

**OAK RIDGE NATIONAL
LABORATORY**

SUMMARY OF RESULTS

PERFORMANCE OF



ENERGY SAVING MODULES

FOR

ABBOTLY TECHNOLOGIES, INC.

December 2004 and April 2005

**December 2004 Test
(Phase 1)**

**Evaluation of Abbotly Technologies Compressor
Optimization Control Product “ESM System 4000”
as applied to
Two Refrigeration Compressor Rack Systems at the
ASDA/Wal-Mart Super Center in Sheffield, UK**

Prepared by
Van D. Baxter

under

User Agreement UR 04-419

between

Abbotly Technologies, Inc.

and

UT-Battelle, LLC/Oak Ridge National Laboratory
PO Box 2008, Bldg 3147, MS-6070
Oak Ridge, TN 37831-6070

Test Overview

Test Location: ASDA/Wal-Mart Super Center
in Sheffield, UK

Compressors Tested: Medium Temperature Pack 4
Low Temperature Pack 2
Each Pack has 8-4 amp scroll
compressors. Each Pack has
common suction manifold.

Controller: Hussman Rack Controller

Test Period: Data collected for a 21 day period
beginning July 14, 2004. ESM
ON July 14 to July 25 and Off
July 27 to Aug 4.

Data Source: Emerson Retail Services and
Abbotly kwhr meter.

Test Results Summary

	Oak Ridge	ABBOTLY
Run Time Reduction Pack 2	11%	
Run Time Reduction Pack 4	19%	
KWHR Reduction total	N/A	72, 528/year (1)
KWHR Reduction Percentage Pack 2	5-6% (1)	15% (1)
KWHR Reduction Percentage Pack 4	6-8 % (1)	20% (1)
Cycle Rate Reduction Pack 2	38%	
Cycle Rate Reduction Pack 4	31%	
Case Temperature Impacts	Negligible	Negligible
COP Increase Pack 2	11.7 % (2)	
COP Increase Pack 4	13 %	

Note (1): Emerson collected amp data on compressors every 15 min therefore Oak Ridge indirectly estimated kwhr reduction using COP calculations. Abbotly, under the supervision of ASDA management, measured kwhr every 8 seconds and summarized. As a follow-up Oak Ridge recommended an additional test under laboratory conditions where kwhr reductions could be further verified (Phase 2).

Note (2): COP is Coefficient of Performance and is a measure of compressor efficiency.

**April 2005 Test
(Phase 2)**

**Experimental Evaluation of
Abbotly Technologies Compressor Optimization
Control Product ‘ESM System 4000’
as applied to a
21-ton Roof Top Air Conditioner**

Prepared by
Van D. Baxter

under

User Agreement UR 04-419

between

Abbotly Technologies, Inc.

and

UT-Battelle, LLC/Oak Ridge National Laboratory
PO Box 2008, Bldg 3147, MS-6070
Oak Ridge, TN 37831-6070

Test Overview

- Test Location:** R&D facilities of Lennox Industries, Inc., located in Carrollton, Texas
- Compressors Tested:** Lennox model LGA248H4B commercial roof top air-conditioner having four scroll compressors of equal size and a total rated capacity of 21 tons cooling (74 kW).
- Controller:** Novar
- Test Period:** 3 day period April 21 to April 24 2005. ESM Off April 21 and On April 24.
- Data Source:** Lennox Research Facility, Carrollton, Texas
- Nature of Test:** Two enclosed chambers, one enclosing HVAC unit and one enclosing heaters to simulate load, i.e. the only variable is whether the ESM was on or off.

Test Results Summary

	Oak Ridge
KWHR Reduction Percentage Total	7.9% (1)
KWHR Reduction Percentage High Load Period	12.1%(1)
Cycle Rate Reduction Compressors 1 and 2	6%
Cycle Rate Reduction Compressors 3 and 4	40%
Average Temperature ESM ON	77.6
Average Temperature ESM OFF	76.8
COP Increase Total Period	6.6%
COP Increase High Load Period	10%
Peak Demand Reduction High Load Period	2.2%

Note (1): This is the kwhr reduction on the total HVAC capacity of which the compressors represent approximately 66.5%. Therefore, the reduction of compressor kwhr usage is closer to 11.87% for total test period and 18.1% for high load test period. Also, during the ESM On high load period the current to the heaters simulating load was turned off for several 2 to 3 minute periods by an improperly set thermostat. Oak Ridge estimated that the maximum load reduction impact would be 6% assuming instantaneous cooling of the heaters with loss of current.