

## PRODUCT DESCRIPTION

The ASI BAC Cd 4000 is a high power density motor controller that utilizes the latest in sinusoidal flux vector control to ensure smooth and quiet brushless DC motor operation and efficient vehicle operation. The Cd 4000 can operate over a nominal voltage range of 24VDC to 72VDC.

A robust MOSFET-based three phase bridge provides peak efficiencies in excess of 95%, no audible noise, and can switch motor currents up to 400A peak. In addition to Hall sensor based motor commutation, sensorless commutation is also supported.

Programmable performance mapping allows throttle and regenerative braking inputs to be adjusted via an optional vehicle display or ASI's BAC Door™ PC configuration software to meet specific performance requirements.

A 0 to 10 Volt analogue state of charge protocol is supported. Alternatively, a software based voltage model of the battery can be used to derive battery state of charge.

Communication to the drive is via a proprietary ASI object dictionary using the ModBus RTU protocol. At the physical layer, RS 485 protocol is standard with options of TTL 232, CAN OPEN or LIN.

Numerous programmable protection features including motor/controller temperature, battery over/under voltage, and motor/battery current limits increase controller and motor longevity.



## FEATURES

- Peak motor currents up to 400A
- Continuous ratings of 65A
- Can be attached to additional heat sinking to significantly increase performance
- Dual communication ports, TTL232 and RS485
- CAN OPEN & LIN optional
- PWM drive for low ripple current and silent drive
- Field oriented control for increased efficiency and smooth motor operation
- Multiple analogue and digital inputs
- Support multiple sensor configurations
- Single pulse and quadrature pedal or wheel speed inputs
- Analog and voltage model based battery management system interfaces
- Meets EN15194 bike safety requirements on compliant bikes
- Sensorless or hall commutation
- Configurable throttle, brake cut-off and regeneration options
- Fault protection including:
  - Bus over and under voltage
  - Motor over current
  - Motor and controller over temperature
  - POST on MOSFET bridge
  - Battery SOC foldback

## APPLICATIONS

- Electric bikes
- Electric scooters
- Small electric vehicles

Input Specifications					
Type	Quantity	Description	Voltage	VMin	VMax
Hall inputs	3	Non isolated, diode protected to 50V max Used for motor commutation Max frequency: 1000 Hz Min pulse width: 40 µsec	Logic Low	0 VDC	0.5 VDC
			Logic High	3.5 VDC	5 VDC
Digital inputs	2	Non isolated, diode protected to 50V max Used for pedal first sensor and cruise control related features 1 kHz sampling rate Max frequency: 500 Hz Min pulse width: 40 µsec	Logic Low	1.5 VDC	2.5 VDC
			Logic High	4.3 VDC	5 VDC
Analogue inputs	4	Non isolated, resistance protected to 30V max, Single ended Min 10 bit resolution Used for throttle, BMS, and brakes		0 VDC	5 VDC

Controller Performance	
Description	Range
Speed regulation	+/- 5% at top speed
Minimum motor phase to phase inductance	60 µH
Motor control scheme	Sinusoidal field oriented (FOC)
Motors supported <sup>1</sup>	PMAC and Brushless DC

Communications	
Feature	Description
Network	Proprietary ASI object dictionary over a variable baud rate ModBus network
Hardware Protocols	TTL Level 232 and RS-485. Optional CAN OPEN   Optional LIN

BAC Cd 4000-72-200

Input Power		
Feature	Rating	Units
Nominal Input Voltage	36-72	Volts DC
Input Power	Software configurable	Watts

Output Phase Current		
no air-flow, no additional heat sinking, 25°C ambient		
Feature	Rating	Units
Absolute Peak	400	Amps DC
1 minute rating	210	Amps RMS
Continuous	65	Amps RMS

This product has various patents and patents pending  
All specifications are subject to change without notice.

\*Disclaimer- these numbers are subject to change upon final release\*

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