

## Vehicle Detection (loops) – Incident Detection

### General Description



Excel Technology Group (ETG) has developed a range of loop based vehicle detectors, which provide vehicle actuation, incident detection, vehicle classification, vehicle categorisation (length and axle) and weigh in motion. These circuit modules and associated functions are available integrated into a single chassis or as standalone modules.

The XL loop based incident detector provides vehicle actuated contact closure or processed incident analysis data in serial form. These detector configurations are available in 8, 16, 24 and 32 channel card format. LEDs are used on all models to indicate power status, operational status, tuning function, loop actuation, loop failure and serial data channel activity. Sensitivity adjustment is available from 3 to 99 and all parameters including loop size and separation are site configurable. All hardware functions have software commands for remote operation and maintenance. A local maintenance port and a remote host port provide flexible accessibility. The standard communication port is RS232 with user configurable port parameters. An optional Galvanic Isolated RS422 line driver and repeater for multidrop situations are available. An ETHERNET TCP/IP communication port is also available to enable web connection and TCP/IP protocol remote HOST connection.

### Applications

- Freeway incident detection
- Tunnel incident detection
- Freeway ramp congestion analysis
- Actuating hazardous sign display and driver advisory signs
- Traffic survey counting and operational road management
- Variable speed management highways control data processing



### Data Output

Contact closure output is available for systems with higher level computing of vehicle actuation processing. Contact closure is a 'dry' contact closure, that is, no voltage solid state switch of 60 volt 500 milliamps capability.

### Serial Data

- The serial port is configurable however 19200,N, 8,1 a default value
- The OUTPUT message contains the following processed data and information
- Traffic volume and vehicle counts (option for length binning)
- Traffic speed – instantaneous and average
- Traffic headway / gap
- Occupancy PLUS calculated HIOCC data

### Data Retrieval

- Communication port is wire or wireless friendly
- Access from 5 seconds to 5 hours
- Accumulated data may be retained for 5 days
- ETG provides communication protocol documentation
- ETG provides sample data retrieval software code for remote host port access





## General Detector Specification

- Self tuning in the range of 50 to 800 microhenries within 1 second of power up
- The detector resonates between 40 KHz and 150 KHz
- Operate with loops of the specified inductance range and Q of  $\geq 3$  at typical resonant frequency
- The circuitry detects a vehicle in less than 50 milliseconds of a departing vehicle (recovery time)
- Standard 2 millisecond scan period with linear interpolation yield of typically 1 millisecond resolution
- High speed scanning for incident detection – 250 microseconds scan period per channel, providing an accuracy resolution of less than 1 kilometre / hour
- For a sensitivity setting of  $(\text{change in } L)/L \geq 0.04\%$  the threshold is  $\pm 5\%$
- For a sensitivity setting of  $(\text{change in } L)/L \leq 0.04\%$  the threshold is  $\pm 10\%$
- Detection trigger actuation (minimum) change in inductance of 0.02% for a period of 10 milliseconds
- Detection trigger actuation (maximum) change in inductance of 10% for a period of 50 milliseconds
- Automatic drift compensation; temperature change 15°C per hour between -10°C and 50°C at 90% humidity
- Crosstalk immunity is maximised on 16 channel scanning however, recognised loop positioning and feeder allocation improves performance on multiple 8 channel cards
- Failure mode, open circuit / short circuit loop and low resistance output when power is removed
- Hold time is user configurable (typically 10 minutes) and open/short circuit loop detection occurs within 0.5 of a second
- Vehicle detection – serial output or contact closure: the vehicle passage data is transmitted serially within 5 milliseconds of the trailing edge of the vehicle detection
- Two levels of lightning protection loop interface and circuit card Transorb

## General Electrical Specification

### Serial Ports

The standard serial ports are RS232C electrical signal level compatible.  
An RS422 Galvanic Isolated and / or Ethernet (TCP/IP) interface is available as an option.

### Digital I/O (Contact closure) and Loop Interface

OUTPUT Devices: PVAZ172 MOSFET Photovoltaic Relay 60 volt 500 milliamp capability  
INPUT Devices: PC844 Opto-isolator 5000 volt RMS isolation, input 20 milliamps at 1.2 volts  
LOOP Interface: Transorb and line isolation transformers 1:1 typical 100 millihenries

## Connector Specification

DB Series current rating 1 amp, contact resistance 20 Mohm max at DC100mA  
DIN41612 current rating 2 amp, contact resistance 30 Mohm max at DC100mA  
Mate-enlock current rating 3 amp per pin, contact resistance 30 Mohm max at DC100mA  
PCB Modular Terminal 'Phoenix style' 10 amp rated voltage 300 volt AC  
IDC Style Connectors withstanding voltage 500 volt RMS for 1 minute, 0.5 amp current rating

### Environmental

Circuitry implemented on all cards is rated to 65°C operation with a relative humidity of 90%. Circuit cards are conformal coated and will operate within Australian Standard Guidelines for Traffic Control Devices as per TSC/3 and TSC/4. The CONFORMAL coating material used to protect the circuit cards is labelled SCC3 CC from Electrolube. The material is sprayed onto the circuit cards in accordance with the manufacturer's recommendations and required Occupational Health and Safety practices. The conformal coating material has a dielectric strength of 90 KV/mm and an operational temperature range of -70°C to 200°C and is self extinguishing when exposed to a flame.

### Power Supply

All units have provision for 240 volt AC, 110 volt AC or 12 volt DC battery solar provision.  
Current consumption specific to detector function and configuration -displayed overleaf  
Card specification / 8 channel.: Card L 250 mm x W 270 mm, Weight .35 kgs typical 280 milliamps  
Card specification /16 channel.: Card L 320 mm x W 240 mm, Weight .5 kgs typical 460 milliamps  
Current consumption per card passive state – actuation operation will cause variation.

### MTBF

Statistical MTBF individual component extrapolation (MIL-STD-217-E)  
\* Using chi-squared test, we can state with 90% confidence: > 180,000 hours  
Field History – based on installations and period: 1.3 site failures per year