PT. ANUGERAH MAKMUR MAHATARA

Intelligent Energy Solutions

In Collaboration with

EnviroTech

EnviroTech Energy Saving Controls

Up to 30% Savings for Air Conditioning Chillers



How does the Enviro-Chill Control operate?

The **Enviro-Chill Control** makes small changes, sometimes only for a few minutes, every half an hour to the associated chillers control setpoints to safely unload or alter the demand on the chiller.

This is how **Enviro-Chill Control** interfaces with the associated chillers and can achieve energy reductions up to **30%** depending on application. Energy reductions achieved are very much dependent of type, age and demand placed on the chiller.

This is how we save energy and money ….

Enviro-Chill Controllers focus on monitoring the entire chiller systems performance then encourages the compressor controls to run more when the refrigerant is at its highest effective state or at its most dense. This means that the chiller system will tend to run compressors for longer when suction pressure is elevated (Denser refrigerant) and therefore run less when at lower less efficient state.





Enviro-Chill Controller solutions reduce the amount of total run time of the compressors in a system by ensuring zero effect on the control space temperature.

Enviro-Chill Controller philosophy uses the inherent mechanical properties of the systems refrigerant to initiate saving due to lower compressor lift pressures required. I.E reducing compressor run time when it is mechanically less effective.





The parallel **Enviro-Chill Controllers** do not directly control the cooling plant but rather monitor the load on the plant and store these events to effect change when applicable. This change is implemented by using OEM analogue input control strategies provided by all chiller manufactures.





Benefits of using the Enviro-Chill Controllers

- Direct Electricity Reduction and improved Cooling Efficiency on your Chiller Plant Systems
- Power Consumption and Costs Savings up to **30%**
- Compatibility regardless of Age, Current Control Strategy or Set Up
- Reduction in Chiller Maintenance Costs for your Buildings
- Online ongoing Performance Reporting **IOT Dashboard** with Complete Remote System Support and System Health KPI's
- Logged Data can be viewed in "real time" against Historic Values as Proactive Maintenance Regime and Fault Diagnostics
- Easy Quick Installation times
- Fast Turnaround times
- Solution available as a Service instead of a Capital Expense
- Typical ROI is under **24 Months** as a Capital Expense (**CAPEX**)
- SaaS has Zero Cost to customer as Energy Reduction Savings exceed annual Subscription Fees
- Multi-Site, Multi-System Remote Management tools
- Customizable IO to facilitate potential demand response Load Control if needed
- Integrated BMS Compatibility with Zero Impact on OEM Warrantee on new Chiller Equipment
- **Energy Saving Results** tend to improve or be better the newer or well maintained the Chiller Equipment

Enviro-Chill Controllers Installation Outline

The basic **Enviro-Chill Controllers** installation involves installing a Master Slave PLC LAN Network.

The EnviroTech supervised installing Engineer will need to identify a space within the chiller existing controls enclosure for the din rail mounted EM4 and EVO PLC controllers, power supply, Current Transducers and EWON Netbiter communication gateway.

The installation consists of installing a Controller, PSU and Current transducer in each chiller as well as a Netbiter and network switch in the identified lead chiller. The lead chiller should preferably be close to the common return and leaving water head tanks or pipeline. If the installation is to be carried out on an ammonia or similar system, then close to the common

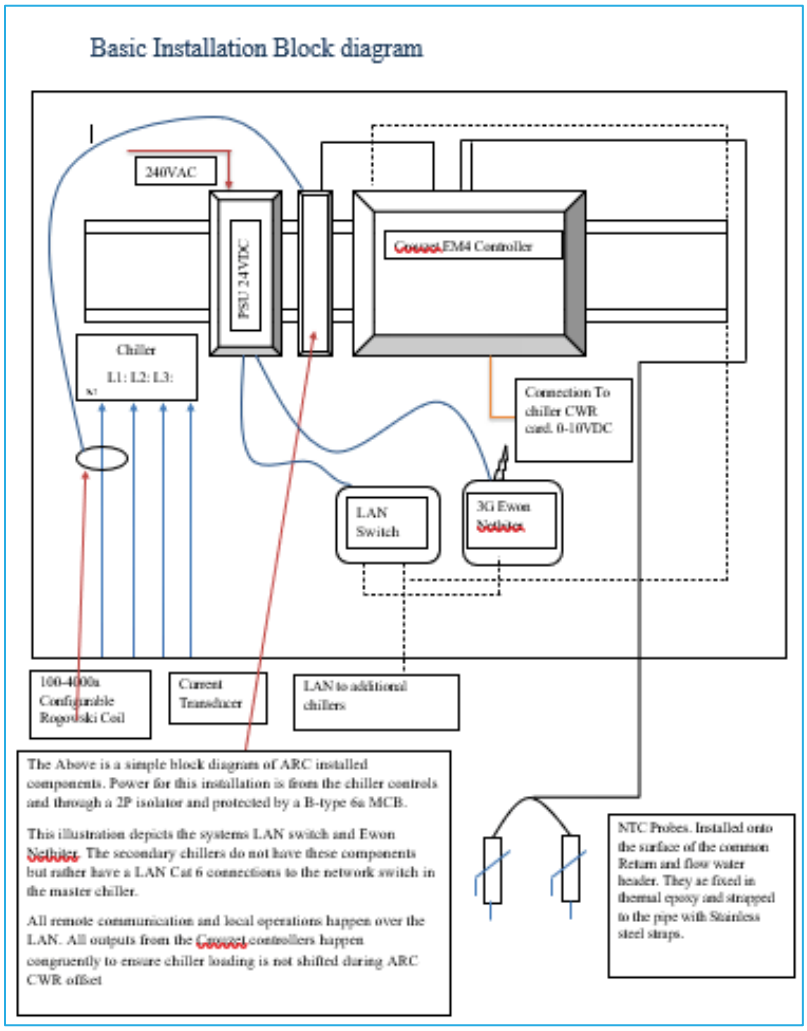
return and discharge refrigerant lines.





NTC transducers will need to be installed onto the common feed and return lines and connected to the closest ARC controller on the NTC IO. The NTC probes in most cases can be strapped to the outside of the water lines between the insulation and the line itself. Thermal epoxy is advised to secure the probe. Covering it with epoxy ensures that it will not move and will ensure that it does not become wet and degrade over time. During the curing process we advise using large SS cable ties (provided in you ARC kit) to strap the NTC probes in place. The insulation can then be placed back and repaired with any locally available aluminium thermal tape.

On the EM4 and EVO controllers' input I9 is the return input and IA is the feed input. Both NTC's are to be fed 24vdc with the return from the NTC to the respective controller input. Please refer to the simple installation diagram below:

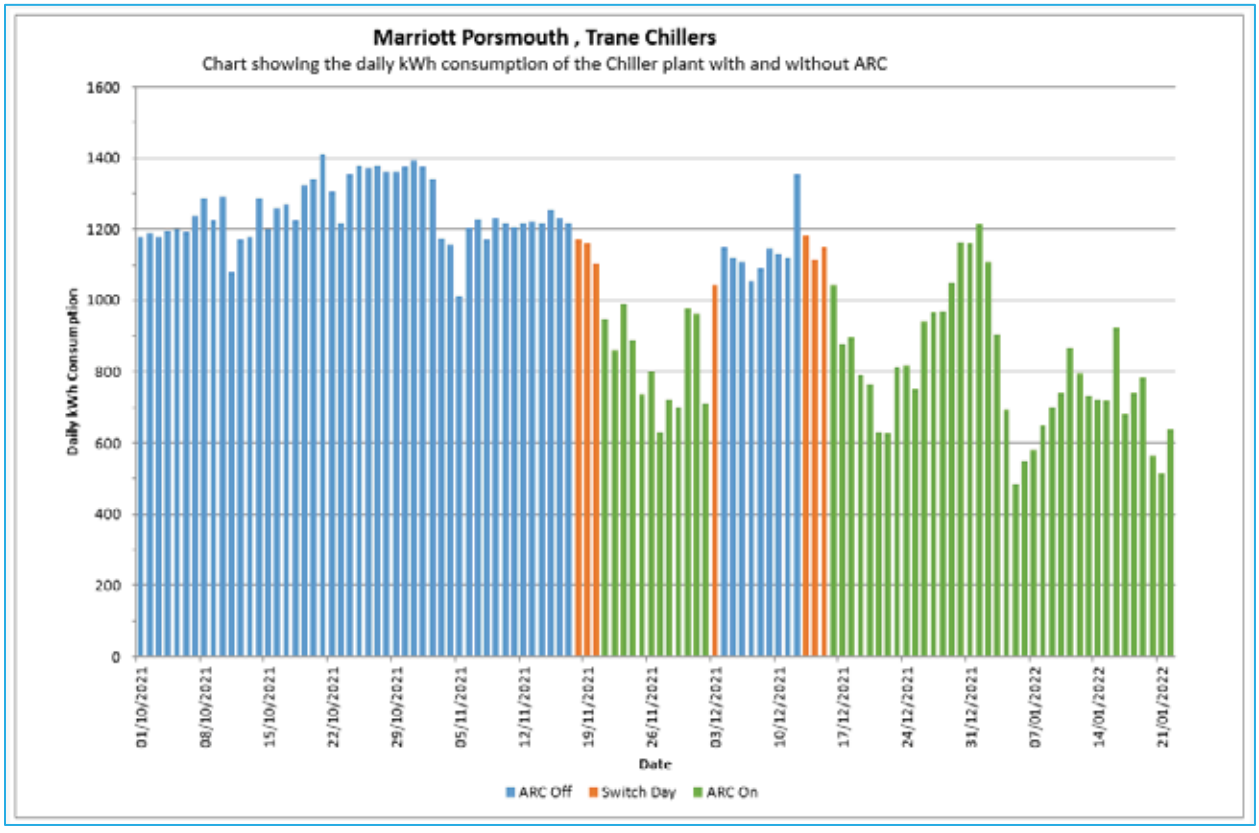


Chiller setpoint analogue input will need to be configured on the chillers. If this is already populated the ARC controller will sit in series with this input and simulate the BMS always with a fallback safety relay. Detailed drawing of the procedure in the BMS installation explanation.

For assistance with this please contact EnviroTech Technical with relevant chiller details.

Once all the components are installed, configured, and powered up in accordance with the detailed explanations further in this document the installing engineer will need to install a working local 3g sim card into a pre-programmed Netbiter.

Once the Netbiter has found the radial server and the indicator lights reflect successful external communication the engineer will need to contact EnviroTech Technical Support help desk for to commence the last stage of the **Enviro-Chill Controllers** Set Up.



In July 2021 when the Average Temperature for the day exceeded 30 Degrees the Energy Consumption of the Chillers reached **2 MWh** for several days and preceding this event the Chillers normalised at 1.2 to 1.5 MWh regardless of the Ambinet Temperature.

Energy Consumption integrating average Ambient Conditions on 4no Trane Chillers



The **M&V Exercise** has shown impressive results, we recognise that the ambient weather conditions will likely have assisted the performance of the software.

The "real time" Energy Monitoring Hardware will continue to collect data and another off period of 10 to 14 days will be performed in **Q1 2022** for inclusion in the next iteration of this report.

From the current calculations, we can observe the following:

During the warmer months **Enviro-Chill Controllers** are delivering on average **25%** Energy Consumption Savings.

This equates to **320 to 380kWh** per day which at GBP 0.13 / kWh equates to a GBP 41 to GBP 49 Cost Saving.

During the cooler months **Enviro-Chill Controllers** are performing at well over **30%** Energy Consumption Savings.

This Energy Consumption Saving equates to **300 to 400 kWh** per day which at GBP 0.13 / kWh equating to a GBP 39 to GBP 52 Cost Savings per Day.

Therefore, we can deduce that the result of the **Enviro-Chill Controllers** installation, using an Energy Consumption reduction of **30%** will result in a net Energy Saving Reduction of **120MWh** as a minimum per annum. This equates to a net Annual Saving of up to **GBP 18,980**.

The following daily Energy Consumptions exclude the above mentioned very warm days which was done to establish a very clear Baseline.

Data Summary for the Portsmouth Marriott Hotel, UK	Enviro-Chill Controllers Off	Enviro-Chill Controllers On
Days Recorded	57	38
Total kWh	74,346.62	30,566.69
Average kWh	1,234.97	804.38
Average Daily Energy Consumption Avoidance in kWh	424.41	
Average Daily Energy Consumption Avoidance as **%**	**34.4%**	
Projected Annual kWh Energy Consumption Savings	154,902	
Projected Annual GBP Cost Savings @ 0.13 GBP / kWh	**£20,137.29**	

Note: The Data is Actual Consumption taken from Ongoing Metering at the Marriott Hotel Portsmouth up to **22/01/2022**.

How Do the Enviro-Chill Controllers work?

The **Enviro-Chill Controller** systems increases plant efficiency by dynamically changing the system set point. This has been called Dynamic Demand Cooling (DDC).

Setpoint manipulation is almost exclusively achieved in an **Enviro-Chill Controller** installation by using the chillers energy management inputs or the inputs designated for BMS set point control by the chiller manufacturer.

The benefits of this are that all the chillers built-in safety framework and any anti-recycle timer functions as well as compressor safety features, designed by the chiller manufacture are adhered to. Thus, our technology complies with all management regimes.

What are the Enviro-Chill Controllers?

Enviro-Chill Controllers are a software solution that is able to reduce energy consumption of packaged chillers, the Controls were designed from the ground up using industry leading Crouzet EM4 controllers as a carrier for our Proprietary software solution.

To facilitate **Enviro-Chill Controllers** software a chiller will need to be fitted with a Crouzet controller and monitoring accessories. The system is modular to ensure plant compatibility no matter the size Chillers.

The solution is deployed in a parallel fashion to ensure existing control philosophy is maintained for maximum security, system safety and ensuring existing warranty is maintained.

Due to the flexibility within the software and the excessive available input and output on the controller.

The hardware is almost identical and any customisation or site-specific tailoring is all done in the software remotely according to customer requirements, system setup needs and local electrical governance.

The **Enviro-Chill Controllers** control solution reduces the amount of total run time of the compressors in a system by ensuring zero effect on the control space temperature.

Enviro-Chill Controllers control philosophy uses the inherent mechanical properties of the systems refrigerant to initiate saving due to lower compressor lift pressures required. I.E reducing compressor run time when it is mechanically less effective.

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