RoadPod® VT5900 - Operator Guide

System overview

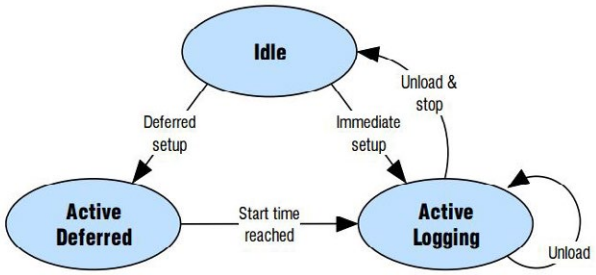
This guide is an introduction to the operation and installation of the RoadPod® VT classifier. For detailed software instructions, refer to your MetroCount Traffic Executive® User Manual (click *Help* in the MTE software menu bar).

The RoadPod VT is a dual air-sensor traffic data logging unit. For short-term operations, the counter is powered by a user-replaceable alkaline battery pack, supporting up to 4 years of continuous data collection. When used for semi-permanent applications, an additional solar panel with SLA battery can power the unit.

The main system unit is fully weatherproof. Communication with the unit is performed via the sealed circular connector, using a MetroCount-supplied USB communication cable and the MTE® software. Mechanical protection is provided by the stainless-steel road case.

The RoadPod VT's LED lights provide constant feedback about the unit's current state and the functionality of the air sensors.

Operating states



The *Idle* state is the unit's standby mode, meaning the counter does not log any data and simply retains the existing data.

The unit is set to *Active Logging* state through a setup. In this state, the counter logs axle hits and runs a number of maintenance tasks. The unit will continue to do this until a data Unload is performed or its memory capacity is filled.

The logging start time can be deferred for up to 10 days. During this time, the unit will be active, but will not log sensor hits. RoadPod VT5900 has an additional *Zombie Mode* feature, that keeps the counter fully inert between axle hits.

Status LED lights

The RoadPod VT has three status LED's located near the air sensors. The A and B lights match each of the sensors and operate in either of the active states. When a sensor is triggered by an air pulse, the corresponding Status LED will flash. This enables users to check sensor installation and easily identify issues, such as blockages. The ♥ Status LED indicates the unit's current state, as described in the table below:

♥ LED	State
Flashing every 8 seconds	Idle
Flashing every 2 seconds	Active Deferred
Flashing every second	Active Logging
On continuously	Communications Active
Off continuously	Data Transfer

Communications and setup

The RoadPod VT is controlled by connecting it to a computer via the MetroCount- supplied USB cable. For setup, you would ideally use a Windows laptop or tablet as it allows you to connect to the counter at the site. Users also have the option to use a PC in the office.

Memory capacity

The RoadPod VT5900 has an 8MB memory capacity capable of storing approx. 4 million axles, which is four times the capacity of its predecessor (MC5600).

The flash memory incorporated in the newest RoadPod VT5900 enables it to retain data in the absence of power supply that can occur in the unlikely event of battery failure.

Battery life

RoadPod VT uses a non-rechargeable, alkaline battery pack. In its Zombie or Idle modes, the counters draw a negligible level of current, giving it a shelf life of five years with minor capacity degradation.

NOTE: The latest generation of tube counters, launched in 2016, has brought significant improvements to the battery performance. Although using the same battery pack, the VT5900 model can run continuously for up to 4 years, while the previous MC5600 model could only last 290 days.

Checking the battery level

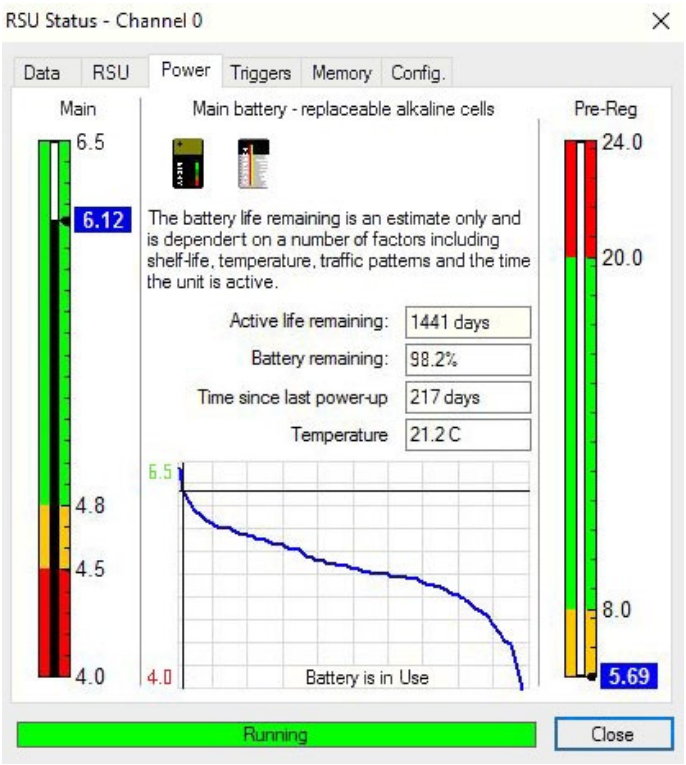
To verify your unit's battery level, please connect the counter to your PC and check the *RSU Status* > *Power* window in MTE.

In the *RSU Status view / Power* tab (see diagram on this page), you'll be able to see the main battery power level in the left hand meter. The right hand meter function will vary depending on what model RoadPod/RSU you are connected to and/or if an external battery is being used. For more information, please contact MetroCount.

Main battery replacement

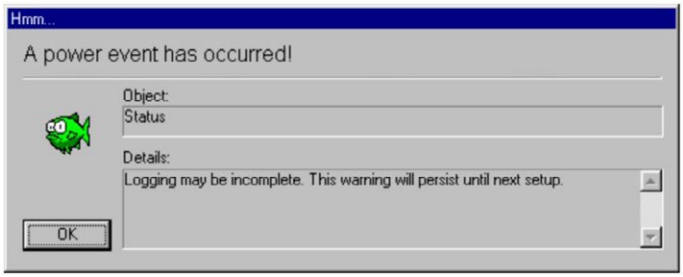
The main battery pack will rarely fail suddenly, however, you should ensure there is enough lead time to organise a replacement. Even at zero days remaining, you will still be able to Unload data. In fact, it is recommended to download any data from the counter's memory before changing the battery.

Replacing the main battery of the VT5900 is a straightforward procedure. We strongly recommend using MetroCount supplied replacement packs, as they will ensure the highest reliability and the longest logging capacity. Do not use spring-based battery packs as these are often unstable and will interrupt the power supply/counting if the RSU is bumped or dropped.



Steps to main battery replacement

1. Using the supplied 4mm hex driver, remove the six screws from the unit's lid.
2. Remove the lid.
3. Lift the existing battery pack from the base.
4. Disconnect both battery pack terminals.
5. Connect the new battery pack, **ensuring you colour-match the leads**; the counter is protected against reverse polarity.
6. Place the new battery pack centrally in the battery compartment.
7. Neatly route each battery lead on opposite sides of the pack, ensuring the leads are not caught under.
8. Reposition the lid, ensuring it is correctly aligned with the Status LEDs.
9. Replace the lid screws. Make sure not to over-tighten them; a quarter turn past the point that the lid mates with the base.
10. After changing the battery pack, a warning message might appear. This is perfectly normal and will disappear the next time the unit is setup.



Connector tips

The battery tab connectors used in the RoadPod VT counters are designed for maximum reliability. Some tips on how to use them:

- The terminals are best separated using a rocking, side-to-side action.
- Always grip the terminals; try to avoid pulling on the leads.
- Consider using a pair of pliers to grip the terminals.
- When reconnecting, the terminals should click into place.

NOTE: Never allow the two battery pack terminals to make contact!

RoadPod® VT installation

This tube counter can be installed in a variety of ways, depending on your data collection goals. The most common approach, resulting in the best achievable classification and count accuracy is the *Classifier Sensor Layout* (two tubes of equal length, of equal length from the kerb to the counter, parallel to each other, spaced one meter apart).

Counter installations should be done by skilled and, where possible, duly qualified personnel.

An adequate supply of simple, yet high-quality tools is essential for safe, speedy tube setup. A minimum set includes:

- Small mallet / heavy duty claw hammer / electric drill
- Crowbar
- Side cutters or pliers
- Chalk or lumber crayon
- Tape measure or 1m stick
- High-quality safety equipment

NOTE: Installers and users should ensure that they have referred to and have regarded all relevant statutes and regulations in force in the locality where installation and use are to be made.

Site selection

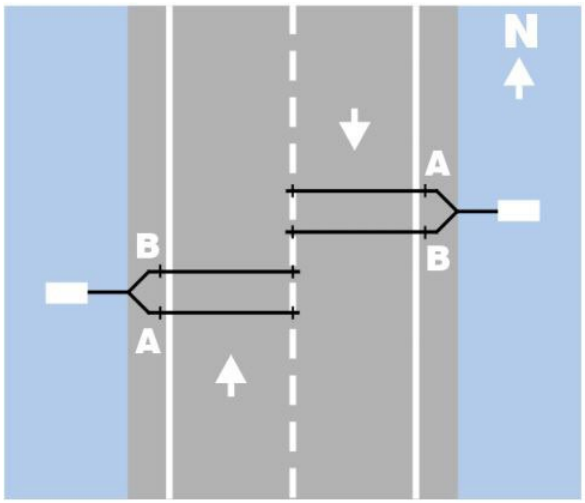
The quality of your traffic data can be affected by a number of site characteristics. While some conditions are unavoidable, here is a list of points to consider when selecting a survey site:

- Select roads where most traffic is travelling at a constant speed across the tubes. If possible, avoid sites where vehicles are accelerating/decelerating due to bends, steep inclines, traffic signals or intersections.
- Avoid sites where vehicles stop over the tubes.
- Ensure that traffic runs perpendicularly to the tubes. Avoid sites where vehicles will turn across the sensors.
- Minimise single tube hits by avoiding excessive swerving or lane changing.
- Ensure there is a suitable point for securing the unit, such as a post or tree.

Site type

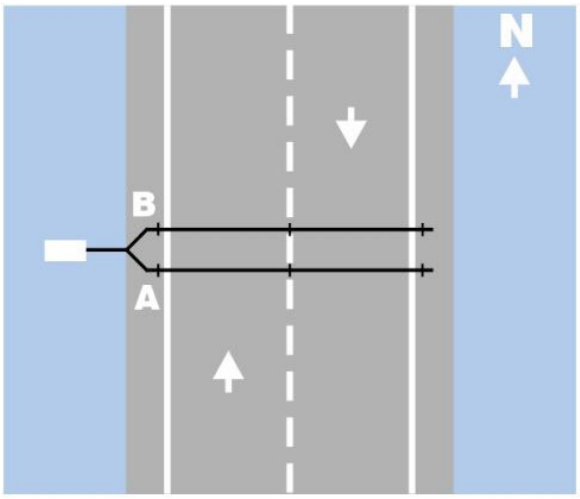
Bidirectional sites

When surveying a bidirectional traffic flow, the approved installation method is to use one RoadPod VT unit per lane. This approach will ensure the best achievable accuracy for a site, in terms of volume, classification and speed.



When installing one unit across two lanes of bidirectional traffic, careful consideration must be paid to the level of data quality degradation. Since sensors are placed parallel to each other, issues appear when two vehicles traverse them simultaneously. The sequence of axle hits produced by such an event makes it difficult to discern actual vehicles.

quality will not be affected. As the number of simultaneous crossing events increases, data quality will decrease. It is a matter of assessing the convenience of a single unit against the acceptable data quality for any given site.



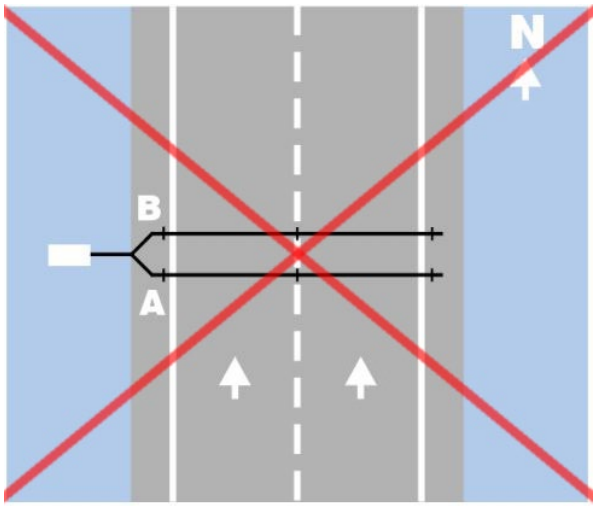
There is no rule-of-thumb for when a single unit can be used for bidirectional traffic. If the occurrence of two vehicles crossing the tubes simultaneously is very low, then data

Multi-lane unidirectional sites

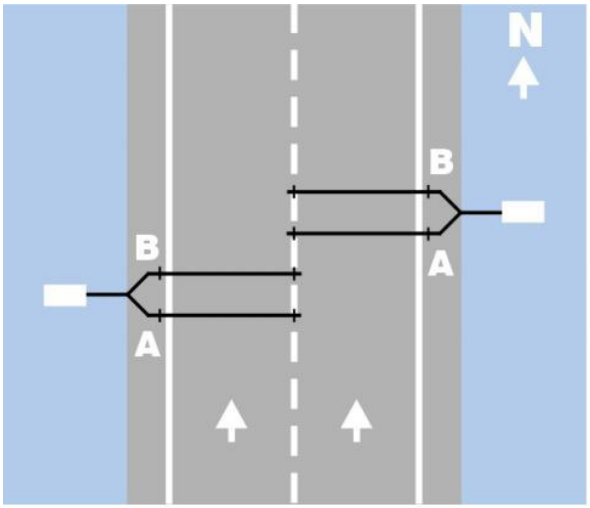
For multilane carriageways with unidirectional traffic, it is mandatory to use one RoadPod VT per lane.

If the sensors of a single unit are placed across two or more lanes with traffic travelling in the same direction, the resultant axle events of multiple vehicles travelling in echelon may be indistinguishable from a heavy vehicle.

For roads with no median access or greater than two lanes, consider using a *Count Sensor Layout* to obtain basic volumetric and gap data.



NOTE: Do not use this configuration for multi-lane unidirectional sites!



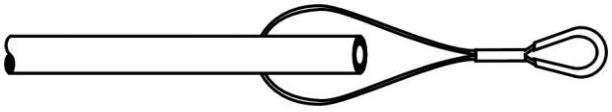
A two-lane road with a central median requires two RoadPod's to properly monitor both lanes.

Sensor installation

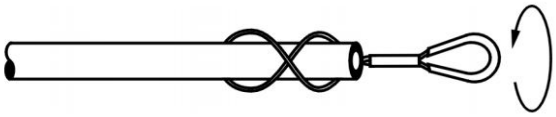
The following section discusses the installation of a RoadPod unit using a *Classifier Sensor Layout*. The techniques mentioned here can be carried over to *Count Sensor Layout* installation.

To attach a Figure-8 Cleat

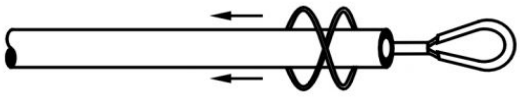
1. Place one end of the pneumatic tube over the large loop of a Figure-8 Cleat.



2. Twist the Figure-8 Cleat to form a second loop and slide over the end of the tube.

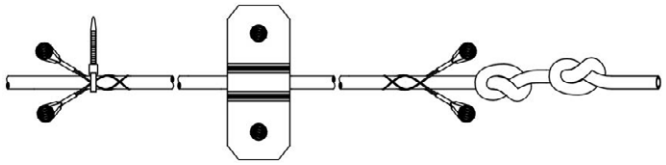


3. Bunch the two loops together and pull the tube through as necessary.



To install pneumatic tubes

1. Prepare two road-tubes by cutting your roll into equal lengths, sufficiently long enough to cover the required lanes and reach the unit's securing point.
2. Using a tape measure or one-metre stick, mark the one-metre tube spacing on the road with a lumber crayon or chalk.
3. Attach Figure-8 Cleats to one end of each tube, using two per tube.
4. Seal the same end of each tube with vent plugs (or two knots), adjacent to the cleats.
5. Secure both tubes to the road using a road nail through the eyelet of each cleat.



6. Attach Figure-8 cleats to the kerb side of each tube, using two per tube, and secure to the road using road nails or screws.

> **NOTE:** Ensure that the tubes are of equal length from the kerb to the counter, parallel to each other and perpendicular to the direction of travel.

7. Double-check that the tube spacing is one metre.
8. Stretch each tube 10-15% to reduce lateral movement. If necessary, tie a cable around the kerb side cleats to prevent slippage.

> **NOTE:** Ensure that the tube length from the kerb to the air sensors is exactly the same. A difference in length will result in incorrect speed and wheelbase values.

9. Attach the *Centre-Line Flaps* as required using two road nails/screws per cleat. This will minimise lateral movement over long distances. Using one in the centre of each lane, in addition to between two lanes will maximise data quality.
10. Remove the inner tray from the stainless steel case and feed both tubes up through the handle.
11. Attach each tube to the appropriate air sensor (brass spigot) on the plastic main system unit. Use the *Status LEDs* or the *Traffic View* (when connected to a laptop) to verify the correct tube connections.

> **NOTE:** Use the convention of the A tube being the first one hit by a vehicle travelling in the lane closest to the unit.

12. Place the main system unit into the road case and push the tubes into the locking cut-outs, as shown below:

13. Slide the tray into the outer case and secure the counter using a padlock through one of the handle holes.

> **NOTE:** The use of Bitumen Tape may be considered in place of road nails/cleats/flaps at some sites (contact MetroCount for more information).

RoadPod® VT setup

The procedure for Roadside unit setup is covered in the *Help* section of the MTE software menu bar. The following sections provide a reference for the Direction Codes, Lockout Settings and Lane Numbering.

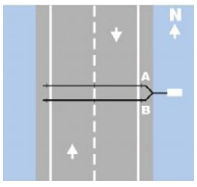
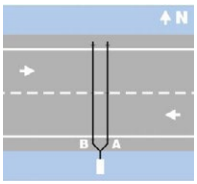
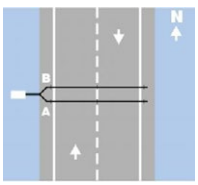
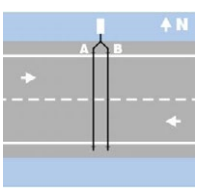
Direction Codes

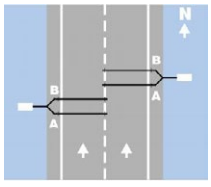
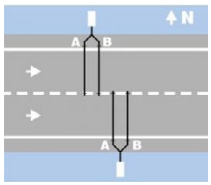
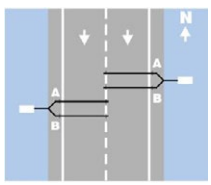
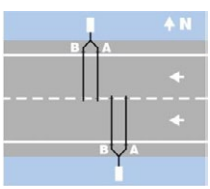
Traffic flow directions are entered during the RoadPod setup to be used later during data analysis. Note that the flow directions specified at setup are purely a descriptive field. They do not perform any filtering function on the actual logging of axle data.

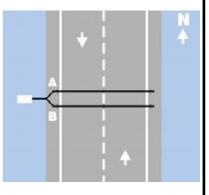
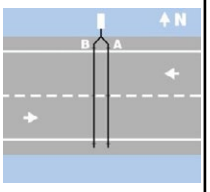
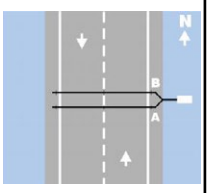
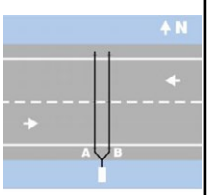
Directions are specified as north, south, east or west. When specifying a direction, simply select one of these compass points that best describes the actual direction.

For consistency across datasets, it is important to adopt a convention of direction codes. The recommended convention is:
The A tube should be the first tube hit by vehicles travelling on the side of the road on which the RoadPod unit is installed.

The following tables provide a useful reference for matching direction codes to tube layouts.

Bidirectional Direction Codes	Left-hand Drive Example
South bound A>B North bound B>A	
West bound A>B East bound B>A	
North bound A>B South bound B>A	
East bound A>B West bound B>A	

Unidirectional Direction Code	Layout Example
North bound A hit first	
East bound A hit first	
South bound A hit first	
West bound A hit first	

Bidirectional Direction Codes	Right-hand Drive Example
South bound A>B North bound B>A	
West bound A>B East bound B>A	
North bound A>B South bound B>A	
East bound A>B West bound B>A	

Lockout

The Lockout eliminates spurious axle hits caused by tube slap from poorly installed tubes or slow moving vehicles, as wheels roll onto and then off the tube.

It is important to select a lockout time that minimises the number of spurious hits without removing real axle hits. When a tube spans multiple lanes, two real axle hits can quite reasonably be only a few milliseconds apart. The alongside table describes the recommended lockout settings.

Lockout	Description
10ms	**Multiple Lane Default** - Use this setting for tubes that span more than one lane, assuming ideal road quality.
20ms	**Multiple Lane Special** - Use this setting for a tube that spans more than one lane, where road quality is poor or traffic is slow moving.
30ms	**Single Lane Default** - Use this setting for a tube that spans one lane only, assuming ideal road quality.
40ms	**Single Lane Special** - Use this setting for a tube that spans more than one lane, where road quality is poor or traffic is slow moving.
>50ms	**Single Lane Special** - Use this setting for a tube that spans one lane only, under exceptional circumstances such as car parks.

Lane Numbering

The lane number is used to distinguish data collected from multiple RoadPod units at one site. By convention, a lane number of zero (0) is used for sites using only one RoadPod unit.

For multiple installations at a single site, adopt a consistent lane numbering convention. For example, number the lanes consecutively, starting at one (1) from the north (north-south roads) or east (east-west roads).

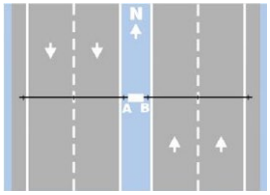
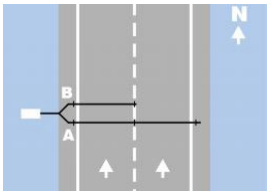
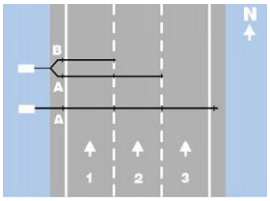
Count installation

To obtain short-term volume data, the RoadPod system can also be used in several Count Sensor Layouts. Each of the sensors can be placed independently of each other, across multiple lanes. Alternatively, the sensors can be used in a split mode.

Count Sensor Layouts provide you with basic volume information, as well as traffic characterisation, such as gap analysis.

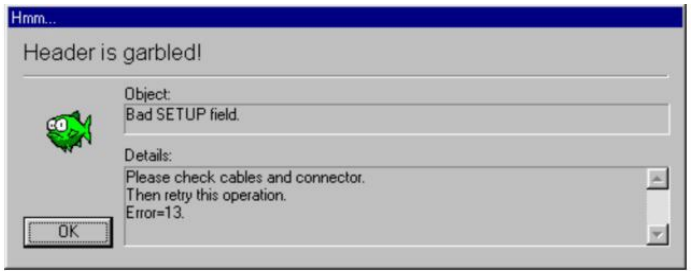
Each pneumatic tube should be secured using the method described for a Classifier Sensors Layout. Note that, this time around, equal tube lengths is not an issue.

The table alongside provides some examples of Count Sensor Layouts.

Count Sensor Layout	Description
	**Separate Mode** - Each sensor is used independently of the other.
	**Split Mode 1**- Used to obtain axle-based data across multiple lanes. MTE handles the necessary data manipulation.
	**Split Mode 2** - This example extends the split mode concept across multiple lanes. MTE handles the necessary data manipulation.

Factory setup

Under very rare circumstances, you may receive a ***Header is garbled!*** message when trying to communicate with a RoadPod unit. This message usually indicates some unusual values in the setup information.



If you encounter this message, you will need to perform a Factory Setup operation in MTE. This will reset the unit and switch it to Active Logging state.

NOTE: A Factory Setup side-effect is that any data in memory might be lost. You should try unloading any required data before performing a Factory Setup.

To perform a Factory Setup

1. In MTE, select **Technical** > **Factory Setup**.
2. Several warnings will be issued about the side-effects of this operation.
3. Confirm that you wish to proceed.
4. If the 'Header is garbled' message persists, contact MetroCount.