

# **HP-GL MANUAL**

**ZÜND G3/S3/L3/D3 - LINE**

**Valid from FW Version 1.66.3**

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# About This Guide

This is a guide to HP-GL Language implemented in Zünd G3/S3/L3/D3s. The plotters/cutters support a subset of the standard HP-GL, together with Zünd specific commands, e.g. for the different tools or the T- and Z-axes.

HP-GL and HP-GL/2 are trademarks of Hewlett-Packard Company.

The first part of this manual explains the coordinate systems of the cutter, the units of measure and the command syntax. The second part describes the commands in detail.

For testing purposes commands can be sent by a terminal program on a computer, connected to the cutter.

## How to connect to the HPGL interface

The cutter offers two hardware ports to connect to the HPGL interface, Ethernet and RS232. Check the menu item 5-5 on the operating unit to find out which hardware port is selected.

Ethernet:

Open a TCP connection to the cutter. The default setting for the IP address is 192.168.0.199 and the default port is 50'000. The complete ethernet settings can be found in menu item 5-3 on the operating unit.

RS232:

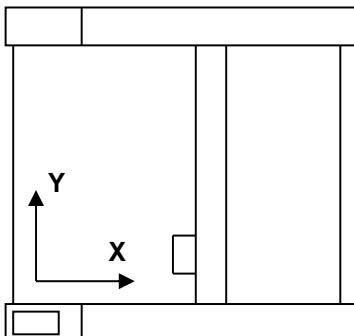
To send HPGL commands via serial port connect your device to COM 1. The complete serial settings of COM 1 can be found in menu item 5-2-1 on the operating unit.

# The Cutter Itself

## Coordinate System

The cutter uses the Cartesian coordinate system: a set of two perpendicular, scaled axes. These axes are usually called the X- and Y-axes. You can locate any point on the XY plane by specifying its X- and Y-coordinates.

**The beam of the Zünd Cutter moves in X-direction.**



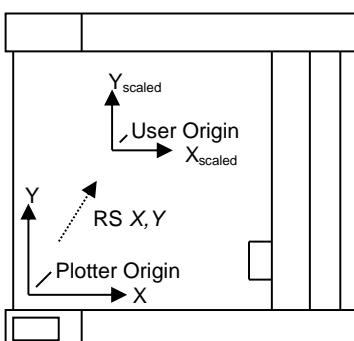
Some tools have a T- and / or Z-Axis. The T-axis is for the tangential rotation, the Z-axis moves the tool vertically up and down.

## Units of Measure

Two different types of coordinates are used.

- **Plotter Coordinates** referring to the initial origin of the cutter.
- **User Coordinates**, they are scalable and refer to the reference point (settable origin).

Depending on the HP-GL command one or the other coordinate system is used. See the command description for details.



### Units:

Plotter Coordinates:  
e.g. RS, HC

User Coordinates:  
e.g. PU, PD, PA

## Absolute and Relative Coordinates

X-, Y- and Z-coordinates in the User Coordinate system can be either absolute or relative.

- The command **PA** selects the **absolute mode**. All User Coordinates in succeeding commands are then interpreted as **absolute coordinates relative to the User Origin**.
- The command **PR** selects the **relative mode**. In this mode coordinates give the difference between the current and the new location.

Commands which work with Plotter Coordinates are independent of the selected mode. Plotter coordinates are always absolute.

Remark:

Absolute mode is default. If you use relative coordinates, we recommend to end your HP-GL program with a **PA;** command, to reset the mode to default (absolute).

## Work Area Limits

Your plotting area usually does not extend to the limits of your media. There is a physical limit beyond which the tool cannot move. These hard-clip limits can be changed with the **HC** command as long as the new hard-clip area is within the physical limits.

# Understanding HP-GL Syntax

HP-GL instructions have four components: a mnemonic, parameter(s), separator(s), and a terminator.

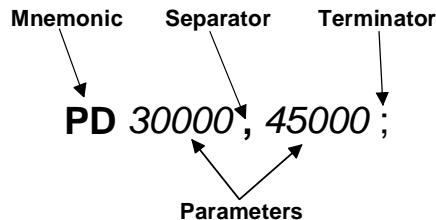
**Mnemonic** → The two-letter mnemonic is designed to remind you of the instruction's function. The mnemonic can be upper- or lowercase.

**Parameter(s)** → Some parameters are required, some optional. Optional parameters, when specified, may require additional, qualifying parameters. Some instructions have no parameters.

**Separator(s)** → When you use parameters, you must separate them with a comma or space, and/or with a + or – sign. Commas are recommended because some computers eliminate spaces, especially when sending variables.

**Terminator** → All instructions require a terminator. The recommended method is to terminate an instruction with a subsequent HP-GL mnemonic. You may also use semicolons, [cr] or [lf] to terminate HP-GL instructions. A special terminator is used for the commands **LB**, **MS** and **UR**, definable by **DT**.

The following illustration describes a typical HP-GL instruction. Note that it uses a semicolon to show that the instruction is being terminated. The recommended practice is to terminate this instruction with the next HP-GL mnemonic.



## Notations

The following describes the notations used in the syntax section of the instruction descriptions.

<b>MNemonic</b>	Command characters.
<b>parameters</b>	All parameters are shown in italics.
( )	Parameters in parentheses are optional.
<b>text</b>	Any number of labeling characters for the LB command. Number of characters is limited for MS and UR.
(...)	Any additional number of the given coordinate set either X,Y, X,Y,T or X,Y,Z
;	Instruction terminator.
[TERM]	The terminator sent back to your computer by the cutter at the end of the response to an output instruction. The output terminators are: a carriage return [cr] or carriage return [cr] and line feed [lf]. Default factory setting is [cr] only.
a-b-c-d	A key sequence for the cutter keypad. [a..d] describes a sequence of Item numbers An M or a T means module or tool number.

# Parameter Formats

## Real

You must give parameters in the format (type of units) required by each HP-GL instruction. All parameters however are read by a floating-point read-in function, regardless of their latter use. In floating point representation, a number is represented internally by a sign bit  $s$  (interpreted as plus or minus), an exact integer exponent  $e$  and an exact positive integer mantissa  $M$ . Taken together these represents the number

$$s * 1.M * 2^{e-E}$$

where  $E$  is a bias of the exponent, a fixed integer constant for any given machine and representation. The actual used mantissa  $M$  is 23-bits wide which give a relative accuracy of  $1.2 * 10^{-7}$ .

Care should be taken with large coordinates, e.g. when using material feeding. While X-coordinates increase in magnitude, small relative coordinates lose their precision when they are added to the X-coordinates.

## Integer

Because of the relative accuracy of the unified read-in function, integer numbers larger than 8388607 ( $= 2^{23}-1$ ) lose their exact value. Therefore it is not advisable to use integer outside the range of  $\pm 8388607$ .

**Standard units are the following:** (exceptions are stated in the command description)

### User units / Plotter units / Relative / Absolute

Coordinates and lengths are usually in either User Units or Plotter Units and can be relative or absolute. These names are used in the parameter format specification. The above chapters 'Units of Measure' and 'Absolute and Relative Coordinates' give more information.

### Time

In milliseconds. A time parameter is named '**Time**'

### Angles

In degrees. (except PT command) An angle parameter is named '**Angle**'.

### Acceleration

Integers from 1 to 4. An acceleration parameter is named '**Accel**'. The resulting acceleration depends on cutter-type and mounted modules.

### Velocity

In cm/s. A velocity parameter is named '**Velocity**'. The maximum velocity depends on cutter-type and mounted modules.

### String

ASCII Characters [32..126]. Exceptions and special characters are marked.

# EBNF Definition of HP-GL Syntax

Instruction	=	Mnemonic [Parameter {Separator Parameter}] (Instruction   Terminator).
Terminator	=	';   CR   LF
Parameter	=	floating number
Separator	=	space   tab   ','   '+'   '-'
Mnemonic	=	character character

- This definition does not cover text based commands e.g. LB, MS, UR, SO.
- The command VP accepts only the semicolon as terminator.

# Tools

Zünd Cutters work with a variety of tools. For selecting a tool on a module, the standard HP-GL command Select Pen (SP) is used. The terms tool and pen are used for any Zünd-Tools, regardless of their actual function.

# Front-End Parser

The so called front-end parser has been implemented to enable an immediate command processing. If the cutter receives a front-end command, it is handled immediately even if the HP-GL buffer is not empty. Front-end commands can be valid in online and offline state. The purpose of the commands is to control the cutter parameters (read and write) or to change the state (online/offline) by a host computer.

The frontend command syntax is the same like HPGL command with a **<ESC>.I** prefix. <ESC> means the ASCII character code with decimal value 27.

See the appropriate header on each command to determine if frontend execution is available.

There are several drawbacks with front-end commands. First of all, they can be potentially dangerous if they are used to move the beam of the cutter. E.g. changing the cutter state may cause unexpected movement. Second, they need more computing time which results in lower performance if frequently used. A front-end command stops the cutter temporarily.

# Command Groups

## Moving Commands

Commands to move the X, Y, Y2, T or Z axis of the Cutter.

**AA, AR, CI, FF, LB, MA, MF, MR, MW, PA, PD, PK, PR, PT, PU**

## Setting Commands

Commands which modify cutter settings.

**AS, AU, CR, DI, DS, DT, FL, FS, HC, LT, PW, QU, RS, SI, SV,  
SZ, TR, UL, UR, VF, VS, VU, VW, XX, ZP, ZS**

## Actor Commands

Commands which switch ports or cause any actions on the Cutter.

**BP, JB, MS, NR, PB, PK, PS, RP, SP, XX, SD**

## Information Commands

Read information from cutter. (Output commands)

**DP, JB, OA, OC, OF, OH, OI, OP, OR, OS, OZ**

## Vacuum and Page Feed Commands

**FF, FL, PB, PS, XX**

## Laser Commands

Commands for the Laser option.

**EG, EL, IN, LF, LL, ML, OP, XX**

# COMMAND DESCRIPTION

## AA ARC ABSOLUTE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Draw a circular arc. The center is defined by the absolute coordinates x and y. Starting position is the actual position of the tool, length of the arc is defined by the input angle. The radius of the circular arc is the difference between the actual position and the center. The sign of *Arcus* determines if the arc is plotted clockwise or anticlockwise. **AA** automatically lowers the tool and sets the tool-status to down.

**SYNTAX:** **AA X,Y,Arcus;**

Parameter	Format	Functional Range	Default
X, Y	User units absolute	Device-dependent	No default
Arcus	Angle	±Real [°]	No default

**X, Y:** Specifies the location of the arc center.

**Arcus:** Specifies the angle, in degrees, through which the arc is drawn. A positive angle draws anticlockwise from the current tool location a negative angle draws clockwise.

**EXAMPLE:** **AA200,200,90;**

Plots a circular arc of 90 degrees, center absolute 200,200 from the reference point, anticlockwise rotation.

**SEE ALSO:** [CR](#)

**NOTE:** (Angles > 360) or (Angles < -360) are possible. This is useful for overlapped cuts.

## AK ACTIVATE KEY

V 1.44 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Get the request code or set the response code to free any options.

**SYNTAX to get the request key:**

**DT 59;  
AK;**

**NOTE:** Don't insert spaces between the **AK**-Command and the semicolon.  
Otherwise a restart is required.

**SYNTAX to set the respond key:**

**DT 59;  
AK ##...##;**

**NOTE:** Don't insert spaces between the **AK**-Command and the semicolon.  
Otherwise a restart is required.  
64 character, whereas # = 0-9 or a-f

# AR ARC RELATIVE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Draws a circular arc. The centre is defined relative to the actual position of the tool. Starting point is the current position of the tool. The radius is defined by the distance between centre and current position. The sign of *Arcus* determines if the arc is plotted clockwise or anticlockwise. **AR** automatically lowers the tool and sets the tool-status to down.

**SYNTAX:** **AR**  $\Delta X, \Delta Y, Arcus;$

Parameter	Format	Functional Range	Default
$\Delta X, \Delta Y$	User units relative	Device-dependent	No default
<i>Arcus</i>	Angle	$\pm$ Real [°]	No default

$\Delta X, \Delta Y$ : Specifies the centre of the arc relative to the current position.

*Arcus*: Specifies the angle, in degrees, through which the arc is drawn. A positive angle draws anticlockwise from the current tool location a negative angle draws clockwise.

**EXAMPLE:** **AR**200,200,90;  
Plots a circular arc of 90 degrees, centre relative 200, 200 from current position, rotation anticlockwise.

**SEE ALSO:** [CR](#)

**NOTE:** (Angles > 360) or (Angles < -360) are possible. This is useful for overlapped cuts.

# AS ACCELERATION SELECT

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Initializes the actual acceleration for lowered and lifted tools. The parameters ranging from 4 to 1 select an acceleration relative to the maximum. The maximum acceleration depends on the cutter type.

**SYNTAX:**

**AS;**  
**AS AccelDown;**  
**AS AccelDown,AccelUp;**

Parameter	Format	Functional Range	Default
AccelDown	Accel	1 to 4	Stored value set by menu entry 1-x-1-3-3-2
AccelUp	Accel	1 to 4	Stored value set by menu entry 1-x-1-3-3-1

AccelDown: Acceleration when tool is down.

AccelUp: Acceleration when tool is up.

Acceleration of M800 e.g.

**AS 1** -> 1,25 m/s<sup>2</sup>  
**AS 2** -> 2,5 m/s<sup>2</sup>  
**AS 3** -> 5 m/s<sup>2</sup>  
**AS 4** -> 10 m/s<sup>2</sup>

**EXAMPLE:**

**AS 1,3;**  
Selects acceleration level 1 for all subsequent down-vectors, acceleration 3 for up-vectors.

**NOTE:**

Only **AS** without parameters selects the default values.

**SEE ALSO:**

[OP](#)

## AU AUTOMATIC TOOL UP

V 1.21 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓

Frontend - Online X

Frontend - Offline X

Initializes the angle of a directional change at which the tool is raised automatically. After rotation, the tool is lowered again.

**SYNTAX:** AU *LiftupAngle*;

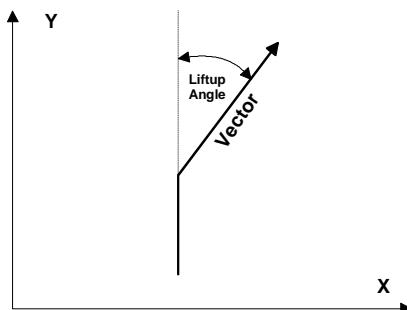
Parameter	Format	Functional Range	Default
<i>LiftupAngle</i>	Angle	±360°	No default

*LiftupAngle*: An angle < 0 turns the automatic tool-up off (similar to 360°).

**EXAMPLE:** AU360;  
Automatic tool-up is turned off.

AU45;

The tool is automatically lifted before and lowered after the rotation if the change of direction exceeds 45 degrees.



**SEE ALSO:** [XX96](#);

## BP BEEP / BEGIN PLOT

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓

Frontend - Online X

Frontend - Offline X

Generates a sound and sets the replot startpointer to the command following this one.

**SYNTAX:** BP;

**EXAMPLE:** BP;  
Activates the keyboard-buzzer for 100 ms and sets the online replot startpointer to the HP-GL command following this BP;

**NOTE:** BP enables you to check the communication between PC and cutter very easily.

**SEE ALSO:** [RP](#)

## CI CIRCLE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Draws a full circle using the current tool position as centre. The circle is plotted anticlockwise with the tool lowered automatically. On completion, the tool returns to centre.

**SYNTAX:** **CI** *Radius*;

Parameter	Format	Functional Range	Default
<i>Radius</i>	User units	Device-dependent	No default

*Radius*: Circle radius [ $^1/_{100}$  mm \* zoom-factor].

**EXAMPLE:** **CI**1000;  
Generates a full circle with a 10 mm \* zoom-factor radius.

**SEE ALSO:** [CR](#)

## CO COMMENT

V 1.46 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

A line that begins with **CO** is interpreted as a comment and is not executed.  
A comment line must be terminated with carriage return [cr].

# CR CIRCLE RESOLUTION

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

**CR** changes the factor for circle resolution of the actual tool.

**SYNTAX:**

**CR;**  
**CR Resolution;**

Parameter	Format	Functional Range	Default
<i>Resolution</i>	Real	0.001 to 100	1.0

*Resolution:* Defines the number of vectors in a circle.

Resolution < 1: lower resolution.

Resolution = 1: normal resolution.

Resolution > 1: higher resolution.

An increased circle resolution can cause a lower speed on circles.

**EXAMPLE:**

**CR 0.5;**

In all subsequent circles the circle resolution will be 0.5.

**NOTE:**

To achieve a good quality in low speed or low acceleration applications circle resolution should be increased. This is done automatically if quality levels High/Normal/Low (**QU1**, **QU2**, **QU3**) are used. **CR** should not be changed in these cases (default 1.0)

Working with quality levels 4 to 9 using **CR** is recommended. In this case the generated number of vectors is:

$$\text{NumbersOfVectors} = \text{Resolution} * \left( \sqrt{\frac{\text{Radius}[UserUnits]}{1[UserUnits]}} + 14 \right)$$

## DH DO HANDLING

V 1.47 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
V 1.48 - added additional parameters			Frontend - Online✓		Frontend - Offline✓
V 1.66 - DH5 also allowed as frontend command					

Starts a handling cycle (in combination with a handling module or a board feeder only).

**SYNTAX:**      **DH Param1;**  
                 **DH Param1,Param2;**

Parameter	Format	Functional Range	Default
Param1	Integer	0 to 3, 5, 6	No default
Param2	Integer	0 to 9999	No default

*Param1:*      Handling module:  
0: Reserved  
1: Reserved  
2: Reserved  
3: Reserved

Board Feeder:  
5: Requests a new board and waits for it.  
6: Sets the delay for the fix delay mode (delay in Param2 [sec]).

**EXAMPLE:**      **DH6,20;**  
The fix delay mode is set to 20s.

**NOTE:**      **DH5;** is only active, if the 'board feeder mode' was set to mode = 2 before.

**DH6,Param2;** is only active, if the 'board feeder mode' was set to mode = 3 before.

**SEE ALSO:**      [OP40](#), [XX40](#)

## DI ABSOLUTE DIRECTION

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓

Frontend - Online X

Frontend - Offline X

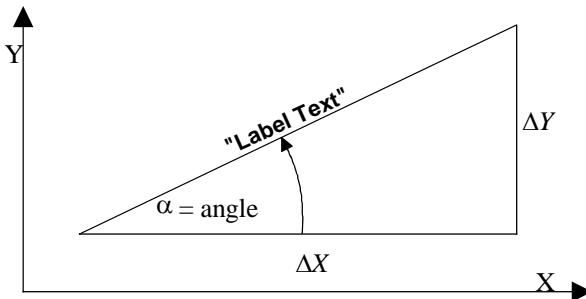
Initialize the direction of a label. The direction can be set either as differential ( $\Delta X/\Delta Y$ ) value or as an angle (in degrees). The angle is measured as shown below.

**SYNTAX:**      **DI**  $\Delta X, \Delta Y$ ;  
                        **DI** Angle;

Parameter	Format	Functional Range	Default
$\Delta X, \Delta Y$	Real	Real	0.0
Angle	Angle	0.0 to 360	0.0

$\Delta X, \Delta Y$ :

Angle ratio



**EXAMPLE:**      **DI** 1,4;  
                        Direction is 75.96° to pos. X-axis.

**SEE ALSO:**      [LB](#)

## DS DEVICE SELECT

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓

Frontend - Online X

Frontend - Offline X

Choose a parser.

**SYNTAX:**      **DS** Number;

Parameter	Format	Functional Range	Default
Number	Integer	1 to 3	1.0

- Number:**
- 1: Selects the Zünd Parser.
    - Label height [18/47 cm / unit], width [15/47 cm / unit].
    - Default terminator for LB, UR and MS is semicolon.
  - 2: Selects the HP-GL Parser.
    - Label size (height and width) [1 cm / unit].
    - Default terminator for LB, UR and MS is semicolon.

**EXAMPLE:**      **DS** 1;  
                        Activates the Zünd Parser.

**SEE ALSO:**      [SI](#), [DT](#)  
                        Menu-function 5-1-1.

## DT DEFINE TERMINATOR

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Defines a character which acts as terminating character in label commands.

**SYNTAX:**

**DT;**  
**DT Terminator;**

Parameter	Format	Functional Range	Default
<i>Terminator</i>	Integer	0 < Integer <= 127 (ASCII - Code)	Semicolon

**Don't use this Terminators:**  
17: XON  
19: XOFF  
27: ESC  
64: @

**EXAMPLE:**

**DT33;**  
Defines the character '!' as terminator for labels.

**DT68;**  
Defines the character 'D' as terminator for labels.  
LB ABCD;  
Only ABC will be plotted, D is used as terminator.

**DT;**  
Set terminator to semicolon (ASCII-Code 59).

**NOTE:**

When using labels in plotfiles it has to be verified that the actual terminator is the same as the terminator used in the plotfile.

**SEE ALSO:**

[LB](#), [MS](#), [UR](#), [OP 18](#)

## EG EXTERNAL GAS

V 1.49 - Initial Release

G3✓ S3✓ L3✗ D3 A✗ D3 B✗  
Frontend - Online ✗ Frontend - Offline ✗

Switches a port on the Laser Interface 3. This output is used to switch the external gas source on and off. (used in combination with the laser option only)

**SYNTAX:**

**EG Param;**

Parameter	Format	Functional Range	Default
<i>Param</i>	Integer	0 to 1	No default

**Param:**  
0: Switches the external gas off.  
1: Switches the external gas on.

**EXAMPLE:**

**EG 1;**  
Switches the external gas on.

## EL RECESS POWER

V 1.49 - Initial Release

G3✓ S3✓ L3✗ D3 A✗ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

Defines the laser power during the 'tool down after waiting time'. (used in combination with the laser option only)

**SYNTAX:** **EL Power;**

Parameter	Format	Functional Range	Default
Power	Real	0-100 [%]	No default

*Power:* Recess power

**EXAMPLE:** **EL50;**  
Defines 50 % recess power.

**SEE ALSO:** [OP17](#), [ML](#), [LF](#), [LL](#)

## FC FOIL CUT

V 1.20 - Initial Release

G3✗ S3✓ L3✗ D3 A✗ D3 B✗  
Frontend - Online✗ Frontend - Offline✗

This command is used to cut off the material from position  $x = -4\text{mm}$  and  $y = -6\text{mm}$  to position  $x = -4\text{mm}$  and  $y = \text{length}$ , if the 'cutting strip' is installed only. The parameter length defines the whole cut length. *FirstLength* defines the length of a short initial cut in negative direction. For a reliable cutting the starting point should be within the material. We recommend the first length to be about 10% of length. All parameters not used will be replaced with the default values.

**SYNTAX:** **FC Length;**  
**FC Length,FirstLength;**

Parameter	Format	Functional Range	Default
<i>Length</i>	Plotter units	Y-axis maximum > integer > 0	Last length or y-axis maximum
<i>FirstLength</i>	Plotter units	Y-axis maximum > integer > 0	Length / 10

*Length:* Cut length.

*FirstLength:* Defines the start position of first cut. The initial cut will be done into negative direction to  $y = -6\text{mm}$ .

**EXAMPLE:** **FC50000;**  
The beam first moves to  $x = -4\text{mm}$  starting y-position of the first cut in negative direction. Then the two cuts in negative and positive direction are made. The total cut-off length is 50000 plotter units (50cm).

**NOTE:** Only available for KCM with CT and installed cutting strip.  
The cut-off will be done automatically in position mode. It's important to set the position down correct with the ZP command before. After cut-off the mode will be set automatically back to the mode before the cut-off was started.

**SEE ALSO** [OP140](#), [ZP](#)

## FF FOIL FEED

V 1.00 - Initial Release  
V 1.58 - added second parameter

G3✓ S3✓ L3✗ D3 A✓ D3 B✗  
Frontend - Online ✗ Frontend - Offline ✗

If a foil feed option is installed, this command is used for releasing a material advance.

**SYNTAX:** FF;

**EXAMPLE:** FF;

The beam is moved to the starting point of the advance, activates the feeder pads and moves the material for a distance previously defined by the **FL** command. After advancing the beam moves back to its last position.

**NOTE:**

- Depending on material and application, a negative advance is also possible. It can be achieved by entering a negative Foil Length either with the **FL** command or via the menu.
- If the length of the advance exceeds the mechanical dimensions of the cutter the advance is performed in several steps.
- The length of the advance changes with the zoom-factor.

**SEE ALSO:** [FL](#)

## FL FOIL LENGTH

V 1.20 - Initial Release  
V 1.30.2 - Feed in both directions possible  
V 1.46 - Option *page distance* implemented  
V 1.58 - Option *page distance* removed

G3✓ S3✓ L3✗ D3 A✓ D3 B✗  
Frontend - Online ✗ Frontend - Offline ✗

Defines the length of a material advance and optional a starting-point.

### SYNTAX:

**FL** *Length*;  
**FL** *Length,StartPointX*;  
**FL** *Length,StartPointX,StartPointY*;  
**FL** *Length,StartPointX,StartPointY,FeedCompensation*;  
**FL** *Length,StartPointX,StartPointY,FeedCompensation,ReleaseMode*;  
**FL** *Length,StartPointX,StartPointY,FeedCompensation,ReleaseMode,PageDistance*;

Parameter	Format	Functional Range	Default
<i>Length</i>	See note	Real	No default
<i>StartPointX</i>	Plotter units	0.. table length	-1 = off
<i>StartPointY</i>	Plotter units	0.. table length	-1 = off
<i>FeedCompensation</i>	Plotter units	-10000.. 10000	0 = off
<i>ReleaseMode</i>	Plotter units	0.. 500	0 = off
<i>PageDistance</i>	Plotter units	0.. table length	0 = off

*Length*: Form feed length.

*StartPointX*: Defines an x-axis starting-point for the material advance.  
Without this definition, the material advance starts at an x-axis position equal to the length of the advance. If a starting-point has been defined it remains until it is changed by giving a new *StartPointX*.

*StartPointY*: Defines an y-axis starting-point for the material advance.  
Without this definition, the material advance starts at an x-axis position equal to the length of the advance. If a starting-point has been defined it remains until it is changed by giving a new *startPointY*.

*FeedCompensation*: Compensation of the material-dependent track during a feed cycle.

*ReleaseMode*: After the feed, the bar moves the set path backwards in order to ensure that the feeding clamps can be raised.

*PageDistance*: No longer supported by FW version >= 1.58.0.  
(Before a starting feed, a page distance will be inserted.)

**EXAMPLE:** **FL50000,100000;**  
Foil length is set to 0.5 meter, the advance starting-point in x direction to 1.0m.

### NOTES:

- Foil-length is multiplied by the x-axis zoom-factor when the advance is released by an **FF** command. A manual advance is not zoom-dependent.
- A negative foil length inverts the direction in which the material is moved. This can be used in combination with the conveyor or with the motorised roll-off unit.
- *StartPointX* is not zoom-dependent.
- *StartPointY* is not zoom-dependent.
- In case of an inserted page distance, the first feed will not be compensated by the *feedCompensation* option.
- The parameter *PageDistance* is no longer supported by FW version >= 1.58.0.

### SEE ALSO:

[FF](#)

# FS FORCE SELECT

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X			Frontend - Offline X	

Initialize the knife pressure for the UM/UM-S and KCM module.

## SYNTAX:

**FS;**  
**FS Pressure;**  
**FS PressureX,PressureY;**

## UM-Module

Parameter	Format	Functional Range	Default
Pressure	Integer	2000 to 20000 gram, identical for X and Y if only one parameter given	10000 gram
PressureX	Integer	2000 to 20000 gram	No default
PressureY	Integer	2000 to 20000 gram	No default

## UM-S-Module

Parameter	Format	Functional Range	Default
Pressure	Integer	2000 to 10000 gram, identical for X and Y if only one parameter given	5000 gram
PressureX	Integer	2000 to 10000 gram	No default
PressureY	Integer	2000 to 10000 gram	No default

## URT-Tool for UM/UM-S-Module

Parameter	Format	Functional Range	Default
Pressure	Integer	2000 to 4000 gram identical for X and Y if only one parameter given	3000 gram
PressureX	Integer	2000 to 4000 gram identical for Y if two parameter given	No default
PressureY	Integer	2000 to 4000 gram identical to X if two parameter given	No default

## KCM-S-Module

Parameter	Format	Functional Range	Default
Pressure	Integer	30 to 1500 gram	100 gram
PressureX	Integer	30 to 1500 gram But there is no direction depending force supported	No default
PressureY	Integer	Value ignored. There is no direction depending force supported	No default

**Pressure:** Knife pressure in gram.

**PressureX,**  
**PressureY** Pressure in X and Y direction for the UM-modules in gram.

## EXAMPLE:

**FS500;**  
If a UM-module is in use, the pressure is set to 2kg (minimum pressure).

**FS6000,10000;**

In this example the pressure for the X-direction is set to 6kg whereas the one for the Y-direction is set to 10kg.

The sectors where the lower pressure is applied are 60° wide, the higher pressure sectors 120°.

This feature is useful for the creasing of corrugated cardboard.

<b>NOTES:</b>	FS command without parameters sets the default values.
NOTES for KCM:	There is no direction depending force for the KCM supported. If FS is sent with two parameters to a KCM tool, only the first parameter is used to set the pressure of KCM Tool.
NOTES for URT:	There is no direction depending force for the URT supported. If FS is sent with two parameters to a URT, only the first parameter is used to set the pressure.
<b>SEE ALSO</b>	<a href="#">XX65</a>

## GL GET ERROR LOG

V 1.65 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✓	

**GL** starts output of error logging information over the logger interface. The logging information give zund head quarter the possibility to analyze error situations.

**SYNTAX:**      **GL;**  
**GL LogType;**

Parameter	Format	Functional Range	Default
<i>LogType</i>	Integer	0,1	0

**LogType:**      0: starts output of actual error logging information to the logger interface  
1: starts output of actual and stored error logging information to the logger interface (more data → takes more time)

**EXAMPLE:**      **GL;**  
Starts an output of actual error logging information.

To get same logging information as in ServiceTool 'Get All Log' use:  
**GL 1;**

**NOTE:**      To receive data on logger interface, open a TCP connection to the cutter with its IP address and cutters port number + 1. If the cutter has port 50'000, use 50'001 for logger interface.

**SEE ALSO:**      [ServiceTool 'Get All Log'](#)

# HC HARD CLIPPING

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A X D3 B X

Frontend - Online X

Frontend - Offline X

**HC** defines a rectangular working area or window. The plotting tool cannot be used outside this area. Make sure that your position is inside to clipping window. You may have to move first into the window.

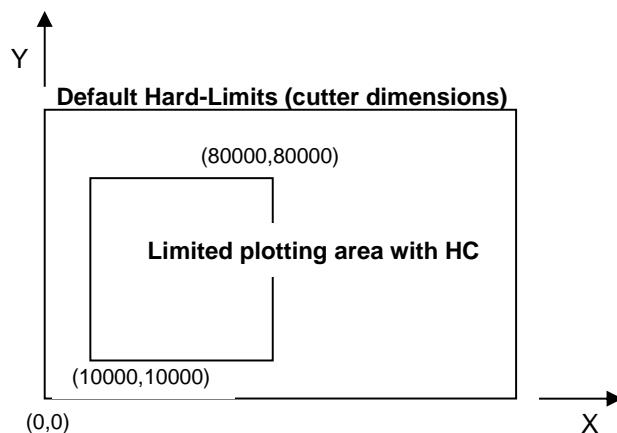
## SYNTAX:

**HC;**  
**HC** *Xl, Yl, Xh, Yh*;

Parameter	Format	Functional Range	Default
<i>Xl, Yl, Xh, Yh</i>	Plotter units Absolute	Device-dependent	cutter dimensions

*Xl*: X lower limit  
*Yl*: Y lower limit  
*Xh*: X higher limit  
*Yh*: Y higher limit

**EXAMPLE:** **HC 10000,10000,80000,80000;**  
Limits plotting area to a size of 70000 by 70000 plotter units.



**HC;**

The **HC** command without parameters deactivates the current clipping window.

## NOTE:

- The border of the window is part of the working area.
- Boundary points are in plotter units and therefore not depending on zoom.
- The window can also be set by the menu function 2-5-1-3.
- If after an **HC** command both, the module and the coordinates of the next moving command are outside the window, the module moves to a boundary (with tool up).
- The **HC** command without parameters deactivates the current clipping window.

## SEE ALSO:

[OP0](#), [OP13](#), [OP30](#), [OH](#)

## JB JOB ECHO

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.51 - non stopping JB implemented			Frontend - Online X		Frontend - Offline X
V 1.64 - additional Parameters					
V 1.66 - Parameter 2 and 3 display value 0(zero)					

Defines a mark in an HP-GL command sequence. It echoes **JB** and the number given when it is processed. **JB** can be used to indicate the progress in a plot-job.

### Stopping Job Echo

The cutter stops while **JB** is processed. Therefore it is not advisable to use it within a tool-down sequence.

**SYNTAX:** **JB JobNr;**

Parameter	Format	Functional Range	Default
<b>JobNr</b>	Integer	0 to max. Integer	No default

**OUTPUT FORMAT:** **JB JobNr[TERM]**

Parameter	Format	Functional Range	Default
<b>JobNr</b>	Integer	0 to max. Integer, no sign and whitechars	No default

**JobNr:** Mark identification number.

**EXAMPLE:** **JB 123;**

**RESPONSE:** **JB 123[TERM]**  
Output from cutter to computer as soon as the command is processed.

### Non stopping JOB ECHO (Status Channel only)

The cutter continues processing while **JB** with two parameter is processed. But there may be a delay up to two second between processing and its echo.

**SYNTAX:** **JB JobNr,JobNrExtention;**  
**JB JobNr,JobNrExtention,JobNrExtention2;**  
**JB JobNr,JobNrExtention,JobNrExtention2,JobNrExtention3;**

Parameter	Format	Functional Range	Default
<b>JobNr</b>	Integer	0 to max. Integer	No default
<b>JobNrExtention</b>	Integer	0 to max. Integer	No default
<b>JobNrExtention2</b>	Integer	0 to max. Integer	No default
<b>JobNrExtention3</b>	Integer	0 to max. Integer	No default

**OUTPUT FORMAT on Status Channel:**

**JB JobNr, JobNrExtention,[cr][lf]**  
**JB JobNr, JobNrExtention, JobNrExtention2,[cr][lf]**  
**JB JobNr, JobNrExtention, JobNrExtention2, JobNrExtention3:[cr][lf]**

**JobNr,** Mark identification numbers.  
**JobNrExtention:**

**EXAMPLE:** **JB 123,456;**  
**JB 123,456,789;**  
**JB 123,456,789,123;**

**RESPONSE on  
Status Channel:** **JB 123, 456;**  
**JB 123, 456, 789;**  
**JB 123, 456, 789, 123;**

Output from cutter to computer as soon as the command is processed.

## LB LABEL

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Plots a label starting at the current tool position. Linefeed is released by using character [cr], size of characters is defined by the **SI** command, direction of the label can be determined by using **DI** command.

**SYNTAX:** **LB** *Text Terminator*;

Parameter	Format	Functional Range	Default
<i>Text</i>	String	ASCII 32 to 126 and [cr] except '@'	No default
<i>Terminator</i>	Character	defined by DT	ASCII 03

*Text:* ASCII-label, [cr] for 'new line'.

*Terminator:* Terminator, defined by **DT**.

**EXAMPLE:** **DT33;**  
**LB**Zund's M1200[cr]Flachbettcutter!

! is the Terminator.

Cutter output:  
Zund's M1200  
Flachbettcutter

**SEE ALSO:** [DT](#), [DI](#), [SI](#)

**NOTE:** Unknown characters are replaced by a blank.

## LF LASER FREQUENCY

V 1.49 - Initial Release

G3✓ S3✓ L3X D3 A X D3 B X  
Frontend - Online ✓ Frontend - Offline ✓

Selects a laser-frequency. The unit is Hertz. (used in combination with the laser option or Cut & Seal option only)

**SYNTAX:** **LF** *Frequency*;

Parameter	Format	Functional Range	Default
<i>Frequency</i>	Integer	Depends on installed laser source <sup>1)</sup>	No default

<sup>1)</sup>  
Synrad (LM-Z or LM-Z-S): 1 - 25000 Hz  
Rofin: 1250 - 100000 Hz  
Coherent 1000 - 100000 Hz  
Synrad (LM) 24 - 160000 Hz

*Frequency:* Laser-frequency;

**EXAMPLE:** **LF5000;**  
Sets the laser-frequency to 5000 hertz.

**SEE ALSO:** [OP17](#), [ML](#), [LL](#), [EL](#), [EG](#)

## LL LASER POWER

V 1.49 - Initial Release

G3✓ S3✓ L3✗ D3 A✗ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

Initializes the maximum laser power. The laser power is proportional to the actual speed, ranging from minimum to this maximum laser power when the cutter accelerates from 0 m/s to max. speed (set with VS). (used in combination with the laser option only)

**SYNTAX:** LL Power;

Parameter	Format	Functional Range	Default
Power	Real	0 – 100 [%]	No default

*Power:* Maximum laser-power;

**EXAMPLE:** LL50;  
Selects 50 % laser power at max. tool-down speed.

**SEE ALSO:** [ML](#), [LF](#), [EL](#)

## LT LINETYPE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✗ Frontend - Offline✗

Specifies the line pattern to be used when drawing lines.

**SYNTAX:** LT;  
LT Type;  
LT Type,Length,Mode;

Parameter	Format	Functional Range	Default
Type	Integer	0 to 8	Solid line
Length	Real	> 0	length not changed
Mode	Integer	1	1

*Type:* Specifies the line pattern for subsequent lines.

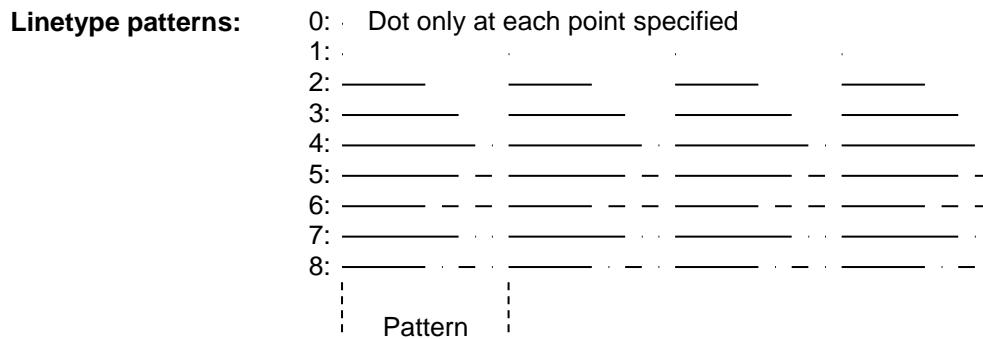
*Length:* Length of one complete line pattern in millimetres.

*Mode:* 1: absolute mode – length in millimetres.  
NOTE: only mode 1 is implemented.

**EXAMPLE:** LT4,20,1;  
Line Type 4 with 20 millimetres length for each pattern, absolute mode.

**NOTE:**

- Positive line types are fixed-length line patterns (length given by the parameter *length*).  
Adaptive-length line types are not implemented.
- LT without parameters cancels previously selected line types. The cutter now draws solid lines.
- If given, the parameter '*mode*' must have the value '1' as long as only absolute mode is implemented.
- LT is independent of zoom-factor.
- LT, SP, BP clear current residue (restart pattern for next vector)



## MA MOVE ABSOLUTE

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X			Frontend - Offline X	

**MA** is the 3-D equivalent to the 2-D command **PA**. It switches the cutter into absolute mode and moves to x, y, z if parameters are given.

**SYNTAX:**

**MA;**  
**MA X,Y,Z;**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute	Device-dependent	No default
Z	Plotter units Absolute	0 to max down position	No default

**X, Y, Z:** Absolute x-, y- and z-coordinates.

**EXAMPLE:** **MA 10000,10000,2000;**

**SEE ALSO:** [MR](#), [MF](#), [MW](#), [VF](#), [VW](#)

**NOTE:** 3-D applications with router module only. The module must be initialized in the absolute working mode.

## MF MOVE FAST

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X			Frontend - Offline X	

**MF** is the 3-D equivalent to the 2-D command **PU**. It works out a 3-D vector fast, therefore the material should not be touched. The maximum speed is defined by the command **VF**. Absolute or relative mode is selected by the instructions **MA** and **MR**.

**SYNTAX:**

**MF;**  
**MF X,Y,Z;**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute or Relative	Device-dependent	No default
Z	Plotter units Absolute or Relative	0 to max down position	No default

**X, Y, Z:** X-, y- and z-coordinates (absolute) or 3-D vector (relative) depending on the most recently executed MA or MR instruction.

**EXAMPLE:** **MF 10000,10000,2000;**

**SEE ALSO:** [MA](#), [MR](#), [MW](#), [VF](#)

**NOTE:** 3-D applications with router module only. The module must be initialized in the absolute working mode.

## ML LASER MINIMAL POWER

V 1.49 - Initial Release

G3✓ S3✓ L3✗ D3 A✗ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

Initializes the minimum laser power. The laser power is proportional to the actual speed, ranging from this minimum to maximum laser power when the cutter accelerates from 0 m/s to max. speed (set with VS).

(used in combination with the laser option only)

**SYNTAX:** **ML Power;**

Parameter	Format	Functional Range	Default
Power	Real	0 – 100 [%]	No default

**Power:** Minimum laser-power;

**EXAMPLE:** **ML 10;**  
Sets the minimum laser power to 10 %.

**SEE ALSO:** [LF](#), [LL](#), [EL](#)

## MR MOVE RELATIVE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✗ Frontend - Offline✗

**MR** is the 3-D equivalent to the 2-D command **PR**. It switches the cutter into relative mode and moves to x, y, z if parameters are given.

**SYNTAX:** **MR;**  
**MR X,Y,Z;**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute	Device-dependent	No default
Z	Plotter units Absolute	0 to max down position	No default

**X, Y, Z:** Relative x-, y- and z-coordinates.

**EXAMPLE:** **MR 10000,10000,2000;**

**SEE ALSO:** [MA](#), [MF](#), [MW](#), [VF](#), [VW](#)

**NOTE:** 3-D applications with router module only. The module must be initialized in the absolute working mode.

## MS MESSAGE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✗ Frontend - Offline✗

**MS** is designated to send messages for the user from the system to the display of the cutter. While displaying the message the cutter stays online but waits for an <ENT> on the keyboard. Three lines of the display can be used the fourth always shows the text 'ENT to continue'. The syntax of **MS** is the same as the syntax of the label command, also the terminator used, defined by **DT**.

If a leading XX12.. command is given, the message text is written into the fourth line of the online display and the cutter continues without any interaction of the user. This can be used to display e.g. a number of a piece which is currently cut. Please see the description of the XX12 command for more information.

**SYNTAX:** **MS Text Terminator;**

Parameter	Format	Functional Range	Default
<i>Text</i>	String	ASCII 32 to 126 and [cr] except '@'	No default
<i>Terminator</i>	Character	defined by DT	ASCII 03

*Text*: ASCII-label + [cr] per display line.

*Terminator*: Terminator, defined by **DT**.

**EXAMPLE:** **DT59;**  
**MSChange material![cr]then;** (; is the Terminator, defined by DT59).

The following message is displayed:

 **User query**

 **Change material!**  
**then**

**Next**

**SEE ALSO:** [DT](#), [XX12](#), [XX129](#)

## MW MOVE WORK

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X		Frontend - Offline X		

**MW** is the 3-D equivalent to the 2-D command **PD**. It works out a 3-D vector slow, used when the material is touched. The maximum speed is defined by the command **VW**. Works only in absolute **MA** mode.

**SYNTAX:** **MW;**  
**MW X,Y,Z;**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute	Device-dependent	No default
Z	Plotter units Absolute	0 to max down position	No default

*X, Y, Z*: X-, y- and z-coordinates (absolute) 3-D vector.

**EXAMPLE:** **MW 10000,10000,2000;**

**SEE ALSO:** [MA](#), [MW](#), [VW](#)

**NOTE:** 3-D applications with router module only. The module must be initialized in the absolute working mode.

## NR NOT READY

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B X
Frontend - Online X		Frontend - Offline X		

The cutter is switched to the offline mode.

**SYNTAX:** **NR;**

## OA OUTPUT ACTUAL POSITION

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✓ Frontend - Offline✓

Requests actual position in 'Plotter Coordinates' and the tool status. All instructions prior to this OA must be completely processed before the cutter responds.

**SYNTAX:** OA;

**OUTPUT FORMAT:** X[space], Y[space], Toolstate[TERM]

Parameter	Format	Functional Range	Default
X, Y	Plotter units, Integer	Device-dependent	No default
Toolstate	Integer	0, 1	No default

X, Y Received actual position in Plotter units, related to the cutter origin.

Toolstate:  
0: up  
1: down

**EXAMPLE:** OA;

**RESPONSE:** +24454 ,+24432 ,1[TERM]

**SEE ALSO** [OC](#)

## OC OUTPUT CURRENT POSITION

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✓ Frontend - Offline✓

Requests the last programmed position in 'User Coordinates' and the tool status. All instructions prior to this OC must be completely processed before the cutter responds.

**SYNTAX:** OC;

**OUTPUT FORMAT:** [space..space]X,[space..space]Y,Toolstate[TERM]

Parameter	Format	Functional Range	Default
X,Y	User units, Real	Device-dependent	No default
Toolstate	Integer	0, 1	No default

X, Y Received actual Position in user units, related to the user origin.

Toolstate:  
0: up  
1: down

**EXAMPLE:** OC;

**RESPONSE:** 0.00000, 0.00000,1[TERM]

**SEE ALSO** [OA](#)

## OF OUTPUT INCREMENT PER MM

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Requests the number of user increments per mm.

**SYNTAX:** OF;

**OUTPUT FORMAT:** [space..space]X,[space..space]Y[TERM]

Parameter	Format	Functional Range	Default
X	Real		No default
Y	Real		

X, Y: Number of user increments per mm for x and y axis.

**EXAMPLE:** OF;

**RESPONSE:** 50.00000, 50.00000[TERM] (if zoom-factor x and y set to 2.0).

## OH OUTPUT HARDLIMITS

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✓ Frontend - Offline✓

Requests boundary points of work area defined by hardware limits.

**SYNTAX:** OH;

**OUTPUT FORMAT:** [sign]X<sub>low</sub>,[sign]Y<sub>low</sub>,[sign]X<sub>high</sub>,[sign]Y<sub>high</sub>[TERM]

Parameter	Format	Functional Range	Default
X <sub>low</sub> , Y <sub>low</sub> , X <sub>high</sub> , Y <sub>high</sub>	Plotter units	Device-dependent	No default

X<sub>low</sub>: X lower limit

Y<sub>low</sub>: Y lower limit

X<sub>high</sub>: X higher limit

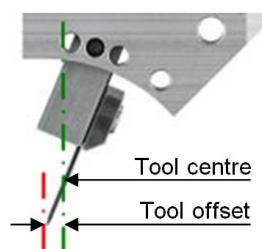
Y<sub>high</sub>: Y higher limit

**EXAMPLE:** OH; Gets the work area of the actual selected module.

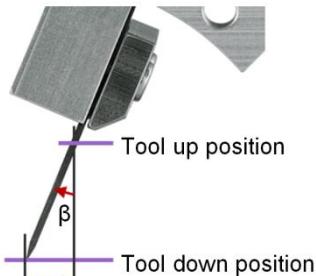
**RESPONSE:** +0,+0,+80000,+129400[TERM]

**NOTE:** - If an error occurs, the work area output will be reduced to 0.

- If a VCT is mounted:  
The output is reduced by a frame of the tool's default offset.



The reduction of the work area about the penetration has to be calculated by the Frontend.



$$\text{Reduction} = (\text{up} - \text{down}) * \tan(\beta)$$

- The hardlimits of an online work area are not be considered by this commando. To get the online work area use the OP132 command.

SEE ALSO: [HC](#), [OP0](#), [OP13](#), [OP30](#), [OP132](#)

## OI OUTPUT IDENTIFICATION

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.62 - Added support for D3	Frontend - Online✓			Frontend - Offline✓	

Ask for an identification string.

**SYNTAX:** OI;

**OUTPUT FORMAT:** Text;[TERM]

Parameter	Format	Functional Range	Default
Text	String	ASCII 32 to 126 max. 20 characters	No default

**Text:** Responded cutter identification (Cuttername).

**EXAMPLE:** OI;  
OI;

**RESPONSE:** G3\_L2500;[TERM]  
D3\_2XL3200\_B;[TERM]

**NOTE:** If this command is sent to a D3 cutter type \_A or \_B is appended to the cutter identification.

# OP OUTPUT SPECIALS

Ask for Zünd cutter specific data.

**SYNTAX:**      **OP** *Index,Option;*

Parameter	Format	Functional Range	Default
<i>Index</i>	Integer	0 to 30000	No default
<i>Option</i>	Integer	0 to 30000	No default

## Index 0 – Clipping Window

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A X	D3 B X
	Frontend - Online X			Frontend - Offline X	

Requests boundary points of window defined by the HC instruction or by the menu functions 'define corner' 2-5-1-3 or 2-5-2-3.

**SYNTAX:**      **OP** *0,WindowNo;*

Parameter	Format	Functional Range	Default
<i>0</i>	Integer	Device-dependent	always 0
<i>WindowNo</i>	Integer	0,1	0

**OUTPUT FORMAT:**    *Xl[/space],Yl[/space],Xh[/space],Yh[TERM]*

Parameter	Format	Functional Range	Default
Xl, Yl, Xh, Yh	Plotter units	Device-dependent	cutter-dimensions

Xl:                X lower limit  
Yl:                Y lower limit  
Xh:                X higher limit  
Yh:                Y higher limit

**EXAMPLE:**      **HC100,100,1000,1000;**  
**OP0;**  
**OP0,1;**

**RESPONSE:**      +100 ,+100 ,+1000 ,+1000[TERM]  
+100 ,+100 ,+1000 ,+1000[TERM]

**SEE ALSO:**      [HC](#), [OH](#), [OP13](#), [OP30](#)

**NOTE:**             The window number 0 defines the hard clipping window which is in most cases the work area of the cutter.

## Index 5 – Obsolete

Command is obsolete. Please use OP38.

## Index 6 – Head Type and Offsets

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✗				Frontend - Offline ✗	

Output of head-type and head-offsets (this command is supported only for compatibility with PN-series). The head-type is always set to MTS.

**SYNTAX:** OP 6;

**OUTPUT FORMAT:** MTS,X-offset,Y-offset[TERM]

Parameter	Format	Functional Range	Default
Head-type	String	ASCII 32 to 126 (7 characters)	No default
X- / Y-offset	Plotter units	Device-dependent	No default

**EXAMPLE:** OP 6;

**RESPONSE:** MTS,+400 ,+600[TERM]

## Index 7 – Actual Tool Number

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - added OP7,1 for G3 support				Frontend - Online ✓	Frontend - Offline ✓
V 1.59 - added OP7,2 for Twin-Cut support					

Output actual tool number

### G3 format:

Output the number of the selected sub module.

The first sub module in module place 1 is 11, the second 12.

The second sub module in module place 2 is 21

Module	Tool	Tool Number
1	1	11
1	2	12
2	1	21
2	2	22
2	3	23
etc		

**SYNTAX:** OP 7,1;

**OUTPUT FORMAT:** ToolNumber[TERM]

Parameter	Format	Functional Range	Default
ToolNumber	Integer	11 to 33	No default

**EXAMPLE:** SP 3;

OP 7,1;

**RESPONSE:** 31[TERM]

### **G3 format with Twin-Cut support:**

This command outputs the number of the selected sub module and the number of the selected slave sub module, if Twin-Cut is enabled. If only one module is used, the slave tool number will always return 0.

**SYNTAX:**      **OP 7,2;**

**OUTPUT FORMAT:**    *MasterToolNumber,SlaveToolNumber[TERM]*

Parameter	Format	Functional Range	Default
MasterToolNumber	Integer	11 to 33	No default
SlaveToolNumber	Integer	0, 11 to 33	0

**EXAMPLE:**      **SP31,21;**

**OP7,2;**

**SP11;**

**OP7,2;**

**RESPONSE:**     **31,21[TERM]**

**11,0[TERM]**

**SEE ALSO:**      [\*\*SP\*\*](#) (Section about Twin-Cut)

### **Old format (PN):**

The output number is 1 less than the number of the selected module

**SYNTAX:**      **OP 7;**

**OUTPUT FORMAT:**    *ModuleNumber[TERM]*

Parameter	Format	Functional Range	Default
ModuleNumber	Integer	0 to 3	No default

**EXAMPLE:**      **SP3;**

**OP7;**

**OP7,1;**

**RESPONSE:**     **2[TERM]    (2 for actual Tool 3)**

**31[TERM]**

## **Index 8 – Serial Input Buffer Status**

V 1.20 - Initial Release

G3✓

S3✓

L3✓

D3 A✓

D3 B✓

V 1.48 – OP8 available as frontend command

Frontend - Online✓

Frontend - Offline✓

Output serial input buffer status.

**SYNTAX:**      **OP 8;**

**OUTPUT FORMAT:**    *Cnt,BytesLeft[TERM]*

Parameter	Format	Functional Range	Default
Cnt	Integer	0 to 1024000	No default
BytesLeft	Integer	0 to 1024000	No default

**Cnt:**              Bytes in serial in buffer.

**BytesLeft**           Available buffer space.

**EXAMPLE:**      **OP8;**

**RESPONSE:**     **+25 ,+1023975[TERM]**  
(with 25 bytes in buffer and a buffer length of 1024000 bytes).

## Index 12 – Up and Down Position

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.58 - support for direction depending positions		Frontend - Online X		Frontend - Offline X	

Get up and down position of the currently selected tool.

**SYNTAX:**           **OP 12;**

**OUTPUT FORMAT:**   *Up,Down[TERM]*

Parameter	Format	Functional Range	Default
Up	Plotter units	0 to max down position	500
Down	Plotter units	- max down position to max down position	0

*Up:*               Up-position of the currently selected tool.

*Down:*           Down-position of the currently selected tool.

**EXAMPLE:**       **OP 12;**

**RESPONSE:**      +500, +800[TERM]

**NOTE:**           Every tool has its own up- and down-position. The positions can be changed either in the user menu 1-M-T-3-4 or with the ZP command. The tool must be selected prior to a change.

**NOTE CTT, PTT, SCT, UCT, WKT:** These tools support the use of two direction depending down-positions. When command OP12 is sent the cutter will only return the down-position in X direction for the down parameter.

**SYNTAX:**       **OP 12,1;**

**OUTPUT FORMAT:** *Up,DownX,DownY[TERM]*

Parameter	Format	Functional Range	Default
Up	Plotter units	0 to max down position	500
DownX	Plotter units	- max down position to max down position	0
DownY	Plotter units	- max down position to max down position	0

*Up:*               Up-position of the currently selected tool.

*DownX:*           Down-position in X direction of the currently selected tool.

*DownY:*           Down-position in Y direction of the currently selected tool.

**EXAMPLE:**       **OP 12,1;**

**RESPONSE:**      +500, +1200, +1000[TERM]

**NOTE:**           When command OP12,1 is sent the cutter will return a second direction depending down-position. If the selected tool does not support a second down-position, the return value for this parameter will be the same as for the X direction.

**NOTE CTT, PTT, SCT, UCT, WKT:** These tools support the use of two direction depending down-positions. In case no value or 0mm was set for the down-position in Y direction the parameter will return the initialization-position.

**SEE ALSO:**       [ZP](#)

## **Index 13 – Hardclipping Boundaries**

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✗	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

Requests boundary points of window defined by the HC instruction or by the menu function ‘define corner’ 2-5-1-3.

**SYNTAX:**      **OP 13;**

Has the same function as **OP0**; See the **OP0** description for details.

## **Index 15 – Up and Down Velocity**

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Requests the currently set velocity with tool up- and down and the allowed maximum. The allowed maximum depends on cutter-type and mounted modules. The unit is 6400 for 1 m/s.

**SYNTAX:**      **OP 15;**

**OUTPUT FORMAT:**    *ActSpeedDown,ActSpeedUp,ActSpeedMax[TERM]*

Parameter	Format	Functional Range	Default
ActSpeedDown	6400 for 1 m/s	Device-dependent	No default
ActSpeedUp	6400 for 1 m/s	Device-dependent	No default
ActSpeedMax	6400 for 1 m/s	Device-dependent	No default

*ActSpeedDown*:      The set XY velocity with tool down.

*ActSpeedUp*:      The set XY velocity with tool up.

*ActSpeedMax*:      The allowed XY max. velocity.

**EXAMPLE:**      **OP 15;**

**RESPONSE:**      +6307 ,+6307 ,+6360[TERM]

## Index 16 – Up and Down Acceleration

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Requests the currently set acceleration with tool up- and down and the allowed maximum. The allowed maximum depends on cutter-type and mounted modules. The unit is 128 for 10 m/s<sup>2</sup>.

**SYNTAX:**      OP 16;

**OUTPUT FORMAT:**    *ActAccelDown,ActAccelUp,ActAccelMax[TERM]*

Parameter	Format	Functional Range	Default
ActAccelDown	128 for 10 m/s <sup>2</sup> .	Device-dependent	No default
ActAccelUp	128 for 10 m/s <sup>2</sup> .	Device-dependent	No default
ActAccelMax	128 for 10 m/s <sup>2</sup> .	Device-dependent	No default

*ActAccelDown:*      The set XY acceleration with tool down.

*ActAccelUp:*      The set XY acceleration with tool up.

*ActAccelMax:*      The allowed XY max. acceleration.

**EXAMPLE:**      OP 16;

**RESPONSE:**      +119,+119,+120[TERM]

## Index 17 – Modulation for 100 % Laser Power

V 1.49 - Initial Release	G3✓	S3✓	L3 ✗	D3 A ✗	D3 B ✗
	Frontend - Online ✓			Frontend - Offline ✓	

Requests the modulation for 100 % laser power. It depends on the laser source in use.

**SYNTAX:**      OP 17;

**OUTPUT FORMAT:**    *Modulation[TERM]*

Parameter	Format	Functional Range	Default
Modulation	Integer	Device-dependent	do default

*Modulation:*      Modulation in %.

**EXAMPLE:**      OP 17;

**RESPONSE:**      +50[TERM]

**SEE ALSO:**      [ML](#), [LF](#), [LL](#), [EL](#)

## Index 18 – Actual Terminator

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Request the actual terminator.

**SYNTAX:**      **OP 18;**

**OUTPUT FORMAT:**    *TerminatorSign[TERM]*

Parameter	Format	Functional Range	Default
TerminatorSign	Integer	0 < Integer <= 127 (ASCII – Code)	59 ";"

*TerminatorSign:*    Terminator for HP-GL commands. Carriage Return is always a Terminator.

**EXAMPLE:**      **DT80;  
OP18;**

**RESPONSE:**      **P[TERM]**

**SEE ALSO:**       [\*\*DT\*\*](#)

## Index 20 – Axes' Scale Factors

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Requests the axes' scale factors.

**SYNTAX:**      **OP 20;**

**OUTPUT FORMAT:**    *ScaleX,ScaleY,ScaleZ,ScaleR[TERM]*

Parameter	Format	Functional Range	Default
ScaleX	Integer	0..655360	No default
ScaleY	Integer	0..655360	No default
ScaleZ	Integer	0..655360	No default
ScaleR	Integer	0..655360	No default

*ScaleX:*           X-axis scale factor  
*ScaleY:*           Y-axis scale factor  
*ScaleZ:*           Z-axis scale factor  
*ScaleR:*           R-axis scale factor

**EXAMPLE:**       **OP20;**

**RESPONSE:**       **+153335 ,+151951 ,-209715 ,+131072[TERM]**

**NOTE:**           Z- and R-axis scale factors depend on the modules and tool in use. They can be different from the ones saved in the EEPROM.

## Index 29 – Working Vacuum Area

V 1.51 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
Frontend - Online✓				Frontend - Offline✓	

Requests the positions of the working vacuum area in 1/100mm.

**SYNTAX:**      **OP 29;**

**OUTPUT FORMAT:**    *VacuumTo, VacuumFrom, WorkingVacuumTo, WorkingVacuumFrom[TERM]*

Parameter	Format	Functional Range	Default
VacuumTo, VacuumFrom, WorkingVacuumTo, WorkingVacuumFrom	Plotter units	Device-dependent	No default

**EXAMPLE:**      **OP29;**

**RESPONSE:**      325000,-4000,13700,43000[TERM]

**NOTE:**

- When a new vacuum area is set by an **SV** command, the working area will also be set to the new vacuum area.
- When an **OP29** command is sent to a cutter which hasn't the hardware installed to adjust the vacuum area on both sides, the response will be 0,0,0,0.
- When an **OP29** command is sent to a cutter of the L3 series, the response will be 0,0,0,0. Use instead [OP131](#) to get the current vacuum area.

**SEE ALSO:**      [XX29](#), [SV](#), [OP32](#)

## Index 30 – Defined Hardclipping Limits

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✗	D3 B✗
Frontend - Online✗				Frontend - Offline✗	

Requests boundary points of window defined by the HC instruction or by the menu function 'define corner' 2-5-1-3.

**SYNTAX:**      **OP 30;**

Has the same function as **OP0**; See the **OP0** description for details.

## Index 31 – Vacuum Generator and Vacuum Valve Status

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.45.1 - OP31 available as frontend commando	Frontend - Online✓			Frontend - Offline✓	
V 1.45.1 - OP31,1 implemented					
V 1.50 - OP31,2 implemented					
V 1.53.3 - OP31,9 and OP31,10 implemented					

Requests the status of the vacuum generator and vacuum switching valve.

**SYNTAX:** **OP 31;**

**OUTPUT FORMAT:** *StatusGenerator,StatusValve[TERM]*

StatusGenerator	0: off	1: on
StatusValve	1: sucking	0: blowing

**SYNTAX:** **OP 31,1;**

**OUTPUT FORMAT:** *StatusGenerator,StatusValve,StatusBlowing,StatusLevel[TERM]*

StatusGenerator	0: off	1: on
StatusValve	1: sucking	0: blowing
StatusBlow	0: not possible	1: possible
StatusVacuumLevel	0: no level defined	1-10: vacuum level

**SYNTAX:** **OP 31,2;**

Returns the status of the second vacuum generator and the second switching valve. The output format is the same like **OP31,1;**

**SYNTAX:** **OP 31,9;**

Returns the status of the vacuum generator(s) and valve(s) of the defined active zone.

**OUTPUT FORMAT:** *StatusGenerator,StatusValve,StatusBlowing,StatusLevel[TERM]*

StatusGenerator	0: off	1: on	-1: not defined
StatusValve	1: sucking	0: blowing	-1: not defined
StatusBlow	0: not possible	1: possible	
StatusVacuumLevel	0: no level defined	1-10: vacuum level	

If the situation is undefined, the output for status generator and valve should be -1, cf. [XX133](#).

**SYNTAX:** **OP 31,10;**

Return the status of the vacuum generator(s) and valve(s) of the inactive zone. The output format is the same like **OP31,9;**

If the situation is undefined, the output for status generator and valve should be -1, cf. [XX133](#).

**SEE ALSO:** [PB](#), [PS](#)

## Index 32 – Vacuum Width / Vacuum Area

V 1.20 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
V 1.45 - OP32 available as frontend command	Frontend - Online✓			Frontend - Offline✓	
V 1.51 - OP32,1 implemented					

Requests the width of the vacuum area in 1/100mm.

In case of the hardware to adjust the vacuum area on both sides is installed ([OP140,14](#)), use the OP32,1 command.

**SYNTAX:** **OP 32;**

**OUTPUT FORMAT:** *Width[TERM]*

Parameter	Format	Functional Range	Default
Width	Plotter units	Device-dependent	No default

**EXAMPLE:** **OP 32;**

**RESPONSE:** 99600[TERM]

**NOTE:**

- Through the accuracy of the measuring system the feedback could have a variation of 11mm.
- In case of the hardware to adjust the vacuum width is not installed, the vacuum width return value is the maximum of the work area in y-direction.
- When an **OP32** command is sent to a cutter of the L3 series, the response will be 0. Use instead [OP131](#) to get the current vacuum area.

**SYNTAX:** **OP 32,1;**

**OUTPUT FORMAT:** *VacuumTo, VacuumFrom[TERM]*

Parameter	Format	Functional Range	Default
VacuumFrom, VacuumTo	Plotter units	Device-dependent	No default

**EXAMPLE:** **OP 32,1;**

**RESPONSE:** 278000,90000[TERM]

**NOTE:**

When an **OP32,1** command is sent to a cutter of the L3 series, the response will be 0,0. Use instead [OP131](#) to get the current vacuum area.

**SEE ALSO:** [SV](#), [XX29](#), [OP29](#)

## Index 33 – Feed Length

V 1.44 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.48 - OP33 available as frontend command	Frontend - Online✓			Frontend - Offline✓	

Requests current set feed length.

**SYNTAX:** **OP 33;**

**OUTPUT FORMAT:** *Length[TERM]*

Parameter	Format	Functional Range	Default
Length	Plotter units	Device-dependent	No default

**EXAMPLE:** **OP 33;**

**RESPONSE:** 122000[TERM]

**NOTE:** Also negative numbers are possible.

## Index 35 – Firmware Version

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - OP32 available as frontend command		Frontend - Online✓		Frontend - Offline✓	

Requests firmware version

**SYNTAX:**           **OP 35;**

**OUTPUT FORMAT:**   *MajorVersion,MinorVersion,BugfixNo,BuildNo[TERM]*

Parameter	Description
MajorVersion	The major version number. Note: on internal TEST release this is a negative value.
MinorVersion	The minor version number (unsigned value).
BugfixNo	The number of the bugfix (unsigned value).
BuildNo	The build number of the release (unsigned value).

**EXAMPLE:**           **OP 35;**

**RESPONSE:**          *1,21,0,2205[TERM]*

## Index 36 – Connected Modules

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - OP36 available as frontend command	Frontend - Online✓			Frontend - Offline✓	

Requests the connected modules

**SYNTAX:**           **OP 36;**

**OUTPUT FORMAT:**   *Module1,Module2,Module3,Module4[TERM]*

Module Name	Description	Cutter	Table Option
	No Module (empty String)	G3/S3/L3/D3	
UM-60	Universal Module	G3/D3	
RM-A	Routing Module	G3/D3	
MAM-D	Marking Module Double	G3/D3	
ZONLY	internal use	G3/D3	
PUM	Punching Module	G3/D3	
MAM-S	Marking Module Single	G3/D3	
UM-60L	Universal Module Large	G3/D3	
SENSOR	internal use	G3/D3	
GAM	Generic Application Module	G3/D3	
LM-Z	Laser Module with Z-Axis	G3	Laser
LM-TZ	Laser Module with T- and Z-Axis	G3	Laser
UM-S	Universal Module	S3/L3	
KCM	Kisscut Module	S3/L3	
MAM-SE	Marking Module, Electric	S3	
MAM-SP	Marking Module, Pneumatic	S3	
PUM-S	Punch Module	S3/L3	
ESM	Extraction Switch Module	G3/D3	
LM-Z-S	Laser Module with Z-Axis	S3	Laser
PPM-S	Punching Pricking Module	S3/L3	
PMM-S	Punching Marking Module	S3/L3	
MAM-SPS	Marking Module, Pneumatic, Single	S3/L3	
MAM-SPD	Marking Module, Pneumatic, Double	S3/L3	
GAM-S	Generic Application Module	S3/L3	
UM-ZS	Universal Module Speed	G3/D3	
UM-ZP	Universal Module Power	G3/D3	
UM-120	Universal Module for 120mm clearance	G3	120 mm clearance
RM-120	Routing Module for 120mm clearance	G3	
RM-S	Routing Module	S3/L3	
RM-L	Routing Module Large	G3	
LM	Laser Module	G3	Cut & Seal

**EXAMPLE:**           **OP 36;**

**RESPONSE:**        *,UM-60,,[TERM]*

## Index 37 – Tools on a Module

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - OP37 available as frontend command			Frontend - Online✓		Frontend - Offline✓
V 1.42 - OP37, moduleNo, 1 implemented					

Request the tools on a module (*moduleNo*=1-3). The optional 1 at the end requests also the tool number.

**SYNTAX:** **OP 37,ModuleNo(,1);**

<b>OUTPUT FORMAT:</b>	<i>Tool1[TERM]</i>	<i>one tool</i>
	<i>Tool1,Tool2[TERM]</i>	<i>two tools</i>
	<i>Tool1,Tool2,Tool3[TERM]</i>	<i>three tools</i>

Tool name	Description
NOTOOL	No module on this slot or no tool in module
UDT	Universal Cutting Tool
UCT	Universal Cutting Tool
CTT1	Creasing Tool Type 1
CTT2	Creasing Tool Type 2
CTT3	Creasing Tool Type 3
DRT	Drive Rotary Tool
EOT	Electric Oscillating Tool
POT	Pneumatic Oscillating Tool
KCT	Kiss Cutting Tool
ROUTER	Router 1KW
RT QC	Router 1KW QC
RT QC A	Router 1KW QC ARC
RT HSK	Router 3.6KW HSK
RT HSK A	Router 3.6KW ARC
CT45	Cutting Tool 45°
VCT	V-Cutting Tool
PUNCH	Punch Tool
SDT	Small Drawing Tool
GAT	Generic Active Tool
PPT	Passepartout Tool
PRT	Power Rotary Tool
IJT	Ink Jet Tool
URT	Universal Routing Tool
CT	Cutting Tool in Kiss Cut Module
ST	Scoring Tool in Kiss Cut Module
DT	Drawing Tool in Kiss Cut Module
WKT	Wheel Knife Tool
SCT	Scoring Tool
LAT3.75	Laser Tool with 3.75" focal length
LAT5.0	Laser Tool with 5.0" focal length
LAT7.5	Laser Tool with 7.5" focal length
EOT-250	Electric Oscillating Tool
PT	Pricking Tool
PTT1	Perforation Tool Type 1
LPT1	Laser Processing Tool with 3.75" focal length and 100W laser source

**EXAMPLE:** **OP 37,2;**

**RESPONSE:** **EOT[TERM]**

**EXAMPLE:** **OP 37,3;**

**RESPONSE:** **PUNCH,PUNCH,SDT[TERM]**

**EXAMPLE:**           **OP37,2,1;**  
**RESPONSE:**        EOT#3[TERM]

**NOTE:**              2 = module, 1 = with tool number

## Index 38 – Tool Offsets

V 1.40 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Output of x and y tool-offsets relative to an imaginary origin. (The origin corresponds with the tool 11 position of a reference module).

Module	Tool	Tool number
1	1	11
1	2	12
2	1	21
2	2	22
2	3	23
etc		

**SYNTAX:**           OP 38,tool/No;

**OUTPUT FORMAT:**   X,Y,Z[TERM]

**EXAMPLE:**          OP 38,21;

**RESPONSE:**        12,18,0[TERM]

## Index 39 – V-Cut Angle

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - OP39 available as frontend command	Frontend - Online✓			Frontend - Offline✓	

Request the V-cut angle setting of the selected module.

**SYNTAX:**           OP 39;

**OUTPUT FORMAT:**   Angle[TERM]

Parameter	Angles
Angle	0°
	15°
	22.5°
	45°
	-1.0°; No V-cut tool is selected

**EXAMPLE:**          OP 39;

**RESPONSE:**        22.5[TERM]

**SEE ALSO:**        [XX39](#)

## Index 40 – Board Feeder Mode

V 1.47 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request the board feeder mode.

**SYNTAX:**      **OP 40,1;**

**OUTPUT FORMAT:**    *Mode[TERM]*

Parameter	Value
0	Load after feed
1	Load automated
2	Load on command
3	Load after delay
4	Load before feed

**EXAMPLE:**      **OP40,1;**

**RESPONSE:**      1[TERM]

**SEE ALSO:**      [XX40](#)

## Index 42 – Paging Acceleration Level

V 1.48 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request the paging acceleration level.

**SYNTAX:**      **OP 42;**

**OUTPUT FORMAT:**    *Level[TERM]*

**EXAMPLE:**      **OP42;**

**RESPONSE:**      6[TERM]

**SEE ALSO:**      [XX42](#)

## Index 65 – Moving Mode Z-Axis

V 1.56 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request the Z-Axis Moving Mode from currently selected (no parameter) or from a specific module.

**SYNTAX:**      **OP 65;**  
                 **OP 65, ToolNumber;**

**OUTPUT FORMAT:**    *MovingMode[TERM]*

Parameter	Format	Functional Range	Default
ToolNumber	Integer	0, 11..33	No default
MovingMode	Integer	0, 1	

*toolNumber*        For description of tool number see [OP7](#).

*movingMode*:      Z-Axis moving mode.  
                  0: Position mode. Moving to the absolute position.  
                  1: Pressure mode

**EXAMPLE:**      **OP65;**

**RESPONSE:**      0[TERM]

**SEE ALSO:**        [XX65](#)

## Index 80 – Tool Precision Offset

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.52.2 - OP80 available as frontend command	Frontend - Online✓			Frontend - Offline✓	

Request the current Tool Offset in x- and y-direction, respectively [1/100mm]. Furthermore the activation state is being checked, whether it's on or off. Choose the module/tool referring to the following table:

Module	Tool	Tool number
1	1	11
1	2	12
2	1	21
2	2	22
2	3	23
Etc.		

**SYNTAX:**      **OP 80;**  
                 **OP 80, ToolNumber;**

Parameter	Format	Functional Range	Default
ToolNumber	Integer	0, 11..33	No default

**OUTPUT FORMAT:**    *State,OffsetX,OffsetY[TERM]*

Parameter	Format	Functional Range	Default
State	Integer	0,1	0
OffsetX, OffsetY	Real	-200...200[1/100mm]	0

**EXAMPLE:**        **OP80,11;** returns state and offset off tool 1 in module 1  
                  **OP80 ;** and **OP80,0;** returns state and offset off currently selected tool.

**RESPONSE:**      1,100,100[TERM]

**SEE ALSO:**        [XX80](#)

## Index 82 – Additional Tool Offset

V 1.58 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.65 – Offset Limits changed from +/-1000 to +/- 1500	Frontend - Online✓			Frontend - Offline✓	

Request the current additional Tool Offset in x- and y-direction, respectively [1/100mm]. Choose the module/tool referring to the following table:

Module	Tool	Tool number
1	1	11
1	2	12
2	1	21
2	2	22
2	3	23
Etc.		

**SYNTAX:**      **OP 82;**  
                 **OP 82, ToolNumber;**

Parameter	Format	Functional Range	Default
ToolNumber	Integer	0, 11..33	No default

**OUTPUT FORMAT:**    *OffsetX,OffsetY[TERM]*

Parameter	Format	Functional Range	Default
OffsetX, OffsetY	Real	-1500...1500[1/100mm]	0

**EXAMPLE:**      **OP82,11;** returns additional offset off tool 1 in module 1  
**OP82;** and **OP82,0;** returns additional offset off currently selected tool.

**RESPONSE:**      100,100[TERM]

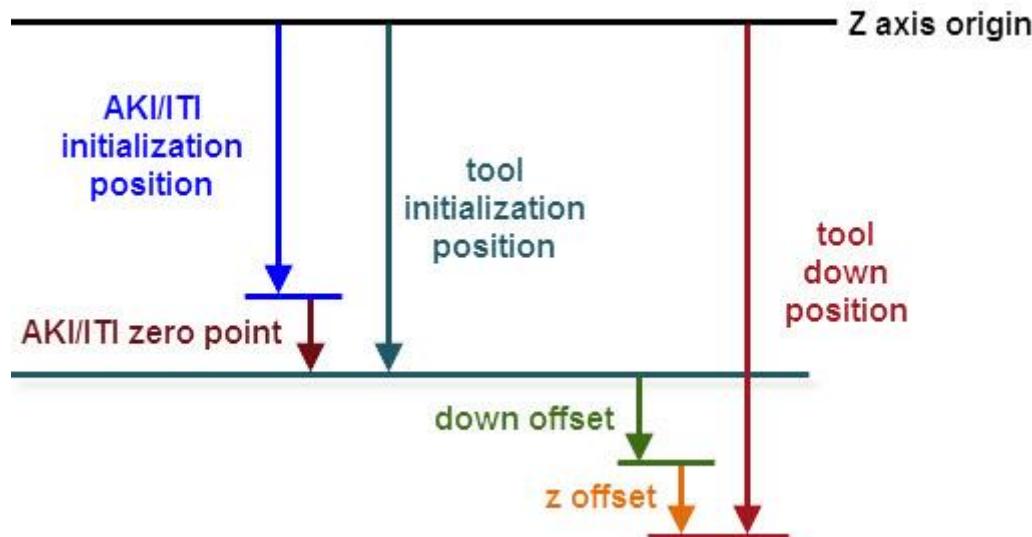
**SEE ALSO:**        [XX82](#)

## Index 83 – Special Z Axis Offsets

V 1.61 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓			Frontend - Offline✓	

Request the current z offset and the AKI/ITI zero point of a tool.



Z offset and AKI/ITI zero point schematic

**AKI/ITI zero point:** The zero point is used to correct the AKI/ITI initialization position to the surface of the underlay.  
With the ITI, the zero point should no longer be used to correct the initialization position. Instead of that, the operator should re-calibrate the cutting base.  
(operating unit 1-9-4-1-2)

**Z offset:** The z offset is used to correct the down position of a tool.

**SYNTAX:** **OP 83;**  
**OP 83,ModuleSlot;**

Parameter	Format	Functional Range	Default
ModuleSlot	Integer	1,2,3	No default

**OUTPUT FORMAT:** *OffsetZ,ZeroPoint[TERM]*

Parameter	Format	Functional Range	Default
OffsetZ	Plotter units	-150...150	0
ZeroPoint	Plotter units	-1...150	0

**EXAMPLE:** **OP83;**  
**RESPONSE:** -23,35[TERM]

**EXAMPLE:** **OP83,2;**  
**RESPONSE:** 35,72[TERM]

**EXAMPLE:** **OP83,4;**  
**RESPONSE:** 0,-1[TERM]

**NOTE:**

- Sending this command without a parameter will return the offsets of the current selected tool.
- If currently the laser pointer or the camera module is selected or sending a wrong module slot, the return value will be 0,-1 (see the last example).

**SEE ALSO:** [XX83](#)

## Index 126 – Release Key States

V 1.58 - Initial Release	G3✓	S3✓	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request for the current release states of the release keys. Tables with tandem vacuum system always has the release keys installed otherwise it can be requested by the [OP140,17/18](#) command if they are installed.

**SYNTAX:**            **OP 126;**

**OUTPUT FORMAT:**    *ReleaseStateKey1,ReleaseStateKey2[TERM]*

Parameter	Format	Functional Range	Default
<i>ReleaseStateKey1,</i>	Integer	0,1	0
<i>ReleaseStateKey2</i>			

*ReleaseStateKey1:*    0: No release.

*ReleaseStateKey2:*    1: Release granted by the user.

**EXAMPLE:**            **OP126;**

**RESPONSE:**          0,1[TERM]

**NOTE:**

- A release state will be reset to 0 during the execution of a [XX133](#) command.
- If the state of a release key is 1, the backlight of the release key lights green. Otherwise the light is switched off.

**SEE ALSO:**            [XX133, Frontend Commands](#)

## Index 131 – Vacuum Pattern

V 1.56 - Initial Release	G3 <b>X</b>	S3 <b>X</b>	L3 <b>✓</b>	D3 A <b>X</b>	D3 B <b>X</b>
	Frontend - Online <b>✓</b>			Frontend - Offline <b>✓</b>	

This command is just for cutters of the L3 series.

Request the current vacuum zone pattern. To get an overview of the zone numeration, look at Figure 1 in HPGL-Command [XX131](#).

**SYNTAX:** **OP 131;**

**OUTPUT FORMAT:** *PatternRow1,PatternRow2,PatternRow3,PatternRow4[TERM]*

Parameter	Format	Functional Range	Default
<i>PatternRow1,</i>	Integer	L3 C-40: The first 10 bits are significant.	No default
<i>PatternRow2,</i>		L3 C-56: The first 14 bits are significant.	
<i>PatternRow3,</i>			
<i>PatternRow4</i>			

**EXAMPLE:** **OP 131;**

**RESPONSE:** 903,963,897,967[TERM]

Row 1:  $903 = 1110000111_2$

Zones 1, 5, 9, 29, 33 and 37 are closed.

Row 2:  $963 = 1111000011_2$

Zones 2, 6, 26, 30, 34 and 38 are closed.

Row 3:  $897 = 1110000001_2$

Zones 3, 31, 35 and 39 are closed.

Row 4:  $967 = 1111000111_2$

Zones 4, 8, 12, 28, 32, 36 and 40 are closed.

**SEE ALSO:** [XX131, Frontend Commands](#)

## Index 132 – Online Work Area

V 1.55 - Initial Release	G3 <b>X</b>	S3 <b>X</b>	L3 <b>✓</b>	D3 A <b>X</b>	D3 B <b>X</b>
	Frontend - Online <b>✓</b>			Frontend - Offline <b>✓</b>	

This command is just for cutters of the L3 series. Request for the current work area boundaries in x-direction.

**SYNTAX:** **OP 132;**

**OUTPUT FORMAT:** *WorkAreaFromX,WorkAreaToX[TERM]*

Parameter	Format	Functional Range	Default
<i>WorkAreaFromX</i>	Plotter units	0 to Device-dependent	No default
<i>WorkAreaToX</i>			

**EXAMPLE:** **OP 132;**

**RESPONSE:** 81250,171230[TERM]

**NOTE:**

- The work area displayed by the LEDs is larger than the real work area by the width of the additional beam offsets.
- When an **OP 132** command is sent to a cutter of the G3 or S3 series the response will be 0,0.

**SEE ALSO:** [XX132, Frontend Commands](#)

## Index 133 – Tandem Areas

V 1.58 - Initial Release	G3✓	S3✓	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request for the current states of the tandem areas.

If a tandem operation mode is set ([OP141.18](#) != 0), the the work area in of the cutter in x direction is divided into two areas, front and rear (tandem system [OP140.52](#) = 1). If the cutter is in online mode and the tandem mode is activated, there is only one area active at the time. The active area is the area wherein the cutter can move around to execute jobs. The inactive area is also called the safety area (safe for the user) and the cutter can't move into it because a clipping window is set over this area.

**SYNTAX:**      **OP 133;**

**OUTPUT FORMAT:**    *AreaStateFront,AreaStateRear[TERM]*

Parameter	Format	Functional Range	Default
<i>AreaStateFront, AreaStateRear</i>	Integer	0,1	1

*AreaStateFront:*    0: Area isn't active (clipping window set over the area).

*AreaStateRear:*    1: Area is active (No clipping window set).

**EXAMPLE:**      **OP 133;**

**RESPONSE:**      0,1[TERM]

**NOTE:**

- The clipping window isn't active when the cutter is offline.
- When an **OP 133** command is sent to a cutter without tandem system or with deactivated tandem mode, the response will always be 1,1.

**SEE ALSO:**        [XX133, Frontend Commands](#)

## Index 140 – Equipment Status

V 1.46 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓		Frontend - Offline✓		

Request the status and availability of equipment(s).

**SYNTAX:**      OP 140,Equipment;

**OUTPUT FORMAT:**    *EquipmentNr.EquipmentStatus[TERM]*  
*EquipmentNr.EquipmentStatus.EquipmentSize[TERM]*  
*EquipmentNr.EquipmentStatus,EquipmentNr.EquipmentStatus[TERM]*

<b>Equipment No.</b>	<b>EquipmentName</b>	<b>Panel menue</b>		<b>since</b>
		<b>install</b>	<b>activate</b>	
0	All equipment		status of all installed equipment	v1.46
1	Unwinding unit core	1-11-1-8	1-7-3-1	v1.46
2	Wind-up unit core	1-11-1-7	1-7-4-1	v1.46
3	External material handling 1	1-11-1-5-1	1-7-6-1	v1.46
4	External material handling 2	1-11-1-6-1	1-7-7-1	v1.46
5	Unwind options	1-11-1-11-1	1-7-9-1	v1.47
6	Reserve	no status (always -1)		v1.46
7	Board loading device	1-11-1-13	1-7-18-1	v1.46
8	Fusion feeder	1-11-1-10	1-7-19-1	v1.46
9	Board feeder	1-11-1-15-1	1-7-20-1	v1.46
10	Board stacker	1-11-1-16-1	1-7-21-1	v1.47
11	External feed stop	1-11-6-1	1-7-1-13-1	v1.46
12	Material sensor	1-11-1-17-1	1-7-1-12-1	v1.49
13	Vacuum generator 2 available (-1 not installed; 1 = installed; answer 0 is not possible for nr 13)	1-11-2-1-5 <sup>1</sup> 1-11-2-2-5 <sup>2</sup>	not possible	v1.50
14	Vacuum zone adjusting type (-1 not installed; 0 = standard; 1 = both sided; 2 = tiles)	1-11-2-4	not possible	v1.53
15	Vacuum key #1	1-11-9-3-1	1-7-16-1	v1.53
16	Vacuum key #2	1-11-9-3-2	1-7-16-2	v1.53
17	Release key #1	1-11-9-4-1	1-7-17-1	v1.53
18	Release key #2	1-11-9-4-2	1-7-17-2	v1.53
19	Sheet feeder	1-11-1-19-1	1-7-5-1	v1.55
20	Stacker table	1-11-1-20-1	1-7-15-1	v1.55
21	Roll up unit tray	1-11-1-12-1	1-7-10-1	v1.59
22	ARC Magazine (-1 = not installed; 1 = Router; 2 = HSK; 0 is not possible)	1-11-11-1	not possible	v1.62
23	Type of vacuum generator 1 -1 = not installed 1 = Turbine Size: 1 = 1 – 9 kW 2 = 1 – 15 kW 3 = 1 – 15 kW plus 2 = Pump Size: 0 = 1.1 / 1.3kW 1 = 2.2 / 2.55kW 2 = 4.0 / 4.6kW 3 = 5.5 / 6.3kW 4 = 8.5 / 9.8kW 5 = 12.5 / 14.5kW 0 is not possible	1-11-2-1-1 <sup>1</sup> 1-11-2-2-2 <sup>2</sup>	not possible	v1.67

<sup>1</sup> Turbine

<sup>2</sup> Pump

24	Type of vacuum generator 2 (for the legend see equipment no 23)	1-11-2-1-5 <sup>3</sup> 1-11-2-2-6 <sup>4</sup>	not possible	v1.67
50	Conveyor (-1 not installed; 1 = installed; answer 0 is not possible for nr 50)	1-11-1-14	not possible	v1.46
51	Cutting strip (-1 not installed; 1 = installed; answer 0 is not possible for nr 51)	1-11-1-18-1	not possible	v1.50
52	Tandem table (-1 not installed; 1 = installed; answer 0 is not possible for nr 52)	1-11-2-8	not possible	v1.53
53	Auxiliary drive (-1 not installed; 1 = installed; answer 0 is not possible for nr 53)	1-11-1-3-1 or 1-11-1-4-1	not possible	v1.53
54	ITI -1 = not installed <u>Single ITI installation:</u> 1 = installed on the left side of the cutter (tools inserted in a module which is mounted on slot 3 can't reach the position of this ITI) 2 = installed on the right side of the cutter (tools inserted in a module which is mounted on slot 1 can't reach the position of this ITI) <u>Double ITI installation:</u> 3 = installed on the left and right side of the cutter. (all tools can be initialized with an ITI) See also <a href="#">OP333</a>	1-11-3-1	not possible	v1.59

EquipmentStatus	Description
-1	No equipment installed (for equipment no. 0 if not any equipment is installed)
0	equipment is installed and switched off (enable off)
1	equipment is installed and switched on (enable on)

**SEE ALSO:** [XX140](#)

**EXAMPLE:** [OP140,0;](#)  
**RESPONSE:** 1.0,2.0,3.0,4.0,5.1,6.0,7.0,8.0,9.0,10.0,11.1,50.1[TERM]

**EXAMPLE:** [OP140,0;](#)  
**RESPONSE:** -1[TERM]  
If not any equipment is installed.

**EXAMPLE:** [OP140,1;](#)  
**RESPONSE:** 1.0[TERM]  
Unwinding unit core is switched off.

**EXAMPLE:** [OP140,7;](#)  
**RESPONSE:** 7.-1[TERM]  
Board loading device is not installed.

---

<sup>3</sup> Turbine

<sup>4</sup> Pump

**EXAMPLE:** **OP 140,23;**  
**RESPONSE:** 23.-1[TERM]  
No vacuum generator 1 is installed.

**EXAMPLE:** **OP 140,23;**  
**RESPONSE:** 23.2.1[TERM]  
A pump of the size 2.2/2.55kW is as vacuum generator 1 installed and enabled.

**EXAMPLE:** **OP 140,45;**  
**RESPONSE:** 45.-1[TERM]  
Unknown equipments are always “not installed”.

**NOTE:**

- In the future the **OP 140**; will give more equipment back. Implement it in a way, that the application can handle new strings.
- **OP 140,0**; shows only installed equipments and -1 if not any equipment ist installed.

## Index 141 – Function Status

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Command requests status of function(s).

**SYNTAX:**      **OP 141,Function;**

**OUTPUT FORMAT:**    *FunctionNr.FunctionStatus[TERM]*  
*FunctionNr.FunctionStatus.Length[TERM]*  
*FunctionNr.FunctionStatus.Time[TERM]*

FunctionNr	description	panel menue	length / time	since
0	All functions	-	-	v1.46
1	Stop before feeding	1-7-1-7-1	-	v1.46
2	Feed compensation	1-7-1-8	1-7-1-8	v1.46
3	Material smooth	1-7-1-14-1	-	v1.46
4	Feeding clamps - release mode	1-7-11-2	1-7-11-3	v1.46
5	Start position in X	1-7-1-15-1	1-7-1-15-2	v1.46
6	Lateral distance	Discontinued after v1.58	-	v1.46
7	Reserved	-	-	v1.46
8	Board feed positioning	1-7-20-2-1	-	v1.47
9	Board feed positioning shaking motion	1-7-20-2-2	1-7-20-2-3	v1.47
10	Feeder <sup>5</sup> separating shaking motion	1-7-20-3-1 (BHS) 1-7-5-4-1 (SF)	1-7-20-3-2 (BHS) 1-7-5-4-3 (SF)	v1.47
11	Action trigger	1-7-1-10-3-1	1-7-1-10-3-2	v1.47
12	Load offset X	1-7-1-10-1-1	1-7-1-10-1-2	v1.47
13	Unload offset	1-7-1-10-2-1	1-7-1-10-2-2	v1.47
14	Load offset Y	1-7-1-10-1-1	1-7-1-10-1-3	v1.47
15	Board stacker collision check	1-7-21-2	-	v1.49
16	Vacuum generator configuration	1-8-2-4	-	v1.50
17	Air cushion during material transport	1-7-1-17-1	Discontinued after v1.58	v1.49
18	Tandem operation mode	1-7-8-1	-	v1.53
19	Vacuum switch off mode	1-7-16-3	-	v1.53
20	To do if feeder stack is empty	1-7-1-10-1-9	-	v1.58
21	ITI active	1-9-2-1 (left) 1-9-3-1 (right)	-	v1.59
22	Vacuum behavior on page feeding	1-7-1-5	-	v1.60
23	Board loading device release time	1-7-18-1	1-7-18-3-1	v1.62
24	Board loading device setting time	1-7-18-1	1-7-18-3-2	v1.62
25	Stop after feeding	1-7-1-7-2	-	v1.66.3

FunctionStatus	description, generally
0	function is switched off
1	function is switched on

**SEE ALSO:**      [XX141](#)

**EXAMPLE:**      **OP 141,0;**

**RESPONSE:**      1.0,2.0.0,3.1,4.0.300[TERM]  
Only material smooth is switched on.

**EXAMPLE:**      **OP 141,1;**

**RESPONSE:**      1.0[TERM]

<sup>5</sup> For BHS feeder or Sheet feeder(SF)

Vacuum mode is switched off.

**EXAMPLE:** **OP 141,5;**

**RESPONSE:** 5.1.220000[TERM]  
Start position X is switched on. After the status digit, the length setting will be submitted.

**EXAMPLE:** **OP 141,11;**

**RESPONSE:** 11.Status.Length[TERM]

Status:

- 0: Periphery (like feeder or stacker) will be ever controlled.
- 1: Periphery will be only controlled if the feed length (fl xxx;(1-7-1-2) is greater than Length.
- 2: Periphery will never be controlled.
- 3: Unloading periphery only will be controlled. It's not necessary to deactivate loading periphery.

**EXAMPLE:** **OP 141,16;**

**RESPONSE:** 16.0[TERM]  
Vacuum generator configuration is set to "both generators parallel"  
0 = "both generators parallel"  
1 = "only generator 1"  
2 = "only generator 2"  
3 = "two separated generators"

**EXAMPLE:** **OP 141,18;**

**RESPONSE:** 18.1[TERM]  
Tandem operation mode "On" ([XX141,18](#))  
-1 = Set if tandem operation mode is not possible which can cause from missing installed equipment  
0 = Off  
1 = On  
2 = Only rear  
3 = Only front  
Note: If you want check if a tandem clipping area has been activated by a [XX133](#), send an [OP133](#).

**EXAMPLE:** **OP 141,21;**

**RESPONSE:** 21.1[TERM]  
ITI is Active  
-1 = ITI is not installed.  
0 = Inactive (double ITI installation ([OP140,54 - 3](#)): both ITI are inactive).  
1 = Active (double installation: both ITI are active).  
2 = Double ITI installation: Left is active, right is inactive.  
3 = Double ITI installation: Right is active, left is inactive.

**EXAMPLE:** **OP141,22;**

**RESPONSE:** 22.0[TERM]  
Vacuum behavior on page feeding: always fixed  
0 = material is always fixed by vacuum or clamp  
1 = optimised time – material must be able to keep itself on the cutter

**EXAMPLE:** **OP141,23;**

**RESPONSE:** 23.1.2000[TERM]  
Board loading device is active. Release time is 2000ms.

- EXAMPLE:** OP141,24;
- RESPONSE:** 24.1.3000[TERM]  
Board loading device is active. Setting time is 3000ms.
- EXAMPLE:** OP141,25;
- RESPONSE:** 25.1[TERM]  
After a page feed, the cutter stopps and shows a message to the user before the clamps are released.
- EXAMPLE:** OP141,42;
- RESPONSE:** 42.0[TERM]  
Unknown functions are always “switched off”.
- NOTE:**
- In the future the **OP 141**; will give more functions back. Implement it in a way that the application can handle new strings.
  - If a length or a time is set, it will be submitted after the status digit.
  - Every change on function 18 resets all Tandemsystem states.

## Index 144 – Board stacker multi page unloading mode

V 1.64.0 - Initial Release

G3✓ S3✓ L3✗ D3 A✓ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

Request for the current states

**SYNTAX:**      **OP 144;**

**OUTPUT FORMAT:**    *MultiPageUnloadingMode.ReadyForStackingMaterial[TERM]*

Parameter	Format	Functional Range	Default
<i>MultiPageUnloadingMode</i>	Integer	-1..2	No default
<i>ReadyForStackingMaterial</i>	Integer	0,1	No default

*MultiPageUnloadingMode*            -1 : multi page unloading not possible  
*MultiPageUnloadingMode*            0 : multi page unloading is not activated  
*MultiPageUnloadingMode*            1 : multi page unloading is activated

*ReadyForStackingMaterial*          0 : no one board is ready for stacking  
*ReadyForStackingMaterial*          1 : min one board is ready for stacking

**EXAMPLE:**      **OP 144;**

**RESPONSE:**       0.1[TERM]  
Multi page is deactivated and at least one board is ready for stacking.

-1.0[TERM]  
Multi page is not possible because there is no BHS stacker installed (see [OP140,10](#)) or the BHS stacker FW version is too old.

1.0[TERM]  
Multi page is activated. The BHS stacker conveyer belt is empty.

**SEE ALSO:**       [FF](#), [FL](#), [XX144](#), [OP140,10](#)

## Index 147 – Capture and/or projection calibration with cutter extension

V 1.63.1 - Initial Release

G3✓ S3✓ L3✗ D3 A✓ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

Request for the current states of a single feed in non-approved feed direction for capture and/or projection calibration.

**SYNTAX:** OP 147;

**OUTPUT FORMAT:** SingleReversePermissionFeed[TERM]

Parameter	Format	Functional Range	Default
SingleReversePermissionFeed	Integer	0..2	0

SingleReversePermissionFeed 0 : not activated

SingleReversePermissionFeed 1 : ready for single page feed in reverse, non-approved direction

SingleReversePermissionFeed 2 : reverse, non-approved directed paging already used

**EXAMPLE:** OP 147;

**RESPONSE:** 0[TERM]

**NOTE:** The reverse feed must be activated with the [XX147](#) command first.

The reverse feed:

- ... is limited to 4m in length.
- ... can only be executed in the ONLINE mode.
- ... can be executed only once. For a second execution the cutter have to be restarted.

The reverse feed activation is maintained until:

- ... the reverse feed is performed.
- ... a reverse feed is cancelled.
- ... the cutter is restarted.

If your paging direction, see (1-11-1-2) or [XX41](#) command, is "forward & backward" you don't need to activate a single reverse feed. The response of the **OP147** will be always "1" (ready).

**SEE ALSO:** [FF](#); [FL](#); [XX41](#); [XX147](#);

## Index 151 – Tool Speed

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✕			Frontend - Offline ✕	

Request the tool speed of the selected tool (EOT, DRT or PRT only).

**SYNTAX:** **OP 151;**

**OUTPUT FORMAT:** *SpeedLevel[TERM]*

Parameter	Description	
SpeedLevel	For EOT and DRT	PRT only
	0: low speed 1: high speed	0: low speed 1: medium speed 2: high speed

**EXAMPLE:** **OP 151;**

**RESPONSE:** **1[TERM]**

**NOTE:** If no EOT, DRT or PRT is selected the response is always 0;  
EOT-250 is not being supported.

**SEE ALSO:** [XX151](#)

## Index 170 – Improvement for Symmetric Tools

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✕			Frontend - Offline ✕	

Request whether the T axis improvement is switched on or off.

**SYNTAX:** **OP 170;**

**OUTPUT FORMAT:** *Status[TERM]*

Parameter	Description
Status	1: on 0: off

**EXAMPLE:** **OP 170;**

**RESPONSE:** **1[TERM]**

**SEE ALSO:** [XX170](#)

## Index 175 – Vector Processing Version

V 1.60 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request the vector processing version.

**SYNTAX:** OP 175;

**OUTPUT FORMAT:** Version[TERM]

Parameter	Description
Version	0: Vector processing version 1 1: Vector processing version 2

**EXAMPLE:** OP 175;

**RESPONSE:** 1[TERM]

## Index 191 – Request for Camera Illumination Mode

V 1.49 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request the camera illumination mode.

**SYNTAX:** OP 191;

**OUTPUT FORMAT:** Mode[TERM]

Parameter	Description
Mode	0: off
	1: on
	3: LED pattern is statically set

**EXAMPLE:** OP 191;

**RESPONSE:** 1[TERM]

**SEE ALSO:** [XX191](#)

## Index 198 – Request ICC Camera Installed

V 1.61 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request ICC camera installed.

**SYNTAX:** OP 198;

**OUTPUT FORMAT:** installed[TERM]

Parameter	Description
installed	0: ICC camera installed
	1: ICC camera not installed

**EXAMPLE:** OP 198;

**RESPONSE:** 1[TERM]

## Index 220 – Request Tool Change Position

V 1.64.1 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓				Frontend - Offline✓	

Request both tool change positions in x- and y-direction, respectively [1/100mm].

**SYNTAX:** [OP 220;](#)

**OUTPUT FORMAT:** *Pos1X,Pos1Y,Pos2X,Pos2Y [TERM]*

Parameter	Description	Format	Functional Range	Default
<i>Pos1X, Pos1Y</i>	Tool change position 1	Real	[1/100mm]	No default
<i>Pos2X, Pos2Y</i>	Tool change position 2	Real	[1/100mm]	No default

**EXAMPLE:** [OP220;](#) returns the tool change position 1 and 2

**RESPONSE:** 320000.00, 0.00, 160000.00, 0.00

**NOTE:** The tool change positions vary depending on the selected tool. Remember to use the command SP correctly before requesting the tool change position.

**SEE ALSO:** [SP, XX220](#)

## Index 251 – Request Table Option

V 1.56 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓				Frontend - Offline✓	

Request the configured table option.

**SYNTAX:** [OP 251;](#)

**OUTPUT FORMAT:** *Option[TERM]*

Parameter	Description
Option	0: Standard 1: Laser 2: CTS 3: 120mm beam clearance 4: Cut & Seal

**EXAMPLE:** [OP251;](#)

**RESPONSE:** 1[TERM]

## Index 260 – User Permission

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request the cutter of the active permission.

**SYNTAX:**           **OP 260;**

**OUTPUT FORMAT:**   *UserLevel[TERM]*

Parameter	Description
UserLevel	0: User 1 1: User 2 2: User 3 3: Operator 4: Service 5: Factory 6: R&D

**EXAMPLE:**           **OP260;**

**RESPONSE:**          1[TERM]

## Index 304 – Extractor Initialized with AKI/ITI

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request if the extractor unit of the RM-A/RM-120/RM-S/RM-L was initialized with the AKI or the ITI.

**SYNTAX:**           **OP 304,Slot,Subslot;**

**OUTPUT FORMAT:**   *Response[TERM]*

Parameter	Format	Functional Range	Default
Slot	Integer	1 to 3	No default
Subslot	Integer	1 to 3	No default
Response	Integer	0: not initialized with AKI or ITI 1: initialized with AKI 2: initialized with ITI	0

**EXAMPLE:**           **OP304,1,1;**

**RESPONSE:**          1[TERM]

**NOTE:**

- Only if the module has a extractor unit (RM-A/RM-120/RM-S/RM-L), this flag will be visible, see panel tree (1 - {1,2,3} - 1 - 2 - 8).
  - A new generated tool is always set to "no".
  - A successfully initialization of the extractor unit with the AKI is always set to "yes".
  - A manual initialization of the tool (1 - {1,2,3} - 1 - 2 - 1) hasn't an effect on the flag.
  - An automatic initialization of the tool (1 - {1,2,3} - 1 - 2 - 2) hasn't an effect on the flag.
- This request has to be true, if the follow commands will be used:  
[OP306](#), [XX306](#), [Frontend Commandos](#)

## Index 305 – Tool Initialization Information

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.48.4 - changed output format			Frontend - Online✓		Frontend - Offline✓
V 1.51 - added mode=1 parameter					
V 1.55 - added mode=2 parameter					

This command requests the tool initialization type, the Z initialization position, Z offset and further parameters as max Z depth, additional underlay (not used or applied) and thickness of the additional underlay if requested.

**SYNTAX:** **OP 305,Slot,Subslot;**

from 1.51.0 forward  
**OP 305,Slot,Subslot,Mode;**

**OUTPUT FORMAT:** up to and including 1.48.3  
*ToolInit[TERM]*

from 1.48.4 forward  
*ToolInit,ZPositionInit,ZOffset[TERM]*

from 1.51.0 forward with mode = 1  
*ToolInit,ZPositionInit,ZOffset,MaxZDepth[TERM]*

from 1.55.0 forward with mode = 2  
*ToolInit,ZPositionInit,ZOffset,MaxZDepth,  
AdditionalUnderlay,ThicknessUnderlay[TERM]*

Parameter	Format	Functional Range	Default
Slot	Integer	1 to 3	No default
Subslot	Integer	1 to 3	No default
Mode	Integer	0: without Z max depth and without additional 1: with Z max depth 2: with Z max depth, additional underlay and underlay thickness	0
ToolInit (1-x-x-2-9)	Integer	0: manually initialized 1: initialized with AKI 2: relative initialized 3: initialized with ITI (reference init <a href="#">XX333</a> ) 4: initialized with ITI (readjust init <a href="#">XX334</a> ) 5: undefined, new tool or initialization process interrupted	0
ZPositionInit (1-x-x-3-4-9)	Integer	0..20000	0
ZOffset (1-x-x-3-4-4)	Integer	-150..150	0
MaxZDepth	Integer	0..20000	0
AdditionalUnderlay (1-6-3/ 1-9-2-4-2)	Integer	0: additional underlay not used 1: additional underlay is applied	0
ThicknessUnderlay (1-9-2-4-3-1)	Integer	0..20000	200

**EXAMPLE:** **OP 305,1,1;or OP 305,1,1,0;**

**RESPONSE:** 1,4512,20[TERM]  
0,0,0[TERM]  
0,3000,10[TERM]  
**EXAMPLE:** **RESPONSE:** **OP** 305,1,1,1;  
1,4512,20,130[TERM]

Initialized with AKI, Z Position Init = 45.12mm, Z Offset = 0.2mm,  
max Z depth = 1.3mm

0,3000,10,5400[TERM]  
Manually initialized, Z Position Init = 30.0mm, Z Offset = 0.1mm,  
max Z depth = 54mm

2,1269,0,1931[TERM]  
Relative initialized, Z Position Init = 12.69mm, Z Offset = 0mm,  
max Z depth = 19.31mm

**EXAMPLE:** **RESPONSE:** **OP** 305,1,1,2;  
0,4846,22,5000,1,198[TERM]  
Manually initialized, Z Position Init = 48.46mm, Z Offset = 0.22mm,  
max Z depth = 50mm, Additional underlay applied,  
Thickness underlay = 1.98mm

1,5229,11,5500,0,0[TERM]  
Initialized with AKI, Z Position Init = 52.29mm, Z Offset = 0.11mm,  
max Z depth = 55mm, Additional underlay not used,  
Thickness underlay = 0mm

2,4269,0,4500,0,193[TERM]  
Relative initialized, Z Position Init = 42.69mm, Z Offset = 0mm,  
max Z depth = 45mm, Additional underlay not used,  
Thickness underlay = 1.93mm

3,5467,15,6000,1,189[TERM]  
Initialized with ITI, Z Position Init = 54.67mm, Z Offset = 0.15mm,  
max Z depth = 60mm, Additional underlay applied,  
Thickness underlay = 1.89mm

- NOTE:**
- The *ToolInit* state of a new generated tool is always set to "undefined initialized" (up to FW version < 1.63.0 the value for new generated tool was "manually initialized").
  - Starting an initialization process sets the *ToolInit* state to "undefined".
  - A successfully initialization of the tool with the AKI sets the *ToolInit* always to "initialized with AKI".
  - A manual initialization (1-x-x-2-1) sets always "manually initialized", even though the tool was initialized with AKI before.
  - "Relative initialization" is only available for some tools (e.g. URT, SCT)
  - Z Position Init = 0 is equivalent to park position. The functional range depends on the selected module. (e.g. UM60: 0 – 8400)
  - max Z depth can be set with ZP.

- NOTE SCT**
- The value of the parameter "Init Z pos" is saved for the position mode (automatic and manual initialization) and pressure mode (relative initialization) individually.
  - The SCT refers only to the "absolute" initialization routines. Thus it will return "manual" or "AKI" for this parameter depending on the initialization routine used in the position mode, also when the tool is switched to pressure mode.
  - Using the tool exclusively in pressure mode without manual or automatic initialization will set "Tool Init" to "manual".
  - In pressure mode the return value of the "relative initialization" routine will be set for "Init Z pos", while in position mode the one from the "manual/automatic initialization" is used.
  - In no case the return value for the parameter "Tool Init" will be "relative".

- NOTE ADDITIONAL** The parameters *AdditionalUnderlay* and *UnderlayThickness* are unique but

**UNDERLAY** have affect on *ZPositionInit* of all mounted tools. If the additional underlay is applied, *ZPositionInit* is reduced by the value of *UnderlayThickness*.

**ATTENTION:** The max Z depth does **not protect the table** from damage, but simply defines the max Z depth of the module, if tool was initialized manually.

**SEE ALSO:** [ZP](#), [XX305](#), [XX306](#), [Frontend Commands](#)

## Index 306 – Extraction Height

V 1.46 - Initial Release	G3✓ Frontend - Online✓	S3✓ Frontend - Online✓	L3✓	D3 A✓ Frontend - Offline✓	D3 B✓
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Request the extraction height of a router module.

**SYNTAX:** **OP 306;**

**OUTPUT FORMAT:** *Height[TERM]*

**EXAMPLE:** **OP 306;**

**RESPONSE:** 1291[TERM]

**NOTE:**

- The unit of the response is ‘Plotter units’.
- This operation can only be used with the RM-A/RM-120/RM-S/RM-L Module.
- This operation can only be used after an AKI/ITI initialization.  
If the extractor hasn’t been initialized with the AKI or the ITI, the output value is -9999.
- The measured height is referenced to the AKI bottom.
- With the ITI the height is referenced to the surface of the underlay.

**SEE ALSO:** [XX306](#), [OP304](#), [Frontend Commands](#)

## Index 307 – Maximal Milling Depth of RM-A/RM-120/RM-S/RM-L

V 1.50.1 - Initial Release (Wrong answer in 1.59.0 and 1.59.1!)	G3✓ Frontend - Online✓	S3✓ Frontend - Online✓	L3✓	D3 A✓ Frontend - Offline✓	D3 B✓
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Requests the maximal milling depth of a RM-A/RM-120/RM-S/RM-L, depending of the difference between router bit and extraction position.

**SYNTAX:** **OP 307;**  
**OP 307,Slot;**

**OUTPUT FORMAT:** *MaximalCuttingDepth[TERM]*

Parameter	Format	Functional Range	Default
Slot	Integer	1 to 3	Actual selected slot
MaximalCuttingDepth	Plotter units	0..8000	No default

**NOTE:**

- The unit of the response is ‘Plotter units’.
- An output value of 0 could mean:
  - no RM-A/RM-120/RM-S/RM-L module
  - the extractor limits the router
  - the module wasn’t initialized with AKI or ITI
  - the extractor is on the same level like the routing bit.
- Without slot parameter the **OP 307** inspects the actual selected slot.

**ATTENTION:**

- In cutter firmware version 1.59.0 and 1.59.1 a wrong answer is returned.  
The answer is in any case 0.

**SEE ALSO:** [XX306](#), [OP304](#), [ZP](#)

## Index 308 – Additional Underlay

V 1.56 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request for the current status and the thickness of the additional underlay.

**SYNTAX:** **OP 308;**

**OUTPUT FORMAT:** *Status,Thickness[TERM]*

Parameter	Format	Functional Range	Default
<i>Status</i>	Integer	0..1	0
<i>Thickness</i>	Plotter units	0..1000	200

*Status:* 0: The additional underlay is disabled.  
1: The additional underlay is enabled.

*Thickness:* Thickness of the additional underlay.

**EXAMPLE:** **OP 308;**

**RESPONSE:** 1,252[TERM]

**NOTE:** When an **OP 308** command is sent to a cutter without an installed ITI, the response will be 0,0.

**SEE ALSO:** [XX308, Frontend Commands](#)

## Index 322 – Minimum Quantity Lubrication Mode

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request the mode of the installed minimum quantity lubrication aggregate.

**SYNTAX:** **OP 322;**

**OUTPUT FORMAT:** *Mode[TERM]*

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	[0..2]	2

*Mode:* 0: disable  
1: cooling  
2: lubrication

**EXAMPLE:** **OP 322;**

**RESPONSE:** 2[TERM]

**SEE ALSO:** [XX322](#)

## Index 323 – Minimum Quantity Lubrication Pump Stage

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓				Frontend - Offline✓	

Request the pump stage of the installed minimum quantity lubrication aggregate.

**SYNTAX:**            **OP 323;**

**OUTPUT FORMAT:**    *PumpStage[TERM]*

Parameter	Format	Functional Range	Default
PumpStage	Integer	[1..5]	3

*PumpStage:*            1: 30s pump frequency  
                            2: 25s pump frequency  
                            3: 20s pump frequency  
                            4: 10s pump frequency  
                            5: 5s pump frequency

**EXAMPLE:**            **OP 323;**

**RESPONSE:**            3[TERM]

**SEE ALSO:**            [XX323](#)

## Index 324 – Minimum Quantity Lubrication Capable

V 1.45	- Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.64.2	- Output not tool dependent	Frontend - Online✓			Frontend - Offline✓	

Request if the system is MQL capable.

**SYNTAX:**            **OP 324;**

**OUTPUT FORMAT:**    *Capable[TERM]*

Parameter	Description
Capable	0: no (module or cutter not capable) 1: yes (one of the mounted modules and the cutter are capable)

## Index 333 – Tool Reference Initialization

V 1.59 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.63 - Output of <i>RefZPosInit</i> changed from -1 to the init position when the tool isn't ITI initialized	Frontend - Online✓			Frontend - Offline✓	

This command outputs various informations which are necessary for the use of the ITI.

### SYNTAX:

**OP 333;**  
**OP 333,ModuleSlot;**

### OUTPUTFORMAT:

*ToolITIpossible,ItiConfiguration,RefZPosInit[TERM]*

Parameter	Format	Functional Range	Default
<i>ModuleSlot</i>	Integer	1,2,3	current selected slot
<i>ToolITIpossible</i>	Integer	0,1	0
<i>ItiConfiguration</i>	Integer	-23,-12,-3,-2,-1,0,1	0
<i>RefZPosInit</i>	Plotter units	-1 to max down position (module specific)	-1

Parameter	Description
<i>ModuleSlot</i>	Module slot 1-3
<i>ToolITIpossible</i>	0: It's not possible to initialize the tool with an ITI (example punch tool). 1: It's possible to initialize the tool with an ITI (example UCT).
<i>ItiConfiguration</i>	1: It's possible to initialize the tool in the module for the current slot. 0: It isn't an ITI installed ( <a href="#">OP140,54</a> = -1) and therefore it's not possible to use the <a href="#">XX333</a> or <a href="#">XX334</a> . -1: It isn't an ITI active ( <a href="#">OP141,21</a> = 0) and therefore it's not possible to use the <a href="#">XX333</a> or <a href="#">XX334</a> . -2: Double ITI installation ( <a href="#">OP140,54</a> = 3): The right ITI is active, the left ITI is inactive. Activate the left ITI or insert the tool on a module which is mounted on slot 2 or 3. -3: Double ITI installation ( <a href="#">OP140,54</a> = 3): The left ITI is active, the right ITI is inactive. Activate the right ITI or insert the tool on a module which is mounted on slot 1 or 2. -12: Single ITI installation ( <a href="#">OP140,54</a> = 1 or 2): The tool is inserted on a module which is mounted on module slot 3 and the ITI is installed on the left side of the cutter ( <a href="#">OP140,54</a> = 1). It's not possible to reach the ITI position with this slot. Insert the tool on a module which is mounted on slot 1 or 2. -23: Single ITI installation: The tool is inserted on a module which is mounted on module slot 1 and the ITI is installed on the right side of the cutter ( <a href="#">OP140,54</a> = 2). It's not possible to reach the ITI position with this slot. Insert the tool on a module which is mounted on slot 2 or 3.
<i>RefZPosInit</i>	-1: The tool has never been initialized 0 to max down position: Reference Z initialization position of the Z axis. Note: The tool initialization type could also be "manually", "AKI" or relative", see <a href="#">OP305</a> .

### EXAMPLE:

**OP333;**

**1,1,2435[TERM]**

The current selected tool has already been initialized.

Note: The tool initialization type could also be "manually", "AKI" or relative", see [OP305](#).

### EXAMPLE:

**OP333,2;**

**-1,1,3718[TERM]**

This tool on slot 2 can't be initialized with the ITI.

### EXAMPLE:

**OP333,3;**

**RESPONSE:** 1,-12,4586[TERM]  
It would be possible to initialize the tool but the module on slot 3 which is the tool inserted in can't reach the ITI position.

**EXAMPLE:** OP333;  
**RESPONSE:** 1,1,-1[TERM]  
The current tool is absolutely new and has never been initialized.

**NOTE:** An error will occur if the parameters *ToolITIpossible* or *ItiConfiguration* haven't the return value 1 and a **XX333** or a **XX334** will be executed.

**SEE ALSO:** [OP140,54](#), [OP141,21](#), [XX305](#), [XX333](#), [XX334](#), [Frontend Commands](#)

## Index 334 – Tool Initialization Comparison

V 1.59 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.63 - Output of <i>RefZPosInit</i> changed from -1 to <i>ZPosInit</i> when the tool isn't ITI initialized	Frontend - Online✓	Frontend - Offline✓			

This command outputs the current Z initialization position and the reference Z initialization position of the current selected tool.

**SYNTAX:** OP 334;

**OUTPUTFORMAT:** *ZPosInit,RefZPosInit*[TERM]

Parameter	Format	Functional Range	Default
<i>ZPosInit</i>	Plotter units	0 to reference Z initial position + 200	0
<i>RefZPosInit</i>	Plotter units	-1 to max down position	-1

**EXAMPLE:** OP334;  
**RESPONSE:** 5435,5435[TERM]  
This is the output after a reference Z initialization ([XX333](#)).  
Note: The tool initialization type could also be "manually", "AKI" or relative", see [OP305](#).

**EXAMPLE:** OP334;  
**RESPONSE:** 5446, 5435[TERM]  
The deviation of 0.11mm between the initialization positions is due to the wear of the tool.

**EXAMPLE:** OP334;  
**RESPONSE:** 5571, 5435[TERM]  
The current Z initialization position is 1.36mm lower than the reference Z initialization position. It's possible that the tip of the tool is broken.

**EXAMPLE:** OP334;  
**RESPONSE:** 0, 5435[TERM]  
The current Z initialization position is more than 2mm (200 plotter units) lower as the reference Z initialization position because 2mm is the maximum possible deviation. A warning is displayed on the operating unit that the initialization process has automatically ended without finding the tip of the tool.

**NOTE:**

- The cutter doesn't stop or throw an error if a larger deviation between the initialization positions is detected. If it should be stopped, this must be done by the frontend.
- The reference Z initialization position is also output in the status channel command TI. See the Status Channel Manual.

**SEE ALSO:** [OP305](#), [OP333](#), [XX333](#), [XX334](#)

## Index 350 – Actual ARC Magazine Content

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

This command outputs the actual ARC magazine content. If the reply of **OP140,22** is “2” (ARC Type HSK) only the first 9 bits are valid, the last bit has no meaning.

**SYNTAX:** **OP350;**  
**OP350, BitSlot;**

**OUTPUTFORMAT:** *MagazineDoorState,{BitPresence, MagazineContent}[TERM]*

Parameter	Format	Functional Range	Default
BitSlot	integer	11-19	No default

Parameter	Description
MagazineDoorState	-1 : magazine is not installed 0 : magazine door is closed 1 : magazine door is opened
BitPresence	-1 : unknown magazine content 0 : bit is absent; magazine slot is empty 1 : bit is present; magazine slot is armed 2 : mark the bit, which is clamped in the spindle
MagazineContent	-1 : unknown magazine content or not installed bit#11, bit#12, bit#13, bit#14, bit#15, bit#16, bit#17, bit#18, bit#19(pin bit)

- EXAMPLE:** **OP350,13;**  
**RESPONSE:** **-1,-1 [TERM]**  
*Magazine is not installed*; unknow magazine content
- EXAMPLE:** **OP350,13;**  
**RESPONSE:** **0,1[TERM]**  
*Magazine door is closed*; slot #3 is armed
- EXAMPLE:** **OP350,13;**  
**RESPONSE:** **1,0[TERM]**  
*Magazine door is opened*; slot #3 is empty
- EXAMPLE:** **OP350,13;**  
**RESPONSE:** **0,2[TERM]**  
*Magazine door is closed* ; bit which is in slot #3 is clamped in the spindle
- EXAMPLE:** **OP350;**  
**RESPONSE:** **0,-1[TERM]**  
*Magazine door is closed*; unknow magazine content
- EXAMPLE:** **OP350;**  
**RESPONSE:** **0,0,0,0,1,0,0,0,0,1[TERM]**  
*Magazine door is closed*; only bit four and the pin bit are armed
- EXAMPLE:** **OP350;**  
**RESPONSE:** **0,1,1,1,1,2,1,1,1[TERM]**  
*Magazine door is closed*; whole magazine is loaded; the 6<sup>th</sup> slot bit is clamped in the spindle
- EXAMPLE:** **OP350;**  
**RESPONSE:** **0,0,0,0,0,0,0,0,0[TERM]**  
*Magazine door is closed*; whole magazine is empty
- NOTE:** The bit installed in the router spindle will be listed in the output, i.e. “2”
- SEE ALSO:** [XX352](#); [XX353](#);

## **Index 355 – Configuration of router bit initialization**

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request router bit initialization configuration.

**SYNTAX:**      **OP355;**

**OUTPUTFORMAT:**    *InitConfiguration[TERM]*

Parameter	Description
<i>InitConfiguration</i>	0: The router bit will be initialized before and after usage. With other words after and before router bit changing. 1: The router bit will only be initialized before usage. With other words only after router bit changing.

**SEE ALSO:**      [XX355;](#)

## **Index 356 – Configuration: ARC magazine door cleaning before open it**

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Request the magazine door cleaning configuration before opening it.

**SYNTAX:**      **OP356;**

**OUTPUTFORMAT:**    *Configuration[TERM]*

Parameter	Description
<i>Configuration</i>	0 : The magazine door will be opened without cleaning it before. (default) 1 : The magazine door will be cleaned before it is opened.

**SEE ALSO:**      [XX356;](#)

## **Index 370 – Routing Frequency Converter Enabled**

V 1.55 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Request if the frequency converter for the Routing Module is enabled

**SYNTAX:**      **OP 370;**

**OUTPUT FORMAT:**    *Enabled[TERM]*

Parameter	Description
<i>Enabled</i>	0: no (frequency converter is not enabled) 1: yes (frequency converter is enabled)

## Index 430 – Operating Hours

V 1.56 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓				Frontend - Offline✓	

Request operating hours of cutter or vacuum turbine

**SYNTAX:**      **OP 430,Device;**

**OUTPUT FORMAT:**    *OperatingHours[TERM]*

Parameter	Format	Functional Range	Default
<i>Device</i>	integer	0 to 2	No default
<i>OperatingHours</i>	integer	-1..max Integer	No default

*Device:*            0: cutter  
                        1: vacuum turbine 1 (standard turbine)

                        2: vacuum turbine 2

*OperatingHours:*    -1: not installed  
                        else: value in hours

## Index 550 – Online Start Position

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X				Frontend - Offline✓	

Frontend command requests the online start position. This is the position where the cutter moves to when it is switched to online. This command can only be sent in offline mode!

**SYNTAX:**      **OP 550;**

**OUTPUT FORMAT:**    *XStartPos,YStartPos[TERM]*

Parameter	Description		
XStartPos, YStartPos	Plotter units	Device-dependent	No default

**EXAMPLE:**        [esc].[OP550;

**RESPONSE:**        20000,31000[TERM]

**NOTE:**              If the response is -999999,-999999[TERM] the command was sent as frontend command in online.

**SEE ALSO:**        [XX550](#)

## OR OUTPUT REFERENCE POINT

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.53 – added support for second reference point	Frontend - Online✓			Frontend - Offline✓	

Requests the current reference point set by **RS** or by keyboard input.

**SYNTAX:**      **OR;**  
                 **OR P;**

**OUTPUT FORMAT:** *X, Y[TERM]*

Parameter	Format	Functional Range	Default
X, Y	Plotter units	Device-dependent	cutter-dimensions
P	Point	0..2	0

*X, Y:*                  Reference point coordinates.

*P:*                  Reference point number 1 or 2 / or 0 if the currently active reference point is addressed.  
0: Get coordinates of active reference point.  
1: Get coordinates of first reference point.  
2: Get coordinates of second reference point.

**EXAMPLE:**      **OR;**  
                  Returns coordinates of active reference point.  
**OR 2;**  
                  Returns coordinates of second reference point.

**RESPONSE:**      +1000 ,+2530[TERM]

**SEE ALSO:**        [RS](#)

## OS OUTPUT STATUS

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.63 – Status for “Clipping window newly established” cleared only by command OP, OP0 and OP13	Frontend - Online X			Frontend - Offline X	

Requests output of plotting table status.

**SYNTAX:** OS;

**OUTPUT FORMAT:** Status[TERM]

Parameter	Format	Functional Range	Default
Status	Integer	0 to 255	No default

*Status:* Cutter Status (Original HP-GL).

Decimal Value	Meaning	Bit Number
1	Pen is down.	0
2	Clipping window newly established; cleared by “OP”, “OP0;” or “OP13;” command.	1
4	Not used (bit always set to 0).	2
8	Initialized; cleared by OS command.	3
16	Ready for data, buffer empty. (bit set if buffer not full)	4
32	Error; Not used (bit always set to 0).	5
64	Not used (bit always set to 0).	6
128	Not used (bit always set to 0).	7

**EXAMPLE:** OS;

**RESPONSE:** 17[TERM]

## OZ OUTPUT ZOOM

V 1.20 – Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✗  
Frontend – Online ✗ Frontend – Offline ✗

Requests the actual zoom factors. The relation between ‘User units’ and ‘Plotter units’ can be expressed using the formula:

distance in ‘Plotter units’ = distance in ‘User units’ \* zoom factor.

**SYNTAX:** OZ;

**OUTPUT FORMAT:** [space..space]X,[space..space]Y[TERM]

Parameter	Format	Functional Range	Default
X, Y	Real	X,Y <> 0	1.0, 1.0

X, Y: X and Y zoom factor.

**EXAMPLE:** SZ2.3,3.0002;  
OZ;

**RESPONSE:** 2.30000, 3.00020[TERM]

**SEE ALSO:** [SZ](#);

**NOTE:** The zoom factor can be negative. Zero is not allowed.

## PA PLOT ABSOLUTE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Switch cutter into absolute mode. If one or more parameter pair(s) are given, the tool moves to the specified absolute location(s). The tool status (up or down) is not changed.

**SYNTAX:** PA;  
PA X, Y(,...);

Parameter	Format	Functional Range	Default
X, Y	User units Absolute	Device-dependent	No default

X, Y: Specifies the absolute location to which the tool moves.

**EXAMPLE:** PA0,100,100,100,100,0,0,0;  
or equivalent:  
PA0,100;PA100,100;PA100,0;PA0,0;

**SEE ALSO:** [PR](#), [PU](#), [PD](#) and chapter ,Absolute and Relative Coordinates‘.

# PB POWERSWITCH BOX

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.40.1 - PB2 available as frontend command		Frontend – Online✓		Frontend – Offline✓	
V 1.43 - added parameter <i>vacuum level</i>					
V 1.50 - added PB8 (second vacuum generator)					
V 1.53.2 - added PB9 & PB10 for tandem system					
V 1.61.0 - added PB5, PB6, PB7					

The **PB** command switches several peripheral units. Especially the vacuum system.

**SYNTAX:**      **PB Number,State;**  
                 **PB Number,State,VacuumLevel;**

Parameter	Format	Functional Range	Default
<i>Number</i>	Integer	0 to 10	No default
<i>State</i>	Integer	0 to 2	No default
<i>VacuumLevel</i>	Integer	1 to 10	No default

- Number:** Peripheral unit number  
0: reserved  
1: compressor  
2: front / whole vacuum area  
3: reserved  
4: vacuum cleaner  
5: Power Box relais OB\_3\_1  
6: Power Box relais OB\_3\_2  
7: Power Box relais OB\_4\_1  
8: rear vacuum area  
9: vacuum area of the active zone, cf. note  
10: vacuum area of the inactive Tandemsystem zone, cf. note
- State:** 0 for 'off'  
1 for 'on'  
2 for 'air blast', cf. example, request firmware version 1.53 or higher
- VacuumLevel:** 1 lower, 10 upper vacuum level  
Parameter < 1, will set level 1.  
Parameter >10, will set level 10.
- NOTE I:** Set the vacuum level make only sense with number = 2, 8, 9, 10 (vacuum system).  
Set the vacuum level make only sense, if the vacuum turbine is installed.  
Otherwise the level parameter will be ignored.  
The level parameter will not be stored.
- NOTE II:** PB9,... switch, if Tandemsystem is not activated, depending on [OP141,16](#).  
PB9,... switch the active zone. If no zone is active, PB9 switch all zones.
- NOTE III:** PB10,... can only be used if Tandemsystem is activated.  
PB10,... do function only, if before a [XX133](#) was used, cf. example.  
Number 9 and 10 are available from version 1.53.2 and higher.
- NOTE IV:** If Tandemsystem is not activated and in case of "two separated generators" control, cf. [OP141,16](#), PB9 switch all zones. PB10 is undefined and will be ignored.
- NOTE V:** While a feed command **FF** is running, the vacuum can only be turned off by frontend command **PB2,0 PB8,0 PB9,0** and **PB10,0**.  
Switching on is not possible. Even if the feed command is interrupted.
- NOTE VI:** The start up behavior of the Power Box Relais OB\_3\_1, OB\_3\_2 and OB\_4\_1, switched by **PB5**, **PB6** or **PB7**, can be defined in the cutter setup menu.

**Eco tip:** To save energy, the frontend software can turn off the vacuum when not further worked on the cutter. For example, when a user request will remain unanswered for too long or if an (error) message on the frontend or the cutter a longer time is not acknowledged.  
The frontend has to decide whether it is permissible "to release" the vacuum fixed material there.

**EXAMPLE:** **PB2,0;**  
Switches the front / whole vacuum area off.

**PB2,2;**  
Switches the front / whole vacuum area off and set the valve to "blow".  
'air blast' make only sense, if a valve (for blow facility) is available.  
Note: The switched valve remains in blow position.

**PB2,1,5;**  
Set the turbine at level 5 and switches the front / whole vacuum area on.

**SEE ALSO:** [XX133](#), [PS](#), [OP31](#)

## PD TOOL DOWN

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

**PD** lowers the plotting tool. In addition, if one or more parameter pair(s) are given, the tool moves to the specified location(s). Depending on the current mode (absolute or relative, defined with **PA** or **PR**) parameters are interpreted as either absolute positions or differences between the current and the new position.

**SYNTAX:** **PD;**  
**PD** *X, Y(,...);*

Parameter	Format	Functional Range	Default
<i>X, Y</i>	User units Absolute or Relative	Device-dependent	tool will be lowered

*X, Y:* New tool position or vector.

**EXAMPLE:** **PR;**  
**PD** 100,100;  
The tool is lowered and a diagonal line is plotted.

**NOTE:** The plotting tool is not lifted automatically at the end of the line.

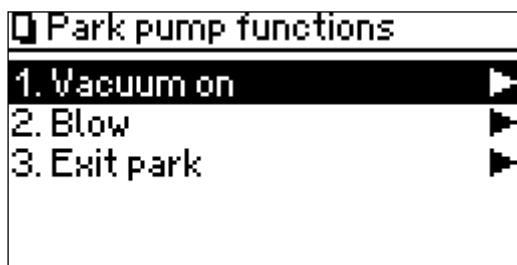
**SEE ALSO:** [PU](#), [PA](#), [PR](#) and chapter ‘Absolute and Relative Coordinates’.

## PK PARK

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A X D3 B X  
Frontend - Online X Frontend - Offline X

With **PK** the module moves to a park position, the park menu is displayed and the interpretation of further HPGL commands is disabled. The purpose of the command is to move the module to a ‘secure’ position.



**SYNTAX:** **PK;**  
**PK** *Mode;*

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0 to 2	No default

*Mode:* 0: move in Y+X to park position  
1: move only the X axis to park position  
2: move only the Y axis to park position

**EXAMPLE:** [PK;](#)  
**NOTE:** The actions initiated by **PK** depend on the selected options.

## PR PLOT RELATIVE

V 1.20 – Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend – Online ✗ Frontend – Offline ✗

Switch the cutter into relative mode. If one or more parameter pair(s) is given, the tool moves to the specified location(s). The tool status (up or down) is not changed.

**SYNTAX:**

**PR;**  
**PR X, Y(,...) ;**

Parameter	Format	Functional Range	Default
X, Y	User units Relative	Device-dependent	No default

X, Y: Difference between the current and the new position (vector).

**EXAMPLE:**

**PR0,100,100,0,0,-100,-100,0;**  
or equivalent:  
**PR0,100;PR100,0;PR0,-100;PR-100,0;**

**SEE ALSO:**

[PA](#), [PU](#), [PD](#) and chapter ‘Absolute and Relative Coordinates’.

## PS PORT SELECT

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B(x)

V 1.50 - added PS2 (second vacuum valve)

Frontend - Online ✓

Frontend - Offline ✓

V 1.53.2 - added PS9 & PS10 for tandem system

V 1.66.3 - added PS0 support for D3 B

The **PS** command switches the vacuum valve or a tool controlled by the output V\_Out7.

**SYNTAX:**

**PS Number,State;**

Parameter	Format	Functional Range	Default
Number	Integer	0,1,9 or 10	No default
State	Integer	0 or 1	No default

**Number:** 0: Output V\_Out7 on the optionboard (S7 Pin 10, also available on D3 B)  
1: valve of the front/whole vacuum area  
2: valve of the rear vacuum area  
9: Vacuum valve of the active zone, cf. note.  
10: Vacuum valve of the inactive Tandemsystem zone, cf. note

**State:** 0: ‘off’, blow (aircushion, airblast)  
1: ‘on’, suck (vacuum)

**EXAMPLE:**

**PS1,1;**  
Switches the front/whole area to ‘suck’ (vacuum).

**NOTE:**

There are connection to power ground on S7 Pin 7, Pin 18 or Pin 24

**PS9,...** switch, if Tandemsystem is not activated, depending on [OP141,16](#).  
**PS9,...** switch the active zone if Tandemsystem is activated.

**PS10,...** can only be used if Tandemsystem is activated.  
**PS10,...** do function only, if before a [XX133](#) was used, cf. example.

If Tandemsystem is not activated and in case of “two separated generators” control, cf. [OP141,16](#), **PS9** and **PS10** are undefined and will be ignored.

Number 9 and 10 are available from version 1.53.2 and higher.

**SEE ALSO:**

[PB](#), [OP31](#), [XX133](#)

# PT INDEPENDENT T-AXIS

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

The **PT** command is a PD command with a third parameter which defines the tangential axis direction. For safety reasons this command should not be used unless there is a need for a tangential direction different from the moving direction.

**This command must not be used in the relative mode!**

**SYNTAX:**

**PT;**  
**PT X,Y,T(,...);**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute	Device-dependent	tool will be lowered
T	Real	0 to 2000	last-position

X, Y: New position or vector.

T: Tangential direction. (2000 corresponds to 360°).

**EXAMPLE:**

**PT 1000,3400,500;**

Turns the tangential axis to 90° and moves with tool down to the given position.

**NOTE:**

The tangential axis always chooses the shorter way to the new direction.

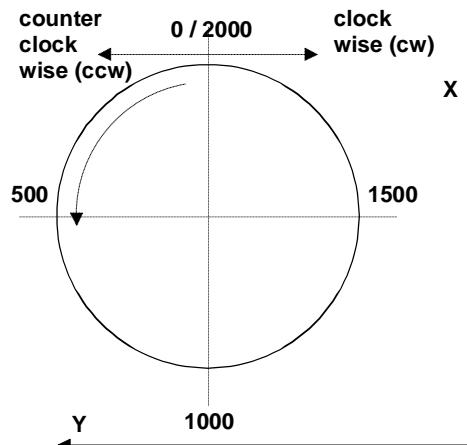


Fig.: Tangential direction within the cutter coordinate system

Negative tangential directions are not allowed.

**SEE ALSO:**

[PD](#), [PA](#)

## PU TOOL UP

V 1.20 - Initial Release  
V 1.66 – Divided Vectors for D3

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

**PU** lifts the plotting tool. In addition, if one or more parameter pair(s) are given, the tool moves to the specified location(s). Depending on the current mode (absolute or relative, defined with **PA** or **PR**) parameters are interpreted as either absolute positions or differences between the current and the new position.

**SYNTAX:**      **PU;**  
                 **PU X, Y(,...);**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute or Relative	Device-dependent	plotting tool will be lifted

X, Y:                  New position or vector.

**EXAMPLE:**      **PA;**  
                 **PU 100,100;**  
The plotting tool is lifted and moved to 100,100.

**NOTE:**                On D3 a PU movement will be divided into 2 vectors (XY-vector + Y-vector), when y-part is greater then x-part and x-direction leads away from other beam.

**SEE ALSO:**         [PD](#), [PA](#), [PR](#) and chapter ‘Absolute and Relative Coordinates’.

# PW TOOL WAITING TIMES

V 1.20 - Initial Release

G3✓

S3✓

L3✓

D3 A✓

D3 B✓

V 1.42.1 - added ADA & AUB parameter

Frontend - Online X

Frontend - Offline X

Initializes the waiting times for plotting tool movements.

## SYNTAX:

**PW;**

**PW PDB,PDA,PUB,PUA;**

**PW PDB,PDA,PUB,PUA,ADA,AUB;**

Parameter	Format	Functional Range	Default
PDB	Time	Integer > 0 [ms]	According to active user
PDA	Time	Integer > 0 [ms]	According to active user
PUB	Time	Integer > 0 [ms]	According to active user
PUA	Time	Integer > 0 [ms]	According to active user
ADA	Time	Integer > 0 [ms]	According to active user
AUB	Time	Integer > 0 [ms]	According to active user

PDB: Tool down before.

PDA: Tool down after.

PUB: Tool up before.

PUA: Tool up after.

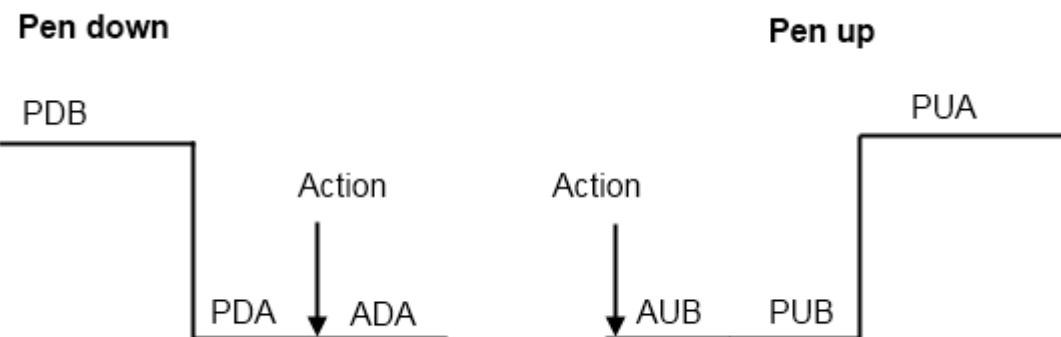
ADA: Tool action after down.

AUB: Tool action before up.

**EXAMPLE:** PW20,25,30,15;

## NOTE:

Depending on the plotting or cutting tool PW parameters have to be adjusted to appropriate values to obtain satisfying results. With certain tools some waiting times are ignored.



## QU SET QUALITY

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

QU chooses a quality level for the selected tool. High quality slows the cutter down, low quality speeds it up.

**SYNTAX:** QU *Quality*;

Parameter	Format	Functional Range	Default
Quality	Integer	1 to 9	No default

*Quality*:  
1: high quality  
2: norm quality  
3: low quality  
4 -9: reserved

**EXAMPLE:** QU3;  
This command sets the selected tool to low quality.

**NOTE:** Use quality 1 – 3 to vary between quality and speed in a curve. For quality 1 – 3 the **CR** (circle resolution) should not be set.

## RC REFERENCEPOINT CHANGE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B X  
Frontend - Online ✓ Frontend - Offline ✓

RC switches between the two available reference points.

**SYNTAX:** RC;  
RC *P*;

Parameter	Format	Functional Range	Default
<i>P</i>	Integer	1..2	No default

*P*: Reference point number 1 or 2.  
1 = Change to first reference point.  
2 = Change to second reference point.

**EXAMPLE:** RC2;  
Activates reference point 2.  
RC;  
RC without parameter toggles the active reference point

**SEE ALSO:** [OR](#), [RS](#)

## RP REPLOT

V 1.20 - Initial Release  
V 1.61 - Increased max range

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

RP is used to repeat the commands between a leading BP and the RP command.

**SYNTAX:**

**RP;**  
**RP N;**

Parameter	Format	Functional Range	Default
N	Clamped integer	-1 .. 2'000'000'000	1

*N:*

Specifies the number of **additional** copies to be made.

Special cases:

- RP without parameter assumes you want one copy.
- RP with n < 0 or n >= 2'000'000'000 repeats the job.
- RP -1 repeats the job for ever.

**EXAMPLE:**

**PR;**  
**PU0,0;**  
**BP;**  
**PD1000,0;**  
**RP10;**  
Draws an 11cm line.

**SEE ALSO:**

[BP](#), [XX12.3](#)

**NOTE I:**

The size of the job must be less than the size of the input buffer. RP will not work otherwise.

**NOTE II:**

Max range up to version 1.61 was 60000.

## RS REFERENCE SET

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.53.2 - support for P=3 and P=4	Frontend – Online(✓)	Frontend – Offline(✓)			

Sets one of the two plotting table origins to a new position.

**SYNTAX:**

**RS;**  
**RS X,Y;**  
**RS X,Y,P;**

Parameter	Format	Functional Range	Default
X,Y	Plotter units	Device-dependent	No default
P	Point	0..0.4	0

X,Y: Reference point co-ordinates.

P: Reference point number 1 - 4 / or 0 if the currently active reference point is addressed.  
0: Set the active reference point to a new position.  
1: Set and activate first reference point.  
2: Set and activate second reference point.  
3: Set first reference point if the second reference point is activated. Also as frontend command executable.  
4: Set second reference point if first reference point is activated. Also as frontend command executable.

**EXAMPLE:**

**RS1000,1000;**

Sets the currently active reference point to 1000,1000 (Plotter coordinates).  
(same as **RS1000,1000,0;**)

**RS;**

Sets all reference points to zero and activate reference point 1.

**RS1000,2000,2;**

Sets the second reference point position to 1000, 2000 and activates it.

**SEE ALSO:**

[OR](#), [RC](#)

**NOTE:**

RS without parameters clears all reference points.

## SD SET DELAY

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✗			Frontend - Offline✗	

SD delays the HP-GL-command processing for the specified time in 1/100 of a second.

**SYNTAX:**

**SD Delay;**

Parameter	Format	Functional Range	Default
Delay	Integer	: 0 – max. Integer [1/100 of a sec.]	No default

Delay: Parser delay time.

**EXAMPLE:**

**SD1000;**

HP-GL command processing is delayed for 100 seconds.

# SI SIZE

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Initializes the character size for labels.

**SYNTAX:**

**SI;**  
**SI Height,Width;**

The interpretation of the command depends on the selected parser, selectable via the user menu 5-1-1 or with the HP-GL command DS.

Parameter	Format	Functional Range	Defaults:	power up	after SI:
Height	Real	Device-dependent	HP-GL parser: Other parsers:	0.375 cm 0.144 cm	0.285 cm 0.109 cm
Width	Real	Device-dependent	HP-GL parser: Other parsers:	0.285 cm 0.091 cm	0.375 cm 0.120 cm

*Height:* HP-GL-parser: character height [cm].  
Others parsers, e.g. Zünd: character height [18 / 47 cm].

*Width:* HP-GL-parser: nominal character width [cm].  
Others parsers, e.g. Zünd: nominal character width [15 / 47 cm].

**EXAMPLE:** **DS2;**  
**SI1.0,0.5;**  
Character size is set to a height of 1 cm and a width of 0.5 cm (HP-GL parser selected).

**NOTE:** The original HP-GL definition of this command is 'SI width, height;'. Please note that the order of height and width is different.

**SEE ALSO:** [DI](#), [LB](#)

Characters are evenly spaced. The space each character takes has a size of 8 by 5 units whereas the character itself covers 6 by 4 units (Character height size and Max character width).

*Height* and *width* parameters of the SI command specify the size of 6 (Character height size) by 5 (Character width size) area.

Starting position (Character start point) is at the lower left corner of the 8 by 5 area, the position after drawing the character (Character end point) is 4 units right of this point. See Figure "Character size and spacing"

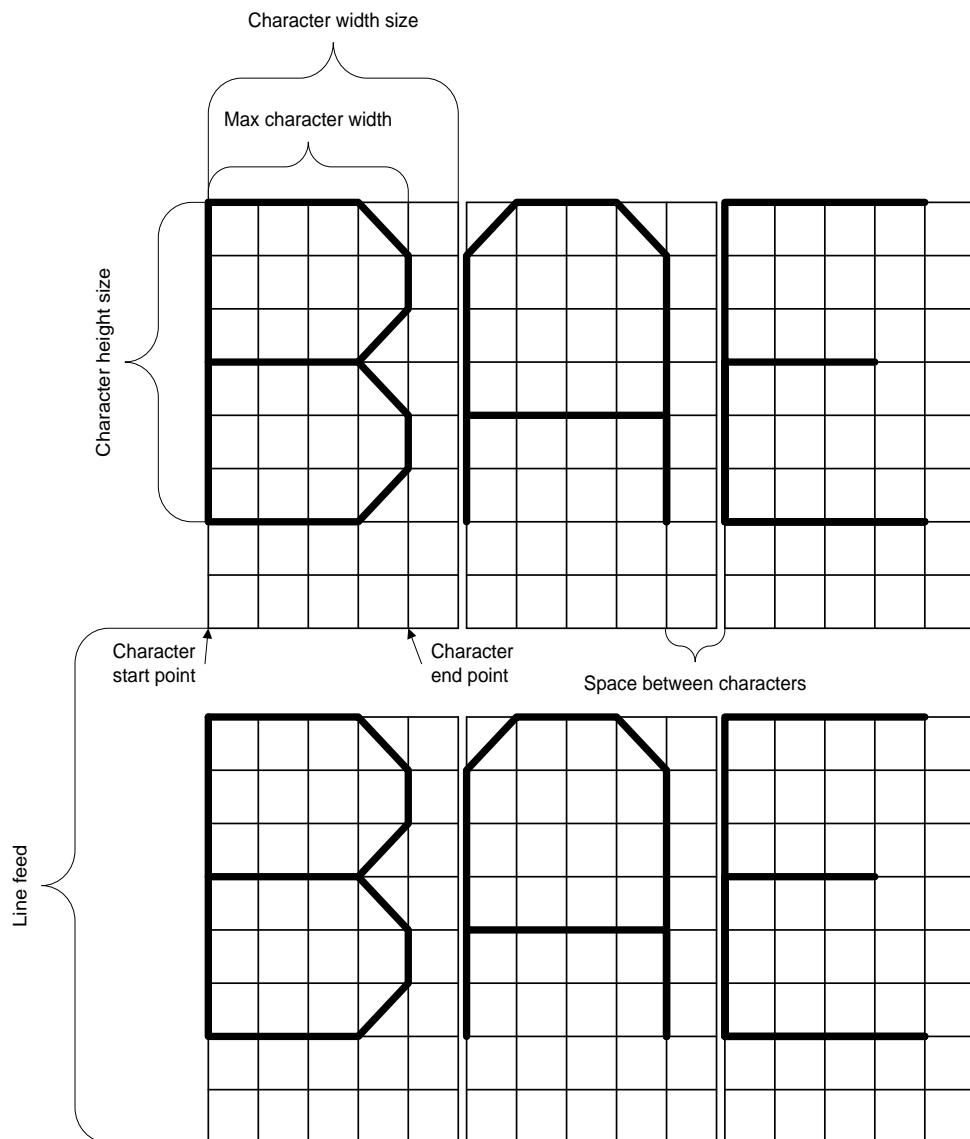


Fig: Character size and spacing

#### Space between characters:

The space between characters is 1.2 height units. This means that the space between the characters depends on the height size of the character. It is also calculated with the character form factor of the dependent parser.

Form factor for HP-GL parser is  $18 / 15 = 1.2$

Form factor for Other parsers is  $47 / 47 = 1.0$

#### Calculation example for space between characters:

HP-GL parser and "SI 2.0, 1.0;"  $\rightarrow 2.0 \text{ cm} / 6 \text{ units} \times 1.2 \text{ units} \times 1.2 \text{ (form factor)} = 0.48 \text{ cm}$

Other parsers and "SI 8.0, 2.0;"  $\rightarrow 8.0 \times [18 / 47 \text{ cm}] / 6 \text{ units} \times 1.2 \text{ units} \times 1.0 \text{ (form f.)} = 0.613 \text{ cm}$

#### Line feed:

The space between the two start points of two lines is 9.6 height units.

#### Calculation example for line feed:

HP-GL parser and "SI 2.0, 1.0;"  $\rightarrow 2.0 \text{ cm} / 6 \text{ units} \times 9.6 \text{ units} = 3.20 \text{ cm}$

Other parsers and "SI 8.0, 2.0;"  $\rightarrow 8.0 \times [18 / 47 \text{ cm}] / 6 \text{ units} \times 9.6 \text{ units} = 4.90 \text{ cm}$

## SO STATUS CHANNEL OUTPUT

V 1.60 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

This command sends the given text to the Zünd status channel and outputs the text by the status channel command SO.

The string must terminate with the sign which was defined by the HPGL command DT.

**SYNTAX:**      **SO** *text*;

Parameter	Format	Functional Range	Default
<i>text</i>	String	ASCII character set	No default

**EXAMPLE :**      **SO***Hello World*;

**RESPONSE :**      Output on the Zünd status channel:  
SO Hello World;

**EXAMPLE :**      **SO***Example when the command is sent with a string that contains more than 64 ASCII signs.*;

**RESPONSE :**      Output on the Zünd status channel:  
SO Example when the command is sent with a string that contains mor;  
SO e than 64 ASCII signs.;

**SEE ALSO:**      [DT](#)

## SP SELECT TOOL

V 1.20 - Initial Release  
V 1.45 - added twin-cut support

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Select the actual tool.

### SYNTAX:

**SP;**  
**SP Toolnumber;**  
**SP Toolnumber,SlavetoolNumber;**

Parameter	Format	Functional Range	Default
<i>Toolnumber</i>	Integer	11,12,13 and 21,22,23 and 31,32,33 and 81, 91 and 1, 2, 3 and 8, 9	tool 1
<i>SlavetoolNumber</i>	Integer	11, 21, 31	No default

*Toolnumber:* Selected tool number.

#### New style (two-digit number):

The first number describes the slot number. The second digit describes the tool on the module.

#### Old style (one-digit number):

A one-digit number just describes the slot. Always the first tool in the module is selected.

*SlavetoolNumber:* Selected slave tool number. (See notes for Twin-Cut below)

### EXAMPLE:

**SP32;**  
On slot 3 tool 2 is selected as actual tool.  
**SP2;**  
On slot 2 tool 1 is selected as actual tool.

**NOTE I:** Tool 8/81 is used for the camera  
Tool 9/91 is used for the laser pointer

**NOTE II:** SP to an already actual tool will be ignored

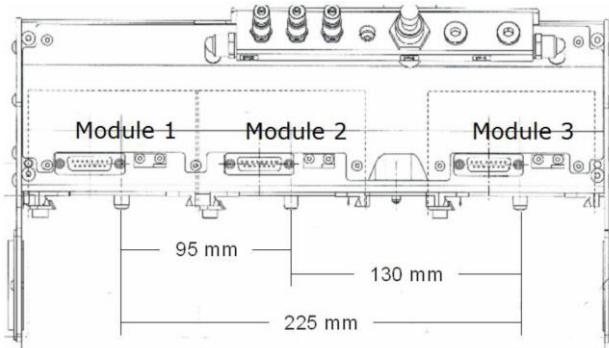
**NOTE III:** Is a tool selected with SP command ("online tool"), it will be reselected after offline / online. Even when another tool is selected manually in offline mode. After cutter start or after Clear Buffer no "online tool" is defined until an SP command is sent. If there is no "online tool" defined, it is possible to go offline, select manually another tool and go online to continue with the new selected tool.

**TWIN-CUT:**

Twin-Cut can be used to work with two synchronous tools. Every movement of the master tool is reflected to the slave tool.

All Z-axis settings (init, up, down positions) for the master tool are automatically applied and used for the slave tool as well.

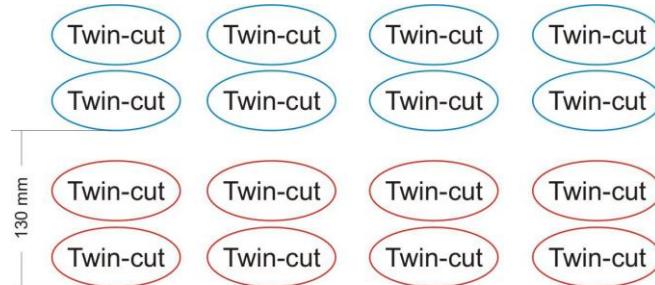
The master and slave tools can be in any of the 3 available module slots.

**EXAMPLES:**

**SP 11,31;**

Module 1 and module 3 are selected for Twin-cut. Module 1 is the master and every movement is reflected to module 3.

By organizing and grouping the objects to be cut to fit in a raster of one of the 3 fix distances, a wide range of twin-cut applications can be achieved.



For the above examples, red colour can for example be cut with the master and blue colour with the slave.

**LIMITATIONS:**

Twin-Cut can only be used with Universal-Modules. The following table shows which types of Universal-Modules can be mixed:

	UM-60	UM-ZS	UM-ZP	UM-S	UM-120
UM-60	X	X UM-60 as master	X UM-ZP as master		
UM-ZS	X UM-60 as master	X	X UM-ZP as master		
UM-ZP	X UM-ZP as master	X UM-ZP as master	X		
UM-S				X	
UM-120					X

Modules of the same type can be used without limitations.

If you mix UM-60, UM-ZS and UM-ZP the module with the slower maximal Z-Axis speed has to be the master!

**NOTE I:**

If you use Twin-Cut in pressure mode, it's only possible with identical module types.

**NOTE II:**

If Twin-Cut is selected with SP command ("online tools"), both will be reselected after offline / online. Even when another tool is selected manually in offline mode.

**NOTE III:**

If you use different module types, make sure that the master module is in position mode (**XX65,0**) before selecting Twin-Cut.

## SV SET VACUUM

V 1.00 - Initial Release  
V 1.45 - SV available as frontend command  
V 1.51 - added support for second parameter

G3✓ S3✓ L3✗ D3 A✓ D3 B✗  
Frontend - Online✓ Frontend - Offline✓

**SV** sets a new vacuum width / area.

In case of the hardware to adjust the vacuum area on both sides is installed ([OP140,14](#)), use the **SV** command with 2 parameters.

This command is ignored by cutters of the L3 series. Use instead [\*\*XX131\*\*](#) to set a vacuum area.

**SYNTAX:**      **SV** *Width*;

Parameter	Format	Functional Range	Default
<i>Width</i>	Plotter units	Device-dependent	No default

*Width*:            Vacuum width.

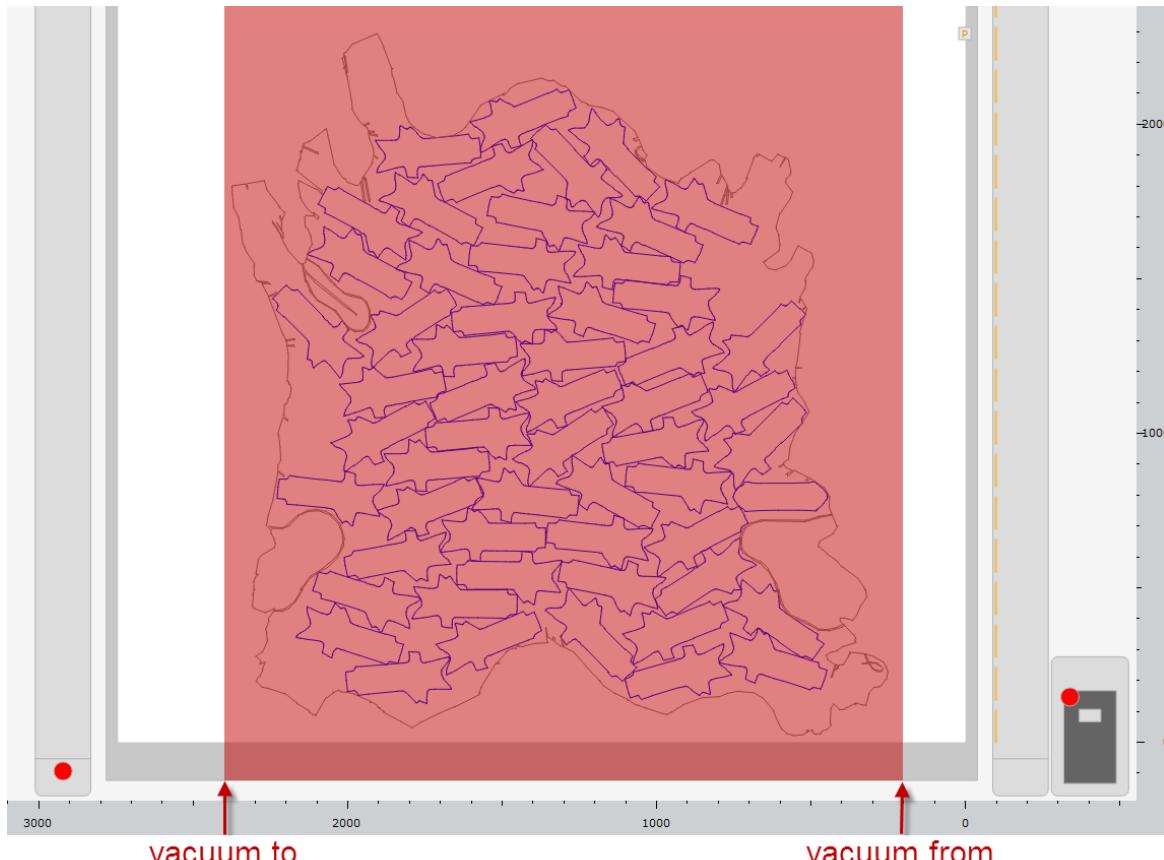
**EXAMPLE:**        **SV**50000;  
                         Sets the vacuum width to 50 cm.

**NOTE:**

- The precision of the parameter is much higher than the precision of the vacuum-width controller
- The minimum width depends on the cutter model. A width less than the minimum selects the minimum width.
- If the command is sent to a cutter which has hardware installed to adjust the vacuum area on both sides, the vacuum area will be set from 0 to the given parameter.

**SYNTAX:****SV VacuumTo, VacuumFrom;**

Parameter	Format	Functional Range	Default
VacuumTo	Plotter units	-4000 to Device-dependent	No default
VacuumFrom	Plotter units	-4000 to Device-dependent	No default

**VacuumFrom:** Right position of the vacuum area.**VacuumTo:** Left position of the vacuum area.**EXAMPLE:****SV230000,60000;**

Sets a vacuum area from 58820 to 231000. The cutter converts the given parameter to the individual zone boundaries.

**EXAMPLE:****SV231000,231000;**

Sets a vacuum area from 222860 to 2391400. The given parameter are exactly on a zone boundary and therefore will be both bordering zones opened.

**NOTE:**

- In case of the *vacuum area to*-parameter is smaller than the *vacuum area from*-parameter, this cause an error and the vacuum area is set from the minimum to the maximum.

**SEE ALSO:**[OP32,1](#) [XX29](#), [OP29](#), [OP140,14](#)

## SZ SET ZOOM

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✗ D3 B✗  
Frontend - Online ✗ Frontend - Offline ✗

Initializes enlargement factors for X and Y axis. The relation between ‘Plotter units’ and ‘User units’ can be expressed by the formula:

distance in ‘Plotter units’ = distance in ‘User units’ \* zoom factor.

**SYNTAX:**

**SZ;**  
**SZ X, Y;**  
**SZ Factor;**

Parameter	Format	Functional Range	Default
X, Y	Real	X and Y <> 0	1.0, 1.0
Factor	Real	factor <> 0	1.0

*X, Y:* Zoom factors, different for x- and y-axis.

*Factor:* Zoom factor for both, x- and y-axis.

**EXAMPLE:**

**SZ2.0,3.0;**  
Sets enlargement factors to 2 for the x-axis and to 3 for y-axis.

**SZ2.5;**  
Sets factor 2.5 for x- and y-axis.

**NOTE:** Zoom factor 0 is not allowed. **SZ0** sets the zoom factors to 1.

## TR TANGENTIAL ROTATING

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Switches tangential control (rotation) on or off.

**SYNTAX:** TR Status;

Parameter	Format	Functional Range	Default
status	Integer	0 or 1	No default

*Status:* 1: tangential control is turned on.  
0: tangential control is turned off.

**EXAMPLE:**

**TR 0;**  
The rotation of the tangential tool is turned off.

**NOTE:**

If a cutting device is inserted it is absolutely necessary to switch tangential rotation to ‘on’ before operating the respective tool. The Cutter automatically switches tangential rotation ‘off’ and ‘on’, depending on the selected tool. However the manual ‘off’ in the menu and the TR 0 command has priority. Once switched ‘off’ manually it must be switched ‘on’ for a cutting device.

# UL USER LINETYPE

V 1.40 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online X Frontend - Offline X

Defines a user line type by specifying gap patterns.

## SYNTAX:

**UL;**  
**UL Index,(Gap1..Gap[n]);**

Parameter	Format	Functional Range	Default
Index	Integer	1 to 8	Standard Linetypes
Gap[n]	Real	0 to Max Real	No default

*Index:* Identifies the line type to be redefined. Specifying an index without gap parameters sets the line type to its default pattern (see the LT command for default patterns). An index different from 1 to 8 causes no action.

*Gap1..Gapn:* Specify alternate pen-down and pen-up stretches in the line pattern. The first gap is a pen-down move. (All odd numbered gaps are pen-down moves). Up to 8 gaps are allowed for each user defined line type. Gap values must be zero or positive. Zero gaps cause the pen-up/down position to alternate and the cutter produces a dot if a nonzero pen-up gap precedes and/or follows the zero value. The sum of the gap parameters must be greater than zero and corresponds to 100%. Gap values are converted to percentages of the pattern length parameter of the LT instruction.

## EXAMPLE:

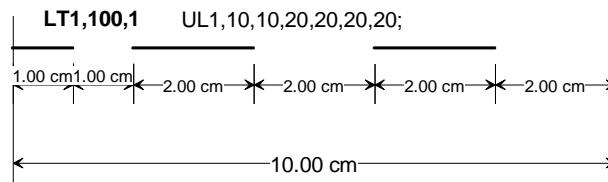
The following three lines specify the same line type pattern.

**UL3,20,10,40,10,20;**  
**UL3,0.20,0.10,0.40,0.10,0.20;**  
**UL3,200,100,400,100,200;**

**LT3,100,1;**

The above LT command selects the previously defined line type 3 and sets the pattern length to 10 cm.

**LT3,100,1**      UL3,20,10,40,10,20; = UL3,0.20,0.10,0.40,0.10,0.20; oder UL3,200,100,400,100,200;



## SEE ALSO:

[LT](#)

## NOTE:

**UL** without any parameter sets all line types to their default patterns.

## UR USER STRING

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✓ Frontend - Offline✓

**UR** Initializes the string shown in the lowest line of the online display.

**SYNTAX:** **UR** *Text Terminator;*

Parameter	Format	Functional Range	Default
<i>Text</i>	String	ASCII 32 to 126 maximal 56 chars	No default
<i>Terminator</i>	Character	defined by DT	ASCII 03

*Text:* ASCII-characters

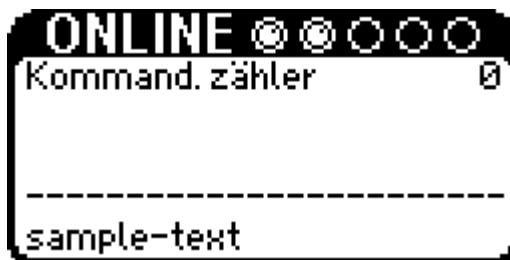
*Terminator:* Terminator, defined by **DT**.

**EXAMPLE:** **DT33;**

**UR***sample-text!*

( ! is the Terminator and therefore not displayed, defined by DT33).

After these instructions the online display looks the following:



**SEE ALSO:** [DT](#)

**NOTE:** **UR** is designated to display a brief description of the selected user parameters in the Online display.

## VF VELOCITY FAST

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✗ Frontend - Offline✗

Initialize the speed for lifted tool.

**SYNTAX:** **VF** *Speed;*

Parameter	Format	Functional Range	Default
<i>Speed</i>	Velocity	0.1 to 100 [cm/s]	No default

*Speed:* Speed tool up.

**EXAMPLE:** **VF10;**  
Speed set to 10 cm/s.

**SEE ALSO:** [VS](#), [VU](#), [VW](#), [MF](#)

# VP VACUUM PATTERN

V 1.64 - Initial Release	G3✓	S3✗	L3✗	D3 A✓	D3 B✗
V 1.64.1 - Support of tandem vacuum table plate	Frontend - Online✓			Frontend - Offline✓	

Command sets a new vacuum zone pattern. It just works if the vacuum zone type is both sided ([OP140,14](#) = 1). Otherwise it will be ignored.

Ensure that you distinguish between the standard vacuum table plate ([OP140,52](#) =-1) and the tandem vacuum plate ([OP140,52](#) = 1). The width of the zones and their positions are not identical. The zones of a tandem vacuum plate are divided in the middle of the X direction.

The dimensions of the zones and their positions in the cutters coordinate system are described at the end of this command.

Note that a vacuum zone is opened (vacuum) by logic one und closed (no vacuum) by logic zero. This is contrary to the command [XX131](#).

**SYNTAX:**      **VP***vacuumZonePattern*;

Parameter	Format	Functional Range	Default
<i>vacuumZonePattern</i>	String with hexadecimal digits 0-9, a-f, A-F	Device dependent	No default

*vacuumZonePattern*: Hexadecimal string which will be converted into a binary vacuum zone pattern.

**EXAMPLE:**      **VPff;**

The vacuum zones from 8 to 1 are switched to open. The remaining zones of the cutter will be closed.

**VPF03F;**

The vacuum zones from 16 to 13 and 6 to 1 are switched to open.

**VP0;**

All vacuum zones should be closed. To avoid a vacuum turbine or pump from overheating, the vacuum zone 1 will be opened.

**VP3fffffffff;**

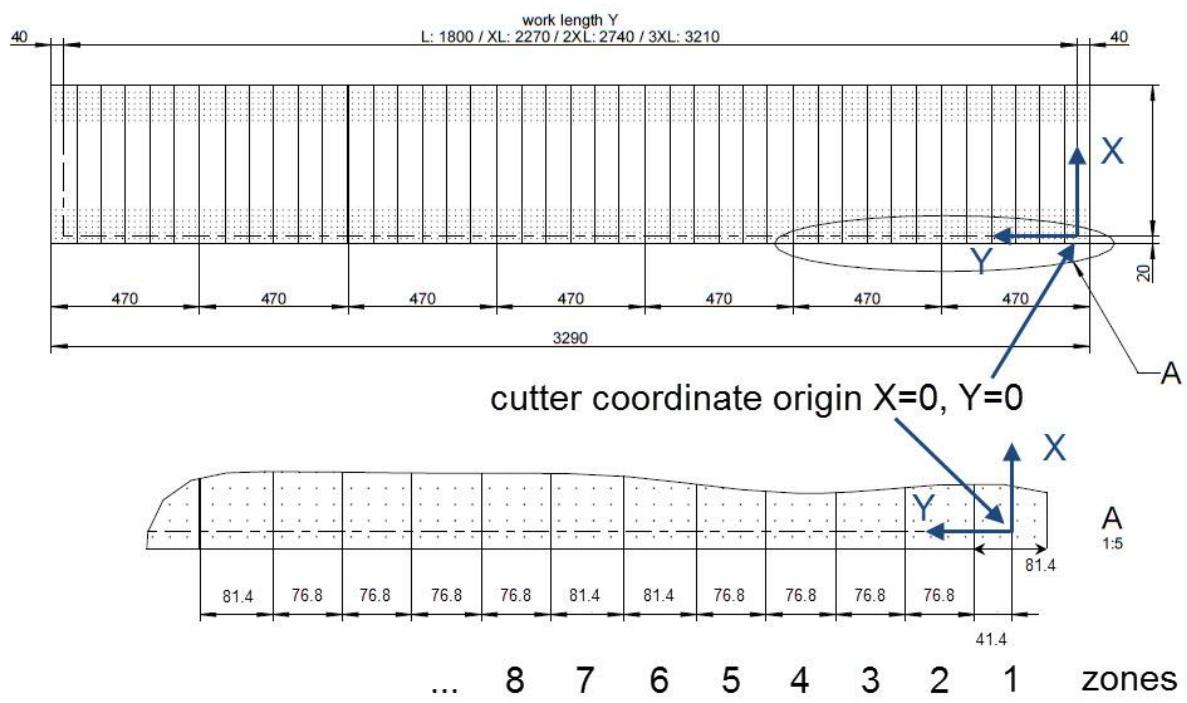
Opens all 42 vacuum zones of a 3XL cutter (cutter with largest width)

**NOTE:**

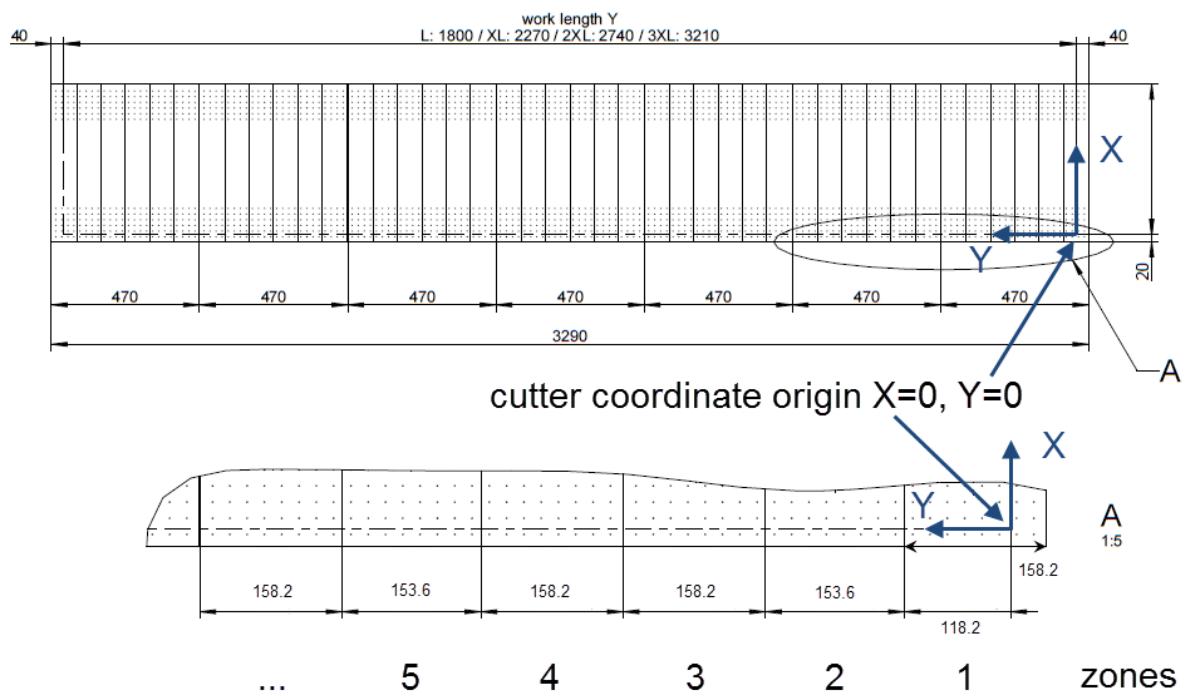
- The command must be terminated with a semicolon ;. Otherwise all characters after VP will be interpreted as parameter *vacuumZonePattern* until the next semicolon is parsed.
- Don't send a string with more than 63 signs. This leads to an undefined vacuum pattern and a warning on the operating unit.
- The command will be ignored if *vacuumZonePattern* contains no sign or other signs than hex digits (space, 'x', ...).
- The command will be ignored if a tandem mode ([OP141,18](#) != 0) is active.

**SEE ALSO:**      [SV](#), [XX29](#), [XX131](#)

Cutter dimension	Number of zones
M	18
L	24
XL	30
2XL	36
3XL	42



**Figure 1: Standard zone dimensions [mm]**



**Figure 2: Tandem zone dimensions [mm]**

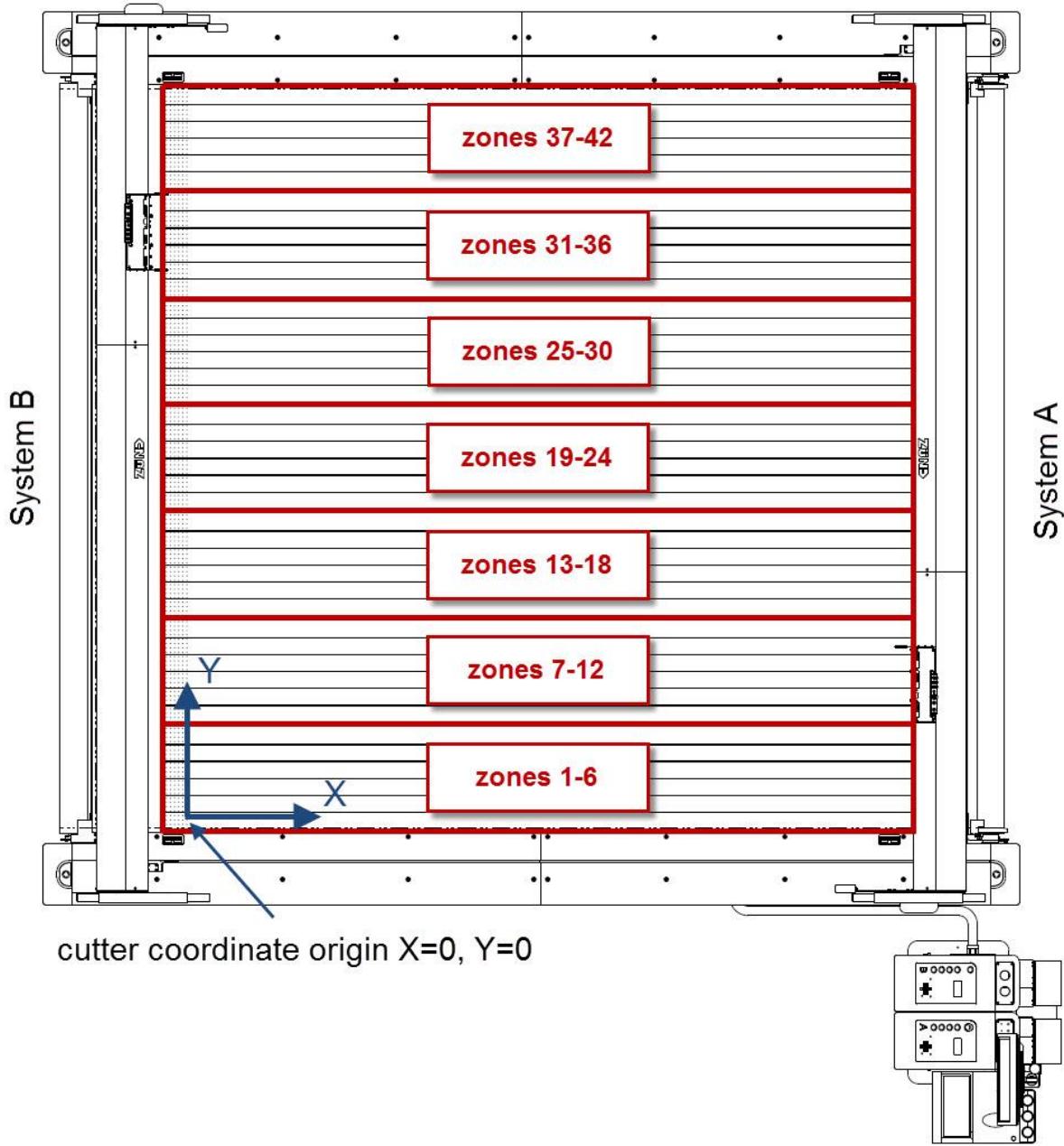


Figure 3: Zone numeration of a D3 3XL-3200 (G3 analog)

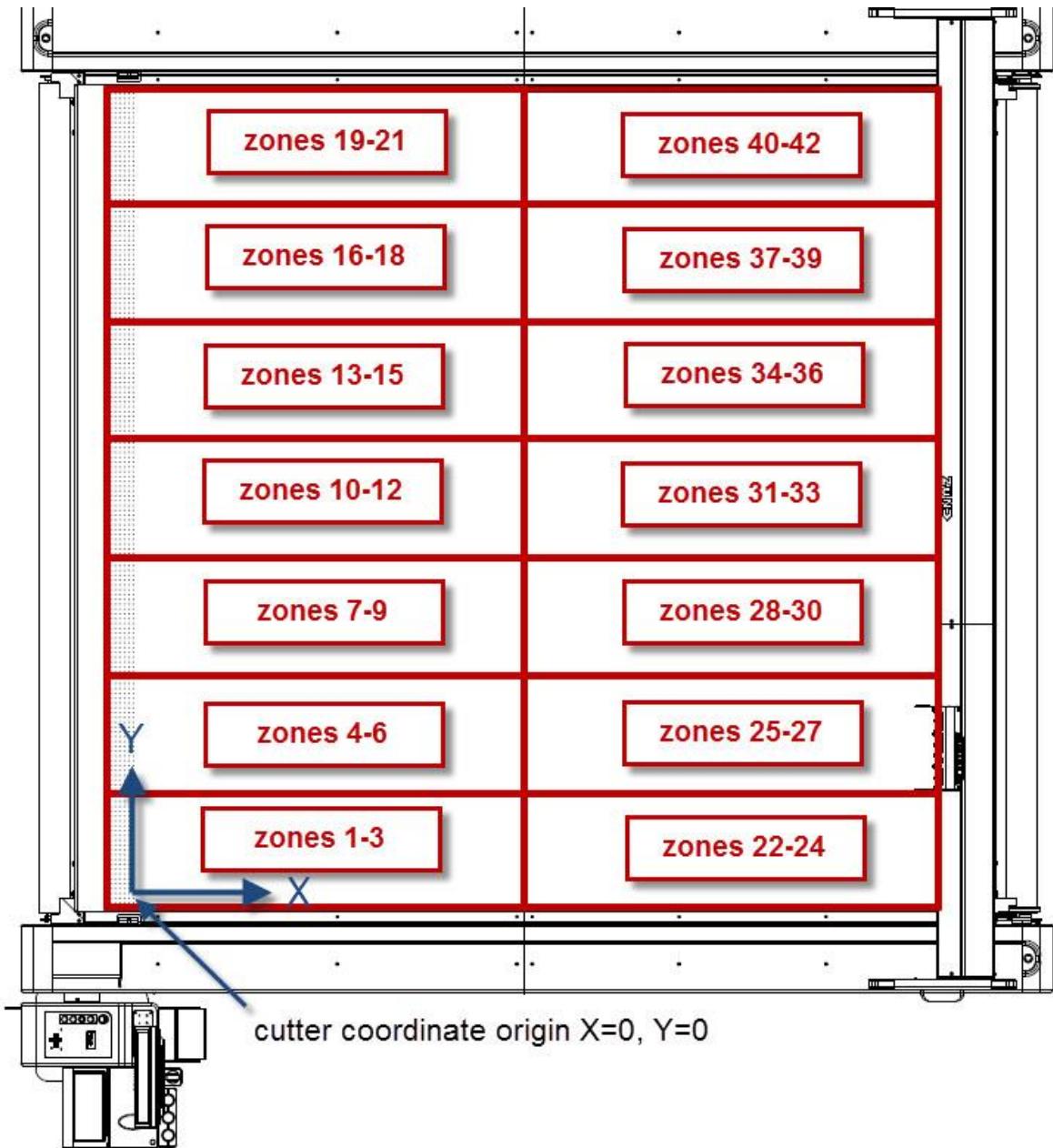


Figure 4: Tandem zone numeration of a G3 3XL-3200

## VS VELOCITY SELECT

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Initialize the speed for lowered and lifted tools.

**SYNTAX:**

**VS;**  
**VS VDown;**  
**VS VDown, VUp;**

Parameter	Format	Functional Range	Default
<i>VDown</i>	<b>Velocity</b>	0.1 to 100 [cm/s]	according to active user
<i>VUp</i>	<b>Velocity</b>	0.1 to 100 [cm/s]	no change

*VDown:* Speed tool down.

*VUp:* Speed tool up.

**EXAMPLE:**

**VS20,40;**  
Speed with tool down is set to 20 cm/s.  
Speed with tool up is set to 40 cm/s.

**NOTE:**

Only **VS** without parameters selects the default values.

**SEE ALSO:**

[VU](#), [VF](#), [VW](#)

## VU VELOCITY UP

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Initialize the speed for lifted tools.

**SYNTAX:**

**VU VUp;**

Parameter	Format	Functional Range	Default
<i>VUp</i>	<b>Velocity</b>	0.1 to 100 [cm/s]	No default

*VUp:* Speed tool up.

**EXAMPLE:** **VU20;**  
Speed with tool up is set to 20 cm/s.

**SEE ALSO:**

[VS](#), [VF](#)

## VW VELOCITY WORK

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Initialize the speed for lowered tool.

**SYNTAX:** **VW VDown;**

Parameter	Format	Functional Range	Default
VDown	Velocity	0.1 to 100 [cm/s]	No default

*VDown:* Speed tool down.

**EXAMPLE:** **VW20;**  
The working speed for the tool is set to 20 cm/s.

**SEE ALSO:** [VS](#), [VU](#), [VF](#), [MW](#)

## XX UNIVERSAL SYNTAX

This command is thought for special applications.

**SYNTAX:** **XX Index,Param\_1[,Param\_2,...Param\_n];**

Parameter	Format	Functional Range	Default
Index	Integer	Integer	No default
Param_n	Real / Integer	Command dependent	No default

*Index:* Command index.

*Param\_n:* Command dependent parameter(s).

### Index 1 – Tangential Offset

V 1.46 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

The XX-command with index=1 switches a 180° offset on the tangential axis on and off. This is mainly used with double edged knifes.

**SYNTAX:** **XX 1,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:* Tangential axis offset status.  
0: no offset on the tangential axis.  
1: a 180° offset on the tangential axis is added.

**EXAMPLE:** **XX 1,1;**  
Add Offset to tangential axis.

**NOTE:** The offset is added when the cutter is online or in a test-function only.  
Its recommended to send the XX 1 command when the cutter is in up or park position, otherwise the tool will rotate while lifting.

## Index 3 – Laser Power Scale

V 1.49 - Initial Release	G3✓	S3✓	L3✗	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

The XX-command with index = 3 is used to select different scale factors for the laser power in X- and Y-direction.

**SYNTAX:**      **XX 3,Param1,Param2;**

Parameter	Format	Functional Range	Default
Param1	Real	param1 <= 1.0	No default
Param2	Real	param2 <= 1.0	No default

Param1:            Laser power scale factor X-axis.

Param2:            Laser power scale factor Y-axis.

**EXAMPLE:**      **XX0.95,1.0;**

## Index 12 – 4<sup>th</sup> Line Display Message

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✗			Frontend - Offline✗	

Command to modify the reaction on an MS command or to enable a replot progress display.

**SYNTAX:**      **XX 12,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 .. 3	No default

Param:            0:    Switches all **XX12** options off. The online display returns to the standard (clearing the input buffer (2-4-1) also switches these options off).

1, 2: An **XX12,1** or **XX12,2** command modifies the reaction on a succeeding **MS** command. In this case the message is written into the fourth line of the online display without any interaction of the user. **XX12,1** should be used if the cutter should beep, when the message is written into the display, **XX12,2** otherwise.

This feature can e.g. be used to display information about the currently cut piece.

Modified and standard MS commands can be mixed. An **XX12,1** or **XX12,2** command modifies only one succeeding **MS**.

3:    If the replot command **RP** is used, **XX12,3** enables the output of the replot progress information. If enabled, the fourth line of the online display shows the number of the current repetition and the total number of repetitions. If **RP-1** (repeat forever) is used, only the number of the current repetition is displayed.

**EXAMPLE:**      **DT59;XX12,2;MSNumber 4 of 70;** (;is the terminator, defined with **DT59**)  
The fourth line of the online display now shows **Number 4 of 70**

**SEE ALSO:**      [\*\*MS, RP\*\*](#)

## Index 13 – Laser Interface 3

V 1.49 - Initial Release	G3✓	S3✓	L3✗	D3 A✗	D3 B✗
V 1.53 - added support for XX13,16				Frontend – Online(✓)	Frontend – Offline(✓)
V 1.60 - added new errorlevel for XX13,13					

**XX13** commands are used to configure some Laser Interface 3 features. Some features of the PN-Series are not implemented!

**2:** Controls the power at 50 % Point: (calibrating of laser output)

**SYNTAX:**      **XX 13,2,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 to 100	50

*Param:*            0 to 100 [%]

**EXAMPLE:**        **XX 13,2,65;**

The laser characteristic has not enough power in the first half. So the laser gets a stronger signal, to raise its output.

**5:** Sets the mode of the warning lamp

**SYNTAX:**        **XX 13,5,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            static / flashing

**EXAMPLE:**        **XX 13,5,1;**

warning lamp will flash

**6:** Sets the mode of the error lamp

**SYNTAX:**        **XX 13,6,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            static / flashing

**EXAMPLE:**        **XX 13,6,1;**

error lamp will flash

**7:** Sets the mode of the ready lamp

**SYNTAX:**        **XX 13,7,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            static / flashing

**EXAMPLE:**        **XX 13,7,1;**

ready lamp will flash

**8:** Controls the timing of the lamps

**SYNTAX:**      **XX 13,8,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	400 to 5000	400

*Param:*            cycle time [ms]

**EXAMPLE:**        **XX 13,8,500;**

The cycle time for all the flashing lamps is 500 ms.

**10:**     Switches the status of the warning lamp on or off:

**SYNTAX:**        **XX 13,10,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            OFF / ON

**EXAMPLE:**        **XX 13,10,1;**

Warning lamp ON

**11:**     Switches the status of the error lamp on or off:

**SYNTAX:**        **XX 13,11,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            OFF / ON

**EXAMPLE:**        **XX 13,11,1;**

Error lamp ON

**12:**     Switches the status of the ready lamp on or off:

**SYNTAX:**        **XX 13,12,Param;**

Parameter	Format	Functional Range	Default
Param	Integer	0 or 1	0

*Param:*            OFF / ON

**EXAMPLE:**        **XX 13,12,1;**

Ready lamp ON

**13:** Sets the errorlevel for one of the configurable inputs:

**SYNTAX:** **XX 13,13,Input,Errorlevel;**

Parameter	Format	Functional Range	Default
<i>Input</i>	Integer	1 to 6	-
<i>Errorlevel</i>	Integer	0 to 3 or 0 to 4	-

*Input:* Selects one of the configurable inputs on the laser interface 3.

*Errorlevel:* Selects one of the available error levels

- 0: *NOTIFICATION*
- 1: *WARNING*
- 2: *FAILURE*
- 3: *ALARM*
- 4: *STATUS\_CHANNEL* (*only available on inputs 4 – 6*)

**NOTE:** After **XX 13,13,..** the next string with **UR** will become the message, which is displayed on the panel when the specified input triggers. (max. 49 characters)

If the error level for inputs 4 – 6 is set to *STATUS\_CHANNEL*, every signal transition on this input will be reflected by an “IN-Command” on the status channel and no errormessage will be displayed on the panel.

**EXAMPLE:** **XX 13,13,1,2;**

**UR** *This is the configured message for input 1!*

The configurable input 1 causes now an error of category *FAILURE* and “LASER: This is the configured message for input1!” will be displayed on the panel.

**XX 13,13,5,4;**

“IN 15,0” appears on the status channel if the signal changes from high to low, “IN 15,1” appears if the signal changes from low to high.

**14:** Sets the value for analog output 1:

**SYNTAX:** **XX 13,14,Output;**

Parameter	Format	Functional Range	Default
<i>Output</i>	Integer	0 to 100	-

*Output:* Desired output voltage on analog output 1 on the laser interface 3.  
(from 0 – 10 V)

**EXAMPLE:** **XX 13,14,25;**

Sets the output voltage on analog output 1 to 2.5 V

**NOTE:** if *Output* is smaller than “minimal pressure” (1-11-4-7-7) then *Output* will be set to this value

**15:** Sets the value for analog output 2:

**SYNTAX:** **XX 13,15,Output;**

Parameter	Format	Functional Range	Default
<i>Output</i>	Integer	0 to 100	-

*Output:* Desired output voltage on analog output 2 on the laser interface 3.  
(from 0 – 10 V)

**EXAMPLE:** **XX 13,14,75;**

Sets the output voltage on analog output 2 to 7.5 V

**16:** Selects a modulation signal for the laser source

**SYNTAX:** **XX 13,16,Source;**

Parameter	Format	Functional Range	Default
Source	Integer	0 to 2	-

**Source:** 0: internal control, based on minimal and maximal laser power settings

1: external modulation input 1 (I\_MOD\_1 on LIF3)

2: external modulation input 2 (I\_MOD\_2 on LIF3)

**NOTE:** The external modulation input is only forwarded to the laser source, if our internal calculated signal would also output laser power.

## Index 16 – Cutter Status

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - XX16,1 available as frontend command			Frontend - Online✓		Frontend - Offline✓
V 1.58 - Additional output of the status channel command SY					
V 1.61 - Supports Subcmd 2					
- Command also executable while the cutter is locked ( <a href="#">XX137</a> )					
V 1.63 - Final output string after output of all state commands					
V 1.65 - Output of all open errors in XX16,2					

Return current cutter state. It is only available via frontend commando.

**SYNTAX:** **XX 16,Subcmd;**

**OUTPUT FORMAT:** **ST +Status;[TERM]**

Parameter	Format	Functional Range	Default
Subcmd	Integer	1,2	No default
Status	Integer	0-4	No default

**Subcmd:** 1: Request for the current cutter status via HPGL interface  
Additional output of the status channel command SY.

2: Request for the current cutter status via status channel interface.  
Output of several status channel commands (see OUTPUT II).

**Status:** System state:  
*status* = +0: Cutter is start up state. Not implemented yet.  
*status* = +1: Cutter is online state  
*status* = +2: Cutter is offline state  
*status* = +3: Cutter is stopped state  
*status* = +4: Cutter is error state

**EXAMPLE I:** [esc].[XX 16,1;

**OUTPUT I:** **ST+1;[TERM]**

The cutter is online.

**EXAMPLE II:** [esc].[XX 16,2;

**OUTPUT II:**

- No output on the HPGL interface.
- Output of the following status commands on the status channel interface: CL, IN, MI, RK, RM, RP, ST, SY, TI, VS, VW, VZ, WA, ER (all open errors).
- There is a final SO command with string "Cutter status updated" generated on the status channel interface after output of all status commands above.
- Note that most of the commands will be put out in dependence of the table type. For example a L3 never generates a VW command. For further information see the Zünd status channel manual.

**NOTE:** For this command the frontend syntax should be used to get an immediate answer even if the cutter is offline. Please see the example above.

**NOTE II:** This Command causes the Status Channel to output the System Status. This may be useful to synchronize the System Status after startup.

## Index 20 – Obsolete

Command is obsolete. Please use [XX131](#).

## Index 29 – Working Vacuum Area

V 1.51 - Initial Release

G3✓	S3✓	L3✗	D3 A✓	D3 B✗
Frontend - Online✓			Frontend - Offline✓	

Sets a new working vacuum area. Between the positions of the working vacuum area and the positions of the vacuum area, every other vacuum zone will be turned off.

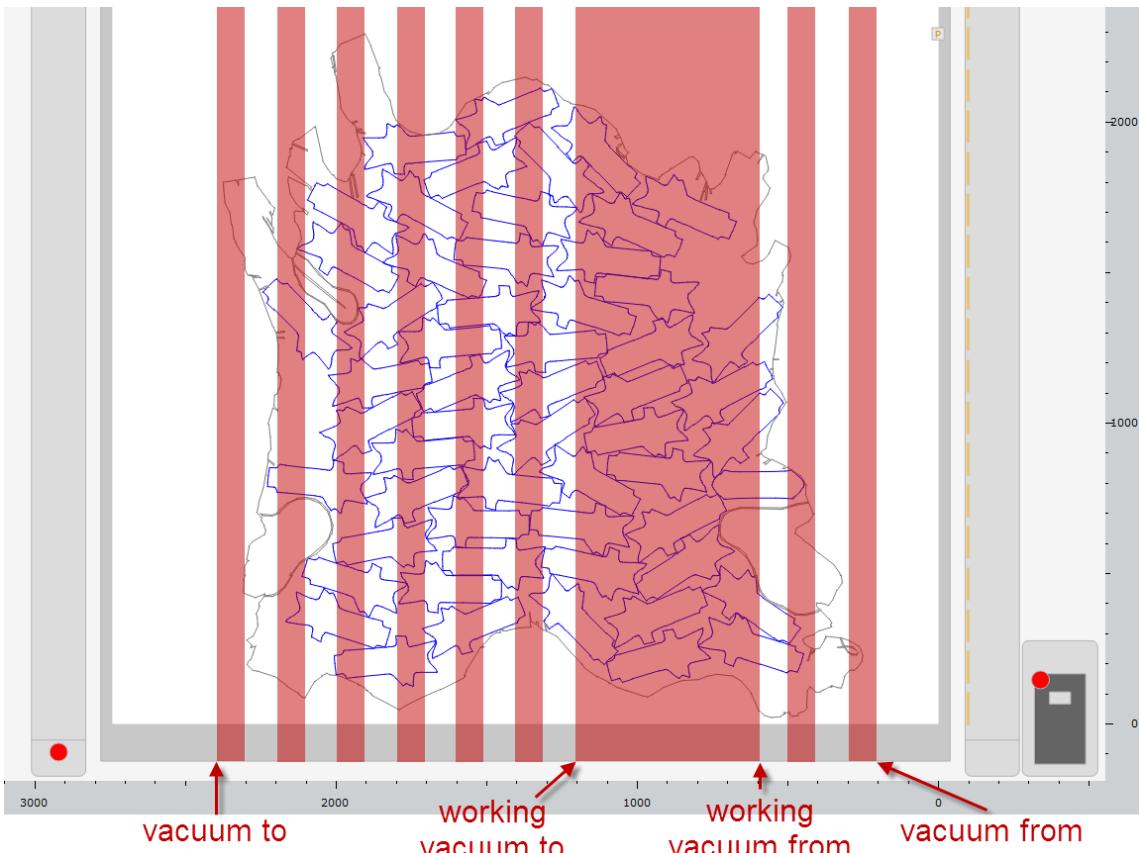
Function just available if the hardware to adjust the vacuum area on both sides is installed.  
This command is ignored by cutters of the L3 series. Use instead [XX131](#) to set a vacuum area.

**SYNTAX:** **XX 29, WorkingVacuumTo,WorkingVacuumFrom;**

Parameter	Format	Functional Range	Default
WorkingVacuumTo	Plotter units	-4000 to Device-dependent	No default
WorkingVacuumFrom	Plotter units	-4000 to Device-dependent	No default

*WorkingVacuumFrom:* Right position of the working vacuum area.

*WorkingVacuumTo:* Left position of the working vacuum area.



**EXAMPLE:**

**XX29,120000,2000;**

Sets a vacuum area from -4000 to 121180. The cutter converts the given parameter to the individual zone boundaries.

**EXAMPLE:**

**XX29,231000,231000;**

Sets a vacuum area from 222860 to 239140. The given parameter are exactly on a zone boundary and therefore will be both bordering zones opened.

**NOTE:**

- In case of the *WorkingVacuumAreaTo*-parameter is smaller than the *WorkingVacuumAreaFrom*-parameter, it cause an error and the *working vacuum area* will not be set.
- In case of the *working vacuum area* is larger than the *vacuum area*, the

- vacuum area* will be widened to the size of the *working vacuum area*.
- In case of a new **SV** command is sent, the existing *working vacuum area* will be deleted.
  - In case of a **XX29** command is sent to a cutter which hasn't the hardware installed to adjust the vacuum area on both sides, nothing will happen.

**SEE ALSO:** [OP29](#), [SV](#), [OP32](#), [OP140,14](#)

## Index 37 – Paging Speed

V 1.41 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

Change Paging speed.

**SYNTAX:** **XX 37;**  
**XX 37,Speed;**

Parameter	Format	Functional Range	Default
Speed	Integer	50..1000	500

*Speed* Paging speed in [mm/s]

**EXAMPLE:** **XX37,100;**  
Set Paging speed to 100 mm/s.  
**XX37;**  
Set Paging speed to the last saved value.

**NOTE:** If the velocity is set too high or too low, it will be set in range automatically.

Depending on the activated periphery or cutter size, the maximum speed could be limited.

Periphery limitations:

- Auxiliary drive(s) : max. 700 mm/s, see [OP140,53](#);
- Ext. material handling(s): max. 700 mm/s, see [OP140,3](#); and [OP140,4](#);
- Board stacker : max. 500 mm/s, see [OP140,10](#);
- Roll up unit tray : max. 250 mm/s, see [OP140,21](#);

**SEE ALSO:** [OP140](#); [XX140](#);

## Index 39 – Set V-Cut Angle

V 1.40 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Change the V-cut angle in the firmware. It can not change the physical angle of the cutter. The V-cut angle is changed on the selected module.

**SYNTAX:**      **XX 39,Angle;**

Parameter	Format	Functional Range	Default
Angle	Real	0°, 15°, 22.5°, 30°, 45°	No default

**NOTE:**            -This change of the V-cut angle is immediately stored on the cutter. After restarting this value is still set.

**SEE ALSO:**       [OP39](#)

## Index 40 – Board Feeder Mode

V 1.48 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online ✓			Frontend - Offline ✓	

Change board feeder mode.

**SYNTAX:**        **XX 40,1,Mode;**

Parameter	Format	Functional Range	Default
Mode	Integer	0..4	No default

**Mode:**            Board Feeder Mode:  
0: Load after feed  
1: Load automated  
2: Load on command  
3: Load after delay  
4: Load before feed

**EXAMPLE:**        **XX40,1,2;**  
Set the board feeder Mode to ‘Load on command’

**XX40,1,3;DH6,20;**  
Set the board feeder Mode to ‘Load after delay’ and set the delay to 20 seconds.

**NOTE:**

- See the board feeder manual for more information about the different modes.
- **XX40,1,2;** don’t load immediately the material. You have to send **DH5;** on the desired point of time.
- **XX40,1,3;** activate the ability to set a time delay over **DH6.**
- At “load automated” (mode = 1) the tracked times will be reset on:
  - a) switch to offline or b) send **XX40,1,Mode;** again.

**SEE ALSO:**       [OP40](#), [DH5](#), [DH6](#)

## Index 41 – Paging Direction

V 1.42.2 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
V 1.49 - XX41 available as frontend command	Frontend - Online✓			Frontend - Offline✓	

Get paging direction

**SYNTAX:** **XX 41;**

**EXAMPLE:** **XX41;**

**RESPONSE:** 1[TERM]

**NOTE:**  
0 = forward  
1 = backward  
2 = forward & backward  
3 = no feed possible

## Index 42 – Paging Acceleration Level

V 1.48 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Change paging acceleration level.

**SYNTAX:** **XX 42,Level;**

Parameter	Format	Functional Range	Default
Level	Integer	1..12	6

**EXAMPLE:** **XX42,3;**  
Set the paging acceleration level to 3.

**NOTE:** - Level settings will not be saved at shutdown.

- Settings out of range sets the level to nearest limit:  
**XX42,0;** -> set level to 1  
**XX42,13;** -> level to 12

**SEE ALSO:** [OP42](#)

## Index 44 – Cutting Off

V 1.55 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B(✓) <sup>1</sup>
Frontend - Online ✕			Frontend - Offline ✕	

This command is used to cut off material.

### SYNTAX:

```
XX 44;
XX 44,PosX;
XX 44,PosX,PosY;
XX 44,PosX,PosY,CutWidth;¹
XX 44,PosX,PosY,CutWidth,ReverseCutWidth;¹
```

Parameter	Format	Functional Range	Default
<i>PosX</i>	Plotter units	-1, 0...device dependent	actual x-position
<i>PosY</i>	Plotter units	-1, 0...device dependent	right position of the vacuum area
<i>CutWidth</i>	Plotter units	-1, 1...device dependent	width of the vacuum area
<i>ReverseCutWidth</i>	Plotter units	-1, 0...device dependent	<i>cutWidth / 10</i>

*PosX, PosY;:* Start positions for the cut off. -1 uses the default value.

*CutWidth:* Total width of the cut in y-direction. -1 uses the default value.

*ReverseCutWidth:* If the parameter is set, the cut off is divided into two cuts. The first cut starts at the position *PosY + reverseCutWidth* and ends at position *PosY*. The second cut starts also at position *PosY + reverseCutWidth* and ends at position *PosY + cutWidth*.  
-1 uses the default value/behaviour of a tool. Non-driven tools (drawknives as UCT, SCT,...) perform the cut off with a reverse cut by default.  
Driven tools (EOT, POT, PRT,...) perform the cut off with a single cut by default.

### EXAMPLE:

**XX44;**

The cut off is executed at the actual x-position over the width of the vacuum area.

**XX44,43600,-1;**

The cut off is executed at the x-position = 436mm over the width of the vacuum area.

**XX44,-1,23000;**

The cut off is executed at the actual x-position, from y = 230mm to y = (230mm + width of the vacuum area)

**XX44,125321,4819,154312,0;**

The cut off is executed at position x = 1253.21mm from y = 48.19mm to y = 1591.31mm.

**XX44,-1,-1,120000,-1;**

The cut off is executed at the actual x-position from the right position of the vacuum with the given width.

### <sup>1</sup>NOTE D3:

- There is no support for vacuum on cutters of type D3 B. Please make sure that **XX44** is always sent to D3 B with three parameters at least. Avoid using default values (-1) for the parameters *PosY*, *CutWith* and *ReverseCutWidth*, because the values for the vacuum width and the right position of the vacuum area are undefined.
- The working area on the D3 is limited for both, D3 A and D3 B. For the parameter *PosX* make sure to not send values lower than 43600 on D3 A or higher than 276400(3200mm – 436mm) on D3 B. Otherwise the cutter will be clipped and cannot perform the cutting pass.

### NOTE

- This function is only executable if the actual selected tool is a cutting tool. If a drawing, punching, creasing, routing tool/module, VCT, PPT or KCM-S without CT is selected or if a cutting strip is installed, an error will occur.

- If the value -1 is set for a parameter, the default value is used.
- If *CutWidth* has the value 0 or another negative value than -1, then no cut off sequence is executed.
- If *ReverseCutWidth* is larger than *CutWidth*, the *ReverseCutWidth* is limited to the value of *CutWidth*.
- No reverse cut is executed if *ReverseCutWidth* has the value 0 or another negative value than -1, no matter what tool is selected.
- The z-axis of a KCM-S module is switched automatically to position mode for the cut off.

#### SEE ALSO

[FC](#), [OP140,51](#), [OP32/OP32,1](#), [XX65](#)

## Index 50 – Upload Cutter Parameter

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Upload cutter parameter. Data direction is PC → CUTTER.

**SYNTAX:** **XX 50,ParameterID,ParameterSubID,ParameterSubSubID,Value;**

**OUTPUT FORMAT:** **(only on Error)**

**XX0,Index,ParameterID,ParameterSubID,ParameterSubSubID,  
ERROR:ErrorID;[cr][lf]**

Parameter	Format	Functional Range	Default
ParameterID	Integer	sw version dependent	No default
ParameterSubID	Integer	sw version dependent	No default
ParameterSubSubID	Integer	sw version dependent	No default
Value	Real	dependent on index	No default

*ParameterID*: The combination of this three parameters selects a database entry.

*ParameterSubID*:

*ParameterSubSubID*:

*Value*:

Value of the selected database entry.  
String-, Real- or Integer- value.

**EXAMPLE:**

**XX50,95,2,4,7.500000e-01;**

Set axis speed down x (ParameterID) for tool knife (ParameterSubID) number 4 (ParameterSubSubID).

**OUTPUT:**

**Only in Error case:**

**XX50,935,2,4,ERROR:0x00001303;[cr][lf]**

Example for an unknown parameterID

**NOTE:**

After uploading a parameter with an **XX50** command, it is required to send an **XX52** command to store the parameters. Not sending an **XX52** can lead to an inconsistent parameter constellation because only a part of the parameters will be stored.

This command is for service use, enabled with service or factory rights only. A detailed description is available.

## Index 51 – Download Cutter Parameter

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✕				Frontend - Offline ✕	

Download cutter parameter. Data direction is CUTTER → PC.

**SYNTAX:**

**XX 51;**  
**XX 51,DbPart;**  
**XX 51,ParameterID,ParameterSubID,ParameterSubSubID;**

**OUTPUT FORMAT:** **XX 50,ParameterID,ParameterSubID,ParameterSubSubID,Value;[cr][lf]**

Parameter	Format	Functional Range	Default
ParameterID	Integer	sw version dependent	No default
ParameterSubID	Integer	sw version dependent	No default
ParameterSubSubID	Integer	sw version dependent	No default
Index	Integer	sw version dependent	No default
Value	Real	dependent on index	No default

*DbPart:* Initiate a download of a specific part of database entries.

*ParameterID:* The combination of these three parameters selects a database entry.

*ParameterSubID:*

*ParameterSubSubID:*

*Value:* Value of the selected database entry.  
String-, Real- or Integer- value.

**EXAMPLE:**

**XX51;**  
Get all parameter stored on cutters database.

**XX51,2;**  
Get a specific part of cutter database.

**XX51,95,2,4;**  
Get axis speed down x (ParameterID) for tool knife (ParameterSubID) number 4 (ParameterSubSubID).

**OUTPUT:**

**XX50,95,2,4,7.50000e-01;[cr][lf]**  
Axis speed down x (ParameterID) for tool knife (ParameterSubID) number 4 (ParameterSubSubID) is 0.75.

**NOTE:**

This command is for service use, enabled with service or factory rights only. A detailed description is available.

## Index 52 – Store Uploaded Cutter Parameter

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✕				Frontend - Offline ✕	

Download cutter parameter. Data direction is PC → CUTTER.

**SYNTAX:**

**XX 52;**

**EXAMPLE:**

**XX52;**  
Stores all uploaded cutter parameter. After this command cutter must shutdown and restart to activate the parameters.

**NOTE:**

This command is for service use, enabled with service or factory rights only. A detailed description is available.

## Index 62 – Continuous Path

V 1.60 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.61 – XX62; added to set default value			Frontend - Online ✗	Frontend - Offline ✗	

Activate continuous path for processing speed settings.

**SYNTAX:**      **XX 62,ContinuousPath;** **XX 62;**

Parameter	Format	Functional Range	Default
<i>ContinuousPath</i>	Integer	0 or 1	No default

*ContinuousPath:*      0: off  
                          1: on

**EXAMPLE:**      **XX62,1;**  
                          Switches continuous path on.

**XX62;**  
Sets the default value defined in the cutter firmware.

**NOTE:**      Use continuous path for all active tools.

**SEE ALSO:**      [VF](#), [VS](#), [VU](#), [VW](#)

## Index 64 – Z-Axis Acceleration

V 1.58 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✕		Frontend - Offline ✕		

Set the z axis acceleration of the selected tool. The maximum z-axis acceleration depends on the module type.

**SYNTAX:**

**XX 64;**  
**XX 64,LowerZAccelLevel;**  
**XX 64,LowerZAccelLevel,LiftZAccelLevel;**

Parameter	Format	Functional Range	Default
<i>LowerZAccelLevel</i>	Real	1 to 4	stored value set by menu entry 1-x-1-3-3-4
<i>LiftZAccelLevel</i>	Real	1 to 4	stored value set by menu entry 1-x-1-3-3-3

Acceleration Level	Grading
4	aMax
3	aMax / 2
2	aMax / 4
1	aMax / 8

Module type	Maximum module acceleration aMax [m/s <sup>2</sup> ]
UM-60	5
RM-A	5
UM-60L	5
UM-S	10
LM-Z	5
LM-TZ	5
LM-Z-S	10
UM-ZS	10
UM-ZP	3.3
UM-120	10
RM-120	5
RM-S	5
RM-L	5

*LowerZAccelLevel*: Acceleration to reach the down position of the tool.

*LiftZAccelLevel*: Acceleration to reach the up or park position of the tool.

**EXAMPLE:**

**XX64;**  
The default acceleration will be set.

**XX64,3;**  
The lower acceleration of the tool is set to 50%.

**XX64,2,4;**  
The lower acceleration is set to 25% and the lift acceleration is set to the maximum.

**NOTE:**

- The *lowerZAccelLevel* parameter acts only on z vectors from the up to the down position.  
The *liftZAccelLevel* parameter acts also on z vectors from the park to the up position.
- It's not possible to set the z axis acceleration of a KCM-S module by this command.

**SEE ALSO:**

[ZS](#), [AS](#)

## Index 65 – Moving Mode Z-Axis

V 1.20 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online X		Frontend - Offline X		

Adjust the moving mode for the Z-Axis.

### SYNTAX:

**XX 65;**  
**XX 65,Mode;**  
**XX 65,Mode,Pressure;**  
**XX 65,Mode,PressureX,PressureY;**

### UM-Module

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1	0
<i>Pressure</i>	Integer	2000 to 20000 gram, identical for X and Y if only one parameter given	10000 gram
<i>PressureX</i>	Integer	2000 to 20000 gram	No default
<i>PressureY</i>	Integer	2000 to 20000 gram	No default

### UM-S-Module

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1	0
<i>Pressure</i>	Integer	2000 to 10000 gram, identical for X and Y if only one parameter given	5000 gram
<i>PressureX</i>	Integer	2000 to 10000 gram	No default
<i>PressureY</i>	Integer	2000 to 10000 gram	No default

### URT-Tool for UM/UM-S-Module

Parameter	Format	Functional Range	Default
<i>Pressure</i>	Integer	2000 to 4000 gram identical for X and Y if only one parameter given	3000 gram
<i>PressureX</i>	Integer	2000 to 4000 gram identical for Y if two parameter given	No default
<i>PressureY</i>	Integer	2000 to 4000 gram identical to X if two parameter given	No default

### KCM-S-Module

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1	0
<i>Pressure</i>	Integer	30 to 1500 gram	100 gram
<i>PressureX</i>	Integer	30 to 1500 gram But there is no direction depending force supported	No default
<i>PressureY</i>	Integer	Value ignored. There is no direction depending force supported	No default

*Mode:*

Z-Axis moving mode.

0: Position mode. Moving to the absolute position.

1: Pressure mode osc. The pressure oscillated

(2: only for compatibility reason -> value is changed to 1)

*Pressure:*

Pressure in gram. The same pressure in direction X and Y.

*PressureX,*  
*PressureY:*

Different pressure in direction X and Y (not supported by KCM). The lower pressure is active in an angle of 60°

**EXAMPLE:****XX65, 1,6000,4000;**

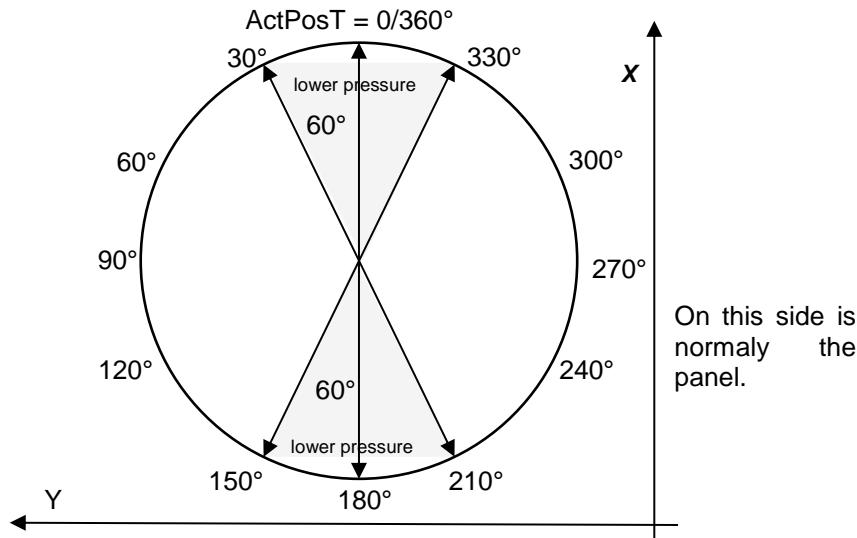
Switch to pressure oscillating mode and set the pressure in direction X to 6000 gram and in direction Y to 4000 gram. The pressure 4000 gram is active in Y-Direction between 60°-120° and 240°-300°.

**XX65;**

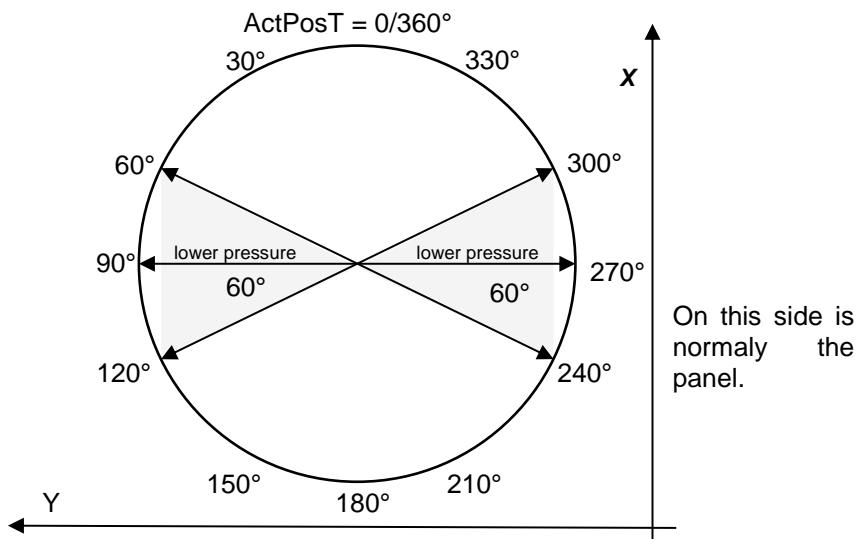
Switch to position mode.

**NOTE:**

Lower pressure in X direction:



Lower pressure in Y direction:

**NOTES for KCM:**

- There is no direction depending force for the KCM available. If FS is send with two parameters to a KCM tool, only the first parameter is used to set the pressure of KCM Tool.
- The pressure does not oscillate on a KCM.

**NOTES for URT:**

- There is no direction depending force for the URT supported. If FS is send with two parameters to a URT, only the first parameter is used to set the pressure.

**NOTES for SCT:**

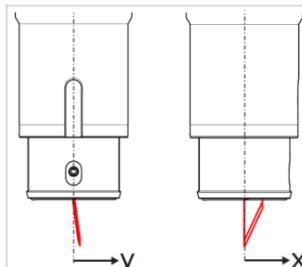
- If mode is set to 0 "position mode", the blade is pneumatically extended for through-cut applications.
- If mode is set to 1 "pressure mode", the blade is pneumatically retracted for scoring applications.

**SEE ALSO:**[FS, OP65](#)

## Index 80 – Tool Offset Correction

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.52.2 - tool number = 0 changes selected tool	Frontend - Online X			Frontend - Offline X	
V 1.52.2 - XX80 without offsetY implemented					

This command sets, activates and deactivates the offset correction of the tool. Use this tool offsets to correct mechanical deviation between the blade and the tool's symmetry axis.



Mechanical deviation of the tool

### SYNTAX:

**XX 80;**  
**XX 80, ToolNumber, State;**  
**XX 80, ToolNumber, State, OffsetX;**  
**XX 80, ToolNumber, State, OffsetX, OffsetY;**

Parameter	Format	Functional Range	Default
ToolNumber	Integer	0,11..33	no
State	Integer	0 = Off 1= On	0, Off
OffsetX	Real32	-200...200[1/100mm]	0
OffsetY	Real32	-200...200[1/100mm]	0

*ToolNumber:* Selects the tool to change.  
 0 = changes the current selected tool  
 11...33 = changes a specific tool. E.g. 21 is tool 1 in module 2

*State:* *Enable=0:* correction off.  
*Enable=1:* correction on.

*OffsetX:* Offset from the tool's symmetry axis in X direction.  
*OffsetY:* Offset from the tool's symmetry axis in Y direction.

**EXAMPLE:** **XX80,11,1,50,-25;**  
 Sets and enables the tool offset correction for tool 1 on module 1. The offsets to the centre of the tangential axis are 0.50 mm in X- and -0.25mm in Y-direction.

**XX80,11,1,50;**  
 Same as above without changing the Y-correction.

**XX80,13,0;**  
 Switches the corrections for tool 3 on module 1 to OFF.

**XX80;**  
 Switches the corrections for the current/active tool to OFF.

- NOTE:**
- Tool number 0 changes the current selected tool.
  - The tool offsets are also available on the control unit (Menu 1-1-1-4 for module 1 and tool 1).
  - Please use XX80 or the menu entries to correct mechanical deviation of the tools. These values will be stored to the selected tool (e.g. UCT#1).
  - Use XX82 for knife compensation based on material thickness and used blade.

**NOTE for VCT:****SEE ALSO:**

This command has no effect for V-cut tools.

[XX82](#), [OP80](#)

## Index 81 – Stop Angle

V 1.55 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

Sets the stop angle of the active tool

**SYNTAX:**

**XX 81;**  
**XX 81,StopAngle;**

Parameter	Format	Functional Range	Default
<i>StopAngle</i>	Real32	0..45	30

**StopAngle:** If a change in direction larger than the set angle is determined during movement then the speed is reduced to zero before movement is started in the new direction

**EXAMPLE:**

**XX81,10;**  
Changes in direction which are larger than 10° will reduce the speed to zero before movement is started in the new direction.

**XX81;**

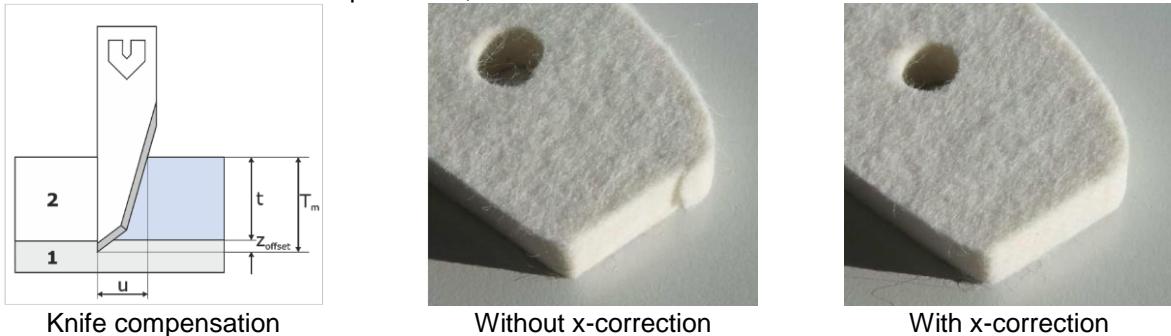
Sets the stop angle for the active tool to the default value.

## Index 82 – Additional Tool Offset Correction

V 1.58 - Initial Release V 1.65 – Offset Limits changed from +/-1000 to +/- 1500	G3✓ Frontend - Online X	S3✓ Frontend - Offline X	L3✓	D3 A✓ Frontend - Offline X	D3 B✓
---	----------------------------	-----------------------------	-----	-------------------------------	-------

This command changes the additional offset correction of the tool. These additional values are always cleared at startup of the cutter. They are always enabled and will be added to the tool offset correction (XX80 or Menu 1-1-1-4). This offset correction is not shown on the operating unit and cannot be changed or cleared by the user.

Use this command for knife compensation, based on material thickness and used blade.



### SYNTAX:

**XX 82;**  
**XX 82, ToolNumber;**  
**XX 82, ToolNumber,OffsetX;**  
**XX 82, ToolNumber,OffsetX,OffsetY;**

Parameter	Format	Functional Range	Default
ToolNumber	Integer	0,11..33	no
OffsetX	Real32	-1500...1500[1/100mm]	0
OffsetY	Real32	-1500...1500[1/100mm]	0

**ToolNumber:** Selects the tool to change.  
 0 = changes the current selected tool  
 11...33 = changes a specific tool. E.g. 21 is tool 1 in module 2

**OffsetX:** Offset from the tool's symmetry axis in X direction.

**OffsetY:** Offset from the tool's symmetry axis in Y direction.

**ATTENTION:** Please consider to move away your shapes from the edge of the working area, if the cumulated tool offsets (Tool offsets from XX80 and Additional Tool Offsets from XX82) are bigger than 2mm.

**EXAMPLE:** **XX82,11,50,-25;**  
 Sets the additional tool offset correction for tool 1 on module 1. The additional offsets to the center of the tangential axis are 0.50 mm in X- and -0.25mm in Y-direction.

**XX82,11,50;**  
 Same as above without changing the Y-correction.

**XX82,13;**  
 Sets the corrections for tool 3 on module 1 to zero.

**NOTE:** Tool number 0 changes the current selected tool.

**SEE ALSO:** [XX80](#), [OP82](#)

## Index 83 – Reset Special Z Axis Offsets

V 1.61 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online✓ Frontend - Offline✓

Sets the z offset and the AKI/ITI zero point of a tool to 0.

### SYNTAX:

**XX 83;**  
**XX 83,ModuleSlot;**  
**XX 83,ModuleSlot,Selection;**

Parameter	Format	Functional Range	Default
<i>ModuleSlot</i>	Integer	1,2,3	No default
<i>Selection</i>	Integer	0,1,2	No default

*ModuleSlot:* Resets both offsets of the tool for the given slot.  
If no value is sended, the command will reset both offsets of the current selected tool.

*Selection:* 0: Resets the z offset and the AKI/ITI zero point.  
1: Resets only the z offset.  
2: Resets only the AKI/ITI zero point.  
If no value is sended, the command will reset both offsets.

### EXAMPLE:

**XX83;**  
**XX83,2;**  
**XX83,3,1;**

**NOTE:** For further information about the z offset and the AKI/ITI zero point and how they take effect, have a look on HPGL command OP83.

### SEE ALSO:

[OP83](#)

## **Index 95 – Move to Z-Park-Position**

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✕			Frontend - Offline ✕	

XX95 is used to move the z-axis of the actual tool to the park-position

**SYNTAX:**      **XX 95;**

## **Index 96 – Auto-Lift-Up-Position**

V 1.49 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✕			Frontend - Offline ✕	

Set an additional up-position for tool in a module with z-axis. This additional up-position is used for auto lift up. Use this command after setting the up position with ZP. The ZP Command will set the auto-lift-up-position to the normal up-position.

**SYNTAX:**      **XX 96,Up;**

Parameter	Format	Functional Range	Default
<i>Up</i>	Plotter units	0 to up-position	No default

*Up:*                  Auto-lift-up-position.

**EXAMPLE:**      **SP 1;**  
**XX96, 1000;**  
Auto-lift-up-position of tool 1 is set to 1000 (10 mm) above the initialization position.

**NOTE:**                  Each tool has its own parameter set. Therefore the tool must be selected before XX96 is sent.  
A ZP command will reset the auto-lift-up-position to the normal up-position.  
If the position is out of the range, the position is set to the up-position.

**NOTE for VCT**      This command has no effect for V-cut tools.

**NOTE for CT/DT/ST**   Functional range is valid from 0.25mm to up-position

**NOTE for PPT**        With the **XX96,0;** the tool doesn't lift up. Only the blade is extended and retracted again.

**SEE ALSO:**           [ZP](#), [AU](#)

## Index 129 – Continue on MS Dialog

V 1.53 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✗	

Use this command to continue while a MS dialog is shown on panel.

**SYNTAX:**      **XX 129;**

**EXAMPLE:**      **DT33;**  
**MSHello!**  
A dialog appears on panel and requests a user input.  
**XX129;**  
The dialog disappears and the command will be preceded.

**NOTE:**      This command can only send while system is online. It can be send as frontend command.

**SEE ALSO:**      [MS](#)

## Index 131 – Set Vacuum Pattern L3

V 1.56 - Initial Release	G3✗	S3✗	L3✓	D3 A✗	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

This command is just for L3 cutters and is ignored by cutters of the G3 or S3 series.  
It sets a new vacuum zone pattern.

The dimensions of the zones and their positions in the cutters coordinate system are described at the end of this command.

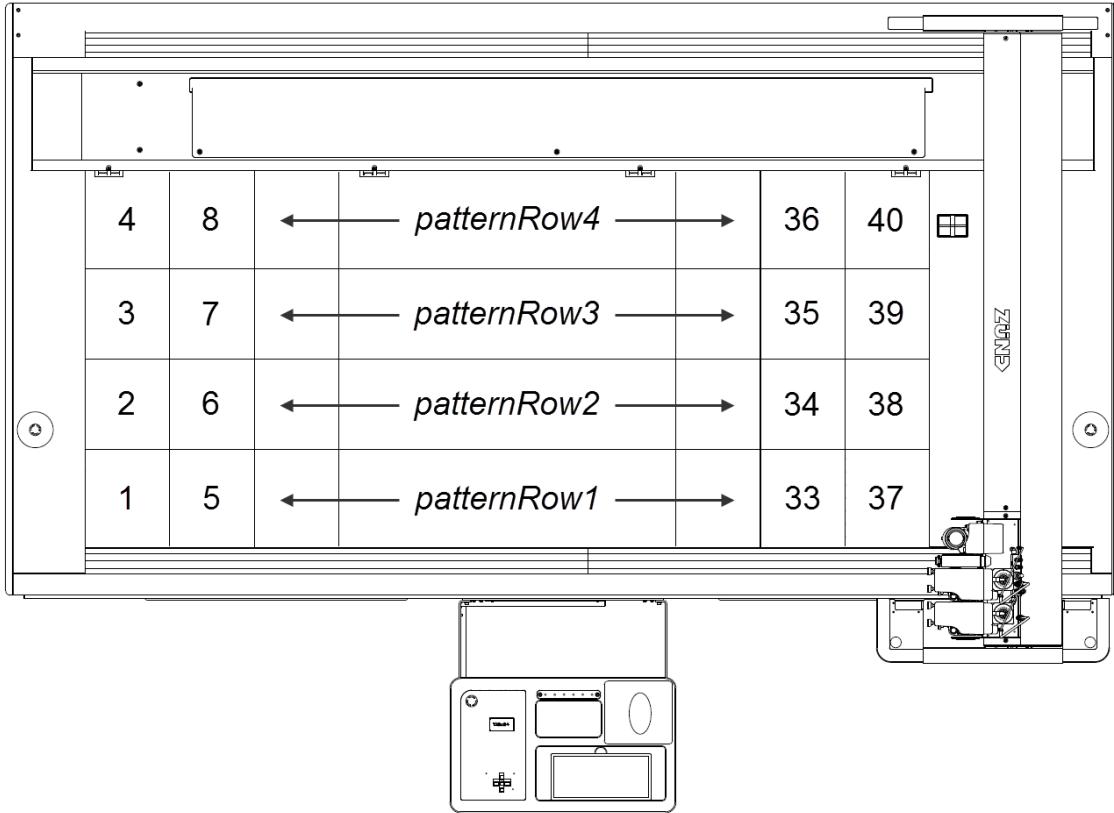
Note that a vacuum zone is closed by logic one und opened by logic zero.

**SYNTAX:**      **XX 131;**  
**XX 131,Row,Pattern;**  
**XX 131,PatternRow1,PatternRow2,PatternRow3,PatternRow4;**

Parameter	Format	Functional Range	Default
<i>Row</i>	Integer	0-3	No default
<i>Pattern,</i> <i>PatternRow1,</i> <i>PatternRow2,</i> <i>PatternRow3</i> <i>PatternRow4</i>	Integer	L3 C-40: The first 10 bits are significant. L3 C-56: The first 14 bits are significant.	No default

*Row:*      Selects a row.

*Pattern:*      Vacuum zone pattern of a row.  
*PatternRow1:*      The least significant bit of a pattern switches the zone in the first column (zones 1-4).  
*PatternRow2:*  
*PatternRow3:*  
*PatternRow4:*



**Figure 2: Zone numeration**

An L3 C-56 has 16 additional zones which are consecutively numbered in the same way.

**EXAMPLE**

**XX131;**

Opens all zones.

**EXAMPLE**

**XX131,1,0;**

Opens all zones of row 2.

**EXAMPLE**

**XX131,2,967;**

$967 = 1111000111_2$

Closes zones 3, 7, 11, 27, 31, 35 and 39 and opens zones 15, 19 and 23 of row 3. The patterns of the other rows won't change.

**EXAMPLE**

**XX131,903,963,897,967;**

Row 1:  $903 = 1110000111_2$

Closes zones 1, 5, 9, 29, 33, 37 and opens zones 13, 17, 21 and 25.

Row 2:  $963 = 1111000011_2$

Closes zones 2, 6, 26, 30, 34, 38 and opens zones 10, 14, 18 and 22.

Row 3:  $897 = 1110000001_2$

Closes zones 3, 31, 35, 39 and opens zones 7, 11, 15, 19, 23 and 27

Row 4:  $967 = 1111000111_2$

Closes zones 4, 8, 12, 28, 32, 36, 40 and opens zones 16, 20 and 24.

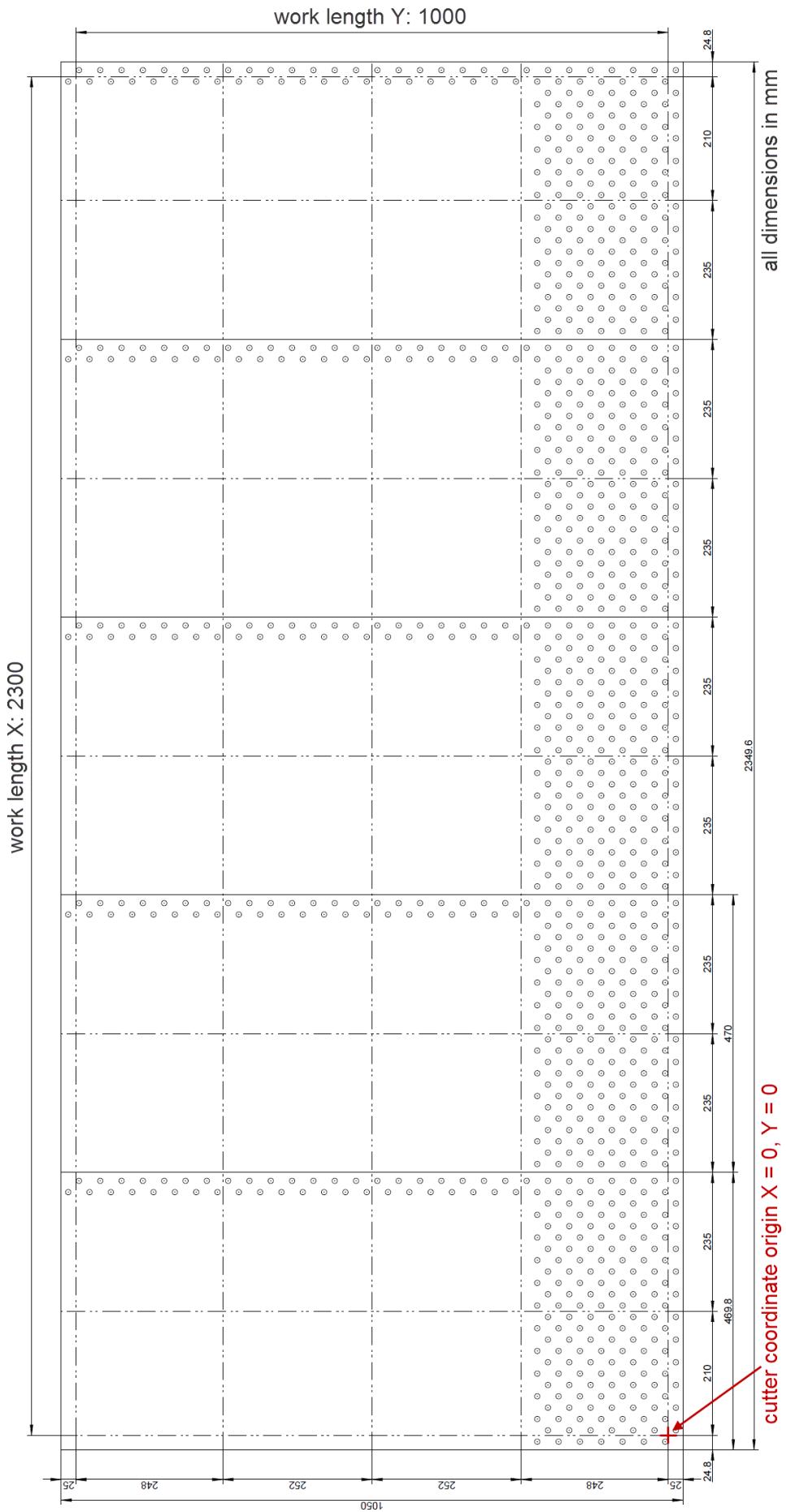
**NOTE:**

- All zones are open after the system start up.

- If all zones should be closed, zone 1 would be opened to protect the vacuum turbine from overheating.

**SEE ALSO:**

[OP131, Frontend Commands](#)



The L3 C-56 has 16 additional zones in X-direction.  
By the fact that only the zones on the edge have a working width of 210mm, results for the L3 C-56 a work length of 3240mm (2300mm+4x235mm) in X-direction.  
The work length in Y-direction is as same as for a L3 C-40.

Figure 3: L3 C-40 vacuum plate and zone dimensions

## Index 132 – Change Online Work Area

V 1.55 - Initial Release	G3 <b>X</b>	S3 <b>X</b>	L3 <b>✓</b>	D3 A <b>X</b>	D3 B <b>X</b>
	Frontend - Online <b>X</b>			Frontend - Offline <b>X</b>	

This command is just for L3 cutters and is ignored by cutters of the G3 or S3 series.

For L3 cutters, the work area is the area wherein a tool can move around to execute jobs.

The area outside the work area is called the safety area. The safety area is shown by a LED strip on top of the cutter. Thereby the LEDs above the safety area are flashing green. The LEDs above the work area do not light.

The beam is not allowed to move into the safety area. Therefore an operator can prepare new jobs within the safety area while jobs are executed in the work area. When all jobs are done in the work area and the next jobs should be executed which were previously prepared in the safety area, this command needs to be used to define the new work area and to move directly into it.

**SYNTAX:**      **XX 132,Mode;**  
                 **XX 132,Mode,WorkAreaFromX,WorkAreaToX,StartPosX,StartPosY;**

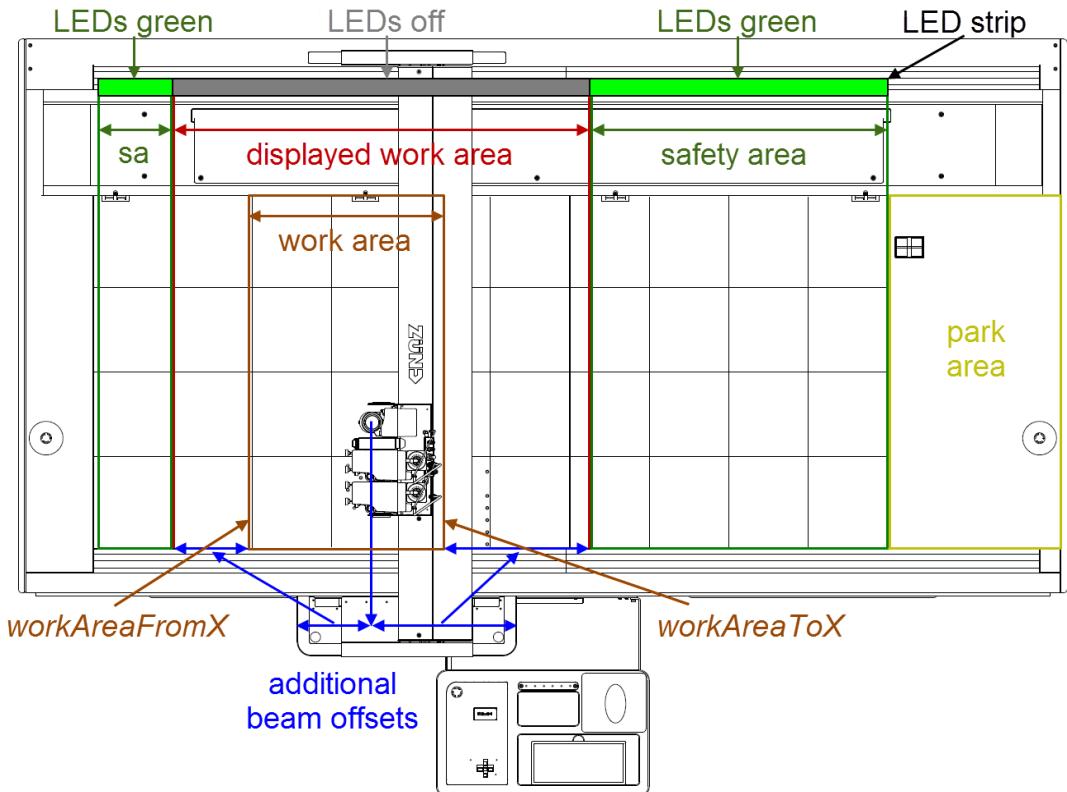
Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1	No default
<i>WorkAreaFromX</i>	Plotter units	0 to Device-dependent	No defaults
<i>WorkAreaToX</i>			
<i>StartPosX</i>			
<i>StartPosY</i>			

*Mode:*            0: Starts the process to move the beam to the park position on the right side.  
                      1: Starts the process to change the work area and move the beam to the given position.

*WorkAreaFromX:*          Boundaries of the new work area.

*WorkAreaToX:*              Note that the displayed work area is larger than the new work area by the width of the additional beam offsets.

*StartPosX:*              Position within the boundaries of the new work area to which the tool should move first.  
*StartPosY:*

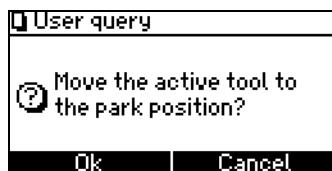


**Figure 1: Work and safety area**

**EXAMPLE:**

**XX132,0;**

- First a user request is displayed on the panel.



OK: Change process will be continued.

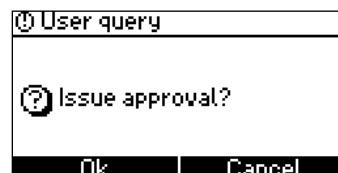
Cancel: The cutter is going offline.

- A safety area between the work area and the park position will be turned off which also means that the LED's above the safety area will be turned off.
- The beam moves to the park position.
- When the beam has reached the park position, the LED's on the left of the beam will be switched to green.

**EXAMPLE:**

**XX132,1,20000,150000,31254,81236;**

- First a user request is displayed on the panel.



OK: Change process will be continued.

Cancel: The cutter is going offline.

- A safety area between the current work area and the new work area will be turned off which also means that the LED's above the safety area will be turned off.
- The beam moves to the new start position inside the new work area.
- When the beam has reached the start position, the LED's outside of the new work area will be switched to green.

**NOTE:**

- Errors occur when the work area “from”-position is larger than the “to”-position or the start position is outside of the new work area.
- The work area and the start positions are independent of reference points or zoom-factors.
- Executing this command will generate two **WA** commands on the status channel.  
First by expanding the work area (examples point 2) and second after the beam has moved into the new work area (examples point 4).

**SEE ALSO:**

[OP132](#)

## Index 133 – Tandem Operation

V 1.53 - Initial Release	G3✓	S3✓	L3✗	D3 A✗	D3 B✗
V 1.58 - added XX133 without start point			Frontend - Online ✗	Frontend - Offline ✗	

This command works only if a tandem operation mode is active (can be requested by [OP141,18](#), return value mustn't be 0). The operation mode can be set by [XX141,18](#) if the cutter has a tandem table plate installed (the return value of [OP140,52](#) must be 1). With a tandem table plate, the work and the vacuum area are divided into two areas (front and rear) if a tandem operation mode is set.

Executing an XX133, a tool is always moved to the center position in x-direction of the cutter. If the tool has arrived at the center position, there is checked if a release key has already been pressed. If a release key is pressed ([OP126](#)), a clipping area is set on the opposite work area, the vacuum for the according area will be switched on and the tool moves directly to the given start position. By sending a XX133 without a start position, the tool won't make a further movement. After this, it's impossible for a tool to move into this clipping area. The area can only be reentered by executing a further XX133.

If a XX133 is executing and the tool has arrived at the center position and no release key has been pressed, the command will block the whole HPGL sequence until a release key is pressed by the user.

In Fig. 1 HPGL sequence you can see the construction of the HPGL sequence.

XX133, start position #1 (front)
job #1
XX133, start position #2 (rear)
job #2
XX133, #3
OP133 (front/rear)
job #3 (front or rear)
...
XX133, start position #last
job #last

Fig. 1 HPGL sequence

**SYNTAX:** **XX** 133;  
**XX** 133,*StartPositionX*,*StartPositionY*;

Parameter	Format	Functional Range	Default
<i>StartPositionX</i>	Plotter units	0.. device dependent	No default
<i>StartPositionY</i>	Plotter units	0.. device dependent	No default

*StartPositionX*: Start position of the following job.

*StartPositionY*:

**NOTE:**

- The start point mustn't be on the center position in X direction. This occurs to an error. If the start point should be on the center position, use the **XX** 133 command without parameters.
- A tandem clipping area is only active if the cutter is in online mode.
- You don't need to switch on/off the vacuum generator. The vacuum generator will be controlled by the **XX** 133 command itself. If the job has stopped because there has been no release by the release keys, the vacuum generator will switch off.
- Sending an **XX** 133 with a start point in the front area and the active area is also the front area, moves the tool to the center and requires from the user to press the front release key (a release key of an active area is blocked until the tool arrives at the center position).
- After sending a **XX** 133 without a start point, send an [OP133](#). If a tool arrives at the center position and there hasn't been pressed a release key, you have to find out which area will be released next.
- The execution of this command will generate RK, VS and WA commands on the status channel.

**SEE ALSO:** [OP126](#), [OP133](#), [OP140,52](#), [OP141,18](#), [XX141,18](#), Zünd Status Channel Manual

## Index 134 – Optionboard Ports

V 1.41 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.51 - XX134,2 to read inputs implemented			Frontend - Online✓		Frontend - Offline✓
V 1.60 - Added inputs 14 – 16					
V 1.61 - Pulse function added					

Function 1: Switch an Optionboard output port permanent or create a pulse on an Optionboard output port.

**SYNTAX:**      **XX 134,1,PortNo,Level;**  
**XX 134,1,PortNo,Level,PulseLength;**

Parameter	Format	Functional Range	Default
<i>PortNo</i>	Integer	0,1	No default
<i>Level</i>	Integer	0,1	No default
<i>PulseLength</i>	Integer	100..1000[ms]	No default

*PortNo:*            0: Output on Port V\_Out6 (Optionboard S7 Pin 11)  
                        1: Output on Port V\_Out5 (Optionboard S7 Pin 12)

*Level:*            0: 'off'  
                        1: 'on'

*PulseLength:*     Switch-on time [ms] or switch-off time [ms] (depending on *Level*)

**EXAMPLE:**        **XX 134,1,0,1;**  
                        Switch port V\_Out6 ON

**XX 134,1,0,0;**  
                        Switch port V\_Out6 OFF

**XX 134,1,1,1, 200;**  
                        Switches port V\_Out5 ON and after 200ms OFF

**NOTE:**            There are connections to power ground on S7 Pin 7, Pin 18 or Pin 24

Function 2: Read the state of an optionboard input.

**SYNTAX:**        **XX 134,2,PortNo;**

**OUTPUT FORMAT:** *PortNo,Level[TERM]*

Parameter	Format	Functional Range	Default
<i>PortNo</i>	Integer	0,1,14-16	No default
<i>Level</i>	Integer	0,1	No default

*PortNo:*            0: Input Port IN\_A8 (Optionboard S7 Pin 25)  
                        1: Input Port IN\_A9 (Optionboard S7 Pin 26)  
                        14: Input Port nCONFIGURABLE\_INPUT\_4\_24V (LIF3 S15 Pin 25)  
                        15: Input Port nCONFIGURABLE\_INPUT\_5\_24V (LIF3 S15 Pin 26)  
                        16: Input Port nCONFIGURABLE\_INPUT\_6\_24V (LIF3 S15 Pin 30)

*Level:*            0: Input at low level  
                        1: Input at high level

**EXAMPLE:**        **XX 134,2,0;**  
                        Read the input level from port IN\_A8

**RESPONSE:**       0,1[TERM]  
                        The level at input IN\_A8 is high.

**NOTE:**            IN\_A8 and IN\_A9 are optically isolated inputs and refer to PGND1 on S7 Pin 29.  
                        See also **XX 135**.

## Index 135 – Optionboard I/O Synchronisation Command

V 1.51 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online✓			Frontend - Offline X	

This **XX135** command is used to synchronize the cutter to an external event. That external event is represented by a signal applied to input IN\_A8 or IN\_A9 on the optionboard (S7, Pin 25 or 26).

If the cutter comes to an **XX135** command in the HP-GL sequence, it waits there for the specified input level or until the timeout time ends. If a timeout occurs, error 0x030E03 is displayed. While the cutter is waiting, a dialog appears and the user can continue without the external signal or abort the **XX135** command. If continue is selected, the cutter executes the next HP-GL command. If the **XX135**-command is aborted by the user, the cutter switches to offline.

If the pulse width of the applied signal is shorter than the chosen filtertime, error 0x030F03 will be displayed.

**SYNTAX:**

```
XX 135,PortNo,Level;
XX 135,PortNo,Level,Timeout;
XX 135,PortNo,Level,Timeout,Option,Filtertime;
```

Parameter	Format	Functional Range	Default
<i>PortNo</i>	Integer	0,1	0
<i>Level</i>	Integer	0,1	1
<i>Timeout</i>	Integer	-1, 0..1600 [sec]	-1
<i>Option</i>	Integer	0	0
<i>Filtertime</i>	Integer	0..1000 [*0.01 sec]	0

*PortNo:*            0:        Input Port IN\_A8 (Optionboard S7 Pin 25)  
                       1:        Input Port IN\_A9 (Optionboard S7 Pin 26)

*Level:*            0:        Wait until the input is low then continue.  
                       1:        Wait until the input is high then continue.

*Timeout:*          -1:      No timeout  
                       0..1600:    Timeout time in seconds  
                       > 1600:     Equal with timeout time = 1600.  
                                   If a timeout occurs error 0x030E03 is displayed

*Option:*            not implemented

*Filtertime:*        0:        No filtering.  
                       > 0:      filtertime in 0.01s steps  
                                   If a filtertime > 0 is specified, the input level must be permanently valid for that time before the cutter continues processing. If the pulse width of the applied signal is shorter than specified by filtertime, error 0x030F03 is displayed.

**EXAMPLE:**        **XX135,0,1,20;**  
                       Wait for a 'high' on input IN\_A8 with a timeout set to 20 seconds.

**XX135,0,1,-1;**  
                       Timeout disabled in this case.

**NOTE:**            IN\_A8 and IN\_A9 are optically isolated inputs and refer to PGND1 on S7 Pin 29.

**SEE ALSO:**        [XX134,2;](#)

## Index 136 – Special Ports on Module

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online✓			Frontend - Offline✓	

Function 1: Switches a special port on the actual selected module.

**SYNTAX:** **XX 136,ModulePort,Level;**

Parameter	Format	Functional Range	Default
<i>ModulePort</i>	Integer	0	No default
<i>Level</i>	Integer	0,1	No default

*ModulePort:* 0: there is actually only on the GAM a special Port to switch

*Level:*  
0: 'off'  
1: 'on'

**EXAMPLE:** **XX 136,0,1;**  
If the actually selected Module is a GAM the Port V\_OPT is switched ON

**XX 136,0,0;**  
If the actually selected Module is a GAM the Port V\_OPT is switched OFF

**NOTE:** See separate documentation for GAM

## **Index 137 – Optionboard I/O Cutter Locking Command**

V 1.60 - Initial Release	G3✓	S3✓	L3✓	D3 A✗	D3 B✗
V 1.64 - Extendet with vacuum	Frontend - Online ✗			Frontend - Offline ✗	

This **XX 137** command is used to lock the cutter while waiting for an external event.

That external event is represented by a signal applied to input IN\_A8 or IN\_A9 on the optionboard (S7, Pin 25 or 26).

If the cutter comes to an **XX137** command in the HP-GL sequence, modules are moved to park position, tools are switched off and vacuum is switched depending on command input, and then the command waits there for the specified input level. While the cutter is waiting, a dialog appears and it is not possible to jump over this dialog or abort the **XX137** command.

While in this locked mode, any HP-GL command is ignored, with three exceptions:

- Cutter Status [XX16](#)
  - Frontend command [ZF6](#)
  - [JB](#) commands

Only frontend offline command (ZF6) can abort this command.

When achieving state locked, the command 'CL 1;' is sent over status channel. After leaving state locked command 'CL 0;' is sent over status channel.

Parameter	Format	Functional Range	Default
<i>PortNo</i>	Integer	0,1	0
<i>Level</i>	Integer	0,1	1
<i>Vacuum</i>	Integer	0,1,2	0

*PortNo:*      0:      Input Port IN\_A8 (Optionboard S7 Pin 25)  
                  1:      Input Port IN\_A9 (Optionboard S7 Pin 26)

<i>Level:</i>	0:	Wait until the input is low then continue.
	1:	Wait until the input is high then continue.

Vacuum:            0:        Switch vacuum off  
                    1:        Switch vacuum on  
                    2:        Do not change vacuum.

**EXAMPLE:**      **XX 137,0,1;**  
Cutter will be locked until a 'high' on input IN\_A8 is set. And vacuum is switched off.

**XX137,1,0,2;**  
Cutter will be locked until a 'low' on input IN\_A9 is set. And vacuum do not change.

**NOTE:** IN\_A8 and IN\_A9 are optically isolated inputs and refer to PGND1 on S7 Pin 29.

**SEE ALSO:** Commands: [XX135](#), [ZF6](#), [JB](#)  
Status channel: [CL](#), [IN](#)

## **Index 138 – Blue Signal Lamp**

V 1.47 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
	Frontend - Online✓			Frontend - Offline✓	

Switches the cutter in user request mode (blue signal lamp on when cutter is online).

**SYNTAX:**           **XX 138,OnOff;**

Parameter	Format	Functional Range	Default
OnOff	Integer	0,1	No default

*OnOff:*           1: user request is pending (blue signal lamp on when cutter is online)  
                  0: no user request (signal lamps shows cutter state)

**EXAMPLE:**       **XX 138,1;**  
                  In online mode on Cutter the signal lamps on cutter switches to blue.

**NOTE:**           This command is intend to signalize a user request in the frontend software.

## Index 140 – Equipment Control

V 1.46 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✗
Frontend - Online✓		Frontend - Offline✓		

Switch equipments on or off.

**SYNTAX:**      **XX 140,Equipment,Control;**

Parameter	Format	Functional Range	Default
<i>Equipment</i>	Integer	0..5, 7..12 and 15..21	No default
<i>Control</i>	Integer	0/1	No default

Equipment No.	Equipment name	Panel menue		since
		install	activate	
0	All equipments (control = 1 “on” is not allowed)		read the examples below	v1.46
1	Unwinding unit core	1-11-1-8	1-7-3-1	v1.46
2	Wind-up unit core	1-11-1-7	1-7-4-1	v1.46
3	Ext. material handling 1	1-11-1-5-1	1-7-6-1	v1.46
4	Ext. material handling 2	1-11-1-6-1	1-7-7-1	v1.46
5	Unwind options	1-11-1-11-1	1-7-9-1	v1.47
6	Reserve	no control possible		v1.46
7	Board loading device	1-11-1-13	1-7-18-1	v1.46
8	Fusion feeder	1-11-1-10	1-7-19-1	v1.46
9	Board feeder	1-11-1-15-1	1-7-20-1	v1.46
10	Board stacker	1-11-1-16-1	1-7-21-1	v1.47
11	External feed stop	1-11-6-1	1-7-1-13-1	v1.46
12	Material sensor	1-11-1-17-1	1-7-1-12-1	v1.49
13	Vacuum generator 2 available	no control possible		v1.50
14	Vacuum zone adjusting type	no control possible		v1.53
15	Vacuum key #1	1-11-9-3-1	1-7-16-1	v1.53
16	Vacuum key #2	1-11-9-3-2	1-7-16-2	v1.53
17	Release key #1	1-11-9-2-1	1-7-17-1	v1.53
18	Release key #2	1-11-9-2-2	1-7-17-2	v1.53
19	Sheet feeder	1-11-1-19-1	1-7-5-1	v1.55
20	Stacker table	1-11-1-20-1	1-7-15-1	v1.55
21	Roll-up unit, tray	1-11-1-12-1	1-7-10-1	v1.59
22	ARC Magazine	no control possible		v1.62
23	Type of vacuum generator 1	no control possible		v1.67
24	Type of vacuum generator 2	no control possible		v1.67
50	Conveyor	no control possible		v1.46
51	Cutting strip	no control possible		v1.50
52	Tandem table	no control possible		v1.53
53	Auxiliary drive	no control possible		v1.53
54	ITI	no control possible		v1.59
<b>Status</b>	0: off 1: on			

**EXAMPLES:**

**XX 140,0,0;**

All equipments will be switched off.

**XX 140,8,1;**

Switch fusion feeder will be switched on.

**NOTE:**

- It is not possible to switch on all equipment together (**XX 140,0,1**).
- If no one equipment is installed, the return value is -1.
- Changes will not be saved at shut down.
- **XX 140,20,1;** uses delays in accordance with (1-7-15-2) and (1-7-15-3).

**SEE ALSO:**

[OP140](#)

## Index 141 – Function Control

V 1.46 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✗
Frontend - Online✓		Frontend - Offline✓		

Switch functions on or off and set length / time if desired.

### SYNTAX:

**XX 141,Function,Control;**  
**XX 141,Function,Control,Length;**  
**XX 141,Function,Control,Time;**

Parameter	Format	Functional Range	Default
<i>Function</i>	Integer	1..20 and 22..25	No default
<i>Control</i>	Integer	0..3	No default
<i>Length</i>	Plotter units	0.. device dependent	device dependent
<i>Time</i>	[ms]	0.. device dependent	device dependent

FunctionNr	Description	Panel Menue	Length / Time	Since
0	All functions <sup>6</sup>	-	-	v1.46
1	Stop before feeding	1-7-1-7-1	-	v1.46
2	Feed compensation	1-7-1-8	1-7-1-8	v1.46
3	Material smooth	1-7-1-14-1	-	v1.46
4	Feeding clamps - release mode	1-7-11-2	1-7-11-3	v1.46
5	Start position in X	1-7-1-15-1	1-7-1-15-2	v1.46
6	No longer supported (lateral distance)	-	-	v1.46
7	Reserved	-	-	v1.46
8	Board feed positioning	1-7-20-2-1	-	v1.47
9	Board feed positioning shaking motion	1-7-20-2-2	1-7-20-2-3	v1.47
10	Feeder <sup>7</sup> separating shaking motion	1-7-20-3-1	1-7-20-3-2	v1.47
11	Action trigger	1-7-1-10-3-1	1-7-1-10-3-2	v1.47
12	Load offset X	1-7-1-10-1-1	1-7-1-10-1-2	v1.47
13	Unload offset	1-7-1-10-2-1	1-7-1-10-2-2	v1.47
14	Load offset Y	1-7-1-10-1-1	1-7-1-10-1-3	v1.47
15	Board stacker collision check	1-7-21-2	-	v1.49
16	Vacuum generator configuration	1-8-1-6/1-8-2-4	-	v1.50
17	Air cushion during material transport	1-7-1-17-1	Not more supported after v1.58	v1.49
18	Tandem operation mode	1-7-8-1	-	v1.53
19	Vacuum switch off mode	1-7-16-3	-	v1.53
20	To do if feeder stack is empty	1-7-1-10-1-9	-	v1.58
21	ITI active	No control possible	-	v1.59
22	Vacuum behavior on page feeding	1-7-1-5	-	v1.60
23	Board loading device release time	1-7-18-1	1-7-18-3-1	v1.62
24	Board loading device setting time	1-7-18-1	1-7-18-3-2	v1.62
25	Stop after feeding	1-7-1-7-2	-	v1.66.3

<sup>6</sup> control = 1 (on) is not allowed

<sup>7</sup> For BHS feeder or Sheet feeder

<b>Control:</b>	<p>Only for 11 “Action trigger”</p> <p>0: Periphery (like feeder or stacker) will be ever controlled.      1: Periphery will be only controlled if the feed length (<b>F1xxx</b>; (1-7-1-2) is greater than length.      2: Periphery will never be controlled.      3: Unloading periphery only will be controlled. It's not necessary to deactivate loading periphery.</p> <p>Only for 16 “Vacuum generator configuration”:</p> <p>0: control for both vacuum generators together      1: control for vacuum generator #1 only      2: control for vacuum generator #2 only      3: separated control for both vacuum generators</p> <p>Only for 18 “Tandem operation mode”</p> <p>0: Off      1: On (Tandem)      2: Only rear      3: Only front</p> <ul style="list-style-type: none"> <li>- Setting a tandem mode does not activate a tandem clipping area (a tool can't enter or move inside this area). Sending a <a href="#">XX133</a> activates the tandem clipping for the according area.</li> <li>- By changing or switching off a tandem mode, the user has to press a release key. After changing the mode, there is no tandem clipping area set. The new tandem clipping area will be activated by the next <a href="#">XX133</a>.</li> <li>- Mode 2 &amp; 3: If the clipping area is once activated by a <a href="#">XX133</a>, it's not possible to change/leave the area by a further <a href="#">XX133</a>.</li> </ul> <p>Only for 19 “Vacuum switch off mode”</p> <p>0: Switch off with vacuum → Switches between vacuum and off. Is a cutter equipped with valves, a short blow back pulse is generated.      1: Switch to with vacuum → Switches between vacuum and blowing. This setting suits especially for short term jobs and it prevents the vacuum pump from overheating.</p> <p>Only for 20 “To do if feeder stack is empty”</p> <p>0: stop when empty      1: proceed when empty</p> <p>Only for 22 “Vacuum behavior on page feeding”</p> <p>0: material is always fixed by vacuum or clamp      1: optimised time – material must be able to keep itself on the cutter</p> <p>Only for 23&amp;24 “Board loading device release time” &amp;“Board loading device setting time”</p> <p>0: Board loading device active      1: Board loading device inactive          → Both command (23 and 24) activate/deactivate same Board loading device!</p> <p>Only for 25 “Stop after feeding”</p> <p>0: No additional stop      1: After a page feed, the cutter stops and shows a message to the user before the clamps are released.</p> <p>Other:      0: off      1: on</p>
<b>Length:</b>	Input possible for the following functions: 2, 4, 5, 6, 11, 12, 13 and 14.
<b>Time:</b>	Input possible for the following functions: 9, 10, 23 and 24.
<b>neither Length nor Time</b>	Input not needed for the following functions: 1, 3, 8, 15, 16, 18, 19, 20 and 22.

- EXAMPLES:**
- XX141,0,0;**  
All functions will be switched off.
- XX141,3,1;**  
Material smooth will be switched on.
- XX141,5,1,100000;**  
Start position will be switched on. Start position is on 1m in x-direction.
- XX141,20,1;**  
When “proceed” is set, the production process won’t stop if the material stack of the feeder is empty. So it’s possible to finish the jobs, which are already placed on cutter before.

- NOTE:**
- It is not possible to switch all functions together on (**XX141,0,1**).
  - Changes will not be saved at shut down.
  - If a function will be disable, the corresponding length / time will be ignore.
  - Vacuum generator configuration is only available if a second generator is installed
  - To activate the function 2 (Feed compensation), the length has to be set.
  - **XX141,18** is not available as online frontend command.
  - **XX141,16** will be ignored, if a tandem mode is active.
  - **XX141,6** was supported by FW version < 1.58.0.
  - An activation of the “Board feed positioningshaking motion”, i.e. **xx141,9,1**; will also activate the “Board feed positioning”, i.e. **xx141,8,1**; for FW version 1.62 and higher.

**SEE ALSO:** [OP141](#)

## Index 144 – Board stacker multi page unloading mode

V 1.64.0 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
Frontend - Online ✗				Frontend - Offline ✗	

The **XX144** command is used to set the multi page unloading mode.

**SYNTAX:**      **XX 144,Mode;**

Parameter	Format	Functional Range	Default
Mode	Integer	0..2	No default

**EXAMPLE:**      **XX 144,0;**  
Disable the multi page unloading.

**XX 144,1;**  
Enable the multi page unloading.

**XX 144,2;**  
Unload the BHS stacker material. After this action the conveyer belt is empty.

**EXAMPLE:**      xx144,1; // activate multi page unloading  
**stacking 4 boards** fl60000;  
ff;ff;ff;ff; // preload four boards

for the last four jobs, deactivate loading, see [xx141,11,3:](#)

```
do job (e.g. in the first row)
ff; // finished job will be unloaded, new board will be loaded
do job (e.g. in the first row)
ff; // finished job will be unloaded, new board will be loaded
do job (e.g. in the first row)
ff; // finished job will be unloaded, new board will be loaded
do job (e.g. in the first row)
ff; // finished job will be unloaded, new board will be loaded
xx144,2; // all four unloaded jobs will be stacked
repeat sequence as needed
```

**NOTE:**      If you abort a page feed, the BHS stacker will stack all boards.

A clear buffer disables the multi page unloading settings.

You can always stack your boards by sending xx144,2;

**SEE ALSO:**      [FL](#), [FF](#), [XX140](#), [OP144](#), [XX141](#)

## Index 146 – Track Material Position

V 1.56 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX 146** command is used to input or reset material position in combination with a unload system like a stacker.

**SYNTAX:**      **XX 146,Mode;**  
                 **XX 146,Mode,Position;**

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0..1	No default
<i>Position</i>	integer	-unload length (see <a href="#">OP141,13</a> ) ... table length + load length (see <a href="#">OP141,12</a> )	No default

**EXAMPLE:**      **XX 146,0;**  
                 Resets the material position buffer.

**XX 146,1,50000;XX 146,1,20000;**  
Insert a new material position at 500mm and another at 200mm.

- NOTE:**
- To track automatically material positions, the [XX141,12](#) (**load length X** has to be enabled).
  - The **load length X** should be automatically enabled, if you enable one of the loading peripherals like BHS feeder (**XX 140,9,1**) or Sheet feeder (**XX 140,19,1**).
  - If the material position pass over the (-) unload length (**OP 141,13**), the position will be automatically removed.
  - If the buffer will be cleared, all the tracked material positions are also removed.

**SEE ALSO:**      [XX140](#), [XX141](#), [OP140](#), [OP141](#)

## Index 147 – Capture and/or projection calibration with cutter extension

V 1.63.1 - Initial Release

G3✓	S3✓	L3✗	D3 A✓	D3 B✗
Frontend - Online ✗			Frontend - Offline ✗	

Activation of a single feed in non-approved feed direction for capture and/or projection calibration.

**SYNTAX:**            **XX147;**

- EXAMPLE:**
1. Activation of the reverse feed  
**XX147;**
  2. Go ONLINE
  3. Set feed length (absolut value  $|$ feed length $| \leq 4m$  – only for reverse feed)  
**FL-20000;**
  4. Start feed  
**FF;**

**NOTE:**            The activation state of the reverse feed can be queried with the [OP147](#) command.

The reverse feed:

- ... is limited to 4m in length.
- ... can only be executed in the ONLINE mode.
- ... can be executed only once. For a second execution the cutter have to be restarted.

The reverse feed activation is maintained until:

- ... the reverse feed is performed.
- ... a reverse feed is cancelled.
- ... the cutter is restarted.

If your paging direction, see (1-11-1-2) or [XX41](#) command, is “forward & backward” you don’t need to activate a single reverse feed.

**SEE ALSO:**        [OP147](#); [FL](#); [FF](#); [XX41](#);

## Index 150 – Router/URT Speed Selection – RPM

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✕				Frontend - Offline ✕	

The **XX150** command is used to define the router/URT speed in RPM.

**SYNTAX:**      **XX 150,Speed;**

Parameter	Format	Functional Range	Default
Speed	Integer	5000.....80000[RPM]	No default

Speed:	RM-A / RM-S / RM-120 Define the speed of the Router. 7000: lowest level 50000: highest level The speed can be changed in steps of 100 rpm	URT Define the speed of the URT. 20000: lowest level 80000: highest level The speed can be changed in steps of 200 rpm
	RM-L Define the speed of the Router. 5000: lowest level 50000: highest level The speed can be changed in steps of 100 rpm.	

**EXAMPLE:**      **XX150,39849;**                    **XX150,39901;**  
                          Set Router Speed to 39800 RPM.        Set URT Speed to 40000 RPM.

**NOTE:**            Is a router in operation and a new speed will be set, it can be problematic if afterwards a **SD** (> 1s) is send, to wait until the router has reached the new speed. Use instead two SD's, the first smaller than 1s to avoid an error.

## Index 151 – Tool Speed Selection

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.47 - added additional speedLevel for PRT	Frontend - Online ✕			Frontend - Offline ✕	

The **XX151** command is used to define the speed of EOT, DRT or PRT tools.

**SYNTAX:**      **XX 151,SpeedLevel;**

Parameter	Format	Functional Range	Default
SpeedLevel	Integer	0,1,2	No default

SpeedLevel:	EOT and DRT 0: low speed 1: high speed	PRT only 0: low speed 1: medium speed 2: high speed
-------------	--	--

**EXAMPLE:**      **XX151,1;**  
                          Set EOT or DRT to high speed and the PRT to medium speed.

**NOTE:**            EOT-250 is not being supported.

**SEE ALSO:**      [OP151](#)

## Index 152 – Advanced Tool Speed Signal

V 1.61 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✕			Frontend - Offline ✕	

The **XX152** command is used to configure the advanced speed-proportional tool speed signal. This function can be assigned to one or more tools and the signal is available on the configured ACS\_OPT\_BRD1 equipped with an ACS\_OPT\_ANT1. Please see “Service Manual, Synchronisation of external equipment” for further details about the configuration of the hardware.

**SYNTAX:** **XX 152,DriveID,MinValue,MaxValue;**

Parameter	Format	Functional Range	Default
<i>DriveID</i>	Integer	1, 2	No default
<i>MinValue</i>	Real	0 – 100	No default
<i>MaxValue</i>	Real	0 – 100	No default

*DriveID*:  
1: new values for “ext. sync. unit 1” (1-11-7)  
2: new values for “ext. sync. unit 2” (1-11-8)

*MinValue*: Minimal value at the configured output in percent.

*MaxValue*: Maximal value at the configured output in percent

**CALCULATION:**

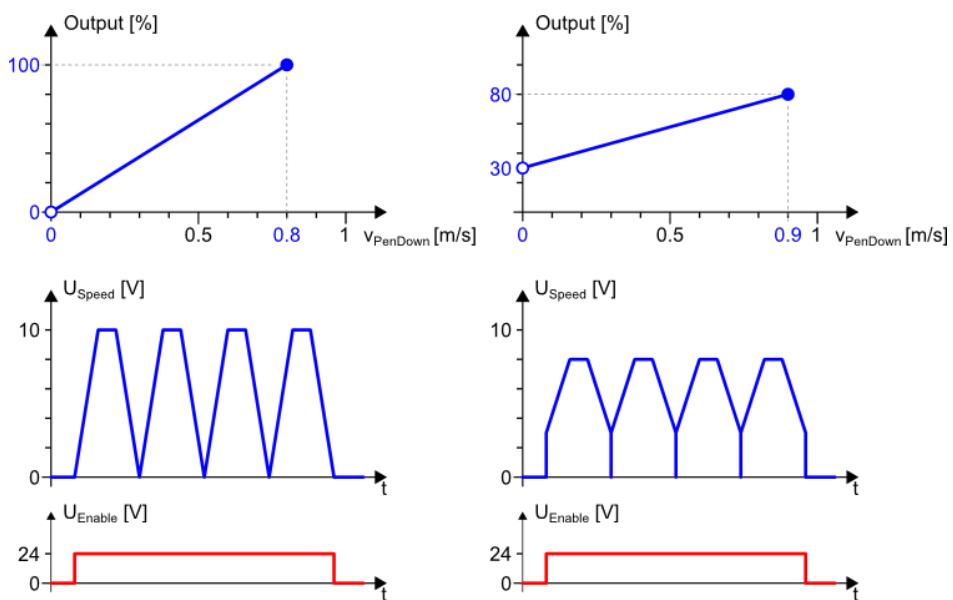
$$U_{OUT} = 10V \cdot \left( \left( \frac{MaxValue - MinValue}{maxToolDownSpeed} \cdot actualToolSpeed \right) + minValue \right)$$

10V is the selected output voltage range on the corresponding ACS\_OPT\_ANT1-Board. With jumper J1 left open on this board it's also possible to select 5V.

**EXAMPLE:**

**VS80; AS4;**  
**XX 152,1,0,100;**  
**PU0,0; PD20000,0;**  
**PD20000,20000;**  
**PD0,20000; PD0,0;**  
**PU;**

**VS90;AS4;**  
**XX 152,1,30,80;**  
**PU0,0;PD20000,0;**  
**PD20000,20000;**  
**PD0,20000;PD0,0;**  
**PU;**



**NOTE:**

- Use *Continuous Path XX62*; together with the advanced tool speed signal to reach a linear relation between the output voltage and the actual tool speed over the whole speed range of the tool.
- If the actual toolspeed in X- and Y-direction is zero, the output voltage remains at 0 V. Only if the speed rises slightly above zero, *MinValue* is

- available at the output.
- **XX152** is only available if the mode (1-11-7-4 or 1-11-8-4) of the corresponding “ext. sync.unit” is set to “enhanced XY speed”.

**SEE ALSO:** [XX62](#)

## Index 160 – Tool Up with T-Axis

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.66 – Divided Vektors for D3	Frontend - Online ✗	Frontend - Offline ✗			

**XX 160** lifts the plotting tool. In addition, the tool moves to the specified location and turns the t-axis to the given angle. Depending on the current mode (absolute or relative, defined with **PA** or **PR**) the X and Y parameters are interpreted as either absolute positions or differences between the current and the new position.

**SYNTAX:** **XX 160,X,Y,Angle;**

Parameter	Format	Functional Range	Default
X, Y	User units Absolute or Relative	Device-dependent	plotting tool will be lifted
Angle	Real	-180.0 ... +180.0	No default

X, Y: New position or vector.

**EXAMPLE:** **PA;**  
**XX160,100,100,90;**  
The plotting tool is lifted and moved to 100,100. While this move the T-axis turns to 90°.

**Note:** Use this command to reduce T-axis movement before next down vector.

**Note II:** On D3 an XX160 movement will be divided into 2 vectors (XY-vector + Y-vector), when y-part is greater then x-part and x-direction leads away from other beam. The t-rotation occurs parallel to the move with longer y part.

**SEE ALSO:** [PU.](#)

## Index 161 – Press Down Material / Hold Material

V 1.51 - Initial Release	G3✓	S3✓	L3✗	D3 A✓	D3 B✗
V 1.59 - XX161 without Delay implemented	Frontend - Online ✗			Frontend - Offline ✗	

The **XX161** is intending to press down those material corners, which the vacuum generator weren't able to suck down on the table. The material will be pressed down with the clamp paw or the clamp bar. Another function of **XX161** is to hold material with the clamp paw or the clamp bar e.g. while the operator collects the produced parts from cutter.

### SYNTAX:

**XX 161,XPosition;**  
**XX 161,XPosition,Delay;**

Parameter	Format	Functional Range	Default
<i>XPosition</i>	User units	depending on device	No default
<i>Delay</i>	[ms]	0..10s	No default

*XPosition:* Position of the up standing material.

*Delay:* Press time, push time, hold time

### EXAMPLE:

**XX 161,70000,100;**

On X position 70000 the material will be pressed down to table for 100 ms, by the clamp units.

**XX 161,70000;**

On X position 70000 the material will be held down, vacuum generator switches off, if it was on, and a dialog appears on panel. After collecting produced parts from cutter, the operator press 'lift + continue' on panel to switch vacuum generator on (if it was on before **XX161**), lift the clamp and continue production.

### Note:

- At first, module will be moved to park position and (only for press down material) the vacuum will be turned on.
- Delay time for press down material will be limited at 10s.
- After a 'press down' execution the vacuum will be switched on.  
After a 'hold down' execution the vacuum will be set as before.

## Index 170 – Improvement for Symmetric Tools

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX170** command is to set or unset the improvement for symmetric tools (e.g. CTT1, CTT2, UCT). This command gets advantage in velocity by driving tangential vectors. This **XX170** command has to use only with symmetric tools!

**SYNTAX:**      **XX 170,OnOff;**

Parameter	Format	Functional Range	Default
OnOff	Integer	0 or 1	No default

OnOff                  Define whether the improvement turns off or on.  
0: off  
1: on

**EXAMPLE:**      XX170,1;  
                        Set the improvement for symmetric tool to on.  
XX170,0;  
                        Set the improvement for symmetric tool to off.

## Index 189 – Switch Laser Pointer, Get Laser Pointer Status

V 1.40.2 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.45 - added XX189 as frontend command		Frontend - Online ✓		Frontend - Offline ✓	

The **XX189** command is used to switch the laser pointer ON or OFF. Also you can get the status.

**SYNTAX:**      **XX 189,Value;**

Parameter	Format	Functional Range	Default
Value	Integer	{ { },0,1,99 }	1

Value:                no value     : equal to value 1  
                      0              : switch laser pointer OFF  
                      1              : switch laser pointer ON  
                      99             : read out state {0 (for OFF), 1 (for ON)}  
                      other        : equal to value 1

**SEE ALSO:**      [OP170](#)

## Index 191 – Camera Illumination Mode

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40.3 - added XX191 as frontend command	Frontend - Online✓			Frontend - Offline✓	
V 1.49 - added parameter <i>LEDpattern</i>					

The **XX191** command is used to switch the light of the Zünd integrated compact colour camera on and off.

It's also possible to switch on a LED pattern for a better edge detection.

**SYNTAX:**      **XX 191,Mode;**  
**XX 191,3,LEDpattern;**

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1	No default
<i>LEDpattern</i>	Integer	0..11111111	No default

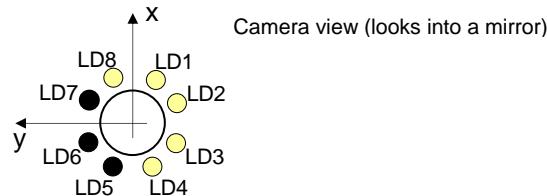
*Mode:*              Selects the according function:

- 0 : light off
- 1 : light on
- 2 : reserved
- 3 : switch the LED pattern on

99 : read out state [0..3] – obsolete, use instead [OP191](#)

*other:* light on

*LEDpattern:*        {LD8,LD7,LD6,...,LD1}, e.g. example for **XX 191,3,10001111;**



**NOTE:**

- Mode 0 and 1 will be saved at shut down.
- Mode 3 will be saved to mode 0 at shut down.
- The LED pattern doesn't will be saved at shut down.
- Set a LED pattern is only possible in mode = 3.

**SEE ALSO:**

[OP191](#)

## Index 192 – Camera Light Level

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40.3 - added XX192 as frontend command	Frontend - Online✓			Frontend - Offline✓	

The **XX192** command is used to set the lighting level of the Zünd integrated compact colour camera.

**SYNTAX:**      **XX 192,Intensity;**

Parameter	Format	Functional Range	Default
Intensity	Integer	1,2,3,4,5,6,7	1

*Intensity:*      Selects the according function:

- 1 : lowest level
- 7 : highest level
- 99 : read out state [1..7]

other : lowest level

**NOTE:**      State will be saved at shut down.

## Index 194 – Camera White Balance Options

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - added XX194 as frontend command	Frontend - Online✓			Frontend - Offline✓	

The **XX194** command is used to set the white balance of the Zünd integrated compact colour camera.

**SYNTAX:**      **XX 194,Mode;**

Parameter	Format	Functional Range	Default
Mode	Integer	0,1,2,3	0

*Mode:*      Selects the according mode:

- 0 : auto
- 1 : indoor, 3200K
- 2 : fluorescent, 4500K
- 3 : outdoor, 6400K
- 99 : read out state [0..3]

other : auto

**NOTE:**      - If the BLC (**XX197**) is on, the white balance is only in “auto mode” possible.  
- State will be saved at shut down.

## Index 195 – Camera Shutter Time Options

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - added XX195 as frontend command	Frontend - Online✓			Frontend - Offline✓	

The **XX195** command is used to set the shutter time of the Zünd integrated compact colour camera.

**SYNTAX:**      **XX 195,Time;**

Parameter	Format	Functional Range	Default
<i>Time</i>	Integer	0,1,2,3	0

*Time*: Selects the according *time*:

0	: auto
1	: 1/6.25 s
2	: 1/12.5 s
3	: 1/25 s
4	: 1/50 s
5	: 1/120 s
6	: 1/250 s
7	: 1/500 s
8	: 1/1k s
9	: 1/2k s
10	: 1/5k s
11	: 1/10k s
12	: 1/20k s
13	: 1/50k s
14	: 1/100k s
99	: read out state [0..14]

other : auto

**NOTE:** State will be saved at shut down.

## Index 197 – Camera Back Light Compensation Mode

V 1.30 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.40 - added XX197 as frontend command	Frontend - Online✓			Frontend - Offline✓	

The **XX197** command is used to set the back light compensation (BLC) of the Zünd integrated compact colour camera.

**SYNTAX:**      **XX 197,Mode;**

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0,1,2,3	0

*Mode*: Selects the according mode:

0	: OFF
1	: ON
99	: read out state {0,1}

other : OFF

**NOTE:**

- Turn ON the BLC, set white balance (xx194) to “auto mode”.
- State will be saved at shut down.

## Index 220 – Move to Tool Change Position

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.66 - Added third change position			Frontend - Online ✗	Frontend - Offline ✗	

The **XX220** command moves the module carriage to tool change position. Depending on the mounted tool type in an universal module they are rotated to a service friendly position so the tools can easily be demounted from the module. This command can also be used for changing the angle of a VCT. Optionally the tool manager can be started, if it is enabled. For safety reasons the cutter changes to offline after executing this command.

### SYNTAX:

**XX 220;**  
**XX 220,ChangePos;**  
**XX 220,ChangePos,Toolmanager;**

Parameter	Format	Functional Range	Default
<i>ChangePos</i>	Integer	1,2,3	1
<i>Toolmanager</i>	Integer	0,1	0

*ChangePos:* If there are several module change positions defined, the module change position can be selected as following:  
1 : moves to the defined module change position 1  
2 : moves to the defined module change position 2  
3 : moves to the defined module change position 3

If there is only one module change position defined in either case this module change position will be chosen.

*Toolmanager:* Define whether the tool manager should be started after move or not.  
0 : no tool manager  
1 : starts the tool manager after move (works only if it is enabled on cutter)

**EXAMPLE:** **XX220,1,0;**  
Moves the module carriage to the module change position 1 without starting the tool manager.

**XX220,2,1;**  
Moves the module carriage to the module change position 2 and, if the tool manager is enabled, it will be started.

**XX220,2;**  
Moves the module carriage to the module change position 2 without starting the tool manager.

**XX220;**  
Moves the module carriage to the module change position 1 without starting the tool manager.

**NOTE:** For safety reasons the cutter changes to offline after executing this command.

## Index 250 – Cutter Identification

V 1.20 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.56 – added XX250 as frontend command	Frontend - Online✓			Frontend - Offline✓	

Function 0:

Not implemented.

Function 1:

Not implemented.

Function 2:

Read cutter serial number as string. Data direction is PLOTTER → PC.

**SYNTAX:**           **XX 250,Function;**

**OUTPUT FORMAT:**   **SerialNumber;[cr][lf]**

Parameter	Format	Functional Range	Default
<i>Function</i>	Integer	0,1,10	No default
<i>SerialNumber</i>	String	ASCII 32 to 126 except '@'	No default

<i>Function:</i>	2 = Read serial number as a string
<i>SerialNumber</i>	Alphanumeric format who describes the cutter. It is a combination of table type + table number.
<b>EXAMPLE:</b>	<b>XX250,2;</b>
<b>RESPONSE:</b>	G3_M2500/123;[cr][lf] G3_M2500 = table type 123 = table number

## Index 270– Protect Frontend Settings

V 1.61 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✓				Frontend - Offline ✗	

Protects settings that have been set by the frontend.

**SYNTAX:** **XX270;**  
**XX270,Selection,Mode;**

Parameter	Format	Functional Range	Default
Selection	Integer	1	No default
Mode	Integer	0,1	0

**Selection:** 1: Protects the up / down position ([ZP](#)) and the auto lift up position ([XX96](#)) from deletion by a tool initialization when the cutters system state isn't online. Contrary to this the z offset ([OP83](#)) will be deleted.  
 Use this setting to avoid the deletion of the down position when the tool is re-initialized after at tool change in case of breakage.

**Mode:**  
 0: Reset the protection.  
 1: Sets the protection active.

**EXAMPLE:** **XX270,1,1;**  
 Sets the setting to protect the Z axis positions.

**XX270;**  
 Resets all settings.

**NOTE:**

- Ensure that after the end of the job the settings are reseted.
- A clear buffer ([ZF2](#)) or a shut down of the cutter will also reset all protected settings.

## Index 305 – Measurement of Material Thickness

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.66.3 - Added third parameter				Frontend - Online ✗	Frontend - Offline ✗

Measure the material thickness.

**SYNTAX:** **XX 305;**  
**XX 305,X,Y;**  
**XX 305,X,Y,Z;**

**OUTPUT FORMAT:** *height[TERM]*

Parameter	Format	Functional Range	Default
X	Plotter units	Device-dependent	No default
Y	Plotter units	Device-dependent	No default
Z	Plotter units	Device-dependent	No default

**EXAMPLE:** **XX305;**  
 Measurement on actual position.

**XX305,4000,60000;**  
 Measurement on position X = 4000 and Y = 60000.

**XX305,4000,60000,1000;**  
 Measurement on position X = 4000 and Y = 60000. Extractor unit moves directly to 10mm above the AKI/ITI reference and starts searching. After measurement, the extractor unit returns to the specified z-position. Send [XX95](#)

to reach park if measurement is finished.

**RESPONSE:** 1291[TERM]

**NOTE:**

- The unit of the response is 'Plotter units'.
- This operation can only be used with the RM-A/RM-120/RM-S/RM-L module.
- This operation can only be used after an AKI or an ITI initialization of the extractor unit (e.g. the RM-A extractor).  
If AKI or ITI initialisation hasn't been realised, the output value is -9999.
- Use XX305 with three parameters if multiple fast measurements on different locations on the same material are required. Please reduce the z-position carefully and on the basis of the previous measurements in order to avoid a collision with the material.

PA20000,20000;  
XX305,20000,20000,1000;  
XX305,30000,25000,1000;  
XX95;

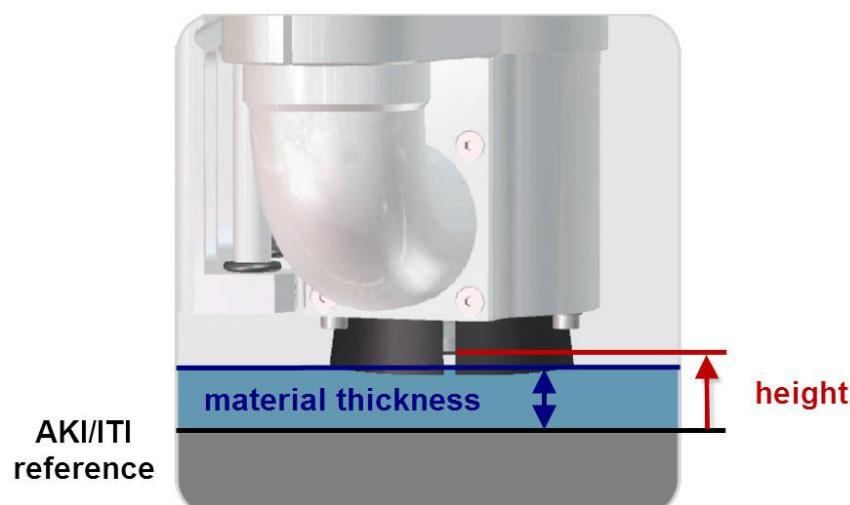
## Index 306 – Set Extraction Position

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.65 - Description adapted		Frontend - Online X		Frontend - Offline X	

The command sets the extraction position of a router module.

It just works if the current module is a router module and the extractor is auto (AKI/ITI) initialized. The return value will be -9999 if one of these conditions does not match.

The brush has newly a length of 3.3mm. So ideally the extraction position is 3.3mm above the material surface. If your material has a thickness of 25mm set a height of 28.3mm



**SYNTAX:** XX 306,Height;

Parameter	Format	Functional Range	Default
Height	Plotter units	RM-A: 0-7000 RM-120: 0-13500 RM-S: 0-5000 RM-L: 0-6670	No default

**EXAMPLE:** XX306, 2830;

**RESPONSE:** 2830 [TERM]

**EXAMPLE (RM-A):** **XX306,8330;**

**RESPONSE:** **-9999 [TERM]**

**NOTE:** - If the height is correctly set the return value is the set height otherwise the error value -9999.

- The height will not be saved at shutdown.

- The height is referenced to the AKI bottom.

- With the ITI the height is referenced to the surface of the underlay.

**SEE ALSO:** [OP306](#), [OP304](#)

## Index 308 – Additional Underlay

V 1.56 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✓	

The command works only if an ITI is installed.

The **XX308** enables or disables the additional underlay in the firmware. It doesn't change the physical state of the additional underlay.

**SYNTAX:**

**XX 308,Mode;**  
**XX 308,Mode,Thickness;**

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0, 1	0
<i>Thickness</i>	Plotter units	0...1000	200

*Mode:* 0: Disables the additional underlay in the firmware. The operator must remove the additional underlay manually by hand.  
1: Enables the additional underlay in the firmware. The operator must apply the additional underlay manually by hand.

*Thickness:* Thickness of the additional underlay.

**EXAMPLE:** **XX308,0;**

**XX308,1,203;**

**NOTE:**

- By setting the thickness of the additional underlay with this command, the value which was calibrated by the user will be overwritten.
- If the state of the additional underlay is changed to applied, all Z-init positions will be automatically reduced by the value of the thickness of the additional underlay and inversely.
- If the value for the thickness that is sent isn't the same as the value who is stored, the difference is added to all Z-init positions if the underlay is actually enabled.
- If the command is sent while the cutter status is online and the module position of the actual selected module isn't park, the module is moved to park.

**SEE ALSO:**

[OP308](#), [XX16](#), [Frontend Commands](#)

## Index 310 – Surface Balance Switch

V 1.43 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

The **XX310** enables or disables the surface balance. An area must be measured with surface balance measuring before it can be enabled.

When the surface balance will be enabled, the Z-Axis moving mode switched automatically to position mode.

**SYNTAX:** **XX 310,Mode;**

Parameter	Format	Functional Range	Default
<i>Mode</i>	Integer	0, 1	0

*Mode:* Activates or deactivates surface balance

0 = Off

1 = On

**EXAMPLE:** **XX310,1;** Activates the surface balance.

**NOTE:** - For more information see Operating Manual Router Module (RM-A/RM-S/RM-L) under surface compensation.

**SEE ALSO:** [XX311;](#)

## Index 311 – Surface Balance Measuring

V 1.43 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✗				Frontend - Offline ✗	

The XX311 defines a rectangular area, a grid and starts measuring the surface balance. The given area is measured with the extractor which is part of an RM-A/RM-S/RM-L module. Therefore an RM-A/RM-S/RM-L must be the selected module. After a successful measuring the surface balance is enabled. Without parameter measuring with the last given parameters starts.

**SYNTAX:**      **XX 311;**  
**XX 311,Xl,Yl,Xh,Yh,Gridsize;**

Parameter	Format	Functional Range	Default
Xl, Yl, Xh, Yh	User units	Device-dependent	No default
Gridsize	Plotter units	3000...120000	No default

Xl:            X lower border

Yl:            Y lower border

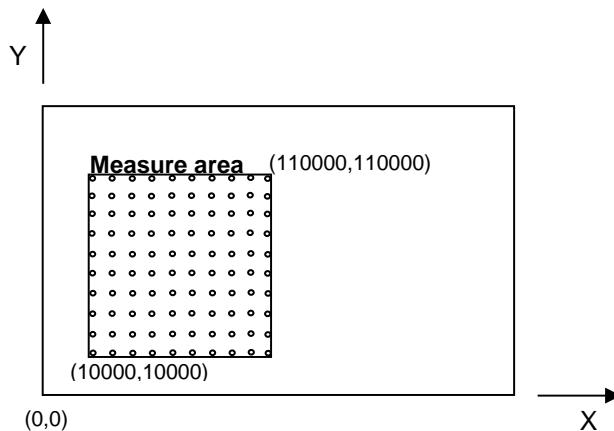
Xh:            X higher border

Yh:            Y higher border

Gridsize:     Distance between measure points

**EXAMPLE:**    **XX311,10000,10000,110000,110000,10000;**

Starts measuring the surface balance in the given area. With the given grid size a grid is calculated within the area. The RM-A/RM-S/RM-L moves to each grid point and starts measuring the z-height.



**NOTE:**        - For more information see Operating Manual Router Module (RM-A/RM-S/RM-L) under surface compensation.

**SEE ALSO:**    [XX310;](#)

## Index 320 – Minimum Quantity Lubrication - Fill the Capillary Tube

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
Frontend - Online ✗				Frontend - Offline ✗	

The XX320 command is used to fill the capillary tube of the installed minimum quantity lubrication aggregate.

**SYNTAX:**      **XX 320;**

## Index 321 – Minimum Quantity Lubrication - Empty the Capillary Tube

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX321** command is used to empty the capillary tube of the installed minimum quantity lubrication aggregate.

**SYNTAX:**      **XX 321;**

## Index 322 – Minimum Quantity Lubrication - Set Mode

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX322** command is used to set the mode of the installed minimum quantity lubrication aggregate.

**SYNTAX:**      **XX 322,Mode;**

Parameter	Format	Functional Range	Default
Mode	Integer	[0, 2]	2

**Mode :**  
0: disable minimum quantity lubrication aggregate.  
1: cooling (by the majority air, a smidgen of lubricate is possible)  
2: lubrication

**EXAMPLE:**      **XX322,2;**

**NOTE:**            - Mode will not be saved at shut down.

**SEE ALSO:**       [OP322](#)

## Index 323 – Minimum Quantity Lubrication - Set Pump Stage

V 1.45 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX323** command is used to set the pump stage of the installed minimum quantity lubrication aggregate.

**SYNTAX:**      **XX 323,Stage;**

Parameter	Format	Functional Range	Default
Stage	integer	[1..5]	3

**Stage:**  
1: 30s pump frequency  
2: 25s pump frequency  
3: 20s pump frequency  
4: 10s pump frequency  
5: 5s pump frequency

**EXAMPLE:**      **XX323,5;**

**NOTE:**            Pump stage will not be saved at shut down.

**SEE ALSO:**       [OP323](#)

## Index 330 – Material Dimension in X-, Y-, and Z-Direction

V 1.48 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

This command is being used to adjust the geometrical dimensions of the machined material (Length, Width, and Height). This information will be forward to the Board Handling System afterwards. Directories are based on the cutter's framework. The main goal is to adjust the height. Changes in X-, and Y-direction are not possible at the moment. Implementation will be done later.

**SYNTAX:** **XX 330,X-direction,Y-direction,Z-direction;**

Parameter	Format	Functional Range	Default
X-direction (length)	Integer	0...[1/100mm]	-
Y-direction (width)	Integer	0...[1/100mm]	-
Z-direction (height)	Integer	10...6000[1/100mm]	-

*X-direction (length):* Value that describes the length (X-direction of the cutter).

*Y-direction (width):* Value that describes the width (Y-direction of the cutter).

*Z-direction (height):* Value that describes the height (Z-direction of the cutter)

**EXAMPLE:** **XX330,200000,100000,500;**

Sets the dimensions in all directories with:

Length: 2m

Width: 1m

Height: 5mm

## Index 333 – Reference Tool Initialization

V 1.59 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

This command initialize the current selected tool and is just executable if an ITI is installed ([OP140,54](#) != -1) and it's possible to initialize the tool with the ITI. For further conditions have a look on [OP333](#).

This command will redetermine the Z initialization position and sets the reference Z initialization position to the newly determined Z initialization position.

The Z offset and the Z up/down positions ([ZP](#)) of the current selected tool are reset to 0 after execution of this command

**SYNTAX:** **XX 333;**

**NOTE:**

- The initialization type of the tool is set automatically to 3 ("ITI reference" [OP305](#)) after successful execution of this command. If this command is aborted during execution, the initialization type of the tool is reseted to 0 ("manual") and the Z initialization position to 0.
- An initialization started on the operating unit while the cutter state is offline acts as a reference initialization.
- If the ITI is installed on the left side of the cutter, tools inserted in a module which is mounted on module slot 3 ([SP3,31](#)) can't be initialized with the ITI. Contrary to this, a tool that is inserted in a module which is mounted on slot 1 ([SP1,11](#)) can't be initialized with the ITI if this is installed on the right side. Only if both ITI's are installed (left and right), it doesn't matter which slot a tool is mounted on. See also [OP333](#).

**SEE ALSO:**

[OP140,54](#), [OP141,21](#), [OP333](#), [XX334](#)

## Index 334 – Readjust Tool Initialization

V 1.59 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

This command reinitialize the current selected tool and is just executable if an ITI is installed ([OP140,54](#) != -1) and a tool can be initialized with an ITI ([OP333](#)). For further conditions have a look on [OP333](#). Contrary to the [XX333](#), the reference Z initialization position won't redetermined by this command and the Z offset and the Z up/down positions ([ZP](#)) of the current selected tool are not reset to 0.

**SYNTAX:**      **XX 334;**

**NOTE:**

- See also the notes of [XX333](#).
- The initialization type of the tool is set automatically to 4 ("ITI readjust" ([OP305](#))) after successful execution of this command. If this command is aborted during execution, the initialization type of the tool is reseted to 0 ("manual") and the Z initialization position to 0.
- If a tool has never been initialized with a **XX333** and is first initialized with the **XX334**, a warning on the operating unit display pops up that the current Z initialization position is used as the reference Z initialization position.
- If the tool has already been ITI reference initialized, the Z axis limit for the search process is set to reference Z initialization position + 2mm (200 plotter units). If the tip of a tool is not found within this limit, the Z initialization position is set to 0 (see also the examples of [OP334](#)).

**SEE ALSO:**      [OP334](#)

## Index 340 – Additional Stacking Height

V 1.48 - Initial Release	G3✓	S3✓	L3 ✗	D3 A✓	D3 B ✗
	Frontend - Online ✗			Frontend - Offline ✗	

This command is used to modify the step height between two boards on the BHS stacker. In normal case the stack moves the size of a board height down. In some case (e.g. wrapped boards or overlapping boards) it is useful to move more then the board size down. This additional move can be set with this command.

**SYNTAX:**      **XX 340,AdditionalStackingHeight;**

Parameter	Format	Functional Range	Default
<b>AdditionalStacking-Height</b>	Integer	-10000...10000[1/100mm]	0

**AdditionalStacking-Height:**      Value that describes the additional stacking height.

**EXAMPLE:**      **XX340,5000;**  
Sets the additional stacking height to 5mm.  
After stacking the next board on the BHS stacker the platform moves material height plus 5mm down.

**NOTE:**

- The additional stacking height is reset to zero every time the material dimension is set to a new value!
- The minimum of the AdditionalStackingHeight must be greater than the negative value of the material height.

**SEE ALSO:**      [XX330](#)

## Index 351 – Router Bit Change

V 1.62 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✓	

This command initiates a router bit change.

**SYNTAX:**      **XX351,RouterBitNumber;**

Parameter	Format	Functional Range	Default
RouterBitNumber	Integer	0..19	no

*RouterBitNumber*      Use following role for the router bit number.  
RT QC (manually router bits) : **1..10**  
RT QC A (magazine router bits) : **11..18** (bit number + 10)  
magazine lock bit : **19** (bit number + 10)

**EXAMPLE:**      **XX351,0;**  
Selects a NoTool.

**EXAMPLE:**      **XX351,1;**  
Selects the manually router bit #1 - → RT QC#1

**EXAMPLE:**      **XX351,12;**  
Selects the magazine router bit #2 → RT QC A#2

**NOTE:**

- Never leave the collet empty (no router bit clamping).
- The process is guided. Follow the instructions displayed on the operating unit.
- Magazine router bits will always be cleaned before placing them.
- Each manual router bit change will reset the initial position of the new router bit.
- If the selected manual router bit is not in toolmanager, it is automatically created.
- The router module has to be selected.
- This action can also be used in tandem operation mode. For running the ARC action you have to release the front work area. Do not toggle the release button of the front work area during the ARC action execution.

**SEE ALSO:**      [SP: OP37; XX133;](#)

## Index 352 – Start ARC Magazine Assembly

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

This command starts the magazine assembly process.

**SYNTAX:**      **XX352;**

**NOTE:**

- At the beginning all magazine router bits #(11-18) will be arranged in the magazine, before it will be released for assembling.
- A manually bit #(1-10) will not be arranged in the magazine before.
- The lock pin (#19) will not be arranged in the magazine before.
- This action can also be used in tandem operation mode. For running the ARC action you have to release the front work area. Do not toggle the release button of the front work area during the ARC action execution.

**SEE ALSO:**      [XX353; OP350; XX133;](#)

## **Index 353 – End ARC Magazine Assembly**

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
Frontend - Online ✗				Frontend - Offline ✗	

This command stops the magazine assembly process.

**SYNTAX:** **XX353;**

**NOTE:**

- The completion of the magazine assembly ends with a scanning move to detect the installed magazine router bits.
- If the last used router bit is still installed, it will be picked after the assembly is completed.  
If the last used router bit was removed from its slot, the lock bit will be picked after the assembly is completed.  
If the last used router bit was removed from its slot and no lock bit is installed, any other bit will be picked instead.  
If no bit is installed (in the magazine), the collet will remain empty.
- The magazine assembly must be finished with XX353; or by confirmation on the operating unit.

**SEE ALSO:**

[XX352; OP350;](#)

## **Index 354 – Cleaning Actual ARC Router Bit**

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
V 1.66 - Note for manually HSK routers added		Frontend - Online ✗		Frontend - Offline ✗	

This command starts the cleaning of the current selected router bit in the ARC cleaning station.

**SYNTAX:** **XX354;**

**NOTE:**

- This command cleans the current router bit, even if it is a manually clamped router bit.
- Manually clamped HSK routers can not be cleaned.
- This action can also be used in tandem operation mode. For running the ARC action you have to release the front work area. Do not toggle the release button of the front work area during the ARC action execution.

**SEE ALSO:**

[XX133;](#)

## **Index 355 – Configuration of the router bit initialization**

V 1.63 - Initial Release	G3✓	S3✗	L3✗	D3 A✗	D3 B✗
V 1.66 - Default value changed from 0 to 1		Frontend - Online ✗		Frontend - Offline ✓	

This command sets the configuration of the router bit initialization.

**SYNTAX:** **XX355, InitConfiguration;**

Parameter	Format	Functional Range	Default
<i>InitConfiguration</i>	Integer	0..1	1

- InitConfiguration*
- 0: The router bit will be initialized before and after usage. With other words after and before router bit changing.
  - 1: The router bit will only be initialized before usage. With other words only after router bit changing.

**NOTE:**

- A router bit fracture can only be detected if it is initialized before and after use.

**SEE ALSO:**

[OP355;](#)

## Index 356 – Configuration: ARC magazine door cleaning before open it

V 1.63 - Initial Release	G3✓	S3 ✗	L3 ✗	D3 A ✗	D3 B ✗
	Frontend - Online ✗			Frontend - Offline ✓	

This command sets the configuration of the magazine door cleaning before opening it.

**SYNTAX:** `XX356,Configuration;`

Parameter	Format	Functional Range	Default
<i>Configuration</i>	Integer	0, 1	0

**Configuration**  
0 : The magazine door will be opened without cleaning it before.  
1 : The magazine door will be cleaned before it is opened.

**NOTE:** The automated cleaning is rudimentary. It is advisable to wipe the magazine door occasionally by hand.

**SEE ALSO:** [OP356:](#)

## Index 380 – Start Cleaning Pass

V 1.65 - Initial Release	G3✓	S3 ✗	L3 ✗	D3 A ✗	D3 B ✗
	Frontend - Online ✗			Frontend - Offline ✗	

This command executes a cleaning pass for tools installed on module 1.

**SYNTAX:** `XX380,StartPosX,StartPosY,EndPosX;`

Parameter	Format	Functional Range	Default
<i>StartPosX</i>	Integer	30000...[1/100mm]	-
<i>StartPosY</i>	Integer	device dependent	-
<i>EndPosX</i>	Integer	30000... [1/100mm]	-

**EXAMPLE:** `XX380,35000,285000,55000;`  
Module 1 is set to park followed by a move to the start position of the cleaning strip. The cleaning pass is being executed from 350mm to 550mm in positive X-direction in a pre defined down position using the command ZP in advance(e.g. G3\_2XL3200).

**EXAMPLE:** `XX380,75000,145000,40000;`  
The cleaning pass is being executed from 750mm to 400mm in negative X-direction in a pre defined down position using the command ZP in advance (e.g. G3\_M2500).

**NOTE:**

- Zund does not offer any kind of cleaning strips for their cutters and is neither responsible for the installation nor for mechanical modifications performed by the customer in order to use a cleaning strip.
- The value of the start and end position in X-direction must be equal or higher than 300mm to avoid potential collisions with an ITI.
- This function can only be executed by frontend systems which can handle this command and start a cleaning pass outside the active working area without switching the cutter into offline mode or removing the tool manually.
- Only tools installed on module 1 can be cleaned using this function. Module 2 and 3 will not perform the cleaning pass due to mechanical limitations of the module carriage using a cleaning strip outside the active working area on the left side of the cutter.
- The cleaning strip can be used in either direction. Set the start and end positions according to the orientation in the X-direction.
- To avoid damages or crashes on the cutter make sure the cleaning strip is installed properly and each parameter is set correctly according to its mechanical properties (e.g. acceleration, speed and additional Z-depth).

**SEE ALSO:**

[ZP](#); [AS](#); [VS](#); [ZS](#);

## Index 550 – Set Online Start Position

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.58 - Supported by L3 tables			Frontend - Online X		Frontend - Offline✓
V 1.63 - Supported during tandem operation					

The frontend command **XX550** is used to set the online start position. This is the position where the cutter moves to when it is switched to online. This command can only be sent in offline mode and the buffer is cleared!

**SYNTAX:**           **XX 550,XStartPos,YStartPos;**

Parameter	Format	Functional Range	Default
XStartPos, YStartPos	Plotter units	Device-dependent	No default

**EXAMPLE:**           [esc].[XX550,20000,31000];

**NOTE:**           This frontend command works only when the cutter is in offline mode and the buffer is cleared!

The command does not work if the cutter is online, either an error is thrown (if it is send via frontend) or the command will not take any effect.

Tandem & L3:

Make sure that the online start position is inside the active tandem work area ([XX133](#)) / online work area ([XX132](#)). Otherwise the XStartPos is set within the limits of the work area.

**SEE ALSO:**           [OP550](#), [XX141,18](#), [XX132](#), [XX133](#), [ZF2](#)

## Index 555 – Manual Move

V 1.46 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online X			Frontend - Offline X	

This command can be used to implement manual move key in frontend software.

### SYNTAX:

**XX 555;**  
**XX 555,XFunction,XDirection,YFunction,YDirection;**

Parameter	Format	Functional Range	Default
XFunction, YFunction	Integer	0 to 5	No default
XDirection, YDirection	Integer	-1,0,1	No default

XFunction:

The **XX555** command with parameter starts or continues the manual move with the given function for x and y axis. Following functions are possible

- 0: normal move
- 1: stop movement on this axis
- 2: fast move
- 3: holds constant velocity (while acceleration)
- 4: move only one increment
- 5: no move on this axis

XDirection:

The direction parameter for the axis must be used to move forward or backward on the axis

- 1: forward (+X or +Y)
- 0: no movement on this axis
- 1: backward (-X or -Y)

YDirection:

An **XX555** with parameter can be followed with another **XX555** with parameter to change the move behaviour direction.

To terminate the manual movement (after one or more **XX555 with** parameter) a **XX555** command **without** parameter must follow!

### Implementation succession for a four arrow keys:

On keydown event of the first key an increment command is send. If within 200ms no keyup event follows a move follows. After keyup the termination command must be send:

Example with +X and Y no move:

```
XX555,4,1,5,0;
// no keyup after 200ms
XX555,0,1,5,0;
// wait for keyup
XX555;
```

As long as at least one arrow key is pressed no termination command must be send. To speed up (e.g. by pressing the control key) a new command with the speed function can be send.

A sequence could look like following:

// command	Up	Down	Left	Right	Ctrl
XX555,4,1,5,0; //inc	X				
XX555,0,1,5,0;	X				
XX555,0,1,0,1;	X		X		
XX555,5,1,0,1;			X		
XX555,5,1,2,1; // speed			X		X
XX555,2,-1,2,1; // speed	X	X			X
XX555,0,-1,0,1;	X	X			
XX555; // all keys released					

For incremental movement, if within 200ms an keyup event follows send the termination command:

Example for four increment steps with -Y:  
**XX555,5,0,4,-1;** // keyup after 200ms  
**XX555;**  
**XX555,5,0,4,-1;** // keyup after 200ms  
**XX555;**  
**XX555,5,0,4,-1;** // keyup after 200ms  
**XX555;**  
**XX555,5,0,4,-1;** // keyup after 200ms  
**XX555;**

**EXAMPLE:** Move sequence in +X direction  
**XX555,4,1,5,0;** // inc  
**XX555,0,1,5,0;** // move  
**XX555;** // stop

## Index 575 – Automated Shut Down

V 1.59 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✗
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX575** command shut down the cutter. Before shut down, a dialog with a down counter is displayed for a certain time. While down counting it is possible to cancel this process.

**SYNTAX:** **XX 575;**

## Index 992 – Set Camera Module Offset

V 1.42 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗			Frontend - Offline ✗	

The **XX992** command is used to set the relative offset (X/Y) of the Zünd integrated compact colour camera. Without parameter the offset is set to the default value.

**SYNTAX:** **XX 992;**  
**XX 992,X,Y;**

Parameter	Format	Functional Range	Default
X, Y	Real	[-200, 200]	0

X: 10 = 0.1mm

Y: 10 = 0.1mm

**EXAMPLE:** **XX922,50,50;**

**NOTE:** Is an offset out of range, the greatest possible offset will be set, followed by a warning.

## Index 1201 – Get Mac Address

V 1.40 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online X			Frontend - Offline X	

Read cutter's Mac address. Data direction is PC → Cutter.

**SYNTAX:** **XX 1201,1;**

**OUTPUT FORMAT:** *Byte6: Byte5: Byte4: Byte3: Byte2: Byte1[TERM]*

**EXAMPLE:** **XX1201,1;**  
Read cutter's Mac address

**RESPONSE:** 00:23:ef:00:00:01[TERM]

## Index 1210 – Set Time on Cutter

V 1.50 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B X
	Frontend - Online ✓			Frontend - Offline ✓	

This command sets the time on cutter.

**SYNTAX:** **XX 1210,Year,Month,Day,Hour,Minute,Second;**

Parameter	Format	Functional Range	Default
Year	Integer	2000...2100	-
Month	Integer	1...12	-
Day	Integer	1...31	-
Hour	Integer	1...23	-
Minute	Integer	1...59	-
Second	Integer	1...59	-

**EXAMPLE:** **XX1210,2011,11,16,7,59,17;**  
Sets time and date on cutter to 07:59:17 16. November 2011

## ZF Zünd Frontend

Zünd frontend commands. They are only available via frontend command.

### Index 2 – Clear Buffer

V 1.40 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
V 1.64 – Extension with keeping online position	Frontend - Online ✗	Frontend - Offline ✓			

Clear the sequential und direct instruction buffer and reset online start position. Or use special command to keep online start position;

**SYNTAX:** **ZF 2; ZF 2,keepOnlinePosition;**

Parameter	Format	Functional Range	Default
keepOnlinePosition	Integer	[0,1]	0

*keepOnlinePosition:* 0 = reset online start position after clear buffer  
1 = keep online start position after clear buffer

**EXAMPLE:** [esc].[ZF2; // reset online start pos  
[esc].[ZF2,1; // keeps online start pos

**NOTE:** A Command without additional parameter automatically **reset** online start position.  
Command with additional parameter 1 **do not reset** online start position.

**SEE ALSO:** [OP550](#), [XX550](#)

### Index 3 – Pointer Function

V 1.43 - Initial Release	G3✓	S3✓	L3✓	D3 A✓	D3 B✓
	Frontend - Online ✗	Frontend - Offline ✓			

The cutter changes into a menu which can be only left by pressing OK. There will be no Cancel button. The pointer can be positioned to a certain point in X and Y direction using the direction keys as usual in offline mode.

Give the absolute position from the active 'pointer type' (tool or laser pointer) without consideration of the reference point.

**SYNTAX:** **ZF 3;**

**EXAMPLE:** [esc].[ZF3;

**RESPONSE:** +24454 ,+24432[TERM]

**NOTE:** The cutter is after the action still in offline mode and the user has to press online. The response is arriving immediately.

## **Index 5 – Go Online**

V 1.40.1 - Initial Release

G3✓	S3✓	L3✗	D3 A✓	D3 B✗
Frontend - Online✗			Frontend - Offline✓	

Switch from offline mode to online mode. For safety reasons it's not allowed to switch cutter from stopped to online.

**SYNTAX:**            **ZF 5;**

**EXAMPLE:**            [esc].[ZF5;

## **Index 6 – Go Offline**

V 1.40.1 - Initial Release

G3✓	S3✓	L3✓	D3 A✓	D3 B✗
Frontend - Online✓			Frontend - Offline✓	

Switch from online mode to offline mode. For safety reasons it's not allowed to switch cutter from stopped to offline.

**SYNTAX:**            **ZF 6;**

**EXAMPLE:**            [esc].[ZF6;

# ZP Z-AXIS POSITION

V 1.20 - Initial Release

G3✓

S3✓

L3✓

D3 A✓

D3 B✓

V 1.58 - added support for parameter *downY*

Frontend - Online X

Frontend - Offline X

Set up- and down-position for tool in a module with z-axis. If the tool is in down-position the tool moves immediately to the new down position.

## SYNTAX:

**ZP Up;**  
**ZP Up,Down;**  
**ZP Up,Down,DownY;**

Parameter	Format	Functional Range	Default
<i>Up</i>	Plotter units	0 to max down position	No default
<i>Down</i>	Plotter units	- max down position to max down position	No default
<i>DownY</i> ,	Plotter units	- max down position to max down position	No default

*Up*: Up-position.

*Down*: Down-position in X respectively X and Y direction, if down position in Y direction is not set or supported by the selected tool.

*DownY*: Down-position in Y direction.

## EXAMPLE:

**SP 1;**  
**ZP 1000, 200;**

Up-position of tool 1 is set to 1000 (10 mm) above the initialization position. And down-position to 200 (2mm) below the initialization position. No down-position set in Y direction therefore the down position will be 2mm below the initialization in each direction.

## NOTE:

Each tool has its own parameter set. Therefore the tool must be selected before ZP is sent.

If the position is out of the range, the position is set to the park-position.

KCM-S: Up-position is current not used from cutter (set this value to 2mm), the range of down position is -0.75mm till 0.75.

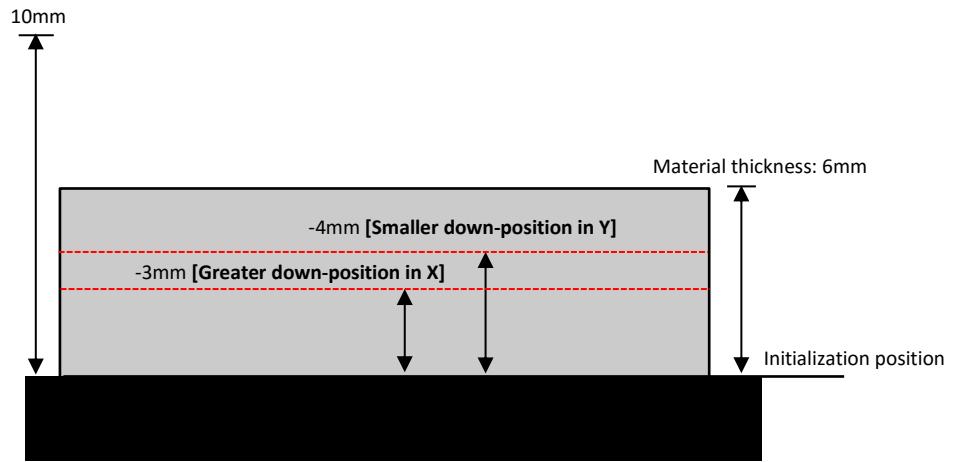
CTT, PTT, SCT, UCT, WKT: In position mode these tools can be operated with two direction depending Z depths. According to the current moving direction of the T-axis (absolute T-axis angle), the Z depth will be adjusted after every up or auto lift up. For the range of angles the same rules apply as with the direction depending pressures shown in "[Index 65 - Moving Mode Z-Axis](#)".

## EXAMPLE

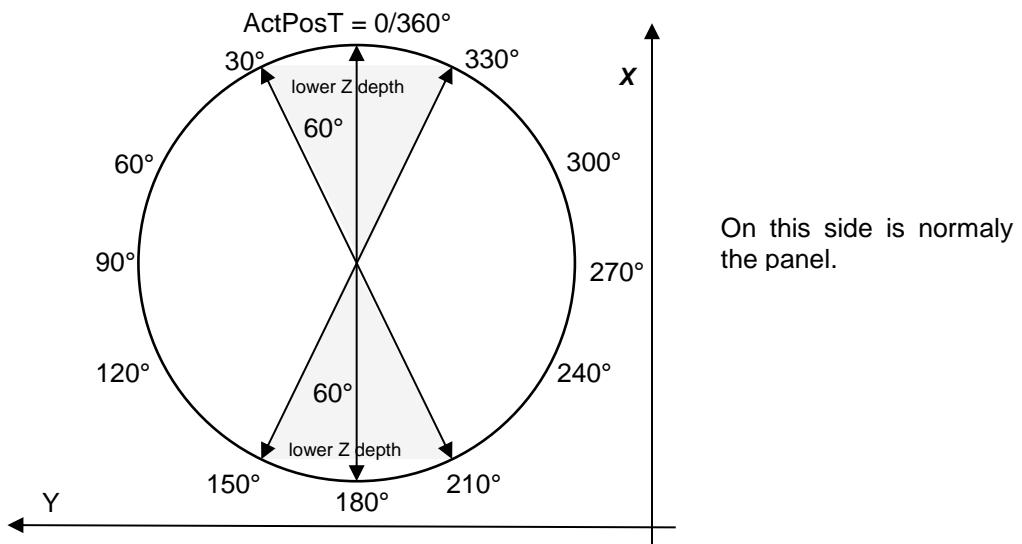
**ZP 1000,-300,-400;**

Set up-position to 1000 (10mm) above the initialization position. Set down-position offset in X direction to -300 (-3mm) and in Y direction to -400 (-4mm). Both down-positions are above the initialization position.

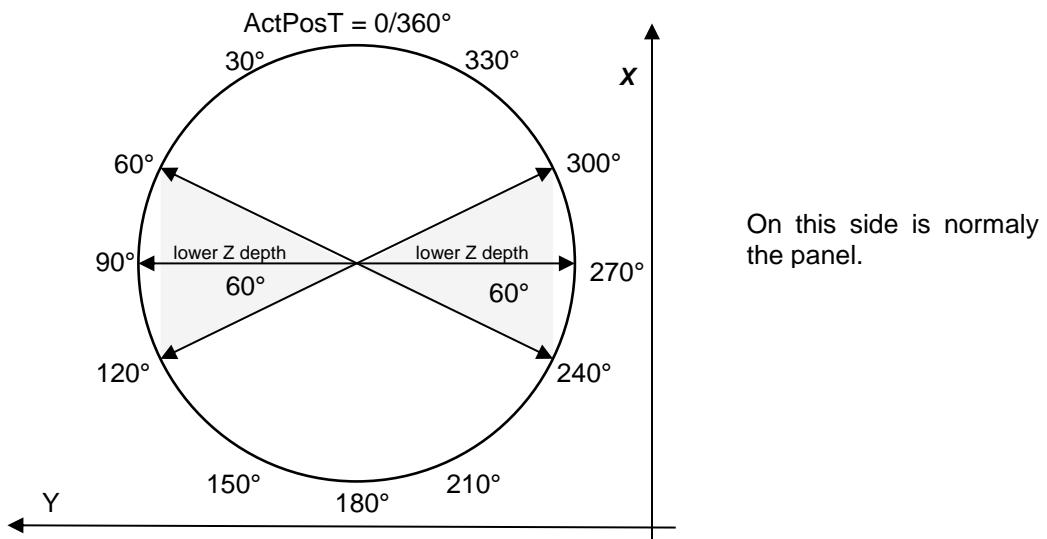
The down-position offset -400 is active in Y direction between 60°-120° and 240°-300°.



Smaller Z depth in X direction



Smaller Z depth in Y direction



SEE ALSO:

[XX65](#), [XX96](#), [OP12](#), [OP305](#)

## ZS Z-AXIS SPEED

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✗ Frontend - Offline ✗

Initialize actual speed for z-axis movements (UM-modules, LM-modules or router-modules).

**SYNTAX:** **ZS** *VUp, VDown;*

Parameter	Format	Functional Range for UM-ZP	Functional Range for UM-60 UM-60L LM-Z LM-TZ RM-A RM-120 RM-S RM-L	Functional Range for UM-S LM-Z-S UM-ZS UM-120	Default
<i>VUp</i>	Real	1 - 200 [mm/sec]	1 - 300 [mm/sec]	1 - 500 [mm/sec]	No default
<i>VDown</i>	Real	1 - 200 [mm/sec]	1 - 300 [mm/sec]	1 - 500 [mm/sec]	No default

*VUp:* Speed to reach up or park position.

*VDown:* Speed to reach down position.

**EXAMPLE:**

**SP 1;**

**ZS30,10;**

Speed to reach up or park position of tool 1 is set to 30 mm / s.

Speed to reach down position is set to 10 mm / s.

**NOTE:**

Each tool has its own parameter set. Therefore the tool must be selected before ZS is sent.

## // SlashSlash

V 1.20 - Initial Release

G3✓ S3✓ L3✓ D3 A✓ D3 B✓  
Frontend - Online ✓ Frontend - Offline ✓

A line that begins with **//** is interpreted as a comment and is not executed. A comment line must be terminated with carriage return [cr].