

# **Power Consumption Management**

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Monitoring residential & industrial energy

use on a large scale can be

overwhelming and cumbersome task. What

is required is an automated system for

collecting data on several appliances within several residences or offices, and somehow

transmitting this data to a central control

station (CCS) that has the necessary tools to

## POWER CONSUMPTION MANAGEMENT (PCM)

ASD's power consumption management (PCM) strategy stresses the exposure of hidden power leakages. To this end, it is important to monitor all the major appliances in a home and be able to recall the data and consumption history of each one. This is done through a multiple of measurement modules (PM<sup>2</sup>, voltage, timer, temperature and humidity). Plus, using a detailed data capture method from the main power line to the house and multiple data points inside the house. Finally, state-of-the-art analytical software. Continuous measurement and analysis will give an early warning to avoid hefty electrical utility bills. In addition to the residential use, this system is also applicable to offices and industrial areas.

#### THE PM<sup>2</sup>-100 MODULE

The PM<sup>2</sup>-100 is a light, portable device developed by ASD to monitor single appliances with single phase mode.



This micro-controller driven device has an accuracy of 0.2% (IEC 62053-22), built-in communication capability, and outputs the Kilowatt and Kilowatt-Hour. It saves the watthour in a non - volatile memory.

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Using several PM<sup>2</sup>-100 units, each one connected to an appliance which is to be monitored, such as lights, heaters, A/Cs and all types of home or industrial appliances. ASD's PCM system relies on these PM<sup>2</sup> communicating locally with a units. communication module through power lines at a baud rate of 1.2kbps (EN50065-1).The user's PC reads from units according to a user defined schedule. The communication module transfers schedules to the corresponding units. Finally, analytical CCS Data transfer between the phase. communication module and the remote CCS occurs through the telephone line modem with rate of 33.6Kbps. This remote communication occurs daily basis on through an automatic dial -up procedure. ASD's PCM software package will be provided.

The PM<sup>2</sup> unit isn't only a measurement one, but it serves as a control unit as well. The schedule transferred to each unit via communication module, shall define the operation of the relative appliance.PM<sup>2</sup> units are available as measurement units or as measurement and control units.

### THREE PHASE MEASUREMENT AND CONTROL UNIT

Taking all details into consideration, ASD designed another light portable device to monitor appliances with three phase mode. As PM<sup>2</sup>-100, this unit is applicable to residential & industrial areas. It's also available as a measurement unit or as a measurement and control unit.

The unit interacts with the whole system exactly as PM<sup>2</sup> units. It communicates locally and remotely with the communication module and CCS via the same links and specifications.

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#### CONTROL UNITS

ASD products are configured and enhanced to satisfy customer's needs. To this point, ASD introduces a sole control unit that handles the operation of single or three phase appliances according to a user defined schedule as described previously. This unit is required for applications where no measurement is needed.

#### VOLTAGE MEASUREMENT MODULE

This Module measures the true RMS voltage with an accuracy of 0.2% and reports data to the communication module through power lines. It checks power for if it's *locally generated or received from utility*.

#### TEMPERATURE AND HUMIDITY MODULE

This includes a temperature and humidity sensor. The temperature sensor measures temperature between -3°C to 60°C with an accuracy of +/-3%. The humidity sensor detects humidity between 10 and 95% with an accuracy of +/-5%.Similar to previous modules; local communication is available via power lines.

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#### TELEPHONE LINE MODULE

ASD continues providing further flexibility to the system by introducing this module. Such module is the exact solution to those who suffer scary telephone bills.



As the schematic reveals, the PC sends a user specified duration to the module passing through the communication unit and power lines. Whenever a phone call exceeds the agreed duration, the module directly cuts the Phone line terminating the call.

#### INTER-BUILDING COMMUNICATION



#### PCM SOFTWARE

ASD's PCM software can monitor as many residential, office and industrial setups by accessing the different communication modules' addresses. As well as online monitoring options for all devices and appliances. The software provides preprogrammed alarms for equipment failures, tempering with the measurement devices and modules.

From the main control panel (below), we can see the two different locations being monitored and plotted on-line. Any one of these locations can be changed using the drop-down list box provided, and the relevant data will be displayed on the graphs in the appropriate color key.

The physical locations will also be displayed for the operator. In this case we are looking at two locations within any region. The graph at the bottom can be used to compare similar appliances in two locations, for example the air conditions and heaters at locations A and B.

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New locations and the appliances being monitored within them can be added to the PCM system from a configuration screen. These may also be edited at any time. The software will store a comprehensive file on the residence being monitored, complete with locations, area, number of residents, insulation, utility tariff information, utility transformer ID and meter information, and much more. The operator has the flexibility to identify new appliances for the system and to define which PM<sup>2</sup> units are connected to which appliances.

In the device details screen (below), the operator can delve into the specifics of which devices are available in the home. he/she can also monitor the and consumption of each one individually. A indicates all status bar incoming communication from the collection of communication modules. A schematic drawing the home being monitored can also indicate the location of each of the appliances in the home.

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A graphical analysis package is provided to make visual sense of the numeric data. The operator can choose to compare and contrast the consumption of different appliances within the home, over a given period of time, as seen in the pie chart (right).

Another useful plot is the total consumption for that particular home over a given period of time. This can be a day, a week, a month, or even a whole year's worth of online energy consumption data.



ASD continually strives to meet your demands, in a genuine effort to improve the efficiency and performance of our utilities and institutions. ASD can customize its products and software to meet specific demands; in some cases this PCM package has been augmented by humidity / temperature-to-power-consumption comparison reports, added statistical search and sort packages, and the like.

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