SourceMeter® AirTest Test System

The Model 2790 SourceMeter Switch System is a high voltage, multichannel resistance measurement solution that speeds and simplifies electrical checks of airbag inflators and a variety of other automotive electrical test applications. It is the only commercial instrument that combines all the sourcing, measurement, and signal routing capabilities required to measure insulation resistance and conductor continuity in one compact, affordable package. Through the use of plug-in source/switch modules, the Model 2790 provides programmable high voltage and low current sourcing, plus multichannel switching support. This unique combination of capabilities establishes a new standard for price and performance in airbag inflator and other test applications.

Measure Extreme Resistances with Constant Current or Constant Voltage

The Model 2790 uses the forced constant-current method to measure resistances less than 1Ω. In this technique, the instrument sources a constant current (I) to the resistance and measures the resulting voltage (V). The amount of current sourced is programmable from 0–50mA. Resistance (R) is calculated (and displayed) using the known current and measured voltage (R = V/I). A 20mV dry circuit clamp is available at sourcing levels up to 1mA for preserving the oxide layers on connectors and other components.

For the 1Ω to 1GΩ resistance ranges, the forced constant-voltage method is used to measure high resistance. This technique optimizes settling speed and reduces noise, allowing faster, high quality insulation resistance measurements. In addition, by applying high voltages (50–500V), the Model 2790 stresses a dielectric while simultaneously measuring its insulation resistance.

In addition to the resistance measurement functions available through the plug-in source/switch modules, the Model 2790’s built-in DMM allows it to make a full range of high precision resistance measurements, as well as AC/DC voltage and current, frequency, and temperature measurements. These DMM functions are available through either front panel jacks or through the addition of a Model 7702 40-channel scanner module. In addition to the shorts/open testing performed with the standard Model 7751, 7752, and 7753 switch/control modules, a wide range of supporting measurements can be made. These supporting measurements simplify creating integrated test solutions for hybrid applications, such as testing complex automotive seating systems, which increasingly combine airbag inflators and seatbelt pre-tensioners, as well as seat heaters, switches, motors, etc.

Newly Enhanced Memory Pattern Test Sequencer

The memory pattern test sequencer allows the mainframe to store and execute pre-programmed test sequences for increased testing throughput. Test setups can be stored as unique memory locations and either recalled by number as needed or scanned in sequence to maximize the number of tests per unit time without command transfer delays due to communication or controller.

Match the System Configuration to the Application

The Model 2790 is available in a variety of configurations to match specific application requirements:

- **Model 2790-H**: a single-module system designed for both low current and high voltage ohms (10MΩ to 1GΩ) applications. This “base” system provides all the capabilities needed for electrical testing of either single- or dual-stage

### ACCESSORIES AVAILABLE

<table>
<thead>
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<th>MODULES</th>
<th>7702</th>
<th>40-Channel General Purpose Multiplexer Module</th>
</tr>
</thead>
<tbody>
<tr>
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SourceMeter® Airbag Test System

inflators in single position test stands (for example, test stands that test only one single- or dual-stage airbag at a time).

- The Model 2790-A, which is similar to the Model 2790-H, enables high voltage ohms measurements down to 1MΩ.
- The Model 2790-HH is configured for applications that require parallel testing or high voltage “soaking.” Like the Model 2790-H, it is designed for both low current and high voltage ohms applications and can test either single- or dual-stage inflators. However, with two plug-in modules, it also has the capacity to test two inflators at once, maximizing test throughput.
- The Model 2790-HL is designed for applications where it is preferable to segregate high voltage sourcing/ohms measurement and low current sourcing/ohms measurement into two separate modules. This design was developed for use in combination testing applications, such as inflator electrical checks of safety steering wheel or seat assemblies that also include switch or other ancillary device tests.
- The Model 2790-L is configured for low voltage source/ohms-only measurement applications, such as continuity-only testing of side/seat airbags and seatbelt pre-tensioners or other programmable I-source resistance applications in which high voltage resistance testing is not required but precise control of source current is.
- With the addition of a Model 7702 40-channel differential multiplexer module (part of the Integra family of switch/measure solutions), the Model 2790-A, -H, or -L + Model 7702 opens the door to higher channel count applications, such as hi-pot/continuity testing of connectors, harnesses, and power distribution devices up to 500V (internally sourced) up to 40 channels.

Broad Range of Measurement Capabilities

The Model 2790’s built-in DMM can make a wide variety of general purpose measurements:

- DC voltage measurements from 0.1µV to 1000V
- AC voltage measurements from 0.1µV to 750V
- DC current measurements from 10nA to 3A
- AC current measurements from 1µA to 3A
- 2-wire resistance measurements from 100µΩ to 120MΩ
- 4-wire resistance measurements from 100µΩ to 120MΩ
- Frequency measurements from 3Hz to 500kHz
- Period measurements from 333ms to 2µs
- Temperature measurements from -200°C to 630°C (thermistors and 4-wire RTDs)

Additional features of the Model 2790 mainframe include:

- Set-up storage—Up to four instrument setups can be saved and recalled.
- Offset-compensated ohms—A two-measurement process for 4-wire ohms to cancel the effects of thermoelectric EMFs. Available for the 100Ω, 1kΩ, and 10kΩ ranges.
- Math—m/X+b, mX+b, percent, and four special math functions provide convenient manipulation of raw readings.
- Relative—Null offsets establish baseline values.
- Ratio and channel average—Ratio and average calculations for two switching module channels (7702).
- Buffer—Store up to 55,000 readings in the internal buffer.
- Limits—Two sets of high and low reading limits to test devices.
- Digital I/O port—Five digital limit test output lines to control external circuitry. An external trigger input can also be accessed at this port.
- Trigger Link—Separate connector with input and output signals.
- Monitor—The Model 2790 can monitor a selected channel. A scan can be triggered to start when the monitor detects that a reading limit has been reached (7702).
- Remote interface—Model 2790 can be controlled using the IEEE-488 interface (GPIB) or the RS-232 interface.

APPLICATIONS

- Automotive airbag inflator/module electrical functional tests
- Seatbelt pre-tensioner actuator/module functional electrical check
- High speed parallel soak dual inflator or dual test station electrical check
- Pinched wire high voltage insulation resistance testing in automotive seats, avionics, etc.
- Multipin connector/harness continuity and leakage resistance measurements
- Multicontact/switch dry circuit continuity and leakage tests
- Automotive power/fuse center continuity and leakage resistance characterization
- PCB/PWB and general purpose short/open circuits testing

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Example Application – Dual Stage Airbag Inflator Testing–One or Two

Example Application – 40-Channel Wiring Harness Testing

Model 2790 Benefits

- **High functional integration**—Sourcing, measurement, and signal routing functions are tightly integrated in one compact enclosure. This high level of integration helps system integrators save rack space, minimize the time needed for system configuration and maintenance, and improve test throughput without sacrificing system accuracy.

- **Enhanced device protection**—Compared to higher powered alternatives, the Model 2790’s inherently lower power sources minimize the possibility of damaging sensitive devices under test through accidental over powering. Automatic cold switching and active cable discharge circuitry reduce the chances for device damage still further, while the high precision DMM and A/D converter ensure high resolution and measurement accuracy.

- **Reliability**—The design of the Model 2790 is based on a proven Keithley technology platform. With a two-year calibration cycle for the module functions, it requires minimal maintenance over the life of the production test line. Its modular mainframe and plug-ins architecture makes module verification and calibration fast and convenient, simply by exchanging modules.

- **Value**—In addition to being a complete solution for airbag inflator testing and related applications, the Model 2790’s fully functional, 6½-digit DMM supports a wide variety of general purpose DC and AC measurements.

Three new source/switch plug-in modules provide the Model 2790 with programmable high voltage and low current sources, connection switching, and signal conditioning circuitry.
2790 SourceMeter® Airbag Test System

7751/7752/7753 SOURCE/SWITCH MODULE SPECIFICATIONS

2790 RESISTANCE MODE SPECIFICATIONS WITH CARDS 2, 3
(Module function accuracy specifications are for 2 years, 25°C, ±5°C.)

<table>
<thead>
<tr>
<th>SOURCE CURRENT</th>
<th>MAXIMUM RESISTANCE</th>
<th>TYPICAL OPEN CIRCUIT VOLTAGE</th>
<th>ACCURACY</th>
<th>TEMPERATURE COEFFICIENT (0–18°C &amp; 28–40°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 mA</td>
<td>20 Ω</td>
<td>5 V</td>
<td>±0.09%</td>
<td>±0.002% + 3 mΩ/°C</td>
</tr>
<tr>
<td>20 mA</td>
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<td>5 V</td>
<td>±0.11%</td>
<td>±0.005% + 3 mΩ/°C</td>
</tr>
<tr>
<td>10 mA</td>
<td>100 Ω</td>
<td>5 V</td>
<td>±0.16%</td>
<td>±0.004% + 3 mΩ/°C</td>
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(Dry Circuit Ohms 1mA max with 7751, 7752, or 7753 card)

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<td>500 V</td>
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<tr>
<td>500 V</td>
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<td>±0.06%</td>
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<td>&lt;1 mA</td>
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<td>±0.13%</td>
</tr>
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(7753 Only)

CURRENT SOURCE OUTPUT
OUTPUT LEVEL: Programmable 0 to 50mA (Ch. 27).
PROGRAMMING RESOLUTION: 10µA.
OUTPUT VOLTAGE: 5 V ±10% compliance.
ACCURACY: ±(0.00% + 10µA) (2 year specification).
SETTLING TIME: 1ms to 0.1% of final value (typ.).
TEMPERATURE COEFFICIENT (0–18°C & 28–40°C): ±0.001% + 0.25µA/°C.
DRI CIRCUIT CLAMP (Ch. 24): 20mV ±10%, Isource ≤1mA.

VOLTAGE SOURCE OUTPUT (7751/7753 Only)
OUTPUT LEVEL: Programmable 50V to 500V (Ch. 28).
PROGRAMMING RESOLUTION: 100mV.
OUTPUT CURRENT: (7751) 50µA maximum for rated accuracy, <1mA typical into short circuit.
(7753) 500µA maximum for rated accuracy, <1mA typical into short circuit.
ACCURACY: ±(0.5% + 0.13V) (2 year specification).
SETTLING TIME: Rise Time: 50V to 500V step, 0.1% of final value, 250ms max.
Fall Time: 500V to 50V step, 0.1% of final value, 1000ms max.
TEMPERATURE COEFFICIENT (0–18°C & 28–40°C): ±(0.001% + 0.005V)/°C.
SAFETY LIMIT: Current limited maximum current of 1mA.
CABLE DISCHARGE (Ch. 20): 100kΩ shunt.
MAXIMUM CAPACITANCE: 1nF.

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2790 RESISTANCE MODE SPECIFICATIONS WITH CARDS 2, 3 (Module function accuracy specifications are for 2 years, 25°C, ±5°C.)

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PROGRAMMING RESOLUTION: 100mV.
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ACCURACY: ±(0.5% + 0.13V) (2 year specification).
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Fall Time: 500V to 50V step, 0.1% of final value, 1000ms max.
TEMPERATURE COEFFICIENT (0–18°C & 28–40°C): ±(0.001% + 0.005V)/°C.
SAFETY LIMIT: Current limited maximum current of 1mA.
CABLE DISCHARGE (Ch. 20): 100kΩ shunt.
MAXIMUM CAPACITANCE: 1nF.

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2790 MAINFRAME FUNCTION SPECIFICATION

Mainframe function accuracy specifications are for 1 year, 23°C ±5°C.

DC MEASUREMENT SPECIFICATIONS

CONDITIONS: MED (1 PLC)², 10 PLC or MED (1 PLC) with Digital Filter of 10.

| FUNCTION | RANGE | RESOLUTION | TEST CURRENT (±5%) OR BURDEN VOLTAGE | INPUT RESISTANCE OR OPEN CIRCUIT VOLTAGE² | ACCURACY ±(ppm of reading + ppm of range) (ppm = parts per million, e.g., 10ppm = 0.001%) | TEMPERATURE COEFFICIENT ±(ppm of reading + ppm of range)/°C
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<td></td>
<td></td>
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<td>24 Hour³ 23°C ±1° 90 Day 23°C ±5° 1 Year 23°C ±5°</td>
<td>0°~18°C &amp; 28°~40°C</td>
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<tr>
<td></td>
<td>100.000 mV</td>
<td>0.1 µV</td>
<td>&gt;10 GΩ</td>
<td></td>
<td>15 ± 30 25 ± 70 30 ± 70 (1 ± 5)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1.00000 V</td>
<td>1.0 µV</td>
<td></td>
<td>15 ± 6 25 ± 7 30 ± 7 (1 ± 1)</td>
</tr>
<tr>
<td></td>
<td>10.0000 V</td>
<td>10 µV</td>
<td>&gt;10 GΩ</td>
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<td>10 ± 4 20 ± 5 30 ± 5 (1 ± 1)</td>
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<tr>
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<td>100.000 V</td>
<td>100 µV</td>
<td>10 MΩ ±1%</td>
<td></td>
<td>15 ± 6 45 ± 9 55 ± 9 (5 ± 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000.00   V³</td>
<td>1 mV</td>
<td>10 MΩ ±1%</td>
<td></td>
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<td>Resistance³</td>
<td>100.000 Ω</td>
<td>100 µΩ</td>
<td>1 mA</td>
<td>6.6 V</td>
<td>20 ± 20 80 ± 20 100 ± 20 (8 ± 1)</td>
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</tr>
<tr>
<td></td>
<td>1.00000 Ω</td>
<td>1 mΩ</td>
<td>1 mA</td>
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<td>20 ± 6 80 ± 6 100 ± 6 (8 ± 1)</td>
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<tr>
<td></td>
<td>10.0000 Ω</td>
<td>10 mΩ</td>
<td>10 µA</td>
<td>12.8 V</td>
<td>20 ± 10 80 ± 10 100 ± 10 (8 ± 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.000 Ω</td>
<td>100 mΩ</td>
<td>10 µA</td>
<td>12.8 V</td>
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<tr>
<td></td>
<td>1.0000 MΩ</td>
<td>1 Ω</td>
<td>Note 7</td>
<td>7.0 V</td>
<td>150 ± 6 200 ± 10 400 ± 10 (70 ± 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.0000 MΩ</td>
<td>10 Ω</td>
<td>Note 7</td>
<td>7.0 V</td>
<td>800 ± 50 3000 ± 50 5000 ± 50 (585 ± 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.000 MΩ</td>
<td>100 Ω</td>
<td>Note 7</td>
<td>7.0 V</td>
<td>400 ± 100 1000 ± 100 1000 ± 100 (8 ± 1)</td>
<td></td>
</tr>
<tr>
<td>Continuity (2W)</td>
<td>1.000 Ω</td>
<td>100 mΩ</td>
<td>1 mA</td>
<td>6.6 V</td>
<td>60 ± 30 300 ± 80 500 ± 80 (50 ± 5)</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>20.0000 mA</td>
<td>10 mA</td>
<td>&lt;0.2 V</td>
<td>100 ± 300 300 ± 800 500 ± 800 (50 ± 50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.000 mA</td>
<td>100 mA</td>
<td>&lt;0.05 V</td>
<td>100 ± 300 300 ± 800 500 ± 800 (50 ± 50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.0000 A</td>
<td>1.0 µA</td>
<td>&lt;0.3 V</td>
<td>200 ± 300 500 ± 800 800 ± 800 (50 ± 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.0000 A</td>
<td>10 µA</td>
<td>&lt;1.0 V</td>
<td>1000 ± 15 1200 ± 40 1200 ± 40 (50 ± 5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Channel (Ratio)³⁴ Ratio Accuracy = Accuracy of selected Channel Range + Accuracy of Paired Channel Range

Channel (Average)³⁵ Average Accuracy = Accuracy of selected Channel Range + Accuracy of Paired Channel Range

TEMPERATURE

(Displayed in °C, °F, or K
Exclusive of probe errors.)

4-Wire RTD
(100Ω platinum [PT100], D100, F100, PT585, PT3916, or user type.
Offset compensation On.)

Resistance (2.2kΩ, 5kΩ, and 10kΩ):

~20°C to 630°C 0.01°C 0.00°C 0.003°C/C

~80°C to 150°C 0.01°C 0.00°C 0.002°C/C

DC SPEED vs. NOISE REJECTION

MAX. EXTERNAL TRIGGER RATE: 2000/s.

DC OPERATING CHARACTERISTICS

60Hz (50Hz) Operation

FUNCTION DIGITS READINGS/s PLCs

DCV, DCL, Ohms (<10MΩ), Thermistor

5.5³⁶ 6.0³⁶ 10

5.5³⁶ 5.5³⁶ 1

5.5³⁶ 680 (400) 0.1

4.5³⁶ 2000 (1800) 0.01

4W Ohms (<10MΩ)

5.5³⁶ 11 (11) 10

5.5³⁶ 15 (12) 1

5.5³⁶ 33 (25) 0.1

RTD

5.5³⁶ 0.9 (0.7) 10

5.5³⁶ 8 (6.4) 1

5.5³⁶ 18 (14.4) 0.1

Channel (Ratio), Channel (AVG)

5.5³⁶ 5.5³⁶ 10

5.5³⁶ 15 (12) 1

5.5³⁶ 25 (20) 0.1

DC SYSTEM SPEEDS³⁶, ³⁷

RANGE CHANGES³⁷ 50/s (42/s).

FUNCTION CHANGES³⁷ 50/s (42/s).


MAX. INTERNAL TRIGGER RATE: 2000/s.

MAX. EXTERNAL TRIGGER RATE: 575/s.
2790 SourceMeter® Airbag Test System

2790 MAINFRAME FUNCTION SPECIFICATION

DC MEASUREMENT CHARACTERISTICS

DC VOLTS
A-D LINEARITY: 2.0 ppm of reading + 1.0 ppm of range.

INPUT IMPEDANCE:
- 100mV–10V Ranges: Selectable >10GΩ with <400pF or 10MΩ ±1%
- 100V, 1000V Ranges: 100MΩ ±1%

INPUT BIAS CURRENT:
- 100mV–10V: <100pA at 23°C.
- 100V, 1000V: <500nA p-p at 50Hz or 60Hz.

COMMON MODE CURRENT:
- <500mA p-p at 50Hz or 60Hz.

RESISTANCE
MAXIMUM RESISTANCE:
- 4W: 100Ω with offset compensation on.

INPUT PROTECTION:
- Front: 1000V, Rear: 300V, 7702 card only.

DC CURRENT
SHUNT RESISTORS:
- 100mA–3A: 0.1Ω.
- 20mA: 5Ω.

INPUT PROTECTION:
- 3A, 250V fuse.

AC MEASUREMENT SPECIFICATIONS

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ALL RANGES CALIBRATION CYCLE</th>
<th>ACCURACY: ±(% of reading + % of range), 23°C ±5°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOLTAGE</td>
<td>100.000mV</td>
<td>0.1 µV</td>
<td>90 Days</td>
<td>3 Hz–10 Hz: 0.35 + 0.03, 10 Hz–20 kHz: 0.55 + 0.05, 20 kHz–50 kHz: 0.11 + 0.05, 50 kHz–100 kHz: 0.6 + 0.08, 100 kHz–300 kHz: 4.0 + 0.5</td>
</tr>
<tr>
<td></td>
<td>1.00000V</td>
<td>1.0 µV</td>
<td></td>
<td>0.05 + 0.03 + 0.05 + 0.03, 0.05 + 0.03 + 0.11 + 0.05 + 0.12 + 0.05 + 0.06 + 0.08 + 4.0 + 0.5</td>
</tr>
<tr>
<td></td>
<td>10.0000V</td>
<td>10 µV</td>
<td>1 Year</td>
<td>0.55 + 0.03 + 0.06 + 0.03 + 0.12 + 0.05 + 0.06 + 0.08 + 4.0 + 0.5</td>
</tr>
<tr>
<td></td>
<td>100.000V</td>
<td>100 µV</td>
<td></td>
<td>0.55 + 0.05 + 0.15 + 0.06 + 0.18 + 0.06 + 0.3 + 0.05</td>
</tr>
<tr>
<td></td>
<td>750.000V</td>
<td>1.0 µV</td>
<td></td>
<td>0.035 + 0.003 + 0.015 + 0.006 + 0.015 + 0.006 + 0.03 + 0.01</td>
</tr>
</tbody>
</table>

(Temp. Coefficient/°C)

CURRENT

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ALL RANGES CALIBRATION CYCLE</th>
<th>ACCURACY: ±(% of reading + % of range), 23°C ±5°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00000A</td>
<td>1.0 µA</td>
<td>90 Day/1 Year</td>
<td>3 Hz–10 Hz: 0.5 + 0.04, 10 Hz–3 kHz: 0.1 + 0.04, 3 kHz–5 kHz: 0.14 + 0.04</td>
</tr>
<tr>
<td>3.00000A</td>
<td>10 µA</td>
<td></td>
<td>0.55 + 0.06 + 0.18 + 0.06 + 0.3 + 0.05</td>
</tr>
</tbody>
</table>

(Temp. Coefficient/°C)

FREQUENCY AND PERIOD

<table>
<thead>
<tr>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ALL RANGES CALIBRATION CYCLE</th>
<th>ACCURACY: ±(% of reading + % of range), 23°C ±5°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>0.333 ppm</td>
<td>90 Day/1 Year</td>
<td>3 Hz–500 kHz: 333 ppm (333 ms–2 µs)</td>
</tr>
<tr>
<td>750 V</td>
<td>33.3 ppm</td>
<td></td>
<td>80 ppm ± 0.33 ppm (SLOW, 1s gate)</td>
</tr>
</tbody>
</table>

Additional Uncertainty ±(% of reading)

LOW FREQUENCY UNCERTAINTY

<table>
<thead>
<tr>
<th>LOW FREQUENCY UNCERTAINTY</th>
<th>MED</th>
<th>FAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Hz–50 Hz</td>
<td>0.3</td>
<td>—</td>
</tr>
<tr>
<td>50 Hz–100 Hz</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>100 Hz–200 Hz</td>
<td>0</td>
<td>0.18</td>
</tr>
<tr>
<td>200 Hz–500 Hz</td>
<td>0</td>
<td>0.10</td>
</tr>
<tr>
<td>&gt;300 Hz</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

CREST FACTOR:

<table>
<thead>
<tr>
<th>CREST FACTOR</th>
<th>LOW FREQUENCY UNCERTAINTY</th>
<th>MED</th>
<th>FAST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–2</td>
<td>0.05</td>
<td>0.15</td>
<td>0.50</td>
</tr>
</tbody>
</table>

1.888.KEITHLEY (U.S. only)
www.keithley.com
### SourceMeter® Airbag Test System

**Internal Scanner Speeds:**

Into and Out of Memory to GPIB

7702 Scanning DCV: 60/s

**General Specifications**

- Modules Supported: Models 7751, 7752, and 7702.
- Power Supply: 100V/120V/220V/240V.
- Line Frequency: 50Hz to 60Hz and 400Hz, automatically sensed at power-up.
- Power Consumption: 28W.
- Battery: Lithium battery-backed memory, 3 years @ 25°C.
- Warrant: 1 year.
- Vibration: MIL-PRF-28800F Class 5, Random.
- Digital I/O: 2 inputs, 1 for triggering and 1 for hardware interlock. 5 outputs, 4 for Reading Limits and 1 for Master Limit. Outputs are TTL compatible or can sink 250mA, diode clamped to 33V.
- Earth Isolation: 500V peak, >10GΩ and <150pF any terminal to chassis.
- Triggering and Memory:
  - Window Filter Sensitivity: 0.01%, 0.1%, 1%, 10%, or full-scale of range (none).
  - Reading Hold Sensitivity: 0.03%, 0.1%, 1%, 10% of reading.
  - Trigger Delay: 0 to 99 hrs (1ms step size).
  - External Trigger Delay: <2ms.
  - External Trigger Jitter: <1ms.
  - Memory Size: 55,000 readings.
- Math Functions: Rel, Min/Max/Average/Std Dev/Peak-to-Peak (of stored reading), Limit Test, %, mX+b and m(UX)+b with user-defined limits displayed.
- Remote Interface: GPIB (IEEE-488.2), RS-232C, SCPI (Standard Commands for Programmable Instruments)
- Warm-Up: 2 hours to rated accuracy.
- Operating Environment: Specified for 0°C to 50°C. Specified to 80% R.H. at 35°C. Altitude up to 2000 meters.
- Storage Environment: –40°C to 70°C.
- Dimensions:
  - Rack Mounting: 48.9mm high x 213mm wide x 370mm deep (3.5 in. x 8.575 in. x 14.563 in.).
  - Bench Configuration (with handle and feet): 104mm high x 238mm wide x 370mm deep (4.125 in. x 9.375 in. x 14.563 in.).
- Shipping Weight: 6.5kg (14 lbs).

**AC Measurement Characteristics**

**AC Volts**

- Measurement Method: AC coupled, true RMS.
- Input Impedance: 1MΩ ±2.5% by <100pF.
- Input Protection: 1000V peak or 400V DC, 300V rms with 7702 module.

**AC Current**

- Measurement Method: AC coupled, true RMS.
- Shunt Resistance: 0.1Ω.
- Burden Voltage: 1A <0.3V rms, 3A <1V rms. Add 1V rms when used with 7702 modules.
- Input Protection: 3A, 250V fuse.

**Frequency and Period**

- Measurement Method: Reciprocal counting technique.
- Gate Time: SLOW 1s, MED 100ms, and FAST 10ms.

**AC General**

- ACMR: 70dB.
- Maximum Crest Factor: 5 at full scale.
- Volt Hertz Product: ≤ 8 × 10^7.

**AC Operating Characteristics**

<table>
<thead>
<tr>
<th>Function</th>
<th>Digits</th>
<th>Readings/s</th>
<th>Rate</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC, ACI</td>
<td>6.5</td>
<td>2s/reading</td>
<td>SLOW</td>
<td>3 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>6.5¹</td>
<td>1.8 (1.1)</td>
<td>MED</td>
<td>30 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>6.5¹</td>
<td>4.8 (4)</td>
<td>MED</td>
<td>30 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>6.5¹</td>
<td>35 (28)</td>
<td>FAST</td>
<td>300 Hz–300kHz</td>
</tr>
<tr>
<td>Frequency, Period</td>
<td>6.5</td>
<td>1 (1)</td>
<td>SLOW</td>
<td>3 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>5.5</td>
<td>9 (9)</td>
<td>MED</td>
<td>30 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
<td>35 (35)</td>
<td>FAST</td>
<td>300 Hz–300kHz</td>
</tr>
<tr>
<td></td>
<td>4.5¹</td>
<td>65 (65)</td>
<td>FAST</td>
<td>300 Hz–300kHz</td>
</tr>
</tbody>
</table>

**AC System Speeds**

- Autorange Time: ≤3s.
- ASCII Readings to RS-232 (19.2k baud): 50/s.
- Max. Internal Trigger Rate: 500/s.
- Max. External Trigger Rate: 250/s.

**AC Notes**

1. 20% overrange except on 750V and 3A.
2. Specifications are for SLOW mode and sine wave input >5% of range. SLOW and MED are multi-sample A/D conversions. FAST is Detector Bandwidth 300 with nPLC = 1.0.
3. Applies to °–18°C and 28°–40°C.
4. Specifications are for square wave inputs only. Input signal must be >10% of ACV range. If input is <20mV on the 10kV range then the frequency must be >10Hz.
5. Applies to 0°–18°C and 28°–40°C.
6. For RCL2 unbalance in LO lead.
7. Speeds are for 60Hz (50Hz) operation using factory defaults operating conditions (*RST). Autorange off, Display off, Limits off, Trigger delay=0. Includes measurement and binary data transfer out GPIB.

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**KEITHLEY**

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