

Technical Data

Measurement Possibilities

Rate deviation, amplitude and beat error of mechanical watches. Diagram recording of the beat noises. Rate deviation from quartz and tuning fork watches by means of the signal sensor Expert Q, available as accessory.

Beat Number

Automatic selection of all common beat numbers.
Manual selection of any beat number between 3'600 to 43'200 b/h.

Measuring Modes

- Standard mode for watches with the Swiss escapement.
- Special1 Mode for watches with coaxial escapement.
- Special2 Mode for watches with AP escapement.
- Special4 Mode with specific amplitude filter for the measurement of watches with the Swiss escapement.

Gain Control

Automatic. Manual control facility for watches with stray or unusual beat noises.

Display Modes

- **Cont** Continuous diagram recording of the beat noise. Measured values for rate deviation, amplitude and beat error are displayed numerically.
- **Vario** Rate and amplitude stability check over a longer time range, up to 100 hours.
- **Scope** Graphic display of the beat noises with adjustable time interval: 20, 200 and 400 ms.
- **Seq.** Only with the optional Micromat S and older Micromat versions possible. Stabilisation time: adjustable from 2 s to 99 s and Aut. Measuring cycle: adjustable for 3 to 6 test positions.
- **Quartz** Rate measurement of quartz- and tuning fork watches. Only with the optional signal sensor Expert Q possible.

Rate accuracy: numerical display in s/d.

Resolution: selectable in 0.1 s/d or 0.01 s/d.

Measuring range: ± 999 s/d (quartz mode ± 9.9 s/d).

Accuracy: ± 0.1 s/d (quartz mode ± 0.01 s/d).

Amplitude: numerical display in degrees.

Resolution: 1° or 0.1°. Measuring range from 80° to 360°.

Accuracy: $\pm 0.4^\circ$.

Lift angle adjustable from 10° to 90°. Resolution: 0.1°.

Beat error: numerical display in milliseconds.

Resolution: 0.1 ms. Measuring range: 9.9 ms.

Accuracy: ± 0.1 ms

Time scale adjustable from 1 to 9 mm/ms (zoom).

4 selectable tracing speeds.

The last three screen contents are callable.

Functions

Adjustable measuring time: 2, 4, 6, 8, 10, 20, 30, 40, 50, 60, 120, 180, 240 s and automatic selection of the shortest possible measuring time. For the quartz mode: 2, 4, 6, 8, 10, 20, 30, 40, 60, 120, 180, 240 s and Aut.

Selectable languages: English, German, French, Spanish and Italian.

Acoustic check: built in loud speaker.

Interfaces:

- RS232 to attach the Witschi thermo printer.
- RS232 to attach a PC or the Witschi GPS receiver.

Details

Time base: pre-aged and thermo-stabilised high frequency quartz, OCXO.

Stability: ± 0.004 s/d between 10° and 50° C.

Aging for the first year: max. ± 0.03 s/d.

Front panel: colourless anodised.

Rear cover and stand: plastic, anthracite coloured.

Display: LCD graphic display, 240 x 128 pixels, illuminated.

Dimensions: 225 x 200 x 87 mm (w x h x d).

Weight: 3.4 kg, microphone and mains adapter included.

Mains connection: mains adapter for 230 V~ or 120 V~, 1.2 A.

Accessories

Witschi thermo printer with universal mains adapter 90 V~ - 260 V~. Item JB01-MCP7810

Thermo paper, roll. Item JB01-MM58-DPU20-N

Micromat S. Item 23.26PK1

Micromat Tourbillon. Item 13.15PK1

Interface S1 for the connection of the Micromat P/Tourbillon and the Expert Q. Item 11.22.251

Clamping microphone for wall clocks. Item 13.1820

Optoelectr. sensor for pendulum clocks. Item 13.1620

Tripod for optoelectronic sensor. Item 13.16.201

AutoPrint: Software for result and graphic file transmission to a PC. Item 64.55.901PK1

Software M1/S1/MMC. Item 11.20.931PK1

PC-Software for the administration of the measuring results. Displays the frequency analysis, isochronisms and unbalance centre of the balance wheel. Network capability with WicoTrace.

For up to 2 independent measurement channels.



Technical details subject to change

11.2210D41e - 02/2009

Chronoscope S1



For testing Mechanical Watches

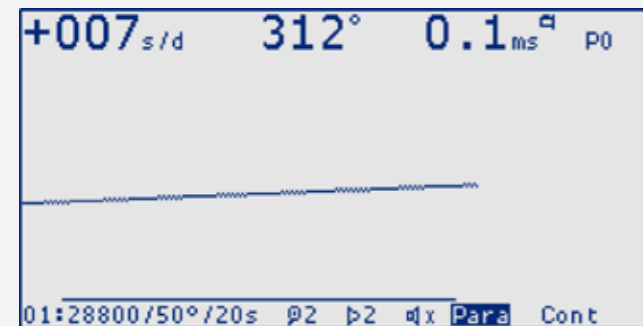
The Chronoscope S1 is the instrument for effective and professional testing of watches by the repair service, by specialised shops and in the industrial field. Noble design, functional layout of the operating elements and the large LCD display, provide a comfortable handling of the instrument. Different display modes as well as the graphic presentation of the beat noises are available.

With the automatic microphone, available as accessory, the watch can be tested in 3 to 6 different positions. The VARIO display mode provides fast overview of the quality and stability of the rate and amplitude. VARIO is the ideal mode for the inspection at the point of sales in the specialised shop and for the incoming watch inspection.

General Description

The Chronoscope S1 is an instrument with sophisticated and simple handling. It provides a fast and easy way to set all parameters. Totally 20 test programs can be created with individual measurement parameters and the number of test positions for the measuring cycle.

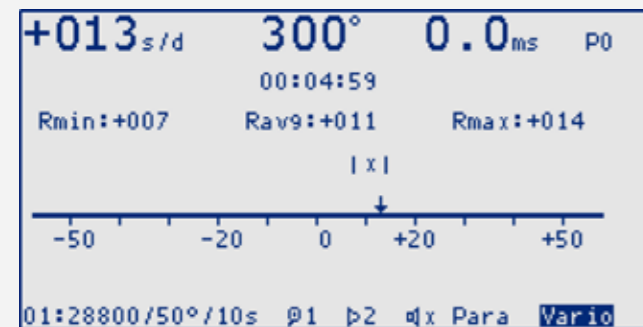
Continuous Diagram Recording



The rate deviation is continuously drawn on the screen. Measured values for rate deviation, amplitude and beat error are displayed numerically.

The numerical results for rate, amplitude and beat error measurements are displayed at the first expiration of the selected measuring time. The average values are updated every 2 seconds. The evaluated diagram part is marked with the scrolling bar.

Vario Display Mode



The Vario mode measures the rate and amplitude stability over a longer time range. This clearly arranged display mode is the ideal extension for a short or a long examination (up to 100 hours).

During the measurement it is possible to toggle between the displays of the measurement values of the rate and the amplitude.

The following values are constantly updated as long as the measurement process is running:

- smallest measured value
- largest measured value
- absolute average value over the entire measuring time
- elapsed measuring time.

Sequence Display Mode

Results & statistics				P0
☐	+009	307°	0.1	
☐	+013	306°	0.1	
♀	+010	302°	0.0	
♂	+006	290°	0.2	
♂	+010	302°	0.2	

D	+007	017°	0.2	
x	+010	301°	0.1	
01:28800/50°/10s p2 p2 qx Para Seq.				

The automatic microphone Micromat S is the ideal accessory for the realisation of test sequences. During the program preparation 3 to 6 test positions can be defined, including stabilisation and measuring time.

This neatly structured table clearly displays the measurement results in each position as well as the average and the largest difference between all positions.

By means of the Interface S1 (accessory) also the previous model Micromat P and the Micromat Tourbillon can be attached.

Measuring Cycle for Tourbillon Watches

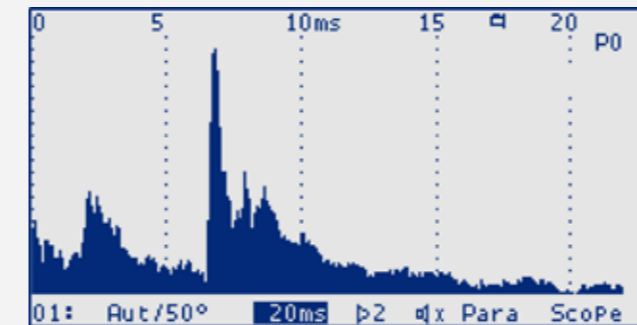
Results & statistics				P0
0°	+007	284°	0.2	
90°	+012	293°	0.1	
180°	+014	292°	0.1	
270°	+011	292°	0.1	

D	+007	009°	0.1	
x	+011	291°	0.1	
START MICROMAT P >>> new sequence				
01:28800/50°/60s p2 p2 qx Para Seq.				

The automated microphone also allows tourbillon watches to be tested. For performing the test, the microphone rotates four times around its axis while the watch is set in the vertical position. The measuring time corresponds to the revolution time of the microphone, in most cases 60 seconds/revolution (same time those the tourbillon cage for a revolution needs).

The values of the rate, amplitude and beat error measured for each angular position are displayed at the end of the test cycle. The maximal difference between the different angular positions and their average is also displayed.

Scope Display Mode



The Scope function graphically displays the acoustic beat noise of the watch. A detailed analysis of the beat noise, i.e. of the state of the escapement, can be carried out.

Signal levels are represented as an envelope curve. The measured value of the amplitude is numerically displayed. The display is based on one of the following three time intervals: 20 ms, 200 ms and 400 ms.

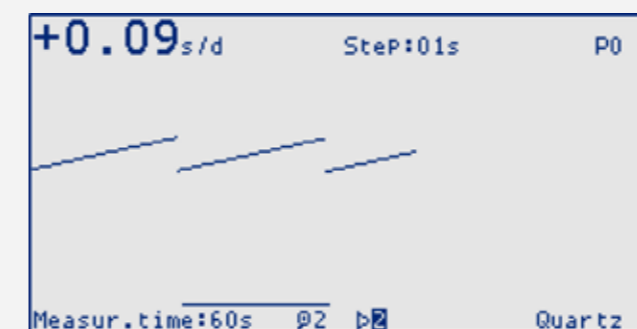
Rate Measurement of Quartz Watches



The rate accuracy of quartz and tuning fork watches can be measured with signal sensor Expert Q, available as accessory.

Quartz Display Mode

- Measurement of analogue quartz watches



The example shows the rate recording of an analogue quartz watch with a motor pulse period of 1 second. The digital adjustment (inhibition) every 60 seconds can readily be identified.

The numerical result for the rate accuracy is displayed at the first expiration of the measuring time.

- **Measurement of digital quartz watches**
The working frequency of the watch's LCD display is evaluated to provide the rate measurement. All frequencies up to 128 Hz that are a multiple of 4 Hz can be processed.
- **Measurement of tuning fork watches**
The oscillation frequency of the tuning fork is magnetically recorded and evaluated to provide the rate measurement.

Compact and Space Saving



With its ergonomic design and compact assembly, the Chronoscope S1 is the ideal instrument when space is at a premium.

Additional Functions

- Log printout of the numerical measurement results or of the display contents on the Witschi thermo printer, available as accessory.
- Export of the numerical results and graphics (screen contents) to a PC by means of the software AutoPrint (accessory).
- Real time clock. Date and time are displayed and printed in the log.
- The Witschi GPS receiver (accessory) allows the time base of the Chronoscope S1 to be tested and adjusted if necessary.