Top Tips for Enclosure Cooling
In Times Of Uncertainty, Make the Most of your Assets

It’s safe to say that there is a great deal of uncertainty at the moment; something which is being felt not just in the UK but in many countries across the world.

In these circumstances, the best thing that businesses can do is protect their existing assets. It’s fundamentally important to ensure that all assets perform at an optimum level during their entire service life, and for an organisation to continue its journey towards increased efficiency and reliability so that it can remain competitive in a changing market-place.

In the industrial space, a company’s lifeblood is its machinery and all machinery has critical components such as its electrical drives, motors etc. without which any very expensive robotic arm is nothing but a very elaborate statue, collecting dust. So it’s imperative that electrical equipment is housed within a protective environment, to ensure it operates to its full potential.

A protective environment takes the form of both high quality enclosures and correctly prescribed climate control equipment.

In this document we have listed key considerations when assessing your site:
1. High Temperatures Impact the Lifespan of Equipment

Prolonged high internal temperatures reduce the lifespan of your equipment. This will mean an increased chance of unplanned breakdowns, increased costs and reduced production output.

Furthermore, your equipment cannot work at 100% output once its maximum operating temperature has been exceeded, which means you will experience an overall reduction in your machine's efficiency and reduced manufacturing output.

To prevent high temperatures being reached within the enclosure, correctly sized enclosure cooling products should be installed. This could be fans and filters, cooling units or air-to-water heat exchangers, dependent on both the amount of heat produced by the electrical equipment and the ambient temperature in the surrounding environment.

Effect of temperature upon equipment life:

Inadequate maintenance & service leads to:
- Higher internal enclosure temperatures
- Reduced components lifetime
- Unexpected equipment failure
- Process shut-down
- Costly replacements

2. Low Temperatures Can Also Damage Equipment

Equipment needs protecting from low temperatures as much as high ones. In winter, when ambient temperatures drop, any equipment that has been idle over the weekend can be damaged as soon as it’s turned on from cold. In addition, motors or compressors can experience problems when oil contained within sealed systems begins to increase in viscosity. This can damage the seals/components, again causing failures.

To prevent this happening, you should fit a correctly sized enclosure heater inside the enclosure. When connected to a thermostat, the heater will maintain an acceptable minimum temperature preventing any damage to electrical equipment caused when the low temperature minimum is exceeded.

Top Tip: Heaters must always be paired with a Thermostat or Hygrostat to control its output.

Condensate Poses Safety Risk

Condensate can be a real issue when it forms within the enclosure and on critical equipment in high humidity environments. Condensate poses a real safety risk to the electrical devices and can cause catastrophic failure if left unchecked. You can combat this problem by using a high quality industrial enclosure with a minimum of an IP54 seal to prevent humid air from constantly entering the enclosure.

This can be combined with a cooling unit featuring an integrated condensate evaporator; the cooling unit acts as a de-humidifier and removes excess condensate from the pocket of air within the sealed enclosure.

Why do we need Climate Control?

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Top Tip: Keeping electrical components at a suitable set point can drastically increase possible service life.
3. Passive v’s Active Cooling

Heat is the enemy inside your enclosure. It attacks your controls and electronics while shortening their service life. Temperature can assail your equipment from all sides — on the outside from ambient temperature fluctuations, and inside with high density, high thermal loads.

One of the biggest hurdles when protecting your electrical equipment is choosing the right type of Climate Control to suit your environment. It is important that all things are considered in your surroundings before a decision is made as to the style of equipment that you buy.

Examples of active cooling are Cooling Units or Air to Water Heat Exchangers. Active Cooling utilises a refrigerant circuit or cooling medium to ensure that even if the Ambient temperature exceeds your setpoint, you can maintain a constant temperature inside your enclosure. This differs to the Fans mentioned above as the enclosure is sealed and only a small pocket of air is being cooled, rather than constantly introducing new air.

Examples of passive cooling are Fans and Filters or Air to Air Heat Exchangers. Passive cooling utilise the difference in temperature between the enclosures internal temperature (Setpoint) and that of the ambient environment. Passive cooling will only work when there is a 0% chance that the ambient temperature will be higher than that of the desired setpoint. Therefore it is important to design your cooling to worst case scenarios in your site. Think mid summer heatwave.

In many instances Passive Cooling may not be suitable. Make sure to consider your specific project characteristics.

Top Tip:

The two main categories you must decide between are Passive or Active Cooling products.
4. Dust, Dirt and Corrosive Substances

Many industries suffer from dusty or dirty environments, which can impact on electrical equipment and its optimum performance.

For example:
- Carbon dust in the steel or manufacturing industry
- Yeast or vinegar extract in the food and beverage industry
- Salt water vapour in the air in a marine or coastal application

The above contaminants will attack the wires and electrical connections within your enclosure. In time, this can corrode or (worse) short connections, which in turn can cause excess heat and/or a panel fire.

In highly contaminated environments, the best advice is to use a cooling product which does not allow dirty ambient air to constantly enter the enclosure, so fans and filters are a no-no. Air-to-air or air-to-water heat exchangers and cooling units are best solutions, dependent on the heat load as they will only treat the small pocket of air within the enclosure, but they will also reduce the level of contaminants entering the space.

Top Tip:
We recommend a combination of chiller and air/water heat exchanger for clean rooms.

5. Integrated Approach with Rittal Therm

It may sound complicated to understand when to use what style of cooling, but Rittal has a Free tool available on our website which will take all of the hassle out of choosing the right equipment. Our Therm software can be used online or downloaded to your computer, and asks for some simple data points which will then tailor its suggestions as to the correct equipment for your specific installation.

Take to the next level with EPLAN:
Therm from Rittal helps engineers to choose the right and most energy-efficient cooling system solution. With just a simple click, based on the data from the EPLAN Data Portal, it makes a complex calculation that identifies potential overheating in good time. Therm's easy-to-use interface makes it easy to select a climate control component with the right ratios. The required components are then prepared from the EPLAN Data Portal on the device list. If you are an ePlan user, Rittal’s Therm software links seamlessly into your available tools.

This integral design philosophy consists of a combination of:
- Digital product data about the thermal properties of components
- Software-based, virtual cabinet design
- Newly developed climate solutions for control cabinets

This gives engineers powerful tools to structurally improve the design, climate control and trouble-free operation of switch cabinets.

Air currents and power loss:
Each climate component has a specific range where the appliance can cool properly based on its flow rate. The software shows in the design the maximum distance that the cooling air can travel and the angle of entry and exit of the air. This also takes into account the fact that the air velocity decreases as the climate device is further away and the range of the device is thereby limited.

Top Tip:
Don’t just go with your gut, use the free tools available to get it right first time.
6. Expert Advice for your Climate Control Equipment

RiAssure is a service which appraises your existing cooling solutions and provides you with clear and honest advice as to the most appropriate actions to improve or maintain the cooling efficiency of your installation.

In the first instance, a skilled Rittal representative will visit your site to undertake a FREE COOLING REVIEW. This short inspection will allow Rittal to evaluate your existing cooling solutions and provide you with usable feedback based on the findings of the visit.

A short report will be provided detailing:
- Any high risk components/enclosures that have been identified.
- Recommended actions going forward.
- Quotation for advanced inspection (if required).

Advanced Inspection:

If opportunities for improvements are identified during the Cooling Review, we will then provide you with a quotation for an advanced inspection. **

This quotation will be a tailored checklist of actions which are most suited to your site.

These actions can include:
- Data loggers and or thermographic equipment to gather data
- Thermal calculations
- Photographs of enclosures and equipment.
- Asset list creation. (Identify and report the status of all enclosures)
- Quotation for recommended replacement cooling units including:-
  - Energy Saving calculations
  - R.O.I calculations
  - A recommended service contract to maintain the efficiency of the on-site units.

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Why is electrical enclosure cooling important?

- Incorrect Process Cooling
- Control Equipment Starts To Overheat (Especially during warmer months)

UNEXPECTED CRITICAL COMPONENT FAILURE

- Increased Replacement Costs
- Unplanned Line Stoppages & Maintenance
- Reduced Production Output
- Loss of Profit & Reduced Efficiency

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Top Tip:
Regular maintenance of enclosure climate control units, can help significantly reduce the number of failures and thus prevent downtime.
Rittal – The System.

Faster – better – everywhere.

- Enclosures
- Power Distribution
- Climate Control
- IT Infrastructure
- Software & Services