

**CNC**

**8055 .T.**

New features

Ref. 2001

Soft: V02.4x



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The content of this manual and its validity for the product described here has been verified. Even so, involuntary errors are possible, thus no absolute match is guaranteed. Anyway, the contents of the manual is periodically checked making and including the necessary corrections in a future edition. We appreciate your suggestions for improvement.

The examples described in this manual are for learning purposes. Before using them in industrial applications, they must be properly adapted making sure that the safety regulations are fully met.

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This product uses the following source code, subject to the terms of the GPL license. The applications *busybox* V0.60.2; *dosfstools* V2.9; *linux-ftpd* V0.17; *ppp* V2.4.0; *uteln* V0.1.1. The library *grx* V2.4.4. The linux kernel V2.4.4. The linux boot *ppcboot* V1.1.3. If you would like to have a CD copy of this source code sent to you, send 10 Euros to Fagor Automation for shipping and handling.

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## 1 Synchronization of the axes movement with the feed hold

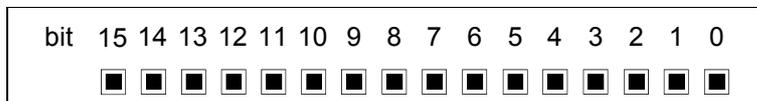
Its use is recommended with punching presses so that the delay that occurs between the time when the feed hold signal raises and the axes begin to move is always the same.

### Synchronization activation

To activate synchronization, set bit 2 of the general machine parameter IPOTIME (P73)=1.

#### IPOTIME (P73)

This parameter has 16 bits counted from right to left.



Each bit has a function or work mode associated with it. By default, all the bits will be assigned the value of ·0·. Assigning the value of ·1· activates the corresponding function.

Bit	Meaning	Bit	Meaning
0		8	
1		9	
2	Activates the synchronization of the axes with the feed hold.	10	
3		11	
4		12	
5		13	
6		14	
7		15	

Default value in all the bits: 0



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## 2 Set the machine coordinate (G174)

Function G174 may be used to set the machine coordinate of an axis; in other words, temporarily set a new machine zero. The new machine zero remains active until the axis is homed; the CNC then restores the original machine reference zero (set in the machine parameters).

After executing function G174, the CNC assumes that the programmed coordinate defines the current position referred to machine reference zero (home). The zero offsets, movements with respect to machine zero, etc. will be referred to the coordinate programmed in G174.

### Programming the function

---

Program function G174, and then the machine coordinate of a single axis. With this function, only the machine coordinate of an axis may be set; to set the machine coordinates of several, program one G174 for each one of them.

When it comes time to setting the machine coordinate, the CNC uses the predefined unit system in the control. If it is a linear axis, use millimeters or inches, as defined in general machine parameter INCHES (P8). If it is a rotational axis, use degrees. The CNC ignores all the other options, radius/diameter, mirror image, scaling factor, etc.

The active zero offsets before G174 remain active and now refer to the new machine coordinate.

#### **Programming format:**

The programming format is as follows:

```
G174 X..C
```

X..C            Machine coordinate of the indicated axis.

#### **Example:**

```
G174 X100
```

### Considerations and limitations

---

By itself, function G174 does not cause any axis movement. After executing function G174, the CNC considers that the axis is homed and verifies that it is within the software travel limits.

The normal use of this function is on rotational axes without limits, which always turn in the same direction.

The CNC does not allow setting the machine coordinate on slaved axes, grantry, tandem or on axes that are part of the active kinematics or active transform. It is also not permitted to set the machine coordinate on the C axis of the lathe or on axes with encoded I/Os. Before setting the new machine coordinate, the CNC checks that the axis is in position and it is not synchronized; if this is not the case, it issues an error message.

When executing G174, if there is any active coordinate transformation (G47, G48, G49, etc.), the CNC will issue an error.

It is possible to use the function G174 from the PLC channel and from the user channel.

### Properties of the function and Influence of the reset, turning the CNC off and of the M30 function

---

Function G174 is modal. The new machine zero is unaffected by either function M02 or M30, or by a reset, an emergency or by shutdown of the CNC. On power-up, the CNC assumes the machine coordinates that were active when the CNC was turned off.



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### 3 Anticipation of M functions

The M functions anticipation feature may be used to transfer an M function to the PLC before the previous movement ends. This feature is very useful in punching presses. In these machines, it allows the next punching to be prepared from the PLC before the previous movement ends.

#### Definition of the M functions to be executed in advance

The table of auxiliary M functions has an 8-bit field for customization.

To define the M functions that will be executed in advance, use bit 5 of the desired M functions customization. The time by which these M functions are anticipated is indicated in the general machine parameter MANTIME (P196).

#### Customization bit 5 from the M auxiliary function table

Indicates whether the M auxiliary function is executed in advance.

Value	Meaning
0	The M auxiliary function is not executed in advance.
1	The M auxiliary function is executed in advance.

#### MANTIME (P196)

General machine parameter that indicates the time in milliseconds by which the M auxiliary functions are anticipated that are indicated by means of customization bit 5 from the M auxiliary functions table.

Possible values
Integers between 0 and 65535 ms.

Default value: 0 (not executed in advance)

#### Considerations and limitations

M functions can be anticipated in G5, G7 and G50, but they cannot be anticipated in G51.

Only those M auxiliary functions are anticipated that are executed from the main channel. The M functions that are executed from the PLC channel are not anticipated.

Only those M auxiliary functions are anticipated that do not have a predefined meaning for the CNC. The following M functions are not anticipated:

M0, M1, M2, M3, M4, M5, M6, M8, M9, M19, M30, M41, M42, M43, M44 and M45.

An M auxiliary function is only anticipated if there are no other low level blocks (F, G, etc.) between the previous movement block and the M function block.

The M functions that are anticipated must be programmed individually in the block; they cannot be programmed together with other M, S or T functions. Otherwise, the CNC will display the error: "The M function must be programmed by itself in the block".

The M functions that are anticipated may be programmed in the movement blocks. If the M function is customized to be executed after the movement block, the combination (movement - punching M) may be programmed in the same block.

The anticipation of the M functions only occurs in execution mode. M functions are not anticipated in any of the simulation modes.



*If there are filters with set parameters on the axes, the anticipation time is greater than that indicated in the general machine parameter MANTIME (P196). In this case, in order to ensure the correct functioning of the feature, it will be necessary to set this parameter.*



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## 4 Save screen by pressing [SHIFT] + [Page Up]

When the key sequence [SHIFT] + [Page Up] is pressed, an image of the currently active screen will be saved in the CNC.

If a USB memory drive (Pendrive) is connected when the screen is saved, the image will be saved in the <PAN> directory of said memory. If the <PAN> directory does not exist on the USB memory drive, it will be created automatically.

If there is no USB memory drive (Pendrive) connected when the screen is saved, the image will be saved in the <PAN> directory of the hard disk (KeyCF) of the CNC.

The saved image can be sent by DNC or FTP.

### ***Image format:***

The image format will be ".bmp" and the name of the saved file will be the following:

S month day hour minute second.bmp (no spaces in the file name).

### ***Example of a saved screen:***

Name of a screen saved on October 30, 2015 at 9:32 and 50 seconds:

S1030093250.bmp



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## 5 Working with two additive handwheels simultaneously

This feature makes it possible to operate while moving two additive handwheels at the same time.

### Parameter setting

The general machine parameters from AXIS1 (P0) to AXIS7 (P8) and from AXIS9 (P136) to AXIS12 (P142) must have a handwheel defined (value of 11 or 12) and a handwheel associated with an axis (values of 21 to 29).

The general handwheel is associated with the axis defined in the general machine parameter MPGAXIS (P76). In additive handwheel mode, the flywheel moves only the axis indicated in the general parameter MPGAXIS (P76).

To enable this feature, assign value 1 to bits 10, 11 and 15 of the general machine parameter ADIMPG (P176). The value of all bits in this parameter will be as follows:

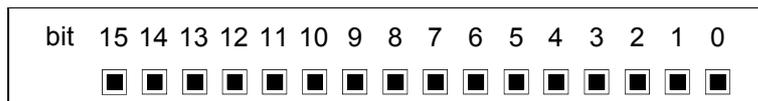
ADIMPG (P176) = 1000 1100 0000 0000.

### ADIMPG (P176)

This parameter enables manual intervention with an additive handwheel.

This function allows jogging the axes while a program is being executed. This movement will be applied as if it were another zero offset.

This parameter has 16 bits counted from right to left.



Each bit has a function or work mode associated with it. By default, all the bits will be assigned the value of ·0·. Assigning the value of ·1· activates the corresponding function.

Bit	Meaning
0 - 9	Not used.
10	Working with two additive handwheels simultaneously.
11	Selecting the additive handwheel as handwheel associated with the axis
12	The resolution of the handwheel is set by g.m.p. ADIMPRES.
13	Manual intervention enabled with look-ahead.
14	Cancel the additive offset after M02, M30, emergency or Reset.
15	Manual intervention with additive handwheel is available.

Default value in all the bits: 0



*As of this version, in order for the CNC to accept a new value for the general machine parameter ADIMPG (P176), it is necessary to press the keystroke sequence [SHIFT] + [RESET] or shut down the CNC and then turn it back on.*



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## Considerations

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In JOG movement mode, the only active handwheel is that indicated with value 11 in its corresponding parameter (general machine parameters AXIS1 to AXIS12). To move an axis, first select the axis and then move it with the handwheel.

In automatic mode, the handwheels will behave as handwheels associated with an axis. The user may move 2 handwheels at the same time. To do this, the PLC MANINT\* marks must be activated.

For example, to move the X and Z axes with the two handwheels, the PLC marks MANINTX and MANINTZ must be activated.

### **Parameter setting example:**

Define an electronic and mechanical handwheel in general machine parameters P1 to P8.

AXIS1 (P0) = 1	Axis X.
AXIS2 (P1) = 2	Axis Y.
AXIS3 (P2) = 3	Axis Z.
AXIS4 (P3) = 10	Main spindle.
AXIS5 (P4) = 11	General handwheel.
AXIS6 (P5) = 23	Handwheel associated with the Z axis.
MPGAXIS (P76) = 1	Associate the handwheel with the Z axis. When the CNC is in automatic mode, when the handwheel is moved, the Z axis will move.
ADIMPG (P176) = 1000 1100 0000 0000	



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## 6 CNC8055 (client) and PC (server) connection

In addition to a local hard disk (on the CNC itself), the CNC can also have a remote hard disk accessible through Ethernet. The CIFS protocol is used to communicate with the remote hard disk.

As remote hard disk, it is possible to use the hard disk of a PC or just a folder. The PC that makes its hard disk (server) public must be connected to the local network.

Once communication has been established, the directory of the connected PC will appear in the CNC browser with the name "REMOTE DISK".

The interface and the softkeys of the CNC will be the same as if it were a local hard disk. The CNC directories cannot be seen from the PC.

### Ethernet parameters

The following Ethernet parameters are available to configure communications via this protocol:

#### **USER (P3)**

Name of the user for connection to the CNC on the PC. If the parameter is not set, indicate that there is no user.

#### **DOMAIN (P4)**

Windows network domain. If the parameter is not set, indicate that there is no domain.

#### **PASSWORD (P5)**

User password for connection to the CNC on the PC. If the parameter is not set, indicate that there is no password.

#### **IPSNFS (P28)**

IP address of the server acting as remote hard disk. If other than 0, the remote hard disk is activated.

##### **Possible values**

Four numbers between 0 and 255 separated by dots.

Default value: 0.0.0.0 (there is no remote hard disk)

#### **DIRNFS (P29)**

Directory of the server that is used as remote hard disk.

##### **Possible values**

It admits up to a maximum of 22 characters (without blank spaces).

Default value: Nameless

#### **NFSPROTO (P32)**

To activate the CIFS communication protocol, set value as 2.



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## 7 Expansion of zero offsets to 40

### ***G159 N1 to N40. Absolute zero offsets.***

To apply any zero offset defined in the table.

The first six zero offsets are the same as programming G54 through G59, except that the values of G58 and G59 are absolute. This is because function G159 cancels functions G54 through G57 and, consequently, there is no active zero offset to add the G58 or G59 to.

## 8 General machine parameter CODEPAGE (P197)

General machine parameter that enables extended ASCII characters to be displayed. This makes it possible to display those characters in the comments of the part programs, regardless of the language in which the CNC is configured through the general machine parameter LANGUAGE (P122).

To display extended ASCII characters, a value other than 9 must be assigned in this general parameter.

Furthermore, if this parameter is configured with a value of 9, an error will not be returned when executing a part program that contains extended ASCII characters in mainland Chinese.

### **CODEPAGE (P197)**

Define the language in which to display the extended ASCII characters in the CNC.

Value	Meaning
0..9	Permits the display of extended ASCII characters.
9	An error is not returned when executing a part program with extended ASCII characters in mainland Chinese.
10..12	Permits the display of extended ASCII characters.

Default value: 9



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## 9 Anticipated spindle stop

This feature permits moving up the spindle stop order. This is useful in laser cutting machines, in which the analog setpoint output of the spindle is used to regulate the laser power and it is necessary for the final movement to coincide with the time when the spindle stops (S=0).

### SANTIME

CNC variable that permits the time, in milliseconds, to be programmed that the start of the spindle deceleration is anticipated before the end of the movement. This variable can be read and written from the CNC and the PLC, but only read from the DNC.

The variable SANTIME does not stop block preparation.

During the execution of a program, if a movement block is followed by an S0 block and the variable SANTIME has a value other than 0, the spindle stop order is advanced. The time of the anticipation will be that indicated in milliseconds in the SANTIME variable.

This variable will only be taken into account if G5 is active. In the rest of the cases, the spindle stop will not be advanced.



*If an anticipation of the spindle stop is programmed and there are active filters, the anticipation will be greater than that defined in the SANTIME variable. In this case, the anticipation must be adjusted.*

## 10 Deletion of temporary files on the hard disk

The new softkey [CLEAN DISK] makes it possible to delete the temporary files that have been created on the hard disk. To access this softkey, go to: DIAGNOSIS / TESTING / HARD DISK.

Example of files that are deleted when the softkey [CLEAN DISK] is pressed:

- Screens saved with [SHIFT] + [Page Up].
- Files with drive variables.

## 11 PANDRAW variable for grinding cycles

WINDRAW55 application. Number of the screen created by the user or the manufacturer and is being consulted.

Even if ESC is pressed (and then START is pressed and the cycle is executed) and the focus changes, the screen number remains.



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## 1 Different accelerations for G00 and G01

The movements programmed using G00 (rapid feedrate) are executed using the rapid feedrate found in the axis machine parameter "G00FEED".

Two new axis parameters are available to define the acceleration and jerk used for the movements in G00 on each axis: ACCTIMG0 (P105) and JERKLIG0 (P106).

If the value of these two parameters equals 0, the CNC will operate in both G00 and G01, using the values of the axis parameters ACCTIME (P18) and JERKLIM (P67). In this manner, the G00 and G01 acceleration and jerk will be the same.

To achieve a different axis acceleration during the G00 operation, change the axis parameter value ACCTIMG0 (P105) to the desired value.

To achieve a different axis jerk during the G00 operation, change the axis parameter value JERKLIG0 (P106) to the desired value.

### Axis machine parameters

---

#### ACCTIMG0 (P105)

Defines the acceleration stage or the time it takes the axis to reach the feedrate selected with axis parameter GOFFED (P38) when performing G00 movements. This time is also valid for the deceleration stage.

##### Possible values

Integers between 0 and 65535 ms.

Default value: 0

If the ACCTIMG0 (P105) and JERKLIG0 (P106) values equal 0, when performing a G00 movement, the acceleration will be that indicated for the axis machine parameter ACCTIME (P18).

#### JERKLIG0 (P106)

Defines the acceleration derivative for the G00 movements. It may be used to limit the acceleration changes to smooth the machine movements on small speed increments or decrements and with FFGAIN values close to 100%.

The CNC ignores this parameter when moving with electronic handwheels, mechanical handwheels, look ahead, threading (G33) and rigid tapping. If the ACCTIMG0 (P105) and JERKLIG0 (P106) values equal 0, when performing a G00 movement, the jerk will be that indicated for the axis machine parameter JERKLIM (P67).

The smaller the value assigned to JERKLIG0, the smoother the machine's response, but the acc/dec time will be longer.

##### Possible values

Between 0 and 99999.9999 m/s<sup>3</sup>.

Default value: 0

Recommended values:

In millimeters       $JERKLIG0 = 82 * G00FEED / ACCTIMG0^{**2}$

In inches             $JERKLIG0 = 2082 * G00FEED / ACCTIMG0^{**2}$

If the stability of the machine is affected by the values mentioned earlier, the JERKLIG0 value should be lowered to half as much.



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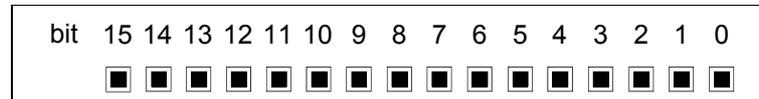
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## 2 Select handwheel movements in radii or diameters, when the axis is in diameters

The bit 13 of the general machine parameter HDIFFBAC (P129) selects whether the handwheel movements and incremental jog are made using radii or diameters, when the axis coordinates are displayed in diameters.

### HDIFFBAC (P129)

This parameter has 16 bits counted from right to left.



Each bit has a function or work mode associated with it. By default, all the bits will be assigned the value of ·0·. Assigning the value of ·1· activates the corresponding function.

Bit	Meaning	Bit	Meaning
0	Handwheel ·1·	8	
1	Handwheel ·2·	9	
2	Handwheel ·3·	10	
3	Handwheel ·4·	11	
4		12	
5		13	The movement of the axis using the handwheel will be performed in diameters.
6		14	Axis filters for movements with the handwheel.
7		15	It limits the movement.

Default value in all the bits: 0

#### Bit 13:

The bit 13 indicates whether the handwheel movements and incremental jog are made using radii or diameters, when the axis coordinates are displayed in diameters.

- (0) The movements are performed using radii.
- (1) The movements are performed using diameters.



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### 3 Calibrating bits or mills with a live tool using the F10 form factor

For this version and later versions, the probe tool calibration (level 2) allows for the calibration of live tool bits and mills using the F10 form factor.

The operation of the calibration cycle of a live tool is the same as that for a non-live tool.

This calibration level requires the purchase of the right software options purchased and the use of a table-top probe.

### 4 CNCDISSTAT variable

The new variable CNCDISSTAT indicates the status of the CNC to execute a program.

- If the variable CNCDISSTAT is set to 0, program execution is permitted.
- If the variable CNCDISSTAT is set to a value other than 0, program execution is not permitted.

The manufacturer's PLC program may read this variable using the instruction CNCRD, so as to determine the CNC status.



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## 1 CNC8055i EN (engraving) model

Basic characteristics of the different models.

	8055i EN	8055 FL 8055i FL	8055 Power 8055i Power
Pendant	8055i EN	8055i FL	8055i Power
Enclosure	-----	8055 FL	8055 Power
USB	Standard	Standard	Standard
Block processing time	1 ms	3.5 ms	1 ms
RAM memory	1Mb	1Mb	1 Mb
Software for 7 axes	-----	-----	Option
TCP transformation	-----	-----	Option
C axis (Lathe)	-----	-----	Option
Y axis (Lathe)	-----	-----	Option
Look-ahead	200 blocks	100 blocks	200 blocks
Flash Memory 512Mb / 2Gb	512Mb	Option	Option



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## 1 New way of drawing the tool path

There a new way of drawing the tool path which does not show all the calculated points. This way of drawing the tool path means that it is faster, however, since it does not display all the calculated points then it is less precise.

To draw the tool path using all the calculated points, set the general machine parameter as FLWEDIFA (P132) to 1.

### General machine parameter FLWEDIFA (P132)

---

Indicating the way in which the tool path is drawn.

Value	Meaning
0	The tool path is drawn without displaying all the calculated points. The tool path is drawn faster.
1	The tool path is drawn using all the calculated points. The tool path is drawn with greater precision.

Default value: 0

## 2 Execution of a part-program from a USB hard drive

The CNC supports the connection of a "Pen Drive" memory device. These memory devices are commercially available (off-the-shelf) and they're all valid regardless of their size, brand name or model.

The CNC recognizes the connected device as USB Hard Disk. When it is connected, it will be shown as <USB hard disk> on the left panel of the explorer. To see its contents, press the <update> (refresh) softkey.

With this version, it is possible to execute, simulate and edit part programs directly from the USB hard drive via the explorer.



*Executing, simulating and editing a part-program from USB hard drive is not permitted in conversational mode.*

*Executing the OPEN instruction is not permitted on the USB hard drive.*

To execute a program from the USB hard drive, select the desired program and press [START]. When the program has completed, the first lines of the program are reloaded and displayed on the screen. This means that by pressing [START] it will execute the program again.

### Removing the USB device

---

The USB device cannot be removed while the program is still being executed, simulated or edited. Nor can it be removed while the program is selected.



*If the USB device is removed while a part-program is being executed, the execution will stop and an error message will be prompted.*

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To remove the USB hard drive, it must be unselected in either of the following ways:

- Executing a program from another unit (Hard drive, memory...).
- Accessing the machine parameters.
- Going into jog mode.

After unselecting the USB device, a message is displayed indicating that the USB device can now be removed.

This feature can be disabled by setting bit 15 of the general machine parameter STARTDIS (P190) to 1.

### **High-level EXEC instruction:**

The high-level EXEC instruction cannot be executed on the USB hard drive.

Any program on the USB hard drive can execute another program found on the USB hard drive through the EXEC high-level instruction using the respective path options.

### **Example:**

The "MAIN.PIM" program found on the USB hard drive can execute a "SECOND.PIM" program found in the same directory on the USB hard drive, using the instruction ("./SECOND" EXEC).

```
MAIN.PIM
;
(EXEC "./SECOND");
M30
```

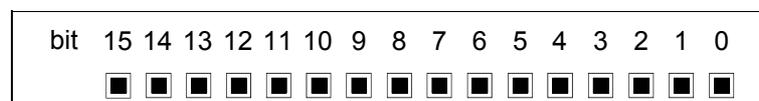
```
SECOND.PIM
(MSG ".SECOND")
G4K300
(MSG "");
M30
```

```
HARD DISK
MYDIR
- MAIN.PIM
- SECOND.PIM
```

The user can copy the entire MYDIR directory onto the USB hard drive and the MAIN.PIM program will work without having to make any changes.

## **General machine parameter STARTDIS (P190)**

This parameter has 16 bits counted from right to left.



### **Bit 15 of general parameter STARTDIS (P190).**

Value	Meaning
0	Enables the ability to execute a part-program from the USB hard drive.
1	Disables the ability to execute a part-program from the USB hard drive.

Default value: 0



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### 3 Executing a part-program from the remote hard drive

The CNC can have a local hard disk (at the CNC itself) or a remote hard disk accessible through Ethernet.

With this version, it is possible to execute, simulate and edit part programs directly from the remote hard drive via the explorer.



*Executing, simulating and editing a part-program from the remote hard drive is not permitted in conversational mode.*

*The OPEN instruction is not permitted on the remote hard drive.*

To execute a program from the remote hard drive, select the desired program and press [START]. When the program has completed, the first lines of the program are reloaded and displayed on the screen. This means that by pressing [START] it will execute the program again.



*If the Ethernet cable is removed while a part-program is being executed, the execution will stop and an error will be prompted.*

#### **High-level EXEC instruction:**

The high-level EXEC instruction cannot be executed on the remote hard drive.

Any program on the remote hard drive can execute another program found on the remote hard drive through the EXEC high-level instruction using the respective path options.

#### **Example:**

The "MAIN.PIM" program found on the remote hard drive can execute the "SECOND.PIM" program found in the same directory on the remote hard drive by using the instruction ("./SECOND" EXEC).

```
MAIN.PIM
;
(EXEC "./SECOND");
M30
```

```
SECOND.PIM
(MSG ".SECOND")
G4K300
(MSG "");
M30
```

```
HARD DISK
MYDIR
- MAIN.PIM
- SECOND.PIM
```

The user can copy the entire MYDIR directory onto the remote hard drive and the MAIN.PIM program will work without having to make any changes.

## 4 Reset X, Y, and Z axes before executing a program

When the execution of a part-program has been interrupted and the program is to be executed from a block prior to the interruption point, this can be done by pressing the sequence [BLOCK SELECTION / FIRST BLOCK / LINE NUMBER] or by pressing [BLOCK SELECTION / GMST EXEC SEARCH / FIRST BLOCK / LINE NUMBER]. After entering the intended line number as the first block to be executed and after pressing [START], the machine will move the axes from the current position to the position of the first block to be executed.

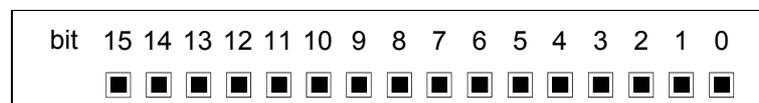
Moving to the position of the first block to be executed can be hazardous, as there could be elements in the way of the tool path that could cause a collision.

To avoid this, with this version, the X, Y and Z axes will be reset after selecting the line number of the first block to be executed.

This feature can be enabled by setting bit 14 of the general machine parameter STARTDIS (P190) to 1.

### General machine parameter STARTDIS (P190)

This parameter has 16 bits counted from right to left.



#### Bit 14 of general parameter STARTDIS (P190).

Value	Meaning
0	The X, Y and Z axes will not be reset after selecting the line number to execute the part-program.
1	The X, Y and Z axes will be reset after selecting the line number to execute the part-program.

Default value: 0



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## 5 A new way to continue executing an interrupted program

When a part-program has been interrupted for any reason (due to a broken tool, voltage drop in the network...), after the issue has been resolved, the program block is selected for the machining by performing a block search. With this version, using the new soft key [RESUME EXECUTION], available from the explorer, the program execution can continue from the line in which it was interrupted.

Pressing the [RESUME EXECUTION] softkey will automatically make the CNC start the following sequence: BLOCK SELECTION / EXEC G SEARCH / STOP BLOCK / AUTOMATIC SEARCH. After this, press [START] to execute the program from the line where the execution was interrupted.

Also, it is also possible to move the cursor a few previous lines in the program to start the execution from a prior point.

If the program has not been interrupted at any time and the program ends successfully, the [RESUME EXECUTION] softkey will not appear. This softkey only appears in the explorer.

### **Example:**

For the example below, the T5 tool has broken during machining of block N500. The operator for machining and the tool change.

Following this, select block number 12 to continue with the machining from the point where it was interrupted, using: AUTO / BLOCK SELECTION / GMST EXEC SEARCH / STOP BLOCK / AUTOMATIC SEARCH / LINE NUMBER.

When pressing [START], the tool changer replaces the T1, T2, T3, T4 and T5 tools. This can amount to a significant loss of time, since only adding the T5 tool is all that is needed.

Using the [RESUME EXECUTION] softkey, the CNC will automatically be returned to the point where the program execution was interrupted, without making any tool changes, meaning there is no loss of time.

### **Example program:**

```
G90G01F5000
G51E0.01
T1
N100 G01X-100Y-100
T2
N200 G01X-200Y-200
T3
N300 G01X-300Y-300
T4
N400 G01X-350Y-350
N410 G01X-400Y-400
T5
N500 G01X-500Y-500
T6
N600 G01X-600Y-600
T7
N700 G01X-700Y-700
T8
N800 G01X-800Y-800
N810 X-850Y-850
M30
```



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## 6 Parameter M in instruction G51

Programs consisting of very small movement blocks (CAM, digitizing, etc.) tend to run very slowly. Those programs may be executed at high machining speed using the look-ahead (G51) function. This function provides smoother and faster machining in programs with very small movements, even in the order of microns.

The general machine parameter LOOKATYP (P160) can choose between three operating modes for the look-ahead (G51) function: Advanced algorithm, algorithm with jerk control and standard algorithm.

Depending on the part being machined, as well as the precision, finishing and speed that is required, one algorithm may be preferred over another. The new M parameter of instruction G51 has three possible values (1, 2 and 3) to select the desired algorithm.

The following cases may arise:

- If G51 is programmed, the look-ahead algorithm will be that indicated in the general machine parameter LOOKATYP (P160).
- If G51 M1 is programmed, the look-ahead algorithm will be that indicated in the general machine parameter LKTYPM1 (P198).
- If G51 M2 is programmed, the look-ahead algorithm will be that indicated in the general machine parameter LKTYPM2 (P199).
- If G51 M3 is programmed, the look-ahead algorithm will be that indicated in the general machine parameter LKTYPM3 (P200).

### New general machine parameters

The new general machine parameters LKTYPM1 (P198), LKTYPM2 (P199) and LKTYPM3 (P200) have 16 bits that are counted from right to left. Their meaning is the same as that given for the general machine parameter LOOKATYP (P160).

The default values of the general machine parameters LOOKATYP (P160), LKTYPM1 (P198), LKTYPM2 (P199) and LKTYPM3 (P200) are the following:

Parameter	Default value	Algorithm
LOOKATYP (P160)	1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0	Advanced algorithm
LKTYPM1 (P198)	1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0	Advanced algorithm
LKTYPM2 (P199)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Standard algorithm
LKTYPM3 (P200)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1	Algorithm with jerk control

## 7 New variable PRGTX

The new PRGTX variable can read the name of the program that is currently being executed. This variable may be read from the CNC, and from DNC.



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## 8 CNC communication using a device via the CANopen bus

With this version, communication can be established between the CNC and a CANopen device. To do this, the chosen device must be connected to the I/Os on the CAN bus.

The device node address must be defined by the PLC parameters IOCANID1 (P89) ... IOCANID4 (P93). If there already is a CAN I/Os module defined by these parameters, there is no need to define it.

The number of inputs (ICAN), outputs (OCAN), analog inputs (IANALOG), analog outputs (OANALOG), PT100 (PT100) associated with this node in the PLC parameters must be set to 0.

### Variables that can be read and written from the CNC.

There are four new variables for reading and writing from CNC. These variables have read and write access via the CNC part-program. They do not have access via the PLC or DNC.

If an error occurs while reading/writing any of these variables, the CNC will prompt the corresponding error.

#### **COVARF nodeNumber canVarId**

Grants access to a float variable.

#### **COVARL nodeNumber canVarId**

Grants access to a long variable.

#### **COVARW nodeNumber canVarId**

Grants access to a word variable.

#### **COVARB nodeNumber canVarId**

Grants access to a byte variable.

### How to use the variables

(P100 = COVARL 1 \$1000); Read the variable whose CANopen address is 1000 (in hexadecimal) on node 1.

(COVARL 1 \$1000 = P1); Writes the value of P1 for the variable whose CANopen address is 1000 (in hexadecimal) on node 1.

To access the sub-index, then it must be programmed as follows:

(P100 = COVARL 1 \$31000); Reads the sub-index 3 CANopen 1000 address.

### Limitations

There is no communication via the synchronous channel.

RXPDO, TXPDO cannot be programmed.

There are no time requirements to read/write the variables.

There is no presence control mechanism provided for the CANopen device in order to detect if it is connected or disconnected.

## 9 PANDRAW variable value to identify the PCALL screen

The PANDRAW variable indicates the number of the screen created by the user or the manufacturer that is being consulted. When using the PCALL screen, the PANDRAW variable will have a value of 257. This variable may be read from the CNC, from DNC and from the PLC.

Even if ESC is pressed (and then START is pressed and the cycle is executed) and the focus changes, the screen number remains.



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## 10 BCSD drives with a 23 bit encoder

With this version, the new BCSD drives with 23-bit encoders can be connected to the CNC.

To work with these drives, set the machine axis parameter NPULSES (P8) to  $2e21$ . With this version, the maximum value for the machine axis parameter NPULSES (P8) is  $2e23$ .

### Axis machine parameter NPULSES (P8)

Indicates the number or pulses/rev provided by the rotary encoder. When using a linear encoder, it must be set to -0-.

#### Possible values

Integer numbers between 0 and  $2e23$ .

Default value: 1250

## 11 New variables for progress and remaining machining time

The following variables are available, including those indicating machining progress and the remaining machining time. These variables are only read by the CNC, DNC and PLC.

#### CYTIMERATE:

Indicates the machining progress as a percentage, from 0 and 100%.

#### CYTIMEEND:

Indicates the time left to complete the machining process, in hundredths of a second.



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## 12 Multiple slot milling cycle 2 (level 6)

The new cycle “multiple slot milling 2” is for the drilling and male tapping cycles. This cycle allows slots to be made with several penetration passes.



By using this key, the drilling and tapping cycles can be accessed.

To access the multi-slot cycle 2, first access level 6.

As it can be seen in the image, the multi-slot cycle 2 has two new parameters allowing the for the penetration and withdrawal.

J: Depth of cut.

If it is not programmed or if programmed with a value of 0, the slot will be made in a single cut.

K: Withdrawal. If it is not programmed it, then it will be 1 mm.

08:16:06 ..... CNC:Error offset de salida analógica.

### CHAVETERO MULTIPLE 2

X	0.000	F	0.000
Y	0.000	S	0
Z	0.000	T	0

Coordenadas (X,Z)	
X	0.0000 Z 0.0000
Dimensiones del chavetero	
L	0.0000 I 0.0000
Geometría angular del cabezal	
α	0.0000 β 0.0000
N. operaciones	N 0
Prof. pasada	J 0.0000
Retr. pasada	K 0.0000
Avance de prof.	F 0.0000
Distancias de seguridad	
X	0.0000 Z 0.0000

RPM

F 0.000 S 0 T 0 D 0 M↓

SHF CAP



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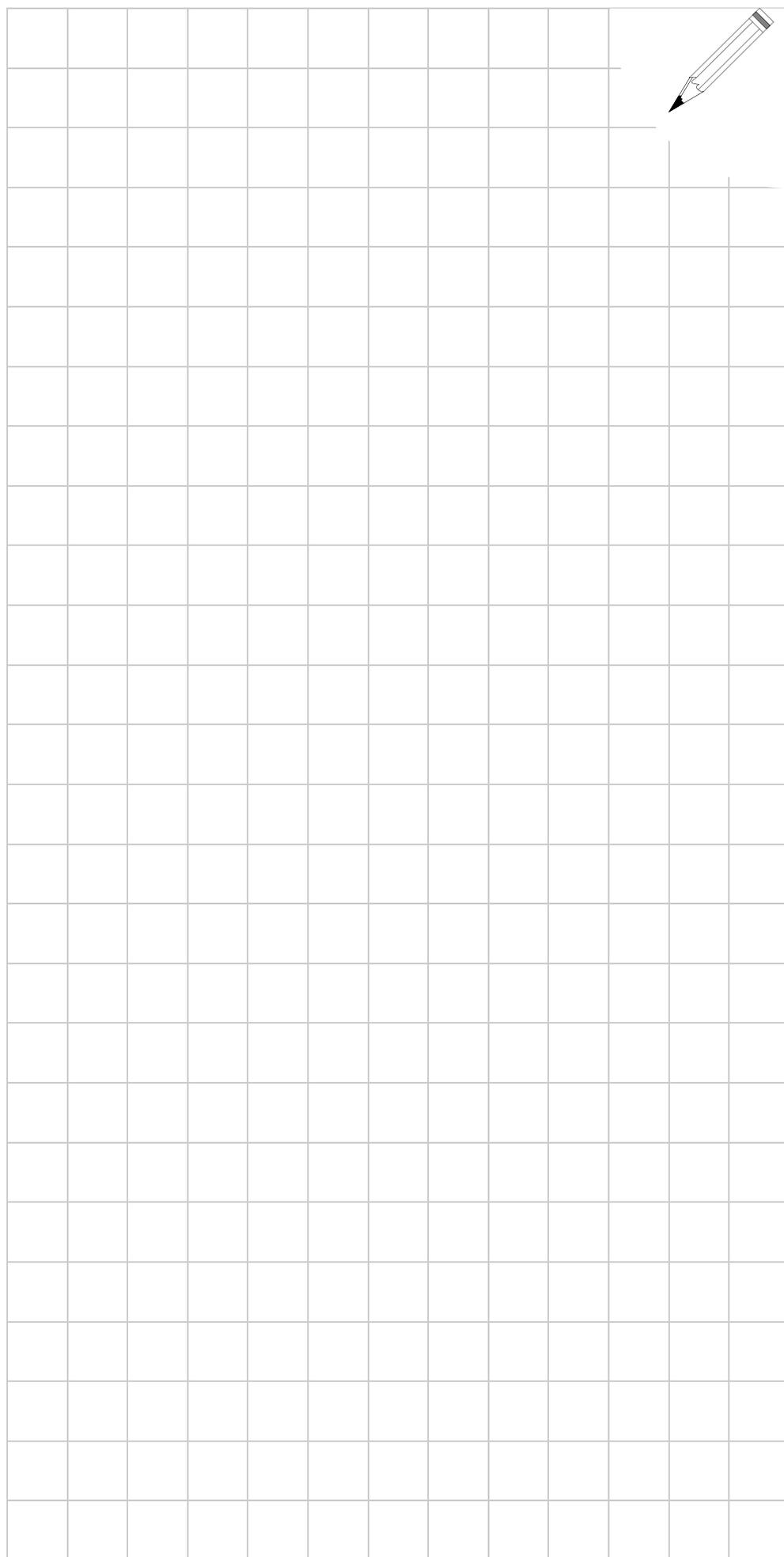
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