OPERATING MANUAL

Lightning Works 300

Lightning Warning System

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Contents

General Information

Lightning Works 300 Description

The BTD-300 Lightning Warning System detects the presence of lightning flashes within 85km (53 miles) of the sensor and warns of the potential for overhead lightning even before the first lightning flash occurs. The Lightning Works 300 software provides a user interface for displaying information and operating the sensor. A server directly interacts with the sensor, connecting to clients via IP based communications. A client may be run local to the server, or remotely if a network connection exists. Use of internet connectivity allows for BTD systems to be observed around the globe.

An optional Lightning Works Messenger service is available to provide SMS and email alerts based on thunderstorm detection.

Prerequisites

The following is required for operation of the Lightning Works Software BTD-300:

- BTD-300 or BTD-350 connected to a workstation
- A workstation running Windows 10/11
- Lightning Works 300 Full Install.zip
- Licence Activation Code. See section 1.3.2.3.

! NOTE:

The Lightning Works Software is not compatible with 32-bit computers.

Customer Satisfaction

At Senseca we set our standards high and only your complete satisfaction is acceptable to us. If you believe your experience has not met these standards, we would be grateful if you would contact us, so we can discuss any issues you may have. We are also pleased to hear of any positive experience.

After Sales Support

Senseca offers support by telephone and email for the lifetime of our products, even if there has been a change of ownership, so please get in touch if you require help. Similarly, if you have any questions about your new equipment, we are only a mouse-click or telephone call away. Our contact details are given below. For your convenience our contact details are also on the label fixed to your equipment.

Contacting Senseca

If you would like technical assistance, advice or you have any queries regarding the operation of the sensor please do not hesitate to contact us.

Contact us through our web site: www.senseca.com

Contact us by telephone on: + 44 (0)1275 847787

Contact us by email at: info.bristol@senseca.com

If you bought your system from a local agent, you may wish to contact them in the first instance. No matter how you got your system Senseca is here to help.

Licences

Lightning Works Licence

BTD Lightning Works software remains the property of Senseca and is protected by appropriate copyright law and international treaty provisions. The Licensee is granted the right to use the software, but not to de-compile or to in anyway alter the composition of the software. The software contains information of commercial value and worth to Senseca.

Google Maps End User Licence

The BTD Lightning Works software uses Google Maps/Google Earth services to provide the map display. To install the Lightning Works software, it is necessary to accept the terms of the Google Maps/Google Earth Additional Terms of Service described at https://maps.google.com/help/terms_maps.html and Google Privacy Policy at https://www.google.com/policies/privacy/.

Data Privacy

Other than described in the Google Privacy Policy as described, the Lightning Works software has no data privacy implications.

1 LIGHTNING WORKS SOFTWARE

1.1 Introduction

The Lightning Works software allows up to five users to interact with the BTD.

The Lightning Works software has three parts, a server which runs in the background to communicate with the BTD, a server admin to configure server, and a client to view or control the system. The client can be run on any computer connected to the server computer via a network, this includes over the internet. Up to five clients may be connected to one server allowing for multiple users to monitor one BTD.

The information provided in this manual describes how to install and operate the software.

The Lightning Works for the BTD-300 requires a licence which can be purchased from Senseca UK.

1.2 Installation

The installation of the Lightning Works software is split into three parts:

- Server Installation
- Server Admin Installation
- Client Installation

Each of the installers are located in the Lightning Works 300.zip folder found on the BTD-300 product page. Download the zip file and extract the contents.

Prior to installation ensure any previous versions have been uninstalled.
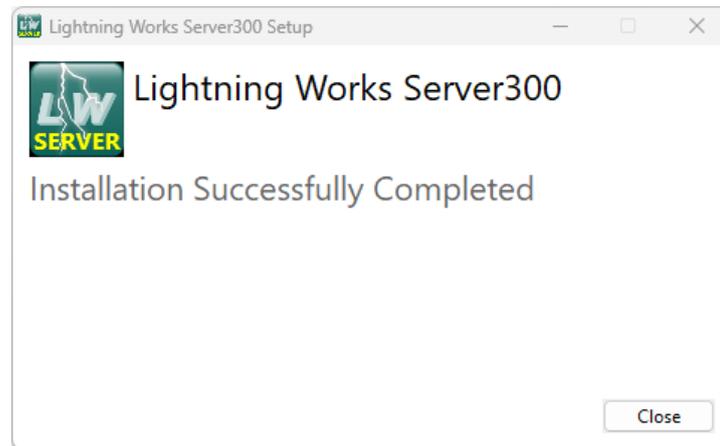
1.2.1 Installing Lightning Works Server Software

The server must be installed on the computer that is connected to the BTD.

To install the Lightning Works Server software, follow the steps below:

1. Double click on the **Lightning Works Server300 Setup** application to start installation.

2. To install the server software, you must accept the End User licence terms and conditions. Please read the licence terms and check the agree box to proceed with installation.

3. When the software has successfully installed you will see the following window. **Note, for the software to start you must restart your computer.**

The server software runs as a service on your computer so does not have a program icon. The server software will start automatically whenever the computer is started.

1.2.1.1   *Uninstalling the Lightning Works Server Software*

To remove the Lightning Works Server software, select Programs and Features in your computers Control Panel. Locate the Lightning Works Server entry in the list and click on it. Use the Uninstall option at the top of the list to remove the server software.
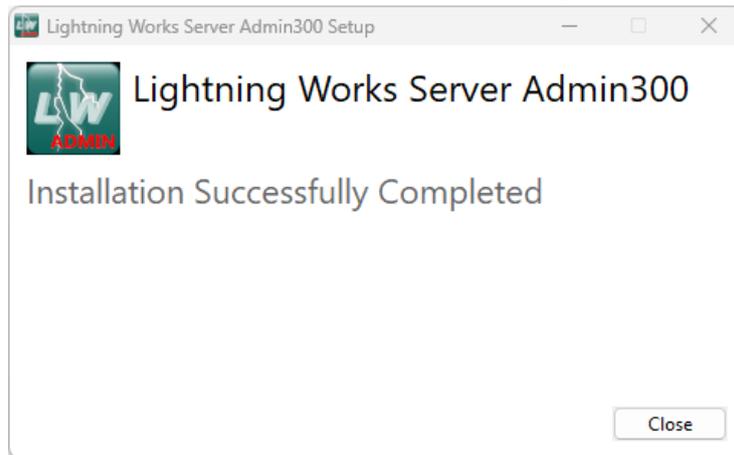
❗ Note:

Uninstalling the Lightning Works Server will permanently delete all saved thunderstorm data.

1.2.2   Installing the Lightning Works Server Admin Software

The Lightning Works Server Admin must be installed on the same computer as the server.

To install the Lightning Works Server Admin software, follow the steps below:

1. Double click on the **Lightning Works Server Admin300 Setup** application to start installation.

2. To install the client software, you must accept the End User licence terms and conditions. Please read the licence terms and check the agree box to proceed with installation.

3. When the software has successfully installed you will see the following window and the Lightning Works Server Admin program icon will be added to the desktop and start menu.
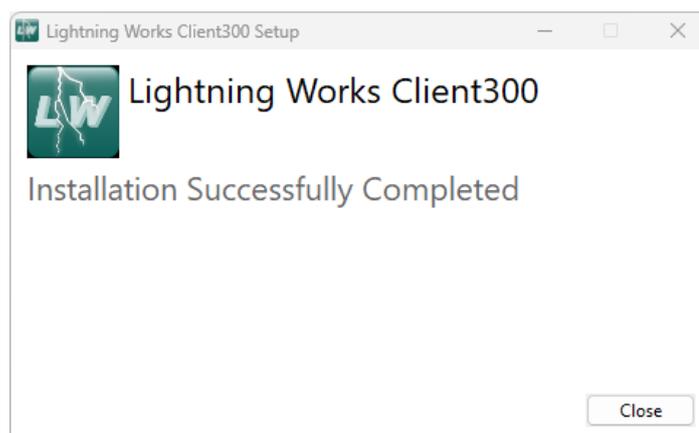
The software is now ready to use.

1.2.2.1   Uninstalling the Lightning Works Server Admin Software

To remove the Lightning Works Server Admin software, select Programs and Features in your computers Control Panel. Locate the Lightning Works Server Admin entry in the list and click on it. Use the Uninstall option at the top of the list to remove the client software.

1.2.3   Installing the Lightning Works Client Software

The Lightning Works Client may be installed on the same computer as the server, or a computer which is connected to the server computer over the network. This may be a local network or can be over the internet provided both computers have internet connectivity. To install the Lightning Works Client software, follow the steps below:

1. Double click on the **Lightning Works Client300 Setup** application to start installation.

2. To install the client software, you must accept the End User licence terms and conditions. Please read the licence terms and check the agree box to proceed with installation.

3. When the software has successfully installed you will see the following window and the Lightning Works Client program icon will be added to the desktop and start menu.

The software is now ready to use.

1.2.3.1   Uninstalling the Lightning Works Client Software

To remove the Lightning Works Client software, select Programs and Features in your computers Control Panel. Locate the Lightning Works Client entry in the list and click on it. Use the Uninstall option at the top of the list to remove the client software.

1.3   Configuring the Lightning Works Software

The system can be configured once the Lightning Works server, server admin and client software have been installed. The BTD should be powered and connected to the computer running the server. Note, this document applies to a singular BTD connected to the server, for multiple BTD configurations please contact Senseca.

1.3.1   Server Configuration

By default, the server will start on Windows startup and run in the background as a service. The server will automatically attempt to connect to the BTD and client.

If a remote connection is required, see section 1.3.1.1

If you are connecting on a local network proceed to section 1.3.2.

1.3.1.1   Remote Connection

If connecting the Client to the Server over the internet the following configuration is required from the server:

- Subnet
- Port
- Add User

Open the Lightning Works Admin software and configure the below:

Subnet

By default, the Server is set to automatically choose a subnet. To ensure remote access either select "Use All Subnets" or select the "Advanced" tickbox and add a user selected Subnet. The subnet of the internet access point to the server must be used.
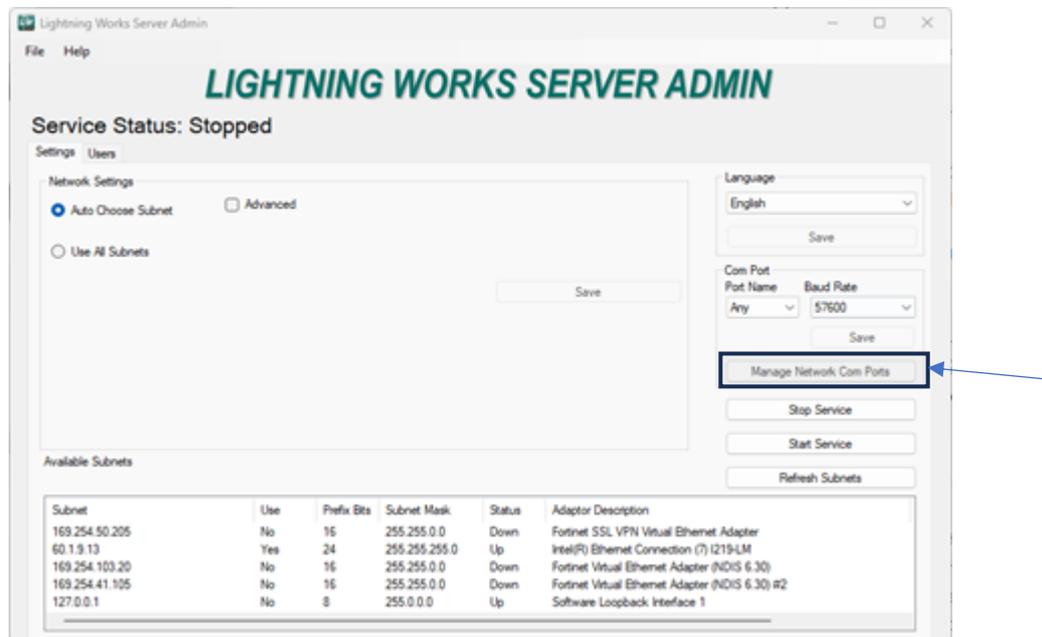
Port

The default port is set to 25367. The user must ensure the firewall allows connections through the port. The user may change the port by selecting "Advanced" and reallocating the port number.

Add User

To remotely connect a Client to the Server a User must be added with a username and password. Select the "Users" tab and add a user, this can be any name and password of choosing. Multiple users may be added.

1.3.1.2 Ethernet Virtual COM Port

The BTD ethernet connection creates a virtual COM port. By default, the software will automatically detect the BTD and connect without user interaction. It is possible for the user to allocate the IP address of the BTD to a fixed COM port on the computer in instances where multiple BTD sensors are on the same network. To do so open the Lightning Works Server Admin300 software and navigate to "Manage Network Com Ports".

This is present a window which lists the available networked devices. To assign a COM port:

- Click on the relevant network address
- Click on the Com Port dropdown and assign a COM port number
- Click "Assign Networked COM Port"
- Exit the window

1.3.2   Client Configuration

When opened the Lightning Works Client300 will automatically search for any available Lightning Works Server available on the network. If installed on a local network the Lightning Works system should now be connected.

This section also contains information for:

- Remote Connections
- Map Configuration
- Licencing (Mandatory)

For general operation and additional settings see section 1.4.

1.3.2.1 Remote Connections

To setup a remote connection to a server navigate to the "Network" settings under File > Network.

Under the Network Settings window select the option "Specify Server Address" and use the address of the remote server. This can be either an IP address or a hostname if using a DNS service.

Note, the port is set to 25367 by default. To change the port, select "Advanced Options" and enter the number of the port, this should match that of the server.

In the Network Settings window, the user details stored in the server must be input under "Login Details". Without user details the remote connection will fail.
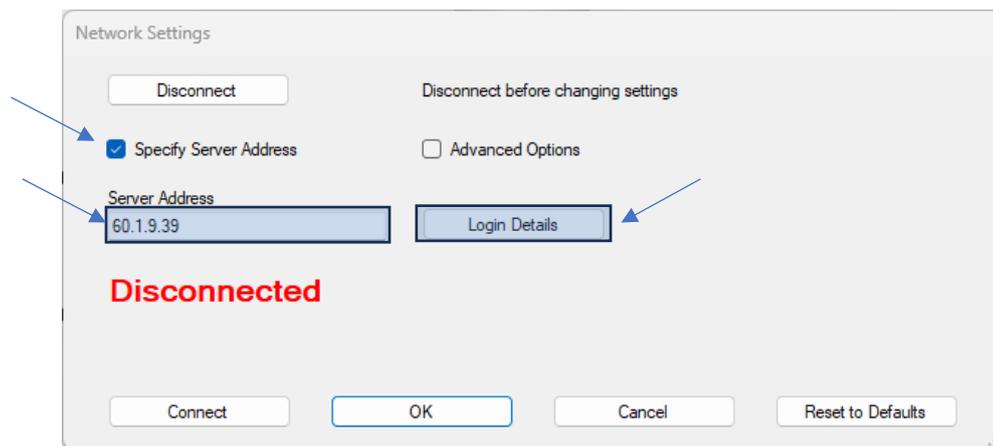
Once all settings are configured for remote click "Connect".

1.3.2.2 Map Configuration

The Lightning Works Client overlays the thunderstorm range bands on a map. The origin of the map must be set by the user using the longitude and latitude coordinates. To set the coordinates see section 1.4.3.5. By default, the coordinates are set to Senseca UK.

For systems without an internet connection, maps can be generated from a client with internet connection or provided by Senseca UK. For further information contact Senseca.

1.3.2.3 Licencing

The BTD Lightning Works Client must be licenced. A licence key may be obtained on purchase of the BTD or requested at a later date. To request a licence key navigate to Help>About on the Client. Copy the BTD serial number and send to info.bristol@senseca.com along with the details of your request. A quotation will be provided.

On purchase, the activation key will be given to the customer. Enter the code into the Help>About window and press "Check Code". If accepted the licence activation status will change to "Activation Code Accepted".

Note, the licence code is applicable to the BTD and not the software itself. The same licence is required for each client connected to the BTD. If multiple BTD sensors are used, a licence is required for each of these.

1.4   Lightning Works Operation

1.4.1   Main Display

Following installation and configuration the Lightning Works system should be configured and connected to the BTD. On Client start up the "Main" page will be displayed. Here the following is observed:

- Lightning Map
- Lightning Status (Alert, Warning, Caution)
- Lighting History (Past 60 Minutes)
- System Status
- Activity Log

Lightning Map   Lightning Status   Activity Log

Lightning History   System Status

Note any lightning activity will cause the Client to jump to the front of the screen by default.

1.4.1.1   Lightning Map

The Lightning Map display shows a map centred around the coordinates from the user, see section 1.4.3.5 for details on setting the coordinates. The map is overlayed with the corresponding lightning range detection bands set by the user, see section 1.4.3.3 for details on adjusting the range bands. Without a direction finder fitted to the BTD the direction of the lightning is unknown and therefore an entire range band will illuminate. With a direction finder the flash is shown as a dot on the map and the illumination is confined to an octant within the range band. Where a flash has been detected but the direction finder has been unable to identify a heading the entire range band will illuminate.

1.4.1.2   Lightning Status

The Lightning Status is classified between:

-   No lightning or pre-lightning activity detected
-   Caution – Lightning Activity detected in Distant range band OR
    Charged Precipitation pre-warning overhead
-   Warning – Lighting Activity detected in Vicinity range band OR
    Strong Electric Field pre-warning
-   Alert – Lightning Activity detected in Overhead range band

The range bands are configurable by the user, see section 1.4.3.3.

When lightning activity is detected, the status will illuminate and there is an audible warning from the computer. It is possible for the user to "Mute" the sound temporarily using the Mute buttons.

1.4.1.3   Lightning History

The lightning history can be quickly viewed by the user. This details the number of flashes in each range band giving a total, a separate row details how many from the total were identified without a direction. For a BTD without a direction finder both rows will show the same information, for BTD systems fitted with a direction finder this allows the user to view the effectiveness of the direction finder.

1.4.1.4   System Status Indicators

There are two indicators visible to the customer for system connectivity, and BTD status. The system connectivity indicator status shows:

-   Solid Green – Both Client to Server connection is good, and Server to BTD Connection is good.
-   Flashing Green – Client to Server connection is good, Server is not connected to the BTD
-   Flashing Red – Client is not connected to Server

The BTD status indicator shows:

-   Green – BTD Connected, all systems functioning correctly
-   Flashing Red – BTD Connected, system fault detected. See section 1.4.3.17 for details.
-   Grey – BTD Disconnected

1.4.1.5   Activity Log

The activity log details all detected events by the BTD. This includes flashes, charged precipitation and strong electric field events. Lightning activity is saved to a database which may be accessed by the user, see section 1.4.2.7.

1.4.2   User Settings

The User Settings tab within the Lightning Works Client allows the user to:

- Change Audible tone settings for the Caution, Warning and Alert status
- Modify the Mute button duration for the Caution, Warning and Alert status
- Toggle the Jump to Front of screen option
- Set the Lightning History duration
- Select the unit of measurement for distance (e.g. km or miles)
- Change the user language
- Export data
- Modify startup settings
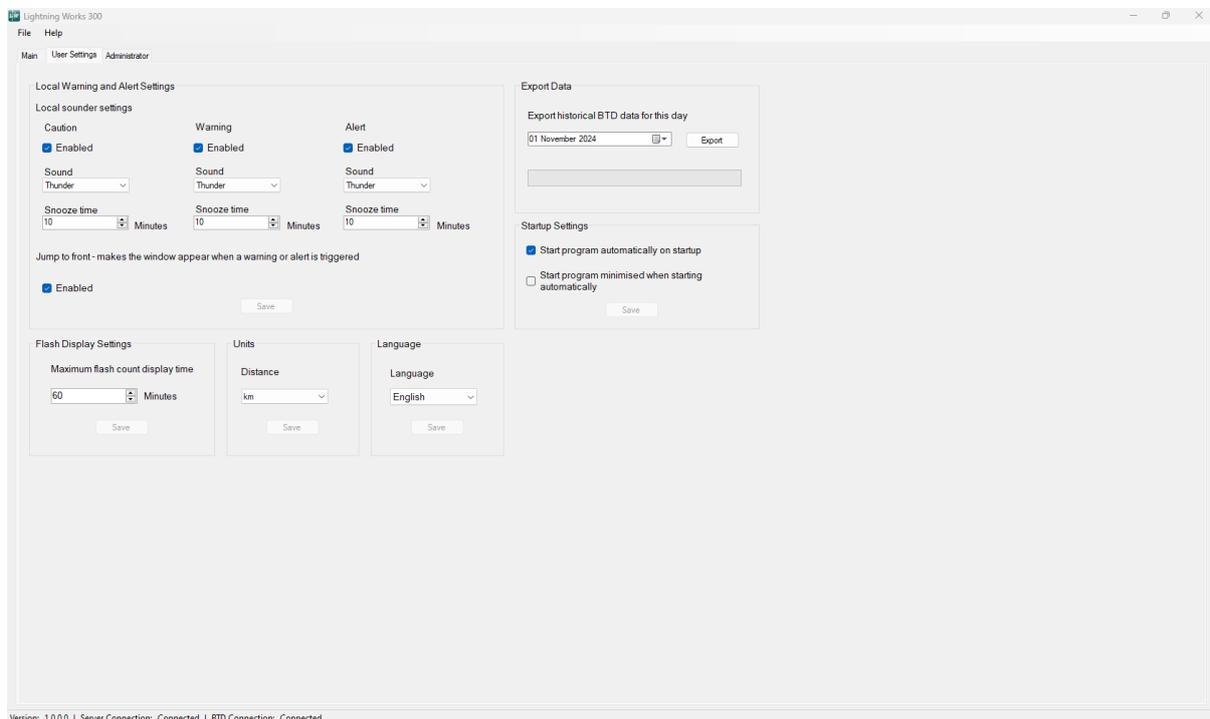
1.4.2.1   Audible Tone Settings

Each of the lightning statuses, Caution, Warning and Alert can be setup with different audible tones or disabled. There are four tones to choose between:

- Thunder
- Alarm Beep
- Alarm Short
- Alarm Siren

For changes to take effect the Save button must be pressed.

1.4.2.2 Mute Button Duration (Snooze Time)

The mute button duration for the lightning status (shown on the main page, section 1.4.1.2) is user configurable.

For changes to take effect the Save button must be pressed.

1.4.2.3 Jump To Front

By default, the Lightning Works Client will jump to the front based on lighting activity or a system fault. To toggle this feature, use the checkbox and press the save button for changes to take effect.

1.4.2.4 Lightning History Duration

The lightning history duration displayed on the main page can be modified. For changes to take effect the Save button must be pressed.

1.4.2.5 Distance Unit of Measurement

The unit of measurement for distance can be changed by the user. Note, this will affect all settings and displays where the unit of measurement is detailed. Where range bands have been setup, the settings will automatically adjust to suit the new unit of measurement. For changes to take effect the Save button must be pressed.

1.4.2.6 Language Selection

The Client language may be changed between the following:

- English
- Dutch
- Chinese
- Romanian
- Italian
- French
- Spanish
- Japanese
- Polish

The text will change for all aspects of the Client and will take effect when the Save button is pressed.

1.4.2.7 Export Data

The user can export data from the Server from any selected date. This data will contain flash information and pre-warning activity. Note, data will only be available from dates when the Server was connected to the BTD. Data can be exported from dates where the Client has not been run, but the Server remained running and connected to the BTD. For further information on exported data and the format see section 3.

1.4.2.8 Startup Settings

The Startup Settings of the Client interface can be modified by the user. For changes to take effect the Save button must be pressed.

1.4.3   Administrator

The Administrator tab allows the user to change core parameters of the BTD. Only competent users should access this page. By default, the password protection is disabled. To enable password protection the user must change the password, see section 1.4.3.1

Only one administrator may be logged in at once. In systems where multiple Clients are connected it is important to remember to log out.

On the admin page the user has the ability to:

- Start or Stop the BTD
- Adjust the range bands   ⊘
- Set the BTD Time   ⊘
- Set the map coordinates   ⊘
- Configure the relay settings   ⊘
- Adjust the sensor sensitivities   ⊘
- Adjust the Flash Warning Settings   ⊘
- Set the Site Correct Factor (SCF)   ⊘
- Test relays   ⊘
- Reset to Factory Settings   ⊘
- Set the Direction Finder Offset ⊘
- Change administrator password
- Enter the Field Test Unit mode (FTU)
- Perform a Site Calibration
- Save Diagnostic File
- Load Parameter File

Settings marked by ⊘ can only be changed when the BTD is stopped. **WARNING - Whilst the BTD is stopped the sensor is not monitoring for thunderstorms.**

1.4.3.1   Changing the Administrator Password

By default, the administrator password is admin and the administrator tab is not password protected. Setting the administrator password back to admin will disable password protection.

To change the Administrator password, click on the Change Password button. A new window will appear, enter the existing password and then the new password in each of the new password boxes. To complete the operation, click the update button.

ⓘ NOTE:

> If the Administrator password is forgotten the only way it can be reset is to reinstall the server software. Reinstalling the server software will result in a loss of the data archive.

1.4.3.2   Auto-Administrator Function

Whenever the client software is started on a PC with Auto-Administrator enabled the software will start as an Administrator.

ⓘ NOTE:

> Only one Administrator can be active on a BTD system at any time. If another client attempts to log on as an Administrator or another client set for Auto-Administrator is started Administrator access will be refused.

1.4.3.3   Range Settings

The Range Settings area of the Administrator tab allows the user to set the Overhead, Vicinity and Distant range bands. The Overhead band cannot be set lower than 1km (1 mile) and the Distant band cannot be set higher than the maximum range of the sensor. Values of adjacent bands cannot overlap.

To change the Range Settings, enter the desired values and click the update button.

ⓘ NOTE:

> Changing the Distant range band causes the scale of the map on the main screen to change. Map updates will only occur if the computer is connected to the internet.

1.4.3.4   Setting the System Time

The BTD has an internal clock that is used to timestamp each message it sends out and to control the relay inactive time. To set the BTD clock to the same time as the local PC click on the Set Time button in the BTD Time area of the screen.

If the BTD time is more than 10 minutes different from the PC time a warning will be displayed in the BTD Time area of the Administrator tab and a system fault will be generated.

🛈 Note:

> The BTD does not automatically update for daylight saving. If your region uses daylight saving you will have to manually set the BTD when the clocks change.

1.4.3.5 Map Settings

The administrator can input the coordinates of the BTD installation, see section 1.4.3 for administrator usage. This will automatically download the map from the internet and display the BTD at the coordinates.

Offline maps can be generated from the client for installations which are not connected to the internet. For more information contact Senseca.

1.4.3.6 Relay Settings

The administrator can change the time period for which the relays remain active from the detection of lightning/pre-lightning.

The administrator can change the timeframes in which the relays are inhibited. For example, if the thunderstorm warning system is connected to a sounder, this may be disabled during the night to prevent noise pollution/complaints.

The times are entered in HH:MM:SS format. To never disable the relays, enter 00:00:00 in both boxes.

For settings to take effect the "Update" button must be pressed.

1.4.3.7 Sensitivities

The BTD sensitivity settings should only be adjusted at the direction of Senseca. These settings are for adjusting the sensor algorithms when the BTD is installed in a non-standard environment e.g. at the top of a skyscraper.

By default, all sensitivities are set to 5.

1.4.3.8 Flash Warning Settings

The administrator may configure the number of flashes which must be detected for a distant flash to be reported by the sensor. As the range increases it is more likely a false detection may occur. Thunderstorms typically consist of multiple flashes therefore if the user sees false reports, it is possible to increase this value to a number more than one.

The Warning Delay Time sets the number of minutes of which the number of flashes are detected over. For example, if the time is set to 15 minutes (default), multiple flashes must be detected within this timeframe for the sensor to trigger a distant warning.

For settings to take effect the "Update" button must be pressed.

1.4.3.9 Site Correction Factor

By default, the site correction factor is set to 1. The site correction factor allows for the reported flash range to be calibrated by the user. It is not expected to be changed under typical usage. See section 2 for more information.

To reset the site correction factor, switch the "Set Value" checkbox and enter the value 1 into the "Current SCF" field and press "Update".

1.4.3.10 Relay Test

The operation of the relays on the BTD, and therefore any equipment connected to them, can be tested using the buttons in the Relay Test section of the Administrator Tab.

Clicking on the Warning or Alert buttons will switch the relay on, the text on the button will change from Start to Stop. Clicking on the button when the button text is Stop will switch the relay off.

1.4.3.11 Factory Default Settings

The BTD can be reset to the factory settings using the Reset button in the Reset Factory Settings of the tab.

1.4.3.12 Direction Finder Offset

If a Direction Finder is fitted to the system, the Direction Finder Offset controls will appear in the Administrator tab.

Depending on the site where the BTD and Direction Finder is installed it may be necessary to correct an offset in the directions reported for lightning flashes. The procedure for determining if a direction correction is necessary is described in the BTD Direction Finder manual.

To enter the Direction Finder Offset click on the Set button in the Direction Finder Offset area of the Administrator tab. A dialogue box will open, enter the angular offset in whole degrees and click on the Set button.

1.4.3.13 Field Test Unit Test Mode

The Field Test Unit (FTU) is an accessory used to prove correct operation of the BTD sensor by simulating thunderstorm activity. The FTU generates signals calibrated for a use with the BTD sensor factory default settings. The software stores the current settings before testing and restores them once testing is complete.

Press the "Start FTU Test Mode" button **before** using the FTU to prepare the BTD. A progress bar will appear. The button will become green and the text will change to "Stop FTU Test Mode". "FTU Test Mode Active" will be displayed across the main page map.

On completion of testing with the FTU, pressing the "Stop FTU Test Mode" button will restore the BTD to normal operation.

1.4.3.14 Perform Site Characteristics

The BTD should be calibrated on installation using the "Perform Site Characteristics" button. The sensor monitors the background electric field and stores this into memory. This must not be done whilst thunderstorm activity or precipitation is in the area.

1.4.3.15 Save Diagnostics File

When contacting Senseca for support the "Save Diagnostic File" button will allow the user to export all sensor settings to help speed up the support process.

1.4.3.16 Load Parameter File

The user may load in parameter files sent by Senseca using the "Load Parameter File" button.

### 1.4.3.17 Additional Administrator Controls

When logged in as administrator a "Clear All" button is available within the Lightning Status zone of the main tab. This button clears all active thunderstorm levels. **Extreme caution should be taken, this button should only be pressed if the user is absolutely certain no danger is present.**

An additional "Details" button is available within the System Status section on the main page. This allows the administrator to view detailed information on the system status.

1.4.4   Software and Hardware Revision

The About window, accessible from the Help option in the main menu provides useful information about the software revisions of the Lightning Works Server and Client and the firmware version of the BTD.

This information may be needed when upgrading part of your system or installing new components.
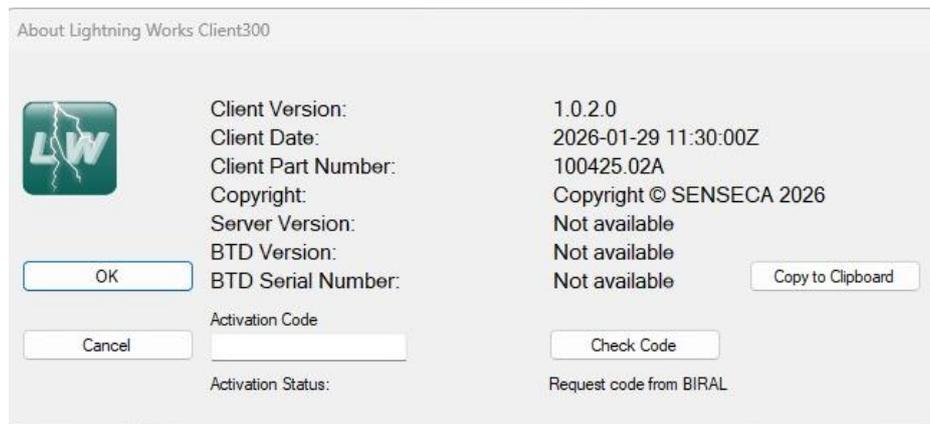
2   ADJUSTING THE SITE CORRECTION FACTOR

If the BTD is installed at a different height than recommended, on the roof of a building or close to tall objects, the lightning distance reported by the detector may be inaccurate. If you notice a systematic difference between actual distance to a storm and distance reported by your BTD, you will need to re-calibrate the detector by entering the actual and reported distances to lightning in the Site Correction Factor section of the Administrator tab.

2.1   Finding the Actual Lightning Distance

There are several options to independently find the actual distance to lightning, some of the best are detailed below. You can find the lightning distance reported by the BTD for each flash in the Activity Log section of the Main tab or in the data export.

For all the methods discussed below; to increase confidence of the comparison distances, it is best to compare many flashes and find a typical distance reported by the BTD and the independent method. Always make sure that you are comparing lightning flashes detected by the BTD and an independent method which occurred at the same time.

Note, lightning can and typically does occur over many kilometres for a single flash. Due to differing methods of detection between the BTD and radio-based systems it is not expected the data will precisely match between these two systems. The BTD sensors are known to pick up low strength activity such as upstreamers from large structures which can be mistaken for false positives against less sensitive networks. Therefore, it is vital to select data where the thunderstorm is detected by both methods.

2.1.1   National Lightning Location Network

Lightning detection by a national lightning location network is usually the best option for locating lightning flashes as you can see individual flashes in near real-time. This service can normally be found on your national weather service website or good quality lightning data sites such as www.lightningmaps.org.

Identify individual flashes that are shown by both the BTD and the lightning location network and record the distance reported by the BTD and the distance from the BTD to the flash as shown on the lightning location network. For best results choose a small, localised storm and average the BTD distance and lightning network distance for several flashes.

2.1.2   Visible Lightning

When using this method ensure you are adequately protected from lightning.

If lightning is within about 10 km you should be able to see the lightning flash and hear the thunder, especially at night. To determine the distance to the lightning flash, measure the time between seeing the flash and arrival of thunder, in seconds. Divide this time by 3 to find the distance to lightning in kilometres (divide by 5 for miles). For each measured flash record the distance reported by the BTD. As before average the distances you calculated and those reported by the BTD over several flashes for best results.

You will find this process easier if you choose a storm that is not too active, so that you do not confuse individual lightning flashes. Avoid using nearby flashes, closer than 5km, as it is hard to accurately measure the time in such cases.

2.2   Entering the Site Correction Factor

In the Actual Distance box of the Site Correction Factor (SCF) area, enter the distance between the sensor and lightning as found by one of the methods described above. It does not matter what units you use (kilometres, miles etc.) providing they are the same for both the Actual and Reported boxes. In the Reported Distance box, enter the distance reported by the BTD for the same lightning activity, using the same units as for the actual distance (e.g. kilometres). Click on the UPDATE button to complete the process. Check the value in the Current SCF box has changed. The BTD has now been re-calibrated to measure the correct distance for your site.

3   UNDERSTANDING EXPORTED DATA

3.1   Introduction

The Lightning Works software can export archived BTD data in CSV format. Archived data is always exported as one file for an entire day. If you require data for a longer period, it is necessary to export multiple files. The file name and location is chosen at the time the file is saved. Each exported file starts with a header line that describes the data. CSV is a simple text format where data fields of numbers or letters are separated by a comma (,). CSV files are easily processed in spreadsheet and word processing applications.

 Note:

Microsoft Excel removes leading zeros when importing CSV files. This has no impact on the data, but the messages will not look as described below when displayed in Microsoft Excel.

3.2   Message structure

When operating, the server exchanges messages with the rest of the system every 60 seconds, unless there is thunderstorm activity in which case messages are exchanged every 2 seconds. The Lightning Works Server software archives these messages so that the Client can export the data in a single format.

Archived data is exported in CSV file format with each message on a separate line. The first line in the file is a header to assist with identifying the fields in subsequent lines. The format of the data is as follows:

NFDATA300:,1,2024-09-03,08:51:39,128,1,0,0,0,0,0,1,0,0,0,0,2000-01-01,00:00:00,0,0,0,2000-01-01,00:00:00,0,0,0,2000-01-01,00:00:00,0,0,0,2000-01-01,00:00:00,0,0,0

Field No.	Field Name	Description
1	Header	NFDATA300: No Flash Data Message FDATA300: Flash Data Message
2	Sensor ID	Always 1
3	Date	BTD date. DD/MM/YY
4	Time	BTD Time. HH:MM:SS
5	Configuration	Records the configuration. Displayed as a decimal integer: 0 – No Direction Finder 128 – Direction Finder Fitted
6	Operating Mode	0 = Not sampling 1 = Sampling
7	Caution State	0 = No Caution 1 = Caution active 2 = Caution cancelled by administrator

8	Warning State	0 = No Warning 1 = Warning active 2 = Warning cancelled by administrator
9	Alert State	0 = No Alert 1 = Alert active 2 = Alert cancelled by administrator
10	System Health	0 = All components OK 1 = BTD fault 2 = User Computer fault 4 = Reserved 8 = Reserved 16 = Direction Finder fault 32 = Reserved 64 = Configuration Fault When multiple faults occur the fault values are added together.
11	BTD Status	0 = OK 1 = OK Any value greater than 1 represents a fault condition.
12	Direction Finder Status	0 = Not connected 1 = OK Any value greater than 1 represents a fault condition.
13	Relay State	0 = No relays active 1 = Caution relay active 2 = Warning relay active 3 = Alert relay active When multiple relays are active the values are added together.
14	Flash Count	The number of lightning flashes detected in the last 2 seconds
15	Warning Indicator	0 = No thunderstorm activity detected 1 = Charged precipitation or distant lightning flash detected 2 = Corona with or without charged precipitation, or vicinity lightning flash detected 3 = Overhead lightning flash detected
16	Warning Flags	0 = No thunderstorm activity detected 1 = Corona detected 2 = Charged precipitation detected 4 = Corona and charged precipitation detected 8 = Distant lightning flash detected 16 = Vicinity lightning flash detected 32 = Overhead lightning flash detected When multiple phenomena occur, the values are added together.
17	Flash 1 date	Date of the first detected lightning flash in the last 2 seconds. DD/MM/YY
18	Flash 1 Time	Time of the first lightning flash detected in the last 2 seconds. HH:MM:SS

| 19	Flash 1 Time (Milliseconds)	Milliseconds from field 16 of first lightning flash.
20	Flash 1 Distance	Distance of first lightning flash detected in the last 2 seconds in decametres.
21	Flash 1 Direction	Value is 0 to 360 in degrees. 999 = no direction data available.
22	Flash 2 Date	Date of the second lightning flash detected in the last 2 seconds. DD/MM/YY
23	Flash 2 Time	Time of the second lightning flash detected in the last 2 seconds. HH:MM:SS
24	Flash 2 Time (Milliseconds)	Milliseconds from field 21 of second lightning flash.
25	Flash 2 Distance	Distance of second lightning flash detected in the last 2 seconds in decametres.
26	Flash 2 Direction	Value is 0 to 360 in degrees. 999 = no direction data available.
27	Flash 3 Date	Date of the third lightning flash detected in the last 2 seconds. DD/MM/YY
28	Flash 3 Time	Time of the third lightning flash detected in the last 2 seconds. HH:MM:SS
29	Flash 3 Time (Milliseconds)	Milliseconds from field 26 of third lightning flash.
30	Flash 3 Distance	Distance of third flash detected in the last 2 seconds in decametres.
31	Flash 3 Direction	Value is 0 to 360 in degrees. 999 = no direction data available.
32	Flash 4 Date	Date of the fourth lightning flash detected in the last 2 seconds. DD/MM/YY
33	Flash 4 Time	Time of the fourth lightning flash detected in the last 2 seconds. HH:MM:SS
34	Flash 4 Time (Milliseconds)	Milliseconds from field 31 of fourth lightning flash.
35	Flash 4 Distance	Distance of fourth flash detected in the last 2 seconds in decametres.
36	Flash 4 Direction	Value is 0 to 360 in degrees. 999 = no direction data available.

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WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by the Consumer Rights Act 2015. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (12 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product.

The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased. We reserve the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION
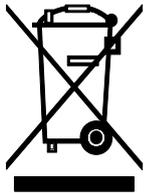
Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

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