

MX 5060



Benchtop Multimeter 60,000 pts

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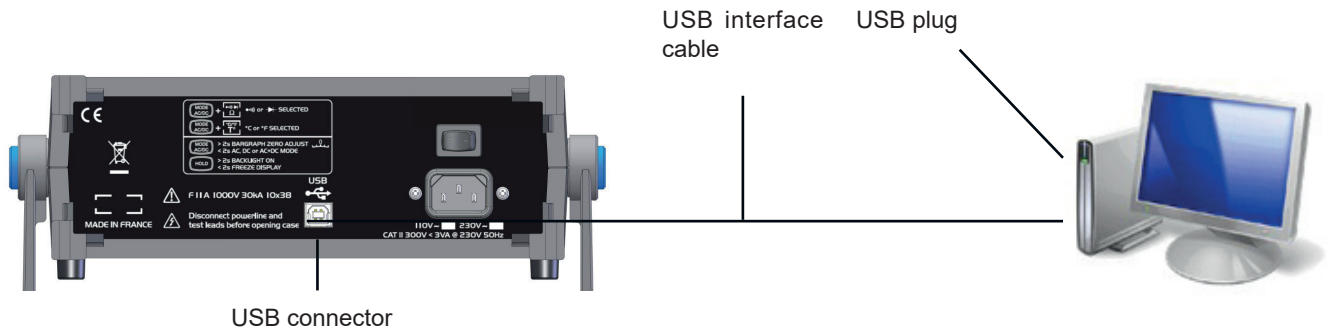
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1. REMOTE PROGRAMMING

1.1. CONNECTION OF USB CABLE

The generator can be remotely programmed using a computer or PC with the programming kit.

1. Connect the optical cable at the rear of the unit at the USB input.
A mechanical fail-safe device indicates the connection direction.
2. Connect connector DB9F on one of the USB inputs of the PC.



1.2. CONFIGURATION

- Communication : 4800 bauds
- 8 data bits,
- 1 stop bit,
- no parity,
- no flow control

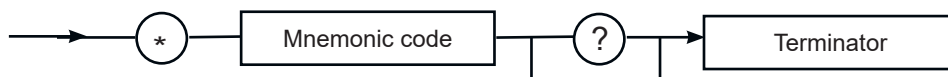
1.3. REMOTE CONTROL

The programming instructions comply with standard IEEE488.2, protocol SCPI.
They provide the user with the possibility of checking the instrument remotely from simple standard controls.

Communication between a controller and a generator enables users to:

- Configure the instrument
- Perform measurements campaign
- Receive information (configuration)

1.4. COMMAND SYNTAX



1.5.2. IEEE 488.2 COMMON COMMANDS

Commands	Functions
*CLS	Reset the event and status registries
*IDN?	Read identifier
*RST	Reset

1.5.3. SPECIFIC COMMANDS OF THE BENCHTOP MULTIMETER

Directory	Command	Function
INPut	:COUPling :COUPling?	Configures the type of coupling of the volt or ampere measurement in progress.
SENSe	:FUNctioN :FUNctioN?	Configures the main measurement type.
	:RANGe[:UPPER] :RANGe[:UPPER]?	Configures the range for the active main measurement.
	:RANGe:AUTO :RANGe:AUTO?	Authorizes or inhibits automatic ranging on the active main measurement.
	:SECOndary :SECOndary?	Configures the secondary measurement type.
	:FILTer[:LPASs][:STATe] :FILTer[:LPASs][:STATe]?	Authorizes or inhibits the multimeter filter.
SYSTem	:ERRor[:NEXT]?	Reading of error number.
	:BEEPer:STATe :BEEPer:STATe?	Authorizes or inhibits the multimeter beeper.
	:LOCal	Configures the multimeter in local mode, so the front panel is accessible again.
	:VERSion?	Reading of the SCPI version
UNIT	:TEMPerature :TEMPerature?	Configures the temperature measurement unit.
READ?		Returns the result of the measurement in progress.
MEASure?	:RANGe:AUTO:PEAK :RANGe:AUTO:PEAK?	Authorizes or inhibits automatic peak ranging on the active main measurement.

1.6. DETAILED DESCRIPTION OF COMMANDS

1.6.1. IEEE 488.2 COMMON COMMANDS

***CLS** (Clear Status)

(Command)

The *CLS common command resets to zero the event and status registries.

Command syntax: *CLS

***IDN? (Identification Number)**

(Query)

In response to the question *IDN?, the generator returns the instrument type and the software version.

Query syntax: *IDN?

Response format:

«manufacturer, instrument, FV<firmware version>><NL>

<manufacturer>	Name of manufacturer
<instrument>	Reference of the instrument
<firmware version>	Software version

*RST (Reset)

(Command)

The *RST command reconfigures the instrument with the factory settings.

1.6.2. COMMANDES SPÉCIFIQUES À L'INSTRUMENT

Commandes INPut

■ COUPling

(Commande/Interrogation)

La commande INP:COUP <DC | AC | ACDC > sélectionne le type de couplage de la mesure volt ou ampère en cour.

A la question INP:COUP?, le multimètre retourne le type de couplage actif.

Commandes SENSE

■ FUNction

(Command/Query)

The command FUNC <»VOLTage» | «CURRent» | «RESistance» | «CONTInuity» | «DIODE» | «FREQuency» | «CAPAcitor» | «TEMPerature»> selects the main measurement type.

In response to the question FUNC?, the multimeter returns the active main measurement type.

■ RANGE[:UPPER]

(Command/Query)

The command RANG <NRf> sets the range for the active main measurement.

Depending on the active main measurement, the possible values are:

0 (0 V)	to	600 (1000 V)	for voltage measurement
0 (0 A)	to	10 (20 A)	for current measurement
0 (0 Ω)	to	60E+6 (60 MΩ)	for resistance measurement
6E-9 (6 nF)	to	60E-3 (650 mF)	for capacitance measurement

Reminder: Frequency measurement is only available with AUTO ranging and the continuity, diode test and temperature measurements are mono-range.

In response to the question RANG?, the multimeter returns the range of the active main measurement.

■ RANGE:AUTO

(Command/Query)

The command RANG:AUTO authorizes or inhibits automatic ranging of the active main measurement.

The values are 0 to inhibit and 1 to authorize.

In response to the question RANG:AUTO?, the multimeter returns the activation status of the automatic ranging.

■ SECondary

(Command/Query)

The command SEC <NRf> selects the type of secondary measurements.

The values vary from 0 to 8:

Display 2

0	→	Hz
1	→	Min/Max/Pk → MAX
2	→	Min/Max/Pk → MIN
3	→	Min/Max/Pk → PK+
4	→	Min/Max/Pk → PK-
5	→	delta MEM/ delta REL

In response to the question SEC?, the multimeter returns the active secondary measurement .

■ FILTer[:LPASs][:STATe]

(Command/Query)

The command FILT authorizes or inhibits the filter of the multimeter.

The values are 0 to inhibit and 1 to authorize.

In response to the question FILT?, the multimeter returns the activation status of the filter.

SYSTem commands

ERRor[:NEXT]?

(Query)

In response to the question SYST:ERR?, the multimeter returns the number of the error positioned at the top of the queue. The queue contains 10 numbers and is managed on the principle of first in, first out.

As the SYST:ERR? questions progress, the multimeter returns the error numbers in the order of their arrival, until the queue is empty. Any additional SYST:ERR? question will cause a negative response: character «0» (ASCII code 48).

If the queue is full, the box located at the top of the queue takes the value -350 (Queue saturated).

The queue is emptied:

- on powering up
- on receipt of a *CLS
- when the last error is read

Response format: <error><NL>

where error = negative integer or null.

List of errors

* Command errors: (-199 to -100)

They indicate that a syntax error has been detected by the syntax analyzer, and caused event register bit 5, called CME, CoMmand Error, to be set to 1.

-101	:	Invalid character
-102	:	Syntax error
-103	:	Invalid separator
-104	:	Data type error
-108	:	Parameter not allowed
-109	:	Missing parameter
-111	:	Header separator error
-112	:	Program mnemonic too long
-113	:	Undefined header
-114	:	Header suffix out of range
-121	:	Invalid character in number
-128	:	Numeric data not allowed
-131	:	Invalid suffix
-138	:	Suffix not allowed
-141	:	Invalid character data
-148	:	Character data not allowed
-151	:	Invalid string data
-171	:	Invalid expression
-178	:	Expression data not allowed

* Execution errors: (-299 to -200)

They indicate that an error has been detected at the moment of command execution, and cause event register bit 4, called EXE, Execution Error, to be set to 1.

-203	:	Command protected
-213	:	Init ignored
-221	:	Settings conflict
-222	:	Data out of range
-224	:	Illegal parameter value
-232	:	Invalid format
-233	:	Invalid version

* Query errors: (-499 to -400)

They indicate that an anomaly in the information exchange protocol has occurred and cause event register bit 2, called QYE, QuerY Error, to be set to 1.

-400 : Query error

* Specific instrument errors: (-399 to -300)

They indicate that an abnormal error has been detected during execution of a task, and cause event registry bit 3, called DDE, Device Dependent Error to be set to 1.

-350 : Queue overflow
-360 : Communication error

BEEPer:STATe

(Command/Query)

The command SYST:BEEP:STAT authorizes or inhibits the beeper of the multimeter.

The values are 0 to inhibit and 1 to authorize.

In response to the question SYST:BEEP:STAT?, the multimeter returns the activation status of the beeper.

COMMunicate: SERIAL[:RECeive] :BAUD

(Commande/Interrogation)

A la question SYST:COMM:SER:BAUD? , le multimètre retourne la vitesse de transmission de la liaison RS232.

LOCal

(Commande)

La commande SYST:LOC, passe le multimètre en mode local, la face avant est de nouveau accessible.

Rappel : Le multimètre passe en mode REMOTE lorsqu'il reçoit une commande SCPI autre que SYST:LOC.

Le passage en mode local peut également se faire avec la touche MENU du multimètre.

VERSion?

(Interrogation)

A la question SYST:VERS?, le multimètre retourne la version SCPI qu'il supporte. La réponse comprend l'année et l'indice de révision.

Format de la réponse : <AAAA.V><NL>
avec A= année et V = version.

Commande UNIT

TEMPerature

(Commande/Interrogation)

La commande UNIT:TEMP <Celsius | Fahrenheit | Kelvin>, sélectionne l'unité de la mesure de température.

A la question UNIT:TEMP?, le multimètre retourne l'unité de température choisie.

Commande READ?

(Interrogation)

A la question READ?, le multimètre retourne le résultat de la mesure en cour.

Format de la réponse : +276.91 mVAc

Commande MEASure?

(Interrogation)

A la question MEAS?, le multimètre retourne le résultat de la mesure en cour.

Format de la réponse : 2.7691e-01



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