Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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HMO3000 Series
Mixed Signal Oscilloscopes
300/400/500 MHz Bandwidth
Precise signal analysis
4 Examples’ sampling rate
8 Msample memory

Intelligent user interface
To optimize the screen display the instrument shows and hides menus

FFT
Superb FFT functionality

Quick view
At the push of a button the 16 most important values of the measured signal are permanently updated and displayed

Setup
Intuitive, multi-lingual user menu

Help
Context-sensitive help

Math
Wide range of programmable math functions

Zoom
Memory zoom up to 250,000 : 1

Analog channels
Vertical sensitivity of up to 1 mV/div.

Bus signal source
To create SPI, I²C, UART and counter signals

Always with MSO functionality
Analyze analog channels plus up to an additional 16 digital channels

Serial Bus Analysis
Hardware-based triggering and decoding (optional)

Fan
Maximum noise reduction by temperature-controlled fan

System that are constantly becoming faster and more complex lead to ever higher demands on the required measurement technology. The new HAMiG oscilloscope series HMO3000 offers the solution for current requirements in regards to bandwidth, sampling rate and memory depth. Its bandwidth of up to 500 MHz allows HAMiG instruments to set a new milestone in the development of high-performance mixed-signal oscilloscopes at an attractive price.

The 2- and 4-channel instruments provide bandwidths of 300, 400 and 500MHz, a sampling rate of 4 GSa/s and a memory depth of 8MPts. The instruments are rounded off with a standard inclusion of the MSO functionality and several options for serial bus analysis to meet all requirements of modern development designs.

HAMiG Instruments is offering the new HMO3000 series exclusively as a mixed-signal oscilloscope. It is also unnecessary to initially activate the mixed-signal functions via software options, as is the case with other suppliers. The low capacitance logic probes HO3508 (also available as double pack HO3516) are optional. They allow the analysis of up to 16 logic channels with a sampling rate of 1 GSa/s. HAMiG logic probes are not linked to a specific instrument serial number. This allows their use with all digital HAMiG oscilloscopes of the HMO series.

For communications between embedded systems and the environment the HMO3000 includes hardware-based signal triggering and decoding for all common protocols (I²C, SPI, UART, CAN and LIN). This option can be activated with an upgrade voucher at any time.

The segmented memory option HOO14 enables you to divide the available memory of your HMO3000 into up to 1000 segments. This procedure allows sampling rates of 200,000 Wfm/s, which makes it possible to capture rare anomalies occurring during many short events in quick succession. For the analysis of the recorded signals, all measurement functions of the HMO are available, including the Pass/Fail function.

The FFT analysis function with 64K test points the HMO3000 series keeps pace with significantly larger oscilloscopes also in the frequency domain. The time domain signal, measurement window, FFT analysis result are displayed together on a single screen, which makes it easier to evaluate the input waveform.

The HMO3000 series offers time domain, logic, protocol and frequency analysis in a single instrument and is a member of the Rohde & Schwarz family of scope-of-the-art oscilloscopes.
Model overview

500 MHz 400 MHz 300 MHz
4 channel HMO3054 HMO3044 HMO3034
2 channel HMO3052 HMO3042 HMO3032

Key facts

Superior hardware-based acquisition for precise measurement results
- 4Gsample/s sampling rate
- 8Msample memory depth
- High vertical sensitivity down to 1 mV/div
- Low-noise measurement due to state-of-the-art ADC converter
- High acquisition rate to identify signal faults
- Segmented memory and manually adjustable memory depth

Versatile measurement functions and fast results
- Wide selection of automatic measurement functions
- QuickView: key results at the push of a button
- Mask test: a new mask can be easily created with just a few keystrokes
- FFT: the easy way to analyze the signal spectrum

Logic analysis with the MSO option
- Mixed signal function as standard
- Precise triggering on signal events
- Straightforward display of digital signals
- Low test point loading due to active probe solution

Serial bus analysis: hardware-based triggering and decoding
- Versatile trigger options for isolating specific data packets
- Color-coded display of decoded bus signals
- Direct export of analyzed data to USB memory drive
- Simultaneous decoding of two buses in real time

Voltmeter measurements using an oscilloscope
- Three-digit display for precise voltage measurements
- Simultaneous measurement on all analog channels of up to four voltage values totaling

Future-ready investment and scalability
- Free firmware updates
- Bandwidth upgrades as required
- Serial bus analysis and segmented memory via optional software licenses

Application How the HAMEG HMO3000 meets your needs

Engineering lab
- Adjustable memory depth
- Advanced math functions available as standard, math on math possible
- Automeasurement for 28 user-defined parameters

Analog
- Mixed signal option (HMO with 16 logic channels)
- Simultaneous acquisition of analog and mixed signal data
- Segmented memory (HMO14, HV114)

Versatile debugging
- Fast boot time
- Reduced, intelligent temperature management
- Enhanced display size through Virtual Screen technology
- DVI-D output for external display

Voltmeter measurements using an oscilloscope
- Three-digit display for precise voltage measurements
- Simultaneous measurement on all analog channels of up to four voltage values totaling

Future-ready investment and scalability
- Free firmware updates
- Bandwidth upgrades as required
- Serial bus analysis and segmented memory via optional software licenses

Should your requirements change, then so does the HMO3000, as the 300 MHz models can be extended to 400 MHz and 500 MHz bandwidth via software upgrades whenever required. This is done with option upgrade vouchers available at your dealer.

- For 300 MHz to 400 MHz: HV342 (2 channel) and HV344 (4 channel)
- For 300 MHz to 500 MHz: HV352 (2 channel) and HV354 (4 channel)
- For 400 MHz to 500 MHz: HV452 (2 channel) and HV454 (4 channel)

Vouchers for bandwidth upgrades or serial bus analysis options are available at your dealer.

The individual voucher number and the serial number of the instrument to be upgraded is entered at http://voucher.hameg.com. The customer immediately receives the respective licence key which can be loaded via USB memory drive into the instrument.

Voltmeter measurements using an oscilloscope
- Three-digit display for precise voltage measurements
- Simultaneous measurement on all analog channels of up to four voltage values totaling

Future-ready investment and scalability
- Free firmware updates
- Bandwidth upgrades as required
- Serial bus analysis and segmented memory via optional software licenses

Should your requirements change, then so does the HMO3000, as the 300 MHz models can be extended to 400 MHz and 500 MHz bandwidth via software upgrades whenever required. This is done with option upgrade vouchers available at your dealer.
Always a MSO

The mixed signal functionality is always included in the HMO3000 series with no software option being necessary to unlock it.

HAMEG is offering the new HMO3000 series exclusively as a mixed-signal oscilloscope. The great advantages of these instruments are best illustrated by taking a look at how ADCs (Analog Digital Converter) or DACs (Digital Analog Converter) are integrated.

These transformer modules include an analog signal on the one side and a digital signal on the other side. As shown in the image below the latency time of a DAC can be determined with one simple cursor measurement. Therefore a MSO allows developers to devote their full attention to the circuit without having to waste energy on the measurement setup.

The active logic probe HO3508 (also available as double pack HO3516) is available separately and is not linked to a specific serial number of an instrument. It can be used with any HMO oscilloscope.

Mixed signal functionality is always included in the HMO3000 series with no software option being necessary to unlock it.

Specifications HO3508

| Channels | 8 |
| Memory depth per channel | 4 MPts (HMO3000 series) |
| Input impedance | 100 kΩ || <4 pF |
| Thresholds | TTL, CMOS, ECL, user-defined (-2 V to +8 V) |
| Max. input frequency | 350 MHz |
| Max. input voltage | 40 V (DC + peak AC) |
| Measuring category | CAT I |
| Cable length | approx. 1 m |

Video

HMO3000 product video

Scan, click or directly

http://youtube.com/HAMEGcom

Optional: Logic probe HO3508

- Logic probe HO3508 fits to all HMO series oscilloscopes (also available as double pack HO3516)
- No hardware lock to a specific device
- 8 logic channels available on each logic probe
- Signal threshold adjustable for each logic pod

14 bit DAC signal change
I2C, SPI, CAN or LIN – in terms of interaction with the outside world for embedded systems, it is safe to say that these are the most commonly used communication protocols. The new HMO3000 series by HAMEG Instruments offers you hardware-accelerated signal triggering and decoding for all of these protocols. You can upgrade your instrument via software licence keys with those functions required to develop your application:

- **HMO10/HV110**: Analysis of I2C, SPI and UART/RS-232 signals on analog and logic channels
- **HMO11/HV111**: Analysis of I2C, SPI and UART/RS-232 signals on all analog channels
- **HMO12/HV112**: Analysis of CAN and LIN signals on analog and logic channels

**Serial bus trigger types:**
- **I2C**: Start, Stop, ACK, nACK, Address/Data
- **SPI**: Start, End, Serial Pattern (32Bit)
- **UART/RS-232**: Startbit, Frame Start, Symbol, Pattern
- **LIN**: Frame Start, Wake Up, Identifier, Data, Error
- **CAN**: Frame Start, Frame End, Identifier, Data, Error

**Segmented Memory**

The segmented memory option HDO14 enables you to divide the available acquisition memory of your HMO3000 into up to 1000 segments. This procedure allows sampling rates of 200,000 Wfm/s, which makes it possible to capture rare anomalies occurring during many short events in quick succession. For the analysis of the recorded signals, all measurement functions of the HMO are available, including the Pass/Fail function.

You can upgrade to option HDO14 at any time with voucher HV114. The individual voucher number and the serial number of the instrument is entered at [http://voucher.hameg.com](http://voucher.hameg.com).
The three-digit digital voltmeter is also a standard feature which makes the work of service technicians in particular easier. Voltage measurements can be performed simultaneously for all analog channels. Integrated into a single compact device it allows you to keep your workplace tidy.

- Perform measurements simultaneously on all analog channels, with up to four freely definable parameters totaling
- These options are available: DC, DCrms, ACrms, Crest Factor, Vpp, Vp+, Vp-
- You decide about the position of the values on the screen

Due to the outstanding FFT functionality of the HMO series oscilloscopes signals can also be analysed in the frequency domain with up to 65,536 points. Additional practical tools such as cursor measurement as well as peak-detect functions are also available. They allow engineers to complete their analysis significantly faster, also in the frequency domain.

**Frequency Analysis**

Due to the outstanding FFT functionality of the HMO series oscilloscopes signals can also be analysed in the frequency domain with up to 65,536 points. Additional practical tools such as cursor measurement as well as peak-detect functions are also available. They allow engineers to complete their analysis significantly faster, also in the frequency domain.

In the time domain quite often the distortion of input signals cannot be detected with the naked eye. For instance, an acquired sine wave signal appears to be undistorted. Only the frequency spectrum - available with just one push of a button - clearly displays additional harmonics that occur as harmonic oscillations for multiples of the basic frequency.

Since FFT is also active for previously stored signals, it is possible to subsequently analyse any sections of those signals captured in single shot mode or stop mode with an adjustable window width.
Virtual Screen usage: 20 Div

Display range in horizontal direction

Analog Channels

Levels of brightness: 32

Display range in vertical

Screen size / type: 16.5 cm (6.5") VGA Color Display

from firmware version 5.520

HMO3052, HMO3054: 500 MHz

HMO3042, HMO3044: 400 MHz

HMO303x: 300 MHz

Bandwidth limitation about 20 MHz (switchable)

Lower AC bandwidth: 2 Hz

Resolution (L x W): 640 x 480 Pixel

Rise time (computed)

with menu bar: 10 Div (500 Pixel)

(5mV bis 5V)/Div

< 1.166 ns

HMO303x

HMO3000 SERIES

HMO304x, HMO305x: 200 MHz

HMO305x: 500 MHz

HMO304x: 400 MHz

Trigger sensitivity

Trigger indicator: Screen and panel (LED)

Normal Triggers only on specific trigger events

Auto Triggers automatically also without any specific trigger event

Trigger Mode

Offset control

Position range: ±2.5 V - 8 Div x

±20 V - 8 Div x

50 mV - 8 Div x

±50 V - 8 Div x

Impedance: 1 MΩ || 14 pF ±2 pF (50 Ω switchable)

Impedance: 1 MΩ

50 Ω

±50 V - 8 Div x

±20 V - 8 Div x

50 mV - 8 Div x

±50 V - 8 Div x

External Trigger Input (BNC)

Function: Pull input for every acquisition triggered externally

Input level: ±8 Div

Pullup/bundled: +100 V or higher (in all cases)

Trigger Types

Trigger Mode

Trigger coupling: auto level, DC, HF

Trigger sensitivity: all analog channels, mains, external (DC, AC)

Edge A/B

Trigger Measurements

Waveform Measurements

Pre-trigger: 0 to 4x10^6 Sa x (1/sample rate), x2 in interlaced mode

Post-trigger: 0 to 8.59 x 10^9 Sa x (1/sample rate)

Number of samples

Accuracy: ±5.0 x 10^-6

Slope of waveform: percentage rise, fall, max, min, mean, std deviation, duty cycle (pos/neg), burst width, overshoot (pos/neg), pulse and edge count (pos/neg)

Voltage (Vpp, Vp+, Vp-, Vrms, Vavg, Vmin, Vmax), Voltage (V1, V2, ∆V), time (t1, t2, ∆t, 1/∆t), ratio

Statistics:

Waveform display: dots, vectors, persistence afterglow

Waveform arithmetics:

Persistence afterglow: min. 50 ms

Waveform display: dots, vectors, persistence afterglow

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Statistics:

Waveform display: dots, vectors, persistence afterglow

Waveform arithmetics:
Mask Testing

- Scale dBm, dBV, Vrms
- Window: Hanning, Hamming, Rectangular, Blackman
- FFT length: 2 kpts, 4 kpts, 8 kpts, 16 kpts, 32 kpts, to 64 kpts

Frequency Analysis (FFT)

- Functions: simultaneous display of math.
  - Number of equations: 5 equations per formula set
  - Number of formula sets: 5 formula sets
- Storage location: Math. Memory
- Sources: all analog channels, user-defined constants

Editing

- Formula editor, menu-driven

Mathematics

- Functions: inverse, log10/ln, derivation, integration, filter
- Absolute value, pos/neg wave, reciprocal,
- Minimum / maximum, square, square root,
- Addition, substraction, multiplication, division,
- Percent), test duration

Statistics

- Number of completed tests, number
- Pulse, automatically saving trace data

Mask definition

- Mask enclosing acquired waveform with user-defined tolerance
- Sources: all analog channels

Aging

- ±5.0 x 10^-6 per year

Frequency range

- 0.5 Hz to 300/400/500 MHz

Frequency Counter

- (hardware based)

Marker

- Navigation, automatic marker positioning
- Up to 8 freely positionable markers for easy

Waveform Maths

- Connectors and ports
  - I2C, SPI, UART/RS-232
  - Description: Option-Code Voucher-Code
  - Bus Analysis and Segmented Memory
  - Bandwidth upgrade 400 MHz to 500 MHz HV452 (2-channel models)
  - Bandwidth upgrade 300 MHz to 500 MHz HV352 (2-channel models)
  - Bandwidth upgrade 300 MHz to 400 MHz HV342 (2-channel models)

Recommended Accessories

- Device settings on internal file system or external USB
- Traces on external USB memory, available file formats:
  - BIN (MSB/LSB), FLT (MSB/LSB), CSV, TXT, HRT

- Reference waveforms
  - Device settings on internal file system or external USB
  - Traces on external USB memory, available file formats:
    - BIN (MSB/LSB), FLT (MSB/LSB), CSV, TXT, HRT

- Data display or acquisition data

- Holster, evolution, documentation, electronic

->All specifications at 23°C after 30 minute warm-up.
- Mechanical data
  - Height 2 kg
  - All specifications at 29°C after 5 minute warm up

Power supply

- Realtime Clock (RTC) date and time

AC supply

- 100 V to 240 V, 50 Hz to 60 Hz, CAT-II

BMP, GIF, PNG

- Data display or acquisition data

- All specifications at 23°C after 30 minute warm-up.

Connectors and ports

- I2C, SPI, UART/RS-232
- Description: Option-Code Voucher-Code
- Bus Analysis and Segmented Memory
- Bandwidth upgrade 400 MHz to 500 MHz HV452 (2-channel models)
- Bandwidth upgrade 300 MHz to 500 MHz HV352 (2-channel models)
- Bandwidth upgrade 300 MHz to 400 MHz HV342 (2-channel models)

Description

- Bandwidth upgrade 200 MHz (10.1, 3.5pf, 1300)
- Bandwidth upgrade 300 MHz (10.1, 3.5pf, 2000)

Recommended Accessories

- Device settings on internal file system or external USB
- Traces on external USB memory, available file formats:
  - BIN (MSB/LSB), FLT (MSB/LSB), CSV, TXT, HRT

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  - Device settings on internal file system or external USB
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