



Open-source Psychrometric plug-in for Microsoft Excel

Psych Plug-in Manual

DESCRIPTION

Psych is an Excel-Plugin or function that will calculate properties of moist air. Properties include wet bulb, dew point, RH, humidity ratio, vapor pressure, degree of saturation, enthalpy, specific volume of dry air, or moist air density based upon pressure, temperature, and one other parameter. This other parameter can be wet bulb, dew point, RH, humidity ratio or enthalpy.

Psych uses only equations from the ASHRAE 2005 Fundamentals Handbook, chapter 6. Please check the code for in-line documentation. To access the code click on the "Developer Tab" click "Visual Basic" in the "Code" group [for Excel 2007 and 2010].

Warning: Psych does not check to make sure inputs are in the allowable domains and reasonable. Please check with formula's source.

SYNTAX

=psych(P, Tdb, InV, InNum, OutNum, Slq)

LEGEND

P is pressure in PSI or Pa.

Tdb is the dry bulb temperature.

InV is the input variable. It is your choice of the parameters in table 1 with an X in the "Valid for Input" column.

InNum is the number that corresponds to InV.

OutNum is the number that corresponds to the parameter you wish to calculate. Pick a number from the table below.

Slq is the optional units selector. 0 means Inch-Pounds; 1 means SI. If Slq is omitted psych will default to Inch-Pounds.

#	Valid for Input	Symbol	Name	IP Units	SI Units
1	✓	Twb	Wet Bulb Temp	°F	°C
2	✓	t _d	Dew Point	°F	°C
3	✓	RH	Relative Humidity	Unitless	0 to 1
4	✓	W	Absolute Humidity	Unitless	MassH ₂ O/ MassDryAir
5		Pw	Water Vapor Pressure	PSI	Pa
6		μ	Degree of Saturation	Unitless	0 to 1
7	✓	h	Enthalpy	BTU/lbm Dry Air	kJ/kg Dry Air
8			Not valid		
9		v	Specific Volume of Dry Air	ft ³ /lbm Dry Air	m ³ /kg Dry Air
10		ρ	Moist Air Density	lbm/ft ³	kg/m ³

EXAMPLE

Let's pretend that you want to find the absolute humidity ratio of 30C air at 28% relative humidity. Once psych is installed you would type in **=psych(101325,30,.28,3,4,1)** in a cell. It should return 0.00738. The 101325 is the atmospheric pressure of 101325 Pa (1 atm). The 30 is the temperature of 30 °C. The 0.28 is the relative humidity of 28%. The 3 is the Input Number(InNum) corresponding to the Relative Humidity input. The 4 is requesting Absolute Humidity with the OutNum. The 1 is the SI Units flag or Unit Selector (Slq) that is declaring that SI units be used.

INSTALLATION

Stick psych.xlam somewhere permanent. " %AppData%\Roaming\Microsoft\AddIns " is a good location. Go to "Excel Options" button on the bottom of the menu that appears when you click Orb or "File" as appropriate. Click "Add ins" on the left. Click "Go" next to manage add in; reference figure 1 for help on locating this button.

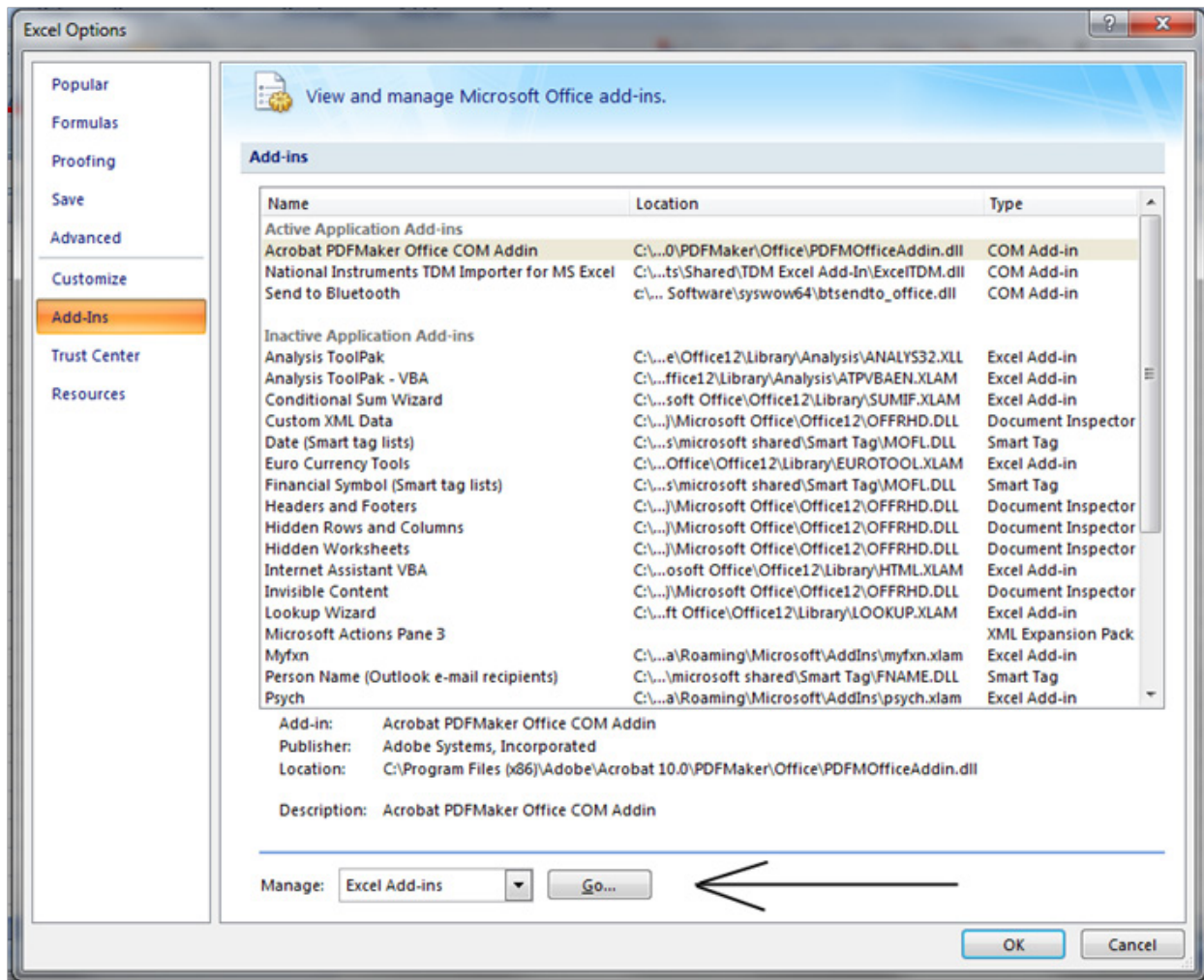


Figure 1: This shows the Excel Options window and the location of the "Go" button.

After clicking go put a check mark next to psych if it is part of the list. Click "Browse" if psych is not part of the list. Tell excel where you put Psych.xlam with the browse window. The below screen shot may help you find the Manage Add Ins "go" button.

For now there is a security warning about his plug in. I hope to get Excel to trust this in future versions.

EMBEDDING IN XLAM FILE

It is sometimes nice to share your work with others. Psych can easily be included in a macro enabled worksheet. To embed psych, go to the Developers Tab. Hit "Visual Basic" in the "Code" group. Drag module 1 from psych.xlam to your workbook. See the below screen shot. Save your workbook as a macro enabled workbook, a *.xlsm. Disable the psych plug in and test it. Use search and replace to clean up formulas if unnecessary file paths end up in formulas.

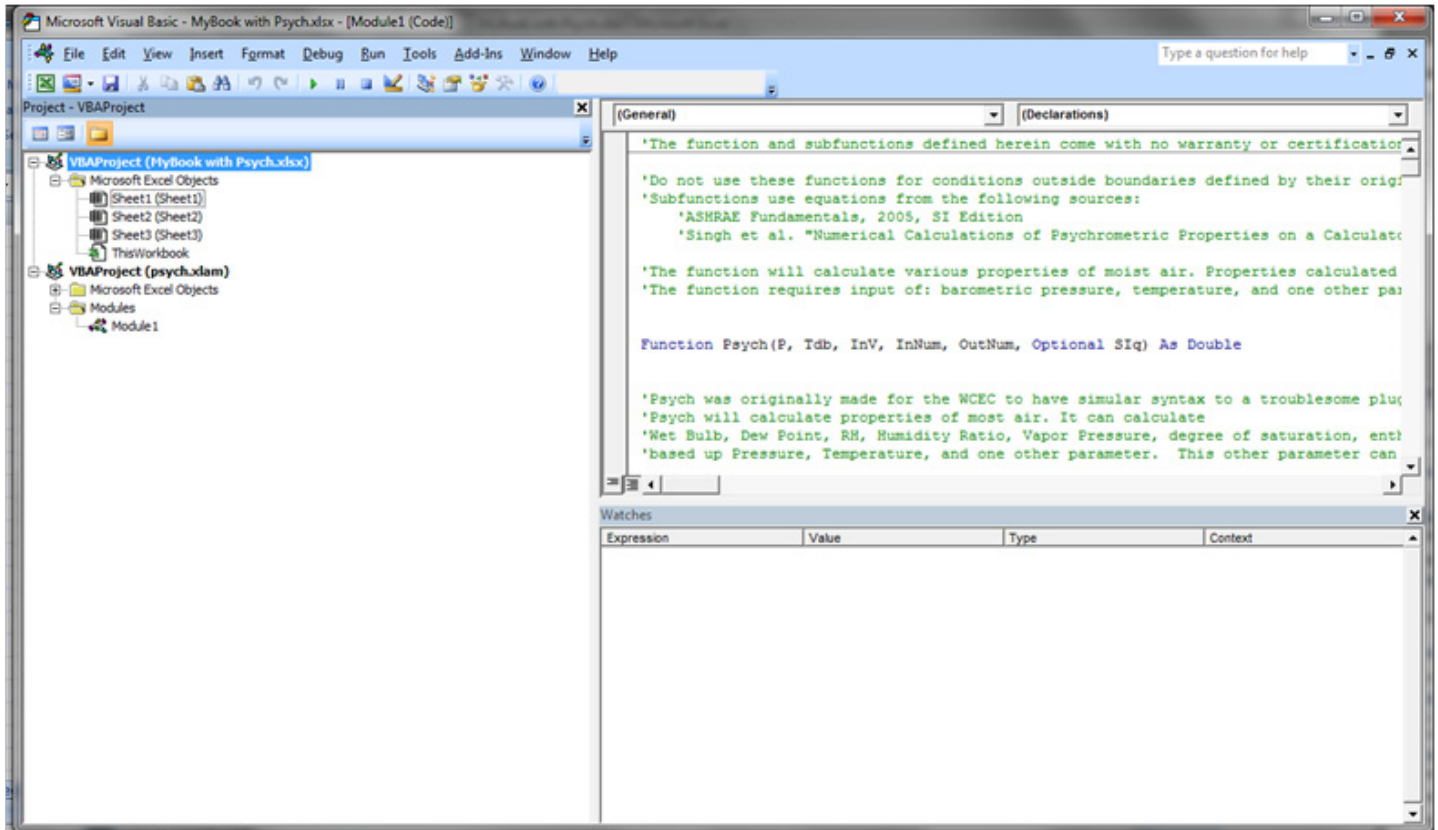


Figure 2: This shows the Visual Basic Screen and the module to drag on the lowermost item of the left pane.