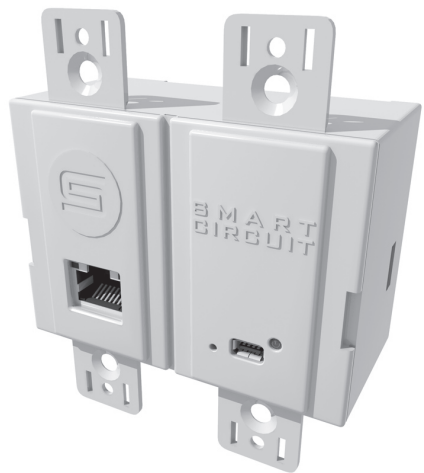


SMART CIRCUIT



20 AMP

Internet Enabled
Electricity Controller

Operators Manual

Thanks for purchasing Smart Circuit 20. It will help you reduce the amount of money you spend on electricity and reduce your carbon footprint. Smart Circuit 20 is easy-to-use, but to make sure you get the most out of your meter, read through the entire manual so you understand all the capabilities of Smart Circuit 20. Smart Circuit 20 incorporates sophisticated digital electronics that enable precise and accurate measurements in an easy-to-use format. State-of-the-art digital microprocessor design utilizes high-frequency sampling of both voltage and current measurements for true power. Power factor is captured so even phase-shifted loads such as motors are accurately measured. Smart Circuit 20 interfaces to a PC via a USB connection, and to a network via an integrated Ethernet jack. Fast, intuitive and easy-to-use, Smart Circuit 20 quickly and accurately measures 100 - 250 VAC, 50/60 Hz, 20 amp circuits.

Uses

Smart Circuit's are installed similarly to circuit breakers, but don't involve the safety aspect. In other words, our Smart Circuit controllers will typically be installed in a panel enclosure box, similar to the enclosure that houses circuit breakers (the "ears" snap off in this case and din rail is used). Or, a Smart Circuit can be installed in a double gang box (blue plastic box available at Home Depot and Lowe's) and wired to an existing outlet to control specific loads, such as a window air conditioner. Regular switch covers can be attached to the "ears". Smart Circuits are ideal for lighting circuits, outlet circuits with lots of vampire or leaker loads, large hard-wired appliances such as electric hot water heaters, washer/dryers, HVAC systems, pumps, blowers, and refrigerator/freezers. Smart Circuits are also ideal for home automation projects where it is important to remotely turn things on or off.

Wireless Applications

Connect a wireless adapter (for example the Dlink DWL-G730AP or the TrendNet TEW430APB, both configured in client mode) into the Smart Circuit's ethernet port, and the Smart Circuit can be used wirelessly. If plugging multiple Smart Circuits into an ethernet switch, and then connecting the switch to a wireless network, a "wireless bridge" is required, such as a D-Link Dap-1522. The switch then needs to have the same submask as the wireless modem.

Load Switching

Smart Circuit 20 provides active energy savings. With an internal switching relay, the Smart Circuit can turn off power to the end load based on user configurable rules. Rules can be based on single or multiple Smart Circuits. These rules and their associated application include:

Reduce Costs – Effective when your utility has TOU (time of use) rates, where they charge a higher rate during peak times. Smart Circuits can automatically "load shift" so loads are used during off peak times.

Reduce Peak Charges – Commercial accounts are charged a "peak charge", which is based on the maximum amount of kilowatts used during the month, even if it was only for half an hour. Lowering your peak usage directly lowers your monthly bill. Smart Circuits can automatically "shed loads" to keep your peak usage under a threshold. For example, connect 25 Smart Circuits to your account, and configure our website to automatically turn off specific loads when the total power across all 25 Smart Circuits exceeds a threshold you designate.

Lower Consumption – Many utilities now have tiered pricing rates, where higher usage is billed at a higher rate. This often happens toward the end of a billing cycle, which might be daily, weekly or monthly based. Smart Circuits keep track of total consumption and can automatically turn off non-critical loads once the high rate tier is activated.

Manual on/off – For security reasons, rebooting servers, or while on vacation.

Private Networks – When using a Smart Circuit on a private network, be aware that the Smart Circuit sends and receives data over port 80 but it can't output web pages. It is possible to assign the meter a static IP address, but it is not possible to enter that address into a web browser and communicate directly with the Smart Circuit as many routers and modems do for configuration purposes. The data packet the Smart Circuit sends is a raw data string and needs to be parsed and formatted. Our API specifies the format. Therefore, a web server application is typically used to collect the data and subsequently format the information.

Getting Started

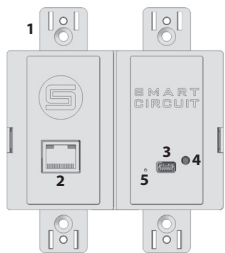
1. Choose a suitable location. For outdoor or wet locations, mount the Smart Circuit inside an appropriate NEMA enclosure.
2. A switch or circuit breaker shall be included in the installation. It should be in close proximity to the Smart Circuit and within easy reach of the operator; and it shall be marked as the disconnecting device for the equipment. The circuit breaker should be 25 or 30 amp breaker (NEC article 422.10A require branch circuits to be less than 80% of the marked rating).
3. Following local and other applicable electrical codes, have a qualified electrician install the Smart Circuit 20 into a 100-250 VAC circuit. There are 4 terminations and it is installed similar to a typical wall switch. For 240v two phase applications, one hot leg is wired to the Neutral. Please be aware that only the hot leg is switched. Therefore when the Smart Circuit 20 has turned off the load, there will be 120v between the one hot leg on the Neutral connector and earth ground.

WIRE	TERMINATION
Green	Ground
White	Neutral, common
Black 1	Hot supply
Black 2	Hot load

Wiring for protective earthing and mains supply/load should be 12 AWG, 250 v, rated 105 degree C, wire strip length of 6-7mm, and be torqued to 3.5 (Lb-In). High voltage wiring should be routed separately and away from data cables per industry standards.

4. Connect a network cable into the Ethernet jack.
5. If you want to change any default settings, connect a PC via the USB cable.
6. Log into www.wattsupmeters.com and create a profile. Enter the serial number from the Smart Circuit 20. View your data and control the Smart Circuit 20 through the web interface.

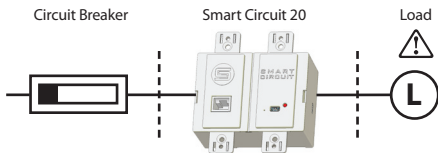
Front View



1. Mounting ears for installation in a gang box, break off if not needed.
2. Ethernet jack. Insert standard network cable.
3. USB connector
4. LED light indicator
5. Reset button. Insert paper clip to restore factory defaults.

Placement

Install the Smart Circuit in-line, between the circuit breaker and the load(s). Mount the Smart Circuit in a suitable enclosure, such as a Nema enclosure, or a double-wide gang box.



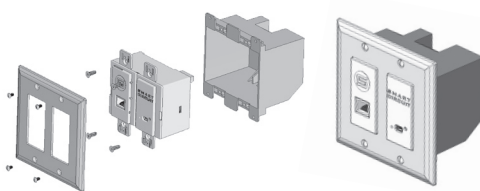
⚠ DO NOT connect to life support loads - see warning.

Indicator Lights

Smart Circuit 20 has an indicator light with 3 modes:

COLOR	INDICATION
Blank	No power
Green	Unit is powered
Red	Relay is switched so there is no power to the load.

Installation Option 1



Install Smart Circuit 20 into a typical double gang box, which are readily available at Home Depot, Lowe's or hardware stores.

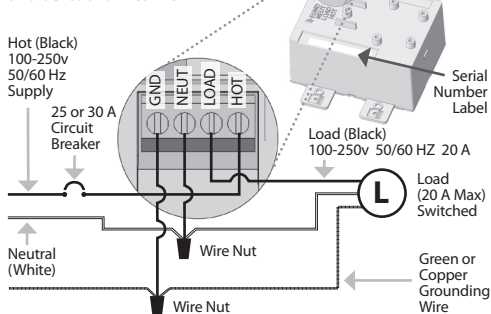
Parts list:

- > Smart Circuit 20
- > Double gang box
- > Switch plate cover
- > Assorted screws and fasteners

*an installation kit with the above parts is available at wattsupmeters.com

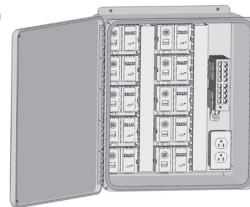
Wiring Diagram

Smart Circuit 20 – Rear View



Installation Option 2

Install Smart Circuit 20 into an appropriate NEMA enclosure using din rail, – see above. To save room, snap off the 4 ears by bending them back where they meet the housing.



Parts list:

- > Smart Circuit 20
- > NEMA enclosure
- > Din rail
- > Din rail mounting plate
- > Pan Head #10-32 Screw and assorted fasteners

*an enclosure with the Smart Circuit prewired and installed is available at www.wattsupmeters.com

Technical Specifications

- > 100-250v, 50/60 Hz, 20 amps
- > True power measured and displayed
- > Accuracy: +/- 1.5% + 3 counts
- > Below 60 watts, amps and power factor accuracy degrades but accuracy of watts is maintained for the full range.
- > USB interface
- > Ethernet interface
- > Mains supply voltage fluctuations not to exceed +/- 10% of the nominal voltage
- > Input and output via wiring termination block
- > Indoor use only
- > Altitude up to 2000 meters
- > Temperature 5° C to 40° C
- > Installation Category II
- > Pollution Degree 2
- > Maximum relative humidity 80% for temperatures up to 31° C decreasing linearly to 50% relative humidity at 40° C.

Cleaning

Smart Circuit 20 should not need to be cleaned. Do not use liquids to clean. Do not disassemble. There are no spare parts. No preventative maintenance is required. If the case breaks or other physical damage is apparent, do not use.

Warning

DO NOT use with life support or mission critical loads. Smart Circuit 20 can turn off electricity to the connected load, and some failure modes may interrupt power intermittently. Do not use with any load that power interruption would cause a problem. Smart Circuit 20 is not a safety device and should not be used in place of a circuit breaker. Smart Circuit 20 is not a toy and is only intended to be installed by qualified electricians. Never open the case. Shock hazard exists. Smart Circuit 20 is not water resistant. As with all electronic equipment, avoid water and liquids. Do not touch Smart Circuit 20 if it is wet. Smart Circuit 20 is not repairable. If Smart Circuit 20 is used in a manner not specified herein, then serious injury could result.

Warranty

Smart Circuit 20 is guaranteed for 12 months from date of purchase. If a problem arises, simply contact us for repair information. For technical assistance or repair, please call toll free: 877.WATT501 (877.928.8701).

Electronic Educational Devices believes it is everyone's responsibility to help the environment. In this effort, e.e.d purposefully uses recycled components wherever possible and minimizes extraneous packaging. We hope that using Smart Circuit 20 helps people understand the costs involved with electricity, and thereby encourages conservation and participation in environmental issues.



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