100,000-count Graphical Multimeters

MTX 3281
MTX 3282
MTX 3283

User's Manual

Pôle Test et Mesure CHAUVIN-ARNOUX
Parc des Glaisins
6, avenue du Pré de Challes
F - 74940 ANNECY-LE-VIEUX
Tel. +33 (0)4.50.64.22.22 - Fax +33 (0)4.50.64.22.00
X02947G00 - Ed. 1 - 05/13

Contents

General instructions

Introduction

You have just acquired a 100,000-count **graphical multimeter.**

Thank you for your trust in our products.

It complies with safety standard EN 61010-1, double insulation, relative to electronic measuring instruments.

For optimum service, read this manual carefully and comply with the operating precautions.

Symbols used on the instrument

Warning: Risk of danger.
Refer to the operating manual to find out the nature of the potential hazards and the action necessary to avoid such hazards.

Earth terminal

Equipment protected throughout by double insulation.

The rubbish bin with a line through it means that in the European Union, the product must undergo selective disposal for the recycling of electric and electronic material, in compliance with Directive WEEE 2002/96/EC.

Attention : Risk of electrical shock

Precautions and safety measures

- Read carefully all the notes preceded by the symbol ⚠ .
- If you use this instrument in a way which is not specified, the protection which it provides may be compromised, putting you in danger.
- The safety of any system incorporating this instrument is the responsibility of the system assembler.
- This instrument has been designed for use indoors:
  - in an environment with pollution level 2,
  - at an altitude of less than 2000 m,
  - at a temperature between 0° C and 55° C
  - with relative humidity of less than 80% up to 31° C.

⚠

- Measurement category III for voltages no higher than 1000 V (AC or DC) in relation to the earth.
- Measurement category IV for voltages no higher than 600 V (AC or DC) in relation to the earth.

Definition of measurement categories

CAT III: Measurement category III corresponds to measurements on building installations.
Example: measurements on distribution panels, cabling, etc.

CAT IV : Measurement category IV corresponds to measurements taken at the source of low-voltage installations
Example: metering and measurements on overvoltage protection devices...

before use

- Comply with environmental and storage conditions.
- For your safety, only use the leads delivered with the instrument: they comply with the norm EN 61010-031.
- The mounted probes must have an assigned measurement category III or IV and a rated voltage rated at least equal to the voltage of the circuit to be measured.
- Before using it, systematically check that it is in perfect condition.

during use

- Never exceed the protection limit values indicated in the specifications for each type of measurement.
- Before changing the function, disconnect the measurement leads from the circuit measured.
- Never measure resistances on a live circuit.
- When the instrument is connected to the measurement circuits, never touch an unused terminal.

General instructions (cont'd)

Safety features

- It is impossible to access the battery or fuse compartment without first disconnecting the measurement leads.
- When measuring voltages greater than 60 VDC or 30 VAC, the ⚠ symbol flashes on the display.
- Automatic detection of a connection on the "Ampere" terminal.
- When there is a persistent range overrun, an intermittent buzzer indicates the risk of electric shock.

Maintenance and metrological verification

Any access to the internal circuits for adjustment, servicing or repair of the unit *under power* must be undertaken only by qualified personnel, after reading the instructions in this manual.

A **qualified person** is a person who is familiar with the installation, its construction, its use and the hazards that exist. They are authorized to activate and deactivate the installation and equipment, in compliance with the safety instructions.

For all repairs under or outside of the warranty, return the device to your retailer.

Warranty

This equipment is guaranteed for **3 years** against any defect in materials or workmanship, in accordance with the general terms and conditions of sale, .

During this period, the equipment can only be repaired by the manufacturer. The manufacturer reserves the right to carry out repair or replacement of all or part of the equipment.
If the equipment is returned to the manufacturer, initial transport costs shall be borne by the customer.

The **warranty** does not apply in the event of:

- unsuitable use of the equipment or use with other incompatible equipment
- modification of the equipment without explicit authorization from the manufacturer's technical services
- repair carried out by a person not certified by the manufacturer
- adaptation to a specific application, not provided for in the definition of the equipment or by the operating manual
- an impact, a fall or flooding.

Unpacking - repacking

All the equipment was verified mechanically and electrically before shipping.

When you receive it, carry out a quick check to detect any damage that may have occurred during transport. If necessary, contact our sales department immediately and register any legal reservations with the carrier.

In the event of reshipping, it is preferable to use the original package. Indicate the reasons for the return as clearly as possible in a note attached to the equipment.

Cleaning

- Turn the instrument off.
- Clean it with a damp cloth and soap.
- Never use abrasive products or solvents.
- Allow to dry before any further use.

General instructions (cont'd)

Measurement input protection systems

These multimeters are equipped with several protection systems:

- Varistor protection clips any transient overvoltages on the measurement terminals.
- PTC (positive temperature coefficient) protection protects against permanent overvoltages less than or equal to 1000 V during capacitance or resistance measurements and diode tests.
  This protection is reset automatically after the overload.
- A fuse (11 A) provides protection during intensity measurements.

Special functions

Automatic current measurement detection

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

☝ ***When a function modification by the control keyboard is incompatible with the lead connection, it triggers a buzzer and a visual alarm (LEADS).***

The current measurement is performed using autorange over the whole range.

Auto power-off

If the function is validated in the Sleep menu: the instrument shuts down automatically after 30 minutes if no action has occurred on the front panel during that time.

The instrument can be powered up again by pressing the key.

☝ *Automatic power-off is inhibited in:*

- ***Surveillance** mode (SURV)*
- ***Memorize** mode (MEM)*
- ***Communication** mode (optical link - RS232C, USB, Bluetooth)*
- *when the value measured (Voltage or Current) on the multimeter's inputs exceeds the danger level.*

Alert signal

An intermittent buzzer sounds:

- on the "Voltage" position, when the range is exceeded (**MANU**al and **AUTO** mode - last range)
- on the "Current" position, when the range is exceeded (**MANU**al) mode, when 10 Amperes or more is measured
- if the position of the leads and the function selected are incompatible
- when the danger thresholds are exceeded (function activated)

When the range is exceeded, the buzzer is accompanied by display of "**O. L**".

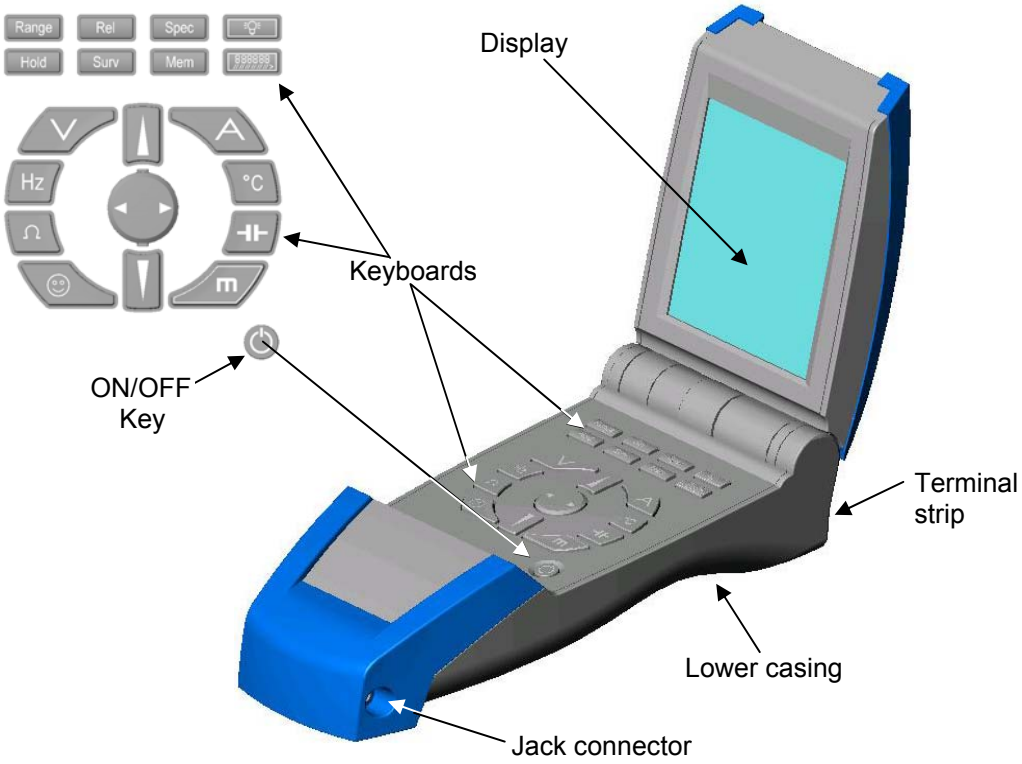
Danger threshold

When this symbol is activated:

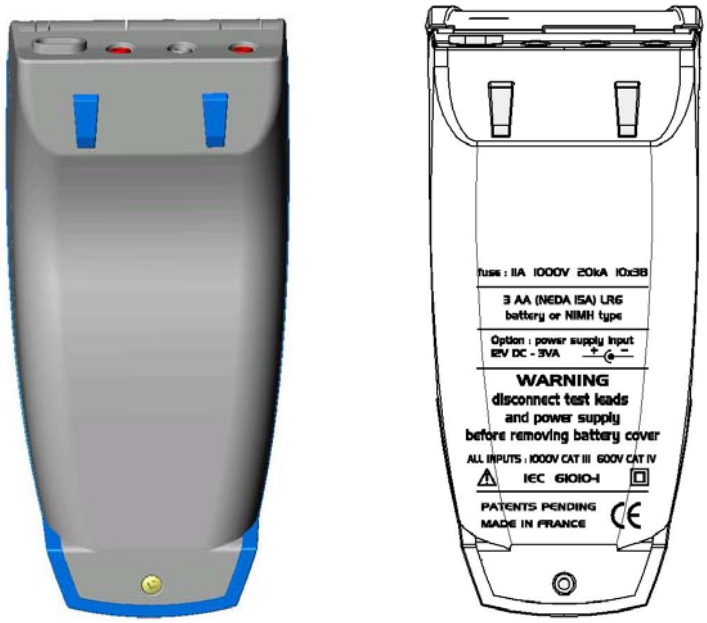
- the voltage on the "**V**olt**"** input exceeds **60 VDC** or **30 VAC**
- the current injected between the "**A**mpere**"** and **COM** exceeds **10 A**
- the range is exceeded (voltage or current) in **MAN**ual mode

Description of the instrument

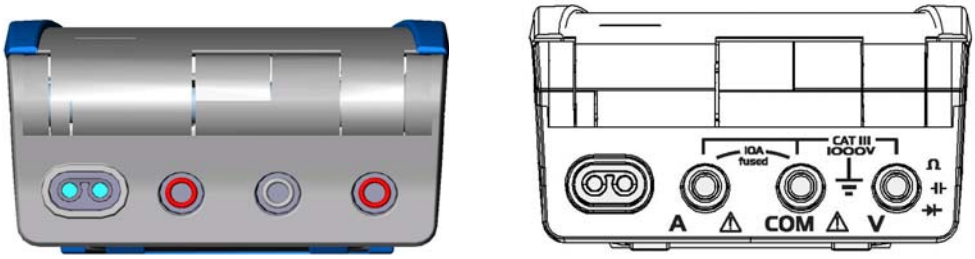
Front panel + keyboards (illustration)



Rear (illustration + markings)



Measurement terminal block (illustration + markings)



Description of the instrument (cont'd)

Front (description)

1 power on/off key

- Starting the multimeter.
- Stopping the multimeter.

If there is a multimeter malfunction, a long press (> 1 s) on this key can be used to return to normal operation.

8 keys for selecting the main functions

Voltage measurement or access to the measurement type: AC, DC or AC+DC

- Selection using this key or the  keys.
- Validation using the  key or after 2 s.

Current measurement or access to the measurement type: AC, DC or AC+DC

- Selection using this key or the  keys.
- Validation using the  key or after 2 s.

Measurement of **Frequency** (Hz) on a VAC voltage or access to the manual frequency range < 900 kHz (default) or > 900 kHz.

A long press opens the menu for changing the voltage range.

- Selection using the  keys.
- Validation using the  or  keys.

Voltage range quick change using the  ***keys.***

The selected range is recalled in the help line (**i**), see page 9.

Measurement of **Resistance** (Ohm)

By pressing again:

- Access to the **Continuity** test (♪)
- Access to **Diode** test (→|)

Measurement of **Temperature** or access to the types of temperature measurements: ° C, ° F or K.

- Selection using the  keys.
- Validation using the  key or after 2 s.
- By pressing this key during measurement type selection, you can access the sensor type:
  - platinum probes: Pt 100, Pt 1000 only on **MTX 3282** and **MTX 3283**
  - thermocouples: J (TC J), K (TC K)
- Selection using the  keys.
- Validation using the  key or after 2 s.

The selected scale is recalled in the help line (**i**), see page 9.

Measurement of **Capacitance**

"**Favourite**" measurement configurable by the user.

A long press opens the "favourite" function configuration menu.

For the menu's configuration, see §. ☺ Function.

Description of the instrument (cont'd)

Instrument **Configuration** menu.
This key can also be used to exit from a menu or submenu after validating it.

3 keys for navigation and modification of the menus

- Selection of a **menu** or **function** (up/down navigation).
- Increase or decrease of the variable selected.

- Selection of a **function** (left/right navigation).
- Modification of a function.
- Movement within sub-menus.

6 keys for activating the instrument's various modes

Selection of the operating mode:
AUTO, AUTO PEAK (**MTX 3282, MTX 3283**), **MANU.**

- Selection using this key or the  keys.
- Validation using the  key or after 2 s.

If the measurement is single range, the range defined is forced and there is no effect if this key is pressed.

Example: *Diode test, continuity test and temperature measurement.*

By pressing one of the  keys, you can switch directly to **MANU**al mode and then modify the range.

Activation, deactivation of the **REL** (relative) mode.
When it is active, a long press opens a window for setting the reference.

Activation, deactivation of the display of the **specifications** for the function and range selected.

Activation of **HOLD** or **AUTO HOLD mode**, deactivation **NO HOLD**.

- Selection using this key or the  keys.
- Validation using the  key or after 2 s.

Activation, deactivation of the **SURV** (surveillance) mode.
A long press opens a window for viewing the most recent records.
Closed by a short press.

Activation, deactivation of the **MEM** (automatic recording) mode.
A long press opens the **MEM Function menu.**

2 utility keys

Back-lighting of the display in dark environments.
A long press opens the menu for adjusting the **contrast** on the LCD.

Selection of the functions for the **3 secondary displays**.

- Selection by successive presses on this key.
- A long press can be used to exit from this mode.

Description of the instrument (cont'd)

Inputs

V Ω ⊣⊢ ⊳|

Input for voltage and frequency measurements, diode tests, resistance measurements, continuity tests, and capacitance or temperature measurements.

A

Input for current measurements.

COM

Reference input.

Display

- The multimeters in this range are equipped with a graphical LCD screen (58 mm x 58 mm) with 160 x 160 resolution for comfortable reading.
- Reading of the LCD can be optimized by varying the orientation of the display, the adjustment of contrast and, if necessary, using the backlighting.
- The modes, the functions selected, the electrical or physical values measured and the alert symbols are clearly shown on the display.

(foot of the screen) i

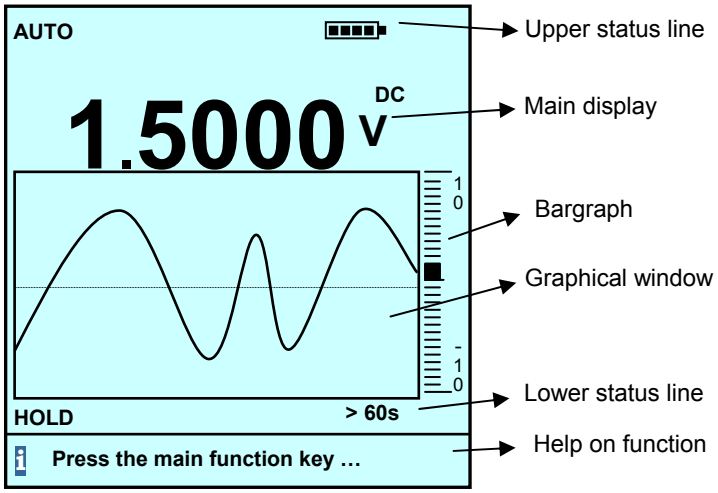
- The user can call up help (**i**) regarding the function selected.
- The main display is accompanied by its sign and the unit.

Depending on the current selections, the display may be graphical or digital:

Graphical display

The graphical window can be used to monitor the evolution of the principal measurement.

Example

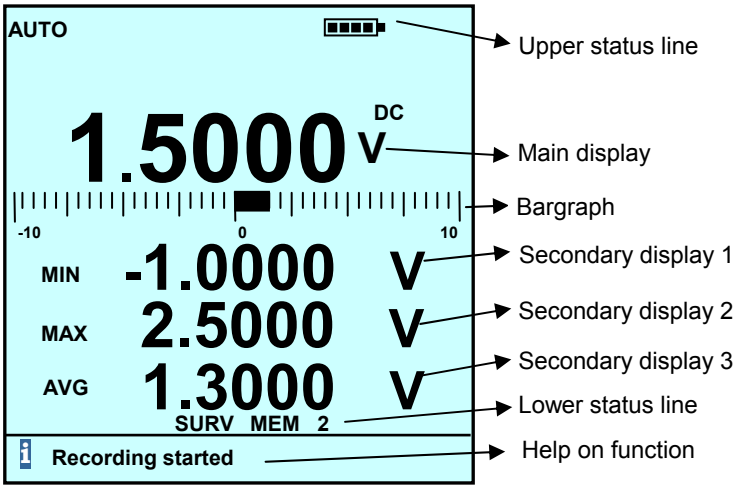


The graphical window and the bargraph constantly track the evolution of the measurement in the range selected.

Display of secondary functions

The secondary displays are intended for the SPEC, REL, MEM, SURV and ***888888*** functions:

Example



The main display and the bargraph constantly track the evolution of the measurement.

Functional description

Preparation for use

Instructions before activation

To use this instrument, you must comply with the usual safety rules in order:
- to protect you against the dangers of the electric current,
- to protect the multimeter against incorrect operations.

For your safety, only use the leads delivered with the instrument. Before using it, systematically check that it is in perfect condition.

Instrument power supply

- The 3 multimeters in this range operate with three 1.5 V alkaline batteries (LR6-AM3 AA) or three 1.2 V Ni-MH rechargeable batteries (accumulators) of the same type:

  ↳ The **MTX 3281** is delivered with three 1.5 V alkaline batteries (LR6-AM3 AA). It can operate with accumulators, but does not allow in situ recharging (see §. Accessories delivered as options).

  ↳ The **MTX 3282** and **MTX 3283** multimeters are delivered with three 1.2 V Ni-MH accumulators and charger (12 VDC 7.2 VA) for mains operation whilst simultaneously charging the batteries.

- When the charger is connected directly to the instrument, the accumulators can be recharged without removing them from the multimeter.
- The multimeter can only operate if the accu./batteries are in place.

Power on

Using the key *opposite.*

Charge indicator

A charge status indicator for the batteries or accumulators is constantly shown on the display:

: Batteries or accumulators > 75 % charged

: Batteries or accumulators > 25 % charged

: minimum charge level < 25 %

The symbol flashes on the display and a buzzer sounds if the power voltage is insufficient (only 30 min charge life).
As the specifications will no longer be guaranteed, you must then replace the batteries or recharge the accumulators (see next page).

There can be differences between the display of the charge level (symbol) and the real charge level of the accumulators, according to the quality and the performances of those.

To avoid this risk, we recommend to use same accumulators (HX0051) as those delivered by the manufacturer (see p. 43).

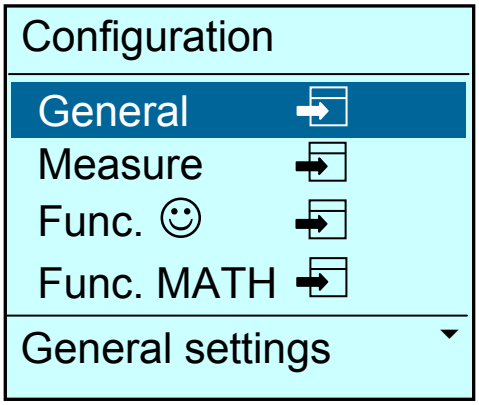
When getting started, the apparatus needs a few seconds to display a correct level of charge (symbol).

Functional description (cont'd)

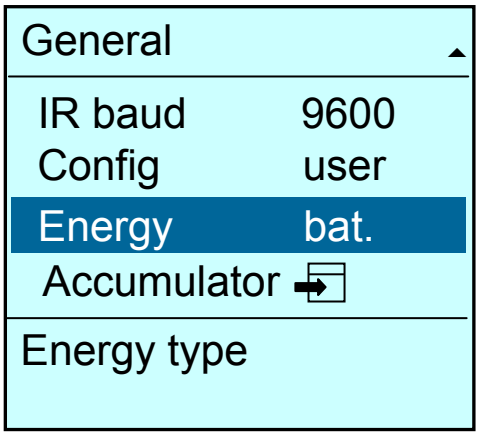
Selection of energy type

For correct management of the battery or accumulator charge status indicator, the type of power must be selected:

- Opening of the **Configuration** menu with the key.
- Selection of the "**General**" function using the keys.
- Validation of **General settings** using the key**.**



- Selection of **Energy Type** menu using the keys.



- Modification of the Energy Type (battery or acc.) using the key**.**
- Validation and exit from the successive menus using the key.

Recharging the accumulators

Before carrying out this operation, check that the accumulators are fitted in the instrument ; they do not need to be removed from the multimeter to be recharged.
Recharging is only possible if "Accumulator" has been selected in the Energy Type menu (see above).

If you try to recharge the accumulators when the batteries are fitted in the multimeter, it could damage it.

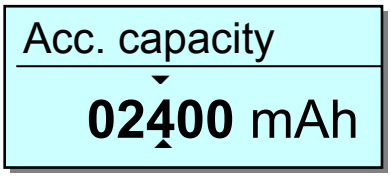
For safety reasons, the accumulators should only be loaded at between 0 and 40°C.

Caution ***High internal temperature due to a current measurement may trigger the thermal security mechanism.***

Functional description (cont'd)

Recharging the accumulators (cont'd)

- Before carrying out this operation, select the capacity of the accumulators (2400 mAh by default) fitted in the instrument:
- Selection: Accumulator in the using the keys.
- Validation: Accumulator using the key, opens a menu for setting the accumulator capacity (in mAh):



- Selection of the digit to be modified using the key.
- Modification of the value using the key.
- Validation of the accumulator capacity and exit from the successive menus using the key .

To maintain the accumulators in good condition, run the accumulators down to the minimum charge level before recharging.

- Then connect the power pack (12 VDC, 7.2 VAC) to the jack connector (see front panel illustration).
- Connect the power pack (12 VDC, 7.2 VAC) to the mains supply.

The symbol opposite on the display allows you to monitor the charge status.

The accumulators are fully charged when the symbol is full .

The **MTX 3282** and **MTX 3283** multimeters contain Ni-MH accumulators. These accumulators must be disposed of by a recycling firm or a company specialized in the treatment of dangerous waste materials.

Never dispose of these accumulators with other solid waste. For further information, contact your MANUMESURE dealer.

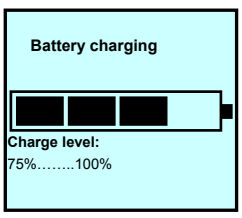
When the multimeter is delivered, the accumulators may be discharged, requiring a complete recharge.

Recharging the accumulators with multimeter off

Do not connect the wall plug when there are disponible batteries in the instrument.

Connection of the wall plug starts recharging the accumulators.

The scrolling symbol shows the progress of recharging.



Once the accumulators have been fully recharged, the instrument shuts down automatically.

Functional description (cont'd)

Wall plug power unit

Use only the charger that is delivered with this device, which is a 2nd generation multimeter. The charger from the previous generation is not compatible.

Recharging totally discharged accumulators or new batteries

1. Fit the batteries into the multimeter, then connect the charger.
2. Wait approximately 30 minutes, then press the ON button to switch on the multimeter and follow the progress of the charge.
   Average charging period : 7h30 (with 2400 mAh accumulators)

☝ *After one effective hour of recharging, the multimeter can be used for measurements, by pressing again on the ON button.*

"A measurement" protection fuse

A fuse provides protection up to 11 A for current measurements. It must be replaced only with an identical fuse:

11 A, 20 kA, 1000 V, 10 x 38 mm (High Interrupting Capacity).

Checking of current measurement fuse

Test the current measurement as follows:

1. Select the Ampere function using the A key.
2. Connect a lead to the A terminal.
3. Check that the LEADS indication disappears from the display (presence of lead). If this is not the case, replace the fuse.

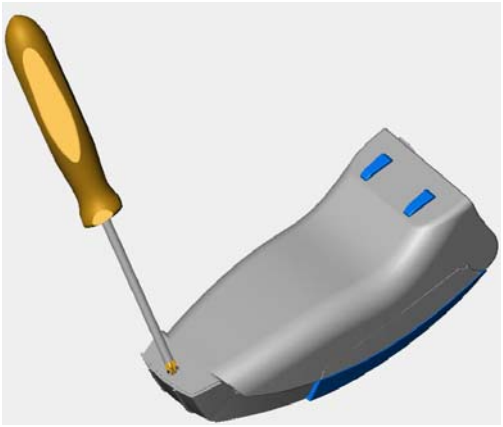
Replacement of the fuse or the batteries

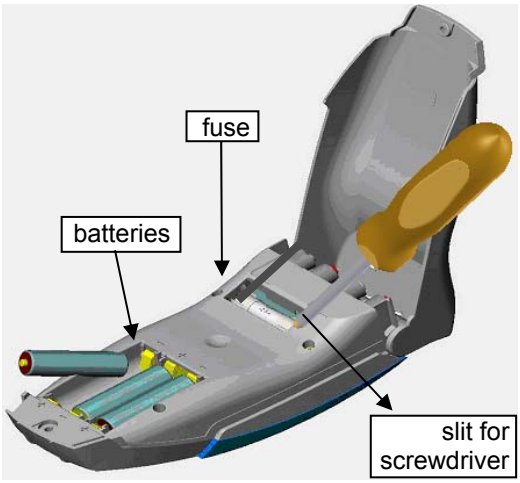
Before replacing the fuse or batteries, comply with the safety instructions given at the beginning of this manual. Then:

1. Disconnect the test leads from the measurement circuits and the instrument.
2. Disconnect the power lead from the **MTX 3282** or **MTX 3283** 12 VDC power pack.
3. Switch off the power to the instrument.
4. Undo the screw on the back of the instrument.
5. Pivot the rear cover of the casing to access the battery/fuse compartment.
6. Remove the fuse or batteries and replace them with identical models.
7. Replace the cover and retighten the screw.

☝ ***Without batteries, the date and time are kept for ca. 1 min in the instrument.***
The measurements recorded are kept for an unlimited time.

Dismantling of multimeter and access to battery/fuse compartment



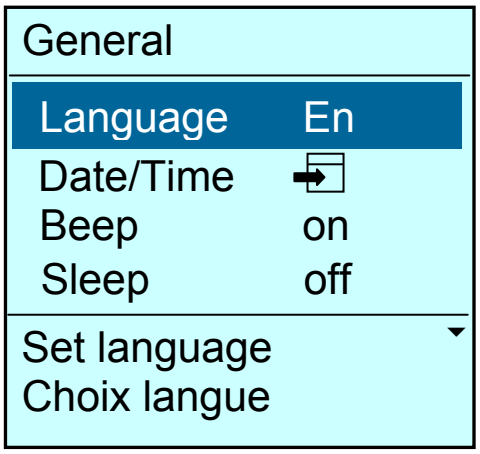


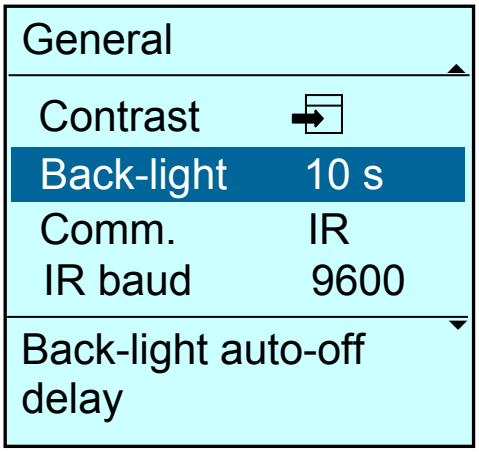
Functional description (cont'd)

Initial settings

The general menu configures the parameters of the multimeter according to the conditions of use and the user's preferences.

- Opening of the **Configuration** menu with the key.
- Selection of the **General** menu using the keys and then the key.

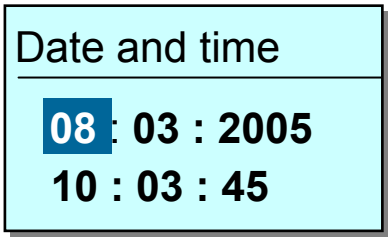




Choice of language

Selection of the language for the multimeter's menus.
Two options are available: French (**Fr**) or English (**En**, default).

Setting the date and time



- Selection of the variables using the key.
- Modification of the value using keys.
- Clock validation and start-up when menu is closed using key.

Activation of the buzzer (Beep)

Validation (default), or not , of audio signal (beep) when:

- a key is pressed,
- there is a voltage of more than 60 VDC or 30 VAC on the "V" input,
- a stable measurement is acquired in AUTO HOLD mode,
- the power supply voltage (battery) is insufficient.

☝ *The audio signal is maintained even when the buzzer is deactivated :*

- *during continuity testing,*
- *when the range is exceeded (voltage or current),*
- *on a 10 A measurement,*
- *if the position of the leads and the function selected are incompatible.*

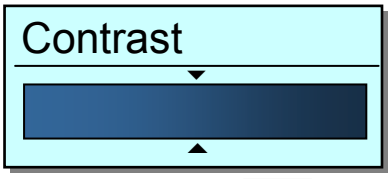
Automatic shutdown (sleep)

Validation (default), or not, of automatic shutdown (**sleep**) after 30 min if there has been no action on the multimeter's front panel during that time.

In **SURV**, **MEM** and **Communication modes,** automatic shutdown is not validated.

For your safety, automatic shutdown is inhibited when the values measured (voltage, current) on the inputs exceed the danger thresholds (*indicator opposite displayed*).

Display contrast



- Modification of the value (default: 50 %) using the key.
- Validation of setting using key.

☝ *A long press on directly opens the menu, validates the setting.*

Functional description (cont'd)

Adjustment of back-lighting

Selection of the **back-lighting** deactivation time to limit the multimeter's energy consumption.

6 times are possible: **10 s**, **30 s, 1 min, 2 min, 10 min** or **infinite** (no deactivation).

☝ ***By default, the back-lighting deactivation time is 2 min.***

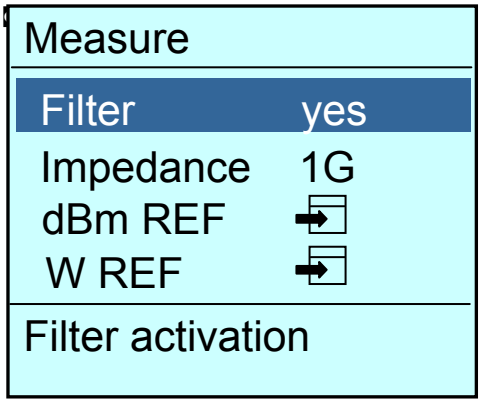
Start-up configuration (Config)

- In **user mode**, the instrument restarts with the user's personal configuration and the main function selected when it was switched off.
- In **basic** mode, by default, the multimeter restarts with its elementary configuration and the Volt (AC+DC) function.

☝ ***Restart configuration indicated without leads connected. If the leads are connected, they will be taken into account for function selection.***

Specific configurations of the instrument

Using the Measure menu, you can adapt the instrument's configuration to the measurement environment:



- Opening of the **Configuration** menu with the m key.
- Selection of the **Measure menu** using the ▲▼ keys and then the ◄► key.

Filter

Activation of a **filter** to improve frequency rejection for measurements in low VDC mode.

☝ ***By default, filter active.***

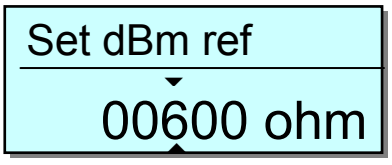
Impedance

Choice of the required input **impedance** on the 100 and 1000 mV (1 V) ranges.
- 100 mVDC and AC+DC range: 2 possible impedances: 1 GΩ or 10 MΩ
- 1000 mV mVDC range: 2 possible impedances: 1 GΩ or 20 MΩ

☝ ***By default, 100 mV range = 10 MΩ, 1000 mV range = 20 MΩ***

dBm REF
MTX 3283

Adjustment of the reference resistance value (dBm REF) between 1 Ω and 10,000 Ω, for measurements in dBm on VAC or VAC+VDC voltages:



- Selection of the digit to be modified using the ◄► key.
- Modification of the value using the ▲▼ keys.
- Validation of the reference resistance in dBm and exit from the menu using the m key.

☝ ***Default value 600 Ω.***

Reminder *A 0 dBm measurement with a 600 Ω reference resistance is given on a voltage of 0.7746 VAC.*

Functional description (cont'd)

W REF
MTX 3283

Adjustment of the reference resistance value (**W REF)** between 1 Ω and 10,000 Ω for resistive power measurements:

The calculation performed is: (voltage measured)^2 / **W REF** (unit W)
(current measured)^2 ∗ **W REF** (unit W)

The adjustment procedure is the same as for the dBm reference resistance.

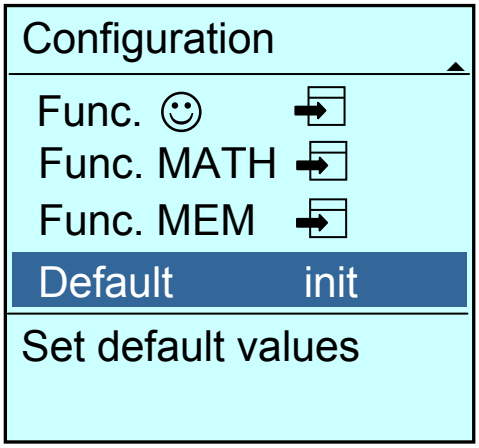
Default value 50 Ω

W REF is used to calculate the resistive power (W) with REF = W REF and to calculate the power (V ∗ A) when V (Ref) = W REF

Initialization of the values

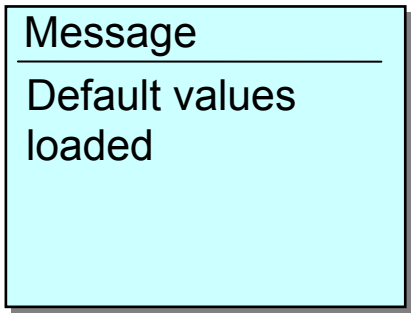
The parameters of the configuration can be reinitialized to the default settings in a single operation:

- Opening of the **Configuration** menu with the m key.



- Selection of the "**Default init"** function using the keys.
- Validation of initialization using the key.

Loading of the default values is confirmed by the following message:



Exit from the successive menus using the m key.

The language and the active main function are not modified.

Default values

General	Language :	Fr	Beep :	on
	Sleep :	on	Contrast :	50 %
	Lighting :	2 min	Communication :	IR
	IR baud :	9600	Configuration :	basic
	Energy 3281 :	battery	Energy 3282, 3283 :	accu.
	Accu. capacity :	2400 mAh	Communication protocol :	MODBUS
Measure	Filter :	active	Impedance :	10 / 20 M
	dBm REF :	600 Ω	W REF :	50 Ω
Favourite func. **MATH func.**	Function :	V	Unit :	none
	Coef. A :	1	Coef. B :	0
MEM func.	Recording freq. :	1 s		
	No. of rec. 3281 :	158	No. of rec. 3282, 3283 :	1000
Main func.	V, A :	AUTO, AC+DC	Hz :	10 V range
	Ω, Capacity :	AUTO	° C :	° C, Pt 100

Functional description (cont'd)

Access to main functions

Connection of leads

The input terminals are limited to 3 : **COM, V,** Ω, ⇥ ⫫ and **A**.
Connect the black lead to the **COM** socket (for all measurements).

Functions authorized when connected on the V Ω ⇥ terminal ⫫

Voltage measurement (Volt).
PEAK is displayed when a peak (Pk+ Pk-measurement) of voltage is detected and when it is higher than the range of active voltage.

Measurement of **Frequency** (Hz) on a VAC voltage.

A 1st press gives access to **Resistance** measurements (Ohm).
A 2nd press gives access to **Continuity** measurements ( ).
A 3rd press gives access to **Diode** measurements ( ).

A 1st press gives access to **Temperature** measurements (according to the last configuration of the function).
A 2nd press gives access to the ***type of temperature measurement: ° C, ° F, K.***
Selection using the keys, validation using the key or after 2 s.

Another press on this key while selecting the measurement type gives access to **the type of sensors**:
- platinum probes: Pt100 or Pt1000 *only on* **MTX 3282**, **MTX 3283**
- thermocouples: J or K (TC J, TC K)
Selection using the keys, validation using the key or after 2 s.

Measurement of **Capacitance.**

"**Favourite**" measurement configurable by the user.
☝ ***For the menu's configuration, see §. ☺ Function.***

Instrument **Configuration** menu.

Functions authorized when connected to the A terminal

When the red lead is connected to the **A** terminal, it automatically selects **Current** (AC + DC) measurement.
If current measurement is selected without connection of a lead to terminal A or without a protection fuse, the **LEADS** symbol flashes on the display.

Current measurement (Ampere)
☝ ***The current measurement may be performed using autorange (AUTO PEAK) over the whole scope of the ranges (µA, mA, A).***
PEAK is displayed when a peak (Pk+ Pk- measurement) of current is detected and when it is higher than the range of active current.

"**Favourite**" measurement configurable by the user.
☝ ***For the menu's configuration, see §. ☺ Function.***

Instrument **Configuration** menu.

Functional description (cont'd)

Range management

The Range key gives access to three operating modes:
- **AUTO** mode
- **AUTO PEAK** mode MTX 3282, MTX 3283
- **MANU** mode

- Selection using this key or the keys.
- Validation using the key or after 2 s.

If the measurement is single range, the range defined is forced and there is no effect if the Range key is pressed.

Example: Diode test, continuity test and temperature measurement.

"AUTO" mode

On the input for a measurement, **AUTO** mode is active by default and range selection is managed automatically by the multimeter.

"AUTO PEAK" mode

MTX 3282
MTX 3283

In **AUTO PEAK mode**, the range changes are performed on the basis of rapid acquisition of peaks, either upward or downward.

AUTO PEAK mode is only accessible for AC, AC+DC in V and A measurements. It prevents untimely overruns of the peak factor specified for the instrument.

"MANUal" mode

When this mode is selected and is valid for the function concerned, the keys can be used to modify the measurement range.

Measurements concerned: voltage, current, resistance, capacitance.

By pressing one of the keys, you can switch directly to MANUal mode and then modify the range.

Display hold management

The Hold key gives access to two operating modes:
- **HOLD** mode
- **AUTO HOLD** mode
- **NO HOLD** deactivates the mode.

- Selection using this key or the keys.
- Validation using the key or after 2 s.

HOLD

HOLD mode freezes on the screen the current main measurement at the time when the key is pressed. The instrument continues to manage the measurements and display them in the graphical window or on the secondary display (**REL mode**).

The range selection remains unchanged: AUTO or MANUal depending on the configuration when you enter this mode.

AUTO HOLD

AUTO HOLD mode automatically freezes on the screen the current main measurement whenever a stable measurement is detected. It is confirmed by a beep (unless the configuration "Beep *no"* has been selected in the Configuration menu).

The values memorized remain displayed until the next stable measurement taken (measurement different from ± 100 digits) or until deactivation of **AUTO HOLD mode**.

The instrument continues to manage the measurements and display them in the graphical window or on the secondary display (**REL mode**).

The range selection remains unchanged (AUTO or MANUal) depending on the configuration when you enter this mode. AUTO HOLD mode is only accessible for V and A measurements.

Functional description (cont'd)

REL

REL mode takes the current main measurement as its reference. It is indicated on the secondary display: **REF**.

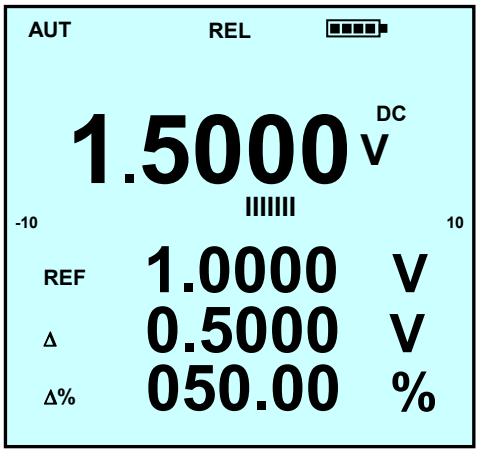
- The main display continues to indicate the instantaneous value measured and the bargraph.
- The secondary display Δ indicates the absolute deviation between the instantaneous value measured and the reference recorded.
- The secondary display Δ % indicates the relative deviation in % between the instantaneous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

☝ ***Range management may be "AUTOmatic" or "MANUal, depending on the configuration when entering this mode.***

☝ ***The Δ and Δ % displays are managed in the same range.***

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

✍ *Example:* Measurement of a 1.5 VDC voltage with a reference set to 1 V:

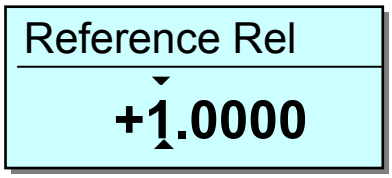


Adjustment of the reference

When the mode is active, a long press on the Rel key opens a window for setting the **REF reference**.

- The ◄► key selects the digit to be modified.
- The ▲▼ keys modify the digit selected.
- The m key can be used to exit from the menu after validating the new reference.

✍ *Example*:



Functional description (cont'd)

SURV

- The **SURV** mode monitors the variations of a signal by recording the extreme values (**MIN** and **MAX**) of the main measurement and calculating the average (**AVG**). For each value memorized the multimeter records the corresponding date and time.

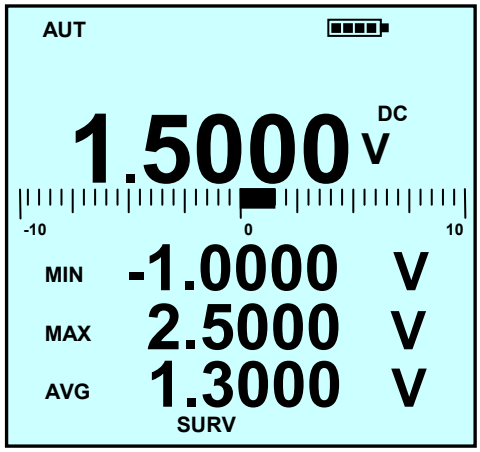
  ☝ ***When it is started up, the MTX 3281 reinitializes the date and time (01:01:2000, 00:00:00).***
  Before starting work, set the correct date and time to "date-stamp" the records see §. Setting the date and time).

- When you enter **SURV** mode by a short press on the key, the last **MIN** and **MAX** measurements are erased and then initialized with the current measurement.

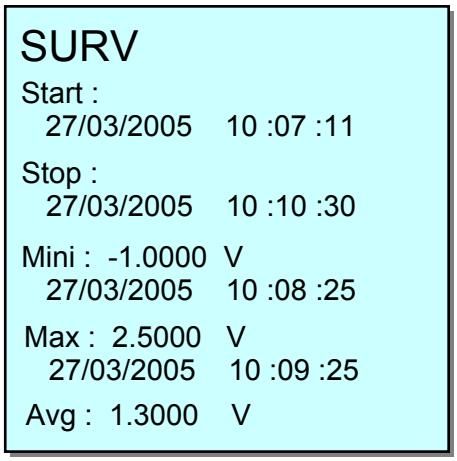
  ☝ ***SURV flashes when the mode is active.***

- **AVG** shows the average of all the measurements recorded since **SURV** mode was activated.
- The data recorded can be viewed by a long press on the Surv key during surveillance or after exiting from the mode.
- **In SURV mode:**
  - MANU or AUTO range management cannot be selected.
  - the current measurement, the MIN value and the MAX value are presented in the most suitable range for each of them.

✍ Example:



Surv



- Consultation of recorded data by a long press on the key Surv

  The data recorded is accompanied by the date, time and surveillance range.

- Exit from consultation by a short press on the Surv.

Functional description (cont'd)

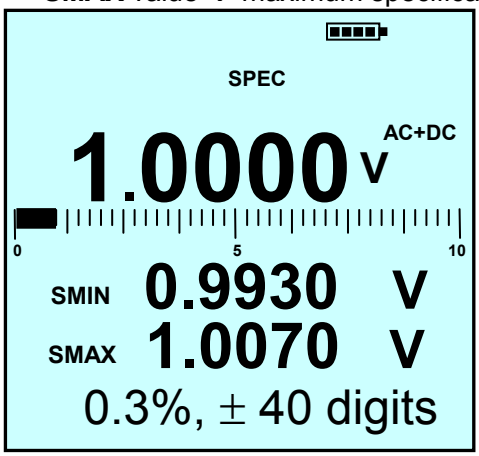
SPEC

On the basis of the technical specifications, the **SPEC** mode directly displays the tolerance of the measurement in progress, so that there is no need to search for it and calculate it.

On the basis of the main measurement, the display:

- indicates the specifications (x % of reading ± n digit) according to the type of measurement, the range selected and the frequency (in AC and AC+DC)
- calculates the interval containing the true value, if the instrument is within its tolerance: **SMIN** value → minimum specification
  SMAX value → maximum specification

✍ *Example*:



In AC+DC, the specifications are calculated only if the frequency can be measured (see §. secondary Functions) and is > 45 Hz.

MEM

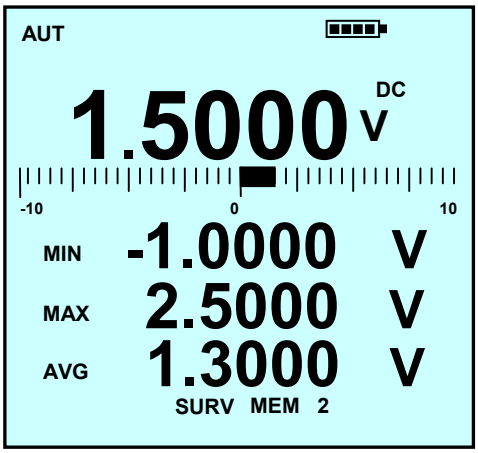
- **MEM** mode records the contents of the digital display(s) in the memory of the instrument at a pre-programmed rate.
- A short press on Mem starts a series of recordings.
- The **MEM** symbol flashes throughout the recording period; it is accompanied by the number of recordings made.
- Memorization of the measurements can be stopped by another short press.
- The number of values to be memorized for a measurement run is programmable: it therefore stops recording automatically.

☝ *Another press on Mem starts a new series of recordings.*

MTX 3281
MTX 3282, MTX 3283

Recording capacity	158 measurements per sequence	1 to 10 sequences
	6500 measurements maximum	1 to 10 sequences (depending on available memory)

✍ *Example*: *activation of* **MEM** *mode during surveillance mode*



- Furthermore, the **MEM** mode may be activated during the **SURV** mode or during display of the secondary functions. The parameters set are saved. It will then be possible to select them and display them as the main function.

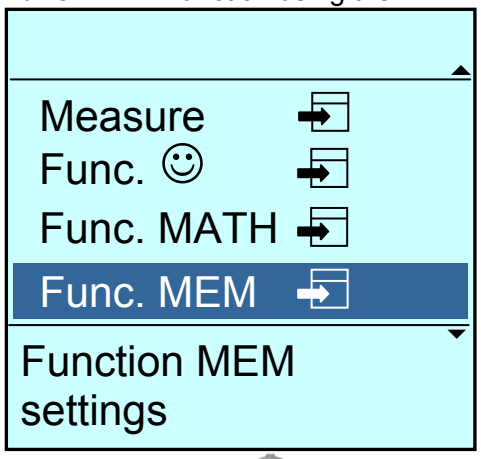
☝ ***(When it is started up, the MTX 3281 reinitializes the date and time (01:01:2000, 00:00:00).***
Before starting work, set the correct date and time to "date-stamp" the records. See §. Setting the date and time).

Functional description (cont'd)

Configuration of MEM mode

The **MEM** mode is configured in the **Func. MEM** function of the **Configuration Menu.**

- Opening of the **Configuration** menu with the key.
- Selection of the "**Func. MEM"** function using the keys.

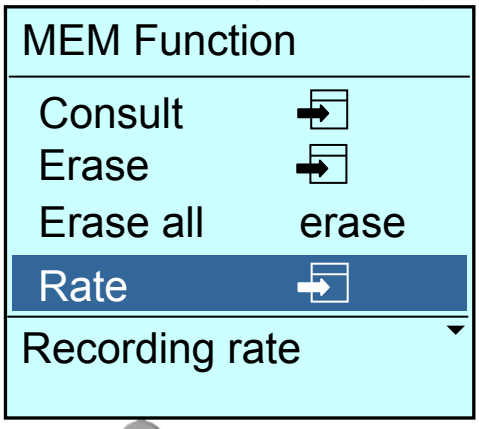


- **Validation of Func. MEM** using the key.

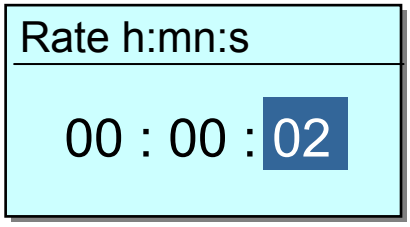
A long press on Mem ***opens the MEM Function menu.***

Programming the recording frequency

- Selection of the "**RATE"** function using the keys.



- Validation of Rate with the key opens a menu for setting the required recording rate in hours, minutes and seconds:



- **Selection of the variables,** hour, minute, second, using the key.
- Modification of the value using the keys.
- Validation of the measurement recording rate and exit from the successive menus using the key .

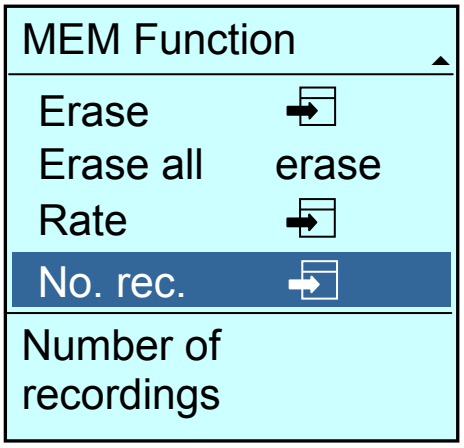
The minimum recording rate is 23 h, 59 min, 59 s.
Default recording rate 1s.

Functional description (cont'd)

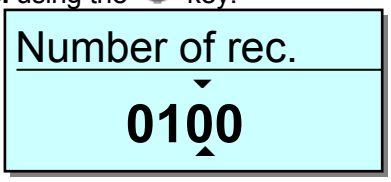
Programming of the number of records

By defining a number of records for a measurement campaign, it is possible to stop recording automatically.

- Selection of the number of records (**No. rec**.) in the **MEM Function** menu using the keys .



- Validation of **No. rec.** using the key.

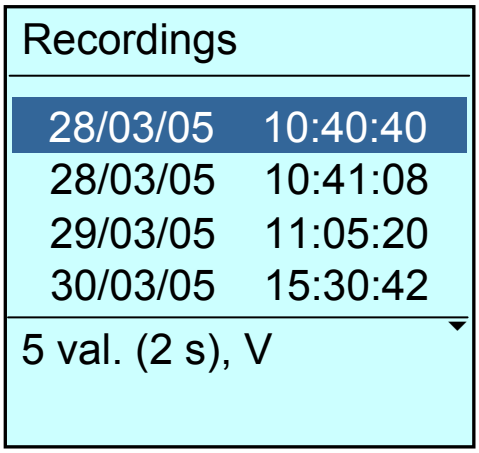


- Selection of the digit to be modified using the key.
- Modification of the value using the keys.
- Validation of the number of records and exit from the successive menus using the key.

Reminder *The recording capacity is limited to 6,500 measurements (158 for MTX 3281)*

Number of records by default : 1,000.

Reading the recorded data



- Select the **Consult** menu in the **MEM Function** to view the list or successive records.

Each recording is identified by its start date and time.

- Selection of a recording using the keys.
- Validation the selection using the key.

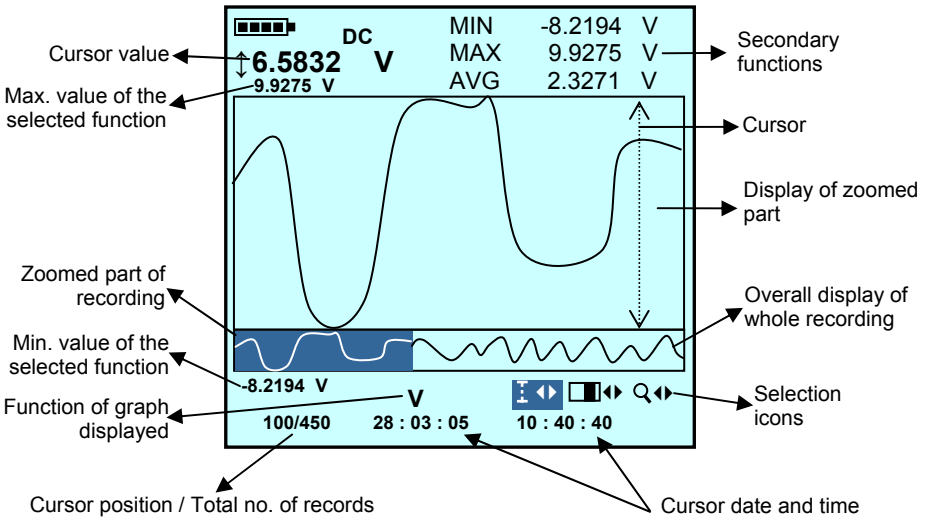
When selected, a recording is accompanied by :
- the number of values recorded,
- the recording rate,
- the function in which they were recorded,
- the secondary functions present during recording, if relevant.

Reminder *The number of recording sequences is limited to 10.*

Functional description (cont'd)

Viewing the data in a recording

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



- Selection of the function (principal or secondary) to be displayed or of the selection icon using the keys, modification using the key.
- Selection of the function to be displayed

V

Example: Main function: **V**
secondary function: **MIN, MAX, AVG** for **SURV** mode

MTX 3281	moves the cursor
MTX 3282, **MTX 3283**	moves the zoomed part (icon present, if a zoom is active)
	activates/deactivates a zoom (icon present, if a zoom is possible)

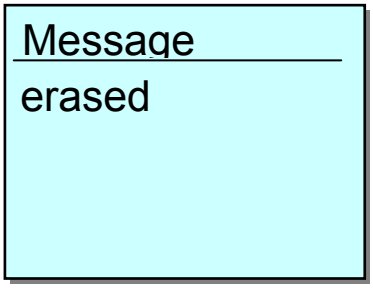
- Exit from viewing a recording by using the Mem key.

Complete erasure of memory

All recordings in the memory of the device may be erased in a single operation.

- Selection of **Erase all** menu in the **MEM Function**.
- Validation of erasure using the key.

Complete erasure of the memory is confirmed by the following message →



Functional description (cont'd)

Access to secondary functions

Choice of secondary functions on the two displays 2, 3 and 4 by pressing successively on the key opposite according to main measurement.

A long pressing deletes the display of secondary measurements.

For the main authorised measurements, the last combination selected for displays 2, 3 and 4 is memorised and will be directly reactivated.

Table of secondary functions
Refer to page 9.

	Display 2		Display 3		Display 4		Display 1: Main measurement					
	Function	Unit	Function	Unit			VAC VAC+DC	VDC	AAC AAC+DC	ADC	Hz	Ω
MTX 3281 / 2 / 3	**FREQ**	Hz	**PER**	S	Func. **MATH**		x		x			
MTX 3283	**FREQ**	Hz	**dB**	dB	Func. **MATH**		x					
MTX 3283	**dBm**	dBm	**REF** ***(dBm)***	Ω	Func. **MATH**		x					
MTX 3281 / 2 / 3	**Pk+**	V or A	**Pk-**	V or A	**CF**	-	x		x			
MTX 3283	**w**	W	**REF** ***(Ω)***	Ω	Func. **MATH**		x	x	x	x		
MTX 3281 / 2 / 3	**PER**	S	**DC+**	%	Func. **MATH**						x	
MTX 3281 / 2 / 3	**PER**	S	**DC-**	%	Func. **MATH**						x	
MTX 3282 / 3	**PW+**	S	**CNT+**	-	Func. **MATH**						x	
MTX 3282 / 3	**PW-**	S	**CNT-**	-	Func. **MATH**						x	
MTX 3282 / 3	Func. **MATH**		-	-	-							x
MTX 3282 / 3	**V** x **A**	**VA**	**A**	A	Func. **MATH**		x (∗)	x				

Function **MATH** = y = Ax + B (**MTX 3282, MTX 3283**)

FREQ = Frequency measurement
PER = Period measurement
dB = Measurement of voltage decibels in dB
dBm = Measurement of power decibels in dBm with REF = dBm REF
Pk+ = Measurement of positive peaks (□□∗∗)
Pk- = Measurement of negative peaks (□□∗∗)
CF = Measurement of peak factor
w = Calculation of resistive power with REF = W REF
V x **A** = Calculation of power (□□∗) limited to 400 Hz
DC+ = Measurement of positive duty ratio
DC- = Measurement of negative duty ratio
PW+ = Measurement of pulse-width or of positive durations
PW- = Measurement of pulse-width or of negative durations
CNT+ = Counting of positive pulses (□□∗∗)
CNT- = Counting of negative pulses (□□∗∗)

(□□∗∗) *Measurement reset to zero: by pressing on*  *key.*

For optimal use, refer to §. Technical Specifications.

Functional description (cont'd)

Access to secondary functions (cont'd)

MTX 3283

Upon activation of **dB** measurements**,** the value measured is taken as voltage reference (V ref).

The calculation is as follows:

$$20 \log_{10} (V \text{ measured} / V \text{ ref}).$$

The voltage reference (V ref) cannot be modified.

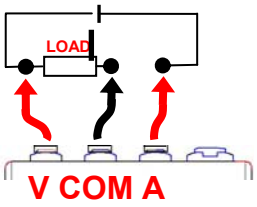
The MATH function is displayed when its parameters allow it (see **MATH Func.**).

For the dBm and resistive power measurements, see **Measurement** menu for the adjustment of related reference resistances (**dBm REF, W REF**) and to know the calculation formulas.

MTX 3282 MTX 3283

The calculation of power **V** x **A** (VA) requests a 3rd connection to the A input (connected to the same circuit) in order to measure simultaneously: DC voltage (main display), DC power (display 3, measurement always in AC+DC).

The link on the COM input must be short and have a large diameter in order to limit the voltage drop which influences the Volt measurement.



Functional description (cont'd)

MATH function

MTX 3282
MTX 3283

The MATH function (y = Ax + B) enables measuring any physical quantity in:

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

and converting it and to assign the adequate unit, to obtain the direct reading of the original parameter on the instrument. Depending on the parameter measured, the device calculates the related MATH function.

The programming takes place in 4 phases:

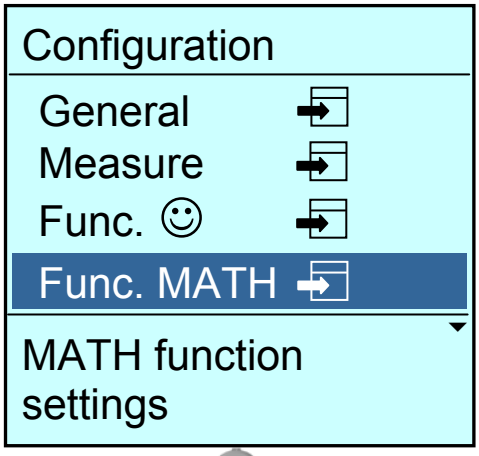
Selection of parameter X measured (V, A, Ω, Hz)
Definition of coefficient A of function y = Ax + B
Definition of coefficient B of function y = Ax + B
Definition of physical unit to be displayed

Coefficients A, B and the unit are programmable for each amount measured (V, A, Ω, Hz).

Adjustment of MATH function

The **MATH** mode is configured in the MATH function in the **Configuration** Menu.

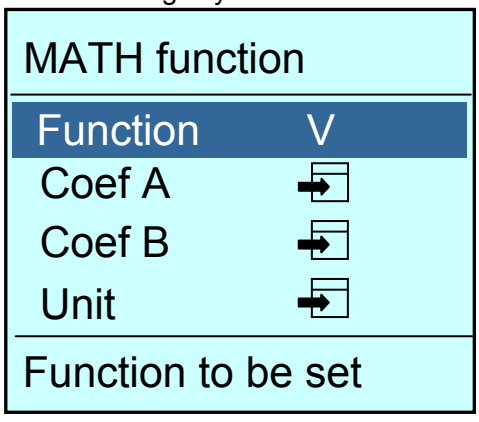
- Opening of **Configuration** Menu using key m.
- Selection of function **MATH Func.** using keys.



- Validation of **MATH Func.** using key.

Selection of function to be adjusted

- Selection of **Function** menu using keys.



- Selection of measurement (V, A, Ω, Hz) using key.

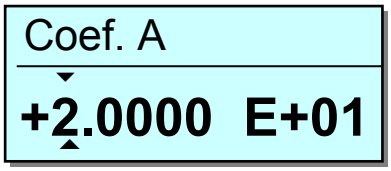
Default function V.

Functional description (cont'd)

Definition of coefficient A

The MATH function applied to the physical quantity (x) measured is y = Ax + B.

- Selection of the coefficient A menu (**Coef A**) in MATH function.
- Validation of **Coef A** (coefficient A) using key .

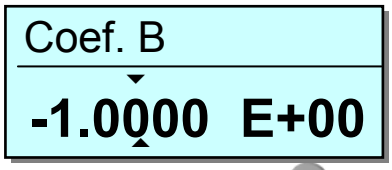


- Selection of digit to be modified or of exponent using key .
- Modification of value using keys .
- Validation of coefficient A and menu exit using key .

Coefficient A by default is 1.

Definition of coefficient B

- Selection of coefficient B menu (**Coef B**) in **MATH function**.
- Validation of **Coef B** (coefficient B) using key .



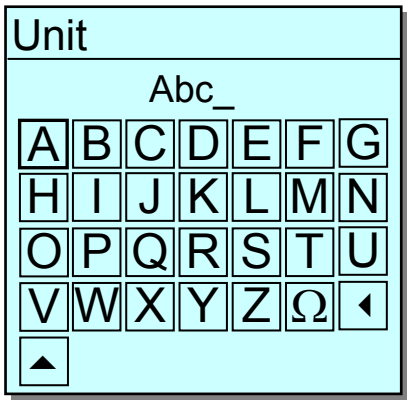
- Selection of digit to be modified using key .
- Modification of value using keys .
- Validation of coefficient B and menu exit using key .

Coefficient B by default is 0.

Definition of unit

The unit of the MATH function may be defined so as to obtain the direct reading of the original physical quantity measured by the instrument.

- Selection of **Unit** menu in **MATH function**.
- Validation of **Unit** using key .



- Selection of letter or character to display using key .
- Validation of letter or character using keys .
- Validation of the unit (3 characters max.) and menu exit using key .

The symbol ▲ is used to switch from uppercase letters to lowercase.

The symbol ◄ is used to erase the last character.

MATH unit by default (without).

Functional description (cont'd)

Function ☺

The favourite function ☺ recalls directly the specific measurement you use most frequently and that you will have carefully defined previously.

This function is of the same type as the **MATH** function (y = Ax + B).
When you measure any physical quantity, this function enables you to convert it and to assign the appropriate unit, to obtain the direct reading of the original amount on the instrument.
Depending on the amount measured, the device calculates the related function ☺, if the parameters of the latter correspond to the amount measured.

Programming takes place in 4 stages:

1. Selection of the amount X measured (V, A, Ω, Hz)
2. Definition of coefficient A of function y = Ax + B
3. Definition of coefficient B of function y = Ax + B
4. Definition of the physical unit to be displayed

Application of the favourite function ☺ acc. to its programmed measurements (V, A, Ω, Hz)

- Access to the type of measurement using key ☺
  - AC, DC or AC+DC for measurements V and A
- Access to the frequency range using key ☺
  - Frequency < 900 kHz (default) or > 900 kHz for Hz measurements
- Control of operating modes using key Range:
  - AUTO, AUTO PEAK, MANU for V and A measurements
  - AUTO, MANU for Ω measurements

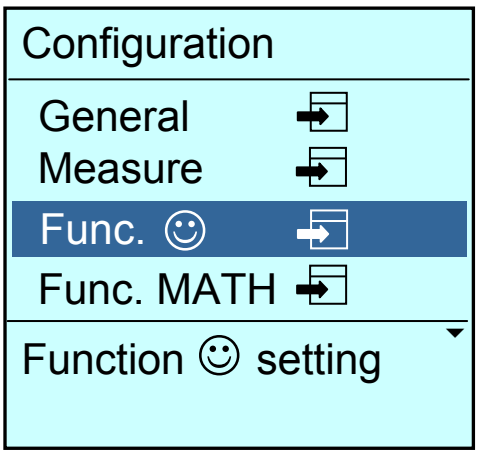
☝ *Pressing one of the keys*  *will switch directly to MANUal mode, then modify the range for measurements V, A and Ω.*
Modification of the voltage range for Hz function.

- Control of display holding using key Hold:
  - HOLD, AUTO HOLD, NO HOLD for V and A measurements
  - HOLD, NO HOLD for Ω, Hz measurements
- Activation, deactivation of relative mode using key Rel
- Activation, deactivation of monitoring mode using key Surv
- Activation, deactivation automatic recording using key Mem

Adjustment of function ☺

The function is configured in **Func.** ☺ in the Configuration Menu**.**

- Opening of Configuration Menu using key  .
- Selection of function **Func.** ☺ using keys  . Validation using key  .

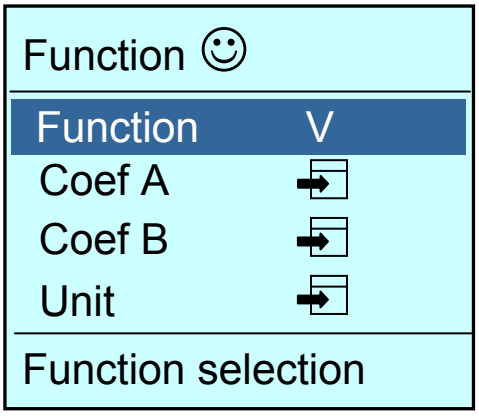


☝ ***A long pressing on***  ***opens directly the Function ☺menu.***

Functional description (cont'd)

Selection of adjustment parameters

- Selection of adjustment parameters using keys .



Selection of amount measured (function)

- Selection of **Function** menu using keys .
- Selection of amount measured (V, A, Ω, Hz) using key .

☝ ***Default function V.***

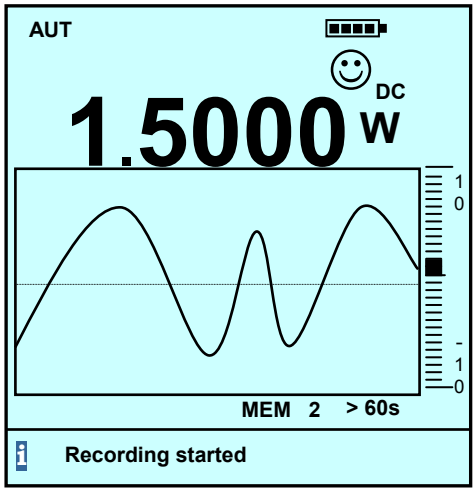
Definition of coefficients A, B and unit

The ☺ favourite function applied to the physical quantity (x) measured is the same as the MATH function (y = **A**x + **B**).

For the definition of coefficients **A**, **B** and the **unit,** see the related menus of the MATH function.

☝ ***Coefficient A is by default 1, B by default 0, unit by default (without).***

Example: activation of favourite function and automatic recording mode



- Symbol ☺ of favourite function
- **AUTO** Mode active
- **DC** Measurement
- **W** Unit
- **MEM** Mode active

Functional description (cont'd)

SX-DMM Software kit (option)

These multimeters can interface directly with a computer or a PC using the SX-DMM software kit (HX0050 option):

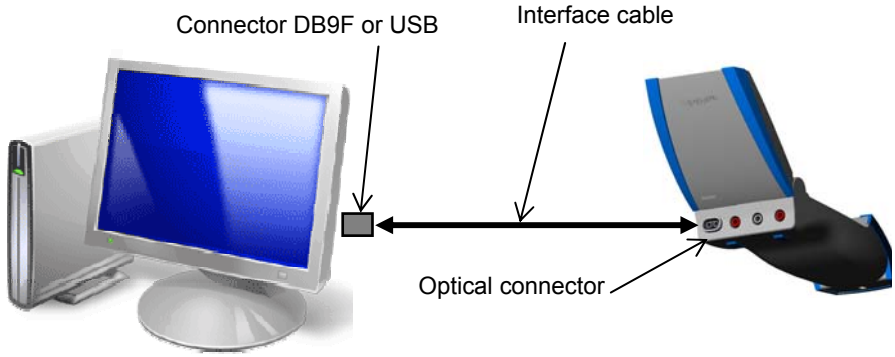
In the menu **General settings** of the multimeter:
- Select infra-red communication (**IR** by default) using the **Comm** function.
- Select Modbus communication protocol.
- Select the infra-red transmission speed using the **IR baud** function: **9600** / **19,200** / **38,400** Bauds/s.

☝ ***The transmission speed by default is 9600 Bauds/s.***

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

Connection of optical cables RS232-DB9F or USB (option)

1. Then connect the optical cable to the optical input of the multimeter (located next to the multimeter inputs). A mechanical failsafe prevents reversing of the connection direction.
   Connect cable RS232-DB9F or USB to one of the corresponding inputs of the PC.
2. Verify that the RS232 interface parameters of the PC are identical to those of the multimeter.



☝ ***For the USB optical cable (option), install, if necessary, the recognition software on your PC (see CD-Rom manual provided).***

Installation of SX-DMM software

1. Install the SX-DMM software on the PC using the CD ROM.
2. Launch the software to perform data acquisition and study the different display possibilities (curves, tables…).

☝ ***The symbol***  ***(RS232) flashes on the display during control of the instrument from the PC (REMOTE mode).***

For more information, refer to software help menu.

☝ ***In this mode, the multimeter keyboard is locked, except for key***  ***which is used to exit this mode.***

Bluetooth (on -BT version)

The -BT versions of the multimeters are fitted with a Bluetooth module. They integrate the Serial Port Profile service used to communicate with a computer fitted with any type of Bluetooth adapter.

If your computer does not have a Bluetooth module, the PC USB/Bluetooth adapter (P01637301*)* is required.
To install these pilots, ***refer to the accompanying instructions.***

Virtual RS232 serial communication between the multimeter (Server) and the PC (Customer) requires a connection on the PC side.

No configuration is required on the multimeter side, except for activation of Bluetooth (BT) communication via the Comm. function in the **General Settings** menu.

Functional description (cont'd)

Bluetooth (cont'd)

To activate connection with the multimeter, the Bluetooth identifying code is " 0000

Creating a Bluetooth connection

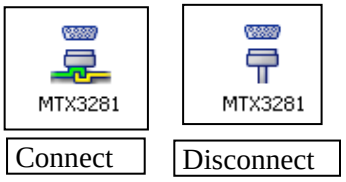
The controls cited below are those of the PC USB/Bluetooth adapter (P01637301). They may be designated differently on another adapter.

(for first connection only)

Steps	Actions
1	Power up the multimeter.
2	Configure it for Bluetooth (BT) via the configuration menu.
3	Create a new connection using the software controlling your Bluetooth dongle on the PC side by: • clicking on the **Bluetooth Manager** icon on the menu bar at the bottom of the screen • selecting the **New connection** function • selecting **Express Mode** (recommended), then clicking on **Next** • selecting the **Bluetooth** peripheral of the multimeter then by clicking on **Next** • clicking on **Next** after configuration of a **COM port** • redefining the name of the connection and its icon (if required) then clicking on **Next** • clicking on **Finish** to save the connection information

You can verify that the connection has been created by viewing it, using the software controlling your PC USB/Bluetooth adapter.

For additional information, refer to the Help menu linked to the Bluetooth utility.



With some Bluetooth adapters, rebooting of the PC is recommended to validate the connection.

The connection parameters are specific to each multimeter. They must be assigned manually, but only the first time.

Example

Communication with SX-DMM software can begin without other Bluetooth configurations. You must simply establish communication between the PC and the multimeter using the COM port configured previously.

Command SX-DMM software: Communication → Parameters

Reactivation of the connection after shutdown

- Click on the Bluetooth Manager icon on the menu bar at the bottom of the screen
- Click on the icon related to the multimeter in the window of the Bluetooth Parameters Software: the icon of the menu bar must be displayed in green.

Communication with several multimeters

The PC USB/Bluetooth adapter is used to communicate simultaneously with several multimeters in the MTX Mobile family.

For each multimeter, you must repeat the previous configuration procedure, while making sure to assign them a different COM port.

Depending on the type of adapter, first make a COM port available.

Technical specifications

Accuracy: "n% +nD" means "n% of reading + n Digit" (as per CEI 485)

Only the values assigned a tolerance or a limit constitute guaranteed values.
Values without tolerance are given for information (standard NFC 42670).
The technical specifications are guaranteed only after 30 min warm-up period.
Except special indication, they are valid from 5 to 100 % of the range of measurement.

Voltage measurement

AC voltage VAC and VAC+DC TRMS

On this position, you measure the true RMS value of an AC voltage with its DC component (no capacitive coupling): so-called TRMS measurement.

- ***The 100 mV range is present in MANUal mode only.***
- ***In VAC & VAC+DC modes and for signals > 1 kHz, the uncertainty range is given for information only : it is recommended to use the formulas below.***

MTX 3281

Range	Input impedance	Resolution	Accuracy	
			45 Hz to 1 kHz	1 to 50 kHz *(log(10) = 1)*
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1 % ± 50D	1 % + 5 % x log(1+ 0.18 x [F(kHz) - 1]) ± 50D (***)
1000 mV	10.5 MΩ	10 µV	1 % ± 30D	1 % + 5 % x log(1+ 0.18 x [F(kHz) - 1]) ± 30D
10 V	10.5 MΩ	0.1 mV	0.7 % ± 30D	0.7 % + 4 % x log(1+ 0.41 x [F(kHz) - 1]) ± 30D
100 V	10 MΩ	1 mV	0.7 % ± 30D	0.7 % + 4 % x log(1+ 0.41 x [F(kHz) - 1]) ± 30D
1000 V (**)	10 MΩ	10 mV	1 % ± 30D	1 % + 6 % x log(1+ 0.16 x [F(kHz) - 1]) ± 30D

(*) *in VAC mode*
(**) ⚠ *limitation in high frequency*
(***) *typical values*

Range	Input impedance	Resolution	Accuracy		
			45 to 400 Hz	400 Hz to 4 kHz	4 to 50 kHz
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1.5 % ± 40D	1.5 % + 0.417 % x [F(kHz) - 0,4] ± 40D	3 % + 0.065 % x [F(kHz) - 4] ± 40D

(*) *in VAC mode*

MTX 3282

Range	Input impedance	Resolution	Accuracy		
			45 Hz to 1 kHz	1 to 75 kHz *(log(10)=1)*	75 to 100 kHz
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1 % ± 50D	1 % + 5 % x log(1 + 0.2 x [F(kHz) - 1]) ± 50D (***)	10% ± 50D(***)
1000 mV	10.5 MΩ	10 µV	0.5 % ± 50D	0.5 % + 5 % x log(1 + 0.25 x [F(kHz) - 1]) ± 50D	10% ± 50D(***)
10 V	10.5 MΩ	0.1 mV	0.3 % ± 50D	0.3 % + 6 % x log(1 + 0.16 x [F(kHz) - 1]) ± 50D	10% ± 50D
100 V	10 MΩ	1 mV	0.3 % ± 50D	0.3 % + 6 % x log(1 + 0.16 x [F(kHz) - 1]) ± 50D	10% ± 50D
1000 V (**)	10 MΩ	10 mV	0.3 % ± 50D	0.3 % + 6 % x log(1 + 0.16 x [F(kHz) - 1]) ± 50D	10% ± 50D

(*) *in VAC mode*
(**) ⚠ *limitation in high frequency*
(***) *typical values*

Range	Input impedance	Resolution	Accuracy		
			45 to 400 Hz	400 Hz to 4 kHz	4 to 100 kHz
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1.5 % ± 40D	1,5 % + 0,417 % x [F(kHz) - 0,4] ± 40D	3 % + 0.065 % x [F(kHz) - 4] ± 40D (***)

(*) *in VAC mode*
(***) *typical values from 50 kHz*

MTX 3283

Range	Input impedance	Resolution	Accuracy		
			45Hz to 1kHz	1 to 100 kHz *(log(10) = 1)*	100 to 200 kHz
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1 % ± 50D	1 % + 8 % x log(1+ 0,06 x [F(kHz) - 1]) ± 50D (***)	15% ± 50D(***)
1000 mV	10.5 MΩ	10 µV	0.5 % ± 40D	0.5 % + 5 % x log(1+ 0,2 x [F(kHz) - 1]) ± 50D	15% ± 50D(***)
10 V	10.5 MΩ	0.1 mV	0.3 % ± 30D	0.3 % + 8 % x log(1+ 0,06 x [F(kHz) - 1]) ± 30D	15% ± 30D
100 V	10 MΩ	1 mV	0.3 % ± 30D	0.3 % + 8 % x log(1+ 0,06 x [F(kHz) - 1]) ± 30D	15% ± 30D

(**) ⚠ *limitation in high frequency*
(***) *typical values*

Range	Input impedance	Resolution	Accuracy			
			45 to 400 Hz	400 Hz to 4 kHz	4 to 50 kHz	50 to 200 kHz
100 mV (*)	1 GΩ - 10 MΩ	1 µV	1.5 % ± 40D	1.5 % + 0.417 % x [F(kHz) - 0.4] ± 40D	3 % + 0.0217 % x [F(kHz) - 4] ± 40D	5 % + 0.067 % x [F(kHz) - 50] ± 40D (***)

(*) *in VAC mode*
(***) *typical values*

Technical specifications (cont'd)

AC voltage VAC and VAC+DC TRMS (cont'd)

(**) BP : Freq [kHz] limited to : 15,000 / U applied [V]
U applied [V] limited to : 15,000 / Freq [kHz]

✍ *Example* : U applied = 1000 VAC ➔ max. frequency : 15,000 / 1000 = 15 kHz

In the presence of a continuous component :
Additional error : (UDC / U measured) x (0,7% + 70D)

✍ *Example* : UDC = 2 V, U measured = 5 Vrms ➔ additional error : 0.28% + 28D

Rejection: common mode > 80 dB at 50 Hz or 60 Hz depending on selection
Automatic or manual selection of ranges.
Protection by varistors.
Maximum permanent acceptable voltage: 1000 VACrms.
Specifications valid from:
20 to 100% of range in the 20 kHz to 200 kHz **MTX 3283** band,
20 kHz to 100 kHz **MTX 3282**
20 kHz to 50 kHz **MTX 3281**.

☝ ***As soon as the PEAK symbol is displayed, connect to AUTO PEAK :***
MTX 3282 **MTX 3283**

Influence of peak factor on accuracy in VAC, VAC+DC at 50% of the range:
- 1% for a peak factor between 4,5 and 6
- 5% for a peak factor between 6 and 9

DC voltage VDC

In "DC" mode, you measure the value of a DC voltage or the DC component of an AC voltage, once the filter is activated, see p. 15.

☝ ***The 100 mV range is present in MANUal mode only.***

MTX 3281

Range	Input impedance	Resolution	Protection	Accuracy
100 mV (*)	10 MΩ / 1 GΩ	1 µV	1450 Vpk	0.1% + 30D
1000 mV	20 MΩ / 1 GΩ	10 µV		0.1% + 8D
10 V	10.5 MΩ	0.1 mV		
100 V	10 MΩ	1.0 mV		
1000 V	10 MΩ	10 mV		0.2% + 8D

MTX 3282

Range	Input impedance	Resolution	Protection	Accuracy
100 mV (*)	10 MΩ / 1 GΩ	1 µV	1450 Vpk	0.1% + 30D
1000 mV	20 MΩ / 1 GΩ	10 µV		0.05% + 8D
10 V	10.5 MΩ	0.1 mV		0.03% + 8D
100 V	10 MΩ	1.0 mV		
1000 V	10 MΩ	10 mV		0.035% + 8D

MTX 3283

Range	Input impedance	Resolution	Protection	Accuracy
100 mV (*)	10 MΩ / 1 GΩ	1 µV	1450 Vpk	0.1% + 30D
1000 mV	20 MΩ / 1 GΩ	10 µV		0.05% + 8D
10 V	10.5 MΩ	0.1 mV		0.02% + 8D
100 V	10 MΩ	1.0 mV		
1000 V	10 MΩ	10 mV		0.03% + 8D

(*) - Accuracy with filter (p. 15) and REL mode activated (Δ measurement).
- Recovery after release of the protection (> 10 V) approx. 10 s.
- Protection 1 min. max.

Specifications valid from 0 % to 100 % of the range

Rejection: common mode: > 120 dB with 50 Hz and 60 Hz acc. to selection
serial mode: > 60 dB with 50 Hz and 60 Hz acc. to selection

Automatic or manual selection of the ranges. Protection by varistors.

Technical specifications (cont'd)

Current measurement

ADC current

In "ADC" mode, you measure the value of a DC current or the DC component of an AC current.

MTX 3281
MTX 3282
MTX 3283

Range	put impedance	Resolution	Protection	Accuracy
1000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	0.1 % + 15D
10 mA	≈ 17 Ω	0.1 µA		0.08 % + 8D
100 mA	≈ 1.7 Ω	1 µA		
1000 mA	≈ 0.17 Ω	10 µA		0.15 % + 8D
10 A	≈ 0.03 Ω (*)	100 µA		0.5 % + 15D
100 A (**)		1000 µA		

(*) with the fuse delivered with the instrument (**) 100 A range limited to 20 A
Specifications valid from 0 % to 100 % of range

AAC current, AAC+DC TRMS

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

MTX 3281

Range	put impedance	Resolution	Protection	Accuracy	
				45 Hz to 1 kHz	1 to 20 kHz
1000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	1 % ± 40D	1 % + 0.25 % x [F(kHz) - 1] ± 30D (***)
10 mA	≈ 17 Ω	0.1 µA		1 % ± 30D	1 % + 0.1 % x [F(kHz) - 1] ± 30D
100 mA	≈ 1.7 Ω	1 µA		1 % ± 30D	1 % + 0.1 % x [F(kHz) - 1] ± 30D
1000 mA	≈ 0.17 Ω	10 µA		1 % ± 30D	1 % + 0.1 % x [F(kHz) - 1] ± 30D
10 A	≈ 0.03 Ω (*)	100 µA		1 % ± 300D	1 % + 0.15 % x [F(kHz) - 1] ± 300D
100 A (**)		1000 µA		2.5 % ± 30D	2.5 % + 0.15 % x [F(kHz) - 1] ± 30D

MTX 3282

Range	Input impedance	Resolution	Protection	Accuracy		
				45 Hz to 1 kHz	1 to 20 kHz	20 to 50 kHz
1000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	0.5 % ± 40D	0.5 % + 0.25 % x [F(kHz) - 1] ± 30D (***)	-
10 mA	≈ 17 Ω	0.1 µA		0.3 % ± 30D	0.3 % + 0.1% x [F(kHz) - 1] ± 30D	
100 mA	≈ 1.7 Ω	1 µA		0.3 % ± 30D	0.3 % + 0.1% x [F(kHz) - 1] ± 30D	
1000 mA	≈ 0.17 Ω	10 µA		0.3 % ± 30D	0.3 % + 0.1 % x [F(kHz) - 1] ± 30D	-
10 A	≈ 0.03 Ω (*)	100 µA		0.4 % ± 400D	0.4 % + 0.15 % x [F(kHz) - 1] ± 400D	-
100 A (**)		1000 µA		2.5 % ± 40D	2.5 % + 0.15 % x [F(kHz) - 1] ± 40D	-

MTX 3283

Range	Input impedance	Resolution	Protection	Accuracy		
				45 Hz to 1 kHz	1 to 20 kHz	20 to 50 kHz
1000 µA	≈ 170 Ω	10 nA	11 A 20 A < 30 s	0.5 % ± 40D	0.5 % + 0.25 % x [F(kHz) - 1] ± 30D (***)	-
10 mA	≈ 17 Ω	0.1 µA		0.3 % ± 30D	0.3 % + 0.1 % x [F(kHz) - 1] ± 30D	
100 mA	≈ 1.7 Ω	1 µA		0.3 % ± 30D	0.3 %+ 0.1 % x [F(kHz) - 1] ± 30D	
1000 mA	≈ 0.17 Ω	10 µA		0.3 % ± 30D	0.3 % + 0.1 % x [F(kHz) - 1] ± 30D	-
10 A	≈ 0.03 Ω (*)	100 µA		0.4 % ± 400D	0.4 % + 0.15 % x [F(kHz) - 1] ± 400D	-
100 A (**)		1000 µA		2.5 % ± 40D	2.5 % + 0.15 % x [F(kHz) - 1] ± 40D	-

A max. overload of 20 A is acceptable for 30 s max. with a pause of 5 min at least between each measurement.

From 7 A, the measurement is limited to an ambient temperature of 40° C and a period of 1h30 with a pause of 15 min at least between each measurement.

Specifications valid from 10 % to 100 % of range for sinusoidal current.

Protection 1000 Vrms by ceramic HRC type fuse
Fuse 1000 V, 11 A > 20 kA Cos φ > 0.9 (10 x 38 mm)

MTX 3282 **MTX 3283**

As soon as the PEAK symbol appears, switch to AUTO PEAK mode :

mA and µA range:
Additional error of 2% for a peak factor between 4.5 and 6
Additional error of 15% for a peak factor between 6 and 9

10 A range:
Zero up to peak factor of 6.

Voltage drop:

10 A	< 400 mV	1 mA	≈ 160 mV	10 mA	≈ 180 mV
100 mA	≈ 180 mV	1000 mA	≈ 300 mV		

Technical specifications (cont'd)

Frequency measurement

Main frequency (Hz)

In this position, you measure the frequency of a voltage.

AC Signals

MTX 3281
MTX 3282
MTX 3283

Range	Resolution	Protection	Accuracy
0.8 to 10 Hz	0.0001 Hz	1450 Vpk	0.02 % ± 8D
10 to 100 Hz	0.001 Hz		
100 to 1000 Hz	0.01 Hz		
1000 Hz to 10 kHz	0.1 Hz		
10 to 100 kHz	1 Hz		
100 to 1000 kHz	10 Hz		
1 MHz to 2 MHz	100 Hz		

Range	Sensitivity (applicable on rectangular signals only)				
	100 mV	1 V	10 V	100 V	1000 V
0.8 Hz to 10 Hz	15 % of range	25 % of range	15 % of range	15 % of range	15 % of range
10 Hz to 100 kHz	10 % of range	20 % of range	10 % of range	10 % of range	10 % of range (∗)
100 to 500 kHz	(∗∗)	20 % of range	typ. 20 % of range	20 % of range (∗)	20 % of range (∗)
500 to 1000 kHz			typ. 30 % of range		

(∗) Freq [kHz] limited to: 15,000 / U applied [V]
U applied [V] limited to: 15,000 / Freq [kHz]
(∗∗) limited to 200 kHz
The measurement is performed by capacitive coupling.

Selection of the manual frequency range < 900 kHz (default) or > 900 kHz, via a short pressing of the key *opposite*.
Selection of voltage range in manual mode possible, via a long pressing of the key *opposite*.
Input resistance: ≈ 10 MΩ (Freq < 100 Hz)
Maximum permanent acceptable voltage: 1000 Vrms. See (∗).
Protection by varistors at the voltage input

Parallel voltage or current or frequency (secondary function)

You measure the frequency and value of a voltage or a current.

MTX 3281
MTX 3282
MTX 3283

Range	Accuracy	Resolution	Admissible overload
0.8 to 10 Hz	0.02 % + 8D	0.0001 Hz	1450 Vdc (1 min max.) on 500 mV range
10 to 100 Hz		0.001 Hz	
100 to 1000 Hz		0.01 Hz	
1000 to 10 kHz		0.1 Hz	
10 to 100 kHz		1 Hz	
100 to 200 kHz		10 Hz	

Range	Sensitivity (applicable on rectangular signals only) Vrms			
	100 mV	1 V	10 V to 1000 V (∗)	1000 µA to 20 A (∗∗)
0.8 Hz to 5 kHz	15 % of range	20 % of range	15 % of range	20 % of range
5 kHz to 50 kHz	10 % of range	20 % of range	10 % of range	20 % of range
50 kHz to 100 kHz	15 % of range	25 % of range	15 % of range	-
100 kHz to 200 kHz	-	30 % of range	30 % of range	

(∗) Freq limited to [kHz]: 15,000 / U applied [V]
U applied [V] limited to [V]: 15,000 [V ∗ kHz] / Freq [kHz]
(∗∗) limited to 20 kHz **MTX 3281** ; at 50 kHz **MTX 3282, MTX 3283** for the "Ampere" range
Measurement is performed by capacitive coupling
Input resistance: ≈ 10 MΩ (Freq < 100 Hz)
Protection by varistors at voltage input

Technical specifications (cont'd)

Resistance measurement (Ω)

MTX 3281

In this position, you measure the value of a resistance.

Range	Accuracy	Resolution	Protection
1000 Ω	0.1 % + 8D	10 mΩ	1000 Vrms
10 kΩ		100 mΩ	
100 kΩ		1 Ω	
1000 kΩ		10 Ω	
10 MΩ	0.5 % + 8D	100 Ω	
50 MΩ	2 % + 8D	1 kΩ	

MTX 3282
MTX 3283

Range	Accuracy	Resolution	Protection
1 000 Ω	0.1 % + 8D	10 mΩ	1000 Vrms
10 kΩ	0.07 % + 8D	100 mΩ	
100 kΩ		1 Ω	
1000 kΩ		10 Ω	
10 MΩ	0.5 % + 8D	100 Ω	
50 MΩ	2 % + 8D	1 kΩ	

Automatic/manual range selection
"Active" protection via CTP thermistor
Measurement voltage: ca. 1.2 V

Maximum voltage developed on open circuit: 4 V typ

In range 50 MΩ, in order to avoid the influence of the network and to guarantee the given specifications, it is advised to disconnect the multimeter from Wall Plug.

For measurements higher than 10 MΩ, a shielded cable is recommended. For a 2 wire-link, use very short wires (< 25 cm) and twist them.

Continuity Mode (♪)

MTX 3281
MTX 3282
MTX 3283

On this position, you can measure the value of a resistance up to 1000 Ω, with steady audio indication at 2 kHz.

Range	Accuracy	Measuring current	Resolution	Protection
Beeper	0.1% + 8D	approx. 0.4 mA	100 mΩ	1000 Vrms

Detection threshold in continuity mode ≈ 120 Ω (response time ≈ 5 ms).
"Active" protection via CTP thermistor.
Maximum voltage on open circuit: 4 V max, 2 V typ.

Diode Test (→)

MTX 3281
MTX 3282
MTX 3283

Indication of junction voltage in the direction from 0 to 2.6 V in a single range (10 V range)

Accuracy	2 % ± 30 D
Resolution	0.1 mV
Measuring current	< 1 mA
Maximum voltage developed on open circuit	4 V max.
"Exceeded" indication	in reverse direction
"Active" protection by CTP thermistor	1000 Vrms

Technical specifications (cont'd)

Capacitance measurement (⊣⊢)

MTX 3281
MTX 3282
MTX 3283

In this position, you can measure the value of a capacitor.

Range	Accuracy	Resolution	Measurement time	Protection
10 nF (*)	1 % + 10D	10 pF	< 0,2 s	1000 Veff.
100 nF	1 % + 5D	100 pF	< 0,5 s	
1000 nF		1 nF	< 2 s	
10 µF		10 nF		
100 µF		100 nF		
1000 µF	1 % + 15D	1 µF	≈ 5 s/mF	
10 mF	1.5 % + 15D	10 µF		

(*) Use the REL function for values < 10 % of range to reset to residual zero (compensation of the test lead capacity)

Resolution of 1000 points.
Automatic/manual range selection.
"Active" protection by CTP thermistor.
Maximum voltage delivered on open circuit: 1 V typ. / 4 V max.

☝ *For measurements lower than 10 nF, a shielded cable is recommended. For a 2 wire-link, use very short wires (< 25 cm) and twist them.*

Temperature measurement with Pt 100 or Pt 1000

MTX 3282
MTX 3283

In this position, you measure a temperature via a Pt 100 or Pt 1000 sensor.

Range	Measuring current	Resolution	Accuracy	Protection
- 125°C to + 75°C	< 0.8 mA (Pt 100) < 0.5 mA (Pt 1000)	0.1°C ≡ 2µV	± 0.5°C	1000 Vrms
- 200°C to + 800°C	< 0.8 mA (Pt 100) < 0.5 mA (Pt 1000)		0,1 % ± 1°C 0,07 % ± 1°C	

"Active" protection by CTP thermistor
Display in ° C (Celsius) / K (Kelvin) / ° F (Fahrenheit) possible

☝ *In Temperature measurement, it is possible to modify the scale of the graphic window with the keys* ▽▽. *The selected scale is recalled in the help line* i.

Temperature measurement with thermocouple J or K

MTX 3281
MTX 3282
MTX 3283

In this position, you measure the temperature via a thermocouple:

Thermocouple K	from -40° C to +1200° C
Thermocouple J	from -40° C to +750° C
Internal measurement accuracy	± 3° C ± 0.1% range (-10° C to 55° C)
Reference temp. accuracy	± 3° C / typical value
Type of thermocouple	J and K

The multimeter needs 60' to adapt to the ambient temperature.

dBm measurement (power decibels)

MTX 3283

Display of measurement in **dBm** in relation to a resistance reference (**dBm REF**) adjustable from 1 Ω to 10,000 Ω, factory set at 600 Ω.

Resolution	0.01 dB
Absolute error in dB	0.09 x VAC relative error expressed in %
Additional calculation error	0.01 dB
Measuring range	10 mV to 1000 V
Protection	1000 Vrms

dB measurement (voltage decibels)

MTX 3283

Display of measurement in **dB** with the value measured (V ref) at activation of the mode as voltage reference.

Resolution	0.01 dB
Absolute error in dB	0.09 x VAC relative error expressed in %
Additional calculation error	0.01 dB
Measuring range	10 mV to 1000 V
Protection	1000 Vrms

Technical specifications (cont'd)

Peak measurement Pk+ Pk-

MTX 3281
MTX 3282
MTX 3283

Secondary values	Peak ranges	Additional error	Protection
Peak V t > 250 µs	100 mV to 1000 V	3% ± 50D	1000 Vrms or 10 Arms
Peak A t > 250 µs	1000 µA to 20 A	4% ± 50D	

Specifications valid from 20 % of the range in A, 10 % of the range in V
The value of the peak factor results from calculation: (Pk+ - Pk-) / 2 x Vrms
Additional error for 250 µs < t < 500 µs : 3 %
Measurement zero reset : by pressing the key .

SURV Function (MIN, MAX, AVG)

Accuracy and rate: id. specifications Volt and Ampere measurements
MTX 3281, MTX 3282, MTX 3283

Resistive power W

Display of measurement in relative power in relation to a resistance reference (**W REF**) adjustable from 1 to 10,000 Ω, factory-adjusted to 50 Ω.

The function performed is:	(measured voltage)^2 / W REF (unit W) (measured current)^2 ∗ W REF(unit W)
Ranges	DC and AC
Resolution	100 µW
Accuracy	2 x accuracy in VDC or VAC (in %)
Protection	1000 Vrms

Power calculation V x A

MTX 3282
MTX 3283

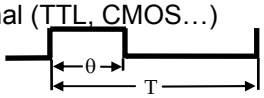
In AC and AC+DC voltage measurement : this calculation is limited to 400 Hz
The current measurement is always performed in AC+DC.
Accuracy (typical) : V measurement accuracy + Peak A measurement accuracy

The connection on the COM input must be short and of large diameter, in order to limit the voltage drop which influences Volt measurement.

Duty ratio DC+ DC-

MTX 3281
MTX 3282
MTX 3283

Display of the measurement in % of a logic signal (TTL, CMOS…)



DC+ Duty ratio	= θ
DC- Duty ratio	= T - θ
Resolution	0.01%
Minimum duration for θ	10 µs
Maximum duration for T	0.8 s
Minimum duration for T	200 µs
Nominal range	5 to 90% typical
Sensitivity (10 V range)	> 30% of the Freq range < 1 kHz > 50% of the Freq range > 1 kHz
Absolute error on the duty ratio, expressed in absolute %	0.05% + 0.0001 / T [t in s] Freq < 1 kHz 0.1% + 0.0005 / T [t in s] Freq > 1 kHz
Additional absolute error (slope at switching to zero)	0.1 x C/P C = range in V or in A (for range 1000 V, C = 5000) P = slope in V/s, A/s
Protection	1000 Vrms

Pulse counting CNT+ CNT-

MTX 3282
MTX 3283

Depending on triggering conditions of frequency meter.

Minimum pulse duration	5 µs
Counting up to	99999
Triggering threshold	10 % of range except range 1000 VAC
This threshold is:	positive in ⎍, negative in ⎎
Counter reset to zero	by pressing the key .

For negative events, reverse the cables.

Technical specifications (cont'd)

Pulse width
PW+ ⎍
PW- ⎎

MTX 3282
MTX 3283

Depending on triggering conditions of frequency meter.

Resolution	10 µs
Minimum pulse width	100 µs
Accuracy	0.05% ± 10 µs
Maximum period duration	12.5 s
Triggering threshold	20 % of range except range 1000 VAC

This threshold is positive in ⎍, negative in ⎎.
Additional error on measurement caused by slope when crossing zero: see §. Measurement of duty ratio.

☝ *For negative events, cross the cables.*

Clock

MTX 3281	Relative time with reset to zero at each powering up
MTX 3282, MTX 3283	Real-time clock
Accuracy	≈ 30 s / month: real-time clock deviation
Display	date - month - year / hour - minute - second

Influences

- Specifications of the accuracy in the field of utilization:
  Typical specifications = SPEC (1 + 0,05 Δ t ° C)

  Specification of the considered measurement. Values given p. 33 to 38.
  Δ T: difference between ambient temperature and input terminal nearest to the field of reference.

  ✎ *Example :* temperature : 38° C DC measurement : 0,02 % + 8 D
  Δ t ° C = 38 - 28 = 10° C
  SPEC (38° C) = (0,02 % + 8 D) (1 + 0,05 ∗ 10)
  = 0,03 % + 12 D

- Electric field under 3 V/m : 1 per thousand at full scale. This influence does not depend on the temperature.

Multimeter

Traceability

TRACEABILITY
Model No. : 3283
Serial No. : 10010110
Firmware Vers. : 1.00
Hardware Vers. : C
CALIBRATION
Last Cal. :
27/11/2005 10:08:25
Next Cal. :
27/11/2006 10:08:25

In the « **General settings** », the menu **Traceability** opens a file with multimeter up-datings :

- Model
- Serial No
- Firmware Version
- Hardware Version

Calibration

A periodic calibration (once a year) of the multimeter is necessary to guarantee the given specification (refer to §. Maintenance, Metrological verification)

General characteristics

Environmental Conditions

Altitude	< 2000 m
Reference temperature	23° C ± 5° C
Utilization temperature	0° C to 55° C
Influence of temperature	see §. Influence
Relative humidity	80 % max. for temperatures up to 31° C decreasing linearly to 50 % at 40° C limited to 70 % for 50 MΩ range
Sealing	IP 51
Operating range	- 10° C to 55° C
Storage range	- 40° C to 70° C
Battery charge range	0 to 40° C

Power supply

MTX 3281

2 possibilities:

• Batteries	3 x 1.5 V alkaline LR6-AM3 AA
• Accumulators	3 x 1.2 V (*) Ni-MH 2400 mAh AA

MTX 3282
MTX 3283

3 possibilities:

• Batteries	3 x 1.5 V alkaline LR6-AM3 AA
• Accumulators	3 x 1.2 V (*) Ni-MH 2400 mAh AA
• Wall Plug power unit:	
Mains voltage	100 V ± 10% or 240 V ± 10%
Frequency	0.3A 50-60 Hz ± 3%

(*) Other capacities are possible.
Via the wall plug, the accumulators can be recharged without removing them from the multimeter.

Average charging period: 7h30 (with 2400 mAh accumulators)

Endurance

• with batteries	80 h (VDC mode)
• with 2200 mAh accumulators	approximately 65 h (VDC mode)

In case of intermittent use of the multimeter, powering by Ni-MH cells is not recommended: this type of cell has an self-discharge rate of 100 % after 3 months of non-use.

☝ ***Endurances are reduced if the LCD backlight and/or the Bluetooth communications interface is used."***

Display

Graphic LCD	useful part 58 x 58 mm orientable, LED backlit, transflective improvement of contrast in full light
Main display	100,000 points + sign + curve adaptive units + bargraph (40 segments) indicators of modes engaged battery level indicator, dangerous voltage indicator…
Secondary display	secondary functions with adapted units

General characteristics (cont'd)

Safety

As per EN 61010-1 :

• Insulation	class 2
• Degree of pollution	2
• Utilisation	interior
• Altitude	< 2000 m
• Measurement category of "measurement" inputs	CAT III, 1000 V in relation to earth
• Measurement category of "measurement" inputs"	CAT IV, 600 V in relation to earth

EMC

This device was designed in accordance with EMC standards in force and its compatibility was tested in accordance with the following standards:

• Emission (cl. A) and Immunity	EN 61326-1
• Max. influence in presence of radiated fields	See §. Influences

US version

• Acc. to	UL 61010-1, CSA C22.2 nr. 61010-1 Homologation UL E 309119

RS232-DB9F or USB optical cables (options)

The optical interface ensures insulation in relation to the connected peripheral (PC) for the transfer of data or for remote control of the multimeter.

RS232 communication interface parameters:

Transmission speed: 9600 / 19,200 / 38,400 Bauds/s

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

USB communication interface: delivered with installation software.

Bluetooth (-BT version only)

Transmission speed	38.4 kbit/s
Sensitivity	-90 dBm
Max. power	20 dBm (100 mW)
Max. distance	ca. 100 m
Battery life	ca. 40 h (VDC mode) with alkaline batteries

Mechanical characteristics

Casing

• Dimensions	87.8 x 265.5 x 107.5 in mm (open position) 87.8 x 187 x 48.6 in mm (casing closed)
• Weight	0.450 kg approximately
• Materials	ABS VO (auto-extinguishing) and PC VO external protective moulding in thermoplastic rubber : SEBS
• Sealing	IP 51

Packaging

• Dimensions

MTX 3281	240 (L) x 158 (W) x 65 (H) in mm
MTX 3282, MTX 3283	297 (L) x 158 (W) x 60 (H) in mm

Supply

Delivered with the instrument

MTX 3281

- Quick Check Guide (bilingual Fr - En)
- Set of 3 batteries 1.5 V alkaline LR6-AM3
- Set of PVC test leads - 4 mm safety touch prods

MTX 3282

- Quick Check Guide (bilingual Fr - En)
- Set of 3 accumulators 1.2 V Ni-MH 2400 mAh
- Wall Plug power/charger unit
- Set of silicon test leads - 4 mm safety touch prods

MTX 3283

- Quick Check Guide (bilingual Fr - En)
- Set of 3 accumulators 1.2 V Ni-MH 2400 mAh
- Wall Plug power/charger unit
- Set of silicon test leads - 4 mm safety touch prods

Supplement delivered with versions

MTX 328I-COM
MTX 3282-COM
MTX 3283-COM

- Acquisition software kit:
  - "Data Viewer" Acquisition software for PC
  - RS232-DB9F Optical cable

Optional Accessories

- Calibration software of the **MTX 328x range** — HX0059
- Acquisition software kit: — HX0050
  - "Data Viewer" Acquisition software
  - RS232-DB9F Optical cable
- External charger for NiMH cells — HX0053
- USB Optical cable + installation software — HX0056-Z
- Adapter + K thermocouple — P06239306
- Ammeter clamps:

MN 08 or 09	0.5 to 240 AAC	ratio 1000 /1	40 Hz to 10 kHz	P01120401 or 02
C100 or 103	0.1 to 1200 AAC	ratio 1000 /1	30 Hz to 10 kHz	P01120301 or 03
Ampflex	0.5 to 2000 AAC	1 mV/A	10 Hz to 20 kHz	P01120504
MN 73	0.01 to 240 AAC	1mA/mV or 1A/10mV	40 Hz to 10 kHz	P01120421
K2	0.1 to 450 mADC	1 mA/10 mV	DC - 1.5 kHz	P01120074
E6N	0.005 to 80 AAC/DC	1 A/1 V or 1 A/10 mV	DC - 8 kHz	P01120040A
PAC21	0.2 to 1400 AAC/DC	1 A/10 mV or 1 A/1 mV	DC - 10 kHz	P01120069

- "2 hands free" Transport Kit — HX0052
- Set of 3 1.2 V Ni-MH cells — HX0051
- PC Adapter USB/RS232 — HX0055
- PC Adapter USB/BLUETOOTH — P01637301
- USB optical cable — HX0056
- Temperature sensor Pt 1000 — HA1263

Spare parts

- Fuse 1000 V, 11 A, 10 x 38 mm, 20 kA — 541171
- Wall Plug power unit EU/US — X03205
- Set of test leads - safety touch prods — AG1064
- Optical cable RS232-DB9F — X02736

Index

Index