

## MEAN WELL VFD Module for Sensorless BLDC Motor

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Brushless Direct Current (BLDC) motors are widely used in industrial applications due to their high efficiency and reliability. BLDC motors usually consist of a rotor, a stator, and three Hall sensors, which play a vital role in ensuring precise and efficient motor control. These tiny devices, positioned near the spinning magnets in the rotor, detect the rotor's position and send signals to the motor's control system. MEAN WELL VFD module is designed to be able to communicate with these Hall sensors to determine which stator coil to energize next, ensuring smooth and efficient operation. Moreover, thanks to the exceptional compatibility and flexibility of our VFD, it ensures seamless integration for speed regulation, direction control, and start/stop operations. Application examples include some convey belt motors in manufacturers which require forward motion, backward motion, moving at precise speed, and sudden brake when required.



Figure 1. VFD module and Hall sensor BLDC motor

There is application such as circulation fan that only needs simple and one direction motor operation upon power up. This application usually uses a Sensorless BLDC Motor to lower the system cost. Sensorless BLDC motors have emerged as a cost-effective and efficient alternative. As the name suggests, these motors eliminate the need for Hall sensors, instead relying on natural electrical signals called back electromotive force (back-EMF). When the rotor's magnets spin past the stator's coils, they induce these back-EMF signals. The MEAN WELL's variable frequency drive (VFD)

Module, is designed to “listen” to these back-EMF signals (Figure 2). By analyzing this feedback, the controller accurately determines the rotor's position and adjusts the stator's magnetic field timing, ensuring smooth and efficient motor operation. This is akin to using sound echoes to map the dimensions of a room—precise and sensor-free.



Figure 2. Sensorless Motor startup voltage

As shown in Figure 2, during motor startup, there is a parking phase where the U, V, and W channels output a voltage to align the rotor. After this detection, the motor is officially powered up, and the rotor begins to spin.

In conclusion, MEAN WELL VFD series is a versatile and easy-to-use solution for both **Sensor-based BLDC motors** and **Sensorless BLDC motors**. Its integration with an intuitive GUI ensures accessibility for users of all skill levels, from beginners to experts. Whether you need straightforward setup or advanced customization, our VFD solution combines high performance with exceptional ease of use, meeting the demands of diverse industrial applications.

For related product and application requirements, please contact MEAN WELL distributors or MEAN WELL application engineers. Also, do not forget to stay tuned for online products and solutions courses on MEAN WELL virtual EXPO.