

DuctSizer 4.2

A friction loss calculator for the PalmOS

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Introduction

Description

DuctSizer was created as a portable tool for estimating the friction loss through duct systems. The calculations are approximations based on known manufacturer's data for the given duct type. This is great for estimating, but final design should be based on published information from your duct supplier.

Version 4.0 was completely redesigned. Some of the forms may look similar, but the overall interface changed from versions prior to 4.0. Calculation time has been dramatically decreased by using the internal math library (MathLib). The total amount of forms has been decreased, which has reduced the overall footprint of the application, and the menu bar is more helpful for quick navigation or options.

Key Features

DuctSizer allows the user to do powerful calculations to determine the duct size to use for a desired friction loss or to find the friction loss through an existing duct system. Both round duct and rectangular duct can be used, and both SI (International) and IP (English) unit systems are supported. Some of the values calculated are:

- Hydraulic Diameter
- Air velocity through the duct
- Friction loss per 100' (meter) of duct
- Total friction loss in a duct system (minus fittings, filters, and instrumentation)

Contact Information

Please email us if you encounter any problems with the software, or if you have any suggestions on how to improve it.

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Visit us on the web at:

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System Requirements

The user must have a handheld running PalmOS 3.0 or higher, with about 90k of free memory. **DuctSizer** also supports PalmOS 5.0 and Palm Hi-Res 320x320.

Installation

Download and open the zip file, **DuctSizer.zip**. Select the file best suited for your handheld. Users with *PalmOS 3.0* should install **DuctSizer30.prc**. **DuctSizer35.prc** supports *PalmOS 3.5* and later.

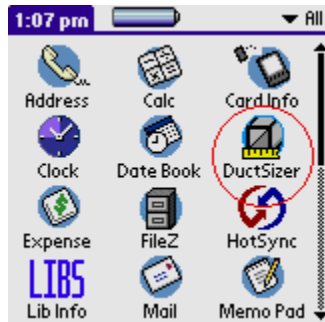
Note: This version of **DuctSizer** uses **MathLib**, which in most cases is required by another application already installed on your handheld. If you do not already have MathLib, it is included with your purchase of **DuctSizer**.

If you are upgrading your current installation, install the appropriate file from the archive. Find **DuctSizer!** and tap it. This will run the program and install the updates.

The other files contained in the DuctSizer directory are; this manual, and two definition files (*.pex) for use in exporting the data from your duct system to excel (covered later in the manual).

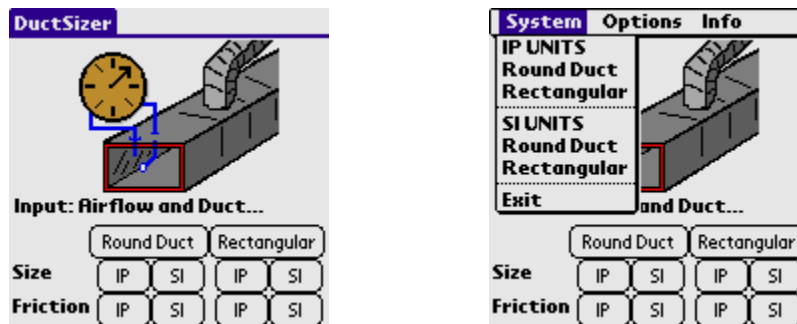
How to Use

Start DuctSizer by tapping on its icon from the launcher.



Main Form

The Main Form allows the user to select either round or rectangular duct construction, in either the International Unit System (SI) or the English Unit System (IP). There are also two ways to enter data: enter the airflow and known duct size (round or rectangular), or enter the airflow and the desired friction rate.



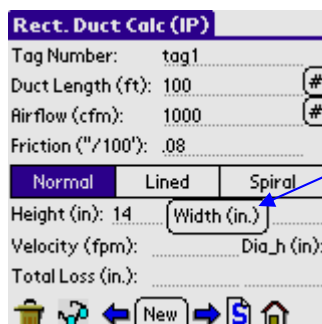
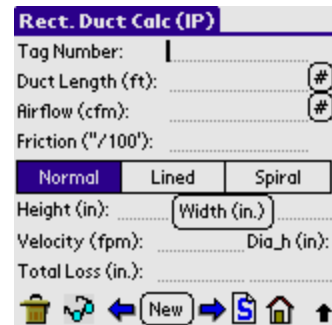
The different functions of the program can be accessed by tapping on the buttons at the bottom of the screen or using the menu bar. The inputs required for the two duct constructions are very similar, so this manual will focus on the rectangular duct using the IP System. The default action if you tap on the “**Rectangular Duct**” button or the “**Round Duct**” button is to use IP units and enter airflow with the friction rate.

Duct Calculations

The **Duct Details** screen allows the user to input a unique identifier for the duct section under consideration, as well as other critical information. The required inputs are:

Airflow and Friction Method

- **Tag Number** – This field is required only if you plan to save multiple duct sections for identification later. Tags should be limited to five characters (alpha or numeric) for easier display on the recap at the end.
- **Duct Length** – The length of the duct section is used to calculate the total friction loss through the duct section. For quick entry, or number entry using your fingertip, tap the "(#)" button on the right of the Length field.
- **Airflow** – The airflow through the duct section for friction loss calculations. Again, for quick number entry, tap the "(#)" button on the right of the airflow field. This will prompt the user for the airflow and the friction rate. If entering airflow and duct width, then the prompts will ask for airflow and duct width.
- **Friction** – The desired friction loss or pressure drop in the duct section
- **Duct Type** – The next series of buttons indicate what type of duct you are using: standard, lined, or spiral.
- **Height** – Duct height, measured on the inside of the duct (airside dimensions)



To calculate the required duct width, and corresponding velocity and hydraulic diameter for this section, tap on the “**Width (in)**” button.

This calculation provides the actual duct width necessary to provide the indicated pressure drop. However, the duct size will need to be rounded. So, to find the actual loss through the true duct type, tap on the “S” button at the bottom of the screen. This can also be used to evaluate a known duct design.

Airflow and Duct Size Method

- **Tag Number** – Same as above, this field is required only if you plan to save multiple duct sections for identification later. Tags should be limited to five characters (alpha or numeric) for easier display on the recap at the end.
- **Duct Length** – The length of the current duct section, used to calculate the total friction loss
- **Airflow** – The airflow through the duct section
- **Height** – Duct height, measured on the inside of the duct (airside dimensions)
- **Width** – Duct width, measured on the inside of the duct (airside dimensions)
- **Duct Type** – The next series of buttons indicate what type of duct you are using: standard, lined, or spiral.

Note: These values are automatically entered if you started with a design friction loss in the previous section to find the calculated duct dimension.

To calculate the pressure drop through this section, tap on the “**Friction (“/100”)**“ button. This will also recalculate the velocity and total friction loss.

Rectangular Duct (IP)	
Tag Number:	tag1
Duct Length (ft):	100
Airflow (cfm):	1000
Width (in.):	14
Height:	14
<input checked="" type="radio"/> Normal <input type="radio"/> Lined <input type="radio"/> Spiral	
Friction (" /100")	.061688021
Velocity (fpm):	734.69388
Total Loss (in.):	.061688021

The Toolbar

The buttons at the bottom of the screen are used for navigation and to manipulate the database that stores the values of the duct sections. After you have calculated the duct size (or friction loss, depending on method being used), you can add another section and repeat the process by tapping “**New.**” To view previous sections from this screen, you can navigate the database by moving back or forward using the **left** and **right** arrow buttons, respectively, on both sides of the “**New**” button. If you want to remove a section, simply tap the **Trash Can**, or the “**Del**” button (depending on OS). A confirmation screen will alert you that this cannot be undone.


System	Edit	Options	Info
Round Duct		tag1	
Rectangular		100	
View All		1000	
Main Form		Height: 14	
Exit			
<input checked="" type="radio"/> Normal <input type="radio"/> Lined <input type="radio"/> Spiral			
Friction (" /100")		.061688021	
Velocity (fpm):		734.69388	
Total Loss (in.):		.061688021	

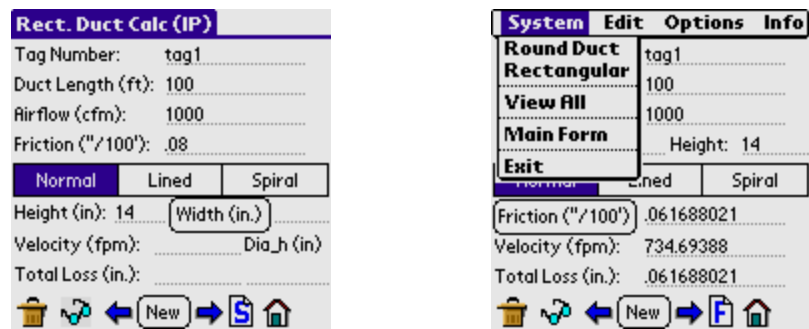
To view a list of all duct sections entered, tap on the “glasses” in the lower left, or select “**View All**” from the Menu Bar. This option is discussed in more detail in the section, *Viewing Your System*.

The buttons at the lower right of the screen allow you to return to the Main Menu Screen () or alternate between entering the desired friction rate () or the known duct size ()




These options are also available through the Menu Bar. There is another option to switch units if you enter the **IP Units** screen, for example, and needed to do a calculation in **SI Units**. Select **"Options | Different Units"**. Note: This will not convert the units; it simply takes the section you are working on moves to the screen with the different unit system.

Viewing Your Duct System

After inputting your duct sections, you can view a table of all of them by either tapping on the **"View All"** () button at the bottom of the **Duct Calculations** screen, or selecting **"System | View All"** from the menu bar.



The **Duct System** screen allows you to get a quick overview of the duct sections currently attached to your system. As the headers indicate, the left pane displays the round duct sections, and the right pane displays the rectangular duct sections. The only values displayed in the table are the tag, entered airflow, and the calculated friction loss (in inches of water column or Pascal) through the duct section. If you want to correct a section, tap on that listing in the table, and you will open that section in the **Duct Calculations** screen for editing. Follow the steps under the ***Duct Calculations*** section of this manual to edit your section.

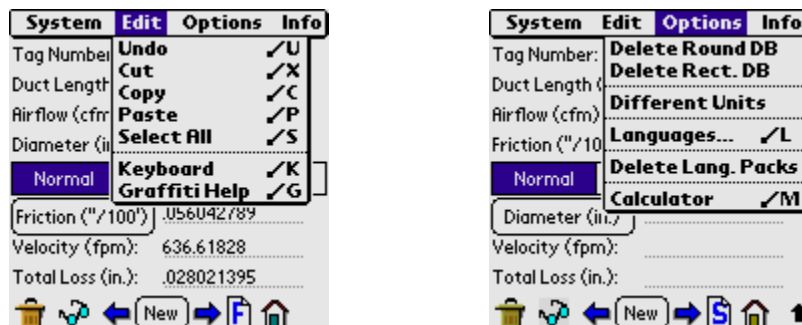
Duct System (IP)					
Round Duct			Rect. Duct		
Tag	CFM	Loss	Tag	CFM	Loss
tag2	500	.0280	tag1	1000	.0616
 			 		

Navigation

In addition to what is mentioned above, to navigate from this screen, you can use the “**Home**” icon (🏠) at the bottom of any screen to go back to the main **DuctSizer** screen. The menu bar also contains some useful functions.

The **System** menu contains:

- **Round Duct** – to go to the **Round Duct Calculations** screen and enter either the known Duct Size or the desired Friction Rate.
- **Rectangular** – to go to the **Rect. Duct Calculations** screen and enter either the known Duct Size or the desired Friction Rate.
- **View All** – allows the user see a list of all duct sections currently in memory.
- **Main Form** – go back to the main DuctSizer screen.
- **Exit** – Exit the program back to the Palm Launcher



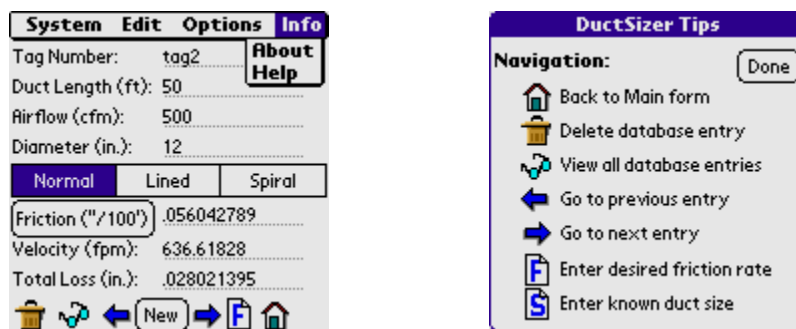
The **Edit** menu contains the standard PalmOS editing features: **Undo**, **Cut**, **Copy**, **Paste**, **Select All**, **Keyboard**, and **Graffiti Help**.

The **Options** menu allows the user to **delete** the current **Round Duct Database** or the current **Rectangular Duct Database**. This is especially useful when starting a new design. From this menu, the user can also alternate between **IP Units** or **SI Units** by selecting **"Different Units"**. As mentioned before, this will not perform a conversion of the existing numbers; it will simply take the user to the correct screen for calculations in that unit system.

The next item under the **Options** menu is **"Languages..."** With the release version 4.2 and later, the user can now select a language to personalize the program. This feature will be discussed in the next section.

Finally, it is now possible to call the PalmOS calculator during duct sizing by choosing **"Calculator"** from the **Options** menu. If you need to add up the actual airflow in a section of duct, call the calculator, do the calculation, then when you tap the **Applications** (Home) button in the **Graffiti** area, you will be returned to **DuctSizer** in the same section you left.

The online **Help** provides version information and a brief description of how to use the software.



Multiple Language Support

Another exiting feature of **DuctSizer** is the ability to select a different language. Version 4.2 supports English, Spanish, and German. To switch languages, choose **"Languages..."** in the **Options** menu. It is important that DuctSizer be installed in

INTERNAL memory and not on an expansion card. Changing the language alters the program itself, so this feature may cause a fault if it is located on an expansion card and referenced using a mounting program, such as *PIDirect* or *MSMount*.

If you are using the PalmOS to run the program from the Palm/Launcher directory, then the language feature is supported, but the setting is not permanent. You will need to select the language each time. Of course, you may only need to set the language one time, so you can install the program on internal memory, set the language, then move **DuctSizer** to the expansion card.

If you do not want the extra languages stored on your device, you can delete the language packs by selecting it in the **Options** menu. Each language uses 17kb of memory.

Uninstalling DuctSizer

Use the PalmOS delete option to remove the main program as you normally would. Any remaining databases will be automatically removed from memory.

Exporting Your Data to Excel

The best way to view or export the duct system database from your handheld to excel is with the use of a third-party application called **PDBExplorer**. It can be downloaded for free from <http://www.llusoft.cjb.net/>.

After installing this program on your PC, it will be necessary to perform a Hotsync to retrieve the latest version of the Duct System from your handheld.

Copy the two database files from your Palm backup directory (C:\Program Files\Palm\<user>\backup) to the DuctSizer folder (C:\Program Files\Palm\DuctSizer). The databases you will need are:

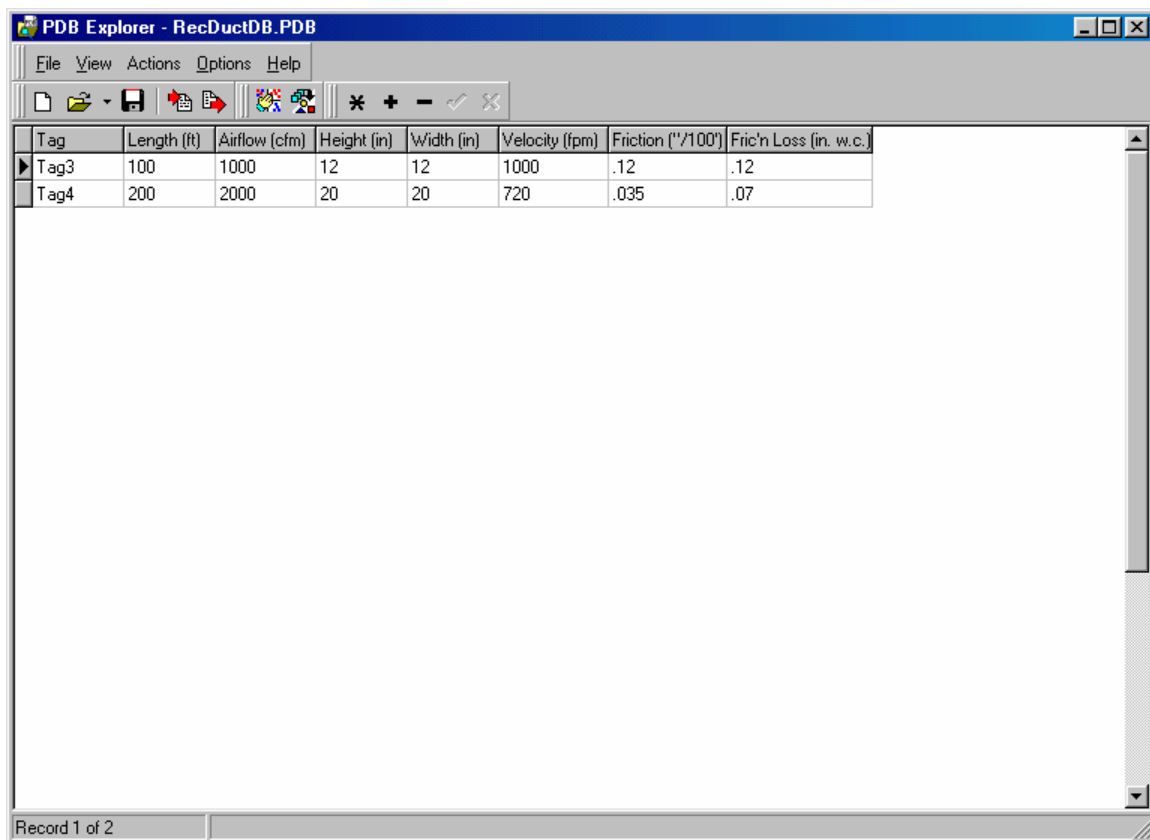
- **RndDuctDB.pdb** – Round Duct System Database

- **RecDuctDB.pdb** – Rectangular Duct System Database

Launch *PDBExplorer*, and select open from the menu. Point to your DuctSizer directory and open one of the two (2) *.pdb database files. The fields should be displayed in a table format similar to Excel. To export the data, click on the export icon from the menu bar.

You can also update the values in the database or enter new duct sections using *PDBExplorer*, then Hotsync the new database to your Handheld.

For more information about this program, please visit <http://www.llusoft.cjb.net/>



Tag	Length (ft)	Airflow (cfm)	Height (in)	Width (in)	Velocity (fpm)	Friction (\"/100')	Fric'n Loss (in. w.c.)
Tag3	100	1000	12	12	1000	.12	.12
Tag4	200	2000	20	20	720	.035	.07

Revision History

1.0 Initial private release of DuctSizer as a friction calculator

- 2.0 First public release. Added better interface and Database for tabulated view.
- 3.0 Added support for SI units as well as IP units.
- 3.1 Added ability to input airflow and duct size OR airflow and desired friction loss.
- 3.2 Fixed a bug on the Rectangular Duct Calculations. The hydraulic diameter was not calculated correctly, and the resulting parameters were wrong.
 - 3.2.1 Added bold font to the answers of each calculation.
 - 3.2.2 Added support for PalmOS 3.0.
 - 3.2.3 Minor updates and string corrections.
- 4.0.0 Redesigned to take advantage of internal MathLib library, increased calculation speed, removed unneeded forms for decreased file size, and redesigned the menu bar layout.
- 4.1.0 Fixed a link error in the velocity calculation for rectangular duct between the “size” calculation and the “friction” calculation. This is only a functional issue unless the database is imported into excel.
- 4.2.0 Added support for PalmOS 5 Hi-Res (320x320), added multiple language support, and a couple user interface improvements.