



## CTM-QTS Quick Tester

### QUICK REFERENCE GUIDE

#### SPECIFICATIONS:

- This test set is designed to take conductance measurements exclusively on 12 Volt Lead/Acid batteries while either on line (float service) or off line
- Voltage and conductance (Siemens) measurements equivalent to the Midtronics' Micro Celltron (CTM-100 & 300)
- Test 12 Volt batteries only (low voltage error for any battery measuring below 11.5 V)
- Operating range: Voltage: 11.5V – 15.0V DC  
Amp Hour Range: approx. 5 Ah to 450 Ah,  
Conductance: 0 – 3,200 Siemens
- Test results: DC Voltage and Conductance (expressed in Siemens) will be stored in internal memory after each test. By depressing the "Review" key, the last test result will be displayed for 15 seconds to allow time to manually record the test information
- Accuracy: +/- 2% across test range
- Voltmeter resolution: +/- 20 mV DC
- Calibration: Auto-calibration each test; no calibration required
- Power requirements: Unit is powered by the battery under test; one replaceable 9V alkaline battery used to power the display
- Operating Temperature range: 0° C to +40° C, 95% relative humidity, non-condensing
- Storage Temperature Range: -29° C to + 70° C, 95% relative humidity, non-condensing
- Over Voltage Protection: Fuse protected to 60 V DC
- Fuse Specifications: 5mm x 20mm 1.25 Amp / 250V fuse
- Reverse Polarity Protection: Diode protected
- Test cables: Interchangeable interface. One standard #C065 DuraProbe cable set and spare probe tips provided with each tester – other interfaces available from Midtronics

#### BATTERY TESTING AND OPERATION

##### Automatic Battery Testing

The Quick Tester requires no setup or calibration. Each unit is shipped with the DuraProbe cable pre-installed and ready to test. The Quick Tester must have good contact with both the positive and negative battery posts before it will begin to test. The unit will automatically begin testing when a good connection has been established.

##### Low Battery Voltage Message

If the battery being tested has a voltage of 12.6 V or less, the test set will sound a dual audible beep after completing the test indicating a low test voltage. If the battery being tested has a voltage below 11.5 V, a "Low Voltage" error message will be displayed and the unit will not test. This indicates that the subject battery's state of charge is too low to be tested or has some other internal fault condition, which will prohibit a valid test result. Consult the battery manufacturer for recommended course of action for very low voltage or suspect batteries.

##### Battery Test Results

Each test takes less than 10 seconds, and test results are held in memory until the next test is completed. Each subsequent test overwrites the previous test result. **Always record and report each test result per operating procedures.** If any test results are suspect, simply re-test as many times as needed to verify

## Conductance Reference Values

All batteries have an electrical signature or "Conductance Reference Value", which can be associated with a specific model number. Conductance Reference Values may or may not be provided by the battery manufacturers. In general, higher measured conductance equals higher typical battery discharge performance.

Batteries will age and degrade when placed in normal float service. Issues affecting the actual battery life include the number and depth of battery discharge cycles, the float charge condition, and any sustained high temperature operation. Deviations from manufacturer recommendations will cause both the battery capacity and measured conductance to decline. When battery conductance has dropped by 30% to 40% from initial installed value or from a valid reference value, it is likely that the cell is below acceptable service condition.

### Example:

- Measured Conductance in three stages of battery life  
New Battery      Marginal Battery      Typical Failure  
1000 Siemens      >700 Siemens      <550 Siemens

Each user must determine the exact battery failure and replacement criteria based on guidelines consistent with company approved business objectives and battery manufacturers' instructions.

### Developing a Reference Conductance Value

If a valid test history or established battery reference value is unavailable, one can easily be developed. Simply test a representative number (30 or more are recommended) of healthy batteries, fully formed and on-line in float service (full state of charge).

Some variance can be expected, typical values among VRLA batteries are:

- New cells - - - 10% deviation ( $\pm 5\%$  from population average)
- Mid-service - - 20% deviation ( $\pm 10\%$  from population average)
- Failed cells - - 30% deviation (30% or more below cell average)

### Test Probe Placement

Test probe placement is CRITICAL and will affect measured variance.

The Quick Tester is a sensitive electrical instrument and placing the test probes on battery connectors, bolts, washers or other hardware may cause false test results. **We recommend that test probes always be placed directly on the lead battery posts to achieve consistent test results.** A "Check Connection" message is an indication of poor battery contact. Move the probes to a better angle and press firmly with both leads to break any surface oxidation and complete the test circuit with all four contacts. Good electrical contact is required for proper test set operation.

### Battery Temperature

Battery temperature will affect measured battery conductance. Never condemn a battery without verifying the low conductance measurement is not temperature related. When the batteries are cold, they will not provide their rated power and this should be considered when provisioning battery installations.

### Temperature Compensation

A digital InfraRed Temperature sensor has been included with each Quick Tester to identify actual battery temperature.

To compensate for cold batteries, simply apply the following conversion formula to your Conductance Reference Value:

Batt. Temp Degrees F	Divide by	Compensated Example with 1400 Ref. Value	Result
95°	0.930	$1400 \div 0.930 = 1505$	100%
86°	0.965	$1400 \div 0.965 = 1451$	100%
77°	1.000	1400	100%
68°	1.035	$1400 \div 1.035 = 1353$	100%
59°	1.070	$1400 \div 1.070 = 1308$	100%
50°	1.105	$1400 \div 1.105 = 1267$	100%
41°	1.140	$1400 \div 1.140 = 1228$	100%
32°	1.175	$1400 \div 1.175 = 1191$	100%

**Example:** For testing against a Reference Value of 1400 Siemens:

If the battery temperature measures 77 °F, no compensation is used. The battery should be measured against 1400.

If it measures 50 °F, simply apply the following compensation formula:  $1400 \div 1.105$  (T-Comp Formula) = 1267 Siemens. A battery that measures at least 1267 Siemens still has 100% relative conductance, and the reduced test value should be expected.

*Compensation should only be used with batteries between 32°F to 95°F for reliable results.*

### Off-Line Testing - Testing Before Installation

- If the batteries are new and healthy, Midtronics recommends they should all test within 20% of each other (+/- 10% of the average). Consult your battery supplier for standards.
- The Quick Tester will also display open circuit voltage. This allows the operator to remove any battery that is not in a full state of charge for charging/further testing. Variances in state of charge will cause variance in the conductance measurements.
- Test all batteries to be installed against a known reference value from your battery supplier or as an average established with a Midtronics Micro Celltron.
- Retest any batteries outside of +/- 10% of the average
- Look for physical problems on any questionable batteries.
- Finally, remove any questionable batteries for further testing before installation.

### On-Line Testing— New Healthy, Batteries

- Any battery that is 30% or more below the reference value or string/system average should be considered questionable.
- Retest to verify any variance.
- Look for physical evidence of problems; bulging, leaking, etc.
- Finally, remove the battery off-line for further testing to verify that replacement is necessary.

Midtronics is actively working with our customers and battery manufacturers to establish a variety of battery conductance reference values. For the most current information, please visit our website at [www.midtronics.com](http://www.midtronics.com) or call 1-630-323-2800. These values can provide you with an initial starting point for battery testing. Remember that your results may vary depending on site conditions, temperature, etc. If you are finding consistently different results, we want to hear from you. Your input will help improve our reference database and the ability to aid both you and other customers.