



**COOLNOMIX™ ENERGY CONTROL SYSTEM
PERFORMANCE REPORT FOR
MANNINGS**



**COOLNOMIX™ testing in the Mannings
Chi Lok Fa Yuen, Tuen Mun retail outlet**

16 December 2013



EXECUTIVE SUMMARY

Mannings, part of the Dairy Farm Group, invited Agile8 Consulting Limited ("Agile8") to demonstrate how **COOLNOMIX™** Optimized Refrigerant Supply (ORS™) can reduce energy costs of air-conditioning in a busy retail outlet.

COOLNOMIX™ is an active energy intelligent thermostat which uses a comparison of the retail outlet temperature and cold supply air temperature to optimise the running time of air-conditioning compressors while significantly improving temperature stability. Accounting for over 95% of the power consumption, the compressor is the main power consuming component in any air-conditioning system.

For this test three **COOLNOMIX™** AC-01 Systems were installed on 17th September 2013 in an open-fronted Mannings retail outlet at Shop no. 66A, G/F., Chi Lok Fa Yuen, Tuen Mun, N.T., Hong Kong. By agreement energy-saving testing then commenced for a period of two and a half months using an electricity billing comparison between monthly electricity metering for the same period in 2012 as for 2013 while under **COOLNOMIX™** control.

At the conclusion of the trial period it was established that **COOLNOMIX™** delivered a **16% average operating cost reduction in the total electricity charge for this retail outlet**. Assuming that air-conditioning accounts for about 70% of the total electricity charge for this Mannings retail outlet **this equates to an average air-conditioning related operating cost reduction of 23%** as shown in the table below.

2012		2013		Days	kWh Savings	% Site Savings	% Aircon Savings	Remarks
Dates	kWh	Dates	kWh					
29 Aug to 27 Sep	7616	29 Aug to 27 Sep	7030	10* of 29	*1699	22%	31%	* COOLNOMIX™ installed on 17 Sep 2013. Savings adjusted for full month
28 Sep to 29 Oct	6299	28 Sep to 29 Oct	5370	31	929	15%	21%	COOLNOMIX™ in operation
30 Oct to 27 Nov	4208	30 Oct to 27 Nov	3723		485	12%	17%	COOLNOMIX™ operate whole month
Average COOLNOMIX™ delivered savings						16%	23%	

Since this Mannings store is an open-fronted outlet on the street (as opposed to, for example, an open-fronted outlet in a shopping mall), this is an exceptional result. Assuming that the energy consumption figures for April through to July are a mirror-image of the above period and that July-August will be similar to August-September, the total annual **COOLNOMIX™** delivered savings for this Mannings retail outlet are likely to be:

$$2 * (1,699 + 929 + 485) + 1,699 = \mathbf{7,925 \text{ kWh annual savings}}$$

INTRODUCTION

Mannings is a leading Healthcare and Beauty products retail organisation in Hong Kong. In common with many organisations Mannings, and its parent Dairy Farm Group, have a firm focus on reducing both operating costs and energy consumption levels in line with their corporate and social responsibility objectives.

As part of a Dairy Farm energy reduction programme **COOLNOMIX™** was installed on 17th September 2013 at Shop no. 66A, G/F., Chi Lok Fa Yuen, Tuen Mun, N.T., Hong Kong.



Fig 1. Mannings Test Site

Within this open-fronted Mannings retail outlet, open to the street, **COOLNOMIX™** worked to reduce energy consumption on three cassette-type air-conditioning units. By agreement with Mannings the set-points on these three air-conditioning units were adjusted to suit comfort level requirements as follows:

- | | |
|---|---------|
| A/C #1 (in the entrance area) | - 23°C |
| A/C #2 cashier area (right hand side) | - 22°C |
| A/C #3) within the store (left hand side) | - 22°C. |



COOLNOMIX™ ENERGY CONTROL TECHNOLOGY

At the core of every **COOLNOMIX™** energy control system is our patent pending **Optimized Refrigerant Supply™** technology.

This technology makes use of two temperature sensors that work continuously to ensure that comfort levels are met while optimising energy savings.

In operation our unique **COOLNOMIX™** technology has three main objectives, namely:

First, protecting the air-conditioning or refrigeration unit. Since the compressor accounts for over 95% of energy consumption, **COOLNOMIX™** delivers energy savings by reducing the time that this component is ON. In many normal operational situations the compressor is ON most - if not all - of the time. Therefore it is accurate to note that **COOLNOMIX™** does turn the compressor ON and OFF more frequently. However, **COOLNOMIX™** has built-in safeguards which ensure:

- Every start is a 'soft' start in the sense that **COOLNOMIX™** ensures that suction and discharge pressures of the compressor are equalised. This is achieved by waiting until the cold supply air temperature from the evaporator coil has increased to 2°C below the room air set-point.
- The compressor runs for a minimum of three minutes following any start-up.
- The compressor remains OFF for a minimum of three minutes before re-starting, regardless of the detected cold supply air temperature.

Second, assuring comfort levels. **COOLNOMIX™** ensures that the compressor is never switched OFF until the desired set-point has been reached. In this sense the cool-down process is exactly the same as that delivered by the air-conditioning or refrigeration unit in normal operating mode. Once achieved, however, the two **COOLNOMIX™** temperature sensors work together to ensure that the delivered room temperature is more exact than when under non-energy-saving mode (typically +/-0.5°C).

Third, optimising energy savings. In operation, **COOLNOMIX™** is designed continuously to adjust energy consumption consistent with the required cooling load. When working with a correctly sized and properly maintained air-conditioning or refrigeration unit the typical compressor ON time required to deliver a required room or space temperature should be between four and seven minutes in duration. The compressor OFF time (during which energy savings are delivered) will obviously vary depending on the prevailing heat load.



RESULTS OBTAINED

The energy savings delivered by **COOLNOMIX™** during the Mannings trial at Shop no. 66A, G/F., Chi Lok Fa Yuen, Tuen Mun, N.T. were similar to those delivered in other open-fronted retail locations where the prevailing Hong Kong climate has a significant impact on results.

Across the trial period, average savings were 16% of the overall electricity bill for this site, or an average 23% for the air-conditioning related energy consumption (assuming that air-conditioning accounts for about 70% of the total energy consumption). From the table below it can be seen that **COOLNOMIX™** delivers greater savings during the hotter months; a result that is also in line with our expectations.

2012		2013		Days	kWh Savings	% Site Savings	% Aircon Savings	Remarks
Dates	kWh	Dates	kWh					
29 Aug to 27 Sep	7616	29 Aug to 27 Sep	7030	10* of 29	*1699	22%	31%	* COOLNOMIX™ installed on 17 Sep 2013. Savings adjusted for full month
28 Sep to 29 Oct	6299	28 Sep to 29 Oct	5370	31	929	15%	21%	COOLNOMIX™ in operation
30 Oct to 27 Nov	4208	30 Oct to 27 Nov	3723		485	12%	17%	COOLNOMIX™ operate whole month
Average COOLNOMIX™ delivered savings						16%	23%	

CONCLUSIONS

Overall, the results of this trial indicate that **COOLNOMIX™** can be very effective in reducing operating costs and delivering significant energy savings while maintaining comfort levels within a busy retail outlet.

Agile8 would like to thank Mannings staff for their valuable assistance and support and for providing energy consumption updates throughout the **COOLNOMIX™** trial period.



REPORT ACCEPTANCE

Mannings, part of the Dairy Farm Group, invited Agile8 to demonstrate that **COOLNOMIX™** can reduce operating costs within an open-fronted Beauty and Healthcare retail environment.

Energy-saving trials were carried out between 17 September and 27 November 2013 on three cassette-type air-conditioning units within a retail outlet at Shop no. 66A, G/F., Chi Lok Fa Yuen, Tuen Mun, N.T., Hong Kong.

During this trial, comfort levels were maintained within requirements. The installed **COOLNOMIX™** reduced the overall 2013 electricity charge for the period by an average 16% compared with the same period in 2012.

Mannings

Company

Alex Au Young
Maintenance & Facility Manager
Name


Signature & Company Chop

Agile8 Consulting Limited

Company

Kevin Moore
CEO

Name


Signature & Company Chop

