

# CURRENT MEASUREMENT PROBES

## MH SERIES

### MODEL MH60

*Designed to measure AC and DC currents using dual Hall effect and transformer technology at frequencies to 1 MHz*

*Self-powered directly from oscilloscope or line-power via line-adaptor*



### SPECIFICATIONS

| MODEL                       | MH60                                                                                                      |
|-----------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>ELECTRICAL</b>           |                                                                                                           |
| Nominal Range               | 100 Aac/dc (140 A peak)                                                                                   |
| Measurement Range           | 500 mA to 100 Aac / 100 Adc                                                                               |
| Transformation Ratio        | Voltage Output                                                                                            |
| Output Signal               | 10 mV/A (1 Vac/dc @ 100 A)                                                                                |
| Phase Shift                 | $\leq 1^\circ$                                                                                            |
| Overload                    | 150 A Continuous                                                                                          |
| Frequency Range (@ -3 dB)   | DC to 1 MHz                                                                                               |
| Load Impedance              | 0.25 m $\Omega$ (at 400 Hz)<br>0.628 m $\Omega$ (at 1 MHz)<br>In RF: 0.1 $\mu$ H for a primary transition |
| Common Mode Voltage         | (600 V Max)<br>At 50 Hz: 3.5 mA / 5 mA @ 100 V<br>At 400 Hz: 25.9 mA / 50 mA @ 100 V                      |
| Power Supply                | Internal NiMH rechargeable battery;<br>5 Vdc external via female micro-USB Type B connection              |
| Battery Life                | 8 h typical with fully-charged battery                                                                    |
| Output Termination          | 6.6 ft (2 m) lead with molded isolated male BNC connector                                                 |
| <b>MECHANICAL</b>           |                                                                                                           |
| Maximum Conductor Size      | $\varnothing$ 1.02 in (26 mm)                                                                             |
| Dimensions                  | (5.43 x 1.92 x 1.10) in (138 x 49 x 28) mm                                                                |
| Weight                      | Approximately 7.05 oz (200 g)                                                                             |
| Material                    | Polycarbonate UL 94                                                                                       |
| <b>ENVIRONMENTAL</b>        |                                                                                                           |
| Operating Temperature       | (14 to 122) °F (-10 to 50) °C                                                                             |
| Storage Temperature         | (-4 to 122) °F (-20 to 50) °C                                                                             |
| Operating Relative Humidity | Up to 85 % RH decreasing linearly above 95 °F (35 °C)                                                     |
| <b>SAFETY</b>               |                                                                                                           |
| CE Mark                     | Yes                                                                                                       |
| Double Insulation           | Yes                                                                                                       |
| Ingress Protection          | IP40 (EN 60529)                                                                                           |
| Safety Rating               | EN 61010-1<br>EN 61010-2-31<br>600 V CAT II, 300 V CAT III<br>Pollution Degree 2                          |



### FEATURES

- Clamping diameter 1.02 in (26 mm)
- Measurement range from (0.5 to 100) Amps AC, 100 Amps DC
- Measures AC and DC signals
- 10 mV/A output
- Automatic compensation for earth's magnetic influence
- Battery Power (8 hour battery life) or USB continuous
- Frequency response from DC to 1 MHz
- Selectable 3 kHz or 30 kHz filter selection
- Push button zero adjust
- LED indicators for power, overload and filter selection
- UL 94 V2 self-extinguishing case material

| CATALOG NO. | DESCRIPTION                                        |
|-------------|----------------------------------------------------|
| 2153.03     | AC/DC Current Probe Model MH60 (100 A, 1 MHz, BNC) |



# CURRENT MEASUREMENT PROBES

## GENERAL PURPOSE PROBES SELECTION CHART

| Series                                                                              | Model  | Ratio  | Measurement Range               |                               | Output Signal |                                                        | Phase Shift** | Maximum Conductor Size             |                                 | Output Connection | Catalog No. |
|-------------------------------------------------------------------------------------|--------|--------|---------------------------------|-------------------------------|---------------|--------------------------------------------------------|---------------|------------------------------------|---------------------------------|-------------------|-------------|
|                                                                                     |        |        | AC                              | DC                            | Current       | Voltage                                                |               | Ø Cable                            | Bus Bar                         |                   |             |
|    | MN01   | 1000:1 | (2 to 150) A                    | —                             | 1 mA/A*       | —                                                      | N/A           | 0.39 in (10 mm)                    | N/A                             | Leads             | 2129.17     |
|                                                                                     | MN02   | 1000:1 | 50 mA to 100 A<br>50 mA to 90 A | —                             |               | —                                                      | N/A           | 0.39 in (10 mm)                    | N/A                             | Leads             | 2129.20     |
|                                                                                     | MN05   | —      | 5 mA to 10 A<br>(1 to 100) A    | —                             | —             | 1 mV/mA<br>1 mV/A                                      | N/A           | 0.39 in (10 mm)                    | N/A                             | Leads             | 2129.19     |
|                                                                                     | MN09   | —      | (1 to 150) A                    | —                             | —             | 100 mV <sub>DC</sub> /A <sub>AC</sub>                  | N/A           | 0.39 in (10 mm)                    | N/A                             | Leads             | 2129.21     |
|    | MN103  | —      | 1 mA to 10 A<br>(1 to 100) A    | —                             | —             | 1 mV/mA<br>1 mV/A                                      | N/A           | 0.47 in (12 mm)                    | N/A                             | Leads             | 1031.02     |
|                                                                                     | MN114  | —      | 1 mA to 10 A                    | —                             | —             | 100 mV/A                                               | < 8 °         | 0.47 in (12 mm)                    | N/A                             | Leads             | 2110.71     |
|                                                                                     | MN185  | 1000:1 | 50 mA to 120 A                  | —                             | 1 mA/A        | —                                                      | < 3.5 °       | 0.47 in (12 mm)                    | N/A                             | Jacks             | 100.185     |
|  | MN255  | —      | (0.1 to 24) A<br>(0.1 to 240) A | —                             | —             | 100 mV/A<br>10 mV/A                                    | < 2.5 °       | 0.78 in (20 mm)                    | N/A                             | Leads             | 2115.81     |
|                                                                                     | MN261  | —      | (0.1 to 24) A<br>(0.5 to 240) A | —                             | —             | 100 mV/A<br>10 mV/A                                    | < 6 °         | 0.78 in (20 mm)                    | N/A                             | BNC               | 2115.82     |
|                                                                                     | MN291  | —      | (0.5 to 240) A                  | —                             | —             | 100 mV <sub>DC</sub> /A <sub>AC</sub>                  | N/A           | 0.78 in (20 mm)                    | N/A                             | Leads             | 2115.84     |
|                                                                                     | MN307  | —      | 10 mA to 12 A                   | —                             | —             | 100 mV/A                                               | < 2.5 °       | 0.78 in (20 mm)                    | N/A                             | Leads             | 2116.23     |
|                                                                                     | MN312  | 1000:1 | (0.1 to 200) A                  | —                             | 1 mA/A*       | —                                                      | < 2.5 °       | 0.78 in (20 mm)                    | N/A                             | Jacks             | 2116.24     |
|                                                                                     | MN352  | —      | (0.1 to 150) A                  | —                             | —             | 10 mV/A                                                | < 2.5 °       | 0.78 in (20 mm)                    | N/A                             | Jacks             | 2116.26     |
|                                                                                     | MN353  | —      |                                 | —                             |               |                                                        | < 2.5 °       | 0.78 in (20 mm)                    | N/A                             | Leads             | 2116.27     |
|                                                                                     | MN373  | —      | (0.1 to 24) A<br>(0.1 to 200) A | —                             | —             | 1000 mV/A<br>10 mV/A                                   | < 3 °         | 0.78 in (20 mm)                    | N/A                             | Leads             | 2116.28     |
|                                                                                     | MN375  | —      | (0.1 to 10) A                   | —                             | —             | 100 mV/A                                               | < 1.5 °       | 0.78 in (20 mm)                    | N/A                             | Leads             | 2115.41     |
|                                                                                     | MN379  | —      | 5 mA to 6 A<br>(0.1 to 120) A   | —                             | —             | 200 mV/A<br>10 mV/A                                    | < 4 °         | 0.78 in (20 mm)                    | N/A                             | Leads             | 2153.01     |
|                                                                                     | MN379T | —      | 5 mA to 6 A<br>(0.1 to 120) A   | —                             | —             | 200 mV/A<br>10 mV/A                                    | < 4 °         | 0.78 in (20 mm)                    | N/A                             | Lead w/ BNC       | 2153.02     |
|  | SL206  | —      | 10 mA to 1.5 A<br>50 mA to 60 A | 10 mA to 2 A<br>50 mA to 80 A | —             | 1 mV/mA <sub>AC</sub> /DC<br>10 mV/A <sub>AC</sub> /DC | < 1 °         | 0.46 in (12 mm)                    | N/A                             | Leads             | 1201.45     |
|  | MD301  | 1000:1 | (2 to 500) A                    | —                             | —             | 1 mV <sub>DC</sub> /A <sub>AC</sub>                    | N/A           | 1.18 in (30 mm)<br>(2 x 500) kcmil | (2.48 x 0.20) in<br>(63 x 5) mm | Leads             | 1201.07     |

\*Output Protection for open secondary

\*\*Phase shift indicated at maximum rating

Note: Models MN103, MN106, MN114 & MN185 are not CE compliant. MN200 & MN300 series are UL approved except MN379.

Consult factory for NIST Calibration price.



# CURRENT MEASUREMENT PROBES

## GENERAL PURPOSE PROBES SELECTION CHART

| SERIES                                                                              | MODEL | RATIO  | MEASUREMENT RANGE                 |                                   | OUTPUT SIGNAL |                   | PHASE SHIFT**      | MAXIMUM CONDUCTOR SIZE |                                         | OUTPUT CONNECTION | CATALOG NO. |
|-------------------------------------------------------------------------------------|-------|--------|-----------------------------------|-----------------------------------|---------------|-------------------|--------------------|------------------------|-----------------------------------------|-------------------|-------------|
|                                                                                     |       |        | AC                                | DC                                | CURRENT       | VOLTAGE           |                    | Ø CABLE                | BUS BAR                                 |                   |             |
|    | MR415 | —      | (0.5 to 400) A                    | (0.5 to 600) A                    | —             | 1 mV/A            | ≤ 1.5 °            | 1.18 in (30 mm)        | 2 bus bar (1.24 x 0.39) in (31 x 10) mm | 5 ft (1.5 m) Lead | 1200.80     |
|                                                                                     | MR416 | —      | (0.5 to 40) A<br>(0.5 to 400) A   | (0.5 to 60) A<br>(0.5 to 600) A   | —             | 10 mV/A<br>1 mV/A | ≤ 2.2 °<br>≤ 1.5 ° | 1.53 in (39 mm)        | 2 bus bar (1.95 x 0.19) in (50 x 5) mm  | 5 ft (1.5 m) Lead | 1200.82     |
|                                                                                     | MR526 | —      | (0.5 to 100) A<br>(0.5 to 1000) A | (0.5 to 150) A<br>(0.5 to 1400) A | —             | 10 mV/A<br>1 mV/A | ≤ 2 °<br>≤ 1.5 °   | 1.53 in (39 mm)        | 2 bus bar (1.95 x 0.19) in (50 x 5) mm  | 5 ft (1.5 m) Lead | 1200.83     |
|    | SR601 | 1000:1 | (0.1 to 1200) A                   | —                                 | 1 mA/A*       | —                 | < 0.5 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Jacks             | 2113.43     |
|                                                                                     | SR604 | 1000:1 | (0.1 to 1200) A                   | —                                 | 1 mA/A*       | —                 | < 0.5 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Leads             | 2113.44     |
|                                                                                     | SR651 | —      | (0.1 to 1200) A                   | —                                 | —             | 1 mV/A            | < 0.5 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Jacks             | 2113.45     |
|                                                                                     | SR701 | 1000:1 | 1 mA to 1000 A                    | —                                 | 1 mA/A*       | —                 | < 0.7 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Jacks             | 2116.29     |
|                                                                                     | SR704 | 1000:1 | 1 mA to 1000 A                    | —                                 | 1 mA/A*       | —                 | < 0.7 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Leads             | 2116.30     |
|                                                                                     | SR752 | —      | (0.1 to 1000) A                   | —                                 | —             | 1 mV/A            | < 0.7 °            | 2.05 in (52 mm)        | (1.95 x 0.19) in (50 x 5) mm            | Leads             | 2116.32     |
|  | K100  | —      | 0.1 mA to 3 A                     | 0.05 mA to ± 4.5 A                | —             | 1 mV/mA           | N/A                | 0.18 in (4.5 mm)       | N/A                                     | Plugs             | 1200.67     |
|                                                                                     | K110  | —      | (0.1 to 300) mA                   | (0.05 to ± 450) mA                | —             | 10 mV/mA          | N/A                |                        | N/A                                     | Plugs             | 2111.73     |
|  | LM102 | 1000:1 | 50 mA to 200 A                    | —                                 | 1 mA/A*       | —                 | < 3 °              | 0.63 in (16 mm)        | N/A                                     | Leads             | 2153.04     |
|                                                                                     | LM103 | —      | (0.1 to 200) A                    | —                                 | —             | 1 mV/A            | < 3 °              |                        | N/A                                     | Leads             | 2153.05     |

\*Output Protection for open secondary

\*\*Phase shift indicated at maximum rating

Note: All SR probes listed on this chart are UL approved, however not all SR series probes are UL approved; please consult factory. Consult factory for NIST Calibration price.



## OUTPUT TERMINATIONS

### Lead with BNC

Insulated 6.5 ft (2 m) coaxial cable with insulated BNC connector rated 600 Vrms



### Jacks

Two standard safety banana jacks (4 mm)



### Leads

Double/reinforced 5 ft (1.5 m) leads with 4 mm safety banana plug



### Shrouded Banana Plugs

Two 4 mm safety banana plugs; standard ¾ in (19 mm) spacing



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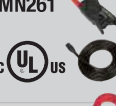
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# AMPFLEX® AND MINIFLEX® PROBES - SELECTION CHARTS

| SERIES                                                                            | MODEL             | RATIO | MEASUREMENT RANGE           | OUTPUT SIGNAL                        | MAXIMUM CONDUCTOR SIZE | CATALOG NO. |
|-----------------------------------------------------------------------------------|-------------------|-------|-----------------------------|--------------------------------------|------------------------|-------------|
|  | MF 300-10-2-10-HF | —     | 30 A / 300 A                | 100 mV/A, 10 mV/A                    | 2.95 in (75 mm)        | 2126.84     |
|                                                                                   | MF 3000-14-1-1-HF | —     | 3000 A                      | 1 mV/A                               | 3.93 in (100 mm)       | 2126.86     |
|  | MA114             | —     | 3 A / 30 A / 300 A / 3000 A | 1 mV/mA, 100 mV/A<br>10 mV/A, 1 mV/A | 4 in (101 mm)          | 2153.41     |
|  | 300-24-2-10       | —     | 30 A / 300 A                | 100 mV/A, 10 mV/A                    | 7.48 in (190 mm)       | 2112.88     |
|                                                                                   | 1000-24-1-1       | —     | 1000 A                      | 1 mV/A                               | 7.48 in (190 mm)       | 2112.39     |
|                                                                                   | 1000-24-2-1       | —     | 100 A / 1000 A              | 10 mV/A, 1 mV/A                      | 7.48 in (190 mm)       | 2112.98     |
|                                                                                   | 1000-36-2-1       | —     | 100 A / 1000 A              | 10 mV/A, 1 mV/A                      | 11 in (280 mm)         | 2113.00     |
|                                                                                   | 3000-24-1-1       | —     | 3000 A                      | 1 mV/A                               | 7.48 in (190 mm)       | 2112.46     |
|                                                                                   | 3000-36-1-1       | —     | 3000 A                      | 1 mV/A                               | 11 in (280 mm)         | 2112.48     |
|                                                                                   | 3000-24-2-1       | —     | 300 A / 3000 A              | 10 mV/A, 1 mV/A                      | 7.48 in (190 mm)       | 2113.05     |
|                                                                                   | 3000-48-2-1       | —     | 300 A / 3000 A              | 1 mV/A                               | 15 in (381 mm)         | 2112.01     |
|                                                                                   | 6000-36-2-0.1     | —     | 600 A / 6000 A              | 1 mV/A, 0.1 mV/A                     | 11 in (280 mm)         | 2113.21     |
|                                                                                   | 30000-24-2-0.1    | —     | 3000 A / 30,000 A           | 1 mV/A, 0.1 mV/A                     | 7.48 in (190 mm)       | 2113.33     |
|  | 24-3001           | —     | 300 A / 3000 Aac            | 10 mV/A, 1 mV/A                      | 7.48 in (190 mm)       | 2120.81     |

Consult factory for NIST Calibration price

## OSCILLOSCOPE & BNC TERMINATED PROBES

| MODEL                                                                                                   | MEASUREMENT RANGE                                |                                   | OUTPUT SIGNAL<br>VOLTAGE      | PHASE<br>SHIFT*    | MAXIMUM CONDUCTOR SIZE |                                               | OUTPUT<br>CONNECTION          |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------|-------------------------------|--------------------|------------------------|-----------------------------------------------|-------------------------------|
|                                                                                                         | AC                                               | DC                                |                               |                    | Ø CABLE                | BUS BAR                                       |                               |
| <br>SL261            | 100 mA to 10 A<br>(1 to 100) A                   |                                   | 100 mV/A<br>10 mV/A           | < 1.5 °            | 0.46 in<br>(12 mm)     | N/A                                           | 6.5 ft (2 m)<br>Lead<br>w/BNC |
| <br>MN261            | (0.1 to 24) A<br>(0.5 to 240) A                  | —                                 | 100 mV/A<br>10 mV/A           | < 2.5 °            | 0.78 in<br>(20 mm)     | N/A                                           | 6.5 ft (2 m)<br>Lead<br>w/BNC |
| <br>SR661            | (0.1 to 12) A<br>(0.1 to 120) A<br>(1 to 1200) A | —                                 | 100 mV/A<br>10 mV/A<br>1 mV/A | < 1 °              | 2.05 in<br>(52 mm)     | (1.96 x 0.19) in<br>(50 x 5) mm               | 6.5 ft (2 m)<br>Lead<br>w/BNC |
| <br>MN251T<br>MN379T | (0.5 to 240) A                                   | —                                 | 1 mV/A                        | < 2.5 °            | 0.78 in<br>(20 mm)     | 0.78 in<br>(20 mm)                            | 10 ft (3 m)<br>Lead<br>w/BNC  |
|                                                                                                         | (0.005 to 6) A                                   | —                                 | 200 mV/A                      | < 4 °              |                        |                                               |                               |
|                                                                                                         | (0.1 to 120) A                                   | —                                 | 10 mV/A                       | < 2.2 °            |                        |                                               |                               |
| <br>MH60             | (0.5 to 100) A                                   | (0.5 to 100) A                    | 10 mV/A                       | < 1 °              | 1.02 in<br>(26 mm)     | N/A                                           | 6.6 ft (2 m)<br>Lead<br>w/BNC |
| <br>MR417            | (0.5 to 40) A<br>(0.5 to 400) A                  | (0.5 to 60) A<br>(0.5 to 600) A   | 10 mV/A<br>1 mV/A             | ≤ 2.2 °<br>≤ 1.5 ° | 1.18 in<br>(30 mm)     | 2 bus bar<br>(1.24 x 0.39) in<br>(32 x 10) mm | 6.6 ft (2 m)<br>Lead<br>w/BNC |
| <br>MR527            | (0.5 to 100) A<br>(0.5 to 1000) A                | (0.5 to 150) A<br>(0.5 to 1400) A | 10 mV/A<br>1 mV/A             | ≤ 2.2 °<br>≤ 1.5 ° | 1.53 in<br>(39 mm)     | 2 bus bar<br>(1.96 x 0.19) in<br>(50 x 5) mm  | 6.6 ft (2 m)<br>Lead<br>w/BNC |

\*Phase shift indicated at maximum rating. Note: All probes are rated 600 V CAT III and CE compliant. Not all models are UL approved; please consult factory. Consult factory for NIST Calibration price.

