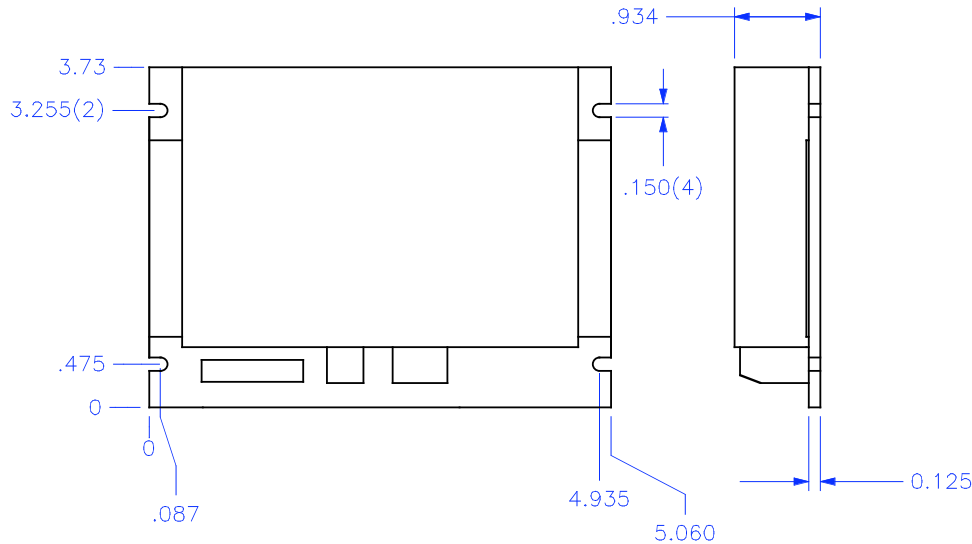


Ultra high efficiency miniature sensorless drive with 56k pwm frequency, designed for use with stand alone, digital or analog operation. The drive has no minimum inductance and will operate slotless or ironless brushless motors without the need for bulky, cumbersome inductors. The drives can be operated in stand alone mode with a speed pot or with an 0-5v analog input or a 5v pwm input from a microcontroller or microprocessor. 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. Connector termination is not needed. If reversible operation is required a SPDT switch can be added between Dir and P- or a 5v signal may be used. If the speed loop is to be closed in the customers microcontroller a 5v or a 3.3v with 5v interface micro should be used. Output to the drive should be a 0-5v analog input (less then 1mA) or a 100 hz to 100k Hz square wave with variable duty cycle. The input signal should be adjusted so as to close the loop with the TC output which outputs a 5v square wave. The frequency equals 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 current output is a DC voltage at 1v 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. The drive weighs 6.5 oz. The operating temperature range is -55°C to 105°C. Drive life will be reduced at baseplate temperatures above 60°C.



Terminal block positions (motor lead hook up for Koford motors)

DR=leave unconnected for forward direction, hook to P- for reverse

TAC=tach/encoder output 3 pulses per revolution per magnet pole pair (1000 hz=20,000 rpm, 2 pole motor)

TR2=leave unconnected

TR1=leave unconnected

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:

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Part number:

S48V20A-1 5v=20k rpm (2 pole)

S48V20A-2 5v=40k rpm (2 pole)

S48V20A-5 5v=100% duty cycle

P1 Optional pot for -1, -2, -5

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 90,000 rpm with this drive and 4 pole motors up to 45,000 rpm. Slotted motors will have a lower maximum speed which must be determined by testing.
3. When using a microcontroller to control the drive a 5 volts output should be used. If the pwm frequency is greater than 8Khz no filtering is required, for lower frequencies an RC filter should be used to produce a DC output.
4. The current limiting of the drive limits the current delivered to the motor to slightly above 20 amps, this means that the current at the power supply will reach a maximum of slightly above 20 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 20 amps. The current at the power supply is different than 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 20 amps the power supply current will be 10 amps.
5. The drive should preferably 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
6. 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% due to energy stored in the motors inductance. 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, efficiency and input voltage. If a wider speed range is required then either hall sensor motors may be used or custom sensorless drives may be required. Contact the factory for more information about these.
7. 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.