

## Very low power LiDAR



### Features

- *Application:* *Battery, solar or energy critical applications*
- *Key features:* *Operates from a Lithium-Ion battery or 3 V coin cell*
- *Measuring range:* *0.2 ... 50 m (80% reflective, large target)*
- *Size:* *32 mm x 30 mm x 22 mm*
- *Weight:* *10 grams*
- *Measuring speed:* *1 to 20 readings per second (configurable)*
- *Interfaces:* *Serial*
- *Integration:* *User APIs, **LightWare Studio***
- *Safety:* *Eye safe laser emission Class 1*
- *Environmental:* *Open frame, no IP rating*



FM 654831

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## Product ordering codes

Model family	Model name	Model description
SF23	SF23/B (50 m)	Open frame LiDAR sensor, max 50 m

## Disclaimer

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## 1. Overview

The SF23/B is a very low power LiDAR that can be used in energy critical applications where batteries or solar cells are used. It is a small form factor, general purpose LiDAR sensor that measures the distance to objects by timing a laser flash. Accuracy is not generally affected by the colour or texture of the target surface, nor the angle of incidence of the laser beam. The SF23/B is tolerant to changes in background lighting conditions, wind and noise.

The following capabilities are included in the SF23/B as standard:

- Adjustable measuring update rate.
- Internal status monitoring.
- Measurement to the nearest detected surface (first return).

Communication interfaces include:

- A serial port (3.0V logic level) with configurable baud rate to connect to a host controller.
- A shutdown control line.
- A general purpose control line.

Application software support is available from the LightWare **API** repository.

The SF23/B LiDAR is rated laser Class 1 eye safe. Do not view the laser with magnifying optics such as microscopes, binoculars or telescopes.

**2. Specifications**

<b>Performance</b>	
<b>Range</b>	0.2 ... 50 m (white wall in daylight conditions)
<b>Resolution</b>	1 cm
<b>Update rate</b>	1 ... 10 readings per second
<b>Accuracy</b>	±10 cm
<b>Connections</b>	
<b>Power supply voltage</b>	3.1 V ... 5.5 V
<b>Power supply current</b>	< 5 mA (average at 1 reading per second), 100 mA (maximum for less than 20ms)
<b>Outputs &amp; interfaces</b>	Serial (3.0 V logic), shutdown, control
<b>Mechanical</b>	
<b>Dimensions</b>	32 mm x 30 mm x 22 mm
<b>Weight</b>	10 g (excluding cables)
<b>Optical</b>	
<b>Laser safety</b>	Class 1 (refer to <a href="http://www.lightware.co.za/safety">www.lightware.co.za/safety</a> for full details)
<b>Optical aperture</b>	28 mm x 15 mm
<b>Beam divergence</b>	< 0.5°
<b>Environmental</b>	
<b>Operating temperature</b>	-10 ... +50°C
<b>Approvals</b>	FDA: 1910981-000 (08/2019)
<b>Enclosure rating</b>	N/A
<b>Accessories</b>	
<b>Main cable</b>	Main cable - 6 way, DigiKey 455-3003-ND; Mating socket, DigiKey 455-1806-ND
<b>Default settings</b>	
<b>Serial port settings</b>	9600 baud, 8 data bits, 1 stop bit, no parity, no handshaking
<b>Update rate</b>	1 reading per second
<b>Main cable connections</b>	
<b>1</b>	+3.7 V - power supply positive (3.2 V to 5.5 V at 100 mA peak)
<b>2</b>	GND - power supply negative
<b>3</b>	Control signal (3.0 V logic level)
<b>4</b>	Shutdown (active low with 470k pull up resistor to power supply)
<b>5</b>	RX - serial data receive line (3.0V logic level)
<b>6</b>	TX - serial data transmit line (3.0V logic level)

### 3. Quickstart guide

#### Caution

**The SF23/B laser rangefinder contains a laser and should never be aimed at a person or an animal. Do not look at the beam directly with optical instruments.**

- Download the **LightWare Studio** application to your PC or laptop.
- Instal and start the application by following the prompts.
- Connect the SF23/B to the PC using a serial to USB adaptor.
- The SF23/B will automatically be detected by the application.
- Settings options will be displayed in the main window along with a visualisation of the data coming from the SF23/B.
- Change the settings to suit your application.
- Unplug the serial to USB adaptor.

Once the settings have been entered, your host controller can communicate with the SF23/B through the serial port. API support is available from the LightWare **API** repository. To test the serial port the **LightWare Communication Adaptor** is available.

Firmware updates and additional features will become available from time to time. These can be installed into the SF23/B using a serial to USB adaptor and the **LightWare Studio** application.

## 4. Safety instructions

The SF23/B emits ionizing laser radiation. The level of the laser emission is Class 1 which indicates that the laser beam is safe to look at with the unaided eye but must not be viewed using binoculars or other optical devices. Notwithstanding the safety rating, avoid looking into the beam and switch the unit off when working in the area.

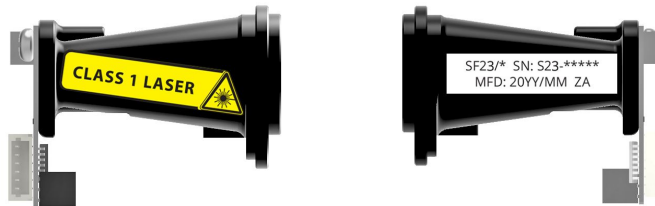
### Caution

**The use of optical instruments with this product will increase eye hazard.**

The SF23/B should not be disassembled or modified in any way. The laser eye safety rating depends on the mechanical integrity of the optics and electronics so if these are damaged do not continue using the SF23/B. There are no user serviceable parts and maintenance or repair must only be carried out by the manufacturer or a qualified service agent.

No regular maintenance is required for the SF23/B but if the lenses start to collect dust then they may be wiped with suitable lens cleaning materials.

### 4.1. Labelling



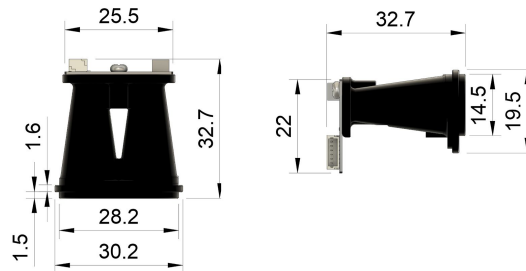
*Laser radiation information and product identification labels*

### 4.2. Laser radiation information

Specification	Value / AEL	Notes
Eye safety classification	Class 1	
Laser wavelength	905 nm	
Pulse width	15 ns	
Pulse frequency	20 kHz	Intermittent, not continuous
Average power	< 0.5 mW	At one reading per second
NOHD	0.5 m	Distance beyond which binoculars with may be used safely

## 5. Hardware

### 5.1. Dimension drawings



Dimension drawings, units in mm

### 5.2. Installation

SF23/B requires a clear line-of-sight to measure distance to a target surface. It can be mounted with a vertical or horizontal lens orientation.



Several mounting accessories can be purchased or downloaded from the [LightWare website](#).

Do not mount the rangefinder within the cavity of an airframe, rather mount it directly at the surface boundary. This can prevent beam divergence from causing false readings in short range distances, or out of range conditions.



## Precautions

**Ensure that nothing is in the path of the laser beam.**

**Ensure that no shiny or highly reflective surfaces are near the path of the beam.**

**Secure the cable with zip ties to protect it from pulling on the connectors.**

## 2. Revision history

Revision	Date	Comments
Rev 0	2019/10/04	First edition