



Multifunction Tester for Quartz

MSA 19.108



DESCRIPTION

Multifunction portable tester for analog quartz watches and movements. Supplied with 2 precision probes, 9V adaptor (Input 220/110V AC - Output 9V DC), 9V ALKALINE battery, instructions for use, technical guide (movement consumption and coil resistance values of popular quartz movements).

CONNECTIONS

1. Open the battery cover located at rear, and connect the 9V battery.
2. Note that when apparatus is ON, you have to change the 9V battery when message "LOW BAT" blinks on LCD display.
3. Connect AC adaptor power supply cord to mains (220V or 110V). Connect the 9V adaptor male plug to rear jack. This action automatically disconnects the 9V battery for daily intensive use (watch repairers, after-sales services, quick battery change shops, watch manufacturers).
4. Connect the 2 probes plugs to rear (black plug in black terminal, red plug in red terminal)
5. Upper part of apparatus is provided with two black and red probe holders.

SPECIFICATIONS

Flashtest has capabilities to perform:

- **WITHOUT OPENING THE WATCH, QUICK TESTS** of
 - electronic watch part (battery, electronic circuit, coil, step motor)
 - mechanical part, by UNJAMING wheels train, hands and calendar parts
- Proceed to these tests when the watch is:
 - NEW, before sale
 - REPAIRED, before to be returned to customer
 - DAMAGED, for a quotation before repair
- **BY OPENING THE WATCH, ACCURATE TESTS** of
 - real battery status
 - consumption of electronic circuit
 - consumption of movement
 - coil continuity

Tests performed with opened watch are necessary to get precise information on real status of vital components.

REFER TO TECHNICAL GUIDE;

useful summary that lists consumption and resistance values of popular movements made by various watch manufacturers, at common temperature of 20° C. This guide does not replace last updated technical documents published by each manufacturer, that we highly recommend.

PRESSURE BUTTONS

ON

- Pressed once
 - Sets power ON
- Pressed continuously
 - For testing or UNJAMING mechanical part

OFF

- Pressed during 1/2 second :
 - Sets power OFF

MUTE

- Pressed once
 - Sets speaker sound OFF

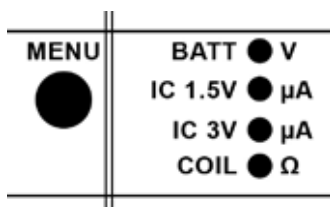
Switch back to sound ON: first set power OFF (button OFF), and then set again power ON (button ON).



MENU

Press to select the desired function

- **function BATT** (battery test); measures the battery voltage in Volts.
- **function IC 1.5V**, activates the 1.5V DC power supply, for measuring the consumption in μA
- **function IC 3V**, activates the 3V DC power supply, for measuring the consumption in μA .
- **function COIL**, measures the coil resistance in $\text{k}\Omega$



SIMUL

- When MENU is selected on BATT function (battery test), the button "SIMUL" simulates the real working conditions of a watch battery, as the various watch components act as a LOAD. So we get information of the real battery power reserve.



SENSORS, PROBES, LCD DISPLAY

WATCH BATTERY TESTER

Zone only used for battery controls. Before test, select MENU button on BATT. Place (+) side of battery down on the metal plate, (-) battery side up. Take black

probe (-) and touch (-) battery side; read the value on LCD display.

QUARTZ ANALOG WATCH

Place watch here to perform following QUICK tests, without probes ***:

- **1. IMPULSE (receiver)**
Detector receives pulses generated by quartz movement and emits an audible signal (BIP); the 4 diodes are flashing:
 - each second for watches with sweep second hand
 - each 5-10-20-30 or 60 seconds for other types of watches.Move watch on this zone to locate where the best signal is received.
- **2. TURBO (transmitter)**
Keep continuously button "ON" down to generate a magnetic field for testing or unjamming the wheel train. Move the watch to locate the best rotating effect.

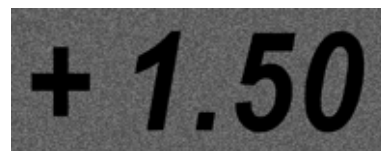
ULTRA THIN PROBES

BLACK NEGATIVE (-)
RED POSITIVE (+)

To get accurate measurements, the handle is coated and insulated with synthetic rubber; they are fitted with very thin precision tips, that make contact with small watch components easier.

LCD DISPLAY

The extra large digits give quick and easy readings; precision 1/100 of V, μA or $\text{k}\Omega$.



*** Tests without probes and closed watch case may not operate in some conditions (watches equipped with thick watch cases, stainless steel watch cases, or with very low consumption movements). When it occurs, open the watch case.



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INSTRUCTIONS FOR USE

We suggest you to proceed as follows (illustrations refer to calibre ETA 955112)

A - Battery voltage

(1/100 of V)

- Measured with **mounted** genuine battery
- Readings from 0 to 19.999 Volts.
- MENU Function BATT activated, SIMUL button is **not activated**.
- No time limit during tests, thanks to high internal resistance of 100 k Ω .
- To make sure that **energy reaches the watch electronic circuit**.



B - Voltage of battery at work

(1/100 of V)

- Take the battery out of the watch (or to test a new battery before replacement)
- We simulate the resistance of the various watch components called LOAD
- Readings from 0 to 19.999 Volts.
- Function BATT, **press** button SIMUL **during 1 to 2 seconds** (the activated internal resistance is 1 k Ω).
- **Limit** test duration to avoid watch battery discharge, especially for "low drain" or small size batteries.
- Place + positive side of watch battery on + WATCH BATTERY zone, then touch-side of battery with the - black negative probe tip; finally, **press SIMUL shortly**
- Check components located inside the battery van, no trace of oxyde should appear. Take rust away or exchange oxyded parts.
- **Do not touch battery with fingers**. Perspiration is a natural thing; touching a battery forms a slim layer, that will generate oxyde after some months.

C - Place the opened watch or the movement on QUARTZ ANALOG WATCH zone

- Keep in mind that some movements generate one impulse per second, and some other only every 5, 10, 20 or 30 seconds.***
- When apparatus receives impulses,

but hands do not move, it means that electronic part functions, mechanical part is faulty; check or clean mechanical parts (dust in wheels train, hand that touch crystal or dial,...)

- When apparatus receives impulses and watch does no longer function, you can proceed to coil testing:

D - Coil continuity, to measure its resistance (1/100 of k Ω)

- Readings from 0 to 19.999 k Ω
- Operating voltage of ohmeter is 0.2 V; voltage exceeding this value is not convenient for getting correct readings
- **Coil must not receive power supply from watch battery.**
- Resistance readings give coil status:
 - **cut** (resistance 0)
 - **in shortcut** (resistance = 1)
 - **not suitable** resistance when value is different from manufacturer; it generates consumption in excess and shortens battery life
- **Compare with the technical chart**



E - Consumption of electronic circuit

(1/100 of microampere):

- Readings from 0 to 19.999 μ A
- Pull the winding stem fully (in position 3. outwards)
- **Take battery out** of the watch
- Function IC 1.5V for 1.5V type watches.
- Function IC 3V for 3V type watches.
- Do not select IC 3V function when testing 1.5V type watches.
- The apparatus acts as a power supply and shows the current consumption
- **Compare with the technical chart**
- When consumption is nil, electronic circuit is faulty; replace the electronic circuit
- When consumption exceeds or do not match with manufacturer value, circuit is nearly end of life and; replacement is recommended



F - Movement consumption

(1/100 of microampere):

- Readings from 0 to 19.999 μ A
- **Take battery out** of the watch
- Press winding stem completely (activate all movement functions)
- Function IC 1.5V for 1.5V type watches
- Function IC 3V for 3V type watches
- Do not select IC 3V function when testing 1.5V type watches
- The apparatus acts as a power supply and shows the current consumption.
- **WAIT 5 TO 10 SECONDS TO GET STABLE AND CORRECT READINGS**
- **Compare with the technical chart**
- When consumption exceeds manufacturer value, it might mean that
 - Wheel train is dirty or faulty, it increases friction and more energy is needed to make wheels rotation; clean, adjust or replace the train wheels.
 - The hands touch dial or glass, or hands are not fitted correctly; adjust, clean or replace hands.



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ETA (www.eta.ch)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil k Ω
201001		0.35	1.20-1.60
205911		1.10	0.20-0.40 gen.
210001-11		0.70	1.25-1.55
251252		3.10	
		1.00 set	
		5.80 chr	1.50-2.50 red
			1.00-2.00 green
251262		3.20	
		0.50 set	
		5.80 chr	1.50-2.50
			1.00-2.00 green
251265		4.60	
		2.50 set	
		7.20 chr	1.50-2.50 red
			1.00-2.00 green
251272			1.50-2.50 red
			1.00-2.00 green
251471		3.20	
		0.50 set	
		5.80 chr	1.50-2.10 red
			1.20-1.80 green
255111-22	0.50	1.50	3.50-4.00
255265	0.50	1.50	3.50-4.00
255411	0.50	1.50	3.50-4.00
255431-41	0.50	0.70	3.50-4.00
255461-81	0.50	1.50	3.50-4.00
255483	0.50	1.50	3.50-4.00
256031	0.40	0.75	1.30-1.60
256041	0.40	0.75	1.30-1.60
256101-11	0.40	1.10	1.30-1.60
256461	0.45	1.20	1.80-2.00
280002		0.70	1.55-1.85
282001		0.50	1.20-1.50
551411		2.20	1.90-2.40
555415		1.80	3.40-3.70
555419	0.55	1.80	3.40-3.70
579001	0.50		3.40-3.70
579105	0.50	1.80	1.40-1.60
802001		1.40	1.30-1.95
802101		1.40	1.30-1.45
803111-21		1.40	1.20-1.40
804111-21		1.40	1.20-1.60
805111-24		1.40	1.20-1.60
805144		1.40	1.20-1.60
901001-05		0.45	0.80-1.20
902002-05	0.70	0.70	0.90-1.40
902101	0.40	1.10	0.90-1.40
902105	0.40	1.10	0.90-1.40
902501	0.40	1.10	0.90-1.40
926301		1.80	2.00-3.00
955102-32	0.50	1.30	1.30-1.80
955402-22	0.50	1.30	1.30-1.80
955432	0.50	0.70	1.30-1.80
956114-24	0.35	1.35	3.70-4.10
956414	0.35	1.35	3.70-4.10
976001		0.60	2.10-2.40
978002		0.70	2.10-2.40
980003-05	0.50	0.60	1.45-1.75
980105-06	0.50	1.00	1.45-1.75
980108	0.50	1.00	1.45-1.75
980153-63	0.50	1.00	1.45-1.75
E01001		0.50	0.90-1.20
E01401		0.50	0.90-1.20
G10211		3.60	
		6.60 chr	

FE (www.technotime.com)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil k Ω
5120-30	<0.30	0.40-0.80	1.50
5820-6120	<0.30	0.40-0.80	1.50
6130	<0.30	0.50-1.10	1.50
6320	<0.30	0.40-0.80	1.50
70200-10	<0.40	0.60-1.40	1.20-1.40
7021-22-24	<0.40	0.60-1.40	1.20-1.40
71200-20	<0.40	0.60-1.40	1.20-1.40
7121-22	<0.40	0.60-1.40	1.20-1.40
7220B	<0.40	0.60-1.40	1.20-1.40
7221-22-28	<0.40	0.60-1.40	1.20-1.40
7224-34-44	<0.40	0.60-1.40	1.20-1.40
73310	<0.40	0.60-1.40	1.20-1.40
7331-34-35	<0.40	0.60-1.40	1.20-1.40
75210	<0.40	0.60-1.40	1.20-1.40
7524-29	<0.40	0.60-1.40	1.20-1.40
7532-36-39	<0.40	0.60-1.40	1.20-1.40
7549-91-99	<0.40	0.60-1.40	1.20-1.40

ISA (www.isaswiss.com)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil k Ω
1198		2.00	
120		0.90	
122-128		0.65	
125-127		0.38	
130-138		0.90	
257		0.40	
307-317		1.80	
317/103.05		2.40	
317/703 solar		1.00	
317/705 electrolum.		1.70	
320-321		1.00	
326-328		0.90	
326/168 small sec		1.20	
8153		2.35	
8154-61-62		1.70	
		12.00 chr	
8155		2.35	
K62		0.35	
K63		1.70	
K63/302 ana digi		2.00	
K83		1.55	

RONDA (www.ronda.ch)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil k Ω
1062		0.35	2.70-2.90
1063-64-65-60		0.72	2.70-2.90
312		1.35-1.85	1.75-1.95
312S		2.11-2.45 sec h	1.75-1.95
		2.63-2.95 sec	
315		1.35-1.85	1.75-1.95
505-509		1.35-1.85	1.75-1.95
515		2.11-2.45 sec h	
		2.63-2.95 sec d	2.45-2.55
519		2.11-2.45 sec h	
		2.63-2.95 sec d	2.45-2.55
705		0.85	
706-706.1		0.80-1.13	1.75-1.95
706.B		1.65-1.85	1.75-1.95
726		0.75	
		3.95 chr	2.55-2.85
751		0.40	2.65-2.90
753		0.71	2.65-2.90
762		0.40	2.65-2.90
763		0.71	2.65-2.90
772-73-82-85		0.90	1.75-1.95

SEIKO (www.seiko.co.jp)
(www.seiko-watch.co.jp/support/manual/index.asp)

Cal.	μA. Ic	μA. Mvt	Coil kΩ
1E20		0.30	1.60-2.80
1F20	0.25	0.30	2.00-2.60
1N00	0.25	0.30	1.70-2.00
1N01	0.25	0.90	2.70-3.30
2A23	0.60	1.00	2.80-3.40
2A27	0.60	1.10	2.30-2.80
2C21	0.40	0.80	2.80-3.40
2E20	0.30	0.60	1.40-2.00
2F50	0.20	0.30	2.00-2.40
2Y00	0.30	0.40	2.10-2.60
3M22	0.40	0.80	2.40-3.20
			AG Coil 330-430 Ω
4N00	0.30	0.50	2.00-2.40
4N01	0.30	1.10	2.10-2.50
4N20	0.30	0.50	2.00-2.40
5A50		0.30	1.80-2.60
5M22	0.50	1.00	2.90-3.40
			gen. coil resist.
			280 Ω-380 Ω
5M42	0.50	0.90	1.70-2.10
			AG Coil new 1.90-2.30
			old 280-380 Ω
5M43	0.50	0.90	1.70-2.10
			AG Coil new 1.90-2.30
			old 280-380 Ω
5T52	1.80	2.50	1.40-2.40 4002701-11
			1.70-2.30 4002700
6M13	0.80	3.00	1.20-1.60 4002454
			0.80-1.20 4002455
			1.50-2.10 4002456
6M15	0.80	3.00	1.20-1.60 4002454
			0.80-1.20 4002455
			1.50-2.10 4002456
6M23	0.80	3.00	1.20-1.60 4002454
			0.80-1.20 4002455
			1.50-2.10 4002456
6M26	0.80	3.00	1.20-1.60 4002454
			0.80-1.20 4002455
			1.50-2.10 4002456
6M37	0.80	3.00	1.20-1.60 4002454
			0.80-1.20 4002455
			1.50-2.10 4002456
7C17	0.30	1.50	2.00-2.50
7C46	0.30	1.50	2.10-2.50
7M22	0.50	1.50	1.70-2.40
			AG Coil 300-400 Ω
7N00	0.50	0.60	1.90-2.30
7N01	0.40	1.30	2.40-2.80
7N07	0.40	1.30	2.40-2.80
7N08	0.40	1.30	2.40-2.80
7N82-83	0.40	1.30	2.40-2.80
7N85	0.40	1.30	2.40-2.80
7N89	0.40	1.30	2.40-2.80
7T27	1.80	2.50	1.20-1.60 4002711
			1.70-2.30 4002700
7T32	1.80	2.50	
		10.00 chr	1.40-2.40 4002701-11
			1.70-2.30 4002700
7T34	1.80	2.50	
		10.00 chr	1.40-2.40 4002701-11
			1.70-2.30 4002700
7T52	1.80	2.50	1.40-2.40 4002701-11
			1.70-2.30 4002700

SEIKO (www.seiko.co.jp)
(www.seiko-watch.co.jp/support/manual/index.asp)

Cal.	μA. Ic	μA. Mvt	Coil kΩ
V220	0.30	0.60	1.40-2.00
V33F	0.40	1.20	3.00-3.40
V33G	0.40	1.20	3.00-3.40
V33J	0.40	1.20	3.00-3.40
V400	0.30	0.50	2.40-2.40
V401	1.30	1.10	2.10-2.50
V421		2.20	1.50-1.90
V501		1.60	
V506		1.60	
V507		2.30	
V515		1.60	
V536		2.20	
V537		2.20	
V654	1.65	3.00	1.80-2.50
V655	1.65	3.00	1.80-2.50
V656	1.65	3.00	1.80-2.50
V657	1.65	3.00	1.80-2.50
V671	0.70	2.90	2.30-2.90
V681	0.80	3.00	1.60-2.00 4002456
			1.20-1.60 4002454
V682	0.80	3.00	1.60-2.00 4002456
			1.20-1.60 4002454
V69F	0.88	1.40	1.20-1.60
V707	0.28	1.40	0.90-1.30
V733	0.40	1.30	2.40-2.80
V736	0.40	1.30	2.40-2.80
V742	0.40	1.30	2.40-2.80
V743	0.40	1.30	2.40-2.80
V782	0.28	1.40	0.90-1.30
V789	0.28	1.40	0.90-1.30
V810		1.40	
V827		1.60	
VX32A		1.85	
VX39		1.20	
VX82		1.10	
VX89		1.10	
W040	0.28	1.40	130-180Ω spk
W041	0.28	1.40	130-180Ω spk
W205	0.30	0.50	
W206	0.50	0.70	
W309	1.50	1.70	50-90 Ω spk
W339	3.00	4.00	140-180 Ω spk
W349		4.00	
W357	3.00	4.00	50-90 Ω spk
W358	3.00	4.00	50-90 Ω spk
W359	3.00	4.00	60-80 Ω spk
W620		4.40	
W650		4.40	
W680		5.50	
W700	3.00	4.00	140-180 Ω spk
W800		5.00	125-175 Ω spk
W801		6.50	125-175 Ω spk
W802		4.00	125-175 Ω spk
W810		4.50	125-175 Ω spk
W820		4.00	125-175 Ω spk
Y123E		1.90	
Y143	0.40	1.90	2.20-2.80
Y150	0.25	0.30	2.00-2.60
Y187	1.80	2.50	
		10.00 chr	1.20-2.40 4002710-11
			1.70-2.30 4002700
Y481		1.20	3.00-3.40
Y799	2.30	2.30	

CITIZEN (www.citizen.co.jp)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil $k\Omega$
0310		0.90	2.90-3.50
0312		0.90	2.90-3.50
0317		0.90	2.90-3.50
0321		0.90	2.90-3.50
0327		0.90	2.90-3.50
0328		0.90	2.90-3.50
0330		0.90	2.90-3.50
0337		0.90	2.90-3.50
0410		0.70	2.90-3.50
0510		1.60	1.80-2.40
			1.80-2.30 sec.chr
0530		1.60	1.80-2.40
			1.80-2.30 sec.chr
0531		1.60	1.80-2.40
			1.80-2.30 sec.chr
0560		1.60	1.80-2.40
			2.00-2.50
0570		1.60	1.80-2.40
			2.00-2.50
0610		3.10	1.80-2.40
			2.00-2.50
			1.80-2.30
0730		0.90	1.90-2.30
0850		1.80	1.10-1.30 coil 1
			1.90-2.30 coil 2-3
0855		1.80	1.10-1.30 coil 1
			1.90-2.30 coil 2-3
0870		1.80	1.10-1.30 coil 1-3
			1.90-2.30 coil 2
1002		0.90	1.20-1.70
1012		0.90	1.20-1.70
1020		0.90	1.50-1.90
1022		0.50	1.20-1.70
1030		0.90	1.50-1.90
1102		0.90	1.20-1.70
1112		0.90	1.20-1.70
2200		0.20	1.70-2.10
2870		1.30	1.70-2.10
2930		0.90	2.60-3.20
3100		1.00	2.60-3.20
3110		1.00	2.60-3.20
3220		0.50	1.90-2.50
3330		0.80	2.20-2.80
3331		0.80	2.20-2.80
3570		3.00	
1000		0.90	1.50-1.90
1010		0.90	1.50-1.90
1032		0.90	1.50-1.90
1100		0.90	1.50-1.90
2201A		0.20	1.70-2.10
2722		1.20	2.60-3.20
2731		1.20	2.60-3.20
2854		1.20	2.90-3.50
3510		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
3531		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
0540		1.60	1.80-2.40
			1.80-2.30 sec.chr
2010		1.50	1.90-2.40
2000		1.50	1.90-2.40

MIYOTA (www.citizen.co.jp)

Cal.	$\mu\text{A. Ic}$	$\mu\text{A. Mvt}$	Coil $k\Omega$
2025		1.30	2.80-3.40
2033		1.30	2.80-3.40
2034		1.30	2.80-3.40
2035		1.30	2.80-3.40
2036		1.30	2.80-3.40
2039		1.30	2.80-3.40
203A		1.30	2.80-3.40
2045		1.30	2.89-3.40
2105		1.50	1.90-2.40
2115		1.50	1.90-2.40
2115/6		1.50	1.90-2.40
213D		1.50	1.90-2.40
3S10/3H		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
3S10/4H		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
3S10/6H		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
3S31		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00
3S60		3.00	0.80-1.30
			1.70-2.10
			2.40-3.00

Interchangeability system between Citizen and Miyota calibres.

MIYOTA	=	CITIZEN
M	=	0
N	=	1
P	=	2
R	=	4
S	=	5
T	=	6
U	=	7
W	=	8
Y	=	9

Examples:

3N20	=	3220
3510	=	3S10
6870	=	6W70



Horotec is a registered trade mark in Switzerland, U.S.A., Europe and many other countries.
10th Feb.,2004/rf