BETA CALIBRATORS

MARTEL ELECTRONICS

Documenting Multi-Function Calibrator

DMC-1400 Documenting Multi-function Calibrator

Description

The DMC-1400 Documenting Multi-function Calibrator provides a feature set unmatched in high accuracy, hand-held calibrators in its price range. The DMC-1400 provides the functions and accuracy associated with fixed installation, laboratory instruments, and has everything needed for virtually any calibration task. What makes this versatile calibrator best in class is the ability to fully document any calibration easily while performing the normal job. No special software is required! You already have all the software you need installed on your PC. Some functions will require a Microsoft® Excel®-compatible spreadsheet.

We call this "the documenting calibrator for the rest of us." Work better — get better work. Set up and calibrate any instrument as you normally would. Just press the "SAVE" key after each calibration point. When you complete the calibration, follow the prompts to enter the "tag" information and you are DONE.

The DMC-1400 also features the ability to test for pass/fail criteria, capture both AS FOUND and AS LEFT data, maintain calibration data for 50 instruments in non-volatile memory, and even print calibration certificates right in the field, with no PC needed, using our optional OTS-100 portable certificate printer.

Measure and simulate thermocouples, RTDs, current, voltage, frequency and pressure, and source pulse trains with one lightweight easy to use calibrator. A communications port compatible with BetaPort–P pressure modules is provided, as is an isolated milliamp/Volt read-back circuit. Arrow keys, direct numeric keypad entry, and three software-driven function buttons, plus a large backlit, menu-driven graphics display combine to provide a highly intuitive, simple yet powerful operator interface.

A built-in 250 Ohm resistor is provided for HART™ compatibility with smart transmitters and PLCs. Full fuseless protection and a serial communications port for full control with ASCII commands, are just some of the additional features that make the DMC-1400 the single, most indispensable tool available for virtually any calibration task.

The DMC-1400 is supplied with a rugged protective boot, four standard alkaline AA batteries, padded carrying case, test leads, communications cable, USB adapter, user manual, quick start guide, DVD and CD based video training and, of course, an NIST traceable calibration certificate.

Optional accessories include the BPPA-100 adapter for BetaPort-P pressure modules as well as the full range of pressure modules. There's a rechargeable battery kit if you prefer recharging over standard alkaline batteries. Finally, we have the very useful OTS-100 battery operated portable printer for printing calibration certificates in the field.

— The Documenting Calibrator For the Rest of Us

Features

- Measure and simulate T/Cs (13 types), RTDs (13 types), Ohms, current, voltage, frequency and pressure; source pulse trains
- Highest accuracy in class to 0.015% of reading
- Pressure module communication port compatible with BETA pressure modules
- Isolated mA/V read-back circuit for complete transmitter calibration
- Built-in 24 V supply can drive 4 – 20 mA loops up to 1000 Ohms
- Direct entry of custom RTD coefficients (R0, A, B, C)
- All simulate modes can be programmed with dedicated setpoints to speed calibration and linearity tests
- Store up to 21 data points per instrument, and up to 50 instruments in non-volatile memory
- Test for pass/fail criteria
- Capture both AS FOUND and AS LEFT data
- Review data and print calibration certificates in the field
- Upload data to PC for analysis with Microsoft® Excel® or full database
- Meets CE requirements and is designed to IEC 1010 safety standards
- Supplied in full rubber boot

Specifications (23 °C ±5 °C unless otherwise noted)

Voltage Read and Source
Source	0.000 to 20.000 VDC
Read	
Isolated	0.000 to 30.000 VDC
Non-Isolated	0.000 to 20.000 VDC

Thermocouple mV
Read/Source	-10.000 to +75.000 mV

Current (mA)
Source	0.000 to 24.000 mA; 1kΩ max. load
Read	
Isolated	0.000 to 24.000 mA
Non-Isolated	0.000 to 24.000 mA
Optional 50 mA Source and Read	

Frequency
(1 to 20 V selectable amplitude)
CPM Source and Read	2.0 to 600.0 CPM
Hz Source and Read	1.0 to 1000.0 Hz
kHz Source and Read	1.0 to 10.00 kHz

Pulse
(Source only; 1 to 20 V selectable amplitude)
Pulses	1 to 30,000
	2 CPM to 10 kHz

Ohms
Source	5.0 to 4000.0 Ohms
Read	0.00 to 4000.0 Ohms

Thermocouple Read and Source
J Thermocouple	-200.0 to +1200.0 °C
K Thermocouple	-200.0 to +1370.0 °C
T Thermocouple	-200.0 to +400.0 °C
E Thermocouple	-200.0 to +950.0 °C
R Thermocouple	-20.0 to +1750.0 °C
S Thermocouple	-20.0 to +1750.0 °C
B Thermocouple	+600.0 to +1800.0 °C
C Thermocouple	0 to +2316.0 °C
XK Thermocouple	-200.0 to +800.0 °C
BP Thermocouple	0 to +2500.0 °C
L Thermocouple	-200.0 to +900.0 °C
U Thermocouple	-200.0 to +400.0 °C
N Thermocouple	-200.0 to +1300.0 °C

RTD Read and Source
Ni120 (672)	-80.0 to +260.0 °C
Pt100 (385)	-200.0 to +800.0 °C
Pt100 (3926)	-200.0 to +630.0 °C
Pt100 (3916)	-200.0 to +630.0 °C
Pt200 (385)	-200.0 to +630.0 °C
Pt500 (385)	-200.0 to +630.0 °C
Pt1000 (385)	-200.0 to +630.0 °C
Cu10	-100.0 to +260.0 °C
YSI400	+15.00 to +50.00 °C
Cu50	-180.0 to +200.0 °C
Cu100	-180.0 to +200.0 °C
Pt385-10	-200.0 to +800.0 °C
Pt385-50	-200.0 to +800.0 °C

Environmental
Operating Temperature	-10 °C to +50 °C
Storage Temperature	-20 °C to +70 °C
Stability	
±0.005% of reading/°C outside of 23 °C ± 5°C	

Power Requirements   6 VDC
Batteries	4 AA; alkaline or optional rechargeable

Mechanical
Dimensions	8.7'' H x 4.2'' W x 2.3'' D
	(220.9 x 106.6 x 58.4 mm)
Weight	30.5 ounces (863 gms)

Accessories Included
Rugged protective boot, four standard alkaline AA batteries, padded carrying case, test leads, communications cable, USB adapter, user manual, quick start guide, DVD and CD based video training and an NIST traceable calibration certificate

Optional Accessories
BPPA-100 BetaPort pressure adapter
BetaPort-P pressure modules (29 ranges) *
MRBK-204 Rechargeable battery kit
OTS-100 battery operated portable printer

* See separate data sheet.

Optional Accessories

MRBK-204 Rechargeable battery kit

BPPA-100 BetaPort pressure adapter

OTS-100 Battery operated portable printer

Accuracy**

Voltage	±0.015% of reading, ±2 mV
Thermocouple mV	±0.02% of reading, ±10 μV

Thermocouple Errors (Typical at 100 °C) (in °C; add 0.2 for Cold Junction Compensation error)		RTD	1 Year Uncertainty; Typ. @ 100 °C
Type J	0.2 °C	Ni120 (672)	0.06 °C
Type K	0.3 °C	Pt100 (385)	0.13 °C
Type T	0.2 °C	Pt100 (3926)	0.13 °C
Type E	0.2 °C	Pt100 (3916)	0.13 °C
Type R	1.2 °C	Pt20 0 (385)	0.45 °C
Type S	1.2 °C	Pt500 (385)	0.21 °C
Type B	1.2 °C	Pt1000 (385)	0.14 °C
Type C	0.6 °C	Cu10	0.82 °C
Type XK	0.2 °C	YSI400	0.05 °C
Type BP	0.9 °C	Cu50	0.20 °C
Type L	0.2 °C	Cu100	0.13 °C
Type U	0.25 °C	Pt385-10	0.84 °C
Type N	0.4 °C	Pt385-50	0.21 °C

	Read	**Source**
Current (mA)	±0.015% of reading, ±2 μA	±0.015% of reading, ±2 μA
CPM	±0.05% of reading, ±0.1 CPM	±0.05% of reading
Hz	±0.05% of reading, ±0.1 Hz	±0.05% of reading
kHz	±0.05% of reading, ±0.01 kHz	±0.125% of reading
Ohms	works with all pulsed transmitters down to 5 ms	
5 - 400 Ohms	±0.015% of reading, ±0.03 Ω	±0.015% of reading, ±0.1 Ω (0.1-0.5 mA)
5 - 400 Ohms	±0.015% of reading, ±0.03 Ω	±0.015% of reading, ±0.03 Ω (0.5-3.0 mA)
400 - 1500 Ohms	±0.015% of reading, ±0.3 Ω	±0.015% of reading, ±0.3 Ω (0.05-0.8 mA)
1500 - 4000 Ohms	±0.015% of reading, ±0.3 Ω	±0.015% of reading, ±0.3 Ω (0.05-0.4 mA)

**Full specifications are contained in the Users Manual.

The DMC-1400 — a cost-effective, straight forward, and reliable way to document calibrations without the investment of time and money required in the past.

DMC-1400 uses a USB connection to your computer.

Measuring Pressure with the DMC-1400

The DMC-1400 is compatible with BETA pressure modules, with the use of an adapter.† Please refer to the separate Pressure Modules data sheet for module ranges and model numbers, as well as information about the adapter.

†BetaPort Pressure Adapter, Model BPPA 100

The Documenting Function

Adding documenting to your normal workflow is easy. Before you start a calibration, simply choose document from the calibrator operating menu. Then choose the calibrator input and output types. A neat feature is that you can also choose "manual" for either or both input and output. That allows you to calibrate and document virtually anything. Connect the calibrator to the instrument you're testing and use it as you normally would. After each calibration point, just press the SAVE key. When you're done, press the DONE key.

The calibrator will then prompt you to enter tag and instrument data, technician ID, ambient conditions and so on. Save that and you have completed the "as found" part of your test. You can also choose to have the calibrator evaluate the pass/fail status of the instrument by supplying an allowable error tolerance in terms of the full scale performance of the instrument. If the instrument passes, you can choose to copy the as found data to the as left data, and you've completely documented your calibration.

If you need a calibration certificate right now, connect the DMC-1400 to our portable battery operated OTS-100 printer and print the certificate. Easy and DONE.

When the day's work is over, you can save the data to a PC. A Windows® PC already has most, if not all, of the software you need. If you will just print calibration certificates, use Windows HyperTerminal to upload an ASCII image of the certificate and print away.

With a Microsoft Excel compatible spreadsheet, you can choose to upload .CSV files using the free Martel USV (Upload-Save-View) support utility. USV will even organize your calibrations in subdirectories to keep your data in easy to find and retrieve status. With the DMC-1400, it's all you need to have a complete and organized, paperless, calibration system.

The Martel USV Utility

The Martel USV (UPLOAD SAVE VIEW) Utility program manages the valuable data captured during calibrations and stored in the calibrator by allowing the viewing of data on the computer and uploading it in a choice of formats. It even creates a simple file cabinet of directories and files so it's easy to find the data you need once it's on the PC. Martel USV is freely distributed with the calibrator or it can be downloaded from our web site (www.martelcalibrators.com). Martel USV is simple to use, with a clean and straightforward interface, allowing ready access to all the functions needed.

USV is run by selecting it from the normal Windows start menu. It loads instantly, ready to get data from the DMC-1400 calibrator. The first time USV is run, an RS-232 COM port will need to be selected from within the utility to establish communications with the DMC-1400. This only needs to be done once unless a different COM port is used.

Report styles to be uploaded to the PC from the DMC-1400 can be chosen from either text

(.TXT) or comma delimited (.CSV) files. Text files are an image of the calibration certificate, which can be printed using Windows®™ Notepad® or other text editor. The CSV file imports right into Microsoft Excel® or other similar spreadsheet program or database. Once a type of file upload has been chosen, that type becomes the default unless changed at a later time.

Some other useful configuration options for the USV are the size of the window, which can be made any size up to full screen. USV remembers this from one session to the next. The location of data files that are saved from the calibrator can also be selected and this becomes the default location until changed. The location can be a local folder or a network location. The default location is the user's *My Documents* folder in a directory called *Martel USV Reports*.

Tags can be individually selected for uploading. To upload more than one tag at a time, the Control or Shift keys are used to select multiple tags using the normal Windows conventions. Alternatively, all tags can be uploaded at once using the menu selection "Reports" and selecting "Upload All Tag Reports."

Files can be saved in several configurations:

> • Save Reports as a Single File …
> • Save Reports as Separate Files …
> • Save Reports in Separate Tag Directories
…
The most powerful of these options is to Save in Separate Tag Directories, which creates a virtual file cabinet with a folder for each TAG. As calibrations continue and each TAG is calibrated multiple times, the data for these calibrations will be stored in the same tag directories. Each TAG data file name identifies the TAG ID and date and time of

calibration, so it's very easy to keep things organized and sorted out without using an extensive, expensive, and challenging database management program. On the flip side, if you do need to use a powerful calibration management tool, CSV files uploaded from the DMC-1400 can be easily imported into your database in most cases. By using Microsoft Excel, the CSV file can be used to create any type of custom calibration certificate or report needed.

A few of the other useful functions of the USV program are to clear the calibrator's memory of no longer needed calibration files. You can also open saved files from your hard drive for quick and easy viewing.
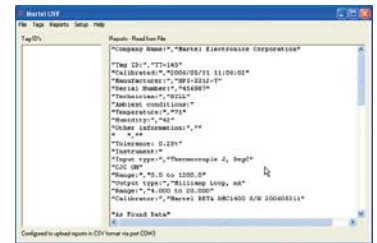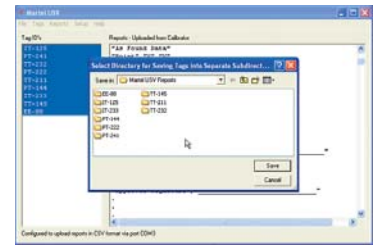
BetaGauge PI — Digital Test Gauge

The BetaGauge P. I. Digital Pressure Test Gauge takes the concept of an analog Test Gauge, and brings it to a new level, by combining the accuracy of digital technology with the simplicity of an analog gauge. It does this while achieving performance, ease-of-use, and a feature set unmatched in the pressure measurement world. Setup of the BetaGauge P. I. is fast and straightforward, through a menu-driven display, with minimal text, and intuitive functions, that is simple enough to allow the gauge to be used anywhere in the world, without the need for multilingual displays.

Features:

- Very high accuracy compared to analog test gauges; ±0.05% F. S.; temperature compensated accuracy over 0 to 50 °C
- Eight (8) standard pressure ranges
- Displays in 18 standard or fully custom engineering units
- Displays ambient temperature in °C or °F
- Large, back-lit, 5-1/2 digit display with 0.65" high digits and 20 segment bar graph
- Rugged stainless steel case meets NEMA 4/IP65
- RS232 port allows extraction of pressure readings for off-line analysis
- CSA intrinsically safe, Class 1, Div. 1
- CE approved
- Available with optional sanitary seal that meets 3A Standards per specification 37-01 for use in sanitary piping applications
- Available with optional 24 V external power input for permanent installations
- Available with optional protective rubber boot

M2001 — Bench Calibrator

The Martel M2001 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 M2001's world-class performance and features are accessed through a very simple-to-use, intuitive user interface. The Martel M2001 is truly a *process calibration laboratory in a box*!

Features:

- Superior calibration accuracy to 0.0025% of reading
- Direct keyboard entry or cursor entry with decade control
- Automatic standby function protects device under test
- Source current, voltage, T/C, RTD (Ohms)
- Read T/C, RTD and pressure
- Source/read 11 thermocouple types
- Source/read nine standard RTD types
- Custom RTD/SPRT profile
- Nine setpoints for each output range and type
- Tellurium-Copper binding posts reduce thermal EMFs to <1µV/V
- Local or RS232 remote control
- Optional IEEE-488 control available
- Compatible with Fluke Met/Cal® software
- Optional rack/panel mount kit available

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