User Manual

1.   Introduction

The Tactile Loop Controller has been designed to provide specific "logic" outputs from a patented EzyLoop Systems tactile Surface Mounted Switch Pad intended primarily for pedestrian detection. The Controller and switch pad provide a pressure activated electronic method of detection that provides both "passive presence detection" and "directional detection" of pedestrians and vehicles. The Switch Pad may also incorporate an inductive loop for conventional vehicle detection.

Due to a combination of vehicle and pedestrian detection capabilities, the tactile loop controller and Switch Pad can be used in a number of applications in low speed / low volume (car park) traffic and pedestrian control applications as follows:

a) Vehicle Detection – by means of the pressure actuation due to the vehicle wheels on the tactile sensor OR by use of the optional built in inductive loop OR a combination of both.

b) Pedestrian Detection – by pressure actuation
The controller is capable of providing timing functions (delay) of the pedestrian actuation

c) Direction of movement detection – in analysing the movements over the Switch Pad to direction in both vehicle and pedestrian modes.

2.   Hardware detail

2.1.   Switch Pad

EzyLoops Systems, Surface Mounted Pedestrian Activated Switch Pads are pre-formed and encapsulated in a protective non-slip tactile surface mat, so that they may be laid onto the surface of a pavement as a single unit.

Pad construction:

Heavy-duty, extruded, rubber mat, which encapsulates the electronic switches, with a UV resistant, slip resistant, tactile mat surface. The standard sized mat is 800mm wide by 1400mm long.

Total Thickness (not incl. buttons)	Thickness of Lip	Weight Per Unit	Tensile Strength	Flexural Strength	Hardness (Rockwell)	Thermal Expansion
4.5mm (nominal)	1.5mm (nominal)	8.0 to 10kg	15 Mpa (nominal)	110 Mpa	R77	7.5

Optional sizes through to 1400mm wide by 2400mm long.

Electrical details:

Max Operating Voltage: 24 V DC

Operating Current: Min 50 micro amps to 20 milli amps Max, Resistive.

Feeder cable, Min 3 core x (0.75mm2) multi-strand insulated cable.

2.2.   PD134TLC Controller

The PD134TLC (301FT0217) detector is designed to be shelf or DIN rail mounted with the controls and visual indicators at the front and wiring at the rear of the enclosure.
The power, loop and relay outputs are all connected to the single 11-pin plug, which is mounted at the rear of the enclosure.
This unit interfaces to tactile mat via the Tactile Mat Interface, the 301FT0218, which connects via the 11-pin plug.
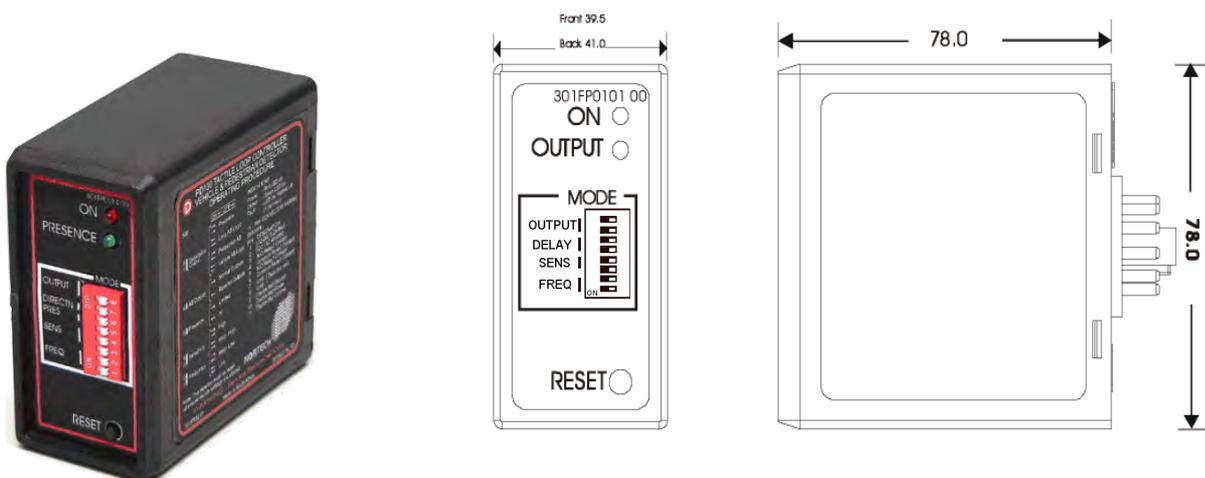

Fig 3.1 PD134TLC Controller Housing detail

2.3. Tactile switch pad interface

The Switch Pad is connected to controller by means of a supplied cable with an interface at the switch pad end. This cable is factory supplied at 3 metre lengths.

The controller should normally be mounted close to the switch pad.

The connecting cable can be extended to a maximum length of 50 metres using 8core Cat 5 cable or similar.

Fig 3.2 Tactile Mat Interface

3. Operating Modes – Rev 03

To accommodate the numerous application requirements, this versatile unit may be configured to operate in a number of unique detection modes.

The available detection options include:

- Vehicle and Pedestrian presence detection with optional tactile delay timing.
- Discrimination between Vehicle and Pedestrian actuation in "mixed" traffic areas, with optional tactile delay timing.
- Vehicle Direction detection with a combined loop / tactile sensor.
- Bicycle Direction detection with discrimination against motor vehicles and Pedestrians in "mixed" traffic areas, with optional tactile delay timing.
- Pedestrian / Bicycle Direction detection with optional delay timeout.

3.1. Presence Mode – (Loop optional)

In this mode the controller provides two separate "presence" outputs. One of these is dedicated to the tactile switches in the switch pad that respond to pressure. The second output becomes functional if an optional detection loop coil is embedded in the switch pad. This detection loop coil (vehicle detector) senses the metal content of a vehicle above the switch pad.

The tactile output provides a "presence" output while a vehicle wheel or pedestrian is standing on the switch pad. This output may be immediate when the pressure is applied or delayed by switch settings on the controller. This output is constant for the duration of the pressure applied to the switch pad.

The delay settings provided are 2 seconds, 4 seconds and 6 seconds. When this delay is selected, the tactile output only occurs after the delay period. Therefore there will be no output when pedestrians or vehicles pass over the sensor and do not remain there for the duration of the delay period.

When a delay is selected, there is also a default time extension of 4 seconds. This means once the actuation is removed after the delay period has expired; the output will remain on for a further 4 seconds. If pressure is reapplied again before the 4 second period has expired, the output will remain on constantly.

The optional vehicle detector output is immediate when a vehicle is present and is constant for the duration of the vehicle presence. The vehicle detector output is unaffected by any delay settings.

The intended application for this mode is without the optional vehicle loop and is for "passive pedestrian detection" at signalised pedestrian crossings.

3.2. Presence Mode – Tactile Disable switch

The loop detector output of the controller provides a "presence" output while a vehicle is present over the loop coil. This output is immediate when the vehicle arrives and remains on for the duration of the vehicle presence. Any timing functions selected to not apply for the loop detector output.

There is a Tactile Disable switch setting applicable to this mode. With this switch enabled, the second "pedestrian" output operates as described in the "Presence Mode" above with the important exception that a vehicle presence disables the tactile output. Therefore the tactile output positively identifies a pedestrian presence in the absence of a vehicle over the sensor.

The intended application for this mode is for monitoring pedestrian and traffic movements on a traffic ramp or similar area, providing alarms to drivers or pedestrians of traffic/pedestrian movements.

It is also ideal for the detection of bicycles that are stopped in a "bike lane" that is directly adjacent to a vehicle lane. In this situation the tactile provides an output in the presence of a bicycle but without the presence of a vehicle. A Bicycle is identified because, with the absence of a vehicle presence to disable the tactile output, it can be assumed that the tactile has been activated by a bicycle.

3.3. Vehicle Directional Mode

In this mode the switch pad is provided with an optional detection loop coil that senses the metal content of the vehicle above the switch pad. The loop detector output and the tactile sensors are used to determine a vehicle presence and the direction of the vehicle.

An output is provided on the appropriate direction output of the controller. This output is immediate when the vehicle arrives and remains on for the duration of the vehicle presence.

Any delay timings selected are not functional in this mode.

In this mode any actuation of the switch pad by pedestrian movements are ignored.

The intended application for this mode is for monitoring vehicle movements where directional information is required.

3.4. Tactile Direction mode (optional tactile disable)

In this mode the controller will analyse the direction of a vehicle traversing the switch pad and provide an output, based on the direction determined.

When the passage of a wheel is sensed, the switch pad immediately activates the appropriate direction output subject to delay timing settings. Such output remains constant while the pressure of the wheel remains on the sensor.

Optionally an inductive loop may be installed to disable the tactile outputs when the metal of a vehicle is sensed over the loop. With suitable loop configuration and sensitivity setting the loop will detect a vehicle and not a bicycle.

Mostly pedestrian movements over the sensor will be ignored.

The main application for this mode is for monitoring vehicle (car/bicycle) movements where vehicle direction determines the action to be taken and pedestrians are ignored.

3.5.   Pedestrian Direction mode (no loop)

In this mode the controller attempts to analyse the direction of a bicycle or person traversing the switch pad and provide an output, based on the direction determined.

If the passage of a wheel (bicycle) is sensed, the switch pad immediately activates the appropriate direction output. Such output remains constant while the pressure of the wheel remains on the sensor.

Where a wheel presence is not detected the controller assumes the actuation is due to pedestrian movements on the switch pad. In this case the direction can only be determined when the pedestrian moves off the switch pad. At this time a brief output pulse is provided on the appropriate direction output once the sensor is completely de-activated.

The delay feature can be used in this mode to provide an override output if an actuation persists for the delay period without direction being determined. In this case the signal is provided on both direction outputs.

Note that further outputs will only occur once the switch-pad has been completely vacated between events.

The intended application for this mode is without the optional vehicle loop and is for "passive pedestrian detection" at signalised pedestrian crossings. Directional outputs are provided to signal the intended direction of bicycles and pedestrians arriving at the sensor.

4.   Operating Instructions

4.1.   Switch Setting Selections

The faceplate switch settings allow the configuration of the operating mode of the controller, the time delay settings for the tactile outputs and the inductive loop settings when the optional detection loop coil is imbedded in the sensor.

4.1.1. Default switch settings

All of the 8 switches on the faceplate Mode switch should initially be set to the "OFF" position.

This is the situation where all switches are set to the right-hand side as indicated in Fig 4.1.
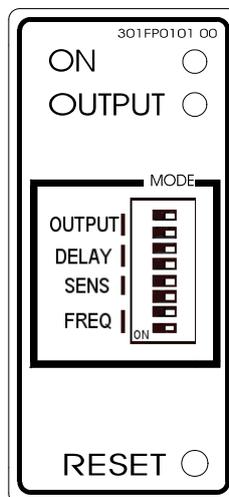
Fig 4.1. Faceplate Details

4.1.2. Output Selection

One of the 4 operating modes must be selected according to the application. These modes and their applications are described in Section 3.

The mode of output is selected by switches No.7 and 8 on the front of the enclosure and is as follows:

SW8	SW7	
Off	Off	Presence Mode (optional loop connected)
On	Off	Loop Vehicle Directional Mode (loop must be connected)
Off	On	Tactile Vehicle Directional Mode (loop optional)
On	On	Tactile Pedestrian Directional Mode (no loop required)

4.1.3. Delay Selection

The Tactile Presence Outputs are normally immediate, but can be delayed by switch settings.
Each Delay setting has a default "extend" setting as described in Section 2.1

This delay operates ONLY on the Switch Pad tactile outputs and is inoperative on any loop controlled outputs.

The delay selected by switches No.5 and 6 on the front of the enclosure and is as follows:

SW6	SW5	
Off	Off	Delay option off, Extend option off.
On	Off	Delay = 2 seconds, Extend = 4 seconds
Off	On	Delay = 4 seconds, Extend = 4 seconds
On	On	Delay = 6 seconds, Extend = 4 seconds

4.1.4. Vehicle Detector Switch Settings

The vehicle detection loop is optionally embedded in the Switch Pad.

If a loop is not connected Switches 1 – 4 should remain off as described in Section 3.2.

4.1.5. Sensitivity

The sensitivity of the detector allows the detector to be selective as to the change of inductance necessary to produce a loop vehicle detection. There are four sensitivity selections and are set as follows: -

SW4	SW3	
Off	Off	High
On	Off	Medium-High
Off	On	Medium-Low
On	On	Low

Med -Low and Low sensitivity settings will generally ignore bicycles, high setting may be prone to ambient electrical noise on some sites.

4.1.6. Frequency

The frequency switches are the lower two switches, numbered 1 and 2. There are four frequency selections and are set out as follows:

SW2	SW1	
Off	Off	High
On	Off	Medium-High
Off	On	Medium-Low
On	On	Low

The frequency switches allows the operating frequency of the loop to be shifted higher or lower depending on the switch position. The actual frequency of the loop is mainly determined by the loop size, and the setting of the switch simply causes a small change in this frequency.

Where more than one detector is used the detectors must be set-up to ensure that there is no cross-talk (interference) between the detectors. This can be achieved by ensuring that the loops of the two detectors are spaced sufficiently apart (approximately 2 metres between adjacent edges) and also ensuring that the detectors are set to different frequencies. As a general rule, the detector connected to the inductive loop with the greatest inductance should be set to operate at the lowest frequency. Loop inductance increases as loop size, number of turns in the loop and feeder length increases.

4.1.7. Reset Switch

The detector automatically tunes to the inductive loops connected to it when power is applied, whether on initial installation or after any break in the power supply. Should it be necessary to retune the detector, as may be required after the changing of any switch selections, momentary operation of the RESET switch will initiate the automatic tuning cycle. On power up the controller checks all tactiles in the Switch Pad and excludes any faulty lines.
The reset switch does not initiate a re-check of the Switch Pad; recycle the power to achieve this.

4.1.8. Internal Switch settings

SW9
Off   No Tactile Disable
On   Tactile Disabled by loop signal
SW10
Off   6 row wheel logic
On   3 row wheel logic

 Wheel detection is determined by operation of a number of tactile rows. The 3 row logic is less secure, but necessary with some (bicycle) tactile mat designs.

4.2.   Front Panel Indicators

4.2.1. Power Indicator

The Power (Red) LED will glow permanently to indicate that the unit is functional. The red LED also serves as an optical interface to the DU100 Diagnostic Unit.

4.2.2. Status Indicator

The STATUS (green) LED will normally be off once the unit is functional.

The green LED will also glow whenever a vehicle is detected passing over the inductive loop or when pressure is applied to the tactile mat.

The green LED will also indicate the vehicle loop tuning and fault conditions as follows:

1.   Detector Tuning

While the detector is tuning the presence LED (Green) will be on. It will extinguish when the system is tuned. The green LED will flash at a rate of 1 Hz after tuning. This is used to indicate the frequency of the loop to the user. Every flash of the LED is equivalent to 10 kHz. It will stop when the operating frequency is reached. This operation is also performed whenever the reset button is depressed.

2.   Loop Sensor Faults

If a fault occurs with the loop, the green LED will come on and flash off at the rate of 2Hz indicating the fault. If the fault is self-healing the detector will recommence operation. However the LED will remain on, but will go off for brief intervals in periods of undetect indicating that a fault has occurred. This "fault memory" condition can be restored by removing the power or by depressing the reset button.

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5. Installation

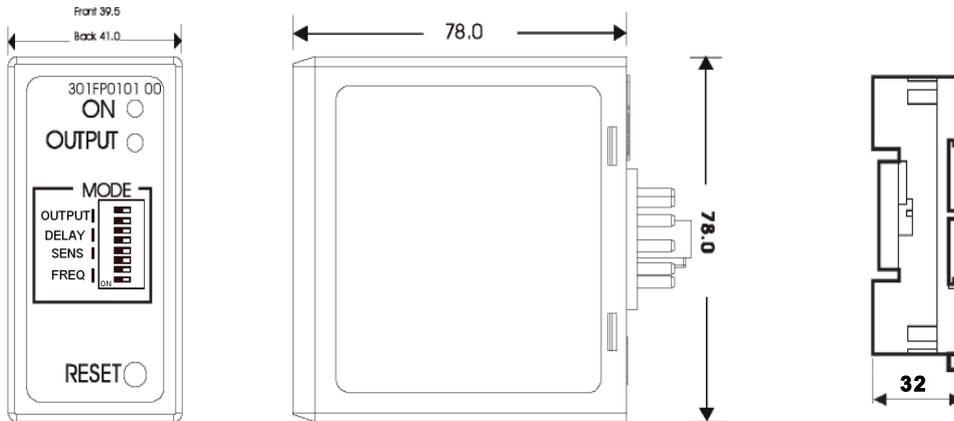## 5.1. Tactile Controller installation

Figure 5.1 PD134TLC Controller Housing detail.

5.2. Tactile Controller wiring detail

11-Pin connector wiring for the PD134TLC

301FT0041 WIRING HARNESS WIRE COLOUR	PIN #	FUNCTION	
Red	1	Power Supply	12-24V AC-DC 45-65Hz
Black	2	Power Supply	0.2A Max
Grey	3	N/O Relay 2 Contact	(2 Amp and 240V ac max)
Violet	4	Common Relay 2 Contact	
Yellow	5	N/O Relay 1 Contact	(2 Amp and 240V ac max)
Brown	6	Common Relay 1 Contact	
White/Blue	7	Loop	Twist this pair
Blue	8	Loop	Or Loop Choke
White/Brown/Green	9 *	Tactile Mat Ground	Connect switch pad interface here, see Fig 5.3
Orange/Red	10 *	Tactile Mat Power	
Blue	11 *	Tactile Mat Communication	

* Cable From Interface Chip

5.3. Switch Pad Interface detail

Switch Pad interface cable connection to the PD134TLC

Order number 301FT0218 (to be used with loop)
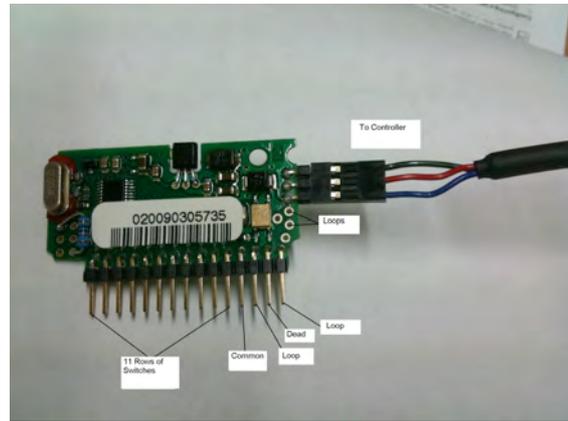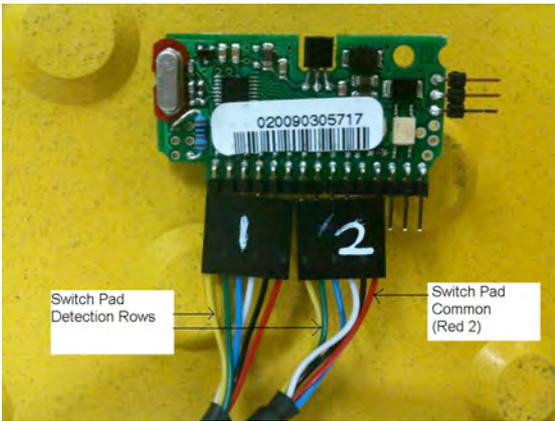Order number 301FT0218 A (to be used without loop)

Figure 5.2 Switch Pad Interface

5.4. Ordering information

1. **Tactile Mat Controller and Interface for Pedestrian applications (no loop)**
   Part Number : 301ND0220, Includes PD134TLC Controller, Switch pad interface with 3 metre cable and screw-terminal wiring base.

2. **Tactile Mat Controller and Interface for Vehicle applications (tactile sensor must have imbedded loop)**
   Part Number : 301ND0221, Includes PD134TLC Controller, Switch pad interface with 3 metre cable and screw-terminal wiring base.

3 CORE CABLE	PIN #	FUNCTION
Grey Cable	1 and 2	Power In
	3 and 4	Relay 2
Black Cable	5 and 6	Relay 1
	7 and 8	Loop or Choke
Green Cable	9	Tactile Mat Ground
Red Cable	10	Tactile Mat Power
Blue Cable	11	Tactile Mat Comms

Figure 5.3 Pedestrian Switch Pad Controller Base
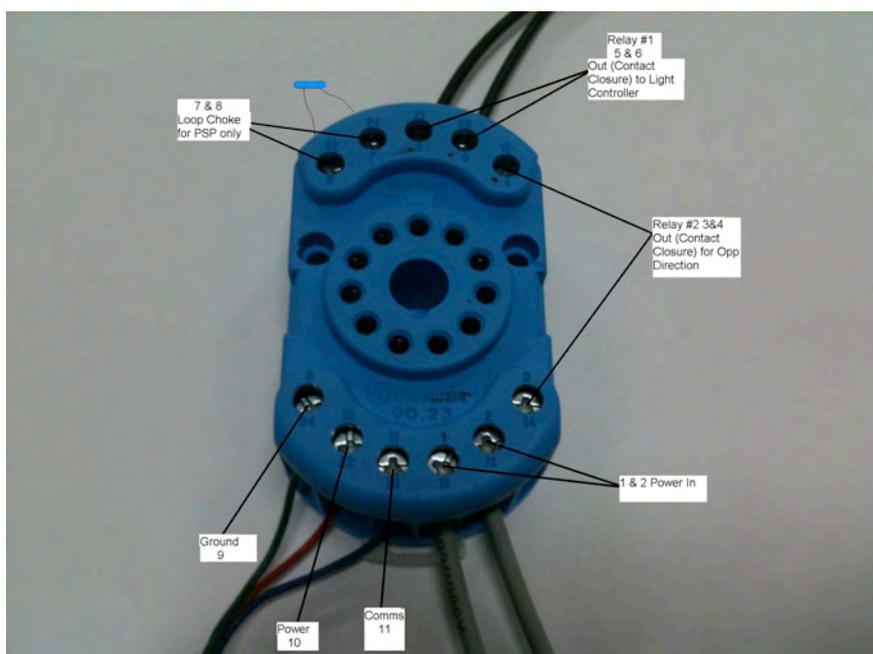
Rev 03 Controller

5.5. Switch Pad Installation

5.5.1. Pedestrian Crossing application

Pedestrian actuated signal devices are part of many traffic signals and require the user to push a button in order to activate a walk signal indicator and initiate a WALK interval. Use of pushbuttons may also lengthen a WALK interval to provide adequate crossing time. Without a supplemental "passive" pedestrian detection device, there is no guarantee that the signals will activate or lengthen a walk interval when necessary.
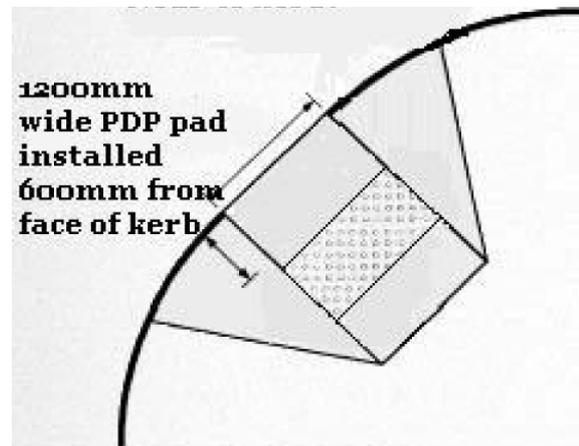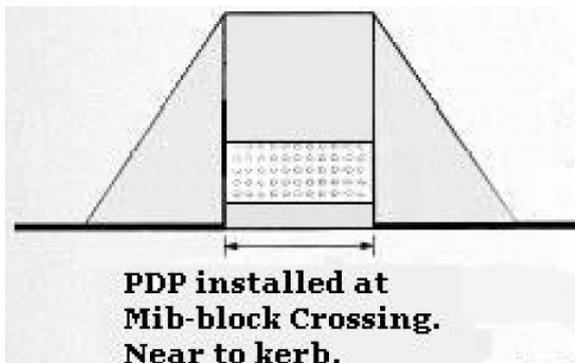

The Pedestrian Activated Detection Pads are designed to be placed in situations where pedestrian interaction with a pushbutton is known to be periodic or where there are high volumes of disabled pedestrians that may find it difficult to locate and/or reach the button to initiate or lengthen a walk interval.

5.5.2. Pad installation

Installation of the surface mounted pedestrian pad is by way of a single part adhesive (SEKA FLEX UV).

Once the location of the pad has been determined, mark-out around the pad with masking tape. Cut a channel from the "Feeder cable" exit point of the pad to the nearest PJ Box. Then drill a hole down into the box. Apply the adhesive to the underside of the pad and place it in position. Seal the lead wire channel and then finish connection in the junction box.

PDP installed at Mib-block Crossing. Near to kerb.

1200mm wide PDP pad installed 600mm from face of kerb

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5.5.3. Bicycle Detection Application

The Bicycle Switch Pad (BSP) is only 5mm thick. Constructed of heavy duty non-corrosive materials with a non-slip surface. The switch pad is simply adhered to the surface of an existing bike lane or path approaching a road crossing on intersection.

This patented Bicycle Switch Pad (BSP-1200) has been designed to be an alternative to a call button as well as being able to cancel a call if vacated.

Each button or rows of buttons on the switch pad can be individually activated so that both presence and direction can be determined.

The installation of the Bicycle pad is the same as with the pedestrian pad, described above.

As with the pedestrian pad, if the surface that the pad is being installed on is asphalt, then the pad can be ordered with a "Butyl" adhesive already applied to the underside of the pad. If this is the case the surface should be primed with a butyl adhesive primer or similar, then simply peel off the backing paper and stick the pad down.

6.   Fault finding information

6.1.   Tactile interface

HARNESS WIRE COLOUR	Controller PIN #	FUNCTION	VOLTAGE
Red	1	Power Supply	12-24V AC-DC 45-65Hz 0.2A Max
Black	2	Power Supply	
White/Brown/Green	9	Tactile Mat Ground	* ± 8volts DC at ±13.0m.a.
Orange/Brown	10	Tactile Mat Power +ve	
Green	11	Tactile Mat Communication	* ± 4.2volts DC
N/A	N/A	Sensor pins 1 - 11	** +3.25V DC
N/A	N/A	Sensor pins 12	** 0V DC

* Voltages measured between 0v – tactile mat ground (Pin 9) and specified pin.
  Current drawn on +ve power lead = 13.0m.a. all tests with controller connected to the interface chip.

** Voltages measured between 0v – tactile mat ground (Pin 9) and specified pin when not connected to tactile mat.