KD-3500ZB

Wireless Area-Imaging Scanner

Configuration guide

bar code configuration

**TABLE OF CONTENTS**

1. INTRODUCTION

This menu book is intended for setting up your bar code reader to optimize its performance for your particular application. When the required options have been configured, they remain in the reader, even after power down. The reader can be returned to factory default by reading the default label.

Menu labels

The reader must be set by reading the bar code labels in the menu table. The layout of the table is explained in next figure 0.01.

Fig. 0.01. Menu labels
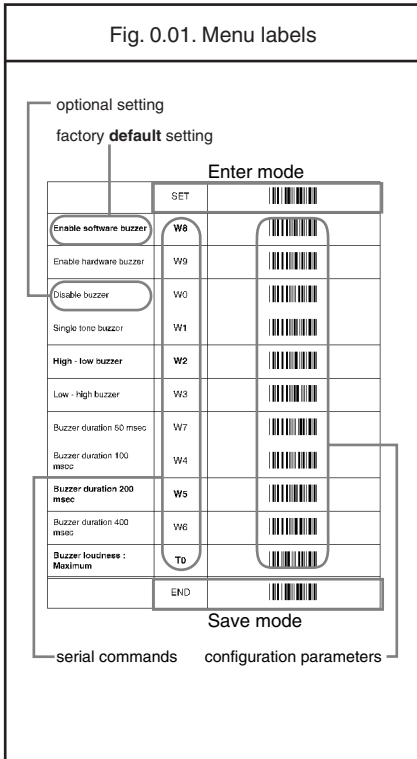
Besides options, some chapters have commands. The commands need to be scanned directly, without reading the "SET" and "END" labels. The commands are executed directly and, unlike options, are not stored in non volatile memory.

Configuring via the menu book
To configure the required options proceed as follows:
• scan the SET label
• scan the required option(s)
• scan the END label
After scanning the END label, the new settings are stored in non volatile memory.

Recommended steps to follow for quick configuration
After checking your connection you are ready to start the configuration of your reader.

• Check connection:
Ensure that the power is disconnected from your equipment before you connect the reader. After connecting the data cable, the power can be applied to the equipment and the reader.

• 1:
Use chapter 1 to set the correct default for your reader.
* The reader is now in factory default.

• 2:
Use chapter 2 to optimize the interface.
* The reader is now able to read bar codes and transmit the data.

• 3:
Use chapter 3 to optimize the reader for the type of bar codes you use. Set the readable codes first and then the options for each of these codes.
* The reader is now able to read the codes you selected, validate the data using length and check digit and transmit that part of the data you specified.

• 4:
Use chapter 4 to select the string options for your application. These include transmission of code length, conversion of upper and lower case and setting a prefix and suffix.
* The reader can now read and transmit the data in the required format.
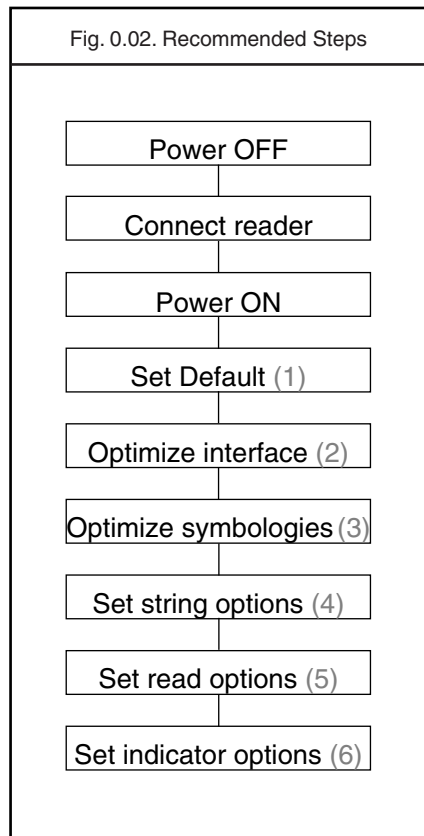
• 5:
Use chapter 5 to select the read options to your preference. These options affect the read mode, read time, trigger and redundancy.

• 6:
Use chapter 6 to select the indicator options you prefer. These options affect the operation of the buzzer and good read LED.
* The reader will now operate to your personal preference.

See figure 0.02.

Fig. 0.02. Recommended Steps

Power OFF

Connect reader

Power ON

Set Default (1)

Optimize interface (2)

Optimize symbologies (3)

Set string options (4)

Set read options (5)

Set indicator options (6)

2. DEFAULTS

This option allows you to undo all previously configured options and bring the reader's configuration back to factory default settings. These factory default settings are printed in bold.

Note that differences may occur depending on the type of interface as will be mentioned in the text.

Select only the correct default settings corresponding to your hardware "defaults" label.

The interfaces supported depend on the reader model and software release.
Please consult your sales office for not listed interfaces.

2. Defaults

USB-HID

3. CODE OPTIONS

The menu options in this chapter are intended to adjust the decoding settings of the reader:
- which bar code types can be read
- the permissible length of the bar codes to be read
- bar code specific options

Note:
The menubook categorizes the barcodes as groups of different symbologies with their translations and sometimes with relations to other family names. The next figure visualizes how code translations and relations are maintained in this Code options chapter. See figure 3.00.

Fig. 3.00. Code translations and relations		
Group	Symbology plus translations	Relations
UPC-A	UPC-A	
	UPC-A +2	
	UPC-A +5	
UPC-E	UPC-E	
	UPC-E +2	
	UPC-E +5	
EAN-13 and EAN-8	EAN-13	ISBN Bookland, ISSN, ISMN
	EAN-13 +2	
	EAN-13 +5	
	EAN-8	
	EAN-8 +2	
	EAN-8 +5	
Code 39 and It.Pharm.	Code 39	
	Code 39 Full ASCII	
	Tri-Optic	
	Italian Pharmaceutical	
Codabar	Codabar	NW7
	Codabar ABC	NW7 ABC
	Codabar CX	NW7 CX
2of5 and S-Code	Industrial 2of5	
	Interleaved 2of5	
	S-Code	
	Matrix 2of5	
	Chinese Post Matrix 20f5	Chinese Post
IATA		
MSI/Plessey		
Telepen		
UK/Plessey		
Code 128 and GS1-128	Code 128	
	GS1-128	(EAN-128 / UCC-128)
Code 93		
Code 11		
Korean Postal Authority code		
Intelligent Mail Barcode		
POSTNET		
GS1 Databar	GS1 Databar	(RSS-14)
	GS1 Databar Limited	(RSS Limited)
	GS1 Databar Expanded	(RSS Expanded)
Composite Codes	CC-A	
	CC-B	
	CC-C	
Codablock F		
DataMatrix		
Aztec	Aztec	
	Aztec Runes	
Chinese Sensible code		
QR code		
Micro QR Code		
Maxi Code		
PDF417		
MicroPDF417		

3.1. Setting of readable codes

These options do not affect the reading of the menu labels. The required bar code types can be selected by enabling a single readable code only and enabling readable codes.

It is strongly recommended to select only the required codes.
Advantages of selecting only the required codes are:
• faster reading
• no accidental scanning of unwanted bar codes
• reduced probability of reading errors which can not be prevented completely, because of the limited security of some bar code types

Some bar codes are translations or special variants of other bar code types. The table on the title page of this chapter visualizes these relations. The setting of different codes is explained in the next chapter 3.1.1. Enabling a single read. code.

3.1.1. Enabling a single read. code

With this option you can set the reader to read a single bar code type only. If you select 'Code 39 only', no other codes will be read.

Example 1:
If you want to read Code 39 only, you read the option 'Code 39 only'. See figure 3.01.

Fig. 3.01. Enabling a single readable code: Symbology only

Code 39

SET

Code 39 only

END
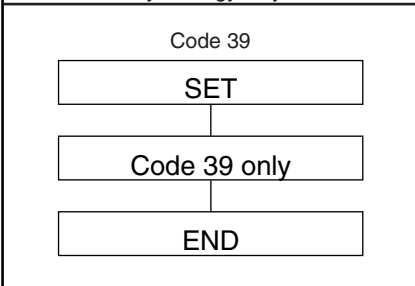
Example 2:
If you want to read one of the special bar codes that is a variation of the readable code, read the single read. code option followed by the dedicated variation option from the applicable symbology options chapter.
• EAN128 only: read the option 'Code 128 only' followed by 'Enable EAN-128 only' from the 'Options for Code 128'.
• Italian Pharmaceutical: read Enable Code 39 only, followed by the option 'Italian Pharmaceutical only' from the 'Options for Code 39'.
See figure 3.02.

Fig. 3.02. Enabling a single readable code: Special variations

GS1-128   Italian Pharmaceutical

SET	SET
Enabling a single read. code	Enabling a single read. code
Code 128 only	Code 39 only
Options for Code 128	Options for Code 39 and It. Pharm
GS1-128 only	It. Pharmaceutical only
END	END
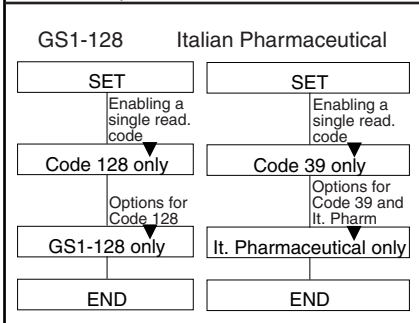
Example 3:
If you want to read a code that is changed to another family name, read the new name.
• RSS+14: read the option 'GS1 Databar'.
See figure 3.03.
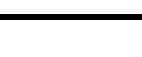
Fig. 3.03. Enabling a single readable code: New family name

RSS-14

SET

GS1 Databar only

END
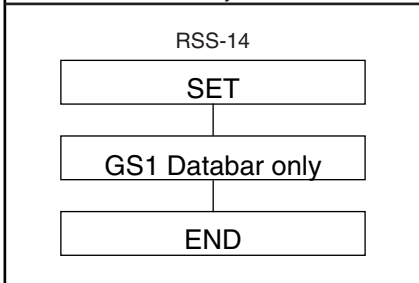
3.1.1. Enabling a single read. code

	SET	
All codes excl. add-on	A0	
Only all UPC and EAN codes	J0	
UPC only	J1	
UPC + 2 only	J2	
UPC + 5 only	J3	
EAN only	J4	
EAN + 2 only	J5	
EAN + 5 only	J6	
Code 39 only	A2	
Tri-Optic only	JD	
Codabar only	A3	
Industrial 2of5 only	J7	
Interleaved 2of5 only	J8	
	END	

3

Code options

	SET	
S-Code only	RA	
Matrix 2of5 only	AB	
Chinese Post Matrix 2of5 only	JE	
Korean Postal Authority code only	JL	
Intelligent Mail Barcode only	D5H	
POSTNET only	D6C	
IATA only	A4	
MSI/Plessey only	A7	
Telepen only	A9	
UK/Plessey only	A1	
Code 128 only	A6	
Code 93 only	A5	
Code 11 only	BLB	
	END	

	SET	||| |||| ||| |||
GS1 DataBar only	J9	||||| ||| ||| |||
GS1 DataBar Limited only	JJ	|||| |||| ||| |||
GS1 DataBar Expanded only	JK	|||| |||| || |||
Codablock F only	D4R	||||| ||| |||| || |||
DataMatrix ECC000 - 140 only	BG2	||||| ||| ||| |||
DataMatrix ECC200 only	BC0	||||| |||| |||| ||| |||
Aztec only	BC5	||||| |||| ||| ||||
Aztec runes only	BF4	||||| |||| ||| |||
Chinese Sensible code only	D4K	||||| ||| |||| || |||
QR Code only	BC1	||||| |||| ||| |||
Micro QR Code only	D38	||||| ||| |||| ||| |||
Maxicode only	BC2	||||| |||| ||| |||
PDF417 only	BC3	||||| |||| ||| ||||
	END	||||| |||| |||| |||

	SET	|||||| |||| ||| ||| |||
MicroPDF417 only	BC4	|||||| |||| ||| ||| |||
Enable all 1D codes only	BCA	|||||| |||| ||| ||| |||
Enable all 2D codes only	BCB	|||||| |||| ||| ||| |||
	END	|||| |||| ||| |||

3.1.2. Enabling of readable codes

With this option you can set the reader to read a number of bar code types or simply enable additional bar code types.
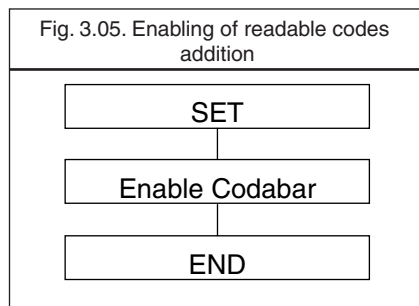
Example:
If you only want to read Code 39 and Code 128, you read 'Code 39 only' and 'enable Code 128'. Alternatively you can read 'Disable All', 'Enable Code 39' and 'Enable Code 128'. See figure 3.04.
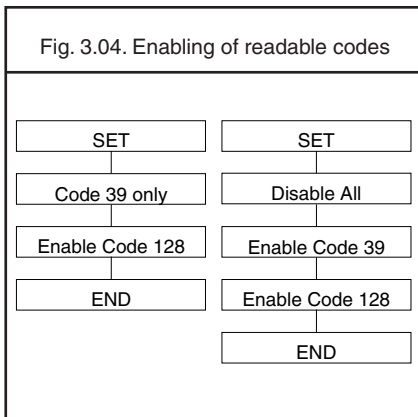
Example of addition:
If you want to enable Codabar in addition to what you already have configured, you read 'Enable Codabar'. See figure 3.05.

Fig. 3.05. Enabling of readable codes addition

SET

Enable Codabar

END

Fig. 3.04. Enabling of readable codes

SET	SET
Code 39 only	Disable All
Enable Code 128	Enable Code 39
END	Enable Code 128
	END

3.1.2. Enabling of readable codes

	SET	||||| |||| |||| |||
All codes excl. add-on	A0	||||| ||| ||| |||
Enable UPC	**R1**	||||| || ||| |||
Enable UPC + 2	R2	||||| ||| ||| |||
Enable UPC + 5	R3	||||| ||| |||| |||
Enable EAN	**R4**	||||| ||| ||| |||
Enable EAN + 2	R5	||||| || |||| |||
Enable EAN + 5	R6	||||| ||| ||| |||
Enable Code 39	**B2**	||||| ||| ||| |||
Enable Tri-Optic	**JZ**	||||| ||| |||| |||
Enable Codabar	**B3**	||||| |||| ||| |||
Enable Industrial 2of5	**R7**	||||| ||| ||| |||
Enable Interleaved 2of5	**R8**	||||| ||| ||| |||
Enable S-Code	**R9**	||||| ||| ||| |||
	END	||||| |||| |||| |||

	SET	
Enable Matrix 2of5	BB	
Enable Chinese Post Matrix 2of5	JS	
Enable Korean Postal Authority code	WH	
Enable Intelligent Mail Barcode	D5F	
Enable POSTNET	D6A	
Enable IATA	**B4**	
Enable MSI/Plessey	**B7**	
Enable Telepen	**B9**	
Enable UK/Plessey	**B1**	
Enable Code 128	**B6**	
Enable Code 93	**B5**	
Enable Code 11	BLC	
Enable GS1-Databar	JX	
	END	

	SET	||||| |||| |||| |||
Enable GS1-Databar Limited	JY	||||| ||| |||| |||
Enable GS1-Databar Expanded	DR	||||| ||||| || |||
Enable Codablock F	D4P	||||| ||| ||||| ||| ||
Enable DataMatrix ECC000 - 140	BG0	||||| ||| ||| ||| ||
Enable DataMatrix ECC200	**BCC**	||||| |||| |||| ||| ||
Enable Aztec	**BCH**	||||| |||| |||| || |||
Enable Aztec runes	BF2	||||| |||| |||| ||| |||
Enable Chinese Sensible code	D4L	||||| ||| ||||| || |||
Enable QR Code	**BCD**	||||| |||| ||||| ||| |||
Enable Micro QR Code	**D2U**	||||| ||| ||| ||| |||
Enable Maxicode	**BCE**	||||| |||| |||| ||| |||
Enable PDF417	**BCF**	||||| |||| |||| || |||
Enable MicroPDF417	**BCG**	||||| |||| |||| ||| |||
	END	||||| |||| ||||| |||

	SET	
Enable all 1D codes	BCM	
Enable all 2D codes	BCN	
Disable all	B0	
	END	

3.2. Setting of number of characters

If you are going to read bar codes of known length, it is recommended to set the reader for a fixed number of characters. This can be done for up to two lengths. The reader uses this to verify that labels read are of the correct length, rejecting any labels which do not have the specified length. The advantage of setting a fixed length, is that it provides protection against short scans of labels, such as Interleaved 2of5, which do not provide sufficient security against partial scan. The length checking is done on the label data and is not affected by options such as (not) transmit start/stop character or check digit. Setting the number of characters does not affect fixed length codes, such as EAN-13. 2D symbologies such as PDF417 and Data Matrix are also not affected by fixed length settings.

The following options are available:

Fixed length OFF all codes.
This option cancels the fixed length checking.

Fixed length ON all codes.
This option enables the fixed length checking. Two fixed lengths are programmed which will affect all variable length codes. This is done by reading the following labels:
<SET>
<Fixed length ON - all codes>
 a bar code with the required length,
a second bar code with the required length (this may be the same length as the first one)
<END>
See figure 3.06.

Fig. 3.06. Setting Fixed length ON all codes

SET

Fixed length ON

Scan a bar code with the required length

Scan a 2nd bar code with the required length

END
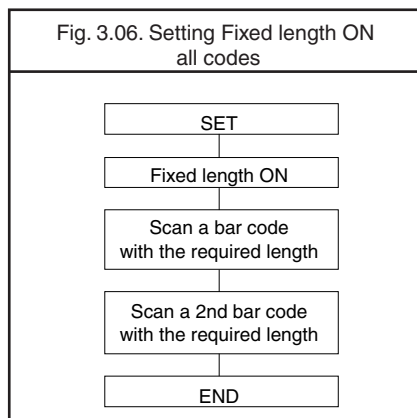
It is possible to configure a fixed length or a minimum and a maximum length for selected symbologies by reading the respective option followed by a barcode label with the required length. The different functions may be combined and will be used as follows:

• if a label is checked for fixed length, it will not be checked for minimum or maximum length
• if a label is not checked for fixed length it will be checked for both minimum and maximum length

By reading an option followed by the 'END' label, the function is disabled or the values for that option are reset to their default. The default values are:

• fixed: disabled, thus no fixed length checking
• minimum: according to the next figure (The minimum length of the 2of5 bar code types can not be changed independent.)
• maximum: disabled, thus no maximum length checking. (The maximum length is reader dependent)

See figure 3.07.

Fixed length ON for selected codes:
This option enables fixed length checking for different bar code types and will only affects the bar code types read. The number of fixed lengths which can be configured is reader dependent.

<SET>
<Fixed length ON for selected codes>
Scan bar codes of the required type and length
<END>

Example:
The 2 examples shown in the next figure have the following results: In the first example only Code 39 labels will be checked for a length of 6 characters. Any other bar code type will not be checked for fixed length. In the second example Code 39 labels will be checked for a length of 6 characters and Interleaved 2of5 labels for a length of 12 characters. This implies that also Industrial 2of5, Matrix 2of5 and S-Code are checked for a fixed length of 12 characters. Any other bar code type will not be checked for fixed length. See figure 3.08.

Fig. 3.07. Setting Minimum length table	
Code type:	Minimum length
Codabar	▶▶ 5
Code 11	▶▶ 1
Code 39	▶▶ 1
Code 93	▶▶ 1
Code 128	▶▶ 1
Industrial 2of5	▶▶ 5
Interleaved 2of5	▶▶ 6
IATA	▶▶ 5
Matrix 2of5	▶▶ 5
MSI/Plessey	▶▶ 3
UK/Plessey	▶▶ 2
GS1Databar-expanded	▶▶ 1
S-Code	▶▶ 5
Telepen	▶▶ 1

Fig. 3.08. Setting Fixed length ON selected codes

SET	SET
Fixed length ON for selected only	Fixed length ON for selected only
Scan a label, i.e. Code 39 with length = 6	Scan a label, i.e. Code 39 with length = 6
END	Scan a label, i.e. Interleaved 2of5 with length = 12
	END

Minimum length for selected codes:

This option modifies the default minimum length table. The number of minimum lengths which can be configured is reader dependent. This is done by reading the following labels:
<SET>
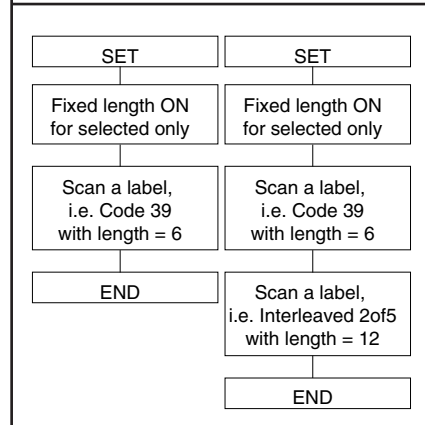<Minimum length for selected codes>
Scan bar codes of the required type and length
<END>

Example:

The two examples shown in the next figure have the following result: In the first example only Code 39 labels will be checked for a minimum length of 2 characters. All other bar code types will be checked for a minimum length as displayed in the next figure.
In the second example Code 39 labels will be checked for a minimum length of 2 characters and Interleaved 2of5 labels for a minimum length of 4 characters. This implies that also Industrial 2of5, Matrix 2of5 and S-Code are checked for a minimum length of 4 characters. All other bar code types will be checked for a minimum length as per figure 3.09.

Maximum length for selected codes:

This option enables the maximum length checking. The number of maximum lengths which can be configured is reader dependent. This is done by reading the following labels:
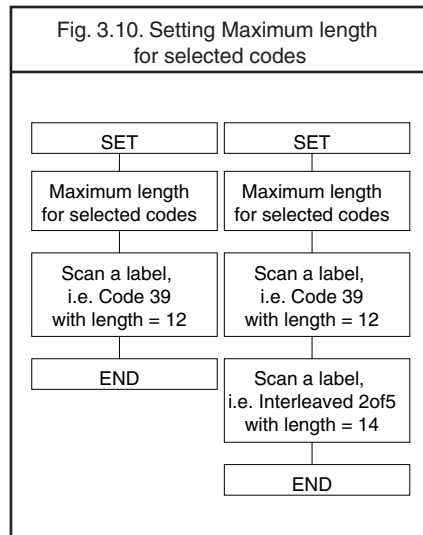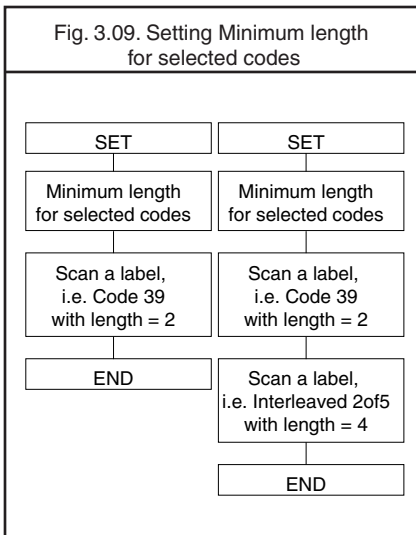<SET>
<Maximum length for selected codes>
Scan bar codes of the required type and length
<END>

Example:

The two following examples shown in the next figure have the following result: In the first example only Code 39 labels will be checked for a maximum length of 12 characters. Any other bar code types will not be checked for a maximum length. In the second example Code 39 labels will be checked for a maximum length of 12 characters and Interleaved 2of5 labels for a maximum length of 14 characters. This implies that also Industrial 2of5, Matrix 2of5 and S-Code are checked for a maximum length of 14 characters. Any other bar code types will not be checked for a maximum length. See figure 3.10.

```
┌─────────────────────────────────────────────┐
│         Fig. 3.09. Setting Minimum length    │
│               for selected codes             │
│                                              │
│   ┌──────────────┐    ┌──────────────┐       │
│   │     SET      │    │     SET      │       │
│   └──────────────┘    └──────────────┘       │
│   ┌──────────────┐    ┌──────────────┐       │
│   │Minimum length│    │Minimum length│       │
│   │for selected  │    │for selected  │       │
│   │codes         │    │codes         │       │
│   └──────────────┘    └──────────────┘       │
│   ┌──────────────┐    ┌──────────────┐       │
│   │Scan a label, │    │Scan a label, │       │
│   │i.e. Code 39  │    │i.e. Code 39  │       │
│   │with length=2 │    │with length=2 │       │
│   └──────────────┘    └──────────────┘       │
│   ┌──────────────┐    ┌──────────────┐       │
│   │     END      │    │Scan a label, │       │
│   └──────────────┘    │i.e. Interl.  │       │
│                       │2of5 length=4 │       │
│                       └──────────────┘       │
│                       ┌──────────────┐       │
│                       │     END      │       │
│                       └──────────────┘       │
└─────────────────────────────────────────────┘
```

Fig. 3.09. Setting Minimum length for selected codes

SET

Minimum length for selected codes

Scan a label, i.e. Code 39 with length = 2

END

SET

Minimum length for selected codes

Scan a label, i.e. Code 39 with length = 2

Scan a label, i.e. Interleaved 2of5 with length = 4

END

Fig. 3.10. Setting Maximum length for selected codes

SET

Maximum length for selected codes

Scan a label, i.e. Code 39 with length = 12

END

SET

Maximum length for selected codes

Scan a label, i.e. Code 39 with length = 12

Scan a label, i.e. Interleaved 2of5 with length = 14

END

3.2. Setting of number of characters

	SET	||||| ||| |||| |||
Fixed length OFF all codes	**H0**	||||| ||| ||| |||
Fixed length ON all codes	H1	||||| ||| ||| |||
Fixed length ON for selected codes	HK	||||| |||| || |||
Minimum length for selected codes	HL	||||| |||| || |||
Maximum length for selected codes	HM	||||| |||| || |||
	END	||||| |||| |||| |||

3

Code options

3.3. Setting code specific options

Code specific options may be configured affecting:

- enabling and disabling code variants and translations, such as EAN-128, as were listed in the relations table for setting of readable codes
- data verification such as by means of a check digit calculation. A check digit has a value that can be calculated from the other data characters and is usually the last data character in a bar code
- pre-editing of the data string such as removing the check-digit and/or start/stop characters

The more common options are described here:

Check CD:
This option enables the check digit calculation. If the calculated check digit does not correspond to the check digit in the bar code, then the bar code is ignored. The use of a check digit greatly improves the security of a bar code.

Not check CD:
This option disables the check digit calculation. This option is required when the bar codes do not contain a check digit or contain an invalid check digit.

Transmit CD:
This option enables the transmission of the check digit together with the data characters. If the check digit calculation is disabled, the reader can not differentiate anymore between a (valid) check digit and a data character. It will therefore transmit all data characters of the label, including what could constitute a check digit.

Not transmit CD:
This option disables the transmission of the check digit. If the check digit calculation is disabled, the reader can not differentiate between a (valid) check digit and a data character. It will therefore transmit all data characters of the label, excluding the character that could constitute the check digit for the type of bar code.

Transmit ST/SP:
This option enables the transmission of the start and stop characters of a bar code.

Not transmit ST/SP:
This option disables the transmission of the start and stop characters of a bar code. The next figure summarizes the effect of the transmit options for a Code 39 label with:
- start and stop characters '*'
- data characters '1 2 3 4 5 6'
- or data characters '1 2 3 4 5' and check digit '6'

Note that because '6' is, according to the Code 39 specifications, not a valid check digit for this label. The check digit calculation must therefore be disabled in order for the label to be accepted.

See figure 3.11.

Fig. 3.11. Setting code specific options		
	Transmit CD	Not transmit CD
Transmit ST/SP	* 1 2 3 4 5 6 *	* 1 2 3 4 5 *
Not transmit ST/SP	1 2 3 4 5 6	1 2 3 4 5

3.3.1. Options for UPC-A

The UPC-A symbology is a fixed length symbology encoding 11 data digits, a check digit and non printable start/stop characters. The following characters are supported:
• the digits 0 up to 9

An optional leading zero can be transmitted, which together with the data and the check digit forms a 13 digit field providing compatibility with the EAN-13 format. For string format see figure 3.12.

UPC-A add-on 2/add-on 5:
The UPC-A symbology as described above can be succeeded by an additional 2 or 5 digit UPC-A code. For string format see figure 3.13.

Options for UPC-A:
• disable transmission of the leading zero
• disable transmission of the check digit

Fig. 3.12. Options for UPC-A		
UPC-A		
leading zero	data (11 digits)	check digit

Fig. 3.13. Options for UPC-A			
UPC-A, +2, +5			
leading zero	data (11 digits)	check digit	add-on 2 or 5

	SET	
UPC-A, No leading zero, transmit CD	**E3**	
UPC-A, No leading zero, not transmit CD	E5	
UPC-A, Leading zero, transmit CD	E2	
UPC-A, Leading zero, not transmit CD	E4	
	END	

3.3.2. Options for UPC-E

The UPC-E symbology is a fixed length symbology encoding 6 data digits, a check digit and non printable start/stop characters. The following characters are supported:
• the digits 0 upto 9

An optional leading digit can be transmitted, which together with the data and the check digit forms an 8 digit field providing a compatibility with the EAN-8 format. For string format see figure 3.14.

UPC-E add-on 2/add-on 5:
The UPC-E symbology as described above can be succeeded by an additional 2 or 5 digit UPC-E code. For string format see figure 3.15.

UPC-E0 stands for UPC version E0 and the first digit is always a '0'. UPC-E1 stand for UPC version E1 and the first digit is a '1'. Options for UPC-E0 affects UPC-E1 too. Support for UPC-E1 is reader dependent.

Options for UPC-E:
• enable transmission of the leading digit
• disable transmission of the check digit
• transmit UPC-E as UPC-A

Transmit UPC-E as UPC-A:
If this option is enabled, a UPC-E label is transmitted in the UPC-A format.

Fig. 3.14. Options for UPC-E		
UPC-E		
leading digit (0 or 1)	data (6 digits)	check digit

Fig. 3.15. Options for UPC-E			
UPC-E, +2, +5			
leading digit (0 or 1)	data (6 digits)	check digit	add-on 2 or 5

3.3.2. Options for UPC-E

	SET	
UPC-E, No leading digit, transmit CD	**E7**	
UPC-E, No leading digit, not transmit CD	E9	
UPC-E, Leading digit, transmit CD	E6	
UPC-E, Leading digit, not transmit CD	E8	
Transmit UPC-E as is	**6Q**	
Transmit UPC-E as UPC-A	6P	
	END	

3.3.3. Options for EAN-13 and EAN-8

EAN-13:
The EAN-13 symbology is a fixed length symbology encoding 12 data digits, a check digit and non printable start/stop characters. The following characters are supported:
• the digits 0 upto 9

The data may be translated into ISBN, ISSN or ISMN format. For string format see figure 3.16.

EAN-13 add-on 2/add-on 5:
The EAN-13 symbology as described above can be succeeded by an additional 2 or 5 digit code. For string format see figure 3.17.

EAN-8:
The EAN-8 symbology is a fixed length symbology encoding 7 data digits, a check digit and non printable start/stop characters.
The following characters are supported:
• the digits 0 upto 9
For string format see figure 3.18.

EAN-8 add-on 2/add-on 5:
The EAN-8 symbology as described above can be succeeded by an additional 2 or 5 digit code. For string format see figure 3.19.

Options for EAN:
• disable transmission of the check digit
• enable ISBN, ISSN or ISMN translation

Enable ISBN, ISSN or ISMN translation:
If this option is enabled, an EAN-13 label is verified for the correct format and transmitted as a 10-digit ISBN number, 8 digit ISSN number. In case of ISMN, the character M is transmitted followed by 9 digits. Support for these translations is reader dependent.

Fig. 3.16. Options for EAN-13 and EAN-8

EAN-13	
data (12 digits)	check digit

Fig. 3.17. Options for EAN-13 and EAN-8

EAN-13, +2,+5		
data (12 digits)	check digit	add-on 2 or 5

Fig. 3.18. Options for EAN-13 and EAN-8

EAN-8	
data (7 digits)	check digit

Fig. 3.19. Options for EAN-13 and EAN-8

EAN-8, +2,+5		
data (7 digits)	check digit	add-on 2 or 5

3.3.3. Options for EAN-13 and EAN-8

	SET	
	SET	
EAN-13 not transmit CD	6J	
EAN-13 transmit CD	**6K**	
EAN-8 not transmit CD	6H	
EAN-8 transmit CD	**6I**	
Disable ISBN translation	**IB**	
Enable ISBN translation	IA	
Enable ISBN if possible	IK	
Disable ISSN translation	**HN**	
Enable ISSN translation	HO	
Enable ISSN if possible	4V	
Disable ISMN translation	**IO**	
Enable ISMN translation	IP	
Enable ISMN if possible	IQ	
	END	

3.3.4. Options for Code 39 and It. Pharm.

Code 39:
Code 39 is a variable length symbology with an optional check digit and printable start/stop characters. The following characters are supported:
- the digits 0 up to 9
- the upper case characters A up to Z
- the characters - . $ / + % SPACE
- start/stop character is *

The checksum is calculated as the sum modulo 43 of the numerical value of the data characters. In full ASCII mode, all 128 ASCII characters are supported. This is done by combining one of the characters +, %, $ or / with one of the alpha characters (A upto Z). For string format see figure 3.20.

Italian Pharmaceutical:
In this mode the Code 39 data is translated to the Italian pharmaceutical format. This format has a fixed length containing 8 numeric data values followed by a single mandatory check digit. An optional leading 'A' can be transmitted. For string format see figure 3.21.

Options for Code 39:
- enable full ASCII conversion
- enable Italian Pharmaceutical conversion
- enable check digit
- disable transmission of the check digit
- enable transmission of start/stop
- enable leading A for Italian Pharmaceutical
- selection of the minimum number of data characters

Normal Code 39:
In this mode the decoded data characters are transmitted without further translation.

Full ASCII Code 39:
In this mode the decoded data characters are translated to full ASCII Code 39.

Full ASCII Code 39 if possible:
In this mode the decoded data characters are translated to full ASCII Code 39. Invalid combinations are not translated and are transmitted as is.

Italian Pharmaceutical only:
In this mode the decoded data characters are translated to the Italian Pharmaceutical format. If the data does not comply with the Italian Pharmaceutical format, the label is rejected.

Italian Pharmaceutical if possible:
In this mode the decoded data characters are translated to the Italian Pharmaceutical format. If the data does not comply with the Italian Pharmaceutical format, then the data is transmitted as Normal or full ASCII Code 39.

Tri-Optic:
This fixed length symbology builds its data out of two data triplets, where the second triplet is encoded at first. The following characters are supported:
- the digits 0 up to 9
- the upper case characters A up to Z
- the characters - . / + % SPACE
- start/stop character is $

For string format see figure 3.22.
There are no options for Tri-Optic supported.

Concatenation:
If a Code 39 bar code contains a leading space, the data is stored into the reader's buffer without the leading space. As soon as a Code 39 bar code is read without a leading space, the data is appended to the reader's buffer and the entire buffer is transmitted and cleared for new data. In case a non Code 39 bar code is read, the data in the non-Code 39 bar code is transmitted and the buffer is cleared. The buffer size is reader dependent.

Fig. 3.20. Options for Code 39 and It.Pharm.			
Code 39			
start char.	data (0 or more char.)	check digit	stop char.

Fig. 3.21. Options for Code 39 and It.Pharm.				
Italian Pharmaceutical				
start char.	leading A	data (8 digits)	check digit	stop char.

Fig. 3.22. Options for Code 39 and It.Pharm.		
Tri-Optic		
start char.	data triplet 2 + triplet 1 (3 + 3 digits = 6 total)	stop char.

3.3.4. Options for Code 39 and It.Pharm.

	SET	
Normal Code 39	**D5**	
Full ASCII Code 39	D4	
Full ASCII Code 39 if possible	+K	
It. Pharmaceutical only	D6	
It. Pharmaceutical if possible	D7	
Not check CD	**C1**	
Check CD	C0	
	END	

	SET	
Not transmit CD	D8	
Transmit CD	**D9**	
Not transmit ST/SP	**D1**	
Transmit ST/SP	D0	
Not transm. Id. A for It. Pharm.Code	**DA**	
Transmit leading A for It. Pharm.Code	DB	
Minimum 3 digits	8D	
Minimum 1 digit	**8E**	
Disable concatenation	**+M**	
Enable concatenation	+L	
	END	

3.3.5. Options for Codabar

Codabar (NW7):
Codabar (NW7) is a variable length symbology with an optional check digit and printable start/stop characters. The next characters are supported:
• the digits 0 upto 9
• the characters - $: / . +
• start/stop characters are A, B, C or D
The checksum is calculated as the sum modulo 16 of the numerical values of all data characters. For string format see figure 3.23.

ABC-Code:
The ABC code is an acronym for American Blood Commission. This code consists of two bar codes which are decoded in one read cycle. The code is concatenated when the stop character of the first bar code and the start character of the second bar code is a D. These two D's are not transmitted. For string format see figure 3.24.

CX-Code:
The CX-Code consists of two bar codes which are decoded in one read cycle. The code is concatenated when the stop character of the first bar code is a C, and the start character of the second bar code is a B. The B and C characters are not transmitted. For string format see figure 3.25.

Options for Codabar:
• enable ABC code concatenation
• enable CX code concatenation
• enable check digit check
• disable transmission of the check digit
• disable transmission of start/stop
• selection of start/stop character translation
• selection of minimum number of data characters
• enable library space (CLSI) insertion

Fig. 3.23. Options for Codabar

Codabar			
start char.	data (1 or more char.)	check digit	stop char.

Fig. 3.24. Options for Codabar

ABC Code					
start char.	data (1 or more char.)	check digit	data (1 or more char.)	check digit	stop char.

Fig. 3.25. Options for Codabar

CX Code					
start char.	data (1 or more char.)	check digit	data (1 or more char.)	check digit	stop char.

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Code options

Space insertion:
This option inserts spaces in position 2, 7, 13, of the data string for use in library systems.

ST/SP translation:
This option enables the translation and transmission of the start and stop characters. Thus if the option ST/SP: abcd/tn*e is chosen, the start character is converted to lower case, e.g. from A, B, C or D to a, b, c, or d respectively and the stop character is converted from A, B, C or D to t, n, *, or e respectively. The next figure shows the resulting format for these options with a Codabar label using A and B as start and stop characters and 1 2 3 4 5 6 as data characters. For string format see figure 3.26.

Minimum data characters:
Codabar labels are checked for a minimum of 1, 3 or 5 characters are set by the user. If the number of characters in the label is shorter than the number set, the label will be rejected. If the fixed length option is used for Codabar type labels then such labels will additionally be checked for fixed length.

Inter character gap check:
This option enables the reading of Codabar labels with a large or irregular gap between characters. Checking the gap means that it is not allowed to have a gap. Disable the gap check allows gaps in the bar code.

Fig. 3.26. Options for Codabar	
Codabar Start and Stop	
1 2 3 4 5 6	Not transmit ST/SP
A 1 2 3 4 5 6 B	ST/SP: ABCD/ABCD
a 1 2 3 4 5 6 b	ST/SP: abcd/abcd
A 1 2 3 4 5 6 N	ST/SP: ABCD/TN*E
a 1 2 3 4 5 6 n	ST/SP: abcd/tn*e
<DC1> 1 2 3 4 5 6 <DC2>	
<DC1>	ST/SP: ASCII Hex 11
<DC2>	ST/SP: ASCII Hex 12
<DC3>	ST/SP: ASCII Hex 13
<DC4>	ST/SP: ASCII Hex 14

3.3.5. Options for Codabar

	SET	
Enable only Codabar normal mode	**HA**	
Enable only ABC code	H4	
Enable only CX code	H5	
Enable Codabar, ABC and CX	H3	
Not check CD	**H7**	
Check CD	H6	
Not transmit CD	H9	
Transmit CD	**H8**	
Disable space insertion	**HE**	
Enable space insertion	HD	
Not transmit ST/SP	**F0**	
ST/SP: ABCD/ABCD	F3	
ST/SP: abcd/abcd	F4	
	END	

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	SET	|||||| |||| ||| |||		
ST/SP: ABCD/TN*E	F1	||||||| ||| || |||
ST/SP: abcd/tn*e	F2	||||||| ||| ||| |||
ST/SP: <DC1><DC2><DC3><DC4>/ <DC1><DC2><DC3><DC4>	HJ	||||||| |||| ||| |||
Minimum data one character	HC	||||||| |||| ||| |||
Minimum data three characters	HB	||||||| |||| ||| |||
Minimum data five characters	**HF**	||||||| |||| ||| |||
Disable intercharacter gap check	HI	||||||| |||| ||| |||
Enable intercharacter gap check	**HH**	||||||| |||| ||| |||
	END	|||| |||| |||| ||| |||

3.3.6. Options for 2of5 and S-Code

Code 2of5:
Code 2of5 is a variable length symbology with an optional check digit and non printable start and stop characters. The following characters are supported:
• the digits 0 upto 9

The checksum is calculated as the sum modulo 10 of the numerical values of all the data characters.

Industrial 2of5:
This symbology encodes a single digit in each data symbol. Information is carried in the bars only.

Interleaved 2of5:
This symbology encodes a pair of digits in each symbol, the number of digits are therefore always an even number. Information is carried in the bars and spaces. The start and stop pattern is not unique inside the code. It is therefore essential to use the fixed length option to prevent partial reads.

S-Code:
This symbology encodes like Interleaved 2of5 but encodes the last data character as Industrial 2of5. The number of data digits is therefore always an odd number.
Information is carried in the bars and the spaces.The start and stop pattern is not unique inside the code. It is therefore essential to use the fixed length option to prevent partial reads.

Matrix 2of5:
This symbology encodes 1 digit in each character, the number of digits can therefore be an odd or an even number. Information is carried in the bars and spaces.

Chines Post Matrix 2of5:
This symbology is a variant of Matrix 2of5. To assure proper reads, check the options and setting for (Matrix) 2of5.

For string format of the supported symbologies see figure 3.27.

Options for code 2of5:
• disable transmission of the check digit
• enable check digit check
• selection of the minimum number of data characters
• disable space check for industrial 2of5
• transmit S-Code as Interleaved 2of5

Minimum data characters:
Code 2of5 are checked for a minimum of 1, 3 or 5 characters as set by the user. If the number of characters in the label is less then the number set, the label will be rejected. If the fixed length option is used for a Code 2of5 type label, than such label will additionally be checked for fixed length.

Space check:
This option enables the reading of Industrial 2of5 labels with a large or irregular spacing.

Transmit S-Code as Interleaved 2of5:
This option enables to transmit S-Code as Interleaved 2of5 by adding a leading zero.

Fig. 3.27. Options for 2of5 and S-Code		
Industrial 2of5, Interleaved 2of5, S-Code, Matrix 2of5, Chinese Post Matrix 2of5		
leading zero (optional)	data (1 or more digits)	check digit

3.3.6. Options for 2of5 and S-Code

	SET	
	SET	
Not transmit CD	E1	
Transmit CD	**E0**	
Not check CD	**G0**	
Check CD	G1	
Minimum data one character	GE	
Minimum data three character	GF	
Minimum data five character	**GI**	
Disable space check for Industrial 2of5	GK	
Enable space check for Industrial 2of5	**GJ**	
Not transmit S-Code as Interleaved 2of5	**GH**	
Transmit S-Code as Interleaved 2of5	GG	
	END	

3.3.7. Options for IATA

The IATA code is a variable length symbology with an optional check digit and non printable start/stop characters. The following characters are supported:
• the digits 0 upto 9

The checksum is calculated as the modulo seven of the data string. IATA is acronym for International Air Transport Association. For string format see figure 3.28.

Options for IATA:
• enable check digit check
• selection of the check digit calculation
• disable transmission of the check digit

Check digit calculation:
If the check digit calculation is required, then the appropriate calculation method must be selected.

Fig. 3.28. Options for IATA				
IATA				
CPN coupon (1digit)	AC airline code (3 digits)	FC form code (2 digits)	SN serial number (8 digits)	CD check digit (1 digit)

	SET	
Not check CD	**4H**	
Check FC and SN only	4I	
Check CPN, FC and SN	4J	
Check CPN, AC, FC and SN	4K	
Not transmit CD	4M	
Transmit CD	**4L**	
	END	

3.3.8. Options for MSI/Plessey

MSI Plessey is a variable length symbology with one or two optional check digit calculations CD1 and CD2 and non printable start/stop characters. The following characters are supported:
• the digits 0 up to 9

The checksum is calculated as the sum modulo 10 or 11 of the data characters. The checksum CD2 is calculated as the sum modulo 10 or 11 of the data characters and CD1. For string format see figure 3.29.

Fig. 3.29. Options for MSI/Plessey		
MSI/Plessey		
data (1 upto 13 digits)	cd1	cd2

Options for MSI/Plessey:
• disable check digit check
• selection of the check digit calculation
• selection of the number of check digits to be transmitted

Check digit:
If the check digit calculation is required, then the appropriate calculation method must be selected.

Not transmit CD:
The character positions CD1 and CD2 are not transmitted.

Transmit CD1:
The character position CD2 is not transmitted.

Transmit CD1 and CD2:
All characters in the label are transmitted.

3.3.8. Options for MSI/Plessey

	SET	
	SET	
Not check CD	4A	
Check 1 CD = MOD 10	**4B**	
Check 2 CD's = MOD 10/ MOD 10	4C	
Check 2 CD's = MOD 10/ MOD 11	4D	
Check 2 CD's = MOD 11/ MOD 10	4R	
Not transmit CD	4G	
Transmit CD1	**4E**	
Transmit CD1 and CD2	4F	
	END	

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3.3.9. Options for Telepen

Telepen is a variable length symbology with a check digit and non printable start/stop characters. The following characters are supported:
- in numeric mode, the digits 00 upto 99
- in full ASCII mode, all 128 ASCII characters

The check digit calculation is derived from the sum of all data characters modulo 127. The check digit cannot be transmitted. For string format see figure 3.30.
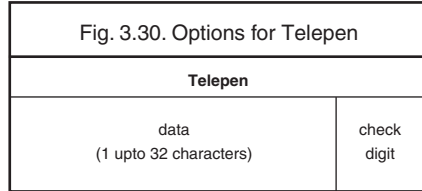
Options for Telepen:
- selection of ASCII mode

	Fig. 3.30. Options for Telepen	
	Telepen	
	data (1 upto 32 characters)	check digit

	SET	‖‖‖‖ ‖‖ ‖‖‖ ‖‖
Numeric mode	**D2**	‖‖‖‖ ‖‖‖ ‖‖ ‖‖
ASCII mode	D3	‖‖‖‖ ‖‖‖ ‖‖ ‖‖
	END	‖‖‖ ‖‖‖ ‖‖‖ ‖‖

3.3.10. Options for UK/Plessey

UK Plessey is a variable length symbology with a mandatory checksum and non printable start/stop characters. The following characters are supported:
- the digits 0 upto 9
- the characters A upto F

The checksum contains 2 digits and is calculated from the numerical values of all the data digits. For string format see figure 3.31.

Options for UK Plessey:
- enable A to X conversion
- disable transmission of the check digits
- enable library space (CLSI) insertion

Space insertion:
This option inserts spaces in position 2, 5, 11, 14 of the data string for use in library systems.

A to X conversion:
This option converts the character 'A' into an 'X'. The data and check digits are affected.

Fig. 3.31. Options for UK/Plessey	
UK/Plessey	
data (5 upto 20 characters)	check digits
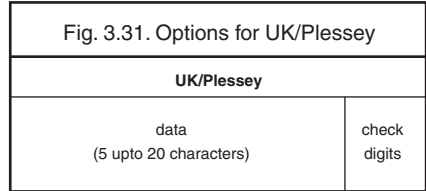
	SET	
Not transmit CD's	4O	
Transmit CD's	**4N**	
Disable space insertion	**DO**	
Enable space insertion	DN	
Disable A to X conversion	**DP**	
Enable A to X conversion	DQ	
	END	

3.3.11. Options for Code 128 and GS1-128

Code 128:
Code 128 is a variable length symbology with a mandatory check digit and non printable start/stop characters. The following characters are supported:
• all 128 ASCII characters
• 4 non data function characters
• 3 start characters
• 4 code set selection characters
• 1 stop character

The check digit is calculated as the sum modulo 103 of the start character and the weighted values of the data and special characters. For string format see figure 3.32.

Options for Code 128:
• enable concatenation

GS1-128:
In this mode the Code128 data is translated to the GS1-128 format, formerly known as EAN-128 or UCC-128. GS1-128 data starts with the FNC1 character and separates 2 data fields with the FNC1 character.
The first FNC1 character is translated to]C1, and the second FNC1 character is translated to an ASCII GS (hex 1D) character. For string format see figure 3.33.

Options for GS1-128:
• enable GS1-128 conversion

Enable GS1-128 only:
In this mode the decoded data characters are translated to the GS1-128 format. If the data does not comply with the GS1-128 format, then the label is rejected.

Enable GS1-128 if possible:
In this mode the decoded data characters are translated to the GS1-128 format. If the data does not comply with the GS1-128 format, then the label is transmitted as Code 128.

FNC2 Concatenation:
If a Code 128 bar code contains a leading FNC2 character, the data is stored into the reader's buffer. As soon as a Code 128 bar code is read without a leading FNC2 character, the data is appended to the reader's buffer and the entire buffer is transmitted and cleared for new data. In case a non Code 128 bar code is read, the data in the non-Code 128 bar code is transmitted and the buffer is cleared. The buffer size is reader dependent.

Fig. 3.32. Options for Code 128 and GS1-128
Code 128
data (1 or more characters)

Fig. 3.32. Options for Code 128 and GS1-128

Fig. 3.33. Options for Code 128 and GS1-128			
GS1-128			
]C1	data (1 or more char.)	<GS>	data (1 or more char.)

Fig. 3.33. Options for Code 128 and GS1-128
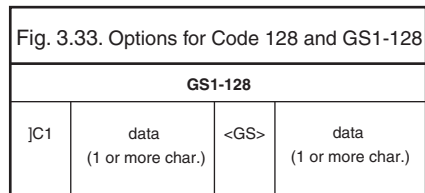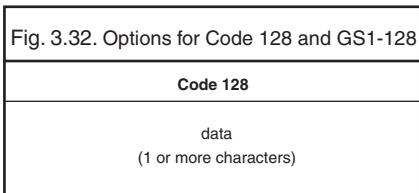
3.3.11. Options for Code 128 and GS1-128

	SET	
	SET	
Disable GS1-128	**OF**	
Enable GS1-128 only	JF	
Enable GS1-128 if possible	OG	
Disable concatenation	**MP**	
Enable concatenation	MO	
	END	

3.3.12. Options for Code 93

Code 93 is a variable length symbology with 2 mandatory check digits and non printable start/stop characters. The following characters are supported:
- the digits 0 upto 9
- the upper case characters A upto Z
- the characters - . $ / + % SPACE
- 4 non printable shift characters

Fig. 3.34. Options for Code 93		
Code 93		
data (1 or more characters)	check digit C	check digit K

The first check digit (C) is the modulo 47 sum of the weighted data character values. The second check digit (K) is the modulo 47 sum of the weighted data character values including the first check digit (C). The check digits are not transmitted.

The special shift characters are control characters and are not transmitted with the data. If one of these characters is followed by an upper case character 'A' upto 'Z', it is transmitted as 1 single character. In case of an invalid combination, the label is rejected. This method enables support for full 128 ASCII characters encodation. The encoding is compatible with the Code 39 $, %, / and + characters. For string format see figure 3.34.

Options for Code 93:
- enable concatenation
- transmission of check digits
- calculation of check digits

Concatenation:
If a Code 93 bar code contains a leading space, the data is stored into the reader's buffer without the leading space. As soon as a Code 93 bar code is read without a leading space, the data is appended to the reader's buffer and the entire buffer is transmitted and cleared for new data. In case a non Code 93 bar code is read, the data in the non-Code 93 bar code is transmitted and the buffer is cleared. The buffer size is reader dependent. Support for this option is reader dependent.

3.3.12. Options for Code 93

	SET	
Not check CD	9Q	
Check CD	**AC**	
Not transmit CD	**DZ**	
Transmit CD	DY	
Disable concatenation	**+W**	
Enable concatenation	+V	
	END	

3.3.13. Options for Code 11

Code 11 is a variable length symbology with 1 or 2 optional check digits and non printable start/stop characters. If the data is 10 or less characters, one check digit is used. If the data is more then 10 characters, then 2 check digits are used. The following characters are supported:
• the digits 0 upto 9
• the dash character '-'

The first check digit is the modulo 11 sum of the weighted data character values.
The second check digit is the modulo 11 sum of the weighted data character values including the first check digit. The check digits are not transmitted. For string format see figure 3.35.

Options for Code 11:
• disable check digit(s)
• automatic checking for 1 or 2 check digits depending of the number of data characters
• enable transmission of check digit(s)

Fig. 3.35. Options for Code 11		
Code 11		
data (1 or more characters)	cd1	cd2

	SET	
Not check CD	BLF	
Check 1 CD	BLG	
Check 2 CDs	BLH	
Check auto 1 or 2 CDs	**BLI**	
Not transmit CD(s)	**BLJ**	
Transmit CD(s)	BLK	
	END	

3.3.14. Options for Korean Postal Authority code

Korean Postal Authority code is a fixed length numeric symbology with a mandatory check digit. The check digit is not transmitted. For string format see figure 3.36.

Options for Korean Postal Authority code:
• transmit dash
• not transmit dash
• transmit CD
• not transmit CD

Transmit dash:
The dash character '-' (hex 2D) is printed between the 3rd and 4th digit

Fig. 3.36. Options for Korean Postal Authority code			
Korean Postal Authority code			
check digit	data (3 digits)	dash (-)	data (3 digits)

	SET	||| ||| |||| |||
Not transmit CD	*-	||| ||| |||| |||
Transmit CD	*+	||| ||| ||| ||||
Not transmit dash	*/	||| ||| ||| ||||
Transmit dash	*.	||| ||| |||| |||
	END	||| ||| |||| |||

3.3.15. Options for Intelligent Mail Barcode

Intelligent Mail Barcode is a symbology in four different states. It is formerly known as OneCode and is a variant of the 4-State Customer Barcode. The symbology is a height modulated and has a number of fixed lengths. For string format see figure 3.37.

Fixed data capacity:
• Numeric data: 20, 25 , 29 or 31 characters

Fixed data format and size:
The data is built of several identifiers which follow each other in fixed order. Sizes are a pre-determined amount of digits.
• Barcode identifier: 2
• Service type identifier: 3
• Mailer ID and Sequence number: maybe 6+9 digits or 9+6, always totalized to 15
• Delivery point zip code: may be omitted (0), standard zip (5), zip+4 (9), zip+4 incl. delivery point digits (11)

Checksum:
An 11-bit CRC Frame Check Sequence is always calculated and is not transmitted.

Encodable characters:
• digits 0 up to 9

Fig. 3.37. Options for Intelligent Mail Barcode			
Intelligent Mail Barcode			
barcode identifier	service type identifier	mailer + sequence ID number	delivery point zip code
2 digits	3 digits	6 + 9 digits or 9 + 6 digits	0, 5, 9 or 11 digits

3.3.16. Options for POSTNET

POSTNET (Postal Numeric Encoding Technique) is a height modulated symbology with a number of fixed lengths.
For string format see figure 3.38.

Fixed data capacity:
• Numeric data: 5 / 6 / 9 / 11 characters
• Additional data: 1 check digit

Checkdigit:
The start and stop pattern consist of a fixed single frame bar which is not unique inside the code. It is not transmitted.
The checkdigit is calculated and transmitted with the barcode data.

Encodable characters:
• digits 0 up to 9

Fig. 3.38. Options for POSTNET	
POSTNET	
data 5, 6, 9 or 11 digits	check digit

3.3.17. Options for GS1 Databar

GS1 Databar is formerly known as RSS familiy including the RSS-14 group. Support for GS1 Databar options is reader dependent.

Maximum data capacity:
- GS1 Databar and GS1 Databar Limited: Application Identifier "01" and 14 digits.
- GS1 Databar Expanded: 74 numeric or 41 alpha characters

Checksums:
The GS1 Databar family uses a mandatory checksum.
- GS1 Databar uses a modulo 79 checksum,
- GS1 Databar Limited uses a modulo 89 checksum
- GS1 Databar Expanded uses a modulo 211 checksum.

The checksum is always calculated and is not transmitted.

Encodable characters:
- GS1 Databar and GS1 Databar Limited: digits 0 up to 9
- GS1 Databar Expanded: subset of ISO 646: upper, lower case characters, digits, 20 punctuation characters and function character FNC1

The next GS1 Databar versions are supported.
- Omnidirectional/Truncated/Stacked (refer to GS1 Databar)
- Limited (refer to GS1 Databar Limited)
- Expanded, Expanded stacked (refer to GS1 Databar Expanded)

For string format see figure 3.39 or 3.40.

Options for GS1 Databar:
- transmission of CD
- transmission of Application Identifier

Not transmit CD:
Do not transmit the last character of GS1 Databar.

Fig. 3.39. Options for GS1 Databar		
GS1 Databar, GS1 Databar Limited		
application identifier (01)	data (13 digits)	cd (1 digit)

Fig. 3.40. Options for GS1 Databar	
GS1 Databar Expanded	
data (1 upto 73 characters)	cd (1 character)

	SET	
Not transmit CD	DM	
Transmit CD	**DL**	
Not transmit Application Identifier	DT	
Transmit Application Identifier	**DS**	
	END	

3.3.18. Options for Composite Codes

CC-A is a modified MicroPDF417 version.
CC-B is standard MicroPDF417.
CC-C is standard PDF417.

Maximum data capacity:
• CC-A: 56 characters
• CC-B: 338 characters
• CC-C: 2361 characters

Symbol size:
• 1D part: see RSS and EAN codes
• Composite part: CC-A and CC-B same as MicroPDF417, CC-C same as PDF417

Error correction:
• 1D part: only error detection
• Composite part: Reed Solomon error correction

Encodable characters:
• ASCII values 0 - 127 (ISO 646)
• ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
• with ECI: many other character sets
For string format of composite codes see figure 3.41 or 3.42 or 3.43.

Options for Composite codes:
• enable composite code
• ignore link flag
• output mode
For string format of composite codes see figure 3.44.

Fig. 3.41. Options for Composite Codes

Composite A	
1D data (1 upto 73 characters)	composite data (1 upto 56 characters)

Fig. 3.42. Options for Composite Codes

Composite B	
1D data (1 upto 73 characters)	composite data (1 upto 338 characters)

Fig. 3.43. Options for Composite Codes

Composite C	
1D data (1 upto 73 characters)	composite data (1 upto 2361 characters)

Fig. 3.44. Combined options for Composite Codes

Composite Enable	Link Flag	Output Mode	Output Result
BHE	RP	BL0	1D / 1D+2D
BHE	RP	BL1	2D / 1D+2D
BHE	RP	BL2	1D / 2D / 1D+2D
BHE	RQ	BL0	1D+2D
BHE	RQ	BL1	1D+2D
BHE	RQ	BL2	1D+2D
BHF	RP	BL0	1D
BHF	RP	BL1	2D
BHF	RP	BL2	1D / 2D
BHF	RQ	BL0	1D
BHF	RQ	BL1	2D
BHF	RQ	BL2	1D / 2D

3.3.18. Options for Composite Codes

	SET	
	SET	
Not ignore composite link flag	**RQ**	
Ignore composite link flag	RP	
Disable Composite on GS1-Databar	**BHF**	
Enable Composite on GS1-Databar	BHE	
As a single component, only 1D component is allowed	BL0	
As a single component, only 2D component is allowed	BL1	
As a single component, only 1D+2D component is allowed	**BL2**	
	END	

3

Code options

3.3.19. Options for Codablock F

Codablock-F is variable size multi row (stacked) symbology based on Code 128. All features of Code 128 do apply for Codablock F.

Maximum data capacity:
- text compaction = alphanumeric data: 2684 characters
- numeric compaction = numeric data: 5368 characters

Symbol size:
- number of rows: 2 up to 44
- number of columns: 1 up to 61

Error detection:
Codablock has 1 additional character for the entire symbol.
Codablock calculates 1 check digit that is not transmitted.

Encodable characters:
- ASCII values 0 - 127 (ISO 646)
- 4 FNC values
For string format see figure 3.45.

Fig. 3.45. Options for Codablock F
Codablock F
data (1 upto 5368 characters)

3.3.20. Options for DataMatrix

Data Matrix is a variable size matrix symbology with selectable error correction levels.

Maximum data capacity (ECC200):
- alphanumeric data: 2335 characters
- 8-bit data: 1556 characters
- numeric data: 3116 characters

Symbol size:
ECC000 - 140:
- odd number of rows and columns, square shape.
- minimum: 9 * 9 modules, maximum: 49 * 49 modules
ECC200:
- even number of rows and columns, square or rectangular shape
- square: minimum 10 * 10, maximum 144 * 144 modules
- rectangular: minimum 8 * 18, maximum 16 * 48 modules

Error correction:
- ECC000 - 140: four levels of convolutional error correction, option for error detection only
- ECC200: Reed-Solomon error correction
For new applications ECC200 is recommended.

Additional features:
- extended Channel Interpretation (ECI, ECC200 only): support for different character sets and data interpretations
- structured append (ECC200 only): represent data in up to 16 Data Matrix symbols
Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent

Encodable characters:
- ASCII values 0 - 127 (ISO 646)
- ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
- with ECI: many other character sets
For string format see figure 3.46.

Options for DataMatrix:
• Structured append time out: see chapter Read options

Fig. 3.46. Options for DataMatrix
DataMatrix
data (1 upto 3116 characters)

3.3.21. Options for Aztec

Aztec code is a variable size matrix symbology with selectable error correction levels.

Maximum data capacity:
Standard Aztec:
• alphanumeric: 3067 characters
• numeric: 3832 characters
• byte: 1914 characters
Aztec runes:
• values 000 up to 255 (3 digits)

Symbol size:
Standard Aztec:
• minimum: 15 * 15 modules
• maximum: 151 * 151 modules
Aztec runes:
• fixed: 11 * 11 modules

Error correction:
User selectable Reed-Solomon error correction levels from 5% to 95% of data region.

Additional features:
• extended Channel Interpretation (ECI): support for different character sets and data interpretations
• structured append: represent data in up to 26 Aztec symbols
• mirror image: decode symbol in mirror reversal presentation
Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent

Encodable characters:
• ASCII values 0 - 127 (ISO 646)
• ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
• with ECI: many other character sets
For string format see figure 3.47.

Options for Aztec:
• structured append time out: see chapter Read options

Fig. 3.47. Options for Aztec
Aztec
data (1 upto 3832 characters)

3

Code options

3.3.22. Options for Chinese Sensible code

Chinese Sensible code is a matrix symbology with selectable error correction levels. The code allows 84 variable sized versions.

Pattern:
Each code is a square area comprised of a variable amount of nxn square symbols. A crossing alignment pattern is available in version 4 and its sequential versions. Al versions include four position detection patterns located on each corner.

Maximum data capacity:
The data capacity depends on the version.
• version 1: 205 characters
• sequential versions: increasing amount per version
• version 84: 31091 characters

Symbol size:
Chinese Sensible code has 84 versions, counting from version 1. Each following version has 2 more modules.
• minimum: version 1 = 23 * 23 modules
• sequentially: version 2 = 25 * 25, version 3 = 27 * 27, etc.
• maximum: version 84 = 189 * 189 modules

Error correction:
Four levels of Reed-Solomon error correction.

Additional feature:
Extended Channel Interpretion (ECI): support for chinese character set, other different character sets and data interpretions.
Support for this option is reader dependent.
The supported character set and the maximum decodable number of characteristics is reader dependent.

Encodable characters:
• numerical values 0-9
• ASCII value 0 - 127 (ISO 646)
• binary byte
• ordinary chinese characters (GB 18030 - 2 Region, Double-byte, Four-byte)
• with ECI: many other character sets
For string format see figure 3.48.

Fig. 3.48. Options for Chinese Sensible code
Chinese Sensible code
data (1 upto 31091 characters)
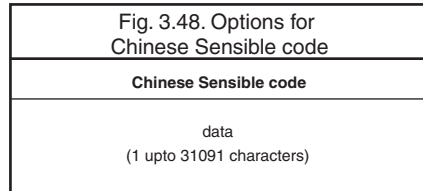
3.3.23. Options for QR Code

QR code is a variable size matrix symbology with selectable error correction levels.

Maximum data capacity:
Model 1:
- alphanumeric data: 707 characters
- 8-bit data: 486 characters
- numeric data: 1167 characters
- kanji data: 299 characters
Model 2:
- alphanumeric data: 4296 characters
- 8-bit data: 2953 characters
- numeric data: 7089 characters
- kanji data: 1817 characters

Symbol size:
Model 1:
- minimum: 21 * 21 modules
- maximum: 73 * 73 modules
Model 2:
- minimum: 21 * 21 modules
- maximum: 177 * 177 modules

Error correction:
Four levels of Reed-Solomon error correction.

Additional features:
- extended Channel Interpretation (ECI, model 2 only): support for different character sets and data interpretations.
- structured append: represent data in up to 16 QR Code symbols.
Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent

Encodable characters:
- ASCII values 0 - 127 (ISO 646)
- ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
- with ECI: many other character sets
For string format see figure 3.49.

Options for QR code:
- structured append time out: see read mode options
- no further options supported

Fig. 3.49. Options for QR Code
QR Code
data (1 upto 7089 characters)

3
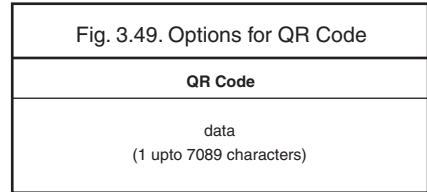
Code options

3.3.24. Options for Micro QR Code

Micro QR code is a compact version for the regular QR Code.

Maximum data capacity:
Model 1:
• numeric data: 5 characters
Model 2:
• alphanumeric data: 6 characters
• numeric data: 10 characters
Model 3:
• alphanumeric data: 11 characters
• 8-bit data: 9 characters
• numeric data: 18 characters
• kanji data: 6 characters
Model 4:
• alphanumeric data: 21 characters
• 8-bit data: 15 characters
• numeric data: 35 characters
• kanji data: 9 characters

Symbol size:
Model 1:
• 11 modules
Model 2:
• 13 modules
Model 3:
• 15 modules
Model 4:
• 17 modules

Error correction:
Up to three levels of Reed-Solomon error correction for Model 4, no error correction for Model 1.

Encodable characters:
• ASCII values 0 - 127 (ISO 646)
For string format see figure 3.50.

Options Micro QR Code
• no options supported

Fig. 3.50. Options for Micro QR Code

Micro QR Code
data (1 upto 35 characters)
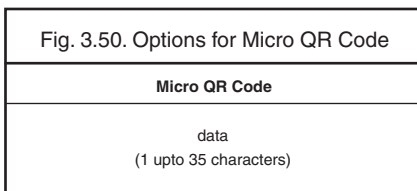
3.3.25. Options for Maxicode

Maxicode is a fixed size matrix symbology with selectable error correction levels.

Maximum data capacity:
• alphanumeric data: 93 characters
• numeric data: 138 characters

Symbol size:
28.14mm wide * 26.91mm high (including quiet zones)

Error correction:
2 levels of Reed-Solomon error correction.

Additional features:
• extended Channel Interpretation (ECI): support for different character sets and data interpretations
• structured append: represent data in up to 8 Maxicode symbols
Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent.

Encodable characters:
• ASCII values 0 - 127 (ISO 646)
• ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
• with ECI: many other character sets
For string format see figure 3.51.

Options for Maxicode:
• structured append time out: see read mode options
• no further options supported

Fig. 3.51. Options for Maxicode

Maxicode
data (1 upto 138 characters)
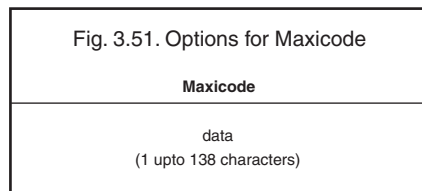
3.3.26. Options for PDF417

PDF417 is variable size multi row (stacked) symbology with selectable error correction levels.

Maximum data capacity:
- text compaction: 1850 characters
- byte compaction: 1108 characters
- numeric compaction: 2710 characters

Symbol size:
- number of row: 3 up to 90
- number of columns: 1 up to 30

Error correction:
8 levels of error correction. Option for error detection only.

Additional features:
- extended Channel Interpretation (ECI): support for different character sets and data interpretations
- macro PDF417: represent data in up to 99.999 PDF417 symbols
- truncated PDF417: reduce some overhead to obtain smaller symbology size

Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent

Encodable characters:
- ASCII values 0 - 127 (ISO 646)
- ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
- for macro PDF417: many other character sets

For string format see figure 3.52

Options for PDF417:
- macro PDF417 timeout (same as Structured append time out): see read mode options
- no further options available

Fig. 3.52. Options for PDF417
PDF417
data
(1 upto 2710 characters)

3.3.27. Options for MicroPDF417

MicroPDF417 is variable size multi row (stacked) symbology with fixed error correction levels.

Maximum data capacity:
- text compaction: 250 characters
- byte compaction: 150 characters
- numeric compaction:366 characters

Symbol size:
- number of row: 4 up to 44
- number of columns: 1 up to 4

Error correction:
Number of error correction codewords is dependent of symbol size and can not be changed.

Additional features:
- extended Channel Interpretation (ECI): support for different character sets and data interpretations
- macro MicroPDF417 (structured append mode): represent data in up to 99.999 MicroPDF417 symbols

Support for these options is reader dependent. The supported character set and the maximum decodable number of characters, is reader dependent

Encodable characters:
- ASCII values 0 - 127 (ISO 646)
- ASCII values 128 - 255 (ISO 8859-1, Latin alphabet No. 1, extended ASCII)
- for macro MicroPDF417: many other character sets

For string format see figure 3.53.

Options for MicroPDF417:
- macro MicroPDF417 timeout (same as Structured append time out): see read mode options
- no further options available

Fig. 3.53. Options for MicroPDF417
MicroPDF417
data
(1 upto 366 characters)

3

Code options

4. STRING OPTIONS

This chapter describes the alterations which can be made to the format of the transmitted data string.

The bar code data has the format as described in chapter 'Code Options'.

Set prefix and suffix
• transmission of a preamble (common prefix)
• transmission of a postamble (common suffix)
• transmission of a prefix
• transmission of a suffix

The string format is transmitted as in figure 4.01.

Fig. 4.01. String Options				
preamble	prefix	bar code data	suffix	postamble
	including └Code ID┘		including └Code ID┘	
	including Code length		including Code length	
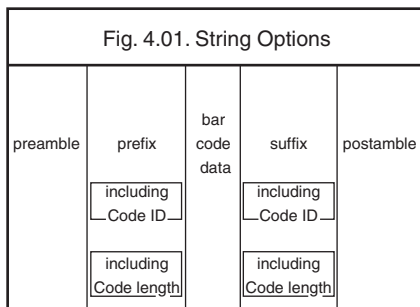
The input entries are described in this chapter.

4.2. Set prefix and suffix

A prefix and suffix of maximum 4 direct input entries each may be included in front and at the end of the string respectively.

If the direct input keyboard key <return> from this chapter is selected then the result is a <carriage return> or <Enter> key. See figure 4.03.
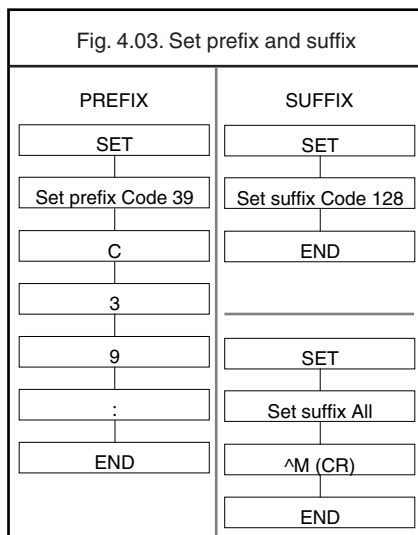
How to set a prefix or a suffix:
To configure a prefix for example for Code-39 as C39: scan the following labels from this current chapter 'String Options':
<SET>
<Set prefix Code 39>
<C>
<3>
<9>
<:>
<END>

Bar code readers which do not support a different prefix or suffix for each symbology have to make use of <ALL>.

How to clear a prefix or suffix:
To clear the suffix for example for Code 128 scan the following labels:
<SET>
<Set suffix Code 128>
<END>

How to set a suffix for all symbologies:
To configure for example the suffix <CR> for all symbologies scan the following labels:
<SET>
<Set suffix ALL>
<^M (CR)>
<END>

```
┌─────────────────────────────────────────┐
│      Fig. 4.03. Set prefix and suffix    │
├──────────────────────┬───────────────────┤
│       PREFIX         │      SUFFIX        │
│  ┌────────────────┐  │  ┌─────────────┐   │
│  │      SET       │  │  │     SET     │   │
│  └────────────────┘  │  └─────────────┘   │
│  ┌────────────────┐  │  ┌─────────────┐   │
│  │Set prefix Code39│ │  │Set suffix 128│  │
│  └────────────────┘  │  └─────────────┘   │
│  ┌────────────────┐  │  ┌─────────────┐   │
│  │       C        │  │  │     END     │   │
│  └────────────────┘  │  └─────────────┘   │
│  ┌────────────────┐  │                    │
│  │       3        │  │  ┌─────────────┐   │
│  └────────────────┘  │  │     SET     │   │
│  ┌────────────────┐  │  └─────────────┘   │
│  │       9        │  │  ┌─────────────┐   │
│  └────────────────┘  │  │Set suffix All│  │
│  ┌────────────────┐  │  └─────────────┘   │
│  │       :        │  │  ┌─────────────┐   │
│  └────────────────┘  │  │   ^M (CR)   │   │
│  ┌────────────────┐  │  └─────────────┘   │
│  │      END       │  │  ┌─────────────┐   │
│  └────────────────┘  │  │     END     │   │
│                      │  └─────────────┘   │
└──────────────────────┴───────────────────┘
```

Preamble and postamble:
A preamble is transmitted before the prefix and can contain up to 8 direct input characters. A postamble is transmitted after the suffix and can contain up to 8 direct input characters. A preamble and postamble will be transmitted for all symbologies. By default, the preamble and postamble is empty.

Code identification Opticon:
A code identification and the code length may be included as a prefix or suffix. The direct input 'code identifier' provides a quick method of programming in addition to programming a separate prefix or suffix for each bar code type. See figure 4.04.

Code identification AIM/ISO:
The Code identifier will be transmitted in the ISO 15424 format :]cm, where:
•] is ASCII value decimal 93
• c is code character
• m is modifier character(s)
For a detailed list of the modifier character 'm' and the AIM-ID's, refer to the ISO15424 standard. See figure 4.05.

In case the modifier is an asterix (*), the value depends on the options of the symbology or on the configured Code options. For details refer to their own respective modifier tables. See figures 4.06 up to 4.17.

Code length:
The code length is transmitted as 2 digits, representing the decimal number of data characters transmitted, excluding prefix and suffix characters. For 2D bar codes the code length is transmitted as 6 digits. It is also possible to send for both 1D and 2D codes the length as 6 digits.

These direct input characters count as 1 entry of the 4 permissible entries for a prefix or suffix.

Example:
If you want to configure the prefix
<code identifier>:<code length>:
scan the following labels:
<SET>
<Set prefix all>
<Code identification>
<:>
<Code length>
<:>
<END>

If you want to use the code identifiers, but need another code identifier for Code 39, you scan the following labels:
<SET>
<Set prefix all>
<Code identification>
<:>
<Set prefix Code 39>
<$>
<:>
<END>

Fig. 4.04. Set prefix and suffix
OPTICON Code identifiers

Code	Identifier
UPC-A	- C
UPC-A +2	- F
UPC-A +5	- G
UPC-E	- D
UPC-E +2	- H
UPC-E +5	- I
EAN-13	- B
EAN-13 +2	- L
EAN-13 +5	- M
EAN-8	- A
EAN-8 +2	- J
EAN-8 +5	- K
Code 39	- V
Code 39 Full ASCII	- W
Italian Pharmaceutical	- Y
Codabar	- R
Codabar ABC	- S
Codabar CX	- f
Industrial 2of5	- O
Interleaved 2of5	- N
S-Code	- g
Matrix 2of5	- Q
Chinese Post	- w
IATA	- P
MSI/Plessey	- Z
Telepen	- d
UK/Plessey	- a
Code 128	- T
GS1-128	- T
Code 93	- U
Code 11	- b
Korean Postal Authority code	- c
Intelligent Mail Barcode	- 0 (zero)
POSTNET	- 3
GS1 Databar	- y
CC-A	- m
CC-B	- n
CC-C	- l
Codablock F	- E
DataMatrix	- t
Aztec	- o
Aztec Runes	- o
Chinese Sensible code	- e
QR code	- u
Micro QR Code	- j
Maxi Code	- v
PDF417	- r
MicroPDF417	- s

Fig. 4.05. Set prefix and suffix		
AIM/ISO15424 Code identifiers		
Symbology		]AIM-ID *(Modifier table)
UPC-A	-	]E0
UPC-A +2	-	]E3
UPC-A +5	-	]E3
UPC-E	-	]E0
UPC-E +2	-	]E3
UPC-E +5	-	]E3
EAN-13	-	]E0
EAN-13 +2	-	]E3
EAN-13 +5	-	]E3
EAN-8	-	]E4
EAN-8 +2	-	]E7
EAN-8 +5	-	]E7
Code 39	-	]A* } (4.06)
Code 39 Full ASCII	-	]A*
Tri-Optic	-	]X0
Code 39 It. Pharmaceutical	-	]X0
Codabar	-	]F* } (4.07)
Codabar ABC	-	]F*
Codabar CX	-	]X0
Industrial 2of5	-	]S0
Interleaved 2of5	-	]I* (4.08)
S-Code	-	]X0
Matrix 2of5	-	]X0
Chinese Post	-	]X0
IATA	-	]R* (4.09)
MSI/Plessey	-	]M* (4.10)
	-	]X0
Telepen	-	]B* (4.11)
UK/Plessey	-	]X0
Code 128	-	]C0
GS1-128	-	]C1
Code 93	-	]G0
Code 11	-	]H* (4.12)
	-	]X0
Korean Postal Authority code	-	]X0
Intelligent Mail Barcode	-	]X0
POSTNET	-	]X0
GS1 Databar	-	]e0
CC-A (transmitted separately)	-	]e1
CC-B (transmitted separately)	-	]e1
CC-C (transmitted separately)	-	]e1
GS1 Databar with CC-A	-	]e0
GS1 Databar with CC-B	-	]e0
GS1-128 with CC-C	-	]e0
Codablock F	-	]0* (4.13)
Data Matrix	-	]d* (4.14)
Aztec	-	]z* (4.15)
	-	]X0
QR Code	-	]Q* } (4.16)
Micro QR Code	-	]Q*
Maxicode	-	]U* (4.17)
PDF417	-	]L0
MicroPDF417	-	]L0

Fig. 4.06. Modifiers for Code 39	
AIM/ISO15424 Code identifiers for : A*	
Code options	]AIM-ID
Normal Code 39 (D5) Not check CD (C1) Transmit CD (D9)	]A0
Normal Code 39 (D5) Check CD (C0) Transmit CD (D9)	]A1
Normal Code 39 (D5) Not check CD (C1) Not transmit CD (D8)	]A2
Normal Code 39 (D5) Check CD (C0) Not transmit CD (D8)	]A3
Full ASCII Code 39 (D4) or Full ASCII Code 39 if pos. (+K) Not check CD (C1) Transmit CD (D9)	]A4
Full ASCII Code 39 (D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Transmit CD (D9)	]A5
Full ASCII Code 39 (D4) or Full ASCII Code 39 if pos. (+K) Not check CD (C1) Not transmit CD (D8)	]A6
Full ASCII Code 39 (D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Not transmit CD (D8)	]A7

4

String options

Fig. 4.07. Modifiers for Codabar	
AIM/ISO15424 Code identifiers for : F*	
Code options	]AIM-ID
Codabar normal mode (HA) Not check CD (H7) Transmit CD (H8)	]F0
Codabar ABC (H3 or H4) Not check CD (H7) Transmit CD (H8)	]F1
Codabar normal mode (HA) Check CD (H6) Transmit CD (H8)	]F2
Codabar ABC (H3 or H4) Check CD (H6) Transmit CD (H8)	]F3
Codabar normal mode (HA) Not check CD (H7) Not transmit CD (H9)	]F4
Codabar ABC (H3 or H4) Not check CD (H7) Not transmit CD (H9)	]F5
Codabar normal mode (HA) Check CD (H6) Not transmit CD (H9)	]F6
Codabar ABC (H3 or H4) Check CD (H6) Not transmit CD (H9)	]F7

Fig. 4.08. Modifiers for Interleaved 2of5		
AIM/ISO15424 Code identifiers for : I*		
Code options		]AIM-ID
Not check CD (G0)	Transmit CD (E0)	]I0
Check CD (G1)	Transmit CD (E0)	]I1
Not check CD (G0)	Not transmit CD (E1)	]I2
Check CD (G1)	Not transmit CD (E1)	]I3

Fig. 4.09. Modifiers for IATA	
AIM/ISO15424 Code identifiers for : R*	
Code options	]AIM-ID
Not check CD (4H) Transmit CD (4L)	]R0
Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN,AC,FC and SN (4K) Transmit CD (4L)	]R1
Not check CD (4H) Not transmit CD (4M)	]R2
Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN,AC,FC and SN (4K) Not transmit CD (4M)	]R3

Fig. 4.10. Modifiers for MSI/Plessey		
AIM/ISO15424 Code identifiers for : M* / X0		
Code options Checksum + Transmit		]AIM-ID
Check 1 CD = MOD 10 (4B):		
(4B) + Transmit CD1	(4E)	]M0
(4B) + Not transmit CD	(4G)	]M1
(4B) + Transmit CD1 and CD2	(4F)	]X0
Check 2 CD's = MOD 10/ MOD 10 (4C):		
(4C) + (4E) or (4G) or (4F)		]X0
Check 2 CD's = MOD 10/ MOD 11 (4D):		
(4D) + (4E) or (4G) or (4F)		]X0
Check 2 CD's = MOD 11/ MOD 10 (4R):		
(4R) + (4E) or (4G) or (4F)		]X0

Fig. 4.11. Modifiers for Telepen	
AIM/ISO15424 Code identifiers for : B*	
Code options	]AIM-ID
Telepen (numeric or ASCII only):	
ASCII mode (D3)	]B0
Numeric mode (D2)	]B1
Telepen (numeric followed by ASCII):	
ASCII mode (D3)	]B0
Numeric mode (D2)	]B2
Telepen (ASCII followed by numeric)(not supported):	
ASCII mode (D3)	]B0
Numeric mode (D2)	]B2

Fig. 4.12. Modifiers for Code 11
AIM/ISO15424 Code identifiers for : H* / X0

Code options	]AIM-ID

Check 1 CD (BLG)
    or Check auto 1 or 2 CDs (BLI)
    (length < 12)
Transmit CD(s) (BLK)
	]H0

Check 2 CDs (BLH)
    or Check auto 1 or 2 CDs (BLI)
    (length > 12)
Transmit CD(s) (BLK)
	]H1

Check 1 CD (BLG)
    or Check 2 CDs (BLH)
    or Check auto 1 or 2 CDs (BLI)
    (length > 12)
Not transmit CD(s) (BLJ)
	]H3

Not check CD (BLF) Not transmit CD(s) (BLJ)	]X0

Fig. 4.13. Modifiers for Codablock F
AIM/ISO15424 Code identifiers for : O*

Data structure	]AIM-ID
FNC1 not used	]O4
FNC1 in 1st position	]O5

Fig. 4.14. Modifiers for DataMatrix
AIM/ISO15424 Code identifiers for : d*

Symbology, data structure	]AIM-ID
ECC000 - ECC140	]d0
ECC200	]d1
ECC200, FNC1 in 1st or 5th position	]d2
ECC200, FNC1 in 2nd or 6th position	]d3
ECC200, supporting ECI protocol	]d4
ECC200, FNC1 in 1st or 5th position and supporting ECI protocol	]d5
ECC200, FNC1 in 2nd or 6th position and supporting ECI protocol	]d6

Fig. 4.15. Modifiers for Aztec
AIM/ISO15424 Code identifiers for : z*

Data structure	]AIM-ID
No structure / other	]z0
FNC1 preceeding 1st message character	]z1
FNC1 following an initial letter or pair of digits	]z2
ECI protocol implemented	]z3
FNC1 preceeding 1st message character and ECI protocol implemented	]z4
FNC1 following an initial letter or pair of digits, ECI protocol implemented	]z5
Structured append header included	]z6
Structured append header included and FNC1 preceeding 1st message character	]z7
Structured append header included, FNC1 following an initial letter or pair of digits	]z8
Structured append header included and ECI protocol implemented	]z9
Structured append header included, FNC1 preceeding 1st message character, ECI protocol implemented	]zA
Structured append header included, FNC1 following an initial letter or pair of digits, ECI protocol implemented	]zB
Aztec runes	]zC

Fig. 4.16. Modifiers for QR Code
AIM/ISO15424 Code identifiers for : Q*

Model, data structure	]AIM-ID
Model 1	]Q0
Model 2, ECI protocol not implemented	]Q1
Model 2, ECI protocol implemented	]Q2
Model 2, ECI protocol not implemented, FNC1 in first position	]Q3
Model 2, ECI protocol implemented, FNC1 in first position	]Q4
Model 2, ECI protocol not implemented, FNC1 in second position	]Q5
Model 2, ECI protocol implemented, FNC1 in second position	]Q6

Fig. 4.17. Modifiers for Maxicode
AIM/ISO15424 Code identifiers for : U*

Data structure	]AIM-ID
Symbol in mode 4 or 5	]U0
Symbol in mode 2 or 3	]U1
Symbol in mode 4 or 5, ECI protocol implemented	]U2
Symbol in mode 2 or 3, ECI protocol implemented	]U3

4

String options

4.2.1. Set prefix

	SET	
All Codes	RY	
UPC-A	N1	
UPC-A + add on	M0	
UPC-E	N2	
UPC-E + add on	M1	
EAN-13	N3	
EAN-13 + add on	M2	
EAN-8	N4	
EAN-8 + add on	M3	
Code 39	M4	
Codabar	M5	
Industrial 2of5	M6	
Interleaved 2of5	M7	
	END	

	SET	
S-Code	MB	
Matrix 2of5	GL	
IATA	I8	
MSI/Plessey	N0	
Telepen	L8	
UK/Plessey	MA	
Code 128	M9	
Code 93	M8	
Code 11	BLD	
Korean Postal Authority code	*$	
Intelligent Mail Barcode	D5I	
POSTNET	D6D	
GS1-Databar	OE	
	END	

	SET	|||||| ||| ||||| |||
Composite codes	RR	|||||| |||| || |||
Codablock F	D4S	|||||| ||| ||||||| || |||
DataMatrix	MD	|||||| ||| || |||
Aztec	BF0	|||||| |||| |||| |||| |||
Chinese Sensible code	D4N	|||||| ||| ||||||| ||
QR Code	MK	|||||| ||| || |||
Maxicode	ML	|||||| |||| || |||
PDF417	OC	|||||| ||| || |||
MicroPDF417	OD	|||||| |||| || |||
ISO track 1 (IATA)	MH	|||||| ||| || |||
ISO track 2 (ABA)	MI	|||||| ||| || |||
ISO track 3 (THRIFT)	MJ	|||||| |||| || |||
Clear all prefixes	MG	|||||| |||| || |||
Preamble	MZ	|||||| || ||||| |||
	END	|||| |||| |||||| |||

	SET	||||| ||| ||| |||
All Codes	RZ	||||| || ||| |||
UPC-A	N6	||||| ||| ||| |||
UPC-A + add on	O0	||||| ||| ||| |||
UPC-E	N7	||||| ||| ||| |||
UPC-E + add on	O1	||||| ||| ||| |||
EAN-13	N8	||||| ||| ||| |||
EAN-13 + add on	O2	||||| ||| ||| |||
EAN-8	N9	||||| ||| ||| |||
EAN-8 + add on	O3	||||| ||| ||| |||
Code 39	O4	||||| ||| ||| |||
Codabar	O5	||||| ||| ||| |||
Industrial 2of5	O6	||||| ||| ||| |||
Interleaved 2of5	O7	||||| ||| ||| |||
	END	||||| ||| ||| |||

4

String options

	SET	
S-Code	OB	
Matrix 2of5	GM	
IATA	I9	
MSI/Plessey	N5	
Telepen	L9	
UK/Plessey	OA	
Code 128	O9	
Code 93	O8	
Code 11	BLE	
Korean Postal Authority code	*%	
Intelligent Mail Barcode	D5J	
POSTNET	D6E	
GS1-Databar	PQ	
	END	

	SET	|||| |||| |||| ||||
Composite codes	RS	|||||| |||| ||||	
Codablock F	D4T	|||||| ||| |||||| |||
DataMatrix	PO	|||||| |||| || |||
Aztec	BF1	|||||| |||| ||| || |||
Chinese Sensible code	D4O	|||||| ||| |||||| || |||
QR Code	PW	|||||| || |||| |||
Maxicode	PX	|||||| || |||| |||
PDF417	PY	|||||| || |||| |||
MicroPDF417	PZ	|||||| || |||| |||
ISO track 1 (IATA)	PT	|||||| |||| || |||
ISO track 2 (ABA)	PU	|||||| || |||| |||
ISO track 3 (THRIFT)	PV	|||||| || |||| |||
Clear all suffixes	PR	|||||| |||| || |||
Postamble	PS	|||||| |||| || |||
	END	|||| |||| |||| |||

4.3.2. Direct input character misc.

	SET	
	SET	
<SPACE>	5A	
!	5B	
"	5C	
#	5D	
$	5E	
%	5F	
&	5G	
'	5H	
(	5I	
)	5J	
*	5K	
+	5L	
,	5M	
	END	

	SET	|||| ||| ||| ||| |||
-	5N	|||| ||||| || |||
.	5O	|||| ||||| || |||
/	5P	|||| ||||| || |||
:	6A	|||| ||||| || |||
;	6B	|||| ||||| || |||
<	6C	|||| ||||| || |||
=	6D	|||| ||||| || |||
>	6E	|||| ||||| || |||
?	6F	|||| ||||| || |||
@	6G	|||| ||||| || |||
[	7A	|||| ||||| || |||
\	7B	|||| ||||| || |||
]	7C	|||| ||||| || |||
	END	|||| ||||| ||| |||

	SET			
^	7D	
_	7E	
‘	7F	
{	9T	
|	9U	
}	9V	
~	9W	
	END	

4.3.3. Direct input numeric

	SET	‖‖‖ ‖‖‖ ‖‖‖ ‖‖
0	Q0	‖‖‖‖ ‖‖ ‖‖ ‖‖
1	Q1	‖‖‖‖ ‖‖ ‖‖ ‖‖
2	Q2	‖‖‖‖ ‖‖ ‖‖ ‖‖
3	Q3	‖‖‖‖ ‖‖ ‖‖ ‖‖
4	Q4	‖‖‖‖ ‖‖ ‖‖ ‖‖
5	Q5	‖‖‖‖ ‖‖ ‖‖ ‖‖
6	Q6	‖‖‖‖ ‖‖ ‖‖ ‖‖
7	Q7	‖‖‖‖ ‖‖ ‖‖ ‖‖
8	Q8	‖‖‖‖ ‖‖ ‖‖ ‖‖
9	Q9	‖‖‖‖ ‖‖ ‖‖ ‖‖
	END	‖‖‖ ‖‖‖ ‖‖‖ ‖‖
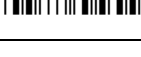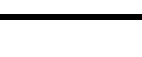
4.3.4. Direct input character

	SET	
A	0A	
B	0B	
C	0C	
D	0D	
E	0E	
F	0F	
G	0G	
H	0H	
I	0I	
J	0J	
K	0K	
L	0L	
M	0M	
	END	

4

String options

	SET	||||||||||||||||||||||
N	0N	||||||||||||||||||||||
O	0O	|||||||||||||||||||||
P	0P	||||||||||||||||||
Q	0Q	||||||||||||||||||
R	0R	|||||||||||||||||||
S	0S	|||||||||||||||||||
T	0T	|||||||||||||||||||
U	0U	|||||||||||||||||||
V	0V	|||||||||||||||||||
W	0W	|||||||||||||||||||
X	0X	|||||||||||||||||||
Y	0Y	|||||||||||||||||||
Z	0Z	|||||||||||||||||||
	END	|||||||||||||||||||

4.3.5. Direct input lower case character

	SET	
a	$A	
b	$B	
c	$C	
d	$D	
e	$E	
f	$F	
g	$G	
h	$H	
i	$I	
j	$J	
k	$K	
l	$L	
m	$M	
	END	

4

String options

	SET	|||||| ||| |||| || |||
n	$N	||||||	|||| || |||
o	$O	||||||	|||| || |||
p	$P	||||||	|||| || |||
q	$Q	||||||	|||| || |||
r	$R	||||||	|||| || |||
s	$S	||||||	|||| || |||
t	$T	||||||	|||| || |||
u	$U	||||||	||| |||| |||
v	$V	||||||	||| |||| |||
w	$W	||||||	||| |||| |||
x	$X	||||||	||| |||| |||
y	$Y	||||||	||| |||| |||
z	$Z	||||||	||| |||| |||
	END	|||| |||| |||| |||

4.3.6. Direct input control character

	SET	||||||
	SET	|||||||||||||||
^@ (NULL)	9G	|||||||||||||||
^A (SOH)	1A	|||||||||||||||
^B (STX)	1B	|||||||||||||||
^C (ETX)	1C	|||||||||||||||
^D (EOT)	1D	|||||||||||||||
^E (ENQ)	1E	|||||||||||||||
^F (ACK)	1F	|||||||||||||||
^G (BEL)	1G	|||||||||||||||
^H (BS)	1H	|||||||||||||||
^I (HT)	1I	|||||||||||||||
^J (LF)	1J	|||||||||||||||
^K (VT)	1K	|||||||||||||||
^L (FF)	1L	|||||||||||||||
	END	|||||||||||||||

4

String options

	SET	‖‖‖‖ ‖‖‖‖‖ ‖‖‖
^M (CR)	1M	‖‖‖‖ ‖‖‖‖‖ ‖ ‖‖‖
^N (SO)	1N	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^O (SI)	1O	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^P (DLE)	1P	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^Q (DC1)	1Q	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^R (DC2)	1R	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^S (DC3)	1S	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^T (DC4)	1T	‖‖‖‖ ‖‖‖‖ ‖ ‖‖‖
^U (NAK)	1U	‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
^V (SYN)	1V	‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
^W (ETB)	1W	‖‖‖‖ ‖‖‖ ‖‖‖‖ ‖‖‖
^X (CAN)	1X	‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
^Y (EM)	1Y	‖‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
	END	‖‖‖‖ ‖‖‖‖ ‖‖‖‖ ‖‖‖

	SET	|||||| |||| |||| |||
^Z (SUB)	1Z	|||||| ||| |||| |||
^[(ESC)	9A	|||||| |||| || |||
^\ (FS)	9B	|||||| |||| || |||
^] (GS)	9C	|||||| |||| || |||
^^ (RS)	9D	|||||| |||| || |||
^_ (US)	9E	|||||| |||| || |||
DEL (ASCII 127)	9F	|||||| |||| || |||
	END	|||||| |||| |||| |||

KBD Wedge Character Table

	0		1		2	3	4	5	6	7
	Type 1	Type 2	Type 1	Type 2						
0			DLE		SP	0	@	P	`	p
1	SOH	Insert	DC1	F1	!	1	A	Q	a	q
2	STX	Delete	DC2	F2	"	2	B	R	b	r
3	ETX	Home	DC3	F3	#	3	C	S	c	s
4	ETO	End	DC4	F4	$	4	D	T	d	t
5	EAQ	Up	NAK	F5	%	5	E	U	e	u
6	ACK	Down	SYN	F6	&	6	F	V	f	v
7	BEL	Left	ETB	F7	'	7	G	W	g	w
8	BS	Backspace	CAN	F8	(	8	H	X	h	x
9	HT	TAB	EM	F9	)	9	I	Y	i	y
A	LF	LF	SUB	F10	*	:	J	Z	j	z
B	VT	Right	ESC	F11	+	;	K	[	k	{
C	FF	PageUp	FS	F12	,	<	L	\	l	|
D	CR	Enter	GS	ESC	-	=	M	]	m	}
E	SO	PageDown	RS	Right ALT	.	>	N	^	n	~
F	SI		US	Enter key on Num keypad	/	?	O	_	o	DEL

Note 1：If scan the following barcode the output data pleaser refer to type 1 (in blue)

Type 1

Note 2：If scan the following barcode the output data please refer to type 2 (in red)

Type 2

4.3.7. Direct input code id/length

	SET	
Code identification	$2	
Code identification ISO-15424 / AIM	$1	
Code length (1D = 2 digits, 2D = 6 digits)	$3	
Code length (1D and 2D = 6 digits)	$6	
	END	

5. READ OPTIONS

This chapter allows to set the read mode,
trigger type, redundancy and illumination.

5
Read options

5.1. Read mode options

The following read modes are available:

Single read:
When a bar code has been decoded, the reader will be turned OFF. The reader must be triggered again to read another label. This option and 'Disable trigger' can not be programmed at the same time.

Multiple read:
When a bar code has been decoded, the reader will stay ON for a time as set by 'Read time options' or indefinitely if the trigger switch has been disabled. The same label can only be decoded again after the label has not been detected for a number of scans.

5.1. Read mode options

	SET	
	SET	
Single read	S0	
Multiple read	**S1**	
	END	

5.1.1. Multiple read reset time

This option can be used in conjunction with multiple read mode.
- for Laser and CCD readers, it sets the time that the reader should be pointed away from the label before it can decode the same label again
- for Image readers, it sets the number of frames that the reader should be pointed away from the label before it can decode the same label again

Indefinitely means that the next bar code must always be different, during the time the bar code reader is triggered.

For the image reader the multiple reset time is not measured in ms, but in frames. The duration of each frame is variable, and is dependent of the captured image. See figure 5.01.

Fig. 5.01. Multiple read reset time
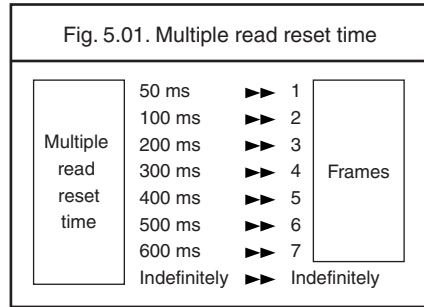
		SET	
50ms	AH		
100ms	AI		
200ms	AJ		
300ms	AK		
400ms	AL		
500ms	**AM**		
600ms	AN		
Indefinitely	AG		
	END		

5.1.2. Quiet zone options

With this option the reader can decode bar codes that have smaller start and/or end margins than specified for the symbology. Be careful when using this option. It may increase the possibility of partial reads and ghost reads. Do not use smaller margin checks then necessary. If possible replace the bar code labels by ones that have correct start and end margins.

	SET	
No margin check	YN	
Margin check 1/7 nominal	YO	
Margin check 2/7 nominal	YP	
Margin check 3/7 nominal	YQ	
Margin check 4/7 nominal	YR	
Margin check 5/7 nominal	YS	
Margin check 6/7 nominal	YT	
Margin check normal	**YU**	
	END	

5.2. Read time options

	SET	
	SET	
0 seconds	Y0	
1 second	Y1	
2 seconds	**Y2**	
3 seconds	Y3	
4 seconds	Y4	
5 seconds	Y5	
6 seconds	Y6	
7 seconds	Y7	
8 seconds	Y8	
9 seconds	Y9	
Read time * 10	YL	
Indefinitely	YM	
	END	

5

Read options

5.3. Redundancy

This is the number of times that a label must be correctly decoded before it is transmitted. Selecting a higher redundancy count makes reading slower, but it reduces the probability of reading errors, especially when labels of poor definition are used.

	SET	
Read 1 time, redundancy = 0	X0	
Read 2 times, redundancy = 1	**X1**	
Read 3 times, redundancy = 2	X2	
Read 4 times, redundancy = 3	X3	
	END	

5.4. Positive and negative bar codes

Usually bar codes are printed black on white, but sometimes white on black. These labels are called positive and negative respectively. In case the 'negative bar codes' option has been selected, positive labels may not be decoded anymore or with difficulty. This also applies to menu labels. To enable the reader to read positive labels again, a number of negative menu labels have been included.

	SET	
Positive bar codes	**V2**	
Negative bar codes	V3	
Positive and negative bar codes	V4	
Positive bar codes	**V2**	
Positive and negative bar codes	V4	
SET / END	ZZ	
	END	

5.5. Floodlight and aiming options

The floodlight and aiming options affect the light source that illuminates the area of the bar code symbol.

The floodlight illuminates the full area during image capturing. When the scannable area consists of a highly reflecting surface the floodlight might need to be disabled to prevent over-exposure.

If an aiming light is available, the bar code reader can generate an aiming pattern to help the user to target at the bar code symbol. The aiming pattern will only be visible between two image captures. The aiming pattern will be off when the floodlight is on.

Disable floodlight:
The option 'disable floodlight' does not illuminate the area of the bar code symbol during image capturing.

Alternating floodlight:
The option 'alternating floodlight' switches by turn between enabled and disabled floodlight.

	SET	
Disable floodlight	D3A	
Enable floodlight	**D39**	
Alternating floodlight	D3B	
	END	

A. EXAMPLE CODES

Example C.01
UPC-A

UPC-A

0 71589 81230 8

UPC-A +2		UPC-A +5

3 4

0 23569 27002 8

9 8 7 6 5

7 49659 02209 3

Example C.02
UPC-E

UPC-E		UPC-E1

0 123456 5

default data: 1234565

1 234567 0

default data: 2345670

UPC-E +2		UPC-E1 +2

2 2

0 213224 0

default data: 213224022

9 0

1 657832 6

default data: 657832690

UPC-E +5		UPC-E1 +5

5 6 7 8 9

0 654321 7

default data: 654321756789

3 2 4 1 8

1 098765 0

default data: 098765032418

Example C.03.
EAN-13 and EAN-8

EAN-13 (ISBN)	EAN-8

9 780131 103627

ISBN data: 0131103628

6537 8823

EAN-13 +2	EAN-8 +2

12

8 710841 090246

23

5638 2662

EAN-13 +5	EAN-8 +5

02904

8 710841 030181

06331

1055 7778

Example C.04.
Code 39 and It.Pharm.

Code 39	Code 39 Italian Pharmaceutical (Full Italian Pharmaceutical)

CODE39

908557705

encoded data: *V2GZD9*

Full Italian Pharmaceutical data: A908557705

Code 39 Full ASCII	Tri-Optic

Code 39

encoded data: *C+O+D+E 39*

R01260
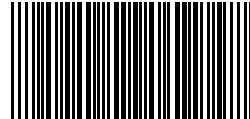
encoded data: $260R01$

Example C.05.
Codabar

Codabar

01235

encoded data: C01235D

Codabar ABC

01234   56789

encoded data:
C01234D

encoded data:
D56789A

Codabar ABC data:
0123456789

Codabar CX

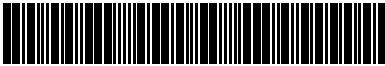12344   56784

encoded data:
A12344C

encoded data:
B56784B

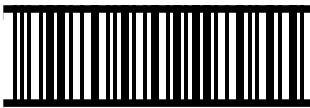Codabar CX data:
1234456784

Example C.06.
2of5 and S-Code

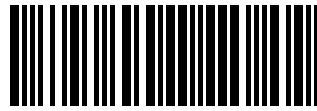| Industrial 2of5 |
|---|

1234567895

Interleaved 2of5 with bearer bars

0123456784

S-Code

98765426

Matrix 2of5

98765430

Chinese Post

0464   100050

encoded data: 04641000501

Example C.07.
IATA

‖‖‖‖‖‖‖‖‖‖‖‖

1234567890

Example C.08.
MSI/Plessey (with MOD 10 Checksum)

‖‖‖‖‖‖‖‖‖‖‖

02468

encoded data: 024687

Example C.09.
Telepen

Telepen numeric (Telepen ASCII)

‖‖‖‖‖‖‖‖‖‖

57748174857483

Telepen ASCII data: Telepen

Example C.10.
UK/Plessey

‖‖‖‖‖‖‖‖‖‖

02468

encoded data: 02468F8

Example C.11.
Code 128 and GS1-128

Code 128

‖‖‖‖‖‖‖‖‖

013579246

EAN-128

‖‖‖‖‖‖‖‖‖

]C12143658709

encoded data: <FNC1>2143658709

Example C.12.
Code 93

‖‖‖‖‖‖‖‖‖

Code 93

Example C.13.
Code 11

‖‖‖‖‖‖‖‖‖

1234-5678

encoded data: 1234-56784

Example C.14.
Korean Postal Authority code

‖‖‖ ‖‖ ‖‖ ‖‖‖ ‖ ‖‖‖ ‖

305-601

Appendix

Example C.15.
Intelligent Mail Barcode

12 001 987654 321600500 21320 0035

Example C.16.
POSTNET

2132035356

encoded data: 21320-3535

Example C.17.
GS1 Databar

GS1 Databar

0165473728281919

encoded data: 65473728281919

GS1 Databar stacked

0198321456098768

encoded data: 98321456098768

GS1 Databar truncated

0100012345678905

encoded data: 00012345678905

GS1 Databar Limited

0117834783468340

encoded data: 17834783468340

GS1 Databar Expanded

012345ABCDE

encoded data: 012345ABCDE

Example C.18.
Composite Codes

Composite
Component A

encoded RSS-14 data: 01234567891231
encoded CC-A data: CC-A : up to 56 characters

default data:
0101234567891231CC-A : up to 56 characters

Composite
Component B

encoded RSS-14 data: 56128923901255
encoded CC-B data: CC-B:encodes up
to 338 alphanumeric characters

default data:
0156128923901255CC-B:encodes up
to 338 alphanumeric characters
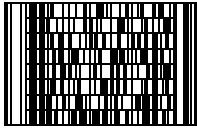
Composite
Component C

encoded EAN-128 data: <FNC1>503012345678
encoded CC-C data: 021301234567893724<GS>
101234567ABCDEFG

default data:
5030123456780021301234567893724<GS>
101234567ABCDEFG

Example C.19.
Codablock F

Codablock F sample bar code

Example C.20.
DataMatrix   (ECC200)

DataMatrix sample bar code.

Example C.21.
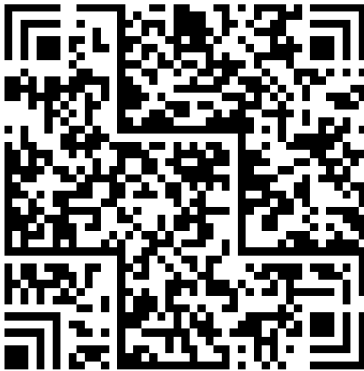**Aztec**   (Aztec)   (Aztec Runes)

Aztec sample bar code.

025

encoded data: 25

Example C.22.
Chinese Sensible code

Example C.23.
QR Code   (Model 2)
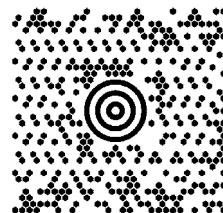

QR Code sample bar code.

Example C.24.
Micro QR Code   (Model 4)

1415926535897

Example C.25.
Maxicode   (Mode 4)

MaxiCode sample bar code.
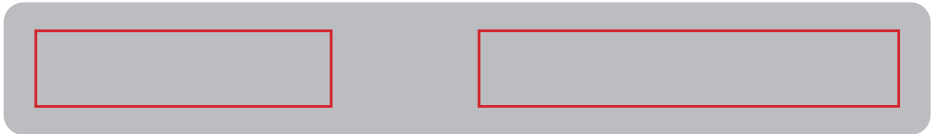
Example C.25.
PDF417

PDF417 sample bar code.

Example C.26.
MicroPDF417

MicroPDF417 sample bar code.

SET ‖‖‖ ‖‖‖ ‖‖‖‖

END ‖‖‖ ‖‖‖ ‖‖‖‖

You can take out this card and pull out the window.

The window spares out one bar code while masking all the other.

Masking card