination of interference effects on the measurement field.

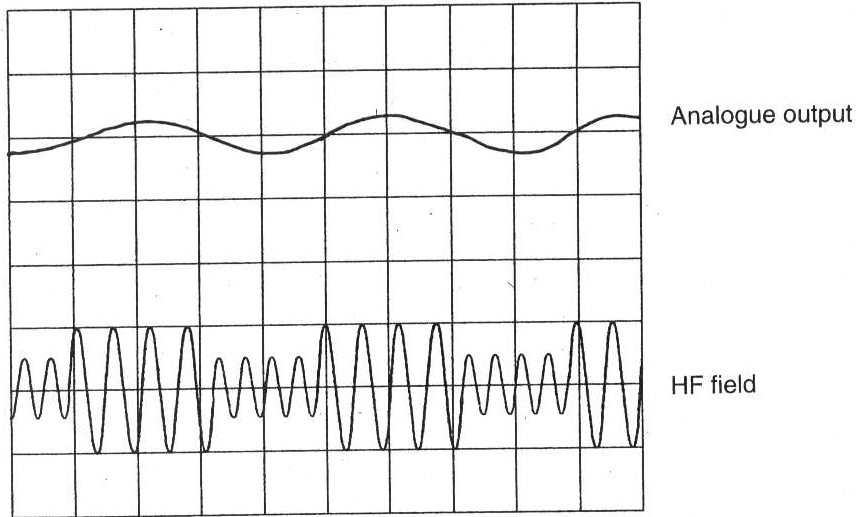
The output is specified up to 1.5V; the graph below defines the transfer function of this output up to 3V.



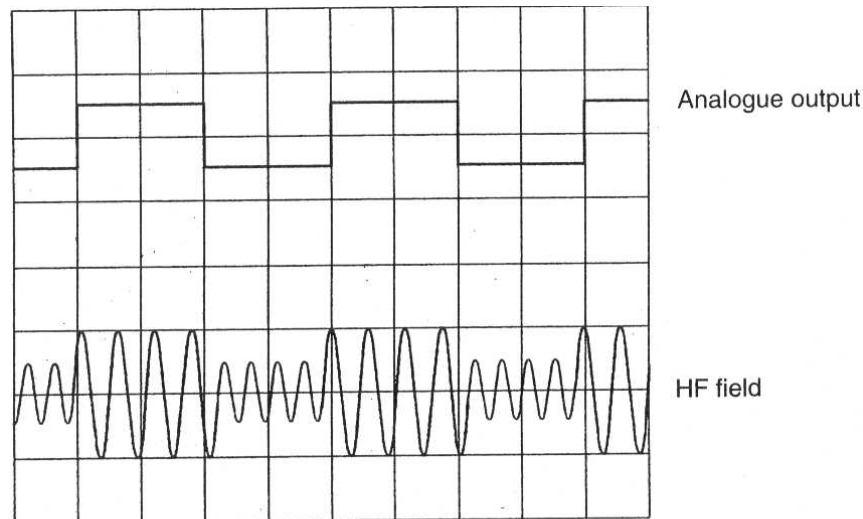
MEMO ON OPERATION

- For normal and SMOOTH measurement, the filtering constant is 400 ms.
- On PEAK measurement, the filtering constant is much more reduced: 1 ms. This allows the display of amplitude modulation signals superimposed on the HF signal (see example below).

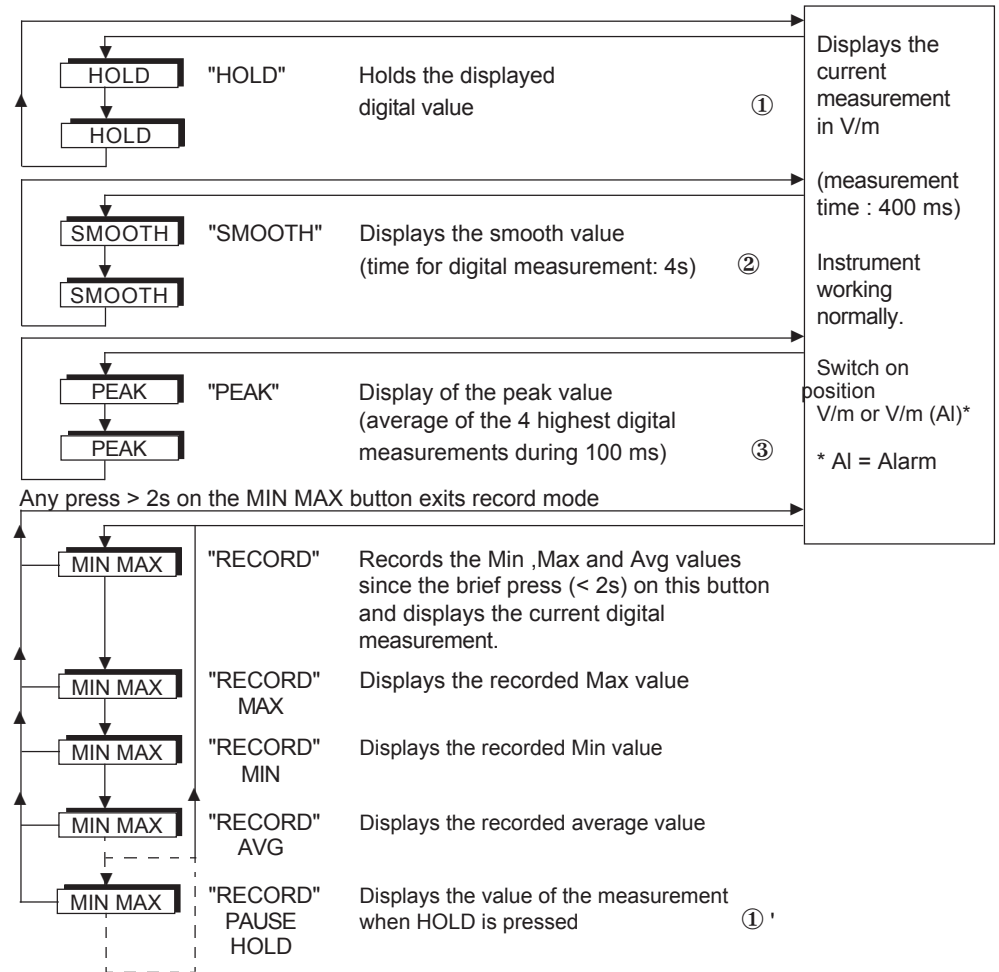
Example :display on oscilloscope of GSM modulation signals.



Normal or SMOOTH measurement.



PEAK measurement.



- ① HOLD can be used on all operating modes. In record mode ① the acquisition of Min, Max and Avg is paused ("PAUSE" symbol).
- ② SMOOTH can be used in record mode. In this case all the values are smoothed ("SMOOTH" symbol).
- ③ Similarly PEAK can be used in record mode. All the values will be peak ("PEAK" symbol). This time, the measurement time is reduced to 1 ms.

The PEAK function switches OFF the 50 Hz rejection filter for low frequency fields. Consequently, your instrument becomes sensitive to the 50 Hz electrical environment: mains cable runs, equipment power supply, etc...

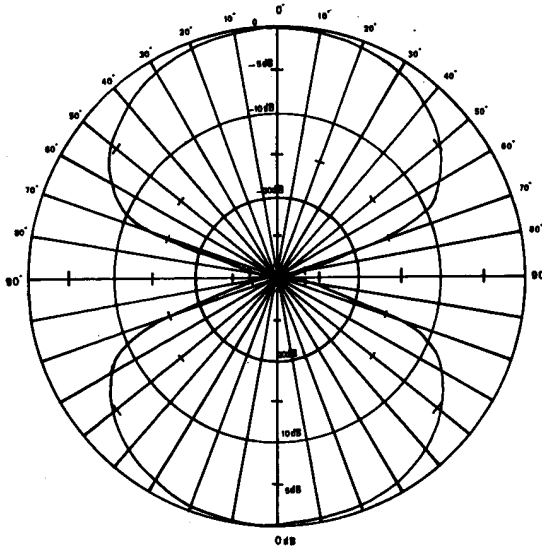
MEASUREMENT PROBES

GENERAL

The measurement of an electric field works on the same principle as an aerial which picks up a radioelectric signal. The sensitive part of the aerial is a detection cell with a very low threshold. This DC signal resulting from the detection is transmitted to the measurement instrument by a resistive line ensuring maximum transparency that does not disturb the electrical field in which the instrument and its aerial is immersed.

The EF1 probe supplied with the C.A 41 is of the dual pole type.

The measurement is anisotropic; reception is only via the vertical polarisation. Consequently, the reception diagram in the horizontal plane is circular. In the vertical plane, the reception diagram conforms to the pattern shown below.



USING THE EF1 PROBE

Because of the anisotropy of the measurement probe, during measurement in a given atmosphere, the aerial must be moved in all planes, along all axes. We recommend using the Record function which after inspection will give the minimum, maximum and average values of the field measured. Before switching OFF the recording, it is necessary to HOLD the measurement using the HOLD function. This makes it possible to memorise the different parameters before exiting the field.

Not using the HOLD recording function before exiting the field would risk introducing into the memory values outside the field which would introduce errors into the measurements.

USING THE EF2 PROBE

As the EF2 probe is isotropic, it does not require special handling. Its sensitive part measures the field according to 3 axes without the aerial having to be moved in the 3 planes. As for the EF1 probe (see above), we recommend using the record function.

SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Specified measurement range

MEASUREMENT EXTENT	0.1 V/m to 200 V/m
RESOLUTION	0.1 V/m
ACCURACY	0.5 dB
SAMPLING TIME	250 μ s
DIGITAL MEASUREMENT TIME	400 ms
ANALOGUE MEASUREMENT TIME	100 ms
STABILITY	0.2 dB

Reference conditions

Distortion magnitudes	Reference conditions	Tolerances
Ambient temperature	20°C	$\pm 2^\circ$ K
Relative humidity	65%	$\pm 5\%$
Battery voltage	9 V	± 0.5 V
Measurement frequency	150 MHz	$\pm 1\%$
Field level	10 V/m	$\pm 1\%$

Accuracy of the measurement in the reference conditions : ≤ 0.5 V/m ± 0.5 dB due to the interchangeability of the sensors.

Measurements are made in a wide field in order to obtain a flat wave, the characteristic impedance of the ambient field must be equal to 377 ohms.

Variations in the operating range

Distortion magnitude	Limit of range	Magnitude distorted	MAX variation
Ambient temperature	0 to 50°C	all magnitudes	0.3%/°C of the reading ± 0.5V/m per 10°C
Humidity	10 to 90% no condensation	all magnitudes	< 0.1 V/m
Power supply	7.5 to 11 V	all magnitudes	0.05 %/V
Frequency of field	20 to 500 MHz 1 MHz to 1 GHz 1 MHz to 2.5 GHz	all magnitudes	± 1 dB ± 1.5 dB ± 2 dB
Level of field	0.1 to 10 V/m 0.1 to 100 V/m 0.1 to 200 V/m	all magnitudes	± 0.5 V/m ± 1 dB ± 2 dB
Interchangeability of the sensors	Frequency from 1 MHz to 2.5 GHz	all magnitudes	±1 dB
	Level from 0.1 to 200 V/m	all magnitudes	± 0.5 dB
All distortion magnitudes	from 0 to 50°C from 10 to 90 % HR power supply from 7,5 V to 9 V frequency from 1 MHz to 2.5 GHz Level from 0.1 to 200 V/m	analog output from 0 to 20 V/m	± 1 dB of the display value
		Alarm detection threshold	± 0.2 V/m of the displayed value

Adherence to standards

Class III instrument in accordance with IEC 248.

- Electrostatic discharge (IEC 801-2 and IEC 1000-4-2)

Class of severity :

level 2 (4 kV) no destruction of build components, but change of function that can be reset by a new instruction.

level 4 (15 kV) non destructive.


- Radiated electrical fields (IEC 801-3 and IEC 1000-4-3)


Class of severity : level 4 (200 V/m)

Power supply

The power supply of the instrument is produced by a 9 V battery type 6 LF 22.

Voltage range ensuring correct operation: 6.5 V to 11 V.

Display of symbol  flashing for a battery voltage < 7.5 V (remaining service life approx. 1 hour).

Display of symbol  continuously for a battery voltage < 7 V (remaining service life approx. 10 minutes).

Display of the "BAT" symbol and auto OFF for a battery voltage < 6.5 V (no operation possible, the battery must be changed).

Average service life: 30 hours in continuous operation without use of the demodulation function. Each time the instrument is switched ON, the remaining service life (3) as a percentage of the capacity appears on the display of the C.A 41.

MECHANICAL SPECIFICATIONS

Operating range

Temperature: 0°C to +50°C.

Relative humidity: 10 to 90% RH (no condensation).

Storage range

Temperature: -20°C to +60°C.

Relative humidity: 10 to 95% RH (no condensation).

Adherence to standards (for the measuring instrument)

- Drop resistance: 0.5 m (IEC 68-2-32),

- Shock resistance: 3 shocks of 100g - 11 ms, in the 3 axes (IEC 68-2-27),

- Vibration resistance: 10 cycles from 10 Hz to 55 Hz at 10 g or 0.75 mm in the 3 axes (IEC 68-2-6),

- Bump resistance: 100 bumps of 10 g in the 3 axes (IEC 68-2-29)

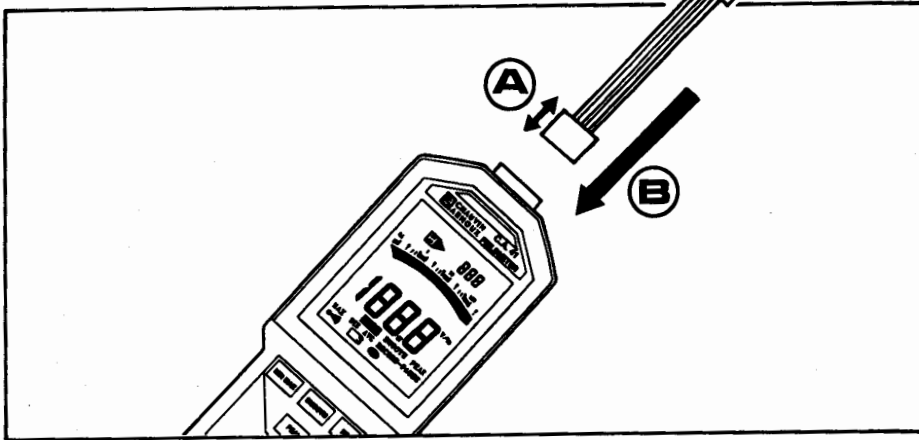
Dimensions and weight

- C.A 41 (without sensor): 212 x 72 x 37 mm - 350 g

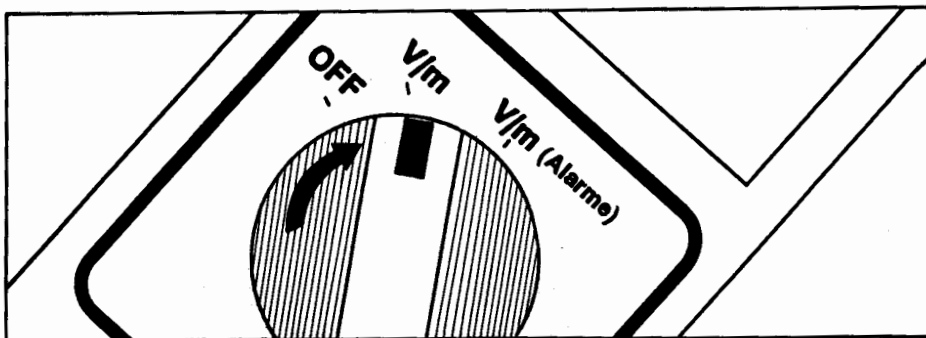
- Measurement probe (EF1/EF2): length: 300 mm diameter: 50 mm

OPERATING PROCEDURE

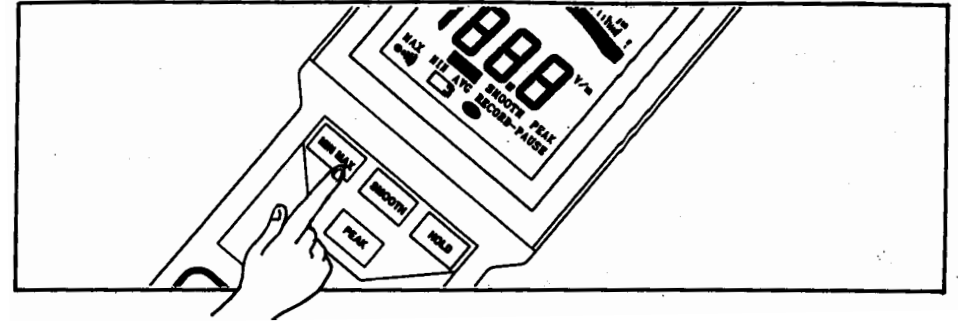
- Connect the measurement probe to the C.A 41 (probe EF1 or EF2). The connection is made through the multicontact push-pull socket (1) located at the top of the instrument.
 - Position the probe in the axis of the case,
 - Turn the probe to align the locking system,
 - Push the probe (A) in and push the ring (B) until it locks (clicks).



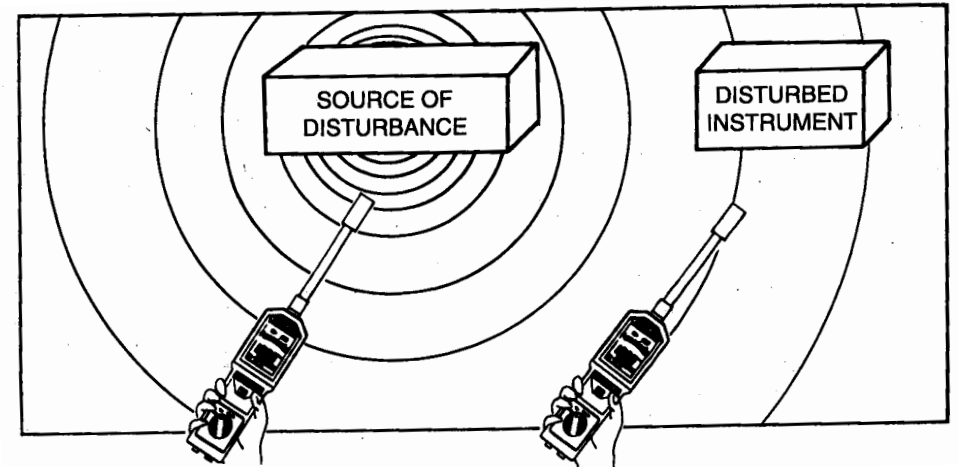
- Switch on the instrument by turning the rotary switch (6) to select measurement with or without alarm, as required (cf. chapter "USE").



- Choose the required operating mode (cf. chapter "OPERATION").



- As applicable, measure the radiation from a source of disturbance or the environment of a disturbed instrument. (B).

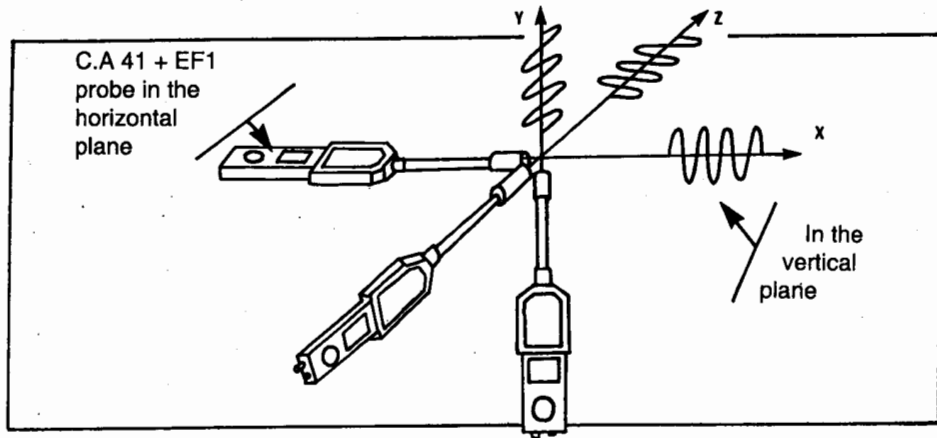


- To do this, move the EF1 probe along the 3 perpendicular spatial axes (cf. chapter "MEASUREMENT SENSOR") Fig.5. With probe EF2, simply point at the target to make the measurement.

As the field diminishes proportionally with distance, take care to place the extremity of the probe as close as possible to the zone to be checked.



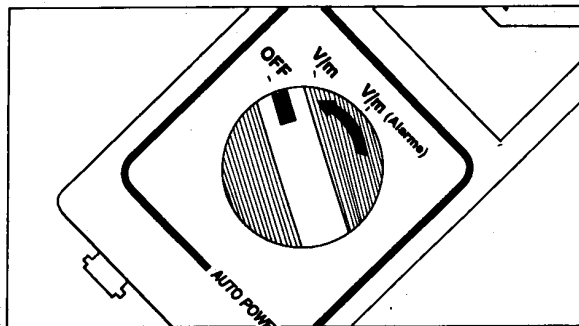
The operator must take care not to be between the source of disturbance and the zone to be checked: the human body shields electromagnetic fields.



- Read on the display the value in V/m of the field measured. Refer to the table below in accordance with standards IEC 801-3 and IEC 1000-4-3 defining the levels of severity of electromagnetic compatibility.

Electromagnetic compatibility	
Level of severity	Maximum value of the field
Level I	1 V/m
Level II	3 V/m
Level III	10 V/m
Level	open class

- After each measurement session, switch OFF the instrument by returning the rotary switch to the OFF position (cf. paragraph "ON/OFF FUNCTION").



Remarks:

- A) If the field is fluctuating (i.e. the display varies without changes in the position of the probe) the use of the SMOOTH and PEAK functions will be particularly useful :
- SMOOTH to read an average value which is more representative of the global field.
 - PEAK to identify the peaks, some of which may exceed the maximum level that is wanted. (Example: the peaks due to the closeness of a neon light are often greater than 3 V/m and cannot be classed as level II).



For PEAK values which occur at more than 100 ms use in addition the MIN MAX function (cf. chapter "OPERATION").

Measurement mode	Symbol (1)	Measurement time (2)
Normal measurement		400 ms
Recording (of min, max and avg.)	RECORD	400 ms
Smooth measurement	SMOOTH	4 s
Recording of smooth values	RECORD SMOOTH	4 s
Peak measurement	PEAK	100 ms
Recording of peak values	RECORD PEAK	1 ms

(1) As applicable, the MIN, MAX or AVG symbols are added to specify the type of measurement in the particular mode.

(2) In all cases, the sampling time is 250 μ s.

- B) In operation, when the battery reaches a level of discharge that only just ensures correct measurement, the battery symbol (23) appears on the display.

When the battery voltage no longer ensures the accuracy of the measurements, "BAT" appears on the digital display and the instrument switches OFF automatically after 5 seconds.

MAINTENANCE

CHANGING THE BATTERY

- As soon as the low battery symbol or the **bat** " message appears, it is necessary to change the battery :
 - Open the battery compartment at the back of the instrument using a coin (tool release screw).
 - Disconnect the battery inside.
 - Reconnect the new battery (type 6 LF 22) in accordance with the polarity shown in the battery compartment.
 - Put it back in the compartment.
 - Close the battery compartment using the coin.

CLEANING

The case can be cleaned with any non abrasive and non acid product, such as: alcohol, flugene, etc.

WARRANTY

Unless otherwise stated, our instruments are guaranteed against any manufacturing defect, or defective parts. They do not have «Safety» specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, will not extend beyond repair of our instruments, and does not apply to damage or destruction caused, in particular due to failure to connect up correctly, mechanical accident, defective use, overload or excess voltage, or calibration done by third parties.

Our responsibility being strictly limited to pure and simple replacement of faulty parts in our instruments, the purchaser expressly resigns the right to claiming responsibility from us for damages or losses caused directly or indirectly.

Our guarantee applies, unless expressly stipulated, for twelve (12) months after the date at which the equipment is supplied. The repair, the modification or replacement of a part during the guarantee period will not extend the period of this guarantee.

Bedienungsanleitung