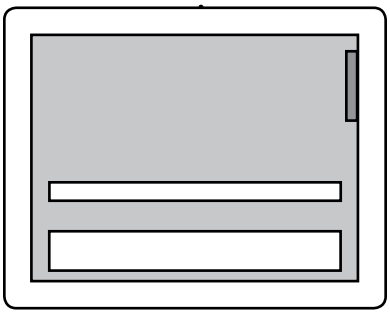
Acoustic Printer Enclosures

2591140-0001 NARROW *(pictured)*
Outside dimensions 24”w x 19”d x 12.5”h
Inside dimensions 20”w x 15.3”d x 10”h

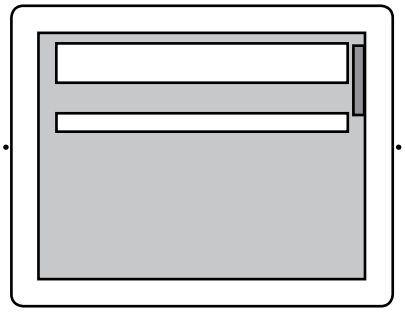
2591142-0001 WIDE
Outside dimensions 30”w x 24”d x 14.5”h
Inside dimensions 26”w x 20.5”d x 13”h

2591144-0001 WIDE/LARGE
Outside dimensions 33”w x 27”d x 20”h
Inside dimensions 29”w x 23.5”d x 18.5”h

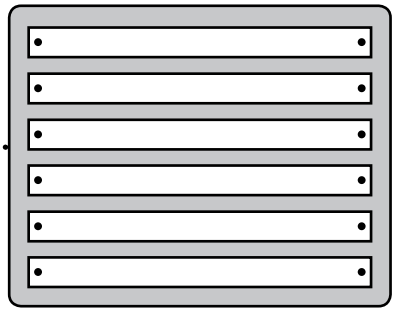
- An acrylic transparent lid covers most of the top and front. The NARROW model is one piece, hinged at rear. The WIDE models have an additional hinge halfway down the front, to allow easy access to the control panel. WIDE models also have a ‘spring’ on the lid to hold it in place while open (NARROW does NOT).
- Foam lining throughout interior helps to absorb sound. Baseboard also has a foam pad to further absorb sound.
- Quiet fan module on right side has an AC receptacle to plug in printer. Air intake is only through slots or openings used (no intake vent).
- The base has 2 slots/openings that can be used for bottom paper entry. The base can be oriented with the 2 slots toward front or back, allowing 4 effective possible bottom feed slot options. (User must cut out foam pad from appropriate bottom feed slot using a utility knife or box cutter.)
- The rear has a set of ‘slats’ for paper inlet and/or outlet. One or more can be removed.



BASE (slots to front)



BASE (slots to rear)



Rear slot openings

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SOUND ENCLOSURE EFFECTIVENESS

It is difficult to put into words just how effective a sound enclosure is in reducing the sound of a printer. We are often asked "***How much does the cover reduce the noise***?"

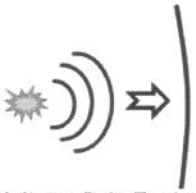
With this in mind, several things need to be considered:

- Each individual printer has a certain level of sound, and a mix of frequencies, which may also vary depending on what is being printed and how it is being printed. (i.e quality vs, draft, hi-impact vs regular, font size and type)
- Because of these differences, the effect of the enclosure on any particular printer will vary accordingly.
- The human ear does not hear sounds in a linear fashion- that is, human ears have a logarithmic response to sound intensity. Consequently, to sound twice as loud, you must increase the sound pressure (power or energy of the sound) by an (approximate) factor of about 10. Conversely, to reduce the perceived loudness of a sound by half, you must reduce the energy by the same factor of 10.
- Perceived loudness is *subjective*. While the above statement about loudness is true, to any individual, just how much louder is "twice as loud? Generally, more annoying sounds tend to bother us more, and hence appear louder.
-

Similar information is also stated in the following paragraphs taken from a very good internet article at sengpielaudio.com :

It's often necessary to estimate how much a sound level changes. Our ears interpret a wide range of sound amplitudes, volume or loudness as change in level and change in loudness. The decibel is a very convenient unit for measuring signal levels in electronic circuits or sound pressure levels in air. However, changes in the loudness of sounds as perceived by our ears do not conform exactly to the corresponding changes in sound pressure level. Loudness is the quality of a sound that is the primary psychological correlation of physical strength (amplitude). Loudness, a subjective feeling, is often confused with objective measures of sound pressure level SPL such as decibels.

A person feels and judges sound events by exposure time, spectral composition, temporal structure, sound level, information content and subjective mental attitude. *Three physically measurable parameters can be identified and separated from each other in musical material and can be described as the pitch (or fundamental frequency f), the tone duration (or time interval Δt), and the volume (or amplitude y_0).*

Change of Level	Loudness Perception	Sound Pressure Effect	Sound Intensity Cause
			
Decibels	Loudness Gain Factor	Voltage Gain Factor	Power Gain Factor
+ 20 dB	4.000	10.000	100.000
+ 10 dB	2.000 •	3.160	10.000
+ 6 dB	1.516	2.000 •	4.000
+ 3 dB	1.232	1.414	2.000 •
± 0 dB	1.000	1.000	1.000
- 3 dB	0.812	0.707	0.500 •
- 6 dB	0.660	0.500 •	0.250
- 10 dB	0.500 •	0.316	0.100
- 20 dB	0.250	0.100	0.010

With this in mind, refer to the following page of test information provided by the acoustic enclosure manufacturer.

This information can be helpful in understanding the enclosure effectiveness.

This actual measurement states the results of tests performed on sound reduction. But keep in mind the above discussion about sound perception. THERE IS NO WAY TO STATE THE EXACT AMOUNT OF "SOUND REDUCTION".

SOUND MEASUREMENT OF AN ACOUSTICAL ENCLOSURE

On this page you can see the frequency analysis, performed by our research department.
This analysis was conducted without the use of a transmission room, and was performed as on open field measurement. This was used to obtain a realistic result under normal working conditions.
We analyzed 6 printers, from major brands such as Ricoh, Diablo, C.Itoh, NEC and Data Products. For this analysis we chose the printer with the highest soundlevel, Diablo, at 67 dB.
The pulse-analysis of the sound can be called pulse-like if shorter than approximately 1 second.
Such short-lasting sounds mean an extra complication at stating the loudness, because the ear perceives short-lasting sounds as being less loud. We call this a pulse characteristic.
However, this does not imply, that, although short-lasting sounds, are not perceived as being very loud, the chance of ear damage will reduce as a matter of course.

The diagram states the frequency-range in Hz and the soundlevel in dB. With this we want to illustrate that by using an acoustical enclosure you can in an efficient way create a quiet and comfortable work atmosphere without irritation from the dominating sound of your printer.
The average soundlevel in your office is ca. 50-55 dB, the use of a printer raises this level considerably.
The soundlevel doubles at an increase of 8 dB.

67 dB - 8 dB = 50% reduction
59 dB - 8 dB = 75% reduction
51 dB - 8 dB = 87.5% reduction

MEASURING-EQUIPMENT
Brüe & Kjaer type 1613
MICROPHONE: 5/26000 Hz
type 4165

TESTED 6 types of Printers
Measured soundlevels:
min. 64 dB pulse 75 dB
max. 67 dB pulse 77 dB

PRINTER WITHOUT HOOD
67 dB pulse 77 dB

PRINTER WITH HOOD 75-sf/bk
46 dB pulse 51 dB

Drops down to 45-55 dB