CHAUVIN ARNOUX

EN - User Manual

CA 5292
CA 5293

PORTABLE 100,000-CTS GRAPHIC MULTIMETERS

Measure up

CONTENTS

1. GENERAL INSTRUCTIONS

Thank you for purchasing a **CA 5292/CA 5293**. For best results from your instrument:

- read this user manual carefully,
- comply with the precautions for use.

1.1. Precautions and safety measures

This device is compliant with safety standard IEC/EN 61010-2-033, the leads are compliant with IEC/EN 61010-031.
Failure to observe the safety instructions may result in electric shock, fire, explosion, or destruction of the instrument and of the installations.

1.1.1. Symbols

WARNING! Risk of electric shock. The voltage on the parts marked with this symbol may be dangerous.

WARNING, DANGER! The operator should refer to this user's manual whenever this danger symbol appears.

Equipment protected throughout by double or reinforced insulation.

Earth terminal.

The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2002/96/EC. This equipment must not be treated as household waste

The CE marking indicates conformity with European directives, in particular LVD and EMC.

USB

IP 67 (Not in operation; if the instrument is immersed, it must be dried, in particular the terminal block, before it can be used again).

Important instruction.

1.1.2. Definitions of the measurement categories

Measurement category II corresponds to measurements taken on circuits directly connected to low-voltage installations.
Example: power supply to domestic electrical appliances and portable tools.

Measurement category III corresponds to measurements on building installations.
Example: distribution panel, circuit-breakers, machines or fixed industrial devices.

Measurement category IV corresponds to measurements taken at the source of low-voltage installations.
Example: power feeders, meters and protection devices.

1.1.3. Precautions for use

- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use.
- Do not use the instrument in an explosive atmosphere or in the presence of inflammable gas or smoke.
- Do not use the instrument on networks with a rated voltage or category higher than those mentioned.
- Do not use the instrument if it seems damaged, incomplete or incorrectly closed
- When handling the device, the leads, the probe tips, and the crocodile clips, keep your fingers behind the physical guards.
- All elements on which the insulation is damaged (even partially) must be put out of service for repair or disposed at waste.
- Respect the environmental conditions of use.
- Use personal protection equipment when conditions require it.
- Comply with the environmental conditions of use.

2. GETTING STARTED

2.1. Delivery condition

Check completeness of the delivery against your order.

Delivered in a cardboard box with:

- 1 Printed Quick Start Guide with instructions for downloading the Operating Instructions
- 1 Set of safety leads (red and black) 1 000 V CAT IV / 1 500 V CAT III
- 1 Set of the test probes (red and black) 1 000 V CAT IV / 1 500 V CAT III
- 1 Set of 4AA / R6 Ni-MH batteries
- 1 5 V DC USB power adapter (100-240 V, 50/60 Hz) and an USB/multimeter power cord
- 1 Optical USB communication lead
- 1 SX-DMM software on USB drive
- 1 Measurement record
- 1 Carrying bag

2.2. Accessories and spares

For the accessories and spares, consult our web site: www.chauvin-arnoux.com

2.3. First use

2.3.1. Replacement (primary or storage batteries)

1. Disconnect the instrument from all sources of current
2. Unscrew the 3 screws on the back
3. Open the lower housing with a screwdriver
4. Remove the seal protecting the batteries (primary or rechargeable)
5. Insert the batteries, paying attention to the polarity
6. Close the housing and screw the screws back in
7. Check the type in Setup/Pw supply/type (alkaline or NiMH)

To switch the instrument on, press the key.
Make sure that the batteries are adequately charged.

When the instrument is off and connected to mains using the USB adapter provided, the LEDs of the switch blink to indicate that the instrument is charging.

When using Ni-MH batteries for the first time, fully charge them before using the multimeter.

2.3.2. System settings

- **Language**

To select the language in which the menus of the multimeter are displayed:

1. Press the Setup key
2. Select the Util. menu
3. Select Language

4 combinations of two languages are available: English/Italian, English/Spanish, English/ German and English/French. As default, the multimeter contains English/French. The other combinations are available as updates of the internal program, by downloading the multimeter loader from: www.chauvin-arnoux.com

- **Clock**

To change the date and time:

1. Press the Setup key
2. Select the Util. menu
3. Select Clock

3. INSTRUMENT OVERVIEW

3.1. Device description

The **CA 5292** and **CA 5293** are self-contained portable digital multimeters, specially designed to group in a single instrument the following electrical measurement functions:

- AC, DC, and AC+DC voltage measurem
- Low-impedance AC voltage measureme
- AC, DC, and AC+DC current measurem
- Frequency measurement
- Resistance measurement
- Capacitance measurement
- Temperature measurement

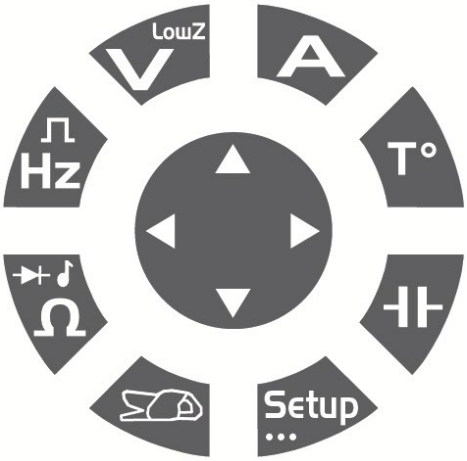
3.1.1. Switch

Changing from one setting to another resets the measurement mode. Around the switch, a fixed orange LED indicates which function is selected and an orange LED flashes for setup. During the charging cycle (OFF), each function LED lights by turns to indicate charging in progress.

In the centre, a "4 position" navigator is used for:

1.navigating up and down, to:
- select a menu or a function,
- manually select the range or graphic scale under " Range ",
- increment or decrement the selected variable.

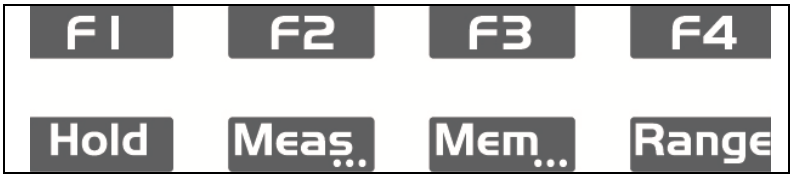
2.navigating right and left, to:
- move from one selected variable to another



	Short press	Successive short presses or selection by F1, F2, F3, or F4
	AC, DC or AC+DC RMS current measurement	
	Temperature measurement T and selection of the unit (°C, °F, K)	Selection of the types of sensor: - Pt 100 or Pt 1000 - TCJ or TCK
	Capacitance measurement	
	Current measurement by clamp, selection of AC, DC, or AC+DC coupling	Configuration of the "Clamp" menu: type of measurement, ratio, and unit
	Resistance measurement, audible continuity measurement, 100 Ohm range, diode test	Selection of the continuity, 100 Ohm or diodes functions
	Frequency measurement	
	AC voltage measurement (AC RMS) and selection of coupling	AC, DC, AC+DC, V LowZ
	SETUP, on 3 levels	Setup 1/3, Setup 2/3, Setup 3/3

3.1.2. Keypad

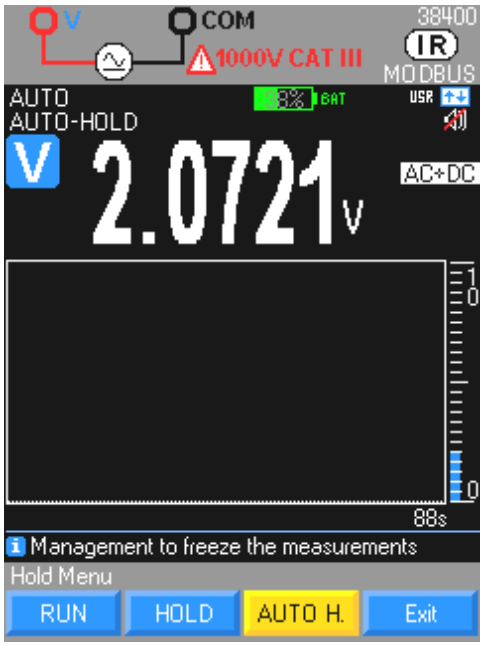
The keypad has the following function keys:



The keys are taken into account and applied when pressed. If the key press is validated, the instrument beeps.
The active keys on a long press are identified by "…": **Meas…, Mem…, Setup…**

	Short press	Long press
	Hold of the display. Selection of RUN, HOLD or Auto HOLD.	
	Measurement menu with 3 levels.	Reset for SURV/PEAK/REL and CNT
	Start/Stop storage.	Selection of the files and configuration of the records.
	Choice of automatic or manual range change.	

3.1.3. Display



Display of the wiring diagram of the terminal block as a function of the measurement
Digital display: - of the quantity measured, - of the value measured, - of the type of measurement, etc.
Secondary display: - in graphic form - or in the form of 3 display units
Scrolling information
Properties of the F1, F2, F3, and F4 keys

3.1.4. Principal quantities measured

- V LowZ — AC voltage measurement at low impedance (V LowZ)
- V AC — AC voltage measurement
- V AC/DC — DC or AC+DC voltage measurement at high impedance (V)
- A — Current measurement A (AC, DC, AC+DC)
- Hz — Frequency measurement
- Ω — Resistance measurement
- C — Capacitance measurement
- T° — Temperature measurement
- % — Measurement of relative value or duty cycle
- ♪ — Continuity, diode test

3.1.5. Secondary quantities measured

For the secondary quantities measured, refer to table in the appendix.

3.1.6. Units

- V — Volt
- A — Ampère
- Hz — Hertz
- Ω — Ohm
- F — Farad
- °F — Degree Fahrenheit
- °C — Degree Celsius
- K — Kelvin
- ms — millisecond
- k — kilo (kΩ - kHz)
- M — Méga (MΩ - MHz)
- n — nano (nF)
- p — pico (pF)
- µ — micro (µV - µA - µF)
- m — milli (mV - mA - mF)
- % — Percentage

3.1.7. Symbols

AC	Measurement of the TRMS AC signal
DC	Measurement of the DC signal
AC+DC	Measurement of the TRMS AC and DC signal
AUTO	Automatic range switching
Δ	Values relative to a reference
REF	Presence of a reference value in memory
HOLD	Storage and display of stored values
MAX	Maximum value
AVG	Mean value
MIN	Minimum value
PK+	Maximum peak value
PK-	Minimum peak value
.run r.un ru.n	Capacitance meter, acquisition in progress
-----	Frequency measurement impossible
O.L	Overshoot of the measurement capacities
V	Volt
Hz	Hertz
F	Farad
°C °F K	Degree Celsius, degree Fahrenheit, kelvin
A	Ampere
%	Percentage
Ω	Ohm
ms	millisecond
n	Symbol of the prefix nano-
p	Symbol of the prefix pico-
µ	Symbol of the prefix micro-
m	Symbol of the prefix milli-
k	Symbol of the prefix kilo-
M	Symbol of the prefix méga-
	Symbol of the audible continuity measurement
	Symbol of the measurement and testing of a semiconductor junction
	Symbol of the Zener diode

⚠	Warning, possibility of electric shock (*)
LEADS	Function selected incompatible with the connection of the lead
	USB communication
	MLI 300 Hz filter

(*) When voltages exceeding 60 V DC or 25 V AC are measured, the symbol flashes on the display unit.

3.2. Getting started

3.2.1. Power supply via the charger

This is on the side of the instrument, using the specific cord connected to the mains-USB adapter supplied, or directly connected to a USB port on your PC.

3.2.2. Powering up, down

Press the key opposite, on the left front panel of the instrument, to switch it on or off. A switching-off page reports the switching off of the active multimeter.

3.2.3. Automatic current measurement detection

The number of input terminals is limited to 3: **V**, **COM**, **A**. Connecting the lead to the "Ampere" terminal automatically selects the corresponding function.

When a change of function from the control keypad is incompatible with the connection of the lead, an audible and visual alert is triggered (LEADS).

The current measurement is made in automatic range mode over the whole span.

3.2.4. Automatic power down

Validate the function by the **Standby** menu of the SETUP menu: the instrument automatically switches itself off after 30 minutes of operation if, during this period, nothing is done on the front panel and the multimeter is not moved.

Automatic switching off is disabled in:

- **Surveillance** mode → SURV
- **Record** mode → MEM
- **Communication** mode (isolated USB optical link)
- when the quantity measured (Voltage or Current) on the inputs of the multimeter exceeds the danger threshold.

3.2.5. Alert signal

An intermittent audible signal is emitted:

- in the "Voltage" setting, when the range is exceeded (**MANUal** and **AUTO** mode - last range)
- in the "Current" setting, when the range is exceeded (**MANUal** mode), starting from a measurement of 10 Amperes
- when the connection of the leads is incompatible with the function selected
- when the danger thresholds are exceeded (if the function is validated)

When the range is exceeded, the audible signal is accompanied by display of the "**O.L**" acronym.

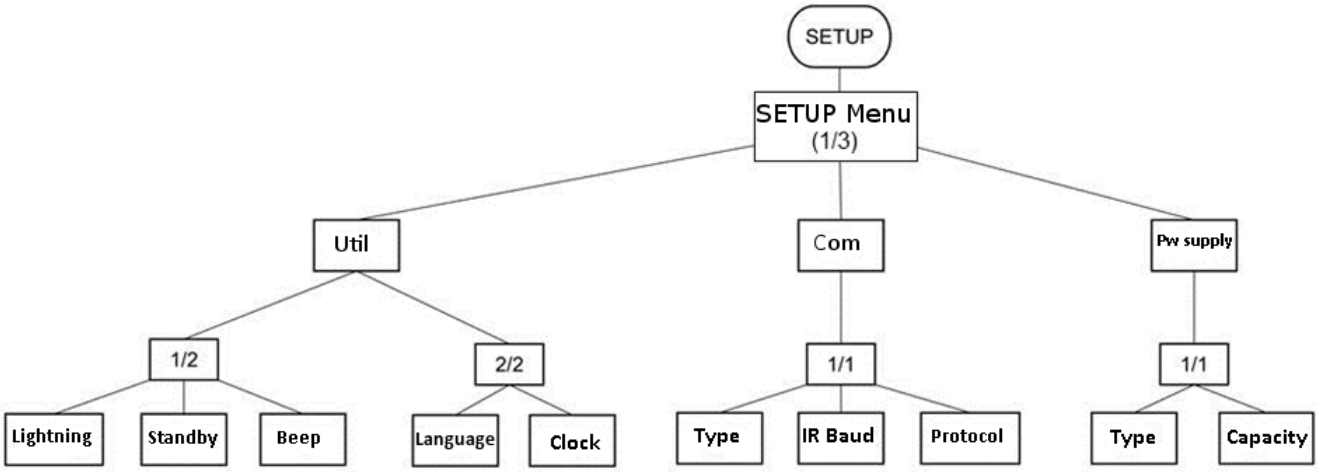
When the ⚠ symbol is activated:

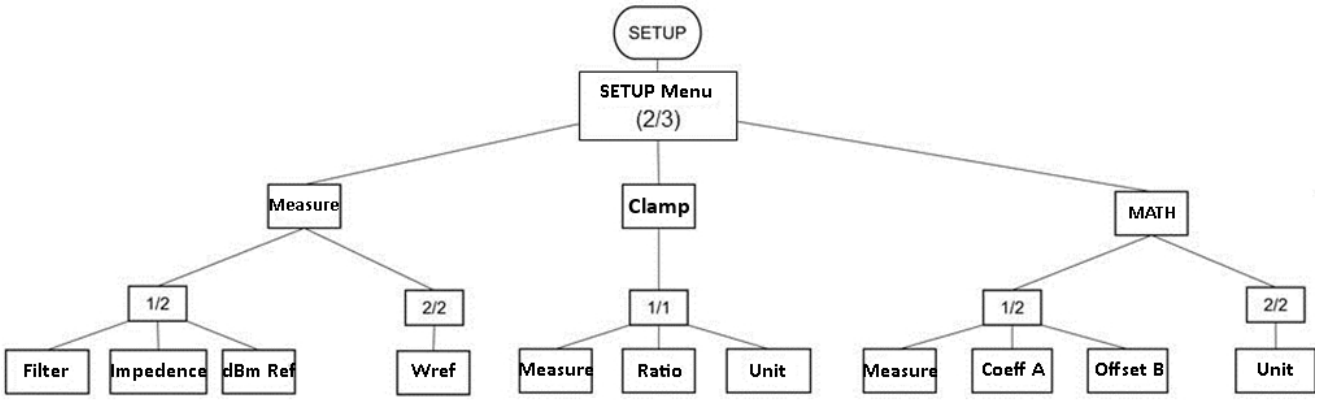
- the voltage on the "Volt" input exceeds **60 V DC** or **25 V AC**
- the current injected between the "Ampere" terminal and **COM** exceeds **10 A**
- the range (voltage or current) is exceeded in MANUAL mode

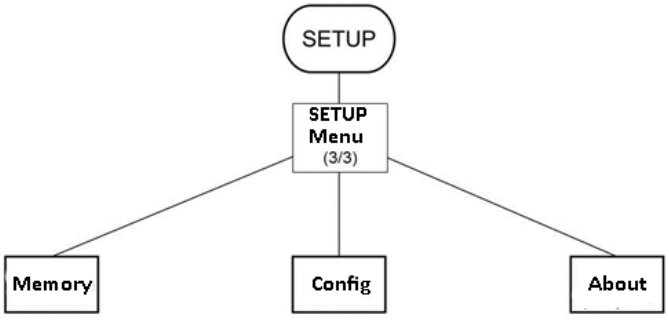
4. USE

4.1. Description of the SETUP menu

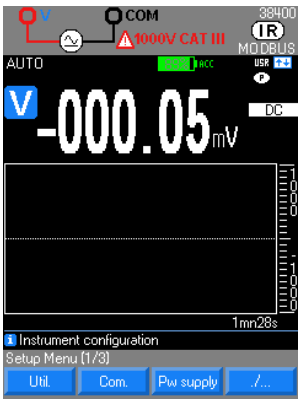
The **SETUP** menu configures the parameters of the multimeter according to the conditions of use and user's preferences.
This menu proposes the main settings or configuration of the multimeter on **3** levels. The configurations are stored when the multimeter is switched off if the **USER** (USR) mode is active; or with the configuration frozen by the user in **LOCKED** mode. If this is not the case (**BASIC** mode), the instrument starts up with the **PLANT** configuration parameters. The menu that is not available is greyed out.





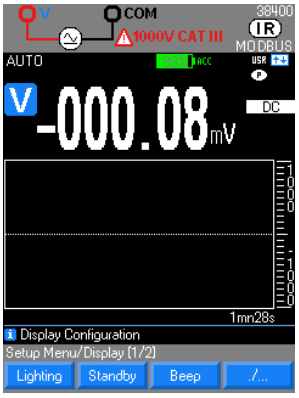


4.1.1. SETUP 1/3: general configuration of the multimeter



- Util. : utility for adjusting the lighting, the standby mode, the audible beep of the keys, the language, and the internal clock on 2 configuration levels.
- Com. : for communication and adjustments of the IR type, then the IR rate in baud, and the protocol, MODBUS or SCPI.
- Pw supply : identifies the type of internal power supply used in the instrument, either Ni-MH battery (capacity) or alkaline battery.

Util 1/2: Display



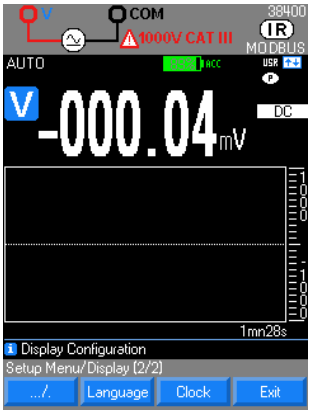
- Lighting : selection of 3 levels of back-lighting of the display unit in order to limit the power consumption of the multimeter, as follows: Eco, Normal, Max
- The default level of extinction of the back-lighting is ECO, after 1min if there has been no action on the front panel of the multimeter. An internal accelerometer makes it possible to wake up the multimeter by simply touching the product with the adjustment selected.
- Standby : validation (default: yes) or not of automatic switching off after 30 min, if there has been no action on the front panel of the multimeter.
- In the SURV, MEM, or Communication mode, automatic switching off is not validated.

For your safety, automatic switching off is disabled when the quantities measured (voltage, current) on the input exceed the danger thresholds.

- Beep : validation (default) or not of the emission of an audible signal (beep) when:
  - a key is pressed
  - there is a voltage on the "V" input exceeding 60 V DC or 25 V AC,
  - a stable measurement is captured in AUTO HOLD

The audible signal is maintained even when the buzzer is deactivated:
- In a continuity test
- When a range is exceeded (voltage or current)
- For a measurement of 10 A or more
- When there is an incompatibility between the connections of the leads and the function selected
- When the supply voltage (battery) is too low blinking of the red batt indicator
- The audible signal is maintened when the function is changed while recording is in progress (low pitched beep)

Util 2/2: Language and clock



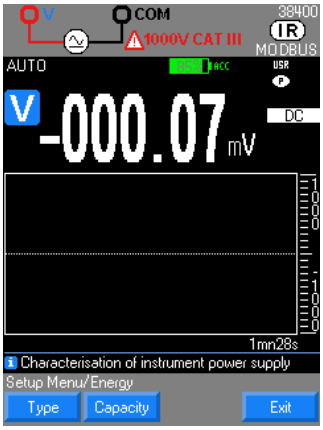
- Language : Selection of one of the two languages loaded. Four combinations of two languages are available: English/Italian, English/Spanish, English/German, and English/French. As default, the multimeter contains English/French. Another combination can be installed in the device using the software (Loader) allowing you to modify or update the "ASYC IV Embedded Software" which can be downloaded from the website:
- www.chauvin-arnoux.com

- Clock : Is used to set the system date and time. They are set using the ▲▼ and ◀▶ keys.

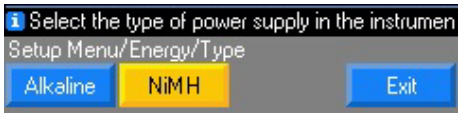
Com 1/1: Communication parameters

- Type : IR: choice of communication:
  - IR/USB
- IR Baud : parameterizing of the infrared transmission rate from among 9600/19200/38400 (default) baud; the other transmission parameters are fixed (8 data bits, 1 stop bit, no parity)
- Protocol : choice of MODBUS or SCPI

Energy 1/1: Characterization of the power supply



- Type : choice of type:
  - Ni-MH battery
  - Alkaline primary battery

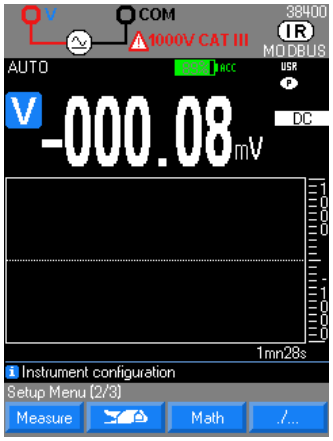


- Capacity : parameterizing of the capacity of the storage battery in mAh; the charge on the default primary batteries is 2 500 mAh.

1. Place the storage batteries in the multimeter, then connect the charger.
2. The LEDs light alternately around the switch to indicate that charging is in progress.
3. Press ON to switch the multimeter on and track the course of the charging by plateau.

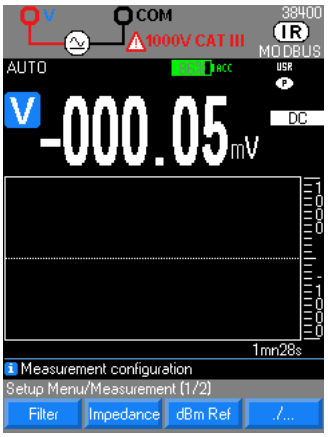
Average charging time: 6 h (with 2 500 mAh storage batteries).
After 1 h of recharging, the multimeter is ready for measurements, by pressing ON again; the level of the plateaus acquired is valid only after a full charge of the instrument.

4.1.2. SETUP 2/3: Configuration of the measurement parameters

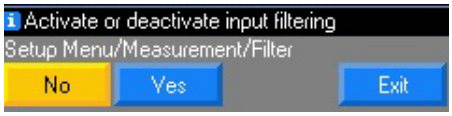


- Measure : configures the filter, the impedance, the reference in dBm and in power W.
- : configures the type of input, current or voltage, the ratio indicated on the clamp, and the unit (default is A).
- Math : configures the type of measurement assigned to the mathematical channel and the values and unit of A and B of the function Ax+B.

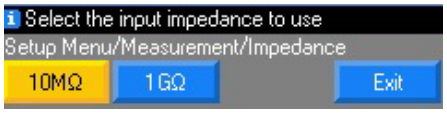
Measurement 1/2: Configuration of the measurement parameters



- Filter : 300 MHz MLI filter for measure on variator



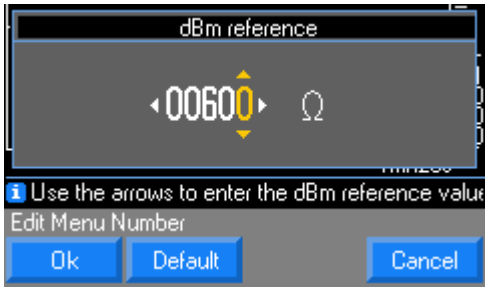
- Impedance : choice of desired input impedance



10MΩ 10 MΩ

1GΩ only in 100 mV DC and 1 000 mV DC

☝ As default, 10 mV range = 10 MΩ, 1 000 mV range = 10 MΩ



- dBm Ref : adjustment of the reference in dBm Adjustment of the reference resistance (dBm REF) between 1 Ω and 10 000 Ω, for measurements in dBm from voltage V AC or V AC+DC
  - Selection of a digit by the navigation key and modification of the digit
  - Validation of the reference resistance in dBm and exit from the menu by "Ok"

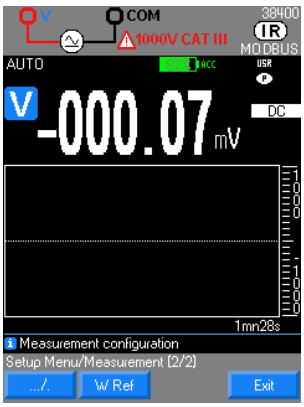
The dBm measurement calculates the power delivered to a reference resistor, referred to 1 mW. It is calculated as follows: $P = \frac{(V_{measured})^2}{R}$. Pref = 1 mW

$$dBm = 10\log(\frac{P}{P_{ref}}) = 10\log(\frac{1000 \times V_{measured}^2}{Reference\ resistance})$$

☝ Default value 600 Ω.

Reminder: a measurement of 0 dBm with a reference resistance of 600 Ω is made using a voltage of 0.7746 V AC.

Measurement 2/2: configuration of the measurement parameters (cont'd)

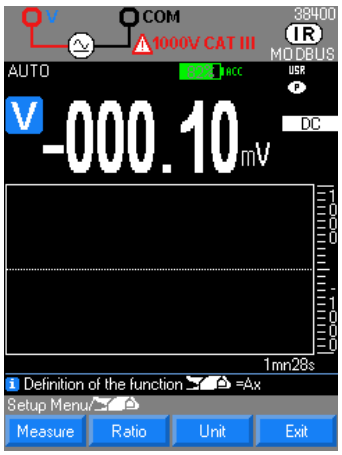


- W Ref : resistive power reference W
  Adjustment of the reference resistance (ref) between 1 Ω and 10 000 Ω, for resistive power measurements. The calculation performed is:

  (measured voltage)^2/ Ref (unit W)
  (measured current)^{2}x Ref (unit W)

☝ Default value 50 Ω.

CLAMP 1/1: Parameterizing of the clamp function



- The function (y = Ax) enables the user, measuring a current with a current clamp in:

  - Volts x V/A
  - Amperes x A/A

  to assign the ratio (or transformation ratio) and the appropriate unit, in order to obtain a direct reading of the measured current.

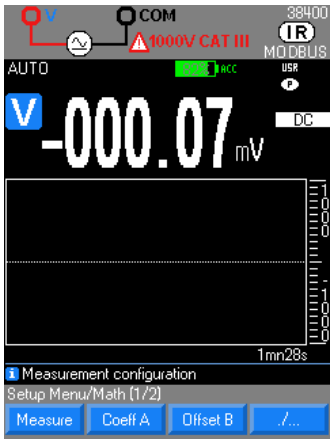
  Depending on the quantity measured, the device calculates the function Ax associated with it.

  The programming is in 3 stages:

  1. Selection of the quantity measured, Measurement (V, A)
  2. Definition of the ratio A displayed on the clamp Val1/ Val2 or: xxxx.XA/xxxx.XV (default is 1 A/1 V)
  3. Definition of the physical unit to be displayed (default is A)

☝ The ratio A and the unit can be programmed for each quantity measured (V, A).

MATH: Parameterizing of the MATH function

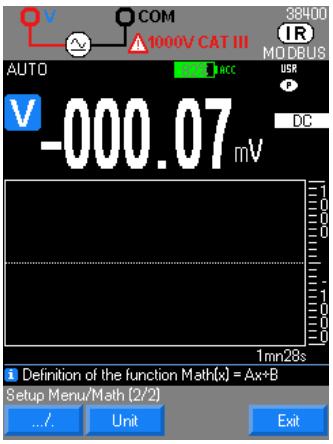


- The Math function (y = Ax + B) enables the user, measuring any physical quantity in:

  - Volts (process 0-10 V or high-voltage probe, for example)
  - Amperes (4-20 mA current loop or current clamp, for example)
  - Frequency (measurement of flow rates, speeds of rotation, for example)
  - Ohms (resistive position sensor, for example)

  to convert it and assign the appropriate unit, in order to obtain a direct reading of the original quantity on the instrument.
  Depending on the quantity measured, the device calculates the MATH function associated with it.

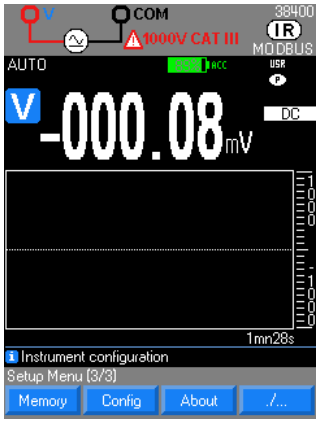
  The programming is in 4 stages:



1. Selection of the quantity measured (V, A, Ω, Hz)
2. Definition of the coefficient A of the function y = Ax + B
3. Definition of the coefficient B of the function y = Ax + B
4. Definition of the physical unit to be displayed by the navigator (Upper-case and lower-case)

☝ The coefficients A and B and the unit can be programmed for each quantity measured (V, A, Ω, Hz).

4.1.3. SETUP 3/3: Configuration and customization



- Memory : retrieval of files, of the number of records (10 000 for the CA 5292 and 30 000 for the CA 5293), and of the frequency of recording (from every 0.3 s up to 23 h, 59 min, 59 s).
- Config : choice of retrieval of the PLANT configuration, of the User (USR), Basic (default), or Locked (LCK) start-up mode.
- About : indicates the traceability of the multimeter: serial number, software versions and Hardware version.

Memory

Reminder:
- of the files recorded
- of the maximum number of records per file (10 000 for the CA 5292 and 30 000 for the CA 5293),
- of the frequency of recording (from every 0.3 s up to 23 h, 59 min, 59 s).

☝ A maximum of 10 recorded sequences on the CA 5292 and 30 recorded sequences on the CA 5293

Config

Choice of recall:

- Factory : of the PLANT configuration
- of the **Basic** (default Basic), **User** (User),or **Locked** (Locked) start-up mode.

- In the **Basic** mode, the multimeter starts up in its elementary configuration (default values) and Volt function (AC+DC).
- In the **User** mode, the instrument restarts in the configuration it was in when last switched off.
- In **Locked** mode, the instrument restarts in the configuration it was in when locked. A password must be entered and confirmed at the time of locking. This password will enable the user to return to the **User** mode. To unlock, simply enter the password.

☝ Restart configuration given assuming no leads connected. If they are connected, the connections will be taken into account in the selection of the function.

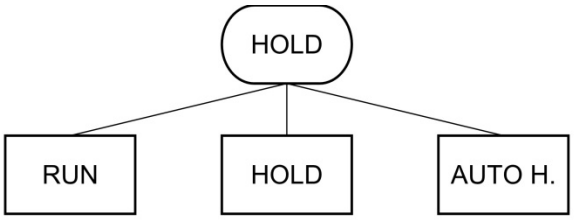
About

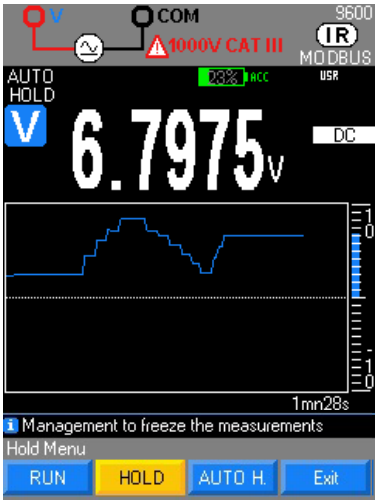
Multimeter traceability information:
- serial no.
- software versions
- hardware version

4.2. Description of the "Keypad" keys

4.2.1. HOLD key: Management and hold of the display

Hold





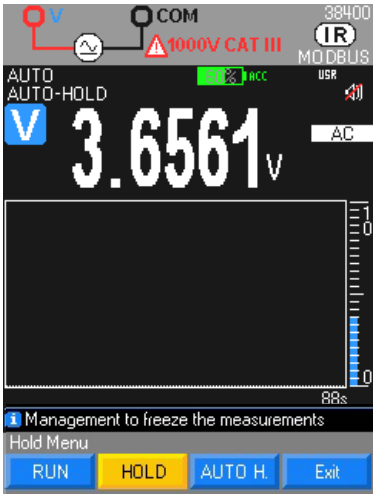
Three operating modes are possible:

- the **RUN** mode → HOLD inactive
- the **HOLD** mode → [F2]
- the **AUTO HOLD** mode → [F3]

- The **HOLD** mode freezes the screen with the main measurement in progress and the history curve as they were when the HOLD key was pressed. The instrument continues to manage the measurements on the secondary display unit (**REL** mode).

☝ The type of range selection remains the same: AUTO or MANUAL depending on the configuration when this mode was entered.

☝ The curve resumes at zero when RUN is pressed.



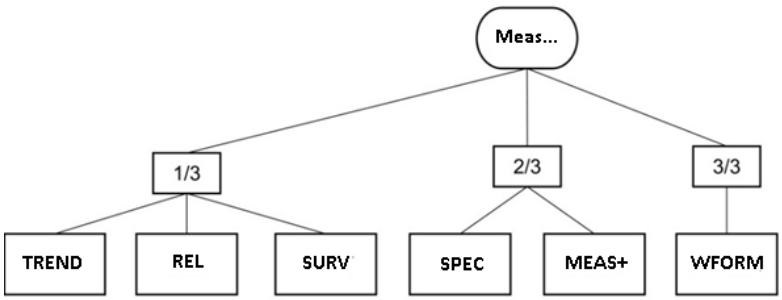
- The AUTO HOLD mode automatically freezes on the screen the main measurement in progress each time a stable measurement is detected. It is confirmed by the emission of an audible beep (if the "No beep" configuration was not selected in the Configuration menu).

The stored values remain displayed until the next stable measurement is made (measurement different by ± 100 digits) or until the **AUTO HOLD** mode is exited by **RUN**. The instrument continues to manage the measurements and to display them in the graphic window or on the secondary display unit (**REL** mode).

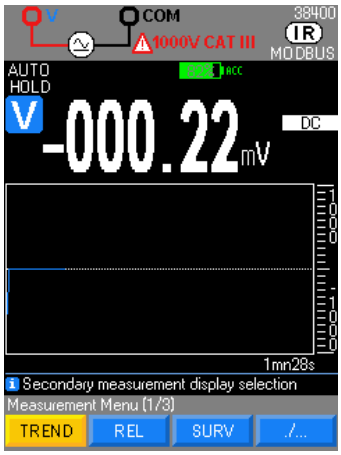
☝ The type of range selection remains the same (in AUTO or MANUAL) depending on the configuration when this mode was entered. The AUTO HOLD mode is available only for V and A measurements.

4.2.2. MEAS key: Advanced measurements

Meas...



MEAS 1/3



3 levels of advanced measurements are possible

- TREND : selects graphic display of the screen for the quantity measured vs time.

The ◄ ► arrows can be used to change the depth of acquisition of the graph, from 1 min, 28 s to 1 h, 13 min, 20 s. A search for the min and max of the main measurement is made for the duration represented by one pixel horizontally. These two values are used to trace a vertical segment from the min to the max. The ▲ ▼ keys can be used to change the measurement range.

- REL : takes the main measurement in progress as reference. It is transcribed on the secondary display unit: REF.

  - The main display continues to indicate the instantaneous measured value, as does the bargraph.
  - The Δ secondary display indicates the absolute difference between the instantaneous measured value and the recorded reference.
  - The Δ% secondary display indicates the relative difference in % between the instantaneous measured value and the recorded reference.

☝ Management of the ranges is "AUTOmatic" or "MANUal" depending on the configuration when the mode was entered.

☝ The Δ and Δ% display units are managed in the same range.

In the "**AUTO**" mode, they cannot fall below the range of the reference when the REL mode was entered.

E.g.: Measurement of a voltage of V DC with a reference set to x V:
When the mode is active, a long press on key [F1] Init or [F2] Enter Ref opens a window for setting reference REF. The navigation keys are used to modify the digits.

☝ Reset of REF by a long press on Meas …

- SURV : monitors the variations of a signal, recording the extremes (MIN, MAX) of the main measurement and calculating its mean (AVG).

For each quantity stored, the multimeter records the corresponding date and time.

☝ When the SURV mode is entered by Start [F1], the last MIN and MAX measurements are erased, then initialized with the present measurement; to stop this mode, press [F2] stop; [F3] to look up.

AVG is the calculated mean of all measurements made since the activation of the SURV mode.

The recorded data can be looked up by pressing Look up key [F3].

In the SURV mode:
- management of the MANU or AUTO range management cannot be selected.
- the present measurement, the MIN value, and the MAX value are presented in the ranges best suited to each of them.

The recorded data are accompanied by the date and time, along with the surveillance range.

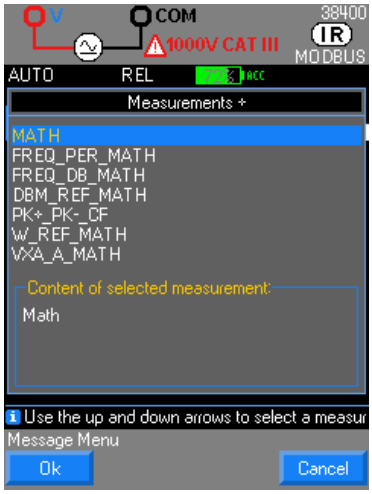
☝ Please update your multimeter before starting a SURVeillance campaign (automatic synchronization).

☝ Reset of the MIN/MAX values by a long press on Meas …

MEAS 2/3

- SPEC : directly displays the tolerance of the measurement in progress; there is no need to search for it and calculate it.

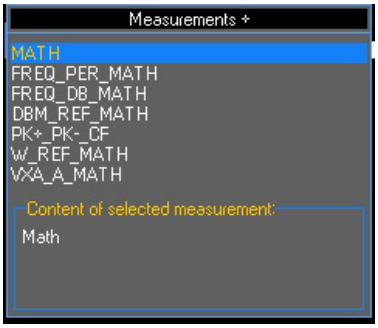
From the main measurement, the display:
- recalls the specifications (x% R ± n D) according to the type of measurement, the range selected and the frequency (in AC and AC+DC)
- calculates the range in which the true value lies, if the device is within its tolerance:
  SMIN value → minimum specification
  SMAX value → maximum specification



- MEAS+ : gives access to the secondary measurements.

Choice of secondary functions on display units 2, 3, and 4 by selection using the navigator, according to the main measurement, and validation by OK.
A long press on MEAS… is used to exit from this menu.

☝ When a main measurement is chosen, the last secondary functions selected are reactivated.

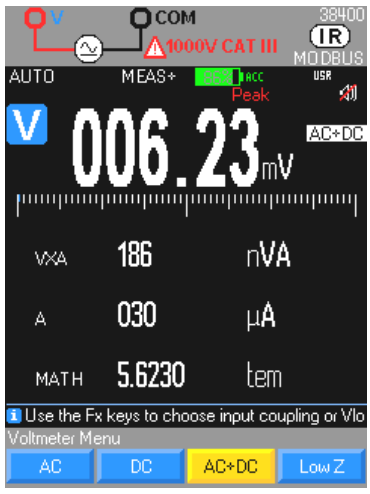


Opposite, example of measurements available in V AC+DC.

When **dB** measurements are activated**,** the value currently measured is taken as reference voltage (V ref). The calculation is as follows:
20 $\log_{10}$ (V measured / V ref).

☝ The reference voltage (V ref) can be reset by a long press on Meas…

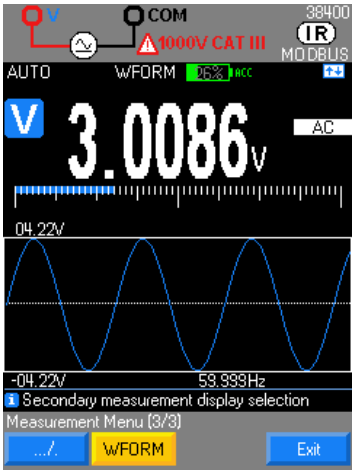
The MATH function is displayed when its parameters allow (see the MATH Function menu).
For dBm measurements and resistive power calculations, refer to the menu for the adjustment of the associated reference resistances (**dBm REF, W REF**) and the calculation formulas. See SETUP 2/3.



The power calculation **V** x **A** (VA) requires a third connection on the A input (connected to the same circuit), in order to measure simultaneously:
- the voltage (main display unit)
- the current (display unit 3), measurement always made in AC+DC.

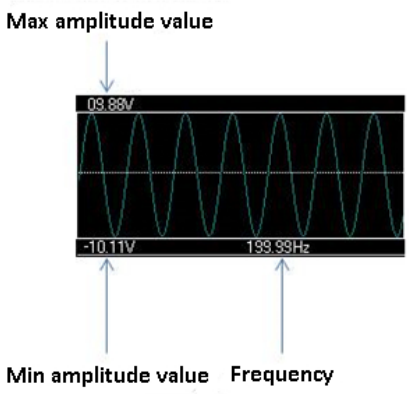
☝ The resistance of the measurement lead on the COM input can impact the quality of the measurement in the case of the combined current and voltage measurement.

MEAS 3/3



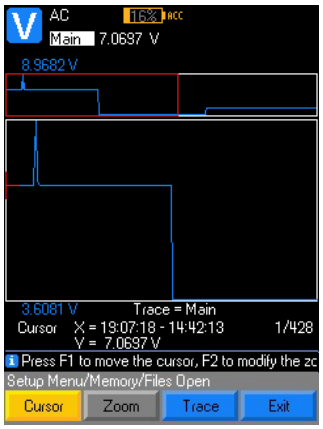
- WFORM : The WFORM mode is available only in AC, for frequencies between 10 and 600 Hz. The frequency range is divided into 4 ranges [10 Hz, 40 Hz[, [40 Hz, 100 Hz[, [100 Hz, 200 Hz[and [200 Hz, 600 Hz[. It is used to display waveforms. When the frequency does not lie within the measurement interval, or cannot be measured, the multimeter indicates "Frequency out of bounds…". In the other failure cases, the multimeter indicates "Automatic adjustment failed".

With weak signals, it may be necessary to change to **MANUAL** mode to reach the most sensitive ranges using the keys.



4.2.3. Mem key: storage of the measurements, recording mode

Mem...



- The MEM mode records the content of the digital display(s) in the memory of the device at a pre-programmed rate.
- A short press on Mem... starts a recording series.
- The MEM symbol is displayed in yellow during the whole recording period; it is accompanied by the number of records made.
- Another short press on Mem... stops the storage of the measurements and displays the file name entry menu.
- Pressing OK or Cancel without entering a name assigns the default file name YYYYMMDD_HHMMSS.
- The number of values to be stored for a measurement campaign can be programmed: recording then stops automatically.
- The records and the configuration can be looked up by a long press on Mem...

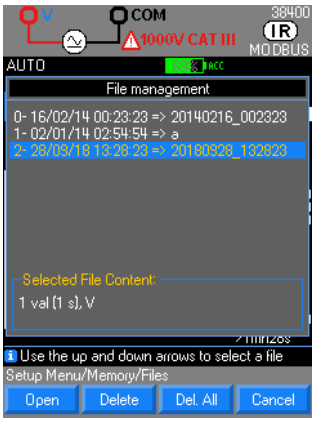
Another press on Mem... recalls a series of records.

Recording capacity	CA 5293	30 000 measurements maximum per sequence	1 to 30 sequences (depending on memory available)
	CA 5292	10 000 measurements maximum per sequence	1 to 10 sequences (depending on memory available)

In this stage, it is possible to list the files and to configure the maximum number of records according to the version and the recording frequency or interval (1 s is default).

- Select the Files menu in the MEM function to display the list of successive records.
- Each record is identified by its date and its start time.

The default name can be changed; entering a 16-character file name is proposed.



- Look-up of the recorded files under [F1] Files and selection by the navigator, then possibility:
  - of opening the selected sequence [F1],
  - of deleting a selected sequence [F2],
  - of deleting all recorded sequences [F3]
  - Select the Files menu in the MEM function to display the list of successive records.

Each record is identified by its date, its start time, and the name entered by the user.

The selection of a record is accompanied:
- by the number of values recorded,
- by the recording interval
- by the function in which they were made,
- by the secondary functions present during the recording, if any.

The number of recording sequences is limited to 10 or 30 depending on the device model.

- Programming the number of records

Defining a number of records for a measurement campaign makes it possible to stop recording automatically.
Selection of the max number of records using the navigator (30 000 or 10 000 measurements max.); as default [F2], 10 000 records
If **MEAS+, SURV**, or **REL** secondary measurements are programmed, it will be necessary to make allowance for them in the depth of recording selected.

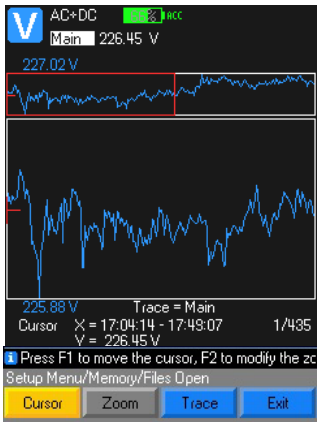
- Programming the recording frequency
- Selection of the digit to be modified by the navigator key.
- Modification of the value by the keys: 

Validation of the number of records by **Ok** [F1]

Validating **Freq.** by the [F3] key opens a menu for adjustment of the recording interval in hours, minutes, seconds

- Modification of the value using the  keys of the navigator
- Validation of the interval of recording of the measurements and exit from the successive menus by the Ok key [F1].

The recording rate is from every 0.3 s to 23 h, 59 min, 59 s.
Default recording interval 1 s.



- Recall of a recording campaign

The curve displayed is adapted to the graphic window according to its min. and max. values and the number of records.

- Selection of the Main function, by default, and display with Cursor selected.

- Displacement of the cursor by the navigator
  - moves the zoomed part (icon present, if a zoom is active)
  - activates, deactivates a zoom (icon present, if a zoom is possible)

- Zoom of the trace by selection of the zone in red border in the upper part of the record
- But access to the secondary measurements to be displayed by pressing TRACE, then selection by keys [F2] to [F4],
- Selection of the function to be displayed

Example:
- Main function: **V**
- Secondary function: **FREQ**, **dB**, **MATH**

If storage has been started, MEM is incremented. A change of function is impossible, and an attempt is reported by a low-pitched beep. Only the SETUP menu can still be opened. The acquisition in progress must be stopped (press MEM) to modify a parameter, a function, or a configuration.

4.2.4. Range key: Management of ranges

Three operating modes can be accessed by the key: Range:
- the AUTO mode → [F1]
- the AUTO Pk mode → [F2]
- the MANUEL mode → [F3]

- When a measurement is being acquired, the AUTO mode is active as default and range selection is managed automatically by the multimeter.

☝ To limit the risk of measurement instability, the 100 mV range is not managed in the **AUTO** mode, but only in the **MANUAL** mode.

- In the AUTO PEAK mode, changes of range occur only when the acquisition of a higher peak makes a higher range necessary.

☝ The AUTO PEAK mode is available only on AC and AC+DC measurements in V and A. It avoids the untimely overshoot of the peak factor specified for the instrument.

- When the MANUAL mode is selected and it is valid for the function concerned, the keys of the navigator allow a change of the measurement range.
  Measurements concerned: voltage, current (in series or clamp), resistance, capacitance

4.3. Communication interfaces

The multimeter can communicate with a PC, making it possible:
- to update the embedded software → Connect the multimeter to the computer via the USB link and run the application downloaded from the CHAUVIN ARNOUX web site.
- to calibrate the multimeter using the optional SX-MTX 329X calibration software (HX0059B).
- to program using Labview and Labwindows
- to recover the data or program the device using the SX-DMM software (USB)

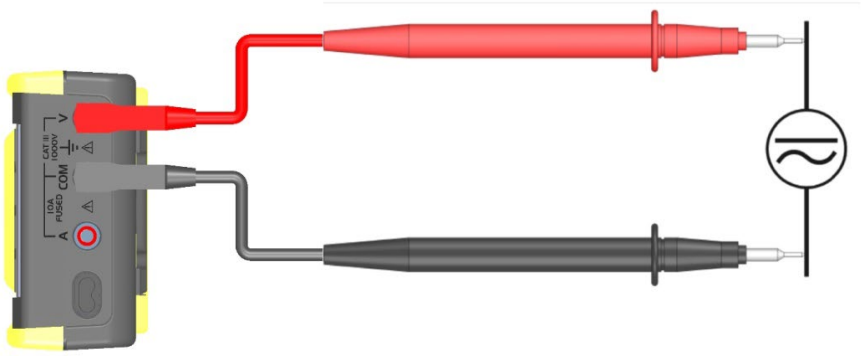
Your multimeter includes:
- an isolated optical USB link (type HX0056Z)
- SX-DMM processing software
- Labview and Labwindows drivers to program the devices.

☝ It is also possible to program the instrument using the SCPI or MODBUS protocol.

5. MEASUREMENTS

5.1. Voltage measurement

5.1.1. Connecting the multimeter



5.1.2. Main measurement

In this setting, the user can measure the true RMS value of an alternating voltage with its bias component (no capacitive coupling): "TRMS" measurement. (default coupling is AC+DC)

In the “DC” mode, you measure a direct voltage or the DC component of an AC voltage.
Selection of the coupling from among:

- alternating voltage measurement AC [F1]
- direct voltage measurement DC [F2]
- alternating voltage superposed on a direct voltage AC+DC [F3] at high impedance
- low-impedance alternating voltage **LowZ** [F4] to make measurements on electrical installations, in order to avoid the measurement of a "phantom" voltage due to coupling between lines.

5.1.3. Secondary measurements

Pressing Meas… gives access to the secondary measurements MEAS+ of the main function.

1. **in V AC+DC and V AC:**

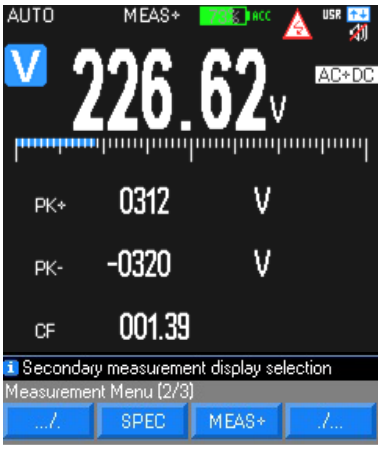
- the frequency, the period, and the mathematical function:	FREQ_PER_MATH
- the frequency, the measurement in dB, and the mathematical function:	FREQ_DB_MATH
- the power measurement in dBm, its reference, and the mathematical function:	DBM_REF_MATH
- the measurement of Peaks + then – and the peak factor:	PK+_PK-_CF
- the resistive power, its reference, and the mathematical function:	W_REF_MATH
- the power VxA, the current A, and the mathematical function:	VxA_A_MATH

2. **in V DC:**

- the mathematical function:	MATH
- the resistive power, its reference, and the mathematical function:	W_REF_MATH
- the power VxA, the current A, and the mathematical function:	VxA_A_MATH

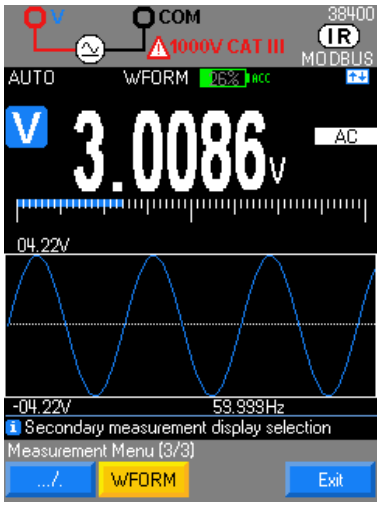
3. **in V LowZ:**

- the mathematical function:	MATH
- the frequency, the period:	FREQ_PER



The 100 mV range is present only in MANUAL mode, by Range.
In all cases, "OL" is displayed above 1 050 V and a beep sounds when the measurement exceeds 600 V.
The hazardous voltage symbol is displayed if "V" exceeds 60 V DC or 25 V AC

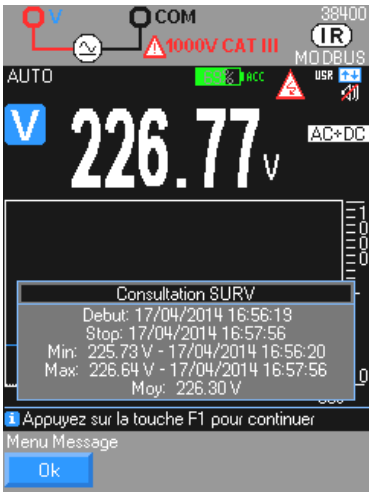
5.1.4. Waveform & trend



During an AC voltage measurement, the waveform of a signal at a frequency between 10 Hz and 600 Hz can be viewed using the WFORM function.

As default, the GRAPH mode displays the trend curve of the quantity measured (default time base 1 min, 28 s) vs time.

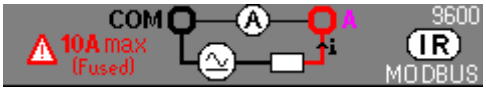
5.1.5. Procedure

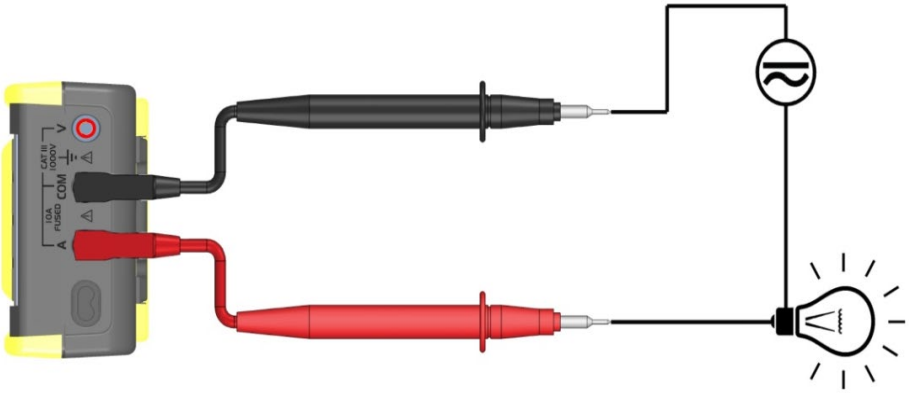


1. Press on the V function, then select the coupling according to your measurements: AC, DC, AC+DC, LowZ (AC is default).
2. Connect the black lead to the COM terminal and the red lead to V.
3. Read the measurement indicated on the display unit; the graph of trend values > 1 min, 28 s is displayed on the screen or selection of secondary measurement ***Meas…/MEAS+*** (4 display units max).
4. It is possible to activate an MLI filter (***SETUP/Measurement/filter/yes***) for measurements on a variator: the cutoff frequency of the filter < 300 Hz.
5. It is possible to display the specifications of the range for metrology or a RELative measurement.
6. Surveillance of voltage by activation by ***Meas…/SURV***
7. Recording of data internal to the multimeter:
   - Mem → to start the campaign
   - Mem → to stop the campaign then look-up of the data by long press on Mem …
   - Processing of the measurements: plot of the main measurement and display of the secondary measurements.
8. Display the waveform of a signal in the 10 Hz – 600 Hz band

5.2. Direct measurement of current

5.2.1. Connecting the multimeter





5.2.2. Main measurement A in series in a circuit

The current is the flow of electrons through a conductor. To measure the current, you must open the circuit to be checked and connect the inputs of the multimeter in series in the circuit.
Selection of the coupling from among:

- alternating current measurement AC [F1]
- direct current measurement DC [F2]
- alternating current measurement superposed on a direct voltage **AC+DC** [F3], at high impedance

When the device is in use in the 10 A range, it can withstand an overload of 20 % for one hour.
An overload of 20 A is acceptable for 30 seconds max., with a pause of at least 5 minutes between measurements.

Reminder: Breaking capacity of the fuse = circuit 11 A / 1 000 V / > 18 kA

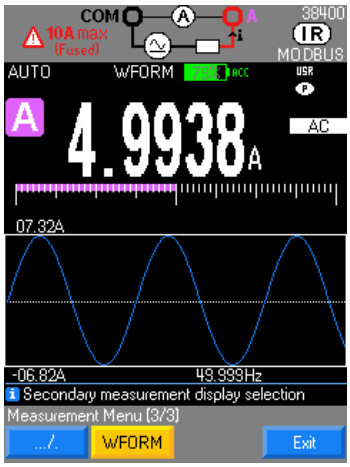
5.2.3. Secondary measurements

1. **in I AC and I AC+DC:**
   - the MATH function associated: MATH
   - the frequency, period and MATH function: FREQ_PER_MATH
   - the Pk+ then Pk- measurement and crest factor: PK+_PK-_CF
   - the resistive power, its reference and MATH function: W_REF_MATH

2. **in I DC:**

   - the MATH function associated: MATH
   - the resistive power, its reference and MATH function: W_REF_MATH

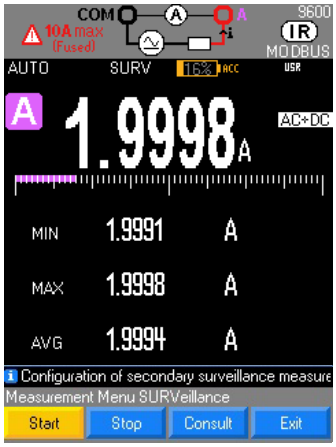
5.2.4. Waveform & trend



During an AC current measurement, the waveform of a signal at a frequency between 10 Hz and 600 Hz can be viewed using the WFORM function.

As default, the GRAPH mode displays the trend curve of the quantity measured (default time base 1 min, 28 s) vs time.

5.2.5. Procedure

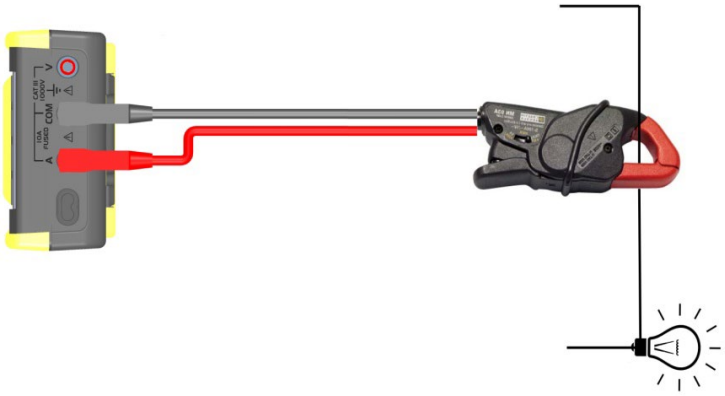


1. Press function A, then select the coupling according to your measurements: AC, DC, AC+DC (AC+DC is default)
2. Connect the black lead to the COM terminal, the red lead to A, and the probe tips in series between the source and the load as shown below:
3. Read the measurement indicated on the main display unit. Look up the graph of the trend values > 1 min, 28 s if it is activated. Look up the secondary measurements if they are activated (activated by **Meas… → MEAS+**).
4. It is possible to display the specifications of the range for metrology or a RELative measurement.
5. Surveillance of voltage **SURV** or Recording **MEM** of data internal to the multimeter
   "OL" is displayed if the current available I > 20 A.
6. View the waveform of a current in the 10 Hz – 600 Hz band

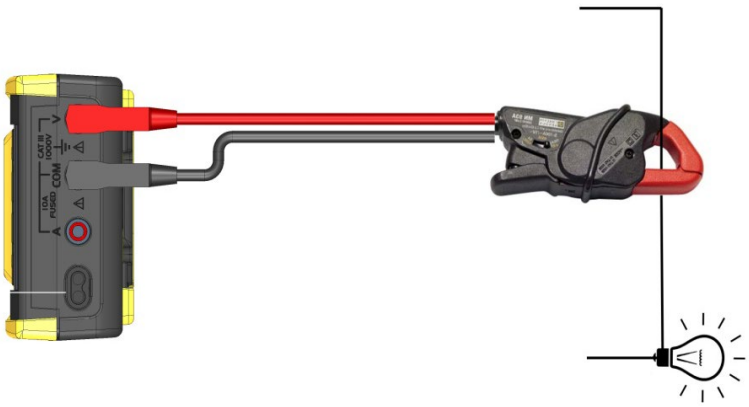
5.3. Current measurement with clamp

5.3.1. Connecting the multimeter

Current clamp with current output connected to the multimeter



Current clamp with voltage output connected to the multimeter

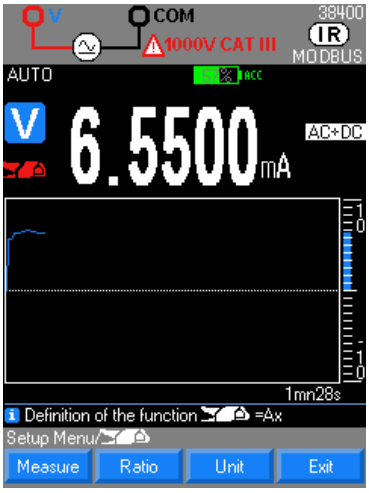


5.3.2. Main measurement

To avoid opening a circuit, we recommend measuring the current with a current clamp, output A or V (Ax function).

The clamp function includes a precise ratio xxxx.XA/xxxx.XV or XA, making it possible to connect a broad range of current clamps that you will find in the CHAUVIN ARNOUX catalogue; it is however necessary to verify that the input/output range of the clamp matches the ranges available on the multimeter.
The accuracy of this "clamp" function depends on the accuracy of the clamp and of the range used on the multimeter.

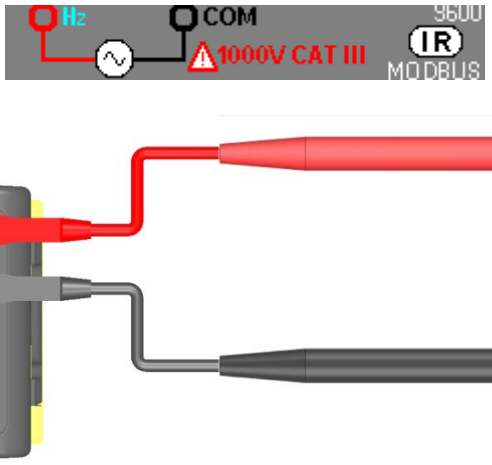
5.3.3. Procedure



1. Activate the clamp function and, depending on the type of clamp connected, double-press "Clamp" or use the setup/clamp menu specify the coupling.
2. Select the type of Measurement clamp output (V, A)
3. Define ratio A displayed on the clamp Val1/Val2 or xxxx.Xa/xxxx.Xv (by default 1 A / 1 V) to be incorporated (Ok to Validate, or Cancel).
4. Define the physical unit to be displayed (default: A): 3 programmable fields

5.4. Frequency measurement

5.4.1. Connecting the multimeter



5.4.2. Main measurement

Select the Hz function to measure the frequency of the voltage
Measurement of the period is accessible as a secondary measurement
If the MLI filter is activated, the frequency that can be measured remains within the pass band limit of the 300 Hz filter.
Below 10 Hz, or if the signal is too weak, the value is forced to "--"
Possibility of selection of the range by "Range+ or –" or of the manual freq. F < 200 kHz (default) or F > 200 kHz

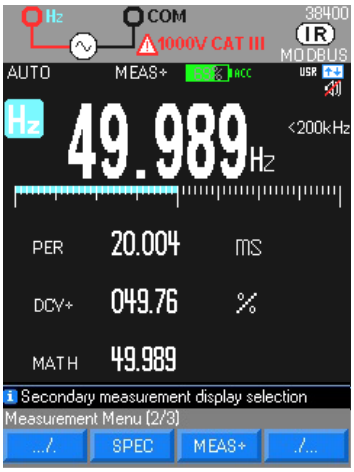
5.4.3. Secondary measurements

Pressing MEAS+ gives access to the measurements of the main function:

1. DUTY CYCLE: duty cycle DCY+ or DCY-
2. CNT+ and CNT-: counting of pulses
3. PW+ and PW-: pulse width

- the mathematical function associated: MATH
- the period, the positive duty cycle and the mathematical function: PER_DCY+_MATH
- the period, the negative duty cycle and the mathematical function: PER_DCY-_MATH
- the positive pulse width, the counting of positive pulses, its reference and the mathematical function: PW+_CNT+_MATH
- the negative pulse width, the counting of negative pulses, its reference and the mathematical function: PW-_CNT-_MATH

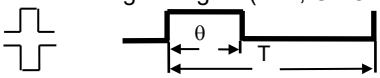
Duty cycle



Display of the measurement in % of a logical signal (TTL, CMOS, etc.)

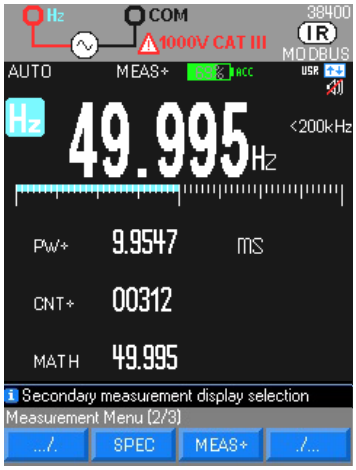
DCY+ duty cycle = θ

DCY- duty cycle = T - θ



The DCY duty cycle mode is optimized to measure the active or inactive intervals of switching signals or logical signals. Electronic fuel injection systems and switching power supplies, in particular, are controlled by pulses of variable width that can be verified by a duty cycle measurement.

Pulse counting

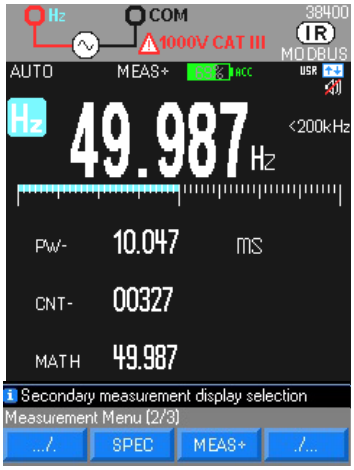


Depending on the triggering conditions of the frequency counter, calculation of the positive or negative pulses
Minimum pulse duration 5 µs
Counting up to 99 999
Triggering threshold 10 % of range except for range 1 000 V AC
This threshold is positive in ⎍, negative in ⎎

☝ Reset of CNT by long press on MEAS… For negative events, cross the leads.

The pulse width function θ measures the duration during which the signal is low or high. The waveform measured must be periodic; its curve must repeat at intervals of equal duration.

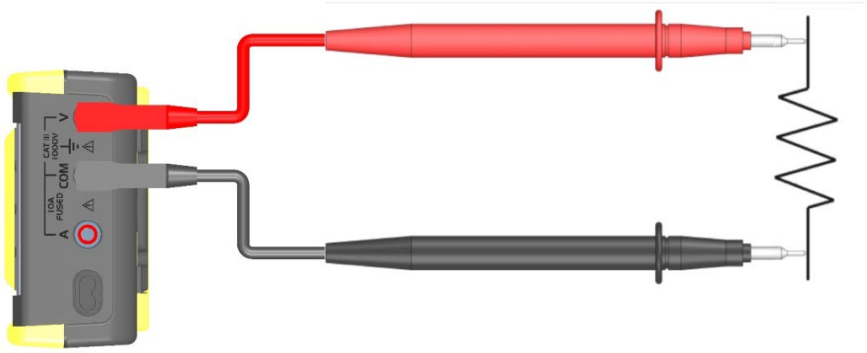
Pulse width



Depending on the triggering conditions of the frequency counter, measurement of the pulse width in ms.
Resolution 10 µs
Minimum pulse width 100 µs
Accuracy 0.05 % ± 10 µs Maximum duration of a period 12.5 s
Triggering threshold 20 % of the range except for the 1 000 V AC range
For negative events, cross the leads.

5.5. Resistance measurement

5.5.1. Connecting the multimeter



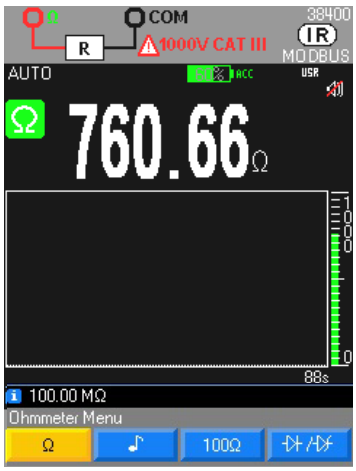
5.5.2. Main measurement

The multimeter measures resistance (opposition to the flow of current) in ohms (Ω). For this purpose, it sends a weak current through the measurement leads to the circuit being tested.
The input (+, COM) must not have been overloaded by the accidental application of a voltage on the input terminals with the switch set to Ω or T°.

- Selection of range: automatic or manual
- "Active" protection: by PTC thermistor
- Measurement voltage: approx. 1.2 V
- Max. open-circuit voltage: 4 V typ.

Because the measurement current of the multimeter takes all possible paths between the probe tips, the resistance measured in a circuit is often different from the nominal resistance.
The measurement leads can add from 0.1 Ω to 0.2 Ω of error to resistance measurements. To test the leads, touch the probe tips together and note the resistance of the leads.
To eliminate the resistance of the leads from the measurement, keep the probe tips together, press the Meas… function key, then REL, and integrate this measurement as REF.
A MATH secondary measurement is active in resistance measurement.
All measurements made then indicate the resistance between the probe tips.

Ohm



In the 50 MΩ range, in order to avoid the influence of the mains and guarantee the stated specifications, it is best to disconnect the multimeter from the Wall Plug to avoid perturbations.

For measurements greater than 10 MΩ, a shielded lead is recommended.

For a 2-wire link, use very short wires (< 25 cm) and twist them together.

100 Ohm measurements

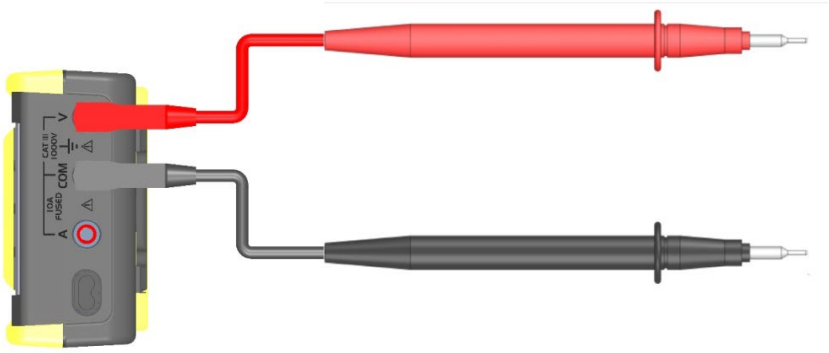
Press the F3 key to access this function.

So as not to damage the circuit tested, note that the multimeter provides a current of approximately 10 mA max. at an open-circuit voltage of 28 volts max.

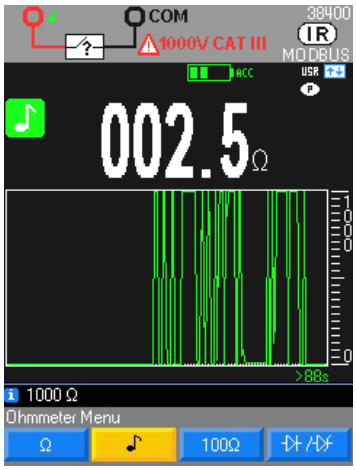
For low resistance measurements, < 100 Ohm, this single range provides good resolution.

5.6. Audible continuity measurement

5.6.1. Connecting the multimeter



5.6.2. Main measurement

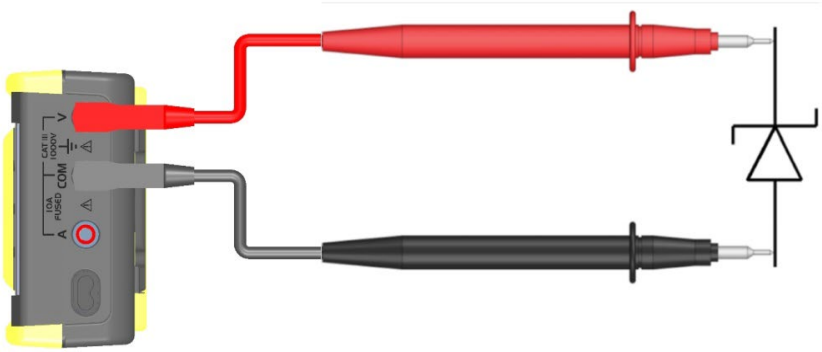


Measurement of a resistance up to 1 000 Ω , with continuous 4 kHz audible indication.
Power the circuit down before making any measurement.

The continuity test monitors the circulation of the current in a complete resistive circuit. The continuity function detects open-circuits and intermittent short-circuits lasting as little as one millisecond.
If a short-circuit is detected, an audible beep sounds. If the circuit is open, **OL** is displayed.
Detection threshold in continuity mode: ≈ 20 Ω (response time < 10 ms)
“Active” protection by PTC thermistor
Max. open-circuit voltage: 3.5 V.

5.7. Diode test

5.7.1. Connecting the multimeter



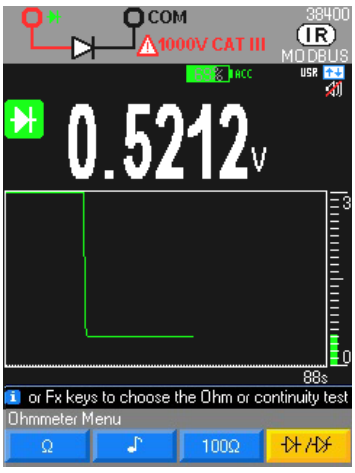
This function performs a diode forward voltage check to verify:

- diodes,
- transistors,
- silicon-controlled rectifiers (thyristors)
- and other semiconductor components.

This function tests a semiconductor junction by passing a current through it and measuring the voltage drop across the junction. Indication of the junction voltage in the forward direction from 0 to 2.1 V in a single range (10 V range): forward polarization.

5.7.2. Main measurement

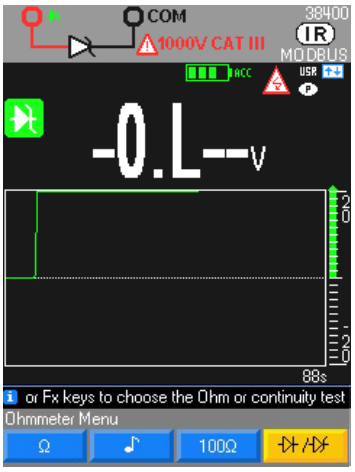
4 V



Reading of the threshold voltage; if the circuit is open or the threshold of the diode > 4 V, the indication is OL.

forward polarization of diode

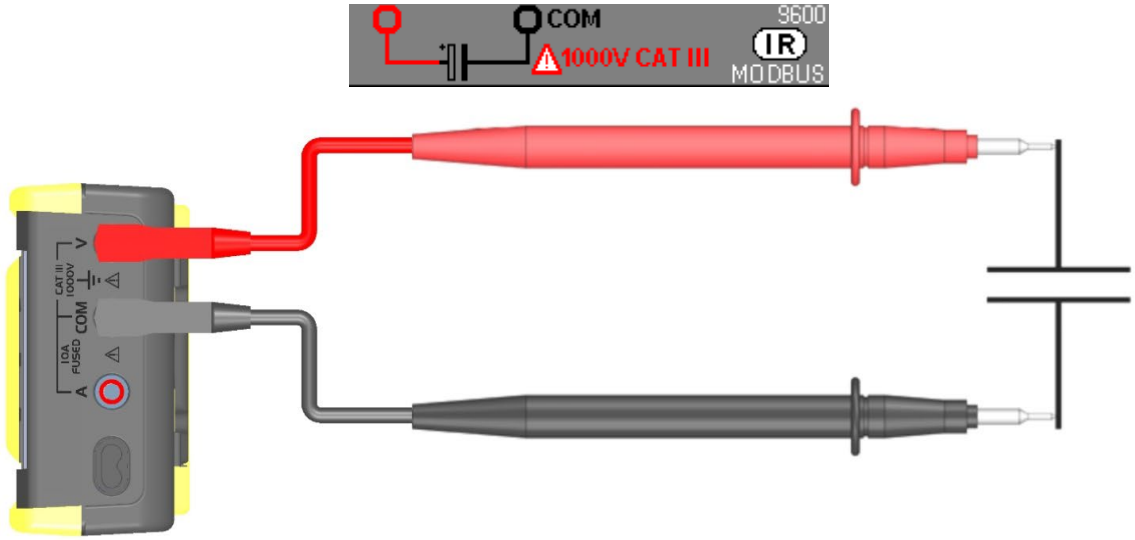
26 V



Zener diode or LED: selecting this diode applies the same function as for the diode above but with a maximum voltage of 26 V and a maximum current of 10 mA.

5.8. Capacitance measurement

5.8.1. Connecting the multimeter



5.8.2. Main measurement

Capacitance characterizes the ability of a component to store an electric charge. The unit of capacitance is the farad (F). Most condensers/capacitors lie within the range from nanofarads (nF) to microfarads (µF).
The multimeter measures capacitance by charging a capacitor with a known current for a known time and measuring the resulting voltage. The result is the capacitance.

Measurement of the capacitance of a capacitor with a resolution of 1 000 pts
"**Run**" appears when the measurement is in progress.
With large capacitances, the display of "**RUN**" lasts longer.
"**OL**" is displayed if the value to be measured exceeds the range limits or if the capacitor is short-circuited.

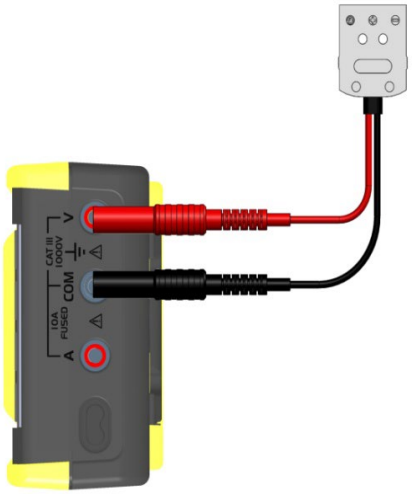
AUTO range selection, automatic (default) or manual: Range + or Range -
"Active" protection by PTC thermistor
Maximum open-circuit Voltage: 1 V typ., 4 V max.
Use the REL function for values < 10 % of the range in order to restore the residual zero (compensation for the capacitance of the leads)

☝ For measurements < 10 nF, a shielded lead is recommended. For a 2-wire link, use very short wires (< 25 cm) and twist them together. Use the REL function to compensate for the error introduced by the measurements leads. In REL mode, changes of range are not available.

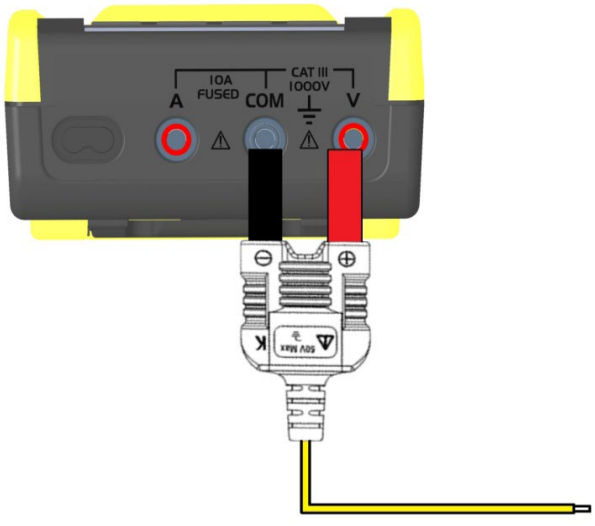
5.9. Temperature

5.9.1. Connecting the multimeter

Connecting Pt100/Pt1000
(with HX0091 adapter)



Connecting a K or J thermocouple with the temperature compensated plug (optional)



5.9.2. Main measurement

To measure a temperature:

1. Connect the sensor to the V and COM terminals, making sure to get the polarity right.
2. Choose the unit: °C (Celsius), K (Kelvin) or °F (Fahrenheit).
3. Select ".../…".
4. Choose the type of sensor Pt100, Pt1000, TCJ, or TCK.

If "**OL**" is displayed, the sensor is open-circuit or the measured value exceeds the range limit.

2 presses T°

Measurement of the temperature with a sensor: Pt100/Pt1000.
"Active" protection by PTC thermistor to connect a 2-wire PT probe to the multimeter, we recommend the use of the PT100 probe adapter → HX0091.

3 presses T°

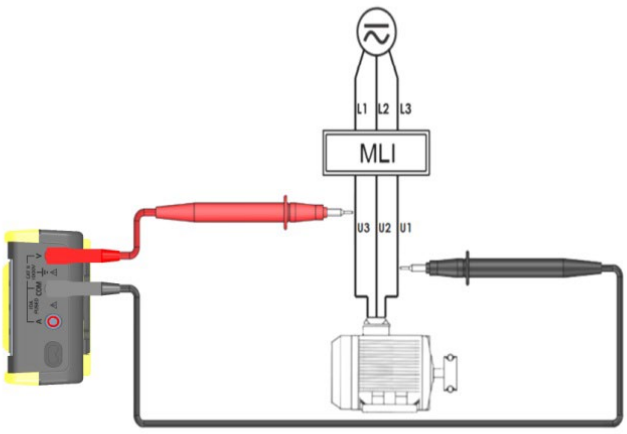
Measurement of the temperature in °Celsius using a thermocouple between the V and COM terminals
K thermocouple from - 40°C to + 1 200°C or TCJ (J thermocouple) from - 40°C to + 750°C
Without a TK thermocouple, you can determine the ambient temperature inside the multimeter with a bridge between the V and COM terminals.

The keys of the navigator are used to change the scale of the graphic window. The scale selected is transcribed in the help line.

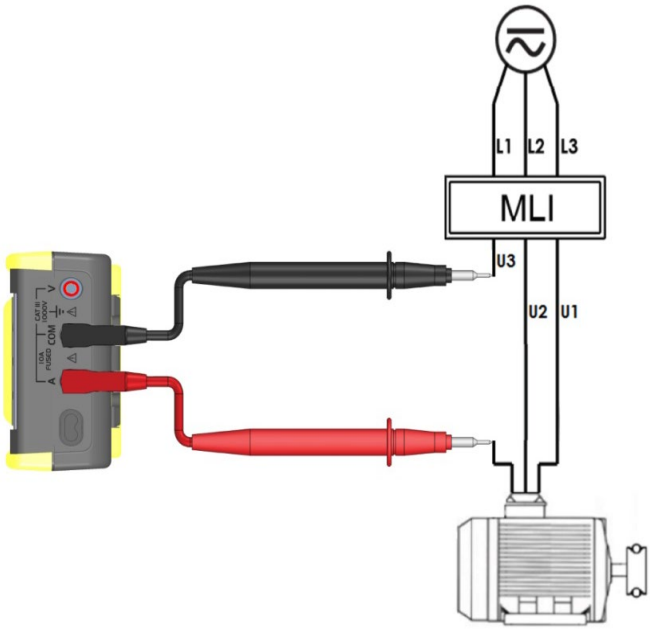
5.10. Measurement on an MLI type speed variator

5.10.1. Connecting the multimeter

Connecting the multimeter to filter a voltage > 300 Hz



Connecting the multimeter to filter a current > 300Hz

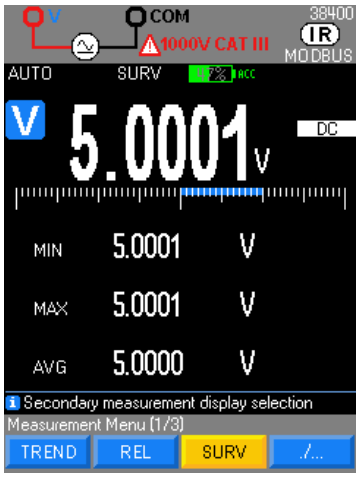


5.10.2. Main measurement

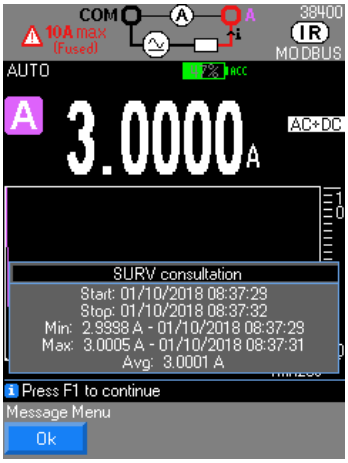
The multimeter has a low-pass AC filter that blocks voltages or currents at undesirable frequencies.
The MLI filter is activated as follows: Setup → Measurement → Filter YES: a symbol then appears on the screen.

The multimeter continues the measurements in the chosen mode, AC, AC+DC, or V LowZ, but the signal goes through a filter that blocks undesirable voltages > 300 Hz.
The low-pass filter improves measurement performance on the composite sinusoidal signals often generated by inverters and variable-speed motors.

5.11. Surveillance mode



The **SURV** mode (available under **MEAS…**) monitors the variations of a signal, recording the extremes (**MIN** and **MAX**) of the main measurement and calculating its mean (**AVG**).
For each quantity stored, the multimeter records the corresponding date and time.
This mode is active for the following functions: V, Hz, Ohm, clamp, capacitance, temperature, and current.



The SURV look-up screen is not saved. You must take a screenshot (Print Scrn) to record it.

Integration time at least **200 ms**, programmable according to your configuration: **Start** → **Stop**, then look-up of the quantities on the screen, in a specific window.

It is possible to recover a screen grab of this window under our SX-DMM software, but this mode cannot be stored in the instrument.

☝ Reset of the MIN/MAX values by a long press on MEAS…

Peak

The rapid peak measurements are available in the **MEAS**, **MEAS+**, **PK+** and **PK-** secondary measurements for the following measurement functions: V and A (AC, AC+DC); integration time less than **250 µs**.

☝ Reset of the values by a long press on MEAS…

5.12. Graphic mode

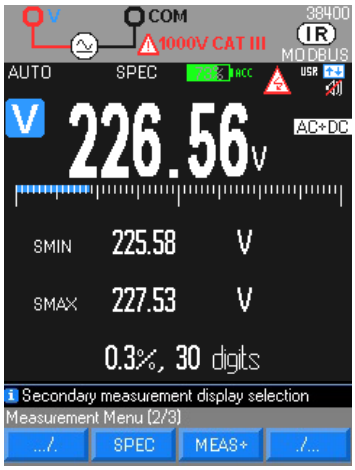
It is accessible by default in **Meas… → Graph** and is used to display a change in the quantity measured with respect to a fixed time scale adjustable from 1 min, 28 s to 1 h, 13 min, 20 s by pressing the left and right arrows; the vertical scale is automatic or manual (range selection).
This mode is available in all main measurement functions.

5.13. Relative mode

This mode indicates that the value displayed is relative to a reference value.
It is available for the following measurement functions: V, Hz, Ohm, clamp, capacitance, temperature, and current.

Reset the Ref to the current value by a long press on **MEAS…**

5.14. SPEC mode



Using the internal technical specifications of the multimeter, the **SPEC** mode directly displays the tolerance on the measurement in progress, with no need to look for it and calculate it.

This mode is very useful for the metrology of the instrument.

5.15. MEAS mode

It gives access to the secondary measurements of the main measurement: a maximum of 3 secondary measurements can be displayed.
This mode is available in **MEAS…** → **MEAS+** for the following measurement functions: V, Hz, Ohm, and current.

5.16. MATH mode

The MATH function y = Ax + B (A and B configurable in **Setup** → **Math** → **Coeff A** and **B**) enables the user, measuring an arbitrary physical quantity in:

- Volts (✎ e.g.: process 0-10 V or high-voltage probe)
- Amperes (✎: 4-20 mA current loop or current clamp)
- Frequency (✎: measurement of flow rates, speeds of rotation)
- Ohms (✎: resistive position sensor)

to convert it and assign the appropriate unit so as to obtain a direct reading of the original quantity on the instrument.
It is available via **Meas…** → **MEAS+** → **MATH** under the following measurement functions: V, Hz, Ohm, and current.

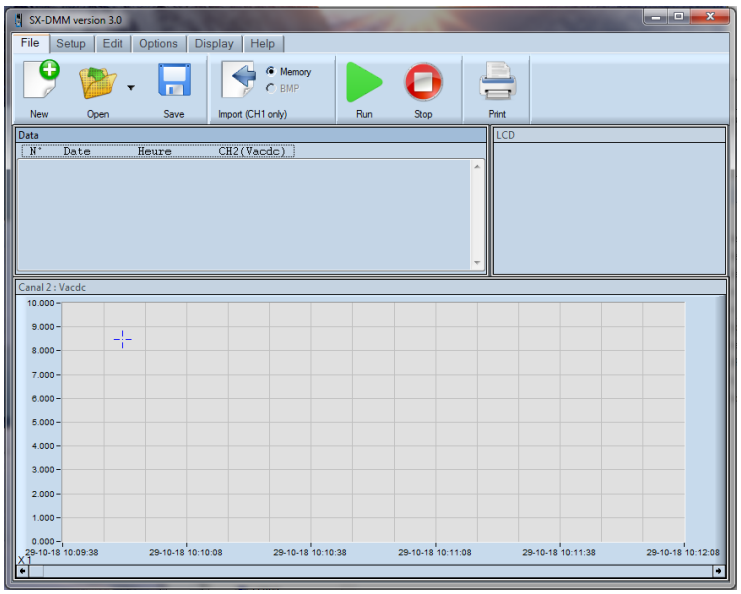
6. SX-DMM Software

These multimeters can interface directly with a computer or with a Windows tablet running the SX-DMM acquisition software:
In the "**General adjustments**" menu of the multimeter:

1. Select infrared communication (IR is default) by the Comm. function
2. Select the Modbus communication protocol
3. Parameterize the infrared transmission rate by the IR baud function: 9 600/19 200/38 400 Baud.

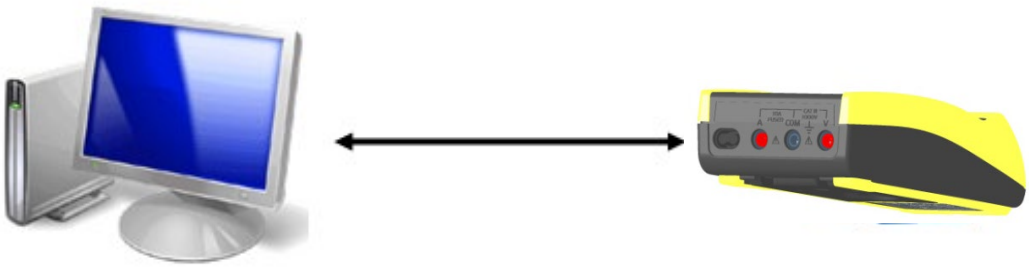
☝ The default transmission rate is 38 400 Baud.

The other transmission parameters are fixed (8 data bits, 1 stop bit, no parity).



6.1. Connection of the isolated USB optical lead supplied

1. Connect the isolated optical lead to the isolated optical input of the multimeter (on the side of the multimeter). Mechanical polarization prevents connection in reverse.
2. Connect the USB lead to one of the USB ports of the PC.
3. Install the USB driver on your PC.



6.2. Installing the software

1. Install the "SX-DMM" software on the PC using the USB drive.
2. Start the software for data acquisition and study the various display possibilities (curves, tables, etc.).

☝ The  symbol appears on the display unit when the instrument is controlled from the PC (REMOTE mode).

For more information, refer to the "Help" menu of the software.

6.3. Remote programming

See the “Remote programming manual” available for free download on the product page at www.chauvin-arnoux.com

7. TECHNICAL CHARACTERISTICS

Intrinsic uncertainty is defined under reference conditions.

This uncertainty is primarily expressed as a function of the measurement value (R = Reading) and the number of display points with which this measurement is displayed. The digits (D) corresponds to the display resolution of the measurement range.
Intrinsic uncertainty (or accuracy) is calculated using the formula:
+/- [a % x R + b x D]

If this uncertainty depends on the signal frequency (F), this formula may include an additional operand.
F(kHz) indicates that the frequency of the measured signal should be expressed in kHz. For example, in the case of a 1 000 Hz signal, F = 1.

7.1. DC voltage

In the “DC” mode, you measure a direct voltage or the DC component of an AC voltage.

The 100 mV range is available only in manual mode, by Range.

7.1.1. CA 5292

Range	Input impedence	Resolution	Protection	Accuracy
100 mV (∗)	10 MΩ / 1 GΩ	1 µV	1 414 Vpk	0.1 % R + 30 D
1 000 mV	11 MΩ / 1 GΩ	10 µV		0.05 % R + 8 D
10 V	10.5 MΩ	0.1 mV		0.03 % R + 8 D
100 V	10 MΩ	1.0 mV		
1 000 V	10 MΩ	10 mV		0.035 % R + 8 D

(∗) REL mode activated (Δ measurement)

- Recovery after triggering of the protection (> 10 V) approx. 10 s.
- Protection 1 minute max.
- Specifications valid from 0 % to 100 % of the range
- Rejection: 100 mV range common mode: > 40 dB at 50 Hz and 60 Hz
- 1 V range common mode: > 70 dB at 50 Hz and 60 Hz
- 10 V range common mode: > 100 dB at 50 Hz and 60 Hz
- serial mode: > 60 dB at 50 Hz and 60 Hz
- Automatic or manual selection of the ranges
- Protection by varistors

7.1.2. CA 5293

Range	Input impedence	Resolution	Protection	Accuracy
100 mV (∗)	10 MΩ / 1 GΩ	1 µV	1 414 Vpk	0.1 % R + 30 D
1 000 mV	10 MΩ / 1 GΩ	10 µV		0.05 % R + 8 D
10 V	10.5 MΩ	0.1 mV		0.02 % R + 8 D
100 V	10 MΩ	1.0 mV		
1 000 V	10 MΩ	10 mV		0.03 % R + 8 D

(∗) REL mode activated (Δ measurement)

- Recovery after triggering of the protection (> 10 V) approx. 10 s.
- Protection 1 minute max.
- Specifications valid from 0 % to 100 % of the range
- Rejection: 100 mV range common mode: > 40 dB at 50 Hz and 60 Hz
- 1 V range common mode: > 70 dB at 50 Hz and 60 Hz
- 10 V range common mode: > 100 dB at 50 Hz and 60 Hz
- serial mode:> 60 dB at 50 Hz and 60 Hz
- Automatic or manual selection of the ranges
- Protection by varistors

7.2. AC and AC+DC voltage

With this function, the user can measure the true RMS (TRMS) value of an AC voltage with its DC component (no capacitive coupling) or without its DC component.

The 100 mV range is available only in Manual mode, by Range.
In the V AC & V AC+DC modes and for signals > 1 kHz, the range of uncertainty displayed is given for information only: we recommend using the formulas below.
VLowZ: The error should be slightly greater than the error in V AC.

7.2.1. CA 5292

Range	Input impedence	Resolution	Accuracy	
			45 Hz to 1 kHz	1 to 100 kHz
100 mV (*)	10 MΩ	1 µV	1 % R + 50 D	1 % R + 0.1 % x [F(kHz) - 1] R + 50 D
1 000 mV	11 MΩ	10 µV	0.5 % R + 50 D	0.5 % R+ 0.25 % x [F(kHz) – 1] R + 50 D < 10 kHz 2.75 % R+ 0.04 % x [F(kHz) - 10] R + 50 D > 10 kHz
10 V	10.5 MΩ	0.1 mV	0.3 % R + 50 D	0.3 % R + 0.04 % x [F(kHz) - 1] R + 50 D
100 V	10 MΩ	1 mV	0.3 % R + 50 D	0.3 % R+ 0.03 % x [F(kHz) - 1] R + 50 D
1 000 V (**)	10 MΩ	10 mV	0.3 % R + 50 D	0.3 % R + 0.02 % x [F(kHz) - 1] R + 50 D

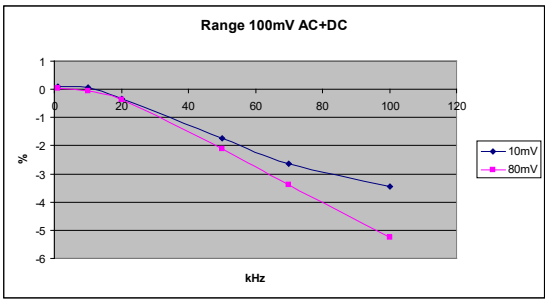
(**) ⚠ limitation at high frequency
(*) not contractual indicative values (see curves below)
(**) BP: Freq [kHz] limited to: 15 000/U input [V]
U input [V] limited to: 15 000/Freq [kHz]

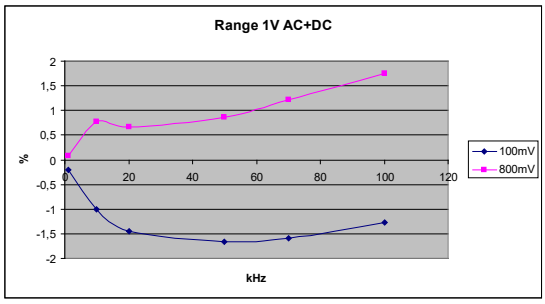
Example: U input = 1 000 V AC → Max. frequency: 15 000/1 000 = 15 kHz
In the presence of a DC component: additional error: (U DC/U measured) x (0.7 % + 70 D)

Example: U DC = 2 V, U measured = 5 Vrms → Additional error: 0.28 % + 28 D

- Rejection: common mode > 80 dB at 50 Hz or 60 Hz depending on selection
- Automatic or manual selection of the ranges
- Protection by varistors
- Maximum acceptable permanent voltage: 1 414 Vpk
- Specifications valid from: 10 to 100 % of the range in the band from 20 kHz to 100 kHz
- Influence of the peak factor on the accuracy in V AC, V AC+DC at 50 % of the range: 1 % for a peak factor < 3.

As soon as the PEAK symbol appears, use the AUTO PEAK mode.





7.2.2. CA 5293

Range	Input impedence	Resolution	Accuracy		
			45 Hz to 1 kHz	1 to 100 kHz	100 to 200 kHz
100 mV (∗)	10 MΩ	1 µV	1 % R + 50 D	1 % R + 0.05 % x [F(kHz) - 1] R + 50 D (∗)	-
1 000 mV	11 MΩ	10 µV	0.5 % R + 40 D	0.5 % R + 0.2 % x [F(kHz) - 1] R + 40 D < 10 kHz 2.3 % R + 0.02 % x [F(kHz) - 10] R + 40 D > 10 kHz	12 % R + 50 D (∗)
10 V	10.5 MΩ	0.1 mV	0.3 % R + 30 D	0.3 % R + 0.03 % x [F(kHz) - 1] R + 30 D	10 % R + 30 D
100 V	10 MΩ	1 mV	0.3 % R + 30 D	0.3 % R + 0.015 % x [F(kHz) - 1] R + 30 D	8 % R + 30 D
1 000 V (∗∗)	10 MΩ	10 mV	0.3 % R + 30 D	0.3 % R + 0.01 % x [F(kHz) - 1] R + 30 D	-

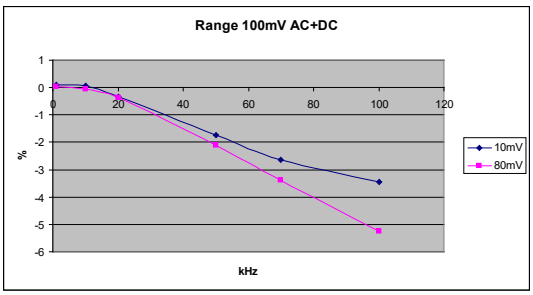
(∗∗) ⚠ limitation at high frequency
(∗) not contractual indicative values (see curves below)
(∗∗) BP: Freq [kHz] limited to: 15 000/U input [V]
U input [V] limited to: 15 000/Freq [kHz]

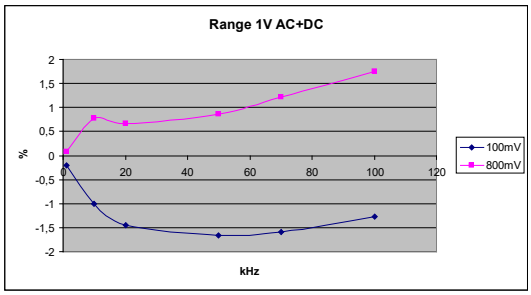
Example: U input = 1 000 V AC → Max. frequency: 15 000/1 000 = 15 kHz
In the presence of a DC component: Additional error: (U DC/U measured) x (0.7 % R + 70 D)

Example: U DC = 2 V, U measured = 5 Vrms → Additional error: 0.28 % R + 28 D

- Rejection: common mode > 80 dB at 50 Hz or 60 Hz depending on selection
- Automatic or manual selection of the ranges
- Protection by varistors
- Maximum acceptable permanent voltage: 1 414 Vpk
- Specifications valid from: 10 to 100 % of the range in the band from 20 kHz to 200 kHz
- Influence of the peak factor on the accuracy in V AC, V at 50 % of the range:
- 1 % for a peak factor < 3.

As soon as the PEAK symbol appears, use the AUTO PEAK mode.





7.3. DC current

Three possible modes: DC, AC, AC+DC
In DC mode, you can measure a direct current or the DC component of an alternating current.
In the AC and AC+DC modes, you can measure the true RMS (TRMS) value of an alternating current with/without its direct component (no capacitive coupling in "DC" mode).
Fuse: ex.: SIBA/5019906/11 A (10x38-11000-DMI-30 kA-CR 1 000 V, very rapid action).

Range	Input impedence	Resolution	Protection	Accuracy
1 000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	0.1 % R + 15 D
10 mA	≈ 17 Ω	0.1 µA		0.08 % R + 8 D
100 mA	≈ 1.7 Ω	1 µA		
1 000 mA	≈ 0.17 Ω	10 µA		0.15 % R + 8 D
10 A	≈ 0.03 Ω (∗)	100 µA		0.5 % R + 15 D
100 A (∗∗)		1 000 µA		

(∗) with the fuse supplied with the device
(∗∗) 100 A range limited to 20 A
Specifications valid from 0 % to 100 % of the range

Limiting condition on the current
An overload of 20 A is acceptable for 30 seconds max. with a pause of at least 5 minutes between measurements.

7.4. AC and AC+DC TRMS current

Range	Input impedence	Resolution	Protection	Accuracy		
				45 Hz to 1 kHz	1 to 20 kHz	20 to 50 kHz
1 000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	0.5 % R ± 40 D	0.5 % R + 0.25 % x [F(kHz) - 1] R ± 30 D	-
10 mA	≈ 17 Ω	0.1 µA		0.3 % R ± 30 D	0.3 % R + 0.1 % x [F(kHz) - 1] R + 30 D	
100 mA	≈ 1.7 Ω	1 µA		0.3 % R ± 30 D	0.3 % R+ 0.1 % x [F(kHz) - 1] R + 30 D	
1 000 mA	≈ 0.17 Ω	10 µA		0.3 % R ± 30 D	0.3 % R + 0.1 % x [F(kHz) - 1] R + 30 D	-
10 A	≈ 0.03 Ω (*)	100 µA		0.4 % R ± 40 D	0.4 % R + 0.15 % x [F(kHz) - 1] R + 40 D	
100 A (**)		1 000 µA		2.5 % R ± 40 D	2.5 % R + 0.15 % x [F(kHz) - 1] R + 40 D	

(*) with the fuse supplied with the device
(**) 100 A range limited to 20 A
In the presence of a DC component:
Additional error: (I DC/I measured) x (0.7 % R + 70 D)
A max. overload of 20 A is acceptable for 30 s max. with a pause of at least 5 min between measurements. From 7 A, the measurement is limited to an ambient temperature of 40°C and a period of 1h30, with a pause of at least 15 minutes between measurements.
AUTO PEAK mode always activated.
Detection of peaks of which the duration exceeds 250 µs
mA and µA range:
Additional error 2 % for a peak factor between 2.5 and 3
Additional error 15 % for a peak factor between 3 and 4
10 A range: Zero up to the peak factor of 2.5 at 100 %

Specifications valid from 10 % to 100 % of the range for a sinusoidal current.
Protection: 1 000 VRMS by HBC ceramic fuse
Fuse: 1 000 V, 11 A > 18 kA Cos φ > 0.9 (10x38 mm)

Voltage drop:
in 1 mA Voltage drop approx. 160 mVRMS
in 10 mA Voltage drop approx. 180 mVRMS
in 100 mA Voltage drop approx. 180 mVRMS
in 1 000 mA Voltage drop approx. 210 mVRMS
in 10 A Voltage drop approx. 300 mVRMS

7.5. Frequency

7.5.1. Main frequency measurement

The user can measure a voltage or a current and its frequency simultaneously.

Range	Resolution	Protection	Accuracy
10 to 100 Hz	0.001 Hz	1 414 Vpk	0.02 % + 10 D
100 to 1 000 Hz	0.01 Hz		
1 000 Hz to 10 kHz	0.1 Hz		
10 to 100 kHz	1 Hz		
100 to 1 000 kHz	10 Hz		
1 MHz to 5 MHz	100 Hz		

Range	Sensitivity (applicable only to rectangular signals)				
	100 mV	1 V	10 V	100 V	1000 V
0 Hz to 10 Hz	-	-	-	-	-
10 Hz to 200 kHz	10 %	20 to 5 %	5 %	5 %	5 % (∗)
200 to 500 kHz	20 %	5 %	5 to 2 %	5 to 10 % (∗)	5 % (∗)
500 to 1 000 kHz	-	5 %	2 %	10 %	5 % (∗)
1 MHz to 5 MHz			2 to 50 %		20 % (∗)

(∗) Freq [kHz] limited to: 15 000/U input [V]
U input [V] limited to: 15 000/Freq [kHz]
(∗∗) limited to 200 kHz
The measurement is made by capacitive coupling.
Manual selection of freq. range, F < 200 kHz (default) or F > 200 kHz by a short press.
Input resistance: ≈ 10 MΩ (Freq < 100 Hz)
Max. acceptable permanent voltage: 1 414 Vpk, see (∗)
Protection by varistors on the voltage input.

7.5.2. Secondary frequency measurement

Range	Resolution	Accuracy	Acceptable overload
10 to 100 Hz	0.001 Hz	0.02 % + 8 D	1 450 V DC (1 min max.) in range 100 mV
100 to 1 000 Hz	0.01 Hz		
1 000 Hz to 10 kHz	0.1 Hz		
10 to 100 kHz	1 Hz		
100 to 200 kHz	10 Hz		

Range	Sensitivity (applicable only to rectangular signals) Vrms			
	100 mV	1 V	10 V to 1 000 V (∗)	1 000 µA to 20 A (∗∗)
10 Hz to 200 kHz	15 % of the calibration	10 % of the calibration	10 % of the calibration	5 to 10 %
10 Hz to 10 kHz				
10 kHz to 30 kHz				

(∗) Freq limited to [kHz]: 15 000/U input [V]
U input [V] limited to [V]: 15 000/Freq [kHz]
(∗∗) at 50 kHz for the «Ampere» range
The measurement is made by capacitive coupling.
Input resistance: ≈ 10 MΩ (F < 100 Hz)
Protection by varistors on the voltage input.

7.6. Resistance

7.6.1. Ohmmeter

In this setting, the user can measure a resistance.
Particular reference conditions:
The (+, COM) input must not have been overloaded following the accidental application of a voltage to the input terminals with the switch set to Ω or T°. If this happens, the return to normal may take about ten minutes.
Protection: 1 414 Vpk

Range	Accuracy	Resolution	Protection
1 000 Ω	0.1 % R + 8 D	10 mΩ	1 414 Vpk
10 kΩ	0.07 % R + 8 D	100 mΩ	
100 kΩ		1 Ω	
1 000 kΩ		10 Ω	
10 MΩ	1 % R + 80 D	100 Ω	
100 MΩ	3 % R + 80 D R ≤ 50 MΩ	1 kΩ	

Automatic or manual range selection
“Active” protection by PTC thermistor
Measurement voltage: approx. 1.2 V
Maximum open-circuit voltage: 3.5 V typ.
In the 100 MΩ range, in order to avoid the influence of the mains and guarantee the stated specifications, it is best to disconnect the multimeter from the Wall Plug.

7.6.2. 100 Ω measure

Range	Accuracy	Resolution	Protection
100 Ω	0.2 % R + 10 D	0.01 Ω	1 414 Vpk

7.7. Capacity

7.7.1. Capacitance meter

In this setting, the user can measure the capacitance of a capacitor.

Range	Operating range	Specified measurement range	Resolution	Intrinsic error	Measurement current	Measurement time
1 nF	0 to 1.000 nF	0.100 to 1.000 nF	1 pF	2.5 % R + 15 D	< 10 µA	≈ 400 ms
10 nF	0 to 10 nF	0.1 to 10.00 nF	10 pF	1 % R + 8 D	< 10 µA	≈ 400 ms
100 nF	0 to 100.0 nF	1 to 100.0 nF	0.1 nF	1 % R + 8 D	< 50 µA	≈ 400 ms
1 000 nF	0 to 1 000 nF	10 to 1 000 nF	1 nF	1 % R + 10 D	< 200 µA	≈ 0.125 s/µF
10 µF	0 to 10.00 µF	1 to 10.00 µF	0.01 µF	1 % R + 10 D	< 200 µA	≈ 0.125 s/µF
100 µF	0 to 100,0 µF	1 to 100.0 µF	0.1 µF	1 % R + 10 D	< 500 µA	≈ 0.125 s/µF
1 mF	0 to 1.000 mF	0.1 to 1.000 mF	1 µF	1 % R + 15 D	< 500 µA	≈ 17 s/mF
10 mF	0 to 10.00 mF	0.5 to 10.00 mF	10 µF	1.5 % R + 15 D	< 500 µA	≈ 17 s/mF

(∗) Use the REL function for values < 10 % of the range in order to restore the residual zero (compensation for the capacitance of the leads)
Resolution 1 000 points
Automatic or manual range selection
“Active” protection by PTC thermistor
Maximum open-circuit voltage: 1 V typ./4 V max.

7.8. Diode test

Indication of the junction voltage in the forward direction, from 0 to 2.1 V in a single range (10 V range)

	Normal	Z Diode
Accuracy	2 % R + 30 D	2 % R + 30 D
Resolution	0.1 mV	1 mV
Measurement current	< 1 mA	< 11 mA
Max. open-circuit voltage	< 3.5 V	< 26 V
Indication of overshoot	in the reverse direction	in the reverse direction
“Active” protection by PTC thermistor	1 414 Vpk	1 414 Vpk

7.9. Audible continuity

In this setting, you measure a resistance up to 1 000 Ω, with continuous 4 kHz audible indication

Range	Accuracy	Resolution	Protection
1 000 Ω	0.1 % R + 8 D	100 mΩ	1 414 Vpk

Detection threshold in continuity mode ≈ 20 Ω (response time < 10 ms)
“Active” protection by PTC thermistor
Maximum open-circuit voltage: 3.5 V max, 2 V typ.

7.10. Temperature

7.10.1. Pt100/Pt1000

The user can measure the temperature by means of a Pt100/Pt1000 sensor.

Range	Measurement current	Resolution	Accuracy	Protection
- 125°C to + 75°C	< 1 mA (Pt100) < 0.1 mA (Pt1000)	0.1°C ---	± 0.5°C	1 414 Vpk
- 200°C to + 800°C	< 1 mA (Pt100) < 0.1 mA (Pt1000)	0.1°C ---	0.1 % R + 1°C 0.07 % R + 1°C	

“Active” protection by PTC thermistor
Display in °C/°F possible

7.10.2. Thermocouples

Function	Internal temperature	External temperature	
Type of sensor	Integrated circuit	K thermocouple	
Display range	1 000°C 1 000°F	1 000°C 1 000°F	10 000°C 10 000°F
Specified measurement domain	- 10.0°C to + 60.0°C + 14.0°F to + 140.0°F	- 40.0°C to + 999.9°C - 40.0°F to + 1 831.8°F	+ 1 000°C to + 1 200°C + 1 832°F to + 2 192°F
Uncertainty (note 1)	± 3°C ± 5.4°F	1 % R + 3°C 1 % R + 5.4°F	1 % R + 3°C 1 % R + 5.4°F
Resolution	0.1°C 0.1°F	0.1°C 0.1°F	1°C 1°F
Thermal time constant (note 2)	0.7 min./°C	Depending on model of sensor	
Detection of sensor open-circuit	No	Yes: indication of the internal temperature although the external sensor is connected	

Note 1: The stated accuracy in external temperature measurement does not take into account the accuracy of the K thermocouple.
Note 2: Operation of the thermal time constant (0.7 min/°C): If there is a sudden variation of the temperature of the multimeter, by 10°C for example, the multimeter will reach 99 % of the final temperature at the end of 5 time constants, or 0.7 min/°Cx10°Cx5 cts = 35 min (to which must be added the constant of the external sensor)
Protection: 1 414 Vpk

7.11. Rapid peak

Secondary quantities	Ranges	Additional error	Protection
Peak V t > 500 µs	100 mV to 1 000 V	3 % R + 50 D	1 414 V_{pk}
Peak A t > 500 µs	1 000 µA to 20 A	4 % R + 50 D	

Specifications valid from 20 % of the range in A, 10 % of the range in V
The peak factor is calculated: CF = (Pk+ - Pk-)/2xVrms
Additional error for 250 µs < t < 500 µs: 3 %

7.12. SURV (Min, Max, Avg)

Remark: measurements time-stamped
Accuracy and rate: same as Volt and Ampere measurement specifications

7.13. dBm mode

Display of the measurement in dBm with respect to a resistance reference chosen by the user between 1 Ω and 10 kΩ (default value 600 Ω).

Resolution	0.01 dBm
Absolute error in dBm	0.09 x relative err. V AC expressed in %
Additional calculation error	0.01 dBm
Measurement span	10 mV to 1,000 V
Protection:	1 414 Vpk

7.14. dB mode

Display of the measurement in dB with the value measured when the mode was activated as voltage reference (V ref.).

Resolution	0.01 dB
Absolute error in dB	0.09 x relative err. V AC expressed in %
Additional calculation error	0.01 dB
Measurement span	10 mV to 1 000 V
Protection:	1 414 Vpk

7.15. W ref resistive power

Display of the measurement in relative power with respect to a resistance reference chosen by the user between 1 Ω and 10 kΩ (default value 50 Ω).

The function determined is:	(measured voltage)^2/W Ref (W unit) (measured current)^2 ∗ W Ref (W unit)
Range	DC, AC and AC+DC
Resolution	100 µW
Accuracy	2 x accuracy in V DC/V AC expressed in %
Max. measurement voltage	1 000 V AC+DC
Protection	1 414 Vpk
Unit of display	W

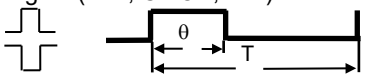
7.16. V x A power

In AC and AC+DC voltage measurement: this calculation is limited to 400 Hz.
The current measurement is always made in AC+DC.
Accuracy (typical)/Accuracy of V measurement + Accuracy of peak A measurement

☝ The link to the COM input must be short and of large diameter, in order to limit the voltage drop that influences the Volt measurement.
Protection: 1 414 Vpk

7.17. Duty cycle

Display of the measurement in % of a logical signal (TTL, CMOS, etc.)



DC+ duty cycle	= θ	
DC- Duty cycle	= T-θ	
Resolution	0.01 %	
Minimum duration for θ	10 µs	
Maximum duration for T	0.8 s	
Minimum duration for T	200 µs (5 kHz)	
Nominal range	5 to 90 % typical	
Sensitivity (10 V range)	> 10 % of the range, Freq < 1 kHz	
> 20 % of the range, Freq	> 1 kHz	
Absolute error on the duty cycle, expressed in % absolute	± [0.1 % + 0.045 % *(RC-50)] Freq < 1 kHz	± [0.5 % + 0.06 % *(RC-50)] Freq > 1 kHz
Additional absolute error (slope at zero crossing)	0.1xC/P C = range in V or in A (for the 1 000 V range, C = 5 000) P = slope in V/s A/s	
Protection	1 414 Vpk	

7.18. Event counting CNT

Depending on frequency counter triggering conditions.

Minimum pulse width	5 µs
Counting up to	99 999
Triggering threshold	10 % of the range except 1 000 V AC range
This threshold is:	positive in ⎍, negative in ⎎

For negative events, cross the leads.

Protection	1 414 Vpk

7.19. Pulse width PW

Depending on frequency counter triggering conditions.

Resolution	10 µs
Minimum pulse width	100 µs
Accuracy	0.1 % R ± 10 µs
Maximum duration of a period	1.25 s (0.8 Hz)
Triggering threshold	20 % of the range except 1 000 V AC range

This threshold is positive in ⎍, negative in ⎎.

Additional error on the measurement due to the slope at the zero crossing:
For negative events, cross the leads.

Protection	1 414 Vpk

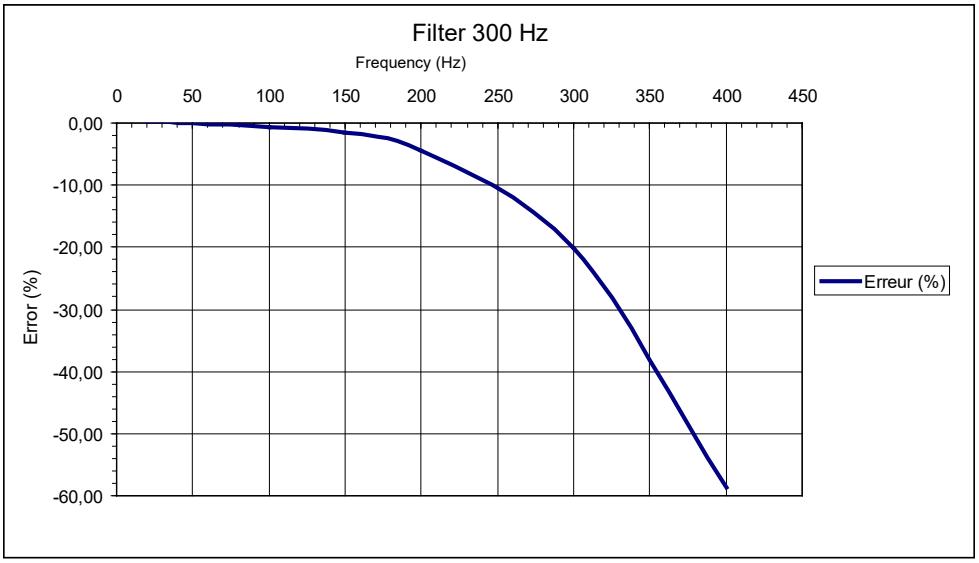
7.20. Time stamp chronometer

Accuracy	approx. 30 s/month (drift of real-time clock)
Resolution	1 s
Display	hour/minute/second Day/month/year

7.21. Variation in the nominal range of use

Quantity of influence **Functions**	**Temperature** (max influence.)	**range** **10 V/m** **500 MHz**	**Humidity**	**voltage** **Primary battery** **4.1 < U < 6.4 V** **Storage battery** **4.1 < U < 5.5 V**
V_{DC}	0.003 % / °C + 3 D / °C	nil		
V_{AC+DC}	0.05 % / °C	nil	influence	no influence
$V_{AC\ LowZ}$	0.05 % / °C	nil	influence	no influence
Hz	0.003 % / °C	nil	nil	no influence
⊣⊢	0.015 % / °C	nil	(objective)	(objective)
Ω **10 M/50 M** **Cap**	0.007 % / °C 0.14 % / °C 0.15 % / °C	nil		
mA_{DC}	0.020 % / °C	nil		
mA_{AC+DC}	0.05 % / °C	nil		
$10\ A_{DC}$	0.05 % / °C	nil		
$10\ A_{AC+DC}$	0.055 % / °C	nil		
Peak fast	0.025 % / °C	nil		
Loader	1.5 D / °C (gamme mV)			

7.22. Response of the filter



8. GENERAL SPECIFICATIONS

8.1. Environmental conditions

Altitude	< 2 000 m
Reference range	23°C ± 5°C
Specified range of use	0°C to 40°C
Influence of temperature	see §. Variation.
Relative humidity	0 % to 80 % from 0°C to 35°C 0 % to 70 % from 35°C to 40°C Limited to 70 % for the 5 and 50 Ω ranges
Storage range	- 20°C to 70°C

8.2. Power supply

- Mains power via USB charger (100-240 V AC/50-60 Hz/0.5 A)
- Primary batteries: 4x1.5 V nominal, LR6 Alkaline (or more if possible)
- Life: ≈ 80 h in V DC
- Storage batteries: 4x1.2 V A-A storage batteries, NI-MH LSD 2 500
- Life: ≈ 80 h in V DC (2 500 mAh).
  ≈ 55 h in V AC+DC (2 500 mAh).
  In order to optimize the life of the storage batteries, the charging of the multimeter with the charger is operational up to < 35°C.
- Average charging time: 6 hours.
  Measurements can be made while the multimeter is charging.

8.3. Display

- 1 colour graphic LCD display unit, 320x240 pts, allowing the display of one main quantity and 3 secondary quantities or a graphic screen
- Dimensions of the display: 70x52 mm useful
- The refresh rate of the display unit is 200 ms.

8.4. Conformity

8.4.1. Safety

According to NF IEC/EN 61010-1:

- Insulation: class 2
- Degree of pollution: 2
- Use: indoor
- Altitude: < 2 000 m
- Measurement category of the "measurement" inputs CAT III, 1 000 V with respect to earth
- Measurement category of the "measurement" inputs CAT IV, 600 V with respect to earth

8.4.2. EMC

This instrument is designed in conformity with the EMC standards in force and its compatibility has been tested in accordance with the following standards:

Emissions and Immunity	NF IEC/EN 61326-1

9. MECHANICAL SPECIFICATIONS

9.1. Housing

• Dimensions	196 x 90 x 47.1 mm
• Mass	570 g
• Materials	ABS V0
• Dust- and water-tightness	IP67, according to NF EN 60529 (Not in operation; if the instrument is immersed, it must be dried, in particular the terminal block, before it can be used again)

10. MAINTENANCE

Except for the fuse and the batteries, the instrument contains no parts that can be replaced by personnel who have not been specially trained and accredited. Any unauthorized repair or replacement of a part by an "equivalent" may gravely impair safety.

10.1. Cleaning

Disconnect the instrument completely and switch it OFF.
Use a soft cloth, dampened with soapy water. Rinse with a damp cloth and dry rapidly with a dry cloth or forced air. Do not use alcohol, solvents, or hydrocarbons.
Make sure that no foreign body interferes with the operation of the snap device of the sensor.

10.2. Replacement of the fuse

For safety reasons the fuse must always be replaced by an identical model:
11 A: 10x38 -1 000 V -F

10.3. Updating of the internal software

With a view to providing, at all times, the best possible service in terms of performance and technical upgrades, Chauvin Arnoux invites you to update the embedded software of the device by downloading the new version, available free of charge on our web site.

Our site:
http://www.chauvin-arnoux.com Embedded software
Under **Support**, click on **ASYC IV embedded software /Loader Asyc IV v.xx.exe**
4 language pairs are available: English/French, English/Spanish, English/German, and English/Italian.

Connect the device to your PC using the USB cord provided.

The update of the embedded software depends on its compatibility with the hardware version of the instrument. This version is indicated in SET-UP (see §5).

Attention: updating the embedded software resets the configuration and causes the loss of the stored data. As a precaution, save the stored data to a PC before updating the embedded software.

11. WARRANTY

Except as otherwise stated, our warranty is valid for **36 months** starting from the date on which the equipment was sold. Extract from our General Conditions of Sale provided on request.

The warranty does not apply in the following cases:

- Inappropriate use of the equipment or use with incompatible equipment;
- Modifications made to the equipment without the explicit permission of the manufacturer's technical staff;
- Work done on the device by a person not approved by the manufacturer;
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user's manual;

Damage caused by shocks, falls, or floods.

12. APPENDIX

12.1. Default configuration

In **User** mode, the device restarts in the user's personal configuration (General and Measurement menus) and the function selected when switched off, but coupling in Volt function (AC+DC).
In **Basic** mode, the default, the multimeter starts up in its elementary configuration (default values) and in the Volt function (AC+DC).

General	Language:	EN/language	Beep:	yes
	Sleep:	yes		
	Lighting:	ECO	Communication:	IR
	IR baud:	38 400	Configuration:	basic
	Energy:	Ni-MH		
	Storage battery capacity:	2 500 mAh		
	Communication protocol:	MODBUS		
Measurement	Filter:	NO	Impedance:	10/20 M
	dBm REF:	600 Ω	W REF:	50 Ω
Func. CLAMP,	Function:	V	Unit:	A
	Ratio:	1 A/AV		
Func. MATH	Function:	V	Unit:	none
	Coef. A:	1	Coef. B:	0
Func. MEM	Recording interval: 1s			
	Nb. of records 5292: 10 000		Nb. Of records. 5293: 30 000	
Main functions	V, A:	AUTO, AC+DC	Hz:	10 V range
	Ω, Capacity:	AUTO	°C:	°C, Pt 100

* FR, DE, IT, ES depending on the embedded software loaded and the user's selection.

Restart configuration assumes no leads connected. If they are connected, they will be taken into account in the selection of the function

12.2. Instructions before recharging the storage batteries

Before recharging, check that the device is equipped with all 4 storage batteries.
It is not necessary to withdraw them to recharge them. If "Ni-MH" is selected in the Type of Energy menu (see paragraph), then charging is enabled.
An attempt to charge with primary batteries in the device may damage the device.
For safety reasons, the charging of the storage batteries is enabled only between: 0°C and 35°C.
Note: an elevation of the internal temperature by a current measurement may possibly trip the thermal safety.
In order to keep the storage batteries in good condition, use the multimeter until the min. level is reached before recharging.
Then connect the plug of the power supply unit (USB) to the specific jack.
Connect the power supply unit (USB) to mains.
The symbol opposite on the display unit is used to monitor the course of the charging with a % of charge:
- battery charged → green symbol and 100 %
- battery discharged → orange symbol, indicating charging recommended
- battery level at limit → red symbol and xx %
- battery level too low → blinking red symbol and % together with audible beep

The storage batteries are fully charged when the symbol is stabilized with 4 segments (each fixed plateau is acquired), after approximately 6 h.
The multimeters are delivered with 2 500 mAh Ni-MH storage batteries.
These used storage batteries must be turned over to a recycling company or a company processing hazardous materials.
Never throw these storage batteries away with other solid waste.
For more information, contact your Manumesure agency.
Once the storage batteries are fully charged, the device stops automatically.
When the multimeter is delivered, it may happen that the storage batteries are discharged and require full recharging.

12.3. Table of secondary measurements

Display unit 1: mean measurement						Secondary display unit 1		Secondary display unit 2		Secondary display unit 3	
V AC V AC+DC	V DC	A AC A AC+DC	A DC	Hz	Ω	function	unit	function	unit	function	unit
X		X				FREQ	Hz	PER	S	MATH funct.	
X						FREQ	Hz	dB	dB	MATH funct.	
X						dBm	dBm	REF(dBm)	Ω	MATH funct.	
X		X				Pk+	V-A	Pk-	V -A	CF	
X	X	X	X			W	W	REF(Ω)	Ω	MATH funct.	
				X		PER	S	DC+	%	MATH funct.	
				X		PER	S	DC-	%	MATH funct.	
				X		PW+	S	CNT+		MATH funct.	
				X		PW-	S	CNT-		MATH funct.	
X	X	X	X	X	X	MATH funct.					
X	X					VxA	VA	A	A	MATH funct.	

MATH = y = Ax + B
FREQ = frequency measurement
PER = measurement of the period
dB = measurement of decibel of voltage in dB
dBm = measurement of decibel of power in dBm with REF = dBm REF
Pk+ = measurement of positive peaks
Pk- = measurement of negative peaks
CF = measurement of the peak factor
w = calculation of the resistive power with REF = W REF
VxA = calculation of the power limited to 400 Hz
DCY+ = measurement of positive duty cycle
DCY- = measurement of negative duty cycle
W+ = measurements of positive pulse widths or durations
PW- = measurements of negative pulse widths or durations
CNT+ = counting of positive pulses
CNT- = counting of negative pulses

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