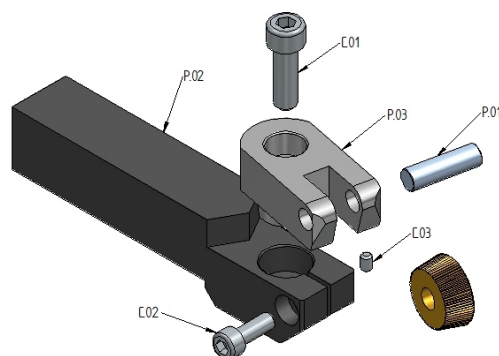




M15 INSTRUCTION MANUAL



1. TOOLS PARTS



Drawing 1

ITEM	CODE	REFERENCE	DESCRIPCIÓN	ITEMS INCLUDED
P.01	01992500	E 25.8 HSS	Axis Ø8x25	P.01
P.02	01150301	MM15 25.20	25x20 mm shank	P.02
	01150401	MM15 25.25	25x25 mm shank	
	01150302	CM15 25.08	Knurl bearing head M15 25.08	
P.03	01150502	CM15 25.10	Knurl bearing head M15 25.10	P.03
	01150402	CM15 25.12	Knurl bearing head M15 25.12	
C.01	01900050	T M8-25	Screw DIN 912 M8x25	C.01
C.02	01900051	T M6-16	Screw DIN 912 M6x16	C.02
C.03	01987900	EA M4-8	DIN 913 M4x8 Stud screw	C.03

Table 1

2. FEASIBLE PATTERNS

M15 form knurling tool is conceived for knurlings frontally and on conical surfaces with diameter between 8 and 300mm.

Performed pattern depends on the used knurls as it is shown below.


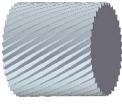

KNURLING PROFILE	DESCRIPTION	KNURLING WHEEL	AXIAL FEED	RADIAL FEED
 RAAA	Right Outward tips	AAA Knurl	✗	✓
 RKBL 30°	30° Left helical Outward tips	KBR30° Knurl	✗	✓
 RKBR 30°	30° Right helical Outward tips	KBL30° Knurl	✗	✓

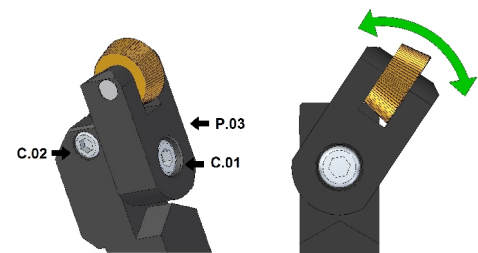
Table 2

3. HEAD ANGLE VARIATION

M15 tool is designed for knurling on conical surfaces or frontally, in both left hand and right-hand lathes.

To tilt the head P-03 just:

- Loosen the head locking screw C.02.
- Loosen the head blocking screw C.01.
- Tilt the head to the desired position.
- Firmly tighten C.01 and C.02 screws.



Drawing 2

Drawing 3

4. CLAMPING AND SETTING THE TOOL INTO THE MACHINE

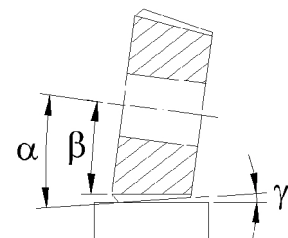
First, we need to make sure that the knurl rotates freely around the pin. Spread graphite grease if necessary.

Clamp the tool to the turret of the lathe.

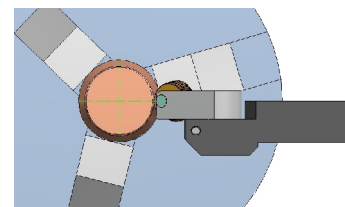
While the chuck rotates very slowly, approach the tool to the workpiece until the knurl makes contact with the workpiece.

Approach the knurling wheel to the workpiece following the 'F' direction up until the teeth plunge a little into it. Check out the resulted print. The printed width (h) must be equal to the width of the teeth on the knurl. If the width isn't correct, change the clearance angle.

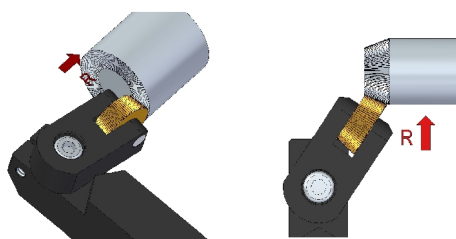
The tool and the workpiece need to be aligned as shown on the drawing 5.



Drawing 4



Drawing 5



Drawing 6

5. KNURLING STEPPED WORKPIECES

When knurling conical surfaces, it may be taken into account any possible interference between the workpiece and the tool. The closest distance (from the tool to any shoulder in the workpiece) is up to the position of the head.

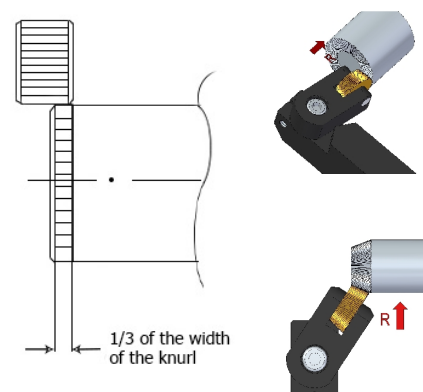
6. BEGINNING TO KNURL

While the chuck is rotating at the speed recommended at point 8, feed the tool so that 1/3 of the width of the knurling wheel gets in contact with the workpiece.

Press the knurl against the workpiece. The value of the radial feed must be according to the conditions recommended on the point 8 (next page).

After that, you will be able to feed longitudinally.

To calculate up to what diameter we must deepen with the knurls, we must take into account the height of the tooth (in the case of standard knurls is always equal to half the step) and the increase in diameter that suffers the material.



Drawing 7

That information is available at www.integi.com and in our catalog.

7. BEFORE AND DURING WORKING PROCESS

- Make sure that the knurl pins are firmly fastened.
- Check that the knurl run free and lubricate it with graphite grease.
- Always apply plenty of coolant, lubricant or cutting oil flowing in order to sweep the swarf away.
- Always feed against the thickest of the areas that hold the pin. If a second run is needed, move the tool away from the workpiece and star again the knurling process. The working direction, longitudinal advance, will always be against the tool.

8. TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Double knurling	Too slow radial feed at the beginning of the knurling	Increase radial feed at the beginning of the knurling*.
	Perimeter of the workpiece is not an exact multiple of the pitch.	Turn a diameter that makes the perimeter to be knurled an exact multiple of the pitch. *
Knurls easily breakable	Knurling too deep.	Reduce the depth to values according to the pitch.
Knurls wear out too fast	Knurling too deep.	Reduce the depth to values according to the pitch.
	Working conditions are not adequate.	Check cutting speed and axial feed.

Table 3

9. RECOMMENDED SETTINGS

MATERIAL	ØWorkpiece	ØKnurl (mm)	Vc (m/min)	RADIAL FEED (mm/rev)	TRAVERSE FEED (mm/rev)			
					PITCH (mm)			
					0.3÷0.6	0.6÷1.2	1.2÷1.6	1.6÷2.0
Steel 600 N/mm²	<10	10÷15	20÷50	0.05÷0.10	0.15	0.10	0.08	0.07
	10÷50	15÷20	25÷55		0.20	0.15	0.13	0.10
	50÷100	25	30÷60		0.25	0.20	0.15	0.13
	100÷200	20÷25						
	200÷300	25						
Steel 900 N/mm²	<10	10÷15	15÷40	0.04÷0.08	0.12	0.08	0.05	0.04
	10÷50	15÷20	20÷45		0.15	0.10	0.08	0.06
	50÷100	25	25÷50		0.20	0.15	0.10	0.08
	100÷200	20÷25						
	200÷300	25						
Stainlees steel	<10	10÷15	15÷40	0.04÷0.08	0.12	0.08	0.05	0.04
	10÷50	15÷20	20÷45		0.15	0.10	0.08	0.06
	50÷100	25	25÷50		0.20	0.15	0.10	0.08
	100÷200	20÷25						
	200÷300	25						
Cast steel	<10	10÷15	20÷40	0.05÷0.10	0.15	0.10	0.08	0.07
	10÷50	15÷20	25÷45		0.20	0.15	0.13	0.10
	50÷100	25	30÷50		0.25	0.20	0.15	0.13
	100÷200	20÷25						
	200÷300	25						
Aluminium	<10	10÷15	25÷45	0.05÷0.10	0.12	0.08	0.05	0.04
	10÷50	15÷20	30÷50		0.20	0.15	0.10	0.06
	50÷100	25	35÷60		0.25	0.20	0.15	0.13
	100÷200	20÷25						
	200÷300	25						
Brass	<10	10÷15	30÷50	0.05÷0.10	0.20	0.15	0.12	0.10
	10÷50	15÷20	35÷55		0.25	0.20	0.18	0.15
	50÷100	25	40÷65		0.30	0.25	0.20	0.18
	100÷200	20÷25						
	200÷300	25						


Table 4



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