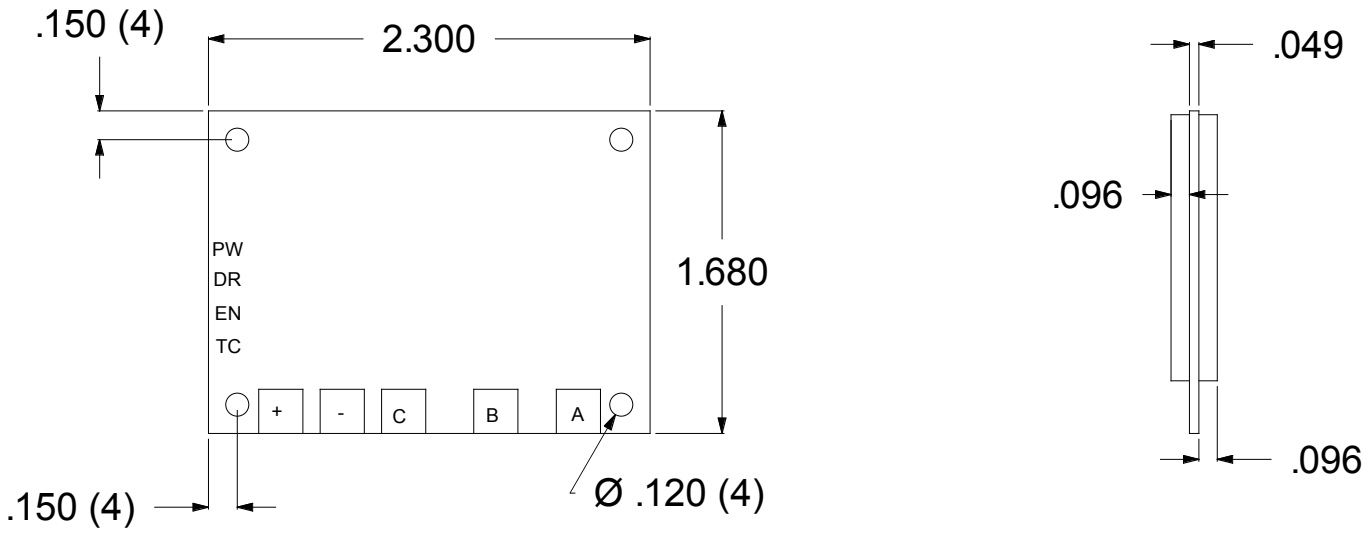
# S24V20A MICRO sensorless motor driver 20A 10-32V

Ultra high efficiency miniature sensorless drive with 37kHz pwm frequency, designed for connection to a microcontroller, or stand alone operation. The drive has no minimum inductance and will operate slotless or ironless brushless motors without the need for bulky, cumbersome inductors. The drives can be operated in stand alone mode with the P1 speed pot or with an 0-5v analog input or a 5v pwm input from a microcontroller (8kHz minimum frequency). The motor is turned off for an PW input between 0 and .5 volts. Once power supply, motor and speed pot (if used) are connected, the motor can be operated without the need for any adjustments, set up or programing. For monitering the speed or closing the speed loop externally the tach output TC can be used. TC outputs a 5v square wave with a frequency equals to 3 pulses per revolution for a 2 pole motor, 6 for a 4 pole etc. The direction is controlled by 0v (reverse) or 5v (forward) to the DR input. The drive weighs 0.5 oz (15 grams). The operating temperature range is -55°C to 105°C. . Drives can be custom programed for special features, such as a running at a fixed speed with no PW input. The motor can be turned on and off using the EN terminal or by reducing the speed input below .5v.




Connections (motor lead hook up for Koford motors).

PW=control voltage 0-5v
DR=5v clockwise, 0v counterclockwise
EN=unconnected or 5v to run, 0v to turn motor off
TC=tach/encoder output 3 pulses per revolution per magnet pole pair (1000 hz=20,000 rpm, 2 pole motor)

-=Connect to black (-) lead of power supply
+=Connect to red (+) lead of power supply
A=blue motor wire
B=white motor wire
C=brown motor wire

## Ordering information:

mail@koford.com•phone 937-695-1275•fax 937-695-0237•www.koford.com

Part number:

S24V20A-M-1 closed loop speed control 5v=10k rpm (2 pole) with direction, tach and enable

S24V20A-M-2 closed loop speed control 5v=20k rpm (2 pole) with direction, tach and enable

S24V20A-M-3 closed loop speed control 5v=40k rpm (2 pole) with direction, tach and enable

S24V20A-M-4 closed loop speed control 5v=80k rpm (2 pole) with direction, tach and enable

S24V20A-M-5 duty cycle speed control 5v=100% with direction, tach and enable

P1 Optional speed pot with knob and leads

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Notes

1. If 5v=20k rpm with a 2 pole motor, then with a 4 pole motor the speed will be 10,000 rpm, an 8 pole motor 5,000 rpm, a 16 pole motor 2,500 rpm etc.

2. Any externally powered inputs such as speed or brake must be turned off when drive power is turned off or drive damage may result.

3. Sensorless drives work best with slotless or ironless brushless motors. Most slotted motors will work reasonably well but a few will not.

4. The maximum speed depends on the characteristic of the motor, however Koford 2 pole motors will run well up to 120,000 rpm with the -5 version of the drive and 4 pole motors up to 60,000 rpm. Slotted motors will have a lower maximum speed which must be determined by testing.

5. When using a microcontroller to control the drive a 5 volts output should be used. If the pwm frequency is greater then 8Khz no filtering is required, for lower frequencies an RC filter should be used to produce a DC output.

6. The current limiting of the drive limits the current delivered to the motor to slightly above 30 amps, this means that the current at the power supply will reach a maximum of slightly above 30 amps with the speed turned to maximum, if the speed is reduced then the current at the power supply will be proportionately reduced so as to maintain the current at the motor at a maximum of 30 amps. The current at the power supply is different then the power delivered to the motor unless the duty cycle (speed) is set to 100%. For example if the duty cycle (speed) is set to 50% then at a motor current of 30 amps the power supply current will be 15 amps.

7. The drive should preferable be mounted to an aluminum chassis or frame, or a aluminum heat sink. Drive heat rise is greatest at high currents, low duty cycles and continuous operation. If the application is 100% duty cycle, with normal indoor ambient temperature, the current is low compared to the rated current, or if the application is intermittent with on times for example of 1 minute and off times of at least 1 minute, then a heat sink will probably not be necessary. For high ambients forced air cooling directed at the board can help. For long term reliability, it is recommended that sufficient cooling be provided to prevent the hottest spot on the board from exceeding 100C. This can be checked with a portable infrared thermometer

8. Sensorless motors cannot operate near zero speed as they need back emf to determine the correct point of

commutation. There is also a minimum duty cycle required for proper commutation which limits the speed range. If the motor has no load then the speed range may only be 40% to 100% due to energy stored in the motors inductance (depending on the motor). With a slight load the speed range increases to 20% to 100%. At 50% of rated current the range is 15% to 100%. These values are approximate and depend on motor inductance, efficiency and input voltage. If a wider speed range is required then contact the factory.

9. If the direction input is changed while the motor is running the drive will stop the motor and then restart in the opposite direction after a brief pause.

10. The motor rpm can be read using a multimeter with a frequency or tach function. 1000 hz=20,000 rpm with a 2 pole motor, 10,000 rpm with a 4 pole motor, 5,000 rpm with a 8 pole motor etc. The tach function on a scope can also be used or the output can be connected to a dataloger or interfaced with a 5 volt input capable micro, or a buffer can be connected to the drive to bring the voltage down to 3.3v or lower if required.