

Small HVAC Database Of Monitored Information

Database of Compiled Information (product 4.4.3)
(This document is located in the *Additional Documents* file)

TECHNICAL REPORT

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PREFACE

The Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

This document is one of 33 technical attachments to the final report of a larger research effort called *Integrated Energy Systems: Productivity and Building Science Program* (Program) as part of the PIER Program funded by the California Energy Commission (Commission) and managed by the New Buildings Institute.

As the name suggests, it is not individual building components, equipment, or materials that optimize energy efficiency. Instead, energy efficiency is improved through the integrated design, construction, and operation of building systems. The *Integrated Energy Systems: Productivity and Building Science Program* research addressed six areas:

- Productivity and Interior Environments
- Integrated Design of Large Commercial HVAC Systems
- Integrated Design of Small Commercial HVAC Systems
- Integrated Design of Commercial Building Ceiling Systems
- Integrated Design of Residential Ducting & Air Flow Systems
- Outdoor Lighting Baseline Assessment

The Program's final report (Commission publication #P500-03-082) and its attachments are intended to provide a complete record of the objectives, methods, findings and accomplishments of the *Integrated Energy Systems: Productivity and Building Science Program*. The final report and attachments are highly applicable to architects, designers, contractors, building owners and operators, manufacturers, researchers, and the energy efficiency community.

This attachment, "Small HVAC Database of Monitored Information" (Attachment A-24), provides supplemental information to the final report within the **Integrated Design of Small Commercial HVAC Systems** research area. It consists of a database of information compiled from the small HVAC system field surveys conducted as part of this research project. This database, which contains the complete data of the Integrated Design of Small Commercial HVAC Systems, is only available by mail (it is not available for downloading from the PIER website).

The Buildings Program Area within the Public Interest Energy Research (PIER) Program produced these documents as part of a multi-project programmatic contract (#400-99-413). The Buildings Program includes new and existing buildings in both the residential and the non-residential sectors. The program seeks to decrease building energy use through research that will develop or improve energy efficient technologies, strategies, tools, and building performance evaluation methods.

For other reports produced within this contract or to obtain more information on the PIER Program, please visit www.energy.ca.gov/pier/buildings or contact the Commission's Publications Unit at 916-654-5200. All reports, guidelines and attachments are also publicly available at www.newbuildings.org/pier.

ABSTRACT

The “Small HVAC Database of Monitored Information” was produced as a part of the Integrated Design of Small Commercial HVAC Systems project. This project was one of six research elements in the *Integrated Energy Systems: Productivity and Building Science* Program, funded by the California Energy Commission’s Public Interest Energy Research (PIER) Program.

This project conducted field surveys and short-term monitoring of packaged HVAC systems up to 10 tons per unit, identified problems that lead to poor system performance, and recommended solutions to those problems. This attachment consists of a database of information from which analysis activities were subsequently conducted. The database includes characteristic information about each HVAC unit and building, the failure modes or suboptimum performance observed in each building, and responses to occupant interviews. The database consists of information collected on 215 HVAC units that were tested at 75 sites.

The researchers identified a number of problems with HVAC systems as they are installed and operated in the field. Problems identified include broken economizers, improper refrigerant charge, fans running during unoccupied periods, fan that cycle on and off with a call for heating and cooling rather than providing continuous ventilation air, low air flow, inadequate ventilation air, and simultaneous heating and cooling.

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Keywords: packaged HVAC system, economizer, RTU, thermostat, DX air conditioner, refrigerant charge, cycling fans, ventilation air, simultaneous heating and cooling

