

AoFrio

WHITE PAPER

Cost savings through SKU consolidation





Reducing product cost with Wellington™ ECR 2 motors

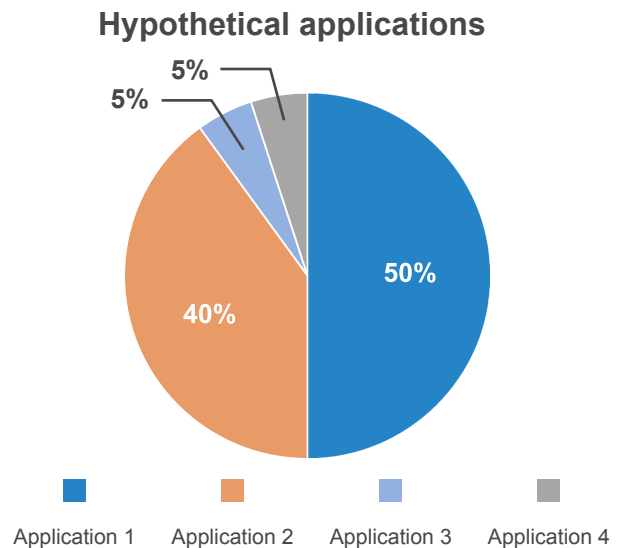
Most manufacturers understand that each product SKU they maintain in their system costs money, since it requires time and labor to stock, track, pay invoices on, provide customer support for, and manage. Wellington ECR 2 motors are completely programmable and enable OEMs to dramatically reduce the number of motor SKUs they need. An AoFrio customer recently reduced the motor SKUs they required for a product line by over 57, replacing it with only one ECR 2 SKU. This reduced their actual inventory by 23-31% and reduced their inventory carrying costs by approximately 30%, saving them hundreds of thousands of dollars, which greatly increased production efficiency, supply chain stability, and profitability.

How Wellington™ ECR 2 motors reduce SKUs in a production environment

The **Wellington™ ECR 2** from AoFrio is a high performance, programmable EC motor. Each motor can be set in the factory or field with three discrete speed levels, different directions of rotation, and timed operation upon start. Simply by configuring the black (control) wire connection, the same motor can also be programmed as needed to accommodate small production runs requiring any alternate setting.

Let's look at a simplified, hypothetical example of a manufacturer with products that have the following performance criteria:

| |
|---|
| Application 1. 50% of products require: |
| <ul style="list-style-type: none">• Condenser runs at 1550 RPM CW• Evaporator runs at 1550 RPM CCW |
| Application 2. 40% of products require: |
| <ul style="list-style-type: none">• Condenser runs at 1600 RPM CW• Evaporator runs at 1550 RPM CCW |
| Application 3. 5% of products require: |
| <ul style="list-style-type: none">• Condenser runs at 1800 RPM CW• Evaporator runs at 1800 RPM CCW |
| Application 4. 5% of products require: |
| <ul style="list-style-type: none">• Condenser runs at 1800 RPM CW• Evaporator runs at 1450 RPM CCW |



In this example, the manufacturer would normally need to maintain at least six different motor SKUs to meet the needs of these applications. If the applications required different voltages, then it could be 12 or more different SKUs.

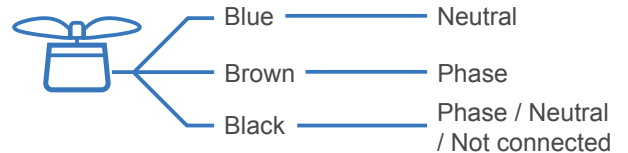


However, a single ECR 2 motor accepts universal voltage and can be shipped to their factory, pre-programmed to immediately cover 90% of their needed applications:

- Speed 1. Evaporator runs at 1550 RPM CCW: Blue to Phase, Brown to Neutral, Black (Control) wire not connected
- Speed 2. Condenser runs at 1550 RPM CW: Blue to Phase, Brown to Neutral, Black (Control) wire to Phase
- Speed 3. Condenser runs at 1600 RPM CW: Blue to Phase, Brown to Neutral, Black (Control) wire to Neutral

The same ECR 2 motor can be programmed in the production environment with the following settings to cover the remaining 10% of applications:

- Black wire not connected: Select 1800 RPM CCW continuous
- Black wire connected to Phase: Select 1450 RPM CCW continuous
- Black wire connected to Neutral: Select 1800 RPM CW continuous



Which results in the following wiring:

- Speed 1. Evaporator runs at 1800 RPM CCW: Blue to Phase, Brown to Neutral, Black (Control) wire not connected
- Speed 2. Evaporator runs at 1450 RPM CW: Blue to Phase, Brown to Neutral, Black (Control) wire to Phase
- Speed 3. Condenser runs at 1800 RPM CW: Blue to Phase, Brown to Neutral, Black (Control) wire to Neutral

The ECR 2 is fully programmable via Bluetooth, so a manufacturer can individually configure any quantity of motors for speed, direction, a timeout, and a speed after timeout.

Installation instructions and technology documentation are available upon request.

Reducing product cost with Wellington ECR 2 motors

Anyone with the responsibility for servicing legacy products knows the difficulty of maintaining countless SKUs for products that customers are still using in the market, but which are not currently manufactured. The struggle of deciding which SKUs to make obsolete for financial reasons and which should be kept ready in the warehouse to satisfy potential customer needs is a regular challenge. More difficult still is determining which parts should be stocked in the limited space of a service truck so that a customer's system can be returned to operation on the first service call.

In all these scenarios, a single motor can be stocked in the truck or warehouse and can be quickly programmed as needed by a technician onsite. This eliminates the need to stock dozens of motors, just in case one might be required on the job site. Using only the nameplate of the existing motor, a tool, and a simple app, an ECR 2 can be programmed to match the failed motor's performance. Standard mounting configurations for front and rear baskets, along with foot mounting, makes retrofitting an ECR 2 fast and easy for virtually any refrigeration motor in the field.

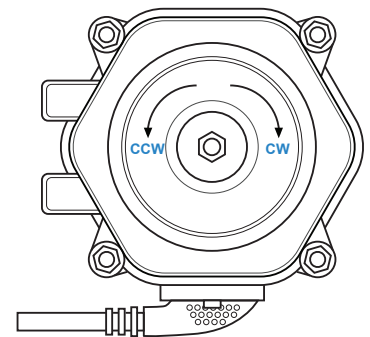
Programmig examples

Single speed motor, rated at 1600 RPM CW OSE (opposite shaft end)

Program all three speeds of the ECR 2 to 1600 RPM CCW (our rotation is defined as looking at the shaft)

Programming all three speeds to the same values ensures any future change in wiring configuration will not inadvertently affect motor operation.

Only the blue and brown wires (line and neutral) are required for single speed operation. The black wire should be tied to either blue or brown (or removed) to ensure it doesn't come in contact with any other circuits. We suggest that a label be added to the motor noting the programmed speed for future reference.



Dual speed motor, rated at 1500 RPM CCW and 1800 RPM CCW (shaft end)

Program all three speeds as below:

- Speed 1. 1500 RPM CCW: Blue to Phase, Brown to Neutral, Black (Control) wire not connected
- Speed 2. 1500 RPM CCW: Blue to Phase, Brown to Neutral, Black (Control) wire to Phase
- Speed 3. 1800 RPM CCW: Blue to Phase, Brown to Neutral, Black (Control) wire to Neutral

When wiring, tie the black and brown wires together, so if the black wire becomes disconnected for any reason, the operation will not be affected. We suggest that a label be added to the motor noting the programmed speeds for future reference.



More than just cost savings

When manufacturers consider the total cost of the materials and employee labor required to maintain each SKU in their system, they see that reducing even five or 10 SKUs saves thousands of dollars each year. This is due to reduced stocking, customer support, invoicing, and managing requirements. When additional costs for regulatory approval are considered, the cost savings is even greater.

ECR 2 motors are also some of the most reliable refrigeration motors in the world. With an average lifespan of 10 years, they last over twice as long as traditional motors. Considering service costs to replace failed motors are often more than five times the cost of the motor, ECR 2 continues to save manufacturers money long after the product is sold. Reliable motors also protect your brand's hard-earned reputation.

Let's make the world better

From protecting food supply to ensuring medicines remain safe, refrigeration systems are critical for modern life as we know it. AoFrio exists to deliver trusted technology for the real world, which solves our customers unique problems. We believe that by collaborating with our OEM partners and placing our technology in every location, we will ensure a sustainable future with safe food, beverages, and medicine for our families and future generations. We invite you to learn more about how AoFrio can partner with you to build a better world together.

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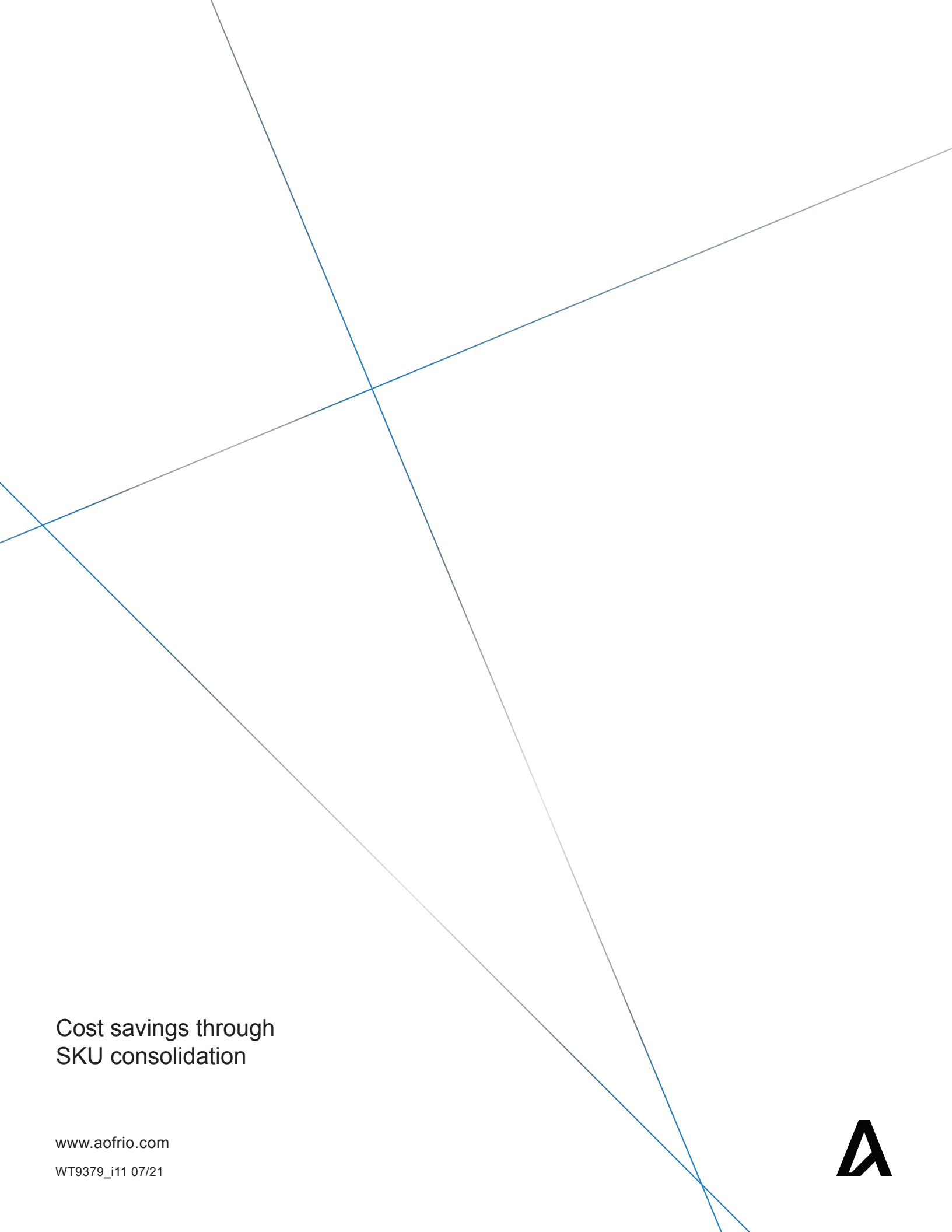
About AoFrio Limited:

AoFrio is a leading provider of IoT solutions, cloud-based fleet management platforms, energy-efficient electronic motors and connected refrigeration control solutions. It serves some of the world's leading food and beverage brands and refrigerator manufacturers and offers proximity-based marketing for Smart Cities to the Australian market. AoFrio's services and products improve sales, decrease costs and reduce energy consumption. Headquartered in Auckland with a global reach, AoFrio is listed on the New Zealand stock exchange under the ticker symbol NZ: AOF

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