

# ZENER 8000

AC Motor Speed Controller



**ZENER ELECTRIC**

Australian Manufacturers and Distributors of Variable Speed Drives and Soft Starters

## About Zener

Zener is an Australian company with 30 years experience in the design and manufacture of electronic motor controls.

Zener offers motor control solutions to a broad range of applications and industries. A network of distributors ensures extends the high level of technical support and service throughout Australia and expanding on a worldwide scale.

Zener is committed to a continuing development program to deliver a product demanded by industry across a broad spectrum. A product backed by support services that exceeds market expectations.



## ZENER AC Drives

AC Drives are used to control the speed and torque of a standard induction motor. Zener is a market leader in Australasia catering for the demanding environments and applications of this region. The Zener AC Drive technology is based on a superior sensorless flux vector control delivering a higher torque through Zeners unique 'flux plus' algorithm. A technology that provides greater torque at low speeds and extending speed control high above a motors rated speed. Technology that allows increased productivity of a process and also energy savings at lower machine speeds.

The Zener Drive ensures accuracy in speed control of a process with the added benefits of closed loop control to automate and simplify processes.

## Specialists in Motor Controls

Our expertise in this field has been earned through 30 years of experience as specialists in the Design and Manufacture of Electronic Motor Controls. As specialists and engineers of the product we can provide the technical support and after sales support demanded by a product of significant investment. With Zener you gain the assurance of product serviceability, ongoing service and support in Australia.

We have identified key attributes which should be considered when selecting a high powered low voltage Variable Speed Drive.

- DC Bus Choke to a value of .....
- Output dv/dt Filter with energy recovery.
- Input Semiconductor fuse protection providing .....
- IGBT Technology with .....
- IGBT Snubber .....
- Short circuit protection achieved .....
- IP rating of .....
- Local Serviceability and availability of Spare parts.



Installation related factors such as:

1. Inverter Rated Motor
2. EMC Compliant installation
3. Environmental conditions within the drive specification, in particular temperature..

# The ZENER 8000

## Ease of Installation

The Zener MSC-3XL series is available direct from the factory as IP00 or installed in an P54 enclosure.

The IP00 is available to allow retrofitting into existing enclosures or into an enclosure of your choice.

## Install into your Switchboard or Enclosure.

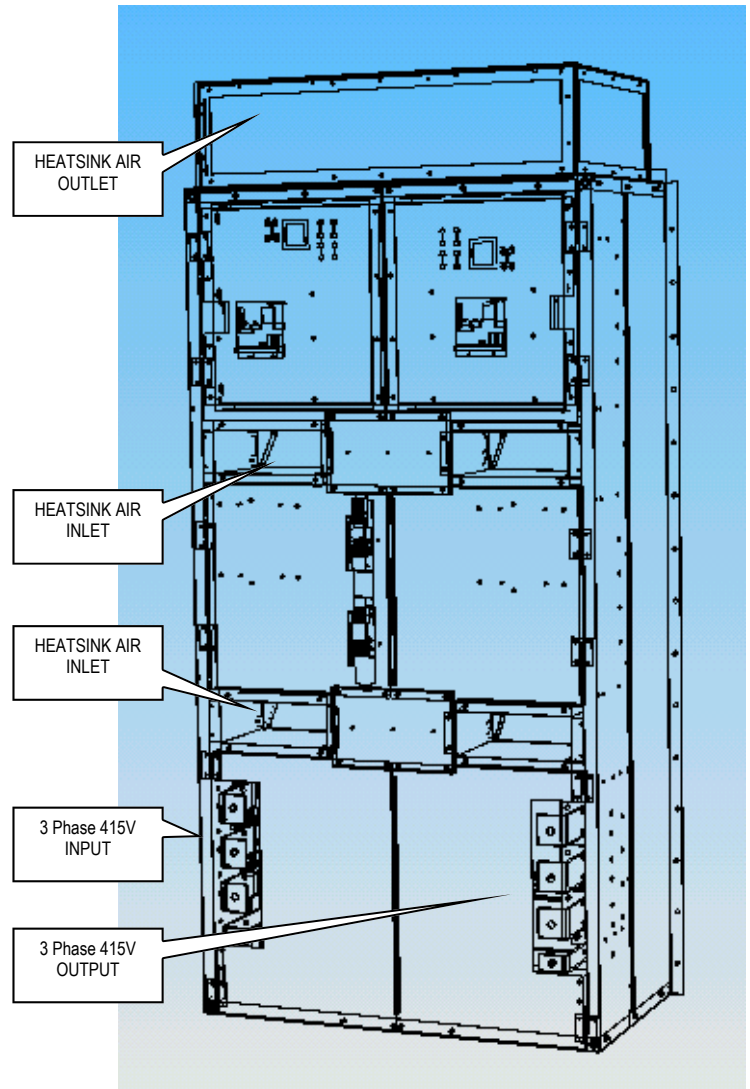
Simple Instructions are provided for the installation of the IP00 ZENER 8000 to ensure optimum performance. The IP00 comes as as one piece assembly, plus a semiconductor fuse kit and the optional dv/dt filter assembly.

Air flow is critical to ensure adequate ventilation and cooling of the heatsink assemblies. Air inlet filters are to be installed on the front door of the Switchboard / Panel with an outlet provided on the top.

Semiconductor fuses (provided) should be installed on the input of the ZENER 8000.

## Or supplied in an IP54 Enclosure

The IP54 is prefabricated enclosure system assembled by Zener Electric for convenient installation. This enclosure has a number of options available promoting a complete solution ready to be installed on site. See page X for more details.

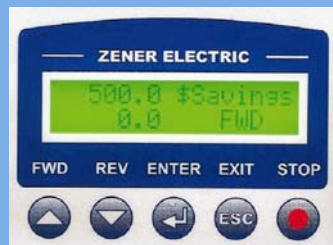


Line Drawing of IP00 ZENER 8000 ready for installation into switchboard or Panel.



IP54 enclosed, complete with output dv/dt filters, line isolator and semiconductor fuses

## Ease of Commissioning & Programming

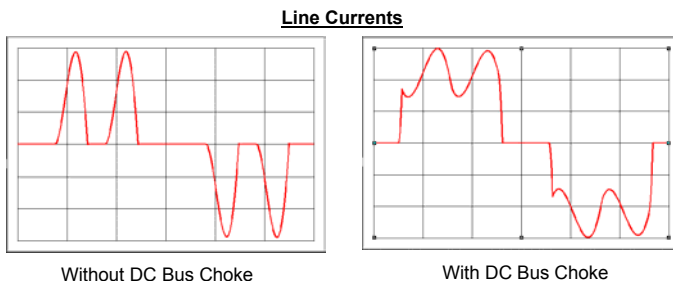


- Plain English Display
- Simple Menu Structure
- Familiarity— same as other Zener products
- No specialized equipment required
- No additional programming device required
- Over the phone technical support / assistance available

Zener has engineered this product to complement other product lines offering consistency and familiarity in control methodology and user interface. No specialist services are required and programmed as easy as a 1kw Drive. Making the installation process both timely and inexpensive.

## Harmonics and DC bus Choke

Provides a reduction of power line harmonics with the added benefit of reducing peak inrush currents, improved power factor and enhanced protection against line transients.



## Dv/dt Filter and energy recovery

An optional but highly commended energy efficient dv/dt filter which aids in softening the rise time of the output waveform. Issues relating to dv/dt are a concern for large kW motors due to the currents involved and the cost factor.

Benefits include:

- Reduction in peak voltages applied to the motor due to effects of cable lengths.
- Improved distribution of voltage stresses in motor windings
- Reduction in 'bearing currents' due to capacitive coupling between the stator windings and rotor
- Reduction in EMI levels and the potential to interfere with sensors and control systems
- Special design to optimize losses with an innovative regenerative circuitry returning energy to the drive

## Input Semiconductor Fuse Protection

Fast acting semiconductor fuses are supplied with the ZENER 8000 to provide ultra protection in the event of a short circuit. This is essential to reduce the damage to the semiconductor power devices and the extent of damage



## Flux Plus® Torque Boost.

Zener's unique flux vector control algorithm provides independent control of motor flux throughout the speed range and is highly robust against motor parameter changes. For a motor to produce full torque it must have the correct flux applied to it. This is particularly critical at low speeds. Flux Plus adjusts the motor flux estimate to provide additional control where specific adjustments to the motor torque response are required. Thus enables an adjustment in the flux vector algorithm that increases motor flux to produce more torque for the same motor current. A high speed flux plus provides further adjustment which promotes more efficient operation depending on the torque requirements throughout the speed range.

## Other Outstanding Features Include:

- **EMC Filter (C-tick)**  
Integral EMC filter for compliance with the Australian EMC Framework. ( C-tick )
- **Option Boards (extended Features / Comms).**  
Zener offers a range of Option Boards to allow communication with existing control systems. Various protocols are available.
- **PC Upload/ Download**  
The ZENER 8000 provides PC connectivity which allows the upload and download of parameters. The ZENER 8000 is powered by the USB port of a laptop allowing this programming function to be performed in an off state to ensure maximum user safety.

# TECHNICAL SPECIFICATION

## Power Supply

Supply Voltage: 380Vac (-15%) to 480Vac (+10%)  
Frequency: 48 to 63Hz  
Output: 0 to 480Vac, 3Phase, 0-200Hz  
*The output cannot be higher than the input voltage*

## Efficiency

## Environmental

IP rating : IP00 or IP54 standard offer.  
Operating temperature: 0 to +40°C ( 32 to 104°F)  
Storage Temperature: -20 to +70°C ( -4 to 158°F)  
Relative Humidity: 5 to 95% Non Condensing  
Altitude: 0-1000m (o -3281ft) without derating.  
Cooling Method: Forced Air ventilated  
Source: External dry clean air

## Standards Compliance

## Power & Control Specifications

PWM Algorithm: Sine weighted PWM  
with harmonic compensation and flux plus  
Control System: Sensorless flux vector  
Audible Frequency: 2 to 8kHz  
Frequency Resolution: 0.10%  
Frequency Linearity: 0.20% of maximum Frequency  
Input Stage:  
DC link Stage:  
Output Stage: IGBT (Insulated Gate Bipolar Transistor)  
DC Bus Choke: Split Choke,

## Protective Features

Output Short Circuit::  
Over Current:  
Current Limit:  
Over/Under Voltage  
DC Ripple:  
Earth Fault:

## Control Inputs

Digital inputs: 5 programmable Digital inputs  
3 digital inputs for speed reference selection  
Expandable with option boards  
Selection: ESO,FWD,REV,FWD Latch, REV Latch,  
JOGFWD, JOGREV, Remote, Up, Down,  
Stop/reset.  
Thermistor Input: 1 (up to x )

## Control Outputs

Digital Outputs: 2 + 1 Relays with programmable functionality  
(expandable to 4)

## User Interfacing

Display: Plain English LCD  
Local Controls: Up, Down, stop/reset, (fwd/Rev)  
Programming: Via Local pushbuttons or PC upload/  
download  
Remote controls: Programmable

## Communications

See Option Boards Available

## Dimensions

IP00 chassis:  
(dv/dt filter and fuse kit supplied loose)

IP54 Drive only:  
(Semiconductor Fuse kit supplied loose)

IP54 complete package:.

## ZENER 8000 Specification

Model:	I Cont.	I Max	P <sub>Nominal</sub>	Weight	Heat Dissipation
--------	---------	-------	----------------------	--------	------------------

Variable Torque Load: 110%

ZENER 8000 R540	540Amps	594Amps	315kW (420Hp)	600kg	9.45kW
ZENER 8000 R660	660Amps	726Amps	400kW (536Hp)	620kg	12kW
ZENER 8000 R800	800Amps	880Amps	450kW (600Hp)	640kg	13.5kW

Constant Torque Load: 150%

ZENER 8000 H450	450Amps	675Amps	220kW (295Hp)	600kg	9.45kW
ZENER 8000 H550	550Amps	825Amps	280kW (375Hp)	620kg	12kW
ZENER 8000 H680	680Amps	1020Amps	355kW (475Hp)	640kg	13.5kW

# ZENER 8000—The Complete Solution

## IP54 Enclosure

The ZENER 8000 may be supplied as IP00 or installed into a prefabricated IP54 enclosure shown below. The enclosure is of a modular design with a selection of 3 sizes depending upon inclusions. The Drive is located in the centre compartment with two side panels, one to house the output dv/dt filter (right) and the other (left) for input components such as a line isolator and semiconductor fuses. The overall dimension of the enclosure depends on these options selected.



## Input Components

Line side components are located in the optional left compartment and consist of a line isolator, semiconductor fuses and connecting buss bar. A protective shroud is provided over the buss bar for personal safety. Semiconductor fuses are required to be installed to provide high speed protection in order to reduce the extent of internal damage in the event of a short circuit.

## dv/dt Filter

In the optional right panel the dv/dt filter is fitted. The dv/dt filter is highly recommended as it aids in reducing the effects of the output switching on the motor and cables. The ZENER 8000 dv/dt filter minimises bearing currents and reduces high voltages that may be experienced at the motor due to long cable runs and cable capacitance.



## Forced Ventilation

The ZENER 8000 is forced air ventilated. A shroud is attached to the internal drive assembly to ensure a positive airflow from the inlet filters located on the front of the enclosure. Zener's filter arrangement provides an IP54 enclosure rating.

## User Friendly Control panel

Control Station located on front panel complete with local controls and plain English display for status & fault indication. A user friendly menu promotes ease of programming and operation.



# ZENER 8000 OPTIONS

## 1. The ZENER 8000 Selection:

Model:	P <sub>Nominal</sub>	I <sub>Cont.</sub>	I <sub>Max</sub>	Dimensions	Part Number
<b>Variable Torque Load: 110%</b>					
ZENER 8000 R540, IP00	315kW (420Hp)	540Amps	594Amps	1745h 846w 405d	8R54010
ZENER 8000 R660, IP00	400kW (536Hp)	660Amps	726Amps	1745h 846w 405d	8R66010
ZENER 8000 R800, IP00	450kW (600Hp)	800Amps	880Amps	1745h 846w 405d	8R80010
<b>Constant Torque Load: 150%</b>					
ZENER 8000 H450, IP00	220kW (295Hp)	450Amps	675Amps	1745h 846w 405d	8H45010
ZENER 8000 H550, IP00	280kW (375Hp)	550Amps	825Amps	1745h 846w 405d	8H55010
ZENER 8000 H680, IP00	355kW (475Hp)	680Amps	1020Amps	1745h 846w 405d	8H68010

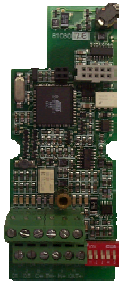
- When purchased as IP00 the following is included:
- Semiconductor Fuse Kit
  - Display Console complete with 3m length cable
  - Fan Filter Kit
  - EMC Filter (C-tick)

## 2. Optional dv/dt Output Filter (recommended):

Description:	Part Number
ZENER 8000 dv/dt Filter to suit H450 / R540	AQ08001
ZENER 8000 dv/dt Filter to suit H550 / R660	AQ08002
ZENER 8000 dv/dt Filter to suit H680 / R800	AQ08003

## 3. Other Options:

Description:	Part Number
ZENER 8000 Option Board: Extended Features (1 x AF8001 is fitted as standard in slot 1)	AF08001
ZENER 8000 Option Board: Communications (Modbus)	AF08004
ZENER 8000 Option Board: Communications (Devicenet)	AF08080
ZENER 8000 Option Board: Communications (Profibus)	AF08079
ZENER 8000 Option Board: Communications (Metasys)	AF08005
ZENER 8000 Option Board: Communications (Lonworks)	AF08078
ZENER 8000 DC bus Choke:	Included as standard
ZENER 8000 Semiconductor Fuse Kit:	Included as standard
ZENER 8000 Display Console Extension cable per metre	AF08023



## 4. Supplied installed within an IP54 enclosure by Zener.

Description:	Part Number
ZENER 8000 IP54 enclosure kit: - installed (2000h 1000w 600d) <i>This option includes the drive only enclosed to IP54, no dv/dt filter. A semiconductor fuse kit is supplied loose.</i>	AF08100
ZENER 8000 IP54 enclosure kit: - installed (2000h 1200w 600d) <i>This option includes the drive only enclosed to IP54, dv/dt filter. A semiconductor fuse kit is supplied loose.</i>	AF08110
ZENER 8000 IP54 enclosure kit - installed (2000h 1600w 600d) <i>This option includes the drive, dv/dt filters, input isolator and semiconductor fuse. (As per photo page 7)</i>	AF08120