



# **Compact 900**



**User Manual** 

English

Page	Content
3	View of the Compact 900
4	The Compact 900 present itself
5	Start up
6	Menu selection
7	Adjustment contrast
8	Adjustment date/time
9	Adjustment language
10	Adjustment printer
11	Testing mechanical watches
12 + 13	Display mechanical watch
14	Testing watches with no standard beat rate
15 + 16	Testing quartz watches with "QM06"
17+18	Testing quartz watches with "EM06"
19	Checking battery voltage
20	Measuring stepper motor ohms
21+22	Testing pendulum clocks with "OPTO6" ( optical )
23+24	Testing pendulum clocks with "CM06" (acoustical)
25	Finding unknown beat rate for pendulum clocks
26	Programming of a button (P1 to P9)
27	Changing automatic adjustment
28	Changing a program name
29	Editing printoud header
30+31	Adapter, microphones for Compact 900
32	Standard - beat rates / CE – Conformity
33 +34	Co-Axial watch
35	Contact



## The Compact 900 presents itself !

The Compact 900 is an all purpose watch timing instrument for testing of mechanical watches, quartz watches, pendulum clocks as well as pocket watches.

Equipped with: Display 256 Colour, 12 x 9 cm

8 buttons for easily and quick handling of different functions

Automatic Standby (low current) while not measuring a watch signal

#### Mechanical Watches (special program for Co-Axial-escapement):

Graphical and alphanumerical indication of:

Rate error, amplitude, out of beat in milliseconds.

Oscillographical noise-meter.

#### Quartz watch:

Graphical and alphanumerical indication of:

Rate error, motor impulse (inductive), quartz frequency (acoustic). Automatic calculation and indication of inhibition.

Consumption of electricity: operational current, quiescent current.

Supply Voltage for watches is adjustable from 0.5 to 3.3 Volt.

Checking of Battery as well as stepper motor ohms.

#### Pendulum clocks:

Graphical and alphanumeric indication of:

Measuring of rate error with light barrier « OPTO 06 »

or with acoustical clamp microphone « CM06 ».

Automatic calculation and indication of beat rate (if unknown).

#### **Printing results:**

The results can be printed alphanumerically with a serial printer or transferred to your computer « PC(result) ».

Your company data (if given) are printed on the printout header.

#### Transform Parameters to the PC:

The measured data can be transferred automatically every (x) seconds to your « PC(grafic) » and can be indicated as a long term graphic.

#### Following microphones (adapters) can be used:

- MP86 Microphone for mechanical watches, fixable in all positions.
- **QM06** Microphone for mechanical and quartz watches.
- **CM 06** Clamp microphone for pocket watches, large watches, pendulum clocks.
- **EM06** Watch holder with mirror for measuring electrical values of quartz watches.

**Opto06** Light barrier for optical measuring of pendulum clocks.

## Start up

Connect the unit with the power transformer to the power supply line and switch on with the turning knob. Put the mark of the knob on 12 o'clock. After switching on you can see the following:

The green control lamp «Power» lights up if the unit is connected with the power supply and switched on.



If your data as your name, address, tel., etc. have been programmed, they will appear instead of the Greiner logo (printout header).

## Standby

If the Compact 900 is on and during 10 minutes is no watch signal incoming or any key pressed, then the display switches off automatically (black screen) and the unit is on standby.

The green control lamp «Power» still lights up, and indicates that the unit is still on hand and can be activated by pressing any button.

# **Menu selection**

#### Menu after startup



Press key <br/>to switch between this 2 menus



various settings.

# **Adjustment contrast**



Press button for indicating software version

Press button for changing to the last menu

03

## Button for more system adjustments



## Adjustment of Date / Time



## Language selection

#### Menu after start



Select language by pressing buttons in following sequence.

button (More)
 button (Settings)
 button (System)
 button (Language), the following menu appears

Select language with the following buttons.



## **Printer selection**

#### Menu after start



Select printer by pressing buttons in following sequence.

button (More)
 button (Settings)
 button (System)
 button (printer), the following menu appears:



For saving the selected printer <

## **Testing mechanical watches**



# **Display of mechanical watch**

During measuring it is possible to choose between error rate, rate diagram or balance wheel signal. Standard is the rate diagram.

Indication of the frequenzy of the watch

Speaker on/off	Auto mode, me Target beat rat Lift angle: Measuring per	echanical watch te: (21604 iod:	1.0 Zoom ) 21600 b/h 52 ° 4 s	View balance wheel signal	
	*****		current be	eat rate	
130	180	240	300	350	
More	Rate: +13 s/d	Amplitude: <b>260°</b>	Out of beat <b>0.2ms</b>	View rate error	

Press button for next display

Press button for the previous display

<b>C</b> Speaker on/off	Auto Target rate: Lift angle: Measuring per	<b>o mode, mechan</b> i iod:	ical watch 21600 b/h 52 ° 4 s	View rate diagram	
	Image: Constraint of the sector of				
0 20 40	60 80 100	120 140	160 180 200	220 240	
More	Rate:	Amplitude:	Out of beat	two	
	+13 s/d	260°	0.2ms	diagram <	

Press button 🔸

to change between one or two beat diagrams

# **Display of mechanical watch**

Speaker on/off	Auto mode, m Target beat ra Lift angle: Measuring pe	echanical watch ite: (21604 riod:	1.0 Zoom ) 21600 b/h 52 ° 4 s	View balance wheel signal
130	180	240	300	350

#### Remark :

An amplitude value lower than 130° is displayed ( < 130°) An amplitude value higher than 350° is displayed ( > 350°)

Press button for next display

Press button for balance wheel signal

Speaker on/off	Auto Target rate: Lift angle: Measuring pe	<b>mode, mechanica</b> riod:	l watch 21600 b/h 52 ° 4 s	View balance wheel signal	
-30 -25 -2	 0 -15 -10	-5 0 5	 10 15 20	 25 30	
130	180	240	300	350	
More	Rate: +3 s/d	Amplitude: 260°	Out of beat 0.2ms	View rate diagram	

Press button for previous display

## Testing watches with no standard beat rate

If a watch has no standard beat rate (p.32) or the rate error is higher then 300s/d, the following display appears.



## Testing quartz watches with "QM06"



**Put the watch** between the slider and the pins (fork) of the microphone "QM06". Press button "Auto QM06 only" to start automatic measurement of the motor impulses.

For manual measurement of the quartz frequency or motor impulses, press first button "More" then button "P7" or "P8".

The pins (fork) receive acoustically the 32 kHz frequency of the quartz if the vibrations are sufficiently transmitted to the watchcase. The motor impulses are measured by an inductive receiver inside the microphone.



Press button "EM06" for measuring: rate of the quartz watch, consumption of electricity (operational current, quiescent current), ohms of the stepper motor and the voltage of the battery.

EM06

## Testing quartz watches with "QM06"





Press button to return to menu above

# Testing quartz watches with "EM06"

Connect watch adapter "EM06" with the jacks ( + ) ( - ) of the Compact 900, put quarz watch without Battery on the "EM06". Contact red bow with plus (+) and black bow with ground (-) of the watch. It is also possible to use only the test cable without EM06.



For the following menu, press button "EM06" in the main menu. Choose then button for measuring consumption of electricity, rate accuracy, stepper motor ohms or voltage.

## Press this button to start diagram



# Testing quartz watches with "EM06"

Voltag	ge higher		Va	oltage lower	
	Volt- age	Auto mode, q Measuring period: Vertical Zoom: Source voltage:	uartz watch Auto s (60) 1 x 1.55 V	Volt- age	
	Quiescent o 0.27 µA	current: Impulse: 18.92 μΑ	Remaining: Inhibition: 3 s 60 s		
	More	Rate: Impulse: +0.08 s/d 5	Supply current:	View rate error	

Press this button for the following menu



Press button to return to display above

# **Checking battery voltage**

For the following menu press button "EM06" in the main menu. Press then button "Battery voltage" for measuring the battery voltage.



Connect test cable with the plugs (+)(-) of the Compact 900. Touch with red probe the positive side (+) and with the black probe the negative side (-) of the battery. The present battery voltage is indicated.



Press button to return to display above

# Measuring Stepper Motor ohms

In the main menu press button "EM06" for the following menu. Then press button "Stepper Motor ohms" for measuring the stepper motor ohms.



Connect test cable with the plugs (+) (-) of the Compact 900. Then connect the ends of the probes to a short circuit and press button "Zero Ohms". Display indicates (0 Ohm). Then touch with the probes the ends of the stepper motor. The present number of ohms of the stepper motor is indicated.



Press button to return to the menu above

# Testing pendulum clocks with "OPTO6" (optical)

To start measuring:

Press this button to begin the automatic start of the measuring





Auto mode

or button

Auto Opto06 only

Mount the light barrier "OPTO 06" on a tripod. Direct the light beam only on one side of the pendulum. Distance 5 - 50mm.

The pendulum shall pass through the light beam only one sided.

The correct adjustment can be checked by the red signal of the Compact 900.



After approx. 8 seconds appears following display (menu).

Press button to accept or to change the beat rate



Press button to start diagram for rate error.

Press button to measure beat rate, page 25.

# Testing pendulum clocks with "OPTO6" (optical)

Graphic for rate error with "Opto06" :

	Auto mode, per	ndulum clock		
	Target rate: Measuring period:	8965 b/h Auto s (10)		
				L
More	Rate: <b>8 s/d</b>		View rate error	

Press button for next display



Press button to return to display above

# Testing pendulum clocks with "CM06" (acoustic)

Press this button to start >>



Contact clamp microphone "CM 06 " with the clockwork of the pendulum clock, or at a place, where the acoustic signals are sufficiently receivable. The red signal on the Compact 900 indicates the noise of the frequency of the pendulum clock.

**CM06** 

After approx. 8 sec. appears the next display.

If the beat rate is known, it can be programmed in the program (P9), page 26.

Press button to accept or to change the beat rate.



Press button to calculate beat rate, page 25

# Testing pendulum clock with "CM 06" (acustically)

Graphic indication of rate error with the microphone "Opto06" :



Press button for next display



Press button to return to display above

## Find unknown beat rate for pendulum clocks

	Menu pendu Auto mode, pend	lum clock		
	Target rate: actual beat rate: average beat rate: measure time:	******* 8965 b/h 8965 b/h 02:10:00		
Menu			stop measure	

To find out the correct beat rate of the pendulum clock:

- 1. Set pendulum clock e.g. on 6.00 o'clock. Press button« start measure »
- 2. Let the clock run for a certain time, for example 2 hours.
- 3. After a time xx, press button « stop measure ».



- 4. Press button "value" in order to give in the passed time of the pendulum (for example) 2 hours, 2 minutes, 0 seconds
- 5. Press button "set target rate "
- 6. Press button " start diagram". Now it is possible to adjust the pendulum.

# Programming of a button (P1 bis P9)

In the main menu press button "Settings" then button "Modify program settings", then button "program" for selecting (P1 - P9). Now press button "Modify program settings".



Press button "Save" to store the parameters.

Standard values	Modify prog	r <b>am s</b> 52°	ettings	Save	
Select	Watch type: Target rate : Lift angle: Measuring period: Amplitude tolerance min.: Amplitude tolerance max.: Rate tolerance min.: Rate tolerance max.:	Mech. 18000 52 ° 4 s 240 ° 320 ° -10 s 10 s	Mech. 18000 b/h 52 ° 4 s 280 ° 320 ° -10 s 10 s	Value	
Modify program name				Back	

- 1. Press (Select up /down arrow) to select a line.
- 2. Press (Value up /down arrow) to change the value.
- 3. Press (Modify program name) to change the name of this program
- 4. Press (Standard values) for factory setting

# Changing automatic adjustments

The parameters of Auto mode are always taken over if one of these buttons are pressed (if you work in auto modus).



To indicate the parameters, press the following buttons in the main menu: button "Settings" then button "Modify auto settings" .

For changing parameters:

- 1. Button (Select) to select a line.
- 2. Button (Value) to change the value.
- 3. Button (Modify program name) to change name of program
- 4. Button (Standard values) for factory settings.

Press button "Save" to store the values.



Press button to return into main menu

Changing a program name.



How to proceed:

Use the « **Cursor** » to move to the desired position. Right or left.



Use « **Character** » To move to the desired character. Right or left. AÁÂÃÄÅÆÇÈÉÊËÌÍĨĨÑÒÓÔÕÖØÙÚÛÜÝ~§©®µ

Use « **Delete character** » to delete the character to the left of the cursor. In this case, it is the **9**.

Use « **Insert character** » to free 1 place to the left of the cursor for a character. In this case, it is to the left of **n**.

Use « Save » to save the program name.





3150

# **Editing printout header**

The printout header appears after switch on the Compact 900 and he is printed together with the results.

The printing of the results has following appearance



## To program or modify the printout header :

Same procedure as modifying the name of the program, see page 28



## Microphones (adapters) for Compact 900

#### **Microphone MP86** Suitable for testing Mechanical watches.

Head is fixable in all positions.





#### **Microphone QM06**

Is a combined microphone for testing mechanical and quartz watches.

#### Clamp microphone "CM06"

For acoustical testing of pendulum clocks, pocket watches and other big watches.

**Light barrier " OPTO 06"** For testing of pendulum clocks. (optical measuring of the pendulousness)

# Microphones (adapters) for Compact 900



**Clamp microphone "CM06"** For acoustical testing of pendulum clocks, pocket watches and other big watches.



Watch adapter "EM06" (Electrical Measuring) Watch adapter with mirror and 2 contact bows for measuring of electrical consumption and the rate error of quarz watches.

#### Test cable

For manual measuring of consumption of electricity and rate error of quarz watches as well as testing of the Stepper Motor ohms and the battery voltage.



#### Standard beat rate / Cleaning / CE - Conformity

#### Following beat rates are programmed as standard:

**3600**,,3960, 4320, 4680, 4800, 5040, 5400, 5760, 6120, 6480, 6840, 7200, **7560**, 7920, 8100, 8280, 8640, 9000, 9360, 9440, 9720, 9760, 10080, 10440, **10800**, 11160, 11520, 11880, 12240, 12600, 12960, 13320, 13680, 14040, **14400**, 14760, 15120, 15480, 15840, 16200, 16560, 16920, 17280, 17640, **18000**, 18360, 18720, 19080, 19440, **19800**, 20160, 20520, 20880, 21240, **21600**, 21960, 22320, 22680, 23040, 23400, 23760, 24120, 24480, 24840, **25200**, 25560, 25920, 26280, 26640, 27000, 27360, 27720, 28080, 28440, **28800**, 29160, 29520, 29880, 30240, 30600, 30960, 31320, 31680, 32040, 32400, 32760, 33120, 33480, 33840, 34200, 34560, 34920, 35280, 35640, **36000**, **+** Auto.

#### Package contents :

- Compact 900 (basic unit)
- Power transformer ( 100 240 ~) [ 12 V= ] .
- 1 Set of test cables
- The ordered microphones
- Manual instruction

## **Cleaning:**

Don't use agressive cleaning supplies. Wipe the keyboard and the display occasionally with a wet cloth.

## **EG Conformity**

- The Compact 900 corresponds with the following

EG directives and rules.

89/392/EWG	machinery
EN 292 – 1991	
89/336/EWG	EMV
EN 50082-2	disturbing security Industry
EN 55011-1991	disturbing emission
23/73/EWG	Low voltage directives
EN 61010 – 1993	Electrical security

# **Co-Axial watch**

For the correct measurement and display of amplitude for Co-Axial escapement, select the key

**Co-Axial** 

A special measuring procedure for Co-Axial escapement will be activated. (Different from the procedure for standard escapement.)



# Menu for Co-Axial watch

## Menu after having selected key "Co-Axial"

Co-Axial 28800	Menu		
30 Co-Axial 25200 38°	Info: In this menu you may select: Co-Axial Auto , or Co-Axial 28800 30°,or Co-Axial 25200 38°,or Menu to return	Co-Axial Auto	
Menu	31.08.2007		

# Display if Co-Axial watch is in test

	Speaker on/off	Co-Axial 2880 Target beat ra Lift angle: Measuring pe	00 30° hte: (24 riod:	1.0 Zoom 8802) 28800 b/h 30 ° 4 s	View balance wheel signal		
	130 More	180 Rate: <b>+8 s/d</b>	240 Amplitude: <b>213°</b>	300 Out of beat: <b>0.6ms</b>	350 View rate error		
If the Co-Axia Auto	key	The C watch chara If not	Compact 9 n on the m acteristics , the follow	900 automat hicrophone h of a real "C wing will be	tically test nas the Co-Axial" n displayed.	s, if the watch.	
	Speaker on/off		Co-Axial	auto			
			?				
			19796 b/h				
	Menu	n	o Co-Axial press me	watch nu			

Now press " Menu " to return to previous menu.



## Greiner vibrograf AG Mittelstrasse 2 CH - 4900 Langenthal / Switzerland

Tel.:	+41 62 923 44 33
Fax:	+41 62 923 18 46
Email:	info@greinervibrograf.ch
Internet:	www.greinervibrograf.com



## Helmut Klein GmbH. Fritz-Neuert-Strasse 31 DE - 75181 Pforzheim / Germany

Tel.:	+49 7231 9535 0
Fax:	+49 7231 9535 95
Email:	info@klein-messtechnik.de
Internet:	www.greinervibrograf.com