Digital oscilloscopes

DOX2025

Two channels - 25MHz - 500 MSPS

DOX2040

Two channels - 40MHz - 1 GSPS

DOX2100

Two channels - 100MHz - 1 GSPS

User's manual

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General instructions

Introduction

You have just acquired a two-channel digital oscilloscope:

- **DOX2025**, 25MHz, 500 MSPS, or
- **DOX2040**, 40MHz, 1 GSPS, or
- **DOX2100**, 100MHz, 1 GSPS.

Your oscilloscope has functions for applications in production, education, maintenance, services, and research and development.

We thank you for your choice and for your confidence in the quality of our products.

This device is compliant with safety standard NF EN 61010-1 concerning electronic measuring instruments; it is a class 1 device that must be connected to the protective earth by its power cord.

For best results, read this manual carefully and observe the precautions for use.

Failure to observe the warnings and/or instructions for use may damage the device and/or its components, thereby endangering the user.

Precautions and safety measurements

- This device is designed for use:
  - indoors,
  - in an environment of pollution level 2,
  - at an altitude below 2000m,
  - at a temperature between **0°C** and 40°C
  - at a relative humidity below **80%** up to 31°C.
- It can be used for measurements on 300V CAT-II circuits and can be supplied by a 300V CAT-II network.

definition of the measurement categories

Overvoltage category II corresponds to devices intended to be connected to building circuits. It applies both to equipment connected via plugs and to equipment connected permanently. *Eg: Measurements made on the low-voltage supply circuits of household appliances, hand tools, and similar equipment.*

Overvoltage category III corresponds to equipment intended to be incorporated in building circuits. This type of equipment can include wall outlets, fuse boards, and some mains installation control equipment. *Eg: Distribution panels (including secondary meters), disconnects, wiring, including cables, busbars, junction boxes, disconnect switches, outlets on the fixed installation, industrial devices, and other equipment such as motors permanently connected to the fixed installation.*

Overvoltage category IV corresponds to equipment installed at the point of entry or near the origin of a building's power supply, between the entry into the building and the main distribution frame. This type of equipment can include power meters and primary overvoltage protection devices. *Eg: Measurements on systems installed upstream of the main fuse or circuit-breaker of the electrical installation of a building.*

before use

- Observe the environmental and storage conditions.

during use

- Read attentively all notes preceded by the ⚠ symbol.
- Connect the device to an outlet having an earthing contact.
- Take care not to obstruct the ventilation ports.
- As a safety measure, use only the appropriate cables and accessories - those supplied with the device or models approved by the manufacturer.
- When the device is connected to the measurement circuits, never touch an unused terminal.

General instructions (cont'd)

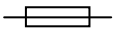
Symbols marked on the instrument


Warning, risk of danger.
Refer to the operating instructions for information about the nature of the potential danger and the actions to be taken to avoid such dangers.


Sorting of wastes for the recycling of electrical and electronic equipment.
In compliance with Directive WEEE 2002/96/CE: must not be treated as household waste.


Earth terminal


USB


Fuse


European conformity


Hazardous voltage switch


Alternating current

Warranty

This device is warranted against defects of materials and workmanship for a period of 3 years, as stated in the general terms of sale.
During this period, only the manufacturer may repair the device. The manufacturer reserves the right to repair or replace the device or any part thereof. If the device is sent back to the manufacturer, the costs of carriage will be borne by the customer. This warranty does not apply in the following cases:

- improper use of the device or use in conjunction with incompatible equipment
- modification of the device without the explicit permission of the manufacturer's technical staff
- use by a person not authorized by the manufacturer
- adaptation to a particular use not anticipated in the design of the device or in the instructions for use
- shocks, falls, or floods.

Servicing

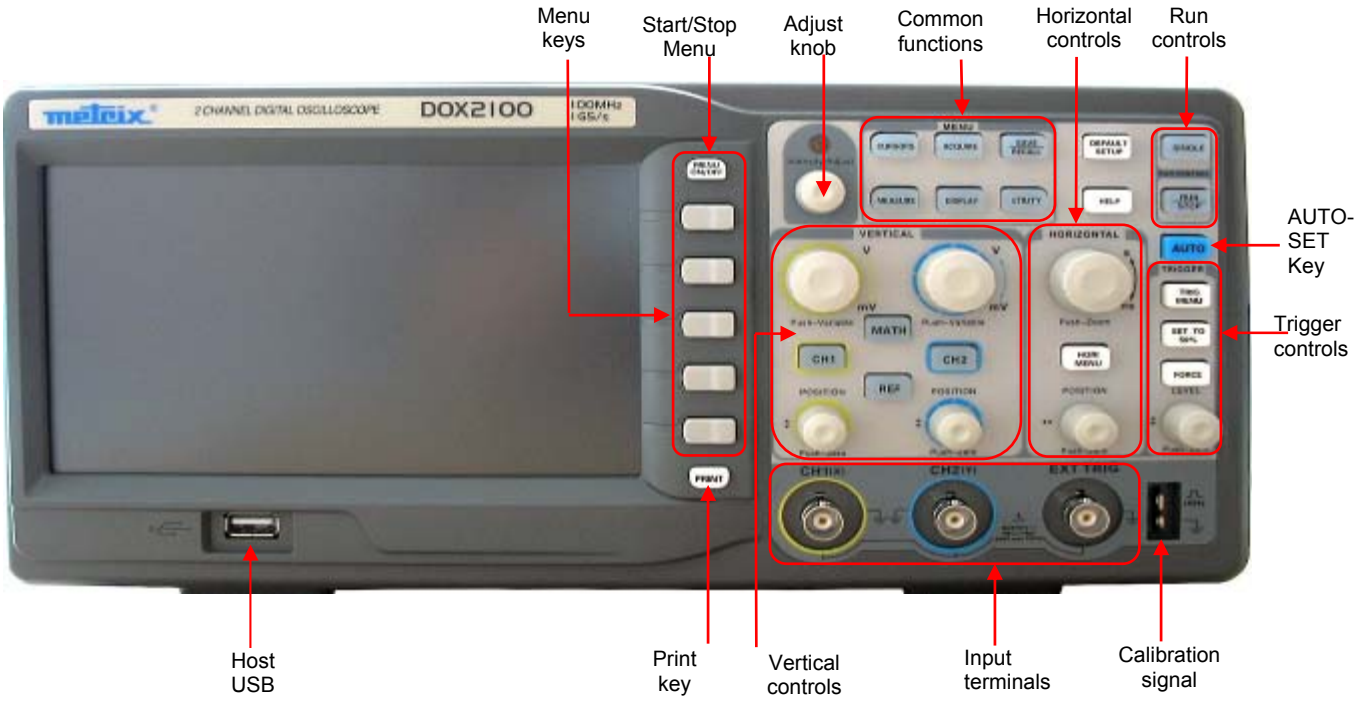
For all repairs before or after expiry of warranty, please return the device to your distributor.

Maintenance

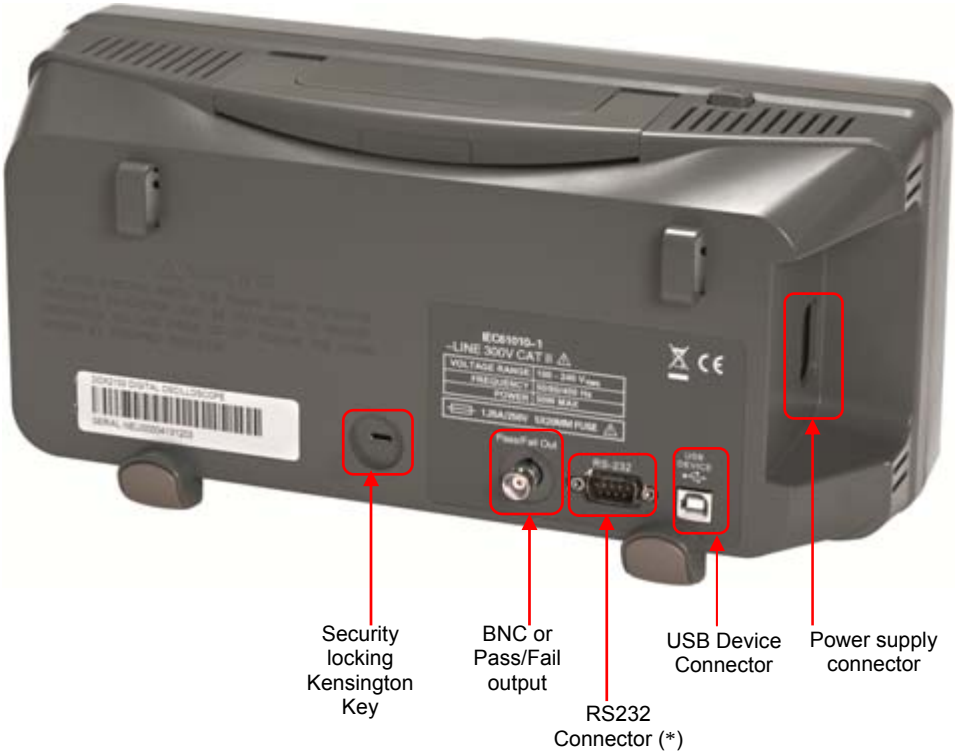
- Power down the instrument.
- Clean it with a damp cloth and soap.
- Never use abrasive products or solvents.
- Dry it before using it again.

Description of the instrument

Front panel



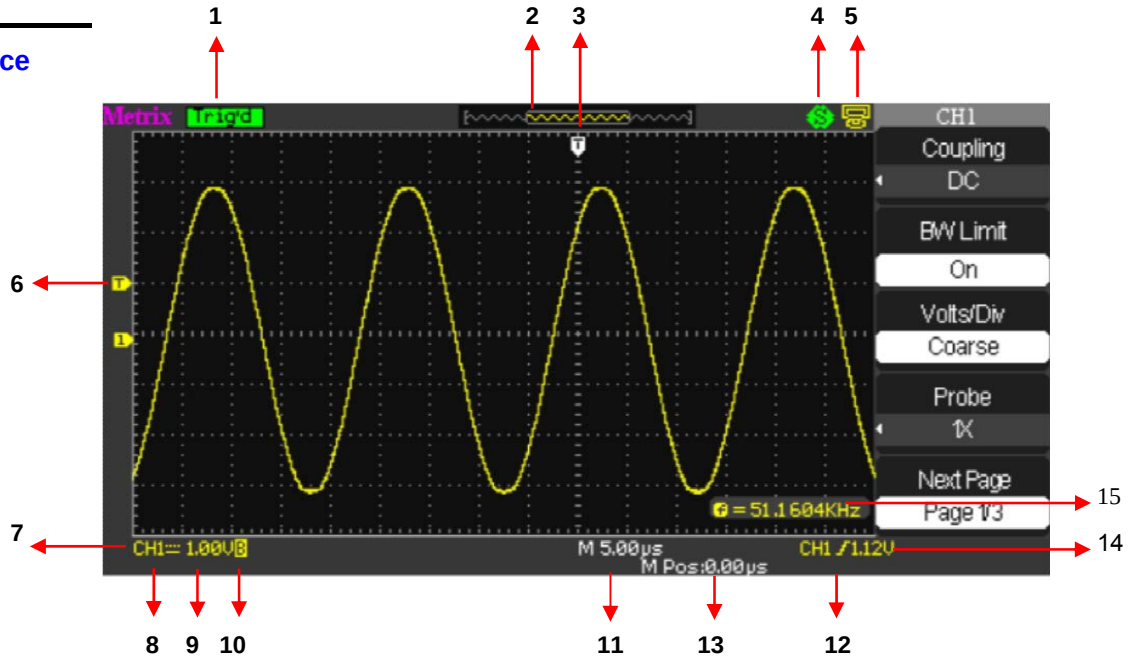
Back



(*) Note: The RS232C function is designed for secondary developments.

Description of the instrument (cont'd)

Display interface



1. **Trigger status:**
   Set: The oscilloscope is in pre-trigger data acquisition. All triggers are ignored in this status.
   Ready: All pre-trigger data have been acquired and the oscilloscope is ready to accept a trigger.
   Trig'd: The oscilloscope has detected a trigger and is in post-trigger data acquisition.
   Stop: The oscilloscope stops the acquisition.
   Auto: The oscilloscope is in "Auto" mode and triggers acquisitions even in the absence of a triggering event.
   Scan: The oscilloscope acquires and displays data continuously in Roll mode.
2. Displays the location in the global internal memory of the window being displayed.
3. Indicates the horizontal position of the trigger; to change it, turn the Horizontal Position knob.
4. Indicates which "Print key" option is active: Print image or Save image
   The active "Print key" option is "Print Image"
   The active "Print key" option is "Save Image"
5. Indicates the rear-panel USB selection: Computer or Printer
   The active "rear-panel USB" option is "Computer"
   The active "rear-panel USB" option is "Printer"
6. Displays the triggering level icon
7. Displays the icon of the channel
8. Displays the input coupling icon
9. Displays the vertical scale of the channels
10. Indicates the status of the bandwidth limitation filter. The letter "B" indicates that the bandwidth is limited to 18MHz.
11. The display indicates the main time base range
12. Displays the type of triggering
13. Indicates the horizontal position of the Trigger with respect to the centre of the screen
14. Indicates the triggering level in Volts
15. Indicates the frequency of the triggering source signal

Description of the instrument (cont'd)

Menu and command buttons and keys

Channel keys (CH1, CH2)	Press one of the channel keys, CH1 or CH2, to activate it (ON) or deactivate it (OFF) and access the menu used to configure the channel. When the channel is active, the corresponding channel button is lit.
MATH	Displays the Math menu.
REF	Displays the "REF trace" menu. You can use this menu to save and recall four or two reference traces in internal memory.
HORI MENU	Displays the Horizontal menu used to choose the Delayed or Normal operating mode and select the acquisition memory depth.
TRIG MENU	Displays the Trigger menu. You can use the Trigger menu to choose the type of trigger (Edge, Pulse, Video, Slope, Alternate) and parameterize the triggering.
SET TO 50%	Press to stabilize the signal rapidly. The oscilloscope defines the trigger level automatically half-way between the minimum and maximum levels of the source signal. This function is especially useful when the trigger source is a signal that is not displayed, such as EXT TRIG
FORCE	Forces an acquisition whether or not a triggering event is present.
SAVE/RECALL	Displays the Save/Recall menu used to save and retrieve up to 20 configurations of the oscilloscope or up to 20 traces in internal memory, or on a USB key (in which case the capacity depends on the USB key). You can also retrieve the Factory configuration, save traces to a CSV file, and save or print a screen grab.

Description of the instrument (cont'd)

ACQUIRE	Displays the Acquisition menu. You can use the Acquisition menu to parameterize the Sampling mode (sample, peak detection, mean).
MEASURE	Displays the Measurement menu.
CURSORS	Displays the Cursor menu. The "Adjust" knob is used to set the position of the active cursor. The cursors remain displayed (unless the "Type" option is "Off") after you exit from the Cursor menu, but they can no longer be set.
DISPLAY	Opens the Display menu. The Display menu is used to configure the graticule and the shapes representing the traces, the persistence, and the intensity.
UTILITY	Gives access to the Utility menu. The Utility menu is used to configure such oscilloscope options as the sound, the language, the counter, etc. It also serves to look up the status of the system and to update the software.
DEFAULT SETUP	Loads the "Default Setup" of the oscilloscope.
HELP	Gives access to the internal help function.
AUTO	Automatically configures the oscilloscope in order to produce a display appropriate to the signals present on the inputs.
RUN/STOP	Acquisition of signals continuously, or stop acquisition. *Note: If acquisition of the signal is stopped (using the "RUN/STOP" button or "SINGLE"), the S/div knob stretches or compresses the signal.*
SINGLE	Enables a single acquisition and then STOPs.

BNC connectors of the inputs and Probe compensation output

Channel connector (CH1, CH2)	Input connectors for the display of signals.
EXT TRIG	Input connector for an external trigger source. Choose the "Ext" or "Ext/5" trigger source in the Trigger menu.
Calibration signal	Connections of the internal generator used for probe compensation.

Adjust knob

This can be used with many functions, for example to adjust the Hold-Off, move the cursors, set the pulse width, define the video line, set the high and low frequency limits of the filters, set the X and Y masks with the Pass/Fail function, etc. The "Adjust" knob is used to select the location of the setup, trace, and image files during a save/recall, and to choose menu options.

Getting started

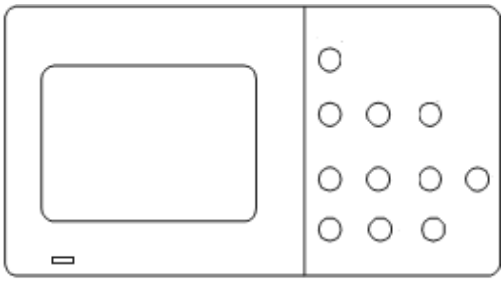
Check of operation

In order to check the proper operation of the oscilloscope, perform the following operations:

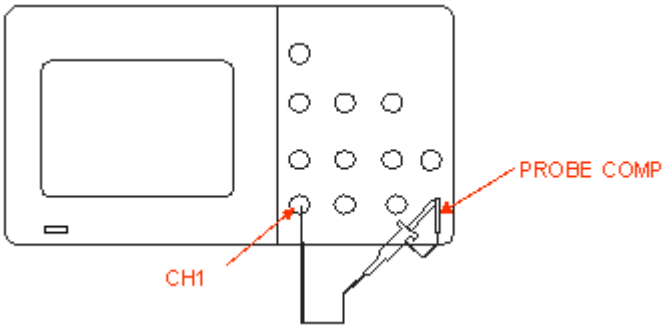
Steps

1. Power up the oscilloscope.

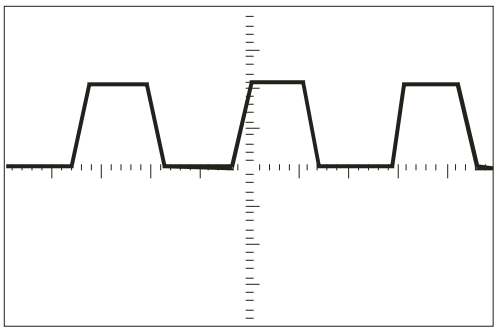
Press "Default Setup" to load the default configuration of the oscilloscope. The default attenuation of the probe is 1X.



2. Set the switch of the probe to 1X and connect the probe to channel CH1. Turn to the right to lock. Connect the end of the probe and the crocodile clip of the earthing cable to the 1kHz probe compensation signal output terminals.



3. Press "AUTO" to display the 1kHz square wave with a peak-to-peak amplitude of approximately 3V.

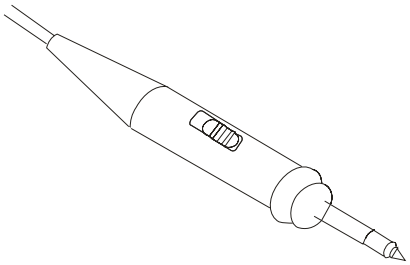


4. Press the "CH1" key to unselect channel CH1. Press the "CH2" key to activate channel CH2 and repeat steps 2 and 3 to display the square-wave probe compensation signal on channel CH2.

Getting started (cont'd)

Probe

A guard around the probe body protects your fingers from electric shocks.



Connect the probe to the oscilloscope, then connect the crocodile clip of the earthing cable of the probe to the earth reference potential of the circuit to be tested before making a measurement.

> ***Note:***
> ***● In order to avoid an electric shock while using the probe, keep your fingers behind the guard on the probe body.***
> ***● In order to avoid an electric shock while using the probe, do not touch the metallic parts of the probe head when the probe is connected on a voltage source. Connect the probe to the oscilloscope, then connect the ground cable to the earth of the circuit to be tested before making a measurement.***

Attenuation of the probe

The probes can have different attenuation factors that modify the vertical scale of the oscilloscope. Press the corresponding channel key (CH 1 or CH2) and select the coefficient that corresponds to the attenuation factor of your probe.

> ***Note: The default probe coefficient is 1X.***

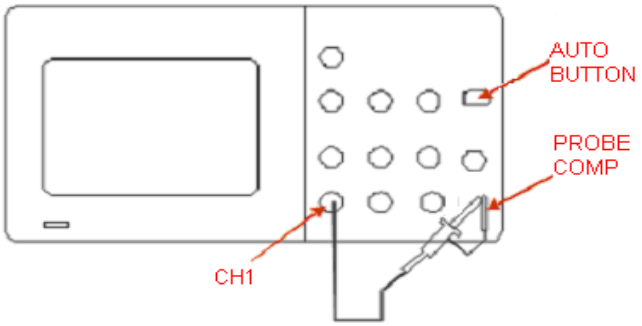
Make sure that the attenuation switch of the probe is set to the same attenuation factor as the oscilloscope. The probes supplied with the oscilloscope have two attenuation coefficients: 1X and 10X.

> ***Note:***
> ***When the attenuation switch is set to 1X, the probe limits the bandwidth of the oscilloscope to approximately 6MHz (depending on the characteristics of the probe). To use the full bandwidth of the oscilloscope, be sure to set the switch of the probe to 10X.***

Getting started (cont'd)

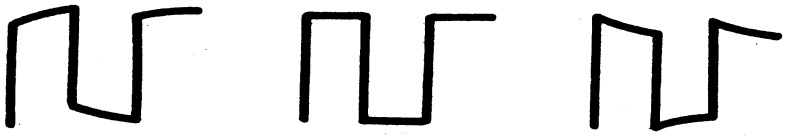
Compensation of the probe

Method used to compensate the probe (in the X10 position) manually to couple it to the input channel:



Steps

1. Set the probe factor in the channel CH1 menu to 10X. Set the switch of the probe to 10X and connect the probe to channel CH1 of the oscilloscope.
2. Connect the probe tip to "PROBE COMP 3V" and the crocodile clip of the earthing cable of the probe to the "PROBE COMP" earth.
   Activate channel CH1 and then press the "AUTO" button.
3. Check the shape of the signal displayed.



Overcompensated | Correct compensation | Undercompensated

4. As the case may be, adjust your probe by acting on the variable capacitor, using the screwdriver provided, so as to obtain "Correct Compensation". Repeat the operation as many times as necessary or when you change probes.

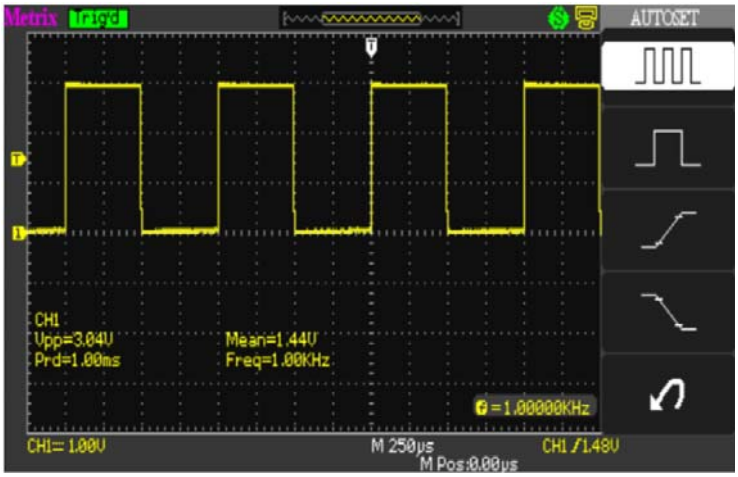
Remark: ***For more details, refer to the directions for use of the probes provided with the oscilloscope***

Functional description
AUTOSET

AUTOSET

The DOX2000 digital oscilloscope has an "AUTOSET" function that is used to automatically configure the device to produce a display appropriate to the signals present on the inputs.

After starting an AUTOSET, if necessary, select the desired signal waveform from among the 4 available:



Autoset function menu

Option	Description
Multi cycles	Autoset and display of the signal for several cycles.
Monocycle	Autoset and display of a single cycle of the signal.
Rising edge	Autoset and display of the rising edge.
Falling edge	Autoset and display of the falling edge.
Cancel config.	Restores the previous configuration of the oscilloscope.

The Autoset defines the triggering source and the display of the channels to satisfy the following conditions:

- If the signals on the inputs are of different frequencies, the priority channel is the one in which the signal has the lower frequency.
- If no signal is detected, it is the channel having the lower index (CH1) that is displayed.
- If no signal is found and no channel is activated, the oscilloscope displays and uses channel CH1.

Functional description
AUTOSET (cont'd)

Autoset function

Function menu	Values
Acquisition mode	Sample
Display format	Y-T
Type of display	Dots for a video signal; Vectors for an FFT spectrum; otherwise unchanged
Vertical coupling	DC or AC depending on the input signal
Bandwidth limit	Bandwidth limiter inactive (full band)
V/div	Adjusted
VOLTS/DIV adjustment	Coarse (in hops, 1 2 5 staging)
Signal inverted	Inactive
Horizontal position	Centre
S/div	Adjusted
Type of trigger	Edge
Source of trigger	Autodetection of the input channel signal
Trigger edge	Rising
Trigger mode	Auto
Trigger coupling	DC
Hold-Off	Minimum
Trigger level	Adjusted to 50%

Factory configuration

When it leaves the factory, the oscilloscope is configured for normal use; this is the "default configuration". To restore this configuration, press the "DEFAULT SETUP" button. The parameterizing of the options, buttons, and commands may be modified when you use the "DEFAULT SETUP" button; see appendix B.

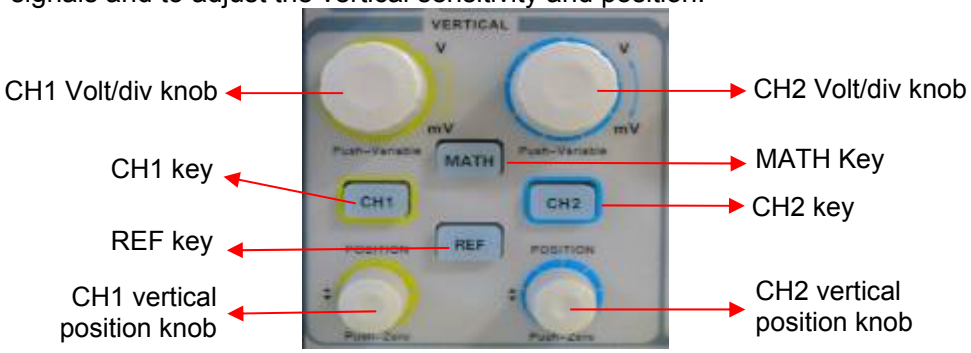
The DEFAULT SETUP button does not modify the following parameters:

- Language option
- Saved reference signal files
- Saved configuration files
- The display contrast
- The calibration data

Functional description

I - VERTICAL System

The buttons, knobs, and keys of the vertical keypad are used to display the signals and to adjust the vertical sensitivity and position.



1. Channels CH1 CH2

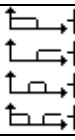
page 1

Option	Values	Instructions
Coupling	DC AC GND	DC passes the AC and DC components of the input signal. AC blocks the DC component of the input signal and attenuates the AC components below 10Hz. GND disconnects the input signal.
BW limit	ON OFF	Limits the bandwidth to reduce high frequency noise (except DOX2025) <20MHz
Volts/Div	Coarse Fine	Selects the resolution of the Volts/Div knob Coarse adjustment in hops, 1-2-5 staging. Continuous fine adjustment of the sensitivity.
Probe	1x ,5x 10x ,50x 100x, 200x 500x,1000x	To be adjusted to the attenuation coefficient of the probe used, to incorporate it in the vertical sensitivity.
Next page	Page 1/3	Access to the second page of the menu.

page 2

Option	Values	Instructions
Inversion	ON OFF	Activates inversion. Deactivates inversion.
Digital filter		Press this button to access the "Digital Filter Menu" (cf. table 2-5)
Next page	Page 2/3	Access to the second page of the menu.

Digital filter

Option	Values	Instruction
Digital filter	Act. Deact.	Activates the digital filter. Deactivates the digital filter.
Type		Config. as LPF (Low Pass Filter). Config. as HPF (High Pass Filter). Config. as BPF (Band Pass Filter). Config. as BSF (Band Stop Filter).
Upper limit		Turn the "Adjust" knob to adjust the upper limit.
Lower limit		Turn the "Adjust" knob to adjust the lower limit.
Return		Return to the main digital filter menu.

Functional description
I - VERTICAL system (cont'd)

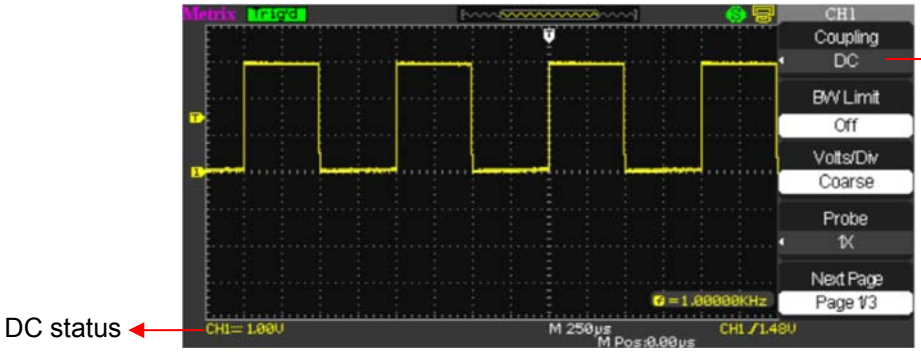
Configuration of channels CH1, CH2

Each channel has its own menu.

1. Selection of the input coupling

- Pressing "CH1"→"Coupling"→"AC" selects AC input coupling.
  The DC component of the signal is blocked.
- Pressing "CH1"→"Coupling"→"DC" selects DC coupling.
  The DC and AC components pass.
- Pressing "CH1"→"Coupling"→"GND" selects GROUND coupling.
  The input signal is disconnected.

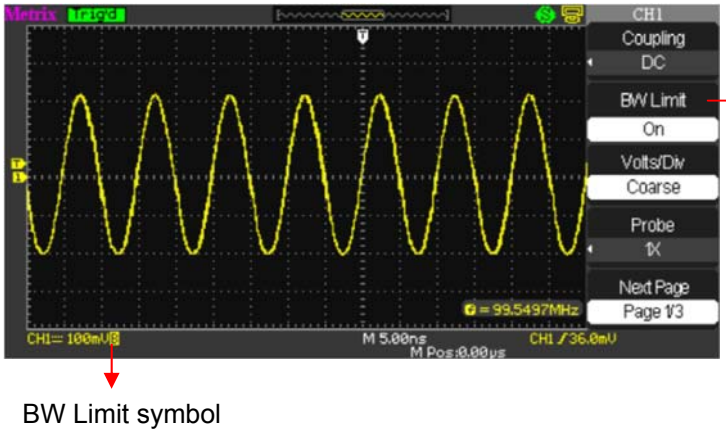
The CH1 input signal is a positive square wave displayed with DC input coupling:



2. Bandwidth limitation, DOX2040 - DOX2100

- Pressing "CH1"→"BW Limit"→ "On" activates the "Bandwidth Limiter".
  The sinusoidal signal >18MHz is attenuated.
- Pressing "CH1"→"BW Limit"→ "Off" deactivates the "Bandwidth limiter".
  The sinusoidal signal >18MHz is not attenuated.

The image shows a 100MHz sinusoidal signal displayed with the Bandwidth Limiter (BW) "On":



Functional description
I - VERTICAL system (cont'd)

3. Adjustment of the vertical sensitivity

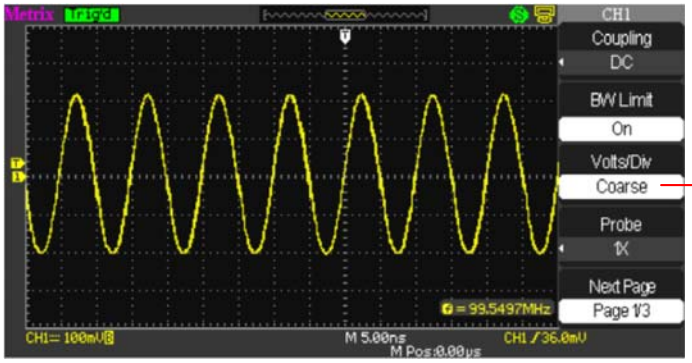
The vertical scale can be adjusted in Coarse and Fine mode; the vertical sensitivity band is from 2mV/div to 10V/div.

For example, for CH1:

- Pressing "CH1"→"Volts/ Div"→ "Coarse" → Volts/div, the default value.

  The vertical sensitivity can be adjusted in hops in a 1-2-5 staging from 2mV/div, 5mV/div, and 10mV/div up to 10V/div.

- Pressing "CH1"→"Volts/Div"→"Fine" → Volts/div. This parameter allows continuous adjustment of the vertical sensitivity.

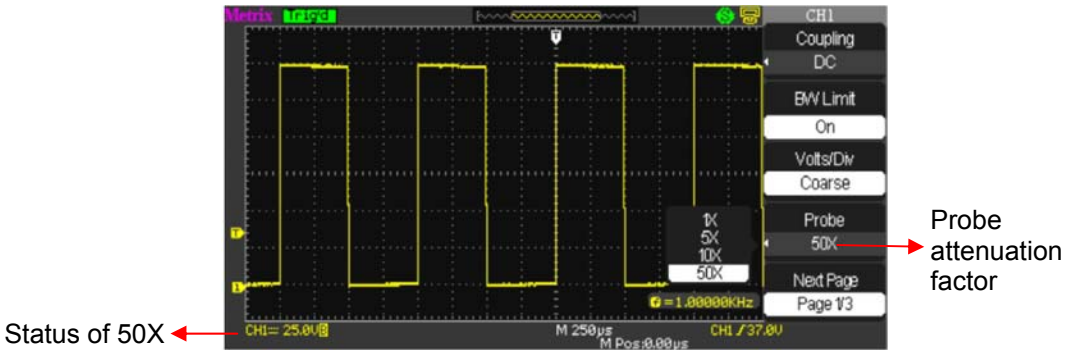


4. Parameterizing the probe attenuation

From the Channel menu, select the probe coefficient corresponding to the attenuation factor of the probe. To compensate a probe attenuation factor of 10:1, the probe coefficient must be set to 10X, in order to incorporate the attenuation factor of the probe in the vertical sensitivity.

For example, if you use a probe having a 50:1 attenuation:

- Press "CH1"→"Probe" →"50X"

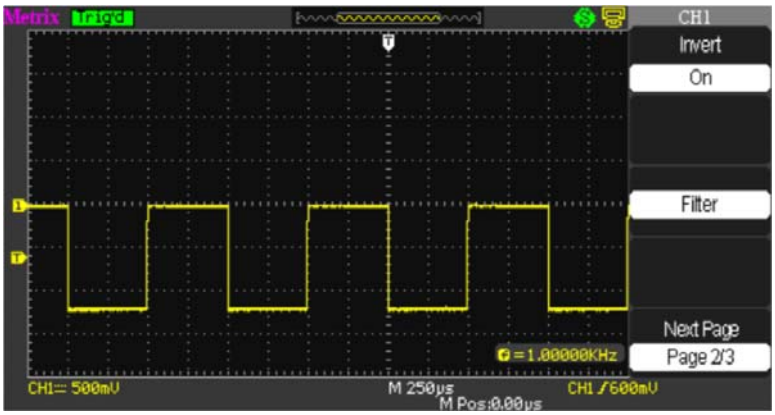


Functional description
I - VERTICAL system (cont'd)

5. Invert the signals

For example, on CH1:

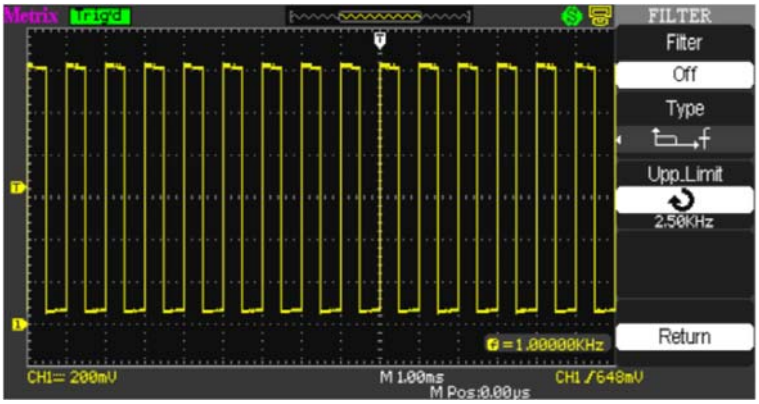
● Press "CH1"→ "Next Page" "page 1/3" →"Invert" → "On":

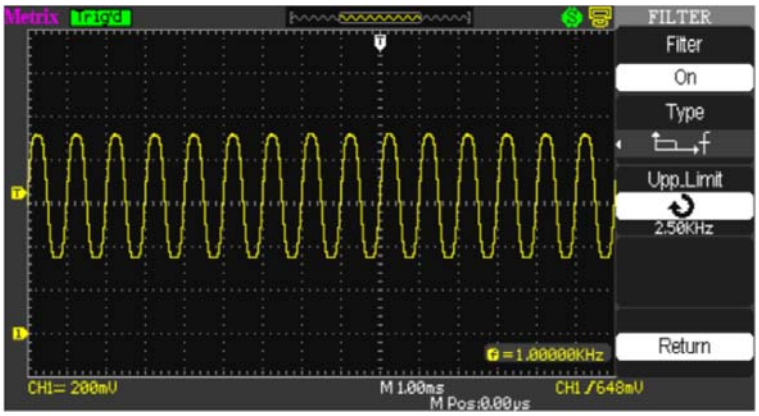


6. Using the digital filter

● Press "CH1" → "Next Page page 1/3" → "Filter", to access the Digital Filter menu. Choose "Filter Type", then select "Upp. Limit " or "Low. Limit " and turn the "Adjust" knob to adjust it.

● Press "CH1" → "Next Page page1/3" → "Filter" → "Off", to deactivate the Digital Filter function.





7. Choosing the unit, V or A

● Press "CH1"→ "Next Page page3/3"→ "Unit" → Then Select the vertical unit, Volt or Ampere.

Functional description
I - VERTICAL system (cont'd)

2. Buttons of the vertical mode

Vertical position knobs

1. Use the "Vertical position" knobs to move the traces up or down on the screen.
2. While you adjust the vertical position of the trace, the value "Volts Pos = " is displayed at bottom left on the screen.
3. Press the "Vertical position" knob to reset the vertical position to zero.

Volts/div knobs

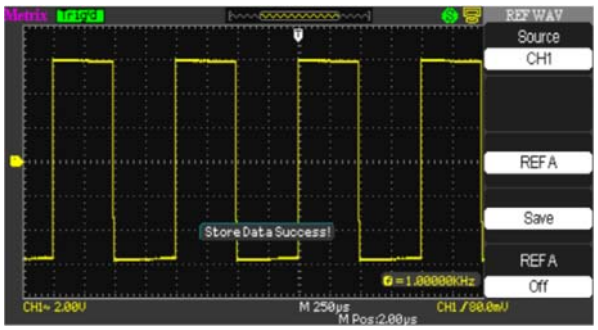
1. Use the "Volts/div" knobs to adjust the vertical sensitivity. If you turn the "Volts/div" knob clockwise or anticlockwise, the oscilloscope increases or reduces the sensitivity.
2. You can press the "Volt/div" to alternate between "Coarse" and "Fine" adjustments. In the "Coarse" mode the vertical sensitivity varies in 1-2-5-staged hops. In the "Fine" mode the vertical sensitivity varies continuously.

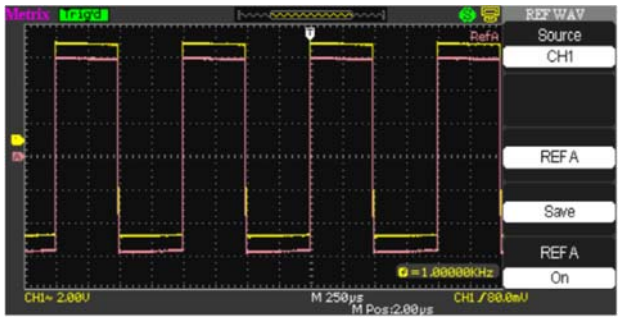
3. Using REF

The reference command stores the traces. The reference function is available once a source trace has been stored.

REF function menu

Option	Values	Instruction
Source	CH1 CH2	Choice of trace to be stored.
REFA **REFB**		Choice of the location of storage or restoration of a trace.
Save		Stores a source trace at the chosen location.
REFA/REFB	On Off	Recalls the reference trace to the screen. Deactivates the reference trace.





Steps

1. Press the "REF" button to access the REFerence menu.
2. Press the "Source" button to choose the source channel, CH1 or CH2.
3. Turn the vertical "POSITION" and "Volt/div" knobs to adjust the vertical position and sensitivity to suitable values.
4. Press the "REF A" (or REF B) button to choose the storage location.
5. Press the "Save" button.
6. Select REF A (or REF B) "ON" to display the reference trace on screen.

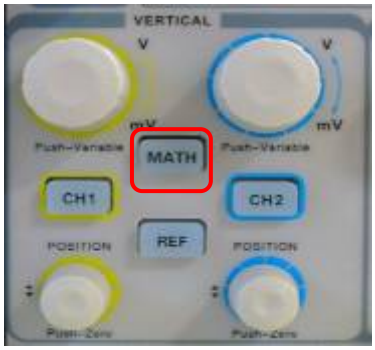
Functional description

I - VERTICAL system / MATHematics function

4. MATH menu

MATH displays the results of +, -, *, /, and FFT operations on channels CH1 and CH2.

Press the MATH key to access the MATHematics menu.

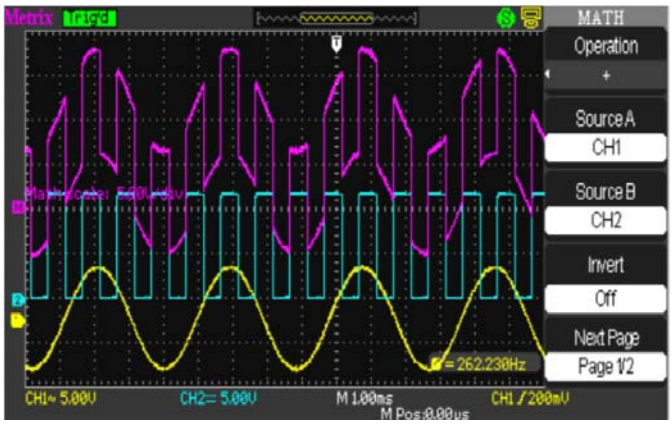


Menu

Function	Values	Description
Operation	+, -, *, FFT	Choice of the MATHematics function.
Invert	On Off	Invert the MATH trace. Deactivate the inversion of the MATH trace.
		Turn the adjust knob to adjust the vertical position of the MATH trace
		Turn the adjust knob to adjust the vertical scale of the MATH channel.

Instruction

Operation	Values	Description
+	CH1+CH2	CH1 is added to CH2.
-	CH1-CH2	CH2 is subtracted from CH1.
	CH2-CH1	CH1 is subtracted from CH2.
*****	CH1*CH2	CH2 is multiplied by CH1.
/	CH1/CH2	CH1 is divided by CH2.
	CH2/CH1	CH2 is divided by CH1.
FFT	Fast Fourier Transform.	



Functional description
I - VERTICAL System / MATHematics function (cont'd)

1) FFT process

The FFT process mathematically converts a signal in the time domain into its components in the frequency domain. It is possible to measure the amplitude and frequency of the spectral components.

FFT function page 1

FFT option	Values	Instructions
Source	CH1, CH2	Selection of the source channel for the calculation of the FFT.
Window	Hanning Hamming Rectangular Blackman	Selection of the type of FFT window
ZOOM FFT	1X 2X 5X 10X	Horizontal zoom of the FFT display.
Next page	Page 1/2	Access to the second page of the FFT menu.

FFT function page 2

Option FFT	Values	Instructions
Scale	Vrms	The vertical scale is in Vrms
	dBVrms	The vertical scale is in Vrms dB
Display	Split Full screen	Half-screen display of the FFT Full-screen display of the FFT
Next page	Page 2/2	Return to the first page of the FFT menu.

Procedure To use the FFT, choose the source signal (time domain):

- Press the AUTO button to display a YT signal and choose the Multi-cycle signal representation.
- Turn the "POSITION" knob so as to centre the YT signal vertically on the screen (zero divisions).
- Turn the horizontal "POSITION" knob to centre the part of the YT signal to be analysed on the 18-division screen.
  The oscilloscope calculates the FFT using the 1024 central points of the time-domain signal.
- Turn the "Volts/div" knob so as to keep the trace on the screen.
- Turn the "S/ div" knob until the desired resolution of the FFT spectrum is reached.

Steps To display the FFT correctly:

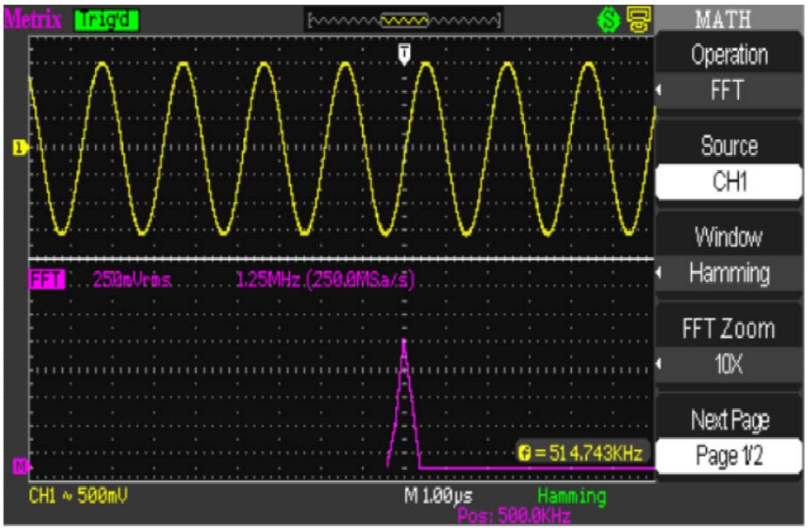
1. Press the "MATH" button.
2. Set the "Operation" option to FFT.
3. Press the "Source" button to choose channel "CH1" or "CH2".
4. Set the sweep coefficient "S/div" so as to obtain a sampling frequency (parameter displayed alongside of the "Hz/div" scale factor of the FFT) of at least twice the frequency of the input signal.

Functional description

I - VERTICAL system / MATHematics function (cont'd)

2) Display of the FFT spectrum

Press the MATH button to display the Math menu. Use the options to select the Source channel, the Window, and the FFT Zoom factor. Only one FFT can be displayed at a time. You can choose "Full Screen" or "Split Screen" in the "Display" option to display the FFT full screen, or to display the signal and its FFT simultaneously on two half screens.



3) Selection of the FFT window

The FFT window reduces the peaks of the FFT spectrum. The FFT assumes that the YT signal continues to infinity. With a whole number of cycles, the YT signal begins and ends at the same amplitude and the signal is free of irregularities. A non-integer number of cycles of the YT signal gives starting and ending points at different amplitudes. The transition between the starting and ending points creates a discontinuity of the signal that causes high-frequency transients.

Window	Specialization	Correct test content
Rectangular	Better frequency resolution, worse amplitude resolution. This is equivalent to no window.	Pulses or symmetrical transients. Sine waves of equal amplitude at fixed frequency. Broad-band random noise with a spectrum that varies rather slowly.
Hanning Hamming	Better frequency resolution and less good precision in amplitude than Rectangular. Frequency resolution is slightly better with Hamming than with Hanning.	Sinusoidal, periodic, and narrow-band random noise. Pulses or asymmetrical transients.
Blackman	Better amplitude resolution, worse frequency resolution.	Signals at single frequency, to find higher harmonics

Functional description

I - VERTICAL system / MATHematics function (cont'd)

4) Zoom and positioning of an FFT spectrum

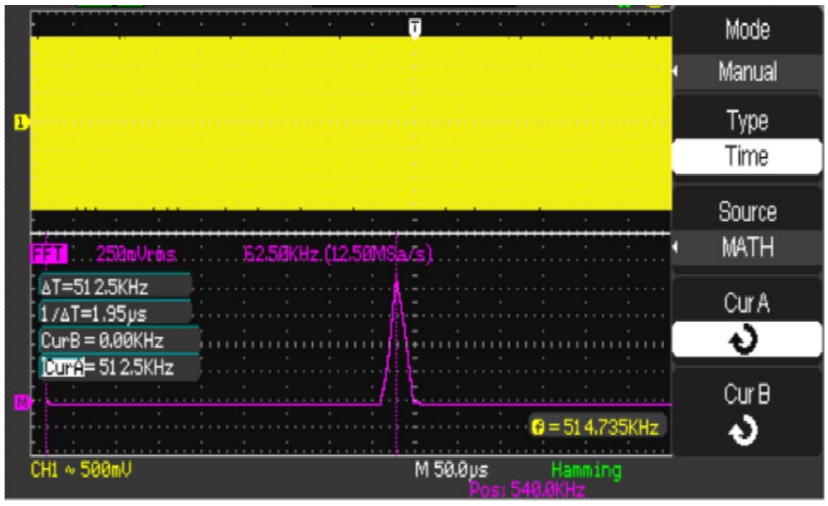
You can use the zoom and the cursors to select measurements of the FFT spectrum. The oscilloscope has an "FFT Zoom" option to effect a horizontal zoom; use this option button to choose "1X", "2X", 5X", or "10X".

5) Measurement of the FFT spectrum using cursors

It is possible to make two measurements on the FFT spectral components: the amplitude (in dB or V) and the frequency in Hz

Amplitude

1. Enter a sinusoidal signal in channel 1 and press the "AUTO" button, then choose the Multi cycles option.
2. Press the "MATH" button to display the "MATH" menu.
3. Press the "Operation" button and choose "FFT"
4. Press the "Source" button and choose "CH1"
5. Press the "CH1" button to display the CH1 menu.
6. Turn the "S/div" knob to adjust the sampling frequency (at least twice the frequency of the input signal).
7. For an FFT display in full screen mode, press the CH1 button again to remove the display of the channel 1 signal.
8. Press the "CURSOR" button to display the "Cursor" menu.
9. Press the "Cursor Mode" button and choose "Manual".
10. Press the "Type" button and choose "Voltage"
11. Press the "Source" button and choose "MATH"
12. Press the "CurA" button, turn the "Adjust" knob to move Cursor A to the highest-amplitude component of the FFT signal.
13. Press the "CurB" button, turn the "Adjust" knob to move Cursor B to the lowest-amplitude component of the FFT signal.
14. The amplitude difference (ΔV) is displayed at top left on the screen.



Functional description

I - VERTICAL system / MATHematics function (cont'd)

Frequency

1. Press the CURSOR button
2. Press the "Cursor Mode" button and choose "Manual".
3. Press "Type" and choose "Time".
4. Press "Source" and choose "MATH".
5. Press "CurA", turn the "Adjust" knob to place Cursor A on the spectral component having the highest amplitude.
6. The value of "CurA = " displayed at top left on the screen corresponds to the frequency of the signal on input CH1.

Functional description
II - HORIZONTAL system

HORIZONTAL menu

The "HORIZONTAL" keypad contains one key and two knobs.

Horizontal menu

Option	Values	Description
Delayed	On Off	Activate this function to simultaneously display the signal according to the main time base at the top of the screen and according to the delayed time base at the bottom of the screen. Deactivate this function to display only the main time base.
MemDepth	Normal Long mem	Normal memory depth (40kpts). Long memory depth, up to 2Mpts.

Note

Memory depth	Channel mode	Sampling rate	Normal Memory	Long Memory
	Single channel	1Gsa/s	40kpts	Not supported
	Single channel	500MSa/s or less	20kpts	2Mpts
	Double channel	500MSa/s or less	20kpts	1Mpts
	(*) DOX2025: Normal memory 32kpts			

Note: The DOX2025 supports only the "Normal memory" depth!

Functional description
II - HORIZONTAL system (cont'd)

Buttons of the horizontal mode

The horizontal commands serve to adjust the sweep coefficient and the horizontal position of the traces.

Horizontal "POSITION" button

1. Adjusts the horizontal position of the traces (the position of the trigger with respect to the centre of the screen). The time resolution of this command depends on the sweep coefficient selected.

2. To reset the horizontal position to zero, press the "POSITION" button.

S/div knob

1. Used to adjust the sweep coefficient. If acquisition of the signal is stopped (use of the RUN/STOP or SINGLE button), turn the S/div knob to stretch or compress the trace.
2. Choose the T/div coefficient of the main or delayed time base. When the Window Zone is active, the width of the window zone is modified by adjusting the time base of the window.

Display the Roll mode

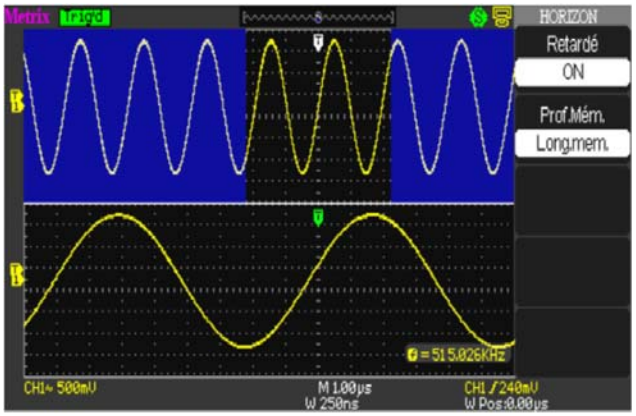
When the S/div command is set to 100ms/div or more, and the trigger mode is Auto, the oscilloscope enters the Roll acquisition mode. In this mode, the signal is refreshed from left to right. In ROLL, there is no trigger or control of the horizontal position.

Window zone

Use the Window Zone option to define the segment of trace to be observed in detail. The slowest time base of the Window (zoomed) cannot be slower than the main time base.
You can turn the Horizontal Position and SEC/DIV controls to enlarge or shrink the signals in the Window Zone.

Delayed

Use the "Delayed" option to define the portion (window) of the complete trace to be observed in detail. The sweep coefficient of the "Window" time base cannot be less than the sweep coefficient of the "Main" time base.
You can turn the "Horizontal Position" knob to move the "Window Zone", and the "S/div" control to enlarge or shrink the Window.
"M" means main time base, "W" means time base of the zoomed Window.
The vertical arrow T indicates the position of the trigger.



Steps

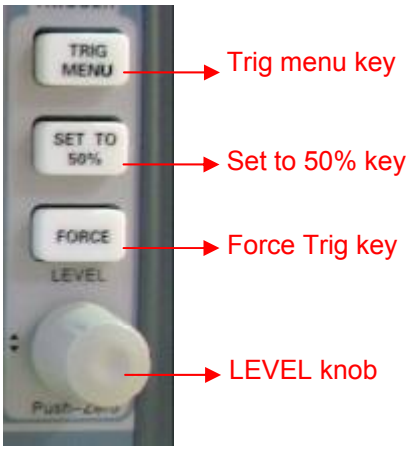
To display a segment of the trace in detail:

1. Press the "HORI MENU" button to display the "Horizontal Menu".
2. Turn the "S/div" knob to modify the main time base.
3. Press the "Delayed" option button and choose "On".

Functional description
III - TRIGGER system

TRIGGER mode

The trigger symbol T indicates the instant at which the triggering event (Trigger) occurred.
The DOX2000 oscilloscopes have five types of trigger: Edge, Video, Pulse, Slope, Alternate



- "TRIG MENU" button: Press the "TRIG MENU" button to display the "Trigger Menu".
- "LEVEL" knob: The LEVEL knob is used to set the voltage level corresponding to the triggering point. Press the "LEVEL" knob to force the triggering level to zero.
- "SET TO 50%" key: Use the "SET TO 50%" button to stabilize the signal rapidly. The oscilloscope automatically sets the triggering level to midway between the minimum and maximum voltage levels of the source signal. This function is useful when using the EXT TRIG triggering source, which is not displayed on the screen.
- "FORCE" key: Use the FORCE button to force an acquisition whether or not a triggering event is present. This function is useful for example in the "Single" or Normal mode.
- Pre-trig/Post-trig/Trig-Delayed: The data before and after the triggering event. If trigger symbol T is at the centre of the screen, the portion of the traces corresponding to the first 9 divisions id the pre-trig and the next 9 divisions the post-trig.
  This function is very useful because you can observe the samples that preceded the triggering event. Everything to the right of the triggering point belongs to the post-trig. The total pre- and post-trig time depends on the sweep coefficient chosen.

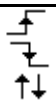
Trigger SOURCE

The trigger source can be the signal present on input CH1 or CH2, on the EXT TRIG input, or the AC line source (available only for the "Edge" type trigger).

Functional description
III - TRIGGER system (cont'd)

1. EDGE

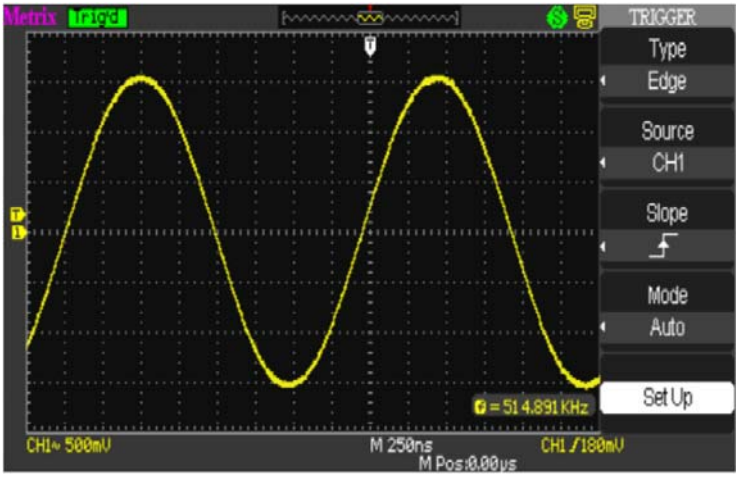
Edge Trigger Menu

Option	Values	Description
Type	Edge	The rising or falling edge of the source signal is used for triggering.
Source	CH1 CH2	The triggering source is active whether or not the channel is displayed.
	EXT	The EXT TRIG source is not displayed. The EXT source uses the signal on the EXT TRIG input. The triggering level range is between -1.2V and +1.2V.
	EXT/5	Identical to the EXT option, but the signal is attenuated by a factor of 5. The triggering range is multiplied by 5, and is between +6V and -6V.
	AC	A signal derived from the mains supply is used as triggering source. The trigger coupling is set to DC and the triggering level to 0V.
Slope		Triggering on the rising edge of the source signal. Triggering on the falling edge of the source signal. Triggering on the rising and falling edges of the source signal.
Mode	Auto	The trace is refreshed even in the absence of a triggering event.
	Normal	The trace is refreshed when the triggering condition is satisfied and waits for the next triggering event when the condition is not satisfied.
	Single	The oscilloscope acquires a signal when the triggering condition is satisfied, and then stops.
Set Up		Access to the "Trigger Configuration Menu".

Trigger Config Menu

Option	Values	Description
Coupling	DC	Passes all components of the signal
	AC	Blocks the DC components and attenuates AC signals below 50Hz.
	Low-pass filter LF	Attenuates the **high-frequency** components above 150kHz.
	High-pass filter HF	Blocks the DC component and attenuates **low frequency** components below 7kHz.
Hold-Off 		Use the "adjust" knob to adjust the Hold-Off time (sec); the value is displayed.
Hold-Off Reset		Reset the Hold-Off time to 100ns.
Return		Return to the first page of the "Main Trigger menu".

Functional description
III - TRIGGER system (cont'd)



Steps

1. Configure the type
   1) Press the "TRIG MENU" key to display the "Trigger" menu.
   2) Press the "Type" option key and choose "Edge".
2. Configure the Triggering source

   To select the source, press the "Source" button to choose "CH1", "CH2", "EXT", "EXT/5", or "AC Line".
3. Configure the Slope

   Press the "Slope" button to choose " ", " " or " ".
4. Configure the triggering mode (Trigger)

   Press the "Trigger mode" key to choose "Auto", "Normal", "Single".

   Auto: The trace is refreshed even if the triggering condition is not satisfied.

   Normal: The trace is refreshed when the triggering condition is satisfied and waits for the next triggering event when the condition is not satisfied.

   Single: The oscilloscope acquires a signal when the triggering condition is satisfied, then stops.
5. Configure the Trigger coupling

   a. Press the "Set Up" key to access the "Trigger Configuration" menu.

   b. Press the "Coupling" key to choose "DC", "AC", "HF Reject", or "LF Reject".

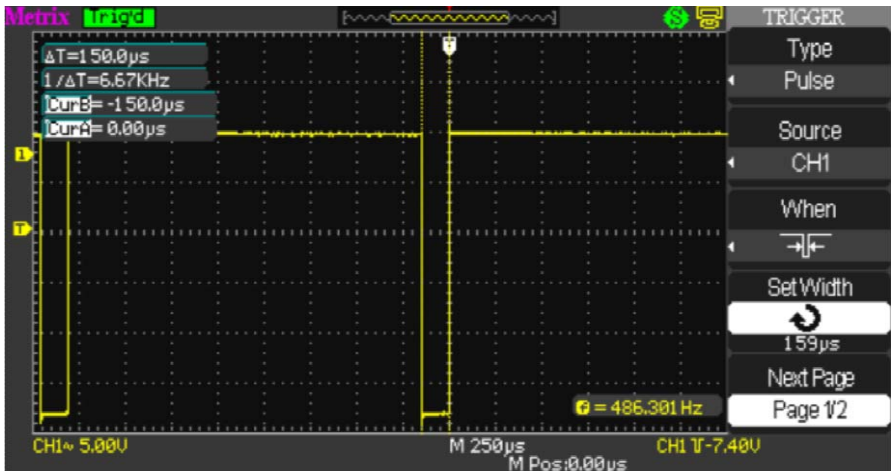
Functional description
III - TRIGGER system (cont'd)

2. PULSE

Use **the pulse width** to trigger on abnormal pulses.

Pulse trigger page 1

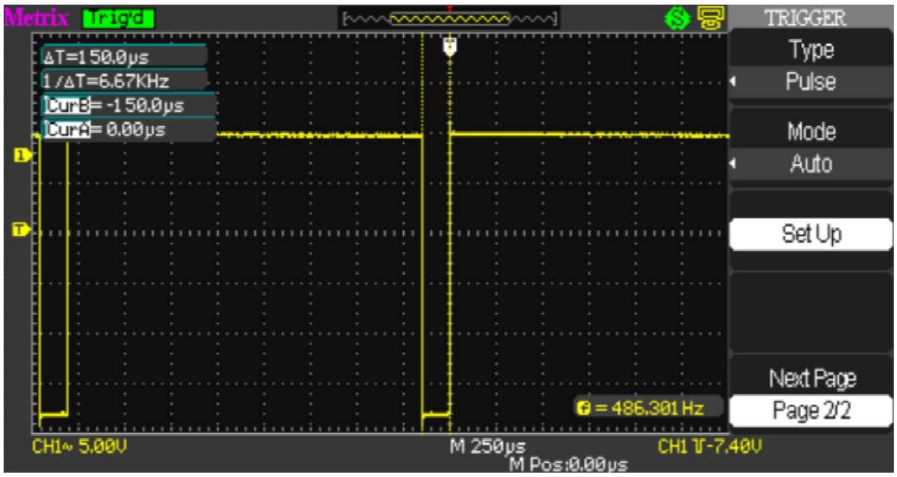
Option	Values	Description
Type	Pulse	Select the type and width of the triggering pulse.
Source	CH1 CH2 EXT EXT/5	Choose the triggering source.
When	(Positive pulse width less than the value set) (Positive pulse width greater than the value set) (Positive pulse width equal to the value set) (Negative pulse width less than the value set) (Negative pulse width greater than the value set) (Negative pulse width greater than the value set)	Choose the type of pulse and the condition to be satisfied to obtain a triggering event
Configure the width	20.0ns to 10.0s	The adjust knob is used to adjust the pulse width.



Functional description
III - TRIGGER system (cont'd)

Pulse trigger, page 2

Option	Values	Description
Type	Pulse	Selection of the pulse corresponding to the triggering condition.
Mode	Auto Normal Single	Choose the type of triggering. The normal mode is suitable for most applications of triggering on pulse **width**.
Set Up		Access the "Trigger Configuration Menu".



Steps

1. **Choose the type**

   1) Press the "TRIG MENU" key to display the "Trigger" menu.
   2) Press the "Type" option key and choose "Pulse"

2. **Configure the condition**

   Press the "When" key to choose the "", "", "", "", "" "or" "" condition

3. **Adjust the Pulse width**

   Turn the "Adjust" knob to adjust the width of the pulse.

Functional description
III - TRIGGER system (cont'd)

3. VIDEO triggering

To trigger on the fields or the lines of standard video signals.

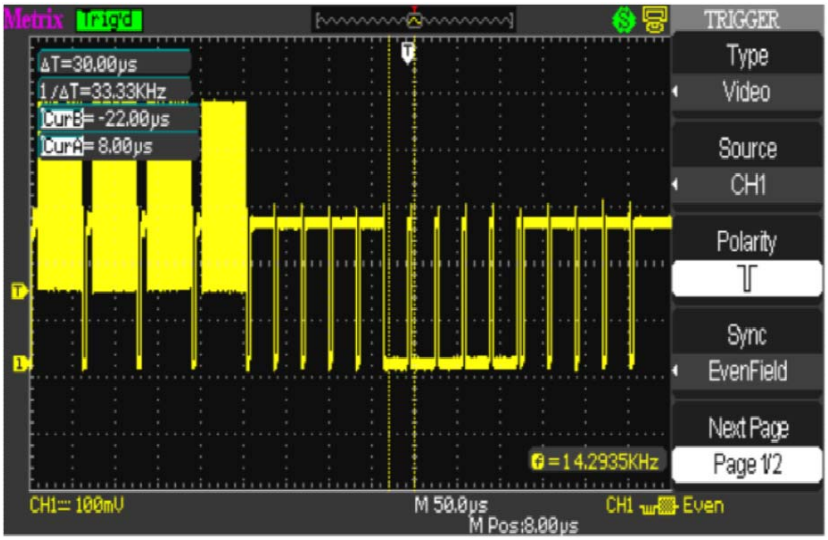
Video trigger page 1

Option	Values	Instructions
Type	Video	To choose the type of video, choose AC coupling; you can then trigger on NTSC, PAL, and SECAM video signals.
Source	CH1 CH2	Choose the triggering signal input source.
	EXT EXT/5	Ext and Ext/5 use the EXT TRIG input signal as source.
Polarity	(normal)	Normal triggers on the negative edge of the sync pulse.
	(inverted)	Inverted triggers on the positive edge of the sync pulse.
Sync	All lines Line num Odd Fr Even Fr	Choose the appropriate video triggering: All lines – Line number – Odd frame – Even frame

Video trigger page 2

Option	Values	Instructions	
Type	Video	When you choose the type of video, choose AC coupling; you can then trigger on NTSC, PAL, and SECAM video signals.	
Standard	NTSC Pal/Secam	Choose the video standard for the synchronization and the number of lines.	
Mode	Auto	Use this mode to let the acquisition run in the absence of a valid trigger. This mode functions with the time base of 100ms/div and less.	
	Normal	Use this mode when you want to see only valid triggered signals. When you use this mode, the oscilloscope displays the trace only in the presence of a triggering event.	
	Single	For a single acquisition, press the "SINGLE" key.	
Set-Up		Access to the "Trigger Configuration Menu".	

Functional description
III - TRIGGER system (cont'd)



Steps

1. **Configure the type**

   1) Press the "TRIG MENU" key to display the "Trigger" menu.

   2) Press the "Type" key and choose "Video"

2. **Configure the polarity**

Press the "Polarity" option key to choose "", " ⎍ " or " ⎍ ".

3. **Configure the synchronization**

   1) Press the "Sync" key to select "All lines", "Line Num", "Odd Fr", or "Even Fr".

   2) If you choose "Line Num", you can use the "Adjust" knob to program the line number.

4. **Configure the standard**

   1) Press the "Next Page" key (page 2/2).

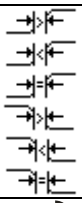
   2) Press the "Standard" key and choose "PAL/SECAM" or "NTSC".

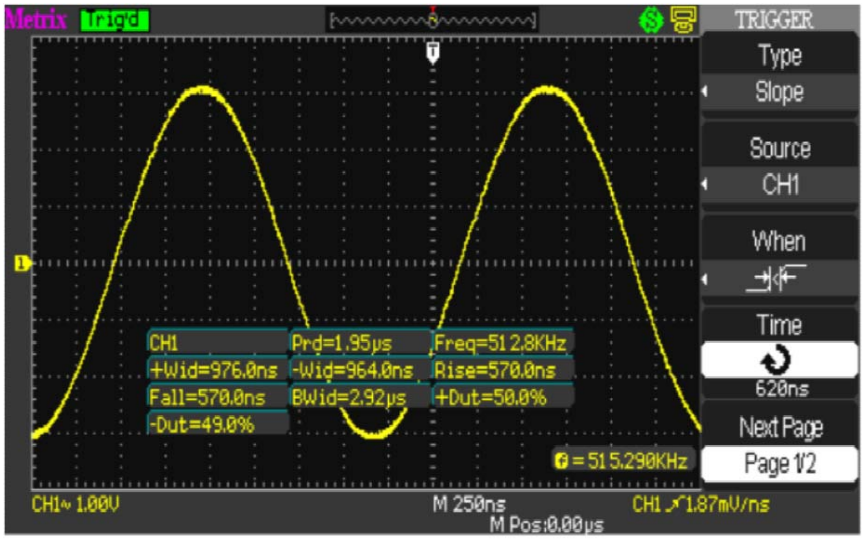
Functional description
III - TRIGGER system (cont'd)

4. SLOPE

Triggering on a positive or negative slope according to the configuration.

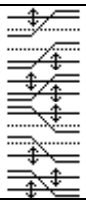
Trigger on Slope page 1

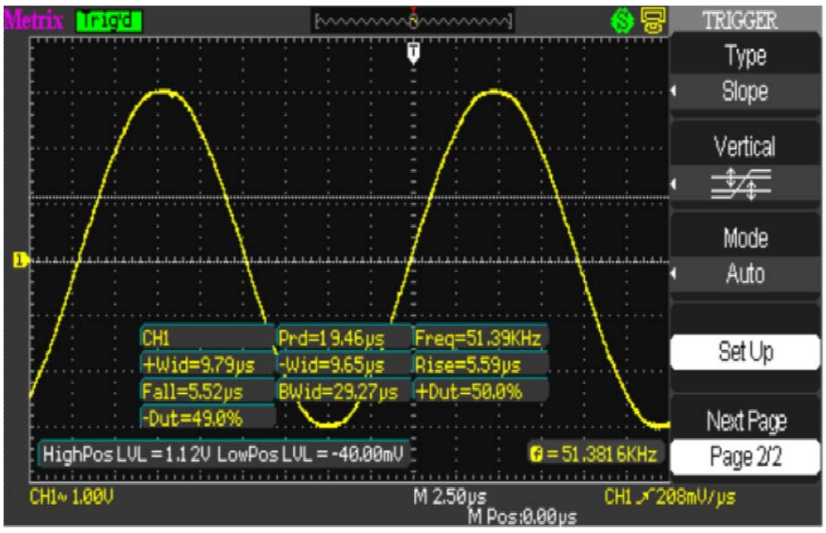
Option	Values	Instruction
Type	Slope	Triggering on the duration of the positive or negative slope.
Source	CH1 CH2 EXT EXT/5	Choose the triggering source.
When		Choose the triggering condition.
Time		Adjust the duration of the slope with the "Adjust" knob. The adjustment range is from 20ns to 10s.



Functional description
III - TRIGGER system (cont'd)

Trigger on Slope
page 2

Option	Values	Instruction
Type	Slope	Triggering on the positive or negative slope
Vertical		Choose the triggering level to be adjusted by the "LEVEL" knob. You can adjust "LEVEL A", "LEVEL B", or both at once.
Mode	Auto	In this mode the trace is refreshed even in the absence of a valid trigger. This mode functions with time bases of 100ms/div and less.
	Normal	Use this mode when you want the trace to be displayed only on valid triggering events. In this mode, the trace is refreshed only in the presence of triggering event.
	SINGLE	To allow only one acquisition.
Set-Up		Access to the "Trigger adjustment" menu.



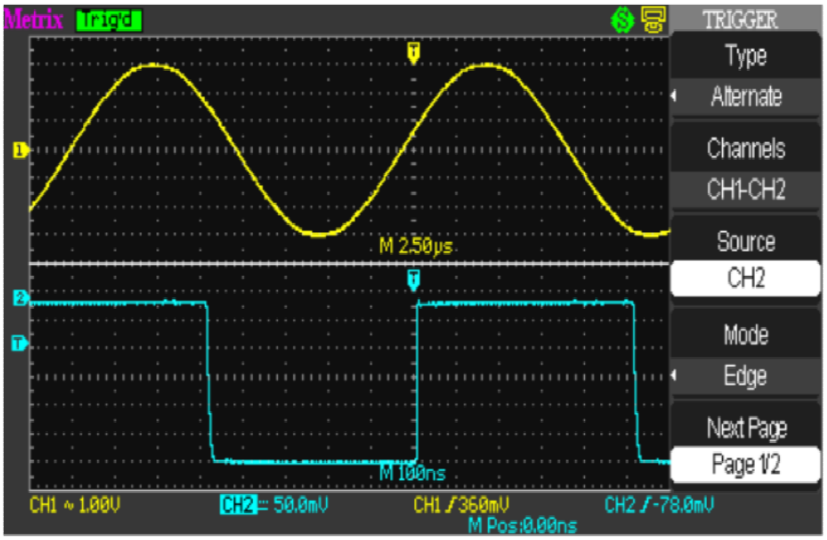
Steps

1. Inject the signal on CH1 or CH2.
2. Press the "AUTO" key.
3. Press the "TRIG MENU" key to access the "Trigger Menu".
4. Press the "Type" key and choose "Slope".
5. Press the "Source" key and choose "CH1" or "CH2".
6. Press the "When" key to choose " ", " ", " ", " ", " ", " ".
7. Press the "Time" key and turn the "Adjust" knob to adjust the duration of the slope.
8. Press the "Next Page" key to go to the second page (2/2) of the "Slope Trigger Menu".
9. Press the "Vertical" key to choose the triggering level to be adjusted.
10. Turn the "LEVEL" knob.

Functional description
III - TRIGGER system (cont'd)

5. ALTERNATE triggering

When you use alternate triggering the triggering source is alternately channel CH1 and channel CH2. With this mode, you can observer two asynchronous signals at the same time. You can choose different types of trigger for two vertical signals. The types available are edge, pulse, video, and slope. The data on the signals of the two channels are displayed at bottom right on the screen.

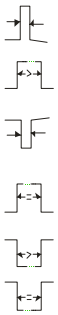


Trigger on Edge page 1

Option	Values	Instructions
Type	Alternate	In this mode the triggering source comes alternately from channels CH1 and CH2. This mode is used to observe asynchronous signals.
Source	CH1 CH2	Configure triggering source CH1 Configure triggering source CH2
Mode	Edge	Choose "Edge" as type of triggering
Slope		Trigger on rising edge. Trigger on falling edge. Trigger on rising and falling edges.
Set-Up		Access to the "Trigger Configuration Menu".

Functional description
III - TRIGGER system (cont'd)

Trigger on Pulse page 1

Option	Values	Instructions
Type	**Alternate**	In this mode, the triggering source comes alternately from channels CH1 and CH2. This mode is used to observe asynchronous signals.
Source	CH1 CH2	Configure triggering source CH1 Configure triggering source CH2
Mode	Pulse	Choose Pulse as type of triggering
When		Triggering condition: Choose the type of Pulse and the Pulse width condition.

Trigger on Pulse page 2

Option	Values	Description
Configure the width	20,0ns ~10,0s	The "Adjust" knob is used to adjust the pulse width.
Set-Up		Access to the "Trigger Configuration Menu"

Functional description
III - TRIGGER system (cont'd)

Trigger on Video page 1

Option	Values	Instructions
Type	Alternate	The triggering source comes alternately from channels CH1 and CH2. This mode is used to observe asynchronous signals.
Source	CH1 CH2	Configure triggering source CH1 Configure triggering source CH2
Mode	Video	Choose Video as type of triggering.
Polarity	(normal) (inverted)	Normal: triggers on the negative edge of the sync pulse. Inverted: triggers on the positive edge of the sync pulse.

Trigger on Video page 2

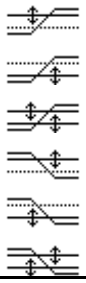
Option	Values	Instructions
Sync	Line number All lines Odd Fr Even Fr	Choose the appropriate video sync: Line Number – All Lines – Odd Frame – Even Frame
Standard	NTSC Pal/Secam	Choose the video standard for synchronization and the number of lines.

Functional description
III - TRIGGER system (cont'd)

Trigger on Slope page 1

Option	Values	Instructions
Type	Alternate	The triggering source comes alternately from channels CH1 and CH2. This mode is used to observe asynchronous signals.
Source	CH1 CH2	Configure triggering source CH1 Configure triggering source CH2
Mode	Slope	Choose Slope as type of triggering
When		Choose the triggering condition of the slope trigger.

Trigger on Slope page 2

Option	Values	Instructions
Time		Turn the "Adjust" knob to adjust the duration of the slope. The range of adjustment is from 20ns to 10s.
Vertical		Choose the triggering level to be adjusted by the "LEVEL" knob. You can adjust "LEVEL A", "LEVEL B", or both at once.
Set-Up		Access to the "Trigger Configuration Menu".

Functional description
III - TRIGGER system (cont'd)

Steps To obtain a stable display in the case of two asynchronous signals, follow the instructions below:

1. Inject asynchronous signals on channels CH1 and CH2.
2. Press the "AUTO" key.
3. Press the "TRIG MENU" key to access the "Trigger Menu".
4. Press the "Type" key and choose "Altern" (Alternate).
5. Press the "Channels" key and choose "CH1-CH2".
6. Press the "Source" key and choose "CH1".
7. Press the "CH1" key and turn the "S/div" knob to optimize the display of the CH1 signal.
8. Press the "Mode" key to choose "Edge", "Pulse", "Slope" or "Video".
9. Choose "Edge" as trigger mode.
10. Press the "Source" key and choose "CH2".
11. Press the "CH2" key and turn the "S/div" knob to optimize the display of the CH2 signal.
12. Repeat steps 8 and 9.

Functional description
III - TRIGGER system (cont'd)

COUPLING

Use the coupling appropriate to the triggering source signal.

To choose the coupling of the trigger, first press the "TRIG MENU" key to choose the triggering mode - "edge", "pulse", video" or "slope" -, then choose in the "Set Up" menu the coupling of triggering source CH1 or CH2.

Horizontal POSITION

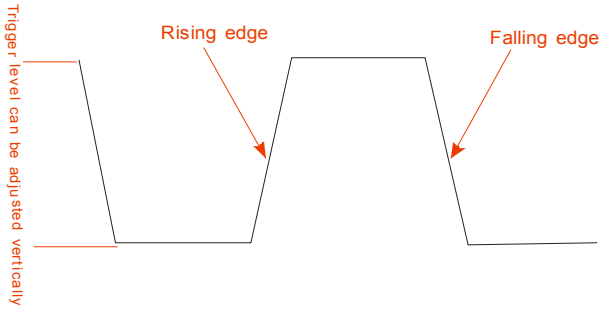
The "Horizontal Position" button is used to adjust the time interval between triggering event T and the centre of the screen. The "Horizontal POSITION" knob is used to adjust the part of the signal displayed before and after triggering event T. The horizontal position reference is the centre of the screen, the "Position" is positive in the left-hand part of the screen and negative in the right-hand part.

SLOPE & TRIGGERING THRESHOLD

The "Slope" and "Triggering Level" commands are used to define the trigger.

The choice of polarity of the "Slope" ("Edge" type trigger only) determines triggering on the rising or falling edge of a signal.

The "LEVEL" knob controls the vertical position of the triggering threshold on the edge.



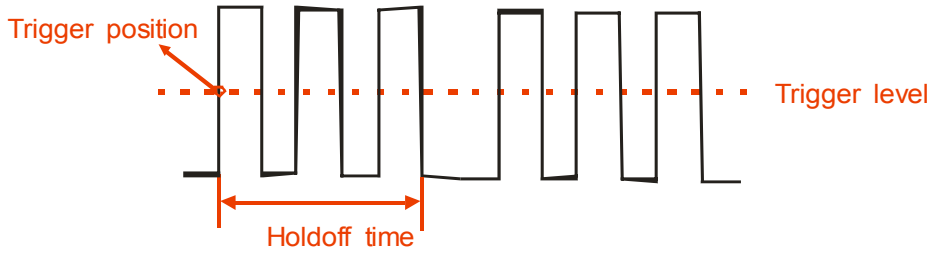
Note:

- ***Use the SINGLE button when you want to capture a single signal.***
- ***The coupling of the triggering source does not affect the coupling bandwidth of the channel displayed on screen.***
- ***Normal polarity is used for positive video, which has negative sync pulses. For negative video, which has positive sync pulses, use the inverted polarity.***

Functional description
III - TRIGGER system (cont'd)

HOLD-OFF

Use Hold-Off to obtain a stable display with complex signals, such as pulse trains, for example. The Hold-Off time is the time interval between the detection of a valid triggering event and the time when the oscilloscope is ready to detect another triggering event. The oscilloscope will not trigger during the Hold-Off time; the triggering circuit is disabled during this time. In the case of a "pulse train", set the Hold-Off equal to the width of the pulse train; this will allow triggering on the first pulse of the train and mask subsequent pulses.



Steps To adjust the Hold-Off time:

1. Press the "TRIG MENU" key to display the "TRIG Menu".
2. Press the "Type" key to choose the type of trigger.
3. Press the "Set Up" key to access the "Trigger Configuration Menu".
4. Press the "Hold-Off" key. Turn the "Adjust" knob to adjust the Hold-Off time so as to obtain a stable signal.
5. Change the Hold-Off time until the trace stabilizes.

Note: ***Use Hold-Off to stabilize the trace in the case of complex periodic signals.***

Functional description
IV - ACQUISITION system

Acquisition menu

During the acquisition of a signal, the oscilloscope converts it to digital format and displays a trace. The acquisition mode determines how the signal is digitized. The time base range determines the duration of recording and the elementary acquisition pitch.

Press the "ACQUIRE" key.

Configuring acquisition

Option	Values	Instructions
Acquisition	Sample	Used for the precise sampling and display of most signals.
	Peak detection	To view the noise and reduce aliasing.
	Mean	Used to reduce the noise, random or not, of the signal displayed.
	Mean 4, 16, 32, 64, 128, 256	Choose the averaging coefficient
Sinx/x	On Off	Use "Sin" interpolation Use "Linear" interpolation
Mode	Equ Time Real Time	Set the Sampling mode to Equivalent Time (Equivalent Time Sampling). Set the Sampling mode to Real Time (Real Time Sampling).
TxEchan (Sa Rate)		Display the sampling rate.

Functional description
IV - ACQUISITION system (cont'd)

Sample

The oscilloscope samples the signal at regular intervals to construct the trace. In general, this mode gives an accurate representation of the signal.

Advantage

You can use this mode to reduce random noise.

Disadvantages

The "sample" mode does not capture the rapid variations of the signal (glitches) that may occur between two successive samples. Aliasing may result, and short pulses may not be detected. In the presence of a pulse having a low width (glitch), you must use the "Peak detection" mode.

Peak detection

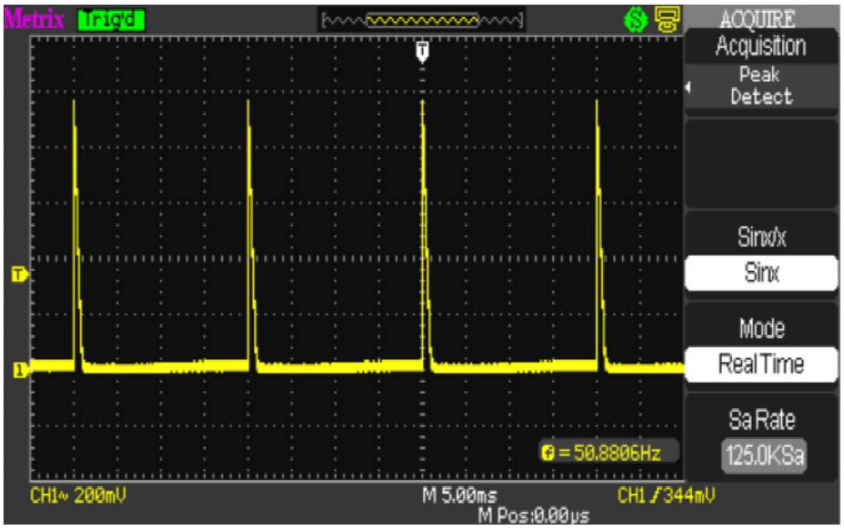
The Peak Detection mode captures the minimum and maximum values of a signal between two successive samples.

Advantage

With this mode, the oscilloscope can capture short pulses (or glitches) that might have escaped detection in the "sample" mode.

Drawback

The trace thickness (noise) will be larger in this mode.

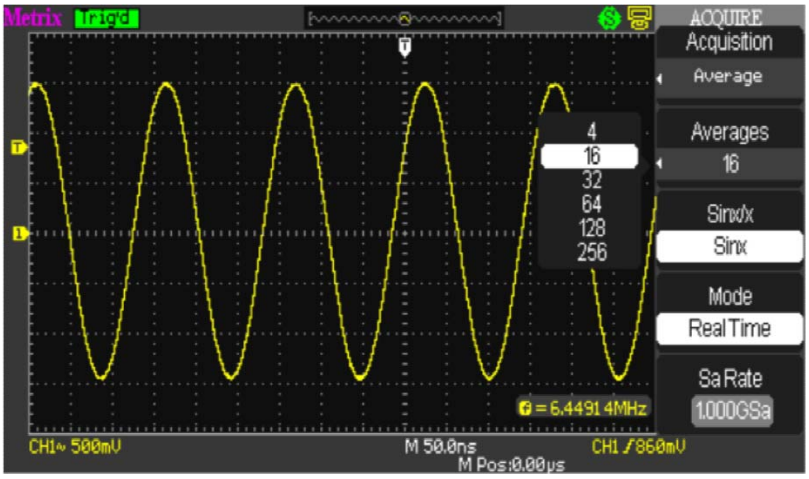


Functional description
IV - ACQUISITION system (cont'd)

Averaging

The oscilloscope performs several acquisitions, determines the mean, and displays the resulting trace.

Advantage You can use this mode to reduce random noise.



Mode

Equivalent time sampling ETS The equivalent time sampling (ETS) mode can reach a horizontal resolution of 20ps (equivalent to 50GSa/s). This mode is suited to the observation of repetitive signals.

Real time sampling RTS The highest real time sampling (RTS) rate is 1GSa/s (DOX2100 & DOX2040), 500MSa/s (DOX2025).

Functional description
IV - ACQUISITION system (cont'd)

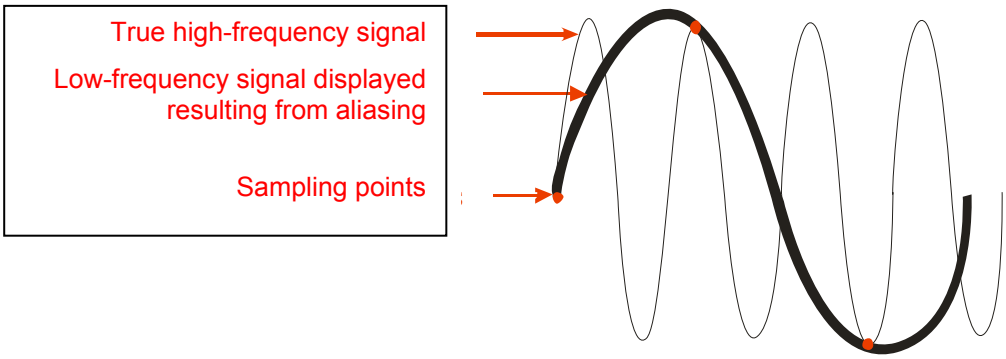
Time base

The oscilloscope digitizes the traces through the acquisition of an input signal at precise points. The time base is used to control the trace sampling rate.

Use the "S/div" knob to adjust the time base coefficient scale that suits you.

Undersampling

Aliasing occurs when the sampling rate of the oscilloscope is not fast enough to reconstruct a trace precisely. When this happens, the oscilloscope displays a signal having a lower frequency than the input signal, or displays an unstable signal.



Steps

Configure the sampling format

Press the "Acquisition" key or turn the "Adjust" knob and choose one of the following sampling modes: "Sample", "Peak Detection", or "Averaging".

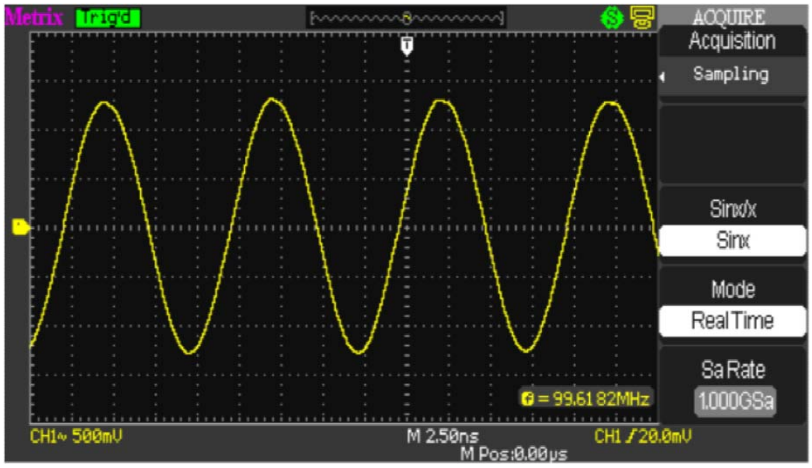
Configure the averaging

If you choose the "Averaging" mode, you can use the "Mean" button and choose "4", "16", "32", "64", "128" or "256".

Configure the interpolation function

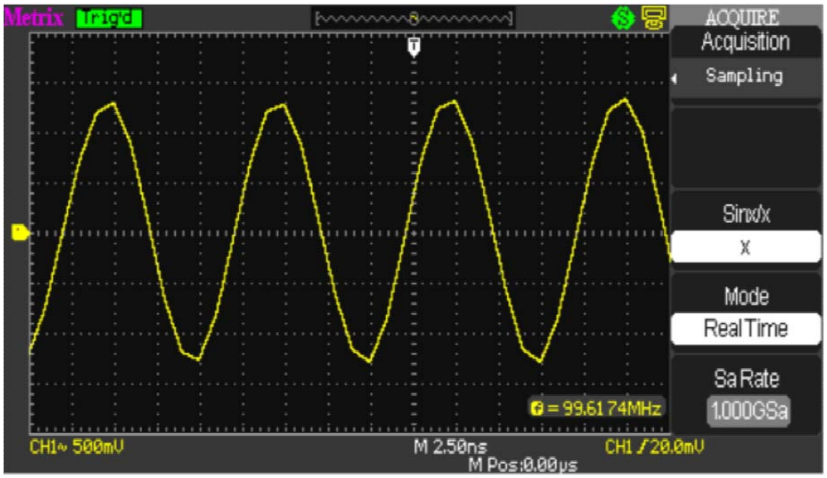
Press the "Sinx/x key" to choose Sinx or interpolation x.

"Sinx" corresponds to sinusoidal interpolation:



Functional description
IV - ACQUISITION system (cont'd)

"X" corresponds to "linear" interpolation:



Configure the Sampling mode

Press the "Mode" key and choose "Real Time" (Real Time Sampling, RTS) or "Equivalent Time" (Equivalent Time Sampling, ETS).

Sampling rate

Adjust the time base coefficient by turning the "T/div" knob of the HORIZONTAL keypad; the corresponding sampling rate is displayed at bottom right on the screen.

Functional description
IV - ACQUISITION system (cont'd)

Run control

Run/Stop Press the "RUN/STOP" key to start (RUN) the continuous acquisition of signals. Press this key again to stop the acquisition.

Single Press the "SINGLE" button to select the "Single" mode.
In "SINGLE" mode, pressing the RUN/STOP key sets the acquisition function to "ready": a triggering event then causes a single acquisition to be performed and displayed; the oscilloscope then changes to STOP.

In SINGLE mode, when you press the "RUN/STOP" button to start a single acquisition, the oscilloscope executes the following steps:

1. Acquisition of the Pre-Trig samples, which on the screen are the part of the signal to the left of the triggering point.
2. Acquisition of the Pre-Trig samples is continuous while waiting for the triggering event.
3. Detection of the triggering event.
4. After the triggering event, the acquisition of samples continues until the recording memory is filled; this is the post-trig, which on the screen is the part of the trace to the right of the triggering point.
5. The newly acquired signal is displayed. Then the acquisition is STOPped; the "RUN/STOP" key must be pressed again to restart the sequence.

Functional description
V - DISPLAY system

Configuration of the display

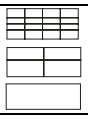
Press the "DISPLAY" key.

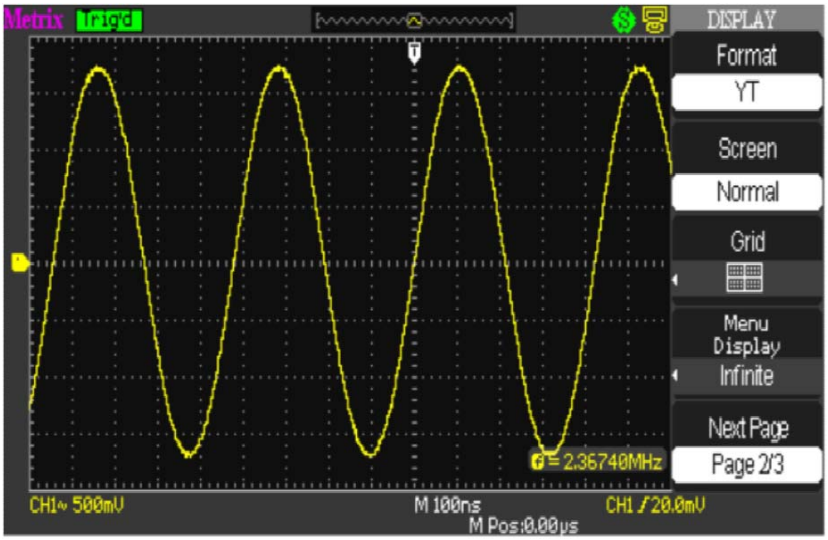
Display page 1

Option	Values	Description
Type	Vectors Dots	"Vectors": joins two adjacent samples by a line segment. Dots: displays all points acquired.
Persistence	Off 1 sec 2 sec 5 sec Infinite	Defines how long the display of the sample acquired is held.
Intensity	<Intensity>	Defines the intensity of the display of the trace.
Brightness	<Intensity>	Configures the brightness of the graticule.

Functional description
V - DISPLAY system (cont'd)

Display page 2

Option	Values	Instructions
Format	YT XY	The YT format displays the voltage (vertical scale) vs time (horizontal scale). The XY format displays a dot for each couple of samples acquired simultaneously in channels CH1 = X and CH2 = Y.
Screen	Normal Reversed	Change to normal mode. Change to reversed colour mode.
Graticule		Display the graticules and axes on screen. Deactivate the graticules. Deactivate the graticules and axes.
Display menu	2 sec 5 sec 10 sec 20 sec Infinite	Definition of the duration of display of the menu to the right of the screen.
Next page	Page 2/3	Press this key to access the second page of the "Display" menu.



Functional description
V - DISPLAY system (cont'd)

Display page 3

Option	Values	Instructions
Interface	Classical Modern Traditional Simple	Configure the display style.
Next page	Page 3/3	Press this button to return to the first page.

Steps

1. Configure the type of display
1) Press the "DISPLAY" key to display the "Display" menu.
2) Press the "Type" key and choose "Vectors" or "Dots".

2. Configure the remanence
Press the "Persistence" key to choose "Off", "1 Sec", "2 Sec", "5 Sec", or "Infinite". This option is used to display certain special signals.

3. Configure the intensity
Press the "Intensity" key and turn the "Adjust" knob to adjust the intensity of the trace.

4. Configure the Brightness
Press the "Brightness" key and turn the "Adjust" knob to adjust the brightness of the graticule.

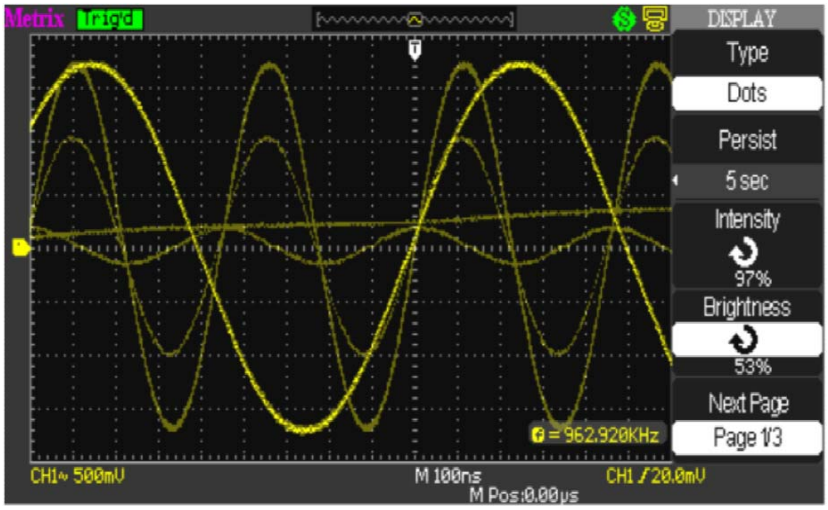
5. Configure the display format
1) Press the "Next Page" key to display the second display menu.
2) Press the "Format" key and choose "YT" or "XY".

6. Configure the screen
Press the "Screen" key and choose "Normal" or "Reversed" to define the background colour of the screen.

7. Configure the graticule
Press the "Shape" key to choose " ", " " or " " and display or not display the graticule.

8. Configure the menu display
Press the "Menu Display" key to choose "2 sec", "5sec", "10sec", "20sec" or "Infinite" to define the duration of display of the menu.

9. Configure "Interface" (skin)
Press the "Interface" (skin) key or turn the "Adjust" knob to choose "Classical", "Modern", "Traditional", or "Simple".



Functional description
V - DISPLAY system (cont'd)

X-Y format

The XY format is used to analyse phase differences between signals using Lissajous figures. The XY format plots the voltage in channel CH1 (horizontal X axis) against the voltage in channel CH2 (vertical Y axis). The oscilloscope uses the triggerless acquisition mode and displays the data in the form of dots.

The "XY" mode accepts sampling rates ranging from 25KSa/s to 250MSa/s (1-2.5-5 staging).

Steps

- Channel CH1 "Volt/div" and horizontal "POSITION" X, configuration of the horizontal scale and position.
- Channel CH2 "Volt/div" and vertical "POSITION" Y, configuration of the vertical scale and position.
- Turn the "S/div" knob to adjust the sampling rate
- The following functions are not available in "XY" mode:
  - XY of a real signal and of a trace obtained by mathematical calculation
  - Cursor
  - Control of trigger
  - Horizontal position knob
  - Vector type display
  - XY with the ≤100ms/div Time Base (Scan mode) or a sampling rate ≤12.5kSPS

Note: The Autoset function automatically restores the YT format.

Functional description
VI - MEASUREMENT system

The oscilloscope displays waveforms, in other words variations of the signal amplitude (voltage) as a function of time.
The oscilloscope also displays the vertical and horizontal ranges and the results of cursor and automatic measurements.

Scale measurement

This method allows a rapid visual estimate. For example, you can observe the amplitude of the signal and determine approximately that it is slightly greater than 100mV. You can estimate the amplitude by simple measurements, by counting the major and minor divisions of the graticule and multiplying by the range. For example, if you count five major divisions between the minimum and maximum values of a signal, and if the vertical range is 100mV/div., then it is easy to calculate its peak-to-peak amplitude: 5 div. x 100mV/div. = 500mV.

Measurements by cursors

Three modes: Manual, Track (cursors attached to the trace), and Auto
Press the "CURSORS" key.

1. Manual cursor

Option	Values	Description
Mode	Manual	This mode is used to configure the measurement by cursors manually.
Type	Voltage Time	Use the cursor to measure the amplitude ΔV of the voltage signal. Use the cursor to measure the period or frequency of the signal, ΔT and 1/ΔT.
Source	CH1 – CH2 MATH REFA - REFB	Choose the reference channel for the measurements.
Cur A ↻		Select CurA and turn the "Adjust" knob to adjust it.
Cur B ↻		Select CurB and turn the "Adjust" knob to adjust it.

When this mode is active, the screen displays two parallel horizontal or vertical cursors to measure the voltage or the time. The "Adjust" knob is used to move the cursors. Make sure that you have selected the right reference for the measurements.

● **Voltage cursor**: The voltage cursors take the form of horizontal lines on the screen. The position of a cursor is in Volts

● **Time cursor**: The time cursors take the form of vertical lines on the screen. The position of a cursor is in seconds.

● **Moving a cursor**: Use the "adjust" knob to move cursors A and B. To be able to move a cursor, you must first select it. When a cursor is moved, the value corresponding to the vertical and(or) horizontal position of the cursor is displayed to the left of the screen.

Functional description
VI - MEASUREMENT system (cont'd)

Steps

1. Press the "CURSORS" key to display the measurement by cursors menu.
2. Press the "Mode" key and choose "Manual".
3. Press the "Type" key and choose "Voltage" or "Time".
4. Press the "Source" key and choose "CH1", "CH2", "MATH", "REFA", "REFB" as reference source for the measurements.
5. Choose "CurA" and turn the "Adjust" knob to adjust cursor A.
6. Choose "CurB" and turn the "Adjust" knob to adjust cursor B.
7. The values of the measurements are displayed at top left on the screen:

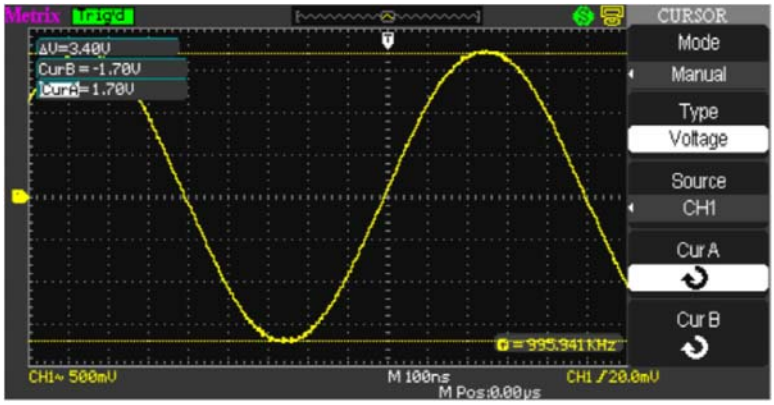
   If the type of measurement configured is "Voltage", the values are in V:

   - The voltage difference between Cursor A and Cursor B: ΔV

   If the type of measurement configured is "Time", the values are in S:

   - The time difference between Cursor A and Cursor B: ΔT

   - The inverse of ΔT is in Hz: 1/ΔT



Track mode

Option	Values	Description
Cursor mode	Track	The "Track" mode allows measurement by cursors attached to the trace.
Cursor A	CH1 - CH2 NONE	Select the channel attached to Cursor A.
Cursor B	CH1 - CH2 NONE	Select the channel attached to Cursor B.
Cur A		Select Cursor A and turn the "Adjust" knob to adjust it.
Cur B		Select Cursor B and turn the "Adjust" knob to adjust it.

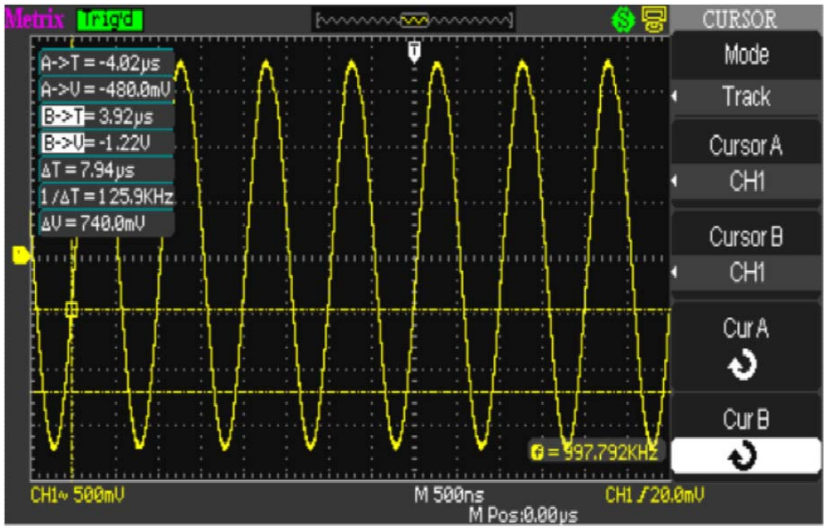
The "Track" mode displays two crossed cursors attached to the trace. You can adjust only the horizontal position of the crossed cursor selected, by turning the "Adjust" knob. The oscilloscope displays the values at top left on the screen.

Functional description
VI - MEASUREMENT system (cont'd)

Steps

1. Press the "CURSOR" key to display the cursor menu.
2. Press the "Mode" key and choose "Track".
3. Press the "Cursor A" key to choose the attached channel.
4. Press the "Cursor B" key to choose the attached channel.
5. Select "Cur A" and turn the "Adjust" knob to move Cursor A horizontally.
6. Select "Cur B" and turn the "Adjust" knob to move Cursor B horizontally.
7. The measurement values are displayed at top left on the screen:

   A→T: The horizontal position of Cursor A (Time cursor).
   A→V: The vertical position of Cursor A (Voltage cursor).
   B→T: The horizontal position of Cursor B (Time cursor).
   B→V: The vertical position of B (Voltage cursor).
   ΔT: The time interval between Cursors A and B.
   1/ΔT: The reciprocal of the time interval between Cursors A and B, in Hz
   ΔV: The voltage difference between Cursors A and B.



Functional description
VI - MEASUREMENT system (cont'd)

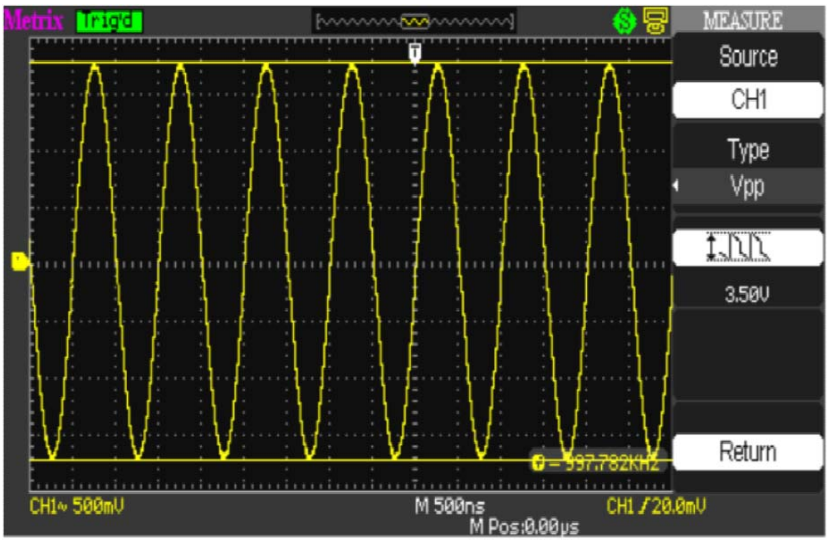
3. Auto mode

This mode makes automatic measurements.

Option	Values	Description
Cursor mode	Auto	Configures the cursor mode.

Steps

1. Press the "CURSORS" key to display the "Cursor Measurement" menu.
2. Press the "Cursor Mode" key and choose "Auto".
3. Press the "MEASURE" key to access the "auto cursor measurement mode" menu and choose the parameter to be measured.



Functional description
VI - MEASUREMENT system (cont'd)

Automatic measurements

Press the "MEASURE" key to open the Automatic measurements menu:

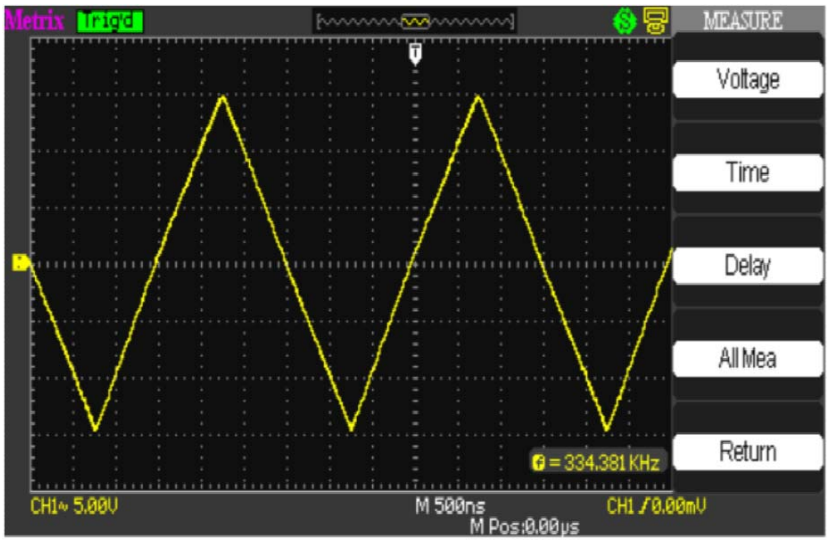
Three types of automatic measurement are available:

- Voltage measurement
- Time measurement
- Delay measurement

32 measurement parameters are available.

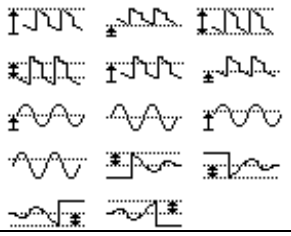
Automatic Measurements

Option	Instructions
1. VOLTAGE	Press this key to access Voltage measurements.
2. TIME	Press this key to access Time measurements.
3. DELAY	Press this key to access Delay measurements.
4. ALL MEASUREMENTS	Press this key to access All measurements menu.
5. RETURN	Press this key to access the home page of the automatic measurements menu.

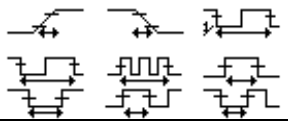


Functional description
VI - MEASUREMENT system (cont'd)

1. Automatic VOLTAGE Measurements

Option	Values	Instructions
Source	CH1 CH2	Choose the reference channel for the Voltage measurements.
Type	Vmax, Vmin, Vpp, Vamp, Vtop, Vbase, Cycle Mean, Mean, Cycle Vrms, Vrms, ROVShoot, FOVShoot, RPREShoot, FPREShoot	Press the "Type" key or turn the "Adjust" knob to choose the type of Voltage measurement.
		Icon corresponding to the type of measurement selected.
Return		Return to the first page of the automatic measurements menu.

2. Automatic TIME measurements

Option	Values	Instructions
Source	CH1 CH2	Choose the reference channel for the Time measurements.
Type	Rise Time Fall Time Freq Period BWidth +Width -Width +Duty -Duty	Press the "Type" key or turn the "Adjust" knob to choose the type of Time measurement.
		Icon corresponding to the type of measurement selected.
Return		Return to the first page of the automatic measurements menu.

Functional description
VI - MEASUREMENT system (cont'd)

3. Automatic DELAY Measurements

Option	Values	Instructions
Source	CH1-CH2	Reference channels for the delay measurement.
Type	Phase FRR FRF FFR FFF LRR LRF LFR LFF	Press the "Type" key or turn the "Adjust" knob to choose the type of Delay measurement.
		Icon corresponding to the type of delay measurement selected.
Return		Return to the first page of the automatic measurements menu.

4. All measurements

Option	Values	Description
Source	CH1 CH2	Choose the reference channel for the measurements.
Voltage	On Off	Activates "all voltage measurements". Deactivates "all voltage measurements".
Time	On Off	Activates "all time measurements". Deactivates "all time measurements".
Delay	On Off	Activates "all delay measurements". Deactivates "all delay measurements".
Return		Return to the main "all measurements menu".

Functional description
VI - MEASUREMENT system (cont'd)

Types of measurement

Types of measurement	Description
Vmax	The maximum positive peak of the signal.
Vmin	The minimum negative peak of the signal.
Vpp	Absolute difference between the maximum and minimum peaks of the signal.
Vtop	Value of the high plateau of the signal.
Vbase	Value of the low plateau of the signal
Vamp	Difference between Vtop and Vbase.
Vavg	Arithmetic mean of the first cycle of the signal.
Mean	Arithmetic mean over the whole signal.
Crms	RMS value of the first cycle of the signal.
Vrms	RMS value of the whole signal.
ROVShoot	Defined as (Vmax-Vtop)/Vamp after a rising edge.
FOVShoot	Defined as (Vmin-Vbase)/Vamp after a falling edge.
RPREshoot	Defined as (Vmin-Vbase)/Vamp before a rising edge.
FPREshoot	Defined as (Vmax-Vtop)/Vamp before a falling edge.
Rise time	Rise time measures the time between 10% and 90% of the first rising edge of the signal.
Fall time	Fall time measures the time between 90% and 10% of the first falling edge of the signal.
Bwid	The duration of a pulse train. Measured on the whole signal.
+Wid	+Width, time interval between the first rising edge and the next falling edge at 50% of Vamp.
- Wid	-Width, time interval between the first falling edge and the next rising edge at 50% of Vamp.
+Duty	+Duty is the ratio of the width of the positive pulse to the period of the signal.
- Duty	- Duty is the ratio of the width of the negative pulse to the period of the signal.
Phase	The phase lead or lag between the signals present on channels CH1 and CH2, expressed in degrees, where 360° represent one cycle of the signal.
FRR	The time interval between the first rising edge of source CH1 and the first rising edge of source CH2
FRF	The time interval between the first rising edge of source CH1 and the first falling edge of source CH2
FFR	The time interval between the first falling edge of source CH1 and the first rising edge of source CH2
FFF	The time interval between the first falling edge of source CH1 and the first falling edge of source CH2
LRR	The time interval between the first rising edge of source CH1 and the last rising edge of source CH2
LRF	The time interval between the first rising edge of source CH1 and the last falling edge of source CH2
LFR	The time interval between the first falling edge of source CH1 and the last rising edge of source CH2
LFF	The time interval between the first falling edge of source CH1 and the last falling edge of source CH2

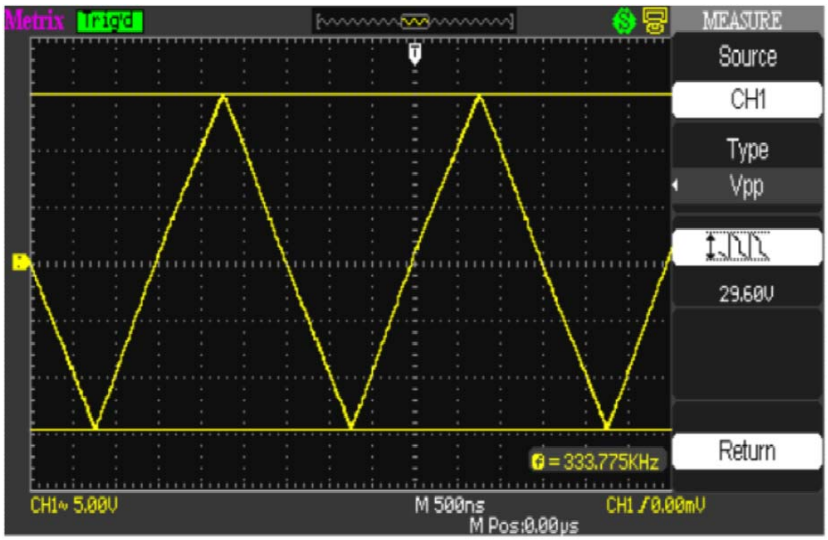
Functional description
VI - MEASUREMENT system (cont'd)

Steps **Voltage measurements**

1. Press the "MEASURE" key to display the "Automatic Measurements" menu.
2. Press the first key at the bottom to access the "second measurement menu".
3. Choose the type of measurement. If you press the "Voltage" key, the "Voltage measurement" menu is displayed on screen.
4. Press the "Source" key to choose the source channel of the measurement, "CH1" or "CH2".
5. Press the "Type" key to select the type of measurement. The icon and the corresponding value are displayed under the type of measurement.
6. Press the "Return" key to access the home page of the "automatic measurements" menu. The last type of measurement chosen and the corresponding value will be displayed at bottom right on the home page.

You can display the other types of measurement in the same way.

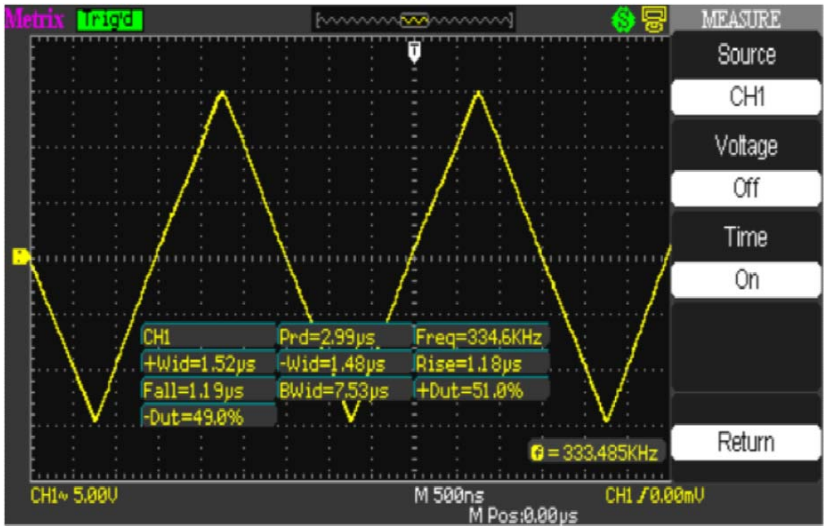
Remark: On the "MEASURE" home screen, five types of measurement can be displayed at most.



Functional description
VI - MEASUREMENT system (cont'd)

Steps **Time measurement**

1. Press the "MEASURE" key to display the "Automatic Measurements" menu.
2. Press the bottom key to access the second page of the Automatic measurements menu.
3. Press the "All" key to access the "All measurements" menu.
4. Press the "Source" key to choose the reference channel.
5. Press the "Time" key and choose "On". Subsequently, all time measurements will be displayed on the screen.



Functional description
VII - STORAGE system

SAVE

The "SAVE/RECALL" key corresponds to the Storage function.

5 types of data:

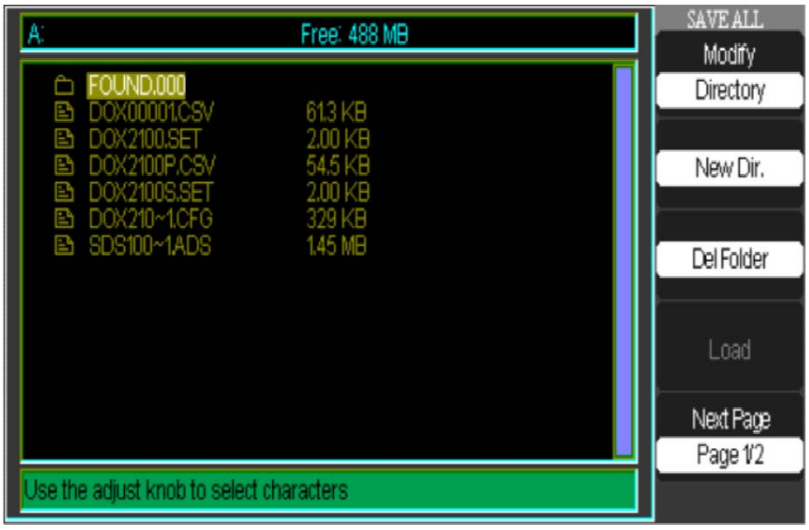
- Set-up Parameters
- Curve
- Image
- CSV
- Factory

You can save in internal memory and retrieve on screen up to 20 configurations of the oscilloscope and 20 traces. The host USB port on the front panel of the oscilloscope is used to save configuration data, traces, screen grabs, CSV files to a USB key. The saved configurations and traces can be retrieved on the screen of the oscilloscope. The screen grabs and the CSV files cannot be retrieved on the oscilloscope, but can be opened using the appropriate PC software.

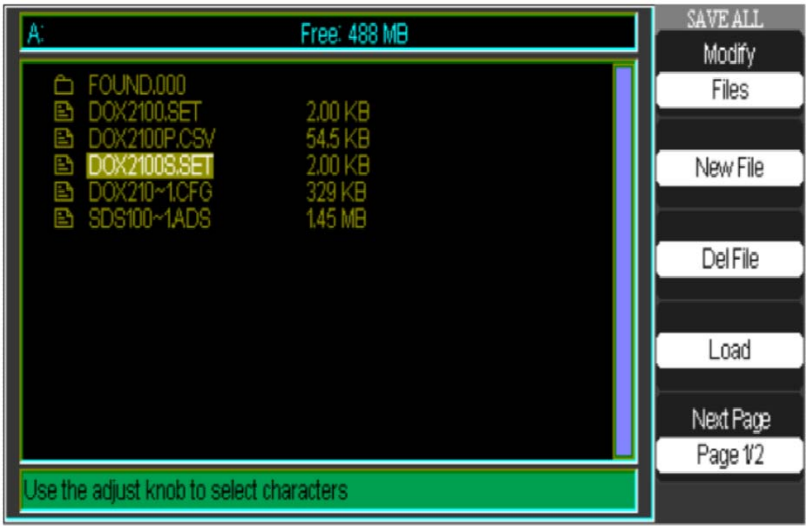
1. "Save All" Screen

The "SAVE ALL" screen is broken down into Directories or Files:

Directories



Files



Functional description
VII - STORAGE system (cont'd)

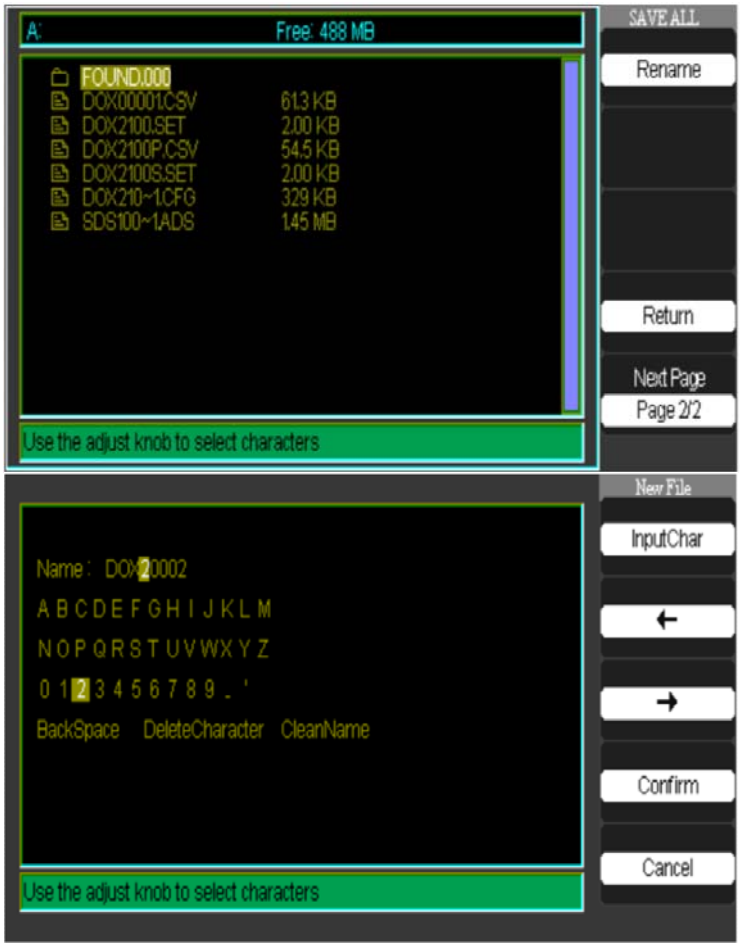
1.1 Recall of files

The "Load" key can be used to restore your configuration files. When you have selected the file in question and it is highlighted in the main zone of the screen, press the "Load" key to restore the configuration from the USB flash memory.

Note: The "Load" button is deactivated when BMP or CSV files are selected.

The directories and files have "Rename" and "Return" keys on Page 2/2. Use these keys to rename a file or directory, or to exit from the "SAVE/RECALL" screen.

1.2 Creation of directories and files



- The "New File" menu is identical to the "New Directory" menu. Only its title changes. The "InputChar" key adds the chosen character at the cursor position in the Name field.
- Move the cursor in the name field using the "→" and "←" buttons.
- Turn the Adjust knob to browse the selection of characters. When the desired character is highlighted, press the Adjust knob or press the "InputChar" button to add it at this position in the Name field.
- Additional selections for "Return", "Delete", and "Reset" are available to facilitate entry and can be accessed by the Adjust knob in the same way.
- Press the "Confirm" button (when the field name is complete) to save the file in memory. When the "Confirm" button has been used, a "Data Store Success!" message appears briefly and the new file or directory appears on your USB flash memory.

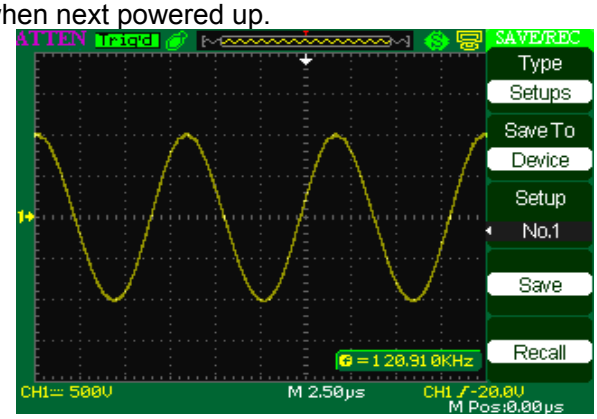
Functional description
VII - STORAGE system (cont'd)

2. Save and Recall of the configuration

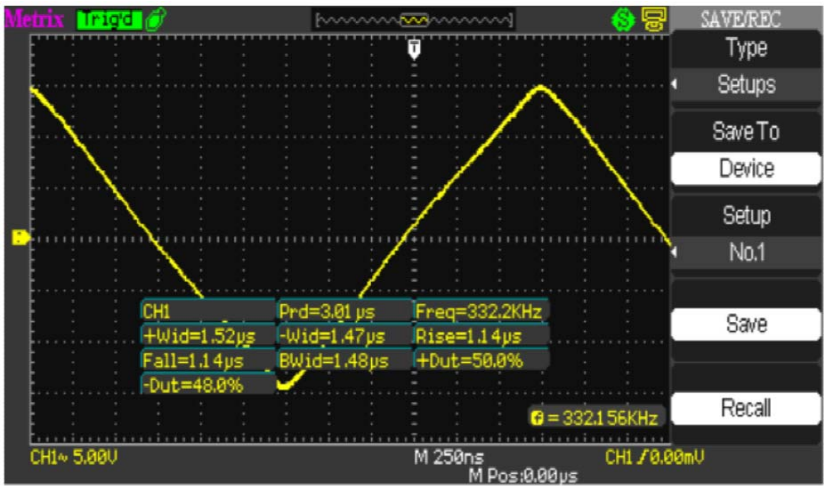
The whole configuration is stored in non-volatile memory. When you restore the configuration, the oscilloscope will be in the mode from which the configuration was saved.

The oscilloscope saves the current configuration if you wait three seconds after the last change before powering it down. The oscilloscope loads this configuration when next powered up.

2.1 Save/Recall the configurations of the device



Option	Values	Description
Type	Set-up parameters	Oscilloscope configuration "Save/Recall" menu
Record on	Device	Save the configuration in the internal memory of the oscilloscope.
Config	No.1 to No.20	Press the "Configuration" button or turn the "Adjust" knob to choose the location.
SAVE		Run the save
RECALL		Restore the configuration



Functional description
VII - STORAGE system (cont'd)

Save steps

Example: Save the configuration corresponding to a "Dots" type display in the internal memory of the oscilloscope.

1. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
2. Press the "Type" key and choose "Set-ups".
3. Press the "Save To" key and choose "Device".
4. Press the "Set-up" key and choose "No. 1".
5. Press the "DISPLAY" key to view the "Display" menu.
6. Press the "Type" key and choose "Dots".
7. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
8. Press the "Save" key.

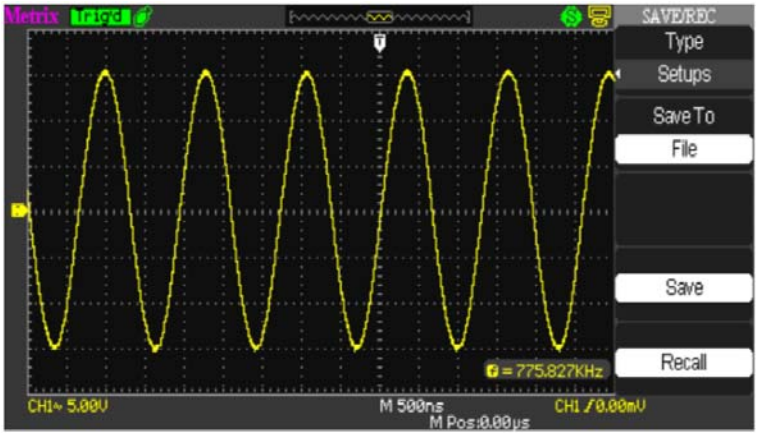
Recall steps

If you want to restore Saved configuration "No. 1".

1. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
2. Press the "Type" key and choose "Set-ups".
3. Press the "Save To" key and choose "Device".
4. Press the "Parameters" key or turn the "Adjust" knob to choose "No. 1".
5. Press the "Load" (Recall) key.

2.2 Save the set-up to a USB key

Option	Values	Instructions
Type	Set-up parameters	Set-up Save/Recall menu.
Save To	File	Save the configuration to USB flash memory.
Save		Go to the Save/Recall interface



Functional description
VII - STORAGE system (cont'd)

Save steps

Save the "Dots" type Display configuration to a USB key:

1. Press the "SAVE/RECALL" key and choose "Parameters".
2. Insert the USB flash memory in the port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately 5 seconds).
3. Press the "Save" key and choose "Folder".
4. Press the "Save" key to access the Save/Recall interface.
5. Press the "New folder" key
6. Press the "Delete folder" key to delete a folder
7. Press the "Modify" key to modify a folder.
8. Press the "New file" key to create a new file
9. Press the "Delete file" key to delete a file
10. Press the "next page" key, then the "Rename" key, to change the name of the file or of the directory.
11. Turn the "Adjust" knob to choose the folder, then press "Confirm" to save the configuration to the USB memory.

Steps in Restoration

To restore a configuration saved to a USB key:

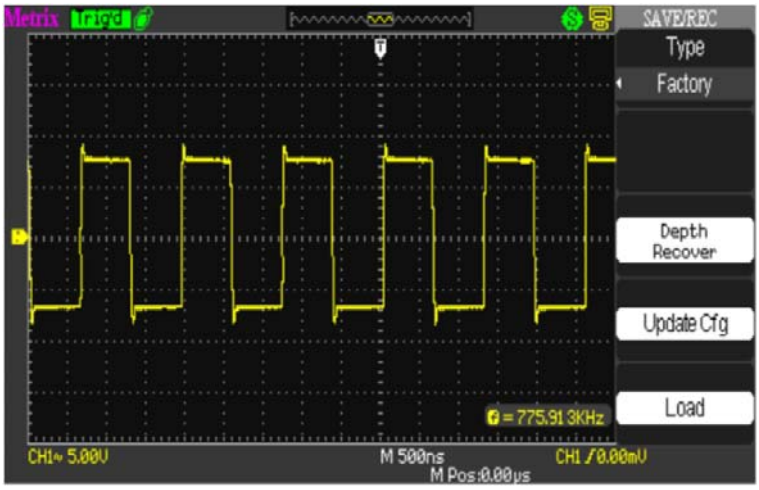
1. Press the "SAVE/RECALL" key
2. Insert the USB key in the host USB port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately 5 seconds).
3. Press the "Type" key and choose "Parameters".
4. Press "Load" and choose "Folder".
5. Press "Save" to display the Save/Recall interface
6. Choose the file and press the "Load" key (after approximately five seconds a "Read data success" message is displayed). The configuration has been restored from the USB memory.

Functional description
VII - STORAGE system (cont'd)

2.3 Restore the Factory configuration (or Default configuration)

This option restores the factory configuration:

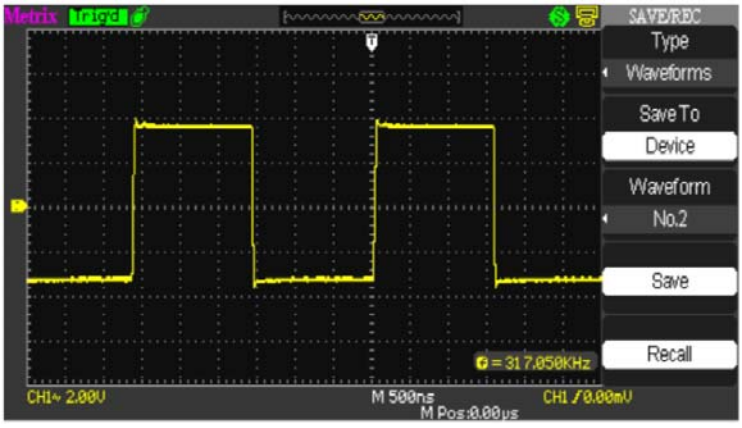
Option	Values	Instructions
Type	Factory	To select the "factory" configuration.
	Load	To load the "Factory" configuration.



3.Backup and Restoration of Traces

3.1 Save/Restore traces on the device

Option	Configuration	Instructions
Type	Waveform	Trace Save/Recall menu.
Save to	Device	Save the traces in the internal memory of the oscilloscope.
Curve	No.1 to No.20	Press the "Curve" key or turn the "Adjust" knob to choose the location.
Save	Save	Run the backup
Recall	Recall	Restore a trace from the internal memory of the oscilloscope.



Functional description
VII - STORAGE system (cont'd)

Save Save traces in internal memory:

Steps
1. Inject a sinusoidal signal on channel 1 and press the "Auto" key.
2. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
3. Press the "Type" key and choose "Curves".
4. Press the "Record" key and choose "Device".
5. Press the "Curve" key or turn the "Adjust" knob to choose "No. 1".
6. Adjust "Volts/div" or "S/div" if necessary to optimize the display of the trace.
7. Press the "Save" button.

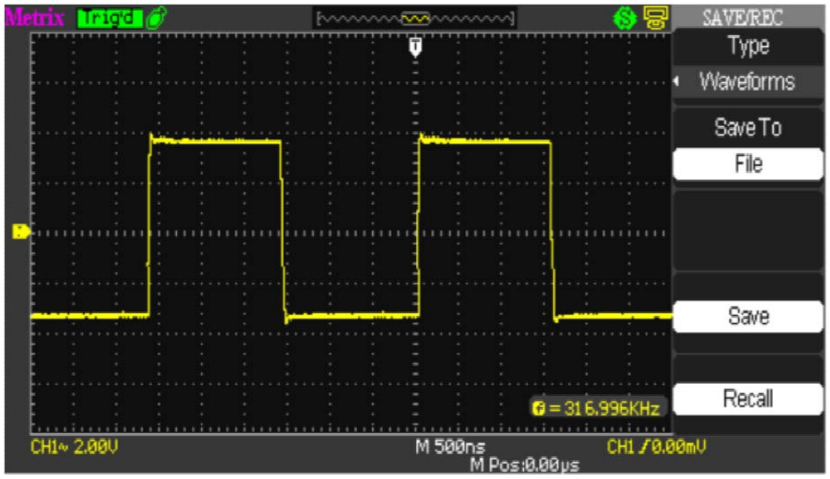
Restore To restore the signals:

Steps
1. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
2. Press the "Type" key and choose "Curves".
3. Press the "Record" key and choose "Device".
4. Press the "Curve" key or turn the "Adjust" knob to choose "No. 1".
5. Press the "Load" key.

Functional description
VII - STORAGE system (cont'd)

3.2 Save/Restore Traces in USB flash memory

Option	Configuration	Description
Type	Curves	Save/Recall menu.
Save to	Folder	Save the trace to the USB key.
Save		Run the backup.



Save Steps

To save a trace in USB flash memory:

1. Inject a signal on channel CH1 and press the "AUTO" key.
2. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
3. Press the "Type" key and choose "Curves".
4. Insert the USB key in the host USB port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately five seconds).
5. Press the "Save To" key and choose "Folder".
6. Press the "Save" key to access the Save/Recall interface.
7. Create a file and then press the "Confirm" button (after approximately five seconds a "Save data success" message is displayed on screen). The trace has been saved in the USB flash memory.

Restore Steps

To restore a signal from the USB flash memory:

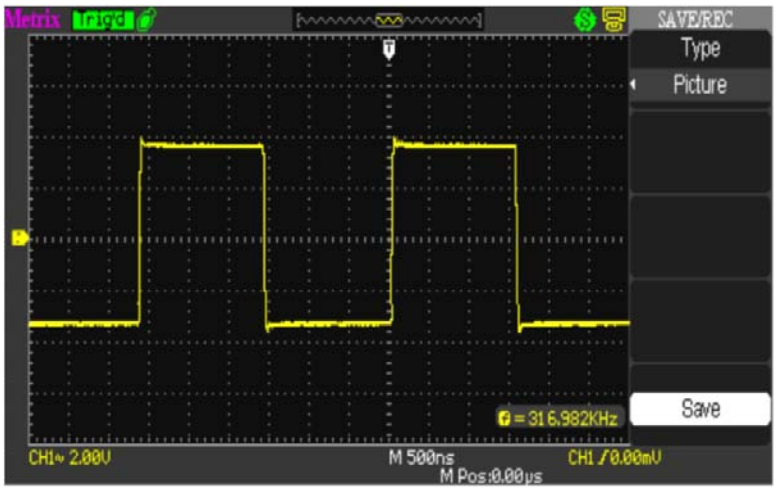
1. Press the “SAVE/RECALL” key.
2. Press the "Type" key and choose "Curves".
3. Insert the USB key in the host USB port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately five seconds).
4. Press the "Save" key and choose "Folder".
5. Press the "Load" button to access the Save/Restore interface.
6. Choose the desired file and press the "Load" button (after approximately five seconds, a "Read data success" message is displayed). The trace has been restored from the USB memory.

Functional description
VII - STORAGE system (cont'd)

3.3 Save an Image

A screen grab can be saved to a USB flash memory, but cannot be restored. It can be displayed using the appropriate PC software.

Option	Values	Description
Type	Image (Picture)	Screen grab Save/Recall menu.
Print key	Print image	When the oscilloscope is connected to a USB printer and the USB option on the rear panel is "Printer", choose "Print Image" and press the "PRINT" key to print a screen grab.
	Save the image	When the USB flash memory is connected to the oscilloscope (the icon of the USB flash memory is displayed at the top of the screen), choose "Save picture" and press the "Save" button to access the Save/Recall interface.
Save		Go to the Save/Recall interface.



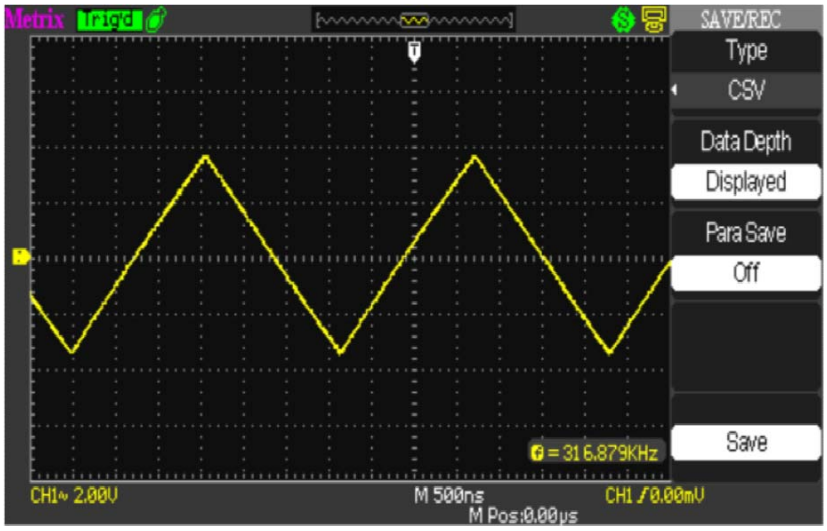
Steps

1. Select the screen grab.
2. Press the "SAVE/RECALL" key to display the "SAVE/RECALL" menu.
3. Press the "Type" key and choose "Picture".
4. Insert the USB key in the host USB port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately five seconds).
5. Press the "Save" key and choose "Print Image".
6. Press the "Save" key to access the "Save/Recall" interface.
7. Name the screen grab and then press the "Confirm" key (after approximately five seconds a "Save data success" message is displayed on screen). The image has been saved to the USB flash memory.

Functional description
VII - STORAGE system (cont'd)

3.4 Save/Recall CSV

Option	Values	Description
Type	CSV	Menu for backup of CSV files on USB flash memory.
Lg data (Data Depth)	Screen (Displayed) Memory (Maximum)	Store only the signal displayed on screen in the CSV file. Stores maximum signal data in the CSV file.
Backup of Parameters	On Off	Used to save or not save the parameters in the CSV file.
Save		Display the Save/Restore interface.



Steps

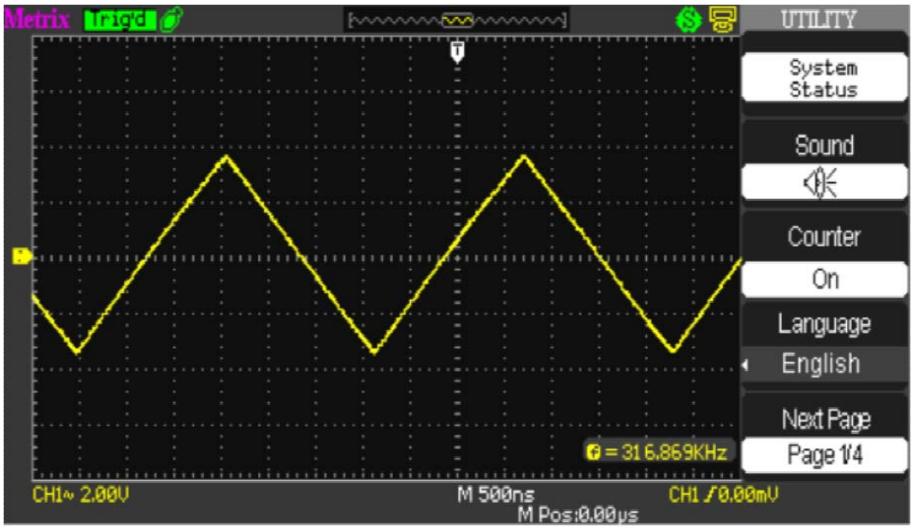
1. Press the "SAVE/RECALL" key to open the "SAVE/RECALL" menu.
2. Press the "Type" key and choose "CSV".
3. Insert the USB key in the host USB port of the oscilloscope and wait for the oscilloscope to initialize the USB flash memory (approximately 5 seconds).
4. Press the "Lg data" key (Data Depth) and choose "Screen" (Displayed) or "Memory" (Maximum).
5. Press the "Para Save" key and choose "On" or "Off".
6. Press the "Save" key to open the Save/Recall interface.
7. Name the CSV file to be saved. Then press the "Confirm" key (after approximately five seconds a "Save data success" message is displayed on screen). The CSV file has been saved to the USB key.

Functional description
VIII - UTILITY 1/4

UTILITY Press the "UTILITY" key.

Utility page 1

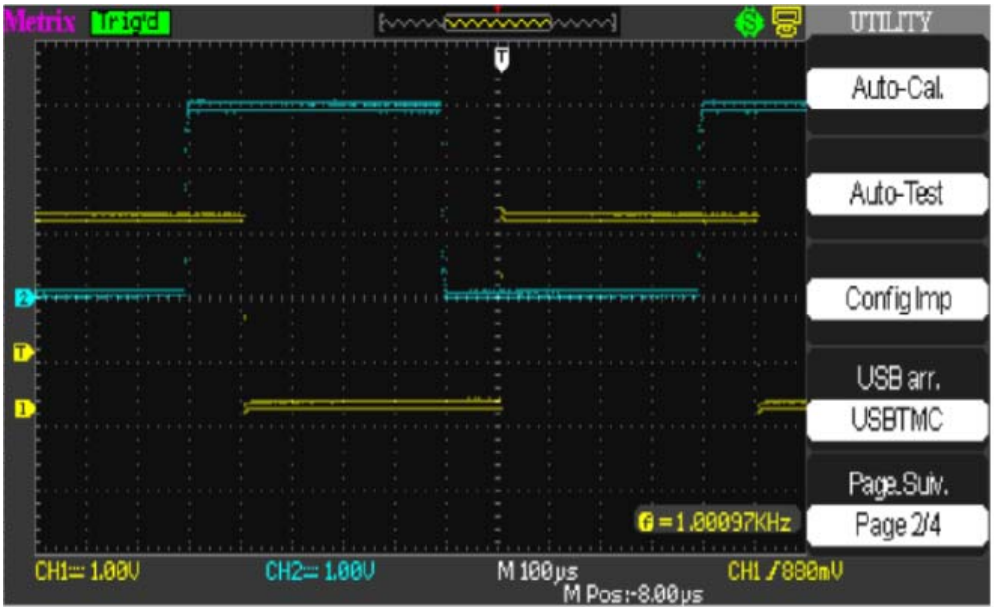
Option	Values	Instructions
System Status		Displays the hardware and software configuration of the oscilloscope.
Sound	 	Press to activate the sound. Press to deactivate the sound.
Counter	On Off	Activate the frequency counter. Deactivate the frequency counter.
Language	English French German Spanish Italian	English French German Spanish Italian
Next page	Page 1/4	Press this key to go to the second page.



Functional description
VIII - UTILITY 1/4 (cont'd)

Utility page 2

Option	Values	Instructions
Auto-Cal Calibration.		Automatic calibration.
Run the Self-Test	Test screen Test keypad Test LED	Start the screen test program Start the keypad test program Start the LED test program
Print Setup		Access the print setup menu.
Back USB	Printer	The oscilloscope is connected to the printer by a USB cable. When you use the printing function, select the "Printer" option. The printing icon is displayed at the top of the screen.
	USBTMC (Computer)	The oscilloscope is connected to the computer by a USB cable. When you run the "EasyScopeX" PC software, choose "**USBTMC**". The computer icon is displayed at the top of the screen.
Next page	Page 2/4	Press **this key** to go to the third page.



Functional description
VIII - UTILITY 1/4 (cont'd)

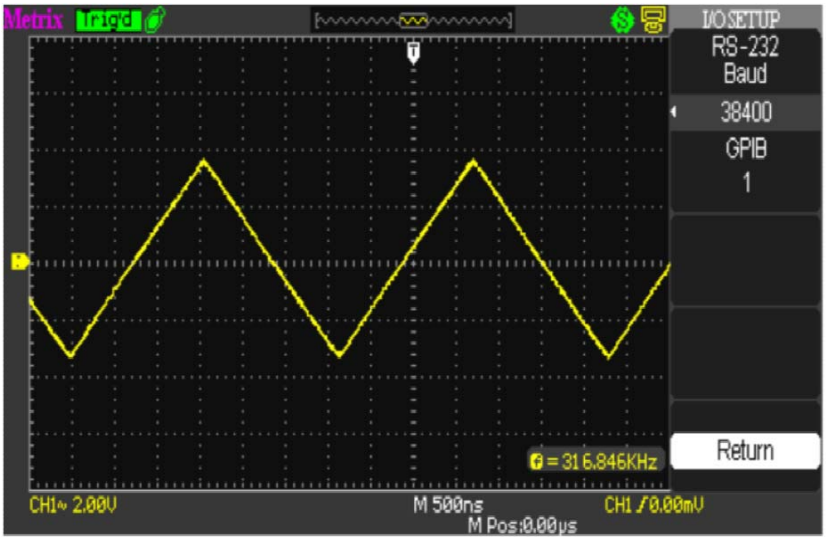
Utility page 3

Option	Values	Instructions
Firmware update		You can update the firmware of the oscilloscope from a USB flash memory (this takes approximately 2 minutes).
Pass/Fail		Press this key to access the Pass/Fail menu.
Record		Press this button to access the Signal Recording menu.
I/O adjustment		Press this key to access the "I/O Adjustment" menu (See table below).
Next page	Page 3/4	Press this key to go to the next page.

I/O adjustment menu

Option	Values	Description
Baud	300 2400 4800 9600 19200 38400	Configure the transmission rate

Note: ***The RS232C function is designed for development only.***

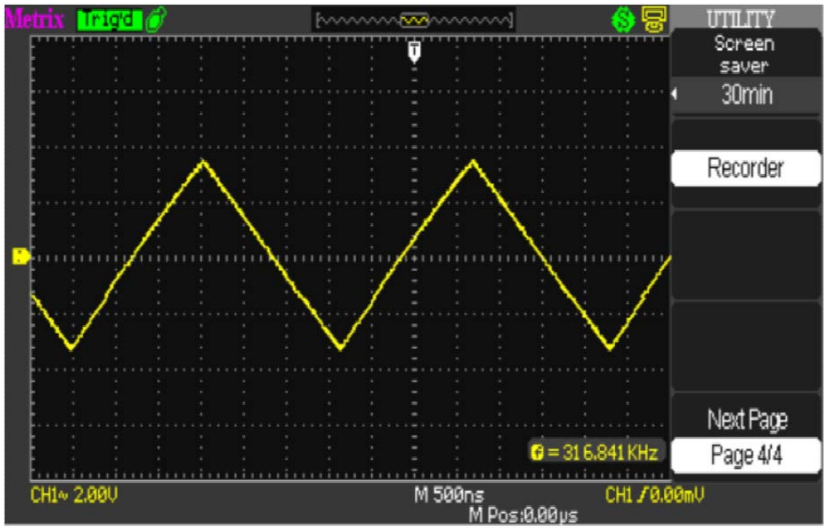


Functional description

VIII - UTILITY 1/4 (cont'd)

Utility page 4

Option	Values	Description
Screen Saver	1 min 2 min 5 min 10 min 15 min 30 min 1 hour 2 hours 5 hours **Off**	Configure the hold-off time for the changeover to screen saver

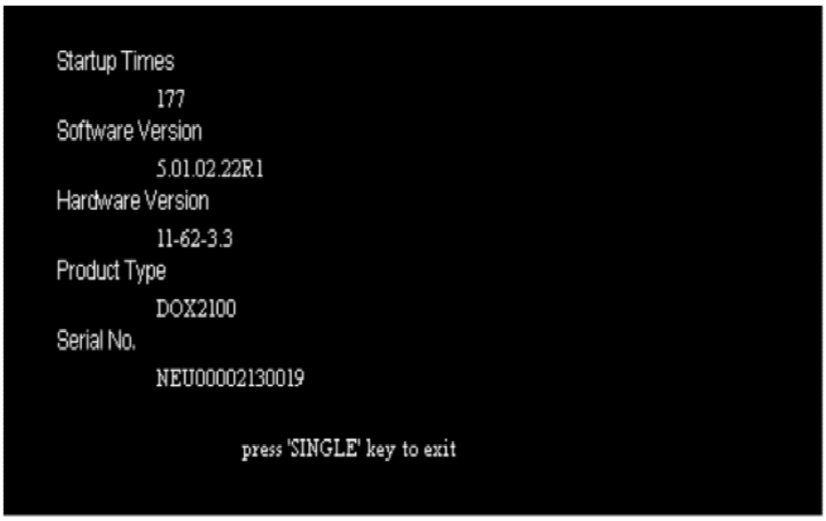


Functional description
VIII - UTILITY 1/4 (cont'd)

System status

Press the "**System Status**" key of the **"UTILITY"** menu to display the hardware and software configuration of the oscilloscope.

Instruction

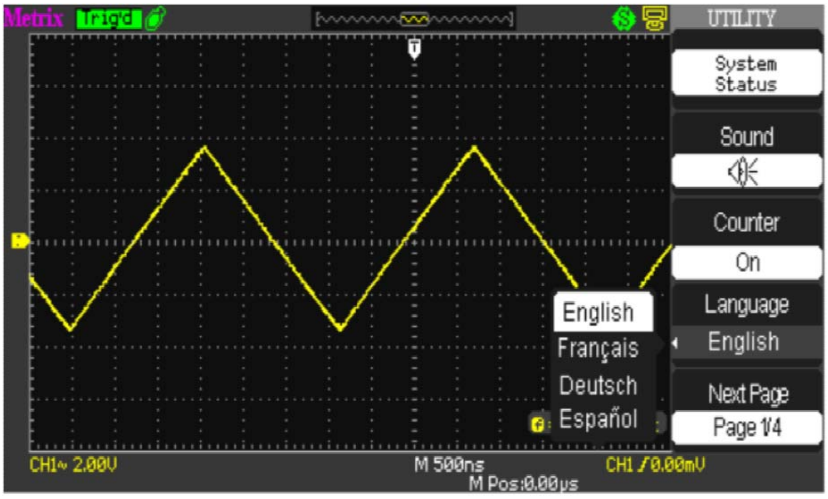


Option	Instructions
Startup Times	Displays the number of power ups.
Software Version	Displays the embedded software version.
Hardware Version	Displays the hardware version.
Product Type	Displays the model name.
Serial No.	Displays the serial number.

Languages

5 languages are available.

Press the "Utility" key →"Language" to choose the working language.



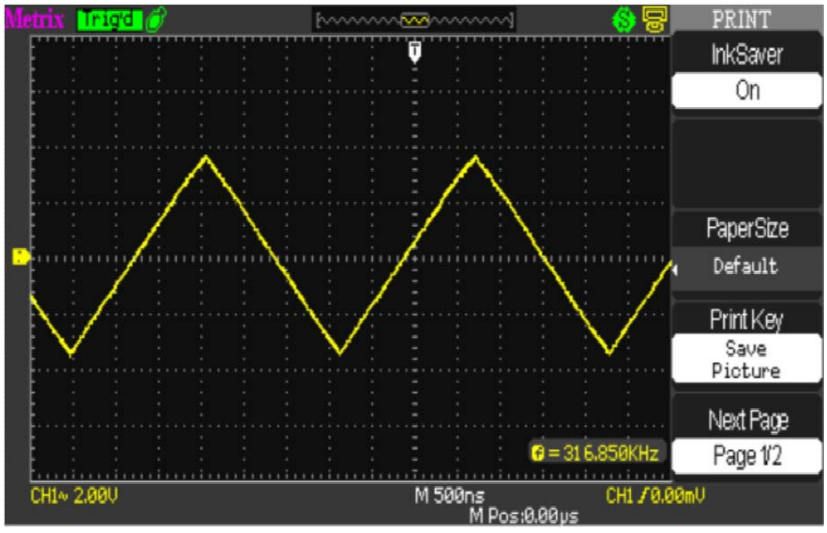
Functional description
VIII - UTILITY 1/4 (cont'd)

Printing

You can connect a "PictBridge" printer to the USB Device port on the rear panel.

Print setup page 1

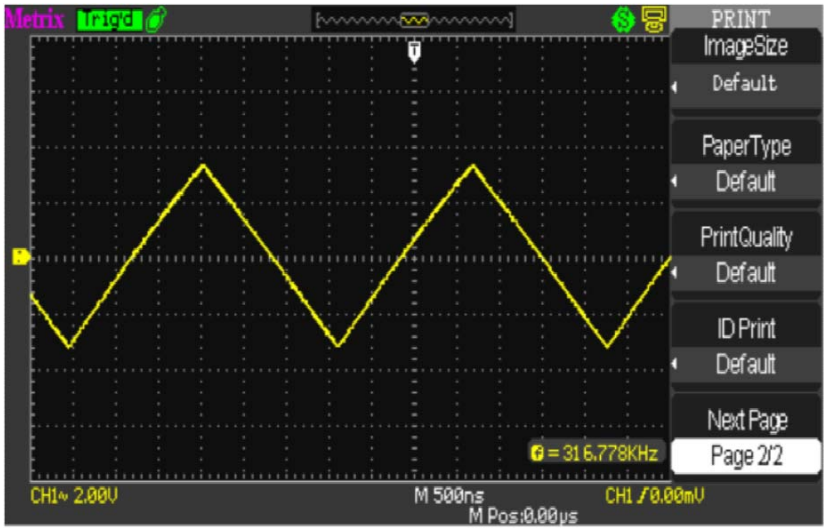
Option	Values	Instructions
Ink Saver	On Off	Prints the screen grab on a white ground. Prints the screen grab in colour.
Layout	Portrait Landscape	Printing orientation.
Paper Size	Default, L, 2L, Hagaki Postcard, Card, 10 x 15 cm, 4" x 6", 8" x 10", Letter, 11" x 17", A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, B0, B1, B2, B3, B4, B5, B6, B7, B8, B9, 89mm, Roll (L), 127mm Roll (2L),100mm Roll (4"), 210mm Roll (A4)	Displays the parameters available with your USB compatible "PictBridge" printer
Print Key	Print Picture Save Picture	Choose the "Print Picture" option. When the oscilloscope is connected to the printer, press the "S/div" knob to print the image. Choose "Save Picture" after inserting the USB flash memory, press "S/div" to save the image.
Next Page	Page ½	Press this key to go to the next page.



Functional description
VIII - UTILITY 1/4 (cont'd)

Print setup page 2

Option	Values	Instructions
Paper size	Default, 2.5 x 3.25 inches, L (3.5 x 5 inches), 4x6 inches, 2L (5x7 inches), 8x10 inches, 4L (7 x 10 inches), E, Card, Hagaki Card, 6 x 8 cm, 7 x 10 cm, 9 x 13 cm, 10 x 15 cm, 13 x 18 cm, 15 x 21 cm, 18 x 24 cm, A4, Letter	Displays the parameters available with your USB compatible "PictBridge" printer
Type of paper	Default, Normal, Photograph, Screen grab	
Print quality	Default, Normal, Draft, Fine	
Print ID	Default, ON, OFF	
Next page	Page 2/2	Access to the first page of print setup.



Note:

1. The printer may replace your selection for a better layout.

2. If the printer does not support your choice, the oscilloscope will use the default parameters.

3. The oscilloscope is designed to print to any "PictBridge" compatible USB printer. Check the documentation of the printer in order to determine whether it is "PictBridge" USB compatible.

Functional description
VIII - UTILITY 1/4 (cont'd)

Print a screen grab

Steps

1. Connect the oscilloscope to a "PictBridge" compatible printer.

1) Connect one end of the USB cable to the "USB Device" port of the oscilloscope.
2) Connect the other end of the USB cable to the "USB Pictbridge" port of a "PictBridge" compatible printer.

2. Print a screen grab

1) Power up the oscilloscope and the printer. (The printer recognizes the oscilloscope only when it is powered up).
2) Press the "UTILITY" key to display the "UTILITY" menu.
3) Press the "Next page" key.
4) Press the "Back USB" key to choose "Printer"
5) Press the "Print setup" key to access the "Print setup" menu.
6) Configure printing to suit your needs. The oscilloscope interrogates the printer and displays only the options and values available on the printer.

   If you do not know which parameter to use, choose "Default" for each option.
7) Press the "Print" option key and choose "Print Picture".
8) Press the "PRINT" button to print the screen grab.

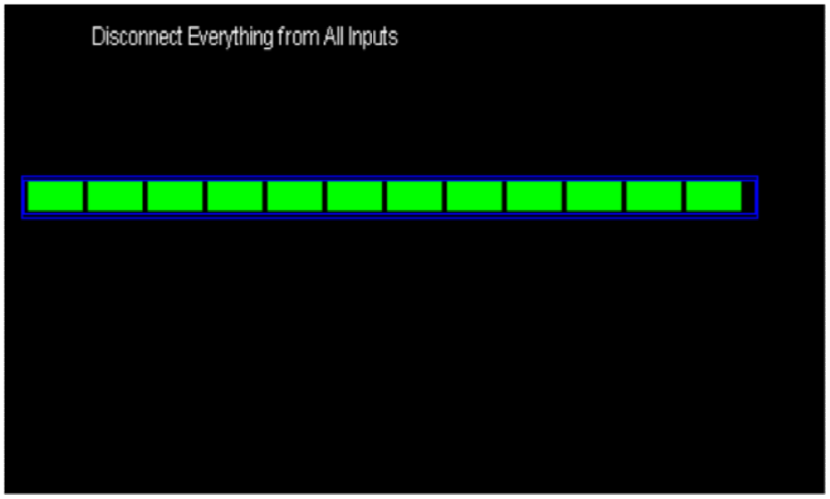
   The oscilloscope needs a few seconds to capture the screen grab. The print setup and speed determine the time needed for the printing. The time may vary according to the format chosen.

Functional description
VIII - UTILITY system 2/4

Auto - Cal

The auto-calibration procedure is used to optimize the precision of acquisition of channels CH1 and CH2. You can run this procedure at any time, e.g. if the ambient temperature varies by more than 5°C, or after the device has been in operation more than thirty minutes.

Before starting the "Auto-Calibration", you must disconnect the probes and leads from the input BNCs. Then press the "Utility" key and choose "Auto Cal." to start the auto-calibration procedure, following the instructions displayed on screen.



Self-Test

Steps

1. Test of screen

Select "Test screen" to start the test of the LCD screen. The message "Press 'SINGLE' Key to continue, Press 'RUN/STOP' Key to exit" is displayed; press the "Single" button to start the test.

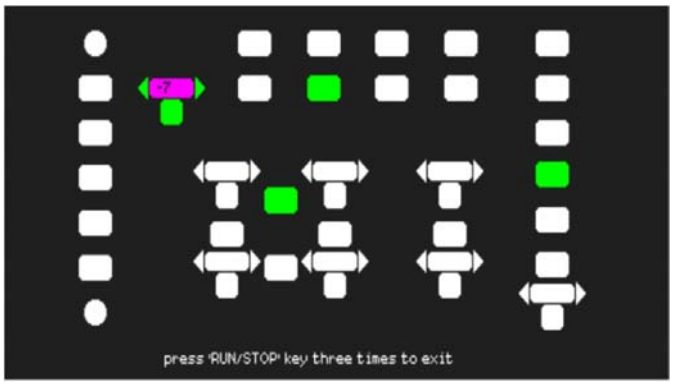
Functional description
VIII - UTILITY 2/4 (cont'd)

2. Test of keypad

Choose "Test keypad" to access the keypad test interface. The rectangles represent the keys on the front panel. The seven rectangles flanked by arrows represent the knobs on the front panel. The square below these seven rectangles represents the switches built into these knobs. Test all of the knobs and their switches. Also check that the backlit keys operate correctly.

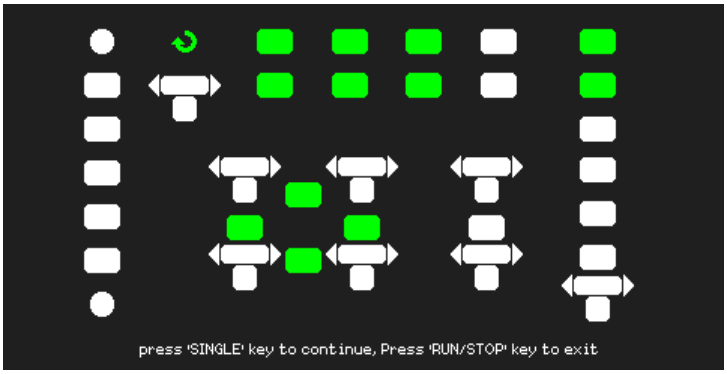
Note:

- *At the start of the "keypad test" all of the keys are white on a black ground.*
- *The keys that are white have not been tested.*
- *The keys that have been tested are green.*
- *The bottom of the screen displays the message "Press 'RUN/STOP' Key Three Times to exit" to indicate that the "RUN/STOP" key must be pressed three times in a row to exit from the keypad test.*



3. LED test

Select "Test LED" to access the key backlight LED test interface. The message "Press 'SINGLE' key to continue, Press RUN/STOP Key to Exit" is displayed. Press the "Single" key repeatedly to test, one by one, the backlight LEDs. When a key is lit, the corresponding rectangle is coloured green.



Functional description
VIII - UTILITY 3/4

Update of the Embedded Software

Update of the "Firmware" from a USB key.

The embedded software of the oscilloscope can be updated directly from a USB key. This takes about two minutes.

Steps

1. Connect the USB key containing the new "Firmware" version to the host USB port on the front panel of the oscilloscope.
2. Press the UTILITY key to access the "Utility" Menu.
3. Press the "Next Page" key to access the third page of the "Utility" menu.
4. Press the "Update Firmware" key.
5. Press the "SINGLE" key to start the update of the embedded software, then follow the instructions on screen.

6 Power down the oscilloscope, then power it back up and check that the firmware has in fact been updated. When the firmware has been updated, an auto-calibration must be run.

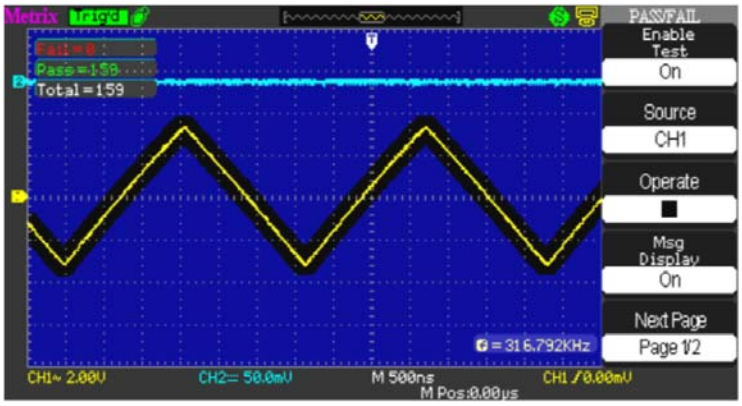
Note: Do not power down the oscilloscope during the update.

Pass/Fail

The "Pass/Fail" function is used to compare the evolution of the real time signal to a pattern (or Mask). If the real time signal matches the predefined pattern, the signal is rated "Pass"; if not, the signal is rated "Fail".

Pass/Fail menu page 1

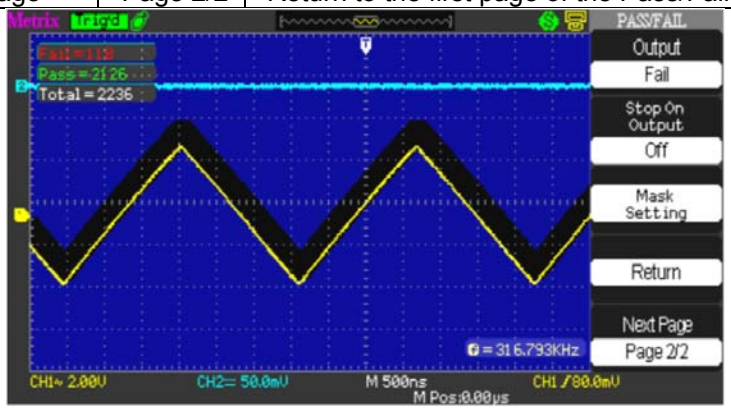
Option	Values	Instruction
Enable Test	On Off	Activate the Pass/Fail test Deactivate the Pass/Fail function
Source	CH1 CH2	Select the Source channel for the Pass/Fail test.
Operate	▶ ■	Press to run the Pass/Fail test. Press to stop the Pass/Fail test.
Msg Display	On Off	Activate the display of the number of passes rated Pass or Fail. Deactivate the display of information about the number of Pass/Fail results.
Next page	Page 1/2	Press this key to access the second page of the Pass/Fail menu.



Functional description
VIII - UTILITY 3/4 (cont'd)

Pass/Fail menu page 2

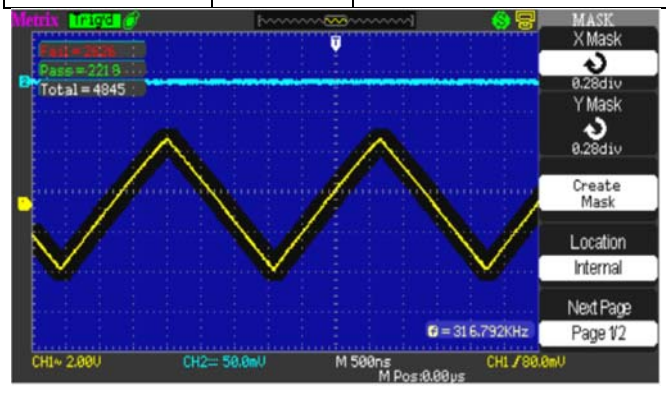
Option	Values	Instruction
Output	Pass Fail	Stop when a Pass condition is detected. Stop when a Fail condition is detected.
Stop On Output	On Off	Stop the test on a departure from the pattern. Continue the test after a departure from the pattern.
Mask Setting		Access the "Mask configuration" menu.
Return		Return to the main "Pass/Fail" menu.
Next page	Page 2/2	Return to the first page of the Pass/Fail menu.



Configuration of the Pass/Fail mask

Configuration of the Pass/Fail mask page 1

Option	Values	Instruction
Mask in X ↻ **xdiv**		Turn the "adjust" knob to adjust the allowed horizontal range of variation of the signal. <0.04div-4.00div>
Mask in Y ↻ **ydiv**		Turn the "adjust" knob to adjust the allowed vertical range of variation of the signal. <0.04div-4.00div>
Create Mask		Generate the Pass/Fail test mask.
Location	Internal External	Choose the mask storage location.
Next page	Page 1/2	Access the second page of the "Mask Configuration" menu.

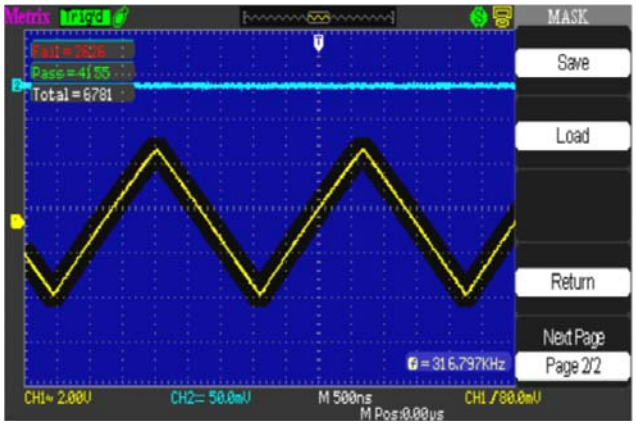


Functional description

VIII - UTILITY system 3/4 (cont'd)

Pass/Fail mask configuration page 2

Option	Values	Instruction
Save		Store the mask configuration.
Load		Restore the mask configuration.
Return		Return to the main mask configuration menu.
Last page	Page 2/2	Return to the first page of the "Mask Configuration" menu.



Run the Pass/Fail test

Steps

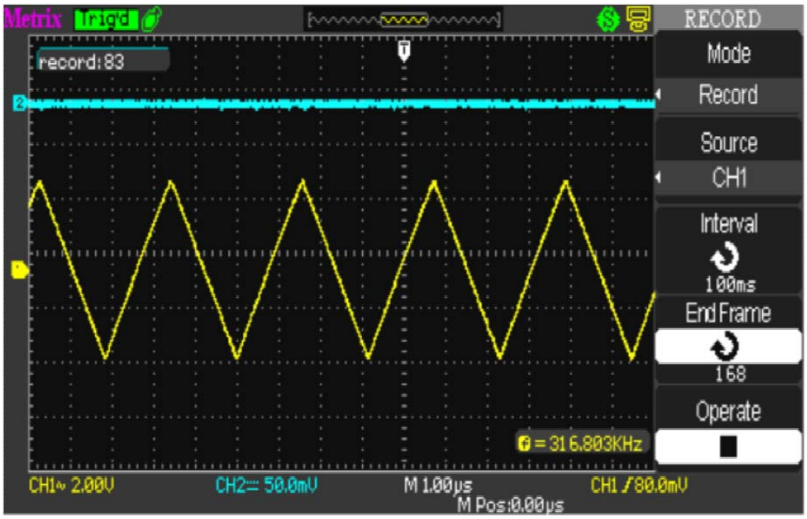
1. Press the UTILITY key to access the "Utility" menu.
2. Press the "Page after 1/4" key.
3. Press the "Page after 2/4" key to access the third page of the "Utility" menu.
4. Press the "Pass/Fail" key to access the "Pass/Fail" menu.
5. Press the "Activate test" key and choose "On"
6. Press the "Source" key to choose the source channel for the test.
7. Press the "Page after 1/2" key to access the second page of the "Utility" menu.
8. Press the "Mask Configuration" key to access the first page of the "Mask" menu.
9. Press the "X Mask" key and turn the "Adjust" knob to adjust the horizontal value of the allowed range.
10. Press the "Y Mask" key and turn the "Adjust" knob to adjust the vertical value of the allowed range.
11. Press the "Create mask" key to create the mask. You can also access the next page of the "Mask" menu to restore the saved mask.
12. Go to the second page of the "Pass/Fail" menu. Press the "Stop On" key to configure the option to Stop on Pass or Fail.
13. Go to the first page of the "Pass/Fail" menu. Press the "Operate" key ▶ to run the pass/fail test.

Functional description
VIII - UTILITY 4/4

Record mode

The Record mode is used to record up to 2500 frames of 2.5 kpoints with time base ranges from 50ms/div to 2.5ns/div. The Record mode is the complement of the Recorder mode, which for its part is suited to slow signals and operates with time base ranges from of 100ms/div to 50s/div.
The Record mode is used to record the signals of channel CH1 or CH2 with a maximum record length of 2500 points. Recording can for example be triggered by an output of the pass/fail test signal, which makes this function very useful for recording slow signals for long periods without having to observe them continuously.
Signal recorder: Record signals at the defined rate.

Option	Values	Instruction
Mode	1. Record 2. Replay 3. Off	Select Recorder mode Select replay mode. Exit from the signal recorder mode.
Source	CH1 CH2 Pass/Fail-OUT	Choose the source channel for recording.
Interval	↻	Set the time interval between frames.
End frame	↻	Maximum number of frames
Use	● (Record) ■ (Stop)	Press to start recording. Press to stop recording.



Steps

1. Press the UTILITY key to access the "Utility" menu.
2. Press the "Next Page" key to access the third page of the "Utility" menu.
3. Press the "Record" key to open the "RECORD" menu.
4. Press the "Mode" key and choose "Record".
5. Press the "Source" key to choose the input signal channel.
6. Choose "Interval" and turn the "Adjust" knob to adjust the time interval between two successive frames.
7. Choose "End frame" and turn the "Adjust" knob to adjust the maximum number of frames to be recorded.
8. Press "●" of the "Use" option to record the signal.

Reading: Read the current record, or read saved records.

Functional description

VIII - UTILITY system 4/4 (cont'd)

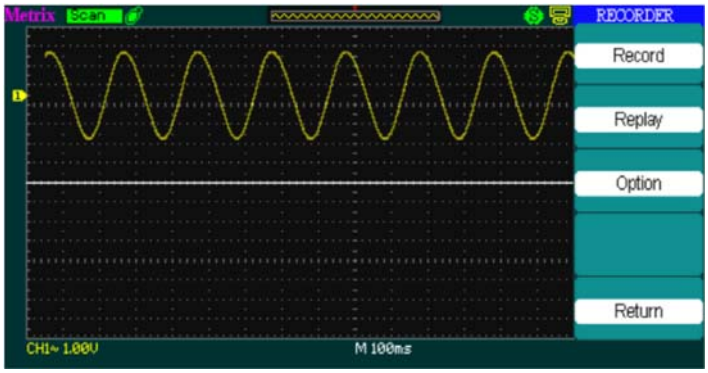
Recorder

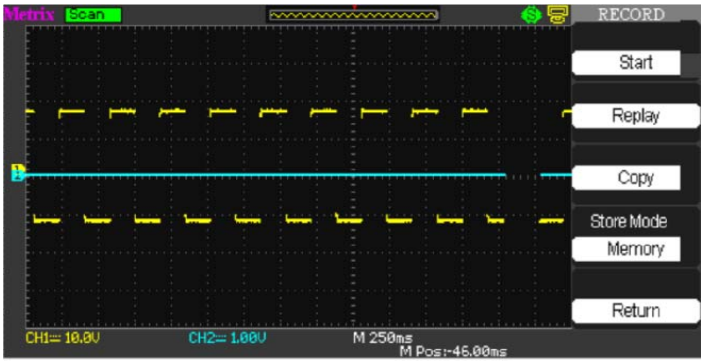
The Recorder mode is the complement of the Record mode, suited to slow signals, with time base ranges from 100ms/div to 50s/div

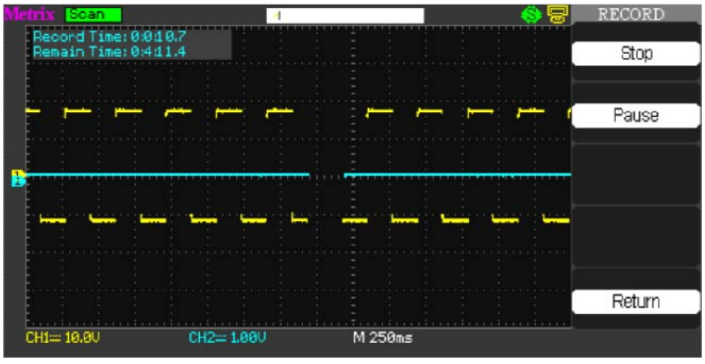
Recorder allows the continuous recording of signals in real time. The oscilloscope can therefore record the signals and read them back to display them again on the screen (Replay). It is equivalent to a Scan mode slow signal recorder (ROLL) with time base ranges from 100ms/div to 50s/div. The Recorder has a maximum internal recording memory depth of 6M or 2500 2.5-kpoint frames.

Signal recorder menu

Option	Description
1. Record	Capture the signal continuously
2. Replay	Read and display the recorded signal (the display scrolls from right to left)
3. Option	Parameterize the recorder.
Return	Exit from the record function.





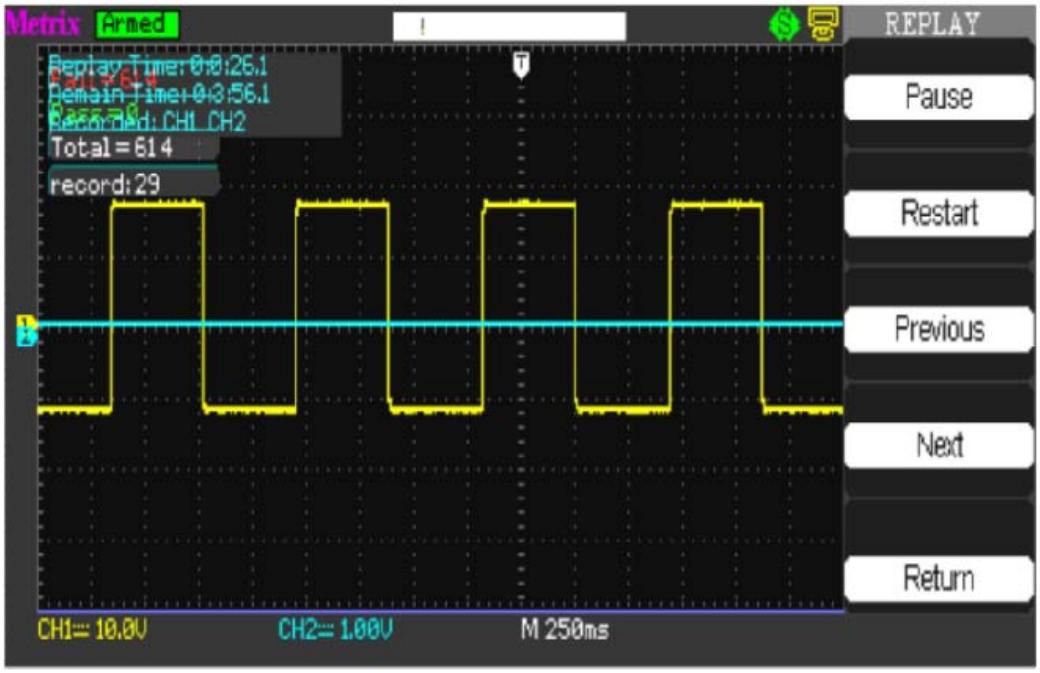


Functional description

VIII - UTILITY system 4/4 (cont'd)

Replay menu Restore a recorded signal

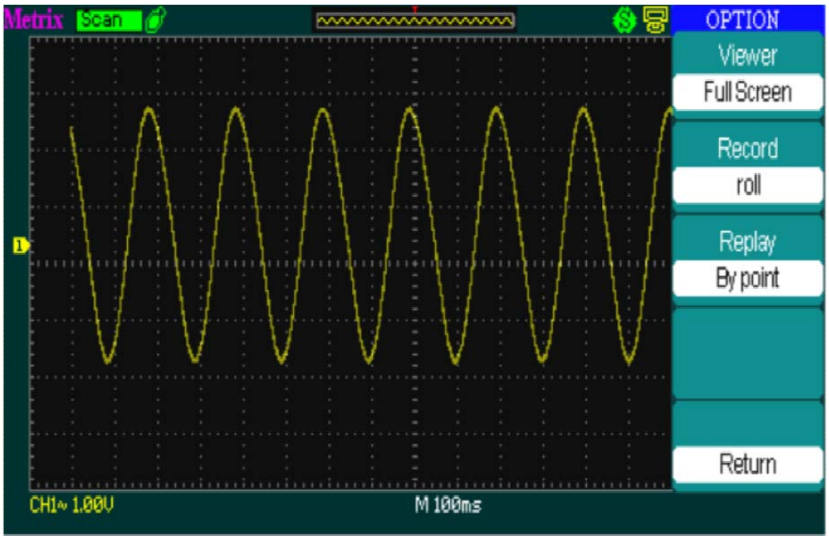
Option	Description
Restart	Start the reading and display of the recorded frames
Previous	Read the previous frame of the recording
Next	Advance to the next frame of the recording
Return	Exit from the Replay mode



Functional description
VIII - UTILITY 4/4 (cont'd)

Parameterizing the Recorder

Option	Values	Description
Viewer	Full screen Half screen	Recording and reading of channels in full-screen mode Recording and reading of channels in half-screen mode CH1 is displayed at the top of the screen, CH2 at the bottom of the screen
Record	Continuous Single	The recorder captures the signal in the channel continuously; the most recent part of the signal overwrites the oldest part. The recorder stops when its memory reaches 6M.
Replay	By point By frame	During replay, the signal is refreshed from left to right on the screen During replay, the signal on the screen will be completely refreshed according to the capture time of each frame
Return		exit from the recorder parameterizing interface



Steps

1. Press the UTILITY key to access the "Utility" menu.
2. Press the "Next Page" key to access the fourth page of the "Utility" menu.
3. Press the "Record" key to access manual recording.
4. Press the "Option" key to select the parameter
5. Press the "Record" button to access the Record menu and then press the "Start" key to start the recording of the signal
6. When the recording of the signal is over, press the "Replay" key to display the recorded signal.

Remote control

Remote control

There are two remote control methods:

User-programmable

The user can control the oscilloscope using Standard Commands for Programmable Instruments (SCPI). See the Programming Guide for more information about the commands and the programming.
The user can control the oscilloscope remotely using EasyScopeX or SX-DOX PC software. National Instruments Corporation's "Measurement & Automation Explorer" software can also be used to control the oscilloscope.

Using the PC software provided by METRIX

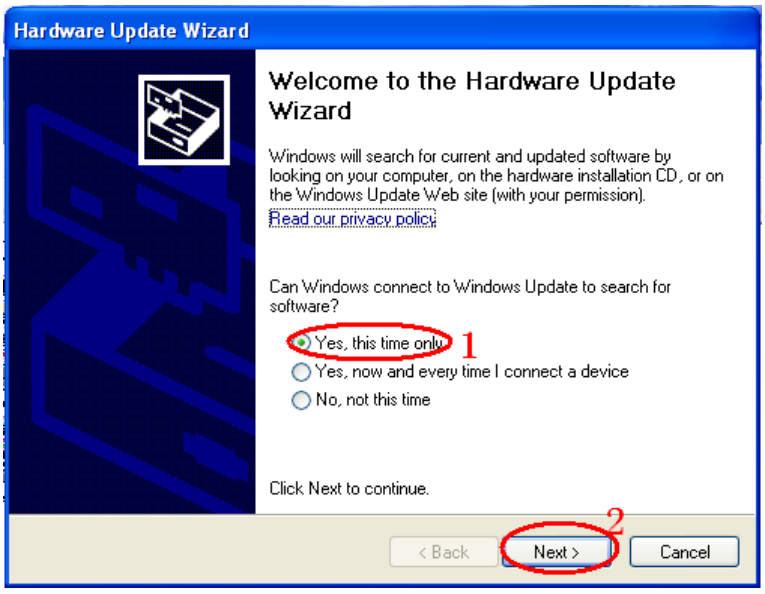
The oscilloscope can communicate with a PC via its USB device port. This part explains how to use EasyScopeX to control an oscilloscope remotely via the USB interface.

Control via USB

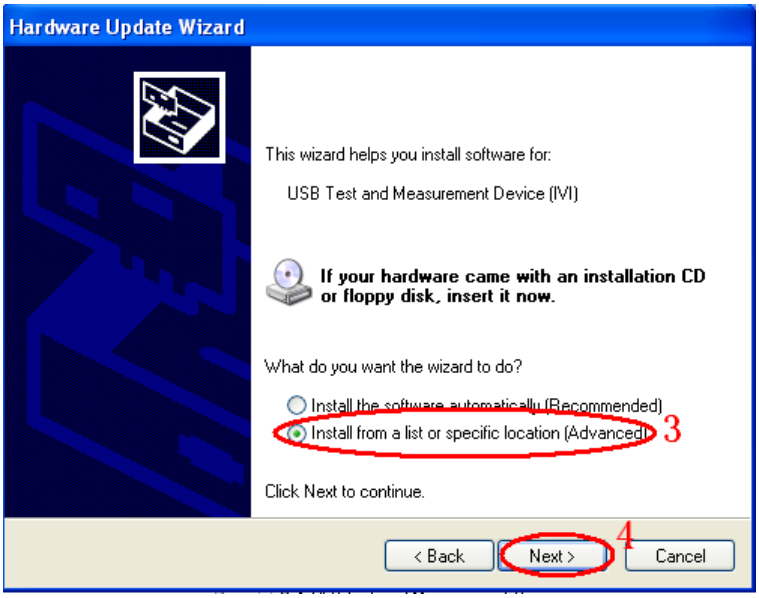
Use a USB cable to connect the oscilloscope (USB device port) to a PC (USB host port) running EasyScopeX software.

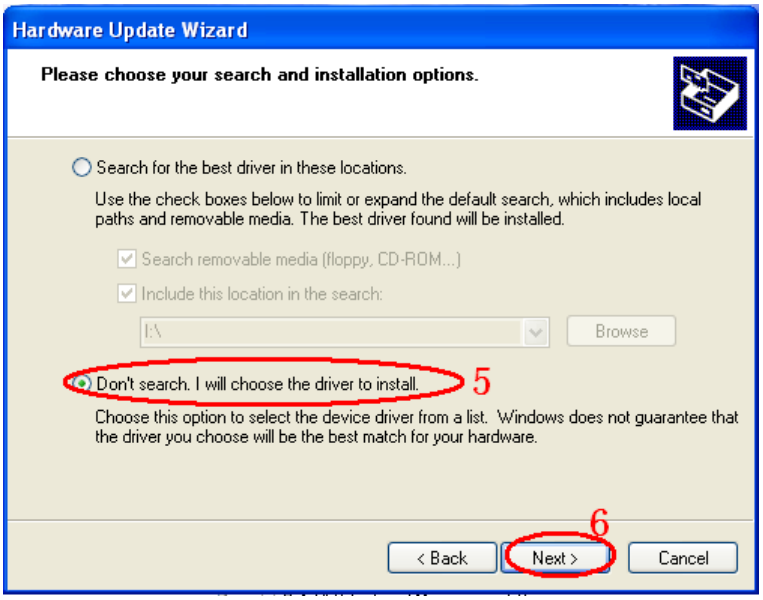
Installing the USB device

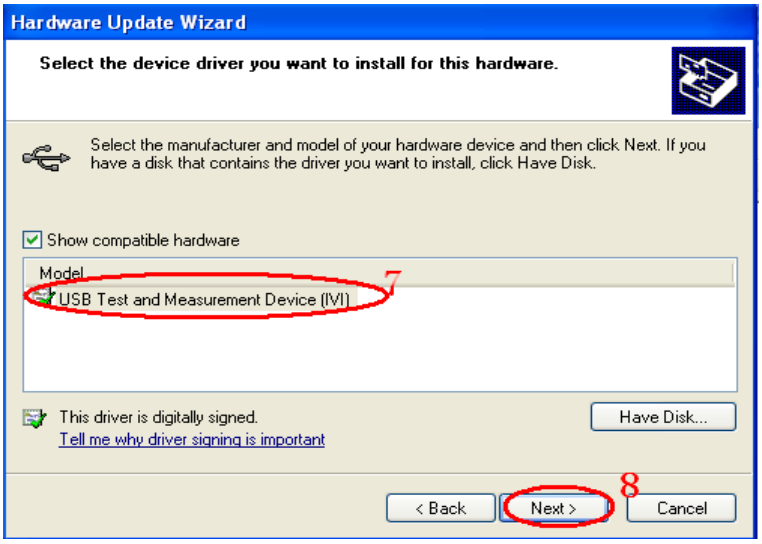
Set the "Back USB" interface on the oscilloscope to USBTMC. If you have installed the EasyScopeX or N.I. software, a dialogue box will be displayed on the PC the first time you connect the oscilloscope. Install the "USB Test and Measurement Device" program as explained on screen. The steps are as follows:



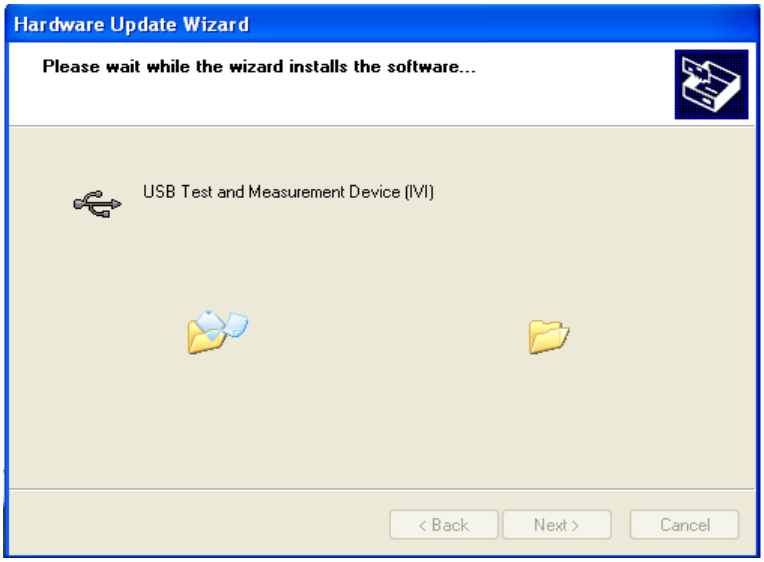
Remote control (cont'd)

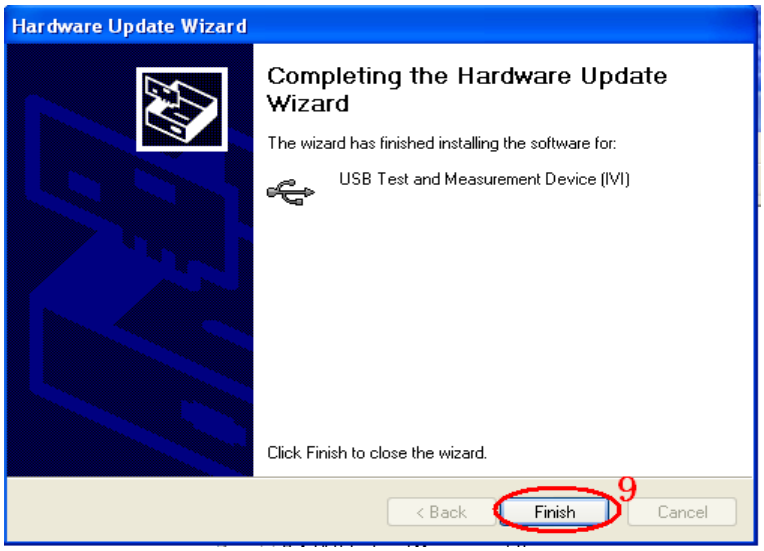






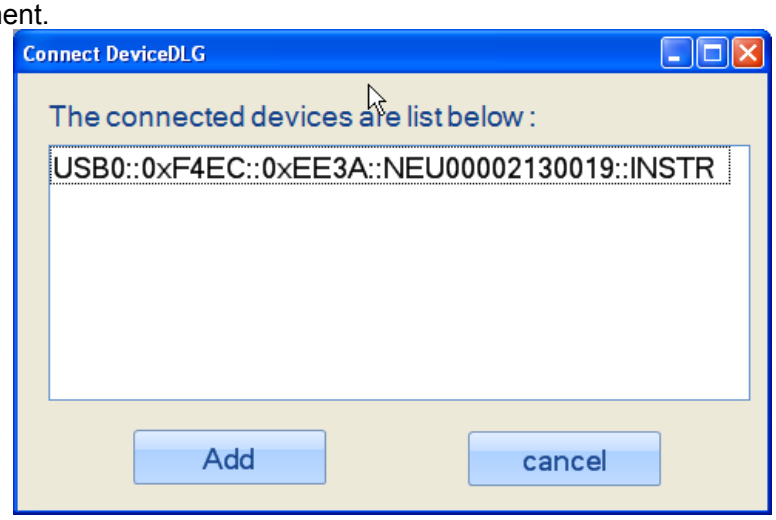
Remote control (cont'd)





Search for the device

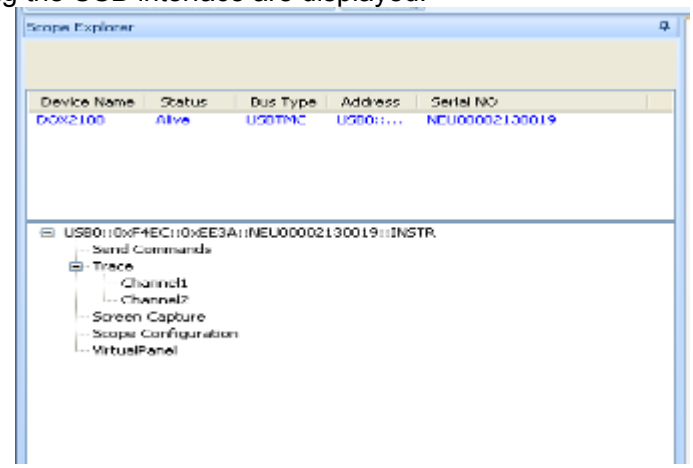
Start the EasyScopeX software, click on "add device" to start the search; the following dialogue box will be displayed. Then click on "Add" to open the instrument.



Remote control (cont'd)

Check the instrument

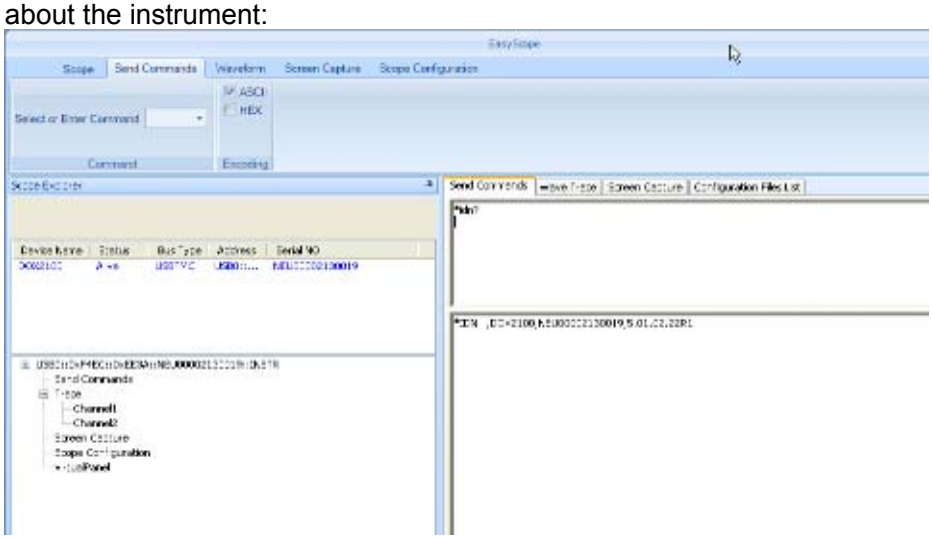
The information concerning the device found is displayed. The following image is an example. The serial number of the device and information concerning the USB interface are displayed.



Test communication

• Send Command

Click on "Send Command" and from the keypad enter the SCPI command "*IDN?"; press the "Enter" key to send the command. The EasyScopeX software will send the command, accept the data sent by the instrument in response to the SCPI command, and, in our case, display the information about the instrument:



• Send Command sends SCPI commands to the oscilloscope

• WaveTrace recovers traces (sets of points acquired)

• Screen Capture captures screens

• Scope Configuration

For more details, we invite you to look up the help file of the EasyScopeX software.

Messages / Help

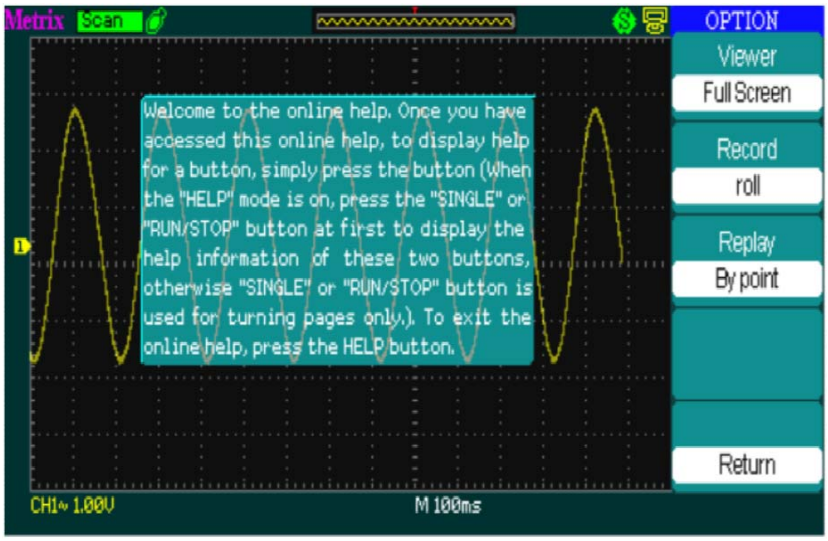
Embedded Help function

The oscilloscope has a help function in English ("GB") that you can use when you need help working with the device.

Press the "HELP" key to access the embedded help, then press the keys for which you want to view the help information.

Note: To view the help for the SINGLE or RUN/STOP key, you must press the keys immediately after pressing the HELP key, because otherwise, if the help text of a key is longer than one page, the SINGLE key is used to view the next help page, and the RUN/STOP key the previous help page.

All of the sub-menus of each main menu have their own help pages.
Note: If you want to view the help pages of sub-menus several pages long, you must press the "HELP" button to exit from the on-line help, go to the next page of the sub-menu, then press the "HELP" button again and the sub-menu option button to view the corresponding help page.



Messages / Help (cont'd)

Messages

- **Trig level at limit!**: Indicates that the Trigger Level, adjustable by the Trig level knob, has reached a limit.
- **Horizon position at limit!**: Indicates that the horizontal position, adjustable by the horizontal position knob, has reached a limit.
- **Volts/Div at limit!**: Indicates that the vertical range has already reached the minimum of 2mV/div or the maximum of 10V/div.
- **Volts position at limit!**: Indicates that the vertical position has reached a limit.
- **Sec/Div at limit!**: Indicates that the time base range, S/div, has reached a limit.
- **Hold-Off time at limit!**: Indicates that the Hold-Off time, adjustable by the adjust knob, has reached a limit
- **Function isn't useable!**: Indicates that the function is not compatible with this operating mode.
- **No signal!**: This message is displayed upon completion of the Autoset when there is no signal.
- **Adjust at limit!**: This message is displayed when the pulse width adjustment (by the adjust knob) has reached the minimum of 20.0ns or the maximum of 10.0s.
- **Location Empty!**: This message is displayed if you press the restore key and no Trace or Configuration is stored at this location.
- **USB Flash Drive Plug In!**: This message is displayed when you insert a USB Flash Drive in the USB host port.
- **USB Flash Drive Pull Out!**: This message is displayed when you disconnect the USB flash memory.
- **Store Data Success!**: This message indicates a "Successful Save" of the configuration, of the Trace, or of the image to the internal memory of the oscilloscope or to the USB key.
- **Read Data Success!**: This message indicates a "Successful Recall" of the configuration or of the trace from the internal memory of the oscilloscope or from the USB flash memory.
- **Please set Back USB to printer!**: This message is displayed if the "S/div" knob is pressed with "Printing" configured to "Print Picture" and the "Back USB" option set to "USBTMC".
- **USB Flash Drive isn't connected!:** This message is displayed when the USB key is not inserted in the USB host port and the "Save to" option is set to "File" or the "Printing" option is set to "Save Picture" in the "Save/Restore" menu and you press the "Save" key or the "S/div" knob.
- **Record Wave Success**!: This message is displayed at the end of successful recording of traces.

Messages / Help (cont'd)

Diagnostics

Steps ***1. After power up ("ON"), the screen of the oscilloscope displays nothing:***

- Check the connection of the power cord.
- Make sure that the device is in fact on.
- Then restart the oscilloscope.
- If the oscilloscope still fails to operates, contact METRIX CHAUVIN-ARNOUX division.

2. The oscilloscope displays no trace after a signal is injected on the inputs:

(1) Check the lead of the probe.
(2) Check the connecting cable.
(3) Check the probe with Probe Output Adjust.
(4) Check whether the unit tested generates the signal or not.
(5) Inject the signal again.

3. The voltage displayed is 10 times as large as/smaller than the true voltage:

Check that **the probe factor of the channel** matches the attenuation factor of the probe

4. The signal displayed is unstable:

(1) Check **that the triggering source chosen** corresponds to the channel displayed.
(2) Check that **the triggering mode chosen** is suited to the type of signal observed (for example, for a video signal, use the "Video" trigger mode).
(3) Try changing the trigger "coupling" to "Low-pass Filter" or "High-pass Filter", to avoid interference with **the triggering** by **high- or low-frequency noise.**

5. You press the "RUN/STOP" key but nothing is displayed.

Check whether the triggering mode is "normal" or "single", and check that the triggering level is between the max and min peaks of the signal. If it is, select "SET TO 50%", otherwise set the trigger to "Auto" or use the "Autoset" button to set it to automatic.

6. The signal is refreshed slowly when acquisition is in "Averaging" or if the "Remanence time" is too long.

This is normal with these parameters

7. The signal is displayed in steps

(1) This phenomenon is normal. If the time base is too slow, turn the adjust knob in order to increase the horizontal resolution and improve the display.
(2) If the type of display is "Vectors", change it to "Dots" to improve the display.

Technical characteristics

The oscilloscope must have operated continuously for thirty minutes at the service temperature. You must run the Auto-calibration from the "Utility" menu if the service temperature varies by more than 5°C. The oscilloscope must be within the factory calibration range. All specifications are guaranteed except those marked "typical"

Inputs	DOX2025	DOX2040	DOX2100
Input coupling	AC, DC, GND		
Input impedance	1 MΩ ±2% || 18 Pf ±3 pF		
Max. voltage at input	300 V (DC+AC Pk) 300 Vmax CAT II		
Ch to Ch insulation (both channels with the same V/div configuration)	>100:1 to 10MHz	>100:1 to 25MHz	>100:1 to 50MHz
Probe attenuator	1X, 10X		
Probe attenuator configuration factors	1X, 5X, 10X, 50X, 100X, 200X, 500X, 1000X		

Vertical system	DOX2025	DOX2040	DOX2100
Vertical sensitivity	2mV/div. -10 V/div. (order 1-2-5)		
Range of variation of the vertical position	2mV - 200mV: ±1.6V 206mV - 10V: ±40V		
Vertical resolution	8 bit		
Number of Channels	2		
Analog bandwidth	25MHz	40MHz	100MHz
Single bandwidth	25MHz	40MHz	100MHz
Flatness of the Bandwidth on the BNC input	DC-10% of the nominal BW: ±1dB 10%-50% of the nominal BW: ±2dB 50%-100% of the nominal BW: +2dB/-3dB		
Low frequency limit to -3dB with AC coupling	≤10Hz		
Noise: Pk-Pk for a 3K recording	≤0.6 div. for a mean of 10 Pk-Pk readings, 2mV to 10V/div ranges ≤0.7 div. for a mean of 10 Pk-Pk readings, with fine adjustment of the range		
SFDR with the harmonics (measurement by FFT)	≥35dB		
Accuracy of DC gain for a signal of amplitude 6 div.	±4.0%: 5mV/div. to 10 V/div. in fixed gain ranges ±5.0%: 2mV/div. variable gain ranges		
Accuracy of the DC measurements: all ranges: ≤100mV/div.	±[3% * (|measurement| +|offset|) +1% * |offset| +0.2 div. +2mV]		
Accuracy of the DC measurements: all ranges: > 100mV/div.	±[3% * (|measurement| +|offset|) +1% * |offset| +0,2 div. +100mV]		
Rise time	<14ns	<8.0ns	<3.5ns
Overshoot (Typical) (with pulse tr = 500ps)	<10% with probe or BNC input with 50 Ohm through termination		
Skew between channels (same V/div range)	<10ns	<4ns	<1ns
Math operation	+, - , *, /, FFT		
FFT	Type of Window: Hanning, Hamming, Blackman, Rectangular		
	Number of sampling points: 1024		
Bandwidth	18MHz ±40% *(Note: The Bandwidth is limited to less than 10MHz when a probe is used at X1)*		

Technical characteristics (cont'd)

Horizontal system	DOX2025	DOX2040	DOX2100
Real time sampling frequency	**Single Channel**: 500MSa/s **Two Channels**: 250MSa/s (when the time base is faster than 250ns/div.)	**Single Channel:** 1GSa/s **Two Channels**: 500MSa/s (when the time base is faster than 100ns/div.)	**Single Channel**: 1GSa/s **Two Channels**: 500MSa/s (when the time base is faster than 100ns/div.)
Equivalent time sampling rate	10 GSa/s max.	50 GSa/s max.	50GSa/s max.
Display of the measurements	MAIN, WINDOW, WINDOW ZOOM, ROLL, X-Y		
Accuracy of the time base	±100 ppm measurement of a 1ms time interval		
Horizontal ranges	25ns/div. - 50s/div.	2,5ns/div. - 50s/div.	2,5ns/div. - 50s/div.
Scan mode	Scan: 100ms/div. - 50s/div. (1-2-5 staging)		

Memory depth	Channel mode	Sampling rate	Normal Memory (*)	Long Memory
	Single Channel	1Gsa/s	40kpts	Not supported
	Single Channel	500MSa/s or less	20kpts	2Mpts
	Two Channels	500MSa/s or less	20kpts	1Mpts
	(*) DOX2025: Normal Memory 32kpts			

Trigger system	
Types of triggering	Edge, Pulse, Amplitude, Video, Slope, Alternative
Source of triggering	CH1, CH2, EXT, EXT/5, AC Line
Modes of Operation of the triggering	Auto, Normal, Single Scan mode (Roll) for ranges from 100ms/div. to 50s/div.
Trigger coupling	AC, DC, LF rej, HF rej
Hold-Off	10ns – 1.5s
Range of variation of the triggering level	CH1, CH2: ±6 divisions from the centre of the screen EXT: ±1.2V EXT/5: ±6V
Displacement of the trigger	Pre-trigger: (Memory depth/(2*sampling)) Deferred trigger: 260 div.
Accuracy of the triggering level (Typical) applicable to signals of which the rise and fall times are > 20ns	Internal: ±(0.2 div. × V/div.)(less than ±4 div. from the centre of the screen) EXT: ±(6% of the value +40mV) EXT/5: ±(6% of the value +200mV)
Triggering sensitivity	2mV to 10V/div ranges (1-2-5 staging): 1 div.: DC - 10MHz 1.5 divisions: 10MHz - max. of BW
	EXT: 200mVpp DC - 10MHz 300mVpp 10MHz - max. BP
	EXT/5: 1Vpp DC - 10MHz 1.5Vpp 10MHz - max. BP
Pulse triggering	(>, <, =) Positive pulse width, (>, <, =) Negative pulse width
	Range of pulse widths 20ns - 10s
Video triggering	Signal formats supported: PAL/SECAM, NTSC
	Trigger condition: odd frame, even frame, all lines, line no.
Slope triggering	(>, <, =) Positive slope, (>, <, =) Negative slope
	Time: 20ns-10s
Alternate triggering	CH1 trigger type: Edge, Pulse, Amplitude, Video, Slope
	CH2 trigger type: Edge, Pulse, Amplitude, Video, Slope

Technical characteristics (cont'd)

X-Y mode	
X-Y inputs	CH1 (X)/CH2 (Y)
Phase error	±3 degrees
Range of sampling rates in XY mode	XY mode sampling rate: 12,5kSa/s ~ 250MSa/s (MemDepth: Normal) 500,5kSa/s ~ 250MSa/s (MemDepth: LongMem)

Equipment frequency counter	
Reading resolution	6 Bytes
Accuracy	±0.01%
Range of operating frequencies of the meter	With DC coupling, the range of operating frequencies of the meter is from 10Hz to the max frequency of the bandwidth.
Type of signal	All triggering source signals that generate triggering events (except: "pulse width" trigger and "video" trigger).

Control panel function	
Auto Set	Self-adjustment of the Vertical and Horizontal systems and of the trigger
Backup/Restoration	Internal backup capacity: 2 REFerences, 20 configurations, 20 Traces. Possibility of saving traces and configurations to external USB flash memory.

Measurement system	
Automatic measurements (32 types)	Vpp, Vmax, Vmin, Vamp, Vtop, Vbase, Vavg, Mean, Crms, Vrms, ROVShoot, FOVShoot, RPREShoot, FPREShoot, Rise time, Fall time, Freq, Period, +Wid, -Wid, +Dut, -Dut, BWid, Phase, FRR, FRF, FFR, FFF, LRR, LRF, LFR, LFF
Measurements by cursor	Modes: Manual, Track, and Auto

General characteristics

Display system	
Display unit	**LCD, Colour, TFT, 7 inches (177.8mm diagonal)**
Resolution	480 horizontal pixels by 234 vertical pixels
Colours	64K colours
Display contrast	150:1 (typical)
Backlighting intensity	300nit (typical)
Display of Traces	8 x 18 div.
Trace display modes	Dots, Vector
Remanence	None, 1 sec, 2 sec, 5 sec, Infinite
Display of menu	2 sec, 5 sec, 10 sec, 20 sec, Infinite
Screen saver	None, 1mn, 2mn, 5mn, 10mn, 15mn, 30mn, 1h, 2h, 5h
Skin	Classical, Modern, Traditional, Succinct
Signal interpolation	Sin(x) , x
Colour model	Normal, reversed
Language	English, French, German, Spanish, Italian

Environment	
Temperature	Reference temperature 18°C to 28°C Service temperature: 0°C to +40°C Storage temperature: -20°C to +60°C Indoor use
Cooling	By fan
Humidity	In service: < 80% RH up to 31°C Storage: <80% RH up to 31°C
Altitude	In service: <2,000m Storage: <12.000m

Mains power	
Mains voltage	Nominal range in service 100-240 VAC, Auto-selection
Frequency	50Hz to 400Hz
Consumption	50W max.
Fuse	1.25A/250V 5 x 20mm
Power cord	Removable

Safety	**Compliant with standard NF EN 61010-1**
Insulation	Class 1
Pollution index	2
Power supply overvoltage category	300V CAT-II
Input overvoltage category	300V CAT-II

Technical characteristics (cont'd)

CEM	
	This device is designed in conformity with the EMC standards in force, and its compatibility has been tested per standard NF EN 61326-1.

European CE directives	
	The CE marking indicates conformity with the European "Low voltage", "EMC", "WEEE" and "RoHS" directives.

Mechanical	
Dimensions	Length 323.1mm Width 135.6mm Height 157mm
Weight	2.385kg
Materials	ABS, VO (self-extinguishing)
Ingress protection	IP20

Packaging	
Dimensions	389 x 228 x 265mm

Accessories	
included	• User guide on CD ROM • EasyScopeX PC software • Getting started guide • Safety data sheet • Power cord • USB A/B cable • 2 probes
options	• Differential probe - single MX9030 - double MTX 1032 (consult us)

Appendix: Default Setup

Menu or system	Options, knobs or buttons	Default setup
CH1, CH2	Coupling	DC
	BW limit	Off
	Volts/div	Coarse
	Probe	1X
	Invert	Off
	Filter	Off
	Volts/div	1.00V
MATH	Operation	CH1+CH2
	CH1 Invert	Off
	CH2 Invert	Off
	FFT operation:	
	Source	CH1
	Window	Hanning
	FFT Zoom	1X
	Scale	dBVrms
	Display	Split
HORIZONTAL	Window	Main
	Position	0.00μs
	Sec/div	500μs
	Window Zone	50.0μs
	Trigger knob	level
CURSOR	Type	Off
	Source	CH1
	Horizontal (voltage)	+/-3.2divs
	Vertical (time)	+/-5divs
MEASURE	Source	CH1
	Type	average
ACQUIRE	three mode options	Sampling
	Averages	16
	Sampling mode	Real Time
DISPLAY	Type	Vectors
	Persist	off
	Grid	
	Intensity	60%
	Brightness	40%
	Format	YT
	Menu Display	infinite

SAVE/RECALL	Type	Setups
	Save To	Device
	Setup	No.1
REF UTILITY	REFA/REFB	REFA
	Source	CH1
	REFA	off
	REFB	off
	Sound	on
	Counter	On
	Back USB	Computer
	Pass/Fail	off
	Record	off
	RS-232 Baud	9600
TRIGGER (edge)	Type	edge
	Source	CH1
	Slope	Rising
	Mode	Auto
	Coupling	DC
	LEVEL	0.00V
TRIGGER (pulse)	Type	pulse
	Source	CH1
	When	=
	Set Pulse Width	1.00ms
	Mode	Auto
	Coupling	DC
TRIGGER (Video)	Type	Video
	Source	CH1
	Polarity	Normal
	Sync	All Lines
	Standard	NTSC
	Mode	Auto
TRIGGER (Slope)	Type	Slope
	Source	CH1
	Time	1.00ms
	Mode	Auto
TRIGGER (Alternative)	Type	Alternative
	Source	CH1
	Mode	Edge
	Coupling	DC