

*Calibration Technology Starts Here*

## *Precision Calibrators*

## "10" Series Calibrators

Work better and get better work with Martel TEN series multifunction calibrators. This family of 5 models scale up to do any size job you need when calibrating process instrumentation.

Start at the top with the DMC-1410 documenting multifunction calibrator. It's versatile, providing access to a complete range of calibration functions while performing automated on the fly calibration data collection and storage. A simple easy-to-use software package is included that allows the user to build a database of all assets that need calibration and download work orders to the calibrator.

Next in line is the MC-1210 multifunction calibrator. It's a rugged and reliable universal calibrator. Like all the others in this series, the MC-1210 is based on the proven reliable, accurate and stable MC-1200. It's dual display and isolated readback allows it to power a transmitter under test while reading its milliamp output. Truly an all-in-one calibrator. The MC-1210 also has a wide range of switch test features for both pressure and temperature switches.

The MC-1010 provides a high level of functions and features at an easy to swallow price for the less demanding user who does not require the isolated read-back feature found on the DMC-1410 or MC-1210.

For those who need specialty temperature calibration with high accuracy, the PTC-8010 is the choice. Special display features show the cold junction temperature and milliVolt equivalents at a glance for thermocouples. Ohms equivalents are shown when using the RTD functions.

The PSC-4010 is a superior loop calibrator with voltage, current and frequency functions. With the best display in the business it makes the essentials of instrument calibration easier than ever. And, a bonus feature not found in other loop calibrators is frequency in and out.

This innovative series features the introduction of a new, high contrast ClearBrite™ graphic display. The display features a vivid white backlight that makes the display easy to read in all light conditions.

All of these models have Martel's easy to learn yet powerful 3 key menu structure. It's the same menu used in all of the company's BetaGauge pressure calibrators, too. Learn it once and you'll know how to use every significant calibrator Martel makes.

### General Features

- New ClearBrite™ Graphic Display
- Auto Stepping/Auto Ramping
- 3 Key Martel Menu System
- Scroll/Step Output Control
- NIST Calibration Certificate
- Proven Rugged Reliable Design
- Fuseless Protection to 250 VAC



# Martel "10" Series Calibrators

## 10 Series Function Table

Function	Documenting	Dual Display	Isolated Feedback	Current In/Out	Voltage In/Out	Loop Power	Thermocouple In/Out	RTD/Ω In/Out	Frequency	Pressure†
Model										
DMC-1410	•	•	•	•	•	•	•	•	•	•
MC-1210		•	•	•	•	•	•	•	•	•
MC-1010				•	•	•	•	•	•	•
PTC-8010							•	•		
PSC-4010				•	•	•			•	

†with optional BPPA-100 pressure module adapter

## 10 Series Feature Table

Feature	ClearBrite™ Graphic Display	Auto Stepping	Auto Ramping	RS-232 Serial Interface	NIST Calibration	Rubber Boot	Martel 3-Key User Interface	Scroll/Step Output	Numeric Input	AC Charger Adapter Option
Model										
DMC-1410	•	•	•	•	•	•	•	•	•	•
MC-1210	•	•	•	•	•	•	•	•	•	•
MC-1010	•	•	•	•	•	•	•	•	•	•
PTC-8010	•	•	•	•	•	•	•	•	•	•
PSC-4010	•	•	•	•	•	•	•	•	•	•

### General Specifications (applies to all models)

Operating Temperature	-10 to 50°C
Storage Temperature	-20 to 70°C
Power	(4) AA Alkaline or optional rechargeable batteries
Low Battery Warning	Yes, on display
ClearBrite™ Display	High contrast 128 x 64 pixel addressable graphic LCD w/daylight backlight 2.4 x 1.8 in. • 63 x 44 mm
Serial Communications	Yes, ASCII, RS-232, requires optional Martel 1919069 serial cable or 1919896 USB cable
CE – EMC	EN50082-1 and EN55022: 1994 Class B
Safety	CSA C22.2 No. 1010-1: 1992
Weight (with batteries)	1.8 lb (0.82 kg)
Size	8.5 x 4.8 x 2.1 in. (22 x 12 x 5.3 cm)
Other	IP54 Protected against misconnection to 250 VAC/VDC

**DMC 1410**



**MC 1210**



**MC 1010**



**PTC 8010**



**PSC 4010**



## DC Voltage and Current

		DC Voltage Upper Isolated	DC Voltage Lower Non-Isolated		DC Current Upper Isolated	DC Current Lower Non-Isolated	
Model		Measurement	Measurement	Source	Measurement	Measurement	Source
DMC-1410	Range	0.000V - 30.000V	0.000V - 20.000V	0.000V - 20.000V	0.000mA - 24.000mA	0.000mA - 24.000mA	0.000mA - 24.000mA
	Accuracy	0.01% ± 2 mV	0.01% ± 2 mV	0.01% ± 2 mV	0.01% ± 2μA	0.01% ± 2μA	0.01% ± 2μA
MC-1210	Range	0.000V - 30.000V	0.000V - 20.000V	0.000V - 20.000V	0.000mA - 24.000mA	0.000mA - 24.000mA	0.000mA - 24.000mA
	Accuracy	0.015% ± 2 mV	0.015% ± 2 mV	0.015% ± 2 mV	0.015% ± 2μA	0.015% ± 2μA	0.015% ± 2μA
MC-1010	Range	N.A.	0.000V - 20.000V	0.000V - 20.000V	N.A.	0.000mA - 24.000mA	0.000mA - 24.000mA
	Accuracy	N.A.	0.015% ± 2 mV	0.015% ± 2 mV	N.A.	0.015% ± 2μA	0.015% ± 2μA
PSC-4010	Range	N.A.	0.000V - 20.000V	0.000V - 20.000V	N.A.	0.000mA - 24.000mA	0.000mA - 24.000mA
	Accuracy	N.A.	0.015% ± 2 mV	0.015% ± 2 mV	N.A.	0.015% ± 2μA	0.015% ± 2μA

Note: optional 50 mA range available

## Frequency

Model		Measurement	Source	Measurement	Source	Measurement	Source
DMC-1410	Range	2.0 CPM - 600.0 CPM	2.0 CPM - 600.0 CPM	1.0 Hz - 1000.0 Hz	1.0 Hz - 1000.0 Hz	1.00 kHz - 10.00 kHz	1.00 kHz - 10.00 kHz
	Accuracy	0.05% ± 0.1 CPM	0.05%	0.05% ± 0.1 Hz	0.05%	0.05% ± 0.01 kHz	0.125%
MC-1210	Range	2.0 CPM - 600.0 CPM	2.0 CPM - 600.0 CPM	1.0 Hz - 1000.0 Hz	1.0 Hz - 1000.0 Hz	1.00 kHz - 10.00 kHz	1.00 kHz - 10.00 kHz
	Accuracy	0.05% ± 0.1 CPM	0.05%	0.05% ± 0.1 Hz	0.05%	0.05% ± 0.01 kHz	0.125%
MC-1010	Range	2.0 CPM - 600.0 CPM	2.0 CPM - 600.0 CPM	1.0 Hz - 1000.0 Hz	1.0 Hz - 1000.0 Hz	1.00 kHz - 10.00 kHz	1.00 kHz - 10.00 kHz
	Accuracy	0.05% ± 0.1 CPM	0.05%	0.05% ± 0.1 Hz	0.05%	0.05% ± 0.01 kHz	0.125%
PSC-4010	Range	2.0 CPM - 600.0 CPM	2.0 CPM - 600.0 CPM	1.0 Hz - 1000.0 Hz	1.0 Hz - 1000.0 Hz	1.00 kHz - 10.00 kHz	1.00 kHz - 10.00 kHz
	Accuracy	0.05% ± 0.1 CPM	0.05%	0.05% ± 0.1 Hz	0.05%	0.05% ± 0.01 kHz	0.125%

## Resistance Measurement (Autoranging)

Model		Ohms Low	Ohms High
DMC-1410	Range	0.00Ω - 400.00Ω	401.0Ω - 4000.0Ω
	Accuracy	0.015% ± 0.03Ω	0.015% ± 0.3Ω
MC-1210	Range	0.00Ω - 400.00Ω	401.0Ω - 4000.0Ω
	Accuracy	0.025% ± 0.05Ω	0.025% ± 0.5Ω
MC-1010	Range	0.00Ω - 400.00Ω	401.0Ω - 4000.0Ω
	Accuracy	0.025% ± 0.05Ω	0.025% ± 0.5Ω
PTC-8010	Range	0.00Ω - 400.00Ω	401.0Ω - 4000.0Ω
	Accuracy	0.025% ± 0.05Ω	0.025% ± 0.5Ω

## PSC-4010 MilliVolts Measurement/Source

Function	Range	Accuracy
Read	0000 mV - 90.000 mV	0.02% ± 10 μV
Source	0.000 mV - 100.000 mV	0.02% ± 10 μV

## Resistance Source (Autoranging)

Model	Range	Ohms Source Low Excitation Current	Accuracy	Range	Ohms Source High Excitation Current	Accuracy	Range	Ohms Source High Excitation Current	Accuracy
DMC-1410	5.0Ω - 400.0Ω	0.1 - 0.5 mA	0.015% ± 0.1Ω	401Ω - 1500Ω	0.05 - 0.8 mA	0.015% ± 0.3Ω	1500Ω - 4000Ω	0.05 - 0.4 mA	0.015% ± 0.3Ω
	5.0Ω - 400.0Ω	0.5 - 3 mA	0.015% ± 0.03Ω						
MC-1210	5.0Ω - 400.0Ω	0.1 - 0.5 mA	0.025% ± 0.1Ω	401Ω - 1500Ω	0.05 - 0.8 mA	0.025% ± 0.5Ω	1500Ω - 4000Ω	0.05 - 0.4 mA	0.025% ± 0.5Ω
	5.0Ω - 400.0Ω	0.5 - 3 mA	0.025% ± 0.05Ω						
MC-1010	5.0Ω - 400.0Ω	0.1 - 0.5 mA	0.025% ± 0.1Ω	401Ω - 1500Ω	0.05 - 0.8 mA	0.025% ± 0.5Ω	1500Ω - 4000Ω	0.05 - 0.4 mA	0.025% ± 0.5Ω
	5.0Ω - 400.0Ω	0.5 - 3 mA	0.025% ± 0.05Ω						
PTC-8010	5.0Ω - 400.0Ω	0.1 - 0.5 mA	0.025% ± 0.1Ω	401Ω - 1500Ω	0.05 - 0.8 mA	0.025% ± 0.5Ω	1500Ω - 4000Ω	0.05 - 0.4 mA	0.025% ± 0.5Ω
	5.0Ω - 400.0Ω	0.5 - 3 mA	0.025% ± 0.05Ω						

### RTD Measurement/Source

(DMC-1410, MC-1210, MC-1010 and PTC-8010 only)

RTD Type	Range (°C)	DMC-1410	MC-1210, MC-1010, PTC-8010
		Accuracy (°C)	Accuracy (°C)
PT385, 10Ω	-200.0 – -80.0	0.76	1.3
	-80.0 – 0.0	0.78	1.3
	0.0 – 100.0	0.83	1.4
	100.0 – 300.0	0.92	1.5
	300.0 – 400.0	0.98	1.6
	400.0 – 630.0	1.05	1.8
	630.0 – 800.0	1.16	1.9
PT385, 50Ω	-200.0 – -80.0	0.16	0.3
	-80.0 – 0.0	0.23	0.4
	0.0 – 100.0	0.23	0.4
	100.0 – 300.0	0.23	0.4
	300.0 – 400.0	0.27	0.5
	400.0 – 630.0	0.30	0.5
	630.0 – 800.0	0.36	0.6
PT385, 100Ω	-200.0 – -80.0	0.08	0.1
	-80.0 – 0.0	0.13	0.2
	0.0 – 100.0	0.14	0.2
	100.0 – 300.0	0.15	0.2
	300.0 – 400.0	0.18	0.3
	400.0 – 630.0	0.21	0.3
	630.0 – 800.0	0.26	0.4
PT3926, 100Ω	-200.0 – -80.0	0.07	0.1
	-80.0 – 0.0	0.10	0.2
	0.0 – 100.0	0.11	0.2
	100.0 – 300.0	0.13	0.2
	300.0 – 400.0	0.17	0.3
	400.0 – 630.0	0.19	0.3
	630.0 – 800.0	0.26	0.4
PT3916, 100Ω	-200.0 – -80.0	0.07	0.1
	-80.0 – 0.0	0.10	0.2
	0.0 – 100.0	0.11	0.2
	100.0 – 260.0	0.13	0.2
	260.0 – 300.0	0.17	0.3
	300.0 – 400.0	0.17	0.3
	400.0 – 630.0	0.19	0.3
PT385, 200Ω	-200.0 – -80.0	0.35	0.6
	-80.0 – 0.0	0.40	0.7
	0.0 – 100.0	0.42	0.7
	100.0 – 260.0	0.45	0.7
	260.0 – 300.0	0.45	0.7
	300.0 – 400.0	0.52	0.9
	400.0 – 630.0	0.53	0.9
PT385, 500Ω	-200.0 – -80.0	0.15	0.2
	-80.0 – 0.0	0.18	0.3
	0.0 – 100.0	0.19	0.3
	100.0 – 260.0	0.21	0.4
	260.0 – 300.0	0.25	0.4
	300.0 – 400.0	0.26	0.4
	400.0 – 630.0	0.29	0.5
PT385, 1000Ω	-200.0 – -80.0	0.10	0.2
	-80.0 – 0.0	0.12	0.2
	0.0 – 100.0	0.14	0.2
	100.0 – 260.0	0.14	0.2
	260.0 – 300.0	0.17	0.3
	300.0 – 400.0	0.19	0.3
	400.0 – 630.0	0.22	0.4
NI120	-80.0 – 260.0	0.6	0.1
Cu10	-100.0 – 260.0	0.77	1.3
Cu50	-180.0 – 200.0	0.16	0.3
Cu100	-180.0 – 200.0	0.08	0.1
YSI400	15.0 – 50.0	0.05	0.1

Accuracy statements are based on 4W connections

### mV/Thermocouples (DMC-1410, MC-1210, MC-1010 and PTC-8010 only)

MilliVolts (mV)	Range	DMC-1410	MC-1210, MC-1010, PTC-8010
		Accuracy	Accuracy
Read	-10.000 mV – 75.000 mV	0.015% ± 10 μV	0.02% ± 10 μV
Source	-10.000 mV – 75.000 mV	0.015% ± 10 μV	0.02% ± 10 μV
Maximum current output in voltage ranges is 1 mA with an output impedance of ≤ 1 Ω			

TC Type	Range (°C)	Accuracy (°C)	
		With CJC OFF	With CJC ON
J	-210.0 – 0.0	0.4	0.6
	0.0 – 800.0	0.2	0.4
	800.0 – 1200.0	0.3	0.5
K	-200.0 – 0.0	0.6	0.8
	0.0 – 1000.0	0.3	0.5
	1000.0 – 1372.0	0.5	0.7
T	-250.0 – 0.0	0.6	0.8
	0.0 – 400.0	0.2	0.4
E	-250.0 – -100.0	0.6	0.8
	-100.0 – 1000.0	0.2	0.4
R	0.0 – 1767.0	1.2	1.4
S	0.0 – 1767.0	1.2	1.4
B	600.0 – 800.0	1.2	1.0
	800.0 – 1000.0	1.3	1.5
C	1000.0 – 1820.0	1.5	1.7
	0.0 – 1000.0	0.6	0.8
	1000.0 – 2316.0	2.3	2.5
XK	-200.0 – 800.0	0.2	0.4
BP	0.0 – 800.0	0.9	1.1
	800.0 – 2500.0	2.3	2.5
L	-200.0 – 0.0	0.3	0.5
U	0.0 – 900.0	0.2	0.4
	-200.0 – 0.0	0.5	0.7
N	0.0 – 600.0	0.3	0.5
	-200.0 – 0.0	0.8	1.0
	0.0 – 1300.0	0.4	0.6

#### Notes

All specifications apply at 23°C ± 5°C unless otherwise stated. Outside of this range add ±0.005% of reading/°C.

Accuracy is % of reading ± floor spec.

Maximum current output in voltage ranges is 1 mA with an output impedance of ≤ 1Ω.

Maximum load on mA source is 1000Ω. Voltage input range on simulate mode 5 – 30 V.

Frequency input voltage amplitude range is 1V to 20V zero based square wave only. Output amplitude is adjustable from 1V to 20V, and is a square wave with 50% duty cycle. For output frequency, a negative offset of approximately -0.1V is present to assure zero crossing.

In Ohms source and RTD source modes, units are compatible with smart transmitters and PLCs that use a strobing excitation current. Frequency response is 5 msec.

# BetaGauge Pressure Modules

## AVAILABLE MODULES

PARAMETER/ RANGE	FULLSCALE ACCURACY	VACUUM ACCURACY	OVER PRESSURE
<b>Isolated Gauge (PSIG):</b>			
0 to 15 (0 to 1 Bar)	±0.025 %		300 %
0 to 30 (0 to 2 Bar)	±0.025 %		300 %
0 to 500 (0 to 35 Bar)	±0.025 %		200 %
0 to 1000 (0 to 70 Bar)	±0.025 %		200 %
0 to 1500 (0 to 100 Bar)	±0.035 %		200 %
0 to 3000 (0 to 200 Bar)	±0.05 %		200 %
0 to 5000 (0 to 340 Bar)	±0.05 %		200 %
0 to 10000 (0 to 700 Bar)	±0.1 %		120 %
<b>Non Isolated Compound (PSIG):</b>			
-0.4 to 0.4 (-20 to 20 mBar)	±0.1 %	±0.15 %	400 %
-1 to 1 (-70 to 70 mBar)	±0.05 %	±0.1 %	400 %
-5 to 5 (-350 to 350 mBar)	±0.075 %	±0.1 %	400 %
-7.2 to 7.2 (-500 to 500 mBar)	±0.07 %	±0.1 %	300 %
-10 to 10 (-700 to 700 mBar)	±0.03 %	±0.05 %	300 %
-15 to 15 (-1 to 1 Bar)	±0.04 %	±0.04 %	300 %
-15 to 30 (-1 to 2 Bar)	±0.025 %	±0.025 %	300 %
<b>Isolated Compound (PSIG):</b>			
-12 to 50 (-0.8 to 3.5 Bar)	±0.03 %	±0.03 %	200 %
-12 to 100 (-0.8 to 7 Bar)	±0.025 %	±0.025 %	200 %
-12 to 150 (-0.8 to 10 Bar)	±0.03 %	±0.03 %	200 %
-12 to 300 (-0.8 to 20 Bar)	±0.025 %	±0.025 %	150 %
<b>Isolated Absolute (PSIA):</b>			
0 to 15 (0 to 1 Bar)	±0.04 %		300 %
0 to 30 (0 to 2 Bar)	±0.025 %		300 %
0 to 50 (0 to 3.5 Bar)	±0.03 %		300 %
0 to 100 (0 to 7 Bar)	±0.025 %		300 %
0 to 300 (0 to 20 Bar)	±0.025 %		200 %
<b>Differential (PSID):</b>			
0 to 5 (0 to 350 mBar)	±0.075 %		400 %
0 to 30 (0 to 2 Bar)	±0.025 %		300 %
0 to 50 (0 to 3.5 Bar)	±0.03 %		300 %

Martel Electronics offers 27 standard pressure modules, covering gauge, vacuum, absolute, compound, and differential measurements. All modules are directly compatible with the BetaGauge II. With the Model BPPA-100 Pressure Module Adapter, all modules (with the exception of the DC measurement model) are fully compatible with the Martel MC-1210 and MC-1010 Multi-Function Calibrators, the BetaGauge 330, 321A, 311A and 301 Pressure Calibrators, the DMC-1410 Documenting Multi-Function Calibrator, and the Martel Electronics M2001 and 3001 Laboratory/Bench Standards.

Pressure ranges may be displayed in any of 13 user selectable units. Water density correction factors of 4 °C, 20 °C, or 60 °F can be selected for either water column unit. The choice of pressure unit may be restricted by limitations on resolution of the instrument display of the particular calibrator the module is used with. For optimum mechanical strength, external pressure connection is made by a 1/8" FNPT 316SS connector welded to a stainless steel metal plate.

## General Features

- 27 standard ranges
- Gauge, vacuum, absolute, compound, and differential measurements
- Accuracy specified over 15 °C to 35 °C range
- Isolated and non-isolated measurements, range dependant

## BetaGauge Pressure Modules



## Model BPPA-100 Pressure Module Adapter



*Lab  
standard  
multifunction  
calibrators*

### The 3001

The Martel 3001 Bench Calibrator combines the power and features of the M2000 voltage/current calibrator, with the addition of thermocouple, RTD, and pressure calibration, 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."

### 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.

### 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



### 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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