## MACHINISTS’ LEVELS

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<td>2 1/2 and 3 1/2 / 63 and 88mm</td>
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This section shows our complete line of precision machinist levels. Builders’ and contractors’ levels can be found in the Jobsite & Workshop Tools section of the catalog.
Level Use
To get a correct reading with a level, both ends of the bubble should be viewed. If the gaps between the ends of the bubble and the lines are unequal at any time, they should be averaged out. The reason for this is temperature, which affects the size of the bubble. As a level is warmed the liquid expands, thereby reducing the size of the bubble so that at true-level there will be gaps at both ends between the bubble and the reading lines. Conversely, if the temperature is very cold, the bubble could expand and overlap the reading lines.

Excessive hand heat on the center of the level for an extended period of time could expand the center, causing the working surface to become slightly convex and also create a tendency to spin on flat surfaces. This is more noticeable on very precise levels. Any level can be checked for accuracy on any flat surface regardless of whether it is level or not. Simply put the level on the surface and note the position of the bubble. Then reverse the level in the same spot. If the level is true, the bubble will be in the same relative position both ways.

Some models, like our No. 98 Series machinist levels with an adjustable system, have an adjustment that can be made on the job.

Level Vial Information
The accuracy of a level is dependent on the proper machining of the working surface, the straightness, and rigidity of the construction and the sensitivity of the level vial. Accuracies are very often specified in parts of degrees such as 10-second accuracy or 43-minute accuracy. Technically, we are referring to the sensitivity of the level vial, but many interchange these terms. Since this means little to most people, we use the more practical definition of inches per foot of elevation. For instance, a 10-second vial accuracy means if the level is on an incline that is .0005” per foot, then the bubble on the vial will move .100” (slightly less than 1/8”).

There are three general types of level vials. Ground vials are generally used in precision levels; bent glass and plastic vials are used in most other levels.

Most level vials have just two lines spanning the length of the bubble because most users just want to know if something is level or not.

The more precise levels have vials with a number of reading lines on each side of the bubble. All Inch reading vial graduations are .100” apart. This will show the machinist in a very precise manner how level the equipment is.

Metric reading levels have vial graduations 2mm apart and accuracies are usually described as millimeters per meter. This is an easy conversion to make, so we converted our Inch specifications to an understandable metric reading. Machinists only need to know how far they are out of level if the bubble moves to the next line.

Precision Machinists’ Levels
Nos. 199, 98 and 132 Series
These are the finest levels available, used for precision work that is typically required in industry. They all have these features:

- All level bases are made from the finest quality seasoned cast iron and are precision-machined on the reference surface
- Non-machined surfaces have an attractive, black wrinkle finish
- All models except the No. 199 have an involute longitudinal groove between the bearing flats for accurate seating on round work. This groove has a special involute design, permitting better centering and greater capacity to handle larger rounds
- Groove and bearing flats are machined together for maximum accuracy

Master Precision Level
No. 199 15”/380mm
This Master Precision Level is especially designed to set up, check and test machinery of all types. The efficiency of modern, high speed machinery depends to a large degree upon the levelness of the machine set-up.

With this Master Level you can tell at a glance the exact variation of the levelness of the machinery and make the necessary adjustments.

- Ground and graduated main vial of 10-second accuracy; one division equals 1/2 thousandth (0.0005) of an inch per foot, or 0.04mm per meter
- Main vials have seven graduations on each side of the bubble
- Auxiliary level vial shows lateral position and assists in horizontal setting
- Level vials are positioned so breakage is reduced to a minimum
- Fool-proof adjustment to avoid tampering, once set
- Special alloy iron used to obtain freedom from thermal effects
- Castings are thoroughly seasoned and machined
- Reference surface is scraped
- Nonmachined surfaces have a black wrinkle finish
- Insulation from handling by means of top plate of nonconductive material

<table>
<thead>
<tr>
<th>Length Base</th>
<th>Width Base</th>
<th>Height Level</th>
<th>Catalog No.</th>
<th>EDP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inch</td>
<td>mm</td>
<td>Inch</td>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>15&quot;</td>
<td>380mm</td>
<td>1 5/8”</td>
<td>40mm</td>
<td>199Z</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3”</td>
<td>75mm</td>
<td>199Z W/SLC*</td>
</tr>
</tbody>
</table>

* Includes redemption card for Standard Letter of Certification (SLC).
**Machinists’ Levels**

with ground and graduated vials

No. 98 Series
4-18”/100-450mm

These levels have ground and graduated main vials. All sizes have a cross test vial except the 4” (100mm) model.

The 12” (300mm) model also has a plumb vial and the 18” (450mm) size has a double plumb vial.

These vials are adjustable to a positive setting and are housed in a satin finished brass tube with a friction-fit closing cover to prevent breakage.

The base of the levels features an involute groove running the length of the base, which provides a reliable seat for round work such as pipes or shafting.

With the cross test vial, it is possible to simultaneously level in both directions. This prevents inaccuracies in the main vial reading caused by canting the level sidewise on round work.

The 6” through 18” (150-450mm) main level vials have graduations that are approximately 80-90 seconds or .005” per foot (0.42mm per meter). There are five, six, or seven lines on each side of the bubble, depending on the base length.

<table>
<thead>
<tr>
<th>Size</th>
<th>mm</th>
<th>Description</th>
<th>Catalog No.</th>
<th>EDP No.</th>
<th>Catalog No.</th>
<th>EDP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4”</td>
<td>100</td>
<td>Without Cross Vial</td>
<td>98-4</td>
<td>50440</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6”</td>
<td>150</td>
<td>With Cross Test Vial</td>
<td>98-6</td>
<td>50441</td>
<td></td>
<td></td>
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<tr>
<td>8”</td>
<td>200</td>
<td>With Cross Test Vial, Standard Letter of Certification*</td>
<td>98-8</td>
<td>50442</td>
<td></td>
<td></td>
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<tr>
<td>12”</td>
<td>300</td>
<td>With Single Plumb Vial and Cross Test Vial</td>
<td>98-12</td>
<td>50443</td>
<td>98Z-12</td>
<td>50444</td>
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<tr>
<td>18”</td>
<td>450</td>
<td>With Double Plumb Vial and Cross Test Vial</td>
<td>98-18</td>
<td>50445</td>
<td>98Z-18</td>
<td>50446</td>
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</tbody>
</table>

* Includes redemption card for Standard Letter of Certification (SLC).

**NOTE:** To guarantee extreme accuracy, the length of your level should not be longer than the work you are leveling.

Packed one in a box.
Precision Bench Levels with double plumbs

No. 132 Series
6-24”/150-600mm

These are moderately priced levels designed for the all-around use of machinists, maintenance and set-up mechanics and carpenters. They are available in a wide range of sizes to suit every requirement.

◆ The attractive filigree design of these levels provides a lighter weight, and the curved design evenly dissipates excess heat
◆ The base of the levels has an involute groove running the full length, which provides a reliable seat for round work
◆ All sizes have a main vial and double plumb vials. Each vial has two graduated lines
◆ The main vials have approximately 19-minute sensitivity, meaning if the bubble moves 1/8” off the graduated lines, the out-of-level is approximately .080” per foot. If the bubble is off 2mm, then the out-of-level is approximately 4.4mm per meter

<table>
<thead>
<tr>
<th>Size</th>
<th>Inch</th>
<th>mm</th>
<th>Description</th>
<th>Catalog No.</th>
<th>EDP No.</th>
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<tr>
<td>6”</td>
<td>150</td>
<td>150mm</td>
<td>With Main Vial and Double Plumb Vial</td>
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<td>50562</td>
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<tr>
<td>9”</td>
<td>225</td>
<td>225mm</td>
<td></td>
<td>132-9</td>
<td>50563</td>
</tr>
<tr>
<td>12”</td>
<td>300</td>
<td>300mm</td>
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<td>132-12</td>
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<tr>
<td>24”</td>
<td>600</td>
<td>600mm</td>
<td></td>
<td>132-24</td>
<td>50566</td>
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</tbody>
</table>

NOTE: To guarantee extreme accuracy, the length of your level should not be longer than the work you are leveling.

Packed one in a box.
Cross Test Level and Plumb

No. 134  2 x 3” / 50 x 75mm

This is an especially useful little level, invaluable for plumbing, approximate squaring and leveling work. Made from cast iron with a satin nickel finish, all working surfaces are flat and true. The level has two vials at right angles for cross test leveling without moving the tool and a plumb level at the top for checking squareness. An accurate, well-made and reliable tool, it is also very light and compact and can be easily carried in the pocket.

Packed one in a box.

Cross Test Level

No. 136  2 3/4 x 2 3/4” / 70 x 70mm

Similar to our No. 134 level, the No. 136 has two vials at right angles which permit leveling in both directions without moving the level from the work. The level is light and compact, with an attractive black wrinkle finish and a ground reference surface.

Packed one in a box.
MACHINISTS’ LEVELS

Bench Level

No. 130 3 3/8” / 85mm

This is a very handy, compact bench level with a sensitive and accurate single vial. The body is made of seasoned cast iron with black wrinkle finish and an accurately machined base leveling surface.

Pocket Levels with satin nickel-plated finish

No. 135 Series

2 1/2 and 3 1/2” / 63 and 88mm

Another extremely useful Starrett level that fits handily in the pocket with no sharp edges. Made from hexagonal stock with convex ends and satin nickel-plated finish.
J.W. Donchin Co. was established in 1924 and has been known worldwide ever since. Customer Service is our Main Focus. We offer Expert Product Knowledge, Large Stocking Inventory and Competitive Pricing to assist you in locating and selecting the correct tool or product to fit your needs. (J.W. Donchin Co. is one of L.S. Starrett’s largest stocking distributors.)

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