



# KnurlTech

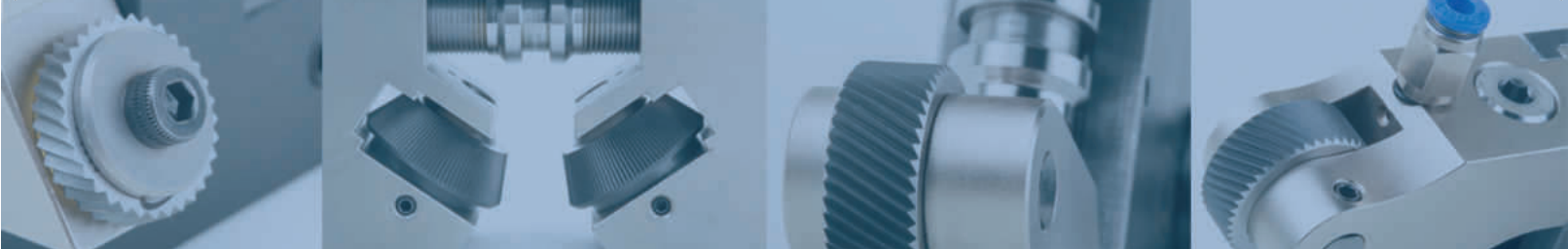
## TECNOLOGÍA DE MOLETEADO

Amplia gama de herramientas de moleteado y de moletas, tanto por corte como por deformación, pensadas para realizar un moleteado perfecto trabajando en todo tipo de tornos.

## KNURLING TECHNOLOGY

Wide range of knurling tools and knurling wheels, both for cut-knurling and form-knurling, for a perfect knurling operation on all types of lathes.





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# MOLETEADO POR DEFORMACIÓN / MOLETEADO POR CORTE

## FORM KNURLING / CUT-KNURLING



### 1. Moleteado por deformación

Con este tipo de moleteado las estrías se generan por deformación del material, al ejercer las moletas presión sobre la pieza mientras gira. Este método no implica arranque de material por lo que no hay generación de virutas. Debido a la deformación del material se produce un incremento del diámetro de la pieza. El valor del incremento es variable, ya que depende del material de la pieza mecanizada y de la forma y paso de las estrías generadas (ver tabla página 8).

1. El moleteado por deformación es imperativo cuando se usa la técnica del moleteado radial (plongée).
2. Cuando el perfil a mecanizar es de forma RGV, RKE, RKV.
3. Cuando es necesario que el diámetro final de la pieza sea mayor que el diámetro de partida.
4. Cuando hay que realizar un moleteado en el fondo de una garganta.
5. Para realizar moleteados hasta una cara.
6. Para moletear en conos o caras frontales.

### 2. Moleteado por corte

En el moleteado por corte las estrías se generan por arranque de material. Este tipo de moleteado no genera sobreesfuerzos sobre la máquina y en muchos casos se obtiene un moleteado de mayor calidad y precisión.

Las herramientas utilizadas para esta técnica de moleteado llevan las moletas con un ángulo de inclinación de 30° respecto al eje de giro de la pieza. Esta inclinación hace que la moleta vaya cortando las estrías según gira y avanza a lo largo de la generatriz de la pieza.

El moleteado por corte no genera incremento del diámetro de la pieza mecanizada, ya que en teoría no hay deformación del material. Aunque cabe resaltar que la realidad es que siempre hay un leve desplazamiento del material, que si bien no es de la misma magnitud que el que se generaría por el moleteado por deformación, hay que tenerlo en cuenta cuando la pieza a realizar requiere de cierta precisión en el diámetro final.

Este sistema de moleteado no es aplicable en todos los casos. Solo los perfiles RAA, RBL, RBR y RGE se pueden ejecutar con las herramientas de moletear por corte.

1. El moleteado por corte posibilita la ejecución de piezas tubulares de paredes finas, imposibles de realizar mediante moleteado por deformación.
2. Cuando el material a moletear no es deformable como plásticos, nylon, hierro fundido.

### 1. Form knurling

In form knurling the teeth are generated by deformation of the material, because the knurls exert pressure on the piece while it turns. This method is made without removing material so no chips are produced. Due to deformation of the material the diameter of the piece is increased. The value of this increase is variable as it depends on the material of the piece machined and the form and pitch of the teeth generated (see table page 8).

1. Form knurling is imperative when a radial knurling technique (plongée) is used.
2. When the profile to machine is RGV, RKE, RKV.
3. When the final diameter of the piece needs to be bigger than the starting diameter.
4. When you have to make a knurling in the bottom of a throat.
5. To make knurling till a face.
6. To knurling in cones or front faces.

### 2. Cut-knurling

In cut-knurling the teeth are generated by removing material. This type of knurling does not generate overstrain on the machine and in many cases a higher quality and more accurate knurling is obtained.

The tools used for this knurling technique fit knurls with a 30° angle in relation to the rotation axis of the piece. Due to this inclination the knurls cut the teeth while they are turning along the piece.

The cut-knurling system does not generate an increase in the diameter of the machined piece as in theory the material is not deformed. Although it must be stated that there is always a slight displacement of the material that even though it is not of the same magnitude as that generated by form knurling, it must be taken into account when the piece to be made requires a certain precision in the final diameter.

This knurling system is not applicable in all cases. Only RAA, RBL, RBR and RGE profiles can be run with cut-knurling tools.

1. Cut-knurling makes it possible to execute thin walled tubular pieces, whereas with form knurling it is impossible.
2. When the material to be knurled is not deformable as plastics, nylon, cast iron.



Básicamente existen dos técnicas de moleteado.

There are basically two knurling techniques.

### 1. MOLETEADO CON AVANCE RADIAL (Tipo R)

### 1. RADIAL FEED KNURLING (R type)

El moleteado radial es aquel en el que la longitud del moleteado en la pieza coincide con el espesor de la moleta a utilizar, por lo tanto la herramienta de moletear solo hay que desplazarla radialmente (avance normalmente representado con la letra R .

Radial knurling is one in which the length of the knurling in the piece coincides with the thickness of the knurl, therefore the knurling tool is to be moved radially (feed usually represented with the letter R .

En esta técnica de moleteado no es necesario que la moleta vaya biselada, si bien siempre es mejor utilizar moletas biseladas para evitar una rotura prematura de las esquinas de los dientes. Los biseles confieren robustez a los cantos de las moletas.



In this knurling technique it is not necessary to use beveled knurls, although it is always better so as to avoid premature breakage of the teeth angles. The bevels give strength to the edges of the knurls.

This knurling technique is only applicable to form knurling. It is never applicable to cut-knurling.

**Esa técnica de moleteado solo es utilizable con herramientas de moletear por deformación. Nunca con herramientas de moletear por corte.**

**This knurling technique is only applicable in form knurling. Never in cut-knurling.**

### 2. MOLETEADO CON AVANCE AXIAL (Tipo F)

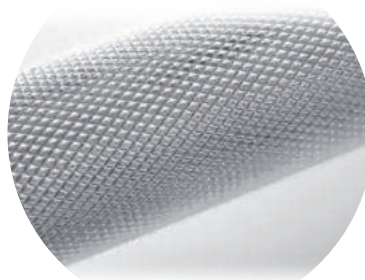
### 2. AXIAL FEED KNURLING (F type)

El moleteado axial es aquel en el que la longitud del moleteado en la pieza es mayor que el espesor de la moleta a utilizar, por lo tanto la herramienta de moletear hay que desplazarla axialmente (avance normalmente representado con la letra F  hasta alcanzar la longitud de moleteado total requerida.

In axial knurling the length of knurling piece is longer than the thickness of the knurl, therefore the knurling tool has to move axially (feed usually represented with the letter F .

Esta técnica de moleteado es utilizable tanto para las herramientas de moletear por deformación como las que trabajan por corte. En el caso de las herramientas de moletear por deformación, las moletas han de llevar biseles imperativamente. En el caso de las herramientas de moletear por corte las moletas no tienen que estar biseladas.

This knurling technique is applicable to both form knurling tools and cut-knurling tools. In form knurling tools, the knurls must be beveled. In cut-knurling tools, the knurls must be unbeveled.





## ELECCIÓN DE LA HERRAMIENTA DE MOLETEADO CHOOSING THE MOST SUITABLE KNURLING TOOL



En muchos casos un mismo tipo de moleteado se puede realizar con diferentes tipos de herramientas. De presión de corte, de una o varias moletas.

In many cases the same type of knurling can be made using different types of tools. Pressure knurling tools or cut-knurling tools of one knurl or more.

En el siguiente cuadro detallamos para cada tipo de moleteado, con qué herramienta se puede realizar y de qué manera.

The following table shows which kind of tool can be used for each type of knurling.

### + Moleteados mecanizables con herramientas de deformación Allowed knurling for form knurling tools

| Tipo de moleteado<br>Type of knurling | Herramienta<br>Tool             | Moleta<br>Knurl | Avance radial<br>Radial feed [R] | Avance axial<br>Axial feed [F] |
|---------------------------------------|---------------------------------|-----------------|----------------------------------|--------------------------------|
| RAA                                   | De una moleta<br>One knurl      | AA              | SI / YES                         | SI / YES                       |
|                                       | De dos moletas<br>Two knurls    | AA + AA         | SI / YES                         | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | AA + AA + AA    | NO / NO                          | SI / YES                       |
| RBR                                   | De una moleta<br>One knurl      | BR              | SI / YES                         | SI / YES                       |
|                                       | De dos moletas<br>Two knurls    | BR + BR         | SI / YES                         | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | BR + BR + BR    | NO / NO                          | SI / YES                       |
| RBL                                   | De una moleta<br>One knurl      | BL              | SI / YES                         | SI / YES                       |
|                                       | De dos moletas<br>Two knurls    | BL + BL         | SI / YES                         | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | BL + BL + BL    | NO / NO                          | SI / YES                       |
| RGE                                   | De una moleta<br>One knurl      | GV              | SI / YES                         | NO / NO                        |
|                                       | De dos moletas<br>Two knurls    | BL + BR         | SI / YES                         | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | BL + BR + BR    | NO / NO                          | SI / YES                       |
| RGV                                   | De una moleta<br>One knurl      | GE              | SI / YES                         | NO / NO                        |
|                                       | De dos moletas<br>Two knurls    | -               | -                                | -                              |
|                                       | De tres moletas<br>Three knurls | -               | -                                | -                              |
| RKE                                   | De una moleta<br>One knurl      | KV              | SI / YES                         | NO / NO                        |
|                                       | De dos moletas<br>Two knurls    | -               | -                                | -                              |
|                                       | De tres moletas<br>Three knurls | -               | -                                | -                              |
| RKV                                   | De una moleta<br>One knurl      | KE              | SI / YES                         | NO / NO                        |
|                                       | De dos moletas<br>Two knurls    | -               | -                                | -                              |
|                                       | De tres moletas<br>Three knurls | -               | -                                | -                              |



## ELECCIÓN DE LA HERRAMIENTA DE MOLETEADO CHOOSING THE MOST SUITABLE KNURLING TOOL



### Moleteados mecanizables con herramientas de corte

Allowed knurling for cut-knurling tools

| Tipo de moleteado<br>Type of knurling | Herramienta<br>Tool             | Versión<br>Version | Moleta<br>Knurl          | Avance radial<br>Radial feed (R) | Avance axial<br>Axial feed (F) |
|---------------------------------------|---------------------------------|--------------------|--------------------------|----------------------------------|--------------------------------|
| RAA                                   | De una moleta<br>One knurl      | Derecha<br>Righth  | BR 30°                   | NO / NO                          | SI / YES                       |
|                                       |                                 | Izquierda<br>Left  | BL 30°                   | NO / NO                          | SI / YES                       |
| RBR 30°                               | De una moleta<br>One knurl      | Derecha<br>Righth  | AA                       | NO / NO                          | SI / YES                       |
| RBL 30°                               | De una moleta<br>One knurl      | Izquierda<br>Left  | AA                       | NO / NO                          | SI / YES                       |
| RGE 30°                               | De dos moletas<br>Two knurls    | -                  | AA + AA                  | NO / NO                          | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | -                  | AA + AA + AA             | NO / NO                          | SI / YES                       |
| RGE 45°                               | De dos moletas<br>Two knurls    | -                  | BL 15° + BR 15°          | NO / NO                          | SI / YES                       |
|                                       | De tres moletas<br>Three knurls | -                  | BL 15° + BR 15° + BR 15° | NO / NO                          | SI / YES                       |



### Posibles problemas al moletear

Possible problems and how to solve them

| Problema<br>Problem                                              | Causa<br>Cause                                                                                                                                           | Solución<br>Solution                                                                                                                                                    |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Moleteado doble<br>Double knurling                               | Escaso avance radial al comenzar el moleteado en la esquina de la pieza<br>Low radial feed at the beginning of the knurling at the edge of the workpiece | Aumentar el avance radial al comienzo del moleteado<br>Increase the radial feed at the beginning of knurling                                                            |
|                                                                  | El perímetro de la pieza no es un múltiplo entero del paso<br>The perimeter of the workpiece is not a whole multiple of the pitch                        | Tornear las piezas a un diámetro que proporcione un perímetro múltiplo entero del paso<br>Modify the workpieces diameter. Perimeter has to be a whole multiple of pitch |
| Fácil rotura de las moletas<br>Easy breaking of the knurls       | Excesiva profundidad de moleteado<br>Excessive knurling depth                                                                                            | Reducir la profundidad a valores admisibles para el paso utilizado<br>Reduce the knurling depth to values according to the pitch used                                   |
| Excesivo desgaste de las moletas<br>Excessive wear of the knurls | Excesiva profundidad de moleteado<br>Excessive knurling depth                                                                                            | Ajustar la profundidad de moleteado a los valores correctos<br>Adjust the depth of the knurling to a correct values                                                     |
|                                                                  | Las condiciones de trabajo no son las adecuadas<br>Unappropriate work conditions                                                                         | Revisar la velocidad de corte y el avance axial<br>Check the cutting speed and axial feed                                                                               |



# MOLETEADO POR DEFORMACIÓN · VELOCIDADES DE CORTE Y AVANCES

## FORM KNURLING · FEED AND SPEED



| Material<br>Material                                       | Ø Pieza<br>Ø Piece | Ø Moleta<br>Ø Knurl | VC (m/min)<br>VC (m/min) | Avance radial (mm/rev)<br>Radial feed (mm/rev) (R) | Avance axial (mm/rev)<br>Axial feed (mm/rev) (F) |           |           |           |
|------------------------------------------------------------|--------------------|---------------------|--------------------------|----------------------------------------------------|--------------------------------------------------|-----------|-----------|-----------|
|                                                            |                    |                     |                          |                                                    | Paso (mm)<br>Pitch (mm)                          |           |           |           |
|                                                            |                    |                     |                          |                                                    | 0.3 + 0.6                                        | 0.6 + 1.2 | 1.2 + 1.6 | 1.6 + 2.0 |
| Acero 600 N/mm <sup>2</sup><br>600 N/mm <sup>2</sup> steel | <10 mm             | 10 / 15 mm          | 20 ÷ 50                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.08      | 0.07      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 25 ÷ 55                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 25 mm               | 30 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 30 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 30 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 200 - 300 mm       | 25 mm               | 30 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
| Acero 900 N/mm <sup>2</sup><br>900 N/mm <sup>2</sup> steel | <10 mm             | 10 / 15 mm          | 15 ÷ 40                  | 0.04 ÷ 0.08                                        | 0.12                                             | 0.08      | 0.05      | 0.04      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 20 ÷ 45                  |                                                    | 0.15                                             | 0.10      | 0.08      | 0.06      |
|                                                            |                    | 25 mm               | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 200 - 300 mm       | 25 mm               | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
| Acero inoxidable<br>Stainless steel                        | <10 mm             | 10 / 15 mm          | 15 ÷ 40                  | 0.04 ÷ 0.08                                        | 0.12                                             | 0.08      | 0.05      | 0.04      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 20 ÷ 45                  |                                                    | 0.15                                             | 0.10      | 0.08      | 0.06      |
|                                                            |                    | 25 mm               | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 200 - 300 mm       | 25 mm               | 25 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
| Acero fundido<br>Cast steel                                | <10 mm             | 10 / 15 mm          | 20 ÷ 40                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.08      | 0.07      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 25 mm               | 30 ÷ 50                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 30 ÷ 50                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 30 ÷ 50                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 200 - 300 mm       | 25 mm               | 30 ÷ 50                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
| Aluminio<br>Aluminium                                      | <10 mm             | 10 / 15 mm          | 25 ÷ 45                  | 0.05 ÷ 0.10                                        | 0.12                                             | 0.08      | 0.05      | 0.04      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 30 ÷ 50                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.06      |
|                                                            |                    | 25 mm               | 35 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 35 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 35 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
|                                                            | 200 - 300 mm       | 25 mm               | 35 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.13      |
| Latón<br>Brass                                             | <10 mm             | 10 / 15 mm          | 30 ÷ 50                  | 0.05 ÷ 0.10                                        | 0.20                                             | 0.15      | 0.12      | 0.13      |
|                                                            | 10 - 50 mm         | 15 / 20 mm          | 35 ÷ 55                  |                                                    | 0.25                                             | 0.20      | 0.18      | 0.15      |
|                                                            |                    | 25 mm               | 40 ÷ 65                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.18      |
|                                                            | 50 - 100 mm        | 20 / 25 mm          | 40 ÷ 65                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.18      |
|                                                            | 100 - 200 mm       | 20 / 25 mm          | 40 ÷ 65                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.18      |
|                                                            | 200 - 300 mm       | 25 mm               | 40 ÷ 65                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.18      |

Valores recomendados / Recommended values



# MOLETEADO POR CORTE · VELOCIDADES DE CORTE Y AVANCES

## CUT-KNURLING · FEED AND SPEED



| Material<br>Material                                       | Ø Pieza<br>Ø Piece | Ø Moleta<br>Ø Knurl | VC (m/min)<br>VC (m/min) | Avance radial (mm/rev)<br>Radial feed (mm/rev) (R) | Avance axial (mm/rev)<br>Axial feed (mm/rev) (F) |           |           |           |
|------------------------------------------------------------|--------------------|---------------------|--------------------------|----------------------------------------------------|--------------------------------------------------|-----------|-----------|-----------|
|                                                            |                    |                     |                          |                                                    | Paso (mm)<br>Pitch (mm)                          |           |           |           |
|                                                            |                    |                     |                          |                                                    | 0.3 + 0.6                                        | 0.6 + 1.2 | 1.2 + 1.6 | 1.6 + 2.0 |
| Acero 600 N/mm <sup>2</sup><br>600 N/mm <sup>2</sup> steel | <10 mm             | 8.9 mm              | 30 ÷ 50                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.08      | 0.05      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 35 ÷ 55                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 60 ÷ 80                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.15      |
| Acero 900 N/mm <sup>2</sup><br>900 N/mm <sup>2</sup> steel | <10 mm             | 8.9 mm              | 15 ÷ 30                  | 0.04 ÷ 0.08                                        | 0.12                                             | 0.08      | 0.05      | 0.04      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 20 ÷ 40                  |                                                    | 0.15                                             | 0.10      | 0.08      | 0.06      |
|                                                            |                    | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 35 ÷ 55                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
| Acero inoxidable<br>Stainless steel                        | <10 mm             | 8.9 mm              | 15 ÷ 30                  | 0.04 ÷ 0.08                                        | 0.12                                             | 0.08      | 0.05      | 0.04      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 20 ÷ 40                  |                                                    | 0.15                                             | 0.10      | 0.08      | 0.06      |
|                                                            |                    | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 25 ÷ 45                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 35 ÷ 55                  |                                                    | 0.20                                             | 0.15      | 0.10      | 0.08      |
| Acero fundido<br>Cast steel                                | <10 mm             | 8.9 mm              | 30 ÷ 50                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.08      | 0.05      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 35 ÷ 55                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 40 ÷ 60                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 60 ÷ 80                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.15      |
| Aluminio<br>Aluminium                                      | <10 mm             | 8.9 mm              | 50 ÷ 70                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.05      | 0.05      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 55 ÷ 75                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 21.5 mm             | 60 ÷ 90                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 60 ÷ 90                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 60 ÷ 90                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 80 ÷ 110                 |                                                    | 0.30                                             | 0.25      | 0.20      | 0.15      |
| Latón<br>Brass                                             | <10 mm             | 8.9 mm              | 35 ÷ 55                  | 0.05 ÷ 0.10                                        | 0.15                                             | 0.10      | 0.12      | 0.05      |
|                                                            | 10 - 50 mm         | 14.5 / 21.5 mm      | 40 ÷ 60                  |                                                    | 0.20                                             | 0.15      | 0.13      | 0.10      |
|                                                            |                    | 21.5 mm             | 45 ÷ 65                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 50 - 100 mm        | 21.5 mm             | 45 ÷ 65                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 100 - 200 mm       | 21.5 mm             | 45 ÷ 65                  |                                                    | 0.25                                             | 0.20      | 0.15      | 0.12      |
|                                                            | 200 - 300 mm       | 35 / 42 mm          | 70 ÷ 90                  |                                                    | 0.30                                             | 0.25      | 0.20      | 0.15      |

Valores recomendados / Recommended values



## INCREMENTO DEL Ø DE LA PIEZA MOLETEADA POR DEFORMACIÓN INCREASE OF Ø OF THE KNURLED PART BY FORM KNURLING



| Material<br>Material                | Paso (mm)<br>Pitch (mm) |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------------------|-------------------------|------|------|------|------|------|------|------|------|------|------|------|
|                                     | Tipo<br>Type            | 0.3  | 0.4  | 0.5  | 0.6  | 0.8  | 1.0  | 1.2  | 1.4  | 1.6  | 1.8  | 2.0  |
| Acero de 90 kg<br>90 kg steel       | RAA                     | 0.08 | 0.13 | 0.18 | 0.22 | 0.36 | 0.43 | 0.50 | 0.58 | 0.66 | 0.68 | 0.96 |
|                                     | RBL                     | 0.08 | 0.13 | 0.21 | 0.24 | 0.33 | 0.43 | 0.52 | 0.65 | 0.70 | 0.76 | 0.87 |
|                                     | RBR                     | 0.08 | 0.13 | 0.21 | 0.24 | 0.33 | 0.43 | 0.52 | 0.65 | 0.70 | 0.76 | 0.87 |
|                                     | RGE                     | 0.10 | 0.18 | 0.17 | 0.30 | 0.38 | 0.51 | 0.63 | 0.70 | 0.83 | 0.93 | 0.95 |
| Acero de 60 kg<br>60 kg steel       | RAA                     | 0.08 | 0.15 | 0.20 | 0.24 | 0.38 | 0.45 | 0.52 | 0.60 | 0.68 | 0.70 | 0.98 |
|                                     | RBL                     | 0.10 | 0.15 | 0.23 | 0.26 | 0.35 | 0.45 | 0.54 | 0.67 | 0.72 | 0.78 | 0.90 |
|                                     | RBR                     | 0.10 | 0.15 | 0.23 | 0.26 | 0.35 | 0.45 | 0.54 | 0.67 | 0.72 | 0.78 | 0.90 |
|                                     | RGE                     | 0.12 | 0.20 | 0.29 | 0.32 | 0.40 | 0.53 | 0.65 | 0.73 | 0.85 | 0.95 | 0.98 |
| Acero inoxidable<br>Stainless steel | RAA                     | 0.10 | 0.14 | 0.20 | 0.25 | 0.33 | 0.45 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 |
|                                     | RBL                     | 0.12 | 0.20 | 0.23 | 0.29 | 0.40 | 0.50 | 0.60 | 0.70 | 0.78 | 0.88 | 0.98 |
|                                     | RBR                     | 0.12 | 0.20 | 0.23 | 0.29 | 0.40 | 0.50 | 0.60 | 0.70 | 0.78 | 0.88 | 0.98 |
|                                     | RGE                     | 0.10 | 0.14 | 0.20 | 0.25 | 0.33 | 0.53 | 0.52 | 0.65 | 0.70 | 0.75 | 0.80 |
| Aluminio<br>Aluminium               | RAA                     | 0.10 | 0.15 | 0.20 | 0.25 | 0.33 | 0.45 | 0.50 | 0.58 | 0.65 | 0.79 | 0.85 |
|                                     | RBL                     | 0.12 | 0.17 | 0.24 | 0.27 | 0.39 | 0.49 | 0.57 | 0.58 | 0.65 | 0.80 | 0.95 |
|                                     | RBR                     | 0.12 | 0.17 | 0.24 | 0.27 | 0.39 | 0.49 | 0.57 | 0.58 | 0.65 | 0.80 | 0.95 |
|                                     | RGE                     | 0.11 | 0.15 | 0.22 | 0.25 | 0.33 | 0.45 | 0.53 | 0.65 | 0.70 | 0.74 | 0.90 |
| Latón<br>Brass                      | RAA                     | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.42 | 0.45 | 0.50 | 0.52 | 0.56 |
|                                     | RBL                     | 0.10 | 0.15 | 0.20 | 0.23 | 0.30 | 0.40 | 0.45 | 0.53 | 0.59 | 0.63 | 0.68 |
|                                     | RBR                     | 0.10 | 0.15 | 0.20 | 0.23 | 0.30 | 0.40 | 0.45 | 0.53 | 0.59 | 0.63 | 0.68 |
|                                     | RGE                     | 0.12 | 0.17 | 0.20 | 0.23 | 0.30 | 0.38 | 0.40 | 0.46 | 0.50 | 0.60 | 0.65 |

\* Valores aproximados / Approximate values



## RELACIÓN ENTRE EL DIÁMETRO A MOLETEAR Y EL PASO RELATIONSHIP BETWEEN PART DIAMETER AND PITCH



La relación entre el diámetro de la pieza a moletear y el paso de la moleta seleccionada es muy importante para poder lograr un moleteado de calidad. Siempre hay que tratar de conseguir que la longitud de la circunferencia de la pieza a moletear sea múltiplo del paso de la moleta utilizada.

The ratio between the diameter of the piece to be knurled and the pitch of the knurl is very important to achieve good quality knurling. The length of the circumference of the piece should always be a multiple of the knurl pitch used.

### EJEMPLO 1

Diámetro previo de la pieza: 21 mm  
Paso de la moleta: 1.0 mm  
Relación:  $21 \times 3.1416 / 1.0 = 65.97$   
Diferencia con número entero:  $66 - 65.97 = 0.03$

### EXAMPLE 1

Previous diameter of the workpiece: 21 mm  
Pitch of the knurl: 1.0 mm  
Ratio:  $21 \times 3.1416 / 1.0 = 65.97$   
Difference with whole number:  $66 - 65.97 = 0.03$

Cuanta mayor diferencia haya entre el valor obtenido del cálculo anterior y un número entero, mayor esfuerzo tendrá que realizar el conjunto moleteador-moleta para tratar de compensar la desproporción. Ese sobre-esfuerzo se traduce en un moleteado de peor calidad y una reducción en el rendimiento de la moleta.

The greater the difference between the value obtained from the above calculation and a whole number, the more effort the tool will have to do to try to compensate the disproportion. This over-pressure generates a reduction in the quality of the knurling and in the performance of the knurl.

En el peor de los casos, cuando el valor de esa proporción difiere demasiado de un valor entero, se produce "doble moleteado". En este supuesto, el conjunto moleteador-moleta no logra compensar la desproporción y durante las primeras la moleta hace múltiples penetraciones en la pieza sin respetar el paso.

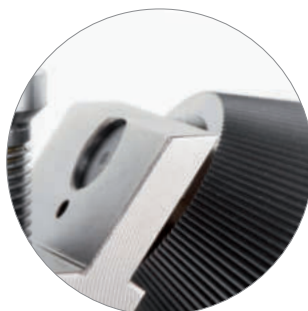
In the worst case, when the value of this proportion differs too much of a whole value, it makes a "double knurling". In this case, the knurling-knurl set cannot compensate for the disproportion and during the first turns the knurl makes multiple penetrations into the part without respecting the pitch.

### EJEMPLO 2

Diámetro previo de la pieza: 18 mm  
Paso de la moleta: 1.0 mm  
Relación:  $18 \times 3.1416 / 1.0 = 56.56$   
Diferencia con número entero:  $57 - 56.56 = 0.44$

### EXAMPLE 2

Previous diameter of the workpiece: 18 mm  
Pitch of the knurl: 1.0 mm  
Ratio:  $18 \times 3.1416 / 1.0 = 56.56$   
Difference with whole number:  $57 - 56.56 = 0.44$





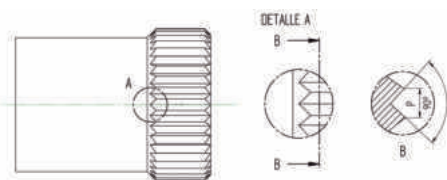
# MOLETEADO EN PIEZA SEGÚN DIN 82

## KNURLING ON COMPONENTS ACCORDING TO DIN 82

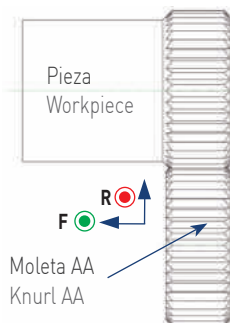


### RAA

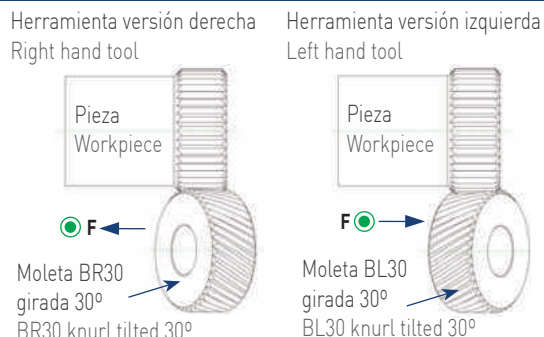
Moleteado con estrías paralelas al eje  
Knurling with grooves parallel to axis



#### Moleteado por deformación Form knurling

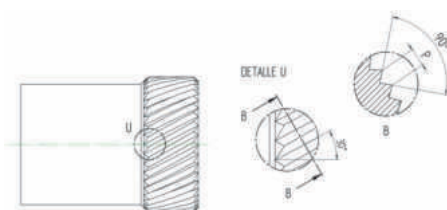


#### Moleteado por corte Cut-knurling

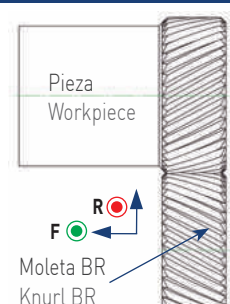


### RBL

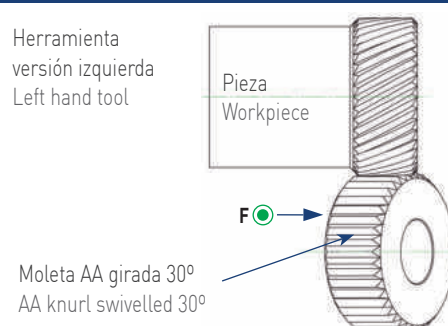
Moleteado con estrías en hélice hacia la izquierda  
Knurling with left spiral grooves



#### Moleteado por deformación Form knurling

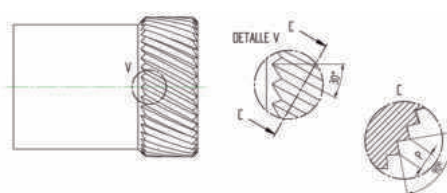


#### Moleteado por corte Cut-knurling

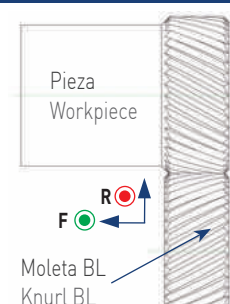


### RBR

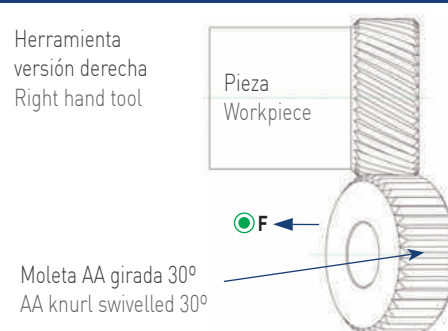
Moleteado con estrías en hélice hacia la derecha  
Knurling with right spiral grooves



#### Moleteado por deformación Form knurling

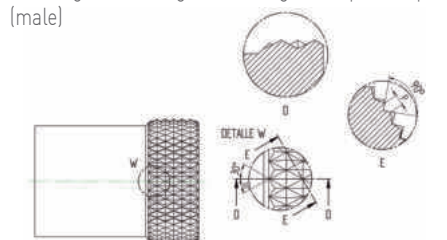


#### Moleteado por corte Cut-knurling

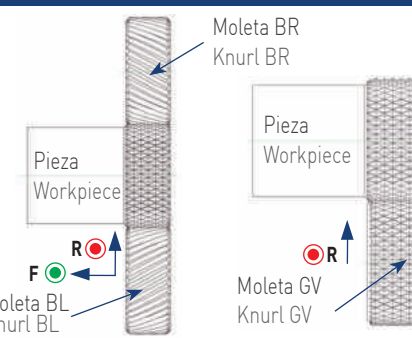


### RGE

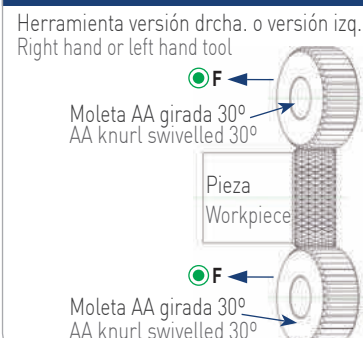
Moleteado con estrías cruzadas derecha-izquierda  
puntas salientes  
Knurling with left-right crossed grooves points up (male)



#### Moleteado por deformación Form knurling



#### Moleteado por corte Cut-knurling



\* Avances permitidos / Allowed feeds F R

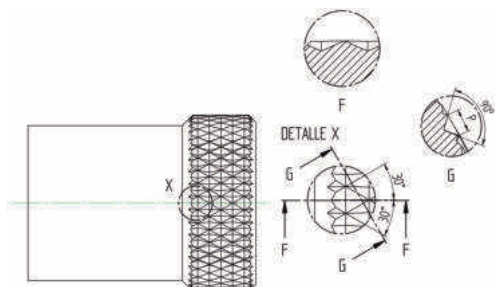


## MOLETEADO EN PIEZA SEGÚN DIN 82 KNURLING ON COMPONENTS ACCORDING TO DIN 82

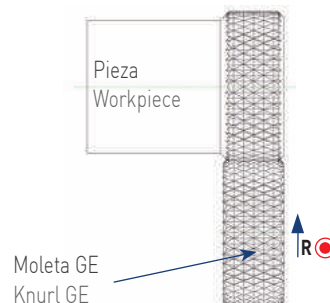


### RGV

Moleteado con estrías cruzadas derecha-izquierda puntas entrantes  
Knurling with left-right crossed grooves points down (female)

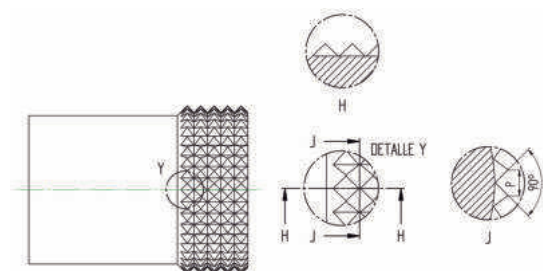


#### Moleteado por deformación Form knurling

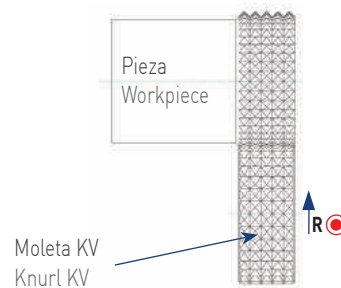


### RKE

Moleteado con estrías cruzadas en cuadrado puntas salientes  
Knurling with square crossed grooves points up (male)

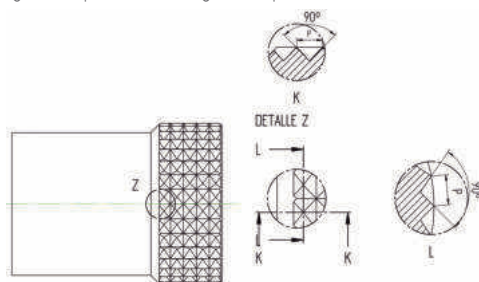


#### Moleteado por deformación Form knurling

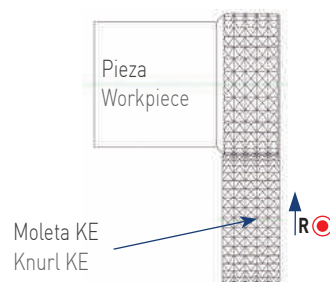


### RKV

Moleteado con estrías cruzadas en cuadrado puntas entrantes  
Knurling with square crossed grooves points down (female)



#### Moleteado por deformación Form knurling



\* Avances permitidos / Allowed feeds **F** **R**



# GAMA MOLETAS INTEG I INTEGI KNURL RANGE



|                                       |                      |                | MOLETAS PARA MOLETEADORES DE INTEG I /<br>DIENTES FRESADOS |      |      |      |      |
|---------------------------------------|----------------------|----------------|------------------------------------------------------------|------|------|------|------|
|                                       |                      |                | AA                                                         | BL15 | BR15 | BL30 | BR30 |
| MOLETAS DE DEFORMACION / FORM KNURLS  | Dimensiones<br>Sizes | Bisel<br>Bevel |                                                            |      |      |      |      |
|                                       | 10x4x4               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 10x5x4               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 15x4x4               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 15x5x4               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 15x6x4               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 15x6x10/6            | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x6x6               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x8x6               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x10x6              | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x8x8               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x10x8              | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x12x8              | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x10x15             | F              | ●                                                          |      |      | ●    | ●    |
| MOLETAS DE CORTE<br>CUT KNURLS        | 8.9x2.5x4            | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 14.5x3x5             | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 21.5x5x8             | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 32x8x14              | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 42x12x18             | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       |                      |                | MOLETAS PARA MOLETEADORES PARA OTROS FABRICANTES /         |      |      |      |      |
|                                       |                      |                | AA                                                         | BL15 | BR15 | BL30 | BR30 |
| MOLETAS DE DEFORMACION<br>FORM KNURLS | Dimensiones<br>Sizes | Bisel<br>Bevel |                                                            |      |      |      |      |
|                                       | 15x6x11/6            | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x8x13/6            | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x6x6,5             | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x8x6,5             | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 20x10x6,5            | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x6x6               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x8x6               | F              | ●                                                          |      |      | ●    | ●    |
|                                       | 25x10x6              | F              | ●                                                          |      |      | ●    | ●    |
| MOLETAS DE CORTE<br>CUT KNURLS        | 15x4x8               | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 20x5x11              | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 25x5x11              | S              | ●                                                          | ●    | ●    | ●    | ●    |
|                                       | 25x6x8               | S              | ●                                                          | ●    | ●    | ●    | ●    |

## Pasos disponibles · Available pitches

|   |                                                        |   |                                                                    |
|---|--------------------------------------------------------|---|--------------------------------------------------------------------|
| ● | 0.3 - 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 1.0 mm             | ● | 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 1.0 - 1.2 - 1.5 - 1.6 - 1.8 - 2.0 mm |
| ● | 0.3 - 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 1.0 - 1.2 mm       | ● | 1.0 - 1.5 - 2.0 - 2.5 - 3.0 mm                                     |
| ● | 0.3 - 0.4 - 0.5 - 0.6 - 0.7 - 0.8 - 1.0 - 1.2 - 1.5 mm | ● | 1.0 - 1.5 - 2.0 - 2.5 - 3.0 - 3.5 - 4.0 mm                         |

Otros pasos bajo pedido / Other pitches under request



## KNURLS FOR KNURLING TOOL FOR OTHER MANUFACTURES

| RECUBRIMIENTO<br>COATING | DESCRIPCIÓN<br>DESCRIPTION    |
|--------------------------|-------------------------------|
| TiN                      | Titanium Nitride PVD          |
| TiCN                     | Titanium Carbon Nitride PVD   |
| TiAlN                    | Titanium Aluminum Nitride PVD |
| AlCrN                    | Aluminum Chromium Nitride PVD |
| Nitried (Tenifer)        | Nitried (Tenifer)             |

| Tipo de bisel · Type of bevel |                                                                    |
|-------------------------------|--------------------------------------------------------------------|
| F                             | Bisel en ambas caras (Moleta de deformación) · Bevel on both faces |
| S                             | Sin bisel (Moleta de corte) · Unbeveled                            |



## MOLETAS ESPECIALES SPECIAL KNURLS



### + Moletas cónicas Conical knurls



#### ► Datos necesarios para la fabricación de moletas cónicas:

- Tipo (KAA, KBL, ...)
- Ángulo de la hélice 30°, 45°
- Dimensiones
- Paso o número de dientes

#### ► Necessary data to manufacture conical knurls:

- Type (KAA, KBL, ...)
- Helix angle 30°, 45°
- Dimensions
- Pitch or number of teeth

### + Moletas cóncavas y convexas Concave and convex knurls



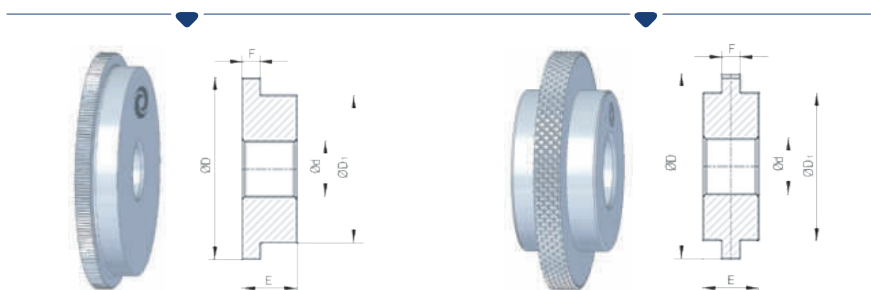
#### ► Datos necesarios para la fabricación de moletas cóncavas y convexas:

- Tipo (C, DL, ...)
- Ángulo de la hélice 30°, 45°
- Dimensiones
- Radio
- Paso o número de dientes

#### ► Necessary data to manufacture concave and convex knurls:

- Type (C, DL, ...)
- Helix angle 30°, 45°
- Dimensions
- Radius
- Pitch or number of teeth

### + Moletas escalonadas Stepped knurls



**Moleta escalonada (una cara)**  
Stepped knurl (one side)

**Moleta escalonada (dos caras)**  
Stepped knurl (two sides)

#### ► Datos para la fabricación de moletas especiales:

- Tipo (AA, BL, ...)
- Ángulo de la hélice
- Dimensiones
- Paso

#### ► Necessary data to manufacture special knurls:

- Type (AA, BL, ...)
- Helix angle 30°, 45°
- Dimensions
- Pitch

# MOLETEADO KNURLING





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



M1

## + Características

- Recomendado para moleteados tipo RAA
- Para trabajos no repetitivos
- Eje de HSS fijado mediante circlip

## Tipos de máquinas

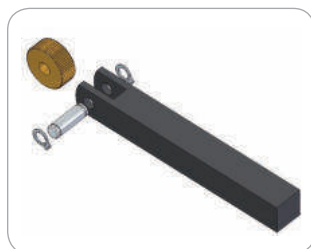
- Para tornos convencionales

## + Features

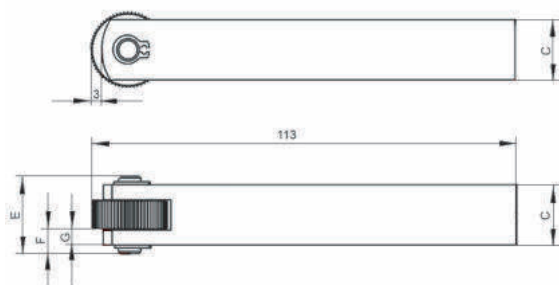
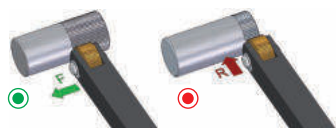
- Recommended for RAA type knurling
- For non-repetitive works
- HSS pin fixed by circlip

## Machine Types

- For conventional lathes



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | R | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |   |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  |   | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds |   | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |   |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|---|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | E  | F   | G | Kg  |
| 01010100           | M1 20.08.14             | R+L                | Ø 8-200               | 20x8x6          | 14 | 19 | 6   | 3 | 0.2 |
| 01010200           | M1 20.08.16             | R+L                | Ø 8-200               | 20x8x6          | 16 | 21 | 6.5 | 4 | 0.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01990100              | EM1                     |  |
| 01990007              | EM1-16                  |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



M2

## + Características

- Recomendado para moleteados tipo RGE
- Cabeza giratoria para el auto-centrado de las moletas (Fig. 1)
- Para trabajos no repetitivos
- Ejes de HSS

## Tipos de máquinas

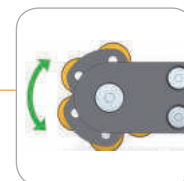
- Para tornos convencionales

## + Features

- Recommended for RGE type knurling
- Revolving head for knurls self-centering (Fig. 1)
- For non-repetitive works
- HSS pins

## Machine Types

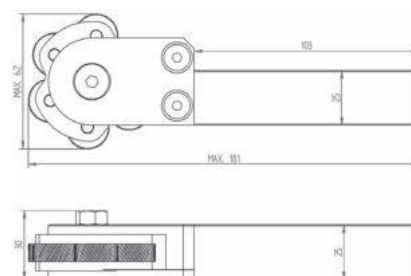
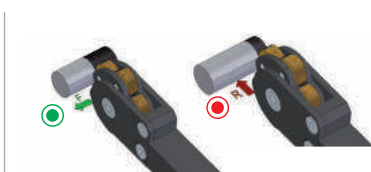
- For conventional lathes



(Fig. 1)



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA     | R<br>RGE 30°  | R<br>RGE 45°  |
|-------------------------------------|---------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |         |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA   | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F ● R ● | F ● R ●       | F ● R ●       |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | Kg  |
| 01020100           | M2 20.08.25             | R+L                | Ø 8-200               | 20x8x6          | 1.0 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01990201              | EM2-SET                 |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



M3

## + Características

- Recomendado para moleteados tipo RGE
- Ajuste y centrado de las moletas sobre la pieza mediante husillo roscado
- Doble posición de los brazos para mayor capacidad de trabajo (Fig. 1)
- Menor riesgo de flexión de la pieza al no ejercer presión radial
- Apta para trabajos no repetitivos
- Ejes de HSS fijados mediante circlip

## Tipos de máquinas

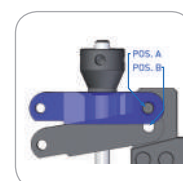
- Para tornos convencionales

## + Features

- Recommended for RGE type knurling
- Knurls self-centering by threaded spindle
- Double position of the arms for higher working capacity (Fig. 1)
- Lower risk of bending the workpiece as tool does not make radial pressure
- Suitable for non-repetitive works
- HSS pins fixed by circlip

## Machine Types

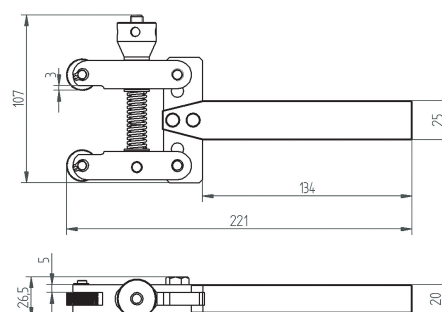
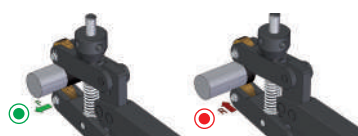
- For conventional lathes



(Fig. 1)



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | RGE 30°       | RGE 45°       |
|-------------------------------------|-------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |       |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F  R  | F  R          | F  R          |

## R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                                 |                 |     |
|--------------------|-------------------------|--------------------|---------------------------------|-----------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity           | Moleta<br>Knurl | Kg  |
| 01030100           | M3 20.08.25             | R+L                | Pos A: Ø 5-40<br>Pos B: Ø 30-50 | 20x8x6          | 1.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01992701              | EM3/M7-SET              |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



**M7**

## + Características

- Recomendado para moleteados tipo RGE
- Cabeza basculante para el autocentrado de las moletas (Fig. 1)
- Para trabajos no repetitivos
- Ejes de HSS fijados mediante circlip

## Tipos de máquinas

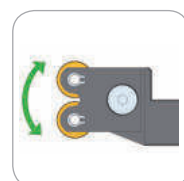
- Para tornos convencionales y CNC

## + Features

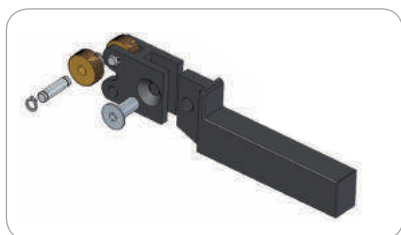
- Recommended for RGE type knurling
- Pivoting head for knurls self-centering (Fig. 1)
- For non-repetitive works
- HSS pins fixed by circlip

## Machine Types

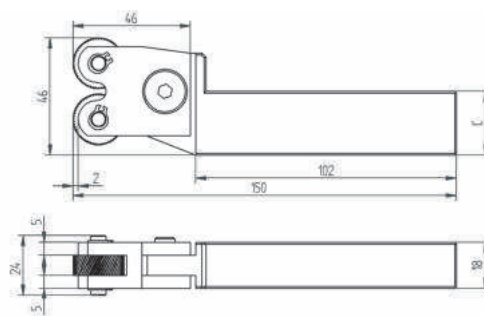
- For conventional and CNC lathes



(Fig. 1)



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | <sup>R</sup><br>RGE 30° | <sup>R</sup><br>RGE 45° |
|-------------------------------------|-------|-------------------------|-------------------------|
| Tipo de moleteado<br>Knurling form  |       |                         |                         |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30°           | BL45° + BR45°           |
| Avances permitidos<br>Allowed feeds | F  R  | F  R                    | F  R                    |

<sup>R</sup> Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | Kg  |
| 01160200           | M7N 20.08.20            | R+L                | Ø 8-200               | 20x8x6          | 20 | 0.7 |
| 01160300           | M7N 20.08.25            | R+L                | Ø 8-200               | 20x8x6          | 25 | 0.7 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01992701              | EM3/M7-SET              |  |



## MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



### KM1-M7



#### Características

- Conjunto básico de moleteado
- Para trabajos no repetitivos

#### Contenido

- 1 x Herramienta modelo M1
- 1 x Herramienta modelo M7N
- 1 x Eje de repuesto para herramienta M1
- 2 x Eje de repuesto para herramienta M7N
- 1 x Moleta BL30 20x8x6 0.8
- 1 x Moleta BR30 20x8x6 0.8
- 1 x Moleta BL30 20x8x6 1.2
- 1 x Moleta BR30 20x8x6 1.2
- 1 x Moleta BL30 20x8x6 1.6
- 1 x Moleta BR30 20x8x6 1.6
- 1 x Moleta AA 20x8x6 0.8
- 1 x Moleta AA 20x8x6 1.2
- 1 x Moleta AA 20x8x6 1.6



#### Features

- Basic knurling kit
- For non-repetitive works

#### Content

- 1 x Tool model M1
- 1 x Tool model M7N
- 1 x HSS pin for M1 tool
- 2 x HSS pin for M7N tool
- 1 x Knurl BL30 20x8x6 0.8
- 1 x Knurl BR30 20x8x6 0.8
- 1 x Knurl BL30 20x8x6 1.2
- 1 x Knurl BR30 20x8x6 1.2
- 1 x Knurl BL30 20x8x6 1.6
- 1 x Knurl BR30 20x8x6 1.6
- 1 x Knurl AA 20x8x6 0.8
- 1 x Knurl AA 20x8x6 1.2
- 1 x Knurl AA 20x8x6 1.6



| Herramienta   Tool |                         |                                          |                       |     |
|--------------------|-------------------------|------------------------------------------|-----------------------|-----|
| Código<br>Code     | Referencia<br>Reference | Herramientas incluidas<br>Included tools | Capacidad<br>Capacity | Kg  |
| 01110100           | KM1-14/M7               | M1 20.08.14 + M7N 20.08.25               | Ø 8-200               | 1,2 |
| 01110200           | KM1-16/M7               | M1 20.08.16 + M7N 20.08.25               | Ø 8-200               | 1,2 |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



## M6



### Características

- Recomendado para moleteados tipo RAA
- Eje de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

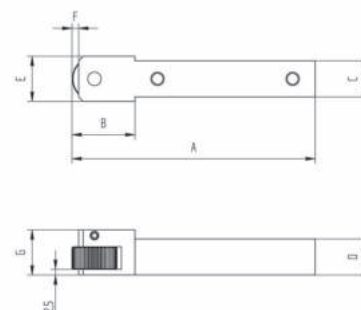


### Features

- Recommended for RAA type knurling
- Carbide pin
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the tool shank



### Avance Feed



### Formas de moleteados realizables Feasible knurling forms

|                                     | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

### Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |      |    |    |    |     |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|------|----|----|----|-----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A     | B    | C  | D  | E  | F   | G  | Kg  |
| 01060300           | M6 10.05.08             | R+L                | Ø 3-50                | 10x5x4          | 122   | 17   | 8  | 8  | 10 | 0,9 | 14 | 0,3 |
| 01060400           | M6 10.05.10             | R+L                | Ø 3-50                | 10x5x4          | 122   | 17   | 10 | 10 | 10 | 0,9 | 14 | 0,3 |
| 01062800           | M6 15.06.08-N           | R+L                | Ø 3-100               | 15x6x4          | 102,5 | 22,5 | 8  | 8  | 14 | 3,5 | 14 | 0,3 |
| 01062900           | M6 15.06.10-N           | R+L                | Ø 3-100               | 15x6x4          | 102,5 | 22,5 | 10 | 10 | 14 | 3,5 | 14 | 0,3 |
| 01063000           | M6 15.06.12-N           | R+L                | Ø 3-100               | 15x6x4          | 102,5 | 22,5 | 12 | 12 | 14 | 3,5 | 14 | 0,3 |
| 01063100           | M6 15.06.14-N           | R+L                | Ø 3-100               | 15x6x4          | 102,5 | 22,5 | 14 | 14 | 14 | 3,5 | 14 | 0,3 |
| 01063200           | M6 15.06.16-N           | R+L                | Ø 3-100               | 15x6x4          | 102,5 | 22,5 | 16 | 16 | 14 | 3,5 | 14 | 0,3 |
| 01061300           | M6 20.06.10             | R+L                | Ø 5-200               | 20x6x6          | 108   | 28   | 10 | 10 | 20 | 3   | 20 | 0,3 |
| 01061400           | M6 20.06.12             | R+L                | Ø 5-200               | 20x6x6          | 108   | 28   | 12 | 12 | 20 | 3   | 20 | 0,3 |
| 01061500           | M6 20.06.14             | R+L                | Ø 5-200               | 20x6x6          | 108   | 28   | 14 | 14 | 20 | 3   | 20 | 0,3 |
| 01061600           | M6 20.06.16             | R+L                | Ø 5-200               | 20x6x6          | 108   | 28   | 16 | 16 | 20 | 3   | 20 | 0,4 |
| 01061700           | M6 20.06.20             | R+L                | Ø 5-200               | 20x6x6          | 108   | 28   | 20 | 20 | 20 | 3   | 20 | 0,5 |
| 01061800           | M6 20.08.10             | R+L                | Ø 5-200               | 20x8x6          | 108   | 28   | 10 | 10 | 20 | 3   | 20 | 0,3 |
| 01061900           | M6 20.08.12             | R+L                | Ø 5-200               | 20x8x6          | 108   | 28   | 12 | 12 | 20 | 3   | 20 | 0,3 |
| 01062000           | M6 20.08.14             | R+L                | Ø 5-200               | 20x8x6          | 108   | 28   | 14 | 14 | 20 | 3   | 20 | 0,3 |
| 01062100           | M6 20.08.16             | R+L                | Ø 5-200               | 20x8x6          | 108   | 28   | 16 | 16 | 20 | 3   | 20 | 0,4 |
| 01062200           | M6 20.08.20             | R+L                | Ø 5-200               | 20x8x6          | 108   | 28   | 20 | 20 | 20 | 3   | 20 | 0,5 |
| 01062300           | M6 20.10.10             | R+L                | Ø 5-200               | 20x10x6         | 108   | 28   | 10 | 10 | 20 | 3   | 20 | 0,3 |
| 01062400           | M6 20.10.12             | R+L                | Ø 5-200               | 20x10x6         | 108   | 28   | 12 | 12 | 20 | 3   | 20 | 0,3 |
| 01062500           | M6 20.10.14             | R+L                | Ø 5-200               | 20x10x6         | 108   | 28   | 14 | 14 | 20 | 3   | 20 | 0,3 |
| 01062600           | M6 20.10.16             | R+L                | Ø 5-200               | 20x10x6         | 108   | 28   | 16 | 16 | 20 | 3   | 20 | 0,4 |
| 01062700           | M6 20.10.20             | R+L                | Ø 5-200               | 20x10x6         | 108   | 28   | 20 | 20 | 20 | 3   | 20 | 0,5 |

### Repuesto | Spare Part

| Código<br>Code | Referencia<br>Reference |
|----------------|-------------------------|
| 01990301       | E 14.4 HM               |
| 01990601       | E 20.6 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



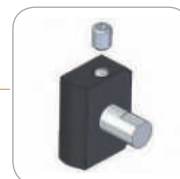
## M8

### + Características

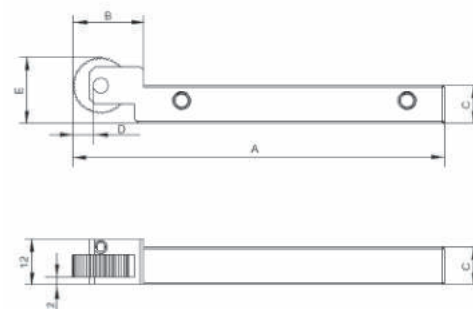
- Recomendado para moleteados tipo RAA
- Eje de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

- Recommended for RAA type knurling
- Carbide pin
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |   |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  |   | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds |   | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |                |                |    |                |                |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----------------|----------------|----|----------------|----------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A<br>Ø10 / Ø15 | B<br>Ø10 / Ø15 | C  | D<br>Ø10 / Ø15 | E<br>Ø10 / Ø15 | Kg  |
| 01200100           | M8 15.04.08 R           | R                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200200           | M8 15.04.08 L           | L                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200300           | M8 15.04.10 R           | R                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200400           | M8 15.04.10 L           | L                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200500           | M8 15.04.12 R           | R                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200600           | M8 15.04.12 L           | L                  | Ø 3-50 / Ø 3-100      | 10x4x4 / 15x4x4 | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200700           | M8 15.05.08 R           | R                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200800           | M8 15.05.08 L           | L                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01200900           | M8 15.05.10 R           | R                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201000           | M8 15.05.10 L           | L                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201100           | M8 15.05.12 R           | R                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201200           | M8 15.05.12 L           | L                  | Ø 3-50 / Ø 3-100      | 10x5x4 / 15x5x4 | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201300           | M8 15.06.08 R           | R                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201400           | M8 15.06.08 L           | L                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 8  | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201500           | M8 15.06.10 R           | R                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201600           | M8 15.06.10 L           | L                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 10 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201700           | M8 15.06.12 R           | R                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01201800           | M8 15.06.12 L           | L                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 12 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01202300           | M8 15.06.16 R           | R                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 16 | 2 / 4.5        | 15 / 17.5      | 0.2 |
| 01202400           | M8 15.06.16 L           | L                  | Ø 3-100               | 15x6x4          | 96.5 / 99      | 16.5 / 19      | 16 | 2 / 4.5        | 15 / 17.5      | 0.2 |

### Repuesto | Spare Part

| Código<br>Code | Referencia<br>Reference |
|----------------|-------------------------|
| 01989701       | E 12.4 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



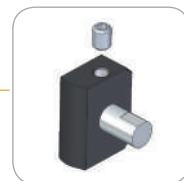
## M20

### + Características

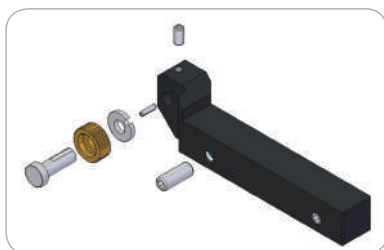
- Recomendado para moleteados tipo RAA
- Para moleteados hasta una cara lateral (Fig.1)
- Eje de HSS
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

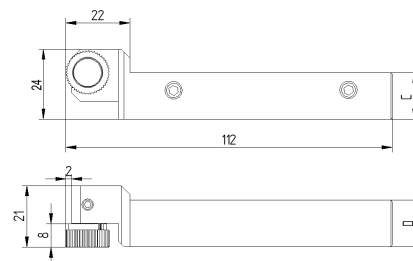
- Recommended for RAA type knurling
- For knurling up to a shoulder (Fig.1)
- HSS bushing
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



(Fig. 1)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |   |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  |   | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds |   | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01290300           | M20 15.06.10 R          | R                  | Ø 3-100               | 15x6x10/6       | 10 | 10 | 0.3 |
| 01290400           | M20 15.06.10 L          | L                  | Ø 3-100               | 15x6x10/6       | 10 | 10 | 0.3 |
| 01290500           | M20 15.06.12 R          | R                  | Ø 3-100               | 15x6x10/6       | 12 | 16 | 0.3 |
| 01290600           | M20 15.06.12 L          | L                  | Ø 3-100               | 15x6x10/6       | 12 | 16 | 0.3 |
| 01290700           | M20 15.06.16 R          | R                  | Ø 3-100               | 15x6x10/6       | 16 | 16 | 0.3 |
| 01290800           | M20 15.06.16 L          | L                  | Ø 3-100               | 15x6x10/6       | 16 | 16 | 0.3 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983220              | EAM20/M21               |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



## M4



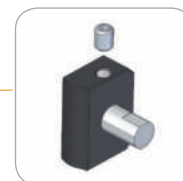
### Características

- Recomendado para moleteados tipo RAA
- Eje de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

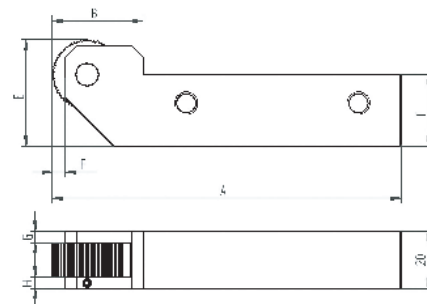
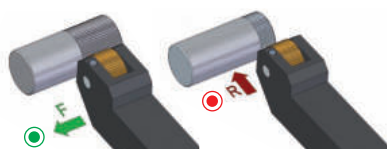


### Features

- Recommended for RAA type knurling
- Carbide pin
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



### Avance Feed



### Formas de moleteados realizables Feasible knurling forms

|                                     | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

### Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |     |      |    |    |      |     |     |     |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-----|------|----|----|------|-----|-----|-----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A   | B    | C  | D  | E    | F   | G   | H   | Kg  |
| 01041200           | M4 20.08.16             | R+L                | Ø 8-200               | 20x8x6          | 120 | 29,5 | 16 | 20 | 26   | 2,5 | 6   | 6   | 0,3 |
| 01041300           | M4 20.08.20             | R+L                | Ø 8-200               | 20x8x6          | 120 | 29,5 | 20 | 20 | 30   | 2,5 | 6   | 6   | 0,4 |
| 01041400           | M4 20.08.25             | R+L                | Ø 8-200               | 20x8x6          | 120 | 29,5 | 25 | 20 | 35   | 2,5 | 6   | 6   | 0,5 |
| 01041500           | M4 20.10.20             | R+L                | Ø 8-200               | 20x10x6         | 120 | 29,5 | 20 | 20 | 30   | 2,5 | 5   | 5   | 0,4 |
| 01041600           | M4 20.10.25             | R+L                | Ø 8-200               | 20x10x6         | 120 | 29,5 | 25 | 20 | 35   | 2,5 | 5   | 5   | 0,5 |
| 01041700           | M4 25.08.20             | R+L                | Ø 8-300               | 25x8x8          | 122 | 32   | 20 | 20 | 32,5 | 5   | 6   | 6   | 0,4 |
| 01041800           | M4 25.08.25             | R+L                | Ø 8-300               | 25x8x8          | 122 | 32   | 25 | 20 | 37,5 | 5   | 6   | 6   | 0,5 |
| 01041900           | M4 25.10.20             | R+L                | Ø 8-300               | 25x10x8         | 122 | 32   | 20 | 20 | 32,5 | 5   | 5   | 5   | 0,4 |
| 01042000           | M4 25.10.25             | R+L                | Ø 8-300               | 25x10x8         | 122 | 32   | 25 | 20 | 37,5 | 5   | 5   | 5   | 0,5 |
| 01042100           | M4 25.12.20             | R+L                | Ø 8-300               | 25x12x8         | 122 | 32   | 20 | 25 | 32,5 | 5   | 5,5 | 7,5 | 0,6 |
| 01042200           | M4 25.12.25             | R+L                | Ø 8-300               | 25x12x8         | 122 | 32   | 25 | 25 | 37,5 | 5   | 5,5 | 7,5 | 0,6 |

### Repuesto | Spare Part

| Código<br>Code | Referencia<br>Reference |
|----------------|-------------------------|
| 01990601       | E 20.6 HM               |
| 01986001       | E 20.8 HM               |
| 01992501       | E 25.8 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



**M10**

## + Características

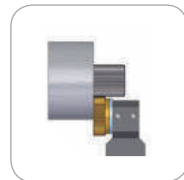
- Recomendado para moleteados tipo RAA
- Para moleteados hasta una cara lateral (Fig. 1)
- Eje de HSS
- Para trabajar a derechas o izquierdas (Fig. 2)
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango
- Provista de arandela de HSS para prevenir el desgaste de la herramienta

## + Features

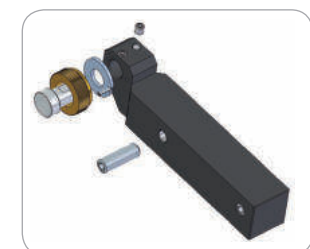
- Recommended for RAA type knurling
- For knurling up to a shoulder (Fig. 1)
- HSS bushing
- Able to fit on right-hand or left-hand (Fig. 2)
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank
- Supplied with a HSS hardened washer to prevent tool wearing



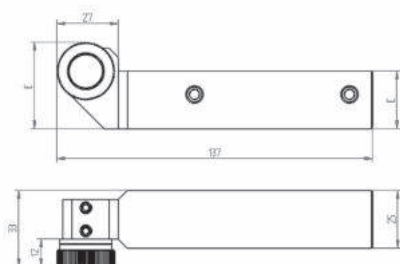
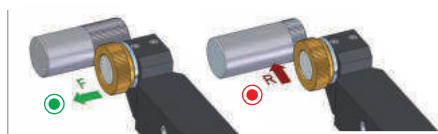
(Fig. 1)



(Fig. 2)



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | R | RAA     | RBL 30° | RBL 45° | RBR 30° | RBR 45° | RGE 30° | RGE 45° | RGV 30° | RGV 45° | RKE | RKV |
|-------------------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|-----|
| Tipo de moleteado<br>Knurling form  |   |         |         |         |         |         |         |         |         |         |     |     |
| Con moleta tipo<br>With knurl type  |   | AA      | BR 30°  | BR 45°  | BL 30°  | BL 45°  | GV 30°  | GV 45°  | GE 30°  | GE 45°  | KV  | KE  |
| Avances permitidos<br>Allowed feeds |   | F ● R ● | F ● R ● | F ● R ● | F ● R ● | F ● R ● | R ●     | R ●     | R ●     | R ●     | R ● | R ● |

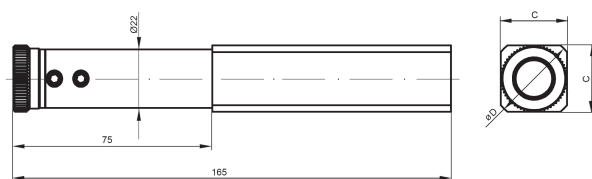
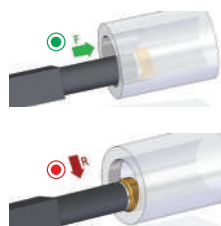
**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | E  | Kg  |
| 01070100           | M10 25.10.20            | R+L                | Ø 8-200               | 25x10x15/11     | 20 | 30 | 0.7 |
| 01070200           | M10 25.10.25            | R+L                | Ø 8-200               | 25x10x15/11     | 25 | 35 | 0.8 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983200              | EAM10                   |  |



- 



**R** **Moletados recomendados | Recommended knurling**

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01983200              | EAM10                   |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



## M15

### + Características

- Recomendado para moleteados tipo RKA
- Para moleteado frontal o cónico
- Cabeza portamoletas giratoria (Fig. 1)
- Eje de metal duro

### + Features

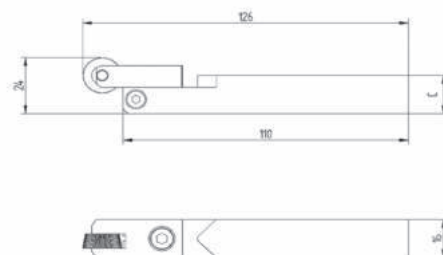
- Recommended for RKA type knurling
- For conical or face knurling
- Swivel tool head (Fig. 1)
- Carbide pin



(Fig. 1)



### + Avance Feed

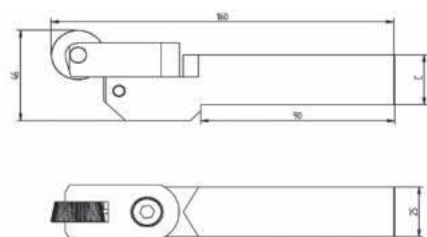


Modelo M15 15

### + Formas de moleteados realizables Feasible knurling forms

|                                     | R    |          |          |  |
|-------------------------------------|------|----------|----------|--|
|                                     | RKAA | RKBL 30° | RKBR 30° |  |
| Tipo de moleteado<br>Knurling form  |      |          |          |  |
| Con moleta tipo<br>With knurl type  | KA   | KBR 30°  | KBL 30°  |  |
| Avances permitidos<br>Allowed feeds | R    | R        | R        |  |

**R** Moleteados recomendados | Recommended knurling



Modelo M15 25

| Herramienta   Tool |                         |                    |                       |                          |    |     |
|--------------------|-------------------------|--------------------|-----------------------|--------------------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta*<br>Knurl*        | C  | Kg  |
| 01150100           | M15 15.06.12            | R+L                | Ø 3-100               | 15x6x4 (cónica/conical)  | 12 | 0,3 |
| 01150200           | M15 15.06.16            | R+L                | Ø 3-100               | 15x6x4 (cónica/conical)  | 16 | 0,3 |
| 01150300           | M15 25.08.20            | R+L                | Ø 8-300               | 25x8x8 (cónica/conical)  | 20 | 0,6 |
| 01150400           | M15 25.08.25            | R+L                | Ø 8-300               | 25x8x8 (cónica/conical)  | 25 | 0,8 |
| 01150500           | M15 25.10.20            | R+L                | Ø 8-300               | 25x10x8 (cónica/conical) | 20 | 0,6 |
| 01150600           | M15 25.10.25            | R+L                | Ø 8-300               | 25x10x8 (cónica/conical) | 25 | 0,8 |
| 01150700           | M15 25.12.20            | R+L                | Ø 8-300               | 25x12x8 (cónica/conical) | 20 | 0,8 |
| 01150800           | M15 25.12.25            | R+L                | Ø 8-300               | 25x12x8 (cónica/conical) | 25 | 0,8 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01982200              | E 16.4 HM               |  |
| 01992501              | E 25.8 HM               |  |

\*Dimensiones aproximadas / Approximate sizes



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



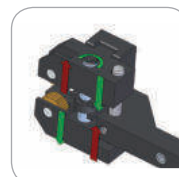
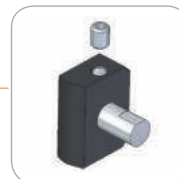
## M12

### + Características

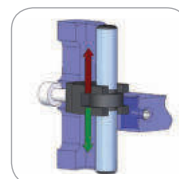
- Recomendado para moleteados tipo RGE en piezas de pequeño diámetro
- Menor riesgo de flexión de la pieza al no ejercer presión radial
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 2)
- Ajuste y centrado de las moletas sobre la pieza mediante husillo roscado (Fig. 1)
- Ejes de metal duro
- Superficie de los brazos endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

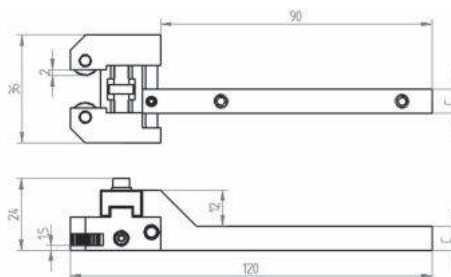
- Recommended for RGE type knurling on small diameter workpieces
- Lower risk of bending the workpiece as tool does not make radial pressure
- Self-centering system to compensate a possible misalignment of the lathe turret (Fig. 2)
- Knurls self-centering by threaded spindle (Fig. 1)
- Carbide pins
- Anti-wearing treatment of the arms surface.
- Adjustment of tool clearance angle by threaded studs integrated in the shank



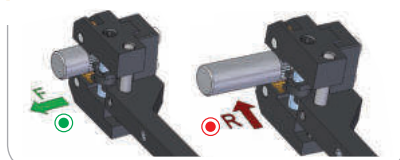
(Fig. 1)



(Fig. 2)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | <sup>R</sup><br>RGE 30° | <sup>R</sup><br>RGE 45° |
|-------------------------------------|-------|-------------------------|-------------------------|
| Tipo de moleteado<br>Knurling form  |       |                         |                         |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30°           | BL45° + BR45°           |
| Avances permitidos<br>Allowed feeds | F  R  | F  R                    | F  R                    |

<sup>R</sup> Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | Kg  |
| 01120700           | M12 10.04.10 R          | R                  | Ø 1-12                | 10x4x4          | 10 | 0.2 |
| 01120800           | M12 10.04.10 L          | L                  | Ø 1-12                | 10x4x4          | 10 | 0.2 |
| 01120900           | M12 10.04.12 R          | R                  | Ø 1-12                | 10x4x4          | 12 | 0.2 |
| 01121000           | M12 10.04.12 L          | L                  | Ø 1-12                | 10x4x4          | 12 | 0.2 |
| 01121100           | M12 10.04.16 R          | R                  | Ø 1-12                | 10x4x4          | 16 | 0.2 |
| 01121200           | M12 10.04.16 L          | L                  | Ø 1-12                | 10x4x4          | 16 | 0.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01989701              | E 12.4 HM               |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



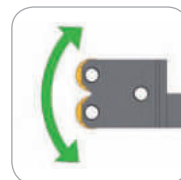
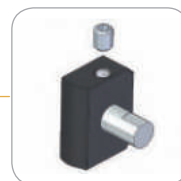
M9

## + Características

- Recomendado para moleteados tipo RGE
- Cabeza basculante para el autocentrado de las moletas sobre la pieza (Fig. 1)
- Cabeza reversible para trabajar a derechas o izquierdas (Fig. 2)
- Ejes de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

## + Features

- Recommended for RGE type knurling
- Pivoting head for knurls self-centering (Fig. 1)
- Tool with reversible head able to fit on left-hand or right-hand lathes (Fig. 2)
- Carbide pins
- Anti-wearing treatment surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



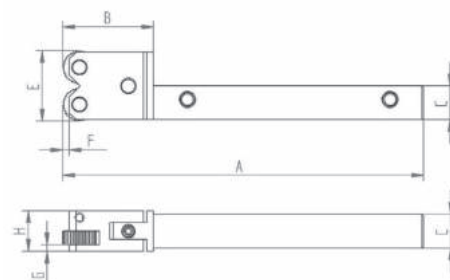
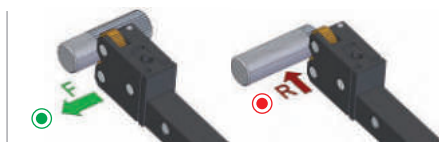
(Fig. 1)



(Fig. 2)



## + Avance Feed



## + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA     | RGE 30°       | RGE 45°       |
|-------------------------------------|---------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |         |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA   | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F ● R ● | F ● R ●       | F ● R ●       |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |      |    |    |   |   |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|------|----|----|---|---|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A     | B    | C  | E  | F | G | H  | Kg  |
| 01180100           | M9 10.04.08             | R+L                | Ø 3-50                | 10x4x4          | 107   | 27   | 8  | 21 | 2 | 2 | 12 | 0.1 |
| 01180200           | M9 10.04.10             | R+L                | Ø 3-50                | 10x4x4          | 107   | 27   | 10 | 21 | 2 | 2 | 12 | 0.1 |
| 01180300           | M9 10.04.12             | R+L                | Ø 3-50                | 10x4x4          | 107   | 27   | 12 | 21 | 2 | 2 | 12 | 0.1 |
| 01180400           | M9 15.04.16             | R+L                | Ø 5-100               | 15x4x4          | 130.5 | 40.5 | 16 | 32 | 2 | 3 | 16 | 0.1 |
| 01180500           | M9 15.05.16             | R+L                | Ø 5-100               | 15x5x4          | 130.5 | 40.5 | 16 | 32 | 2 | 3 | 16 | 0.1 |
| 01180600           | M9 15.06.16             | R+L                | Ø 5-100               | 15x6x4          | 130.5 | 40.5 | 16 | 32 | 2 | 3 | 16 | 0.1 |

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01989701              | E 12.4 HM               |
| 01982200              | E 16.4 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



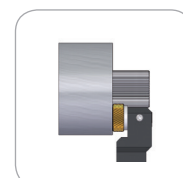
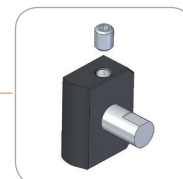
## M21

### + Características

- Recomendado para moleteados tipo RGE
- Para moleteados hasta una cara lateral (Fig. 1)
- Eje de HSS
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango
- Provista de arandela de HSS para prevenir el desgaste de la herramienta

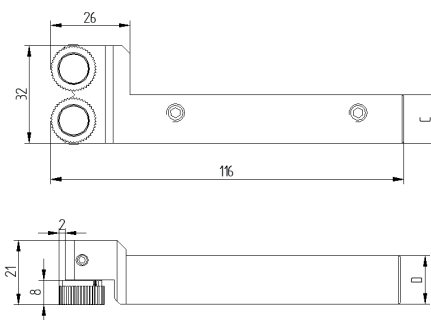
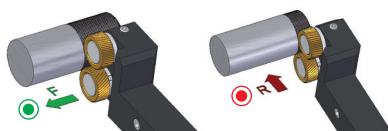
### + Features

- Recommended for RGE type knurling
- For knurling up to a shoulder (Fig. 1)
- HSS bushing
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank
- Supplied with a HSS hardened washer to prevent tool wearing



(Fig. 1)

### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | RGE 30°       | RGE 45°       |
|-------------------------------------|-------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |       |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F  R  | F  R          | F  R          |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01280300           | M21 15.06.10 R          | R                  | Ø 5-100               | 15x6x10/6       | 10 | 10 | 0.4 |
| 01280400           | M21 15.06.10 L          | L                  | Ø 5-100               | 15x6x10/6       | 10 | 10 | 0.4 |
| 01280500           | M21 15.06.12 R          | R                  | Ø 5-100               | 15x6x10/6       | 12 | 16 | 0.4 |
| 01280600           | M21 15.06.12 L          | L                  | Ø 5-100               | 15x6x10/6       | 12 | 16 | 0.4 |
| 01280700           | M21 15.06.16 R          | R                  | Ø 5-100               | 15x6x10/6       | 16 | 16 | 0.4 |
| 01280800           | M21 15.06.16 L          | L                  | Ø 5-100               | 15x6x10/6       | 16 | 16 | 0.4 |

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01983220              | EAM20/M21               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



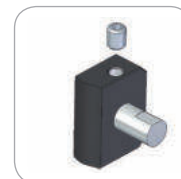
## M5

### + Características

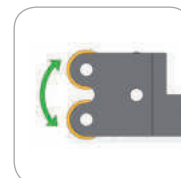
- Recomendado para moleteados tipo RGE
- Cabeza basculante para el autocentrado de las moletas sobre la pieza (Fig. 1)
- Cabeza reversible para trabajar a derechas o izquierdas (Fig. 2)
- Ejes de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

- Recommended for RGE type knurling
- Pivoting head for knurls self-centering (Fig. 1)
- Tool with reversible head able to fit on left-hand or right-hand lathes (Fig. 2)
- Carbide pins
- Anti-wearing treatment surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



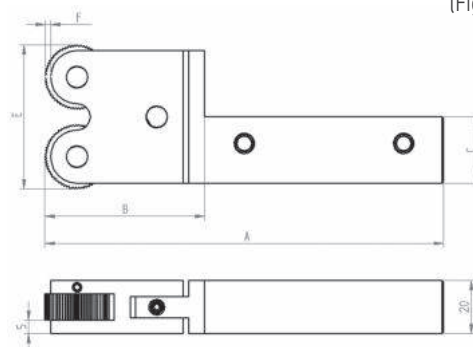
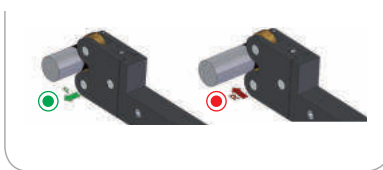
(Fig. 1)



(Fig. 2)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA     | RGE 30°       | RGE 45°       |
|-------------------------------------|---------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |         |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA   | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F ● R ● | F ● R ●       | F ● R ●       |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |    |    |    |     |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|----|----|----|-----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A     | B  | C  | E  | F   | Kg  |
| 01050700           | M5 20.08.20             | R+L                | Ø 8-200               | 20x8x6          | 139,5 | 49 | 20 | 42 | 2.5 | 1.0 |
| 01050800           | M5 20.08.25             | R+L                | Ø 8-200               | 20x8x6          | 139,5 | 49 | 25 | 42 | 2.5 | 1.0 |
| 01050900           | M5 20.10.20             | R+L                | Ø 8-200               | 20x10x6         | 139,5 | 49 | 20 | 42 | 2.5 | 1.0 |
| 01051000           | M5 20.10.25             | R+L                | Ø 8-200               | 20x10x6         | 139,5 | 49 | 25 | 42 | 2.5 | 1.0 |
| 01050100           | M5 25.08.20             | R+L                | Ø 8-300               | 25x8x8          | 150   | 60 | 20 | 55 | 2.5 | 1.0 |
| 01050200           | M5 25.08.25             | R+L                | Ø 8-300               | 25x8x8          | 150   | 60 | 25 | 55 | 2.5 | 1.0 |
| 01050300           | M5 25.10.20             | R+L                | Ø 8-300               | 25x10x8         | 150   | 60 | 20 | 55 | 2.5 | 1.0 |
| 01050400           | M5 25.10.25             | R+L                | Ø 8-300               | 25x10x8         | 150   | 60 | 25 | 55 | 2.5 | 1.0 |

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01990601              | E 20.6 HM               |
| 01986001              | E 20.8 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



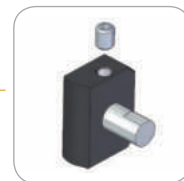
## M11

### + Características

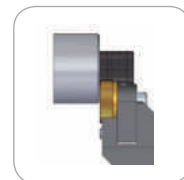
- Recomendado para moleteados tipo RGE
- Para moleteados hasta una cara lateral (Fig. 1)
- Cabeza basculante para el autocentrado de las moletas sobre la pieza (Fig. 2)
- Ejes de HSS
- Superficie endurecida para una mayor resistencia al desgaste
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

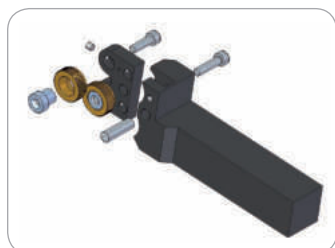
- Recommended for RGE type knurling
- For knurling up to a shoulder (Fig. 1)
- Pivoting head for knurls self-centering (Fig. 2)
- HSS bushings
- Anti-wearing treatment of the tool surface
- Adjustment of tool clearance angle by threaded studs integrated in the shank



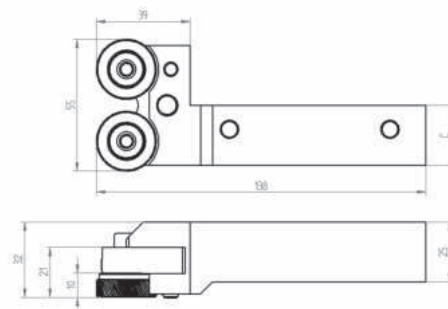
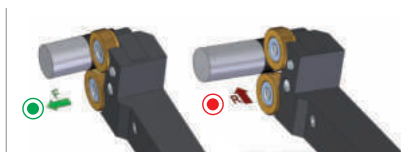
(Fig. 1)



(Fig. 2)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | <sup>R</sup><br>RGE 30° | <sup>R</sup><br>RGE 45° |
|-------------------------------------|-------|-------------------------|-------------------------|
| Tipo de moleteado<br>Knurling form  |       |                         |                         |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30°           | BL45° + BR45°           |
| Avances permitidos<br>Allowed feeds | F  R  | F  R                    | F  R                    |

<sup>R</sup> Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | Kg  |
| 01080100           | M11 25.10.20 R          | R                  | Ø 8-200               | 25x10x15/11     | 20 | 1.0 |
| 01080200           | M11 25.10.20 L          | L                  | Ø 8-200               | 25x10x15/11     | 20 | 1.0 |
| 01080300           | M11 25.10.25 R          | R                  | Ø 8-200               | 25x10x15/11     | 25 | 1.2 |
| 01080400           | M11 25.10.25 L          | L                  | Ø 8-200               | 25x10x15/11     | 25 | 1.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983200              | EAM10                   |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



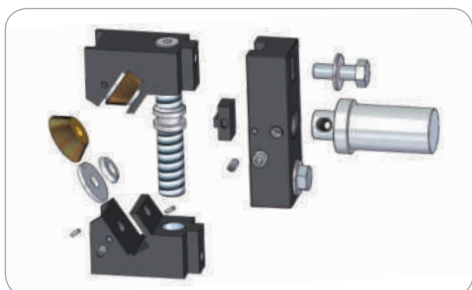
## M16

### + Características

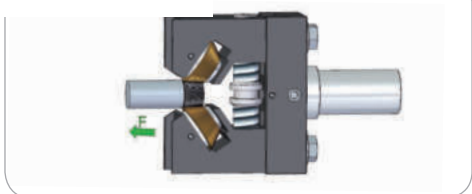
- Recomendado para moleteados tipo RKAA
- Especial para moleteado según DIN-72783
- Menor riesgo de flexión de la pieza al no ejercer presión radial
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 1)
- Ajuste y centrado de las moletas sobre la pieza mediante husillo roscado (Fig. 2)
- Ejes de metal duro
- Provista de arandelas de HSS para evitar el desgaste de los brazos portamoletas

### + Features

- Recommended for RKAA type knurling
- Specially designed for knurling according to DIN-72783
- Lower risk of bending the workpiece as tool does not make radial pressure
- Self-centering system to compensate a possible misalignment of the lathe turret (Fig. 1)
- Knurls self-centering by threaded spindle (Fig. 2)
- Carbide pins
- Supplied with HSS hardened washers to prevent arms wearing



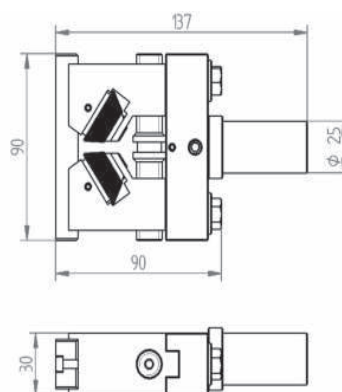
### + Avance Feed



(Fig. 1)



(Fig. 2)



### + Formas de moleteados realizables Feasible knurling forms

|                                     | RKAA      | <sup>R</sup> RKGE 30° | <sup>R</sup> RKGE 45° |
|-------------------------------------|-----------|-----------------------|-----------------------|
| Tipo de moleteado<br>Knurling form  |           |                       |                       |
| Con moleta tipo<br>With knurl type  | KAA + KAA | KBL30° + KBR30°       | KBL45° + KBR45°       |
| Avances permitidos<br>Allowed feeds | F         | F                     | F                     |

<sup>R</sup> Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                   |     |
|--------------------|-------------------------|--------------------|-----------------------|-------------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl   | Kg  |
| 01210100           | M16                     | R+L                | Ø 1 - 12              | Cónica<br>Conical | 1.5 |

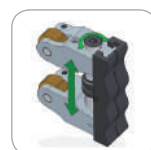
| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01981700              | EM16 HM                 |  |



- 



(Fig. 1)

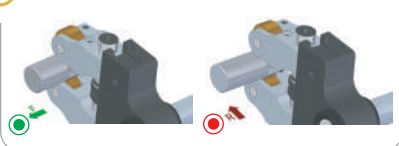
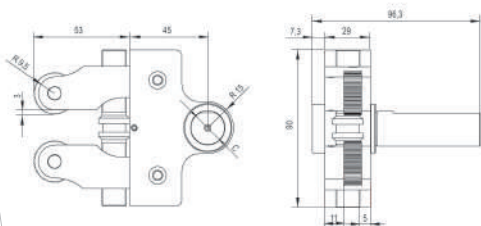
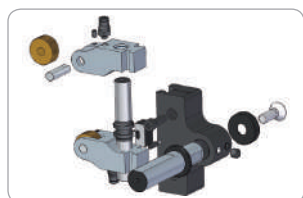


(Fig. 2)



- 
- Brazos posición 1**  
Arms position 1
- Brazos posición 2**  
Arms position 2

(Fig. 3)



|                                            | RAA                                                                                                                                                                             | RGE 30°                                                                                                                                                                         | RGE 45°                                                                                                                                                                         |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tipo de moleteado</b><br>Knurling form  |                                                                                            |                                                                                            |                                                                                            |
| <b>Con moleta tipo</b><br>With knurl type  | AA+AA                                                                                                                                                                           | BL30° + BR30°                                                                                                                                                                   | BL45° + BR45°                                                                                                                                                                   |
| <b>Avances permitidos</b><br>Allowed feeds | F  R  | F  R  | F  R  |



| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01990800              | E 26.8 HM               |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



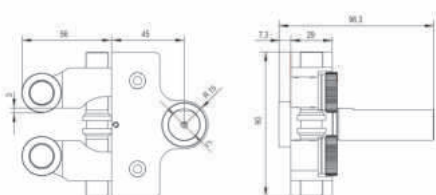
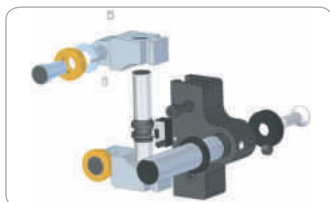
## M22-B

### + Características

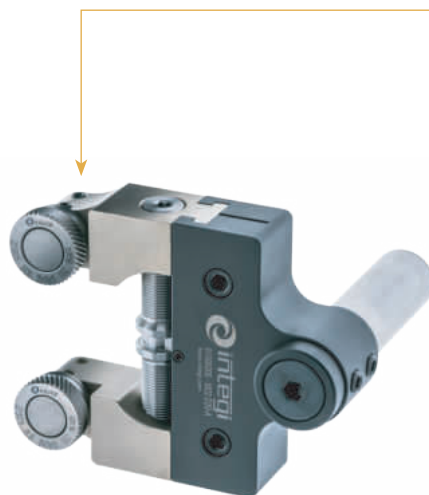
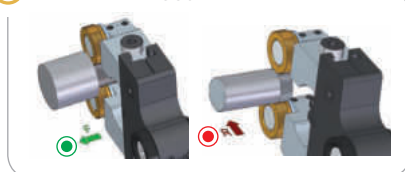
- Recomendado para moleteados tipo RGE en piezas de pequeño diámetro
- Menor riesgo de flexión de la pieza al no ejercer presión radial
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 1)
- Ajuste y centrado de las moletas sobre la pieza mediante husillo roscado (Fig. 2)
- Superficie de los brazos endurecida para una mayor resistencia al desgaste
- Para moleteados hasta una cara lateral (Fig.3)
- Invertir la posición de los brazos según el Ø de la pieza a moletear (Fig.4)

### + Features

- Recommended for RGE type knurling on small diameter workpieces
- Lower risk of bending the workpiece as tool does not make radial pressure
- Self-centering system to compensate a possible misalignment of the lathe turret (Fig. 1)
- Knurls self-centering by threaded spindle (Fig. 2)
- Anti-wearing treatment of the arms surface
- For knurling up to a shoulder (Fig.3)
- The position of the arms must be reversed depending on the Ø to be knurled (Fig. 4)



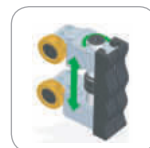
### + Avance Feed



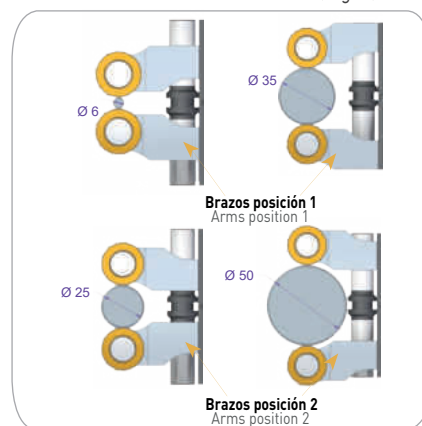
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

### + Formas de moleteados realizables

### Feasible knurling forms

|                                     | RAA   | RGE 30°       | RGE 45°       |
|-------------------------------------|-------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |       |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F  R  | F  R          | F  R          |

### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C     | Kg  |
| 01300101           | M22 D3/4"-B             | R+L                | Ø 6-50 mm             | 25x10x15/11     | 19.05 | 1.7 |
| 01300201           | M22 D20-B               | R+L                | Ø 6-50 mm             | 25x10x15/11     | 20    | 1.7 |
| 01300301           | M22 D22-B               | R+L                | Ø 6-50 mm             | 25x10x15/11     | 22    | 1.7 |
| 01300401           | M22 D25-B               | R+L                | Ø 6-50 mm             | 25x10x15/11     | 25    | 1.7 |
| 01300501           | M22 D1"-B               | R+L                | Ø 6-50 mm             | 25x10x15/11     | 25.4  | 1.7 |

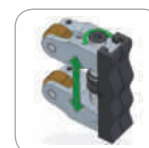
| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983200              | EAM10                   |  |



- 
- A detailed close-up of the tool head of the Integri M23 25 R-A. The image shows the upper assembly with a gear mechanism. An orange arrow points to a small hole on the side of the upper gear housing. The 'integri' logo is visible on the side of the main body, along with the model number 'M23 25 R-A' and '013 10.101'. The website 'www.integri.com' is also printed at the bottom of the side plate.



(Fig. 1)

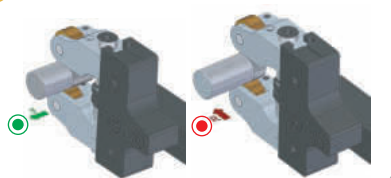
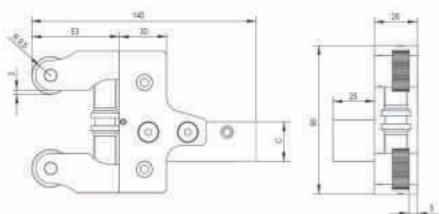
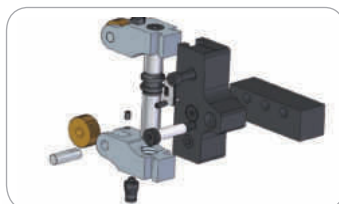


(Fig. 2)



- 
- Brazos posición 1**  
Arms position 1
- Brazos posición 2**  
Arms position 2

(Fig. 3)



**R Moleteados recomendados | Recommended knurling**

| Repuesto   Spare Part |                         |                                                                                       |
|-----------------------|-------------------------|---------------------------------------------------------------------------------------|
| Código<br>Code        | Referencia<br>Reference |                                                                                       |
| 01990800              | E 26.8 HM               |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



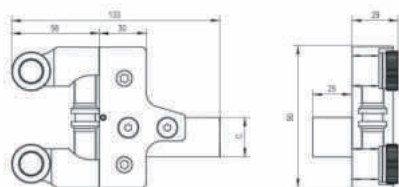
## M23-B

### + Características

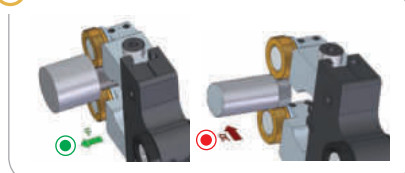
- Recomendado para moleteados tipo RGE en piezas de pequeño diámetro
- Menor riesgo de flexión de la pieza al no ejercer presión radial
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 1)
- Ajuste y centrado de las moletas sobre la pieza mediante husillo roscado (Fig. 2)
- Superficie de los brazos endurecida para una mayor resistencia al desgaste
- Con brazos modelo B para moleteados hasta una cara. (Fig. 3)
- Invertir la posición de los brazos según el Ø de la pieza a moletear (Fig. 4)

### + Features

- Recommended for RGE type knurling on small diameter workpieces
- Lower risk of bending the workpiece as tool does not make radial pressure
- Self-centering system to compensate a possible misalignment of the lathe turret (Fig. 1)
- Knurls self-centering by threaded spindle (Fig. 2)
- Anti-wearing treatment of the arms surface
- With B type arms for knurling up to a shoulder (Fig. 4)



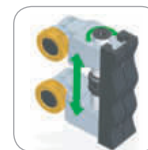
### + Avance Feed



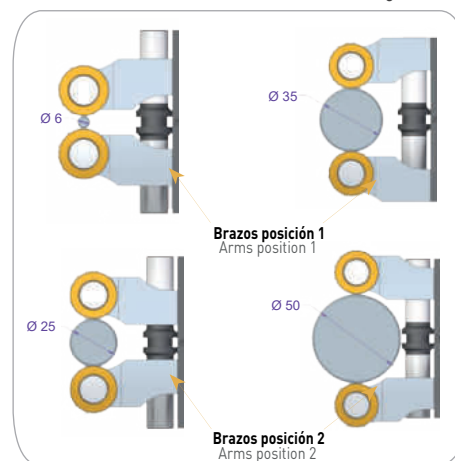
(Fig. 1)



(Fig. 2)



(Fig. 3)



(Fig. 4)

### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA   | RGE 30°       | RGE 45°       |
|-------------------------------------|-------|---------------|---------------|
| Tipo de moleteado<br>Knurling form  |       |               |               |
| Con moleta tipo<br>With knurl type  | AA+AA | BL30° + BR30° | BL45° + BR45° |
| Avances permitidos<br>Allowed feeds | F  R  | F  R          | F  R          |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | Kg  |
| 01310101           | M23 20 R-B              | R                  | Ø 6-50                | 25x10x15/11     | 20 | 1,7 |
| 01310201           | M23 20 L-B              | L                  | Ø 6-50                | 25x10x15/11     | 20 | 1,7 |
| 01310301           | M23 25 R-B              | R                  | Ø 6-50                | 25x10x15/11     | 25 | 1,7 |
| 01310401           | M23 25 L-B              | L                  | Ø 6-50                | 25x10x15/11     | 25 | 1,7 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983200              | EAM10                   |  |



# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



## M17 10 / M17 20

### + Características

- Recomendado para moleteados tipo RAA y RGE
- Ataque frontal mediante 3 garras de ajuste simultaneo (Fig. 1)
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 2)
- Ejes de metal duro
- Superficie endurecida para una mayor resistencia al desgaste

### + Features

- Recommended for RAA and RGE type knurling
- Frontal feeding by means of 3 jaws simultaneously adjusted (Fig. 1)
- Self-centering system to compensate a possible misalignment of the lathe turret (Fig. 2)
- Carbide pins
- Anti-wearing treatment of the tool surface



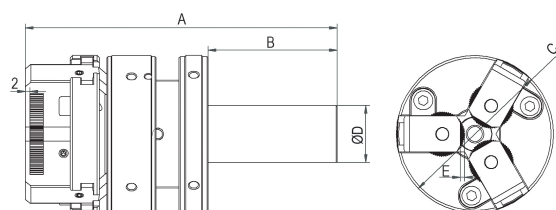
(Fig. 1)



(Fig. 2)



### + Avance Feed



### LONGITUD MÁXIMA DE MOLETEADO (mm) MAXIMUM KNURLING LENGTH (mm)

| Modelo<br>Model | Ø Pieza<br>Piece Ø | Longitud (mm)<br>Length (mm) |
|-----------------|--------------------|------------------------------|
| M17 10          | <10                | 40                           |
|                 | <14                | 69                           |
| M17 20          | >14<21             | 37                           |
|                 | >21<30             | 17                           |

### + Formas de moleteados realizables Feasible knurling forms

|                                     | RAA      | RGE 30°               | RGE 45°               |
|-------------------------------------|----------|-----------------------|-----------------------|
| Tipo de moleteado<br>Knurling form  |          |                       |                       |
| Con moleta tipo<br>With knurl type  | AA+AA+AA | BL30° + BR30° + BR30° | BL45° + BR45° + BR45° |
| Avances permitidos<br>Allowed feeds | F        | F                     | F                     |

**R** Moleteados recomendados | Recommended knurlings

### Herramienta | Tool

| Código<br>Code | Referencia<br>Reference | Capacidad<br>Capacity | Moleta<br>Knurl | A   | B    | C  | D     | E   | Kg  |
|----------------|-------------------------|-----------------------|-----------------|-----|------|----|-------|-----|-----|
| 01170300       | M17 10.04.1/2"          | Ø 3-10 mm             | 10x4x4          | 107 | 57,5 | 44 | 12,7  | 1,5 | 1,0 |
| 01170100       | M17 10.04.16            | Ø 3-10 mm             | 10x4x4          | 107 | 57,5 | 44 | 16    | 1,5 | 1,0 |
| 01170500       | M17 20.06.3/4"          | Ø 5-30 mm             | 20x6x6          | 139 | 57,5 | 70 | 19,05 | 2,0 | 1,4 |
| 01170200       | M17 20.06.20            | Ø 5-30 mm             | 20x6x6          | 139 | 57,5 | 70 | 20    | 2,0 | 1,4 |
| 01170600       | M17 20.06.22            | Ø 5-30 mm             | 20x6x6          | 139 | 57,5 | 70 | 22    | 2,0 | 1,5 |
| 01170700       | M17 20.06.25            | Ø 5-30 mm             | 20x6x6          | 139 | 57,5 | 70 | 25    | 2,0 | 1,5 |
| 01170400       | M17 20.06.1"            | Ø 5-30 mm             | 20x6x6          | 139 | 57,5 | 70 | 25,4  | 2,0 | 1,5 |

### Repuesto | Spare Part

| Código<br>Code | Referencia<br>Reference |
|----------------|-------------------------|
| 01981800       | EM17 10.04 HM           |
| 01998201       | EM17 20.06 HM           |





# MOLETEADORES POR DEFORMACIÓN FORM-KNURLING TOOLS



## M17 15 / M17 25



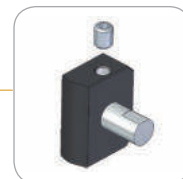
### Características

- Recomendado para moleteados tipo RAA y RGE
- Ataque frontal mediante 3 garras de ajuste simultaneo (Fig. 1)
- Sistema de centrado para compensar un posible desalineamiento del torno (Fig. 2)
- Ejes de metal duro
- Superficie endurecida para una mayor resistencia al desgaste
- Para moleteados hasta una cara lateral (Fig.3)

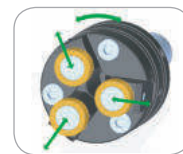


### Features

- Recommended for RAA and RGE type knurling
- Frontal feeding by means of 3 jaws simultaneously adjusted (Fig. 1)
- Self - centering system to compensate a misalignment of the lathe turret (Fig. 2)
- Carbide pins
- Anti-wearing treatment of the tool surface
- For knurling up to a shoulder (Fig.3)



(Fig. 1)



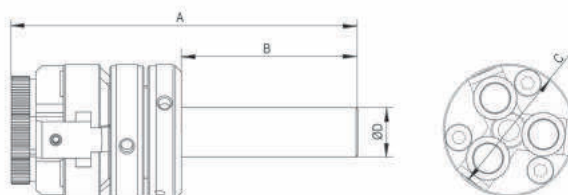
(Fig. 2)



(Fig. 3)



### Avance Feed



### LONGITUD MÁXIMA DE MOLETEADO (mm) MAXIMUM KNURLING LENGTH (mm)

| Modelo<br>Model | Ø Pieza<br>Piece Ø | Longitud (mm)<br>Length (mm) |
|-----------------|--------------------|------------------------------|
| M17 15          | <10                | 40                           |
|                 | <14                | 69                           |
| M17 25          | >14<21             | 37                           |
|                 | >21<30             | 17                           |



### Formas de moleteados realizables

### Feasible knurling forms

|                                     | RAA      | RGE 30°               | RGE 45°               |
|-------------------------------------|----------|-----------------------|-----------------------|
| Tipo de moleteado<br>Knurling form  |          |                       |                       |
| Con moleta tipo<br>With knurl type  | AA+AA+AA | BL30° + BR30° + BR30° | BL45° + BR45° + BR45° |
| Avances permitidos<br>Allowed feeds | F        | F                     | F                     |

Moleteados recomendados | Recommended knurlings

| Herramienta   Tool |                         |                       |                 |     |      |    |       |     |
|--------------------|-------------------------|-----------------------|-----------------|-----|------|----|-------|-----|
| Código<br>Code     | Referencia<br>Reference | Capacidad<br>Capacity | Moleta<br>Knurl | A   | B    | C  | D     | Kg  |
| 01170301           | M17 15.06.1/2"          | Ø 4-10 mm             | 15x6x10/6       | 113 | 57,5 | 44 | 12,7  | 1,0 |
| 01170101           | M17 15.06.16            | Ø 4-10 mm             | 15x6x10/6       | 113 | 57,5 | 44 | 16    | 1,0 |
| 01170501           | M17 25.10.3/4"          | Ø 6-30 mm             | 25x10x15/11     | 149 | 57,5 | 70 | 19,05 | 1,4 |
| 01170201           | M17 25.10.20            | Ø 6-30 mm             | 25x10x15/11     | 149 | 57,5 | 70 | 20    | 1,4 |
| 01170601           | M17 25.10.22            | Ø 6-30 mm             | 25x10x15/11     | 149 | 57,5 | 70 | 22    | 1,5 |
| 01170701           | M17 25.10.25            | Ø 6-30 mm             | 25x10x15/11     | 149 | 57,5 | 70 | 25    | 1,5 |
| 01170401           | M17 25.10.1"            | Ø 6-30 mm             | 25x10x15/11     | 149 | 57,5 | 70 | 25,4  | 1,5 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01983220              | EM20/M21                |  |
| 01983200              | EAM10                   |  |



## MOLETEADORES POR CORTE CUT-KNURLING TOOLS



### MFS 89

#### + Características

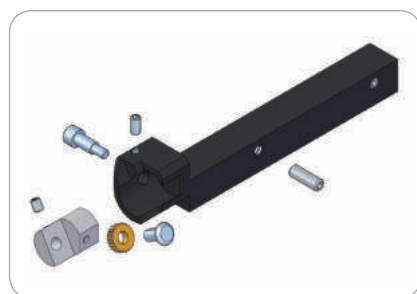
- Recomendado para moleteados tipo RAA
- Cabeza basculante para el alineamiento de la moleta (Fig. 1)
- Eje de HSS
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

#### + Features

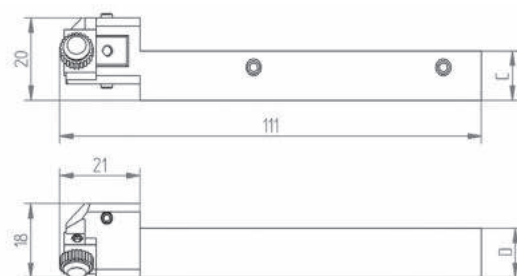
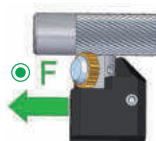
- Recommended for RAA type knurling
- Pivoting head for knurl alignment (Fig. 1)
- HSS bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



(Fig. 1)



#### + Avance Feed



#### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                              | RBR 30° | R<br>RAA                               | RBL 30° |
|-------------------------------------|---------------------------------------|---------|----------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                       |         |                                        |         |
| Con moleta tipo<br>With knurl type  | BR30°                                 | AA      | BL30°                                  | AA      |
| Con herramienta<br>With tool        | Versión derecha R<br>Right - handed R |         | Versión izquierda L<br>Left - handed L |         |
| Avances permitidos<br>Allowed feeds | F                                     | F       | F                                      | F       |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01090900           | MFS 89.25.08 R          | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 8  | 8  | 0.2 |
| 01091000           | MFS 89.25.08 L          | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 8  | 8  | 0.2 |
| 01091100           | MFS 89.25.10 R          | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 10 | 10 | 0.2 |
| 01091200           | MFS 89.25.10 L          | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 10 | 10 | 0.2 |
| 01091300           | MFS 89.25.12 R          | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 12 | 12 | 0.2 |
| 01091400           | MFS 89.25.12 L          | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 12 | 12 | 0.2 |

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01993300              | ES 89.25 HSS            |





# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



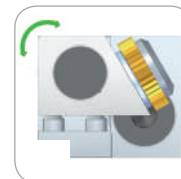
## MFS1 14

### + Características

- Recomendado para moleteados tipo RAA
- Cabeza basculante para el alineamiento de la moleta (Fig. 1)
- Eje de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

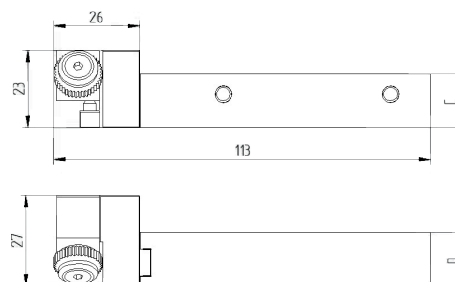
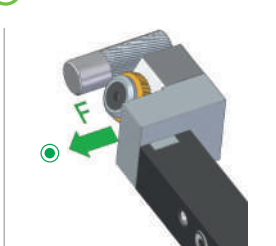
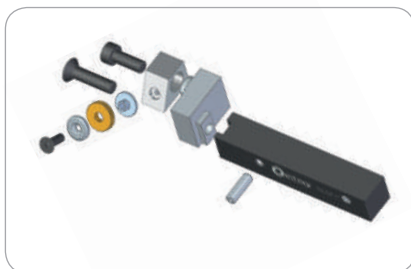
- Recommended for RAA type knurling
- Pivoting head for knurl alignment (Fig. 1)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



(Fig. 1)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                              | RBR 30° | R<br>RAA                               | RBL 30° |
|-------------------------------------|---------------------------------------|---------|----------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                       |         |                                        |         |
| Con moleta tipo<br>With knurl type  | BR30°                                 | AA      | BL30°                                  | AA      |
| Con herramienta<br>With tool        | Versión derecha R<br>Right - handed R |         | Versión izquierda L<br>Left - handed L |         |
| Avances permitidos<br>Allowed feeds | F                                     | F       | F                                      | F       |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01260100           | MFS1 14.53.12 R         | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 14 | 0.3 |
| 01260200           | MFS1 14.53.12 L         | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 14 | 0.3 |
| 01260300           | MFS1 14.53.14 R         | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 14 | 0.3 |
| 01260400           | MFS1 14.53.14 L         | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 14 | 0.3 |
| 01260500           | MFS1 14.53.16 R         | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.3 |
| 01260600           | MFS1 14.53.16 L         | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.3 |

| Repuesto   Spare Part |                         |
|-----------------------|-------------------------|
| Código<br>Code        | Referencia<br>Reference |
| 01985600              | EAT 14.53               |





## MOLETEADORES POR CORTE CUT-KNURLING TOOLS



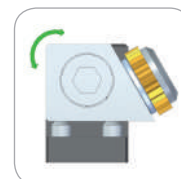
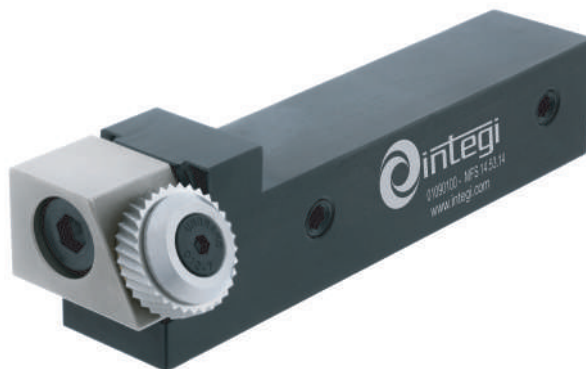
### MFS 14

#### + Características

- Recomendado para moleteados tipo RAA
- Cabeza basculante para el alineamiento de la moleta [Fig. 1]
- Cabeza reversible para trabajar a derechas o izquierdas [Fig. 2]
- Eje de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

#### + Features

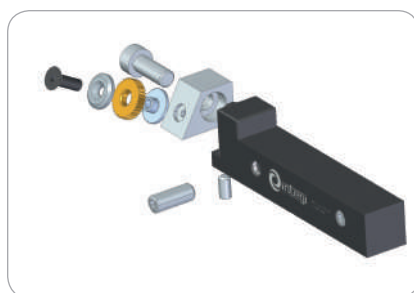
- Recommended for RAA type knurling
- Pivoting head for knurl alignment [Fig. 1]
- Tool with reversible head able to fit on left-hand or right-hand lathes [Fig. 2]
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



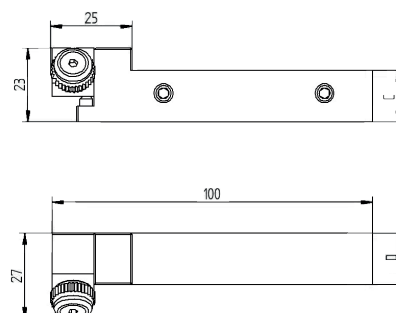
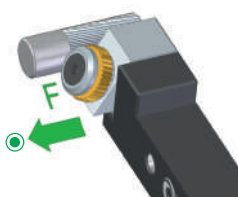
[Fig. 1]



[Fig. 2]



#### + Avance Feed



#### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                              | RBR 30° | R<br>RAA                               | RBL 30° |
|-------------------------------------|---------------------------------------|---------|----------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                       |         |                                        |         |
| Con moleta tipo<br>With knurl type  | BR30°                                 | AA      | BL30°                                  | AA      |
| Con herramienta<br>With tool        | Versión derecha R<br>Right - handed R |         | Versión izquierda L<br>Left - handed L |         |
| Avances permitidos<br>Allowed feeds | F                                     | F       | F                                      | F       |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01090500           | MFS 14.53.12            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 16 | 0.2 |
| 01090100           | MFS 14.53.14            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 16 | 0.2 |
| 01090200           | MFS 14.53.16            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985600              | EAT 14.53               |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



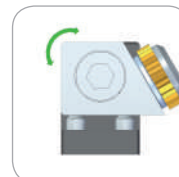
## MFS 21

### + Características

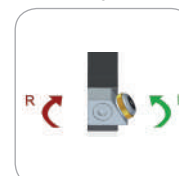
- Recomendado para moleteados tipo RAA
- Cabeza basculante para el alineamiento de la moleta (Fig. 1)
- Cabeza reversible para trabajar a derechas o izquierdas (Fig. 2)
- Eje de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

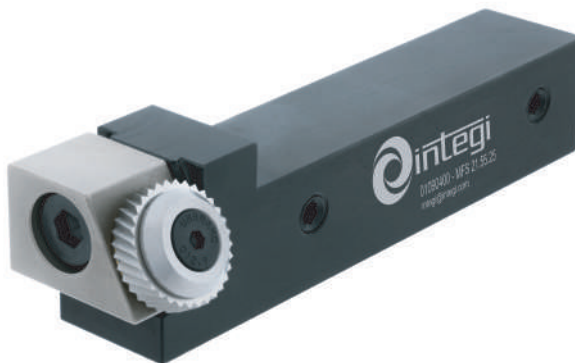
- Recommended for RAA type knurling
- Pivoting head for knurl alignment (Fig.1)
- Tool with reversible head able to fit on lefthand or right-hand lathes (Fig. 2)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



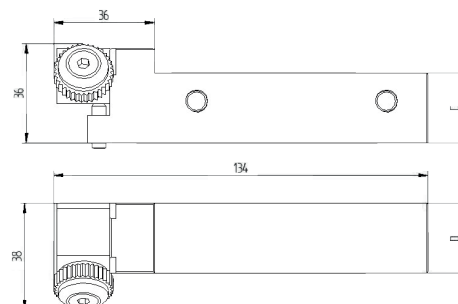
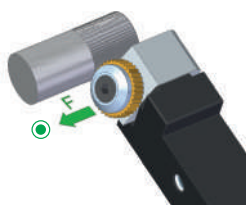
(Fig. 1)



(Fig. 2)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                              | RBR 30° | R<br>RAA                               | RBL 30° |
|-------------------------------------|---------------------------------------|---------|----------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                       |         |                                        |         |
| Con moleta tipo<br>With knurl type  | BR30°                                 | AA      | BL30°                                  | AA      |
| Con herramienta<br>With tool        | Versión derecha R<br>Right - handed R |         | Versión izquierda L<br>Left - handed L |         |
| Avances permitidos<br>Allowed feeds | F                                     | F       | F                                      | F       |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C     | D  | Kg  |
| 01091500           | MFS 21.55.3/4"          | R+L                | Ø 4 ÷ 250             | 21.5x5x8        | 19.05 | 25 | 0.8 |
| 01091600           | MFS 21.55.1"            | R+L                | Ø 4 ÷ 250             | 21.5x5x8        | 25.4  | 25 | 0.8 |
| 01090300           | MFS 21.55.20            | R+L                | Ø 4 ÷ 250             | 21.5x5x8        | 20    | 25 | 0.8 |
| 01090400           | MFS 21.55.25            | R+L                | Ø 4 ÷ 250             | 21.5x5x8        | 25    | 25 | 0.8 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985700              | EAT 21.55               |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



## MFS 32

### + Características

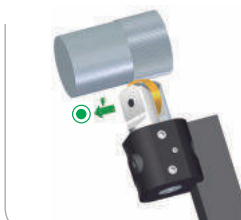
- Recomendado para moleteados tipo RAA
- Giro de la cabeza portamoletas mediante tornillo sin fin, para un alineamiento preciso de la moleta (Fig. 1)
- Cuerpo reversible para trabajar a derechas o a izquierdas (Fig. 2)
- Mínimo voladizo entre el amarre y el extremo de la moleta (Fig. 3)
- Máxima rigidez para garantizar una calidad excelente de moleteado.
- Posibilidad de moletear cualquier helice entre 0°-30° (Fig. 4)

### + Features

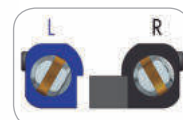
- Recommended for RAA knurling
- Pivoting head by endless screw, for a precise knurl alignment (Fig. 1)
- Reversible body for righthand or lefthand tool version (Fig. 2)
- Minimum tool overhang (Fig. 3)
- Maximum rigidity to guarantee an excellent knurling quality.
- Possibility of knurling any helix between 0°-30° (Fig. 4)



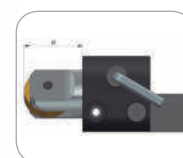
### + Avance Feed



(Fig. 1)



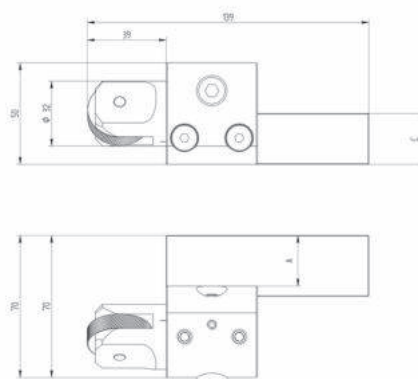
(Fig. 2)



(Fig. 3)



(Fig. 4)



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                                                                | RBR 30° | R<br>RAA                                                                 | RBL 30° |
|-------------------------------------|-------------------------------------------------------------------------|---------|--------------------------------------------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                                                         |         |                                                                          |         |
| Con moleta tipo<br>With knurl type  | BR30°                                                                   | AA      | BL30°                                                                    | AA      |
| Con herramienta<br>With tool        | Cabeza inclinada 30° a la derecha<br>Knurl head tilted 30° to the right |         | Cabeza inclinada 30° a la izquierda<br>Knurl head tilted 30° to the left |         |
| Avances permitidos<br>Allowed feeds | F                                                                       | F       | F                                                                        | F       |

R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01230100           | MFS 32.08.20            | R+L                | Ø 50 - 1000           | 32x8x14         | 20 | 25 | 1.5 |
| 01230200           | MFS 32.08.25            | R+L                | Ø 50 - 1000           | 32x8x14         | 25 | 25 | 1.5 |
| 01230300           | MFS 32.08.32            | R+L                | Ø 50 - 1000           | 32x8x14         | 32 | 32 | 1.5 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01239901              | TCMFS 32                |  |



## MOLETEADORES POR CORTE CUT-KNURLING TOOLS



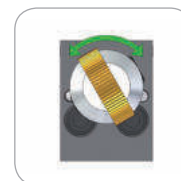
### MFS 42

#### + Características

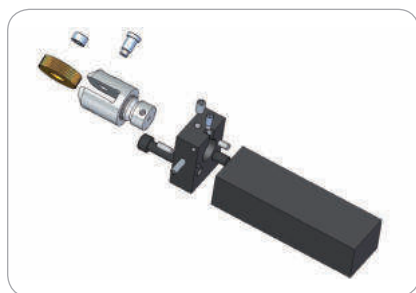
- Recomendado para moleteados tipo RAA
- Cabeza basculante para el alineamiento de la moleta (Fig. 1)
- Posibilidad de trabajar a derechas o a izquierdas girando la cabeza
- Eje de HSS

#### + Features

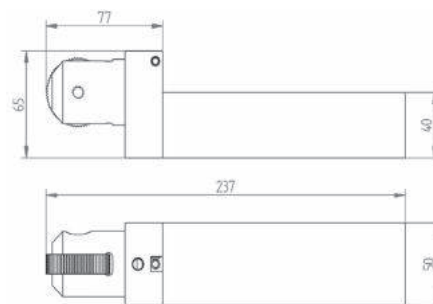
- Recommended for RAA type knurling
- Pivoting head for knurl alignment (Fig. 1)
- Tool with reversible head able to fit on left-hand or right-hand lathes
- HSS bushing



(Fig. 1)



#### + Avance Feed



#### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RAA                              | RBR 30° | R<br>RAA                               | RBL 30° |
|-------------------------------------|---------------------------------------|---------|----------------------------------------|---------|
| Tipo de moleteado<br>Knurling form  |                                       |         |                                        |         |
| Con moleta tipo<br>With knurl type  | BR30°                                 | AA      | BL30°                                  | AA      |
| Con herramienta<br>With tool        | Versión derecha R<br>Right - handed R |         | Versión izquierda L<br>Left - handed L |         |
| Avances permitidos<br>Allowed feeds | F                                     | F       | F                                      | F       |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | Kg  |
| 01270100           | MFS 42.12.40            | R+L                | Ø 100 ÷ 3000          | 42x12x18        | 7.0 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01995901              | TCMFS 42                |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



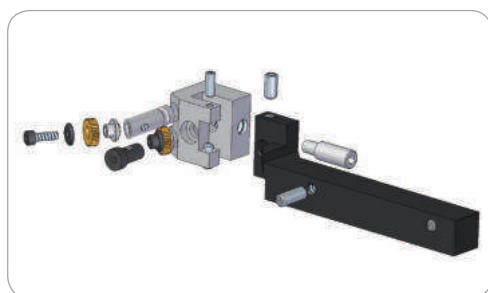
## MF 89

### + Características

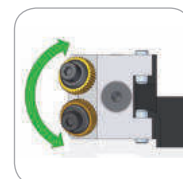
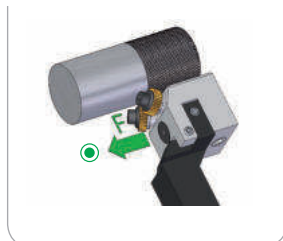
- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 2)
- Cabeza basculante para el alineamiento de las moletas (Fig. 1)
- Ejes de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

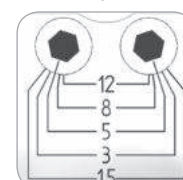
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 2)
- Pivoting head for knurls self-centering (Fig. 1)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



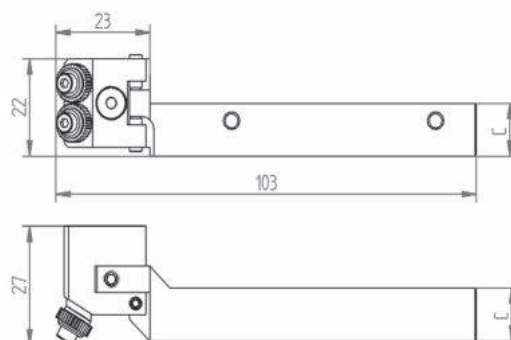
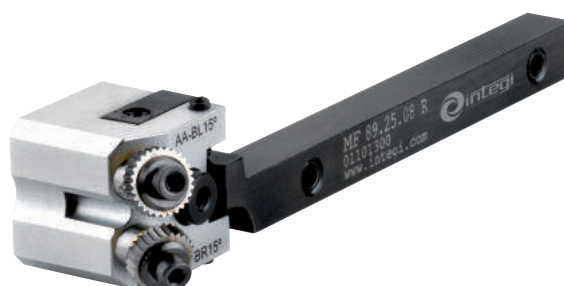
### + Avance Feed



(Fig. 1)



(Fig. 2)



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | Kg  |
| 01101300           | MF 89.25.08 R           | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 8  | 0.2 |
| 01101400           | MF 89.25.08 L           | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 8  | 0.2 |
| 01101500           | MF 89.25.10 R           | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 10 | 0.2 |
| 01101600           | MF 89.25.10 L           | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 10 | 0.2 |
| 01101700           | MF 89.25.12 R           | R                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 12 | 0.2 |
| 01101800           | MF 89.25.12 L           | L                  | Ø 1.5 ÷ 12            | 8.9x2.5x4       | 12 | 0.2 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985500              | EAT 89.25               |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



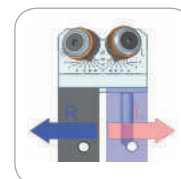
## MF1 14

### + Características

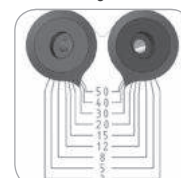
- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 2)
- Doble posición del mango para trabajar a derechas o izquierdas (Fig. 1)
- Ejes de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

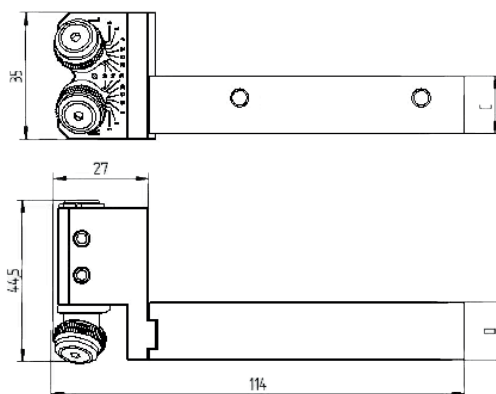
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 2)
- Tool with reversible shank able to fit on left-hand or right-hand lathes (Fig. 1)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



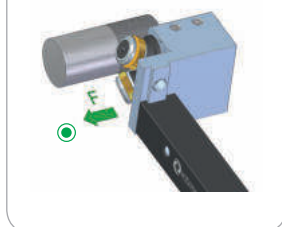
(Fig. 1)



(Fig. 2)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

**R** Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01250100           | MF1 14.53.12            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 14 | 0.5 |
| 01250200           | MF1 14.53.14            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 14 | 0.5 |
| 01250300           | MF1 14.53.16            | R+L                | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.5 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985600              | EAT 14.53               |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



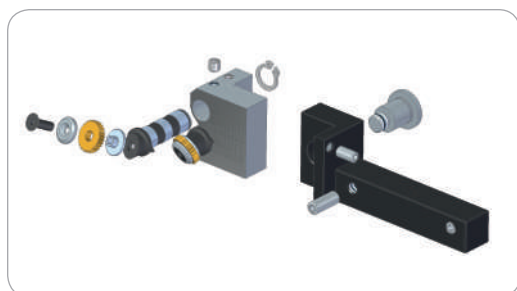
## MF 14

### + Características

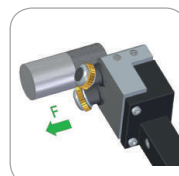
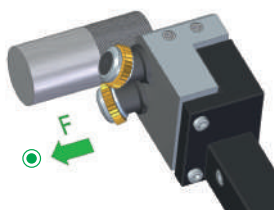
- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 2)
- Cabeza basculante para el alineamiento de las moletas (Fig. 1)
- Ejes de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

### + Features

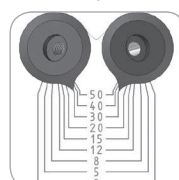
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 2)
- Pivoting head for knurls self-centering (Fig. 1)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



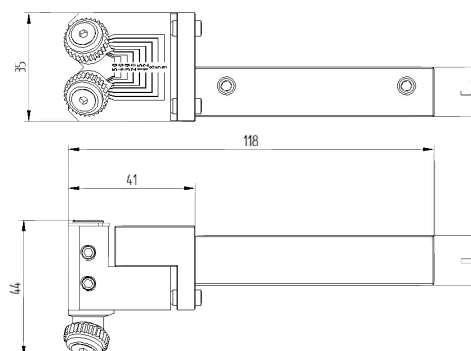
### + Avance Feed



(Fig. 1)



(Fig. 2)



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C  | D  | Kg  |
| 01100900           | MF14.53.12 R            | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 16 | 0.5 |
| 01101000           | MF 14.53.12 L           | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 12 | 16 | 0.5 |
| 01100100           | MF 14.53.14 R           | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 16 | 0.5 |
| 01100200           | MF 14.53.14 L           | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 14 | 16 | 0.5 |
| 01100300           | MF 14.53.16 R           | R                  | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.5 |
| 01100400           | MF 14.53.16 L           | L                  | Ø 3 ÷ 50              | 14.5x3x5        | 16 | 16 | 0.5 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985600              | EAT 14.53               |  |



## MOLETEADORES POR CORTE CUT-KNURLING TOOLS



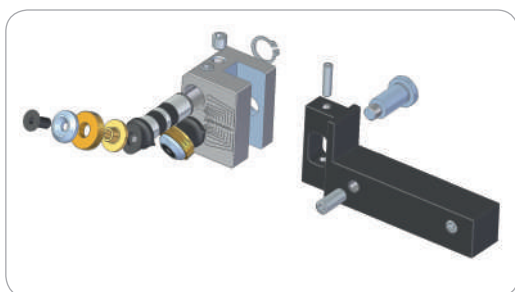
### MF 21

#### + Características

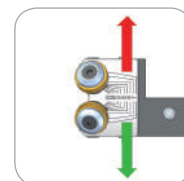
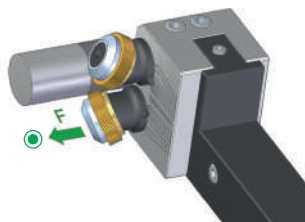
- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 2)
- Cabeza ajustable en altura para el alineamiento de las moletas (Fig. 1)
- Cabeza reversible para trabajar a derechas o izquierdas (Fig. 3)
- Ejes de HSS+TIN
- Ajuste del ángulo de ataque mediante tornillos integrados en el mango

#### + Features

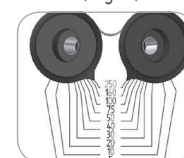
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 2)
- Up & down tool head alignment for knurls centering (Fig. 1)
- Tool with reversible head able to fit on left-hand or right-hand lathes (Fig. 3)
- HSS+TIN bushing
- Adjustment of tool clearance angle by threaded studs integrated in the shank



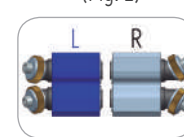
#### + Avance Feed



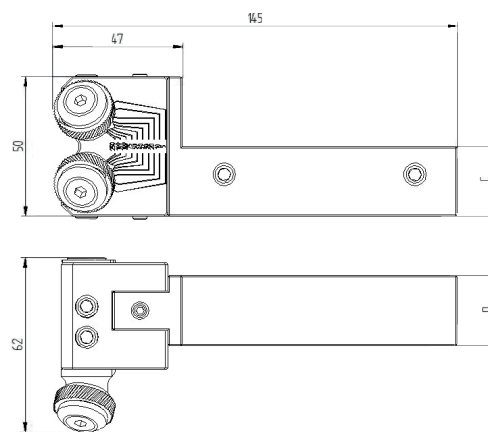
(Fig. 1)



(Fig. 2)



(Fig. 3)



#### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

#### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |       |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-------|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | C     | D  | Kg  |
| 01101900           | MF 21.55.3/4"           | R+L                | Ø 5 ÷ 250             | 21.5x5x8        | 19.05 | 25 | 1.4 |
| 01102100           | MF 21.55.1"             | R+L                | Ø 5 ÷ 250             | 21.5x5x8        | 25.4  | 25 | 1.4 |
| 01100500           | MF 21.55.20             | R+L                | Ø 5 ÷ 250             | 21.5x5x8        | 20    | 25 | 1.4 |
| 01100700           | MF 21.55.25             | R+L                | Ø 5 ÷ 250             | 21.5x5x8        | 25    | 25 | 1.4 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985700              | EAT 21.55               |  |



## MOLETEADORES POR CORTE CUT-KNURLING TOOLS



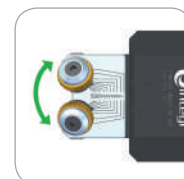
### MF 21 VDI

#### + Características

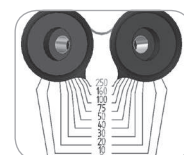
- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 2)
- Cabeza basculante para el alineamiento de las moletas (Fig. 1)
- Ejes de HSS+TIN

#### + Features

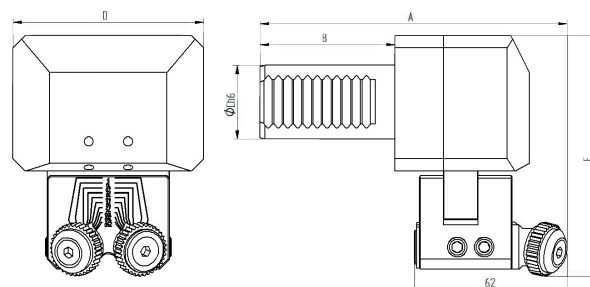
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 2)
- Pivoting head for knurl alignment (Fig. 1)
- HSS+TIN bushing



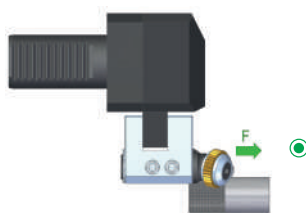
(Fig. 1)



(Fig. 2)



#### + Avance Feed



#### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

#### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |     |    |    |    |    |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-----|----|----|----|----|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | A   | B  | C  | D  | E  | Kg  |
| 01140100           | MF 21.55 VDI 30R        | R                  | Ø 5 ÷ 250             | 21.5x5x8        | 126 | 55 | 30 | 68 | 95 | 2.6 |
| 01140200           | MF 21.55 VDI 30L        | L                  | Ø 5 ÷ 250             | 21.5x5x8        | 126 | 55 | 30 | 68 | 95 | 2.6 |
| 01140300           | MF 21.55 VDI 40R        | R                  | Ø 5 ÷ 250             | 21.5x5x8        | 136 | 63 | 40 | 78 | 98 | 2.9 |
| 01140400           | MF 21.55 VDI 40L        | L                  | Ø 5 ÷ 250             | 21.5x5x8        | 136 | 63 | 40 | 78 | 98 | 2.9 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01985700              | EAT 21.55               |  |



# MOLETEADORES POR CORTE CUT-KNURLING TOOLS



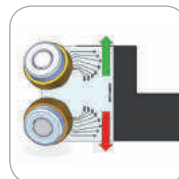
## MF 42

### + Características

- Recomendado para moleteados tipo RGE
- Ajuste de las moletas según diámetro a moletear mediante escala graduada (Fig. 3)
- Cabeza ajustable en altura para el alineamiento de las moletas (Fig. 1)
- Cabeza reversible para trabajar a derechas o izquierdas (Fig. 2)
- Ejes de metal duro

### + Features

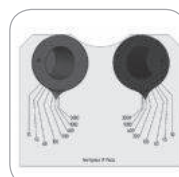
- Recommended for RGE type knurling
- Easy setting to the workpiece diameter by means of a graduated scale (Fig. 3)
- Up&down tool head alignment for knurls centering (Fig. 1)
- Tool with reversible head able to fit on left-hand or right-hand lathes (Fig. 2)
- Carbide pins



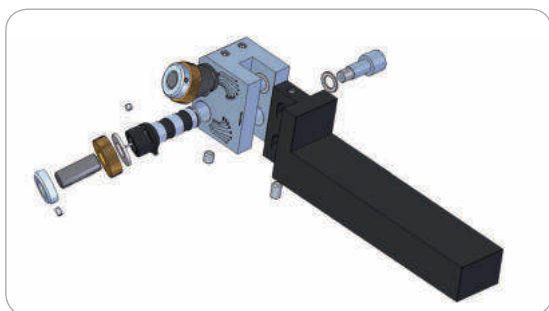
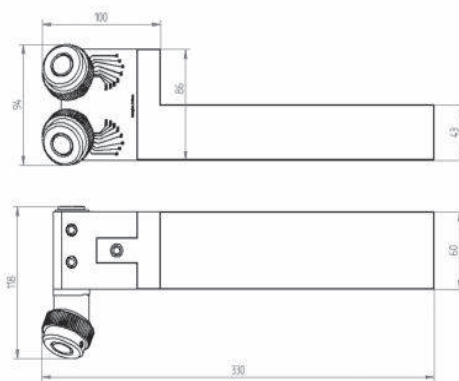
(Fig. 1)



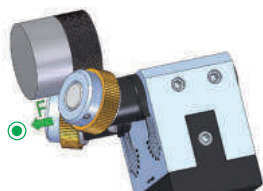
(Fig. 2)



(Fig. 3)



### + Avance Feed



### + Formas de moleteados realizables Feasible knurling forms

|                                     | R<br>RGE 30° | R<br>RGE 45°  |
|-------------------------------------|--------------|---------------|
| Tipo de moleteado<br>Knurling form  |              |               |
| Con moleta tipo<br>With knurl type  | AA + AA      | BL15° + BR15° |
| Avances permitidos<br>Allowed feeds | F            | F             |

### R Moleteados recomendados | Recommended knurling

| Herramienta   Tool |                         |                    |                       |                 |     |
|--------------------|-------------------------|--------------------|-----------------------|-----------------|-----|
| Código<br>Code     | Referencia<br>Reference | Versión<br>Version | Capacidad<br>Capacity | Moleta<br>Knurl | Kg  |
| 01240100           | MF 42.12.40             | R+L                | Ø 100 ÷ 3000          | 42x12x18        | 9,0 |

| Repuesto   Spare Part |                         |  |
|-----------------------|-------------------------|--|
| Código<br>Code        | Referencia<br>Reference |  |
| 01240105              | EMMF 42                 |  |

## KIT DE MOLETEADORES KNURLING KITS



### KIT MOLETEADORES KNURLING KITS

#### + Características

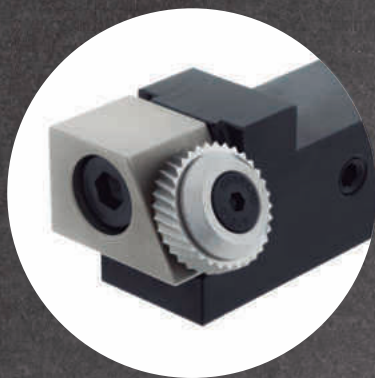
- Kit de moleteado compuesto por una herramienta doble para moleteados cruzados tipo RGE y una herramienta simple para moleteados rectos tipo RAA
- Varios tamaños disponibles
- Suministrado en una estuche de protección de PVD rígido
- Incluye llaves de servicio
- No incluye moletas

#### + Features

- Cut knurling kit consisting of a double tool for cross-knurling type RGE and a single tool for straight knurling type RAA
- Available in various sizes
- Supplied in a rigid PVD protection case
- Service keys included
- Knurls not included



| Herramienta   Tool |                         |                                          |                       |
|--------------------|-------------------------|------------------------------------------|-----------------------|
| Código<br>Code     | Referencia<br>Reference | Herramientas incluidas<br>Included tools | Capacidad<br>Capacity |
| 01220400           | KMF 89-08 R             | MF 89.25.08 R + MFS 89.25.08 R           | Ø1,5-12               |
| 01220500           | KMF 89-08 L             | MF 89.25.08 L + MFS 89.25.08 L           | Ø1,5-12               |
| 01220600           | KMF 89-10 R             | MF 89.25.10 R + MFS 89.25.10 R           | Ø1,5-12               |
| 01220700           | KMF 89-10 L             | MF 89.25.10 L + MFS 89.25.10 L           | Ø1,5-12               |
| 01220800           | KMF 89-12 R             | MF 89.25.12 R + MFS 89.25.12 R           | Ø1,5-12               |
| 01220900           | KMF 89-12 L             | MF 89.25.12 L + MFS 89.25.12 L           | Ø1,5-12               |
| 01221000           | KMF1 14-12 R            | MF1 14.53.12 + MFS1 14.53.12 R           | Ø3-50                 |
| 01221100           | KMF1 14-12 L            | MF1 14.53.12 + MFS1 14.53.12 L           | Ø3-50                 |
| 01221200           | KMF1 14-14 R            | MF1 14.53.14 + MFS1 14.53.14 R           | Ø3-50                 |
| 01221300           | KMF1 14-14 L            | MF1 14.53.14 + MFS1 14.53.14 L           | Ø3-50                 |
| 01221400           | KMF1 14-16 R            | MF1 14.53.16 + MFS1 14.53.16 R           | Ø3-50                 |
| 01221500           | KMF1 14-16 L            | MF1 14.53.16 + MFS1 14.53.16 L           | Ø3-50                 |
| 01221600           | KMF 14-12 R             | MF 14.53.12 R + MFS 14.53.12             | Ø3-50                 |
| 01221700           | KMF 14-12 L             | MF 14.53.12 L + MFS 14.53.12             | Ø3-50                 |
| 01221800           | KMF 14-14 R             | MF 14.53.14 R + MFS 14.53.14             | Ø3-50                 |
| 01221900           | KMF 14-14 L             | MF 14.53.14 L + MFS 14.53.14             | Ø3-50                 |
| 01222000           | KMF 14-16 R             | MF 14.53.16 R + MFS 14.53.16             | Ø3-50                 |
| 01222100           | KMF 14-16 L             | MF 14.53.16 L + MFS 14.53.16             | Ø3-50                 |
| 01220200           | KMF 21-20               | MF 21.55.20 + MFS 21.55.20               | Ø5-250                |
| 01220300           | KMF 21-25               | MF 21.55.25 + MFS 21.55.25               | Ø5-250                |
| 01320100           | KM4/M5 20.08.20         | M4 20.08.20 + M5 20.08.20                | Ø8-200                |
| 01320200           | KM4/M5 20.08.25         | M4 20.08.25 + M5 20.08.25                | Ø8-200                |



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