PC100

Operating Manual

Programming-Software for Compact-Encoder

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Printing

This manual was edited using text formatting software on a DOS personal computer. The text was printed in *Arial*.

Fonts

Italics and **bold** type are used for the title of a document or to emphasize text passages.

Passages written in `Courier` show text which is visible on the screen / display as well as software menu selections.

"< >" refers to keys on your computer keyboard (e.g. <RETURN>).

Note

Text following the "NOTE" symbol describes important features of the respective product.

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Revision History

Note:
The cover of this document shows the current revision status and the corresponding date. Since each individual page has its own revision status and date in the footer, there may be different revision statuses within the document.

Document created: 16.10.1996

Revision	Date
New: chapter 6, examples Article numbers are given Modification: chapter "Installation on hard disk"	03.03.1999
Implementation of the disk 490-00401 on 490-00404	27.09.2001

Table of contents

1 Hardware and software required

- An IBM or 100 % compatible Personal Computer with at least 512 K byte memory.
- A 3½" floppy disk drive.
- A monochrome or colour monitor with a video adapter which can represent at least 80 columns and 25 lines in the text mode
- DOS 3.1 or newer DOS version.
- ***Note:*** The software only operates under DOS
- PC100-Adapter (Art.-No. 490-00301)
- PC100-disk (art. no. 490-00404) + operating manual in English (document no. TR-E-BA-GB-0007)
- Mouse with Microsoft or compatible driver (alternatively).
- Printer with parallel interface (alternatively).

Contents of the PC100 tool:

- One 3½" disk (1,4 MByte)
- Operating Manual PC100 (English)

Warning!

First of all, you should create a copy of the original diskette and store the original diskette at a safe place.

2 Installation and program call

2.1 Creation of backup copy

We suppose that the operating system DOS is already installed on your hard disk.

1. Switch on your computer.
2. After the prompt C:> has appeared, enter the following:
   diskcopy a: a: RETURN
3. After the prompt has appeared, insert the original diskette into disk drive A and confirm with any key.
4. After the prompt has appeared, insert a blank (3½") diskette into disk drive A and confirm with any key.

2.2 Installation on hard disk

We suppose that the operating system DOS is already installed on your hard disk.

1. Switch on your computer.
2. Insert the program diskette in drive A.
3. Create the sub directory pc100 on drive C:
   md pc100 *<RETURN>*
4. Change to the sub directory pc100 with ***cd pc100*** *<RETURN>*
5. The files are extracted into the pc100 directory:
   a:_PC100 *<RETURN*

2.3 Program call

We suppose that the connection between the encoder and one of the serial PC interfaces has been realized correctly.

1. Switch on your computer.
2. After the prompt C:> has appeared, enter the following:
   cd pc100 <RETURN>
   pc100 <RETURN>

2.4 Program call with parameters

Enter the following: *pc100 -h <RETURN>*
A list of all possible command-line parameters is displayed:

	PC100-call:
pc100	Standard program call
pc100 -h	This text is given
pc100 -nr	In the menu option "Download File to Encoder" you can enter a new serial number
pc100 file/axis	Load data from file/axis and send it to the encoder
pc100 -gb	English
pc100 -f	French
pc100 -i	Italian
pc100 -s	Swedish
pc100 -sf	Finnish
pc100 -e	Spanish
pc100 -dk	Danish
pc100 -b	Belgian
pc100 -n	Norwegian
pc100 -nl	Dutch

If a wrong parameter or the parameter "-h" is given, this help text appears. Afterwards the program must be called up again.

The parameter "-nr" is only needed if the encoder has a wrong serial number. The serial number is displayed in the menu option "upload file from encoder". It should correspond to the number on the type plate of the encoder.

The parameter "file/axis" causes the given axis number to be loaded from the file and to be downloaded to the encoder immediately. The program is ended automatically according to successful carrying out. If an error occurs, a message is output and the program must be ended with the ESC-key.

The parameters "-gb","-f","-i","-s","-sf","-e","-dk","-b","-n" and "-nl" determine the language of the output program texts. If none of these parameters is given, the program texts appear in German.

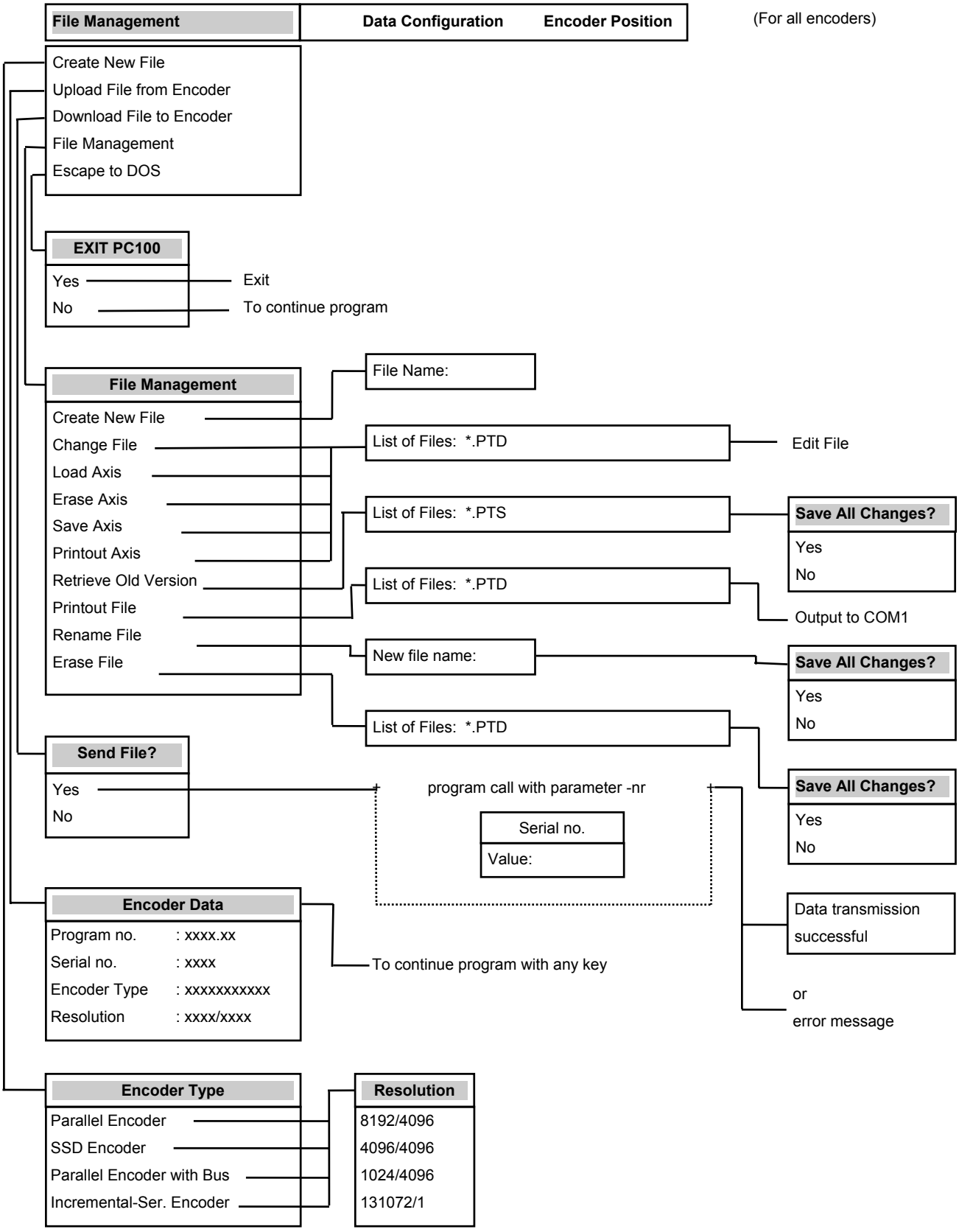
The parameters "-s", "file/axis" and "language" may also be combined.

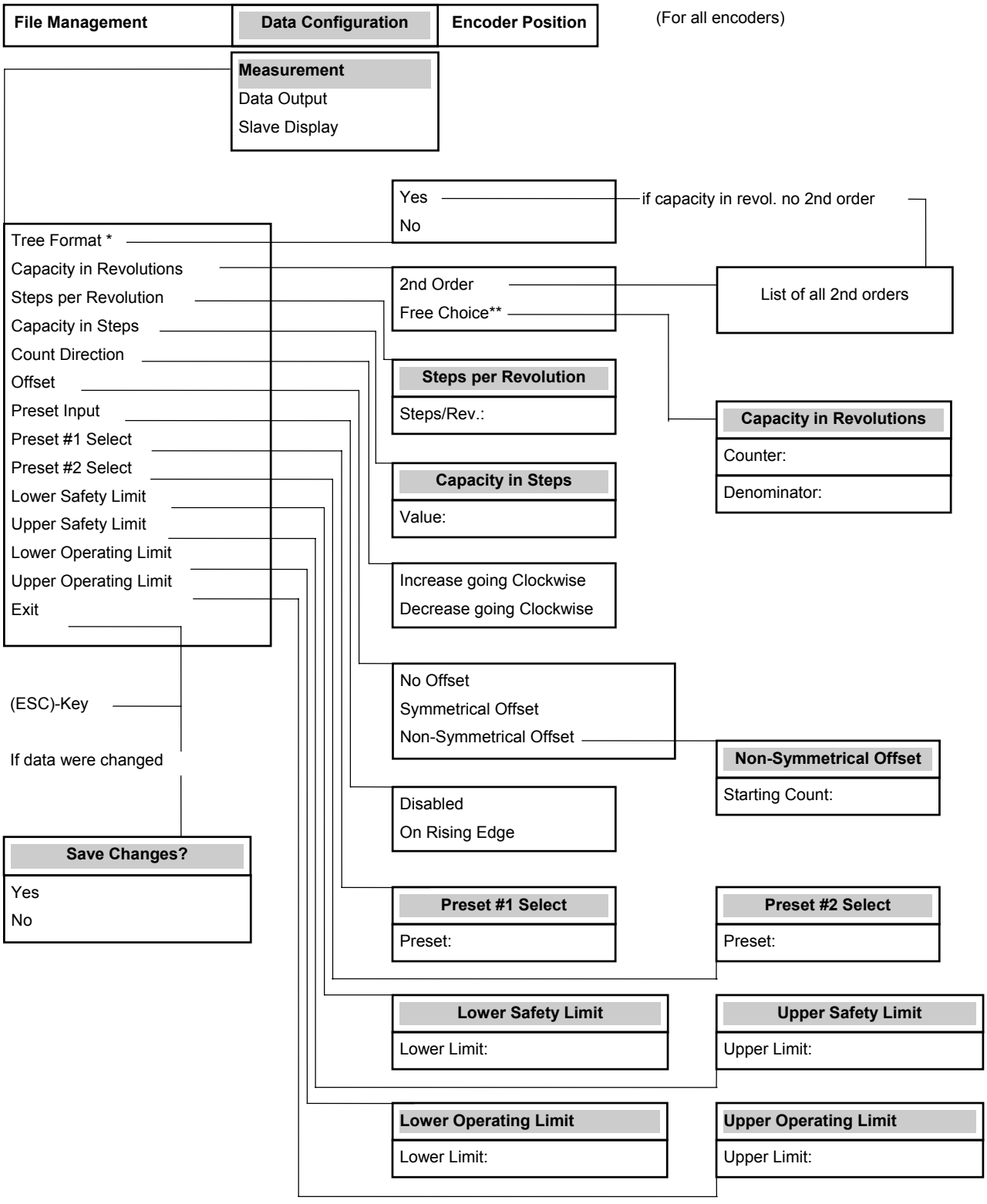
2.5 README.TXT file

The file README.TXT is on this diskette. It contains supplementary information, possible corrections of this brief instruction and a list of all files with a brief description of their intended purpose.

With the DOS command " TYPE README.TXT" the content is output on the display (output page by page with "TYPE README.TXT | MORE"). An output on the printer is carried out with "TYPE README.TXT > PRN". Please take closer information about the DOS commands from your DOS manual.

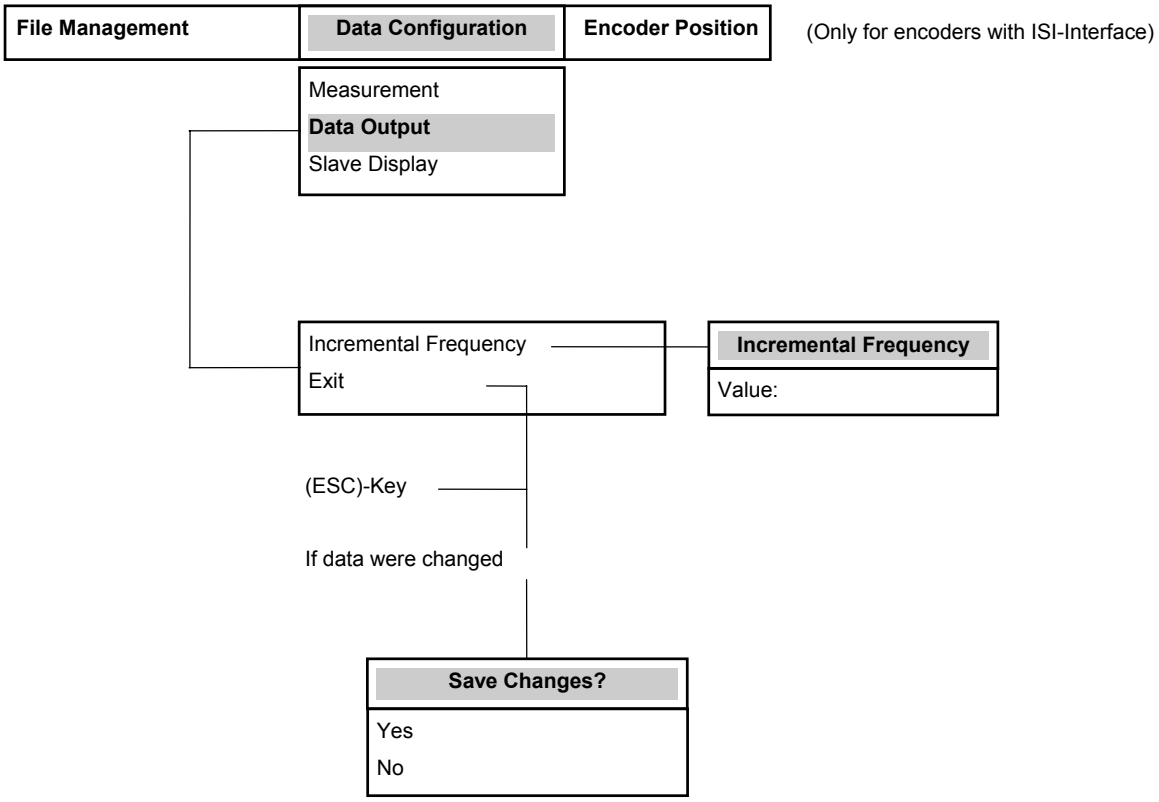
3 Structure of the menu

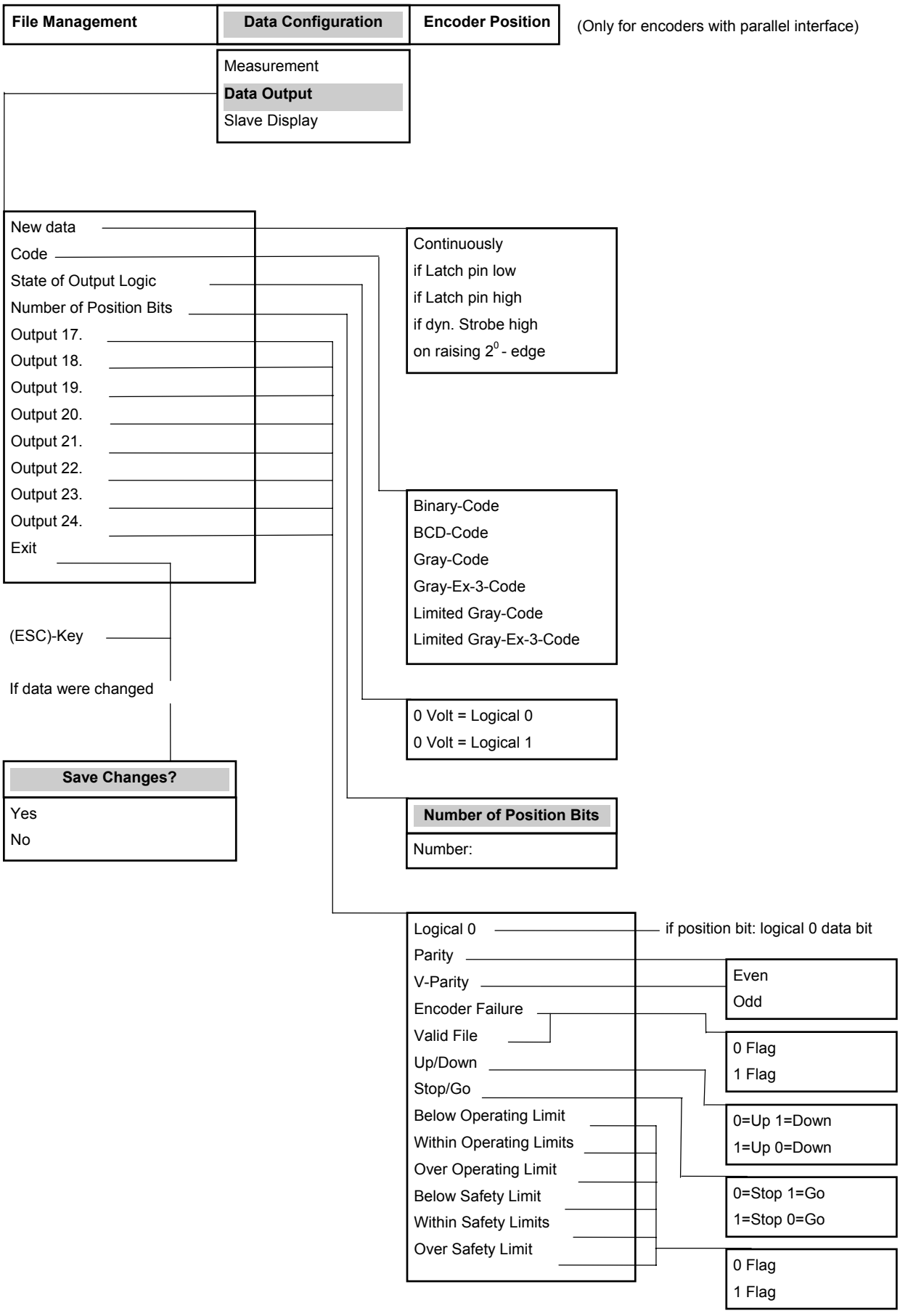


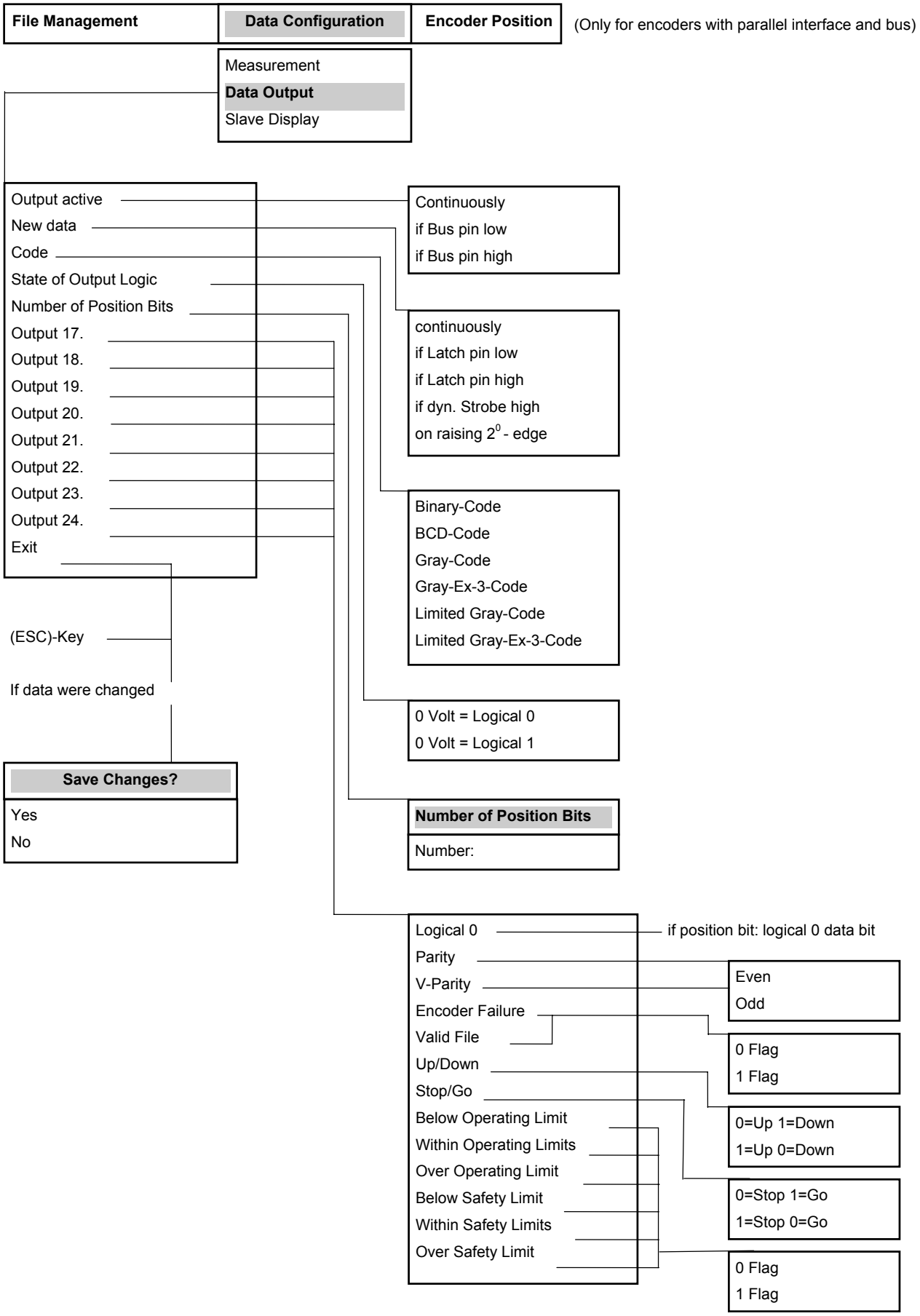


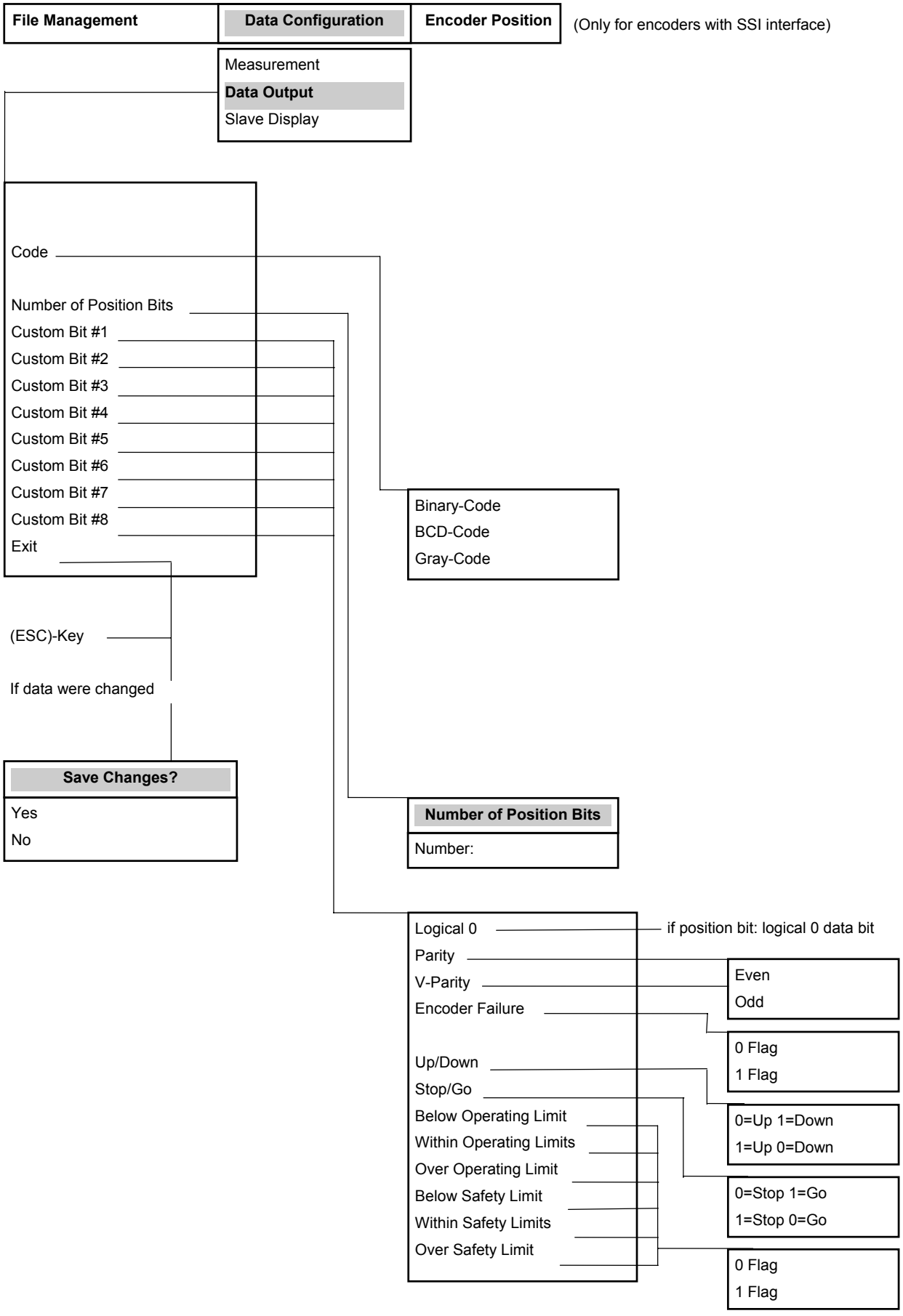
* SSI encoder only

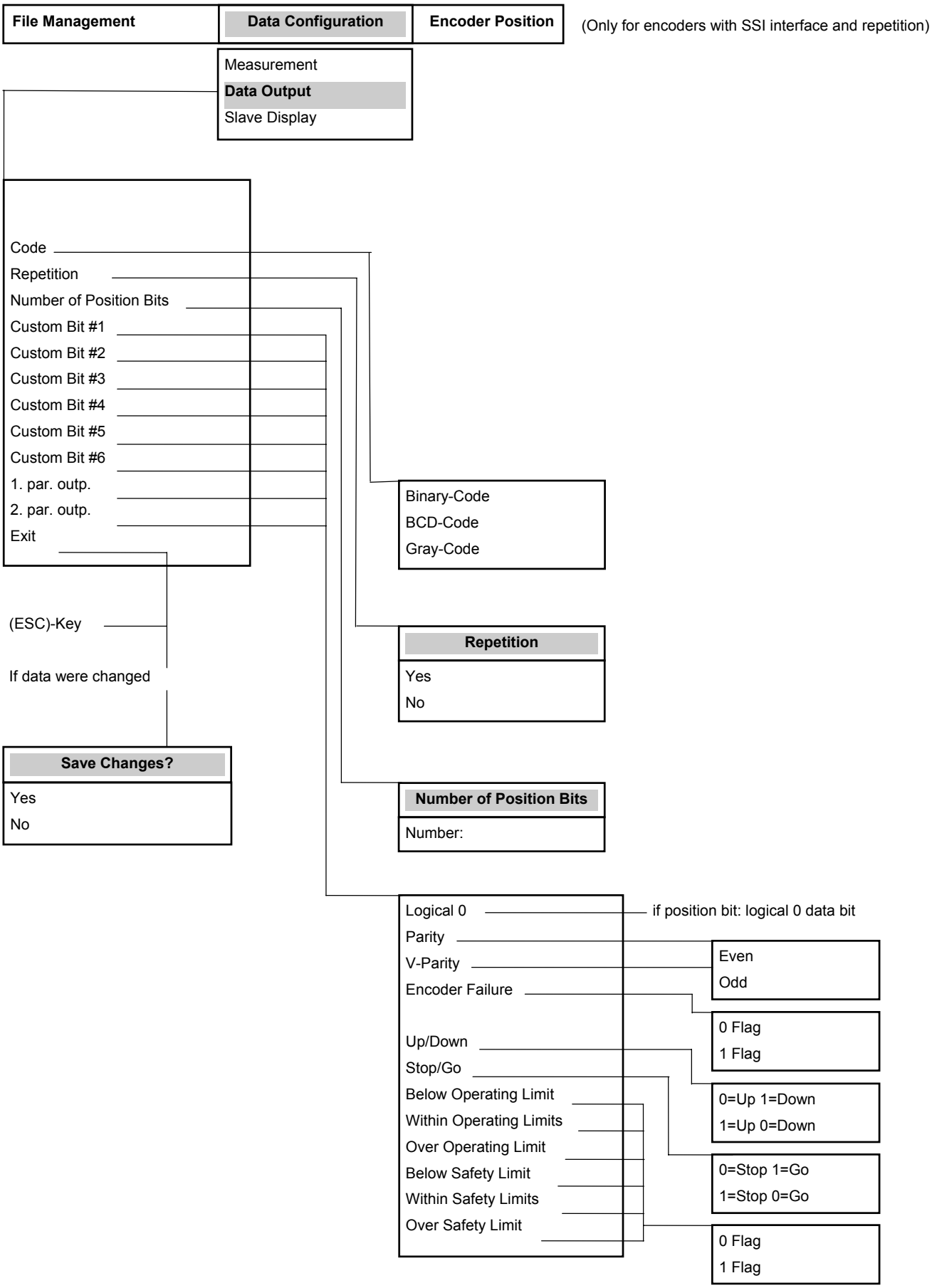
** SSI encoder only and if tree format is "No"

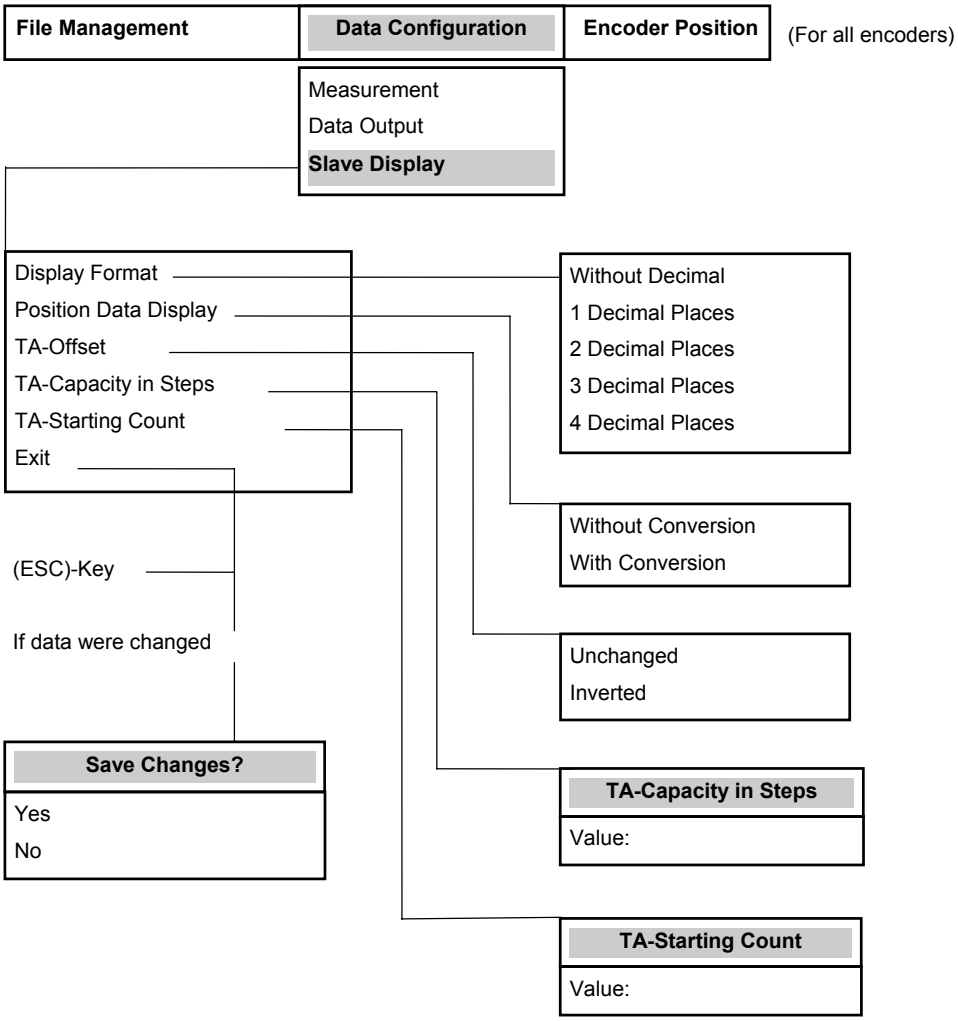

File Management
Data Configuration
Encoder Position
(Only for encoders with ISI-Interface)
Measurement
Data Output
Slave Display
Incremental Frequency
Exit
Incremental Frequency
Value:
(ESC)-Key
If data were changed
Save Changes?
Yes
No

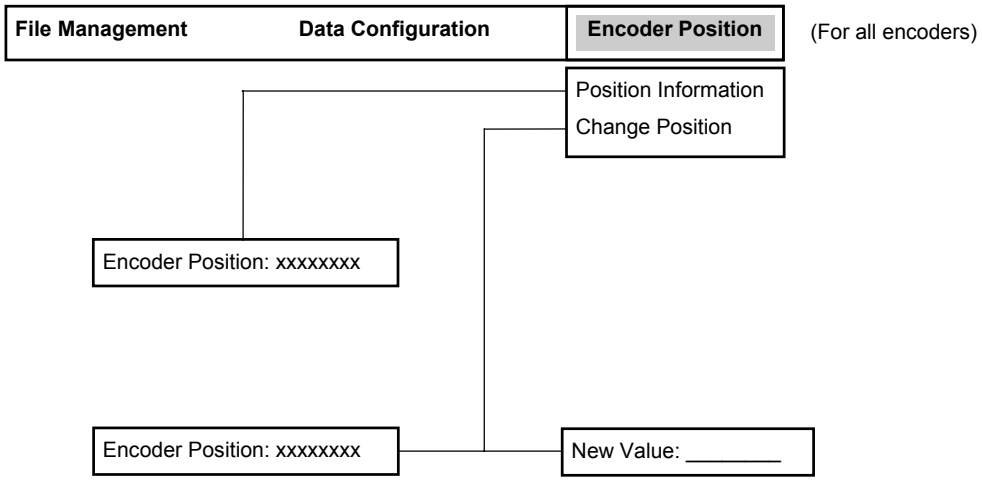

File Management
Data Configuration
Encoder Position
(Only for encoders with parallel interface)
Measurement
Data Output
Slave Display
New data
Code
State of Output Logic
Number of Position Bits
Output 17.
Output 18.
Output 19.
Output 20.
Output 21.
Output 22.
Output 23.
Output 24.
Exit
Continuously
if Latch pin low
if Latch pin high
if dyn. Strobe high
on raising 2^0 - edge
Binary-Code
BCD-Code
Gray-Code
Gray-Ex-3-Code
Limited Gray-Code
Limited Gray-Ex-3-Code
0 Volt = Logical 0
0 Volt = Logical 1
(ESC)-Key
If data were changed
Save Changes?
Yes
No
Number of Position Bits
Number:
Logical 0
Parity
V-Parity
Encoder Failure
Valid File
Up/Down
Stop/Go
Below Operating Limit
Within Operating Limits
Over Operating Limit
Below Safety Limit
Within Safety Limits
Over Safety Limit
if position bit: logical 0 data bit
Even
Odd
0 Flag
1 Flag
0=Up 1=Down
1=Up 0=Down
0=Stop 1=Go
1=Stop 0=Go
0 Flag
1 Flag


File Management
Data Configuration
Encoder Position
(Only for encoders with parallel interface and bus)
Measurement
Data Output
Slave Display
Output active
New data
Code
State of Output Logic
Number of Position Bits
Output 17.
Output 18.
Output 19.
Output 20.
Output 21.
Output 22.
Output 23.
Output 24.
Exit
(ESC)-Key
If data were changed
Save Changes?
Yes
No
Continuously
if Bus pin low
if Bus pin high
continuously
if Latch pin low
if Latch pin high
if dyn. Strobe high
on raising 2^0 - edge
Binary-Code
BCD-Code
Gray-Code
Gray-Ex-3-Code
Limited Gray-Code
Limited Gray-Ex-3-Code
0 Volt = Logical 0
0 Volt = Logical 1
Number of Position Bits
Number:
Logical 0
Parity
V-Parity
Encoder Failure
Valid File
Up/Down
Stop/Go
Below Operating Limit
Within Operating Limits
Over Operating Limit
Below Safety Limit
Within Safety Limits
Over Safety Limit
if position bit: logical 0 data bit
Even
Odd
0 Flag
1 Flag
0=Up 1=Down
1=Up 0=Down
0=Stop 1=Go
1=Stop 0=Go
0 Flag
1 Flag


File Management
Data Configuration
Encoder Position
(Only for encoders with SSI interface)
Measurement
Data Output
Slave Display
Code
Number of Position Bits
Custom Bit #1
Custom Bit #2
Custom Bit #3
Custom Bit #4
Custom Bit #5
Custom Bit #6
Custom Bit #7
Custom Bit #8
Exit
Binary-Code
BCD-Code
Gray-Code
(ESC)-Key
If data were changed
Save Changes?
Yes
No
Number of Position Bits
Number:
Logical 0
if position bit: logical 0 data bit
Parity
V-Parity
Even
Odd
Encoder Failure
0 Flag
1 Flag
Up/Down
Stop/Go
0=Up 1=Down
1=Up 0=Down
Below Operating Limit
Within Operating Limits
Over Operating Limit
Below Safety Limit
Within Safety Limits
Over Safety Limit
0=Stop 1=Go
1=Stop 0=Go
0 Flag
1 Flag


File Management
Data Configuration
Encoder Position
(Only for encoders with SSI interface and repetition)
Measurement
Data Output
Slave Display
Code
Repetition
Number of Position Bits
Custom Bit #1
Custom Bit #2
Custom Bit #3
Custom Bit #4
Custom Bit #5
Custom Bit #6
1. par. outp.
2. par. outp.
Exit
Binary-Code
BCD-Code
Gray-Code
(ESC)-Key
If data were changed
Repetition
Yes
No
Save Changes?
Yes
No
Number of Position Bits
Number:
Logical 0
if position bit: logical 0 data bit
Parity
V-Parity
Encoder Failure
Even
Odd
0 Flag
1 Flag
Up/Down
Stop/Go
Below Operating Limit
Within Operating Limits
Over Operating Limit
Below Safety Limit
Within Safety Limits
Over Safety Limit
0=Up 1=Down
1=Up 0=Down
0=Stop 1=Go
1=Stop 0=Go
0 Flag
1 Flag


File Management
Data Configuration
Encoder Position
(For all encoders)
Measurement
Data Output
Slave Display
Display Format
Position Data Display
TA-Offset
TA-Capacity in Steps
TA-Starting Count
Exit
(ESC)-Key
If data were changed
Save Changes?
Yes
No
Without Decimal
1 Decimal Places
2 Decimal Places
3 Decimal Places
4 Decimal Places
Without Conversion
With Conversion
Unchanged
Inverted
TA-Capacity in Steps
Value:
TA-Starting Count
Value:


File Management
Data Configuration
Encoder Position
(For all encoders)
Position Information
Change Position
Encoder Position: xxxxxxxx
Encoder Position: xxxxxxxx
New Value: _____

4 Meaning of the functions in the sub-menu "File Management"

4.1 Create new file

Before you can save the parameters of the encoder, you have to create a new file. The name may consist of 8 or less characters.

4.2 Change file, load / erase / save and printout axis

At first, the file header is displayed. Here it is possible to modify the text.

Functions:	Key (s)	
	<Ctrl>+<PgDn>	revise top
	<PgUp> / <PgDn>	previous / next axis
	<L>	load axis
	<D>	destroy axis
	<S>	save axis
	<P>	printout axis on LPT1
	<Esc>	end

If modifications are carried out, a polling "Save Yes/No" follows.

4.3 Retrieve old version

Restores the backup-file *.PTS to an actual file.

4.4 Printout file

Use this selection to print a *.PTD file on LPT1. The file header and each axis are printed on separate sheets. Printer control sequences can be entered in the DOS-area (if the printer accepts them).

Example: Type (DOS-command or AUTOEXEC.BAT file):
SET PC100INIT=27,77,27,108,15

Meaning: 27,77 (ESC M) ELITE-script (12 characters per inch).
27,108,15 (ESC I n) Sets the left margin on position 15.

Note:
Printer problems (HP-Laserjet / HP-Deskjet)
Type: SET PC100INIT=27, 38, 107, 50, 71, 49

4.5 Rename file

Use this selection to change the *.PTD file name.

4.6 Erase file

Use this selection to delete a *.PTD file from the disk.

5 Meaning of the encoder parameters

5.1 Tree format

To transmit synchronous serial data with a certain structure, there is the possibility to use the tree format. The data configuration (as well as the number of revolutions and steps per revolution) is determined when programming the encoder. If the encoder has less than 12 bits (4096) of revolutions, zeros will precede the data. If it has fewer than 12 bits (4096) steps per revolution, the zeros will follow the data.

5.2 Capacity in revolutions

Number of revolutions.
This value can never be greater than the physical capacity of the encoder (normally 4096).

5.3 Steps per revolution

Number of steps per revolution.
This value can never be greater than the physical capacity of the encoder (normally 4096).

5.4 Capacity in steps

Output capacity of the encoder.
Here you can program the desired max. number of steps. This value can never be greater than the physical capacity of the encoder. This value is defined by "Steps per Revolution" multiplied by "Capacity in Revolutions". You can optionally define these two values.

5.5 Count direction

In addition to the partly available hardware change-over the count direction can be changed for all shaft-encoders by programming the encoder.

- clockwise with view to the flange and the shaft
- counter clockwise with view to the flange and the shaft

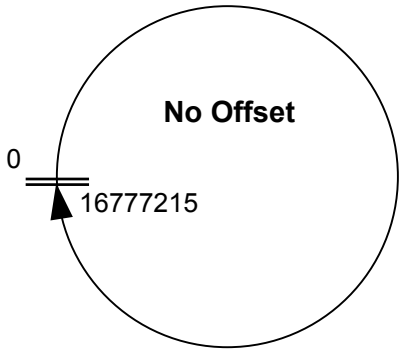
5.6 Offset

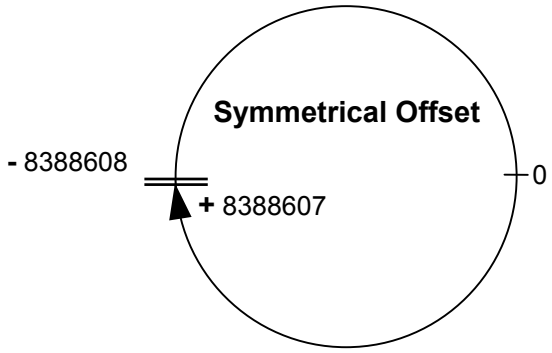
Start of the counting can be shifted optional:

-	No	no offset
-	Symmetrical with sign	symmetrical offset
-	Free	Offset with free value possible.

If only positive data are to be output by the encoder, starting with zero, "no offset" has to be programmed. After an overflow the encoder starts again with zero.
"Symmetrical offset" is a special case of "Free offset". The programmable gear is divided by two and arranged at the right and left of the central line. After a positive overflow counting continuous in the negative range and vice versa.
If the programmable gear must be asymmetrical in the maximum possible range, "Free offset" is set. The origin can be defined at any point in the area.

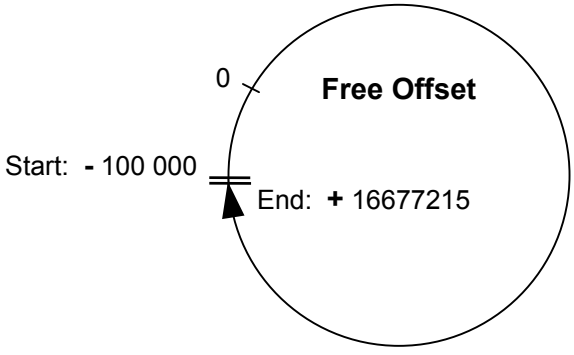
Examples (measuring length = 16777216 [24 bit])





min. value = measuring length / 2

max. value = (measuring length / 2) - 1



Offset = |100 000|

5.7 Preset input 1/2

The preset inputs may be used to force the encoder to a pre-programmed position. This feature can be used for initial setup of the encoder (i.e. start position, mechanical zero position, etc.).

5.8 Lower safety limit

Position of the soft limit switch, lower safety limit.

5.9 Upper safety limit

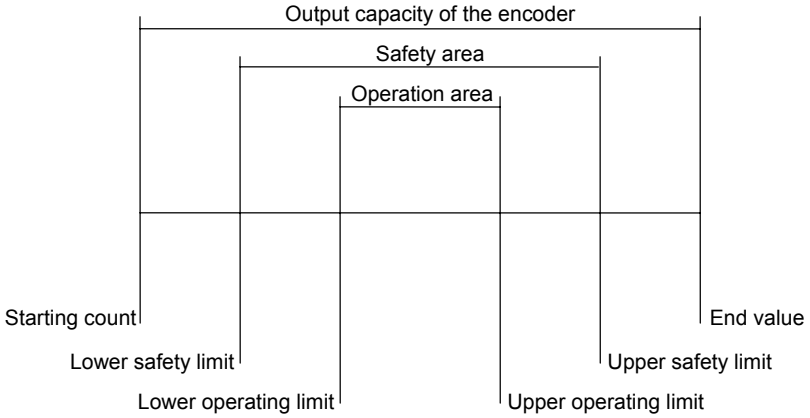
Position of the soft limit switch, upper safety limit.

5.10 Lower operating limit

Position of the soft limit switch, lower operating limit.

5.11 Upper operating limit

Position of the soft limit switch, upper operating limit.



5.12 Output active

The data interface can be activated permanently or dependent on the bus-input for **encoders with parallel interface** and the option "Bus compatible".

Select between:

- Always active — Data outputs are always active
- if Bus = low — Data are available when bus input is low
- if Bus = high — Data are available when bus input is high

5.13 New data

Select between:

- Continuously — Data are continuously active
- Latch = low — Data "frozen in ", when Latch input is low
- Latch = high — Data "frozen in ", when Latch input is high
- Dyn. Strobe — The encoder sends a strobe signal
- LSB-edge (2^0 edge) — Data are valid by the edges of the LSB

5.14 Code

Select between:

- Binary
- BCD
- Gray
- Shifted Gray
- Gray-3-Excess
- Shifted Gray-3-Excess

Note:
Dependent on the encoder type only a part of the mentioned possibilities appears.

5.15 Repetition

If SSI with repetition is selected, the SSI data are repeated after 26 clock pulses.
A break of more than 25 µs interrupts the repetition mode. Actual data are transmitted with the next request which then can be repeated as well.

If SSI without repetition is selected, zero bits are output after the last data bit (special bit).

5.16 State of output logic

For certain applications an inverted output of the data can be necessary. This is called negative or positive logic. Whether the encoder outputs the data accordingly is defined with this selection.

Select between:

- 0V == LOW — high-active switching logic
- 0V == HIGH — low-active switching logic

5.17 Number of position bits

Position bits are digitized angular positions or distances which are available at the outputs as code word. 16 outputs are usually assigned for position data. The minimum number of data bits further depends on the Steps / length and the code used and may change.

5.18 Output 17. to 24. or custom bit 1. to 8. respectively (SSI-data transfer)

Select between:

"Data bit": Bit is a data bit
"1=neg. sign": signalizes that a negative value is concerned
"Logical 0": The bit is always zero
"Even Parity": even parity for all data previously transmitted
"Odd Parity": odd parity for all data previously transmitted
"Even V-Parity": even parity connected with the encoder monitoring
"Odd V-Parity": odd parity connected with the encoder monitoring
"0=Encoder Failure": Error output as "0" from the encoder monitoring
"1= Encoder Failure ": Error output as "1" from the encoder monitoring
"0=Up 1=Down": Recognize count direction.
"1=Up 0=Down": Recognize count direction
"0=Stop 1=Go": Standstill monitoring
"1=Stop 0=Go": Standstill monitoring
"0= Below Operating Limit": (soft limit switch).
"1= Below Operating Limit": (soft limit switch).
"0= Within Operating Limit": (soft limit switch).
"1= Within Operating Limit": (soft limit switch).
"0= Over Operating Limit": (soft limit switch).
"1= Over Operating Limit": (soft limit switch).
"0= Below Safety Limit": (soft limit switch).
"1= Below Safety Limit": (soft limit switch).
"0= Within Safety Limit": (soft limit switch).
"1= Within Safety Limit": (soft limit switch).
"0= Over Safety Limit": (soft limit switch).
"1= Over Safety Limit": (soft limit switch).

5.19 Display format

For an optimum adaptation of the display to the programmable gear the data can be output in decimal point presentation.

Select between:

- no decimal point
- 1 to 4 decimal points

5.20 Position data display

With the display the position data can be recalculated and displayed in another way than with the encoder. Set the parameter "Display Format" first.

5.21 TA-offset

Here the sign of the position data can be changed.

5.22 TA-capacity in steps

Output capacity of the Slave Display.

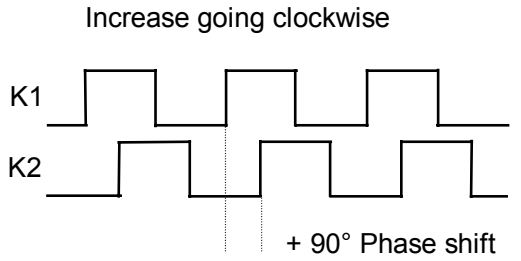
5.23 TA-starting count

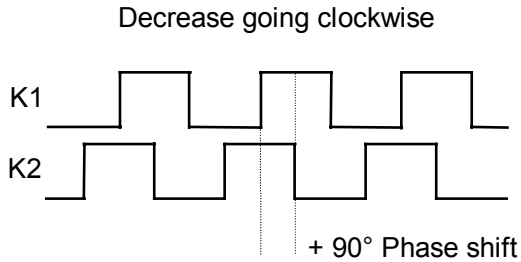
Here the number of steps for the offset-value can be entered.

5.24 Incremental frequency

Incremental serial interface for absolute encoders. Changes in position are transferred by means of two common incremental tracks. The sign of the 90° phase displacement indicates the direction of travel. However, it is not necessary to approach reference points.
Instead, the encoder's loading input is connected to the loading level. The encoder then no longer issues pulses, but switches on its loading output. The incremental counter can now be set to zero and the loading level disconnected from the loading input. The encoder then issues counter pulses until the incremental counter is counted up to the encoder position. When this position is reached, it disconnects its loading output again and is then ready for further loading operations.
Since during the loading operation the incremental encoder does not contain a valid position, the axis should not be positioned during that period. To suppress glitches stored in the incremental counter, you should repeat the loading operation at regular intervals, for example when the respective axis is idle.

Channel diagram





6 Examples for creating a file and saving or loading encoder data

The menu options have to be carried out in order.

6.1 Create file

1. Upload / save data
2. File management
3. Create new file
4. File name: (max. 8 characters)

Now a file is created; it doesn't contain any encoder data yet.

6.2 Save encoder data

We suppose that the desired encoder data is stored in the main memory of the pc by means of "Upload File from Encoder" or "Create New Data".

1. Upload / save data
2. File management
3. Save axis
4. A list with all created *.PTD* files appears. Select the desired file with the arrow keys and ENTER.
5. The file header appears next. Here you may enter note sentences and information into various text fields.
6. Press keys <Ctrl> + <PgDn>: empty text field
7. Key <S>: save axis
8. Axis number: (1 – 99)
9. Key <Esc>
10. Save modifications: YES
    Encoder data are stored in the file now.

6.3 Load encoder data

1. Upload / save data
2. File management
3. Load axis
4. A list with all created *.PTD* files appears. Select the desired file with the arrow keys and ENTER.
5. The file header appears next.
6. Press keys <Ctrl> + <PgDn>
   Encoder data is displayed in a field. If several encoder data records have been stored, select the desired data record with the keys <PgDn> and <PgUp>.
7. Key <L>: load axis
   The data are transferred from the file into the main memory of the pc.
8. <Esc>

Now the data can be transferred as often as you like (menu option "Download File to Encoder").

7 Pin assignments

PC adapter

Serial interface:

9 pole Sub-D connector PIN		25 pole Sub-D connector PIN
2	RxD	3
3	TxD	2
4	DTR	20
5	GND	7
7	RTS	4
9	RI	22

K-Module:

15 pole Sub-D connector

PIN	
1	PT-
2	PT+
14	Us 11-27 V DC (power supply)
15	GND

8 Wiring PC-100 encoder