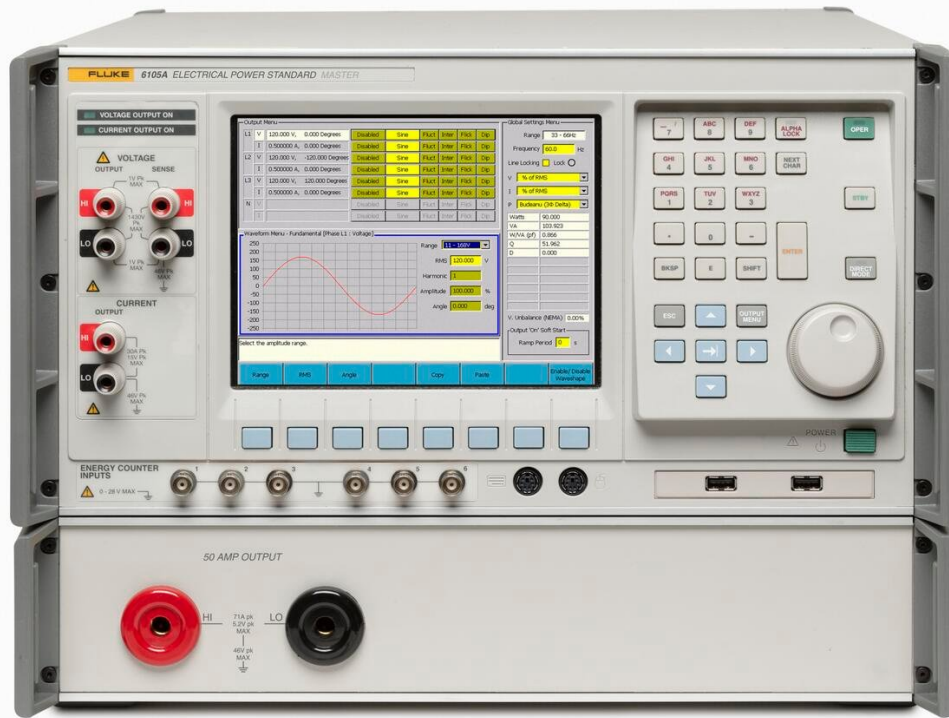
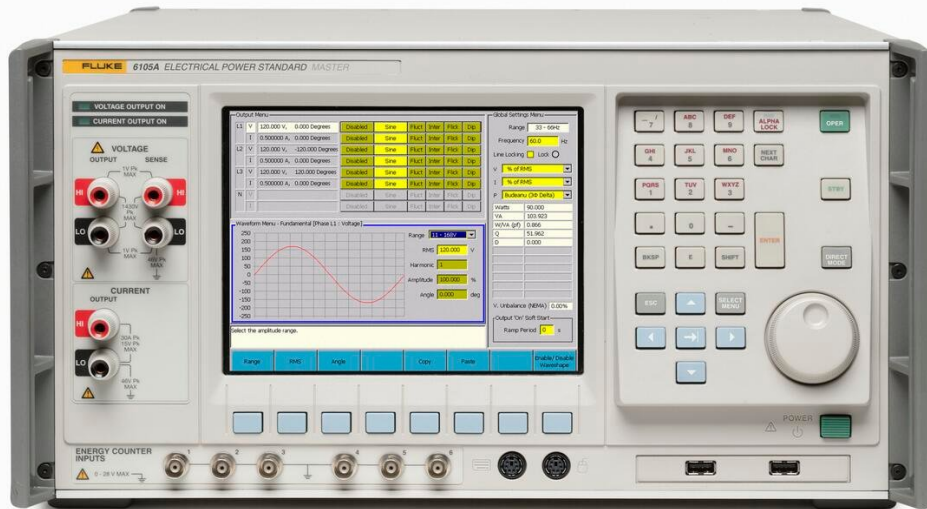
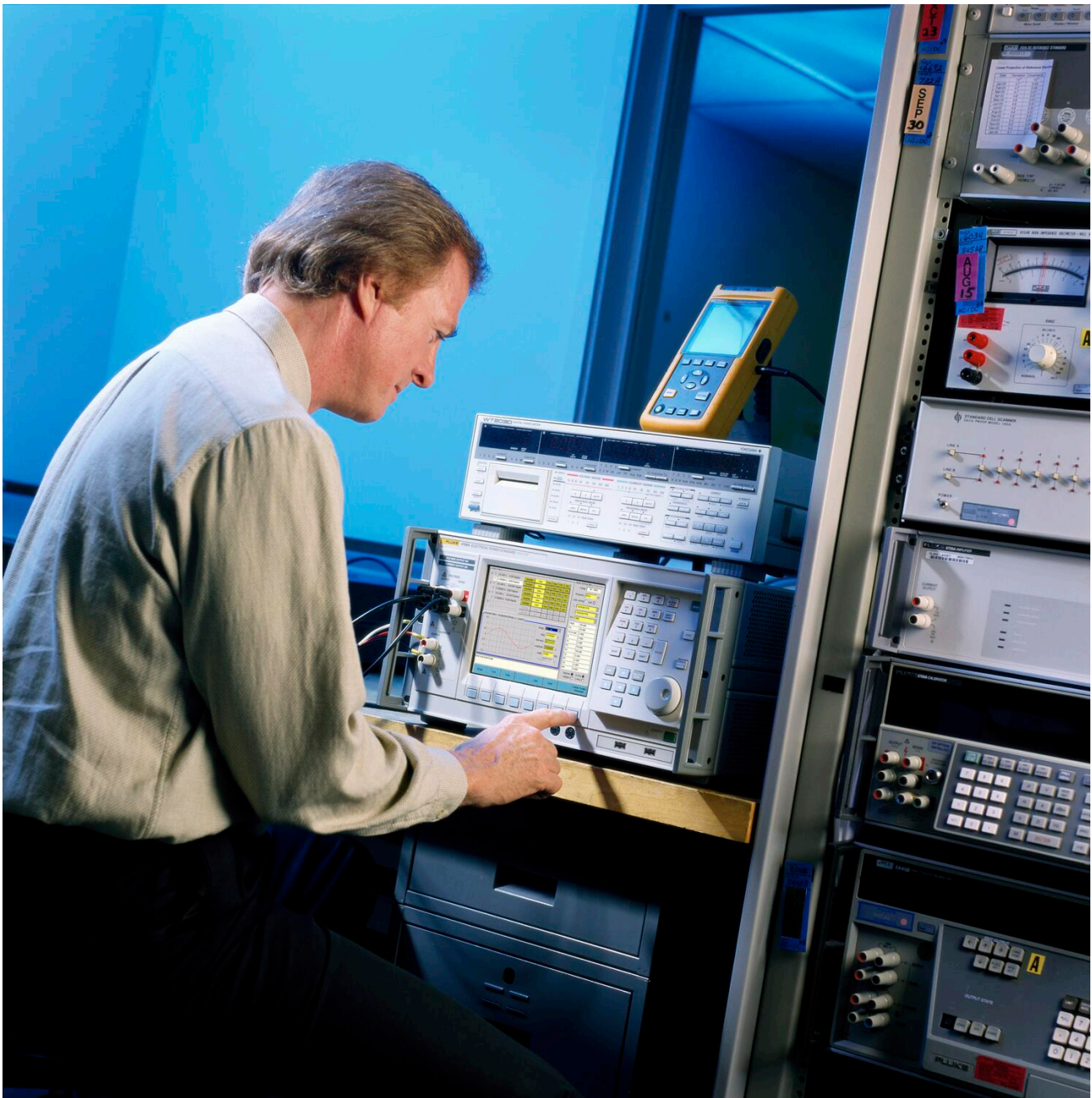


TECHNICAL DATA

# 6105A, 6100B Electrical Power Quality Calibrator









## Product overview: 6105A, 6100B Electrical Power Quality Calibrator

### Who needs a 6105A or 6100B power quality calibrator for electrical power calibration?

Validation of electrical power quality and energy measurements and the equipment that make them is required in many disciplines:

- In National Measurement Institutes (NMI) to provide precise non-sinusoidal signals and phantom power in various research applications
- In research and design to validate the function and accuracy of prototypes and first-off production units
- In manufacturing test to make certain that measurements are correct and repeatable on every unit manufactured
- In service and calibration to ensure that instruments continue to perform to specification throughout their lifetime
- In standards laboratories to calibrate secondary standards used in large scale production calibration of power quality and energy meters

The 6105A and 6100B provide the signals to allow the processes described above to be completed effectively, quickly and by lower skill operators. More importantly, it ensures that the process of validation can be completed thoroughly, accurately and with all measurements being traceable to national and international standards. The 6100A was designed to produce a comprehensive array of electrical power quality signals with exceptional accuracy over one, two, three or four phases independently and simultaneously. The 6100B and 6105A products add even more utility and

extend capability into the calibration of energy. The new products provide even more flexibility than the 6100A.

Until now a system for three phases would require one 6100A 'Master' and two 6101A 'Auxiliary' units. The 6100B and 6105A Master units can be configured as Auxiliaries merely by reconfiguring communication cables. This gives many more options for combinations of instruments in different systems. A new 50A option has been added to the 80A already available. The 50A option can be configured so that all current ranges are available through the same terminals.

### **Phantom power**

The 6100B and 6105A will supply pure sinusoidal voltage to 1008 V and current to 21 Amps. Up to 50 VA's of power are available from the voltage terminals to support instruments which draw power from the line on which they are measuring, or where the voltage circuits of several devices are connected in parallel. Up to 14 V peak compliance is available from the current output to ensure current is delivered in setups involving long cable runs, connectors and switches, or where the current circuits of multiple instruments are connected in series. The current output is also able to produce an auxiliary voltage in order to simulate signals that may be produced by transducers or current probes. Higher ac current outputs are available from the 50A and 80A options.

In addition to the values of V, I and phase angle set by the user, the on-screen display shows calculated values of real power (W), apparent power (VA), reactive power (VAR) and power factor (PF). Reactive power for non-sinusoidal signals is calculated by the 6100B and 6105A using any of seven user selectable methods. When 6100B or 6105A are connected to form three-phase WYE or three-phase, three-wire Delta systems, the user may elect to view—for each phase individually or the three phase total—VA, power and VAR. Three-phase unbalance is also displayed with the choice of the IEC or the NEMA calculation method.

In this mode of operation the 6100B can be used to calibrate or verify measurement of power, VA, VAR, phase angle, power factor, voltage and current on single or multi-phase instruments.

### **Resolution and accuracy**

The 6100B sets a new benchmark for accuracy in electrical power calibration standards. Voltage and current are generated with up to six digits precision and accuracies less than 0.005% (50 ppm). Phase adjustment provides for 1 milli-degree or 10 micro-radian resolutions. Phase performance is exceptional, with accuracy to 3 milli-degrees for the 6100B, 2.3 milli-degrees for the 6105A. In multi-phase systems, phase accuracy between phase voltages is 5 milli-degrees.

### **Complex measurements**

The 6105A and 6100B generate a wide variety of complex signals, including:

- Flicker
- Harmonics
- Dips and swells
- Interharmonics
- Fluctuating harmonics
- Simultaneous application

### **Multi-phase operation**

The 6105A and 6100B Master units offer self-contained single phase operation, with one voltage and one current output. For multiphase applications, the addition of one or more 6101B or 6106A Auxiliary units provides additional phases, with identical performance but without the overhead of controls or display. Additional phases can be added



individually until a maximum of four phases is reached. For added flexibility, the 6100B and 6105A Master units can be configured as Auxiliary devices within seconds. In multiphase systems, each phase remains totally independent and totally electrically isolated, yet synchronized with, and under the control of the master unit. This means applications where phase unbalance is required are simple and easy to arrange. Multiphase 6100B/6105A systems are necessarily connected together in four-wire, WYE configuration. Simulation of three-phase, three-wire Delta and three-phase, four-wire Delta is simply arranged by changing settings via the user interface

### **80A and 50A options**

Two higher current options are available. The 80 A option provides 0 A to 80 A through 100 mm sockets. The outputs from the standard current ranges cannot be routed via these connectors. The 50 A option provides 0 A to 50 A also through 100 mm sockets. With the 50 A option the operator can choose to route all currents through the 100mm sockets or use the 0 A to 21 A range outputs through the standard terminals

### **Energy option**

The energy option adds a comparator to the 6100B and 6105A. Six input channels can be individually configured for "Meter Constant. The user has the choice of reference. The 6105A energy accuracy is as good as almost any external device; but the 6100B user may choose to use an external reference standard. Measured energy is compared with the reference value and a percentage error reported for each device being tested.

### **CLK Option**

The CLK option is an additional reference signal available from the rear panel.

### **Reference signals**

It is not unusual for systems to be synchronized by a common clock signal, particularly when sampling techniques are used. The 6105A and 6100B provide the following signals:

- The phase reference: a CMOS logic signal with rising edge coincident with the positive going zero crossing of the fundamental voltage.
- Sample reference: a CMOS logic signal synchronous with the internal sampling. Can be used to synchronize sampling devices for system calibration.
- Reference signal output (available only when the 'CLK' option is fitted): TTL compatible 10 MHz or 20 MHz reference output signal derived from the system master clock.

### **Soft start**

To overcome the inrush current of devices taking power from the voltage signal; the user may select 0 to 10 seconds slow ramp-up of the output.

### **IEC 61036 and IEC 62053 waveforms**

To make it more convenient to type test and calibrate watt hour meters, the waveforms required by the relevant standards are preinstalled in the 6105A and 6100B

### **User interface**

Microsoft Windows® user interface makes the 6105A and 6100B easy and simple to operate. The interface can be accessed through a combination of front panel knobs and buttons, or by connecting the user's own mouse and keyboard. Actions are then viewed on the high resolution, eight-inch TFT display. Status information of all four phases is displayed, alongside more detailed information on current parameters being set or adjusted.

Frequency domain and time domain representation of current signal types can be displayed on the screen, so the user

can evaluate the effect of control settings before applying the signal to the output terminals. A context sensitive help window at the bottom of the screen guides the operator through instrument setup by providing control information and error messages.

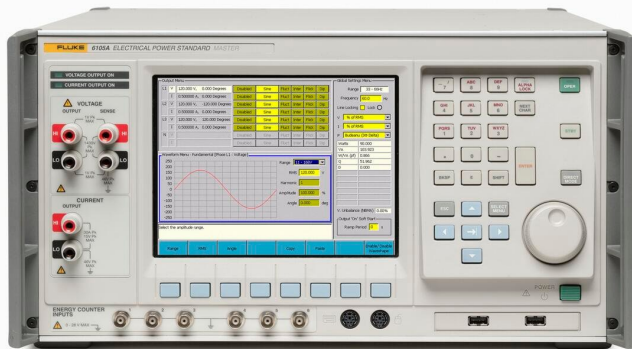
The 6105A and 6100B can be operated under remote control. Where multiphase systems are operated, control of the Auxiliary devices is via the Master unit. The 6105A and 6100B conform to the IEEE 488.1 standard and supplemental standard IEEE 488.2 The programming language complies with the Standard Commands for Programmable Instruments (SCPI).

Complex instrument setups can be saved and recalled within the instrument or saved and recalled from a USB storage device.

## **Specifications: 6105A, 6100B Electrical Power Quality Calibrator**

For full specifications, download the 6105A/6100B Extended Specifications (.pdf) available under the Knowledge and Information tab.

## Ordering information



### 6105A

Electrical Power Standard – Master

### 6106A

Electrical Power Standard – Auxiliary unit. Requires the 6105A Electrical Power Standard Master unit to operate.

### 6106A/50A

6106A with 50A option

### 6106A/80A

6106A with 80A option

### 6125A

6105A Two Phase System

### 6135A

6105A Three Phase System

### 6145A

6105A Four Phase System

### 6105A/50A

6105A with 50A option



**6125A/50A**

6125A with 50A option

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**6135A/50A**

6135A with 50A option

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**6145A/50A**

6145A with 50A option

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**6105A/80A**

6105A with 80A option

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**6125A/80A**

6125A with 80A option

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**6135A/80A**

6135A with 80A option

---

**6145A/80A**

6145A with 80A option

---

**6105A/E**

6105A with Energy option

---

**6125A/E**

6125A with Energy option

---

**6135A/E**

6135A with Energy option

---

**6145A/E**

6145A with Energy option

---

**6105A/CLK**

6105A with CLK option

---

**6125A/CLK**

6125A with CLK option

---

**6135A/CLK**

6135A with CLK option

---

**6145A/CLK**

6145A with CLK option

---

**6105A/50A/CLK**

6105A with 50A and CLK options

---

**6125A/50A/CLK**

6125A with 50A and CLK options

---

**6135A/50A/CLK**

6135A with 50A and CLK options

---

**6145A/50A/CLK**

6145A with 50A and CLK options

---

**6105A/80A/CLK**

6105A with 80A and CLK options

---

**6125A/80A/CLK**

6125A with 80A and CLK options

---

**6135A/80A/CLK**

6135A with 80A and CLK options

---

**6145A/80A/CLK**

6145A with 80A and CLK options

---

**6105A/E/CLK**

6105A with Energy and CLK options

---

**6125A/E/CLK**

6125A with Energy and CLK options

---

**6135A/E/CLK**

6135A with Energy and CLK options

---

**6145A/E/CLK**

6145A with Energy and CLK options

---

**6105A/E/50A**

6105A with 50A and Energy options

---

**6125A/E/50A**

6125A with 50A and Energy options

---

**6135A/E/50A**

6135A with 50A and Energy options

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**6145A/E/50A**

6145A with 50A and Energy options

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**6105A/50A/E/CLK**

6105A with 50A, Energy and CLK options

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**6125A/50A/E/CLK**

6125A with 50A, Energy and CLK options

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**6135A/50A/E/CLK**

6135A with 50A, Energy and CLK options

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**6145A/50A/E/CLK**

6145A with 50A, Energy and CLK options

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**6105A/E/80A**

6105A with 80A and Energy options

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**6125A/E/80A**

6125A with 80A and Energy options

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**6135A/E/80A**

6135A with 80A and Energy options

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**6145A/E/80A**

6145A with 80A and Energy options

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**6105A/80A/E/CLK**

6105A with 80A, Energy and CLK options

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**6125A/80A/E/CLK**

6125A with 80A Energy and CLK options

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**6135A/80A/E/CLK**

6135A with 80A, Energy and CLK options

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**6145A/80A/E/CLK**

6145A with 80A, Energy and CLK options

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**6100B**

Electrical Power Standard – Master

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**6101B**

Electrical Power Standard – Auxiliary unit. Requires the 6100B Electrical Power Standard Master unit to operate.

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**6101B/50A**

6101B with 50A option

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**6101B/80A**

6101B with 80A option

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**6120B**

6100B Two Phase System

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**6130B**

6100B Three Phase System

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**6140B**

6100B Four Phase System

---

**6100B/50A**

6100B with 50A option

---

**6120B/50A**

6120B with 50A option

---

**6130B/50A**

6130B with 50A option

---

**6140B/50A**

6140B with 50A option

---

**6100B/80A**

6100B with 80A option

---

**6120B/80A**

6120B with 80A option

---

**6130B/80A**

6130B with 80A option

---

**6140B/80A**

6140B with 80A option

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**6100B/E**

6100B with Energy option

---

**6120B/E**

6120B with Energy option

---

**6130B/E**

6130B with Energy option

---

**6140B/E**

6140B with Energy option

---

**6100B/CLK**

6100B with CLK option

---

**6120B/CLK**

6120B with CLK option

---

**6130B/CLK**

6130B with CLK option

---

**6140B/CLK**

6140B with CLK option

---

**6100B/50A/CLK**

6100B with 50A and CLK options

---

**6120B/50A/CLK**

6120B with 50A and CLK options

---

**6130B/50A/CLK**

6130B with 50A and CLK options

---

**6140B/50A/CLK**

6140B with 50A and CLK options

---

**6100B/80A/CLK**

6100B with 80A and CLK options

---

**6120B/80A/CLK**



6120B with 80A and CLK options

---

**6130B/80A/CLK**

6130B with 80A and CLK options

---

**6140B/80A/CLK**

6140B with 80A and CLK options

---

**6100B/E/CLK**

6100B with Energy and CLK options

---

**6120B/E/CLK**

6120B with Energy and CLK options

---

**6130B/E/CLK**

6130B with Energy and CLK options

---

**61040B/E/CLK**

6140B with Energy and CLK options

---

**6100B/E/50A**

6100B with 50A and Energy options

---

**6120B/E/50A**

6120B with 50A and Energy options

---

**6130B/E/50A**

6130B with 50A and Energy options

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**6140B/E/50A**

6140B with 50A and Energy options

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**6100B/50A/E/CLK**

6100B with 50A, Energy and CLK options

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**6120B/50A/E/CLK**

6120B with 50A, Energy and CLK options

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**6130B/50A/E/CLK**

6130B with 50A, Energy and CLK options

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**6140B/50A/E/CLK**

6140B with 50A, Energy and CLK options

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**6100B/E/80A**

6100B with 80A and Energy options

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**6120B/E/80A**

6120B with 80A and Energy options

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**6130B/E/80A**

6130B with 80A and Energy options

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**6140B/E/80A**

6140B with 80A and Energy options

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**6100B/80A/ECLK**

6100B with 80A, Energy and CLK options

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**6120B/80A/ECLK**

6120B with 80A, Energy and CLK options

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**6130B/80A/ECLK**

6130B with 80A, Energy and CLK options

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**6140B/80A/ECLK**

6140B with 80A, Energy and CLK options

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