

DENSO

2D Code Scanner (Fixed type)

QB30-SR

QB30-SU

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: Specifications described in this manual are supported by QB30-SR Firmware version 1.00 or later and QB30-SU Firmware version 1.00 or later.

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 QB30 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 (Δ) 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 scanner 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.

Follow the instructions correctly. Failure to do so could cause fire or smoke, as well as malfunction to the scanner. Please read the following safety precautions carefully before using the device.



- 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 AC adapter 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 power cable of the AC adapter. 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, disconnect the AC adapter and 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 AC adapter and 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 AC adapter and the interface cable, and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.

CAUTION

Follow the instructions correctly. Failure to do so could cause fire or smoke, as well as malfunction to the scanner. Please read the following safety precautions carefully before using the device.

 Never disassemble	<ul style="list-style-type: none"> • Never disassemble or modify the scanner; doing so could result in an accident such as break or fire. 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 or AC adapter 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 and AC adapter in a well-ventilated area. • Keep the power cable of the AC adapter away from any heating equipment. Failure to do so could melt the sheathing, resulting in a fire or electrical shock. • 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, creating a fire hazard. • Do not put heavy material on the scanner or its interface cable, or allow the cable 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. • Do not use or store the scanner at a place such as near processing machine or on the carpet where it may generate strong magnetism or static electricity. Doing so could affect the housing or parts, resulting in a malfunction or break.

CAUTION

Follow the instructions correctly. Failure to do so could cause fire or smoke, as well as malfunction to the scanner.
Please read the following safety precautions carefully before using the device.

	<ul style="list-style-type: none">• When disconnecting the AC adapter from the wall socket, hold the AC adapter body not the power cable. The power cable may be broken, resulting in a burnt AC adapter, electrical shock, or fire.• 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 electrical storm activity, always unplug the AC adapter from the wall socket. Exposure to power surges could result in a damaged scanner or fire.• When taking care of the scanner, unplug the AC adapter from the wall socket 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. Using the scanner whose housing is broken could result in smoke or fire. Unplug the AC adapter from the wall socket and contact your nearest dealer.

Care and Maintenance

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

- To clean the plate, first blow the dust away with an airbrush. Then wipe the plate with a cotton swab or the similar soft one gently.
- 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.

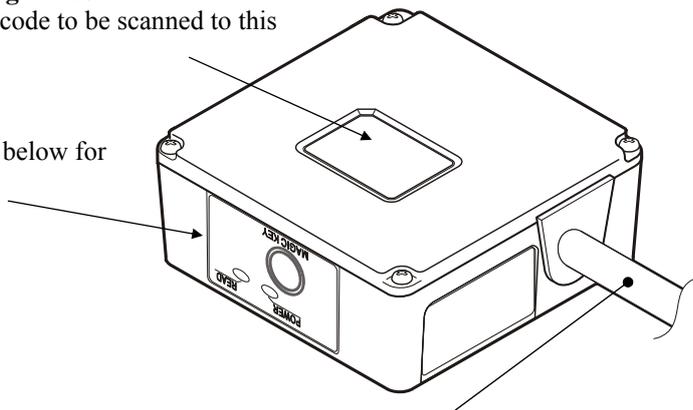
Chapter 1 Names and Functions

Scanning window

Bring a code to be scanned to this window

Key sheet

See the illustration below for details.



Interface cable

Use the cable to connect your scanner to a host computer or other equipment.

POWER LED

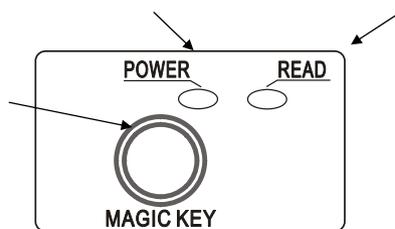
POWER LED lights when the power is on.

READ LED

READ LED lights in blue when a read is successfully complete.

MAGIC KEY

Use it as an auxiliary key for scanning or data transmission.

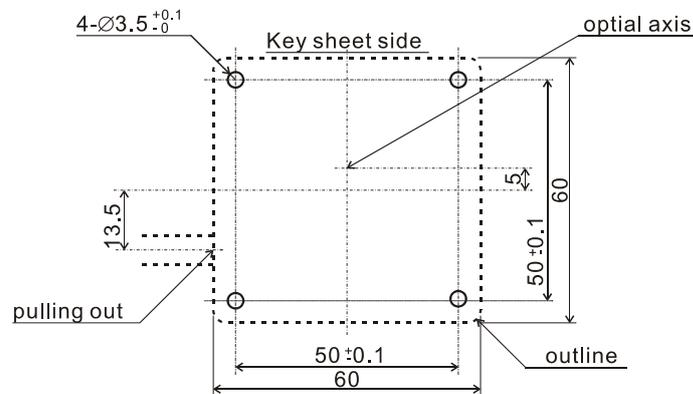


Detail of key sheet

Chapter 2 Installation

■ Mounting hole

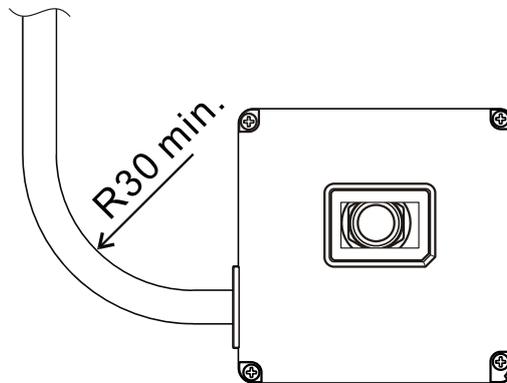
Following measurement should be applied for mounting hole when the screw hole on the device is used for setting up. Nominal diameter and pitch of the screw used, and the depth of the screw for the device are M3×0.5mm and 6mm, respectively. 0.315 N·m is recommended for the tightening torque.



Dimensions without tolerance are for reference.
Barr is not allowed on the equipment side.

■ Interface cable wiring

Wire the interface cable so that bending radius of the cable is more than 30 mm.



Chapter 3 Preparation (QB30-SU)

Using the scanner via the USB interface 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.

USB-COM interface:

To use this interface, you need to install the dedicated Active USB-COM port 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 driver, refer to Chapter 4, Section 4.2.1. For the interface specifications, refer to Chapter 12, Section 12.2.

This interface is selected by default.

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 driver, refer to Chapter 4, Section 4.2.2. For the interface specifications, refer to Chapter 12, Section 12.3.

You can switch between the USB-COM interface and USB keyboard interface by using the QR-coded parameter menu (provided in Chapter 12) or the configuration software (QB Setting)*.

	To use the USB-COM interface (factory default):	To use the USB keyboard interface:
Host computer	DOS/V	
Operating System (OS)	Windows XP, 32 bit Edition. Windows Vista, 32 bit Edition Windows 7, 32 Edition/64bit Edition	
USB driver	Active USB-COM port driver provided by DENSO WAVE	OS-supplied device driver

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

- Using QR-coded parameter menu (provided in Chapter 17),
- Using the configuration software (QB Setting),*

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.

* Registered users can download the configuration software (QB Setting) from QBdirect on the Denso Wave website at no extra charge. (members-only)

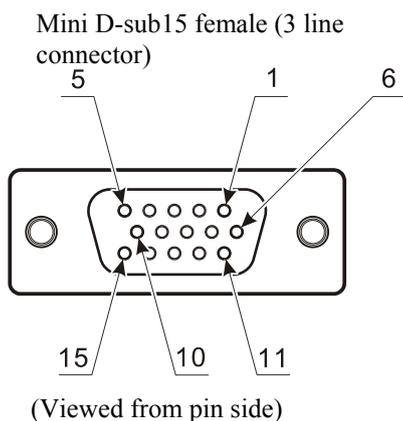
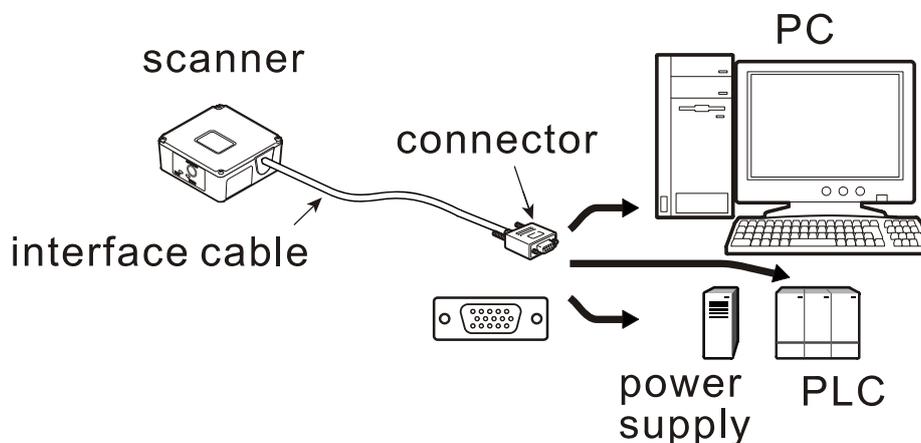
For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>

Chapter 4 Connection to the Host Computer

4.1 QB30-SR

Connect the interface cable to the host computer and PLC.



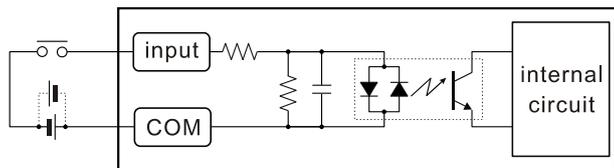
Pin No.	Terminal name	Name	Signal direction
1	No Connection	Unconnected (*1)	—
2	TXD	Transmission data	Output
3	RXD	Incoming data	Input
4	CTS	Permit to send	Input
5	RTS	Request to send	Output
6	GND	Ground	—
7	No Connection	Unconnected (*1)	—
8	COM IN	Input common (*2)	Input/Output
9	TRIGGER	Input TRIGGER	Input
10	RESET	Input RESET	Input
11	OUT1	Output terminal1 (*3)	Output
12	No Connection	Unconnected (*1)	—
13	OUT2	Output terminal2 (*3)	Output
14	COM OUT	Output common (*2)	Output
15	+5V	Power source	—

*1) Do not connect anything to 1pin, 7 pin and 12 pin

*2) Insulated from the power/ground of QB30.

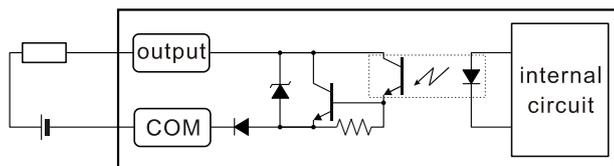
*3) Factory default setting is unused. Function of external output terminal can be set with setting software (QB Setting)

Connection of input circuit
Input: NPN/PNP



Input Specifications (NPN, PNP)	
ON voltage	3.5V or more
OFF voltage	1.5V or less
Maximum input power supply	5.5V

Connection of output circuit
Output: NPN Open Connector



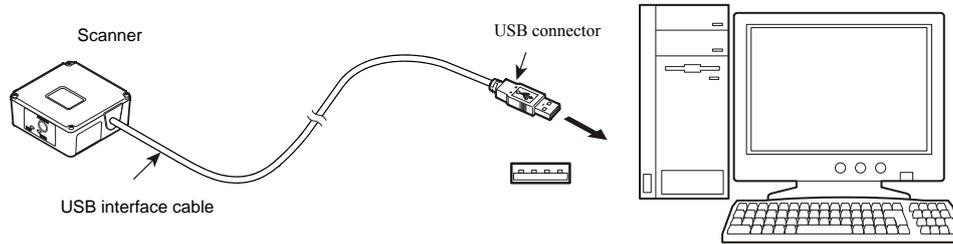
Output Specifications (NPN open collector)	
Rated load	DC30V/50mA
Residual voltage when ON	1.0V or less (50mA)
Leakage current when OFF	0.1mA or less

Note: When disconnecting the interface cable or DC power jack, hold the connector housings not the cables. Pulling cables will result in breaks.

Note: Avoid connecting and disconnecting of connectors all if possible. Doing so may result in weak contact.

4.2 QB30-SU

The scanner 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.



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.
- Hot plugging/unplugging is allowed for USB devices. However, do not plug or unplug the USB connector when:
 - The computer is on standby (in suspend mode) or
 - The COM port is open with the USB-COM interface being used. (Hot plugging/unplugging under this condition will lose data.)
- 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 the power management functions of the computer.

This device does not support power management functions such as “Standby”, “Sleep”, “Resume” and “Hibernation”.

Cancel the setting of those power management functions before setting up the device.

When suspend status is cancelled while the software for communication on the computer is open, occasionally computers are unable to communicate.

In that case, please terminate the software and restart the computer.

4.2.1 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 does not come with the scanner in a CD-ROM. It can be downloaded for free from our website at:

<http://www.qbdirect.net>

The file downloaded contains the Active USB-COM port driver and uninstaller which are compressed. It is a self-extracting file. Store the file into a folder and then double-click its icon to extract it.

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

Follow the procedure shown below to install the Active USB-COM port driver.

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.

The driver installation procedure is required every time a USB device is to be connected to a difference USB port.

To use a new USB port for which the driver has not been installed, be sure to perform the driver installation procedure.

Installing the serial port driver before connection of the USB device

[Windows XP]

(1) Run the Setup.exe.



(2) Wait for the **InstallShield Wizard** screen to appear and then click **Next**.



(3) Check that the USB device (scanner) to be connected is not plugged in the computer, and then click **OK**.

Note: When installing the serial port driver for the 2nd or the following USB devices on the same computer, ensure that none of those USB devices is plugged in the computer, and then click **OK**.



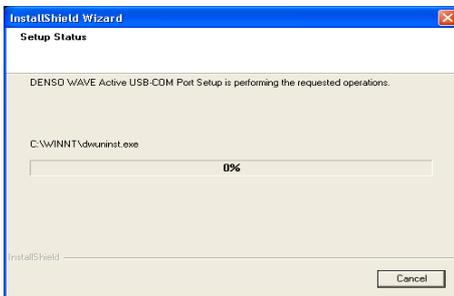
If the conventional USB-COM device driver version 1.x has been installed, the message asking for uninstallation of the conventional driver appears. Click **OK**.



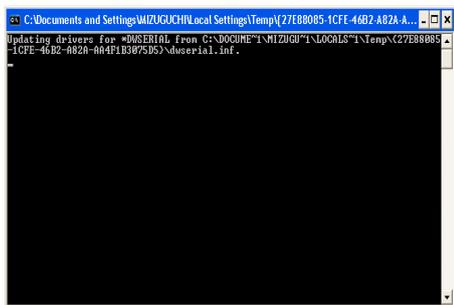
If the message shown at left appears, the conventional driver is running on the computer. Terminate the application using the COM port of the driver, remove the corresponding USB device, and then click **OK**.

Uninstall the drivers.

Uninstalling drivers is in progress, showing the uninstalling message given at left. Upon completion of uninstallation, select **Finish** and reboot the computer. After the computer reboots, go back to step (1) above again.



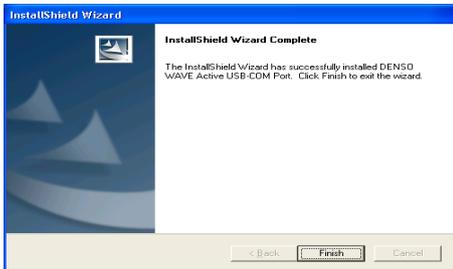
(4) Wait for installation of the driver files to proceed.



Note: When installation is in progress, the DOS prompt window appears as shown at left. Do not close the window since it is not abnormal. Wait for the window to automatically close.



(5) Wait for the caution message for driver's digital signature to appear, then click **Continue Anyway** to proceed.

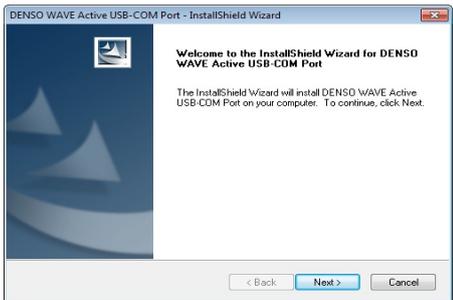


(6) After completion of installation of the driver files, click **Finish**.

[Windows 7]

(1) Run the Setup.exe.

(2) Wait for the User account control message screen to appear and then select “**Yes (Y)**”.

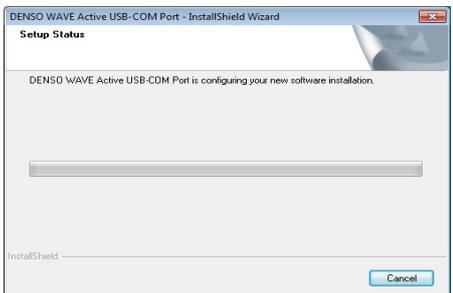


(3) Wait for the **InstallShield Wizard** screen to appear and then click **Next**.

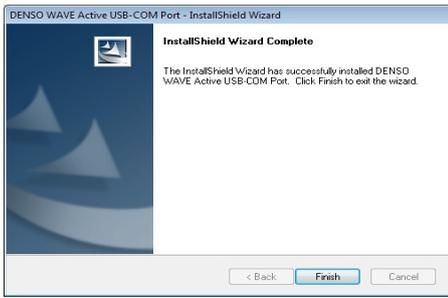


(4) Check that the USB device (scanner) to be connected is not plugged in the computer, and then click **OK**.

Note: When installing the serial port driver for the 2nd or the following USB devices on the same computer, ensure that none of those USB devices is plugged in the computer, and then click **OK**.



(5) Wait for installation of the driver files to proceed.



(6) After completion of installation of the driver files, click **Finish**.

● **To use two or more USB ports**

To use two or more USB ports, run the Setup.exe by the same number of times as the number of USB ports to be used. Running the Setup.exe once adds one COM port.

Note: USB ports can be assigned to COM ports, one to one. It is not allowed to assign two or more USB ports to a single COM port. To use two or more USB ports with a single USB device by turns, you need to run the Setup.exe by the same number of times as the number of USB ports.

Connecting the USB device and installing the USB driver

[Windows XP]

(1) Connect the scanner's USB interface cable to the computer or USB hub.



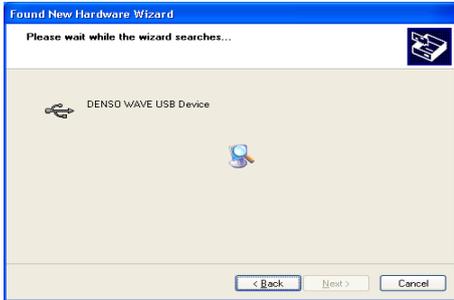
(2) Wait for the "Found New Hardware" to appear on the Windows task tray.



(3) Wait for Found New Hardware wizard to start, select "No, not this time," then click Next.



(4) Select "Install the software automatically (Recommended)" and click Next.



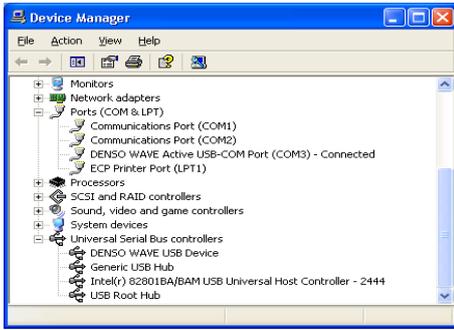
(5) Wait for the wizard to start searching for the USB driver.



(6) Wait for the USB driver to be found and for the caution message for driver's digital signature to appear, then click **Continue Anyway** to proceed.



(7) Wait for the completion screen to appear and then click **Finish**.



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

If "**DENSO WAVE USB Device**" and "**DENSO WAVE Active USB-COM Port (COMx) - Connected**" are added to the tree as shown at left, the scanner is connected normally.

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

- **"Safe removal of hardware" on the Windows task tray**

When the USB device (scanner) is being connected, Windows shows the "Unplugging DENSO WAVE USB Device (COMx) in safety" on the task tray. This is useful to view the connection status of USB devices or disconnect those devices.

- **Changing a COM port number**

Using the Windows Device Manager can change a COM port number.

Note: Before accessing a COM port number, be sure to disconnect the USB device. Changing a COM port number sometimes may not update the indication on the Device Manager or the task tray icon. If it happens, use the Device Manager to disable the virtual serial port whose COM number has been changed and then enable it again.

4.2.2 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 is set up, switch it to the USB keyboard interface by scanning the "USB keyboard interface" QR Code symbol given in Section 17.3 with the parameter setting procedure in Section 17.1. (Plugging the USB interface cable in the scanner automatically switches to the USB-COM interface by default.)

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. The setup procedure on each of Windows XP and Windows Vista is described below. Follow the wizard for Windows 7 as well.

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.



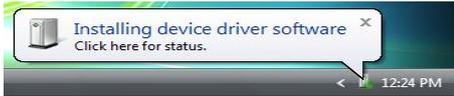
- (4) To check whether the USB device is working normally, open Windows Device Manager.

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 Vista

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

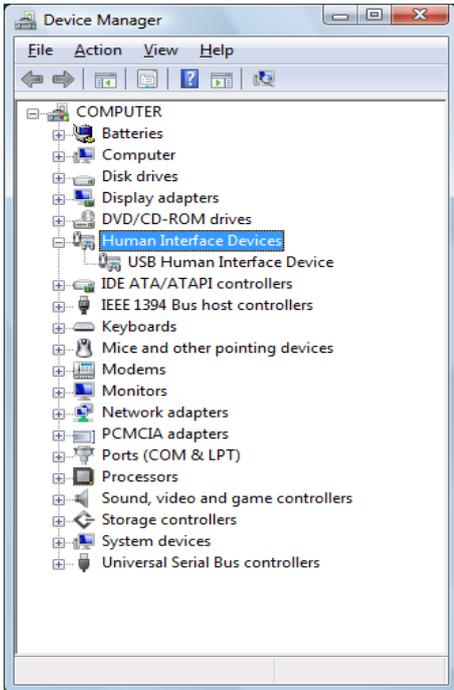


- (3) Wait for the **Installing device driver software** hint to pop up on the Windows task tray.

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.

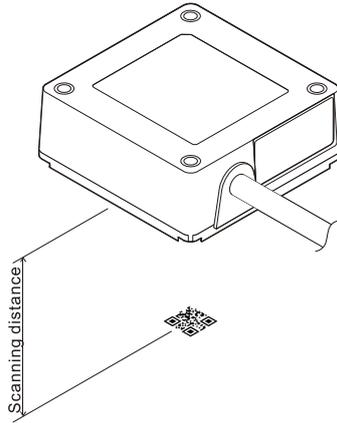
If **USB Human Interface Device** is added to the sub-tree of **Human Interface Devices** as shown at left, the scanner is connected normally.

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.

Chapter 5 Scanning Codes

Bring the QR Code to the scanning window of the scanner as shown below.

The scanner reads the QR Code, outputs the code data read, sounds the beeper, and turns the READ LED blue.



Notes -----

- 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 successful 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.

- The double-read prevention timeout can be specified with the configuration software (QB Setting) and commands..
- The scanner can read codes omnidirectionally. Note that a target code plus its margin should lie within the scan range.

Chapter 6 Setting the parameters

You can customize the scanner by modifying communications, code type, and other scanner parameters with the commands, the QR-coded parameter menu or the configuration software QB Setting*. These parameters retain their settings even when the power is off. The settings are not retained without sending SAVE command when you modify the parameters with the commands.

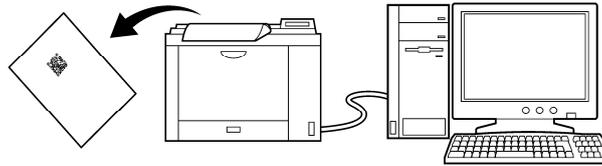
(1) Scanning parameter setting QR Codes (QR-Coded parameter menu) by pressing the trigger switch.

(The QR-coded parameter menu is given in Chapter 17.)

(2) Using the configuration software (QB Setting) in your computer.

The configuration software is available via the RS-232C interface or 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 RS-232C interface, USB-COM interface and USB keyboard interface.



Note: Configuration software (QB Setting) is unable to use when USB keyboard interface is selected.

(3) Using the command in your computer.

Operation setting is configured when you send the commands to the QB30 by communication from external devices such as a computer.

* Registered users can download the configuration software ([QB Setting](#)) 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 7 Reading mode

The scanner is equipped with continuous scan mode capable of automatically scanning scan codes, and trigger modes used to control scanning with external trigger signal and commands. These modes can be selected using the commands, QR Coded parameter menu or configuration software (QB Setting).

1) Continuous reading mode

- Continuous reading mode A (Settable to QB30-SR only)

Scanning is performed repeatedly while the trigger signal is ON, and data is transferred to the host computer when scanning is complete. Test scanning is performed repeatedly while the code is within the scanner field of view. Codes may continue to be scanned alternately if two or more codes enter the scanner field of view.

- Continuous reading mode B

Scanning is performed repeatedly regardless of the trigger signal condition, and data is transferred to the host computer when scanning is complete. Test scanning is performed repeatedly while the code is within the scanner field of view.

Codes may continue to be scanned alternately if two or more codes enter the scanner field of view.

- Auto sense mode

If the scanner detects an object within the scanning field of view, it enters the Active state, where it performs scanning. When approximately 3 seconds has elapsed after scanning is complete, or if scanning is not complete approximately 3 seconds after the scanner entered the Active state, the scanner turns off the illumination LED and enters the Code detecting state. Code detection level can be selected from "High", "Medium" and "Low".

Since the scanner starts to scan when an object is detected within the scanning field of view, if the code symbol is left as is inside the scanning field of view after scanning is complete, the scanning operation may be repeated.

Note1) If object cannot be detected due to low illumination, etc., the scanner will not enter the Active state. (Ambient illumination of 500lx or more is necessary)

Note2) There may be times when the unit switches between the Active state and Ready state due to fluctuations in the ambient lighting.

Scanning is performed repeatedly regardless of the trigger signal condition, and data is transferred to the host computer when scanning is complete. Test scanning is performed repeatedly while the code is within the scanner field of view. Codes may continue to be scanned alternately if two or more codes enter the scanner field of view.

2) Trigger scanning mode

Direct trigger mode (Settable to QB30-SR only)

Scanning starts when the trigger signal input delay time has elapsed after the trigger signal was turned ON, and continues scanning as long as the trigger signal remains ON.

Indirect trigger mode (Settable to QB30-SR only)

Scanning starts when the trigger signal input delay time has elapsed after the trigger signal was turned ON, and continues scanning for the indirect one-shot duration.

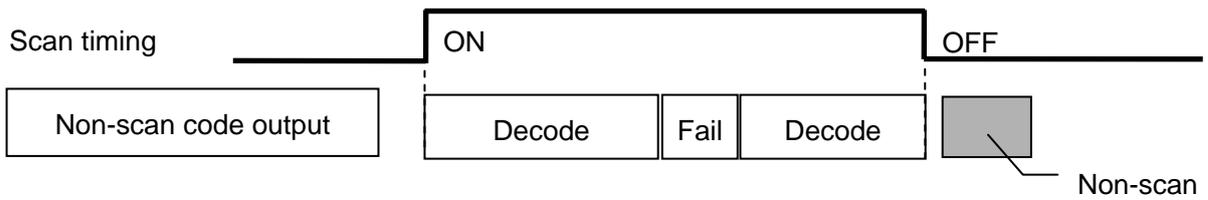
Direct software trigger mode

Scanning starts by the start command and ends by the scanning completion command.

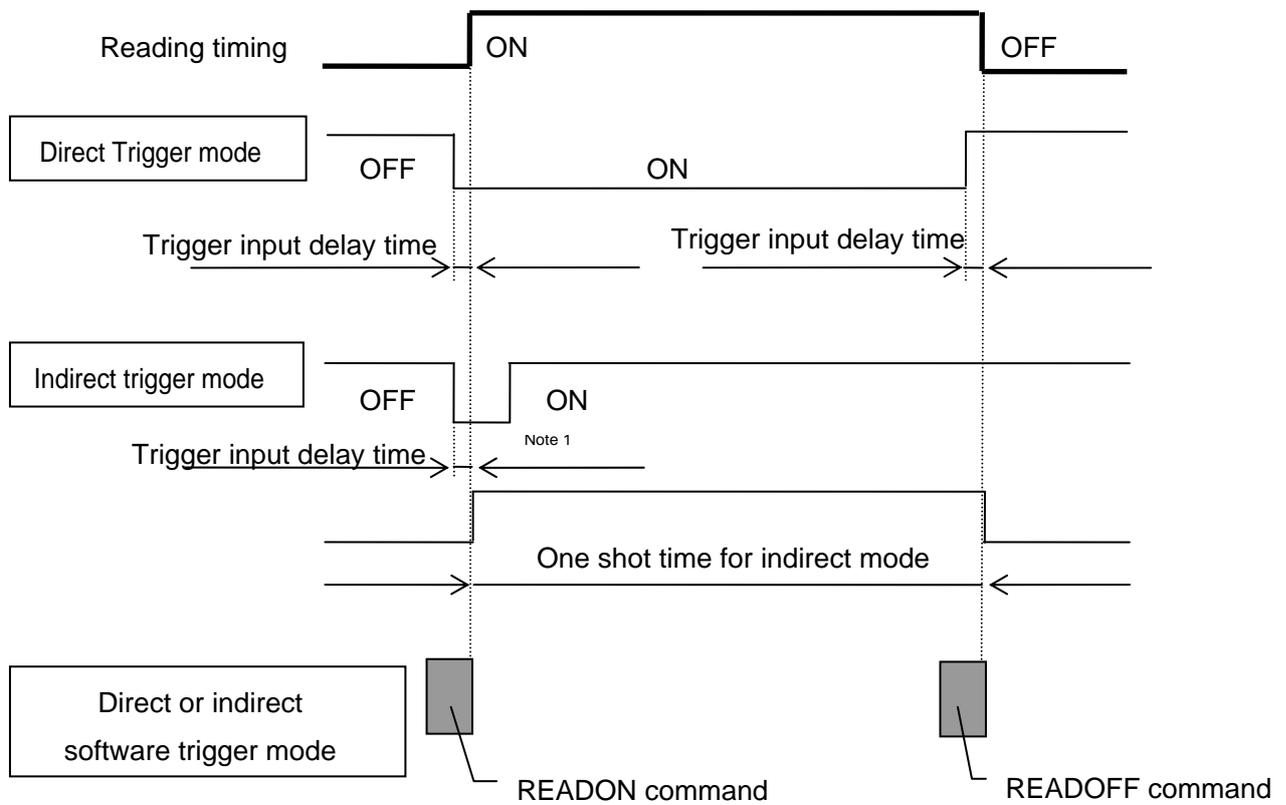
Indirect software trigger mode

Scanning starts by the start command and ends by the scanning completion command. Scanning is performed at this time for the one-shot duration in direct software trigger mode.

The time of period in which scanning is enabled is called "Scan timing". Exposure starts at the beginning of the scan timing, and data, if correctly scanned, is transmitted to the host before scanning is terminated. Such exposure is repeatedly attempted until the code is correctly scanned for each scan timing. If the scan timing is terminated while the code is incorrectly scanned, non-scan codes can be transmitted to the host. Whether non-scan codes are output and characters to be transmitted can be set using the command or configuration software. Non-scan codes are represented as "ERROR" by default.



The trigger signal input delay time is used to control the time from the trigger signal ON to the start of a scan timing (exposure start), as well as to prevent the timing signal from functioning incorrectly due to some mechanical or external noise. You may change the delay time with the command or configuration software.



Note1: Delay timing is not selectable when the trigger input is designated in the Software trigger mode.
 Note2: Transmission command can be changed in the Software trigger mode. (Default READON/READOFF)
 Note3: The trigger signal ON duration shall be longer than the trigger input delay time.
 Note4: Trigger signal input delay time can be set using the 0ms (No delay time) or 5ms. The trigger signal input delay time is guaranteed from 5ms.

Chapter 8 Scanning Functions

8.1 Data Verification Mode

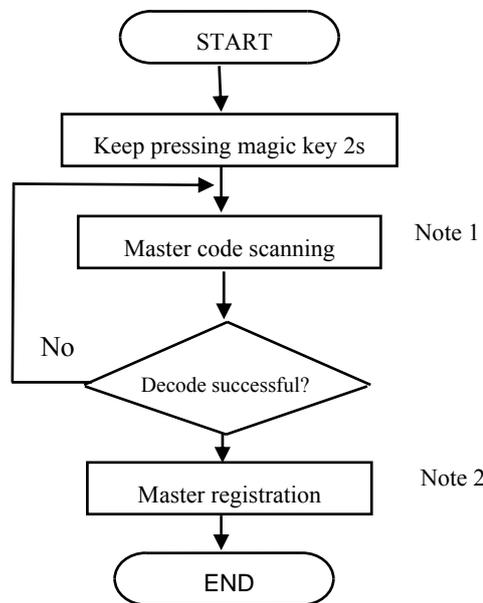
The data verification mode verifies the code data read against the master data stored in the scanner and reports the match status with data output.

8.1.1 Scan entry mode

Scan a code and set the content as the verification master. The scanner enters master data registration mode after the magic key is pressed for two seconds or the master registration command is sent with the permission of scan entry verification by configuration software (QB Setting) or commands, and the first scanned code is used as master data. Only one master data can be registered, the position of the verification digit can be specified. The output format for the verification result can be selected, with the position of the verification digit and verification result output format being set using the commands or configuration software(QB Setting). Verification are made on 1:n basis, with the maximum number of comparable data digits being 255.

8.1.1.1 Master data registration with magic key

The following chart is the procedure of master data registration with a magic key.

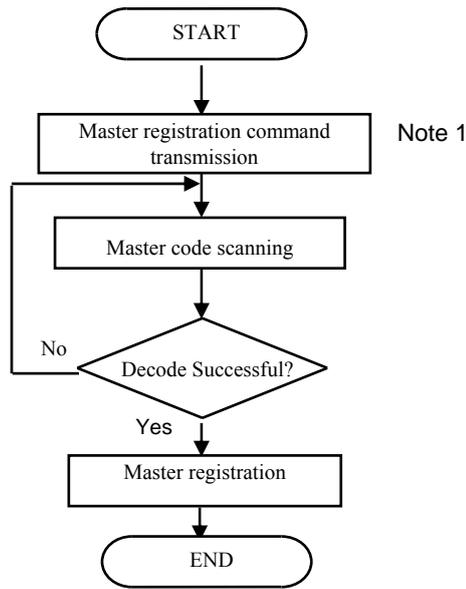


Note1: The scanner enters master data registration mode while the magic key is pressed. The scanner enters the normal scanning mode if the magic key is released.

Note2: The registered master(s) is deleted when the power is turned OFF.

8.1.1.2 Master data registration with command

The following chart is the procedure of master data registration with commands.



Note1: Following two types of commands are supported for master registration.

Command	Details
ENT	Master data registration The registered master(s) is deleted when the power is turned OFF.
ENTS	Master data registration The registered master(s) is retained even when the power is turned OFF.

8.1.1.3 Verification digit position designation

This is set using the commands or configuration software.. All digits will be compared if no verification digit position is designated. Only the designated digit position is compared if a verification digit position is designated, and the verification master and number of digits (data length) in the scanned code data are ignored.

Example in which verification digit position designation is used.

Verification master data (10 digits) : 0034500000
 Scanned code data (11 digits) : 12345000000
 Verification digit position setting : 3rd to 5th digit
 verifiedVerification result output : OK

8.1.1.4 Verification result output

This is set using the commands or configuration software.. The verification result output format can be selected from the following four patterns. “NO MASTER” is output if scanned when the master data is not registered.

	When Verification Successful	When Verification Unsuccessful
Pattern 1	“OK”	“NG”
Pattern 2	“OK”+ < data >	“NG”
Pattern 3	“OK”	“OK”+ < data >
Pattern 4	“OK”+ < data >	“NG”+ < data >

8.1.2 File entry mode

First, save the verification master data. Up to 50 verification master can be registered. the position of the verification digit can be designated. the output format for the verification result can be selected, with the position of the verification digit and verification result output being set using the commands or configuration software(QB Setting). Verification can be made on a 1:n basis for a single master, and on an n:n basis if multiple masters are designated. The maximum number of comparable data digit is 255.

8.1.2.1 Master data registration

This is set using the commands or configuration software(QB Setting). Commands used for master registration are as follows.

Command	Details
ESTART	Starts master data registration
EEND	End master data registration
EF	Master registration command. The registered master(s) is deleted when the power is turned OFF.
EFS	Master registration command. The registered master(s) is retained even when the power is turned OFF.

- Master registration command transmission format

“EF” “EFS”	Master no. ^(Note 1)	Comma “,”	Code data length ^(Note 2)	Comma “,”	Code data
---------------	--------------------------------	--------------	--------------------------------------	--------------	-----------

<Example>

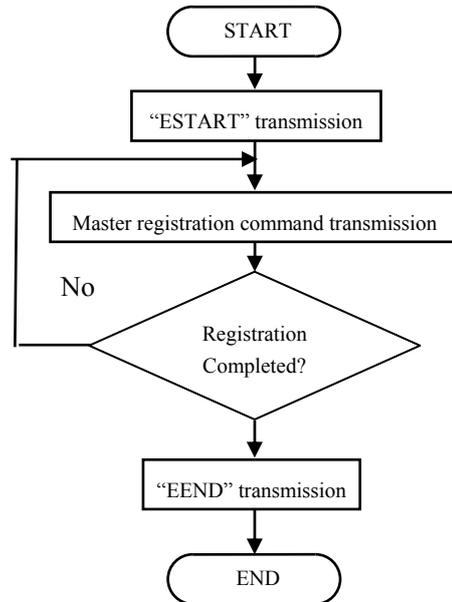
If verification master data (10 digits) “1234567890” is registered to master no. 11:

Master registration command: “EFS11,010,1234567890”

Note 1: Specify a master number between “01” and “50” (2 digits, fixed). If an existing master number is specified, the original number will be overwritten.

Note 2: Specify the data length of the registered code data in the range “001” to “255” (3 digits, fixed).

The flow for master data registration is as follows.



8.1.2.2 Verification master data designation

This is set using the commands, or configuration software (QB Setting). Commands used for verification master designation are as follows.

Command	Details
MEM#nn	Verification master designation command nn = 00: No verification master designation (all masters and n:n verification) nn = 01 - 50: Master no. nn verification master and 1:n verification

8.1.2.3 Verification digit position designation

This is set using the commands, menu, or configuration software (QB Setting). All digits will be compared if no verification digit position is designated. Only the designated digit position is compared if a verification digit position is designated, and the verification master and number of digits (data length) in the scanned code data are ignored. Unlike Scan entry mode, however, the verification master is always used to perform a verification from the first digit. If the number of digits in the verification master is fewer than the number of digits being compared, it is treated as an unregistered condition. If the number of digits in the verification master is the same or greater than the number of digits being compared, the excess data is ignored.

[Example in which verification digit position designation is used]

Verification master data (4 digits): 3456

Scanned code data (11 digits): 12345678901

Verification digit pos. setting: 3rd to 6th digit compared. (Verified digit qty: 4)

Verification result output: OK

8.1.2.4 Verification result output

This is set using the commands, menu, or configuration software (QB Setting). The verification result output format can be selected from the following four patterns.

	When Verification Successful	When Verification Unsuccessful
Pattern 1	“OKnn”	“NGnn”
Pattern 2	“OKnn” + <data>	“NGnn”
Pattern 3	“OKnn”	“NGnn” + <data>
Pattern 4	“OKnn” + <data>	“NGnn” + <data>

“nn” will be the designated verification master number if a verification master has been designated. If no verification master has been designated and a verification is made using all masters, the successful master number will be the designated verification master number when verification is successful, and “00” when verification is unsuccessful.

(Note) 1. Multi-line barcode scanning with the data verification mode

Master data registration

- To register a multi-line barcode as a master code, each code mark in each row shall be matched for the success of master data registration.
The definition of code marks complies with Type 1(DENSO1) described in section 12-4.
- If a multi-line barcode is registered as a master code, the concatenated data is registered by the master data in the same order as the scanning of code data.

Scan data verification

- To scan a multi-line barcode, all the code marks in respective rows shall be matched for a successful scanning. If this is not satisfied, it is regarded as data mismatching irrespective of the type of scanned data.
The definition of code marks complies with Type 1(DENSO1) described in section 12-4.

(Note) 2. A QR structured append code and an iQR structured append code scanning with the data verification mode

Master data registration

In registering a structured append code as a master code, the scan data is registered in the master code after all the divided codes are scanned with the Edit mode and Batch edit mode, while in the Unedited mode the data is registered each time a symbol block is scanned. In this case, the code block number, the total number of code blocks and the parity data are not registered as master data.

Scan data verification

If the scan code is a QR structured append code, the scanned data is compared against the master data after scanning of all divided codes is complete when in Edit mode or Batch edit mode. When in the Unedited mode, however, scan data for each divided code is compared against the master code.

8.2 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 (QB Setting). 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 12, Section 12.4).

Note: In the case of split 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.

8.2.1 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 (EAN-128), GS1 DataBar (RSS), and EAN.UCC Composite symbols (excluding linear components in a UPC/EAN Composite symbol).

8.2.1.1 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(EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
GS1 DataBar (RSS)	
EAN.UCC Composite symbology	
"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	<i>n</i> th position
Tail position	
<i>n</i> th position	Tail position
	By <i>n</i> positions from the start position
	<i>n</i> 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 specified. if	Error
"Code type": PDF417 "Data transfer regardless of error result": Permit	Invalid if specified.	Invalid specified. if	[STX]Q000512345[ETX]

8.2.1.2 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 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
GS1 DataBar (RSS)	
EAN.UCC Composite symbology	
"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 "Data transfer regardless of error result": Prohibit	1,23,456,7890	1, 2 and 3	[STX]1[ETX][STX]23[ETX][STX]456[ETX]
	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 "Data transfer regardless of error result": Permit	1,23,456,7890	5	[STX]1,23,456,7890[ETX]
	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]

8.2.1.3 Extracting AI (Application Identifier)-prefixed strings

If the scanner reads any of EAN-128 (GS1-128), GS1 DataBar (RSS), and EAN.UCC Composite 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 12, Section 12.4).

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

(1) AI-delimited 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

Delimiters can be any of the following three--header/terminator, comma and tab.

• 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]001494901234567894[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]

■ 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.

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	AIs 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
	01,11,17		[STX]94901234567894,030808,040208[ETX]
"Data transfer regardless of error result": Permit	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		
	01,12	[STX]019490123456789411030808130308101704020817040305[ETX]	
	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	0194901234567894110308081 303 081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081 303 081061704020817040305	Error (Note 1)
"Data transfer regardless of error result": Permit	0194901234567894110308081 303 081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081 303 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 (***)
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 (***)

AI	Format	Description
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 (***)
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) EAN.UCC Global Location Number
411	n3+n13	Bill to (Invoice to) EAN.UCC Global Location Number
412	n3+n13	Purchased from EAN.UCC Global Location Number

AI	Format	Description
413	n3+n13	Ship for (Deliver for) EAN.UCC Global Location Number
414	n3+n13	Identification of a Physical Location--EAN.UCC Global Location Number
415	n3+n13	EAN.UCC Global Location Number of the Invoicing Party
420	n3+an..20	Ship to (Deliver to) Postal Code Within a Single Postal Authority
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	EAN.UCC Global Returnable Asset Identifier (GRAI)
8004	n4+an..30	EAN.UCC 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 (YYMMDDHHMMSS)
8018	n4+n18	EAN.UCC 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
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).

8.2.2 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 12, Section 12.4).

■ Substitution conditions

Substitution conditions	Choices
"Code type"	Any code
	QR
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
GS1 DataBar (RSS)	
EAN.UCC Composite symbology	
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]

8.2.3 Data blocksorting mode

The scanner splits code data read into a maximum of 5 blocks at the specified split positions, sorts those blocks in the specified order, and outputs it in the data transmission format selected in the scanner (see Chapter 12, Section 12.4).

Note: The split 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
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	GS1 DataBar (RSS)
EAN.UCC symbology	Composite

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

Split 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]

8.2.4 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 (EAN-128), GS1 DataBar (RSS) and EAN.UCC Composite 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 LED and beeper

The ADF script mode can be programmed with the configuration software (QB Setting). 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 (QB Setting) 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 any of other edit modes (data extraction mode, data substitution mode, and data blocksorting mode).

8.3 Scanning a Mirror Image 2D Code

If you enable the mirror image scanning with the configuration software (QB Setting), the scanner can scan a mirror image 2D code as well as a normal image. Note that when the mirror image scanning is enabled, the time required for scanning may increase.

8.4 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 commands, the QR-coded parameter menu or the configuration software (QB Setting).

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.

8.5 Decode Time Setting

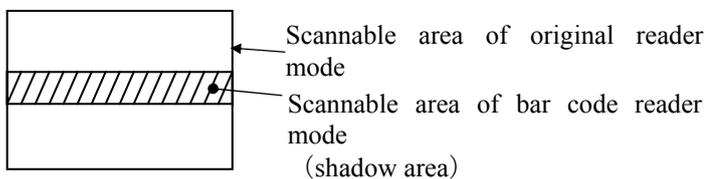
The decode time can be set at the QB30. The decoding time can be set between 0.05 second to 9.99 seconds, and decoding is repeated during scannable intervals with the set decode time as the upper limit. If scanning is not completed during decode time, scanners decode again. Decode time can be set with commands/QR Code menu and configuration software (QB Setting).

(2) Decode time

“Decode time” differs from “the time of period (Scan timing)”. For example, scanning timing is set to one second (external trigger is ON for one second) and decode time is set to 0.3 seconds, the scanner decodes approx. three times during each scanning timing. (However, decoding is terminated when successful) Decode is repeated for every 0.3 seconds for the continuous reading mode.

8.6 Bar code Reader Mode

Scannable area of lengthwise direction at the Barcode Reader Mode is limited to the central part of 15% as shown in the illustration and the skew angle θ is $6^\circ \geq \theta \geq -6^\circ$. Therefore, the barcode scanning time of the bar code reader mode is shorter than that of the original reader mode. However, 2D Code, Multi-line barcode, RSS stack code and EAN, UCC COMPOSIT can not be read even if they are permitted for reading. Neither QR Code menu nor configuration software (QB Setting) can be used when bar code reader mode is set, during which USB keyboard interface is being used. In that case bar code reader mode can be cancelled temporarily with approx. 2 seconds of holding down the magic key. (see Chapter 9, Section 9.4).



8.7 Scanning Structured Append QR (iQR) Code Symbols

QR Code symbology can split data into a maximum of 16 blocks and encode each of them into structured append Code symbol (model 1 or 2). Structured append code scanning is possible only with the same QR Code model.

The scanner can scan structured append symbols and restore them to the original data string in edit mode, batch edit mode, and non-edit mode, which you can select using the command, the QR-coded parameter menu or configuration software (QR Setting).

Edit mode

The scanner accumulates and edits split QR Code symbols read and then sends the edited data to the host computer. If the total data volume of split QR Code symbols exceeds 8 kilobytes, a read error will result and the accumulated data will be discarded.

Batch edit mode

If all the split QR Code symbols to be scanned 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 split QR Code symbol is read, the scanner sends the data read to the host computer.

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

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

Note: If the scanner switches to standby in auto-off mode (after approx. 5 seconds of holding down the trigger switch or by releasing the trigger switch within 5 seconds) or the split code scanning interval exceeds approx. 3 seconds in any trigger switch operating mode except auto-off mode, then the scanner discards the data scanned and cancels the structured append code scanning sequence.

Note: If you scan a structured 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.

8.8 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 (QB Setting).*

8.8.1 Number of lines

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

8.8.2 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.

8.8.3 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 12.4) 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 12.4). 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, EAN.UCC Composite symbols including the specified linear components cannot be read.

8.9 Scanning an SQRC (Security QR Code) Symbol

An SQRC symbol refers to a security QR Code symbol that consists of public and nonpublic data. The nonpublic 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 (QB Setting). The following SQRC related parameters can be also specified--"Data transmission after mismatch of encryption key," "Management of encryption key," and "Data transmission of nonpublic data."

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

Chapter 9 **Beeper, Indicator LED, Illumination LEDs, and Magic key**

9.1 **Beeper**

(1) **Beeping**

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

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

- the scanner has read a code successfully,
 - code data read matches the master data in the data verification mode,
 - the scanner has read a split 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 17),
 - the configuration software (QB Setting) starts up or accepts new settings (3 beeps), or
 - the scanner has read a batch-process QR Code symbol generated with the configuration software (QB Setting) (3 beeps).
-

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

- code data read does not match the master data in the data verification mode,
 - the scanner has read split QR Code symbols in edit mode and the accumulated data exceeds 8 kilobytes,
 - a master code has the wrong number of digits during registration of master data,
 - 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 (QB Setting),
 - the encryption key of data read does not match the one configured in the scanner in SQRC scanning (when the "data transmission after mismatch of encryption key" is disabled),
 - a communications error has occurred, or
 - an invalid control command is received.
-

When the scanner is turned on, the configuration software (QB Setting) provides a choice of beeper ON/OFF (default: ON), but does not provide a choice of beeper tone.

You can disable the beeper using the QR-coded parameter menu or configuration software (QB Setting). In any of the following cases, however, the beeper sounds regardless of that beeper setting:

- when you make settings by scanning the QR-coded parameter menu,
- when the scanner receives a beeper-ON command from the host computer,
- when the configuration software (QB Setting) starts up or any setting you have made is established,
- when the scanner reads a batch-process QR Code symbol,
- when the execution error occurs at ADF script,
- when the power is on,
- when the scanner receives the start command of the control command and quit command.
- when registration of master data of data verification scanning is completed
- when the beeper of scanning completion during scanning test is set at the QR Code menu (chapter 17)

(2) Adjusting the beeper volume

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

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



Even if the scanner is turned off, this setting will be retained.

The beeper volume is set to “High” when shipped.

9.2 Indicator LED

The indicator LED lights or flashes in blue, green, red or orange as described below.

(1) “Scanning complete” indication: Blue

The indicator LED illuminates when scanning is successfully completed.

- I. When scanning successfully complete/scanning menu/scanning structured append code (except for start/end)/batch scanning structured append code: Approximately 500ms once.
- II. When starting structured append scanning: Approximately 120ms ON/OFF 2 times.
- III. When ending structured append scanning/Starting,ending,cancelling and default menu /Receiving and ending the command/Successful scanning of batch setting menu/Parameter setting using the configuration software(QB Setting)/Completing of registration of the master data required for data verification mode/ Approximately 120ms ON/OFF 3 times.
- IV. When the following operations complete in the data verification mode: Approximately 500ms once.
 - The scanned code data and the master data are perfectly matched.

(2) “Performing verification mode master data registration” indication: Green

The indicator LED illuminates if ready for master data registration when in Data verification scan mode.

- I. When a scan entry command is received and the scanner is waiting for master data registration.
- II. When a file entry command is received and the scanner is waiting for master data registration.
- II. When a magic key is pressed for two seconds in the scan entry verification mode and the scanner is waiting for master data registration.

(3) “Command setting” Indication:Green

- I. The scanner receives the ‘START’ command, and flashes when in setting mode

(4) Scanning ON/OFF mode

When the magic key is set to the scanning ON/OFF mode in the Continuous reading mode B, the indicator LED illuminates in blue in the active mode and in green in the standby mode, respectively.

(5) “NG” indication: Red

This lights when the following errors occur: approx. 50 ms ON/OFF – 20 times

- I. The scanner abnormally received a control command.
- II. The scanner has failed in data editing.
- III. Either of the following errors occurred in the data verification mode scanning.
 - Digit count of master code is incorrect for the master code registration.
 - The scanned code data does not match the master data.
- IV. More than 8-Kbyte data is collected in the Structured Append mode.
- V. When unable to transmit data.
- VI. The scanner has failed in saving the parameters configured by the configuration software, QR Code parameter menu or control commands.
- VII. A code not supported by the QR Code parameter menu was scanned during the QR Code parameter menu setting.
- VIII. When a communication error or communication timeout occurs due to settings made the configuration software.
- IX. When an execution error occurs with ADF script.
- X. When encryption keys don’t match when performing SQRC scanning.
(Encryption key mismatch: when transfer prohibited)
- XI. The matic key is pressed when disabled.
- XII. When reading error occurs when reading error beeper is enabled.

(6) Power ON indicator: Orange

After the power is turned on, the scanner always turns on.

(7) Fault indicator: Orange

The indicator LED illuminates when the following errors occur. 100 ms ON/OFF – Always turns on.

I, when the scanner is broken.

Even if indicator LED illumination has been disabled at the QR Code menu or with the configuration software(QB Setting), this setting does not apply in the following cases.

- When set at the QR Code menu.
- An indicator LED illumination command is received from the host.
- Settings are reflected when the configuration settings are started up.
- Setting with a batch setting QR code.
- While in master code registration mode when performing data verification.
- If no master code has been registered when performing data verification.
- If master code registration is completed when performing data verification.
- If an error occurs during master code registration when performing data verification.
- When unable to save settings.
- When an execution error occurs with ADF script.
- When the trigger switch is pressed when trigger switch control is disabled.
- Power on indication
- Malfunction indication
- When in the setting mode
- When magic key is in the scanning ON/OFF mode and the continuous reading mode B.
- When magic key is in the illumination change mode.

9.3 Illumination LEDs

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

The illumination LEDs provide the three choices--Always ON, Automatic, Always OFF by using the command and configuration software (QB Setting).

For QB30-SU, illumination light (LED) turns off when beeper is beeping even if Always-Turn ON is set.

9.4 Magic key

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

(1) No function

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

(2) Ready/standby switching function

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

This function is effective when the trigger switch is set to Continuous reading mode B.

The following functions can be operated regardless of magic key mode shown above

1) Master code registration

When the data verification mode enters into the scan entry mode, the magic key is held down for approximately 2 seconds and indicator LED lights in green in the master code registration mode. Scan a code in this state and set the content as master code. The registered master code is turned off when the power is off.

2) ADF script cancellation

When running a script that enables an operation to continue endlessly with an ADF script, the scanner is unable to perform reading. In this case, push down the magic key for approximately 2 seconds to forcibly complete execution of the ADF script.

3) Temporary cancellation of the barcode reader mode (QB30-SU only)

The QR Code menus and setting software (QB Setting) can not be operated when the USB keyboard Interface and the barcode reading mode are selected simultaneously. In this situation the barcode reading mode can be cancelled during which the magic key is pressed in approximately for two seconds with the temporary cancellation function of the barcode reader mode.

The cancellation is ineffective when the parameter setting is performed using the QR Code menus or the configuration software.

4) Switching the interface mode (QB30-SU only)

When the power is on while pressing the magic key, Interface mode can be switched to USB keyboard interface if USB-COM Interface is set, and vice versa. The confirmation LED turns in blue if the change of the USB-COM interface is completed, and the confirmation LED turns in green if the change of the USB keyboard interface is completed. (See Chapter 9, Section 9.2)

If the power is turned off, the Interface condition will be retained.

USB-COM Interface is set when shipped.

Chapter 10 LUMINOSITY SETTING

The luminosity setting is composed of the shutter time and the sensor's gain (hereafter gain) settings.

(1) Auto mode

The scanner calculates the shutter time and gain automatically.

(2) Fixed shutter time, Auto gain mode

The shutter time is set with a fixed value, and the gain is calculated automatically.

The shutter time can be set at 0.1ms intervals from 0.1ms – 9.9ms.

The shutter time is set using the commands or the configuration software(QB Setting).

(3) Fixed shutter time, fixed gain mode

The shutter time and gain are set with fixed value.

The gain is set from 0 – 15. 0 is the darkest and bigger value is brighter.

The gain is set with the commands or the configuration software (QB Setting).

Chapter 11 External Input/Output (QB30-SR only)

11.1 External Trigger Terminal

The scanner can start and end scanning using the trigger signal input by the external trigger terminal.

11.2 External Reset Terminal

The scanner can reset using the reset signal input by the external reset terminal.

11.3 External Terminal

The scanner is capable of outputting the following 6 types of signals. Each signal can be assigned to an output terminal 1 or output terminal 2. (However, SHT signals can only be assigned to an output terminal 2.) Output signals can be set using the commands or configuration software.

(1) OK signal

This signal is output by turning the OUTPUT Tr (transistor) ON at a specific timing to indicate the successful completion of scanning. Note 1

(2) NG signal

This signal is output by turning the OUTPUT Tr (transistor) ON at a specific timing to indicate that scanning has been unsuccessful. Note 1

(3) SHT signal (External light sync signal)

This signal is used for lighting ON/OFF control when using external lighting, and can be used to turn ON the lighting only for the scanner exposure time.

(4) Verification OK signal

When using the verification function, this signal is output by turning the OUTPUT Tr (transistor) ON at a specific timing to indicate the successful completion of scanning. Note 1

(5) Verification NG signal

When using the verification function, this signal is output by turning the OUTPUT Tr (transistor) ON at a specific timing to indicate that scanning has been unsuccessful. Note 1

(6) READY signal

This signal is output by turning the OUTPUT Tr (Transistor) ON at a specific timing to indicate that the scanner is in a ready condition. The trigger signal or trigger command is ignored when the scanner is not in a ready mode. Ready conditions refer to the following conditions.

- When not in the scan timing (including data transmission) condition
- When not in setting mode using commands
- When not in the master data registration condition in the data verification mode
- When not connecting with configuration software

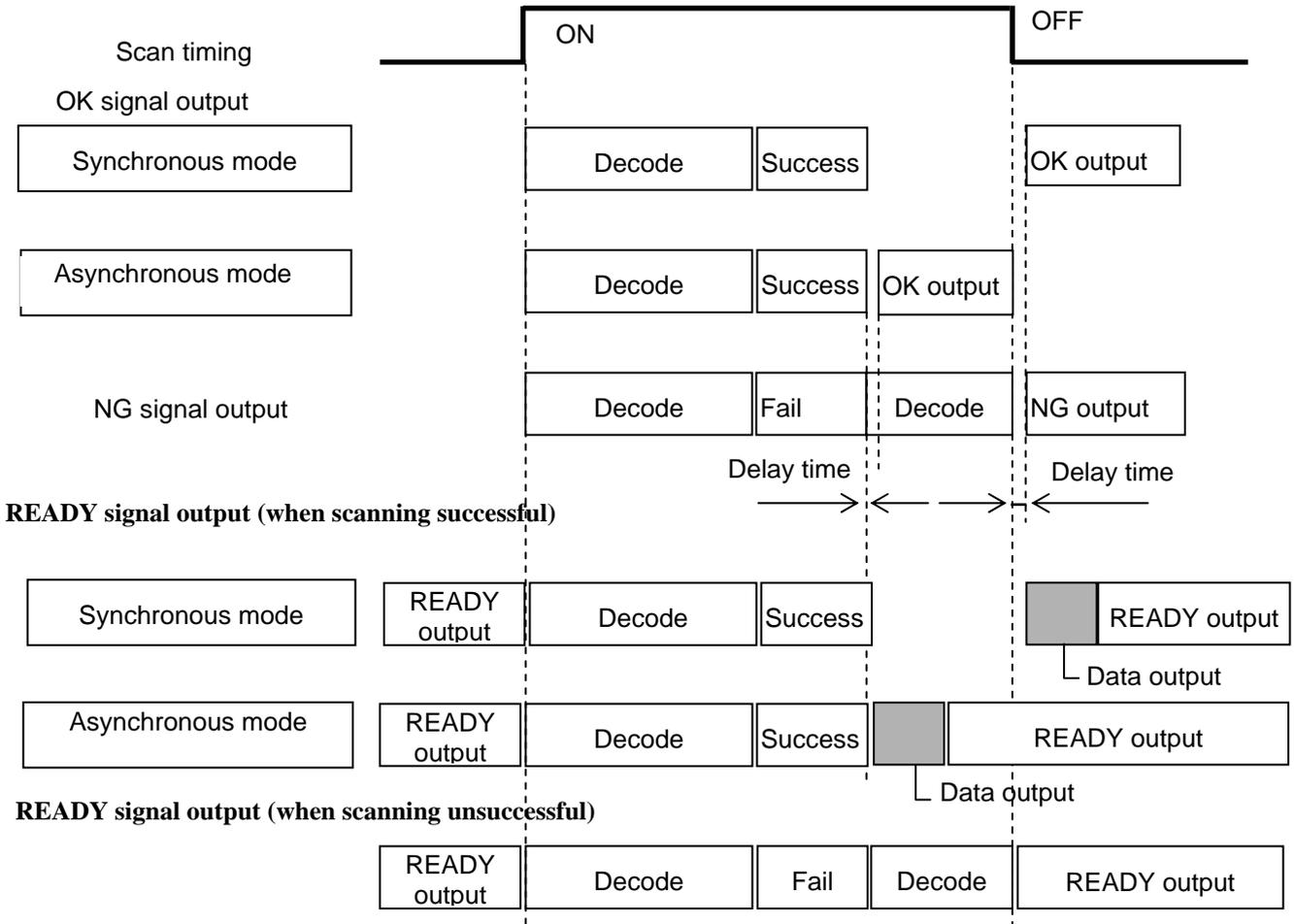
The ready signal is constantly OFF when the following trigger modes are applied:

- Continuous reading mode A
- Continuous reading mode B
- Luminosity setting of auto sense mode consists of shutter time and sensor gain (Referred to as Gain).

The selection of the OK, NG, SHT, Verification NG and READY signal output enabled/disabled status, ON duration width, and delay time from output timing can be set using the commands or configuration software.

(Note 1) The signal is not output while the scan test is operated.

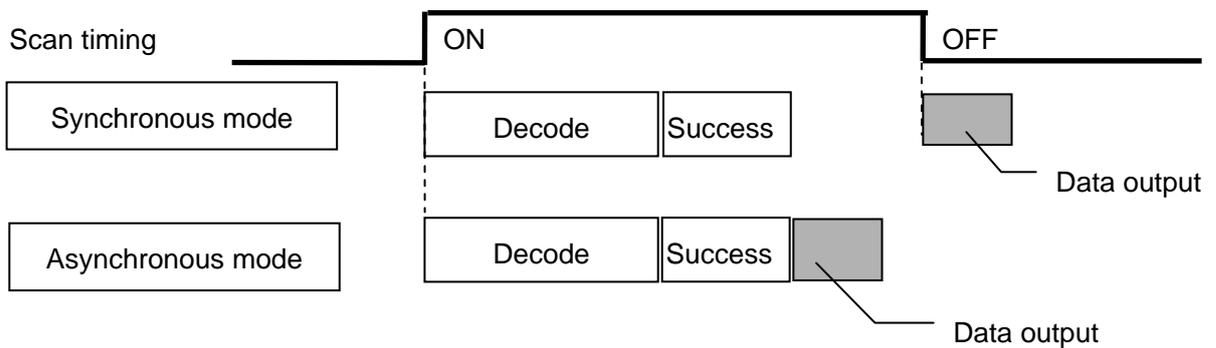
(OK, NG, READY signal output timing example)



Refer to "4.1 External I/O Terminal Equivalent Circuit" for the output circuit specifications.

11.4 Data output Timing

Following the completion of scanning, the data output timing for the transfer of data to the host can be selected from either synchronous or asynchronous mode using the commands or configuration software.



11.5 Selectable Scanning Methods

Data output timing and outputs can be set for each scanning mode as shown below.

Scanning mode	Data output timing	Non-scan code	OK signal	NG signal
Trigger mode	Synchronous mode	Enabled	Enabled	Enabled
	Asynchronous mode	Enabled	Enabled	Enabled
Continuous reading mode A/B	Asynchronous mode	Disabled	Enabled	Disabled
Auto sense	Asynchronous mode	Disabled	Disabled	Disabled

Scanning mode	Verification OK	Verification NG
Trigger mode	Enabled	Enabled
	Enabled	Enabled
Continuous reading mode A/B	Enabled	Enabled
Auto sense	Disabled	Disabled

11.6 SHT Signal (External Lighting Synchronous Output Signal)

The scanner outputs the SHT signal that synchronizes to the exposure operation of the scanner from the output terminal 2 when the output terminal 2 is set in the SHT signal. Polar character of the SHT signal can be selected from the following two types using the commands or configuration software.

Signal polarity	During Exposure	Except during exposure
Tr ON	HIGH	LOW
Tr OFF	LOW	HIGH

Note:

1. Some external lights which will take time for start-up, for example a halogen lamp, may not respond quickly or light up properly. You are required to use a light, such as a LED, with a faster response.
2. The output terminal 2 output is a NPN open collector and power shall not be supplied from the terminal. Do not apply power exceeding the specified voltage level to the output terminal 2. It may cause the scanner to break or malfunction.

Chapter 12 Communication

12.1 RS-232C Interface (QB30-SR)

With the RS-232C interface being selected, the scanner uses asynchronous data transmission and communicates with the host computer or external equipment via the RS-232C. You can set various communications conditions using the command, QR-coded parameter menu or configuration software (QB Setting). Code data read is transferred in the following format.

(1) 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 (QB Setting) provides CTS timeout settings 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 command and configuration software (QB Setting) provide CTS timeout and ACK/NAK response settings each from 100 ms to 9.9 s in 100-ms increments.

(2) RTS signal control protocol

You can select either the scanner ready mode or the data ready mode.

Scanner ready mode (default)

The RTS signal goes High and stays at a high level when the scanner is ready to communicate at power on. Make sure that the RTS signal is at a high level when transmitting a command from the host to the scanner.

Data ready mode

The RTS signal goes High before the scanner transmits data to the host and goes Low after the data transmission is completed. Commands can be transmitted from the host to the scanner regardless of the level of the RTS signal. However, there is a short time when commands cannot be transmitted to the scanner after power has been turned on.

(3) Transmission speed

There are six transmission speeds available, ranging from 4800 bps to 115200 bps (default: 38400 bps).

(4) Characters

Characters that the scanner transfers are all ASCII codes. The frame format has the following parameters.

Data bits: 7 bits or 8 bits (default)

Parity: Odd, Even, or None (default)

Stop bits: 1 bit (default) or 2 bits

Note: When data contains binary data or 2-byte codes, selecting "7 bits" for the data bits transfers the 2-byte codes with the most significant bits trimmed.

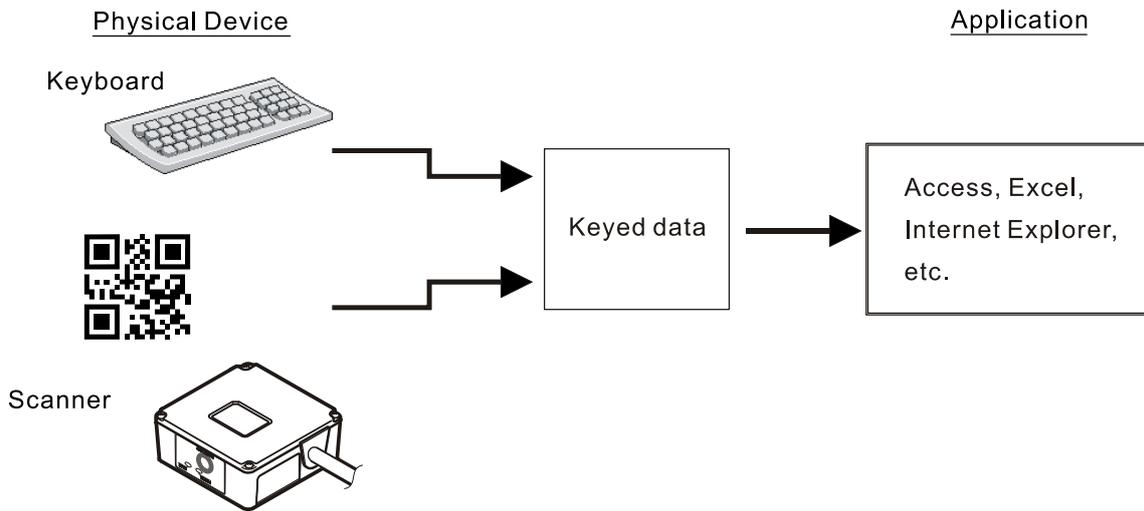
This scanner is compliant with USB 1.1 (Universal Serial Bus Specification Revision 1.1).

12.2 USB-COM Interface

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.

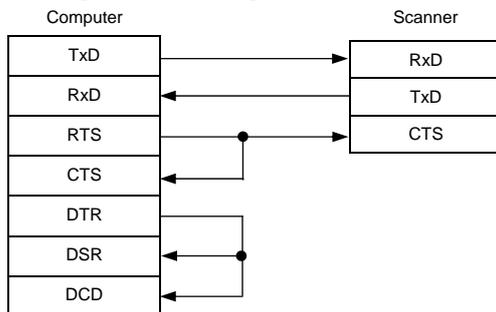
Note: Keyboard interface software (QR_kbif) is required to input scanned data transmitted from the scanner via USB-COM interface into the application (Access, Excel, Internet Explorer and so on) directly. QR_kbif enables to pass the scanned data to the application as if the converted data is input from the keyboard. The scanned data can be used at any applications with key inputs. QR_kbif can be downloaded for free from our web site at QBdirect (member only, free).

<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 command and configuration software (QB Setting) provide a choice of CTS timeout settings 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 command and configuration software (QB Setting) provides a choice of CTS timeout and ACK/NAK response time settings each from 100 ms to 9.9 s in 100-ms increments.

12.3 USB Keyboard Interface (QB30-SU)

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 101, US English)

(3) Numeric data transmission format

Select the "inboard numeric keys" or "numeric keypad" on the connected keyboard. (Default: Inboard numeric 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 bitwise. Selecting this parameter does not output 80h to FFh data.
- "Binary conversion" :Converts 00h to FFh data to binary format and outputs it bitwise.
- "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 bitwise instead.

Binary conversion format	Output data	Note
No conversion	No output	Scanning complete operation only.
Binary conversion	8Ah BFh 8Eh 9Ah Assigned characters	Output with binary data 1 byte by 1 byte
Kanji conversion	“Kanji”	Output with Kanji conversion (Note)

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

(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 1 ms to 100 ms (default: 10 ms).

12.4 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.

RS-232C interface, 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 11.

(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 (QB Setting). (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.

Code Type			Codemark			
			Type1		Type2	
			Coupling	Separate	Coupling	Separate
2D Code	QR Code		Q		Q	
	QR Code	Edit mode	Q		Q	
		Batch edit mode	Q		Q	
		Unedit mode	S		S	
	Micro QR Code		Q		Q	
	SQRC		Q		Q	
	iQR Code		G		G	
	iQR Code	Edit mode	G		G	
		Unedit mode	S		S	
	MaxiCode		X		X	
	PDF 417		Y		Y	
	Micro PDF 417		Y		Y	
	Data Matrix	Square	Z		Z	
		Retangular	Z		Z	
Aztec		J		J		
Barcode	UPC-A	No Add-on		A		
		With two-digit Add-on	Linear	A		
			Add-on	None		
		With five-digit Add-on	Linear	A		
			Add-on	None		
		UPC-E	No Add-on		C	
	With five-digit Add-on		Linear	C		
			Add-on	None		
	With five-digit Add-on		Linear	C		
		Add-on	None			

Code Type			Code Mark			
			Type 1(DENS01)		Type 2(DENS02)	
			Coupling	Separate	Coupling	Separate
Barcode	EAN-13	No Add-on		A	F	
		With two-digit Add-on	Linear	A	F	
			Add-on	None	None	
		With five-digit Add-on	Linear	A	F	
			Add-on	None	None	
		EAN-8	No Add-on		B	FF
	With two-digit Add-on		Linear	B	FF	
			Add-on	None	None	
	With five-digit Add-on		Linear	B	FF	
			Add-on	None	None	
	Interleaved 2 of 5		I	I		
	CODE39		M	M		
	CODE39 Full ASCII		M	M		
	CODABAR(NW-7)		N	N		
	CODE128		K	K		
	GS1-128 (EAN-128)		W	W		
CODE93		L	L			
GS1 DataBar (RSS) (Note 1)		R	R			

Code type				Code ID mark						
				Type 1		Type 2				
				Coupling	Separating	Coupling	Separating			
EAN.UCC Composite symbols	RSS (Note 1) CC-A RSS (Note 1) CC-B		RSS		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)		
	EAN-128 CC-A, EAN-128 CC-B, EAN-128 CC-C		GS1-128 (EAN-128)		V	W	V	W		
			CC-A, CC-B, CC-C		None	Y (Note 2)	None	Y (Note 2)		

Code type			Code ID mark						
			Type 3		Type 4 (Note 3)				
			Coupling	Separating	Coupling	Separating			
2D codes	QR Code		P01		]Qm		
	QR Code (Structured append code)	In edit mode	P01		]Qm		
		In batch edit mode	P01		]Qm		
		In non-edit mode	P01		S (Note 4)				
	MicroQR Code		P01		Q (Note 4)				
	SQRC		P01		Q (Note 4)				
	iQR Code		G		]Qm		
	iQR Code (Structured append code)	In edit mode	G		]Qm		
		In non-edit mode	S		S				
	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				
				Type 3		Type 4 (Note 3)		
				Coupling	Separating	Coupling	Separating	
Interleaved 2of5				F		]Im	
Code 39				B		]Am	
Bar codes	Code 39 Full ASCII			B		]Am	
	Codabar (NW-7)			C		]Fm	
	Code 128			D		]Cm	
	GS1-128 (EAN-128)			K		]C1	
	Code 93			E		]G0	
	GS1 DataBar (RSS) (Note 1)			R		]e0	
	EAN.UCC Composite symbols	RSS (Note 1) CC-A		RSS		T	R]e0
RSS (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	T	A]X3]X0
				Add-on	None	None	None]X1 (Note 2)
			With 5-digit add-on	Linear	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	T	A]E3]E0
	Add-on			None	None	None	]E1 (Note 2)
	With 5-digit add-on		Linear	T	A	]E3	]E0
			Add-on	None	None	None	]E2 (Note 2)
	CC-A, CC-B		None	X (Note 2)	]e0 (Note 2)		
	UPC-E CC-A, UPC-E CC-B	UPC-E	Without add-on		T	A	]X0
			With 2-digit add-on	Linear	T	A]X3]X0
				Add-on	None	None	None]X1 (Note 2)
			With 5-digit add-on	Linear	T	A]X3]X0
Add-on				None	None	None	]X2 (Note 2)
CC-A, CC-B			None	X (Note 2)	]e0 (Note 2)		
EAN-8 CC-A, EAN-8 CC-B	EAN-8	Without add-on		T	A	]E4	
		With 2-digit add-on	Linear	T	A	]E5	]E4
			Add-on	None	None	None	]X1 (Note 2)
		With 5-digit add-on	Linear	T	A	]E6	]E4
			Add-on	None	None	None	]X2 (Note 2)
		CC-A, CC-B		None	X (Note 2)	]e0 (Note 2)	
EAN-128 CC-A, EAN-128 CC-B, EAN-128 CC-C	GS1-128 (EAN-128)		T	K	]e0		
	CC-A, CC-B, CC-C		None	X (Note 2)	None			

(Note 1) GS1 DataBar (RSS) represents: GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS-14 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)	Options
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 position 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	mode 4, mode 5
		1	mode 2, mode 3
	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 followed by the 1st message character	
2		FNC1 following the 1 st character or pair 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]I3.

-] : Flag character (ASCII 93h)
- 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 (EAN-128)) skip this field.

4 digits (4 byte) transmission

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

2 digits (2 byte) transmission

- n1: tens (0 to 9)
- n2: units (0 to 9)

(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.

Structured Append QR/Structured Append iQR Code

In edit mode and batch edit mode(only Structure Append QR Code): 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 disclosed data only" is selected in "SQRC Encryption key match", it transmits only non-disclosure data.

$X_1 X_2 \dots X_{n-1} X_n Y_1 Y_2 \dots Y_{m-1} Y_m$

X_n : Disclosure data

Y_m : Non-disclosure data

When "Disclosure data plus non-disclosure data" is selected, the following format applies.

$X_1 X_2 \dots X_{n-1} X_n Y_1 Y_2 \dots Y_{m-1} Y_m$

When "Transmit only non-disclosure data" is selected, the following format applies.

$Y_1 Y_2 \dots Y_{m-1} Y_m$

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 10.7.

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

0 S $X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10}$ 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 section 12.4.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.5.

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

With 2-digit add-on:

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

With 5-digit add-on:

0 S $X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10}$ C/D $X_{11} X_{12} X_{13} X_{14} X_{15}$

0: Padding character for adjustment of the data length

S: Number system character

X_{11-15} : 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 12.5.

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

- Conversion to UPC-A 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 0 X₄ X₅ C/D

X₆=4 0 S X₁ X₂ X₃ X₄ 0 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 12.4.)

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 9.5.

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

With 2-digit add-on:

- Conversion to UPC-A 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 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 12.5.

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

- Conversion to ISBN/ISSN 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 (*¹)

To the ISSN format

X₁ X₂ X₃ X₄ X₅ X₆ X₇ C/D (*¹)

(*¹) 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 12.4.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 12.5.

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

With 2-digit add-on:

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁

With 5-digit add-on:

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ X₁₂ X₁₃ X₁₄

P_n: Prefix characters

X₁₀₋₁₄: 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 12.5.

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

- Conversion to EAN-13 disabled

P₁ P₂ P₃ X₁ X₂ X₃ X₄ C/D

- Conversion to EAN-13 enabled

0 0 0 0 P₁ P₂ P₃ X₁ X₂ X₃ X₄ 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 12.4.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 12.5.

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

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(EAN-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 can be selectable from either transferred or user selection.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 12.5.

Code 93

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

GS1 DataBar (RSS)

Code data read will be transmitted as is.

FNC1 of GS1 DataBar Expanded (RSS Expanded) will be converted to GS(1Dh) and can be selectable from either transferred or user selection. The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

GS1 DataBar (RSS) Composite symbols

Code data read will be transmitted as is.

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. (For details about the code ID mark, refer to (5) Code ID mark on section 12.4.)

Under the conditions "Code ID mark: Type 4" and "Linear component length (RSS/EAN-128): Variable," a separator (GS: 1Dh) is inserted between the linear component and 2D Composite component.

UPC/EAN Composite symbols

Code data read will be transmitted as is.

You can select whether or not to transmit a check digit of the linear component (UPC/EAN).

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 2," 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 section 12.4.)

UPC/EAN with add-on Composite

Code data read will be transmitted as is.

The format setting of various codes doesn't apply to the format of the linear component ((UPC-A/UPC-E/EAN-13/EAN-8). GTIN format doesn't apply. (See section 12.5)

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: Connecting," a 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: Separating," a 2D code mark precedes add-on component and are inserted between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark on section 12.4 .)

You can select whether or not to transmit check digit of the linear component (UPC/EAN component).

EAN-128 Composite

Code data read will be transmitted as is.

The format of GS1-128(EAN-128) doesn't apply to the format of the linear component (GS1-128(EAN-128)).

GTIN format doesn't apply. (See section 12.5)

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. (For details about the code ID mark, refer to (5) Code ID mark on section 12.4.)

Under the conditions "Code ID mark: Type 4" and "Linear component length (RSS/EAN-128): Variable," a separator (GS: 1Dh) is inserted between the linear component and 2D Composite component.

12.5 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 RSS (GS1 DataBar) and GS1-128(EAN-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 EAN8 do 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:

$PI\ 0\ S\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9\ X_{10}\ C/D\ X_{11}\ X_{12}$ (*2)

With 5-digit add-on:

$PI\ 0\ S\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9\ X_{10}\ C/D\ X_{11}\ X_{12}\ X_{13}\ X_{14}\ X_{15}$ (*2)

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

UPC-E

- Data read

$0\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ C/D$

0: Padding character for adjustment of the data length

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

$X_6=0-2\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_6\ 0\ 0\ 0\ 0\ X_3\ X_4\ X_5\ C/D$ (*1)

$X_6=3\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ 0\ 0\ 0\ 0\ 0\ X_4\ X_5\ C/D$ (*1)

$X_6=4\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ 0\ 0\ 0\ 0\ 0\ X_5\ C/D$ (*1)

$X_6=5-9\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ X_5\ 0\ 0\ 0\ 0\ X_6\ C/D$ (*1)

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

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

$X_6=0-2\ PI\ 0\ 0\ X_1\ X_2\ X_6\ 0\ 0\ 0\ 0\ X_3\ X_4\ X_5\ C/D$ (*2)

$X_6=3\ PI\ 0\ 0\ X_1\ X_2\ X_3\ 0\ 0\ 0\ 0\ 0\ X_4\ X_5\ C/D$ (*2)

$X_6=4\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ 0\ 0\ 0\ 0\ 0\ X_5\ C/D$ (*2)

$X_6=5-9\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ X_5\ 0\ 0\ 0\ 0\ X_6\ C/D$ (*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:

$0\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ C/D\ X_7\ X_8$

With 5-digit add-on:

$0\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ C/D\ X_7\ X_8\ X_9\ X_{10}\ X_{11}$

0: Padding character for adjustment of the data length

X_{7-11} : Add-on code data

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

With 2-digit add-on:

$X_6=0-2\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_6\ 0\ 0\ 0\ 0\ X_3\ X_4\ X_5\ C/D\ X_7\ X_8$ (*1)

$X_6=3\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ 0\ 0\ 0\ 0\ 0\ X_4\ X_5\ C/D\ X_7\ X_8$ (*1)

$X_6=4\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ 0\ 0\ 0\ 0\ 0\ X_5\ C/D\ X_7\ X_8$ (*1)

$X_6=5-9\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ X_5\ 0\ 0\ 0\ 0\ X_6\ C/D\ X_7\ X_8$ (*1)

With 5-digit add-on:

$X_6=0-2\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_6\ 0\ 0\ 0\ 0\ X_3\ X_4\ X_5\ C/D\ X_7\ X_8\ X_9\ X_{10}\ X_{11}$ (*1)

$X_6=3\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ 0\ 0\ 0\ 0\ 0\ X_4\ X_5\ C/D\ X_7\ X_8\ X_9\ X_{10}\ X_{11}$ (*1)

$X_6=4\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ 0\ 0\ 0\ 0\ 0\ X_5\ C/D\ X_7\ X_8\ X_9\ X_{10}\ X_{11}$ (*1)

$X_6=5-9\ 0\ 1\ PI\ 0\ 0\ X_1\ X_2\ X_3\ X_4\ X_5\ 0\ 0\ 0\ 0\ X_6\ C/D\ X_7\ X_8\ X_9\ X_{10}\ X_{11}$ (*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:

$X_6=0-2$ PI 0 0 $X_1 X_2 X_6$ 0 0 0 0 $X_3 X_4 X_5$ C/D $X_7 X_8$ ^{(*)2}
 $X_6=3$ PI 0 0 $X_1 X_2 X_3$ 0 0 0 0 0 $X_4 X_5$ C/D $X_7 X_8$ ^{(*)2}
 $X_6=4$ PI 0 0 $X_1 X_2 X_3 X_4$ 0 0 0 0 0 X_5 C/D $X_7 X_8$ ^{(*)2}
 $X_6=5-9$ PI 0 0 $X_1 X_2 X_3 X_4 X_5$ 0 0 0 0 0 X_6 C/D $X_7 X_8$ ^{(*)2}

With 5-digit add-on:

$X_6=0-2$ PI 0 0 $X_1 X_2 X_6$ 0 0 0 0 0 $X_3 X_4 X_5$ C/D $X_7 X_8 X_9 X_{10} X_{11}$ ^{(*)2}
 $X_6=3$ PI 0 0 $X_1 X_2 X_3$ 0 0 0 0 0 0 $X_4 X_5$ C/D $X_7 X_8 X_9 X_{10} X_{11}$ ^{(*)2}
 $X_6=4$ PI 0 0 $X_1 X_2 X_3 X_4$ 0 0 0 0 0 0 X_5 C/D $X_7 X_8 X_9 X_{10} X_{11}$ ^{(*)2}
 $X_6=5-9$ PI 0 0 $X_1 X_2 X_3 X_4 X_5$ 0 0 0 0 0 X_6 C/D $X_7 X_8 X_9 X_{10} X_{11}$ ^{(*)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 PI $P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9$ C/D ^{(*)1}

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

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

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

With 5-digit add-on:

0 1 PI $P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9$ 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:

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

With 5-digit add-on:

PI $P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9$ 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

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ C/D

P_n: Prefix characters

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

0 1 PI 0 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ 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 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ 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:

P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇

With 5-digit add-on:

P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇ X₈ X₉ X₁₀

P_n: Prefix characters

X₆₋₁₀: 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 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇ (*¹)

With 5-digit add-on:

0 1 PI 0 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇ X₈ X₉ X₁₀ (*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 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇ (*²)

With 5-digit add-on:

PI 0 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ X₅ C/D X₆ X₇ X₈ X₉ X₁₀ (*²)

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

Interleaved 2 of 5(14-digit)

- Data read

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

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

0 1 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.

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

RSS (GS1 DataBar) or EAN-128 (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 (RSS)

- 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

GS1-128(EAN-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 13 Reading Test Function

QR Code error correction number display/total codewords and scan result displays can be designated with commands. Scanning is analyzed and displayed for all the images decoded by the scanner. The data output is unconditionally limited to the asynchronous mode only.

Setting items

Items	Setting	Note
Error correction numbers/total codewords	Enable/Disable	Note 1
Reading Result (OK/NG)	Enable/Disable	
Symbol information	Enable/Disable	Note 2
Accumulated number of times	Enable/Disable	Note 3

Example of the data display (QR Code)

[0001/0026][OK] [MODEL2,V1,ECCM,M3] C[6/10]1234567890

The error correction numbers: 1/The total codewords numbers: 26, decode: Successful,

QR Code: Model 2, Version number: 1, Error correction level: M, Mask number: 3,

Reading Mode (C: Continuous reading mode, T: Trigger mode)

6th successful decode/10 times of image capturing

Decoded data: 1234567890

(Note1) The number of error corrections is displayed in codeword units. Resultantly, the number will not match the actual number of data characters. This is valid only when scanning QR Code, SQRC, iQR Code and DataMatrix code.

(Note2) This is valid only when scanning QR Code, SQRC, iQR Code, DataMatrix and Aztec. With QR Code, SQRC and iQR Code, the model, version, error correction level, and master number are displayed. With DataMatrix code, the number of vertical cells, the number of horizontal cells, and error correction level are displayed. With Aztec, the model and layer are displayed.

(Note3) The total number of decoded image is accumulated after test mode is commenced when in Continuous reading mode/auto sense mode, and accumulated within each trigger when in Trigger mode.

(Note4) For the structured append code, all the decoded data are output as the non-edit mode. Code numbers, division numbers and parity are added to the scanning data. The setting QR Code menus are scanned as the standard codes and the setting performance is not performed.

(Note5) The scanning test function is disabled in the followings;

During the setting mode with commands

During the registration of the file entry master code in the verification mode

During the setting with the setting QR Code menu

(Note6) The following functions are disabled during the scanning test.

The setting change using the configuration software.

The setting change using the commands.

Chapter 14 Image Memory Function

The image memory function enables the scanner to store the captured image on a temporary basis.

The Images taken from the scanner can be confirmed on the configuration software (QB Setting) or transferred to the host computers. Storing the non-scannable image enables to analyze the causes.

Note: When the power is off, the image is not stored. Be sure to upload the data to the host computers before turning the power off.

- Number of images : 10
- Image type: : Gray image BMP images (256 gradations)
- Image upload protocol : X-modem (1K)
- Scannable Image

The images below can be captured at each of continuous mode and trigger mode.

*Image Capture mode (Continuous reading mode)

1. Save all captured images
2. Save all unsuccessful images
3. Save all successful images

*Image Capture mode (Trigger mode)

1. Save all images within a single trigger interval.
2. Save the first image within a single trigger interval.
3. Save the last image within a single trigger interval.
4. Save the first unsuccessful image within a single trigger interval.
5. Save the last unsuccessful image within a single trigger interval.
6. Save the last unsuccessful image within a single trigger interval when the scan is not successfully completed within a single trigger interval.

*Image storage method

- 1) Write memory no. designation

Images are always overwritten to the specified memory.

- 2) Cyclic

Images are written to memory number #00 - #17 sequentially. The start memory cannot be specified. The image storage memory automatically returns to #00 after #09.

(Notes)

1. When the scan is successfully completed in the trigger mode, no more images are captured, even if the last image is designated to be saved in the trigger mode. In this case, the last scanned image is stored in the memory.
2. When captured image is stored in trigger mode, the scanning may be delayed due to ready condition maximum 10ms after completion of scanning timing.
3. Transmission protocol of the images to the host system, etc. is X-modem (1K) regardless of the pre-set protocol. (non-protocol or ACK/NAK mode).
4. Transmission takes about 40 seconds at the transmission speed 115.2Kbps, but it depends on the performance of the host system, etc.
- 5 The reading test can be executed.

Chapter 15 Live Mode Function

The scanner transmits the captured images to the host on a real-time basis

This function can be used for configuration software only. (QB Setting).

Note:

1. Transmission protocol of the images to the host system, etc. is X-modem (1K) regardless of the pre-set protocol. (non-protocol or ACK/NAK mode).

Chapter 16 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 (QB Setting), 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 verification mode	Regular read mode	√	Chapter 8 Section 8.1
	Scan entry mode		
	File entry mode		
Data edit mode	Non-edit mode	√	Chapter 8 Section 8.2
	Data extraction mode		
	Data conversion mode		
	Blocksorting mode		
Bar code reader mode	Enabled		Chapter 8 Section 8.6
	Disabled	√	
Double scan prevention time	Double scan enabled		Chapter 5
	Double scan prevention time Setting range 0.1- 9.9 seconds	0.5 seconds	
Decode limitation time	Disabled	√	Chapter 8 Section 8.5
	0.05s – 9.99 s		
Luminosity setting	Automatic	√	Chapter 10
	Fixed shutter, Variable gain		
	Fixed shutter, Fixed gain		
Shutter time	0.1-9.9ms	0.5ms	
Gain level	0-15	8	
External illumination synchronized signal	TrOn	√	Chapter 11 Section 11.6
	TrOff		
Data Output Timing	Synchronous		Chapter 11 Section 11.4
	Asynchronous	√	
Unread cord transmission	Disabled	√	Chapter 7
	Enabled		
Unread cord	Designate up to 7 characters with ASCII characters	“ERROR” (Note 1)	Chapter 7
Scanning start command	Designate up to 7 characters with ASCII characters	“READON” (Note1)	Chapter 7
Scanning end command	Designate up to 7 characters with ASCII characters	“READOFF” (Note1)	Chapter 7

■: Can be changed only with the configuration software.

(Note 1) 0x20~0x7E can be registered excluding the control characters of ASCII character codes.

(2) Interface to the host (QB30-SU only)

Items	Parameters	Defaults	Refer to:
Interface	USB-COM interface	√ (Note 1)	Chapter 12
	USB keyboard interface (Note 1)		

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

(3) Communications parameters for RS-232C interface (QB30-SR only)

The following settings take effect when the RS-232C interface is set up.

Items	Parameters	Defaults	Refer to:
Communications protocol	Non-acknowledge mode	√	Chapter 12.1
	ACK/NAK mode		
Transmission speed	4800 bps		
	9600 bps		
	19200 bps		
	38400 bps	√	
	57600 bps		
	115200 bps		
Data bit	7 bits		
	8 bits	√	
Parity	Odd		
	Even		
	None	√	
Stop bit	1 bit	√	
	2 bits		
CTS signal monitoring	Enable		
	Disable	√	
CTS signal monitoring time	0.1 to 9.9 seconds	2 s	
ACK/NAK response confirmation time	0.1 to 9.9 seconds	1 s	
RTS signal control protocol	Scanner ready mode	√	
	Data ready mode		

(4) 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	√	Chapter 12.2
	ACK/NAK mode		
CTS signal monitor	Enable		
	Disable	√	
CTS signal timeout	0.1 to 9.9 seconds	2 s	
ACK/NAK response time	0.1 to 9.9 seconds	1 s	

: Can be changed only with the configuration software.

(5) Communications parameters for USB keyboard interface (Only QB30-SU)

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

Items	Parameters	Defaults	Refer to:
CAPS mode	Manual	√	Chapter 12 Section 12.3
	Auto		
Host's CAPS LOCK status	OFF (Lowercase letter)	√	
	ON (Uppercase letter)		
Keyboard type	U.S. English (101 key type)	√	
	Germany (102 key type)		
	French (102 key type)		
	U.K. English (102 key type)		
	Italian (102 key type)		
	Swedish (102 key type)		
	Japanese (106 key type)		
Numeric key selection (0 to 9)	Inboard numeric keys	√	
	Numeric keypad		
Binary data conversion (See Note 2.)	None (ASCII)	√	
	Binary conversion		
	Kanji conversion		

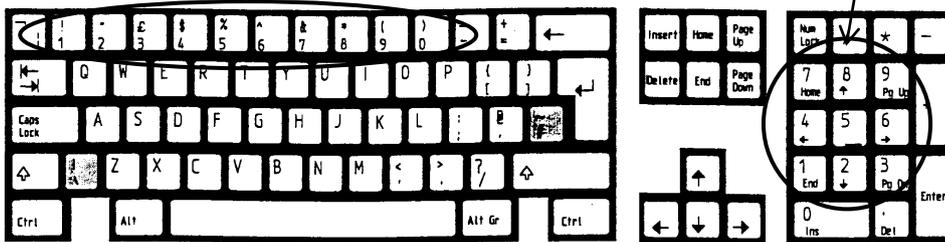
(Note 1) Select the Caps Lock state that matches host's keyboard state.

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

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

Inboard numeric keys

Numeric keypad



U.S. English (101 key type)

■: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Special key transfer mode	Enable		Chapter 12 Section 12.3
	Disable	√	
Data transmission interval	1 ms		
	5 ms		
	10 ms	√	
	16 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.

Lower \ Upper	E	F
0		↓
1		F1
2		F2
3		F3
4		F4
5		F5
6		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

(6) Data transmission format common to all interfaces

Items	Parameters	Defaults	Refer to:
Transmission of code ID mark	Enable		Chapter 12 Section 12.4
	Disable	√	
Code ID mark position	Before prefix		
	After prefix	√	
Code ID mark	Type 1 (DENSO1)	√	
	Type 2 (DENSO2)		
	Type 3		
	Type 4		
	User-defined		
Code ID mark output mode	Coupling	√	
	Separating		
Transmission of the number of digits (not applicable to UPC/EAN codes)	Enable, in 4 digits		
	Enable, in 2 digits		
	Disable	√	
Prefix transmission	Enable		
	Disable	√	
Suffix transmission	Enable		
	Disable	√	
Scanner ID output	Enable		
	Disable	√	
GTIN format conversion	Enable		Chapter 12 Section 12.5
	Disable	√	
Conversion type from UPC/EAN/ Interleaved 2of5 (14-digit) to GTIN format	Conversion to 16 digits	√	
	Conversion to 14 digits		
	Conversion prohibited		
Conversion type from GS1 DataBar(RSS)/GS1-128(EAN-1 28) in GTIN format to EAN format	Conversion to 14 digits	√	
	Conversion to 13 digits		
	Conversion prohibited		
Prefix PI in conversion from UPC/EAN/ Interleaved 2of5 (14-digit) to GTIN format	0 to 9	0	

■: Can be changed only with the configuration software.

(7) Data transmission format exclusive to RS-232C interface/USB-COM interface

Items	Parameters	Defaults	Refer to:
Header when transmitting	NONE	√	Chapter 12 Section 12.4
	STX		
	User-defined		
Terminator when transmitting	NONE		
	ETX		
	CR	√	
	LF		
	CR LF		
	User-defined		
Terminator when receiving	NONE	√	
	STX		
Terminator when receiving	ETX		
	CR	√	
	LF		
	CR LF		
Transmission of BCC	Enabled		
	Disabled	√	

: Can be changed only with the configuration software.

(8) Data transmission format exclusive to USB keyboard interface

Items	Parameters	Defaults	Refer to:
Header	NONE	√	Chapter 12 Section 12.4
	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.

(9) 2D codes, mirror image and black-and-white inverted codes

Items	Parameters	Defaults	Refer to:
Reading reverse 2D Codes (mirror image)	Enable		Chapter 8
	Disable	√	Section 8.3
Reading black-and-white inverted codes	Black cells/bars on a white background	√	Chapter 8 Section 8.4
	White cell/bars on a black background		
	Auto detection of black and white inverted codes		
Reading QR Code	Enabled	√	Chapter 12
	Disabled		Section 12.4
Reading QR Structured Append Code	Edit mode	√	Chapter 8 Section 8.7
	Batch edit mode		
	Non-edit mode		
QR Code, minimum version readable	Setting range 1-40	1	
QR Code, maximum version readable		40	
Reading MicroQR	Enable		
	Disable	√	
MicroQR Code, minimum version readable	1 to 4	1	Chapter 12 Section 12.4
MicroQR Code, maximum version readable		4	
Reading SQRC	Enabled		Chapter 8 Section 8.9
	Disabled	√	
SQRC Code, minimum version readable	Setting range 1 to 4	1	
SQRC Code, maximum version readable		40	
SQRC Encryption key mismatch	Reading disabled	√	
	Enable transmission of disclosure data only		
SQRC Encryption key match	Enable transmission of disclosed data + undisclosed data	√	
	Enable transmission of undisclosed data only		
Reading iQR Code (square)	Reading enabled		Chapter 12 Section 12.4
	Reading disabled	√	
iQR Code, (square) minimum version readable	Setting range 1-61	1	
iQR Code, (square) maximum version readable		61	
Reading iQR Code (rectangular)	Reading enabled		Chapter 12 Section 12.4
	Reading disabled	√	

iQR Code, (rectangular) minimum version readable	Setting range 1-15	1	
iQR Code, (rectangular) maximum version readable		15	
Reading iQR Structured Append Code	Edit mode	√	Chapter 8
	Non-edit mode		Section 8.7
Reading Aztec (Full Range)	Enabled		Chapter 12
	Disabled	√	Section 12.4
Reading Aztec (Compact)	Enabled		Chapter 12
	Disabled	√	Section 12.4
Aztec, (Full range) minimum version readable	Setting range 1-32	1	
Aztec, (Full range) maximum version readable		32	
Aztec, (Compact) minimum version readable	Setting range 1-4	1	
Aztec, (Compact) maximum version readable		4	
Reading PDF417	Enabled		Chapter 12
	Disabled	√	Section 12.4
Reading MicroPDF417	Enabled		
	Disabled	√	
Reading MaxiCode	Enabled		Chapter 12
	Disabled	√	Section 12.4
Reading Data Matrix (square)	Enabled		Chapter 12 Section 12.4
	Disabled	√	
Reading Data Matrix (rectangular)	Enabled		Chapter 12 Section 12.4
	Disabled	√	
Data Matrix (Square), minimum code number readable	1 to 24	1	
Data Matrix (Square), maximum code number readable		24	
Data Matrix (Rectangular), minimum code number readable	1 to 6	1	
Data Matrix (Rectangular), maximum code number readable		6	

(Note1) Refer to the reference standard for each code in Section 5 for code details.

(Note2) The following table shows the DataMatrix (square) code number vs the number of cells.

Code No.	No. of Cells (Row x Col.)	Code No.	No. of Cells (Row x Col.)	Code No.	No. of Cells (Row x Col.)	Code No.	No. of Cells (Row x Col.)
1	10 × 10	7	22 × 22	13	44 × 44	19	88 × 88
2	12 × 12	8	24 × 24	14	48 × 48	20	96 × 96
3	14 × 14	9	26 × 26	15	52 × 52	21	104 × 104
4	16 × 16	10	32 × 32	16	64 × 64	22	120 × 120
5	18 × 18	11	36 × 36	17	72 × 72	23	132 × 132
6	20 × 20	12	40 × 40	18	80 × 80	24	144 × 144

(Note3) The following table shows the DataMatrix (rectangular) code number vs the number of cells.

Code No.	No. of Cells (Row x Col.)
1	8 × 18
2	8 × 32
3	12 × 26
4	12 × 36
5	16 × 36
6	16 × 48

(Note4) It is possible to simultaneously enable/disable square or rectangular at the QR Code parameter menu.

(Note5) It is possible to simultaneously enable/disable Full-Range or Compact the QR Code

(Note6) Only enabled at the QR Code parameter menu

: Can be changed only with the configuration software.

(10)Bar codes

UPC-A/E, EAN-13/8

Items	Parameters	Defaults	Refer to:	
Scanning UPC-A and EAN-13	Enable	√	Chapter12 Sections 12.4	
	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	√		
	Disable			
EAN-13 conversion to the ISBN / ISSN format	Enable			
	Disable	√		
Reading UPC-E	Enable	√		Section 12.4
	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	√	Chapter 12 Sections 12.4
	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	Disabled checking	√	
	Levels 1 to 4		

(Note 1) With the QR Code parameter menu, UPC-A, EAN-13, UPC-E, EAN-8 will be enabled/disabled at the same time.

(Note 2) The add-on check level can be set in order to prevent a digit scanning miss when performing add-on scanning.
Add-on check level: (Low) Disabled < Level 1 < Level 2 < Level 3 < Level 4 (High)
The scan time may increase by raising the add-on check level.

Interleaved 2of5

Items	Parameters	Defaults	Refer to:
Reading Interleaved 2of5	Enable, without a check digit	√	Chapter 12 Section 12.4
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	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	

(Note 1) With the QR Code parameter menu, UPC-A, EAN-13, UPC-E, EAN-8 will be enabled/disabled at the same time.

Codabar (NW-7)

Items	Parameters	Defaults	Refer to:
Reading Codabar (NW-7)	Enable, without a check digit	√	Chapter 12 Section 12.4
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	Disable		
Minimum number of readable digits for Codabar (NW-7)	3 to 99 digits (including start/stop codes)	4 digits	
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		Chapter 12 Section 12.4
	Transmit a/b/c/d		
	Disable	√	
Check digit 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.

(Note 2) In the QR Code menu, Transmission of upper case letters are not permitted.

■ : Can be changed only with the configuration software.

Code 39

Item	Parameters	Defaults	Refer to:
Reading Code 39	Enable, without a check digit	√	Chapter 12 Section 12.4
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	Disable		
Minimum number of readable digits for Code 39	1 to 99 digits (excluding start/stop codes)	1 digit	
Maximum number of readable digits for Code 39		99 digits	
Transmission of Start/Stop codes for Code 39	Enable		Chapter 12 Section 12.4
	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.

Code 128, EAN-128 (GS1-128)

Items	Parameters	Defaults	Refer to:
Reading Code 128	Enable	√	Chapter 12 Section 12.4
	Disable		
Reading EAN-128 (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	
Maximum number of readable digits for Code 128		99 digits	
Transmission of FNC1 for Code 128	Disable		
	Transmit GS	√	
Minimum number of readable digits for EAN-128 (GS1-128)	1 to 99 digits (excluding start/stop codes and 1-digit check digit)	1 digit	
Maximum number of readable digits for EAN-128 (GS1-128)		99 digits	
Transmission of FNC1 for EAN-128 (GS1-128)	Disable		
	Transmit GS	√	

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

Code 93

Items	Parameters	Defaults	Refer to:
Reading Code 93	Enable		Chapter 12 Section 12.4
	Disable	√	
Minimum number of readable digits for Code 93	1 to 99 digits (excluding start/stop codes and 2-digit check digits)	1 digit	
Maximum number of readable digits for Code 93		99 digits	

: Can be changed only with the configuration software.

GS1 DataBar (RSS), EAN.UCC Composite symbols

Items	Parameters	Defaults	Refer to:
Reading GS1 DataBar Omnidirectional, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded (Note 1)	Enable		Chapter 12 Section 12.4
	Disable	√	
Reading GS1 DataBar Stacked, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional (Note 2)	Enable		
	Disable	√	
Transmission of FNC1 for GS1 DataBar (RSS) Expanded code	Disabled	√	
	Transmit GS		
	User Selection (1 digit)		
Min. number of digits to be scanned for GS1 Data Bar (RSS) Expanded code		1 digit	
		99 digits	
Max. number of digits to be scanned for GS1 Data Bar (RSS) Expanded code		1 digit	
		99 digits	
Reading EAN.UCC Composite symbols	Enable		
	Disable	√	
Reading RSS Composite with CC-A	Enable		
	Disable	√	
Reading RSS Composite with CC-B	Enable		
	Disable	√	
Reading UPC/EAN Composite with CC-A	Enable		Chapter 12 Section 12.4
	Disable	√	
Reading UPC/EAN Composite with CC-B	Enable		
	Disable	√	
Reading EAN-128 Composite with CC-A	Enable		
	Disable	√	
Reading EAN-128 Composite with CC-B	Enable		
	Disable	√	
Reading EAN-128 Composite with CC-C	Enable		
	Disable	√	

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

- (Note 2)** Indicates GS1 DataBar Stacked (RSS-14 Stacked), RSS Expanded Stacked(GS1 DataBar Expanded Stacked) and RSS-14 Stacked Omnidirectional (GS1 DataBar Stacked Omnidirectional).
- (Note 3)** In the QR Code menu, the GS1 DataBar (RSS codes) cannot separately be selected and they are enabled or disabled all together.
- (Note 4)** In the QR Code menu, the COMPOSITE codes cannot separately be selected and they are enabled or disabled all together.

*

: Can be changed only with the configuration software.

Multi-line barcode scanning designation

Items	Parameters	Defaults	Refer to:
Reading multi-line bar codes	Enable		Chapter 8 Section 8.8
	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.

Data verification mode designation

Item	Parameters	Default Setting	Remarks
Verification digit position designation in scan entry mode	Enabled		Chapter 8 Section 8.1
	Disabled	√	
Verification start position in scan entry mode	1-255 digits	1 digit	
Verification end position in scan entry mode		255	
Verification master designation in file entry mode	Enabled		
	Disabled	√	
Verification master number in file entry mode	1-50	1	
Verification digit position designation in file entry mode	Enabled		
	Disabled	√	
Verification start position in file entry mode	1-255 digits	1	
Verification end position in file entry mode		255	
Verification result output in scan entry mode	“OK”/“NG”	√	
	“OK”+ <data>/“NG”		
	“OK”/“NG”+ <data>		
	“OK”+<data>/“NG”+ <data>		
Verification result output in file entry mode	“OK”/“NG”	√	
	“OK”+ <data>/“NG”		
	“OK”/“NG”+ <data>		
	“OK”+<data>/“NG”+ <data>		

Output Terminal (QB30-SR Only)

Item	Parameter	Default setting	Remarks
Setting external terminal 1	OK signal		Chapter 11 Section 11.3
	NG signal		
	Verification OK signal		
	Verification NG signal		
	READY signal		
	Unused	√	
Setting External terminal 2	External illumination synchronized signal		
	OK signal		
	NG signal		
	Verification OK signal		
	Verification NG signal		
	READY signal		
	Unused	*	
Signal output ON duration width	10~2550ms	500ms	
Signal output Delay time	0.0~9.9s	0.1s	

Data Editing Mode Designation

Item	Parameters	Default Setting	Remarks
Applicable codes for data editing	Specified from the codes	Any code (Note1)	Chapter 8 Section 8.2
Data extraction mode in data editing	Transmit data regardless of the Results		
	Transmit data when editing is successful	√	
Data extraction mode in data editing	Data string extraction	√	
	Data block extraction		
	AI mode		
Extraction start position for data string extraction	First character		
	Last character		
	Specified position	√	
Extraction end position for data string extraction	Last character	√	
	Specified no. of digits		
	Specified no. of position		
Extraction start position for data string extraction	0001 to 9999 digits in ASCII characters	1 digit	
Extraction end position for data string extraction	0001 to 9999 digits in ASCII characters	9999 digits	
Data block numbers for data block extraction (Max. 3 blocks)	01 to 99 digits in ASCII characters	Not specified	
Search string and substitution string in data substitution mode	Max. 16 characters in ASCII characters	Not specified	
Blocksorting mode division count	2 to 5 divisions	2 divisions	
Blocksorting mode division location	0001 to 9999 characters in ASCII characters	1 character	
Blocksorting mode output order	BLOCK1 - BLOCK5	BLOCK1/ BLOCK2	

(Note) 1. Data editing is applied to all the codes when selecting Any Code.

Item	Parameters	Default Setting	Remarks
AI mode	AI division mode	√	Chapter 8 Section 8.2
	AI Parenthesis mode		
AI Split mode AI1 designation enable/disable	Enabled	√	
	Disabled		
AI Split mode AI2 designation enable/disable	Enabled		
	Disabled	√	
AI Split mode AI3 designation enable/disable	Enabled		
	Disabled	√	
AI Split mode AI1 specified	Specified from AI candidates (Note 2)	00	
AI Split mode AI2 specified	Specified from AI candidates (Note 2)	00	
AI Split mode AI3 specified	Specified from AI candidates (Note 2)	00	
AI Split mode delimiter	Header/terminator	√	
	Comma		
	Tab		

(Note) 2. Refer to Section 8.2.1.3 for more information about AI.

Image Memory Designation

Item	Parameter	Default setting	Remarks
Image storage	Enabled		Chapter 14
	Disabled	√	
Image storing condition	Save all captured images		
	Save all unsuccessful images		
	Save all successful images		
	Save the first successful image within the trigger.	√	
	Save the last successful image within the trigger		
	Save all images within the trigger.		
	Save the first unsuccessful image within the trigger.		
	Save the last unsuccessful image within the trigger		
Save the last image within the trigger when the scan is unsuccessfully completed.			
Image storing location	Cyclic	√	
	Fixed (No.0~9)		

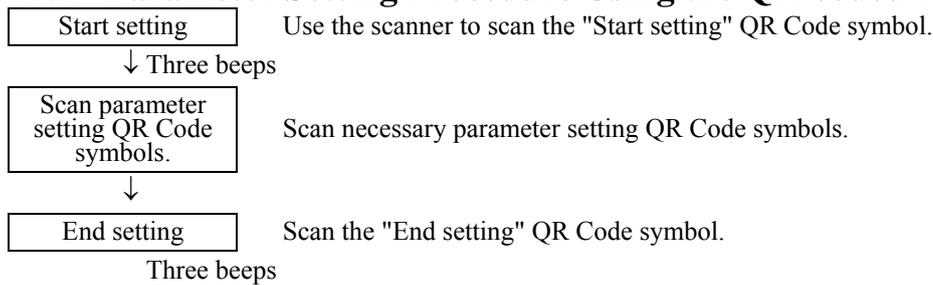
Other Selections Designations

Item	Parameter	Default Setting	Remarks
Reading mode	Direct trigger mode		Chapter 7
	Indirect trigger mode		
	Direct software trigger mode		
	Indirect software trigger mode		
	Continuous reading mode A		
	Continuous reading mode B	√	
	Auto sense mode		
Trigger signal input delay time	0~999ms	0ms	
Indirect mode one-shot duration	0.10~9.99s	1.00s	
Magic key control	Scanning ON/OFF function		Chapter 9.4
	No function	√	
Scanner sensitivity level in Auto sensing mode	High		Chapter 7
	Medium	√	
	Low		
Beeper control	Enabled	√	Chapter 9 Section 9.1
	Disabled		
Reading error beeper control	Enabled		
	Disabled	√	
Beeper tone	Low-pitch tone: approx. 2.6kHz		
	Medium-pitch tone: approx. 2.8kHz	√	
	High-pitch tone: approx. 3.0kHz		
Beeper beep time	Short: 60ms		
	Medium: 80ms	√	
	Long: 120ms		
Beeper volume	High	√	
	Medium		
	low		
Indicator LED control	Enabled	√	Chapter 9 See 9.2
	Disabled		
Beeper sound when power turned ON	Enabled		Chapter 9 Section 9.1
	Disabled	√	
Illumination LED	Always turns OFF		Chapter 9 Section 9.3
	Automatically controls on/off	√	
	Always turns ON		

■ : Can be changed only with the configuration software.

Chapter 17 QR-Coded Parameter Menu

17.1 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 default.

17.2 Parameter Setting Procedure Using the QR-coded Parameter Menu

Control command (See annex 2) enables to limit to use QR Code menu. The setting change can not be made with the QR Code menu (including the QR Code for batch setting) while the use of QR Code menu is limited. However, even though the use of QR Code menu is limited, the setting changes can be made with commands/ configuration software (QB setting) with the limitation on the use of QR Code menu cancelled.

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

Adjusting the beeper volume

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



□ **Communications parameters for RS-232C interface/ USB-COM Interface**

Procedure

 Non-acknowledge mode (default)	 ACK/NAK mode
------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------

Transmission speed (QB30-SR only)

 4800 bps	 9600 bps
 19200 bps	 38400 bps (default)
 57600 bps	 115200 bps

Data length (QB30-SR only)

 7 bits	 8 bits (default)
-----------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------

Parity (QR30-SR only)

 <p>None (default)</p>	 <p>Even parity</p>  <p>Odd parity</p>
---------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Stop bit (QB30-SR only)

 <p>1 bit (default)</p>	 <p>2 bits</p>
----------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------

Header when transmitting

 <p>None</p>	 <p>STX</p>
-----------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------

Terminator when transmitting



None



ETX



<CR>



LF



CR+LF

Header when receiving

 None	 STX
-------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------

Terminator when receiving

 ETX	 <CR>
 LF	 CR+LF

Transmission of BCC

 <Disabled>	 Enabled
---------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------

USB interface to the host



USB-COM interface
(default)



USB keyboard
interface

☐ Communications parameters for USB keyboard interface

Conversion to binary data

 No conversion (default) (ASCII)	 Binary conversion
 Kanji conversion	

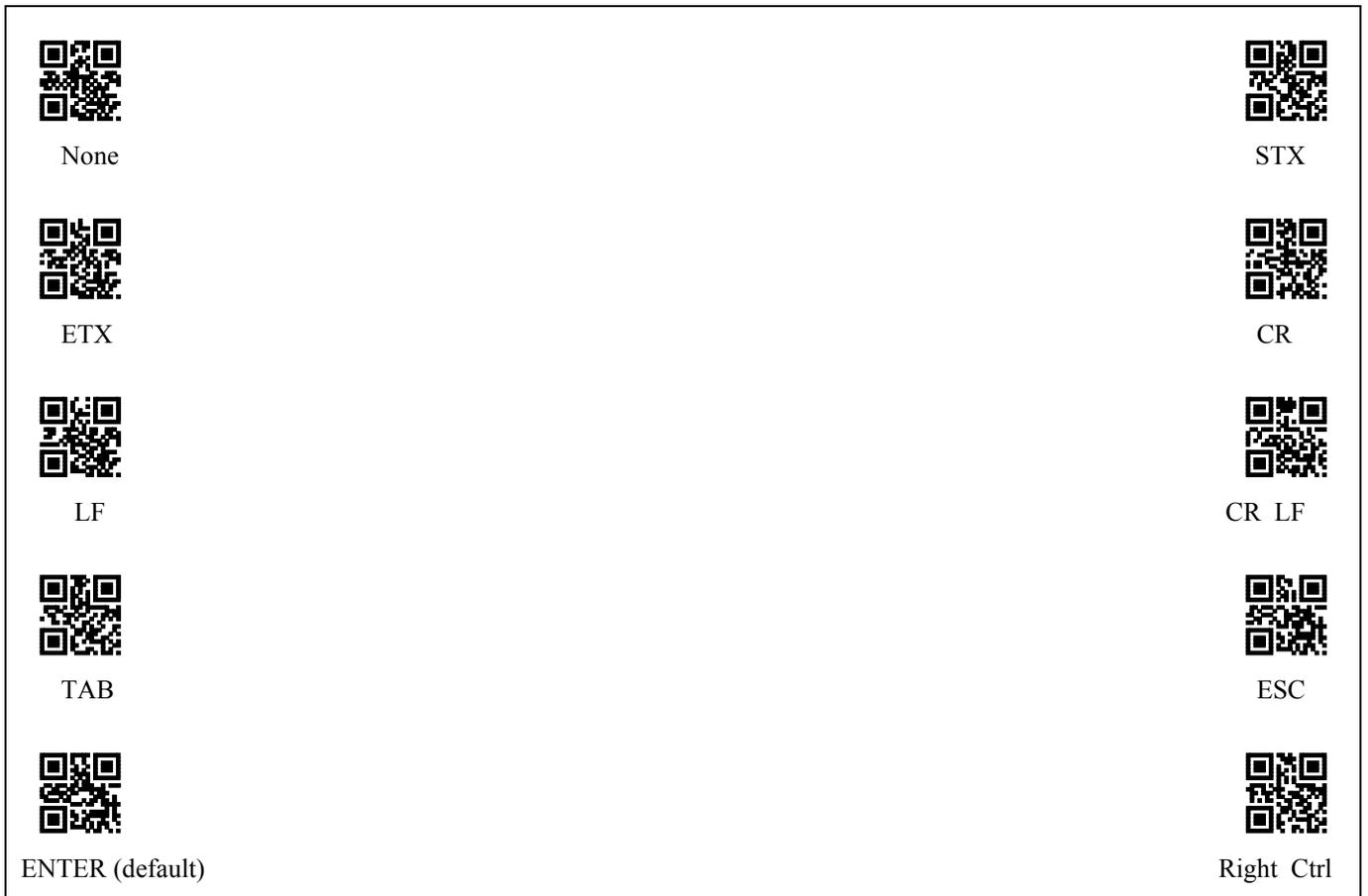
Header (USB keyboard interface)

 None (default)	 STX
 ETX	 CR
 LF	 CR LF
 TAB	 ESC
 ENTER	 Right Ctrl

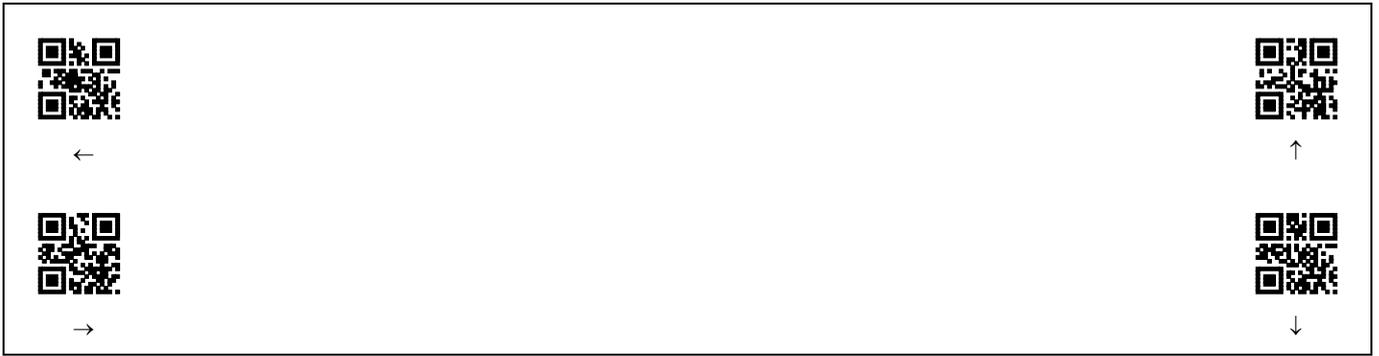
Header (USB keyboard interface)



Terminator (USB keyboard interface)



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 split QR Code ("Structured Append")

 Edit mode (default)	 Non-edit mode
 Batch edit mode	

Scanning iQR Code

 <Disable>	 Enable
--------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

Scanning Aztec

 <Disable>	 Enable
--------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

Scanning PDF417

 Disable	 Enable (default)
----------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------

Scanning MaxiCode

 Disable	 Enable (default)
----------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------

Scanning Data Matrix

 Disable	 Enable (default)
----------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------

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 (EAN-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	 Enable (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 (RSS)

 Disable (default)	 Enable
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

Scanning Composite

 Disable (default)	 Enable
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

□ Other settings
Scanning mode



Continuous reading mode A



<Continuous reading mode B>



Direct trigger mode



Indirect trigger mode



Direct software trigger mode



Indirect software trigger mode



Auto sense mode

Beeper control



Disable



Enable (default)

indicator LED



Disable



Enable (default)

Chapter 18 Control Commands

The commands which are transmitted between the host unit and the scanner through the communication line are called the control commands.

Items set by control commands from the host unit overlap those indicated in “Parameter setting by QR Code parameter menu/Configuration software (QB Setting)”. Designation by the control command prevails over that by the QR Code parameter menu. However, unless a PW command is given, the value set with the control command will not be stored in the internal FLASH ROM, and therefore if the power is turned OFF, all designations made with control commands will be cleared and only the parameter setting by QR Code menu/Configuration software (QB Setting) is valid.

If commands other than 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: 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.

(1) Outline of the command settings

Type of commands

The command can be classified as follows:

Command	Details
1. Setting control command	Start/End/Save of setting commands
2. Setting command	Detailed items of operational settings
3. Soft Trigger command	ON/OFF of soft trigger
4. Test mode control command	Start/End of test mode
5. Image memory output command	Output start of image memory

Operational setting of QB30 is configured with “Setting control command” and “Setting command”.

Soft Trigger command”, “Test mode control command and “Image memory output command” are used after the operational settings.

(2) Procedure for the operational settings

Procedure for the operational setting writing is as follows:

Procedure for the operational setting writing

Procedure	Detailed commands
1. Start operational settings	Setting control command: Transmit the start of the setting command (START)
2. Write the setting	Setting command : Transmit the arbitrary commands (WRnn#n)
3. Save the setting	Setting control command: Transmit the saving of the setting value (SAVE #n)
4. End the operational settings	Setting control command: Transmit the ending of setting command (END)

Operation is set with the combination of control command and setting command

Direct Commands

Direct command allows the scanner to direct the start/end function operations. The direct command includes the followings:

Command	Format	Response
Start scanning (Software trigger)	READON (Note 1)	No response
End scanning (Software trigger)	READOFF (Note 1)	No response
Start scanning test	TESTON#nnn (Note 2)	OK
End scanning test	TESTOFF	OK
Start image memory output	MEMUPLOAD#nn (Note 3)	OK

(Note 1) The transmitted commands for scanning control can be changed. Default values are “READON” and “READOFF”.

(Note 2) This is the test scan count, and should be specified in the range nnn = 001 to 999. (However, continuous testing is performed if “000” is specified.)

(Note 3) Specifies the image memory from nn = 00 to 99.

Indirect Commands

Indirect command allows the scanner to confirm the system settings or the setting contents. The command can be accepted when receiving “START” from the host and ends receiving commands when receiving END reflected by the setting with commands. The indirect commands include control command, scanning setting command, communication setting command, image memory setting command, scanning test setting command and option setting command.

The commands are followings;

Note) Reply with NG even if the commands other than indirect commands are received until it ends with “END” after starting the setting with “START”.

Note) Indirect commands can not be operated during the scanning test.

Command	Format	Response
Initialize set value	DEFAULT (Note 1) (Note 2) (Note 5)	OK
Save set value (FLASH storage)	SAVE (Note 2) (Note 4) (Note 5)	OK
Reset software	RESET (Note 3)	No response

(Note 1) The system set values shall be returned to default.

(Note 2) There may be times when commands are not accepted during the period from the receipt of the “DEFAULT” or “SAVE” commands until a response is returned

(Note 3) When executing the “RESET”, the decoder will execute the same sequence as it resets the set value at power application.

(Note 4) No set parameter is stored in the QB30 without executing the “SAVE#n” command. If the “SAVE#n” command is executed, the last set parameters are maintained even though the decoder is powered off and powered on again. On the contrary, if the setting mode exits from the setting mode at the “END” command without executing the “SAVE#n” command, the decoder operates based on the set parameters until the decoder is powered off, but when powered on again, the last set parameters are canceled.

(Note 5) The data is written to the flash memory. Writing should be performed up to a maximum of 100,000 times.

Scan Setting Commands

Setting command	Transmitted command	Response	
Scan mode	(Change) WR01#n (Confirmation) RD01	OK n	n=0: Continuous reading mode A n=1: Continuous reading mode B n=2: Direct trigger mode n=3: Indirect trigger mode n=4: Direct software trigger mode n=5: Indirect software trigger mode n=6: Auto sense mode
Black and white inversion	(Change) WR02#n (Confirmation) RD02	OK n	n=0: Normal code n=1: Black-and-white inverted code n=2: Black-and-white automatic identification
Period of double-scanning prevention (Note 1)	(Change) WR04#nn (Confirmation) RD04	OK nn	nn= 01 - 99 00(Permit double scanning) 01~99(0.1s~9.9s)
Lighting setting	(Change) WR07#nn (Confirmation) RD07	OK n	n=0 : Automatic n=1 : Fixed shutter auto gain n=2 : Fixed shutter fixed gain
SHT signal (external lighting synchronous signal) setting	(Change) WR09#n (Confirmation) RD09	OK	n=0 : Tr OFF (During exposure- LOW, Except during exposure-HIGH) n=1 : Tr ON (During exposure-HIGH, Except during exposure-LOW)
Verification function	(Change) WR0B#n (Confirmation) RD0B (Note 5)	OK n	n=0: Verification disabled n=1: Scan entry mode n=2: File entry mode
Verification digit pos. designation (Scan entry mode)	(Change) WR0C#nnn#NNN (Confirmation) RD0C	OK nnn#NNN	nnn#NNN=000#000 : Verification digit pos designation disabled Verification from nnn to NNN (001 - 255)
Verification result output (Scan entry mode)	(Change) WR0D#n (Confirmation) RD0D	OK n	n=0: "OK"/"NG" n=1: "OK"<Data>/"NG" n=2: "OK"/"NG"<Data> n=3: "OK"<Data>/"NG"<Data>
Verification result output (File entry mode)	(Change) WR0E#n (Confirmation) RD0E	OK n	n=0: "OK"/"NG" n=1: "OK"<Data>/"NG" n=2: "OK"/"NG"<Data> n=3: "OK"<Data>/"NG"<Data>
Shutter time (Note 2)	(Change) WR0G#nn (Confirmation) RD0G	OK nn	nn=01- 99 (0.1 - 9.9 ms)
Verification digit pos. designation (File entry mode)	(Change) WR0I#nnn#NNN (Confirmation) RD0I	OK nnn#NNN	nnn#NNN=000#000 Verification digit pos designation disabled Verification from nnn to NNN (001 - 255)
Switching gain (Note 3)	(Change) WR0J#nnn#NNN (Confirmation) RD0J	OK nn	nn=00~15 Gain(0~15) (Note 4)

Note 1: Effective only when Continuous reading mode A, Continuous reading mode B or auto sense mode is selected.

Note 2: Effective only when "Fixed shutter, Gain auto mode" or "Fixed shutter, Gain fixed mode" is selected for the lighting setting.

Note 3: Effective only when "Fixed shutter, lighting fixed mode" is selected for the lighting setting.

Note 4: 15 is the brightest and 0 is the darkest in the gain setting value.

Note 5: When verification function is enabled, verification master data is output following the setting contents.

Setting command	Transmitted command	Response	
Data output timing	(Change) WR11#n (Confirmation) RD11	OK n	n=0: Synchronous n=1: Asynchronous
Non-scan code	(Change) WR12#n (Confirmation) RD12	OK n	n=0: Enabled n=1: Disabled
Indirect mode one-shot time	(Change) WR15#nn (Confirmation) RD15	OK nnn	nnn=010 - 999 (0.1 - 9.99 sec.)
Trigger signal input delay time	(Change) WR16#nnn (Confirmation) RD16	OK nnn	nnn=000 – 004 (No Delay time) nnn=005~999 (5ms~999ms)
Signals output ON duration width (Note 3)	(Change) WR17#nnn (Confirmation) RD17	OK nnn	nnn=001 - 255 (10 to 2550 ms)
Single output Delay time (Note 3)	(Change) WR18#nn (Confirmation) RD18	OK	nn=00 – 99 (no Delay time) nn= 01-99 (0.1 - 9.9 sec.)
non-scan code	(Change) WR19#hhhhhhh (Confirmation) RD19	OK hhhhhhh	hhhhhhh=Non-scan code hhhhhhh (Up to seven characters) (Not2)
Scanning start command	(Change) WR1A#hhhhhhh (Confirmation) RD1A	OK hhhhhhh	hhhhhhh=ON code setting hhhhhhh (Up to seven characters)(Note 2)
Scanning end command	(Change) WR1B#hhhhhhh (Confirmation) RD1B	OK hhhhhhh	hhhhhhh=OFF code setting hhhhhhh (Up to seven characters) (Note 2)
LED lighting on control setting (Note1)	(Change) WR1C#nn (Confirmation) RD1C	OK n	n=0 : Always off n=1 : Automatic n=2 : Always on
Decode time setting (Note 1)	(Change) WR1D#nnn (Confirmation) RD1D	OK nnn	nnn=000: Disabled (No decode time setting) nnn=005 - 999 (0.05 - 9.99 sec.)

Note 1: NG to indicate the scanning failure is output when decoding is unsuccessful during the setting time because the scanner repeats the decode within readable code setting the upper limit of decode limit when scanning test is performed. Effective only when Continuous reading mode A, Continuous reading mode B or auto sense mode is selected.

Note 2: 0x20~0x7E excluding ASCII character can be registered.

Note 3 The setting is effective only for OK signal, NG signal, verification OK signal or verification NG signal.

Setting command	Transmitted command	Response	
Output terminal 1 setting	(Change) WR1E#n (Confirmation) RD1E	OK n	n=0 : Unused n=1 : OK signal output n=2 : NG signal output n=3 : Verification OK signal output n=4 : Verification NG signal output n=5 : READY signal output
Output terminal 1 setting	(Change) WR1G#n (Confirmation) RD1G	OK n	n=0 : Unused n=1 : OK signal output n=2 : NG signal output n=3 : Verification OK signal output n=4 : Verification NG signal output n=5 : READY signal output n=6 : SHT signal output

Setting command	Transmitted command	Response	
QR code scanning	(Change) WR41#n (Confirmation) RD41	OK n	n=0: Enabled n=1: Disabled
Micro QR code scanning	(Change) WR42#n (Confirmation) RD42	OK n	n=0: Enabled n=1: Disabled
PDF417 code scanning	(Change) WR43#n (Confirmation) RD43	OK n	n=0: Enabled n=1: Disabled
Data Matrix code scanning	(Change) WR44#n (Confirmation) RD44	OK n	n=0: Enabled n=1: Disabled
UPC-A, UPC-E, EAN-13, EAN-8 code scanning	(Change) WR45#n (Confirmation) RD45	OK n	n=0: Enabled n=1: Disabled
Interleaved 2of5 code scanning	(Change) WR46#n (Confirmation) RD46	OK n	n=0: No C/D, scanning enabled n=1: With C/D, scanning enabled n=2: Scanning disabled
CODABAR(NW-7) code scanning	(Change) WR47#n (Confirmation) RD47	OK n	n=0: No C/D, scanning enabled n=1: With C/D, scanning enabled n=2: Scanning disabled
CODABAR(NW-7) code start/stop code transmission	(Change) WR48#n (Confirmation) RD48	OK n	n=0: Enabled n=1: Disabled
CODE39 code scanning	(Change) WR49#n (Confirmation) RD49	OK n	n=0: No C/D, scanning enabled n=1: With C/D, scanning enabled n=2: Scanning disabled
CODE128, EAN128 (GS1-128) code scanning	(Change) WR4A#n (Confirmation) RD4A	OK n	n=0: Scanning enabled n=1: Scanning disabled
QR code, Micro QR Code, SQRC, Micro QR code, Data Matrix code mirror image scanning	(Change) WR4B#n (Confirmation) RD4B	OK n	n=0: Scanning enabled n=1: Scanning disabled

Setting command	Transmitted command	Response	
QR code scanning version restriction	(Change) WR4C#nn#mm (Confirmation) RD4C	OK	nn#mm=nn to mm (Note 1)
Micro QR code scanning version restriction	(Change) WR4D#n#m (Confirmation) RD4D	OK	n#m=n to m (Note 2)
Structured append code mode setting	(Change) WR4F#n (Confirmation) RD4F	OK n n	n =0: Non-edit mode n= 1 Batch edit mode n =2: Edit mode
GS1 DataBar (RSS) scanning	(Change) WR4I#n (Confirmation) RD4I	OK n	n=0: Enabled (Note 3) n=1: Disabled
EAN.UCC COMPOSITE scanning	(Change) WR4J#n (Confirmation) RD4J	OK n	n=0: Enabled (Note 4) n=1: Disabled
Micro PDF417 scanning	(Change) WR4K#n (Confirmation) RD4K	OK n	n=0: Enabled n=1: Disabled
Barcode reader mode	(Change) WR4L#n (Confirmation) RD4L	OK n	n=0: Enabled n=1: Disabled
SQRC scanning	(Change) WR4M#n (Confirmation) RD4M	OK n	n=0: Enabled n=1: Disabled
SQRC version restriction	(Change) WR4N#nn#mm (Confirmation) RD4N	OK	nn#mm=nn to mm (Note 1) nn#mm
SQRC encryption key match operation	(Change) WR4O#n (Confirmation) RD4O	OK n	n=0:Disclosed data + undisclosed data transmission n=1:Undisclosed data transmission only
SQRC encryption key mismatch operation	(Change) WR4P#n (Confirmation) RD4P	OK n	n=0:Scanning disabled n=1:Disclosed data transmission only

Setting Command	Transmitted command	Response	
iQR Code (square) scanning	(Change) WR4Q#n (Confirmation) RD4Q	OK N	n=0 : Enabled n=1 : Disabled
iQR Code (rectangular) scanning	(Change) WR4R#n (Confirmation) RD4R	OK n	n=0 : Enabled n=1 : Disabled
iQR Code (square) scanning version restriction	(Change) WR4S#nn#mm (Confirmation) RD4S	OK nn#mm	nn#mm=nn to mm (Note 5)
iQR Code (rectangular) scanning version restriction	(Change) WR4T#nn#mm (Confirmation) RD4T	OK nn#mm	nn#mm=nn to mm (Note 6)
iQR structured append code mode setting	(Change) WR4U#n (Confirmation) RD4U	OK n	n=0 : Unedit- mode n=2: Edit-mode
Aztec code (Full-Range) scanning	(Change) WR4V#n (Confirmation) RD4V	OK n	n=0 : Enabled n=1 : Disabled
Aztec code (Compact) Scanning	(Change) WR4W#n (Confirmation) RD4W	OK n	n=0 : Enabled n=1 : Disabled
Aztec(Full-Range) scanning layer restriction	(Change) WR4X#nn#mm (Confirmation) RD4X	OK nn#mm	nn#mm=nn to mm (Note 7)
Aztec(Compact) scanning layer restriction	(Change) WR4Y#nn#mm (Confirmation) RD4Y	OK nn#mm	nn#mm=nn to mm (Note 8)
Menu scanning	(Change) WR4Z#n (Confirmation) RD4Z	OK n	n=0 : Enabled n=1 : Disabled

(Note 1) Applies to QR code only. Conditions of $nn \geq 01$, $mm \leq 40$, and $nn \leq mm$ are necessary. However, larger versions may not be scanned due to restrictions such as the field of view.

nn#mm=00#00 : Ver. no restriction.

(Note 2) Applies to Micro QR code only. Conditions of $n \geq 1$, $m \leq 4$, and $n \leq mm$ are necessary.

However, larger versions may not be scanned due to some restrictions such as the field of view of the decoder. n#m=0#0 : Ver. no restriction.

(Note 3) Readable codes when GS1 DataBar ((RSS) scanning is enabled are as follows;

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), GS1 DataBar Expanded Stacked(RSS Expanded Stacked)

(Note 4) Readable codes when EAN.UCC COMPOSITE scanning is enabled are as follows;

RSS CC-A,RSS CC-B,UPC/EAN CC-A ,UPC/EAN CC-B,
EAN-128 CC-A,EAN-128 CC-B,EAN-128 CC-C

When the barcode ((UPC-A,UPC-E,EAN-13,EAN-8, CODE128,EAN128,RSS) included in EAN.UCC COMPOSITE are enabled, it scan only the type of EAN.UCC COMPOSITE that includes these barcodes.

(Note 5) Applies to iQR code (square) only. Conditions of $nn \geq 01$, $mm \leq 61$, and $nn \leq mm$ are necessary.

However, larger versions may not be scanned due to restrictions such as the field of view.

nn#mm=00#00 : Ver. no restriction.

(Note 6) Applies to iQR code (rectangular) only. Conditions of $nn \geq 01$, $mm \leq 15$, and $nn \leq mm$ are necessary.

However, larger versions may not be scanned due to restrictions such as the field of view.

nn#mm=00#00 : Ver. no restriction.

(Note 7) Applies to Aztec (Full-Range) only. Conditions of $nn \geq 01$, $mm \leq 32$, and $nn \leq mm$ are necessary.

However, larger versions may not be scanned due to restrictions such as the field of view.

nn#mm=00#00 : Ver. no restriction.

(Note 8) Applies to Aztec (Compact) code only. Conditions of $nn \geq 01$, $mm \leq 04$, and $nn \leq mm$ are necessary.

However, larger versions may not be scanned due to restrictions such as the field of view.

nn#mm=00#00 : Ver. no restriction.

(Note 9) Designation of upper case or lower case is disabled. The characters set up currently are valid.

Communication Setting Commands

Setting command	Transmitted command	Response	
Communication protocol	(Change) WR21#n (Confirmation) RD21	OK n	n=0: No protocol n=1: ACK/NAK
Transmission rate	(Change) WR22#n (Confirmation) RD22	OK n	n=0: 4800bps n=1: 9600bps n=2: 19200bps n=3: 38400bps n=4: 57600bps n=5: 115200bps
Transmission conditions	(Change) WR23#nnn (Confirmation) RD23	OK n ₁ n ₂ n ₃	n ₁ =7 or 8 (data bit) n ₂ =N or E or O (parity) n ₃ =1 or 2 (stop bit)
Code mark transmission	(Change) WR25#n (Confirmation) RD25	OK n	n=0: Disabled n=1: Enabled (Note2)
Digit Number transmission	(Change) WR26#n (Confirmation) RD26	OK n	n=0: Disabled n=1: transfer2 digits n=2: transfer4 digits
BCC transmission	(Change) WR27#n (Confirmation) RD27	OK n	n=0: Disabled n=1: Enabled
CTS signal control	(Change) WR28#n (Confirmation) RD28	OK n	n=0: No control n=1: control
CTS monitoring time	(Change) WR29#nnn (Confirmation) RD29	OK nn	nn= 01-99 (0.1-9.9s)
ACK/NAK monitoring time	(Change) WR2A#nnn (Confirmation) RD2A	OK nn	nn= 01-99 (0.1-9.9s)
Header when receiving	(Change) WR2C#n (Confirmation) RD2C	OK n	n=0 : None n=1 : STX
Terminator when receiving	(Change) WR2D#n (Confirmation) RD2D	OK n	n=0 : ETX n=1 : CR n=2 : LF n=3 : CR+LF
Header when transmitting	(Change) WR2E#n (Confirmation) RD2E	OK n	n=0 : None n=1 : STX (Note1) n=2 : Selected by user (Note3)
Terminator when transmitting	(Change) WR2F#n (Confirmation) RD2F	OK n	n=0 : None n=1 : ETX n=2: CR n=3 : LF n=4 : CR+LF (Note1) n=5 : Selected by user (Note3)

(Note 1) The characters selected by user are not settable with commands.

(Note 2) The current setting is transmitted when enabled.

(Note 3) User selection is not settable with scanning only.

Image Memory Setting Command

Setting command	Transmitted command	Response	
Image save	(Change) WR53#n (Confirmation) RD53	OK n	n=0: Disabled n=1: Enabled n=2: Clear all image memories
Image save conditions	(Change) WR54#n (Confirmation) RD54	OK n	n=0: Saves all acquired images. n=1: Saves all unsuccessful image. n=2: Saves all successful images. n=3: Saves first image within trigger. n=4: Saves last image within trigger. n=5: Saves all images within trigger. n=6: Saves first unsuccessful image within trigger. n=7: Saves last unsuccessful image within trigger. n=8: Save the last image within trigger when scanning is unsuccessful within trigger
Image memory no. designation	(Change) WR55#nn (Confirmation) RD55	OK nn	n=00 - 19: Specify the memory address. n=99: Cyclic

Scanning Test Setting Commands

Setting command	Transmitted command	Response
Set scan test	(Change) WR51#nmlpq (Confirmation) RD51	OK nmlpq (Note 1)

The QB30 switches to Scanning Test with “Test analysis start (=TESTON#nnn)”, and then after receiving the following test commands, returns to normal mode with “Test end (=TESTOFF)”.

During the setting mode, the decoder cannot enter the test mode.

nnn represents the test count, with a range of between 001 and 999 times. (However, if nnn=000, test scanning is performed continuously.)

(Note 1) The designated items are as follows:

Parameter	Item	0	1
n	Error correction count/total no. of codewords	Enabled	Disabled
m	Scan result (OK/NG)	Enabled	Disabled
l	Code information	Enabled	Disabled
p	Number of accumulation	Enabled	Disabled

Output type example: When “WR51#00000” specified:

Header [0001/0026] [OK] [MODEL2,V1,ECCM,M3] C [6/10]1234567890 Terminator

Error correction count 1/total no. of codewords 26, Decoding successful,

QR code Model 2, Ver1, Error correction level: M, Master no. 3,

Continuous reading mode, 6th successful decode, Total of 10 decoded images,

Decode data 1234567890

Optional Setting Commands

Setting command	Transmitted command	Response	
Software version check	(Confirmation) RD31	VER.n.nn	
Beeper beeping	(Change) WR33#n (Change) RD33	OK n	n=0: Enabled n=1: Disabled
Beeper beeping when scanning is unsuccessful	(Change) WR35#n (Confirmation) RD35	OK n	n=0: Enabled n=1: Disabled
Magic key functions setting	(Change) WR37#n (Confirmation) RD37	OK n	n=0: Enabled n=1: Disabled
Beeper beeping when power is on	(Change) WR38#n (Change) RD36	OK n	n=0: Enabled n=1: Disabled

Error Processing

Conditions	Response
Received an undefined command (Header and terminator are matched.)	NG transmitted
Received a control command after entering setting mode. (Header and terminator are matched.)	
Received only a setting command/menu (Header and terminator are matched.)	
The value of setting command is invalid	
Receiving error occurred. (Parity error, framing error)	No response
Non-scan code	ERROR (can be set by a command)

Chapter 19 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 reading 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)

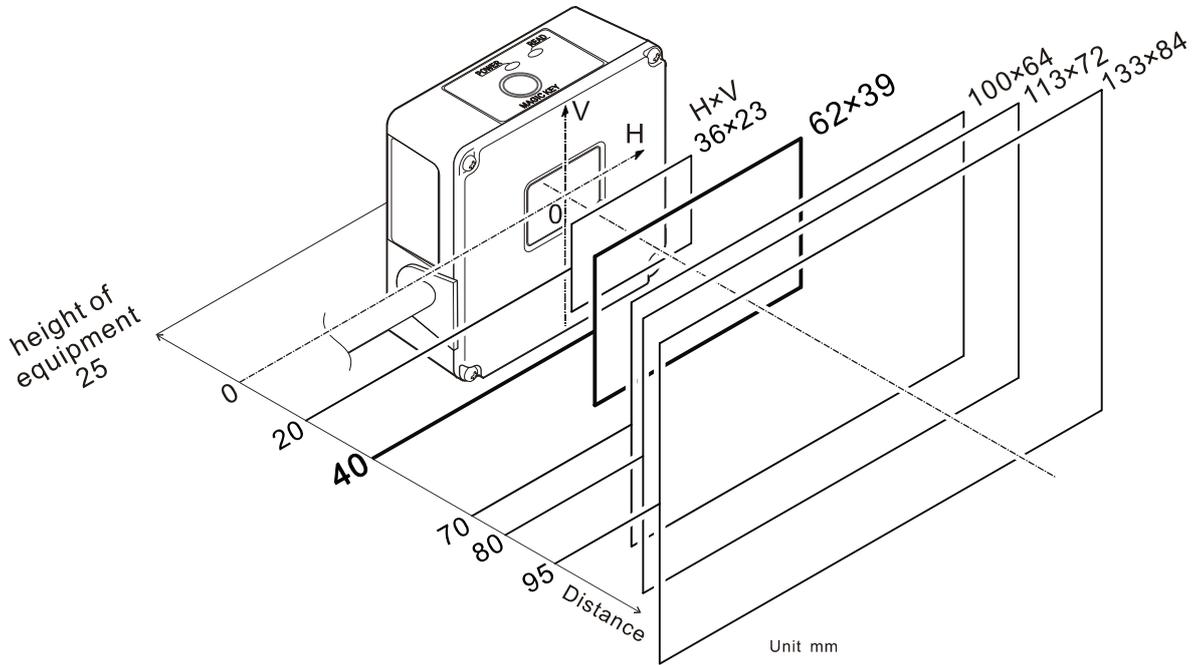
Probable cause	What to do:
<ul style="list-style-type: none"> • The keyboard type selected may not match one that is set up in the host computer. 	<ul style="list-style-type: none"> • Select the same keyboard type as one that is set up in the host computer. (You can check the computer's keyboard type 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		Specifications	
Scanning specifications	Readable codes	two-dimensional codes	Model 1 and Model 2 of QR Code, MicroQR, SQRC(*), iQR MaxiCode, DataMatrix, Aztec, iQR, PDF417, MicroPDF417, EAN.UCC COMPOSITE
		bar codes (binary codes)	Interleaved 2of5 (ITF), CODE 39, CODABAR (NW-7)
		bar codes (multiple codes)	UPC-A/E, UPC/EAN with add-on EAN-13/8, GS1-128 (EAN-128) and GS1 DataBar (RSS) UCC, CODE 128, CODE 93
	Scanning resolution	two-dimensional codes	0.20 mm (7.9 mils)
		bar codes	0.15 mm (5.9 mils)
	Elevation angle		±35°
	Tilt angle		±35°
	Skew angle		360°
	Light source		LED (White)
	Reading confirmation		READ LED (Blue, Green and Red) and beeper
RS-232C Interface (QB30-SR)		RS-232C asynchronous	
Input power requirements (RS-232C)	Operating voltage range	5V DC±5%	
	Consumption current	Max. 1A	
USB Interface (QB30-SU)		USB-COM interface USB keyboard interface	
Standard		USB 1.1 compliant	
Connector		USB type A	
Operating voltage range		5V DC±5%	
Consumption current		Max. 500mA	
Environmental conditions	Operating temperature range	-20°C to 50°C (-4°F to 122°F)	
	Operating humidity range	10% to 90% RH (No condensation allowed, wet-bulb temperature 30°C max.)	
Dimensions (W) x (D) x (H)		2.4×2.4×1.0 inches (60×60×25 mm)	
Weight	QB30-SR	Approx. 120 g	
	QB30-SU	Approx. 150 g	

(*Please consult your dealer when using SQRC in countries other than Japan.

Appendix 2 Scan Range



Standard location of scanning

Distance : 40mm

Field of view : 62×39mm

code	Cell size (mm)	(mm)			
		Scanning area and horizon			
		near point		far point	
		distance	field of view	distance	field of view
two-dimensional codes	0.2	20	36×23	35	55×35
	0.25	↑	↑	45	68×43
	0.33	↑	↑	60	88×56
	0.42	↑	↑	75	107×68
	0.5	↑	↑	80	113×72
bar codes (multiple code)	0.25	↑	↑	55	81×52
	0.33	↑	↑	70	100×64
bar codes (binary code)	0.15	↑	↑	55	81×52
	0.25	↑	↑	85	120×76
	0.33	↑	↑	95	133×84

Fixed Type 2D Code Scanner

QB30-SR/SU

User's Manual

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