

*The Worldwide Source for Calibration in the Processing Industry*

## *Lab Standard Multi-Function Calibrator*

## *Millennium Series* **3001** **Precision Calibrator**

The Martel 3001 precision calibrator combines the power and features of the M2001 (voltage, current, TC, RTD and pressure) with a second completely isolated measurement channel for a single laboratory calibration instrument unmatched in versatility, performance, and value. As with every Martel calibrator, the 3001's world-class performance and features are accessed through a very simple-to-use, intuitive user interface. The Martel 3001 is truly a "process calibration laboratory in a box."

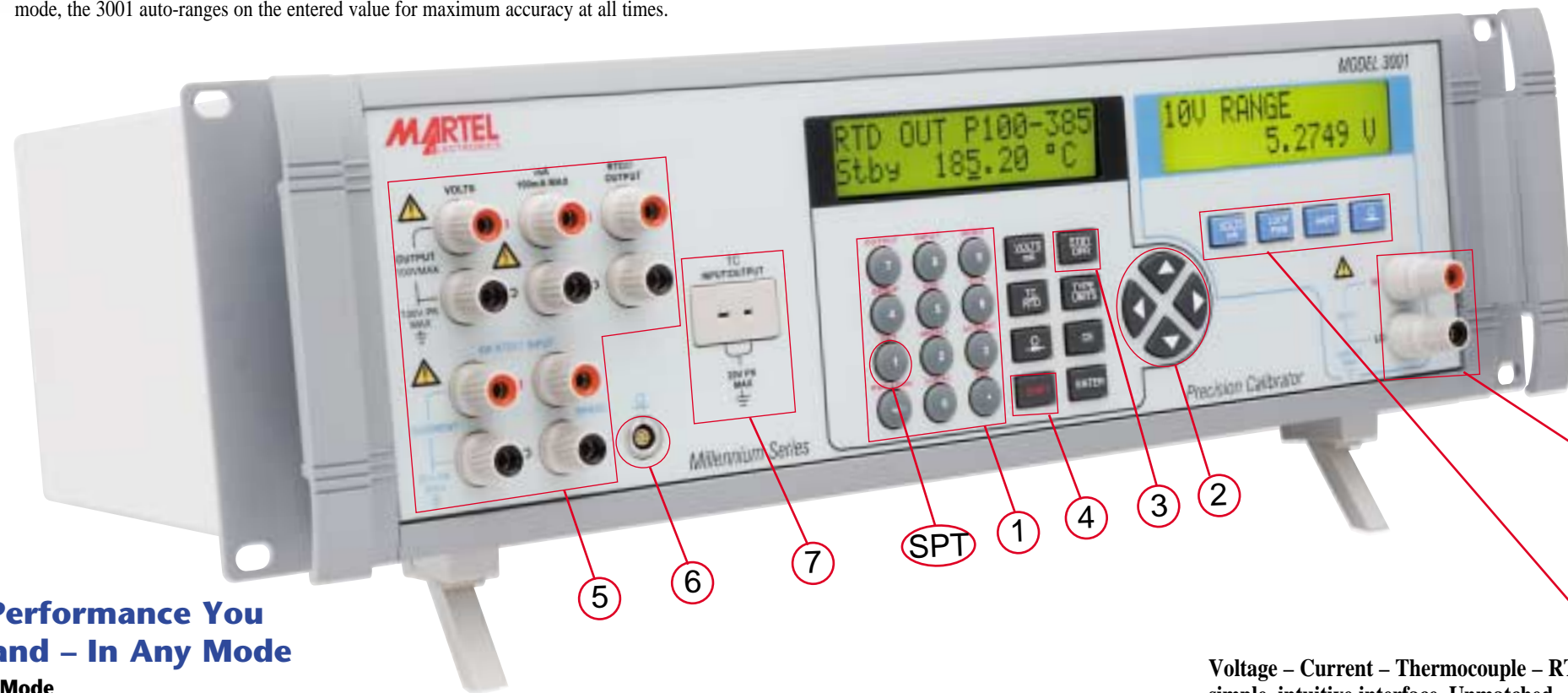
### **General Features**

- Superior calibration accuracy to 0.0025% of reading
- Direct keyboard entry or cursor entry with decade control
- Source/Read thermocouple (13), RTD (9), Voltage, Current, Pressure (read only)
- Custom RTD and SPRT profiles
- Nine (9) setpoints for each output range and type
- Beryllium-Copper binding posts reduce thermal EMFs
- RS232, USB and IEEE-488 remote control
- Compatible with Fluke Met/Cal® software
- Isolated measurement channel
  - Two (2) voltage ranges: 10V and 100 V DC
  - MilliAmp range 0 to 52 mA
  - MilliAmp range with simultaneous 24 VDC power
  - Selectable 250 Ohm HART™ resistor
  - Accuracy of 0.005% of reading on voltage ranges



## Simple, Intuitive Interface

The 3001 provides simple, front-panel entry of mode, range, and value, using either direct key-board entry (1) or cursor entry (2). Using cursor entry, the LEFT/RIGHT arrow keys are used to move the cursor under the digit in the display to be changed. The UP/DOWN arrow keys increment/decrement the value at the cursor position. Using direct keyboard entry (1), the exact value desired is entered using the numeric keys, and the ENTER key is pressed to set the output to that value. Whichever way you choose, setup is simple and fast. In the voltage output mode, the 3001 auto-ranges on the entered value for maximum accuracy at all times.



## Total Setpoint Control

A SHIFT key (4) provides easy access to the setpoint controls of the 3001. Up to nine setpoints can be defined for each output mode and each thermocouple and RTD type. Setpoints are recalled individually at the touch of three buttons, SHIFT (4), SETPOINT (SPT) button and then the corresponding numeric keys 1-9. Any number of sequential setpoints can be stepped through automatically, with complete control of dwell time. Either way, for rapid setup of repeatable tests, no other instrument comes close to the Martel 3001.

## Remote Control

All of the 3001 operating functions can be accessed via RS-232, IEEE-488 or USB using a standard PC running Fluke Met/Cal® software, Windows® HyperTerminal or other software using an ASCII protocol. Custom control programs may be written using programming software such as C++. Switching between LOCAL and REMOTE is as simple as touching the SHIFT (4) and LOCAL buttons.

## Rock-Solid Stability

The 3001 stability and accuracy is traceable to NIST standards. The accuracy of the 3001 is specified for both 90-day and one-year intervals. Manual zero calibrations can be made on all T/C and pressure functions to eliminate offsets.

## Flexible Output

Five-way copper alloy binding posts (5) provide a wide range of connection options. A standard pressure module connector is provided (6), as is the CJC T/C mini-jack (7).

## Isolated Measurement Channel

The 3001 features a fully isolated measurement channel which allows the user to calibrate process transmitters and signal isolators. In reality it's like having two instruments in one! This channel also incorporates a 24 volt loop power supply to power 2-wire transmitters and a HART interface resistor enabling direct connection to HART communicators. Key features are:

- Two voltage ranges 10V and 100V DC
- Milliamp range 0 to 52mA
- Milliamp range with simultaneous 24 volt power (0 to 24ma)
- Selectable 250 ohm HART resistor
- Accuracy of 0.005% of reading on all ranges

## The Performance You Demand – In Any Mode

### Voltage Mode

The 3001 offers four precision voltage output ranges (100mV, 1V, 10V, and 100V) all with 0.003% (30ppm) accuracy. These ranges are ideal for calibrating a broad range of DC voltage instrumentation. Additionally all voltage outputs settle to full specification in less than 200ms making the 3001 ideal for automated calibration systems.

An automatic stand-by mode (3) assures that output voltages above 30VDC must be acknowledged by the operator before the voltage appears at the output jacks. The stand-by mode is also triggered if the output current compliance is exceeded, thereby protecting the device under calibration.

### Current Mode

The 3001 features a precision current output range (100mA) that offers 0.01% (100ppm) accuracy, which is ideal for calibrating process instrumentation especially 4 to 20mA equipment. With a full 12 volts of compliance at 100mA virtually any precision DC current measuring device can be calibrated using the 3001. Like the voltage ranges the current range offers quick settling time and an operate/stand-by mode.

### Thermocouple Mode

The Martel 3001 can read and source any of 11 types of thermocouples. Its T/C input and output is Cold Junction Compensated, using an ultra-stable PT-1000 sensor.

### RTD Mode

The 3001 can read and source 9 RTD types as well as YSI-400 and Ohms for non-standard curves. Probe coefficients (A, B, C, and R0) can be entered directly, with storage for up to five custom curves and one SPRT curve. The performance of the 3001 in the RTD mode compares to dedicated RTD measurement instruments. Unlike low-cost, less accurate RTD instruments, the display in the 3001 is always active, reading to three decimal places, using polynomial averaging to extract a high accuracy signal. The result is a very quiet, high accuracy reading.

### Pressure Mode

The 3001 operates with all Martel BetaPort series pressure modules using the BPPA module adapter and covers pressure ranges from 0 to 10" H<sub>2</sub>O to 10,000 psi. Pressure can be displayed in a wide range of engineering units with up to 0.025% Full Scale accuracy. The 3001 also supports Fluke 700 series modules and Mensor 6100 precision pressure modules.

**Voltage – Current – Thermocouple – RTD simple, intuitive interface. Unmatched performance. The Martel 3001 – process calibration laboratory in a box.**

### Optional RTD Probe

The Martel IBP-1 high-accuracy RTD probe is supplied with R0, A, B, and C coefficients to provide the maximum possible accuracy for critical calibration requirements.

Probe Type	PT-100 Alpha 385
Temperature Range	-100°C to +400°C
Accuracy	±0.025°C
Stability	±0.025°C at 0° for 1 year ±0.05°C at 0°C for 5 years
Dimensions	0.25" OD, 14 inches
Cable	3.5'

### Optional Accessories

- IBP-1 High Accuracy RTD Probe (with data)
- BPPA-100 Pressure Module Adapter
- PTL-1 Low EMF Beryllium Copper Test Leads
- JKTE Thermocouple Lead Kit
- R/SNB Thermocouple Lead Kit

### Martel...Your Source For BetaPort Pressure Modules

Martel provides industry standard BetaPort-P pressure modules for use with the 3001 Precision Calibrator. BetaPort modules are available in 29 ranges and types including gauge, vacuum, absolute, differential and compound. Modules are available from 10" water column (WC) to 10,000 PSI full scale. Request our BetaGauge family brochure for more information on these and other Martel pressure calibration products.

In addition, the 3001 also accepts Mensor and Fluke pressure modules for the ultimate in pressure measurement performance and flexibility.



## Specifications

(1 year at 23°C ±5°C; % of reading, unless otherwise noted)

### Output Voltage

#### Range

0 to 100.000 mV  
0 to 1.00000 V  
0 to 10.0000 V  
0 to 100.000 V

#### Resolution

0 to 100 mV Range 1 µV  
0 to 1 V Range 10 µV  
0 to 10 V Range 100 µV  
0 to 100 V Range 1 mV

#### Accuracy (% of reading)

0 to 100 V Range ±0.003% (30ppm) ± 3 µV  
0 to 1 V Range ±0.003% (30ppm) ± 10 µV  
0 to 10 V Range ±0.003% (30ppm) ± 100 µV  
0 to 100 V Range ±0.003% (30ppm) ± 1 mV

#### Maximum Burden (~ 1 Ohm output impedance)

0 to 100 mV Range 10 mA  
0 to 1 V Range 10 mA  
0 to 10 V Range 10 mA  
0 to 100 V Range 1 mA

### Output Current

Range 0 to 100.000 mA  
Resolution 1 µA  
Accuracy (% of reading) ± 0.005% ± 1 Count  
Maximum Burden 10 V

### Thermocouples

#### Output

Types J, K, T, E, R, S, N, B, L, U, C, BP, XK  
Range mV  
Resolution 0.1 °C/°F  
Accuracy 0.14 °C; Type J, typical

#### Input

Types J, K, T, E, R, S, N, B, L, U, C, BP, XK  
Range mV  
Resolution 0.01 °C/°F  
Accuracy 0.14 °C; Type J, typical

### RTD

#### Output

Range Pt385 (100, 200, 500, 1000),  
Pt392, Pt3916 (JIS), Ni120,  
Cu 10, YS 1400  
Resolution 0.01 °C/°F; Pt385-100, typical  
Accuracy ±0.05 °C; Pt385-100, typical

#### Input (All RTD inputs are 4 wire)

Range Pt385 (100, 200, 500, 1000),  
Pt392, Pt3916 (JIS), Ni120,  
Cu10, YSI400, 25 Ohm SPRT  
Resolution 0.001 °C/°F; Pt385-100, typical  
Accuracy ±0.02 °C; Pt385-100, typical

### Ohms

#### Output

Range 5 to 4000.0 Ω  
Resolution 5 to 400.00 Ω 0.001 Ω  
5 to 4000.0 Ω 0.01 Ω  
Accuracy 5 to 400.00 Ω ±0.05 Ω  
5 to 4000.0 Ω ±0.3 Ω

#### Input (4 wire connection)

Range 0 to 4000.00 Ω  
Resolution 0 to 400.00 Ω 0.001 Ω  
0 to 4000.0 Ω 0.01 Ω  
Accuracy 0 to 400.00 Ω 40 PPM ±0.002 Ω  
0 to 4000.00 Ω 40 PPM ±0.02 Ω

### Pressure

Range 0 to 1 inch H<sub>2</sub>O; to 10,000 psi  
Compatibility All BetaPort modules using the  
BPPA adapter and all Fluke 700  
and Mensor 6100 Series  
Pressure Modules

### Isolated Measurement Channel

Range Accuracy  
0-10.0000V ±0.005% ± 0.2mV  
0-100.000V ±0.005% ± 2.0mV  
0-52.0000mA ±0.01% ± 1µA  
Loop power: 24 V ± 10%  
HART™ resistor: 250Ω ± 3%  
Maximum current: 24 mA

### Stability

Warm-up Time 30 minutes to rated accuracy  
Temp Co. (~18°C/>28°C) 10% of accuracy spec/°C

### Temp Co. (~18°C/>28°C)

### Environmental

Operating Temperature 0°C to +50°C  
Storage Temperature -20°C to +70°C  
Humidity  
Operating <80% to 30°C  
<70% to 40°C  
<40% to 50°C  
Storage <95%, non-condensing

### Power Requirements

Voltage Range 90 to 240 VAC  
<15 VA

### Mechanical

Dimensions 5"h x 19"w x 11"d  
(17.7 cm x 48.26 cm x 27.96 cm)  
Weight 10.5 lbs. (4.8 kg)  
Display (2) Large character 16 by  
2 line alphanumeric backlit LCDs

## Need similar performance for voltage and current only?

If your calibration needs are limited to voltage and current, the Martel M2000 Bench Calibrator provides all of the performance, functionality, and ease of use of the 3001.



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