EN - User's manual

ASYC IV

MTX 3290 - 6 000 cts
MTX 3291 - 60 000 cts

Portable multimeters with digital display

Measure up

Thank you for purchasing a **Portable multimeter with a digital display**.
For best results from your instrument:

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

	Display	Power supply	Counts	Communication
MTX 3290	digital, monochrome (70 x 52)	4 R6 primary batteries (AA format) or 4 re-chargeable batteries	6 000	-
MTX 3291	digital, monochrome backlit (70 x 52)		60 000	IR / USB


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


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


Useful information or tip.


Equipment protected by double insulation.


Earth.


The CE marking indicates compliance with the European Low Voltage Directive (2014/35/EU), Electromagnetic Compatibility Directive (2014/30/EU), and Restriction of Hazardous Substances Directive (RoHS, 2011/65/EU and 2015/863/EU).


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 2012/19/EU. This equipment must not be treated as household waste.

Definitions of the measurement categories

- Measurement category IV corresponds to measurements taken at the source of low-voltage installations.
  Example: power feeders, meters and protection devices.
- Measurement category III corresponds to measurements on building installations.
  Example: distribution panel, circuit-breakers, machines or fixed industrial devices.
- 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.

PRECAUTIONS FOR USE

- This instrument is been designed to be used as follows:
  - indoors
  - in an environment of pollution degree 2
  - at an altitude of less than 2 000 m
  - at a temperature between -10°C and 55°C
  - at a relative humidity below 80 % up to 31°C
- The safety of any system incorporating the instrument is the responsibility of the system integrator.
- Can be used for measurements on circuits:
  - **MTX 3290**: 600 V, CAT III and 300 V, CAT IV
  - **MTX 3291**: 1 000 V, CAT III and 600 V, CAT IV

  However, some accessories may lead to the use of this instrument on circuits of a lower voltage and category.
- Comply with the environmental and storage conditions.
- Check the integrity of the guards and insulation of the accessories. Any item of which the insulation is deteriorated (even partially) must be removed from service and scrapped. A change of colour of the insulation is a sign of deterioration.
- Read closely all notes preceded by the ⚠ symbol.
- As a safety measure, use only the appropriate leads and accessories supplied with the instrument or approved by the manufacturer.

CONTENTS

1. GENERAL DIRECTIONS

1.1. SAFETY FEATURE

- It is impossible to open the battery or fuse compartment without first disconnecting the measurement lead.
- During a measurement exceeding 60 VDC or 25 VAC, the  symbol blinks on the display unit.
- Automatic detection of a connection to the "Ampere" terminal (for both voltage and current measurements).
- When the maximum permanent voltage or current that can be measured is exceeded, an intermittent audible signal warms of the risk of an electric shock.

1.2. FEATURES PROTECTING THE MEASUREMENT INPUTS

These multimeters have several features to protect them:

- Varistor protection that clips transient voltage surges on the measurement terminals.
- PTC (Positive Temperature Coefficient) protection against permanent over-voltages less than or equal to 1000 V during resistance, capacitance, and diode test measurements.
  This protection is reset automatically after the overload.
- A fuse that provides protection during current measurements.
  - **MTX 3290**: 10 A
  - **MTX 3291**: 11 A

1.3. SPECIAL FUNCTIONS

1.3.1. AUTOMATIC 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 by the command keypad is incompatible with the connection of the lead, it triggers an audible or visual (LEADS) alert.
The current measurement is made with automatic peak range full-scale. During a current measurement, an audible alert is triggered in the event of a prolonged absence of current.

1.3.2. AUTOMATIC SWITCHING OFF

If the function is validated (**P**), the device is automatically switched off after 30 min of operation if there has been no action on the front panel during this time.

Automatic switching off is disabled:
- **in the MAX, MIN, AVG, PEAK Surveillance mode**
- **in the Communication mode**
- **if there is a voltage > 60 VDC or 25 VAC on the terminals of the multimeter.**

1.3.3. WARNING SIGNALS

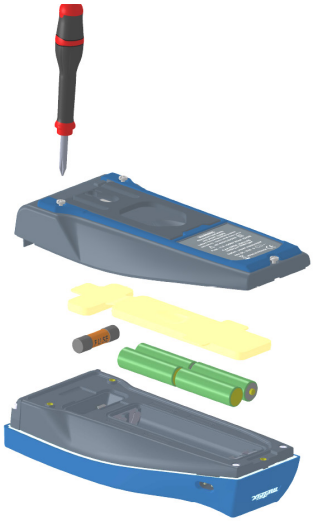
An intermittent audible signal is emitted in all "Voltage" and "Current" settings if the max. permanent value the device can measure is exceeded. It is accompanied by display of the "**O.L.**" acronym and of the symbol  on the display unit.

 This symbol is activated when the voltage on the "**V**" input exceeds 60 VDC or 25 VAC in the "**Voltage**" setting or when the current injected between the **A** and **COM** terminals exceeds 10 A.

1.4. MAINTENANCE

- Disconnect everything connected to the instrument and press the ON/OFF key ().
- Use a soft cloth, moistened with soapy water.
- Rinse with a damp cloth and dry rapidly with a dry cloth or forced air.
- Make sure that no foreign objects interfere with the operation of the device bi which the leads are snapped into place.

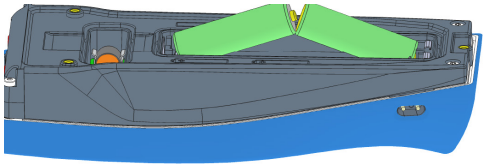
1.5. REPLACING THE FUSE



- Before replacing the fuse (reached by opening the bottom compartment), disconnect the instrument from any source of current. During the replacement, make sure that only a fuse of the appropriate rating and specified type is used. Using another type of fuse and shorting the fuse holder are strictly forbidden.
- Checking the current fuse:
  Fuse: SIBA / 5019906
  - **MTX 3291**: 11 A: 10 x 38 - 1,000 V - F
    breaking capacity: > 20 kA
  - **MTX 3290**: 10 A: 6 x 32 - 600 V - F
    breaking capacity: > 50 kA

1.6. RECHARGEABLE AND PRIMARY BATTERIES

The multimeter is powered by primary or rechargeable batteries (see above).



To charge the rechargeable batteries (set of 4 NI-MH LSD batteries), use an external rapid charger, available as an accessory.

After replacing the batteries, wait 10 s before switching the instrument back on.

1.7. ACTIVE COMMUNICATION INTERFACE (MTX 3291 ONLY)

The multimeter can communicate with a PC via the USB link.

The basic version includes a USB link using an isolated optical USB cord (type HX0056Z) and SX-DMM software, plus Labview and Labwindows drivers to program the devices.

MTX 3291: They can also be programmed via the SCPI protocol:
- to program via Labview / LW
- to recover data or program the instrument using the software
- to calibrate the MTX 3291

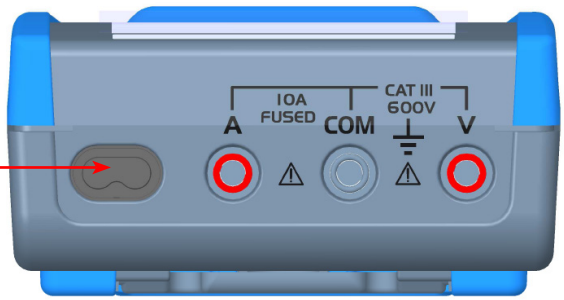
2. DESCRIPTION OF THE INSTRUMENTS

2.1. MTX 3290

2.1.1. FRONT PANEL - BACK

2.1.2. PROP

2.1.3. TERMINAL BLOCK



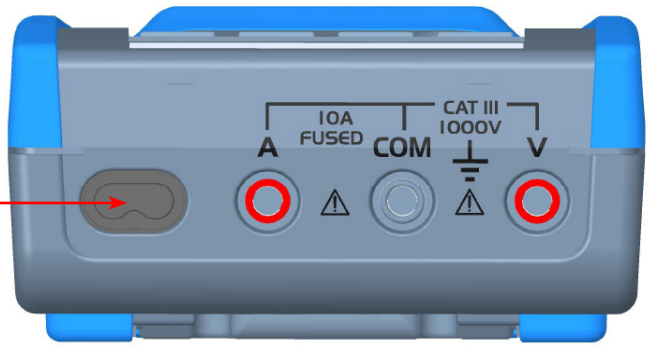
Optical connector: not active!

2.2. MTX 3291

2.2.1. FRONT PANEL - BACK

2.2.2. PROP

2.2.3. TERMINAL BLOCK

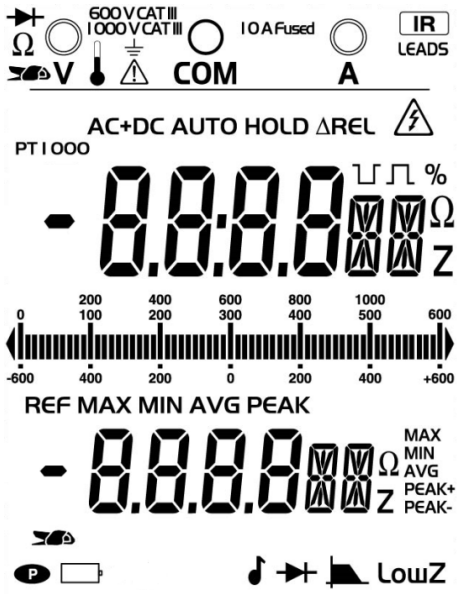


Optical connector: active!

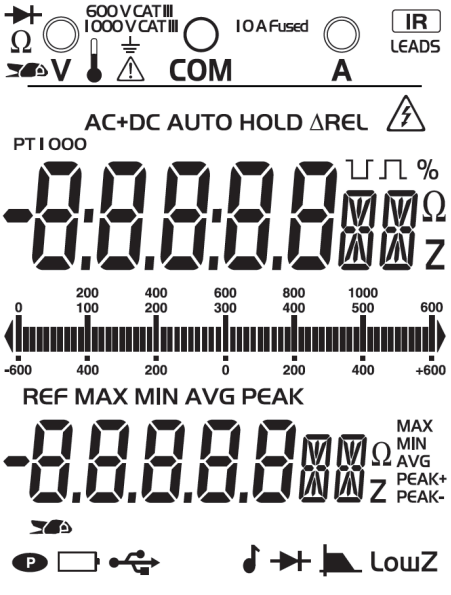
2.3. DISPLAY UNIT

The display is in two parts:

- A digital display for convenient reading of the digits:
  - main display unit: 12.7 mm
  - secondary display unit: 9.7 mm
- The "bargraph" display (61 segments) with scale (indication of the measurement range) for an analog reading.



MTX 3290
double 6,000 cts display



MTX 3291
double 60,000 cts display

2.3.1. QUANTITIES MEASURED

- VLowZ — AC voltage measurement at low impedance (VLowZ)
- VAC — AC voltage measurement
- VAC/DC — DC or AC+DC voltage measurement at high impedance (V)
- A — Current measurement A
- Hz — Frequency measurement
- Ω — Resistance measurement
- µF — Capacitance measurement
- T° — Temperature measurement
- ms — Measurement of the period
- % — Measurement of relative value

2.3.2. UNITS

- V — Volt
- A — Ampere
- Hz — Hertz
- Ω — Ohm
- F — Farad
- °F — Degree Fahrenheit
- °C — Degree Celsius
- ms — millisecond
- k — kilo (kΩ - kHz)
- M — Mega (MΩ - MHz)
- n — Nano (nF)
- µ — micro (µV - µA - µF - µS)
- m — milli (mV - mA - mF - ms)
- % — Percentage

Symbols	Designations
AC	Measurement of the AC signal
DC	Measurement of the DC signal
AC+DC	Measurement of the AC and DC signal
AUTO	Automatic range switching
Δ REL	Values relative to a reference
REF	Reference value
HOLD	Storage and display of stored values
MAX MIN AVG	Value (surveillance)
MAX	Maximum value
MIN	Minimum value
AVG	Mean value
PEAK	Peak value
PEAK+	Maximum peak value
PEAK-	Minimum peak value
.run r.un ru.n	Capacitance meter, acquisition in progress
-----	Frequency measurement impossible
O.L	Overshoot of the measurement capacities
USER	USER mode (on main display unit)
BASIC	BASIC mode (on main display unit)
Z	Hertz symbol (main display unit)
Z	Hertz symbol (secondary display unit)
Ω	Ohm (main display unit)
Ω	Ohm (secondary display unit)
%	Percentage
	Positive pulse
	Negative pulse
PT 100	Symbol for temperature measurement using a PT 100 probe
PT 1000	Symbol for temperature measurement using a PT 1000 probe
	Symbol for measurement using a current clamp
LEADS	Function selected incompatible with the connection of the lead
LowZ	Low-impedance voltage measurement
	Symbol of the audible continuity measurement
	Symbol of the measurement and testing of a semiconductor junction
	Warning, possibility of electric shock (*)
	USB communication (**MTX 3291**)
	300 Hz filter
	Auto power OFF deactivated (permanent mode)

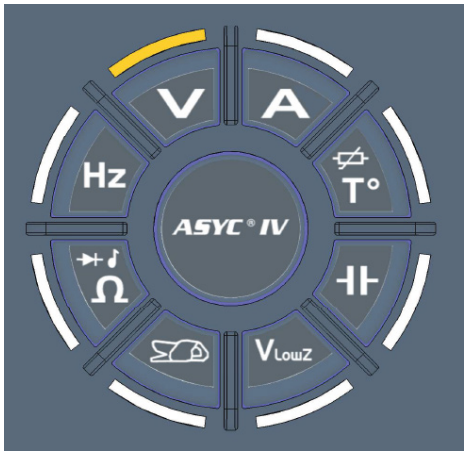
	This symbol indicates the battery change level.
	Volt, Ohm, Temperature, etc. measurement input
	COM measurement input
	Ampere measurement input
600 V CAT III	Input indication
1000 V CAT III	Input indication
	Isolated optical link (USB) input
	Display of unit on the main display unit (2 x 14 segments)
	Display of unit on the secondary display unit (2 x 14 segments)
	Identifies the reminder of the display zone connection

(*) When voltages exceeding 60 VDC or 25 VAC are measured, the symbol flashes on the display unit.

2.4. SWITCH

Orange LEDs around the highly reliable virtual switch indicate the measurement function chosen. The keys of the switch have priority over the action of the keys of the keypad. The change from one function to another resets the configuration of the measurement mode

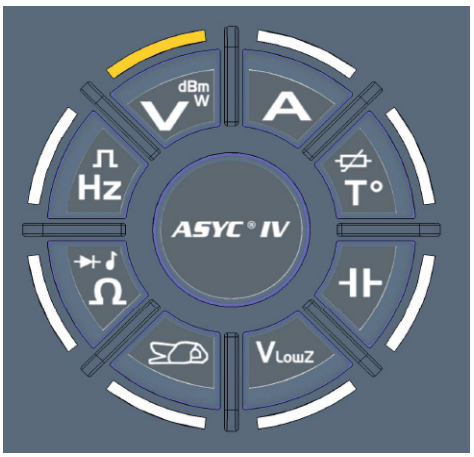
2.4.1. MTX 3290



2.4.2. KEYS OF THE SWITCH

	Short press	Successive short presses
A	Current measurement	
T°	Temperature measurement	Selection of the type of probe: Pt 100, Pt 1000
⊣⊢	Capacitance measurement	
VLowZ	Low-impedance AC voltage measurement (VLowZ)	
	Current measurement using a current clamp	Selection of the transformation ratios 1, 10, 100, 1 000 mV/A
Ω	Resistance measurement, audible continuity measurement, diode test	Selection of the continuity, diode functions
Hz	Frequency measurement	
V	Voltage measurement	

2.4.3. MTX 3291



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VLowZ	Low-impedance AC voltage measurement (VLowZ)	
	Current measurement using a current clamp	Selection of the transformation ratios 1, 10, 100, 1 000 mV/A
Ω	Resistance measurement, audible continuity measurement, diode test	Selection of the continuity, diode functions
Hz	Frequency measurement	Selection of the functions: - Positive duty cycle - Negative duty cycle - Positive pulse width - Negative pulse width
dBm W V	Voltage measurement	Selection of the functions: dBm, W

2.5. 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.

Two types of action are possible:

- Short press → press lasting < 2 seconds, validated by a beep as soon as the key press is detected
- Long press → press lasting > 2 seconds, validated by a beep as soon as the key press is detected.

MTX 3290

MTX 3291

2.5.1. FUNCTION KEYS

	Successive short presses	Long press
Hold	Activation / Deactivation of the storage of the measurements and of the quantities at a given time: - Hold of the display without stopping the acquisitions. The bargraph continues to operate normally. - Exit from the HOLD mode In the MAX/MIN/AVG PEAK mode, when the HOLD is activate, the blinking of the "MAX MIN AVG PEAK" symbol indicates that acquisition continues as a background.	- Hold of the display after stabilization of the measurement (Auto HOLD) - Exit from the Auto HOLD mode
MODE AC/DC	Choice of coupling **AC, DC, AC+DC**: - Access to various parameters → In dBm: change of impedance 50 Ω, 75 Ω, 90 Ω, 600 Ω (**MTX 3291 only**) → In temperature: the main display unit indicates the temperature in °C, the other in °F → In the ΔREL mode, the key is used to change from (present value - reference value) to $\frac{\text{Present value - reference value}}{\text{Reference value}} \times 100$ The value is displayed in % (**MTX 3291 only**)	Activation / Deactivation of the Auto Power OFF (APO) (**MTX 3291 only**)
	Activation / Deactivation of the low-pass filter ≈ 300 Hz : The low-pass filter (4th order) makes it possible to measure the RMS voltage delivered by an MLI type speed controller (for asynchronous motor).	Activation / Deactivation of the key-press beep
Range	Manual selection of measurement range: The range defines the maximum measurement range the instrument can cover. **The Auto Range mode is default.**	Used to return to Auto Range mode.
(*) Peak ±	Activation of the **Peak+ Peak-** measurements: - **Peak+**: displays the maximum instantaneous peak value of the measurement. - **Peak-**: displays the minimum instantaneous peak value of the measurement. - 1st press: recording of Peak+, Peak- (on the 2nd display unit). The Peak+ value is displayed as default. - Subsequent presses: look-up of stored values (volatile).	Exit from the **Peak** mode
(*) MAX/MIN AVG	Activation of **MAX, MIN, AVG** measurements: - **MAX** and **MIN**: inform the highest and lowest values of the effective measurement. - **AVG**: displays the mean value of the signal since the key press Time-stamped value for the min and the max [temporary display (4 s) on the main display unit, followed by return to present value] If the time (h:min:sec) exceeds (9:59:59) is displayed ---- (**MTX 3291 only**) - 1st press: recording of the MAX, MIN, AVG (on the 2nd display unit). The max. value is displayed by default. - Subsequent presses: look-up of the stored values (volatile).	Exit from the **MAX, MIN, AVG** mode

(*) ΔRel	Activation of the relative display mode: - Display and storage of the reference and differential values in the unit of the quantity measured. - 1st press: activates the relative mode ΔREL (present value - reference value) and stores the measured value that will be used as reference. - "REF" indicates the storage of the reference. - Subsequent presses: toggles the display between the measured value and the relative measurement ΔREL.	Exit from the **ΔREL** mode
☀	Activation of the Backlight: - successive presses to increase the brightness - circular operation: brightness 1 → brightness 2 → brightness 3 → brightness 1	Deactivation of the Backlight
0	Activation / Deactivation of the zero centre bargraph : (**MTX 3290 only**)	
P	Activation / Deactivation of Auto Power OFF : (**MTX 3290 only**)	

- The 0 centre bargraph is managed automatically in IDC and VDC (**MTX 3291 only**).

When the multimeter is switched on:

- 1st press on Hold (sustained press) + press on ON/OFF → display of all segments of the display unit.
- 2nd press → display of model and version (US / Europe)
- 3rd press → software version (display unit 1) and keyboard and display unit board versions (display unit 2)
- 4th press → normal operation. An audible beep acknowledges key presses.

USER / BASIC mode: during power up, the device is in BASIC mode (default configuration Volt AC+DC).

- If, when you power up your multimeter, you want to activate the USER mode to recover the configuration when the multimeter was switched off, press the Range key, hold it down, the press ON/OFF .

- After an automatic power down, the device restarts in USER mode.

The main display unit indicates, for 3 s, the change to USER or BASIC mode.

In the Volt and Ampere functions, the multimeter starts up in AC+DC, as in the USER mode.

2.6. CONNECTION

2.6.1. IN VOLT AND OTHER FUNCTIONS

2.6.2. IN AMPERE

3. GETTING STARTED

3.1. PREPARATION FOR USE

3.1.1. INSTRUCTIONS BEFORE STARTING UP

When you use this multimeter, you must observe the usual safety rules, which:
- protect you from electrical hazards,
- protect the multimeter from operator errors.

For your safety, use only the leads and accessories (clamp meter, etc.) supplied with the instrument. Before each use, make sure that key are in perfect condition.

3.1.2. POWER SUPPLY

The devices operate with:
- 4 1.5 V alkaline batteries (LR6-AM3-AA) or
- 4 1.2 V NI-MH rechargeable batteries of the same type.

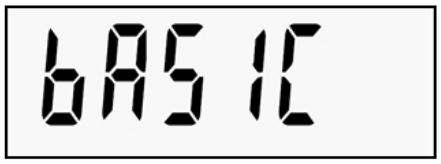
The rechargeable batteries cannot be recharged in the multimeter.

3.1.3. POWERING UP, DOWN

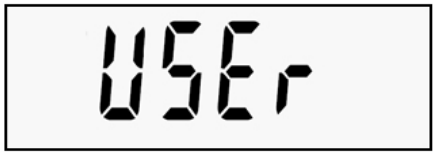
Press ON/OFF to power up the device.

Reminder: after replacing the batteries, wait 10 s before powering the device back up.
If the multimeter malfunctions, a long press (> 2 s) on this key can be applied to power down the instrument and then restore normal operation.

3.1.4. POWER-UP CONFIGURATION



In the BASIC mode, as default, the device starts up in its elementary configuration (default values) and in the VAC+DC function.



MTX 3291 only: in the USER mode, the device restarts in the configuration and function selected when it was powered down.

In the Volt and Ampere functions, the instrument restarts in AC+DC.

3.1.5. AUTOMATIC POWER DOWN

The multimeter automatically switches itself off after 30 minutes if there has been no action on the front panel of the multimeter. Auto power off is disabled:
- in the **MAX**, **MIN**, **AVG**, **PEAK** mode and in communication
- when the measured quantity (voltage, current) on the input exceeds the danger thresholds, for the user's safety.

4. FUNCTIONAL DESCRIPTION

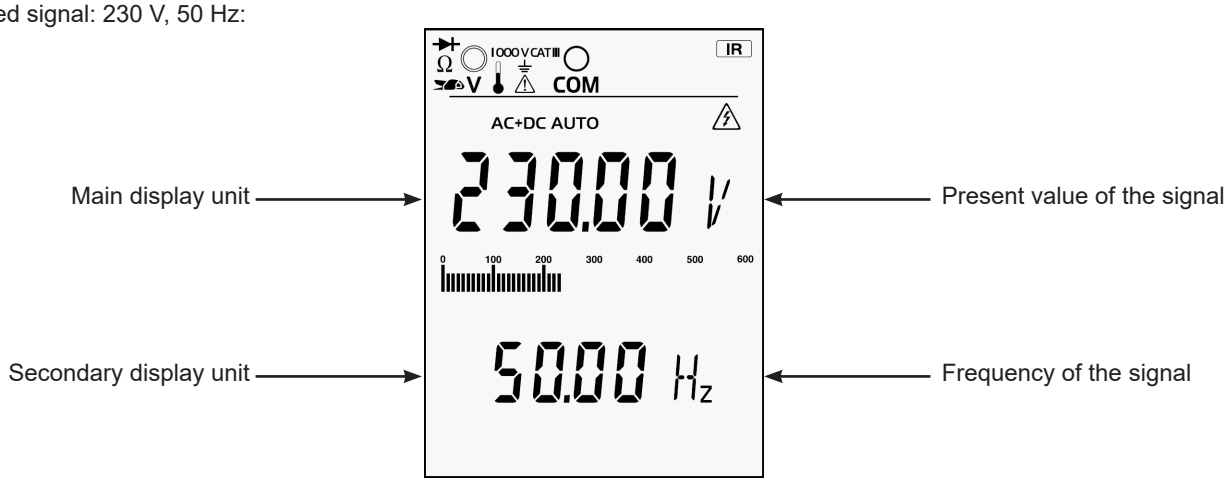
The examples described in this chapter use an MTX 3291 multimeter (60,000 counts).

4.1. MAX MIN AVG MODE

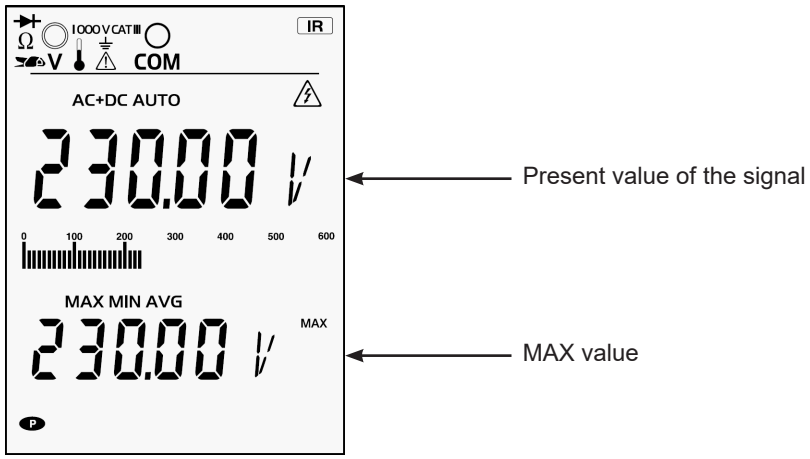
A beep indicates an overshoot or a change of quantity.

Displays in the VAC+DC function

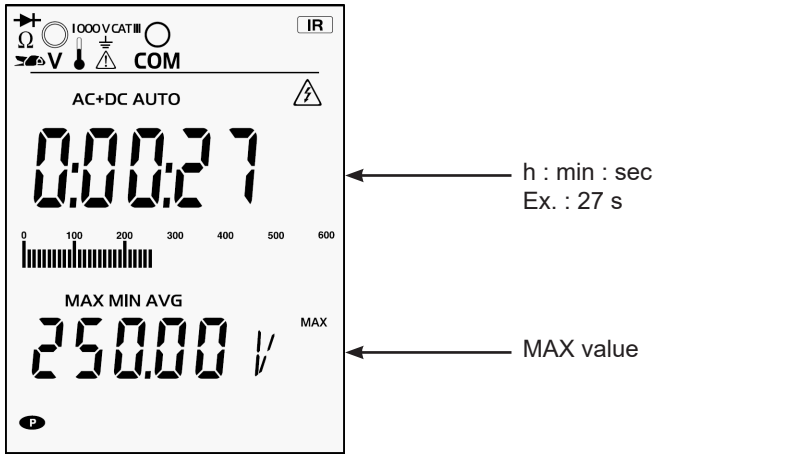
Measured signal: 230 V, 50 Hz:



For the MAX value : 1st press on MAX/MIN AVG :

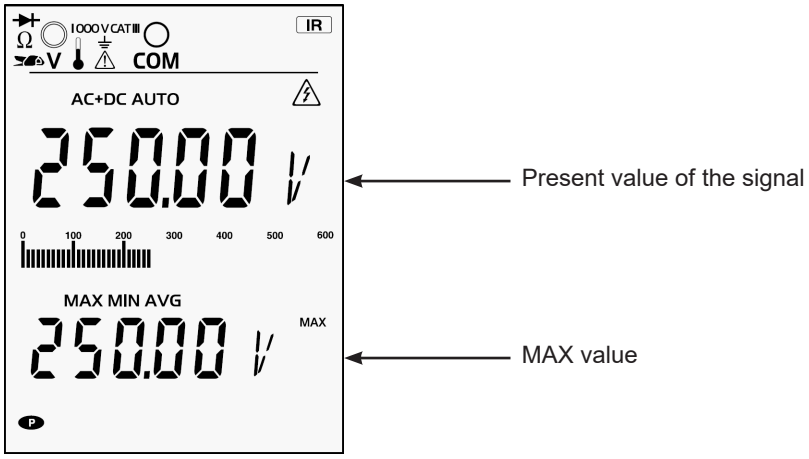


The measured signal changes to 250 V, 50 Hz:

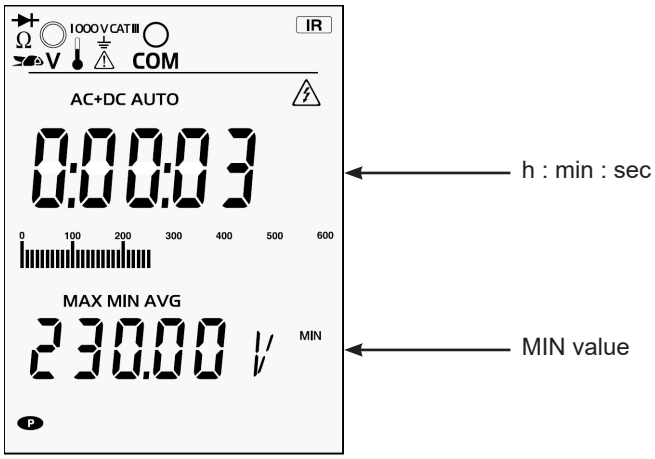


Momentary screen (4 s) indicating the time-stamped max. value, if the value changes or if the value is looked up.

The display then becomes:

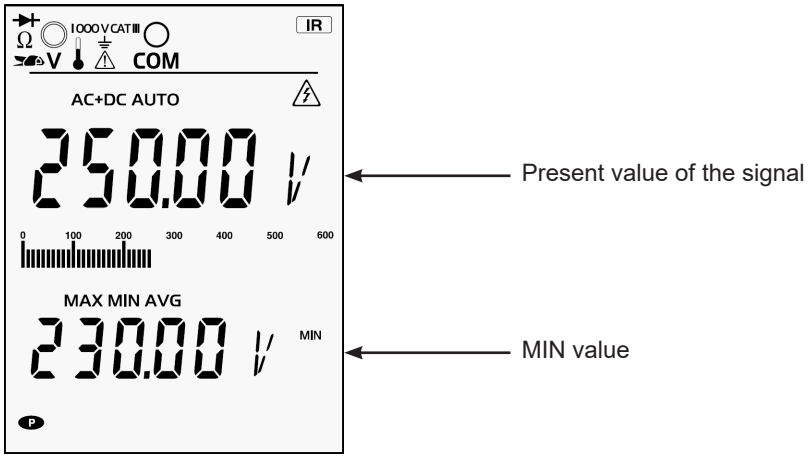


For the MIN value: 2nd press MAX/MIN AVG :
Ex. : 3 s

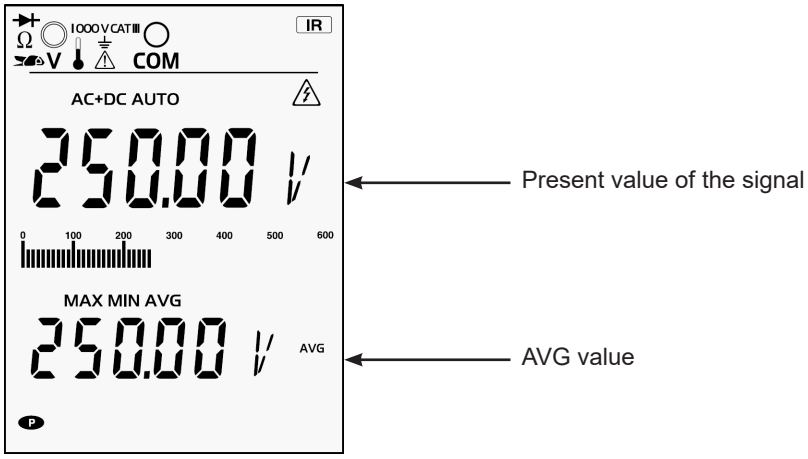


Momentary screen (4 s) indicating the time-tamped max. value, if the value changes or if the value is looked up.

The display then becomes:



For the AVG value: 3rd press on MAX/MIN AVG:



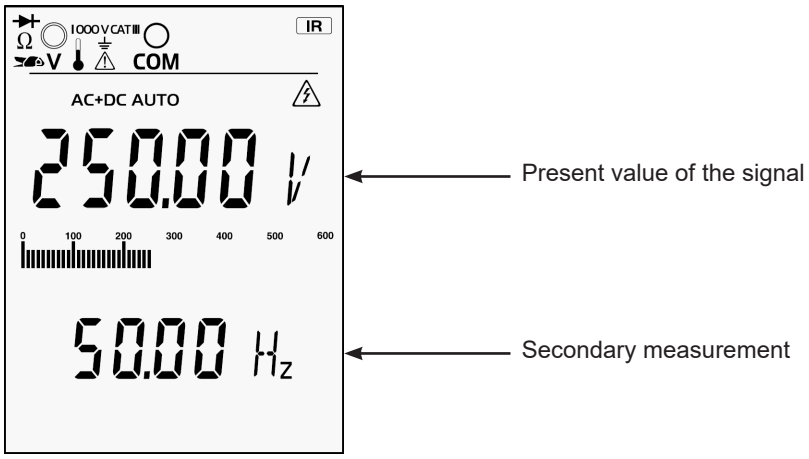
Deactivation: By a long press on the key.

4.2. PEAK MODE

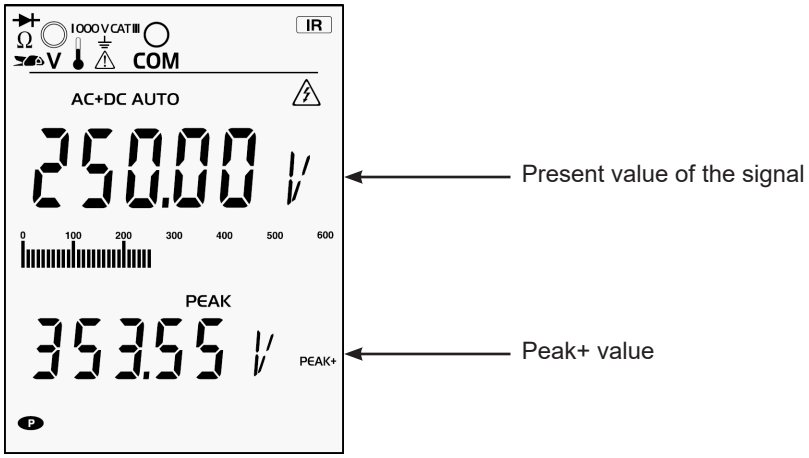
A beep indicates an overshoot or a change of quantity.

Displays in the VAC+DC function

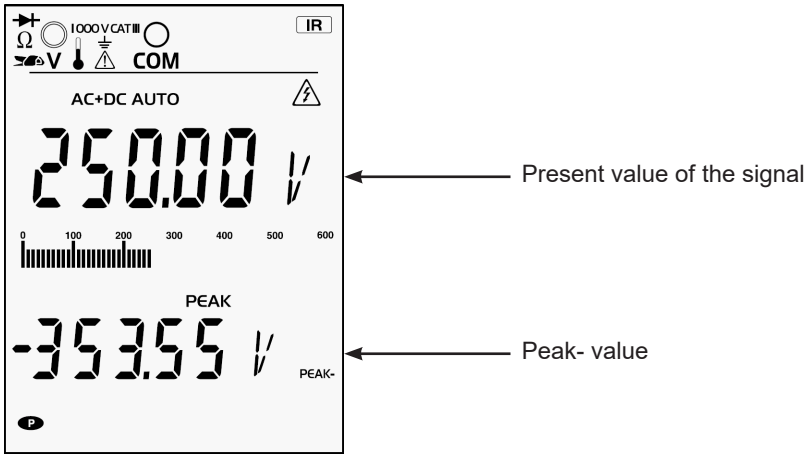
Measured signal: 250 V, 50 Hz



For the Peak+ value: 1st press on Peak ± :



For the Peak- value: 2nd press on Peak ± :

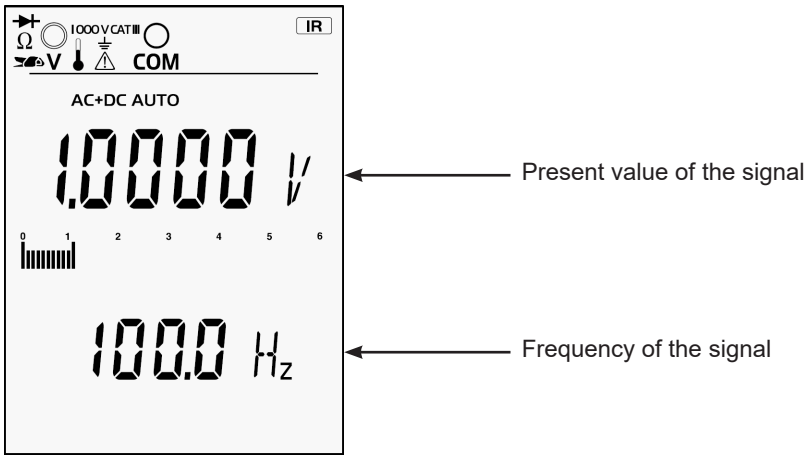


Deactivation: By a long press on the key.

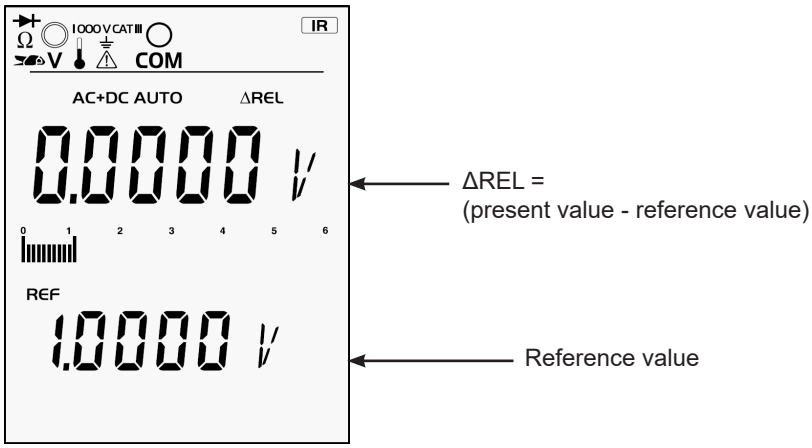
4.3. ΔREL MODE

Displays in the VAC+DC function

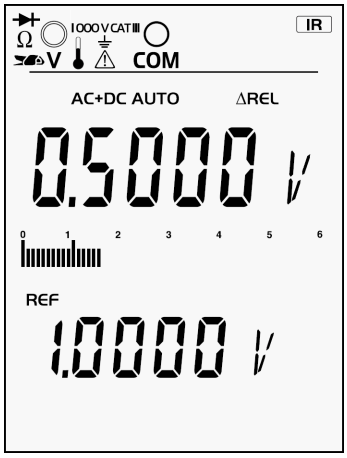
Measured signal: 1 V, 100 Hz



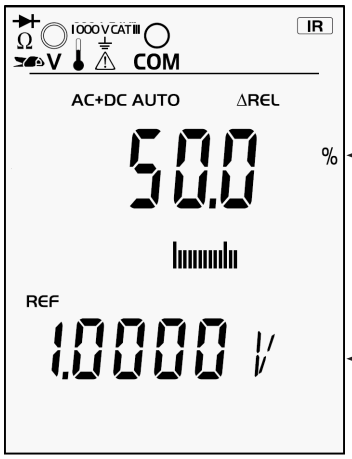
Activation of the ΔREL mode by: Short press on the ΔREl key:



The measured signal changes to 1.5 V: (ΔREL = 1.5 V - 1 V = 0.5 V)

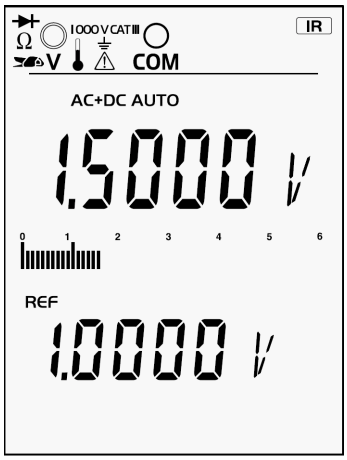


Short press in the ΔREL mode, on MODE AC/DC:



present value - reference value
ΔREL (%) = ---------- x 100
reference value

Reference value

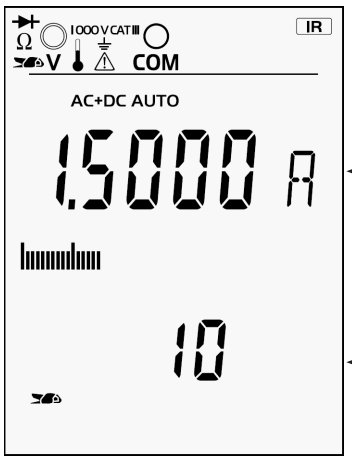


A long press on the ΔRel key erases the reference value.

Deactivation: By a long press on the key.

4.4. "CLAMP" FUNCTION

Ex.: 10 mV/A



Present value of the signal

Transformation ratio, selected by successive presses on :

- press 1 : 1 mV/A
- press 2 : 10 mV/A
- press 3 : 100 mV/A
- press 4 : 1 000 mV/A

4.5. SERIAL OPERATION OF THE KEYS OF THE SWITCH

MTX 3290

	Press 1	Press 2	Press 3	Press 4	Press 5	Short press
V	V	V	V	V	V	... ↻
A	I	I	I	I	I	... ↻
T°	Pt100	Pt1000	Pt100	Pt1000	Pt100	... ↻
⊣⊢	Capa	Capa	Capa	Capa	Capa	... ↻
VLowZ	VLowZ	VLowZ	VLowZ	VLowZ	VLowZ	... ↻
	R = 1	R = 10	R = 100	R = 1000	R = 1	... ↻
Ω	Ω	Continuity	Diode	Ω	Continuity	... ↻
Hz	Frequency	Frequency	Frequency	Frequency	Frequency	... ↻

MTX 3291

	Press 1	Press 2	Press 3	Press 4	Press 5	Press 6	Short press
dBm W V	V	dBm	W	V	dBm	W	... ↻
A	I	I	I	I	I	I	... ↻
T°	Pt100	Pt1000	Pt100	Pt1000	Pt100	Pt1000	... ↻
⊣⊢	Capa	Capa	Capa	Capa	Capa	Capa	... ↻
VLowZ	VLowZ	VLowZ	VLowZ	VLowZ	VLowZ	VLowZ	... ↻
	R = 1	R = 10	R = 100	R = 1000	R = 1	R = 10	... ↻
Ω	Ω	Continuity	Diode	Ω	Continuity	Diode	... ↻
Hz	Frequency	- Pos. duty cycle	- Neg. duty cycle	- Width of pos. pulse	- Width of neg. pulse	Frequency	... ↻

4.6. FUNCTIONS OF THE SWITCH AND KEYS

To access the 

, **dBm**, **W**, **continuity**, **diode**, **duty cycle, and pulse duration** functions, press the button of the switch corresponding to the chosen function.

Here are the possible combinations according to the type of measurement:

Type of measurement	MAX/MIN/ AVG	PEAK±	ΔREL		RANGE		HOLD	
					Auto.	Manu.		
Voltage VLowZ Voltage VAC Voltage VAC+DC Current AAC, AAC+DC	✓	✓	✓	**in ΔREL only**	✓	✓	✓	✓
Voltage VDC Current ADC	✓	-	✓	✓	✓	✓	✓	-
Voltage 60 mVDC	✓	-	✓	✓	-	✓	✓	-
Voltage 60 mVAC Voltage 60 mVAC+DC	✓	✓	✓	**in ΔREL only**	-	✓	✓	✓
Temperature	✓	-	✓	-	✓	✓	✓	-
Ohmmeter	✓	-	✓	**in ΔREL only**	✓	✓	✓	-
Capacitance	✓	-	✓		✓	✓	✓	-
Frequency	✓	-	✓		✓	-	✓	✓
Period (1/F)	✓	-	✓	-	✓	-	✓	✓
Continuity	-	-	-	-	✓	-	-	-
Diode	-	-	-	-	✓	-	✓	-
dBm	-	-	-	-	✓	-	✓	-
W	-	-	-	-	✓	-	✓	-
Duty cycle (DC+, DC-)	-	-	-	-	✓	-	✓	-
Pulse duration (Pw+, Pw-)	-	-	-	-	✓	-	✓	-

5. HOW ARE THE VARIOUS QUANTITIES MEASURED?

The connections illustrated in this chapter were made with an MTX 3290 multimeter (6,000 counts). They would be the same with an MTX 3291 (60,000 counts).

5.1. VOLTAGE MEASUREMENT

V : AC voltage measurement, or measurement of an AC voltage superposed on a DC voltage, or DC voltage measurement at high impedance.

VLowZ : This position is provided to allow measurements in electrical installations. The input impedance < 1 MΩ serves to avoid measuring "phantom" voltages due to couplings between the lines.

In all cases, "**O.L**" is displayed above 1050 V (**MTX 3291**) or 620 V (**MTX 3290**) and a beep sounds when the measurement exceeds 1 000 V (**MTX 3291**) or 600 V (**MTX 3290**).

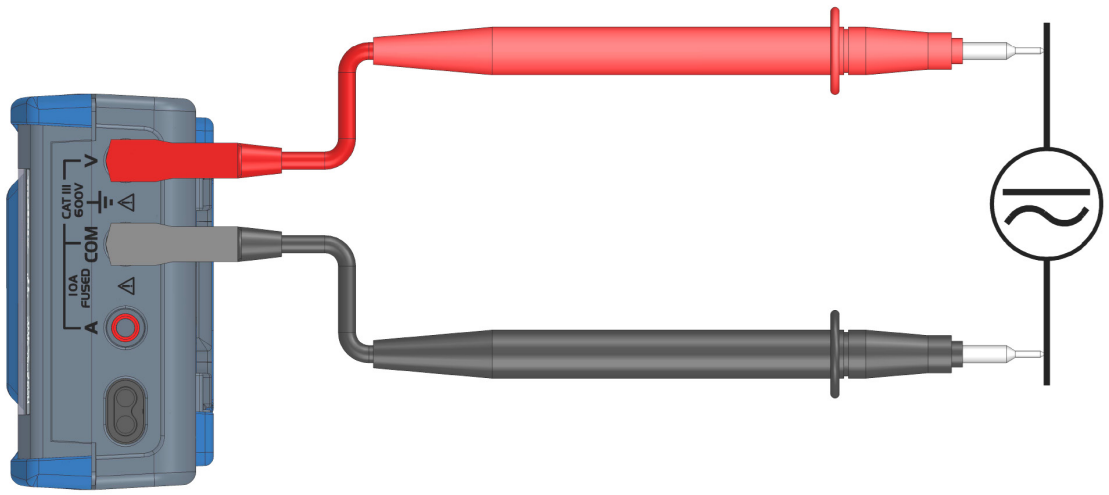
1. Press: VLowZ or V .

2. Select AC+DC, AC or DC coupling of the signal by pressing MODE AC/DC (the default coupling AC+DC). Depending on what you select, the screen displays DC, AC or AC+DC.

3. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

If the connection is not correct, an audible beep and a visible signal (LEADS) are activated.

4. Place the test probes on the terminals of the circuit to be measured:



5. Read the measurement value indicated on the display unit.

6. As default, the 2nd display unit indicates the frequency, except in DC.

It is possible to activate the filter in VLowZ, VAC+DC, VAC. The frequency of the filter is ≤ 300 Hz. When a voltage having a frequency above 150 Hz is measured, it is heavily attenuated, and so a large error may be observed. It is necessary in this case to deactivate the filter to have the full passband.

5.2. CURRENT MEASUREMENT

In an ammeter

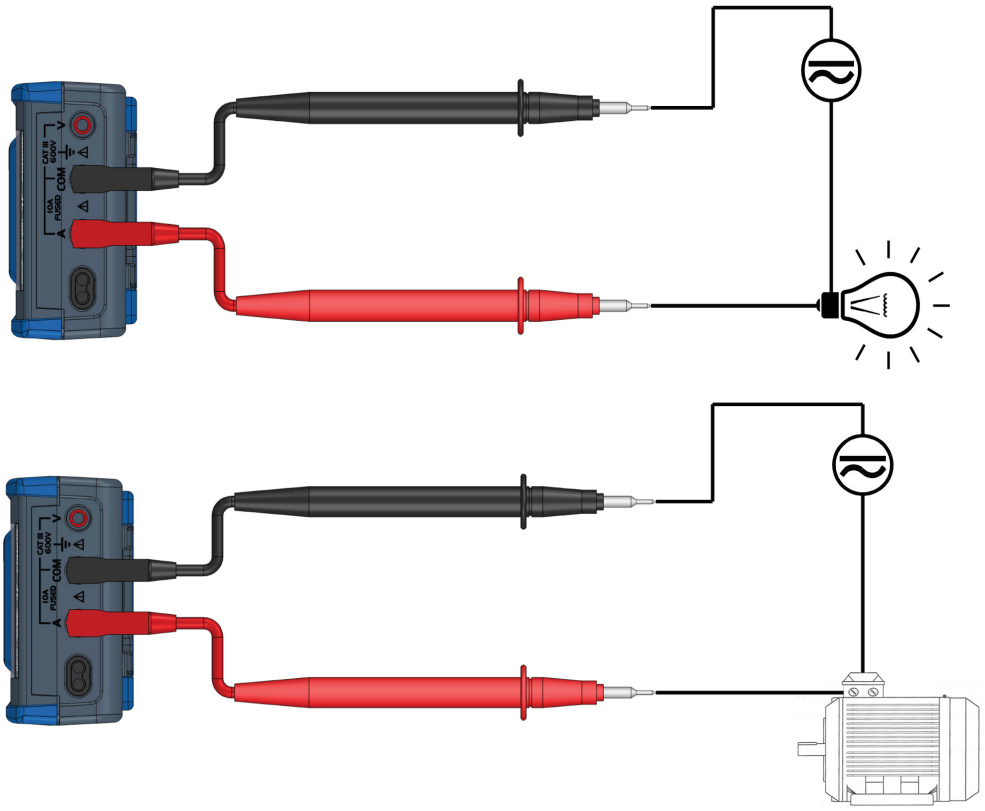
1. Press A .

2. Select the type of signal, AC+DC, AC or DC, by pressing MODE AC/DC .
Depending on what you select, the screen displays AC, DC or AC+DC.

3. Connect the black lead to the "**COM**" terminal and the red lead to "**A**".

If the connection is not correct, an audible beep and a visible signal (LEADS) are activated.

4. Place the test probes in series between the source and the load:



5. Read the measurement value indicated on the display unit.
"**O.L**" is displayed, if I > 20 A.

6. As default, the 2nd display unit indicates the frequency, except in DC.

It is possible to activate the filter in AAC+DC, AAC. The cut-off frequency of the filter is ≤ 300 Hz. When a voltage having a frequency above 150 Hz is measured, it is heavily attenuated, and so a large error may be observed. It is necessary in this case to deactivate the filter to have the full passband.

With a current clamp

1. Press:  .

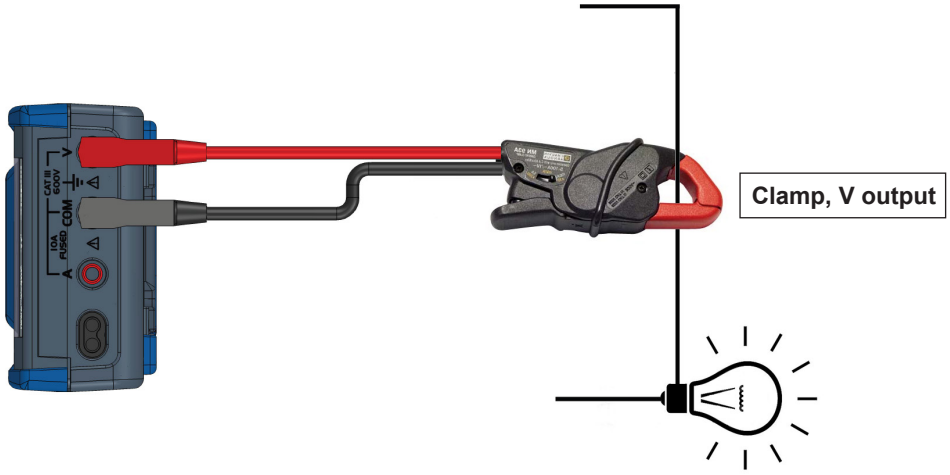
2. Select the type of signal, AC+DC, AC or DC by pressing MODE AC/DC.
Depending on what you select, the screen displays AC, DC or AC+DC.

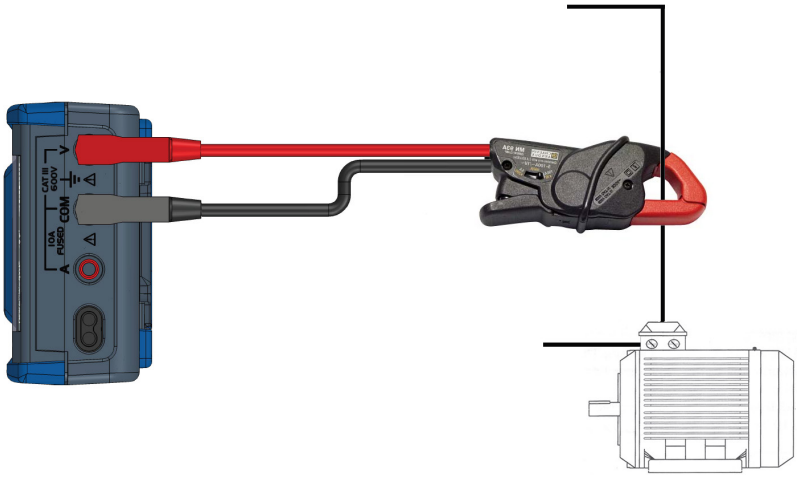
3. Connect the black lead of the clamp to the "**COM**" terminal and the red lead of the clamp to "**V**".

4. Select the transformation ratio (the same as that of the clamp) 1 mV/A, 10 mV/A, 100 mV/A, 1 000 mV/A by pressing on "clamp"

 to have a direct reading of the current.

5. Place the clamp around the conductor.





7. Read the measurement value indicated on the display unit. The measurement accuracy is indicated in "Technical characteristics", § "Clamp".

8. As default, the 2nd display unit indicates the transformation ratio in mV/A.

It is possible to activate the filter in AAC+DC, AAC. The cut-off frequency of the filter is ≤ 300 Hz.
When a voltage having a frequency above 150 Hz is measured, it is heavily attenuated, and so a large error may be observed. It is necessary in this case to deactivate the filter to have the full passband.

5.3. FREQUENCY MEASUREMENT

1. Press: Hz .

2. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

3. Place the test probes on the terminals of the circuit to be measured.

Connect the instrument as for a resistance measurement.

4. Read the measurement value indicated on the display unit. The second display unit indicates the period of the signal, 1/F.

5. Press Hz several times to obtain (**MTX 3291 only**):
- positive duty cycle (DC+)
- negative duty cycle (DC-)
- positive pulse duration (Pw+)
- negative pulse duration (Pw-)

It is possible to activate the filter in AAC+DC, AAC. The cut-off frequency of the filter is ≤ 300 Hz.

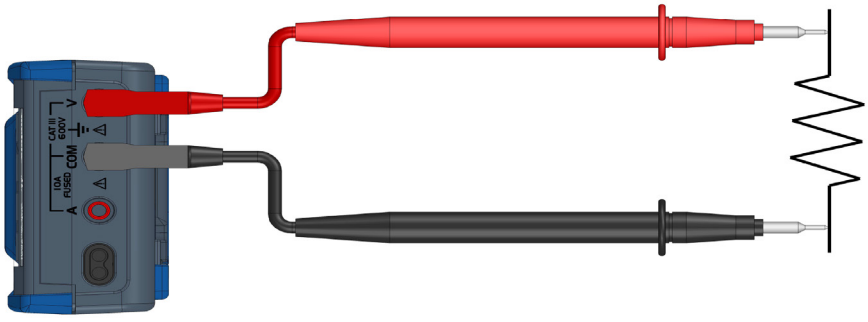
5.4. RESISTANCE MEASUREMENT

1. Press the Ω button of the switch.

2. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

3. Place the test probes on the terminals of the component.

Resistance measurements must be made with power off. However, while the presence of a voltage will prevent or throw off the measurement, it will not damage the instrument.



4. Read the measurement value indicated on the display unit.

5. "**O.L**" is displayed, if the circuit is open.

5.5. AUDIBLE CONTINUITY MEASUREMENT

1. Press:  .

2. Press  again; the"♪" symbol is displayed.

3. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

4. Place the test probes on the terminals of the circuit to be measured.

Connect the instrument as for a resistance measurement.

5. Read the measurement value indicated on the display unit.

6. The continuity beep sounds when R < 30 Ω ± 5 Ω.

7. "**O.L**" is displayed, if the circuit is open.

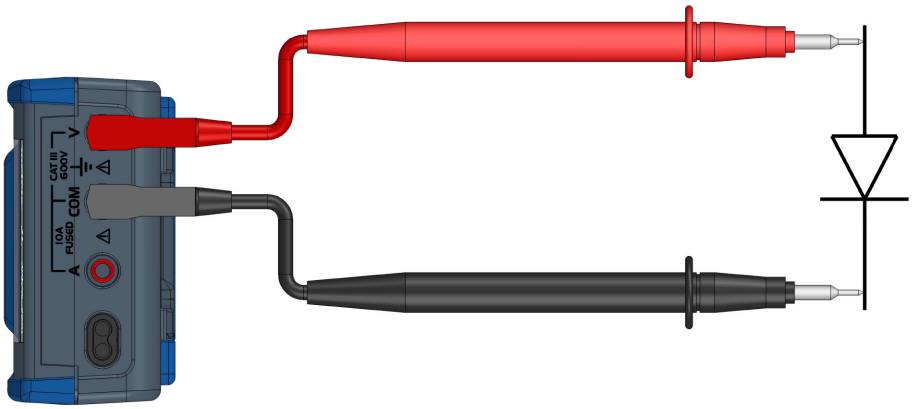
5.6. DIODE TEST

1. Press:  .

2. Press two times  ; the "→|" symbol is displayed.

3. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

4. Place the test probes on the terminals of the component:



5. Read the measured threshold voltage of the junction indicated on the display unit.
If the value is < 40 mV ± 10 mV, an audible signal is triggered.

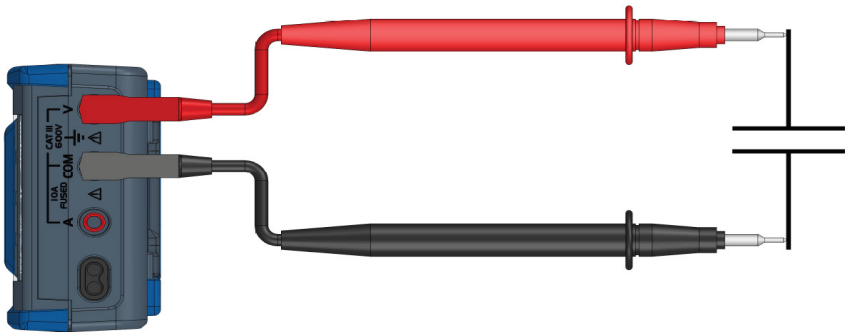
6. "**O.L**" is displayed, if the circuit is open or the threshold of the diode > 3 V.

5.7. CAPACITANCE MEASUREMENT

1. Press:  .

2. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

3. Place the test probes on the terminals of the component:



4. Read the measurement value indicated on the display unit.
"**O.L**" is displayed, if the value to be measured exceeds the capacitance of the range.
"**O.L**" is displayed, if the capacitor is short-circuited.

- For high values, the measurement cycle includes the display of "run" with a "chaser" decimal point. This means that acquisition is in progress; wait for the display of the digital result.

⚠ **"run" is displayed immediately, if the previous measurement was in a small range.**

- The prior discharge of very high capacitances helps shorten the measurement time.

5.8. TEMPERATURE MEASUREMENT

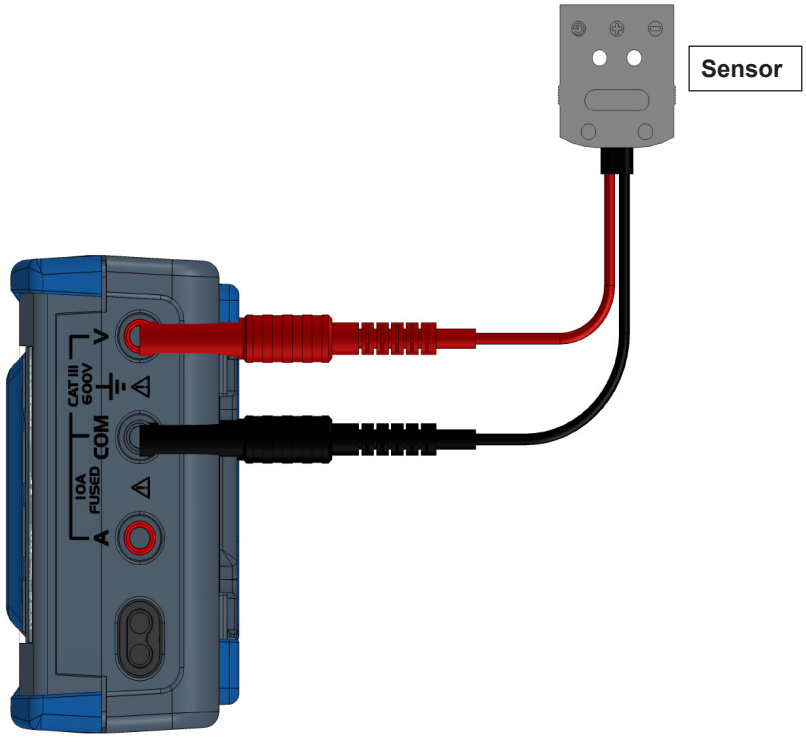
1. Press: T°.

2. Press T° to select the type of probe: Pt100 or Pt1000.

3. Press MODE AC/DC to switch the temperature unit (°C or °F) between the two display units.

The unit displayed as default on the main display unit is °C.

4. Connect the adapter of the Pt100 or Pt1000 temperature probe (*) to the "**COM**" and "**V**" terminals, making sure that the polarity is correct:



5. Read the measurement value indicated on the display unit.
If "**O.L**" is displayed, the probe is open-circuit or short-circuited or the value to be measured exceeds the range.

For greater accuracy, avoid exposing the instrument to sudden changes of temperature.

(*) You will find a list of accessories in the CHAUVIN ARNOUX catalogue.

5.9. MEASUREMENT ON AN MLI TYPE SPEED VARIATOR

Voltage measurement

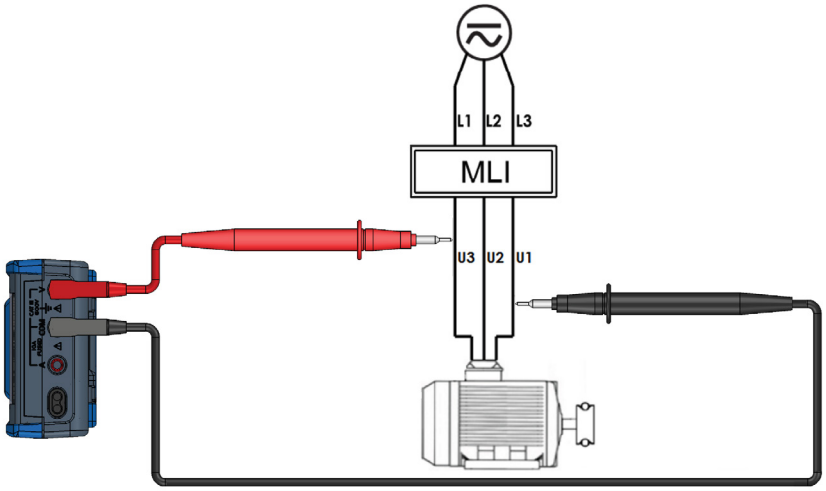
1. Press: VLowZ .

2. Select the type of signal, AC+DC, AC or DC by pressing MODE AC/DC.
Depending on what you select, the screen displays AC, DC, or AC+DC.

3. Select the filter by pressing .

4. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

5. Place the test probes between two phases of the circuit to be measured:



6. Read the measurement values indicated on the display unit (voltage and frequency):
In all cases, "**O.L**" is displayed above 1 050 V (**MTX 3291**) or 620 V (**MTX 3290**) and a beep sounds when the measurement exceeds 1 000 V (**MTX 3291**) or 600 V (**MTX 3290**).

The presence of the symbol indicates that the 300 Hz filter is active.

It is very important to leave the filter activated to measure the voltage and frequency of the signal without being perturbed by the MLI.

5.10. CURRENT MEASUREMENT

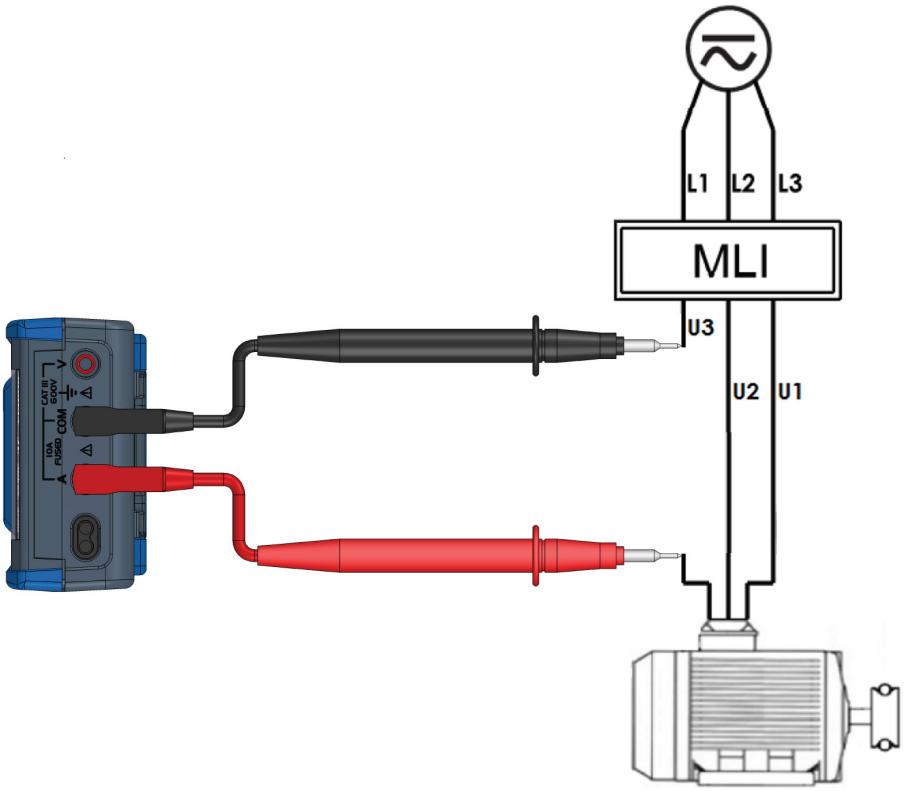
1. Press: A .

2. Select the type of signal AC+DC, AC or DC by pressing MODE AC/DC .
Depending on what you select, the screen displays AC, DC or AC+DC.

3. Select the filter by pressing .

4. Connect the black lead to the "**COM**" terminal and the red lead to "**A**".

5. Place the test probes in series between the source and the load.



6. Read the measurement value indicated on the display unit.
"**O.L**" is displayed if I > 20 A.

The presence of the symbol indicates that the filter is activate.

It is very important to leave the filter activated to measure the voltage and frequency of the signal without being perturbed by the MLI.

7. As default, the 2nd display unit indicates the frequency, except in DC.

It is possible to make the current measurement using a current clamp in conjunction with the multimeter (see § 5.2 Current measurement)

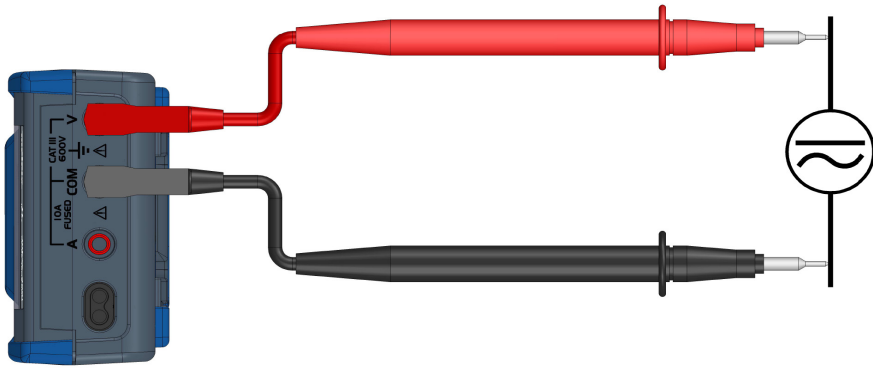
5.11. RESISTIVE POWER (MTX 3291 ONLY)

1. Press dBm W three times.

2. Select AC+DC, AC or DC coupling of the signal by pressing MODE AC/DC (the default coupling is AC+DC). Depending on what you select, the screen displays DC, AC or AC+DC.

3. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

4. Place the probes tips on the terminals of the resistive load:



5. As default, the main display unit indicates the power in W delivered to a 600 Ω resistive load ($U^2/600$).

For a load ≠ 600 Ω.

How to measure the resistance

1. Start by applying power to the load.

2. Press Ω. The display unit indicates the resistance.

3. Press Hold to store the resistance, which will be used to calculate the power.

4. Press dBm W three times.

5. Select AC+DC, AC or DC coupling of the signal by pressing MODE AC/DC (the default coupling AC+DC). Depending on what you select, the screen displays DC, AC or AC+DC.

6. Apply power to the load.

7. Read the measurement value indicated on the display unit:
- the main display unit indicates the power in W (U^2/R)
- the secondary display unit indicates the resistance measured on the installation (600 Ohm by default).

5.12. dBm DECIBELS IN POWER (MTX 3291 ONLY)

1. Press: 

.

2. Press 

again.

3. Press 

to select the reference resistance 50, 75, 90 or 600 Ohm.

4. Connect the black lead to the "**COM**" terminal and the red lead to "**V**".

5. Place the test probes on the terminals of the circuit to be measured.

Connect the instrument as for a voltage measurement.

6. Read the measurement value indicated on the display unit:
- the main display unit indicates the value in dBm.
- the secondary display unit indicates the resistance measured on the installation (50 Ω, by default).

Reminder:

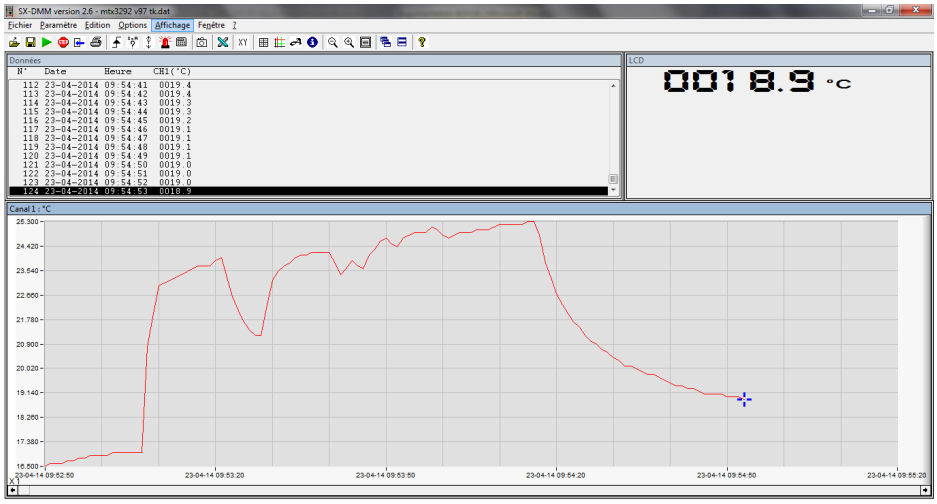
R	0 dBm (VRef) en
50 Ω	223.6 mV
75 Ω	273.86 mV
90 Ω	300 mV
600 Ω	774.6 mV

$$X\ dBm = 20 \log \frac{V_{measured}}{V_{Ref}}$$

6. SX-DMM SOFTWARE

6.1. SX-DMM: PROCESSING SOFTWARE

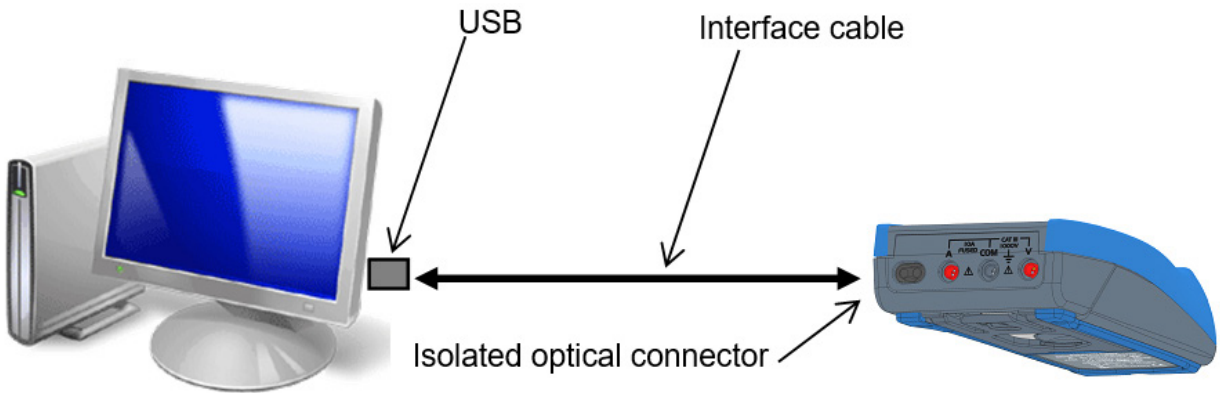
This multimeters can be interfaced directly with a PC or other computer using "SX-DMM" acquisition software:
The transmission rate is 9 600 Bauds.
The transmission parameters are fixed (8 data bits, 1 stop bit, no parity).



6.2. 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.
Connect the USB lead to one of the USB ports of the PC.

2. Install the USB driver on your PC.



6.3. INSTALLING THE "SX-DMM" 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.

7. TECHNICAL CHARACTERISTICS OF THE MTX 3290

Accuracy: "n % L + n D" means "n % of the reading + n Digit" (see IEC 485)

Only values with tolerances or limits are guaranteed values.
Values without tolerances are given for guidance (standard NFC 42670).
The technical specifications are guaranteed only after 30 minutes of warming up.
Except as otherwise indicated, they are valid from 10 % to 100 % of the measurement range.

7.1. DC VOLTAGE

In the "DC" mode, you measure a direct voltage or the DC component of an AC voltage (**filter activated**)

Range	Specified measurement range	Resolution	Intrinsic error	Input impedance
600 mV	0 to 600.0 mV	0.1 mV	0.6 % L + 2 D	10.9 MΩ
6 V	0 to 6.000 V	0.001 V	0.3 % L + 2 D	10.9 MΩ
60 V	0 to 60.00 V	0.01 V		10.082 MΩ
600 V (*)	0 to 600.0 V	0.1 V		10.0008 MΩ

(*) The display indicates "+OL" above + 620 V and "-OL" above - 620 V.
Protection: 850 Vpk
Secondary measurements and displays: MAX, MIN, AVG

7.2. AC AND AC+DC VOLTAGES

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.

VAC RMS
Protection: 850 Vpk

Range	Operating range	Specified measurement range[3]	Resolution	Uncertainty (±)	Additional uncertainty F (Hz) [1]	Pass-band	@ 1 kHz Input impedance // < 50 pF	Peak factor 3
600 mV	0 to 600.0 mV	60.0 to 600.0 mV	0.1 mV	2 % L + 0.25 % x [F(kHz)-1] L ± 5 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	10 Hz to 20 kHz	10.9 MΩ	@ 500 mV
6 V	0 to 6.000 V	0.600 to 6.000 V	0.001 V	2 % L + 0.18 % x [F(kHz)-1] L ± 3 D		10 Hz to 20 kHz	10.9 MΩ	@ 5 V
60 V	0 to 60.00 V	6.00 to 60.00 V	0.01 V				10.082 MΩ	@ 50 V
600 V [2]	0 to 600.0 V	60.0 to 600.0 V	0.1 V				10.008 MΩ	@ 500 V

(1) See the typical curve of the 300 Hz filter.
(2) The LCD indicates "+OL" above +620 V, "-OL" below -620 V or above 620 Veff.
(3) From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

VAC+DC TRMS
Protection: 850 Vpk

Range	Operating range	Specified measurement range(3)	Resolution	Uncertainty DC (±)	Uncertainty AC (±)	Additional uncertainty F (Hz) (1)	Passband	@ 1 kHz Input impedance // < 50 pF	Peak factor 3
600 mV	0 to 600.0 mV	60.0 to 600.0 mV	0.1 mV	0.8 % L ± 10 D	2 % L + 0.18 % x [F(kHz)-1] L ± 5 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	10 Hz to 20 kHz	10.9 MΩ	@ 500 mV
6 V	0 to 6.000 V	0.600 to 6.000 V	0.001 V		2 % L + 0.18 % x [F(kHz)-1] L ± 3 D		10 Hz to 20 kHz	10.9 MΩ	@ 5 V
60 V	0 to 60.00 V	6.00 to 60.00 V	0.01 V					10.082 MΩ	@ 50 V
600 V (2)	0 to 600.0 V	60.0 to 600.0 V	0.1 V					10.008 MΩ	@ 500 V

(1) See the typical curve of the 300 Hz filter.
(2) The LCD indicates "+OL" above +620 V, "-OL" below -620 V or above 620 VRMS.
(3) From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

VLowZ AC
Protection: 850 Vpk
The passband is reduced to 300 Hz, if the filter is activated. The frequency measurement is made like the measurement in a 300 Hz passband.

Range	Operating range	Specified measurement range(3)	Resolution	Uncertainty (±)	Additional uncertainty F (Hz) (1)	@ 1 kHz Input impedance // < 50 pF	Peak factor 3
600 mV	0 to 600.0 mV	60.0 to 600.0 mV	0.1 mV	2.2 % L + 0.25 % x [F(kHz)-1]L ± 5 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	≅ 300 kΩ	@ 500 mV
6 V	0 to 6.000 V	0.600 to 6.000 V	0.001 V	2.2 % L + 0.18 % x [F(kHz)-1] L ± 3 D			@ 5 V
60 V	0 to 60.00 V	6.00 to 60.00 V	0.01 V				@ 50 V
600 V (2)	0 to 600.0 V	60.0 to 600.0 V	0.1 V				@ 500 V

(1) See the typical curve of the 300 Hz filter.
(2) The LCD indicates "+OL" above +620 V, "-OL" below -620 V or above 620 VRMS.
(3) From 1 kHz the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

7.3. CURRENTS

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 AC and AC+DC modes, you can measure the true RMS (TRMS) value of alternating current with / without its direct component (no capacitive coupling in "DC" mode).

DC current
Particular reference conditions:
6 mA range: Measuring a strong current for a long time can cause a temperature rise in some components. In this case, it is necessary to wait some time for the metrological characteristics specified in 6 mA to be restored.

Range	Operating range	Specified measurement range(3)	Resolution	Uncertainty (±)	Voltage drop	Protection
6 mA	0 to 6.000 mA	0.002 to 6.000 mA	1 µA	1.2 % L ± 5 D	25 mV / mA	Fuse 10 A / 600 V > 50 kA
60 mA	0 to 60.00 mA	0.02 to 60.00 mA	0.01 mA	1.2 % L ± 2 D	3 mV / mA	
600 mA	0 to 600.0 mA	0.2 to 600.0 mA	0.1 mA	1.2 % L ± 2 D	0.58 mV / mA	
6 A	0 to 6.000 A	0.200 to 6.000 A	0.001 A	1.2 % L ± 3 D	0.05 V / A	
10 A / 20 A (*)	0 to 20.00 A	0.20 to 20.00 A	0.01 A	1.2 % L ± 2 D	0.05 V / A	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beep sounds above 10 A.
(*) Acceptable overload: 10 A to 15 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
Secondary measurements and displays: MAX, MIN, AVG.

AAC RMS current

Range	Operating range	Specified measurement range	Resolution	Uncertainty (±) 40 Hz to 20 kHz (**)	Peak factor	Voltage drop	Protection
6 mA	0 to 6.000 mA	0.600 to 6.000 mA	1 µA	1.7 % L ± 5 D	2.6 @ 5 mA	25 mV / mA	Fuse 10 A / 600 V > 50 kA
60 mA	0 to 60.00 mA	6.00 to 60.00 mA	0.01 mA	1.5 % L ± 3 D	2.6 @ 50 mA	3 mV / mA	
600 mA	0 to 600.0 mA	60.0 to 600.0 mA	0.1 mA		2.6 @ 500 mA	0.58 mV / mA	
6 A	0 to 6.000 A	0.600 to 6.000 A	0.001 A	1.7 % L ± 5 D	2.8 @ 5 A	0.05 V / mA	
10 A/20 A	0 to 20.00 A	1.00 to 10.00 A	0.01 A	1.5 % L ± 3 D	3.7 @ 8 A	0.05 V / mA	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beep sounds above 10 A.
Secondary measurements and displays: FREQ (AC coupling) MAX, MIN, AVG, PEAK.
(*) Acceptable overload: 10 A to 15 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
(**) Additional uncertainty with the 300 Hz filter.

AAC+DC TRMS current

Warning: The sum AC+DC must never exceed the range, 600 mA, or 60 mA, or 6 mA or 6 A or 10 A, as the case may be.

Range	Operating range	Specified measurement range	Resolution	Uncertainty AC 40 Hz to 20 kHz (±) (**)	Additional uncertainty DC (±)	Peak factor	Voltage drop	Protection
6 mA	0 to 6.000 mA	0.060 to 6.000 mA	1 µA	1.7 % L + [0.08 % x (FkHz-1)] L ± 5 D	± 15 D	2.6 @ 5 mA	25 mV / mA	Fuse 10 A/600 V > 50 kA
60 mA	0 to 60.00 mA	6.00 to 60.00 mA	0.01 mA	1.5 % L + [0.08 % x (FkHz-1)] L ± 3 D	± 13 D	2.6 @ 50 mA	3 mV / mA	
600 mA	0 to 600.0 mA	60.0 to 600.0 mA	0.1 mA			2.6 @ 500 mA	0.58 mV / mA	
6 A	0 to 6.000 A	0.600 A to 6.000 A	0.001 A	1.7 % L + [0.08 % x (FkHz-1)] L ± 5 D	± 10 D	2.8 @ 5 A	0.05 V / mA	
10 A/20 A (*)	0 to 20.00 A	0.60 A to 20.00 A	0.01 A	1.5 % L+ [0.08 % x (FkHz-1)] L ± 3 D	± 10 D	3.7 @ 8 A	0.05 V / mA	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beep sounds above 10 A.
(*) Acceptable overload: 10 to 15 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK
(**) Additional uncertainty with the 300 Hz filter.

7.4. FREQUENCY

Main frequency measurement
In this setting, you can measure the frequency of a voltage.

Particular reference conditions: 150 mV < U < 600 V
When the switch is set to Hz, the 300 Hz filter is not in service.
Protection: 850 Vpk

Range	Operating range	Specified measurement range	Resolution	Intrinsic error
60 Hz	10.00 to 60.00 Hz	10.00 to 60.00 Hz	0.01 Hz	0.1 % L ± 1 D
600 Hz	10.0 to 600.0 Hz	10.00 to 600.0 Hz	0.1 Hz	
6 kHz	0 to 6.000 kHz	0.010 to 6.000 kHz	0.001 kHz	
60 kHz	0 to 60.00 kHz	0.01 to 60.00 kHz	0.01 kHz	
600 kHz	0 to 200.0 kHz	0.1 to 200.00 kHz	0.1 kHz	

Below 10 kHz, or if the signal detection level is inadequate, the reading is forced to zero.

The measured period in ms is available on the second display unit.

Secondary frequency measurement
You can measure the frequency and magnitude of a voltage or of a current simultaneously.
Same accuracy as in the "Hz" setting
Particular reference conditions: 150 mV < U < 600 V
0.15 A < I < 10 A
Max. frequency measurable in volts: 20 kHz
Max. frequency measurable in amperes: 20 kHz
When the switch is set to VLowZ, Volts or Ampere, if the 300 Hz filter is activated, the measurable frequency remains within the limits of the BP of the filter. Below 10 Hz, or if the signal detection level is inadequate, the reading is forced to "------".

7.5. RESISTANCE

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: 850 Vpk.

Range	Specified measurement range	Resolution	Uncertainty	Measurement current	Open-circuit voltage
600 Ω	0 to 600.0 Ω *	0.1 Ω	0.5 % L ± 2 D	≈ 850 µA	< 5 V
6 kΩ	0 to 6.000 kΩ	0.001 kΩ	0.5 % L ± 2 D	≈ 126.6 µA	
60 kΩ	0 to 60.00 kΩ	0.01 kΩ		≈ 12.6 µA	
600 kΩ	0 to 600.0 kΩ	0.1 kΩ		≈ 1.26 µA	
6 MΩ	0 to 6.000 MΩ	0.001 MΩ	1.5 % L ± 3 D	≈ 240 nA	
60 MΩ	0 to 60.00 MΩ	0.01 MΩ	3 % L ± 3 D	≈ 29 nA	

(*) REL measurements

7.6. CAPACITANCE

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
6 nF	0.100 to 6.000 nF	0.100 to 6.000 nF	0.001 nF	2.5 % L ± 30 D	≈ 1.26 µA	≈ 400 ms
60 nF	0 to 60.00 nF	0 to 60.00 nF	0.01 nF	1.5 % L ± 8 D	≈ 1.26 µA	≈ 400 ms
600 nF	0 to 600.0 nF	0 to 600.0 nF	0.1 nF	1.5 % L ± 5 D	≈ 1.26 µA	≈ 400 ms
6 µF	0 to 6.000 µF	0 to 6.000 µF	0.001 µF	1.5 % L ± 5 D	≈ 12.6 µA	≈ 0.125 s/µF
60 µF	0 to 60.00 µF	0 to 60.00 µF	0.01 µF	1.5 % L ± 5 D	≈ 126.6 µA	≈ 0.125 s/µF
600 µF	0 to 600.0 µF	0 to 600.0 µF	0.1 µF	3.5 % L ± 5 D	≈ 850 µA	≈ 0.125 s/µF
6 mF	0 to 6.000 mF	0 to 6.000 mF	1 µF	4.5 % L ± 5 D	≈ 850 µA	≈ 17 s/mF
60 mF	0 to 60.00 mF	0 to 60.00 mF	10 µF	6.5 % L ± 5 D	≈ 850 µA	≈ 17 s/ mF

The use of wires that are very short and shielded is strongly recommended.

Protection: 850 Vpk.

7.7. DIODE TEST

Range	Resolution	Accuracy	Open-circuit voltage	Measurement current
3 V	1 mV	2 % L ± 3 D	< 5 V	< 1.1 mA

Audible signal triggered < 40 mV ± 10 mV
Protection: 850 Vpk

7.8. AUDIBLE CONTINUITY

Range	Resolution	Accuracy	Open-circuit voltage	Measurement current	Protection
600 Ω	0.1 Ω	0.5 % L ± 3 D	< 5 V	< 1.1 mA	850 Vpk

Response time < 100 ms
Triggering threshold: < 30 Ω ± 5 Ω
Protection: 850 Vpk

7.9. CLAMP

You can measure a current using various current clamps and obtain a direct reading of the current by selecting the correct transformation ratio, which must be the same as that of the clamp.
If the signal detection level is insufficient, the value is forced to "-----".
The input impedance is approximately 10 MΩ.

Add the error of the clamp to the intrinsic error of the multimeter, specified in the tables below.

DC current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			0.6 % L ± 2 D	0.6 % L ± 2 D	0.3 % L ± 2 D
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		0.6 % L ± 2 D	0.6 % L ± 2 D	0.3 % L ± 2 D	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	0.6 % L ± 2 D	0.6 % L ± 2 D	0.3 % L ± 2 D		
1 000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	0.6 % L ± 2 D	0.3 % L ± 2 D			

Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.

AAC RMS current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			2 % L ± 5 D (*)	2 % L ± 5 D	2 % L ± 3 D
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		2 % L ± 5 D (*)	2 % L ± 5 D	2 % L ± 3 D	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	2 % L ± 5 D (*)	2 % L ± 5 D	2 % L ± 3 D		
1000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	2 % L ± 5 D	2 % L ± 3 D			
Peak factor 3		@ 500 mA	@ 5 A	@ 50 A	@ 500 A	@ 5 000 A

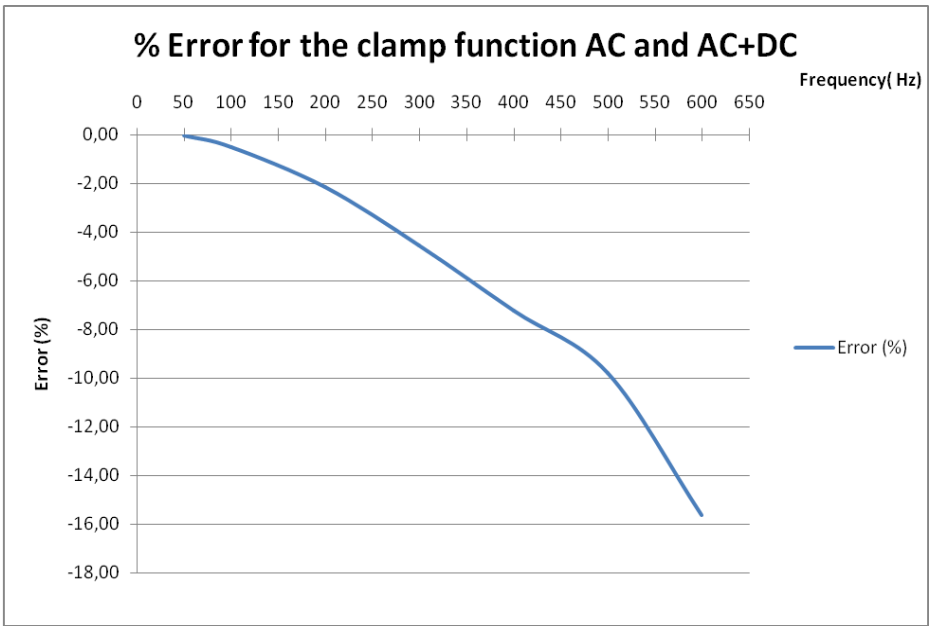
Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.
300 Hz filter: if the filter is active, see "300 Hz filter" curve for the additional uncertainty.
(*) : see "Frequency response" curve.

AAC+DC TRMS current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			2.8 % L ± 15 D (*)	2.8 % L ± 15 D	2.8 % L ± 13 D
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		2.8 % L ± 15 D (*)	2.8 % L ± 15 D	2.8 % L ± 13 D	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	2.8 % L ± 15 D (*)	2.8 % L ± 15 D	2.8 % L ± 13 D		
1 000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	2.8 % L ± 15 D	2.8 % L ± 13 D			
Peak factor 3		@ 500 mA	@ 5 A	@ 50 A	@ 500 A	@ 5 000 A

Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.
300 Hz filter: if the filter is active, see "300 Hz filter" curve for additional uncertainty.
(*) : see "Frequency response" curve.

Frequency response



7.10. TEMPERATURE

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

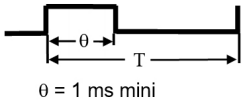
Range	Measurement current	Resolution	Accuracy	Protection
-200°C to +800°C	< 1 mA (Pt100) < 0.15 mA (Pt1000)	0.1°C	0.1 % L ± 1.5°C	850 Vpk

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

7.11. PEAK

Add 1 % L ± 30 D to obtain the accuracy corresponding to the function and the range.

Fmax: 1 kHz (1 ms)
Protection: 850 Vpk



θ = 1 ms mini

7.12. SURV

MIN, MAX, AVG
Add 0.2 % L +2 D to obtain the accuracy corresponding to the function and the range.
Acquisition time of the extrema: approximately 100 ms.
Protection: 850 Vpk

7.13. OPERATION OF THE AUDIBLE BEEP

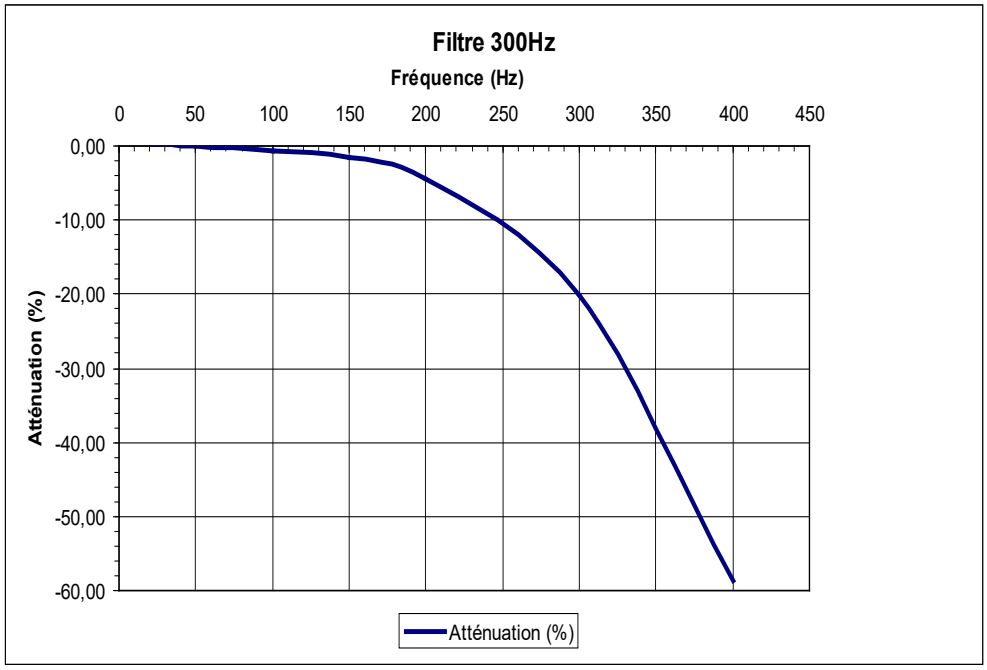
Beep reporting a valid key	High-pitched sound
Beep reporting an invalid key	Low-pitched sound
Successive beeps reporting an overshoot of the danger	High-pitched sound
Successive beeps reporting recording of the MAX, MIN, PEAK	High-pitched sound
Successive beeps (alarm) → current > 10 A	High-pitched sound
Continuity measurement	Medium-pitched sound

7.14. VARIATION IN THE NOMINAL RANGE OF USE

Quantity of influence	Range of influence	Quantity influenced	Influence	
			Typical	MAX
Battery voltage	4 V to 6 V	all	< 3 D	0.2 % L + 1 D
Temperature	-10°C ... 18 28 ... 55°C	VDC mV	0.02 % L ± 0.2 D / 1°C	0.04 % L ± 0.25 D / 1°C
		VAC mV, VLowZ mV	0.08 % L ± 0.2 D / 1°C	0.15 % L ± 0.25 D / 1°C
		VDC	0.01 % L ± 0.1 D / 1°C	0.05 % L ± 0.1 D / 1°C
		VAC, VAC+DC, VLowZ		0.25 % L ± 0.1 D / 1°C
		ADC	0.05 % L ± 0.1 D / 1°C	0.1 % L ± 0.1 D / 1°C
		AAC and AAC+DC	0.08 % L ± 0.1 D / 1°C	0.12 % L ± 0.1 D / 1°C
			0.01 % L ± 0.1 D / 1°C	0.1 % L / 1°C
		Ω	0.05 % L / 1°C	0.1 % L / 1°C
		60 MΩ		0.3 % L / 1°C
		µF		0.2 % L ± 0.1 D / 1°C
		mF		0.6 % L ± 0.1 D / 1°C
		Hz		0.01 % L / 1°C
		Temperature		± 2°C + 0.05 % L / 1°C
		Stabilization time	≈ 2 h	2.5 h
Humidity (without condensation)	10 % ... 80 % RH	V A Ω Hz	0	0

Common mode	600 V 50 Hz	VAC, VAC+DC, VLowZ	Range	Typical
			60 mV 600 mV	> 35 dB
			6 V	> 60 dB
			60 V 600 V 1 000 V	> 95 dB

7.15. RESPONSE OF THE FILTER



8. TECHNICAL CHARACTERISTICS OF THE MTX 3291

Accuracy: "n % L + n D" means "n % of the reading + n Digit" (see IEC 485)

Only values with tolerances or limits are guaranteed values.
Values without tolerances are given for guidance (standard NFC 42670).
The technical specifications are guaranteed only after 30 minutes of warming up. Except as otherwise indicated, they are valid from 10 % to 100 % of the measurement range.

8.1. DC VOLTAGE

In the "DC" mode, you measure a direct voltage or the DC component of an AC voltage (filter activated).

60 mV range: Measuring a strong current or measuring a current for a long time may cause a temperature rise of some components.
Protection: 1 414 Vpk

Range	Specified measurement range	Resolution	Intrinsic error	Input impedance
60 mV (1)	0 to 60.000 mV	0.001 mV	0.5 % L + 35 D	10.612 MΩ
600 mV	0 to 600.00 mV	0.01 mV	0.5 % L + 25 D	10.9 MΩ
6 V	0 to 6.0000 V	0.0001 V	0.05 % L + 25 D	10.9 MΩ
60 V	0 to 60.000 V	0.001 V		10.082 MΩ
600 V	0 to 600.00 V	0.01 V		10.008 MΩ
1 000 V (2)	0 to 1 000.0 V	0.1 V	0.07 % L + 25 D	10.008 MΩ

(1) This range is accessible only with the Range key.
Input impedance: approx. 10.6 MΩ // 50 pF
(2) The display indicates "+OL" above +1 050 V and "-OL" below -1 050 V.
Secondary measurements and displays: MAX, MIN, AVG.

8.2. 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.

VAC RMS
60 mV range: Measuring a strong current or measuring a current for a long time may cause a temperature rise of some components.
Protection: 1 414 Vpk

Range	Operating range	Specified measurement range (4)	Resolution	Uncertainty (±)	Additional uncertainty F(Hz) (1)	Pass band	@ 1 kHz Input impedance // < 50 pF	Peak factor 3
60 mV (2)	0 to 60.000 mV	6.000 to 60.000 mV	0.001 mV	1.5 % L ± 35 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	≈ 400 Hz	10.612 MΩ	3 @ 50.0 mV
600 mV	0 to 600.00 mV	60.00 to 600.00 mV	0.01 mV	1 % L + 0.25 % x [F(kHz)-1]L ± 30 D		10 Hz to 50 kHz (≈ 23 % @ 100 kHz)	10.9 MΩ	3 @ 500.0 mV
6 V	0 to 6.0000 V	0.6 to 6.0000 V	0.0001 V	0.5 % L + 0.15 % x [F(kHz)-1 L ± 25 D		10 Hz to 100 kHz	10.9 MΩ	3 @ 5.0 V
60 V	0 to 60.000 V	6.000 to 60.000 V	0.001 V				10.082 MΩ	3 @ 50.0 V
600 V	0 to 600.00 V	60.00 to 600.00 V	0.01 V				10.008 MΩ	3 @ 500.0 V
1 000 V (3)	0 to 1 000.0 V	60 to 1 000.0 V	0.1 V				10.008 MΩ	1.42 @ 1 000.0 V

(1) See the typical curve of the 300 Hz.
(2) This range is accessible only with the RANGE key.
Input impedance: approx. 10.6 MΩ // 50 pF.
(3) The LCD indicates "+OL" above +1 050 V, "-OL" below -1 050 V or above 1 050 VRMS.
(4) From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

VLowZ AC RMS
The pass band (between 3 dB down points) is reduced to 300 Hz, if the filter is activated. In VLowZ, there is no 60 mV range. The frequency measurement is made like the measurement in a 300 Hz pass band.

Protection: 1 414 Vpk

Range	Operating range	Specified measurement range (3)	Resolution	Uncertainty (±)	Additional uncertainty F (Hz) (1)	Input impedance // < 50 pF	Peak factor
600 mV	0 to 600.00 mV	60.00 to 600.00 mV	0.01 mV	1 % L + 0.25 % x [F(kHz)-1] L ± 30 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	≅ 300 kΩ	3 @ 500.0 mV
6 V	0 to 6.0000 V	0.6 to 6.0000 V	0.0001 V	0.5 % L + 0.18 % x [F(kHz)-1] L ± 25 D			3 @ 5.0 V
60 V	0 to 60.000 V	6.000 to 60.000 V	0.001 V				3 @ 50.0 V
600 V	0 to 600.00 V	60.00 to 600.00 V	0.01 V				3 @ 500.0 V
1 000 V(2)	0 to 1 000.0 V	60 to 1 000.0 V	0.1 V				1.42 @ 1 000.0 V

(1) See the typical curve of the 300 Hz.
(2) The LCD indicates "+OL" above +1 050 V, "-OL" below -1 050 V or above 1 050 VRMS.
(3) From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

VAC+DC TRMS
60 mV range: Measuring a strong current or measuring a current for a long time may cause a temperature rise of some components.

Protection: 1 414 Vpk

Range	Operating range	Specified measurement range (4)	Resolution	Additional uncertainty DC (±)	Uncertainty AC (±)	Additional uncertainty F(Hz) (1)	Pass band	Input impedance // < 50 pF	Peak factor 3
60 mV (2)	0 to 60.000 mV	6.000 to 60.000 mV	0.001 mV	± 15 D	1.5 % L ± 35 D	45<F<65 Hz 0.3 % L typ. at 100 Hz 0.7 % L typ. at 150 Hz 1.8 % L typ. at 300 Hz 30 % L typ.	≈ 400 Hz	10.612 MΩ	3 @ 50 mV
600 mV	0 to 600.00 mV	60.00 to 600.00 mV	0.01 mV		0.8 % L + 0.18 % x [F(kHz)-1] L ± 30 D		10 Hz to 50 kHz	10.9 MΩ	3 @ 500 mV
6 V	0 to 6.0000 V	0.6 to 6.0000 V	0.0001 V		0.5 % L + 0.18 % x [F(kHz)-1] L ± 25 D		10 Hz to 100 kHz	10.9 MΩ	3 @ 5 V
60 V	0 to 60.000 V	6.000 to 60.000 V	0.001 V					10.082 MΩ	3 @ 50 V
600 V	0 to 600.00 V	60.00 to 600.00 V	0.01 V					10.008 MΩ	3 @ 500 V
1 000 V (3)	0 to 1 000.0 V	60 to 1 000.0 V	0.1 V					10.008 MΩ	1.42 @ 1 000 V

(1) See the typical curve of the 300 Hz.
(2) This range is accessible only with the Range key.
Input impedance: approx. 10.6 MΩ // 50 pF.
(3) The LCD indicates "+OL" above +1 050 V, "-OL" below -1 050 V or above 1 050 VRMS.
(4) From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.

8.3. CURRENTS

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).

DC current
Particular reference conditions:
600 µA and 6 mA modes: Measuring a strong current for a long time may cause a temperature rise of some components. In this case, it is necessary to wait some time for the metrological characteristics specified in these ranges.

Range	Operating range	Specified measurement range	Resolution	Uncertainty (±)	Voltage drop	Protection
600 µA	0 to 600.00 µA	0.02 to 600.00 µA	0.01 µA	1 % L ± 25 D	0.12 mV / µA	Fuse 11 A / 1 000 V > 20 kA
6 mA	0 to 6 000.0 mA	0.002 to 6.0000 mA	0.1 µA	0.8 % L ± 25 D	25 mV / mA	
60 mA	0 to 60.000 mA	0.020 to 60.000 mA	0.001 mA	0.8 % L ± 20 D	3 mV / mA	
600 mA	0 to 600.00 mA	0.20 to 600.00 mA	0.01 mA	0.8 % L ± 20 D	0.58 mV / mA	
6 A	0 to 6.0000 A	0.2000 to 6.0000 A	0.0001 A	0.8 % L ± 20 D	0.05 V / A	
10 A / 20 A (*)	0 to 20.000 A	0.200 to 20.000 A	0.001 A	0.8 % L ± 20 D	0.05 V / A	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beep sounds above 10 A.
(*) Acceptable overload: 10 to 20 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
Secondary measurements and displays: MAX, MIN, AVG.

AAC RMS current

Range	Operating range	Specified measurement range	Resolution	Uncertainty 40 Hz to 20 kHz (±)(**)	Peak factor	Voltage drop	Protection
600 µA	0 to 600.00 µA	60 to 600.00 µA	0.01 µA	1.5 % L ± 30 D	2.6 @ 500 µA	10 mV / µA	Fuse 11 A / 1 000 V > 20 kA
6.000 mA	0 to 6.0000 mA	0.6000 to 6.0000 mA	0.1 µA	1.2 % L + [0.08 % x (FkHz-1)] L ± 25 D	2.6 @ 5 mA	25 mV / mA	
60 mA	0 to 60.000 mA	6.000 to 60.000 mA	0.001 mA	1 % L + [0.08 % x (FkHz-1)] L ± 25 D	2.6 @ 50 mA	3 mV / mA	
600 mA	0 to 600.00 mA	60.00 to 600.00 mA	0.01 mA		2.6 @ 500 mA	0.58 mV / mA	
6 A	0 to 6.0000 A	0.6000 to 6.000 A	0.0001 A	1 % L + [0.1 % x (FkHz-1)] L ± 25 D	2.8 @ 5 A	0.05 V / mA	
10 A / 20 A (*)	0 to 20.000 A	1.000 to 20.000 A	0.001 A	1.2 % L + [0.1 % x (FkHz-1)] L ± 25 D	3.7 @ 8 A	0.05 V / mA	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beed sounds above 10 A.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.
(*) Acceptable overload: 10 to 20 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
(**) Additional uncertainty with the 300 Hz filter.

AAC+DC TRMS current
Warning: the sum AC+DC must never exceed the range, 600 mA, or 60 mA, or 6 mA, or 600 µA, or 6 A, or 10 A, as the case may be.
The AC component must represent at least 5 % of the amplitude of the AC+DC total for it to be possible to measure it.

Range	Operating range	Specified measurement range	Resolution	Uncertainty AC 40 Hz - 20 kHz (±)(**)	Additional uncertainty DC (±)	Peak factor	Voltage drop	Protection
600 µA	0 to 600.00 µA	60 to 600.00 µA	0.01 µA	1.5 % L ± 20 D	± 20 D	2.6 @ 500 µA	10 mV / µA	Fuse 11 A/1 000 V > 20 kA
6 mA	0 to 6.0000 µA	0.6000 to 6.0000 mA	0.1 µA	1 % L + [0.08 % x (FkHz - 1)]L ± 25 D	± 15 D	2.6 @ 5 mA	25 mV /mA	
60 mA	0 to 60.00 mA	6.000 to 60.000 mA	0.001 mA	1 % L + [0.08 % x (FkHz - 1)]L ± 25 D		2.6 @ 50 mA	3 mV / mA	
600 mA	0 to 600.00 mA	60.00 to 600.00 mA	0.01 mA			2.6 @ 500 mA	0.58 mV / mA	
6 A	0 to 6.0000 A	0.6000 to 6.000 A	0.0001 A	1 % L + [0.1 % x (FkHz-1)]L ± 25 D		2.8 @ 5 A	0.05 V /mA	
10 A / 20 A (*)	0 to 20.00 A	0.600 to 20.000 A	0.001 A	1.2 % L+ [0.1 % x (FkHz-1)]L ± 25 D		3.7 @ 8 A	0.05 V /mA	

The display indicates "OL" above 19.99 A. The ⚠ symbol blinks and a beep sounds above 10 A.
(*) Acceptable overload: 10 to 20 A for 30 s max. with a pause of 5 min between 2 measurements. Ambient temp. 35°C max.
Secondary measurements and displays: FREQ (AC coupling), MAX, MIN, AVG, PEAK.
(**) Additional uncertainty with the 300 Hz filter.

8.4. FREQUENCY

Main frequency measurement
In this setting, you can measure the frequency of a voltage.

Particular reference conditions: 150 mV < U < 600 V
When the switch is set to Hz, the 300 Hz filter is not in service.
Protection: 1 414 Vpk

Range	Operating range	Specified measurement range	Resolution	Intrinsic error
60 Hz	10.00 to 60.00 Hz	10.00 to 60.00 Hz	0.01 Hz	0.1 % L ± 1 D
600 Hz	10.0 to 600.0 Hz	10.0 to 600.0 Hz	0.1 Hz	
6 kHz	0 to 6.000 kHz	0.010 to 6.000 kHz	0.001 kHz	
60 kHz	0 to 60.00 kHz	0.01 to 60.00 kHz	0.01 kHz	
600 kHz	0 to 200.0 kHz	0.1 to 200.0 kHz	0.1 kHz	

Below 10 Hz, or if the signal detection level is inadequate, the reading is forced to zero.

The measured period in ms is available on the second display unit.

Secondary frequency measurement
You can measure the frequency and magnitude of a voltage or of the current simultaneous.
Same accuracy as in the "Hz" setting

Particular reference conditions: 150 mV < U < 600 V
0.15 A < I < 10 A
Max. frequency measurable in volts: 100 kHz
(except 60 mV range → 400 Hz and 600 mV range → 50 kHz)
Max. frequency measurable in amperes: 20 kHz
When the switch is set to VLowZ, Volt or Ampere, if the 300 Hz filter is activated, the measurable frequency remains within the limits of the PB of the filter.
Below 10 Hz, or if the signal detection level is inadequate, the reading is forced to "-----".

8.5. RESISTANCE

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	Specified measurement range	Resolution	Uncertainty	Measurement current	Open-circuit voltage
600 Ω	0 to 600.00 Ω (*)	0.01 Ω	0.2 % L ± 20 D	≈ 1 mA	< 5 V
6 kΩ	0 to 6.0000 kΩ	0.0001 kΩ	0.2 % L ± 20 D	≈ 126.6 µA	
60 kΩ	0 to 60.000 kΩ	0.001 kΩ		≈ 12.6 µA	
600 kΩ	0 to 600.00 kΩ	0.01 kΩ		≈ 1.26 µA	
6 MΩ	0 to 6.0000 MΩ	0.0001 MΩ	1.5 % L ± 30 D	≈ 240 nA	
60 MΩ	0 to 60.000 M*	0.001 MΩ	3 % L ± 30 D	≈ 29 nA	

(*) REL measurements

8.6. CAPACITY

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
6 nF	0.100 to 6.000 nF	0.100 to 6.000 nF	0.001 nF	2 % L ± 30 D	≈ 1.26 µA	≈ 400 ms
60 nF	0 to 60.00 nF	0 to 60.00 nF	0.01 nF	1 % L ± 8 D	≈ 1.26 µA	≈ 400 ms
600 nF	0 to 600.0 nF	0 to 600.0 nF	0.1 nF	1 % L ± 5 D	≈ 1.26 µA	≈ 400 ms
6 µF	0 to 6.000 µF	0 to 6.000 µF	0.001 µF	1 % L ± 5 D	≈ 12.6 µA	≈ 0.125 s/µF
60 µF	0 to 60.00 µF	0 to 60.00 µF	0.01 µF	1 % L ± 5 D	≈ 126.6 µA	≈ 0.125 s/µF
600 µF	0 to 600.0 µF	0 to 600.0 µF	0.1 µF	3 % L ± 5 D	≈ 1 mA	≈ 0.125 s/µF
6 mF	0 to 6.000 mF	0 to 6.000 mF	1 µF	4 % L ± 5 D	≈ 1 mA	≈ 17 s/mF
60 mF	0 to 60.00 mF	0 to 60.00 mF	10 µF	6 % L ± 5 D	≈ 1 mA	≈ 17 s/mF

The use of wires that are very short and shielded is strongly recommended.
Protection: 1 414 Vpk

8.7. DIODE TEST

Range	Resolution	Accuracy	Open-circuit voltage	Measurement current
3 V	0.1 mV	1 % L ± 30 D	< 5 V	< 1.1 mA

Audible signal triggered if < 40 mV ± 10 mV
Protection: 1 414 Vpk

8.8. AUDIBLE CONTINUITY

Range	Resolution	Accuracy	Open-circuit voltage	Measurement current	Protection
600 Ω	0.01 Ω	0.2 % L ± 20 D	< 5 V	< 1.1 mA	1 414 Vpk

Response time: < 100 ms
Triggering threshold: < 30 Ω ± 5 Ω
Protection: 1 414 Vpk

8.9. CLAMP

You can measure a current using various current clamps and obtain a direct reading of the current by selecting the correct transformation ratio, which must be the same as that of the clamp.

If the signal detection level is insufficient, the value is forced to "-----".

The input impedance is approximately 10 MΩ.

Add the error of the clamp to the intrinsic error of the multimeter, specified in the tables below.

DC current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			0.5 % L ± 2 D	0.5 % L ± 2 D	0.05 % L ± 2 D
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		0.5 % L ± 2 D	0.5 % L ± 2 D	0.05 % L ± 2 D	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	0.5 % L ± 2 D	0.5 % L ± 2 D	0.05 % L ± 2 D		
1 000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	0.5 % L ± 2 D	0.05 % L ± 2 D			

Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.

AAC RMS current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			1.5 % L ± 5 D (BW ≈ 400 Hz)	1 % L + 0.25 % x [F(kHz)-1] L ± 5 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz)-1] L ± 3 D (BW: 10 Hz to 100 kHz)
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		1.5 % L ± 5 D (BW ≈ 400 Hz)	1 % L + 0.25 % x [F(kHz)-1] L ± 5 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz)-1] L ± 3 D (BW: 10 Hz to 100 kHz)	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	1.5 % L ± 5 D (BW ≈ 400 Hz)	1 % L + 0.25 % x [F(kHz)-1] L ± 5 D (BW: 10 Hz to 50 kHz)	0.5 % L+ 0.18 % x [F(kHz)-1] L ± 3 D (BW: 10 Hz to 100 kHz)		
1 000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	1 % L + 0.25 % x [F(kHz)-1] L ± 5 D (BW: 10 Hz to 50 kHz)	0.5 % L+ 0.18 % x [F(kHz)-1] L ± 3 D (BW: 10 Hz to 100 kHz)			
Peak factor 3		@ 500 mA	@ 5 A	@ 50 A	@ 500 A	@ 5 000 A

From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.
300 Hz filter: if the filter is active, see "300 Hz filter" curve for the additional uncertainty.

AAC+DC TRMS current

Range / Ratio		600 mA	6 A	60 A	600 A	6 000 A
1 mV/A	Resolution			0.01 A	0.1 A	1 A
	Accuracy			1.5 % L ± 15 D (BW ≈ 400 Hz)	0.8 % L + 0.18 % x [F(kHz) -1] L ± 15 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz) -1] L ± 13 D (BW: 10 Hz to 100 kHz)
10 mV/A	Resolution		0.001 A	0.01 A	0.1 A	
	Accuracy		1.5 % L ± 5 D (BW ≈ 400 Hz)	0.8 % L + 0.18 % x [F(kHz) -1] L ± 15 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz) -1] L ± 13 D (BW: 10 Hz to 100 kHz	
100 mV/A	Resolution	0.1 mA	0.001 A	0.01 A		
	Accuracy	1.5 % L ± 5 D (BW ≈ 400 Hz)	0.8 % L + 0.18 % x [F(kHz) -1] L ± 15 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz) -1] L ± 13 D (BW: 10 Hz to 100 kHz		
1 000 mV/A	Resolution	0.1 mA	0.001 A			
	Accuracy	0.8 % L + 0.18 % x [F(kHz) -1] L ± 15 D (BW: 10 Hz to 50 kHz)	0.5 % L + 0.18 % x [F(kHz) -1] L ± 13 D (BW: 10 Hz to 100 kHz			
Peak factor 3		@ 500 mA	@ 5 A	@ 50 A	@ 500 A	@ 5 000 A

From 1 kHz, the measurement must exceed 15 % of the range.
Secondary measurements and displays: MAX, MIN, AVG and transformation ratio of the sensor.
300 Hz filter: if the filter is active, see "300 Hz filter" curve for the additional uncertainty.

8.10. TEMPERATURE

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

Range	Measurement current	Resolution	Accuracy	Protection
-200°C to + 800°C	< 1 mA (Pt100) < 0.15 mA (Pt1000)	0.1°C	0.1 % L ± 5°C	1 414 Vpk

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

8.11. PEAK

Add 1 % L ± 30 D to obtain the accuracy corresponding to the function and the range.
Fmax 1 kHz (1 ms)
Protection 1 414 Vpk

8.12. SURV

MIN, MAX, AVG
Add 0.2 % L ± 2 D to obtain the accuracy corresponding to the function and the range.
Acquisition time of the extrema approximately 100 ms
Protection 1 414 Vpk

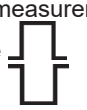
8.13. RESISTIVE POWER

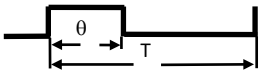
Display of the resistive power with respect to a reference resistance measured on the installation and saved in memory using the HOLD key (600 Ω is the default).

The function determined is:	(measured AC+DC voltage) ² / VRef
Range:	DC, AC and AC+DC
Resolution:	1 mW
Accuracy:	2 x accuracy VAC (in %)
Max. measurement voltage:	1 000 VAC+DC
Protection:	1 414 Vpk
Unit of display:	W

8.14. DUTY CYCLE

Display of the measurement in % of a logical signal (TTL, CMOS, etc.) in "AC+DC" mode.





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 95 % 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
Protection:	1 414 Vpk

8.15. PULSE WIDTH

() ()

Depending on frequency counter triggering conditions.

Resolution:	10 µs
Minimum pulse width:	100 µs
Accuracy:	0.1 % ± 10 µs
Maximum duration of a period:	1.25 s (0.8 Hz)
Triggering threshold:	20 % of the range except 1 000 VAC range
This threshold is:	positive in  , negative in  .

Additional error on the measurement due to the slope at the zero crossing: See § Measurement of duty cycle

Protection:	1 414 Vpk

8.16. dBm

Display of the measurement in dBm with respect to a resistance reference chosen by the user from among 50 Ω, 75 Ω, 90 Ω and 600 Ω, (default value 600 Ω).

Resolution:	0.1 dBm
Absolute error in dBm:	0.09 x relative error VAC expressed in %
Additional calculation error:	0.1 dBm
Measurement range:	10 mV to 1 000 V
Protection:	1 414 Vpk

8.17. OPERATION OF THE AUDIBLE BEEP

Beep reporting a valid key	High-pitched sound
Beep reporting an invalid key	Low-pitched sound
Successive beeps reporting an overshoot of the danger threshold (alarm)	High-pitched sound
Successive beeps reporting recording of the MAX, MIN, PEAK	High-pitched sound
Successive beeps (alarm) → current > 10 A	High-pitched sound
Continuity measurement	Medium-pitched sound

8.18. VARIATION IN THE NOMINAL RANGE OF USE

Quantity of influence	Range of influence	Quantity influenced	Influence	
			Typical	MAX
Batt. voltage	4 V to 6 V	all	< 3 D	0.2 % L + 1 D
Temperature	-10°C… 18 28 ... 55°C	VDC mV	0.02 % L ± 0.2 D / 1°C	0.04 % L ± 0.25 D / 1°C
		VAC mV, VLowZ mV	0.08 % L ± 0.2 D / 1°C	0.15 % L ± 0.25 D / 1°C
		VDC	0.01 % L ± 0.1 D / 1°C	0.05 % L ± 0.1 D / 1°C
		VAC, VAC+DC, VLowZ		0.25 % L ± 0.1 D / 1°C
		ADC	0.05 % L ± 0.1 D / 1°C	0.1 % L ± 0.1 D / 1°C
		AAC and AAC+DC	0.08 % L ± 0.1 D / 1°C	0.12 % L ± 0.1 D / 1°C
			0.01 % L ± 0.1 D / 1°C	0.1 % L / 1°C
		Ω	0.05 % L / 1°C	0.1 % L / 1°C
		60 MΩ		0.3 % L / 1°C
		µF		0.2 % L ± 0.1 D / 1°C
		mF		0.6 % L ± 0.1 D / 1°C
		Hz		0.01 % L / 1°C
		Temp.		± 2°C + 0.05 % L / 1°C
		Stabilization time	≈ 2 h	2.5 h
Humidity (without condensation)	10 % ... 80 % HR	V A  Ω (*) Hz	0	0
CEM (immunity to the radiated field)	300 MHz... 500 MHz	Ω clamp		600 cts
	300 MHz... 500 MHz			450 cts
Common mode	1 000 V 50 Hz	VAC, VAC+DC, VLowZ	Range / Typical	
			60 mV 600 mV: > 35 dB	
			6 V: > 60 dB	
			60 V 600 V 1 000 V: > 95 dB	

8.19. RESPONSE OF THE 300 HZ FILTER

9. GENERAL CHARACTERISTICS

9.1. ENVIRONMENTAL CONDITIONS

Altitude:	> 2 000 m
Reference range:	23°C ± 5°C
Specified range of use:	- 10°C to 55°C
Influence of temperature:	see § Influences
Relative humidity:	0 % to 80 % from 0°C to 31°C 0 % to 70 % from 40°C to 55°C Limited to 70 % for the 6 and 60 MΩ ranges
Dust- and water-tightness:	IP 67 (in the event of immersion, under 1 m of water for 30 min, it is necessary to let the water flow off or to let the unit dry before putting it back into service).
Storage range:	- 20°C to 70°C

9.2. POWER SUPPLY

The multimeter is powered by primary or rechargeable batteries:

- Batteries, 4 x 1.5 V nominal - LR6, Alkaline
  Life in VDC:
  MTX 3290 ≈ 200 h
  MTX 3291 ≈ 300 h
- Rechargeable batteries, 4 x 1.2 V, A-A, Ni-MH LSD, 2 400 mAh
  Life in VDC:
  MTX 3290 ≈ 140 h
  MTX 3291 ≈ 210 h

9.3. DISPLAY

The refresh rate of:
- the display unit is 200 ms
- the bargraph is 100 ms

9.4. CE

Security
According to NF IEC/EN 61010-1:

- Insulation class 2
- Degree of pollution 2
- Use indoor
- Altitude < 2 000 m

Measurement category of the "measurements":
MTX 3290: 600 V CAT III and 300 V CAT IV with respect to earth
MTX 3291: 1 000 V CAT III and 600 V CAT IV with respect to earth

CEM
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

10. MECHANICAL CHARACTERISTICS

10.1. HOUSING

- Dimensions 196 x 90 x 47.1 mm
- Mass 570 g
- Materials Polycarbonate PC
- Dust- and water-tightness IP 67, according to NF EN 60529

11. SUPPLY

11.1. SUPPLIED WITH THE INSTRUMENT

- Directions for operation in 5 languages
- SX-DMM software on USB drive (**MTX 3291**, only)
- Getting started guide
- 1 set of safety leads (red and black) with double insulation probe tip (∅ 4 mm) 1 000 V CAT III 20 A
- 1 set of 4 AA / R6 batteries
- 1 statement of manufacturer's measurements
- Optical USB communication lead (**MTX 3291**, only)
- 1 carrying case (**MTX 3291**, only)

11.2. OPTIONAL

- Current clamps (see table below)
- Two-wire Pt100 temperature probe (HX0091)
- Two-wire Pt1000 temperature probe (HA1263)
- Metrology software for Windows
- Set of 4 rechargeable batteries (external charger)
- External charger for 4 Ni-MH rechargeable batteries (HX0053)
- HT probe (SHT 40 kV)
- CMS clamp (HX0064)
- Multiflix adapter for DMM

Spare

- **MTX 3291**: Fuse, 11 A: 10 x 38 - 1 000 V - Fast - breaking capacity: > 20 kA
- **MTX 3290**: Fuse 10 A: 6 x 32 - 600 V - Fast - breaking capacity: > 50 kA
  (Get in touch with our Manumesure Regional Technical Centre)
- Kit of test accessories for DMM
- Carrying case with Multiflix (HX0052B)

List of clamps set to  mV/A	Ratio
Miniflex MA 100 from 0.5 to 3 000 AAC - 10 Hz to 20 kHz	1 or 10 or 100
Ampflex A100 from 0.5 to 3 000 AAC - 10 Hz to 20 kHz	1 or 10 or 100
MNXX or MN 73 clamps from 0.1 to 240 AAC - 40 Hz to 10 kHz	10
E3N-6N clamps from 0.05 to 80 AAC/DC - DC to 8 kHz	1 or 10 or 100
PACXX clamps from 0.2 to 1 400 AAC/DC - DC to 10 kHz	1 or 10

12. WARRANTY

Except as otherwise stated, our warranty is valid for **3 years** starting from the date on which the equipment was sold. The Extract from our General Conditions of Sale is available on our website.

www.group.chauvin-arnoux.com/en/general-terms-of-sale

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.

metrix

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