HANDYSCOPE MODEL HS4
4 Channel Portable Instrument
Connected to USB 2.0 and USB 1.1

MOST PORTABLE

TiePie engineering introduces the Handyscope model HS4, a portable and compact MOST (Multimeter, Oscilloscope, Spectrum analyzer and Transient recorder). As four channel measuring device with a 50 MS/s sample rate, a 12-16 resolution and 128 KSamples memory per channel, the Handyscope HS4 is the first four channel MOST in the world which can be connected to a PC (USB2.0 and USB 1.1 compatible), without external power supply. Because of the very extensive and accessible Windows based software, the user is offered many measuring possibilities

With good reason you can say the Handyscope HS4 is really "Plug in and Measure":

"Plug in" = connect one cable
"Measure" = read a SET file and measuring can start

Because of the availability of the four different measuring instruments: oscilloscope, spectrum analyzer, voltmeter and transient recorder almost every measuring problem can be solved.

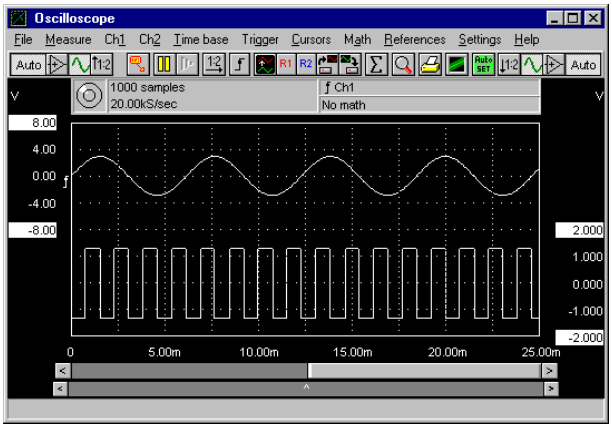
General

The interesting point of the Handyscope HS4 is that once it is connected to a standard PC, there are offered a lot of measuring options which are normally only obtained by using several instruments.

The range of applications for the Handyscope HS4 are fast signals; like serial data communication, frequency regulators, TV signals as well as many low-frequency measuring applications as industrial production machines, office automatisation (photocopier, telephone exchange), sensor measurements, mains voltage measurements, start-up current at motors, mains pollution measurements, checking slow running processes (like temperature, pressure and moistness), sound analyses, vibration measurements (like machines, buildings), trend measurements and single failure detection measurements.

Software

Besides the very good hardware qualities (50 MS/s sample rate, 0.2 up to 80 Volt input range, 12-16 bit resolution, 128 Kword memory per channel and fine trigger options), the Handyscope HS4 also has a powerful software pack. Because of all these qualities, there is no better measuring instrument, in the same pricing range and with the same possibilities, for sale in the world. The software is object oriented and has a built in option that prevents "jamming". Other strong points are that most adjustments graphically can be done by the mouse. You can "grab" the tips of the x-axis and y-axis scrollbars and "live" increase and decrease them. The diagrams are directly enlarged or reduced.



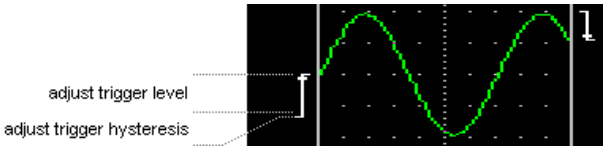
Portable Instruments

Instrument settings

The practical side of the software is that the "software instruments", for instance the oscilloscope and spectrum analyzer, are linked to each other. When in the oscilloscope the input sensitivity is changed, this is also immediately visible in the spectrum analyzer (and voltmeter). Striking are the extensive possibilities of the cross wires. A remarkable point is the auto correction option of the cross wires. Through this the cross wires are put in such a way that over a complete number of periods, for example the true RMS values are determined. Besides that, many time and voltage options are available with the cross wires. Naturally there can be stored an unlimited number of instrument settings to disk. These instrument settings can easily be read which also ensures the instrument is set properly.

Triggering

Besides the normal triggering there is also a window triggering. With this window triggering a trigger moment occur when the signal gets outside the set window. In combination with the AUTO-DISK function, it is very simple to measure the voltage dip or peak, which occasionally do occur.



A service technician of UPS systems is continuously measuring the mains voltage (=voltage of the public electricity network) with the Handyscope. There is set up a minimum and maximum voltage the UPS has to go into service. There is triggered with the AUTO-DISK function. When the mains voltage is cut off or if the voltage becomes too high, a triggering appears (the UPS system should enter into operation and there is measured how the mains voltage behaves during switching over). The measurement (with set number of pre and post samples) is saved to disk and measuring is automatically started again. After a certain time there is checked how the UPS responded on the mains voltage peaks and dips. Through this it could easily be checked whether the UPS did its job well.

Input range

The complete Handyscope HS4 gain and offset calibration is controlled by the software. The mechanical potentiometers are replaced by digital adjustable types. The gain and offset resolution can be adjusted better than 0.2%. Nice to know is that your own calibration files can be saved and read. For the Handyscope, calibration files are available for other input range's. The minimum input range is 200 mVolt and the maximum input range is 80 Volt.

Resolution

The Handyscope HS4 has a resolution range of 12 up to 16 bit.

Resolution	Signal/noise ratio	levels	Maximum sample frequency	percentage proportion
12	72dB	4096	50MHz	0,024%
14	84dB	16384	3.125MHz	0,0061%
16	96dB	65535	195.3125kHz	0,0015%

Through the high flexible resolution it is possible to perform measurements to very fast signals. Because of the high resolution there can be performed good measurements when a large dynamic range is required. If for example you want to measure an interference of 2 mVolt on a sine wave with a 10 Volt amplitude, an 12 bit measuring device is not sufficient. Though with a 16 bit resolution the interference can be measured and analysed well.

DLL and personal software

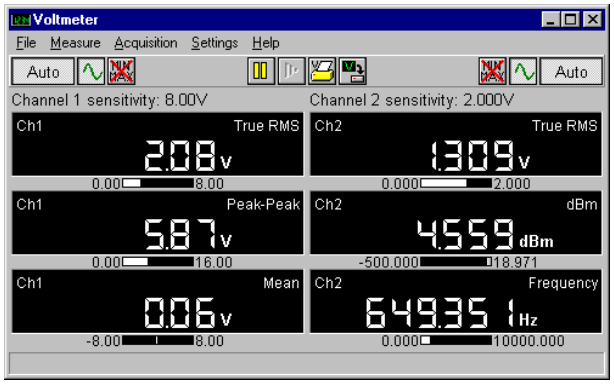
The Handyscope HS4 DLL is delivered with example programs (source code in Delphi, C++, Visual Basic, Matlab), to easily write your own measuring application. The DLL also can be used in other developing environments, like Dasy-lab and Labview.
Because the software (and hardware) are completely developed and produced by TiePie engineering in the Netherlands, the TiePie engineers can simply (and fast) make adjustments. Software updates can be downloaded free of charge from internet (www.tiepie.com). The DLL and the example measuring program can also be downloaded from our web page (www.tiepie.com).

Data export

The measured data can easily be processed in a spreadsheet. Exporting data can be done in ASCII (CSV), so it can be read in a spreadsheet program. All instrument settings can be saved in SET files according the Windows INI file structure. By reading the SET file, the instrument is completely configured so the measurement can start immediately. Together with each data file an information file is stored. In the data file all measured samples (ASCII or binary) are saved. In the information file all instrument settings are saved. The information file is always in ASCII and can easily be read by other programs.

More than 4 channels

There can be connected more Handyscope HS4's to a PC. Using the Multi Channel software,multiple channels can be measured at the same time. A special cable interconnects the instruments and takes care of the synchronization.



Documentation

To document the measure values there are three tools available. For general documentation, there are three text lines printed at each printout. You can for example put your company name and address in these text lines. For measuring specific documentation, there are 240 characters available. There can be put "text balloons" at the measured signals. The text balloons can be configurated to your own view. Both black-and-white as color printers are supported.

General comment

The Handyscope HS4 is a compact measuring device. Many people in the service departments have a laptop and like to use a compact and complete measuring device with it (instead of a separate oscilloscope, spectrum analyzer, transient recorder or voltmeter). The Handyscope HS4 meets that requirement very well. Besides that, easily (dis)connecting of the device is important. This makes that the Handyscope HS4 can be used by several people. Because a measuring device most of the time is not used every day, and the device has many settings possibilities, the SET file is a grateful tool for fast and good performance of the measurement. The SET file contains all instrument settings, so cannot be made a setting error. By making your own SET files, the inexperienced user still can directly carry out a complicated measurement without first adjusting the instrument. Furthermore, convenient copies for reportage can be made and measure values can be processed in external programs like spreadsheet programs.

Software and hardware updates

The Handyscope HS4 uses hardware which can be configurated over and over again. The hardware configuration is controlled by the USB port. In this way it is possible to carry through hardware updates besides the software updates. With this option the user always has access to the latest hardware options. The hardware and software updates can be downloaded from our web site www.tiepie.com free of charge.

Dimensions

The dimensions of the Handyscope HS4 (25x170x-140mm) are comparable to a palm of the hand. Through this small dimensions, 25mm height, the Handyscope HS4 can simply be taken, since there is only required an USB connection to make the Handyscope HS4 work everywhere together with a laptop. So, an external power supply is not needed.

USB port

The Handyscope HS4 is connected to the USB port of a PC.

The Handyscope HS4 supports both USB2.0 High Speed mode (480 Mbit/sec) and USB 1.1 Full Speed mode (12 Mbit/sec). Because of this, it should not give any problem when using the Handyscope HS3 on older PC's.

Because the Handyscope HS4 is suitable for USB 2.0, a very high data transfer rate can be obtained.

Virtual instrumentation

TiePie engineering is one of the few manufacturers who is developing and selling virtual instruments for more than 17 years, over the whole world.

Price performance

The price performance of the Handyscope HS4 is that good that there is not a competitive device and you can fairly say the Handyscope HS4 is a "Plug in an Measure" device. Our advice: Let the Handyscope HS4 "look" at your measuring problems so they become visible to you too.

To conclude

What you just read means TiePie engineering is the only manufacturer on the world who has made a low power "high speed" and "high resolution" four channel data acquisition device and very complete software. So, you might understand that we had to put a lot of technical knowledge together to bring the Handyscope HS4 on this level. The only thing you as user will notice is that you only have to connect one cable and can start measuring. Furthermore the data transfer from Handyscope HS4 to PC is kept very high (50 frames/sec) to get a "live" measuring feeling. Also, the software is developed in such a way (TiePie has more than seventeen years experience in the PC controlled measuring device field), that a wide audience can work with it (we sell to more than 74 countries and to a diversity of sectors).

Software specifications Handyscope model HS4

Oscilloscope

Display channels	CH1, CH2, CH3, CH4
Display mode	
Envelope	On/Off
Averaging	1.. 256 averaging
Math mode	CH1...4 + CH1...4, CH1...4 - CH1...4
Polarity	Normal, Invert
Vertical position setting	±200mV, ±400mV, ±1V, ±2V, ±4V, ±10V, ±20V, ±40V and ±80V full scale
Vertical gain setting	0.25 to 8 magnifying
Input coupling	AC/DC
Time base minimum	20 day's/div
Time base maximum	200nsec/div (model HS4-50MHz) 400nsec/div (model HS4-25MHz) 1µsec/div (model HS4-10MHz) 2µsec/div (model HS4-5MHz)
Time base gain	1 to 125 magnifying
Record length	1 to 131060 samples per channel
Record view scroll bar gain	1 to 125
Trigger mode	free run, auto, single, edge triggered, window, peak, external
Trigger system	two digital trigger levels, 4096 positions
Trigger source	CH1, CH2, CH3, CH4, External, Keyboard
Trigger level	0-100% full input range
Pre trigger	1 to 131060 samples per channel
Post trigger	1 to 131060 samples per channel
Trigger hysteresis	0 to 100% full input range
Trigger hysteresis resolution	0.025 % full scale
Auto disk measuring	1 to 1000 file's
Auto setup	connect and show
Zooming	mouse window control, gain vertical and gain horizontal
Cursor system	two cursors, autotracking, auto correct points
Cursor mode	large cursors, small cursors
Cursor measurements:	rise time left
	rise time right
	sample time left
	sample time right
	sample time difference
	cursor frequency
	Voltage left
	Voltage right
	Voltage difference
	slew rate left
	slew rate right
	fase difference in Degrees, Radials or cos()
Color settings	CH1...4 Ref CH1...4, math, trigger, timebase, background, raster, cursors
Fonts	user selectable

Voltmeter

Display channels	CH1, CH2, CH3, CH4
Display size	user selectable
Number of displays	1 to 12 user selectable
Frequency range	10 Hz to 10 MHz, model HS4-50
	10 Hz to 2MHz, model HS4-10 and HS4-25
	10 Hz to 500 kHz, model HS4-5
Full scale reading	2000 counts
Accuracy DC coupled	0.2% ±10 counts
Accuracy AC coupled	0.3 % ±10 counts(10 to 1 MHz)
	0.7 % ±20 counts(1 MHz to 5 MHz)
	2.5 % ±20 counts(1 MHz to 5 MHz)
	low frequency roll of frequency is 10 Hz

Measurements	True RMS, Peak-Peak, Mean, Max, Min, dBm, Power, Crest, Frequency, Duty cylce, Moment. value
Display mode	CH1, CH2, CH1*CH2, CH1/CH2, CH1-CH2, CH2-CH1, CH1+CH2, >the Hi, <then Lo, ><COMP, <> HI LO,MAX, MIN, LOG(CH1/CH2), LOG CH2/CH1)
Measure units	Volt, Amp, °C, °F, Watt, %, Meter, Coulomb, Hertz, Bar, user defined
Relative	CH1, CH2, user defined value
Sound settings	No sound, 100Hz, 200Hz, 500Hz, 1kHz, 2kHz, and 10 kHz
Data storing	direct on paper, on disk and on network
Acquisition hysteresis	used defined value

Transient recorder

Measuring channels	CH1, CH2, CH3, CH4
Measuring points	1 to 131060
Measure time between to points	0.01 sec to 500 sec
Measure time span	21 min to 750 days
Measure mode	scroll mode or scan mode
Cursor readout	see oscilloscope
Time reference	time of start, time of measuring, time differency

Spectrum analyzer

Display channels	CH1, CH2, CH3, CH4
Display mode	single shot, continuous
Measuring mode	max mode, standard mode
Vertical position setting	±200mV, ±400mV, ±800mV, ±2V, ±4V, ±8V, ±20V, ±40V and ±80V full scale
Vertical gain setting	0.25 to 4 magnifying
Input coupling	AC/DC
Frequency axis	Logarithmic, linear, octaves or third octave
Octave range	22.1Hz to 22.6 kHz
Frequency range	0.01 Hz to 25 MHz (model HS4-50MHz) 0.01 Hz to 12.5 MHz (model HS4-25MHz) 0.01 Hz to 5 MHz (model HS4-10MHz) 0.01 Hz to 2 MHz (model HS4-5MHz)
Record length	32768 to 32 frequency components
Windows functions	rectangular, Hanning, Hamming, Bartlett, Blackman, Parzen, Blackman-Harris
Averaging	1 to 256 measurements
Cursor readout	see oscilloscope
Total Harmonic Distortion	1 to 100 spectrums

Hardware specifications Handyscope model HS4

Acquisition system

Number of input channels	4 analog
Resolution	12 bit ≤ 50 MS/s 14 bit ≤ 3.125 MS/s 16 bit ≤ 195.3125 kS/s
Accuracy	0.2% ± 1 LSB
Sensitivity	±200 mV, ±400mV, ±800mV, ±2V, ±4V, ±8V, ±20V, ±40V and ±80V full scale
Coupling	AC/DC
Impedance	1 MOhm / 30 pF
Protection	±200 Volt (DC + AC peak < 10 kHz)
Bandwidth (-3dB)	DC to 50 MHz maximum
AC coupling cutt off frequency (-3dB)	1 Hz with 1x probe
Sample rate	50 MS/s, 20 nsec (model HS4-50MHz) 25 MS/s, 40 nsec (model HS4-25MHz) 10 MS/s, 100 nsec (model HS4-10MHz) 5 MS/s, 200 nsec (model HS4-5MHz)
Sampling source	internal, external
Internal sampling source	quartz
accuracy	±0.01%
stability	±100 ppm over -40°C to +85°C
Memory	0 - 131072 samples each channel

Trigger system

System	digital, 2 levels
Source	CH1, CH2, CH3, CH4, AND, OR, digital external
Trigger modes	rising slope, falling slope, inside window, outside window
Level adjustment	0 - 100% of full scale
Hysteresis adjustment	0 - 100% of full scale
Resolution	0.025% (12 bits)
Pre trigger	0 - 131060 samples (0 - 100%, one sample resolution)
Post trigger	0 - 131060 samples (0 - 100%, one sample resolution)
Digital trigger input level	0 - 3.3 volt (5 volt max)

Power Requirements

Power from USB port	500 mAmp max (2.5 Watt max)
Power via extention connector	500 mAmp max (2.5 Watt max)

Physical

Instrument height	25mm (1 inch)
Instrument length	170mm (6.7 inch)
Instrument width	140mm (5,2 inch)
Cord length	1.8 meter (70 inch)
Instrument weight	480 gram (17 ounce)

I/O Connectors

Input Channel 1	BNC
Input Channel 2	BNC
Input Channel 3	BNC
Input Channel 4	BNC
USB	fixed cable with USB 2.0 / USB 1.1 type A connector
Extension connector	Sub-D 25 pins female

System Requirements

PC I/O connection	USB 2.0 High speed (480 Mbit/s) or USB 1.1 Full speed (12 Mbit/s)
Operating system	Windows 98/2000/ME/XP/Vista

Operating Environment

Ambient temperature	0 to 55 °C
Relative humidity	10 to 90% non condensing

Storage Environment

Ambient temperature	-20 to 70 °C
Relative humidity	5 to 95% non condensing

Certifications and Compliances

CE mark compliance	CE

Package

Instrument	Handyscope HS4
Accessories	4 oscilloscope probes 1:1 - 1:10 switchable
Software	Windows 98/2000/ME/XP/Vista on CD
Drivers	Windows 98/2000/ME/XP/Vista on CD
Manual	color printed on paper and digital on CD

Ordering Handyscope model HS4

Order codes

Handyscope HS4 full packaged model 50 MS/s	Handyscope HS4-50
Handyscope HS4 full packaged model 25 MS/s	Handyscope HS4-25
Handyscope HS4 full packaged model 10 MS/s	Handyscope HS4-10
Handyscope HS4 full packaged model 5 MS/s	Handyscope HS4-5

Warranty

Handyscope HS4 all models	12 months starting from the date of shipment