



# MITUTOYO COUNTER HEIGHT MASTER



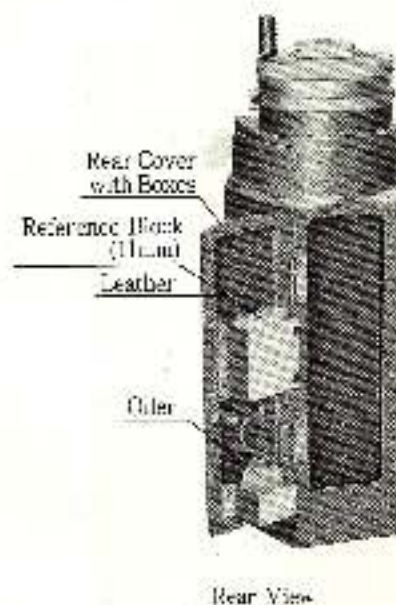
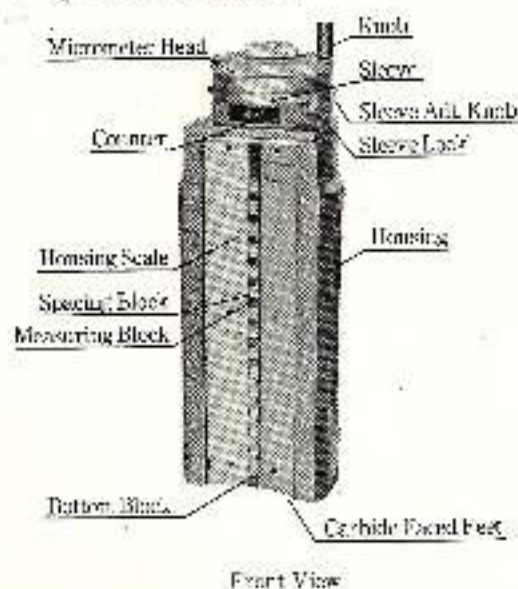
**MITUTOYO MFG. CO., LTD.**

## 1. CODE NO.

515-320N 0-300mm

515-310N 0-12"

## 2. CONSTRUCTION



### (1) Housing

The main housing is designed to insure its strength, stability, handling and style. Superior material pioneered by MITUTOYO is well tempered and seasoned to eliminate secular change.

### (2) Three carbide Feet

Three carbide faced feet ground and micro lapped are fixed at the base of the housing; for extreme accuracy and wear resistance.

### (3) Micrometer Head

Micrometer head turns on a precisely ground sleeve with a 0.5mm (0.025") pitch. The main scale is divided into 500 (250) divisions, thus each division is 0.001mm (0.0001") in inch system, you can get minimum reading 0.00001" with vernier scale on the sleeve.

To eliminate reading error, the main scale and the reference line on the sleeve meet on the same plane with no overlap. The knurl at the top facilitates rapid and smooth turning of the micrometer head.

### (4) Reference line on the Sleeve

The sleeve is fully adjustable. You can move the reference line freely to any position by sleeve adjustment knob after unfastening sleeve lock. This is one of the characteristic mechanism of this unit and helps you to do easy zero adjustment and to

make the most of principles of precisely comparative measurement of any desired height related to zero.

### (5) Blocks

Four kinds of blocks (consisting of one top block, fourteen measuring blocks, four teen spacing blocks and one bottom block) are assembled into the block holder and form the measuring column. The distance between the upper (lower) face of one measuring block and the upper (lower) face of the next is exactly 20mm (1") over entire 300mm (12") column. Each block has the same shape as conventional gage blocks, so you can attach the special blocks to it and check zero point of inside micrometer, etc. The measuring column is mounted in a carrier with an up and down movement produced by the precision ground lead screw. The crossed axes of the roller bearing control its smooth and precise movement.

### (6) Bottom Block

The bottom block has a 5mm (0.2") stage which makes it possible to measure minimum height 5mm (0.2") when you use the upper face of measuring block.

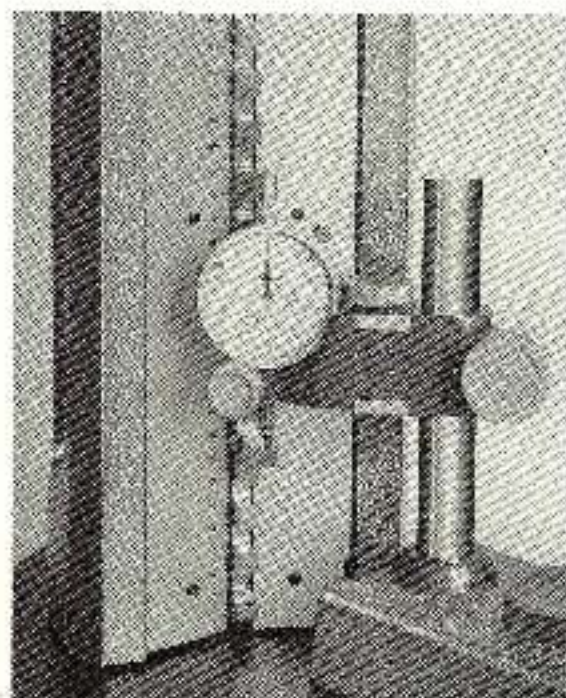
### (7) Housing Scale

The housing scale is satin of round finished for easy reading and graduated every 5mm (0.1"), from 0mm (0.2") up to 310mm (12.4") height) to read each height of measuring faces from the reference (zero)

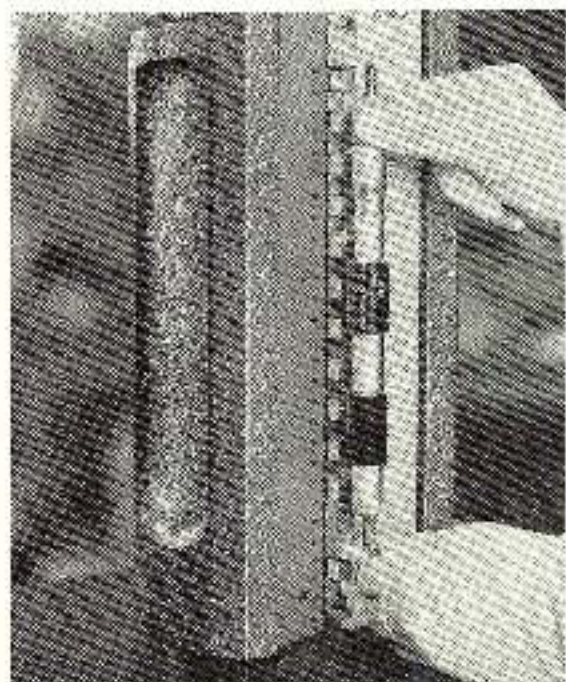


#### (4) Use of Special Block and Attachments

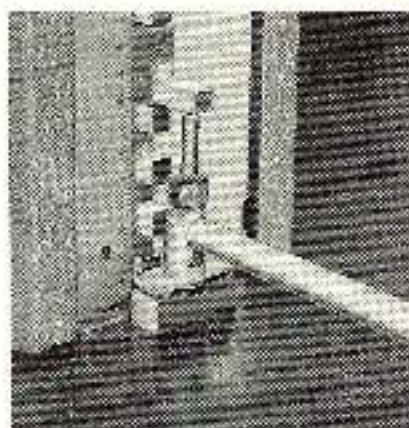
When the special accessories (Illustrated in 2 (2) D) are used, inspection and accuracy check of other types of precision measuring tools are possible. See following examples.



Checking the accuracy of a dial Indicator.



Zero setting of an Inside Micrometer.



Zero setting of a Bore Gauge.

#### 7. CAUTION

- (1) Around the limit line of the up and down movement (the upper face of the bottom block is near 10mm and 5mm line on the housing scale), micrometer head must be turned slowly with special care.
- (2) Ideally a temperature should be maintained 20°C to insure thermal stability.
- (3) Counter Height Master should be handled with care in removal and set-up. Don't drop it onto the surface plate.
- (4) Prior to use, measuring face of blocks must be thoroughly cleaned off dust and rust residue of oil with cotton tissue or gauge. After being used, it must be wiped off and applied with superior oil to prevent rust.
- (5) The Counter Height Master is very precisely constructed. The joints of the lead screw, micrometer head and measuring column are assembled with extreme care. You are cautioned not to disassemble the unit for any reason. Any Counter Height Master damaged internally and deviated from accuracies specified will no longer be guaranteed by MITUTOYO when the unit has been tampered with by anyone but an authorized personnel.
- (6) When zero setting, turn the micrometer head clockwise to eliminate thread error.



### 3. FUNCTION

	Metric	English
Measuring range	0-300mm	0-12"
Minimum marking	0.001mm	0.00001"
Minimum reading with the counter	0.01mm	0.001"
Travel of Micrometer head	25mm	1"
Pitch of Micrometer head	0.5mm	0.025"
Distance of two measuring faces	20mm	1"
Travel of the reference line	360°	360°
Minimum reading the housing scale	0mm	0.1"
Weight	20kgs	20lbs

### 4. ACCURACY

	Metric	English
Overall accuracy	±0.0015mm	0.00005"
Parallelism over entire end of blocks	0.001mm	0.00004"
Accuracy of lead screw	±0.001mm	0.00005"
Roughness of measuring face	0.08-5	0.08-5
Hardness of block	over HSS	over H888
Hardness of spindle of micrometer head	over H80	over H880
Hardness of carbide faced feet	over HrA80	over Hr480

### 5. ACCESSORIES

#### (1) Standard accessories

- A. Zero setting plate block (HrA0.5")
- B. Leather of case
- C. Oiler

#### (2) Special accessories

- A. Riser blocks

#### Specification of Riser Blocks

No.	Height	Feasible measuring range with base (Height - Model)	Accuracy	Parallelism	Flatness of face	Hardness of top Center Point	Weight
5.5-105N 5.5-105H	1.0mm	50mm-150mm	±0.0005mm ±0.0002mm	less than 0.0005mm less than 0.001mm	over H880	over H88H	1.7kg
5.5-115N 5.5-115H	1"	5" - 15"	±0.0005" ±0.0002"	less than 0.0005" less than 0.001"	over H880	over H88H	2.7kg
5.5-145N 5.5-145H	300mm	100mm-400mm	±0.001mm ±0.0005mm	less than 0.0008mm less than 0.001mm	over H880	over H88H	11.3kg
5.5-175N 5.5-175H	18"	12" - 24"	±0.0005" ±0.0002"	less than 0.0005" less than 0.001"	over H880	over H88H	11.3kg
5.5-185N 5.5-185H	300mm	300mm-900mm	±0.002mm ±0.001mm	less than 0.001mm less than 0.002mm	over H880	over H88H	31.0kg
5.5-195N 5.5-195H	24"	24"-96"	±0.0015" ±0.0002"	less than 0.0005" less than 0.001"	over H880	over H88H	31.0kg

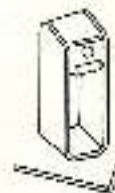
#### B. Special Blocks and Attachments



900438 (900419)  
Base Block with holding bracket



900437 (900439)  
Base Block with holding bracket



900386 (900387)  
Block clamp



102300 (102394)  
Gage Block

## 6. HOW TO OPERATE

### (1) How to read

Three digits are shown in the counter and minimum reading is 0.01mm(0.001"). For example, figure 2 shows 7.85 mm. When the upper face (A of figure 1) and the lower face (B of figure 1) coincide with the lines numbered each 10mm on the housing scale, all three digits indicate zero. As you turn the micrometer head, the counter reading progresses each 0.01mm(0.001") and returns to zero after 10mm(.1") travel. In the example below, the height of A face is read as follows:

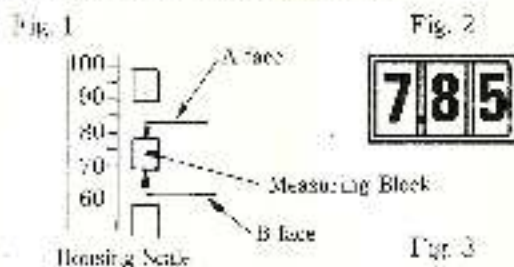


Fig. 2

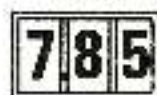
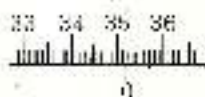
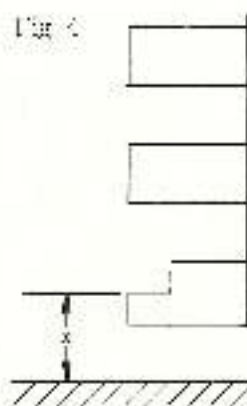


Fig. 3



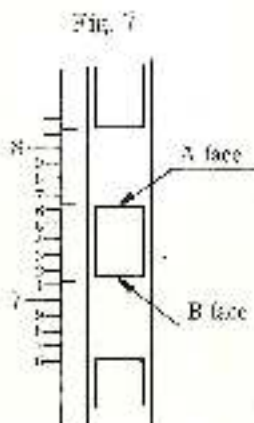
Scale reading (figure 1)	70.000
Counter reading (figure 2)	7.850
Micrometer reading (figure 3)	0.002
Final reading	77.852mm

When a 5mm stage of the bottom block is used as measuring face, add .5mm to the counter reading



The bottom block (figure 4)	5.000
Counter reading (figure 5)	7.850
Micrometer reading (figure 6)	0.002
Final reading	12.852mm

In inch system, the minimum reading of the counter is 0.001". Therefore, the height of A face of figure 7 is:



Scale reading (figure 7)	7.00000"
Counter reading (figure 8)	0.62100
Micrometer reading (figure 9)	0.00050
Verrier reading (figure 8)	0.00006"
Final reading	7.62156"

### (2) Zero setting

As shown in figure 10, turn the micrometer head until the indicator reading of Dial test indicator (or Nu-Checker) shows that the upper face (center) of the bottom block is on the same level as the measuring face (center) of the zero setting gage block (.1mm(.003"). When the height of the two blocks coincide, the counter indicates 100(100). Then set the reference line on the sleeve by turning the sleeve adjustment knob in line with "0" on the main scale and tighten the sleeve lock.

### (3) Use of Riser Blocks

The measurable height of the basic unit is 310mm (12.4"). But when a riser block is combined with it, up to 910mm (36.4") is possible.

