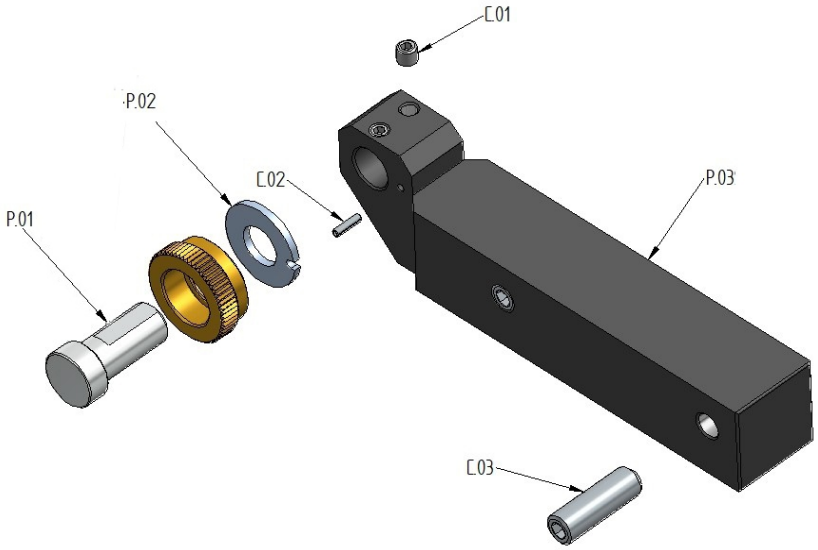
integi
Marking the difference

M10 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	-	MM10 25.10.20	Shank M10 25.10.20	-
		MM10 25.10.25	Shank M10 25.20.25	
C.01	01995100	EA M5-5	Stud screw DIN 913 M5x6	C.01
C.02	01900060	PE D2-8	Elastic pin DIN 1481 Ø2x8	C.02
C.03	01981400	EA M8-25	Stud screw DIN 913 M8x25	C.03

*This item is not sold individually

Table 1

2. FEASIBLE KNURLING TYPE

The M10 form knurling tool is conceived for knurling on pieces with diameters between 8 and 200mm.

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

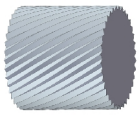
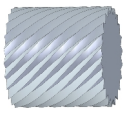
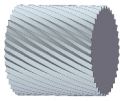
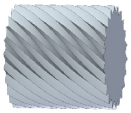
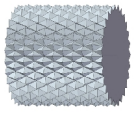
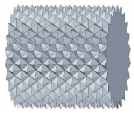
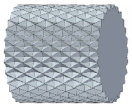
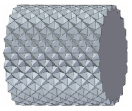
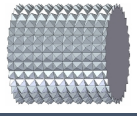
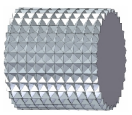
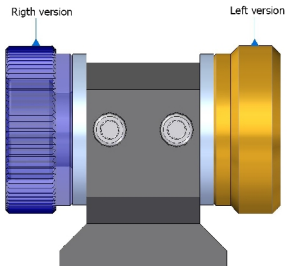
TEETH PATTERN		DESCRIPTION	KNURL TYPE	AXIAL FEED	RADIAL FEED
	RAA	Right	AA Knurl	✓	✓
	RBL 30º	30º Left helical	BR30º Knurl	✓	✓
	RBL 45º	45º Left helical	BR45º Knurl	✓	✓
	RBR 30º	30º Right helical	BL30º Knurl	✓	✓
	RBR 45º	45º Right helical	BL45º Knurl	✓	✓
	RGE 30º	30º Diamond pattern male	GV30° Knurl	✗	✓
	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. SETTING THE TOOL AS RIGHT HAND OR LEFT-HAND

The M10 tool is conceived to work on right or left hand. To change versions:

- Remove the axle and the knurl.
- Remove the spacer and its positioning pin.
- Place the pin into the hole on the opposite face of the shank.
- Place the spacer and re-assembly the knurl and the axle.



Drawing 2

4. CLAMPING AND SETTING THE TOOL TO THE MACHINE

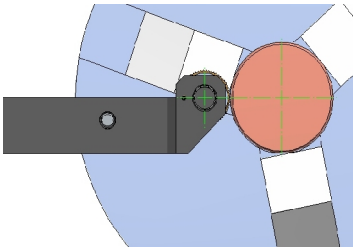
First, we need to make sure that the knurl rotates freely around the pin. Spread graphite grease if necessary.

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 '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 3.**



Drawing 3

5. KNURLING 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.

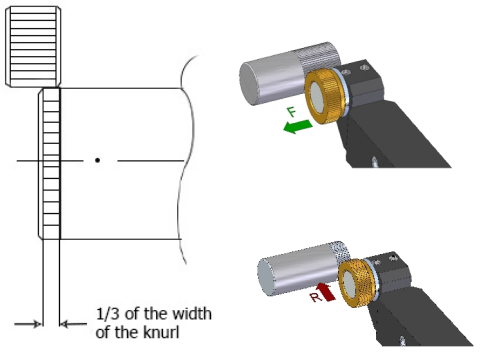
6. BEGINNING TO KNURL

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 9. After that, you will be able to feed longitudinally.

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

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



Drawing 4

7. BEFORE AND DURING THE 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 the hold the pin. If a second run is needed, move the tool away from the workpiece and start 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*
	The perimeter of the workpiece is not an exact multiple of the pitch.	Turn a diameter so that the perimeter to be knurled is 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 be radially fed if the workpiece is too weak.

9. RECOMMENDED SETTINGS

MATERIAL	ØWORKPIECE (mm)	ØKNURL (mm)	Cutting speed (m/min)	RADIAL feed (mm/rev)	TRAVERSE FEED (mm/rev) FOR PITCHES (mm)			
					0.3÷0.6	0.6÷1.2	1.2÷1.6	1.6÷2.0
Acero 600 N/mm^2	50÷100	25	30÷60	0.05÷0.10	0.25	0.20	0.15	0.13
	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	5						
	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	25						

Table 4

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