APR Control

- **Continuously Matches AC System Capacity to Changing Loads**
- **Eliminates Problems of Excess Capacity**

RAWAL DEVICES, INC

The APR Control Solves

AC Systems Have Overcapacity by Design

AC systems are typically designed using a "design day", a set of maximum load assumptions. These assumptions — a sunny, 95˚F day with high relative humidity and maximum building occupancy — are, in most cases, more extreme than actual conditions. As a result, most AC systems have excess capacity for more than 50 weeks a year.

Most AC Systems Offer Only ON/OFF Control

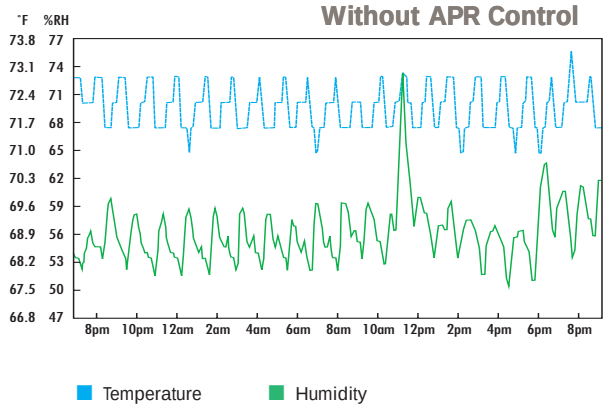
Most direct expansion air conditioning systems offer very little in terms of capacity control; they are either running at full capacity or they're off. Unfortunately, for most days of the year this lack of subtlety leads to excessive compressor cycling and other nagging problems.

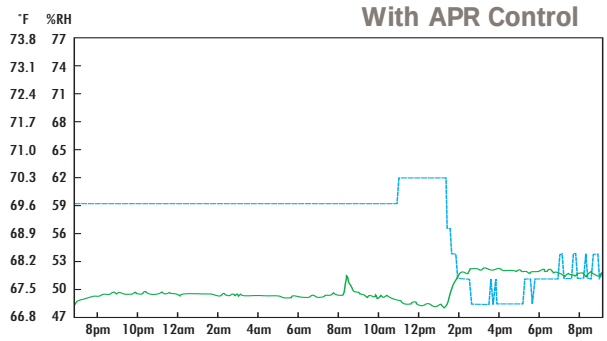
Poor Capacity Control Leads to Humidity, Compressor Cycling, and Service Problems

For roughly 50 weeks each year, an AC system runs at full capacity until the space reaches the desired thermostat temperature and then shuts off. While it's off, humidity levels in the building increase, causing occupants to feel uncomfortable even though temperatures are within the desired range. This problem is exacerbated on cloudy - muggy days with moderate temperatures when frequent ON/OFF cycling causes excessive wear-and-tear on the system's compressor and increased downtime and service. And, because the temperature of the air crossing the evaporator coils is too low, they often ice up, leading to liquid slugging and other system failures.

The APR Control provides more consistent temperature and humidity control.

These graphs show actual temperature and humidity readings from two rooms with identical load characteristics at the Sheraton World Resort, Orlando, FL. Both rooms had identical GE 9,000 BTU/hour DX PTAC units. One unit was fitted with an APR Control; the other was not.





Most Common AC System Problems

The APR Control Automatically Matches System Capacity to Changing Loads

Installing an APR Control is like giving your AC system a brain. It continuously modulates system capacity, automatically matching it to reduced or changing loads. The APR Control responds quickly to changing load conditions by monitoring the heat content of return air and adjusting refrigerant flow. As a result, it maintains the AC in dehumidifying mode while providing close temperature control.

With reduced humidity levels, the space feels more comfortable to occupants, allowing higher thermostat settings and lower energy costs.

Improves System Performance, Reduces Service Costs

The APR Control:

- Improves humidity control, reducing humidity levels without overcooling the space
- Reduces compressor cycling, thereby reducing wear-and-tear on the compressor, energy costs, and repair costs
- Prevents coil icing or liquid slugging, even if a filter is clogged or a belt is malfunctioning
- Reduces system maintenance and repair costs, and eliminates repeated service calls for the same problem
- Outperforms hot-gas bypass
- Automatically compensates for inaccurate design data / assumptions or changes in load

Outperforms End-Type Controls

Because the APR control responds instantly to the heat content of return air, it outperforms end-type controls such as thermostats and humidistats.

Simplifies System Renovations

The APR Control has been successfully used to improve comfort and system performance in a wide range of renovation applications involving oversized RTUs, undersized ductwork, system expansions, and building layout / use changes that resulted in dramatic load shifts or widely varying loads.

Compensates for Efficiency Differences in Old and New Equipment

The APR Control effectively compensates for reduced suction pressures that result when new high efficiency systems (with oversized condenser units) are used with older lower efficiency evaporators.

Reduces Variability of Make-Up Air

In high-percentage make-up air systems (25% ~100%), cooling /dehumidifying loads can vary widely. By keeping the system online longer, the APR Control reduces the cycling caused by wide variations in the temperature and humidity of make-up air. In addition, by reducing the variation in make-up air, the APR Control improves compliance with ASHRAE ventilation standard 62-1989.

Reduces or Eliminates Reheat

The APR Control can also significantly reduce or, in some cases, eliminate reheat. Since reheat typically accounts for 30% ~ 50% of the operating cost of AC systems, the APR pays for itself in months.

Reduces the Cost of Piping and Ductwork in Multiple Evaporator Zone Systems

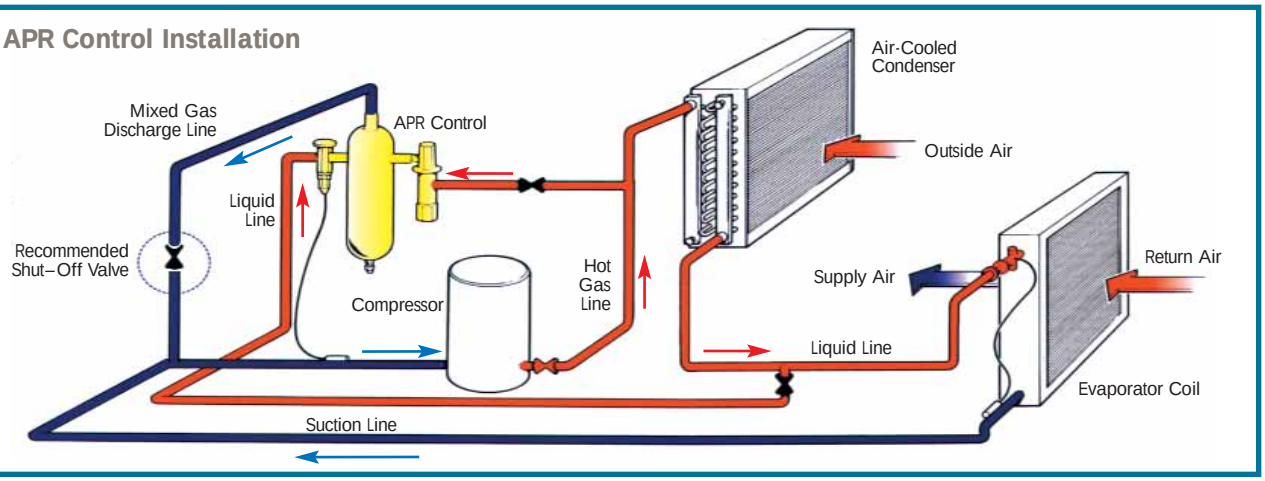
By permitting the control of individual fan coil evaporators using simple thermostatically-activated solenoid valves, the APR Control reduces ductwork and system installation costs. It provides superior performance even for zones that are remotely located, oddly shaped, or have widely varying load conditions. No complicated piping, control wiring, or expensive air-side controls are required.

When sizing pipe for this type of installation, ASHRAE refrigerant piping protocol must be observed. Contact Rawal Devices for technical assistance.

Approved for Use with New Environmentally Friendly Refrigerants

The new APR Control has been tested and approved for use with new R410-A environmentally friendly refrigerants such as Dupont Puron®.

APR Control Installation



Thousands of Satisfied Users

Facilities

Bayer Pharmaceuticals
Caterpillar
Cincinnati Zoo
Dell Computer
Del Monte Food Company
Forrest Labs
GTE
Hampton Inn
Jack-in-the-Box
Kodak
Langley Air Force Base
PPG Industries
St. Louis Public Schools
Sheraton World Resort
University of Georgia
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Yale University

Engineers

Aquarious Consulting
Consulting Engineering Associates
Ericson, Ellison and Associates
Lester, Bueher Engineers
Parsons Engineering
Scheeser, Buckley, Mayfield
TLC Engineering
URS Consultants

Contractors

Airco Mechanical
Comfort Systems USA
Coolray Heating and Cooling
County Fair Air Conditioning
George Haney & Son
Hill York, Inc.
Kentuckiana Comfort Center
Monsen Engineering
Rieck Mechanical
Shambaugh & Sons
United Mechanical
The Warko Group

"We have a 35-ton rooftop AC unit on our county library that was grossly oversized and therefore would not dehumidify sufficiently. Books were molding, the space was very uncomfortable, and electric reheat was required. The APR Control we installed has performed wonderfully, maintaining both humidity and temperature without the need for reheat. We are very pleased with the results."

Keith Chandler, HVAC Department Manager
WestPoint Stevens Inc.
Valley, AL

"After speaking with Rawal Devices technical support a few years ago, I had a number of uses in mind for the APR Control. Since then, I have installed over 100 APRs in a wide range of applications, and I've seen it used in many more. It solves a long list of design and service problems."

Bob Reichenbach, HVAC Service Manager
The Warko Group
Reading, PA

"After 2½ years and almost 400 APR Control installations, I have yet to have a single problem. Rawal Devices applications support is top-notch. Both the product and the company are a pleasure to work with."

Chuck Ruedebusch
Rollie Johnson, Inc.
Chesterfield, MO

RAWAL DEVICES, INC

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