ZX Lidars

Wind speed at light speed

ZX 300 Deployment Guide

Issue 3.51

22 May 2024

ZXL/CS/UML/00013

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1 Introduction

Welcome to the ZX 300 Siting and Deployment Guide. Within this document you'll find everything you need to prepare for, power and deploy a ZX 300 unit.

Site investigation, deployment planning and up-front preparation are key elements to a successful campaign. This guide will take you through each part of a campaign deployment whether you intend to deploy under a mast or in a remote location for resource assessment.

This guide will cover:

- System Familiarisation and unpacking your ZX 300 after shipment
- Choosing an appropriate site for a ZX 300 deployment
- Chosen Site Investigation and Preparation
- Powering the ZX 300
- Deploying the ZX 300
- Connecting any Communications hardware

2 System familiarisation

Your ZX 300 is shipped to you in a grey shipping crate for its protection during its journey. Within the crate, you will find:

- The ZX 300
- A washer fluid container
- A plastic tub containing ZX 300 accessories:
  - Met Station
  - Security Driver and Bit
  - Power Cables and Connectors
  - Washer pump
  - Additional accessories
- Thermal Jacket (optional)

A full packing list can be found in the accompanying Servicing Guide.

2.1 Unpacking the ZX 300

1. Your ZX 300 should arrive in the following manner:

2. Remove the two large ratchet straps:

3. Then carefully remove the lid:

4. Lift the crate walls to remove them, take care not to damage the ZX 300 whilst doing so:

5. Remove the fluid container and accessories tub then detach the three smaller ratchet straps:

6. Remove the thermal jacket (if present) using the Velcro fixers and take the unit off its crate.
7. The ZX 300 packing crate will collapse for easier storage.

2.2 ZX 300 Hardware

The ZX 300 is designed to be simple to set up and use. A ZX 300 unit consists of 4 main areas:

1. Main pod
   a. White bell
   b. Grey base
   c. Black transport ropes
2. Adjustable legs
   a. Carbon fibre legs
   b. Orange Quick-Release clamps
   c. Metal feet with fixing holes.
3. Top Plate
   a. Wiper arm and blade
   b. Window
   c. Alignment notches
4. Meteorological (Met) Station

The unit also has 2 orange access panels on the sides of the base to connect power, Ethernet and the washer pump. Each port is clearly labelled. The ZX 300 can be powered via AC or by DC.

The “front” of the ZX 300 is the side with no access panels, visible on the images above. The “rear” of the ZX 300 is the corner with the Met Station on.

The Met Station is very important and care should be taken to protect the met station from damage when handling the ZX 300.

2.3 Met station mounting on extended pole

For ZX 300 the met station is raised higher to place it in clearer airflow. The unit is shipped with the met station and extension pole removed, and these must be assembled when the unit is deployed. The photos below show the correctly assembled system.

The procedure is as follows:

- Screw the metal pole into the mount on ZX 300 unit
- Attach the met station; orient N correctly in alignment with the N marker on the top plate (as shown); firmly tighten in position
- Use cable clips on pole as shown to prevent cable movement

The met station and pole must be removed before shipping by reversing the operations listed above.

2.4 ZX 300 Software

Access to the ZX 300 is performed by using the bespoke software called Waltz. We always recommend using the latest version of the software to get the best from your ZX 300.

The units are controlled by bespoke firmware. You can update your firmware periodically and installing it to your ZX 300. Updating your unit will offer operational improvements and enhanced features without compromising data quality or consistency.

3 Choosing a Site for Wind Resource Assessment

Careful siting of the lidar is an important step towards achieving the best possible results from a measurement campaign. It is usually straightforward to deploy in an open flat site, but often there is a necessity to measure in less ideal terrain.

3.1 Buildings and Other Large Obstructions

The first consideration is to ensure the lidar scan is free of obstructions. The emitted beam scan forms a cone of half angle 30 degrees (full angle 60 degrees). In practice, a reasonable amount of obscuration by solid, stationary objects (e.g. buildings, masts) can be tolerated provided no more than 90 degrees out of the total 360-degree scan is obscured. Moving objects must be avoided: if the laser beam strikes a moving object such as a cooling fan, flag, flapping panels etc. then this can give rise to a spurious Doppler return and the possibility of erroneous wind measurement.

Large buildings can result in distortion of the flow that the lidar is trying to measure, and the resulting non-uniformity can make it impossible for the ZX 300 (or any remote sensor) to perform finance-grade wind measurements at all heights. It is best to position the ZX 300 as far as possible from any obstructions. If positioning close to a building is unavoidable, then as a rule of thumb, it would be difficult to obtain reliable wind data up to twice the height of the building due to flow distortion. This limitation will apply regardless of the type of anemometry used, but ZX 300 has the advantage that it will automatically identify and reject such data.

Finally, the met station on the top of the ZX 300 must be in a free airflow to ensure correct operation (see section 6.1 for further details). Common sources of flow distortion at the met station include PV panels, power supply and/or container, mast logger boxes etc. If it is impossible for the ZX 300 and/or adjacent equipment to be positioned such that the met station is unobstructed, then the met station should be mounted separately on a pole or other suitable structure. ZX 300 Ltd can supply an extended met station cable if this becomes necessary. It is essential that the met station remains in the correct orientation with respect to the ZX 300 axis (see section 6.2 for further details).

3.2 Forests and Forest Clearings

In a forested site, as with deployments near buildings, the first requirement is to ensure the lidar scan is free from obstruction. When deployed in forested terrain, unlike when close to buildings, the full 360-degree scan must be clear; it is essential there is no obscuration of the scan by foliage or branches, since these are liable to movement that may give rise to spurious Doppler returns. The edge of a forest clearing will typically generate flow distortions in similar ways to a building, preventing finance-grade measurement up to approximately twice the tree height. Therefore, it is best to site the lidar in as large a clearing as possible, maximising the distance to the edge.

No problems will be encountered if the lidar is positioned more than five times the tree height from the edge of the clearing. In many cases this will not be practical and if this is the case, the availability of data passed by ZX 300's automated quality control (QC) checks may be reduced at heights up to twice the tree height.

There is a risk that clear airflow around the met station is compromised in forest clearing deployments. In small clearings, where the shortest distance from the lidar to the edge of the clearing is less than twice the tree height, it would be advantageous to mount the met station on a suitable pole. It is essential that the met station remains in the same orientation as the ZX 300 (see section 6.2 for further details).

Mounting the met station on a raised pole will reduce the risk of experiencing locally-recirculating flow.

3.3 Siting Adjacent to a Met Mast

Many customers perform ZX 300/mast comparisons in order to check lidar calibration and performance. Care is required when carrying out such comparisons; these guidelines should help to achieve good agreement and hence provide confidence in the technology.

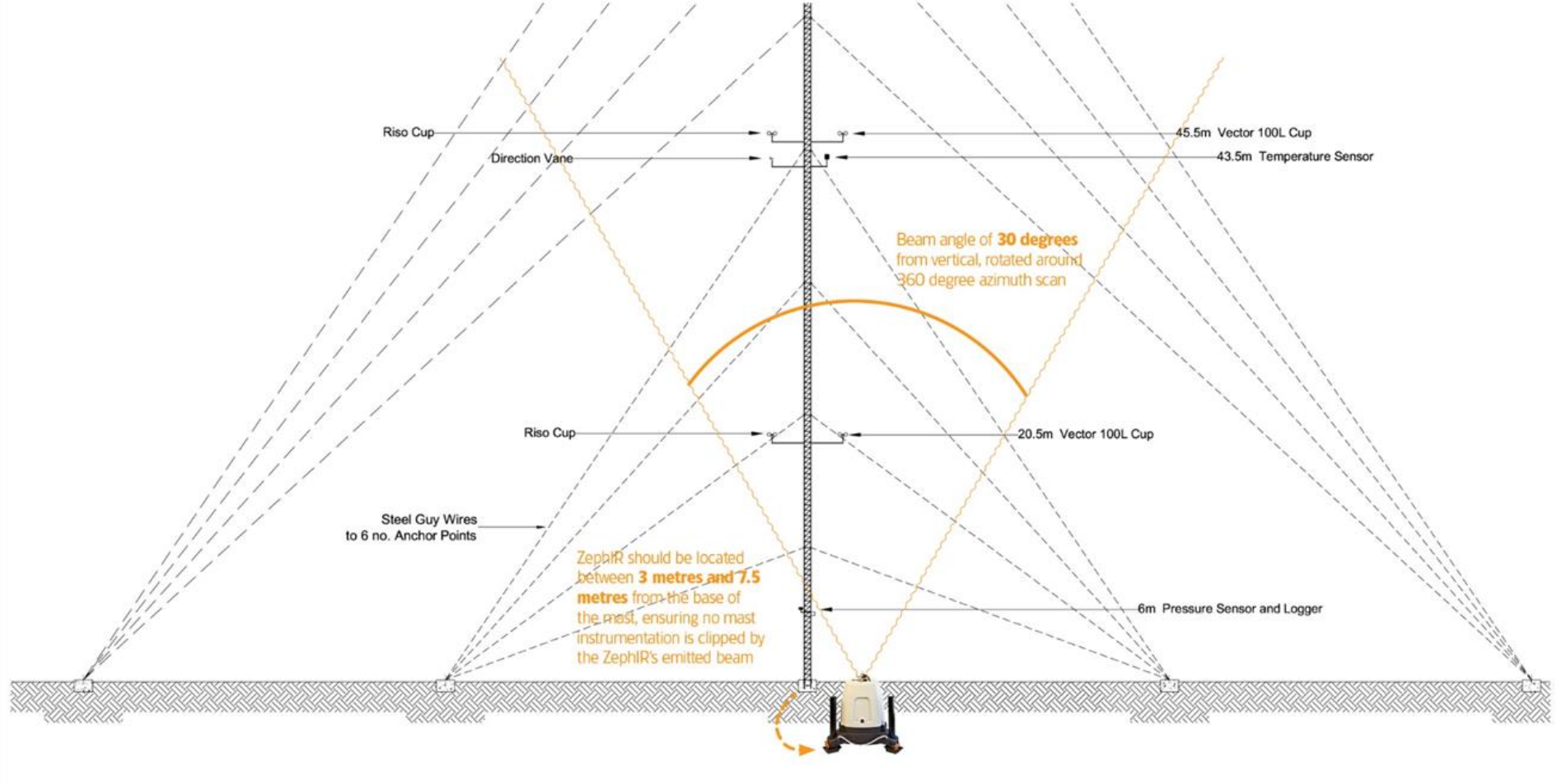
For a standard lattice or tilt-up mast, the lidar is best positioned close to the mast. A separation of between 3 m and 7.5 m is recommended. If the lidar must be deployed further away from the mast then the level of correlation should be expected to decrease as the separation from the mast increases.

For the majority of ground based units, the laser beam emerges from the lidar window at an angle of 30 degrees to the vertical, and scans in a cone (overleaf). It is important that the beam does not illuminate any moving objects such as cups or vanes throughout the scan. Guy wires will no doubt intersect the scan and they should be under full tension to limit movement. The ZX 300 should be positioned to minimise intersection with any guy wires. Ideally the lidar is positioned to minimise obscuration by the mast of its scan disk in the expected upwind and downwind directions.

The ZX 300 measurement height is taken from the top window of the unit. If the lidar is deployed on its legs on the ground then the window height will be about 1 m above ground level, though if the lidar is deployed in a trailer or on a platform then the window height could be considerably higher. The window height must be taken into account when configuring the lidar to compare with mast anemometry – for example, to compare against mast anemometry at 100 m above the base of the mast then a ground-deployed lidar with a window height of 1 m should be set to measure at 99 m.

In the simplest model of air flow, the wind is expected to follow the contours of the ground. The measurement height set on the lidar should therefore not be adjusted to compensate for sloping terrain and the best correlation will be achieved by setting the measurement heights as described in the previous paragraph. Where the slope of the terrain varies significantly over the area swept by the lidar beam then it is recommended that the complex terrain guidelines of section **Error! Reference source not found.** are followed.

The figure below illustrates best practice, and shows a ZX 300 unit undergoing verification tests against ZX Lidar's 90m mast at Pershore, U.K, with all parts of the scan well clear of any cups or vanes. With cups at 20m such as the case of the Pershore mast, it is necessary to reduce the lidar-mast separation to 7.5m or below. The emitted beam is deflected by an angle of 30 degrees to the vertical, so that the scan forms a cone of half angle 30 degrees (full angle 60 degrees).


Riso Cup
Direction Vane
45.5m Vector 100L Cup
43.5m Temperature Sensor
Beam angle of 30 degrees
from vertical, rotated around
360 degree azimuth scan
Riso Cup
20.5m Vector 100L Cup
Steel Guy Wires
to 6 no. Anchor Points
ZephIR should be located
between 3 metres and 7.5
metres from the base of
the mast, ensuring no mast
instrumentation is clipped by
the ZephIR's emitted beam
6m Pressure Sensor and Logger

3.4 Complex Terrain

Complex terrain presents a challenge for all methods of anemometry. As a general rule, the ZX 300 should be sited to avoid possible areas of highly non-uniform flow including recirculation. Significant differences in wind resource can sometimes be found by moving a relatively small distance, and this needs to be borne in mind when analysing results of a measurement campaign. Again, this is a limitation of all methods, but a portable lidar like ZX 300 does permit the possibility to investigate micrositing variability.

The ZX 300 results can be adjusted to account for the effects of terrain-induced non-uniform flow, and give results equivalent to what a co-located mast would obtain.

Please refer the ZX 300 Data Analysis Guide for more details on complex terrain compensation.

4 Campaign Preparation and Site Survey

Prior to any deployment and siting for a campaign, it is strongly recommended that a full site visit and survey is conducted. This will allow the client to fully understand the site, the access and any available comms in order to adjust the campaign logistics if necessary.

An example checklist is included in Appendix A of this guide.

4.1 Access to Site

Site access is obviously important both in terms of being able to deploy, but also for any future site visits for refuelling, data collection or other maintenance activities. Consideration needs to be made for the following:

- Landowners permitting access to the site.
- General site access (e.g. road/tracks, logging trails, gates, seasonal flooding etc.).
- Seasonal restrictions to site (e.g. nature areas, animal breeding, game shooting etc.).
- Vehicular access limitations.
- Power Supply access (e.g. small PV systems or large generator requirements).
- Fuel Supply (e.g. Diesel, LPG, Methanol) restrictions due to environmental preservation.
- Site Security limitations (e.g. Restricted Areas, Test Sites etc.).
- Health and Safety requirements (e.g. Lone working)

This is not an exhaustive list as each site will depend on the local environment and intended location.

4.2 Communication Options

In addition to site access and ZX 300 position, the communications to and from the ZX 300 need to be taken into account so the unit can send data and status emails. The unit may contain a GSM/GPRS modem for cell comms remote access, but there may be occasions where there is insufficient cell coverage for a reliable signal. In these circumstances, alternative comms solutions may need to be considered (see section 4.2.2).

The possible options by default are:

- Wireless Local Connection (Local WiFi)
- Direct wired Local Area Connection (Local Area Network)
- GSM/GPRS Remote Connection (Cellubi)

For full details of the comms solutions available to a ZX 300 and how to configure the unit for each, please see the accompanying Communications Guide and section 7 of this document.

Prior to installing your ZX 300, it is strongly recommended to ensure your communications system is functional. This will prevent any issue on site.

Should you require guidance on which comms solution to choose or have any further questions, please contact Zephir Limited for support by email at support@zxlidars.com or phone our offices on +44 (0)1531 651000.

4.2.1 GSM/GPRS Coverage

Cellubi coverage details can be found at http://cellubi.co.uk/markets/wind-farm-assessment.

Whilst performing your site survey, it is strongly recommended that cell coverage is assessed to understand the possibility of using the internal GSM solution.

Cell signal strength in any location is only indicative and does not necessarily mean that the unit will be able to send or receive data. Strong signals are preferable to weak, but data connections are ultimately determined by the cell network.

There is usually more than one cell operator that is compatible with Cellubi so it is recommended that you check with Wireless Innovations which operators these are for your area and check the coverage for these operators. If a data-enabled device can be used on site to send/receive emails, this will provide the best indication of whether the ZX 300 can use its internal SIM, as per the UK Deployment advice.

The ZX 300 can be manually forced to use a network compatible with Cellubi if desired. Please see the accompanying Communications Guide for details.

4.2.2 Alternative Comms Solutions

In certain more isolated areas, a GSM/GPRS modem may not be sufficient due to coverage limitations. In these cases, there are also further ways to communicate with the ZX 300, but they will require additional consideration:

- Ethernet Network (Existing Infrastructure)
- External Ethernet Modems
- Satellite Comms
  - Iridium
  - Broadband Global Area Network (BGAN)

Satellite comms systems are usually more expensive and will require additional hardware (available separately). For fitting instructions, please see section 7.3 of this document. For configuration instructions, please see the accompanying Communications Guide.

4.3 Security

As a valuable asset, it may be desirable to protect your ZX 300 unit from unauthorised access. In addition, fuel and generators can make attractive targets for theft so you may wish to consider precautions to prevent loss or damage. For specific ZX 300 unit security, a few options exist for both the ZX 300 and Dual Mode models.

4.3.1 Fixing the ZX 300 to the floor, plinth or platform.

The ZX 300 has fixing holes in the feet to allow the unit to be bolted to the surface it is deployed on to prevent the ZX 300 from being easily moved. For example, a concrete plinth can be made to which the ZX 300 can be bolted:

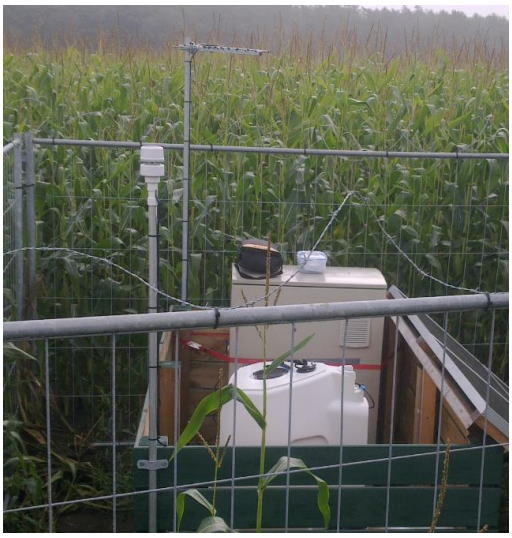
4.3.2 Incorporating the ZX 300 into a power supply.

Many power supplies are large enough to require a trailer. For example, diesel generators or renewable systems can be quite large. Trailers can be modified to contain a ZX 300 which can be positioned on the trailer roof or partially within the trailer (example below). This restricts access to the unit however there are additional considerations to bear in mind – in such a deployment, the met station may need to be positioned in clear airflow (see section 6.1). The extended met station cable can be used in such conditions.

You should also position the ZX 300 so the scan cone of the laser is not impeded by the trailer if the ZX 300 is within it. The scan cone is 60 degrees (full arc) and should be assumed to extend from the outer edge of the top window (at least 30 degrees from vertical).

4.3.3 Erecting fencing around the deployment.

The use of fencing to obscure/protect the ZX 300 is a relatively simple way of adding security to a deployment. However, by placing the ZX 300 (example below) inside a fenced area, there is the risk of obscuring the wind flow over the met station – as such it will need to be raised above the line of the fencing with the use of an extended met station cable and appropriate mount. See section 6.1 for more details.



The options above are not exhaustive; each deployment comes with its own considerations. Should you require guidance on which security solution to choose or have any further questions, please contact ZX Lidars for support by email at support@zxlidars.com or phone our offices on +44 (0)1531 651000.

4.4 Lightning Protection

If the ZX 300 is to be operated in an exposed site especially where the unit is the highest point above the ground, it is recommended that additional lightning protection and arrestors are deployed within the immediate vicinity of the unit. They are readily available from any commercial supplier and can be implemented easily and cheaply.

No direct connections to the unit are required. A free standing device such as an interception air rod requires only securing and an earth connection to the ground. The user should ensure that the protective device is tall enough to exceed the height of the ZX 300.

The protective device can be placed four metres or more away from the ZX 300, but the user must ensure that the scan of the ZX 300 will not be intercepted by the lightning rod.

The ZX 300 meets full electrical compliance which covers a variety of conditions, but cannot guarantee full lightning protection. The unit is protected for radiated immunity EN61000-4-3:2006 +A1:2008 with fast transient protection to ±2 kV. In addition the unit successfully completed voltage surge testing EN61000-5-5:2006 to ±2 kV.

4.5 Extreme Climate

4.5.1 Hot Climate

The ZX 300 is rated for operation up to 50° C however, this is in the absence of solar loading, which can considerably increase the internal temperature of the unit. The ZX 300 will hibernate in hot weather to protect itself, but it is strongly recommended that the user protect the unit from direct solar loading with the use of a solar tepee. The tepee will prevent direct sunlight from warming the unit, but also permit the unit to cool itself using the heat exchanger on the underside of the unit.

The solar tepee is supplied by ZX Lidars and can be ordered separately.

4.5.2 Cold Climate

The ZX 300 unit is rated for operation down to -40° C and will operate normally down to -20° C without issue. However, for extremely low temperature, the use of the thermal jacket is strongly recommended to ensure the unit does not shut down due to low temperature. If the internal pod temperature drops to 0° C or lower, the internal heaters will trigger (which will increase power draw) to keep the unit stable, but the use of the thermal jacket will be required for very low temperatures.

The Thermal Jacket is supplied by ZX Lidars and can be ordered separately.

5 Power Supplies

A reliable power supply is essential for smooth operation of a wind lidar. The ZX 300 is capable of being powered by either AC or DC voltage. The accompanying Power Guide details the power supply options and connections used by the ZX 300.

5.1 Power Draw Requirements

The table below provides a brief overview to the standard power requirements for a ZX 300 unit. The values cover the majority of deployment conditions, but if you are planning to deploy in a more hostile (e.g. hot/cold) environment, please refer to the accompanying Specification, Power and Servicing Guide for a complete specification and power draw characteristics.

Table 5.1: ZX 300 Power Requirements

ZX 300 Electrical Specification	
DC supply	
DC Input Voltage	Nominal: 12 V DC
	Input Operating Range: 24 V DC via integrated DC/DC power supply.
Typical DC Power Consumption	Standard climate (-15 to +22 °C): 55 W (64 W if DC/DC is used)
AC Supply	
AC Input Voltage	Input Operating Range: 90 – 264 V AC via integrated AC/DC power supply.
Typical AC Power Consumption	Standard climate (-15 to +22 °C): 65 W (via integrated AC/DC)
AC Frequency	50 – 60 Hz
General	
Standby Power	1 W
Startup	102 W
	Note: Load test initiated during start-up period (37 A in-rush) only to test external power source (up to 30 seconds).
Input Ripple (Noise)	<200mV rms

5.2 Connecting Your Power Supply

5.2.1 Integrated AC or DC Supplies

AC/DC Power Supply

DC/DC Power Supply

The ZX 300 is shipped with either AC/DC or DC/DC integrated power supplies. Each of these has a dedicated, IP67 rated connector supplied with it for easy connection to the unit. The power supplies are located under the ZX 300 unit and can be easily swapped by unscrewing the four security screws.

The input power to the ZX 300 is provided via amphenol connector from either integrated power supply or the supplied DC cable:

Please ensure the amphenol connector is correctly located and secured.

5.2.2 External DC Supplies

The ZX 300 is shipped with a DC cable for use with external DC supplies (e.g. battery bank) that ideally include a DC/DC converter. The cable length between the output of the power supply and the input to the ZX 300 should be as short as possible.

6 Deploying the ZX 300

Before physically deploying the ZX 300, it is always beneficial to check a few important aspects of the site to avoid any later issues. Please see section 3.4 for further preparation details.

6.1 Unit Deployment Positioning

ZX 300s are very tolerant to terrain and environment and can be deployed almost anywhere in the world. To get the best results, the following is advised when choosing a deployment location:

- In a clear, open space.
- As far away from obstructions like trees or buildings as possible.
- Avoid placing the ZX 300 in turbine wakes or other forms of turbulence.
- Make sure there is clear airflow across the Met Station.

Full requirements and considerations for the siting of a ZX 300 can be found in section 3.

6.1.1 Met Station Relocation

If the unit cannot be deployed far away from obstructions (e.g. buildings) then it is recommended that the user to detach the Met Station from the body of the ZX 300 and raise it on a pole into clear air (see section 6.2 for alignment procedures). For example:

The ZX 300 is shipped by default with an approximate 10 m met cable. This cable attaches to the ZX 300 via amphenol connector behind one of the cover panels:

Disconnect the existing amphenol connector and cover it with the dust cap. Connect the extended cable amphenol connector in its place.

To install the met station to its extended (remote) position, it will first need to be disconnected from the ZX 300. Take care to not handle upper met station. Ensure the lidar is powered OFF before disconnecting the MET Station.

1. Identify met station at rear of ZX 300.

2. Firstly unscrew the base of the met station mount.

3. Identify met cable.

4. Disconnect met cable from met station.

5. Unscrew mid-section of mount and remove cable.

6. Unscrew lower station mount.

7. Remove lower mount.

8. Screw lower mount onto met pole.

9. Locate extended cable and screw in mid-section of met station mount.

10. Locate and fix met cable connector to met station (note the locating notch).

11. Locate and screw in upper met station mount and met station.

6.2 Alignment of the met station with the lidar

The met station is used to help the lidar to discriminate between upwind and downwind directions. In order for it to be able to do this effectively, the “North” arrow on the top of the Met Station must align with the notches/North arrow on the top plate of the ZX 300 and point to the “front” of the unit, as in the image below. Special care should be taken with this alignment if the met station is deployed remotely, as described in the previous section.


806
NORTH
ZX300
NORTH


NORTH


NORTH

6.3 Unit Alignment

By default, the ZX 300 reports wind direction with respect to the north markings on its chassis. It is recommended that the lidar is deployed with these north markings aligned with true north. If this is not possible then a non-zero deployment bearing can be configured in Waltz (see the accompanying Configuration Guide) and the reported wind direction will take into account the configured bearing. It is important for the bearing of the lidar to match the bearing configured in Waltz if the lidar is to report wind direction accurately.

The lidar's met station reports a bearing that can be used to align the lidar if the met station is correctly aligned with the lidar chassis and if a more accurate reference is not available. The met station bearing is reported relative to true north if the met station has a GPS signal. Without GPS then the met station bearing will be reported relative to magnetic north.

6.4 Unit Levelling

The ZX 300 should be levelled once it has been oriented. Adjust the unit legs using the orange quick-release clamps to make the unit level using the spirit levels visible through the top window.



Both spirit levels should look like this when the unit is levelled:

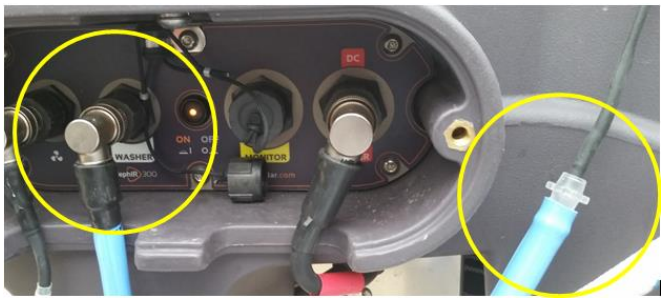
It is also recommended that the unit be raised slightly – approx. 200-300 mm – from its lowest position to aid cooling in standard or warm environments and to prevent snow build up in cold environments.

Once the unit is level in position, the clamps can be locked in place to prevent any movement using the provided 3 M8 security bolts:

6.5 Connecting the Washer Pump

The ZX 300 is supplied with a washer pump to aid cleaning in case the top window is soiled. To connect the pump to the ZX 300, first fill the washer bottle with appropriate cleaning fluid (standard vehicle screen wash is suitable) then insert the pump. Screw the lid down:

You should then connect the amphenol connector and fluid connector to the unit and rubber hose respectively. The image below shows the locations of the connections.



6.6 Fitting the Z300 Insulation Jacket

In cold environments (below -15 °C), the ZX 300 jacket must be fitted as shown below. It the deployment is remote, the jacket can remain in place for temperatures below 10° C.

It is strongly advised that the jacket is removed above 10° C or the unit may require the use of its fans more often which will increase the power draw of the ZX 300.

If applicable, prepare the jacket for fitting.

Secure the base of the jacket around the panels.

Ensure the panel covers are in position.

Feed the base of the jacket underneath the unit behind the rope handles.

Raise the jacket sides around the unit.

Connect the catch and stick the Velcro edges together to secure the jacket in place.

It should be noted that an Iridium Satellite backpack (see section 7.3.1) cannot be attached to the ZX 300 when the jacket is in use.

Full connection details can be found in the accompanying Power Guide.

7 Connecting External Communication Systems

In most circumstances, the default communication devices within a ZX 300 will be sufficient for the majority of deployments. However, if cell coverage is poor or should the user wish to use their own device, the unit can be connected to alternative comms devices to allow connectivity to and from the ZX 300.

7.1 Ethernet Local Area Networks

The ZX 300 is shipped with an IP67 rated Ethernet cable which allows LAN connections to the unit:

To fit the cable to the ZX 300, identify the Ethernet port, unscrew the protective cap, fit the IP67 connector and twist the amphenol connector to secure the LAN cable to the ZX 300:

To connect to the ZX 300 directly from a computer over Ethernet or to configure your ZX 300 to use a LAN, please see the accompanying Communications Guide. For short term LAN connections, the use of the IP67 rated connector is not required, although recommended.

7.2 External GSM/GPRS Modems

7.2.1 Modems Supplied by ZX Lidars.

ZX Lidars can provide an external modem in an IP67 rated enclosure which is suitable for connection to a ZX 300 unit. The modem is also provided with a Yagi directional antenna to increase signal gain and obtain a stronger GSM/GPRS connection. The use of such a modem is usually used when the unit is deployed in locations that lie in areas of poor cell connectivity.

The external modem is usually configured for use ahead of shipping, but the user can choose to configure the modem themselves by following the associated modem configuration guide provided by ZX Lidars. Physically connecting the modem to the ZX 300 is detailed in the same guide.

7.2.2 Client Modems

The ZX 300 can make use of alternate external modems. Connecting an external modem to a ZX 300 should be performed using the Ethernet port; however, there are a few things to bear in mind:

- The SIM will require a fixed IP address.
- The modem/SIM must accept incoming connections.
- The modem must be Ethernet (IPv4) compliant.
- The modem will need to be powered. ZX Lidars can build a connector to power the modem from the ZX 300 given the correct specifications. Otherwise you must find an alternative power source.
- ZX Lidars will not support any modems that they do not supply.
- Any damage to the ZX 300 caused by the modem would invalidate the warranty.

Please see the associated Communications guide for more detailed configuration information.

7.3 Satellite Modems

7.3.1 Iridium Modems

The ZX 300 is capable of utilising an Iridium Satellite modem for deployments with no cell connectivity. Whilst the Iridium satellite network provides a slower data rate, it is global and will work in any location, even offshore.

The Iridium modem pack is supplied in an IP67 rated enclosure that should be mounted on the rear of the ZX 300 body. The pack is supplied complete with omni-directional antenna. There is a single amphenol connector that provides power and data to the system which connects to the ZX 300 using its modem port:

Unscrew the protective cap and connect the amphenol connector, ensuring it is fully screwed in.

The enclosure is mounted on the rear of the ZX 300 body over the back plate using metal “backpack” and the mounting screws provided:

The legs will need to be fully extended to access the lower screw on the back plate. To configure the ZX 300 to use the Iridium modem, please see the accompanying Communications Guide.

7.3.2 BGAN Modems

The ZX 300 is capable of utilising a Broadband Global Area Network (BGAN) Satellite system for deployments with no cell connectivity. The BGAN system is a fast, reliable solution and can be used in a similar way to the Cellubi modem, however the antenna is directional and relies upon geostationary satellites which limit the deployment locations of the BGAN system to approximately +/- 70° Latitude and require a clear line of sight to the satellite. If there are hills or buildings in the line of sight, the operation of the BGAN system may suffer.

To connect the BGAN system to your ZX 300, please refer to the supplied BGAN Antenna Setup Guide. This guide will detail the hardware and software setup of the system.

8 Powering Up the ZX 300

The ZX 300 is powered up using the System Power Button positioned in the customer access panel on the lower right hand side of the unit, behind the orange protection plate. Pressing the System Power button once will illuminate the button and initiate the power-up sequence.

Initiating a power-up sequence will start a 15-30 second draw on the power supply by running the lower fans. The power button will remain illuminated throughout, then all system functions will begin to operate.

On power-up, after the start-up period (approximately 2 minutes), the laser power will switch on automatically and the wedge will start to spin.

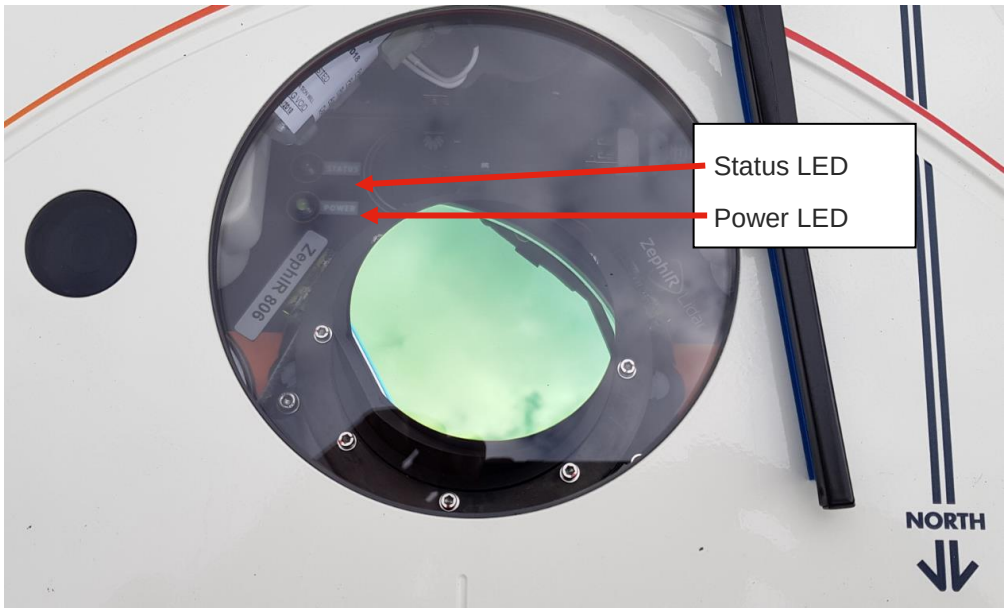
The ZX 300 has a considerable in-rush current for a brief period during start up. This can affect some power supplies. Please ensure your power system can tolerate this current flow.

8.1 Cold Starts

The ZX 300 requires an internal pod temperature greater than 0 °C to operate. Below 0 °C the internal heaters will remain on and power is not passed to rest of the unit. During this period of “warm up”, the centre of the System Power Button will be illuminated as shown in the image below and the system power light (visible through the top window) will shine solid amber. Once the pre-heat cycle is complete, that power LED will turn solid green.

8.2 Operational Status

On completion of the power-up sequence, the status LED will flash green and the power LED will shine solid green.



It is recommended when turning the unit on for the first time after a period of inactivity that it is left for 15 minutes before powering down. This allows enough time to charge the internal battery, which allows a warning message to be sent if power is removed from the system.

Once the unit is powered up and running, it will need to be configured for the deployment. Please refer to the accompanying Configuration Guide for details on how to set up the ZX 300.

A Site Visit Checklist

This form is an example of a pre-deployment check list whenever a lidar campaign is planned and a site visit is performed.

Site information	
Client name	
Site Visited By	
Date of visit	
Site Location/Name	
GPS Coordinates	

Deployment Method	
Deployment method (select appropriate method)	On Foot / 4x4 / ATV / Helicopter
Note any Special requirements for deployment E.G. steep access, soft ground, tracks etc	
Photograph site access and potential hazards	

Environmental Information	
Power source(select appropriate method)	Mains / Off Grid power Supply
Recommended power supply for deployment environment	
Can power supply be deployed in correct orientation – E.G south for PV panels	YES / NO
Maps of the location available	YES / NO
Photographs of the deployment location	YES / NO
GSM Coverage at deployment location	GOOD / POOR / NONE
Data Coverage at deployment location	YES / NO

Site Information	
Landowner permission for access	YES / NO
Landowner name and contact details	
Gated access	YES / NO
Gate widths (measured)	
Gates locked	YES / NO
Gate keys available for 24hr access	YES / NO
Key holder name and contact details	
Onsite security (24hrs?)	YES / NO
Onsite Security name and contact details	
Site lone working arrangements	
Local onsite support	YES / NO
Onsite support name and contact details	
Livestock on site (unit fencing required)	YES / NO

Site Information
Local fuelling options if required e.g. Propane, Diesel, Petrol etc.

Additional Information

B Site Deployment Checklist

This is an example deployment form to ensure all necessary checks are performed for a ZX 300 deployment.

Site information	
UNIT ID	
Deployed By	
Date	
Location Name	
GPS Coordinates	

Unit Orientation	
Ground Condition Observations:	
Mast Cup Heights if used:	
Position relative to Mast (review guidelines for deployment against mast)	
Bearing rel. To Magnetic North	
Met station marker and correctly aligned	YES / NO
Unit level (use spirit levels)	YES / NO
Leg clamps secure with bolts	YES / NO
Amount of fluid in washer bottle	
Lens height above ground (m)	

Power Supply	
Power Source	
AC or DC supply	
DC – DC Information	
PV angle deg. from horizontal - Clean	
Turbines clear and rotating	YES / NO
Monitor cable connected	YES / NO
Power supply Output Voltage	
Power supply running Hours	
Fuel Level / Quantity	
Estimated Re-fuel / Service date	

Waltz Checks	
Waltz version	

Waltz Checks	
ZX 300 Firmware version	
Top LEDS Green, and Modem light flashing green (if SIM is being used)	YES / NO
Unit Ethernet IP address	IP
	Subnet Mask
	DNS
Waltz Status lights green	YES / NO
Pod temperatures (Deg. C)	Upper Pod:
	Lower Pod:
Primed Washer Fluid	YES / NO

Configuration checks	
Deployment measurement heights	
Email addresses for ‘SMS’ messages	
UTC Offset	
Check configuration settings & Save	YES / NO

Communication Checks	
External modem or Internal Modem	
Wifi (192.168.1.1)	
Cellubi IP address	
Signal strength	
Network carrier	
Internet available flag	YES / NO
Test Email / power on.	YES / NO

System Checks	
ZX 300 time	Local time
Tilt (deg)	
Input Voltage	
If Monitor cable used, Generator Voltage (V)	

Photos
8 off around ZX 300 / Mast in foreground Must include N,NE,E,SE,S,SW,W,NW

Photos

Additional Information

C Contact Details

ZX Lidars Customer Support

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