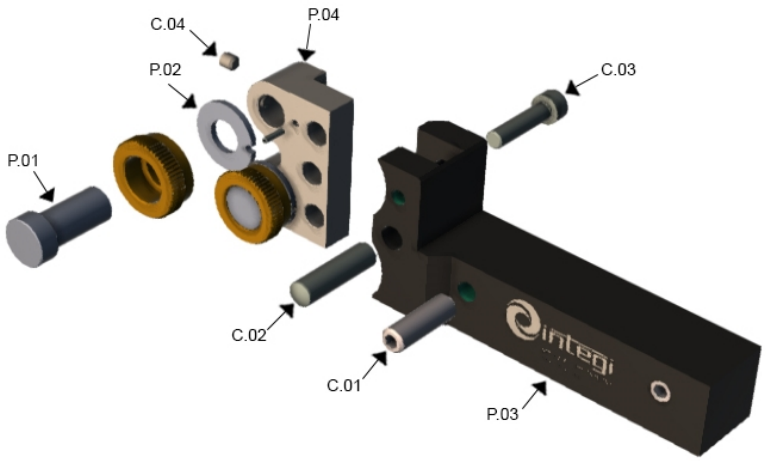
M11 INSTRUCTION MANUAL

1. TOOL PARTS



Drawing 1

ITEM	CODE	REFERENCE	DESCRIPTION	ITEMS INCLUDED
SET.01	01983200	EAM10	Axis + Screw	P.01+P.02
*P.01	-	EM10	Axis	-
*P.02	-	AM10	HSS Washer	-
P.03	01980100	MM11 25.10.20 R	Shank 25x20 R	P.03+C.01(2x)
	01980200	MM11 25.10.20 L	Shank 25x20 L	
	01979900	MM11 25.10.25 R	Shank 25x25 R	
	01980000	MM11 25.10.25 L	Shank 25x25 L	
P.04	01995200	M11 25.10/2	Knurl-bearing plate	P.04+C.04(2x)
C.01	01981400	EA M8-25	Stud screw DIN 913 M8x25	C.01
C.02	01995300	P D8-30	Bolt DIN 6325 Ø8x30	C.02
C.03	01900054	T M6-25	Screw DIN 912 M6x25	C.03
C.04	01995100	EA M5-5	Stud screw DIN 913 M5x5	C.04

*This item is not sold individually.

Table 1

2. FEASIBLE PATTERNS

The M11 form knurling tool is conceived for knurling on pieces with diameters between 8 and 200mm.

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

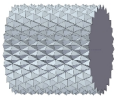
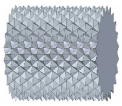
KNURLING PROFILE		DESCRIPTION	KNURLING WHEEL	
			AXIS L	AXIS R
	RAA	Rigth	Knurl AA	Knurl AA
	RGE 30º	30° Cross-knurl Diamond pattern male	Knurl BL30°	Knurl BR30°
	RGE 45º	45° Cross-knurl Diamond patterrn male	Knurl BL45°	Knurl BR45°

Table 2

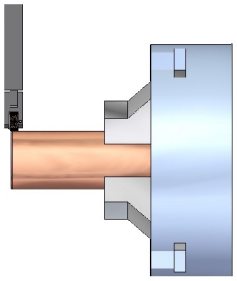
3. CLAMPING AND SETTING THE TOOL INTO THE MACHINE

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



Drawing 2

The tool and the workpiece need to be aligned as shown on the drawing 2.

4. 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.

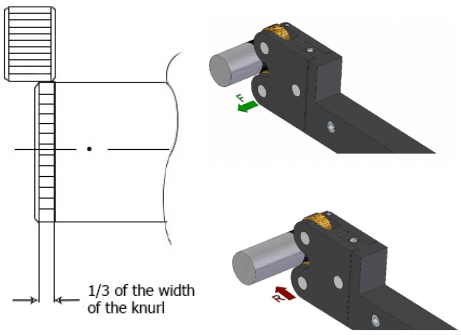
5. BEGINNING TO KNURL

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 wheels gets in contact with the workpiece.

Press the knurls against the workpiece. The value of the radial feed must be according to the conditions recommended on the point 8. 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 knurls run free and lubricate them with graphite grease.
- Always apply plenty of coolant, lubricant or cutting oil.
- 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 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 radilly fed if the workpiece is too weak.

8. RECOMMENDED SETTINGS

MATERIAL	Øworkpiece	ØKNURLING WHEEL (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
Steel 600 N/mm^2	10÷50	20	25÷55	0.05÷0.10	0.20	0.15	0.13	0.10
		25						
	50÷100	20÷25	30÷60		0.25	0.20	0.15	0.13
	100÷200							
	200÷300	25						
Steel 900 N/mm^2	10÷50	20	20÷45	0.04÷0.08	0.15	0.10	0.08	0.06
		25						
	50÷100	20÷25	25÷50		0.20	0.15	0.10	0.08
	100÷200							
	200÷300	25						
Stainless steel	10÷50	20	20÷45	0.04÷0.08	0.15	0.10	0.08	0.06
		25	25÷50					
	50÷100	20÷25	25÷50		0.20	0.15	0.10	0.08
	100÷200							
	200÷300	25						
Cast steel	10÷50	20	25÷45	0.05÷0.10	0.20	0.15	0.13	0.10
		25						
	50÷100	20÷25	30÷50		0.25	0.20	0.15	0.13
	100÷200							
	200÷300	25	30÷50					
Aluminium	10÷50	20	30÷50	0.05÷0.10	0.20	0.15	0.10	0.06
		25	35÷60					
	50÷100	20÷25	35÷60		0.25	0.20	0.15	0.13
	100÷200							
	200÷300	25						
Brass	10÷50	20	35÷55	0.05÷0.10	0.25	0.20	0.18	0.15
		25						
	50÷100	20÷25	40÷65		0.30	0.25	0.20	0.18
	100÷200							
	200÷300	25						

Table 4

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Marking the difference

INTEGI, S.A.

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

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