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Product Review: SpeechWare FlexyMike Dual Ear Cardioid

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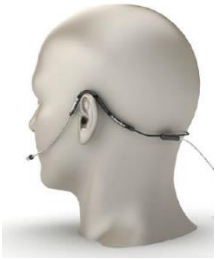
Note: For more information on the SpeechWare FlexyMike Dual Ear Cardioid Microphone please visit our SpeechWare product page at: http://store.speechrecsolutions.com/speechware-c39.aspx

Overview: It's rare that a new product enters the speech recognition field with the ability to immediately alter the status quo. But Brussels-based *SpeechWare* has done it again. If it wasn't enough that they have reinvented the table-mounted microphone with their "TableMike" series, provided a USB adapter and associated "TravelMike" to revolutionize the portable USB microphone arena, now they have brought to market what is clearly the most serious competition for our long-favored headset microphone. The FlexyMike Dual Ear Cardioid (FMKDEC) is the latest in a series of unique and beautifully engineered products from SpeechWare and which truly sets the standard. It is a headset microphone made of a titanium-steel alloy which is extremely light and yet carrying a microphone element which is all about business. And "business" in this case means quality sound reproduction leading to superb accuracy with speech recognition, and external noise rejection at a level which has been seen previously only in the Sennheiser ME3. The result is a product that extends 99% accuracy to an additional decimal point. It truly has to be seen and held to appreciate the workmanship and engineering. And it needs to be used in order to grasp the leap in performance.

The look and the feel: One only needs to open the box to see that FMKDEC is not simply another mass-produced headset. It differs from all the competition in its sleekness, simplicity, smooth lines, and its light weight. Constructed of a titanium-steel alloy, it weighs just 25 g (less than 2 oz.), and yet is obviously built to endure punishment. Key areas are covered in injected rubber to make a comfortable yet secure fit with your ears, and the flexible boom is solid and durably constructed. Like the Sennheiser ME3, this headset is a microphone, does not include speakers and mounts around the back of the head rather than over the top.



Comfort: While extremely lightweight, as it comes out of the box it is probably better sized for a small or medium sized head. It is, however, somewhat moldable and can be carefully stretched open to accommodate a larger sized head. When adjusted as needed for your head size, its light weight and minimal foot-print leaves it barely detectable.

Cord Length: although we were initially concerned about whether the short (40 inch) integrated cord would be long enough for laptop users leaning back or standing up, after thoroughly testing it in clinic over two days, we became convinced that SpeechWare got the length *just right*. There is enough excess to allow freedom of movement, but not so much as to get in the way. For desktop users, an included 80 inch extension cable will provide all the length you need.

Speech Recognition Performance: At the end of the day it is performance with speech recognition that truly counts. Having tested a pre-production prototype of this microphone several months ago, I had high hopes for this microphone. In fact, during my extensive testing of this microphone with a SpeechWare MultiAdapter, it seemed flawless. The results with the final production model were just as good. Results are shown below.

Formal "Bench Testing":

	FlexyMike DEC	Sennheiser ME3	AT Pro 8HEmW
Accuracy (no noise)	98.9	98.5	98.7
Accuracy (75 dB noise)	98.5	98.7	98.2

*Testing done with 5 readings of the Rainbow Passage using the Speech Recognition Solutions "Artificial Mouth" and using prerecorded passages for microphone training and reading of all testing text and in both condition of quiet and moderate noise contamination. Contaminating noise originated immediately in front of the testing apparatus and at a distance of 3 ft. from the microphone element and at a 70-75 dB range. A unique profile was created for each microphone. Only required initial training done prior to testing. Profiles not exposed to Rainbow Passage text in advance of testing. For more information on Speech Recognition Solutions testing protocol, please visit: web link

When looking at the numbers above, keep in mind that these represent use of each microphone used with a dedicated profile and with no training beyond the mandatory 5-6 minutes of recommended initial training. All testing was done with a pre-recorded reading of the "rainbow passage" to which the profile had never been exposed. The results shown above demonstrate excellent levels of accuracy with all three of the top quality microphones tested. In my opinion the differences shown in the table below are

inconsequential and I believe these results suggest that factors other than accuracy and noise cancellation should drive your choice between the three tested microphones.

Qualitative Testing: For two full days I used the FMKDEC for all dictation in a fairly busy clinic setting at my medical center. For one of those days dictation was done seated in a dictation room shared with two other clinicians. For the second day dictation was done at a standing wall-mounted counter in a busily traveled hallway in clinic. It was not possible to provide quantitative results of these two days of testing, but here are my qualitative impressions:

- Accuracy was superb and as good as I have seen with any microphone.
- During periods of excessive noise, recognition *speed* was affected, but minimal impact was seen on accuracy

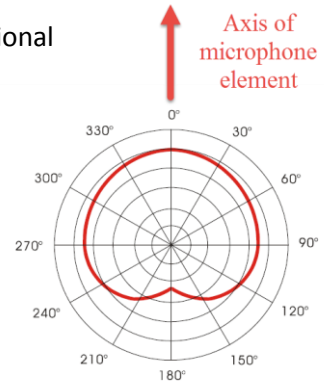
Detailed Specifications:

- Back Electret Condenser Element
- Unidirectional Cardioid Polar Pattern
- Frequency Range, 50Hz ~ 18,000Hz
- Sensitivity: -66dB ± 3dB (0dB=1V/μbar@1KHz)
- Impedance: 1.500Ω ± 30% @ 1KHz (RL:2.2K, DC:1.5V)
- Operating Voltage: 1V – 10V
- Connector: standard 3.5 mm stereo gold-plate plug

What should these specifications mean to you?

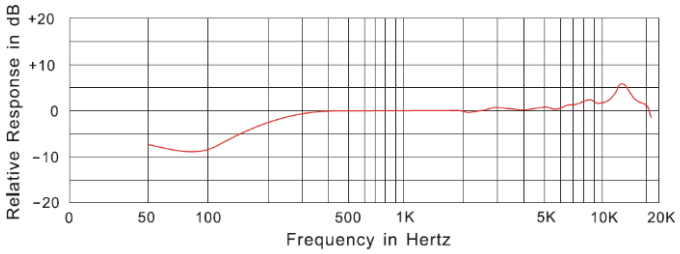
The “Back Electret Condenser Element” is the most common arrangement in headset microphones and involves a permanently charged plate on the back of the element that is moved synchronously by a front diaphragm impacted by your voice and which causes changes in the voltage in the charged plate which is converted into the signal emanating from the microphone capsule. In our opinion, this is the standard and one which performs admirably in the FMKDEC.

The “Unidirectional Cardioid Polar Pattern” is important refers to the directional nature of the microphone element which tends to accept sound only coming from one direction (you!) and ignores sounds from other directions. As you can see from the “polar pattern” diagram for the element on the FMKDEC shown to the right, the microphone is oriented mainly toward sound coming from directly in front and accepts very little from the sides and virtually none from the portion of the microphone element facing away from a user’s head. It is this “cardioid” arrangement that contributes significantly to the external noise rejection of this microphone. And not widely appreciated, one of the biggest benefits of rejecting contaminating noise is less “thinking” for dragon and a significant improvement in speech recognition speed.



The frequency range refers to the frequencies to which the microphone element is sensitive. Human voice frequencies are typically in the range of 50 Hz to 10, 000 KHz, although the majority of energy in human speech is in the range of 300 Hz to 3 KHz. Vowels tend to show up in the 250 to 500 Hz range and consonants in the 2-4 KHz range. It is the consonants that truly make speech intelligible. Ideally you want the microphone element to be most sensitive to normal human speech frequencies and not the frequencies of contaminating noise. Shown to the right is that the microphone element is sensitive across its frequency range. Since much of the contaminating noise falls right in the frequency of human voice, it ends up being other factors, including the polar pattern and other geometric factors that determine whether a microphone will eliminate common contaminating noise.

Frequency Graph:



About the "sensitivity" we will say only that the higher the negative number, the less sensitive the mic. In our opinion, the critical issue is whether the microphone element is sensitive enough, when combined with a USB adapter or sound card, to provide an adequately strong signal for use with Dragon. If a microphone element is not sufficiently sensitive, your system will need to boost the signal and in the process will also boost any system noise. In this regard we have found that when using the FMKDEC with both the SpeechWare MultiAdapter and the Andrea Pure Audio MA USB adapters, it acts as a fairly "hot" microphone (the signal needs to be attenuated quite a bit.) It does not require loud talking to trigger a signal. In our testing we consider this microphone to be perhaps a little too hot and it will occasionally give a "Sound Level too High" warning. The easy solution for this is simply to move the microphone element a little farther away from your mouth.

The downsides: We would love to tell you otherwise, but no product is perfect – including this one. These are a few of the things we would change in FMKDEC:

1. Despite being lightweight, the FMKDEC makes contact with your head in the area immediately above the ear on each side. Unfortunately, this is "real estate" already reserved for eye-glasses, so for those wearing glasses you will need to do a little negotiating between the FMKDEC and your glasses. In my case I found it most practical and comfortable to let the FMKDEC make skin contact and position the glasses over the microphone band. The issue is that eye-glass wearers will need to negotiate this brief extra step whenever mounting the FMKDEC. Once done, it is entirely comfortable.
2. As configured out of the box, this microphone is probably best shaped for a small or medium sized head. For those with a large head it will seem a little firm. The fix for this is simply to bend open the headband slightly, which will only take a few seconds and will resolve this issue completely. At the end of the day, every headset has to find a balance between comfort and stability and this product seems to find a good balance.
3. The included foam windscreen is a bit flimsy in its mounting and tends to rotate quite easily. It is *not* at risk of falling off. We don't see this as a problem that will affect performance, but it leaves a slight bit of uncertainty about what direction the element is facing. You'll need to squeeze the foam windscreen to feel exactly what direction the element is facing. Certainty about the microphone element axis would be improved with a visible marking on the end of the

boom as many manufacturers employ. We hope SpeechWare will eventually find a better fitting windscreen.

4. The microphone doesn't look entirely as pictured in so much as the flexible boom is black and not the chrome appearance seen in the picture. Also, the short, integrated cord is black. Needless to say this has no bearing on the function of the product. We're thankful that SpeechWare didn't try to make the microphone "flesh colored" (who's flesh?)
5. The "cable tie clip" described in the product specifications and label on the box simply isn't included. This was apparently a manufacturing oversight, but no big deal.
6. There is not getting around the fact that the FMKDEC is expensive. Excluding a USB adapter (which is recommended for each), our highest quality microphones are priced as follows:

Microphone	Price
SpeechWare FlexyMike DEC	**$189**
Sennheiser ME3	$155
Audio Technica 8HEmW	$129

Only you can decide if the light weight, simplicity and improved sound card compatibility are worth the extra $34 when compared to the ME3.

Summary: While not perfect, we consider the SpeechWare FlexyMike Dual Ear Cardioid solid competition for our other top performing microphones, including the Sennheiser ME3 and Audio Technica Pro 8HEmW. It offers high levels of accuracy and excellent external noise rejection, although is slightly on the "hot" side in terms of sensitivity. While we find the ME3 a bit more comfortable and logistically easier to deal with when wearing reading glasses, we very much appreciate that the FMKDEC will work with any sound card and doesn't have the padding which tends to soften and slide off after years of use with the ME3. Compared with the Audio Technica 8HEmW, this microphone shares the excellent performance but is much better when it comes to sound card compatibility and comfort. Our final thoughts? Don't trade in your current microphone if you're happy with it, but if you're looking to step up to a very high quality headset microphone and consider simplicity and sound-card compatibility a priority, the FlexyMike Dual Ear Cardioid is your best choice.