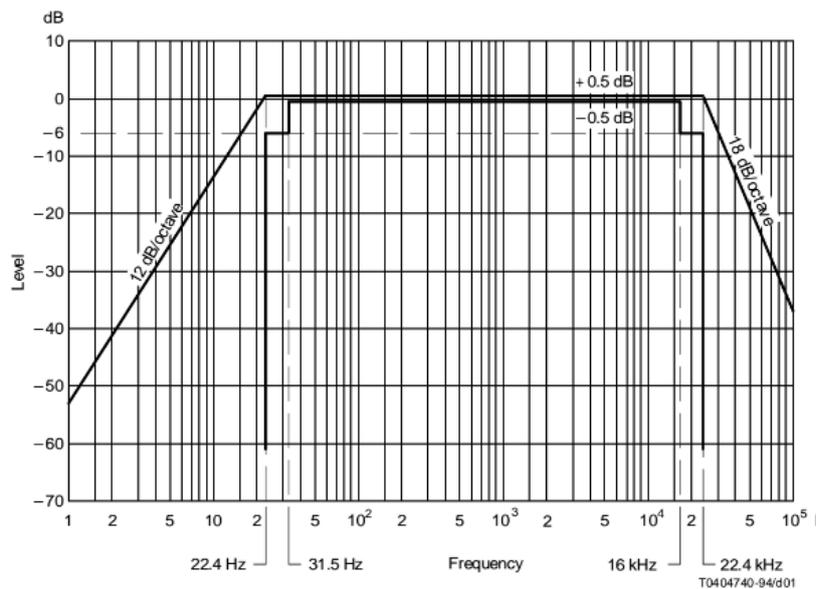




DEWESoft®  
measurement innovation

# PSOPHOMETER

Technical note, version 1.0, 14.12.2016



DEWESoft d.o.o.  
Gabrsko 11a, 1420 Trbovlje, Slovenia  
[www.dewesoft.com](http://www.dewesoft.com)

support@dewesoft.com

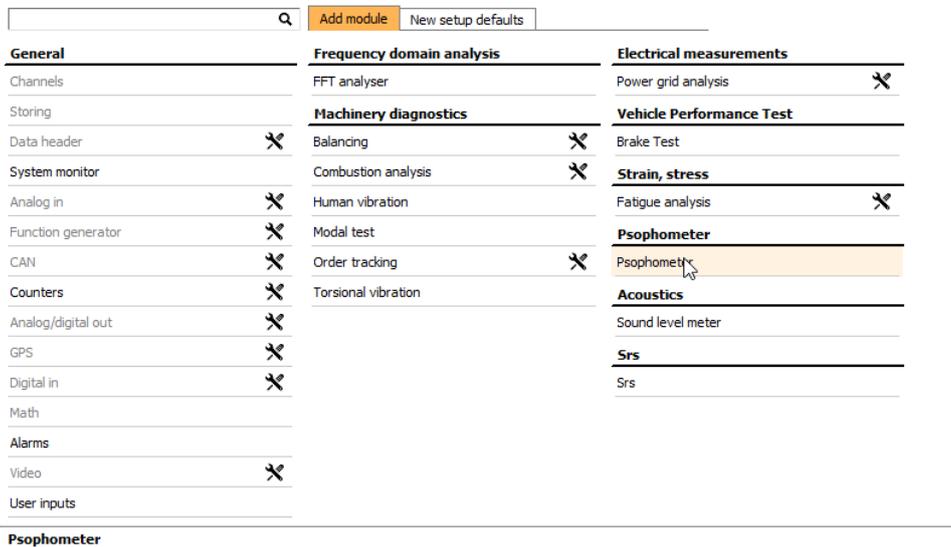


# Introduction

Psophometer is an instrument that is used in telecommunications. The purpose of weighting the signal is to emphasise the parts of the audible spectrum that ears detect most and attenuate the parts that contribute less to perception of loudness.

## DEWESoft plugin

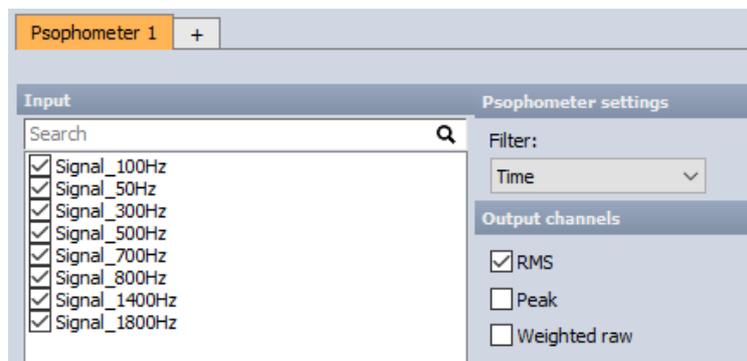
The plugin PSOPHOMETER can be found under Math plugins.



When the plugin is added, you will see an icon among all the other enabled plugins.

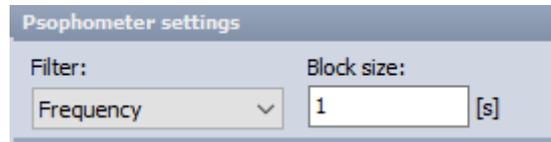


After opening the plugin, you have to select the input channels and the psophometer settings.





## Frequency filter



Block size is calculated from the defined block size [s] and the sample rate.

For example, if we have a sample rate of 20 kHz and we define the block size as 1 s. First, we multiply these two numbers to get the block size number in terms of samples, so  $20\,000\text{ s}^{-1} * 1\text{ s} = 20\,000$  samples. Since the psophometer uses an FFT, the number of samples needs to be defined as  $2^n$  (n is any integer). Since no n in the equation  $2^n$  produces the number of sample which would match our block size (20 000 samples), DEWESoft simply takes the closest number of samples from the equation. In this case,  $2^{15} = 32768$  is the nearest largest block size. DEWESoft then converts the samples into a time block, this would equal  $32768\text{ samples} / 20000\text{ s}^{-1} = 1.6384$  second time block.

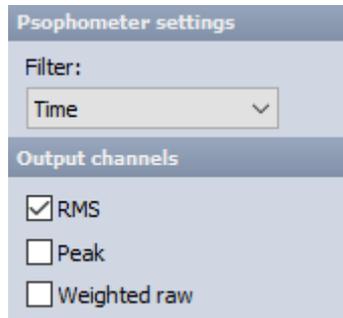
If you want to use an exact block size, then you have to adjust your sample rate so that it matches a possible FFT rate. Also, there is no overlap in the calculations, every block is calculated on its own.

The frequency weighting curve in DEWESoft is compliant with the table in standard ITU-T O.41.

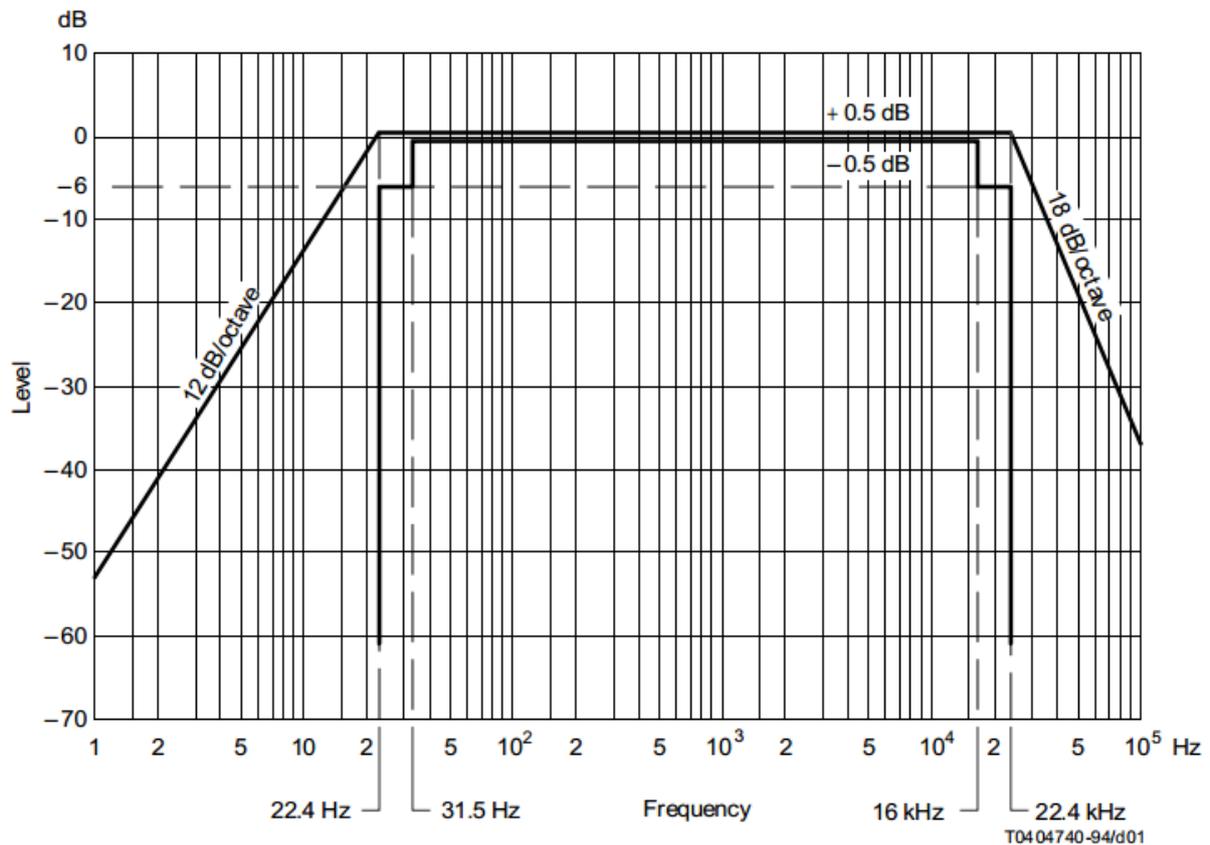
Frequency (Hz)	Relative weight (dB)	Tolerance ( $\pm$ dB)
16.66	-85.0	-
50	-63.0	2
100	-41.0	2
200	-21.0	2
300	-10.6	1
400	-6.3	1
500	-3.6	1
600	-2.0	1
700	-0.9	1
800	0.0	0.0 (Reference)
900	+0.6	1
1000	+1.0	1
1200	0.0	1
1400	-0.9	1
1600	-1.7	1
1800	-2.4	1
2000	-3.0	1
2500	-4.2	1
3000	-5.6	1
3500	-8.5	2
4000	-15.0	3
4500	-25.0	3
5000	-36.0	3
6000	-43.0	-



## Time filter



Time filter outputs the same result as the frequency filter, but in another way. Frequency filter applies weighting coefficients to each frequency. Time filter applies a filter on the time domain data that has the same characteristics as the frequency weighting curve.



The output channels can be selected from RMS, peak or weighted raw.

<b>RMS</b>	RMS of the weighted signal
<b>Peak</b>	Peak of the weighted signal
<b>Weighted raw</b>	Weighted raw time signal



# Results in DEWESoft

To check the compatibility with the ITU-T O.41 international telecommunication standard we made a simple test with psophometer plugin in DEWESoft to see the frequency weightings.

Psophometer_50Hz[dB] ACT	Psophometer_100Hz[dB] ACT	Psophometer_300Hz[dB] ACT	Psophometer_500Hz[dB] ACT
-63.8	-40.9	-10.6	-3.6
Psophometer_700Hz[dB] ACT	Psophometer_800Hz[dB] ACT	Psophometer_1400Hz[dB] ACT	Psophometer_1800Hz[dB] ACT
-0.9	0.0	-0.9	-2.4

Comparison of the results from DEWESoft with the standard ITU-T O.41.

Freq [Hz]	Relative weight, from standard ITU.T O.41 [dB]	Tolerance [±dB]	Result from DEWESoft weighting [dB]
50	-63.0	2	-63.8
100	-41.0	2	-40.9
300	-10.6	1	-10.6
500	-3.6	1	-3.6
700	-0.9	1	-0.9
800	0.0	0	0.0
1400	-0.9	1	-0.9
1800	-2.4	1	-2.4

