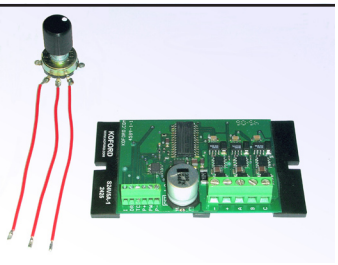
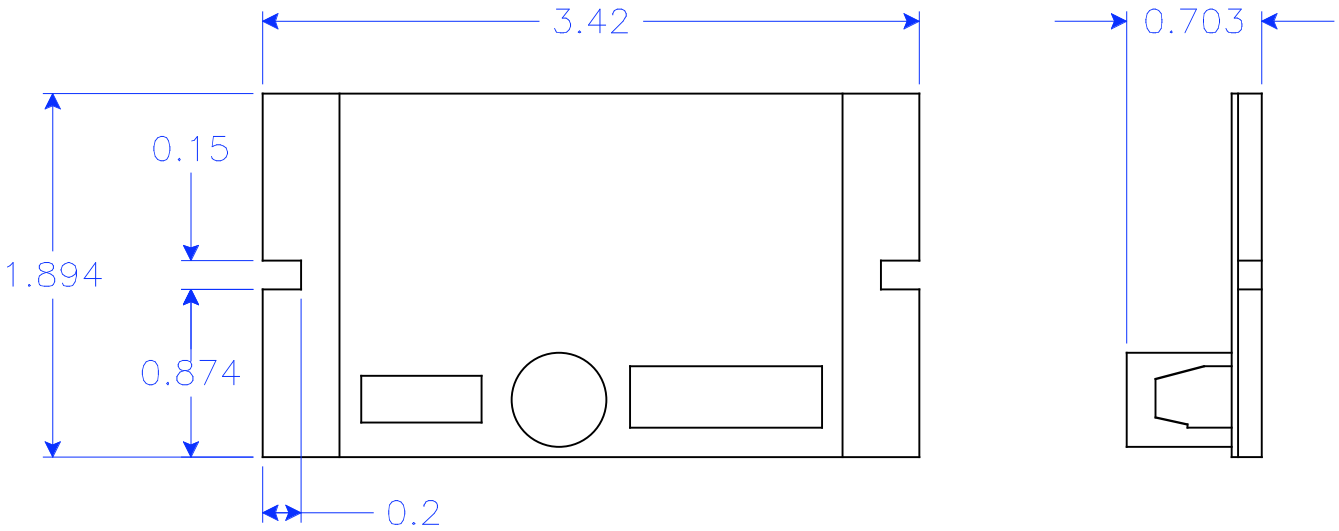
KOFORD ENGINEERING, LLC S24V10A sensorless motor driver 10A 12-32V



Ultra high efficiency miniature sensorless drive with 56k pwm frequency (37k for -3), designed for use with stand alone, digital or analog operation. The drive has no minimum inductance and will operate slotless or ironless brushless motors without the need for bulky, cumbersome inductors. Three type are available, a full featured -1 model which include tach and current output, speed control and direction control, and a lower cost -2 which deletes the tach and current output, and -3 a DSC based control which can be fully customized for difficult to start up loads and other needs. -B has brake and tach function. For stand alone operation the optional speed pot can be ordered. Once power supply, motor and speed pot are connected the motor can be operated without the need for any adjustments, set up or programing. If reversible operation is required a SPDT switch can be added between Dir and P-. For digital operation the unit will interface with a customers microcontroller. The microcontroller should be 5v or be a 3.3v with 5v interface capabilities. Speed input can be accomplished with a 0-5v analog input (less then 1mA) or a 100 hz to 100k Hz square wave with variable duty cycle. The -3 version can also accept a 1-2 ms pulse (RC) input. The direction is controlled by 0v (reverse) or 5v (forward) to the DR input. The current output is a DC voltage at .5v per amp of motor current (not power supply current). For analog operation the TAC output can be connected to a one shot, filtered and a DC voltage proportional to the rpm will result.



Terminal block positions (motor lead hook up for Koford motors)
I=current output, .5V = 1A of motor current
DR=leave unconnected for forward direction, hook to P- for reverse
TC=tach/encoder output 3 pulses per revolution per magnet pole pair (1000 hz=20,000 rpm, 2 pole motor)

P+=connect to one side of pot (6.2v)
PW=connect to pot wiper (center terminal)
P-=connect to other side of pot (ground)
-=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 330-315-3061•fax 937-695-0237•www.koford.com

Part number: S24V10A-1 Full featured drive
S24V10A-2 Drive without current and tach functions
S24V10A-3 Programable drive with tach function
S24V10A-B Drive with brake and tach
P1 Optional pot

Notes

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

2. The maximum speed depends on the characteristic of the motor, however Koford 2 pole motors will run well up to 100,000 rpm with this drive and 4 pole motors up to 50,000 rpm. Slotted motors will have a lower maximum speed which must be determined by testing.

3. When using a microcontroller to operate the drive a 5 volts output should be used and the pwm frequency should be 8Khz or more, otherwise filtering of the output will be required.

4. The drives current output shows motor current, this is not the same as power supply current. A pwm drive acts much like a variable transformer to reduce the voltage and at the same time increase the current delivered to the motor. For example if the speed pot is set to 10% of maximum speed and the power supply shows 0.5 amp and 24 volts, the motor will see approximately 5 amps and 2.4 volts. This current sense output is approximate and is most accurate near full load current. The current can be used to indicate motor load or for use in current mode control.

5. The current limiting of the drive limits the current delivered to the motor to slightly above 10 amps, this means that the current at the power supply will reach a maximum of slightly above 10 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 10 amps.

6. 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

7. 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 50% to 100%. With a slight load the speed range increases to 20% to 100%. At 50% of rated current the range is 10% to 100%. These values are approximate and depend on motor inductance and input voltage. If a wider speed range is required then either hall sensor motors may be used or special sensorless drives may be used. Contact the factory for more information about these.

8. The motor direction should only be reversed when the motor is stopped. Otherwise excessive voltages and currents can be produced potentially damaging the power supply and/or the drive.

9. -B version absorbs the braking energy in the motor. Therefore there is no risk of overvoltage damage to the power supply or drive during braking and no need for a braking resistor. However the effect of motor temperature must be considered in the case of repetitive braking of a high inertia load. For maximum braking a steady 5 volt signal can be provided. For reduced deacceleration the braking signal can be PWM'd.

10. -3 version can be factory programed with custom features and start up can be modified to meet customer requirements. This version is most suitable if a soft start up or a difficult to start load is involved.