

ENDOCUBE TEST REPORT

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1. Endocube Product Description

The Endocube consists of a food simulant contained in a skinned enclosure. Once the Endocube is placed on the refrigerator's thermostat sensor, it will use food temperature as the signal to control its refrigeration cycle rather than fluctuating air temperature. The effect is a more efficient refrigeration cycle, where the individual cycle lasts longer but the frequency is reduced by up to 80% which additionally increases the life span of your refrigeration units.

2. Endocube Trial Setup and Testing Procedure

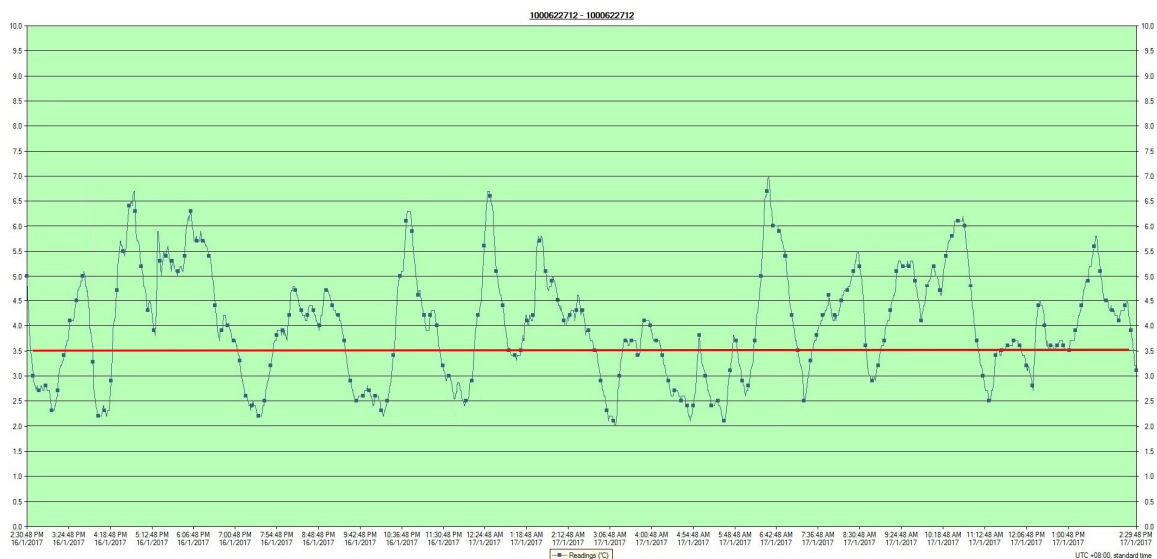
During the trial period from 16th to 18th January 2017, we installed one power analyzer measurement device on the DB board of one Chiller (Chinese Kitchen – Level 6) walk-in room.

From 16th to 17th January (24 hours) we recorded the electrical power consumption without the Endocube Device, whereas from 17th to 18th January 2017 (24 hours) we recorded the electrical power consumption with the Endocube device fitted in.

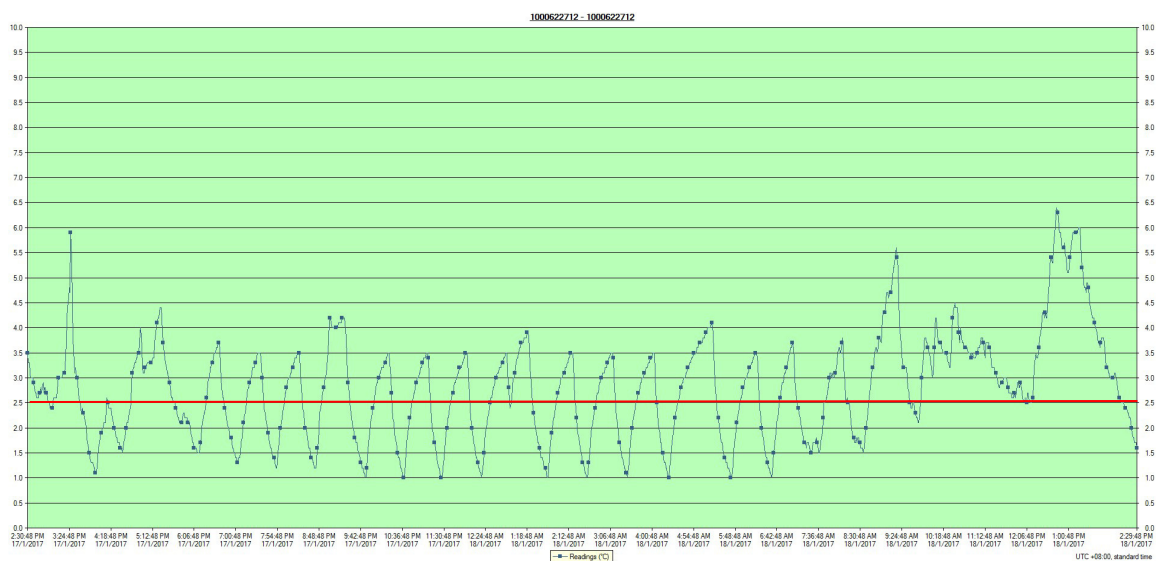


3. Chiller room - Temperature Measurement Results

Air Room Temperature – Without Endocube:



Air Room Temperature – With Endocube:



With the Endocube fitted in, the average air room temperature remains lower at 2.5°C with a better temperature stability.



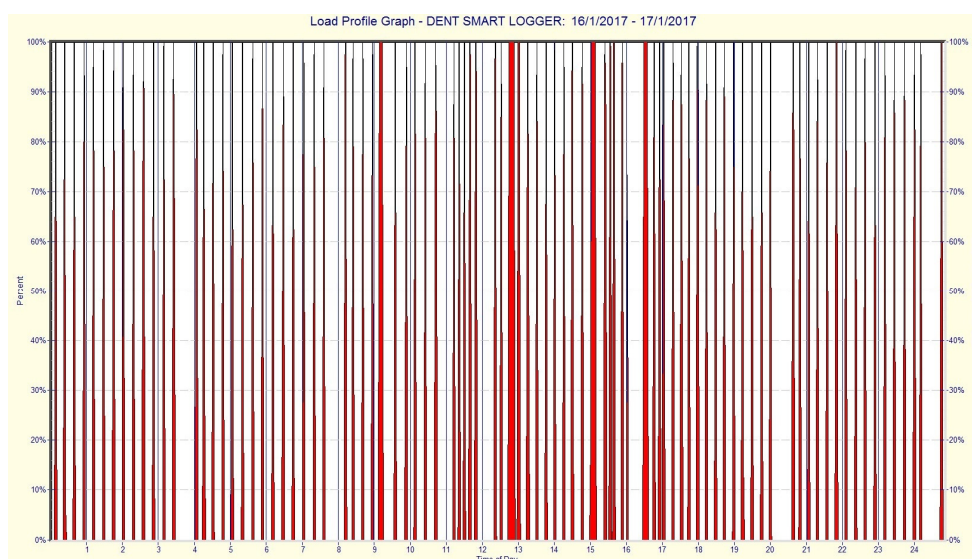
4. Chiller room - Power Measurement Results

Measurement of absorbed power:

This absorbed power measurement only include the compressor(s).

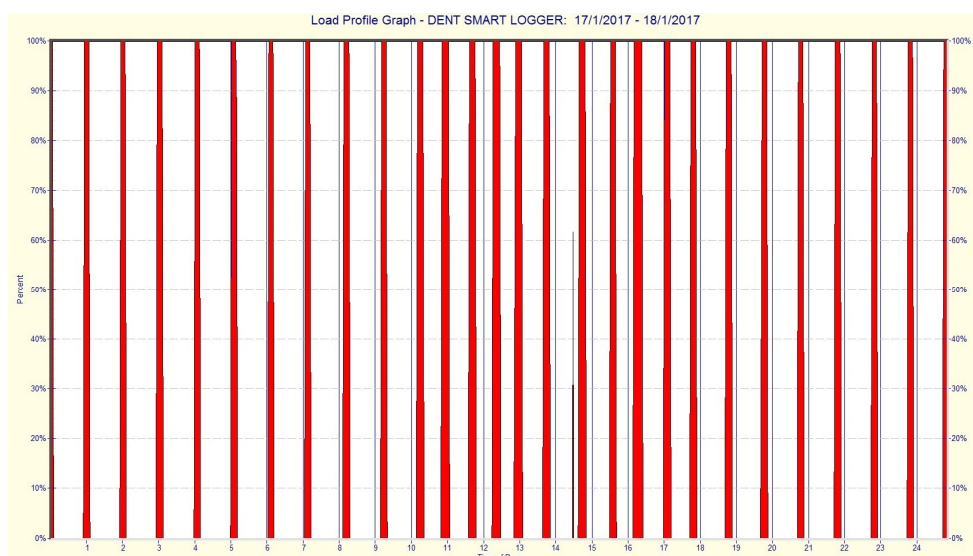
	Chiller room
Voltage (V)	419.0
Amperage (A)	3.72
Power Factor	0.977
Power Input (kW)	2.641

Time of Usage Graph – Without Endocube:





Time of Usage Graph – With Endocube:



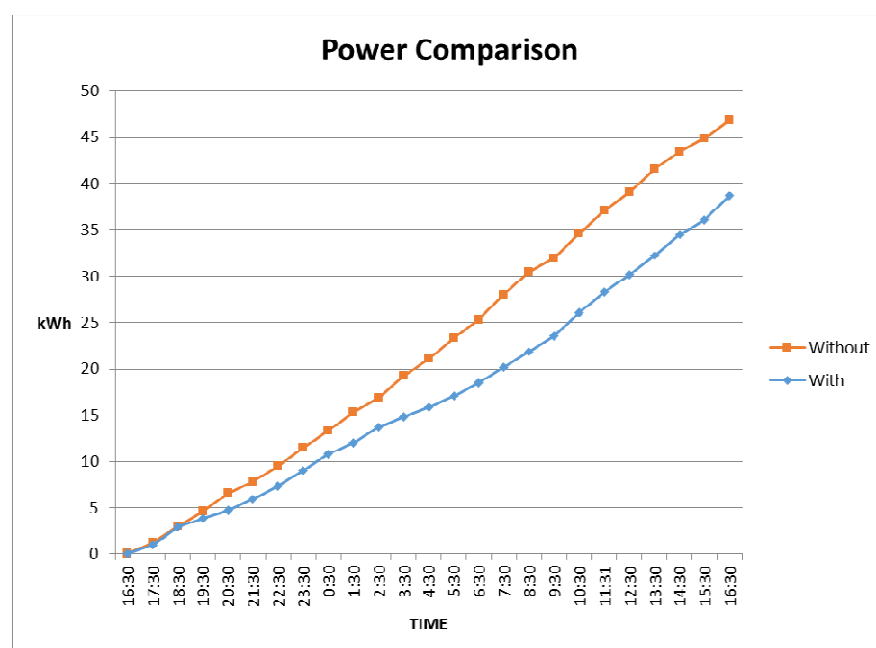
Time of Usage Summary:

Without Endocube

With Endocube

Data File Name:	Mandarin - Chiller - CP without.log		Mandarin - Chiller - CP with.log	
Logger Serial Number:	CT15110055		CT15110055	
Description:	DENT SMART LOGGER		DENT SMART LOGGER	
Data Starts:	16/1/2017	14:30:00 PM	17/1/2017	15:30:00 PM
Data Ends:	17/1/2017	14:30:00 PM	18/1/2017	15:30:00 PM
Data Elapsed Time:	24 hrs		24 hrs	
Number of Turn Ons:	84		25	
Percent On:	28.47 %		23.68 %	
Data On-Time:	6.83 hrs		5.68 hrs	
Average On-Time:	0.08 hrs		0.15 hrs	
Longest On-Time:	0.18 hrs		0.28 hrs	
Shortest On-Time:	0.04 hrs		0.09 hrs	
Number of Turn Offs:	85		26	
Percent Off:	71.53 %		76.32 %	
Data Off-Time:	17.16 hrs		18.32 hrs	
Average Off-Time:	0.16 hrs		0.41 hrs	
Longest Off-Time:	0.42 hrs		0.72 hrs	
Shortest Off-Time:	0.07 hrs		0.12 Hrs	

Daily Power Consumption Graph:



5. Chiller room - Final Report Analysis and Savings

	Without Endocube	With Endocube
Power Consumption per 24 hours:	46.8 kWh	38.6 kWh
Estimated Power Consumption per month	1,404 kWh	1,158 kWh
Power Consumption Savings per month	246 kWh	
Electricity Cost Savings per month (1)	S\$ 44.28	
Return on Investment (2)	7.9 Months	
Power Savings in Percentage	17.5%	
Reduction in Compressor Cycles	70.9%	

(1) Calculation based on 0.18 S\$/kWh

(2) Calculation based on S\$350.00 per Endocube