SF30/C microLiDAR® sensor

The versatile high-speed sensor for autonomy and automation applications

Disclaimer

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ISO 9001:2015 Quality Management
FM 654831

Welcome to LightWare

Thank you for selecting LightWare as your **partner** in distance sensing technology.

LightWare is a pioneer in microLiDAR® distance sensors, drawing upon **four decades** of expertise in LiDAR technology to develop application-specific products renowned for their **accuracy, reliability, and durability**. LightWare's assembly process involves meticulous handling of sensors and optics, creating microLiDAR® sensors of world class quality. Our production methods benchmark the **ISO 9001:2015** standards at scale, with manufacturing capabilities reaching up to **45,000 units annually**, with each microLiDAR® unit crafted to the same exacting standards. Unsurprisingly, leading companies worldwide trust LightWare as their **preferred LiDAR partner**.

We are dedicated to ensuring **your success** when using LightWare microLiDAR® sensors to address your unique distance measuring and geospatial challenges.

Beyond this comprehensive product guide, our website's **resource center** (https://lightwarelidar.com/) offers a wealth of supplementary information, **including APIs, CAD drawings, and FAQs**.

Our dedicated technical support desk is at your service if you require assistance with integration or technical queries. Reach out to them at support@lightwarelidar.com.

LightWare products come with a **24-month limited warranty**, covering any defects in material or workmanship under normal use. For detailed warranty information, please refer to our website at https://lightwarelidar.com/terms-and-conditions/. We're here to support you on your journey — sensing your world with LightWare LiDAR.

Table of contents

1 Overview

This product guide is a comprehensive companion to your LightWare SF30/C microLiDAR® - the ideal LiDAR sensor for **autonomy and automation applications**.

The LightWare SF30/C is a compact and high-performance microLiDAR sensor designed for **fast and accurate distance measurements**, detecting objects up to **100 meters** away.

The **excellent optics** in the SF30/C allows it to be integrated into systems that need to perform reliably, even in bright sunlight. The SF30/C **delivers accurate readings up to 20,000 readings per second**, making it ideal for IoT, robotics and real-time applications.

Despite its powerful capabilities, the device remains ultra-light at just 30 grams and measures only 30 x 56 x 50 millimeters, making it easy to integrate into space-constrained systems. Additionally, the power draw of only 0.55W unlocks new opportunities in high-speed distance measurement on extended missions.

This sensor is widely used in UAVs for tasks such as precision takeoff, hovering, position hold, landing, and terrain following. It also supports **ground-based robotics** by enabling real-time obstacle detection and collision avoidance. Additionally, it is well-suited for **smart automation systems and environmental monitoring**, where robust and precise distance sensing is essential.

The SF30/C uses the time-of-flight principle to measure distance, emitting a rapid succession of laser pulses that are reflected by target objects and then received back and processed immediately. It uses 905-nanometer laser technology, ensuring optimal performance at an affordable price, while meeting **Class 1M eye safety** standards. Its accuracy is not affected by the color or texture of the target surface or the laser beam's angle of incidence, and it is virtually immune to background light, wind, and noise.

The **lenses are IP67 rated** while the rugged electronic enclosure allows for convenient access to the communications terminals. There are robust **mounting brackets** available for the SF30/C to allow steady and precise mounting of the sensor to achieve the best results.

The SF30/C supports multiple communication interfaces, including USB, Serial, and analogue outputs, and is compatible with platforms like Arduino, Raspberry Pi, and custom flight controllers.

The SF30/C is valued for its versatility, reliability, and ease of integration across a broad range of autonomous and robotic platforms.

2 Safety

Always adhere to these product safety precautions and operate the sensor strictly in accordance with the guidelines outlined in this product guide. LightWare bears no responsibility or liability for any damage or injury, whether direct or indirect, arising from a failure to comply with these stipulations. Non-compliance with the precautions or warnings provided in this product guide constitutes a breach of safety standards intended for the proper use of the sensor.

2.1 Laser eye safety

LightWare LiDAR sensors comply with the United States Food and Drug Administration (FDA) laser eye safety regulations for safe use around humans and animals, based on the international standard IEC 60825-1 and utilizing LaserSafe PC Professional for the computations.

Caution: The sensor contains a laser and should never be aimed at a person or animal. Do not view the laser with magnifying optics such as microscopes or telescopes.

This laser product emits non-ionizing laser radiation. It is classified as Class 1M, indicating that the laser beam is safe to look at with the naked eye during normal use. However, avoid viewing it through magnifying optics such as binoculars, microscopes, telescopes, etc. Despite the safety rating, refrain from looking into the beam, switch off the device when in the vicinity, and never stare directly into the lens from less than half a meter.

Caution: Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warning: Risk of permanent eye damage

- Class 1M lasers are **not safe** if viewed through **magnifying optics such as microscopes, binoculars, or telescopes from a distance less than the NOHD**.
- The laser eye safety rating of the sensor depends on the mechanical integrity of the optics and electronics. It must **not be disassembled or modified in any way**.
- **If the sensor is damaged, do not continue using it**.
- The sensor should be mounted using the mounting holes or product-specific brackets. **Do not attach to or clamp the lens tubes** as this may cause damage and adversely affect the laser safety rating.
- There are **no user-serviceable parts**, and maintenance or repair must only be done by the manufacturer or a qualified service agent.
- No regular maintenance is required, but if the lenses start collecting dust, they may be wiped with suitable lens-cleaning materials. Ensure that the device is switched off before looking into the lenses.

2.2 Labeling

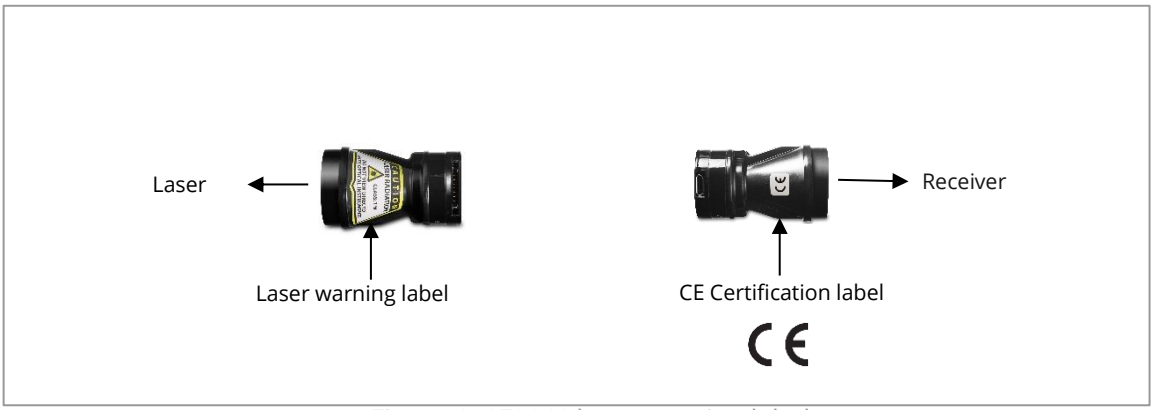

Figure 1: SF30/C laser warning label

Important note: It is a legal requirement to display the laser warning label on your final product or system. To assist with this, LightWare has included an extra laser warning label in the packaging.

2.3 Laser radiation information

Table 1: Laser radiation information

Specification	Value
LightWare product	SF30/C microLiDAR®
LiDAR type	Static single beam
Eye safety classification	Class 1M
Laser wavelength	905 nm
Pulse width	16 ns
Pulse frequency	20 kHz
Average laser power	5.5 mW
Maximum energy per pulse	275 nJ
Extended Nominal ocular hazard distance (Extended NOHD)*	23 m / 75.5ft

* Distance beyond which binoculars may be safely used.

Approximate values only. Please contact LightWare LiDAR if further information is required.

3 Key technical specifications

Table 2: SF30/C microLiDAR® key technical specifications

SF30/C microLiDAR® key technical specifications	
Performance	
Range	0.2 to 100m / 0.6 to 328ft 70% albedo in sunlight conditions, 10km visibility, 0.9 x 0.9 m target size)
Update rate	39 to 20,000 readings per second (customizable to suit application)
Resolution	1 cm / 0.4 in
Accuracy	± 5 cm / ± 2 in for update rates lower than 500 readings/s ± 10 cm / ± 4 in for update rates higher than 500 readings/s
Connections	
Power supply voltage	4.5 to 5.5 V
Power supply current	110mA typical, <250mA on startup
Outputs and interfaces	Serial UART and Analogue (3.3 V TTL, 5 V tolerant)
Form factor	
Dimensions	30 mm x 56 mm x 50 mm / 1.2 in x 2.2 in x 2 in
Weight	30 g / 1.06 oz (excluding cables)
Optical	
Approvals	FDA: 1410968-002 CE certified ROHS3 Compliant REACH unaffected
Laser safety	Class 1M (Please refer to the eye safety section of this user guide, above)
Optical aperture	25.0 mm / 0.98 in
Beam divergence	< 0.2°
Environmental	
Operating temperature	-10 to 50°C / 14 to 122°F
Storage temperature	–40 to 80 °C / 40 to 176 °F
Enclosure rating	Full unit is IP40 & front face is IP67
Accessories	
Communication cable	CAB_195
USB cable for SF11/ SF30 / SF20	AE10418-ND
DroneCAN Adapter	ACC_DroneCAN
Default settings	
Serial port settings	Baud rate 115200, 8 data bits, 1 stop bit, no parity, no handshaking
Update rate	39 readings per second

4 Accessories

To support configuration and integration, the following accessories are available for purchase from the LightWare website:

4.1 Communication cable

Each SF30/C is supplied with a communication and power cable. Additional cables are available for purchase from our online store.

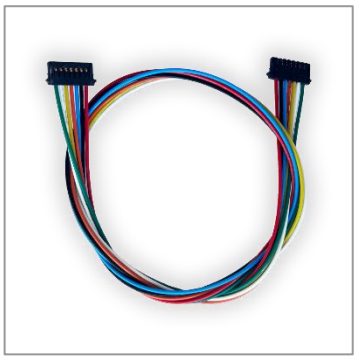

Figure 2: CAB_195 - Communication cable for SF11/SF30

4.2 USB cable

An optional USB Type A to USB Type B Micro cable is available to connect the SF30/C to your computer using the micro-USB interface on the SF30/C.

Figure 3: AE10418-ND - USB cable for SF30/C

4.3 DroneCAN adapter

A DroneCAN adapter is available to seamlessly integrate the LightWare LiDAR rangefinder with DroneCAN enabled flight controllers.

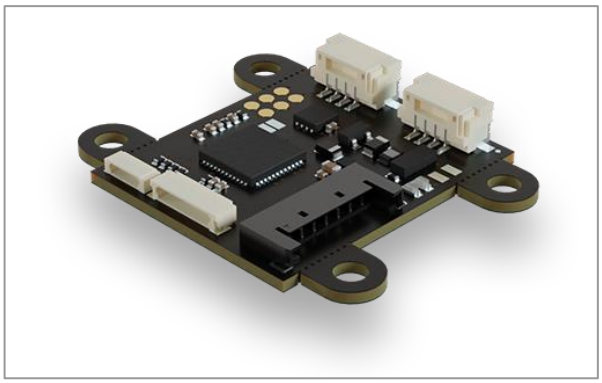

Figure 4: ACC_DroneCAN – DroneCAN adapter

5 Getting started

LightWare Studio is a free application (available for Windows, macOS, and Linux) and is the gateway to configuring your microLiDAR® sensor and visualizing your data. This software empowers you to customize settings, fine-tune sensor parameters, and easily analyze data. It also facilitates firmware upgrades and in-field diagnostics and support.

Detailed step-by-step videos are available on LightWare's YouTube channel: https://www.youtube.com/@LightWareLiDAR/videos

Follow these easy steps to get going with your LightWare microLiDAR®:

1. Download and install the version of LightWare Studio compatible with your operating system from the Resource section of LightWare's website at https://lightwarelidar.com/. You can safely install over an existing version of LightWare Studio if you are upgrading.

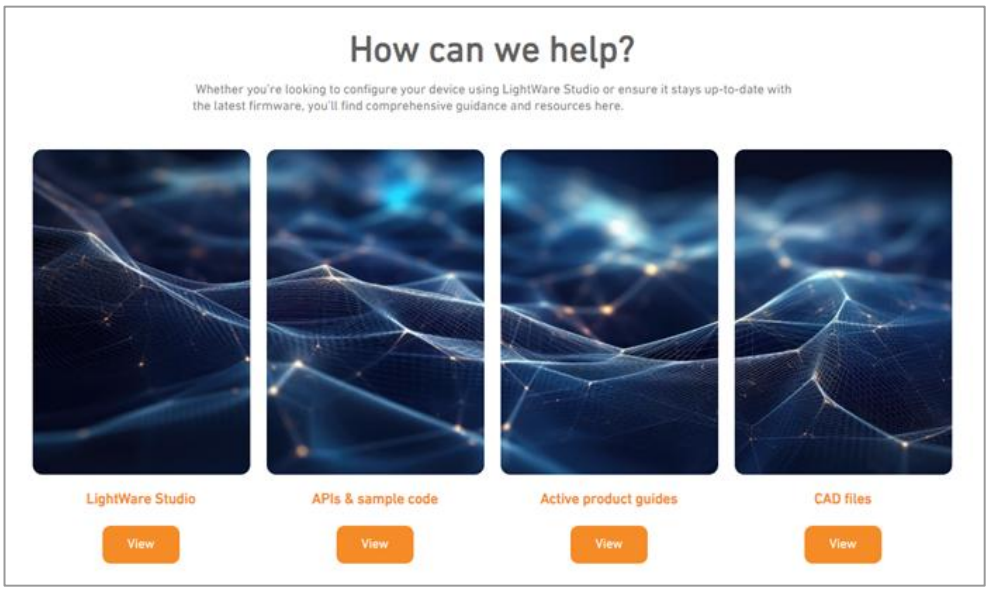

Figure 5: LightWare Studio website download page

2. Once the installation is complete, the *Welcome to LightWare Studio* page will open, prompting you to attach a device to your computer.

3. Carefully connect your SF30/C to your PC via a standard MicroUSB cable.

Figure 6: SF30/C connection to a PC via microUSB cable

Caution: To avoid the risk of shorting the high voltage lines on the sensor circuit board, connect the USB cable to the sensor first before connecting it to the computer.

4. When connecting the sensor for the first time, Windows users may experience a brief delay as the operating system installs the necessary generic communication driver. Please allow the installation process to complete.

5. LightWare Studio will automatically detect the device and present it for selection on the Welcome page. The Welcome page may show other communications ports on your computer. Select the FTDI connection.

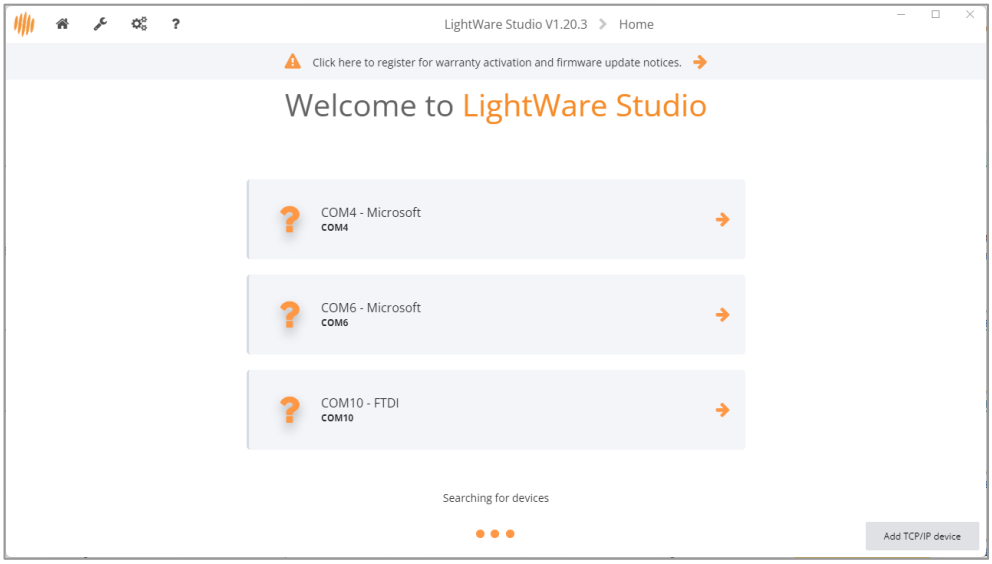

Figure 7: Connection established with the SF30/C

6. LightWare Studio will start on the device's Info page, indicating the serial number, hardware version and firmware version of your device.

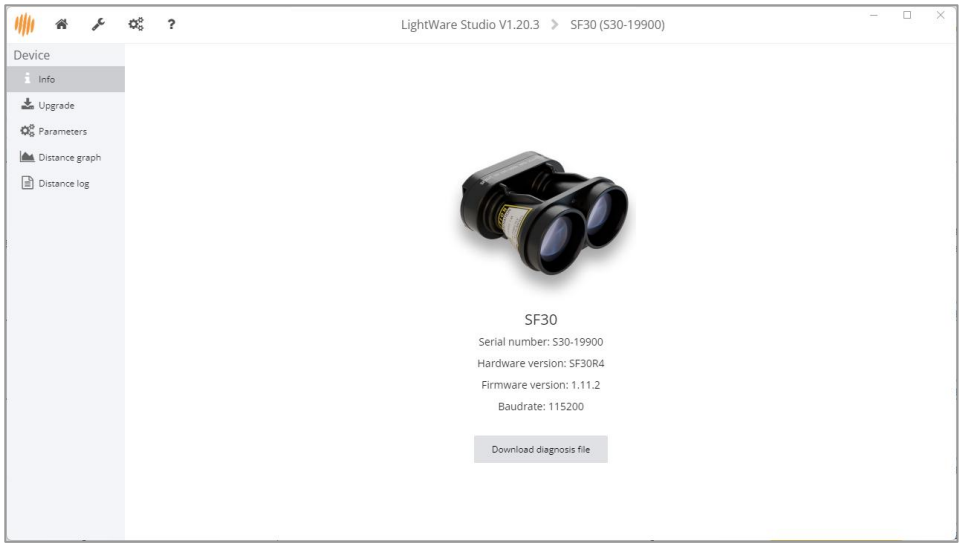

Figure 8: LightWare Studio device information page

7. Navigate to the *Distance mode* tool from the left panel. This streams live distance data in meters as it is scanned by the sensor as a graph.

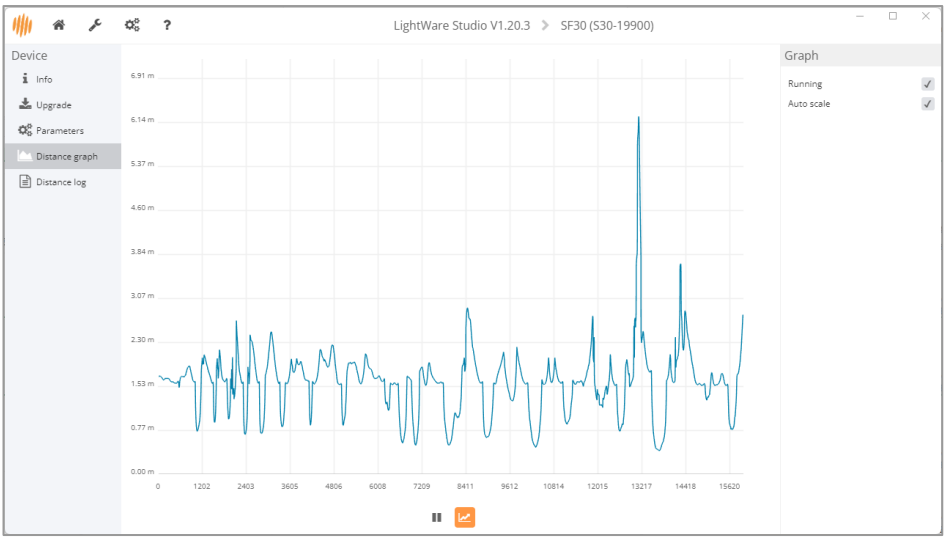

Figure 9: LightWare Studio SF30/C distance graph page

8. Navigate to the *Distance log* tool from the left panel. This tool streams live distance data in meters as it is scanned by the sensor. Toggle the parameters on the right to stop or start the streaming, add line numbers or time stamps, or switch on different data types.

9. Data can be downloaded and saved using the *save* icon above the data.

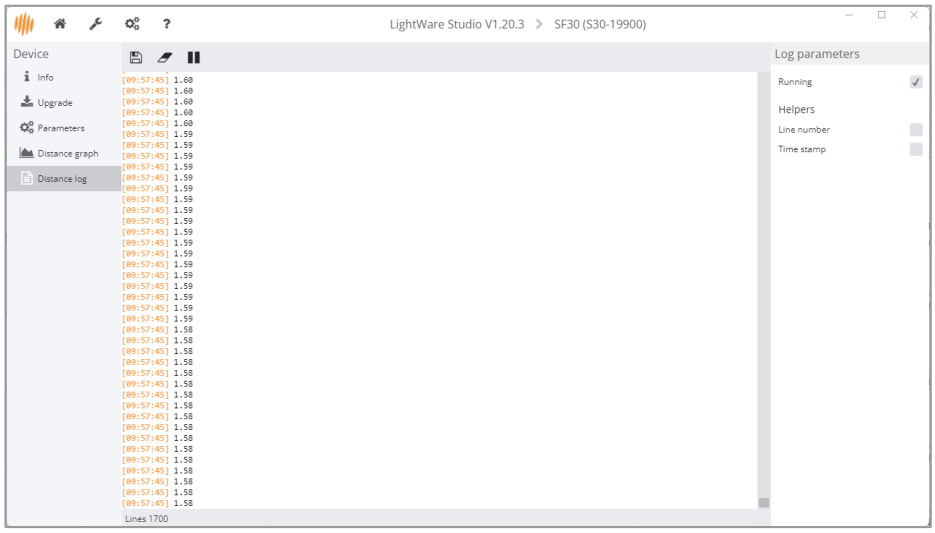

Figure 10: LightWare Studio SF30/C distance log page showing measurements

6 Parameters, settings, and tools

6.1 Setting the device parameters

Your LightWare SF30/C microLiDAR® sensor can be configured via LightWare Studio or from a host controller using the product commands through the serial UART communication interface.

To set the device parameters using LightWare Studio:

1. In the left panel, click on *Parameters* to open the detailed parameters page.

2. The scroll-down list of adjustable parameters will be displayed, with explanatory notes and dropdown options.

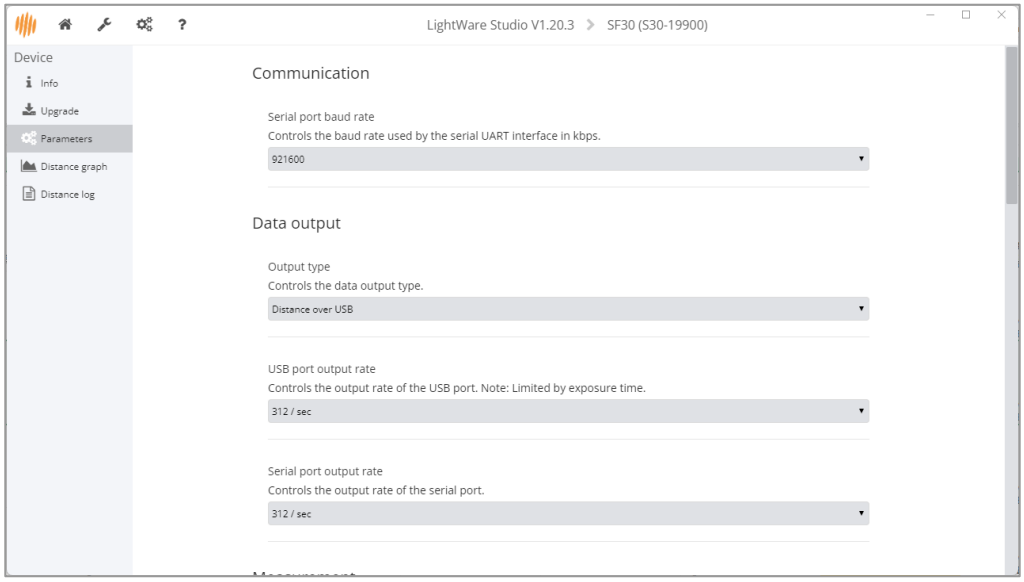

Figure 11: LightWare Studio SF30/C detailed parameters page

3. Set your device parameters according to your requirements. Refer to the table below for more information.

Table 3: SF30/C adjustable parameters

Parameter	Explanation	Options/range
Communication		
Serial UART baud rate	Select the serial UART interface baud rate, (in bps).	9 600 to 921600
Data output		
Output type	Controls the data output type. Primarily used for legacy compatibility.	Distance over USB, Distance and strength over USB, Distance over Serial, Analog voltage over USB, Full communication mode
USB port output rate	Controls the output rate of the USB port. Limited by exposure time.	39 to 625 readings per second
Serial port output rate	Controls the output rate of the serial port. Limited by exposure time.	39 to 20010 readings per second
Measurement:		
Exposure time	Controls the duration of a single measurement and limits the total measurement speed.	50µs – 25587µs (20010 to 39 readings per second)
Return mode	Controls whether the output measurements are first or last pulse.	First / Last
Lost signal confirmations	The number of failed readings required before a loss of signal is reported, (whole number).	1 to 250
Zero offset	The distance in meters that the output measurement is adjusted by.	-100 to 100
Analog:		
Analog port output rate	Controls the output rate of the analog port.	39 to 20010 readings per second
Analog range	The value in meters that 0V to 2.048V represent	1 - 256
Alarms		
Alarm activation distance	Warn when an object is detected closer than this user-set alarm distance. (In meters, up to two decimal places.)	0.5 to 254
Alarm hysteresis	The amount by which distance reading must decrease below the alarm distance before the alarm is cleared. Used to prevent alarm chatter. (In meters, up to two decimal places.)	0.06 to 50 meters
Alarm latch	If latching is enabled and the alarm is triggered, the alarm output will remain active until manually released.	Select/Deselect
Extra		
Synchronization output	Output on the Sync output (2, white) will be high while the ranging function is in operation.	Select/Deselect
Sensitivity offset	Adjust the receiver sensitivity to ensure consistent reliability in excessive levels of direct sunlight.	-30000 to 0

6.2 Settings and tools

Additional application **settings** are available by clicking on the *gears* icon in the top menu:

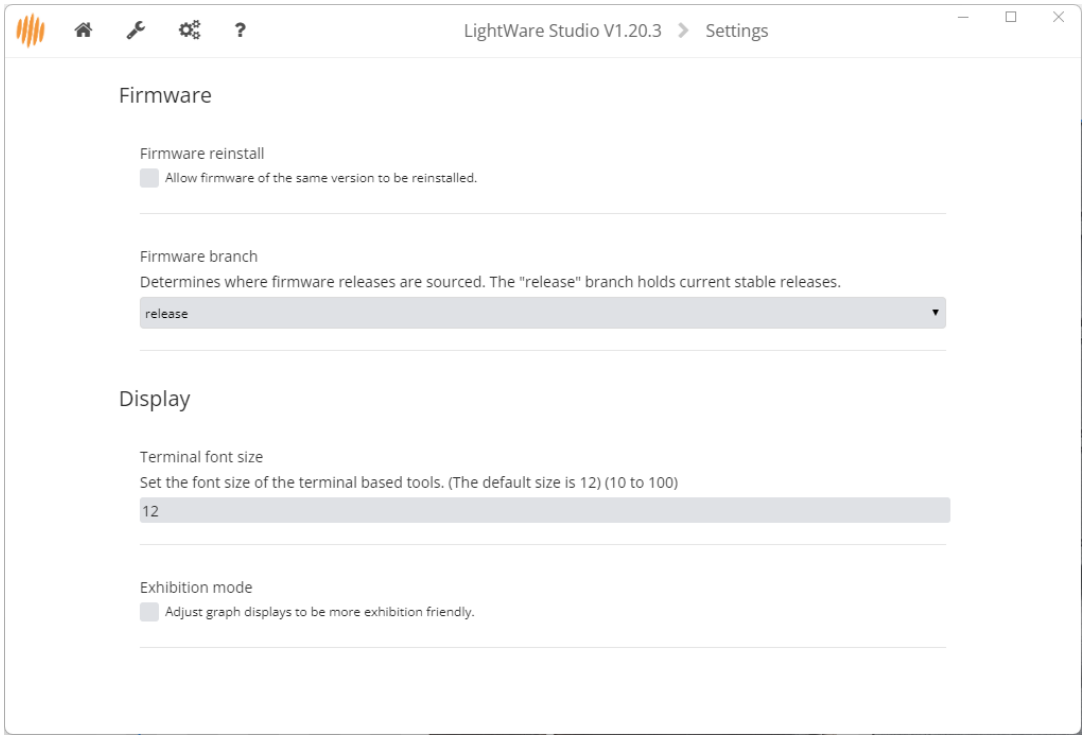

Figure 12: LightWare Studio application settings page

You can access the **specialized device tools page** by clicking on the *wrench* icon in the top menu, including a traditional terminal if needed:

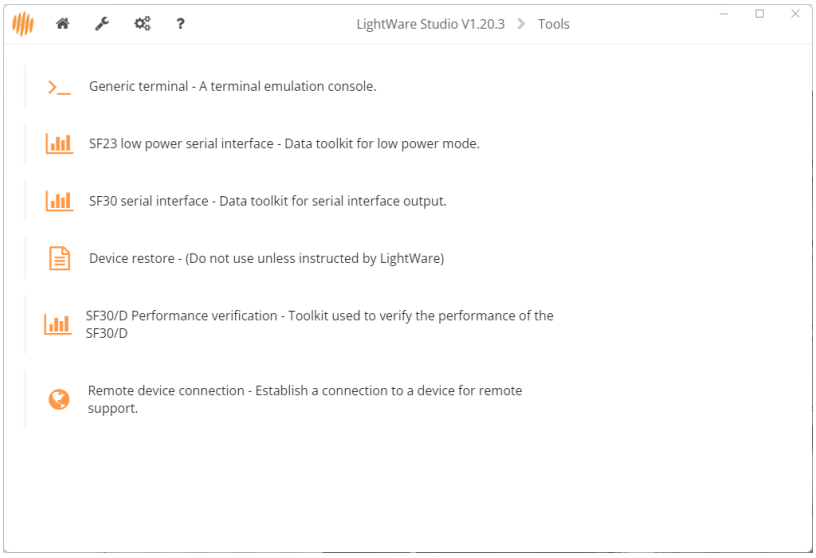

Figure 13: LightWare Studio specialized tools page

7 Installation, mounting, and cabling

7.1 Mechanical interface

For detailed CAD files, please refer to the LightWare resource center at https://lightwarelidar.com/.

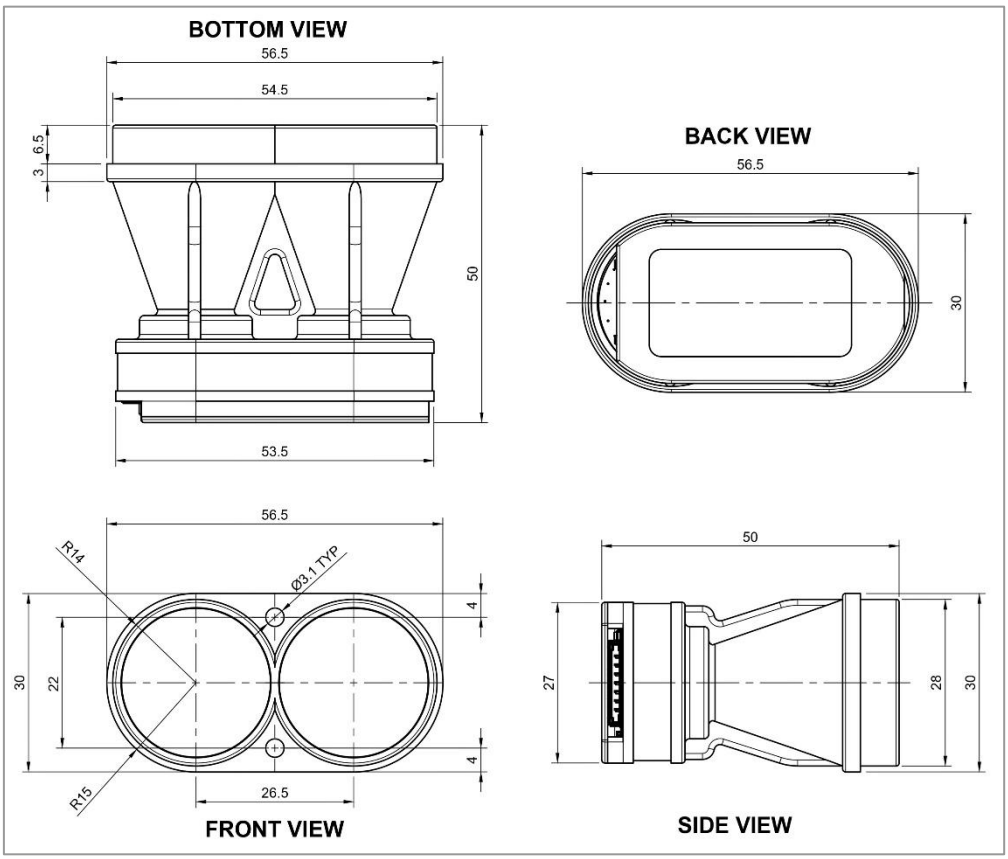

Figure 14: SF30/C dimensions

Caution: This sensor is an OEM module that requires the customer to provide appropriate heat sinking and EMI shielding.

7.2 Mounting brackets

The CAD files to print mounting accessories can be downloaded from the LightWare Resource center at https://lightwarelidar.com.

The mounting brackets available for the SF30C provide a convenient way to securely grasp and mount the enclosure of the sensor.

7.3 Mounting and alignment instructions

Take careful note of the following points when mounting the sensor:

- When choosing a position, ensure that there is **nothing in the path** of the laser beam and that there are **no shiny or highly reflective surfaces near the beam path** that could result in false signals.
- Do not mount the sensor recessed within a cavity of the airframe. This can cause false readings in short-range distances (side lobes) or out-of-range conditions. Mount the sensor **flush with the exterior** or keep the recess conical and shallow.
- The back end of the sensor has a semi-exposed PC board with IP40 ingress protection and is designed to be integrated into an airframe or enclosure, while the lens assembly is IP67 rated. For protection against water and dust, install the sensor with only the lenses exposed, and with a **watertight seal** around the lens flange. (Refer to the image below)

Figure 22: An example of good integration

- Make sure the sensor is securely mounted to prevent false readings or damage.
- The LightWare microLiDAR® sensor is designed for installation with exposed lenses. If it is to be mounted behind glass, ensure use of non-reflective glass and mount the sensor flush with the glass to prevent false readings. The glass must have good transmission at 905 nm wavelength, with an anti-reflective coating optimized for this wavelength.
- Ensure adequate heat dissipation and EMI shielding is provided to the sensor.
- Secure the communication cable to prevent it from pulling on the connection port.

7.4 Orientation

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

Figure 24: Sensor mounting orientations

It can be mounted in a downward facing, angled, or forward-facing orientation, depending on your application:

- Mount with a downward-facing orientation for altimetry, terrain following, or precision landing applications.
- Mount at an angle to reduce reaction lag time for terrain following. The ideal angle depends on the speed traveled and the overall system lag but should be between 20° and 45°.
- Mount in a forward-facing orientation for sense-and-avoid or position-hold applications.

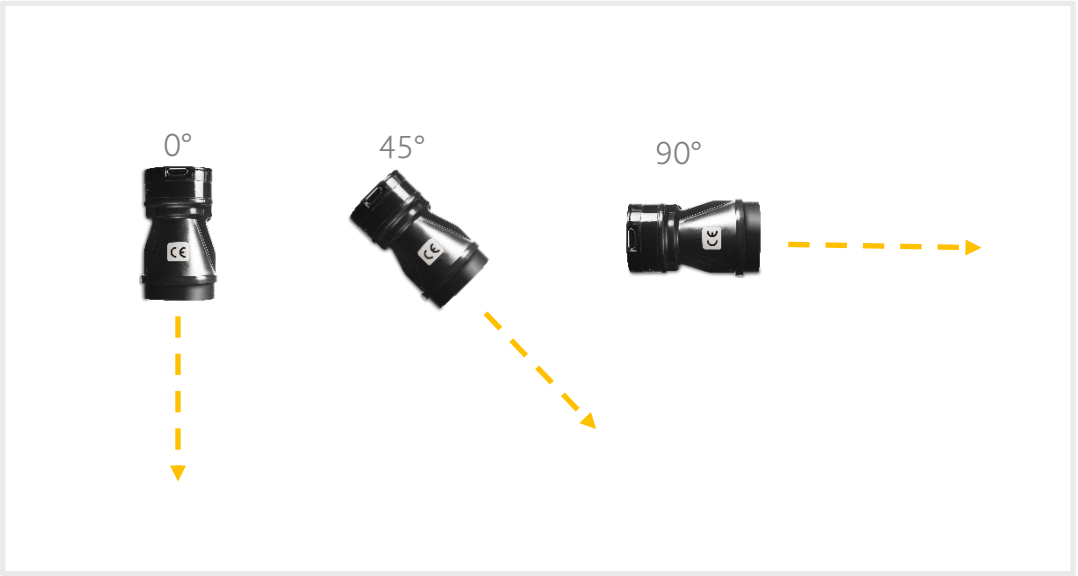

Figure 25: Sensor mounting angle

7.5 Communication and power cable

The SF30/C is supplied with an LW 000_135 communication cable. This cable carries the power supply, communications signals, and servo driver signals, and connects to the SF30/C through an eight-position receptacle connector. The cable is shielded and must be earthed to reduce electromagnetic interference (EMI). Spare cables are available from the LightWare online store: https://lightwarelidar.com/.

Figure 26: SF30/C communication cable connection

Table 4: SF30/C pinout table

Connector Pin	Wire	Serial Function
1	Green	Alarm output
2	White	Sync output
3	Yellow	TXD, transmit data for serial connections
4	Orange	RXD, receive data for serial connections
5	Blue	ANALOG
6	Black	GND, power supply negative, power or logic
7	Red	VIN, +5 V power supply positive

Note: The serial UART, Alarm and Sync interfaces use 3.3 V TTL logic, (5 V tolerant). The 5-volt power supply should be sized appropriately for startup power.

8 Advanced features

8.1 First and last pulse detection

This LightWare microLiDAR® sensor features *first and last pulse* processing, capturing both initial and final laser return signals in scenarios where multiple objects are within the sensor's line of sight. It is important to note that objects must be separated by approximately five meters or more for separate return signals to be recognized.

First and last pulse capability allows the microLiDAR® sensor to measure its altitude above the ground while simultaneously monitoring its height above treetops or structures for collision avoidance, and enhances performance in challenging environmental conditions like dust, rain, fog, and snow. By discerning both pulses, the sensor can effectively penetrate these elements and accurately report the furthest distance as the actual target. This feature also allows the sensor to measure the distance to objects through foliage.

A glass window in the sensor's line of sight will reflect some laser energy back toward the receiver, potentially resulting in false readings. The sensor's *first and last pulse* detection feature can usually mitigate this issue, depending on the type of glass used.

Although *first and last pulse* detection is helpful when the sensor needs to be positioned behind a protective window, this type of mounting is not recommended, as LightWare sensors are designed to be integrated with exposed lens elements.

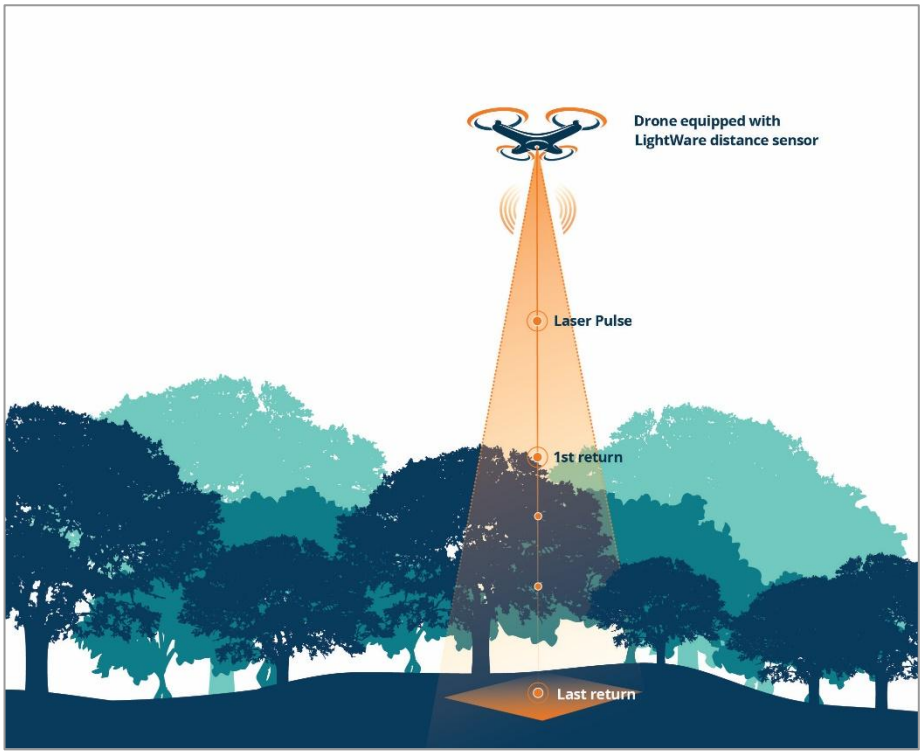

Figure 15: First and last pulse detection

8.2 Alarms

Your LightWare SF30/C microLiDAR® measures and reports distances and has a dedicated alarm channel providing live alarm status outputs, warning of potentially hazardous conditions.

The Alarm trigger provides warnings when the ground (or another object) is detected closer than their user-set alarm distance. Each time a distance measurement is taken, the data is analyzed internally by the sensor and the alarm status is updated in real time.

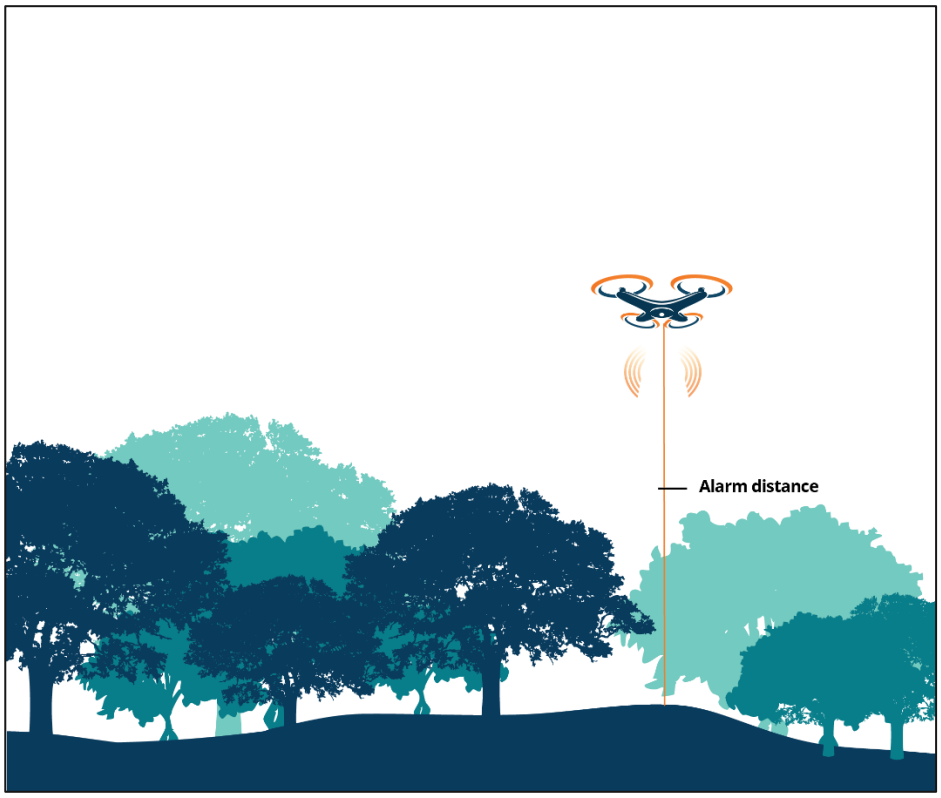

Figure 16: Alarm distance

These alarm parameters (including hysteresis) can be set using the LightWare Studio parameters page or by using commands through your host controller.

9 Output interfaces

The distance data measured by the SF30/C can be obtained via the following outputs:

- Serial UART;
- Linear analogue voltage; and
- Alarm interfaces.

We suggest using LightWare's pre-built APIs wherever possible, which are available via the LightWare website resource center. If you require more control or do not find a suitable pre-built API, you can use the information below to build a compatible system. Please contact LightWare for assistance with APIs or programming if required.

9.1 Serial UART interface

The serial port is used to transmit distance readings to an embedded host processor such as the flight controller in a UAV. The hardware interface uses 3.3 V logic levels and can be connected directly to any similar, compatible interface.

The default serial UART interface properties are:

- Baud rate: 115200 (configurable)
- Data: 8 bit
- Parity: none
- Stop: 1 bit
- Flow control: none

Distances are output as a 2-byte binary number. You can identify which byte you are reading by looking at the most significant bit. If the MSB is not set then you have received the low byte, if the MSB is set then you have received the high byte. The high byte is always sent first for an individual reading. The remaining 7 bits in each byte combine to make a 14-bit distance reading in centimeters.

Converting the high- and low byte data to a single reading can be accomplished with the following formula: Reading = ((Byte_H & 0x7F) * 128) + (Byte_L & 0x7F).

The table below indicates the structure of a 2-byte bitstream.

Table 5: SF30/C 2-byte bitstream

Bit stream	Byte indicator	High byte data	Low byte data
15	**1** – High Byte		
14		High byte bit 6	
13		High byte bit 5	
12		High byte bit 4	
11		High byte bit 3	
10		High byte bit 2	
9		High byte bit 1	
8		High byte bit 0	
7	**0** – Low Byte		
6			Low byte bit 6
5			Low byte bit 5
4			Low byte bit 4
3			Low byte bit 3
2			Low byte bit 2
1			Low byte bit 1
0			Low byte bit 0

9.2 Analog interface

The analog output is presented on connector pin 5 of the device. It produces a linear voltage of between 0.00 V and 2.048 V proportional to the measured distance.

A distance reading of zero meters produces a 0 V output.

By setting the Analog range value in LightWare Studio, the upper limit distance equivalent to 2.048V can be set. This upper limit can range from 1m to 256m. A lower analog range value will result in a finer analog resolution.

9.3 Alarm interface

The alarm output is a 0 V to 3.3 V signal that becomes active low when the distance reading falls below the preset distance.

In cases where the Analog range in LightWare Studio is set to a lower value than the Alarm activation distance, the alarm will remain activated.

10 Commands

Commands can be sent to your LightWare SF30/C microLiDAR® by means of ASCII-encoded characters via the serial UART interface.

10.1 Command structure

A command string is formatted as "#Annnnn:", where

- # indicates the start of the command
- A indicates the command mnemonic
- Nnnnn indicates the values to be set (where applicable)
- : indicates the end of the command.

Table 6: SF30/C commands

<table>
<tr><th>ID</th><th>Name</th><th>Description</th></tr>
<tr><td>#Rn:</td><td>Update rate</td><td>Controls the SF30's sampling update rate.
Writing this command will set the update rate.
<table>
<tr><th>Command value</th><th>Update rate samples/second</th></tr>
<tr><td>0</td><td>20010</td></tr>
<tr><td>1</td><td>10005</td></tr>
<tr><td>2</td><td>5002</td></tr>
<tr><td>3</td><td>2501</td></tr>
<tr><td>4</td><td>1250</td></tr>
<tr><td>5</td><td>625</td></tr>
<tr><td>6</td><td>312</td></tr>
<tr><td>7</td><td>156</td></tr>
<tr><td>8</td><td>78</td></tr>
<tr><td>9</td><td>39</td></tr>
</table></td></tr>
<tr><td>#Un:</td><td>Serial port output rate</td><td>This control the update rate of the data output through the Analog output.
Reading this command will return the current update rate. Writing this command will set the update rate.
The update rate is selected from the following table:
<table>
<tr><th>Command value</th><th>Update rate samples/second</th></tr>
<tr><td>0</td><td>20010</td></tr>
<tr><td>1</td><td>10005</td></tr>
<tr><td>2</td><td>5002</td></tr>
<tr><td>3</td><td>2501</td></tr>
<tr><td>4</td><td>1250</td></tr>
<tr><td>5</td><td>625</td></tr>
<tr><td>6</td><td>312</td></tr>
<tr><td>7</td><td>156</td></tr>
<tr><td>8</td><td>78</td></tr>
<tr><td>9</td><td>39</td></tr>
</table></td></tr>
<tr><td>#Vn:</td><td>Analog Data Update Rate</td><td>This control the update rate of the data output through the Analog output.
Writing this command will set the update rate.
The update rate is selected from the following table:
<table>
<tr><th>Command value</th><th>Update rate samples/sec</th></tr>
<tr><td>0</td><td>20010</td></tr>
<tr><td>1</td><td>10005</td></tr>
<tr><td>2</td><td>5002</td></tr>
<tr><td>3</td><td>2501</td></tr>
<tr><td>4</td><td>1250</td></tr>
<tr><td>5</td><td>625</td></tr>
<tr><td>6</td><td>312</td></tr>
<tr><td>7</td><td>156</td></tr>
<tr><td>8</td><td>78</td></tr>
<tr><td>9</td><td>39</td></tr>
</table></td></tr>
<tr><td>#Annnnn:</td><td>Alarm distance</td><td>The distance in centimeter at which the alarm is activated</td></tr>
</table>

<table>
<tr><th>ID</th><th>Name</th><th>Description</th></tr>
<tr><td>#LN:</td><td>Alarm latching</td><td>Enables the alarm signal latch. This keeps the alarm in the active low state after an alarm event until it is cleared by sending “#X:” over the serial port.
<table>
<tr><th>Value</th><th>Description</th></tr>
<tr><td>0</td><td>Disabled</td></tr>
<tr><td>1</td><td>Enabled</td></tr>
</table></td></tr>
<tr><td>#X:</td><td>Alarm latch clear</td><td>Clears the alarm latch if it is enabled.</td></tr>
<tr><td>#N:</td><td>Laser stop</td><td>Stops the laser from firing.</td></tr>
<tr><td>#Y:</td><td>Laser start</td><td>Starts the laser firing.</td></tr>
</table>

11 Firmware updates

Occasionally, LightWare will release new firmware for your sensor, to address bug fixes or introduce additional features. All registered customers will receive an email notification when new firmware is released for their LightWare sensor.

Caution: LightWare strongly advises that all LightWare sensors are kept up to date with their latest firmware revision.

You can check whether your sensor is equipped with the latest firmware and access updates directly through LightWare Studio as follows:

1. Select *Upgrade* from the left panel.

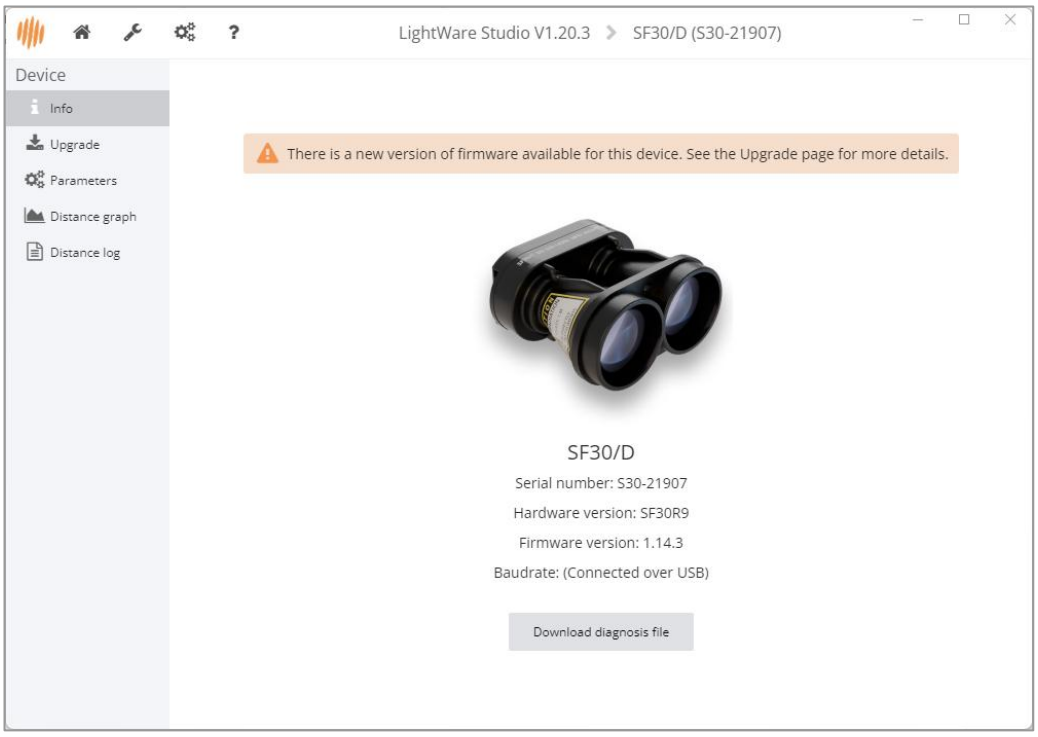

Figure 17: LightWare Studio device information page

2. The page will display the firmware version currently installed on the sensor and indicate whether any recent upgrades are available for download.

3. If you need to upgrade, click the *Install* button, and follow the instructions.

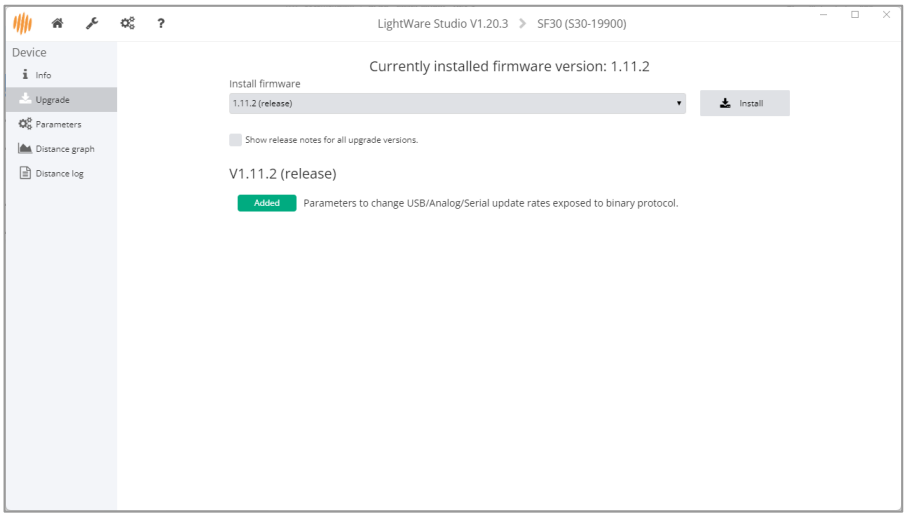

Figure 18: LightWare Studio firmware upgrade page

4. The page will display the currently installed firmware version on the sensor, and it will indicate whether any recent upgrades are available for download.

5. After selecting Install, a prompt will request permission to proceed

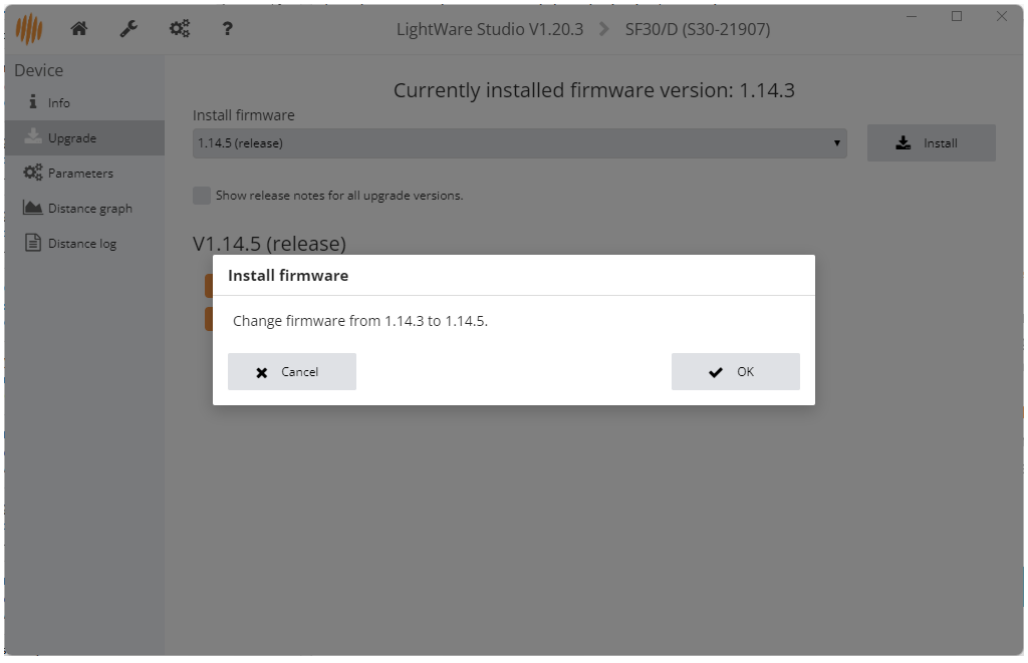

Figure 19: Confirmation of firmware upgrade

6. The firmware will be installed to your device, and the device will automatically reboot.

12 Troubleshooting

Table 13: SF30/C troubleshooting

Problem	Solution
1. Sensor outputs a short distance reading or distorted distance reading	• The sensor is receiving a signal caused by scattered light from a close-by object in the vicinity of the beam, such as a desk surface, landing gear, pole, or highly reflective object. Relocate your sensor or the object and test again.
2. Sensor outputs 230	• This is an out-of-range condition. There is no measurable object within the sensor's range.
3. Sensor is not communicating with the serial UART controller at all.	• Ensure that the sensor's baud rate is compatible with the controller. • Ensure that the sensor's TXD and RXD lines are connected to the controller's RXD and TXD lines, respectively. • If using ArduPilot or PX4, ensure that the correct parameters for sensor integration have been set. • Ensure that the sensor supply voltage is within the specified range and is not dropping below the specified minimum level. If using a separate power supply, ensure a common ground.
4. Alarms not triggering as expected	• Check alarm zone distances are set correctly • Ensure that alarm hysteresis has been set such that the deadband does not hinder performance
5. Sensor stops communicating during flight	• Check the power supply to the sensor. • Ensure all cable connections are properly seated and secured.
6. Readings are erratic or changing too fast	• Check the update rate and ensure it is suitable for the application. (Slower update rates are advised for altimetry.) • Consider using the built-in filters to remove background noise. • Investigate possible sources of electromagnetic interference (EMI).
7. The sensor is running hot	• Ensure adequate ventilation and heat sinking to prevent heat build-up.

For issues not covered above, refer to the FAQs in the LightWare website resource center or contact LightWare's dedicated technical support team for assistance with remote testing of your LightWare sensor.

13 Repair and maintenance

13.1 Maintenance and calibration

The LightWare microLiDAR® sensor contains no moving parts, and **no regular maintenance** is required. The sensor **does not need regular calibration** and will remain true to specification throughout its lifespan if used as directed.

13.2 Cleaning

If the LightWare microLiDAR® lenses collect dust, use a clean, soft cloth or air compressor to remove it. The lenses are coated with an anti-reflective, non-scratch coating. Only appropriate lens cleaning materials should be used to avoid scratching the sensor's lens or damaging the coating. Keep the device free from moisture in accordance with its IP rating.

13.3 Electrical safety

- Check all electrical connections are isolated and that there are no exposed wires.
- Ensure the power supplied to the device does not exceed the maximum rated voltages specified in the technical specifications section.
- Keep the device free from moisture in accordance with the IP rating.

13.4 Service and repairs

If you experience any problems with your sensor, please contact the LightWare technical support desk for in-field diagnostics before sending the unit to LightWare. During in-field support, you may be requested to supply the device's diagnostics file, which can be downloaded from LightWare Studio from the device *Info* page.

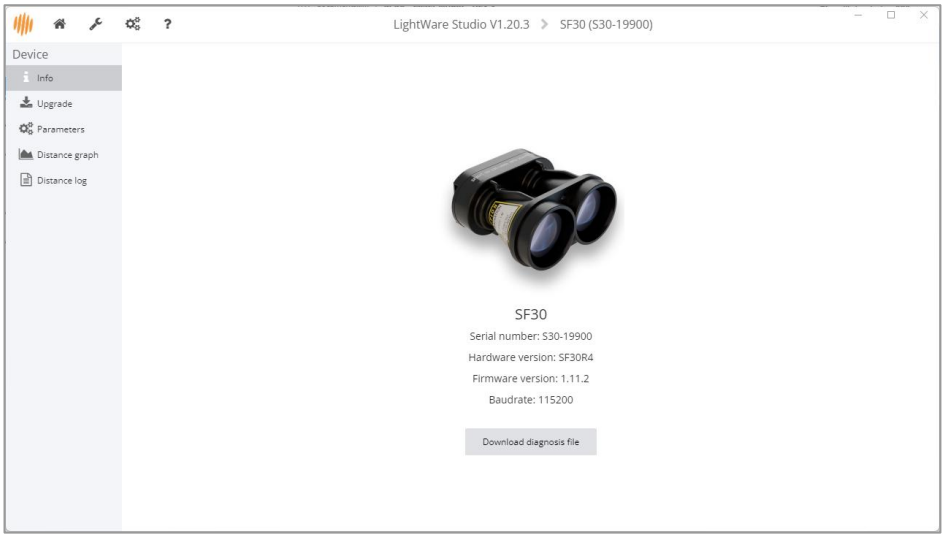

Figure 20: LightWare Studio device information page

If the unit needs to be returned to LightWare for repairs, LightWare support will assist you with the Return Merchandise Authorization (RMA) procedure.

14 End-of-life safe disposal

At LightWare, we are committed to protecting the environment and ensuring that our products have minimal impact on the planet at the end of their lifecycle. As your device reaches the end of its operational life, we encourage you to dispose of it in a responsible and environmentally friendly manner.

Please do not dispose of LightWare sensors with general household or commercial waste.

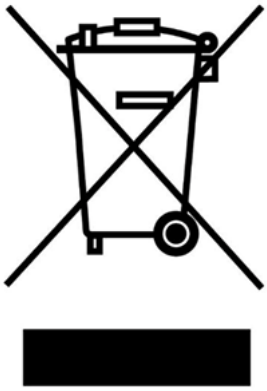

Figure 21: End-of-life disposal

LightWare sensors consist of ABS and other plastics, acrylic, and glass components, which are widely recyclable. The electronic PC board assembly should be disposed of through a reputable electronic waste recycler in your area. Alternatively, return your device to LightWare for safe disposal.

15 Document revision history

Table 14: Revision history

Revision	Date	Comments
Rev 10.3	2026/03/16	Replaced figure 2 image and updated the image caption
Rev 10.2	2025/10/14	Added section on availability of CAD files to print mounting accessories.
Rev 10.1	2025/07/29	Error fix in certification
Rev 10	2025/07/25	Major rework of the Product Guide
Rev 9	2019/01/21	Included new section into “7. Communicating with the serial port” relating to serial commands available for firmware version 1.5.0 and later (pages 9, 10).
Rev 8	2018/12/10	Updated branding and layout of this document has resulted in page number changes to previous revision history entries. Update the maximum readings per second from “18317” to “20010”. Removed the sentence “Both SF30 models have settings to smooth the distance measurements if higher resolution is required or use the raw results if higher speed is needed.”. Update the FDA accession number “1410968-002 (2018/09)” in “2. Specifications of the SF30”. Update the minimum range of “0.2” in “2. Specifications of the SF30”. Updated references to the settings available through the USB port. Removed references to “Synchronisation” logic level signal from copy and Illustrations.
Rev 7	2016/09/13	Updated FDA accession number “1630995-000 (2016/09)” in “Appendix A :: Specifications”. Update maximum update rate from “18316” to “18317” readings per second. Update rate modified from “2289” to “1665” readings per second. Update rate modified from “1144” to “832” readings per second.
Rev 6	2016/01/29	Update FDA accession number “1410968-002 (2016/01)” in “Appendix A :: Specifications”.
Rev 5	2015/12/17	Updates to this document revision are applicable from SF30/* SN: S30-00491, firmware revision 7.0. Update rate modified from “36633” to “18316” readings per second. Amended the “1: Active data port” values available. Amended references of “2: Snapshot resolution” to “2: Resolution / Smoothing filter”. Amended the “2: Resolution / Smoothing filter” values available. Updated the lowest resolution to 0.25 m. Amended references to serial port transmitting two bytes at all update rates. Add serial port command “#pn:”. Updated the resolution and update rate in “Appendix A :: Specifications”. Amended the values relating to the relationship between update rate and resolution. Noted that the speed function is active only when the resolution is set to “0.03 m” or “Smoothed”.
Rev 4	2015/11/09	The amendments to this manual are applicable to SF30 serial numbers “SF30-00470” onwards. Reformatted the “8: Alarm latch” command “#X:” to “#X”. Added new serial commands “N” and “Y”. Added new keyboard “hotkeys” <X>, <Y> and <N>. Updated the minimum update rate for the serial, analog and USB ports to 1 reading per second. Decrease the minimum alarm activation distance to 0.5 meters. Amended details of the serial and USB protocol to “8 data bits” and “8N1”. Amended details regarding USB outputs at different update rates.
Rev 3	2015/09/23	Reformatted the “8: Alarm latch” command “#X:”
Rev 2	2015/09/18	Update FDA accession number “FDA: 1410968-001 (2015/09)” in “Appendix A :: Specifications”. Updated height dimension to “56.5 mm”
Rev 1	2015/06/09	Updated product part code “Main cable type 1, 35 cm”
Rev 0	2015/05/12	First edition