



Wind speed at light speed

ZX 300e Specification, Power and Servicing Guide

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1 Introduction

This guide details the product specification, power requirements and mechanical specification for the ZX 300e unit.

It also outlines servicing, warranty and maintenance information vital to the ongoing use of your Lidar.

1.1.1 Summary of Changes

This document is the first release of the manual for ZX 300e.

2 Product Technical Specification

2.1 Primary Technical Identification

Table 2.1: Primary Identification

MANUFACTURER DETAILS	ZX LIDARS
MODEL VARIANT	ZX 300e
PRODUCT DESCRIPTION	WIND LIDAR (LASER ANEMOMETER)

2.2 Environmental Specification

Table 2.2: Environmental Specification

Specification	Value
MAXIMUM OPERATING TEMPERATURE	+50°C
MINIMUM OPERATING TEMPERATURE	-40°C
HUMIDITY	0-100%
INGRESS PROTECTION	IP 66 / IP67

2.3 CE Marking

The ZX 300e system is declared compliant with the essential requirements and provisions to provide it with CE marking, some are listed below:

- ▲ European Safety Directive for electrical equipment for measurement, control and laboratory use EN61010-1:2010/AMD1:2016
- ▲ Electromagnetic Compatibility EN 61326-1:2021
- ▲ Laser Product Classification to IEC/EN 60825-1:2014+A11:2021
- ▲ Ingress protection IEC 60529:1989+AMD1:1999+AMD:2013 BS EN 60529:1992+A2:2013
- ▲ Shock and vibration testing BS EN 60068-2-64:2008+A1:2019 profile EN 300 019-2-2: v2.4.1
- ▲ Temperature Testing BS EN 60068-2-1:2007 Ad and BS EN 60068-2-2:2007 Bd

2.4 Operational Specifications

Measurement range

Specification	Value
Minimum height	10m
Max. Height	200m, extended range 300m
Max. Wind Speed	80m/s
Min. Wind Speed	< 1m/s
Wind Speed Accuracy	0.1 m/s
Direction Variation	< 0.5°
Probe Depth	+/- 0.07m @ 10m, +/- 7.70m @ 100m
Focus heights	10 user programmable heights up to 300m

**Data Storage**

- ▲ Over 6 years wind data (53 GB)

Data Output

- ▲ Live, Quality Controlled Wind data (1 sec data).
- ▲ 10-minute Quality Controlled wind speed averages.
- ▲ Met data (temperature, pressure, humidity).

2.5 Mechanical Specification

Once the Lidar is in-situ, adequate mechanical support must be provided.

Table 2.3 system weights

Specification	Value
ZX 300e LIDAR (net)	57kg
DC/DC CONVERTER	1kg
AC/DC POWER SUPPLY	4kg

(Transit case weights can be found in the shipping section of this manual).

Detailed mechanical specifications, dimensions of the ZX 300e product and 3D CAD models are available on request.

2.6 Power and Electrical Specification

Powering the Lidar outside the specified ranges could result in damage to the unit and will invalidate the warranty.

Table 2.4: Electrical Specification

Specification	Value
Internal Operating Voltage	12Vdc (Operable 11-13.5Vdc)
Standby Power	1W
Max. DC Power	192W (Rated 240W)
AC/DC Input Voltage	90-264Vac 50 to 60Hz via AC/DC Power supply ONLY
DC/DC Input Voltage	Nominal 24V (*see table 3.1 for variation)
Typical Power Draw (no thermal jacket)	44W between -25°C and 24°C*
	108W between -40°C and -25°C*
	59W between 24°C and 50°C*
Recommended External DC Supply Over Current Protection	20A TYPE C Miniature Circuit Breaker (MCB)
Recommended External AC Supply Over Current Protection	3A TYPE C Miniature Circuit Breaker (MCB)

***This refers to Power Draw in normal operating conditions, power supply systems need to be able to support <130W start up condition.**

2.7 Laser Information

- ▲ Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- ▲ This product meets the requirements for a Class 1 Laser product to IEC/EN 60825-1:2014+A11:2021 under normal operating conditions and those of a single fault failure.



Figure 1 Laser Class Label

2.7.1 Laser Specification

The Lidar Laser specification is as follows:

- ▲ Wavelength 1560nm
- ▲ Maximum output power 1.3W
- ▲ The average power through the scanner aperture is 4mW.

2.7.2 Lidar Label

The ZX 300e Label is found on the rear panel of the product:

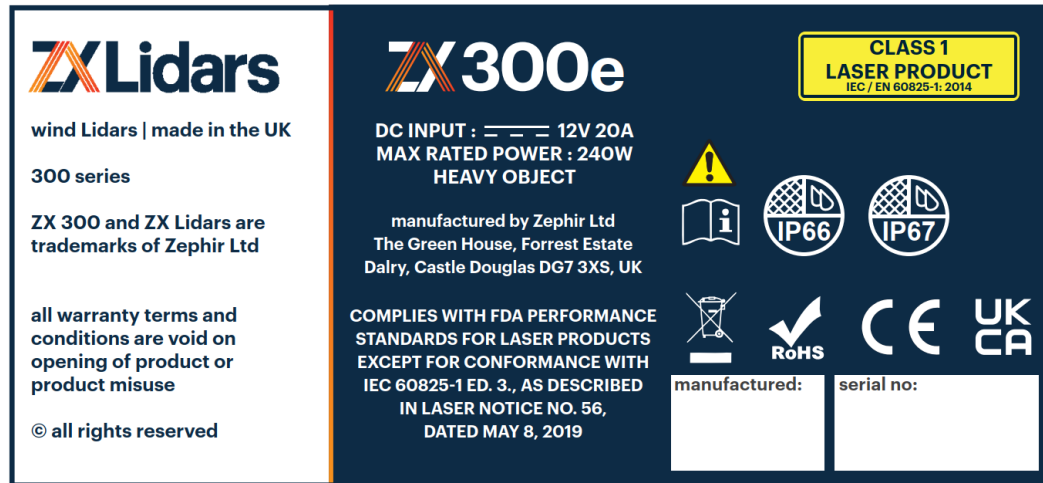


Figure 2 ZX 300e Product Label

3 Powering your Lidar

The ZX 300e is shipped with either a DC/DC converter, AC/DC Power supply unit or DC power cable. 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 300e unit and can be easily swapped by unscrewing the four M8 caphead screws.



Figure 3 Lidar Power supply options

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 optical prism will start to rotate.

3.1 Power switching

The ZX 300e has a latched power switch, which means that if external power is discontinued, after the Lidar powers down, it will auto-resume when power is restored.

Ensure all components specified and installed for the Lidar power supply can handle the voltage and power specified in Table 2.4

Failure to ensure correct power supply setup and specifications may cause permanent damage to your Lidar. If further information is required on the Lidar power supply setup and switching contact ZX Lidars, see section 7.3.1 for details.

3.2 System Standby

During operation, if the DC input voltage to the Lidar drops below 10V or rises above 15V the unit will automatically shut down and enter standby. During standby the monitoring circuit remains active until the input voltage returns to within operating range (see Table 2.4). The unit will then automatically restart, and the system will return to normal operation within 3 minutes. No operator intervention is required.

3.3 Additional Power Requirements

The Lidar wiper system will run during periods of rain or if the window has been obstructed. In these cases, the unit will require more power to run the wiper and washer system. The Wash/Wipe function will draw approximately 4W during use with a peak instantaneous draw of approximately 27W.

3.4 Climate Ranges

The ZX 300e requires an internal pod temperature greater than 1°C to operate. Below 1°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 amber (see figure 4 below) the system power light (visible through the top window) will flash **red 3 times**. Once the pre-heat cycle is complete, that power LED will turn solid green

3.4.1 Cold Climate (-16 to -40 °C)

We suggest the thermal insulation jacket is applied if the temperature remains consistently below -15°C. Cold climate power draw figures assume the maximum draw lasts four hours with a duty cycle of 60% with the insulation jacket fitted. Failure to fit a thermal insulation jacket at low temperatures will result in higher duty cycle and a higher average power draw.



Figure 4 Power LED indicator

During operation if the internal temperature drops below 0°C the heaters will activate to maintain pod temperature. There will be an increase in power draw during this time, see Table 2.4.

3.4.2 Hot Climate (+24 to +50 °C)

Hot climates will increase the use of the cooling fans for the Lidar which will require more power. The average power increases due to heat exchanger fans (100% fan duty cycle at 50°C dropping to 30% duty cycle at 23°C).

For extreme heat environments (desert, direct sunlight) it is strongly advised that solar shading is used to protect the unit and reduce the chance of overheating. **If shading is used, ensure that a 45-degree clearance angle is maintained from the top plate window edge to avoid measurement disruption.**

The Lidar uses a heat exchanger located on the underside of the unit to cool itself. If the floor or surrounding environment is at an elevated temperature, this may affect the ability of the unit to keep

itself cool. Avoid where possible concrete or stone bases which can radiate significant heat below the Lidar reducing the efficiency of the heat exchanger.

3.4.3 Auto-Shutdown

The Lidar will protect itself from extreme temperatures, both hot and cold. While operating, if the internal temperature reaches certain limits, the Lidar will auto-shutdown to protect itself. If this occurs the power and status LEDs will be as described in the ZX 300e deployment guide. Should the temperature return within operational limits the Lidar will auto-start.

The thermal limits within the Lidar are:

Cold :

Auto-shutdown -5°C

Auto-start +1°C

Hot:

Auto-shutdown >+60°C

Auto-start +55°C

Prior to auto-shutdown, the unit will attempt to send an email informing you that it is either too hot or too cold, depending on a network connection.

3.5 Lidar Power Connection Options

The Lidar is capable of being powered by either DC or single-phase AC voltage. The input power to the Lidar is provided via an Amphenol connector from either an integrated power supply or DC power cable.



Figure 5 Lidar power connection

Powering the lidar with a cable not supplied by ZX Lidars is not recommended and may result in damage to the unit and will invalidate the warranty.

The ZX 300e lidar is fitted with an integrated AC/DC by default, but a DC/DC can be fitted either at point of order or later upon request. Both the DC/DC converter and AC/DC power supply are interchangeable and reside on the underside of the Lidar.

3.6 AC Power supply

The integrated AC/DC power supply produces 12Vdc to power the lidar, there is no need to use any other power conversion supplies.

The lidar is supplied with a 2 pin and Earth IP67 rated socket to enable a simple connection to a suitable AC supply (e.g. shore/mains/grid power) which will power the lidar.

To connect your lidar to an AC power supply, the supplied AC socket connector will require wiring to suitable power cables (single phase, neutral + earth). It is recommended that cable conductor sizes at minimum are 2 x 1.5mm² CSA (16AWG). Increased cable lengths require appropriated rated power conductors to reduce voltage drops, for example in a cable up to **300 metres** 3 Core Mains Power Cable, 2.5mm² CSA (14AWG) should be used where the cable is exposed.

Note the 'L/+' mark on the socket connector interior screw terminal, this indicates the terminal for the LIVE wire and the terminal marked '⏏' to be connected to the GROUND/EARTH wire. The remaining terminal is for the NEUTRAL wire.

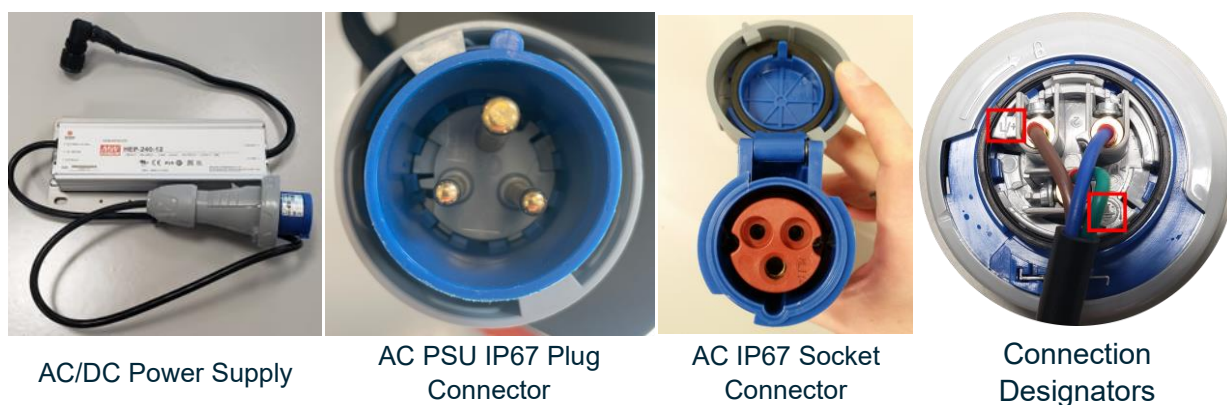


Figure 6 AC/DC Power supply connections

3.7 DC/DC Converter supply

The integrated DC/DC power supply produces 12Vdc to power the lidar, there is no need to use any other external DC/DC converter. See Table 3.1 for further information on DC power requirements for your lidar.

The lidar is supplied with an IP67 rated socket to enable a simple connection to a DC supply (e.g. PV system battery bank) which will power the lidar.

To connect your Lidar to a DC power supply, the supplied DC socket connector will require wiring to suitable power cables. It is recommended that cable conductor sizes at minimum are 2 x 4.0 mm² CSA (10AWG). Note the orientation '+' mark on the socket connector below in figure 7, this indicates the terminal for the positive wire, the other unmarked terminal should be connected to the power supply 0V. See Figure 7. DC/DC converter connections

Always ensure cable lengths be kept to a minimum to minimise voltage drops and interference.



DC/DC Power Supply



DC PSU IP67 plug connector



DC IP67 socket connector

Figure 7. DC/DC converter connections

3.8 External 12Vdc Cable supply

In some circumstances, the lidar can be supplied with a DC cable which should be connected to the lidar power input instead of via the optional DC/DC supply. Contact ZX Lidars for advice.

The lidar is rated at 12Vdc input. Supplying the lidar outside of its power specification (Table 2.4) may severely damage the unit and will invalidate the warranty.

Recommended cable length should be no more than 2 metres from the power source

For any 3rd party DC/DC converter, it must output 12Vdc as per power specification (Table 2.4).

3.9 Alternative Configurations

Further options can be found below in Table 3.1, which detail the full range of options for a direct 12V supply in addition to 24V configurations.

Table 3.1: DC input options

Input Voltage	Input Type	Cable Length	Supported?	Notes
12V	Direct cable	2m maximum	Yes	Source of power or a regulating DC/DC
12V	Direct cable	6m	Condition ^{#1}	Low Voltage Disconnect recommended.
12V	Direct cable	10m	No	Voltage Drop too high, unstable operation with battery at low voltage.
24V	Direct cable	Any	No	Voltage too high. Will damage Lidar.
24V	DC/DC PSU	1m	Condition ^{#2}	Low Voltage Disconnect required.
24V	DC/DC PSU	5m	Condition ^{#2}	Low Voltage Disconnect required.
24V	DC/DC PSU	9m	Condition ^{#2}	Low Voltage Disconnect required.

Tested using 4 core - 2mm² cable.

^{#1} Suggested **low voltage cut-off = 10.5V** for a 12V input.

^{#2} Suggested **low voltage cut-off = 21.5V** for a 24V input.



4 Lightning Protection

If the ZX 300e is to be operated in an exposed site especially where the unit is the highest point, 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 300e.

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

The ZX 300e 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 +A2:2010 with fast transient protection to $\pm 2\text{kV}$. In addition, the unit successfully completed voltage surge testing EN61000-4-5:2014 to $\pm 2\text{kV}$.

5 Service and Maintenance

- ▲ There are no user serviceable parts inside the ZX 300e lidar.
- ▲ It is advised that the lidar should be powered down for any cleaning and maintenance activities.
- ▲ In the event of ice build-up on the lidar window during loss of power it is essential that the ice is cleared prior to lidar switch on, failure to do so may lengthen the time for the lidar to collect representative data and damage the wiper blade.
- ▲ Further guidance on maintenance activities contact to ZX Lidars customer support, see section 7.3.1.

5.1 Periodic maintenance

It is essential for smooth operation of your lidar that interim 6 monthly basic maintenance checks are conducted. Essential but not exhaustive checks are itemised below, ZX Lidars may infrequently request evidence of the maintenance checks.

Table 5.1: Maintenance

INSP No.	CHECK	6 MONTHS
A1	WASHER FLUID LEVEL	X
A2	LIDAR WINDOW CLEANED	X
A3	WIPER BLADE CONDITION	X
A4	CABLE AND CONNECTOR CONDITION	X

5.2 Cleaning your lidar

To keep your lidar in prime condition your lidar should be periodically cleaned to prevent build-up of debris such as salt and guano. ZX Lidars recommends that the ZX 300e lidar may be cleaned with a damp cloth and clean water. A pH balanced detergent without any added waxes or protectants may also be used.

5.3 Servicing

Servicing your ZX 300e is an extremely important part of its on-going validated performance. We strongly recommended that you have your unit serviced as close to its service interval as possible.

A full unit service typically consists of:

- ▲ Full sign-in and thorough check over of your system for any obvious performance or system defects
- ▲ Reconditioning of internal components to ensure on-going optimal performance
- ▲ Upgrading of hardware components to take advantage of improvements where appropriate
- ▲ Upgrading of operational firmware to include new features and unit functionality
- ▲ Testing of all accessories including full electrical PAT test and full comms test
- ▲ Full unit factory acceptance.

Return to Base Service Schedule

The service schedule is taken from the point of ownership of the ZX 300e. In most cases, this will be the point of receipt of the unit. ***The schedule is based on time of ownership, not levels of use.***

6 Disassembly Procedure

Prior to turning off the lidar ensure you have completed the following tasks:

- ▲ Lidar data collection campaign has been confirmed as complete
- ▲ Downloaded all necessary wind data

To disassemble the lidar once it has switched off, you need to reverse the assembly process with the following modifications.

- ▲ Power off
- ▲ Disconnect all cables
- ▲ Remove MET-station and pole
- ▲ Attach dummy connectors

6.1 System Shipping & Transit Details

Whenever you ship your ZX 300e you should ensure that the unit is shipped with all of its accessories. A full parts inventory is available in the deployment guide



Please ensure that the system is cleaned and checked for animals, insects and other contaminants prior to shipping – not only to prevent possible injury, but also to stop the spread of disease and the introduction of non-native species into new environments.

6.2 Packing the ZX 300e for shipping

6.2.1 Detachment of accessories

To prevent damage to the Meteorological (MET) Station, please remove it from the unit prior to shipping. The MET station can be unscrewed from the ZX 300e and placed in its supplied box.

6.2.2 Packing the ZX 300e

The following pictorial steps show the packing process for the ZX 300e prior to shipping.

1. Prepare the pallet base with the 3 smaller ratchet straps fed through the drilled holes.

2. Strap the unit to the base using the ratchet straps.



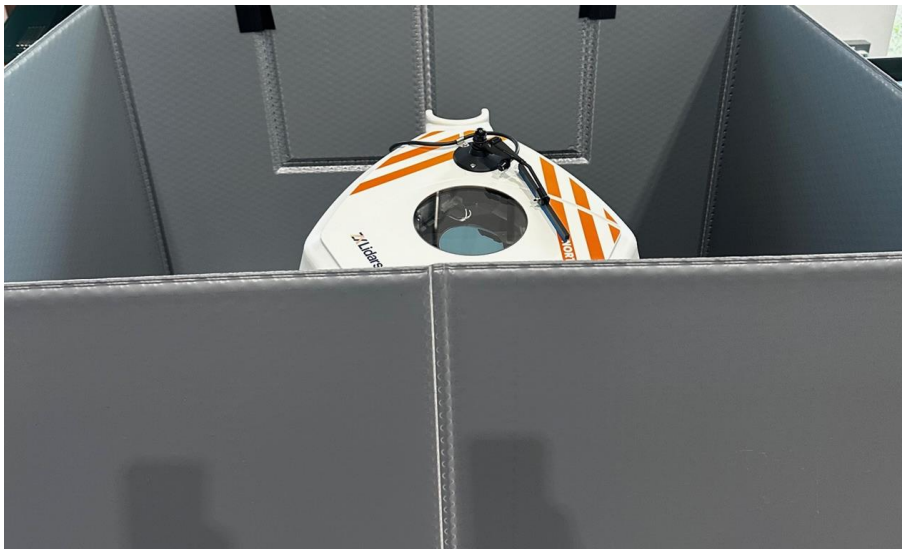
3. Tighten all three straps.



4. Ensure dust caps are in place and stow any loose cables appropriately.



5. Carefully put the crate walls over the unit and slot them into the base.



6. Stow the water bottle and accessories tub in the crate.



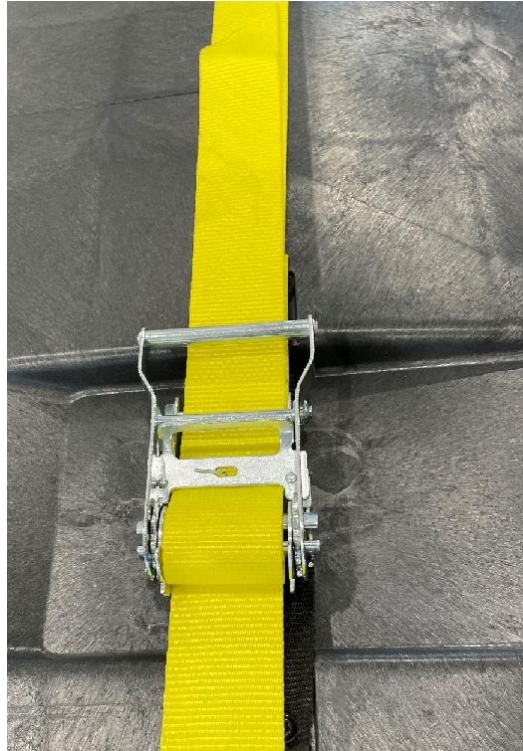
7. Carefully place the lid over the crate and ensure it is located properly.



8. Strap the lid on using the two larger ratchet straps ready for shipping.



9. Ensure strap ratchet is connected as below:



6.2.3 Shipping Address

The shipping address to which you should send your ZX 300e for service can be found in section 7.3.1 of this guide.

Shipping takes approximately 1 week via air freight but can vary according to location and accessibility.

7 Warranty and support

7.1 Standard Product Warranty

ZX Lidars provides a standard warranty on the ZX 300e system, which is as detailed in the Terms & Conditions of Sale. Warranty repairs are provided on the basis of a return-to-base service, with all parts and labour costs covered under the warranty by ZX Lidars. Within this warranty period, access to a telephone support service (Monday – Friday, 09:00 – 17:00 UK time) is included. On expiry of the warranty period all parts and labour are chargeable at the appropriate rates.

7.2 Comprehensive Maintenance Service

Should the customer require a dedicated support service with defined response times or on-site service provision etc., then ZX Lidars offers a fully comprehensive support service. The cost of such a service can be provided at the time of system purchase, as this is determined by system location and customer options required (in-field backup system availability etc.).

7.3 Data Management Service

ZX Lidars offers a fully managed data retrieval and processing service where the customer is provided with validated data collected by the ZX 300e system, directly to their desk. The costs of this service can also be provided at the time of system purchase as this is determined by specific customer requirements.

7.3.1 Contact Details

ZX Lidars Customer Support

ZX Lidars,
Willow End,
Blackmore Park Rd,
Malvern,
WR13 6BD,
UK+44 (0) 1531 651 000
support@zxlidars.com