

## What to Know When Customizing a Universal Motor

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The golf course, the cheese factory, the printmaking shop and the carnival—these are all places (plus many more) where universal motors will be found. Similarly, just as the location of these applications are diverse, so are the actual motors themselves. This need for versatility and variance calls for universal motors to typically be custom-made to fit the needs of a particular application.

However, in order to effectively customize your universal motor, one must first consider the following three factors:

1. **Power:** Speed, Torque, and Voltage
2. **Temperature:** Cooling and Insulation Class
3. **Structure:** Mounting and Housing

### POWER

When picking out a motor, people usually have certain speed, torque, and voltage requirements in mind. Their application will need such requirements to function properly—or at least a very close range to these proposed criteria. Will this application need to function primarily on AC or DC power? Will it require higher torque or increased speed?

### TEMPERATURE

Universal motors require large amounts of air flow to help keep the motor cool. Most are built with fans for this very purpose. However, since universal motors can be purchased as both the skeleton frame and as parts sets, if the latter is chosen, the fan is sometimes an installation that the purchaser assembles, rather than the manufacturer. These fans are necessary because for every 10°C that an application exceeds the maximum temperature rating (also known as insulation rating), the motor life is cut in half. At Groschopp, each motor undergoes a “temp test” in order to establish a temperature rating—the highest temperature at which a motor can run normally and without causing damage to internal components. [Click here for temperature class chart.](#)



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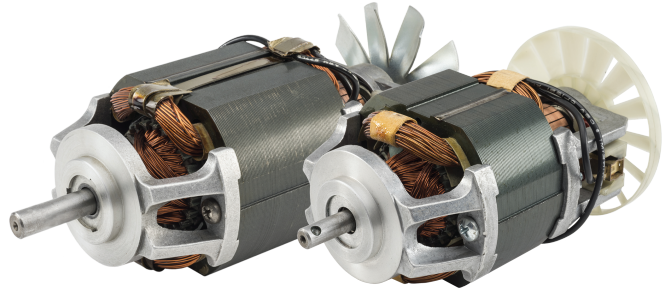
The temperature rating is determined based on continuous duty, so motors designed for intermittent duty—so motors that aren’t expected to run continuously for more than 20 minutes—can go slightly above their given temperature rating. In addition, the higher speeds of Universal motors increases heat generation, which affects the insulation rating of each motor.



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Depending on the application, some choose to add thermal protection as part of the customization of their universal motor. Although some thermal protection must be manually reset while others are automatic, this heat-shield component stops the motor once it gets to a certain temperature. This helps avoid any accidental burn-out from overheating.



For a more in-depth look into temperature ratings and insulation classes, read our blog entitled, “Electric Motor Ambient Temperature & Insulation Systems.”

## STRUCTURE

Housing and mounting encompasses size, weight, orientation and lifespan requirements for your application. These variables, particularly with size, will affect both the temperature and power of your motor. Smaller motors tend to have less power and higher heat buildup due to the limited space for air circulation. Also, the lifespan of Universal motors tend to be less than the typical AC or DC motor—much of this has to do with the high temperature, high speed composition of this motor type. The brushes undergo extreme stress and as a result, wear out more quickly (they tend to be replaceable however, so brush life as an undesirable factor can be easily remedied). High-thermal characteristics are also available to help with this additional wear.

## ACCESSIBILITY

Just like someone must be measured in order for them to purchase the ideal fitted suit, people in pursuit of a universal motor that will best fit their needs must tailor their motors according to these three categories. However, it is good to note that some aspects of a universal motor will remain unchanged regardless of personalized attributes.

Commonly found in many applications—such as blenders, filament heaters, power tools, various lab and industrial equipment—all operate with universal motors, which mean they all have the ability to run on AC or DC power. Just to recap, Universal motors tend to be cheaper in cost and have shorter lifespans than other motors, although exceptions apply. Additionally, universal motors have a high power density—they can reach speeds that are much faster than most motors. Consequently, if low cost and high speed would benefit your application, a universal motor customized to meet your power, temperature, and structural needs might be exactly what you are looking for.

Groschopp’s beginnings were centered on universal motors and as a result, expertise and customization abilities have only grown. [Click here to learn more about our history.](#)

