

SERVOGOR 500 Oscillographic Recorder



FEATURES

- o Ergonomically, compact and lightweight, optimized for field applications
- o 2 or 4 analog inputs for AC or DC
- o Voltage measurements up to 1000 V DC and 500 V RMS
- o 8 additional digital inputs (high voltage probes in option)
- o Up to 400k samples per channel (11 bits resolution)
- o Real-time and / or memory recording mode
- o Harmonic analysis
- o Powerful trigger functions (wave window trigger...)
- o Integrated thermo printer
- o PC card slot supporting flash memory and modem / fax cards
- o Standard Supply: Internal alkaline batteries

GENERAL

The SERVOGOR 520 / 540 are handy, versatile oscillographic recorders

Specially designed for field applications, the small footprint and lightweight housing allows very easy handling for mobile use.

Up to four analog high voltage inputs offer the possibility of direct measurements on mains. Powerful trigger functions such as wave window, edge and time-out trigger make possible the acquisition of mains disturbances, interruptions, unbalance and other abnormalities in the waveform of a commercial frequency power supply.

Additionally the harmonic trigger is a key feature for the simple detection of heat and vibration losses in machines, transformers, installations...

One of the main highlights of the SERVOGOR 520/540 is the automatic fax transfer via modem card or storage on a PC flash card for long-term recording. Stored data are easy to transfer to spread sheet applications.

There are many powerful analysis functions such as Root Mean Square, content and phase angle for harmonic of each order, active power, reactive power which are performed Automatically.

The SE 520 / 540 is extremely easy to use:
 First step . the recorder measures,
 Second step . the recorder analyses,
 Third step . the recorder saves the results on the PC flash card.

Three different modes are available: real-time, memory and harmonic mode.

TECHNICAL SPECIFICATIONS

Measurement input

Input type	Floating unbalanced input
Input mode	DC, GND. RMS
Measuring ranges (calibrated)	0.1-0.2-0.5-1-2-5-10-20-50-100-200-500-1000 VDC
Accuracy	1% of FSV (After zero calibration following 30 minute warm-up at 23 ±5 ~C)
Zero position	variable within the measurement range (null function included)
Frequency range	DC 1o40 kHz (+1/-3 dB, typical)
Interference suppression	AC CMR 85 dB (50/60 Hz)
Low-pass filter	5 Hz. 500 Hz, off (-6 dB/octave)
Noise	2.0 mVp-p typical (with filter off, 10 mV/div range input shorted)
AD resolution	12 bits (11 bit internal processing resolution)
Max. sample rate	400 kS/s per channel (80 kS/s wave-window)

SERVOGOR 500 Oscillographic Recorder

Technical Specifications

Input impedance 1 M Ω \pm 1%, 5 pF (at 40 kHz, typical)
 Input terminal Safety terminal (for banana plug)
 Max. input & floating voltage 500 Vrms CAT II
 300 Vrms CAT III (between H and L input terminals, between H-L input terminal and ground)

Memory mode

Time axis 200, 500 μ s/div
 1, 2, 5, 10, 20, 50, 100, 200, 500 ms/div
 1, 2, 5, 10, 30 s/div
 1, 2 mm/div
 Resolution 80 points/div
 (Time axis) (measurements period is 1/80 of time axis)
 Recording length 10, 20, 50, 100, 200, 400, 800, 1600,
 3200*1, 6400*2 div

*1: Only works on odd-numbered channel when two channels are connected together.

*2: Only works on channel 1 when two channels are connected together.

Memory blocks 32 maximum
 Automatic functions Automatic printing
 Automatic statistic calculations
 Automatic saving (to external memory)
 Automatic dialing (for faxing)

Cursor functions One cursor: Measurement on all channels displayed simultaneously.
 Two cursors: Time on all channels, as well as measurement differences or frequencies
 Zoom function Time axis: x2, x1, x12 to x-1000 (The reduction ratio varies depending on memory length)

Calculations Y axis: x5, x2, x1, x1/2
 max/min/ave/rms for cursor range
 Surface area of cursor range

Recording

Recording paper Thermal paper roll (111 mm (width) x 10 metres), effective recording width: 104 mm

Precision of Advance \pm 3%
 Chart speed 2.5, 10, 30 s/div; 1, 2, 5, 10, 30 min/div;
 1 hour/div

Recording formats

Y-T-recording 4 analog and 8 logic channels (logic can be turned on/off separately for each bit)
 Digital recording measurements are recorded as digital values
 X-Y recording X1-Y1, Y2, Y3. X-axis is always 1 channel only.
 Recording size: 8 div x 8 div (80 x 80 mm)

Recording format options Dots, lines
 Recording length 20 div. 200 div. 800 div continuous
 Recording line types three line thickness (analog waveforms)

Printing functions

Printed information List (settings), scale (units), time print marker, chart speed, chart speed modification point marker, trigger sensing position, grid (thin line, baseline, off), channel number, TAG etc.
 Comments Character string (20 characters per channel) or channel information printed in 100 mm intervals
 Channel number Channel number or TAG name (7 character per channel) printed on waveform.

Real-time & memory

Description Normally memory sampling starts when trigger is detected during real-time recording.

Normal trigger

Trigger sources Analog channels, 1-4, logic A and B
 External trigger input, manual, timer
 Free, Single. Repeat
 AND/OR
 Trigger modes
 Trigger conditions
 Analog trigger types Rise, fall, high, low, slope, level window (in, out)
 Trigger level 1% FS increments (setting)
 Trigger filter Filter or time-out (except when slope is set)
 Trigger delay -100% to 100% (in increments of 1%)

Wave-window trigger

Trigger modes Single, repeat, free
 Frequencies 50 Hz, 60 Hz
 Trigger conditions and/or on each analog channel
 Reference wave form Automatically generated from current input or specified parameters
 Reference wave form parameters: Amplitude, tolerance, offset (1% increments for each), phase (in increments of 1°)
 Trigger delay -100% to 100% (in increments of 10%) (PRE/POST-trigger)
 Sampling rates 80 kS/s (1 ms/div), 40 kS/s (2 ms/div), 16 kS/s (5 ms/div), 8 kS/s (10 m/div)
 Memory length Memory cannot be linked; maximum memory length for each channel is one-half that of normal triggers. Maximum memory length: 800 div

Display

Screen 5.7 inch LCD, 480x320 dots, contrast adjustable
 Back light Display can be turned on/off manually
 Display languages English, French, German, Japanese

Harmonic Analysis Mode

Fundamental wave 50 Hz, 60 Hz or automatic (45.0 Hz to 65.0 Hz; Automatic Analysis mode only)
 Sample rates 25600 Hz (50 Hz), 30720 Hz (60 Hz)
 Data points 512 (for analyse)
 Analysis orders Fundamental wave to 40th order
 Analysis modes Waveform Analysis, Automatic Analysis
 Sample length 5-250 cycles, max. 1000 cycles (4 channels linked)
 Anti-aliasing filter Cutoff frequency 7.5 kHz, -30 dB/oct
 Effect on analysed range caused by aliasing: -40 dB or less
 Amplitude accuracy (voltage, current) *1 Fundamental wave to 20th order \pm (1.5% of rdg + 1.5% of FS)
 21st to 40th orders \pm (1.5% of rdg + 2% of FS)
 Phase accuracy voltage and current to fundamental wave phase tolerance) *1 *2
 2nd order to 10th order \pm 5°, 11th order to 413th order \pm 15°
 *1 In 50/60 Hz fixed mode (not including current clamp accuracy)
 *2 Harmonica amplitude: At FS/100 to FS
 Analysed frequency range 45 to 2.6 kHz (65 Hz x 40)
 Triggers Same as trigger functions in Waveform Analysis mode (but trigger sensing rate depends on sampling rate).
 Triggers available in Automatic Analysis mode: Synchronized channel and level trigger settings, distortion factor and content of specified order

SERVOGOR 500 Oscillographic Recorder

Technical Specifications

Analysis types	Root mean square value, content and phase angle for harmonic component of each order; and active power, power content*, and phase angle* *: The following power measurement method is used (only works in Automatic Analysis mode; voltage output from a clamp probe is scaled to current values): Single-phase two-wire method (in the 4-channel model, two single phase tow-wire systems can be measured), single-phase three-wire method, three-phase three-wire method
PC Card	Analysis results can be saved to a flash ATA memory card
Data format	CSV
Saving methods	Manual and automatic (for saving continuous trends at specified intervals)
Trend saving parameters	Root mean square value, content, phase angle, over all root mean square value, overall distortion factor, active power, apparent power, reactive power, and power factor. Analysis trends and number of orders for saving trends to PC card can be selected separately for each channel
Trend saving Intervals	1 minute, 10 minutes, 30 minutes, 1 hour, 24 hours
Real-time RMS measurements	
Frequency ranges	DC, 40 Hz to 1 kHz
Measurement range	100 mV RMS to 500 V RMS
Accuracy	As shown below for 50/60 Hz, sine wave 100 mV FS to 2 V FS \pm (2% of FS + 1 mV) 5 V FS to 50 V FS: \pm (2% of FS + 1 mV) 100V FS to 1000 V FS: \pm (2% of FS+0.1V) (for 0-100% of FS step input)
Response rate	Rise (0 - 90% of FS): 200 ms (typical) Fall (140 - 10% d FS): 310 ms (typical)
Crest factor	2 (measurable range for crest factor 2 is RMS value of no more than 90% crestfactor)

External I/O interface

Terminal	Screwless terminal
Ext. trigger input	TTL level or contact (pulse width of 2 μ s or greater) Depending on settings, can be used as input for external sampling clock (up to 100 kHz) or for starting/stopping measurement
Ext. trigger output	TTL level (pulse width of 10 ms or greater; for parallel operation)

RS-232 interface

Connector	9 pin DSUB connector (male)
Transfer rates	1200, 2400, 4800, 9600, 19200 bps

PC card Interface

Supported card	Flash ATA memory card (made by ScanDisk Corporation or equivalent)
Supported card size	Up to 40 MB
Function	Saving settings data, measurement data and graphical images (BMP)
Saving formats	ASCII, binary, BMP

Modem communications

Supported card	Fax/modem card
Transmission rate	19200 bps maximum
Fax control	Class 2 card must be used
Functions	Sending measurements data, receiving setting commands, automatic transmission of measurement data (fax only)

PC cards Reference

<i>Flash ATA memory card</i>	
I/O DATA	PCFCS-1OMS, 2OMS, 4OMS
Epson	FLASH - PACKER Series FP2MB to FP4OMB
Panasonic	BN-002AAP3 to O4O AAP3
<i>Faximodem cards</i>	
TDK	DF3314ES
U.S. Robotics	XJ4336, XJ1560
Psion	Gold card V34 + Fax
Xicrom	CREDIT CARD MEMO 33.6

Logic probes

	Logic probe	High voltage Logic probe
Input type	4-channel, TTL or contact input, common input in the same probe	4-channel, voltage input, insulation between channels
Max. allowable input voltage	\pm 35 VDC	\pm 250 VRMS
Input impedance	Approx. 10 k Ω	Approx. 100 k Ω
Threshold level	Approx. +1.4 V	Sensed: 60 - 250 VAC, \pm 30 - \pm 250 V DC Not sensed: 0 - 10 VAC, 0 \pm 10DC
Withstand voltage	500 VDC 1 minute (between probe and case)	1.5 kV AC, 1 minute (between channels) 1.5 kV DC, 1 minute (between probe and case)

General specifications

Measurement	Memory, Real-Time Recorder, Real-time Recording & Memory, Harmonica Analysis
Channels	Analog: 2 channels or 4 channels Logic: 8 bits (maximum of 2 four-bit probes can be connected)
Internal memory Capacity1	28 K data per channel (or 256 K data per two linked channels, 512 K data per four linked channels)
Internal memory	SRAM (battery backup)
Power supply	Commercially available AA alkaline dry cells or special AC adapter, special DC converter for external DC power source. When both the AC Adapter and batteries are connected, the AC adapter is used first
AC adapter (option)	Rated supply voltage: 100 to 240 VAC Permissible supply voltage fluctuation range: 90 to 264 VAC Rated supply frequency: 50/60 Hz Permissible supply frequency fluctuation range: 48 to 62 Hz Maximum consumed power: 70 to 90 VA AC adapter rated output voltage: 12 V DC AC adapter rated max. output current: 2.6A
NiMH battery pack (Option)	2100 mAh, 7.2 V Number of charges (cycle life): approx. 300 (varies depending on usage environment)

SERVOGOR 500 Oscillographic Recorder



Technical Specifications

Running time (NIMH battery)	Approximately 3.5 hours (on trigger standby without options) Approximately 3 hours (when recording 1 Hz cycle waveform in 2 S/div)	Battery backup	Lithium battery for backing up settings, waveform data and clock
Charging Function	Charged in the recorder, connect the dedicated AC adapter and turn off the power which to enter charge mode. Charging time is approximately 1.5 hours	Life of lithium battery	Approximately 5 years for backup (at room temperature)
AA/R6 dry cells	Six AA/R6 alkaline dry cells (JIS, IEC model name: LR6)	Safety/EMC Performance	CSA-C22.2 No. 1010-92 approved Declaration of compliance with EN 61 010-1
Running time (AA/R6 dry cells)	Approximately 2 hours (on trigger standby without options) Approximately 1/2 hour (when reordering 1 Hz cycle waveform in 2 S/div)	Dimensions (H x W x D)	Approximately 256 x 190 x 46mm
DC converter (Option)	Input voltages: 9-18 V DC 18-36 V DC	Weight	SERVOGOR 520 (2-channel model): Approximately 1.4 kg (without battery and chart) SERVOGOR 540 (4-channel model): Approximately 1.5 kg (without battery and chart)
Output voltage	12V±5 %	Ordering information Please indicate the order code for each instrument and accessory.	
Power Consumption	Approximately 25 VA max. Terminal type: Screw terminal (lead wire approx. 5 metres long included)	Recorder	Order code
Power Consumption	AC adapter: 25 VA maximum Batteries: 20 VA maximum	SERVOGOR 520 (2-channel-recorder)	A 2500 102 11
Warm-up time	30 minutes	SERVOGOR 540 (4-channel-recorder)	A 2500 104 11
Test voltage	Between recorder and special AC adapter power line: 2kV AC for 1 minute Between recorder and analog input terminal: 2kV AC for 1 minute.	Scope of delivery: Operating manual 1 Measurement cable for each analog input 1 Thermosensitive roll paper	
Insulation Resistance	Between recorder and special AC adapter power line: Minimum 10 MΩ at 500 DC Between recorder and analog input terminal: Minimum 100 MΩ at 500 V DC Between input terminals: Minimum 100 MΩ at 500 V DC	Options	Option package consisting of 1), 2), 3) AC adapter 1) NiMH battery pack 2) 4 channel logic probe 4 channel high voltage logic probe Carry case 3) Small carrying case DC adapter 9- 18V DC adapter 18- 36V
Source Resistance	500 Ωmax.	Mains cable (for AC adapter)	A 6500 011 10 A 6500 021 10 A 6500 031 10 A 6500 041 10 A 6500 051 10 A 6500 061 10 A 6500 081 10 on request on request
Operating and temperature and humidity	5 to 40 °C, 35 to 80% RH (Note: Wet-bulb temperature of 29 °C or less, no condensation)	230 V / CEE-7-VII P1 115V/UL498 P2 240V/BS1363A P3	E 4380 000 10 E 4380 000 20 E 4380 000 11
Storage temperature and humidity	20 to 60 °C, 90% RH (Note: Wet-bulb temperature of 29 °C or less, no condensation; NiMH battery and alkaline dry cells not included)	Recording accessories	Thermosensitive roll paper (111 mm x 10 metres) A 6500 091 10
Clock accuracy	±100 ppm (typical)	Documentation	Operating Manual: German A 2500 21 GA1D English A 2500 11 GA1E French A 2500 21 GA1F