



**BOWERS**

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*XT* Analogue Micro and  
*XT* Analogue Bore Gauges  
Operating Instructions

*XT* Micro Analogique et  
*XT* Alésomètre Analogique  
Notice d'utilisation

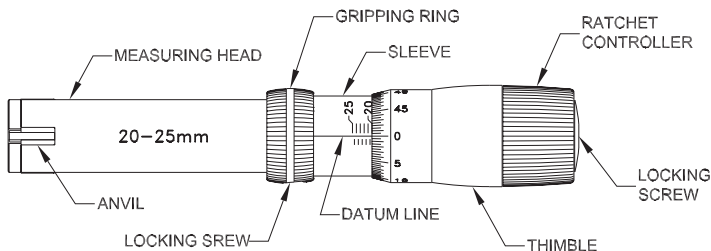
*XT* Analog Micro und  
*XT* Analoge Bohrungslehre  
Bedienungsanleitung

*XT* Analogico Micro et  
*XT* Analogico Alesmetro  
Istruzioni d'uso per

*XT* Analógico Micro y  
*XT* Micrómetro de interiores Analógico  
Instrucciones de funcionamiento

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## NOMENCLATURE & SETTING INSTRUCTIONS (METRIC)

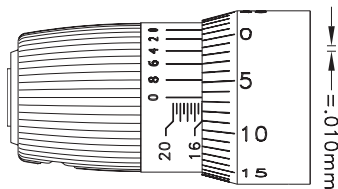


### HOW TO READ...

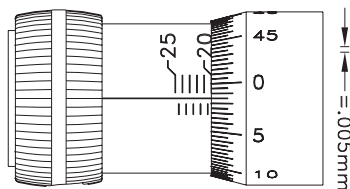
Metric micrometers above the 20mm range are graduated in 0.005mm divisions. Metric micro micrometers below the 20mm range are graduated in 0.010mm divisions. The sleeve has a datum line, and the thimble is graduated as illustrated below. The sleeve is graduated in 0.5mm divisions and one complete revolution of the thimble is equal to 0.5mm. To read the instrument, read the size on the sleeve to obtain the nearest half millimeter, and to obtain hundredths and microns read the number on the thimble which lines up with the datum line.

Metric micro micrometers have an included vernier scale (to accurately read the micron measurement) on the sleeve, graduated in either 0.001mm or 0.002mm divisions. To read the vernier scale, read the vernier graduation that lines up with the thimble graduation.

Examples are illustrated below.



In the illustration above the micro micrometer reading would be 16.066mm



In the illustration above the micrometer reading would be 20.015mm

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## RESETTING PROCEDURE...

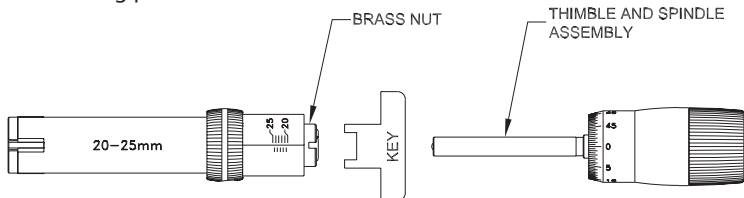
Should the gauge start to lose accuracy due to wear etc., it may be reset as follows :-

- 1) Insert the instrument into the setting ring gauge and set at the correct tightness using the ratchet controller.
- 2) Lock the spindle with the locking screw located through the hole in the grip-ring.
- 3) Loosen the ratchet controller by inserting the allen-key provided into the screw located in the end of the controller and unlock the screw.
- 4) The thimble will now be free and can be rotated and set to the size on the setting ring.
- 5) Re-tighten the controller screw and slacken off the spindle locking screw. The micrometer is now reset.
- 6) Recheck the gauge in the setting ring. Gauge reading should be the same as the setting ring calibrated value.

A KEY IS PROVIDED TO MAKE ADJUSTMENTS OF THE MICROMETER NUT IN THE EVENT OF WEAR.

### PROCEDURE:-

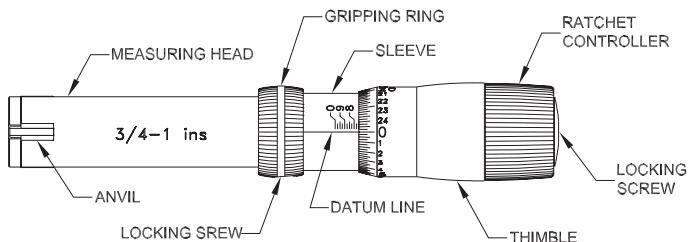
- 1) Remove the thimble and spindle assembly from the micrometer by completely winding the thimble off the sleeve.
- 2) Locate the key in the slots of the brass nut.
- 3) Make adjustments in very small increments. A clockwise rotation of the brass nut will close the nut to compensate for wear.
- 4) Replace the thimble assembly and recalibrate the gauge as per resetting procedure above.



**EXTENSIONS:** When extensions are used for deep hole measurement it will be necessary to reset the instrument as per the resetting instructions above.

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## NOMENCLATURE & SETTING INSTRUCTIONS (Inch)

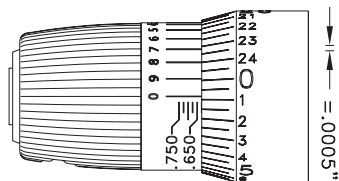


### HOW TO READ...

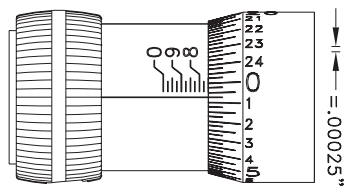
Inch micrometers above the 3/4" range are graduated in 0.00025" divisions. Inch micro micrometers below the 3/4" range are graduated in 0.0005" divisions. The sleeve has a datum line, and the thimble is graduated as illustrated below. The sleeve is graduated in 0.025" divisions and one complete revolution of the thimble is equal to 0.025". To read the instrument, read the size on the sleeve to obtain the tenths and hundredths, and to obtain thous and tenths of thous read the number on the thimble which lines up with the datum line.

Inch micro micrometers have an included vernier scale on the sleeve, graduated in 0.0001" divisions. To read the vernier scale, read the vernier graduation that lines up with the thimble graduation.

Examples are illustrated below.



In the illustration above the micro micrometer reading would be 0.6258"



In the illustration above the micrometer reading would be 0.75075"

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## RESETTING PROCEDURE...

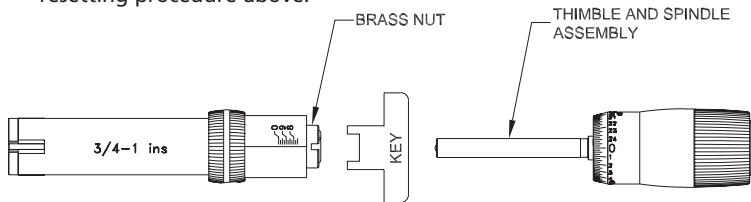
Should the gauge start to lose accuracy due to wear etc., it may be reset as follows :-

- 1) Insert the instrument into the setting ring gauge and set at the correct tightness using the ratchet controller.
- 2) Lock the spindle with the locking screw located through the hole in the grip-ring.
- 3) Loosen the ratchet controller by inserting the allen-key provided into the screw located in the end of the controller and unlock the screw.
- 4) The thimble will now be free and can be rotated and set to the size on the setting ring.
- 5) Re-tighten the controller screw and slacken off the spindle locking screw. The micrometer is now reset.
- 6) Recheck the gauge in the setting ring. Gauge reading should be the same as the setting ring calibrated value.

A KEY IS PROVIDED TO MAKE ADJUSTMENTS OF THE MICROMETER NUT IN THE EVENT OF WEAR.

### PROCEDURE:-

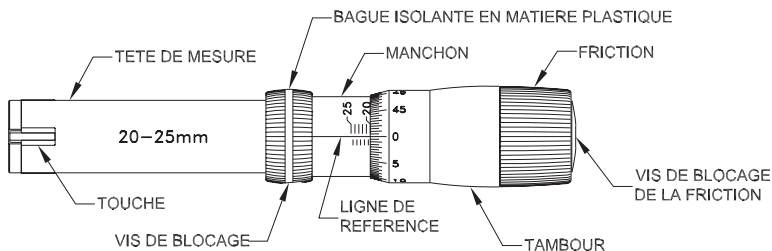
- 1) Remove the thimble and spindle assembly from the micrometer by completely winding the thimble off the sleeve.
- 2) Locate the key in the slots of the brass nut.
- 3) Make adjustments in very small increments. A clockwise rotation of the brass nut will close the nut to compensate for wear.
- 4) Replace the thimble assembly and recalibrate the gauge as per resetting procedure above.



**EXTENSIONS:** When extensions are used for deep hole measurement it will be necessary to reset the instrument as per the resetting instructions above.

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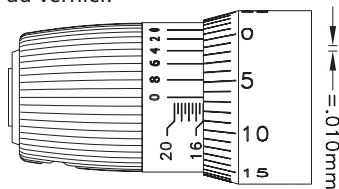
## NOMENCLATURE ET NOTICE D'UTILISATION POUR MICROMETRES D'INTERIEUR



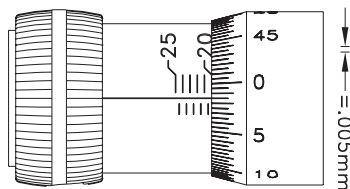
### LECTURE...

Au delà d'une capacité de 20mm, les micromètres en unité métrique sont gradués par division de 0,005mm. En deçà d'une capacité de 20mm, les micromètres Micro en unité métrique sont gradués par division de 0,010mm. Sur le manchon est placée une ligne de référence et sur le tambour figure l'échelle (dessin ci-dessous). Le manchon est gradué par division de 0,5mm. Une rotation complète du tambour correspond à 0,5mm. La lecture des millimètres et demi-millimètres s'effectue sur le corps. La lecture des centièmes et demi-centièmes s'effectue sur le tambour à l'aide de la ligne de référence placée sur le corps.

Les micromètres Micro en unité métrique possèdent une échelle complémentaire sur le manchon (pour relever avec précision la mesure au micron), gradué soit par division de 0,001mm ou 0,002mm. La lecture de cette échelle s'effectue à l'aide de la graduation qui s'aligne avec l'échelle du vernier.



Sur le dessin ci-dessus,  
la mesure relevée par le  
micromètre Micro est 16,066mm



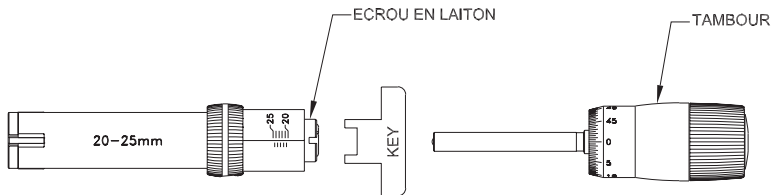
Sur le dessin ci-dessus,  
la mesure relevée par le  
micromètre est 20,015mm

## ETALONNAGE

- 1) Insérer le micromètre dans la bague étalon jusqu'à ce que le micromètre soit immobilisé dans la bague..
- 2) Serrer avec la clé hexagonale la vis située au niveau de la bague isolante en plastique.
- 3) Deserrer d'un tour avec cette même clé la vis située au centre de la friction.
- 4) Le tambour peut être actionné pour l'étalonner à la valeur de la bague étalon.
- 5) Rebloquer la vis de la friction.
- 6) Desserrer la vis située au niveau de la bague isolante en plastique.
- 7) Le micromètre est maintenant réétalonné.
- 8) Vérifier l'étalonnage du micromètre dans la bague étalon.

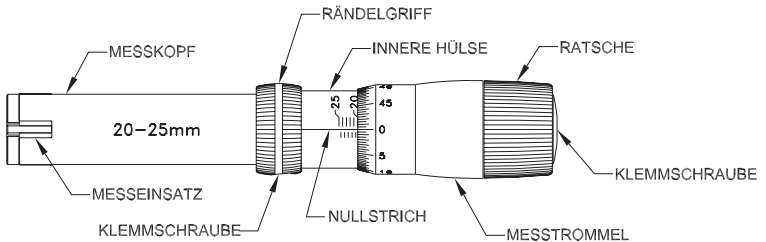
UNE CLÉ SPÉCIALE EST PRÉVUE POUR PERMETTRE DE RATTRAPER LE JEU DE LA VIS MICROMÉTRIQUE (consécutif à une longue utilisation):

- 1) Enlever complètement le tambour
- 2) Introduire la clé spéciale dans les rainures de l'écrou en laiton.
- 3) Serrer légèrement et vérifier que le micromètre n'a plus de jeu.  
Renouveler l'opération jusqu'à ce que le jeu de la vis micrométrique soit rattrapé.
- 4) Remonter le tambour et réétalonner le micromètre.



**RALLONGE:** Il est important de réétalonner le micromètre lorsque l'on utilise une ou plusieurs rallonges pour la mesure d'alésage de grande profondeur.

## BEDIENUNGSANLEITUNG ZUR MECHANISCHEN INNENMEßSCHRAUBE



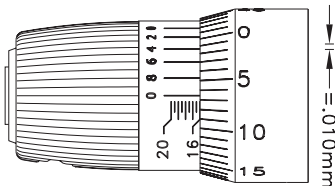
### WIE ABLESEN...

Metrische Mikrometer mit einem Messbereich grösser als 20mm haben eine Teilung von 0,005mm. Metrische Micro Mikrometer mit einem Messbereich kleiner als 20mm haben eine Teilung 0,010mm. Die innere Hülse ist mit einem waagerechten Nullstrich, sowie mit den 0,5mm Teilstrichen und die Messtrommel mit den Teilstrichen der Feinteilung, wie unten angezeigt, beschriftet. Eine Umdrehung der Messtrommel entspricht einer Messbereichsänderung von 0,5 mm.

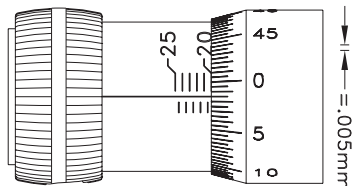
### ABLESUNG DER MESSWERTE

Der waagerechte Nullstrich (0,5 mm) kommt zur Deckung mit einem Teilstrich der Feinteilung der Messtrommel. Metrische Micro Mikrometer haben auf der Skalenhülse einen Nonius (um das genaue ablesen von Mikrometern zu ermöglichen) in 0,001mm oder 0,002mm Teilung eingraviert. Um den Nonius Wert abzulesen, lesen Sie den Nonius der mit der auf der Skalentrommel korrespondierenden Teilung.

Beispiele sind unten dargestellt.



In dem oberen Bild, ist der Ablesewert des Micro Mikrometers 16,066mm



In dem oberen Bild, ist der Ablesewert des Mikrometers 12,015mm



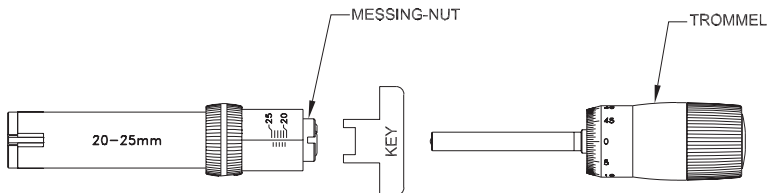
## NEUEINSTELLUNG

Sollte die Ablesung aufgrund häufigen Gebrauchs etc. ungenau werden, kann diese wie folgt neu eingestellt werden :

- 1) Innenmessschraube in den Einstellring stellen und mit der Ratsche einige Rasten durchdrehen.
- 2) Spindel anhand der Innensechskantschraube durch festziehen der Feststellschraube im gerändelten Kunststoffring klemmen.
- 3) Ratsche durch lösen der stirnseitigen Innensechskantschraube lockern.
- 4) Die Messtrommel wird hierdurch gelöst und die Innenmessschraube kann auf das Maß des Einstellringes eingestellt werden.
- 5) Schraube an der Ratsche festdrehen, Feststellschraube der Spindel lösen.
- 6) Einstellung im Einstellring prüfen.

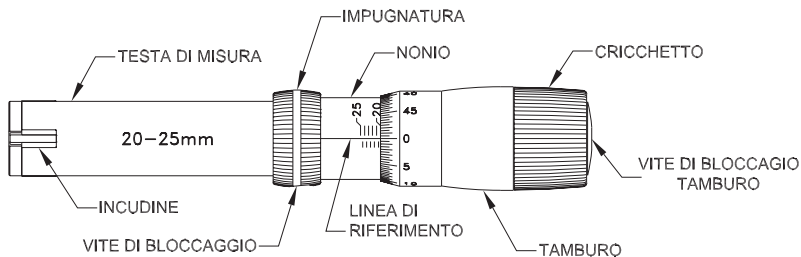
SOLLTE DURCH HÄUFIGEN GEBRAUCH DIE MESSSCHRAUBENSPIDEL SPIEL AUFZEIGEN, KANN DIES MIT DEM MITGELIEFERTEN SPEZIALSCHLÜSSEL NACHGESTELLT WERDEN:-

- 1) Messtrommel mit Spindel komplett herausschrauben.
- 2) Spezialschlüssel in die Messing-Nut stecken.
- 3) Im Uhrzeigersinn vorsichtig drehen (geschlitzte Gewindemutter wird geklemmt).
- 4) Spindel mit Messtrommel wieder einsetzen, eine Neueinstellung durchführen (wie oben beschrieben).



**VERLÄNGERUNGEN:** Wenn Verlängerungen zur Messung von tiefen Bohrungen eingesetzt werden, muß eine Neueinstellung (wie unten beschrieben) durchgeführt werden.

## NOMENCLATURA E ISTRUZIONI DI TARATURA (micrometri metrici)



### COME LEGGERE....

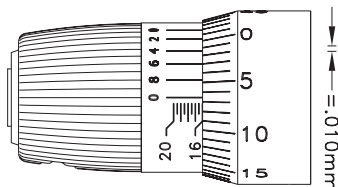
I micrometri metrici con campo di misura superiore a 20mm sono dotati di scala graduata con lettura diretta 0,005 mm. I micro micrometri metrici con campo di misura inferiore a 20 mm sono dotati di scala graduata con lettura di 0,01 mm sul tamburo e 0,001 o 0,002 mm. sul manicotto.

Il corpo fisso ha una linea di riferimento, ed il tamburo è graduato come nell'illustrazione seguente.

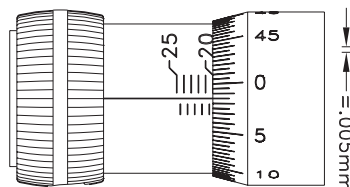
La linea di riferimento ha graduazioni di 0,5 mm, quindi un giro completo del tamburo corrisponde a 0,5 mm. Se il campo di misura dello strumento è sopra i 20 mm., per ottenere il valore leggere la misura sul manicotto per ottenere il mezzo millimetro più vicino e direttamente sul tamburo la linea che collima con la linea di riferimento per i centesimi e mezzi centesimi (5 micron).

I micro micrometri sotto i 20 mm sono dotati di un nonio (per leggere con precisione la misura in micron) sul manicotto, con divisione 0,001 mm o 0,002 mm. Per leggere il nonio, leggere la scala sulla sinistra della linea di riferimento per i millimetri e mezzi millimetri, e la graduazione che collima con la linea di riferimento per i micron.

Alcuni esempi sono illustrati di seguito.



Nella figura sopra  
la lettura del micro micrometro  
sarebbe 16,066 millimetri



Nella figura sopra  
la lettura del micrometro  
sarebbe 20,015 millimetri

## TARATURA DEL MICROMETRO....

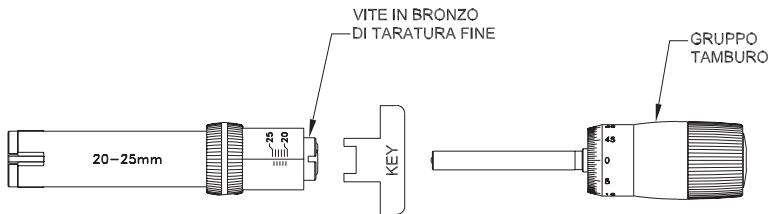
In ogni caso si renda necessario, potere tarare nuovamente lo strumento in questo modo:-

- 1) Inserire il micrometro all'interno dell'anello di taratura e portare a contatto le incudini agendo sul cricchetto.
- 2) Bloccare l'asta interna del micrometro chiudendo il grano posto sul lato del corpo strumento.
- 3) Allentare solamente di poco la vite esagonale posta al centro del cricchetto con l'apposita chiave a brugola.
- 4) Il nonio è ora libero di ruotare ed essere portato al valore corrispondente dell'anello.
- 5) Serrate ora nuovamente la vite in testa e liberate l'asta interna riallentando il grano laterale. Il micrometro è tarato.
- 6) Ricontrollate lo strumento eseguendo una nuova misura nell'anello di taratura, la misura dovrebbe corrispondere.

VIENE FORNITA IN DOTAZIONE ANCHE UNA CHIAVE SPECIALE PER REGISTRARE LA MADREVITE INTERNA IN CASO DI USURA.

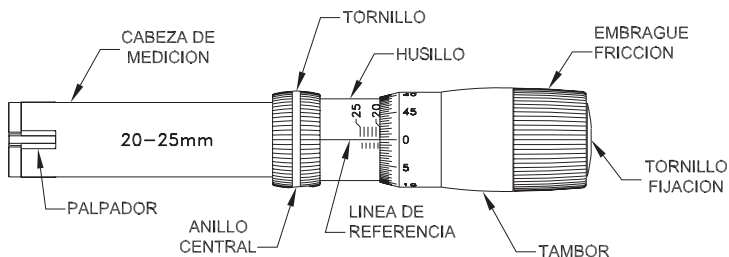
### PROCEDURA:-

- 1) Svitare completamente il tamburo dal corpo del micrometro ed estrarlo.
- 2) Posizionare la chiave speciale negli inserti della vite in ottone.
- 3) Eseguire la registrazione con rotazioni minime. Ruotando in senso orario la vite in ottone tenderà a chiudersi, recuperando eventuali giochi.
- 4) Rimontare il tamburo sul corpo strumento ed eseguire una nuova taratura come descritto precedentemente.



**USO DI PROLUNGHE:** quando si rende necessario l'utilizzo di prolunghe per misure in fori profondi, è necessario tarare nuovamente lo strumento come descritto in seguito:

## NOMENCLATURA E INSTRUCCIONES DE AJUSTE



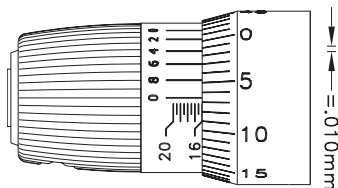
### LECTURA...

Micrómetros métricos por encima del rango de 20 mm están graduados en divisiones de 0,005mm. Micrómetros métricos micro por debajo del rango de 20 mm están graduados en divisiones de 0,010mm. El husillo tiene una línea de referencia y el tambor está graduado como muestra la siguiente figura. El husillo está graduado en divisiones de 0,5 mm y una vuelta completa del tambor equivale a 0,5 mm. Para realizar la lectura, lea el número del husillo para obtener el medio milímetro más próximo y para centésimas y micras lea el dígito del tambor que coincida con la línea de referencia del husillo.

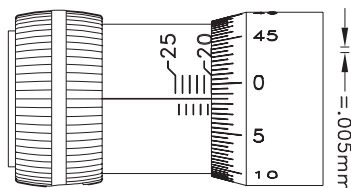
Micrómetros micro métricos tienen una escala vernier incluida (para leer con precisión la medición en micras) en el husillo, graduados en divisiones de 0,001 mm o de 0,002 mm.

Para leer la escala vernier, lea la graduación vernier que se alinee con la graduación en el tambor.

Ejemplos se ilustran a continuación.



En la ilustración arriba  
la lectura micrómetro micro  
sería 16,066mm



En la ilustración arriba  
la lectura micrómetro  
sería 20,015mm

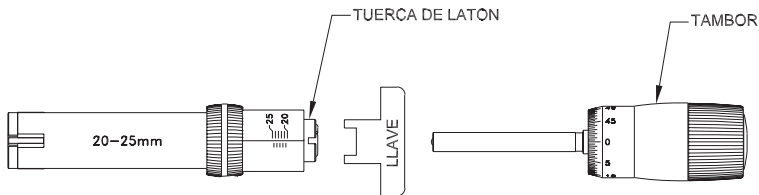
## PUESTA A CERO...

Si el micrómetro comienza a perder precisión debido al desgaste, etc ajústelo como sigue:-

- 1) Introduzca el micrómetro en el anillo patrón adecuado y realice una medición usando el embrague de fricción.
- 2) Bloquee el eje con el tornillo situado en el anillo central.
- 3) Afloje el embrague de fricción insertando la llave allen suministrada en el tornillo de la parte trasera del embrague.
- 4) Ahora el tambor gira libre y puede posicionarlo correctamente en la dimensión exacta del anillo patrón.
- 5) Vuelva a apretar el tornillo del embrague de fricción. El micrómetro ya está ajustado.
- 6) Vuelva a comprobar la dimensión del anillo.

UNA LLAVE ESPECIAL SE SUMINISTRA PARA PERMITIR REAJUSTAR EL JUEGO DEL HUSILLO

- 1) Retirar el tambor completamente.
- 2) Introduzca la llave especial en las ranuras de la tuerca de latón.
- 3) Apriete suavemente en pequeños incrementos. Repita la operación hasta que el juego del husillo desaparezca..
- 4) Vuelva a montar el tambor y a calibrar el micrómetro.



**ALARGADERAS:** Cuando se empleen alargaderas para medición de agujeros más profundos, es necesario poner a cero el instrumento como indican las siguientes instrucciones.





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