



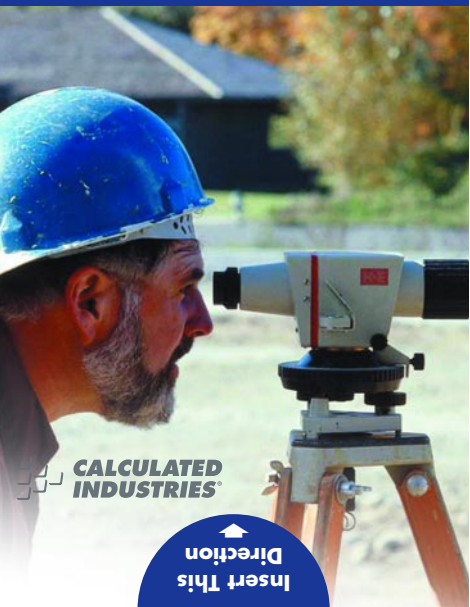
# **ULTRA MEASURE MASTER<sup>®</sup>**



PROFESSIONAL GRADE U.S. STANDARD  
TO METRIC CONVERSION CALCULATOR

## **Model 8020**

# **Pocket Reference Guide**



**CALCULATED  
INDUSTRIES<sup>®</sup>**



**Insert This  
Direction**

## ULTRA MEASURE MASTER®

The *Ultra Measure Master* calculator simplifies conversions between Metric and Imperial weights and measures. The *Ultra Measure Master* can convert the following types of dimensions:

- *Linear*
- *Area*
- *Volume*
- *Weight*
- *Temperature*
- *Linear Velocity*
- *Volumetric Velocity (Flow Rates)*
- *Pressure*
- *Bending Moment*

In addition to the above, the *Ultra Measure Master* performs dimensional calculations with ease!

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# GETTING STARTED

## KEY DEFINITIONS

---

**+** **-** **x**  
**÷** **=**

Arithmetic operation keys.

**%**

Four-function (+, -, x, ÷) percent key

**0** – **9**  
and **•**

Keys used for entering numbers.

**Off**

**Off Key** — Turns all power off.

**On/C**

**On/Clear Key** — Turns on power. Pressing once clears the display. Pressing twice clears all temporary registers.

**Stor**

**Storage Key** — Used to store values.

**Rcl**

**Recall Key** — Recalls values stored in registers.

**Conv**

**Convert Key** — Used with dimension keys to convert dimensions, or with other keys to access special functions.

**Shift**

**Shift Key** — Used with other keys to access units of measure or other special functions.

- gal**      **Gallon Key** — Displays and enters value as gallons.
- fl oz**      **Fluid Ounces Key** — Displays and enters value as fluid ounces.
- liters**      **Liter Key** — Displays and enters value as liters.
- mL**      **Milliliter Key** — Displays and enters value as milliliters.
- tons**      **Ton Key** — Displays and enters value as tons.
- lbs**      **Pounds Key** — Displays and enters value as pounds.
- dry oz**      **Dry Ounces Key** — Displays and enters value as dry ounces.
- kg**      **Kilograms Key** — Displays and enters value as kilograms.
- grams**      **Grams Key** — Displays and enters value as grams.
- Sq**      **Square Key** — Defines a square dimension.
- m**      **Meters Key** — Displays and enters value as meters.
- cm**      **Centimeter Key** — Displays and enters value as centimeters.

**mm**

**Millimeter Key** — Displays and enters value as millimeters.

**km**

**Kilometer Key** — Displays and enters value as kilometers.

**Yds**

**Yards Key** — Displays and enters value as yards.

**Feet**

**Feet Key** — Enters or converts to *feet* as whole or decimal number. Also used with the **Inch** and **/** keys for entering Feet-Inch values (e.g., **6 Feet 9 Inch 1 / 2**). Repeated presses during conversions toggle between Fractional and Decimal Feet.

**Inch**

**Inch Key** — Enters or converts to *inches*. Entry can be whole or decimal number. Also used with the **/** key for entering fractional inch values (e.g., **9 Inch 1 / 2**). Repeated presses during conversions toggle between Fractional and Decimal Inches.

**/**

**Fraction Key** — Used to separate the numerator and denominator when entering fractions: **1 / 2**

- Miles** — Displays and enters value as miles.
- Shift gal** — Displays and enters value as gallons per minute.
- Shift fl oz** — Displays and enters value as fluid ounces per second.
- Shift liters** — Displays and enters value as liters per second.
- Shift mL** — Displays and enters value as milliliters per second.
- Shift %** — Displays and enters weight per volume ratio in permanent memory.
- Shift tons** — Displays and enters value as metric tons.
- Shift lbs** — Displays and enters value as pounds per square inch.

**Shift** **dry oz**

**Pounds per Square Foot (psf)** — Displays and enters value as pounds per square foot.

**Shift** **kg**

**Kilopascals (kPa)** — Displays and enters value as kilopascals.

**Shift** **grams**

**Megapascals (MPa)** — Displays and enters value as megapascals.

**Shift** **Sq**

**Cubic Volume (Cu)** — Displays and enters a cubic dimension.

**Shift** **m**

**Meters per Minute (m/min)** — Displays and enters value as meters per minute.

**Shift** **cm**

**Meters per Second (m/sec)** — Displays and enters value as meters per second.

**Shift** **mm**

**Millimeters per Second (mm/sec)** — Displays and enters value as millimeters per second.

**Shift** **km**

**Kilometers per Hour (km/h)** — Displays and enters value as kilometers per hour.

- Shift** **Yds**      **Feet per Minute (ft/min)** — Displays and enters value as feet per minute.
- Shift** **Feet**      **Feet per Second (ft/sec)** — Displays and enters value as feet per second.
- Shift** **Inch**      **Inches per Second (in/sec)** — Displays and enters value as inches per second.
- Shift** **/**      **Exponential Notation (EXP)** — Used to enter an exponential value (i.e.,  $x10^y$ ).
- Shift** **Miles**      **Miles per Hour (mph)** — Displays and enters value as miles per hour.
- Shift** **9**      **Newton-meters (N-m)** — Displays and enters value as newton-meters.
- Shift** **8**      **Foot-Pound (ft-lbs)** — Displays and enters value as foot pounds.
- Shift** **7**      **Inch-Pounds (in-lbs)** — Displays and enters value as inch pounds.
- Shift** **6**      **Acre-Feet (Acre-Ft)** — Displays and enters value as acre-feet.
- Shift** **5**      **Acre** — Displays and enters value as acres.

- Shift** **4**     **Hectare** — Displays and enters value as hectares.
- Shift** **3**     **Fahrenheit (°F)** — Displays and enters value as Fahrenheit.
- Shift** **2**     **Celsius (°C)** — Displays and enters value as Celsius.
- Shift** **1**     **Board Feet (BdFt)** — Displays and enters value as board feet.
- Shift** **□**     **Per Unit Function (Per)** — Allows you to calculate total material cost, if you multiply the total amount of material by the per unit cost of the item.
- Shift** **—**     **Change Sign (+/-)** — Toggles the sign of the displayed value.
- Shift** **√**     **Square Root Function ( $\sqrt{x}$ )** — Calculates and displays the square root of a number. You will get an error if you try to find the square root of a linear or volume value.
- Conv** **+**     **Pi Constant ( $\pi$ )** — An internal constant: 3.141593.

**Conv** **Rcl**

**Memory Clear** — Clears the value in the cumulative memory (**Shift** **0**) without changing the display.

**Conv** **X**

**All Clear (AC)** — Clears all values including Memory. Resets all settings to their defaults.

**Rcl** **X**

**Metric Mode Toggle** — Toggles between Metric mode and Imperial mode.

*Note: This mode is not reset when you perform an all clear*

**Conv** **X**.

**Rcl** **=**

**Paperless Tape Function (Tape)** — Accesses the “Paperless Tape” mode so you can check previous entries.

**Rcl** **/**

**Preference Setting** — Accesses user defined fractional and exponential settings.

**Rcl** **+**

**Memory Clear** — Clears all Memory registers (0 – 9) without clearing the display.

**Stor** **0**

**Cumulative Memory (M+)** — Adds the displayed value to Memory.

**Conv** **Stor** **0** **Subtract from Cumulative Memory (M-)** — Subtracts the displayed value from Memory.

**Stor** **1** – **9** **Memory Storage** — When pressed after the **Stor** key, the **1** through **9** keys will store the displayed value into fixed Memory.

## **POWER ON AND OFF**

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Turn the calculator on by pressing the **On/C** key. To turn the calculator off, press **Off**.

## **CONVENTIONS AND UNITS OF MEASURE**

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### **CONVENTIONS**

### **UNITS OF MEASURE**

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#### **Linear**

meters  
centimeters  
millimeters  
feet  
inches  
yards  
miles  
kilometers

#### **Area**

square meters  
square yards  
square miles  
hectares  
square centimeters  
square feet

*(Cont'd)*

*(Cont'd)*

<b>CONVENTIONS</b>	<b>UNITS OF MEASURE</b>
<b>Area</b> <i>(Cont'd)</i>	square kilometers square millimeters square inches acres
<b>Volume</b>	cubic meters cubic yards cubic miles gallons milliliters cubic centimeters cubic feet cubic inches cubic kilometers fluid ounces board feet cubic millimeters acre-feet liters
<b>Temperature</b>	Celsius Fahrenheit
<b>Weight</b>	dry ounces pounds tons grams kilograms metric tons

*(Cont'd)*

*(Cont'd)*

<b>CONVENTIONS</b>	<b>UNITS OF MEASURE</b>
<b>Linear Velocity</b>	feet per minute feet per second inches per second meters per minute meters per second millimeters per second miles per hour kilometers per hour
<b>Volumetric Velocity</b> <i>(Flow Rate)</i>	fluid ounces per second gallons per minute milliliters per second liters per second
<b>Pressure</b>	pounds per square inch pounds per square foot kilopascals megapascals bars
<b>Bending Moment</b>	inch-pounds foot-pounds newton-meters

## FRACTIONAL SETTINGS

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When your calculator is in a default condition (battery change or full reset), it is set to round fractional values to the nearest 1/64th of an inch. However, you may program your preference for six different accuracy levels and two different modes (Normal and Fixed), all of which remain in permanent memory until revised or reset.

The fractional level can be revised by using **Conv** as shown below:

**Conv** **1** = Fraction Set to 1/16"

**Conv** **2** = Fraction Set to 1/2"

**Conv** **3** = Fraction Set to 1/32"

**Conv** **4** = Fraction Set to 1/4"

**Conv** **6** = Fraction Set to 1/64"

**Conv** **8** = Fraction Set to 1/8"

If there is a value on the display, when one of the functions above is performed the accuracy level will be temporarily revised. If the display is cleared, then the accuracy will be permanently revised.

## PREFERENCE FEATURE

---

The Ultra Measure Master provides Preference Settings that allow you to set fractional accuracy and display features. The preference settings are displayed using **Rcl** **/**. Repeated presses of **/** toggle through the different settings while the **+** and **-** keys are used for revision. These settings remain set until they are changed or the calculator is reset.

### FRACTIONAL ACCURACY SETTINGS

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- Fraction Set to 1/64" (*Default*)
- Fraction Set to 1/2"
- Fraction Set to 1/4"
- Fraction Set to 1/8"
- Fraction Set to 1/16"
- Fraction Set to 1/32"

### FRACTION MODES

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- Normal Mode (*Default*)
- Fixed Mode

### EXPONENT

---

- On (*Default*)
- Off

### FLASHING FRACTION

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- Off (*Default*)
- On

Whenever the fractional setting is other than 1/64 normal mode, a star (★) will appear in the bottom left of the display when the calculator is turned on. This indicates a special fractional setting is stored within.

## Setting Fractional Accuracy

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### KEYSTROKES

### DISPLAY

---

1. Access the Preference Feature:

**Rcl** **/**

NM 1/64

(Note "1/64" flashing)

2. Scroll through preference options:

**/**

NM 1/64 INCH

(Note "nm" flashing)

**/**

EXP On

**/**

FLSH OFF

3. Change fraction setting to 1/8:

**/**

NM 0-1/64 INCH

**+**

NM 0-1/2 INCH

**+**

NM 0-1/4 INCH

**+**

NM 0-1/8 INCH

4. Return calculator to normal operation and verify fraction setting:

**On/C** **Rcl** **/**

NM 0-1/8 INCH

## Setting Fractional Modes

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### Normal Mode

In Normal Mode, the fractional result is reduced to its lowest common denominator (i.e., 8/16 reduces to 1/2).

### Fixed Mode

In Fixed Mode, fractional results remain in the defined accuracy level (i.e., 1/2 will be shown as 8/16). Entries of higher accuracy values will temporarily override the fixed fraction setting.

## USING EXPONENTIAL NOTATION

---

Your calculator is defaulted to have exponential notation set to “on.” Therefore, any integer value exceeding seven digits will display in exponential format. When exponential notation is deactivated, the calculator adjusts dimensioned values to a higher unit when the display limit is exceeded (known as Auto-Ranging). i.e., “10,000,000 mm” exceeds the seven-digit display, so “10,000 m” is displayed. This auto-ranging also applies to other dimensional units, such as inches to feet, feet to yards, etc.

To enter an exponential value, enter the main value, press **Shift** **/**, then enter the exponential power.

### Entering Exponents

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Enter  $2.34 \times 10^{-8}$  into the calculator.

KEYSTROKES	DISPLAY
<b>2</b> <b>.</b> <b>3</b> <b>4</b>	2.34
<b>Shift</b> <b>/</b>	2.34
<b>Shift</b> <b>-</b> <b>8</b>	2.34-8
<b>=</b>	2.34000-08

## SETTING FLASHING DENOMINATOR

---

Your calculator can be set to flash the fractional denominator while fractions are entered. The flashing denominator is useful as it displays the fractional accuracy setting.

KEYSTROKES	DISPLAY
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---

1. Access the Preference feature:

**Rcl** **/**

NM 1/64

(Note "1/64" flashing)

2. Scroll through Preference options:

**/**

NM 1/64

(Note "nm" flashing)

**/**

EXP ON

**/**

FLSH OFF

3. Change flashing denominator setting:

**+**

FLSH ON

Note: Continuous presses of **+** toggles between On and Off.

## **BASIC MATH OPERATIONS**

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Your calculator uses standard chaining logic which simply means that you enter your first value, the operator (+, −, ×, ÷), the second value and then the equals sign (=).

- A. 3 + 2 = 5  
B. 3 − 2 = 1  
C. 3 × 2 = 6  
D. 3 ÷ 2 = 1.5

This feature also makes the calculator simple to use for dimensional math.

### **Adding or Subtracting Dimensions**

- 1) You can add or subtract two numbers when the first value entered is labeled with units of measurement and the other is just a whole number (no units of measurement).
- 2) You can add or subtract numbers whose units of measurement are within the same convention. For example, you can add or subtract kg and pounds.
- 3) You cannot add or subtract two numbers of different conventions, except for weight and volume.

*(Cont'd)*

(Cont'd)

- 4) The format of the first value you enter determines the format of the answer. However, you can use the **Conv** key to change to any format desired, provided that you maintain convention.

Examples:

**KEYSTROKES** **DISPLAY**

---

1. Add 7 feet 3-1/2 inches to 11 feet 4 inches:

**7 Feet 3 Inch 1 / 2 +**  
**1 1 Feet 4 Inch = 18 FEET 7-1/2 INCH**

2. Add 25 PSF to 12 PSI:

**2 5 Shift dry oz + 1 2 Shift lbs =**  
**1753 PSF**

3. Add 14 gallons to 52 liters:

**1 4 gal + 5 2 liters = 27.73695 GL**

4. Subtract 450 acres from 5 square km:

**5 Sq km - 4 5 0 Shift 5 =**  
**3.178915 SQ KM**

5. Subtract 32 mm from 8 centimeters:

**8 cm - 3 2 mm = 4.8 CM**

## **Multiplying or Dividing Dimensions**

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- 1) You can multiply and divide two numbers when the first value entered is labeled with units of measurement and the other is just a whole number (no units of measurement).

(Cont'd)

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- 2) You cannot multiply or divide two numbers that have different units of measurement or different conventions, except for weight and volume.
- 3) You can multiply and divide numbers when their units of measurement are within or between the linear and area conventions. For example, you can multiply kilometers by square feet, which will give you cubic kilometers.
- 4) The format of the first value you enter determines the format of the answer. However, with the **Conv** key you can change to any format you desire, provided that you maintain convention.

*Examples:*

KEYSTROKES	DISPLAY
1. <i>Multiply 5 feet 3 inches by 8 feet 6-1/2 inches:</i>	
<b>5</b> <b>Feet</b> <b>3</b> <b>Inch</b> <b>X</b> <b>8</b> <b>Feet</b> <b>6</b> <b>Inch</b> <b>1</b> <b>/</b> <b>2</b> <b>=</b>	44.84375 SQ FEET
2. <i>Multiply 50 meters per minute by 12.5:</i>	
<b>5</b> <b>0</b> <b>Shift</b> <b>m</b> <b>X</b> <b>1</b> <b>2</b> <b>.</b> <b>5</b> <b>=</b>	625 M/M
3. <i>Multiply 33.5 gallons by 2.031:</i>	
<b>3</b> <b>3</b> <b>.</b> <b>5</b> <b>gal</b> <b>X</b> <b>2</b> <b>.</b> <b>0</b> <b>3</b> <b>1</b> <b>=</b>	68.0385 GL
4. <i>Divide 20 feet 3 inches by 9:</i>	
<b>2</b> <b>0</b> <b>Feet</b> <b>3</b> <b>Inch</b> <b>÷</b> <b>9</b> <b>=</b>	2 FEET 3 INCH
5. <i>Divide 30 mph by 2.5:</i>	
<b>3</b> <b>0</b> <b>Shift</b> <b>Miles</b> <b>÷</b> <b>2</b> <b>.</b> <b>5</b> <b>=</b>	12 MPH

## Percent Calculations

---

The percent key **%** can be used to find a percentage of a number or for working add-on, discount or division percentage calculations.

<b>3</b> <b>5</b> <b>5</b>	<b>×</b>	<b>1</b> <b>5</b>	<b>%</b>	53.25
<b>2</b> <b>5</b> <b>0</b>	<b>+</b>	<b>6</b> <b>.</b> <b>5</b>	<b>%</b>	266.25
<b>2</b> <b>5</b>	<b>-</b>	<b>5</b>	<b>%</b>	23.75
<b>1</b> <b>0</b> <b>0</b>	<b>÷</b>	<b>5</b> <b>0</b>	<b>%</b>	200.

## MEMORY OPERATION

---

The *Ultra Measure Master* has ten storage registers (0 through 9). Memory 0 is a cumulative memory which operates similar to a standard **Miles** key, while the other memories are used for storage only. A value can be stored in any format, but attempts to add mixed conventions will result in an error (the value in memory will not be revised). Memory 0 will keep its value until it is revised (as shown below), or the calculator is shut off. Memories 1 through 9 will keep their values even when the calculator is shut off. Keystrokes for operation are as follows:

(Cont'd)

(Cont'd)

STEPS	KEYSTROKES
Store to Memory $x$ ( $x = 0-9$ )	<b>Stor</b> $x$
Subtract from Memory 0	<b>Conv</b> <b>Stor</b> <b>0</b>
Recall total in Memory $x$	<b>Rcl</b> $x$
Recall and clear Memory 0	<b>Rcl</b> <b>Rcl</b>
Clear Memory 0 ( <i>not display</i> )	<b>Conv</b> <b>Rcl</b>
Replace Memory 0	<b>Conv</b> <b>Rcl</b> <b>Stor</b> <b>0</b>
Clear Memory 0 thru 9	<b>Rcl</b> <b>+</b>
Reset calculator	<b>Conv</b> <b>X</b>

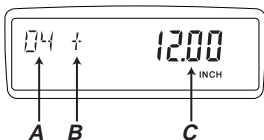
## How to Use Memory 0 Functions

KEYSTROKES	DISPLAY
<i>Enter in Memory:</i>	
<b>3</b> <b>5</b> <b>5</b> <b>Stor</b> <b>0</b>	355.
<i>Add to Memory:</i>	
<b>2</b> <b>5</b> <b>5</b> <b>Stor</b> <b>0</b>	255.
<i>Recall Memory:</i>	
<b>Rcl</b> <b>0</b>	610.
<i>Subtract from Memory:</i>	
<b>7</b> <b>4</b> <b>5</b> <b>Conv</b> <b>Stor</b> <b>0</b>	745.
<i>Recall and clear:</i>	
<b>Rcl</b> <b>Rcl</b>	- 135.

The cumulative memory function (M-0) can also be used with dimensional units that are of the same convention (linear, area, volume, etc.). If you try to enter numbers of different conventions, "error" displays.

## “PAPERLESS TAPE” FEATURE

The “Paperless Tape” feature allows the user to display the last 20 entries. While in this mode, the display looks similar to this:



- A** - the sequence number of entry  
(01 - 1st entry, 02 - 2nd entry, etc.)  
**B** - the math operator (+, -, x, ÷, %)  
**C** - the entered or calculated value

### How to Use the Paperless Tape

<u>KEYSTROKES</u>	<u>DISPLAY</u>
-------------------	----------------

1. Clear calculator and enter a string of numbers:

<b>On/C</b> <b>On/C</b>	0.
<b>4</b> <b>Feet</b> <b>+</b>	4 FEET 0 INCH
<b>5</b> <b>Feet</b> <b>+</b>	9 FEET 0 INCH
<b>6</b> <b>Feet</b> <b>+</b>	15 FEET 0 INCH
<b>7</b> <b>Feet</b> <b>=</b>	22 FEET 0 INCH

2. Access the Tape function:

<b>Rcl</b> <b>=</b>	TTL= 22 FEET 0 INCH
---------------------	---------------------

3. Scroll from first value to total:

<b>+</b>	01 4 FEET 0 INCH
<b>+</b>	02+ 5 FEET 0 INCH

(Cont'd)

(Cont'd)

KEYSTROKES	DISPLAY
<b>+</b>	03+ 6 FEET 0 INCH
<b>+</b>	04+ 7 FEET 0 INCH
<b>+</b>	TTL= 22 FEET 0 INCH
4. Scroll to last 2 values:	
<b>-</b>	04+ 7 FEET 0 INCH
<b>-</b>	03+ 6 FEET 0 INCH
5. Exit Tape function and add more:	
<b>=*</b>	TTL= 22 FEET 0 INCH
<b>+</b>	22 FEET 0 INCH
<b>2</b> <b>Feet</b> <b>=</b>	24 FEET 0 INCH

\* *Note:* At this point, you can press any key besides **Off**, **+** or **-**.

When you press a key to exit the tape, the calculator will display the total value of the tape. The next key press will begin a new tape function.

## Clearing the Paperless Tape

The paperless tape is cleared:

- 1) each time you press **On/C** **On/C** (clear);
- 2) each time you press **Conv** **X** (full reset/all clear);
- 3) when you begin entering numbers (for a new problem) after pressing the equals **=** key;
- 4) when you turn the unit off.

# USING THE ULTRA MEASURE MASTER

## ENTERING DIMENSIONS AND UNITS

---

When entering feet-inch dimensional values, you must enter the largest dimension first — feet before inches, inches before fractions. To enter fractions of an inch, enter the numerator (value above the line), press **7** (fraction bar key) and then enter the denominator (value below the line).

<i>numerator</i>	<b>3</b>
<i>fraction bar</i>	<b>—</b>
<i>denominator</i>	<b>16</b>

For all other units of measurement, you can only enter whole numbers or decimal numbers. You cannot enter combinations of units (for example, you cannot enter 12 meters 6 centimeters 4 millimeters).

## LINEAR CONVERSIONS

---

The following examples show how linear dimensions are entered:

DIMENSION	KEYSTROKES
5 Feet*	<b>5</b> <b>Feet</b>
1/2 Inch	<b>1</b> <b>/</b> <b>2</b>
5 Feet 1-1/2 Inch	<b>5</b> <b>Feet</b> <b>1</b> <b>Inch</b> <b>1</b> <b>/</b> <b>2</b>
10 Yards	<b>1</b> <b>0</b> <b>Yds</b>
17.5 Meters	<b>1</b> <b>7</b> <b>.</b> <b>5</b> <b>m</b>

\* The **On/C** key should be pressed after each of the entries above to clear the display as this is not a contiguous example.

Any units of measurement other than inches must be entered as whole values (5 yards) or decimal values (5.5 meters), and not in combination with feet and inches or with themselves. For example, you cannot enter 12 meters 6 centimeters 4 millimeters.

To convert a linear value on your display, press the **Conv** key, then the key for the linear dimension to which you want to convert. For example, **Conv** **mm** converts to millimeters.

Convert 27 feet to other linear dimensional formats.

KEYSTROKES	DISPLAY
1. Enter 27 feet: <b>2 7 Feet</b>	<b>27 FEET</b>
2. Convert to inches: <b>Conv Inch*</b>	<b>324 INCH</b>
3. Convert to yards: <b>Yds</b>	<b>9 YD</b>
4. Convert to meters: <b>m</b>	<b>8.2296 M</b>
5. Convert to km: <b>km</b>	<b>0.00823 km</b>
6. Convert to miles: <b>Miles</b>	<b>0.005114 MI</b>

\* Note: You only need to press **Conv** once.

Convert 65 meters to other linear dimensions.

KEYSTROKES	DISPLAY
1. Enter 65 meters: <b>6 5 m</b>	<b>65 M</b>
2. Convert to cm: <b>Conv cm*</b>	<b>6500 CM</b>
3. Convert to yards: <b>Yds</b>	<b>71.08486 YD</b>
4. Convert to miles: <b>Miles</b>	<b>0.040389 MI</b>

\* Note: You only need to press **Conv** once.

## AREA CONVERSIONS

---

To convert an area value on your display, press the **Conv** key and then the key-strokes for the units of value to convert it to (for example, **Conv** **m** to convert to square meters).

*Note: You do not have to use the **Sq** square key to convert to other square units of value; the calculator automatically converts to a square unit of value.*

### Examples

---

*Convert 1.25 acres to other area dimensions:*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 1.25 acres: <b>1</b> <b>.</b> <b>2</b> <b>5</b> <b>Shift</b> <b>5</b>	1.25 ACRE
3. Convert to sq feet: <b>Conv</b> <b>Feet</b>	54450 SQ FEET
4. Convert to sq yards: <b>Conv</b> <b>Yds</b>	6050 SQ YD
5. Convert to meters: <b>Conv</b> <b>m</b>	5058.571 SQ M

*Convert 252 square meters to other area dimensions:*

**KEYSTROKES**

**DISPLAY**

---

1. *Enter 252 sq m:*

**2 5 2 Sq m**

**252 SQ M**

2. *Convert to sq feet:*

**Conv Feet**

**2712.505 SQ FEET**

3. *Convert to sq yards:*

**Conv Yds**

**301.3895 SQ YD**

4. *Convert to hectares:*

**Conv Shift 4**

**0.0252 HECT**

## VOLUME CONVERSIONS

---

To convert a volume value on your display, press the **Conv** key and then the keystrokes for the volume dimension to convert it to (for example, **Conv cm** to convert to cubic centimeters).

*Note: When converting volume dimensions, you do not have to use the **Shift Sq** cubic function to convert to other cubic units of value; the calculator automatically converts to a cubic unit of measurement.*

### Examples

---

*Convert 45.75 board feet to other volume dimensions.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C On/C</b>	0.
2. Enter 45.75 board feet: <b>4 5 . 7 5 Shift 1</b>	45.75 B FEET
3. Convert to cubic feet: <b>Conv Feet</b>	3.8125 CU FEET
4. Convert to cubic yards: <b>Conv Yds</b>	0.141204 CU YD
5. Convert to cubic inch: <b>Conv Inch</b>	6588 CU INCH

Find the volume of a rectangular container 3 feet by 1 foot 9-5/8 inches by 2 feet 4 inches then convert to centimeters and yards.

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C On/C</b>	0.
2. Enter length and multiply by width and depth: <b>3 Feet X 1 Feet</b> <b>9 Inch 5 / 8</b> <b>X 2 Feet 4 Inch =</b>	3 FEET 1 - 9 5/8 FEET INCH 12.61458 CU FEET
3. Convert to cu cm: <b>Conv cm</b>	357205.2 CU CM
4. Convert to Cu Yds: <b>Conv Yds</b>	0.467207 CU YD

Convert 126 liters to other volume dimensions.

KEYSTROKES	DISPLAY
1. Clear Calculator: <b>On/C On/C</b>	0.
2. Enter 126 liters: <b>1 2 6 liters</b>	126 L
3. Convert to gallon: <b>Conv gal</b>	33.28568 GL
4. Convert to fluid oz: <b>Conv fl oz</b>	4260.567 F-OZ

## WEIGHT CONVERSIONS

---

To convert a weight value on your display, press the **Conv** key, then the keystrokes for the weight unit to which you want to convert.

### Examples

---

*Convert 150 pounds to kilograms.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 150 pounds: <b>1</b> <b>5</b> <b>0</b> <b>lbs</b>	150 LB
3. Convert to kilograms: <b>Conv</b> <b>kg</b>	68.03886 kg

*If your car has a 12 gallon tank, how many liters of gas will it take to fill it? What is the cost if one liter is \$0.75? Use the per unit function to find the total cost of the gas.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 12 gallons: <b>1</b> <b>2</b> <b>gal</b>	12 GL
3. Convert to liters at \$0.75 per liter: <b>Conv</b> <b>liters</b> <b>X</b> <b>•</b> <b>7</b> <b>5</b> <b>Shift</b> <b>•</b>	45.42494 L \$34.07 Per

*You have received a shipment of 23,000 kg of fill. How many tons is this?*

**KEYSTROKES**

**DISPLAY**

---

1. *Clear calculator:*

**On/C** **On/C**

**0.**

2. *Enter 23000 kg:*

**2** **3** **0** **0** **0** **kg**

**23000** kG

3. *Convert to tons:*

**Conv** **tons**

**25.35316** Ton

## **WEIGHT/VOLUME CONVERSIONS**

---

The *Ultra Measure Master* can convert between weight and volume. The default weights per volume factor is:

- 1.5 tons per cubic yard
- 3000 lbs per cubic yard
- 111.1111 lbs per cubic feet
- 1.779829 metric tons per cubic meter
- 1779.829 kg per cubic meter
- 1.779829 grams per cubic centimeter

To recall weight per volume factor press **Rcl** **%**. Continue pressing **%** to display as pounds or kilograms.

To change the weight per volume factor, enter the value then press **Shift** **%**. The first press will enter the weight as the calculator's current setting. To change the weight per volume factor, continue to press the **%** key to cycle through the factors shown above. When you have selected the desired factor, press **On/C** to set and exit.

## Examples

---

*Find the total volume of concrete needed to pour five 24 inch by 12 inch footings, each 2 feet deep. Then find the weight of the concrete (use the default weight factor of 1.5 tons per cubic yard).*

**KEYSTROKES**      **DISPLAY**

---

1. Clear calculator:

**On/C** **On/C**      **0.**

2. Enter weight per cubic yard:

**1** **.** **5** **Shift** **%**      **1.5** Ton per CU YD

### Step 1 — Find Volume for One Footing

3. Enter depth and multiply by length and width:

**2** **Feet**      **2** FEET

**X** **2** **4** **Inch**      **24** INCH

**X** **1** **2** **Inch** **=**      **4** CU FEET

4. Convert to yards:

**Conv** **Yds**      **0.148148** CU YD

### Step 2 — Find Volume for All 5 Footings

5. Multiply by 5 footings:

**X** **5** **=**      **0.740741** CU YD

### Step 3 — Find the Weight of Concrete

6. Find wt in tons then kilogram:

**Conv** **tons**      **1.111111** Ton

**kg**      **1007.983** kG

Find the weight of 15 cubic yards at 1.75 tons/cu yd, and convert to other weights.

**KEYSTROKES**

**DISPLAY**

---

1. Clear calculator:

**On/C** **On/C**

0.

2. Enter 1.75 factor:

**1** **.** **7** **5** **Shift** **%**    1.75 Ton per CU YD

3. Enter 15 cu yds:

**1** **5** **Shift** **Sq** **Yds**    15 CU YD

4. Convert to lbs then kg:

**Conv** **lbs**    52500 LB

**Conv** **kg**    23813.6 kg

## TEMPERATURE CONVERSIONS

---

To convert a displayed temperature value, press **Conv** then the keystrokes for either Fahrenheit or Celsius.

### Examples

---

*Convert 78 °F to a °C temperature.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 78 °F and convert to Celsius: <b>7</b> <b>8</b> <b>Shift</b> <b>3</b>	78 °F
<b>Conv</b> <b>Shift</b> <b>2</b>	25.55556 °C

*Convert 11 °C to a °F temperature.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 11 °C and convert to °F: <b>1</b> <b>1</b> <b>Shift</b> <b>2</b>	11 °C
<b>Conv</b> <b>Shift</b> <b>3</b>	51.8 °F

## LINEAR VELOCITY CONVERSIONS

---

To convert a linear velocity on your display, press the **Conv** key and then the keystrokes for the linear velocity to convert it to.

### Examples

---

*Convert 55 MPH to kilometers per hour.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 55 mph then convert to kmh: <b>5</b> <b>5</b> <b>Shift</b> <b>Miles</b> <b>Conv</b> <b>Shift</b> <b>km</b>	55 MPH 88.51392 KM/H

*Convert eight inches per second (IPS) to millimeters per second (mm/s).*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 8 ips: <b>8</b> <b>Shift</b> <b>Inch</b>	8 IPS
3. Convert to mm/s: <b>Conv</b> <b>Shift</b> <b>mm</b>	203.2 MM/S

## VOLUMETRIC VELOCITY CONVERSIONS

---

To convert a volumetric velocity on your display, press the **Conv** key and then the keystrokes for the volumetric velocity to convert it to.

### Examples

---

*Convert 48 fluid ounces per second to liters per second.*

KEYSTROKES	DISPLAY
------------	---------

---

1. Clear calculator:

<b>On/C</b> <b>On/C</b>	0.
-------------------------	----

2. Enter 48 oz/s then convert to l/s:

<b>4</b> <b>8</b> <b>Shift</b> <b>fl oz</b>	48 OPS
<b>Conv</b> <b>Shift</b> <b>liters</b>	1.419529 L/S

## Calculating Aqueduct Slope —

An aqueduct should be sloped so that water travels less than ten feet per minute. After a heavy rainfall, the water traveled at an approximate velocity of 1.72 inches per second. Is the aqueduct sloped correctly?

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 1.72 ips then convert to ft/min: <b>1</b> <b>.</b> <b>7</b> <b>2</b> <b>Shift</b> <b>Inch</b> <b>Conv</b> <b>Shift</b> <b>Yds</b>	1.72 IPS 8.6 FPM*

\* Because 8.6 fpm is less than 10 fpm, the aqueduct is sloped correctly.

The faucet in a house should provide 4.5 gallons of water per minute. If you have a two liter bottle that filled up in 12 seconds, is the faucet within code?

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Divide liters/sec: <b>2</b> <b>÷</b> <b>1</b> <b>2</b> <b>=</b>	0.166667
3. Enter as liters/sec.: <b>Shift</b> <b>liters</b>	0.166667 L/s
4. Convert to gal/min: <b>Conv</b> <b>Shift</b> <b>gal</b>	2.641721 GPM*

\* Because 2.641721 gpm is less than 4.5 gpm, the faucet is not within code.

## PRESSURE CONVERSIONS

---

The following examples show how to convert a pressure value.

### Examples

---

*A water line is reading a pressure of .5 psi, what would the pressure be in psf, kpa and mpa?*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter psi: <b>◦</b> <b>5</b> <b>Shift</b> <b>lbs</b>	0.5 PSI
3. Convert to psf: <b>Conv</b> <b>Shift</b> <b>dry oz</b>	72 PSF
4. Convert to kpa: <b>Conv</b> <b>Shift</b> <b>kg</b>	3.447379 kPA
5. Convert to mpa: <b>Conv</b> <b>Shift</b> <b>grams</b>	0.003447 MPA

*Convert 24 pounds per square foot to kilopascals.*

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 24 psf: <b>2</b> <b>4</b> <b>Shift</b> <b>dry oz</b>	24 PSF
3. Convert to kpa: <b>Conv</b> <b>Shift</b> <b>kg</b>	1.149126 kPA

## **BENDING MOMENT CONVERSIONS**

---

To convert a bending moment value on your display, press the **Conv** key and then the keystrokes for the bending moment value to convert it to.

### **Examples**

---

*Convert 120 inch-lb to newton-meters.*

<b>KEYSTROKES</b>	<b>DISPLAY</b>
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter 120 in/lb: <b>1</b> <b>2</b> <b>0</b> <b>Shift</b> <b>7</b>	120 LB INCH
3. Convert to N-m: <b>Conv</b> <b>Shift</b> <b>9</b>	13.55818 N-M

*Convert 700 newton-meters to ft-lb.*

<b>KEYSTROKES</b>	<b>DISPLAY</b>
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter N-m: <b>7</b> <b>0</b> <b>0</b> <b>Shift</b> <b>9</b>	700 N-M
3. Find ft/lbs: <b>Conv</b> <b>Shift</b> <b>8</b>	516.2936 LB FEET

Your metric-based plan says that the bridge rail bolt must be tightened to 30 n-m but your torque wrench only shows ft-lb. Find the ft-lb setting required to set up the wrench.

KEYSTROKES	DISPLAY
1. Clear calculator: <b>On/C</b> <b>On/C</b>	0.
2. Enter N-m: <b>3</b> <b>0</b> <b>Shift</b> <b>9</b>	30 N-M
3. Find ft/lbs: <b>Conv</b> <b>Shift</b> <b>8</b>	22.12687 LB FEET

# APPENDIX

## ACCURACY/ERRORS

---

### Accuracy/Display Capacity

---

Your calculator has an eleven digit display. This is made up of seven digits (normal display) and four digits for the fraction. In a standard calculation, each calculation is carried out internally to ten digits and rounded to a seven-digit standard display. A 5/4 rounding technique is used to add 1 to the least significant digit in the display if the next non-displayed digit is five or more. If this digit is less than five, no rounding occurs.

### Errors

---

When you make an incorrect entry, or the answer is beyond the calculator's ability, it displays the word "ERROR." To clear an error, press the **On/C** button twice. At this point you must determine what caused the error and re-key the entry. An error also occurs if you enter a mathematical impossibility such as division by zero.

## **Auto-Range**

---

If an “overflow” is created because of an input and calculation with small units that are out of the standard seven-digit range of the display, the answer will be automatically expressed in the next larger units (instead of showing “**ERROR**”) — i.e., “10,000,000 mm” cannot be displayed because it is out of the seven-digit display, so “10,000 m” will be displayed instead. This auto-ranging also applies to other dimensional units, such as inches to feet, and feet to yards, etc.

## **BATTERY INFORMATION**

---

Your calculator is powered by a single three-Volt Lithium CR-2032 battery. This should last upwards of 800 hours of actual use (one year plus for most users). Should the display become very dim or erratic, replace the battery. **WARNING:** *Please use caution when disposing of your old batteries as they contain hazardous chemicals.*

## **SPECIFICATIONS**

---

### **Dimensions:**

3" x 5.63" x 0.67"

76mm x 143mm x 17mm

### **Weight:**

4 oz. (114 g)

### **Accuracy:**

10 digits (internal)

# REPAIR AND RETURN

## WARRANTY, REPAIR AND RETURN INFORMATION

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### Return Guidelines

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1. Please read the **Warranty** in this User's Guide to determine if your Calculated Industries calculator, measuring device or electronic tool remains under warranty **before** calling or returning any device for evaluation or repairs.
2. If your calculator won't turn on try pressing the "Reset Button" first. If it still won't turn on, check the batteries as out-lined in the User's Guide.
3. **If there is a black spot on the LCD screen, THIS IS NOT A WARRANTY DEFECT. The unit can be repaired. Call for a repair quote before returning your unit.**
4. If you need more assistance, please go to our website at [www.calculated.com](http://www.calculated.com) and click on Support, then Repair Services FAQs.
5. If you believe you need to return your calculator, please speak to a Calculated Industries representative for additional information!

**Call Toll Free: 1-800-854-8075**

# WARRANTY

## **Warranty Repair Service – U.S.A.**

---

Calculated Industries ("CI") warrants this product against defects in materials and workmanship for a period of one (1) year from the date of original consumer purchase in the U.S. If a defect exists during the warranty period, CI at its option will either repair (using new or remanufactured parts) or replace (with a new or remanufactured calculator) the product at no charge.

THE WARRANTY WILL NOT APPLY TO THE PRODUCT IF IT HAS BEEN DAMAGED BY MISUSE, ALTERATION, ACCIDENT, IMPROPER HANDLING OR OPERATION, OR IF UNAUTHORIZED REPAIRS ARE ATTEMPTED OR MADE. SOME EXAMPLES OF DAMAGES NOT COVERED BY WARRANTY INCLUDE, BUT ARE NOT LIMITED TO, BATTERY LEAKAGE, BENDING, OR VISIBLE CRACKING OF THE LCD, WHICH ARE PRESUMED TO BE DAMAGES RESULTING FROM MISUSE OR ABUSE.

To obtain warranty service in the U.S., ship the product postage paid to Calculated Industries (address listed on the last page). Please provide an explanation of the service requirement, your name, address, day phone number and dated proof of purchase (typically a sales receipt). If the product is over 90 days old, include payment of \$6.95 for return shipping and handling within the contiguous 48 states. (Outside the contiguous 48 states, please call CI for return shipping costs.)

A repaired or replacement product assumes the remaining warranty of the original product or 90 days, whichever is longer.

## **Non-Warranty Repair Service – U.S.A.**

Non-warranty repair covers service beyond the warranty period, or service requested due to damage resulting from misuse or abuse.

Contact Calculated Industries at the number listed above to obtain current product repair information and charges. Repairs are guaranteed for 90 days.

## **Repair Service – Outside the U.S.A.**

To obtain warranty or non-warranty repair service for goods purchased outside the U.S., contact the dealer through which you initially purchased the product. If you cannot reasonably have the product repaired in your area, you may contact CI to obtain current product repair information and charges, including freight and duties.

## **Disclaimer**

CI MAKES NO WARRANTY OR REPRESENTATION, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT'S QUALITY, PERFORMANCE, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. AS A RESULT, THIS PRODUCT, INCLUDING BUT NOT LIMITED TO, KEYSTROKE PROCEDURES, MATHEMATICAL ACCURACY AND PREPROGRAMMED MATERIAL, IS SOLD "AS IS," AND YOU THE PURCHASER ASSUME THE ENTIRE RISK AS TO ITS QUALITY AND PERFORMANCE.

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*(Cont'd)*

*(Cont'd)*

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights, and you may also have other rights, which vary from state to state.

## **FCC Class B**

---

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules.

## **Looking For New Ideas**

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Calculated Industries, a leading manufacturer of special-function calculators and digital measuring instruments, is always looking for new product ideas in these areas.

If you have an idea, or a suggestion for improving this product or User's Guide, please submit your comments online at [www.calculated.com](http://www.calculated.com) under "Contact Us," "Product Idea." Thank you.



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