DC Voltage and Current Reference Source

The 103A Voltage and Current Reference Source is based on a unique pulse width modulation digital/analog conversion principle ensuring high accuracy and stability. This makes the 103A ideally suited for use as a reference unit in many applications such as: voltage and current generator, system calibration, resistance measurements and sensor stimulation.

EASY ENTRY OF DATA
Parameters keyed-in immediately appear on the 7 digit display but are not validated until the "EXECUTE" key is pressed. Pressing "EXECUTE", the keyboard lamp turns off and the OUTPUT lamp turns on, indicating the displayed value is now available at the output terminals. The polarity of the output voltage or current is reversed by pressing + or − followed by "EXECUTE".

INCREMENTED OUTPUT
The output may be changed via the increment/decrement keys. Set the increment value by pressing the "INC" key. Multiply or divide increment in tens by pressing the "× 10" or "× 100" keys. By holding down the + "or − " key for more than two seconds the output is automatically incremented or decremented at a rate of approximately 5 steps per second.

MEMORY
For repetitive measurements, the displayed value may be stored in memory and assigned an address between 01 and 20. The contents of any of the 20 memories can be recalled by pressing "RM" and the setting then output by pressing "EXECUTE". Swap memories to optimise use of memory space.

SWEEP
Two scanning modes automatically sweep the output or scan the memory contents between two set limits. The output scanning step is that of the increment selected with each step lasting 250 ms. During scanning an auxiliary voltage is also available varying between 0 and 5 V at a rate of 5 mV per step, for up to 1000 steps.

INTERNAL PROCESSOR CONTROL
Internal microprocessor control provides the instrument with monitoring facility enabling the user to be alerted of system faults by generating an error code on the display.

PROGRAMMING
Voltage, current and polarity reversal can all be programmed externally via the GPIB enabling the 103A to be incorporated in automatic systems.

SPECIFICATION

GENERAL DESCRIPTION
103A is a voltage and current standard covering the ranges 1 nV to 110 V and 1 nA to 110 mA respectively. Microprocessor control enables flexibility of use. Remote control via the General Purpose Interface Bus is provided as standard.

VOLTAGE MODE
Range
±1 V to ±109.9999 V
Resolution
1 nV from ±1 μV to ±109.9999 V, 10 μV from ±10 μV to ±109.9999 V, 100 μV from ±100 μV to ±109.9999 V
Range selection and indication
2 front panel keys and 4 LED display of auto or selected range
Selection
Front panel key
Indication
7 digit display.
Linearity
0.001% of range.
Accuracy
After 15 hours of continuous operation with required output parameters and at 70% humidity, 23°C ±1°C
(3 months after switch on)
±0.001% of range + ±0.003% of displayed value in 1 V range, ±0.001% of range + ±0.003% of displayed value in 10 V range, ±0.001% of range + ±0.005% of displayed value in 100 V range.
Stability
After 15 hours continuous operation at a constant temperature (±1°C), between 15°C and 35°C,
±0.0005% of range after an additional 3 hours.
±0.002% of range after an additional 3 months.
Common mode rejection
-140 dB.
Internal impedance
Impedance: 0.1 mΩ.
Impedance: From DC to 10 kHz for an AC load current up to 20% of the DC component; Less than 2 μΩ in 1 V range, Less than 20 μΩ in 10 V range, Less than 200 μΩ in 100 V range.
Current limiting
0 to 110 mA across the three ranges, Maximum limitations may be set to 25 or 50 mA at the front panel.
4 wire output
±0.1 V drop across the load for the accuracy specified. Maximum permissible capacitive load: 0.22 nF.
Dielectric rigidity ±500 V between output ports and ground. Four quadrant operation, with maximum current direct or reverse.

CURRENT MODE
Range
0 to 110 mA.
Resolution
1 nA from ±1 nA to ±109.9999 mA, 10 nA from ±10 nA to ±109.9999 mA
Range selection and indication
2 front panel keys and 4 LED display of auto or selected range.
Selection
Front panel key.
Indication
7 digit display.
Linearity
0.001% on 1 mA range, 0.002% on 10 mA range, 0.005% on 100 mA range.
Accuracy
After 15 hours of continuous operation with required output parameters and at 70% humidity, 23°C ±1°C
(3 months after switch on).
For 1 mA range: ±(0.008% of range + 0.005% of displayed value).
103A

For 10 mA range: ±(0.004% of range + 0.005% of displayed value).
For 100 mA range: ±(0.006% of range + 0.006% of displayed value).

Stability
After 1 h continuous operation at a constant temperature (±1°C) between 15 and 35°C: 0.0007% after 2 hours, 0.002% after 3 months, 0.005% after 1 year.

Voltage limiting
0 to 110 V. Maximum limits of 25 and 50 V may be selected at the front panel.

Output conductance
0.1 siemens.

VOLTAGE AND CURRENT MODES

Setting time
Within 10% of the displayed value: 100 ms (approx.) after entry of new data. Within 10% of the displayed value: 50 ms (approx.) after entry of new data.

Temperature coefficient
(5 μV x 0.0001° of the displayed value)°C for temperatures between 15 and 35°C.

Dielectric stiffness
Measured between ground and the positive and negative floating outputs: ±500 V on output.

Output protection
Outputs are disabled on the application of a short circuit. On removal of the short circuit, operation is resumed.

Sweep
Single or continuous sweep of current, voltage and memories may be performed.

Time/step
1 second.

Monitor sweep output
0 to 7 V in steps of 5 mV for voltage or current. 0 to 5 V in steps of 250 mV for the memories. Impedance: 10 kΩ (Front panel 9NC).

KEYBOARD AND DISPLAYS

Main Functions
All instrument settings are controlled by the front panel keyboard. Settings are entered by selecting the required function and keying in the value followed by the execute key. Other functions provided are:

Single or continuous sweep.

START and STOP
Specify start and stop data for the sweep.

M and RM
Provide storage and recall of instrument settings. Up to 20 complete instrument settings may be stored.

+ and –
Increment or decrement output values.

x10 and –10 Volt, V and mA, I
Resolution of increment, selection of either voltage or current for output.

AUTO, 1, 10, 100 and 1
Selection of the range for voltage or current.

+ and –
Selection of polarity.

X = Y
Recall of present output parameters while entering a new configuration.

INC
Enter increment value via the keyboard, for voltage or current.

GPIB INTERFACE
A GPIB interface is fitted as standard. Voltage, current, polarity, signal inhibit and LOCAL/REMOTE modes are remotely programmable.

Capabilities
Complies with the following subsets as defined in IEEE 488-1975: SH1, AH1, T6, TE0, L2, LE2, SR1, RL1, PP0, DC1, D71, C0, E1.

SAFETY
Complies with IEC 348.

RATED RANGE OF USE
(Over which full specification is met)

Temperature
+15 to +30°C.

Humidity
70% relative.

CONDITIONS OF STORAGE AND TEMPERATURE

Temperature
-20 to +70°C.

Humidity
97% non-condensing.

Attitude
15,000 m.

POWER REQUIREMENTS
AC supply
115 or 230 V ± 10%, 50 to 60 Hz, 30 VA.

DIMENSIONS AND WEIGHT

<table>
<thead>
<tr>
<th>Height</th>
<th>Width</th>
<th>Depth</th>
<th>Weight Approx.</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 mm</td>
<td>440 mm</td>
<td>360 mm</td>
<td>10 kg</td>
</tr>
</tbody>
</table>

NANO Volt EXTENSION ACCESSORY

1/100 DIVIDER

Internal Resistance
2 Ω ±5%.

10 V range
Sub-range: 0 to 100 mV. Resolution: 10 nV.

1 V range
Sub-range: 0 to 10 mV. Resolution: 10 nV.

Noise
0.1 Hz to 20 kHz band.

Less than 10 μV RMS for 10 V range and 1 V range.

Less than 60 μV RMS for 100 V range.

VERSIONS AND ACCESSORIES

When ordering please quote eight digit code numbers.

<table>
<thead>
<tr>
<th>Ordering numbers</th>
<th>Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>103A</td>
<td>Current and Voltage Standard</td>
</tr>
<tr>
<td>103A-15</td>
<td>19 inch Rack Mounting Adapter</td>
</tr>
</tbody>
</table>

Supplied with
AC supply lead
Operating manual

Accessories
Nano Volt Extension, 1/100 Divider
GPIB Lead Assembly
GPIB Manual

4 Avenue de Norvège 91140 Villebon sur Yvette
Tél.: +35(0)1 644 644 22
www.leasametric.com