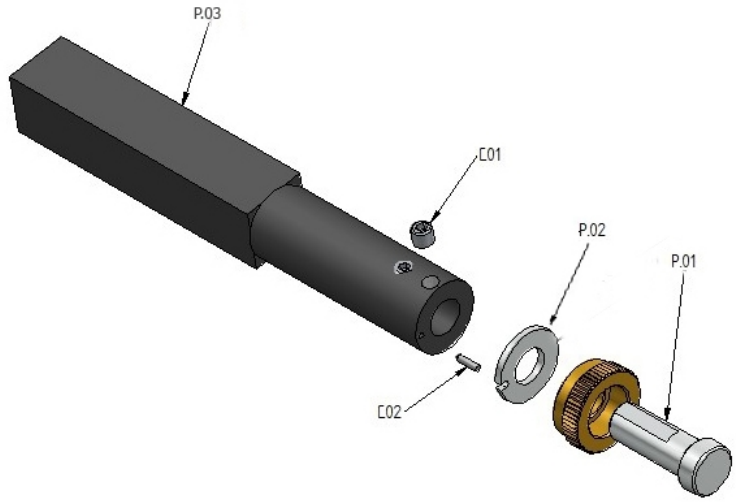
integi
Marking the difference

M19 INSTRUCTION MANUAL

1. TOOL SPARE PARTS



Drawing 1

ITEM	CODE	REFERENCE	DESCRIPTION	ITEMS INCLUDED
SET.01	01983200	EAM10	Rolling set	P.01+P.02
*P.01	-	EM10	Axis of the knurl	-
*P.02	-	AM10	Washer	-
*P.03	-	MM19 25.20	Shank M19 25.20 25x20	-
		MM19 25.25	Shank M19 25.25 25x25	
C.01	01996100	EA M5-6	Knurl pin DIN 913 M5x6	C.01
C.02	01900060	PE D2-8	Reg-socket set screw DIN 1481 Ø2x8	C.02

*This item is not sold individually.

Table 1

2. FEASIBLE PATTERNS

The M19 form knurling tools is conceived for knurling on pieces with diameter between 30 and 200mm.

The obtained pattern depends on the knurls used as shown below.

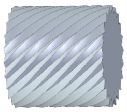
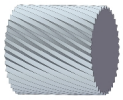
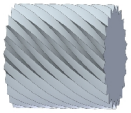
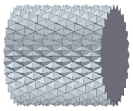
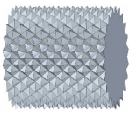
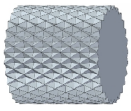
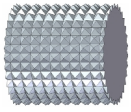
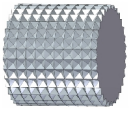
TEETH PATTERN		DESCRIPTION	TYPE OF KNURL	AXIAL FEED	RADIAL FEED
	RAA	Right	AA Knurl	✓	✓
	RBL 30º	30° Left helical	BR30º Knurl	✓	✓
	RBL 45º	45° Left helical	BR45º Knurl	✓	✓
	RBR 30º	30° Right helical	BL30º Knurl	✓	✓
	RBR 45º	45° Right helical	BL45º Knurl	✓	✓
	RGE 30º	30º Diamond pattern male	GV30° Knurl	✘	✓
	RGE 45º	45º Diamond pattern male	GV45° Knurl	✘	✓
	RGV 30º	30º Diamond pattern female	GE30º Knurl	✘	✓
	RGV 45º	45º Diamond pattern female	GE45º Knurl	✘	✓
	RKE	90º Diamond pattern male	KV Knurl	✘	✓
	RKV	90º Diamond pattern male	KE Knurl	✘	✓

Table 2

3. CLAMPING AND SETTING THE TOOL INTO THE MACHINE

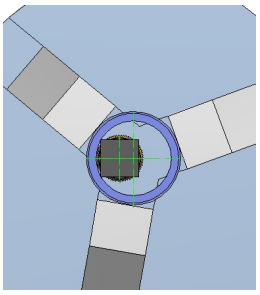
First, we need to make sure that the knurl rotates freely around the pin. Spread graphite grease if necessary.

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 2.



Drawing 2

4. KNURLING ON STEPPED WORKPIECES

When knurling stepped workpieces, it is not possible to knurl up to a shoulder. Using this tool, no knurling should be performed closer to 0,5mm from the shoulder itself.

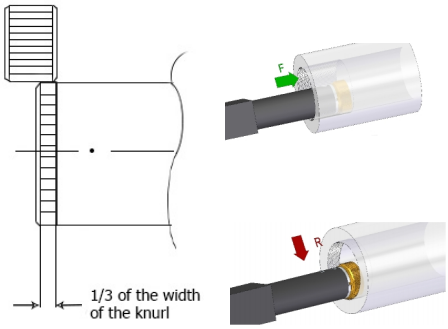
5. BEGINNING TO KNURL

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.

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



Drawing 3

6. 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.

7. 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*
	The 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 *
Knurling wheels easily breakable	Knurling too deep	Reduce the depth to values according to the pitch
Knurling wheels wear out too fast	Knurling too deep	Reduce the depth to values according to the pitch
	Working conditions are not adequate	Check cutting and traverse feeding speeds

Table 3

* Sometimes, it is not possible to increase radial feed or it just cannot fed if the workpiece is too weak.

8. RECOMMENDED SETTINGS

MATERIAL	Øworkpiece (mm)	ØKNURLING WHEEL (mm)	Cutting speed (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
Acero 600 N/mm^2	10÷50	25	30÷60	0.05÷0.10	0.25	0.20	0.15	0.13
	50÷100	25						
	100÷200							
Acero 900 N/mm2	10÷50	25	25÷50	0.04÷0.08	0.20	0.15	0.10	0.08
	50÷100	25						
	100÷200							
Acero inoxidable	10÷50	25	25÷50	0.04÷0.08	0.20	0.15	0.10	0.08
	50÷100	25						
	100÷200							
Acero fundido	10÷50	25	30÷50	0.05÷0.10	0.25	0.20	0.15	0.13
	50÷100	25						
	100÷200							
Aluminio	10÷50	25	35÷60	0.05÷0.10	0.25	0.20	0.15	0.13
	50÷100	25						
	100÷200							
Latón	10÷50	25	40÷65	0.05÷0.10	0.30	0.25	0.20	0.18
	50÷100	25						
	100÷200							

Table 4

www.integi.com

Marking the difference

INTEGI, S.A.

Autonomía Kalea, 5 - 48250 Zaldibar (Bizkaia) - Spain

+34 943 174 800 integi@integi.com www.integi.com