Antenna W.A.S.P.

User's Guide

Regulatory Specifications

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada Notifications

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage;

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CE Mark Conformity

(insert EC Certificate of Conformity here, when issued)

3Z Telecom, Inc. declares that the WASP Sensor and Data Collector products conform to their respective specifications, following the provisions of the European R&TTE directive 1999/5/EC:

3Z Telecom, Inc. déclare que les produits est conforme aux conditions essentielles et aux dispositions relatives à la directive 1999/5/EC.

- EN 301 489-1, 301 489-17 General EMC requirements for Radio equipment.
- EN 300 328 Technical requirements for Radio equipment.

CAUTION—The products are intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. Contact local authority for procedure to follow.

Note: ESD precautions should be used when attaching or removing the antenna from the Data Collector.

Note: Combinations of power levels and antennas resulting in a radiated power level of above 100 mW equivalent isotropic radiated power (EIRP) are considered as not compliant with the above mentioned directive and are not allowed for use within the European community and countries that have adopted the European R&TTEdirective 1999/5/EC. For more details on legal combinations of power levels and antennas, contact 3Z Telecom, Inc.

Protect the Data Collector from water. Do not use if Data Collector gets wet.

Avoid using these products during an electrical storm. There may be a remote risk of electric shock from lightning.

Radio Frequency Notifications

FCC Notifications

RF Radiation: The Product is an intentional radiator of Radio Frequency (RF) energy. In order to limit RF exposure to personnel in the immediate area, the Product should be located and installed such that a separation of at least 20 centimeters is maintained between the Product's antenna and personnel in the vicinity of the device. The antenna used for this transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

Modification warning: Caution - changes or modifications to this equipment, not expressly approved by 3Z Telecom, Inc. could void the user's authority to operate the equipment.

List of Approved Antennas

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (E.I.R.P.) is not more than that required for successful communication. This device has been designed to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Please note that the WASP Sensor is designed to only operate with an internal, non-user-replaceable antenna. Therefore the list below is applicable only to the Data Collector.

List of Approved Antennas for Data Collector

	Manufacturer	**Model**	**Type**	**Connector**	**Gain (dBi)**	**Note**
1	Telestone	STQJ-2400-5	Omnidirectional	SMA plug reverse polarity via provided antenna cable	5	
2	Galtronics	02008073-05831	Omnidirectional	SMA plug reverse polarity via provided antenna cable	2.5	Assembled within same enclosure as Antenna #3
3	Galtronics	02008073-05831	Directional	SMA plug reverse polarity via provided antenna cable	8	Assembled within same enclosure as Antenna #2

Antenna WASP System Overview

Antenna WASP Sensors

The antenna WASP sensors are designed with a highly sensitive digital compass and inclinometer to precisely measure the orientation of cellular antennas and to wirelessly relay the information back to the Data Collector.

Data Collectors

The Data Collector is an embedded computer installed at each installation site that receives and records antenna WASP sensor information. The Data Collector is also responsible for:

- Monitoring the sensor data and raising alarms when out-of-range measurements are detected.
- Automatically upload sensor data to the web (optional)
- Generate SNMP traps (optional)

Data Collector Manager

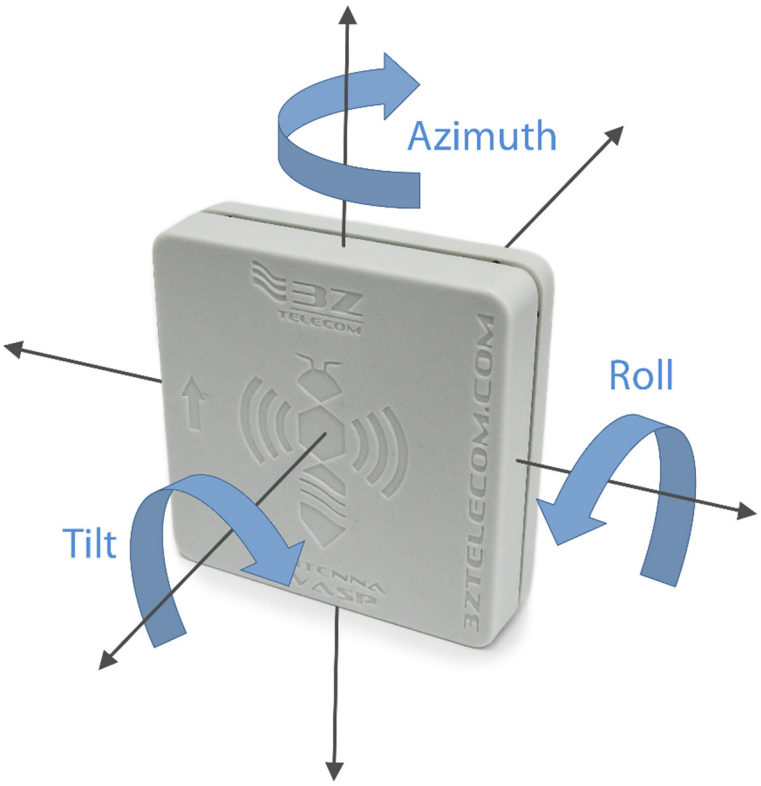
The Data Collector Manager is a Windows application which is responsible for:

- Configuring the settings in one or more Data Managers.
- Downloading and viewing antenna WASP sensor data from Data Managers.

WASP Telemetry and Sensor Measurements

3-D Orientation (Azimuth, Tilt, and Roll)

The antenna WASP sensor contains a highly sensitive magnetometer and inclinometer which can detect very slight changes in orientation. The antenna WASP sensor measures orientation on three different axes as illustrated below.



- **Azimuth –** is an angular measure relative to the Earth's magnetic field and is specified in degrees offset from magnetic north. This value can range from 0 degrees (north) to 359 degrees.
- **Roll –** is a measure of the sensor's deviation from vertical (zero degrees). This parameter can range from -180 degrees to 180 degrees.
- **Tilt –** is a measure of the sensor's deviation from level with respect to the horizon. This parameter can range from -180 degrees to 180 degrees.

Temperature

The antenna WASP sensors are also equipped with a temperature sensor which will measure and report the ambient temperature at the sensor location in degrees Celsius.

Battery Level

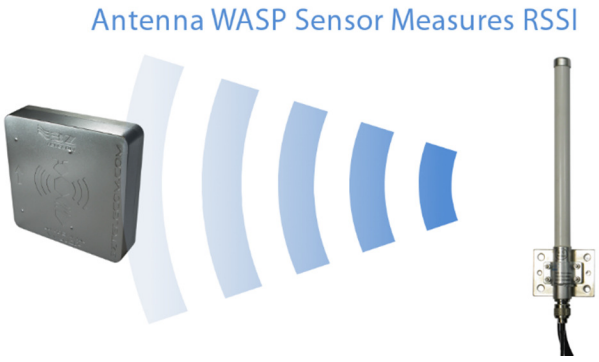
Each antenna WASP sensor monitors and reports the battery level to give the user plenty of notice before the battery needs to be replaced.

Wireless Signal Strength

In any wireless network the signal strength of the received signal is a key measure of the reliability of the wireless link. The antenna WASP makes Received Signal Strength Indicator (RSSI) measurements (in units of dBm) at both ends of each wireless link and reports the information to the Data Collector. Very low RSSI measurements can indicate that a sensor is at the limit of the wireless range or that something has moved into the transmission path and is blocking the signal. This signal strength information can be configured to generate alarm conditions and may be used by technicians to troubleshoot the network.

When the antenna WASP sensor transmits sensor information to the Data Collector, the receiver within the Data Collector makes a measurement of the RSSI, as illustrated below.

Occasionally the Data Collector will send commands or upload information to the WASP sensor, in which case the WASP sensor measures the received signal strength and relays the measurement back to the Data Collector the next time it transmits sensor information. This situation is illustrated below.



NOTE: The Data Collector only occasionally sends commands to the WASP sensors, so this second measurement may not always be available (which is normal).

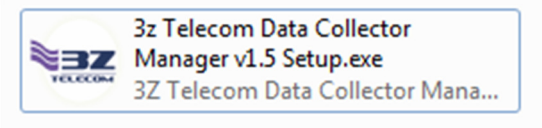
Antenna WASP Installation Guide

Step 1 - Install the Data Collector Manager Software

In order to configure the Antenna WASP sensors and Data Collector you will need to install the Data Collector Manager Software on a PC which has at least one USB connection and is running Windows 7 or Windows 8.1.

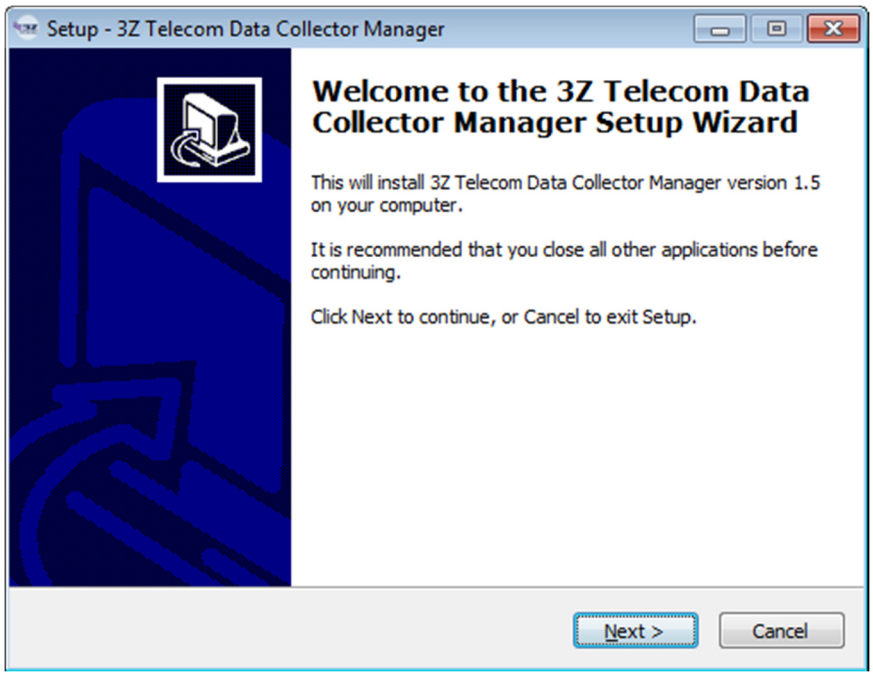
To install the software on your Windows system, please do the following:

1. Open Windows Explorer and **locate the Data Collector Manager Installer file** as distributed by 3z Telecom. It should look similar to the following:



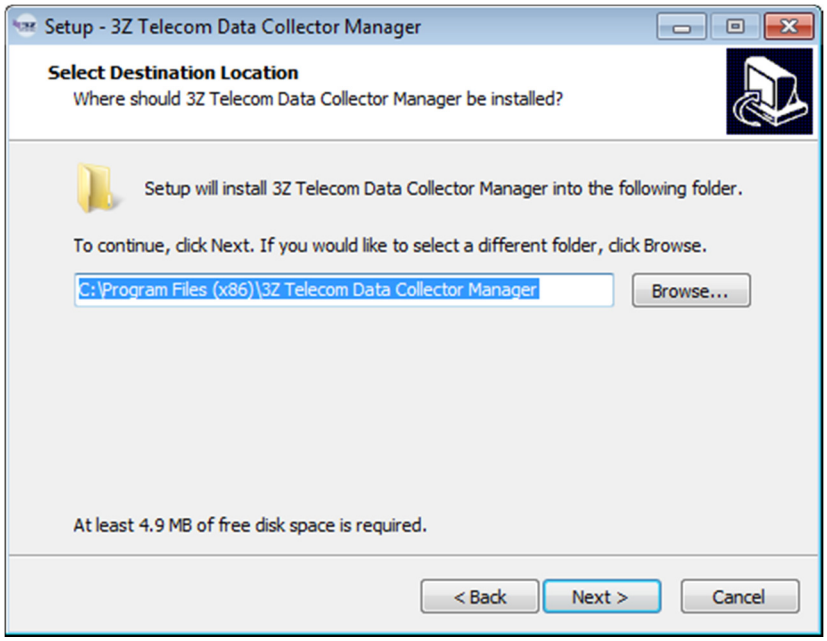
2. **Double click the installer file** to start the installation process. You may be required to enter Administrator credentials for the computer. If you do not have the required credentials, you will need to contact your network administrator.

3. When the installer starts, you will see a window as shown below:



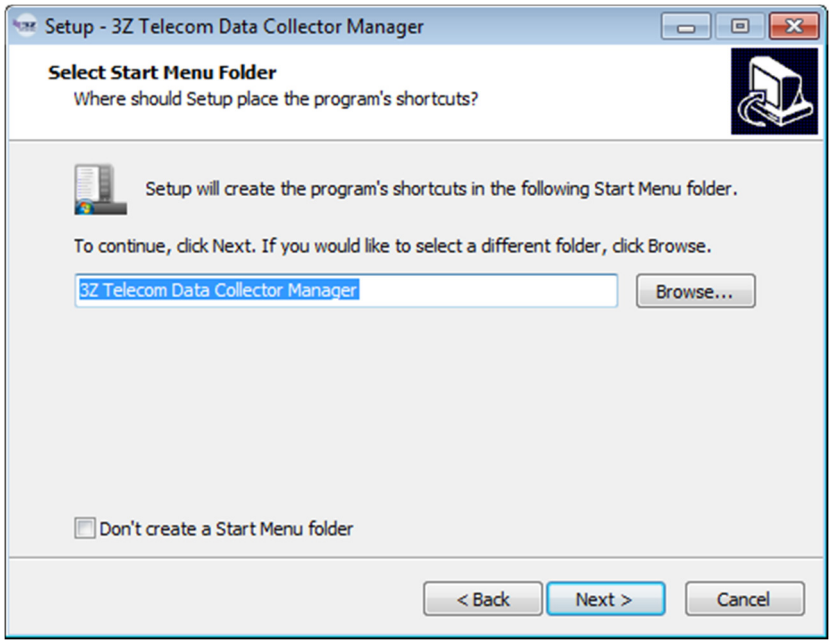
4. **Click 'Next'** to continue.

5. Next, you will see a screen which allows you to choose the installation location for the software as shown below. **It is recommended to choose the default installation location**.



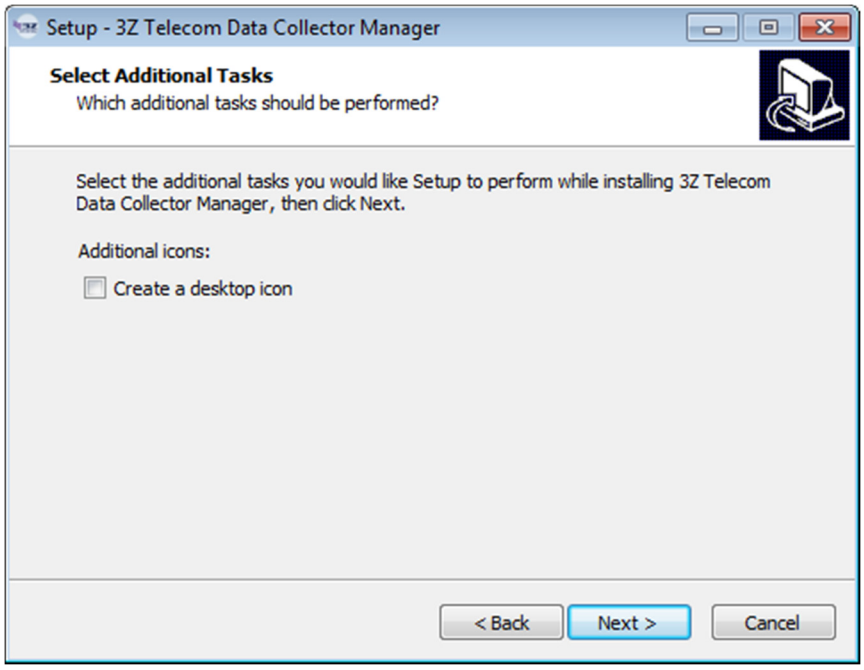
6. **Click 'Next'** to continue.

7. Next, you will be asked to select the Start Menu folder as shown below .**It is recommended to choose the default name.**



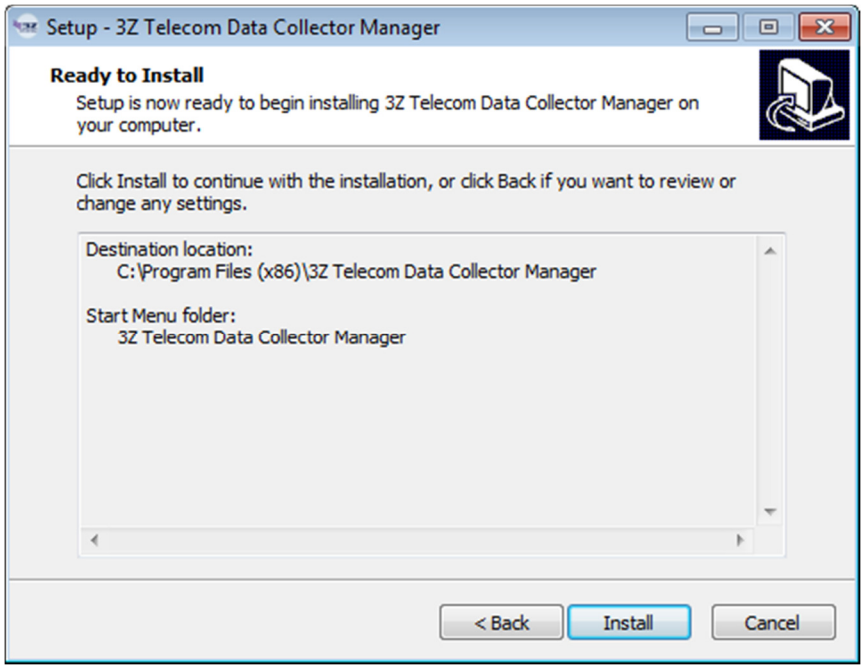
8. **Click 'Next'** to continue.

9. You will then be asked if you would like to optionally create a desktop icon for the Data Collector software as shown below.

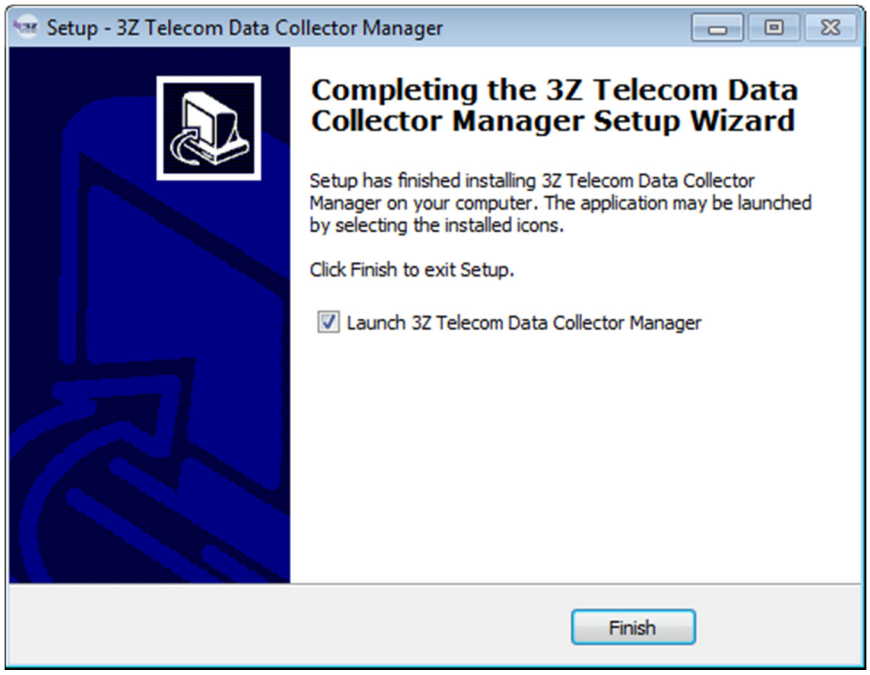


10. **Click 'Next'** to continue.

11. Finally, you will be prompted to confirm the installation details with a window similar to the one shown below. Confirm that the information is correct and **click 'Next'**.



12. The installer will then install the Data Collector Manager software onto your Windows computer. When it is finished, you will be prompted with a completion screen as shown below.



13. **Click 'Finish'** to complete the installation.

Step 2 - Install the Data Collector Antenna

Installation of the Data Collector antenna is intended to be performed by professional personnel.

The Data Collector ships with a 2.4 GHz omnidirectional antenna and N-to-RPSMA coaxial cable (as shown below). The antenna must be installed with direct line of sight to the Antenna WASP sensors installed on the tower.

WARNING: **Always be aware of power lines and ensure this antenna is installed at least 4 meters away from any high voltage lines.**

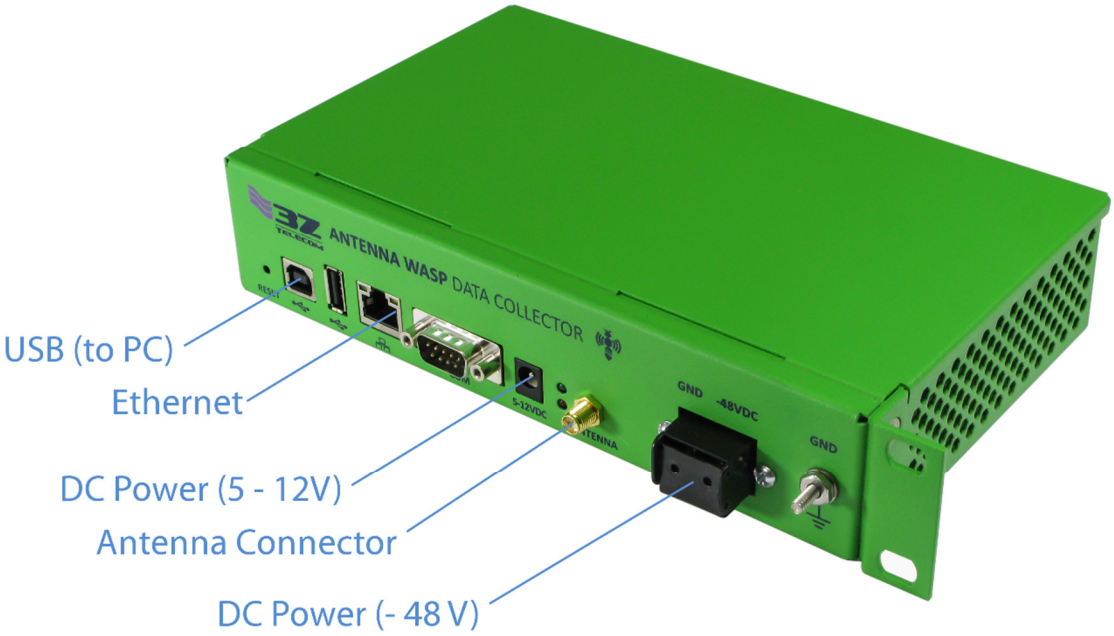
Also note:

- Ensure the antenna is fixed firmly to a rigid surface and will not be moved by wind or adverse weather conditions.
- Ensure the attached cable will reach the Data Collector installation site.

Step 3 - Install the Data Collector

Installation of Data Collector is intended to be performed by professional personnel.

The Data Collector must be installed in a cool dry location near the base of the tower on which the Antenna WASP sensors are to be installed. Once the Data Collector is firmly fixed to a solid surface, you may make the necessary cable connections as described and illustrated below.



1. **Attach the antenna** to the antenna connector illustrated above. Use an appropriate torque wrench set to 8 inch-pounds to ensure the connector is firmly attached (but do not over tighten).
2. **Connect the Ethernet to a LAN device** (router). Make 2 loops of the Ethernet cable around one of the two supplied ferrite cores (Fair-Rite 0446167251), and secure the cable loops by clamping shut the ferrite core assembly.
3. **Connect DC Power (-48V) port to power source at the base of the tower**. AWG#20 wire is recommended. Make 5 loops of the wires around one of the two supplied ferrite cores (Fair-Rite 0446167251), and secure the wire loops by clamping shut the ferrite core assembly. Once you have connected DC power to the Data Collector the green power LED next to the Antenna Connector will turn on. This indicates that the system has power and the system software is loading.
4. **Connect a USB cable from the PC to the Data Collector** using the device USB port as shown above.

Attention: The two USB Ports, 9-pin Serial Port, and Power Jack (5-12V) are only used for system debug and configuration purposes. These ports are not to be connected to any device during normal operation.

Attention: The Data Collector's Ethernet Port is designed to only connect to a commercially available network router. The Data Collector is not designed to be a peripheral device to a Class B Personal Computer (PC). As such, the Ethernet Port shall not be connected to a Class B PC in any operating configuration.

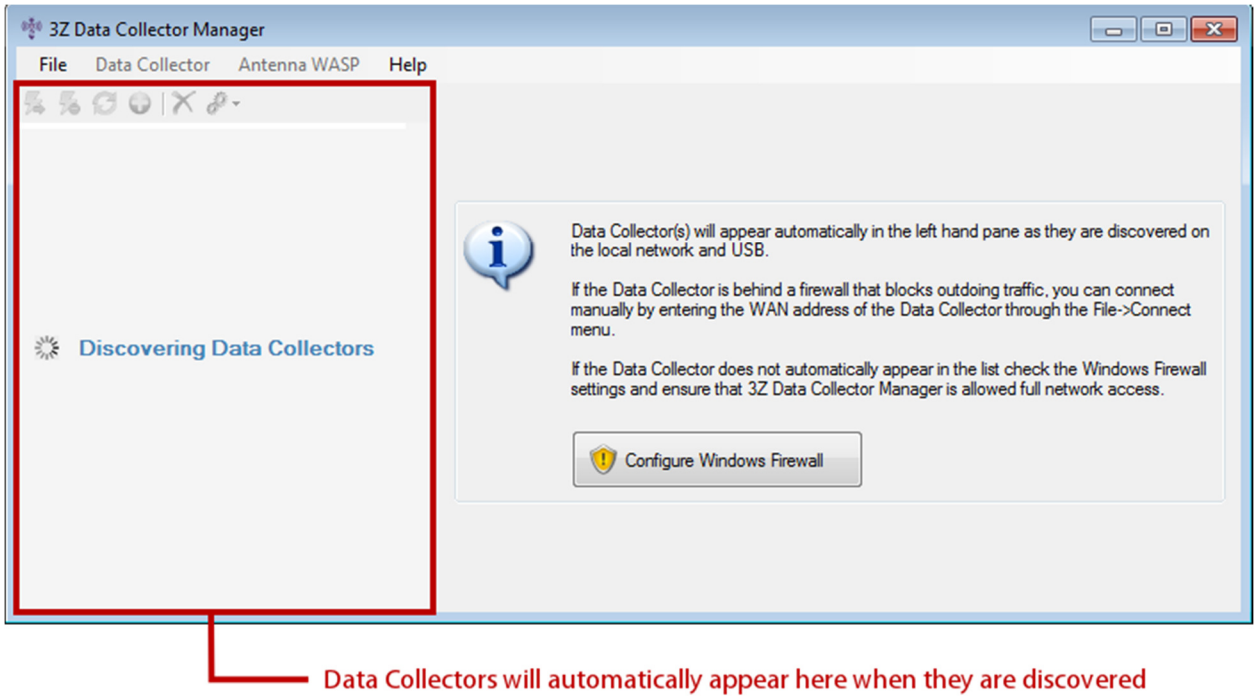
Attention: The sole power source of the Data Collector is -48VDC supplied by a power source at the base of the tower. The Data Collector does not require connections at the two USB Ports nor the Power Jack (5-12V) to operate.

Note on Ferrite Cores: The two supplied clamp-on ferrite cores are necessary to filter electromagnetic noise on the Ethernet cable and input power wires. They must be installed to meet EMC requirements. Both ferrite cores should be fastened on their respective cords as close to the Data Collector as possible.

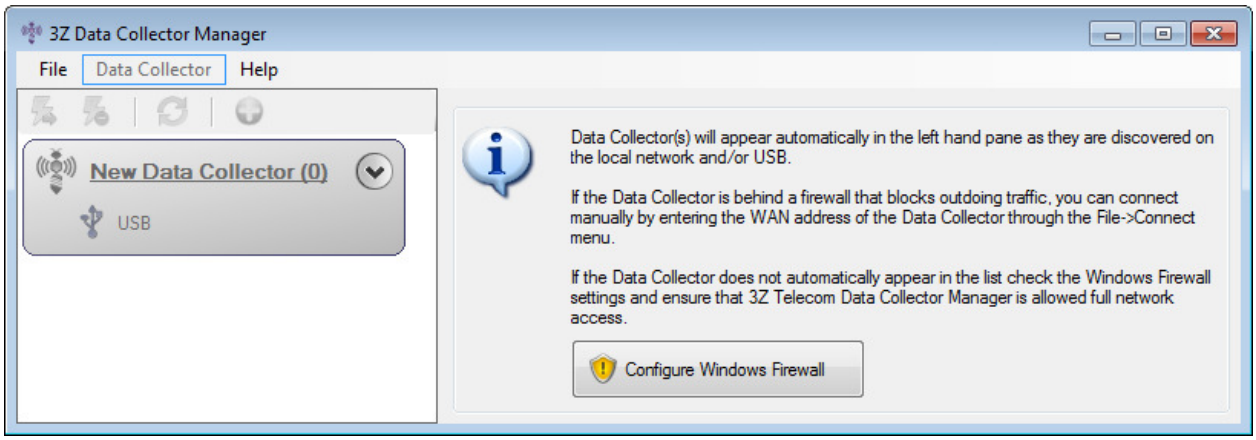
Step 4 - Run the Data Manager Software

Run the Data Collector Manager software that was installed in Step 1 by clicking on the '3z Telecom Data Collector Manager' application. A login prompt will appear as shown below.

Enter your username and password and click 'Login'. When you have successfully logged in to the software, the manager window will appear as shown below.



After a few moments, the manager software will detect the Data Collector connected on USB and the Data Collector will appear in the left pane as shown below.

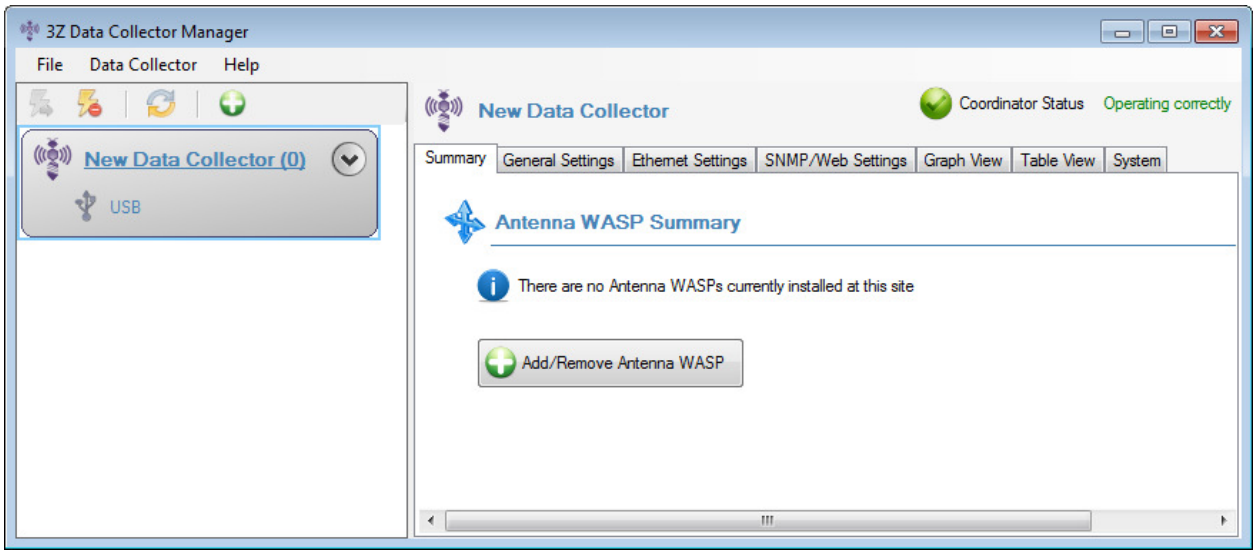


Step 5 - Connect to the Data Collector

To connect to a Data Collector you may:

- Double click the Data Collector's name link in the left pane, or
- Select "Data Collector -> Connect" from the File menu.

If the Data Collector has not previously been configured, then the screen will look very similar to the image below.



Once a connection to the Data Collector is established proceed to Step 6 - Update System Time.

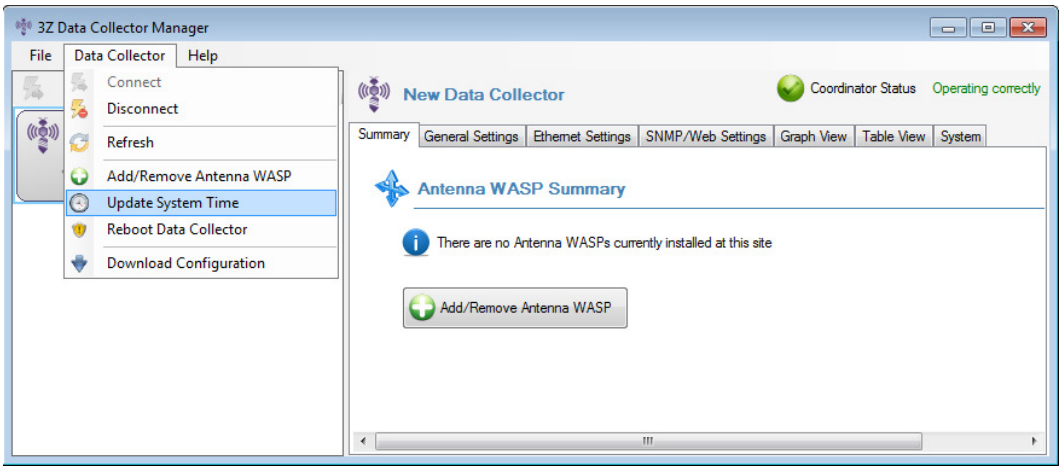
Step 6 - Update System Time

When a Data Collector is being configured for the first time, it is crucial that the system time is updated from the configuration PC. To update the system time, do the following:

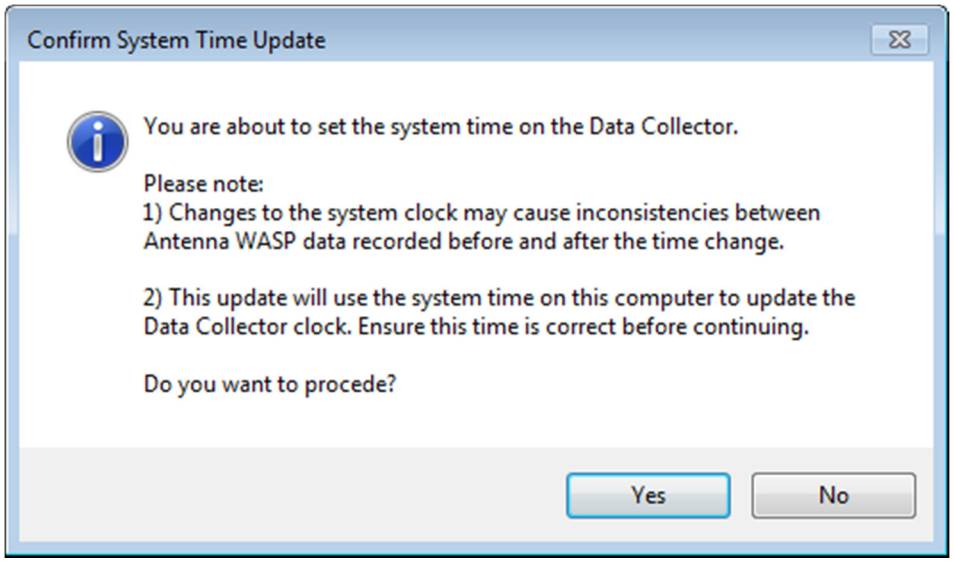
1. **Ensure the clock on the PC running the Data Collector Manager software is set to the correct time and time zone**.

2. **Click on the Data Collector Site Name** in the left pane to select the Data Collector.

3. From the menu select **Data Collector > Update System Time** as shown below.



4. A warning will appear as shown below.



5. **Click 'Yes'** to update the system time.
6. Proceed to Step 7 - Apply power to the Antenna WASP Sensors.

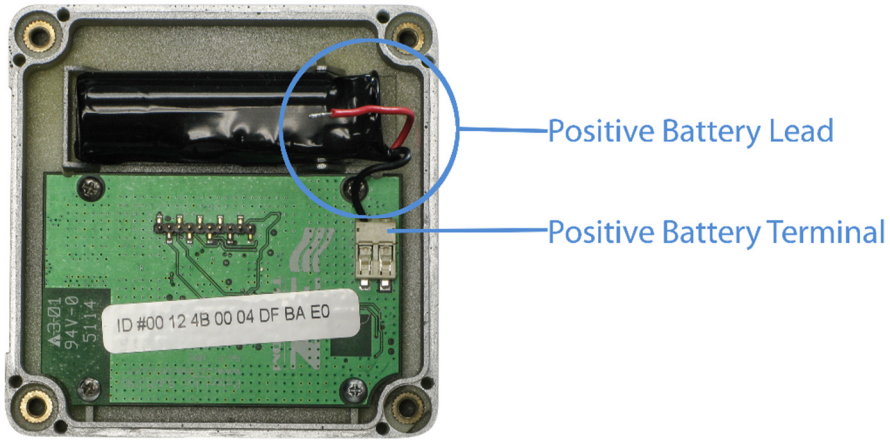
Step 7 - Apply power to the Antenna WASP Sensors

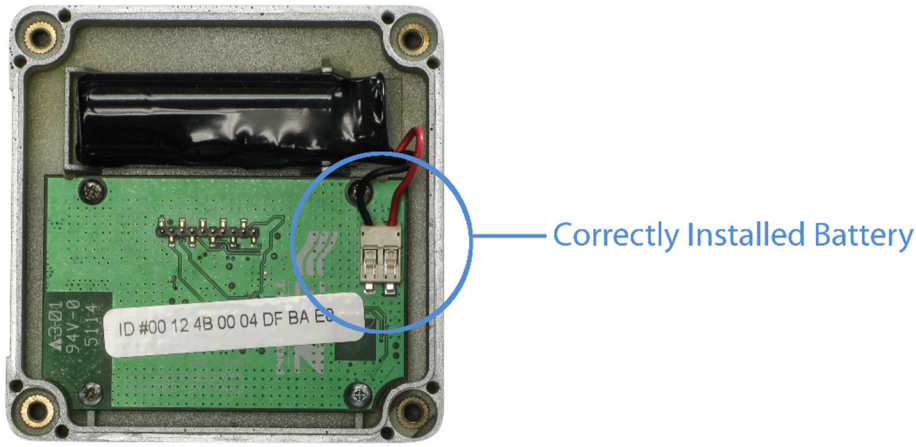
Installation of antenna WASP sensors is intended to be performed by professional personnel.

The antenna WASP sensors are shipped with the batteries disconnected and must be connected to the Antenna WASP circuit board **before installation on the tower**. Please follow these steps carefully:

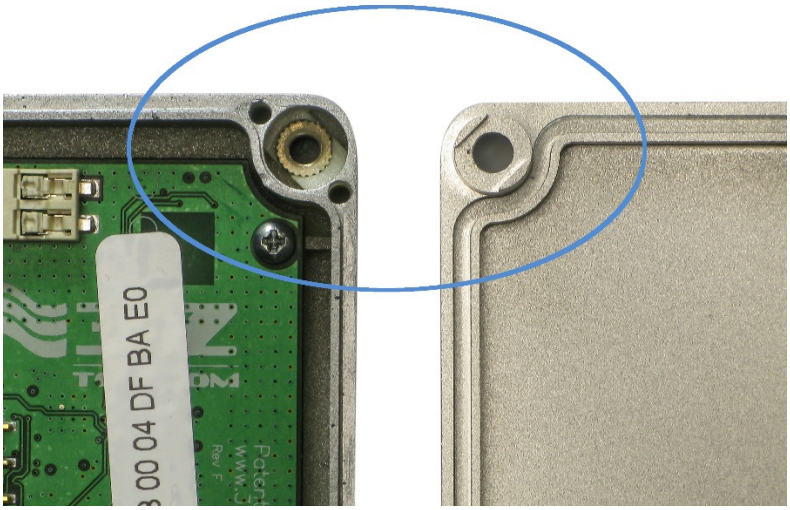
1. Open each of the Antenna WASP cases by removing the 4 screws. **This should be done on the ground before installing them on the tower.**

2. **Connect the red battery lead to the positive power terminal on the circuit board** as shown below.



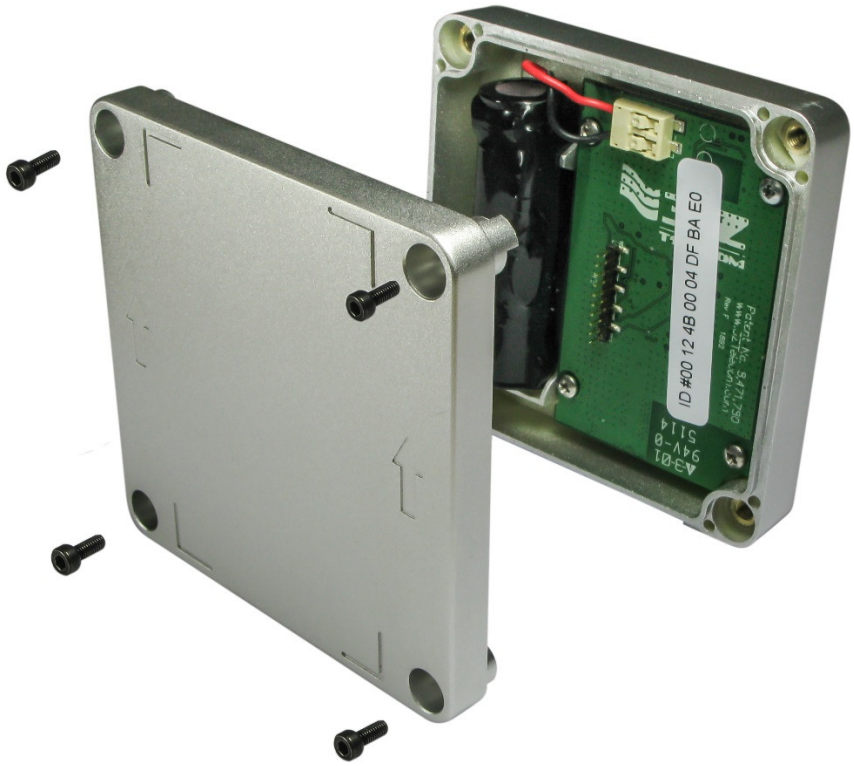


3. **Close the sensor housing by placing the back panel on the sensor case** as shown below, ensuring that the polarized corners are properly aligned.



IMPORTANT: One of the corner posts of the back panel is polarized and must be aligned to the corresponding hole in the sensor case as illustrated above.

4. **Install the provided four (4) screws in each of the four (4) holes** to attach the back panel to the sensor case as illustrated below. **Do not overtighten!**



> ***IMPORTANT:*** Ensure that the screws are tightened sufficiently so that the case makes a proper seal to the rubber gasket in the lid. There should be no gaps visible around the edges of the case. **Do not overtighten!**

5. **Label the WASP as needed.**

6. **Repeat Steps 1 to 5 for each WASP** to be installed at the site.

When all Antenna WASPs have been powered on proceed to Step 8 - Configure the Data Collector with Antenna WASP Sensors.

Step 8 - Configure the Data Collector with Antenna WASP Sensors

The Data Collector must be configured with Antenna WASP information before they will wirelessly connect and begin reporting position information. To configure the Data Collector with new WASP sensor information, do the following:

1. **Click**  **the 'Add/Remove Antenna WASP' link** in the left pane of the manager window and the configuration window will appear as shown below.

(insert screenshot)

2.  **Click 'Add Antenna WASP'** button and a screen will appear in the right pane and prompt you to enter Antenna WASP information as shown below.

(insert screenshot)

3. **Locate the MAC address of the Antenna WASP on the label on the side of the case** as shown below.

(insert picture)

4. **Enter the MAC Address of the Antenna WASP** from the label into the top field as highlighted below.

Note: this address can only contain hexadecimal characters **(0 to 9 or A to F).**

(insert screenshot)

5. **Enter the WASP Identification Information** as shown below. Note: The sector and antenna name are fields which will be used to uniquely identify the sensor and corresponding antenna on which it is installed.

(insert screenshot)

6. **Enter the Target Orientation for the Antenna WASP** in the fields highlighted below.

(insert screenshot)

These three numbers describe the ideal orientation of the installed antenna in 3-D space. Specifically:

a. **Azimuth** – specifies the direction of the antenna as a compass bearing from magnetic north (0 to 359 degrees).
b. **Tilt** – specifies the side rotation of the antenna (-180 to +180 degrees).
c. **Roll** – specifies the forward to back rotation of the antenna. (-180 to +180 degrees).

For more information on these orientation values, refer to the section titled 3-D Orientation (Azimuth, Tilt, and Roll) on page 9.

7. **Click the 'Add Antenna WASP Button'** to add the antenna WASP to the list of configuration changes. It will appear in the list of configured remotes on the left as highlighted below.

(insert screenshot)

8. **Repeat the above steps 2 to 7 for each Antenna WASP Sensor** to be installed at the site.

9. **Click the ‘Apply Changes’ button to save the configuration** to the Data Collector. You will be presented with a prompt to confirm the changes similar to the one shown below.

(insert screenshot)

10. **Carefully review the changes and then click ‘Yes’** to save the configuration to the Data Collector.

When all Antenna WASPs have been properly configured in the Data Collector Manager you may proceed to Step 9 - Wait for Antenna WASP Sensors to Connect.

Step 9 - Wait for Antenna WASP Sensors to Connect

Once each of the Antenna WASP sensors are configured in the Data Collector, the management software will display an icon in the right pane and a row in the summary table for each WASP sensor.

Note: A  grey icon next to each antenna WASP sensor indicates that the sensor has not yet wirelessly connected to the Data Collector.

Before continuing to the next step, each of the antenna WASP sensors must connect to the Data Collector and report position information. When the sensors are connected, the status information will appear with a green icon next to each Antenna WASP similar to the image below.

(insert screenshot)

IMPORTANT: You must press  the refresh button or configure automatic refresh (as described in the section titled Automatic Refresh Setting on page 54) in order to see changes in the Data Collector Manager window.

Once each of the Antenna WASPs has reported to the Data Collector Manager software at least once, you may proceed to Step 10 – Install Antenna WASPs on the Tower.

Step 10 – Install Antenna WASPs on the Tower

IMPORTANT: **Ensure that you have successfully completed steps 1 through 9 and have verified that each Antenna WASP is reporting to the Data Collector before installing any Antenna WASPs on the tower.**

The following steps must be followed precisely to ensure the Antenna WASPs are securely fastened onto the antennas.

1. Clean the area where the Antenna WASP is to be mounted with a rag and clean water.
2. Dry the area with a dry cloth and use the supplied alcohol pad to remove excess debris, to ensure sufficient adhesion

(insert picture)

3. Allow the entire area to dry completely.
4. Remove plastic on the back of the Remote WASP to expose adhesive as shown below.

(insert pictures)

5. Secure Antenna WASP to antenna with arrows on the case pointing upwards as shown below.

(insert picture)

IMPORTANT: **The Antenna WASP must be installed such that the arrow etched into the case points upward (towards the sky).**

6. Repeat steps 1 – 5 for each antenna.

When all WASP Remotes have been installed on the tower, proceed to Step 11 - Commission Each Antenna WASP Sensor.

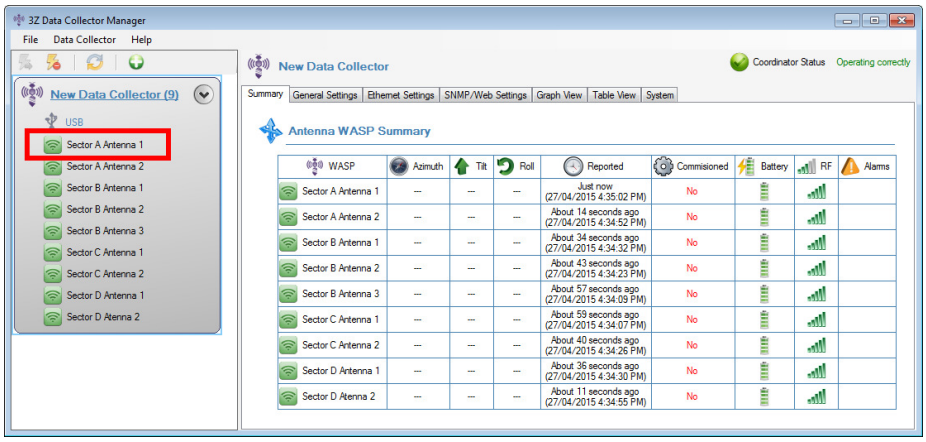
Step 11 - Commission Each Antenna WASP Sensor

IMPORTANT: **Ensure that you have successfully completed steps 1 through 10 before commissioning any WASP remotes.**

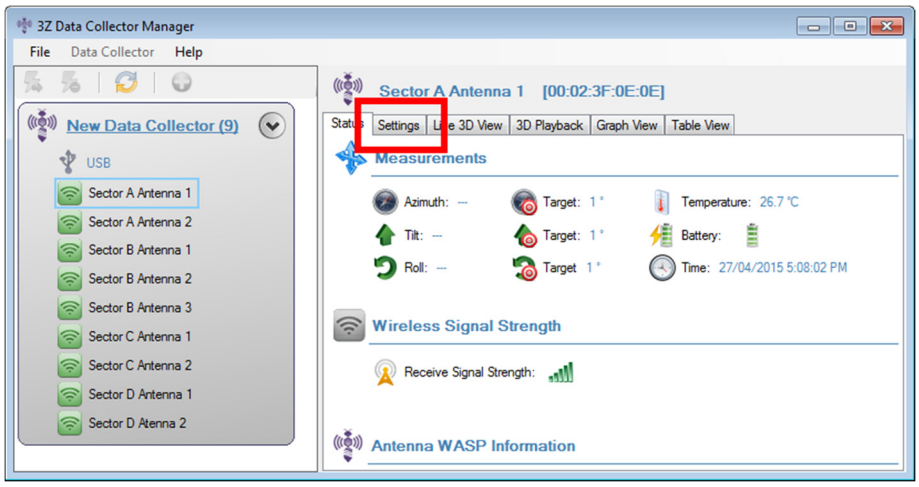
Now that the antenna WASP sensors are properly installed on the tower and connected to the Data Collector, each sensor must be commissioned.

Please follow these steps for each antenna WASP sensor.

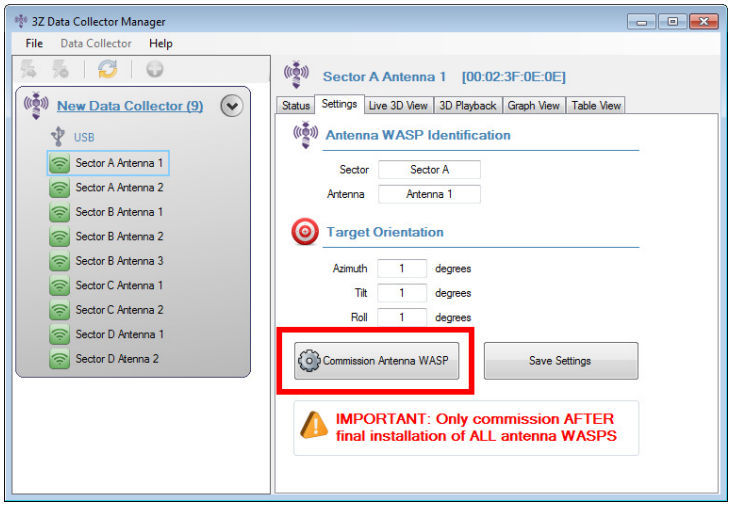
1. **Click on the icon for the antenna WASP sensor in the left pane** as highlighted below.



2. **Click on the Settings tab in the right pane** as shown below.



3. **Click the 'Commission Antenna WASP' button** as highlighted below.

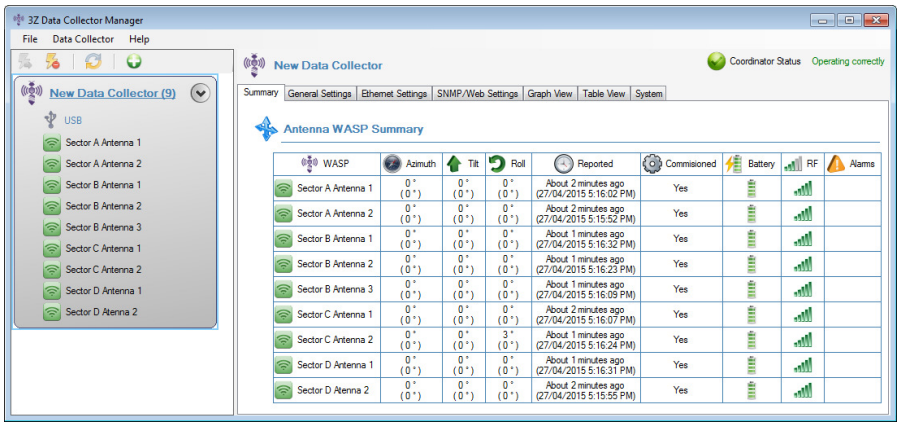


4. Repeat steps 1 to 3 for each Antenna WASP in the installation.

5. Once each antenna WASP is commissioned, **click the Control Panel link in the left pane** to return to the summary screen.

6. **<u>Wait at least 5 minutes</u>** for each antenna WASP sensor to report position information to the Data Collector**.**

7. When each antenna WASP sensor is properly installed and commissioned and has reported, the screen will appear similar to the image below.



Please ensure:

1. Each antenna WASP has a  green icon displayed.
2. Each row of the 'Commissioned' row contains a 'Yes'

Congratulations! The Antenna WASP installation is complete!

Data Collector Manager Software Guide

Running the Data Collector Manager

You can launch the Data Collector Manager software clicking on the '3z Telecom Data Collector Manager' application from the list of installed programs in Windows.

A login prompt will appear as shown below.

(insert screenshot)

Enter your username and password and click 'Login'.

When you have successfully logged in to the software, the Data Collector window will appear as shown below.

(insert screenshot)

The manager window is setup in two panes (left and right):

- The left pane displays a list of Data Collectors which have been discovered by the software. This list will automatically update as new Data Collectors are discovered.
- The right pane displays settings related to the active Data Collector selected in the left pane.

Connecting to a Data Collector

The manager software can connect to a Data Collector in two ways:

- **Directly over a USB cable** connected between the Windows PC running the manager software and the Data Collector.
- **Over Ethernet**. In this case both the Windows PC running the manager software and the Data Collector must both be connected to the same Local Area Network (LAN). Please refer to the section titled Networking Guide on page 55 for details on Ethernet networking.

Once the Data Collector Manager software is running, it starts automatically scanning for Data Collectors on USB or Ethernet. When a Data Collector is discovered, it will automatically appear in the left pane as shown below.

(insert screenshot)

This view displays some key information about the Data Collector even before a connection is made, including:

- The **Site Name** assigned to the Data Collector.
- The **Number of Antenna WASPs installed** in brackets after the site name.
- The **Connection Type** (USB or Ethernet)
- The **Connection State**. (Connected or Disconnected). Based on the color of the WASP icon.

To connect to a Data Manager, double click on the data collector name link in the left pane and the manager software will establish a connection. Once connected, the right pane of the manager window will show more detailed status information and controls which can be used to configure the Data Collector as shown below.

(insert screenshot)

IMPORTANT: If the Data Collector has not previously been configured, then no antenna WASP sensors will appear and you will need to follow the step-by-step instructions in the Antenna WASP Installation Guide on page 11 to ensure the system is installed and configured correctly.

Summary View

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, a summary view similar to the one shown below will automatically appear in the right pane.

(insert screenshot)

This summary view provides a quick overview of the status of an entire antenna WASP installation and allows administrators and technicians to quickly identify and resolve issues. For example, the following image shows an example where two antenna WASP sensors were moved out of the target orientation.

(insert screenshot)

General Settings Panel

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can edit the general settings of the Data Collector by following these steps:

1. Click on the Data Collector's Site Name in the Data Collector's status summary.
2. Click on the 'General Settings' tab in the right pane.

This will make the General Settings panel appear as shown below.

(insert screenshot)

NOTE: Once you have made changes to any of the settings on this panel, you must click the Save button to apply the changes to the Data Collector. To discard any changes and reload the current settings from the Data Collector, click the Reload button.

Site Name Setting

Each antenna WASP installation can be given a unique site name to distinguish a particular site from other installations. This name will appear in the left pane of the software when connecting and will be also visible through SNMP.

Location Setting

Each antenna WASP installation can be optionally configured with the GPS latitude and longitude of the installation site. If this information is not known, simply enter ‘0’ in each field.

Alarm Settings

The alarm settings page allows the user to configure the thresholds for several measured parameters which define when the Data Collector generates an alarm condition. The following describes each setting in detail:

- **Maximum Δ Azimuth, Tilt, Roll** - Each of these settings specifies how much change in position from the commissioned target orientation is allowed before generating an alarm. Each axis of rotation can be independently specified in degrees.
- **Maximum Report Interval** – This field specifies the maximum acceptable amount of time between each sensor data report from an antenna WASP sensor (in hours). If unsure, leave this setting at the default value of 2 hours.

Ethernet Settings

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can edit the Ethernet settings of the Data Collector by following these steps:

1. Click on the Data Collector's Site Name in the Data Collector's status summary.
2. Click on the 'Ethernet Settings' tab in the right pane.

This will make the Ethernet Settings panel appear as shown below.

(insert screenshot)

The Ethernet settings section allows you to specify how the Data Collector will connect to a Local Area Network (LAN) if available. Please read the section titled Networking Guide on page 55 for more information on Ethernet networking.

- **Host Name** – This specifies the hostname of the Data Collector as used in name resolution. (If unsure, use the default value).
- **Use DHCP to obtain IP Address** – If this option is selected, then the Data Collector will use the DHCP protocol to automatically fetch an IP address. (If unsure, select this option)
- **Use a Static IP Address** – If the LAN does not have a DHCP server or your application requires a fixed IP address, then select this option and enter each of the IP networking parameters. Contact your network administrator if you are unfamiliar with these settings.

IMPORTANT: If unsure, please contact your network administrator to verify these settings before connecting the Ethernet jack.

SNMP Settings

The Simple Network Management Protocol (SNMP) is an Internet-standard protocol for managing devices on IP networks. Please read the section titled Networking Guide on page 55 for more information on SNMP. The Data Collector software supports a set of SNMP features which:

- Allows an SNMP manager to remotely read the status of the Data Collector over the IP network, and
- Allows the Data Collector to automatically notify an SNMP server with "trap" messages when an alarm condition occurs.

The SNMP setup contains two nearly identical fields:

- **Inform Host –** specifies the destination and settings for SNMP “Inform” messages.
- **Trap Host -** specifies the destination and settings for SNMP “Trap” messages.

Both of these host fields follows the same basic format:

host [community [port]]

- **Host** – specifies the SNMP trap server which can receive the trap or inform message. This field may be an IP address (e.g. ‘192.168.1.25’) or a fully qualified domain name (e.g. ‘example.com’).
- **Community** (optional) - specifies the “community string” which may be required by the SNMP server to accept the trap/inform message. Contact the SNMP server administrator to determine if this is required.
- **Port** (optional) – specifies the port to which trap/inform messages should be sent. If this value is not specified, the default SNMP trap port (162) will be used.

Web Upload Settings

Each Data Collector is also capable of automatically uploading WASP data directly to the cloud where it can be analyzed and reviewed online through the Antenna Wasp Remote Monitoring Portal. Check the box named ‘Automatically upload antenna WASP data to the web’ to enable this feature.

Please note that for this feature to work the Data Collector must:

1. Be connected to a LAN with Internet access, and
2. Have properly configured network settings including the gateway address. Please refer to the section titled Ethernet Settings on page 41 for more information.

Antenna WASP Status

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 336, you can view the status of a specific antenna WASP sensor by following these steps:

1. Click on  the icon for the WASP sensor in the left pane.
2. Click on the 'Status' tab in the right pane.

The status for the WASP sensor will appear in the right pane similar to the following:

(insert screenshot)

Please refer to the section titled WASP Telemetry and Sensor Measurements on page 9 for a description of each field in the 'Measurements' and 'Wireless Signal Strength' sections.

The 'Antenna WASP Information' section lists additional information specific to the sensor:

- **MAC Address** - displays the unique MAC address of the sensor on the wireless network.
- **Firmware Version** – displays the version of the firmware running on the WASP sensor.
- **Mode** – displays the current mode of the WASP sensor. The possible values are
    - **Configuration** – This mode is usually only entered when the sensors are first powered on. They report sensor information every minute in order to speed up the installation and configuration process.
    - **Report** – This is the normal operating mode for the WASP remote. In this mode, sensor information is reported once per hour.

3D View

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can view a 3D visualization of the antenna WASP orientation by following these steps:

1. Click on  the icon for the WASP sensor in the left pane.
2. Click on the '3D View' tab in the right pane.

The 3D view for the WASP sensor will appear in the right pane. It will be similar to the following:

(insert screenshot)

This view renders a virtual beam (in red) to display the 3D orientation of the sensor relative to the earth. To **compare the antenna WASP orientation to the target orientation** click the target icon in the top left corner. This will overlay the ideal target orientation in green as shown below, and any discrepancy between the two orientations will immediately become visible. If the two are perfectly aligned, the beam lines will turn yellow.

To adjust the 3D camera position in this view, **click on the camera icon in the upper right** of the view to display a popup window with camera controls as shown below.

(insert screenshot)

These sliders operate as following:

- **Distance** - this slider controls the distance from the virtual antenna and will zoom in and out as the slider is moved to the left and right, respectively.
- **Vertical Angle** – this slider controls the virtual altitude above the ground. The camera will move up and down as the slider is moved to the right and left, respectively.
- **Pan Angle** – this slider controls the rotation of the camera (azimuth) around the 3D antenna.

Antenna WASP Settings

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can edit the settings for a specific antenna WASP sensor by following these steps:

1. Click on  the icon for the WASP sensor in the left pane.
2. Click on the 'Settings' tab in the right pane.

The settings for the WASP sensor will appear in the right pane similar to the following:

(insert screenshot)

Antenna WASP Identification

The identification of each WASP sensor is broken into two fields.

- **Sector Name** – indicates the sector (azimuth) of the cellular antenna on which the WASP sensor is installed.
- **Antenna Name** – uniquely identifies which antenna the sensor is installed on within the current sector.

Target Orientation

Each WASP sensor must be configured with the ideal 3D orientation for the cellular antenna on which the sensor is installed. Each of the three fields (azimuth, tilt, and roll) specify this ideal orientation. For more information on these 3D orientation fields please refer to the section titled 3-D Orientation (Azimuth, Tilt, and Roll) on page 9.

Downloading Antenna WASP Data

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can download and view the antenna WASP sensor data as described below.

To download and view data for **multiple sensors**:

1. Click on the Data Collector's Site Name in the left pane.
2. Click on the 'Graph View' or 'Table View' tab in the right pane.

To download and view data for **a single WASP sensor:**

1. Click on  the icon for the WASP sensor in the left pane.
2. Click on the either the '3D Playback', 'Graph View' or 'Table View' tab in the right pane.

This will make a screen appear in the right pane similar to the image shown below. Click the search button in the top left corner as highlighted below.

(insert screenshot)

A search prompt window will appear similar to the image shown below.

(insert screenshot)

This search window allows you to search for just the range of sensor information you are interested in. You can specify:

- **After time** – by checking the 'After' box in the 'Time Range' section, the search will only return sensor information reported **after** the date and time specified in the corresponding date/time field to the right.
- **Before time** – by checking the 'Before' box in the 'Time Range' section, the search will only return sensor information reported **before** the date and time specified in the corresponding date/time field to the right.
- **Only Alarms** – you can further narrow the search to report only sensor data which caused an alarm condition in the Data Collector by checking the 'Only return results with active alarms' in the Alarm Status field.
- **Antenna WASP** - if you are searching through data from multiple sensors within the 'Antenna WASP Data' tab, you can additionally narrow the search to include only specific WASP sensors by checking the box next to the sensors names.

When you have selected the desired ranges, you may click `Search` and the manager software will download the sensor data while displaying a progress message similar to the image below.

(insert screenshot)

3D Playback View

When viewing individual sensor data from a single WASP sensor, the 3D view will appear as shown below.

(insert screenshot)

This view will play back the antenna WASP sensor data both in the 3D view and in the sensor status view below. The 3D view controls operate exactly as described in the section titled 3D View on page 44.

The playback can be controlled using the controls immediately below the 3D view.

- Press  the **Play** button to start the playback.

- When playback is running, you can click the **Stop** button to stop the playback.
- To move back to the beginning, you can  click the **Rewind** button.
- When the playback is stopped, you can use the slider to the right of the Play/Stop button to step through each of the sensor data measurements.
- You can s**elect the speed of the playback** (slow, medium, fast) through the dropdown list immediately below the Play button.

Graph View

Sometimes identifying trends in sensor data is easiest when the data is plotted on a graph. To automatically plot all the downloaded antenna WASP sensor data on a chart, simply click the “Graph View’ tab in the right pane. If data has already been downloaded this view will graphically plot the same data as the table view.

The graph view will appear in a window similar to the image below.

(insert screenshot)

The **Display Filter** allows you to choose which traces will be automatically plotted on the graph to the right, as highlighted above.

By default, the chart will display the most recent sensor data. You can move through the sensor data by:

- Click the **Next** **Page** or **Previous Page** button to move to the next page of data.
- Change the **Page Size** by editing the corresponding field on the top right of the view.
- Click the **Last** **Page** or **First Page** buttons to advance to the last or first pages of data, respectively.

Also, to view more detailed information in the chart view, you can hover the mouse over a specific data point and the specific measurement data will appear automatically in a popup message as illustrated below.

(insert screenshot)

Table View

For more detailed analysis, you can display the sensor data in a table by clicking on the 'Table View' tab in either the main Data Collector view or in an individual Antenna WASP view.

The table view will appear in the right pane similar to the image below.

(insert screenshot)

The display filters and data page controls operate in the same manner as described in the section titled Graph View on page 50.

Exporting Antenna WASP Data

Any data which has been downloaded to the manager software can be easily exported to a comma separated variable (CSV) format simply by  clicking the **Export to CSV** button in the top right of each of the sensor history views. This button is available for the 3D Playback View (see page 45), Graph View (see page 47), and Table View (see page 49).

System Status

Once you have connected to a Data Collector, as described in the section titled Connecting to a Data Collector on page 36, you can view the system status of the Data Collector by following these steps:

1. Click on the Data Collector Site Name link in the left pane.
2. Click on the ‘System’ tab in the right pane.

This will make the system status summary appear as shown below.

(insert screenshot)

The above image is from a Data Collector which is operating correctly, as indicated by:

- The network  green Operating Correctly message indicates that the wireless is operating correctly.
- The communication errors count is zero. If this value is not zero, this could indicate a hardware problem with the Data Collector.
- The system time offset is very low, which means the system clock is set correctly.

Preferences

The Data Collector Manager software has some application preferences which configure the behaviour of the software. To access the application preferences, click **File > Preferences** within the manager software and the preferences window will appear.

Automatic Refresh Setting

By default, the Data Collector Manager software will not automatically refresh the display which means you must click the Refresh button in order to update the display.

However, if you check the automatic refresh button in the application preferences as shown below, the manager software will automatically refresh the display at the rate specified in the second field.

(insert screenshot)

Networking Guide

Work in progress

Troubleshooting Guide

Antenna WASP Sensors Are Not Connecting to the Data Collector

Work in progress

Technical Support Contacts

Work in progress