Precimar

Product Brochure

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130B-Series Gage Block Comparators

The GOLD Standard for Comparative Gage Block Measurement

Model 130B-24
Gage Block Comparator

Model 130B-16
Long Gage Block Comparator

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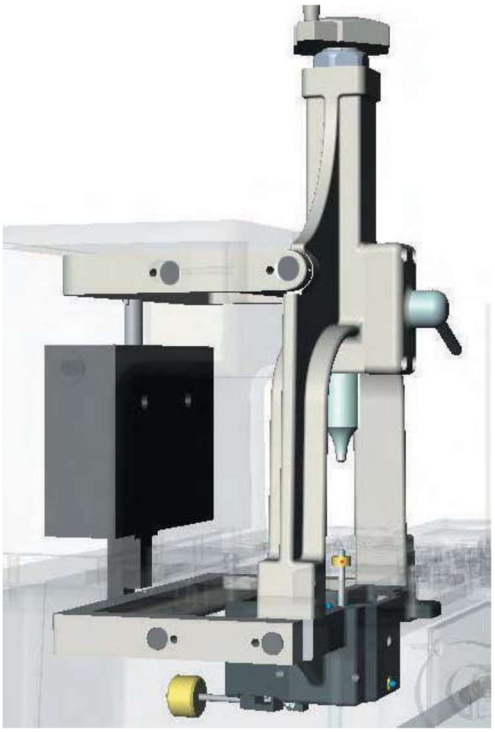
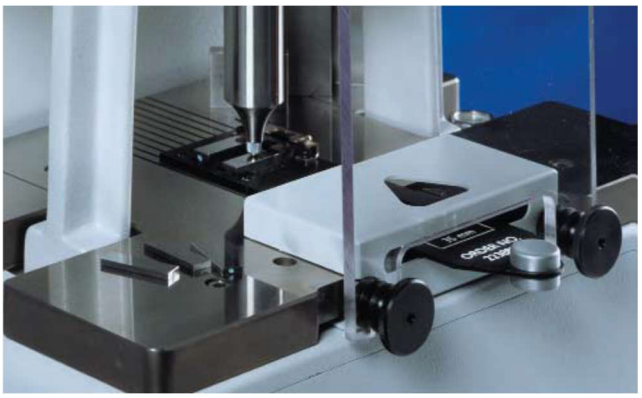
Model 130B-24 – The Standard of the Industry

Mahr Inc.'s 130B-24 Gage Block Comparator is truly the preferred choice of all major calibration laboratories, including the National Institute of Standards and Technology (NIST). It is specifically designed for the measurement of gage blocks by comparison, with no compromises made. The Model 130B-24 provides the ultimate resolution and reproducibility for measurement of industry's most important dimensional standards.



- Unique "Floating Measuring Frame" design, pictured here, assures true point-to-point measurement.
- Single sensor design provides the lowest possible level of electronic noise.
- Precise counterbalancing for control of measurement forces.
- Large platen area for staging blocks before measurement – critical for achieving thermal equilibrium with the gage.
- Resolution of 0.1µin (*0.001µm*)
- Repeatability of 0.2µin (*0.005µm*)
    - 6σ < 1µin (*0.025µm*)
- Measurement capacity from 0.010" to 4.000" (*0.25mm to 100mm*)
- Integrated measurement software and user interface
- Built-in positioner for reproducible measurement locations.

Gage Block Positioner



A precision positioning mechanism is built into the platen of the 130B-24. The master block and the work block are loaded into spaces in the template. The mechanism swings into place between the contacts and guides the blocks to their proper measurement positions – first, to the master block's reference position, then to the work block's reference position, and finally to the corners of the work block of the Variation in Length (ViL) measurements.

Three easily interchangeable templates are included for comparison of square blocks, 35mm long rectangular blocks, and 30mm rectangular blocks. Other template configurations are optionally available. Custom templates may also be available upon request.

The positioner accommodates blocks as thin as 0.020" (*0.5mm*) and as tall as 4.000" (*100mm*). It can be hinged for left-hand or right-hand operation and can be removed completely if not needed. The positioner includes an acrylic breath shield that keeps body heat out of the measurement area.

Electronics Overview

The amplifier, sensor, and computer work together to provide unequaled measurement accuracy, along with convenient and simple operation. The amplifier has no user controls. The entire user interface is built into the controlling computer, which can be either a desktop or a laptop computer. Communication to the computer is via USB and is two-way. The computer reads the sensor position and returns a controlling signal to the amplifier, instructing it exactly how much offset it needs to allow the extremely high magnification of the actual measurement.

The sensor is Mahr Inc.'s best friction-free LVDT-based sensor assembly. It is mounted on stable flexures, allowing it to withstand the side loading of a sliding gage block without any loss of accuracy over time.

Model 130B-24 Specifications

Specifications	
Approximate Size (*without computer*)	15" L x 15" H x 23" H (*400mm x 400mm x 600mm*)
Approximate Weight (*without computer*)	225 lbs. (*100 kg*)
Gaging Capacity	0.010 – 4.000" (*0.25mm – 100mm*)
Gaging Force (Upper) (Lower)	3 oz. (*0.8 N*) 1 oz. (*0.3 N*)
Contact Tip Material	Tungsten Carbide *Optional – Diamond*
Contact Radius	0.125" (*3mm*)
Sensor Range	±0.015" (*±0.38mm*)
Direct Measurement Range	±500µin (*±10µm*)
Repeatability	6σ < 1µin (*0.025µm*) Measured on a 1" gage block without removing the block
Linearity	<1µin (*0.020µm*) over the central ±50µin (*±1µm*) and <1µin (*0.020µm*) in any ±50µin space (*±1µm*) over the entire ±500µin (*±10µm*) range

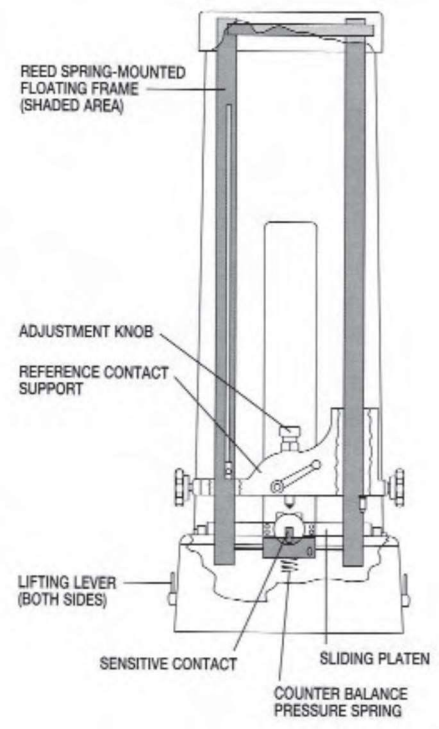
Model 130B-24 Ordering Information

Base Systems	Order No.
Complete System with Desktop Computer	2150076
Complete System with Laptop Computer	2152804
Complete System w/ Customer-Supplied Computer	2150078
Positioning Templates	
Template – 30mm Rect. Master - 30mm Rect. Work	2238822*
Template – 35mm Rect. Master - 35mm Rect. Work	2238821*
Template – SQR Master - SQR Work (5 pos.)	2239637*
Template – SQR Master - SQR Work (4 pos.)	2238823
Template – SQR Master - 30mm Rect. Work	2238826
Template – SQR Master - 35mm Rect. Work	2238825
Template – 30mm Rect. Master - SQR Work	2240939
Template – 35mm Rect. Master - SQR Work	2240940
Template – 35mm Rect. Master - 30mm Rect. Work	2243256
Template – 30mm Rect. Master - 35mm Rect. Work	2243257
Replacement Contacts	
Tungsten Carbide*	
Upper	2240154
Lower	2239733
Diamond	
Upper	EPT-1029
Lower	2216189
Additional Accessories	
Temperature Controller w/ Two Certified Probes	2253440
Software v4.19 (*Win10 Compatible*)*	2260656
Deskjet Printer	2243928
Accessory Kit	2240602
Calibration Kit for 130B Series	2260985

**Included as standard with the purchase of all new/upgraded 130B-24 units*

Model 130B-16 “Long Block” Comparator

- Same “Floating Measuring Frame” (pictured here) design concept as the 130B-24.
- Single sensor design provides the lowest possible level of electronic noise.
- Precise counterbalancing for control of measurement forces.
- Large platen area for staging blocks before measurement – critical for achieving thermal equilibrium with the gage.
- Resolution of 0.1µin (*0.001µm*)
- Repeatability of 0.2µin (*0.005µm*)
  - 6σ < 1µin (*0.025µm*)
- Open frame design allows for an increased measurement capacity of 0.100” to 24.000” (*2.5mm to 600mm*)
- Integrated measurement software and user interface
- Linear ball slide for smooth placement of long gage blocks without risking damage to the contact tips.
- Scale on the left-hand post allows for coarse positioning of the upper contact tip while a micrometer-style spindle allows for smooth fine adjustment.



Model 130B-16 Ordering Information

Base Systems	Order No.
Complete System with Desktop Computer	2150080
Complete System with Laptop Computer	2150079
Complete System w/ Customer-Supplied Computer	2150081
Replacement Contacts	
Tungsten Carbide*	
Upper	2240154
Lower	2239733
Diamond	
Upper	EPT-1029
Lower	2216189
Additional Accessories	
Temperature Controller w/ Two Certified Probes	2253440
Software v4.19 (*Win10 Compatible*)*	2260656
Deskjet Printer	2243928
Accessory Kit	2240602
Calibration Kit for 130B Series	2260985

**Included as standard with the purchase of all new/upgraded 130B-16 units*

Model 130B-16 Specifications

Specifications	
Approximate Size (*without computer*)	15” L x 15” H x 40” H *400mm x 400mm x 1016mm*
Approximate Weight (*without computer*)	310 lbs. *140 kg*
Gaging Capacity	0.100 – 24.000” *2.5mm – 600mm*
Gaging Force (Upper)	4 oz. (*1.1 N*)
(Lower)	2 oz. (*0.6 N*)
Contact Tip Material	Tungsten Carbide *Optional – Diamond*
Contact Radius	0.125” (*3mm*)
Sensor Range	±0.015” (*±0.38mm*)
Direct Measurement Range	±500µin (*±10µm*)
Repeatability	6σ < 1µin (*0.025µm*) Measured on a 1” gage block without removing the block
Linearity	<1µin (*0.020µm*) over the central ±50µin (*±1µm*) and <1µin (*0.020µm*) in any ±50µin space (*±1µm*) over the entire ±500µin (*±10µm*) range

130B-56 Dual Comparator Configuration

It is possible to run one 130B-24 comparator and one 130B-16 long block comparator from the same controlling computer. This designation is called the **130B-56 Dual Comparator System**.

The main advantages of the 130B-56 are:

1. Smaller footprint compared to one 130B-24 system with PC and one 130B-16 with PC in the same location.
2. Seamlessly transition from the measurement of standard gage block sets with blocks up to 4"/100mm to larger gage blocks up to 24", all while keeping the measurement data in one location on one PC.

****NOTE: In the 130B-56, only one comparator can be run at a given time.*

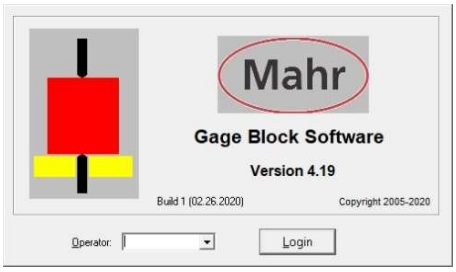
The specifications of the individual 130B-24 and 130B-16 units remain the same. The 130B-56 system however requires a temperature controller system with three certified temperature probes (PN 2249122).

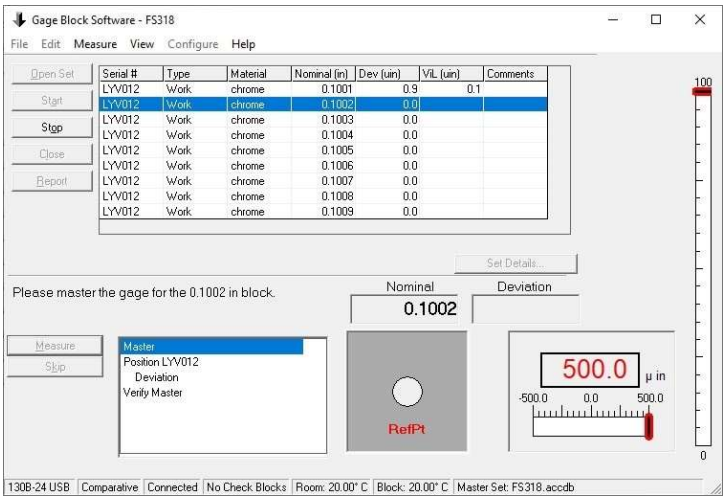
130B-56 System Ordering Information

Base Systems	Order No.
Complete System with Desktop Computer	2150082
Complete System with Laptop Computer	2150083
Complete System w/ Customer-Supplied Computer	2150084
Positioning Templates for 130B-24 Portion	
Template – 30mm Rect. Master - 30mm Rect. Work	2238822*
Template – 35mm Rect. Master - 35mm Rect. Work	2238821*
Template – SQR Master - SQR Work (5 pos.)	2239637*
Template – SQR Master - SQR Work (4 pos.)	2238823
Template – SQR Master - 30mm Rect. Work	2238826
Template – SQR Master - 35mm Rect. Work	2238825
Template – 30mm Rect. Master - SQR Work	2240939
Template – 35mm Rect. Master - SQR Work	2240940
Template – 35mm Rect. Master - 30mm Rect. Work	2243256
Template – 30mm Rect. Master - 35mm Rect. Work	2243257
Replacement Contacts	
Tungsten Carbide*	
Upper (x2)	2240154
Lower (x2)	2239733
Diamond	
Upper (x2)	EPT-1029
Lower (x2)	2216189
Additional Accessories	
Temperature Controller w/ Three Certified Probes	2249122
Software v4.19 (*Win10 Compatible*)*	2260656
Deskjet Printer	2243928
Accessory Kit	2240602
Calibration Kit for 130B Series	2260985

**Included as standard with the purchase of all new 130B-56 systems*

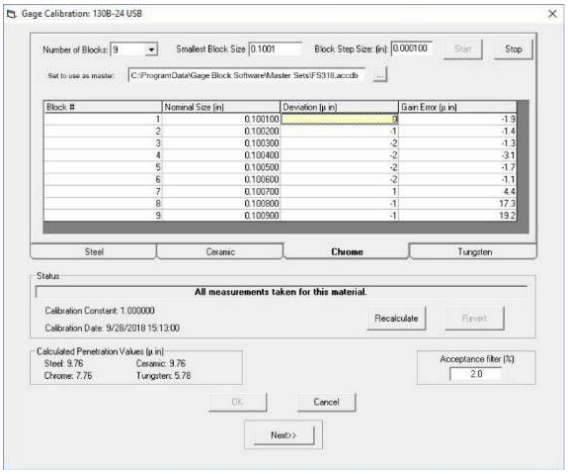
Gage Block Software





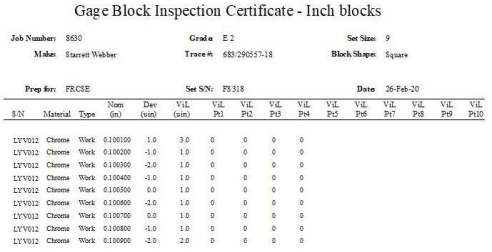
Integrated Software

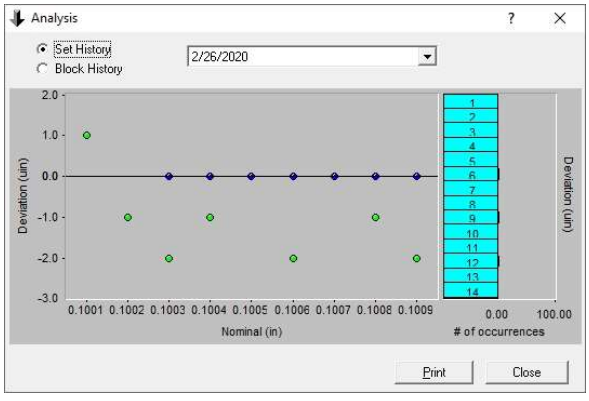
All user functions are controlled and displayed on the screen of the comparator's controlling computer. All functions from setting-up to the printing-out of the final report are handled in one place. Software v4.19 runs on Windows 10 and with the newest iterations of Microsoft Access. The report generator is a runtime version of Microsoft's powerful Access database program. The software is included with Access 2010 and Access 2013 runtime installation files, allowing computers without full versions of Microsoft Access to still use the software effectively. The flow of the program has been tested through usage in many calibration laboratories, evolving over almost 20 years, with improvements constantly being implemented.



Software Features

- Master Set values (Nominal Size, Certified Deviation, etc.) stored in a Microsoft Access database file on the controlling computer's C:\ drive.
- System calibration achieved by measuring a series of certified blocks with known deviation values and then fitting the measurement data with a straight line – providing an extremely robust value for the gain calibration.
- Penetration coefficients for compensating for the four different gage block materials: Steel, Ceramic, Chromium Carbide, and Tungsten Carbide. Default values from literature are included but can be changed within the software.
- Calibration history for each measured set kept in the same file record for easy access to each measurement of that set, year after year.
- Automatic correction made for temperature through the temperature controller and the Coefficients of Thermal Expansion for each of the four gage block materials. Allows for comparative measurement of blocks of dissimilar materials.
- Analysis screens provide a visual measurement history of each block within a set or a quick visual report of the overall measurement history of that set.
  - Supports tolerance grades for ASME B89.1.9-1984 (same tolerances as the Federal Specification GGG-G-15C), ASME B89.1.9-2002, and ISO 3650 (metric only). Custom tolerance grades within these three can also be created.
- Printed reports available for each calibration.
- Password protection for set-up parameters. Separate password protection for all master gage block sets.
- Easy switching between inch and metric.
- Evaluates measured deviation from nominal, plus Variation in Length (ViL) with the number of points selectable from one (reference point only) up to 10. Defaults to five places for compliance with current ASME standards.
- Powerful User Interface displays Sensor Position, Measurement Value, and Current Measurement.
- Status bar report instrument status, Room and Block temperatures, and if Check Standards are in use.
- User is prompted through the measurement process for each block in a set.
- Ability to keep all parts of a standard gage block set (work blocks, wear blocks, accessories) within one measurement set.





130B System Upgrades

Older Model 130B-24 and 130B-16 comparators built before July 2004 may be upgradeable to the current design level or any one of several other levels:

- Complete system upgrades include full factory reconditioning, replacement of electronics, and addition of computer with Gage Block Software
- Mechanical upgrade only – 130B-24 platen replacement with a new-style platen which incorporates the gage block positioner. Can be accomplished on-site.
- Software upgrade only – add the capability to handle the tolerance grades of the ASME B89-1.9-2002 standard to your existing 130B.

******NOTE**: For the 130B-16, only older-model comparators with this silver lifting lever can be considered for a system upgrade. Systems without this lever are not upgradeable.*

Accessories

2253440 – Thermometer with Two Certified Precision Probes
An electronic thermometer with platinum-resistance probes that the gage block software can read directly via the USB interface. Includes the USB cable, two calibrated probes, and two magnetic blocks for staging the probes. One probe monitors the platen/gage block temperature while the second probe monitors the room temperature near the comparator.

2240602 – Gage Block Measurement Accessories Kit
This kit includes helpful tools for gage block handling, gage block measurement preparation, and maintenance of the gage block comparator. This kit includes: forceps, tongs, bush, blower, chamois, deburring stone, optical flat, vacuum pick-up pen, 100gr. lever-style load tester, hex wrenches, and rust-inhibiting grease.

Calibration Services

Mahr Inc. provides calibration services for dimensional standards, including gage blocks, master rings, master discs & plugs, surface roughness specimens, roundness master balls, and other reference masters. In the unique Precision Measurement Center (PMC), temperatures are controlled to within ±0.1°F (*±0.05°C*) and strict process control is followed to achieve extremely low measurement uncertainties in the measurement process.

The measurement processes in the PMC have been accredited to ISO 17025:2017 by NVLAP (Lab Code# 20605-0).

Mahr Inc.'s scope of accreditation can be found at https://www.mahr.com/en-us/Company/Quality/America/

Gage Block Master Sets can be calibrated to uncertainties as low as 2µin (*0.050µm*) by sending them to:

Mahr Inc.
attn: Repair and Calibration Department
1139 Eddy St.
Providence, RI 02905

Mahr® Inc.
1144 Eddy Street
Providence, RI 02905

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