SYNAPSENSE™

Wireless Data Center Monitoring
and Energy Management

SynapSense™ P³ SmartPlug Power Meter User Guide

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Document Number: 000-0000 rev 1 *SynapSense™ P³ SmartPlug Power Meter User Guide*

Regulatory Information

Notice to Users:
This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However,

there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Plug the equipment into an outlet on a circuit different from that which the receiver is plugged.
- Consult the dealer or an experienced radio/TC technician for help. This product works using a radio frequency, so use on an airplane may be restricted due to interference.

FCC Statement:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

CE Statement:
This equipment has been tested and found to comply with the limits of the European Council Directive on the approximation of the law of the member states relating to electromagnetic compatibility (89/336/EEC) according to EN 55022 Class B.

Industry Canada Equipment Notice:
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

En Français:
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The Industry Canada certification identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure, for their own protection, that the electrical ground connectors of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This presentation may be particularly important in rural areas. Caution: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority or electrician, as appropriate.
Caution: *Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority or electrician, as appropriate.*

Warranty Information

Limited One Year Warranty

Our company warrants that for one year from the date of purchase, it will replace this product if found to be defective in materials or workmanship. For a prompt, no charge replacement of equivalent product, contact technical support at support@synapsense.com or by phone.

Technical Support Center

Telephone: +1.916.294.0110 option 2

Email: support@synapsense.com

2365 Iron Point Road, Suite 100

Folsom, CA 95682

United States of America

This replacement is the company's sole obligation under this warranty. ***SynapSense™ Corporation*** will not be responsible for any incidental or consequential damages or for any loss arising in connection with the use or inability to use this product. Some states/provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty excludes defects or damage due to misuse, abuse, or neglect. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state/province to province.

Warnings and Precautions

Installation of this equipment must be in accordance with local and national electrical codes.

Do not use if damaged. Check for cuts or abrasions in power cords.

Introduction

This document provides instructions for the installation and use of the ***SynapSense P3 SmartPlug Power Meter*** in data center server cabinets. ***P3 SmartPlug Power Meters*** are a hardware power-monitoring component within the ***SynapSense Wireless Data Center Monitoring and Energy Management Solution***.

Overview

P³ SmartPlug Power Meter is an inline power meter providing electrical data via a wireless connection. The ***SmartPlug*** basically consists of a server power cord with a small SynapSense node mounted in the middle of the power cord. The node housing encloses a power meter and radio. Typically, all of the computer servers within a given server cabinet (rack) are metered with ***SmartPlugs***.

The ***P³ SmartPlug Controller*** provides the wireless link between the ***SmartPlug*** meters and the ***SynapSense Wireless Sensor Network*** (***WSN***). The ***Controller*** aggregates power meter data from the ***SmartPlugs*** and reports via the ***WSN*** to the host server. The ***Controller*** is also capable of collecting server cabinet environmental data (intake and exhaust air temperatures for the server cabinet). The ***Controller*** also supports a door contact switch for use in alerting when server cabinet doors are left ajar.

Figure 1 – P³ SmartPlug Power Meter

Software Requirements

Requires ***SynapSoft 6.0 Device Manager*** software or newer (***Device Manager***, ***MapSense***, and other software referenced in this document are included with ***SynapSoft 6.0***).

Power Meter and Electrical Specifications

P3 SmartPlug Power Meter Measurement Range:

100 to 240 VAC RMS, 50/60Hz, Allowable current crest factor 3
0 to 10amps RMS (all models)
Overload capacity 115% continuous, six times full load rating (inrush)

Power Consumption:

Not to exceed 4VA in current circuit
Not to exceed 2W and 10VA elsewhere

Accuracy:

Parameter	Accuracy Specification
Voltage	+/-0.5% Measurement
Current	+/-0.5% Measurement, +/-0.5% Full Scale
Energy (0.7 to 1.0 PF)	+/-1.0% Measurement
Energy (0.5 to 0.7 PF)	+/-1.5% Measurement

P3 SmartPlug Maximum Electrical Ratings:

Rated Input Voltage: 100 to 240 VAC RMS, 50/60Hz
Rated Maximum Current:
18/3AWG power cord (C13/C14 models): 10amps RMS
14/3AWG power cord (C19/C20 models): 15amps RMS

Controller:

Voltage Input:

12 to 27VDC; 2.1x5.5mm center positive barrel jack connector

AC Adapter Included with the Controller Kit:

Voltage: 100 to 240VAC (L-L or L-N)
Frequency: 50/60Hz

Maintenance and Calibration

SmartPlugs are factory calibrated and require no field maintenance.

Regulatory Information

SmartPlug Radio (Viking Radio):

FCC Part 15, Subpart C, 15.247
U62-SJA100
Industry Canada
7265A-SRA100
CE Marking
EN 300 328; V1.7.1 (2006-05) and EN 300 440-2 V1.1.2 (2004-07)

Controller Radio's (WSN and Viking Radio's):

FCC Part 15, Subpart C, 15.247
U62-SRS100 (WSN Radio)
U62-SSC100 (Viking Radio)
Industry Canada
7265A-SRS100 (WSN Radio)
7265A-SSC100 (Viking Radio)
CE Marking
EN 300 328; V1.7.1 (2006-05) and EN 300 440-2 V1.1.2 (2004-07)

Power Meter:

UL 61010
Designed to meet IEC 62053 Class 1, ANSI C12.20 Class 1 accuracy requirements

Environmental Conditions

P3 SmartPlug:

Operating: 0C to +60C, 10-90% relative humidity (non-condensing)
Storage: -40C to +70C, 10-90% relative humidity (non-condensing)

Controller:

Operating: 0C to +60C, 10-90% relative humidity (non-condensing)
Storage: -40C to +70C, 10-90% relative humidity (non-condensing)

Controller Power Adapter:

Operating: 0C to +40C*, 10-90% relative humidity (non-condensing)
Storage: -40C to +70C, 10-90% relative humidity (non-condensing)

* The lower max operating temperature of the ***Controller*** power supply brick is typically overcome by mounting the power supply outside of the server cabinet confines. The power cord for the ***Controller*** power supply is 1.8meters (6feet) on both sides of the brick. This long length allows the brick to mounted outside of the cabinet when the AC cord is plugged in to an outlet strip inside the cabinet and still reaching over to the ***Controller*** DC jack receptacle.

Part Number and Model Information

P3 SmartPlug PowerMeter Part Number Explanation:

All P3 SmartPlug Powermeters will have a product label documenting the SynapSense part number. The part number breaks down as follows:

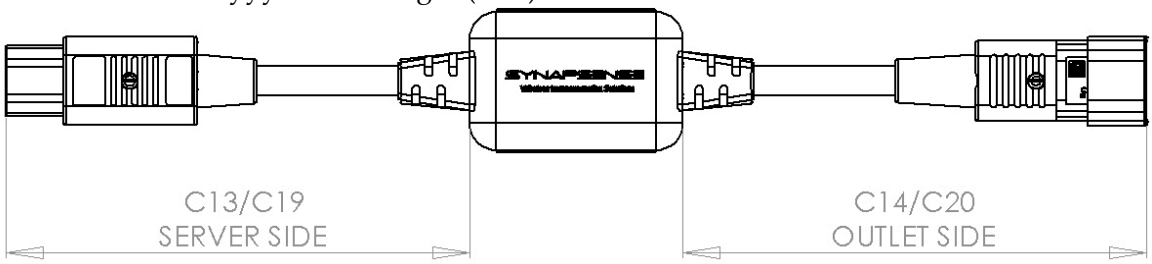
99-0642-xxx-yyy

Part numbers starting 99-0642… will come with C13 and C14 plugs

Part numbers starting 99-0643… will come with C19 and C20 plugs

Where "xxx" is the length (mm) of the server cord side

Where "yyy" is the length (mm) of the outlet cord side



EXAMPLE: Part Number: 99-0642-150-150

C13 Server Side Plug, length 150mm

C14 Outlet Side Plug, length 150mm

P3 SmartPlug PowerMeter Model Number Explanation:

MODEL 0642:

Part numbers starting 99-0642… come with C13/C14 plugs, 18/3AWG cord, 10amp max

MODEL 0643:

Part numbers starting 99-0643… come with C19/C20 plugs, 14/3AWG cord, 15amp max

Installation

The ***P3 SmartPlug*** is an inline power cord that replaces the power cord of the equipment to be monitored. The ***SmartPlug*** installation process requires the use of the ***SmartPlug Configuration Software Utility*** to associate the ***SmartPlug*** with the ***SmartPlug Controller*** and ***SynapSoft Web Console***.

The utility will also collect information about the server configuration and electrical outlet for use in the ***SynapSoft*** software. The ***SmartPlug*** is associated with the ***Controller*** by scanning (or manually entering) the ***SmartPlug*** identification number located on the product label.

The ***Controller*** is connected to a PC (typically laptop) via the USB interface (USB Type A to Micro-B cable required).

The ***Controller***'s association with the server cabinet (rack) that it is mounted on, along with rack environmentals, is also configured in the host server software (typically ***SynapSense's MapSense*** configuration utility).

Figure 2 – P³ SmartPlugs installed in a server cabinet

Technical Support

For all technical support issues, contact ***SynapSense Technical Support***:

Tel: (916) 294-0110, option 2

Email: support@SynapSense.com

Web: http://www.SynapSense.com