HEIDENHAIN

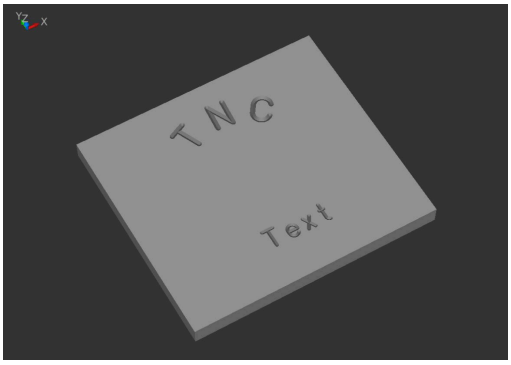
NC Solutions

Description of NC program 9010

English (en)
4/2017

1 Description of the NC program 9010_en.h

NC program for engraving texts in linear and circular layouts.



Description

With this NC program the control engraves texts defined by you into a workpiece. You can arrange the texts in a linear or circular layout. You define the texts with an ASCII code. The NC program is therefore executable with contouring controls as of TNC 155 B/ Q. You can use uppercase letters, lowercase letters and the most important special characters for the engraving text.

Geometric capabilities

Texts can be defined horizontally on a single line, or on a circle above or below its center point. The control engraves the text so that reading the text is possible without turning the workpiece. The position, circle center point and font height are selectable; these do not influence each other.

The font is of a vertical, simple, standard style.

The characters used are kept fully proportional. This means that the control automatically modifies the character width and distance between characters to your defined font height.

Define your desired engraving depth with the milling depth (Q4) input value.

Remark on control used

For the circular arcs the NC program uses the CC and C functions. These functions are available starting with the TNC 150. These circular arcs are programmed with three decimal places. On controls with four enterable decimal places you must check whether you need to modify the accuracy requirements for the circle definitions in MP 213 or 7431 (machine parameter or user parameter).

Character set

The character set shown in the following ASCII code table has been realized. The characters are selected in the subprograms 84, 78, 67 etc.

ASCII table

Character	Code	Character	Code	Character	Code
Space	32	A	65	a	97
-	45	B	66	b	98
.	46	C	67	c	99
/	47	D	68	d	100
0	48	E	69	ES	101
1	49	F	70	f	102
2	50	G	71	g	103
3	51	H	72	h	104
4	52	I	73	IT	105
5	53	J	74	Y	106
6	54	K	75	k	107
7	55	L	76	l	108
8	56	M	77	m	109
9	57	N	78	n	110
:	58	O	79	o	111
ß	130	P	80	p	112
		Q	81	q	113
		R	82	r	114
		S	83	s	115
		T	84	t	116
		U	85	u	117
		V	86	v	118
		W	87	w	119
		X	88	x	120
		Y	89	y	121
		Z	90	z	122

Determining positions

The control decides whether to calculate the positions on a linear or circular path depending on the type of first position indication (X/Y or radius and angle).

After engraving a character the control shifts the momentary position by the width of the engraved character. The control saves the new position (or angle of rotation as the case may be) and uses this position for the next character.

This is defined in the NC program and does not involve you as the operator—the control executes all the required calculations.

Program layout

The engraving program is designed as a single complete program.

It consists of the following program sections:

1 Definition of the cutting data and the tool call
2 Definition of the text blocks
3 Subprograms with the necessary calculations and path contours

Using the program

The operator defines all required parameters in the main section of the NC program. The subprograms remain unchanged because these contain complex calculations.

In the main program you define the tool, all parameters required for machining and the texts to be engraved.

You can also simply expand the main program with further texts. Each text requires the input parameters of the layout and the characters to be engraved by defining Q1 = ASCII code of the character and by calling the subprogram LBL1. When you define words or texts, you must program the definition and the LBL call separately for each character.

General parameters

Parameter	Name	Meaning
Q2	SCALING FACTOR EFFECT	Input 0 or 1 matching the entry in machine parameter 213 or 7410 The scaling factor is effective on 2 or 3 axes
Q4	MILLING DEPTH	Depth of engraving—absolute value from the datum
Q6	FEED RATE FOR MILLING	Traversing speed of the tool during machining
Q7	FEED RATE FOR PECKING	Traversing speed of the tool in the Z axis
Q8	SAFETY CLEARANCE	Z clearance between the tool and datum approached by the control in rapid traverse before machining

Parameters for text on a straight line

Parameters	Name	Meaning
Q5	FONT HEIGHT	Character height in mm
Q21	STARTING POINT IN X	X coordinate of the first character relative to the datum
Q22	STARTING POINT IN Y	Y coordinate of the text line relative to the datum
Q24	ADDITIVE STEP IN X	Incremental distance added to the standard distance of the characters between two characters

Explanation

The datum of every character lies at the height of the text line in the center of the character. You define the starting position before execution of the first character and at the beginning of each line with Q21 and Q22. The control recalculates each datum for the character within the line. If desired you can also individually specify the position of single characters before the call with Q21 and Q22, if for example you wish to carry out a fine adjustment of the position. An additional or reduced space requirement in the character string can be considered using the additive X step Q24.

Parameters for text on a circle

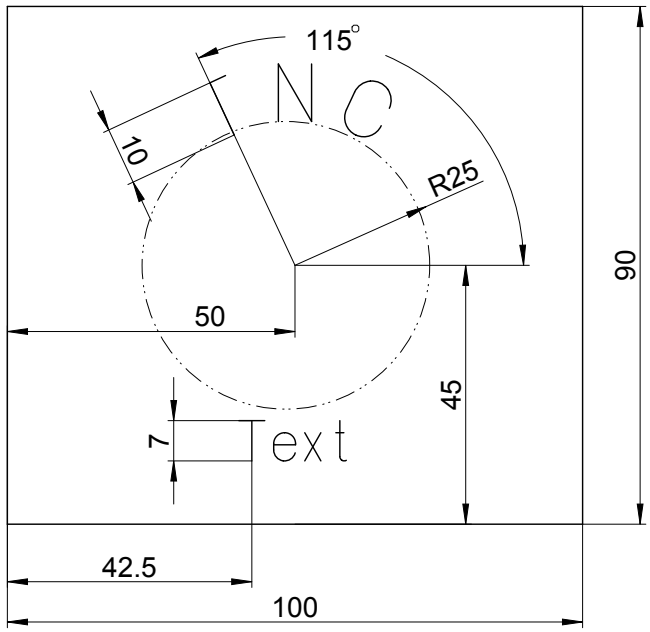
Parameters	Name	Meaning
Q5	FONT HEIGHT	Character height in mm
Q11	CIRCLE CENTER IN X	X coordinate of the circle center point relative to the datum
Q12	CIRCLE CENTER IN Y	Y coordinate of the circle center point relative to the datum
Q16	RADIUS	Radius of the text line
Q17	STARTING ANGLE	Angle position of the first character relative to zero degrees
Q14	ADDITIVE STEPPING ANGLE	Incremental angle step added to the standard distance of the characters between two characters

Explanation

Here, too, the datum of every character lies at the height of the text line in the center of the character. The control detects the defined angle of rotation and saves this position in Q29. An additional or reduced space requirement in the character string can be defined using the additive angle step Q14.

Reset

After engraving a text on a circle, set the parameters for rotation, radius and the additive angle to 0!



744 650 A4

				ID number
Text:				Change No. C000941-10 Phase: Nicht-Serie
	Original drawing Scale	Format	Platte Plate Einzelteilzeichnung / Component Drawing	Werkstoff: Material:
RoHS	1:1	A4		
Maße in mm / Dimensions in mm				●blanke Flächen/Blank surfaces
Werkstückkanten nach ISO 13715 Workpiece edges ISO 13715 -0.3 +0.3		Allgemeintoleranzen ISO 2768-mH ≦6mm: ±0,2 General tolerances ISO 2768-mH ≦6mm: ±0,2	Tolerierung nach ISO 8015 Tolerances as per ISO 8015 Oberflächenbehandlung: Surface treatment:	Oberflächen nach ISO 1302 Surfaces as per ISO 1302

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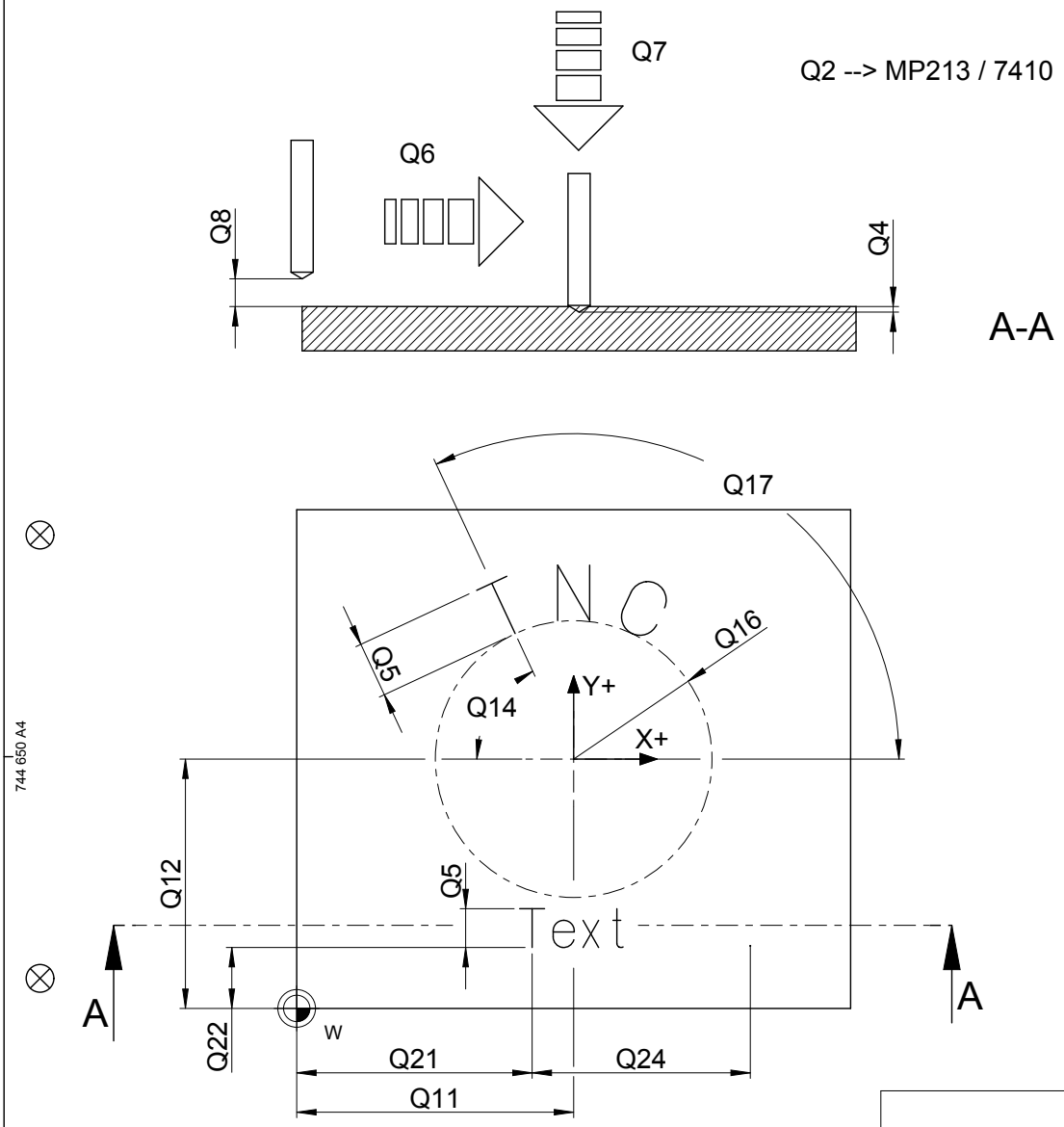
	01.02.2017			Document number			



			ID number
Text:			Change No. C000941-10 Phase: Nicht-Serie
	Original drawing Scale / Format	Bausatz Assembly kit Montage-ZZ / Assembly Drawing	Werkstoff: Material:
RoHS	1:1 / A4		
Maße in mm / Dimensions in mm			●blanke Flächen/Blank surfaces
Werkstückkanten nach ISO 13715 Workpiece edges ISO 13715 -0.3 +0.3	Allgemeintoleranzen ISO 2768-mH ≦6mm: ±0,2 General tolerances ISO 2768-mH ≦6mm: ±0,2	Tolerierung nach ISO 8015 Tolerances as per ISO 8015 Oberflächenbehandlung: Surface treatment:	Oberflächen nach ISO 1302 Surfaces as per ISO 1302

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