Welcome to your purchasing UNITREX MINI HANDY 80SR. This is a very compact high-performance electronic calculator with 13 types of technical calculation circuits and an 8-figure memory. Your perfect knowledge of this machine will assure you of full use of various functions as a powerful means for troublesome calculations.
SPECIAL FEATURES

PARTS NAMES & DESCRIPTIONS

OPERATION EXAMPLE

• GENERAL ARITHMETIC OPERATIONS
  ADDITION SUBTRACTION MULTIPLICATION & DIVISION
  POWER CALCULATION & CONSTANT CALCULATION

• MEMORY CALCULATION
  PRODUCT ADDITION & SUBTRACTION
  CONSTITUTIONAL RATIO CALCULATION

• TECHNICAL CALCULATIONS
  POWER CALCULATION
  EXPONENTIAL CALCULATION: e
  INVERSE NUMBER CALCULATION: 1/x
  ROOT CALCULATION: √
  TRIGONOMETRIC FUNCTIONS: sin x, cos x, tan x
  INVERSE TRIGONOMETRIC FUNCTIONS: sin⁻¹ x, cos⁻¹ x, tan⁻¹ x
  COMMON & NAPERIAN LOGARITHMS: log x, ln x
  REPLACEMENT OF BATTERY

MAINTENANCE INSTRUCTION

- It makes possible 13 types of technical calculations.
- Function calculations can be switched over from degree to radian and vice versa.
- Provided with an 8-figure memory.
- Calculations are possible just in the same order of the formula.
- It employs an underflow system which gives an approximate answer in up to 16 figures.
- A full floating decimal system is adopted.
- Positive or negative sign can easily be changed over with the sign change key.
- Auto constant circuit is provided.
C: Clear key

Depressing this key once deletes the wrong entry only.
Two depressions of this key clears all digits except the contents in the memory.
This key is also available when releasing an overflow error.

CM: Clear memory key

This key is used to delete an entry from the memory.

x·M: Memory display key

Used to exchange a displayed number (x register) for the number in the memory.
Key is useful when checking a total in the memory in the middle of calculation.
Calculation can proceed when it is depressed again.

MR: Memory recall key

Used to recall the result of memory calculation.

M+: Memory plus key

Used to add the displayed number to the number in memory.
When the displayed number is negative, subtract from the memory is possible by means of this key.

x·y: Display exchange key

Used to exchange a displayed number (x register) for the number (y register) contained inside the machine.

Example: 4·2 = 6 5·4·y!
In this way the numerator and the denominator in division can be exchanged for convenience of a series of operations.

\text{operation keys} \hspace{1cm} \text{operation keys}

This key is used for the calculation of \( a^y = e^{y \ln a} \). The result is always given in the approximate value. The value \( y \) should be a positive number, while \( a \) can be any real number.

Important: Except for \( \sqrt{x} \), all the following technical calculations will produce errors within the range of \( \pm 1 \) at the 6th figure as seen from the left side.

This key is used to start technical calculations. For example, \( \sqrt{4} \) can be obtained after the operation: \( \sqrt{[4]} \). The value of \( \sin 45^\circ \) can be obtained by the operation of \( 45 \left[ \frac{1}{2} \right] \) in the setting. The \( F \) lamp (\( \cdot \)) lights at the end of the display when this key is depressed.

\text{Decimal point, root key.} \hspace{1cm} \text{Display recall key:}

Generally used to put an entry which contains a decimal point. However, root calculation is possible with this key after \( \sqrt{[x]} \) key has been depressed.

\text{Sign change \( \mathbf{\pi} \) key.} \hspace{1cm} \text{Entry, technical calculation key:}

Generally used to convert a positive number into a negative one and vice versa. The value of \( \pi \) is displayed if this key is depressed after depressing \( \mathbf{\pi} \) key.

\text{Entry, technical calculation key:} \hspace{1cm} \text{Display recall key:}

Generally used to put a necessary entry in the machine. However, respective technical calculations are carried out for the displayed numbers if these keys are used after depressing \( \mathbf{\pi} \) key.

Example: \( \sin 54^\circ = 54 \left[ \frac{1}{2} \right] \).
• Overflow Error

When the result of general calculation exceeds 9 figures, the mark ('\) of the overflow error (simply called error hereafter) is left and higher 8 figures are displayed. Except for 0, all other keys are locked electrically. In this case, the decimal point is indicated at a certain figure from the left end of the display means that the number of the figures above the decimal point is equal to that of the lower figures to be omitted.

Example: \[ \frac{99999999 \times 9999}{999999999999} \]

Namely, the lower four figures 0999 are omitted and the higher 8 figures only are displayed.

In the case of minus calculation, an overflow is indicated by the mark (\). An error condition also appears if mathematically unacceptable numbers are put in technical calculations.

Example: \[ x > 1 \text{ for } \sin x \text{ and } \cos x \]

\[ x < 0 \text{ for } \ln x \text{ and } \log x \]

In this case the error mark (\) is at the left end of the display and (\) at the right end.

• General Arithmetic Operations

General arithmetic operations are possible by operating the associated keys in the same order of formulas. If an operation key is depressed by mistake, successive calculation conforms to the key depressed later.

Example: \[ \A + \B - \C = \D \]

\[ \A - \B + \C = \D \]

\[ \A \times \B = \C \]

\[ \A \div \B = \C \]

ADDITION & SUBTRACTION

\[
\begin{array}{c|c|c}
125 & 260 & 272.5 \\
186 & -256 & -237.4 \\
150 & -150 & 450 \\
\end{array}
\]

OPERATION & DISPLAY

\[
\begin{array}{c|c|c}
& 272.5 & \\
& -237.4 & \\
& 450 & \\
\end{array}
\]

MULTIPLICATION & DIVISION

\[
\begin{array}{c|c|c|c}
525 & \times & 280 & 1470 \\
1470 & \div & 280 & 5.25 \\
\end{array}
\]

EXAMPLE
### Power Calculation

<table>
<thead>
<tr>
<th>5^2</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/5</td>
<td>0.008</td>
</tr>
</tbody>
</table>

### Constant Calculation

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 x 15</td>
<td>4200</td>
</tr>
<tr>
<td>250 x 36</td>
<td>9000</td>
</tr>
<tr>
<td>250 x 7290</td>
<td>1800</td>
</tr>
<tr>
<td>4200 / 25</td>
<td>168</td>
</tr>
<tr>
<td>38.5 / 25</td>
<td>1.54</td>
</tr>
<tr>
<td>0.644 / 25</td>
<td>0.02576</td>
</tr>
</tbody>
</table>

*For constant multiplication, the multiplicand (the number to be multiplied by another) is automatically set as a constant. For constant division, the divisor (the quantity by which another is to be divided) is set automatically. For addition or subtraction, the addition or subtraction number is set as a constant.

### Memory Calculation

The memory allows for storage of a result or an entry while still retaining the normal functions of the calculator.

### Product Addition & Subtraction

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>256 x 45</td>
<td>11520</td>
</tr>
<tr>
<td>290 x 250</td>
<td>72500</td>
</tr>
<tr>
<td>550 x 36</td>
<td>1980</td>
</tr>
</tbody>
</table>

*For subtraction from the memory, the displayed number is attached with a minus mark by the use of [⇒] key. Then the value can be put by depressing [MR] key. When the displayed number is negative in the beginning, [C] key need not be used. But [MC] key only is to be depressed.*
### Technical Calculations

This calculator is provided with 13 functions of technical calculations. Except for the calculation of $X$, the results of the required technical calculations can be obtained by operating the associated keys after depressing $F_1$ key. The $F_1$ lamp is lit.

**POWER CALCULATION: $X$**

<table>
<thead>
<tr>
<th>$X$</th>
<th>$5 \times 3$</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X$</td>
<td>$5 \times 3$</td>
<td>0.008</td>
</tr>
</tbody>
</table>

Numeral range: $0 \leq X \leq 10^3$ and $X = x \times 10^y$

**Important:** The next key should not be depressed until the display appears after depressing $X$ key. If keys are depressed too quickly, a wrong answer may be obtained.
EXPONENTIAL CALCULATION: \( e^{x} \)

\[
\begin{align*}
3 \times e^x & = 20.08653 \\
2.5 \times e^{x/2} & = 0.020805
\end{align*}
\]

Numerical range: Operation results \( \leq 10^{1}/1 \) or \( |x| \leq 18.4 \) (approx.)

INVERSE NUMBER CALCULATION: \( 1/x \)

\[
\begin{align*}
4 & \times 5 & = & 0.05 \\
5 & \times 4 & = & 0.008
\end{align*}
\]

ROOT CALCULATION: \( \sqrt{x} \)

\[
\begin{align*}
\sqrt{2} & = 2.2360679 \\
\sqrt{3} & = 1.73205
\end{align*}
\]

Numerical range: \( x \geq 0 \)

CIRCULAR CONSTANT \( \pi \)

\[
\begin{align*}
\sin x & = \frac{1}{2} \left( e^{ix} - e^{-ix} \right) \\
\cos x & = \frac{1}{2} \left( e^{ix} + e^{-ix} \right)
\end{align*}
\]

**Example:** \( \sin 30^\circ = \frac{1}{2} \times (e^{i\pi/6} - e^{-i\pi/6}) \)

**Correct:** \( \frac{1}{2} \times (e^{i\pi/6} + e^{-i\pi/6}) \)

**Wrong:** \( \frac{1}{2} \times (e^{i\pi/6} - e^{-i\pi/6}) \)

**TRIGONOMETRIC FUNCTIONS:** \( \sin x, \cos x, \tan x \)

By the use of the change-over switch lever, calculation can be expressed in either degrees or radians.

\[
\begin{align*}
\sin 30^\circ & = 0.5 \\
\tan 30^\circ & = 0.57735 \\
\sin 30^\circ \times \cos 30^\circ & = 0.433013 \\
\cos \frac{3\pi}{2} & = -1
\end{align*}
\]

\[\text{NUMERICAL RANGE: } 0 \to 10^9, 0 \to 10^{-9} \]
For calculation to the units of minutes and seconds, each must be converted into the unit of degrees.

Numerical range: \( x \leq 10 \)

Inverse Trigonometric Functions: \( \sin^{-1} x, \cos^{-1} x, \tan^{-1} x \)

In the same manner as for trigonometric functions, the use of the change-over switch lever makes possible calculations in either degrees or radians.

\[
\sin 30^\circ = 0.5 \quad \cos 30^\circ = 0.866 \quad \tan 30^\circ = 0.577
\]

Numerical range: \( x \leq 1 \)

Principal value range: \( -90^\circ \leq x \leq 90^\circ \)

\[
\tan^{-1} (\sin 45^\circ + \cos 45^\circ) = \frac{\pi}{4}
\]

Hyperbolic Sine, Cosine, Tangent: \( \sinh x, \cosh x, \tanh x \)

There is no exclusivity available key for these calculations. However, the results are obtainable in the following principles of hyperbolic functions:

\[
\sinh x = \frac{e^x - e^{-x}}{2} \quad \cosh x = \frac{e^x + e^{-x}}{2} \quad \tanh x = \frac{e^x - e^{-x}}{e^x + e^{-x}}
\]

Conversion between Degrees and Radians

\( 180^\circ = \pi \text{ radians} \quad \frac{180}{\pi} \text{ rad} = \pi \text{ radians} \quad 1^\circ = \frac{\pi}{180} \text{ rad} \)
REPLACEMENT OF BATTERY

Battery power

Open the cover of the battery compartment on the bottom of the unit and insert three batteries to match the polarity as per drawing. Close the cover and slide the power switch "ON".
MAINTENANCE INSTRUCTION

This calculator is made up of precision parts such as LSI. Radical changes in temperature or humidity can be harmful. The following points must be carefully noted:

1. Do not drop or jar the machine.
2. Always be certain machine is switched "OFF" when not in operation. This will prevent unnecessary drain on the batteries.
3. Long hours of direct heat rays from the sun or an appliance must be avoided.
4. When cleaning the machine, use a neutral cleaner. Do not use a wet cloth or liquid such as paint thinner.