

# MX 57 EX

## Multimètre - Multimeter Multimeter - Multimetro - Multímetro

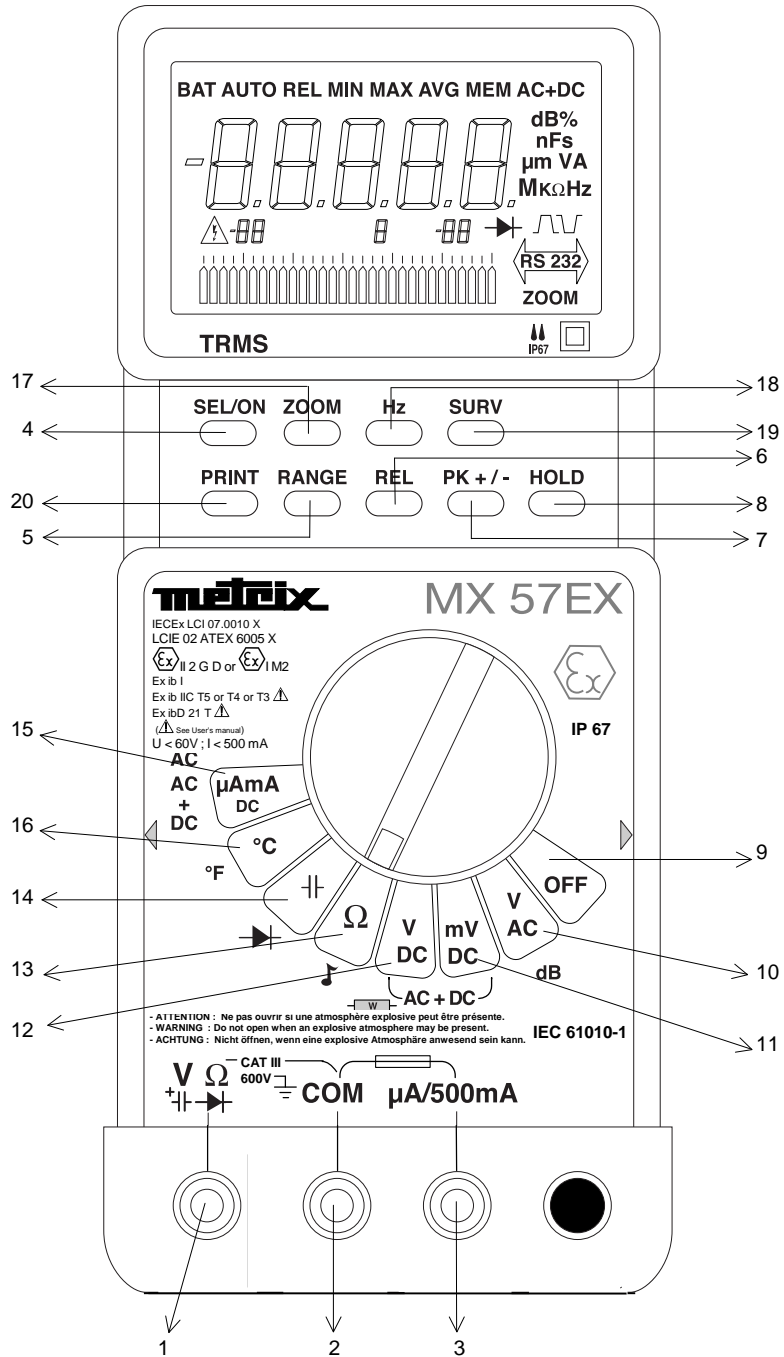
50 000 points - counts - Punkte - punti - puntos

de sécurité intrinsèque  
intrinsically safe  
mit Eigensicherheit  
a sicurezza intrinseca  
de seguridad intrínseca



Notice de fonctionnement  
User's manual  
Bedienungsanleitung  
Libretto d'istruzioni  
Manual de instrucciones

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## 1. **GENERAL INSTRUCTIONS**

You have just acquired an intrinsically safe portable digital multimeter and we thank you for your confidence.

For your own safety and that of the unit, you must observe the instructions described in this manual to ensure safe operation of the multimeter, in the specified conditions of use.

This **MX 57 EX** multimeter complies with safety standard EN 61010-1 (2001), double insulation, relative to electronic measuring instruments. This instrument has been designed for indoor use, in an environment with pollution level 2, at an altitude of less than 2000 m, at a temperature between 0°C and 50°C, with relative humidity of less than 80% up to 40°C.

It can be used for measurements on Measurement category III type of circuits for voltages no higher than 600 V (AC or DC) in relation to the earth.

The safety of any system incorporating this instrument is the responsibility of the system assembler.

It meets Cenelec European standards EN 60079-0, EN 60079-11 and EN 61241-11 (electrical equipment for explosive atmospheres) as per Directive 94/9/CE (ATEX) and international standards IEC 60079-0, IEC 60079-11, IEC 61241-0, IEC 61241-11 as per the IECEx certification system.

It enables electrical measurement in explosive atmospheres in intrinsically safe circuits (gas per group II C, temperature class depends on the battery) in potential danger zones (zone 1) and in gassy mines (group I). In accordance with the standard, the certification allows voltage measurements up to 60 V, current measurements less than 500 mA and not over 40°C.

### 1.1. Safety measures

**After a use on circuits other than those of intrinsically safety, the user must observe a period of 3 min. waiting before carrying the multimeter in a dangerous area of EX class.**

#### 1.1.1. Utilisation of the intrinsically safe multimeter in danger zones

The safe use of equipment in danger zones requires familiarity with the group of gases and comparison of the self-ignition temperature of the gas mixtures involved with the temperature indicated on the equipment.

This multimeter must be used only by personnel who are familiar with the rules for explosive atmosphere equipment and have undergone appropriate training.

*The **MX 57 EX** multimeter may be used for short measurement operations on category "ib" intrinsically safe circuits. "Short" means that the multimeter must not be used continuously, nor be used as a fixed unit.*

*The **MX 57 EX** multimeter may be considered as a passive element without energy accumulator, i.e. with no inductance  $l_{int} \approx 0$ , or capacitance  $C_{int} \approx 0$ .*

*During a voltage measurement, to prevent any overload, the existing intrinsically safe safety circuit must never be opened.*

#### 1.1.2. Before use

- \* Before use in explosive atmospheres, check the type of battery fitted in the instrument to determine the authorised class of temperature.  
If necessary, adapt the battery according to the references in the tables in the Power Supply §. on page 43.
- \* Comply with environmental and storage conditions.
- \* The electrical parameters of the intrinsically safe circuit must comply with the following values :  $U \leq 60$  V (peak value) or  $I \leq 500$  mA.

- \* For your own safety, only use the measuring probes which have been delivered with the instrument. Before use, check that they are in good condition.
- \* In an explosive atmosphere, use only accessories that have a certificate of conformity authorising their use with this multimeter.

### 1.1.3. During use

\* *Never exceed the protective limiting values given in the characteristics specific to each type of measurement.*

- \* When the multimeter is linked to measurement circuits, do not touch unused terminals.
- \* When the scale of the value to be measured is unknown, check that the scale initially set on the multimeter is the highest possible or, wherever possible, choose the autoranging mode.
- \* Before changing functions, disconnect the test leads from the circuit under test.
- \* When performing current measurements, never change of range, do not connect or disconnect leads without first isolating the current. If you do, there is a risk of generating surge currents which can blow the fuse or damage the instrument.
- \* Never perform resistance measurements on live circuits.

### 1.1.4. Symbols



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



Dual insulation



According to WEEE directive 2002/96/EC

### 1.1.5. Definition of measurement categories

*CAT III: Measurement category III corresponds to measurements on building installations.*

*Example: measurements on distribution panels, cabling, etc.*

### 1.1.6. Opening the instrument (*performed outside explosive atmosphere only*)

- \* Before opening the instrument, always disconnect from all sources of electric current and make sure not to be loaded with static electricity, which may destroy internal components.
- \* The F1 fuse certified for EX classified danger zones, as well as the F2 fuse, must be replaced by a model identical to the origin fuses.  
(See §. 3.5.3. Replacing the battery or one fuse).
- \* Any adjustment, maintenance or repair work carried out on the multimeter should be carried out only by appropriately qualified personnel, after having taken into account the instructions in this present manual. A "**qualified person**" is one who is familiar with the installation, construction and operation of the equipment and the hazards involved.  
This qualified person must be familiar with equipment for explosive atmospheres and be trained in the general rules for intrinsic safety.
- \* When the instrument is open, for maintenance purposes for example, remember that some internal capacitors can retain a dangerous potential even after the instrument is powered down.


- \* If any faults or abnormalities are observed, take the instrument out of service and ensure that it cannot be used until it has been checked out.
- \* It is recommended to remove the battery from the instrument if not used.

### 1.2. Protection devices

ASYC II series instruments are fitted with various protection devices :

- \* A protection by varistors allows a chopping of transient overvoltages present at the terminals of measurement.
- \* A PTC (Positive Temperature Coefficient) resistor protects against permanent overvoltages of up to 600 V during resistance, capacitance and diode test measurements. This protection is reset automatically after overload.
- \* One F1 intrinsically safe fuse provides protection during current measurements.
- \* A special intrinsic safety case ensures IP 67 sealing.

### 1.3. Safety devices

- \* The battery unit and fuse cannot be accessed without first disconnecting the measuring leads.
- \* When measuring voltages above 24 V, the sign blinks  on the display.
- \* If the maximum range is repeatedly exceeded, an intermittent audible signal indicates the risk of electric shock.

### 1.4. Warranty

This equipment is warranted against any defects of manufacture or materials according to the general conditions of sale.

During the warranty period (3 years), defective parts will be replaced, the manufacturer reserving the right to repair or replace the product. In the event of the equipment being returned to the after sale department or to a local agency, carriage to the centre shall be payable by the customer.

The warranty does not cover the following :

1. Repairs necessitated by misuse of the equipment or use in association with incompatible equipment.
2. Modification of the equipment or any related software without the explicit authorization of the manufacturer.
3. Repairs necessitated by attempts to repair or maintain the product made by a person not approved by the manufacturer.
4. Adaptation to a specific application not provided for in the specifications of the equipment or the user manual.
5. Damage after a drop, a shock or flooding.

The contents of this manual must not be reproduced in any form whatsoever without the consent of the manufacturer.

### 1.5. Maintenance

Maintenance of this unit can only be performed by a person who has undergone training on intrinsic safety rules.

Return your instrument to your distributor for any work to be done within or outside the guarantee.

### 1.6. Unpacking - Repacking

This equipment has been fully checked out mechanically and electrically before shipping. All precautions have been taken to ensure that the instrument arrives at its destination undamaged.

However, it is advisable to carry out a rapid check for damage sustained in shipping. If there is any evidence of damage, make this known immediately to the shipper.

**Caution** *Should you need to return the instrument, preferably use the original packaging and indicate the reasons as clearly as possible on an accompanying note.*

## 2. **DESCRIPTION**

This multimeter is one of the ASYC II (Advanced Safety Concept, second generation) range, designed for a high degree of user safety, maximum protection and unrivalled performance.

### 2.1. **Selector switch**

This standalone, handheld professional measuring instrument is capable of measuring the following quantities (accessed by the eight-position rotary selector switch) :

- \* AC voltages with AC (or RMS) capacitive coupling
- \* AC voltages with AC+DC (or TRMS) direct coupling
- \* DC voltages
- \* AC currents with AC (or RMS) capacitive coupling
- \* AC currents with AC+DC (or TRMS) direct coupling
- \* DC currents
- \* resistance values
- \* continuity (with beeper)
- \* capacitance
- \* diode threshold voltage
- \* frequencies
- \* duty cycles
- \* pulse counting
- \* pulse width
- \* dBm
- \* resistive power
- \* temperature

### 2.2. **Keypad**

An nine-key keypad lets you :

- \* select the autoranging mode (RANGE)
- \* store a value (HOLD)
- \* measure fast peaks (PK+/-)
- \* set the measurement relative to a reference value (REL)
- \* select a function derived from the main function, or switch on the multimeter again after it has been shut down automatically (SEL/ON)
- \* select time-domain measurements: frequency, duty cycle, stopwatch, pulse counter (Hz)
- \* activate the MIN- MAX- AVG detection mode (SURV)
- \* activate sending data to a printer or a computer (PRINT)

### 2.3. **Display**

The display shows :

- \* clearly legible figures (14 mm high)
- \* an analogue readout of the parameter being measured through a 34-segment bargraph
- \* perform 50 000-point measurements (high resolution)
- \* perform 5 000-point measurements (low resolution)

### 2.4. **Power supply**

It is powered by a standard 9 V (6LF22, 6LR61) battery which provides approximately 300 hours of operation (in VDC mode). It is prohibited to use batteries other than those specified (see §. 3.5.3. Replacing the battery or fuse).


### 2.5. **Input terminals**

Measurements are performed using two measuring leads supplied with the instrument connected to input terminals 1, 2, 3 and 4, as indicated in §. 3.1.

### 3. **COMMISSIONING**

#### 3.1. **Connecting the test leads**

Connect the black lead to the COM socket (for all measurements). Depending on the position of the selector switch, connect the red lead as follows :

Rotary selector switch position	Input terminal
V <sub>AC</sub> , mV <sub>DC</sub> , V <sub>DC</sub> , Ω,  , °C	VΩ
μA mA <sub>DC</sub>	μA / 500 mA


#### 3.2. **Switching on the instrument**

Turn the selector switch to the required function.  
All segments of the display come on for a few seconds. The instrument is then ready for measurements.

#### 3.3. **Switching off the instrument**

The instrument can be switched off manually by returning the selector switch to the OFF position, or automatically after approximately half an hour if no key is pressed or the switch is not operated.

**Note** *Automatic shutdown of the instrument is disabled in order to avoid interrupting the surveillance mode (SURV), peak measurements (PK+/-), the pulse counting mode or a data printout.*

*For user safety, automatic shutdown is also disabled when a measured magnitude (Voltage / Current) present at the input exceeds dangerous levels ( indicator displayed).*

#### 3.4. **Special configurations**

To adapt the configuration of the instrument to the measurement environment, the user can:

- *Choose 50 Hz or 60 Hz rejection :*  
Switch on with the rotary switch while holding down the HOLD key. The selection is reversed from the last configuration, is displayed for two seconds and remains backed up in non-volatile memory.
- *Choose the input impedance for measurements in the mV range :*  
Switch on with the rotary switch while holding down the RANGE key. The selection is reversed from the last configuration, is displayed for two seconds, and remains backed up in non-volatile memory.
- *Choose a low resolution mode (5 000 counts) :*  
Switch on with the rotary switch while holding down the REL key. The selection is displayed for two seconds.



### 3.5. Multimeter maintenance



**Any internal intervention can only be performed outside the danger zone.**

#### 3.5.1. Fuse self-test

F1 Fuse: When the switch is set to the  $\mu$ A mA position and the (0.500 A, 125 V) F1 fuse of intrinsic safety is cut, the display shows "FUSE".  
Replace it by a fuse of identical model.

F2 Fuse : The (1 A, 600 V, 30 kA) F2 fuse does not have automatic control. To check it, set the switch to the continuity test position, connect the COM input and the V input by a cord; if the buzzer is active, the (1 A) F2 fuse is in good condition, if the buzzer is not active, F2 is out of order.  
Replace it by a fuse of identical model.

**Note** *When the F2 fuse is cut, replace it : voltage measurements are possible, but the specifications are not guaranteed any more. The other types of measurements are not possible any more.*

#### 3.5.2. Battery self-test

When the "BAT" indication is displayed continuously on the display, the instrument still has approximately 10 hours of operation (in VDC mode), but specifications can no longer be guaranteed.

Replace the battery.

#### 3.5.3. Replacing the battery or one fuse

When changing parts (**performed outside the danger zone only, EX class**), check that a fuse of the correct calibre and specified type is used.  
Use of a non-compliant fuse and short-circuiting of the fuse holder are strictly prohibited.  
Use only a 9 V battery (6LF22, 6LR61) verified as being on the certified list. It is prohibited to use batteries other than those specified.

Certified batteries : See the list on page 43 of this user manual.

**CAUTION: The temperature class depends on the battery used.**

Certified fuse : **F1** intrinsically safe fuse 0.5 A, 125 V  
**LITTLEFUSE** : part-number 259.500  
**F2** fuse 1 A, 600 V, 30 kA, 6 x 32 mm

Open the multimeter casing as follows (refer to last page of the manual) :

1. Remove the stand from the back of the instrument.      Figures 1 and 2
2. Remove the front cover using the stand as a lever.      Figure 3
3. Remove the flexible seal.
4. Unscrew the screw maintaining the sealed casing located under the movable panel.
5. Replace the battery or fuse.

Before using the unit, check that the flexible seal and the upper case cover are carefully repositioned.

#### 3.5.4. Cleaning

Clean the multimeter using a damp cloth and soap. Let it dry before using. Do not use abrasives or solvents.

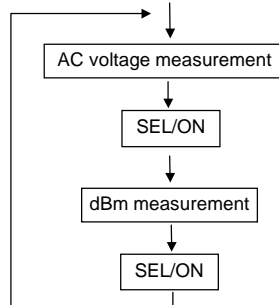
#### 4. **FUNCTIONAL DESCRIPTION**

##### 4.1. **SEL/ON key**

This can be used to switch on the multimeter again after an automatic shutdown. It can also be used to access secondary functions associated with the selector switch positions.

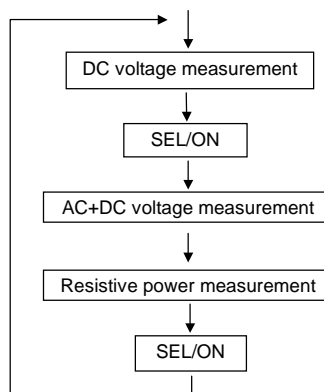
The flowcharts below define these various functions.

##### 4.1.1. **V<sub>AC</sub> position**



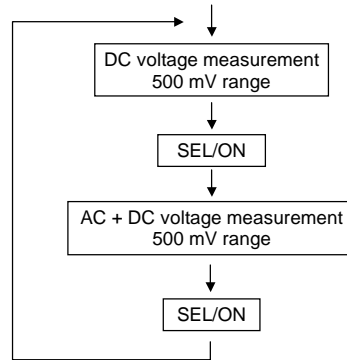
**ELECTRICAL SPECIFICATIONS OF INTRINSICALLY SAFE CIRCUITS**  
**U ≤ 60 V (peak value)**

##### 4.1.2. **V<sub>DC</sub> position**

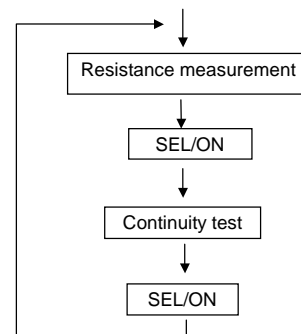


**ELECTRICAL SPECIFICATIONS OF INTRINSICALLY SAFE CIRCUITS**  
**U ≤ 60 V (peak value)**

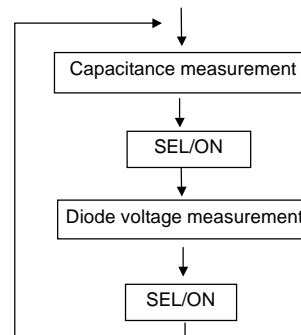
#### 4.1.3. mV position



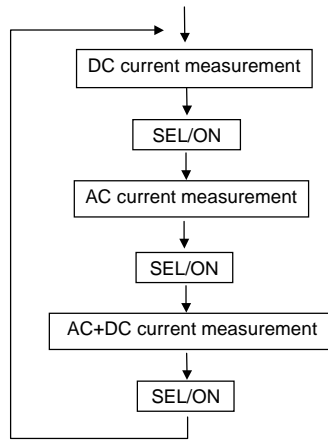
#### 4.1.4. $\Omega$ position



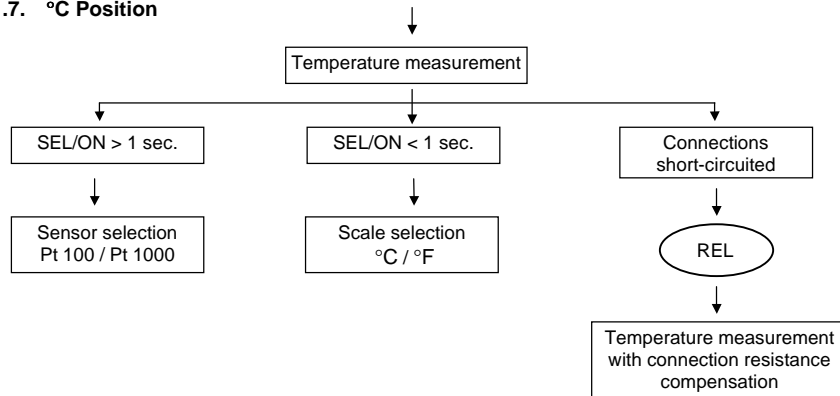
#### 4.1.5. $\mu\text{F}$ position



**Warning ! Do not perform capacity measurements in danger zones.**

4.1.6.  $\mu\text{A}$  mADC position

**ELECTRICAL SPECIFICATIONS OF THE INTRINSICALLY SAFE CIRCUITS**  
 $I \leq 500 \text{ mA}$

4.1.7.  $^{\circ}\text{C}$  Position

$^{\circ}\text{C}/^{\circ}\text{F}$  selection and Pt 100 / Pt 1000 selection are saved in non-volatile memory.  
 Pt 100 selection is indicated by display of  $\Omega$  symbol and Pt 1000 by display of  $\text{k}\Omega$  symbol.



**Warning !** *The use of non-certified probes with this multimeter is not authorised in danger zones. Only use probes (system manufacturer's certification) with a certificate of conformity authorising their use with this multimeter.*

#### 4.2. RANGE key

- In AUTO mode, to switch to MANUAL mode (short press).
- In MANUAL mode, to select the next range (short press) or return to AUTO mode (long press).  
Measurements concerned : voltages, capacitance, resistance, currents.
- When making time measurements (frequency, duty cycle, pulse width, pulse count) : if the range change made during previous measurements (Voltage or Current) was in manual mode, it may be necessary to adapt this measurement range to the signal level injected at the input. This is why the RANGE key is used to change from one range (Voltage or Current) to the next range. The new range is then displayed for 2 seconds.

#### 4.3. REL key

**Short press :** mode REL, the last value measured becomes the reference value derived from subsequent measurements.

**Long press :** When in REL mode, a long press displays the reference being used. This value may be adjusted using the SEL/ON key (selection of digits and a sign) and the RANGE key (increment the selected digit).

#### 4.4. PK+/- key

The fast positive or negative peak measurement functions ( $\geq 1$  ms) can be accessed by repeatedly pressing this key in the  $V_{DC}$ ,  $mV_{DC}$ , and  $mA_{DC}$  functions.

#### 4.5. HOLD key

**Short press :** Fixes the display on the current value.

**Long press :** Accesses or quits the autostore mode. Can be accessed in the  $V_{DC}$ , mV,  $V_{AC}$  positions.

##### Autostore

Set the probes on the point to be measured. An audio signal indicates if the measurement is stable. When you remove the probes, a second audible signal indicates that this stable value displayed has been stored.

#### 4.6. ZOOM key

You can press this key to expand the bargraph readout five times for positive measurements and eleven times for bipolar measurements, one centred around zero (centre zero mode).

##### Adjusts ohm-value references in dB and resistive power measurements

When the current measurement is dB or resistive power, you can display the resistance reference with the ZOOM key (long press). This value can then be adjusted using the SEL/ON and RANGE keys (this value is common to dBm and resistive power measurements).

You quit the ohm reference adjustment mode with the ZOOM key (short press).

#### 4.7. SURV key





If you press this key (long press), you access the surveillance mode (or coming out), in which minimum (MIN), maximum (MAX) and sliding average (AVG) values of the current measurement are stored (capture time  $\geq$  500 ms).

You can look up each of these values by repeatedly pressing the same key (short press). The symbols MIN, MAX or AVG flicker with the selected value.

**Note** *When entering in the SURV mode, non-coherent values may be displayed momentarily.*

#### 4.8. Hz key

When the current positions are  $V_{AC}$ ,  $V_{DC}$ , mV, mA, the Hz key invokes, in turn :

- frequency measurement,
- positive duty cycle measurement (% +),
- negative duty cycle measurement (% -),
- positive pulse count ()
- negative pulse count ()
- positive pulse width measurements ()
- negative pulse width measurements ()

A long press on Hz key allows a direct selection of the voltage or current function.

#### 4.9. PRINT key (for use with optional interface accessory for printer or PC)

**Short press :** Activates/deactivates « send measurements to printer » mode at the rate defined by the user.

**Long press :** Adjusts the rate varying from 00000 s (a single transmission) up to 9h 59min 59s, using the SEL/ON key (selection of digits) and the range key (increment the selected digit).

## 5. TECHNICAL SPECIFICATIONS

Only those values assigned tolerances or limits are guaranteed values. Values without tolerances are given for information only (French standard NFC 42-670).  
 {Accuracy : "n% R + nD" means "n% of the reading + n digits" as per IEC 485}

(♦) When the measurement terminals are connected to an intrinsically safe circuit, the electrical specifications of intrinsically safe circuits must conform following values :  $U \leq 60 \text{ V}$  (peak value) or  $I \leq 500 \text{ mA}$ .

After a use on circuits other than those of intrinsic safety, the user must observe a period of 3 minutes waiting before carrying the multimeter in a dangerous area of EX class.

**Note** If voltage measurements are out of the specifications or if other measurements are no longer possible, first check the F2 fuse.  
 (See §. 3.5.1. Fuse self-test).

### 5.1. DC voltages

Selector switch position	Ranges	Accuracy	Input impedance	Protection	Resolution
mV	500 mV	0.025%R <sup>***</sup> + 2D	10 M $\Omega$ /1G $\Omega$ *	$\pm 1100 \text{ VPK}$ ***	10 $\mu\text{V}$
V <sub>DC</sub>	5 V		11 M $\Omega$	$\pm 1100 \text{ VPK}$	100 $\mu\text{V}$
	50 V	10 M $\Omega$	1 mV		
	(♦) 500 V	0.05%R <sup>***</sup> + 2D	10 M $\Omega$	10 mV	
	(♦) 600 V			100 mV	

\* Refer to §. 3.4.

\*\* at 23°C  $\pm$  2°C

\*\*\* 1 min max.

Number of counts : 50 000 (or 5 000 - refer to §. 3.4.)  
 Range selection : automatic or manual for the 5 V, 50 V, 500 V, 600 V ranges  
 Common mode rejection : at 50 and 60 Hz, better than 120 dB  
 Serial mode rejection : at 50 and 60 Hz, better than 60 dB  
 Additional error in PK+/- mode for a pulse of  $\geq 1 \text{ ms}$  : 1% R  $\pm$  50 D  
 For measurements performed on alternative signals, the selected range must tally with the max. value of the signal peak.

### 5.2. AC voltages (AC and AC+DC)

Selector switch position	Ranges	Accuracy					Input impedance	Protection	Resolution
		DC*	40 Hz to 1 kHz	1 kHz to 4 kHz	4 kHz to 10 kHz	10 kHz to 30 kHz			
		from 5 % to 100 % of the range		from 10 % to 100 % of the range					
mV + SEL/ON	500 mV*			7 % R + 30 D	//////////		10M $\Omega$ /1G** // 100 pF	$\pm 1100 \text{ VPK}$ ***	10 $\mu\text{V}$
V <sub>AC</sub> or	5 V	0.3% R + 30 D	1% R + 30 D	2 % R + 30 D		3% R + 30 D	11M $\Omega$ /100pF	$\pm 1100 \text{ VPK}$	100 $\mu\text{V}$
	50 V						10 mV		
V <sub>DC</sub> + SEL/ON	(♦) 500 V					10M $\Omega$ /100pF		10 mV	
	(♦) 600 V			//////////				100 mV	

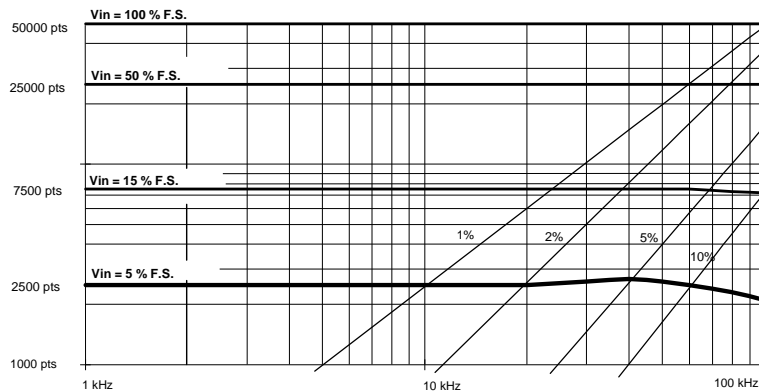
\* AC+DC only

\*\* Refer to §. 3.4.

\*\*\* 1 min max.

Number of counts : 50 000 (or 5 000 - refer to §. 3.4.)  
 Range selection : automatic or manual for the 5 V, 50 V, 500 V, 600 V ranges  
 Common mode rejection : at 50 and 60 Hz, better than 80 dB  
 Additional error according to crest factor : 0.2 % for a crest factor of 2 to 3  
 0.5 % for a crest factor of 3 to 6  
 (Specification given full scale for a squarewave signal pulse 200  $\mu$ s wide)

### Curve showing typical measurement error (5 V, 50 V, 500 V ranges)



### 5.3. DC current

Selector switch position	Ranges	Accuracy	Max. voltage drop	Protection	Fuse*	Resolution
$\mu$ A mA	500 $\mu$ A	0.2%R + 5 D	700 mV	600 VRMS	F1	10 nA
	5 mA	0.2%R + 2 D				100 nA
	50 mA	0.05%R+2 D	1 $\mu$ A			
	500 mA	0.2%R + 2 D	1.5 V			10 $\mu$ A

\* Refer to fuse specifications, §. 6.1.1.

Number of counts : 50 000 (or 5 000 - refer to §. 3.4.)  
 Range selection : automatic or manual for the 500  $\mu$ A, 5 mA, 50 mA, 500 mA ranges

Additional error in PK+/- mode for a pulse width of  $\geq 1$  ms : 1 % R  $\pm$  50 D  
 For measurements performed on alternative signals, the selected range must tally with the max. value of the signal peak.

### 5.4. AC currents (AC and AC+DC)


Ranges	Accuracy	Protection	Fuse*	Resolution	Max. Crest
	40 Hz to 5 kHz				
	5 % to 100 % of range				
500 $\mu$ A	0.75 % R + 30 D	600 VRMS	F1	10 nA	1 mA
5 mA	0.6 % R + 30 D			100 nA	10 mA
50 mA				1 $\mu$ A	100 mA
500 mA				10 $\mu$ A	1 A

\* Refer to fuse specifications, §. 6.1.1.



Number of counts : 50 000 (or 5 000 - refer to §. 3.4.)  
 Range selection : automatic or manual for the 500  $\mu$ A, 5 mA, 50 mA, 500 mA ranges  
 Additional error according to crest factor : 0.2 % for a crest of 2 to 3  
 0.5 % for a crest of 3 to 6  
 (Specification given full scale for a squarewave signal pulse 200  $\mu$ s wide)  
 Additional error in IAC+DC with a direct current at input : 1 %

### 5.5. Resistance / Continuity


Ranges	Accuracy	Measurement current	Protection*	Resolution
500 $\Omega$ / 	0.07% R + 8 D	1 mA	600 VRMS	10 m $\Omega$
5 k $\Omega$	0.07% R + 5 D	100 $\mu$ A		100 m $\Omega$
50 k $\Omega$	0.07% R + 2 D	10 $\mu$ A		1 $\Omega$
500 k $\Omega$		1 $\mu$ A		10 $\Omega$
5 M $\Omega$ **	0.3% R + 2 D	100 nA		100 $\Omega$
50 M $\Omega$ **	1% R + 2 D	50 nA		1 k $\Omega$

\* Overload protection can be reset automatically.

\*\* It is highly recommended to use very short and shielded test leads for measurements in this range (> 1 M $\Omega$ ).

Number of counts : 50 000 (or 5 000 - refer to §. 3.4.)  
 Range selection : automatic or manual (fixed in continuity mode)  
 Maximum open circuit voltage : 7 V  
 Detection threshold in continuity mode : 10  $\Omega$  to 20  $\Omega$   
 Response time in continuity mode : 1 ms

### 5.6. Capacitance

 **Discharge all capacitors before performing measurements.**

Ranges	Accuracy	Measurement current	Max measurement time	Protection *	Resolution
50 nF**	1% R + 2 D	100 nA	0.5 s	600 VRMS	10 pF
500 nF		1 $\mu$ A			100 pF
5 $\mu$ F		10 $\mu$ A			1 nF
50 $\mu$ F		100 $\mu$ A			10 nF
500 $\mu$ F		1 mA	1.5 s		100 nF
5000 $\mu$ F		3 s/mF	1 $\mu$ F		
50 mF		10 $\mu$ F			

\* Overload protection can be reset automatically.

\*\* It is highly recommended to use very short and shielded test leads for measurements in this range.

Number of counts : 5 000  
 Range selection : automatic or manual  
 Maximum open circuit voltage : 7 V

 **Caution ! Do not perform capacitance measurements in dangerous zones.**

**5.7. Diode threshold voltage measurement**

Measurable voltages :	0 to 2 V
Measurement current :	1 mA $\pm$ 20 %
Resolution :	1 mV
Protection :	600 VRMS, can be reset automatically.

**5.8. dB function**

Displays measured values in dBm relative to a resistance reference which can be adjusted from 1 to 9999 ohms and backed up in non-volatile memory (factory-set to 600 ohms, refer to adjustment procedure in §. 4.6).

Resolution :	0.01 dB
Absolute error in dB :	0.09 x $V_{AC}$ relative error as a percent
Additional computation error :	$\pm$ 0.01 dB
<b>Measurement range :</b>	<b>10 mV<sub>AC</sub> to 600 V<sub>AC</sub> (◆)</b>
Protection :	$\pm$ 1100 V

**5.9. Resistive power function**

Displays resistive power relative to a resistance reference which can be adjusted from 1 to 9999 ohms and backed up in non-volatile memory (factory-set to 600 ohms, refer to adjustment procedure in §. 4.6).

Measured function is :	(measured voltage) <sup>2</sup> / Rref
Resolution :	100 $\mu$ W
Accuracy :	2 x $V_{AC}$ accuracy (%)
<b>Measurement max. voltage :</b>	<b>600 V<sub>AC+DC</sub> (◆)</b>
Protection :	$\pm$ 1100 V
Display unit :	VA

**5.10. Frequencies**

Selector switch setting :	$V_{AC}$ , mV, $V_{DC}$ , mA
Measurement range :	0.62 Hz to 500 kHz
Accuracy :	0.03 % $\pm$ D
Protection :	1100 V in $V_{AC}$ , mV, $V_{DC}$ modes 600 VRMS (F1) in mA mode
Display :	50 000 counts

Range	SENSITIVITY			
	500 $\mu$ A to 500 mA	500 mV	5 V to 500 V (◆)	600 V (◆)
0,62 Hz to 5 kHz*	3 % of range	5 % of range	2 % of range	100 V
5 kHz to 50 kHz	5 % of range	6 % of range	5 % of range	250 V
50 kHz to 500 kHz	10 % of range	//////////	10 % of range	//////////

\* rectangular signal

Additional positive limit in DC : + 3 % of range, except in 600 V<sub>DC</sub> range (150 V additional)

(◆) Refer to page 37.





**6. GENERAL SPECIFICATIONS****Adjustment**

The **MX 57 EX** multimeter incorporates a non-volatile memory containing the adjustment characteristics for all measurement ranges. It is supplied with a certificate of conformity.

**Safety**

acc. to	IEC 61010-1 Ed. 2 (2001)
Insulation	class 2
Degree of pollution	2
Utilisation	indoor
Altitude	< 2000 m
Measurement category of "measurement" inputs	CAT III, 600 V in relation to earth

**Intrinsic Safety**

As per Directive ATEX 94/9/CE	 II 2G D ou  I M2 EN 60079-0 (2004), EN 60079-11 (2007), EN 61241-11 (2006)
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EC type Examination Certificate	LCIE 02 ATEX 6005X
Supplementary EC type Examination Certificate	LCIE 02 ATEX 6005X / 01
Amendment to EC Examination Certificate type	LCIE 02 ATEX 6005 X / 02

As per the IECEx Certification System	IEC 60079-0 (2004), IEC 60079-11 (1999), IEC 61241-0 (2004), IEC 61241-11 (2005)
Certificate	IECEX LCI 07.0010X

Type of protection	ATEX and IECEx Ex ib I Ex ib IIC T5 or T4 or T3 Ex ib D 21 T
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The battery must be replaced outside danger zone only.

Casing	FR90 Bayblend, RD 3020 (red)
Labels	sticking polycarbonat, 8A85 quality
PCB's IRC	> 100
Protecting varnish IRC (2 layers)	> 100

**Environment**

Reference temperature	18°C to 28°C
Rated range of use	0°C to 50°C
Max. temperature of use in danger zone	≤ 40°C
Limit range of operation	-10°C to 60°C
Storage temperature range	-40°C to 70°C
Temperature coefficient	max 0.1 x accuracy /°K max. 0,2 x accuracy /°K in VDC and 50 mADC
Relative humidity	0 to 80% from 0°C to 40°C (70% max. for 5 MΩ/50 MΩ), 0 to 70% from 40°C to 50°C, 60% above 50°C

**EMC**

This unit was designed in compliance with the EMC standards in force and its compatibility has been tested in accordance with the following standard :

- Emission (cl. A) and Immunity NF EN 61326-1 (1997) ; A1 (1998); A2 (2001)
- Max. influence in electro-magnetic fields at 3 V/m acc. to EN 61000-4-3, 1997 3 % end of scale on VDC, VAC, ADC, AAC3 % end of scale on VDC, VAC, ADC, AAC capacity ranges

**Sealing**

IP 67

acc. to NF EN 60 529 : 1992

**Resistance**

Fall resistance

as per EN/IEC 60079-0 (2004)

Impact resistance


as per EN/IEC 60079-0 (2004)

Heat resistance

as per EN/IEC 60079-0 (2004)

**Power supply**9 V alkaline battery (6LF22, 6LR61) battery life 100 hours in V<sub>DC</sub> mode

This multimeter must be fitted with certified batteries, such as :

 **CAUTION: The temperature class depends on the battery used.**

Certified battery	Gaseous explosive atmosphere	Combustible dusty atmosphere
<i>DURACELL PROCELL</i>	<b>T5</b>	<b>91°C</b>
<i>POWER LINE</i>	<b>T4</b>	<b>103°C</b>
<i>ANSMANN</i>	<b>T4</b>	<b>112°C</b>
<i>SANYO</i>	<b>T4</b>	<b>123°C</b>
<i>ENERGIZER</i>	<b>T4</b>	<b>124°C</b>
<i>POWER ONE</i>	<b>T3</b>	<b>133°C</b>

**Measurement rate**

Digital display

2 measurements/s

Bargraph

20 measurements/s

**Display**

Liquid crystal display comprising :

- a 50 000-point display + sign (digits 14 mm high),
- a 34-bar analogue bargraph display,
- appropriate units for each type of measurement,
- triggered mode indicators (relative, ranging),
- battery discharged indicator.

**Mechanical**

Dimensions 189 x 82 x 40 mm Weight 400 g

**Packaging**

Dimensions 230 x 155 x 65 mm Weight 500 g

**6.1. Accessories and documentation supplied with the multimeter**

Set of test leads with safety probes

Intrinsically safe spare fuse (0.5 A, 125 V)

Operating manual

EC type Examination Certificate

LCIE certificate of conformity

Test report,

Carrying case