

ScopiX IV OX 9062 OX 9102 OX 9104 OX 9304



# **DIGITAL OSCILLOSCOPES**

- 60MHz, 2 <u>isolated</u> channels
- 100MHz, 2 isolated channels
- 100MHz, 4 <u>isolated</u> channels
- 300MHz, 4 isolated channels





Thank you for purchasing a *ScopiX IV* digital oscilloscope with <u>isolated</u> channels.

For best results from your instrument:

- Read this user manual carefully
- Observe the precautions for use

	WARNING, risk of <b>DANGER!</b> Refer to these instructions whenever this danger symbol appears.  Indoor use.		In the European Union, this product is subject to selective collection and recycling at end-of-life as waste electric and electronic equipment under directive 2002/96/EC (WEEE): this equipment must not be treated as an ordinary household waste. Spent batteries must not be treated as ordinary household waste. Take them to the appropriate collection point for recycling.
	Instrument entirely protected by double insulation.	士	Earth terminal.
Lancap Lon	Chauvin Arnoux has adopted an Eco-Design approach in designing this instrument. Analysis of the complete lifecycle has enabled us to control and optimize the effects of the product on the environment. In particular this instrument exceeds regulation requirements with respect to recycling and reuse.	<b>\$</b>	Risk of electric shocks: instructions for connecting and disconnecting the inputs. Always connect the probes or adapters to the instrument before connecting them to the measurement points. Always disconnect the probes or leads from the measurement points before disconnecting them from the instrument. These instructions apply
	The product is declared recyclable following an analysis of the life cycle in accordance with standard ISO 14040.		before cleaning the instrument and before opening the cover on the battery compartment and the probe calibration outputs.
CE	The CE marking indicates conformity with European directives, in particular LVD and EMC.	<b>(X</b> )	Application or withdrawal not authorized on conductors carrying dangerous voltages. Type B current sensor as per EN 61010-2-032.

# **Definition of measurement categories:**

Measurement category IV corresponds to measurements taken at the source of low-voltage installations.

Example: power feeders, counters and protection devices.

Measurement category III corresponds to measurements on building installations.

🔀 Example: distribution panel, circuit-breakers, machines or fixed industrial devices.

Measurement category II corresponds to measurements taken on circuits directly connected to low-voltage installations.

 $\ge$  Example: power supply to electro-domestic devices and portable tools.

# PRECAUTIONS FOR USE

This instrument and its accessories comply with safety standards EN61010-1, EN61010-031, and EN61010-2-032, at voltages that depend on the accessories (600V CAT III with respect to earth whatever the accessory) at an altitude of less than 6500' (2,000m), indoors, with a degree of pollution  $\leq 2$ .

Failure to observe the safety instructions may result in electric shock, fire, explosion, and destruction of the instrument and of the installations.

- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use. Sound knowledge and a keen awareness of electrical hazards are essential when using this instrument.
- If you use this instrument other than as specified, the protection it provides may be compromised, thereby endangering you.
- Do not use your instrument on networks of which the voltage or category exceeds those stated.
- Do not use the instrument if it seems to be damaged, incomplete, or poorly close.
- Before each use, check the condition of the insulation on the leads, housing, and accessories. Any item of which the insulation is deteriorated (even partially) must be set aside for repair or scrapping.
- Use only the leads and accessories supplied. The use of leads (or accessories) of a lower voltage rating or category limits the use of the combined instrument + leads (or accessories) to the lowest category and service voltage.
- Use personal protection equipment systematically.
- When handling the leads, test probes, and crocodile clips, keep your fingers behind the physical guard.
- All troubleshooting and metrological checks must be done by competent, accredited personnel.

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# 1. GENERAL

# 1.1. Introduction

Your oscilloscope belongs to the ScopiX line of instruments; this user manual describes the operation of an OX 9304:

OX 9062 (Cat #2150.31)	digital	color	2 <u>isolated</u> channels	60MHz	scale 2.5GS/s
<b>OX 9102</b> (Cat #2150.32)	digital	color	2 <u>isolated</u> channels	100MHz	scale 2.5GS/s
<b>OX 9104</b> (Cat #2150.33)	digital	color	4 <u>isolated</u> channels	100MHz	scale 2.5GS/s
OX 9304 (Cat #2150.34)	digital	color	4 <u>isolated</u> channels	300MHz	scale 2.5GS/s

These instruments provide the following functional modes:

- oscilloscope
- multimeter
- logger
- harmonic analyzer

The interface is user-friendly: simple, compact, and practical. The **Probix** accessories ensure safety and speed, because they are recognized automatically when connected. The means of communication and storage are optimized.

# 1.2. Delivery condition

# 1.2.1. Unpacking, re-packing

The mechanical and electrical condition of the instrument was checked before shipment. When you receive it, perform a quick check for damage that may have occurred in transit. Should there be any, contact our sales department immediately and inform the carrier. For reshipping, we suggest using the original packaging.

# 1.2.2. Supply

Reference (Cat #)	Designation	OX 9062 2x60MHz (2150.31)	OX 9102 2x100MHz (2150.32)	<b>OX 9104</b> 4x100MHz (2150.33)	OX 9304 4x300MHz (2150.34)
(2152.05)	Set of 2, 5 ft. color-coded leads, test probes & alligator clips	1	1	1	1
	Probe tips 4mm in diameter	1	1	1	1
(2136.80)	10 ft USB cable	1	1	1	1
HX0179*	μSD memory card, HC, 8GB + SD	1	1	1	1
<b>HX0033</b> (2124.76)	PROBIX Banana Plug (4mm) Adapter	1	1	1	1
<b>HX0130</b> (2157.02)	1/10 500MHz probe, 300V CAT III				4
<b>HX0030C</b> (2157.06)	1/10 250MHz probe 600V CAT III	2	2	4	
<b>HX0120</b> (5000.86)	METRIX carrying case	1	1	1	1
<b>HX0121</b> (5000.17)	Set of 5, replacement stylus pen	1	1	1	1
<b>HX0122</b> (5000.87)	Carrying strap	1	1	1	1
(2960.47)	LI-ION 5.8 Ah battery pack	1	1	1	1
(5000.85)	Replacement power adapter PA40W-2 for OX9000 series	1	1	1	1
(5000.22)	Power cord 110V (Razor Plug) for OX III % IV oscilloscopes	1	1	1	1

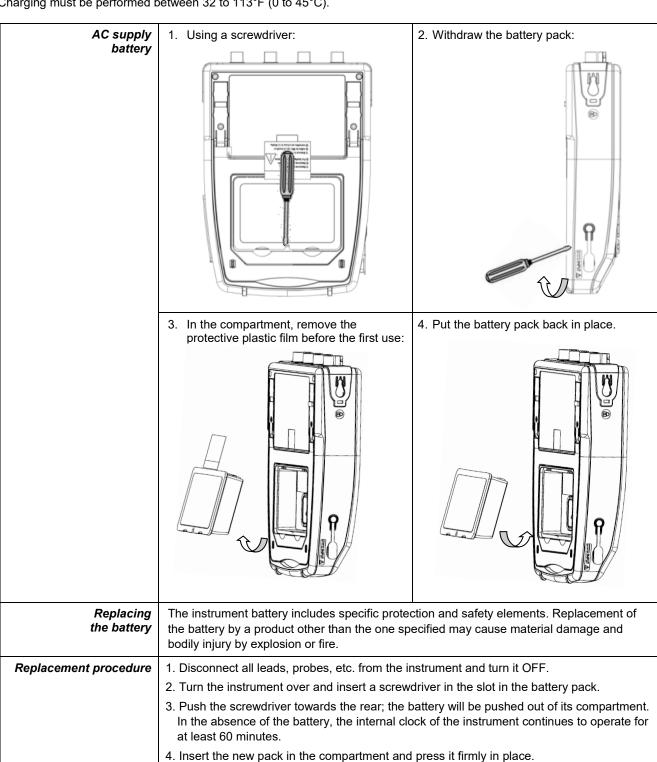
<sup>\*</sup>Replacement  $\mu$ SD cards can be purchased at most retail electronics outlets.

# 1.3. Accessories

			Terminations					esn	nent		
Reference (Cat #)		Probe	BNC adapter	Banana adapter	Current Clamp	Amp FLEX sensor	Mini Amp FLEX SK1-20	SK1-19 sensors	SP10-13 sensors	Range of use	Types of measurement
<b>HX0130</b> (2157.02)	NAME OF THE PROPERTY OF THE PR	<b>✓</b>								300V CAT III 500MHz	Voltage
<b>HX0030C</b> (2124.73)		<b>✓</b>								600V CAT III 250MHz	Voltage
<b>HX0031</b> (2124.74)	□ (		✓							300V CAT III 250MHz	Voltage
<b>HX0032</b> (2124.75)	50Ω		✓							30V 250MHz	Voltage
<b>HX0033</b> (2124.76)	□			✓						300V CAT III	Voltage Resistance Capacitance Diode tester
<b>HX0093</b> (2157.01)				✓						600V CAT III Filter 300Hz	Voltage
<b>HX0034B</b> (2124.77)					<b>✓</b>					0.2-60Arms 1MHz AC/DC	Current
<b>HX0072</b> (2124.91)						✓				5-3000Arms 200kHz AC	Current
<b>HX0073</b> (2124.92)							<b>✓</b>			1-300Arms 3MHz AC	Current
<b>HX0094</b> (2157.03)				✓						4-20mA	%
<b>HX0096</b> (2157.04)	To the same of the		✓							100mV/A	Courant
<b>HX0035B</b> (2124.78)								✓		from 14 to 2282°F (-10° to +1250°C)	Temp. K thermocouple
<b>HX0036</b> (2157.05)									✓	from 212 to 932°F (100 to 500°C)	Temp. Probe PT-100

# 1.4. Battery and power supply

The instrument is powered by a rechargeable 10.8V, Lithium-Ion battery pack. Fully charge the battery before first use. Charging must be performed between 32 to 113°F (0 to 45°C).



with a damaged package.

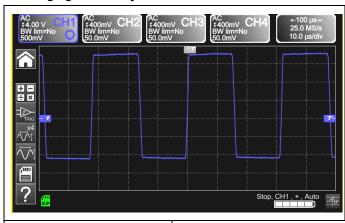
To ensure safety, replace the battery only by the original model. Do not use a battery

#### 1.4.1. LITHIUM-ION battery

# Li-ion battery advantages

- Long life between charges with limited bulk and weight
- No memory effect: you can recharge the battery even if it is not fully discharged without reducing its capacity
- Very low self-discharge
- Rapid recharging
- Protection of the environment, ensured by the absence of polluting materials such as lead and cadmium

# 1.4.2. Charging the battery



Before first use, fully charge the battery. Perform the charging between 32 and 113°F (0 and 45°C). The instrument is designed to operate with the charger connected. The charger includes two elements: a power supply and a charger. The charger simultaneously manages the charging current, the battery voltage, and the battery's internal temperature. This optimizes charging while ensuring long battery life.

Display, in each mode, of the **5 charge levels** of the battery

# Before using instrument, check its charge level



- Charger LED orange and blinking: no battery or battery being charged. The LED
  appears green at the end of charging.
- Battery level indicator displays fewer than three bars: start charging the instrument. Charging typically takes about five hours. After prolonged storage, the battery may be completely discharged. In this case, the first charge may take longer. If the instrument is not likely to be used for more than two months, remove the battery. To maintain its capacity, recharge it every 4 to 6 months.

# To extend battery life:

- Only use the charger provided with your instrument. Using another charger may be dangerous!
- Charge your instrument only between 32 and 113°F (0 and 45°C).
- Observe the conditions of use and storage stated in this user manual.
- If the instrument will not be used for an extended period, remove the battery and store it at room temperature.

# Battery dock External Li-lon charging support P01102130 + label

- The charger is common to several Chauvin Arnoux instruments; the label of the PA40W-2 power supply bears the CHAUVIN ARNOUX logo.
- This PA40W-2 charger is compatible with the ScopiX. A set of labels is provided, for "personalizing" ScopiX accessories.

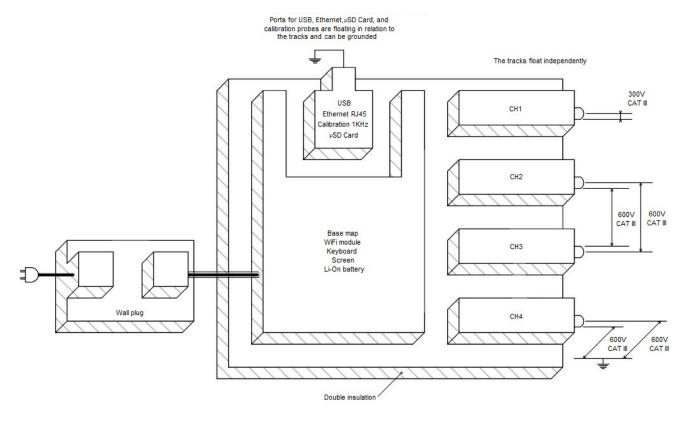


Depleted batteries must not be treated as household wastes. Take them to the appropriate collection point for recycling.

# 1.5. Isolation of the channels

ScopiX has 2 or 4 channels that are isolated from each other and from earth (600V CAT III):

# ScopiX electrical dagram:



# Frame grounds isolation

- Making measurements in systems where the circuits may be at different potentials can be very dangerous, due to short-circuits via the instrument or from the potentials themselves.
- The digital isolation of the grounds uses the same input terminals and acquisition systems for the oscilloscope and multimeter modes, making it possible to change from one instrument to the other without changing the measurement connection.
- Since the 3 channels are isolated from each other, you can safely set up one or two channels with a voltage-to-ground output and the other channel(s) with low current or voltage input.
- Probix accessories provide continuous information about the limits of the instrument (insulation voltage, rated maximum voltage).

# 1.6. Probix accessories

#### 1.6.1. Probix



#### ScopiX uses Probix intelligent probes and sensors,

which are recognized automatically when connected. When a probe or sensor is connected to the oscilloscope, a safety message about the probe/sensor indicates:

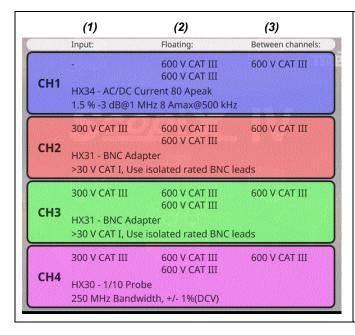
- maximum input voltage as a function of the category
- maximum voltage with respect to earth as a function of the category
- maximum voltage between channels as a function of the category
- sensor/probe type
- elementary specifications
- suitable safety leads

For the safety of both you and the instrument, read and carefully follow this information.

The trace color of the signal measured with a given accessory is set in the menu: "Green" → "chX" → "Probix". An interchangeable elastic or plastic ring is used to associate the color of the probe and the color of the trace. Scaling and units are configured automatically by the *Probix* system, allowing rapid measurements with no risk of error.

#### 1.6.2. Rapid, error-free measurements

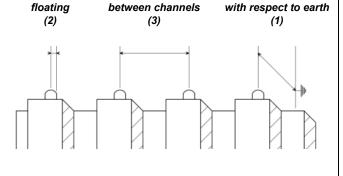
The *Probix* system ensures rapid and error-free setting up of the instrument, which is essential for instruments used for troubleshooting. Standard BNC accessories and banana cables can be connected using the safety adapters provided. An interchangeable plastic ring is used to match the color of the accessory to its channel. The power supply for the sensors is provided by the oscilloscope.



Display of the:

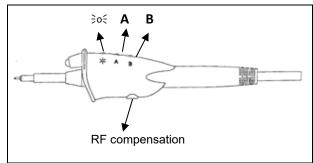
- max. input voltage (1) with respect to earth
- floating voltage (2)
- voltage between channels (3)

according to the installation category, the type or reference of the sensor, and a designation of the main characteristics.



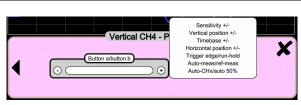
# 1.6.3. Auto scale

Some *Probix* probes have buttons with programmable settings:



The *HX0030* probe has three directly accessible control buttons:

- Button A (programmable) modifies settings for the connected channel
- Button B (programmable) modifies settings for the connected channel
- **Button** >0 < controls the backlighting of the measurement zone



At the time of connection, all preferred settings stored in the accessories (assignments of buttons  $\bf A$  and  $\bf B$  + color) are automatically reactivated. They can be modified by pressing the zone shown in the illustration to the left.

# Configuring channels and managing sensors

The coefficients, scales, and units of the sensors and the configurations of the channels are managed automatically.

# 1.6.4. Safety message

Accessory identification and safety management

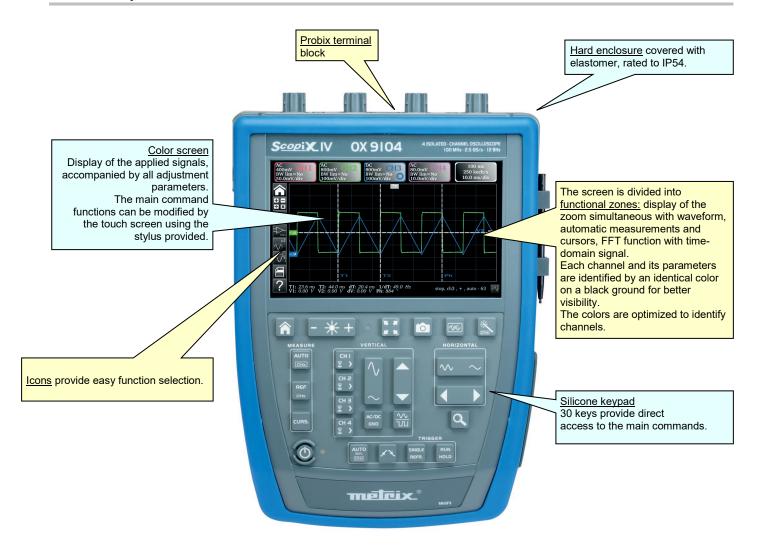
Probes and sensors are automatically recognized when connected. The instrument identifies the probe/sensor and provides information about its characteristics. This helps ensure safety.

# 1.6.5. Power supply to the accessories

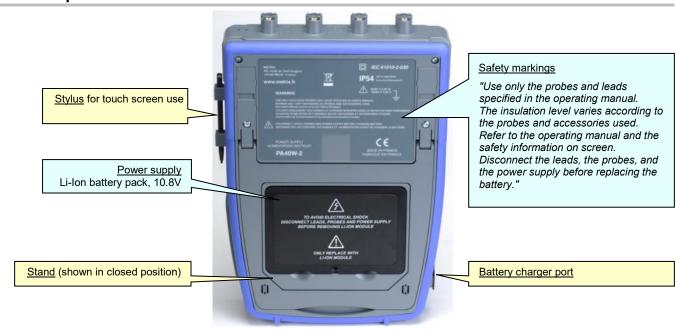
The oscilloscope supplies power to the *Probix* accessories.

# 2. DESCRIPTION

# 2.1. Front panel



# 2.2. Rear panel



# 2.3. Touch screen and stylus

# Display

# ScopiX IV **OX 9104**

# Color screen:

- LCD WVGA
- (800x480)
- 7 inch
- resistive, color, touch operated (can be used with protective gloves)
- Backlighting by LEDs
- Brightness adjustable by the keypad

Light sensor: automatically adjusts brightness to accommodate ambient light

- The screen:
  - touch-operated

  - water- and dust-resistant
  - responds to any form of pressure by any pointing resource, such as a stylus or bare or gloved hand
- Intuitive icons for ease of use.
- Each channel and its parameters are identified by matching color on a black ground for better legibility.
- Colors are optimized to facilitate channel identification.
- Screen is partitioned according to the functions selected:
  - display of the zoom at the same time as the waveform
  - automatic measurements and cursors
  - FFT function and time-domain signal

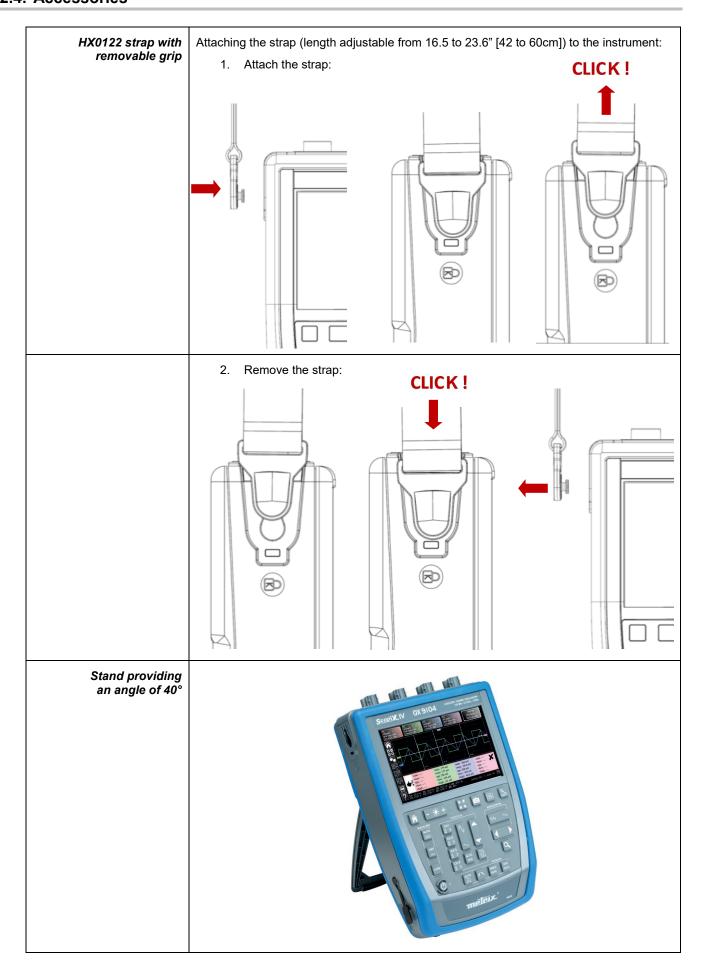
Calibrating the touch screen



The touch screen can be calibrated from the home window by pressing the key.



# 2.4. Accessories



# HX0120 carrying case

The carrying/protection case includes:

- waterproof all-terrain bottom
- 2 handles
- shoulder strap
- removable interior compartment with 3 storage areas:

  - 1 central compartment with plasticized pouch for the *ScopiX*2 side pockets with 2 adjustable self-adhesive separators for storing accessories



# HX0121 stylus



The stylus is stored in the holder on the side of the instrument.



The stylus has an eyelet.

A nylon thread can be passed through it to secure the stylus to the terminal block:

2 holes, with a thread guide between them, are provided for this purpose.

# 2.5. Communication interfaces

# Communication interfaces Communication ports are grouped in a dedicated compartment on the right side of the oscilloscope and protected by a removable cover. **USB** connector **RJ45 Ethernet** μSD card (SD, SDHC, Probe (USB connector calibration Type B, 12Mb/s) (10/100 SDXC) lugs BASE-T) Type B USB (peripheral) for communication with a PC RJ45 Ethernet wired peripheral WiFi (default state is inactive) for communication with a PC or with a network High-capacity µSD for data storage The memory icon appears in one of three colors (refreshed every 5 minutes) to indicate the presence of the SD-Card and the amount space left on the card or the internal memory. The general configuration of the communication interfaces appears when you select the icon. By default, the WiFi link is inactive. Communication type Hard-wired ETHERNET LAN network (manual/automatic configuration) WiFi to communicate with a PC or (in an Android environment) with a tablet or

Type B USB to connect a PC and exchange files or control the instrument

# 3. GETTING STARTED

# 3.1 General principles

- Dialog boxes are displayed at the bottom of the screen. They do not overlap the graph display area, providing an unobstructed view of the user's action on the channel. (Only adjustments related to the displayed graph remain displayed.) However, in some cases a virtual keypad appears to enable entering alphanumeric content; this keypad appears in the center of the screen and covers the graph display area.
- The button at top right closes the currently open dialog box.
- Changes to dialog box settings take effect immediately (no confirmation required).
- Selecting displays the online Help (common to all modes). The Help explains the keys of the keypad: pressing any key of the keypad displays the Help menu of the key pressed, without starting the function associated with the key. The name and icon of the key are displayed above the explanation.

  To exit Help, point the stylus to the Help window.
- The operating mode is multilingual; screen shots in this manual are in English.

# 3.2 ON/OFF key



- Pressing this key turns ON the instrument (orange LED lights).
- A short press switches the instrument to standby (orange LED blinks).
- A long press saves the configuration and turns OFF the instrument.

# 3.3 Screenshot key



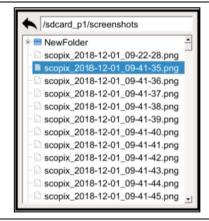
Saves screen shots in the "Screenshot" folder.

Accessible in the following modes:

- oscilloscope
- multimeter
- logger
- harmonic analyzer

Files are named:

SCOPIX\_date\_hour-minute-second.png in the internal memory or on the connected  $\mu SD$  Card.



# 3.4 Full Screen key



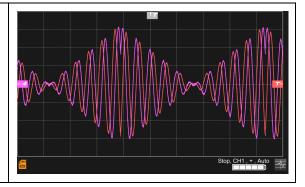
Toggles the display mode between normal and "full screen."

The screen is organized to provide optimal area for displaying graphs.

Blanking:

- menu bar
- parameters of the time base traces
- bargraph

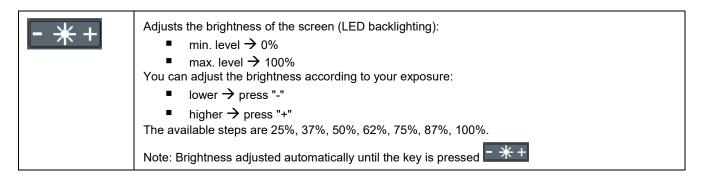
from the home screen, this key allows calibration of the touch screen.



# 3.5 HOME key and icon

Action <sup>™</sup>	Result ₹>	(on the screen) ₹
Press the HOME key on the keypad	Return to the home screen from a measurement session.	ScopiX IV  ScopiX IV  Signature  Signature
	Directly access the instrument's operating modes:  - oscilloscope →  - multimeter →  - LOGGER →  - harmonic analyzer →  Access the internal file management system and the SD-Card (a file contains a saved object).	→ functions  harmonic  logger  NewFolder  screenshots  sdcard_p1  setups  traces
	Access the system parameters:  set time and language WiFi network printing  Access the following information: serial number of the instrument hardware version software version texts of the licences of the various embedded software modules (GPL, GPL2, LGPL)	
Click the "HOME" icon on the screen	Return to the home screen, at any time during yo	our browsing.

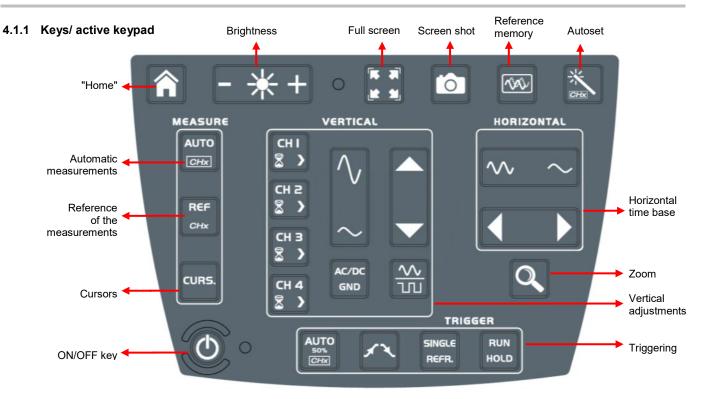
# 3.6 Brightness key



# 4. OX 9304 FUNCTIONAL DESCRIPTION

# 4.1 SCOPE mode





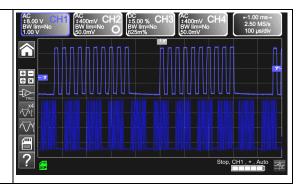
# 4.1.2 Reference Memory adjustment



In oscilloscope mode, pressing this key freezes the traces on the screen. The graph is displayed in a darker shade of the channel color as a reference to be compared to a new acquisition. The reference memories are accompanied by their reference numbers.

Pressing this key again erases reference memories.

This memory is not saved and will be lost when you exit Oscilloscope mode.



# 4.1.3 AUTOSET adjustment → "Magic Wand" key



Automatic optimum adjustment of the AUTOSET of the channels to which a signal is applied.

The adjustments are:

- coupling
- vertical sensitivity
- time base
- slope
- positions
- triggering

The signal having the lowest frequency is used as triggering source.

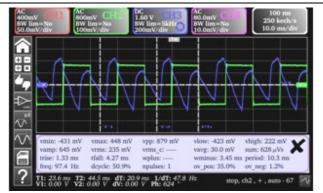
If no trace is detected on the inputs, autoset is aborted.

A simultaneous press on + assigns the corresponding channel as triggering source.

# 4.1.4 MEASURE adjustment



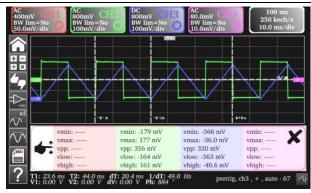
Activates/deactivates window that displays the 20 automatic measurements of the reference trace.





Activates the 20 automatic measurements of the 4 traces with displacement by "scrolling".

By default, cursors are activated with automatic measurements.





Selects, from among displayed traces, the reference trace for automatic and manual measurements. The reference channel is identified by a circle in the color of the channel in the CHx or Fx zone.



Activates/deactivates display cursors used for manual measurements.

# In automatic measurement mode, cursors cannot be deactivated.

The vertical and horizontal cursors can be moved on the touch pad via the stylus.

The measurements made in position T (period), "dt" (time difference between the two cursors), 1/dt (difference as a frequency, in Hz) and "dv" (voltage difference between the 2 cursors) are reported in the status area. A phase cursor Ph (in °) displays a value for the angle between T and the reference.

# 4.1.5 HORIZONTAL time base adjustment

# a) from the keypad



Increases/decreases the coefficient of the time base by successive presses (T/DIV).



After a Zoom, the "Z-Pos." adjustment modifies the position of the screen in the acquisition memory (upper part of the screen).



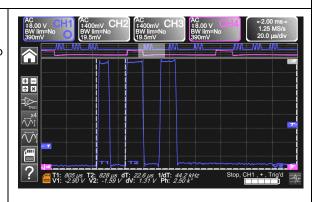
Activates/ deactivates the horizontal "Zoom" function

A waveform screen is displayed at the top of the screen, with the zoomed portion in the main display area.

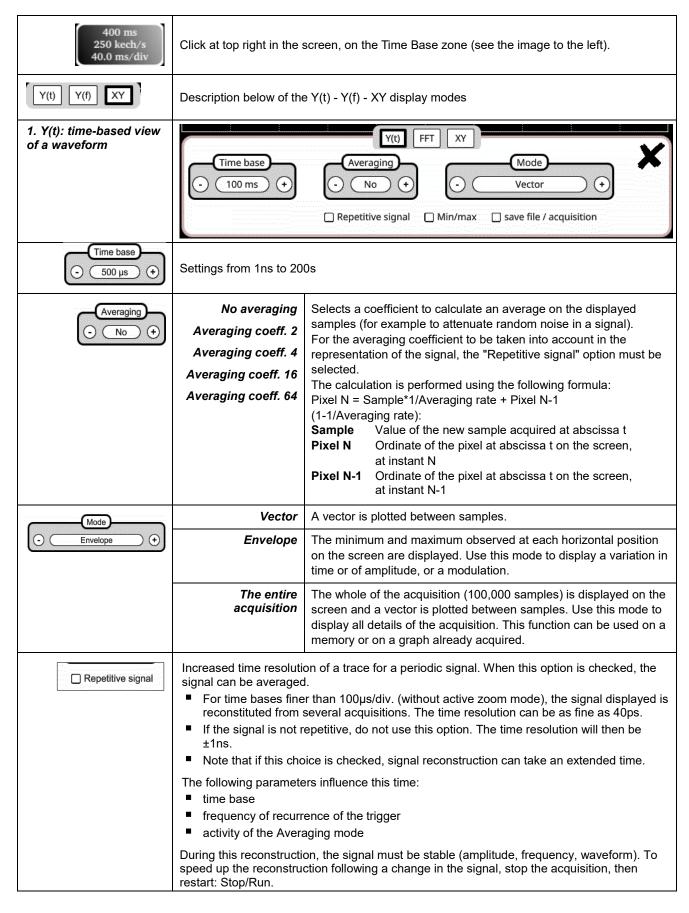
By default, the zoom is around samples at the center of the screen, but the display area can be moved.

A display area can be zoomed by tracing a rectangle around the area to be enlarged using the stylus on the touch pad.

The sensitivity values, time base, and horizontal and vertical positions are recalculated automatically.



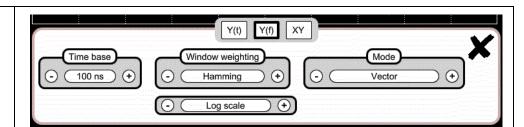
#### b) from the screen



# OX 9304 Functional Description

☐ Min/max	Displays extreme values of the signal, acquired between two samples of the acquisition memory. This mode:
	<ul> <li>detects a false representation due to undersampling</li> <li>displays short-duration events (Glitch, ≤2ns).</li> <li>Whatever time base is used, with its corresponding sampling rate, events having a short duration (Glitch, ≤2ns) are displayed.</li> </ul>
	ROLL: Automatic on time base > 100ms, single In single-shot mode, if the time base exceeds 100ms/div, the new samples are displayed as soon as they are acquired. In addition, ROLL mode is activated when acquisition memory is full (scrolling of the trace from right to left on the screen).
save file / acquisition	In triggered mode, save/retrieve can be used to record acquisitions in .trc format to the "Traces" directory. This lets you store several rare events in the file system and analyze them later.

# 2. Y(f) = FFT (Fast Fourier Transform)



The *Fast Fourier Transform (FFT)* is used to calculate the discrete representation of a signal in the frequency domain from its discrete representation in the time domain. It is calculated on 2500 points. It can be used in the following applications:

- measure harmonics and distortion of a signal
- analyse pulse response
- search for a noise source in logical circuits

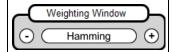
# Fast Fourier Transform calculation

$$X(k) = \frac{1}{N} * \sum_{n = -\frac{N}{2}}^{\frac{N}{2} - 1} x(n) * \exp\left(-j\frac{2\pi nk}{N}\right) \text{ for } k \in [0 \ (N - 1)]$$

x (n): a sample in the time domain

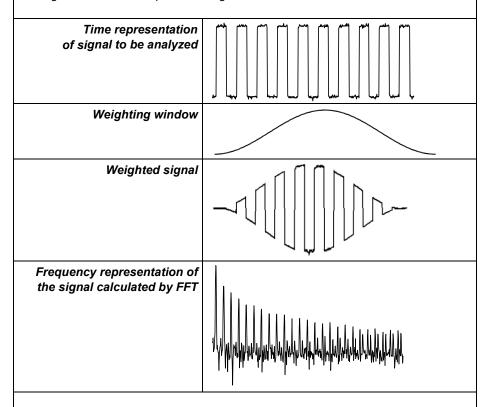
X (k): a sample in the frequency domain

N: resolution of the FFT n: time-domain index k: frequency index



- Rectangle
- Hamming
- Hanning
- Blackman
- Flat top

Before calculating the FFT, the oscilloscope weights the signal to be analyzed by a window that acts as a bandpass filter. The choice of window type is essential to distinguish the different spikes of a signal and make accurate measurements.



The total duration of the study interval results in a convolution in the frequency domain of the signal with a function sinx/x.

This convolution modifies the graphic representation of the FFT because of the characteristic lateral lobes of the sinx/x function (unless the study interval contains an integral number of periods).

Five weighting windows are available. The menus appear immediately when you select FFT menu:

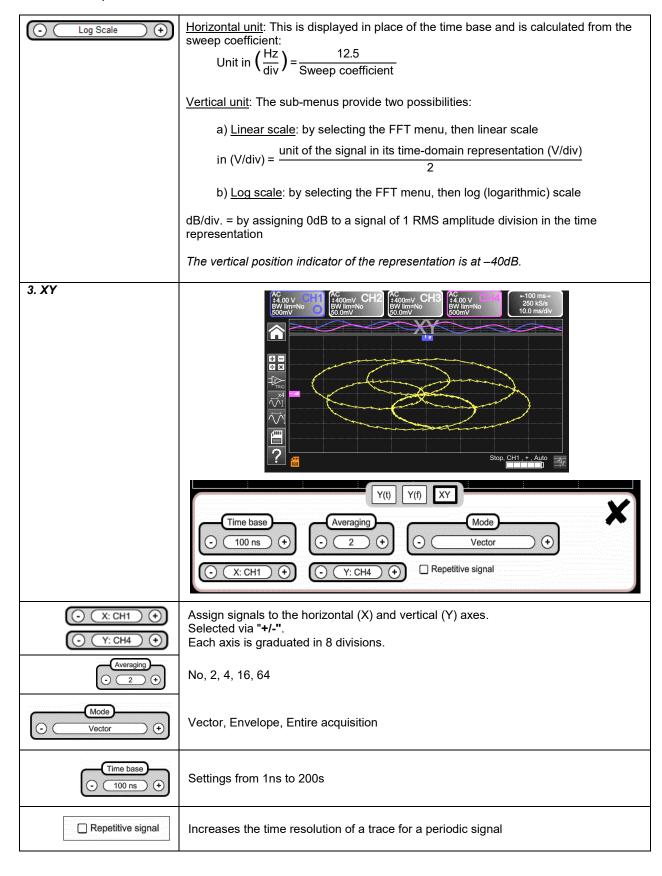
Type of window	Width of the main lobe at 3dB down (bin)	Max. amplitude of the secondary lobe (dB)
rectangular	0.88	-13
Hamming	1.30	-31
Hanning	1.44	-43
Blackman	1.64	-58
Flat top	3.72	-93

# Effects of undersampling on the frequency representation:

If the sampling frequency is too low (less than twice the cutoff frequency of the signal to be measured), the high-frequency components are undersampled and are "aliased" (frequency-shifted) in the graphic representation of the FFT.

The Autoset function is active. It avoids the undersampling issue and adapts the horizontal scale to make results easier to view.

The Zoom function is active. The zoom affects the graphic representation of the FFT but does not change the conditions of acquisition (TB + depth).



# 4.1.6 Adjustment of the amplitude of the "VERTICAL" signal

# a) from the keypad



- Select channel
- Activate channel
- De-activate channel



Adjust the vertical sensitivity of the last channel selected:

- Increase the vertical sensitivity
- Decrease the vertical sensitivity

The sensitivity is displayed in the parameter display area of the channel.

It takes into account the parameters of the "Vertical scale" menu.



Adjusts position of the selected graph on the screen:

- Move up
- Move down



Select, by successive presses on the input coupling, "AC", "DC" or "GND" of the last channel selected

Modification of the coupling AC - DC - GND:

- AC → blocks the DC component of the input signal, attenuates signals below 10Hz.
- **DC** → transmits the DC and AC components of the input signal.
- GND → the instrument internally connects the input of the selected channel to a reference level of 0V.

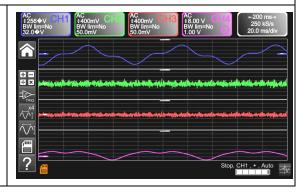


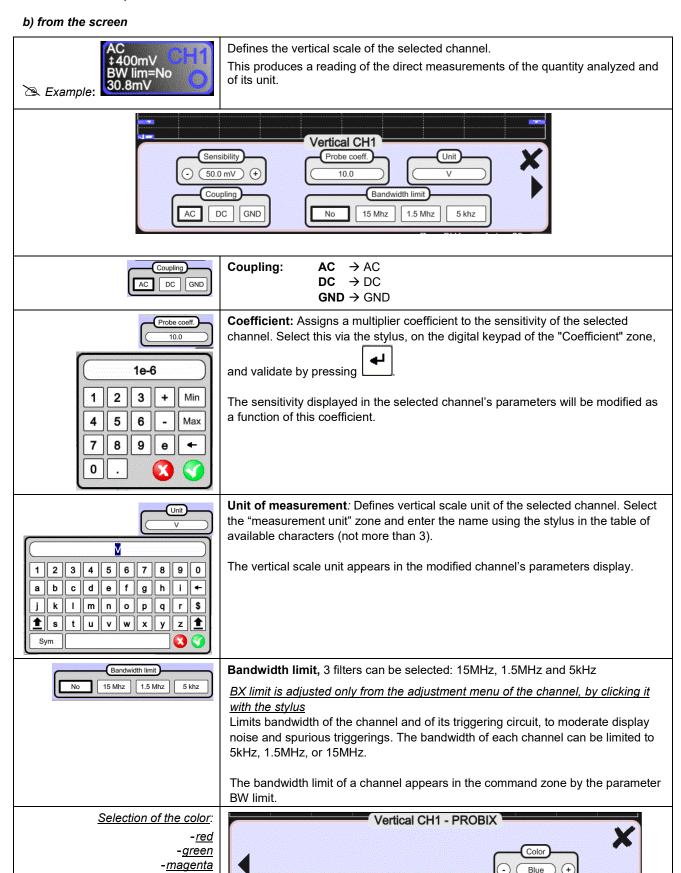
Activates or deactivates the **horizontal division by 4** of the display zone.

Activation of the "Full Trace" function is indicated by:

- continuous horizontal line between the display zones
- horizontal division of the graticule by 2

After this function is activated, traces can be moved vertically in their zones.





-blue

# 4.1.7. Adjustment of the triggering level "TRIGGER"

# a) from the keypad



Adjusts the triggering level on the mean value of the signal (50%) without modifying the coupling of the trigger. Pressing this button combined with a *CHx* key starts the same function, but first selects the corresponding channel as triggering source.



Sets the triggering slope (positive or negative). The slope is displayed in the status zone.



Cycles through acquisition mode options:

- Single-shot = SINGLE (sgl)" on the screen
- Triggered (trig'd)
- Automatic (Auto) = REFRESH



#### SINGLE-SHOT mode:

A single acquisition triggered by the trigger by pressing the RUN HOLD key is allowed. For another acquisition, the triggering circuit must be reset by pressing the RUN HOLD key. The ROLL mode is automatically activated.

# ■ TRIGGERED mode:

Updates the screen only when a triggering event linked to the signals present on the inputs of the oscilloscope (CH1, CH2, CH3, CH4) occurs.

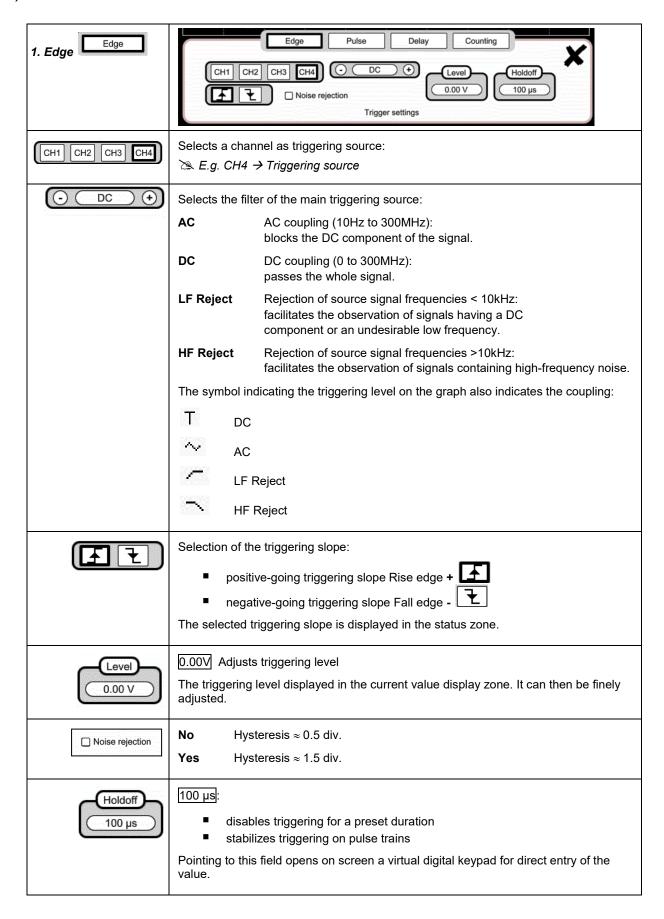
In the absence of any triggering event linked to the signals present on the inputs (or in the absence of signals on the inputs), the trace is not updated.

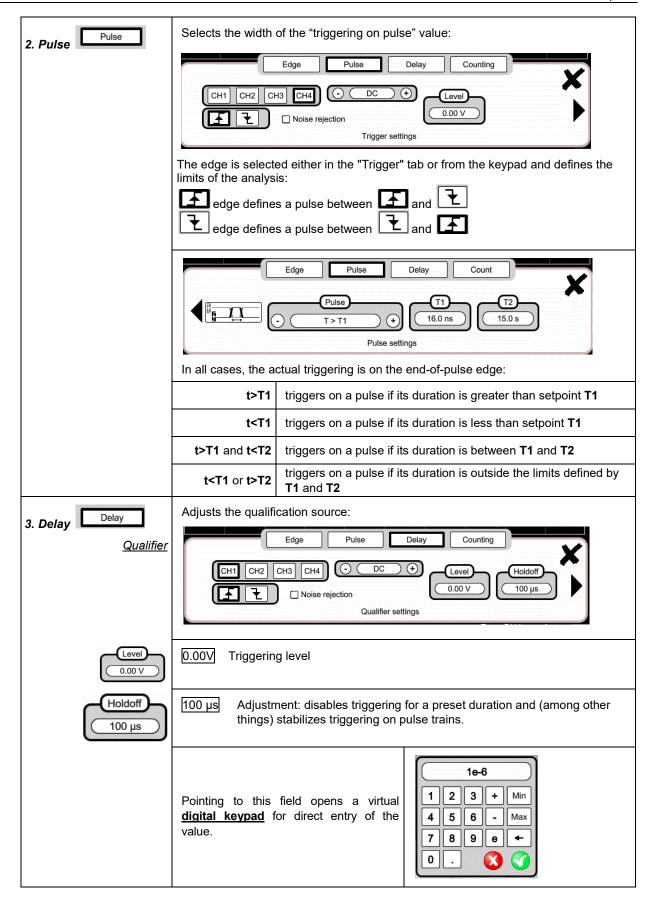
#### ■ AUTOMATIC mode:

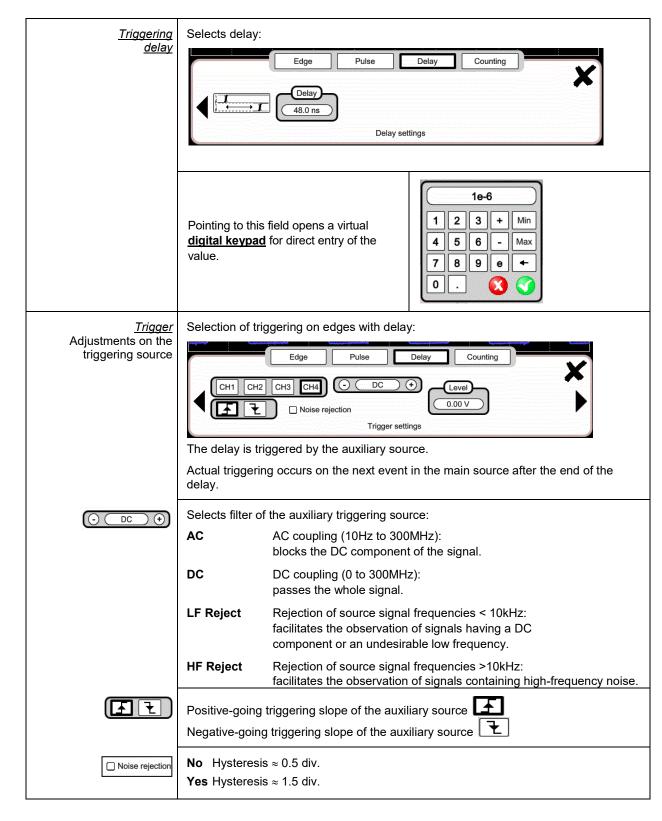
Updates the screen even if the triggering level is not detected in the signals on the inputs. In the presence of a triggering event, the refreshing of the screen is managed as in the "Triggered" mode.

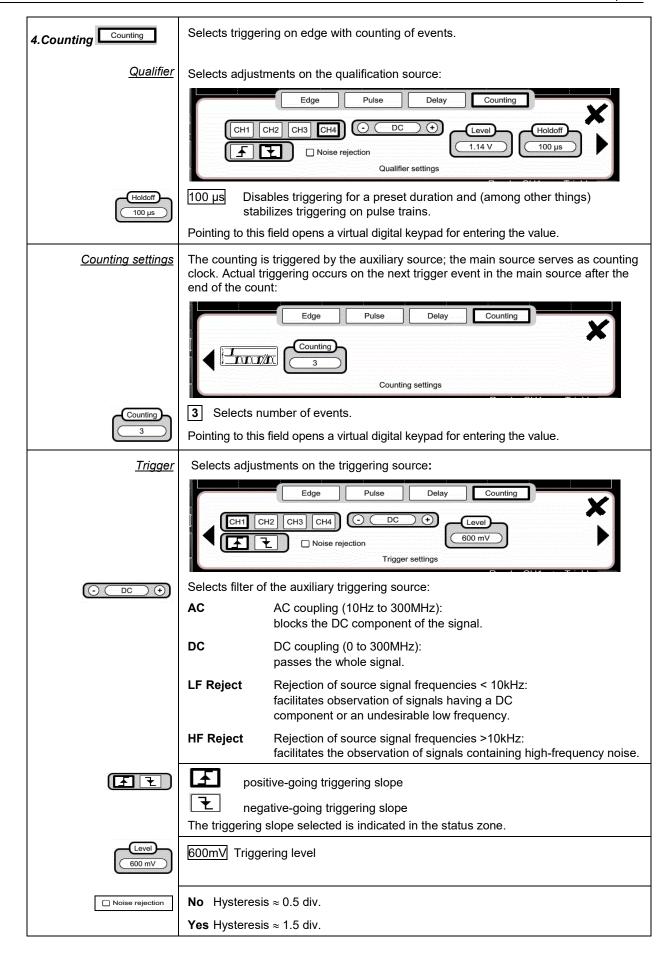
- Acquisitions in TRIGGERED and AUTOMATIC modes are enabled or stopped.
- The triggering circuit in SINGLE-SHOT mode is reset.
- Acquisition is started according to the conditions defined by the acquisition mode (SINGLE REFR).
- The status of the acquisition is indicated in the status zone:
  - RUNNING → started
  - STOP → stopped
  - **PRETRIG** → acquisition

#### b) from the screen









# 4.1.8. MATHEMATICAL function, from the screen



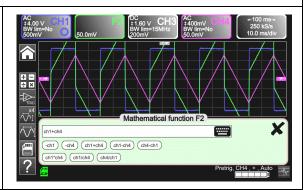
Defines, for each trace, a mathematical function and vertical scale

Equation editor (functions, in the channels or simulated, programmable as F1, F2, F3, F4):

- Addition
- Subtraction
- Multiplication
- Division
- Complex functions between channels

# Simple functions

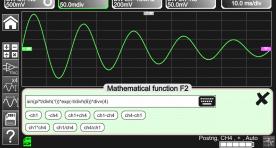
Example: Addition between channels



# **Complex functions**

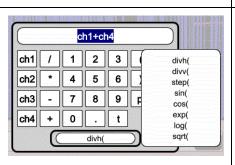
Example: Production of a damped sinusoidal trace from predefined functions

# 



"sin (pi\*t/divh(1))" changes the number of periods.
"exp (-t/divh(6))" changes the damping level.

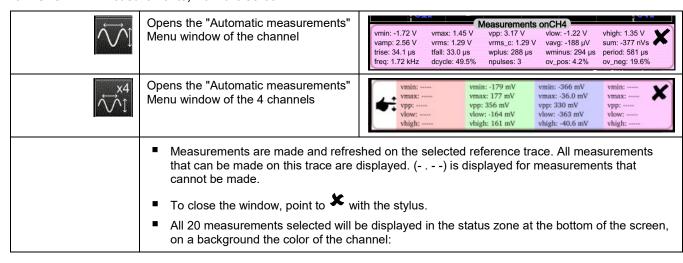
# Defining a complex function



8 predefined mathematical functions can be used:

- **divh( →** "horizontal division"
- divv( → "vertical division"
- **step(** → "on" using "t" (\*)
- **sin( →** "sine"
- cos( → "Cosine"
- exp( → "exponential"
- log( → "logarithmic"
- sqrt( → "square root"
- (\*) t = abscissa of the sample in the acquisition memory divh(1) is equivalent to 10,000 samples (points) = 1 horizontal div.

# 4.1.9. AUTOMATIC measurements, from the screen

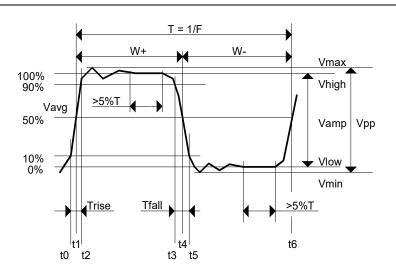


vmin	minimum peak voltage	trise	rise time
vmax	maximum peak voltage	tfall	fall time
vpp	peak-to-peak voltage	wplus	positive pulse width (at 50% of Vamp)
vlow	stabilized low voltage	wlow	negative pulse width (at 50% of Vamp)
vhigh	stabilized high voltage	period	period
vamp	amplitude	freq	frequency
vrms	RMS voltage determined in the measurement interval	dcycle	duty cycle
vrms_c	RMS voltage determined on a whole number of cycles	npulses	number of pulses
vavg	mean voltage	over_pos	positive overshoot
sum	summation of the instantaneous values of the signal	over_neg	negative overshoot

# Measurement conditions

- The measurements are made on the part of the trace displayed on screen between cursors T1 and T2.
- Any modification of the signal entails an update of the measurements. They are refreshed as the acquisition proceeds.
- The accuracy of the measurements is optimum when at least two complete periods of the signal are displayed.

# Automatic measurements



- Positive overshoot = [100 \* (Vmax Vhigh)]/Vamp
- Negative overshoot = [100 \* (Vmin Vlow)]/Vamp

$$Vrms = \left[\frac{1}{n}\sum_{i=0}^{i=n} (y_i - y_{GND})^2\right]^{1/2}$$

$$Vavg = \frac{1}{n} \sum_{i=0}^{i=n} (y_i - y_{GND})$$

$$Vsum = \sum_{i=0}^{i=n} (\mathbf{y}_i \times \delta \mathbf{t})$$

YGND = value of the point representing zero volts

# 4.1.10. Backup



Pressing this key displays the screen shown below:



Use this function to record (in local memory or on an  $\mu SD$  Card) the following:

- traces displayed
- mathematical functions
- configuration of the instrument

These files can be restored from the file manager.



# 4.2.1 Keys/keyboard active in Multimeter mode

The **ScopiX** has a Multimeter function with 8000 display points. It has as many independent multimeters as there are channels in the Oscilloscope mode (2 or 4), with the same function as in the Oscilloscope mode: **Probix**.





# Coupling:

If a channel is activated and selected, pressing this key changes the input coupling of the channel. With successive presses, the coupling runs through the following settings:  $|AC| \rightarrow |AC| < 5 \text{kHz} \rightarrow |AC| < 625 \text{Hz} \rightarrow$ 

Adjusting the coupling is not possible in the following modes: Ohmmeter, Capacitance meter, Continuity, Test of component, Wattmeter.

Modification of the coupling (AC, DC, AC + DC) in amplitude measurement

- AC: AC voltage measurement
- **DC:** DC voltage measurement
- AC + DC: AC voltage measurement with a DC component

If the channel measures AC or AC + DC voltage, you can filter the signal with a low-pass analog filter having a cutoff frequency of 5kHz.

The other filter proposed is a digital filter at 625Hz; if this filter is chosen, the 5kHz analog filter is also activated.

- Low-pass filter
- Cutoff frequency ...... 625Hz
- Order.......94
- Bandwidth ripple...... 0.5dB
- Transition band ...... 0.02
- Stopband attenuation ...... 50.0dB



Manual measurement range.

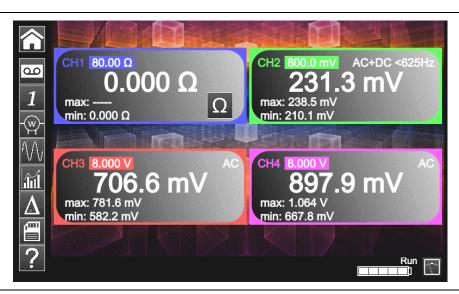
De-activates Autorange and returns to manual mode.

The Autorange function is active by default; pressing this key changes to manual range.

#### 4.2.2 Icon/screen of the Multimeter mode

The channel is displayed in the color defined in Oscilloscope mode. Inactive channels are displayed in white.

# Display screen: 4 measurements 4 channels



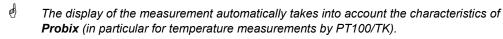


Several types of measurement are possible on CH1; the other channels are voltmeter channels only. A display zone is reserved for each channel. Each displays the following information:



- CH1, CH2, CH3, or CH4 as Voltmeter 2
- Ohmmeter and audible safety beep
- Continuity
- Capacitance meter
- Test of component

Volt: no display of the symbol (lower part of the CH zone)



# Autorange

A long press on channel CH validates or invalidates autorange of the channel.

If Autorange is active, the range is displayed in white in a colored square.

# Main measurement

If the channel is activated, the measurement result is displayed. Otherwise the message "- X -" occupies the unused space. If "----" is displayed, measurement is not possible: it is outside the authorized range, and "OL" is displayed.

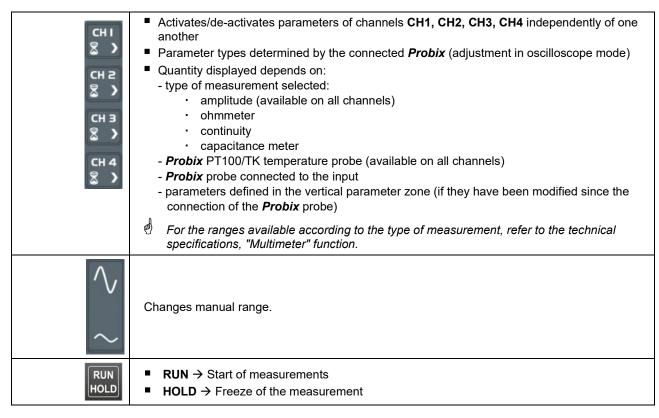
# Unit

Contains the measurement unit associated with the current measurement range according to the **Probix** used and the type of measurement.

The unit cannot be configured in multimeter mode.

# Secondary If no display is selected, or if no display is possible (e.g. frequency measurement of a DC measurements signal, etc.), the string '----' is displayed. If the channel is not selected, the string '-X-' is displayed. If the signal is outside of the range: "OL" for overload is displayed. Frequency For an AC amplitude measurement, displays frequency of the measured 1.566 -4.505 mV signal (if possible and coherent) in each channel. 8.000 V -2.003 V 913.6 mV Displays Min and Max values of **Statistics** measurements for each channel. $0.000 \Omega$ 19.8 m\ Ω min: 0.000 Ω Relative mode Displays difference in each channel. 750.0 mV This is the difference between the $0.000 \Omega$ measured value and the value displayed Ω Relative: 119.8 mV when this key was pressed. 907.3 mV Relative: 30.71 mV

# 4.2.3 Adjustments of the VERTICAL menu



#### 4.2.4 Power measurement

### Display

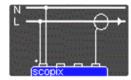




The following secondary measurements are available in this quantity:

- MIN/MAX
- relative
- frequency

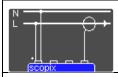
Selecting distribution network type and power parameters





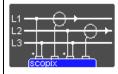






Single-phase

$$P_A = \frac{1}{N} * \sum_{N} V(n) * I(n)$$



Three-phase without neutral (two-wattmeter method)

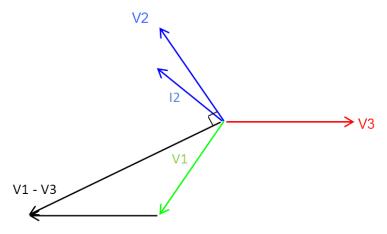
Available only for 4 channel instruments

$$P_A = \frac{1}{N} * \sum_{N} (U_{12}(n) * I_1 n + U_{32}(n) * I_3(n))$$

$$P_R = \frac{\sqrt{3}}{N} * \sum_{N} (U_{12}(n) * I_1 n - U_{32}(n) * I_3(n))$$



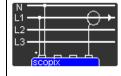
Balanced three-phase without neutral (3 wires)



Voltage V3-V1 measurement and measurement of the current on I2

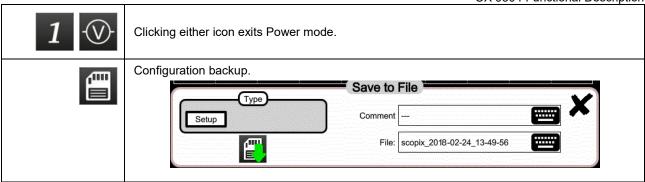
$$P_A = \sqrt{3 * (\hat{\mathcal{O}} * \hat{\mathcal{T}})^2 - P_R}$$

$$P_R = \frac{\sqrt{3}}{N} * \sum_{N} (\mathbf{U}_{13}(n) * I_2(n))$$



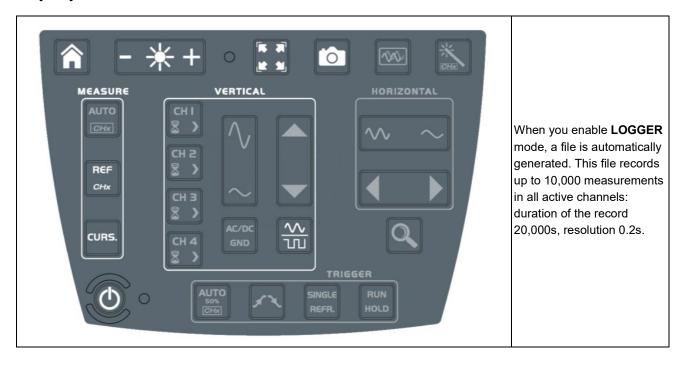
Balanced three-phase with neutral

$$P_A = \frac{3}{N} * \sum_{N} V(n) * I(n)$$

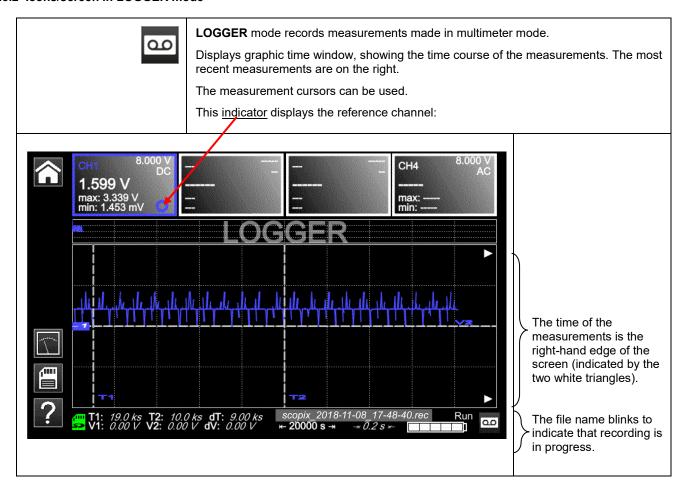


# 4.3. LOGGER mode

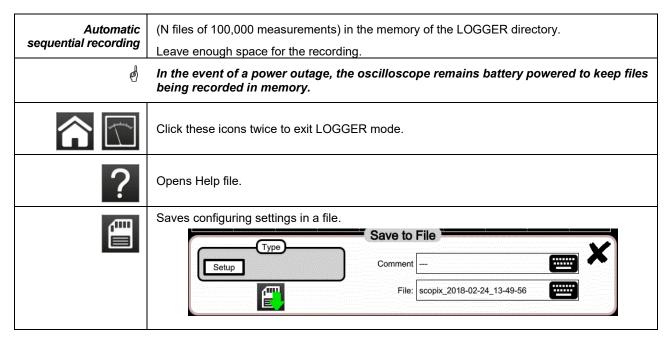
### 4.3.1 Keys/keyboard active in LOGGER mode



#### 4.3.2 Icons/screen in LOGGER mode



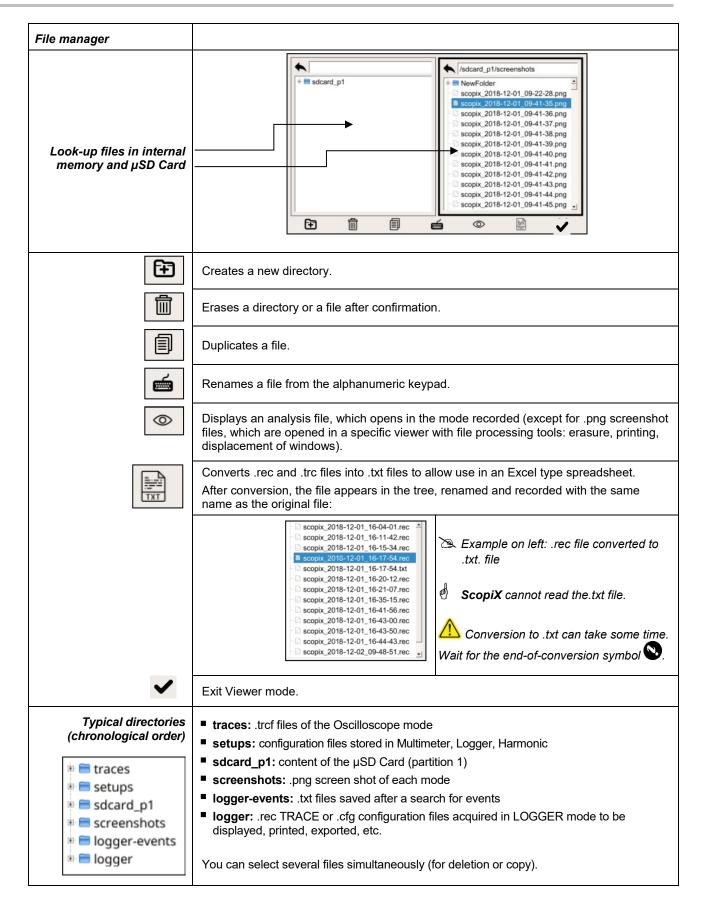
### 4.3.3 Principles

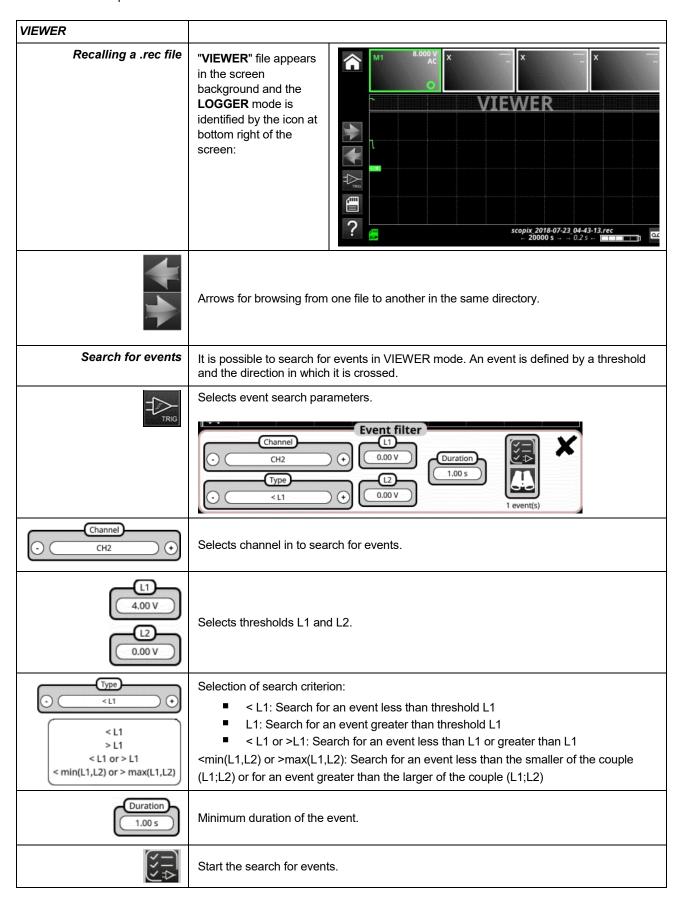


Note: In this mode and in VIEWER mode, it is possible to display cursors.

## 4.4. VIEWER mode

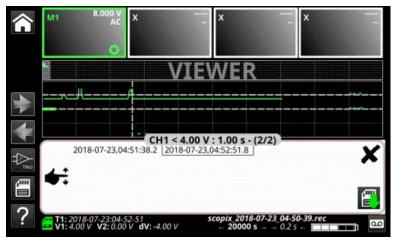








Analyze events found. Pressing this icon opens a window containing the events meeting the search criteria.



When an event is selected, the V1, V2, and T1 cursors appear. The associated measurements are displayed below the event window.

The event name format is YYYY-MM-DD,HH:MM:SS .s where YYYY-MM-DD is the date of the record and HH:MM:SS.s is the value of the T1 cursor.



Records the events in .txt format.

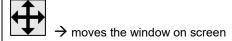
These events are recorded in the logger-events folder in File Manager.

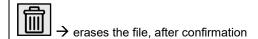
### Recalling a .png file

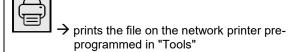


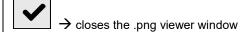
A window (which can be moved by cursor) appears at the top of the screen:











5/261  $\rightarrow$  Number of files in the directory

# 4.5. HARMONIC mode



### 4.5.1. Keys/keyboard active in Harmonic mode



### 4.5.2. Principle

#### Harmonic mode

Displays the breakdown into harmonics of a voltage or a current of which the signal is steady-state or quasi-steady-state. It establishes a first diagnostic of the harmonic pollution of an installation.

This mode displays a graph of the fundamental frequency and harmonics out to the 63rd.

The time base is adaptive; it is not adjusted manually.

This analysis is only for signals with a fundamental frequency between 40Hz and 450Hz.

Only channels CHx (not the functions or the memories) can undergo a harmonic analysis.

The harmonic analysis of 2 ( $\it OX~2~channels$ ) or 4 ( $\it OX~4~channels$ ) signals can be displayed simultaneously.

#### 4.5.3. Icons/screen in Harmonic mode

Displays harmonic analysis of the selected traces.

The harmonic analyses of traces **ch1** and **ch4** appear as solid-color bar charts, in the color of the trace.

By default, the fundamental is selected automatically; but the fundamental frequencies of 50Hz/60Hz and 400Hz can be programmed manually.

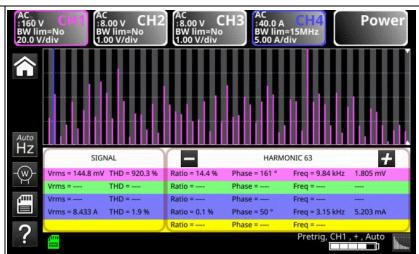












The measurement parameters displayed: Signal Measurement

- RMS voltage of the signal in V - total harmonic distortion (THD) in %, per standard EN50160

$$THD = \frac{1}{V_{RMS}(Fond)} \times \sqrt{\sum_{Harm-2}^{40} V_{RMS}^{2}(Harm)}$$

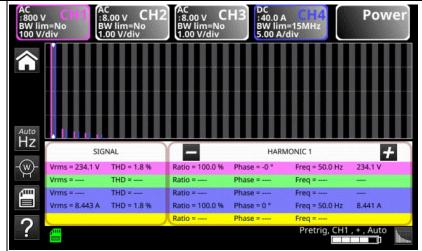
### **Harmonic Measurement**

- value in %, ratio

- phase in ° with respect to the fundamental

- frequency in Hz

- RMS voltage in V

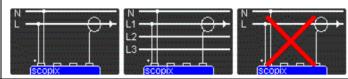


Example: Harmonic of order 1, incrementing of display of the harmonic order by + and decrementing by -

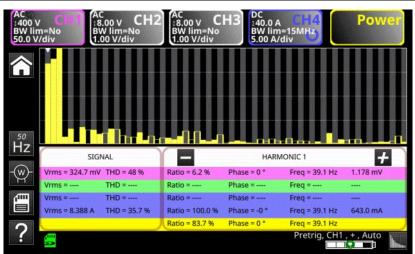
#### Power harmonics

Choice of set-up with type of power.

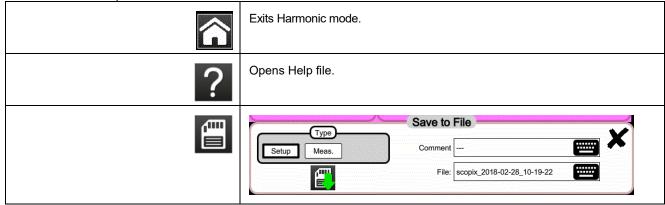




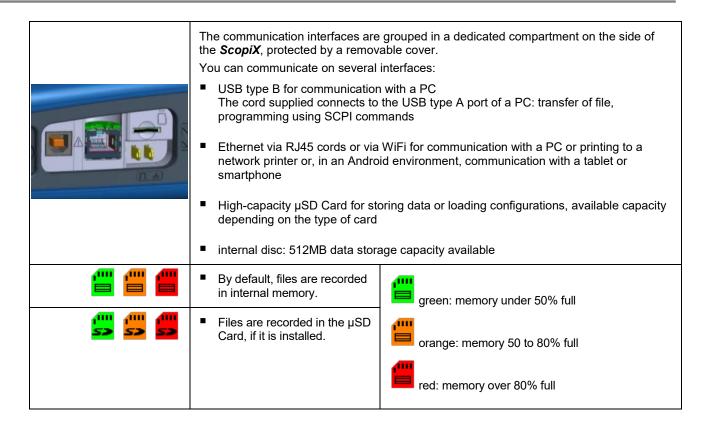
Solid bars indicate harmonics consumed and hollow bars harmonics generated.



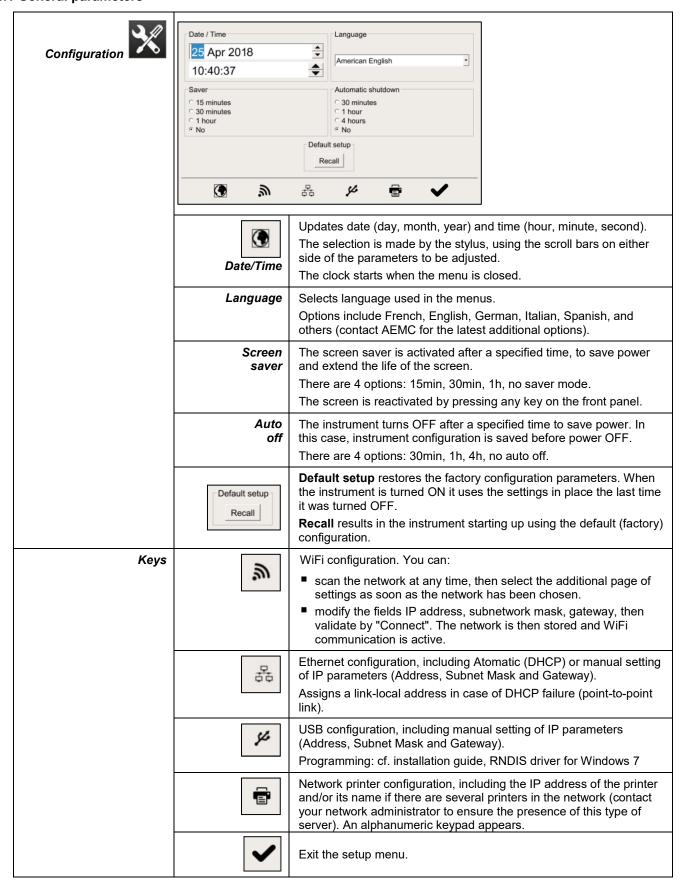
OX 9304 Functional Description



### 4.6. Communication



#### 4.6.1 General parameters



304 Functional Description				
IP address	An IP address is coded in 4 bytes, displayed in decimal form. (>: 132.147.250.10).			
	Each field can be set between 0 and 255; the fields are separated by decimal points.			
	Unlike the physical address, the IP address can be modified manually by the user or automatically by DHCP.			
	Ensure the IP address is unique on your network. A duplicate address could impact network operation.			
Subnetwork	If the result of the "LOGICAL AND" between the IP address of the addressee of the			
mask and Gateway	message and the value of the subnetwork mask (SUBNET MASK) is different from the address of the addressee of the message, the message is sent to the gateway (GATEWAY), which takes charge of getting it to its destination.			
	The mask and the address of the gateway can be configured on the instrument.			
DHC	This protocol automatically sets network access.			
protocol	A DHCP (Dynamic Host Configuration Protocol) server must be accessible in this network (contact your network administrator to ensure this is the case).			
MAC address	Each <b>ScopiX</b> instrument has a unique factory-configured MAC address. There is one wire network MAC address and one WiFi address.			
WiFi network selection	To connect to the WiFi network:    TV Room_1_[2]			
	2. Select the SSID network.			
	3. Enter the network's security key.			
	4. Select DHCP mode if you want the network to give you an IP address, or manual mode if you already have a fixed IP adress.  CETAN			
Wire network selection	1. Select DHCP mode if you want the network to give you an IP address, or manual mode if you already have a fixed IP adress.  Gateway  1. Select DHCP mode if you want the network to give you an IP address, or manual mode if you already have a fixed IP adress.  2. Click Connect to confirm the settings			
	MAC: D8:80:39:5A:B0:7E and complete connection.  Connect      MAC: D8:80:39:5A:B0:7E  Connect			
	ScopiX IV  When the state of th			

# 4.7. Memory

Backup	The files are stored in a specific partition.					
memory	File system:					
	<ol> <li>on an μSD Card; the partitions of the μSD Card are accessible in the sdcard_pX directory</li> <li>in the local file system</li> </ol>					
Available memory	■ Internal memory of the instrument: 1GB for the file system					
	<ul> <li>"Micro SD" memory card, type: SC (≤2GB)</li></ul>					
	of which the partition(s) are formatted to FAT32					
Memory space optimization and	■ Files of traces acquired in SCOPE mode		Size: 400kB per trace stored (max.: 1.6MB)			
consumption	<ul> <li>Files of traces acquired in LOGGER mode, Binary format</li> </ul>	.rec	Size: 400kB per trace stored (max.: 1.6MB)			
	Configuration files, Binary format		Size: 1ko			
	<ul><li>Printing</li></ul>	.png	Size: <200ko			
	■ Files of mathematical functions, Text format		Size: <1ko			
	■ Files in text format containing a trace acquired in HARMONIC mode		Size: <10ko			
	Text format files resulting from the conversion of binary files (.rec or .trc)	.txt	Size : variable			

Storage options by mode					
	Icon	Icon	Icon	lcon [	Keypad O
Type of file	Setup.(cfg)	Traces.(trc)	Math.(fct)	Measurement.(txt)	Screen shot.(png)
Oscilloscope mode	✓	✓	✓		✓
Multimeter mode	✓				✓
Harmonic mode	✓			✓	✓
Logger mode	✓				✓
Viewer mode				✓	✓
Directory	setups	traces	functions	harmonic	screenshots

Note: all files in "SCOPIX" including NF are viewable on a PC as an external disk via the USB port.

Ethernet communication is reserved for remote control of the instrument. The SCOPENET application, running on a PC, uses the files in memory in SCOPIX.

### 4.8. Firmware update

### **Firmware**

Periodically, an "update available" message may appear on the home screen, if the **ScopiX** is connected to Ethernet or WiFi:



This message indicates update files have been downloaded transparently to the *ScopiX*: they are available for an update, which is recommended to obtain new functions, bug fixes; etc.

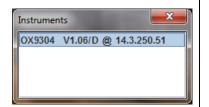
- Select **OK** and the update automatically installs the files in the **ScopiX**.
- The duration of the update varies, but is less than 15 minutes.
- Follow the directions (see below).
- Do not switch off ScopiX during the update.
- The files of the internal memory (measurements, screen shots, setups, etc.) are not destroyed during the update.
- For more complete information, go to the support space of our Web site: a manual update procedure is available.

### Update installation procedure

- 1. Connect the **ScopiX**, preferably to line power.
- 2. Check "Do you want to install it."
- 3. **ScopiX** powers OFF, then back ON.
- 4. A screen (yellow-white) of which the color varies to represent an action in progress, with an "update running" message, remains on screen for approximately 8 minutes.
- 5. **ScopiX** powers OFF and then back ON.
- 6. A touch slab calibration procedure screen is displayed: follow the steps by checking the 4 corners, then the center.
- 7. The home screen is displayed again: you can view the new system information (date, version, etc.); the update is complete.
- The operating instructions in .pdf format, or any other updated document, can be downloaded and placed in the file manager.

### 4.9. ScopeNet IV





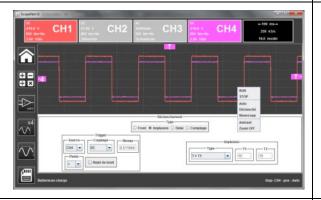
When you have obtained the IP address of the **ScopiX** (DHCP or manual) using a browser, type 14.3.250.51/scopenet.html (for example) on your computer; the screen to the left appears.

JAVA application PC is used to display the ScopeNet IV page.

Carefully check the installation of **ScopeNet** to minimize issues.

To check the instruments connected, do the following:

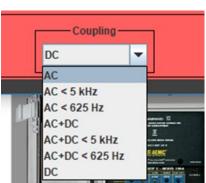
- Press the network icon, in the center of the screen: the search for instruments in the network (Ethernet and WiFi) is performed by a specific function. A series of compatible instruments connected is displayed (see illustration on left).
- The PC environment uses icons in an HMI identical to the **Scopix IV** product, with the same access to the functions and adjustments.



In Oscilloscope mode, **ScopeNet IV** proposes adjustments by a right click on the waveform: RUN/STOP, AUTO/TRIG/SINGLE/AUTOSET and ZOOM are easy-to-configure parameters.

Example: 2 active channels: CH1 and CH4 2 greyed-out inactive channels: CH2 and CH3





In MULTIMETER mode, the vertical configuration can be accessed by activating the channel (see top left).

In AUTO RANGE mode (default) you can select from among a set of ranges (white zone around the quantity) via the Coupling field (see lower left).

Example: - channel 1 active, AUTO

- channels 2 and 3 inactive, AUTO
- channel 4 inactive, but adjustment of the voltage ranges is possible.

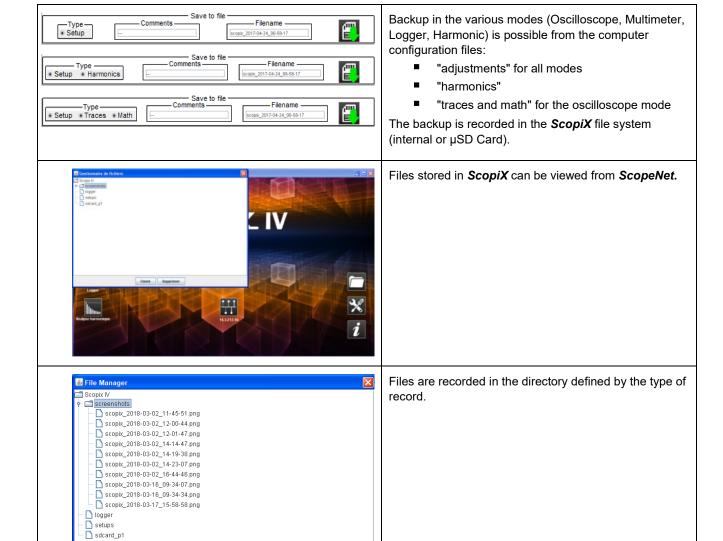
OX 9304 Functional Description



Open

Remove

File and backup management is performed on the PC. You can also store data in *ScopiX*. via USB.



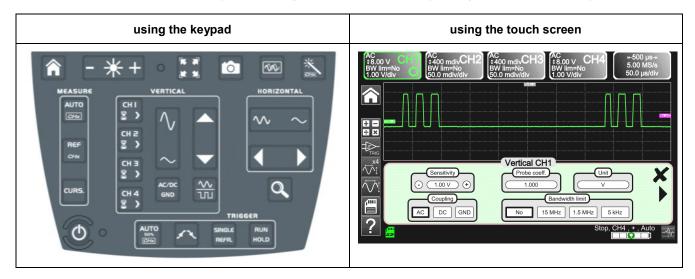
# 5. WAVEFORM DISPLAY

# 5.1 Manual display

To view the signal and project it on the screen, be aware of the following characteristics:

- Coupling: note whether the signal is pure AC or has a DC component
- amplitude in Volts: defines the signal's amplitude on screen
- **frequency** or period of the signal: note whether or not it is repetitive
- **bandwidth:** the frequency related to the maximum frequency to measure

Once these characteristics are known, you can configure the channel to display the signal. There are two ways to do this:



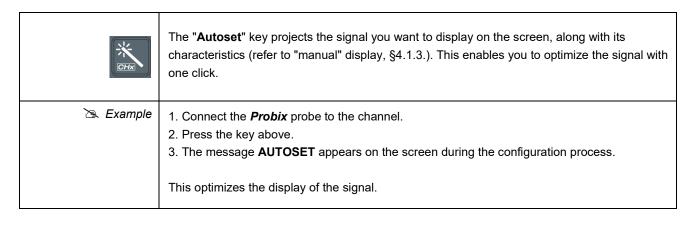
### 5.1.1. Using the keypad

Key ₹	Action <sup>2</sup>
	Connect the <i>Probix</i> probe to a channel input.
CHI           ☑	2. Press the channel key to refresh it and access configuration.
AC/DC GND	3. Press this key to select coupling.
$\sim$	Press this key to select the vertical sensitivity of the channel or its maximum amplitude visible on the screen.
$\sim$	Press this key to select the desired time base of the channel or the maximum period visible on screen.
RUN HOLD	6. Press this key to view signal.
	7. The signal appears.
<sup>d</sup> Note	It is not possible to configure the bandwidth of the signal from the keypad.

### 5.1.2. Using the touch screen

lcon <sup>™</sup>	Action 3
	Connect the <i>Probix</i> probe to the channel input.
	Click the channel key to refresh it ("channel activated") and access configuration.
Coupling  AC DC GND	3. Select the coupling type.
Sensitivity  - 1.00 V +	Press + or - to select the desired sensitivity of the channel or its maximum amplitude visible on screen.
No 15 MHz 1.5 MHz 5 kHz	Select the type of bandwidth to obtain the desired limitation.
	6. Press X.
⊬500 μs→ 5.00 MS/s 50.0 μs/div	7. Click the time base to access the adjustments.
Time base Averaging No 4 Vector Repetitive signal	8. Click Y(t)
	9. Ensure that only "roll" is checked.
Time base  - 10 ms +	10. Select the duration of the time base with + or
	11. Press X.
	12. The signal appears.

### 5.2 Autoset



# 5.3 Calibrating the probes

Step	Action 3	<del>2</del> \$
1.	Connect the Probix adapter of an HX0030 probe having a 1/10 ratio to the CH1 input.	
2.	Connect the probe (with its ground) to the calibrator output (Probe Adjust: ≈3V, ≈1kHz) on the side of the instrument.	
3.	Connect the cold of the probe to the cold of the calibration output of the probes.	
4	Ensure the 1/10 coefficient of the probe has been taken into account.	<ul> <li>Menu CH1</li> <li>Click the right arrow, Measurement of probe, select Coefficient: 10,</li> <li>Validate by clicking</li> <li>Note: The sensitivity and the measurements take the coefficient of the probe into account.</li> </ul>
5.	Set the sensitivity of CH1.	<ul> <li>Menu CH1, Sensitivity/coupling: 500mV/div</li> <li>or use buttons A and B of the HX0030 probe</li> <li>or use the</li> </ul>
6.	Set the coupling of CH1.	<ul> <li>Menu CH1, coupling: AC</li> <li>or use the key.</li> </ul>
7.	Set the sweep rate.	■ Time base menu: 500µs/div ■ or or use the keys
8.	Set the triggering parameters	Trigg menu: Source: CH1, Coupling: AC, + Edge
9.	Set the triggering mode.	<ul> <li>Trigg Menu by the SGLE REFR. key</li> <li>use the RUN HOLD key to start the acquisitions ("RUN" mode).</li> </ul>

### If necessary:

- Modify the triggering level with the stylus by moving the T (Trigger) symbol on the screen. The triggering level appears at bottom right on the screen.
- Modify the vertical position of the graph by using the stylus to move the 1 symbol, to the left of the screen.



key can be used to perform these adjustments automatically.

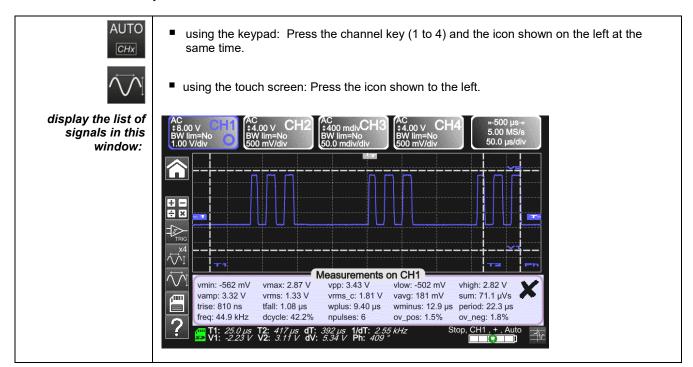
Compensation of the HX0030 probe	Probix HX0030 compensation adjustment.  For optimum response, use the knob at the top of the probe to adjust the low-frequency compensation of the probe so that the plateau of the signal is horizontal.		
Probe overcompensated			
Probe correctly compensated			
Probe under-compensated			

### 5.4 Auto/Cursors/Zoom measurement

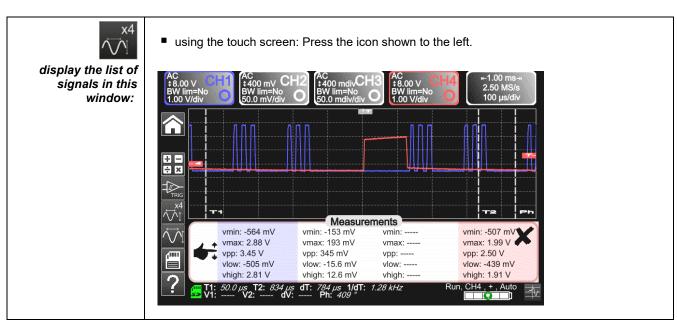
### 5.4.1. Auto

For optimum measurement accuracy, we recommend displaying two complete periods of one or more signals. To do this, modify the time base using the "horizontal" keys.

There are two ways to start Auto measurements in a channel:



To start Auto measurements in the 4 channels:

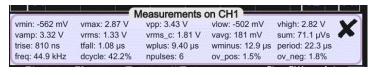


Auto Measurements list	Time measurements	Level measurements
	rise time	DC voltage
	fall time	RMS voltage
	positive pulse	peak-to-peak voltage
	negative pulse	amplitude
	duty cycle	max. voltage
	period	min. voltage
	frequency	upper plateau
	phase	lower plateau
	counting	overshoot
	integral	

#### **5.4.2. Cursors**

#### 3 categories of cursors (use the stylus to move them)

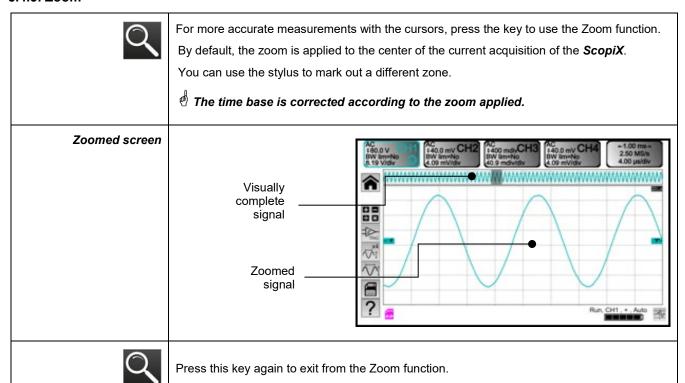
- Time cursors (T1 and T2) measure certain time values and calculate a delta and its frequency.
- Amplitude cursors (V1 and V2) measure amplitude values and calculate a delta.
- Phase cursor measures the phase of the signal according to the positioning of T1 and T2 and of a reference signal.



(m)

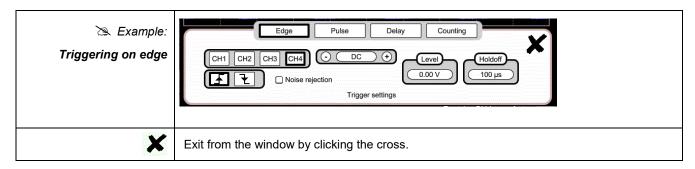
The phase cursor is inactive if you are in Auto measurement mode in all channels.

### 5.4.3. Zoom



### 5.5 Adjusting the Trigger

- Choose the triggering mode that corresponds to your application.
- Set the values of all triggering parameters.

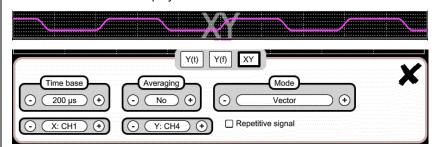


### 5.6. Mathematical/FFT/XY measurement

# Mathematical functions These serve to process readings as a function of the settings configured on one of the channels of the instrument. These functions can be accessed using the key on the screen to specify the channel you want. A window appears that can be used to configure the mathematical function of this channel using the keypad or the predefined functions. Mathematical function F1 (-ch1) (-ch4) (ch1+ch4) (ch1-ch4) (ch4-ch1) ch1\*ch4 ch1/ch4 ch4/ch1 FFT The FFT (Fast Fourier Transform) function is activated via the time base menu by clicking it and selecting "Y(f)". Y(t) Y(f) Time base Window weighting Mode (<del>+</del>) Log scale Parameters: Time base in seconds Weighting window: rectangular, hamming, hanning, blackman, flat top Type of scale: logarithmic or linear Mode: vector, envelope, whole acquisition, total

XY

This function is used to display one channel as a function of another.



#### Parameters:

- Time base in seconds for channels X and Y
- Channel X or Channel Y
- Averaging: no, 2, 4, 16, 64
- Mode: vector, envelope, whole acquisition, total

The checkbox field "Repetitive signal" selects whether or not the signal is repetitive (sign wave, square wave, and so on).

# **6. MULTIMETER MEASUREMENT**

# 6.1 Differentiating channels



Channel 1 of the *ScopiX* is named CH1. It measures various physical quantities in addition to the signal amplitude measurements, using the appropriate *Probix* accessories. The other channels are voltmeter channels only (or current channels, when used with a *Probix* clamp).

### 6.2 Measurement type

Measurements	CH1	CH2	СНЗ	CH4
Voltage	✓	✓	✓	✓
Current	✓	✓	✓	✓
Resistance	✓			
Capacitance	✓			
Diode test	✓			
Continuity	✓			
Power	✓	✓	✓	✓
Temperature by Pt100	✓	✓	✓	✓

By clicking 🕀	You can 🎨
	Display the frequency, in the case of an AC amplitude measurement, as a secondary measurement performed on each channel.
áúl	Display the Min and Max values of the measurements made, as a secondary measurement on each channel.
Δ	Display the relative values of the measurements made, as a secondary measurement on each channel.
	Save your configurations, by entering their properties.

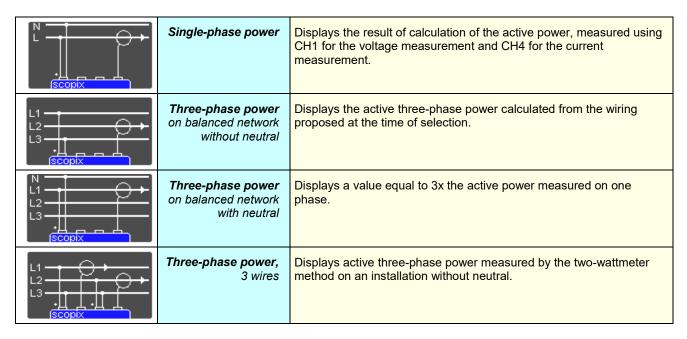
Remarks	
<b>~</b> ~	The channels of the measurement ranges are automatic. To define the measurement range in manual mode, press the key.
CH1 CH2 CH3 CH4	A long press on the channel key return to automatic mode. In addition:     In automatic mode, the measurement range on the screen is highlighted in the color of the channel.     In manual mode, it is not.
AC/DC GND	The coupling of the channels can be modified using the $CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC$

### 6.3 Power measurement

To measure power, you must have the right *Probix* accessories:

- current measurements: HX0034, HX0072, and HX0073 clamps
- voltage measurements: **HX0033** banana adapter and leads

Click the icon to make a power measurement in Multimeter mode. Then, select the type of set-up you want to measure:



When the values are read in this mode, the following screen is displayed: 🌣 Example: Single-phase power



- ←Channel 1 indicates the **voltage** measured directly with its min and max values.
- ←Channel 4 indicates the **current** measured directly with its min and max values.
- ←The various **power values** calculated from channels 1 and 4 are displayed, along with their **power factor**.
- The type of wiring is indicated next to the values.

# 6.4 LOGGER mode



This function of Multimeter mode records values read on the various channels of the ScopiX, whatever the type of measurement.

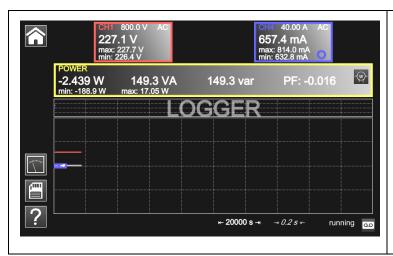


The records may be long. We suggest connecting ScopiX to external power to avoid measurement stoppage when the battery is depleted.

When you click

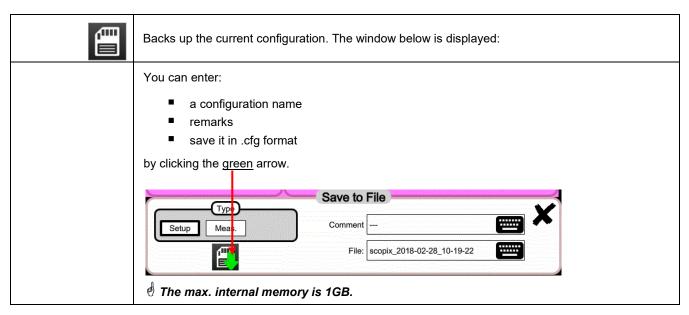


, the screen below is displayed and recording starts:



Each recording file contains 100,000 measurements per channel, at a rate of one measurement every 0.2 sec for 20,000 sec (approx. 5h30').

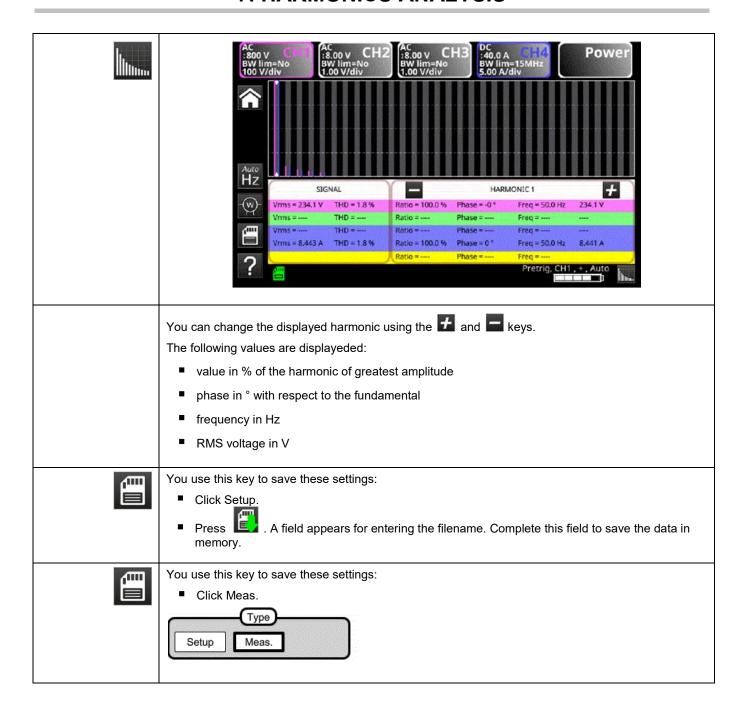
- If a recording exceeds 100,000 measurements, ScopiX automatically generates a second measurements file that continues where the preceding file ended.
- If the second measurement file reaches 100,000 measurements, a third file is created, and so on until you decide to stop the acquisition or the memory available for the files is full.







# 7. HARMONICS ANALYSIS



# 8. TECHNICAL SPECIFICATIONS

# 8.1. Oscilloscope function

Only the assigned tolerance or limit values are guaranteed values (after a half-hour warm-up period). The values without tolerances are given as an indication.

# **Vertical deflection**

Characteristics	OX 9062	OX 9102 OX 9104	OX 9304		
Number of channels <sup>1</sup>	2	OX 9xx2: 2, OX 9xx4: 4			
Vertical ranges		2.5mV to 200V/div.  Variation in steps (no continuously variable coefficient)			
BW to 3dB down	60MHz	100MHz	300MHz		
	Measured into a 50Ω load with	a signal having an am	plitude of 6 div.		
Max. input voltage <sup>2</sup>	1400 VDC, 1kVrms v	with the <i>Probix</i> HX0030	probe		
Types of input	Probix safety connec	ctor: class 2, isolated in	puts		
Dynamic of the vertical offset	±10 divisi	ions in all ranges			
Input coupling AC DC GND	10Hz to 60MHz 0 to 60MHz reference	10Hz to 100MHz 0 to 100MHz reference	10Hz to 300MHz 0 to 300MHz reference		
Bandwidth limiters	at ≈15MH	lz, 1.5MHz, 5kHz			
Rise time in all vertical ranges. 2.5mV to 200V/div.	≈5.85ns	≈3.5ns	≈1.17ns		
Cross-talk between channels	>70dB (Same ser	>70dB (Same sensitivity in both channels)			
Response to rectangular signals at 1kHz and 1MHz	Positive or negative overshoot Overshoot ≤ 4%				
Vertical resolution of the display	±0.4% of full scale (without ZOOM) 0.025% in ZOOM mode (12 bits)				
Accuracy of the peak-to-peak gains	±2% with averaging from 4 to 1kHz				
<b>Accuracy</b> of the vertical measurements in DC with offset and averaging over 16	±[2.2% (reading) + 11% (sensitivity) + 400 μV] applies to the following measurements: Vmin, Vmax, Vlow, Vhigh, Vavg, curs(1), curs(2)				
<b>Accuracy</b> of the vertical measurements in AC without offset at 1kHz with averagin over 16	±[2% (reading) + 1% (sensitivity)] applies to the following measurements: Vamp, Veff, Dep+, Dep-				
Resolution of the measurements	12 bits				
Accuracy of the vertical offset	±[0.2% (reading) + 10% (sensitivity) + 400 μV]				
Vertical <b>ZOOM</b> function on an acquired or saved graph	ZOOM factors: 16 max.				
Input impedance	1 MΩ ±0.5% approx. 12 pF				

<sup>&</sup>lt;sup>1</sup> Instruments with two channels: CH1 and CH4, instruments with four channels: CH1, CH2, CH3, CH4

<sup>&</sup>lt;sup>2</sup> Refer to the figure (§ 9.4.2.): max. input voltage as a function of frequency

# Horizontal deflection (time base)

Characteristics	OX 9062 - OX 9102 - OX 9104 - OX 9304	
Time base ranges	35 ranges, from 1ns to 200s/div.	
Accuracy of the time base	±[0.0005% + max (500ps, 1 sample)]	
Sampling <b>frequency</b>	2.5GS/sec. in real time 100GS/sec. on repetitive signal	
Accuracy of the time measurements	±[(0.02 div.) x (time/div.) + 0.01 x reading + 1ns]	
	Zoom coefficient: x1 to x100 The oscilloscope has a memory capacity of 100,000 pts per channel.	
Horizontal <b>ZOOM</b>	In ZOOM mode, the sequence of time base ranges is the same as in the normal mode.  The horizontal resolution of the screen is 2500 points for 10 divisions.	
XY mode	The bandwidths are the same in X and in Y. As in standard mode, the sampling frequency depends on the time base.	
Phase error	<3°	
	In time or frequency domain (FFT)  calculation on the displayed traces	
Representation  Fast Fourier Transform	<ul> <li>dynamic refresh according to the signal observed in RUN mode</li> <li>windowing: rectangle, hamming, Hanning, Blackman</li> <li>scales: logarithmic or linear</li> <li>automatic adjustment via autoset</li> </ul>	

# **Triggering circuit**

Characteris	tics	OX 9062	OX 9102 OX 9104	OX 9304	
Triggering sources		CH1, CH2, CH3, CH4 ( <b>OX 9xx4</b> ) CH1, CH4 ( <b>OX 9102</b> )			
Triggering mode		Automatic Triggered Single-shot Auto Level 50%			
	AC	10Hz to 100MHz	10Hz to 200MHz	≥10Hz	
<b>BW</b> on triggering	DC	0Hz to 100MHz	0Hz to 200MHz	0Hz to BW max <sup>3</sup>	
without band limitation	HF reject	0Hz to 10kHz	0 to 10kHz	0 to 10kHz	
	BF reject	10kHz to 100MHz	10kHz to 200MHz	≥10kHz	
		If bandwidth limitation is activated, the BW of the triggering is also reduced.			
Triggering <b>slope</b>		Negative- or positive-going edge			
Triggering sensitivity	,	0.6 div. (0Hz to 50MHz) 1.2 div. (50MHz to 100MHz) 0.6 div. (0Hz to 50MHz) 1.2 div. (50MHz to 200MHz) 0.6 div. (0Hz to 50MHz) 1.2 div. (50MHz to 200MHz) 1.5 div. (200MHz to BW m			
Noise rejection		≈ ±1.5 div.			
Triggering <b>level</b> Range of variation		±10 div.			
Type of triggering		on edge Triggering source: CH1 (CH2) (CH3) CH4			
		on pulse width			
		triggering after delay	Source of qualities: CH1 (CH2) (CH3) CH4		
		triggering after counting	<ul> <li>from 3 to 16,384 events</li> <li>Source of qualifier: CH1 (C</li> <li>Counting source: CH1 (C</li> <li>Triggering source: source counting</li> </ul>	H2) (CH3) CH4	
Holdoff			Adjustable from 64ns to 15 se		

<sup>&</sup>lt;sup>3</sup> BW max: maximum bandwidth determined by the vertical sensitivity of the channel

# **Acquisition system**

Characteristics	OX 9062 - OX 9102 - OX 9104 - OX 9304		
ADC Resolution	12 bits		
Maximum <b>sampling</b> frequency	2.5GS/s in real time 100GS/s with repetitive signal (ETS) according to time base 1 converter per channel		
	Minimum width of transients that can be detected: ≥ 2ns		
Transient Capture MIN/MAX mode	In the range [1ns 5ms]: 1250 MIN/MAX couples stored in 100,000-pt acquisition memory.		
	In the range [20ms 200s]: 50,000 MIN/MAX couples		
Depth of acquisition memory reconstituted	100,000 pts per channel		
PRETRIG	0-9.5 div. 0-950 div. (zoom)		
POSTRIG	0-20 div. 0-2000 div. (zoom)		

### File formats

Characteristics	OX 9062 - OX 9102 - OX 9104 - OX 9304
Backup memory	Local file system. The user's files are stored in a specific partition. System of files on µSD Card. The partitions of the µSD Card can be accessed in the sdcard_pX directory of the local file system.
<b>Size</b> of memory available for the file system	<ul> <li>Internal memory of the instrument: 1GB</li> <li>with µSD Card of type SC (≤2GB), HC (&gt;2GB ≤32Go) or XC (&gt;32GB ≤2TB) with its partition(s) formatted in FAT32</li> </ul>
The files of traces acquired in SCOPE mode Extension: .trc	Binary format Size: ≈ 400kB per trace stored (max: 1.6MB)
The files of traces acquired in LOGGER mode Extension: .rec	Binary format Size: ≈ 400ko per trace stored (max: 1.6Mo)
Configuration files Extension: .cfg	Binary format Size: ≈ 1ko
Printing files Extension: .png	Size: <200ko
Files of <b>mathematical</b> functions Extension: .fct	Text format Size: <1ko
Files containing <b>text</b> Extension: .txt	Text format Files with the .TXT extension can contain measurements made in the instrument's various acquisition modes.
.txt file containing measurements made in <b>HARMONIC</b> mode	Size: <10ko

Measurement processing			
Mathematical functions	Equation editor (functions on the channels or simulated functions):		
	Addition, subtraction, multiplication between channels.	n, division, and complex functions	
Automatic measurements	Time measurements rise time fall time positive pulse negative pulse duty cycle period frequency phase counting integral	Level measurements DC voltage RMS voltage peak-to-peak voltage amplitude max. voltage min. voltage upper sup. lower plateau overshoot	
Resolution of the measurements	12 bits/display on 4 digits		
Measurements by <b>cursors</b> or <b>automatic</b> neasurements			
Accuracy of <b>vertical</b> measurements in DC	±[1% x (reading - offset) + accuracy of the vertical offset + (0.05 div.) + (V/div.)]		
Accuracy of <b>time</b> measurements with 2 cursors	±[0.02 x (t/div.) + 0.01% (reading) + 1ns]  In XY mode, the cursors are not attached to the graph.		

# Display

Characteristics	OX 9062 - OX 9102 - OX 9104 - OX 9304
Display screen	LCD 7" TFT (color display)
	Backlighting by LEDs
Brightness	Continuous adjustment
Resolution	WVGA, or 800 pixels horizontally x 480 pixels vertically
Screen saver	Choice of delays: 15', 30', 1h, or none
Display without Zoom	Complete memory: 100,000
Horizontal ZOOM	2500 pts out of the 100,000 of the complete memory
Display	
modes Vector	Points acquired, points interpolated, average. Linear interpolation between 2 acquired pts.
Envelope	Display of the min. and of the max., on each abscissa, acquired on several bursts.
Average	Over: no averaging, 2, 4, 16, 64
The entire acquisition	Display of all samples acquired in a burst with linear interpolation between 2 acquired points.
Screen <b>indicators</b> <i>Triggering</i>	Position of the triggering level (with coupling and overshoot indicator) Position of the Trigger point on the bargraph and on the top edge of the screen (with overshoot indicators)
	Identifiers of traces, activation of the traces Position, Sensitivity Ground reference
Traces	High and low overshoot indicators, if traces outside screen

Vai	rın	211

Signal for calibration of the 10:1 probes	Form: rectangular Amplitude: ≈0-3V Frequency: ≈1kHz Connect the cold of the probe to the cold of the calibration output of the probes.	
Autoset  Search time Frequency range Amplitude range Limits of duty cycle	<5s >30Hz 15mVpp to 400 Vpp from 20 to 80%	

### 8.2 Multimeter and LOGGER functions

Only the assigned tolerance or limit values are guaranteed values (after a half-hour warm-up period). The values without tolerances are given as an indication.

Display	8,000 points as voltmeter				
Input impedance	1ΜΩ				
Max. input voltage	600 Vrms sine and 800 VDC without probe 1000 Vrms and 1400 VDC with HX0030 probe				
DC measurement					<u>HX0030</u>
Ranges	V8.0	8V	80V	800V	8kV
Resolution	0.1mV	1mV	10mV	0.1V	1V
Accuracy	± (0.5 % + 2	5 D) in DC	from 10% to	o 100% of the scale	
Common mode rejection	>70dB at 50	or 60 or 4	00Hz		
AC and AC+DC measurements					<u>HX0030</u>
Ranges	0.6V 0.8V	6V 8V	60V 80V	600 Vrms sine 800 Vpeak	6kVrms 8kVpc
Resolution	0.1mV	1mV	10mV	0.1V	1V
Accuracy in coupling AC + DC Filters inactive	± (1% + 25 I ± (2% + 25 I ± (3% + 25 I	D) from >1	kHz to 10kH	z id.	o of the scale (peak)
AC Filters inactive	± (1% + 25 I ± (2% + 25 I ± (3% + 25 I	D) from >1	kHz to 10kH		
Common Mode Rejection	>70dB at 50	, 60 or 400	)Hz		
Digital filter	<ul><li>Order</li><li>Bandwid</li></ul>	equency Ith ripple			0.5dB
	<ul><li>Stopbar</li></ul>	d attenuat	ion		50dB

Resistance measurement	In Channel 1		
Ranges (full scale)	Ohmmeter	Resolution	Measurement current
	80Ω 800Ω 8kΩ 80kΩ 800kΩ 8MΩ	0.01Ω 0.1Ω 1Ω 10Ω 100Ω 1000Ω	500μΑ 50μΑ 50μΑ 2μΑ 2μΑ 50nΑ
<b>4</b>	32MΩ	10kΩ	50nA
Accuracy	±(0.5% + 25 D) from 10	1% to 100% of the sc	cale
Open-circuit voltage	≈3V		
Continuity measurement	In Channel 1		
Beeper	<30Ω ±5Ω		
Measurement current	≈0.5mA		
Beeper response	<10ms		
Diode test	In Channel 1		
Voltage	Open-circuit: ≈ + 3.3V		
Accuracy	±(0.5% + 5 D)		
Measurement current	≈ 0.6mA		
Capacitance measurement	In Channel 1		
Ranges	Capacitance meter	Resolution	Measurement current
Accuracy	5mF 500µF 50µF 5µF 500nF 50nF	1μF 0.1μF 0.01μF 1nF 100 pF 10 pF 1 pF	500μA 500μA 500μA 50μA 50μA 2μA 2μA
Accuracy	<ul> <li>5nF range (measurement with a shielded lead):</li></ul>		
Cancellation of series and parallel R	parallel R >10 k Use the shortest possible leads.		
Frequency measurement	20Hz to 200kHz on a square- and sine-wave signal 20Hz to 20kHz on a triangular signal Accuracy: 0.2%		
Power measurement	The power measurem	nenet is available or	nly in AC, AC<5kHz, and AC <625 Hz.
active	± (2% +25 D) from 40	to 1kHz, filters inac	ctive
reactive	± (4% +25 D) from 1 t	o 10kHz, filters inac	ctive
	1	to 200kHz, filters in	

# **Operating modes**

Relative mode	Display with respect to a base measurement  The Relative, Surveillance, a	
Surveillance (statistical)	On all measurements in MAX MIN value	Frequency modes are mutually
Frequency	The frequency can be displayed in AC mode	exclusive.
Interval of time between 2 measurements	0.2s	
Duration of the records (LOGGER mode)	Each file contains 100,000 measurements, or an acquisition time of 20,000 seconds. Automatic sequential recording (N files of 100,000 measurements)	
RUN (MULTIMETER mode)	Measurements started	
HOLD (MULTIMETER mode)	Measurement frozen	

# Display

In digital form	<ul> <li>main measurement: large display</li> <li>secondary measurement: small display</li> <li>The type of secondary measurement can be selected in the menu.</li> </ul>
Graphic plot (LOGGER mode)	History of measurements over time
Number of measurements represented on a trace	100,000

# 8.3. VIEWER function

The **VIEWER** function reads a file acquired in LOGGER mode.

Horizontal zoom	Zoom coefficient: x1 to x100 The oscilloscope has a memory capacity of 100,000 pts per channel.
Vertical zoom	ZOOM factors: maximum 16
Accuracy of measurements by cursors, vertical	± [1%x(reading - offset) + accuracy of the vertical offset + (0.05 div.) + (V/div.)]
Accuracy of measurements by cursors, time	± [0.02 x (t/div.) + 0.01% (reading) + 1ns]

### 8.4. HARMONIC ANALYSIS function

- Displays harmonics in bargraph form
- Crosshair with vertical axis graduated in %
- Horizontal axis graduated in orders of harmonic
- Displays 63 orders
- The harmonic analysis function can be implemented on the 4 channels
- Displays measurements:
  - RMS level of the signal
  - total harmonic distortion (THD) with respect to the RMS value of the fundamental
  - RMS level of the harmonic selected
  - ratio in % of the RMS value of the selected harmonic to the RMS value of the fundamental
  - frequency of selected harmonic
  - phase of selected harmonic/fundamental

Harmonic analysis		
Frequency of the fundamental of the signal analyzed	from 40 to 450Hz	Condition
Accuracy of the measurements	In the domain of reference: 64 to 82°F (18 to 28°C), at 50Hz a	and 60Hz
Level of the Fundamental	±(2% + 10 D)	
Level of the Harmonics	±(3% + 10 D), ratio ±2%	ratio >4%
Harmonic distortion (THD)	±4%	
Phase	±5%	ratio >4%
Variations in the nominal range of use	32 to 104°F (0 to 40°C), at 50Hz and 60Hz	
Level of the Fundamental	±(5%/18°F [10°C])	
Level of the Harmonics	±(5%/18°F [10°C]), ratio ±(1%/18°F [10°C])	ratio >4%
Harmonic distortion (THD)	±(5%/18°F [10°C])	
Phase	±(10°/18°F [10°C])	ratio >4%

# 8.5. Communication

# 8.5.1. Communication port and peripherals

ETHERNET	100Base-T, electrically isolated (peripheral) 600V, CAT III isolation is implemented inside the instrument. ETHERNET isolation by transformer USB isolation by logical isolator
WIFI	WEP, WPA
USB	Electrically isolated CDC (Communication Device Class) ACM (Abstract Control Model) protocol to submit SCPI queries MS (Mass Storage) protocol to manage the SCOPIX IV file system (and its µSD card). RNDIS (Remote Network Driver Interface Specification) to communicate via USB using the TCP/IP protocol.
SDCARD	Transfer files between the scope and a computer by memory card, Micro SD format (type SC, HC, or XC). The supported file system is FAT32.

### 8.5.2. Applications

SCOPENET	Accessible via ETHERNET, WIFI, or USB using a browser. To access, type the following line in the navigation bar of: FIREFOX/CHROME/EXPLORER: http:// <ip address="">  Example: http://192.168.1.1 This application uses IP ports 50 000 and 50 010 (it may be necessary to update your computer's Firewall).</ip>
Access to the file system from a PC	via USB: using the RNDIS protocol (and the corresponding driver)
SCPI	via USB: using the CDC ACM protocol (and the corresponding driver) via ETHERNET: on port 23 via WIFI: on port 23

# 9. GENERAL SPECIFICATIONS

# 9.1. Nominal range of use

### 9.1.1. Environmental conditions

Reference temperature: 64 to 82°F (18 to + 28°C)

Operation temperature: 32 to 104°F (0 to + 40°C)

Storage temperature: -4 to 158°F (-20 to + 70°C)

Relative humidity: <80% RH  $\rightarrow$  95°F (35°C); <70% from 95 to 104°F (35 to 40°C)

(limited to 70% in the  $8M\Omega$  and  $32M\Omega$  ranges)

Altitude: <6500' (<2000m)

### 9.1.2. Variations in the nominal range of use

Quantities of	Range of		Error	
influence	influence		Typical	Max.
Battery voltage	9.4V to 12.6V	All	-	-
Temperature	32 to 104°F (0 to + 40°C)	Oscilloscope  Vertical gain Position Triggering level Automatic measurements  Time base	±0.5% per 18°F (10°C) ±0.1% per 18°F (10°C)	±1% per 18°F (10°C)  ±0.2% per 18°F (10°C)
	32 to 104°F (0 to + 40°C)	Bandwidth, overshoot	±2.5% per 18°F (10°C)	±5% per 18°F (10°C)
	32 to 104°F (0 to + 40°C)	Multimeter  DC measurements  AC+DC  Measurement  of resistance of diodes of capacitance  Frequency counter	±0.5% per 18°F (10°C) ±0.5% per 18°F (10°C) ±0.5% per 18°F (10°C) ±0.1% per 18°F (10°C)	±1% per 18°F (10°C) ±1% per 18°F (10°C)  ±1% per 18°F (10°C)  ±0.2% per 18°F (10°C)
	32 to 104°F (0 to + 40°C)	Measurements of harmonics of the network  Fundamental Harmonics Distortion  Phase	±3% per 18°F (10°C) ±5° per 18°F (10°C)	±5% per 18°F (10°C) ±10° per 18°F (10°C)
Electromagnetic field	10V/m	Oscilloscope Vertical noise Ohmmeter Measurements	5mV <sub>pp</sub> 0 - 2%	7.5mV <sub>pp</sub> 5% of full scale
Humidity	0% to 70%	All measurements	-	-
Temperature	70% to 80%	All measurements from 32 to 95°F $\underline{(0 \text{ to } 35^{\circ}\text{C})}$ except 8 M $\Omega$ and 32 M $\Omega$ ranges	-	-

### 9.1.3. Power supply

Battery voltage: >9.5V; 10.8V nominal

or external power: connected to network at 230V  $\pm$  15%, 50Hz

or 110V ± 15%, 60Hz

(therefore operates from 98V to 264V).

### 9.2. Mechanical specifications

### 9.2.1. Case covered with elastomer

#### Components:

- lower housing
- central belt holding all terminations
- upper housing
- battery compartment cover
  - Dimensions: 11.5 x 8.3 x 2.6" (292.5 x 210.6 x 66.2mm)
  - Weight: approximately 5.3 lbs (2.4 kg) with the battery
  - Carrying strap: snaps onto the top of the instrument

#### 9.2.2. Mechanical conditions

### ■ Waterproofing

Resistant to drops of water falling vertically and penetration of objects ≥ 1mm: IP 54 (instrument not in operation).

Instrument alone, without accessories or external power supply, upright, tilted 40° on its prop or flat with LCD up.

# Remarks:

- 1. Do use not the instrument in locations with carbon dust, metallic dust, or other conducting dust in the air.
- 2. Wipe the instrument, in particular the measurement terminals, after each use.

#### Shocks and impacts

Per test standards IEC 62262: IK03 (LCD screen) and IK06 (any other part of the instrument). 3 impacts with a force of 1 Joule (IK06) or 0.35 Joule (IK03), applied to each component part of the instrument, without deterioration that might create a risk for the safety of the user.

Free fall, without packaging.
 Instrument alone, without accessories, on 3 sides.
 Per the test standards of IEC 61010-1-2010.

### 9.3. Electrical specifications

### 9.3.1. Battery power supply

- Li-lon technology
- Nominal voltage: 10.8V
- Operating voltage: 10V to 12V
- Capacity: 5800mAh/62 Wh
- Battery protected from short circuits by resettable fuse
- Life between charges
  - 5h30min for the two-channel models
  - 4h for the four-channel models
- Charging time: ≤ 7 hours depending on charger type

### 9.3.2. Line power

- DC supply, approximately 15V, 30W for instrument operation
- DC supply, approximately 11V, 15W to charge the battery
- Primary circuit characteristics: 98V < Input voltage < 264V</p>
- Therefore operates on the following networks:
  - 230V, ±15%, 50Hz
  - 115V, ±15%, 60Hz

### 9.4. CEM and safety

### 9.4.1. Electromagnetic compatibility

The instruments are compliant with the standards and any amendments, in their industrial classification:



IEC 61326-1 with a quantity of influence in the presence of a magnetic field of 10V/m

### 9.4.2. Electrical safety

IEC 61010-1 (2010 + amendment 1)

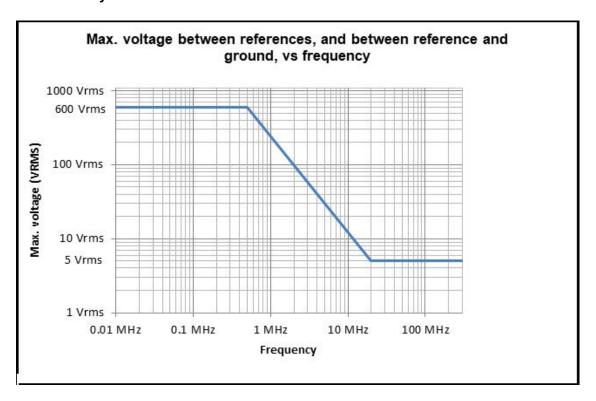
€

IEC 61000-2-030 (2017)

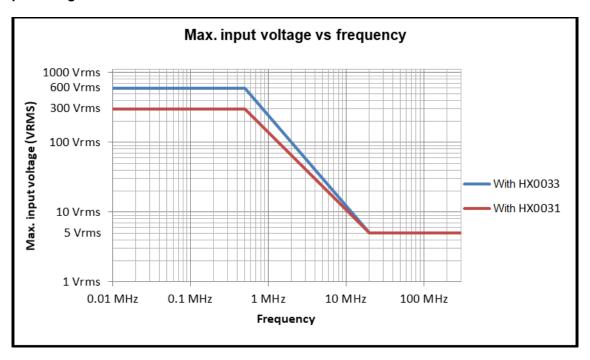
Electrical safety without accessories	600V CAT III, double isolation
Max. input voltage without accessories	300 VDc, 300 Vrms, 414 Vpk (DC + peak AC at 1kHz)

### **Derating values**

### a) Electrical safety:



### b) Input voltage:



### 9.4.3. Temperature

Maximum internal temperature: 185°F (85°C) when the max. ambient temperature is 104°F (40°C).

# 10. MAINTENANCE

### 10.1. Warranty



This oscilloscope is guaranteed for three (3) years against defects of materials or workmanship, in accordance with the general terms of sale.

During this period, the instrument must be repaired only by the manufacturer, which reserves the right either to repair the instrument or to replace all or part of it. If the equipment is sent back to the manufacturer, the customer pays for shipping to the manufacturer.

The warranty does not apply in the following cases:

- Inappropriate use of the equipment or use with incompatible equipment
- Modifications made to the equipment without the explicit permission of the manufacturer's technical staff
- Work done on the device by a person not approved by the manufacturer
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user's manual
- Damage caused by shocks, falls, or floods

### 10.2. Cleaning



- Power down the instrument.
- Clean it with a damp cloth and soap.
- Never use abrasive substances, solvents, alcohol, or hydrocarbons.
- Let dry before using again.

### 10.3. Repair and metrological verification

See attached safety data sheet.

Warning!

In all cases, if you find a defect (broken screen, broken Probix socket, defective housing, etc.) do not use your ScopiX, because its insulation may be impaired. Return it immediately to customer service for repair.



### **USA**

Chauvin Arnoux Group d.b.a AEMC

15 Faraday Drive Dover, NH 03820 USA

Phone: (800) 945-2362 (Ext. 360)

(603) 749-6434 (Ext. 360)

Fax: (603) 742-2346 or (603) 749-6309

E-mail: repair@aemc.com

### INTERNATIONAL

Chauvin Arnoux Group

Phone: +33 1 44 85 44 38 Fax: +33 1 46 27 95 69

### Our international contacts

www.chauvin-arnoux.com/contacts

