

 **EPS2116**

***Microphone/Preamplifier***

Environmental Protection System  
User Guide



 **LARSON DAVIS**  
A PCB DIVISION

# **Larson Davis**

EPS2116

Outdoor

Mic/Preamplifier

Protection System

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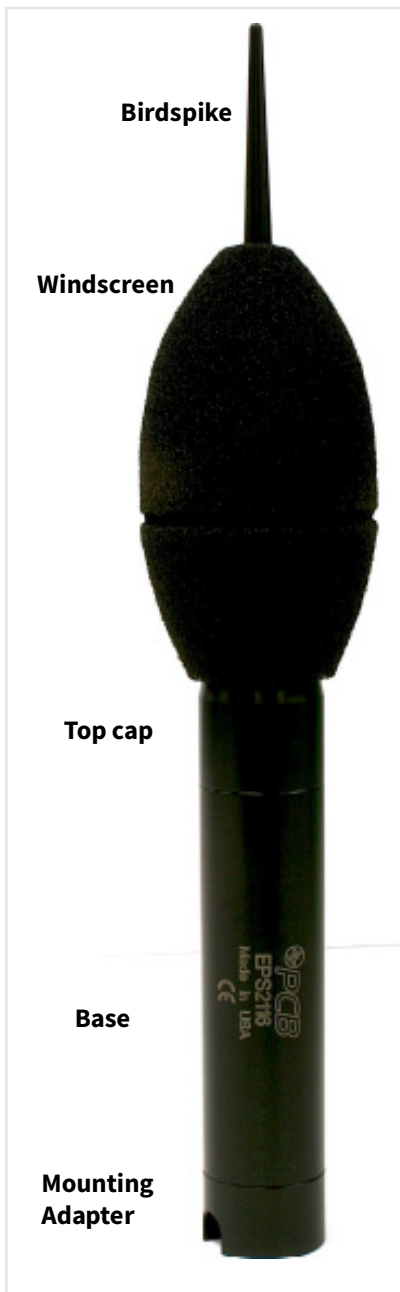
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# Module 1 Getting Started

## In this module:

- 1.1 Product Info and Compatibility -----1
- 1.2 Assembling the EPS2116 -----2
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## 1.1 Product Info and Compatibility



The EPS2116 is a necessary accessory that provides complete protection for your ½-inch microphone and preamplifier against wind, rain, snow, humidity, and physical damage.

In high humidity environments, the optional desiccant cartridges preserve the performance of your environmentally certified preamp/mic (See *Table 1.1* for environmentally certified models). It is especially effective for back-vented microphones. In this scenario, moist air is absorbed by the desiccant before reaching the preamplifier and the back of the microphone. Additionally, the built-in birdspike effectively deters birds from perching on the device.

The EPS2116 is intended to be connected on a threaded ¾-inch conduit, or a 1½-inch (38mm) speaker stand, or fastened on a mounting screw and applied to a tripod in the field.

When used with an environmentally certified preamplifier, the EPS2116 protects your microphone and preamplifier from the environment. However, it is only effective if the preamplifier in use has a waterproofing o-ring installed.

Refer *Table 1.1* to ensure your device is ready for use with the EPS2116.

**Table 1.1 Larson Davis Preamplifiers and Compatibility**

Preamplifier	Manufacturer Installed o-ring?	Environmental Certification Available to Purchase
PRM2103	Yes	Yes
PRM831	No	Yes
PRMLXT1/2B/1L/2L	No <sup>a</sup>	No
PRM828	No	Yes
PRM902	No	Yes

a. This device is not compatible with an o-ring seal.

Environmental Certification service for your qualifying preamp is available by contacting your Larson Davis representative.

## 1.2 Assembling the EPS2116

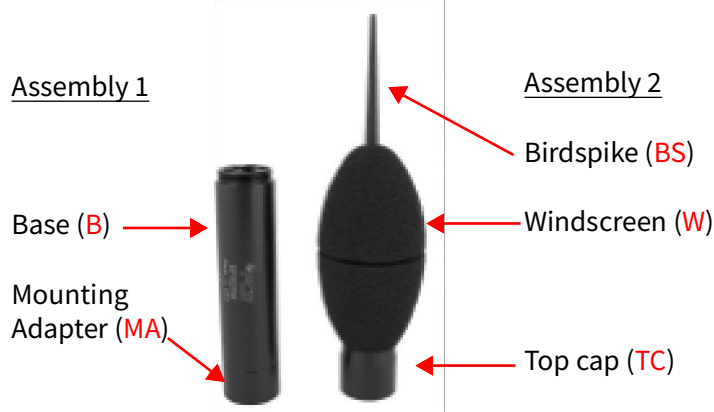
Complete each step in this section in the order it's presented. Once assembled, the EPS2116 can be left in place during calibration or transport.

The EPS2116 is shipped with the base and adapter in one assembly. The top cap, windscreen, and birdspike are combined in a second assembly, as shown in Figure 1-1.

**FIGURE 1-1 EPS2116 As shipped**

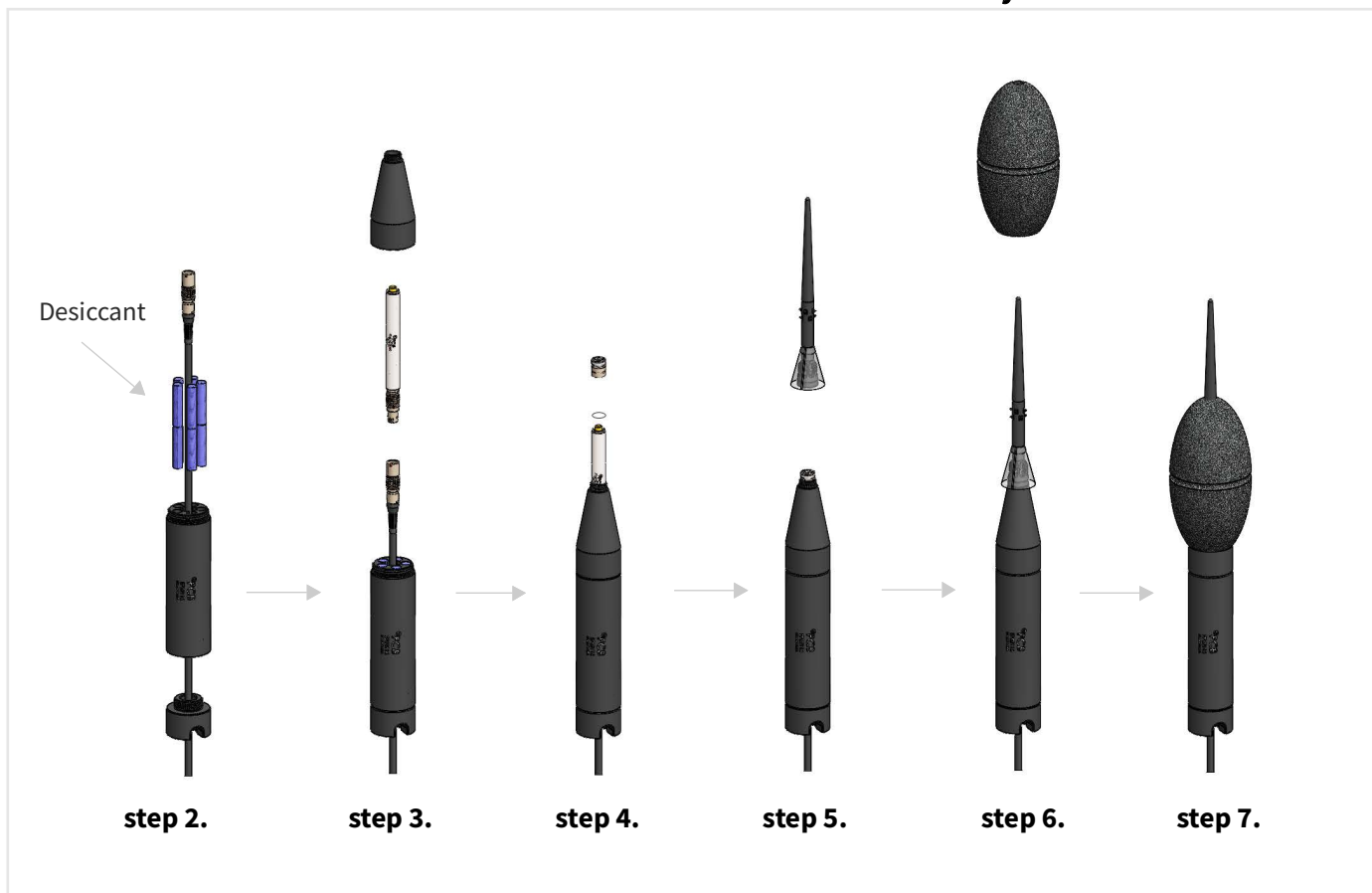
**CAUTION** DO NOT pull the windscreen (W) upward over the birdspike (BS).

If you need to separate the birdspike (BS) and windscreen (W), be sure to pull the windscreen down and the birdspike up.



**Step 1.** Follow the steps associated with *Figure 1-2* to prepare the EPS2116 for use.

**FIGURE 1-2 Overview of EPS2116 assembly**



- Step 2.** Thread the included cable upward through the mounting adapter (MA) and base (B) as shown in Figure 1-2, step 2.

When using the PRM831 preamplifier, complete **Installing Desiccant Cartridges** (steps a–c). Alternatively, if you are using the PRM2103, desiccant is not required. Instead, refer to the *SoundAdvisor 831C Manual*, **section 9.13** to choose preamp heater options.

### Installing Desiccant Cartridges

- a. Insert five desiccant cartridges into four of the desiccant chambers in the base.
- b. Insert desiccant indicator (clear tube) into the fifth chamber.

**FIGURE 1-3 Inserting desiccant indicator**



**TAKE NOTE** When the desiccant indicator crystals change color, replace the cartridges. Replacement cartridges are available to order from [LarsonDavis.com](http://LarsonDavis.com) (Part #DSC003)

- Step 3.** Connect the preamplifier to the cable. (See *Figure 1-4*)

- Step 4.** Slide the preamplifier partially through the top cap, and then screw the top cap to the base.

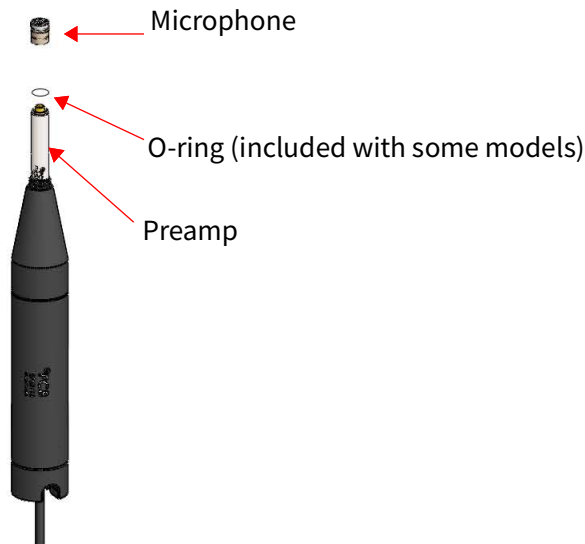
**TAKE NOTE** You should expect some resistance pushing the preamplifier partially through the top, especially for preamplifiers with a built in o-ring.

**FIGURE 1-4 Connecting the preamp**



- Step 5.** Screw the 1/2-inch microphone onto the preamplifier, and then carefully push the preamplifier back down into the top cap until it stops and the microphone is seated properly in the EPS2116. If your model includes a weatherproofing O-ring, install over the preamp before screwing the microphone as shown in *Figure 1-5*.

**FIGURE 1-5** Installing a weatherproofing O-ring



- Step 6.** Screw the birdspike (with attached rainscreen) onto the top cap.
- Step 7.** If the windscreen is not already in place, slide it over the birdspike until the bottom of the windscreen is seated on the EPS2116 top.
- CAUTION** If you need to remove the windscreen, do not pull it off the birdspike with an upward motion. First, unscrew the birdspike by twisting the top, then pull the windscreen down over the bottom of the unscrewed birdspike.

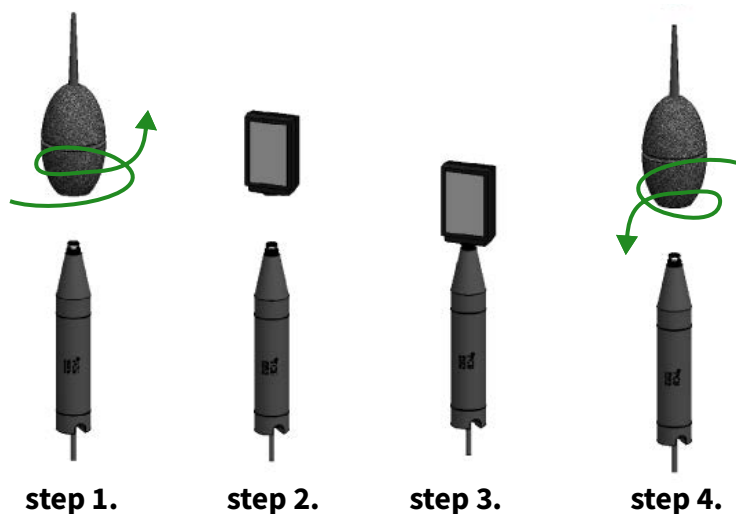
## 1.3 Calibrating a Microphone in the EPS2116

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You may calibrate a microphone without removing it from the EPS2116 as shown in this section.



**FIGURE 1-6 Steps for Microphone Calibration**



- Step 1.** Remove windscreen/birdspike by unscrewing the windscreen/birdspike assembly from the top cap.
- Step 2.** Place the calibrator (CAL 200 shown) on the microphone by gently pushing down while twisting slightly clockwise.
- TAKE NOTE** If needed, pull the mic/preamp upward out of the top cap, so the microphone seats fully inside the calibrator.
- Step 3.** Calibrate the microphone as described in the microphone manual. When the calibration is complete, remove calibrator by pulling up and slightly twisting counter-clockwise.
- Step 4.** Replace the windscreen/birdspike assembly.

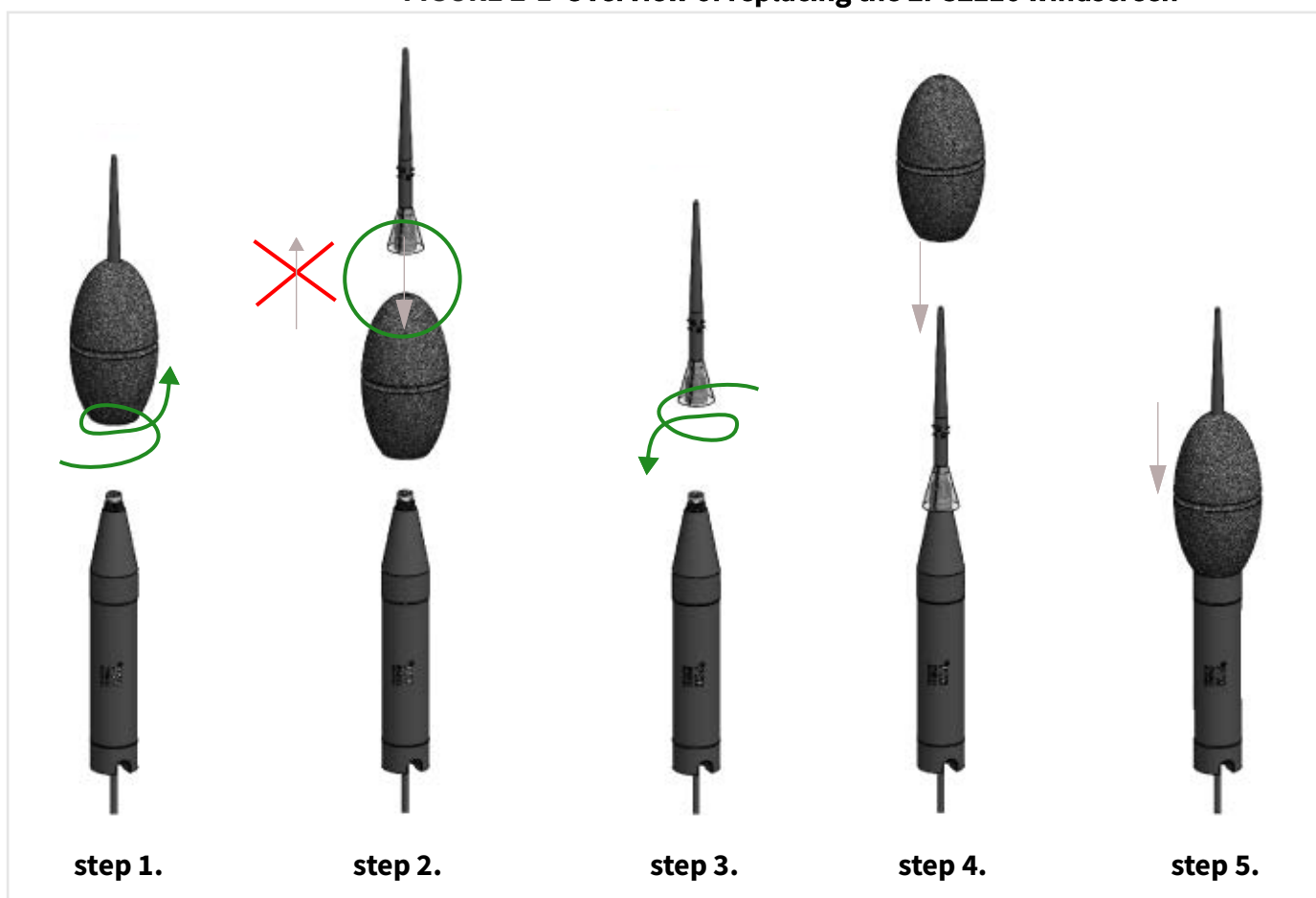
# Module **2** Maintaining the EPS2116

## In this module:

- 2.1 Replacing the Windscreen -----6
- 2.2 Replacing the Desiccant -----7

## 2.1 Replacing the Windscreen

FIGURE 2-1 Overview of replacing the EPS2116 windscreen



**Step 1.** Remove the windscreen/birdspike by unscrewing the assembly.

**Step 2.** Pull the windscreen downward, and over the bottom of birdspike to remove it.

**CAUTION** Pulling the windscreen over the top of the birdspike may damage the rain screen.

- Step 3.** Replace the birdspike by screwing it onto the top cap.
- Step 4.** Pull new windscreen downward over the birdspike until the bottom aligns with the windscreen seating line on the base of the birdspike.

## 2.2 Replacing the Desiccant

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If you are using the PRM831 preamplifier, adding desiccant to the EPS2116 protects the preamplifier and microphone from precipitation or moist air.

If you are using the PRM2103 preamplifier, desiccant is not required. Instead, the PRM2103 uses a built-in heater to control humidity near the microphone and preamplifier.

**TAKE NOTE** When the desiccant indicator changes color, it's time to replace it. Replacement cartridges are available to order from LarsonDavis.com. (Part# DSC003)

- Step 1.** Remove the windscreen by unscrewing it from the top cap, as shown in [2.1 Replacing the Windscreen](#).
- Step 2.** Gently pull the microphone and preamplifier upward through the top cap of the EPS2116, then disconnect the preamplifier from the cable.
- Step 3.** Unscrew the top cap from the EPS2116 base assembly to reveal the desiccant chambers.
- Step 4.** Discard the old desiccant cartridges, insert four groups of five new cartridges, and place the indicator (clear tube) in the unfilled chamber. (See

**FIGURE 2-2 Replacing desiccant cartridges**

Do not let the cable slip down into the base. It may be difficult to retrieve.



- Step 5.** Replace the preamplifier and then the top cap. To do this, do the following:
  - a.** Push the cable upward through the top cap.
  - b.** Screw the top cap onto the base.
  - c.** Connect the preamplifier to the cable, and push it down until seated firmly. Do not pull the cable from the bottom.

**FIGURE 2-3 Replacing the top cap and preamplifier**



**Step 6.** Screw the windscreen/birdspike combination onto the top cap. Do not overtighten.

# Appendix **A** Technical Specifications

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## In this module:

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## A.1 Standards and Safety Requirements Met By EPS2116

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### A.1.1 Sound Level Meter Standards

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When used with the Larson Davis Model 831C, 831, or LxT versions, the EPS2116 can be used as part of a Class 1 or 2 measurement system when the appropriate microphone correction is applied, as directed by IEC 61672-1:2013 and ANSI S1.4-2014.

### A.1.2 Safety Requirements

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Compliance	Standard
All	IEC 61010-1 (2010): Safety requirements for electrical equipment for measurement, control, and laboratory use
IP 55	IEC 60529 (2001): Degrees of Protection Provided by Enclosures
NEMA 4	NEMA 250 (2008): Enclosures for Electrical Equipment
2002/95/EC (RoHS 1)	RoHS: The Restriction of Hazardous Substances Directive

## A.2 Included Accessories

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Part #	Quantity	Accessory
WS011	2	Windscreen for EPS2116
M2116.01	1	Camera/instrument tripod adapter
ADP103	1	EPS2116 to TRP003 adapter
I2116.01	1	Flash drive with instruction manual

## A.3 Optional Accessories

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Part #	Accessory
TRP001	Camera/Instrument tripod
TRP003	Tripod, max height of 8 feet, for use with portable noise monitoring systems and ADP034 adapter
TRP019	Permanent, tilt-down pole for use with ADP100 adapter
TRP020	Semi-permanent tripod for use with ADP100 adapter
DSC003	50 non-indicating desiccant cartridges, * and two indicating desiccant cartridges <b>CAUTION</b> *Desiccant cartridges contain 0.05% cobalt chloride and are suitable for use in Europe. Although non-toxic, the cartridges are not edible. Keep away from children and pets.
ADP100	Adapter connecting EPS2116 to TRP019 or TRP020. Connects 3/4"-14 NPSM (ISO 228-G 3/4) to 1 1/2" BSPF (ISO 228-G 1.5).
CAL200	Class 1 acoustic calibrator for 1/2" microphones

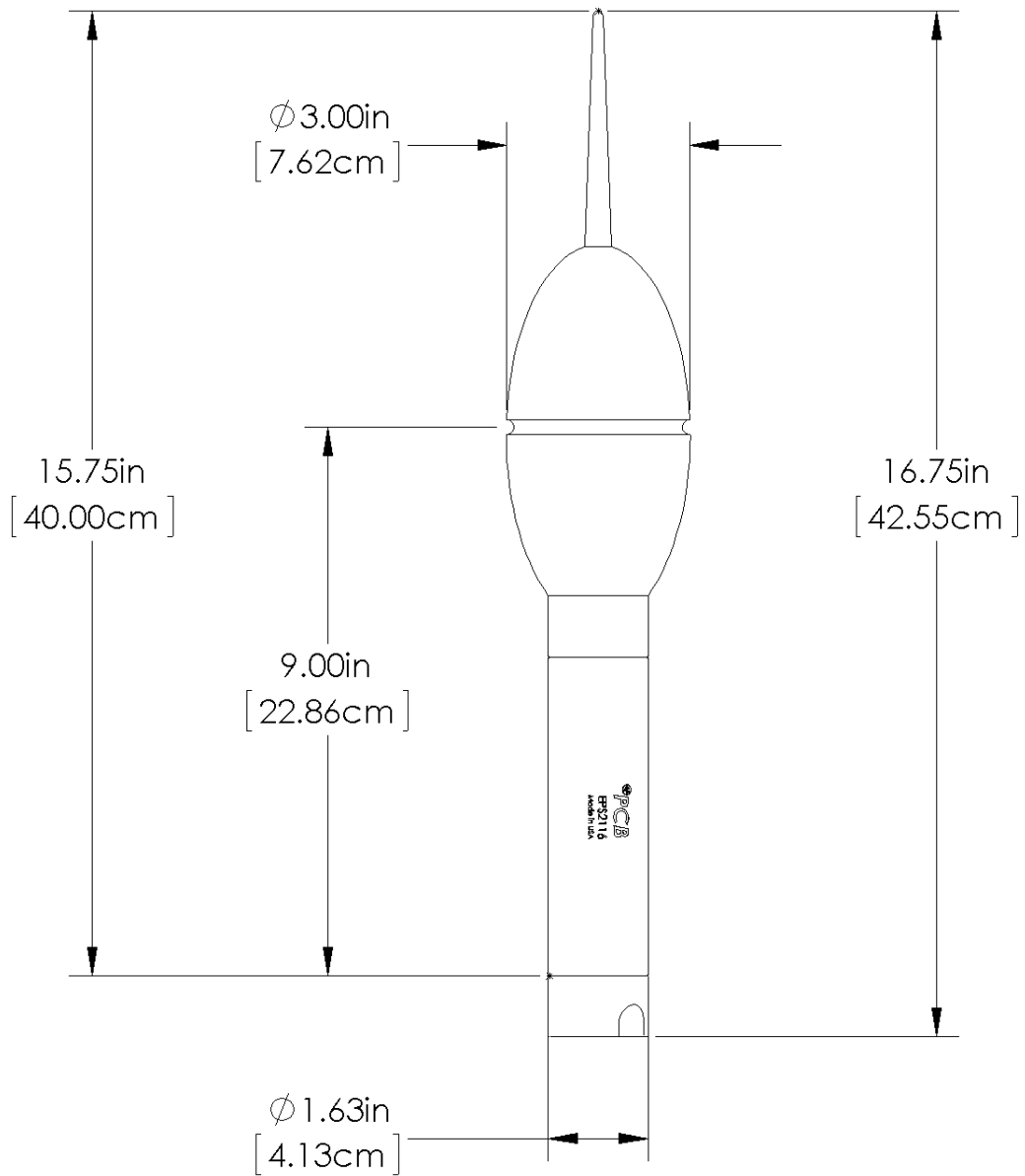
## A.4 Physical Specifications

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Table A.1

<b>Material Composition</b>	UV resistant
<b>Venting</b>	Below preamplifier, near connector
<b>Desiccant</b>	Optional cartridges
<b>Mounting</b>	3/4 in. NPT, or Pipe thread R 3/4 (female) 1/4-20 camera thread using included adapter 1.5 in (3 cm) speaker stand using included adapter
<b>Total Weight</b>	.71 lb; 332 g
<b>Compatibility</b>	Compatible with 1/2" microphones and preamplifiers

**FIGURE A-1** EPS2116 Dimensions



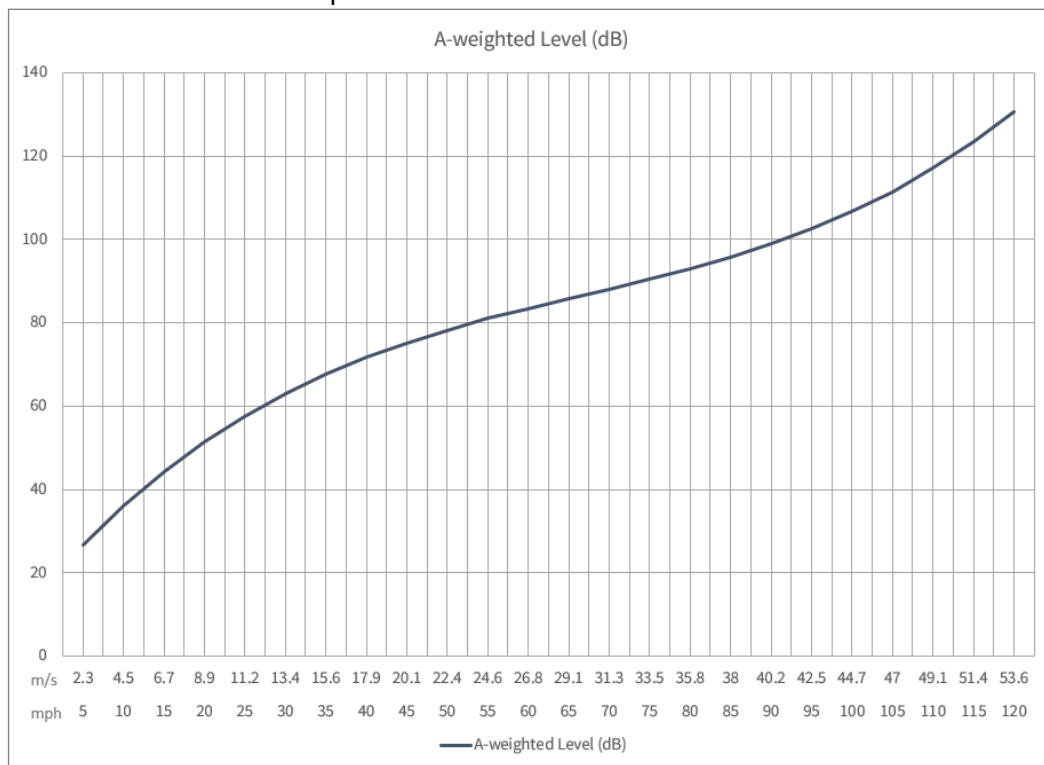
## A.5 Wind-Induced Noise

The following tables show quantified figures for self-generated noise created by the EPS2116 due to wind.

MPH	m/s	A-Weighted Level (dB)
5	2.3	26.7
10	4.5	36
15	6.7	44.2
20	8.9	51.4
25	11.2	57.6
30	13.4	63
35	15.6	67.6

40	17.9	71.7
45	20.1	75.1
50	22.4	78.2
55	24.6	81
60	26.8	83.4
65	29.1	85.8
70	31.3	88.1
75	33.5	90.4
80	35.8	92.9
85	38	95.7
90	40.2	98.9
95	42.5	102.5
100	44.7	106.6
105	47	111.4
110	49.1	117
115	51.4	123.4
120	53.6	130.7

**FIGURE A-2** Wind-Induced Noise Graph





## A.6 Description of EPS2116 Windscreen Filter

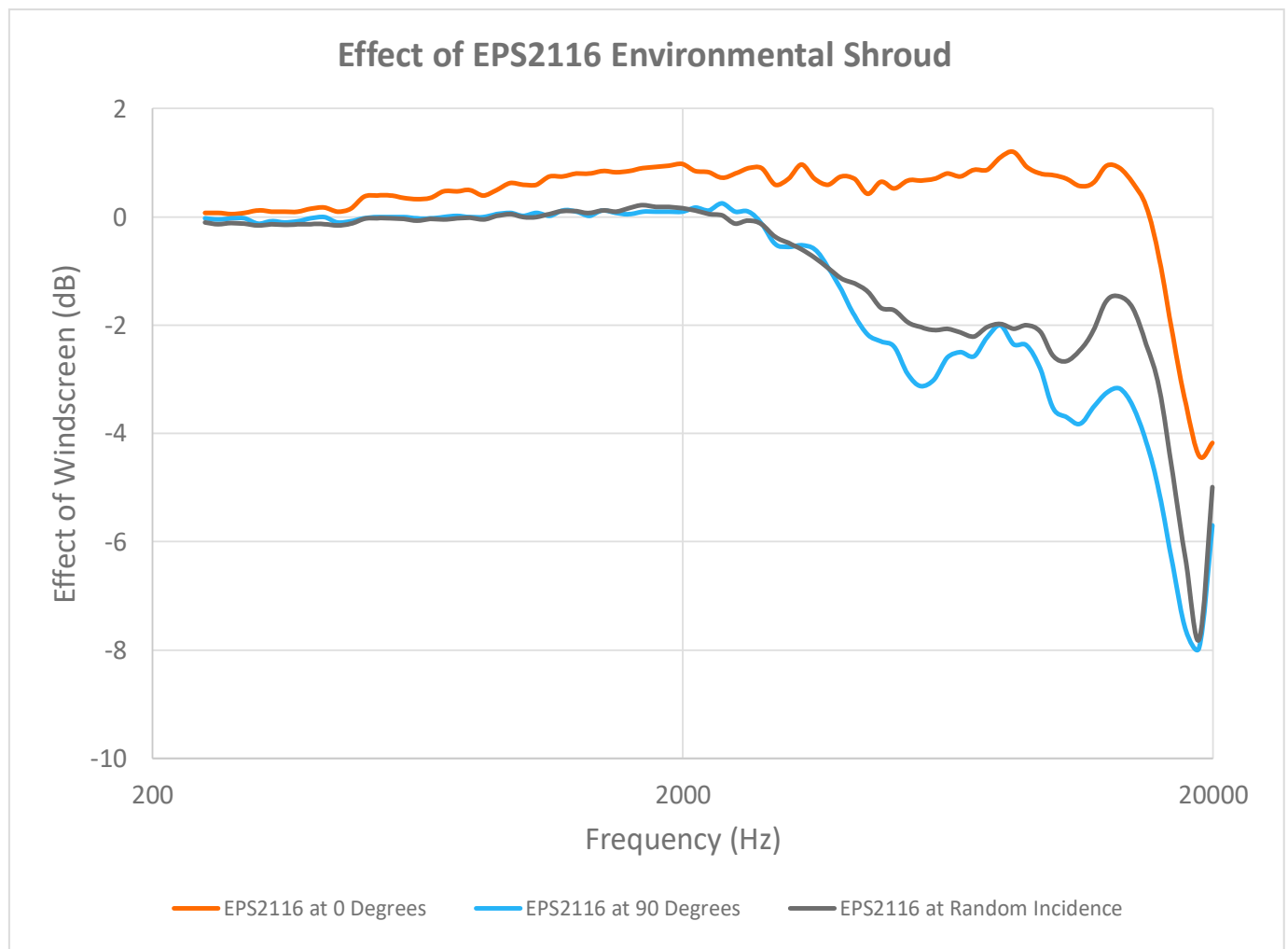
This section describes the effects of the environmental protection shroud on the response of the sound level meter. See *Table A.2* for the name of the filter to select in the measurement setup for a given test. *Figure A-3* graphs the effects of the windscreen on the SLM. *Table*

A.3 lists the effect measured at each of the listed frequencies. Data from this table can be added to electrical test measurement data to simulate the windscreen effect.

**Table A.2** Test, Filter Name, and Description

Test	SLM Filter Name	EPS 2116 Filter Description
Free-Field Response	FF:FF 2116	Free-Field to Free-Field EPS2116
90° Response	FF:90 2116	Free-Field to 90° EPS2116
Random Incidence Response	FF:RI 2116	Free-Field to Random Incidence EPS2116

**FIGURE A-3** Effects of EPS2116 Environmental Shroud



**Table A.3** Effects of EPS2116 Environmental Shroud by Frequency

<b>Frequency (Hz)</b>	<b>EPS2116 at 0 Degrees (dB)</b>	<b>EPS2116 at 90 Degrees (dB)</b>	<b>EPS2116 at Random Incidence (dB)</b>	<b>Expanded Uncertainty (dB)</b>
63	0.05	-0.03	-0.10	0.20
79	0.05	-0.03	-0.10	0.20
100	0.05	-0.03	-0.10	0.20
126	0.06	-0.03	-0.10	0.20
158	0.06	-0.03	-0.10	0.20
200	0.07	-0.03	-0.10	0.20
251	0.85	0.05	0.12	0.20
316	0.13	-0.13	-0.16	0.20
398	0.15	-0.02	-0.13	0.20
501	0.37	-0.03	-0.03	0.20
631	0.32	-0.02	-0.06	0.20
794	0.50	0.00	-0.01	0.20
1000	0.60	0.03	0.00	0.20
1059	0.60	0.08	0.00	0.20
1122	0.75	0.12	0.11	0.20
1189	0.75	0.12	0.11	0.20
1259	0.80	0.10	0.11	0.20
1334	0.80	0.03	0.07	0.20
1413	0.85	0.12	0.13	0.20
1496	0.82	0.08	0.10	0.20
1585	0.85	0.05	0.17	0.20
1679	0.90	0.10	0.22	0.20
1778	0.93	0.10	0.19	0.20
1884	0.95	0.10	0.18	0.20
1995	0.98	0.10	0.16	0.20
2113	0.85	0.17	0.12	0.20
2239	0.82	0.12	0.06	0.20
2371	0.73	0.25	0.03	0.20
2512	0.80	0.10	-0.12	0.20
2661	0.90	0.10	-0.06	0.20
2818	0.90	-0.13	-0.13	0.20

2985	0.60	-0.50	-0.37	0.20
3162	0.70	-0.55	-0.48	0.20
3350	0.97	-0.53	-0.60	0.20
3548	0.70	-0.60	-0.76	0.20
3758	0.60	-0.92	-0.94	0.20
3981	0.75	-1.35	-1.13	0.20
4217	0.70	-1.82	-1.23	0.30
4467	0.43	-2.17	-1.38	0.30
4732	0.65	-2.30	-1.68	0.30
5012	0.53	-2.40	-1.73	0.30
5309	0.67	-2.90	-1.94	0.30
5623	0.67	-3.13	-2.04	0.30
5957	0.70	-3.00	-2.09	0.30
6310	0.80	-2.60	-2.07	0.30
6683	0.75	-2.50	-2.14	0.30
7079	0.88	-2.57	-2.21	0.30
7499	0.88	-2.22	-2.04	0.30
7943	1.10	-2.00	-1.97	0.30
8414	1.20	-2.35	-2.06	0.30
8913	0.93	-2.37	-2.00	0.30
9441	0.80	-2.80	-2.12	0.30
10000	0.77	-3.55	-2.57	0.30
10593	0.70	-3.70	-2.66	0.30
11220	0.58	-3.82	-2.46	0.30
11885	0.62	-3.52	-2.11	0.30
12589	0.95	-3.25	-1.54	0.30
13335	0.90	-3.17	-1.47	0.30
14125	0.63	-3.50	-1.69	0.30
14962	0.20	-4.15	-2.35	0.30
15849	-0.77	-5.10	-3.17	0.30
16788	-2.20	-6.45	-4.77	0.30
17783	-3.47	-7.65	-6.38	0.30
18836	-4.42	-7.95	-7.80	0.30
19953	-4.17	-5.70	-5.00	0.30

## A.7 Acoustical Response

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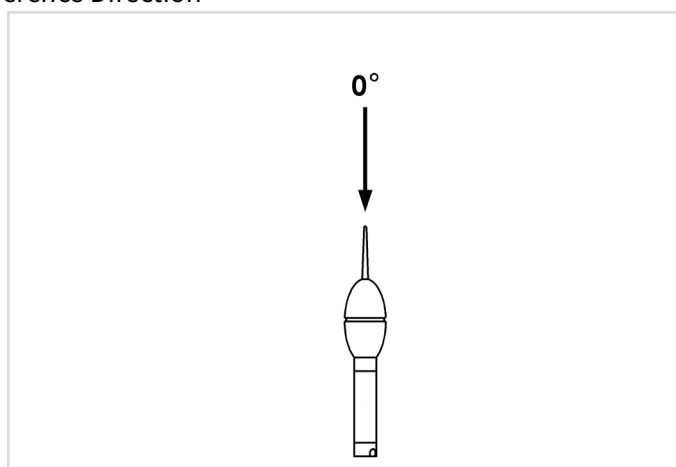
This section provides expected acoustical response data when the EPS2116 is in place. Graphs are shown with and without the available correction filters available as settings on the Model 831C, 831, and LxT sound level meters. Also included in this section is a description of the directional characteristics of the EPS2116.

### A.7.1 Reference Direction

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The 0° direction is perpendicular to the plane of microphone diagram, as shown below:

**FIGURE A-4** EPS2116 Reference Direction



### A.7.2 Frequency Response Graphs

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The Larson Davis Model 831C, 831, and LxT sound level meters can modify the measured response when using the EPS2116 by using the available FF:FF 2116, FF:90 2116, or FF:RI 2116 correction filters. Selecting the appropriate correction in the sound level meter preferences allows the meter to be IEC 61672 Type 1 compliant. The following graphs show the uncorrected frequency response with the EPS2116 (blue curve) and the corrected frequency response data at 0°, 90°, and random incidence (green curve). These are shown with IEC 61672 type 1 tolerances. The correction filter applied in the meter in each case is indicated in the legend for the plot.

FIGURE A-5 EPS2116 Response at 0°

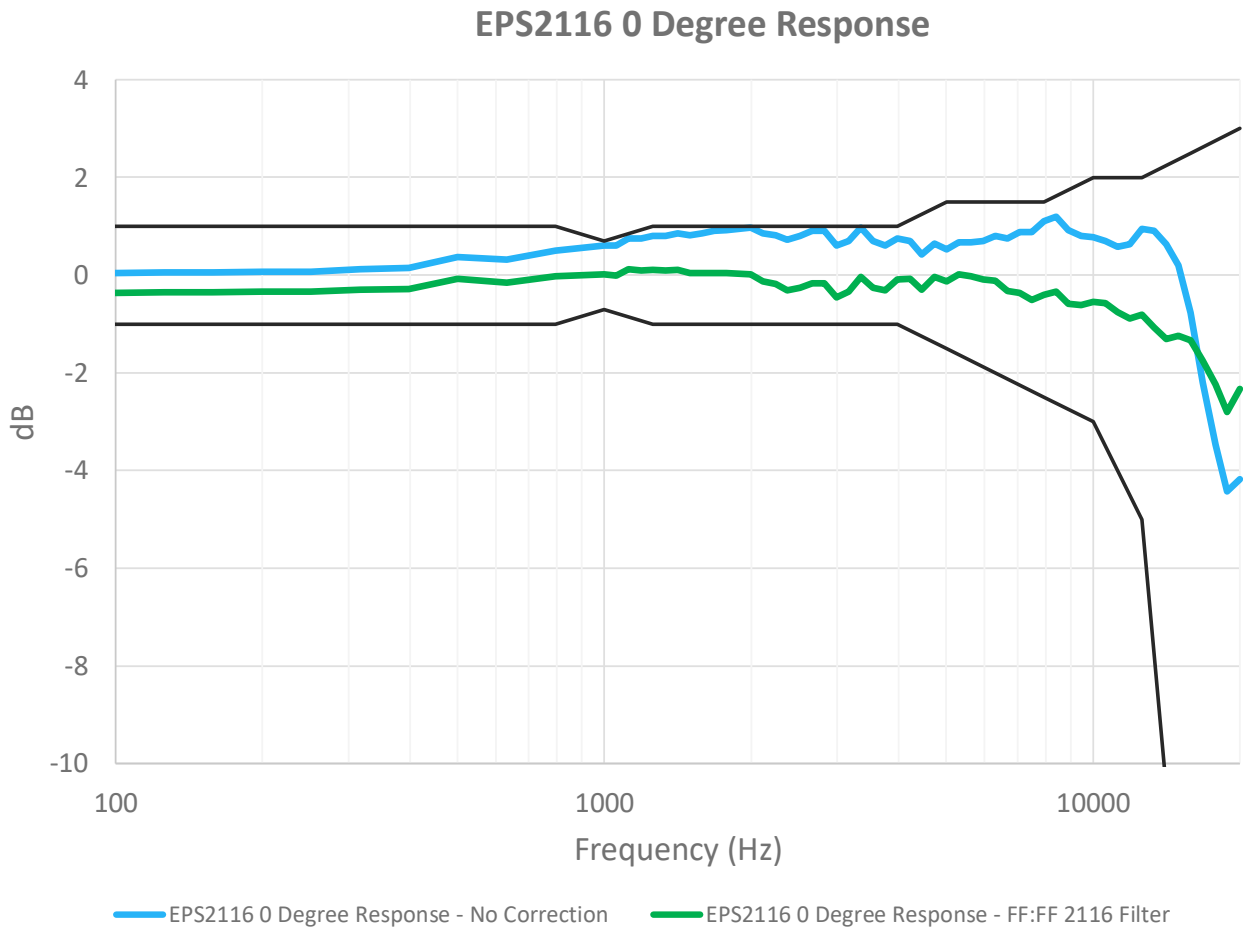


FIGURE A-6 EPS2116 Response at 90°

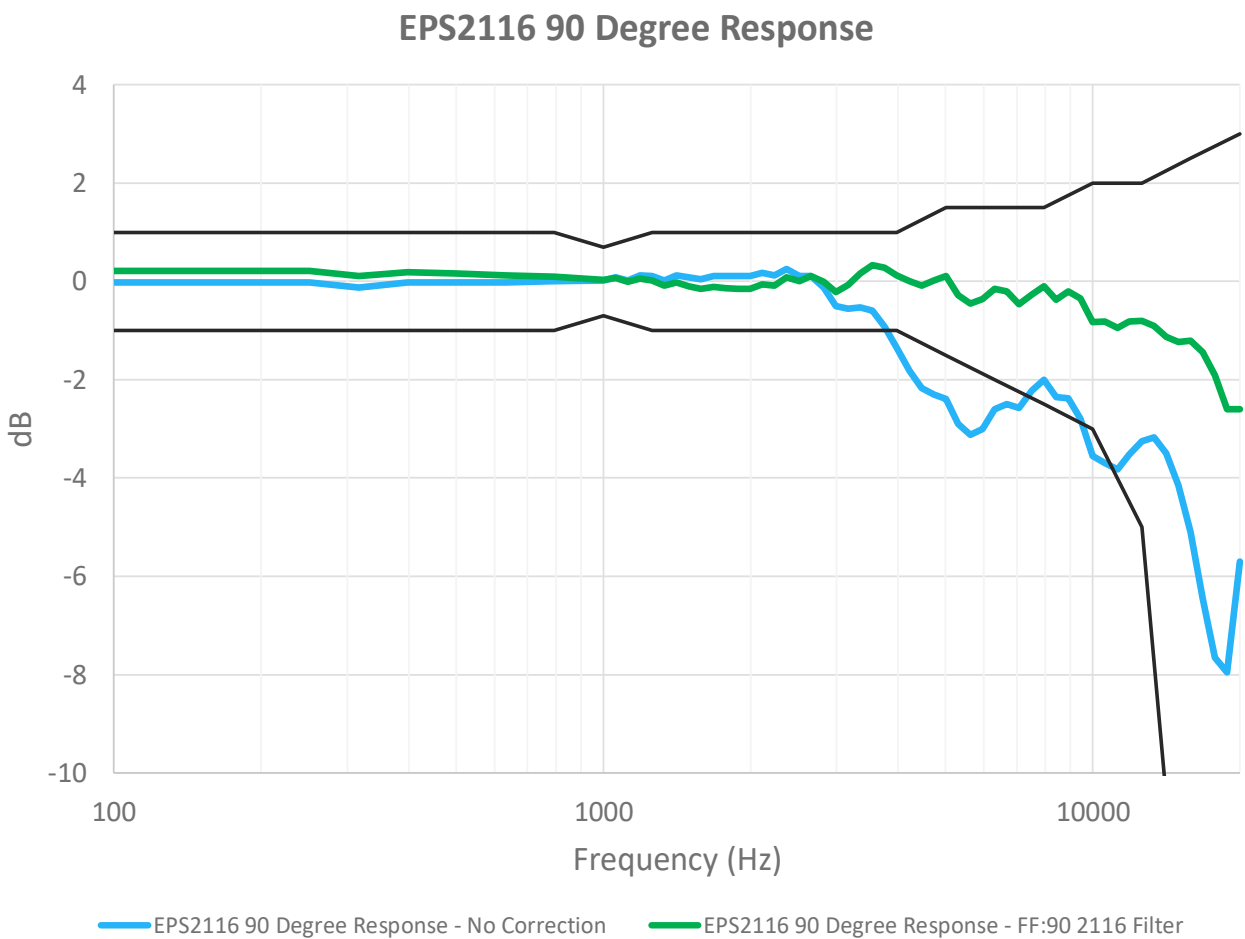
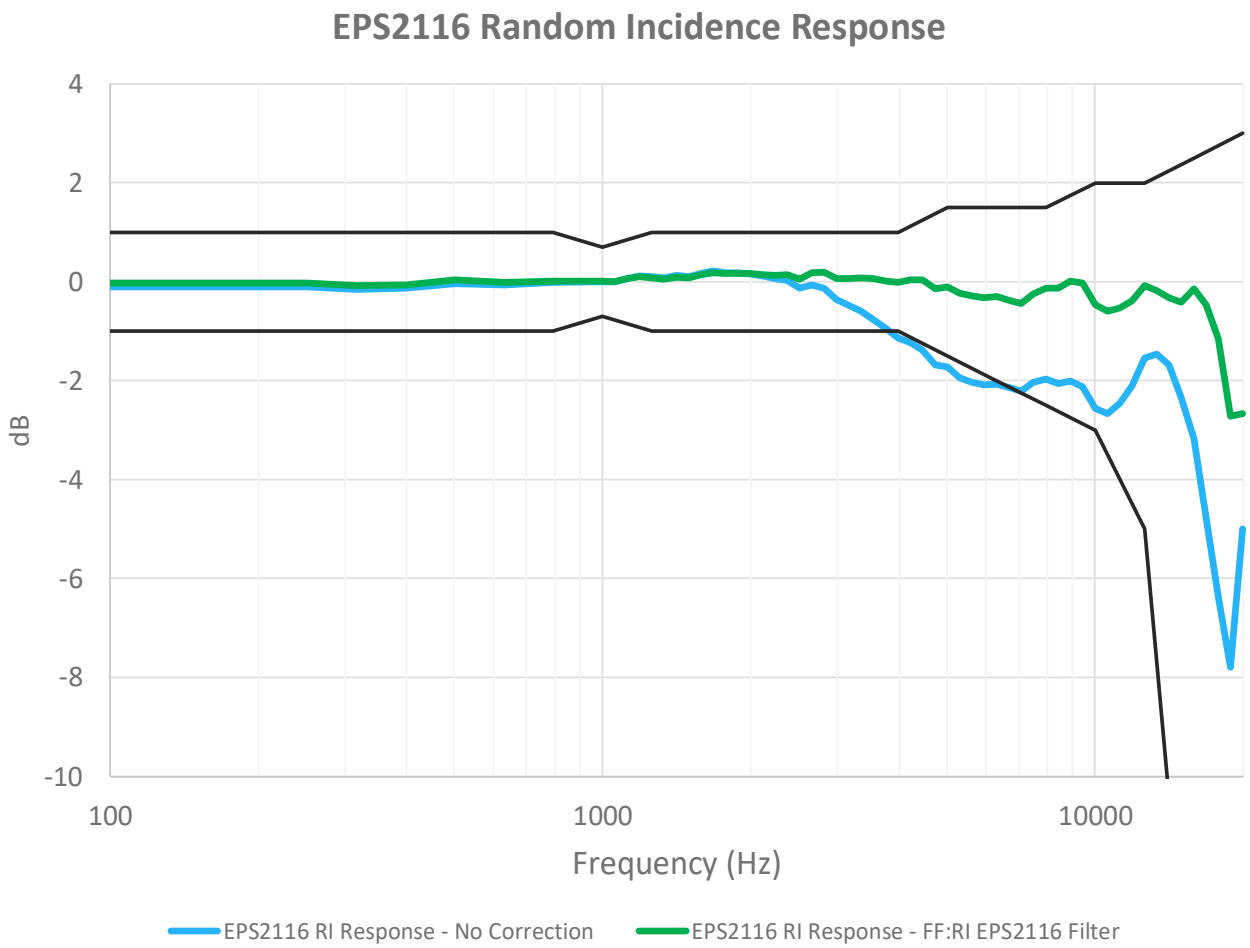
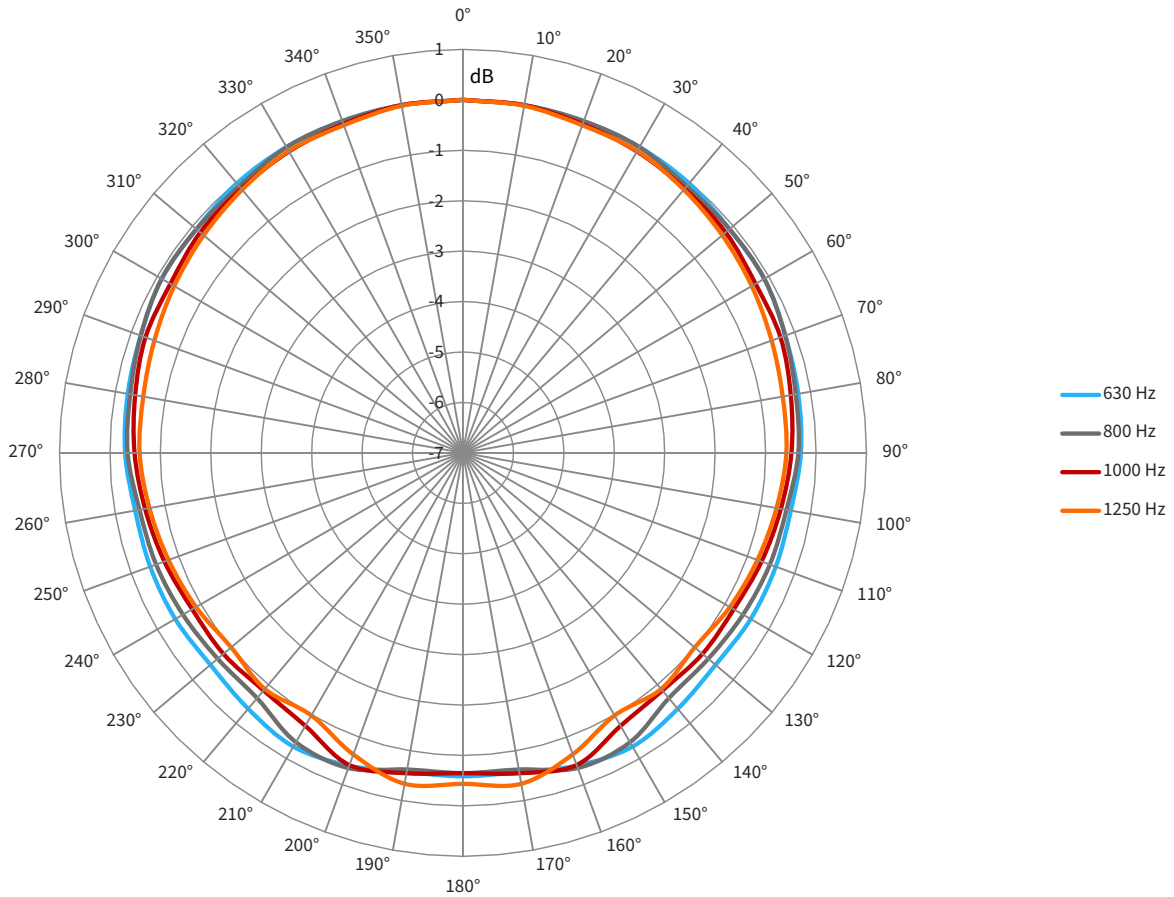


FIGURE A-7 EPS2116 Random Incidence Response

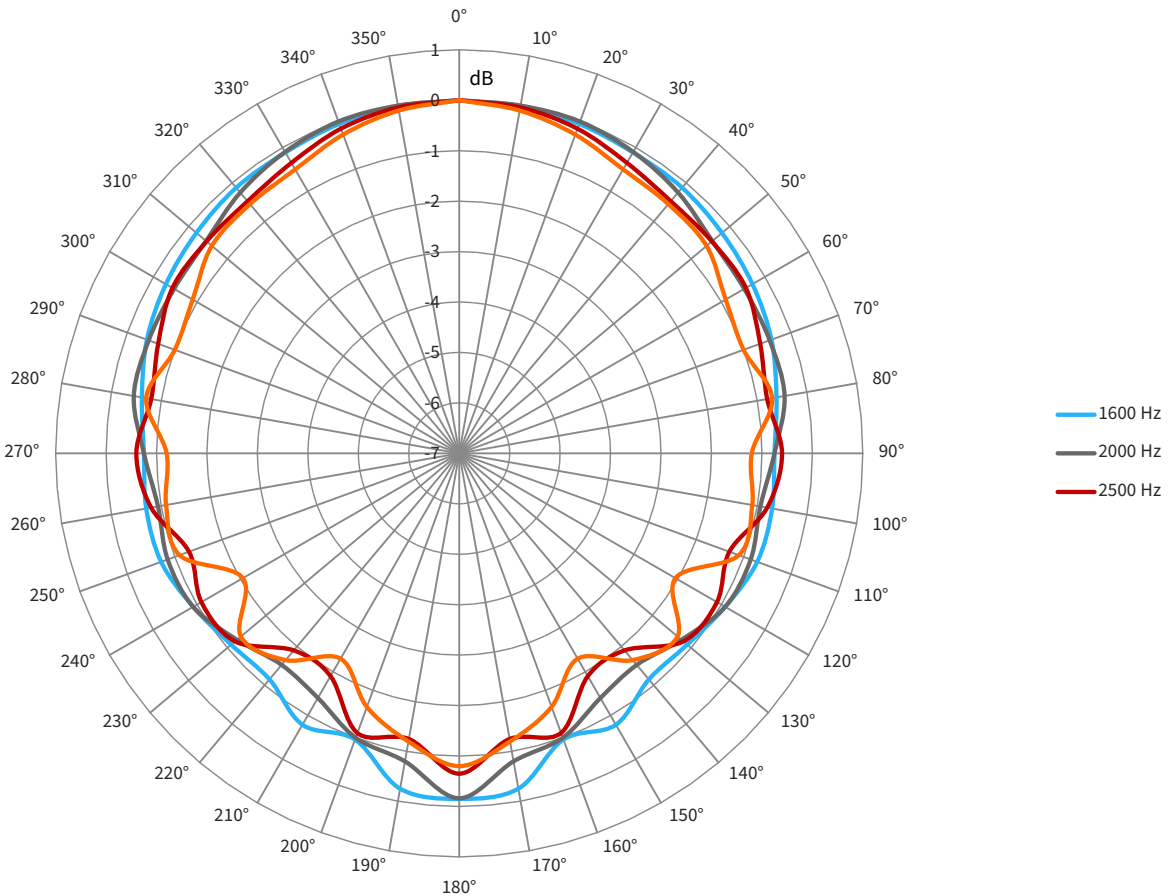


## A.7.3 EPS2116 Directional Response

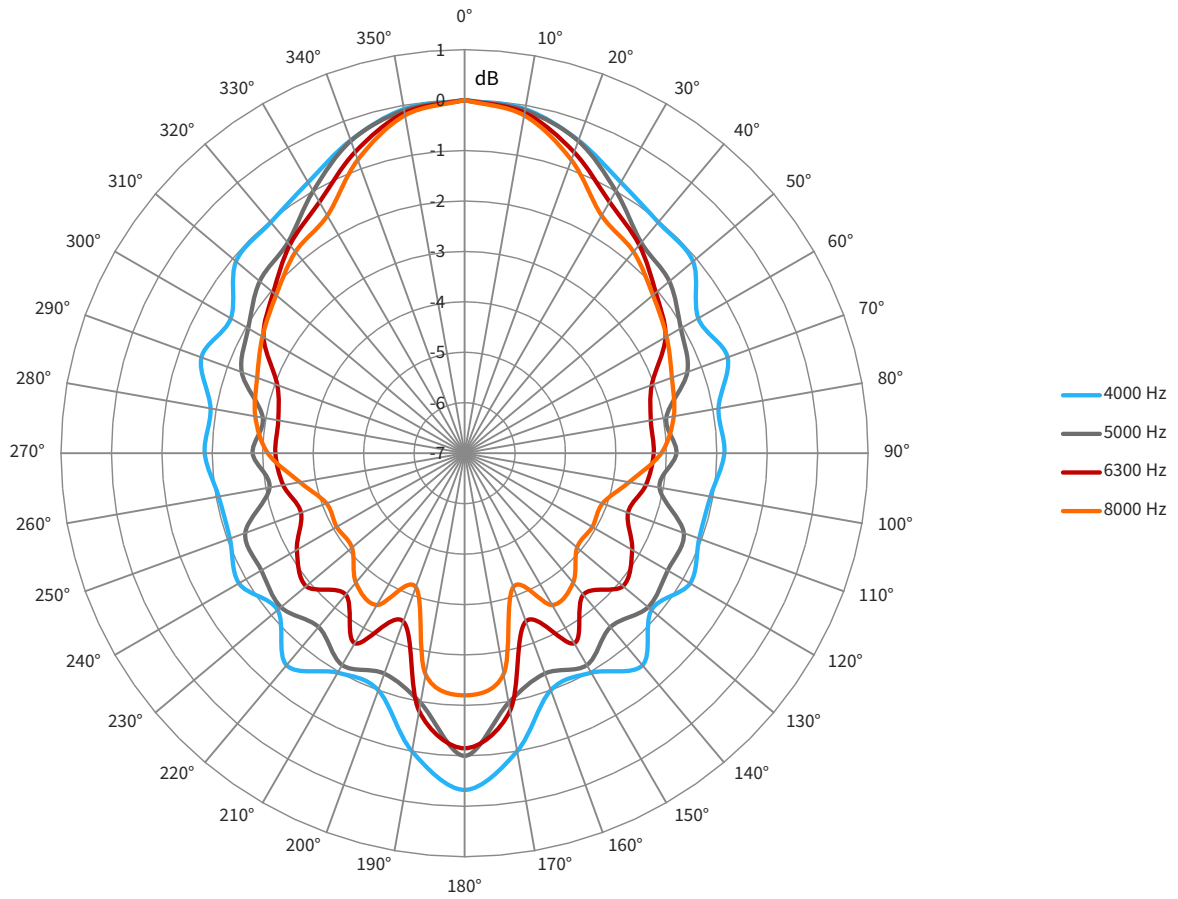
**FIGURE A-8** EPS2116 Directional Response (630 Hz–1250 Hz)



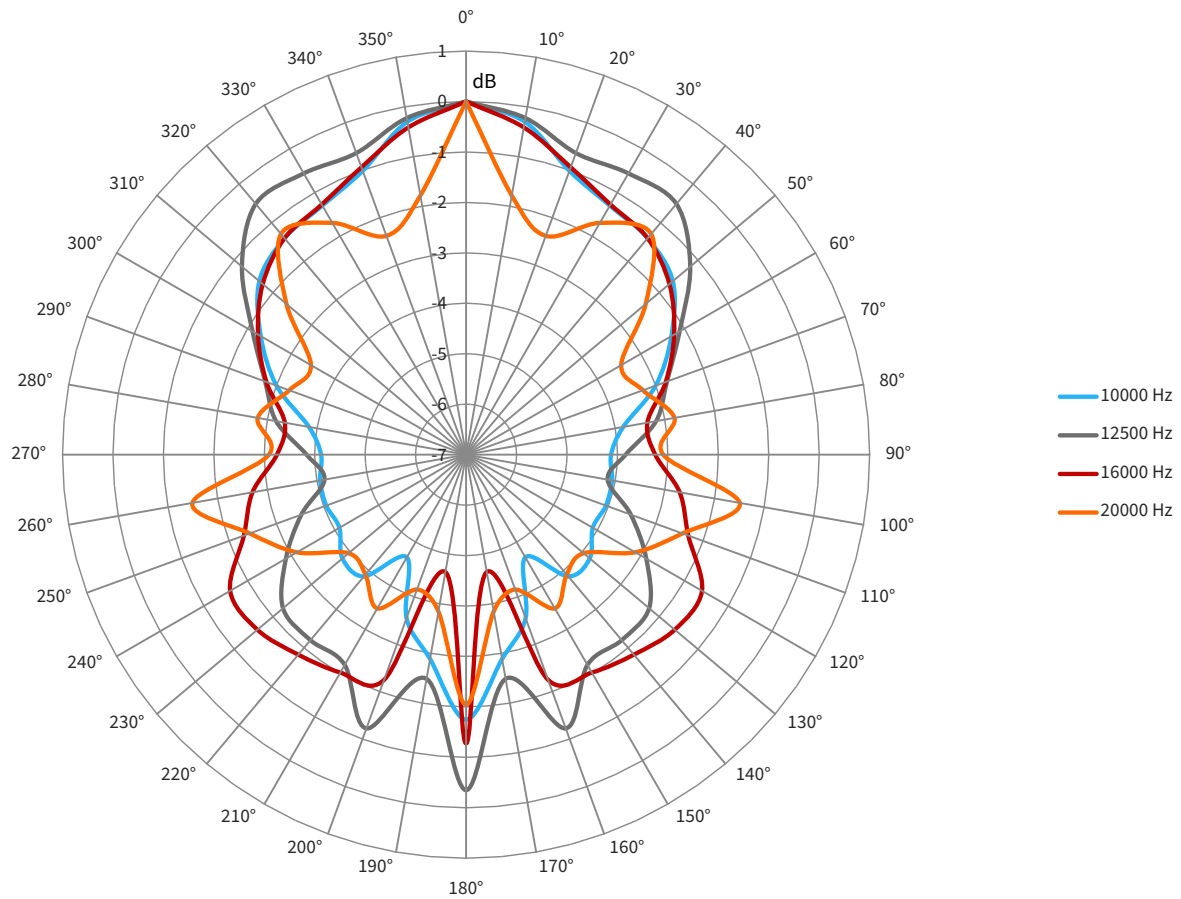
**FIGURE A-9** EPS2116 Directional Response (1600 Hz–3150 Hz)



**FIGURE A-10** EPS2116 Directional Response (4000 Hz–8000 Hz)



**FIGURE A-11** EPS2116 Directional Response (10000 Hz–20000 Hz)







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