

## TECHNICAL DATA

# Fluke Norma 6000 Series Portable Power Analyzers



## KEY MEASUREMENTS

Voltage, Current, Active Power, Reactive Power, Apparent Power, Power Factor and Harmonics with associated values

## HIGH ACCURACY AND WIDE BANDWIDTH

0.1 % measurement accuracy and 500kHz bandwidth

## HIGHLY PORTABLE

Battery powered, weighs 3.5kg, operates for up to 10 hours without a power cord

## Accurate enough for the lab, built for the field

The Fluke Norma 6000 Series Portable Wideband Precision Power Analyzers give you more freedom than ever before to make high accuracy power measurements wherever you need to—whether in the lab, or in the field. Designed for portability the lightweight, battery powered Fluke 6000 Series eliminates the need to carry large, fragile, expensive analyzers into the field, allowing you to make measurements directly at the load in nearly any environment. By measuring directly at the load, you can discover how the equipment operates under real-world conditions, with real-world variables, not just at a test bench or in the lab.

The Fluke 6003 includes three measurement channels which each consist of a voltage and current input making it ideal for three-phase power measurements. The Fluke 6004 includes four measurement channels giving it the capability to measure three-phase power and DC power simultaneously to enable real-time inverter efficiency measurements under real-world conditions. The Fluke 6003+ and 6004+ models both add the capability to measure mechanical parameters such as speed and torque (from separate transducers) to discover the electrical to mechanical efficiency of the load under a variety of typical operating modes. With the addition of optional measurement accessories, you can even make measurements up to 1,500V DC and 2,000A AC+DC on conductors with a diameter of up to 52mm.

The instrument's compact, battery-powered design combined with a wideband frequency response makes it easier than ever to make measurements on hard to access systems such as inverter drive systems, DC-AC and AC-DC power conversion systems and electric motors without removing them from service. Making these measurements in the field simplifies the troubleshooting and performance measurement processes without sacrificing uptime, giving you more accurate test results that will enable you to discover whether your loads are operating as effectively and efficiently as they should be.

- Highly portable and easily installed in tight spaces—only 9.6 cm thick.
- Operate continuously for up to 10 hours without an external power supply using the 5000mAh Li-ion Internal Battery.
- Measure safely—safety rated for CAT III 1000V, CAT IV 600V environments.
- Measure three phase power and DC output power at the same time with 3 or 4 channel models, with voltage and current inputs on each channel.
- Make mechanical torque and speed measurements using the included inputs and outputs of the Fluke 6003+ and 6004+.

- 0.1% accuracy, 500kHz bandwidth, 200ks/s sample rate so you can rely on the power conversion system measurements you take no matter what distortion may be present.
- USB and RS485 interface and open communication protocol for easy system integration and software platform flexibility.
- Combine two analyzers to enable simultaneous measurement of multiple circuits for even more troubleshooting capability—configurable to 6 or 8 channels using dual analyzer synchronization.
- View critical data in the field on the main display—Meter, Waveform, Harmonics up to the 100th, Vector and Trend.
- Ensure high common-mode rejection and allow flexible configurations according to measurement requirements using the electrically isolated channels.
- User adjustable measurement rate from 100ms to 1s with continuous logging via 32GB of onboard storage.
- Easy in-field set up using the integrated front panel or a remote PC connection (USB or RS485).
- Online measuring, data download and analysis with included PC software (Fluke Power Analyzer Software).
- Full remote control of the connected instrument using Fluke Power Analyzer Software and a local USB or long-distance RS485 connection.

## Specifications

|                         |                                                                                                                              |                                 |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Inputs                  | Norma 6003                                                                                                                   | 3 Voltage + 3 Current           |
|                         | Norma 6003+                                                                                                                  | 3 Voltage + 3 Current + 1 Motor |
|                         | Norma 6004                                                                                                                   | 4 Voltage + 4 Current           |
|                         | Norma 6004+                                                                                                                  | 4 Voltage + 4 Current + 1 Motor |
| Sample rate             | 200ks/s                                                                                                                      |                                 |
| Measurement update rate | 100ms, 200ms, 500ms, 1s                                                                                                      |                                 |
| Dimensions (H * W * L)  | 298mm x 215m x 96mm                                                                                                          |                                 |
| Weight                  | 3.5 kg (7.7 lbs)                                                                                                             |                                 |
| Display                 | 5.7 inch, TFT LCD, 640x480                                                                                                   |                                 |
| Operating temperature   | -10 °C to +50 °C                                                                                                             |                                 |
| Storage temperature     | -30 °C to +60 °C                                                                                                             |                                 |
| Operating humidity      | Non-condensing (< 10 °C )<br>≤ 90 % RH (at 10 °C to 30 °C)<br>≤ 75 % RH (at 30 °C to 40 °C)<br>≤ 45 % RH (at 40 °C to 50 °C) |                                 |
| Operating altitude      | 2000m                                                                                                                        |                                 |
| Storage altitude        | 12000m                                                                                                                       |                                 |
| Ingress protection      | IP 50 (Terminals mated) according to IEC 60529:                                                                              |                                 |
| Battery                 | BP 291, 10.8V/5000mAh, 54Wh IEC 62133, UN38.3<br>Operating time: 10 Hours (on battery)                                       |                                 |
| Safety                  | IEC 61010-1: Pollution Degree 2<br>IEC 61010-2-030: CAT IV 600V, CAT III 1000 V                                              |                                 |
| EMC                     | IEC 61326-1: Industrial<br>IEC 61326-2-2                                                                                     |                                 |
| Warranty                | 1 Year                                                                                                                       |                                 |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communication Interface            | USB/RS485                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Dual Analyzer Synchronization Mode | Able to extend to 6, 7 or 8 channels (using multiple instruments)                                                                                                                                                                                                                                                                                                                                                                                                         |
| PC Software                        | Fluke Power Analyzer software                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Storage Capacity                   | 32GB                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Data trend storage rate            | As per display rate                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Main Function                      | Meter, Scope, Harmonic, Phasor, Trend                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Measuring Parameters               | RMS, DC Component, AC Component, Rectified Mean, Peak Value, Peak-Peak, Crest Factor, Form Factor, Fundamental Component, Fundamental Content, Harmonic Distortion, Harmonic Content, Harmonic Factor for voltages and currents, Active Power, Reactive Power, Apparent Power, Power Factor, Phase Shift, Efficiency, Impedance, Electric Energy, Charge/Discharge capacity (Ah), Frequency, Motor Speed, Torque, Mechanical Power, Mechanical Energy, Summation function |

## Electrical specifications

### Voltage

|                         |                                                                |
|-------------------------|----------------------------------------------------------------|
| Range                   | 10 V, 100 V, 1000 V                                            |
| Crest Factor            | CF ≤ 2                                                         |
| Maximum Voltage         | 10 % overload                                                  |
| Input Impedance         | 2M Ω/10pF (Typical)                                            |
| Temperature Coefficient | 0.05 * (Spec)/k                                                |
| Bandwidth               | 1000V range: 500kHz; 100V range: 200 kHz;<br>10V range:100 kHz |
| CMRR                    | 120 dB @ 50/60 Hz                                              |

## Accuracy (% reading + % range)

| Range             | 1000 V    | 100 V     | 10 V      |
|-------------------|-----------|-----------|-----------|
| DC                | 0.1 + 0.1 | 0.1 + 0.1 | 0.1 + 0.2 |
| AC (10Hz to 1kHz) | 0.1 + 0.1 | 0.1 + 0.1 | 0.1 + 0.2 |
| AC (10kHz)        | 5 + 0.5   | 5 + 0.5   | 5 + 0.5   |

  

| Current                 |                   |
|-------------------------|-------------------|
| Crest Factor            | CF ≤ 2            |
| Temperature Coefficient | 0.05 x (Spec)/k   |
| Overload capacity       | 10 % overload     |
| CMRR                    | 120 dB @ 50/60 Hz |

  

| Shunt (current input) |                                                               |
|-----------------------|---------------------------------------------------------------|
| Measuring Range       | 0.1 A, 1 A, 10 A                                              |
| Input Impedance       | 0.025 Ω (Typical)                                             |
| Bandwidth             | 10 A range: 500 kHz; 1 A range: 200 kHz; 0.1 A range: 100 kHz |

  

| BNC (voltage input) |                                                               |
|---------------------|---------------------------------------------------------------|
| Range               | 0.1 V, 1 V, 10 V                                              |
| Input Impedance     | 100k Ω/100pF (Typical)                                        |
| Bandwidth           | 10 V range: 500 kHz; 1 V range: 200 kHz; 0.1 V range: 100 kHz |

**Accuracy (% reading + % range)**

| Range             | 10 A      | 1 A       | 0.1 A | 10 V    | 1 V     | 0.1 V   |
|-------------------|-----------|-----------|-------|---------|---------|---------|
| DC                | 0.1 + 0.2 | 0.1 + 0.5 | 0.1+2 | 0.1+0.1 | 0.1+0.2 | 0.1+1   |
| AC (10Hz to 1kHz) | 0.1+0.1   | 0.1+0.2   | 0.1+1 | 0.1+0.1 | 0.1+0.1 | 0.1+0.5 |
| AC (10kHz)        | 5+1       | 5+1       | 5+1   | 5+1     | 5+1     | 5+1     |

**Motor Module (Torque and Speed)**

|                            |                             |
|----------------------------|-----------------------------|
| Voltage Range              | ± 10 V dc, 10 % overload    |
| Voltage Channels           | 2                           |
| Input Impedance            | 1.1M Ω (Typical)            |
| Accuracy at dc             | 0.1 % range + 0.1 % reading |
| Pulse Channels             | 3                           |
| Pulse Logic High Threshold | 2 V (Typical)               |
| Pulse Logic Low Threshold  | 0.8 V (Typical)             |
| Maximum Pulse Frequency    | 100 kHz                     |

**Frequency Domain Measurement**

|                    |                               |
|--------------------|-------------------------------|
| Frequency Accuracy | 0.05 % range + 0.05 % reading |
| Harmonics          | 100 (50Hz/60Hz)               |
| Calculation method | FFT/Interpolation             |



# Optional Accessory: Fluke U1500s High Voltage Differential Probe

**Product Feature**

The Fluke U1500s High Voltage Differential Probe is a portable voltage sensor with a 1500 V range and 0.1 % accuracy.

**General Specifications**

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| Modules         | U1500s                                              |
| Maximum Voltage | 1000 V ac rms, continuous, 1500 V dc (Single-range) |
| Dimensions      | 138 mm x 75 mm x 45 mm                              |
| Weight          | 295 g, battery included                             |
| Input terminal  | 4 mm banana jacks                                   |

|                       |                                                                                                                            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------|
| Output terminal       | BNC (female)                                                                                                               |
| Accessory Cable       | BNC to Banana, 1.6 m                                                                                                       |
| Ingress Protection    | IEC 60529: IP40 (Terminals Mated)                                                                                          |
| Battery Type          | 4 AA, IEC LR6                                                                                                              |
| Battery Life          | 168 hours (typical)                                                                                                        |
| Indicator             | Low battery flashes red<br>Working flashes green                                                                           |
| Operating Temperature | -10 °C to 50 °C                                                                                                            |
| Storage Temperature   | -30 °C to 60 °C                                                                                                            |
| Operating Humidity    | Non-condensing (<10 °C)<br>≤ 90 % RH (at 10 °C to 30 °C)<br>≤ 75 % RH (at 30 °C to 40 °C)<br>≤ 45 % RH (at 40 °C to 50 °C) |
| Operating Altitude    | 2000 m                                                                                                                     |
| Storage Altitude      | 12 000 m                                                                                                                   |
| Safety General        | IEC 61010-1: Pollution Degree 2                                                                                            |
| Safety Measurement    | IEC 61010-2-030: CAT III 1000 V, CAT IV 600 V, DC 1500 V                                                                   |

## Electrical Specifications

|                             |                                  |
|-----------------------------|----------------------------------|
| Measurement Range           | 1000 V ac rms, 1500 V dc         |
| Accuracy                    | 0.1 % of reading +0.1 % of Range |
| Bandwidth                   | 100 kHz (Max)                    |
| Input Impedance             | 10 MΩ / <10 pF                   |
| Scale                       | 4 mV/V                           |
| Common Mode Rejection Ratio | 60 dB at 50 Hz                   |
| Temperature Coefficients    | 0.05 % / °C (<18 °C or >28 °C)   |
| Over-range Protection       | 10 % over range                  |



## Optional Accessory: Fluke 80i-2010s AC/DC Current Clamp

### Product Feature

The Fluke 80i-2010s AC/DC Current Clamp is a clamp-on current probe with 2000A range and 0.8 % accuracy.

### General Specifications

|                           |                                                                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modules                   | 80i-2010s                                                                                                                                                               |
| Dimensions                | 110 mm x 270 mm x 46mm                                                                                                                                                  |
| Weight                    | 0.710 kg (1.6 lbs), including battery                                                                                                                                   |
| Output Cable              | 1.5 m (60 in) Shielded Coaxial cable with BNC plug                                                                                                                      |
| Maximum Conductor Size    | 52.0 mm (2.05 in)                                                                                                                                                       |
| Maximum Jaw Opening       | 81.5 mm                                                                                                                                                                 |
| Output to Zero            | Auto adjustment with Zero button                                                                                                                                        |
| Temperature Operating     | -10 °C to 50 °C (14 °F to 122 °F)                                                                                                                                       |
| Storage (battery removed) | -30 °C to +60 °C (-22 °F to +140 °F)                                                                                                                                    |
| Operating Humidity        | ≤ 90 % RH (at 10 °C to 30 °C) ≤ 75 % RH (at 30 °C to 40 °C) ≤ 45 % RH (at 40 °C to 50 °C)                                                                               |
| Altitude Operating        | 2,000 m (6560 ft)                                                                                                                                                       |
| Storage                   | 12,000 m (40,000 ft)                                                                                                                                                    |
| Demagnetize Clamp         | Open and close the Clamp jaws several times with soft click, use of the clamp on uninsulated conductors is limited to 1000 Vac rms or DC and frequencies 1 kHz or less. |
| Safety                    | IEC 61010-1, Pollution Degree 2, IEC 61010-2-032: CAT III 1000 V /CAT IV 600 V                                                                                          |
| Ingress Protection        | IEC 60529, IP40                                                                                                                                                         |
| Power Supply Type         | 2 x AA alkaline battery, IEC LR6                                                                                                                                        |
| Battery Life              | 150 hours (typically)                                                                                                                                                   |
| Low battery indicator     | Yes                                                                                                                                                                     |

## Electrical Specifications

|                                      |                                                                       |
|--------------------------------------|-----------------------------------------------------------------------|
| Current Range                        | 2000 A ac rms, $\pm$ 2000 A dc                                        |
| Output Sensitivity                   | 1 mV/A                                                                |
| Accuracy                             | $\pm$ 0.8 % of reading $\pm$ 0.2 % of range                           |
| Bandwidth for Accuracy Specification | DC to 400 Hz                                                          |
| Load impedance                       | >1 M $\Omega$ and <10 pF                                              |
| Frequency Response (small signal)    | DC to 20 kHz (-3 dB)                                                  |
| Temperature Coefficient              | 0.1 x specified accuracy for each degree C above 28 °C or below 18 °C |
| Working Voltage                      | 1000 V AC RMS or DC                                                   |

## Ordering information

|                             |                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------|
| <b>Fluke-Norma 6003</b>     | Portable power analyzer with 3 voltage inputs and 3 current inputs                 |
| <b>Fluke-Norma 6003+</b>    | Portable power analyzer with 3 voltage inputs, 3 current inputs, and 1 motor input |
| <b>Fluke-Norma 6004</b>     | Portable power analyzer with 4 voltage inputs and 4 current inputs                 |
| <b>Fluke-Norma 6004+</b>    | Portable power analyzer with 4 voltage inputs, 4 current inputs, and 1 motor input |
| <b>Optional accessories</b> |                                                                                    |
| <b>Fluke U1500S</b>         | High Voltage Differential Probe                                                    |
| <b>Fluke 80i-2010S</b>      | 2,000 A AC/DC Current Clamp                                                        |
| <b>Fluke 80i-2010S/3PK</b>  | 2,000 A AC/DC Current Clamp 3 pack                                                 |

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