Starrett®

436.1 OUTSIDE MICROMETER
USER MANUAL

READ THIS MANUAL BEFORE USING THE INSTRUMENT

**ANTES DE UTILIZAR EL INSTRUMENTO,
LEA ATENTAMENTE ESTE MANUAL**

LIRE CE MANUEL AVANT D'UTILISER L'INSTRUMENT

**LEIA ATENTAMENTE ESTE MANUAL ANTES
DE UTILIZAR O INSTRUMENTO**

使用仪器前请阅读本操作手册

**DIESES HANDBUCH VOR DER VERWENDUNG
DES MESSGERÄTS LESEN**

**LEGGERE ATTENTAMENTE QUESTO MANUALE PRIMA
DI UTILIZZARE QUESTO STRUMENTO**

03/16 PDF

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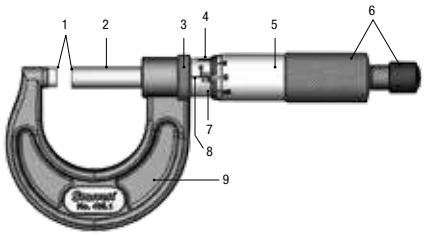
COMPONENTS



1. Measuring faces (stationary and movable)
   - Superficies de medición (fija y móvil)
   - Faces de mesure (fixe et mobile)
   - Superfici di misurazione (fissa e mobile)
   - Hartmetall-Messflächen
   - 测量端面 (固定、活动测砧)
   - Superfícies de medição (fixa e móvel)
2. Spindle
   - Husillo micrométrico
   - Tige
   - Albero principale
   - Messspindel
   - 芯轴
   - Fuso micrométrico
3. Lock nut
   - Traba
   - Bague de blocage
   - Anello di bloccaggio
   - Feststellung
   - 固定钮
   - Trava
4. Vernier Scale
   - Nonio
   - Vernier
   - Nonio
   - Skalenhülse
   - 游标
   - Nônio
5. Graduated thimble
   - Tambor graduado
   - Tambour gradué
   - Tamburo graduato
   - Skalentrommel
   - 微分筒
   - Tambor graduado
6. Ratchet (Friction Thimble)
   - Carraca o Tambor de Fricción
   - Bouton à rochet ou tambour à friction
   - Comando o tamburo con frizione
   - Ratsche
   - 棘轮摩擦套管
   - Catraca ou tambor de fricção
7. Graduated Sleeve
   - Cilindro graduado
   - Manchon gradué
   - Bussola graduata
   - Skalenhülse
   - 固定套筒
   - Cilindro graduado
8. Main reading line
   - Línea de lectura principal
   - Ligne de lecture principale
   - Linea di fede
   - Bezugslinie
   - 主读数线
   - Linha de leitura principal
9. Frame or Instrument Body
   - Arco o cuerpo del instrumento
   - Cadre ou corps de l'instrument
   - Arco o corpo dello strumento
   - Bügel
   - 尺架
   - Arco ou corpo do instrumento

436.1 OUTSIDE MICROMETER

THIS IS A STARRETT USER GUIDE FOR THE 436.1 OUTSIDE MICROMETER.

ALL SPECIFICATIONS IN THIS DOCUMENT ARE CORRECT AT TIME OF PRODUCTION AND ARE SUBJECT TO CHANGE. PLEASE CONTACT STARRETT FOR FURTHER INFORMATION.

ENGLISH

CHARACTERISTICS

	INCH	MILLIMETER	RANGE (IN/MM)
Resolution[1]	0.0001	0.001	0 to 6 (0 to 150)
	0.001	0.01	
Accuracy[2]	0.0001	0.002	0-3 (0-75)
	0.0002	0.004	4-6 (100-150)

1. Resolution: Smallest difference between indications of a displaying device that can be meaningfully distinguished. For a digital displaying device, this is the change in the indication when the least significant digit changes by one step (VIM).
2. Accuracy: Closeness of the agreement between the result of a measurement and a true value of the measurand (VIM).

P.S.: VIM - International Metrology Vocabulary

- End Measuring Rod or "Standard" with spherical ends comes with micrometers over 25mm range.
- Smooth ratchet stop or friction thimble for uniform pressure.
- Rigid one-piece steel tapered frame ribbed for extra strength. Black enameled finish.
- Satin chrome finish thimble and sleeve, with staggered lines and distinct figures for precise and easy readability.

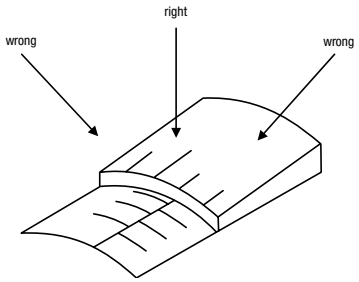
NOTE: *The pictures shown are illustrative; the components may vary according to the model.*

PRECAUTIONS WHEN USING THE MICROMETER

- Clean the measuring faces with a smooth cloth or chamois.
- Do not expose the micrometer to direct sunlight or extreme temperatures.
- Avoid mechanical shocks so as not damage the instrument.
- Do not disassemble the micrometer.
- Do not use compressed air on the micrometer; this can contaminate the spindle.
- After using the micrometer, clean it and apply a thin coat of **special lubricant for instruments** on the measuring faces and spindle to avoid oxidation.
- Keep the micrometer, preferably, in its own original package.

PRECAUTIONS WHEN MEASURING

- Do not measure a rotating part; it is dangerous and causes the faces in contact to wear.
- Do not apply excessive pressure when measuring. Use the ratchet or thimble to obtain the appropriate measuring pressure.
- Parallax Error: Be careful when measuring to avoid a parallax error. This error occurs when the observation point is not perpendicular to the display. Take the reading perpendicularly to the thimble, sleeve and vernier lines.



ENGLISH

HOW TO READ A MICROMETER

INITIAL ADJUSTMENTS

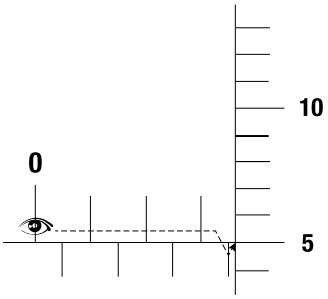
- Before taking a reading, verify that the instrument is set to zero. For micrometers from 0 to 1" (25mm), carefully clean the measuring surfaces (1) and bring them together to start the reading. On micrometers over 1" (25mm), use the "standard" with the ends properly cleaned.
- If necessary, adjust the micrometer to zero, insert the spanner wrench in the small slot of the sleeve (7) and turn the sleeve until the line on the sleeve (8) coincides with the zero line on the thimble (5). When the micrometer resolution is 0.001mm, adjust the zero through the vernier zero line (4).

GRADUATED IN HUNDREDTHS OF A MILLIMETER (0.01MM)

- The main reading line (8) has a split graduation to 0.5mm, created by the 1mm graduated vertical lines above and below the main reading line.
- The thimble (5) is divided also in fifty equal parts, with each line representing 0.01mm and every fifth line being numbered from 0 to 50. To read the micrometer, add the number of millimeters and half-millimeters visible on the sleeve (7) and the number of hundredths of a millimeter indicated by the thimble. See the example:

HOW TO READ A MICROMETER

Follow the "eye path" below, along with the explanation for practice.



The 3mm sleeve graduation is visible	3.00mm
One additional 0.5mm line is visible on the sleeve	0.50mm
The division of line "5" on the thimble coincides with the reading line on the sleeve	5 x 0.01= 0.05mm
The micrometer reading is	3.55mm

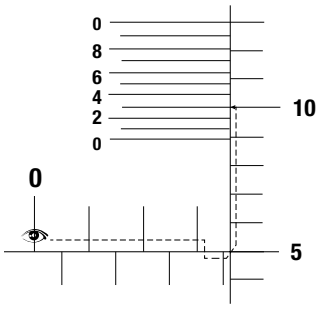
ENGLISH

GRADUATED IN ONE-THOUSANDTH OF A MILLIMETER (0.001MM) - (1µM)

- Reading a 0.001mm micrometer with vernier (4) is exactly like reading a 0.01mm micrometer, except that the reading in one-thousandths of a millimeter is obtained from a vernier scale on the sleeve, which consists of ten divisions numbered every two, and each division is equal to 0.001mm.
- First obtain the hundredths of a millimeter (0.01mm), as previous explained. Next, see which of the lines on the vernier coincides with a line on the thimble (5). If it is the first line, add 0.001mm to the reading etc. See example:

HOW TO READ A MICROMETER

Follow the "eye path" below, along with the explanation for practice.



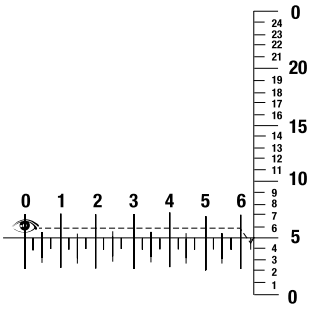
The one-hundredths of a millimeter should be obtained as previous explained.....	3.55mm
Line "3" on the vernier coincides with one of the lines on the thimble	0.003mm
The micrometer reading is	3.553mm

GRADUATED IN THOUSANDTHS OF AN INCH (.001")

- The reading line on the sleeve (8) is graduated to 0.025". Every fourth line, which is longer than the others, designates hundred thousandths (.100"). For example: the line marked "2" represents .200" etc.
- The thimble (5) is divided into 25 equal parts, each line represents .001" and it is numbered consecutively. To read the micrometer, observe the indicative lines of tenths of an Inch and the additional lines (.025") visible on the sleeve, and the number of thousandths indicated by the line on the thimble. See example:

HOW TO READ A MICROMETER

Follow the "eye path" below, along with the explanation for practice.



Line "6" on sleeve is visible	.600"
There is one additional line visible representing .025"	.025"
The division of line "5" on the thimble coincides with the reading line on the sleeve	5 x .001= .005"
The micrometer reading is	.630"

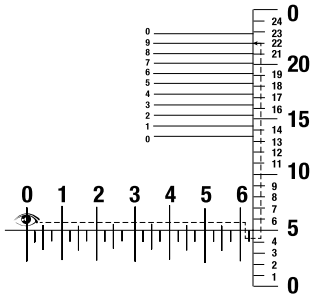
ENGLISH

GRADUATED IN TEN-THOUSANDTHS OF AN INCH (.0001")

- The micrometers graduated in Ten-Thousandths of an Inch read like micrometers graduated in thousandths, except that an additional reading in ten-thousandths is obtained from a vernier scale (4). The vernier consists of ten divisions on the sleeve, each one equal to one ten-thousandth of an Inch (.0001").
- To read a ten-thousandths micrometer, first obtain the thousandths reading, and then see which of the lines on the vernier coincides with one of the lines on the thimble (5). If it is the line "7" on the sleeve, add .0007" etc. See example:

HOW TO READ A MICROMETER

Follow the "eye path" below, along with the explanation for practice.



First obtain the thousandths as previous explained	.630"
Line "9" on the vernier coincides with one of the lines on the thimble	.0009"
The micrometer reading is	.6309"

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