

DENSO

2D Code Scanner (Fixed type)

QK30-U

User's Manual

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Preface

Please READ through this manual carefully. It will enable you to operate your scanner correctly.

After you have finished reading this manual, keep it handy for speedy reference.

Note: Do not use this scanner in an environment with electrical noise that can trigger malfunction.

Note: The QK30-U specifications described in this manual are supported by the QK30-U firmware version 1.00 or later.

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Customer Registration and Inquiries

Customer Registration

To allow us to provide our customers with comprehensive service and support, we request that all customers complete a Member Registration Form. Registered members will be offered the following privileges.

- Latest upgrade information
- Free exhibition and event information for new products
- Free web-information service "QBdirect"

QBdirect Service Contents

Information search service (FAQ)	Offers detailed information on each product.
Download service	Offers downloads of repair modules for the latest QK30 Series systems or software, and sample programs.
E-mail inquiries	Allows customers to send product-related queries by e-mail.

Please note that these privileges may be subject to change without prior notice.

How to Register

Access the URL below and follow the instructions provided.

<http://www.qbdirect.net>

SAFETY PRECAUTIONS

Be sure to observe all these safety precautions.

- Please READ through these instructions carefully. They will enable you to use the scanner correctly.
- Always keep this manual nearby for speedy reference.

Strict observance of these warnings and cautions is a MUST for preventing accidents that could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and symbols given below before you proceed to the text itself.

 WARNING	Alerts you to those conditions that could cause serious bodily injury or death if the instructions are not followed correctly.
---	--

 CAUTION	Alerts you to those conditions that could cause minor bodily injury or substantial property damage if the instructions are not followed correctly.
---	--

Meaning of Symbols



A triangle (\triangle) with a picture inside alerts you to a warning of danger. Here you see the warning for electrical shock.



A diagonal line through a circle (\odot) warns you of something you should not do; it may or may not have a picture inside. Here you see a screwdriver inside the circle, meaning that you should not disassemble.



A black circle (\bullet) with a picture inside alerts you to something you MUST do. This example shows that you MUST unplug the power cord.

 **WARNING**

To System Designers:



- When introducing the QK30 series of scanners in those systems that could affect human lives (e.g., medicines management system), develop applications carefully through redundancy and safety design which avoids the feasibility of affecting human lives even if a data error occurs.

Wrong handling of the scanner could result in a heat, smoke, or scanner failure. Be sure to observe the following.



- Never bring any metals into contact with the terminals in connectors.
Doing so could produce a large current through the scanner, resulting in heat or fire, as well as damage to the scanner.
- Keep the scanner away from water.
Failure to do so could cause fire or electrical shock.
- Never use the scanner on the line voltage other than the specified level.
Doing so could cause the scanner to break or burn.
- Do not use the scanner where any inflammable gases may be emitted.
Doing so could cause fire.
- Do not scratch, modify, bend, twist, pull, or heat the interface cable. Do not place heavy material on the cable or allow the cable to get pressed under heavy material.
Doing so could break the cable, resulting in a fire.
- Do not subject the scanning window of the scanner to direct sunlight for extended periods.
Doing so could damage the scanner, resulting in a fire.



- If smoke, abnormal odors or noises come from the scanner, immediately switch off the host computer, unplug the interface cable, and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.
- If foreign material or water gets into the scanner, immediately unplug the interface cable, and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.
- If you drop the scanner so as to affect the operation or damage its housing, switch off the host computer, unplug the interface cable, and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.

⚠ CAUTION

Wrong handling of the scanner could result in a heat, smoke, or scanner failure. Be sure to observe the following.

 <p>Never disassemble</p>	<ul style="list-style-type: none">• Never disassemble or modify the scanner. Doing so could result in a fire or electrical shock.
	<ul style="list-style-type: none">• Do not put the scanner on an unstable or inclined plane. The scanner may drop, creating injuries.• Never put the scanner in places where there are excessively high temperatures, such as inside closed-up automobiles, or in places exposed to direct sunlight. Doing so could affect the housing or parts, resulting in a fire.• Avoid using the scanner in extremely humid areas, or where there are drastic temperature changes. Moisture will get into the scanner, resulting in malfunction, fire or electrical shock.• Do not place the scanner anywhere where it may be subjected to oily smoke or steam, e.g., near a cooking range or humidifier. Doing so could result in a fire or electrical shock.• Never cover or wrap up the scanner in a cloth or blanket. Doing so could cause the unit to heat up inside, deforming its housing, resulting in a fire. Always use the scanner in a well-ventilated area.• Do not scratch or modify the scanner or its interface cable. Do not bend, twist, pull, or heat the cable. Doing so could damage the scanner or its interface cable, resulting in a fire.• Do not put heavy material on the scanner or its interface cable, or allow it to get pressed under heavy material.• Do not look into the light source from the scanning window or do not point the scanning window at other people's eyes. Eyesight may be damaged by direct exposure to this light.• Do not use the scanner if your hands are wet or damp. Doing so could result in an electrical shock.• Never use chemicals or organic solvents such as benzene and thinner to clean the housing. Do not apply insecticide to the scanner. Doing so could result in a marred or cracked housing, electrical shock or fire.• Do not use the scanner with anti-slip gloves containing plasticizer. The scanner housing may be broken, creating injuries, electrical shock, or fire.

 **CAUTION**

Wrong handling of the scanner could result in a heat, smoke, or scanner failure. Be sure to observe the following.

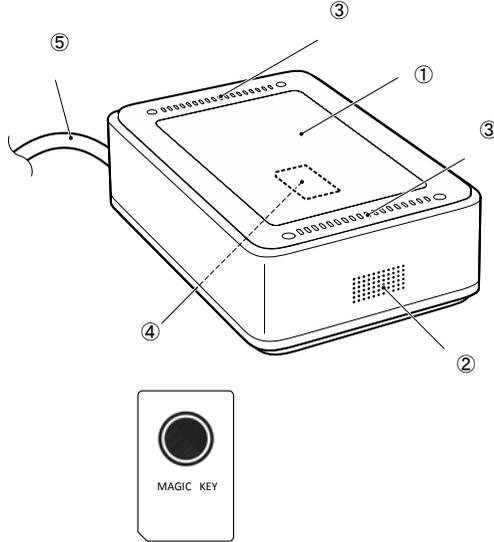
	<ul style="list-style-type: none">• If the interface cable is damaged (e.g., exposed or broken lead wires), stop using it and contact your nearest dealer. Failure to do so could result in a fire or electrical shock.
	<ul style="list-style-type: none">• During an electrical storm, always unplug the interface cable. Expose to power surges could result in a fire.• When taking care of the scanner, unplug the interface cable for safety. Failure to do so could result in an electrical shock.• Do not drop the scanner. The scanner housing may be broken, creating injuries. Unplug the interface cable and contact your nearest dealer. Using the scanner whose housing is broken could result in smoke or fire.

Care and Maintenance

Dust or dirt accumulating on the clear plate of the scanning window will affect reading performance. If you use the scanner in dusty areas, therefore, periodically check the clear plate of the scanning window and clean it if dusty.

- To clean the plate, first blow the dust away with an airbrush. Then gently wipe the plate with a cotton swab or the similar soft one.
- If sand or hard particles have accumulated, never rub the plate; doing so will scratch or damage it. Blow the particles away with an airbrush or a soft brush.

Chapter 1 Names and Functions



No.	Name	Function and Description
①	Scanning window	Apply a code to be scanned to this window.
②	Speaker hole	The speaker sounds when reading is complete.
③	Indicator LEDs	These LEDs light blue when reading is complete and flash red if an error occurs. (Refer to Section 8.2 for details.)
④	Magic key (on the back side)	This key is used to switch the USB interface. (Refer to Section 8.4 for details.)
⑤	Interface cable	USB interface cable The interface cable connects the scanner to a host computer or other host equipment. (Refer to Chapter 3 for the connection to the host and setting up of the USB interface.)

Chapter 2 Preparation

2.1 Operating Environment for Use of the QK30-U

Using the QK30-U requires a host computer equipped with a USB port. The operating environment differs depending upon whether you use the USB-COM interface or USB keyboard interface as listed below. The default interface is the USB-COM interface.

USB-COM interface (factory default):

To use this interface, you need to install the dedicated Active USB-COM driver (virtual COM port driver) to the host computer. This interface allows you to use the scanner in applications using the conventional serial port. For instructions on how to set up the device driver, refer to Chapter 3, Section 3.1. For the interface specifications, refer to Chapter 9, Section 9.1.

USB keyboard interface:

No dedicated USB device driver is required. Via this interface, data scanned by the scanner can be entered to the cursor position in your application. For instructions on how to set up the device driver, refer to Chapter 3, Section 3.2. For the interface specifications, refer to Chapter 9, Section 9.2.

	To use the USB-COM interface (factory default):	To use the USB keyboard interface:
Host computer	Windows PC	
USB driver	Active USB-COM port driver* provided by DENSO WAVE	OS-supplied device driver

Note: Information on the type of applicable operating systems is available from QBdirect.

Refer to the User's Manual for the setup procedure.

Switching between the USB-COM interface and USB keyboard interface is possible by:

- Using QR-coded parameter menu (see Chapter 11),
- Using the configuration software (ScannerSetting_2D)* or
- Using Magic key (see Chapter 8.4).

The interface setting will be retained even if the scanner is turned off.

Note: For approx. 20 seconds after switching from the USB-COM interface to the USB keyboard interface, the scanner cannot accept data entry.

* The User's Manual, Active USB-COM port driver and configuration software (ScannerSetting_2D) are available for registered users to download free of charge from QBdirect.

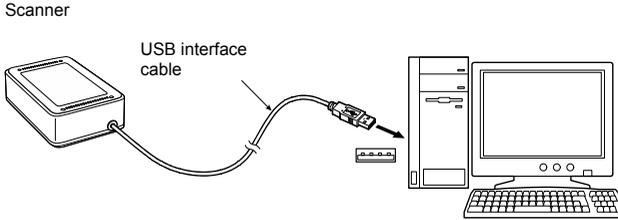
<http://www.qbdirect.net>

Chapter 3 Connection to the Host Computer

The QK30-U receives and sends data from/to the host computer through the USB-COM interface or USB keyboard interface. You need to set up the device driver designed for the interface to be used. (Refer to the section 3.1 and section 3.2)

Notes for connecting the USB interface cable

- To use the USB-COM interface, you need to install the serial port driver to the host computer before connection of the USB interface cable.



- When plugging and unplugging the USB connector, put an interval of at least 10 seconds between those actions since Windows may take several to 10 seconds to add or delete the USB device.
- When the host computer is processing the scanner connection, do not plug or unplug any other USB device cables.
- Directly connect the scanner to the USB port on the host computer or to the self-powered hub. The scanner may not be connected to some types of hubs. If the operation of the hub-connected scanner is unstable, connect it directly to any USB port on the host computer.
- Do not use any extension cord.

Do not use computer's power management features

The scanner does not support standby, sleep, resume, hibernation, and other power management features; therefore, disable their settings before setting up the scanner.

When communication software is open on a computer, disabling a suspend state may cause some computers to be unable to communicate. If it happens, terminate the software and reboot the computer.

3.1 Setting up the USB-COM interface

Using the USB-COM interface requires installing the Active USB-COM port driver provided by DENSO WAVE to the host computer. The driver can be downloaded for free from our website at:

<http://www.qbdirect.net>

The file downloaded contains the driver set up file and the installation guide. For installation, refer to the installation guide. For the latest information, refer to the QBdirect at our home page.

Notes for installing and using the Active USB-COM port driver

- The driver should be installed with administrative permission (Administrator Login).
- The driver does not contain a Microsoft digital signature. Therefore, do not block installation of drivers containing no signature with the driver's signature option or local policy's security option.
- The driver allows hot plugging or unplugging of a USB device even during communication (when the COM port is being opened); however, the communications data when the USB device is disconnected will be lost.
- The driver always serves as a virtual serial port even if a USB device is unplugged, so the driver always occupies a COM port number.
- The driver cannot coexist with conventional Denso USB-COM device drivers in a host computer. In the installation procedure, the Active USB-COM port driver requires uninstalling the conventional ones.
- Installing the driver on a single host computer more than one time enables more than one USB device to be used. However, the uninstaller of the Active USB-COM port driver uninstalls previously installed drivers, not individually but all at once.

Installation procedure

Refer to the installation procedure for “Active USB-COM Port Driver Installation Guide”.

The driver installation procedure consists of two processes: installation of the serial port driver to be performed before connection of the USB device (scanner) and installation of the USB driver to be performed following connection of the USB device.

3.2 Setting up the USB keyboard interface

The USB keyboard interface requires the USB device class driver for HID (Human Interface Device) which is included in Windows 98 or later Operating Systems and whose setup wizard will automatically run. You do not need to install the device driver.

Note: If the USB-COM interface (factory default) is set up, switch it to the USB keyboard interface by scanning the "USB keyboard interface" QR Code symbol given in Section 11.3 with the parameter setting procedure in Section 11.1 or by following the procedure in section 8.4.

Connecting the USB interface cable to the host's USB port or USB hub automatically runs the system-supplied driver setup wizard. Follow the wizard and set up the driver. This section describes the procedure on each of Windows 8, Windows 7, Windows Vista and Windows XP.

Windows 8, Windows 7 and Windows Vista

- (1) Switch the computer on to run Windows 8, Windows 7 or Windows Vista. Log on as an Administrator.
- (2) Connect the scanner's USB interface cable to the computer or USB hub.

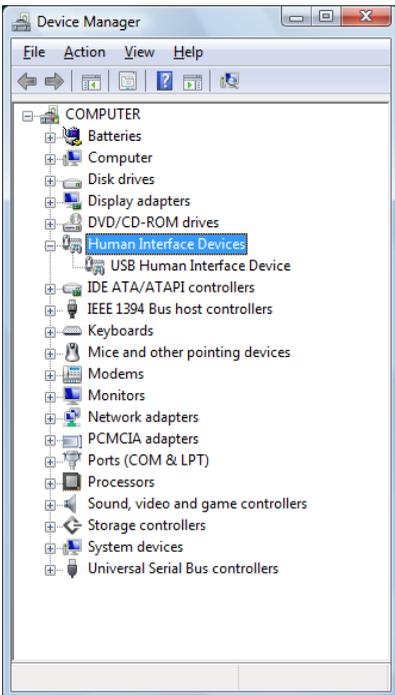


- (3) Wait for the **Installing device driver software** hint to pop up on the Windows task tray.

Windows will automatically configure the scanner. Upon completion of the configuration, the screen shown at left automatically disappears.



- (4) Wait for the **USB Human Interface Device** hint to pop up on the task tray.



- (5) To check whether the USB device is working normally, open the Windows Device Manager.

If **USB Human Interface Device** is added to the sub-tree of **Human Interface Devices** as shown at left, the scanner is connected normally.

If the device is not added or it is marked with **!** or **x**, remove this driver with the uninstaller, reboot your computer, and perform the above connection process again.

Windows XP

- (1) Switch the computer on to run Windows XP. Log on as an Administrator.
- (2) Connect the scanner's USB interface cable to the computer or USB hub.



- (3) Wait for the **Found New Hardware** hint to pop up on the Windows task tray.

Windows will automatically configure the scanner. Upon completion of the configuration, the screen shown at left automatically disappears.



- (4) To check whether the USB device is working normally, open the Windows Device Manager.

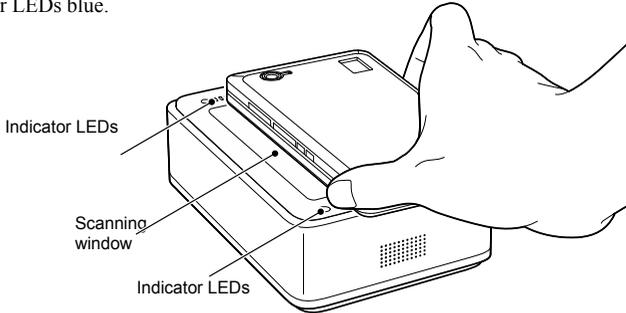
If **USB Human Interface Device** is added to the sub-tree of **Human Interface Devices** as shown at left, the scanner is connected normally.

If the device is not added or it is marked with **!** or **x**, remove this driver with the uninstaller, reboot your computer, and perform the above connection process again.

Chapter 4 Scanning Codes

Bring the LCD of a mobile phone to the scanning window of the scanner as shown below.

The scanner reads a code shown on the mobile's LCD, outputs the code data read, beeps the speaker, and turns the indicator LEDs blue.



Note: The scanner supports the double-read prevention function that prevents the scanner from reading in the same code more than once in succession even if you keep applying a code to the scanning window. To read the same code again after successfully read, therefore, pull the mobile away from the scanning window for at least half a second to release the double-read prevention function.

Note that if you keep applying a low-quality code that cannot be read within half a second to the scanning window, the scanner may double-read the code at intervals of half a second or longer.

Note: The double-read prevention timeout can be specified with the configuration software (ScannerSetting_2D).

Note: The scanner can read codes omnidirectionally. Note that a target code plus its margin should lie within the scan range.

Note: The scanner may fail to read depending upon the mobile model, the contrast or backlight setting, or the LCD surface conditions (e.g., sticker pasted, scratches).

Chapter 5 Customizing the Scanner

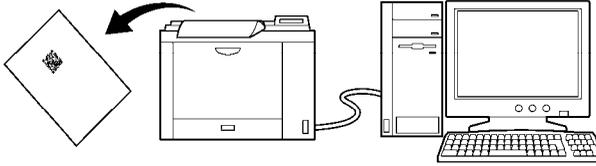
You can customize the scanner by modifying communications, code type, and other scanner parameters with the QR-coded parameter menu or the configuration software ScannerSetting_2D*. These parameters retain their settings even when the power is off.

(1) Scanning parameter setting QR Codes from the **QR-coded parameter menu** by pressing the trigger switch.
(The QR-coded parameter menu is given in Chapter 11.)

(2) Using the **configuration software (ScannerSetting_2D)*** in your computer.

The configuration software is available via the USB-COM interface; it is not via the USB keyboard interface.

The configuration software also offers batch-process QR code symbols for read by scanners in the field. Those symbols printed can be scanned by the scanner via any of the USB-COM interface and USB keyboard interface.



Note: Selecting the USB keyboard interface makes the configuration software unavailable.

* Registered users can download the configuration software (ScannerSetting_2D) from QBdirect, their customer support section on the Denso Wave website at no extra charge.

For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>

Chapter 6 Scanning Control

6.1 Software Control

You can control the scanner by sending scanning control commands from the host computer via USB-COM interface. (For details about control commands, refer to Appendix 2.)

Commands	Description
R	<u>Ready-to-scan command</u> Upon receipt of one of these commands, the scanner lights the illumination LEDs and becomes ready to scan.
Z	<u>Standby command</u> Upon receipt of one of these commands, the scanner turns off the illumination LEDs and switches to standby.

Each of these commands should be enclosed with a header and terminator for transmission according to the communications conditions of the scanner.

6.2 Automatic detection of labels

Bringing a code label within the scan range of the scanning window turns on the illumination LEDs and starts the scanner reading the code.

The illumination LEDs come on when you bring a code label within the designated range or move a code label within the same range. These LEDs go off when a code label is moved away from the range or stays within the range without move for approx. 3 seconds.

The scanner offers a choice of three code response levels. Switch to a higher code response level if the illumination LEDs will not come on when a code is brought into the range, for example. The code response level can be specified with the configuration software (ScannerSetting_2D).

Note: Even if you do not bring a code label within the scan range, the illumination LEDs may come on when the ambient level of light changes or any shadows move within the scan range.

Note: To enable the scanner to work properly in auto sensing mode, an ambient illuminance of at least 30 lx is required.

Chapter 7 Scanning Functions

7.1 Editing Data

You can edit and output code data read, in any of the four data edit modes--"data extraction mode," "data substitution mode," "data blocksorting mode" and "ADF script mode." These data edit modes can be selected with the configuration software (ScannerSetting_2D). The default is "No editing."

Note: In the case of multi-line bar codes, unless all code ID marks read are matched, the data editing processing will result in an error regardless of whether or not the data read contains any error. Whether the code ID mark is matched is determined not by the combination of code ID marks but by Type 1 only (refer to Chapter 9, Section 9.3).

Note: In the case of Structure Append QR Code, the scanner in edit mode or batch edit mode performs data editing processing upon completion of scanning of all split code symbols; in non-edit mode, it performs each time a single split code symbol is read.

7.1.1 Data extraction mode

This mode offers three extraction choices--"data string," "data block" and "AI (Application Identifier)-prefixed string" extractions from code data read and then outputs it.

The "data block" extraction is available only when code data is in the comma-delimited CSV format. The "AI-prefixed string" extraction is available for GS1-128, GS1 DataBar, and GS1 Composite symbols (excluding linear components in a UPC/EAN Composite symbol).

7.1.1.1 Extracting a data string

The scanner extracts a data string specified by the "Extraction start position" and "Extraction end position" from a code specified by the "Code type" and then outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4). The extraction conditions and extraction start and end positions are listed below.

■ Extraction conditions

Extraction conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
Standard 2of5 (STF)	
GS1 DataBar	
GS1 Composite symbols	
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract a data string or scans a code not specified by "Code type" when the "Data transfer regardless of error result" is permitted, then it outputs the data read as is without editing.

■ Extraction start and end positions

"Extraction start position"	"Extraction end position"
Head position	n th position
Tail position	
n th position	Tail position
	By n positions from the start position
	n th position

The n can be 1 through 9999. Note that if the extraction start position is specified as n th position, the extraction end position should be equal to or greater than the extraction start position.

Note: The number of characters for Code 39 symbols should be specified including start and stop codes.

Example Code read: QR Code, Data: 12345,
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Type 1,
Transmission of the number of digits: Enable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Extraction start position	Extraction end position	Output data
"Code type": QR Code "Data transfer regardless of error result": Prohibit	Head position	3rd position	[STX]Q0003123[ETX]
	Tail position	3rd position	[STX]Q0003345[ETX]
	1st position	Tail position	[STX]Q000512345[ETX]
	1st position	By 3 positions	[STX]Q0003123[ETX]
	2nd position	4th position	[STX]Q0003234[ETX]
	Head position	6th position	Error
	Tail position	6th position	Error
	6th position	Tail position	Error
	6th position	By 10 positions	Error
	1st position	6th position	Error
"Code type": QR Code "Data transfer regardless of error result": Permit	Head position	6th position	[STX]Q000512345[ETX]
	Tail position	6th position	[STX]Q000512345[ETX]
	6th position	Tail position	[STX]Q000512345[ETX]
	6th position	By 10 positions	[STX]Q000512345[ETX]
	1st position	6th position	[STX]Q000512345[ETX]
"Code type": PDF417 "Data transfer regardless of error result": Prohibit	Invalid if specified.	Invalid if specified.	Error
"Code type": PDF417 "Data transfer regardless of error result": Permit	Invalid if specified.	Invalid if specified.	[STX]Q000512345[ETX]

7.1.1.2 Extracting data blocks

If data read is in the comma-delimited CSV format, the scanner extracts data blocks specified by the data block numbers from a code specified by the "Code type" and then outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4). The extraction conditions and data block numbers are listed below.

■ Extraction conditions

Extraction conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
Standard 2of5 (STF)	
GS1 DataBar	
GS1 Composite symbols	
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract a data block or scans a code not specified by "Code type" when the "Data transfer regardless of error result" is permitted, then it outputs the data read as is without editing.

■ Data block numbers

Each data block number should be within the range from 1 through 99. Up to three blocks can be extracted.

Example Code read: QR Code, Data: (See the table below.)

Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Data read	Data block numbers	Output data
"Code type": QR Code	1,23,456,7890	1, 2 and 3	[STX]1[ETX][STX]23[ETX][STX]456[ETX]
"Data transfer regardless of error result": Prohibit	1,23,456,7890	3, 1 and 2	[STX]456[ETX][STX]1[ETX][STX]23[ETX]
	1234567890	1	[STX]1234567890[ETX]
	1,,23,456,7890	2 and 5	[STX][ETX][STX]7890[ETX]
	1,23,456,7890	5	Error
	1,23,456,7890	4 and 5	Error
	1234567890	1 and 2	Error
"Code type": QR Code	1,23,456,7890	5	[STX]1,23,456,7890[ETX]
"Data transfer regardless of error result": Permit	1,23,456,7890	4 and 5	[STX]1,23,456,7890[ETX]
	1234567890	1 and 2	[STX]1234567890[ETX]
"Code type": PDF417 "Data transfer regardless of error result": Prohibit	1,23,456,7890	Invalid if specified.	Error
"Code type": PDF417 "Data transfer regardless of error result": Permit	1,23,456,7890	Invalid if specified.	[STX]1,23,456,7890[ETX]

7.1.1.3 Extracting AI (Application Identifier)-prefixed strings

If the scanner reads any of GS1-128, GS1 DataBar, and GS1Composite symbols (excluding linear components in a UPC/EAN Composite symbol), it edits the data according to AIs and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.3).

The "AI-prefixed string" extraction is available in two modes--AI split mode and AI parenthesizing mode. AIs to be used for data editing are listed in (3) AI table later.

(1) AI split mode

In this mode, the scanner extracts strings prefixed with AIs specified (up to three types of AIs) and separates them with the specified delimiters (selectable from headers/terminators, commas and tabs) instead of AIs to output them.

■ Extraction conditions

Extraction conditions	Choices
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed string when the "Data transfer regardless of error result" is permitted, it outputs the data read as is without editing.

■ Delimiters

• Header/terminator

Specifying a header/terminator as delimiters prefixes a header and suffixes a terminator to each element string separated.

A scanner ID, code ID mark, the number of digits, prefix, and suffix can be also added to each element string if their transmissions are enabled. The number of digits is the count of each element string edited.

Example Data read: (01)94901234567894(11)030808(13)030810
 Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
 Transmission of the number of digits: Enable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]94901234567894[ETX][STX]0006030808[ETX][STX]0006030810[ETX]

• Comma

Specifying a comma as delimiters outputs comma-delimited data. No comma follows the tail of the data.

A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

Example Data read: (01)94901234567894(11)030808(13)030810
 Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
 Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]94901234567894,030808,030810[ETX]

• Tab (ASCII 09H (HT))

Specifying a tab as delimiters outputs tab-delimited data. No tab follows the tail of the data.

A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

Example Data read: (01)94901234567894(11)030808(13)030810
 Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
 Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]94901234567894[TAB]030808[TAB]030810[ETX]

Example Data read: (01)94901234567894(11)030808(13)030810(17)040208(17)040305
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Als specified	Delimiter	Output data
"Data transfer regardless of error result": Prohibit	01,11,17	Comma	[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		Error
	01,12		Error
	01,01		Error
"Data transfer regardless of error result": Permit	01,11,17	Comma	[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		[STX]019490123456789411030808130308101704020817040305[ETX]
	01,12		
	01,01		

(Note 1) Element strings will be output in the order of AIs specified.

(Note 2) If data read contains two or more element strings prefixed with the same AI, those element strings will be output in the order arranged in that data read.

(Note 3) If data read does not contain a string prefixed with the specified AI or it contains such data but its number of digits is more or less than the one defined for that AI, an error will result when the "Data transfer regardless of error result" is prohibited.

(2) AI parenthesizing mode

In this mode, the scanner parenthesizes AIs contained in data read and outputs the edited data according to the extraction conditions.

■ Extraction conditions

Extraction conditions	Choices
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed element string when the "Data transfer regardless of error result" is permitted, it outputs the data read as is without editing.

Example Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Data read	Output data
"Data transfer regardless of error result": Prohibit	0194901234567894110308081303 081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081303 081061704020817040305	Error (Note 1)
"Data transfer regardless of error result": Permit	0194901234567894110308081303 081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081303 081061704020817040305	[STX]0194901234567894110308081303081061704020817040305[ETX]

(Note 1) Data from the head to element string 030810 prefixed with AI (13) can be normally extracted, but the following data (as underlined below) causes an error since it starts with 6 that cannot start any AI.

(01)94901234567894(11)030808(13)03081061704020817040305

(3) AI table

In the AI-prefixed string extraction, the scanner edits data according to the Application Identifiers (AIs) defined below.

AI	Format	Description
00	n2+n18	Serial Shipping Container Code (SSCC)
01	n2+n14	Global Trade Item Number (GTIN)
02	n2+n14	GTIN of Trade Items Contained in a logistic unit (For Use with AI 37 Only)
03	n2+n14	Reserved.
04	n2+n16	Reserved.
10	n2+an..20	Batch or Lot Number
11	n2+n6	Production Date (YYMMDD) (*)
12	n2+n6	Due Date (YYMMDD) (*)
13	n2+n6	Packaging Date (YYMMDD) (*)
15	n2+n6	Best Before Date (YYMMDD) (*)
17	n2+n6	Expiration Date (YYMMDD) (*)
20	n2+n2	Product Variant
21	n2+an..20	Serial Number
22	n2+an..29	HIBCC (Health Industry Business Communication Council)--Quantity, Date, Batch, and Link
23n	n3+n..19	Batch or Lot Number (Transitional Use) (**)
240	n3+an..30	Additional Product Identification Assigned by the Manufacturer
241	n3+an..30	Customer Part Number
250	n3+an..30	Secondary Serial Number
251	n3+an...30	Reference to Source Entity
252	n3+n27	Global Serial Number
30	n2+n..8	Quantity
310n	n4+n6	Net Weight, Kilograms
311n	n4+n6	Length or 1st Dimension, Meters
312n	n4+n6	Width, Diameter, or 2nd Dimension, Meters
313n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters
314n	n4+n6	Area, Square Meters (***)
315n	n4+n6	Volume, Liters (***)
316n	n4+n6	Volume, Cubic Meters (***)

AI	Format	Description
320n	n4+n6	Net Weight, Pounds (***)
321n	n4+n6	Length or 1st Dimension, Inches (***)
322n	n4+n6	Length or 1st Dimension, Feet (***)
323n	n4+n6	Length or 1st Dimension, Yards (***)
324n	n4+n6	Width, Diameter, or 2nd Dimension, Inches (***)
325n	n4+n6	Width, Diameter, or 2nd Dimension, Feet (***)
326n	n4+n6	Width, Diameter, or 2nd Dimension, Yards (***)
327n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches (***)
328n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet (***)
329n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards (***)
330n	n4+n6	Gross Weight, Kilograms (***)
331n	n4+n6	Length or 1st Dimension, Meters, Logistics (***)
332n	n4+n6	Width, Diameter, or 2nd Dimension, Meters, Logistics (***)
333n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters, Logistics (***)
334n	n4+n6	Area, Square Meters, Symbology (***)
335n	n4+n6	Gross Volume, Liters (***)
336n	n4+n6	Gross Volume, Cubic Meters (***)
337n	n4+n6	Kilograms per Square Meter (pressure) (***)
340n	n4+n6	Gross Weight, Pounds (***)
341n	n4+n6	Length or 1st Dimension, Inches, Logistics (***)
342n	n4+n6	Length or 1st Dimension, Feet, Logistics (***)
343n	n4+n6	Length or 1st Dimension, Yards, Logistics (***)
344n	n4+n6	Width, Diameter, or 2nd Dimension, Inches, Logistics (***)
345n	n4+n6	Width, Diameter, or 2nd Dimension, Feet, Logistics (***)
346n	n4+n6	Width, Diameter, or 2nd Dimension, Yards, Logistics (***)
347n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches, Logistics (***)
348n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet, Logistics (***)
349n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards, Logistics (***)
350n	n4+n6	Area, Square Inches (***)
351n	n4+n6	Area, Square Feet (***)
352n	n4+n6	Area, Square Yards (***)

AI	Format	Description
353n	n4+n6	Area, Square Inches, Logistics (***)
354n	n4+n6	Area, Square Feet, Logistics (***)
355n	n4+n6	Area, Square Yards, Logistics (***)
356n	n4+n6	Net Weight, Troy Ounces (***)
357n	n4+n6	Net Volume, Ounces (***)
360n	n4+n6	Volume, Quarts (***)
361n	n4+n6	Volume, Gallons (***)
362n	n4+n6	Gross Volume, Quarts (***)
363n	n4+n6	Gross Volume, Gallons (***)
364n	n4+n6	Volume, Cubic Inches (***)
365n	n4+n6	Volume, Cubic Feet (***)
366n	n4+n6	Volume, Cubic Yards (***)
367n	n4+n6	Gross Volume, Cubic Inches (***)
368n	n4+n6	Gross Volume, Cubic Feet (***)
369n	n4+n6	Gross Volume, Cubic Yards (***)
37	n2+n..8	Quantity (For Use with AI 02 Only)
390n	n4+n15	Amount Payable--Single Monetary Area
391n	n4+n3+n15	Amount Payable and ISO Currency Code
392n	n4+n15	Amount Payable for a Variable Measure Trade Item--Single Monetary Area
393n	n4+n3+n15	Amount Payable for a Variable Measure Trade Item and ISO Currency Code
400	n3+an..30	Customer's Purchase Order Number
401	n3+an..30	Consignment Number
402	n3+n17	Shipment Identification Number
403	n3+an..30	Routing Code
410	n3+n13	Ship to (Deliver to) Global Location Number
411	n3+n13	Bill to (Invoice to) Global Location Number
412	n3+n13	Purchased from Global Location Number
413	n3+n13	Ship for (Deliver for) Global Location Number
414	n3+n13	Identification of a Physical Location--Global Location Number
415	n3+n13	Global Location Number of the Invoicing Party
420	n3+an..20	Ship to (Deliver to) Postal Code Within a Single Postal Authority

AI	Format	Description
421	n3+n3+an..9	Ship to (Deliver to) Postal Code with Three-Digit ISO Country Code Prefix
422	n3+n3	Country of Origin of a Trade Item
423	n3+n15	Country of Initial Processing
424	n3+n3	Country of Processing
425	n3+n3	Country of Disassembly
426	n3+n3	Country of Final Processing
43	n2+n4+n7+an..10+n1	Carrier Assigned Tracking Number
7001	n4+n13	NATO Stock Number (NSN)
7002	n4+an..30	UN/ECE Meat Carcasses and Cuts Classification
7003	n4+n10	Effective term (YYMMDDHHMM)
7030	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, Butchery
7031	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 1st Processing Place
703n	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 2nd to 9th Processing Places
8001	n4+n14	Roll Products--Width, Length, Core Diameter, Direction, and Splices
8002	n4+an..20	Cellular Mobile Telephone Identifier
8003	n4+n14+an..16	Global Returnable Asset Identifier (GRAI)
8004	n4+an..30	Global Individual Asset Identifier (GIAI)
8005	n4+n6	Price Per Unit of Measure
8006	n4+n14+n2+n2	Identification of the Component of a Trade Item
8007	n4+an30	International Bank Account Number (IBAN)
8008	n4+n6+n6	Date and Time of Production (YYMMDDHHMSS)
8018	n4+n18	Global Service Relation Number (GSRN)
8020	n4+an25	Payment Slip Reference Number
8100	n4+n1+n5	UPC Coupon Extended Code--Number System Character and Offer Code
8101	n4+n1+n5+n4	UPC Coupon Extended Code--Number System Character, Offer Code, and End of Offer Code
8102	n4+n1+n1	UPC Coupon Extended Code--Number System Character Preceded by Zero
90	n2+an..30	FACT Data Identifiers
91	n2+an..30	Company Internal Information--Company
92	n2+an..30	Company Internal Information--Company

AI	Format	Description
93	n2+an..30	Company Internal Information--Company
94	n2+an..30	Company Internal Information--Company
95	n2+an..30	Company Internal Information--Carrier
96	n2+an..30	Company Internal Information--Carrier
97	n2+an..30	Company Internal Information--Company
98	n2+an..30	Company Internal Information--Company
99	n2+an..30	Company Internal Information

(*) To indicate only year and month, DD must be filled with "00."

(**) n indicates the length of data.

(***) n indicates the decimal point position.

a	Alphabetic characters
a3	3 alphabetic characters, fixed length
a..3	Up to 3 alphabetic characters
n	Numeric characters
n3	3 numeric characters, fixed length
n..3	Up to 3 numeric characters
an	Alphanumeric characters
an3	3 alphanumeric characters, fixed length
an..3	Up to 3 alphanumeric characters

(Note 1) If the specified AI is variable in length and the number of digits in data read is less than the maximum number of digits defined for the AI, then the output contains data read up to a GS (1Dh).

7.1.2 Data substitution mode

If the scanner reads a code specified by the "Code type" in this mode, it searches the data read for the specified string (max. 16 ASCII characters), substitutes it with the specified substitution string (max. 16 ASCII characters), and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.3).

■ Substitution conditions

Substitution conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	Standard 2of5 (STF)
GS1 DataBar	
GS1 Composite symbols	
Search string and substitution string	Max. 16 ASCII characters (00h to FFh) each

Example Code read: PDF417, Data: 12345678,
 Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
 Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Substitution condition	Search string and Substitution string	Output data
"Code type": PDF417	2 → A 4 → B	[STX]1A3B5678[ETX]

7.1.3 Data blocksorting mode

The scanner splits code data read into a maximum of 5 blocks at the specified separate positions, sorts those blocks in the specified order, and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.3).

Note: The separate position must be specified by the number of digits from the head of code data read. Specifying the number of digits exceeding that in the code data results in an error.

■ Blocksorting conditions

Blocksorting conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
Standard 2of5 (STF)	
GS1 DataBar	
GS1 Composite symbols	

Example Code read: Code 128, Data: 1234567890,
 Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
 Transmission of the number of digits: 4 digits, Prefix/Suffix: None, BCC: Disable

Separate position	Order of blocks	Output data
3rd position, 8th position	Block 2, 1, 3	[STX]K00104567812390[ETX]
3rd position, 8th position	Block 1, 3	[STX]K000512390[ETX]

7.1.4 ADF script mode

The ADF script refers to a simple program language designed for editing of data read. It enables the following functions.

- (1) Extracting data that is fixed or variable in length
- (2) Supporting Application Identifiers (AIs) in GS1-128, GS1 DataBar and GS1Composite symbols
- (3) Sorting data blocks into the specified order
- (4) Collating data for verification
- (5) Outputting same data repeatedly
- (6) Performing four arithmetic operations including residue calculation, e.g., transformation of units
- (7) Substituting data
- (8) Comparing character strings
- (9) Driving indicator LEDs and speaker

The ADF script mode can be programmed with the configuration software (ScannerSetting_2D). To configure the scanner with the ADF script, transfer the script to the scanner or generate an ADF script QR code symbol with the configuration software (ScannerSetting_2D) and use the scanner to read the symbol.

For the specifications and instructions for use of the ADF script, refer to the ADF Script User's Guide.

Note: The ADF script mode cannot be used together with the GTIN format conversion or any of other edit modes (data extraction mode, data substitution mode, and data blocksorting mode).

7.2 Scanning a reverse Code

The scanner can scan symbols viewed from the front surface or from the back surface. Scanning of 2D Code viewed from the back surface can be set to enable(setting to read Reverse code) or disable(setting to read Normal mode) using the configuration software. If scanning of 2D Code viewed from the back surface is enabled, scanning time of 2D Code may become longer.

7.3 Scanning a Black-and-white Inverted Code

The scanner usually scans a black-and-white normal code (black cells/bars on a white background). You can switch the scanner to scan a black-and-white inverted code (white cells/bars on a black background) or to scan both types of codes while automatically identifying them, using the QR-coded parameter menu or the configuration software (ScannerSetting_2D).

Note that the automatic detection scanning may take more time than normal code or inverted code scanning.

A black-and-white inverted code requires a black quiet zone of more than the number of cells defined in the code specifications.

7.4 Scanning Structure Append QR(iQR) Code Symbols

QR Code symbology can split data into a maximum of 16 blocks and encode each of them into a Structure Append QR Code symbol (model 1, model 2) or iQR Code symbol. Structure Append QR Code scanning is possible only with the same QR Code type.

The scanner can scan Structure Append QR Code symbols and restore them to the original data string in batch edit mode or non-edit mode. The mode can be selected with the QR-coded parameter menu or configuration software (ScannerSetting_2D).

Batch edit mode

This mode is supported by QR Code model 1 and 2 only.

If all Structure Append QR Code symbols split into a maximum of four blocks lie within the readable area, the scanner reads them all once and then edits and sends them to the host computer.

Non-edit mode

Each time a single Structure Append QR Code symbol is read, the scanner sends the data read to the host computer.

When scanning Structure Append QR Code symbols, the scanner beeps in a different way from usual. That is, when the scanner reads the first Structure Append code, it beeps twice and enters the Structure Append code scanning mode. When the scanner completes the sequence of Structure Append code scanning, it beeps three times.

Note: If you scan any non Structure Append QR (iQR) Code symbol or a code other than a QR (iQR) Code symbol midway through a sequence of Structure Append QR Code scanning, the scanner cancels the Structure Append code scanning, discards the Structure Append QR Code data already scanned, and sends the code scanned last.

Note: If the scanner switches to standby or the Structure Append code scanning interval exceeds approx. 3 seconds, then the scanner discards the data scanned and cancels the Structure Append code scanning sequence.

Note: If you scan a Structure Append code symbol of any other QR Code before completion of the current scanning sequence, the scanner discards the data already scanned and starts a new scanning sequence.

7.5 Multi-line Barcode Scanning

The scanner can scan up to 3 lines of bar codes in the readable area at any one time. You can specify the number of lines to be scanned, the data output order and output format using the configuration software (ScannerSetting_2D).

7.5.1 Number of lines

The number of lines allowed for multi-line barcode scanning is 2 or 3. This setting is essential.

7.5.2 Data output order

You can specify the data output order by designating code types*¹, heading characters*², or the number of digits to be scanned*³.

*¹ Code types should be selected from readable bar codes you enable. This setting is essential.

*² Up to two heading characters can be specified. If a question mark (?) is specified, it acts as a wild card. This setting can be omitted.

*³ The number of digits to be scanned varies depending upon the code type. This setting is essential.

Note: The number of characters for Code 39 symbols should be specified including start and stop codes.

7.5.3 Output format

You can select either the header/terminator- or comma-delimited output format.

(1) Header/terminator-delimited output format

Specifying this format allows the scanner to output multiple lines of barcode data in succession in the data transmission format selected (see Section 9.3) so that the headers and terminators act as delimiters. For UPC and EAN codes, the number of digits will be omitted.

(2) Comma-delimited output format

Specifying this format allows the scanner to output multiple lines of barcode data delimited with commas in the data transmission format selected (see Section 9.3). Note that the scanner outputs the code ID mark specified for the first line barcode and the number of digits including the delimiter commas. The number of digits will not be omitted even for UPC and EAN codes.

Note 1: Bar code types specified for multi-line barcode scanning cannot be read individually.

Note 2: The scanner cannot read multi-line barcodes of UPC/EAN with add-on.

Note 3: If linear components in a UPC/EAN Composite symbol are specified for multi-line barcode scanning, UPC/EAN Composite symbols including the specified linear components cannot be read.

7.6 Scanning an SQRC (Security QR Code) Symbol

An SQRC symbol refers to a security QR Code symbol that consists of disclosed and undisclosed data. The undisclosed data can be read only when the encryption key configured in the scanner matches the one in the SQRC symbol.

To read an SQRC symbol with the scanner, it is necessary to enable SQRC scanning ("SQRC symbols only" or "both SQRC symbols and QR Code symbols") using the configuration software (ScannerSetting_2D). The following SQRC related parameters can be also specified--"Data transmission after mismatch of encryption key," "Management of encryption key," and "Data transmission of undisclosed data."

Note: SQRC scanning requires configuring an encryption key beforehand with the SQRC configuration software (SQRC Setting) separately prepared.

Chapter 8 Speaker, Indicator LEDs, Illumination LEDs and Magic key

8.1 Speaker

8.1.1 Beeping at prescribed frequencies

(1) Beeping

The scanner emits a short or long beep, once or a couple of times as described below.

The speaker emits a **short beep** when:

- the scanner has read a code successfully (Instead of this beep, audio data in Section 8.1.2 can be used as a scanning completion sound.),
 - the scanner has read a Structure Append QR Code symbol,
 - the "Start setting" or "End setting" code is read (3 beeps) or the parameter setting QR Code symbols are read (1 beep) from the QR-coded parameter menu (given in Chapter 11),
 - the configuration software (ScannerSetting_2D) starts up or accepts new settings (3 beeps), or
 - the scanner has read a batch-process QR Code symbol generated with the configuration software (ScannerSetting_2D) (3 beeps).
-

The speaker emits a **long beep** when:

- the scanner has read Structure Append QR Code symbols in edit mode and the accumulated data exceeds 8 kilobytes,
 - a code other than a parameter setting code is read during parameter setting by the QR-coded parameter menu,
 - a transmission error or timeout occurred when the scanner was communicating with the configuration software (ScannerSetting_2D),
 - the encryption key of data read does not match the one configured in the scanner in SQRC scanning (when the "Reading disable" is selected in "SQRC Encryption key mismatch")
 - a communications error has occurred, or
 - an invalid control command is received.
-

The configuration software (ScannerSetting_2D) provides a choice of speaker ON/OFF (default:OFF) when the scanner is turned on, but does not provide a choice of speaker tone.

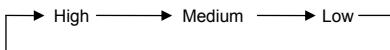
You can disable the speaker using the QR-coded parameter menu or configuration software (ScannerSetting_2D)*. In any of the following cases, however, the speaker sounds regardless of that speaker setting: (Except that speaker forced OFF is enabled.)

- when you make settings by scanning the QR-coded parameter menu,
- when the scanner receives a speaker-ON command from the host computer,
- when the configuration software (ScannerSetting_2D) starts up or any setting you have made is established,
- when the scanner reads a batch-process QR Code symbol, and
- when the parameter values are saved by a PW command (refer to Appendix 2).

(2) Adjusting the speaker volume

You can adjust the speaker volume to three levels--high, medium and low--using the QR-coded parameter menu or configuration software (ScannerSetting_2D). The factory default is High.

Each time the "Speaker volume" QR Code symbol is read, the speaker volume cycles as shown below.



Even if the scanner is turned off, it retains this setting.

8.1.2 Audio playback

The scanner plays back previously recorded audio data files as a scanning completion sound, using the speaker.

(1) Registering an audio data file

Up to five audio data files can be registered with the configuration software (ScannerSetting_2D).

Audio data file specifications

The table below lists the audio data file specifications supported by the scanner.

File format	WAV
Audio file format	PCM (Linear PCM)
Sampling rate	8 to 48 kHz (44.1, 22.05, or 11.025 kHz recommended)
Sampling size	8 bits, 16 bits
Number of channels	1 (monaural) 2 (stereo, the left channel is played)
File size	500 kilobytes (max.)

Notes

- Once registered, audio data files can no longer be erased, so overwrite them with new ones.
- Audio data files out of the specifications cannot be registered.

(2) Playing back an audio data file

Using the configuration software (ScannerSetting_2D) or control commands (IS and VOLSND in Appendix 2) to be sent from the host plays back audio data files previously registered.

Notes

- During playback of an audio data file, no code can be read.
- If the playback time of an audio data file is long, take it into consideration in system operation.
- Playback specified by a control command has priority over that by the configuration software (ScannerSetting_2D).
If the scanner receives two or more playback commands, the last one takes effect.

(3) Adjusting the playback volume

You can adjust the playback volume to ten levels for each audio data file, using the QR-coded parameter menu, configuration software (ScannerSetting_2D), or control commands.

Notes

Depending upon the playback volume selected, the speaker may make crackling or stuttering sounds due to the installation environment.

8.2 Indicator LEDs

The indicator LEDs light or flash in blue, green or red as described below.

The indicator LEDs light **in blue** when:

- the scanner has read a code successfully,
 - the "Start setting" or "End setting" code is read from the QR-coded parameter menu (given in Chapter 11),
 - the scanner starts or ends a sequence of Structure Append QR Code scanning,
 - the scanner has read a Structure Append QR Code symbol, or
 - the parameter values are saved by a PW command (refer to Appendix 2).
-

The indicator LEDs light **in red** when:

- the scanner has received an abnormal control command,
 - the scanner has failed to edit data read,
 - the scanner has read Structure Append QR Code symbols in edit mode and the accumulated data exceeds 8 kilobytes,
 - the scanner has failed to save parameter values specified with the configuration software (ScannerSetting_2D), QR-coded parameter menu, or control commands,
 - a code other than a parameter setting code is read during parameter setting by the QR-coded parameter menu,
 - a transmission error or timeout occurred when the scanner was communicating with the configuration software (ScannerSetting_2D), or
 - a run-time error has occurred in ADF script.
-

The indicator LEDs light or flash **in green** when: (POWER Indication LEDs)

- When the scanner is turning on. (Power indication LED function needs to be setting with the configuration software (ScannerSetting_2D))
-

The indicator LEDs can be disabled with the QR-coded parameter menu or configuration software (ScannerSetting_2D). In any of the following cases, however, the indicator LEDs come on regardless of the current LED setting.

- When the scanner is being customized with the QR-coded parameter menu (Chapter 11),
- When the scanner receives an LED-ON command (ID) from the host computer (refer to Appendix 2),
- When the configuration software (ScannerSetting_2D) starts up or any setting is newly established,
- When the scanner reads a batch-process QR Code symbol,
- When the parameter values are saved by a PW command (refer to Appendix 2),
- When the scanner has failed to save parameter values specified with the configuration software (ScannerSetting_2D), QR-coded parameter menu, or control commands, or
- When a run-time error has occurred in ADF script.

8.3 Illumination LEDs

When the scanner is ready to scan, the illumination LEDs flash.

8.4 Magic key

8.4.1 Magic key function

The following magic key functions, or no function, can be selected according to need, by the configuration software.

Note: Do not apply force in excess of 10N on this key.

No function

No function is assigned to magic key: No operation is changed by pressing magic key.

Scanning ON/OFF mode

Each time the magic key is pressed, the scanner mode is switched between Standby mode and Active state.

8.4.2 USB keyboard interface auto-switching function

If the Active USB-COM port driver is not installed in the computer, (1) hold on the magic key, (2) connect the scanner's USB interface cable to the computer or its USB hub, and (3) release the magic key more than five seconds later.

After the interface is switched to the USB keyboard interface, the scanner is reconnected to the host computer. The interface can be switched to the USB keyboard interface only when the scanner is originally set to the USB-COM interface. The configuration software can disable the USB keyboard interface switchover function. The interface type remains unchanged during the power off.

Chapter 9 Communication

9.1 USB-COM Interface

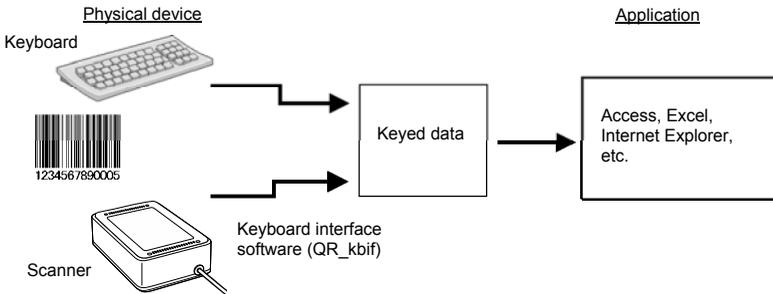
This scanner is compliant with USB 1.1(Universal Serial Bus Specification Revision 1.1)

Installing the dedicated Active USB-COM port driver to the host computer allows the USB-COM interface to operate in communications applications using the conventional serial port.

Note: Entering data transferred from the scanner via the USB-COM interface directly to applications (e.g., Access, Excel, and Internet Explorer) running on the host computer requires the keyboard interface software (QR_kbif)*. As shown below, the QR_kbif converts the data read into the keying format and passes it to applications in the manner as if it is coming from the keyboard. It is, therefore, possible for applications capable of accepting keyed data to handle the data read by the scanner.

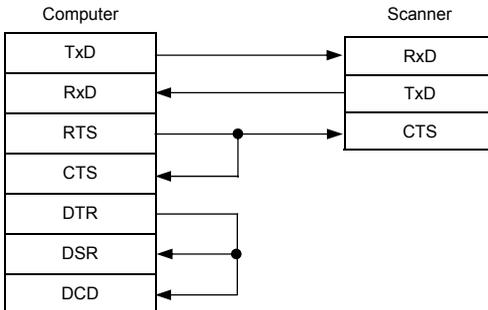
* Registered users can download the keyboard interface software (QR_kbif), Active USB-COM driver, and the configuration software (ScannerSetting_2D) from QBdirect, their customer support section on the Denso Wave website at no extra charge. For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>



■ Notes for use

- If you connect the scanner to your computer first time or have changed the COM port for the scanner or hub, then confirm the COM port number on the Windows Device Manager or the like before use.
- If you want to use two or more communications processors (software) or scanners concurrently on your computer, be sure to assign a unique COM port number to each of them.
- It is not necessary to make settings such as transmission speed, data bits, parity, and stop bits (which are required for communications software using a conventional serial port) since the USB interface ignores those settings. The flow control should be set to "Hardware (RTS/CTS)" or "None."
- The virtual COM port on the computer and the scanner are connected with each other as shown below.



■ Communications protocol

You can select either non-acknowledge mode or ACK/NAK mode.

Non-acknowledge mode (default)

If the CTS signal is at a high level (Enable transmission), the scanner transmits code data read.

Note: The configuration software (ScannerSetting_2D) provides a choice of CTS signal monitoring time from 100 ms to 9.9 s in 100-ms increments and two CTS signal control choices Yes and No.

ACK/NAK mode

If the CTS signal is at high level (Enable transmission), the scanner transmits code data read. After that, the scanner waits for and then processes a response. If the response is an ACK, the scanner normally ends the transmission; if it is a NAK, the scanner transmits the code data again.

Note: The configuration software (ScannerSetting_2D) provides a choice of CTS signal monitoring time and ACK/NAK confirmation time settings each from 100 ms to 9.9 s in 100-ms increments.

9.2 USB Keyboard Interface

The USB keyboard interface requires no dedicated device driver. Data read by the scanner can be entered to the cursor position in your application.

The USB keyboard interface operates in conformity with the following:

- Universal Serial Bus (USB) Device Class Definition for Human Interface Devices (HID) Version 1.11
- Universal Serial Bus (USB) HID Usage Tables Version 1.11 keyboard

(1) CAPS Lock state

Select the CAPS Lock ON or OFF to match the state of the connected keyboard. (Default: CAPS Lock OFF)

(2) Keyboard type

Select the type of the connected keyboard. (Default: Type 106, Japanese)

(3) Numeric data transmission format

Select the "Inboard keys" or "TEN keys" on the connected keyboard. (Default: Inboard keys)

(4) Binary conversion

Select the conversion type to be applied to data read, from the following:

- "No conversion" (ASCII) (default) : Outputs 00h to 7Fh data in ASCII format byte-wise. Selecting this parameter does not output 80h to FFh data.
- "Binary conversion" : Converts 00h to FFh data to binary format and outputs it byte-wise.
- "Kanji conversion" : Converts 00h to FFh data to Shift-JIS format and outputs it, two bytes at a time. If there is any data to which this Kanji conversion cannot apply, it converts such data to binary format and outputs it byte-wise instead.

Note that some applications may fail to output converted data as it is displayed.

(Example) If the code data is "Kanji":

```
DATA:Kanji  
Shift JIS:8ABF, 8E9A
```

Binary Data Conversion	Output Data	Remarks
None	Not output	Only indicates that scanning is complete.
Binary conversion	8Ah BFh 8Eh 9Ah assigned characters	Outputs 1 byte at a time in binary data.
Kanji conversion	"Kanji"	Converted to Kanji and output. (Note 1)

(Note 1) Some applications cannot output data correctly on the display.

(5) Data transmission interval

Select the data transmission interval to be applied when the scanner sends data read to the host computer. There are seven choices from 3 ms to 100 ms (default: 10 ms).

9.3 Communication Format

■ Data transmission format

Select one of the following two data transmission formats.

Header	Scanner ID	Code ID mark	Prefix	No. of digits				Code data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

Header	Scanner ID	Prefix	Code ID mark	No. of digits				Code data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

(1) Header/Terminator

The following choices are available.

USB-COM interface

Header: None (default), STX, or user-defined one

Terminator: CR (default), none, LF, CR/LF, ETX, or user-defined one

USB keyboard interface

Header: None (default), TAB, ESC, ENTER or others

Terminator: None, TAB, ESC, ENTER (default) or others

For details, refer to Chapter 10.

(2) Scanner ID

A scanner ID is a unique serial number assigned to an individual scanner at the time of shipment. It consists of six numerals.

(3) Prefix/Suffix

A prefix or suffix consists of up to eight ASCII characters (00h to FFh). You can set a prefix or suffix with the configuration software (ScannerSetting_2D). (Default: No prefix or suffix)

(4) BCC

The Block Character Check (BCC) exclusive-ORs all bits at the same bit level in characters following the header and preceding the terminator in a transmission block to generate a horizontal parity byte to be transferred in a binary code. The BCC can be enabled or disabled. If no header is prefixed or the USB keyboard interface is selected, no BCC will be transferred.

(5) Code ID mark

This optional field specifies the code system. It offers ten combinations with five code ID marks (Type 1, Type 2, Type 3, Type 4, and user-defined) and two output modes (coupling and separating) as listed below.

You can also select whether or not to transmit the code ID mark. (Default: No transmission)

(1/3)

Code Type			Code ID mark				
			Type1		Type2		
			Coupling	Separating	Coupling	Separating	
2D codes	QR Code		Q		Q		
	QR Code (Structured appended)	In batch edit mode	Q		Q		
		In non-edit mode	S		S		
	MicroQR Code		Q		Q		
	SQRC		Q		Q		
	iQR Code		G		G		
	iQR Code (Structured appended)(Non-edit mode)		S		S		
	MaxiCode		X		X		
	PDF417		Y		Y		
	MicroPDF417		Y		Y		
	Data Matrix	Square	Z		Z		
		Rectangular	Z		Z		
Aztec		J		J			
Bar codes	UPC-A	Without add-on		A		A	
		With 2-digit add-on	Linear component	A		A	
			Add-on	None		None	
		With 5-digit add-on	Linear component	A		A	
			Add-on	None		None	
		UPC-E	Without add-on		C		E
	With 2-digit add-on		Linear component	C		E	
			Add-on	None		None	
	With 5-digit add-on		Linear component	C		E	
			Add-on	None		None	
	EAN-13		Without add-on		A		F
		With 2-digit add-on	Linear component	A		F	
			Add-on	None		None	
		With 5-digit add-on	Linear component	A		F	
			Add-on	None		None	
		EAN-8	Without add-on		B		FF
	With 2-digit add-on		Linear component	B		FF	
			Add-on	None		None	
With 5-digit add-on	Linear component		B		FF		
	Add-on		None		None		

Code Type		Code ID mark			
		Type1		Type2	
		Coupling	Separating	Coupling	Separating
Bar codes	Interleaved 2of5	I		I	
	Standard 2of5 (short)	H		H	
	Standard 2of5 (normal)	H		H	
	Code 39	M		M	
	Code 39 Full ASCII	M		M	
	Codabar (NW-7)	N		N	
	Code 128	K		K	
	GS1-128	W		W	
	Code 93	L		L	
	GS1 DataBar (Note 1)	R		R	

Code Type			Code ID mark					
			Type1		Type2			
			Coupling	Separating	Coupling	Separating		
GS1 Composite symbols	GS1 DataBar (Note 1) CC-A GS1 DataBar (Note 1) CC-B		GS1 DataBar		V	R	V	R
			CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)
	UPC-A CC-A, UPC-A CC-B	UPC-A	Without add-on		V	A	V	A
			With 2-digit add-on	Linear component	V	A	V	A
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	A	V	A
				Add-on	None	None	None	None
	CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)		
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	Without add-on		V	A	V	F
			With 2-digit add-on	Linear component	V	A	V	F
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	A	V	F
				Add-on	None	None	None	None
	CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)		
	UPC-E CC-A, UPC-E CC-B	UPC-E	Without add-on		V	C	V	E
			With 2-digit add-on	Linear component	V	C	V	E
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	C	V	E
				Add-on	None	None	None	None
	CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)		
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	Without add-on		V	B	V	FF
			With 2-digit add-on	Linear component	V	B	V	FF
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	B	V	FF
				Add-on	None	None	None	None
	CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)		
GS1-128 CC-A, GS1-128 CC-B, GS1-128 CC-C	GS1-128		V	W	V	W		
	CC-A, CC-B, CC-C		None	Y (Note 2)	None	Y (Note 2)		

Code Type			Code ID mark					
			Type3		Type4 (Note 3)			
			Coupling	Separating	Coupling	Separating		
2D codes	QR Code		P01		]Qm			
	Structured Append QR Code	In batch edit mode	P01		]Qm			
		In non-edit mode	P01		S (Note 4)			
	MicroQR Code		P01		Q (Note 4)			
	SQRC		Q		Q (Note 4)			
	iQR Code		G		]Qm			
	Structured Append iQR Code(Non-edit mode)		S		]Qm			
	MaxiCode		P02		]Um			
	PDF417		X		]L0			
	MicroPDF417		X		]L0			
	Data Matrix	Square	P00		]dm			
		Rectangular	P00		]dm			
Aztec		z		]zm				
Bar codes	UPC-A	Without add-on		A		]X0		
		With 2-digit add-on	Linear component	A		]X3		]X0
			Add-on	None		None		]X1 (Note 2)
		With 5-digit add-on	Linear component	A		]X3		]X0
			Add-on	None		None		]X2 (Note 2)
		UPC-E	Without add-on		A		]X0	
	With 2-digit add-on		Linear component	A		]X3		]X0
			Add-on	None		None		]X1 (Note 2)
	With 5-digit add-on		Linear component	A		]X3		]X0
			Add-on	None		None		]X2 (Note 2)
	EAN-13		Without add-on		A		]E0	
		With 2-digit add-on	Linear component	A		]E3		]E0
			Add-on	None		None		]E1 (Note 2)
		With 5-digit add-on	Linear component	A		]E3		]E0
			Add-on	None		None		]E2 (Note 2)
		EAN-8	Without add-on		A		]E4	
	With 2-digit add-on		Linear component	A		]E5		]E4
			Add-on	None		None		]E1 (Note 2)
	With 5-digit add-on		Linear component	A		]E6		]E4
			Add-on	None		None		]E2 (Note 2)

Code Type			Code ID mark					
			Type3		Type4 (Note 3)			
			Coupling	Separating	Coupling	Separating		
Bar codes	Interleaved 2of5		F		]Im			
	Standard 2of5 (short)		G		]R0			
	Standard 2of5 (normal)		G		]S0			
	Code 39		B		]Am			
	Code 39 Full ASCII		B		]Am			
	Codabar (NW-7)		C		]Fm			
	Code 128		D		]Cm			
	GS1-128		K		]C1			
	Code 93		E		]G0			
	GS1 DataBar (Note 1)		R		]e0			
GS1 Composite symbols	GS1 DataBar (Note 1) CC-A		RSS		T	R	]e0	
	GS1 DataBar (Note 1) CC-B		CC-A, CC-B		None	X (Note 2)	None	
	UPC-A CC-A, UPC-A CC-B	UPC-A	Without add-on		T	A	]X0	
			With 2-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X2 (Note 2)
			CC-A, CC-B		None	X (Note 2)	]e0 (Note 2)	
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	Without add-on		T	A	]E0	
			With 2-digit add-on	Linear component	T	A	]E3	]E0
				Add-on	None	None	None	]E1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]E3	]E0
				Add-on	None	None	None	]E2 (Note 2)
			CC-A, CC-B		None	X (Note 2)	]e0 (Note 2)	

Code Type				Code ID mark				
				Type3		Type4 (Note 3)		
				Coupling	Separating	Coupling	Separating	
GS1 Composite symbols	UPC-E CC-A, UPC-E CC-B	UPC-E	Without add-on		T	A	JX0	
			With 2-digit add-on	Linear component	T	A	JX3	JX0
				Add-on	None	None	None	JX1 (Note 2)
		With 5-digit add-on	Linear component	T	A	JX3	JX0	
			Add-on	None	None	None	JX2 (Note 2)	
		CC-A, CC-B		None	X (Note 2)	Jε0 (Note 2)		
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	Without add-on		T	A	JE4	
			With 2-digit add-on	Linear component	T	A	JE5	JE4
				Add-on	None	None	None	JE1 (Note 2)
		With 5-digit add-on	Linear component	T	A	JE6	JE4	
			Add-on	None	None	None	JE2 (Note 2)	
		CC-A, CC-B		None	X (Note 2)	Jε0 (Note 2)		
	GS1-128 CC-A, GS1-128 CC-B, GS1-128 CC-C	GS1-128		T	K	Jε0		
		CC-A, CC-B, CC-C		None	X (Note 2)	None		

(Note 1) GS1 DataBar represents: GS1 DataBar Omnidirectional(RSS-14), GS1 DataBar Truncated(RSS-14 Truncated), GS1 DataBar Limited(RSS Limited), GS1 DataBar Stacked(RSS-14 Stacked), GS1 DataBar Expanded(RSS Expanded), GS1 DataBar Stacked Omnidirectional(RSS-14 Stacked Omnidirectional), and GS1 DataBar Expanded Stacked(RSS Expanded Stacked).

(Note 2) These code ID marks are contained in code data.

(Note 3) Type 4 is a code ID mark system compliant with the AIM USA "Guidelines on Symbology Identifiers." The m" suffix is a modifier character that differs depending upon options of individual symbologies as defined below.

Code Type		"m" (Modifier character)	Option
2D codes	QR Code	0	Model 1
		1	Model 2
		3	Model 2 (FNC1 in the 1st character position from start code)
	iQR Code	A	No FNC1 in the 1st character positions from start code
		C	FNC1 in the 1st character position from start code
		E	FNC1 in the 2nd character position from start code
	MaxiCode	0	mode4、 mode5
		1	mode2、 mode3
	Data Matrix	1	ECC-200
		2	ECC-200 (FNC1 in the 1st or 5th character position from start code)
		3	ECC-200 (FNC1 in the 2nd or 6th character position from start code)
	Aztec	0	No option
1		FNC1 preceding the 1st message character	
2		FNC1 following an initial letter or pair of digits	
Bar codes	Interleaved 2of5	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Code 39 Code 39 Full ASCII	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Codabar	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Code 128	0	No FNC1 in the 1st and 2nd character positions from start code
		2	FNC1 in the 2nd character position from start code

Example: The code ID mark for Interleaved 2of5 with option "Scanning enabled, with a check digit (Check digit transmission disabled)" is JI3.

J: Flag character (ASCII 5Dh)

I: Code character (Interleaved 2of5)

3: Modifier character (See the table above.)

(Note 4) For code ID marks not compliant with the AIM USA "Guidelines on Symbology Identifiers," same characters as ones defined in Type 1 apply.

(6) Number of digits

This optional field specifies whether or not to transmit the number of digits (2 or 4 bytes) of code data to transmit or disables the transmission (default). Note that UPC and EAN codes except GS1-128 skip this field.

- n1 : thousands (0 to 9)
- n2 : hundreds (0 to 9)
- n3 : tens (0 to 9)
- n4 : units (0 to 9)

Selecting the two-digit length does not transmit n1 or n2.

(7) Code data

The data format for each symbology is described below.

QR Code/MicroQR Code/iQR Code

Code data read will be transmitted as is.

Structure Append QR Code/ Structure Append iQR Code

In batch edit mode(Structure Append QR Code only): The scanner edits code data read and then transmits it. It does not transmit the code number, number of splits, or parity.

In non-edit mode: The scanner transmits the code number, the number of splits, parity, and code data read. The code number and the number of splits are 1 byte each and the parity, 2 bytes in hexadecimal format.

SQRC

Code data read will be transmitted as is.

When "Enable transmission of undisclosed data only" is selected in "SQRC Encryption key match", it transmits only undisclosed data.

$X_1 X_2 X_3 X_4 X_5 Y_1 Y_2 Y_3 Y_4 Y_5$

X_n : Disclosed data

Y_m : Undisclosed data

When Transmission of disclosed data + undisclosed data is selected, the following format applies.

$X_1 X_2 X_3 X_4 X_5 Y_1 Y_2 Y_3 Y_4 Y_5$

When Transmission of undisclosed data only is selected, the following format applies.

$Y_1 Y_2 Y_3 Y_4 Y_5$

PDF417, MicroPDF417, MaxiCode, Data Matrix and Aztec

Code data read will be transmitted as is.

UPC-A

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following format applies.

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D

0: Padding character for adjustment of the data length

S: Number system character

UPC-A with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂

With 5-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅

0: Padding character for adjustment of the data length

S: Number system character

X₁₁₋₁₅: Add-on code data

UPC-E

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 9.4.

- Conversion to UPC-A also disabled

X₁ X₂ X₃ X₄ X₅ X₆ C/D

- Conversion to UPC-A enabled

X₆=0-2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D

X₆=5-9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D

0: Padding character for adjustment of the data length

S: Number system character

UPC-E with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

- Conversion to UPC-A also disabled

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈

- Conversion to UPC-A enabled

X₆=0-2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈

X₆=5-9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈

With 5-digit add-on:

- Conversion to UPC-A also disabled

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

- Conversion to UPC-A enabled

X₆=0-2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=5-9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

0: Padding character for adjustment of the data length

S: Number system character

X₇₋₁₁: Add-on code data

EAN-13

You can select whether or not to transmit the two prefix characters "P1" and "P2" and a check digit to the host. The conversion to the ISBN/ISSN format is selectable. Enabling the conversion allows EAN-13 code with prefix characters 978 or 979 to be converted into the ISBN format, and EAN-13 code with prefix characters 977, into the ISSN format.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

- Conversion to ISBN/ISSN also disabled

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D

P_n: Prefix characters

- Conversion to ISBN/ISSN enabled

To the ISBN format

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D ^(*)

To the ISSN format

X₁ X₂ X₃ X₄ X₅ X₆ X₇ C/D ^(*)

^(*) Check digits in the ISBN/ISSN format are calculated (MOD-11) and transferred to the host.

EAN-13 with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11}$

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14}$

P_n : Prefix characters

X_{10-14} : Add-on code data

EAN-8

You can select whether or not to transmit a check digit to the host. The conversion to EAN-13 is selectable.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

- Conversion to EAN-13 also disabled

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D$

- Conversion to EAN-13 enabled

$0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D$

P_n : Prefix characters

EAN-8 with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 40.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.4.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6$

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9$

P_n : Prefix characters

X_{5-9} : Add-on code data

Code 39

Code data read will be transmitted as is.

You can select whether or not to transmit start and stop codes ("*").

Interleaved 2of5/Standard 2of5

The scanner transmits code data read, starting from the character following the start code to the one preceding the stop code. No start/stop codes will be transmitted.

Codabar (NW-7)

The scanner transmits code data read including the start/stop codes. You can select whether or not to transmit start/stop codes.

Code 128 (GS1-128)

The scanner transmits code data read, starting from the character following the start code to the one preceding the check digit. Start/stop codes, FNC codes, or check digit will not be transmitted. Note that FNC1 placed in character positions other than the 1st and 2nd ones from the start code will be converted to GS (1Dh) and transferred.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.4.

Code 93

The scanner transmits code data read, excluding start and stop codes and a check digit.

GS1 DataBar

Code data read will be transmitted as is.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.4.

(Note)

GS1 DataBar includes:

GS1 DataBar Omnidirectional(RSS-14),

GS1 DataBar Truncated(RSS-14 Truncated),

GS1 DataBar Limited(RSS Limited),

GS1 DataBar Expanded(RSS Expanded),

GS1 DataBar Stacked(RSS-14 Stacked),

GS1 DataBar Expanded Stacked(RSS Expanded Stacked),

GS1 DataBar Stacked Omnidirectional(RSS-14 Stacked Omnidirectional)

GS1 DataBar Composite symbols

Code data read will be transmitted as is.

GTIN Format Conversion is not applied.

Under the conditions "Code ID mark: Type 1" and " output mode: Separating," a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

Under the conditions "Code ID mark: Type 4" and "Linear component length: Variable," a separator (GS: 1Dh) is inserted between the linear component and 2D Composite component.

(Note)

GS1 DataBar includes:

GS1 DataBar Omnidirectional(RSS-14),

GS1 DataBar Truncated(RSS-14 Truncated),

GS1 DataBar Limited(RSS Limited),

GS1 DataBar Expanded(RSS- Expanded),

GS1 DataBar Stacked(RSS-14 Stacked),

GS1 DataBar Expanded Stacked(RSS Expanded Stacked),

GS1 DataBar Stacked Omnidirectional(RSS-14 Stacked Omnidirectional)

UPC/EAN Composite symbols

Code data read will be transmitted as is.

The format setting for each code does not apply to the linear component (UPC-A/UPC-E/EAN-13/EAN-8) format.

GTIN Format Conversion is not applied.

Under the conditions "Code ID mark: Type 1" and "Code ID mark output mode: Separating," a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component.

Under the conditions "Code ID mark: Type 4," the 2D code ID mark is inserted between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

UPC/EAN Composite symbols with add-on

Code data read will be transmitted as is.

The format setting for each code does not apply to the linear component (UPC-A/UPC-E/EAN-13/EAN-8) format.

GTIN Format Conversion is not applied.

Under the conditions "Code ID mark: Type 1" and "Code ID mark output mode: Separating", a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component.

Under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Coupling", the 2D code ID mark is inserted between the linear component and 2D Composite component.

Under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating", the 2D code ID mark is inserted before add-on portion and between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

GS1-128 Composite symbols

Code data read will be transmitted as is.

The format setting for each code does not apply to the linear component (GS1-128) format.

GTIN Format Conversion is not applied.

Under the conditions "Code ID mark: Type 1" and "Code ID mark output mode: Separating," a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component.

Under the conditions "Code ID mark: Type 4" and "Linear component length: Variable," a separator (GS: 1Dh) is inserted between the linear component and 2D Composite component.(For details about the code ID mark, refer to (5) Code ID mark on pages 35 to 41.)

9.4 GTIN Format Conversion

Enabling the GTIN (Global Trade Item Number) format conversion allows UPC-A, UPC-E, EAN-13, EAN-8, and Interleaved 2of5 (14-digit) data to output in the GTIN format. It also allows GS1 DataBar and GS1-128 data in the GTIN format to output in the EAN format (product code format).

Note: Under any of the following conditions, the GTIN format conversion is invalid.

- In scanning bar code types specified for multi-line barcode scanning
- In any of the data edit modes (data extraction mode, data substitution mode, data blocksorting mode, and ADF script mode)

(1) Conversion from UPC/EAN/Interleaved 2of5 (14-digit) to GTIN format

Conversion provides two choices--16- and 14-digit GTIN formats. The former adds the Application Identifier (AI) "01" and Package Indicator PI as a prefix, and the latter, a PI only.

If the GTIN format conversion is enabled, however, the output formats available for UPC-A, UPC-E, EAN-13, and EAN-8 does not apply.

UPC-A

- Data read

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D

0: Padding character for adjustment of the data length

S: Number system character

- Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D ^{(*)1}

^{(*)1} Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D ^{(*)2}

^{(*)2} Check digits are calculated again and transferred regardless of the transmission specified.

UPC-A with add-on

- Data read

With 2-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂

With 5-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅

0: Padding character for adjustment of the data length

S: Number system character

X₁₁₋₁₅: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ ^{(*)1}

With 5-digit add-on:

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅ ^{(*)1}

^{(*)1} Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ ^{(*)2}

With 5-digit add-on:

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅ ^{(*)2}

^{(*)2} Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E

- Data read

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D

0: Padding character for adjustment of the data length

- Conversion to 16-digit GTIN format (AI "01" and PI added)

X₆=0-2 0 1 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D ^{(*)1}

X₆=3 0 1 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D ^{(*)1}

X₆=4 0 1 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D ^{(*)1}

X₆=5-9 0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D ^{(*)1}

^{(*)1} Check digits are calculated again and transferred regardless of the transmission specification.

- Conversion to 14-digit GTIN format (PI added)

X₆=0-2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D ^{(*)2}

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D ^{(*)2}

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D ^{(*)2}

X₆=5-9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D ^{(*)2}

^{(*)2} Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E with add-on

- Data read

With 2-digit add-on:

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈

With 5-digit add-on:

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

0: Padding character for adjustment of the data length

X₇₋₁₁: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

X₆=0-2 0 1 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ ^{(*)1}

X₆=3 0 1 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ ^{(*)1}

X₆=4 0 1 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ ^{(*)1}

X₆=5-9 0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ ^{(*)1}

With 5-digit add-on:

X₆=0-2 0 1 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)1}

X₆=3 0 1 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)1}

X₆=4 0 1 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)1}

X₆=5-9 0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)1}

^{(*)1} Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

X₆=0-2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ ^{(*)2}

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ ^{(*)2}

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ ^{(*)2}

X₆=5-9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ ^{(*)2}

With 5-digit add-on:

X₆=0-2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)2}

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)2}

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)2}

X₆=5-9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁ ^{(*)2}

^{(*)2} Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13

- Data read

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D$

P_n : Prefix characters

- Conversion to 16-digit GTIN format (AI "01" and PI added)

$0 1 P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D$ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D$ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13 with add-on

- Data read

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11}$

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14}$

P_n : Prefix characters

X_{10-14} : Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

$0 1 P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11}$ (*1)

With 5-digit add-on:

$0 1 P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14}$ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11}$ (*2)

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14}$ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8

- Data read

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D$

P_n : Prefix characters

- Conversion to 16-digit GTIN format (AI "01" and PI added)

$0 1 P_1 0 0 0 0 P_2 P_3 X_1 X_2 X_3 X_4 C/D$ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

$P_1 0 0 0 0 P_2 P_3 X_1 X_2 X_3 X_4 C/D$ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8 with add-on

- Data read

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6$

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9$

P_n : Prefix characters

X_{5-9} : Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

$0 1 PI 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6^{(*1)}$

With 5-digit add-on:

$0 1 PI 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9^{(*1)}$

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

$PI 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6^{(*2)}$

With 5-digit add-on:

$PI 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9^{(*2)}$

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

Interleaved 2 of 5(14-digit)

- Data read

$X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D$

- Conversion to GTIN format (AI "01" added)

$0 1 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D^{(*1)}$

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

(2) Conversion from GS1 DataBar/GS1-128 in GTIN format to EAN format

GS1 DataBar or GS1-128 data read in the GTIN format (16-digit with AI "01") can be converted to the EAN format if the conversion is enabled. The conversion provides two choices--13- or 14-digit EAN formats. The former trims the Application Identifier (AI) "01" and Package Indicator PI, and the latter, a PI only.

GS1 DataBar

- Data read

0 1 PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D

PI: Package indicator

- Conversion to 13-digit EAN format (AI "01" and PI trimmed)

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D (*¹)

(*¹) Check digits are calculated again and transferred regardless of the transmission specified. If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

- Conversion to 14-digit EAN format (AI "01" trimmed)

PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D

(Note)

GS1 DataBar includes:

GS1 DataBar Omnidirectional(RSS-14),

GS1 DataBar Truncated(RSS-14 Truncated),

GS1 DataBar Limited(RSS Limited),

GS1 DataBar Expanded(RSS Expanded),

GS1 DataBar Stacked(RSS-14 Stacked),

GS1 DataBar Expanded Stacked(RSS Expanded Stacked),

GS1 DataBar Stacked Omnidirectional(RSS-14 Stacked Omnidirectional)

GS1-128

- Data read

0 1 PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D

PI: Package indicator

- Conversion to 13-digit EAN format (AI "01" and PI trimmed)

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D (*¹)

(*¹) Check digits are calculated again and transferred regardless of the transmission specified. If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

- Conversion to 14-digit EAN format (AI "01" trimmed)

PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D

Chapter 10 Parameters and Defaults

The tables below list the parameters and their defaults. Those parameters can be changed with the QR-coded parameter menu or configuration software (ScannerSetting_2D), except shadowed ones only with the configuration software.

When the scanner leaves the factory, all of these parameters are set to defaults.

(1) Reading mode related parameters

Items	Parameters	Defaults	Refer to:
Data edit	Non-edit mode	√	Section 7.1
	Data extraction mode		
	Data conversion (substitution) mode		
	Data blocksorting mode		
	ADF script mode		
Period of double-read prevention	Double-read enabled		Chapter 4
	Period of double-read prevention 0.1 to 9.9 seconds	0.5 s	

: Can be changed only with the configuration software.

(2) Interface to the host

Items	Parameters	Defaults	Refer to:
Interface	USB-COM interface	√	Chapter 2
	USB keyboard interface (Note 1)		

(Note 1) Selecting the USB keyboard interface disables access to the configuration software (ScannerSetting_2D).

(3) Communications parameters for USB-COM interface

The following settings take effect only when the USB-COM interface is set up.

Items	Parameters	Defaults	Refer to:
Communications protocol	Non-acknowledge mode	√	Section 9.1
	ACK/NAK mode		
CTS signal monitoring	With CTS signal Monitoring		
	No CTS signal Monitoring	√	
CTS signal monitoring time	0.1 to 9.9 seconds	2 s	
ACK/NAK confirmation time	0.1 to 9.9 seconds	1 s	

: Can be changed only with the configuration software.

(4) Communications parameters for USB keyboard interface

The following settings take effect only when the USB keyboard interface is set up.

Items	Parameters	Defaults	Refer to:
CAPS mode	Manual	√	Section 9.2 (1) (See Note 1.)
	Auto		
Hosts CAPS LOCK status	CAPS OFF	√	
	CAPS ON		
Keyboard type	U.S. English (101 key type)		Section 9.2 (2)
	Germany (102 key type)		
	French (102 key type)		
	U.K. English (102 key type)		
	Italian (102 key type)		
	Japanese (106 key type)	√	
Numeric key selection (0 to 9)	Inboard keys	√	Section 9.2 (3) (See Note 3.)
	TEN keys		
Binary data conversion (See Note 2.)	None (ASCII)	√	Section 9.2 (4)
	Binary conversion		
	Kanji conversion		

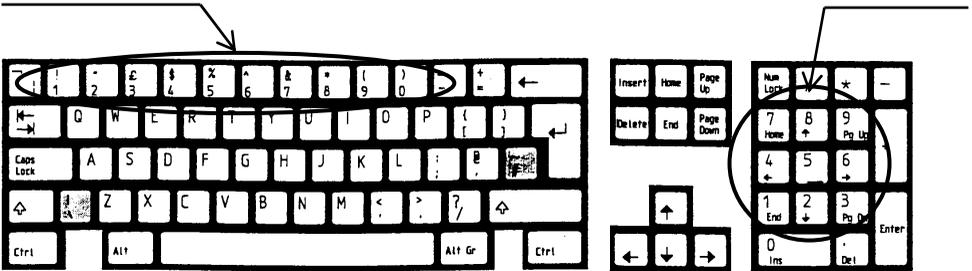
(Note 1) Select the Caps Lock state that matches host's keyboard state.

(Note 2) Some applications cannot output data correctly on the display.

(Note 3) When selecting "TEN keys for the numeric data transmission format, set the host's NUM LOCK to ON.

Inboard keys

TEN keys



U.S. English (101 key type)

■ : Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Special key transfer mode	Enable		(See Note 4.)
	Disable	√	
Data transmission interval	1 ms		Section 9.2 (5)
	5 ms		
	10 ms	√	
	15 ms		
	30 ms		
	50 ms		
	100 ms		

(Note 4) Special key transfer applies to the fields except header and terminator in the data transmission format. Enabling this function substitutes E7h to FDh data with the special keys as listed below and transmits the substituted data to the host.

The Left SHIFT, Left CTRL, and Left ALT are transmitted as a simultaneous depression with the subsequent character or key.

Upper Lower	E	F
0		↓
1		F1
2		F2
3		F3
4		F4
5	HOME	F5
6	END	F6
7	Left SHIFT	F7
8	Left CTRL	F8
9	Left ALT	F9
A	TAB	F10
B	ESC	F11
C	ENTER	F12
D	←	Right CTRL
E	↑	
F	→	

Special Key Substitution Table

■: Can be changed only with the configuration software.

(5) Data transmission format common to all interfaces

Items	Parameters	Defaults	Refer to:
Transmission of code ID mark	Enable		Section 9.3
	Disable	√	
Code ID mark position	Before prefix		Section 9.3, (5)
	After prefix	√	
Code ID mark	Type 1 (DENSO1)	√	Section 9.3, (5)
	Type 2 (DENSO2)		
	Type 3		
	Type 4		
	User-defined		
Code ID mark output mode	Coupling	√	Section 9.3, (6)
	Separating		
Transmission of the number of digits (not applicable to UPC/EAN codes)	Enable, in 4 digits		Section 9.3, (6)
	Enable, in 2 digits		
	Disable	√	
Prefix transmission	Enable		Section 9.3, (3)
	Disable	√	
Suffix transmission	Enable		Section 9.3, (2)
	Disable	√	
Scanner ID output	Enable		Section 9.4
	Disable	√	
GTIN format conversion	Enable		Section 9.4
	Disable	√	
Conversion type from EAN/UPC to GTIN format	Conversion to 16 digits	√	Section 9.4
	Conversion to 14 digits		
	Conversion prohibited		
Conversion type from GTIN format to EAN/UPC format	Conversion to 14 digits	√	Section 9.4
	Conversion to 13 digits		
	Conversion prohibited		
Prefix PI in conversion from EAN/UPC to GTIN format	0 to 9	0	

 : Can be changed only with the configuration software.

(6) Data transmission format exclusive to USB-COM interface

Items	Parameters	Defaults	Refer to:
Header	NONE	√	Section 9.3, (1)
	STX		
	User-defined		
Terminator	NONE		
	ETX		
	CR	√	
	LF		
	CR LF		
	User-defined		
Transmission of BCC	Enabled		Section 9.3, (4)
	Disabled	√	

 : Can be changed only with the configuration software.

(7) Data transmission format exclusive to USB keyboard interface

Items	Parameters	Defaults	Refer to:
Header	NONE	√	Section 9.3, (1)
	STX		
	ETX		
	CR		
	LF		
	CR+LF		
	TAB		
	ESC		
	ENTER		
	Right Ctrl		
	←		
	↑		
	→		
	↓		
	User-defined		
Terminator	NONE		
	STX		
	ETX		
	CR		
	LF		
	CR+LF		
	TAB		
	ESC		
	ENTER	√	
	Right Ctrl		
	←		
	↑		
	→		
	↓		
	User-defined		

 : Can be changed only with the configuration software.

(8) 2D codes, mirror image and black-and-white inverted codes

Items	Parameters	Defaults	Refer to:
Reading reverse codes (mirror image)	Reverse code		Section 7.2
	Normal code	√	
Reading black-and-white inverted codes	Black cells/bars on a white background	√	Section 7.3
	White cell/bars on a black background		
	Auto detection of black and white inverted codes		
Reading QR Code	Enable	√	
	Disable		
Edit/Non-edit mode for split QR codes (Structure Append)	Batch edit mode		Section 7.4
	Non-edit mode	√	
Reading MicroQR Code	Enable	√	
	Disable		
Reading PDF417	Enable		
	Disable	√	
Reading MicroPDF417	Enable		
	Disable	√	
Reading MaxiCode	Enable		
	Disable	√	
Reading DataMatrix (Square)	Enable		(See Note 1.)
	Disable	√	
Reading DataMatrix (Rectangular)	Enable		(See Note 1.)
	Disable	√	
QR Code, minimum readable code ver	1 to 40	1	(See Note 2.)
QR Code, maximum readable code ver		40	
MicroQR Code, minimum readable code ver	1 to 4	1	
MicroQR Code, maximum readable code ver		4	
Data Matrix (Square), minimum readable code No	1 to 24	1	
Data Matrix (Square), maximum readable code No		24	
Data Matrix (Rectangular), minimum readable code No	1 to 6	1	
Data Matrix (Rectangular), maximum readable code No		6	

(Note 1) Using the QR-coded parameter menu enables or disables scanning of both Square and Rectangular Data Matrix symbols at the same time.

(Note 2) The parameter setting ranges are different from versions or code numbers that the scanner can actually read.

 : Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:	
Reading SQRC	Enable (SQRC and QR Code symbols)		Section 7.6	
	Enable (SQRC symbol only)			
	Disable	√		
SQRC Encryption key mismatch	No send(Reading disabled)	√		
	Send Public Data only (Enable transmission of disclosed data only)			
SQRC Encryption key match	Send Public Data + Private Data (Enable transmission of disclosed data + undisclosed data)	√		
	Send Private Data only (Enable transmission of undisclosed data only)			
Reading iQR Code (Square)	Enable			
	Disable	√		
iQR Code (Square), minimum readable code No	1 to 61	1		
iQR Code (Square), maximum readable code No		61		
Reading iQR Code (Rectangular)	Enable			
	Disable	√		
iQR Code (Rectangular), minimum readable code No	1 to 15	1		
iQR Code (Rectangular), maximum readable code No		15		
Reading Aztec (Full Range)	Enable			
	Disable	√		
Reading Aztec (Compact)	Enable			
	Disable	√		
Aztec (Full Range), minimum Reading Layer	1 to 32	1		
Aztec (Full Range), maximum Reading Layer		32		
Aztec (Compact), minimum Reading Layer	1 to 4	1		
Aztec (Compact), maximum Reading Layer		4		

 : Can be changed only with the configuration software.

(9) Bar codesUPC-A/E, EAN-13/8

Items	Parameters	Defaults	Refer to:	
Reading UPC-A and EAN-13	Enable	√	Sections 9.3	
	Disable			
UPC-A transmission of check digit	Enable	√		
	Disable			
UPC-A transmission of number system character	Enable	√		
	Disable			
UPC-A transmission of the leading character	Enable	√		
	Disable			
EAN-13 transmission of check digit	Enable	√		
	Disable			
EAN-13 transmission of country code	Enable	√		Sections 9.3 (See Note 1.)
	Disable			
EAN-13 conversion to the ISBN / ISSN format	Enable		Sections 9.3	
	Disable	√		
Reading UPC-E	Enable	√		
	Disable			
UPC-E transmission of check digit	Enable	√		
	Disable			
UPC-E transmission of the leading character	Enable	√		
	Disable			
UPC-E transmission of number system character	Enable			
	Disable	√		
UPC-E conversion to the UPC-A format	Enable			
	Disable	√		

(Note 1) A country code is in the upper two digits of the prefix character field in EAN-13.

: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Reading EAN-8	Enable	√	Sections 9.3
	Disable		
EAN-8 transmission of check digit	Enable	√	
	Disable		
EAN-8 Conversion to the EAN-13 format	Enable		
	Disable	√	
Reading UPC/EAN with 2-digit add-on	Enable		
	Disable	√	
Reading UPC/EAN with 5-digit add-on	Enable		
	Disable	√	
Reading UPC/EAN with add-on only	Enable		
	Disable	√	
Add-on check level	Disable checking	√	
	Levels 1 to 4		

Interleaved 2of5/Standard 2of5

Items	Parameters	Defaults	Refer to:
Reading Interleaved 2of5	Reading Enabled (Check digit : Disabled)	√	
	Reading Enabled (Check digit : Enabled, with C/D transmission)		
	Reading Enabled (Check digit : Enabled, without C/D transmission)		
	Disable		
Minimum number of readable digits for Interleaved 2of5	2 to 99 digits	4 digits	(See Note 1.)
Maximum number of readable digits for Interleaved 2of5		99 digits	
Reading standard 2of5	Reading Enabled (Check digit : Disabled)		
	Reading Enabled (Check digit : Enabled, with C/D transmission)		
	Reading Enabled (Check digit : Enabled, without C/D transmission)		
	Disable	√	
Minimum number of readable digits for Standard 2of5	1 to 99 digits	3 digits	(See Note 1.)
Maximum number of readable digits for Standard 2of5		99 digits	

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

 : Can be changed only with the configuration software.

Codabar (NW-7)

Items	Parameters	Defaults	Refer to:
Reading Codabar (NW-7)	Reading Enabled (Check digit : Disabled)	√	
	Reading Enabled (Check digit : Enabled, with C/D transmission)		
	Reading Enabled (Check digit : Enabled, without C/D transmission)		
	Disable		
Minimum number of readable digits for Codabar (NW-7)	3 to 99 digits (including start/stop codes)	4 digits	(See Note 1.)
Maximum number of readable digits for Codabar (NW-7)		99 digits	
Transmission of Start/Stop codes for Codabar (NW-7)	Transmit (a/b/c/d)	√	
	Transmit (A/B/C/D)		
	Disable		
Check digit calculation method for Codabar (NW-7)	MOD-16	√	
	7-check method		

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

: Can be changed only with the configuration software.

Code 39

Items	Parameters	Defaults	Refer to:
Reading Code 39	Reading Enabled (Check digit : Disabled)	√	
	Reading Enabled (Check digit : Enabled, with C/D transmission)		
	Reading Enabled (Check digit : Enabled, without C/D transmission)		
	Disable		
Minimum number of readable digits for Code 39	1 to 99 digits (excluding start/stop codes)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 39		99 digits	
Transmission of Start/Stop codes for Code 39	Enable		
	Disable	√	
Conversion to FULL ASCII	Enable		
	Disable	√	

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

: Can be changed only with the configuration software.

Code 128, GS1-128

Items	Parameters	Defaults	Refer to:
Reading Code 128	Enable	√	(See Note 2.)
	Disable		
Reading GS1-128	Enable	√	
	Disable		
Minimum number of readable digits for Code 128	1 to 99 digits (excluding start/stop codes and 1-digit check digit)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 128		99 digits	
Transmission of FNC1 for Code 128	Disable		
	Transmit GS	√	
	User-defined		
Minimum number of readable digits for GS1-128	1 to 99 digits (excluding start/stop codes and 1-digit check digit)	1 digit	(See Note 1.)
Maximum number of readable digits for GS1-128		99 digits	
Transmission of FNC1 for GS1-128	Disable		
	Transmit GS	√	
	User-defined		

(Note 1) The setting ranges are different from the numbers of digits that the scanner can actually read.

(Note 2) Using the QR-coded parameter menu enables or disables scanning of both Code 128 and GS1-128 at the same time.

 : Can be changed only with the configuration software.

Code 93

Items	Parameters	Defaults	Refer to:
Reading Code 93	Enable		
	Disable	√	
Minimum number of readable digits for Code 93	1 to 99 digits (excluding start/stop codes and 2-digit check digits)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 93		99 digits	

(Note 1) The setting ranges are different from the numbers of digits that the scanner can actually read.

 : Can be changed only with the configuration software.

GS1 DataBar, GS1 Composite symbols

Items	Parameters	Defaults	Refer to:	
Reading GS1 DataBar omnidirectional (RSS-14) and GS1 DataBar Truncated (RSS-14 Truncated)	Enable		(See Note 1.)	
	Disable	√		
Reading GS1 DataBar Stacked (RSS-14 Stacked) and GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional)	Enable			
	Disable	√		
Reading GS1 DataBar Limited (RSS Limited)	Enable			
	Disable	√		
Reading DataBar Expanded (RSS Expanded)	Enable			
	Disable	√		
Minimum number of readable digits for GS1 DataBar Expanded (RSS Expanded)	Setting range 1 to 99 digits	1 digit		(See Note 2.)
Maximum number of readable digits for GS1 DataBar Expanded (RSS Expanded)		99 digits		
Transmission of FNC1 for GS1 Data Bar Expanded	Disable			
	Transmit GS	√		
	User-defined			
Reading GS1 Composite	Enable		(See Note 3.)	
	Disable	√		
Reading GS1 DataBar Composite (with CC-A)	Enable			
	Disable	√		
Reading GS1 DataBar Composite (with CC-B)	Enable			
	Disable	√		
Reading UPC/EAN Composite (with CC-A)	Enable			
	Disable	√		
Reading UPC/EAN Composite (with CC-B)	Enable			
	Disable	√		
Reading GS1-128 Composite (with CC-A)	Enable			
	Disable	√		
Reading GS1-128 Composite (with CC-B)	Enable			
	Disable	√		
Reading GS1-128 Composite (with CC-C)	Enable			
	Disable	√		

(Note 1) Using the QR-coded parameter menu enables or disables scanning of GS1 DataBar all together.

(Note 2) The setting ranges are different from the numbers of digits that the scanner can actually read.

(Note 3) Using the QR-coded parameter menu enables or disables scanning of GS1 Composite symbols all together

 : Can be changed only with the configuration software.

Multi-line barcode scanning

Items	Parameters	Defaults	Refer to:
Reading multi-line bar codes	Enable		Section 7.5
	Disable	√	
Number of lines for multi-line barcode scanning	Two lines	√	
	Three lines		
Output format for multi-line bar codes	Header/Terminator-delimited		
	Comma-delimited	√	
First-line barcode	Selectable from readable bar codes	Not specified.	
First-line barcode character	Up to 2 ASCII characters	Not specified.	
First-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
First-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	
Second-line barcode	Selectable from readable bar codes	Not specified.	
Second-line barcode character	Up to 2 ASCII characters	Not specified.	
Second-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
Second-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	
Third-line barcode	Selectable from readable bar codes	Not specified.	
Third-line barcode character	Up to 2 ASCII characters	Not specified.	
Third-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
Third-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	

 : Can be changed only with the configuration software.

(11) Other settings

Items	Parameters	Defaults	Refer to:
Code response level	High	√	Section 6.2
	Medium		
	Low		
Reading subject (Switching of scanning target)	LCD and paper	√	Appendix 2
	Paper only		
	LCD only		
Magic key control	No function	√	Section 8.4
	Scanning ON/OFF mode		
USB keyboard interface auto-switching	Disable		Section 8.4
	Enable	√	
Restriction on the use of QR-coded parameter menu (See Note 1. and Note 2.)	Enable		Section 11.2
	Disable	√	

(Note 1) Can be changed with the control commands only.

(Note 2) Changing any other parameter with the configuration software automatically disables the "Restriction on the use of QR-coded parameter menu."

■: Can be changed only with the configuration software.

(12) Speaker and indicator LEDs

Items	Parameters	Defaults	Refer to:
Speaker control	Enable	√	Section 8.1
	Disable		
Forced speaker-OFF	Enable(Always off)		
	Disable(Speaker : enable)	√	
Speaker tone	Low tone (3.1 kHz)	√	
	Medium tone (3.3 kHz)		
	High tone (3.5 kHz)		
Speaker beeping time	Short (60 ms)	√	
	Medium (80 ms)		
	Long (120 ms)		
Speaker volume	High	√	
	Medium		
	Low		
Speaker sound when power turned ON	Enable		
	Disable	√	
Scan complete sound	Speaker control (Beeping at prescribed frequencies)	√	
	Audio playback		
POWER indicator LED	Always turns OFF	√	Section 8.2
	Always turns ON		
	Blinking light		
Indicator LEDs control	Enable	√	Section 8.2
	Disable		

 : Can be changed only with the configuration software.

(13) Playback of audio data

Items	Parameters	Defaults	Refer to:
Audio data file registration	Audio Data1	Unregistered	Section 8.1.2
	Audio Data2	Unregistered	
	Audio Data3	Unregistered	
	Audio Data4	Unregistered	
	Audio Data5	Unregistered	
Audio volume (Selectable for each sound file)	Level 0		
	Level 1		
	Level 2		
	Level 3		
	Level 4		
	Level 5		
	Level 6		
	Level 7		
	Level 8		
	Level 9	√	

 : Can be changed only with the configuration software.

(14) Data verification conditions and data editing conditions

Items	Parameters	Defaults	Refer to:
Applicable condition (Code type in data editing)	Specified from the codes	Any code (See Note 1)	Section 7.1
Transmit data regardless of the results	Enable		
	Disable	√	
Data extraction mode	Data string extraction mode	√	
	Extraction block mode		
	AI mode		
Data string extraction mode - Start position	First position		
	Last position		
	Specified position	√	
Data string extraction mode - End position	Last character	√	
	Specified digits		
	Specified position		
Data string extraction mode - Specified position for extraction start position	0001 to 9999 positions (Specify with ASCII characters)	1	
Data string extraction mode - Specified position for extraction last position	0001 to 9999 positions (Specify with ASCII characters)	9999	
Extraction block mode - Extraction block number (Maximum 3 blocks)	01 to 99 positions (Specify with ASCII characters)	Not specified.	

(Note 1) Selecting "Any code" edits all types of codes.

 : Can be changed only with the configuration software.

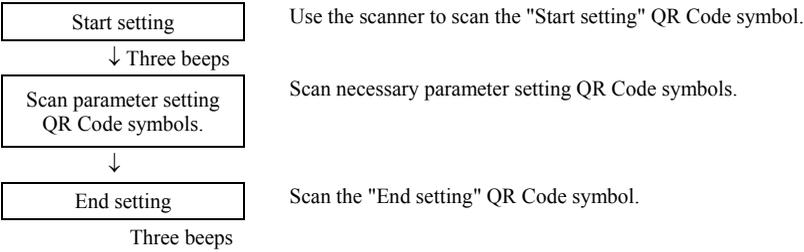
Items	Parameters	Defaults	Refer to:
Search string and substitution string in data substitution mode	Max. 16 ASCII characters	No specified.	Section 7.1
Number of splits in data blocksorting mode	2 to 5 splits	2	
Separate position in data blocksorting mode	0001 to 9999 positions, specified by ASCII characters	Single character	
Output order in data blocksorting mode	Blocks 1 to 5	Block 1/ Block 2	
AI mode	AI split mode	√	
	AI parenthesis mode		
AI split mode - AI1 designation enable/disable	Enable	√	
	Disable		
AI split mode - AI2 designation enable/disable	Enable		
	Disable	√	
AI split mode - AI3 designation enable/disable	Enable		
	Disable	√	
AI split mode - AI 1 specified	Specified from AI candidates (See Note 2)	00	
AI split mode - AI 2 specified	Specified from AI candidates (See Note 2)	00	
AI split mode - AI 3 specified	Specified from AI candidates (See Note 2)	00	
AI split mode - Delimiter	Header/Terminator	√	
	Comma		
	Tab (09h)		

(Note 2) For details about AI candidates, refer to Chapter 7, Section 7.1.1.3, "(3) AI table."

 : Can be changed only with the configuration software.

Chapter 11 QR-Coded Parameter Menu

11.1 Parameter Setting Procedure Using the QR-coded Parameter Menu



Scanning the "All defaults" QR Code symbol in the QR-coded parameter menu makes all items in the menu revert to the factory defaults. Select the "All defaults" or "Cancel" and the scanner will immediately end the operation without reading the "End setting".

11.2 Restriction on the Use of QR-coded Parameter Menu

Using the control commands (see Appendix 2) can restrict the use of the QR-coded parameter menu. When the restriction is enabled, it is impossible to change parameters with the QR-coded parameter menu or a batch-process QR code printout.

Note that using the configuration software for changing any parameter automatically disables the restriction on the use of the QR-coded parameter menu.

11.3 QR-coded Parameter Menu

■ Menu control (Starting/Ending the Setting Procedure and Reverting to Defaults)

	
Start setting	Start setting (When the "White code on black background" is set)"
	
Cancel	
	
All defaults	End setting

The speaker volume can be set by scanning the following QR Code symbol only. No "Start setting" or "End setting" QR Code symbol is required to be scanned.

Adjusting the speaker volume

Scanning this QR Code symbol cycles the speaker volume through High, Medium and Low. The factory default is High.

This QR Code symbol applies only to the speaker beep. Adjusting the playback volume of audio data files requires the same operation as for other parameters (see Section 11.1).



Speaker volume

■ USB interface to the host



USB-COM interface
(default)



USB keyboard
interface

■ Communications parameters for USB-COM interface

Communications protocol (USB-COM interface)



Non-acknowledge mode
(default)



ACK/NAK mode

Header (USB-COM interface)



None (default)



STX

Terminator (USB-COM interface)



None



ETX



CR (default)



LF



CR LF

Transmission of BCC (USB-COM interface)



Disable (default)



Enable

■ Communications parameters for USB keyboard interface

Conversion to binary data



No conversion (default)
(ASCII)



Binary conversion



Kanji conversion

Header (USB keyboard interface)



None (default)



STX



ETX



CR



LF



CR LF



TAB



ESC

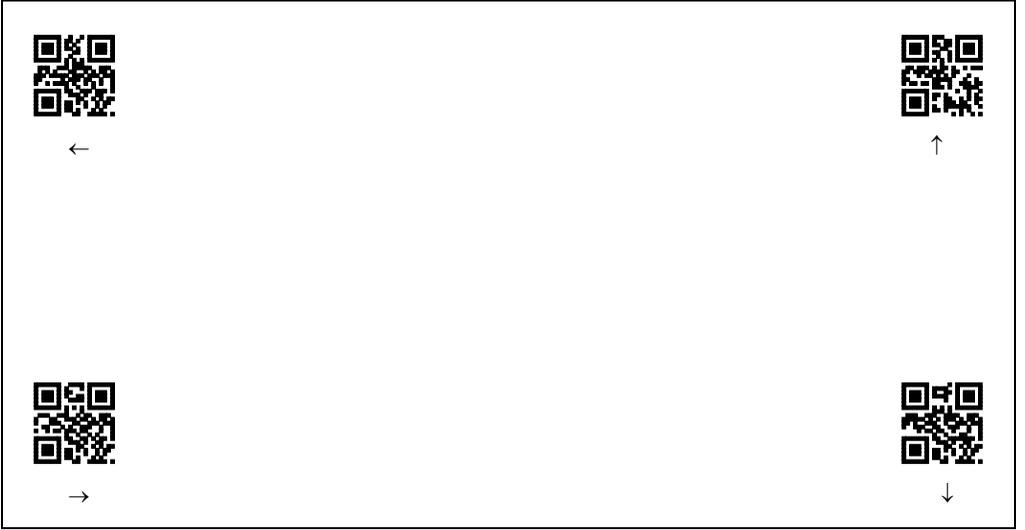


ENTER



Right Ctrl

Header (USB keyboard interface)



Terminator (USB keyboard interface)



None



STX



ETX



CR



LF



CR LF



TAB



ESC

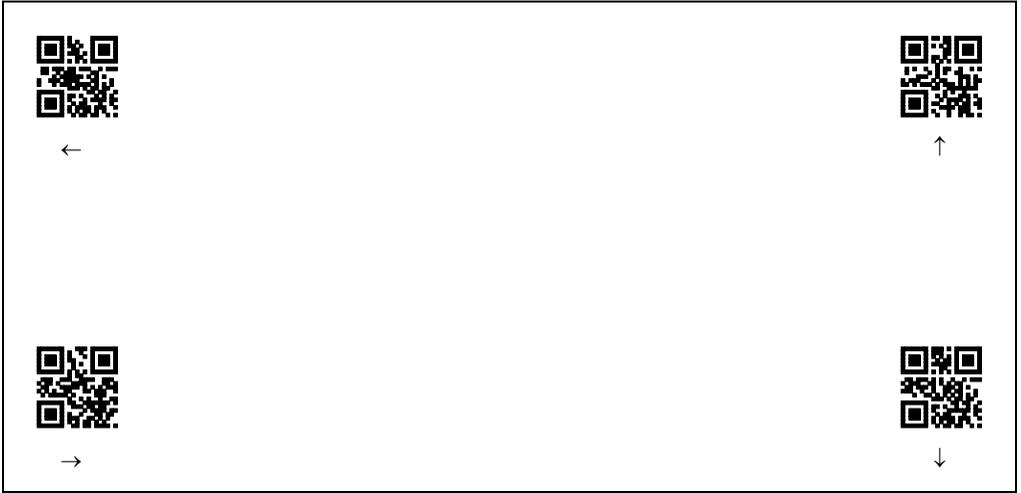


ENTER (default)



Right Ctrl

Terminator (USB keyboard interface)

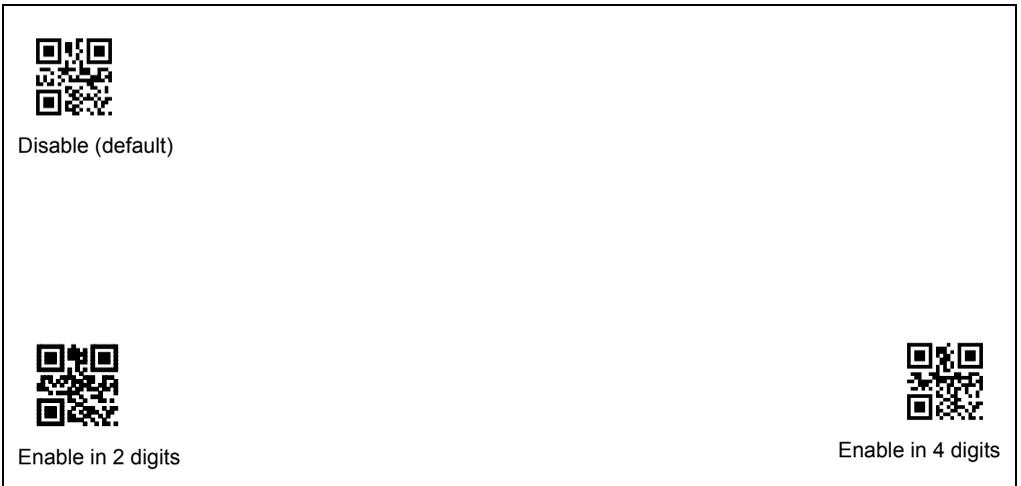


■ Data transmission format

Transmission of code ID mark



Transmission of the number of digits



■ 2D codes, mirror image and black-and-white inverted codes

Scanning MicroQR Code



Disable



Enable (default)

Scanning black-and-white inverted codes



Black cells/bars on a
white background (default)



White cells/bars on
a black background



Automatically identify black
and white inverted codes

Scanning Structured Append QR Code



Non-edit mode (default)



Batch edit mode

Scanning PDF417



Disable (default)



Enable

Scanning MaxiCode



Disable (default)



Enable

Scanning Data Matrix



Disable (default)



Enable

■ Bar codes

Scanning UPC-A, UPC-E, EAN-13 and EAN-8



Disable



Enable (default)

Scanning Interleaved 2of5



Disable



Enable with a check digit
(Check digit transmission disabled)



Enable without
a check digit (default)



Enable with a check digit
(Check digit transmission enabled)

Scanning Code 128 (GS1-128)



Disable



Enable (default)

Scanning Codabar (NW-7)



Disable



Enable without a check digit
(default)



Enable with a check digit
(Check digit transmission enabled)



Enable with a check digit
(Check digit transmission disabled)

Transmission of start/stop codes for Codabar (NW-7)

	
Disable	Transmit(a/b/c/d) (default)

Scanning Code 39

	
Disable	Enable without a check digit (default)
	
Enable with a check digit (Check digit transmission enabled)	Enable with a check digit (Check digit transmission disabled)

Transmission of start/stop codes for Code 39

	
Disable (default)	Enable

Scanning Code 93



Disable (default)



Enable

Scanning GS1 DataBar



Disable (default)



Enable

Scanning GS1 Composite symbols



Disable (default)



Enable

■ Other settings

Speaker control



Disable



Enable (default)

Indicator LEDs



Disable



Enable (default)

Audio data files



Audio data file: Index 1



Audio data file: Index 2



Audio data file: Index 3



Audio data file: Index 4



Audio data file: Index 5

(Note 1) This is not menu to register an audio data file.

(Note 2) Scanning two or more QR Code symbols specifying an audio data file index in succession makes the last scanned one go into effect.

(Note 3) A QR Code symbol specifying an audio data file index and the one specifying a playback volume should be scanned in this order. Scanning those symbols in the reverse order results in an error.

(Note 4) Settings made by scanning audio-related QR Code symbols go into effect the moment the scanner reads the "End setting" QR Code symbol.

Playback volumes



Playback volume: Level 0



Playback volume: Level 1



Playback volume: Level 2



Playback volume: Level 3



Playback volume: Level 4



Playback volume: Level 5



Playback volume: Level 6



Playback volume: Level 7



Playback volume: Level 8



Playback volume: Level 9

Chapter 12 Troubleshooting

Problem 1: Low reading efficiency.

Probable cause	What to do:
<ul style="list-style-type: none">• A target code is not within the scan range of the scanning window.	<ul style="list-style-type: none">• Bring a code within the scan range.
<ul style="list-style-type: none">• The code may be smeared.	<ul style="list-style-type: none">• Wipe off the dirt from the code.
<ul style="list-style-type: none">• The code may be blurred.	<ul style="list-style-type: none">• Use a code clearly printed.

Problem 2: Cannot read 2D codes or bar codes.

Probable cause	What to do:
<ul style="list-style-type: none">• The type of the code to be scanned has not been set as a readable code.	<ul style="list-style-type: none">• Enable the type of the code to be scanned as a readable code.
<ul style="list-style-type: none">• The scanned bar code contains no check digit, while the "Enable, with a check digit" parameter is selected.	<ul style="list-style-type: none">• Select the "Enable, without a check digit" parameter.
<ul style="list-style-type: none">• The check digit contained in the scanned bar code is wrong.	<ul style="list-style-type: none">• Use a correct bar code.

Problem 3: Code data cannot be displayed normally on the computer screen. (USB-COM interface)

Probable cause	What to do:
<ul style="list-style-type: none">• The communications conditions of the scanner are different from those of the connected host.	<ul style="list-style-type: none">• Change the communications conditions of the scanner to match those of the connected host.
<ul style="list-style-type: none">• Any device driver other than our Active USB-COM port driver may be used.	<ul style="list-style-type: none">• Use our Active USB-COM port driver that is designed for the USB-COM interface.

Problem 4: Code data cannot be displayed normally on the computer screen. (USB keyboard interface)

Probable cause	What to do:
<ul style="list-style-type: none">• The keyboard type selected may not match one that is set up in the host computer.	<ul style="list-style-type: none">• Select the same keyboard type as one that is set up in the host computer. (You can check the computer's keyboard type by clicking My Computer | Control Panel | Keyboard | Hardware.)
<ul style="list-style-type: none">• The Caps Lock state selected may not match that of the connected keyboard.	<ul style="list-style-type: none">• Select the same Caps Lock state as that of the connected keyboard.
<ul style="list-style-type: none">• Any device driver other than the system-supplied driver (USB device class driver for HID) may be used.	<ul style="list-style-type: none">• Use the system-supplied driver.
<ul style="list-style-type: none">• The computer's keyboard may be held down.	<ul style="list-style-type: none">• Do not press the computer's keyboard when scanning codes.

Appendix 1 Specifications

Item		QK30-U
Scanning specifications	Readable codes	QR Code (Model 1 and Model 2), MicroQR Code, SQRC (*1), iQR Code, PDF417, MicroPDF417, MaxiCode, Data Matrix, Aztec, GS1 Composite symbol, EAN-13/8, UPC-A/E, UPC/EAN with add-on, Interleaved 2of5 (ITF), Standard 2of5 (STF), Code 39, Codabar (NW-7), Code 93, Code128, GS1-128, and GS1 DataBar
	Skew angle	360°
	Scanning resolution	0.25 mm (9.8 mils) min. for two-dimensional codes 0.18 mm (7.1 mils) min. for bar codes
	Elevation angle (skew)	±10°
	Tilt angle (pitch)	±10°
	Light source	LED (white)
	Reading confirmation	Indicator LEDs (blue, red and green), speaker
USB interface		USB-COM interface, and USB keyboard interface
	Standards	USB 1.1 compliant
	Operating voltage	5.0 VDC ±5%
	Power consumption	Max. 400 mA
Environmental conditions	Operating temperature range	-5 to 50°C
	Operating humidity range	10 to 90% RH (*2)
	Storage temperature range	-10 to 60°C
	Storage humidity range	5 to 95% RH (*2)
	Ambient illuminance range	Max. 3,000 lux
Dimensions (W) x (D) x (H)		4.9 x 3.3 x 1.6 inches (125 x 85 x 40 mm)
Weight		Approx. 250 g

(*1) To use SQRC (Security QR Code), contact your Denso Wave representative.

(*2) Sharp temperature change, dewing or freezing not allowed, wet-bulb temperature 30°C max.

Appendix 2 Control Commands

Control commands refer to commands that are exchanged between the host computer and the scanner via the communications line.

Some of the control commands that the host computer issues are functionally equivalent to some parameters that can be set with the QR-coded parameter menu (refer to Chapter 11). Settings of those control commands have priority over settings made with the QR-coded parameter menu.

Note that turning off the scanner clears control command settings so that settings made with the QR-coded parameter menu take effect unless the PW command is sent to the scanner for saving control command settings into the flash ROM.

If commands other than the ones listed below are sent to the scanner, the scanner operation is not assured.

Note: Selecting the USB keyboard interface disables the control commands.

Note: Until the completion of execution of a specified control command, the subsequent command will not be executed.

Note: During configuration with the QR-coded parameter menu, the scanner does not receive any control command and returns the "NG" response.

Note: After recognition of the virtual COM port when the USB-COM interface is used, the scanner requires a maximum of one second to be ready to receive control commands.

Control Commands	Parameter	Response	Function
Z (Note 1)	None	None	Switch to standby Upon receipt of a Z command, the scanner goes standby.
R (Note 1)	None	None	Ready to scan Upon receipt of an R command, the scanner becomes ready to scan.
S	See Parameter Details , [1] given later.	OK/NG (Note 2)	Allow the specified code type to be read.
MA	None	None	Switch the scanning target to LCD and paper.
MP (Note 3)	None	None	Switch the scanning target to paper.
ML (Note 6)	None	None	Switch the scanning target to LCD.
I	See Parameter Details , [2] given later.	None	Control the speaker beeping time, speaker volume, speaker tone, and indicator LEDs as specified temporarily.
BR	See Parameter Details , [3] given later.	OK/NG (Note 2)	Enable the speaker, and control the speaker beeping time, speaker volume and speaker tone as specified.
BZ	None	OK/NG (Note 2)	Disable the speaker.
DR	None	OK/NG (Note 2)	Enable the indicator LEDs.
DZ	None	OK/NG (Note 2)	Disable the indicator LEDs.
NR	See Parameter Details , [4] given later.	OK/NG (Note 2)	Enable transmission of the number of digits.
NZ	None	OK/NG (Note 2)	Disable transmission of the number of digits.
CR	None	OK/NG (Note 2)	Enable transmission of code ID marks.
CZ	None	OK/NG (Note 2)	Disable transmission of code ID marks.

Control Commands	Parameter	Response	Function
TR	See Parameter Details , [5] given later.	OK/NG (Note 2)	Specify the double-read prevention timeout.
MENULOCK (Note 4) (Note 5)	None	OK/NG (Note 2)	Enable restriction on the use of QR-coded parameter menu.
MENUUNLOCK (Note 4) (Note 5)	None	OK/NG (Note 2)	Disable restriction on the use of QR-coded parameter menu.
VER	None	Ver.n.nn	Request for software version. <Response from the scanner> Ver. n.nn where n.nn is version number (Ex. Ver. 1.00)
IR	None	OK/NG (Note 2)	Enable transmission of scanner ID.
IZ	None	OK/NG (Note 2)	Disable transmission of scanner ID.
ID	None	ID. nnnnnn	Request for scanner ID (serial number) <Response from the scanner> "ID. nnnnnn" where nnnnnn is a serial number (Ex. ID. 000001)
DLV	See Parameter Details , [6] given later.	OK/NG (Note 2)	Specify the bar code scanning level (1 to 8).
PW (Note 4) (Note 5)	None	OK/NG (Note 2)	Save parameter values. This command saves settings made with control commands into the flash ROM. Without a PW command, the scanner loses settings made with control commands when it is turned OFF.
IS	See Parameter Details , [7] given later.	OK/NG (Note 2)	Play back an audio data file specified by index, with the specified playback volume. If the scanner receives two or more IS commands in succession, it plays back the audio data file specified by the last command.
VOLSND	See Parameter Details , [8] given later.	OK/NG (Note 2)	Specify the playback volume for an audio data file specified by index.

(Note 1) When the power is ON, the scanner is ready to scan.

If the scanner receives an R command, sends the code data read, and receives Z and R commands with a code being applied to the scanning window of the scanner, then it sends even the same code data twice. This is because the Z command cancels the double-read prevention processing.

(Note 2) If the scanner receives a control command successfully, it returns an "OK" response to the host. If the format or parameter of the received control command is invalid, the scanner returns an "NG" response.

(Note 3) The scanner can read codes even displayed on a mobile's LCD under some conditions.

(Note 4) To make the scanner save settings made with control commands into the flash ROM, do not turn the scanner power OFF until the host returns an "OK" or "NO" response. Doing so may cause the scanner to malfunction.

(Note 5) These commands can save settings into the flash ROM a maximum of 1,000,000 times due to the restrictions on the flash ROM.

(Note 6) The scanner can read codes even displayed on a paper under some conditions.

[1] "S" command parameters

Specified code symbol	Parameter	Example	Readable code symbol
QR Code/MicroQR Code	Q	SQ	QR Code/MicroQR Code
iQR Code	G	SG	iQR Code
PDF417/MicroPDF417	Y	SY	PDF417/ MicroPDF417
Data Matrix	Z	SZ	Data Matrix
Aztec	J	SJ	Aztec
EAN/UPC (EAN-13/EAN-8/UPC-A/UPC-E)	A	SA	EAN-13/EAN-8/UPC-A/UPC-E
Interleaved 2of5(ITF)	I[:[C]] (Note 1)	SI	ITF with/without check digit
		SI:C	ITF with check digit
Standard 2of5(STF)	H[:[C]] (Note 1)	SH	STF with/without check digit
		SH:C	STF with check digit
Codabar (NW-7)	N[:[C]] (Note 1)	SN	NW-7 with/without check digit
		SN:C	NW-7 with check digit
Code 39	M[:[C]] (Note 1)	SM	Code 39 with/without check digit
		SM:C	Code 39 with check digit
Code 93	L	SL	Code 93
Code 128/GS1-128	K	SK	Code 128/GS1-128
GS1 DataBar (Note 2)	R	SR	GS1 DataBar
GS1 Composite symbols	V	SV	GS1 Composite symbols
Multi-line barcode scanning	&	S&	Up to 3 lines of bar codes at one time

(Note 1) Adding ":C" allows the scanner to read only codes with a check digit(s) so that the scanner cannot read codes having no check digit.

(Note 2) RSS refers to all of the following codes:

GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS Limited), GS1 DataBar Expanded (RSS Expanded), GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Expanded Stacked (RSS Expanded Stacked), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional).

To specify two or more parameters in a command sequence, separate them with commas (,) as shown below. If any one of them is wrong, the scanner returns an "NG" response to the host and makes all parameters invalid.

Example If you specify "SQ,A,I,N:C,M:C,K", the scanner can read the following codes.

QR Code/MicroQR Code
EAN-13/EAN-8/UPC-A/UPC-E
ITF with/without check digit
Codabar (NW-7) with check digit
Code 39 with check digit
Code 128/GS1-128

Command parameters for multi-line barcode scanning (to be preceded by an ampersand (&))

Specified code symbol	Syntax	Example
EAN/UPC (EAN-13/EAN-8/UPC-A/UPC-E)	A:code [1stchara[2ndchara]] where, code is A, B, or C specifying the following: A EAN-13/UPC-A B EAN-8 C UPC-E	&A:A, &A:B, &A:C, &A:A49
Interleaved 2of5 (ITF)	I:[[:[mini.no.digits[-max.no.digits]][C]; [1stchara[2ndchara]]]]	&I:6-10C;, &I:;12
Codabar (NW-7)	N:[[:[mini.no.digits[-max.no.digits]] [startstop][C]]]	&N:8AAC, &N:4-8C
Code 39	M:[[:[mini.no.digits[-max.no.digits]][C]; [1stchara[2ndchara]]]]	&M:8-12C;, &M:;23
Code 128	K:[[:[mini.no.digits[-max.no.digits]]; [1stchara[2ndchara]]]]	&K:6-12;, &K:;34
GS1-128	W:[[:[mini.no.digits[-max.no.digits]]; [1stchara[2ndchara]]]]	&W:6-12;, &W:;34
Code 93	L:[[:[mini.no.digits[-max.no.digits]]; [1stchara[2ndchara]]]]	&L:6-12;, &L:;34

Note 1: The minimum and maximum numbers of digits for bar codes to be read should satisfy the following condition.

$$\text{mini.no.digits} \leq \text{max.no.digits}$$

Note 2: Specifying mini.no.digits only makes the scanner read the number of digits specified by mini.no.digits. Specifying max.no.digits only is not allowed.

Note 3: The number of lines allowed for multi-line barcode scanning is 2 or 3.

Note 4: The data output order follows the order of code types specified by an "S" command.

Note 5: To specify two or more parameters in a command sequence, separate them with commas (,) as shown below. If any one of them is wrong, the scanner returns an "NG" response to the host and makes all parameters invalid (Example) Specification of S&A:A,&I,&N:C allows the following codes to be scanned.

- Multi-line bar codes under the following conditions

- 1st line: EAN-13/UPC-A
- 2nd line: ITF with/without a check digit
- 3rd line: Codabar (NW-7) with a check digit

Note 6: If a bar code specified for multi-line barcode scanning does not satisfy the scanning condition, the scanner scans it as a single-line code.

(Example) Specification of S&A:A12,&M,&K:5-10;56 allows the following codes to be scanned.

- Multi-line bar codes under the following conditions

- 1st line: EAN-13/UPC-A starting with 12
- 2nd line: Code 39 with/without a check digit
- 3rd line: Code 128 of 5 to 10 digits, starting with 56

(In the above case, the scanner can read EAN-13/UPC-A and Code 128 out of the above specifications as a single-line code, but it cannot read any Code 39 as a single-line code. This is because Code 39 has no scanning condition specification so that all Code 39 symbols are targets for multi-line scanning.)

Note 7: Single-line scanning and multi-line scanning can be specified at one time.

(Example) Specification of SZ,Y,&A:A12,&M,&K:5-10;56 allows the following codes to be scanned.

- Data Matrix

- PDF417/MicroPDF417

- Multi-line bar codes under the following conditions

1st line: EAN-13/UPC-A starting with 12

2nd line: Code 39 with/without CD

3rd line: Code 128 of 5 to 10 digits, starting with 56

- EAN-13/UPC-A and Code 128 out of the above scanning specifications, as a single-line code

Note 8: Multi-line barcode scanning should be specified at the end of a command sequence. Specifications halfway in a command sequence results in an error.

(Wrong example) SZ,Y,&A:A12,&M,&K:5-10;56,Q

MicroQR Code follows multi-line barcode scanning, so this results in an error.

(Correct example) SZ,Y,Q,&A:A12,&M,&K:5-10;56

[2] "I" command parameters

Items	Parameter	Example	Function
Speaker beeping time	T0	IT0	60 ms
	T1	IT1	420 ms
Speaker volume	V0	IV0	Low
	V1	IV1	Medium
	V2	IV2	High
Speaker tone	F0	IF0	Low tone
	F1	IF1	High tone
	F2	IF2	Medium tone
ON/OFF interval of indicator LEDs	D0	ID0	Light the blue LED for approx. 500 ms.
	D1	ID1	Flash the blue LED for approx. 2 seconds at intervals of approx. 50-ms ON and approx. 50-ms OFF.
	D2	ID2	Light the green LED for approx. 500 ms.
	D3	ID3	Flash the green LED for approx. 2 seconds at intervals of approx. 50-ms ON and approx. 50-ms OFF.
	D4	ID4	Light the red LED for approx. 500 ms.
	D5	ID5	Flash the red LED for approx. 2 seconds at intervals of approx. 50-ms ON and approx. 50-ms OFF.

Note 1: If the scanner receives an "I" command when it is ready to scan, it may take a maximum of 100 ms for the scanner to operate.

Note 2: The speaker and the indicator LEDs operate regardless of whether they are enabled or disabled.

Note 3: When the same parameters having different values are specified, the last specified one takes effect.

Note 4: Specifications of the speaker volume and tone only do not produce any operation.

Note 5: To specify two or more parameters in a command sequence, separate them with commas (,) as shown below. If any one of them is wrong, the scanner returns an "NG" response to the host and makes all parameters invalid

(Example) Specification of IT0, ID0

The scanner beeps the speaker for 60 ms and lights the blue LED for approx. 500 ms.

[3] "BR" command parameters

Items	Parameter	Example	Function
Enable speaker	NONE	BR	Beep the speaker for 60 ms.
Speaker volume	V0	BRV0	Low
	V1	BRV1	Medium
	V2	BRV2	High
Speaker tone	F0	BRF0	Low tone
	F1	BRF1	High tone
	F2	BRF2	Medium tone

Note 1: When the same parameters having different values are specified, the last specified one takes effect.

Note 2: To specify two or more parameters in a command sequence, separate them with commas (,) as shown below. If any one of them is wrong, the scanner returns an "NG" response to the host and makes all parameters invalid

(Example) Specification of BRV0, BRF0

The scanner enables the speaker and switches the speaker volume and tone to Low.

[4] "NR" command parameters

Items	Parameter	Example	Function
Enable transmission of the number of digits	2	NR:2	Transmit data by two digits.
	4	NR:4	Transmit data by four digits.

[5] "TR" command parameters

Items	Parameter	Example	Function
Double-read prevention timeout	00	TR00	Enable double-read processing.
	01 to 99	TR05	Set the double-read prevention timeout (x 100 ms) Default: 05 (500 ms)

[6] "DLV" command parameters

Items	Parameter	Example	Function
Bar code scanning level	Bn	DLVB1 to DLVB8	Scanning level 1 to 8 (Low) 1 ← Scanning level → 8 (High) Default: 2

Note 1: The "DLV" command applies to all one-dimensional codes, not to two-dimensional ones.

Note 2: Specifying a high scanning level may increase the scanning time required.

The entry range of the scanning level is from 1 to 8. Increasing the scanning level value decreases the bar-code reading efficiency, but it diminishes the possibility of misreading of low-quality bar codes (split, stained, thicker, or thinner). To the contrary, decreasing the value increases the bar-code reading efficiency, but the scanner may misread low-quality bar codes.

[7] "IS" command parameters

Items	Parameter	Example	Function
Playback of audio data file	n,m where n : 1 to 5 m : 0 to 9	IS1,0 to IS1,9	Play back an audio data file specified by index, with the specified playback volume. Audio file index (n): 1 to 5 Playback volume (m): 0 to 9 (Minimum) 0 ← Playback volume → 9 (Maximum) This parameter can be omitted. If it is omitted, the playback volume specified by the configuration software (ScannerSetting_2D) or a VOLSND command applies. Example: File index 1, Playback volume 0 IS1,0

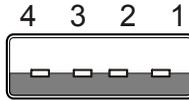
[8] "VOLSND" command parameters

Items	Parameter	Example	Function
Playback volume	n,m where n : 1 to 5 m : 0 to 9	VOLSND 1,0 to VOLSND 1,9	Specify the playback volume for an audio data file specified by index. Audio file index (n): 1 to 5 Playback volume (m): 0 to 9 (Minimum) 0 ← Playback volume → 9 (Maximum) Example: File index 1, Playback volume 1 VOLSND1,1

Appendix 3 Interface Specifications

■ USB Interface

USB connector, type A



Viewed from pin side

Pin #	Signal
1	DC5V
2	D-
3	D+
4	GND

2D Code Scanner (Fixed type)

QK30-U

User's Manual

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