

Active-S Humidity Control Sheets Used to Solve Recurring Corrosion Problem in IoT System Control Boxes

A global provider and installer of IoT gateways, devices and control system solutions had long struggled with how to prevent breakdowns in equipment installed in outdoor environments. They had to find a solution that would support their commitment to stable operation 24 hours a day, 365 days a year. In addition, their IoT devices are equipped with self-detection and recovery mechanisms to help prevent against abnormalities, allowing their customers to have peace-of-mind after installation. However, they were losing the battle with condensation inside the control box.

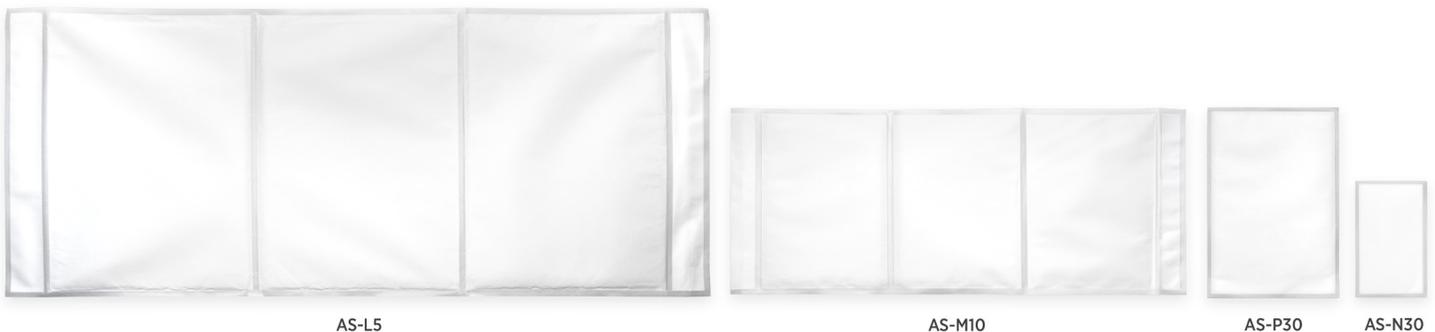
It was assumed that high humidity inside the control box was causing metal components to corrode. The IoT devices installed outdoors were exposed to temperature changes, such as high and low temperatures, and natural elements such as rain and snow. However, waterproofing alone could not protect the electrical components from failure. When the failed device boxes were analyzed, they found that the metal parts on the circuit board had corroded, despite their efforts to control humidity and condensation inside the control box.

Heaters and dehumidifiers consumed space and required more power which made them unsuitable for miniaturization and energy conservation. So initially, the customer had tried Silica gel and moisture absorption/desorption products to reduce humidity. Eventually these solutions reached their moisture absorption limit, requiring replacement and maintenance work, and placed a heavy burden of maintenance on the end user. They also discovered that there was a risk of lowering humidity too much and exceeding the lower limit of the electrical components operating humidity range.

They then applied a moisture-proof coating to the electrical components and circuit boards. The drawback of applying moisture-proof coating to circuit boards was the connection terminals on the board could not be coated. Therefore, when applying the coating, each connection terminal on the board needed to be masked, adding additional cost. However, the uncoated metal terminals on the board still corroded. There were other problems associated with this solution. Masking each terminal and drying it after application required dedicated space, and a lot of time and effort.

Controlling Humidity Without Using Electricity

To find a sustainable countermeasure to the moisture caused by condensation inside the control box, the customer turned to Active-S Humidity Control Sheets which had the potential to revolutionize and overcome all the challenges they had faced up to that point.



AS-L5

AS-M10

AS-P30

AS-N30

They discovered that condensation occurred when the ambient humidity dropped and further confirmed that Active-S prevented this humidity from rising. Active-S released moisture when the ambient humidity dropped, so it absorbed and released moisture according to daily humidity fluctuations. After learning why humidity increases and condensation occur in waterproof structures, the company conducted countermeasures and new evaluation tests that simulated real-world environments, and found that it was possible to prevent humidity increases inside the waterproof structure.

Applying Active-S was a simple process of installing it inside the case. It significantly reduced the amount of work compared to previous coating processes, was environmentally friendly, did not require any organic solvents, and needed no scheduled maintenance or field replacement.

In addition to improving product reliability, the introduction of Active-S reduced the product's size and power consumption, making it possible to develop more environmentally friendly and sustainable products.

Demonstrating the Impact of Active-S

An example where the strengths of Active-S were demonstrated involved an outdoor IoT gateway. This gateway played a part in the stable operation of a power management system that improved the efficiency of a renewable solar energy generation project. The project was in an area with high temperatures, high humidity, and a high risk of natural disasters and salt damage. According to users interviewed by the media, the solar power generation power management system has prevented power outages even during high winds and rain. In this application, the outdoor IoT gateway incorporating Active-S demonstrates excellent humidity control performance even in harsh environments and is part of an IoT product that is resistant to natural disasters.

No Risk

Overall, since installing Active-S humidity control sheets in their outdoor devices, the customer has experienced no malfunctions caused by salt damage or condensation since their installation more than four years ago. The customer is expanding into new markets including utility, railway, medical care, and factories with IoT systems involving outdoor environments. They are developing new products that combine Active-S to provide effective products that meet the needs of specific customers who are troubled by IoT failures in demanding environments.

