Data Sheet

Process Multimeter
Model 394B

The 394B Process Multimeter combines the capabilities of a mA loop calibrator with a full-featured True RMS multimeter in one package.

Dedicated mA loop calibrator functions provide technicians and electricians with the tools required for testing and troubleshooting current loop applications in process control systems. Source and simulate industry standard 0-20 mA and 4-20 mA control loops using the adjustable DC current output. To evaluate process transmitters, the built-in power supply outputs 24 V while measuring the signal drive current displayed in mA and % of scale.

Additionally, the 394B serves as a general purpose multimeter delivering the performance required for evaluating a wide range of electronics and electrical systems.

When working in low-light environments, the auto on/off backlight adjusts for best visibility while maximizing battery life. Dual line display capabilities enable two measurements or one measurement and a math function to appear on screen simultaneously. PC software is provided for convenient measurement monitoring and recording from a computer connected to the meter's optical isolated USB interface.

Key Specifications	
Process Multimeter	
Current Output Ranges	0-20 mA or 4-20 mA, using internal batteries or external loop supply
Current Output Adjustment Modes	Slow ramp, fast ramp, 25% step
Loop Power Supply	> 24 V
250 Ω HART® Mode	✔
General Purpose Multimeter	
True RMS	✔ AC, AC+DC voltage and current
Basic DCV Accuracy	± 0.05%
Display	5 digit / 50,000 count

Features and benefits

Process

- Source/Measure/Simulate 0-20 mA and 4-20 mA DC current
- Simultaneously monitor mA and % of scale
- Adjustable manual and automatic output current ramp and step modes
- Built-in 24 V loop power supply for testing process transmitters eliminates the need for an external supply
- HART® mode inserts 250 Ω resistor in series with loop power output when evaluating devices using the HART communication protocol

General Purpose

- Measurement functions: DCV, ACV, AC+DC, DCI, ACI, resistance, frequency, continuity, diode test
- True RMS AC and AC+DC measurements
- 50,000-count, dual display
- dB, dBm, limits, peak-hold, REL (Δ), MIN, MAX, average math functions
- HFR (High Frequency Rejection) mode applies a low pass filter for AC measurements (800 Hz cut-off)
- Frequency measurement to 100 kHz
- Dirt and water-resistant housing with rubberized protective case
- Isolated USB interface with operating software for remote data logging
- CAT III 1000 V / CAT IV 600 V protection

Operation highlights

Optical isolated USB interface for PC connectivity

Auto on/off backlit display sensor

50,000 count resolution

Low pass filter to minimize high frequency noise

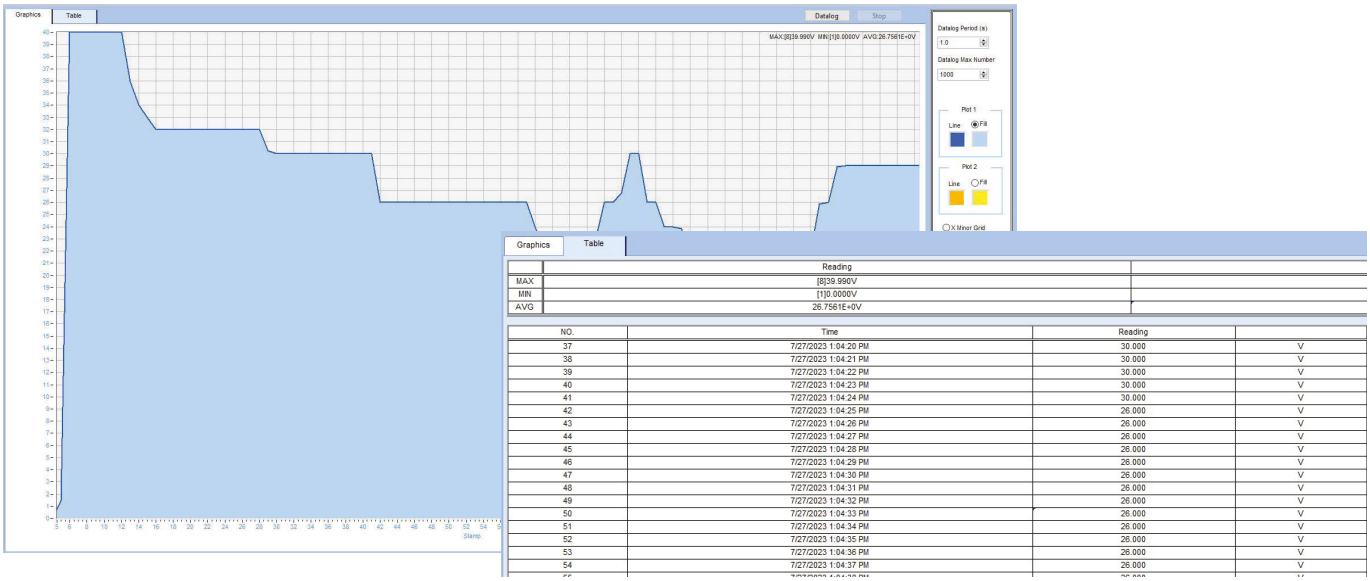
Quick manual range adjustment

True RMS AC and AC+DC

Adjustable manual and automatic output current

HART mode (adds 250 Ω resistor)

Provided application software



PC software is available for logging measurement data at specified intervals with date and time stamp. Log up to 100,000 data points in graph or table format. Measurement data recorded in the field can be imported using the software for analysis.

Specifications

Specifications are based on the following conditions/assumptions:

- Accuracy specifications: ± (% of reading + counts of least significant digit) at 23 °C ± 5 °C, with relative humidity less than 80% RH
- One year calibration cycle
- Temperature coefficient is 0.1 x (specified accuracy)/°C for T < 18 °C, T > 28°C
- AC voltage and AC current specifications are AC coupled, true RMS
- For non-sinusoidal waveforms:
  - Add 1.0% to AC accuracy specification for Crest Factor 1.4 to 2.0
  - Add 2.5% to AC accuracy specification for Crest Factor 2.0 to 2.5
  - Add 4.0% to AC accuracy specification for Crest Factor 2.5 to 3.0
- For best accuracy use REL (delta) function to compensate the offsets
- AC + DC accuracy: AC accuracy + DC accuracy + 1.0%
- HFR accuracy: AC accuracy + 1.0% for 40 Hz to 400 Hz.
- Overload protection: AC/DC 1000 V

Voltage

Function	Range	Accuracy
AC[1]	50.000 mV 500.00 mV	Sine wave: (0.7 + 20) for 40 Hz to 70 Hz (1.5 + 40) for 71 Hz to 10 kHz
	5.0000 V 50.000 V 500.00 V 1000.0 V[2]	Sine wave: (0.5 + 20) for 40 Hz to 70 Hz (1.5 + 40) for 71 Hz to 10 kHz (3.0 + 80) for 1001 Hz to 10 kHz
DC	50.000 mV	0.05 + 30
	500.00 mV 5.0000 V 50.000 V 500.00 V 1000.0 V	0.05 + 5

(1) Below 5% of AC range, add 20 digits to accuracy.
(2) The bandwidth of range is 40 Hz to 1 kHz

Notes:
- Input impedance: 10 MΩ, < 100 pF
- Min. resolution: 1 µV in 50 mV range

Current

Function	Range	Accuracy
AC[3]	50.000 mA 1.000 A	Sine wave: (1.0 + 20) for 40 Hz to 70 Hz (2.0 + 40) for 71 Hz to 10 kHz
DC	50.000 mA 1.000 A	0.05 + 5

(3) Below 5% of AC range, add 20 digits to accuracy.

Notes:
- Max. continuous measuring time: 10 minutes at mA input, 1 minute at A input
- Min. rest time: 20 minutes after continuous measuring
- Input impedance: 13 Ω at mA input and 0.1 Ω at A input
- Min. resolution: 1 µA in 50 mA range

Continuity

Range	Resolution	Test Current	Accuracy
500.00 Ω	0.01 Ω	1 mA	0.1 + 30

Notes:
- Max. open circuit voltage: 3.5 V
- Continuity threshold: < 30 Ω

Resistance

Range	Resolution	Test Current	Accuracy
500.00 Ω	0.01 Ω	1 mA	0.2 + 30
5.0000 kΩ	0.1 Ω	100 µA	0.2 + 10
50.000 kΩ	1 Ω	10 µA	
500.00 kΩ	10 Ω	1 µA	0.5 +10
5.0000 MΩ	100 Ω	100 nA	1.0 + 10
50.00 MΩ	10 kΩ	10 nA	2.0 + 10

Notes:
- Max. open circuit voltage: 3.5 V

Diode Test

Range	Resolution	Test Current	Accuracy
2.000 V	1 mV	± 1 mA	1.0 + 10

Notes:
- Max. open circuit voltage: ± 3.5 V

Frequency

Range	Resolution	Accuracy
500.00 Hz	0.01 Hz	± 3 digits
5.0000 kHz	0.1 Hz	
50.000 kHz	1 Hz	
100.00 kHz	10 Hz	

Notes:
- Min. frequency: 5 Hz

Specifications

Process Multimeter Functions / Current Output

Range	Accuracy	Resolution	Output Adjustment Modes	
			Ramp	Step
0 to 20 mA or 4 mA to 20 mA (overrange up to 24 mA)	± (0.05 + 5)	1 µA	Linear (slow), 0% to 100% and back to 0% in 40 s Linear (fast), 0% to 100% and back to 0% in 20 s	25% steps (coarse), 0% to 100%, 15 s for each step 25% steps (fine), 0% to 100%, 5 s for each step

General

394B		
Display		5 digit / 50,000 count
Measurement Speed		10 samples per second
Connectivity		IR-USB
Power		4 x 1.5 V AA size batteries
Battery Life (typical)		100 hours
Auto Power Off		Adjustable up to 20 minutes or never
Low Battery Indicator		✔
Overrange		OL is displayed
Temperature	Operating	14 °F to 122 °F (-10 °C to 50 °C) at ≤ 80% relative humidity
	Storage	-4 °F to 140 °F (-20 °C to 60 °C)
Safety		Low Voltage Directive (LVD) 2014/35/EU, EN61010-1, EN61010-2-30, 600 V CAT IV / 1000 V CAT III
Electromagnetic Compatibility		EMC Directive 2014/30/EU, EN61326-1:2013
Dimensions (W x H x D), without holster		3.8" x 8.2" x 2" (95 mm x 207 mm x 52 mm)
Weight		1.4 lbs (630 g)
Warranty		3 Years
Standard Accessories		Test leads, protective case, optical-isolated USB cable, magnetic hanging kit, alkaline batteries

Process Multimeter Functions / Loop Power

Range	Accuracy	Drive Capability	
		Normal	250 Ω HART
50 mA	± (0.05 + 5)	30 V / 1.25 kΩ	24 V / 1 kΩ

Included Accessories

These multimeters include test leads, magnetic hanger strap, and USB communication cable.

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B&K Precision group member Independent service center Service center location

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