



MSC-3

Car Park Ventilation System



Saving Energy using ZENER Variable Speed Drives on Car Park Ventilation

By installing a CO (Carbon Monoxide) monitoring and control system using the ZENER Variable Speed Drive (VSD) significant energy savings can be achieved.

✓ Significant Energy Savings

- Due to the Speed / Power relationship of a fan the power consumed is reduced significantly when the speed is reduced.
- By controlling the speed of the fan(s) when full ventilation is not required to maintain the CO levels at acceptable levels.
- The Zener MSC-3 ensures the optimum speed of the ventilation fans are maintained during peak and off peak periods.

✓ Compliance with AS1668.2 2002.

- AS1668.2 allows the use of energy saving devices provided such device continuously monitor the concentration of contaminants.
- The ZENER MSC-3 & the CO sensor input module the CO sensors/transmitters are connected directly and continuously monitor the CO concentration in the atmosphere
- By actively monitoring the CO levels using the correct number of sensors in compliance with AS1668.2
- The ZENER MSC-3 is configured to operate the ventilation fans at reduced speeds according to the requirements of AS1668.2.

Smarter Control of the speed and operating time of ventilation fans can result in significantly reduced power consumption

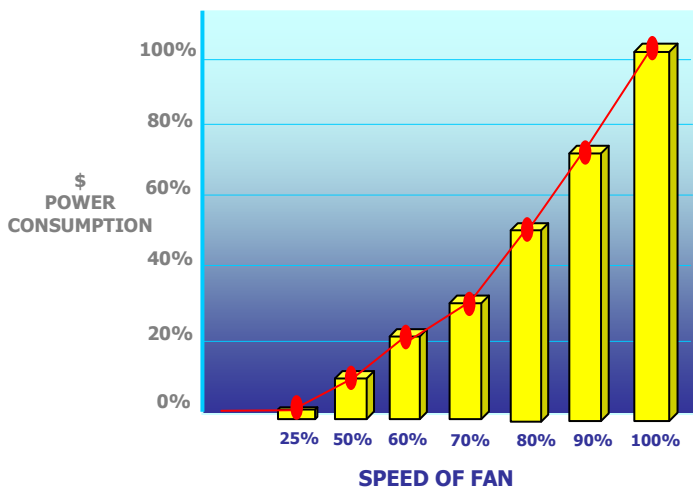
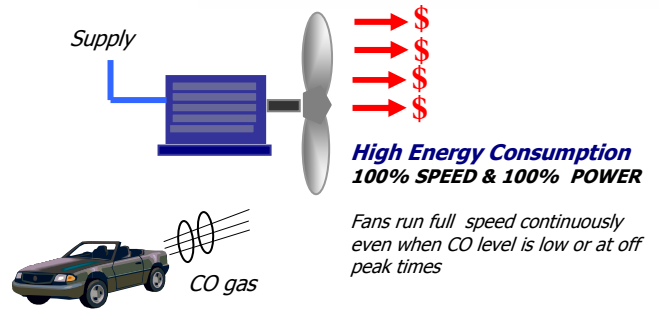
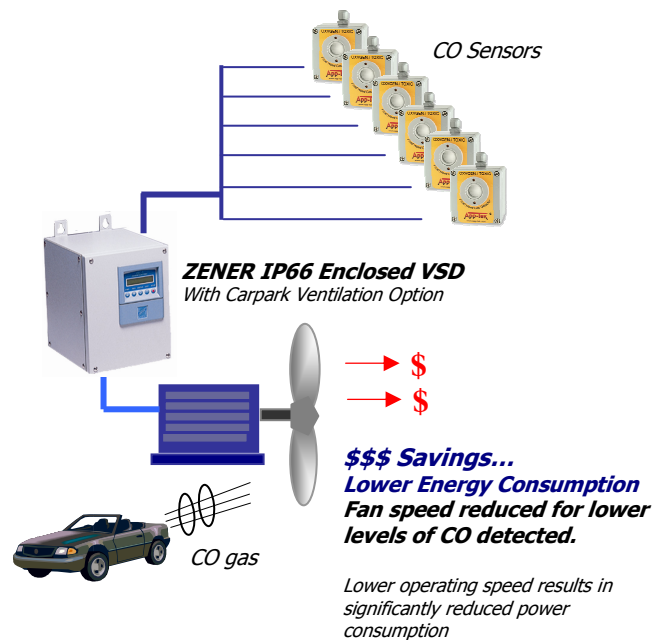


Fig.1 Energy Savings with reduction in fan speed

Without a CO Control System:



With a CO Control System:



The Smarter Control of the speed and operating time of ventilation fans results in significantly reduced power consumption

✓ Potential Cost Savings

- **Decreased operational costs through reduced energy consumption.** The fundamental characteristics of a fan is that the absorbed power varies proportional to the cube of the speed.

$$\text{Power} = \text{Speed}^3$$

Therefore, any reduction in speed results in significant energy savings (see Fig.1). Office car park fans can operate at lower speeds for most of the off peak period and during the peak periods full speed may not be required to maintain acceptable CO levels.

- **Peak Demand cost savings.** When Power is purchased in blocks of kWhr it may be subject to peak demand penalties. Installing a VSD reduces your peak demand by removing the high surge currents of power associated with normal DOL starting methods. The starting current of a motor is reduced from as high as 700% to less than 110% of the motors rated Full Load Current.
- **Improved Power Factor.** A motor operating on a ZENER Variable Speed Drive with a DC bus choke fitted will have an improved effective power factor (PF) as compared to running DOL at full speed and load. Improved power factor results in better feeder/supply utilisation and reduced energy costs when charged for apparent power or power factor.
- **Maintenance cost savings.** The mechanical stresses of starting fans using normal starting methods (DOL) can result in bearing stresses and fan belt wear. The ZENER Variable Speed Drive provides a smooth acceleration ensuring all stresses are eliminated.
- **Indicative Energy Savings.** The following tables provide an indication only of potential energy savings that may be achievable. The actual energy savings will vary depending on the operational requirements of each application.

Indicative Energy Savings
Percentage of Flow/Speed required

kW	90%	80%	70%	60%	50%	40%
1.1	\$292	\$550	\$751	\$902	\$1,011	\$1,084
1.5	\$385	\$726	\$991	\$1,192	\$1,335	\$1,433
2.2	\$546	\$1,030	\$1,408	\$1,692	\$1,897	\$2,035
3	\$730	\$1,378	\$1,883	\$2,264	\$2,538	\$2,723
4	\$952	\$1,800	\$2,461	\$2,959	\$3,318	\$3,560
5.5	\$1,288	\$2,436	\$3,331	\$4,006	\$4,492	\$4,820
7.5	\$1,731	\$3,277	\$4,483	\$5,392	\$6,046	\$6,488
11	\$2,480	\$4,700	\$6,434	\$7,740	\$8,679	\$9,314
15	\$3,339	\$6,332	\$8,667	\$10,426	\$11,693	\$12,548

The above figures are approximate only & based on 9.88c/kWhr, 24hours use per day, 365 days per year, 100% loading & typical motor characteristics.

- **Payback Periods.** The energy savings will vary from site to site depending upon the dynamics of the car park, the ventilation system and the traffic flows. As a guide, payback periods on the equipment installation can be around two to four years.

✓ Simple Installation & Setup

- The CO Input Module accepts up to 6x CO Sensors
- Sensors are to be installed to manufacturer requirements, using the recommended cable.
- An integral 24V Power Supply Option is available for CO sensors or Transmitters.
- The ZENER MSC-3 is available enclosed to IP66 allowing the VSD to be wall mounted close to the motor, protected against the ingress of dust & moisture. VSD's are to be installed to manufacturers recommendations, in particular to installation of screened motor cables. Refer to the equipment instruction manual.

✓ The Equipment Required

The Variable Speed Drive Package to include:

A ZENER MSC-3 should be installed on each ventilation fan. The 'Master Drive' is configured to accept the CO sensors with additional drives controlled by the 'Master Drive' and configured as 'Slave Drives'.

1. ZENER MSC-3 Series (Master)

- IP66 Enclosure
- Integral EMC Filter in compliance with Australian Standards and the EMC framework.
- Extended Features Option Board
- Essential Services Over-ride Feature
- DC Bus Choke (optional)

MSC-3 CO Sensor 6 Input Module

- Fitted within the VSD's IP66 enclosure

MSC-3 Integral Power Supply Option

- 24Vdc 110mA capacity
- Fitted within the VSD's IP66 enclosure

2. ZENER MSC-3 Series (Slave)

- IP66 Enclosure
- Integral EMC Filter in compliance with Australian Standards and the EMC framework.
- Essential Services Over-ride Feature
- DC Bus Choke (optional)

CO Sensors/ transmitters

- 4-20mA output, suitable for the application.
- Correct number of Sensors / transmitters for the enclosure in compliance with AS1688.2.
- Sensors installed in compliance with AS16688.2 and manufacturers recommendations.
- Mounting Hardware

✓ Commissioning & Setup

The equipment requires on site commissioning by Zener Electric to ensure the equipment is configured correctly to meet the requirements of AS1668.2-2002.

✓ Application Suitability

A feasibility study is recommended to determine whether this system is suitable for a particular application or site. The CO emissions need to be monitored and assessed over a period of time. Every installation is different and dependant on the CO levels, ventilation and the dynamic nature of the traffic profiles.