HEMS 2000 Home Energy Management System

1. System Structure

1.1. System Diagram

HEMS2000 is a ZigBee-based close system that consists of a Smart Thermostat and an In-Home Display, allowing the user to control the home temperature remotely as well as monitor the home energy data sent from the Smart Meter.
1.2. System Description

HEMS 2000 is a 4-in-1 system that functions as a Thermostat, an In-Home Energy Monitor, a Smart Energy gateway, and a Digital Photo Frame. It consists of PCT501-GW and IHD703 that offers the system with excellent stability and portability. PCT501-GW is the control centre of this system, and IHD703 functions as a remote control.

Home Area Network (HAN) Integration
HEMS 2000 interfaces with AMI technologies and integrates a smart meter, Thermostat w/ ZigBee Gateway, and In-Home Display to create a Home Area Network.

System communication
PCT501-G will collect data from your smart meter. When IHD703 has paired with PCT501-G successfully, IHD703 will synchronize with PCT501-G.

System Data storage and display
The storage data will include consumption data such as instantaneous power, energy usage, price, and other information such as billing rate, TOU, messages about how to save energy, etc. Data will be stored in the PCT501-G and IHD703 based on requirements. It adds WI-Fi connectivity on top of HEMS 1000 (See HEMS 1000 Home Energy Management System) to allow the dual-way information sharing with the cloud-based web portal or analytic tools. It also allows the user to remotely display and control the energy usage and HVAC using smart phone, iPad, etc.

2. System Features

2.1. PCT501-GW (Smart Thermostat w/ZigBee Energy Gateway)

PCT501-GW is a Wall-mounted Programmable Communicating Thermostat also functioning as a ZigBee & Wi-Fi Energy Gateway. It retrieves and saves utility data sent from the smart meter and further transmits it to the portable Remote In-Home Display. PCT501-G also functions as a regular thermostat. It is the control centre of the system.
A Smart Thermostat

- Temperature Remote Control
- Thermostat LCD On-Demand Backlight
- 7-Day Programming
- Multiple HOLD Options
- System Compatibility

- Built-In Temperature & Humidity Sensor
- Heating & Cooling Indicator
- Multiple Display Options
- Thermostat Backup Li-ion Battery

A Smart Energy Gateway

- ZigBee Connectivity
- Wi-Fi Connectivity
- AMI Compatibility
- Smart Meter Interoperability

- Trans-platform Data Transmission
- Bridges Personal Smart Devices
- Historical Data Storage and Exporting
- Real-Time Energy Data Remotely Access

Features details

Programmable Communicating Thermostat

- Temperature Remote Control: By operating with a 7” full color LCD portable In-Home Display will allow you to sense and adjust the temperature from anywhere in the home and wirelessly set the schedule;
- LCD On-Demand Backlight: Easy to read in various lighting conditions;
- Backup Li-ion battery: Built-in Li-ion battery to maintain the system clock & settings during temporary power outage;
- 7-Day Programming: Allows separate schedule programming of the home temperature for each day of the week, 4 periods per day, to fit your lifestyle and save energy;
- Multiple HOLD Options: Allows you to override the program schedule with temporary and permanent hold settings;
- Multi-System Compatibility: Compatible with heating, cooling, and heat pump systems. (Does NOT work with electric heating);
- Built-In Temperature & Humidity Sensor: Displays current in-home temperature, set temperature, and humidity level;
- Heating & Cooling Indicator: Clearly indicates whether the heating or cooling system is on;
- Multiple Display Options: °C or °F temperature, 12 or 24 hour clock;
ZigBee Smart Energy Gateway

- **ZigBee Connectivity:** In accordance with ZigBee Smart Energy Profile 1.1 (Backwards compatible to 1.0);
- **WiFi Connectivity:** The gateway could communicate with smartphones, iPad via the home Wi-Fi network.
- **AMI Compatibility:** Interfaces with AMI (Advance Metering Infrastructure) technologies such as Elster, Sensus, Trilliant, Silver Spring and etc.;
- **Smart Meter Interoperability:** Fully integrated into HAN (Home Area Network) and retrieves the whole home energy consumption data from the Smart Meter via wireless communication;
- **Remotely Access to Real-Time Energy Data:** Gateway allows remotely monitor and manage real-time home energy data through Home Area Network. Energy data is automatically retrieved from smart meters and accessible from anywhere in the home by using a compatible In-Home Display;
- **Trans-platform Data Transmission:** Extend ZigBee signal to Wi-Fi IP to support multi-platform application;
- **Bridges Personal Smart Devices:** Bridge popular smart phone such as iPhone, iPad, android Device to communicate and control ZigBee-based devices such as smart meters, IHD (In-home display) devices, load-control devices, and PCT (Programmable Communicating Thermostat) devices;
- **Historical Data Storage and Exporting:** The gateway could save minute-to-minute energy data up to 10 years. All incoming data from the connected sensors are getting stored locally in CSV files and further transferred via wireless connectivity or USB port.

2.2. IHD703 (Portable Remote In-Home Display)

IHD703 is a 7” portable In-Home Display functioning as a Home Energy Monitor, a thermostat remote controller, and a digital photo frame. It comes with a Li-ion battery.
Home Energy Monitor

- Smart Meter Interoperability
- Real-Time Energy Usage Tracking
- Energy Usage Alerts and Prompts
- Energy Usage Trend Forecasting
- Historical Data Display
- Historical Data Download
- Time-of-Use Information Display and Update
- Password Protection

Thermostat Remote Controller

- Temperature Remote Control
- Built-In Temperature & Humidity Sensor
- 7-Day Programming
- Multiple HOLD Options
- Heating & Cooling Indicator

Smart Home Plus

- Digital Photo Frame
- Smart Home Alarm System control

Features details:

Home Area Network (HAN) Integration

- **AMI Compatibility**: Interfaces with AMI (Advance Metering Infrastructure) technologies such as Trilliant, Elster, Sensus, Silver Spring and etc.;
- **ZigBee-Based HAN**: Integrates Smart Meter, Thermostat w/ ZigBee Gateway, and In-Home Display to formulate a Home Area Network based on ZigBee SEP 1.1 (Smart Energy Profile 1.1);
- **Thermostat w/ ZigBee Gateway**: A Wall-mounted PCT (Programmable Communicating Thermostat) also functioning as a ZigBee Energy Gateway. It retrieves & saves utility data sent from the Smart Meter and further transmits it to the portable In-Home Display;
- **Portable In-Home Display**: A 7” portable In-Home Display functioning as a Home Energy Monitor, a thermostat remote controller and a digital photo frame. It comes with a Li-ion battery.

Remote Control Thermostat

- **Temperature Remote Control**: Portable In-Home Display equipped with a 7” full color LCD screen allowing you to sense and adjust the temperature from anywhere in the home and wirelessly set the schedule;
- **Thermostat LCD On-Demand Backlight**: Easy to read in various lighting conditions;
- **Thermostat Backup Li-ion battery**: Built-in Li-ion battery to maintain the system clock & settings during temporary power outage;
• **7-Day Programming:** Allows separate schedule programming of the home temperature for each day of the week, 4 periods per day, to fit your lifestyle and save energy;

• **Multiple HOLD Options:** Allows you to override the program schedule with temporary and permanent hold settings;

• **System Compatibility:** Compatible with heating, cooling, and heat pump systems; (Does NOT work with electric heating)

• **Built-In Temperature & Humidity Sensor:** Displays current in-home temperature, set temperature, and humidity level;

• **Heating & Cooling Indicator:** Clearly indicates whether the heating or cooling system is on;

• **Multiple Display Options:** °C or °F temperature, 12 or 24 hour clock.

**IHD for Energy Monitor**

• **Smart Meter Interoperability:** Retrieves the whole home energy consumption data from ZigBee Gateway;

• **Password Protection:** The device is protected by a 4-digit password to ensure the system safety and users’ privacy;

• **Color LCD Touch Screen:** 7” full color, touch screen LCD display with excellent clarity;

• **Real-Time Energy Usage Tracking:** Displays current utility Time-of-Use period, price rate and real-time power consumption both numerically and graphically. Uses At-a-Glance graphic for better real-time energy usage tracking;

• **Energy Usage Alerts and Prompts:** System alerts when electricity consumption exceeds the set threshold; displays TOU period countdown and prompts when reaching the Off-Peak period; (NEW)

• **Energy Usage Trend Forecasting:** Uses Side-by-Side histogram comparison for energy usage prediction, which includes “last hour vs. next hour”, “today vs. each day in the past week”, and “this month vs. same month in last year”; (NEW)

• **Historical Data Display:** Displays hourly, daily and monthly data both numerically and graphically for the past 10 years. Offers vivid diagram display for history data review; (NEW)

• **Historical Data Download:** Downloads hourly, daily, weekly and monthly data to a PC via USB or SD card;

• **Display and Update Time-of-Use Information:** TOU schedule display and update;

• **Excellent System Performance:** Excellent system performance backed up with a supreme 400MHz embedded CPU; up to 300-ft wireless range;
• **Backup Li-ion Battery:** up to 3 hour capacity under working mode and more in stand-by offering the system with better mobility and portability; (NEW)

• **Multiple System Configuration Options:** Real-time clock synchronization between the HEM device and the Smart Meter, customizable background pictures and etc.

**Digital Photo Frame**

• **Fun Photo Play:** Displays personal photos or favorite pictures while in stand-by;

• **Image Source:** Selectable from USB Stick, SD Card or device’s local memory;

• **Photo Slideshow:** Single Image or Slideshow Display in preferred speed;

• **Background Customization:** Set an image as the system background.

---

**About OWON**

OWON Technology (part of LILIPUT Group) is a globalized ODM [Original Design Manufacturer] service provider specialized in research and application of electronic and computer-related technologies. It is an ISO 9001:2008 certified research institute and manufacturer involved in design, manufacturing, marketing and delivery of electronic products across the world since 1993. The company has been producing and delivering both standardized and customized products in the past two decades offering a variety of solutions in satisfying a wide range of industries.

OWon SmartLife aims at deploying state-of-the-art technologies to propel the efficient use of energy, and to create a “Greener, Comforter & Smarter” home environment. We have been delivering both standardized products and turnkey solutions for Home Energy Management and Smart Home industry, offering reliable one-stop ODM services for utilities, contractors, distributors as well as home builders.

---

**Corporate Headquarters**

3D Via Renzo Drive, Suite 200
Richmond Hill, Ontario
L4B 0B8, CANADA
Tel: 905-787-2289
Fax: 905-784-1183
Email: sales@owon.com [Sales & Distribution]
info@owon.com [General Inquiries]
Web: www.owon.com
www.owon-smart.com

---

OWON Technology  OWON SmartLife