

DA-52s

**Reference Manual
Operation of Version 3
English**

Preface

This manual describes the operation of the Delem controller type DA-52s and is meant for operators who are instructed for operation of the total machine.

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Version history

The control software is updated regularly to increase performance and add new functionality. This manual is also updated as a result of changes in the control software. The following overview shows the relation between software and manual versions.

Software version	Manual version	Description
V3.2	V0812	first issue V3

This manual is valid for software version 3.2.

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1. Operation overview and general introduction

1.1. The control unit

The control looks as follows:



1.a

The precise outfit of your control may vary.

Operation of the control is done with the various keys on the front panel. A description of all keys and their functions is given in the next section.

1.2. Operation modes

The control has the 3 following modes:



Manual mode

In this mode it is possible to program all parameters of just one bending. This mode is useful for testing and for calibration.



Programming mode

In this mode bend programs can be programmed and executed.



Manual movement

In this mode any selected axis can be moved manually with the arrow keys.

Each mode can be selected by pressing the relevant push button. A LED in the push button indicates whether or not this mode is active.

1.3. Programming modes

The control has the following programming functions:



Program constants

In this mode you program the general parameters for bend programming.



Tools

In this mode you program and edit the tools. There are 30 different punches and 30 different dies to program in the program memory.



Change view

Key to switch between various pages of a bend. It also serves to return to an active program.



Program library

Open the library with bend programs on the control.

You select one of the programming modes in the manual- or automatic operation mode while the controller is in the 'stop'-status.

1.4. Other frontpanel keys

The frontpanel consists of the following items:

Keyboard:



10 numerical keys (0-9) incl. alphanumeric input

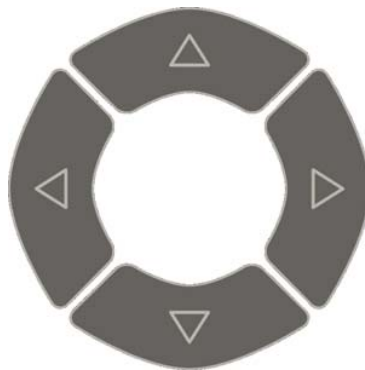
decimal point

plus/minus toggle

clear key: Clearance of the input data field in the bottom left corner on the monitor screen

enter key, to confirm a programmed value

Cursor path control:



Stop button Start button





Return to previous function or abort parameter edit.

1.5. Software versions

The version of the software in your control is displayed at the upper side of the menu screen in the programming mode.

Example of version number:

V 1.2

V stands for version

1 is version number

2 is version level

The version number is increased when new features are added to the software, the level number is increased when minor corrections are needed in the existing version number.

2. Product programming

2.1. Program selection

To edit or create a program, proceed as follows:



Press this key to activate the automatic mode.



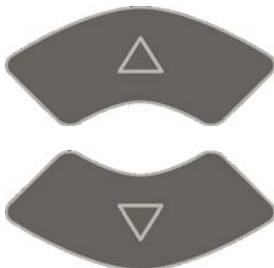
Press this key to open the program library.

The program library screen appears.

Product selection		Free space: 15.012 MB	Mach.no: 1 Prod.no: --		
product ▲	drawing number	no.bend	punch/die	dd-mm-yyyy	
1	90DEGREE	1	5/5	29-11-2012	
2	BOTTOMING	2	5/5	29-11-2012	
3	ABSOLUTE AIR	3	5/5	29-11-2012	
5		5	1/1	29-11-2012	
9		5	1/1	29-11-2012	
10		5	0/0	29-11-2012	
11		1	1/1	29-11-2012	
15		1	0/0	29-11-2012	
65		3	1/1	29-11-2012	
112		3	1/1	29-11-2012	
123	EXAMPLE 123	1	1/1	29-11-2012	
124		1	0/0	29-11-2012	
127		1	1/1	29-11-2012	
128	BUMPING	2	1/1	29-11-2012	
569		4	1/1	29-11-2012	

product no to load = new number = new product

2.a



Use the arrow keys to move to the desired program in the list.



Use the 'enter' key to select the highlighted program.

A program can also be selected by entering its number directly.

To create a new program:

Type a number that does not exist yet. When entered, the control asks whether or not to create a new program.

To delete a program:



Move the cursor bar to the correct program.

Press the 'clear' key. The program number changes to zero.

Press the ENTER key. The control will ask if you wish to delete the selected program. Choose yes (1) to confirm or no (0) to cancel.

2.2. Program edit

2.2.1. General properties

When a program has been selected (or created), a screen is shown with the general product parameters. These parameters are the same for every bend of the program.

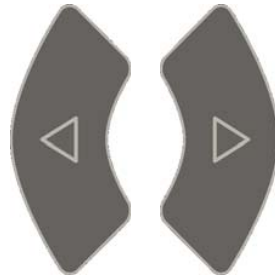
Auto		PN: 123
		DN: EXAMPLE 123
Program 1		
General		
Drawing number	DN = EXAMPLE 123	
Number of bends	NB =	1
Angle sel.	mα =	1 α
Thickness	TH =	0.00 mm
Material	M =	1 STEEL (1.0037)
Punch	UP =	1
Die	UN =	1
Bending length	BL =	200 mm
Stock	ST =	
Corrections		
G-corr. α	Gα =	0.00 °
G-corr. X	GX =	0.00 mm
DN = EXAMPLE 123		

2.b

This page gives all data which are the same for every bending of the program (main data of program).



Use the arrow keys up/down to move the cursor to the desired parameter.



Use the arrow keys left/right to browse between the various pages of the bend program.



After pressing the enter key the programmed value will be placed at the corresponding parameter.

2.2.2. Parameters explanation

Drawing numberDN

A name or description of the program. The maximum length is 20 characters.

Number of bendsNB

The number of bends in the current program.

When this value is increased, the additional bends are copied from the last bend.

When this value is decreased, the superfluous bends are deleted.

Angle selectionma

Selection of the programming mode for the Y-axis.

0 = absolute: program the absolute Y-axis position for a bend.

1 = a: program the angle to bend. The required Y-axis position is computed.

Depending on this parameter, either the parameter 'angle' or the parameter 'bend position' will appear in a bend step.

ThicknessTH

Thickness of the sheet.

MaterialM

Selection of one of the programmed materials, which are used to calculate the bending depths. The control contains 4 preprogrammed materials and 2 programmable ones. In total, 6 materials can be programmed on the control. See the chapter about programming constants how to program materials.

	E-MODULE (N/mm ²)	TENSILE STRENGTH (N/mm ²)
1 = Steel	210.000	400
2 = Aluminium	70.000	200
3 = Zinc	94.000	200
4 = Stainless steel	210.000	700
5 = Material 5	210.000	400
6 = Material 6	210.000	400

PunchUP

Number of punch in library.

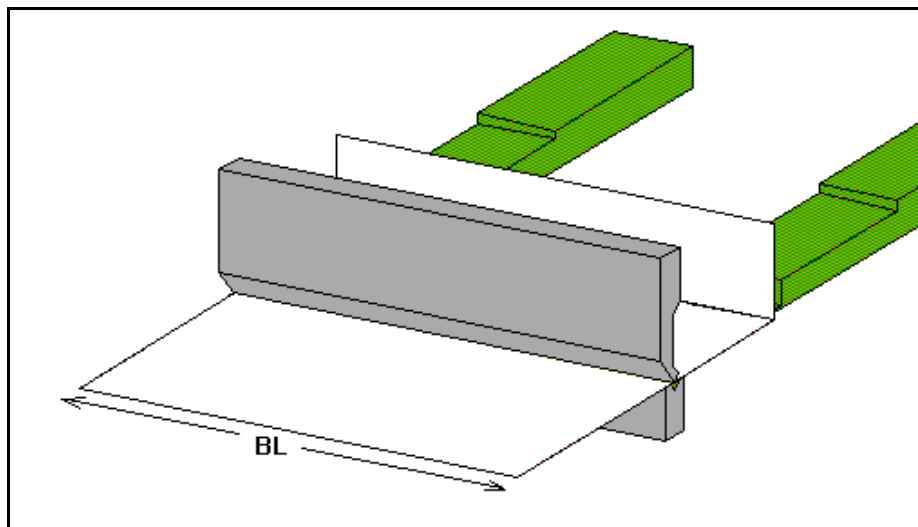
DieUN

Number of die in library.

Bending lengthBL

Length of sheet between tools.

When programming a bend, it is assumed the programmed tools have the necessary length.



StockST

The number of products that should be created with this program.

G-Corr α G α

General correction of the angle, valid for each bend of the program. The value should be programmed in the same manner as for the correction per bend.

G-Corr XGx

General correction of the X-axis position, valid for each bend of the program. The value should be programmed in the same manner as for the correction per bend.

2.3. Bend programming

2.3.1. Introduction

The parameters of one bend are divided over 2 screen pages. The bend number, product number and drawing number are displayed in the top row on the screen.

Auto

BN: 1 / 1
RP: 1 / 1

PN: 123
DN: EXAMPLE 123

Program 1

Y = 0.00

X = .

Method	= 0	X-axis	= 300.00
Angle	= 90.00	Retract	= 0.00
Opening	= 20.0	R-axis	= 0
Force	= 9	Gauge pos	= 0
		Code	= 2
		Delay	= 0
		Deflect	= 0
Actual Repetition	= 1	Corr.X	= 0.00
Corr.α1	= 0.00	Corr.DF	= 0
Corr.α2	= 0.00		

BM = 0 air bend

2.d



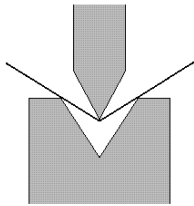
Use the key ‘change view’ to switch to another page with bend parameters.
When this key is pressed again, a screen with zoomed values appears.

The parameters below the line are corrections. They are not necessary when programming a product, but are used to correct the machine behaviour during production. They are described in chapter 6.

2.3.2. Bend parameters - first page

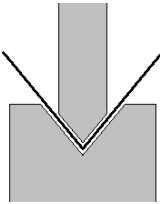
MethodBM
Select the required bending method. The control supports 2 methods:
0 = Air bend
1 = Bottoming

Bend methods:



air bend

The sheet is bent to the programmed angle by bringing the punch to the required depth. The control calculates the required Y-axis position to obtain the programmed angle.



bottoming

The sheet is bent by squeezing the sheet between the punch and the die. The control assumes the bottom of the die as required Y-axis position.

Note:

When bottoming operation is selected, the end of bend position of the Y-axis beam is depending on the working tonnage. If however the force is sufficient for the beam to go to the calculated Y-axis end of bend position, the beam stroke will be limited by the position value.

Angle α

The required angle of this bend. This parameter only appears if angle programming is selected with the parameter 'Angle sel.' and the bend method is an air bend.

Bend positionY

The required Y-axis position for this bend. This parameter only appears if absolute programming is selected with the parameter 'Angle sel.' This parameter also appears if the bend method is bottoming and/or flattening.

OpeningDY

This parameter results in a certain gap opening between the punch and the die after the bend. A positive value is the gap opening above Mute, a negative value below Mute. When you want to limit the handling time of the product you can program a small positive or a negative value.

RepetitionCY

0 = bending is skipped.

1 through 99 = the number of times this bending will be repeated.

X-axisX

Backgauge position. When a negative sign is programmed this backgauge dimension is an incremental dimension. The incremental dimension is subtracted from the actual X-axis position. Therefore this parameter can also be used as a chaining measure.

RetractDX

Retract distance of backgauge during the bending. The "backgauge retract" is started at the pinching point of the sheet.

Auxiliary axisR/Z/Aux.

If you have one or more auxiliary axes (for instance a R-axis) the parameters of these axes appear here.

CodeCX

Programmable parameter which determines when the parameter values for the next bending will be active. The possibilities are:

0 = Bending number change (step change) at end of decompression (next bend parameters active).

1 = Step change at muting position when the beam moves in opening direction.

2 = Step change at upper dead point.

3 = Step change at upper dead point without movement of any axis and the control goes to "stop".

4 = Step change if C-input signal becomes active, without movement of the beam. When you still have a beam movement there will be no retract function of the backgauge performed. See also code 5.

5 = Step change if C-input signal becomes active and the beam is in the upper dead point. Now you may move the beam and the retract function of the backgauge will be performed.

10= Step change at end of decompression with the Y-axis beam waiting at the pinching point until the backgauge is at the retract position.

11= Step change at mute position when the beam moves in the opening direction, with the Y-axis beam waiting at the pinching point until the backgauge is at the retract position.

12= Step change at upper dead point, with the Y-axis beam waiting at the pinching point until the backgauge is at the retract position.

13= Step change at upper dead point without movement of any axis. The Y-axis beam will wait at the sheet clamp point until the backgauge is at the retract position. After the bending with this code, the control goes to "stop".

15= Step change if C-input signal becomes active and the beam is in the upper dead point. The beam may be moved but not necessarily. The Y-axis beam will wait at the sheet clamp point until the backgauge is at the retract position.

The not mentioned CX-values have no meaning.

2.3.3. Bend parameters - second page

Auto		BN: 1 / 1	PN: 123
		RP: 1 / 1	DN: EXAMPLE 123
Program 1			
Y = 0.00		X = ____.	
Speed	= 20.0	Parallelism	= 0.00
Decompr.	= 0.01	Repetition	= 1
Decomp speed	= 20.0	Dwell time	= 0.1
Actual Repetition	= 1	Corr.X	= 0.00
Corr.α1	= 0.00	Corr.DF	= 0
Corr.α2	= 0.00		
V = 20.0 mm/s			

2.e

This page contains the additional parameters of a bend.

ForceP

The required force during pressing (auto computed).

This force is precomputed from the bend properties Material, Thickness, Bending length and the V-opening of the die.

SpeedV

Working speed (pressing speed). Initially, the value for this parameter is copied from the parameter 'default pressing speed' in the programming constants menu.

Dwell timeT

Holding time of punch at bending point.

DecompressionDC

Decompression stroke after bending to release the working pressure

Decomp speedBS

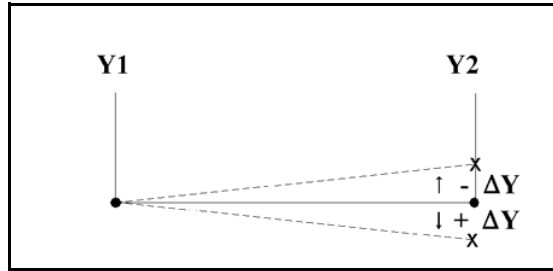
The decompression speed is the programmable speed which is active during the programmed decompression stroke.

Delay timeTX

Programmable delay time before step change (0-30sec).

ParallelismY2

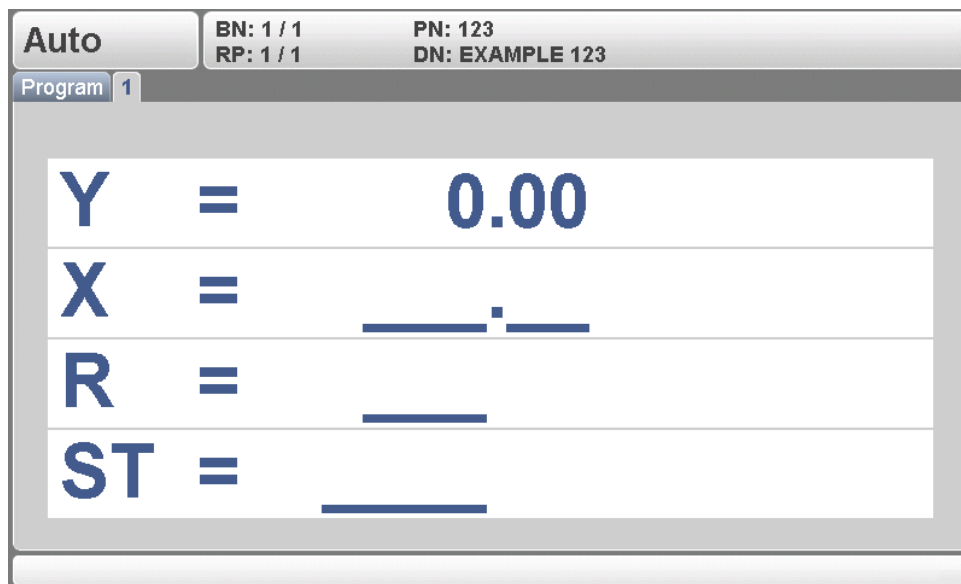
Difference of left- and right hand side cylinder (Y1 and Y2). When positive, right hand side lower. When negative, right hand side higher. The programmed value is active below the clamping point.



2.f

2.3.4. Bend parameters - third page

When pressing the 'change view' button from any of the bend pages there is a third page available with large values. These "large actuals" are helpfull while working at the machine from a distance to the control. Most important values are displayed in a large charactersize and can be easily monitored.



2.g

The control can be started from this view.

When pressing the 'change view' button again the first bend parameters page is displayed again.

When pressing the 'change view' button from the general properties page of a bendprogram (Program tab) the list with all bends from the active program is displayed. Within this view all bends can be seen on one page and properties from each bend can be modified.

2.h

When pressing the 'change view' button again the general properties pages is displayed again.

2.3.6. Bumping programming

For big radius bends made with 'bumping' it is possible to simple program the required data in a numerical program. First the operator can select the bend method:

- 0 = Airbend
- 1 = Bottoming
- 2 = Bumping

Auto		BN: 2 / 4		PN: 128	
		RP: 1 / 1		DN: BUMPING	
Program 1 2~ 3~ 4~					
Y = 0.00		X = ____.			
Method	= 2	X-axis	= 150.00		
Angle	= 172.50	Retract	= 0.00		
Opening	= 20.0	R-axis	= 10		
Force	= 47	Gauge pos	= 0		
Bumping angle	= 90.00	Code	= 10		
Bumping radius	= 30.0	Delay	= 0		
Segments	= 6	Deflect	= 2		
Actual Repetition		= 1	Corr.X	= 0.00	
Corr.α1		= 0.00	Corr.DF	= 0	
Corr.α2		= 0.00	Corr.Bumping	= 0.00	
BM = 2 bumping					

2.i

When selecting the bend method 'Bumping' the operator can program the following parameters:

- Required bumping radius
- Total bumping angle
- The number of segments in the radius

The controller will calculate:

- The number of required bends
- The angles of the separate bends
- The backgauge positions of the separate bends

The first bend has an absolute backgauge position; the other bends will be treated as chained bends with relative backgauge positions.

Auto		BN: 3 / 4	PN: 128
		RP: 5 / 5	DN: BUMPING
Program 1 2~ 3~ 4~			
Y = 0.00		X = ____.	
Method	= 2	X-axis	= -8.09
Angle	= 165.00	Retract	= 0.00
Opening	= 20.0	R-axis	= 10
Force	= 47	Gauge pos	= 0
Bumping angle	= 90.00	Code	= 10
Bumping radius	= 30.0	Delay	= 0
Segments	= 6	Deflect	= 2
Actual Repetition	= 5	Corr.X	= 0.00
Corr.α1	= 0.00	Corr.DF	= 0
Corr.α2	= 0.00	Corr.Bumping	= 0.00
DY = 20.0 mm			

2.j

3. Programming of tools

3.1. Introduction

This chapter describes the programming of the tools.



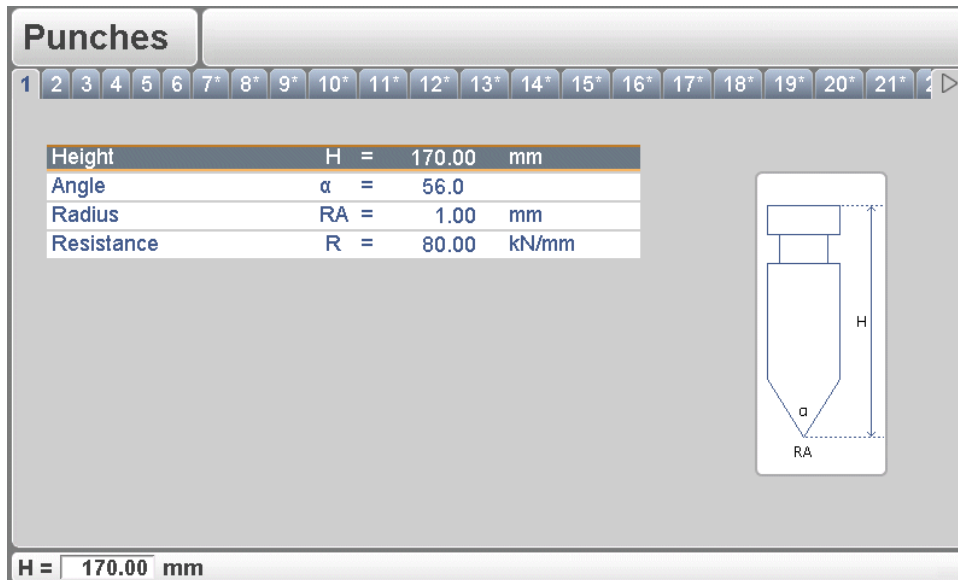
Press this key for tool programming.

The first time this key is pressed, the screen for punch programming appears. To switch to programming of bottom dies, press this key again.

3.2. Programming of Punches

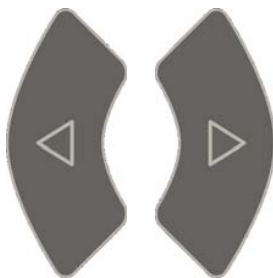
3.2.1. Punch library

The programming of punches is started by pressing the tools key.



3.a

A maximum of 30 punches can be programmed. Tools that are not programmed show an asterisk (*) beside the tool number.



Use the arrow keys left/right to browse to the desired tool in the library.

3.2.2. Punch parameters

HeightH
The height of the tool. Important: this height value will be used in bend depth calculation.

Anglea
The angle of the punch tip.

RadiusRA
The radius of the punch.
This parameter has to be used as selection criterium, the value will not be used in computation formulas.

ResistanceR
Maximum allowable force on punch in kN/mm.

3.3. Programming of bottom dies

3.3.1. Die library

The programming of dies is started by pressing the tools key.

Bottom dies

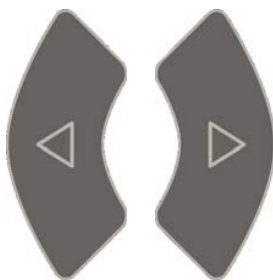
123456°7°8°9°10°11°12°13°14°15°16°17°18°19°20°21°

Height	H =	120.00	mm
V opening	V =	6.20	mm
Angle	α =	30.0	
Radius	RA =	1.00	mm
Mute	M =	4	mm
X-safe	SN =	10.5	mm
Resistance	R =	0.50	kN/mm

H = 120.00 mm

3.b

A maximum of 30 dies can be programmed.



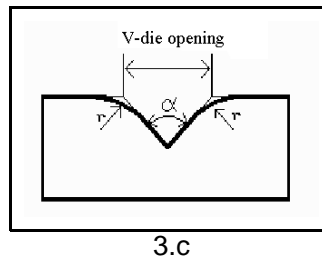
Use the arrow keys left/right to browse to the desired tool in the library.

3.3.2. Die parameters

HeightH
The height of the tool. Important: this height value will be used in bend depth calculation.

V-openingW
The V-opening of the die.

V-die opening:



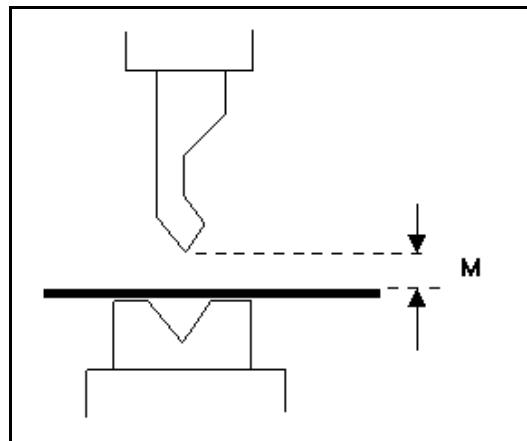
3.c

The width V is the distance between the touching lines crossing.

Angleα
The angle of the die.

RadiusRA
The radius of the edges of the V-opening.

MuteM
Muting distance. Distance above the sheet at which the speed change takes place.



3.d

X-safe.....SN

Calculated safety zone (minimum X-axis value), which will be used in the case an R-axis is mounted. This to prevent finger to die collision. The indicated minimum value is computed automatically from the die dimensions as follows:

X-SAFE = FS + $\frac{1}{2}$ V in which:

FS = flat section on the back side of the V-grove

V = opening value

In this formula also a small additional safety value (0.5 mm) has been added.

Resistance.....R

Maximum allowable force on the die in kN/mm.

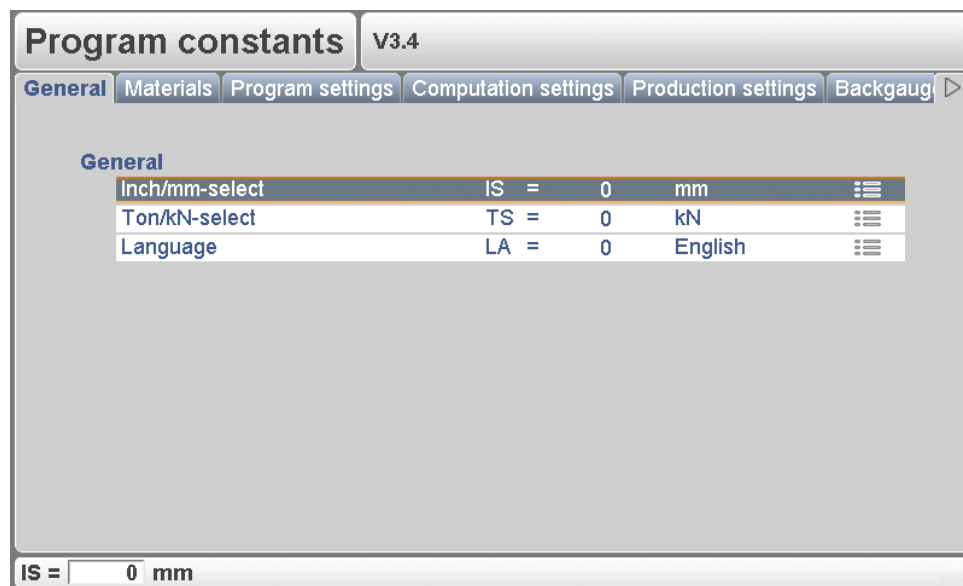
4. Program Constants

4.1. Introduction

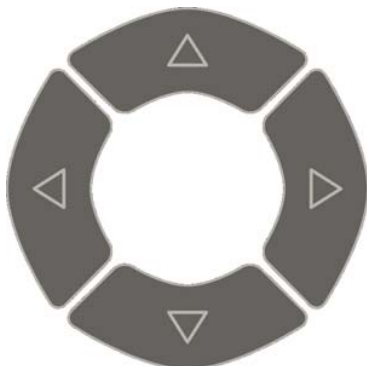


Press this key to enter the program constants. The program constants are divided across several pages. They are discussed in the following sections.

4.2. General




4.a



Use the arrow keys left/right to browse through the various pages with parameters. Use the arrow keys up/down to select individual parameters.



At some parameters, a value can be selected with the 'constants' key. This is indicated by the symbol .

Inch/mm-selectIS

1 = dimensions in inches
0 = dimensions in millimeters

Ton/kN selectTS

1 = Ton
0 = kN
It is possible to select the units for all Force data to be expressed in Tons or kN.

LanguageLA

Select the language for the user interface. The following languages are supported:

0 = English	11 = Polish
1 = German	12 = Lithuanian
2 = Danish	13 = Slovenian
3 = French	14 = Turkish
4 = Italian	15 = Russian
5 = Dutch	16 = Brazilian
6 = Swedish	17 = Hungarian
7 = Czech	21 = Chinese
8 = Spanish	22 = Chinese Traditional
9 = Finnish	23 = Korean
10 = Portugese	24 = Japanese

4.3. Materials

Program constants V3.4

General **Materials** Program settings Computation settings Production settings Backgaug

ID	Material name	σ	E
1	STEEL (1.0037)	400	210000
2	ALUMINUM	200	70000
3	ZINC	200	94000
4	STAINLESS STEEL (1.4016)	700	210000
5	MATERIAL 5	400	210000
6	MATERIAL 6	400	210000

Tensile strength = 400 N/mm2

4.b

In this window, material properties can be programmed. You can edit existing materials, program new materials or delete existing materials. A maximum of 6 materials can be programmed on the control.

For each material, three properties are present and can be viewed and edited.

Material nameNA

Name of the material. The maximum allowed length of the material name is 25 characters, the name must begin with a character (not a numeral).

Tensile strengthS

Tensile strength of the selected material.

E moduleE

E- module of the selected material.

The materials are initially listed according to their material number, which is shown in the first column (ID).

To change an existing material, go to the relevant line and change the values as you see fit.

Use the ENTER key to confirm a typed value.

To delete an existing material, move the cursor to the relevant line and press the function key 'delete material' (S6) to erase the values.

To program a new material, move the cursor to an empty space and start programming its values.

4.4. Program settings

Program constants V3.4			
General Materials Program settings Computation settings Production settings Backgaur			
General			
Machine number	MN =	1	
Angle corr. database	CD =	1	enabled
Y1/Y2 independent	YI =	1	on
Default values			
Y opening default	13 =	20.0	mm
Default pressing speed	PS =	10.0	mm/s
Default X-axis code	XC =	10	
Default X time	XT =	0	sec
Default hold time	HT =	0.2	sec

MN = 1

4.c

Machine numberMN

When there are several bending machines in a factory, it can be useful to give the control on each machine a unique machine number.

The selected machine number will be stored with the bending program. This number will be checked when a program is read from USB key. When the machine number does not match you must confirm to read it anyway or not. If you do not confirm the question the action will be aborted.

The machine number is also stored in the filenames of tools. When the machine number is changed in this screen, you are prompted to make a new backup of your tools because the filenames of all tools have been changed according to the new machine number.

Angle correction databaseCD

Toggle function, to switch the database with angle corrections on or off.

Angle corrections are entered in production mode (automatic/step by step). These corrections are stored in the product program. Beside this, it is also possible to store these corrections in a general database with angle corrections. This way corrections that have once been entered for certain bends remain available for future use in other products.

When this setting is switched on, the control checks during production whether corrections for similar bends are present in the database. If corrections for certain bends are available, then they will be offered. On other occasions, corrections can be interpolated and offered.

The correction database is adjusted by entering new corrections during production. When the database is enabled with this parameter, all new-entered corrections are stored in the database.

When searching for similar bends, the control searches for bends that have the same

properties as the active bend. The following properties of a bend are compared:

- Material properties
- Thickness
- Die opening
- Die radius
- Punch radius
- Angle

The first five properties of a bend must be exactly the same as the active bend to start a comparison.

If an angle is found with the same value as the angle of the active bend, the correction is offered.

If no matching angle is found, the control will attempt to interpolate a correction from already existing corrections. To compute a correction, the following two conditions must be obeyed:

- If the angle of the active bend must have a maximum difference of 10° with two adjacent bends.
- The corrections of these two adjacent bends may differ no more than 5°.

Y opening default13

Default Y-axis opening value.

The value programmed here is used as initial value for the parameter 'Y-axis opening' when making a new bend program.

Default X-axis codeXC

Default value for the parameter 'code' in a bend program. This parameter determines the moment of step change in a bend program. Initially the code parameter is set to the value programmed here during postprocessing and during programming.
The default value of this parameter = 2.

See chapter 'program edit' for more information about the code parameter.

Default X time.XT

Default waiting time for step change. With this parameter you can preset a longer waiting time when needed for product handling.

Default hold timeHT

Default value for the dwell time, the time the pressbeam stays at the bending position.

4.5. Computation settings

Program constants		V3.4				
General		Materials	Program settings	Computation settings	Production settings	Backgrou
Computation settings						
Bend allowance	BA =	0	correction off			
Bottoming force factor	BF =	3.0				

BA = 0 correction off

4.d

Data preparation bend allowanceBA

0 = correction off

1 = correction on

With this parameter you can choose whether or not you wish to have programmed values corrected for bend-allowance. This on/off setting only refers to corrections during product programming of a new program in the menu 'program edit'. If a numeric program has been entered with corrections on, the axis corrections are calculated and stored in the program. These corrections can be viewed and edited in production mode (see 'Automatic mode').

Bottoming Force FactorBF

The pressure needed for an airbend multiplied by this factor in order to obtain the coining pressure.

4.6. Production settings

Program constants V3.4

General Materials Program settings Computation settings **Production settings** Backgaur ▶

General

Stock count mode	SC =	0	down	⋮
------------------	------	---	------	---

Corrections

Pressure correction	PC =	120	%
Clamping correction	CC =	0.00	mm
X reference correction	C1 =	0.00	mm

Axis properties

Intermediate R for X	RS =	0.00	mm
----------------------	------	------	----

SC = 0 down

4.e

Stock count modeSC

Setting for the stock counter in production mode, to have the stock counter (product counter) count up or down.

When dncounting is selected, the stock counter in production mode is decremented after each completion of a product. When the counter has reached zero, the control is stopped. On the next start action, the stock counting value is reset to its original value. When upcounting is selected, the counter is incremented after each completion of a product.

Dncounting can be useful if a pre-planned quota must be produced. Upcounting could be used to give a report on production progress.

Pressure correctionPC

Percentage of calculated tonnages which actually controls the pressure valve.

Clamping correctionCC

The position of the beam at which the sheet is clamped, is calculated. In order to have a firm clamped sheet it is possible to offset the calculated pinch point with the value here programmed. A positive value will result in a deeper position, a negative value in a higher position of the beam.

X-reference correctionC1

When the actual, mechanical X-axis position is not corresponding with the displayed value than is it possible to correct the position with this parameter. Program the calculated difference.

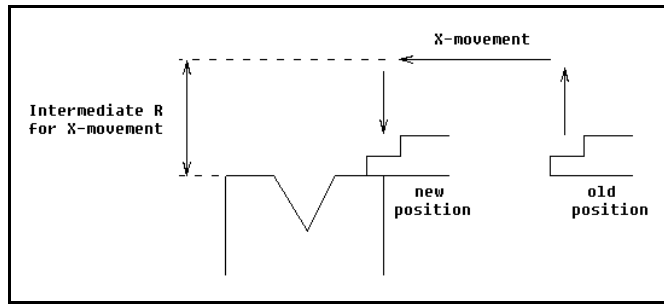
Example:

- When the programmed and displayed value = 250 and the actual, mechanical position value = 252 the XR parameter = -2.

- When the programmed and displayed value = 250 and the actual, mechanical position value = 248 the XR parameter = +2.

Intermediate R for X-movement.RS

Temporary position for the R-axis, to avoid collision as a result of movement of the X-axis. The value 0 disables this functionality. When programmed not equal to zero this position will be active when the X-axis has to move inside the safety zone of the die.



4.f

4.7. Backgauge dimensions

Program constants

V3.4

Materials

Program settings

Computation settings

Production settings

Backgauge

Ma

General

Gauge R offset	RO =	0.0	mm
----------------	------	-----	----

Dimensions

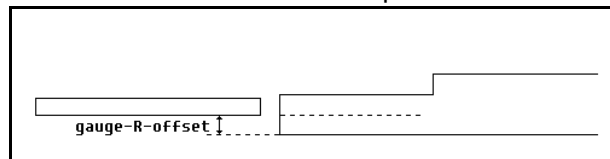
Finger height	FH =	10.0	mm
Finger length	FL =	40.0	mm

RO = 0.0 mm

4.g

Gauge R offsetRO

An offset value for the R-axis when the X-axis position is outside the die safety zone.



4.h

A negative value gives a lower backgauge position. This offset is only valid for gauge position 0.

Finger heightFH

The height of the default finger level.

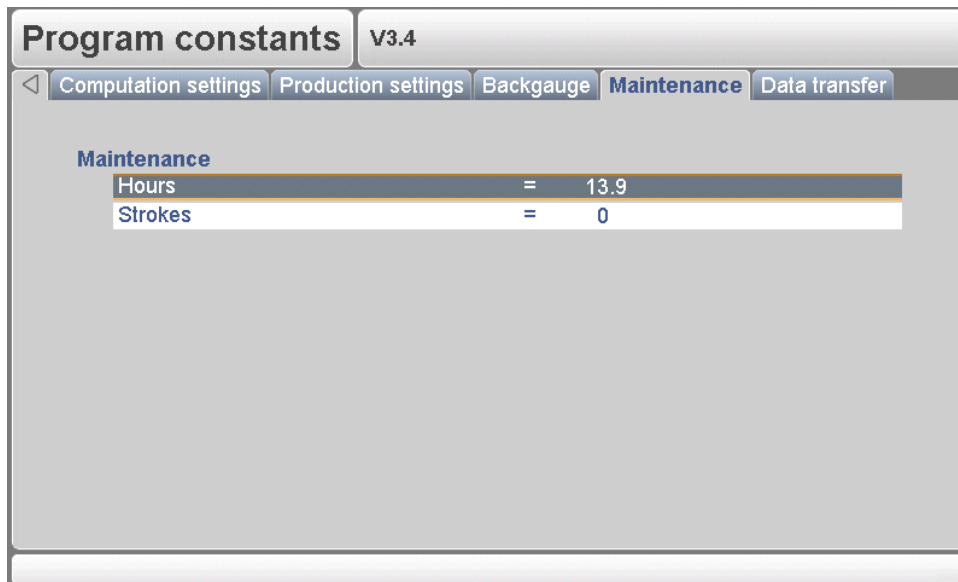
Used to correct the R-axis position in case of lay-on.

Finger lengthFL

The length of the first finger level.

Used to correct the X-axis position in case of lay-on.

4.8. Maintenance

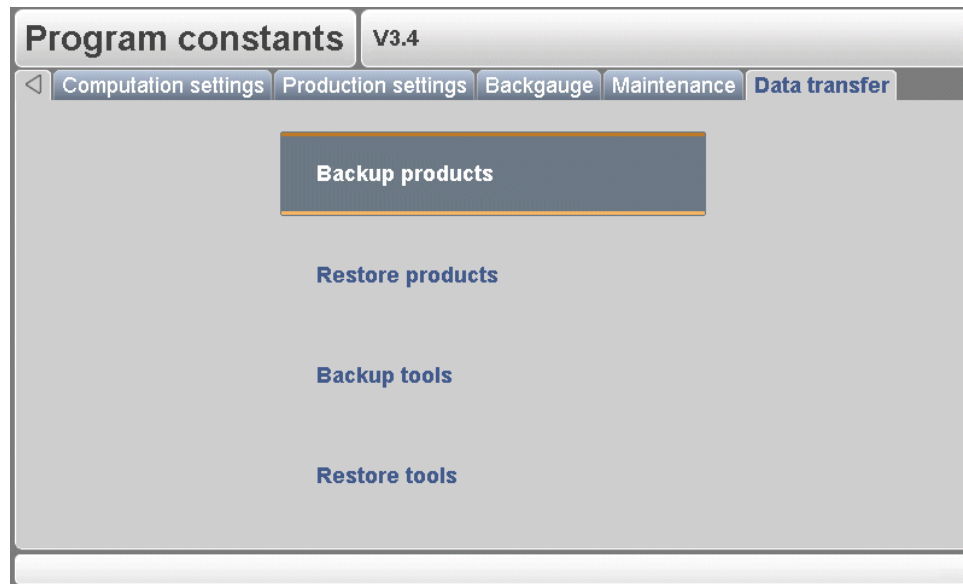


4.i

Hours
The number of hours the machine is running.

Strokes
The number of strokes the pressbeam has executed.

4.9. Data transfer



4.j

From this menu, all program data on the control can be stored on an external USB device or restored from such a device.

Backup products	Copy all products from the control to the USB disk. Existing products on the USB disk with the same name are replaced.
Restore products	Copy all products present on the USB disk to the control. Existing products on the control with the same name are replaced.
Backup tools	Copy all tools from the control to the USB disk. Existing tools on the USB disk with the same name are replaced. Beside the tools, also the program constants are stored.
Restore tools	Copy all tools present on the USB disk to the control. Existing tools on the control with the same name are replaced.

5. Manual mode

5.1. Introduction



Manual mode By pushing this key the CNC is in manual mode.

In manual mode you program the parameters for one bending.
After pushing the 'Start' button all parameters are active and the backgauge will go into position. It is also possible to move the axes manually, see section 5.2.

Manual

Y = .

Punch	=	1
Die	=	1
Material	=	1
Thickness	=	1.00
length	=	1000
Method	=	0
Corr.α	=	0.00
Angle	=	90.00
Y1-axis	=	111.66
Y2-axis	=	111.66
Mute	=	105.00
Decompr.	=	0.04
Force	=	94

X = .

X-axis	=	150.00
Retract	=	0.00
R-axis	=	0
Deflect	=	4
Opening	=	20.0
Speed	=	10.0
Decomp speed	=	10.0
Dwell time	=	0.1
Parallelism	=	0.00

UP = 1

5.a



Use the key 'change view' to switch to a screen with zoomed values.

5.2. Parameter Explanation

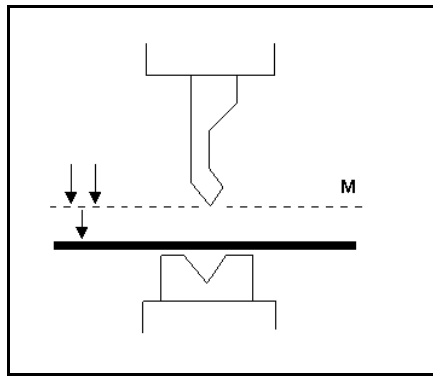
All the parameters can be programmed independently of the programs in memory.

PunchUP
Number of selected punch in the library.

DieUN
Number of selected die in the library.

MaterialMA
Selection of one of the programmed materials, which are used to calculate the bending depths. The control contains 4 preprogrammed materials. In total, 6 materials can be programmed on the control. See the chapter about programming constants how to program materials.	
ThicknessTH
Thickness of the sheet.	
LengthBL
Length of the sheet between the tools.	
MethodBM
Select the required bending method. The control supports 2 methods: Air bend Bottoming See chapter 2 for more information about possible bend methods.	
Corr. αC α
Correction on angle to bend The angle correction should be entered as follows: - Programmed value of 90 degrees. - Measured value of 92 degrees. Then it is required to program Corr._ with -2. - Programmed value of 90 degrees. - Measured value of 88 degrees. Then it is required to program Corr._ with +2.	
Angle α
Angle to bend.	
Y1-axisY
The programmed or calculated Y-axis value to realise a certain angle.	
Y2-axisY
The programmed or calculated Y-axis value to realise a certain angle. Normally Y2 is copied from Y1. Y2 can be programmed differently in case of conical bending.	

MuteM
Sequence point where the Y-axis is switched from fast closing speed to pressing speed. It is programmed here as a Y-axis position value.



5.b

DecompressionBP
Decompression stroke after the bending to release the working pressure. The same parameter as DC in the auto mode.

ForceP
The required force during pressing (auto computed).
This force is precomputed from the bend properties Material, Thickness, Bending length and the V-opening of the die.

X-AxisX
The programmed value in X- direction to get a certain backgauge position.

RetractDX
Retract distance of backgauge during the bending. The "backgauge retract" is started at the pinching point of the sheet.

Auxiliary axisR
If you have one or more auxiliary axes (for instance a R-axis, Z-axis or part support) the parameters of these axes appear here.

OpeningDY
This parameter results in a certain gap opening between the punch and the die after the bend. A positive value is the gap opening above Mute, a negative value below Mute. When you want to limit the handling time for the product you can program a small positive or a negative value.

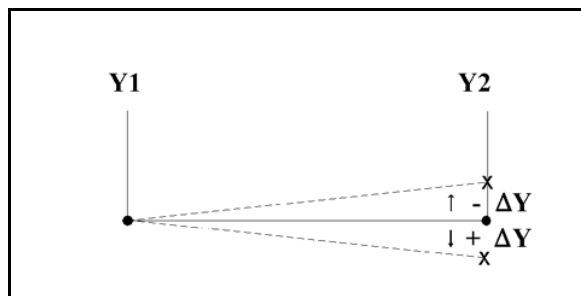
SpeedS
Pressing speed.

Decomp speedBS
The decompression pressure speed is the programmable speed of the beam during the decompression stroke.

Hold timeT
Dwell time of punch at the bending point.

Parallelism.....Y2

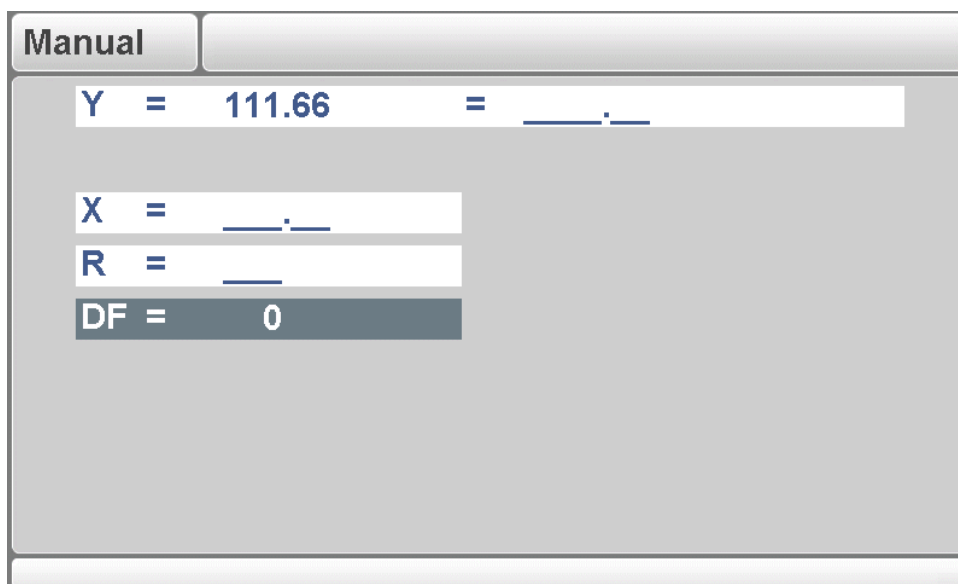
Difference of left- and right hand side cylinder (Y1 and Y2). When positive right hand side lower. When negative right hand side higher. The programmed value is active below the clamping point.



5.c

After pushing the start button all the programmed parameters are active.

5.3. Zoomed values



5.d

In this screen, the values of the controlled axes are displayed.

5.4. Manual operation of the axes

5.4.1. General



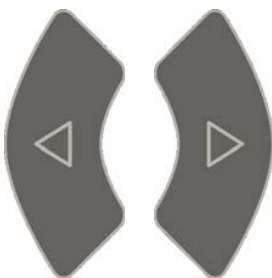
Press this key to activate the manual movement mode.

It is possible to move an axis by pressing the arrow keys on the front panel of the control. After pressing the key 'manual pos', the following screen appears:

Manual	
Programmed	Actual position
Y = 111.66	<input type="text"/>
Y1 = 111.66	<input type="text"/>
Y2 = 111.66	<input type="text"/>
X = 150.00	<input type="text"/>
R = 0	<input type="text"/>

20.5

5.e



Put the cursor bar on the axis you wish to move with the arrow keys. Then simply press the keys and watch the movement of the intended axis.

The procedure for moving the axis depends on the axis you wish to move.

- Auxiliary axes:

With the keys the backgauge can be positioned manually. This operation is only possible in "Stop" + "Manual Mode".

First you select the respective backgauge axis with help of the "Manual positioning"-key, so that you will see the cursor bar at the required axis. Then you can move the axis with help of the keys.

- Y-axis:

With the keys the punch can be positioned manually in the same way as for the auxiliary axes. This operation is only possible in "Start" + " Manual Mode". Furthermore, the following conditions must be met:

- The 'adjust' function must be active, indicated on the screen by "Adjust" in the lower righthand corner.
- The Y-axis must be below mute-point.
- A pressing command must be given to the CNC.

5.4.2. To teach

You can teach an axis a correct position within the manual positioning mode. When you have moved an axis to a certain position with the cursor keys, you may want to store this position. To do so, press the ENTER key within this screen.

The actual axis value (left side) will appear in the programmed axis field (right side).

6. Automatic mode

6.1. Introduction

Auto		BN: 1 / 1 RP: 1 / 1	PN: 123 DN: EXAMPLE 123
Program 1			
Y = 0.00		X = .	
Method	= 0	X-axis	= 300.00
Angle	= 90.00	Retract	= 0.00
Opening	= 20.0	R-axis	= 0
Force	= 9	Gauge pos	= 0
		Code	= 2
		Delay	= 0
		Deflect	= 0
Actual Repetition	= 1	Corr.X	= 0.00
Corr.α1	= 0.00	Corr.DF	= 0
Corr.α2	= 0.00		
BM = 0 air bend			

6.a

In the automatic mode a bend program can be executed automatically bend by bend after pushing the 'start'-key. When a new bending program is selected you must check your tools and tool positions in your machine.

In the header information is displayed on the number of bends, the repetition of a bend, the product number and the drawing number.

Above the horizontal line the programmed and computed parameters are displayed. See chapter 2 about programming of these parameters.

The parameters below the horizontal line are corrections on the programmed values.

If the key lock is active, the program parameters (above the line) cannot be changed. The correction parameters (below the line) can always be changed.



Use the key 'change view' to switch to another page with bend parameters.

When this key is pressed again, a screen with zoomed values appears.

6.2. Parameters

Select repeatCY

Selection of one of the repeated steps of one bend. Useful if a bend has a repetition value larger than 1.

Corr $\alpha 1$ C α

Corr $\alpha 2$ C α

Corrections on angle values (C α) in this bending.

Angle corrections can be programmed for both sides of the machine, Y1 and Y2. When correction $\alpha 1$ is entered for one side, this value is automatically copied to the $\alpha 2$ correction for the other side. The correction for the other side can then be changed.

When both angle corrections have been entered, the resulting corrections for Y-axis and parallelism are calculated. The corrections will be saved in the active bending program. The angle correction should be entered as following examples indicate:

1) Programmed value of 90 degrees.

Measured value of 92 degrees.

Then it is required to program Corr. α with -2.

2) Programmed value of 90 degrees.

Measured value of 88 degrees.

Then it is required to program Corr. α with +2.

In case the angle correction database has been switched on, the control checks whether a correction exists for this type of bend in the database. The result of this check is prompted in the entry field:

No stored correction. No correction has been found for this bend

Stored correction. A correction that matches the current bend has been found

Interpolated correction. A correction has been calculated (interpolated) based on other existing corrections

If a correction is entered, it will be stored in the database. At each next bend with the same properties, this same correction will be offered.

See the chapter 'Program constants' for more information on the angle correction database.

Corr XCx

Corrections on X-axis positions (Cx) in this bending. In case bend allowance is activated (see PROGRAM CONSTANTS) and a program has been entered in data preparation, the X-axes correction values are the result of bend allowance calculation. The corrections will be saved in the active bending program.

The X-axis correction should be entered as following examples indicate:

1) Programmed value of 200 millimeters.

Measured value of 202 millimeters.

Then it is required to program Corr.x with -2

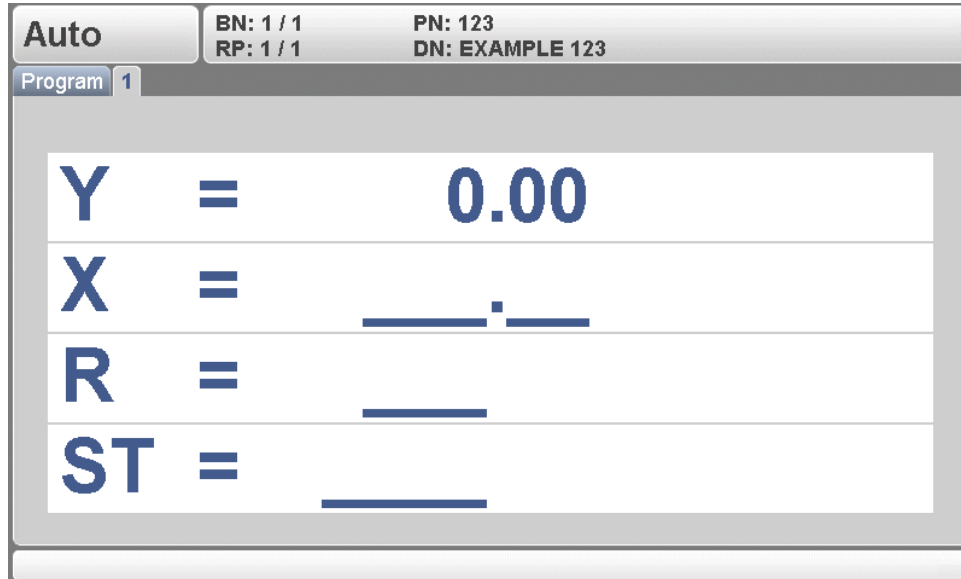
2) Programmed value of 200 millimeters.

Measured value of 198 millimeters.

Then it is required to program Corr.x with +2

6.3. Zoomed values

When the function key 'zoomed values' has been pressed, the control switches to a new view with only axes values on the screen.



6.b

6.4. Manual operation of the axes



Press this key to activate the manual movement mode.

It is possible to move an axis by pressing the arrow keys on the front panel of the control. After pressing the key 'manual pos', the following screen appears:

Auto		Bend: 3 of 4	
Programmed		Actual position	
Y =			
X =	-8.09		
R =	10		
DF =	2	0	

21.9

6.c

The procedure for manual movement is described in section 5.2.

A. Parameter index

This appendix contains a list of all parameters described in this manual, in alphabetic order.

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