



KTS350-X User Manual

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2 Introduction

This purpose of this guide is to provide sufficient information to allow a KTS350-X radar to be physically installed, powered up and configured to correctly communicate over a network. This guide assumes that a suitably trained person has already performed a site survey and a suitable mounting location identified. The KTS350-X radar, together with the Navtech Radar software Witness, form the Navtech Radar ClearWay Automatic Incident Detection system. Service and Maintenance procedures are covered in a separate manual.

2.1 ClearWay™



The ClearWay system is an important component of a Smart Highways solution, providing accurate and reliable vehicle tracking and Automatic Incident Detection (AID) for roads, bridges and tunnels. The 'Smart Highways' concept, enables improved traffic flow and enhanced safety through the effective use of technology. Increasing safety on our motorways and reducing traffic congestion have become major goals for us at Navtech Radar. In the UK alone, more than £2 billion a year is lost due to traffic congestion, not to mention the negative effects on the environment and health.

2.2 Support

Navtech Radar Ltd offer comprehensive support services both pre and post radar commissioning to ensure you get the best performance and support for your radar installation. Navtech Radar Ltd have a dedicated Customer Services Support Centre that can offer 1st and 2nd line technical support for both hardware and software queries. The centre is staffed by a highly skilled technical team who can advise and offer support with any technical questions both pre and post commissioning. In the event a fault cannot be diagnosed remotely, or a repair is required, the team can arrange for your radar to be returned to base for further diagnostic tests or repair.

Navtech Radar Ltd also offer a number of support plan options during the lifetime of your radar, offering peace of mind for your installation.

For further information on the support plan options or any technical questions please contact the Customer Services Support Centre on +44 (0) 1235 832419, or email at support@navtechradar.com

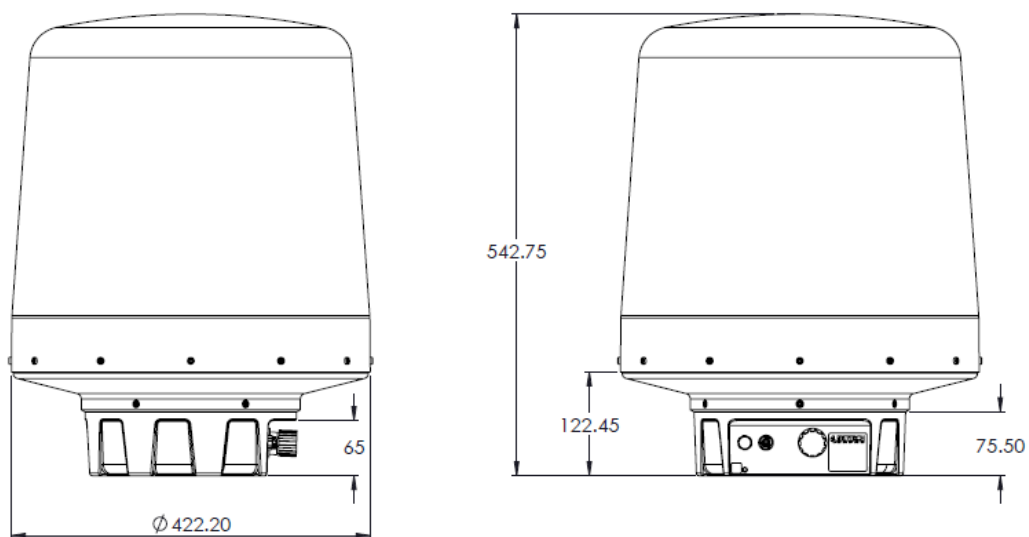
2.3 Patent Information

GB Patent No.: GB 2 518 344

US Patent No.: 10 522893

3 KTS350-X

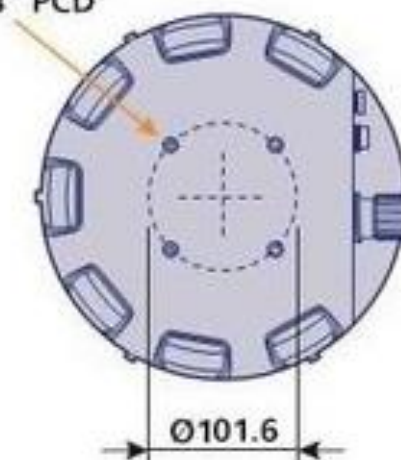
3.1 Dimensions



Throughout this manual generic stock images of a Navtech Radar system are used.

3.1.1 Mounting Holes

4 x M8 mounting holes on 4" PCD



4 Installation

The KTS350-X can be mounted on a dedicated post or various other structures (e.g. walls, roofs, gantries) by use of brackets. For correct operation of the radar, Navtech recommend that any bracket should not move more than half degree in any direction whilst carrying the 12kg load of the radar under the required operating conditions (customer site specific). Ensure that the radar line of sight is not obscured by any existing infrastructure.

To allow the radar to be installed in the optimum position relative to the road surface, the KTS350-X radar should be fitted to a mounting plate which allows the tilt to be adjusted (see below). The KTS350-X radar is fitted to the mounting plate using 4x M8 bolts in a 4" PCD pattern (standard CCTV mounting). The procedure for adjusting the tilt to optimise the radar performance is detailed in the section Levelling and optimising the radar position.

The mounting plate provides a simple method to fine tune the incline of the radar. For each of the mounting holes, the bolt is fed from underneath and locked onto the mounting plate with a nut. Two more nuts are used below the radar base plate and another is used above so that the sensor can be positioned anywhere up or down the bolt thread, as necessary. An extra nut should then be added once the radar is levelled to lock off the position.

4.1 User Safety

The equipment should be mounted in a fixed location maintaining minimum separation distance from personnel when in general operation, of 60cm.

4.2 Essential Equipment

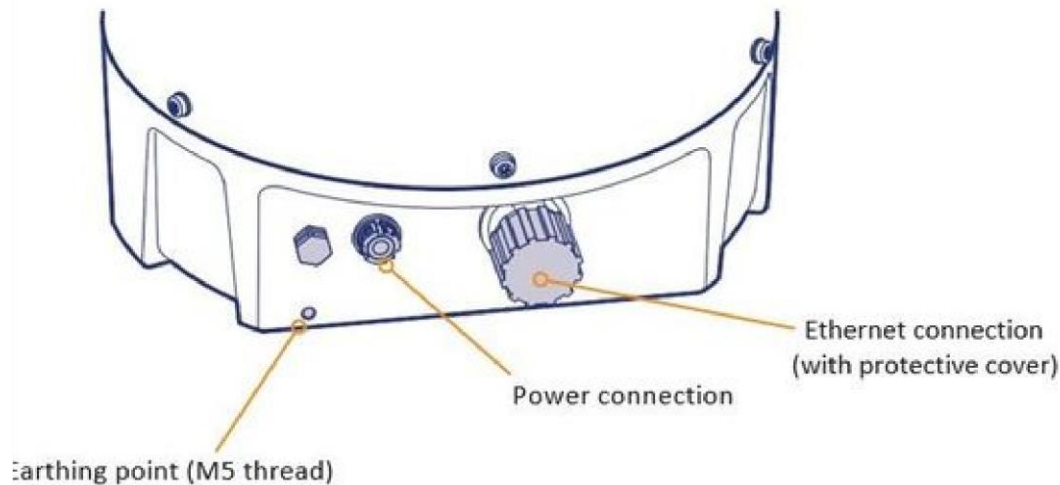
- Laptop computer with Ethernet port, Web Browser (IE v10 or higher, Chrome), RadarView Lite v1.59.3 or higher with correct configuration file.
- Qty 2 – 25m2 Radar targets. RadarView Lite and targets are available by contacting Navtech Radar customer support.
- Qty 2 – Tripods (for mounting radar targets)
- Qty 2 – Adjustable spanners to suit mounting bracket used (see Mounting plate section)
- 4mm and 6mm Allen keys
- Digital inclinometer (accurate to 0.1°)
- Pair of 2-way radios Measuring wheel

4.3 Connecting the Radar

Navtech radar sensor requires a power and a network connection.

The power and network connections run from the sensor to a local junction box (e.g. at the base of the post) where the power supply is situated. Remember to ensure that the maximum cable lengths remain within the capability of the selected cabling and infrastructure.

4.3.1 Connect Power and Network



1. Remove the protective cap from the Ethernet connector on the radar and attach the RJ45 plug. Ensure that the weatherproof shroud on the Ethernet cable is sealed and secure to the radar.
2. Making sure first that the power is off, attach the 24V DC plug to the radar connector.
3. Attach a suitable earth cable to the earthing point (use M5 bolt, spring washer and plain washer supplied in bolt kit).
4. Ensure that the power and Ethernet cables are securely connected into a suitable junction box that has a suitable 24V DC power supply installed.
Note: The radar typically draws approximately 1A. Ensure that the power supply cabling is correctly terminated.
5. Ensure that the junction box has an Ethernet cable/fibre optic running to the infrastructure network switch.
6. When power is applied, ensure that the radar begins rotating - you can easily hear this, although it takes approximately 10 seconds for the radar to start rotating – in cold conditions this could be longer

4.3.2 Care Point

Additional Protection:

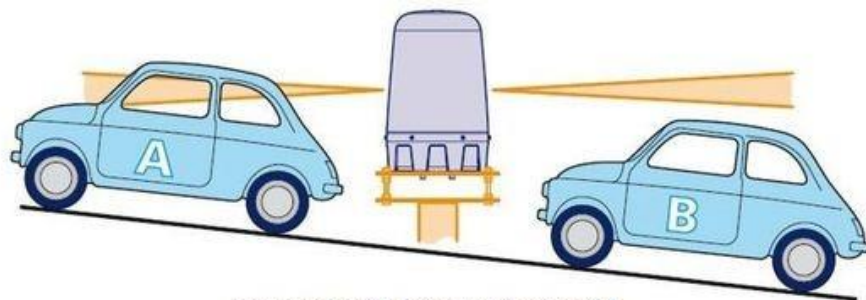
If the radar is likely to be exposed to high pressure jet washing and/or washing with an added soap solution you should add additional protection to the connector fittings once the cables are attached. The application of a wax oil or non-corrosive silicone sealant to the connector joints after final installation should be utilised. Failure to do so in this situation could cause premature corrosion to the connectors, causing the radar to stop working due to incorrect installation.

No other washing additives should be used to clean the radar except water and soap.

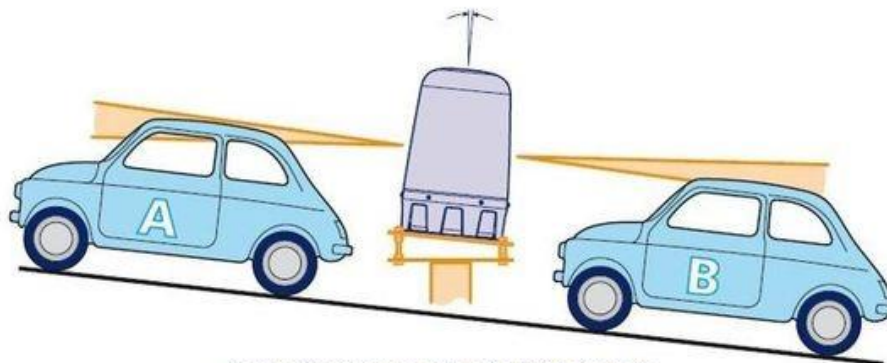
4.4 Optimising the Radar Mount Angle

The KTS350-X radar has a spread vertical beam, however maximum power is within a 2-degree main lobe. For optimum detection performance it is important that each sensor is level in relation to the area that it surveys. Level may not mean absolutely horizontal. For example, if the site has a slope it is necessary to incline the sensor in line with the slope to obtain optimum performance.

The exaggerated examples below show how a sensor with an incorrect incline could miss targets which are lower down the slope:

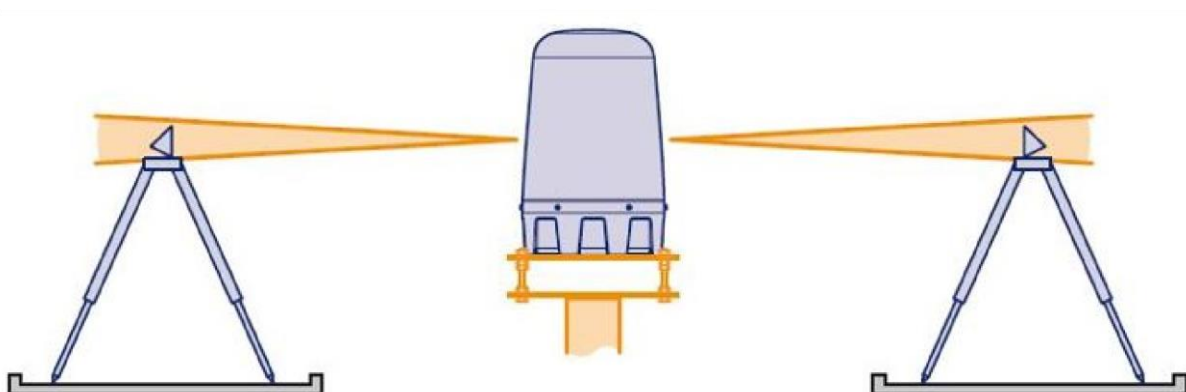


Horizontal radar sensor misses target B



Inclined radar sensor locates both targets

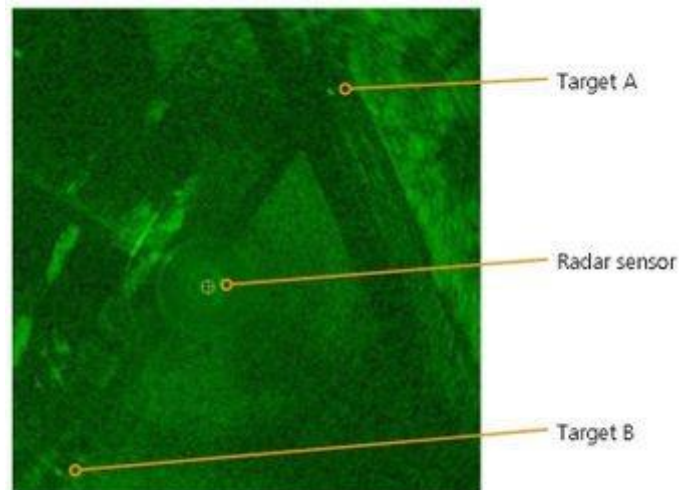
The recommended procedure to optimise the radar is to use two radar targets on tripods either side of the radar.



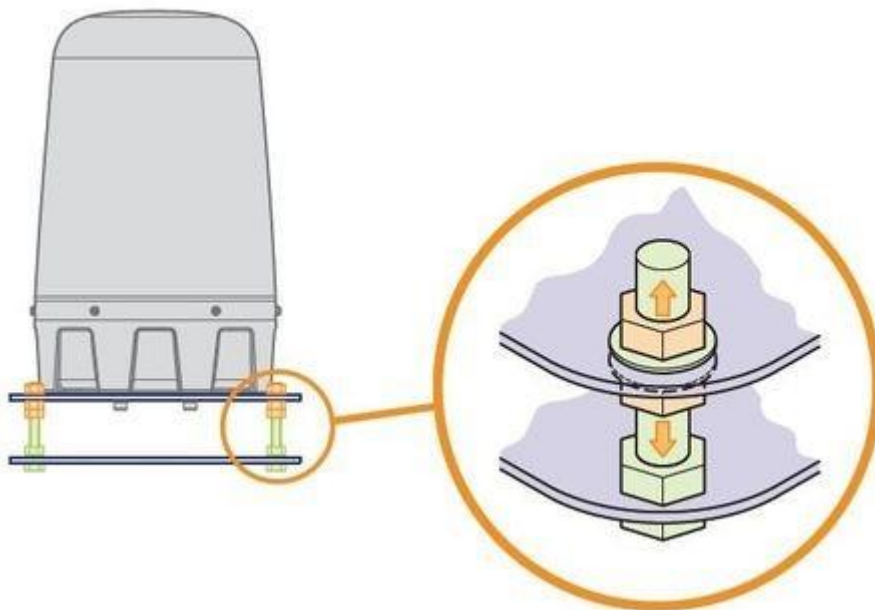
Use the RadarView Lite utility to view the resulting radar images and adjust the tilt of the mounting plate until the signals from each target are equal. Please see Using SPx RadarView Lite for details about setting up and using RadarView Lite.

To level and optimise the radar

1. In line with the limitations of the site and taking all appropriate safety precautions, position the two targets equal distances (at least 150 metres, if possible) either side of the radar along the carriageway. The targets must be at the same height (1.5 metres is suggested), while the area behind each target should be clear for 10 to 15 metres. The aim is to maximise the signal level on both the targets.
2. Use the RadarVlew Lite utility to view the resulting data and use the A-scan function to view the signal level of the target.

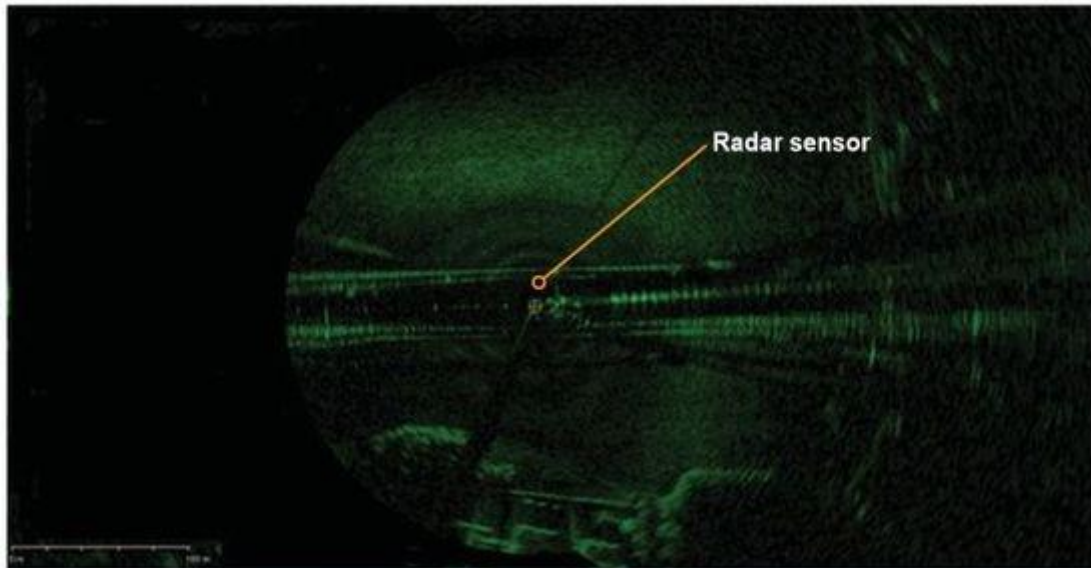


3. Using a digital inclinometer, ensure that the radar is level across the carriageway. Then adjust the tilt of the radar (on the threaded studs of the mounting plate), to maximise the signal level on the 2 targets, using the gradient of the road around the radar as a starting point.

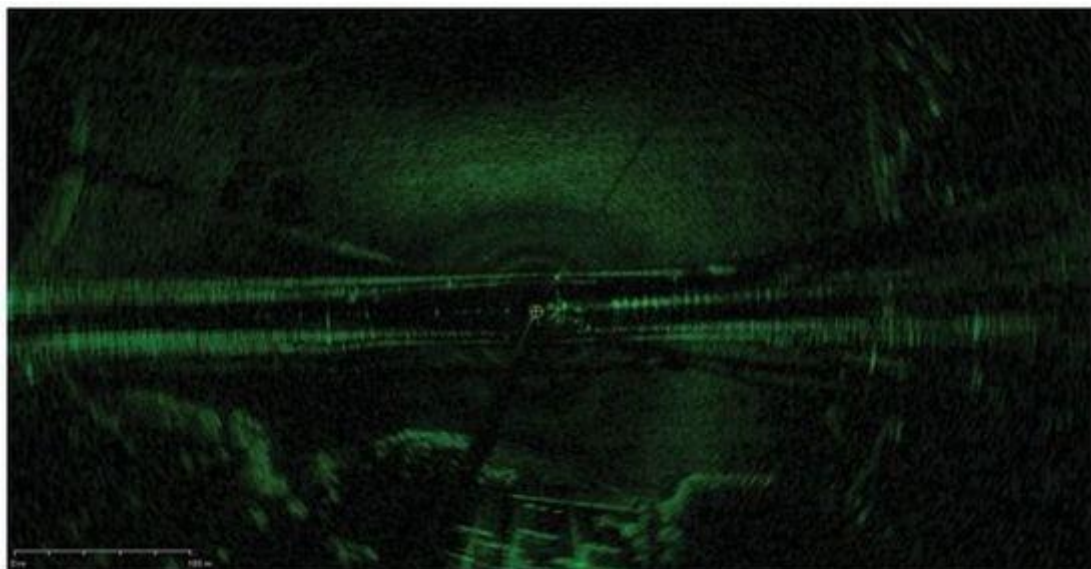


4. If this method cannot be used (for example live carriageway), then as a minimum the road gradient should be measured using a digital inclinometer in several locations to gain an average, and the radar matched to this. However, if possible and especially if the road is obviously not flat, use RadarView Lite to view the radar data and adjust the tilt to have an equal amount of data either side of the radar.

The sample screenshots from RadarView Lite shown here show (first) an uneven amount of data and (second) a more even distribution of data either side of the radar.



An uneven amount of data from the two targets



a more even distribution of data either side of the radar

5 Using the Vertex interface

The KTS350-X radar sensor has a built in web interface (known as Vertex) which provides default user level access to the radar. Vertex allows you to view various operational data (e.g. IP address, serial number, System Uptime and Radar health, etc.) as soon as it opens, however, to make any changes you will need to Login.

When first connecting, ensure there is nothing else on the network that is using the same IP address. If necessary, connect a computer directly to the Ethernet port of the radar unit and access Vertex directly in order to change the IP address.

5.1 To Access the Vertex Interface

1. On the computer that is linked to the sensor, open a suitable web browser: Internet Explorer (v10 or above) or Chrome.
2. Type in the address of the sensor in the format <http://192.168.0.1> and press return. This will redirect you to a secure http (https) connection. Accept any security warnings – these are raised because the browser does not recognise the certificate from the radar. To avoid seeing this warning every time you connect, save the IP address of the radar in the secure/trusted sites zone of your browser (although the certificate is regenerated every time the radar reboots). You should now see the Vertex interface opening page:



Within the basic view (when not logged in to the sensor), Vertex provides four main pages, accessible from the four buttons in the top left corner:

Status - Displays basic static settings (i.e. auto-hostname, serial number, IP address, etc.) plus dynamic graphs (arranged on two tabs in the lower portion of the page) that provide Temperature and Rotation details. Each graph shows the following about each parameter:

- *Actual Value (Blue):* Instantaneous value.
- *Expected Value (Green):* Expected value based on the configuration of the radar.
- *Min / Max Values (Red):* The min & max allowed values for each metric.

System Information - Provides three pages of detailed settings under the sub headings of System, Radar and Advanced. Click the System Information option to reveal the three sub-headings.

Log Viewer - A full list of all sensor activities. Viewing is possible while not logged-in, however, you must log in if you wish to download the record.

Radar Data - Allows you to view the live radar data. Two other buttons are shown in green at the top right corner of the page: **Report** - Click on this option to display a configuration summary report that details all of the key sensor settings.

Login - Click on this option to login so that changes can be made to the service date.

5.2 Changing the IP Address

Once you are logged in it is then possible to change various details, such as the radar sensor's own IP address, its Subnet mask, the Gateway IP address and/or the NTP (Network Time Protocol - *where the sensor should derive its time information*) address. To change IP details

1. Login to Vertex, as described above.
2. Click on the System Configuration button on the left side to display the following page:



3. As required, change the IP Address, Subnet Mask, Gateway and/or NTP Address to suit the installation and then click the blue Apply button in the lower right corner.
4. Click the green Commit Changes button to save the settings to the sensor memory. A message will be displayed when this action has been carried out.
5. Click the red Action button at the top of the page and then click the Reboot option to restart the radar sensor.