# Unit Conversion Addin

Overview, installing, and summary of use

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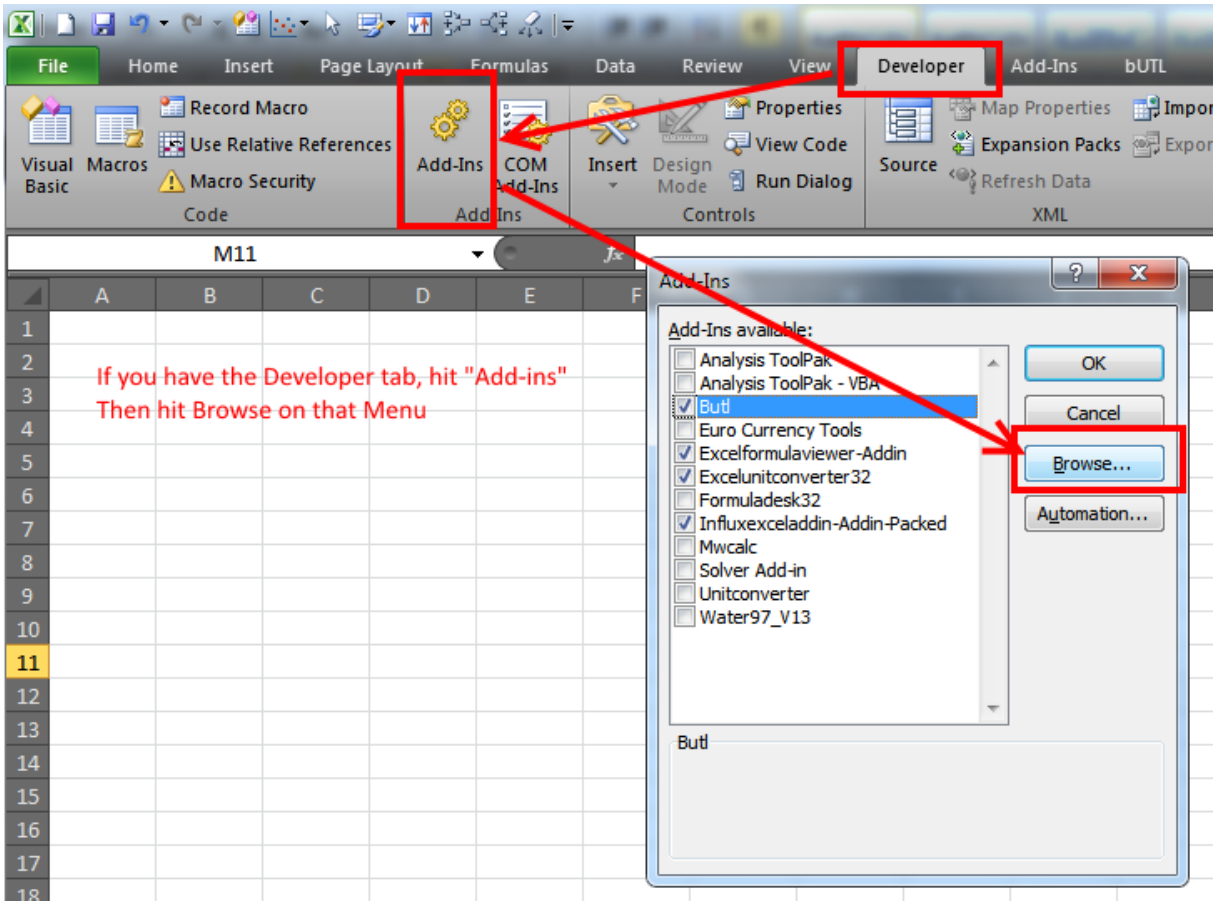
This document is an overview of the Unit Conversion addin for Excel.

## overview of the addin

The Unit Conversion addin provides a simple interface for doing unit conversion within Excel. It can support a range of units (and base dimensions). Most importantly, the addin can infer the appropriate conversions between units as long as they extend a known unit.

## Installing the addin




## summary of UDFs provided by addin

The addin provides for two additional functions:

| function | description |
|---|---|
| `Conv` | converts a given value from one unit to another |
| `ConvFactor` | returns the multiplicative factor to convert from one unit to another |
| `ConvToSi` | converts a given value from one unit to the base SI unit |
| `ConvToPref` | converts a given value in one unit to a preferred unit |
| `UnitType` | returns the SI unit for a given unit |

### Conv(Value, UnitFrom, UnitTo)

The `Conv` function is used to perform a unit conversion, returning the new value after conversion.

The parameters of this function are described by the table:

| parameter | type | description |
|---|---|---|
| value | number | the value in the base unit to be converted |
| unit from | string | the text for the base unit |
| unit to | string | the text for the desired outcome unit |

If the unit conversion is valid, this UDF will return a single value which represents the converted value. If the unit conversion is not valid, then an error will be returned. There are a couple of reasons that a conversion is not valid:

1. The starting unit or the desired unit are not found in the database.
2. The starting unit and desired unit exist but they do not share a common dimension

TODO: describe how the unit conversion is done (or link to the desc)

TODO: link to how to add a new unit if not found

TODO: note about checking the `UnitType`

### ConvFactor(UnitFrom, UnitTo)

The `ConvFactor` function will return the conversion factor that should be multiplied by the base value to arrive at the desired unit. Note that the conversion factor will only return the multiplicative

factor. This factor is not valid for some types of units where the conversion is defined with an offset (e.g. temperature and gauge pressure). The factor is valid, but it only covers the non-offset part of the conversion.

The parameters of this function are described by the table:

| parameter | type | description |
|---|---|---|
| value | number | the value in the base unit to be converted |
| unit from | string | the text for the base unit |

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TODO: add an image showing this working

### ConvToSi(Value, UnitFrom)

The `ConvToSi` function is a helper function which will convert a given value in a base unit to a new value with SI units. This function can return the SI units along with the value if entered as an array formula.

The parameters of this function are described by the table:

| parameter | type | description |
|---|---|---|
| unit from | string | the text for the base unit |
| unit to | string | the text for the desired outcome unit |

If the unit conversion is valid, this UDF will return an array which includes the new value along with the text for the new SI unit. If the formula is not entered as an array, the returned value will only include the converted value. If you know the underlying SI units, then this is fine. More likely, you may not exactly know the SI units, and this UDF will return those if entered as an array. The UDF expects to

output to 2 cells that are 1x2 (rows x columns).

1. The starting unit or the desired unit are not found in the database.
2. The starting unit and desired unit exist but they do not share a common dimension

TODO: add an image showing this working

### ConvToPref(Value, UnitFrom)

The `ConvToPref` function is a helper function which will convert a given value in a base unit to a new value using a "preferred" unit if setup, SI otherwise. This function will return the preferred unit along with the value if entered as an array formula.

The preferred units are controlled by an interface available from the `Addins` tab on the Ribbon.

TODO: add image of setting the preference

For the preferred units, they are input using the SI base. This is done this way since internally all conversions go to the SI base before going to the output unit.

The parameters of this function are described by the table:

| parameter | type | description |
|---|---|---|
| value | number | the value to be converted |
| unit to | string | the text for the desired outcome unit |

If the unit conversion is valid, this UDF will return an array which includes the new value along with the text for the unit. If the formula is not entered as an array, the returned value will only include the converted value. If you know the underlying unit, then this is fine. More likely, you may not exactly know the unit, and this UDF will return those if entered as an array. The UDF expects to output to 2 cells that are 1x2 (rows x columns).

1. The starting unit or the desired unit are not found in the database.
2. The starting unit and desired unit exist but they do not share a common dimension

TODO: add an image showing this working

## summary of the forms for controlling the addin

TODO: add detail

## summary of how the addin was built

The Unit Conversion addin was built using C#/.Net and leverages the ExcelDna library. ExcelDna provides the framework for using C# code from within Excel.

TODO: add detail