

MODEL 138 PROGRAMMABLE SERIAL GATEWAY ENERNETWORKS™ NETWORK ADAPTER



MODEL 13800 User Guide

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ANTENNA

The wireless RF equipment described in this document is supplied with one of the following two (2) antenna configurations.

Helical element Monopole Antenna:

Antenna P/N ANT-916-CW-RH

Dipole Antenna with cable:

Antenna P/N ANT-916-MHW-RPS

Cable P/N PE36559-960

Warning:

This device has been designed to operate with the antennas listed above and having a maximum gain of 2.15 dB. Antennas not included in this list or having a gain greater than 2.15 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

FCC ID: TGD13800 / IC: 6120A-13800

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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INTRODUCTION

This document discusses the model 138 Programmable Serial Gateway — ENERNETWORKS™ Network Adapter (PSG). The PSG Network Adapter provides a bridge between an ENERNETWORKS™ 900MHz mesh network and an EIA-232 network interface device. ENERNETWORKS™ is a proprietary mesh network protocol used to create connectivity among T9000 wireless thermostat Remote Control Nodes (RCN) and other licensed devices manufactured by ENERNET Corporation. A network interface device or other EIA-232-capable serial device connects to the PSG Network Adapter. A single model 138 Programmable Serial Gateway Network Adapter can accommodate data traffic from as many as 500 ENERNETWORKS™ capable nodes.

MESH NETWORK OVERVIEW

A simple overview example of ENERNETWORKS™ is shown in Figure 1. A network interface device communicates with an arbitrary number of targeted ENERNETWORKS™ capable nodes via one or more PSG Network Adapters. Each node in the network can be individually polled for status and other data, sent operational commands or set to automatically report changes in conditions and/or operating status. Communications can be further extended by routing onto a power line carrier network using the Model 125 wall-plug RF/PLC Bridge.

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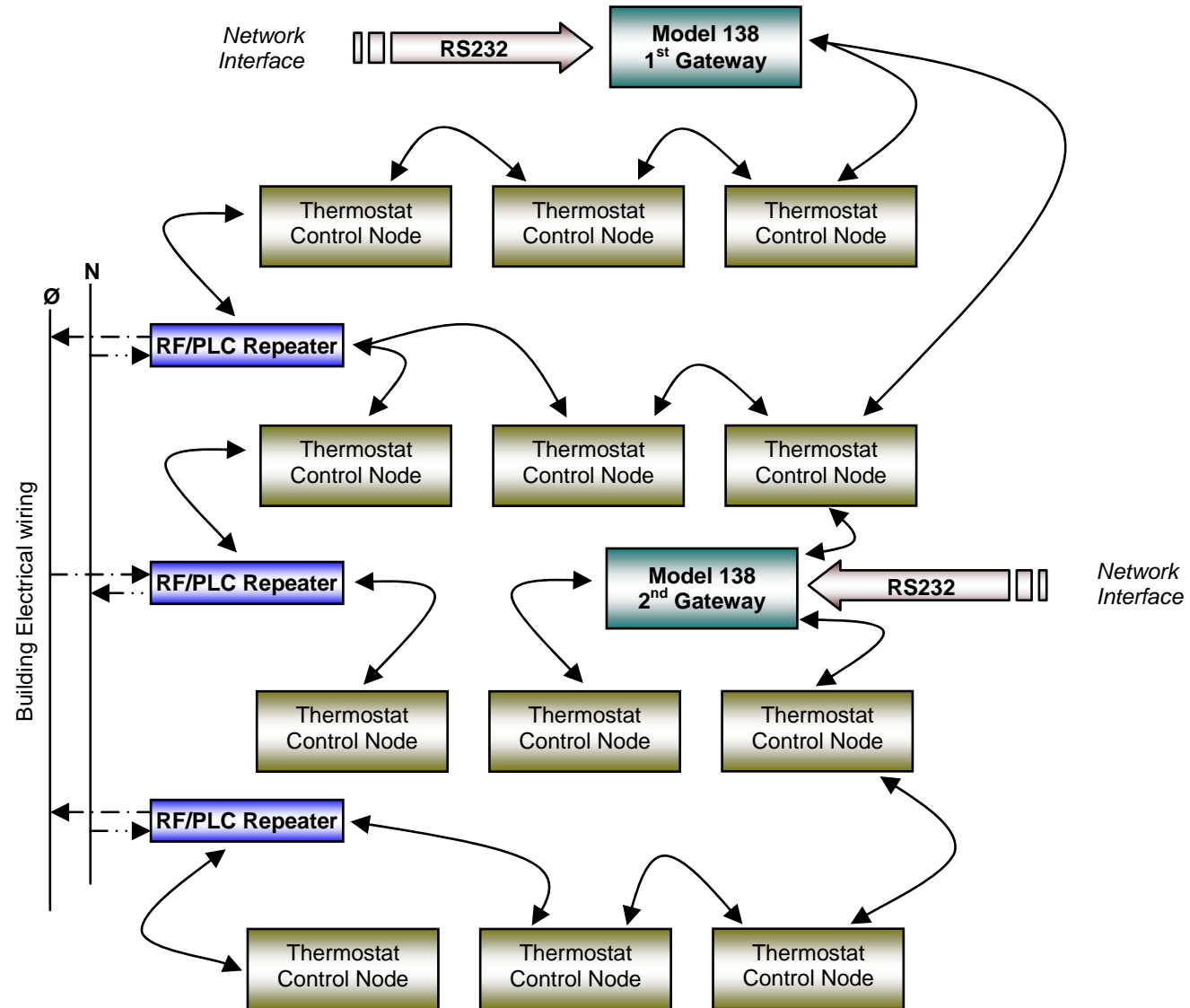


Figure 1: ENERNETWORKS™ Mesh Network Overview

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INTERCONNECTION

The PSG Network Adapter is powered by the supplied 9-volt DC wall-plug power source. A standard 9-pin serial cable connects the PSG Network Adapter to a network interface device. (Refer to Figure 2.)

POSITIONING

Locate the PSG Network Adapter within RF mesh network range of one or more **ENERNETWORKS™** nodes to ensure sufficient connectivity. Some installations may require the optional external dipole antenna. (See *RF COMMUNICATION TEST* section below.)

CONFIGURATION SWITCHES

Configuration switches set one of 256 possible network addresses into the PSG Network Adapter in a binary fashion. See Figure 3 for Configuration Switch location and Table 1 for address setup. If the selected network address is already in use, the Network Adapter will light the Service LED indicating possible network contention.

Decimal	S1	S2	S3	S4	S5	S6	S7	S8
0	DN	DN	DN	DN	DN	DN	DN	DN
1	DN	DN	DN	DN	DN	DN	DN	UP
2	DN	DN	DN	DN	DN	DN	UP	DN
3	DN	DN	DN	DN	DN	DN	UP	UP
etc.	DN	DN	DN	DN	DN	UP	DN	DN

Table - 1

MULTIPLE PSG NETWORK ADAPTERS

If multiple PSG Network Adapters are needed because of a large number of network nodes, or in the case of two or more independent networks comingled within overlapping RF coverage, configuration dip switches must be set to different domain addresses. RCN's and any other **ENERNETWORKS™** capable devices must also be set to the same network address. (See specific device Operators Manual for details.)

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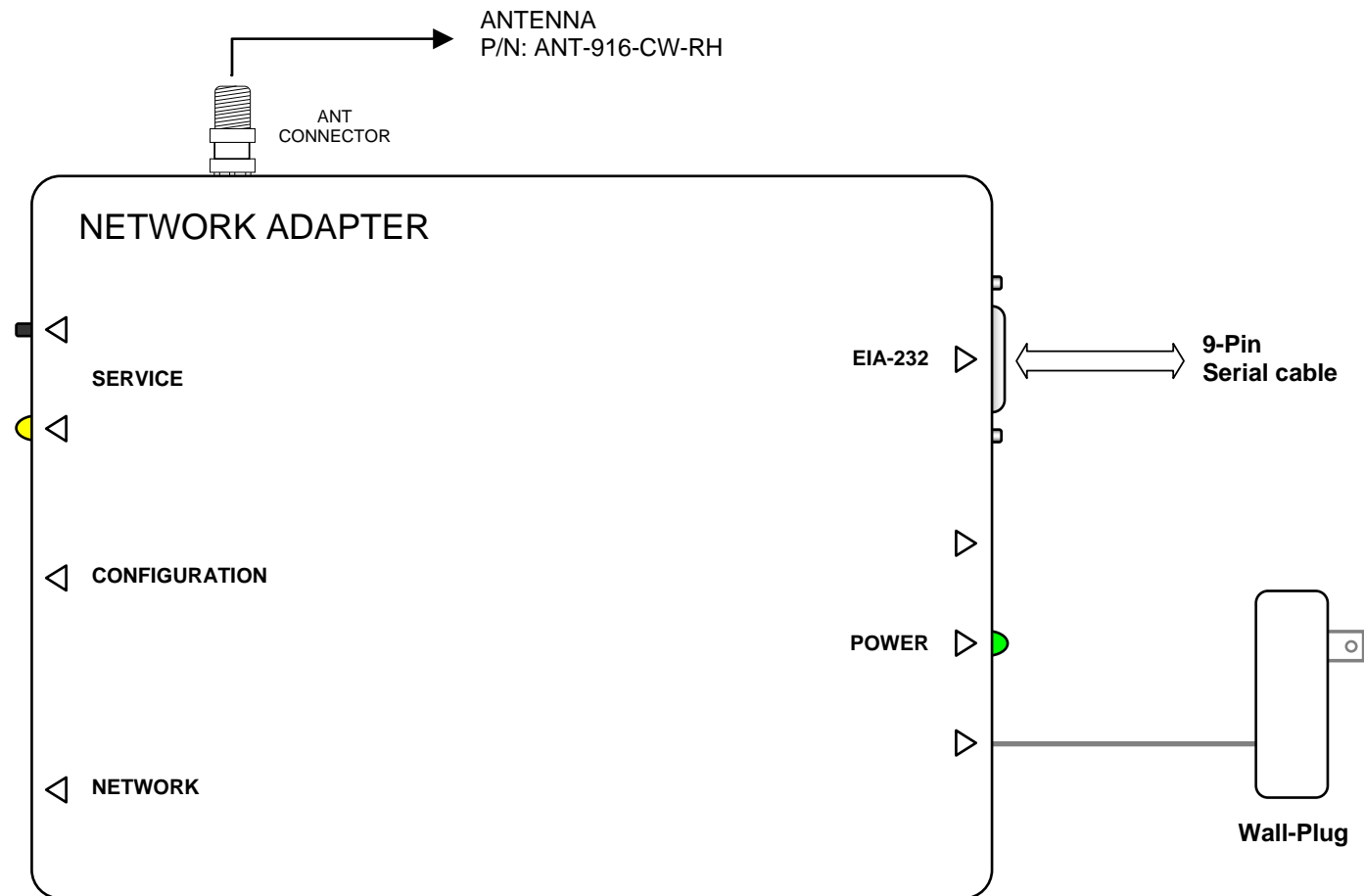


Figure 2: Network Adapter — Programmable Serial Gateway

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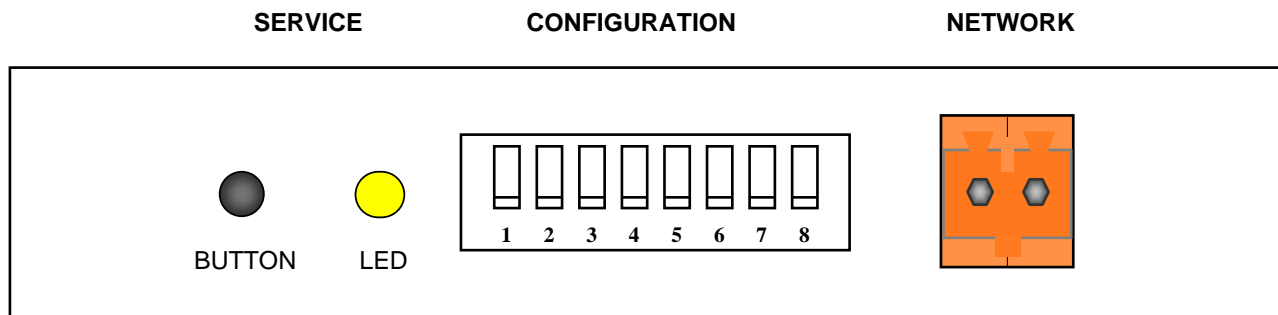


Figure 3: Network Adapter — Configuration Switches and Service Pin Button

NOTE:

The orange two-pin connector labeled “NETWORK” is not used.

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TESTING

The PSG Network Adapter operates in two protocol modes – binary and ASCII. Binary mode is used only by applications such as the Monet™ suite, and enables detailed, automated control and monitoring of target nodes on the mesh network. Refer to the ENERNETWORKS™ Mesh Network API Guide for details.

ASCII mode is used primarily to test and configure the PSG Network Adapter via the EIA-232 port. Perform the following steps to configure the PSG Network Adapter:

1. Make sure PSG Network Adapter is unpowered while making connections or changing configuration switch settings.
2. Set building address per instructions on page 6, *Configuration Switches*.
3. Set network interface device to 57600bps, 8 bits, no parity 1 stop bit, flow control = NONE.
4. Connect 9-pin serial cable to the PSG Network Adapter EIA-232 port and to your network interface device.
5. Connect power cable to PSG Network Adapter. It immediately sends the message,
“ENERNETWORKS™ Serial Gateway, Ver.
<firmware version #>”

6. You can now execute the following PSG Network Adapter commands as needed:

CMD

- | | |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ? | Display firmware version number |
| B or b | Set building address. Same as setting DIP switches. |
| S or s | Toggle serial diagnostic mode. Certain mesh network responses are transmitted through the EIA-232 port in ASCII format.

<i>Displays Serial Diagnostic Mode= OFF/ON</i> |
| R or r | Reset PSG Network Adapter. Read the configuration switch setting.

<i>Displays Resetting</i> |
| E or e | Display last error:

<i>ASCII Command Error</i>

<i>Frame Timeout Error</i>

<i>Frame Overrun Error</i>

<i>Busy</i>

<i>Binary Command Error</i>

<i>Unknown Room Number</i>

<i>Frame Format Error</i>

<i>No Error</i>

<i>No Neighbors</i> |

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- N or n** Invoke and display PSG Network Adapter neighbor count (see next section)
- X or x** Enable/disable ASCII responses. Used to squelch any ASCII asynchronous responses (i.e. send only binary mode). This is reset by command *R*
- Note: PSG Network Adapter transmits certain status messages asynchronously, unless the X command has been issued:
- Line Break Detected*

RF COMMUNICATION TEST

For proper operation, the PSG Network Adapter should be placed within RF range of *at least* one other ENERNETWORKS™ node. For maximum reliability it should link to at least four neighbors. The following test requires connection to a network interface device (see previous section, TESTING):

1. Make sure Configuration / Building address is set per instructions on page 6, *Configuration Switches*.
2. If you are using the monopole helical antenna (standard supplied configuration) place the PSG Network Adapter in its proposed location. Then go to step 4.

3. If you are using the dipole/cable antenna option, place only the antenna in its proposed location. Screw the other end of the cable to the PSG Network Adapter antenna connector. (**WARNING: HAND TIGHTEN ONLY, DO NOT USE TOOLS. Excessive force can damage the connector!**)
4. Issue the “N” command to send a *neighbor count* command on the mesh network. PSG Network Adapter responds with the message *Neighbor Count = XX*, where XX is the actual number of ENERNETWORKS™ nodes heard.
5. If the Neighbor Count is less than 4, consider relocating the PSG or antenna closer to other ENERNETWORKS™ nodes.