

## Model 4811 Remote Power Meter



The MCCI® NerveCircuit™ Model 4811 is a complete integrated AC power measurement system for LoRaWAN® technology projects.

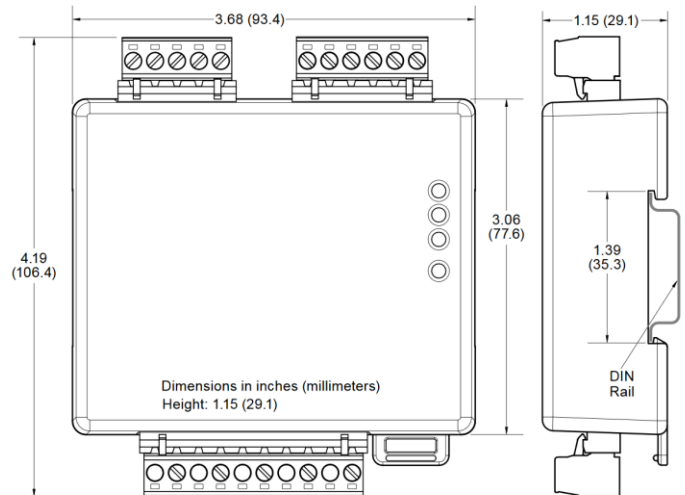
The Model 4811 is a bidirectional networked energy meter able to measure and report a wide range of quantities including energy (kW), power (kWh), voltage, current, demand, kVAR, kVARh, power factor, frequency and more. These measurements are communicated over the customer's choice of LoRaWAN-technology (1.0.3) networks, commercial, community, or private. The meter uses any externally mounted 0.333 Vac current transformers (available from MCCI or customer-supplied). The same meter can measure single phase or three phase circuits and a wide range of AC voltages.

Revenue grade accuracy can be achieved by using the revenue-grade version of the Model 4811 with Class 0.6 or Class 0.3 current transformers, also available from MCCI.

### Standard Features

- LoRaWAN 1.0.3 915 MHz – up to 0.5 mile with external antenna
- Automatic data acquisition and transmission at six-minute intervals (adjustable)
- Remote register-based programming
- Uses safe low-voltage (0.333 Vac) CTs
- Current Measurement: 5 to 6000 amps
- ANSI C12.20 with Class 0.3 current transformers
- Single or three phase, wye or delta configuration
- External Power Supply: 12 to 24 Vac isolated or 6 to 24 Vdc.
- UL, cUL, CE, RoHS compliant
- 5-year warranty
- Ready for firmware update over the air (FUOTA)
- Modbus RTU (RS485) port for control of local devices

### Dimensions



### System Features

The Model 4811 can be combined with the full MCCI NerveCircuit building monitoring system to give unprecedented real-time insight into the performance of residences and commercial buildings. Fully open source, NerveCircuit systems can be customer-operated or operated by MCCI.

Power data can be readily combined on the same dashboard with other resource consumption data (water, natural gas, etc.) and real-time environmental and air quality data. Contact MCCI for a guided walkthrough.

## Long-Range Wireless Communication

Unlike many other wireless sensing approaches, the Model 4811 gets up to half-mile range in urban environments without site planning, complex RF engineering, or a SIM card. Rather than rely on Wi-Fi and tapping into the corporate network, it uses special encrypted protocols and simple, secure gateways that can be placed anywhere, typically outside the corporate firewall. One gateway can handle up to 10,000 devices; if noise or congestion limit capacity, it's easy to add another gateway – the devices automatically take advantage of all the gateways in range. Rather than using licensed spectrum and cellular connections for every device, LoRaWAN technology networks use unlicensed (free to use) spectrum in the 900 MHz band. This frequency range inherently has good building penetration; the innovative radio allows for extremely long range communication by clever use of redundancy and advanced modulation techniques. Most important, the radio technology is optimized for *things*, not *phones*; this allows for great service at a very modest price.

The long-range communication module in the Model 4811 is based on the MCCI Catena 4801. MCCI provides a full Arduino board-support package and libraries to allow rapid customization by system integrators, including an open-source LoRaWAN stack. STM tools may also be used.

The Model 4811 works well with and is tested with [The Things Network](#) (an open-source, user-owned IoT network based on LoRaWAN); but can be used with any LoRaWAN-compatible network, including offerings from Actility, chirpserver.io, Helium, machineQ, myDevices, MultiTech, Senet, SenRa, Tata, and others.

Software is open source and available from MCCI. Hardware design is readily available, but because the metering technology is proprietary to an MCCI partner, hardware is not fully open source.

## Specifications

### Accuracy

Parameter	Test Conditions	Typ	Max	Unit
<b>EnergySum, Energy1, 2, 3 (active energy)</b>	elapsed time $\geq 10$ s	$\pm 0.2$	$\pm 0.5$	%
<b>PowerSum, Power1, 2, 3 (active power)</b>	averaging $\geq 1$ s	$\pm 0.3$	$\pm 0.5$	%
<b>VoltA, B, C, VoltAB, BC, CA (RMS voltage)</b>	averaging $\geq 1$ s	$\pm 0.3$	$\pm 0.5$	%
<b>Current1, 2, 3 (RMS current)</b>	averaging $\geq 1$ s	$\pm 0.2$	$\pm 0.5$	%
<b>Freq (frequency)</b>	averaging $\geq 1$ s	$\pm 0.05$	$\pm 0.2$	%
<b>PowerFactor1, 2, 3</b>	averaging $\geq 1$ s, PF $> 0.5$	$\pm 0.5$	$\pm 1.0$	%
<b>EnergyReacSum, EnergyReac1, 2, 3 (reactive energy)</b>	elapsed time $\geq 10$ s, PF $< 0.9$	$\pm 0.6$	$\pm 1.5$	%
<b>PowerReacSum, PowerReac1, 2, 3 (reactive power)</b>	averaging $\geq 1$ s, PF $< 0.9$	$\pm 0.6$	$\pm 2.0$	%
<b>EnergyAppSum, EnergyApp1, 2, 3 (apparent energy)</b>	elapsed time $\geq 10$ s	$\pm 0.3$	$\pm 0.5$	%
<b>PowerAppSum, PowerApp1, 2, 3 (apparent power)</b>	averaging $\geq 1$ s	$\pm 0.3$	$\pm 0.5$	%

Specifications apply to the underlying power metering module, and do not include errors caused by the current transformer accuracy or phase angle errors. "Rated current" is the current that generates a CT output voltage of 0.33333 Vac or equivalent milliamp output. Unless otherwise noted, all accuracy specifications assume the following conditions: *Line voltage*: 100 to 690 Vac; *Power factor(PF)*: 0; *Frequency*: 48-62 Hz; *Ambient Temperature*: 23°C  $\pm$  5°C; *CT Current*: 1% to 100% of rated current.

### Revenue Models

- Meet the ANSI C12.1-2008 standard for revenue metering when used with class 0.6 or better current transformers.
- Meet the ANSI C12.20-2010 standard for revenue metering when used with class 0.3 or better current transformers.

## Electrical

### Power Supply

- **Nominal Power Supply Voltage:** 6 to 24 Vdc or isolated 12 to 24 Vac source
- **Power Supply Minimum Operating Voltage:** 6 Vdc or 10 Vac
- **Power Supply Absolute Maximum Voltage:** 40 Vdc or 30 Vac
- **Power Supply Watts:** typical 0.6 W, maximum 1.0 W

### General Electrical

- **Line Frequency:** 45 to 65 Hz
- **Nominal Line-to-Neutral Vac:** 90 to 347 Vac
- **Nominal Line-to-Line Vac:** 120 to 600 Vac
- **Measurement Over-Voltage Limit:** 720 Vac
- **Over-Current Limit:** 200% of rated current. Exceeding 200% of rated current will not harm the meter, but current and power will not be measured accurately.
- **Maximum Surge:** EN 61000-4-5: 2kV, ANSI C12.1 combination wave: 6kV, 1.2/50  $\mu$ s – 8/20  $\mu$ s
- **Line Voltage Power Consumption:** the line voltage sensing circuitry draws 0.006 watts per phase at 120 Vac, increasing to 0.150 watts per phase at 600 Vac.
- **Real Power (50-60 Hz):**  $\leq$  0.2 watts
- **Power Factor:**  $\sim$ 1.0
- **Rated VA:** 25 VA at 720 Vac, 50 Hz. The Rated VA is the maximum at 115% of nominal Vac at 50 Hz.
- **Measurement Category:** The line voltage measurement terminals on the meter are rated for CAT III, 600 Vac. Measurement Category III is for measurements performed in the building installation. Examples are measurements on distribution boards, bus-bars, branch circuits, plug loads, and permanently connected equipment such as motors, boilers and heaters.

### Current Transformer Inputs

- **Nominal Input Voltage (at CT Rated Current):** 0.3333 Vac RMS
- **Absolute Maximum Input Voltage:** 5.0 Vac RMS
- **Input Impedance at 50-60 Hz:** 23 k $\Omega$

## Regulatory

*Note: certifications are in progress. Underlying radio and power modules has passed all the following.*

- **UL:** UL Listed 2808. UL / IEC 61010-1, 3<sup>rd</sup> Edition; CAN/CSA-C22.2 No 61010-1-12, 3<sup>rd</sup> Edition
- **FCC:** Class B, FCC part 15, radiated and conducted emissions; FCC module ID VPYCMABZ.
- **CE:** EN 61326-1: 2013, industrial locations
- **ROHS Compliant**

## Environmental

- **Operating Temperature:** -40°C to +80°C.
- **Operating Humidity:** non-condensing, 5% to 90% relative humidity (RH) up to 40°C, decreasing linearly to 50% RH at 55°C.
- **Operating Altitude:** up to 3000 m.
- **Pollution:** POLLUTION DEGREE 2 – normally only non-conductive pollution; occasionally a temporary conductivity caused by condensation must be expected.
- **Indoor use:** suitable for indoor use
- **Outdoor use:** suitable for outdoor use if mounted inside an electrical enclosure rated NEMA 3R or 4 (IP66).

## Mechanical

- **Enclosure:** high-impact, ABS/PC plastic. **Flame Resistance Rating:** UL 94V-0, IEC FV-0.
- **Size:** 106.4 mm × 93.4 mm × 29.1 mm.
- **Connectors:** Euroblock pluggable terminal block. **Green:** up to 12 AWG (2.5 mm<sup>2</sup>), 600 V. **Black:** up to 12 AWG (2.5 mm<sup>2</sup>), 300 V. **Screw torque:** lbf-in (4.08 kgf-cm)
- **Optional external antenna:** SMA
- **Weight:** 5 oz (142 g)

## More Information

For more information, please contact MCCI at [sales@mcci.com](mailto:sales@mcci.com), Twitter [@MCCI](https://twitter.com/MCCI), <http://www.mcci.com>.