

Vehicle Detection (loops) – Simple Actuation (Contact Closure and Serial ‘state’ Data)

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 & axle) and weigh in motion. These circuit modules and associated functions are available integrated into a single chassis or as standalone modules.



The basic XL loop detector provides contact closure or simple serial data actuation state output, indicating a vehicle detection. These detector configurations are available in 2, 8 and 16 channel card format. The circuit modules are available in OEM (card only format) or standalone package that includes a power supply or multiple card frames.

LEDs are used on all models to indicate power status, operational status, tuning function, loop actuation, loop failure and serial data channel activity. The 2 channel detector has a selector switch for selecting hi/low sensitivity while 8 and 16 channel cards have a range of sensitivity from 3 to 99. All cards have a manual retune push button while the 8 and 16 channel cards have an additional software reset command function.



The 2 channel detector has provision for a 4 way plug connector, to facilitate loop connection directly to the circuit module. The circuit module incorporates transorb surge protection. The 8 and 16 channel cards have a field termination panel for convenient loop feeder connection. The field termination card incorporates transorb surge protection that is replicated on the detector loop input circuitry for added protection. Chassis can be configured with multiple circuit cards as per client requirements.

Applications

- Vehicle actuated traffic control; fixed site, temporary and portable traffic signals
- Simple vehicle counting by actuation
- Actuating hazardous sign display and driver advisory signs
- Traffic survey counting
- Automated barrier and gate control



Output States

Contact closure is a ‘dry’ contact closure, that is, no voltage solid state switch of 60 volt, 500 milliamps capability.

Serial Data ‘simple actuation’ message

The serial port configuration is 19200,N,8,1

The OUTPUT provides a ‘#00#’ message continually. Upon actuation of a specific channel, the output message state will change accordingly with actuation on channel 1 indicated by #10# and actuation on channel 2, indicated by #01#.

Vehicle detectors available in the following configurations

These devices are available as standalone vehicle detection modules with integrated power supply or in an OEM card only configuration.

2 channel card size W 150 mm x D 150 mm Weight 0.25 kg

2 channel module size W 225 mm x D 165 mm x H 45 mm Weight 3 kg

8 channel card size W 270 mm x D 250 mm Weight 0.4 kg

8 channel module size W 300 mm x D 280 mm x 100 mm Weight 4 kg

16 channel card format W 320 mm x D 250 mm Weight 0.5 kg



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 ≥ 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 (TCPIP) 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, Power Supply and Physical Specification

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 ISO and Australian Standard Guidelines for Traffic Control Devices. The CONFORMAL coating material used to protect the circuit cards is labelled SCC3 CC from Electrolube and 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.

All stand alone modules have provision for 240 volt AC, 110 volt AC or 12 volt DC battery solar operation.

2 Channel current consumption 180 milliamps at 12 volt DC

8 Channel current consumption 290 milliamps at 12 volt DC

16 Channel current consumption 460 milliamps at 12 volt DC

Typical PS consumption 50 to 100 milliamps at 12 volt DC

* Some degree of variation in current consumption will occur due to operational state and PS operation

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