SYSTEMS FOR RESEARCH & DEVELOPMENT

SoundAdvisor™

Model 831C Sound Level Meter & Noise Monitoring Kit

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

SoundAdvisor™
MODEL 831C SOUND LEVEL METER

The Model 831C SoundAdvisor is designed to make noise measurement easy. Due to its color display, connectivity, extensive software features, and small form factor the SoundAdvisor is an ideal choice for handheld operation. Attended measurements are simplified, with the ability to control and monitor data via any PC or mobile device with a standard web interface. Designed with the acoustic professional in mind, the SoundAdvisor offers an elegant solution for complex needs in an easy-to-use system.

Applications

- Environmental noise assessment
- Noise reduction validation
- Product quality control
- Spectral noise analysis
- In-situ sound power measurements
- Code enforcement

Measurements Simplified

- **Connectivity Is Key –** Cellular, WiFi, and wired networking are all available to you when using the SoundAdvisor. The meter can even serve as its own WiFi hotspot.
- **Many Platforms, Same Controls –** Whether you are setting up a test on the meter, checking in remotely from your laptop, or receiving an alert to your smartphone, you'll be working with the same interface and menus across all platforms.
- **Customizable for Your Application –** From complete outdoor monitoring kits to a low noise option to automatic event detection, the SoundAdvisor is designed to help meet your testing needs.
- **LCD Color Interface –** A full-color user interface allows you to interpret data more easily, right from the meter.

Technically Optimized

As with any device from Larson Davis, a thoughtful design process ensures that your needs are met, from international standards to functionality.

- IEC 61672-1:2013, ANSI S1.4-2014 Class 1 integrating sound level meter
- Real-time frequency analysis in 1/1 and 1/3 octave bands, compliant with IEC 61260:2014 and ANSI S1.11-2014 Class 1
- >120 dB dynamic range
- 2 GB internal memory, expandable by USB
- Full range AC output
- Available low noise option (831C-LOWN)

SoundAdvisor™ Kit
Model NMS044 Noise Monitoring System

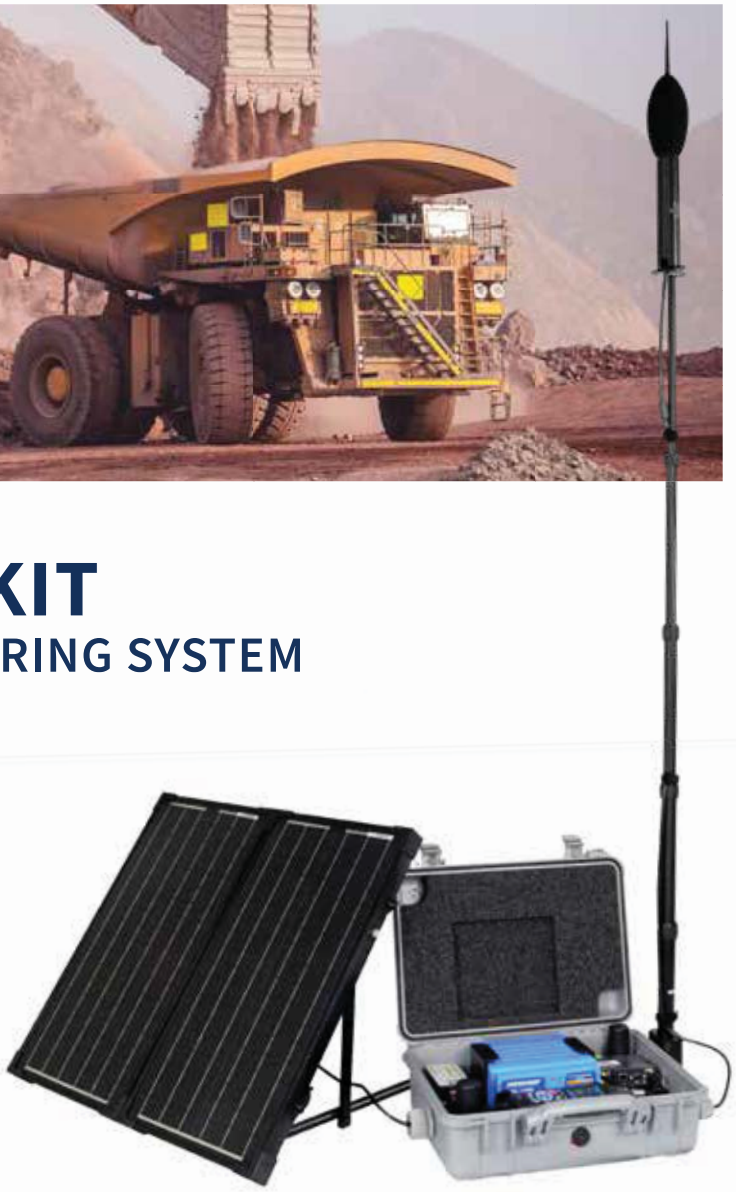
Larson Davis has created a new standard for portable noise monitors by making the Model NMS044 SoundAdvisor Kit completely wireless with solar charging and 4G wireless while keeping it truly portable. The SoundAdvisor Kit includes everything needed for a noise monitor that can run indefinitely while remaining connected to the Internet, making your meter and your data always readily available.

Applications

- Remote noise monitoring
- Environmental noise compliance
- Airport noise management
- Continuous and Event sound recordings
- Networked noise level display

Remote Access to Data

- **Network Access 24/7 –** Login from your computer, your smartphone, or other mobile device to engage directly with the meter at your remote location. Make updates, receive alerts, change test parameters, check microphone calibration, and download data with ease.
- **Complete Power Solutions –** With a low power requirement (831C ~1.2 W / 831C + Cellular gateway ~3.5 W) options are available to power the remote unit via solar power, keeping your measurements running indefinitely and sustainably.
- **Real-Time Alerts –** Receive email or texts with data and sound recordings when set noise limits are exceeded. Allows quick response to compliance concerns and listening to sounds for source identification.
- **Own Your Data –** Control your data without monthly access and maintenance costs.



Powering the SoundAdvisor Kit

The SoundAdvisor Kit is offered with a choice of a traditional lead acid (SLA) battery or a Lithium Iron Phosphate (LiFePo) battery. LiFePo batteries deliver a significant improvement over Lithium ion technology, offering extended life of over 2500 recharge cycles and safer automation. The LiFePo battery provides high capacity at half the weight of a comparable SLA battery with a longer life and great low temperature performance.

To accommodate use in both common and harsh solar conditions, the SoundAdvisor Kit can be configured with one of two different portable solar panels.

Available Kit Configurations

Configuration	BAT019	BAT020	SLP001	SLP002
NMS044-LFP60	✓		✓	
NMS044-LFP100	✓			✓
NMS044-SLA60		✓	✓	
NMS044-SLA100		✓		✓

Power Configurations

Model	Description	Capacity	Weight	Use
BAT019	LiFePo Battery	45 Ah	12.8 lb (5.8 kg)	~2500 charge cycles
BAT020	Lead-acid Battery	35 Ah	24.7 lb (11.2 kg)	3 – 5 years
SLP001	Solar Panel	60 W	20 lb (9 kg)	insolation > 2 kW•h/m²/day
SLP002	Solar Panel	100 W	24 lb (11 kg)	insolation > 1 kW•h/m²/day

SOLVING YOUR CHALLENGES

The Larson Davis SoundAdvisor Sound Level Meter is extremely versatile, performing the functions of several instruments. It puts the combined features of a precision Class 1 sound level meter, environmental noise analyzer, and a real-time frequency analyzer in the palm of your hand or on a network. It expands upon the Larson Davis tradition of delivering value, innovation, and function in a rugged, single-handed, expandable package and is backed by a 2-year factory warranty, 24-hour application support, total customer satisfaction, and accredited factory service/calibration.

Solutions with Your Meter

- **Easy Setup and Data Download –** SoundAdvisor offers setup directly on the meter's keypad, touchscreen, or via web interface, plus streamlined export of data to Excel®.
- **ANY LEVEL™ –** Never miss a key sound metric with the ability to view and store multiple time weightings (Slow, Fast, and Impulse) and frequency weightings (A, C, and Z) simultaneously.
- **Flexibility for Integration –** Designed to allow integration into a larger or customized solution, SoundAdvisor allows connection of accessories, internal clock for accurate data synchronization, and local language compatibility.

Solutions with Your Outdoor Kit

- **Data on Demand –** Access the meter from any location to make modifications to the setup, view current noise levels, and modify alerts.
- **Instant Alerts –** Receive immediate notification of noise events and use the recorded sound files to evaluate the cause.
- **Long Term Remote Power –** Lithium Iron Phosphate batteries paired with a solar panel offer a continuous, sustainable means to keep your measurements running.
- **Avoid Trips To the Field –** With access to measurements, event alerts, and continuous power, you can spend time in the office, rather than travelling to reach remote locations.

Connectivity

- **Cellular, WiFi, or Wired Networking –** Select your network by choosing what to plug into the USB port. You can choose cellular by using a Sierra Wireless gateway for mobile or permanent applications, WiFi for close proximity wireless, and wired (Ethernet) for permanent locations. A USB hub can be used to support multiple USB devices.
- **Expandable USB Memory –** Easily expand the 831C memory by adding a USB memory stick. Data is written directly to the USB memory so it's always available and the data is protected if the USB memory is accidentally removed.

USING THE SOUNDADVISOR

Standard Features

- **Web Interface –** Control the SoundAdvisor and view data from any device that runs a web browser.
- **NTP Time Sync and GPS –** Network Time Protocol automatically selects the most accurate clock from several sources and synchronizes the meter for accurate measurement times.
- **External Batteries –** Power directly from 12 V batteries for efficient power usage and long run times.
- **Built-In Power Management –** Safely power the meter off based upon battery voltage. Compatible with solar systems.
- **ANY LEVEL™ –** Measure levels simultaneously.
- **Run Modes –** Control how and when the SoundAdvisor will operate to best match measurement conditions. Choices include a manual mode; stop after a predetermined period of time; run continuously with automatic calibration check and file save; and defined timers.

Supported PC Software

- **G4 LD Utility [INCLUDED] –** PC software supplied with the SoundAdvisor that supports full sound level meter control, in-the-field firmware and option upgrades, data export to spreadsheet, and includes a remote display to view the 831C screen on a PC.
- **DNA [OPTIONAL] –** The analysis, post-processing, and reporting tool for sound and vibration measurements. DNA delivers enhanced analysis capability, sound playback, and graphical reporting. Graphs can be annotated and shared amongst multiple users working with DNA reader software.
- **Software Development Kit (SDK) [OPTIONAL] –** Toolkit for developing custom applications in Microsoft Windows® or Linux® for the Model 831C

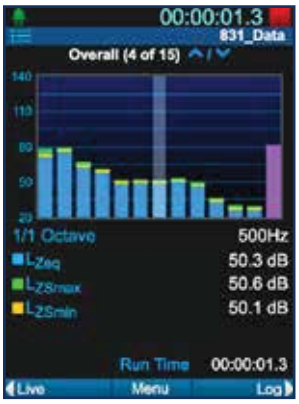
Common Firmware Options

When performing noise surveys, it is important to have a fully capable sound level meter at your fingertips to capture all of the essential data. Have you ever lost your measurement notes, or worse, forgotten to log the information properly and then had to either go back and reacquire the data altogether or simply not report it? SoundAdvisor is available with a variety of firmware options to help you achieve your testing goals the first time.

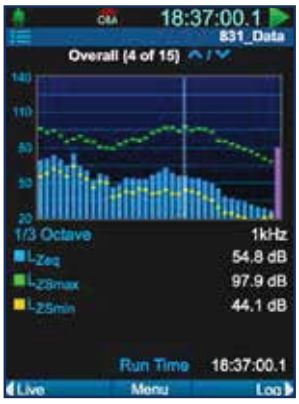
- **Octave Band Analysis 831C-OB3 –** Simultaneous real-time measurement of 1/1 and 1/3 octave Leq, Lmax, Lmin along with broadband parameters.
- **Logging 831C-LOG –** Select Time History logging periods as short as 2.5 ms to a full 24 hours. Additional parameters such as battery condition, microphone performance, and meteorological data (831C-WTHR) can be recorded.
- **Event Detection and Measurement History 831C-ELA –** Define an Event in terms of threshold level, duration, hysteresis, and continuation period.
- **Sound Recording 831C-SR –** Record audio files in a raw or compressed format to determine the source of the noise event.
- **Direct USB Support for RV50 Gateway 831C-SW –** Connect the SoundAdvisor by USB to a wireless gateway to create a highly portable noise monitor.

ANY LEVEL parameter display

831C-WTHR Datalogging



1/1 Octave Display



1/3 Octave Display

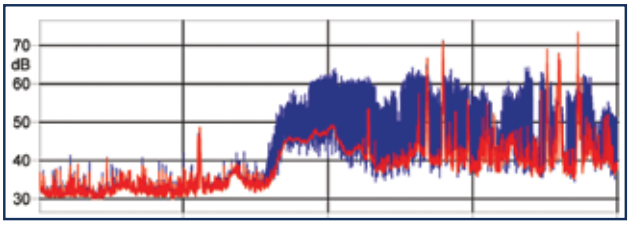
SoundAdvisor Options

Octave Band Analysis (831C-OB3)

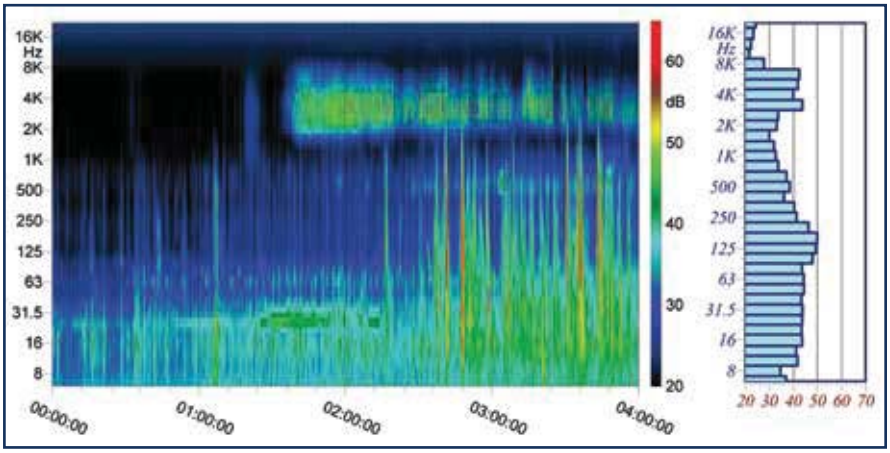
In many applications, it is important to acquire both the broadband level and spectral content of noise data. With spectral information, the source and content of the measured level can be better understood. Constant percentage bandwidth filters (1/1 or 1/3 octave) best approximate human perception of sound.

Option 831C-OB3 firmware enables simultaneous real-time measurement of 1/1 and 1/3 octave Leq, Lmax, Lmin along with all the ANY LEVEL™ broadband parameters. Option 831C-OB3 is compliant with IEC 61260:2014 Class 1 and ANSI S1.11-2014 Class 1 standards covering the entire frequency range of human hearing: 6.3 Hz to 20 kHz for 1/3 octave bands.

When 831C-OB3 is combined with Time History Logging (831C-LOG) or Automatic Event Detection and Event History (831C-ELA), it is possible to review the frequency content of logged data or specific events.



Events Extracted from Noisy Data (taken from DNA software, not in base product)



Spectrogram of Events with High Frequency Noise

(taken from DNA software, not in base product)

DNA Software Time History and Hourly Interval Graph with Color Spectrogram

Logging (831C-LOG)

The Model 831C can be used to record the evolution of sound pressure level over time as a Time History (TH). The Time History is then used to profile the observation period, which can vary from several seconds to continuous monitoring.

With the addition of Time History Logging Firmware (831C-LOG), users can pre-select from logging periods as small as 20 ms to a full 24 hours. Parameter selections consist of familiar acoustic metrics as well as non-acoustic metrics, such as battery condition, outdoor microphone performance, and meteorological data (831C-WTHR).

Filters (Selected Frequency and Time Weighting)

Parameter	1/1	1/3
L_{eq}	✓	✓
L_{max}	✓	✓
L_{min}	✓	✓
L_{SPL}	✓	✓

Logging Parameters

Parameter	A	C	Z
L_{weq}	✓	✓	✓
L_{wpeak}	✓	✓	✓
L_{wSmax}	✓	✓	✓
L_{wFmax}	✓	✓	✓
L_{wImax}	✓	✓	✓
L_{wSmin}	✓	✓	✓
L_{wFmin}	✓	✓	✓
L_{wImin}	✓	✓	✓
L_{wS}	✓	✓	✓
L_{wF}	✓	✓	✓
L_{wI}	✓	✓	✓

Other Parameters
$L_{Ceq} - L_{Aeq}$
$L_{Ieq} - L_{Aeq}$
Statistics (Ln)
Battery
Temperature
External Power
Wind Speed
Gust Direction
Gust Speed
Avg Temp
Max Temp
Min Temp
Avg Humidity
Max Humidity
Min Humidity

Select to log from the above parameters

Measurement History (831C-ELA)

While Time Histories are typically logged at one sample per second, longer-term averages are often useful to see trends, e.g., 10 minute or hourly averages. 831C-ELA firmware enables Measurement History (MH) and logs these parameters similar to Time History (TH) over a longer interval time. MH and TH can run together simultaneously or independently.

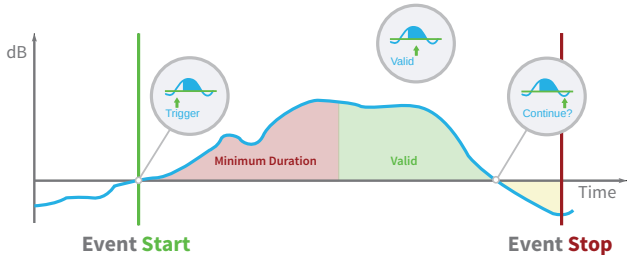
Data for each measurement or location is saved in a unique MH record and may include the Leq, Lmax, Lmin, SPL, and statistical distribution of the SPL (Ln). A complete set of MH records then can be stored in a single measurement that keeps all the noise survey data in a single file. Finally, an automated sound recording at the beginning of each MH period can be achieved with 831C-SR firmware.

Data	Parameters			Notes
Averages	Leq	LE		
Sound	Lmax	Lmin	Lpeak	
Occurance Date & Time	Lmax	Lmin	Lpeak	
Temperature	Avg	Max	Min	
Relative Humidity	Avg	Max	Min	
Wind Speed	Avg	Max	Min	
1/3 Octaves	Leq	Lmax	Lmin	w/831C-OB3
1/1 Octaves	Leq	Lmax	Lmin	w/831C-OB3
Date & Time	Date	Time		
Measurement Time	Run Duration	Run Time	Pause Time	
GPS	Lat	Lon	Elevation	w/831-GPS
Other	Exceedance	6 Ln		

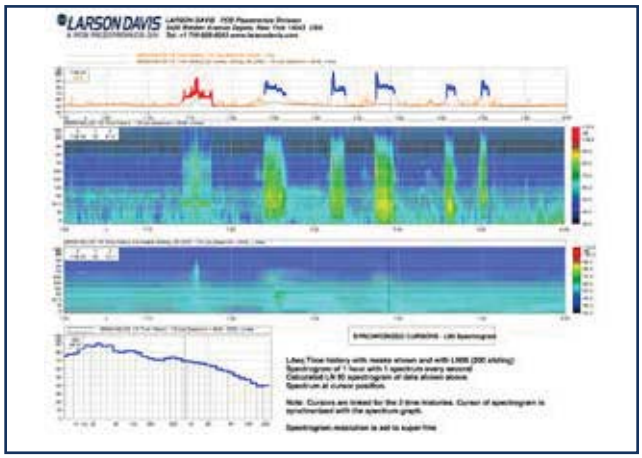
Automatic Event Detection and Alerts (831C-ELA)

In the Model 831C, events are defined as one of the following:

- Exceedance of a fixed threshold level for a minimum duration
- Exceedance of a dynamic threshold level for a minimum duration
- External trigger set by the digital input signal



Event Definition on the SoundAdvisor



DNA Software – TH with embedded .wav files on Event,
color spectrogram, L95, and 1/3 octave frequency analysis

With 831C-ELA firmware, event definition is defined by you – including threshold level, duration, and event continuation period when the SPL drops below the threshold level for a specific period of time. Triggering status icons identify event progression and qualification (see graph above).

The Model 831C can automatically generate an email alert to provide fast notice of any noise exceedance. The event alerts can be sent to a user configurable list of email addresses or by text message using an email to MMS gateway. Email event sound recording in conjunction with option 831C-SR.

Added Functionality with 831C-ELA Option

With Option	Description
831C-OB3	Frequency analysis of the event
831C-LOG	Record an independent time history of the event including filters when combined with 831C-OB3
831C-SR	Record event audio in .wav or compressed file

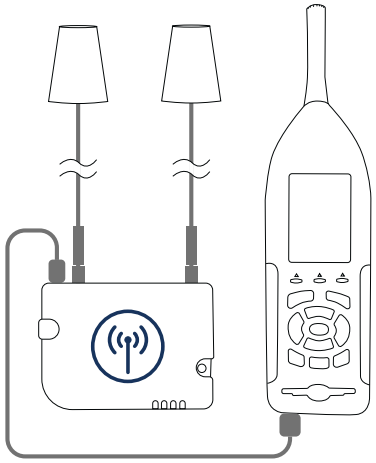
Event Detection Display on the 831C

A dog barking through the night is typically perceived as more annoying than during the day. To minimize false event triggers and capture detection of annoying noise events, an innovative Dynamic Trigger method is available on Model 831C. Dynamic Triggers occur when the background L85, L90, or L95 level is exceeded by a user set number of decibels. A rise rate can also be specified to further track more or fewer events.

Cellular Communication (831C-SW)

We understand how beneficial it can be to have access to your noise monitor at any time of the day. Due to the remoteness or need to setup contracts and get permits, connecting a noise monitor to a wired network or main power just isn't feasible.

With option 831C-SW you can connect the SoundAdvisor by USB directly to a Sierra Wireless gateway and get a highly portable noise monitor that can easily be powered by battery and/or solar. We recommend the Sierra Wireless model RV-50 because of its low power usage and industrial design.

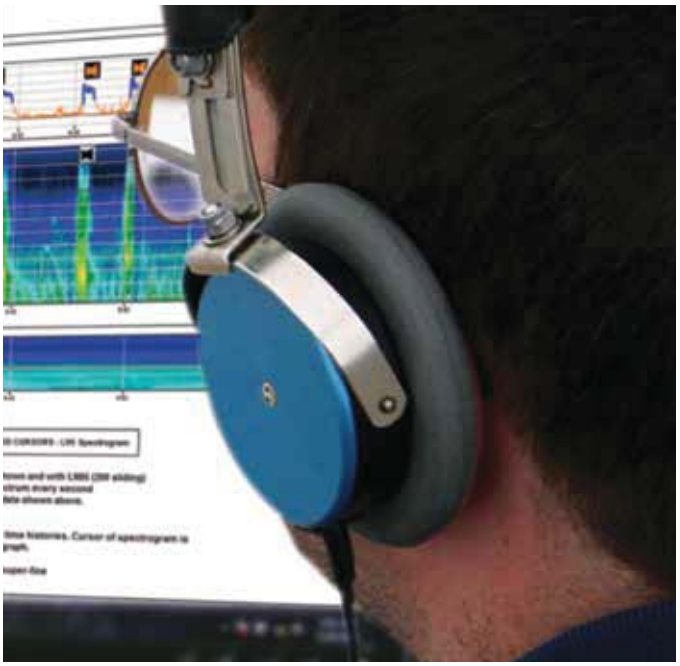


Option 831C-SW

Hear The Sound Being Measured (831C-SR)

Measuring sound levels is a well-accepted way to objectively quantify the noise radiated by a product in an environmental survey. Rather than rely simply on the objective data, why not record a sample of the sound to truly determine the source of the noise?

The 831C-SR option enables the 831C to record audio files in a raw format (.wav) for a lossless recording or with .ogg compression to reduce file size. Audio data can also be streamed from the 831C to allow remote listening to the current sound.



Option 831C-SR Recording Triggers

- **Event History Sound Recordings –** Automatically record the audio for an Event with a user-configured pre-trigger record time and recording length. Recording is time-synchronous with the Event.
- **Measurement History Sound Recordings –** Automated sound recording at the beginning of each Measurement History
- **Manual Sound Recording –** User-controlled recording duration, acquired during operation
- **Marker-based Sound Recording –** User-initiated with user-defined duration, acquired during operation
- **Logic Input (Button) Recording –** User-initiated recording with a button push or other logic level input. The 831C will record for a predetermined period of time.

A recording icon ( ) will turn red on the Model 831C display when recordings are being made.

Listen to audio recordings while they are still on the 831C

Options for Listening to a Recorded Sound

Connect a USB headset to the 831C and play from the meter

Connect to the meter by G4 and play directly from the meter to the PC

Connect to the meter by G4, download the file and then play the audio on the PC

Connect to the meter using a browser and play the file directly from the meter through the browser

32 GB
USB Memory

Size For 1 Minute Recording (kbytes)

Sample Rate	wav	ogg (typical)
48 kHz	5760	960
24 kHz	2880	480
16 kHz	1920	320
8 kHz	960	160

SLM Utility G4
in Wireless Mode

SOFTWARE SOLUTIONS

The Model 831C has numerous on-board capabilities, yet often further processing, visualization, or reporting needs exist. For this purpose the Model 831C can be used as a portable instrument and retrieve the data, work as a data acquisition front-end, or in combination with other products.

G4 LD Utility

The G4 LD Utility program is easy-to-use Windows® software for the Model 831C providing configuration set-up, data download, and remote access. Measurement set-ups can be stored on the PC for use on one or more Model 831C Sound Level Meters. Data can be downloaded onto a PC and easily exported to Excel® for further analysis. G4 LD Utility can simultaneously access multiple 831C-based noise monitoring stations via USB or Ethernet, which makes managing multiple noise monitors simple and convenient. A convenient Live View emulates the SLM screen on your PC, ideal for quick presentations or training.

Data Navigation and Analysis Software (SWW-DNA)

Data Navigation and Analysis Software (SWW-DNA) is designed to analyze and report environmental noise, worker exposure, and architectural acoustic measurements with an interactive graphical interface. With many sound studies being similar in nature, a drag-and-drop feature places new data in an existing layout that allows for quick, professional-looking reports. DNA can either retrieve existing files from Model 831C, or can drive the 831C as a data acquisition front-end.

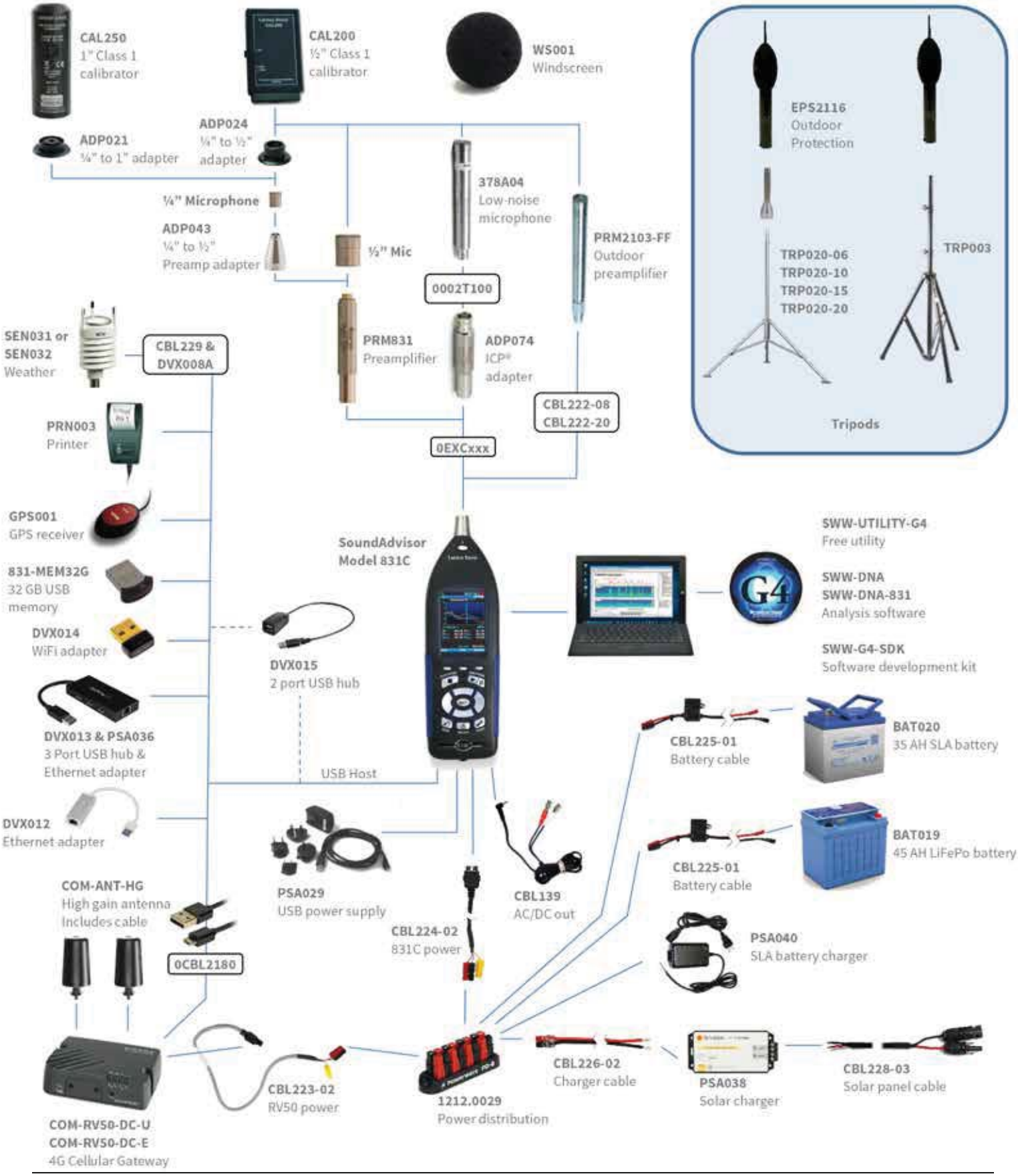
- Remote network access
- Interactive graphs with data: zoom, overlay Time History and spectrogram with playable event sound recordings, advanced event analysis, mapping, industrial hygiene, and more.
- Template-based operation with customizable options

Software Development Kit (831C-SDK)

Build your own software or integrate the SoundAdvisor into your existing application using our Software Development Kit (SDK).

The Software Development Kit for the Model 831C interfaces smoothly and directly with Microsoft® or Linux® programming environments supporting Excel®, HTML5, Javascript, Visual C++, or C# programming languages. The SDK provides functionality to connect and fully control the Model 831C over USB, network, or wireless gateway (modem) connections. File download is supported and the SDK includes documentation and software for extracting data from files. With JSON (JavaScript Object Notification), the SDK makes it easy to create modern, web-based applications with minimal effort.

SYSTEMS AT-A-GLANCE



STANDARDS, FEATURES, AND SPECIFICATIONS

Standards Met by Model 831C		
The Model 831C meets the specifications of the following standards:		
Sound Level Meter Standards		
IEC61672-1 Ed. 2.0 (2013) Class 1, Group X		
IEC60651 Ed 1.2 (2001) plus Amendment 1 (1993-02) and Amendment 2 (2000-10) Type 1, Group X		
IEC60804 (2000-10) Type 1, Group X		
ANSI S1.4-2014 Class 1		
ANSI S1.43-1997 Type 1		
DIN 45657		
Octave Filter Standards (Option 831C- OB3)		
IEC61260 Ed. 2.0 (2014) Class 1, all filters		
ANSI S1.11-2014 Class 1, all filters		
Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use		
2014/35/EU Low Voltage Safety Directive		
IEC 61010-1 Ed. 3.0 (2010-06)		
2011/65/EU RoHS Directive		
EMC Immunity and Emission		
2014/30/EU EMC Directive		
IEC 61326-1 Ed. 2.0 (2012-07)		
IEC 61672-1 Ed. 2.0 (2013-09)		
FCC Title 47 CRF Part 15, Class B		
Sound Level Meter Specifications		
Averaging (Integration Method)	Linear or Exponential	
Time Weightings	Slow, Fast,or Impulse	
Frequency Weightings	A, C, and Z	
Peak Detector Frequency Weighting	A, C, or Z	
Gain	0 dB or +20 dB	
Sample Rate	51,200 Hz	
Peak Rise Time	30 µs	
Metrics Measured	Leq, Lmax, Lmin, Lpeak, Ln (6 values), LDN, LDEN, LCeq – LAeq	
Physical Characteristics		
Length with Microphone and Preamplifier	11.35 in	29.0 cm
Length, Instrument Body Only	8.8 in	22.4 cm
Width	2.8 in	7.1 cm
Depth	1.6 in	4.1 cm
Weight with Batteries, No Preamplifer or Microphone	17.3 oz	490 g

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SoundAdvisor Model 831C with Model DVX012 Ethernet Adaptor

General Specifications	
Reference Level	114.0 dB re. 20 µPa
Reference Level Range	Single large range for SLM measurements
Reference Frequency	1000 Hz
Reference Direction	0° is perpendicular to the microphone diaphragm
Operating Temperature	≤ ± 0.5 dB error between -22°F to +122 °F (-30 °C to 50 °C)
Storage Temperature	-40 °F to 176 °F (-40 °C to 80 °C)
Humidity	≤ ± 0.5 dB error from 30% to 90% relative humidity at 104 °F (40 °C)
Equivalent Microphone Impedance	12 pF
Effect of an Extension Cable	None up to 200 ft (61 m) with EXCxxx cable
Approvals	CE, ROHS, WEEE
Extended Weather Options	-40 °F to +158 °F (-40 °C to +70 °C) operation with CER-831-E
Resolution Specifications	
Levels	0.1 dB
Elapsed Time	0.1 s
Real Time Clock	1 s
Integration Time	
Time Averaged Levels and Sound Exposure Levels	
Minimum	0.1 s
Maximum with Daily Autostore Enabled	Unlimited
Maximum with Daily Autostore Disabled	> 23 days with error < 0.5 dB
Ln Statistics	
Number of Selectable Parameters	6 in xx.xx% format
Distribution Resolution	0.1 dB
Spectral Statistics	Requires Octave Analysis option (831C-OB3)
Markers	
Number of Markers	10
Prenamed Markers	Truck, Automobile, Motorcycle, Aircraft, Exclude
Back Erase	
Back Erase Time	5 or 10 s
Measurement Control Modes	
Available Modes	Manual Stop, Timed Stop, Stop when Stable, Continuous, Single Block Timer, Daily Block Timer
Timed Stop	Time in hh:mm:ss
Stop When Stable	Delta level in xx.x dB and time in hh:mm:ss
Continuous with Daily Auto-Store	1, 2, 4, 6, 12, 24, 48, 96 or 144 files per day, automated file numbering “yymmddnn.LD0”
Restart after Power Failure	Automatic if powered by 12 VDC and continuous run mode
Single Block Timer	Start date and time to end date and time
Daily Block Timer	Up to 3 blocks between each start and end date
Clock Stability	
< 1 sec in 24 hours, at 75 °F (+24 °C)	
< 10 sec in 30 days, at -40 °F to +158 °F (-40 °C to +70 °C)	
<1 s when using NTP	

ADDITIONAL HARDWARE SPECIFICATIONS AND BROADBAND NOISE LEVELS

General Specifications (Continued)				
Microphone Input				
Connector	Latching 5-pin connector			
Input Impedance	100 kΩ and 300 pF			
Full Scale Input (0 dB gain)	14 Vpeak			
ICP Current (requires ADP074)	4 mA			
AC/DC Output				
Jack	2.5 mm (3/32 in) female			
AC Output Voltage Range	± 14 Vpeak (preamplifier output)			
	± 2.1 Vpeak with 0, 20 or 40 dB gain (for LINE inputs)			
AC Output Recommended Load	10 kΩ or greater			
DC Output Voltage Scale	10 mV per dB, 0 V for 0 dB, 1 V = 100 dB			
DC Output Frequency & Time Weighting	Follows SLM Settings: A, C, or Z and S, F, or I			
Power Supply				
Batteries	4-AA (LR6) NiMH, 1.5 V Lithium or Alkaline cells (supplied with 2500 mAh NiMH)			
External Power (5 V from USB)	USB Mini-B connector to * USB interface from computer * PSA029 AC to DC power adaptor			
External Power	I/O connector: 10 to 25 VDC (Use cable CBL140)			
Operating Time (with power save options)	> 18 hours (1.5 V Lithium batteries)			
	> 8 hours (Alkaline or NiMH batteries)			
Power Consumption with PRM831	1.1 W (backlight off, running)			
	≤ 2 W (with DVX012)			
	5 W (maximum)			
Memory Retention				
Data Memory	Non-volatile flash memory, backup performed every minute			
Real-time Clock	≥ 1 year with batteries removed			
Broadband Noise Levels				
Self-generated Electrical Noise	**0 dB Gain**		**20 dB Gain**	
Weighting	Typical (dB)	Max (dB)	Typical (dB)	Max (dB)
A	10	12	6	9
C	13	16	12	15
Z	22	25	22	25
Self-generated Total Noise	**0 dB Gain**		**20 dB Gain**	
Weighting	Typical (dB)	Max (dB)	Typical (dB)	Max (dB)
A	16	19	16	17
C	17	20	16	19
Z	23	26	23	26
Note: Combination of the electronic noise and the thermal noise of the 377B02 microphone at 68 °F (20 °C) measured in a sealed and vibration isolated cavity with an averaging time of 60 seconds. Electronic noise of the instrument with an ADP090 (12 pF) in place of the microphone highest anticipated self-generated noise.				

Model 831C Preamplifier Specification (PRM831)	
Frequency response with respect to the response at 1 kHz with 1 Vrms input	
8 Hz to 16 Hz	+0.1 dB, -0.2 dB
16 Hz to 100 kHz	+0.1 dB, -0.1 dB
Lower -3 dB limit	< 1.5 Hz
Attenuation	0.1 dB (typical)
Input Impedance	10 G Ω / 0.16 pF
Output Impedance	50 Ω
Maximum Output	28 Vpp 143 dB peak for microphones with 50 mV/Pa sensitivity
Maximum Output Current	12 mA peak
Harmonic Distortion	< -70 dBC with 8 VRMS output at 1 kHz
Output Slew Rate	2 V per µs (typical)
Electronic Noise With 12 pF Equivalent Microphone	1.8 µV typical A-weighted (2.4 µV max)
	4.3 µV typical Flat 20 Hz to 20 kHz (5.0 µV max)
Power Supply Voltage	15 V to 36 V
DC Output Level	½ power supply voltage
Power Supply Current	1.9 mA (typical)
Temperature Sensitivity	< ±0.05 dB from -40 °F to +176 °F (-40 °C to +80 °C)
Humidity Sensitivity	< ±0.05 dB from 0 to 90% RH, non-condensing at +122 °F (+50 °C)
Dimensions (D x L)	0.50 in x 2.88 in (12.7 mm x 73 mm)
Microphone Thread	11.7 mm - 60 UNS (0.4606 in - 60 UNS)
Maximum Cable Length	200 ft (61 m) for signals up to 20 kHz
Output Connector	Switchcraft TA5M (5-pin male)
Reference Conditions	All values are at 73 °F (23 °C), 50% RH, 35 V supply, 10 ft (3 m)

Model 831C with PRM831 and 377B02 Microphone			
		0 dB Gain	**20 dB Gain**
Dynamic Range	A	17 dB - 140 dB	16 - 120 dB
	C	17 dB - 140 dB	17 - 120 dB
	Z	24 dB - 140 dB	23 - 120 dB
Measurement Range [1]	A	24 dB - 140 dB	20 - 120 dB
	C	26 dB - 140 dB	25 - 120 dB
	Z	36 dB - 140 dB	33 - 120 dB
Peak Range	A	65 dB - 143 dB	44 - 123 dB
	C	66 dB - 143 dB	45 - 123 dB
	Z	68 dB - 143 dB	59 - 123 dB
Max Level	SPL	140 dB	120 dB
	PEAK	143 dB	123 dB
Notes			
[1] As defined in IEC 61672-1. Microphone and electrical self-noise included			

PRM831
Preamplifier

377B02
Microphone

OPTIONS AT-A-GLANCE

Spectral Analysis	
Octave Analysis (with Option 831C- OB3)	
1/1 Octave Filters	8 Hz to 16 kHz
1/3 Octave Filters	6.3 Hz to 20 kHz
Octave filter self-generated noise at 1 kHz	
1/1 Octave Filters	2.0 dB @ normal range (0.2 dB in low range w/ 20 dB gain)
1/3 Octave Filters	-3.1 dB @ normal range (-4.9 dB in low range w/ 20 dB gain)
Octave Analysis Parameters	
Filters	None, 1/1 octave, 1/3 octave, or 1/1 and 1/3 octaves
Frequency Weighting	A, C, or Z (independent of broadband weighting)
Maximum Spectrum	Maximum in each band or Spectrum at broadband Lmax
Spectral Statistics	6 percentiles per filter
Octave Band Logging Capability	Time History (see 831C-LOG) Measurement History (see 831C-ELA) Event History (see 831C-ELA)
Normalized Spectrum	
View Modes	SPL, Leq, Lmax, or Lmin; absolute or relative
Predefined Curves	A, C, -A, -C
User-Defined Curves	Four named for 1/1 octave and four for 1/3 octaves bands
Profiling with Time History Logging, Measurement History, and Event History	
Time History Logging (with option 831C-LOG)	
Record Period	Selections from 2.5 ms to 24 hr
Logging Parameters	Any combination of available broadband and spectral AnyData plus non sound metrics
Measurement History Logging (with option 831C-ELA)	
Interval	1 min to 99 hr
Logging Parameters	Same as Overall Measurements Ln Statistics + Spectral Ln (if OB1 or OB3 enabled)
Sound Record Tagging	At start of each interval (required to enable SR)
Event History Logging (with option 831C-ELA)	
Logging Period	20 ms to 5 s (independent of TH or MH)
Logging Parameters	Leq, Lmax, Lpeak, Date and Time, Duration, Exposure in dB and Pa2s, and available spectral Leq and maximum. Event Time History is also available with broadband and spectral levels.
Sound Record Tagging	Required to enable SR at 8 ksps or 16 ksps
SEL	Yes (LAE)
Sound Recording (831-SR)	
Data Format	Mono wave file (.wav) or compressed (.ogg)
Listening Options	On Model 831 using USB headset with Utility program, DNA, or using standard wave file player
Sample Rate	8, 16, 24, ,48, or 51.2 ksps
Storage Requirement	1 MB/min at 8 ksps to 6 MB/min at 48 ksps for .wav file
Sound Recording Modes	Manual, coupled to marker, at measurement interval start, upon event
Pretrigger	Variable depending upon sample rate; up to 60 s
Duration	Max 9999 s
Sound Streaming	Streaming to host
Weather (Meteorological Parameters)	
Combined Meteorological Unit (with sensor SEN031)	
Measuremed Parameters	Wind speed and direction, temperature, relative humidity, rain, and hail
Communication	USB using DVX008A
Sensor Model	SEN031 (requires CBL167 & DVX008A)
Sensor Noise Level	30 dB A-weighted at 2 ft (61 cm)
Ultrasonic Anemometer – Wind Sensor (with sensor SEN032)	
Measured Parameters	Wind speed and direction
Communication	USB using DVX008A
Sensor Model	SEN032 (requires CBL167 & DVX008A)
Sensor Noise Level	30 dB A-weighted at 2 ft (61 cm)
Communication Options	
Direct USB to Sierra Wireless (831C-SW)	
Sierra Wireless RV50	4G cellular gateway
Power	3.2 W with power save configuration

Model 831C
SoundAdvisor™

ORDERING INFORMATION

Model Number	Description
Sound Level Meter	
831C-FF	SoundAdvisor Model 831C sound level meter with Class-1 free-field, pre-polarized precision condenser microphone (50 mV/pa), preamplifier (PRM831), accessory kit (831C-ACC)
831C-FF-KIT1	831C-FF with DVX012 and firmware options 831C-LOG, 831C-OB3, 831C-ELA & 831C-SR
831C-FF-KIT2	SoundAdvisor Model 831C-FF with firmware options 831C-LOG & 831C-OB3
831C-RI	SoundAdvisor Model 831C sound level meter with Class-1 random-incidence pre-polarized condenser microphone (50 mV/Pa), preamplifier (PRM831), accessory kit (831C-ACC)
831C-RI-KIT1	SoundAdvisor Model 831C-RI with DVX012 and firmware options 831C-LOG, 831C-OB3, 831C-ELA & 831C-SR
831C-LOWN	SoundAdvisor Model 831C sound level meter with 378A04 low noise, ICP microphone and preamplifier (450 mV/Pa), accessory kit (831C-ACC) and ICP adapter (ADP074)
831C-ENV	SoundAdvisor Model 831C class 1 sound level meter base kit for environmental noise. Includes EPS2116, PRM2103-FF, CBL203-20 & PSA032 and firmware options 831C-LOG, 831C-OB3, 831C-ELA, 831C-SR & 831C-SW
831C	SoundAdvisor Model 831C sound level meter for environmental and community noise without microphone or preamplifier
Firmware Options	
831C-LOG	Upgrade Model 831C sound level meter with logging of time histories with periods from 20 ms to 24 hr
831C-OB3	Upgrade Model 831C sound level meter with Real-time 1/1 & 1/3 octave filter set
831C-ELA	Upgrade Model 831C sound level meter with event, interval and daily histories logging
831C-SR	Upgrade Model 831C to record compressed and uncompressed audio
831C-MSR	Upgrade Model 831C to add Measurement History and sound recording
831C-SW	Upgrade Model 831C to add direct USB communication with Sierra Wireless RV50 gateway
Calibration	
CER-831	ISO 17025 compliant calibration and certification of 831C (SLM, preamplifier with microphone) and 831C-RPT
CER-831-E	Environmental certification Model 831C for [-40,+158] °F ([-40,+70] °C) range. Includes calibration of 831C and PRM831, 831-RPT, environmental test of microphone. Microphone calibration not included.
CER-MIC	Calibration and certification for microphone
CER-PRM2103-E	Environmental Certification Model PRM2103 for [-40,+158] °F ([-40,+70] °C) range; (no microphone certification); environmental test of microphone
CER-426A12	Calibration and certification for 426A12 including environmental testing for temperature vand humidity stability. Replaces windscreen, o-ring, and desiccant cartridges.
831-RPT	Model 831C Sound Level Meter certification test report. Certificate for SLM, preamplifier, and microphone.

ORDERING INFORMATION

Model Number	Description
Accessories	
831C-ACC	Accessory kit for Model 831C sound level meter, which includes case (831-CCS), batteries (4-AA), power supply w/ USB cable (PSA029), WiFi dongle (DVX014), and windscreen (WS001)
831-CCS	Hard shell case with rugged foam lining
831-MEM32G	USB memory, 32GB
ADP074	Adapter to provide ICP® output on BNC connector
ADP097	Direct input adapter with BNC connector for Model 831C & 831 sound level meters
BAT015	8 D cell battery holder with fuse; batteries not included
CBL138	Cable USB A to mini-B 6 ft (1.8 m)
CBL139	AC/DC output cable with 2.5 mm sub-miniature plug to BNC or RCA
CBL140	DC power cable for Model 831 Sound Level Meter, 10 – 25 VDC includes lead-acid battery clamps and 12 V car plug
CBL170	Cable connecting Model 831 to 9-pin D connector (wind speed, direction, logic I/O, 3 slow ADC) and coaxial DC connector (to PSA027)
DVX008A	USB Adaptor to serial (DB9 connector)
DVX012	USB to Ethernet adapter
DVX013	Gigabit Ethernet dongle for 831C with USB-A connector to RJ-45 (CAT5) and includes 3 port USB hub. Hub requires external 5V power, AC adapter included (StarTech model ST3300GU3B) . For DC power use PSA036
DVX014	WiFi adapter supporting b/g/n for 831C (D-Link DWA-121)
DVX015	USB self-powered 2 port hub (Cables To Go model #29525)
EXC006/10/20/50	Microphone extension cable, 5 pin Switchcraft, 6 ft (2 m), 10 ft (3 m), 20 ft (6 m), 50 ft (15 m). Additional lengths available
GPS001	USB connected GPS receiver
PSA029	AC Power supply (100-240 VAC to 5 V USB w/mini-B cable, CBL138)
PSA036	12V to 5V DC power adapter for use with DVX013
SEN025	Single axis accelerometer, 10 mV/(m/s²) or 100 mV/g ICP®.
WS001	3.5 inch diameter windscreen for 0.5 inch microphone
Microphones and Preamplifiers	
377B02	0.5inch free-field, prepolarized condenser microphone, typical sensitivity = 50 mV/Pa, 3.15 Hz to 20 kHz (±2 dB)
377C20	0.5 inch random incidence, prepolarized condenser microphone 50 mV/Pa, 3.15 Hz to 16 kHz (±2 dB)
377C10	0.25 inch pressure, prepolarized condenser microphone typical sensitivity = 1.6 mV/Pa, 4 Hz to 70 kHz (±2 dB)
378A04	ICP® Low noise microphone & preamplifier system, 6.5 dB A-weighted typical noise
426A12-FF	Permanent outdoor preamplifier & free field microphone with electrostatic actuator, humidity reading, TEDS and supporting externally and pre-polarized microphones
426A12-RI	Permanent outdoor preamplifier & random incidence microphone with electrostatic actuator, humidity reading, TEDS and supporting externally and pre-polarized microphones
ADP043	0.25 inch microphone to 0.5 inch preamplifier adaptor
PRM831	Model 831C Sound Level Meter preamplifier for 0.5 in free-field or random incidence prepolarized microphones
PRM2103-FF	Permanent Outdoor Preamplifier with free-field microphone with Remote Calibration Check, humidity reading and heater, for pre-polarized microphone. Random or 90 degree response can be selected on the Model 831C.
Software	
SWW-SLM-UTILG4	G4 LD Utility software for SoundTrack LxT® and Model 831C sound level meter: download, upgrade, translate, print text reports or export to spreadsheet. CD with Quick Start Guide
SWW-DNA	Basic software and dongle (USB) for evaluation and reporting of data downloaded from the Larson Davis instruments, requires an instrument driver
SWW-DNA-831	Instrument driver for instrument control, set-up, live display, data translation, and data download for Model 831C & 831 sound level meter
SWW-DNA-EV	DNA option for Events tracking: PNL and PNLT Event Time History and EPNL Event
SWW-DNA-BA	DNA software Building Acoustics, allows calculation of transmission loss and sound insulation calculations
SWW-DNA-REMOTE	DNA software for monitoring a remote location when using 820, 824, 870, or 831C Models. Uses modem connection for communication and data download.
Calibrators	
CAL200	Class 1 acoustic calibrator with user selectable output of 94 or 114 dB at 1 kHz. 1/2 inch opening (no adaptor)
CAL250	Class 1 microphone calibrator, output 114 dB at 251.2 Hz. 1 inch opening with 1/2 inch (ADP019) adaptor. 3/8 inch (ADP020) and 1/4 inch (ADP021) adaptors available

[2] Hazardous materials shipping license required to ship LiFePo battery by common carrier. Battery not allowed on passenger aircraft

Model Number	Description
Noise Monitoring System Components	
COM-RV50-DC-E/U	Sierra Wireless Model RV50 cellular gateway to add Internet connectivity through cellular network to 831C. Choose /U for US and /E for rest of world. Requires option (831C-SW for direct USB connection).
EPS030-831	Case for Model 831C Sound Level Meter including (1) 21 Ah battery, charger (PSA032), internal preamplifier cable (CBL141), and power distribution cable (CBL151)
EPS036-831	Case on wheels (CCS035) to enclose Model 831C with (2)x 21 Ah batteries (BAT011). Includes CBL166 & CBL168 to power Model 831C
EPS037-831	Case on wheels (CCS035) to enclose Model 831C with 100 Ah batteries (BAT012). Includes CBL166 & CBL168 to power Model 831C
EPS042	Environmental protection for 831C, 831 or LxT with BAT015 in a CCS002 hard case; includes a cable gland
EPS044	Noise monitor enclosure for 831C including CCS051, CCS052, ACC009, PSA038, CBL224-02, CBL225-01, CBL226-02 & CBL228-03
EPS044-SLA	Noise monitor enclosure for 831C including CCS051, CCS052, BAT020 35 Ah SLA battery, ACC009, PSA038, CBL224-02, CBL225-01, CBL226-02 & CBL228-03
EPS044-LFP	Noise monitor enclosure for 831C including CCS051, CCS052, BAT019 45 Ah LiFePo battery, ACC009, PSA038, CBL224-02, CBL225-01, CBL226-02 & CBL228-03. License required to ship battery
EPS2116	Environmental protection for 1/2 inch preamplifiers with windscreen, bird spikes, desiccants, and universal mounting
SEN031	Combined weather sensor: wind speed and direction (no moving parts), temperature, humidity, pressure, rainfall (requires CBL167 cable + DVX008A)
TRP001	Instrumentation tripod with ADP032 preamplifier to tripod interface
TRP003	Support tripod, maximum height 8 ft (2.4 m) used in portable NMS systems
CBL174	Waterproof cable connecting EPS030-831 to external PC, 2 m USB A-to-B
ACC009	Monopole for use in EPS044 and NMS044 systems
BAT019[2]	45 Ah 12V LiFePo battery. Weighs 12.8 pounds (5.8 kg)
BAT020	35 Ah 12V SLA battery. Weighs 24.7 pounds (11.2 kg)
CBL218	Cable, USB-A to micro-B, 3 ft (1 m)
CBL222-08	Cable connecting 831C or 831 to PRM2103 with Anderson Powerpole® connectors for 12V power. (8 ft / 2.4 m)
CBL222-20	Cable connecting 831C or 831 to PRM2103 with Anderson Powerpole® connectors for 12V power. (20 ft / 6 m)
CBL223-02	Power cable for Sierra Wireless with sense line and Anderson Powerpole® connectors for 12V power (2 ft / 0.6 m)
CBL224-02	Power cable for 831C or 831 with Anderson Powerpole® connectors for 12V power (2 ft / 0.6 m)
CBL225-01	Power cable for battery with spade connectors and Anderson Powerpole® connectors for 12V power (1 ft / 0.3 m)
CBL226-02	Power cable with Anderson Powerpole® connectors to bare wires (2 ft / 0.6 m)
CBL228-03	Cable, 1m, with MC-4 connectors for solar and bare wires for use with solar charge controllers
CCS051	Base enclosure for EPS044 and NMS044 systems that includes mounting plate, glands and mount for ACC009
CCS052	Canvas bag with zipper and handles. 19 x 9 x 6 in (48 x 23 x 15 cm)
COM-ANT-GPS	GPS antenna with SMA connector and cable for use Sierra Wireless modem like RV-50
SLP001	Portable folding 60 Watt solar panel with integrated stand and carrying case
SLP002	Portable folding 100 Watt solar panel with integrated stand and carrying case
PSA038	Solar charge controller, 10A, used in EPS044 and NMS044 configurations
PSA039	AC power supply, 15 V, 90 W, with MC4 connectors for use with EPS044 & NMS044
PSA040	SLA Battery Charger with PowerPole output connectors. Input: 100-240VAC, 50-60Hz, 0.80-035A. Output:14.7VDC, 2.25A
Permanent Noise Monitoring Systems	
NMS044-LFP60-E[2]	Complete NMS for use outside US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-LFP, COM-RV50-DC-E, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP001, PSA039 & necessary cables. For use when solar insolation > 2 kW•h/m2/day
NMS044-LFP60-U[2]	Complete NMS for use in US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-LFP, COM-RV50-DC-U, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP001, PSA039 & necessary cables. For use when solar insolation > 2 kW•h/m2/day
NMS044-LFP100-E[2]	Complete NMS for use outside US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-LFP, COM-RV50-DC-E, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP002, PSA039 & necessary cables. For use when solar insolation > 1 kW•h/m2/day
NMS044-LFP100-U[2]	Complete NMS for use in US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-LFP, COM-RV50-DC-U, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP002, PSA039 & necessary cables. For use when solar insolation > 1 kW•h/m2/day
NMS044-SLA60-E	Complete NMS for use outside US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-SLA, COM-RV50-DC-E, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP001, PSA039 & necessary cables. For use when solar insolation > 2 kW•h/m2/day
NMS044-SLA60-U	Complete NMS for use in US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-SLA, COM-RV50-DC-U, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP001, PSA039 & necessary cables. For use when solar insolation > 2 kW•h/m2/day
NMS044-SLA100-E	Complete NMS for use outside US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-SLA, COM-RV50-DC-E, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP002, PSA039 & necessary cables. For use when solar insolation > 1 kW•h/m2/day
NMS044-LFP100-U	Complete NMS for use in US including Model 831C with 831C-LOG, 831C-ELA, 831C-SW, EPS044-LFP, COM-RV50-DC-U, 2 ea. COM-ANT-HG, PRM2103-FF, EPS2116, SLP002, PSA039 & necessary cables. For use when solar insolation > 1 kW•h/m2/day

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MD-0324 Rev B 062617