

ULTITEC Electronics c.c.

**VEHICLE DETECTOR
with a wide operating power
supply voltage range
ULTLDS200mini
USER MANUAL**

Specifications contained herein are subject to alterations without notice.

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1. INTRODUCTION

The ULTLDS200mini is a single channel microprocessor based detector designed for the car parking and security industry.

This loop detector has a wide operating voltage for use in many different voltage supply installations thus obviating the need for dedicated power supplies or for many different voltage range detectors.

The Vehicle detector uses the active magnetic field change principle to detect a metal vehicle. This is achieved by burying a loop of wire in a paved surface, which in turn is connected to an oscillator that creates a magnetic field. This magnetic field changes as a metal vehicle passes over the loop changing the magnetic field. This change is detected in the change of oscillator frequency.

The ULTLDS200mini provides LEDs for visual indicators for simple diagnostics.

Permanent Presence on power up. This is a powerful feature that allows the loop detector to power down and still know if there is a vehicle on the loop on power up. This is a selectable feature as it takes a while to get used to.

2. TECHNICAL DATA

2.1 Functional data

Tuning	Fully automatic
Loop size	20uH to 1500uH
Sensitivity	High 0.02% $\Delta L/L$ Medium high 0.05% $\Delta L/L$ Medium low 0.10% $\Delta L/L$ Low 0.50% $\Delta L/L$
Frequency	Four settings. Frequency dependant on loop geometry.
Filter	On/off selectable 2 second.
Presence Relay	Fail secure
Presence time	Limited presence Permanent presence
Limited Presence compensation	3% $\Delta L/L$ per hour
Pulse Relay	Pulse on detect Pulse on undetect
Pulse output duration	250 milliseconds
Response Time	50 milliseconds
Drift Compensation Rate	10% $\Delta L/L$ per hour
Visual indication	Red LED Yellow LED
Outputs	Presence relay 1A @ 125VAC Pulse relay 1A @ 125VAC
Surge Protection	Gas discharge tube Tranzorb

2.2 Electrical Data

Power requirements	12V to 24V AC/DC 300mW max
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2.3 Environmental Data

Operating temperature	-40°C to 85°C
Humidity	Up to 95% relative humidity without condensation.
Circuit protection	Conformal coating over PCB

2.4 Mechanical Data

Mounting Position	Pillar or shelf mounting
Connections	12-pin Pin type
Dimensions	53mm(L) by 50mm(W) by 20mm(H)
Weight	50g approx. (with packing enclosure)

3. OPERATING INSTRUCTIONS

3.1 Hardware setup

The ULTLDS200mini single channel parking detector is designed to be plug in or shelf mounted with visual indicators and control buttons accessible.

3.2 Program Settings Selections

It will not be necessary to reset the unit after altering the program settings. The unit will do it automatically. The only setting that requires the loop detector to be reset will be the Frequency setting

3.2.1 Frequency

The frequency setting is set by switches 1 and 2. They are set out as follows.

S2	S1
Off	Off - High
Off	On - Medium High
On	Off - Medium Low
On	On - Low

The frequency switches are essentially only used to create a shift in frequency to prevent cross-talk between adjacent loops.

Cross-talk or interference between loops must be prevented to ensure proper operation. A good installation of loops will not require the frequency settings to be altered. This can be achieved on most applications by using the following rules.

- 1) Keep loops far away from each other as reasonably possible.
Two metres is usually suffice.
Wind each adjacent loop with different number of turns, or make the size of each adjacent loop different.
Position the loops away from metal paving or re-enforcing rods.

3.2.2 Sensitivity

The sensitivity adjustment of the detector allows the detector to be selective to the change of inductance necessary to produce a detect. Select lowest sensitivity for noisy environment.

S4 S3

Off Off - High

Off On - Medium High

On Off - Medium Low

On On - Low

3.2.3 Automatic Sensitivity Boost

Automatic sensitivity boost is a mode which alters the undetect level of the detector to maximum sensitivity setting while detecting.

S5

Off - Disabled

On - Enabled

3.2.4 Filter mode

The filter produces a delay of two seconds before the relays actuate. This is to allow unwanted objects to pass over the loop without being detected.

S6

Off - Disabled

On - Enabled

3.2.5 Second Relay

This relay may be made to operate as a pulse on detect, pulse on undetect.

S7

Off - Pulse on detect

On - Pulse off detect

3.2.6 Presence time out

Limited presence tunes out a detection after a time, to allow further actuations on the loop. Permanent presence compensates for environmental conditions while a vehicle is on the Loop to maintain detection indefinitely.

S8

Off - Limited Presence

On - Permanent Presence

3.3 Front Panel Indicator

On power up of the vehicle detector, the Red LED (Top LED) will flash at a rate of twice a second for five seconds while the internal oscillator warms up. Thereafter it will stay on.

If there exists a short circuit Loop fault the Red LED will flash at a rate of once a second until the fault is corrected.

If the Loop was short circuit and was then corrected Red LED will flash at a rate of once briefly every four seconds until the unit is reset.

If there exists a open circuit Loop fault the Yellow LED will flash at a rate of once a second until the fault is corrected.

If the Loop was open circuit and was then corrected Yellow LED will flash at a rate of once briefly every four seconds until the unit is reset.

The Yellow LED (Bottom LED) will glow whenever a metal mass passes over the inductive loop.

4. PRINCIPLE OF OPERATION

The ULTLDS200mini in conjunction with the Loop and feeder cables, creates a magnetic field around the Loop. When a vehicle passes into this magnetic field alters it through eddy current losses. This alteration is detected as a negative inductance change by the ULTLDS200mini which in turn responds by changing the output relays.

4.1 Detector tuning

The tuning of the detector is fully automatic. When power is applied, the reset button is activated or the frequency setting is altered, the detector will automatically tune itself to the loop it is connected.

Once tuned the slow environmental changes in loop inductance are compensated out by the detector to maintain accurate sensitivity of the loop detector.

4.2 Sensitivity

The sensitivity of the system is dependant on many parameters, like depth of the loop, size of the loop, number of turns of the loop, moisture content in the windings, metal in close proximity to the loop, vibration and many other factors.

For this reason the sensitivity is adjustable on the detector. The detection of small unwanted objects such as trolleys, prams, bicycles, cans can be eliminated by setting the sensitivity lower.

The un-detect sensitivity is also selectable to give the optimum hysteresis for high bed vehicles and trailer combinations. If the un-detect sensitivity is set high the detector will not un-detect when high bed vehicle traverses the loop. In the case of sliding gates in close proximity of the loop a high un-detect sensitivity is not desirable as the detector will detect the moving gate. In this case the un-detect sensitivity can be lowered to suit the moving gate.

4.3 Modes of operation

The detector has two outputs. Relay 1 for Presence output and Relay 2 for Pulse or other outputs.

The Presence output is a secure output so when power fails the detector will un-detect. The presence output indicates when the vehicle is on the loop. This output will stay in this mode until the vehicle leaves the loop or when the presence time out occurs. The timeout is variable from 1 minute to 255 minutes and infinity.

The 2nd Relay can function as a presence output or a pulse output depending on the settings. This relay can function as a safe or secure output, depending on the settings. When set to pulse mode, the pulse can be set to given on vehicle leaving or entering the loop.

4.4 Response Times.

The response time is measured from when the vehicle moves into detection range to the time it takes the detector to give a response.

4.5 Low voltage shut down.

This feature is used to help save the battery from completely discharging. When the battery voltage reaches 10,5V for more than 15 seconds the Loop detector will shut down to a low power mode. Drawing just enough power to keep the control chip in a sleep state.

4.6 Timed operation.

The loop detector will power up as normal detector. If the timed input is activated the loop detector will only operate for 5 minutes or 10 minutes depending on the jumper setting JP2 inside the loop detector. Jumper off is 5 minutes and jumper on is 10 minutes. This is a useful feature for gated communities where the free exit is enabled for a few minutes to allow visitors to exit without having to call from the gate. When in this mode the power LED will flash quickly.

4.7 Permanent presence.

This feature allows the detector to determine if there is a vehicle on the loop on power up. To enable this feature jumper JP1 must make contact on pins 1 and 2. When in this mode you have to re-tune the detector when there is no vehicle on the loop. The re-tune button is switch 10 on the DIP switch. To tune turn the switch on then off. The detector will flash 3 times. In normal mode on power up the power LED will flash 9 times.

5. INSTALLATION GUIDE

Optimum functioning of the detector module is largely dependent on factors associated with the inductive sensor loop connected to it. These factors include choice of material, loop configuration and correct installation practice. A successful inductive loop vehicle detection system can be achieved bearing the following constraints in mind, and strictly following the installation instructions. The detector must be installed in a convenient weatherproof location as close as possible to the loop.

5.1 Operational Constraints

Crosstalk

When two loop configurations are in close proximity, the magnetic fields of one can overlap and disturb the field of the other. This phenomena, known as crosstalk, can cause false detects and detector lock-up.

Crosstalk between adjacent loops operating from different detector modules can be eliminated by:

1. Careful choice of operating frequency. The closer together the two loops, the further apart the frequencies of operation must be.
2. Separation between adjacent loops. The closer together the two loops, the further apart the frequencies of operation must be.
3. Careful screening of feeder cables if they are routed together with other electric cables. The screen must be earthed at the detector end only.

Reinforcing

The existence of reinforced steel below the road surface has the effect of reducing the inductance, and therefore the sensitivity, of the loop detection system. Hence, where reinforcing exists 2 turns should be added to the normal loop, as referred to in section 5.3.

The ideal minimum spacing between the loop and the cable and steel reinforcing is 150mm, although this is not always practically possible. The slot depth should be kept as shallow as possible, taking care that the feeder remains exposed after the sealing compound has been applied.

5.2 Loop and Feeder Specification

The loop and feeder should preferably constitute a single unjoined length of insulated multi-strand copper conductor, with a minimum rating of 1.5mm² cross sectional area.

Joints in the loop or feeder are not recommended. Where this is not possible, joints are to be soldered and terminated in a waterproof junction box. This is extremely important for reliable detector performance.

5.3 Sensing Loop Geometry

Sensing loops should, unless site conditions prohibit, be rectangular in shape and should normally be installed with the longest sides at right angle to the direction of traffic movement. These sides should ideally be 1 metre apart.

The length of the loop will be determined by the width of the roadway to be monitored. The loop should reach to within 300mm of each edge of the roadway.

In general, loops having a circumference measurement in excess of 10 metres should be installed using two turns of wire, while loops of less than 10 metres in circumference, should have three turns or more. Loops having a circumference measurement less than 6 metres should have four turns. It is good practice at time of installation to construct adjacent loops with alternate three and four turn windings.

5.4 Loop Installation

All permanent loop installations should be installed in the roadway by cutting slots with a masonry cutting disc or similar device. A 45° crosscut should be made across the loop corners to reduce the chance of damage that can be caused to the loop at right angle corners.

NOMINAL SLOT WIDTH: 4mm

NOMINAL SLOT DEPTH: 30mm TO 50mm

A slot must also be cut from the loop circumference at one corner of the loop to the roadway edge to accommodate the feeder.

A continuous loop and feeder is obtained by leaving a tail long enough to reach the detector before inserting the cable into the loop slot. Once the required number of turns of wire are wound into the slot around the loop circumference, the wire is routed again via the feeder slot to the roadway edge. A similar length is allowed to reach the detector and these two free ends are twisted together to ensure they remain in close proximity to one another. (Minimum 20 turns per metre) Maximum recommended feeder length is 100 metres. It should be noted that

the loop sensitivity decreases as the feeder length increases, so ideally the feeder cable should be kept as short as possible.

6. CONFIGURATION

Pinouts

PIN NUMBER	FUNCTION
1	12V-24VAC/DC
2	12V-24VAC/DC
3	N/O Pulse contact
4	Common Pulse contact
5	N/O Presence contact
6	Common Presence contact
7	Loop
8	Loop
9	Mains earth
10	N/C Presence contact
11	N/C Pulse contact

7. APPLICATIONS

The ULTLDS200mini is used in many applications in the parking and domestic environments.

To open door, boom, gate and road blocker barriers.

To arm card readers and ticket dispensers.

To count vehicles

To function as a safety device for closing booms, gates and doors.

8. FAULT AND DIAGNOSTICS ANALYSIS

8.1 Initial diagnostics

The front panel of the loop detector is fitted with two LEDs. These LEDs display the operating status of the vehicle detector.

- 1) No LEDs turn on, on power up.
 - a) There is a fault on the power supply. Check the power connection to the unit.
- 2) The Red LED keeps flashing at 2 Hz.
 - a) The Loop is short circuit. Check the Loop and the feeder for shorts in the cables.
- 3) The Yellow LED keeps flashing at 2Hz.
 - a) The Loop is open circuit. Check the Loop and feeder for breaks in the cables.
- 4) The Red LED Keeps flashing at 1Hz.
 - a) The vehicle detector is not properly connected to the 230VAC supply. Check for intermittent connections or the mains supply voltage is too low.
- 5) The Detector keeps detecting intermittently.
 - a) There maybe crosstalk between detectors loops. Adjust the frequencies of the detectors.
 - b) There is a faulty loop or feeder connection. Check the feeder is connected and twisted properly.
 - c) There maybe an electrical cable is close proximity to the loop or feeder. Move the Loop or electrical cable away from the loop.