

Logger

USER MANUAL



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OVERVIEW

SPL Logger is a versatile measurement and logging plugin for QSC®'s Q-SYS™, designed to calibrate, graph and log audio loudness on Q-SYS™ systems where this audio loudness information is necessary to meet company or legal standards. SPL Logger provides configurable logging modes, frequency weightings, and level ranges to fit into the individual needs of each unique user.

Once properly configured and calibrated, SPL Logger provides SPL, Leq measurements ranging from 1 – 60 minutes in the real time and historical data on the graph. Configurable noise exposure can be measured and displayed in percentage of dose alongside an SPL A measurement, continual LAeq averaging, time weighted average (TWA), and both an event and exposure duration timer. These controls and graph can easily be placed on a UCI for quick and easy real time tracking of SPL levels on a Q-SYS™ system.

Noise exposure can be measured against three standards:

- OSHA HC (Hearing Conservation, *OSHA 1926.52*) defines a legally mandated hearing conservation policy for workers who are regularly exposed to “moderate to high” noise levels to be provided with hearing protection.
- OSHA NC (Noise Control, *OSHA 1910.95*) defines a legally mandated noise control policy where excessive noise levels must be administratively reduced.
- NIOSH (*CDC 98-126*) defines a recommended exposure limit (REL) based on industry best practices.

The accuracy of SPL Logger is dependent upon the quality and accuracy of the external equipment used and the accuracy of the calibration performed. SPL Logger is not certified to any standard and should not be used for measurement where certification is required.

The SPL Logger plugin requires a license key to function but can be used in demo mode for 10 minutes to evaluate the plugin. The 10-minute period can be restarted by restarting the Q-SYS™ design. Use of the plugin in demo mode for commercial purposes is prohibited.



CONFIGURATION

The Forward Thinking Designs SPL Logger plugin as well as the audio reference tools used with the Q-SYS™ system must be set up and calibrated properly to accurately measure loudness.

Properties

Property	Function	Choices
License Key	Enter the license key here to activate the plugin.	
Logging Mode	Specifies how and when the plugin will log the loudness data to a CSV file.	Manual Threshold Continuous
Level Range	Specifies the level range of the SPL measurements.	0-100 dB 10-110 dB 20-120 dB 30-130 dB 40-140 dB
SPL Frequency Weighting	Specifies the weighting of the SPL measurements.	Linear ANSI S1.42 A ANSI S1.42 C
Leq 1 Frequency Weighting	Specifies the weighting of the Leq 1 measurement.	Linear ANSI S1.42 A ANSI S1.42 C
Leq 2 Frequency Weighting	Specifies the weighting of the Leq 2 measurement.	Linear ANSI S1.42 A ANSI S1.42 C
Leq 1 Time	Specifies the Leq 1 time.	1 – 60 minutes
Leq 2 Time	Specifies the Leq 2 time.	1 – 60 minutes
TREND Connect	Allows SPL Logger to connect to TREND Software and send metering data	Enabled, Disabled
Exposure	Allows for measuring noise exposure percentage using OSHA or NIOSH standards.	Off OSHA NC OSHA HC NIOSH (N)
Custom Colors	Allows customization of the color of the SPL, Leq 1 and Leq 2 indicators and graph lines.	Yes No
Label Color	Specifies the color of the SPL label and grid lines.	Hex Color Values (i.e. #AABADD) Or HTML Color Names (i.e. Orange)*
SPL Color	Specifies the color of the SPL graph lines.	
Leq 1 Color	Specifies the color of the Leq 1 graph lines.	
Leq 2 Color	Specifies the color of the Leq 10 graph lines.	
Show Debug	Allows you to turn on and off the plugin debug window.	Yes No

*HTML Color Names are not supported in Q-SYS Control for iOS app.

SPL Logger Properties		
License Key		
Logging Mode	Threshold	▼
Level Range	20-120dB	▼
SPL Frequency Weighting	ANSI S1.42 A	▼
Leq 1 Frequency Weighting	ANSI S1.42 A	▼
Leq 2 Frequency Weighting	ANSI S1.42 A	▼
Leq 1 Time	1	
Leq 2 Time	10	
Exposure	OSHA HC	▼
TREND Connect	Enabled	▼
Custom Colors	No	▼
Show Debug	No	▼

Setup

To configure SPL Logger, follow these steps:

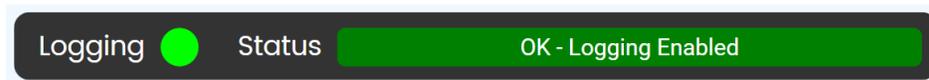
1. Enter your License Key given to you with the purchase of the plugin in the Properties window. Without a license the plugin will only function for 10 minutes.
2. Choose your desired Logging Mode in the plugin Properties panel. This mode determines how the plugin logs loudness measurements to the CSV file.
 - a. **Manual** allows you to enable and disable logging with the click of a button.



- b. **Threshold** allows you to specify a dB level, above which the plugin will begin logging loudness data to the CSV file. If the level drops below the threshold for one minute the plugin will stop logging data to the CSV file. This setting is useful for automatically logging loudness data only when your venue is in use.

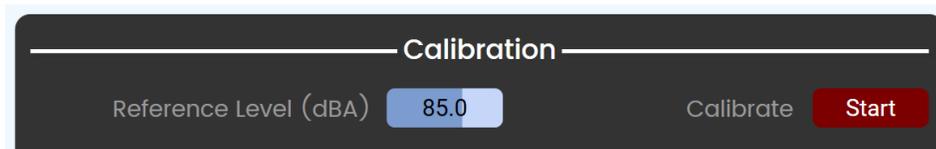


- c. **Continuous** runs constantly in the background, logging loudness to the CSV file 24 hours per day.



3. Determine and select the correct option from **Frequency Weighting** for your needs in the plugin properties. The options are Linear (Unweighted), ANSI S1.42 A (A Weighting) and ANSI S1.42 C (C Weighting). The most common weighting for loudness measurement is A weighting.
4. Attach your measurement microphone directly to an analog input on the Q-SYS™ system and digitally wire the Q-SYS™ input to the input on the SPL Logger plugin. Passing your measurement microphone signal through external audio processors or mixing consoles introduces the possibility that the gain could be adjusted making the measurements inaccurate. Your measurement microphone should be designed and intended for loudness measurement. Use of vocal or instrument microphones for loudness measurement will result in very inaccurate measurement.
5. The offline plugin settings are now finished, and the plugin should be run on an active Q-SYS™ Core using *Save to Core & Run*.

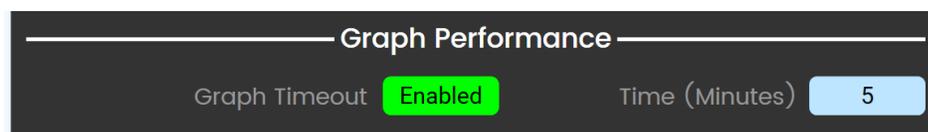
- Prepare for calibration: The best way to calibrate your measurement microphone is using a microphone calibrator placed on the end of the microphone. If you do not have a microphone calibrator, the next preferred method is to pass pink noise through your speaker system at a high level and use a hand-held SPL meter at the same location as your measurement microphone. To begin, turn on your microphone calibrator or pink noise.
- Adjust the **Analog Preamp Gain** of the microphone input to Q-SYS™ so that there is sufficient headroom in the Peak Input Level (dBFS) meter. For example: if your microphone calibrator is producing 94dB and you expect the maximum level in your venue to never exceed 110dB the Peak Input Level (dBFS) meter should read a maximum of -16dB to allow 16dB of measurement above 94dB.
- In the Calibration section on the Configuration page of the plugin, set the reference level to match the calibration level you are using to calibrate the microphone. Press Start to set the calibration of the SPL Logger plugin. The SPL level measurement on the Measure page should now match the level of your calibrator.



- Set your Signal Limit Thresholds. These limits will turn each respective reading red when the measured level is above the set threshold.



- Set Graph Performance Enable / Disable. Displaying the graph is the portion of plugin that requires the most processing power. The Graph Timeout will automatically disable the graph after a set number of minutes to reduce processing power when no one is viewing the graph. If you are using the graph on a UCI that will be viewed regularly by a user, set the Graph Timeout to Disabled.



11. Set the Log File name. This will be the name of the CSV file that is saved to the Q-SYS™ Core. SPL Logger automatically adds the date and the .csv extension to the file name you enter.
12. Set the directory. SPL Logger creates a new folder on your Q-SYS™ Core named SPL Logs. Using the Core Manager, you can create additional folders in the SPL Logs folder. If you are using multiple SPL Logger plugins on one Q-SYS™ Core you can create a folder for each venue. Select the Directory where SPL Logger should store the CSV log files.
13. Set Auto Delete. SPL Logger can automatically delete log files older than a configurable number of days to prevent filling the Q-SYS™ Core hard drive.

The screenshot shows a configuration panel titled "Log File" with a dark background. It contains three input fields: "File Name" with the value "Concert Venue", "Directory" with the value "root", and "Current File" with the value "Concert Venue 2020-04-25.csv". Below these fields, there is an "Auto Delete" section with an "Enable" label and a green "Enabled" button, and a "Days to Keep" section with a blue slider set to "90".

14. (Optional) If you would like to establish a connection with TREND Software, ensure that the Trend connect property is enabled, and select the port number of the TREND instance

The screenshot shows a configuration panel titled "TREND Connect" with a dark background. It features a "TCP Port" input field with the value "9999" and a "Status" label next to a green "OK - Connected" button.

15. Congratulations, SPL Logger is now ready to use!

CONTROLS

Measure



Logging

Manual Logging - Allows you to manually enable and disable logging.



Enable – Enables logging of the SPL data to the CSV file.

Status – Displays the plugin status and current logging state.

Threshold Logging – Automatically enables logging to the CSV file when the Reference level is above the Threshold for 5 seconds. Logging is automatically disabled when the Reference level is below the Threshold for 60 seconds.



Logging – Indicates if the plugin is currently logging the SPL data to the CSV file.

Status – Displays the plugin status and current logging state.

Threshold – The dB level above which the plugin will begin logging the SPL data to the CSV file and below which logging will be disabled.

Reference – Selects which measurement must be above the Threshold to activate logging to the CSV file. Options: SPL, Leq 1, or Leq 10. Additional options for LAeq or Exposure also available, when enabled in the plugin properties.

Continuous Logging – Continuous logging to the CSV file, 24 hours per day.



Logging – Indicates if the plugin is currently logging the SPL data to the CSV file.

Status – Displays the plugin status and current logging state.

SPL/Leq

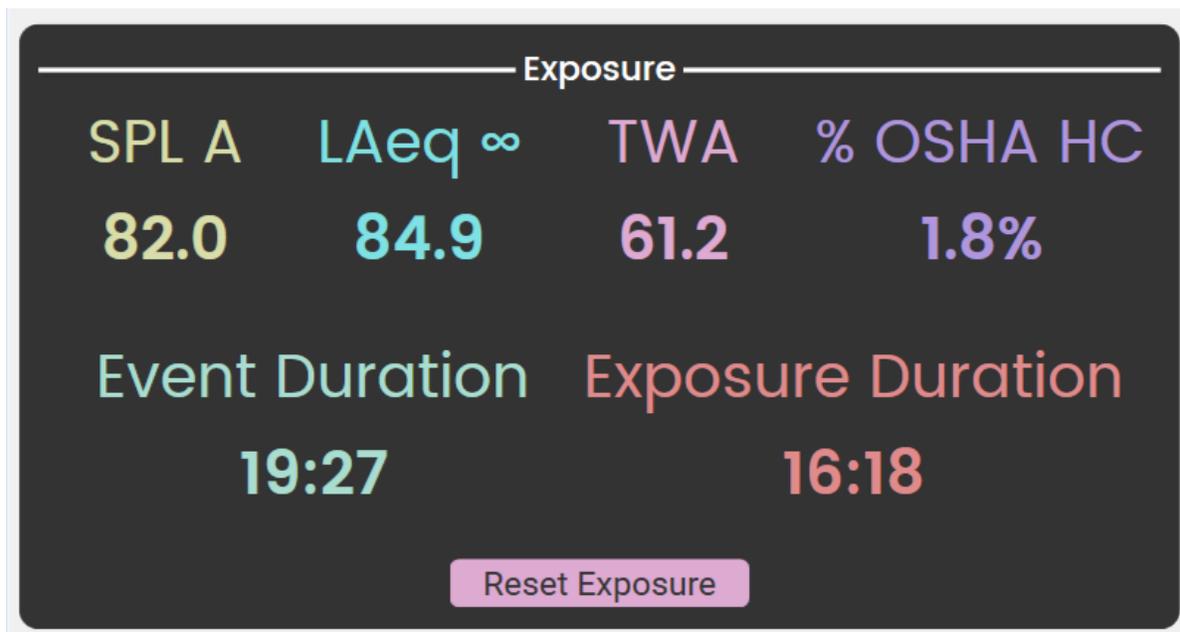


SPL – Displayed as SPL, SPL A or SPL C based on the Frequency Weighting set in the plugin properties, SPL is the current SPL Slow measurement.

Leq 1 – Displayed as Leq 1, LAeq 1 or LCEq 1 based on the Frequency Weighting set in the plugin properties, Leq 1 is the equivalent continuous sound level of the previous number of minutes set in the Leq 1 Time properties.

Leq 10 – Displayed as Leq 10, LAeq 10 or LCEq 10 based on the Frequency Weighting set in the plugin properties, Leq 10 is the equivalent continuous sound level of the previous number of minutes set in the Leq 2 Time properties.

Exposure



SPL A – The measurement of the Sound Pressure Level using Acoustic A weighting.

LAeq ∞ – Using the ANSI S1.42 A Frequency Weighting, LAeq ∞ is the equivalent continuous sound level over the continual Event Duration time, until triggered to Reset.

TWA – The time weighted average for exposure to occupational noise (normalized to an 8-hour workday).

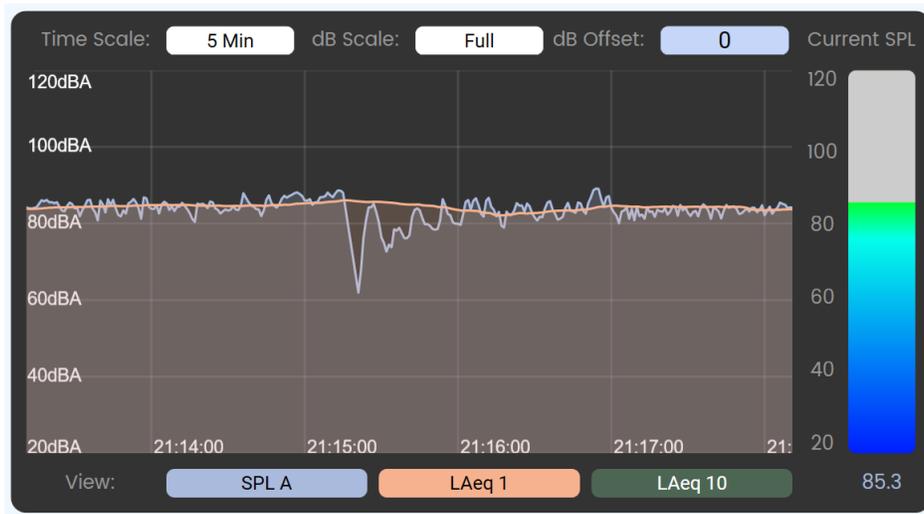
% Exposure (OSHA HC, OSHA NC, NIOSH) – Displayed as % OSHA HC, % OSHA NC, % NIOSH, based on the plugin’s ‘Exposure’ property. OSHA HC (Hearing Conservation, *OSHA 1926.52*) defines a legally mandated hearing conservation policy for workers who are regularly exposed to “moderate to high” noise levels to be provided with hearing protection. OSHA NC (Noise Control, *OSHA 1910.95*) defines a legally mandated noise control policy where excessive noise levels must be administratively reduced. NIOSH (*CDC 98-126*) defines a recommended exposure limit (REL) based on industry best practices. Exposure is presented in a percentage-based level in reference to an 8-hour permissible exposure limit (PEL). Exposure can be reset to “0.0%” with the Reset Exposure control.

Event Duration – Running duration timer displayed in “MM:SS” and then “HH:MM:SS” format once applicable. Elapses through the entirety of the occupational event.

Exposure Duration – Running duration timer displayed in “MM:SS” and then “HH:MM:SS” format once applicable. Elapses when the SPL A reading is above the threshold relative to the selected exposure policy.

Reset Exposure – Resets the duration timers, averaging, and exposure %.

Graph



Graph – Displays the historical loudness data measured. This image can be placed on a UCI for convenient real-time viewing. The colors of the graph can be customized in the plugin properties.

Time Scale – Sets the horizontal axis scale of the graph to display the amount of historical data desired. Options: 1 Minute, 5 Minutes, 10 Minutes, 30 Minutes or 60 Minutes.

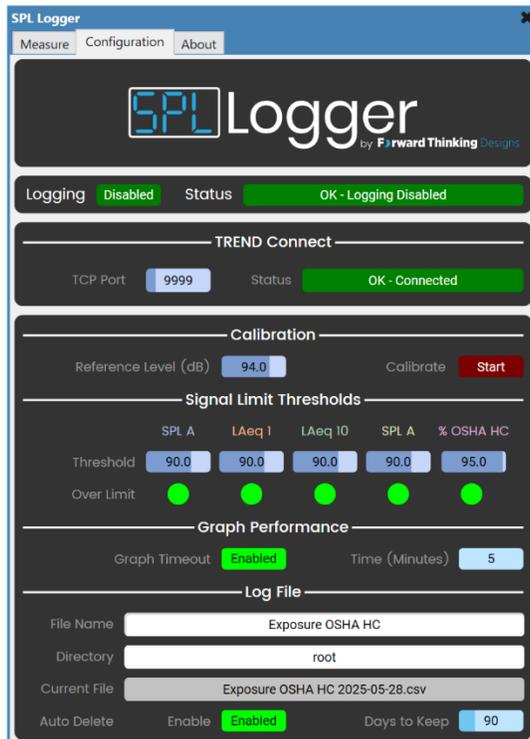
dB Scale – Sets the vertical axis scale of the graph to display the detail of the loudness data. Options: Full, 80dB, 60dB, 40dB or 20dB.

dB Offset – Adjusts the vertical position of the graph lines in the graph view.

View – SPL, Leq 1 and Leq 10. Enables the display of the graph lines for the three measurement types.

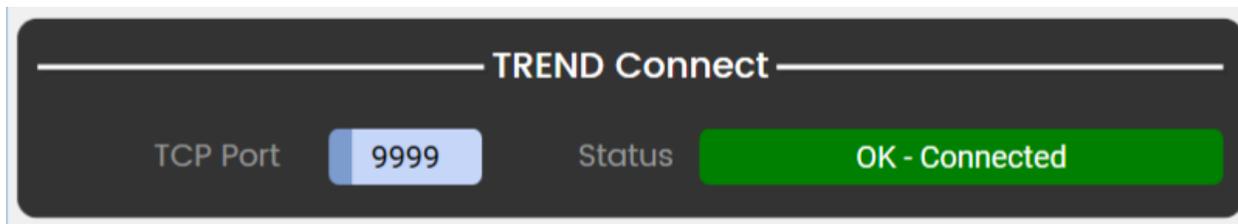
Current SPL – Displays the current SPL Slow measurement.

Configuration



TREND Connect

This configuration section allows communication between the SPL Logger plugin and the TREND SPL software. SPL Logger acts as a remote calibrated microphone source for the Trend software. This section is only visible if you have the Trend Connect property set to 'Enabled'

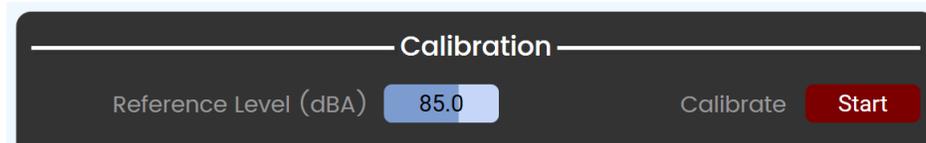


TCP Port – Select the port that the Trend software instance is exposed on.

Status – Displays the plugin status and current connection state.

Calibration

Proper calibration is the most important aspect of the SPL Logger plugin. The recommended method for calibration is to use a measurement microphone and a microphone calibrator designed for your microphone model. If a microphone calibrator is not available, the next best method for calibration is to use your speaker system to produce pink noise at the average loudness your venue will be used. Using a handheld SPL meter in the same location as your measurement microphone, calibrate to the level measured by the handheld SPL meter.



Reference Level – The level in dB that the SPL measurement will be calibrated to when the Calibrate button is pressed. This value should be equal to the level output by your microphone calibrator or the measurement of a handheld loudness meter in the same location as the measurement microphone.

Calibrate – Sets the SPL measurement equal to the value set in the Reference Level.

Signal Limit Threshold

Great for indicating to a user or activating external controls when the loudness in your venue exceeds a defined limit.

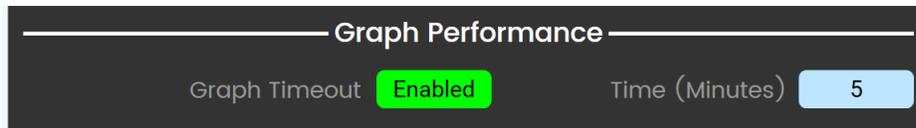


Threshold – The level in dB (% for Exposure only) that will activate the Over Limit LED and the red indicator behind the current values in the SPL/Leq section on the Measure page.

Over Limit – Turns from green to red when the current value of each measurement exceeds the value defined in the Threshold.

Graph Performance

Displaying the graph on the Measure page is the most resource intensive portion of the SPL Logger plugin. The Graph Performance settings allow the graph to automatically disable after a defined period. This allows the plugin to reduce its processing power when no one is viewing the graph. The graph can easily be re-enabled by clicking on it. If the graph is placed on a UCI for regular viewing, Graph Timeout should be disabled so the graph is always displayed.

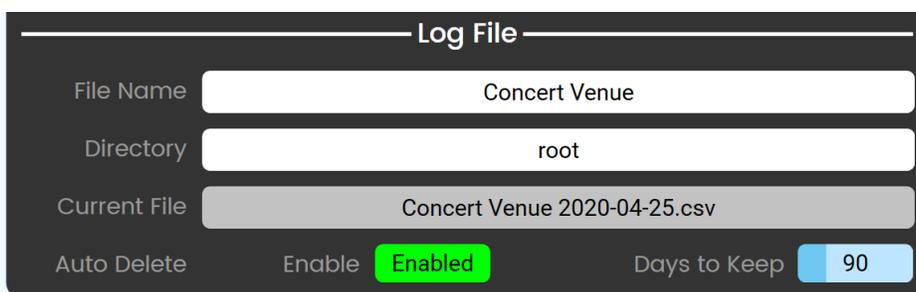


Graph Timeout – Enables the graph to automatically disable after the time specified in the Time control.

Time – How long in minutes after interacting with the graph it will automatically disable. Has no impact if Graph Timeout is disabled.

Log File

Controls that define the historical loudness CSV file saved to the Q-SYS™ Core’s internal hard drive.



File Name – The name of the file written to the Q-SYS™ Core. The date and .csv extension are automatically added and do not need to be included in the File Name.

Directory – SPL Logger automatically creates a new folder named SPL Logs in the Files / Audio directory of your Core the first time it runs. The default setting of root will save the CSV files into the SPL Logs folder. Directory can be set to any sub folder that you create in the SPL Logs folder. This is especially useful if multiple copies of SPL Logger are running on the same core, each can save its log files to a unique folder.

Current File – Displays the full current file name that is being logged to on the Q-SYS™ Core.

Auto Delete Enable – When enabled the plugin will automatically delete log files with the same name older than the number of days defined by the Days to Keep control.

Days to Keep – The number of days to keep log files on the core before they are automatically deleted to save storage space.

LOG FILES

SPL Logger stores the SPL, Leq 1, and Leq 10. If the Exposure property is enabled, SPL Logger will also store TWA, LAeq ∞ , Exposure %, Event Time, and Exposed Time. All measurements will be logged to the Q-SYS™ Core's internal hard drive once per second. These files are saved in the comma separated values (CSV) format. CSV files can be opened by Microsoft Excel® or any common spreadsheet software.

Accessing the Logs

Logs are stored in the SPL Logs folder on the Media drive of the Q-SYS™ core. The easiest way to view the files currently on the Core is in the Files tab of the Q-SYS™ Core Manager. You can access the Core Manager by browsing to the IP address of the core in a web browser i.e. <http://192.168.1.10>

The CSV log files can be downloaded from the core and saved to your computer by accessing the Files/Audio directory in your web browser. Enter the IP address of your core followed by files/Audio i.e. <http://192.168.1.10/files/Audio>. Select the SPL Logs folder to view the files and select the desired file to download.

File Sizes

File sizes of the CSV log files will vary depending on the amount of time each day that is logged. The typical log file for continuous recording for 24 hours will average 3MB. Q-SYS™ Cores that have not had the media drive expansion installed do not have a significant amount of available storage space, and the available storage space will be impacted by the quantity of audio files stored on the hard drive. Available storage can be viewed in the top right corner of the Audio Files page in the Q-SYS™ Core Manager. Use the auto delete function of SPL Logger to prevent the drive from becoming completely full.

APPENDIX A: CONTROL PINS

Calibration

Pin Name	Control Type	Value Range	Pin Direction
Reference	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Input / Output
Start	Momentary Button	True or False	Input / Output

File

Pin Name	Control Type	Value Range	Pin Direction
Current	Text Indicator	String	Output
Delete Days	Integer Knob	0 - 365	Input / Output
Delete Enable	Toggle Button	True or False	Input / Output
Directory	Combo Box	String	Input / Output
Name	Text Field	String	Input / Output

Leq1

Pin Name	Control Type	Value Range	Pin Direction
Current	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Output
Limit	LED	True or False	Output
Threshold	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Input / Output

Leq2

Pin Name	Control Type	Value Range	Pin Direction
Current	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Output
Limit	LED	True or False	Output
Threshold	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Input / Output

Exposure

Pin Name	Control Type	Value Range	Pin Direction
Event Duration	Text	String	Output
Exposure Duration	Text	String	Output
LAeq ∞ Current	Floating Point Knob	20-120	Output
OSHA(%) Current	Text	String	Output
OSHA(%) Limit	Boolean	True or False	Output
OSHA(%) Threshold	Float	0-100	Input / Output
NIOSH(%) Current	Text	String	Output
NIOSH(%) Limit	Boolean	True or False	Output
NIOSH(%) Threshold	Float	0-100	Input / Output
Reset	Trigger	N/A	Input / Output
SPL A Current	Floating Point Knob	20-120	Output
SPL A Limit	LED	True or False	Output
SPL A Threshold	Floating Point Knob	0-100	Input / Output

TWA Current	Floating Point Knob	0-120	Output
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Log

Pin Name	Control Type	Value Range	Pin Direction
Enable	Toggle Button or LED	True or False	Input / Output
Reference	Combo Box	String	Input / Output
Threshold	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Input / Output

SPL

Pin Name	Control Type	Value Range	Pin Direction
Current	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Output
Limit	LED	True or False	Output
Meter	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Output
Threshold	Floating Point Knob	Level Range* i.e. 20dB – 120dB	Input / Output

View

Pin Name	Control Type	Value Range	Pin Direction
Scale dB	Combo Box	String	Input / Output
Scale Offset	Integer Knob	0 - 80	Input / Output
Scale Time	Combo Box	String	Input / Output
Graph	Toggle Button	True or False	Input / Output
Leq1	Toggle Button	True or False	Input / Output
Leq10	Toggle Button	True or False	Input / Output
SPL	Toggle Button	True or False	Input / Output
Timeout Enable	Toggle Button	True or False	Input / Output
Timeout Time	Integer Knob	0 - 1440	Input / Output

General

Pin Name	Control Type	Value Range	Pin Direction
Status	Status	0-5, String	Output

TREND Connect

Pin Name	Control Type	Value Range	Pin Direction
Status	Status	0-5, String	Output
TCP Port	Integer	0-65535	Input / Output

*Level Range – The level range is defined by the Level Range property of the plugin and is always a 100dB range i.e. 0dB-100dB or 40dB-140dB.

SUPPORT

For plugin support and feedback please contact us at:

ForwardThinkingDesigns.com

support@forwardthinkingdesigns.com

+1 407-850-8093

+1 800-4840-FTD