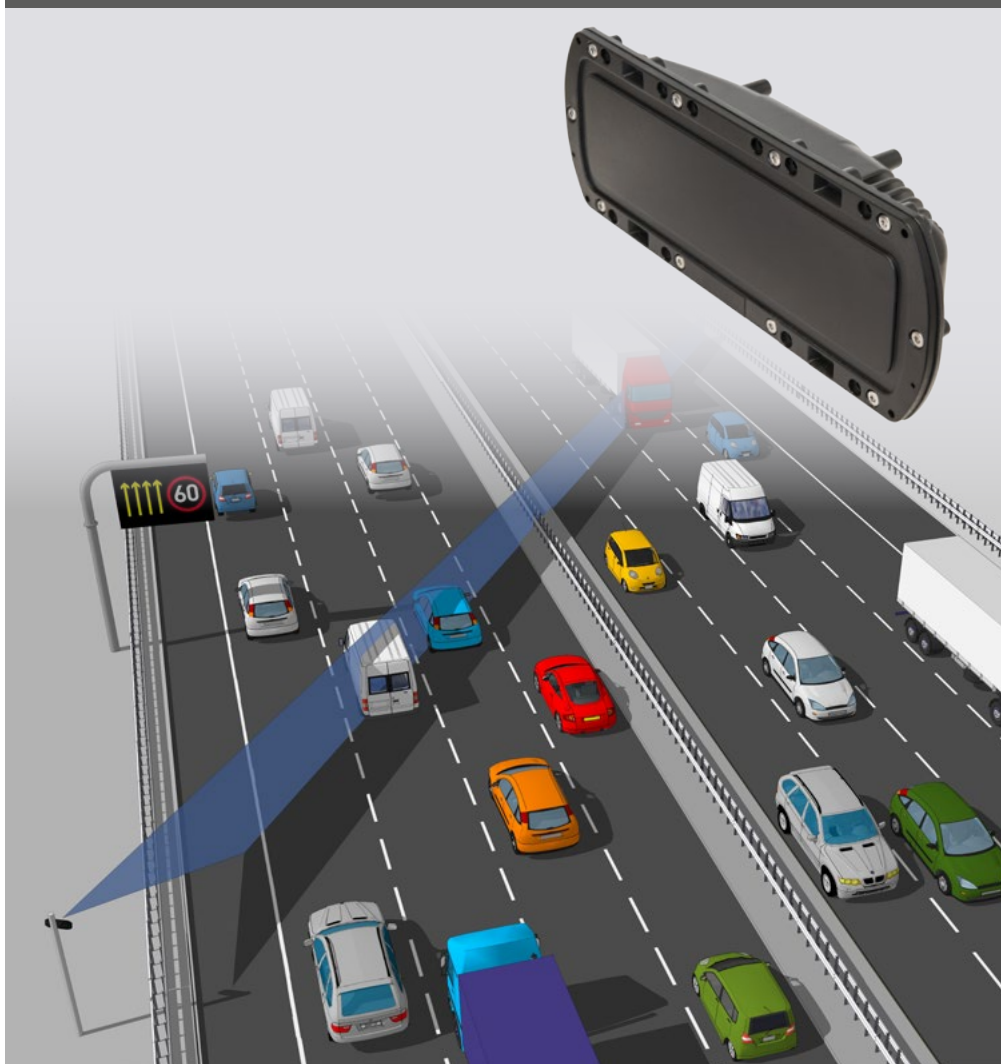


# AGD 343

HIGHWAYS MONITORING RADAR

PRODUCT MANUAL



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**AGD 343**  
HIGHWAYS MONITORING RADAR

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**AGD Align**  
AN AGD TOUCH-SETUP TOOL



The AGD 343 Highways Monitoring Radar is an easy-to-integrate traffic flow monitoring solution that provides real-time data on multi-lane highways. Designed for traffic profiling and incident detection, the 343 dramatically enhances highways safety, capability and efficiency.

AGD's 343 employs proven enforcement-grade radar & measurement techniques to quantify speed, range and length of passing vehicles. Detailed traffic information - such as, 'is traffic free-moving, slowing or starting-to-queue?' - is available in all weather conditions to inform control rooms and allow instant decision making.

AGD radar can replace intrusive high-maintenance loops, mounting on existing roadside poles or gantries where it 'looks' across the road at 30 degrees. The additional capability to operate at a  $\geq 2$ -metre offset, while maintaining a 6-metre plus mounting height, ensures reliable operation in managed motorway scenarios and ALR (All Lanes Running) schemes. The 343 has been designed to cope with the many difficulties facing international road network installations.

## KEY FEATURES

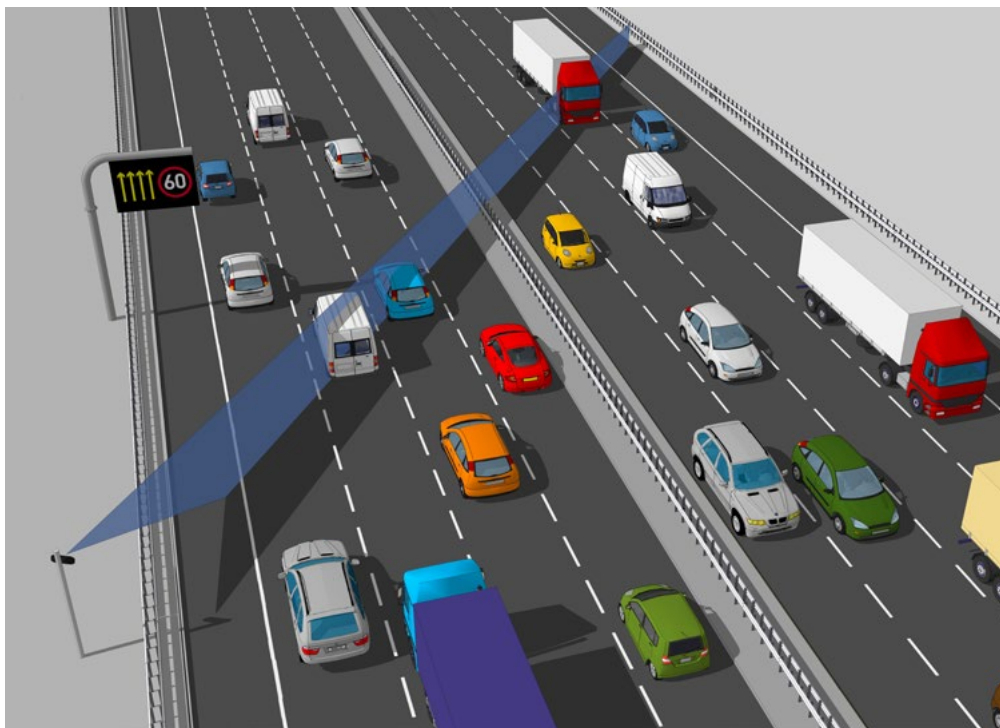
- Flow monitoring solution for multi-lane real-time data
- Traffic Profiling and Incident Detection
- Ten lane highway capability
- Enforcement grade radar & techniques
- Identifies, tracks & measures speed, length, lane/direction of individual targets
- Multi-level incident detection mode
- Non-intrusive loop replacement
- Mounts on existing infrastructure
- Simple to install, setup and configure using AGD Align

# Introduction

AGD 343  
HIGHWAYS MONITORING RADAR

## TYPICAL APPLICATIONS

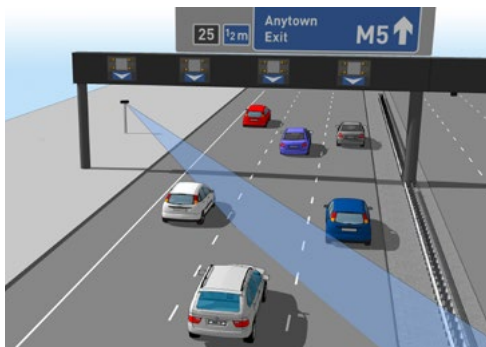
### Multi-Lane Highways Monitoring Radar



Caption



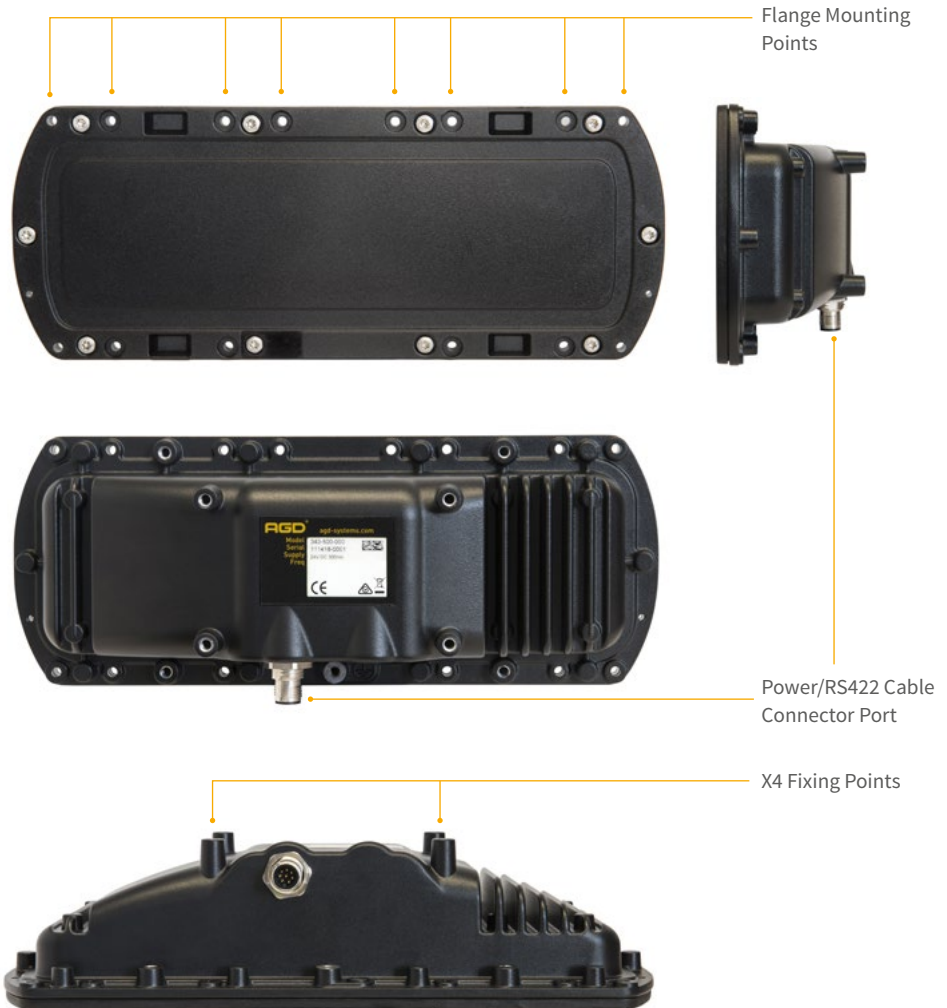
Caption



# Introduction

## AGD 343 HIGHWAYS MONITORING RADAR

### PRODUCT OVERVIEW



*safer, greener, more efficient*

## INSTALLATION INFORMATION

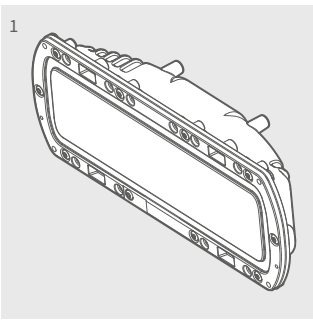
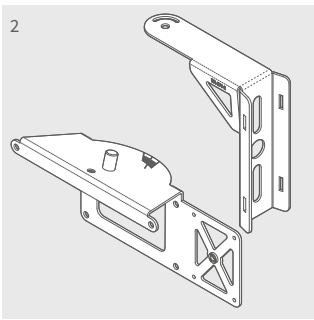
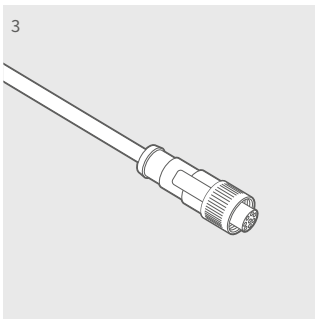
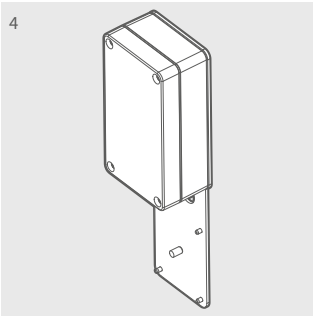
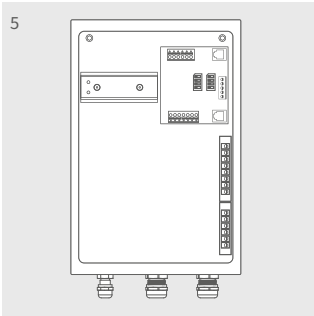
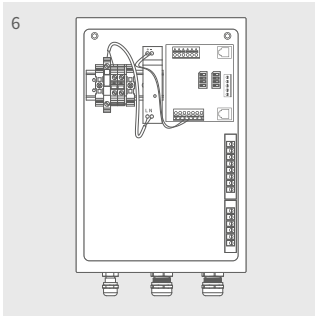
The radar is designed to be mounted to various structures such as a dedicated column, gantry or sign.

To install the radar, the following parts will be required:

| No. | Part No     | Description                       | Notes                        |
|-----|-------------|-----------------------------------|------------------------------|
| 1   | 343-500-000 | AGD 343 Highways Monitoring Radar |                              |
| 2   | MS-246      | 343 Mounting Bracket Kit          |                              |
| 3   | CA-310      | 343 Power/RS422 Cable Assembly    |                              |
| 4   | MK343-05    | Camera Setup Tool                 | (this is removed upon setup) |

To provide power and communication interfaces the following parts will assist in detector integration:

| No. | Part No  | Description                             | Notes |
|-----|----------|-----------------------------------------|-------|
| 5   | MK343-01 | 343 Interface Enclosure                 |       |
| 6   | MK343-03 | 343 Interface Enclosure (c/w 24Vdc PSU) |       |

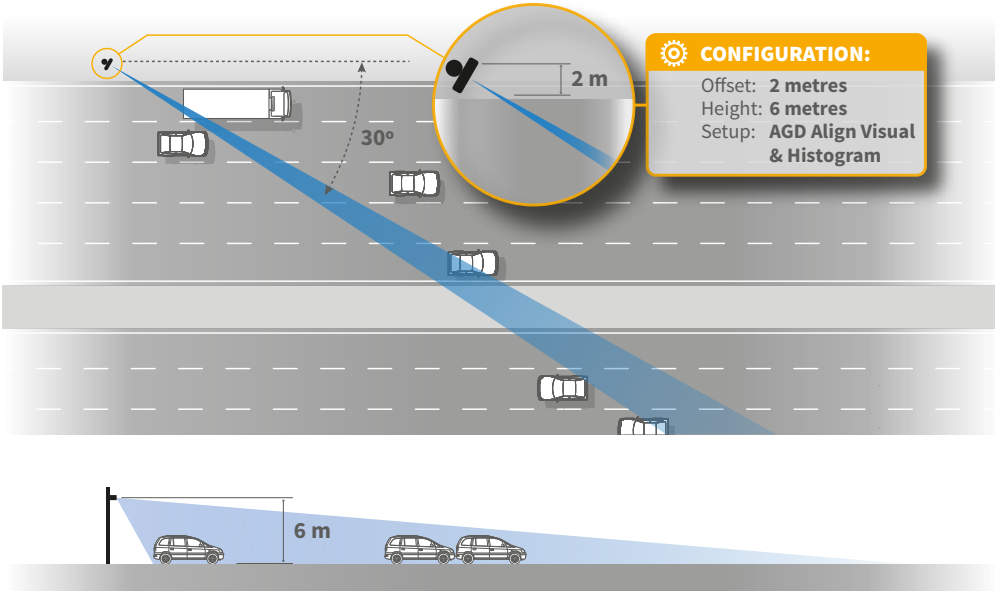


## MOUNTING LOCATION

The AGD 343 has been designed to be mounted on a variety of structures, where it looks across the carriageway at 30 degrees to provide highly accurate traffic data.

The detector must be mounted at a **minimum height of 6m** above the carriageway and at an angle of 30 degrees. The AGD align set-up tool assists in accurate set up of the angle.

| Offset | Recommended Mounting Height | Acceptable Mounting Height |
|--------|-----------------------------|----------------------------|
| 2m     | 6m                          | 6m                         |



## Mounting Location Considerations

The detector has been designed to monitor traffic in inter-urban environments while maintaining resilience to external factors, however, care must be taken when choosing a mounting location.

### Avoid where possible:

- Installing the detector where it points toward large reflective surfaces (such as signs, barriers and metal retaining walls)

# Installation

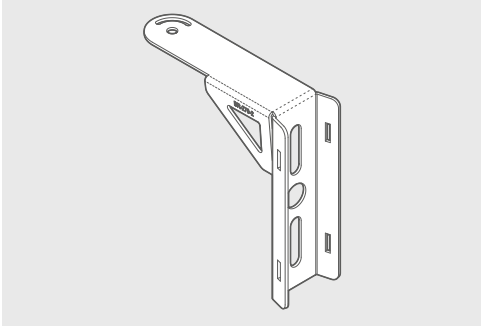
AGD **343**

HIGHWAYS MONITORING RADAR

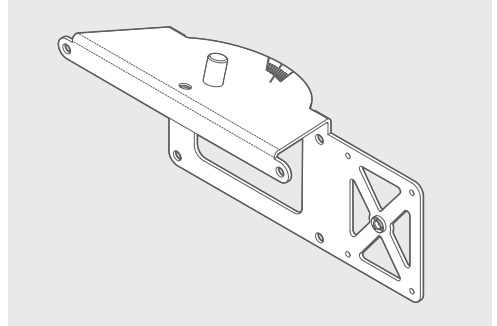
## PHYSICAL INSTALLATION

### 343 Mounting Bracket Kit

The AGD 343 bracket mounting kit (part number **MS-246**) consists of two brackets and all the required fixing hardware.



**BR-270** is the component of the bracket kit that fits to the structure you are mounting to.



**BR-271** is the component of the bracket kit that fits to the rear of the radar.

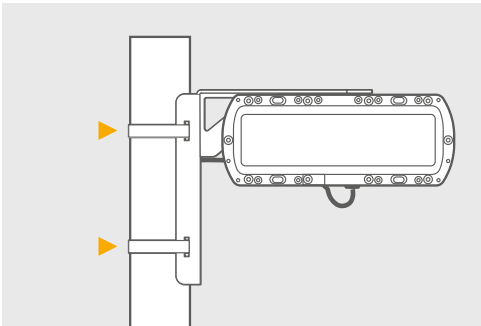
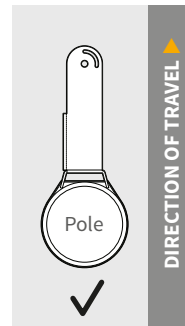
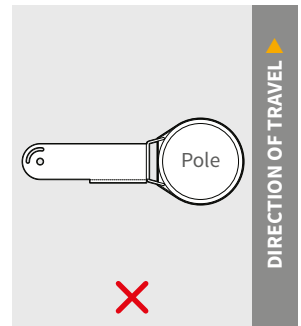
### Fixing hardware consists of:

7no. M5 x 10mm Torx T20 A2 Stainless Screws

7no. M5 External Shakeproof A2 Stainless Washers

### Step 1 – Mount bracket to the pole

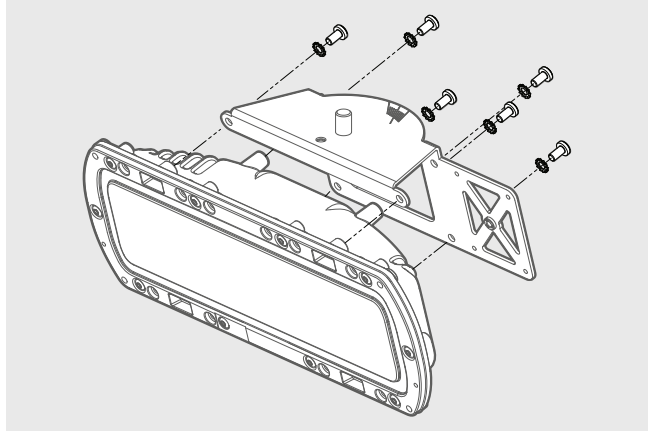
Attach BR-270 to the structure you are mounting too using mounting straps (AGD recommends stainless steel sign banding  $\frac{1}{2}$ " thick).



## PHYSICAL INSTALLATION

### Step 2 – Mount bracket to the radar

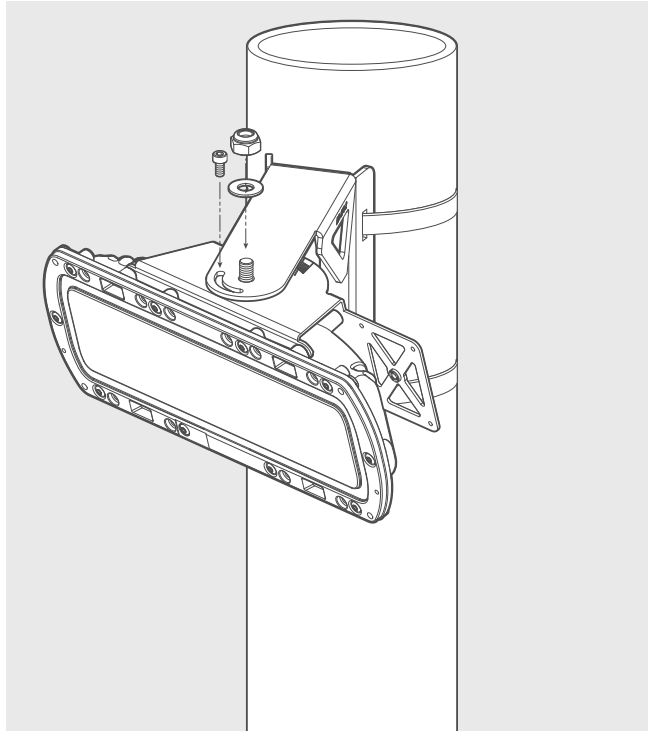
Fit the six torx screws and washers and tighten to a torque of 1.2Nm.



### Step 3 – Mount radar to the pole

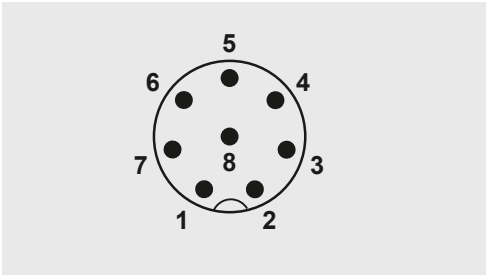
Insert the M10 Mounting Bolt through the hole in the bracket on the pole, loosely tighten the M10 Nyloc Nut.

Position the radar at roughly 30 degrees to the road, the etched marks on top of the bracket will help with alignment.



## ELECTRICAL INSTALLATION

The detector is powered using a 24Vdc supply. The power is applied to the detector using the multi-pin mating connector.



The product mating connector is shown above and is located on the bottom of the product.

| CONNECTIONS |                        |          |                  |
|-------------|------------------------|----------|------------------|
| Pin No.     | Associated wire colour | Function | Additional Notes |
| 1           | White                  | GND (0v) |                  |
| 2           | Brown                  | GND (0v) |                  |
| 3           | Yellow                 | Y (TX-)  |                  |
| 4           | Green                  | Z (TX+)  |                  |
| 5           | Grey                   | B (RX-)  |                  |
| 6           | Pink                   | A (RX+)  |                  |
| 7           | Blue                   | Vin      |                  |
| 8           | Red                    | Vin      |                  |

### 343 Power/RS422 Cable Assembly

The cable assembly to connect power and comms to the radar is **Part Number CA-310**. This cable is supplied in a 10m length and is shown below:



**CA-310** has the same attributes as shown in the Connections table above.

#### POWER AND COMMUNICATIONS

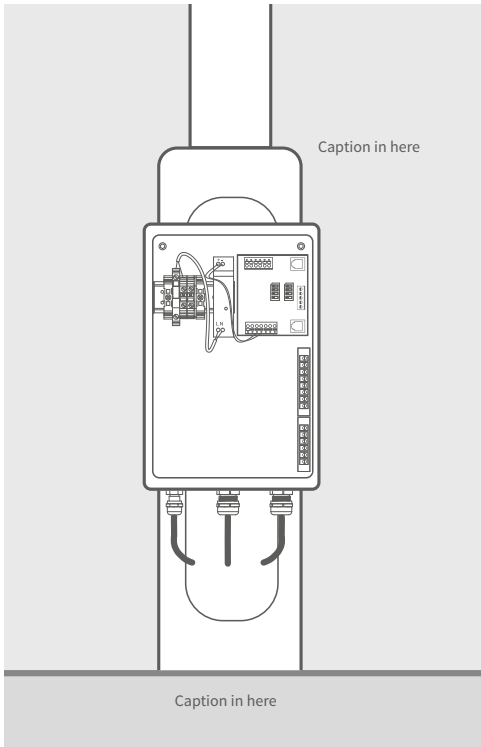
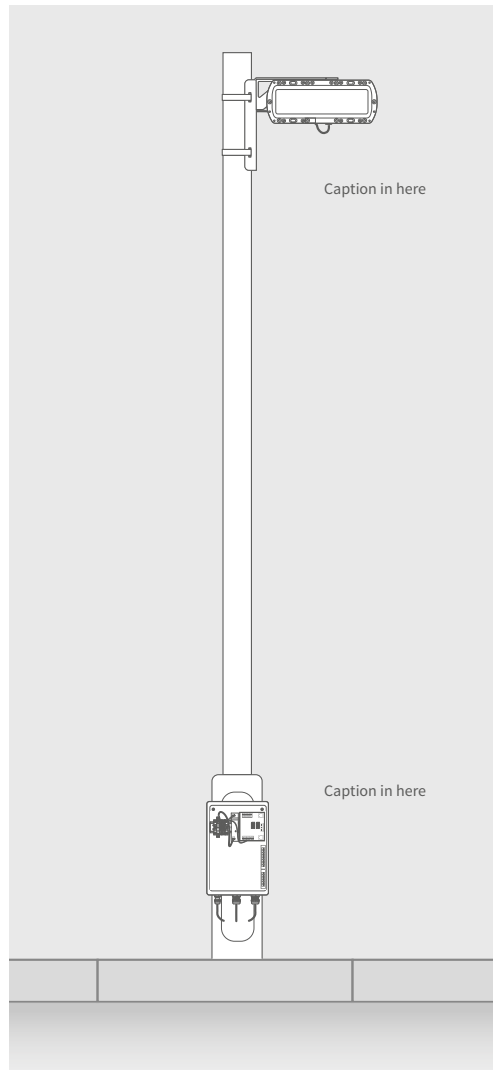
The radar can be powered and communicated with as per the specification, however for ease of installation, AGD provides a series of equipment to support simple integration into the road network and line protection for connected equipment.

The unit can be installed with or without existing roadside network infrastructure, so the device can be installed in most situations.

#### Installation with Interface Enclosure

AGD provides a 343 interface enclosure complete with power, communications and line protection to connect the detector. Part No. MK343-03 - 343 Interface Enclosure (c/w 24Vdc PSU)

The detector, bracket and interface enclosure are secured to the pole using stainless steel banding as described previously. Cable entry glands are provided for the customer to provide power to the device and connect the CA-310 Power/RS422 cable assembly.

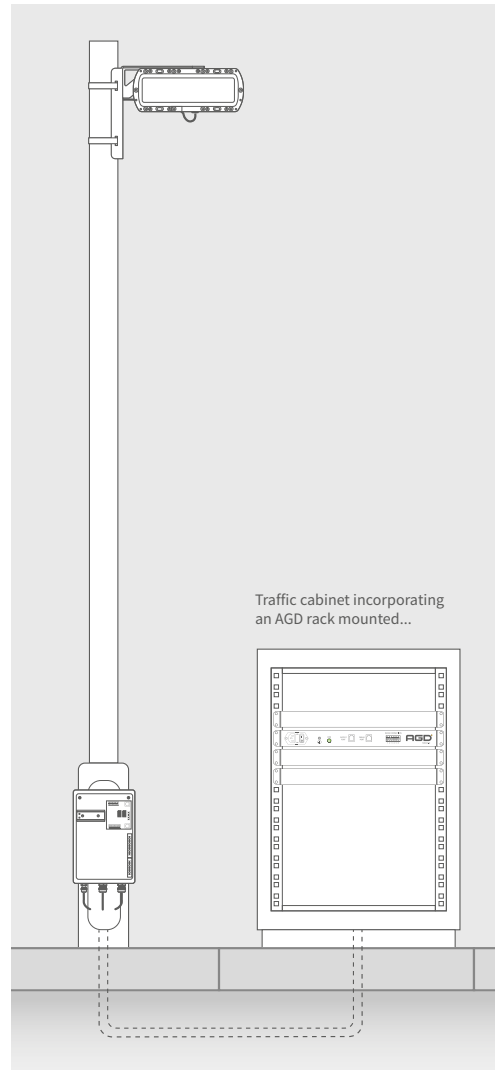


## POWER AND COMMUNICATIONS

### Installation with Interface Enclosure & Existing Infrastructure

If installing the equipment combined with existing infrastructure (existing traffic cabinet for example). The AGD 343 interface enclosure with communications and line protection would be used. Part No. MK343-01 - 343 Interface Enclosure.

\*Please note that this variant, does not have a power supply and is intended for use with an MK343-02 - 343 19" Interface Rack.



Power connection to existing traffic cabinet

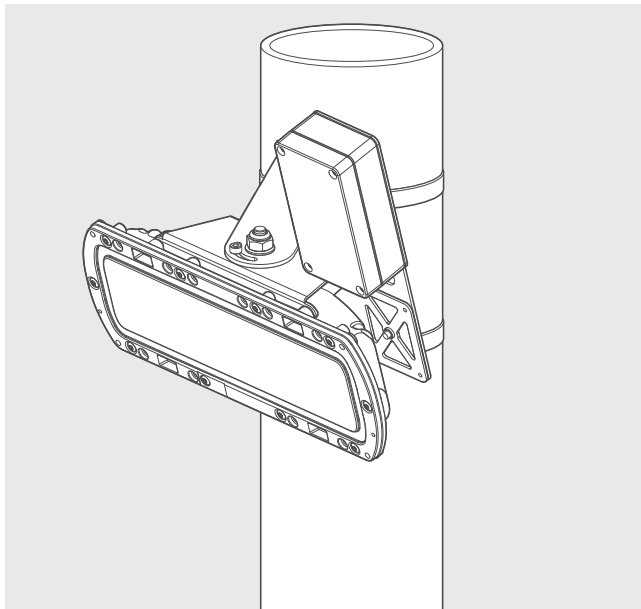
# Installation and commissioning

**AGD 343**  
HIGHWAYS MONITORING RADAR

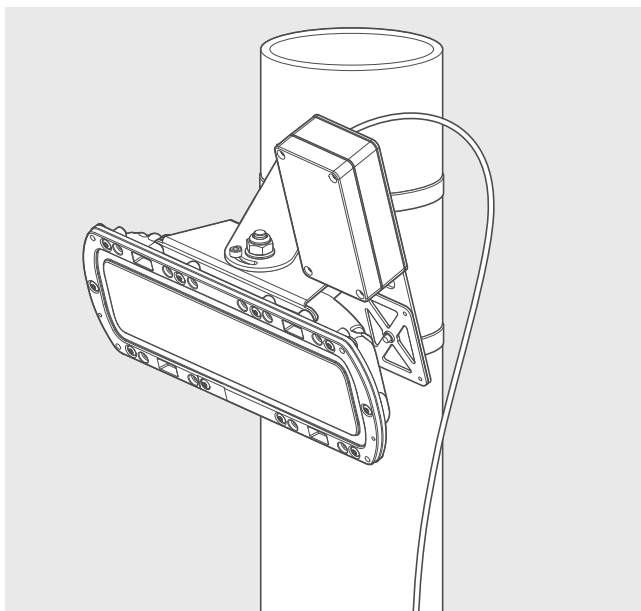
## CAMERA CONNECTION

Initial camera mounting paragraph

**Step 1 – Mount set-up camera to the radar bracket using the single thumb screw to secure**



**Step 2 – Re-position the radar cable into the the top camera cable port as shown right.**



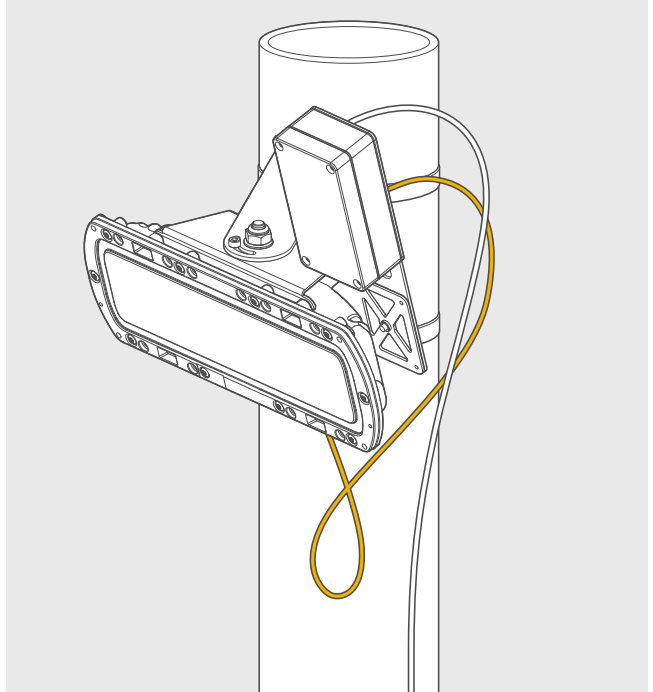
# Installation and commissioning

**AGD 343**  
HIGHWAYS MONITORING RADAR

## CAMERA CONNECTION

**Step 3 - Fit the yellow interrupter cable between the bottom camera port and the radar (the cable is keyed so can only be connected one way)**

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.



## WIFI CONNECTION

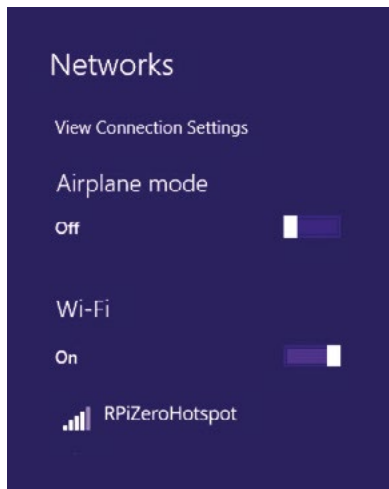
In network WiFi connections search for:

### **RPiZeroHotspot**

Select the network, click 'connect' and input the default password:

### **AboveGroundSensorsPiZero**

**\*The WiFi connection is hosted by the setup camera and is only used in the setup phase of the device. The radar DOES NOT have WiFi functionality.**



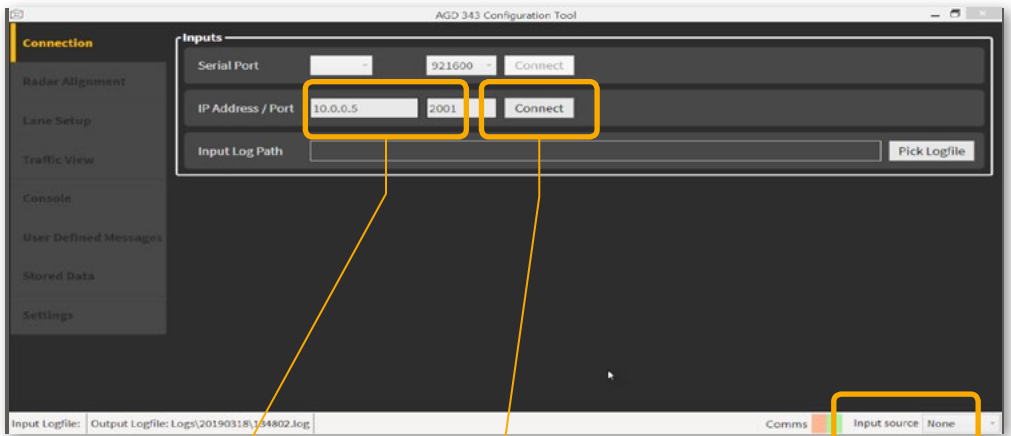
# Installation and commissioning

## AGD ALIGN SET-UP TOOL

### Connection

When launching the GUI, the above window is presented. All options except the '**Connection**' are greyed out.

For initial setup, it is required to connect via the '**TCP**' option to the setup camera.  
The fields are automatically populated with the following information:



**IP Address: 10.0.0.5**  
**Port: 2001**

Click '**Connect**' the GUI should show a connected message and the Comms LED bars across the bottom should illuminate red and green to signal communication.

The '**Input Source**' field (bottom right) should also show TCP.

The menu bar on the right hand side should now be illuminated and able to be selected.

# Installation and commissioning

AGD 343

HIGHWAYS MONITORING RADAR

## AGD ALIGN SET-UP TOOL



### Radar Alignment

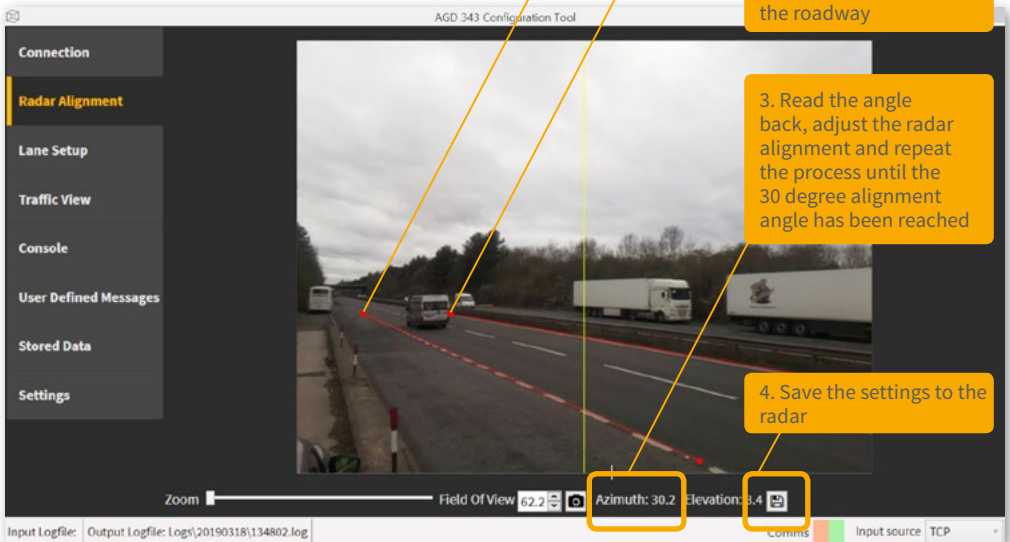
The AGD Align set-up software makes this simple following the four points as shown.

1. Take a snapshot of the roadway

2. Drag the red boxes to match the white lines on the roadway

3. Read the angle back, adjust the radar alignment and repeat the process until the 30 degree alignment angle has been reached

4. Save the settings to the radar



# Installation and commissioning

AGD 343

HIGHWAYS MONITORING RADAR

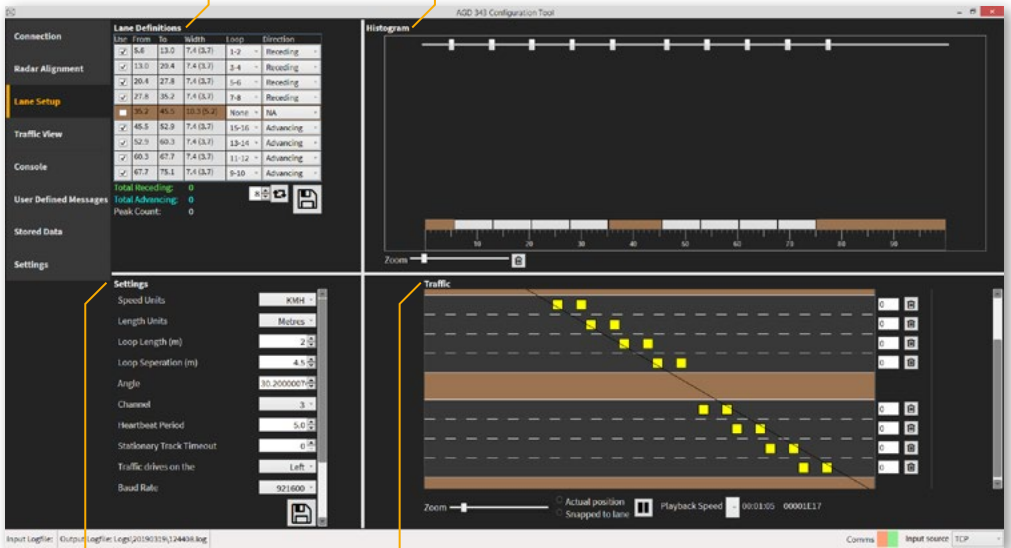
## AGD ALIGN SET-UP TOOL

### Lane Setup Window

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.

LANE DEFINITIONS  
Text

HISTOGRAMS  
Text



SETTINGS  
Text

TRAFFIC  
text

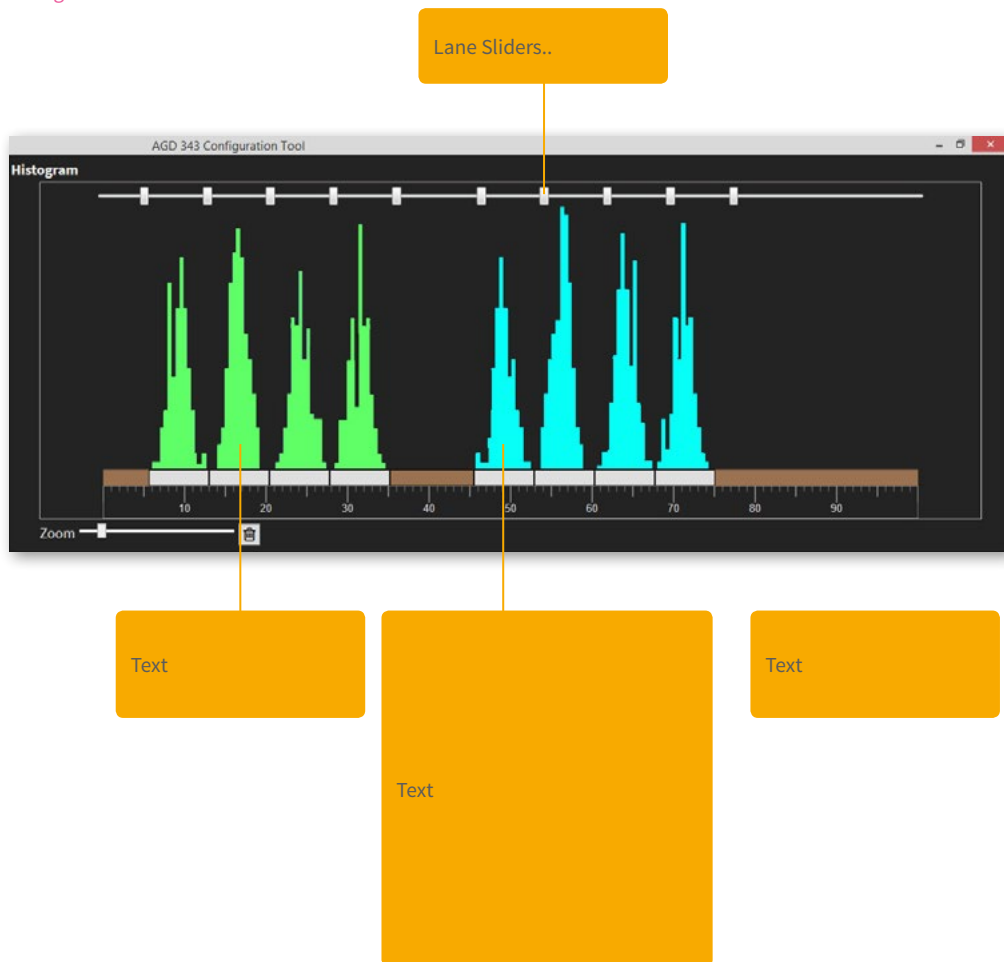
# Installation and commissioning

## AGD ALIGN SET-UP TOOL

AGD **343**  
HIGHWAYS MONITORING RADAR

### Lane Setup - Traffic Histogram

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.



# Installation and commissioning

AGD 343

HIGHWAYS MONITORING RADAR

## AGD ALIGN SET-UP TOOL

### Lane Setup - Lane Definitions

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.

Lane Sliders..

AGD 343 Configuration Tool

| Connection            | Lane Definitions                    |      |      |            |       |           |
|-----------------------|-------------------------------------|------|------|------------|-------|-----------|
|                       | Use                                 | From | To   | Width      | Loop  | Direction |
| Radar Alignment       | <input checked="" type="checkbox"/> | 5.6  | 13.0 | 7.4 (3.7)  | 1-2   | Receding  |
|                       | <input checked="" type="checkbox"/> | 13.0 | 20.4 | 7.4 (3.7)  | 3-4   | Receding  |
|                       | <input checked="" type="checkbox"/> | 20.4 | 27.8 | 7.4 (3.7)  | 5-6   | Receding  |
| Lane Setup            | <input checked="" type="checkbox"/> | 27.8 | 35.2 | 7.4 (3.7)  | 7-8   | Receding  |
|                       | <input type="checkbox"/>            | 35.2 | 45.5 | 10.3 (5.2) | None  | NA        |
| Traffic View          | <input checked="" type="checkbox"/> | 45.5 | 52.9 | 7.4 (3.7)  | 15-16 | Advancing |
|                       | <input checked="" type="checkbox"/> | 52.9 | 60.3 | 7.4 (3.7)  | 13-14 | Advancing |
|                       | <input checked="" type="checkbox"/> | 60.3 | 67.7 | 7.4 (3.7)  | 11-12 | Advancing |
| Console               | <input checked="" type="checkbox"/> | 67.7 | 75.1 | 7.4 (3.7)  | 9-10  | Advancing |
| User Defined Messages | Total Receding: 0                   |      |      |            |       |           |
|                       | Total Advancing: 0                  |      |      |            |       |           |
|                       | Peak Count: 0                       |      |      |            |       |           |

8  

Text

Text

Save

# Installation and commissioning

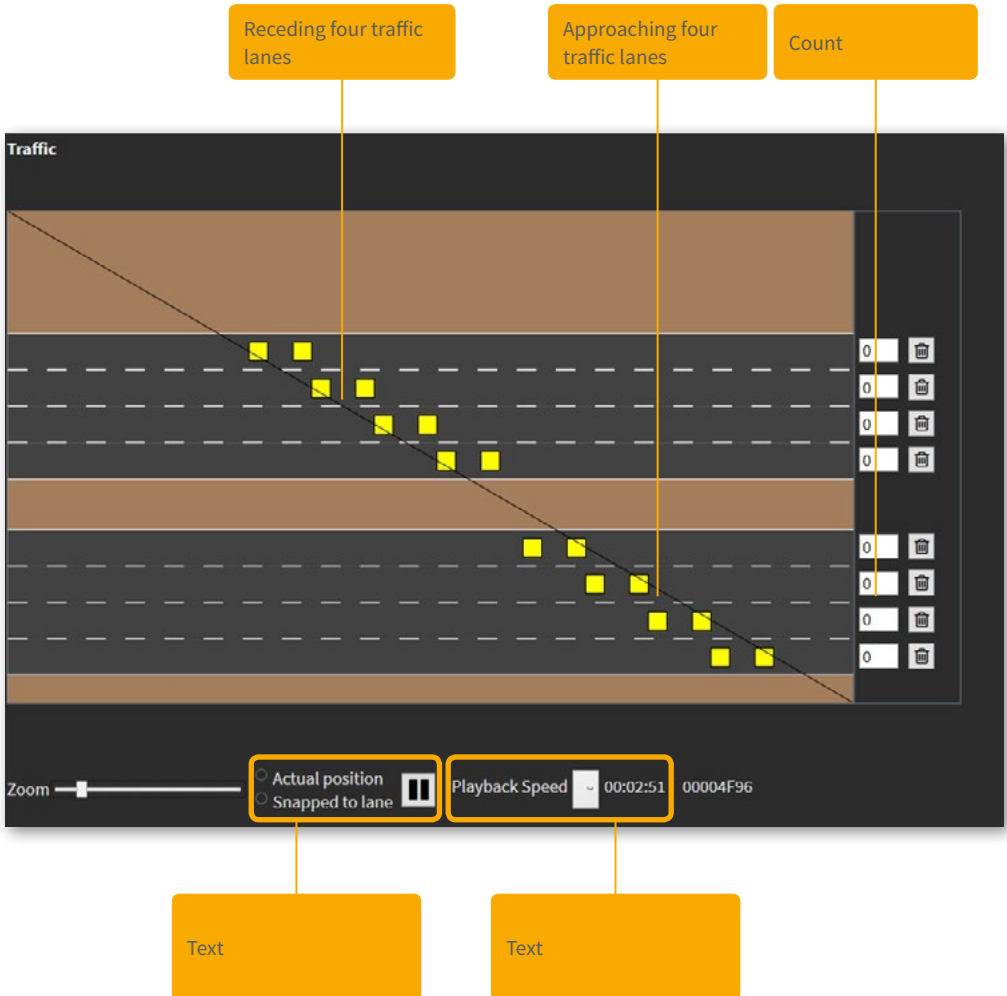
AGD 343

HIGHWAYS MONITORING RADAR

## AGD ALIGN SET-UP TOOL

### Lane Setup - Traffic View

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.



# Installation and commissioning

## AGD ALIGN SET-UP TOOL

### Lane Setup - Settings

Once connected and powered the camera will cast a WiFi network that will allow initial alignment to be configured.

Lane Sliders..

Settings

Speed Units KMH

Length Units Metres

Loop Length (m) 2

Loop Separation (m) 4.5

Angle 30.2000007

Channel 3

Heartbeat Period 5.0

Stationary Track Timeout 0

Traffic drives on the Left

Baud Rate 921600

Save

Date / Time

Text

Text

Save



## PHYSICAL INSTALLATION

---

If the unit is not operating correctly, please check the following, has the unit been:

- 1) Mounted within the recommended height of 6 metres?
- 2) Angled according to the installation guide to provide good coverage of the detection area?
- 3) Installed with any obstructions in the viewable area?

## ELECTRICAL INSTALLATION

---

If the unit is not operating correctly, please check the following:

- 1) Is power present at the unit?
- 2) Is the red LED illuminated when power is applied to the unit?
- 3) Is there sufficient current to run the unit - identified by the red LED failing to flash or flashing only once during power-up and the web page not starting correctly? Refer to technical specification table.

## CONNECTING / COMMISSIONING

---

If the unit is not operating in the prescribed manner, please check the following:

- 1) Is the LED on the front of the unit you wish to connect to illuminated blue to show that the WiFi network is successfully connected?
- 2) Has the correct IP Address been entered into the browser address bar?
- 3) Have you followed the AGD Align Touch-setup stages correctly and verified correct operation?

If trouble with operation persists please contact AGD Technical Support.

## AGD TECHNICAL SUPPORT

eMail: [technical@agd-systems.com](mailto:technical@agd-systems.com)

Tel: +44-1452 557404

# Radar Characteristics

## OPERATING FREQUENCY BAND AND POWER

The radar frequency and power is as follows;

| Parameter                    | Specified   | Notes |
|------------------------------|-------------|-------|
| Centre Frequency (channel 1) | 24.077GHz   |       |
| Centre Frequency (channel 2) | 24.125GHz*  |       |
| Centre Frequency (channel 3) | 24.175GHz   |       |
| Centre Frequency (channel 4) | 24.223GHz   |       |
| Frequency Modulation (FM)    | 45MHz       |       |
| Power                        | <100mW eirp |       |
| Field Strength               |             |       |
| ITU Code                     | 45M0FXN     |       |

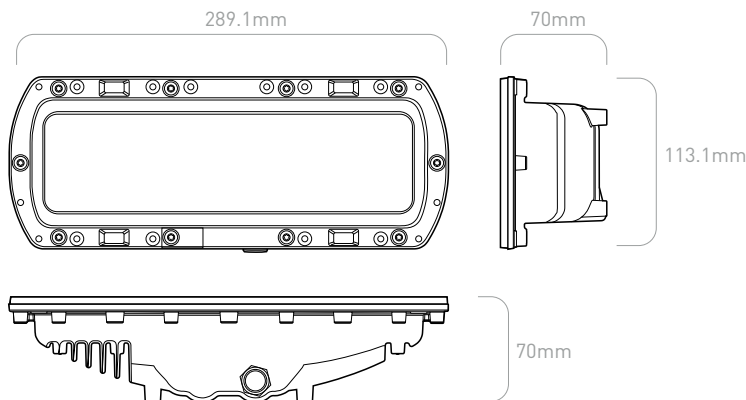
\*Channel for USA & Canadian variant, Channel 2 - 24.125GHz.

# Technical Specifications

AGD **343**

HIGHWAYS MONITORING RADAR

## PRODUCT DIMENSIONS



## SPECIFICATIONS

|                         |                                                                    |
|-------------------------|--------------------------------------------------------------------|
| <b>Description</b>      | Highway Monitoring Radar                                           |
| <b>Technology</b>       | 24GHz FMCW Radar                                                   |
| <b>Mounting</b>         | Pole, portal gantry, MS3, MS4 or other structures                  |
| <b>Mounting Height</b>  | 6 metres nominal                                                   |
| <b>Range</b>            | 2-100 metres                                                       |
| <b>Speed Range</b>      | 5-250 kph                                                          |
| <b>Housing Material</b> | Black Polycarbonate / Aluminium                                    |
| <b>Sealing</b>          | IP66                                                               |
| <b>Operating Temp</b>   | -20°C to +60°C                                                     |
| <b>Power</b>            | 6 W @ 24Vdc                                                        |
| <b>Power Supply</b>     | 12 - 24V dc                                                        |
| <b>Configuration</b>    | WiFi AGD Align Touch-Setup                                         |
| <b>Dimensions</b>       | W 113.1mm x D 70mm x L289.1mm                                      |
| <b>Radar Output</b>     | RS422                                                              |
| <b>Weight</b>           | 1400g                                                              |
| <b>Approvals</b>        | ETSI EN 301 489 / BS EN 50293, ETSI 300.440, FCC CFR47 Part 15.245 |

Owing to the Company's policy of continuous improvement, AGD Systems Limited reserves the right to change their specification or design without notice.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference, that may cause undesired operation. See 47 CFR Sec. 15. 19

A separation distance of at least 20 centimetres should normally be maintained between this product and the body of users or nearby persons. Changes or modifications to this equipment, not expressly approved by AGD Systems Ltd, may void the user's authority to operate this equipment.



# End Of Life – Disposal Instructions (EOL)

Intentionally left blank

## SAFETY PRECAUTIONS

All work must be performed in accordance with company working practices, in-line with adequate risk assessments. Only skilled and instructed persons should carry out work with the product. Experience and safety procedures in the following areas may be relevant:

- **Working with mains power**
- **Working with modern electronic/electrical equipment**
- **Working at height**
- **Working at the roadside or highways**

1. This product is compliant to the Restriction of Hazardous Substances (RoHS - European Union directive 2011/65/EU).
2. Should the product feature user-accessible switches, an access port will be provided. Only the specified access port should be used to access switches. Only non-conductive tools are to be used when operating switches.
3. The product must be correctly connected to the specified power supply. All connections must be made whilst the power supply is off or suitably isolated. Safety must always take precedence and power must only be applied when deemed safe to do so.
4. No user-maintainable parts are contained within the product. Removing or opening the outer casing is deemed dangerous and will void all warranties.
5. Under no circumstances should a product suspected of damage be powered on. Internal damage may be suggested by unusual behaviour, an unusual odour or damage to the outer casing. Please contact AGD for further advice.
6. This device complies with part 15 of the FCC Rules and contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).

- Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

- A separation distance of at least 20 centimetres should normally be maintained between this product and the body of users or nearby persons.
- Changes or modifications not expressly approved by AGD Systems Ltd could void the user's authority to operate the equipment.

7. This Product is Compliant with the European Radio Equipment Directive 2014/53/EU. There are no restrictions of use within any EU Member state for this product. This product is Receiver Category 2.
8. Indicates compliance with all applicable Australian ACMA technical standards and associated record-keeping (including testing) arrangements.



## IMPORTANT INFORMATION

### Low Power Non-Ionising Radio Transmission and Safety

Concern has been expressed in some quarters that low power radio frequency transmission may constitute a health hazard. The transmission characteristics of low power radio devices is a highly regulated environment for the assurance of safe use.

There are strict limits on continuous emission power levels and these are reflected in the testing specifications that the products are approved to. These type approval limits are reflected in the product specifications required for a typical geographic area such as those for the EU (ETS300:440), for the USA (FCC part 15c) and for Australia/New Zealand (AS/NZS 4268). The limits adopted in these specifications are typically replicated in many other localized specifications.

The level of safe human exposure to radio transmission is given by the generally accepted guidelines issued by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This body has issued guidance for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz) which are quoted below.

|                                         | Radar and ICNIRP limit comparison       |                                                     |                 | Typical Informative Limits for Radar Transmission Approval |                    |                             |
|-----------------------------------------|-----------------------------------------|-----------------------------------------------------|-----------------|------------------------------------------------------------|--------------------|-----------------------------|
|                                         | Radar Transmitted Level (Note 4)        | ICNIRP Limit (Table 6)                              | Exposure Margin | ETS300:440                                                 | FCC (part15c)      | AS/NZS 4268                 |
| Power (mW EIRP)                         | <100mW (<20dBm)                         | N/A                                                 | N/A             | 100mW (20dBm)                                              | 1875mW (Note 1)    | 100mW (20dBm)               |
| Max Power Density (mW/cm <sup>2</sup> ) | 3.18μW/cm <sup>2</sup> at 50cm (Note 3) | <50W/m <sup>2</sup> (5mW/cm <sup>2</sup> ) (Note 2) | 0.064%          | N/A                                                        | N/A                | N/A                         |
| Field Strength (V/m) at 3m              | <0.58V/m (5.8mV/cm) (Note 1)            | <137V/m (1370mV/cm)                                 | 0.42%           | 0.58V/m (5.8mV/cm) (Note 1)                                | 2500mV/m (25mV/cm) | 0.58V/m (5.8mV/cm) (Note 1) |

*Note 1 Values are calculated conversions for comparison purposes.*

*Note 2 Other equivalent limits include; Medical Research Council Limit of 10mW/cm<sup>2</sup>, IACP limit of 5mW/cm<sup>2</sup> (at 5cm) and UK CAST limit of 5mW/cm<sup>2</sup>. Power density at the radome typically 4μW/cm<sup>2</sup>.*

*Note 3 Calculation is made on the assumption antenna is a point source therefore the actual value is likely to be significantly less than that quoted. Note that a theoretical max level at a 5cm distance (which gives 0.318mW/cm<sup>2</sup>) is at a point in the field where the radar beam is not properly formed.*

*Note 4 Comparison for product model 343 operating in the band typically 24.050GHz to 24.250GHz*

From the table it can be seen that it is extremely unlikely that a potentially hazardous situation could occur owing to the use of such low power devices.

It is considered to be good practice not to subject humans to radiation levels higher than is necessary. In a works environment where multiple equipment on soak test are to be encountered then it is considered good practice to contain the equipment in an appropriate enclosure lined with radar absorbing material.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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## WARRANTY

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All AGD products are covered by a 12 month return to factory warranty. Products falling outside this period may be returned to AGD Systems for: evaluation, repair, update or re-calibration, any of which may be chargeable.



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