CC10.3

Operating, Programming, Remote Control

Version 101

BOSCH
Automationstechnik

CC10.3

Operating, Programming, Remote Control

1070 072 154-101 (95.09) GB

Reg. Nr. 16149-03

Discretionary charge 20.– DM

Safety instructions and reading help

Read this instruction manual before you use the CC10.3. Keep this manual in a place where it is always accessible to all users.

Standard operation

This instruction manual contains all of the information required for standard operation of the described products.

The products described were developed, manufactured, tested and documented in accordance with the relevant safety standards. There should be no risk of danger to personnel or property if the specifications and safety instructions relating to the project phase and installation and correct operation of the product are followed.

Qualified personnel

This instruction manual is designed for specially trained PLC personnel. The relevant requirements are based on the job specifications as described by the ZVEI, see:
Anforderungsprofile für SPS–Fachkräfte
I + K SPEKTRUM 19
Hrsg.: ZVEI
Stresemannallee 19
60596 Frankfurt
Federal Republic of Germany
ISSN 0932–5018

This instruction manual is designed for PLC comissioners. These comissioners require special knowledge of PLC controllers.

Interventions in the hardware and software of our products which are not described in this instruction manual may only be performed by our skilled personnel.

Unqualified interventions in the hardware or software or non-compliance with the warnings listed in this instruction manual or indicated on the product may result in serious personal injury or damage to property.

Qualified personnel are persons who

- as **planning personnel**, are familiar with the safety guidelines used in electrical engineering and automation technology.
- as **operating personnel**, are familiar with the equipment used in the field of automation technology and are thus familiar with the operating instructions in this manual.
- as **commissioning personnel**, are authorized to commission, ground and classify electric circuits and devices/systems in accordance with the relevant safety standards.

Safety instructions on the control components

The following warnings and notices may be indicated on the control components themselves and have the following meaning:


Danger: High voltage!


Danger: Battery acid!


Electrostatically–sensitive components!


Disconnect at mains before opening!


Pin for connecting PE conductor only!


For screened conductor only!

Safety instructions in this manual

These symbols are used throughout this manual subject to the following conditions.

DANGER

This symbol is used to warn of the presence of **dangerous electrical current.** Insufficient or lacking compliance with these instructions can result in **personal injury.**

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.

DANGER

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **personal injury**.

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.

CAUTION

This symbol is used wherever an insufficient or lacking compliance with instructions can result in **damage to equipment or files**.

Safety instructions accompanied by this symbol are serially numbered, for example 0.1. The appendix provides translations of the safety notes shown here in all the official EC languages.

This symbol is used to inform the user of special features.

Safety instructions

DANGER

0.1

Danger to persons and equipment!

Test every new program before operating the system!

CAUTION

0.2

Danger to the module!

Do not insert or remove the module when the control is switched on! This can destroy the module. Switch off or remove the power supply module of the control, external power supply and signal voltage before inserting or removing the module!

CAUTION

0.3

Danger to the module!

All ESD protection measures must be observed when using the module! Avoid electrostatic discharges!

Observe the following protective measures for electrostatically endangered modules (EEM)!

- The employees responsible for the storage, transport and handling must be trained in ESD protection.
- EEMs must be stored and transported in the protective packaging specified.
- EEMs may basically only be handled at special ESD work places set up specifically for this purpose.
- Employees, work surfaces and all devices and tools, which could come into contact with EEMs must be same potential (e.g. earthed).
- Wear an approved earthing strap around your wrist. The grounding bracelet must be connected via a cable with integrated 1 M resistance with the work surface.
- EEMs may on no account come into contact with chargeable objects, these include most plastics.
- When inserting EEMs into devices and removing them, the power source of the device must be switched off.

Contents

Operating instructions

FUNCTION BLOCK INFO (Information)

CC 10 module

Contents

Programming instructions

General

Compensation tables

Programming the rotary axis

Contents

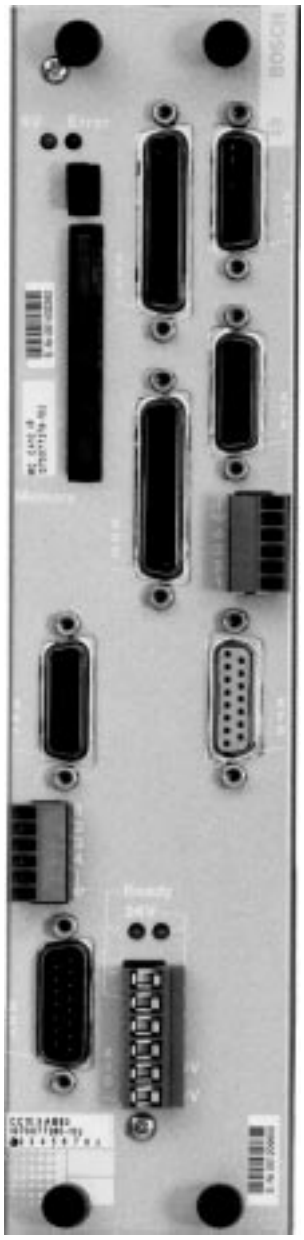
Remote control

GENERAL

This description refers to the CC 10 operating system software as from version C40.

CC 10

Computer–assisted positioning control for max. 3 axes



These instructions are intended for the user of the CC 10 control system.

FOREWORD

These instructions describe the operator steps which must be performed on the CNC itself. They apply only to type CC 10 control systems. Only the described sequences and operations are permitted.

Machine–specific operation through assignment of the function keys F1–F12 is described by the machine tool manufacturer.

All function blocks (FBL) are represented in their overall context, together with all possible operating sequences. This permits a general overview of all the functions available in a particular FBL and their selection. The ”arrow notation” (softkey trees) used for this purpose is intended as a simple and effective memory aid for experienced operators.

The error messages for the CC 10 are contained in Chapter 8. Chapter 9 contains further details relating to the function descriptions and examples.

These operating instructions represent a control–specific general ”reference work” giving the user details and comprehensive information on the available functions and their selection as well as permitting effective operation of the control system.

The CC 10 is a computer–assisted numerical positioning control (CNC) for use in the following fields:

- special mechanical engineering
- transfer lines
- handling technology
- assembly technology
- feed units and
- auxiliary axes on machine tools.

The CC 10 is integrated in the programmable logic controllers (PLC) CL 300 or PC 600 (refer to the ”Interface conditions”).

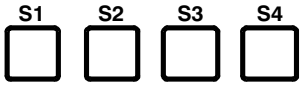
The CC 10 has its own microprocessor and a part program memory with a capacity of 10 kBytes (for max. 99 part programs). This permits axis positioning parallel to the PLC cycle without affecting the timing of the latter. Position–controlled axes can be expanded from 1 axis to 3 axes.

Up to 3 axes can be operated

- as asynchronous, mutually independent axes, each with its own part program
  or
- as synchronous axes with a common part program.

This specification and any adjustment to the machine–specific requirements are defined by input of machine parameters.

Operator prompts in all modes ensure that the operator makes the necessary sensible inputs. These prompts also allow the operator to jump to different function and softkey levels in accordance with the type of information and operation required. Detailed error messages assist the user in the event of any operator errors.

The CC 10 possesses 4 function blocks (FBL) which can be selected by means of the function keys or softkeys 

in the top row of the keyboard on the operating and programming panel (BPF 10):

- **NO.X** 

Chapter 3

  (Axis changeover for asynchronous axes)

- **MODE** 

Chapter 4

  (Automatic execution and setting–up mode)

- **MEM**ory 

Chapter 5

  (Storage)

- **INFO**rmation 

Chapter 6

  (Diagnosis)

These function blocks are described in the following chapters and explained with the aid of examples.

Each FBL has a number of function levels, each of which may contain up to 4 different functions.

The level return key  is located on the far right in the second line of the keyboard.  This key is pressed in order to jump back to the preceding (higher) function level. In some levels, operation of this key results in a jump back over two functions levels. The functions of the individual keys are described in the subsection ”OPERATING ELEMENTS”.

The chapter ”INTRODUCTION” briefly describes the

- operating and programming panel BPF 10 and BPF 10 E
- operating elements
- display unit

of the CC 10, as well as general information of relevance for the subsequent chapters.

The user is advised to read the chapter ”INTRODUCTION” and to note the information in the subsections ”NOTES” and ”CONVENTIONS” for subsequent operation.

he chapter ”INTRODUCTION” starts with a list of the abbreviations used in these operating instructions, before going on to describe the operating and programming panel (BPF 10).

Abbreviations

ASCII	”American standard code for information interchange” (data transmission code)
BAUD	Baud rate or transmission rate in characters per second
BPF	Operating and programming panel
CC	Computer control
CL	Control logic
CNC	Computerized numerical control
DCR	Digital cassette recorder
DFS	Define store program
EPROM	Erasable Programmable Read Only Memory
EEPROM	Electrically Erasable Programmable Read Only Memory
FLASH-EPROM	Side by side electrically deletable and programmable read memory
FBL	Function block
FU	Function
I/O	Input/Output
kByte	Kilo–Byte (1024 bytes)
LED	Light–emitting diode
MP	Machine parameter
MPP	Machine parameter program
NC	Numerical control
P	Part program
PG6	PG6 programming device
RAM	Random Access Memory
SK	Softkey
PCMCIA	Personal Computer Memory Card International Association (international association for standardising PC memory cards)

Device description and information for the user

This subsection contains a general description of the operating and programming panel and the layout of the display. It also explains the significance of the individual operating elements.

Operating and programming panel BPF 10/BPF 10 E

The operating and programming panel is available in two versions:

- as BPF 10/hand–held unit and
- as BPF 10 E/built–in version.

BPF 10 hand–held unit

The BPF 10 hand–held unit is intended for mobile applications. It comprises a housing accommodating the electronics. The keypad, display unit and EMERGENCY OFF button are located on the front. The BPF 10 is connected to the control system via a cable. The housing is made of black thermoplastic material.

Keypad

The BPF 10 has a total of 36 keys with different functions (refer to the section OPERATING ELEMENTS of the BPF 10 (E)).

Consent key

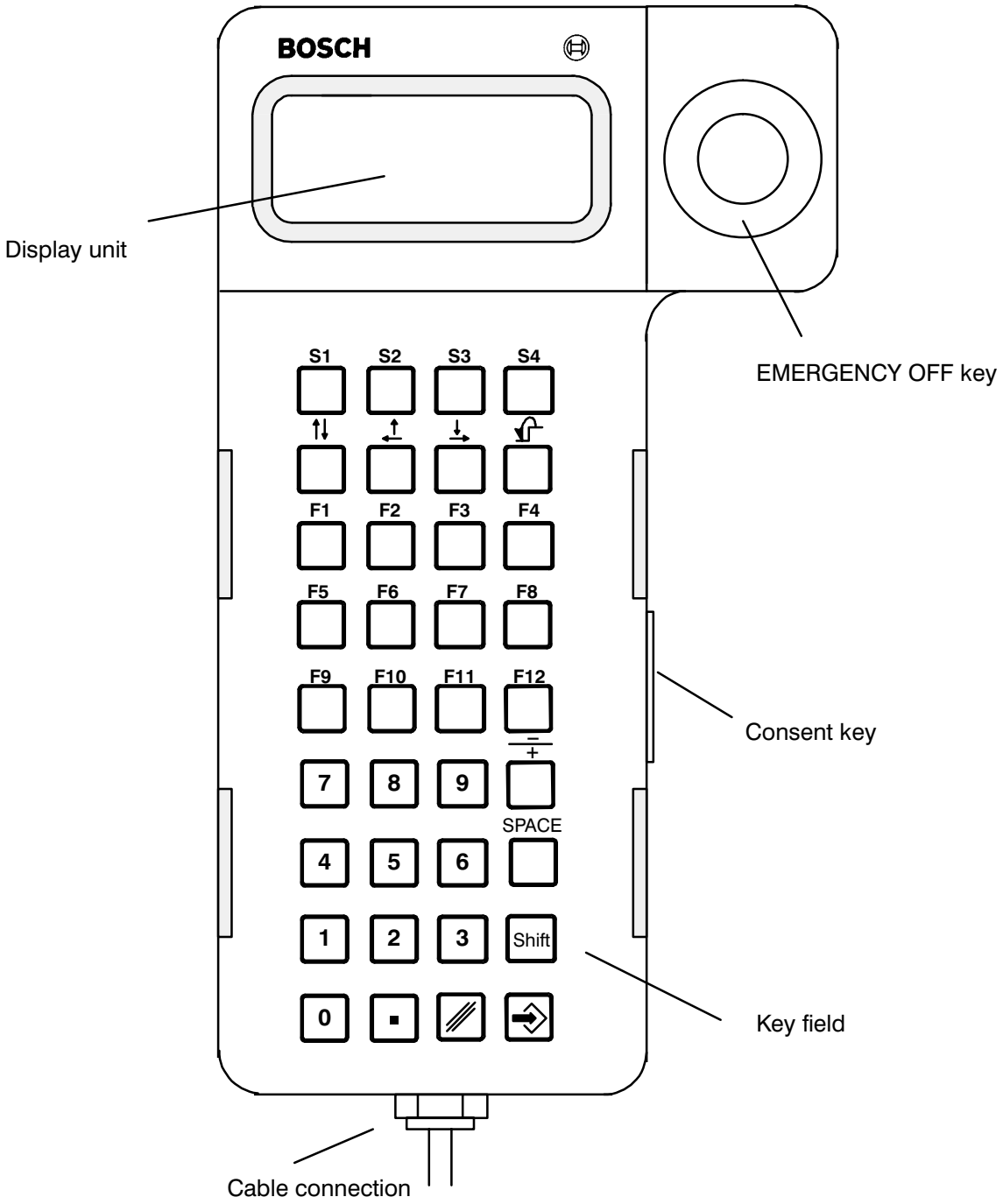
The CONSENT KEY is located on the side panel of the BPF 10. It must be pressed whenever one of the freely definable function keys F1 – F12 is to be activated. This key is positioned in such a way that it cannot simply be circumvented (for instance by jamming the switching element). The contact in the consent key is opened by spring force.

Display unit

An LCD display unit (4 x 20 positions) with alphanumeric characters is used as the display. The character height is approx. 5 mm.

EMERGENCY OFF key

The EMERGENCY OFF key is a slam button with locking switching element and reliably opening contact. It must be wired to the monitoring circuit of the control cabinet.


BOSCH
Display unit
EMERGENCY OFF key
S1
S2
S3
S4
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
7
8
9
SPACE
4
5
6
1
2
3
Shift
0
Consent key
Key field
Cable connection

BPF 10 E/built–in version.

The built–in unit is designed for installation in panel cut–outs (e.g. control cabinet door or operating panel). It consists of a scaled panel to which the electronics of the BPF 10 is secured.

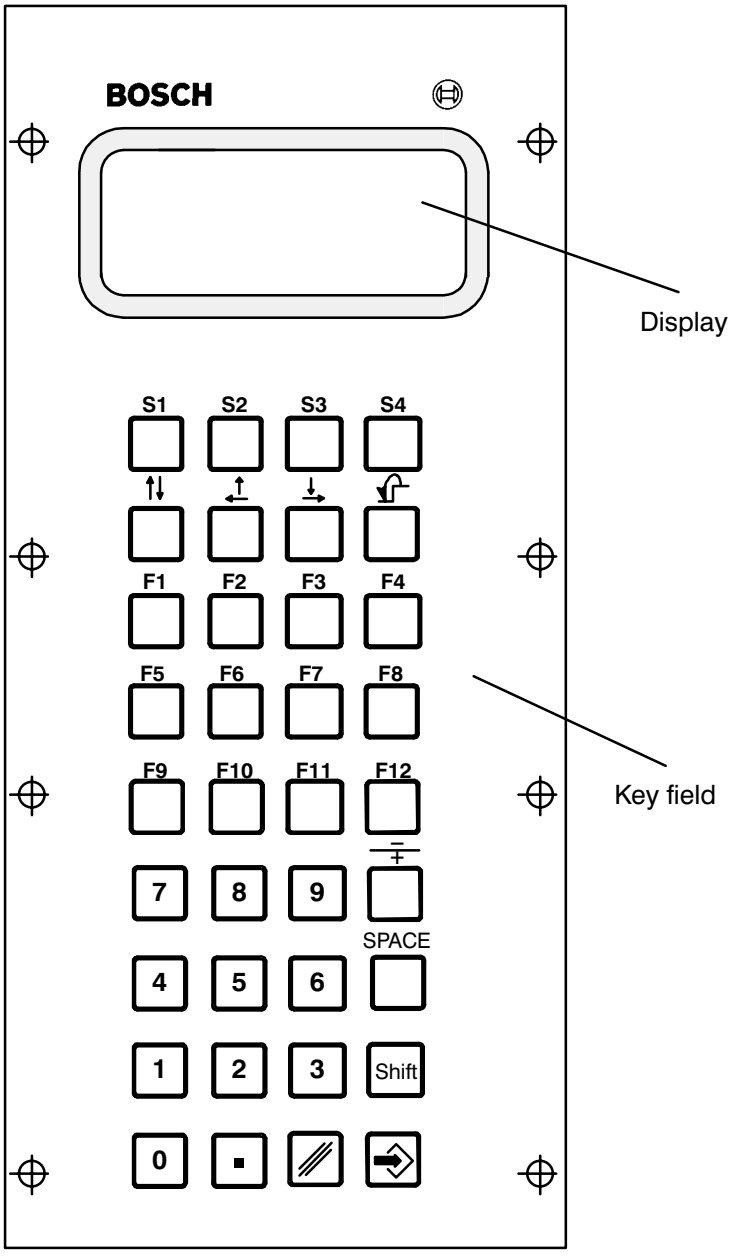
The unit does not possess either an EMERGENCY OFF button or a consent key. Otherwise, it is identical with the hand–held unit.

Keypad

The keypad for the BPF 10 built–in unit is identical with that of the hand–held BPF 10. Refer to the description of the keypad for the BPF 10 hand–held unit for further details.

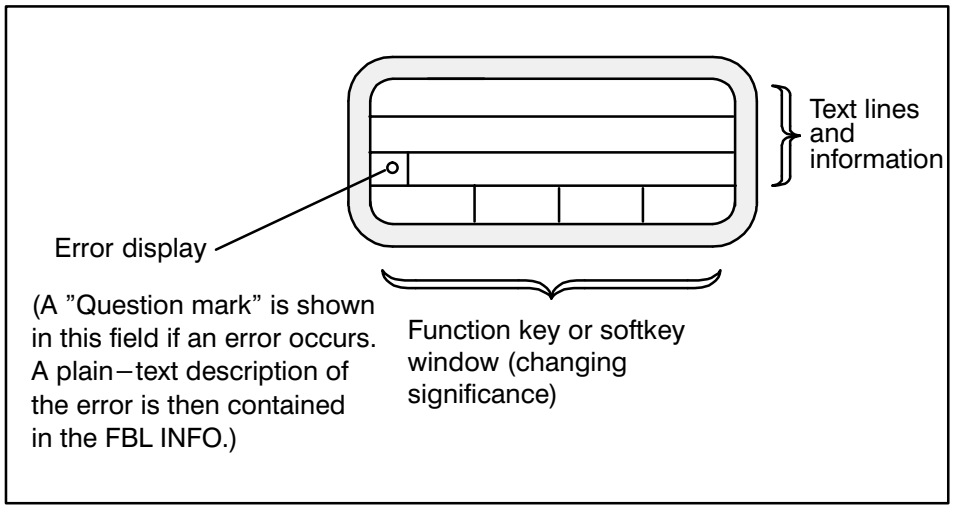
Display unit

A 4 x 20–position LCD display unit with alphanumeric characters is used for display purposes. All ASCII characters can be represented. The character height is approx. 5 mm.


BOSCH
Display
S1
S2
S3
S4
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
7
8
9
SPACE
4
5
6
1
2
3
Shift
0
Key field

Display unit

The typical display unit layout for the CC 10 is shown in the figure below:



The display consists of a 4 x 20–position display unit with alphanumeric characters. The character height is approx. 5 mm. When the control system is switched on (refer to the starting display), the available function blocks ”NO.X, MODE, MEM and INFO” are displayed in the bottom line. The function blocks (FBL) are activated by pressing softkeys S1–S4:

NO.X	MODE	MEM	INFO

NO.X: Axis changeover

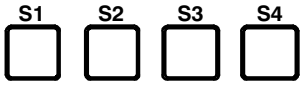
MODE: MODE (automatic/setting–up)

MEM: MEMory (storage)

INFO: INFOrmation (diagnosis)

OPERATING ELEMENTS OF THE BPF 10 (E)

Softkeys



These keys are used to call up the individual function blocks:

S1: NO.X (axis selection)

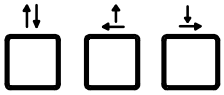
S2: MODE

S3: MEMory

S4: INFOrmation

Cursor keys

Individual function:

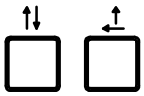


The cursor can be moved to the left and right or up and down on the display unit pressing these cursor keys.

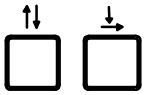
The keys can be used in the program editor and for paging through the program directory.

Programs and tables can be edited at the point at which the cursor is located.

Double function:



The cursor automatically jumps to the beginning of the preceding line when these two cursor keys are pressed simultaneously.

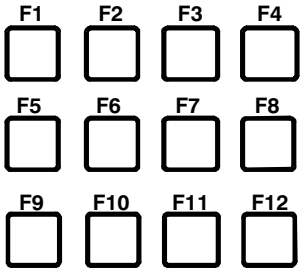


The cursor jumps to the start of the next line when these two keys are pressed simultaneously.

Level return key:

By pressing the level return key, it is possible to jump back from one function level to the previous (next higher) level or all the way back to the starting level.

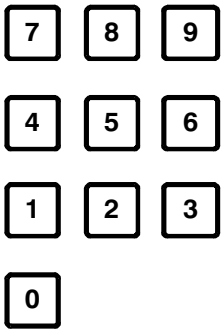
Function keys



The function keys F1 – F12 can be freely defined via the MPP and do not have any predetermined functions.

Note:
No signals affecting safety such as ”STOP” or ”START” must be routed via these keys.

Number keys



Numbers 0 – 9

Minus sign –

If the value of an input is negative, a negative sign must be written between the address letter and the string of digits.

Plus sign +

Positive signs may be written but need not be.

SPACE

Space between words

Decimal point

Delete key

SHIFT key

Shift for keys with two functions in the program editor.

Pressed: Lower character active.

Released: Upper character active

ENTER key

Confirms and stores the input.

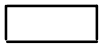
NOTES

This section contains general operating instructions which apply to the subsequent chapters. No further reference will be made there to the specific significance of the points listed below.

- Fixed functions are assigned to softkeys on all levels.
- Each FBL has a number of function or softkey levels which can be selected in succession. The next following (lower) function level is activated whenever the corresponding function keys S1–S4 are pressed.
- Each new key assignment is designated as a softkey or function level.
- Each numerical value input must be confirmed by pressing the key  .
- The level return key  can be used to jump back to the preceding (higher) level.
- In order to select a different FBL, it is necessary to jump back to the starting level by pressing  .
- When the control system is switched on, the reference points must first be approached in order to permit execution of a program (exception: the function ”Approach reference point” is not included in absolute measuring systems).
- There is a switch on the front panel of the CC 10 module (refer to the chapter EXPLANATIONS) which allows the EEPROM write protection to be switched on and off.
- The machine control panel is provided by the machine tool manufacturer. Operations associated with the machine control panel are therefore not explicitly described here.

CONVENTIONS

Press the function key



Enter numerical values

Confirm input of numerical values

Return to the next higher level

The following program example (P12) is always used for reference in the subsequent chapters.

N10X01=100G62

N20X02=200

N30X03=300

N40X01=0X02=0X03=0

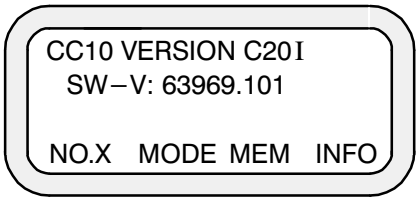
N50M30

Significance:

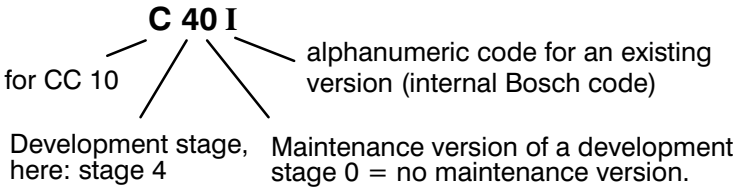
Axes X01 – X03 are traversed to the SETPOINT positions 100 mm, 200 mm and 300 mm block–by–block (SEMI) or automatically (AUTO) in the function ”Execute PROGram” (refer to FBL ”MODE”). All axes are then traversed to position ”0”.

Starting level

The CC 10 performs a self–test when the control system is switched on. When this self–test has been completed successfully, the control system is in the starting level and shows the following typical display for the CC 10:



The version number refers to the operating system software and has the following significance:



Significance of the functions

N0.X: **FBL** AXIS SELECTION
Selection of asynchronous axes.

MODE: **FBL MODE**

- **MAN**UAL (setting–up)
- APPROACH **REF**ERENCE POINT(S)
- **SEMI**–AUTOMATIC
- **AUTO**MATIC
- **HAND**
- **TEST**

MEM: **FBL MEM**ORY (storage)

- Display, edit and store
  part programs,
  tool compensation values,
  zero shifts,
  machine parameters.
- Data input and output from/to external data media.

INFO: **FBL INFO**RMATION (diagnosis)

- Display of
  ACTUAL and SETPOINT locations,
  difference between SETPOINT and ACTUAL positions,
  lag, status (error display, condition, reset) as well as
  input and output signals (digital interface CC 10 ↔ PLC).

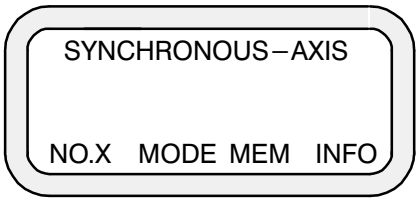
- Trip to basic setting (Reset)

The respective FBL can be selected by pressing the softkeys S1 – S4 when the starting display appears after the self–test. The functions which can be activated in these FBL are described in the following chapters together with their significance.

FUNCTION BLOCK NO.X (Axis selection)

Softkey S1 ”NO.X” is used to select asynchronous axes (max. 3 axes, e.g. X01 – X03) if these have been defined in the machine parameter program. The first axis is activated after switching on. Since each asynchronous axis has its own part program, each axis is controlled separately, i.e. a separate part program is executed for each asynchronous axis.

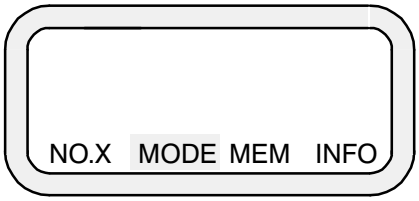
Only synchronous axes can be selected if asynchronous axes have not been defined in the MPP. The following message is displayed if softkey ”NO.X” is pressed nevertheless:



This indicates that only synchronous axes have been defined and that asynchronous axes cannot be selected.

FUNCTION BLOCK MODE

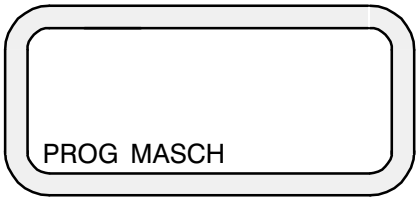
The modes can be selected via the interface inputs I1.0...1.2 (refer to the description of the digital interface in the ”Interface conditions”) or via the



The first menu level reached after pressing the softkey ”MODE” contains the two function groups

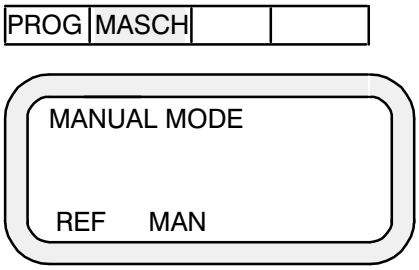
- **PROG**ram execution and
- **MACH**INE:

The modes available in FBL **”MODE”** are selected by pressing **”PROG”** or **”MACH”**.



FUNCTION: MACHine

The following modes can be called up when **"MACH"** is pressed:
.
.

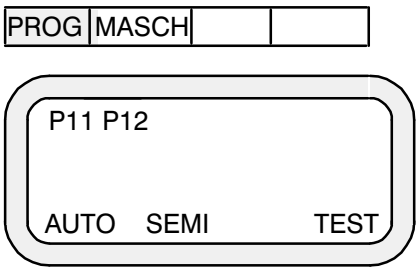


Significance of these modes:

- **REF:** Approach REFerence point(s)
- **MAN:** MANual displacement of the axes (e.g. by means ofthe jog keys on the machine control panel).

Function: PROGram execution

The following modes can be selected by pressing **"PROG"**:
.
.



Significance of these modes

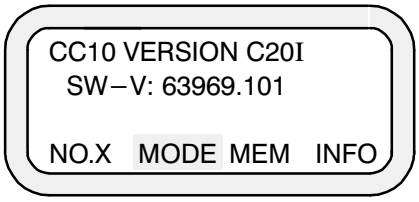
- **AUTO**: AUTOmatic execution of a part program from the first block to the end of the program.
- **SEMI:** SEMI–automatic (block–by–block) execution of the program by pressing the START key on the machine tool control panel.
- **TEST:** Program check for SYNTAX errors.

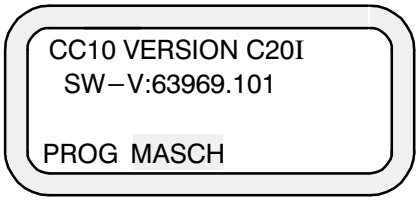
MODE: Approach REFerence points (applies only in conjunction with incremental measuring system)

The mode **"Approach reference point"** (refer to the Interface conditions, Chapter 6 "Digital interface") is output at the digital interface outputs (CC 10 → PLC) when "REF" is pressed. The feedback signal from the corresponding inputs I4.2–I4.4 then allows the corresponding axes to approach the reference points.

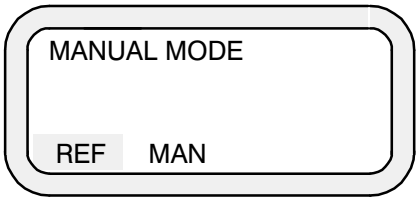
The procedure for approaching the reference points is represented with the aid of the various softkey levels. Selection is made by pressing **"MOD**", **"MACH"** and **"REF"**:

The starting display with selection menu appears when the control system is switched on (version may differ, here C20I).

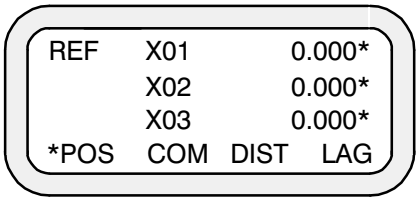




Select **"MACH"**

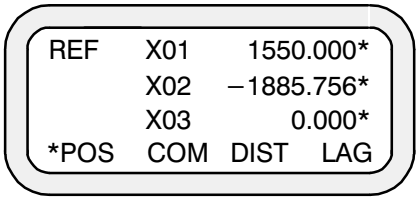


Select **"REF"** (not applicable in the case of absolute measuring systems)



The axes can now be travelled to the reference point in accordance with the machine manufacturer's instructions.

When the reference point switches have been reached, the axes are synchronized with the zero pulse of the measuring system and the limit positions are displayed for each axis.



These are the coordinate values of the respective reference points as defined in the MPP.

When an axis (e.g axis 1) approaches the reference point (manual or via G74) and has synchronized with the zero point, the signal REFERENCE POINT APPROACH AXIS 1 is set in the digital interface (refer to the Interface conditions/Digital interface).

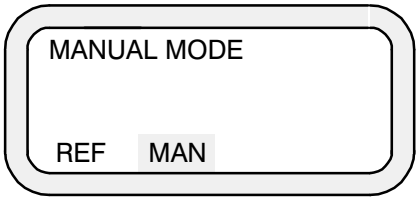
The INPOS signal "*" is displayed after the corresponding axis to indicate that the reference points have been reached.

MODE: MANual axis displacement

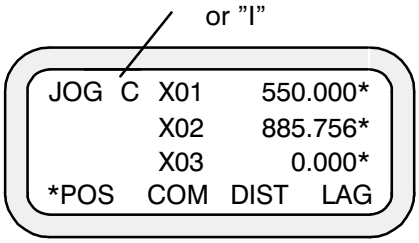
The mode **"MAN**ual" is output at the interface outputs of the CC 10 (CC 10 → PLC) after selecting FBL "MODE" and pressing **"MACH"** and **"MAN"**. The axes can then be traversed "manually" in accordance with the machine tool manufacturer's instructions. The operating sequence on the BPF 10 is as follows:

NO.X	MODE	MEM	INFO

PROG	MASCH		



When the axis to be traversed has been selected, it can be moved to the following positions, for example, either "continuously" or "incrementally" as selected:



C: Continuous displacement

or

I: Incremental displacement

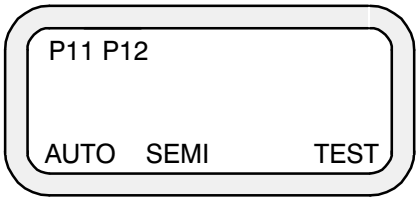
TEST part program

The part program ”P12” (refer to CONVENTIONS, Page 1–13) is to be executed after selecting FBL **”MODE”** and pressing **”PROG”**.

It is advisable to check the program for possible syntax errors before it is executed. This is done by pressing **”TEST”**:

NO.X	MODE	MEM	INFO

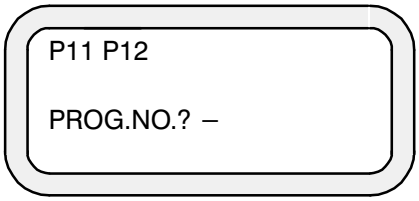
PROG	MASCH		



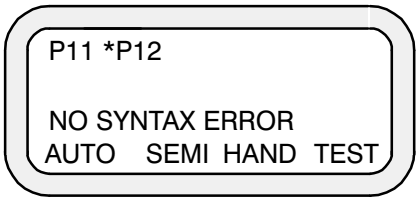
The displayed programs P11 and P12 are stored in the memory (EPROM).

AUTO	SEMI		TEST

Program check for SYNTAX errors.



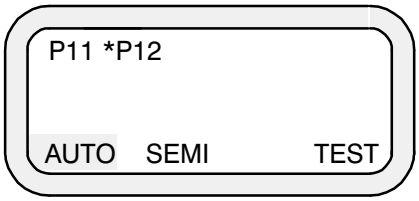
Enter the program No.: 1 2 ➡



(*) indicates that P12 has been activated and that no error has been found during the syntax check

MODE: AUTOmatic part program execution

The entire part program is executed automatically from the first block to M30, for example, by pressing **"AUTO"**, entering the program number and START (via the interface). The momentary axis positions are indicated on the display screen.



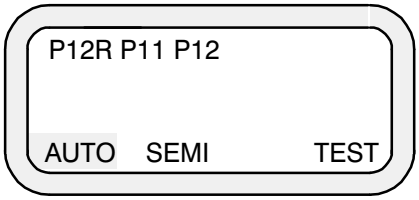
- When execution of "P12" has been completed, **"AUTO"** can be pressed to start execution of another program (such as P11) or  can be pressed to return to the starting level.
- If another program is not selected, the START key can be pressed to execute the same program once more.

MODE: SEMI–automatic part program execution

The program can be executed block–by–block from the first block to M30, for example, in "SEMI–AUTOMATIC" mode by pressing **"SEMI"** and entering the program number. The START key must be pressed after each block has been executed in this case. Softkey S1 can be pressed at any time during execution to switch over between AUTO and SEMI–automatic.

NOTES

1. If program ”P12” has been processed (edited) in FBL **”MEM”** before ”Execution” and then stored in the part program memory, the information ”P12R” appears in the top display line when the part program is selected in the FBL **”MODE”**:



Significance:

P12: stored in the EEPROM

P12R: was last edited and is additionally stored in the working memory/RAM.

(Refer to the description of FBL **”MEM”** for a more detailed explanation).

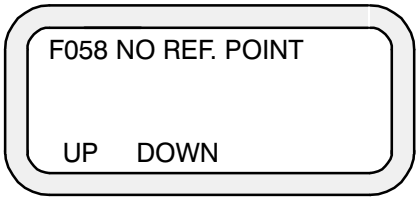
2. If no reference points have been approached before selecting mode **”PROG”**, execution is blocked and a flashing question mark appears on the screen. This question mark indicates that an error has occurred.
The significance of the error message can be determined in the FBL **INFO** as follows.

NO.X	MODE	MEM	INFO

AXIS	STAT	I/O	

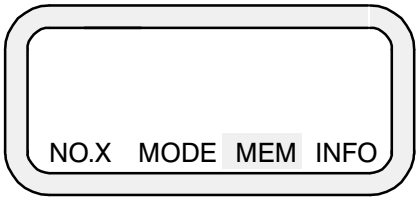
ERR		COND	RESET

The error is now displayed in ”plain text”.

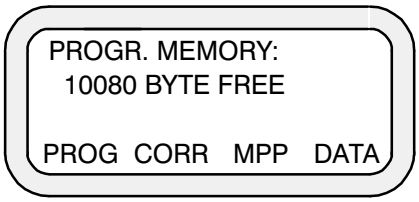


FUNCTION BLOCK MEM (Memory)

The FBL **"MEM"** can be used to call up and edit part programs, tool compensations and zero shifts as well as the machine parameter program (MPP). In addition, it is also possible to transfer programs, compensation values or the MPP to an external data medium (refer to the control system summary in Chapter 1 of "Interface conditions") or to load these into the memory from there.



The first function level of the FBL **"MEM"** is reached by pressing **"MEM"**.



10080 bytes are still free in the part program memory.

Significance of the functions

PROG: Call, check and edit a part program

CORR: Call, check and edit tool compensation values or zero shifts

MPP: Call the machine parameter program

DATA: Load and output data

Example: Create part program P12

The program example described in the subsection ”CONVENTIONS” (refer to Page 2–14) is to be entered under program No. ”P12”.

Select FBL ”MEM” and then press **”PROG”**.

PROG	CORR	MPP	DATA

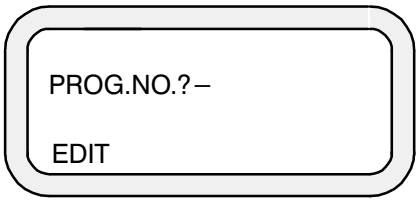
EDIT	DEL		REN

Significance:

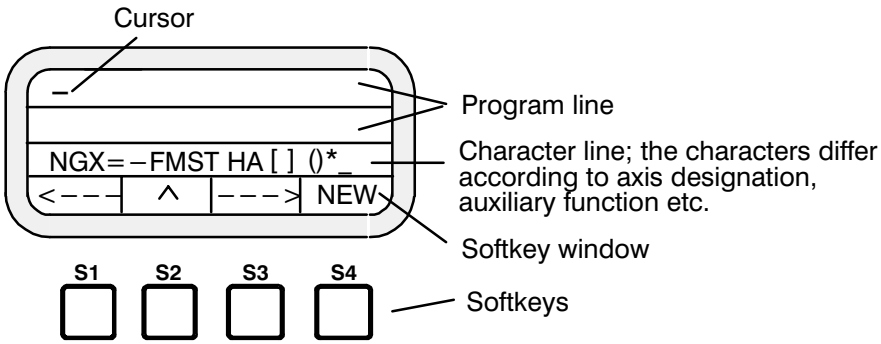
EDIT: Edit program

DEL: Delete program

REN: Rename program



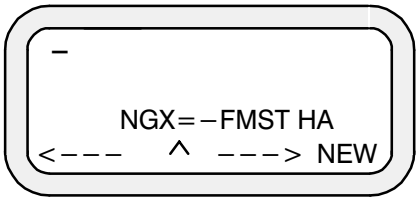
Call P12

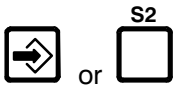


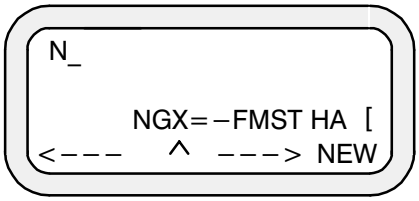
Example: Enter the 1st block of P12: (N10X01=100G62)

Press S1 or S3 so that the character line is moved until the character to be programmed is located above the arrow " ^ ". Then enter the character by pressing the ENTER key or softkey 2. After this, the character appears on the display unit. Numerical values are input directly via the keyboard (without ENTER).

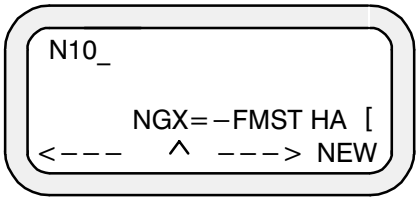
S3 → until N is positioned over ^.







Input: 1 0

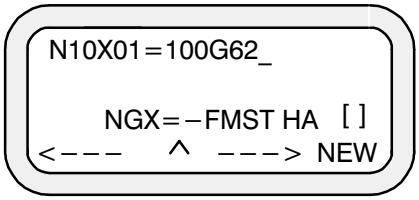


The numerical value 10 has been programmed.

S1 ← until X is positioned over ^ [→] or S2 [ ] [0] [1]

S2 ← until = is positioned over ^ [→] or S2 [ ] [1] [0] [0]

S3 → until G is positioned over ^ [→] or S2 [ ] [6] [2]



The block programmed in this manner is now completely located in the program line: Block 1 has been programmed.

NC blocks N20 to N40 can be subsequently input by pressing S4 **"NEW"**:

N [2] [0] X [0] [2] = [2] [0] [0]

S4 [ ]

N [3] [0] X [0] [3] = [3] [0] [0]

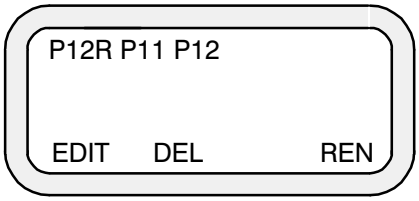
S4 [ ]

N [4] [0] X [0] [1] = [0] X [0] [2] = [0]
X [0] [3] = [0]

S4 [ ]

N [5] [0] M [3] [0]

Press the level return key  twice after completing input. The program can then be stored and executed in MODE "**MODE**" under "**AUTO**" or "**SEMI**".

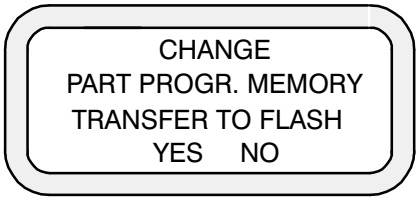


Significance:

P12: stored in the PMEM part program memory.

P12R: stored in the edit memory (RAM).

The following query appears if a change is detected when the EDIT mode is left:



The new part program P12 has thus been stored and can be executed in FBL **"MODE"** under **"AUTO"** or **"SEMI"**.

CAUTION **5.1**

Programs which have not been stored with "YES" into the FLASH–EPROM are no longer available after the supply voltage has been switched off.

Notes:

Until now the CC10 had access to EEPROM as permanent memory. It was possible to write in individual lines of the EEPROM. The part programs were each stored separately. This could, depending on the size of the program, be carried out very quickly.

The CC10.3 now has access to FLASH-EPROMs as permanent memory. FLASH-EPROMs are **rarely** written in or deleted. For this reason, the **complete** part program memory must be written into the FLASH-EPROM after a part program has been altered or loaded (independent of the length of the program). This programming process takes a few seconds.

Whereas changes in the CC10.2 were made asynchronously in RAM and EEPROM, the FLASH memory of the CC10.3 functions solely as a resident backup medium.
When the MEM/PROG level is exited in the CC10.3, the RAM memory is checked for changes. If changes have been made, the user is informed and must decide whether to accept the changes into the FLASH-EPROM.
Programming changes to the FLASH-EPROM are carried out in the background. Further processing of the part programs is not possible during this time.

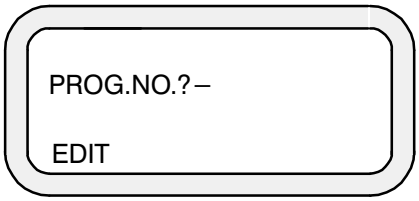
Example: Editing an NC block

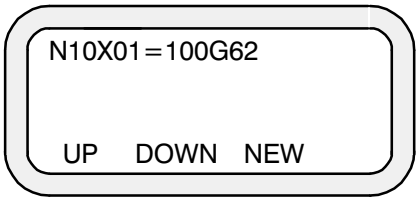
The first NC block ”N10” is to be edited:

Old block: N10X01 = 100G62

New block: N10X01 = 200G62

.
.

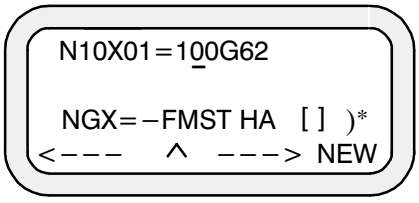




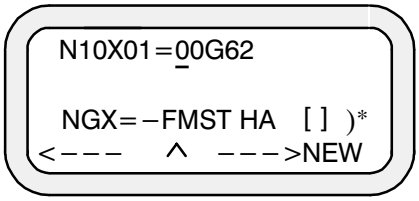
The first NC block is displayed in the program line:

”NEW”: Assignment of a value

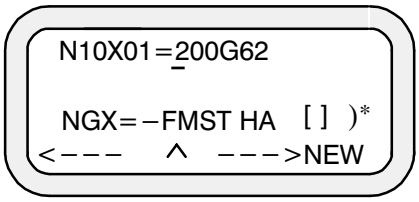
When **”NEW”** is pressed, the cursor appears on the screen and can then be positioned on the ”0” to the right of the ”1” using the cursor keys:



Press the delete key 



Input: 



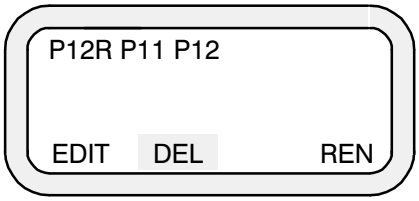
The new (edited) NC block is displayed.

The next line can be edited by pressing ”UP” and ”NEW” after pressing the level return key  . The same also applies to all subsequent lines. The edited program can then be executed, for example, after storage (refer to ”PROGram execution”).

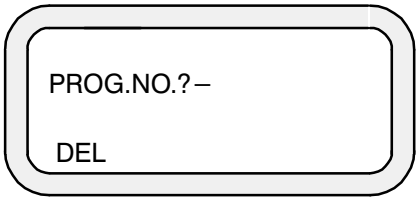
Delete a program

Programs stored in the part program memory can be deleted by pressing **"DEL"**.

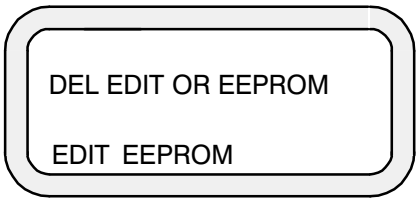
1. Deleting the part program in the EDIT or part program memory
   .
   .



Call "Delete"



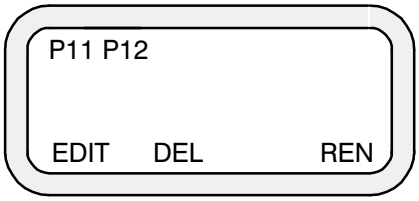
Enter: 



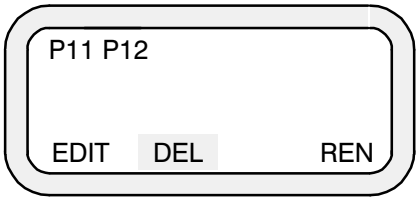
Delete the program in the RAM (EDIT, deletion of P12R in the RAM) or EEPROM (select EEPROM).

After pressing **"EDIT"**:

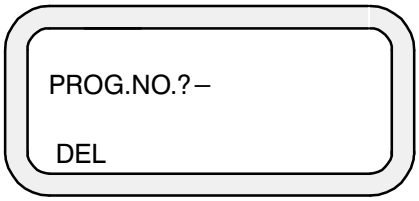
P12(R) is now deleted in the RAM (edit memory) and is no longer listed as "P12R" on the display.



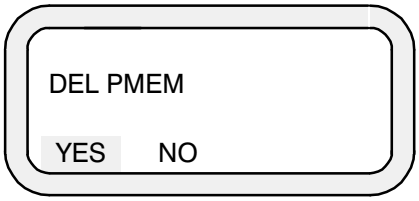
2. Deleting a part program which is stored only in the PMEM part program memory (when, for example, it was previously deleted in the working memory as in pt. 1)



Press **"DEL"**

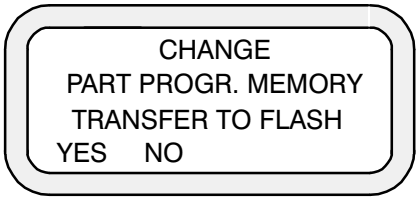


Enter: 



Deleting the part program in the PMEM part program memory

Pressing the level return key  triggers recognition of changes to the memory and prompts the query, whether the deleted part program is also to be deleted in FLASH.



YES: Program is also deleted in FLASH memory

NO: Program is not deleted
During the next run-up, the program is automatically copied from FLASH into the part program memory and is once more at the user's disposal.

Rename a program

The program name can be changed by pressing **"REN"**, e.g. P12 → P20.

The old program name P12 no longer applies and the program is given the new designation P20.

The rename function is possible only for part programs stored in the part program memory. Part programs can thus be copied in this way.

- Select the program to be copied (P12). The program is now located in both the RAM (P12R) and the PMEM part program memory (P12).
- Rename the PMEM program (P12 after P20).
- Select (P12R) and store (as P12) the RAM program.
- Save the changes in FLASH.

COMPENSATION

The function COMPENSATION can be selected by pressing ”CORR” after selecting the FBL **”MEM”** (MEMORY).

NO.X	MODE	MEM	INFO

PROG	CORR	MEM	DATA

	H		G

There are 2 different types of compensation:

- H: Tool length compensation
- G: Zero shift.

Tool length compensation

A total of 72 length compensation values can be entered in the table and stored for 3 x 1 asynchronous axis (24 compensation values for each axis) or max. 72 compensation values for 1 axis or max. 24 compensation values for 3 synchronous axes (the user can define the number of axes in the MPP). If 72 length compensation values are agreed in the machine parameter program for one axis, these compensation values are always offset in the axis defined as the first axis in the MPP.

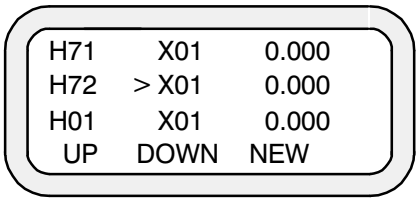
For example, if there are 3 synchronous axes (e.g. 2 positioning axes and one machining or feed axis with a tool of variable length), the number of axes to be compensated is defined as ”1” in the MPP. The user can now enter 72 different compensation values in the length compensation table.

The function is called by pressing **”H”**.

	H		G

DATA INPUT
LENGTH OFFSET
GROUP: _

Enter the length compensation (offset) group (e.g. 72):

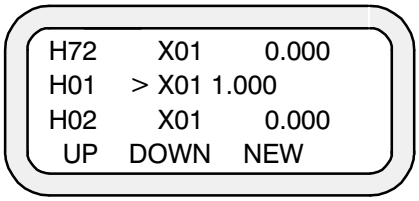


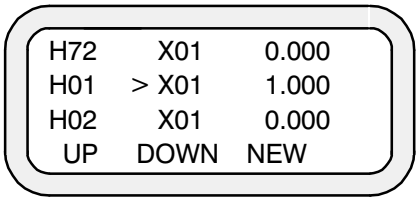
.
.

The selected group is always shown in the middle line.

A length compensation value can now be assigned to axis X01 by pressing **"NEW"**. The corresponding compensation group can be selected by pressing **"UP"** or **"DOWN"**. As an example, the compensation value "1.000 mm" will now be assigned to the group 01:

Set " > " to group 01 using softkey **"UP"** and then press **"NEW"**.

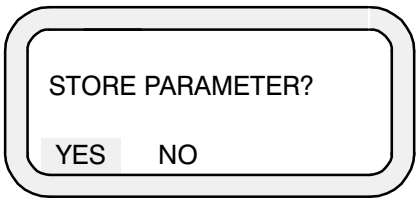




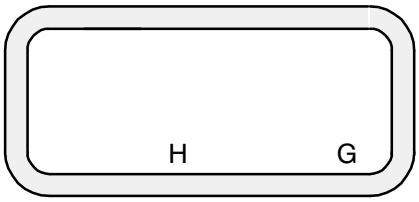
The compensation value 1.000 has now been entered in group 01 and becomes active immediately, irrespective of whether the compensation value has been stored in the EEPROM or not.

So that the compensation value is still available after switching the control off and then back on again, the length compensation value input in this way must be stored in the EEPROM. To do this, it is necessary to press the level return key  twice. The system then enquires whether the new value is to be stored or not.

Press level return key  twice.



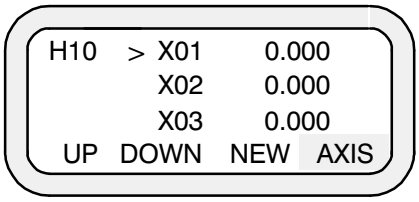
Store: yes



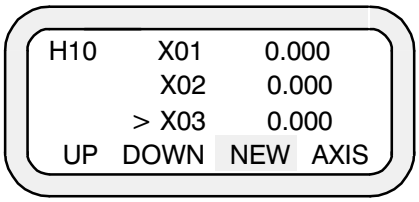
The compensation value has now been stored.

In the same way, it is possible to assign 24 compensation values to each axis. The corresponding length compensation values are selected by pressing **"UP"** or **"DOWN"**. Here, for example, it is wished to assign a value to axis X03 in the compensation group "10".

Select "H"



Select **"AXIS"** twice

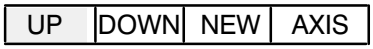


Press **"NEW"** and enter the new value.

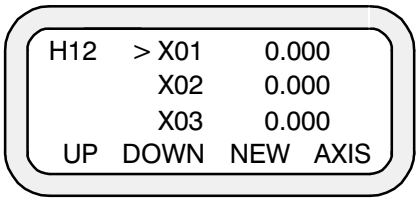
Refer to Page 5–12 for a description of the remaining steps.

If it is wished to select a different compensation group, (for example, e.g. group 12), **"UP"** must be pressed twice.

.
.



Press twice



Compensation group 12 can now be edited.

A total of 24 compensation groups are available for each axis. If **"UP"** is pressed when group 24 is activated, group 01 is displayed again.

Important:

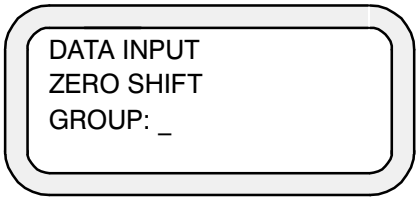
Compensation values edited during program execution (in SEMI or AUTO mode) may only become effective 5 blocks later owing to preparatory block processing.

Zero shift

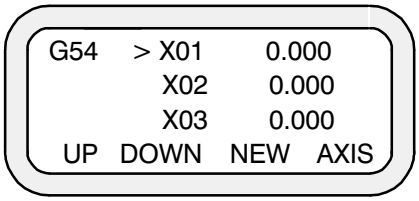
A total of 6 zero shifts (axis–specific) G54–G59 can be entered (refer to Programming instructions).

	H		G

The zero shift table is called by pressing **"G"**:



Select group G54, for example:

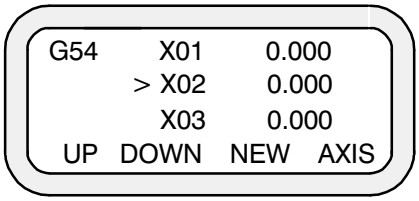


The other groups G55 – G59 can be selected by pressing **"UP"** and **"DOWN"**.

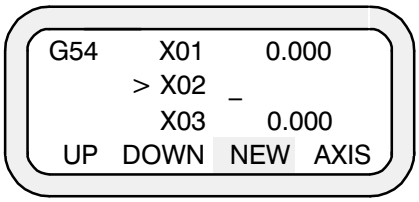
Example:
The compensation value 1.000 is to be assigned to axis X02 in group G54.

UP	DOWN	NEW	AXIS

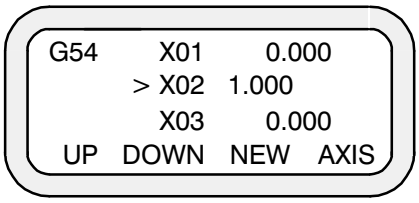
Select an axis (e.g. X02)

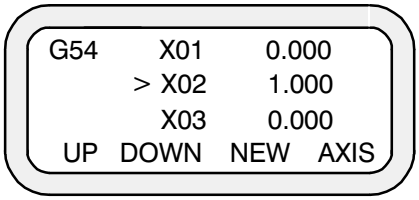


Assignment



The zero shift value ”1.000” is to be entered



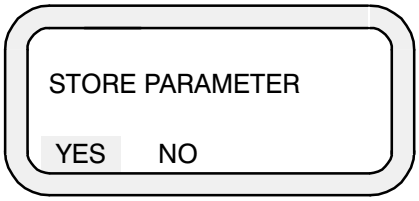


The zero shift has been programmed for X02.

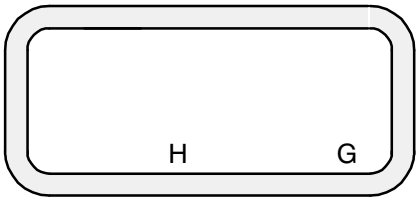
Zero shift values can be assigned to the axes X1, X2 and X3 in all zero shift groups G54–G59 using the procedure set out above.

The zero shift values must be stored when input has been completed. Proceed as follows for this purpose:

Press the level return keytwice ().



The following display appears on the screen when the compensation values have been stored:



Important:

Compensation values which are edited during program execution (in SEMI or AUTO mode) may only become effective 5 blocks later due to preparatory block processing.

Note

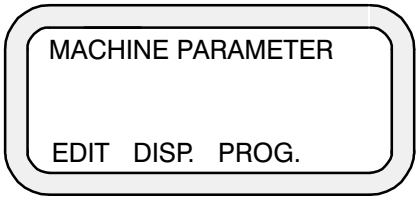
It is also possible to program an additive zero point shift(G160). See programming instructions.

Machine parameter program (MPP)

The machine parameters can be called up and paged through, edited or stored in the EEPROM by pressing **"MPP"** in FBL "MEM".

NO.X	MODE	MEM	INFO

PROG	CORR	MPP	DATA



Significance:

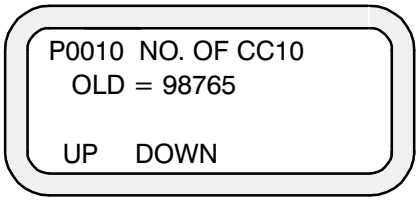
EDIT: Edit

DISP: Display

PROG: Program

Example: Display machine parameters

EDIT	DISP.	PROG.	



The OLD parameter (old value) stored under No. P0010 = 98765 is displayed. All machine parameters can be displayed by pressing **"UP"** or **"DOWN"** (refer to the chapter on machine parameters in "Interface conditions").

Press  once in order to return.

Example: Edit machine parameters

EDIT	DISP.	PROG.	

```
MPP – EDIT
PASS WO: _
```

In order to be able to edit the machine parameters, it is necessary to enter a specific code. This is the number ”337”.

3 **3** **7**

```
PASS WO:***_
```

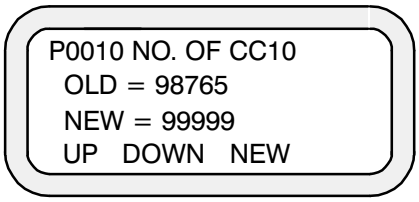
```
P0010 NO. OF CC10
  OLD = 98765

 UP  DOWN  NEW
```

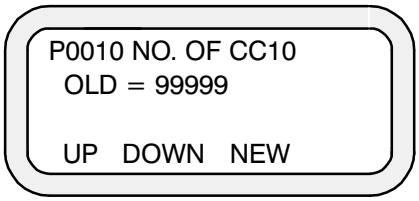
The machine parameter can now be edited by pressing **”NEW”**.

```
P0010 NO. OF CC10
  OLD = 98765
  NEW = _
 UP  DOWN  NEW
```

Old parameter: 98765
New parameter: 99999

9 **9** **9** **9** **9**





The new parameter has now been entered and can be stored in the EEPROM.

Press  once.

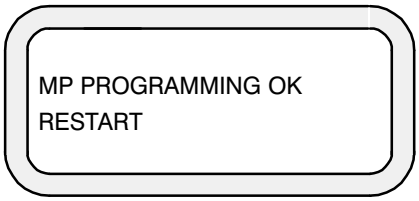
EDIT	DISP.	PROG.	

Press PROG.

Example: Programming machine parameters

When machine parameters have been entered or edited, they are stored by pressing the key  and then **"PROG"**.

EDIT	DISP.	PROG.	



This display indicates that the new parameters have been stored in the EEPROM.

Press  once; the CC 10 performs a system restart (the READY signal is cancelled).

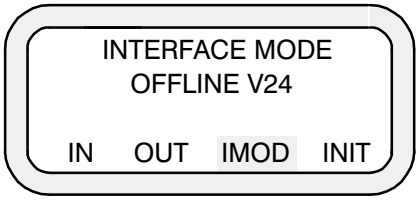
Data input and output

After selecting FBL **"MEM"** (MEMORY), it is possible to transfer data (programs, tables, tool compensation values and machine parameters) from the memory to an external data medium or read this data from there into the memory by pressing **"DATA"**.

Before reading in or outputting data, it is possible to select the external data medium by pressing **"DEV"**.

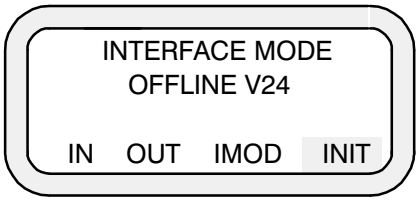
NO.X	MODE	MEM	INFO

PROG	CORR	MPP	DATA

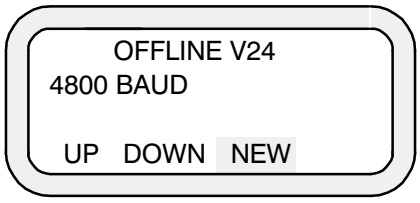


Interface selection
The interface defined in machine parameter P0491 is valid when the system is switched on. The setting can be changed by operation of **"IMOD"**.

* OFFLINE V24
* ONLINE V24
* ONLINE PLC



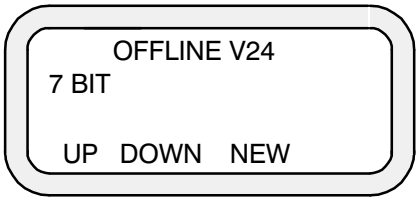
The data interface can be configured with **"INIT"** before reading data in or out. The power-up state is defined in parameters P0492...P0497 or P0481...P0486.



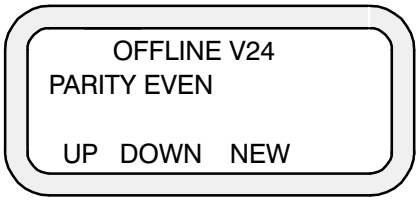
The following speeds (BAUD rate) can be set with **"NEW"**.

110 BAUD
300 BAUD
600 BAUD
1200 BAUD
2400 BAUD
4800 BAUD

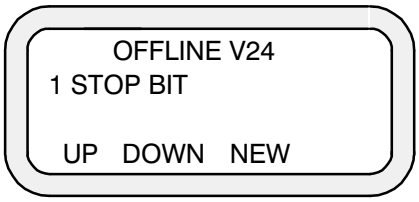
It is possible to page through the list of adjustable interface parameters with **"UP"** or **"DOWN"**.



The character length may be
7 bits or
8 bits.



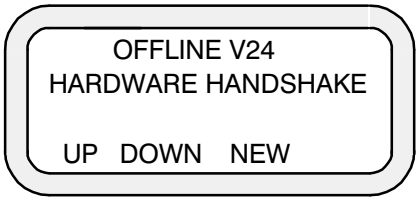
Each character can be provided with a parity bit. Possible settings:
* Even parity
* Odd parity
* No parity



The number of stop bits can be defined as follows:

1 stop bit
1.5 stop bits
2 stop bits

The start bit cannot be adjusted; one start bit is always sent before the code of the ASCII character.



The user must specify for each external input or output device whether it is operated with a ”software handshake”, ”hardware handshake” or without ”handshake” (control character).

Hardware handshake The following characters are involved here:

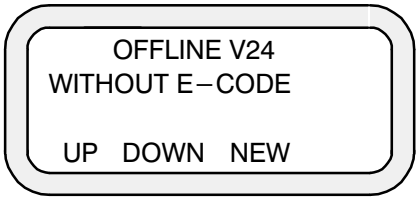
DTR Data Terminal Ready
Ready to receive status is output (output signal)

DSR Data Set Ready
Permission to transmit status is recognized (input signal)

Software handshake The following characters are involved here:

DC2 Start of transmission (XON)

DC4 End of transmission (XOFF)



Data transmission reliability can be increased by the read monitoring function ”E–CODE” (refer to Programming Instructions).
Possible parameters: With E–Code
Without E–Code

XTRANS

BOSCH offers with XTRANS a comfortable File handling program to tfansfer Data from PC to CC10 controller an d vice versa. The interface parameters have to be adjusted according to the CC10 requirements.

Adjusting the XTRANS interface

F7 SYSTEM

F2 SET UP

F1 INTERFACE

INTERFACE DATA:	No. of interface:	1
	Baudrate:	4800
	Data bits:	7
	Stop bits:	1
	Patrity:	EVEN
	Handshake	NO
	Timeout	20

Reading in data

After initializing the interface, it is possible to read part programs, tables and/or machine parameters into the memory of the control system. The selection is made by pressing **"IN"** as well as **"PROG"** or **"TAB"**. or **"MPP"**.

Select **"DATA"**

PROG	CORR	MPP	DATA

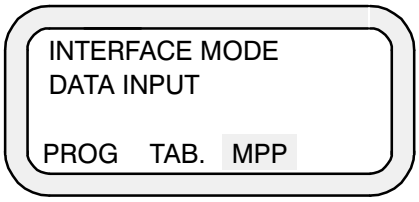
Select interface, set interface parameters with **"INIT"**

IN	OUT	IMOD	INIT

Select **"IN"** (reading in).

IN	OUT	IMOD	INIT

READING IN of programs, tables or machine parameters ("PROG, TAB. or MPP"). The DCR operates with a hardware control character; for this reason, switch to HARDWARE HANDSHAKE previously with "INIT".

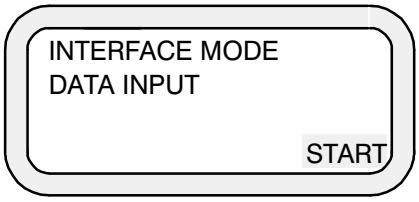


Select MP (machine parameters)

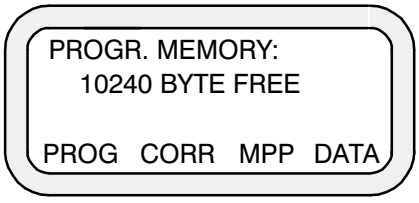
XTRANS operation

F1 Transfer F2 Output F3 N files

Select the file(s) with +



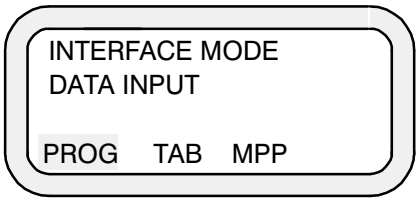
Confirmation with ENTER in XTRANS triggers the transfer of data.



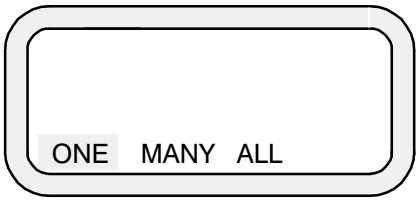
After data transfer, the CC 10 returns to the FBL **"MEM"**. The free memory space is reduced during transfer of part programs.

Reading in part programs

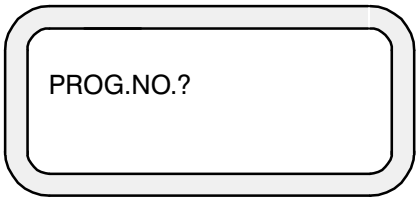
Read in selection ”Part programs”



Select ”ONE” part program



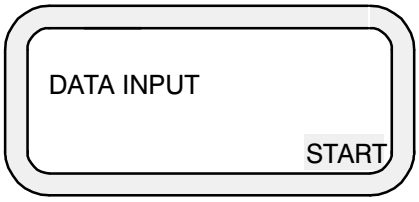
Enter the part program number



XTRANS operation

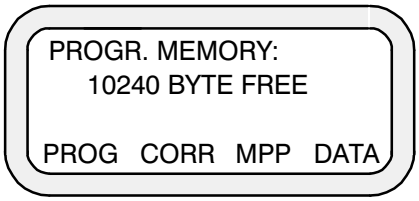
Select the file(s) with +

”START” reading in part program

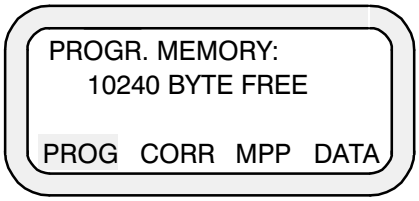


Confirmation with ENTER in XTRANS triggers the transfer of data.

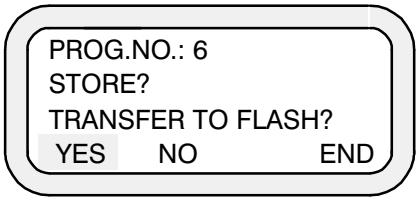
Once the part program has been read in, it can be stored in the part program memory.



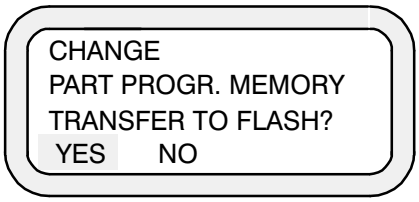
Select PROG



Press YES



Answering the query prompted when leaving the MEM/PROG level with YES transfers the program into the FLASH memory.



Data output

Programs, tables or machine parameters can be transferred from the CC 10 to the previously defined by pressing **"OUT"**.

Example: Program output

After selecting the FBL **"MEM"** and pressing **"DATA"** and **"OFF"**, data can be transferred from the control system memory to an external data medium. As an example a part program will be output to a PC.

PROG	CORR	MPP	DATA

IN	OUT	IMOD	INIT

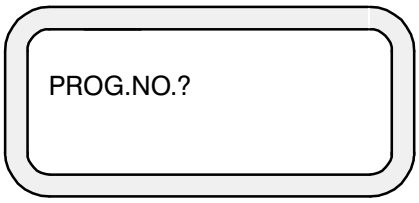
(Data output)

PROG	TAB	MPP	

(Part program output)

ONE	MANY	ALL	

(Output of 1 program)



Enter the program number

The part program can now be output.

XTRANS operation

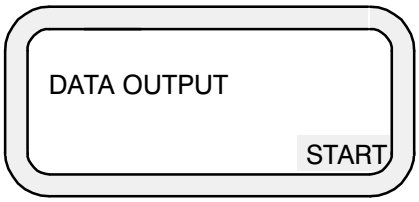
F1 Transfer

F1 Input

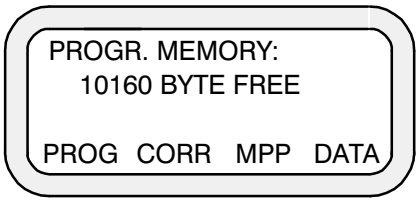
F4 Standard

Enter the file name in which your data should be stored

Trigger the data transfer with the START key on the BPF



The display for the function block **"MEM"** is displayed after the end of data output.



Note

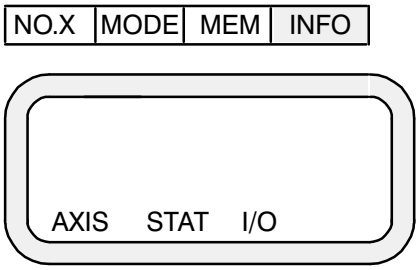
Apart from OFFLINE operation as described here, it is also possible to have data transfer to the CC10 triggered automatically (no manual operation at the BPF).

1. **ONLINE V24** (controlled via serial interface)
2. **ONLINE PLC** (controlled from PLC program)

See also **REMOTE-OPERATION** description.

FUNCTION BLOCK INFO (Information)

The FBL "INFOrmation" can be selected by pressing **"INFO"**. The functions **"AXIS"**, **"STAT"** and **"I/O"** can then be activated.



Significance:

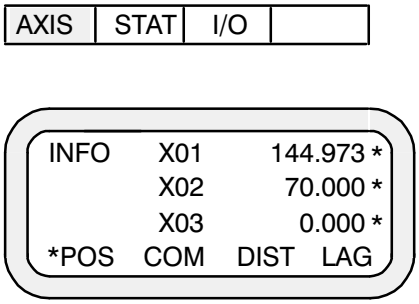
AXIS: Axis display

STAT: Status display

I/O: Display of INPUTS and OUTPUTS

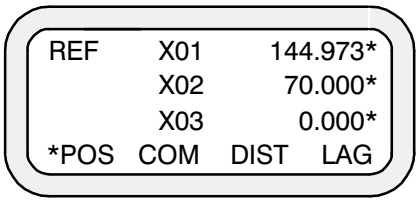
Axis display

The ACTUAL and SETPOINT positions of the axes as well as the difference between the ACTUAL and SETPOINT positions and the axis lag are displayed when **"AXIS"** is pressed.

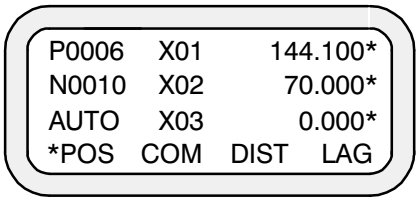


e.g. display of actual positions (no mode selected).

The following display appears if the CC 10 is in **"REF"** mode.



The program and block numbers are additionally displayed for the AUTO and SEMI modes.



Status display

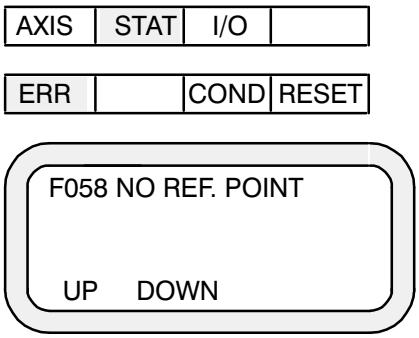
The function **"STAT"** is used to interrogate

- errors,
- the momentary compensation groups,
- control conditions,
- software version and
- G functions.

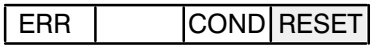
It can also be used to perform a "Reset". This resets the CC 10 to its "basic setting".

Error display

It is possible to "page through" the error list (refer to Chapter 8 ERROR MESSAGES) by means of the functions **"UP"** or **"DOWN"** after activating the FBL **"INFO"**, **"STAT"** and selecting **"ERR"**. If an error message (flashing question mark) is displayed in any operating mode, for example, then it is possible to immediately activate the FBL **"INFO"** and determine the significance of the error on the basis of the error list.



Display and paging through of the pending errors, such as the error "F058" in this case.



"RESET" has the same function as the interface signal "BASIC SETTING".
The following functions are performed when the softkey "RESET" is pressed:

- All pending errors are cleared
- A selected program is cancelled and the axes are stopped
- The axes are stopped in operating modes MAN and APPROACH REFERENCE POINT. The axes can be restarted with the leading edge of the interface signal MAN+/MAN–.
- The operating mode is preserved. The user remains in the INFO level.

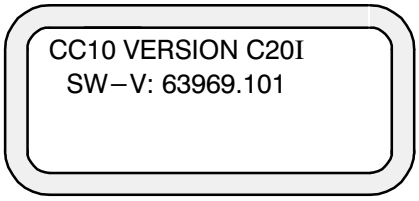
Software version

The current software version can be determined by pressing **"STAT"**, **"COND"** and **"VERS"**.

AXIS	STAT	I/O	

ERR		COND	RESET

G			VERS

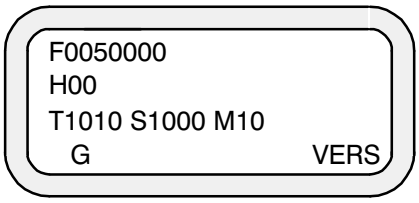


In this case, the software version "C20I" is installed in the control system. The EPROM module with this software has the order No. 63969.101.

Display of control conditions

The operator can determine the conditions under which the control system is currently operating by selecting **"STAT"** and **"COND"**, i.e. the momentarily active machine conditions can be displayed, such as the G functions, length compensation groups executed in the program, feed rate and other machine parameters (e.g. auxiliary functions M, S, T).

ERR		COND	RESET



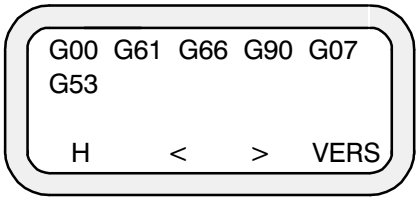
Display of

- Feed rate (F...)
- Active length compensation (H...)
- Auxiliary functions (T..., S..., M...)

The active G functions can be displayed by pressing **"COND"** and **"G"**.

ERR		COND	RESET

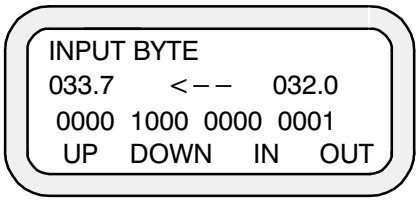
G			VERS



Display of inputs and outputs

The inputs **PLC → CC 10** and the outputs **CC 10 → PLC** can be displayed by pressing **"I/O"** (also refer to "Interface conditions/Digital interface")

AXIS	STAT	I/O	

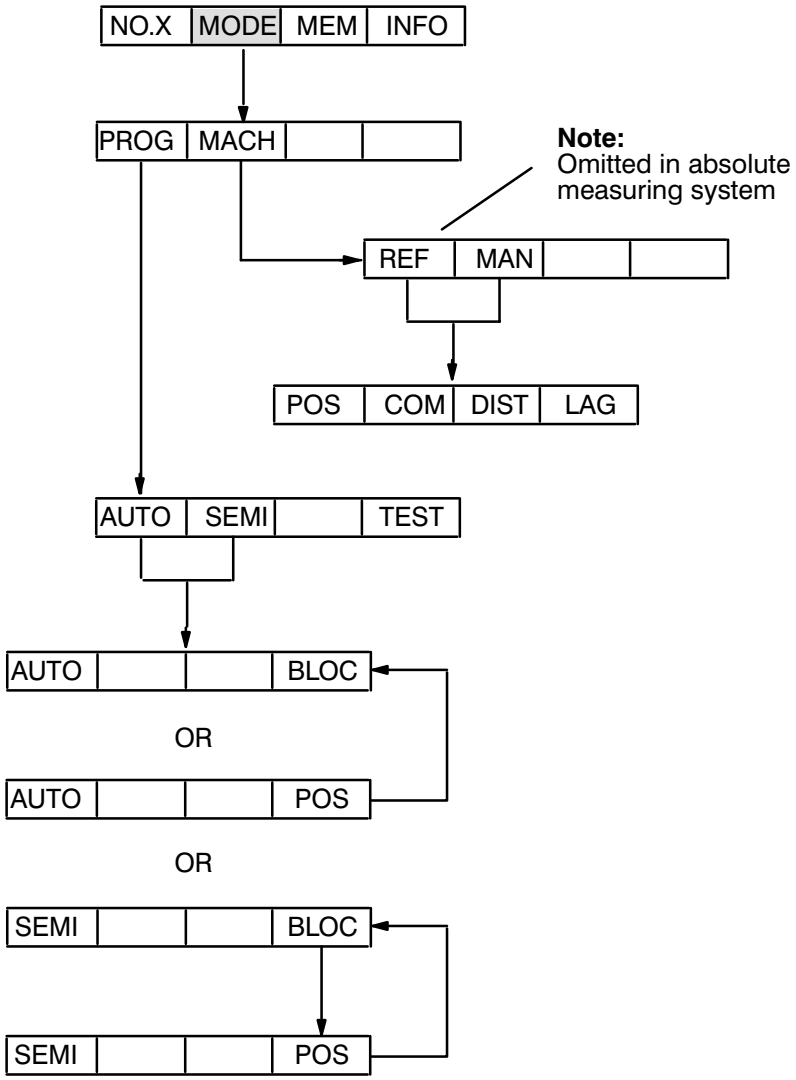


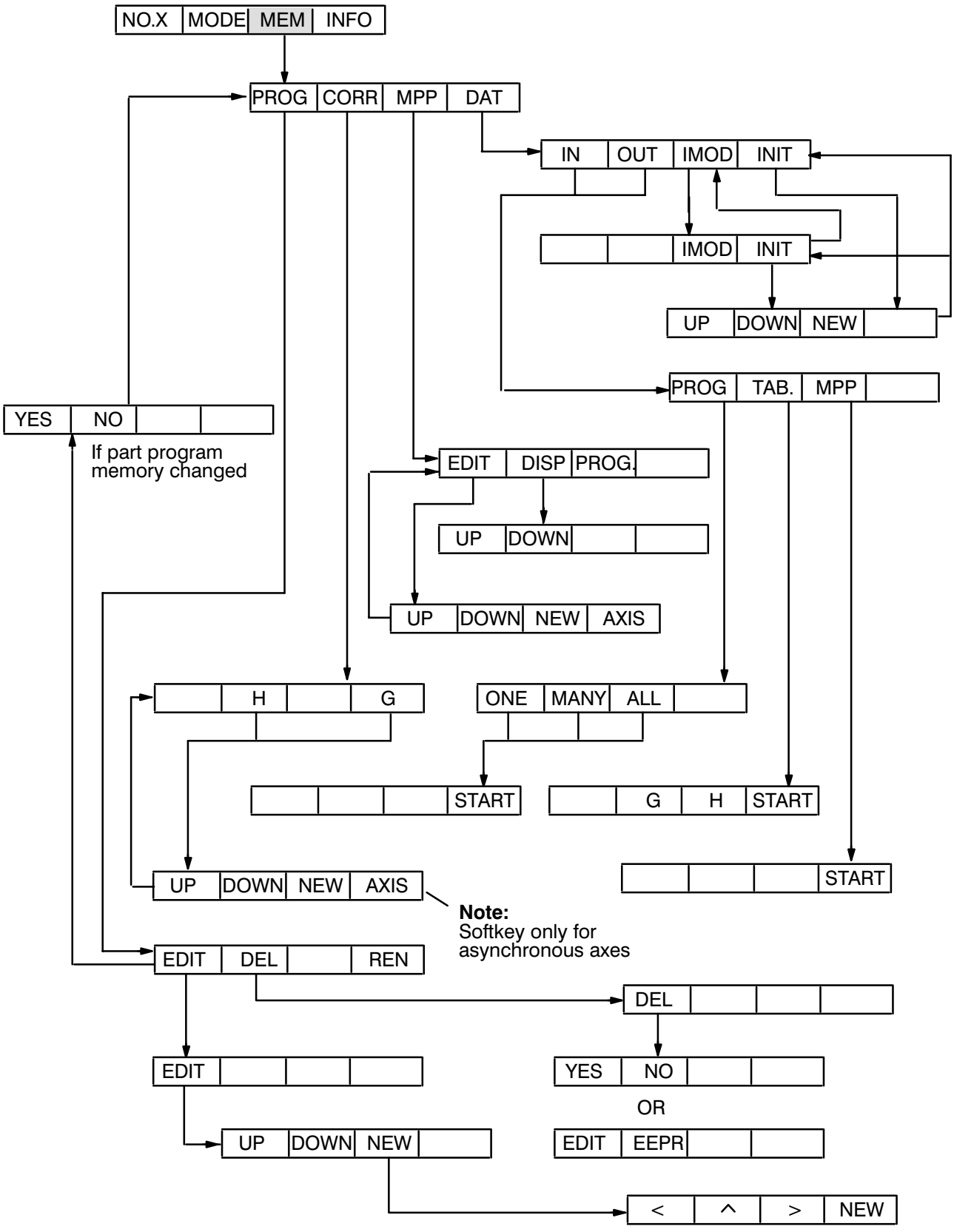
"Paging" with **"UP"** and **"DOWN"**.

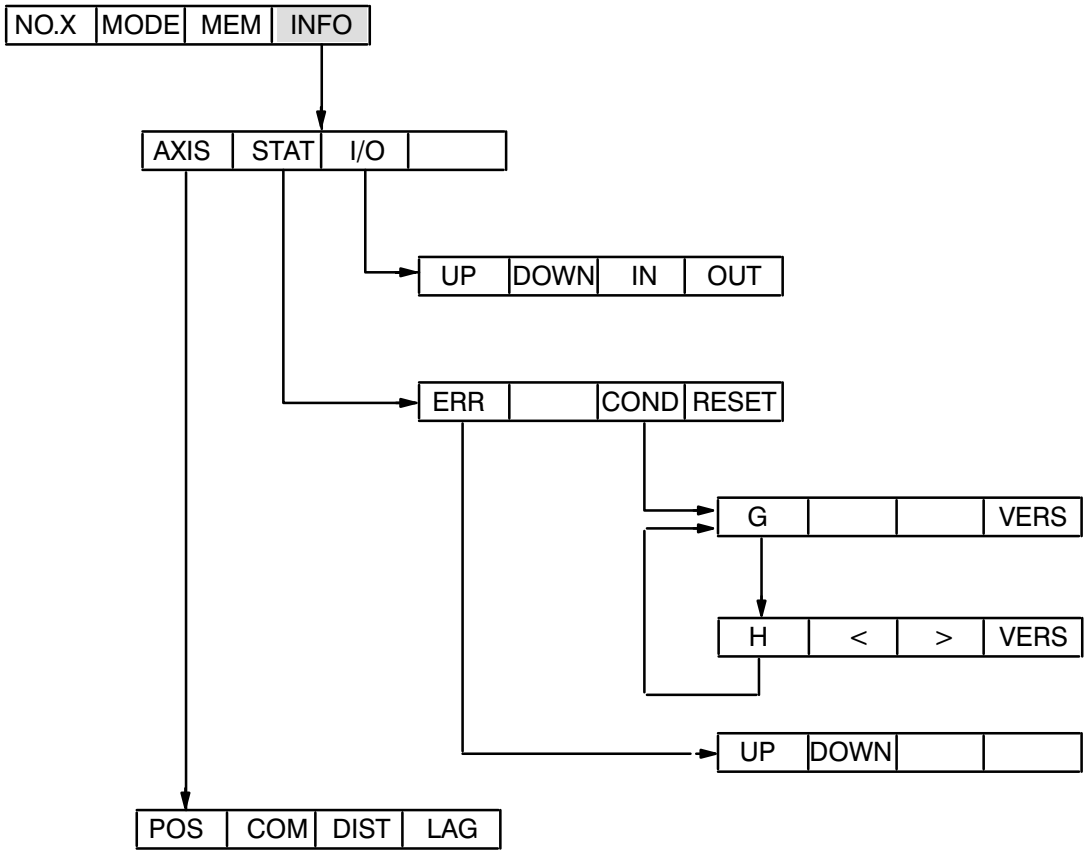
Select "Outputs or inputs" with **"IN"** and **"OUT"**.

In this example, the CC 10 input bytes 32 and 33 are displayed.

Note:
Inputs for the CC 10 are outputs for the PLC, while outputs for the CC10.3 are inputs for the PLC. In the above example, the CC10.3 input bytes 0 and 1 correspond to the PLC output bytes 0 and 1 (the interface signals for the CC10.3 being located in the PLC in the **M, D, DP, DF** areas).


NO.X
MODE
MEM
INFO
PROG
MACH
Note:
Omitted in absolute measuring system
REF
MAN
POS
COM
DIST
LAG
AUTO
SEMI
TEST
AUTO
BLOC
OR
AUTO
POS
OR
SEMI
BLOC
SEMI
POS


NO.X
MODE
MEM
INFO
PROG
CORR
MPP
DAT
IN
OUT
IMOD
INIT
IMOD
INIT
UP
DOWN
NEW
PROG
TAB.
MPP
YES
NO
If part program memory changed
EDIT
DISP
PROG.
UP
DOWN
UP
DOWN
NEW
AXIS
H
G
ONE
MANY
ALL
START
G
H
START
START
UP
DOWN
NEW
AXIS
Note:
Softkey only for asynchronous axes
EDIT
DEL
REN
DEL
EDIT
YES
NO
OR
UP
DOWN
NEW
EDIT
EEPR
<
^
>
NEW


NO.X
MODE
MEM
INFO
AXIS
STAT
I/O
UP
DOWN
IN
OUT
ERR
COND
RESET
G
VERS
H
<
>
VERS
UP
DOWN
POS
COM
DIST
LAG

SIGNIFICANCE OF THE SOFTKEYS

NO.X:	Axis conversion
MODE:	FBL MODE (setting–up, execution)
MEM:	FBL MEMory (storage)
INFO:	FBL INFOrmation (diagnosis)
PROG:	PROGram (execution)
AUTO:	AUTOmatic
SEMI:	SEMI–automatic
POS:	Display of POSition
BLOC:	Display of NC BLOCK
TEST:	TESTing a program
MACH:	MACHine (setting–up)
REF:	REFerence point
MAN:	MANual
POS:	ACTUAL value
COM:	SETPOINT value
DIST:	Remaining DISTance
LAG:	LAG
UP:	Page UP
DOWN:	Page DOWN
EDIT:	EDIT
DEL:	DELete
REN:	REName
NEW:	NEW assignment
CORR:	Compensation tables
H:	Length compensation values
G:	Zero shifts
AXIS:	Selection of the 1st, 2nd or 3rd AXIS

PROG:	PROGramming
MPP:	Machine Parameter Program
DISP:	DISPlays
DATA:	DATA input and output
IN:	INput
OUT:	OUTput
IMOD:	Interface MODe
INIT:	Interface INITialization
TAB:	TABle
AXIS:	AXIS display
STAT:	STATus display
I/O:	Inputs/outputs (CC 10 ↔ PLC)
ERR:	ERRor display
COND:	CONDition
VERS:	Software VERSion

8. Error codes

The following list contains all error codes which can potentially be displayed on the PLC interface (O7.1 – O7.7) and BPF (FBL INFO). They are accompanied by possible causes and concrete advice to help the user remedy the error.
After remedying an error, those error numbers marked ❑ trigger a restart (run-up) in the controller as well.

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F003	RANGE?	Programmed traversing range too large	Displacement > 360° on rotary axes	Enter new displacement
❑ F004	MPP.ERROR	Machine parameter error	Format for parameter P300 > 3.3	Adapt parameter
			Maximum traversing speed = 24 m/min. (with 0.001 mm resolution) → 400.000 < P200 [pulses/mm] • P300 [mm/s]	
			Rotary axis is operated with revolution–coded, incremental encoder	
			On rotary axis: value for reference position (P230) > 360°	
			On linear axis: value for reference position (P230) outside traversing range	
			Number of axes (P020) > 3	
			On revolution–coded, incremental encoder: P220 – P210 > traversing range of the encoder	
			Range monitoring P210 or P220 > possible traversing distance	

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F005	ILLEGAL CHAR.	Illegal character	Wrong order when entering characters, e.g. a letter instead of digit after N	Edit program addresses correctly
			On rotary axis: displacement in revolutions, preset value > 32.767 revolutions	Enter new value
F006	PROGR IS ACTIVE	Program is selected and activated	Attempt to edit in the active program	Cancel program by means of ”Basic setting” function and reselect for editing
F007	LIMIT SWITCH	Limit switch approached	A traversing range outside the software limit switches is detected in a program	Correct program correspondingly
			Displacement lies outside the traversing range	
❑ F008	SERVO FAULT 1 A	Servo–fault on the 1st axis	The setpoint of the position controller to the speed controller exceeds the permitted range (sign reversal)	Check the motor feeder cable
❑ F009	SERVO FAULT 2 A	Servo–fault on the 2nd axis		Check the measuring system
❑ F010	SERVO FAULT 3 A	Servo–fault on the 3rd axis	Positive feedback of the system, servo–output defective, servo–amplifier does not react correctly to setpoint input of the CC 10	Check the servo–amplifier
F011	INTER. STOP 1 A	Interpolator stop 1st axis	Excessive overtravel, speed too high, mechanical system does not move easily	Check the speed, mechanical system, parameters or loop gain factor, adjust servo–amplifier
F012	INTER. STOP 2 A	Interpolator stop 2nd axis		
F013	INTER. STOP 3 A	Interpolator stop 3rd axis		
F014	ILLEGAL FORMAT	Illegal format	Entered range of values too large, e.g. F 7.0 or illegal function, e.g. G90 for revolution–programmed rotary axis or G74 for revolution–coded incremental encoder	Edit, enter correct value
F015	WRONG ACCELERAT.	Illegal acceleration	Acceleration too high for preset speed (programmed value plus override)	Edit, enter correct value

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F016	OUTPUT FAULT	Output fault	Problems with output on the V.24/20 mA interface, e.g. wrong device, wrong baud rate, wrong handshake signals, parity error	Initialize interface correctly
❑ F017	E2P. PRGR. ERROR	E2PROM programming error	E2PROM cannot be written, is defective	Replace E2PROM
F018	E2P. WRITE PROT.	E2PROM write–protected	WRITE–Protect switch set to ”ON” position	Set WRITE–Protect switch to ”Off”
F019	E2P OVERFLOW	E2PROM overflow	E2PROM is full	Delete programs not required
F020	PROGR. NOT POSS.	as for 17		
❑ F021	NO MARKER 1 A	No marker 1 A	No marker after one encoder revolution Wire discontinuity Defective encoder	Check the measuring system feeder cable, connector Check the ground and screen connections
❑ F025	NO MARKER 2 A	No marker 2 A		
❑ F029	NO MARKER 3 A	No marker 3 A		
❑ F022	POS. ERROR 1 A	Position error 1st axis	Encoder pulses/encoder revolution do not agree with the parameter ”Number of encoder lines” Wrong parameter Wire discontinuity Encoder defective	Check the measuring system feeder cable, connector Check the ground and screen connections
❑ F026	POS. ERROR 2 A	Position error 2nd axis		
❑ F030	POS. ERROR 3 A	Position error 3rd axis		
❑ F023	MS. ERROR 1 A	Measuring system error 1st axis	Encoder defective Cable discontinuity Short–circuit	Check the measuring system
❑ F027	MS. ERROR 2 A	Measuring system error 2nd axis		
❑ F031	MS. ERROR 3 A	Measuring system error 3rd axis		

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
❑ F024	2EDGE/CLOCK 1 A	2 edge/system CLOCK	2 active counting edges within one clock period. (Counting direction not clearly detectable)	Check the measuring system Check the ground and screen connections
❑ F028	2EDGE/CLOCK 2 A		2 active counting edges within one clock period. (Counting direction not clearly detectable)	Check the measuring system Check the ground and screen connections
❑ F032	2EDGE/CLOCK 3 A			Check the measuring system Check the ground and screen connections
F033	E2. COR. TAB. LOST	Length compensation table in E2PROM lost	E2PROM defective Empty E2PROMs have been installed	Enter new length compensation tables
F034	ZERO SHIFT LOST	Zero shift table in E2PROM lost	Empty E2PROMs have been installed	Enter new zero shift table
F035	NO STORAGE	No free storage space is available for part programs	Program too long, e.g. 1 kByte is still free, but program has a length of 2 kBytes	Delete programs not required
F036	I/O TIME OUT	Input/output timeout	No characters are received within 5 seconds after starting read–in	Start the data input device accordingly
F037	FAULT DFS HEAD	Fault in DFS head	Syntax error in DFS head	Edit, define DFS head as described in the programming instructions
F038*	ABS. SYNC. ERR.	Synchronization CC 10 – absolute encoder not possible	Data communication absolute encoder – CC 10 not taking place correctly	Possibly wrong parameters
F039*	ABS. WRITE ERR.	Not possible to write to the dual–port RAM on the absolute encoder module in the CC 10	RAM or busy FF on the absolute encoder defective	Replace control system

* Occurs only in conjunction with absolute encoder

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F040*	ABS. RAM ERROR	Dual–port RAM error on the absolute encoder module in the CC 10	RAM on the absolute encoder module defective	Replace control system
F042*	ANS. ENC. ERR.	General error on absolute encoder module	Watchdog of the absolute encoder has responded	Replace control system
F044	EDIT DISABLE	Disables editing	IF signal edit disable present	Cancel IF signal
F045	NO PROGRAM	Program to be output does not exist	Wrong program No. selected Memory empty	Select correct program No.
❑F046**	POS. COD. MAR 1 A	Position of the coded marker 1st axis	No coded marker has been received within the defined traversing range Wrong parameter Wrong wiring of the encoder Wire discontinuity Encoder defective	Check the parameter ”Revolutions” Check the encoder wiring Check the measuring system
❑F047**	POS. COD. MAR 2 A	Position of the coded marker 2nd axis		
❑F048**	POS COD. MAR 3 A	Position of the coded marker 3rd axis		
❑F049**	POS. CYC. MAR 1 A	Position of the cyclic marker 1st axis	No cyclic marker has been received within a defined traversing range Wire discontinuity Encoder defective	Check the measuring system wiring Check the ground and screen connections
❑F050**	POS. CYC. MAR 2 A	Position of the cyclic marker 2nd axis		
❑F051**	POS. CYC. MAR 3 A	Position of the cyclic marker 3rd axis		
❑F052**	ENC. FAULT 1 A	Encoder fault 1st axis	The position of the axis does not correspond with the absolute position of the coded marker Encoder defective Encoder connection incorrectly wired	Check the wiring and the measuring system Replace the measuring system
❑F053**	ENC. FAULT 2 A	Encoder fault 2nd axis		
❑F054**	ENC. FAULT 3 A	Encoder fault 3rd axis		
* Occurs only in conjunction with absolute encoder				
** Occurs only in conjunction with revolution–coded rotary encoder				

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
❑ F055**	NOMZ–PARAM. 1 A	The number of revolutions encoded in the coded marker is higher than the programmed number of revolutions	Parameter incorrectly programmed	Check the parameter ”Revolutions”
❑ F056**	NOMZ–PARAM. 2 A			
❑F057**	NOMZ–PARAM. 3 A			
F058	NO REF. POINT	No reference point approached	The reference point has not yet been approached in one or more axes. Program cannot be started.	Travel the axes to the reference point
F059	ILLEGAL FEED	Feed illegal	Preset feed lies outside the machine parameter value	Program the feed correspondingly
F060	ILLEGAL PARAM.	Parameter illegal	Acceleration value does not correspond to the speed (division by 0)	Reduce acceleration or increase speed
F061	DATA LOCKED	Interlock between read–in of the compensation tables and editing of the compensation table	Editing and reading–in simultaneously	Either only editing or only read–in
F062	LOFFSET IGNORED	Length compensation is not active	Call of length compensation Hxx for rotary axes	Delete the call in the part program
F063	Z–SHIFT IGNORED	Zero shift not active	Call of zero shift for rotary axes if the position data are preset in revolutions	Delete the call in the part program
F064	ILLEGAL H–GROUP	Compensation group illegal	Selected H group > 24 or > 72	Modify the part program accordingly
❑F065	PLC STOPPED	PLC has executed an I/O cycle for longer than 2 s	Hardware PLC defective, cycle time of PLC program too long	Ensure that the I/O cycle occurs within 2 s

** Occurs only in conjunction with revolution–coded rotary encoder

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F066	NO MPP DATA	NO MPP data	MPP data do not correspond to the internal checksum	Enter new MPP data
❑F067*	CABLE FAULT 1 A	Cable discontinuity on the absolute encoder	Mechanical damage	Test the encoder cable and replace if necessary
❑F068*	CABLE FAULT 2 A			
❑F069*	CABLE FAULT 3 A			
❑F070*	POWERFAIL 1 A	Encoder power failure	Malfunctions in encoder power supply	Test the encoder cable and replace if necessary
❑F071*	POWERFAIL 2 A			
❑F072*	POWERFAIL 3 A			
❑F073*	DATA ERROR 1 A	The encoder supplies different values after two data requests	Malfunctions on the encoder line or defective encoder	Check the encoder and encoder line
❑F074*	DATA ERROR 2 A			
❑F075*	DATA ERROR 3 A			
F076	DRIVE OFF 1 A	Traverse command pending but signal ”Drive on” not present	PLC program or input signal itself	Check signal ”Drive on” in the PLC program
F077	DRIVE OFF 2 A			
F078	DRIVE OFF 3 A			
		The numerical value of the KV (loop gain) factor	Wrong value for KV (loop gain)	Correct KV, Vmax or pulse factor, see formula:
❑F079	KV FACTOR? 1 A	does not correspond to the other drive data. This may lead to division by zero internally	$K_{VL} = \frac{3096481 \quad [\text{pulses}] \cdot Kv \left[\frac{m}{\text{min} \cdot \text{mm}}\right]}{P200\left[\frac{\text{pulses}}{\text{mm}}\right] \cdot P300\left[\frac{m}{\text{min}}\right]}$	
❑F080	KV FACTOR? 2 A			
❑F081	KV FACTOR? 3 A			
				Values must be entered without units. Errors F79...81 indicated if $K_{VL} < 100$
F082	LIMIT SWITCH 1 A	Software end limit switch has been approached	Software limit switch has been approached	Move the axis away in the opposite direction
F083	LIMIT SWITCH 2 A			
F084	LIMIT SWITCH 3 A			

* Occurs only in conjunction with absolute encoder

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F086	SET ERROR	A block number has not been found in definition of a block number for the CC 10	Wrong block preset	Check block preset by PLC
❑ F087 ❑ F088 ❑ F089	V–ERROR 1 A V–ERROR 2 A V–ERROR 3 A	a) General for all measuring systems Standstill monitoring function has responded, see description in Section 4.4.5 of interface conditions. b) Actual speed on the absolute encoder does not correspond to the required speed	Axis stuck or drive not in control loop (e.g. trigger enable missing) or drive amplifier or axis moving although there is no travel command from the control Encoder defective	Check mechanism and wiring Replace encoder
F090	HARDWARE CONFIG.	The parameter P201 does not agree with the hardware. e.g. P201 defined for absolute encoder, but measuring system input incremental The hardware identification (axis board) is not correct	Parameter P201 not correctly defined Hardware defective	Correct parameter P201 Replace device
F091	E–CODE ERROR	Checksum of ASCII valencies (E–code) incorrect	Data transfer corrupt	Repeat data transfer, check checksum (E–code)
F092 F093 F094	REF. CAM 1 A? REF. CAM 2 A? REF. CAM 3 A?	Applies only as from 2nd approach to reference point. Axis positioned at the reference point position, but the reference point switch is not signalled	Reference point switch or feeder cable defective	Check switch or feeder cable and replace if necessary

** Occurs only in conjunction with absolute encoder

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F095	ILLEGAL PLANE	Wrong plane selection	The axes defined for G18 or G19 do not exist in the control	Program the correct plane in the part program
F096	ILLEGAL RADIUS	Programmed radius not permitted	The programmed radius is less than half the distance from the start point to the end point	Correct the radius in the part program
F097	ILLEGAL RISE	The pitch of the infeed axis is too large (for interpolation of a helical line)	The travel of the infeed axis must not be greater than the travel on the circular path	Correct the pitch in the part program
F098	ILLEGAL CIRCLE	A full circle has been programmed	The start point and end point are identical	Program two circle segments
F099	PLC CYCLE TIME?	The PLC cycle time is too short	The PLC cycle time must be > 5 ms	Extend the PLC cycle time
F100	ILLEGAL RTC	The servo–loop sampling time is too short	The internal limit values in MPP21 are not observed	Set a longer servo–loop sampling time in MPP21
F101	FAULT MP300	Machine parameter P300 is incorrectly defined	The max. speed is too high	Reduce the max. speed
F102	FAULT MP200	Machine parameter P200 is incorrectly defined	The cut–off frequency for the measuring system input is exceeded	Check parameters P300 and P200
F103	FAULT MP110,201	The selected measuring system is not permitted for the defined axis	A revolution–coded, incremental measuring system is on the rotary axis	Replace the measuring system by a ”purely” incremental measuring system and redefine MP201 correspondingly
F104	FAULT MP210,220	The definitions for the software limit switches are incorrect	– The reference point is outside the traversing range – The traversing range of the revolution–coded, incremental rotary encoder is exceeded – P210 or P220 • P200 > 2^{31}	Reduce the values for the software limit switches correspondingly

CC 10 Error number	Display (Text)	Significance	Possible causes	Remedy
F105	FAULT MP201	The measuring system selection is not correct	The hardware is not designed for absolute measuring systems	Replace hardware
F106	FAULT MP360–379	The definitions in MP360–379 are not correct	Damping of preset setpoint of one or more stages not correct	Set again in accordance with instructions in MPP description
F107	FAULT MP100, 400	The designations of the auxiliary functions or axes are not correct	The designations of the auxiliary functions and axes overlap or are identical	Change designations
F109	FEP.DEL FAULT	FLASH-EPROM not correctly deleted	FLASH-EPROM defective	Replace hardware
F110	FEP.PRG FAULT	FLASH-EPROM not written in correctly	FLASH-EPROM defective	Replace hardware
F111	PRG ERROR	Checksum error detected during run-up	Part program file system in FLASH has been destroyed	Check if programming procedure was interrupted by power failure. If yes: reload part program. If no: replace hardware.
F112	DATA ERROR	Error during data transfer to the V24 interface	Faults in wiring. Interface configurator malfunctional	Check leads, install screen, check interface configuration.

9. CC 10 module

Control versions for driving 1 axis, incremental measuring system

Incremental measuring system input or revolution–coded, incremental measuring system input, analog setpoint output, V.24/20 mA interface.

Designation: CC10.3 INC1 – V.24/20 mA (refer to Fig. 9.1)

Order number: 075702

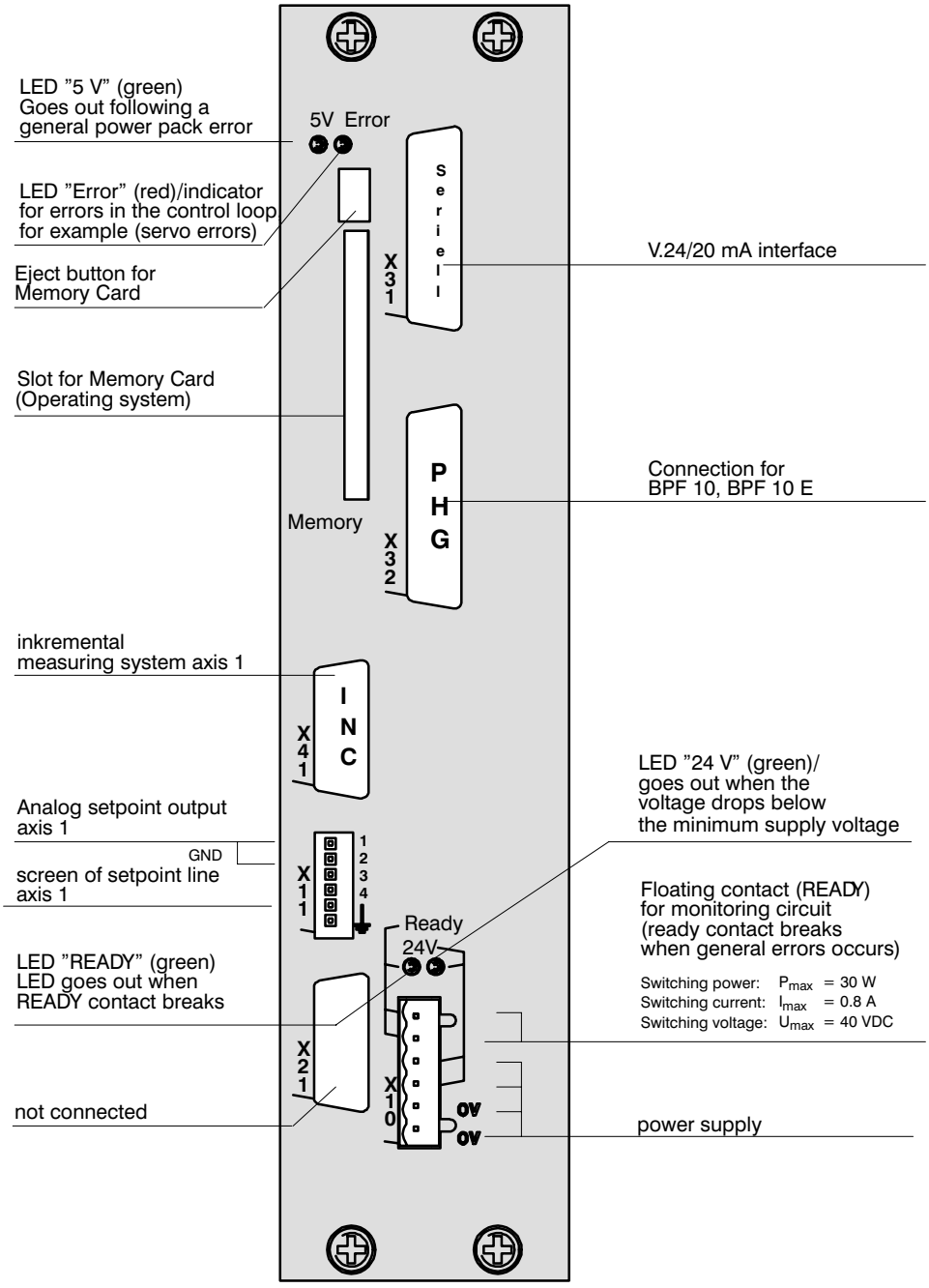


Fig. 9.1

Control versions for driving 1–3 axes, incremental measuring system

Incremental measuring system input or revolution–coded, incremental measuring system input, analog setpoint output, V.24/20 mA interface.

Designation: CC10.3 INC3 – V.24/20 mA (refer to Fig. 9.2)

Order number: 075642

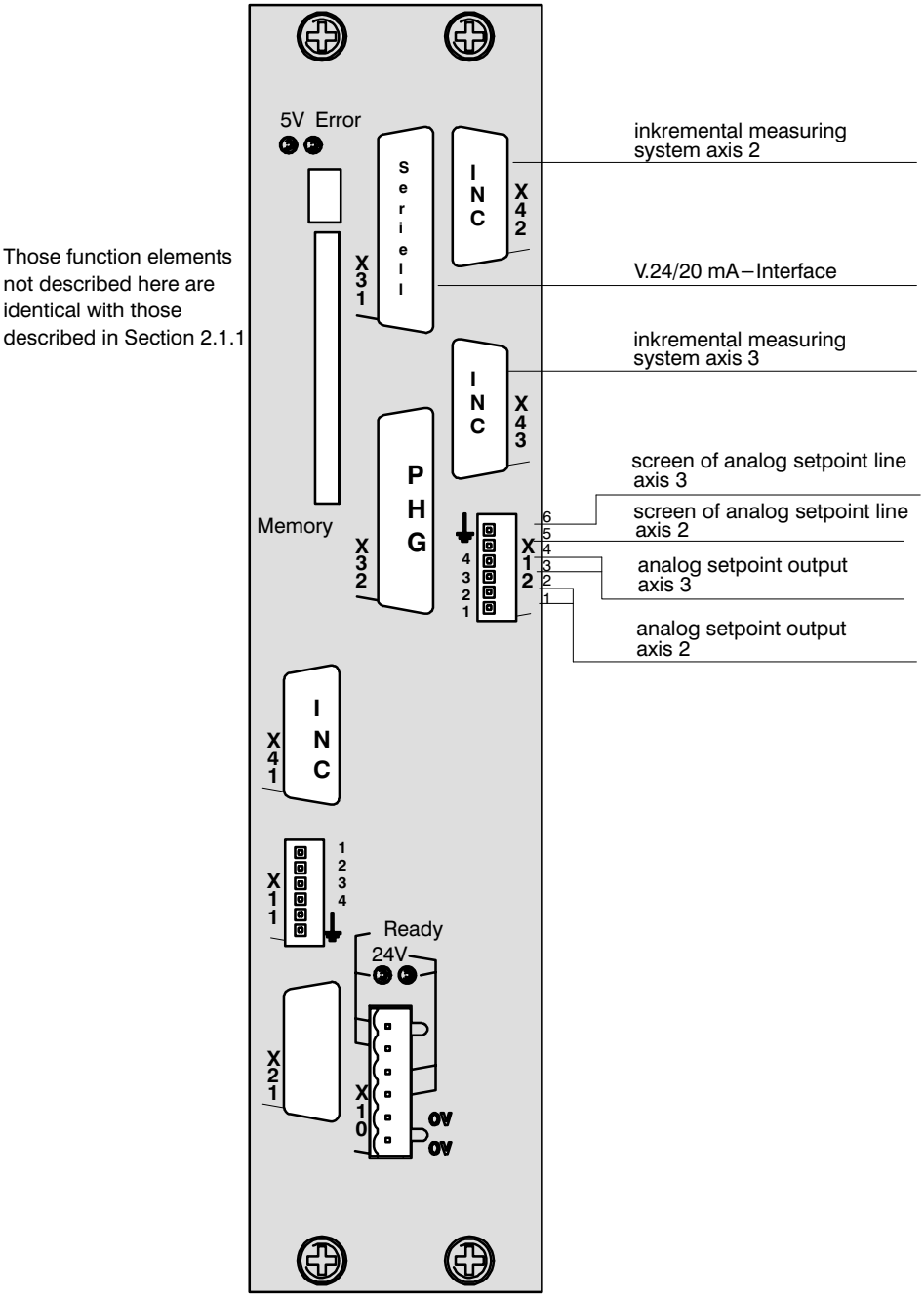


Fig. 9.2

Control versions for driving 1–3 axes, absolute measuring system

Optionally incremental or absolute measuring system input for the 1st axis, absolute measuring system input for the 2nd and 3rd axes, analog setpoint output, V.24/20 mA interface

Designation: CC10.3 ABS3 – V.24/20 mA (refer to Fig. 9.3)

Order number: 075703

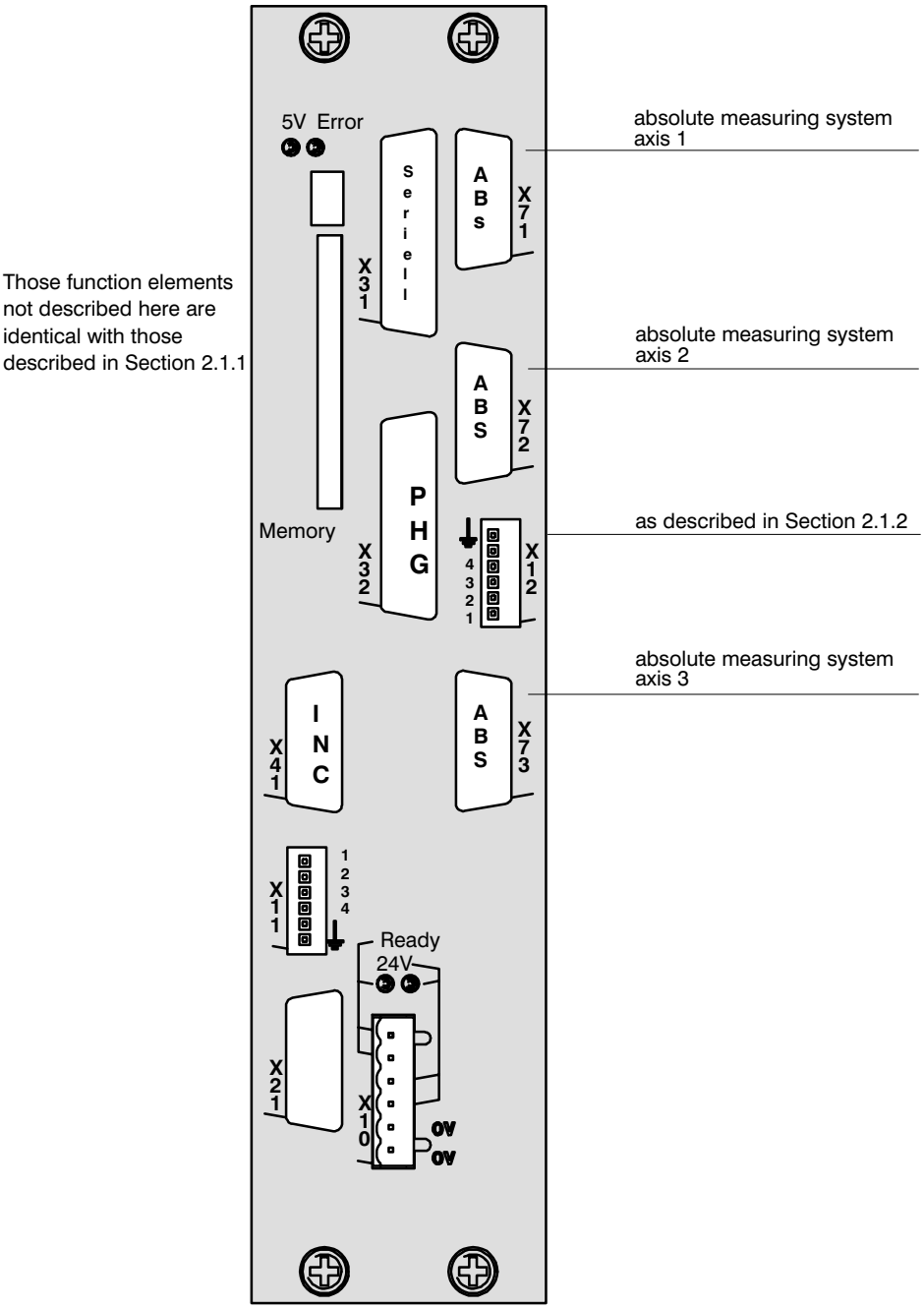


Fig. 9.3

Data transfer CC 10.3 ↔ PG6

CC 10 programs, machine parameters, zero shifts and length compensation values can be read from the PG4 to the CC 10 and vice versa with the software package XTRANS.
Also refer to the description XTRANS, P. No. 4094.

Loading new operating software

The CC10 is supplied equipped with the latest version of operating software. The CC10 has a PCMCIA interface at its disposal which, when the software is later updated, is used to load the new software into the control unit.

The PCMCIA card, which contains a so-called *boot load* as well as the operating software, can then be plugged into the relevant unit.

During every run-up, the CC10 ascertains whether a PCMCIA card is plugged in. If this is the case, the CC10 automatically executes the boot load program, which is copied by the operating software from the PCMCIA card into the operating system memory of the CC10 and then activated.
Copying lasts approximately one minute. During this time (while the ERROR LED flashes) the PCMCIA card may not be pulled out. After a short while the CC10.3 is ready to operate again.

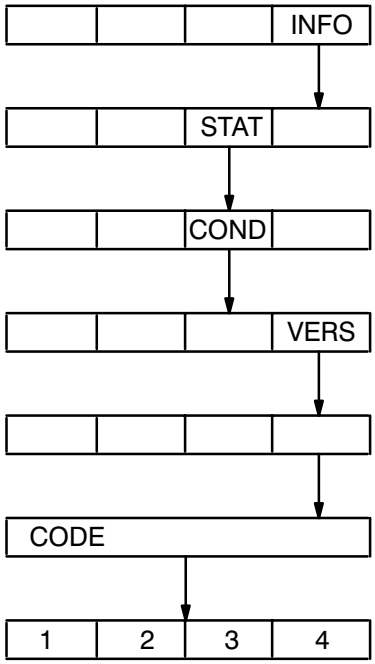
Normally there is no PCMCIA card plugged into the CC10.3 during run up. Then the control runs up with the software in the operating system.

Initializing the FLASH EPROM

It may be necessary to reinitialize the FLASH EPROM in the CC 10.3.

Both the part programs and the machine parameters can be deleted in the FLASH EPROM by operation of the BPF10 with multiple safeguards.

Procedure:



No softkey label

Input: 06160 ENTER

SK1 Initialize part program memory

SK2 Delete machine parameters

SK3 Test mode
(for use only by Bosch employees)

CAUTION **9.1**

The corresponding data in the FLASH EPROM is then completely deleted. It is therefore necessary to buffer all important data on an external data medium and to reload this data into the CC 10 after completed initialization.

General

This description refers to the CC 10.3 operating system software as from Version C40.

Programming of the CC 10.3 on the basis of ”DIN 66025” is described below.

Program creation

Part programs can be created in the following ways:

- directly at the control by input via the BPF10 or BPF10 E,
- or via external programming stations.

Reading data in/out

Data (part programs, zero shifts, length compensations or machine parameters) can be read into the memory of the CC 10 from external data terminals via the V.24/20 mA interface (X31) and can also be output again from there to an external device. Details on the sequences necessary for this are contained in the operating instructions, Chap. 5 *FBL MEMORY/DATA INPUT AND OUTPUT* as well as in the chapter *”REMOTE CONTROL”*.

Editing programs

Part programs can be manually edited (changed) via the BPF keyboard in the *FBL* (**F**unction **BL**ock) *MEMORY* under the function *EDIT* or can be created anew (refer to chapter operating instructions).

Program execution

A part program can be executed or also tested in *PROG* mode in *FBL OPERATING MODE* (block–by–block program execution in *SEMI* mode or automatic program execution in *AUTO* mode). Also refer to the chapter operating instructions, Chap. 4 *FBL OPERATING MODE*.

Part programs

A part program consists of a string of machining steps which are structured into blocks such as

- preparatory functions,
- position information and
- auxiliary and miscellaneous functions.

A total of max. 99 part programs can be managed in the 10 kByte part program memory.

Memory allocation

The following user data are stored in the control system:

Memory areas	Contents
Part program memory	max. 99 part programs
Tool compensation	Tool length compensations "Hxx"
Zero shifts	Zero shifts G54 – G59
Machine parameter memory	Machine–specific data

Start of program

Program generally takes place for the CC 10 in accordance with ISO code.

Program run

The program blocks are executed one after the other.

Program end

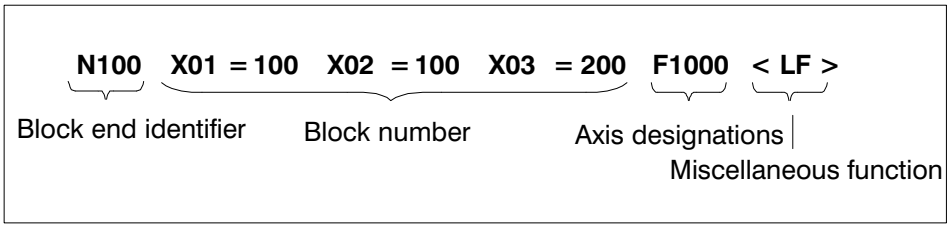
The program end must be identified with the auxiliary functions *M02* or *M30*.

Program block

A block consists of the block number, one or more words and the block end identifier.

The blocks can be programmed with variable length. If a block number is programmed, this must be positioned at the start of the block. The blocks may differ in length, but are restricted to 100 characters (including block number) per block. Word spaces (blanks) need not be programmed.

Example of program block

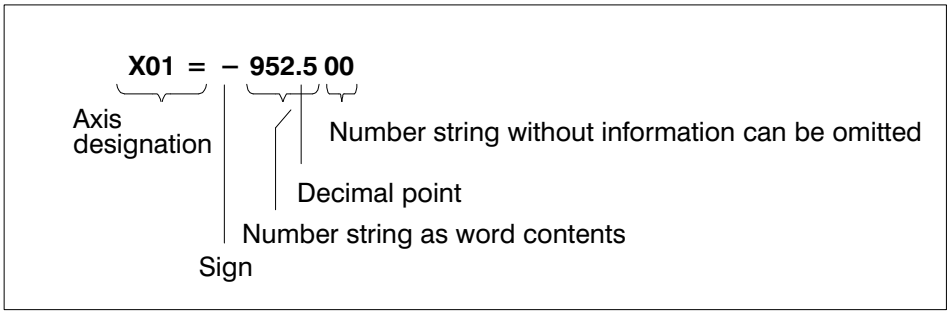


Program word

A word consists, for example, of the axis designation, sign and a number string which represents the word contents. The positive sign need not be entered during input. Corresponding to its meaning, the number string may contain a decimal point. Words can be programmed with arbitrary length within the defined limits (only the digits which actually contain information must be written).

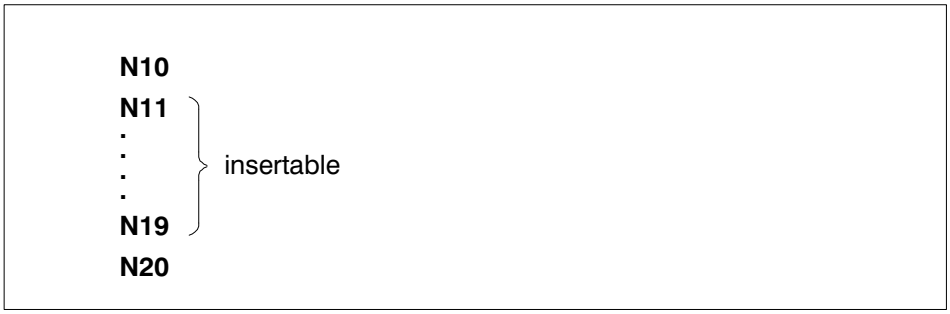
The axis designation is defined in machine parameter P0100 (1 ... max. 4 alphanumeric characters).

Example of program word



Block number

The block numbers should be programmed in ascending order. It is recommended to use intervals of 10. If a program is edited later on, it is then still possible to insert up to 9 additional blocks between two blocks:



Program format

The program is defined by the

- HEADER — in the first line. The header contains the identification DFS (Define Store Program), the program number as well as the channel number (as defined in the MPP) for an asynchronous axis. A text may then be programmed after this, but this is not stored in the memory of the CC 10. The header is programmed by the user in the case of external program creation.
- PROGRAM END — in the last line, programmed alone in the block (M02 or M30).

Examples of program format:

1. A part program for synchronous axes:

```
(DFS,P0001,PART PROGRAM)      – Header with DFS identifier,
                                program number, text
N10   G00   X01=1000
N20   X02=1000
N30   X03=1000                – Part program
.
.
N80   M30                     – Program end (with M30 or M02)
```

2. Or a part program for an asynchronous axis (e.g. for axis X01). The channel number is determined by the definition in the machine parameter program in P030 and P100.

```
Identifier for part program
          Identification of channel number
(DFS,P0100,1,PART PROGRAM)    – Header with DFS identifier,
                                program number, text
N10   G00   X01=1000
N20   X01=1500   F3000
N30   X01=1400                – Part program
.
.
N60   M02                     – Program end (with M30)
```

As it is possible to see in the header, this is a part program. The axis designation of the axis for channel No. 1 is defined, among other things, in machine parameter P0100 (for further information, refer to *MACHINE PARAMETERS*. In the case of asynchronous axes, the definitions in the operating instructions also apply (for example under FBL NO.X).

The feedrate F must be defined in the program line containing the first positioning movement with feedrate (X01=...) at the latest. Only whole–number values must always be entered. The feed value applies (for all subsequent blocks) until a new feedrate or G00 is defined.

Each address can be programmed only once for each block (*). It is not necessary to insert any blanks.

The control character ”STX” may be programmed before the header. The control character ”ETX” can be programmed after the program end (M30).
In the case of output (CC 10 → ext. data device) of programs, machine parameters, zero shift or length compensation, the control character STX is always output at the start of the program and the control character ETX at the end of the program.

```
<STX>
(DFS, .....
.
.
N100   M30
<ETX>
```

(*) Exception:

Up to five auxiliary functions of the same kind can be programmed in one block. In addition, it is also possible to program several G–functions in one block. However, they must not mutually exclude each other.

G–FUNCTIONS

General

The following G–functions are active:

- G00 Positioning in rapid traverse mode
- G01 Linear interpolation in feed mode
- G02 Circular interpolation in clockwise direction
- G03 Circular interpolation in counterclockwise direction
- G04 Dwell time
- G06/07 Programmed acceleration ON/OFF
- G17 – 19 Plane selection
- G23/G24 Conditional/unconditional jump
- G53 Zero shifts OFF
- G54–59 Zero shifts
- G61/62 Exact positioning ON/OFF
- G63/66 Set 100 % feedrate / clear G63
- G74 Automatic approach to reference point
- G90 Absolute dimension input
- G91 Incremental dimension input
- G160 / 167 Additive zero shift On / Off

Positioning in rapid traverse mode G00

Definition

The programmed position is approached at rapid traverse speed.

Function

If *G00* is contained in a block without feedrate input *F*, the axis is traversed to the axis position in rapid traverse mode (see example). G00 is maintained until a new type of movement is selected. The axes travel to the programmed position in rapid traverse mode independently of each other.

In conjunction with an F value, G00 means that the axes will traverse in accordance with the F value but will not perform interpolation.

The F value has the format 6.0. Depending on the resolution, values of 1 mm/min (degrees/min) up to 999999 mm/min (degrees/min) are possible.

The speed can be influenced by means of the interface (override function), except in conjunction with G63.

Examples of G00 (for a linear axis):

N10 G00 X01=500 . . .	The axis positions itself at rapid traverse speed. G00 is stored after switching on.
N10 G00 X01=100 F1000 . . .	The axis traverses at a speed of 1000 mm/min. The F value has priority over the G00 value.
N10 X01=300 F100 . . .	The axis traverses at 1000 mm/min

Linear interpolation in feed mode G1

Definition

The programmed end point is approached on a straight line with the active feedrate (F–word).
The F–value has the format 6.0. Feedrates of 1 mm/min to 999999 mm/min are possible, depending on the system resolution.
The movement is coordinated so that the involved axes reach the programmed end point at the same time.
A maximum of 3 axes (e.g. X, Y, Z) can be traversed in space by interpolation at any time (also see descriptions for G17, G18, G19).

Effect

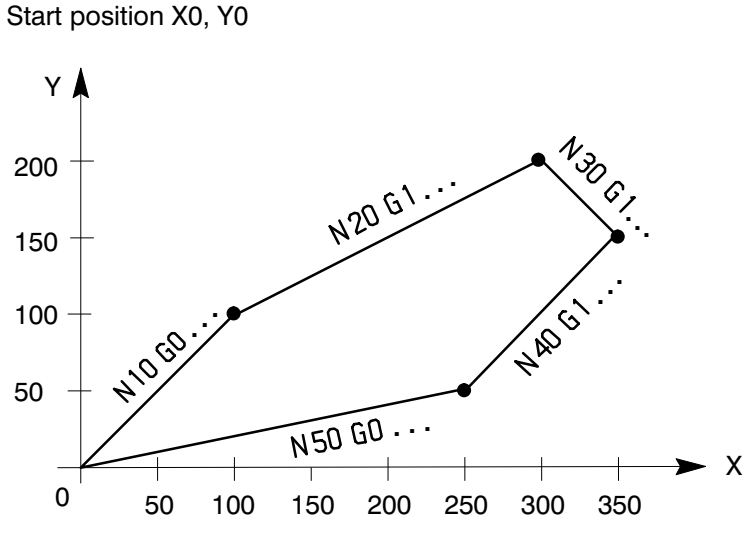
The function G1 acts modally and cancels the functions G0, G2, G3 or G74. In contrast to G0, no speed is predefined for G1. When G1 is called for the first time, it is therefore necessary to program an F–value if no G2/G3 with F–value has been active previously in this part program.
The F–value acts as a path feedrate; as a result, the speed component of each individual axis is less than the programmed F–value when several axes are traversed.
The F–value can be influenced by means of the feed override function (interface input signal E4.5...E4.7).
When an F–value has been programmed once in the part program for G1, this feedrate then remains active (also for G2/G3) until a new F–value is programmed or until the program end is reached.

G0 clears the F–value.
The previously valid F–value becomes active again if G1 is programmed again after G0.
G1 can be programmed only if ”synchronous axes” is defined in machine parameter P0030 and at least 2 axes are defined in machine parameter P0020. Only the interpolation plane G17 is permissible for 2 axes.

Example for G1

N10 G0 X100 Y100 Z–300	The axes X, Y and Z travel to the programmed end point with max. axis speed (rapid traverse mode) **without** interpolation.
N20 G1 X300 Y200 F1000	The axes X and Y travel to the programmed end points with the path speed 1000 mm/min by means of interpolation.
N30 X350 Y150	The axes X and Y travel to the programmed end points with the path speed 1000 mm/min by means of interpolation.
N40 X250 Y50 F200	The axes X and Y travel to the programmed end points with the path speed 200 mm/min by means of interpolation.
N50 X0 Y0 Z0 G0	The axes X, Y and Z travel to the programmed end points with max. axis speed (rapid traverse) **without** interpolation.

The function G1 and the F–value can be programmed with or without position information.



Note

The maximum speed for interpolation is defined for each axis in machine parameter P0302.
An internal control monitoring function ensures that this speed is not exceeded by the individual axes.
The path speed is reduced internally by the control if programming of a high path feedrate results in an axis speed above that defined in machine parameter P0302 (no message is issued to the outside).

Circular interpolation G2, G3

Definition

The programmed end point is approached on a circular path with the active feedrate (F–value).
The F–value has the format 6.0. Feedrates of 1 mm/min up to 999999 mm/min are possible, depending on the system resolution.
G2 results in interpolation in clockwise direction and G3 interpolation in counter–clockwise direction. The circle radius is defined by programming the R–value.
The movement is coordinated so that the involved axes reach the programmed end point at the same time.

Programming of the plane G17, G18, G19 defines which axes can perform circular interpolation.

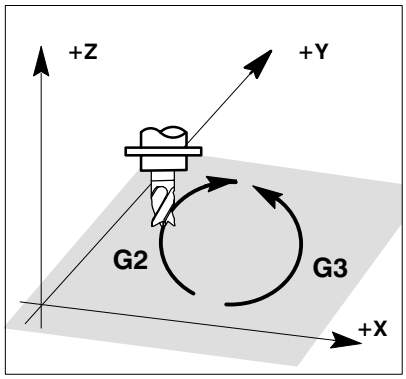
Effect

The functions G2/G3 act modally and cancel each other mutually as well as cancelling the functions G0, G1 and G74.
In contrast to G0, no speeds are predefined for G2/G3. When G2/G3 is called for the first time, it is therefore necessary to program an F–value if no G1 with F–value has been active before in this part program.
The F–value acts as a path feedrate.
The F–value can be influenced by means of the feed override function (interface input E4.5...E4.7). When an F–value has been programmed once in the part program for G2/G3, this feedrate remains active (also for G1) until a new value is programmed or the program end is reached.

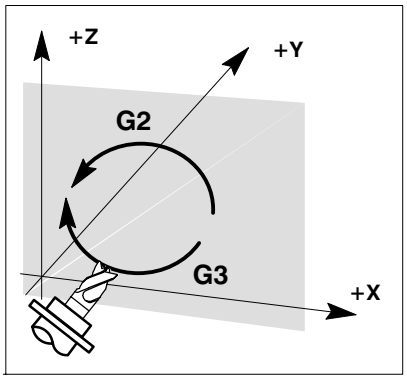
G0 cancels the F–value.
The previously valid F–value becomes active again, however, if G2/G3 is programmed again after G0.
G2/G3 can be programmed only if ”synchronous axes” is defined in machine parameter P0030 and if at least 2 axes are defined in machine parameter P0020.

Only interpolation plane G17 is permissible for 2 axes.
Circulation interpolation in the planes G17, G18 and G19 is possible for 3 axes.

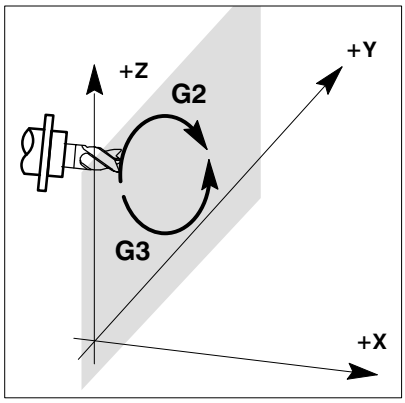
G17, XY–plane



G18, ZX–plane



G19, YZ–plane



Note

If the ”Interpolation” option is active, the machine parameters for axis identification must be defined as follows.

1st axis	X
2nd axis	Y
3rd axis	Z

In addition to the position values for the circle end point (X, Y or Z), it is also necessary to specify the radius in order to permit definition of the circle arc. The radius is defined with sign by the address R; the maximum radius is 30 m (format 5.3).

A negative sign means
that the arc is less than a semi–circle.

A positive sign means
that the arc is larger than a semi–circle.

Four different arcs are possible for a given radius when fixed start and end points are defined. The programmer determines which of these arcs is to be traversed by selection of the G–function (G2 or G3) and the sign of the radius R.

Example for circular interpolation G2 (in clockwise direction)

Assumption: The axes X and Y are already positioned at the start point P1 X = 0 and Y = 0.

1st variant

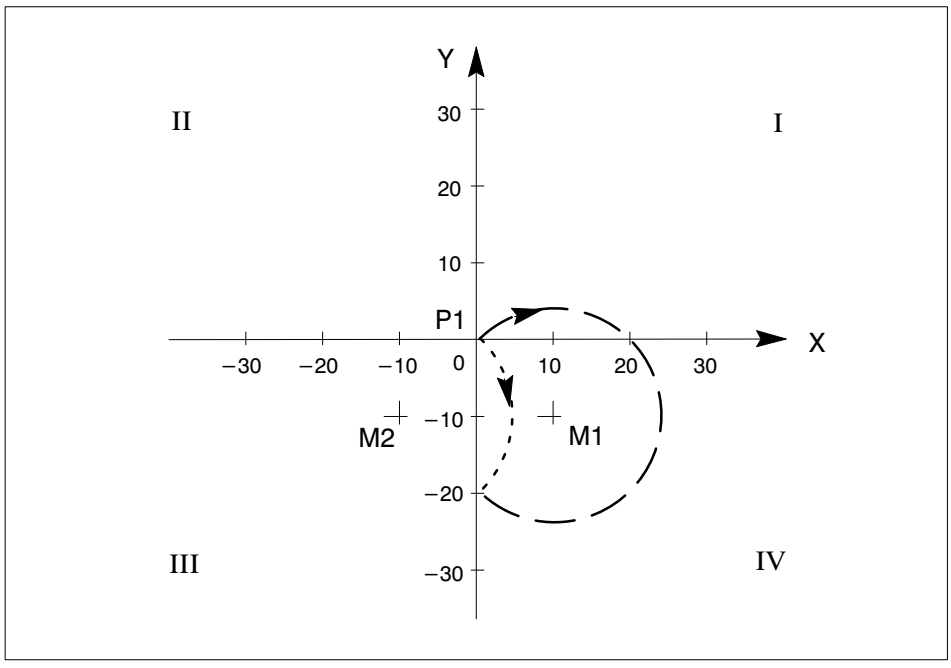
N10 G0 X0 Y0	/ Start point P1
N20 G2 X0 Y–20 R15 F200	/ Circular interpolation in clockwise direction

- The **positive** radius R means that the center point M1 is located in the quadrant IV and the large arc (dashed line) is produced as a result.

2nd variant

N10 G0 X0 Y0	/ Start point P1
N20 G2 X0 Y–20 R15 F200	/ Circular interpolation in clockwise direction

- The **negative** radius R means that the center point M2 is located in quadrant III and that the small arc (dotted line) is produced as a result.



Example for circular interpolation G3 (in counter–clockwise direction)

Assumption: The axes X and Y are already positioned at the start point P1 X=0 and Y=0.

1st variant

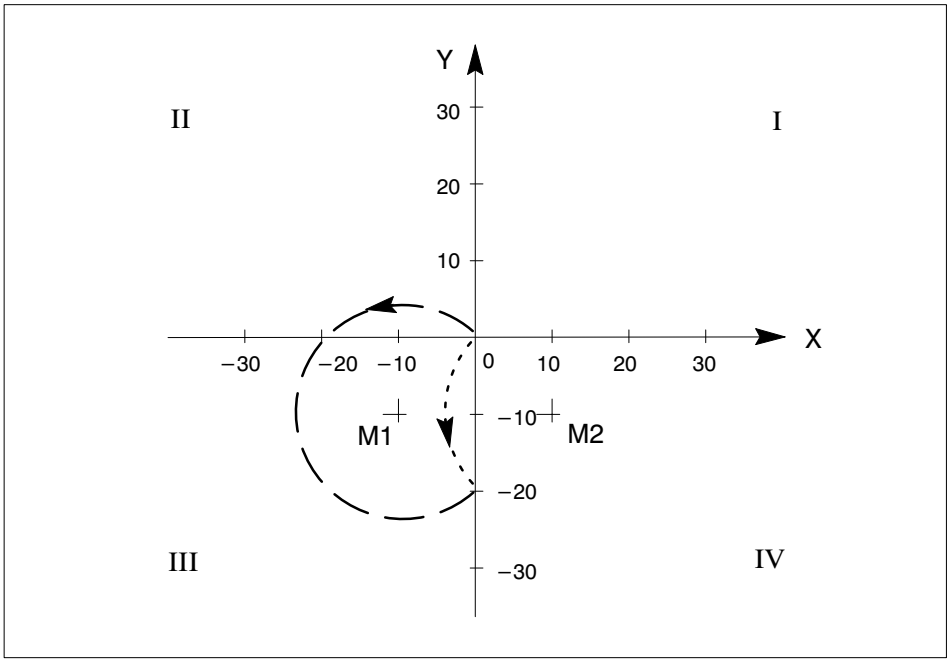
N10 G0 X0 Y0	/ Start point P1
N20 G3 X0 Y–20 R15 F200	/ Circular interpolation in counter–clockwise direction

- The **positive** radius R means that the center point M1 is located in quadrant III and that the large arc (dashed line) is produced as a result.

2nd variant

N10 G0 X0 Y0	/ Start point P1
N20 G3 X0 Y–20 R15 F200	/ Circular interpolation in counter–clockwise direction

- The **negative** radius R means that the center point M2 is located in quadrant IV and that the small arc (dotted line) is produced as a result.



Note

It is not possible to program a full circle in **one** NC block. In order to generate a full circle, it is necessary to program 2 NC blocks which each contain a circle segment. In addition, it is necessary to take into account that a maximum speed for interpolation is defined for each axis in machine parameter P0302.
The internal control monitoring function ensures that this speed is not exceeded. The path speed is correspondingly reduced internally by the control if programming of a high path feedrate results in an axis speed which is above that defined in machine parameter P0302 (no message is issued to the outside). The minimum programmable radius value depends on the axis which has the maximum input resolution (machine parameter P200).

Helical interpolation

Definition

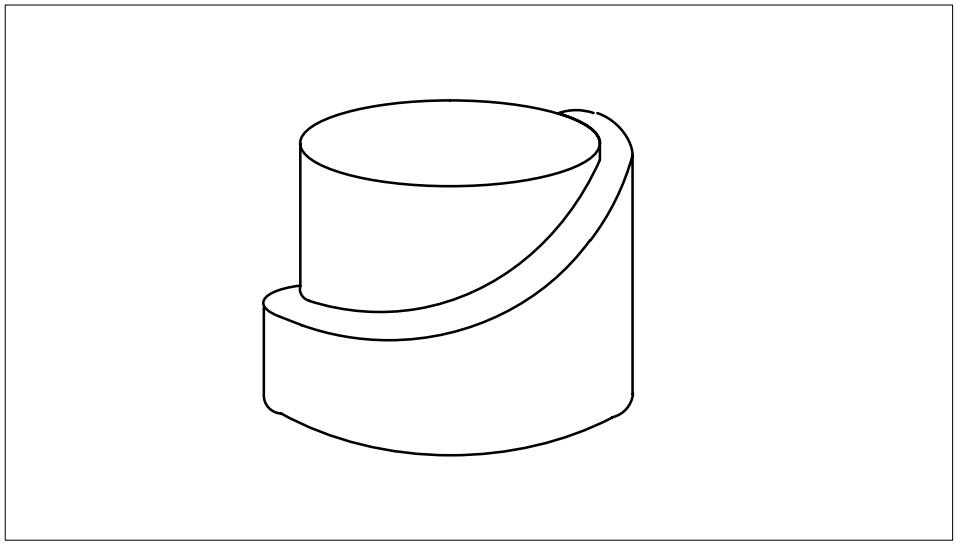
If a third linear axis is programmed in conjunction with G2/G3, the resultant movement of all three axes produces a helical line. The axes for circular interpolation are defined by the plane selection G17, G18, G19.

Effect

The three axes reach the programmed end point at the same time.
The programmed F–value is referred to the ”helical line”.
The circular movement on the plane is the reference variable for the whole movement. The traversing distance of the infeed axis (linear axis) must be restricted in order to achieve sufficient accuracy on the path. The traversing distance of the infeed axis must therefore be the same as or less than the distance on the circular path.

Example: Helical interpolation

```
N10   G0    X0    Y0      Z0
N20   G17   G02   X50     Z78.539   R–25    F1000
N30   G02   X0    Z157.078          R–25
N40   M30
```



Dwell time G4

Definition

G04 is used for definition of a dwell time in the program block in which G04 is programmed in conjunction with Fxxxx.xx.

Function

G04 acts block–by–block and is programmed without travel information. Only auxiliary or miscellaneous information can be programmed in the same block.

The F value specifies the dwell time in seconds. The format for F in conjunction with G04 is 4.2, corresponding to max. 9999.99 seconds.

Since G04 acts only block–by–block, G04 must be written together with the F word again for the same dwell time in following blocks.

The dwell time is started when the dwell time block has been completely processed by the CC 10.

The program is stopped for the dwell time.

Example of G04:

N10 G04 F10.37 . . .	A dwell time of 10.37 seconds elapses in the CC 10.

Programmable acceleration on G6

Programmable acceleration off G7

Definition

The function *PROGRAMMABLE ACCELERATION ON/OFF* allows an acceleration value defined in machine parameter P0320 to be changed within a part program.

Effect

The condition upon switching on is G07 (*PROGRAMMABLE ACCELERATION OFF*).

G06 (*PROGRAMMABLE ACCELERATION ON*) is a modal function.

G07 is activated internally by the control after M30 and M02.

G06/G07 can be programmed alone in a block, i.e. without any other functions.

Refer to the description *MISCELLANEOUS FUNCTIONS*/address A for functions.

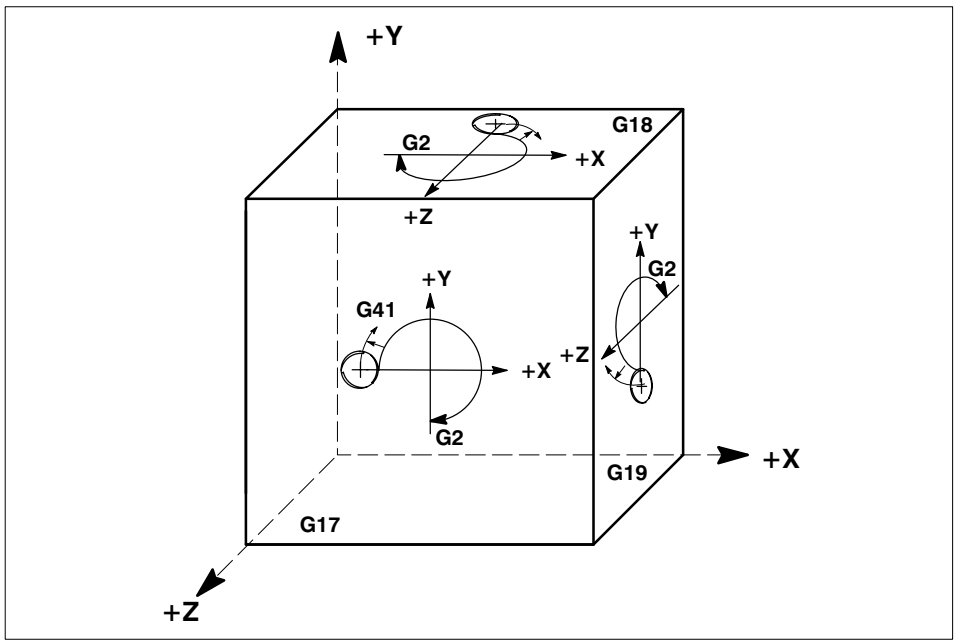
Plane selection G17, G18, G19

Definition

A specific working plane is defined in each case by programming of the functions G17, G18 or G19.
The effects of circular interpolation G2 and G3 as well as offset of the length compensation H also depend on this.

Effect

G17, G18 and G19 are self–holding and mutually cancel each other.



G–Code	Circular interpolation	Tool length compensation
G17	X / Y – level	Z – axis (3rd axis)
G18	Z / X – level	Y – axis (2nd axis)
G19	Y / Z – level	X – axis (1st axis)

The plane must be programmed before the first circular interpolation operation. G17 is stored as the power–on condition and after the program end. A plane change must not take place while length compensation is active.

Conditional jump G23

Unconditional jump G24

Definition G23

The function G23 acts in conjunction with the interface input signal I5.1 CONDITIONAL JUMP.
G23 is programmed in conjunction with an L–address in the part program. The L–address defines the jump destination; the jump destination is always a block number.

Definition G24

In contrast to G23, the jump is executed directly with G24 independently of the interface input signal I5.1.

Effect of G23

G23 and an L–address are programmed in an NC block. The jump to the block number defined under L is executed if the signal I5.1 CONDITIONAL JUMP possesses the status ”logical 1”.

The interface signal I5.1 is already polled internally by the CC 10 during block preparation. A change in the state of the signal I5.1 (e.g. from logical 1 to logical 0) between block preparation (max. 5 blocks) and block execution is no longer taken into account.

If the signal change must be recognized nevertheless, block preparation must be stopped by programming the command WAIT.
It is only possible to jump to blocks which are identified by the block number ”N”.

It is not possible to jump to blocks with line number, e.g. in the case of the command WAIT.
G23 must be programmed alone in a block.
Format of L: 4.0, i.e. it is possible to program a block number with a maximum of 4 digits.
Leading zeros are ignored.

Example of G23

```
N10 G91
N20 X01=100
N30 X02=100
N40 M11
 50  WAIT          : Stops block preparation
N60 G23 L20        : Jump to block number N20
                     if signal 15, 1 is logical 1
.
.
.
N200 M30
```

Effect of G24

The same conditions as described in ”Effect of G23” apply to the function G24. However, the jump is executed directly without taking into account the input signal I5.1 CONDITIONAL JUMP. It is possible to realize an ”endless loop” in the part program with the function G24.

Example of G24

```
N10 G91
N20 X01=100
N30 X02=100
N40 M11
N50 G23 L200       : Conditional jump to block 200
                     if 15, 1 is logical 1
N60 G24 L20        : Unconditional jump to block 20
.
.
.
N200 M30
```

Zero shifts G53, G54 – G59

Definition

Axis–specific zero shifts can be activated in mm or degrees with the functions G54 – G59.

The zero shifts can be deactivated again or cleared with the function G53, with the result that the machine coordinates apply again.

Effect

G54 to G59 are maintained and cancel each other mutually (as also by G53). A zero shift results in the workpiece zero point being moved by the specified zero shift value. The magnitude of the shift is determined by the stored value. The zero shift becomes active only with the next position information after programming of (G54–G59). Each axis where the zero shift is to be active must be programmed correspondingly. The functions G54 – G59 alone do not result in any traversing movement.

The zero shift table contains a maximum of zero shifts. The condition upon switching on is G53, whereby the zero shifts are reset. If G54 is called, for example, the control system sets the workpiece zero point to the coordinates which are stored under G54 (also refer to zero shift table in the operating instructions). The use of zero shifts assumes that the zero shift table is programmed with the corresponding shift values.
The zero shifts act in G90 and in G91.

Note:

No zero shift is calculated for rotary axes programmed in ”revolutions” and rotary axes with absolute measuring systems (defined via machine parameter P 140).

Example

The following shift values are entered in the zero shift table:

G54	X01 = 10
	X02 = 10
	X03 = 10

The following program is to be executed taking into account the zero shift values:

N10 X01=100 X02=100	The axes X01 and X02 travel to the position 100 mm in each case
N20 G54	The zero shift G54 is activated, but the axes are not yet traversed.
N30 X01=200 X02=300	The axis X01 travels to the position 210 mm, while the axis X02 travels to the position 310 mm. The axis X03 does not travel. The function G54 is modal and could also have been programmed in block N30.
N40 G53 X01=50 X02=20	The zero shift G54 is cleared. Axis X01 travels to position 50 mm, axis X02 to position 20 mm.

Exact positioning on G61

Exact positioning off G62

Definition G61, G62

When a block is being executed automatically, the system waits until an *IN–POSITION WINDOW* is reached before starting the next block. The size of this window is defined in machine parameter P0240.

Effects

G62 has priority over G00. G61 is active initially after the *START* of a new program in the case of the CC 10 **without interpolation option**; G61 is the power–on condition, like in all previous software versions.
G62 is active initially after switching on in the case of the CC 10 **with interpolation option**.
The functions G61/G62 act modally and mutually cancel each other.
G61/G62 must be programmed in the block for which the function is to apply at the latest.
The function acts only in conjunction with traversing information.
In the case of the CC 10 software version **without interpolation**, programming of the function G62 allows an almost continuous block transition to be achieved in positioning mode G0 as well. A possible programming variant is shown in the following example.

Example of G61/G62

N10 G00 X01=500	X01 positions to 500 mm in rapid traverse mode; the next block is executed only after the position 500 mm is reached +/– INPOS range.
N20 G61 X01=700 F1000	X01 moves to position 700 mm at a feedrate of 1000 mm/min; the next block is executed only when the position 700 mm +/– INPOS has been reached.
N30 G62 X01=800 F50	X01 travels to the position 800 mm with a feedrate of 50 mm/min;
N40 X01=950	the next block is executed when computing of the block N30 has been completed but the axis still has to traverse the lag. This results in an almost continuous transition between two blocks between traversing movement and programmed feed.
N50 M30	**Notes:** Dips in the traversing speed can occur at the block transition if ❍ the execution time of block N40 is less than the block cycle time ❍ different acceleration times are programmed at the block transitions.

In the case of CC 10 software versions "with interpolation", a continuous block transition is achieved automatically if G1, G2 or G3 is programmed.

Set feedrate to 100% G63

Clear G63 G66

G66 is the state upon switching on.

Both functions are modal and mutually exclude each other.

Definition G63

The feedrate is set to 100 % of the programmed value irrespective of the potentiometer override value supplied to the interface input, i.e. *OVERRIDE* is no longer active.

Definition G66

G66 cancels G63.

OVERRIDE is active and the axis traverses in accordance with the programmed speed, but the ”potentiometer value” supplied to the interface is superposed.

Example G63/G66

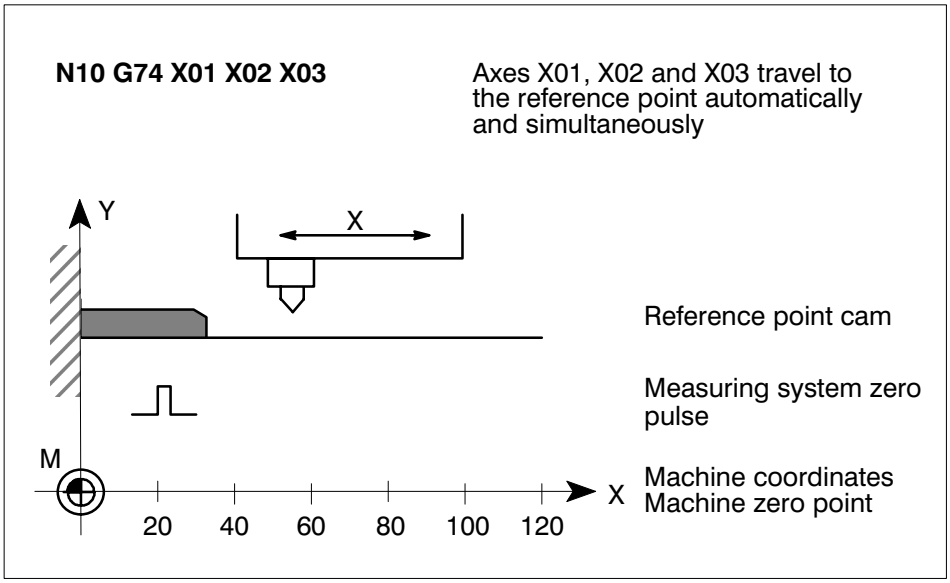
N10 G63 G00	Override to 100 %.
N20 X01=1000	Axis travels to position in rapid traverse mode, override no longer active.
N30 G66 X01=500	Axis travels to position in rapid mode. The override value supplied to the interface acts modally.

Approach reference point G74

Definition

The axes programmed in a block travel to the reference point at the speed defined in the part program.

Example



Effect

- G74 acts only block–by–block
- The axes programmed in a block with G74 traverse to the reference point at the programmed speed (override is active, except in conjunction with G63)
- The actual axis values are not set or zeroed for approach to the reference point with G74, i.e. the programmed displacement values are not influenced.
- G74 is cleared upon activation of the next block; G0 is activated if no G1, G2 or G3 is programmed.
- Unlike with manual approach to the reference point, there is no search for the marker, but the difference between actual position/reference point is traversed.

Programming

- G74 must be programmed in conjunction with axis designations, e.g.:
  G74 X or
  G74 X01= or
  G74 BC

- G74 is programmed in a separate block with the axes to be traversed.

- Auxiliary and miscellaneous functions such as the F–value can be programmed in the same block

Absolute dimension input G90

Incremental dimension input G91

Definition

Axis positions can be specified in:

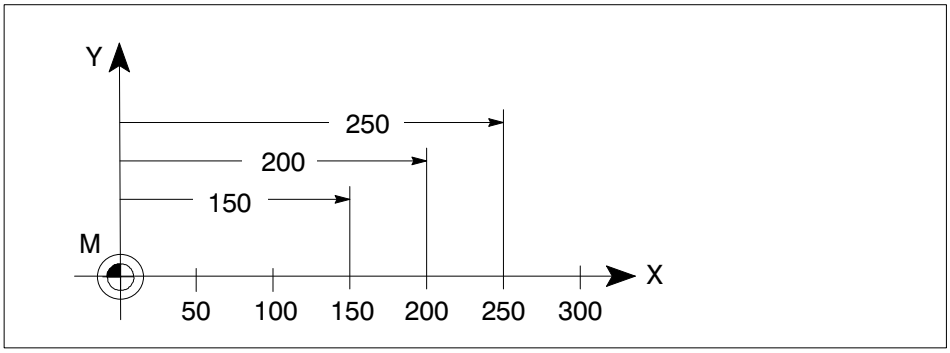
- G90 absolute dimensions, i.e. dimension inputs refer to the machine datum or
- G91 incremental dimensions, i.e. the dimension inputs refer to the respective ACTUAL POSITION of the axis in each case.

Note:

Programming of G90 is not permitted if a position is entered for a rotary axis in revolutions.

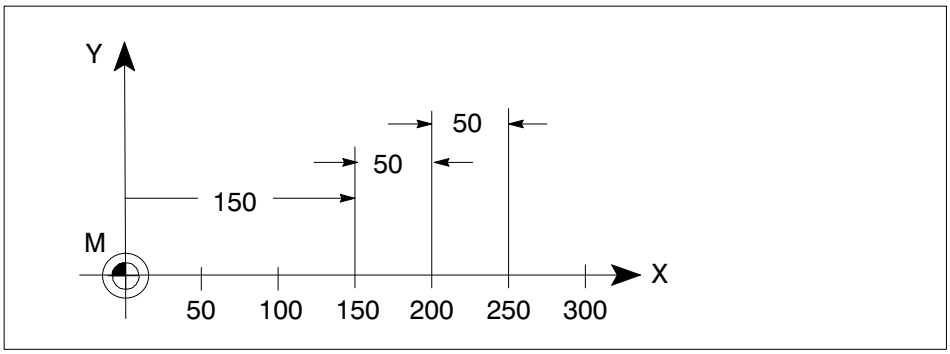
Effect of G90

- G90 is the state upon switching on. This function is maintained and cancels the function G91.
- All end points are approached referred to the coordinate origin.



Effect of G91

- G91 is a maintained function and cancels function G90.
- Each programmed position is referred to the last *ACTUAL POSITION* of the axis.



Additive Zero Shift On G160

Additive Zero Shift Off G167

Definition

The G160 function allows an axis-oriented zero shift (ZS) to be overloaded from the PLC in mm or degrees.

The G167 function allows the additive zero shift (ZS) to be deactivated again. G167 is active at start-up.

Effect

The CC10.3 must have access to the expansion interface. The expansion interface is activated by machine parameter (P42). The expansion interface is provided with data areas for the external setpoint setting for each axis. These data areas did not previously have any significance for the processing of a program. From now on they are used to provide the values for the additive zero shift via the PLC. Each axis is, as with external setpoints, assigned a value.
As the additive zero shift is activated the data of all axes present are read and stored in the control unit.
There is no handshake between PLC and CC10.3.If a block is **prepared** (with G160), the data are read from the CC10.3; this does not occur if the block becomes active. It is therefore recommended that you halt block preparation beforehand with WAIT.
G160 functions with self-latch until a new command from the PLC is overwritten (with G160) or deleted by G167 or program end (M30).
A new ZS has the effect of shifting the tool zero point by the ZS value given. The size of the shift is determined by the value given by the PLC.
The additive zero shift is effective in G90 as well as in G91.

Note:

No zero shift is computed for rotary axes programmed in ”revolutions” or rotary axes with absolute measuring systems (defined via machine parameter P140).

Beispiel: G160 mit zusätzl. Handshake über M–Funktion und Wait

	NC–Program		G160 values	End pos.	Explanations
N01	G0	X100,Y200,Z20	x0,y0,z0	X100,Y200,Z20	This freely selected (must be acknowledged) auxiliary
N02	**M48**		x0,y0,z0	X100,Y200,Z20	function is used to tell the PLC to make the data for the ZS available (here as an example x50y30z10).
WAIT			x0,y0,z0	X100,Y100,Z20	Block preparation is halted until this block becomes active.
N03	**G160**	X122,Z35	x50,y30,z10	X172,Z45	The ZS data are read in, becoming immediately effective.
N04	G3	X130,Z39	x50,y30,z10	X180,Z49	The ZS data remain effective until the program end or the next G160 or the G167.
N...			x50,y30,z10	...	
N25	G2	X...,Y...	x50,y30,z10	...	
N26	**M48**		x50,y30,z10		This freely selected (must be acknowledged) auxiliary function is used to tell the PLC to make the data for the ZS available (here as an example x25y40z15).
WAIT			x50,y30,z10		Block preparation is halted until this block becomes active.
N27	**G160**	X54,Z11	x25,y40,z15	X79,Z26	The ZS data are read in, becoming immediately effective.
N...				...	
N45	**G167**	X221,Z50	x0,y0,z0	X221,Z50	The ZS data become immediately ineffective.
N...			x0,y0,z0	...	
N53	**M48**		x0,y0,z0		This freely selected (must be acknowledged) auxiliary function is used to tell the PLC to make the data for the ZS available (here as an example x23y11z100).
WAIT			x0,y0,z0		Block preparation is halted until this block becomes active.
N63	**G160**	X110,Z150	x23,y11,z100	X133,Z250	The ZS data are read in, becoming immediately effective.
N...			x23,y11,z100	...	
M30			x0,y0,z0	...	G160 is replaced by G167, shifts are deleted.

The handshake via M-function and WAIT is not always vitally necessary. It is used to stop the block preparation for as long as it takes for the PLC to make the ZS data available. It may also be redundant depending on the task setting.

Example: G160 only with Wait

	NC–Program		G160 values	End pos.	Explanations
	< Start >		x0,y0,z0		The ZS data are made available by the PLC before program selection but do not yet become effective (x50,y30,z10).
N01	G0	X100,Y200,Z20	x0,y0,z0	X100,Y200,Z20	
WAIT			x0,y0,z0	X100,Y100,Z20	Block preparation is halted until this block becomes active.
N03	**G160**	X122,Z35	x50,y30,z10	X172,Z45	The ZS data are read in, becoming immediately effective.
N04	G3	X130,Z39	x50,y30,z10	X180,Z49	The ZS data remain effective until the program end or the next G160 or the G167.
N...			x50,y30,z10	...	
M30			x0,y0,z0	...	G160 is replaced by G167, shifts are deleted.

Example: G160 alone

	NC–Program		G160 values	End pos.	Explanations
	< Start >		x0,y0,z0		The ZS data are made available by the PLC before program selection but do not yet become effective (x50,y30,z10).
N01	G0	X100,Y200,Z20	x0,y0,z0	X100,Y200,Z20	
N02	**G160**	X122,Z35	x50,y30,z10	X172,Z45	The ZS data are read in, becoming immediately effective.
N03	G3	X130,Z39	x50,y30,z10	X180,Z49	The ZS data remain effective until the program end or the next G160 or the G167.
N...			x50,y30,z10	...	
M30			x0,y0,z0	...	G160 is replaced by G167, shifts are deleted.

Miscellaneous functions

Feedrate — Address F

- The address F can be programmed in conjunction with positioning mode G0 as well as with interpolation G1, G2 or G3.
  In conjunction with G0, each axis traverses to the end point with the speed programmed under F.
  The path **feedrate** in mm/min or degrees/min is defined with F with active G1, G2 or G3. In contrast to G0, the setpoint for the drive amplifier is not defined by a ramp but as a step function for G1, G2 or G3.
  The step–type setpoint output can be restricted in machine parameter P0302 in order to make sure that the mechanical machine components (e.g. bearings of the lead screw etc.) are not overloaded.
  When a program is executed, the control then internally restricts the resultant path speed so that the feed value set in machine parameter P302 is not exceeded for any of the axes involved in the movement.
- Format 6.0
- Depending on the measuring system resolution and feedrate restriction in machine parameter P0302, F–values between
  1 – 999999 m/min or 1 – 999999 degrees/min are possible.
- The minimum programmable speed is 1 mm/min or 1 degree/min. This speed cannot be reduced further by means of the override function at the interface of the CC 10.

Dwell time — Address F

Dwell time programming is called via the corresponding preparatory function:

- G4 Fxx dwell time in seconds.
- xx $\hat{=}$ format 4.2

Acceleration — Address A

General

The values for acceleration (acceleration ”up–slope”, braking ”down–slope”) defined in machine parameters P0320 and P0321 can be changed via the part program by means of the function G06 in conjunction with an Axx address.
The programmed value must not exceed the value stored in machine parameter P0320 or P0321 (these values define the maximum acceleration).

The slope function may be linear or rounded at the transitions (see description of machine parameter P0310).

OVERRIDE does not have any effect during the acceleration or braking phase.

The programmable acceleration value is cancelled by G07.

- Axx = Identification for acceleration
  is programmed differently, depending on the operating system software. In software level C10, programming of xx corre sponded to the axis identification as defined in machine parameter P100.
  As from software level C20, xx must correspond to the following key:
  A**01** for the 1st axis
  A**02** for the 2nd axis
  A**03** for the 3rd axis
  This change was made owing to flexible axis identifiers.
- Format 6.0, in mm/s^2 or $degrees/s^2$ (for rotary axes).
- The up/down slope is identified by the mathematical sign.
  Example for the 1st axis
  A01 = 1000 Up–slope
  A01 = –200 Down–slope

Example of progr. acceleration G06

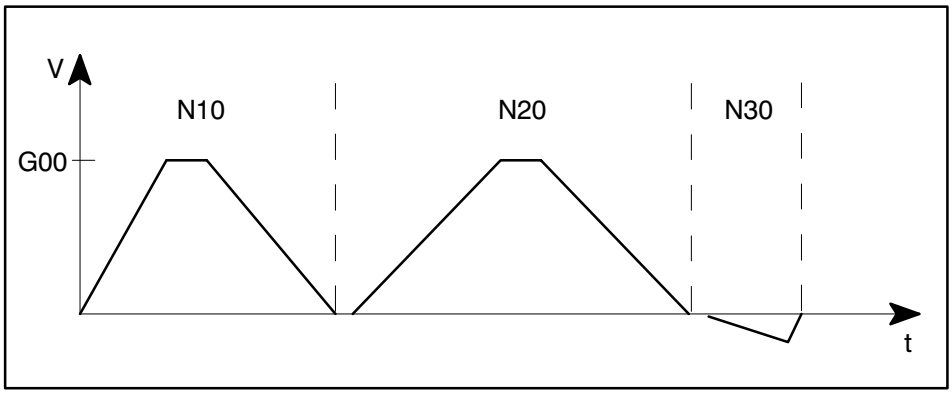
G06 progr. acceleration ON (condition upon switching on, modal).

G07 progr. acceleration OFF.

N10 G06 X01=500 A01=1000 A01=−500	Axis X01 accelerates with 1000 mm/sec2 and moves to the position 500 mm in rapid traverse mode (at constant speed). Braking to V=0 is performed at 500 mm/sec^2.
N20 X01=700 A01=800 A01=−800	Axis X01 is accelerated from V=0 to rapid traverse speed at 800 mm/sec^2. It then traverses in rapid traverse mode (at constant speed) for a certain time and is then braked to V = 0 at 800 mm/sec^2 until the position 700 mm is reached.
N30 X01=680 A01=300 A01=−1000	At the position X=700, the axis X01 is accelerated in the opposing direction with 300 mm/sec^2 (from standstill/V=0) and is then braked with a deceleration of 1000 mm/sec^2 until the M position 680 mm is reached.

Note:

The ramps for acceleration and braking are set to be the same by means of the corresponding machine parameters.



Auxiliary functions

General

Three types of auxiliary functions can be programmed in the CC 10 for execution of machine functions (e.g. M,S,T).

One of the auxiliary functions **must** possess the designation M. The 2nd and 3rd auxiliary functions can be freely defined.

The auxiliary functions consist of 4 characters; they are transferred via the I/O interface (for further information, refer to ”Interface conditions”).

Function

A maximum of 5 auxiliary functions can be programmed in one block (also of the same type).

If the auxiliary functions are programmed in conjunction with a displacement, output can take place parallel to setpoint output as a function of the machine parameters P0410 – P0412.

An internal read–in and feed stop (transfer stop) can be assigned to each auxiliary function via machine parameters P0410 – P0412. If this transfer stop is active, output of the auxiliary function occurs first. If the read–in stop is set to zero at the interface during output of the auxiliary functions, the active block is executed. However, the following block is executed only when the read–in enable has reached the state ”logical 1” again.

If an auxiliary function with internal transfer stop is programmed in a block together with an auxiliary function without transfer stop, the internal transfer stop is active for this block until auxiliary function output has been completed.

One or more types of auxiliary functions ”with acknowledgement” can be defined in machine parameter program P440 – P442. After output of the corresponding auxiliary function, further execution of the NC block is stopped in this case until the auxiliary function has been acknowledged.
If the auxiliary function is output parallel to the traversing movement (refer to MPP definition), execution of the remaining program is stopped after completion of this traversing movement.
The auxiliary functions (different types) are output to the PLC in the order in which they are defined in machine parameter P400.

The active auxiliary functions

- M00, M01 (program stop) and
- M02, M30 (program end)

are described below.

Auxiliary function — Address M

(Program stop, program end)

The following M–functions act internally in the CC 10:

- M00: Programmed stop, continue after START.
  Must be programmed alone in a block.
- M01: Optional stop
  (Depending on the internal signal I3.6 OPTIONAL STOP).
- M02: Program end
  (Preparatory functions and other current states are reset).
- M30: Program end
  (Like M02).

These auxiliary functions must be programmed alone in a block.

Any letters can be assigned to auxiliary functions 2 and 3 by the machine tool manufacturer.

Exception:

Letters which are already used to identify functions in the CC 10, such as G, A etc.

Block preparation

Function of the WAIT command

For some functions, it is necessary to stop block preparation and wait until the preceding blocks have been executed. This can be done with the command ”WAIT”.

If ”WAIT” is recognized by the control system, block preparation (max. 5 blocks) stops at this point until all blocks before WAIT have been executed. After this, block preparation continues automatically. WAIT acts in the operating modes AUTOMATIC and SEMI–AUTOMATIC.
The WAIT command is programmed alone in a block. The block contains only a line number, i.e. the ”N” is omitted.

Example:

```
N10  X01=100  G0
N20  X01=150  X02=200
N30  M01
 40  WAIT
N50  G54  X01=150
N60  X03=20  F1000
.
.
N70  X01=200
N80  X03=20
N90  X01=250  X02=300
N100  X01=300
.
.
N200  M30
```

The program is stopped in block N30 as a function of the interface signal I3.6 ”Optional stop”.
The WAIT command is programmed in line 40.
A zero shift G54, is called in block N50.

The program was stopped in block N30 and block preparation was also stopped in line 40 owing to the WAIT command. It is now possible to manually change the numeric value of the zero shift G54, e.g. for axis X01.
After the program has been restarted with START, the new zero shift is already active in block N50.

Important:

If the WAIT command were not programmed in line 40, the changed zero shift might become active only in block N90 (owing to internal block preparation of max. 5 blocks).

Read monitoring E–code

General

The function E–code increases transfer reliability when reading part programs, machine parameters, length compensations and zero shifts into the CC 10. E–code can be activated optionally via machine parameters or by manual operation on the BPF10.

Function

During reading in, the CC 10 adds the ASCII valency of all characters of a block and of the ”header” (DFS...). If the sum of all ASCII valencies is greater than 999, the checksum E.... is generated via the modulo 999 function.

Example

```
(DFS, P26, 1, PART PROGRAM) E652
N10  G00  G90  X150E852
20  WAITE439
N30  T4E345
N40  X95.35E558
N50  F500E430
N60  X82.702E605
N70  M30E389
```

When a file is read in, all characters are included in the checksum which are located between the last block end identifier ”LF” (Line Feed) and the following E–address.

The control characters STX and ETX and the skip character DELETE are generally not included in the checksum by the CC 10.
In addition, the characters ”LF” (Line Feed) and ”CR” (Carriage Return) are not included in the checksum if no other characters are programmed in the same block.

If programs with E–address are read in without the E–code configuration level having been activated, the E–address is transferred to the part program memory. This error is, however, detected after the program START.

If a deviation from the programmed E–code is recognized during calculation of the checksum by the CC 10, then an error message is output.

- In ”ON LINE” mode
  (ERR, 300: E–CODE)

  Data transfer must be restarted (DFS, ...).

- In ”OFF LINE” mode
  Error code F091: E–code

  This message is output to the interface as binary information and is displayed on the BPF10.
  Reading in is continued until the program end M30 or M02; the program can be stored in the EEPROM and subsequently executed.

Compensation tables H, G

General

These are tables for tool length compensations ”H” and zero shifts ”G” (also refer to the operating instructions).

Tool length compensation ”Hxx”

Length compensations are added to the programmed setpoint with the correct sign. This offset addition corresponds to a zero shift for linear axes.

Length compensations (H00...H72) are not permitted for rotary axes and are not included in the calculation. If a length compensation is nevertheless programmed, the following error message is output and the program sequence is interrupted.
F062 LCOMP INACTIVE

An exception to this is mixed operation of linear and rotary axes. Here, it is possible to program length compensations for the linear axes. In this case, the error F062 is recognized only when the compensation table value for the rotary axis is not equal to zero.

- Synchronous axis

  The user can determine by means of machine parameters (refer to MPP) whether the H compensation memory is allocated to 3x1 axis (24 compensations each/axis) or to 1 axis (72 compensations). If a synchronous axis is equipped with a tool of variable length (the other 2 axes not), for example, a 1 is specified as the number of axes to be compensated (in the MPP). It is thus possible to enter 72 different compensation values for the synchronous axis X01 in the compensation table. If 72 tool length compensations are defined in machine parameter P0480, the compensation value always refers to the infeed axis, which is perpendicular to the selected plane G17, G18 or G19 (applies only if the interpolation option is active). The compensation value applies to every axis in the event of subdivision into 3 x 24 compensations (also machine parameter P0480). The compensation values are stored in the EEPROM.

  – Compensation for 3 axes ⟶ H01...H24

  – Compensation for 1 axis ⟶ H01...H72

  Manual inputs are always permitted and can be prevented only by the interface signal *EDIT DISABLE*.

Important: Changes in compensation values during execution (in SEMI or AUTO) of part programs may become active only 5 blocks later owing to preparatory block processing.

- Asynchronous axes

  Each axis is treated as an independent axis system in asynchronous mode, i.e. each axis is controlled by a separate part program. For this reason, a compensation table is permanently assigned to each axis. 24 compensation values are then available for each axis (with 3x1 axes asynchronous).

Example of tool length compensation call

The tool length compensations are called via the H–function. This is modally active and is cancelled with H00. A program call has the following form:

N10 X01=5000 X02=5000 H10	Activation of compensation group 10
.	
.	
N90 H00	Cancelation of compensation
.	
.	

Format of tool length compensation table

(DFS ,K,LENGTH COMPENSATION)

H01					
X01=	**1.000**	**X02=**	**0.000**	**X03=**	**0.000**
H02					
X01=	**0.000**	**X02=**	**0.000**	**X03=**	**0.000**
H03					
X01=	**0.000**	**X02=**	**0.000**	**X03=**	**0.000**
H04					
X01=	**0.000**	**X02=**	**0.000**	**X03=**	**0.000**
.					
.					
.					
H23					
X01=	**0.000**	**X02=**	**0.000**	**X03=**	**0.000**
H24					
X01=	**0.000**	**X02=**	**0.000**	**X03=**	**0.000**
M30					

Note for CC 10 software version with interpolation:
The axis designation X01 can be omitted in programmming of the compensation table if 72 length compensations are defined in the machine parameter P480. The compensation value is then assigned directly to the compensation number.

e.g.	H01	1.000
	H02	0.576

The compensation value always acts on the infeed axis if 72 length compensation values are defined. The infeed axis is the non–interpolation axis in the plane in each case.

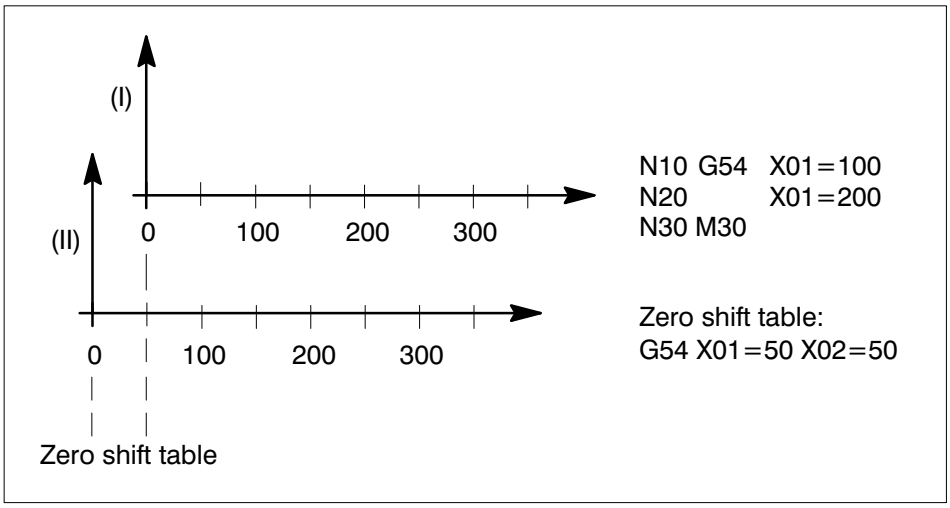
Zero shifts ”Gxx”

A zero shift results in displacement of the workpiece zero point. The zero shift table can be activated with G54 – G59. The table values of all active axes are taken into account. G53 clears the zero shift.

Zero shifts are absolute, i.e. the programmed displacement is always referred to the machine coordinate system (also refer to G–function specification).

Example:

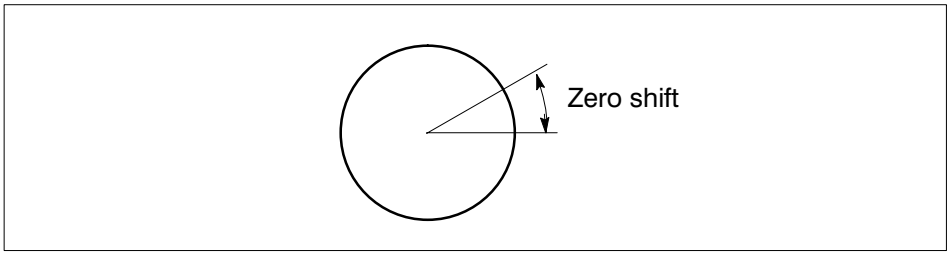
The coordinates of the workpiece zero point (I) are displaced with respect to the machine reference point (II) by the zero shift G54. The programmed travel command in N10 results in traversing of the first axis in the machine reference system to 150 mm for a zero shift of X01=50. The axis X01 travels to 250 mm in block N20.



G54 is a modal function and can be programmed with or without travel commands. However, the value is traversed only in conjunction with a programmed displacement.

Zero shift in conjunction with rotary axes

Zero shifts are included only if the rotary axis is programmed in DEGREES. A zero shift is then included in degrees.



No zero shift is included for rotary axes programmed in ”revolutions”. If a zero shift is nevertheless programmed, the following error message is output and the program sequence is aborted.
F063 ZERO SHIFT INACTIVE

It is possible to continue working only after renewed program selection.

Important: Changes in compensation values during execution (in SEMI or AUTO) of part programs may become effective only 5 blocks later owing to preparatory block processing.

Format of zero shift table

```
(DFS ,V,ZERO SHIFT)
G54
X01=    10.000    X02=    0.000    X03=    0.000
G55
X01=    0.000     X02=    0.000    X03=    0.000
G56
X01=    0.000     X02=    0.000    X03=    0.000
G57
X01=    0.000     X02=    0.000    X03=    0.000
G58
X01=    0.000     X02=    0.000    X03=    0.000
G59
X01=    0.000     X02=    0.000    X03=    0.000
M30
```

Reading in the tables

It is possible to read in table values only if editing is not taking place in them. After reading in has been completed without errors, the table values are automatically copied to the edit memory in the RAM and the table memory in the EEPROM (exception: ON LINE mode – in order to permit storage of the values in the EEPROM, the command for ”Program EEPROM” must be sent).
The part program accesses exclusively the compensation values stored in the edit memory.

Saving the tables in the FLASH EPROM

The tables are stored in a fixed memory location in the FLASH EPROM. The values are copied into the RAM area during run–up of the control system. Changes which are not explicitly transferred to the FLASH EPROM are therefore lost when the control system is switched off. The only exception here is for read–in table values which are automatically written into the FLASH EPROM. A checksum test is performed for the table area in the FLASH EPROM during the control system run–up; if an error is detected, the user is informed by the error message:

F033 E2.COMP.TAB.DEST ⟶ compensation table in FLASH EPROM destroyed

or

F034 E2.ZER.TAB.DEST ⟶ zero shift table destroyed.

The tables must be stored again in order to eliminate this error message.

Programming the rotary axis

General

The function *ROTARY AXIS* is active in all operating modes. Programming is either incremental or absolute.

A rotary axis acts in synchronous and asynchronous modes.

Definition

The definition of rotary axis/linear axis is made by machine parameters.
In addition, the following are also defined by machine parameters:

- Rotary axis with displacement optimization,
- circular displacement input in revolutions or degrees and
- pulses/degree.

Function

If an axis (synchronous or asynchronous) is defined as a rotary axis, no software limit switches are active, i.e. the rotary axis can rotate infinitely or is restricted only by the programming format.

Displacement input

Displacement input in the part program takes place in revolutions or degrees.

- Displacement inputs in revolutions:

  The format of displacement input is +/– 5.3 (max. 32767 revolutions). The programmed value is internally multiplied by 360 degrees in each case.

  The speed is specified in degrees/min and has the format 6.0. The maximum programmable speed is thus 999999 degrees/min ($\hat{=}$ 2777 revolutions/min). Displacement inputs in revolutions generally act incrementally (G91); *DISPLACEMENT OPTIMIZATION* is not active. The direction is determined by means of the sign in conjunction with the displacement input.

  G90 results in the error message F14.

Caution:

No interpolation G1, G2 or G3 is possible for rotary axes with displacement in revolutions.

- Displacement inputs in degrees:

  The format is 3.3, i.e. it is possible to traverse positions of 0...359.999 degrees.

  The speed is also input in degrees/min and has the format 6.0 (max. 999999 degrees/min).

  Displacement input can take place with G90 or G91.

  Depending on the sign, the rotary axis travels in positive or negative direction with G91.

  The reference point is always approached in the direction as defined in machine parameter P340.
  The parameter P111 ”optimum displacement” is not taken into account for travel to the reference point.

15 General

This description refers to the CC 10 operating system software as of Version C40.

The CC 10 functions which permit automatic communication with peripheral devices are summarized with the term ”REMOTE CONTROL”.

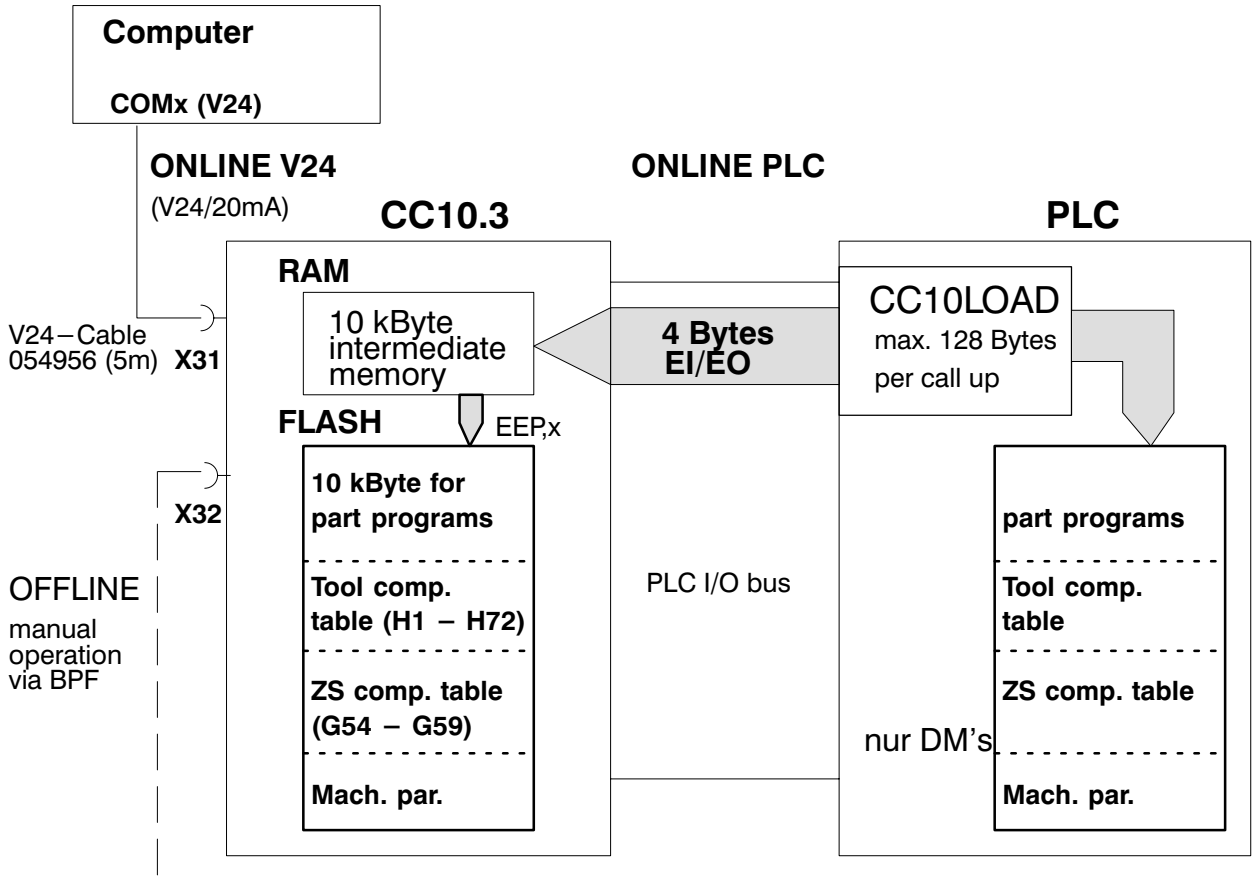
The terms ”ON LINE V24” and ”ON LINE PLC” are used frequently below.

ON LINE V24 means that data can be transferred from a higher–ranking computer for instance to the CC 10 and from the CC 10 to a higher–ranking computer via the V.24/20 mA interface **without** manual operation on the CC10.

The type of data which can be transferred is defined in Chapter ”Functions”.

Communication can also be performed via the interface to the PLC besides via the V.24/20 mA interface, plug connector X31. In this case, we use the term ”**ON LINE PLC**” (see Figure 15.1).

If data transfer occurs with manual operation on the BPFÿ10, we use the term ”**OFF LINE**”.



Functions

Read part programs in/out	(DFS,Px,y,T..)
Delete part programs	(CLM,Px,y)
Read tool compensation table in/out	(DFS,K,y,L..)
Read zero shift table in/out	(DFS,V,y,N..)
Read machine parameters in/out	(DFS,L,M..)
Determination of memory area	(FRM,P)
Contents	(DIR,y)
Program FLASH (part programs)	(EEP,P)
Program FLASH (ZS tables)	(EEP,V)
Program FLASH (tool comp. tables)	(EEP,K)
Program FLASH (mach. parameters)	(EEP,L)
NEW: Output error messages	**(ERL,y)**

Fig 15.1

16 Machine parameters

As sketched in Fig. 15.1, data transfer between CC 10 and external device can be performed via the V.24/20 mA interface or the CC 10 interface to the PLC.

The interface parameters defined with parameters P0481 – P0486 apply in conjunction with ON LINE mode.

[P0491] INTERF. MODE
[0] OFF LINE

The following options are available:
[0] OFF LINE
[1] ON LINE V24
[2] ON LINE PLC
The interface defined in parameter P0491 is active after system startup.

- [OFF LINE]
  via V.24/20 mA interface, manual operation via BPF 10
- [ON LINE V24]
  via V.24/20 mA interface, remote control
- [ON LINE PLC]
  via interface data channel input and data channel output

The data transfer rate at the V.24/20 mA interface (BAUD RATE) can be matched (within limits) to the external device.

[P0481] BAUD.V24 ONL.
[4800] BAUD
Value range:
110 BAUD
300 BAUD
600 BAUD
1200 BAUD
2400 BAUD
4800 BAUD

4800 BAUD means that max. 4800 bits can be transferred per second. However, since the receiving device can stop data transfer, the net transfer rate may be far lower than this.

Data transfer generally occurs in ASCII characters.
ASCII = American Standard Code for Information Interchange.

This data transfer code has been standardized by the American Standards Association. 7 bits are used to represent the characters of the ASCII standard character set (see Annex).
The extended character set has a length of 8 bits. These characters can currently not be interpreted by the CC 10.

[P0482]	ZL.V24 ONL.	[0]	7 bits
	[0] 7 BIT	[1]	8 bits

The ASCII characters may be provided with a parity bit. The parity bit is the 8th bit. The parity bit supplements the ASCII characters to produce an even number of bits (even parity) or an odd number of bits (odd parity).

[P0483]	PARI.V24 ONL.	[0]	No parity bit
	[1] PARITY EVEN	[1]	Even parity
		[2]	Odd parity

1 START bit is automatically prefixed to each ASCII character, i.e. the number of START bits cannot be selected. A number of STOP bits are also appended after each ASCII character.

[P0484]	SBIT.V24 ONL.	[0]	1 stop bit
	[0] 1 STOPBIT	[1]	1.5 stop bits
		[2]	2 stop bits

Communication via the V.24/20 mA interface is performed with ”handshake” signals. Only lines TX, RX, GND and shield are required with software handshake (DC2 ”XON” or DC4 ”XOFF”) for data transfer. Terminals DSR and DTR must be jumpered at both ends.
In conjunction with hardware handshake, the control lines DSR and DTR (DTR = Data Terminal Ready and DSR = Data Set Ready) must be wired to the data lines TX, RX and GND (see Interface conditions, Chapter Serial interface V.24/20 mA).

Data transfer can occur with hardware or software handshake.

[P0485]	HMODE.V24 ONL. [0] NO HANDSHAKE	[0] [1] [2]	No handshake Hardware handshake Software handshake

Each NC block can be provided with a checksum, the E code, in order to increase data transfer integrity. (See Programming instructions, ”E code”.)

[P0486]	ECODE V24 ONL. [0] NO	[0] [1]	NO YES	No E code E code

17 Interface selection

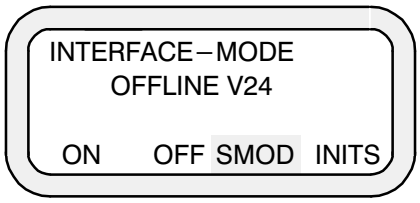
Data can be read in or out via a variety of interfaces. The interface is selected via the BPF10 (see Operating Instructions) or via the PLC interface.

17.1 Interface selection via BPF

The interface defined in machine parameter P0491 is active after power–up of the CC 10. The interface can be switched over by manual operation on the operating panel BPF 10(E). The following softkeys must be pressed on the BPF 10:

NO. X	MODE	MEM	INFO

PROG	M/C	MPP	DATA



Interface selection

The setting can be changed by pressing **SMOD**.

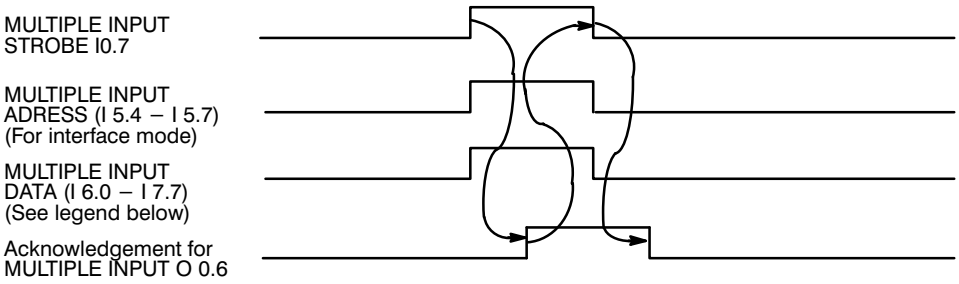
* OFFLINE V24
* ONLINE V24
* ONLINE PLC

If the interface has been switched to ONLINE V24, data transfer between CC 10 and external device is performed via the V.24/20 mA interface, plug connector X31 on the front panel of the CC 10. If the interface is switched to ONLINE PLC, the data are transferred via the interface from/to the PLC.

17.2 Interface selection via PLC interface

INTERFACE MODE I 5.4 – I 5.7

The pre-assignment of the interface mode from the MPP can be changed via the PLC interface. This is done with the help of the multiple inputs. Switchover of mode can occur at any time. Consequently, the user must ensure that switchover to a different interface occurs only if no data transfer is active at the moment of switch-over. Should the interface be switched over nevertheless, this may result in trans-mission errors.



Mode switchover

The CC10 evaluates the MULTIPLE INPUT ADDRESS and the MULTIPLE INPUT DATA with MULTIPLE INPUT STROBE.

For the INTERFACE MODE functions, input 5.6 must have logical state 1, while inputs I5.4, 5.5, 5,7 have logical state 0.

The following BCD codes must be applied to MULTIPLE INPUT DATA.

Interface	BCD–Code
OFFLINE V24	0
ONLINE V24	1
ONLINE PLC	2

relevant for remote control

18 REQUIRED DATA CHANNEL

The CC10.3 has access to a required data channel which allows effective communication with the PLC and replaces the data channel on the extended PLC interface of previous CC10 control units.
This interface can transfer data from the PLC to the CC10.3 and vice versa in serial ASCII code. Transfer operations generally take place in Handshake mode.
A hardware module in the CC10.3 accepts the module addressing and the data transfer. The **CC10LOAD** module is required on the PLC end to accept the entire telegram handling.
Setting the **ONLINE PLC** interface mode activates the required data channel. A maximum of 128 bytes can be transferred per Handshake cycle.

Required data are:

Reading contents of memory in and out (MPP, part programs, tables)
Programming and deleting contents of memory
Memory INFO (size, directory)
Error messages (file list)

These data are transferred and parameterised with the **CC10LOAD** module. If the parameter P10 **required data length > 0**, the required data is exchanged.

Required data are generally located in or written into **data modules.**

The required data parameters are validated via a Handshake mode. This mode corresponds to data channel handling up to this point and results via simultaneous strobe and acknowledgement signals at the extended interface.

- The transmission of a demand (remote demand) or a file with a DFS header always triggers a transfer.
- The length of the required data is transferred to the P10 of the CC10LOAD module. P10 > 0 signifies that required data are to be replaced.
- The PLC program can, at any time, read or write required data. The user should not attempt to gain access to the required data while they are being transferred.

The end identifier (ETX) must be queried when the data are received, in order to prevent the destination area from being overwritten (by a new specification of destination) where data quantities > 128 bytes are involved.

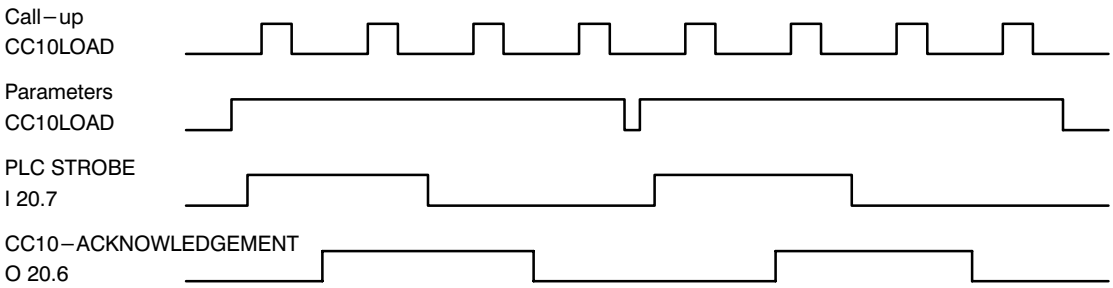
18.1 Handshake mode

Required data are transferred in Handshake mode with STROBE and ACKNOWLEDGEMENT signals.
When they are transmitted, data must be available at the instant of the strobe signal and all parameters of the CC10LOAD module must be valid.

18.1.1 CC10.3 receives required data

Sequence:
1. Make data module (prog., MPP, compensations etc.) available
2. Make CC10LOAD parameters (DM no., start address, length) available
3. Set STROBE
4. Call up CC10 LOAD
5. Reset STROBE by accepting ACKNOWLEDGE6. New command may be necessary with more than 238 bytes of required dataAblauf:
6. New command may be necessary with more than 238 bytes of required data

REQUIRED DATA CHANNEL INPUT STROBE I 20.7
ACKNOWLEDGEMENT FOR DATA CHANNEL INPUT O 20.6



Example:

A part program is to be transferred via the REQUIRED DATA CHANNEL, triggered by the PLC. The header of the part program is defined as follows:

(DFS,P....etc.)

Between 2 and 128 ASCII characters can be transferred from the PLC to the CC10 per transfer operation. Data transfer begins with the STROBE INPUT I20.7 being set to logical 1.

At the same instant, the parameters must be stored at the CC10LOAD module and the data block must be made available for transfer. The data block is accepted into the CC10 with the 0/1 edge of the STROBE INPUT I20.7.

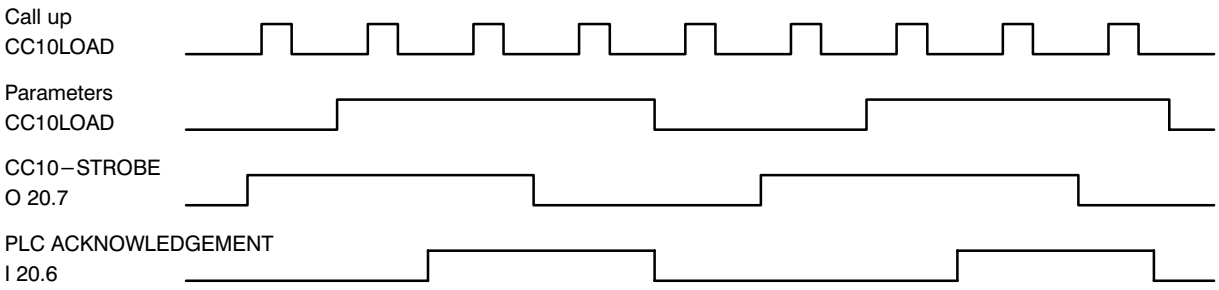
The CC10.3 acknowledges acceptance with the ACKNOWLEDGEMENT FOR DATA CHANNEL INPUT O20.6 signal. The DATA CHANNEL INPUT STROBE signal must be reset with this signal in the PLC program.

At the same time, new data and parameters can be applied to the CC10LOAD module. After the CC10 has reset the ACKNOWLEDGEMENT FOR DATA CHANNEL INPUT signal, the next data transfer operation can commence.

18.1.2 CC10.3 transmits required data

Sequence:
1. Detect STROBE signal
2. Make data module (empty) available
3. Make CC10LOAD parameters (DM no., start address) available
4. Call up CC10LOAD
5. Output ACKNOWLEDGEMENT until STROBE is reset
6. A new STROBE triggers a new start address or a new data module

REQUIRED DATA CHANNEL OUTPUT STROBE O 20.7
ACKNOWLEDGEMENT FOR DATA CHANNEL OUTPUT I 20.6



Example:

A part program has been transferred from the PLC to the CC10 beforehand via the data channel input.

The CC10 now acknowledges this transfer with the following message:

...(NCS,FTR OK)...

A maximum of 128 ASCII characters are transferred from the CC10 to the PLC per transfer operation.

The CC10 starts the acknowledgement message by setting the DATA CHANNEL OUTPUT STROBE O20.7 to logical 1 and fixing the required data block to the standard data block. In this case this is (NCS,FTR OK).

The PLC program acknowledges acceptance of the characters with the ACKNOWLEDGEMENT FOR DATA CHANNEL OUTPUT I20.6 signal. The CC10 then resets the DATA CHANNEL OUTPUT STROBE signal.

The PLC program must also then reset the ACKNOWLEDGEMENT FOR DATA CHANNEL OUTPUT signal.

19 Functions

The following functions can be supported via the Remote Control.

- Read–in of part programs
- Read–out of part programs
- Read–in of the compensation table
- Read–out of the compensation table
- Read–in of the zero shift table
- Read–out of the zero shift table
- Read–in of the machine parameters
- Read–out of the machine parameters
- Deleting part programs
- Determining memory space
- Part program directory
- Programming in the FLASH EPROM
- Read–out of an existing error table

Part programs and machine parameters can be read in only if the CC10 is not in *Edit mode* and no other CC10 system process has write access to the part program memory. Files output by the CC10 are assigned the identifier

<STX> <CR> <LF>

at the start of the file and the identifier

<ETX> <CR> <LF>

at the end of the file.

Files which can be read into the CC 10 may also contain the identifier but this is not absolutely necessary.
The CC 10 skips the characters STX and ETX, i.e. these characters are not stored in the program memory.
In the descriptions below, it is always assumed that communication is performed via an external computer connected to the V.24/20 mA interface (ONLINE V24).

The same functions can also be performed via the required data channel. (ONLINE PLC)

19.1 Read–in

19.1.1 Read–in of part programs

The computer sends a part program with the following format to the CC 10:

(DFS,PXXXX,X, PART PROGRAM)
.
.
.
M30<CR><LF>

Channel number
Program nummer

If read-in has been terminated properly and the part program stored in the part program memory, the CC10 sends the message:

<STX><CR><LF>
(NCS,FTR OK)<CR><LF>
<ETX><CR><LF>

The part program is now available in the CC10 file system RAM and can be executed.

To avoid the part program being lost through a power failure, it should be regularly saved with the command (**EEP,P**) in the FLASH EPROM. The command (EEP,P) initiates a *complete update* of all programs present in the part program memory into the FLASH.

- CC10 in edit mode:

  <STX><CR><LF>
  (ERR,321: NC IN EDIT MODE)<CR><LF>
  <ETX><CR><LF>

- DFS header not recognised

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- No free space

  <STX><CR><LF>
  (ERR,312: NO FREE SPACE)<CR><LF>
  <ETX><CR><LF>

- The file is currently active

  <STX><CR><LF>
  (ERR,315: FILE ACTIVE)<CR><LF>
  <ETX><CR><LF>

CAUTION 19.1
Part programs which have not been stored in FLASH may be lost if power failure occurs.

19.1.2 Read–in of compensation tables

The computer sends a compensation table with the following format to the CC 10:

(DFS,K,X, LENGTH COMPENSATION)
.
. Channel number
.
M30<CR><LF>

If read–in has been terminated properly, the CC 10 sends the following message:

<STX><CR><LF>
(NCS,FTR OK)<CR><LF>
<ETX><CR><LF>

If the DFS header has not been detected, the CC 10 sends an error message with the following contents to the computer:

<STX><CR><LF>
(ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
<ETX><CR><LF>

If the table format is not correct, the following error message is issued:

<STX><CR><LF>
(ERR,303: INVALID FORMAT)<CR><LF>
<ETX><CR><LF>

19.1.3 Read–in of zero shifts

The computer sends a zero shift table with the following format to the CC 10:

(DFS,V,X, ZERO SHIFT)
.
. ——— Channel number
.
M30<CR><LF>

If read–in has been terminated properly, the CC 10 sends the following message:

<STX><CR><LF>
(NCS,FTR OK)<CR><LF>
<ETX><CR><LF>

If the DFS header has not been detected, the CC 10 sends an error message with the following contents to the computer:

<STX><CR><LF>
(ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
<ETX><CR><LF>

If the table format is not correct, the following error message is issued:

<STX><CR><LF>
(ERR,303: INVALID FORMAT)<CR><LF>
<ETX><CR><LF>

19.1.4 Read–in of machine parameters

The computer sends the machine parameters with the following format to the CC 10:

(DFS,L, MACHINE PARAMETER)
.
.
M30<CR><LF>

If read–in has been terminated properly, the CC 10 sends the following message:

<STX><CR><LF>
(NCS,FTR OK)<CR><LF>
<ETX><CR><LF>

If the DFS header has not been detected, the CC 10 sends an error message with the following contents to the computer:

<STX><CR><LF>
(ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
<ETX><CR><LF>

If the CC 10 is in Edit mode, it sends an error message in the following form to the computer:

<STX><CR><LF>
(ERR,321: NC IN EDIT MODE)<CR><LF>
<ETX><CR><LF>

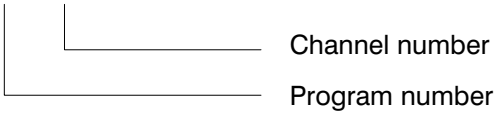
19.2 Read–out

After the computer has transferred a send request to the CC 10, the data are output by the CC 10.

19.2.1 Requesting a part program

The command has the following format:

(FRQ,PXXXX,X)<CR><LF>



After reception of this command, the CC 10 may transmit the following messages:

- The file

  <STX><CR><LF>
  (DFS,PXXXX,X, PART PROGRAM)
  .
  .
  M30<CR><LF>
  <ETX><CR><LF>

- File not found

  <STX><CR><LF>
  (ERR,300: FILE NOT FOUND)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- Incorrect channel number

  <STX><CR><LF>
  (ERR,302: INCORRECT CHANNEL NUMBER)<CR><LF>
  <ETX><CR><LF>

19.2.2 Requesting the compensation tables

The command has the following format:

(FRQ,K,X)<CR><LF>

Channel number

After reception of this command, the CC 10 may transmit the following messages:

- The file

  <STX><CR><LF>
  (DFS,K,X, LENGTH COMPENSATION)
  .
  .
  M30<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- Incorrect channel number

  <STX><CR><LF>
  (ERR,302: INCORRECT CHANNEL NUMBER)<CR><LF>
  <ETX><CR><LF>

19.2.3 Requesting the zero shift table

The command has the following format:

(FRQ,V,X)<CR><LF>

Channel number

After reception of this command, the CC 10 may transmit the following messages:

- The file

  <STX><CR><LF>
  (DFS,V,X,ZERO SHIFT)
  .
  .
  M30<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- Incorrect channel number

  <STX><CR><LF>
  (ERR,302: INCORRECT CHANNEL NUMBER)<CR><LF>
  <ETX><CR><LF>

19.2.4 Requesting the machine parameters

The command has the following format:

(FRQ,L,XXXXXXXXXXX)<CR><LF>

Any text

After reception of this command, the CC 10 may transmit the following messages:

- The file

  <STX><CR><LF>
  (DFS,L, MACHINE PARAMETER)
  .
  .
  M30<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

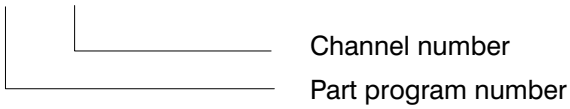
  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

19.3 Deleting files (applicable only to part programs)

It is possible to delete individual programs in order to create space for other programs. It is not possible to delete zero shift tables, compensation tables or the machine parameters. They can only be overwritten with new data.

The delete command has the following syntax:

(CLM,PXXXX,X)<CR><LF>



After reception of this command, the CC 10 may transmit the following messages:

- File deleted

  <STX><CR><LF>
  (CLM,PXXXX,X DELETED)<CR><LF>;
  <ETX><CR><LF>

- Program number not found

  <STX><CR><LF>
  (ERR,300: FILE NOT FOUND)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM destroyed

  <STX><CR><LF>
  (ERR,311: FLASH PROGR. ERROR)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- Incorrect channel number transferred

  <STX><CR><LF>
  (ERR,302: INCORRECT CHANNEL NUMBER)<CR><LF>
  <ETX><CR><LF>

- CC 10 in Edit mode

  <STX><CR><LF>
  (ERR,321: NC IN EDIT MODE)<CR><LF>
  <ETX><CR><LF>

19.4 Determining memory space

This command permits the computer to determine the free memory space within the part program memory. This can prevent a part program being loaded into the NC and not being acknowledged until afterwards with error message (ERR,312: NO FREE SPACE).

The command has the following format:

(FRM,P)<CR><LF>

After reception of this message, the CC 10 may transmit the following messages:

- Size of the free memory space

  <STX><CR><LF>
  (FRM,XXXX BYTE)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM not formatted

  <STX><CR><LF>
  (ERR,313 FLASH NOT FORMATTED)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

19.5 Program directory

This command permits the ”P numbers” of the part programs stored in the NC memory to be determined.

(DIR,X)<CR><LF>

Channel number

After reception of this command, the CC 10 may transmit the following messages.

- The program directory

<STX><CR><LF>
(DIR,X,X)<CR><LF>

Number of stored Programs
Channel number

PXXXX PXXXX PXXXX PXXXX PXXXX PXXXX<CR><LF>
PXXXX PXXXX PXXXX PXXXX PXXXX PXXXX<CR><LF>
PXXXX<CR><LF>
<ETX><CR><LF>

- No part programs found

<STX><CR><LF>
(DIR,X,0)<CR><LF>

Channel number

<ETX><CR><LF>

- Unrecognized command

<STX><CR><LF>
(ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
<ETX><CR><LF>

- Incorrect channel number

<STX><CR><LF>
(ERR,302: INCORRECT CHANNEL NUMBER)<CR><LF>
<ETX><CR><LF>

19.6 Programming files (in the EEPROM)

If files have been read into the CC 10, they can be programmed in the EEPROM with corresponding programming commands. The commands for these are as follows:

19.6.1 Programming part programs

(EEP,P)<CR><LF>

The command can be answered by the CC 10 as follows:

- Part program stored

  <STX><CR><LF>
  (EEP,P,OK)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM destroyed

  <STX><CR><LF>
  (ERR,311: FLASH PROGR. ERROR)<CR><LF>
  <ETX><CR><LF>

CAUTION 19.2

Part programs which have not been stored in FLASH may be lost if power failure occurs. In the previous CC10, a part program which could be executed was automatically stored (in the EEPROM).

19.6.2 Programming zero shift tables

(EEP,V)<CR><LF>

The command may be answered by the CC 10 as follows:

- Zero shift stored

  <STX><CR><LF>
  (EEP,V,OK)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM destroyed

  <STX><CR><LF>
  (ERR,311: FLASH PROGR. ERROR)<CR><LF>
  <ETX><CR><LF>

19.6.3 Programming compensation tables

(EEP,K)<CR><LF>

The command may be answered by the CC 10 as follows:

- Compensation table stored

  <STX><CR><LF>
  (EEP,K,OK)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM destroyed

  <STX><CR><LF>
  (ERR,311: FLASH PROGR. ERROR)<CR><LF>
  <ETX><CR><LF>

19.6.4 Programming machine parameters

(EEP,L)<CR><LF>

The command may be answered by the CC 10 as follows:

- Machine parameters stored

  <STX><CR><LF>
  (EEP,L,OK)<CR><LF>
  <ETX><CR><LF>

- Unrecognized command

  <STX><CR><LF>
  (ERR,301: UNRECOGNIZED COMMAND)<CR><LF>
  <ETX><CR><LF>

- FLASH EPROM destroyed

  <STX><CR><LF>
  (ERR,311: FLASH PROGR. ERROR)<CR><LF>
  <ETX><CR><LF>

CAUTION 19..3

After the program command for the machine parameter has been issued, there automatically occurs a start−up of the NC (NEW START).

19.7 Read-out of any list of errors present

The CC10 makes a list of errors for the entry of errors concerning operation. The list can accommodate a maximum of 30 errors. With previous CC10 hardware, access to the list of errors was only possible with the BPF 10 in the **INFO** operating mode.

With the CC10.3, however, the list of errors (without BPF 10 as well) can be read out in **remote control mode** to the set interface using the commands:

(ERL,0) **List all errors**

(ERL,1 ...3) **List errors of the preselected channel**

The list of errors is given in ASCII string form.

Format: 4-digit error number + max. 15 characters of error messages

Examples:

F005 UNPERM. CHAR N1
F058 NO REF PT
F033 I2.CORR.AB.ZRST
M30

If the error has arisen during program execution and can be attributed to a particular block, the block number is displayed (see first example).

If the list of errors is recalled and no error is present (list of errors is empty), the following message is displayed:

<STX> <CR> <LF>
M30 <CR> <LF>
<ETX> <CR> <LF>

20 ANNEX

20.1 Connection cable PG6 <–> CNC

20.1.1 Connection via V.24 interface (COM1)

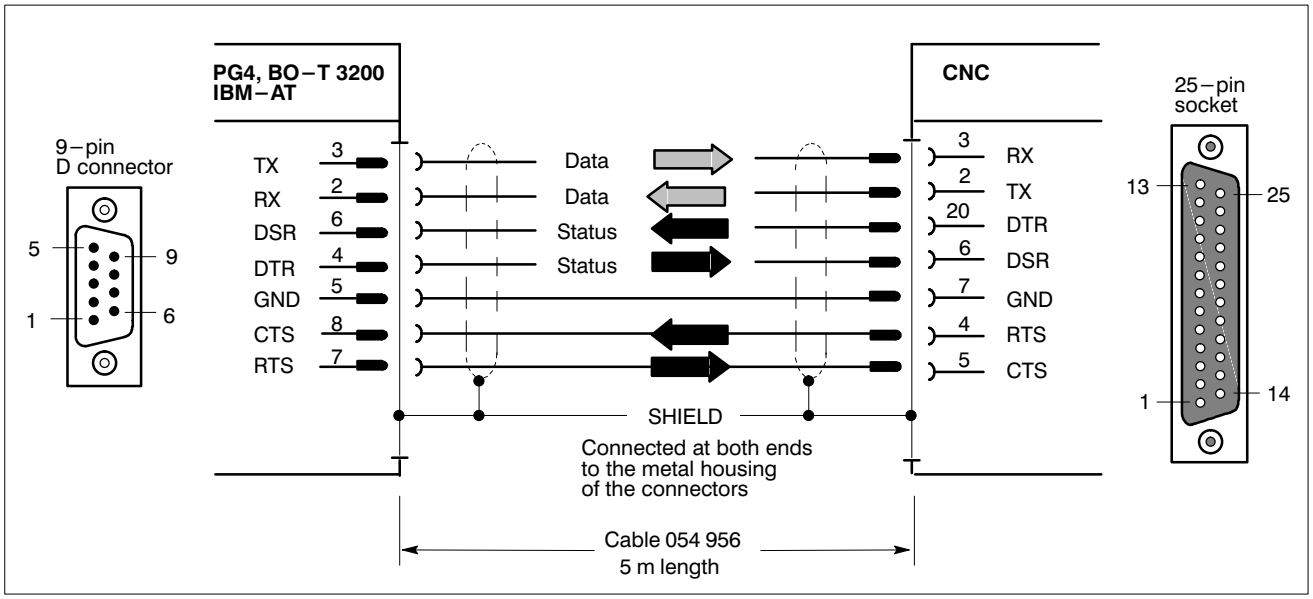
The cable length with V.24 connections is dependent upon the baud rate (short cable → higher baud rate; long cable → low baud rate). The following empirical value applies: max. cable length 15 m at 4800 baud. If reliable data transmission is no longer guaranteed, suitable repeaters must be interconnected or you must use the 20 mA interface (COM2) of the EP/AG module.

Available cable:

Cable No.	Cable designation	Length
054956	V.24 connection cable	5 m

The serial interface COM1 has a 9–pin D connector.

Illustration: V.24 connection between COM1 interface and CNC



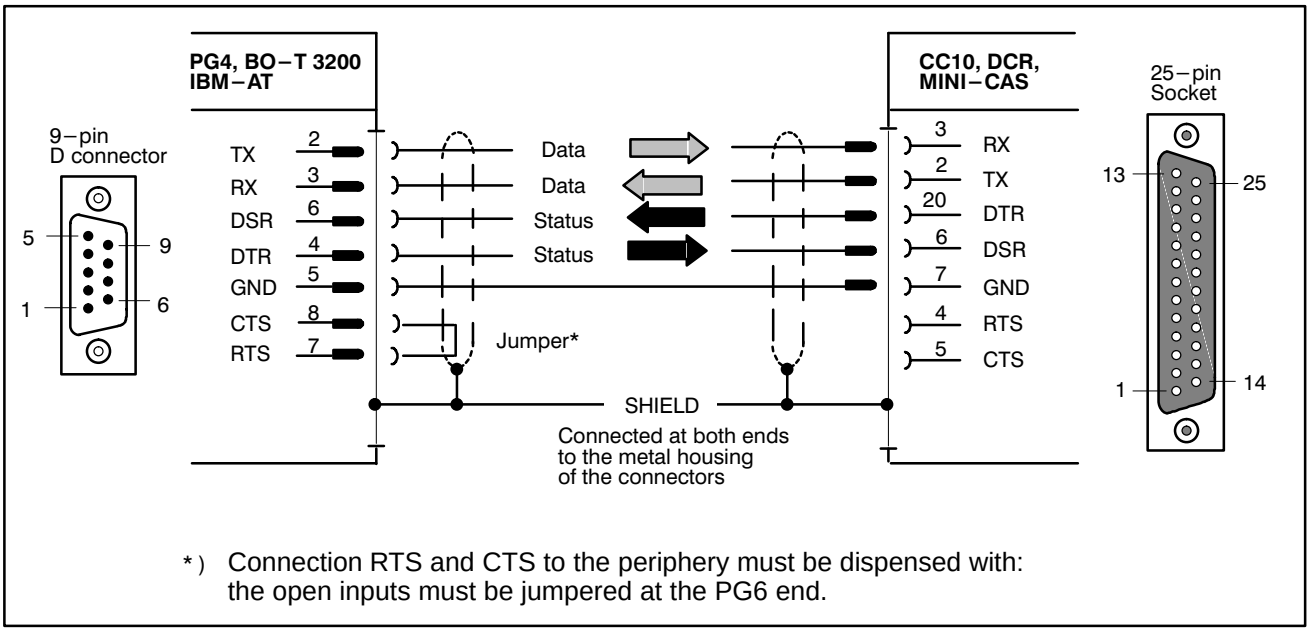
The cable 054956 permits data transfer to the CC 100, CC 200, CC 300 and CC 320 with software or hardware handshake.
The following applies to production of a connection cable:

- Only the lines TX, RX, GND and shield are required for software handshake (XON/XOFF) via V.24. Terminals DSR and DTR must be jumpered at both ends.
- The CNC control lines DSR and DTR must be wired to the lines of TX, RX and GND in the case of hardware handshake (DTR/DSR) (see illustration). Bosch CNCs (CCÿ10, CC 100, CC 200, CC 300, DCR and Mini Cass) operate with DTR/DSR.
- If connection RTS/CTS is not available since the data transmission equipment does not provide or evaluate the signals, pin 7 must be jumpered to pin 8 in the PG4–end connection socket.

The following restriction applies to a V.24 transfer to CC10 controls with the type designation CC 10 (without index, see rating plate):

- The connection RTS and CTS to CC 10, DCR or Mini Cass must be dispensed with and the two open inputs RTS/CTS must be jumpered at the PG6 end. The V.24 connection cable (cable number 054956) must be modified as shown in the illustration. You can also use the modified cable for CC 10.3.

Illustration: V.24 connection between COM1 interface and CC 10, DCR and Mini Cass



*) Connection RTS and CTS to the periphery must be dispensed with: the open inputs must be jumpered at the PG6 end.

20.2 ASCII character set

Dec.	Hex	ASCII
0	00	NUL
1	01	SOH
2	02	STX
3	03	ETX
4	04	EOT
5	05	ENO
6	06	ACK
7	07	BEL
8	08	BS
9	09	HT
10	0A	LF
11	0B	VT
12	0C	FF
13	0D	CR
14	0E	SO
15	0F	SI
16	10	DLE
17	11	DC1
18	12	DC2
19	13	DC3
20	14	DC4
21	15	NAK
22	16	SYN
23	17	ETB
24	18	CAN
25	19	EM
26	1A	SUB
27	1B	ESC
28	1C	FS
29	1D	GS
30	1E	RS
31	1F	US

Dec.	Hex	ASCII
32	20	SP
33	21	!
34	22	”
35	23	#
36	24	$
37	25	%
38	26	&
39	27	’
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	–
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?

Dec.	Hex	ASCII
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	↑
95	5F	→

Dec.	Hex	ASCII
96	60	‘
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	DEL

A Appendix

A.1 Safety instructions

A.1.1 Dansk

Sikkerhedshenvisningerne i denne brugsanvisning

Disse symboler anvendes i den foreliggende brugsanvisning i følgende tilfælde:

FORSIGTIG

Dette symbol benyttes, hvis der skal advares mod **farlig elektrisk spænding**. Hvis advarslen ikke følges nøjagtigt eller ignoreres kan det medføre **personskader**.

FORSIGTIG

Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **personer**.

VIGTIGT

Dette symbol benyttes, hvis en unøjagtig eller manglende overholdelse af anvisningerne kan medføre beskadigelser af **apparater eller filer**.

Dette symbol benyttes for at gøre Dem opmærksom på noget særligt.

VIGTIGT

0.2

Risiko for modulet!

Modulet må ikke sættes i eller trækkes ud af stikket, når der er tændt for styringen! Modulet kan blive ødelagt. Der skal først slukkes for styringens netdelmodul, den eksterne spændingsforsyning og signalspændingen eller disse skal trækkes ud af stikket, inden modulet må sættes i eller trækkes ud af stikket!

VIGTIGT

0.3

Risiko for modulet!

Ved omgang med modulet skal alle forholdsregler til ESD-beskyttelse iagttages!

Undgå elektrostatiske udladninger!

VIGTIGT

5.1

Programmer, som ikke sikres i FLASH–EPROM med "JA", står ikke til rådighed længere, når der slukkes for forsyningsspændingen.

VIGTIGT

9.1

De aktuelle data i FLASH–EPROM slettes fuldstændigt. Derfor skal alle vigtige data mellemlagres på et eksternt datamedie og indlæses i CC 10 igen efter initialiseringen.

VIGTIGT

19.1

Deleprogrammer, som ikke er blevet sikret i FLASH, kan mistes ved spændingsudfald.

VIGTIGT

19.2

Deleprogrammer, som ikke er blevet sikret i FLASH, kan mistes ved spændingsudfald. Ved den tidligere CC10 var et deleprogram, som kunne afvikles, automatisk lagret (i EPROM).

VIGTIGT

19.3

Efter udlæsning af programmeringskommandoen for maskinparametrene sker der automatisk en booting af NC'en (GENSTART).

Sikkerhedshenvisninger på styrekomponenterne

På styrekomponenterne selv kan der være anbragt følgende advarsler og henvisninger, som skal gøre Dem opmærksom på bestemte ting:

Advarsel mod farlig elektrisk spænding!

Advarsel mod farer fra batterier!

Elektrostatisk udsatte komponenter!

Træk netstikket ud, inden De åbner!

Bolt kun til tilslutning af jordledningen PE!

Kun til tilslutning af en afskærmningsledning!

A.1.2 Deutsch

Sicherheitshinweise in dieser Gebrauchsanweisung

Diese Symbole werden in dieser Gebrauchsanweisung unter den folgenden Bedingungen verwendet.


VORSICHT

Dieses Symbol wird benutzt, wenn vor einer **gefährlichen elektrischen Spannung** gewarnt werden soll. Durch ungenaues Befolgen oder Nichtbefolgen dieser Anweisung kann es zu **Personenschäden** kommen.


VORSICHT

Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Personenschäden** kommen kann.


ACHTUNG

Dieses Symbol wird benutzt, wenn es durch ungenaues Befolgen oder Nichtbefolgen von Anweisungen zu **Beschädigungen von Geräten oder Dateien** kommen kann.

☞

Dieses Symbol wird benutzt, wenn Sie auf etwas Besonderes aufmerksam gemacht werden sollen.


VORSICHT

0.1

Gefahr für Personen und Sachen!
Testen Sie jedes neue Programm bevor Sie eine Anlage in Betrieb nehmen!


ACHTUNG

0.2

Gefahr für die Baugruppe!
Baugruppe nicht bei eingeschalteter Steuerung stekken oder ziehen! Baugruppe kann zerstört werden. Zuerst Netzteilbaugruppe der Steuerung, externe Spannungsversorgung und Signalspannung ausschalten oder abziehen und erst dann Baugruppe stecken oder ziehen!


ACHTUNG

0.3

Gefahr für die Baugruppe!
Beim Umgang mit der Baugruppe müssen alle Vorkehrungen zum ESD-Schutz eingehalten werden! Elektrostatische Entladungen vermeiden!


ACHTUNG

5.1

Programme, die nicht mit ”JA” ins FLASH – EPROM gesichert werden, stehen nach dem Auschalten der Versorgungsspannung nicht mehr zur Verfügung.


ACHTUNG

9.1

Die jeweiligen Daten im FLASH – EPROM werden dabei vollständig gelöscht. Es müssen daher alle wichtigen Daten auf einen externen Datenträger zwischengespeichert und nach erfolgter Initialisierung in die CC 10 zurückgeladen werden.


ACHTUNG

19.1

Teileprogramme, die nicht ins FLASH gesichert wurden, können bei Spannungsausfall verloren gehen.

ACHTUNG

19.2

Teileprogramme, die nicht ins FLASH gesichert wurden, können bei Spannungsausfall verloren gehen.
Bei der bisherigen CC10 war ein Teileprogramm, das abgearbeitet werden konnte, automatisch (im EEPROM) gespeichert.

ACHTUNG

19.3

Nach der Ausgabe des Programmierkommandos für die Maschinenparameter erfolgt automatisch ein Hochlauf der NC (NEUSTART).

Sicherheitshinweise an den Steuerungskomponenten

An den Steuerungskomponenten selbst können folgende Warnungen und Hinweise angebracht sein, die Sie auf bestimmte Dinge aufmerksam machen sollen:

Warnung vor gefährlicher elektrischer Spannung!

Warnung vor Gefahren durch Batterien!

Elektrostatisch gefährdete Bauelemente!

Vor dem Öffnen Netzstecker ziehen!

Bolzen nur für Anschluß des Schutzleiters PE!

Nur für Anschluß eines Schirmleiters!

A.1.3




β

.

β

β β .

!

! !

) PE

)

)

A.1.4 Español

Indicaciones de seguridad en estas instrucciones de empleo

Estos símbolos se utilizan en estas instrucciones de empleo bajo las siguientes condiciones.

PRECAUCION

Este símbolo se utiliza para advertir de una **tensión eléctrica peligrosa**. La ejecución inexacta o la no ejecución de esta instrucción podrá provocar **daños a las personas**.

PRECAUCION

Este símbolo se utiliza cuando por una ejecución inexacta o la no ejecución de instrucciones se pueden llegar a producir **daños a las personas**.

ATENCION

Este símbolo se utiliza cuando por la ejecución inexacta o la no ejecución de instrucciones se pueden llegar a producir **daños en los aparatos o archivos**.

Este símbolo se utiliza cuando se le debe llamar la atención respecto a algo especial.

PRECAUCION

0.1

íPeligro para personas y bienes materiales!

¡Compruebe cada nuevo programa antes de poner en funcionamiento una instalación!

ATENCION

0.2

íPeligro para el módulo!

íNo enchufe ni extraiga el módulo cuando el control está conectado! Puede destruirse el módulo. íDesconecte o desenchufe primero el módulo de fuente de alimentación del control, la alimentación de tensión externa y la tensión de señalización y sólo después enchufe o extraiga el módulo!

ATENCION

0.3

¡Peligro para el módulo!

¡Observe en la manipulación del módulo todas las precauciones en cuanto a la protección ESD! ¡Evite descargas estáticas!

ATENCION

5.1

Los programas que no se archivan con SI en la FLASHEPROM ya no estarán disponibles después de desconectar la tensión de alimentación.

ATENCION

9.1

En ello, los respectivos datos de la FLASHEPROM se borran completamente. Por tanto, todos los datos relevantes tienen que memorizarse en un soporte de datos externo y cargarse nuevamente al CC10 una vez efectuada la inicialización.

ATENCION

19.1

Los programas de piezas que no hayan sido archivados en la FLASH se podrán perder en caso de un fallo de la tensión.

ATENCION

19.2

Los programas de piezas que no hayan sido archivados en la FLASH se podrán perder en caso de un fallo de la tensión. En la versión anterior del CC10, un programa de piezas que pudo ejecutarse estaba archivado automáticamente (en la EEPROM).

ATENCION

19.3

Después de editar la instrucción de programación para los parámetros de máquina se realiza de forma automática una inicialización del NC (REARRANQUE).

Indicaciones de seguridad en los componentes de control

En los componentes de control mismos pueden estar dispuestos las siguientes advertencias e indicaciones que le deben llamar la atención sobre determinados temas:

¡Advertencia ante tensión eléctrica peligrosa!

¡Advertencia ante riesgos por baterías!

¡Elementos constructivos con riesgos de descargas electrostáticas!

¡Antes de abrir, desenchufar el conector de la red!

¡Perno sólo para la conexión del conductor protector PE!

¡Sólo para la conexión de un conector blindado!

A.1.5 Français

Directives de sécurité relatives au présent mode d'emploi

Ces symboles sont utilisés dans les conditions suivantes:

 DANGER

Ce symbole est utilisé lorsque l'on veut mettre en garde contre une **tension électrique dangereuse**. Risque de **dommage corporel** si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

 DANGER

Ce symbole est utilisé s'il y a un risque de **dommage corporel** si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

 ATTENTION

Ce symbole est utilisé s'il y a un risque de dommage matériel ou risque de destruction de fichier si les consignes données ne sont pas respectées ou lorsqu'elles sont mal respectées.

Ce symbole est utilisé lorsqu'il s'agit d'attirer votre attention sur un point particulier.

 DANGER

0.1

Risque pour les personnes et le matériel !

Testez chaque nouveau programme avant de mettre une installation en service!

 ATTENTION

0.2

Risque pour l'unité !

Ne branchez ou ne débranchez pas l'unité lorsque la commande est activée ! Risque de destruction de l'unité. Avant de brancher ou de débrancher l'unité, coupez ou déconnectez d'abord le bloc d'alimentation de la commande, l'alimentation en courant électrique externe et la tension de signal !

 ATTENTION

0.3

Risque pour l'unité !

Respectez toutes les mesures de protection ESD lors du maniement de l'unité ! Evitez les décharges électrostatiques !

 ATTENTION

5.1

Les programmes qui ne sont pas sauvegardés par "OUI" dans la FLASH – EPROM ne sont plus à disposition après coupure de la tension d'alimentation.

 ATTENTION

9.1

Les différentes données contenues dans la FLASH – EPROM sont intégralement effacées. C'est pourquoi toutes les données importantes doivent être placées dans une mémoire temporaire puis rechargées dans CC10 après la réinitialisation suivante.

 ATTENTION

19.1

Les programmes de pièce qui n'ont pas été sauvegardés dans FLASH peuvent être perdus en cas de chute de tension.

ATTENTION

19.2

Les programmes de pièce qui n'ont pas été sauvegardés dans FLASH peuvent être perdus en cas de chute de tension. Dans le cas des CC10 utilisés jusqu'à ce jour, un programme de pièce pouvant être interrompu était mémorisé automatiquement (dans l'EPROM).

ATTENTION

19.3

Une fois la sortie de la commande de programmation des paramètres de la machine réalisée, une accélération de la commande numérique NC s'effectue automatiquement (NOUVEAU DEPART).

Mesures de sécurité relatives aux despositifs de commande

Les pictogrammes et messages d'avertissement suivants peuvent se trouver sur les éléments de commande afin d'attirer votre attention sur certains points:

Présence de tension électrique dangereuse

Danger lié à la présence de batteries

Modules sensibles à l'électricité statique

Eniever la fiche secteur avant l'ouverture

Uniquement pour le raccordement de la terre PE !

Uniquement pour le raccordement d'un câble blindé

A.1.6 Italiano

Avvertenze per la sicurezza in queste istruzioni per l'uso

Questi simboli vengono impiegati in queste istruzioni per l'uso nelle seguenti condizioni.


PERICOLO
Questo simbolo viene impiegato per segnalare la presenza di **tensioni elettriche pericolose**. La mancata osservanza, anche parziale, di queste istruzioni può provocare danni alle **persone**.


PERICOLO
Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni possono provocare danni alle **persone**.


ATTENZIONE
Questo simbolo viene impiegato qualora l'osservanza imprecisa o la mancata osservanza delle istruzioni può provocare danni agli **apparecchi o ai file**.

Questo simbolo viene impiegato quando si voglia richiamare l'attenzione su qualcosa di particolare.


PERICOLO
0.1
Pericolo per persone ed oggetti!
Provare ogni nuovo programma prima di mettere in funzione l'impianto!


ATTENZIONE
0.2
Pericolo per il modulo!
Non innestare o rimuovere il modulo quando il comando è acceso! Il modulo potrebbe venire distrutto. Spegnere prima il modulo d'alimentazione del comando, l'alimentazione esterna di tensione e la tensione del segnale e solo successivamente innestare o rimuovere il modulo!


ATTENZIONE
0.3
Pericolo per i moduli!
Durante operazioni con i moduli rispettare tutte le misure di protezione ESD! Evitare scariche elettrostatiche!


ATTENZIONE
5.1
Dopo il disinserimento della tensione di alimentazione i programmi che non sono stati memorizzati con "SI" nella FLASH−EPROM non sono più a disposizione.


ATTENZIONE
9.1
I rispettivi dati contenuti nella FLASH−EPROM vengono completamente cancellati. Per questo motivo è necessario archiviare su una memoria di massa esterna tutti i dati importanti, per poterli ricaricare dopo la positiva inizializzazione del CC 10.

ATTENZIONE

19.1

Parti di programmi non memorizzati nella memoria FLASH possono andare perduti in caso di interruzione della corrente.

ATTENZIONE

19.2

Parti di programmi non memorizzati nella memoria FLASH possono andare perduti in caso di interruzione della corrente. Nei precedenti CC 10 una parte di programma eseguibile con successo veniva automaticamente memorizzata (nella EEPROM).

ATTENZIONE

19.3

Dopo l'output dei comandi di programmazione per i parametri della macchina avviene automaticamente un bootstrap del comando numerico (RIAVVIO).

Avvertenze per la sicurezza sul componenti di comando

Sui componenti di comando stessi possono essere applicate le seguenti targhette di avvertimento e di avvertenza, che richiamano l'attenzione su particolari pericoli:

Avvertimento per tensione elettrica pericolosa!

Avvertimento per pericoli dovuti alle batterie!

Elementi costruttivi danneggiabili da cariche elettrostatiche!

Sfilare la spina dalla rete prima di aprire!

Perno solo per il collegamento del conduttore di protezione PE!

Solo per il collegamento di un conduttore schermato!

A.1.7 Nederlands

Veiligheidsrichtlijnen in deze gebruiksaanwijzing

Deze symbolen worden in deze gebruiksaanwijzing onder de volgende voorwaarden gebruikt.

ATTENTIE

Dit symbool wordt gebruikt, als de aandacht op een **gevaarlijke elektrische spanning** gevestigd moet worden. Wordt deze aanwijzing niet precies gevolgd of zelfs genegeerd, dan is **lichamelijk letsel** niet uitgesloten.

ATTENTIE

Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan personen** kan worden berokkend.

LET OP

Dit symbool wordt gebruikt wanneer door onnauwkeurige of niet-naleving van aanwijzingen **schade aan toestellen of bestanden** kan worden berokkend.

Dir symbool wordt gebruikt wanneer wij u op iets bijzonders willen attent maken.

ATTENTIE

0.1

Gevaar voor lichamelijk letsel en materiële schade!
Test elk nieuw programma voor u een installatie opstart!

LET OP

0.2

Gevaar voor de module!
Als de besturing ingeschakeld is, de module niet insteken of uittrekken! De module kan hierdoor kapot gaan. De module van het netdeel van de besturing, de externe spanningstoevoer en de signaalspanning uitschakelen of aftrekken en pas dan de module insteken of uittrekken.

LET OP

0.3

Gevaar voor de module!
In de omgang met de module alle voorschriften m.b.t. de ESD-beveiliging in acht nemen! Elektrostatische ontladingen vermijden!

LET OP

5.1

Programmas, die niet met JA in de FLASH – EPROM opgeslagen worden, staan na het uitschakelen van de voedingsspanning niet meer ter beschikking.

LET OP

9.1

De desbetreffende gegevens in de FLASH – EPROM worden daarbij volledig gewist. Alle belangrijke gegevens moeten daarom op een externe informatiedrager tussentijds opgeslagen en na een verrichte initialisering in de CC10 teruggeladen worden.

LET OP

19.1

Gedeeltelijke programmas, die niet in de FLASH opgeslagen werden, kunnen bij uitvallen van de spanning verloren gaan.

LET OP

19.2

Gedeeltelijke programmas die niet in de FLASH opgeslagen werden, kunnen bij uitvallen van de spanning verloren gaan. Bij de tot nu toe gebruikelijke CC10 was een gedeeltelijk programma, dat afgewerkt kon worden, automatisch (in de EEPROM) opgeslagen.

LET OP

19.3

Na de uitvoer van het programmeercommando voor de machineparameters geschiedt automatisch een opstarten van de NC (OPNIEUW STARTEN).

Veiligheidsaanwijzingen bij de besturingscomponenten

Aan de besturingscomponenten zelf kunnen de volgende waarschuwingen en richtlijnen aangebracht zijn. Zij zijn bedoeld om u op bepaalde zaken te attenderen:

Waarschuwing voor gevaarlijke elektrische spanning.

Waarschuwing voor gevaar veroorzaakt door akku's.

Elektrostatisch gevoelige componenten.

Trek de stekker uit alvorens te openen.

Bouten alleen voor aansluiting van de veiligheidsaarding PE.

Alleen voor aansluiting van een afgeschermde kabel.

A.1.8 Português

Instruções de segurança contidas nas presentes instruções de serviço

Estes símbolos são utilizados nas presentes instruções de serviço nos seguintes casos:


CUIDADO

Este símbolo é utilizado para indicar uma **tensão eléctrica perigosa**. Em caso de não observância ou observância incorrecta desta instrução, existe **perigo de ferimento de pessoas**.


CUIDADO

Este símbolo é utilizado quando existe o **perigo de ferimento de pessoas** por observância incorrecta ou não observância das instruções.


ATENÇÃO

Este símbolo é utilizado quando existe o perigo de danificação de aparelhos ou ficheiros por observância incorrecta ou não observância das instruções.

Este símbolo é utlizado para chamar a atenção para algo de especial.


CUIDADO

0.1

Perigos de ferimentos de pessoas e de danos materiais!

Antes de colocar uma instalação em funcionamento há que experimentar sempre qualquer programa novo!


ATENÇÃO

0.2

Perigo para o módulo!

Não retire ou introduza o módulo quando o comando estiver ligado! O módulo poderá ser danificado. Primeiro desligue ou retire o módulo de alimentação do comando, o cabo alimentador da rede e a tensão de sinal, e em seguida, poderá introduzir ou retirar o módulo!


ATENÇÃO

0.3

Perigo para o módulo!

Na utilização do módulo, respeitar todas as prescrições para a protecção do ESD! Evitar descargas electrostáticas!


ATENÇÃO

5.1

Programas que não estão memorizados na FLASH−EPROM com «SIM», não se encontram mais disponíveis após a máquina ter sido desligada da tensão de alimentação.


ATENÇÃO

9.1

Os dados armazenados na FLASH−EPROM são completamente apagados. Por esta razão, é necessário armazenar todos os dados importantes num meio de memória externo e voltar a carregá−los na CC 10 após a inicialização com sucesso.


ATENÇÃO

19.1

Programas para peças que não foram armazenados na FLASH, podem perder−se caso ocorra uma falha de tensão.

ATENÇÃO

19.2

Programas para peças que não foram armazenados na FLASH, podem perder–se caso ocorra uma falha de tensão. Nas versões da CC10 anteriores, os programas para peças que podiam ser trabalhados, eram automaticamente armazenados na EEPROM.

ATENÇÃO

19.3

Após o comando para a programação dos parâmetros da máquina ter sido dado, ocorre automaticamente um arranque do NC (NOVO ARRANQUE).

Instruções de segurança nos componentes de comando

Nos próprios componentes de comando podem estar afixados os avisos ou as instruções seguidamente descritos para chamar à atenção para determinados pontos.

Aviso referente a uma tensão eléctrica perigosa!

Aviso referente a perigos relacionados com baterias!

Módulos em perigo electrostático!

Antes de abrir tirar o cabo alimentador da rede!

Borne apenas para ligação do condutor de protecção à massa PE!

Só para ligação de um condutor blindado!

A.1.9 Suomi

Tämän käyttöohjeen turvallisuusohjeet

Näitä symboleja käytetään tässä käyttöohjeessa seuraavasti.


VAROITUS

Tätä symbolia käytetään, kun varoitetaan **vaarallisesta sähköjännitteestä**. Seurauksena voi olla **henkilövahinko**, jos ohjetta ei seurata tai sitä ei seurata tarkkaan.


VAROITUS

Tätä symbolia käytetään, jos ohjeiden noudattamatta jättäminen voi johtaa **henkilövahinkoihin**.


HUOMIO

Tätä symbolia käytetään, jos ohjeiden noudattamatta jättäminen tai niiden epätarkka seuraamihen voi johtaa **laitteiden tai tiedostojen vahingoittumiseen**.

Tätä symbolia käytetään, kun halutaan kiinnittää lukijan huomio johonkin erikoisseikkaan.


VAROITUS

0.1
Henkilö- ja tavaravahinkovaara!
Testaa jokainen uusi ohjelma, ennen laitteiston käyttöönottoa!


HUOMIO

0.2
Rakenneosaryhmä voi vioittua!
Älä liitä tai irrota rakenneosaryhmää ohjauksen ollessa päällekytkettynä! Rakenneosaryhmä voi tuhoutua. Kytke ensin ohjauksen verkko-osarakenneryhmä, ulkoinen jännitteentulo ja signaalijännite pois päältä tai irrota ne ja liitä tai irrota rakenneosaryhmä vasta sitten!


HUOMIO

0.3
Rakenneosaryhmä voi vioittua!
Rakenneosaryhmän kanssa toimittaessa on kaikkia ESD-suojaan liittyviä toimenpiteitä noudatettava! Elektrostaattista latausta on vältettävä!


HUOMIO

5.1
Ohjelmat, joita ei varmisteta käskyllä ”KYLLÄ” FLASH−EPROMiin, eivät ole enää käytettävissä huoltojännitteen katkaisemisen jälkeen.


HUOMIO

9.1
FLASH−EPROMin tiedot tyhjäytyvät kokonaan. Sen vuoksi kaikki tärkeät tiedot on välitallennettava ulkopuoliselle tietovälinneelle ja ladattava takaisin menestyksekkään alustuksen jälkeen CC 10:een.


HUOMIO

19.1
Osaohjelmat, joita ei ole varmistettu FLASH:iin, voivat mennä hukkaan jännitteen katketessa.

HUOMIO

19.2
Osaohjelmat, joita ei ole varmistettu FLASH:iin, voivat mennä hukkaan jännitteen katketessa.
Tähänastisessa CC10:ssä osaohjelma, joka voitiin poistaa, oli automaattisesti tallennettu (EEPROMiin).

HUOMIO

19.3Koneparametrien ohjelmointikäskyn ulosannon jälkeen tapahtuu automaattisesti NC:n ryntökäynti (KÄYNNISTYS UUDELLEEN):

Ohjauskomponenttien turvallisuusohjeet

Ohjauskomponentteihin voi olla merkittynä seuraavat varoitukset ja ohjeet, joiden tarkoitus on kiinnittää käyttäjän huomio tiettyihin seikkoihin:

Varoitus, vaarallinen sähköjännite!

Varoitus, akkujen aiheuttamat vaarat!

Sähköstaattisesti vaarannetut rakenneosat!

Vedä verkkopistoke irti pistorasiasta ennen avaamista!

Pultti vain suojajohtimen PE liitännälle!

Vain suojajohtimen litäntää varten!

A.1.10 Svenska

Säkerhetsanvisningar i denna driftsinstruktion

Dessa symboler används i denna driftsinstruktion för följande förutsättningar.

VARNING

Denna symbol används, vid varning för **farlig elektrisk späning**. Om denna anvisning inte exakt följs eller inte följs alls kan det medföra **personskador**.

VARNING

Denna symbol används, när **personer kan skadas** om anvisningar inte exakt följs eller inte följs alls.

OBSERVERA

Denna symbol används, när **apparater eller filer kan skada**s om anvisningar inte exakt följs eller inte följs alls.

Denna symbol används, när Ni skall göras uppmärksam på något särskilt.

VARNING

0.1

Fara för person- och sakskador!

Prova varje nytt programm innan Ni tar en anläggning i drift!

OBSERVERA

0.2

Fara för en komponentgrupp!

Stick inte in och drag inte heller ur en komponentgrupp när styrningen är tillkopplad! Komponentgruppen kan förstöras. Frånkoppla eller drag först ur styrningens nätdelskomponentgrupp, extern spänningsförsörjning och signalspänningen och stick in eller drag först därefter ut komponentgruppen!

OBSERVERA

0.3

Fara för en komponentgrupp!

Vid arbeten med komponentgruppen skall alla åtgärder för ESD-skydd innehållas! Statiska urladdningar skall undvikas!

OBSERVERA

5.1

Program, som inte kan säkras i FLASH–EPROM med ”JA” står efter frånkoppling av försörjningsspänningen inte längre till förfogande.

OBSERVERA

9.1

Respektive data i FLASH–EPROM raderas därvid fullständigt. Därför skall alla viktiga data mellanlagras i en extern volym och efter fullföljd initialisering laddas igen i CC10.

OBSERVERA

19.1

Delprogram, som inte sparats i FLASH, kan försvinna vid spänningsbortfall.

OBSERVERA

19.2

Delprogram, som inte sparats i FLASH, kan försvinna vid spänningsbortfall.
Vid tidigare CC10 lagrades ett delprogram, som kunde köras, automatiskt (i EEPROM).

OBSERVERA

19.3

När programmeringskommandot för maskinparametrarna har givits genomförs automatiskt en start av NC (NY START).

Säkerhetsanvisningar på styrningskomponenterna

På styrningskomponenterna kan följande varningar och anvisningar vara placerade, som vill göra Er uppmärksam på vissa saker:


Varning för farlig elektrisk spänning!


Varning för faror genom batterier!


Komponenter som kan skadas av elektrostatisk urladdning!


Drag ur kontakten innan öppning!


Bultar endast för anslutning av skyddsledaren PE!


Endast för anslutning av en avskärmningsledare!!

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