



## MCEMAX™ Product Information

### M-Series 5kV Electric Motor Analyzer



- Portable and battery powered
- Monitors Power Circuit, Insulation, Stator, Rotor, and Air Gap
- Variable test voltage from 250 to 5000V
- Automatic IR, PI, DAR, and Step Voltage Tests
- Measures insulation resistance to 3 TΩ
- Precision resistance with resolution to 10 μΩ using a 4-wire bridge test measurement
- Measures capacitance (pF) and inductance (mH)
- Six channel simultaneous acquisition
- Torque and efficiency analysis
- Impedance and phase angle measurement
- Power and current signature tests

## Description

The MCEMAX™ Motor Circuit Evaluation test equipment offers the most versatile approach to troubleshooting and trending de-energized electric motors on the market today.

It is equipped with a fully functional laptop computer and loaded with MCEGold, the gold standard in motor management software.

With MCEGold the entire test history of your electric motor along with the latest in acceptance criteria from IEEE and NEMA is at your fingertips. Immediately following the test, Red or Yellow color-coded alarms identify any test data that is outside the acceptance criteria.

The MCEMAX™ provides dynamic and static testing for all types of motors and generators including AC Induction, Synchronous, Wound Rotor, and DC motors.

Whether your motor is running or shutdown, the MCEMAX™ can provide a health assessment of the six fault zones.

The MCEMAX™ evaluates:

- Incoming **Power Quality** and alerts the user if the distortion or harmonic content exceeds IEEE limits.
- Cables and **Power Circuit** to verify the severity of a high resistance connection.
- Ground **Insulation** for deterioration,
- **Stator** turn insulation for shorts/opens.
- **Rotor** cage for breaks and shorted iron.
- **Air Gap** for non-symmetry or eccentricity.

The case is made of ultra high impact ABS material for ruggedness. It is easy to carry and no AC power is required, making tough to reach motors or starters easier to test.

Data Includes:

- Phase-to-Phase Resistance
- Phase-to-Phase Inductance
- Balance of Resistance
- Balance of Inductance
- Ground Capacitance
- Polarization Index
- Dielectric Absorption Ratio
- Measured Ground Resistance
- Corrected Ground Resistance
- Rotor Influence check
- DC Field Inductance
- DC Field Resistance
- DC Field Capacitance
- DC Field Ground Resistance
- DC Armature Tests
- Synchronous Motor Tests
- Wound Rotor Motor Tests
- Current Spectral Analysis
- High Frequency Eccentricity Analysis
- Three Phase In-Rush/Start-Up
- Phase-to-Phase and Line-to-Neutral Voltage
- Voltage Imbalance
- Crest Factor
- Total Harmonic Distortion (THD)
- % Full Load Amps
- Phase Current RMS
- Phase Impedance
- Impedance Imbalance
- Power (KW, KVA, KVAR)
- Power Factor
- Efficiency
- Energy Cost Analysis
- Output Power
- Torque

**Ground Resistance Test Voltages:**

250-5000 V in 50 V steps

\*250-1000 V in 50 V steps

Range (Accuracy):

20 K $\Omega$  to 100 M $\Omega$  @250-500v ( $\pm 2\%$ )

100 M $\Omega$  to 1 G $\Omega$  @250-5000v ( $\pm 2.5\%$ )

1 G $\Omega$  to 220 G $\Omega$  @500-5000v ( $\pm 5\%$ )

220 G $\Omega$  to 1000 G $\Omega$  @1kV-5kV ( $\pm 5\%$ )

1 T $\Omega$  to 3 T $\Omega$  @1kV-5kV ( $\pm 20\%$ )

Short circuit/charge current:

2 mA

**Capacitance Measurement:**

Range (Accuracy):

1000 to 220,000 pF @1200 Hz ( $\pm 5\%$ )

220,000 to 1,000,000 pF @300 Hz ( $\pm 5\%$ )

Resolution:

250 pF

**Inductance Measurement:**

Range (Accuracy@1200 Hz):

.05mH to 250mH ( $\pm 1\%$ )

Range (Resolution):

.05mH to <50mH (.01mH)

50mH to <100mH (.05mH)

100mH to 250mH (.1mH)

Range (Accuracy @300 HZ):

220mH to <700mH ( $\pm 1\%$ )

700mH to 2000mH ( $\pm 2\%$ )

>2000mH to 5000mH ( $\pm 5\%$ )

Resolution:

.1mH to 25mH

**Resistance Measurement:**

Range (Accuracy):

100  $\mu\Omega$  to 2000  $\Omega$  ( $\pm 1\%$ )

Range (Resolution):

.00010 $\Omega$  to .02000 $\Omega$  (.00001 $\Omega$ )

.0200 $\Omega$  to 2.000 $\Omega$  (.0001 $\Omega$ )

2.00 $\Omega$  to 50.0 $\Omega$  (.001 $\Omega$ )

50.00 $\Omega$  to 1000.00 $\Omega$  (.01 $\Omega$ )

1000.0 $\Omega$  to 2000.0 $\Omega$  (.1 $\Omega$ )

**Voltage Measurement:**

AC Voltage 0-1000 Vrms  
Direct line  $\pm 1\%$  (10 to 100% of range)  
Secondary line  $\pm 1\%$  + PT error (10 to 100% of range)  
MTAP Leads 0-35 VAC  $\pm 1\%$  +PT error (10 to 100% of range)

DC Voltage 0-1000 Vpeak(qualitative only)

**Current Measurement AC/DC:**

$\pm 0.5\%$  of input ( $\pm$  accuracy of the probes)

**Standard Current Probes:**

PdMA 2128.14  
 $\pm 1\%$ (of reading)  $\pm 0.1\text{mV}$  from 1 to 12A  
@100mV/A  
 $\pm 1\%$ (of reading)  $\pm 2\text{mV}$  from 10 to 80A  
@10mV/A  
 $\pm 2.5\%$ (of reading)  $\pm 2\text{mV}$  from 100 to 150A  
@10mV/A

**Power Measurement:**

THD/HVF/ Spectrum – 50<sup>th</sup> harmonic

**Current Spectrum Analysis:**

8,000 lines resolution

**In-Rush/Start-Up Test:**

Sampling rate 3,600/second  
Test duration 1 minute

**Rotor Evaluation test:**

Sampling rate 960/second  
Fmax 0-480 Hz  
Resolution 8,000 lines

**Eccentricity and Power Test:**

Sampling rate 12,288/second  
Fmax 0-6,000 Hz  
Resolution 8,000 lines

**Dimension:**

18.5x14.5x6 in. (46.99x36.83x15.24 cm)

**Weight:**

26 lbs (11.79 kg)

**Test Lead Set:**

10 ft. (3.05 m.) MCE Test Leads  
10 ft. (3.05 m.) fused voltage leads for 3 phases and ground  
10 ft. (3.05 m) current probe cable connects 3 probes via BNC connector  
Voltage probe accessory kit:  
Three 6 ft. (1.83 m.) current probes for three phases

**Computer Voltage Input:**

AC 100-240 V, 50/60 Hz (computer)

**Environmental**

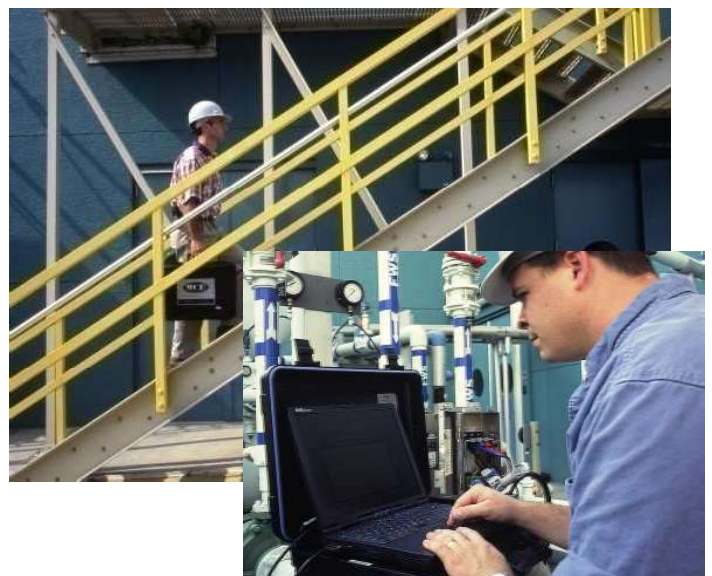
Operating Temperature:  
32°F to 95°F (0°C to 35°C)

Storage Temperature:  
-40°F to 149°F (-40°C to 65°C)

Operating Humidity:  
10% - 90% (non-condensing)

Storage Humidity:  
5% - 95% (non-condensing)

Accuracies to within the specified +/- % accuracy or +/- two resolution steps whichever is greater. Note: Lowest range Inductance/Resistance (+/- 1 %) or Inductance (+/- 50 $\mu\text{H}$ )/Resistance (+/- 4 $\mu\Omega$ ), whichever is greater.



Lightweight Portable Electric Motor Analyzer



**GENERAL DESCRIPTION**

The SR Probe is designed for use in industrial environments. The ergonomic design allows it to easily attach to cables or small bus bars. The “circular” jaws guarantee a very good accuracy and low phase shift.



**ELECTRICAL SPECIFICATIONS**

**Operating Range:** 0.1 to 1000A

**Measurement Range:**

100 mA to 1200 Arms

**Output Signal:** mV output signal (2V peak max)

3 range switch selectable on handle

100mV/A: 10mA to 10A

10mV.A: 0.1A to 100A

1mV/A: 1A to 1000A

**Accuracy and Phase Shift:**

**Load impedance:** 1MΩ @ 47pF

**Range:** 1mV/A (1V at 1000A)

Primary Current	1A to 10A	10A to 100 A	100A to 1000A
Accuracy	≤1% ± 0.5mV	≤0.5 %± 0.5mV	≤ 0.2% ± 0.5mV
Phase Shift	≤3°	≤2°	≤1°

**Overload:** 1200A for 5 min ON

**Range:** 10mV/A (1V at 100A)

Primary Current	0.1A to 1A	1A to 10 A	10A to 100A
Accuracy	≤ 1% ± 2mV	≤0.5% ± 2mV	≤ 0.5% ± 1mV
Phase Shift	N/A	≤3°	≤2°

**Overload:** 120A continuous

**Range:** 100mV/A (1V at 10A)

Primary Current	0.01A to 0.1A	0.1A to 1 A	1A to 10A
Accuracy	≤ 1%± 10mV	≤0.5%± 10mV	≤ 0.5%± 10mV
Phase Shift	N/A	≤6°	≤3°

**Overload:** 12A continuous

\*Reference conditions: 23°C ±3°K, 20 to 75% RH, 48 to 65 Hz, external magnetic field < 40 A/m, no DC component, no external current carrying conductor, test sample centered. Load impedance 1Ω/47pF.

**Limit Operating Conditions:** 48Hz to 1kHz; Frequency derating beyond 1 kHz - I max δ 1000 A x 2/f (in kHz).

**Working Voltage:** 600V Cat. III

**Influence of Adjacent Conductor:** < 1mA/A AC

**Influence of Conductor Position in Jaw Opening:**

0.1% of reading under 400Hz

**Influence of Frequency:**

From 30 to 48 Hz: <1% of R

From 65 to 1000 Hz: <0.5% of R

From 1 kHz to 5kHz: <1% of R

**MECHANICAL SPECIFICATIONS**

**Dimensions:** 4.37 x 8.50 x 1.77" (111 x 216 x 45 mm)

**Weight:** 1.21 lbs (550 g)

**Jaw Opening:** 2.25" (57 mm) max

**Maximum Conductor Size:** 2.05" (52 mm)

**Maximum Bus Bar size:** One 1.95 x .19" (50 x 5 mm)

**Drop Test:** 1 m (IEC 68-2-32)

**Mechanical Shock:** 100 g (IEC 68-2-27)

**Vibration:** 5 to 15 Hz, 0.15 mm (IEC 68-2-6)

15 to 25 Hz, 1 mm

25 to 55 Hz, 0.25 mm

**Polycarbonate Material:**

Jaws - Polycarbonate Red UL 94 V0

Case - Polycarbonate ABS Grey: UL 94 V0

**Output:**

6 ft (2m) insulated lead with insulated BNC Connector

**ENVIRONMENTAL SPECIFICATIONS**

**Operating Temperature:** -14° to 122°F (-10° to +50°C)

**Storage Temperature:** -4° to 158°F (-20° to +70°C)

**Altitude:** Non-operating: 0 to 12,000 m

Operating: 0 to 2000 m

**Operating Relative Humidity:**

0 to 85% @ at 35°C

**Influence of Temperature:**

<0.15% per 10°K

**Influence of Humidity (10 to 90% RH):**

10 to 90% : 0.1%

**SAFETY SPECIFICATIONS**

**Electrical:**

Double insulation or reinforced insulation between the primary or secondary and the outer case of the handle conforms to IEC 1010-2-32.

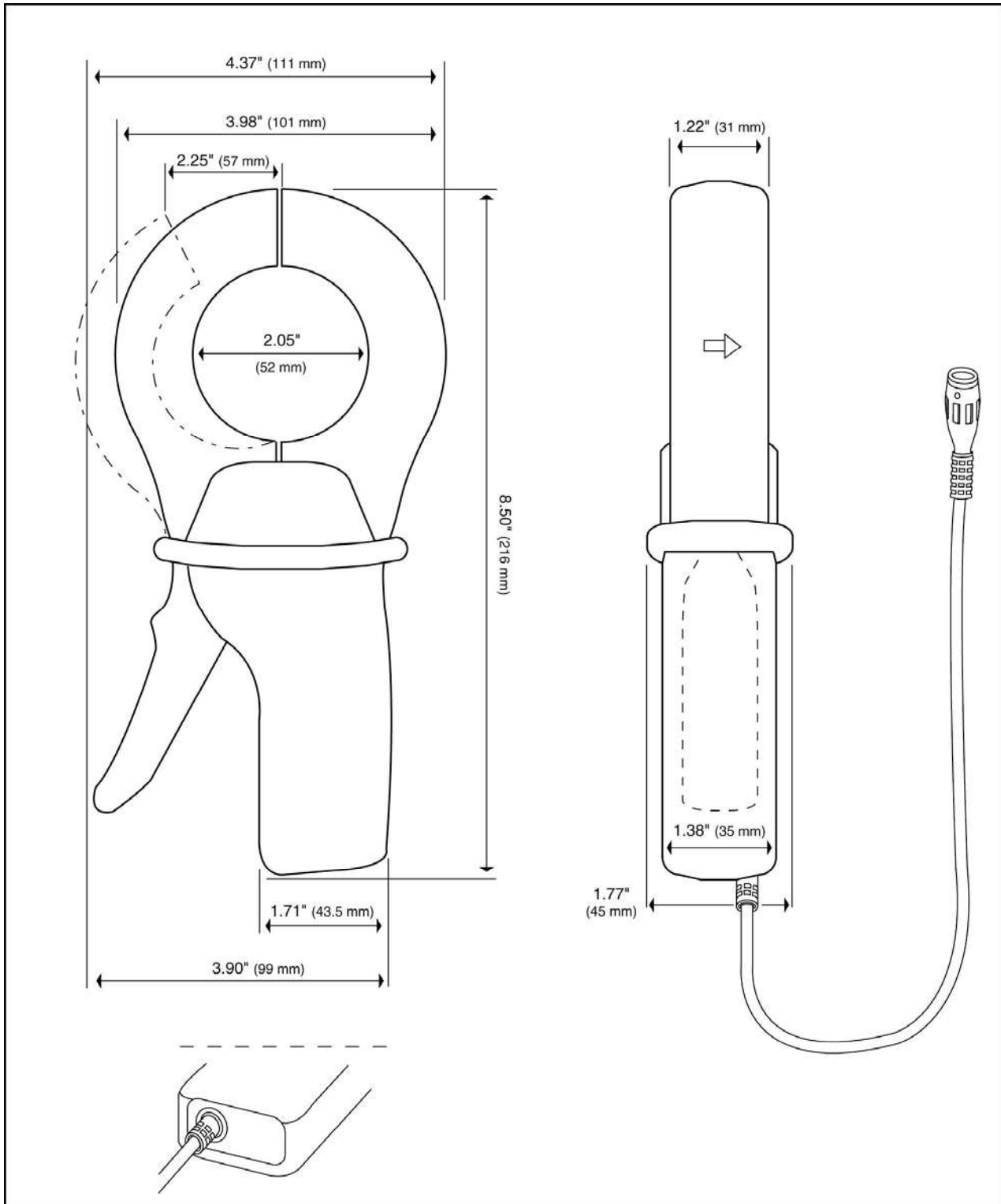
600V Cat. III, Pollution Degree 2



**ORDERING INFORMATION**

**PdMA Current Probe SR 10A; 00A;1000A..... ASY #2128.13**

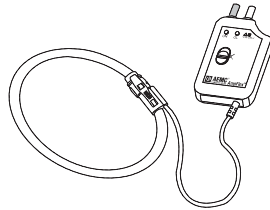
**Packaging:** Plain white box with white litho label





**GENERAL DESCRIPTION**

The AmpFlex® is a flexible AC current transformer compose of a flexible sensor and an electronic module. The unit has proportional mV output for direct readings on DMM, loggers or oscilloscope.



**ELECTRICAL SPECIFICATIONS**

**Current Range:** 300/3000A

**Measurement Range:** 5 to 3000A

**Output Signal:** 10mV/A; 1mV/A

**Crest Factor:** ≤ 6

**Accuracy:** 1% of Reading ± 200mA

**Phase Shift:** < 0.7° at 50 or 60Hz

*\*Reference conditions: 23°C ± 3°K, 20 to 70% RH, 50 Hz, 1 minute warm-up, battery at 9V ± 0.1 V, external magnetic field <40A/m, no DC component, no external current carrying conductor, 10 MΩ load, conductor center.*

**Residual Noise:** 200mA

**Frequency Range:** 40 to 20kHz (-3dB with current derating)

**Working Voltage:** 1000V Cat. III, 600V Cat. IV

**Influence of Adjacent Conductor:** <2%

**Influence of Conductor Position:** 4% max

**Influence of Frequency:** Add 1% to the reference accuracy between 40 to 2000Hz and up to 5% 15 to 20kHz

**Common Mode Rejection:** 100dB typical, 80dB min

**Overload Indication:** Red LED ON indicates the selected range is overloaded. Module output may not reflect the actual measurement.

**Power Source:** 9V alkaline (NEDA 1604A, IEC 6LR61)

**Battery Life:** Useable from 9V to 7V, 150 hrs typical (continuous use)

**Low Battery:** Green LED Off when battery voltage ≥ 7V, LED blinks when battery voltage is low

**MECHANICAL SPECIFICATIONS**

**Dimensions (Module):** 4.9 x 2.5 x 1.1" (124 x 64 x 28mm)

**Weight (Module):** 24" with battery: 0.74 lb

**Dimensions (Sensor):** 24", ± 1"

**Weight (Sensor):** 10.8 oz (302g)

**Drop Test:** Per IEC 68-2-32

**Vibration:** Per IEC 68-2-6

**Mechanical Shock:** Per IEC 68-2-27

**Weatherproofing:** Module: IP40 (EN 60529)  
Sensor: IP 45 (EN60529)

**Connection Cable Length (sensor to module):** 6.5 ft (2m)

**Material:**

Module - Polycarbonate Dark Grey UL 94 V2

Sensor Latch - Lexan 500R, UL 94 V0

Cable Assembly to Sensor – 1000V UL 94 V0

**Output:**

6 ft (2m) insulated lead with insulated BNC Connector

**ENVIRONMENTAL SPECIFICATIONS**

**Operating Temperature:** 14° to 131°F (10° to +55°C)

**Storage Temperature:** -40° to 158°F (-40° to +70°C)

**Altitude:** Non-operating: 0 to 12,000 m  
Operating: 0 to 2000 m

**Operating Relative Humidity:**

18° to 65°F (10 to 30°C); 85 ± 5% RH (without condensation)

72° to 90°F (40 - 50°C); 45 ± 5% RH (without condensation)

**Influence of Temperature:**

Module: -18° to 99°F (-10° to 55°C); 0.15% per 18°F (10°C) typical, 0.5%

Sensor: -18° to 162°F (-10° to 90°C); 0.15% per 18°F (10°C) typical, 0.5%

**Influence of Humidity:**

10 to 90% RH: 0.2% typical, 0.5% maximum

**SAFETY SPECIFICATIONS**

**Electrical:**

Double insulation or reinforced insulation between the primary or secondary and the outer case of the handle conforms to EN 61010.

1000V Cat. III, 600V Cat. III

Pollution Degree 2



**ORDERING INFORMATION**

**PdMA AmpFlex® 24IN 300/3000A ..... ASY #2128.15**

**Packaging:** Plain white box with white litho label

