CHRONOSCOPE X1 (G3)

Operating instructions

Please read before you work with the device!

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witschi
LEADING SWISS PRODUCTS

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CONTENTS

1 SAFETY REFERENCE

Please read carefully all the information contained in this document and strictly follow the operating instructions, which will help you to use and safely operate our product. Keep these instructions in a safe place near the instrument and give it to any other user.

The facility must be used only for the aims and purposes described in these very operating instructions and must be set up and operated as described and under the conditions herein specified.

The Manufacturer, Witschi Electronic AG in CH - 3294 Büren a.A. Switzerland takes no responsibility and offers no warranty for damages that may follow from the non-observance of these directives or from inappropriate handling, such as damages to the checking device, to watches and/or people!

1.1 Recycling

This electronic instrument should not be disposed of as household refuse. If it is not accepted by public collecting points, kindly bring it back to the sales outlet. It will provide suitable disposal according to legal directives. Your equipment suppliers in the EU will take back free of charge all instruments manufactured after the 13.8.2005, as well as an older instrument provided an equivalent new instrument is purchased.

Congratulations

You made the right choice.

You bought CHRONOSCOPE X1 (G3), an extremely accurate test instrument, technically reliable as well as easy to handle and operate.
Follow the given instructions regarding usage and maintenance and you will enjoy this new instrument for quite a long time. It will be a pleasure and will prove profitable for you to use this device.

2 DESCRIPTION

The Most Recent Technology for Testing Mechanical Watches
The Chronoscope X1(G3) is the top-of-the-line instrument to be used during manufacturing, by the repair service or in the watch-testing lab. It includes the terminal X1 (G3) with a 10.4" colour touch screen and the automatic Micromat C microphone with integrated Chronoscope measurement electronics. It provides 6 different display modes as well as a graphical representation of beat noises.
The large touch screen provides an extremely intuitive and straightforward operation.

Particular Features:

- **Screen capture (camera function)**
  The current content of the screen is stored in PNG format into a plugged-in USB memory stick
  when the camera key is pressed.
- **Picture presentation**
  Up to 99 pictures in JPG format can be stored for the start/stop screen saver. The slide show runs at a rate of a new picture every 10 seconds.
- **Client Address and Piece Information's**
  Via menu point easy input of client addresses and piece information's. If desired, the selected data appears on the printout and as header in the captured print screen as PNG file. The client addresses and piece information can be stored and retrieved in a list.
- **Display of the moon phase**
  In display mode time and date is also the moon phase symbolically presented, with following information's: number of days since last new moon, last new moon, full moon and next new moon.

3 INSTALLATION

3.1 Extend of delivery

The basic equipment comprises the following components:

- X1 (G3) Terminal with colour Touchscreen
- Pen for Touchscreen
- Universal AC-Adapter 100 – 240 V~ for Terminal X1 (G3)
- Printer cable for Witschi printer
- Microfiber cloth 23x23 cm
- Dust proof cover for Terminal X1 (G3)
- Automatic microphone Micromat C
- Mains adapter for 230 V~ or 120 V~
- USB cable
- Dust proof cover for Micromat C
- Certificate of guarantee, installation guide, operating instructions (5 languages)

3.2 Setting up the instrument

Warning:
When installing the device, avoid direct proximity to very high temperatures and direct exposure to the sun which negatively influences the readability of the display. Loud noises impair the signal reception of the microphone, which must obviously be kept at a reasonable distance from noisy machines, loudspeakers and particularly from ultrasonic cleaning equipment.

3.2.1 Mains connection

Power is supplied to the X1 (G3) Terminal through the universal AC-adapter for a mains voltage of 100 – 240 V~. The power supply for the Micromat C occurs through a for a mains adapter for a mains voltage of 230 V~ (range 210 V~ - 240 V~) or for 120 V~ (range 110 V~ - 130 V~).

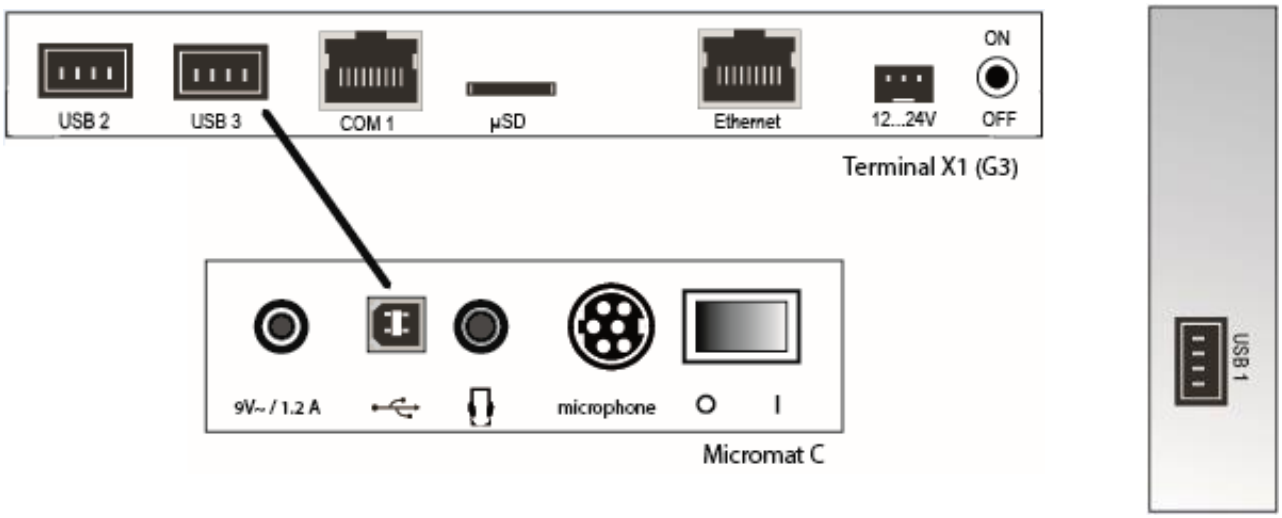
Before connecting for the first time, make sure that the voltage of the mains adapter corresponds to the voltage of your mains.

Use Original Adapter only!

Connect the mains adapters to the suitable sockets on the rear panel and connect the X1 (G3) Terminal with the Micromat C by means of the USB-wire. If present, connect also the thermo printer (available as accessory).
See chapter 3.3 *Connections*, page 7.

We recommend disconnecting the power supply from the mains during longer idle periods, e.g. vacations.

3.3 Connections Terminal X1 (G3) – Micromat C



Terminal X1 (G3)

USB 1, USB 2, USB 3	USB interfaces for Micromat C and memory stick, Bluetooth-Dongle, computer-mouse etc.
µSD	Slot for Micro SD card
COM 1	Interface for Thermal printers Connect printer to **COM 1** interface only!
Ethernet	Network interface
12-24V	Connection socket for universal adapter 100 to 240 V, 1.5A 50-60Hz
⏻	Main switch for switching the equipment on / off

Micromat C

9V~ / 1.2A	Connection socket for mains adapter, 230 V~ or 120 V~
⇄	USB Interface for X1 (G3) Terminal
🎧	Connection socket for earphone (accessory)
microphone	Connection socket for stand microphone (accessory)
O 1	Main switch for switching the equipment on / off

4 OPERATING

Place the watch on the microphone in such a way that the crown is located between the metal leads of the signal sensor.

The LED ***signal*** flashes in the rhythm of the beats of the watch, thus showing that watch's signal is received. The measurement starts automatically.

4.1 Touch Screen

When it is switched on, the Chronoscope X1 (G3) goes back to the same measuring mode it was in before being switched off.

The large buttons on the touch screen are activated by touching them with a finger or the pen.

4.2 Menu Bars and Buttons

The buttons around the main screen are organized in menu bars, ordered by function:

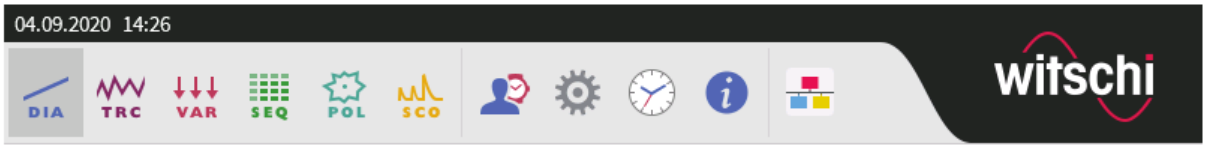


Diagram display mode

Trace display mode

Vario display mode

Sequence display mode

Polar display mode

Scope display mode

For input of customer and watch data, comments etc.

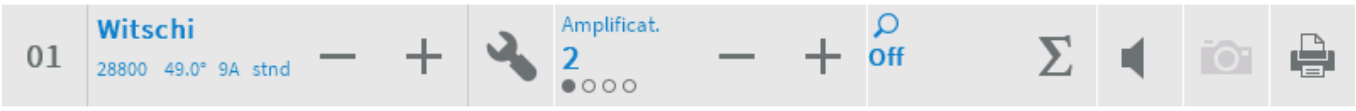
System parameter

Time, Date and Moon phase

Various information

Access to the WiCoTRACE data base if the device is connected to the network

Toolbar for the Scope system parameter setting ***Mode: Scope 1***



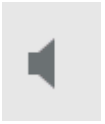
Toolbar for the Scope system parameter setting ***Mode: Scope 2***

Display of the current program number in the selected colour.
This button opens an overview of all measuring programs.

The next or previous program is selected with the *plus* and *minus* buttons; a longer contact with the button automatically increments or decrements the program number. The amplification value as well as the zoom can also be adjusted with *plus* and *minus* buttons.

Program selection button: for adjusting individual measurement parameters of a selected program. A complete list of the programs is shown for this purpose.

Button for switching on/off the *Averaging* mode. Active only in test mode *Scope 2*. See chapter *5.6 Scope Display Mode*, page 18



Speaker button: for switching on and off the audio output of the Micromat C.

Camera button: When this button is pressed, a copy (PNG file) of the screen content is saved to a USB stick, if plugged in. Data are stored in the directory “Witschi\Chronoscope_X1\Capture” under the file name “Snapshot_NN.png”. NN is incremented from 01 to 99.

Print button: The current view can be printed on the Witschi thermal printer while the measurement process is running.

The current amplification value is indicated in the sector ***Amplificat***. It can be adjusted with the plus and minus buttons. The selected program does not automatically use the amplification set-up. A lasting modification must be carried out in *Program selection*.

Important information:

By touching the "Amplificat." surface, the lift angle and test mode functions can be directly selected. With the buttons − + you can adjust the appropriate parameters. The selected function and the parameter setting are displayed on a yellow background.

4.3 Lateral Toolbar

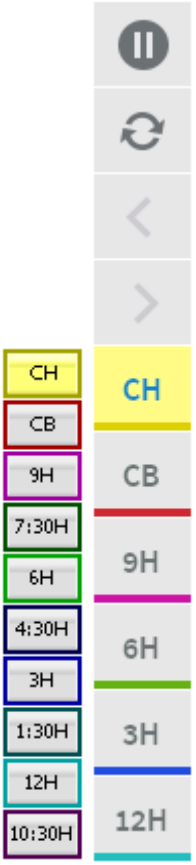
- *Stop button*: For pausing a measurement

  Start button: For measurement start or continue 

- *Reset button*: The current measurement is restarted, except in SEQ test mode

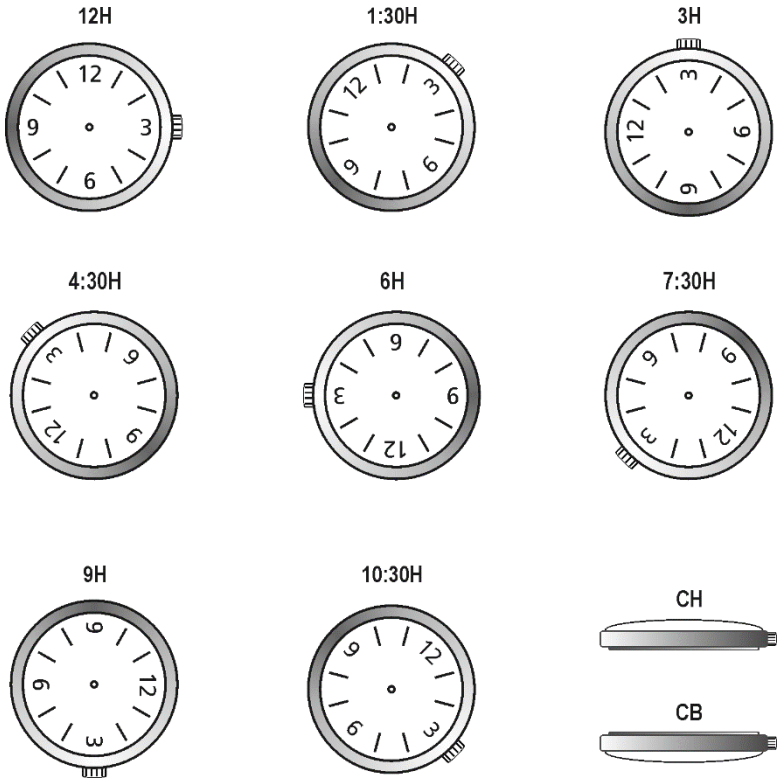
- *Left button*: The function varies according to the display mode being selected

  Right button: The function varies according to the display mode being selected

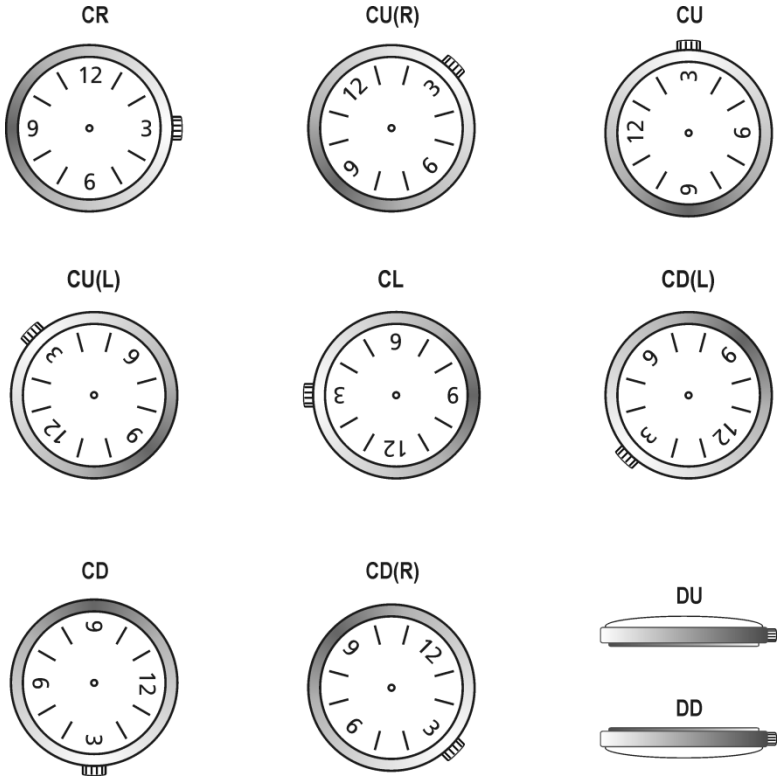


- *Positions* buttons: Display of the current test position. Any test position can be directly selected by clicking on the suitable button. The MMC then switches to the desired position. The measurement is interrupted during the rotation. Switching from one test position to another can also be carried out with the joystick on the MMC.
- **Remark**
  In the test mode “Sequence” only 6 positions are displayed if the measuring cycle contains no intermediate test positions.

Indication of the test positions in accordance with NIHS 95-10/ISO 3158



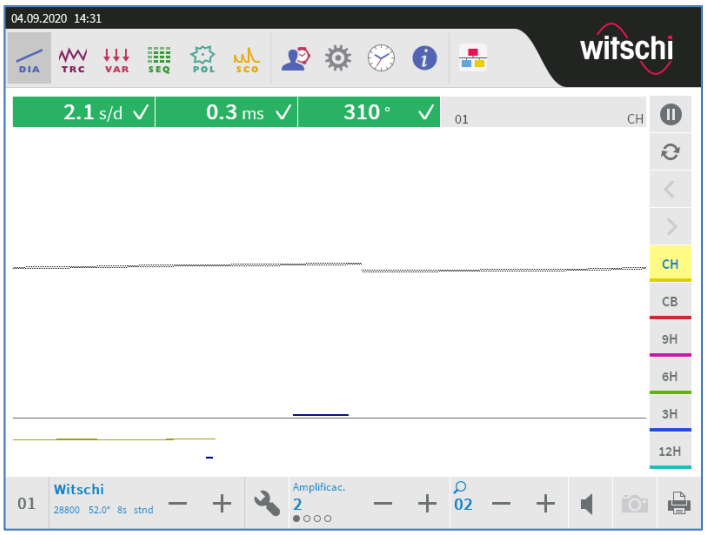
Current indication of the test positions



5 DISPLAY MODES

5.1 Display Mode Diagram

Measured values for rate deviation and beat error are continuously displayed during the measurement process. The slope of the diagram can be changed (1, 2, 4, 8 and 16 times) by pressing the *plus* and *minus* buttons (zoom).



Measured values for rate deviation, amplitude and beat error are displayed numerically. The last measured result remains displayed when measurements are paused.

The last eight pages of the measurement are shown as small strips under the current diagram if measurements have been performed for a long time. If measurements are paused, one of the last pages can be selected with the *left* and *right* buttons. The desired page can also be displayed in a large format by directly touching it.

5.2 Trace Display Mode

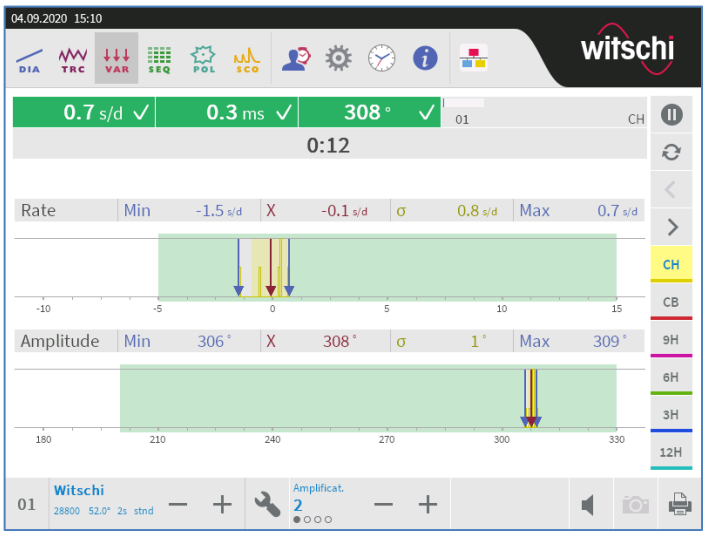
This display mode is combined with the Vario display mode. It is possible to switch between the two modes during measurement or during a pause.

The rate deviation and the amplitude are contiguously recorded. The *plus* and *minus* buttons allow zooming in and out (1 to 8 times).

Measured values for rate deviation, amplitude and beat error are displayed numerically. The last measured result remains displayed when measurements are paused. The means are numerically displayed at the end of the measurement time.

5.3 Vario Display Mode

The Vario display mode measures the and amplitude over a longer time range.



The following measured values related to rate and amplitude is continuously updated during the measurement process: smallest and largest measured values, mean, standard deviation, elapsed measurement time and current measured value.

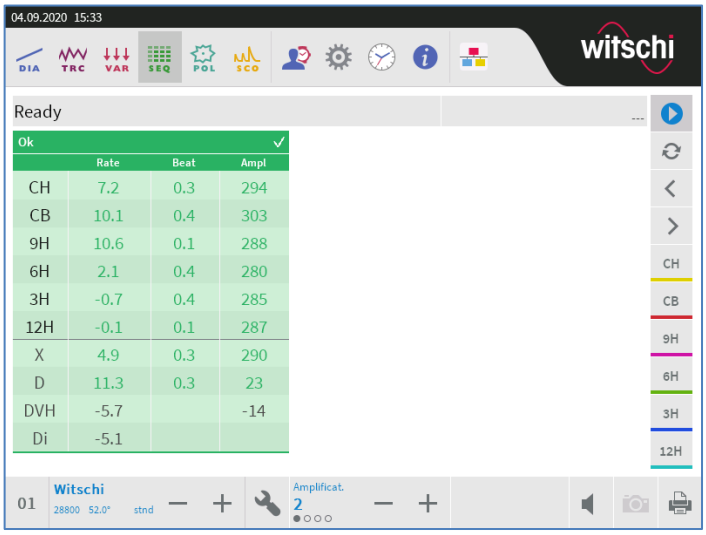
Measured values for rate deviation, amplitude and beat error are displayed numerically. The last measured result remains displayed when measurements are paused. The means are numerically displayed at the end of the measurement time.

Checking the rate quality:
The evaluation of the quality takes place via the interpretation of the 2 analysed rate values.

- The difference between the minimum and the maximum rate value, presented with the vertical arrows, is a quality indicator of the watches condition. The smaller the difference the better is the rate stability.
- The average value **X** is an indicator for the adjustment quality of the watch movement.
- **σ** (Sigma) shows the standard deviation (68.2%) of all instantaneous rate and amplitude measurements. (1 Sigma = +/- 34.1% = 68.2%)

5.4 Sequence Display Mode

A measurement cycle including up to 10 test positions can be defined in this mode. The measurement cycle can also be started from Micromat C.



The *left* and *right* buttons allow selecting one of the Diagram, Trace, Vario and Sequence formats during or after the measurement cycle.

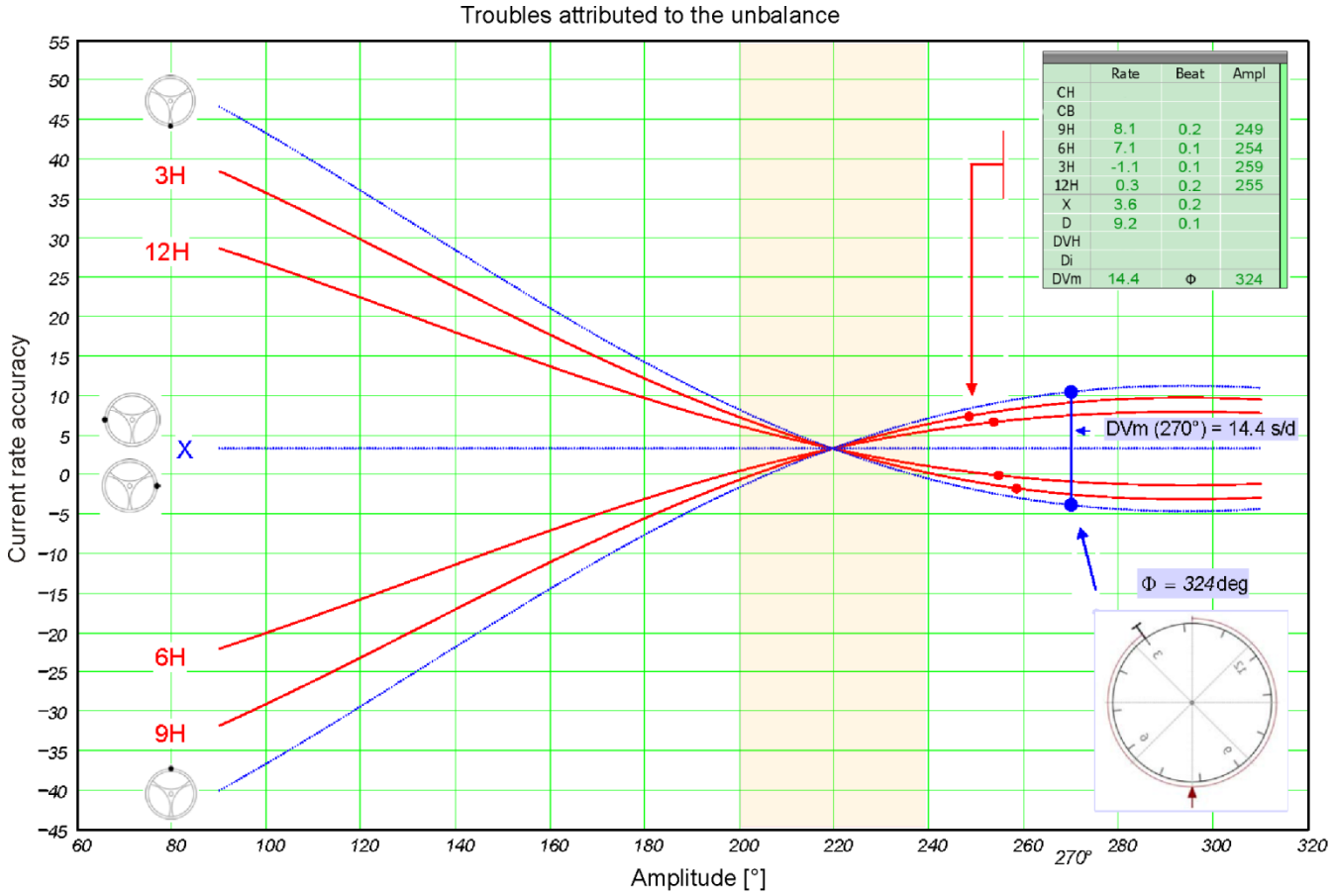
The following measurement results are calculated for rate, amplitude and beat error:

- Mean for each test position
- **X**: Mean of all test positions
- **D**: Difference between the largest and the smallest measured value.
- **DVH**: Only for rate and amplitude. Difference between the mean of all vertical test positions and the mean of all horizontal test positions.
- **Di**: Only for rate. Difference between the 6H and CH test positions.

- **DVm:** Standardized rate difference proportionally to the size of the unbalance. I.e. theoretical maximum rate difference causes by the unbalance of the balance wheel, at an amplitude of 270°, in the two vertical positions where the unbalance is down or above on the vertical.

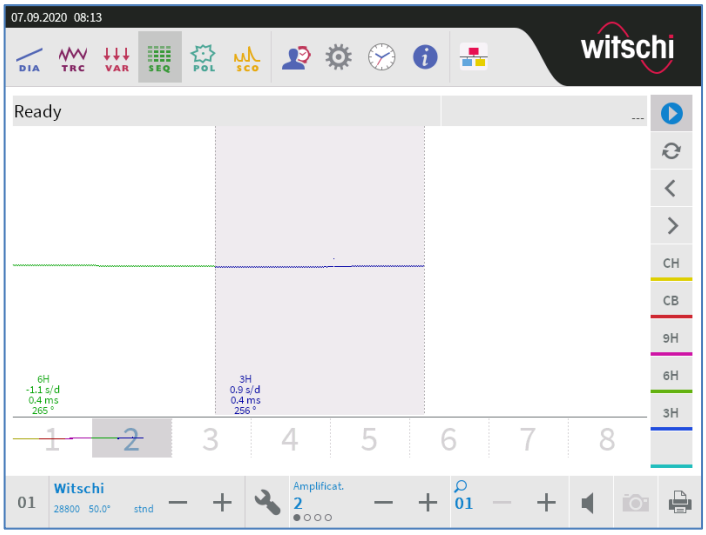
- **Φ:** Watch is in vertical position. Shows the place of the unbalanced point on the balance wheel (flash)

  I.e. The rotation angle of the stem refers to the 3H position.



During a measurement cycle, the test position and measured rate accuracy will be displayed.

After an elapsed measurement cycle appears in “Diagram” display mode the test positions with its numerical measuring values of rate accuracy, beat error and amplitude.

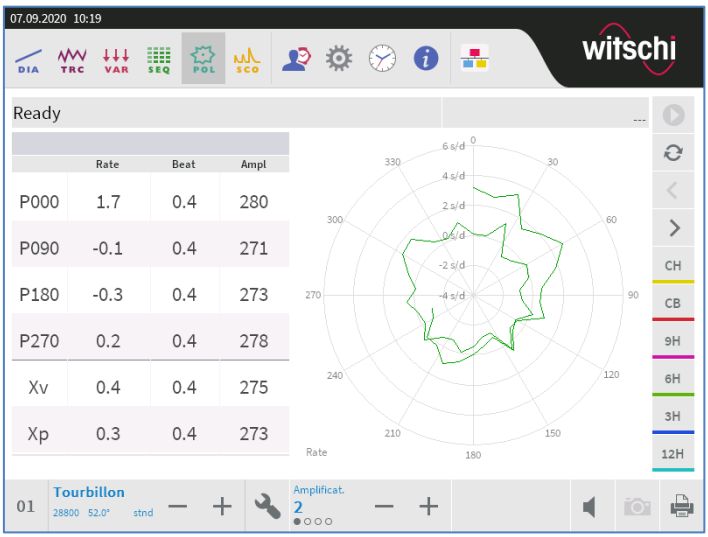


5.5 Polar Display Mode

POLAR display mode indicates the rate stability in a polar diagram. One revolution (rotation time) of the Tourbillon watch corresponds to one revolution on the diagram. The average values of rate, beat error and amplitude for specific angles are calculated and displayed. The watchmaker can now determine the centre of gravity of the balance wheel.

First, the desired start position (9H, 6H, 3H or 12H) must be selected. By pressing the ***start*** button on the MMC, the start position 6H is automatically approached.

Upon reaching the start position, the stabilisation time must be awaited before starting the measuring cycle (i.e. 30 seconds stabilisation at a rotation time of 60 seconds = half turn of the Tourbillon cage). Then start the cycle with:



- ***start*** button on the MMC or

- button on the X1

Important!
The measurement time should be at least the tourbillon rotation time. Recommended is a measurement time that corresponds to five full tourbillon rotations (see chapter 6.5, page 26).

The first result is automatically assigned to the value P000. Thus, the user must define a starting point based on the visible balance wheel position and the trigger the measurement always in the correct condition (Fig.).

With the two arrow buttons you can toggle between the displays of rate accuracy and amplitude.

Results:

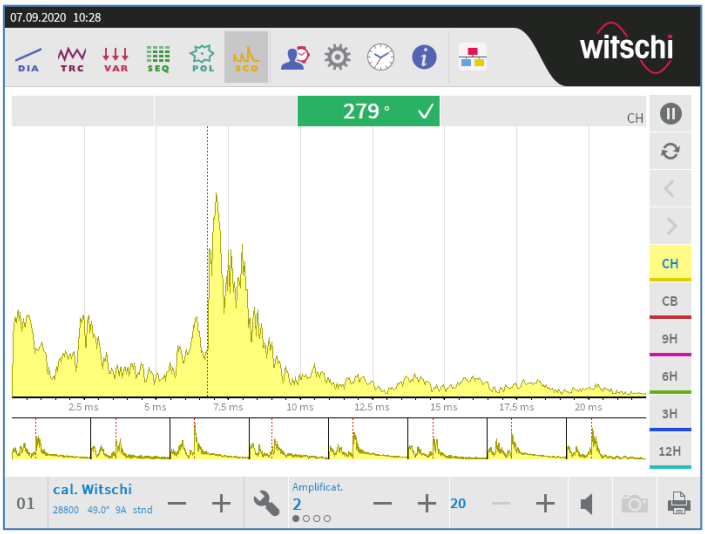
	Rate	Beat	Ampl
P000	1.7	0.4	280
P090	-0.1	0.4	271
P180	-0.3	0.4	273
P270	0.2	0.4	278
Xv	0.4	0.4	275
Xp	0.3	0.4	273

- **P000:** Average value of the results at the star of the measurement
- **P090:** Average value of the results after a 90° rotation of the tourbillon cage
- **P180:** Average value of the results after a 180° rotation of the tourbillon cage
- **P270:** Average value of the results after a 270° rotation of the tourbillon cage
- **Xv:** Average value of the four results P000, P090, P180 and P270
- **Xp:** Average value of all results of the total measurement time

5.6 Scope Display Mode

Mode: Scope 1

The acoustic beat noise of the watch is graphically shown in this mode. The Tic and the Tac are shown alternatively.



A time range of 20 ms, 200 ms or 400 ms can be selected with the *left* and *right* buttons.

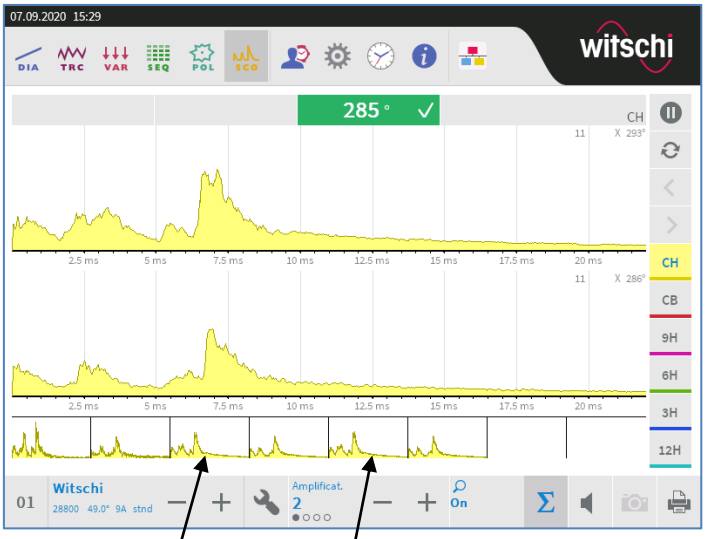
The last eight scopes are shown as small strips under the current beat noise if measurements have been performed for a long time. The desired beat noise can also be displayed in a large format by directly touching it.

Mode: Scope 2

In this mode the averaging can be switched on and off with the Σ button. The time range is fixed at 20 ms. Presentation of the beat noises (tic and tac) on two horizontal axes.

When the averaging mode is turned off, the beat noises are continuously recorded.

When the averaging mode is turned on, the graphical presentation of a certain amount of beat noises is averaged.



Picture 3 Picture 5

The duration of the measurement cycle is determined by the beat number and the selected interval. It is finished after 50 Tic and 50 Tac intervals and the average value of the amplitude is displayed on each horizontal axe. The assignment of the Tic and the Tac to the two diagrams cannot be determined.

When you click on Picture 3 the average value after 10 intervals is displayed, and for Picture 5 after 20 intervals.

The **Averaging** of the signal is a process, by which the noise can be reduced in repetitive signals. By additive superposition the signal is thereby increased, while the superposition of random noise leads to a lower gain. Overall, the signal-to-noise ratio is improved.

5.7 Input of Client Address and Piece Information's

Here you can store client addresses and piece information. You can choose None , Standard or Extended

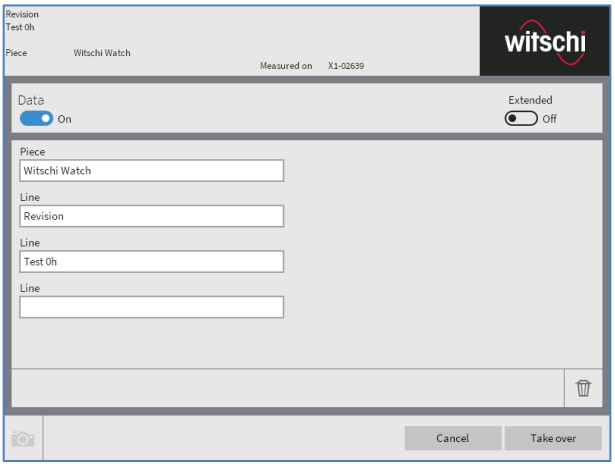
The relevant information will appear as header on the exported screen contents and on the printing protocol if the Standard or Extended is enabled.

Possible input options in Standard mode

Piece: 24 character
Line 1, 2. 3: 24 characters/each

Delete the displayed piece information.

Save and load of piece information is only available in Extended mode.



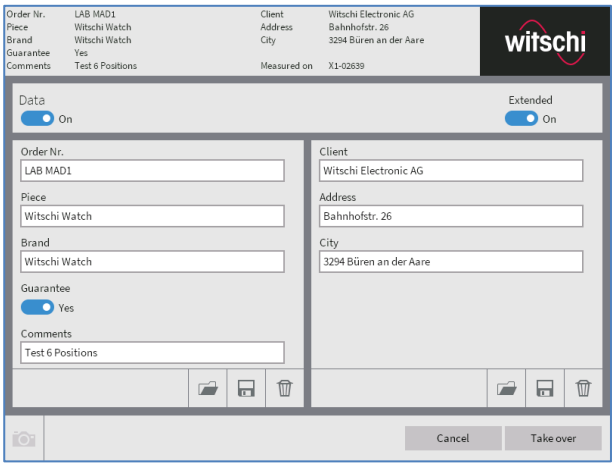
Possible input options in Extended mode

Guarantee: Yes or No

For all other input fields
24 characters/each.

In this mode you can save client address and piece information data or open saved client addresses and piece information.

Delete the displayed client address or the piece information.



Save Client Address and Piece Information

Push on  to display the "Save Client Address" or the “Save Piece information” window. Select from the list one unassigned Client Address or Piece information (01: to 99:) and press Take over

You may also select an already used address number and overwrite its data.

Load Client Address and Piece Information

Push on  to display the "Load Client Address" or the “Load Piece information” window.

Select from the list the desired Client Address or Piece information (01: to 99:) and press Take over
The loaded Client Address with the associated Piece information can also be edited.

5.8 Time, Date and Moon phase

In this mode, time and date are displayed in analogue and digital form. A signal sound repeated every 15 seconds can be optionally switched on. A time signal is generated whenever the last 5 seconds of the minute are reached. The current moon phase is symbolically presented with the following information: number of days since last new moon, last new moon, full moon and next new moon.

Attention!
The internal watch of the X1 (G3) terminal does not reach the accuracy of a quartz watch. Therefore, it must be frequently inspected and, if necessary, be re-adjusted.

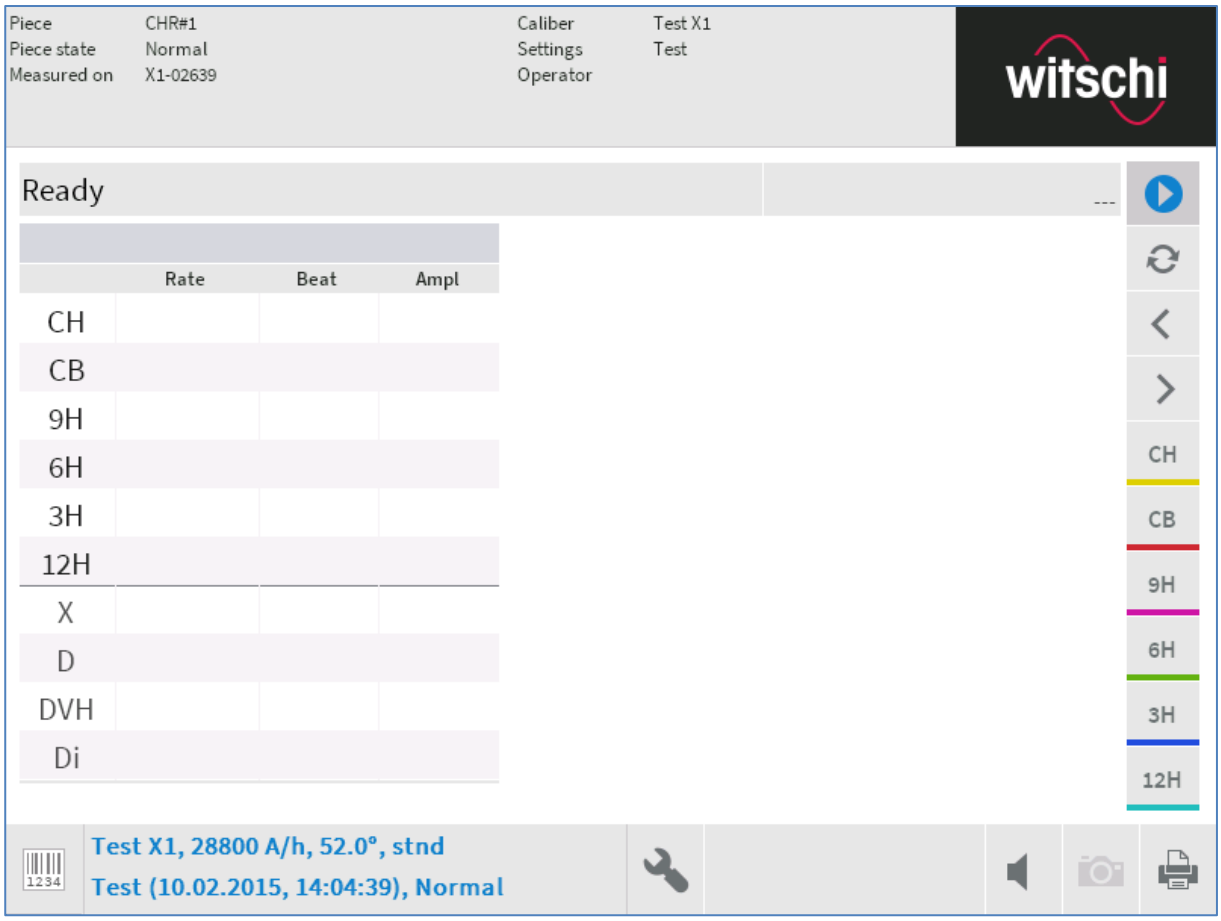
If the instrument is connected to a network, the watch can be synchronised up to the second over the Internet by a time server (NTP). Thus, the need for adjusting the time and date is eliminated.

5.9 Information

Displays the following information:

- Software version.
- MAC address for connecting to the network.
- IP address when connected to the network.
- Firmware version and serial number of the Micromat C (must be connected and switched on).
- Calibration date and value of the Micromat C (must be connected and switched on).
- Version for connected Bluetooth Dongle

5.10 WiCoTRACE



For this function, your Chronoscope X1 (G3) must be configured for use with WiCoTRACE software. See Chapters 7.10 and 7.11 WiCoTRACE tab and Network.

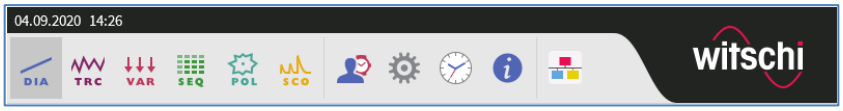
Using WiCoTRACE, Chronoscope X1 (G3) units that are linked by a network can be synchronised via a PC. All measuring programs are centralised in the software and all measurement results from the devices in the network can be saved to the WiCoTRACE database. With the Universal Editor, programs can be created globally and used by all the networked Chronoscope X1 (G3) units.
Connecting to WiCoTRACE: please see WiCoTRACE page 38.

The optional barcode reader can be used in combination with WiCoTRACE. Barcodes can be created for different work orders with the software. When the operator scans a barcode, the program and identification codes are automatically loaded onto the Chronoscope X1 (G3) units.
The barcode reader can be connected to any USB port of the Terminal X1 (G3). Configuration of Country Mode = U.S.

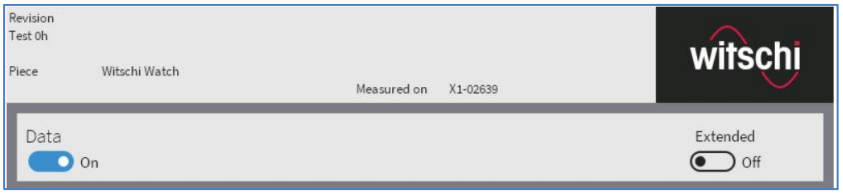
5.11 Export screen content

Depending on the Data: parameter setting, one of the below headers appear above the display of the PNG file

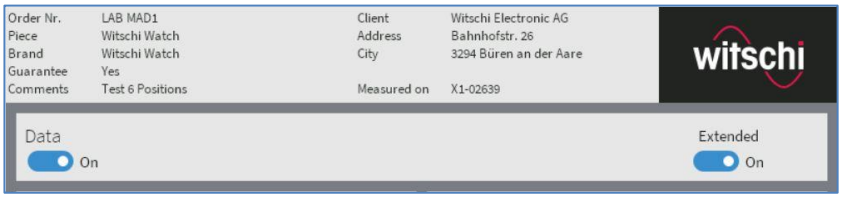
None



Standard



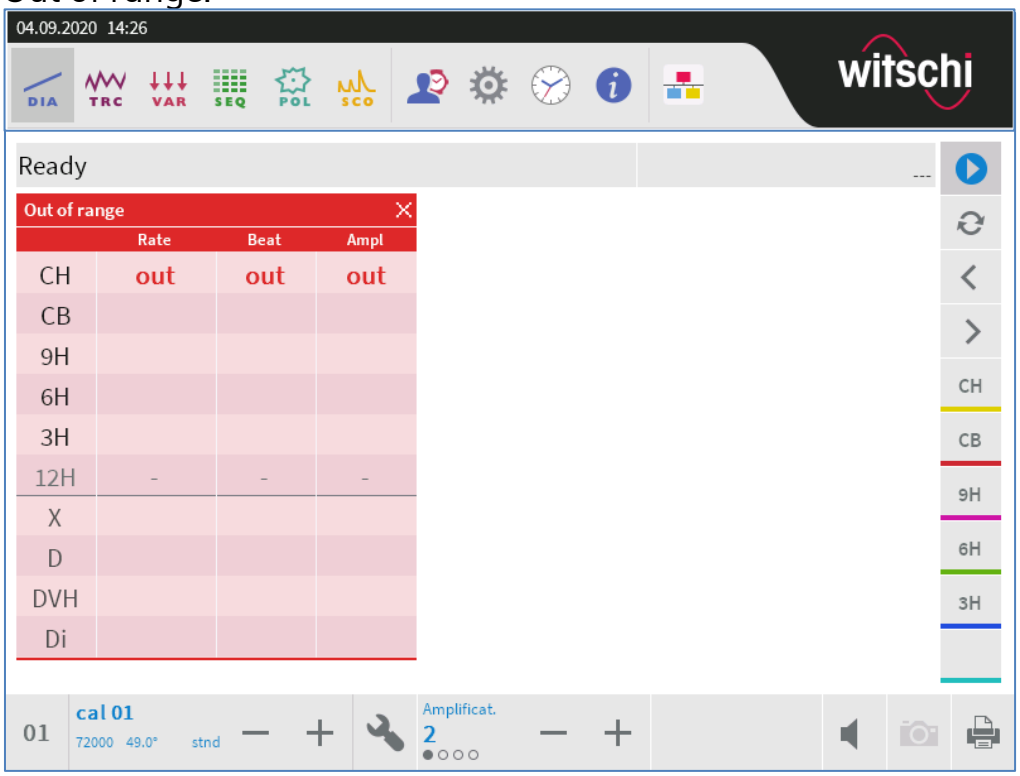
Extended



See chapter *5.7 Input of Client Address and Piece Information*

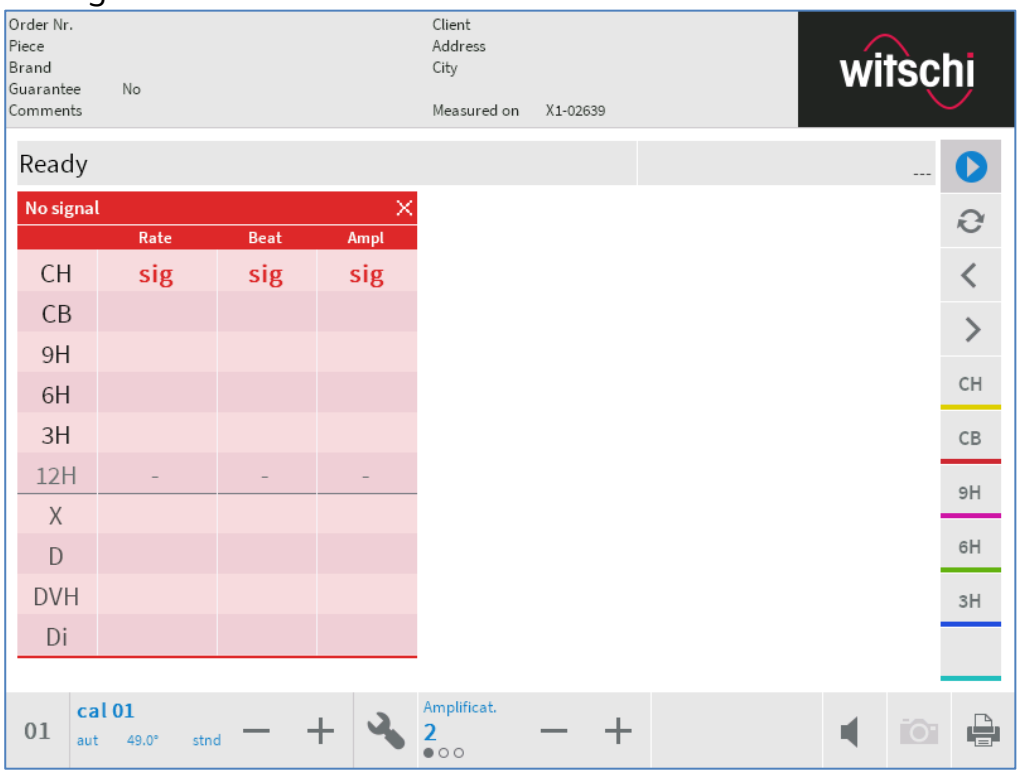
5.12 Error messages

Out of range:



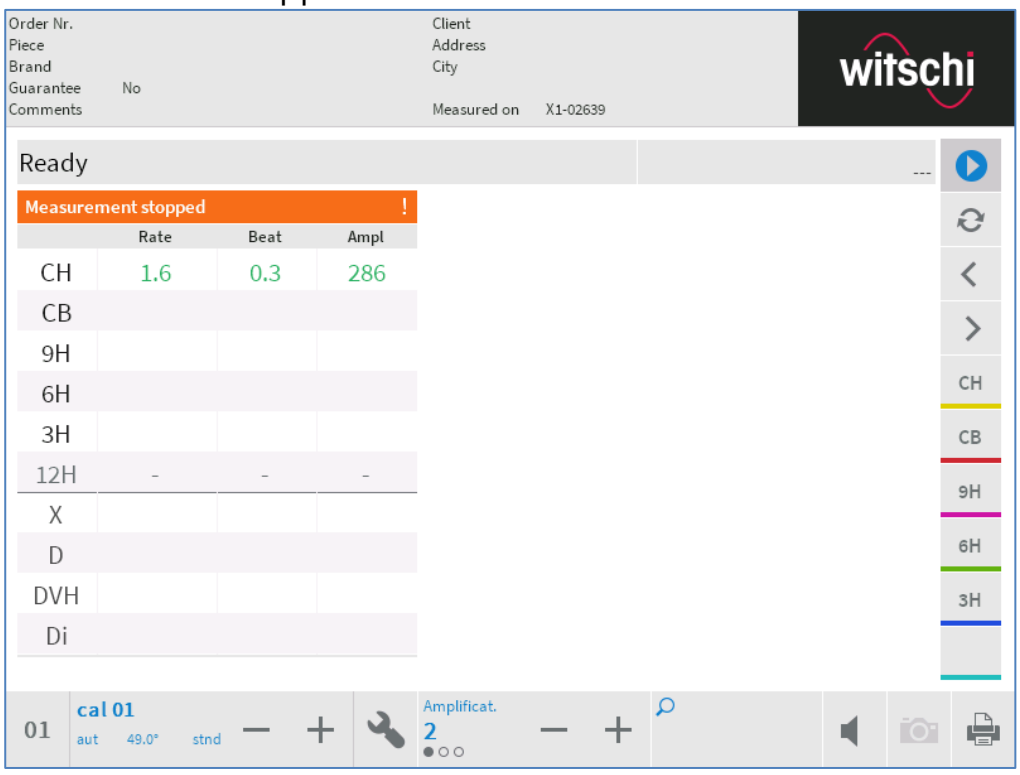
This message appears when, for example, the signal of the movement is outside of the preset tolerances or beat numbers. In this case, adjust mode *Beat number* to "Automatic" and select the tolerances in accordance to manufacturer's specifications.

No Signal:



This message appears when the microphone of the Micromat C, don't receive any signal from the Watch movement

Measurement stopped:



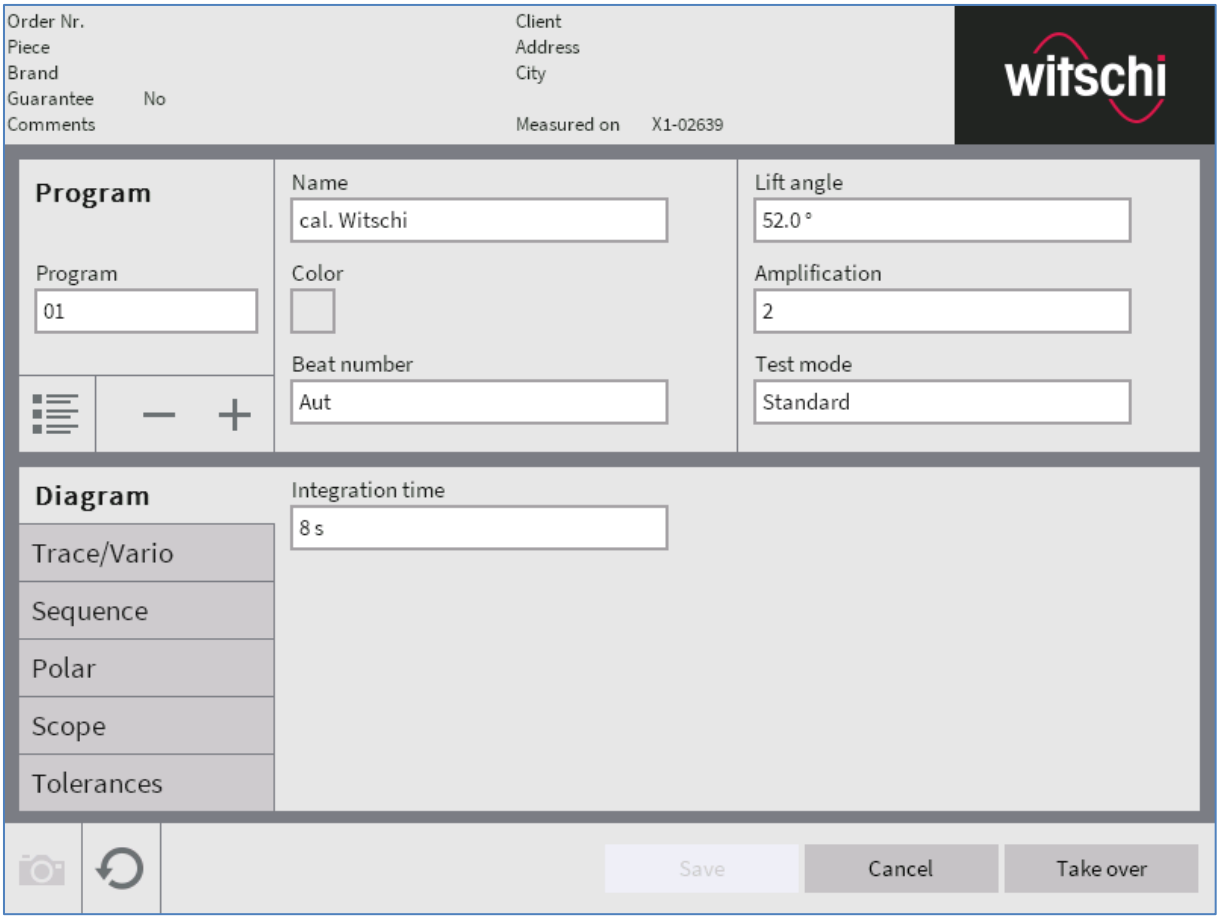
This message appears when the measurement has been stopped by the pause button , or

if the start-and position 

knob on the Micromat C is interrupted.

6 DISPLAY/EDIT MEASUREMENT PROGRAMS

The current program is displayed when  is pressed. Any measurement in progress will be interrupted. This allows editing the measurement parameters of the selected program.



A list of all programs opens when  is pressed. Any program in the list can be directly selected. The next or previous program can be selected with the *plus* and *minus* buttons.

The editing possibilities related to the available tabs are described below. The desired tab and the entry fields are also accessed by touching them.

6.1 Tab Program

The entry fields to be edited can be accessed by touching them. A keyboard, a numerical keypad or suitable function keys appear, depending on the function of the entry field.

Description

Program:	For a direct selection and entry of the desired program number (from 01 to 99).
Name:	The name assigned to the program can have up to twelve characters.
Color:	The program number can be highlighted with one of the following colours if desired: white, orange, yellow, red, green or blue.
Beat number:	The beat number can be set in the range 3600 to 72000 b/h and 360'000 b/h. *Automatic*: automatic evaluation of the beat number. *Manual*: the beat number can be manually entered. *Frequency*: automatic evaluation of the beat number for a rate deviation = 0 s/d.
Lift angle:	It is important to check that the lift angle corresponds to the watch being tested. The set-up range covers 10.0° to 90.0°.
Amplification:	The signal amplification provides 4 steps: 1 = weakest and 4 = strongest amplification. We recommend setting 2 for watches that do not present any special problems.
Test mode:	Selection of the appropriate mode. **Rate**: Only the rate measurement occurs. With this test mode it is possible to measure the rate even with watches with cylinder-, duplex- or chronometer escapements and also watches with bad or unusual beat noises. **Standard**: Mode for watches with Swiss lever escapement. **Special 1**: Mode for watches with coaxial escapement. **Special 2**: Mode for watches with AP escapement. **Special 4**: Mode with specific amplitude filter for measuring watches with Swiss lever escapement. It is better to use this mode when amplitudes of 360° are measured in the standard mode. **Special 6**: Mode for Chronograph "Foudroyante".

	Caution! The other test modes are **not yet active**, they are reserve modes.

6.2 Tab Diagram

Description

Integration time:	Selection of the integration time over which numerical results are used in the Diagram display mode. Selection: 2, 4, 6, 8, 10, 20, 30, 40, 50, 60, 120, 180 and 240 seconds. 4A can also be selected (= 4 alternations).

6.3 Tab Trace and Vario

Description

Integration time:	Time during which the numerical measurement results are calculated in the Trace and Vario modes. Selection of the *Auto* or *4A* integration time. *Auto* mode: Measuring time — Integration time 0 – 2 h — 2 s 2 – 8 h — 10 s 8 – 40 h — 30 s from 40 h — 60 s *4A* Mode: Measuring time — Integration time 4 s – 8 min — 4A The measurement results are calculated and displayed every 4 vibrations.
Measuring time: 	The measuring time can be entered with the numerical keypad. For the *Auto* integration time: from 4 s to maximal 99 h : 59 min : 58 s. For the *4A* integration time: from 4 s to a maximum of 8 min. Suggestion: The use of integration time 4A should be limited to lab measurements.

6.4 Tab Sequence

Description

Stab. time VV/HH:	Selection of the stabilisation time needed for the change inside the vertical or horizontal test positions from 2 s to maximum 2 min.
Stab. time VH/HV:	Selection of the stabilisation time needed for the change from the vertical to the horizontal test positions or vice versa from 2 s to maximum 2 min.
Measuring time:	A measuring time from 4 s to 10 min maximum can be entered. The integration time is set to 2 s.
Pos.:	Disregarding some predefined measurement cycles, up to 10 test positions can be entered in any order. Switched off test positions must be located at the end of the measurement cycle.

6.5 Tab Polar

Description

Rotation sense:	Select the appropriate tourbillon rotation sense: - CW Clockwise - CCW Counterclockwise
Rotation time:	Select the appropriate tourbillon rotation time: 24, 30, 60, 120, 180 und 240 seconds
Measuring time:	You can enter a measuring time 4 seconds up to a maximum of 1 hour **Important!** The measuring time must correspond to the tourbillon rotation time, or a multiple thereof.

6.6 Tab Tolerances

Description

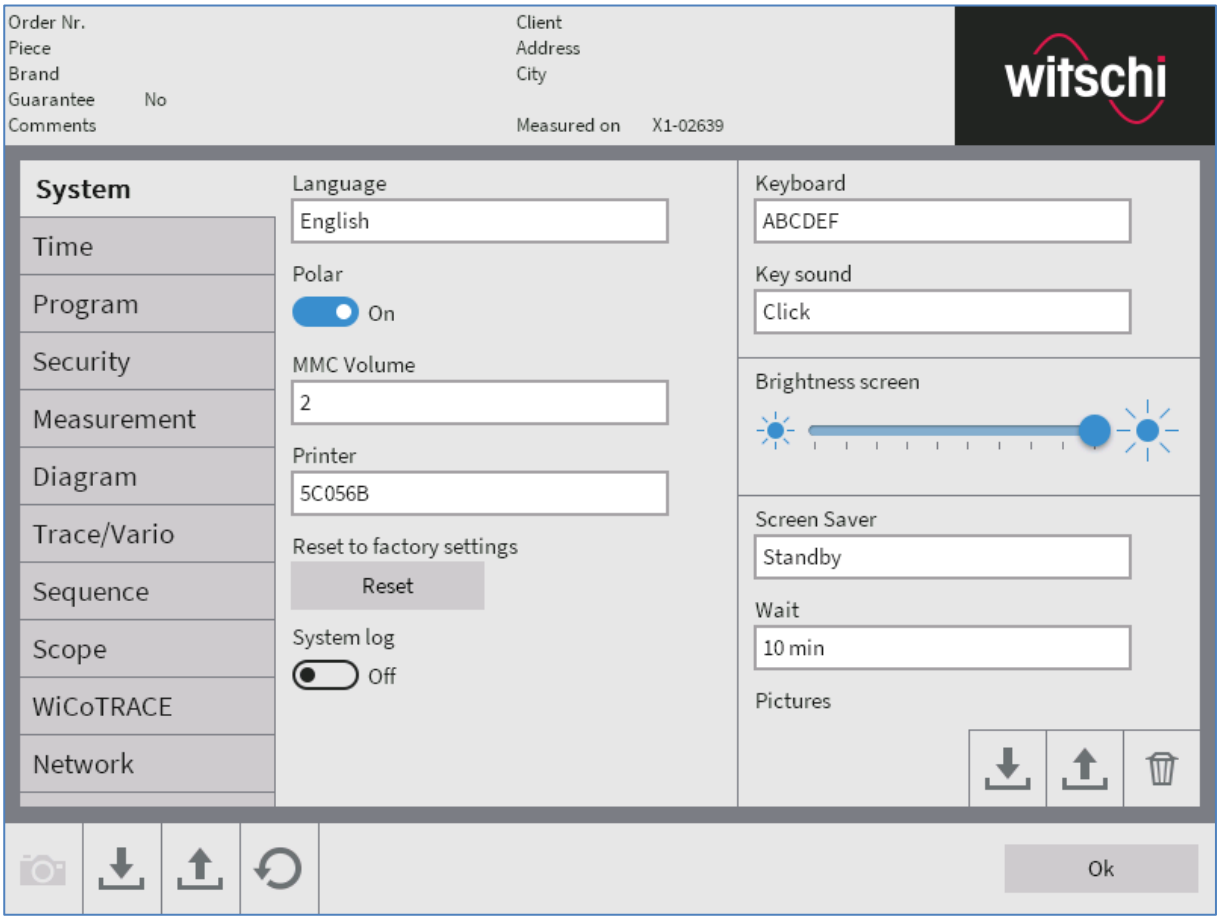
Positions H:	Selection of the minimal and maximal rate, amplitude and beat tolerance values for the horizontal test positions.
Positions V:	Selection of the minimal and maximal rate, amplitude and beat error values for the vertical test positions.
X:	Selection of the minimal and maximal rate, amplitude and beat error values for the mean of the test sequence.
Rate Min/Max:	Input range: from -999.9 s/d to +999.9 s/d
Amplitude Min/Max:	Input range: from 0° to 360°
Beat error Max:	Input range: from 0.0 to 9.9 ms
D:	Selection of the maximal rate, amplitude and beat error tolerance values for the delta value of the test sequence. Input range: Rate Max: from 0.0 s/d to +999.9 s/d Amplitude Max: from 0° to 360° Beat error Max: from 0.0 ms to 9.9 ms
On / off switching:	By clicking on the tolerance entry field, each individual tolerance can be switched on or off.

The tolerances for all display modes are used for the numerical representation of the results.
The tolerances for the mean (X) and delta (D) are only used in the Sequence display mode.

7 SYSTEM PARAMETERS

The system parameter set-up is normally performed only once, in most cases after the device has been installed and connected.

The window, which opens when  is pressed, contains various parameters that can be adjusted as required.



The set-up possibilities for the available tabs are described below. The desired tab and the entry fields are also accessed by touching them.

7.1 Tab System

Description

Language:	You can choose one of the four following languages: English, German, French, Spanish and Italian.
Key sound:	The confirmation following the activation of a touch screen button can be set to 'Silent' or 'Click'.
Show mouse pointer:	The mouse pointer can be shown provided a mouse is connected.
Keyboard:	You can choose the keyboard layout: ABCDEF (universal), QWERTZ (German), QWERTY (English USA) and AQUERY (French).

Screen saver:	To select which of three available screen savers will become active at the end of the waiting time. Standby : The backlight is switched off. Pictures : Display of the available pictures. The picture changes every 15 s. The pictures can be loaded from the memory or from the USB stick. The standard pictures are used when other ones are not available. Watch : Display of time, date and moon phase.
Wait:	Selection of a delay from 1 to 99 min. The selected screen saver is activated at the end of the delay.
Printer:	Searches for a nearby Bluetooth printer. Following a successful scan, the printer that has been found is listed with its name and address. The serial interface RS-232 can also be selected from the same list. Requirement: the Bluetooth Dongle must be plugged into one of the three USB ports.
MMC volume:	For defining the sound volume level (from 1 to 4) of the Micromat C audio output.
Polar:	The Polar display mode can be switched On or Off
Brightness Screen:	Using the slider, the screen brightness can be adjusted.
Pictures: 	Import The pictures can be copied from the USB stick to the internal memory. The structures and names listed below must not be modified! Directory: **Witschi\Chronoscope_X1\Pictures\Picture_NN.jpg** NN= 01 to 99. The numbering of the pictures, starting with 01, should not show gaps. If a picture is missing, the slide show starts again from Picture_01.jpg. Picture format: 800 x 600 points. Export The pictures in internal memory can be directly copied onto the USB stick. Both the structure and the names will be automatically created. Delete All pictures in internal memory will be deleted.
System:	Import The system parameters can be loaded from the USB stick. Export The system parameters stored on the USB stick can be

	copied into another Chronoscope X1 (G3). This saves both time and work.
System: log	Switch on system log only if malfunctioning of the unit is present. For that a USB stick must be connected. Subsequently all transacted operations are stored on the memory stick. For the failure analysis our service department requests these data's.

Proceed for Importing

1. Plug the USB stick into the X1 (G3) Terminal and touch the Export button. The directory is generated automatically in the USB stick.
2. Then plug the USB stick into the PC and transfer the picture from it into the present directory.
3. Plug the USB stick again into the X1 (G3) Terminal and touch the Import button.

7.2 Tab Time

Description

Date:	For setting the current date: 01.01.2008 – 31.12.2099
Format:	You can choose from the following formats: dd.mm.yyyy, dd-mm-yyyy, dd/mm/yyyy, mm/dd/yyyy und yyyy-mmm-dd.
Time:	For setting the current time: 00:00:00 – 23:59:59
Top of the minute:	If 'On' is selected, a signal sound repeated every 15 seconds is activated in the 'Time and Date' display mode. This time signal is generated whenever the last 5 seconds of the minute are reached.
Time Zone:	Change The correct time zone can be selected in the list. The selected time zone is displayed above the button.
Time change:	For enabling or disabling the automatic adjustment to daylight saving time/winter time.
Time server: 	If the instrument is connected to a network, the watch can be synchronised up to the second over the Internet by a timeserver (NTP). An alternative address of a time server can also be set (standard value: pool.ntp.org or a numeric IP-address). Should only be enabled if the timeserver is available!

7.3 Tab Program

Description

From:	Selection of the start index: 01 – 99.
To: 	Selection of the end index: 01 – 99. The end index cannot be smaller than the start index.
Program:	Import The programs on the USB stick can be copied to the internal memory from a selected start index to the end index. Export Inversely, the programs can be exported onto the USB stick and then copied into another Chronoscope X1 (G3). Delete The programs are deleted from the start to end index.
Clients:  	Import You can download the client files from the start until the end index from the USB stick into the internal memory. The structures and names listed below must not be modified! Directory: **Witschi\Chronoscope_X1\Addresses\Address_NN.ini** NN is the client number. Export The stored client files can be copied onto the USB stick from the start index to the end index. Both the structure and the names will be automatically created. Delete The stored client files can be deleted from the start to end index.

7.4 Tab Security

Description

Use security: 	Neither system parameters nor programs can be edited while the security mode is enabled. The editing function will be restored once a 4-digit (numerical) password has been entered. The device is delivered with the following password: 1234.

Change password:	Password The current password must be typed into the dialog box before the new password can be entered and confirmed.

7.5 Tab Measurement

Description

Positions:	For selecting the display mode of the measurement positions. Old standard: DU, DD, ... etc. According to the new standard: CH, 6H, ... etc.
Number of positions:	Choose 6 or 10 vertical positions with intermediate positions.
Watch position: 	Selection of the watch test position on the Micromat C: DU or DD (CH or CB). The test positions correspond to the 'Sequence' measuring mode.
Resolution:	Selection of the resolution for the rate deviation display: 1.0 s/d, 0.1 s/d or 0.01 s/d. At 0.01 s/d, the amplitude is displayed with a resolution of 0.1°.
No signal:	Selection of the desired setting. Measure: If the measurement process of the watch cannot proceed, the corresponding error, e.g. Signal error, is displayed. Pause: If the measurement process of the watch cannot proceed, the measurement is interrupted. The measurement process has to be restarted.
Result order:	You can choose the order of the numerical results: R-A-B (Rate- Amplitude-Beat error) or R-B-A (Rate-Beat error-Amplitude.
Micromat C:	Displays the firmware version, serial number, calibration date and calibration value, provided the Micromat C is connected. Verify and Calibrate The time base of the Micromat C can be verified and calibrated with suitable test equipment if needed. See Chapter 8.3 *Calibration*, page 35.
Calibrations:	List of the most recent calibrations.

7.6 Tab Diagram

Line width:	You can set the line width for the diagram recording: 1 or 2

7.7 Tab Trace / Vario

Description

After measurement:	Selection of the desired setting. Restart: The measurement process is restarted at the end of the measuring time. Pause: The measurement process is stopped at the end of the measuring time. Print: The measurement process is stopped and the measurement results are printed at the end of the measuring time.
Axis:	Two kinds of settings are available. Manually: The range with its minimum and maximum can be defined. Ranges for rate: 5, 10, 20, 50, 100, 200 and 500 s/d. Ranges for amplitude: 5°, 10°, 20°, 50°, 100°, 200° and 360°. Min, and Max. for rate: from -999.9 s/d to 999.9 s/d Min, and Max. for amplitude: from 0° to 360° Automatic: Automatic adaptation of the range as well as of the minimum and maximum. This is the most convenient set-up.
Range:	'Manual': The range can be defined. The minimum and maximum are adjusted automatically. Ranges for rate: 5, 10, 20, 50, 100, 200 and 500 s/d. Ranges for amplitude: 5°, 10°, 20°, 50°, 100°, 200° and 360°. Automatic: Automatic adaptation of the range.

7.8 Tab Sequence

Description

After measurement:	Pause: The measurement is stopped at the end of the measuring time. Print: The measurement process is stopped and the measurement results are printed at the end of the measuring time.
Switch to:	Here you can select the display mode for the start of a test sequence: Sequence, Diagram, Trace or Vario.
Φ, DVm:	Display of the gravity center error: Yes or No. Is activated only in the test mode “Sequence”. The measuring cycle must include the vertical test positions.
Autostart:	With Yes selected, a new measurement cycle will be started after the elapsed time interval. In this mode the reference line cannot be printed.
Next measurement: 	Selection of the time interval during which the measurement cycle will be started, from 1 min to 99 min. The measurement is immediately restarted if a measurement cycle is longer than the preset time.

7.9 Tab Scope

Description

Interval:	Selection of the display refresh interval: The number of vibrations is defined or the refresh interval is set to 2 s. Set-up options: 3A, 5A, 7A, 9A or 2 s. **Note**: For the purposes of setting 3A and 5A, the beat number in the measurement program must be set to “manual” mode. In „automatic“ beat mode or for a beat number greater than 36’000 a/h, the refresh interval is changed to 7A.
Mode:	You can select the display mode Scope 1 or Scope 2. See chapter 5.6 *Scope Display Mode*, page 18

7.10 WiCoTRACE tab

WiCoTRACE	WiCoTRACE 2009, WiCoTRACE 2 and WiCoTRACE 3 are all supported. Software installation is described in detail in the corresponding instruction. The Chronoscope X1 (G3) must be configured for use with **WiCoTRACE** software.
Procedure	• Select **WiCoTRACE** from the list. • Activate use of **WiCoTRACE**. • Enter the SMX service address of the server on which **WiCoTRACE** is located. • Enter the port of the server on which **WiCoTRACE** is located. • The Chronoscope X1 (G3) is now linked with the **WiCoTRACE** software.

7.11 Network

Network	The connection option facilitates the automatic configuration of the Chronoscope X1 (G3) with the help of a server. The steps below are necessary when using a PC in a network. **Equipment required** • Chronoscope X1 (G3) • Ethernet cable (not included in Chronoscope X1 (G3) scope of supply) • PC, including network environment (not included in Chronoscope X1 (G3) scope of supply)
Procedure	**Connecting** • Make sure that the Chronoscope X1 (G3) is switched OFF. • Connect the Ethernet cable to the network. • Connect the Ethernet cable to the network connection of the Chronoscope X1 (G3) and switch on the Chronoscope X1 (G3). • Select **Network** from the list. • Activate the network. • The Chronoscope X1 (G3) is now connected to the network. By default, the DHCP button is set to "Yes".

8 MAINTENANCE AND CUSTOMER SERVICE

8.1 Guarantee

Your instrument is covered by the Witschi Electronic Ltd guarantee for 2 year from the date of purchase. We guarantee to replace free of charge during the guarantee period, any parts which exhibit a defect due to faulty material or manufacture. Instruments returned under guarantee should be packed in the original packaging. Transport costs must be paid by the customer.

The guarantee does not cover the following:

- Damage which occurs due to improper handling of the instrument.
- Repair of damage not caused by Witschi customer service engineers, i.e. attempts by third parties to carry out repairs or adjustments to the instrument.
- Parts which, due to their function, are subject to normal wear and tear.

8.2 Maintenance

- The instrument does not require any special maintenance.
- Only use a soft cloth to remove the dirt; do not use aggressive detergents or solvents. Clean the LCD display with a lightly moistened cloth.
- Disconnect the power supply during longer idle periods of time (e.g. vacations).

8.3 Calibration

To keep measurements accurate, we recommend contacting our customer service to have your instrument calibrated and its functionality checked yearly.

If the Micromat C is connected to the Witschi GPS receiver, it is possible to test the calibration and, if necessary, to re-calibrate the device.

This task is normally carried out exclusively by our service centres. Inappropriate adjustment will impair the accuracy of the instrument!

Please contact the customer service department at our head office or one of our representatives.

9 TECHNICAL DATA

Measurement Possibilities
Rate deviation, amplitude and beat error of mechanical watches. Diagram of the beat noises.

Beat Number
Automatic selection of all common beat numbers. Manual selection of less common beat numbers. Manual selection of any beat number between 3'600 to 72'000 b/ h and 360'000 b/h.

Measuring Modes

— Rate:	Only measurement of the rate accuracy
— Standard:	Mode for watches with the Swiss escapement
— Special 1:	Mode for watches with coaxial escapement
— Special 2:	Mode for watches with AP escapement
— Special 4:	Mode with specific amplitude filter for the measurement of watches with the Swiss escapement
— Special 6:	Mode for Chronograph "Foudroyante"

The other test modes are reserve modes and **not yet** supported

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

Adjustment Possibilities

— **Continuous Diagram Recording**
  Selectable integration time: 2, 4, 6, 8, 10, 20, 30, 40, 60, 120, 180 and 240 s.
  Adjustable zoom: 1, 2, 4, 8, 16 x
— **Trace Display Mode**
  Selectable measuring time: from 4 s to 99:59:58h
  Adjustable zoom: 2, 4, 8 x
— **Vario Display Mode**
  Measuring time: adjustable from 4 s to 99:59:58h
— **Sequence Display Mode**
  Stabilisation time: adjustable from 2 s to 2 min.
  Measuring time: adjustable from 4 s to 10 min.
  Measuring cycle: adjustable from 1 to 6 test positions
— **Polar Display Mode**
  Rotation time: Clockwise or counterclockwise
  Rotation time: 24, 30, 60, 120, 180 and 240 s
  Measuring time: adjustable from 4 s to 1 hour
— **Scope1 Display Mode**
  Selectable time deviation: 20, 200, 400 ms.
— **Scope2 Display Mode**
  Fix time deviation: 20 ms.
  Averaging of the beat noises
— **Screensaver / Illuminating**
  Switched on and off, switch after: 1 to 30 min

Measuring Ability

Rate accuracy:	numerical display in s/d
Resolution:	selectable 0.1 s/d or 0.01 s/d
Measuring range:	± 999 s/d
Accuracy:	± 0.1 s/d
Amplitude:	numerical display in degrees
Resolution:	1° or 0.1°. Measuring range 80° to 360°
Accuracy:	± 1.0°
Lift angle adjustable:	from 10° to 90°. Resolution 0.1°
Beat error:	numerical display in milliseconds
Resolution:	0.1 ms. Measurement range 9.9 ms
Accuracy:	± 0.1 ms

Details Micromat C

Automatic microphone with integrated measuring unit.
By means of the inserted Joystick are manually up to 10 selectable, also in the automatic Sequence mode.

Acoustic check:	audio out, Stereo Jack (3.5 mm)
Time base:	Pre-aged and thermo-compensated high frequency quartz, OCXO
Stability:	+ / – 0.004 s /d between 10° and 50° C
Aging for the first year:	max. + / – 0.03 s /d
Plastic housing:	anthracite
Front panel:	aluminium colourless anodised
Dimensions:	115 x 125 x 215 mm (w x h x d)
Weight:	1.7 kg
Mains connection:	mains adapter for 230 V~ or 120 V~, 1.2 A

Details X1 (G3) Terminal

Display terminal with 10.4“ TFT colour Touchscreen (capacitive)
High power with low current consumption

Resolution:	800x600 (18bit colour)
Built-in flash memory:	1GB
Languages:	English, German, French, Spanish, Italian
Interfaces:	— 3 x USB 2.0 — 1 x UART RS-232 — Ethernet — 1 x RJ-45 100Base for network
Terminal in aluminium:	silver coloured
Stand in aluminium:	anthracite coloured
Dimensions:	266 x 213 x 43 mm (w x h x d)
Weight:	2.1 Kg

Mains connection Terminal X1 (G3): universal adapter for 100 to 240 V~, 1.5 A, 50-60Hz

9.1 Declaration of Conformity

The instrument is in conformity with the following EC-Directives:

2004/108/EG CEM

Emissions

EN 55022	**Conduction**
EN 55022	**Radiation**
EN 60555-2	**Harmonics**
EN 60555-3	**Flicker**

Immunity

IEC 1000-4-2	**ESD**
IEC 1000-4-3	**HF**
IEC 1000-4-4	**Burst**
IEC 1000-4-5	**Surge**
IEC 1000-4-6	**Cond. Immunity**
IEC 1000-4-8	**50Hz Magn. Puls**
IEC 1000-4-11	**Dips**

10 ACCESSORIES

Item	**Order Nr.**
Thermal printer with paper cutter, 100 V~ - 240 V~	JB01-SLK-TE25-S
Thermal paper for JB01-SLK-TE25-S, roll	JB01-MM60-740RS
Barcode reader 1D/2D with USB	JB15-901651082
WiCoTRACE 3 LITE software	64.6010

WiCoTRACE 3 Lite software can be downloaded from the Support section of our website www.witschi.com (subject to a charge).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