V7000

Fixed Barcode Scanner

User Manual

Introduction

Thank You for Your Purchase

This manual explains the specifications, setup, installation, features, operation, and system configuration, of the V7000 barcode scanner.

In order to use the product properly, read this manual carefully.

If you encounter any issue, please describe the detailed step to reproduce it for our investigation.

The contents of this manual may change without notice. Check our website for the most current version.

Safety notices

DO NOT disassemble. Disassembly will void the warranty and could cause damage or personal injury.

This product is intended for use in general electronics equipment (electronic computer, OA equipment, communications equipment, test and measurement equipment, machine tools, industrial robots, AV equipment, home appliances etc.).
Appropriate measures should be taken at use of unit/system related to safety and operation of transportation equipment (aircraft, train, automobile), traffic signal, gas leak detector, and safety devices

This product is classified as Class I as specified in IEC60825-1.
Avoid prolonged viewing into scan window during operation.

Brady products are not designed or intended for the use as a component in life support appliances or as surgical implants nor in any other application where failure of the product could cause personal injury or death. The use of Brady products shall indemnify and hold harmless to Brady and its shareholders against any claims of injury or death associated with unintended authorized use.

Handle with care

- DATA BACKUP
  This product has a memory backup function. This backup data restoration cannot be guaranteed if repair, reconstruction, or upgrades are performed on this product.

- DO NOT use this product at temperature or humidity ranges beyond that documented in the product specifications, or in direct sunlight.
- DO NOT expose this product to water, moisture, oil, etc.
- This product may be damaged in environments containing corrosive gas.
- DO NOT use any chemicals when cleaning.

If there are any dust particles on the image sensor, please clean the sensor as follows:

- Wipe lightly with cloth or swab (may be damp with alcohol).
- Wipe off any residual alcohol using a dry cloth.
- This is a high-precision optical device, avoid exposing this product to excessive force such as that sustained by a drop.

Do not install electrical wiring or plugin/unplug of cable when this product is powered on. These may result in an electrical damage to this product.

To minimize the risk of data loss, make sure to backup the hard drive before installing the software. Our company shall not be responsible for any troubles such as data loss or damages.

Locations for operation and storage

Avoid the following locations that could cause an accident or damage to the product.

- Exposed to ambient temperature outside the rating
- Exposed to relative humidity outside the rating
- Exposed to rapid temperature fluctuations (causing condensation)
- Exposed to direct sunlight or near heaters
- Exposed to direct vibration or shock
- In the presence of dust, salt, or iron particles
- In environments where static electricity can build into significant charges
- In the presence of flammable or explosive gases
- In the presence of corrosive gas

Long-term storage

Store away from direct sunlight and direct vibration or shock for long-term storage. Do not store this product at temperature or humidity ranges beyond that documented in the product specifications.

Precautions on Regulation and Standards

FCC Regulations

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area may cause harmful interference in which case the user will be required to correct the interference at his own expense.

In instances where interference is experienced, the following measures are recommended to assist in mitigation:

- Reorient or reposition the equipment relative to the interference.
- Increase the separation distance between the equipment and the interference.
- Connect equipment to a separate power circuit than the interference if applicable.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and, (2) this device must accept any interference received, including interference that may cause undesired operation.

Innovation, Science and Economic Development (ISED)
Canada ICES-003: Information Technology Equipment (including Digital Apparatus)
Canada NMB-003: Équipement de technologie de l'information (incluant les appareils numériques)
CAN ICES-3 (A)/NMB-3(A)

Download information

The user manuals, software, and device drivers are available from: **https://www.bradyid.com/V7000**

User Manual:	This document
V7000 Quick Start Guide:	Describes basic usage of this product
FixedConfigV7000:	Communication & configuration software
FixedConfigV7000 Quick Start Guide:	Describes basic usage of FixedConfigV7000
Industrial Ethernet Connection Manual:	Describes how to use Industrial Ethernet

NOTE: The terms scanner and reader are used interchangeably in this document.

1 Contents

2 Overview

(1) V7000 is a fixed mount (stationary type) barcode scanner that applies the latest digital camera technology and image recognition software. It applies a powerful high-speed processing engine equipped with a quad-core CPU to automatically identify and read one-dimensional and two-dimensional codes (hereinafter also referred to as “symbols”).

(2) Equipped with a mechanical focus/zoom adjustment mechanism, V7000 can read at various distances and magnifications.

(3) For reading symbols of direct marking printed with laser markers or dot peen, has suitable functions.

- Image Preprocessing:
  This function improves the image quality by preprocessing the captured image. When reading symbols with poor image quality, you can improve the reading performance by using this function.

- Configuration Parameters:
  Up to 16 types of reading parameters can be registered, and reading can be adjusted one by one.

- Lighting unit:
  You can set the optimum lighting pattern according to the reading target and condition.

(4) Cycle Buffer Function (MAXIMG) performs both the decoding and capturing images in parallel. This function eliminates the detailed timing tuning for moving symbols.

(5) Symbol print check function
It is equipped with a function to check the print quality in-line for the two-dimensional code captured by this product, and by verifying the print quality using the evaluation parameters of ISO / IEC 15415 or ISO / IEC TR 29158, You can get a detailed understanding of the tendency of the symbols flowing in the line to change over time.

This function outputs the evaluation result in the same format as the standard evaluation parameter, but it is for a simple check and cannot be used as a formal 2-D code verifier.

(6) This product has a dust-proof and water-proof protection structure (IP67) and can be used even in harsh environments.

(7) This product has an Ethernet interface, you can easily connect to an Ethernet port of a computer running Windows.

You may not be able to connect depending on the computer.

- Windows is a registered trademark of Microsoft Corporation.

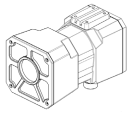
3 Flow to start of operation

Operation Start

3.1 Checking the contents of the package

When you open the package, please check the following items are there without scratches/damages.

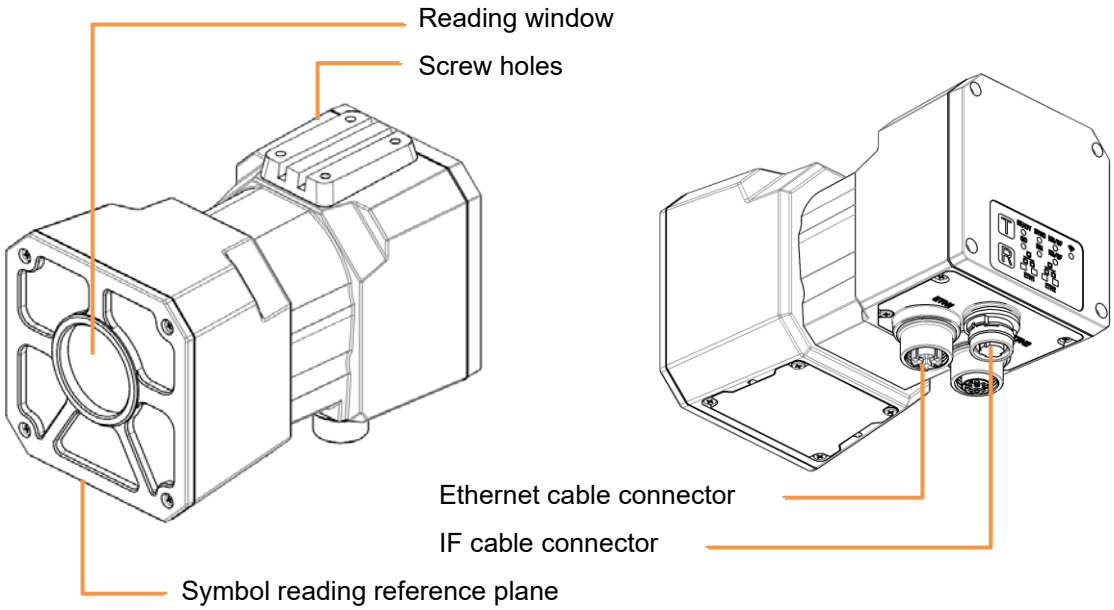
If you find any shortage, please contact our customer support.

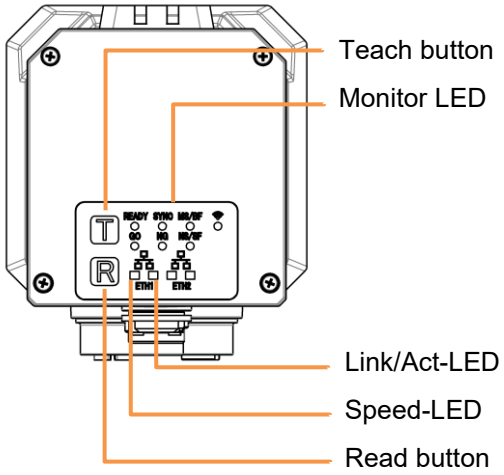
Packaged product name	Image	Quantity
V7000		1
Calibration sheet		1
V7000 Quick Start Guide:		1

Optional accessories

Product name	Model number	
24V AC Adapter	AKA-24271A1	
Interface and Power Jack Cable	MFR-CA05-S99-AC	
LAN Cable	NBC-MSX/5.0-94F/R4ACSCO	

3.2 Name of each part

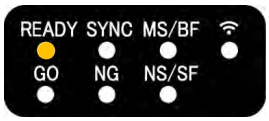
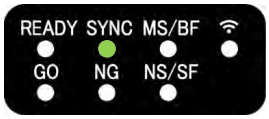
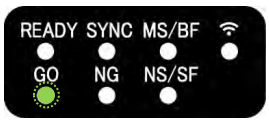
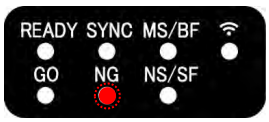
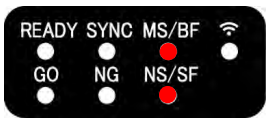




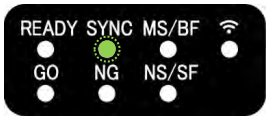
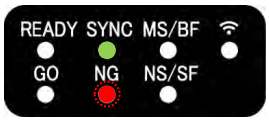
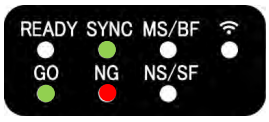
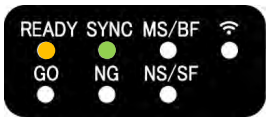
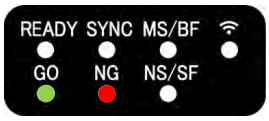
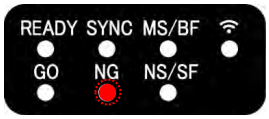
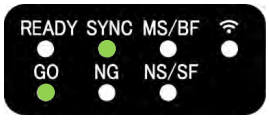
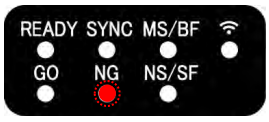
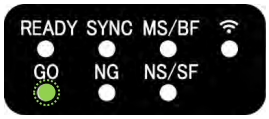
Name	Explanation
Reading window	Window to read the symbols.
Symbol reading reference plane	Reference plane for symbol reading distance.
Screw holes	Holes for mounting the enclosure (M3, depth 4 mm, 4 places).
Teach button	Button for starting Auto Tuning or resetting IP address to default.
Read button	Button for reading test.
Status LED	Display the status and results of reading and Auto Tuning.
Link/Act -LED	Ethernet connection / data transfer status display.
Speed -LED	Ethernet connection speed display.
Ethernet cable connector	Connector for connecting Ethernet cable (optional).
IF cable connector	Connector for connecting IF cable (optional)

3.3 Status LEDs

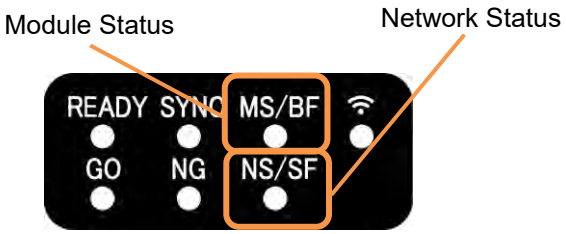
●Normal operation

Panel	LED	Color	Function description
	READY	Orage	The reader is ready to operate.
	SYNC	Green	The reader received SYNC signal.
	GO	Green	Blinks once when the symbol is successfully read.
	NG	Red	Blinks once when symbol reading fails.
 	MS/BF NS/SF	Green Red Green Red	Industrial Ethernet function is enabled. - EtherNet/IP MS:Module Status NS:Network Status - Not used in this product BF:Bus Fault SF:System Fault

●Special status display

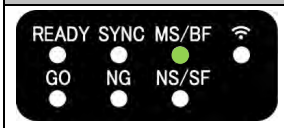
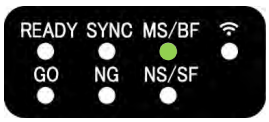
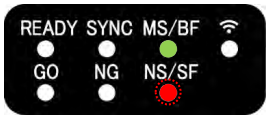
Panel	LED	Color	Status	Function description
	SYNC	Green	Blinking	Blinks 3 times when saving the configuration is completed.
	SYNC NG	Green Red	ON Blinking	When the data arrival confirmation setting is enabled and reading data cannot be transmitted, NG blinks 7 times and SYNC lights up until transmission.
	SYNC GO NG	Green Green Red	ON ON ON	The Teach button is pressed.
 	READY SYNC GO NG	Orange green Green Red	ON ON ON ON	During Auto Tuning of read parameters LEDs (READY, SYNC) and (GO, NG) turn on and off alternately and repeatedly.
	NG	Red	Blinking	Auto Tuning failed to find good settings. → Blinks 7 times When it is canceled. → Blinks 7
	SYNC GO	Green Green	ON ON	LED (SYNC, GO) turn ON when Auto Tuning finds settings.
	NG	Red	Blinking	Only 1 setings are found by Auto Tuning. → Blinks 3 times when saved in table 1.
	GO	Green	Blinking	Found up to 3 types of settings. Blinks 3 times when saved in tables 1 to 3.

●Industrial Ethernet (EtherNet/IP) when enabled

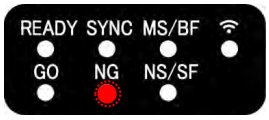
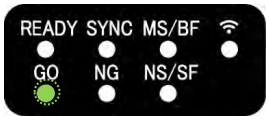
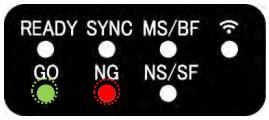
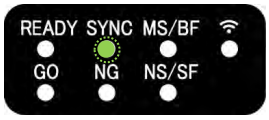
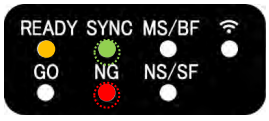
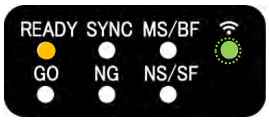


Module Status : Indicates barcode scanner status when Industrial Ethernet is enabled.

Network Status : Indicates connection status when Industrial Ethernet is enabled.

Panel	LED	Color	Status	Function description
	MS/BF NS/SF	Green Red Green Red	ON	When the Industrial Ethernet is enabled, the LEDs are lit or unlit in the order.
	MS/BF	Green	ON	When ready to connect to PLC
	MS/BF NS/SF	Green Green	ON Blinking	Not connected to PLC
	MS/BF NS/SF	Green Green	ON ON	Connected to PLC
	MS/BF NS/SF	Green Red	ON Blinking	Disconnected from PLC

●Others

Panel	LED	Color	Status	Function description
	NG	Red	Blinking	The scanner has some error. Please contact our customer support.
	GO	Green	Blinking	
	NG GO	Red Green	Blinking Blinking	
	SYNC	Green	Blinking	
	READY SYNC NG	Orange Green Red	ON Blinking Blinking	
	READY (wifi)	Orange Green	ON Blinking	

3.4 Status notification by buzzer

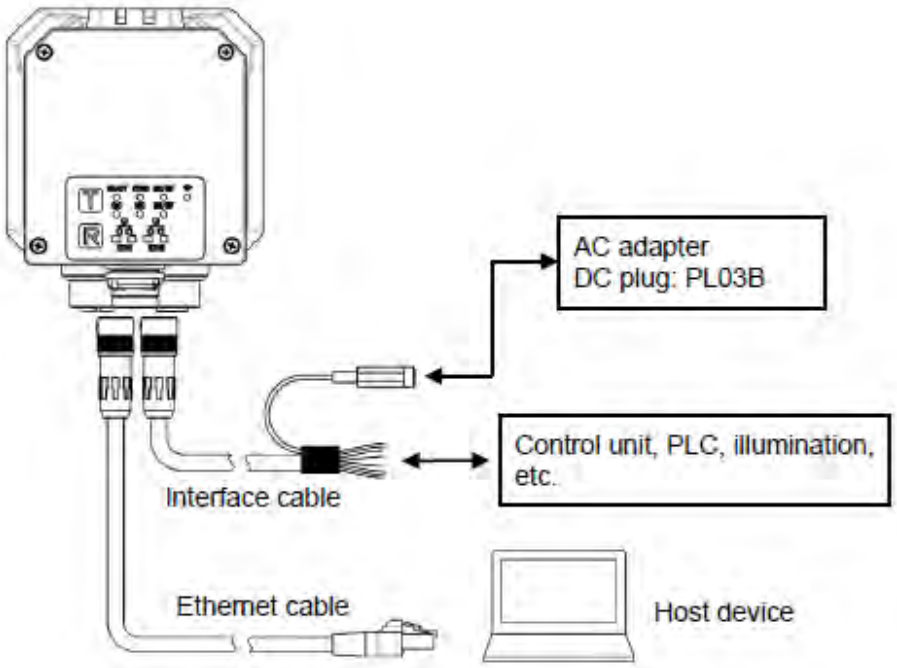
Notifies the reader's status by the length of the buzzer sound and the pattern of the number of times it sounds.

Length of buzzer sound	Number of times	Function description
Short	**3**	**When the reader has completed booting.**
Short	**1**	**When the symbol is successfully read.**
Short	**7**	**(1) When no adjustment settings are found as a result of a Auto Tuning, or when it is canceled.** **(2) When there is no communication response from PLC while using PLC link.**
Medium	**3**	**When the reader settings are saved in the flash ROM.**
Long	**1**	**When the reader starts up after power-on.** *** Depending on the status of the reader at startup, it may sound multiple times at intervals of several tens of seconds.**
Long	**3**	**When adjustment settings are found a result of Auto Tuning.**
Long	**4**	**When just one setting that Auto Tuning found is saved.**

3.5 Example of Device configuration

An example of the connection configuration of this product is as follows.

●V7000



No.	Item	Model
1	Interface & Power Jack Cable	MFR-CA05-S99-AC
2	24V AC Adapter	AKA-24271A1
3	LAN Cable	NBC-MSX/5.0-94F/R4ACSCO

Note: This product has an engraved mark of "E58085 UL AWM VW-1" on its coating of the wire. Please note that there are other products that have the same connectors but different markings.

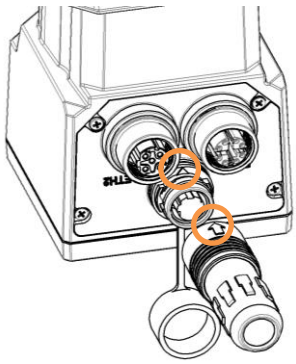
3.6 Cable connection, pin assignment, wiring example

The cable connection of this product, the cable pin assignment and wiring example are as follows.

● Cable connection

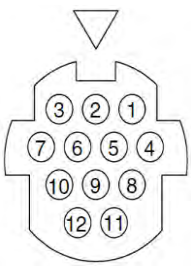
1) When installing the IF cable, please align [⇧] mark of IF cable and [⇧] mark of the connector.

2) When removing the IF cable, hold around [⇧] mark and pull the cable straight out.



● Pin assignment

Main unit side connector pin assignment (viewed from outside)

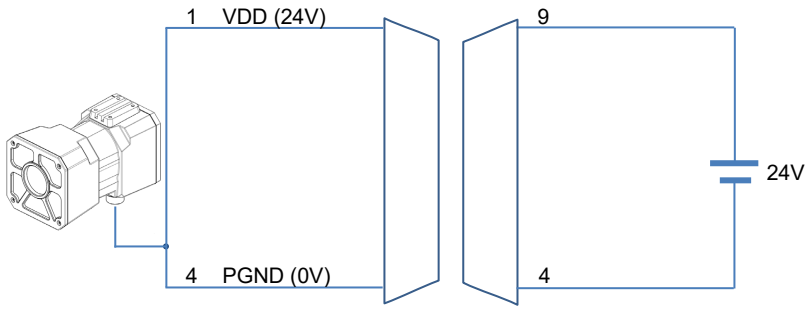


IF cable pin assignment

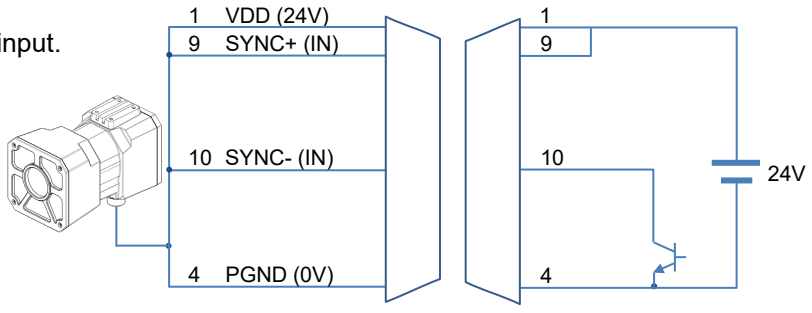
#	line color	Name	Function	Directions
1	Red	VIN	Power supply DC24V	
2	Orange (Red mark)	OUT1+	Digital output 1 (Initial value: GO) (Photocoupler + side)	Output
3	White (Red mark)	OUT2+	Digital output 2 (Initial value: NG) (Photocoupler + side)	Output
4	Black	PGND	Power supply GND	
5	Orange (Black mark)	COM-	Output common (Photocoupler – side)	Output
6	Gray (Black mark)	LIGHT-	External lighting control output (Photocoupler – side)	Output
7	Gray (Red mark)	LIGHT+	External lighting control output (Photocoupler – side)	Output
8	Yellow (Red mark)	ENCODE+	Digital input 2 (Photocoupler + side)	Input
9	Pink (Red mark)	SYNC+	Digital input 1 (SYNC signal) (Photocoupler + side)	Input
10	Pink (Black mark)	SYNC-	Digital input 1 (SYNC signal) (Photocoupler - side)	Input
11	Yellow (Black mark)	ENCODE-	Digital input 2 (Photocoupler - side)	Input
12	—	Shield (Earth)	Connect the shield to the FG.	

●e.g.

1) Powered by DC,
Not use I/O.

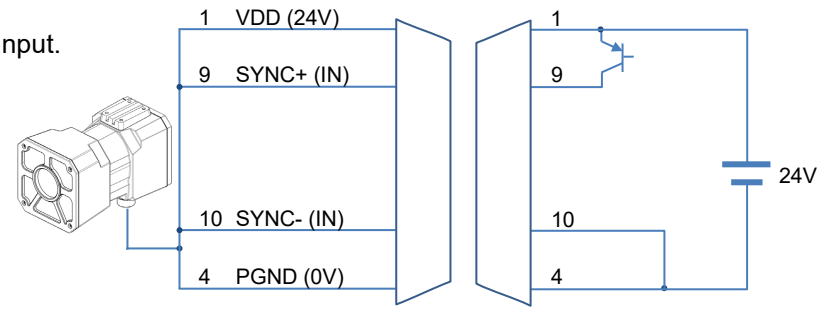


2) Powered by DC,
NPN wiring for SYNC input.



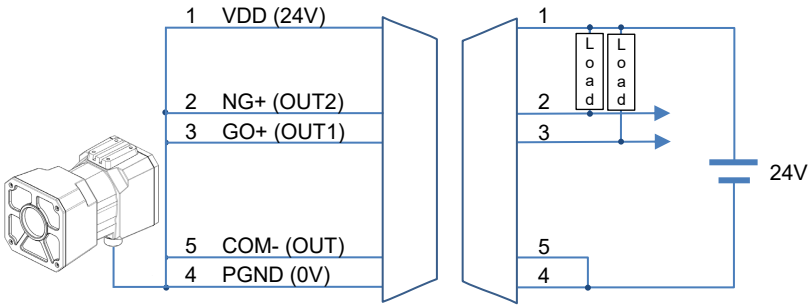
3) Powered by DC,

PNP wiring for SYNC input.



4) Powered by DC,

and use I/O signals.



3.7 Reading distance, Field of view

In this section you will find the field of view and reading distance

●Reading distance, Field of view

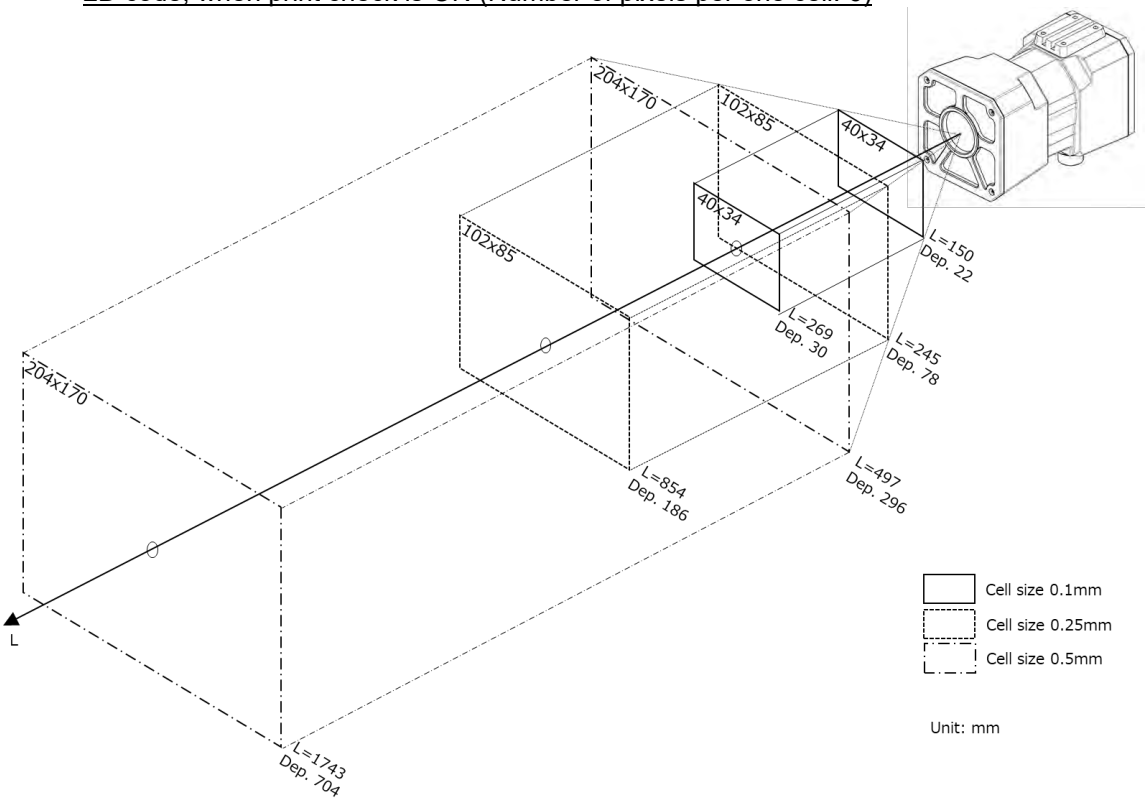
If the reading distance exceeds 400 mm, the built-in illumination may not provide enough light. In this case, please prepare external lighting.

When the reading distance is more than 1000mm, the built-in distance sensor may not be able to measure the distance.

When the reading distance is less than 100 mm, the built-in distance sensor may become unstable to measurement the distance.
In that case, please adjust the focus by manual focus.

V7000 (Standard)

2D code, when print check is ON (Number of pixels per one cell: 6)



Unit: mm

Cell sizes [mm]	Focus adjustment range (Reading depth in parentheses Note 1)		Field of view	
	Near end	Far end	X	Y
0.1 (Note 2)	150 (22)	269 (30)	40	34
0.125	150 (24)	368 (40)	51	42
0.167	167(Note 3) (40)	533 (80)	68	57
0.19	188(Note 3) (48)	622 (104)	77	64
0.25	245(Note 3) (78)	854 (186)	102	85
0.33	322(Note 3) (106)	1152 (286)	134	112
0.5	497(Note 3) (296)	1743 (704)	204	170

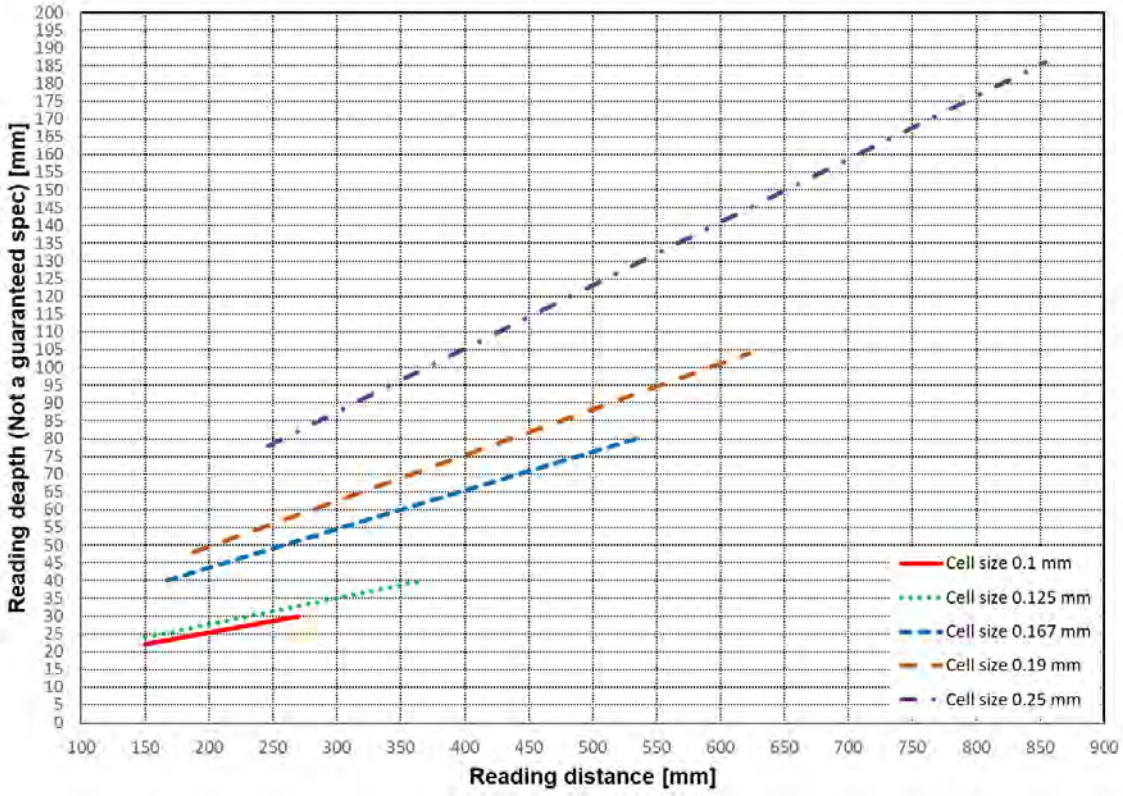
Note 1: The reading depth is not a guaranteed spec.

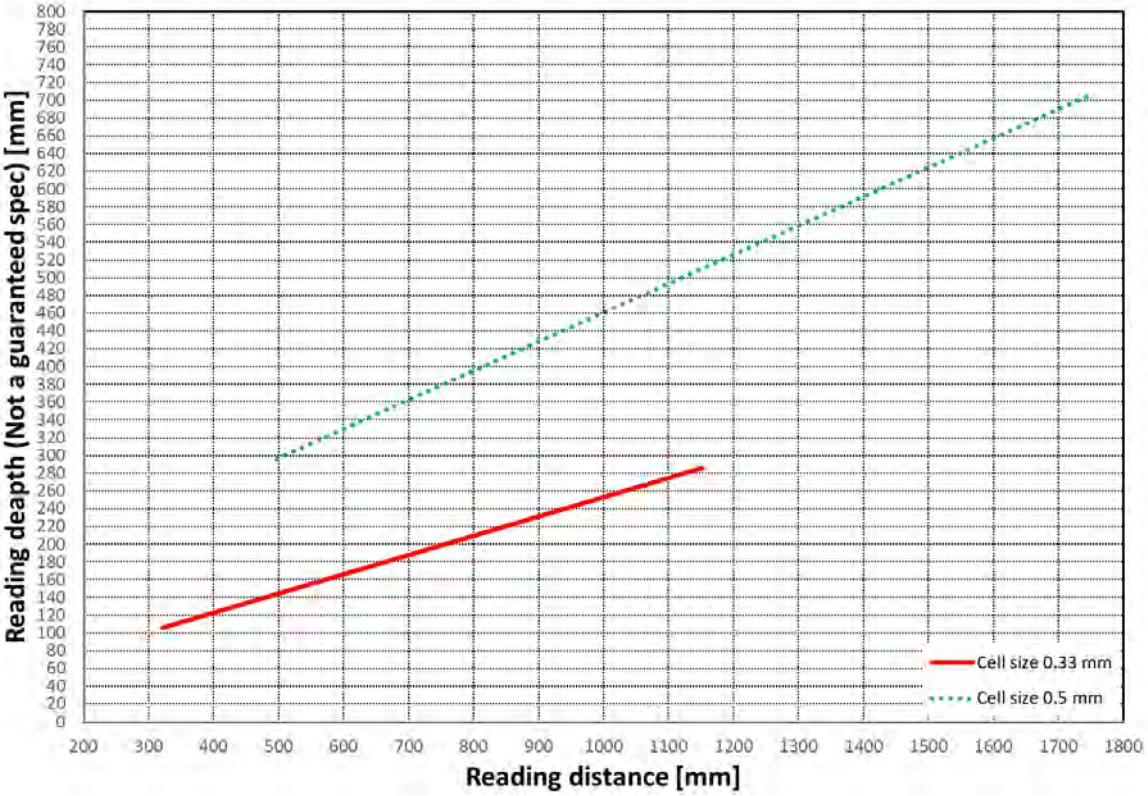
Note 2: All specs with 0.1mm size are not guaranteed spec.

Note 3:

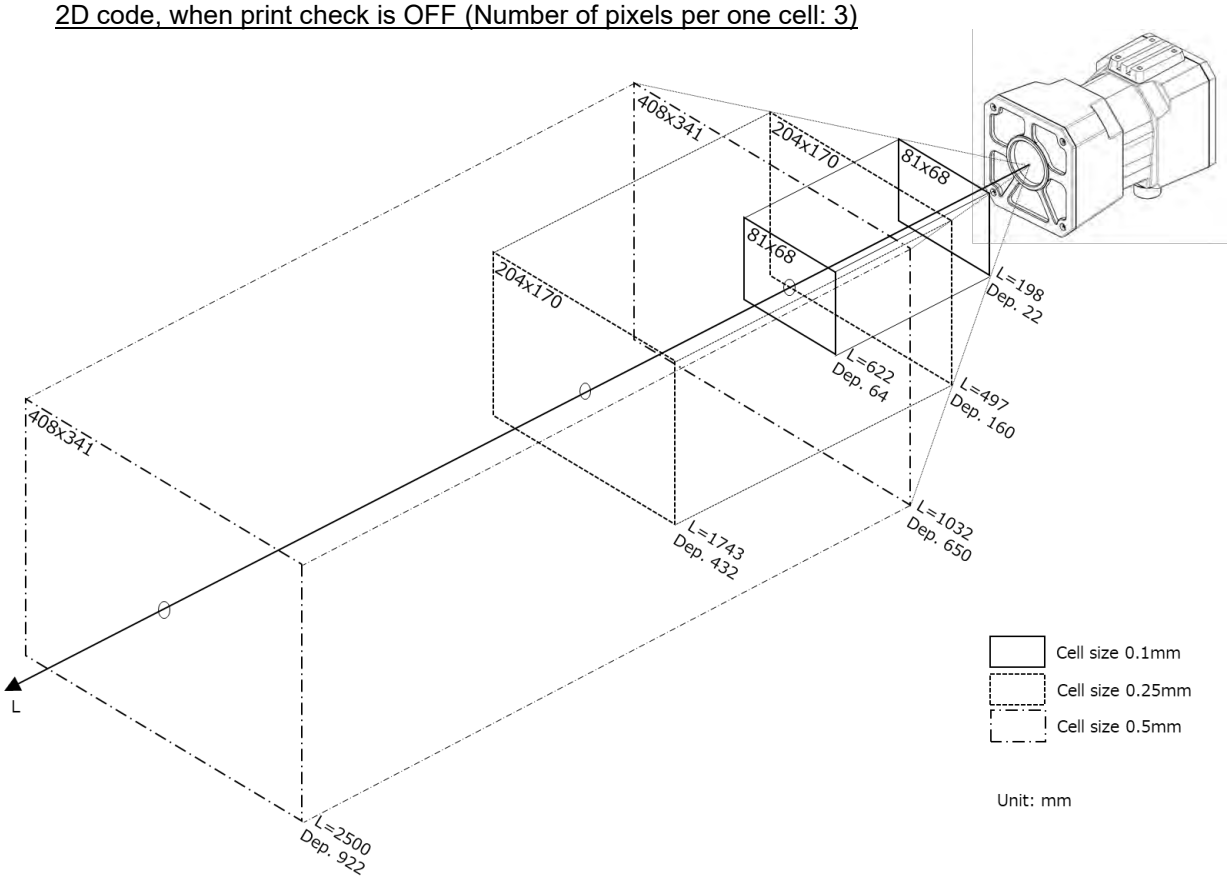
Increasing the number of pixels per one cell (magnification) makes the focus closer. (Shortest distance: 150mm)

Note that the field of view will be narrower.


Reading deapth (Not a guaranteed spec) [mm]
Reading distance [mm]
Cell size 0.1 mm
Cell size 0.125 mm
Cell size 0.167 mm
Cell size 0.19 mm
Cell size 0.25 mm


Reading deapth (Not a guaranteed spec) [mm]
Reading distance [mm]
Cell size 0.33 mm
Cell size 0.5 mm

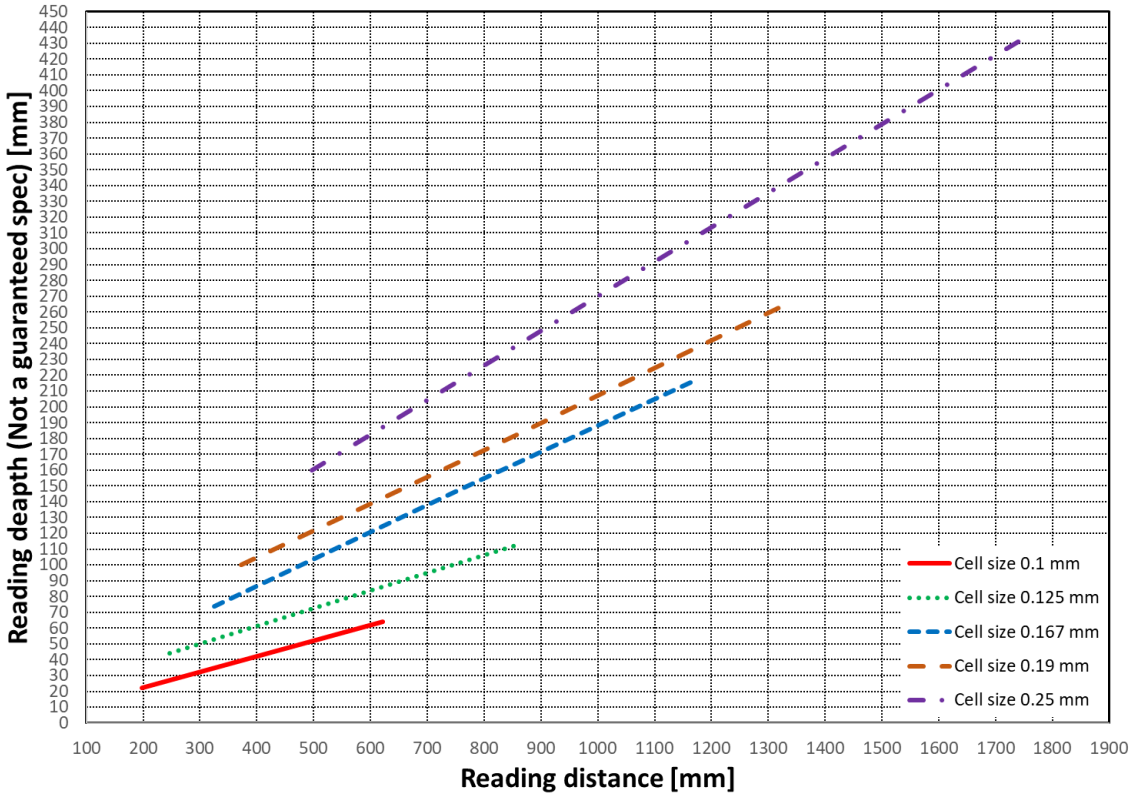
2D code, when print check is OFF (Number of pixels per one cell: 3)

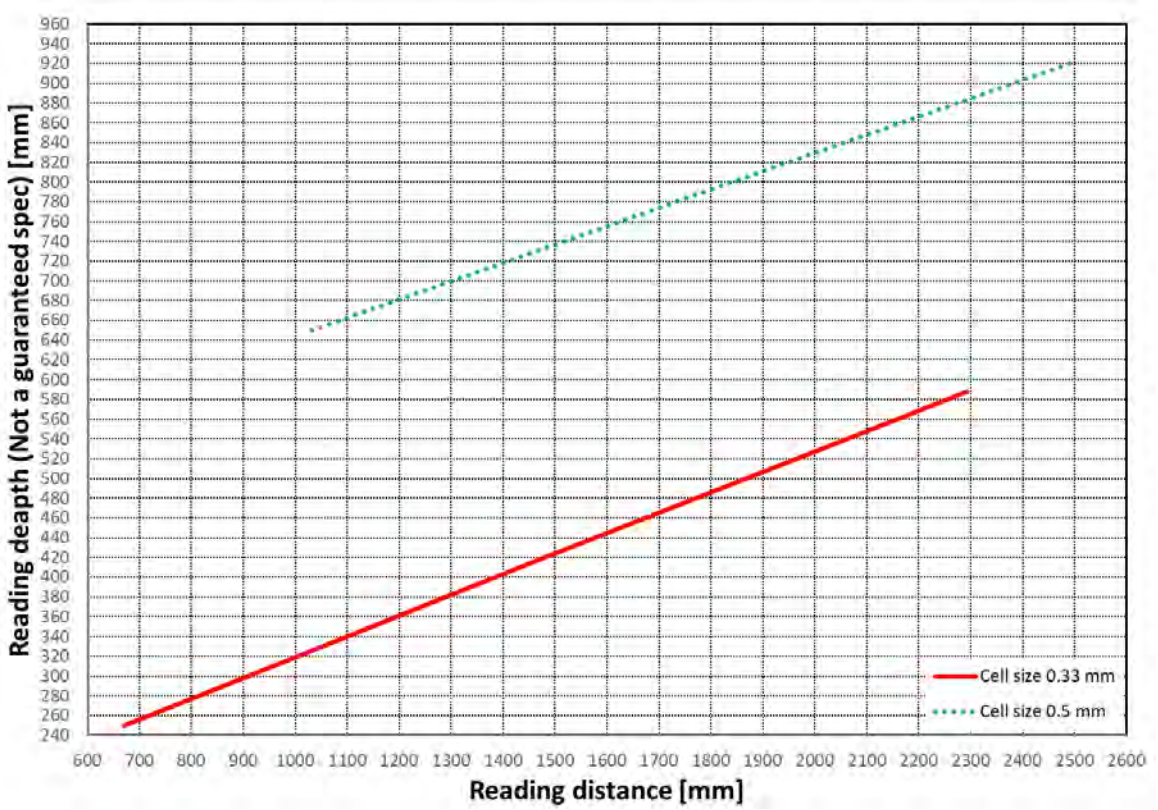


Unit: mm

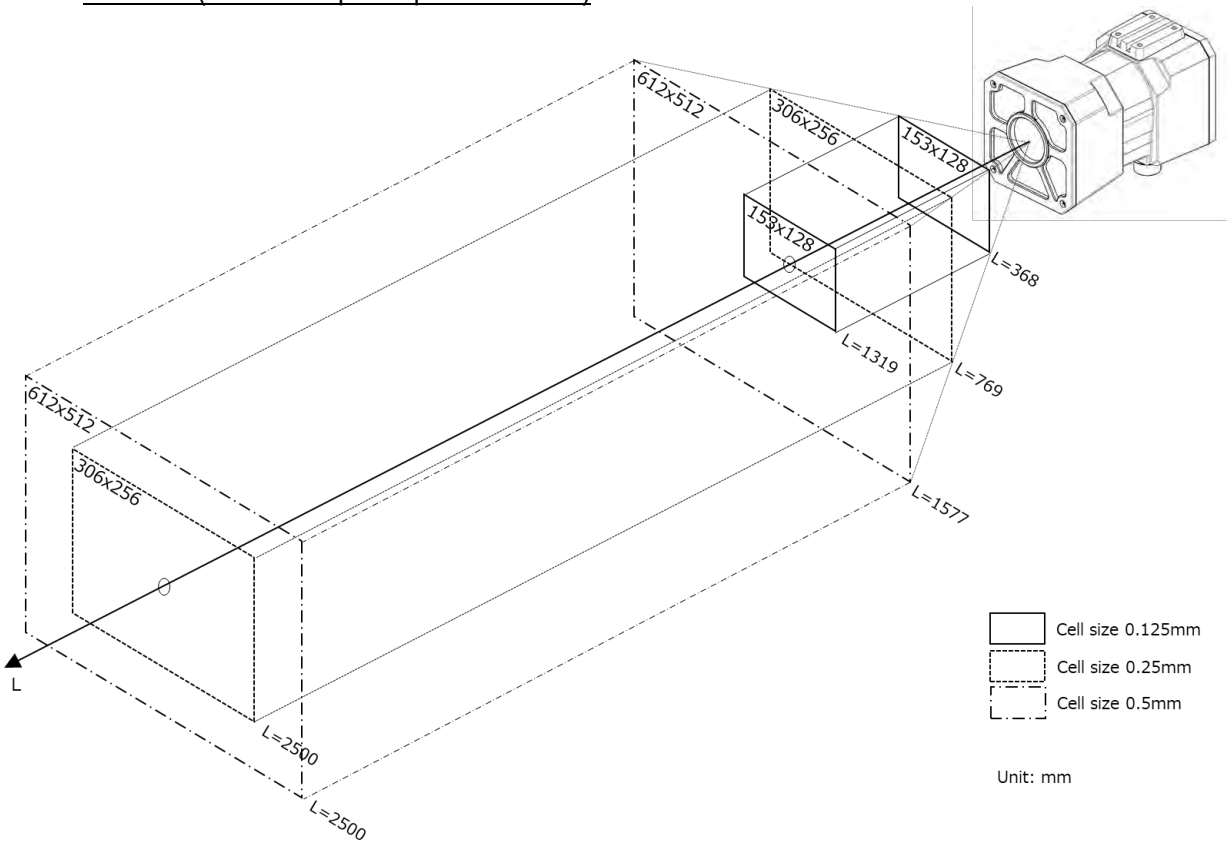
Cell sizes [mm]	Focus adjustment range (Reading depth in parentheses Note 1)		Field of view	
	Near end	Far end	X	Y
0.1 (Note 2)	198(Note 3) (22)	622 (64)	81	68
0.125	245(Note 3) (44)	854 (112)	102	85
0.167	325(Note 3) (74)	1166 (216)	136	114
0.19	373(Note 3) (100)	1337 (266)	155	129
0.25	497(Note 3) (160)	1743 (432)	204	170
0.33	670(Note 3) (250)	2293 (588)	269	225
0.5	1032(Note 3) (650)	2500 (922)	408	341

Note 1: The reading depth is not a guaranteed spec.
Note 2: All specs with 0.1mm size are not guaranteed spec.
Note 3:
Increasing the number of pixels per one cell (magnification) makes the focus closer. (Shortest distance: 150mm)
Note that the field of view will be narrower.


Reading deapth (Not a guaranteed spec) [mm]
Reading distance [mm]
Cell size 0.1 mm
Cell size 0.125 mm
Cell size 0.167 mm
Cell size 0.19 mm
Cell size 0.25 mm


Reading deapth (Not a guaranteed spec) [mm]
Reading distance [mm]
Cell size 0.33 mm
Cell size 0.5 mm

Bar code (Number of pixels per one cell: 2)



Unit: mm

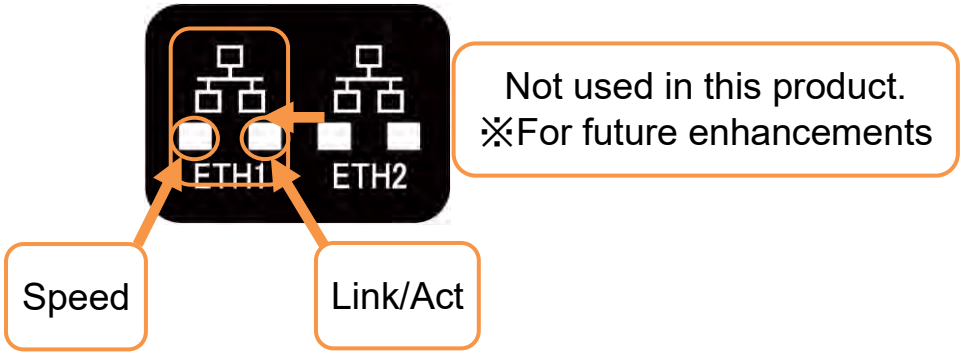
Cell sizes [mm]	Focus adjustment range		Field of view	
	Near end	Far end	X	Y
0.125	368(Note 1)	1319	153	128
0.15	444(Note 1)	1571	183	153
0.19	573(Note 1)	1983	232	194
0.25	769(Note 1)	2500	306	256
0.33	1022(Note 1)	2500	403	337
0.5	1577(Note 1)	2500	612	512

Note 1:
Increasing the number of pixels per one cell (magnification) makes the focus closer. (Shortest distance: 150mm)
Note that the field of view will be narrower.

3.8 Ethernet connection

●LED Indication

When the Ethernet connection with the host device is established, the Link/Act-LED (color: orange) and Speed-LED (color: green/yellow) will light up. The status of each LED is as follows.



Speed-LED	State
Yellow light	1G bps
Green light	100M bps
Turn off	10M bps

Link/Act-LED	State
Orange light	Link up
Orange flashing	During data transfer
Turn off	Link down

●Ethernet communication preparation

Start terminal software for TCP/IP communication.

This section describes the communication settings using “FixedConfigV7000".

* “FixedConfigV7000" can be downloaded from our website.

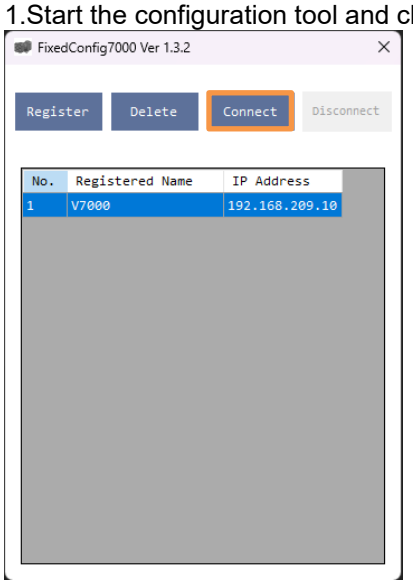
To perform Ethernet communication with the factory default, you need to change the network settings of host device

V7000 Communication setting value (default)

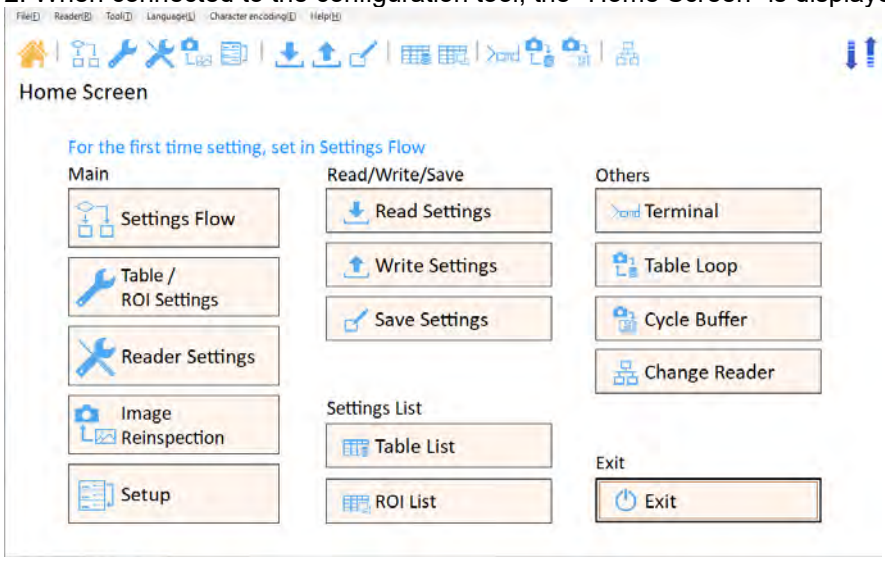
Item	Value (at the time of shipment)
IP address	192.168.209.10
Subnet mask	/24 → (Same as 255.255.255.0)
TCP port number	27110
Default Gateway	192.168.209.254

●Connecting to the Configuration Tool

1.Start the configuration tool and click "Connect" button.



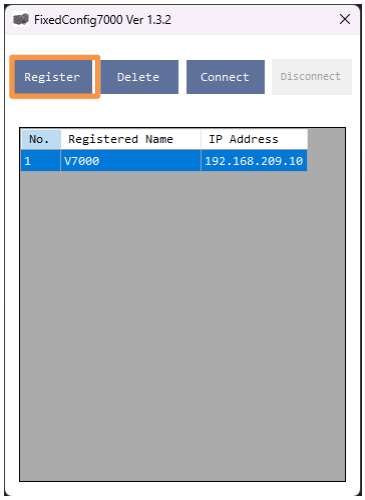
2. When connected to the configuration tool, the "Home Screen" is displayed.



●Reader registration

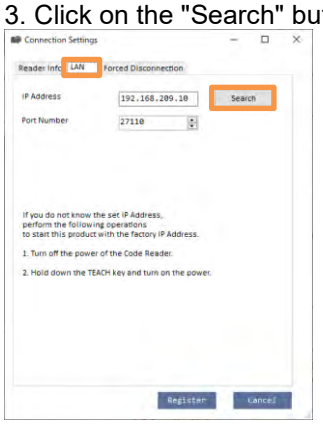
If IP address of the reader is different from default setting, register IP address of the reader.

1.Start the configuration tool and click "Register" button.

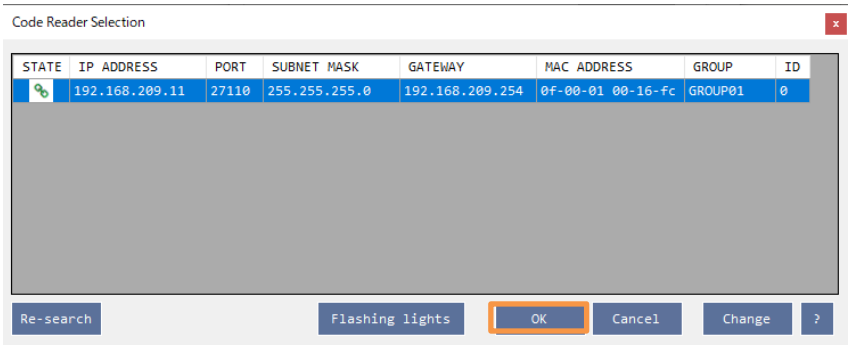


2. Select "V7000" for "Model Name" in "Reader Info".

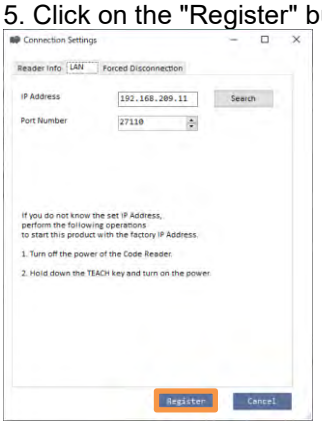
3. Click on the "Search" button in "LAN".



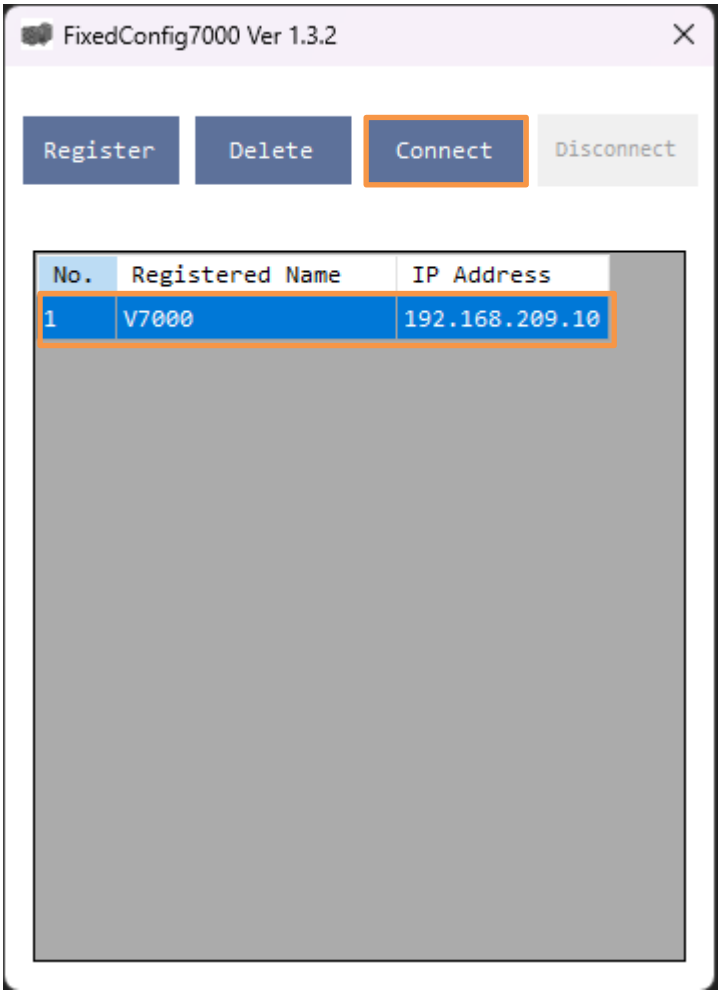
4. Select the reader to be connected and click on the "OK" button.



5. Click on the "Register" button.



6. Select the registered reader and click on the "Connect" button.



●Change IP address

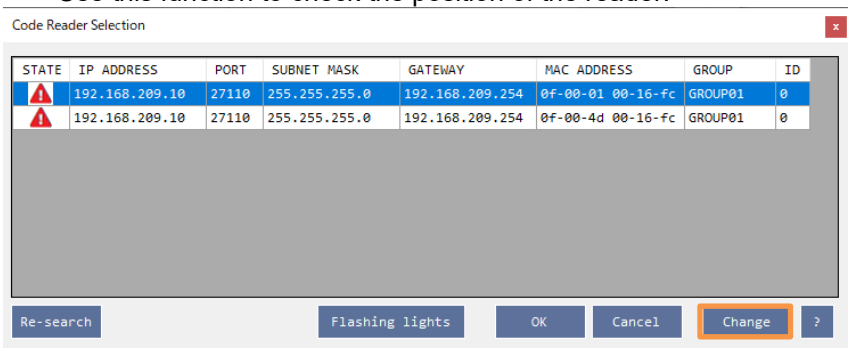
If IP address of the readers on the same network are overlapped, change the IP address of the readers according to the following procedure.

1. Perform steps 1 through 3 of "Reader registration”.

2. Select a reader and click "Change" button.

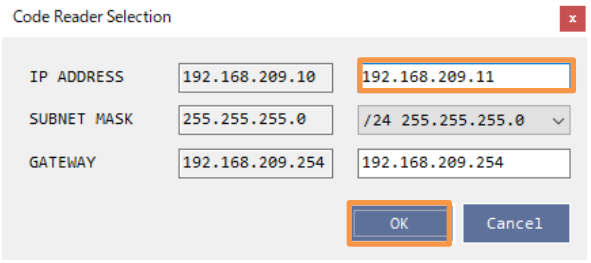
† Click on the "Flashing lights" button to flash the internal illumination 5 times.

Use this function to check the position of the reader.

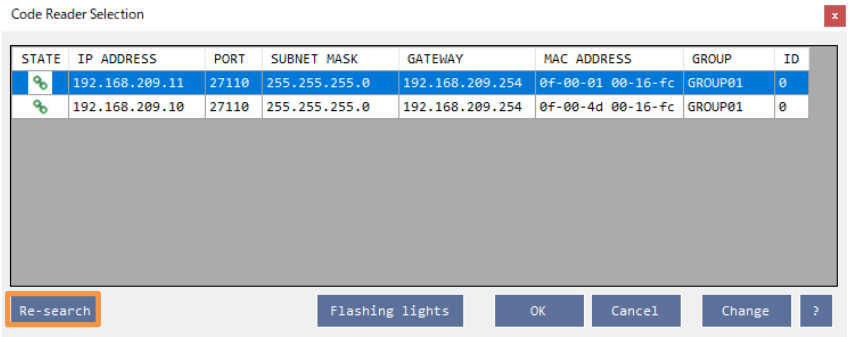


3. Enter the IP address in the right field of “IP ADDRESS” and click “OK” button.

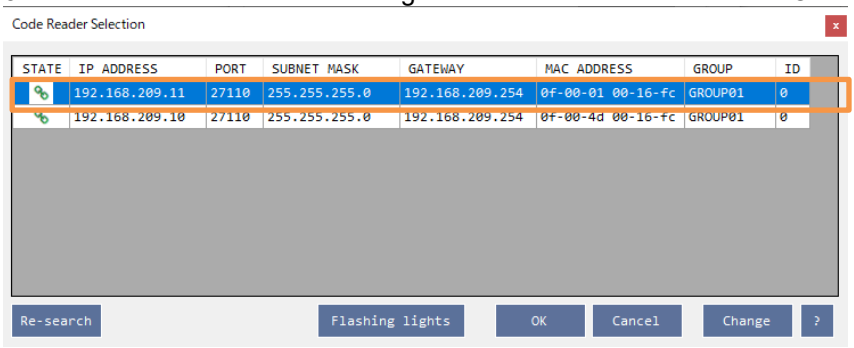
The reader will reboot to reflect the changed IP address.



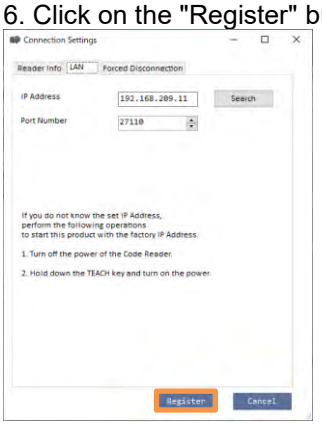
4. After the reader reboot, click on the”Re-search” button.



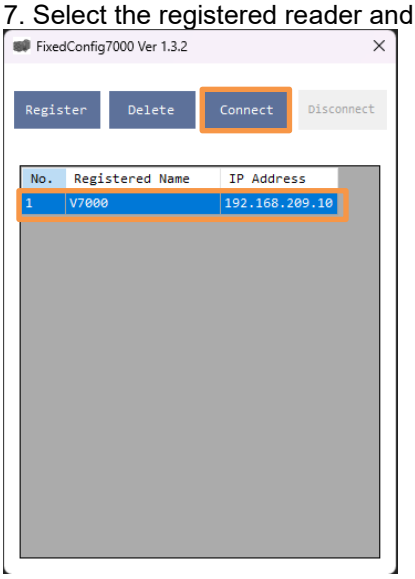
5. Select the reader with the changed IP address and click on the "OK" button.



6. Click on the "Register" button.



7. Select the registered reader and click on the "Connect" button.



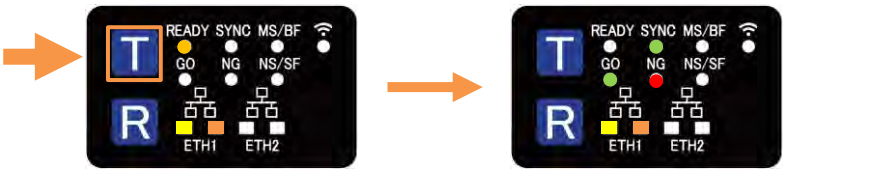
3.9 Auto Tuning of read parameters (button operation)

Use the Read button and Teach button to start the adjustment and save the settings.

* If you are using the configuration tool, please refer to “3.10 Auto Tuning of read parameters (configuration tool)”.

●Start adjustment

In standby mode, press the Teach button for at least 2 seconds it to start adjustment.

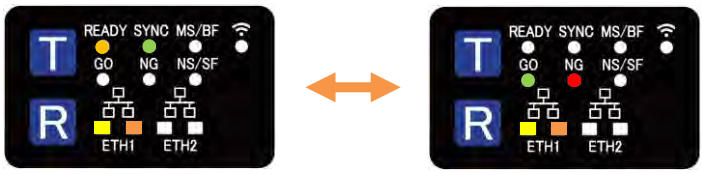


Standby state　　Teach button is being pressed

●Auto Tuning

The illumination turns on when the adjustment is started.

During the adjustment, the status LEDs (READY, SYNC) and LEDs (GO, NG) turn on and off alternately.



●Tuning result

If a good setting is found, the status LEDs (SYNC, GO) will turn on.

* If there is no operation for 40 seconds, it will return to the standby state without saving the result.

If no good setting is found, the monitor LED (READY) turns on and the status LED (NG) flashes seven times. After that, it returns to the standby state.

Found a good setting　　Failed to find a good setting

●Save the found settings

When the status LEDs (SYNC, GO) turn on, press the Read button to save the settings in the configuration table.

For more information about the configuration table, please refer to ”6.2 Configuration Parameters”.

* If there is no operation for 40 seconds, it will return to the standby state without saving the result.

”

The settings to be saved will change by the difference of duration to press & hold the Read button.

More than 3 seconds: One type of read saves the best settings in table 1.

When the save is completed, the status LED (READY) turns on and the monitor LED (NG) blinks 3 times.

1 to 3 seconds: Save up to 3 types of settings in tables 1 to 3 in order of readability.

When the save is completed, the status LED (READY) turns on and the monitor LED (GO) blinks three times.

* Even if it is less than 3 seconds, there may be two or less setting values to be saved.

* To use multiple configuration tables in a single trigger, you need to set the operation mode to do so.

For more information for changing the operating mode, please refer to ”4 Operation Mode”.

●Check the reading

When the Read button is pressed in the standby state, the status LED (SYNC) turns on and the read operation is performed.

If the reading is successful, the status LED (GO) blinks once, and then the LED (SYNC) turns off.

If reading fails, the status LED (NG) blinks once, and then the LED (SYNC) turns off.

If the read is successful

If the read is failed

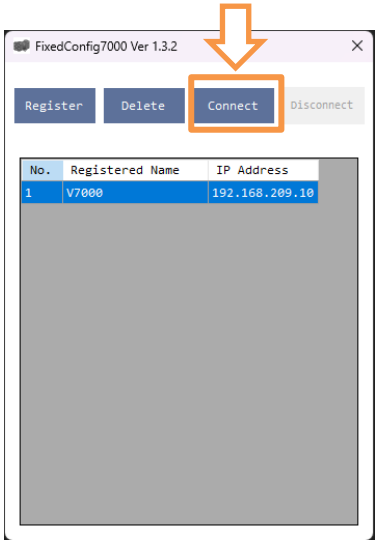
3.10 Auto Tuning of read parameters (configuration tool)

* When using button operation to start Automatic adjustment, please refer to ”3.9 Auto Tuning of read parameters (button operation)”.

Use the setting tool “FixedConfigV7000” to start adjustment and save the settings.

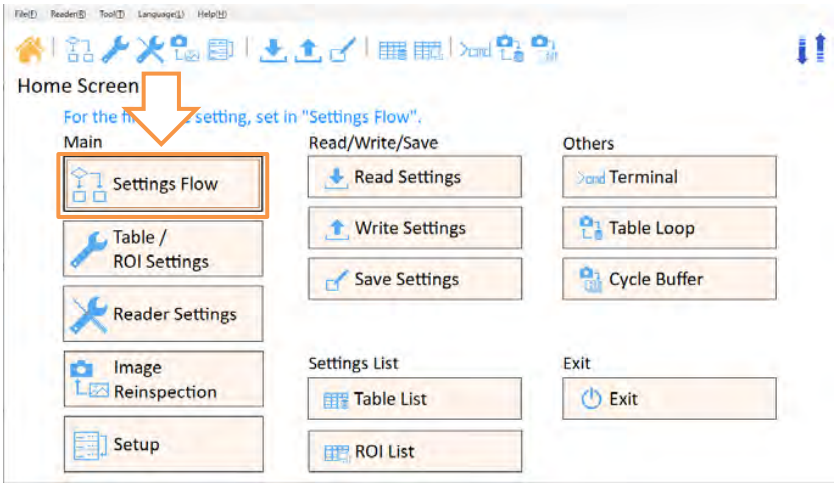
●Connecting to the Configuration Tool

1. When you start the configuration tool, the following screen will appear.



2. Click on the "Connect" button to start the connection process.

3. From the "Home Screen", click on the "Settings Flow" button.



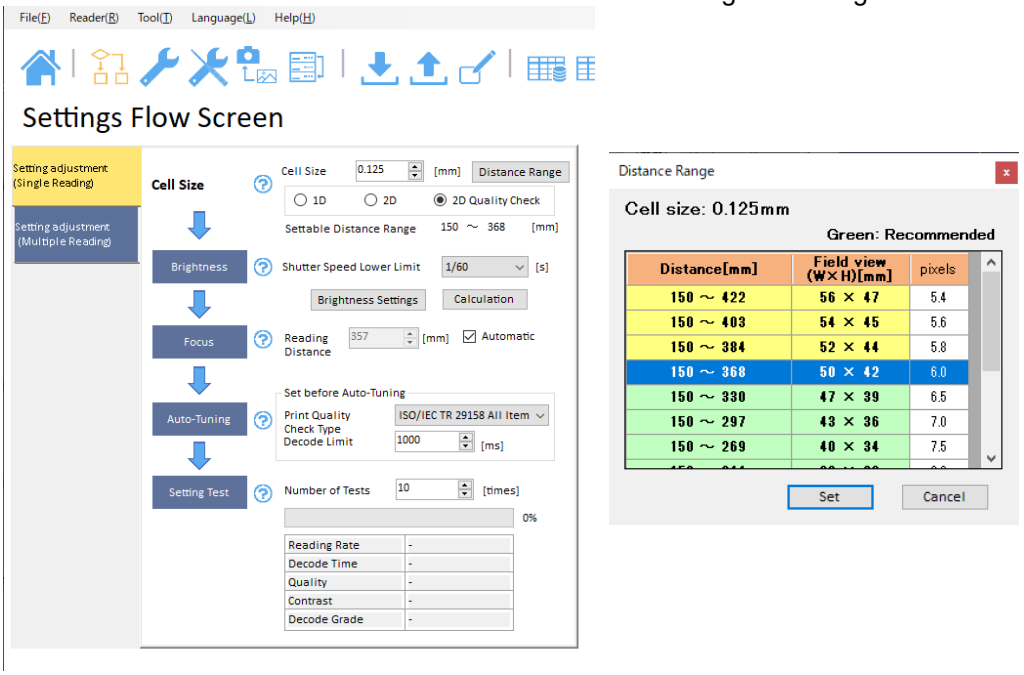
●Reading target setting

1. Enter the “Cell Size”.
2. Select symbol type to be read.

   Check "2D Quality Check" if you want to use print quality verification.
3. Clicking on "Distance Range" button will display a list that shows settable

   Distance Range and field of view range based on the current Cell Size.

   Select an item and click "Set" to reflect the selected settings in Settings Flow Screen.



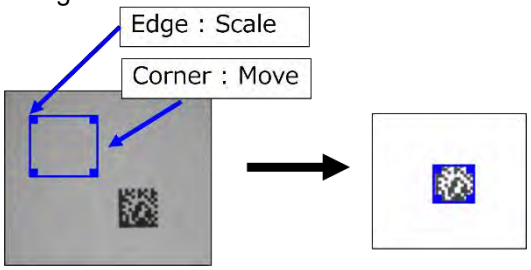
●Brightness adjustment

1. Click the “Brightness” button.
2. While looking at the screen, align the blue rectangle in the image display area with the symbol.

   Drag the following two points on the rectangle to move or scale it.

   -Drag the dots at the four corners : Scale the rectangle.

   -Drag the lines at the four sides : Move the rectangle.



3. Brightness is adjusted automatically.

   The rectangle is displayed in red during adjustment.

   When adjustment is completed, the rectangle is displayed in blue.

4. Click the “Stop” button to stop adjustment.

●Focus adjustment

1. Click on the "Focus" button to start the focus adjustment.

   To adjust the focus distance manually, uncheck "Automatic" and enter the distance you want to set in "Reading Distance".

●Auto Tuning

1. Clicking "Auto Tuning" button will make the reader start automatically adjusting the reading settings. If "2D Quality Check" is checked, select "Print Quality Check Type".
2. To set the decode timeout for automatic adjustment, enter "Decode timeout".

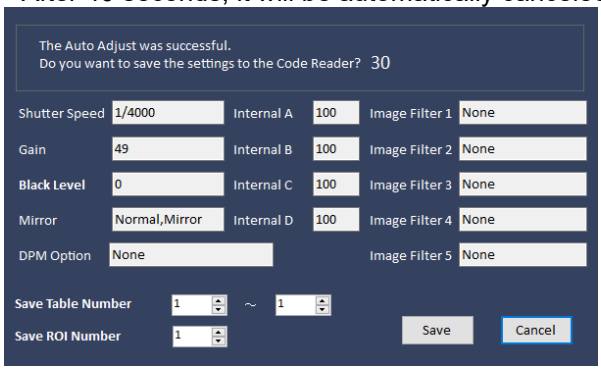
   (Unit: ms)

3. After the automatic adjustment is completed, a dialog box will appear.

   Click on the "Save" button to save the settings to the reader.

   Click on the "Cancel" button to cancel the automatically adjusted value.

   * After 40 seconds, it will be automatically canceled.



●Configuration test

1. Enter an arbitrary number of tests in the "Number of Tests" box.
2. Click on the "Setting Test" button and the reader will start reading.

About configuration test result items

Item	Overview
Reading Rate	Reading rate for the entire test.
Decode Time	Decode time information for the last symbol read.
Quality	Unused error correction information for the last symbol read.
Contrast	Contrast information for the last symbol read.
Decode Grade	Readability is displayed in 3 stages of A, B, C.

3.11 Basic reading operation flow (default setting)

1) Sync input (the following three ways are available)
   - Serial command
   - Read button of the operation panel
   - Digital input (SYNC input) * Need the optional IF cable

   When the sync input is turned ON, the reading operation is performed.

2) Result of reading operation
   - When the symbol is read
   - Send the read data.
   - Digital signal (GO) turns on, Status LED (GO) turns on in green.

   - If the symbol cannot be read
   - Send the error code.
   - Digital signal (NG) turns on, Status LED - NG turns on in red.

3.12 Operation setting

Send serial commands from the communication port to make various settings.

3.13 Image data transfer

By using the "FixedConfigV7000", the image data taken by this reader can be transferred from the reader to the host PC through the communication port. It can be taken out during standby state or after every reading.

Estimated transmission time of image data.

Condition: Bitmap format (file name * .bmp, 2448 x 2048 pixels)

Ethernet communication about 1 second.

4 Operation Mode

V7000 has three operation modes as follows.

Operation mode	Command	Description
Single Reading Mode	SYNCMODE=0	Single reading for each SYNC input.
Timeout Mode	SYNCMODE=1	After SYNC input, the reader continues reading during the duration time set by the ”TOTALLIM” command. The reader sends the error code when it fails in reading within the duration time.
External Trigger Mode	SYNCMODE=2	The barcode scanner continues reading during the SYNC input is ON. The “G” command (start reading command) is not accepted.

The reading operation means that processing from image capture to symbol decoding.

The following diagnostic mode can be used while the reader is in Single Reading Mode.

Diagnostic mode	Command	Description
Normal Mode	CONTMODE=0	For normal use or for returning to Normal Mode.
Continuous Reading Mode	CONTMODE=1	Used to adjust the reading position. Exit this mode with the “stop” command.

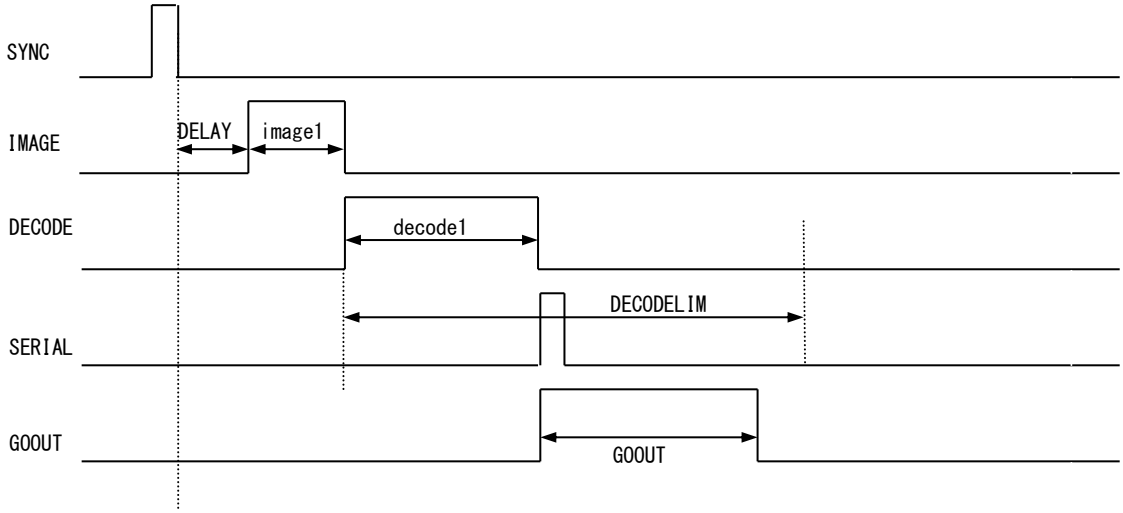
Glossary of terms

DELAY:	The time from SYNC ON to reading.
CHATT:	The time needed for eliminating the chattering.
IMAGE:	The duration for capturing an image.
DECODE:	The duration for decoding.
DECODELIM:	The maximum duration to attempt the decoding.
GOOUT:	The duration of GO signal.
NGOUT:	The duration of NG signal.
SERIAL:	The duration of data output through the serial interface.
MAXIMG:	The maximum number of images in the buffer.
CAPINTVL:	The interval of image capture.
Soft trigger:	The SYNC by the serial command input.
Hard trigger:	The SYNC by digital input or the Read button.

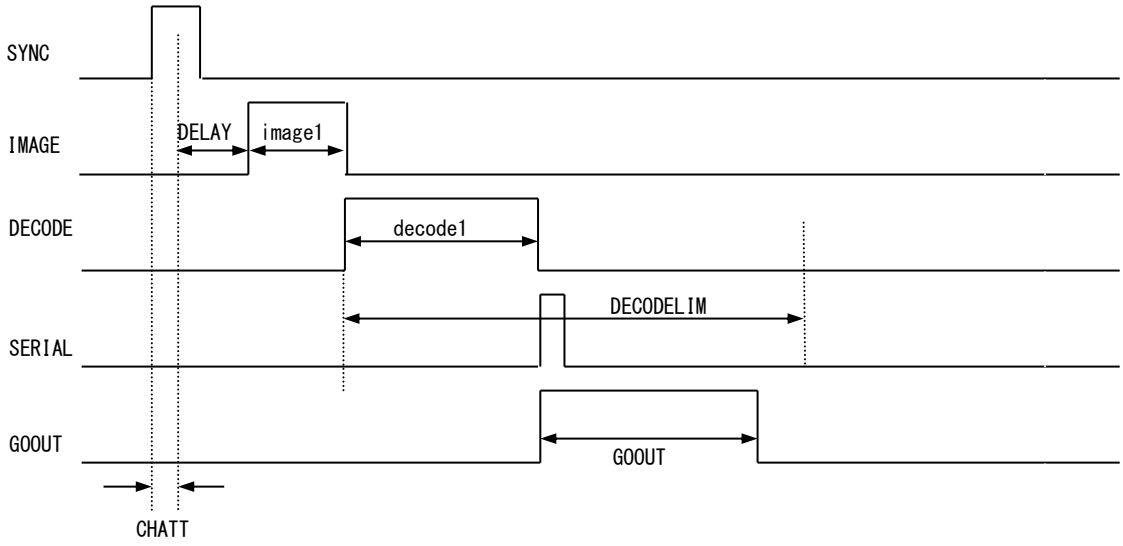
4.1 Single Reading Mode

The barcode scanner performs a single read for each SYNC input.

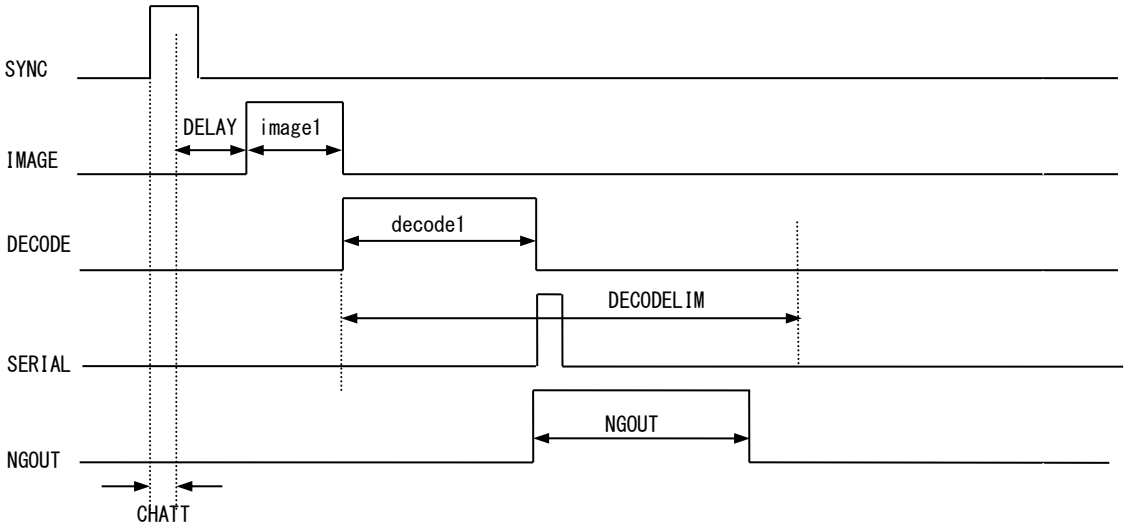
4.1.1 Soft trigger, Read OK, Data transmission: After decoding



4.1.2 Hard trigger, Read OK, Data transmission: After decoding



4.1.3 **Hard trigger, Read NG, Data transmission: After decoding**



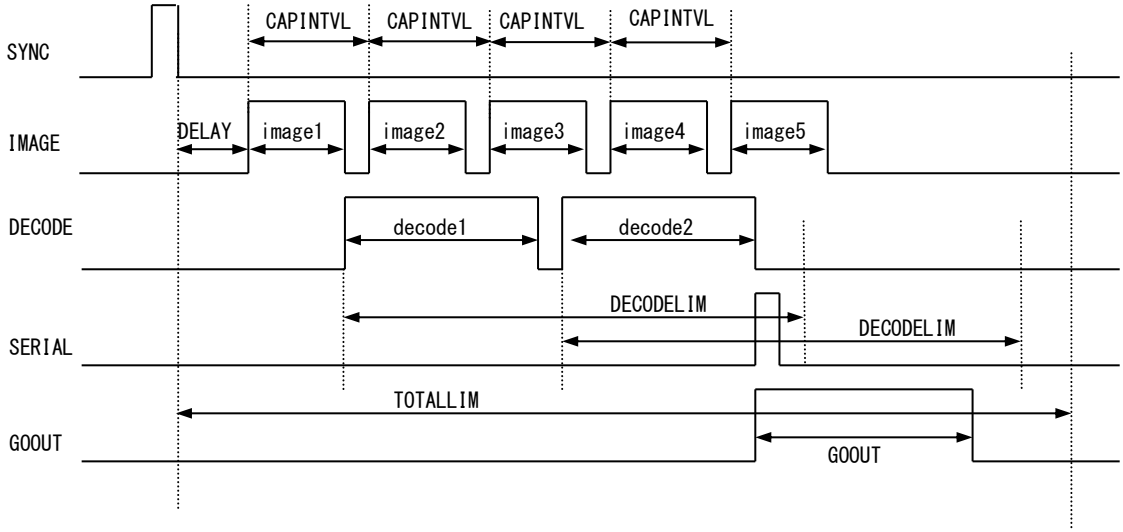
4.2 Timeout Mode

The barcode scanner reads the symbol repeatedly during the duration time, set by “TOTALLIM” after the SYNC input, or continues reading until the decoding is successful. If the barcode scanner cannot decode successfully in the duration time, it stops reading and sends an error code to the host.

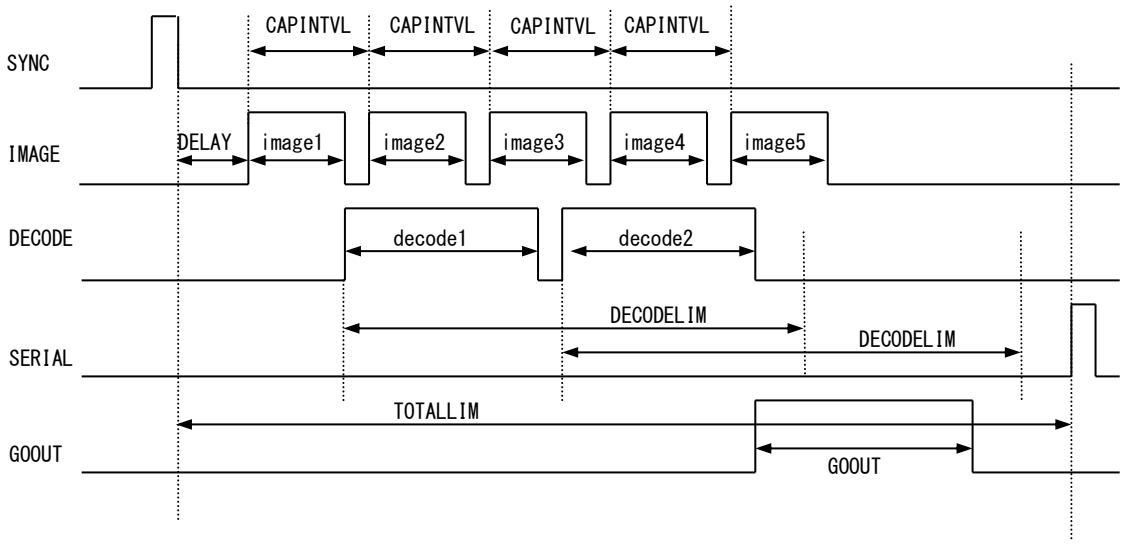
Typically, MAXIMG is set to a number greater than one. The multiple MAXIMG enables the Cycle Buffer Function and the parallel processing of the image capturing and decoding. This can reduce the processing time.

The below timing charts explain the behavior of Cycle Buffer Function.

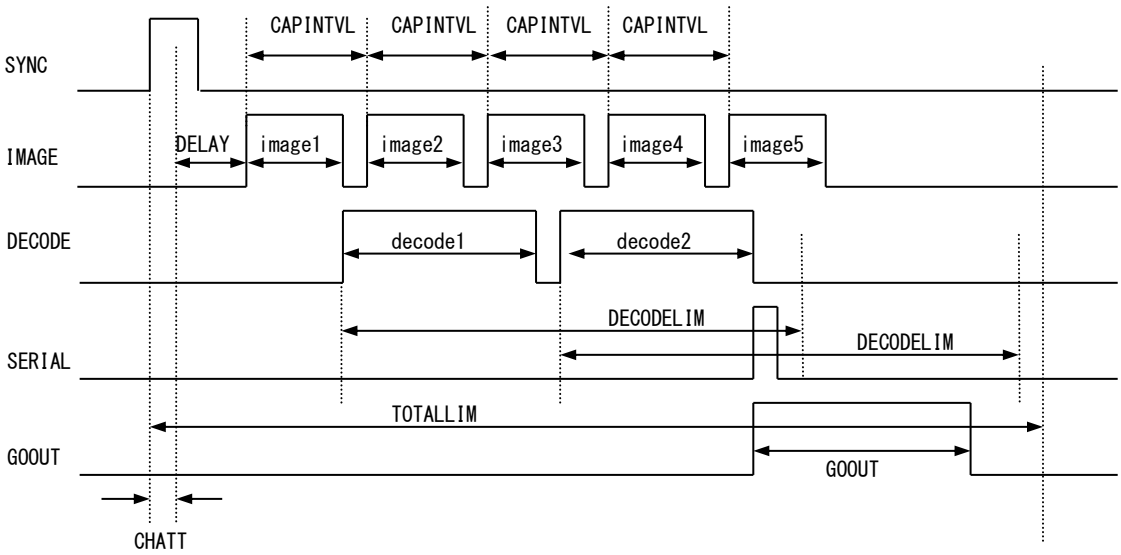
4.2.1 **Soft trigger, Read OK, Data transmission: After decoding**



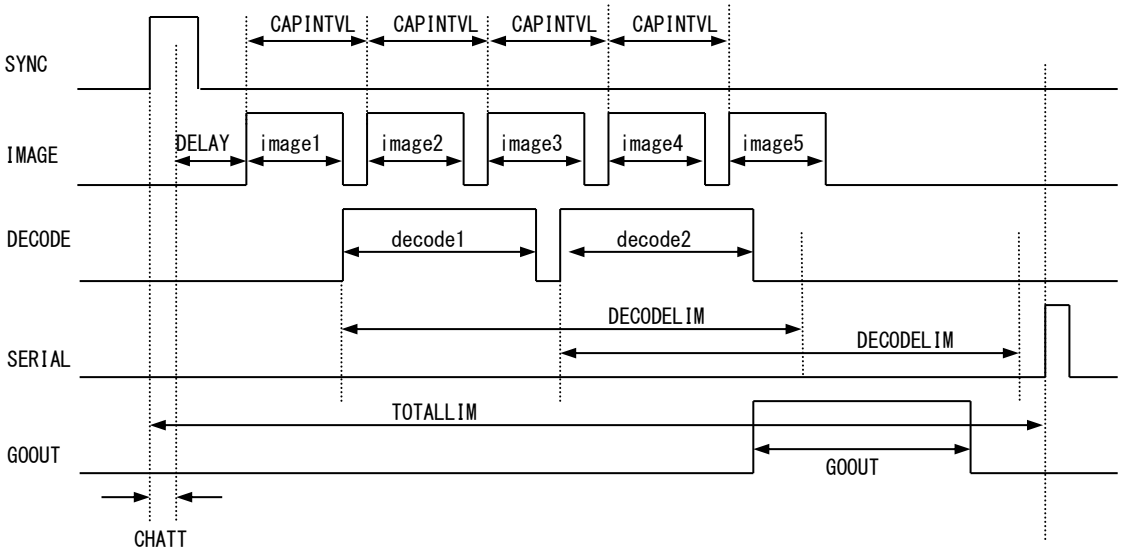
4.2.2 **Soft trigger, Read OK, Data transmission: After SYNC OFF**



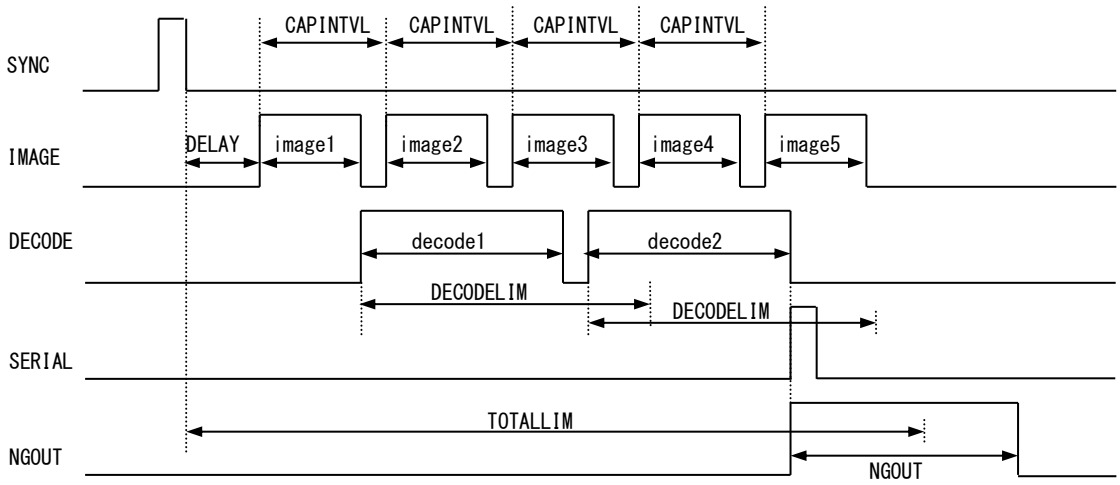
4.2.3 **Hard trigger, Read OK, Data transmission: After decoding**



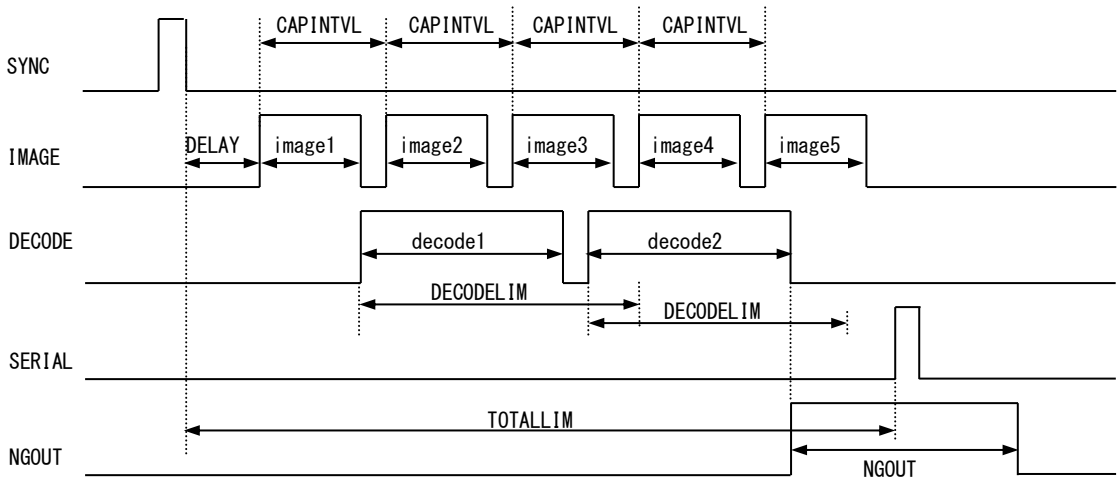
4.2.4 **Hard trigger, Read OK, Data transmission: After SYNC OFF**



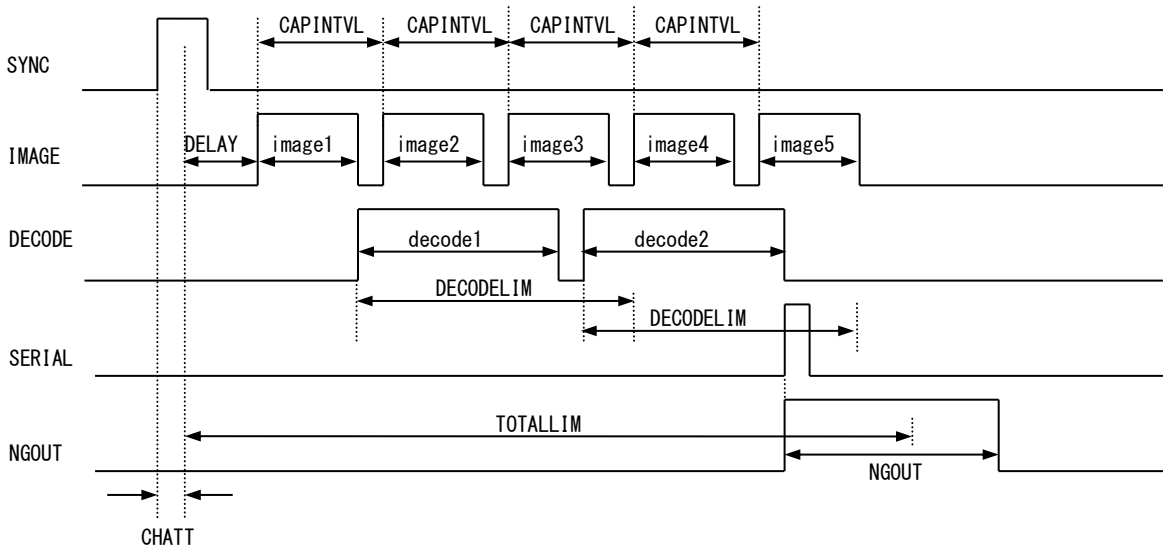
4.2.5 **Soft trigger, Read NG, Data transmission: After decoding**



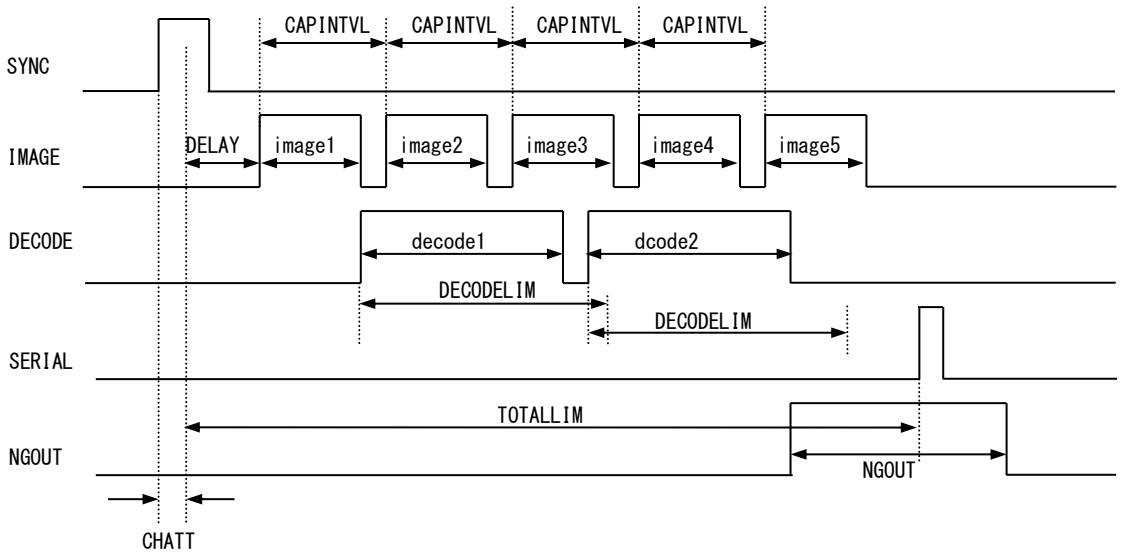
4.2.6 **Soft trigger, Read NG, Data transmission: After SYNC OFF**



4.2.7 **Hard trigger, Read NG, Data transmission: After decoding**



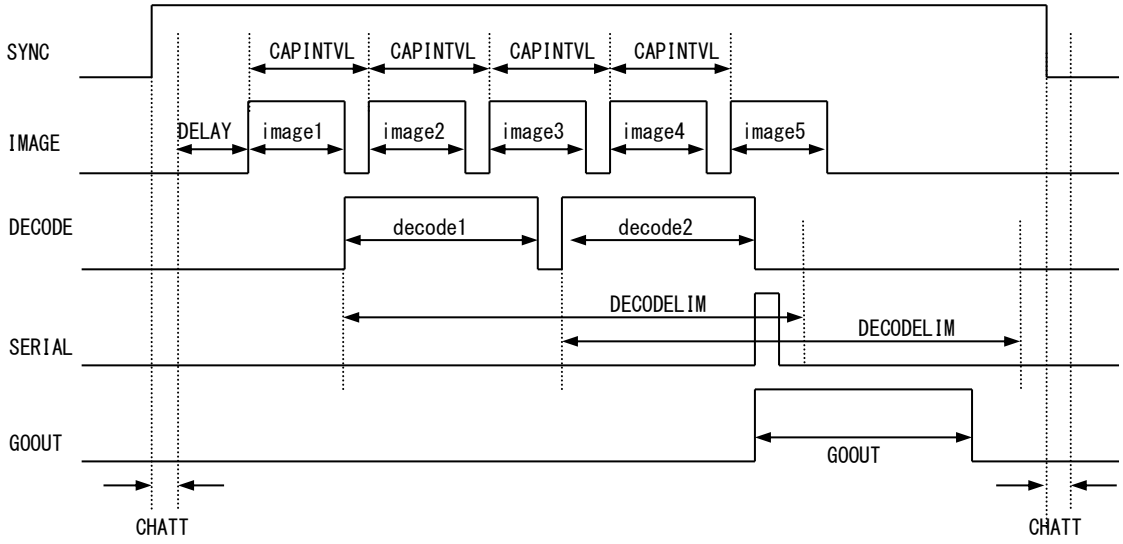
4.2.8 **Hard trigger, Read NG, Data transmission: SYNC OFF**



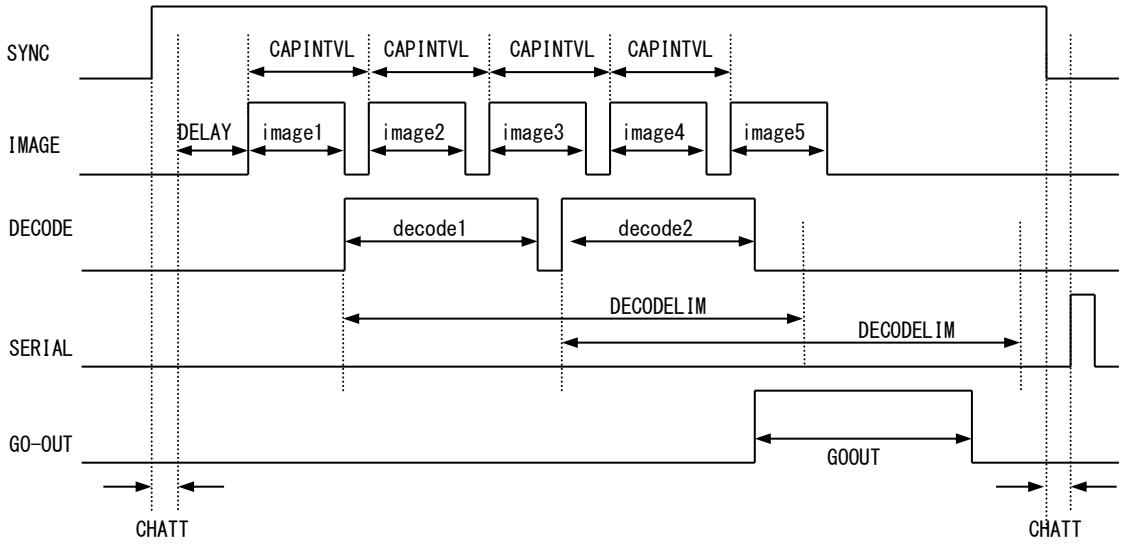
4.3 External Trigger Mode

The barcode scanner reads the symbol repeatedly during the SYNC input is active. Typically, MAXIMG is set to a number greater than one. The multiple MAXIMG enables the Cycle Buffer Function and the parallel processing of the image capturing and decoding. This can reduce the processing time.
The below timing charts explain the behavior of Cycle Buffer Function.

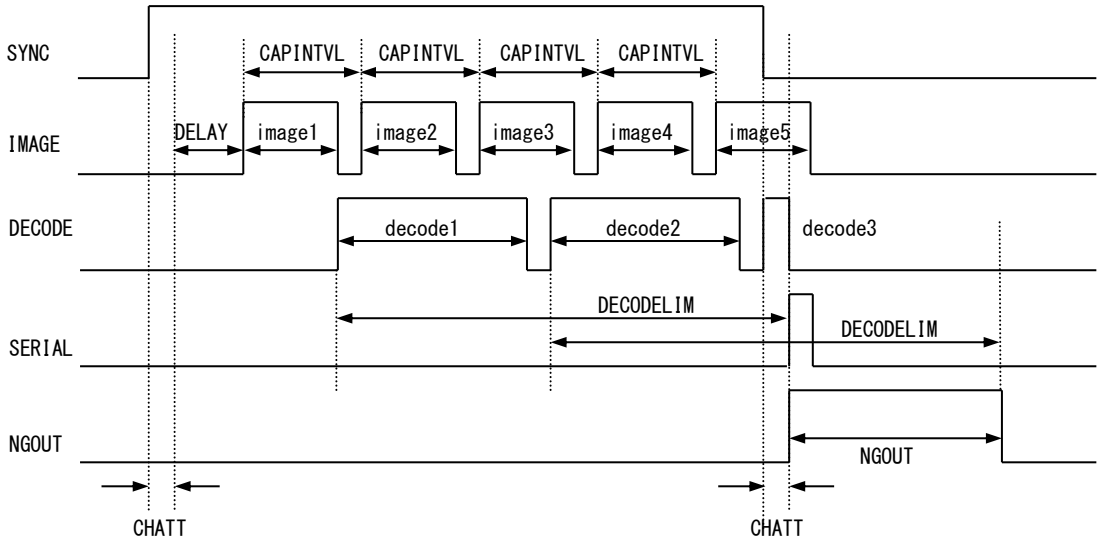
4.3.1 Hard trigger, Read OK, Data transmission: After decoding



4.3.2 Hard trigger, Read OK, Data transmission: After SYNC OFF



4.3.3 **Hard trigger, Read NG, Data transmission: After decoding or SYNC OFF**



4.4 Continuous Reading Mode

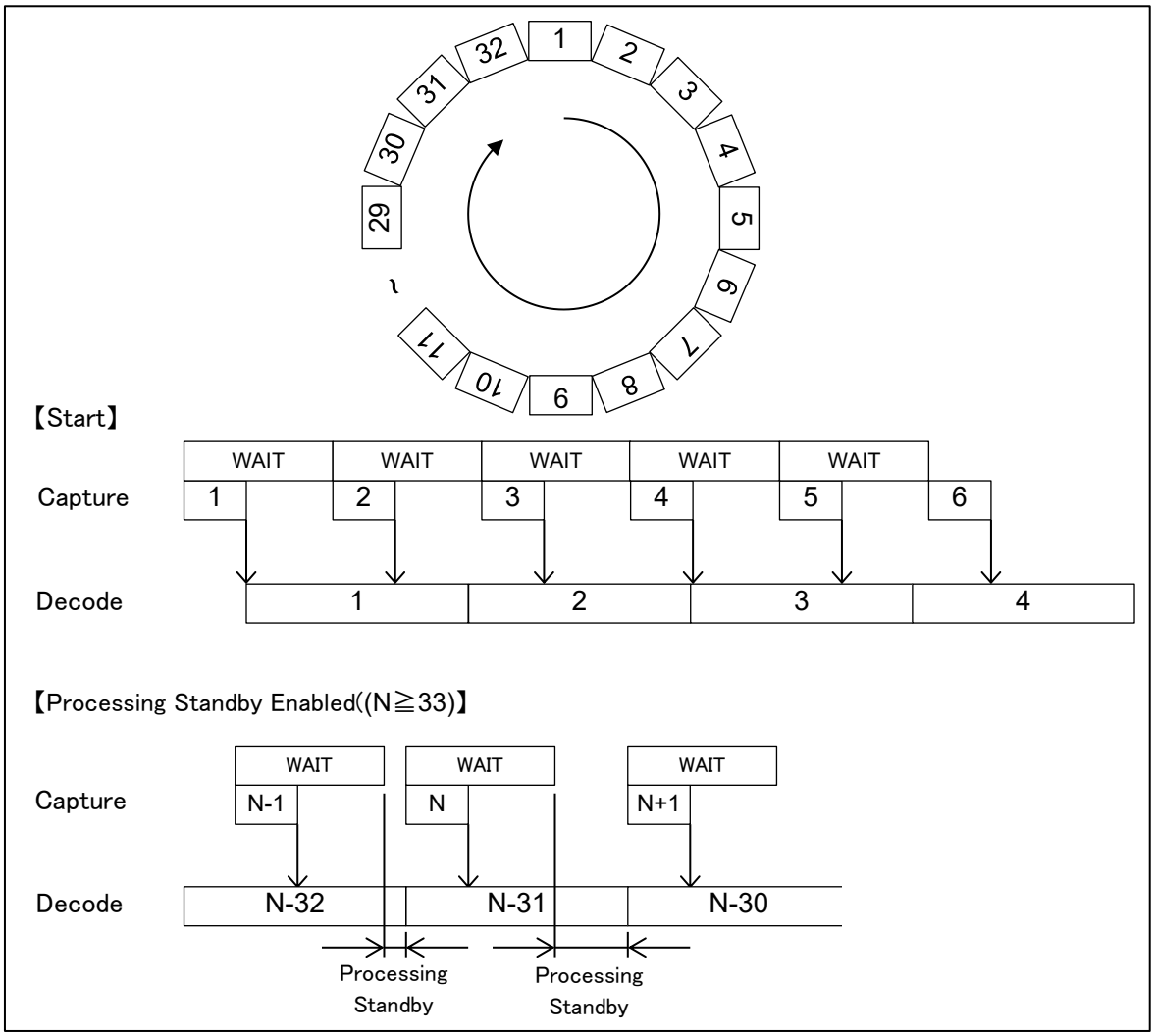
In Continuous Reading Mode, the barcode scanner reads repeatedly. It is useful for camera tunings.

To put the barcode scanner in this mode, send the serial command “CONTMODE=1” to the barcode scanner, and then send the serial command "G" to start reading.

To exit this mode, send the serial command “CONTMODE=0” to the barcode scanner.

4.5 Cycle Buffer Function

Cycle Buffer Function is for moving object, especially for the case it is difficult to catch the object within the field of view. In SYNCMODE=1 (Timeout Mode) or SYNCMODE=2 (External Trigger Mode), the Cycle Buffer Function is enabled when the MAXIMG number is greater than 1 (max. 32). If the Cycle Buffer Function is enabled, the barcode scanner captures multiple images after receiving the SYNC signal and then saves the images to the buffer memory (up to 32 images). The barcode scanner starts decoding from memory #1, if it is not successful, the barcode scanner will decode the image saved in memory #2. When the buffer memory reaches to #32, the next image will be saved into buffer memory location #1 if the barcode scanner has finished decoding that image. If the barcode scanner has not finished, the saving of 33th image will wait until the decoding of memory #1 is finished.



4.6 Concept of Cycle Buffer

This function focuses to avoid No Read by missing the object from the sight of V7000. Decoding process can be postponed, and the reader focuses to obtain images which include the moving object. Please try to configure to finish the capture and decode within the time the reader saves the images whose number is set by MAXIMG. The maximum value of MAXIMG is 32. Otherwise, the imaging interval will vary depending on the reading processing time after the number of imaging.

[Configuration Example]

The relation of Shutter Time (SHUTT), Capture Time (CAPIMG), Capture Interval (CAPINTVL) and Total Imaging Cycle (CAPCYC) are as follows.

① SHUTT+CAPIMG <= CAPINTVL

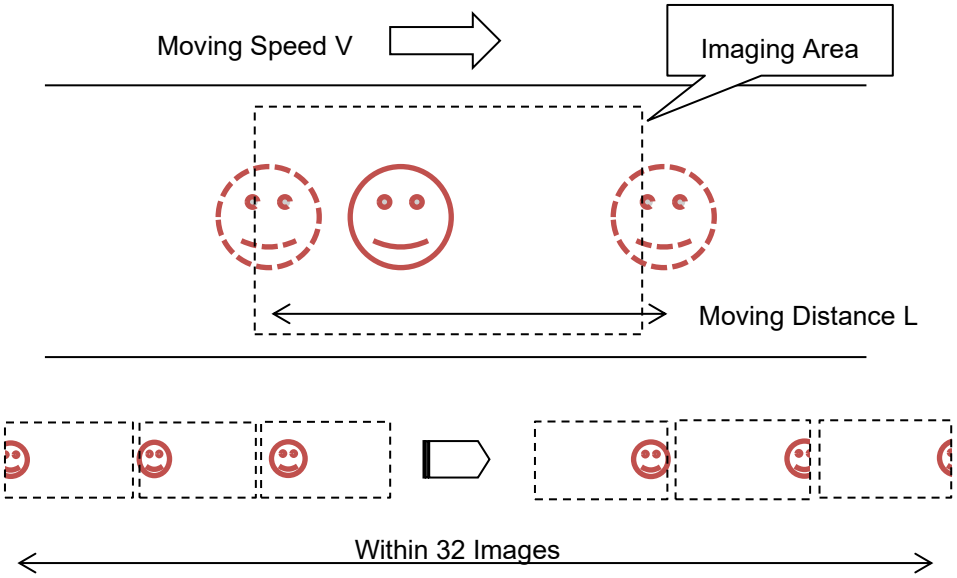
CAPCYC ＝ CAPINTVL

② SHUTT+CAPIMG > CAPINTVL

CAPCYC ＝ SHUTT + CAPIMG

Moving Time T = L ／ V should be less than (32 × CAPCYC)

when the moving object's speed is V and the object's moving distance is L.



MAXIMG = 32, CAPINTVL = 50ms

The imaging cycle is CAPCYC = CAPINTVL =50ms

(1) When the imaging range is L = 100mm, the movement speed V:

L/V < 32 × CAPCYC

⇒ V > L/(32 × CAPCYC) = 100mm/(32 × 50ms) = 0.0625m/s = 3.75m/min. ∴ V > 3.75m/min.

(2) When the moving speed is V = 30m/min. (= 500mm/s = 0.5mm/ms), the imaging range L:.

L/V < 32(CAPCYC)

⇒ L < 32 × CAPCYC × V = 32 × 50ms × 0.5mm/ms = 800mm ∴ L < 800mm

5 Focus/zoom adjustment function

This product is equipped with a mechanical focus and zoom adjustment function.

The configuration tool "FixedConfigV7000" makes it easy to set the appropriate combination of focus and zoom.

* FixedConfigV7000" can be downloaded from our website.

For details on focus and zoom adjustment using the tool "FixedConfigV7000", please refer to the following. This section describes the focus adjustment by serial command.

Separate volume: "FixedConfigV7000_Operation Manual" 3.10 Auto Tuning Process

5.1 How to adjust focus

When reading, it is necessary to adjust the focus position appropriately. There are two types of adjustment methods as follows:

5.1.1 Auto focus

Adjust the focus to the distance acquired by the distance sensor.

5.1.2 Manual focus

Adjust the focus to the specified distance. (Unit: mm)

5.2 Operation procedure for focus adjustment

- Set the reading target setting and set the reading range.
- Set the focus area to the center of the reading target.
- Perform auto focus or manual focus.
- Execute the focus check command to check whether the focus is correct. If the focus is not correct, repeat this command to fine tune the focus.
- When the power is turned off, the focus position returns to before adjustment. To start up with the current focus setting, save the focus setting.

5.3 Focus related command

"**(*)"** indicates the default setting.

- Reading target (cell size, number of imaged pixels)

  FCSRANGE1=a,b

  a: 0.03 to 10.0(V7000) cell size a=0.0 **(*)**

  0.02 to 10.0(V7000-H)

  b: 1.0 to 100.0 number of imaged pixels b=0.0 **(*)**

  When the cell size and the number of image pixels to be read are set, the settable range is output in mm.

  The number of image pixels refers to the number of pixels in one cell/module formed on the image sensor of the barcode scanner.

  For stable reading, 3 or more pixels are recommended for symbol reading, and 6 or more pixels are recommended when using the symbol printing check function.

  If the number of image pixels is changed, the settable range will change. If the number of image pixels is increased, the image shifts to the near side and the range becomes narrower. The number of image pixels corresponding to the reading distance can be easily set using the configuration tool "FixedConfigV7000".

  e.g.) When setting the cell size is 0.25 and the number of image pixels is 6:

  (Input) FCSRANGE1=0.25,6

  (Output) FCSRANGE=239,869 (Settable range: 239mm to 869m)

- Focus area

  FCSAREA=a,b,c,d

a: 0 to 2447	X-coordinate of starting point	a=1063 **(*)**
b: 0 to 2047	Y- coordinate of starting point	b=863 **(*)**
c: 75 to 640	Width	c=320 **(*)**
d: 75 to 640	Height	d=320 **(*)**

  Set the adjustment area for focus adjustment.

- Focus adjustment

  FCSDIST=a

  a: -1 or 150 to 2500 (V7000)a=0 **(*)**

  a: -1 or 84 to 2500 (V7000-H) a=0 **(*)**

  Adjust the focus to the specified distance value. Unit is [mm].

  If it is set outside the reading range, the focus adjustment is suspended.

  When a=-1, adjust the focus to the distance acquired by the internal distance sensor.

- Initialize focus setting
  SETFCS

  Initialize the following settings:
  FCSDIST=0
  FCSRANGE1=0,0

  It also moves the lens position to the origin.

- Save focus setting
  WSETF

  Save the focus setting to the internal flash ROM.

  Output focus setting

  ?FCS

  (Output example)

```
?FCS

====================
?FCS
--------------------
 FCSDIST=400 (-1:ToF 150-532[mm])
 FCSRANGE1=0.190,7.00 (module size, pixels)
 FCSAREA=1063,863,320,320 (0-2447,0-2047,75-640,75-640)
--------------------
V7000
108-V0.8u
====================
```

6 Read setting

6.1 Automatic Parameter Tuning (Auto Tuning)

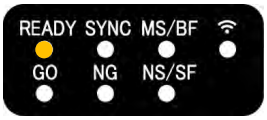
With this function, the barcode scanner parameters (Table and ROI settings) can be configured automatically. This function is available by the communication from the host device as well as an easy button operation on the barcode scanner.

For the detail of the button operation, please refer to “3.9 Auto Tuning of read parameters (button operation)”.

6.1.1 How to operate Auto Tuning function

- Place the symbol to be used for automatic setting near the center axis of the lens, within the range of the pre-reading distance. During adjustment, image capture will be repeated. Fix the object so that the symbol does not move.
- Follow the steps below.

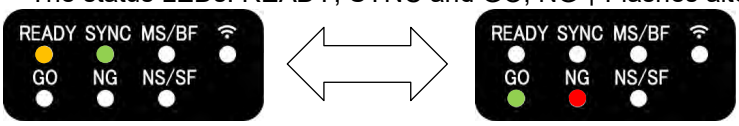
1. Start Auto Tuning by FixedConfigV7000 or serial command.
   The status LED: READY | ON SYNC, GO, NG | OFF



Buzzer state: 1 long beep

↓

2. Wait until Auto Tuning is completed.
   The status LEDs: READY, SYNC and GO, NG | Flashes alternately

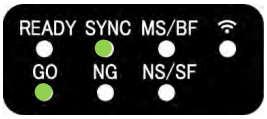


Buzzer state: no beep

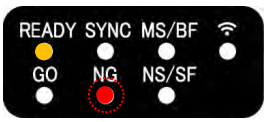
↓

3. The result of Auto Tuning.

- Success The status LEDs: SYNC, GO | ON READY, NG | OFF



- Failure The status LED: READY | ON SYNC, GO | OFF
  NG | Blinks 7 times at short intervals

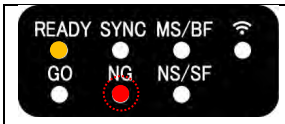


Buzzer state: Auto Tuning succeeds: 3 long beeps
Auto Tuning fails: 7 short beeps

↓

4. Save the settings when Auto Tuning is successful.

(1) Save one type of settings in specified table:
The status LED: READY | ON NG | Blinks 3 times
SYNC, GO | OFF

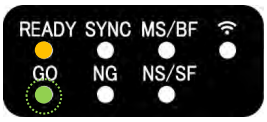


Buzzer state: 4 long beeps

(2) Save up to 3 types of settings in Table #1 to #3:

The status LED: READY | ON GO | Blinks 3 times

SYNC, NG | OFF



Buzzer state: 4 long beeps

Note: If there is no operation for 40 seconds, it will return to the standby state without saving the result.

DO NOT turn off power during Auto Tuning operation.

DO NOT send serial commands during Auto Tuning operation.

6.1.2 **Commands for Auto Tuning**

In Auto Tuning, you can configure the Auto Tuning operation, reference of tuning result, selection of storing method and setting of tuning condition.

"**(*)**" indicates the default setting.

- Start Auto Tuning

  *SETUP

  This command is to start this function.

- Force-quit Auto Tuning
  *CANCEL
  his function takes relatively long time. The barcode scanner will force-quit by this command.

- Check the reader state

  *?STATE

  This command is to check the state of the reader.

State	Response
Reading standby	STANDBY[CR]
Auto Tuning in progress	RECEIVED[CR]
Auto Tuning success: waiting for save settings	SAVEWAIT[CR]
Auto Tuning failure	ABORTED[CR]
Auto Tuning cancel	CANCEL[CR]
Read in progress	(No reply)

- Save the result of Auto Tuning

  *SAVE=a,b,c …a: Number of entries (1 to 3)

  b: Save location number (1 to 16)

  c: Save processing area number (1 to 20)

  This command is to save the results. When the reader receives this command within about 40 seconds after the completion of the tuning process, the results are saved in Table and ROI. If no command is received, the reader will discard the results and return to reading standby state.

- Lower limit of shutter speed for Auto Tuning

  STPSHUTTLIM=a …a: Shutter speed (0 to 9)

  Set the lower limit of the shutter speed during Auto Tuning.

  0: 1/60 **(*)** 1: 1/125
  2: 1/250 3: 1/500
  4: 1/1000 5: 1/2000
  6: 1/4000 7: 1/6000
  8: 1/8000 9: 1/10000 (Unit: seconds)

- ROI limit time during Auto Tuning

  STPDECLIM=a …a: ROI time limit [ms] (50 to 2000) **(*)**:500[ms]

  Set the time limit during Auto Tuning. Also, when saving the Auto Tuning result, the ROI time limit (ROInTOUT=) will be the same as this setting.

- ROI size during Auto Tuning

  STPROISIZE=a,b,c,d…a: Coordinate origin X (0 to 2447) **(*)**: 0

  b: Coordinate origin Y (0 to 2047) **(*)**: 0

  c: Width (1 to 2448) **(*)**: 2448

  d: Height (1 to 2048) **(*)**: 2048

Set the ROI size during Auto Tuning. When saving the Auto Tuning result, the ROI size (ROInSIZE=) will be the same as this setting.

- Refer to the saved result

  ?TBL

  This command is to refer to the saved result of Auto Tuning.

Output example of ?TBL

```
==================
?TBL
------------------
 ENABLETBL=1 (1-16)
 TBLTX=0,0 (0:OFF 1:ON)
 ### TABLE 1 ###
 TBL1NAME=table1
 TBL1FLASH=100,100,100,100,100
 TBL1SHUTT=2 (0-9)
 TBL1GAIN=1
 TBL1BLKLV=0 (0-4095)
 TBL1TOUT=3000 [ms]
 TBL1IMGPROC=0,0,0,0,0
 TBL1ROINO=1
 ### TABLE 2 ###
---------- Omission ----------
 ### TABLE 16 ###
 TBL16NAME=table16
 TBL16FLASH=100,100,100,100,100
 TBL16SHUTT=2 (0-9)
 TBL16GAIN=1
 TBL16BLKLV=0 (0-4095)
 TBL16TOUT=3000 [ms]
 TBL16IMGPROC=0,0,0,0,0
 TBL16ROINO=1
------------------
V7000
108-V0.8a
==================
```

6.2 Configuration Parameters

There are the following types of configuration parameters for reading.

・Table settings…Image capture settings.
Set the Shutter speed, illumination brightness and image preprocessing.

・Trapezoid correction settings…Trapezoidal correction settings.
Set whether or not to use trapezoidal correction and the correction coordinates.

・ROI settings…Decoding settings.
Set the ROI size, time limit and reading target.

6.3 Configuration Table

The combination of configuration parameters for imaging is called a Table.
A maximum of 16 tables can be set, and by preparing multiple tables, a variety of targets can be reading.
When using multiple tables, set the operation mode to read timeout mode or external synchronization mode.
The number of tables to be used can be set by the following command.

The number of tables to be used is set by the command below.

ENABLETBL=a (a: 1 to 16) **(*)**:1

e.g.1) Use 3 tables (a=3)
Table #1, #2 and #3 are enabled and Table #4 to #16 will not be used.
If the barcode scanner successfully decodes a symbol with Table #1, Table #1 will be used in the next reading.
If the barcode scanner failed to decode a symbol with Table #1, the settings will switch to Table #2, and if it fails again, switch to Table #3.
If the barcode scanner failed to decode with Table #3, the settings will switch back to Table #1.

e.g.2) Use 1 table (a=1)
Only Table #1 is enabled. Table #2 to #16 will not be used. As the result, Table #1 is always used every reading.

Set the number of tables according to the reading target and the operating environment.

The following shows the structure of the Table. Each table has 8 types of parameters:

①	Illumination brightness	【TBLnFLASH】
②	Shutter Speed	【TBLnSHUTT】
③	GAIN	【TBLnGAIN】
④	Black Level	【TBLnBLKLV】
⑤	Image Preprocessing	【TBLnIMGPROC】
⑥	Table Time Limit	【TBLnTOUT】
⑦	Processing Area	【TBLnROINO】
⑧	Table Name	【TBLnNAME】

6.3.1 Illumination brightness【TBLnFLASH】

This command specifies the brightness of each illumination

TBLnFLASH=a,b,c,d,e

n : Table number (1 to 16)

a : Brightness of external illumination (0 to 100)

b,c,d,e : Brightness of internal illumination (0 to 100) *

*About internal illumination

1 to 99 is valid only when the shutter speed is from 0(1/60 sec) to 4(1/1000 sec). When the speed is 5(1/2000 sec) or more, the value is 100.

0 : OFF
1(dark) to 100(bright) : ON

The internal Illumination locations are as follows.

6.3.2 **Shutter speed【TBLnSHUTT】**

This command specifies the shutter speed of the reader. A slower shutter speed makes the image brighter but may introduce motion blur into the image.

TBLnSHUTT=a

n : Table number (1 to 16)

a : Shutter speed (0 to 9)*

0: 1/60 1: 1/125
2: 1/250 3: 1/500
4: 1/1000 5: 1/2000
6: 1/4000 7: 1/6000
8: 1/8000 9: 1/10000 (Unit: seconds)

*When the speed is 5 or more, the brightness of internal illumination is 0 or 100.

6.3.3 **GAIN【TBLnGAIN】**

This command specifies the gain of the camera.

A larger gain makes the image brighter.

TBLnGAIN=a

n : Table number (1 to 16)

a : GAIN (0 to 60)

0 (Lowest gain) to 60 (Highest gain)

6.3.4 **Black level【TBLnBLKLV】**

This command is used to improve the contrast of an image taken by the reader.

The higher the value, the brighter the image is captured, but the lower the contrast.

TBLnBLKLV=a

n : Table number (1 to 16)

a : GAIN (0 to 4095)

0 (Lowest level) to 4095 (Highest level)

6.3.5 **Image preprocessing【TBLnIMGPROC】**

If the image quality is low, by using an appropriate image filter may improve the reading ratio.

6.3.6 **Table time limit【TBLnTOUT】**

This function is used to set the time limit for each table.

TBLnTOUT=a

n : Table number (1 to 16)

a : Timeout [ms] (50 to 20000)

6.3.7 **Processing area【TBLnROINO】**

MULTIRSY=0　The setting is not applied and only ROI #1 is used.

MULTIRSY=1　Set the ROI number used in the Table.

TBLnROINO=a,b,c,d,e,f,g,h,I,j

n　　: Table number (1 to 16)

a,b,c,d,e,f,g,h : ROI number (1 to 20)

e.g.) To set the ROI to be used in table number 1 to 1, 3, and 7

TBL1ROINO=1,3,7

6.3.8 **Table name【TBLnNAME】**

Specify the name of the table. Use this as a memo, for example, the location where you will use it (LINE1 for use on line 1), or the type of workpiece to be read in this table (engine for engine). It does not affect the reading, so you do not need to set it. TBLnNAME=a

n　: Table number (1 to 16)

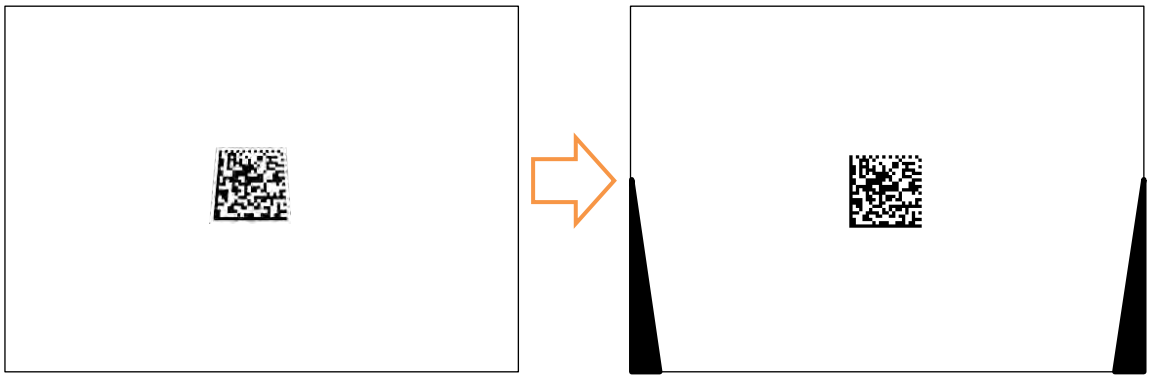
a　: Table name (16 half-width characters)

6.4 Trapezoid correction

Trapezoid correction is a function that corrects the distortion of the captured image when the barcode scanner is mounted at an angle.

Image distortion correction can improve the reading results.

When trapezoid correction is enabled, the correction is applied to all captured images.

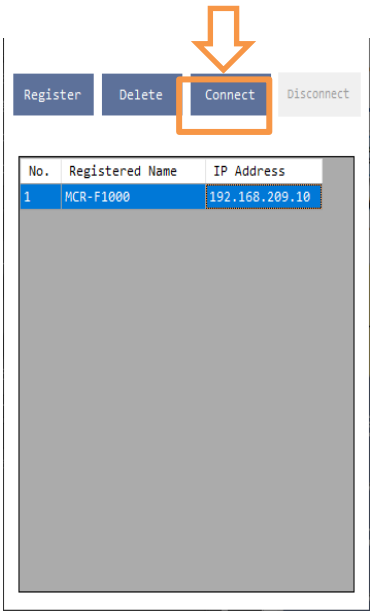


Trapezoidal correction disable　　Trapezoidal correction enable

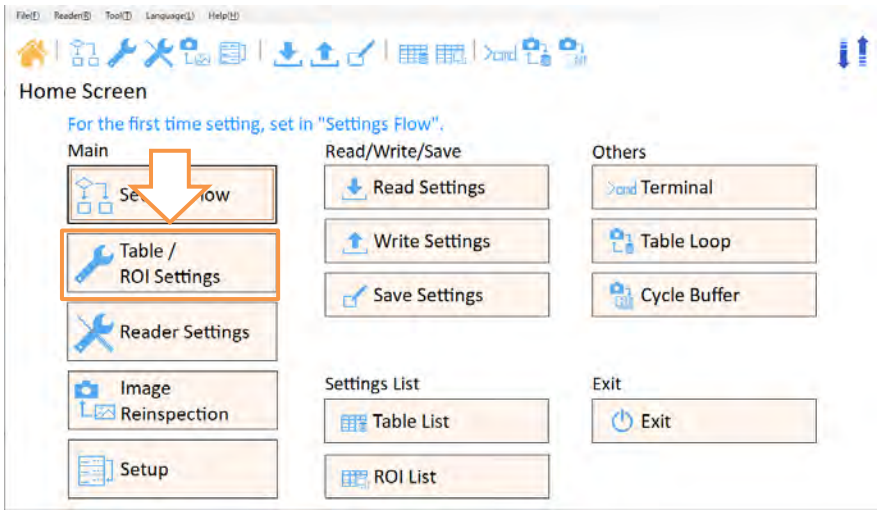
6.4.1 Setup procedure

To set the trapezoid correction, use the enclosed calibration sheet and the configuration tool "FixedConfigV7000".

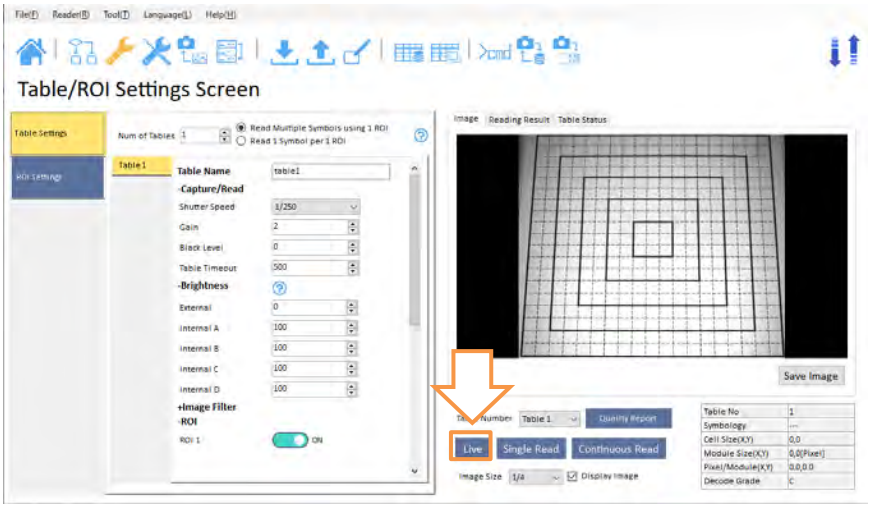
1. When launching the configuration tool, the following screen will appear. Click "Connect" to connect to the reader.



2. From the "Home Screen", click "Table/ROI Settings Screen".

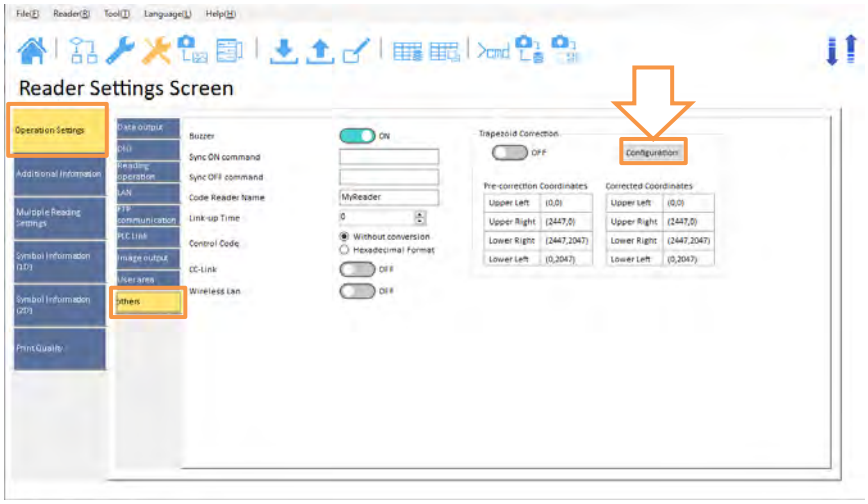


3. Click "Live" in "Table/ROI Settings Screen" to start imaging. Check the displayed image and place the calibration sheet so that it is within the screen.

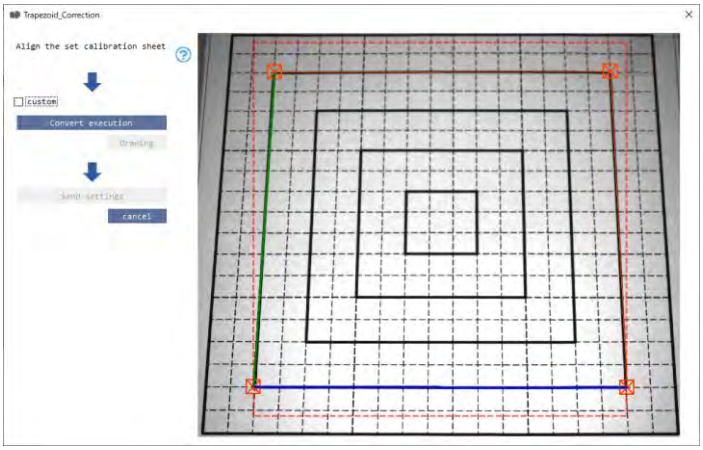


4. Click  in "Table/ROI Settings Screen" to display “Reader Settings Screen”.

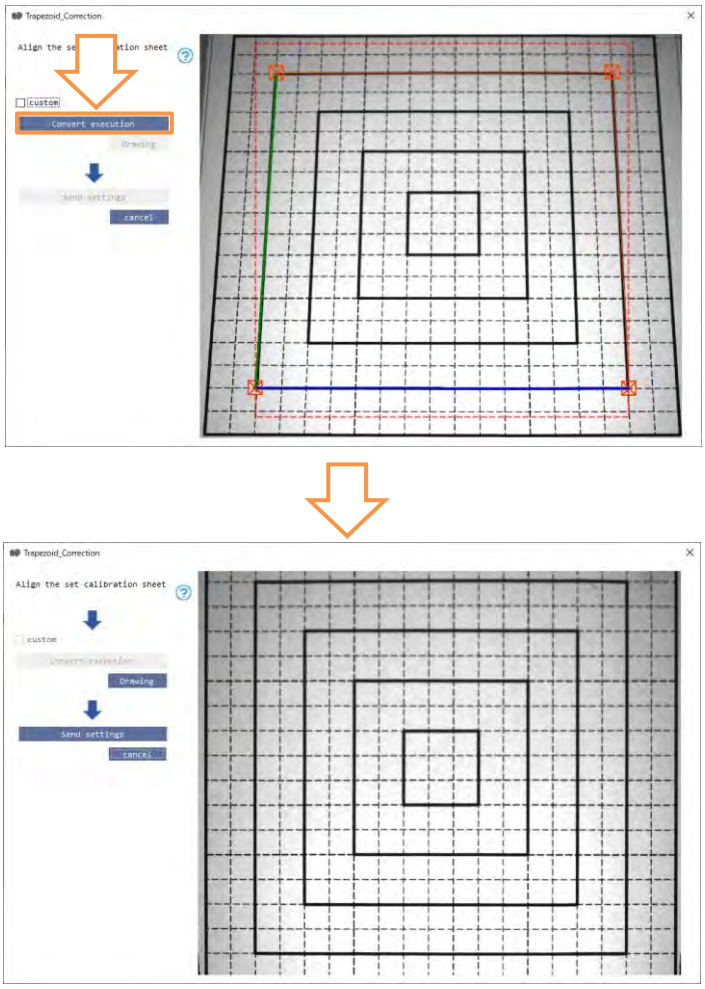
5. In the "Reader Settings screen", click "Operation Settings", "Others", and “Configuration” in that order.



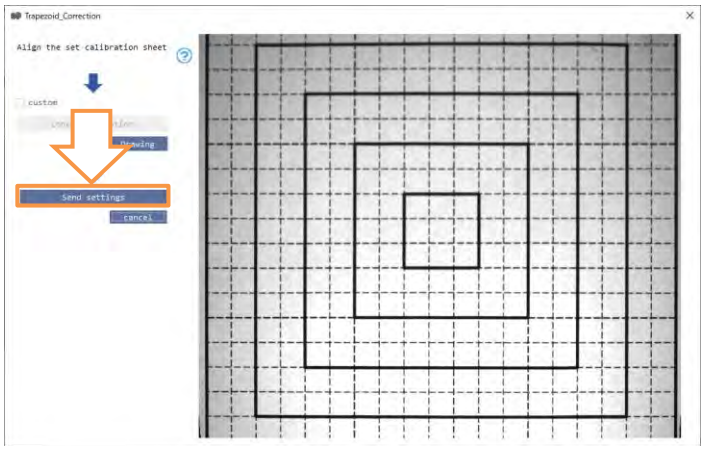
6. Manipulate the four corner rectangles and align the vertices with the largest grid line in the calibration sheet that shows the four corners well.



7. Click on the "Convert execution” button to display the corrected image.



8. Click the "Send settings" button to send the trapezoidal correction settings to the reader.



6.4.2 **Trapezoid correction commands**

"**(*)"** indicates the default setting.

- With or without trapezoidal correction

  TRPCORRECTION=a

  a: 0 Disables **(*)**

  1 Enables

- Coordinate settings

  TRPROI=a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p

a: -500 to 2947	Before correction, Upper-left X-coord	a=0 **(*)**
b: -400 to 2447	Before correction, Upper-left X-coord	b=0 **(*)**
c: -500 to 2947	Before correction, Upper-right X-coord	c=2447 **(*)**
d: -400 to 2447	Before correction, Upper-right Y-coord	d=0 **(*)**
e: -500 to 2947	Before correction, Lower-right X-coord	e=2447 **(*)**
f: -400 to 2447	Before correction, Lower-right Y-coord	f=2047 **(*)**
g: -500 to 2947	Before correction, Lower-left X-coord	g=0 **(*)**
h: -400 to 2447	Before correction, Lower-left Y-coord	h=2047 **(*)**
i: -500 to 2947	After correction, Upper-left X-coord	i=0 **(*)**
j: -400 to 2447	After correction, Upper-left Y-coord	j=0 **(*)**
k: -500 to 2947	After correction, Upper-right X-coord	k=2047 **(*)**
l: -400 to 2447	After correction, Upper-right Y-coord	l=0 **(*)**
m: -500 to 2947	After correction, Lower-right X-coord	m=2047 **(*)**
n: -400 to 2447	After correction, Lower-right Y-coord	n=2047 **(*)**
o: -500 to 2947	After correction, Lower-left X-coord	o=0 **(*)**
p: -400 to 2447	After correction, Lower-left Y-coord	p=2047 **(*)**

Set the coordinates before and after the trapezoid correction.

- Save trapezoid correction settings
  WSETT

  Save the trapezoid correction settings to flash ROM.

- Initialize trapezoid correction settings

  SETTRP

- Output trapezoid correction settings

  ?TRP

  (Output example)

```
?TRP

====================
?TRP
--------------------
 TRPCORRECTION=0 (0:OFF 1:ON)
 TRPROI=0,0,2447,0,2447,2047,0,2047,0,0,2447,0,2447,2047,0,2047
(0,0-2448,2048)
--------------------
V7000
108-V0.8u
====================
```

6.5 ROI settings

The area in the captured image where reading is performed is called Region of Interest (Hereinafter called “ROI”).

By changing the ROI setting, the reading time can be shortened, and reading can be performed only on a specific target.

The following settings change the behavior of the ROI.

I. Multi symbol reading (MULTIRSY=)

Set whether or not to use multiple ROIs.

This setting changes the behavior of the ROIs and the number of ROI that can be used.

In the case of "MULTIRSY=0”

- Only ROI #1 is used.
- When there are multiple reading targets in the ROI, the number of symbols set by the command "LABLES=" is read at once.
- The reading targets of the same data cannot be read.

In the case of "MULTIRSY=1“

- Up to 20 ROIs can be used.
- The ROI specified by "TBL**n**ROINO=" in the table settings will be used.
  (**n** represents the table number.)
- Only one reading target can be read in one ROI.
  (The setting of "LABELS=" is not applied.)
- The same data reading target can be read.

II. ROI output order (ROIOUTFORM=)

Set the output order of reading results when multiple ROIs are used.

In case of “ROIOUTFORM=1,2,3,…,20”

Output the reading results in the order of ROI #1 to ROI #12.

In case of “ROIOUTFORM=11,19,20”

Output the reading results in the order of ROI #11, #19, #20, #1, #2, #3,…,#10, #12, #13, … #18

The ROI numbers not specified in argument are registered in ascending order.

The following configuration parameters are used for ROI.

①	ROI size	: ROInSIZE
②	Processing contents	: ROInSET
③	Decode time limit	: ROInTOUT
④	Symbol type	: RSYnTYPE
⑤	Mirrored image	: RSYnMIRROR

⑥ DPM option : RSYnDPM
⑦ Matching Mode : RSYnVERIMODE
⑧ Matching data : RSYnVERIDATA
⑨ ROI number for matching : RSYnVERIROINO
⑩ Start digit of matching data : RSYnVERISTART
⑪ Mask strings of matching data : RSYnVERIMASK

6.5.1 **ROI size [ROInSIZE]**

Set the readable area. The area can be set by the starting point x, y coordinates, width, and height.

ROInSIZE=a,b,c,d

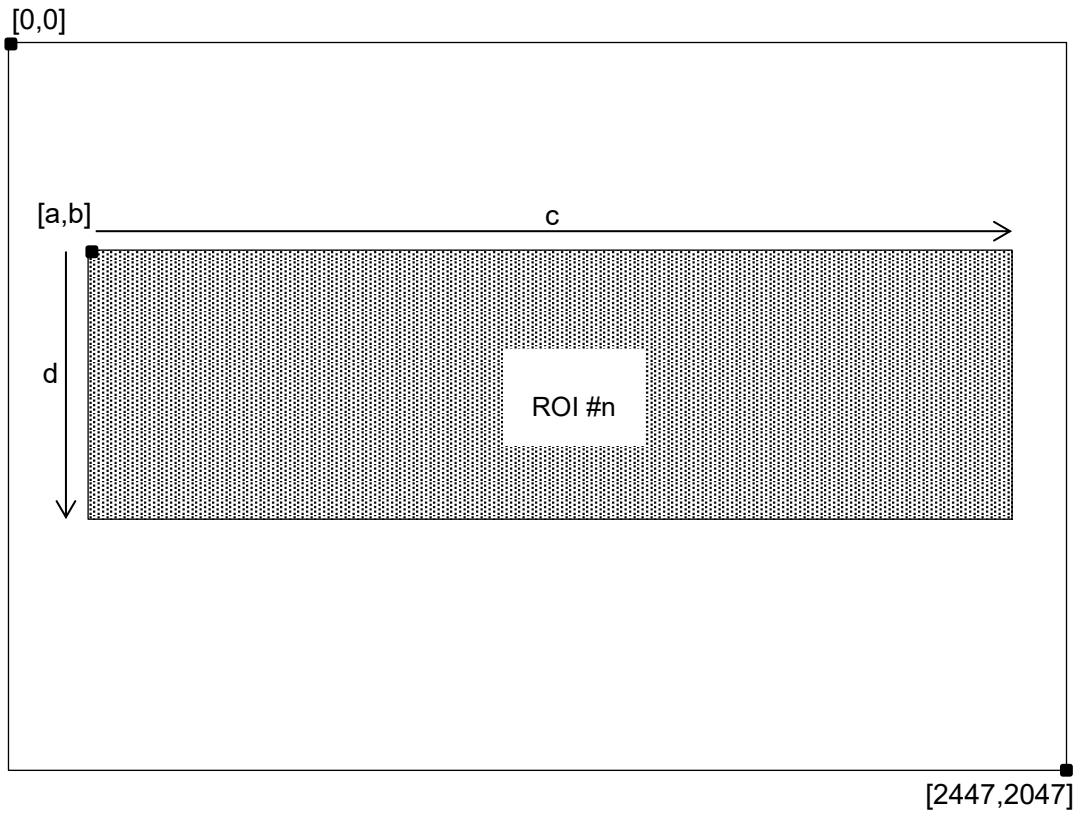
n: ROI number (1 to 20)
a: Starting point X coordinate (0 to 2447)
b: Starting point Y coordinate (0 to 2047)
c: Width (1 to 2448)
d: Height (1 to 2048)

To set the size of ROI #1 to full screen

ROI1SIZE=0,0,2448,2048

To set the size of ROI #2 to 50% of the center area

ROI2SIZE=612,512,1224,1024



6.5.2 **Processing contents [ROInSET]**

Set the processing contents for each ROI.

ROInSET=a

n: ROI number (1 to 20)

a: Processing contents (1)

1: Symbol reading

6.5.3 **Decode time limit [ROInTOUT]**

Set the time limit for each ROI.

ROInTOUT=a

n: ROI number (1 to 20)

a: Time limit [ms] (50 to10000)

6.5.4 **Symbol type [RSYnTYPE]**

Set the symbol type to be read for each ROI.

RSYnTYPE=a,b,c…

n: ROI number (1 to 20)

a,b,c: Input string for symbol type

Symbol type	Input string
Disable all symbols	(Null)
Enable all symbols	all
Data Matrix	dm
QR Code	qr
PDF417	pdf
Aztec Code	az
Code39	c39
Code128	c128
Codabar	cb
Code93	c93
ITF (Interleaved 2 of 5)	itf
UPC/EAN/JAN	uje
GS1 DataBar	db
Composite	cc

To set the symbol type for ROI #1 to Data Matrix

RSY1TYPE=dm

To set the symbol type for ROI #4 to QR Code and Code39 RSY4TYPE=qr,c39

6.5.5 **Mirrored image [RSYnMIRROR]**

Set the settings for normal symbol and mirror image symbol reading.

RSYnMIRROR=a

n: ROI number (1 to 20)

a: Mirror setting (0 to 2)

0: Read only normal type (not mirrored).

1: Read only mirrored type.

2: Read both normal type and mirrored type.

6.5.6 **DPM option [RSYnDPM]**

Set the DPM reading improvement in the DPM option.

RSYnDPM=a

n: ROI number (1 to 20)

a: DPM option (0 to 3)

0: Disable DPM option.

1: Dot peen (black on white)

2: Dot peen (white on black)

3: Laser / Chemical etching

6.5.7 **Matching mode [RSYnVERIMODE]**

Sets the matching mode for reading results.

RSYnVERIMODE=a

n: ROI number (1 to 20)

a: Matching mode (0 to 2)

0: Disable matching mode.

1: Check against the registered character string.

The character string is registered by RSYnVERIDATA command.

2: Check against the reading results of the specified ROI.

The ROI is set by RSYnVERIROINO command.

6.5.8 **Matching data [RSYnVERIDATA]**

Register a string for matching.

Up to 50 half-width characters can be registered.

RSYnVERIDATA=a

n: ROI number (1 to 20)

a: Matching data (Up to 50 half-width characters)

6.5.9 **ROI number for matching [RSYnVERIROINO]**

Set the ROI number to be checked against the reading result.

RSYnVERIROINO=a

n: ROI number (1 to 20)

a: ROI number to check (1 to 20)

6.5.10 **Start digit of matching data [RSYnVERISTART]**

Set the number of starting digits for matching.

RSYnVERISTART=a

n: ROI number (1 to 20)

a: Start digit (1 to 9999)

6.5.11 **Mask strings of matching data [RSYnVERIMASK]**

Set the mask character strings that represent the matching points of the read data.

The maximum length of the mask strings that can be set is 50 characters.

RSYnVERIMASK=a

n: ROI number (1 to 20)

a: Mask strings (Up to 50 characters)

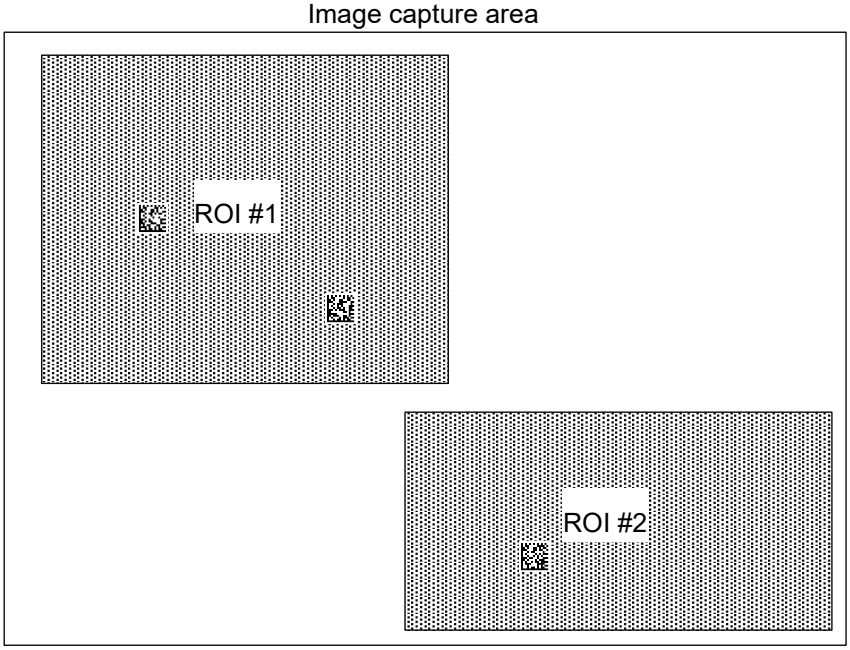
+: Matching

-: Not matching

6.6 Read operation

This section describes the operations for each operation mode and multiple symbol reading setting, and the percentage of processing time for each operation.

6.6.1 **Normal Mode (SYNCMODE=0)**



I. MULTIRSY=0

Only ROI #1 is used.

The number of symbols to be read conforms to the setting of the number of symbols to be read (LABLES=).

The reading result is output when the set number of symbols are read or the time limit of Table #1 (TBL1TOUT=) is exceeded.

Percentage of processing time

Table time limit	Table #1	
Image capture		
Trapezoid correction		
Image preprocessing		
ROI time limit		ROI #1

II. MULTIRSY=1

Decode to the processing area set in the ROI (TBL1ROINO=) of Table #1.

The number of symbols to be read is the number of processing areas to be used.

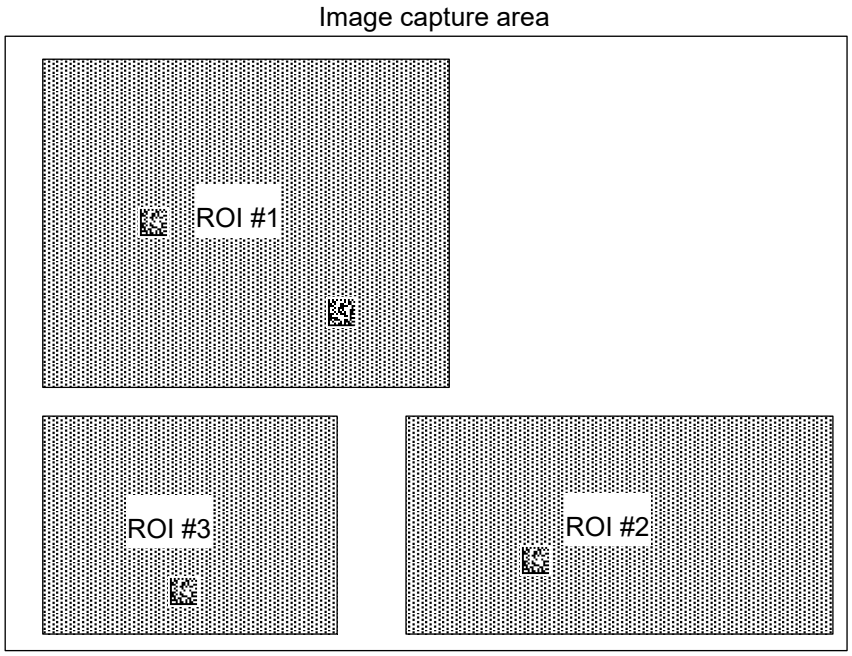
If there are two or more symbols in one ROI, the symbol that was read first is output.

When the number of symbols read in the set processing area or the time limit (TBL1TOUT=) in Table #1 is exceeded, the reading result is output.

Percentage of processing time

Table time limit	Table #1		
Image capture			
Trapezoid correction			
Image preprocessing			
ROI time limit		ROI #1	ROI #2

6.6.2 **Reading Timeout Mode (SYNCMODE=1)**



I. MULTIRSY=0

Only ROI #1 is used.

The number of symbols to be read conforms to the setting of the number of symbols to be read (LABLES=).

The reading result is output when the set number of symbols are read or the time limit of Table #1 (TBL1TOUT=) is exceeded.

Percentage of processing time

Read timeout				
Table time limit	Table #1		Table #2	
Image capture				
Trapezoid correction				
Image preprocessing				
ROI time limit		ROI #1		ROI #1

II. MULTIRSY=1

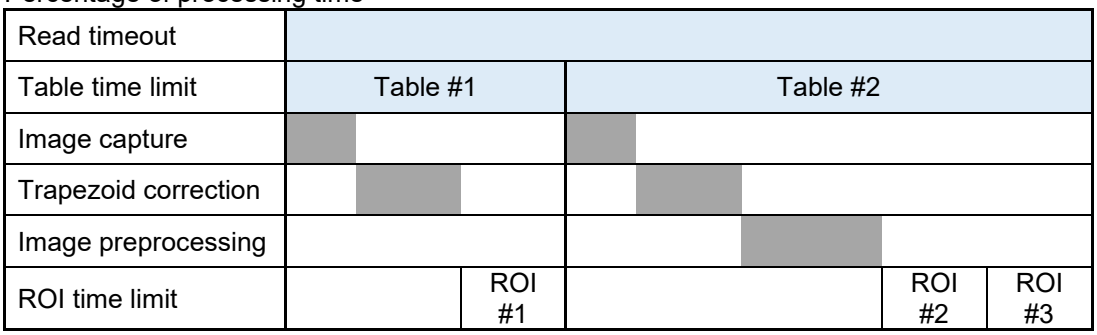
Reads the ROIs (TBLnROINO=) set in each table.

The number of symbols to be read conforms to the setting of the number of ROIs.

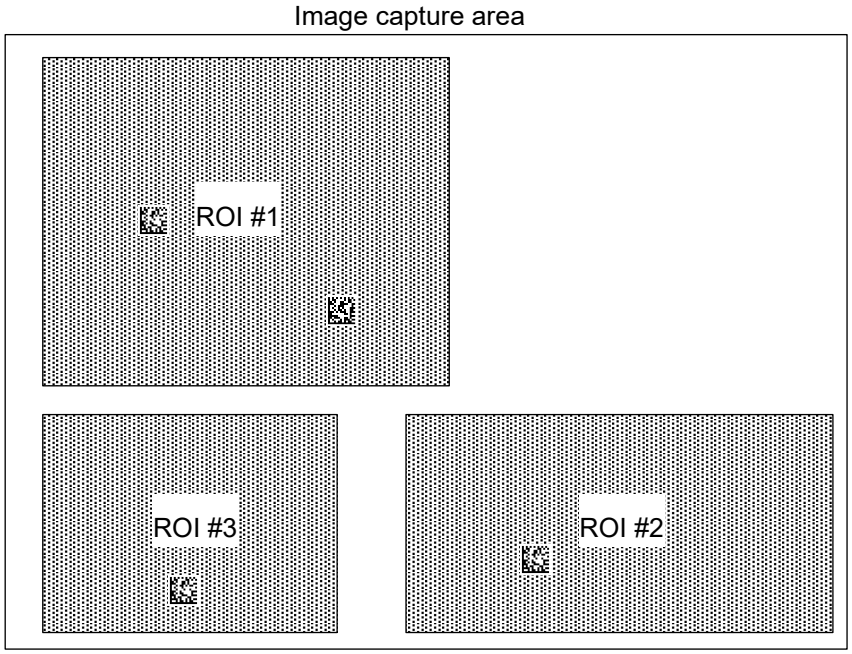
If there are two or more symbols in one ROI, the symbol that was read first is output.

The reading result is output when the set number of symbols are read or the reading timeout period (TOTALLIM=) is exceeded.

Percentage of processing time



6.6.3 **External Trigger Mode (SYNCMODE=2)**



I. MULTIRSY=0

Only ROI #1 is used.

The number of symbols to be read conforms to the setting of the number of symbols to be read (LABLES=).

The reading result is output when the set number of symbols are read or SYNC is turned off.

Percentage of processing time

SYNC ON period				
Table limit time	Table #1		Table #2	
Image capture				
Trapezoid correction				
Image preprocessing				
ROI time limit		ROI #1		ROI #1

II. MULTIRSY=1

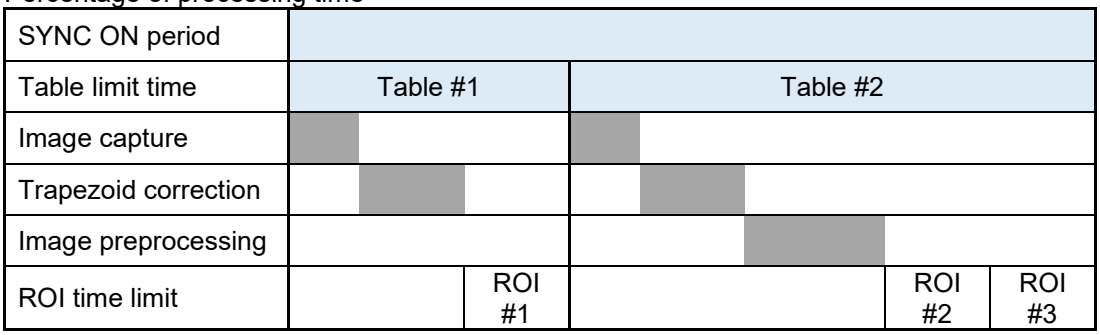
Reads the ROIs (TBLnROINO=) set in each table.

The number of symbols to be read conforms to the setting of the number of ROIs.

If there are two or more symbols in one ROI, the symbol that was read first is output.

The reading result is output when the set number of ROIs of symbols are read

Percentage of processing time



6.6.4 **Table Timeout**

The table timeout should be set considering the following four factors: image capture time, trapezoid correction processing time, image preprocessing time, and ROI timeout.

Table Timeout	Set shorter		Set longer		
Image capture time					
Trapezoidal correction processing time					
Image preprocessing time					
ROI timeout		ROI #1		ROI #2	ROI #3

To obtain an estimated timeout for each table, send the following command to the reader. Set the timeout for the table with reference to the response value from the reader.

G4=n
n: Table number (1 to 16)

Response) TBLnTOUT=a
n: Table number (1 to 16)
a: Estimated timeout value [ms]

Example) Obtain the estimated timeout for table #1 and set it to table #1.
G4=1
If the reader's response is TBL1TOUT=680.
Set a timeout value in Table #1 that is more than the estimated value.
TBL1TOUT=700

If the table shutter speed, image preprocessing, number of ROIs used or their timeout settings are changed, the optimal table timeout should be re-set.

6.7 Matching Function

By using the matching function, only specified readings can be judged as good reads or compared with readings from other ROIs.

The matching function can be set for each ROI.

6.7.1 Matching Mode

I. Check against a registered character string. (RSYnVERIMODE=1)

Check the reading data against the character string registered with "RSYnVERIDATA=".

The character string that can be set is 50 half-width characters.

II. Check against the reading data of the specified ROI. (RSYnVERIMODE=2)

Check the read data of the ROI specified by "RSYnVERIROINO".

The maximum number of matching digits is 50.

6.7.2 Start digit of matching data [RSYnVERISTART=]

Set the number of starting digits for matching.

6.7.3 Mask strings of matching data [RSYnVERIMASK=]

Set the matching point with a mask string consisting of "+" and "-".

"+": matching

"-": Not matching

The maximum number of mask strings that can be set is 50 characters.

6.7.4 Examples of matching settings and results

I. Check whether the first digit of the read data is "123" of ROI #1.

Method	: RSY1VERIMODE=1
Character string	: RSY1VERIDATA=123
Start digit	: RSY1VERISTART=1
Mask strings	: RSY1VERIMASK=+++

Read data	Matching character string	Matching result
123	**123**	match
123ABC	**123**	match
124ABC	**123**	mismatch
12	**123**	mismatch

II. Check that the 5th digit is "AB" and the 8th digit is "D" in the read data of ROI #1.

Method : RSY1VERIMODE=1

Character string : RSY1VERIDATA=ABCDE

Start digit : RSY1VERISTART=5

Mask strings : RSY1VERIMASK=++-+

☐: Not checked

Read data	Matching character string	Matching result
12345**AB**C**D**	☐☐☐☐☐**AB**☐**D**	match
abcde**AB**c**D**	☐☐☐☐☐**AB**☐**D**	match
12345	☐☐☐☐☐**AB**☐**D**	mismatch
12345**ab**C**d**	☐☐☐☐☐**AB**☐**D**	mismatch

III. Check the read data of ROI #1 and ROI #2 by matching three characters from the first digit.

Method : RSY1VERIMODE=2

Character string : RSY1VERIDATA=2

Start digit : RSY1VERISTART=1

Mask strings : RSY1VERIMASK=+++

Read data		Matching result
ROI #1	ROI #2	
123	**123**	match
123ABC	**123**	match
123	**123**ABC	match
ABC	**123**	mismatch
123	**12**	Mismatch

IV. Check the 5th, 6th, and 8th digits of the read data of ROI #1 and ROI #2.

Method : RSY1VERIMODE=2

Character string : RSY1VERIDATA=2

Start digit : RSY1VERISTART=5

Mask strings : RSY1VERIMASK=++-+

Read data		Matching result
ROI #1	ROI #2	
12345**AB**C**D**	12345**A**BC**D**	match
abcde**AB**c**D**	12345**AB**C**D**	match
12345**AB**C**D**	abcde**AB**c**D**EFG	match
12345	12345**AB**C**D**	mismatch
12345**ab**C**d**	12345**AB**C**D**	mismatch

7 Advanced Features

7.1 Output Additional Information

7.1.1 Symbol Type Information

Add symbol type information (data carrier identifier) to the head of decoded symbol. Symbol type is not added at read NG.

Symbol Type	Example of Data Carrier Identifiers
Data Matrix	]d1
QR Code	]Q1
PDF417	]L0
Aztec Code	]z0
Code39	]A0
Code128	]C0
GS1-128	]C1
Codabar	]F0
Code93	]G0
ITF (Interleaved 2 of 5)	]I0
EAN/JAN 13 digits	]E0
EAN/JAN 8 digits	]E4
UPC	]E0
GS1 DataBar	]e0
Composite	]e1

(Output format)

]ab Data

]: flag character

a: code character

b: modifier character

(Output example)

]d1ABC123

7.1.2 Decoding Time

Add decoding time to the symbol data.

(Output format)

Data (DT:a[ms])

a: Decoding Time

(Output example)

ABC123(DT:50[ms])

7.1.3 **Imaging Condition**

Adds the image capture conditions (shutter speed, gain, black level) to the symbol data.

(Output format)

Data (CAM:[s]a;[g]b;[b]c)

a: Shutter speed setting (0-9)

b: Gain setting (0-60)

c: Black level

(Output example)

ABC123(CAM:[s]2;[g]5;[b]0)

7.1.4 **Reading Time**

Adds the reading time (sum of imaging time and decoding time for one table) to the symbol data.

(Output format)

Data (RT:a[ms])

a: Reading Time

(Output example)

ABC123(RT:91[ms])

7.1.5 **Total Reading Time Information**

The total reading time (time from synchronization ON to serial output) is added to the symbol data.

(Output format)

Data (TT:ams)

a: Total Reading Time

(Output example)

ABC123(TT:1049[ms])

7.1.6 **Contrast Information**

Add the Contrast Information of the last decoded image.

- Read OK

  Calculate the contrast value of a symbol including a quiet zone. The decoder determines a rectangular area for the symbol and calculates the contrast value from its brightness level. If there are multiple symbols, the calculated value is for the first decoded symbol.

- Read NG

  Calculate the contrast value for the whole image.

(Output format)

Data (CONT:a,b,c)

a: Maximum value of reflectance (0 - 255)

b: Minimum value of reflectance (0 - 255)

c: Contrast [%] =100 x (aaa - bbb) / 255 (0 - 100)

(Output example)

ABC123(CONT:14,226,83)

7.1.7 **Quality Information**

The percentage of the Unused Error Correction codeword of the 2D code is added to the decoded data.

For example, if the decoder does not use any error correction, this value would be 100. The barcode scanner outputs the quality information individually if there are multiple symbols. Quality Information is not added at Reading Error.

(Output format)

Data (QT: a)

a: Quality (0 - 100)

(Output example)

ABC123(QT:34)

7.1.8 **Symbol Coordinates**

The positional data of the symbol in the image is output along with the decoded data. There are two types of output information: coordinate of the center of gravity and rectangular coordinates. The origin (+0000, +0000) is the left-top edge of a field of view.

1) Coordinate of the center of gravity

(Output format)

Data (XY:[g]G)

G: ab,ac

a: + or –

b: x-coordinate (+/-0 - +/-9999)

c: y-coordinate (+/-0 - +/-9999)

(Output example)

ABC123(XY:[g]+122,+24)

2) Rectangular coordinates

(Output format)

Data (XY:[c]C1/C2/C3/C4)

C1-C4: ab,ac

a: + or –

b: x-coordinate (+/-0 - +/-9999)

c: y-coordinate (+/-0 - +/-9999)

(Output example)

ABC123(XY:[c]+269,+11/+455,+86/+386,+270/+198,+199)

3) Both coordinates
Output coordinates of the center of gravity and the four corners.

(Output format)

Data (XY:[g]G;[c]C1/C2/C3/C4)

G: Center of gravity coordinates

C1-C4: Rectangular coordinates

G, C1-C4: ab,ac

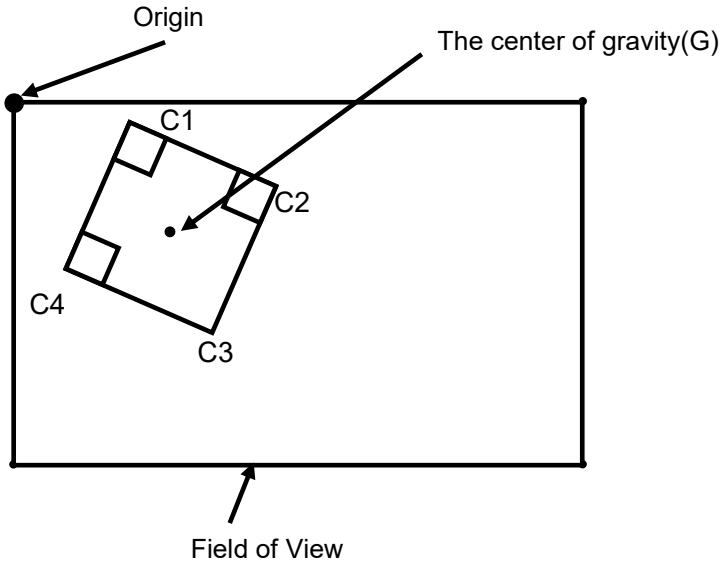
a: + or –

b: x-coordinate (+/-0 - +/-9999)

c: y-coordinate (+/-0 - +/-9999)

(Output example)

ABC123(XY:[g]+362,+141;[c]+269,+11/+455,+86/+386,+270/+198,+199)



7.1.9 **Table Number**

Adds setting table number used in the last decoding.

(Output format)
Data (TBL: a)
a: Table number
(Output example)
ABC123(TBL:3)

7.1.10 **Mirror information**

Adds the mirror information of the read symbol (left/right mirror image inversion ON/OFF) to the read data.

(Output format)
Data (MR: a)
a: ON or OFF
(Output example)
ABC123(MR:ON)

7.1.11 **Image capture and decoding information**

The number of times the image was captured and the number of times it was decoded are added to the read data.

(Output format)
Data (CD:[c]a;[d]b)
a: Number of images taken
b: Number of decoding
(Output example)
ABC123(CD:[c]10;[d]3)

7.1.12 **Comparison Result**

When the matching function is enabled, the result of the matching is added to the read data.

(Output format)

Data (VERI:a)

a: OK or NG

(Output example)

ABC123(VERI:OK)

7.1.13 **Reader Name**

Adds the individual name of the barcode scanner.

(Output format)

(NAME:a) Data

a: Reader name

(Output example)

(NAME:MYREADER)ABC123

7.1.14 **Module Information**

The module information of the symbol to be read is added to the read data.

When a target symbol type is read, all of them are set to 0.

The target symbol types are as follows: DataMatrix、QRCode、Aztec Code

(Output format)

Data (MDL:[n]a1,a2;[p]b1,b2)

a1/a2: Number of modules(x-axis/y-axis)

b1/b2: Number of image pixels(x-axis/y-axis)

(Output example)

ABC123(MDL:[n]14,14;[p]6.14,6.01)

7.1.15 **Decode Grade**

The decode grade of the read symbol is added to the read data.

This grade is an evaluation value of the read symbol calculated from the contrast ratio and unused error correction rate.

The grade based on the contrast ratio and unused error correction rate is shown below.

Contrast Ratio	Unused Error Correction Ratio	Decode Grade
55% or more	75% or more	A
20% to 55	50% to 75	B
less than 20%	less than 50%	C

If the contrast ratio is 70% and the unused error correction ratio is 60%, the decode grade is B.

(Output format)

Data (DR:a)

a: Decode grade

(Output example)

ABC123(DR:B)

7.1.16 **Success/Failure judgment result**

Adds the success/failure judgment result to the reading data.

(Output format)

Data (GONG:a)

a: GO … read success

a: NG … read failure

(Output example)

ABC123(GONG:GO)

7.2 Save Image

"**(*)**" indicates the default setting.

Maximum 32 captured images can be stored. The number of cycle buffer memory means the number of storable images.

MAXIMG=a[CR]	a=1-32 Specify number of cycle buffer memory.
MAXIMG=1[CR] **(*)**	

7.2.1 Transmit processed image

Select an image to save from the 2 images captured before or after preprocessing. (Only for latest image)

IMGSEL=0[CR]	Transmit captured image (Raw image)
IMGSEL=1[CR] **(*)**	Transmit decoded image

7.2.2 Overwrite setting of cycle buffer memory

When the number of saved images exceeds the number of cycle buffer memories, you can select whether to overwrite the cycle buffer memory to continue imaging or to stop imaging without overwriting.

CAPLIM=0[CR] **(*)**	Overwrites from the oldest image in the cycle buffer memory.
CAPLIM=1[CR]	Interrupt the imaging.

7.2.3 Preparation for transmitting the saved image

Using "FixedConfigV7000" software allows the download of the saved image that has been completed the preparation of transmission to the host.

IMGBUF=a[CR] a=0 - 32

a=0: Preparation for the image saved in last decoded **(*)**)

a=1-32: Preparation for the image saved in buffer No. (a)。

7.2.4 Output the settings of saving images

Outputs the current settings (status) for image output.

?IMG[CR]	Output the status

(Output example)

```
====================
?IMG
--------------------
 IMGSEL=a (0:Captured Image 1:Decoded Image)
 MAXIMG=b (1-32)
 IMGBUF=c (0-32)
--------------------
V7000
108-V0.8a
====================
a : Image type (Captured image, Decoded image)
b : Number of cycle buffer memory
c : Cycle buffer memory number
```

7.3 Simultaneous reading of multiple labels

Multiple (up to 20) labels can be read simultaneously at reader.

The order of reading data output can be configured like the following.

1. By completion of reading process
2. By preset number of digits
3. By preset matching characters
4. By preset symbologies

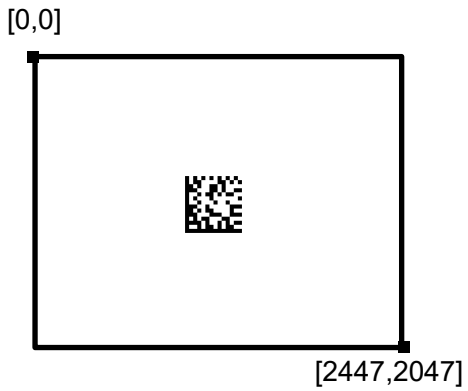
† Setting more symbols in an image than the number of preset symbols causes output failure.

7.4 Image flipping

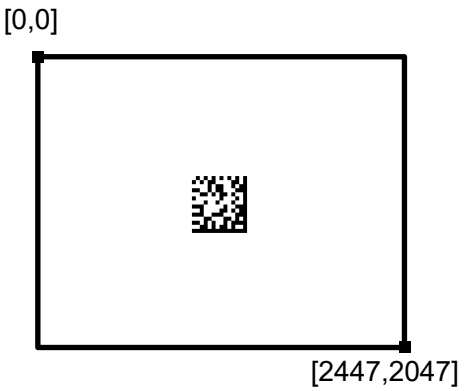
Get an image with its orientation flipped.

Subsequent decoding and saving of the image will all use the inverted image.

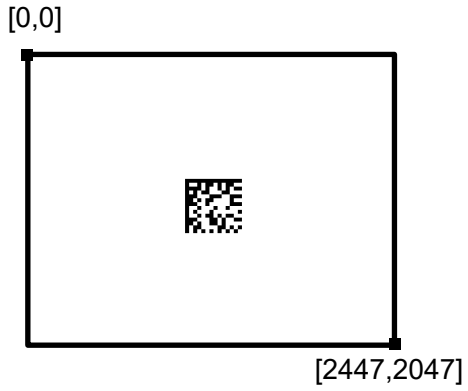
No image inversion (Default))



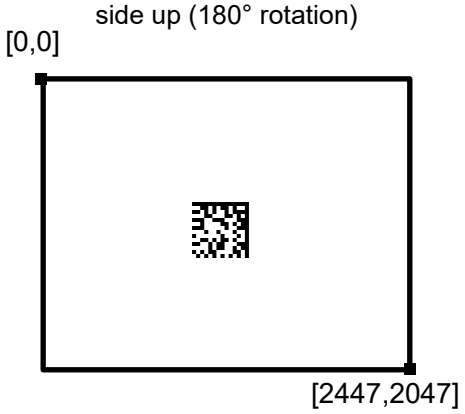
Flip image left or right



Flip image upside down



Flip image upside down, left side up, or right side up (180° rotation)



7.5 Register of SYNC ON/OFF command

The SYNC ON/OFF command of the barcode scanner can be registered with any 8 alphanumeric characters (available characters are 0x20 to 0x7E in 9.20 Table of Character Code). If an entered arbitrary character string is the same as an existing serial command, the command is not registered.

"**(*)**" indicates the default setting.

- SYNC ON command setting

  SONCMD=a[CR] (a: Up to 8 alphanumeric characters)

  The character string a is registered as SYNC ON command.

  e.g.)

  SONCMD=FIND[CR] Register "FIND" as SYNC ON command.

  SONCMD=[CR] **(*)** Default value is not registered.

- SYNC OFF command setting

  SOFFCMD=a[CR] (a: Up to 8 alphanumeric characters)

  The character string a is registered as SYNC OFF command.

  e.g.)

  SOFFCMD=END[CR] Register "END" as SYNC OFF command.

  SOFFNCMD=[CR] **(*)** Default value is not registered.

  Note: SYNC OFF command can only be used in Timeout Mode.

7.6 Industrial Ethernet

The following operations can be performed using Industrial Ethernet (EtherNet/IP).

- ●Write barcode reading results directly into the PLC's internal memory.
- ●Control the operation of the product from PLC.

For the details, download "Industrial Ethernet Connection Manual".

7.7 Symbol Printing Check

This function judges a printing quality of a two-dimensional symbol captured by barcode scanner using in-line. It verifies the print quality and output the result by using evaluation parameters of ISO/IEC 15415 or ISO/IEC TR 29158.

Printing quality of symbols flowing on manufacturing line is maintained at a certain level by being checked in-line. By checking the printing quality soon after marking, detailed time-dependent change of a marking system can be seen based on the evaluation parameter.

† Notice that this function is for a simple check that outputs the evaluation result in the same format with standard evaluation parameter. It cannot be used as a proper two-dimensional symbol verifier.

† Adjust the focus so that the number of pixels at the time of reading is 6 pixels or more.

† Verification results of this function may be affected by the change of imaging conditions of the barcode scanner. To prevent a variance of evaluation result, use this function under the same imaging condition (especially following conditions) as much as possible.

- Reading distance
- Illumination condition (Light ON/OFF configuration of internal/external illumination, illumination brightness)
- Shutter speed
- Gain
- Black level
- Inclination of the symbol surface against barcode scanner (tilt, skew, pitch)
- Amount of light around barcode scanner

† Processing time becomes longer than regular symbol reading when this function is active. Turn off when this function is not necessary.

7.7.1 **Supported Symbologies**

2D code

Data Matrix (ECC200)

QR Code

7.7.2 **Symbol Printing check Items to be output**

Evaluation items to be used for overall determination is selectable.

The evaluation values are output on a scale of 5 levels (0 to 4) by each evaluation item.

2D code (Select an evaluation item from ISO and

No.	Evaluation Items
0	Overall Quality (Lowest value of selected evaluation item)
1	Contrast (ISO) / Cell Contrast (ISOTR)
2	Modulation (ISO) / Cell Modulation (ISOTR)
3	Fixed Pattern Defection
4	Decode
5	Non-uniformity of Axis
6	Non-uniformity of Grid
7	Unused Error Correction

Overall Quality"(OVR) means a value of each element's lowest grade.

In the default setting, the Overall Quality is determined by the evaluation of the 7 items numbered 1 to 7 in the table.

You can also select the evaluation items to be targeted for the Overall Quality.

Below are examples of Overall Quality output for all evaluation items and when fixed pattern damage is not included.

Evaluation item	Grade value for each evaluation item							OVR
	1	2	3	4	5	6	7	
All	4	3	2	4	4	4	4	**2**
Other than Fixed Pattern Defection	4	3	-	4	4	4	4	**3**

7.7.3 Digital Output of Determination in Symbol Printing Check

When Print Check Output is enabled, the determination can be output digitally in check result. Configure a threshold to determine whether the overall judgment is OK (GOOUT) or NG (NGOUT).

If a threshold is configured 2:
Outputs OK when an overall quality is 2,3, or 4
Outputs NG when an overall quality is 0 or 1

If a threshold is configured 0, the determination is output in a determination of regular symbol reading without a determination in check result.

7.7.4 Print Boldness Information

Adds print fatness/thinness information.
+" means thicker than the original cell, and "-" means thinner.
This function is available only when the Symbol Print Check function is enabled.

(Output format)

Data (PG:A1,A2)
A1～A2 : ab%,ab%
a : + or -
b : Cell thickness/thinning ratio(%)

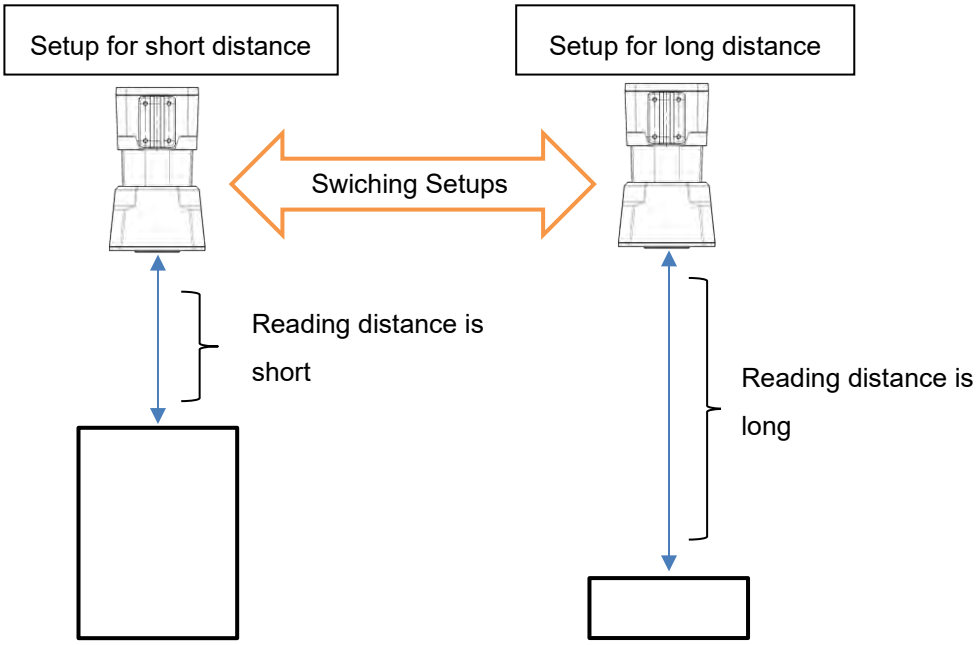
(Output example) 10000000099070(PG:+14%,+11%)

7.8 Functions for saving and loading the setup

When multi settings of focus or reading are required according to the reading target or operating environment, setups (up to 20) can be set to switch them.

The setup includes read and focus settings, excludes communication ones.

See "7.8.2 Configuration Parameters for Setup" for applicable settings.

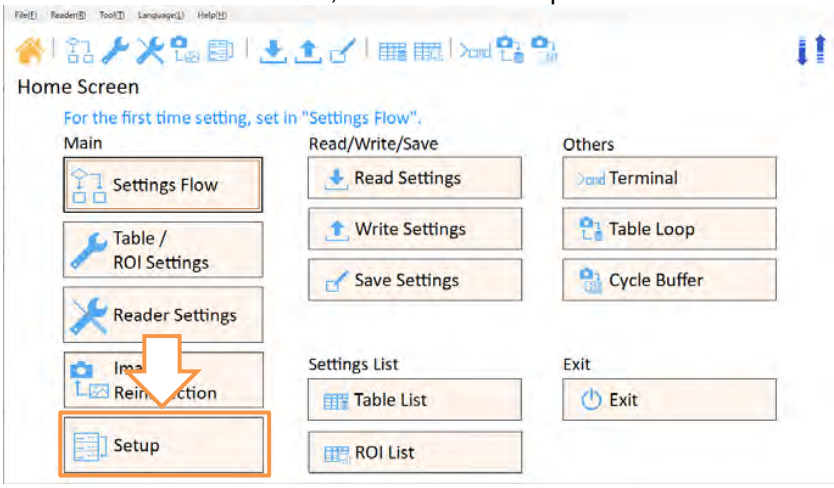


7.8.1 Save and load setup (configuration tool)

Use the setting tool “FixedConfigV7000” to save and load the setup.

●Displaying the Setup Screen

1. From the "Home Screen", click on the "Setup" button.

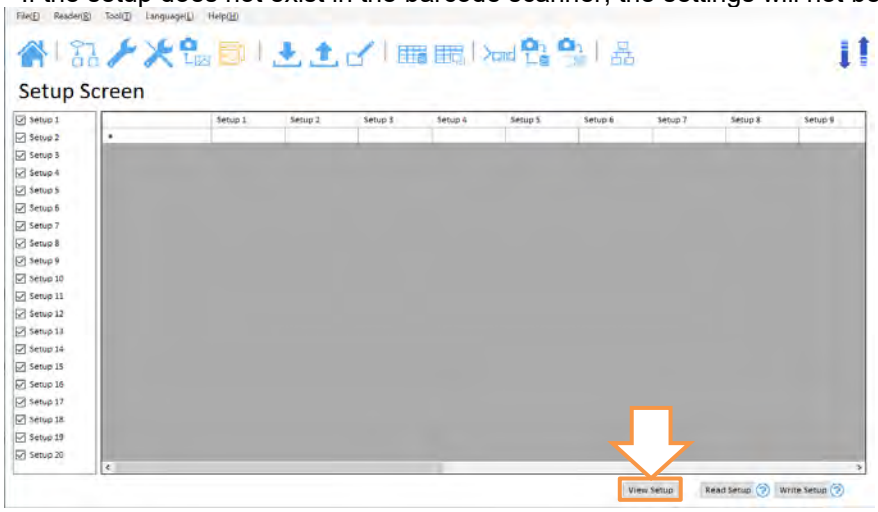


●Display saved setup

1. Click the “View Setup” button.

   Display the setup parameter stored in the barcode scanner.

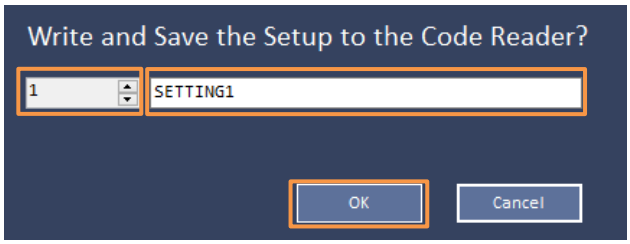
   If the setup does not exist in the barcode scanner, the settings will not be displayed.



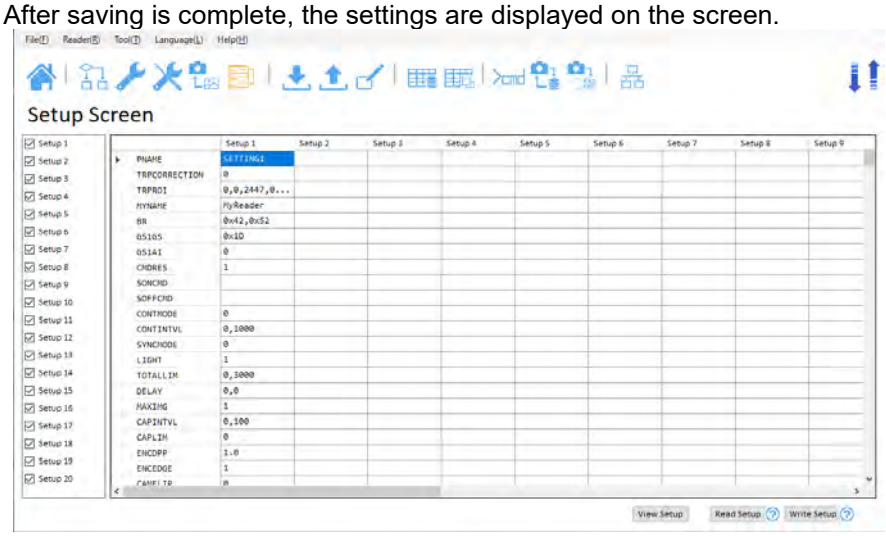
●Save the barcode scanner settings as a setup

1. Click the “Write Setup” button.
2. Enter the setup number and name of the destination to save the file.

   Entering a name is optional.
3. Click the "OK" button.

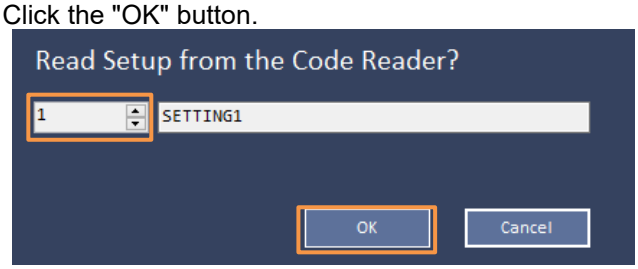


4. After saving is complete, the settings are displayed on the screen.



●Load a setup

1. Click the “Read Setup” button.
2. Enter the setup number to be read.
3. Click the "OK" button.



7.8.2 **Configuration Parameters for Setup**

The following configuration parameters are available for setup.

Term	Command	Description
Communication settings	CMDRES=	Command response ON/OFF setting
Common	GS1GS=	Data delimiter characters for GS1 series symbols.
	GS1AI=	Set the output method of GS1 AI (AI: application identifier)
	LABELS=	Number of labels
	OUTFORM=	Output in the order of decoding
	OUTnVRFYD=	Number of collation digits
	OUTnVRFYC=	Collation character
	OUTnVRFYS=	Collation symbol system
Code39	C39MODE=	Set reading of Code39.
	C39SS=	Set start/stop code transmission of Code39.
	C39DIGIT=	Set the minimum and maximum number of digits of reading Code39.
	C39EDIT=	Set output of the data when reading Code39.
	C39HEAD=	Set header character of Code39.
	C39FOOT=	Set footer character of Code39.
Code128	C128MODE=	Set reading of Code128.
	C128DIGIT=	Set the minimum and maximum number of digits of reading Code128.
	C128EDIT=	Set output of the data when reading Code128.
	C128HEAD=	Set header character of Code128.
	C128FOOT=	Set footer character of Code128.
Codabar	CBMODE=	Set reading of Codabar.
	CBSS=	Set start/stop code transmission of Codabar.
	CBCS=	Set lowercase and uppercase for Codabar start and stop codes
	CBCHK=	Checksum algorithm setting of Codabar.
	CBDIGIT=	Set the minimum and maximum number of digits of reading Codabar.
	CBEDIT=	Set output of the data when reading Codabar.
	CBHEAD=	Set header character of Codabar.
	CBFOOT=	Set footer character of Codabar.

Term	Command	Description
ITF	ITFMODE=	Set reading of ITF.
	ITFDIGIT=	Set the minimum and maximum number of digits of reading ITF.
	ITFEDIT=	Set output of the data when reading ITF.
	ITFHEAD=	Set header character of ITF.
	ITFFOOT=	Set footer character of ITF.
Code93	C93MODE=	Set reading of Code93
	C93DIGIT=	Set the minimum and maximum number of digits of reading Code93.
	C93EDIT=	Set output of the data when reading Code93.
	C93HEAD=	Set header character of Code93.
	C93FOOT=	Set footer character of Code93.
UPC/EAN/JAN	UJEMODE=	Set reading of UPC/EAN/JAN.
	JE13SUM=	Checksum output setting of EAN/JAN (standard 13 digits).
	JE8SUM=	Checksum output setting of EAN/JAN (standard 8 digits).
	UPCASUM=	Checksum output setting of UPC-A.
	UPCESUM=	Checksum output setting of UPC-E.
	UPCANS=	Number system output setting of UPC-A.
	UPCENS=	Number system output setting of UPC-E.
	UPCEFORM=	Output format setting of UPC-E.
	UPCAFORM=	Output format setting of UPC-A.
	UJEDIGIT=	Set the minimum and maximum number of digits of reading UPC/EAN/JAN.
	UJEEDIT=	Set output of the data when reading UPC/EAN/JAN.
	UJEHEAD=	Set header character of UPC/EAN/JAN.
	UJEFOOT=	Set footer character of UPC/EAN/JAN.
GS1 Databar	DBMODE=	Set reading of GS1 Databar.
	DBDIGIT=	Set the minimum and maximum number of digits of reading GS1 Databar.
	DBEDIT=	Set output of the data when reading GS1 Databar.
	DBHEAD=	Set header character of GS1 Databar.
	DBFOOT=	Set footer character of GS1 Databar.

Term	Command	Description
CompositeCode	CCMODE=	Set reading of Composite.
	CCDIGIT=	Set the minimum and maximum number of digits of reading Composite.
	CCEDIT=	Set output of the data when reading Composite.
	CCHEAD=	Set header character of Composite.
	CCFOOT=	Set footer character of Composite.
Data Matrix	DMMODE=	Set reading of Data Matrix.
	DMDIGIT=	Set the minimum and maximum number of digits of reading Data Matrix.
	DMEDIT=	Set output of the data when reading Data Matrix.
	DMHEAD=	Set header character of Data Matrix.
	DMFOOT=	Set footer character of Data Matrix.
QR Code	QRMODE=	Set reading of QR Code.
	QRDIGIT=	Set the minimum and maximum number of digits of reading QR Code.
	QREDIT=	Set output of the data when reading QR Code.
	QRHEAD=	Set header character of QR Code.
	QRFOOT=	Set footer character of QR Code.
PDF417	PDFMODE=	Set reading of PDF417.
	PDFDIGIT=	Set the minimum and maximum number of digits of reading PDF417.
	PDFEDIT=	Set output of the data when reading PDF417.
	PDFHEAD=	Set header character of PDF417.
	PDFFOOT=	Set footer character of PDF417.
Aztec Code	AZMODE=	Set reading of Aztec Code.
	AZDIGIT=	Set the minimum and maximum number of digits of reading Aztec Code.
	AZEDIT=	Set output of the data when reading Aztec Code.
	AZHEAD=	Set header character of Aztec Code.
	AZFOOT=	Set footer character of Aztec Code.
Reading	BR=	Set the reading error message.
	SONCMD=	Set the character string for the synchronization ON command.
	SOFFCMD=	Set the character string for the synchronization OFF command.
Operation Mode	SYNCMODE=	Set reading operation.
	LIGHT=	When the illumination will be turned on.
	TOTALLIM=	Decode timeout

Term	Command	Description
Continuous Reading Mode	CONTMODE=	Continuous reading mode ON/OFF
	CONTINTVL=	When reading is OK in continuous reading mode, the waiting time until the next reading starts.
	CONTVRFY=	Set ON/OFF for prohibiting reading the same data in continuous reading mode.
	CONTVTIM=	Set the time to prohibit reading the same data in continuous reading mode.
Additional Information	SYMIDTX=	Symbol system information.
	DTTX=	Decode time.
	TTTX=	Total time of decoding.
	RTTX=	Reading time.
	CAMTX=	Imaging condition
	TBLTX=	Table number.
	MYNAME=	Individual name of the barcode scanner.
	NAMETX=	Individual name.
	CONTTX=	Contrast information.
	CONTROI=	Contrast calculation area for read NG.
	QTTX=	Quality information.
	MRTX=	Mirror information.
	XYTX=	Symbol position Coordinate.
	PNTX=	The last setup number that was read.
	MDLTX=	Module information.
	CDTX=	Number of images taken and number of decodes.
	DRTX=	Decode grade.
	GONGTX=	Pass/Fail judgment result.
	VERITX=	Comparison result
Delay Time	DELAY=	Time from synchronization ON to shutter release.
Cycle Buffer	MAXIMG=	Number of images acquired.
	CAPINTVL=	Interval to acquire images when the number of images to acquire is set to multiple images.
	CAPLIM=	Operation when the number of images taken exceeds the number of images acquired.

Term	Command	Description
Focus Adjustment	FCSRANGE1=	Cell size to be read, number of image pixels.
	FCSDIST=	Focusing distance.
Image Orientation	CAMFLIP=	Image direction.
Table setting	ENABLETBL=	Number of tables to be enabled.
	TBLnFLASH=	External and internal illumination of tables.
	TBLnSHUTT=	Shutter speed for tables.
	TBLnGAIN=	Gain of tables.
	TBLnBLKLV=	Black level for tables.
	TBLnIMGPROC=	Image preprocessing for tables.
	TBLnTOUT=	Table time limit.
	TBLnROINO=	Processing area used for the table.
	TBLnNAME=	Table name.
Processing area	MULTIRSY=	Reading Multiple Symbols.
	ROIOUTFORM=	Processing area Output order of reading results.
	ROInSET=	Processing contents of processing area.
	ROInSIZE=	Area size of the processing area.
	ROInTOUT=	Processing time limit of the processing area.
	RSYnTYPE=	Symbol types of the processed area.
	RSYnMIRROR=	Mirror image processing.
	RSYnDPM=	Improving decode reading of processing area.
	RSYnVERIMODE=	Matching function for ROI
	RSYnVERIDATA=	Matching data.
	RSYnVERIROINO=	ROI number to be checked.
	RSYnVERISTART=	Start digit of the matching data.
	RSYnVERIMASK=	Mask string.
Symbol Printing Check	PQTX=	Symbol Print Check.
	PQTYPE2D=	Standards used for symbol printing check.
	PQITEM2D=	Matching items to be output as overall judgment.
	PQOKTH=	Threshold of the overall judgment used for OK/NG judgement.
	PGTX=	Printing Thickness.
Trapezoid correction	TRPCORRECTION=	Trapezoid correction Disable / Enable.
	TRPROI=	Coordinates before and after the trapezoid correction.

7.8.3 **Serial Commands Related to Setup**

The setup-related commands are as follows.

“(*)” indicates the default setting.

PSAVE=a[CR] a=1 - 20

Saves the current barcode scanner settings to flash ROM as setup a.

PLOAD=a[CR] a=1 - 20

Reflects the settings of setup a to the barcode scanner.

If setup a does not exist, the settings are not changed.

PERASE=a[CR] a=1 - 20

Erase setup a from flash ROM.

PNAME=a,b[CR] a=1 - 20, b= alphanumeric 32 bytes

Set a name for setup a.

WSETP[CR] Saves the setup name to flash ROM.

PNTX=a[CR] a=0**(*)** - 1

After the power is turned on, the number of the setup that has been read is added to the read data.

If the setup has not been read, "--" is added to the data.

(Output example) 12345(SETUP:01)

?PLISTCR] Outputs the setup name.

```
?plist
PNAME=1,SETUP1
PNAME=2,SETUP2
---------------------------- Omission ----------------------------
PNAME=20,
```

8 Ethernet connection (TCP server)

8.1 Preparation

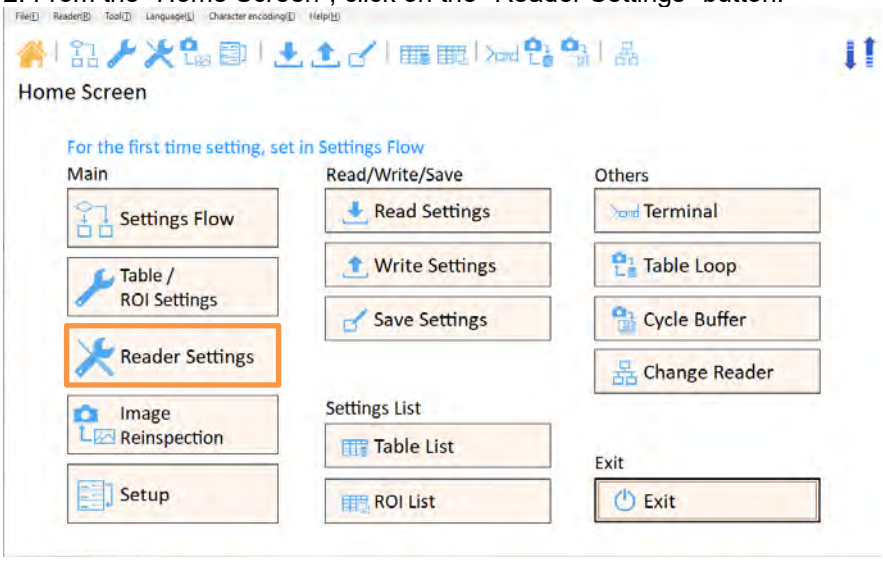
To connect this product, it needs to be configured to match the network.

8.2 IP address

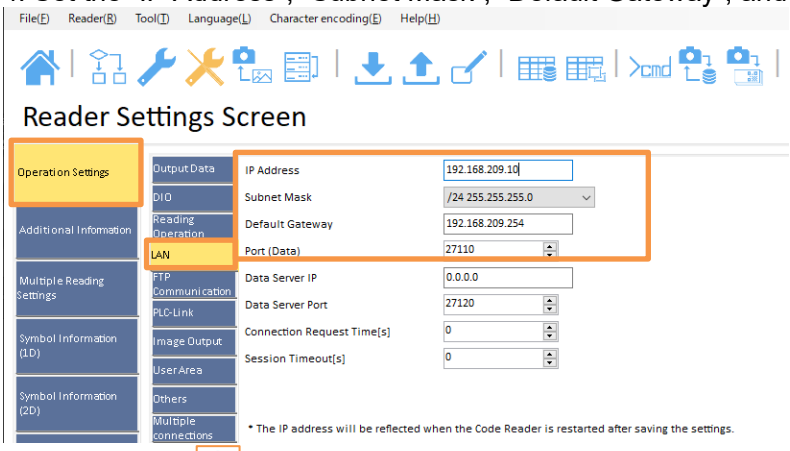
Set the IP address of the PC from 192.168.209.1 to 192.168.209.255 excluding the default IP address of this product (192.168.209.10).

1. Connecting to the Configuration Tool.
   See "3.8 Ethernet connection" for connection method.

2. From the "Home Screen", click on the "Reader Settings" button.



3. From the "Reader Setting Screen", click on the "Operation Settings" and "LAN" button.
4. Set the “IP Address”, “Subnet Mask”, “Default Gateway”, and “Port(Data)”.

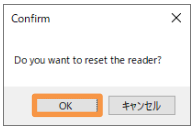


5. Click on the  to send the settings to the reader.
6. Click on the  to save the settings to internal flash ROM.

7. The reader will reboot to reflect the changed settings.

Click on the "Reader(R)" and "Reboot...".

8. When the following screen appears, click on the "OK" button.



9. Click on the "File(F)" and "Exit".

10. After rebooting the reader, connect the reader to the configuration tool.

See "3.8 Ethernet connection" for connection method.

8.3 Confirm Ethernet settings

Communication state can be checked by UDP (User Datagram Protocol), if the network address is already known.

- Set the IP address of the host PC to the same network as the reader.
- Connect the reader to the host PC with an Ethernet cable.
- Specify the broadcast / port number as a UDP communication destination.

† The port number is 49460 fixed.

† If multiple readers are connected in the same network, respective devices will respond.

?WHO: Confirm the settings.

?WHO

The following parameters are output in a line:

- Local IP address (IP address of the reader)
- Local port number (Port number of TCP/IP server of the reader)
- Subnet mask
- Default gateway
- MAC address (Lower 3 bytes)
- MAC address (Upper 3 bytes) †

8.4 Auto-negotiation

Both the communication speed (1 Gbps, 100 Mbps, 10 Mbps) and the communication mode (Full Duplex, Half Duplex) are equipped with an auto-negotiation function that sets them automatically. Therefore, when using a crossover cable for one-to-one communication with a computer, the computer's network settings (communication speed and communication mode) should also be set to auto.

8.5 Communication management

The reader supports 4 types of communication method:

- TCP server communication (for all commands)
- TCP client communication (for reading result transmission)
- TCP client communication (for image data transmission)
- UDP communication (for administration)

[TCP server communication]

It works as a TCP server that can be configured with any port number.

Two ports can be used, one for sending read data and one for sending image data.

The maximum number of connections to the port for reading result transmission varies by version.

V1.1c or earlier ... 1

V1.2a or later ... Up to 3

Once a connection is established, it will be disconnected in the following cases.

- Receive close request from the client
- Detect transmission error

In the following cases, the reader cannot detect disconnect state:

- When the cable is unplugged before the client sends close request.
- The client aborted the system without sending close request.

In this case, the reader will not recognize the "disconnect" and will not accept the client's request to reconnect. Send DISCON (Disconnect) command from the UDP communication to make the reader wait for connection, and then try to reconnect.

e.g.; (Command) -> DISCON=1,27110

[TCP client connection for transmission of reading result]

It works as a TCP client that can set any connection destination (IP address: port number).

The timing of the connection is set by TCP1CRTIM (connection request interval) command.

- Connect every time the reader sends data.
- Connect automatically every time the reader is powered on.

  Once a connection is established, the reader will disconnect in the following cases.
  - The session timeout period has elapsed (always-on connections are also possible).
  - Receive a disconnect request from the server/client.
  - Detect transmission error.

  DISCON (Disconnect) command can be used to disconnect at any time.

  e.g.; (Command) -> DISCON=TCP1SVADR,0

[UDP communication]

It works as a UDP server with a fixed port number (49460).

It can communicate with multiple PCs because UDP communication is connectionless.

When a PC sends a broadcast, all devices on the network will respond.

With broadcast, the following can be done.

- Get a list of the products that are operating normally on the network.
- Get terminal information such as unknown IP address and port number for TCP server communication.

UDP communication can be used to forcibly disconnect TCP server communication, etc.

8.6 Serial command for Ethernet settings

?LAN

Get a list of settings for Ethernet connection.

IP1ADR=<IP address>/<Number of subnet mask bits>

Set IP address and subnet mask of the reader.

† If the subnet mask is not changed, the number of mask bits can be omitted.

GW1ADR=<Default gateway>

Set default gateway address of the reader.

† Set the same network with the IP address.

TCP1PORT=<TCP server communication port number>

Set the port number for TCP server communication of the reader.

TCP1SVADR=aaa.bbb.ccc.ddd:ee

Destination IP address of reading results: Set the port number.

Send from the TCP server when the destination IP address is 0.0.0.0.

Send from the TCP client when the destination IP address is other than 0.0.0.0.

aaa.bbb.ccc.ddd	Destination IP address
ee	Destination port number (1 to 63335)

TCP1CRTIM=<Connection request interval>

Set the reconnect attempt time (0 to 100 sec) for TCP client communication.

When set to 0, the connection is made every time data is sent.

When the value is non-zero, the connection is made automatically at startup.

When the setting is changed, it will take effect the next time the connection is established.

TCP1STOUT=<Session timeout period>

Set the no communication timeout (0 to 100 sec) before requesting disconnection in TCP client communication.

When set to 0, no disconnect request is sent (always connected).

When the setting is changed, it will take effect the next time the connection is established.

e.g.) Setting example

```
IP1ADR=192.168.209.101/24
TCP1PORT=60000
GW1ADR=192.168.209.1
?LAN

====================
?LAN
--------------------
 Connected Speed : 1000 Mbps/Full Duplex
 MAC Address     : 00-16-fc-0f-00-01
 IP1ADR=192.168.209.10/24   [>> 192.168.209.101/24] (IP Address/Subnet Mask[CIDR])
 IP1SNM=255.255.255.0       [>> 255.255.255.0] (Subnet Mask)
 GW1ADR=192.168.209.254     [>> 192.168.209.1] (Default Gateway)
 TCP1PORT=27110             [>> 60000] (Port No.:1024-65535)
 TCP1SVADR=0.0.0.0:27120 (TCP Server Addr.:Port No.)
 TCP1CRTIM=0 (0:Every 1-100[s])
 TCP1STOUT=0 (0:None 1-100[s])
 LINKUPTOUT=0 (0-30000 [ms])
--------------------
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====================
```

The setting values are displayed enclosed in "[>>]" and "[ ]".

In the case of the above screen dump, the following settings are shown.

[Current operating settings]

IP address	192.168.209.10
Subnet mask	/24
Default gateway	192.168.209.254
Port number (for reading result transmission)	27110

[Settings that will take effect at the next startup]

IP address	192.168.209.101
Subnet mask	/24
Default gateway	192.168.209.1
Port number (for reading result transmission)	60000

To make the setting effective, save it to the flash ROM with WSETS command, and then reset the power.

?WHO

The following parameters are output in a line:

- Local IP address (IP address of the reader)
- Local port number (TCP server port number of the reader)
- Subnet mask
- Default gateway
- MAC address (Lower 3 bytes)
- MAC address (Upper 3 bytes) †

† This function is supported from firmware version V1.2a or later.

?NETSTAT

The following parameters are output in a line:

- Local IP address (IP address of the reader)
- Local port number (TCP server port number of the reader)
- Remote IP address (IP address of the connected PC)
- Remote port number (Port number of the connected PC)
- TCP server socket status

The number of output lines varies by version.

V1.1c or earlier ... 1

V1.2a or later ... 3

?VER

The following parameters are output:

- System version
- Model name

DISCON=1,<TCP sever port number>

Shut down TCP server connection of the specified port number.

Set the port number in <TCP server port number> as a decimal number.

e.g.; DISCON=1,27110

8.7 Initialize Ethernet settings

If the configured address is lost, the following procedure can be used to start the reader with the factory default Ethernet settings.

- Hold down the Teach button on the control panel and start the reader.
- Release the Teach button when the status LED-READY lights up.

† The Ethernet settings stored in the reader will not be changed.
Therefore, the reader will start up with the saved Ethernet settings next time.

The factory default settings are as follows.

IP address	192.168.209.10
Subnet mask	/24
TCP server port number	27110
Default gateway	192.168.209.254

9 Transfer images to FTP server

After sending the reading data to the host device, the image data and reading data can be transferred to an FTP server. If there is no space on the FTP server, the data will be discarded.

9.1 Image data transfer

・SYNCMODE=0

Transfer decoded image.

・SYNCMODE=1 or 2

Transfer the last decoded image.

・Data format

8-bit grayscale bitmap

・Image size

Full size only.

・File name

It changes depending on the image file name format setting.

(1) Standard format

Good read: YYYYMMDD-hhmm_okimgnnnnnnn.bmp

No read: YYYYMMDD-hhmm_ngimgnnnnnnn.bmp

YYYYMMDD-hhmm: Year (4 digits) Month (2 digits) Day (2 digits) - Hour (2 digits) Minute (2 digits)

nnnnnnn: 0000001 to 9999999 (Number of Good reads/No reads.)

Set the year, month, date, and time (time stamp) with DATE command.
The time stamp added to the file name is the time when the file is transferred.
The number of Good read / No read is equal to the number of times displayed by the command "?TOTAL1" (OK for Good read, BR for No read). Both are cleared to 0 by the command "CLRTOTAL".

(2) 8-character limit format

Good read: o*nnnnnnn*.bmp

No read: n*nnnnnnn*.bmp

nnnnnnn:0000001 to 9999999 (Number of Good reads/No reads.)

The number of Good read / No read is equal to the number of times displayed by the command "?TOTAL1" (OK for Good read, BR for No read). Both are cleared to 0 by the command "CLRTOTAL".

9.2 Read data transfer

Transfer the decoded strings.

・Data format

Saves the read data in text format.

When the transfer file type is "Read data and image data", the read data and its image file name will be saved in CSV format.

(The separator can be set as desired.

e.g., Transfer read data only)

<read data><CR><LF>

abcdefg

BR

0123456789

e.g., Transfer read data and image data)

<read data><separator><image file name><CR><LF>

abcdefg,20180907-1850_okimg0000001.bmp

BR,20180907-1851_ngimg0000001.bmp

0123456789,20180907-1852_okimg0000002.bmp

The data of No read depends on the setting of the command "BR".

(Default setting: "BR")

・File name

This is the file name for saving the reading data. It can be set arbitrarily, but some symbols such as \ and / are not allowed.

・Append mode

This is the mode for writing to a file. The default setting is append mode.

If the FTP server does not support the append mode, use the overwrite mode.

9.3 Serial command

"**(*)**" indicates the default setting.

・FTPCMODE: The conditions for transferring the reading results.

FTPCMODE=0 **(*)**	Disable
FTPCMODE=1	Transfer on No read.
FTPCMODE=2	Transfer on Good read
FTPCMODE=3	Transfer on Good read or No read.

The connection to the FTP server is made during the first transfer.

・FTPCHOST: IP address of the FTP server to connect to.

FTPCHOST=192.168.209.110 **(*)**

・FTPCUSER: User name (31 characters or less)

FTPCUSER=ftpuser **(*)**

Note: The number of valid characters for the user name depends on the specifications of the FTP server.

・FTPCPASS: Login password (31 characters or less)

FTPCPASS=password **(*)**

Note: The number of valid characters for the login password depends on the specifications of the FTP server.

・FTPCTYPE: Connection mode

FTPCTYPE=0 **(*)** Passive mode

FTPCTYPE=1 Active mode

・FTPCHOSTDIR: Directory name of the destination FTP server

FTPCHOSTDIR=/ **(*)** 255 characters or less

The directory hierarchy that can be set is up to 10 layers.

・FTPCTXTNAME: File name of decoded data

FTPCTXTNAME=data.csv **(*)** 31 characters or less

・FTPCTXTMODE: Writing mode of decoded data

FTPCTXTMODE=0 **(*)** Append mode

FTPCTXTMODE=1 Overwrite mode

・FTPCTXTSEPA: Data separator of decoded data file

FTPCTXTSEPA=2C **(*)** Hexadecimal code (01 to FF)

・FTPCFILETYPE: Type of transferring files

FTPCFILETYPE=1 **(*)** Transfer the image data.

FTPCFILETYPE=2 Transfer the decoded data.

FTPCFILETYPE=3 Transfer both the image data and decoded data.

・FTPCNAMEFORM: Image file name format

FTPCNAMEFORM=0 (*) Standard format

FTPCNAMEFORM=1 8-character limit format

・FTPCCLOSE: Close FTP client connection.

FTPCCLOSE No command parameter

・?FTPC: Get the FTP status.

Example of display)

?FTPC

FTPCSTATUS:disconnected

FTPCMODE=0 (0:disabled 1:ng 2:ok 3:ok/ng)

FTPCHOST=192.168.209.110 (ftp server IP address)

FTPCUSER=ftpcuser (login user-id, up to 31 chara)

FTPCPASS=ftpcpass (login password, up to 31 chara)

FTPCTYPE=0 (0:passive 1:active)

FTPCHOSTDIR=/ (working directory, up to 255 chara)

FTPCFILETYPE=1 (1:image 2:text 3:both)

FTPCTXTNAME=data.csv (text file name, up to 31 chara)

FTPCTXTMODE=0 (0:append 1:over-write)

FTPCTXTSEPA=0x2C (text data separator, 0x01-0xFF)

FTPCNAMEFORM=0 (0:standard 1:8 characters)

FTPCCLOSE (disconnect)

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9.4 Date settings

・DATE: Set the year, month, date, and time.

DATE=YY/MM/DD/hh/mm

YY : Year (Last 2 digits of calendar year)

MM : Month

DD : Day

hh : Hour

mm : Minute

Each parameter is 2 digits.

e.g., DATE=20/09/07/19/34 -> September 7, 2020, 7:34 PM

The set date and time will be reset to [January 1, 2020, 0:00:0] when the device is restarted or turned off.

The date and time that can be set are in the following range.

[January 1, 2000, 0:00 AM] – [January 19, 2038, 3:14 PM]

If the time passes 3:14 on January 19, 2038, the software will not operate properly.
Note that if the DATE command is used, it should be operated so that this time does not elapse.

・?DATE: Get the date and time set by the DATE command.

Example of display)

```
?DATE
--------------------
 Date & Time      : 2021-04-18 16:43
--------------------
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```

9.5 Transfer image settings

Set the image type to be transferred.

Hereinafter, “**(*)**” shows the default setting.

・IMGSEL: Select the image to be transferred.

IMGSEL=0	Capture image (without image preprocessing)
IMGSEL=1 **(*)**	Decoded image (with image preprocessing)

・IMGBUF: Selects the image buffer to be transferred.

IMGBUF=0 **(*)**	Buffer with the last decoded image.
IMGBUF=1 to 32	Specified buffer.

10 Save images to user area

Saves image data and reading data in the ROM area of the reader.

The data in the ROM area can be transferred to a PC with FTP client software.

To use the FTP client software, enter the following user name and password.

User name: ftpuser

Password: ftppass

If there is no free space in the ROM area, each data will be discarded.

10.1 Save image data

・When SYNCMODE = 0, the decoded image is saved.

・When SYNCMODE = 1 or 2, the last decoded image is saved.

・Data format
8-bit grayscale bitmap

・File name
In case of Good read : OK_AABBCCDDEEFF_YYMMDD_hhmmss.bmp

In case of No read : NG_AABBCCDDEEFF_YYMMDD_hhmmss.bmp

AABBCCDDEEFF: MAC address
YYMMDD: Year (2 digits) Month (2 digits) Day (2 digits)
hhmmss: Hour (2 digits), minute (2 digits), second (2 digits)

The year, month, date, and time (time stamp) are set by the DATE command.
The time stamp added to the file name is the time when the file is saved.
For details on the DATE command, see "9.4 Date settings.

10.2 Save reading data

Save the decoded character string.

・Data format
Saves the read data in text format.
When the type of file to be saved is "Reading data and image data", the reading data and the name of the image file used for reading are saved in CSV format.
The separator can be set as desired.

(Example: To save only the reading data)
<read data><CR><LF>
abcdefg
BR
0123456789

(Example: To save both reading data and image data)
<read data><separator><image file name><CR><LF>
abcdefg,OK_211215-185010.bmp
BR, NG_211215-185120.bmp
0123456789, OK_211215-185204.bmp

The data at the time of No read depends on the setting of the command "BR".
(Default setting: "BR")

・File name
The file name to save the reading data. It can be set arbitrarily, but some symbols such as \ and / cannot be used.

・Append mode
This is the mode for writing to a file. The default setting is append mode.

10.3 Serial command

The default setting for each command is indicated by (*).

・UAMODE: Timing for saving
Specifies the timing for saving the reading result.

UAMODE=0 (*)	Not saved
UAMODE=1	When reading is NG
UAMODE=2	When reading is OK
UAMODE=3	When reading is both OK and NG

・UAFILETYPE: Type of file to be transferred
Specify the file to be transferred.

UAFILETYPE=1 (*)	Save the image data.
UAFILETYPE=2	Save the read data.
UAFILETYPE=3	Save both image data and read data.

・UATXTNAME: Read data file name

UATXTNAME=data.csv (*)	Up to 31 characters

・UATXTMODE: Write mode of the read data file.

UATXTMODE=0 (*)	Append mode
UATXTMODE=1	Overwrite mode

・UATXTSEPA: Data separator of read data file

UATXTSEPA=2C (*)	Specified in hexadecimal format (01 to FF)

・?UA: Status display
Displays the settings of the user area.

Display example)

```
====================
?UA
--------------------
 UAMODE=0 (0:disabled 1:ng 2:ok 3:ok/ng)
 UAFILETYPE=1 (1:image 2:text 3:both)
 UATXTNAME=data.csv (text file name, upto 31 chara)
 UATXTMODE=0 (0:append 1:over-write)
 UATXTSEPA=0x2c (text data separator, 0x01-0xFF)
--------------------
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====================
```

11 Multi Unit Connection Function

This function allows one reader to control multiple readers connected via Ethernet.

The host device only needs to be connected to one reader to control multiple readers and receive read data.

CAUTION

This function uses UDP.

The port number used is fixed at 49461.

11.1 Function description

11.1.1 Leader and Follower

Set the role of barcode scanner to Leader or Follower.

(1) Leader

It instructs the Follower to start reading and collects the reading results.

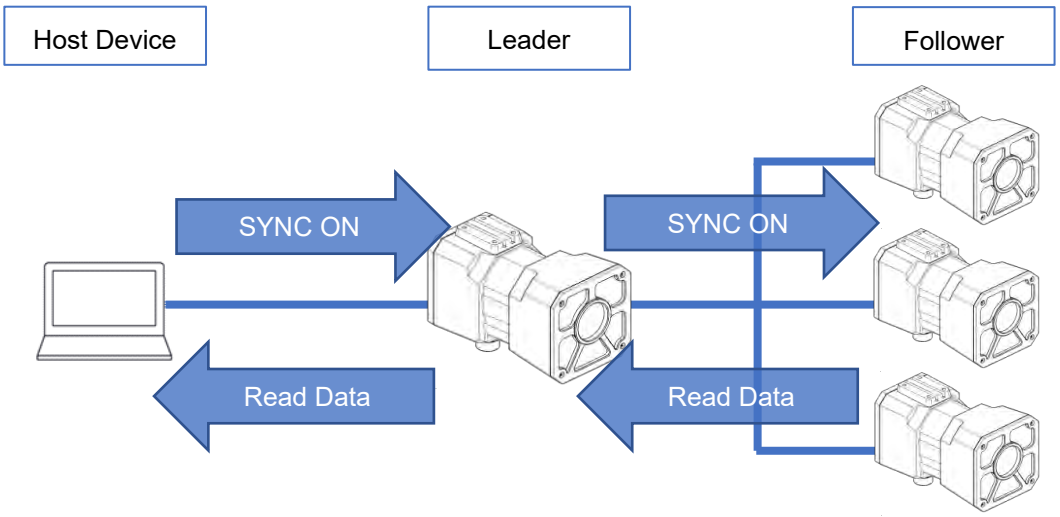
The read data is sent to the host device.

(2) Follower

It starts reading at the Leader's instruction.

Reading data is sent to the Leader.

Up to 9 Follower units can be connected.



11.1.2 **Control Mode**

This function has two control mode.

(1) Multi Unit

Leader and Follower act like a single reader.

They start reading all at once, and the Leader sends the read data from all the readers to the host device.

Read data is transmitted under the following conditions.

- The number of labels read reaches "LABELS=" setting for the Leader.
- Meet the end condition of the Leader's operation mode (SYNCMODE=).

The output order of the read data is fixed as follows.
Leader, Follower1, Follower2, …Omission…, Follower9

(2) Repeater

Leader relays communication data between the host device and Follower.

Leader and Follower start reading individually.

Follower reading data is relayed through the Leader to the host device.

Read data is transmitted under the following conditions.

- The number of labels read reaches "LABELS=" setting for each barcode scanner.
- Meet the end condition of the Leader's operation mode (SYNCMODE=).

Read data is output sequentially after each barcode scanner reading is completed.

11.2 Available functions

The table below shows the available functions in Multi Unit Connection.

11.2.1 **Multi Unit**

Term	Leader	Follower
Serial command (SYNC ON command)	✔	-
Digital input (SYNC input)	✔	-
Continuous Reading Mode (CONTMODE)	-	
Multiple symbol reading (MULTIRSY)	Only “MULTIRSY=0”	
Data output timing (OUTTIMING)	✔	-
User area (UMAMODE)	✔	-
Transfer images to FTP server (FTPCMODE)	✔	-

11.2.2 **Repeater**

Term	Leader	Follower
Serial command (SYNC ON command)	✔	✔*
Digital input (SYNC input)	✔	
Continuous Reading Mode (CONTMODE)	-	
Multiple symbol reading (MULTIRSY)	“MULTIRSY=0” and “MULTIRSY=1”	
Data output timing (OUTTIMING)	✔	
User area (UMAMODE)	✔	
Transfer images to FTP server (FTPCMODE)	✔	

* Serial command "MLTDG" to start reading.

11.3 Serial command

The default setting for each command is indicated by (*).

・MLTID:

Set the device ID of the barcode scanner.

MLTID=0 (*)	Leader
MLTID=1 to 9	Follower

・MLTCTRL:

Set the control mode.

MLTCTRL=0 (*)	Multi Unit
MLTCTRL=1	Repeater

・MLTGROUP:

Set the group name.

When operating multiple groups on the same network, set different names for each group.

MLTGROUP=GROUP01 (*) Up to 16 characters

・MLTMEMBER:
Set the device ID to be connected by the Leader.
This setting is valid only for Leader.
MLTMEMBER=1,2,3,4,5,6,7,8,9 (*)　　Device ID connected by Leader

e.g.1) When connecting to device IDs 1, 5, and 7

MLTMEMBER=1,5,7

e.g.2) When connecting to device IDs 1 to 9

MLTMEMBER=all

・MLTMODE:
Set the Multi Unit Connection function.
MLTMODE=0 (*)　　Disabled
MLTMODE=1　　Enabled

・MLTHTX: **[Dedicated settings for Multi Unit]**
Set the device ID to be added to read data.
It is valid for Leader only.
MLTHTX=0 (*)　　Disabled
MLTHTX=1　　Enabled

(Output format)

Data (MLTID:a)

a: Device ID (0 to 9)

(Output example)

ABC123(MLTID:0),DEF456(MLTID:1)

・MLTDG: **[Dedicated settings for Repeater]**
Start reading barcode scanner for specified device ID.
MLTDG=a (*)　　Specified device ID starts reading.
MLTDG=all　　Leader and all Follower start reading.

・MLTDTX: **[Dedicated settings for Repeater]**

Set the device ID to be added to read data.

MLTDTX=0 (*)	Disabled
MLTDTX=1	Enabled

(Output format)

(MLTID:a)Data

a: Device ID (0 to 9)

(Output example)

(MLTID:1)ABC123

・FBLINK:

Flashes internal illumination 5 times.

Use this function to check the installation position of the barcode scanner.

・?MLT:

Displays the settings of the multi-unit connection.

Display example)

```
====================
?MLT
--------------------
 MLTID=0              (0:LEADER,1-9:FOLLOWER)
 MLTMODE=0            (0:OFF,1:ON)
 MLTCTRL=0            (0:MULTI UNIT,1:REPEATOR)
 MLTGROUP=GROUP01
 MLTMEMBER=1,2,3,4,5,6,7,8,9
--------------------
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====================
```

・?MLTSTAT:
Displays the status of Leader’s connection with Follower.

Display example)

```
====================
?MLTSTAT
--------------------
ID      IP Address          Port    State
1       a.a.a.a             b       ccccc
2       a.a.a.a             b       ccccc
------------------------- Omission-------------------------
9       a.a.a.a             b       ccccc
--------------------
V7000
108-V1.2a
====================
```

a.a.a.a …IP Address
“0.0.0.0” for disconnected state

b …TCP Server Port Number
“0” for disconnected state

ccccc …Barcode scanner status

DISCONNECT	: Disconnected
IDLE	: Connected, stand-by state
WORKING	: Connected, reading operation
SETTING	: Connected, in operation with configuration tool

12 Serial Command

- Serial command format

  Serial command + [CR]

12.1 Communication settings

Term	Command	Description
Header	HEAD = =a =a,b	Header character Null: None **(*)** a: 0x00 to 0xff (Hexadecimal code *1) a,b: 0x00 to 0xff (Hexadecimal code *1)
Terminator	TERM = =a =a,b	Set the terminator character to be added to the read data. Null: None **(*)** a=0x00 to 0xff 、b=0x00 to 0xff a: 0x00 to 0xff (Hexadecimal code *1) a,b: 0x00 to 0xff (Hexadecimal code *1) **(*)**0x0d,0x0a
Separator	SEPA = =a =a,b	Character code Null: None a: 0x00 to 0xff (Hexadecimal code *1) **(*)**0x2c a,b: 0x00 to 0xff (Hexadecimal code *1)
Prefix	PREFIX = =a,b,c,d,e	Prefix character Null: None **(*)** a,b,c,d,e:0x00 to 0xff (Hexadecimal code *1)
Suffix	SUFFIX = =a,b,c,d,e	Suffix character Null: None **(*)** a,b,c,d,e:0x00 to 0xff (Hexadecimal code *1)
Control Code	CTRLCHAR=0 CTRLCHAR=1	Output the code through **(*)** Output the code in hexadecimal format [hex]
Command response	CMDRES=a	Command response ON/OFF setting a=0: response OFF a=1: response ON **(*)**

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

12.2 Symbologies settings

Term	Command	Description
Common	SYMDIGIT =a,b	Set the minimum (a) and maximum (b) number of digits for symbol reading. A=1 to 9999 b=1 to 9999
	SYMEDIT =a,b	Set the output start digit (a) and the number of digits (b) of the read data. A=1 to 9999 b=1 to 9999
	SYMHEAD = =a	Header character for all symbologies Null: Disable a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	SYMFOOT = =a	Footer character for all symbologies Null: Disable a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	GS1GS = =a	Convert characters which indicate the data delimiter of GS1 related symbols(FNC1). Null: Disable a=0x00 to 0xff: Delimiter after conversion (Hexadecimal code *1) 0x1d **(*) [GS]**
	GS1AI=a	Add parentheses to the application identifier of GS1 related symbols. A=0: Disable **(*)** a=1: Enable
Multi-Labels	LABELS=a	a=1-20: Number of labels a=1 **(*)**
	OUTFORM=0 OUTFORM=1 OUTFORM=2 OUTFORM=3	Output in the order of decoding **(*)** Output in the order of the specified digit-number Output in the order of the specified characters (first 2 characters) Output in the order of the specified symbologies
	OUTnVRFYD =a =a	Set label number and verification digit number. n=1 to 20: Label number a=0 to 9999: Digit number (a=0: Disable)
	OUTnVRFYC =a,b	Set label number and verification character. n=1 to 20: Label number a=0x00 to 0xff: The first character in Hexadecimal b=0x00 to 0xff: The second character in Hexadecimal b=0x00 to 0xff: The second character in Hexadecimal
	OUTnVRFYS =a	Set label number and verification symbologies. n=1 to 20: Label number a: Symbol identifier(As follows) all: Enable all symbols c128:Code39 c39:Code128 cb:Codabar itf:ITF c93:Code93 uje:JAN/EAN/UPC db:GS1 Databar cc:Composite Code dm:DataMatrix qr:QR Code pdf:PDF417 az:Aztec Code

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
Code39	C39MODE=0	Disable Code39
	C39MODE=1	Enable Code39, checksum disable **(*)**
	C39MODE=2	Enable Code39, checksum enable and output
	C39MODE=3	Enable Code39, checksum enable and not output
	C39MODE=4	Enable Code39, checksum disable, Full ASCII mode
	C39MODE=5	Enable Code39, checksum enable and output, Full ASCII mode
	C39MODE=6	Enable Code39, checksum enable and not output, Full ASCII mode
	C39SS=0	Disable Code39 start/stop code output. **(*)**
	C39SS=1	Enable Code39 start/stop code output.
	C39DIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of Code39. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C39EDIT =a,b	Set the output start digit (a) and the number of digits (b) of Code39. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C39HEAD = =a	Header character of Code39 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	C39FOOT = =a	Footer character of Code39 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
Code128 GS1-128	C128MODE=0	Disable Code128/GS1-128.
	C128MODE=1	Enable Code128/GS1-128. **(*)**
	C128DIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of Code128/GS1-128. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C128EDIT =a,b	Set the output start digit (a) and the number of digits (b) of Code128/GS1-128. A=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C128HEAD = =a	Header character of Code128/GS1-128 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	C128FOOT = =a	Footer character of Code128/GS1-128 Null: Disable **(*)** a=0x00-0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
Codabar	CBMODE=0	Disable Codabar
	CBMODE=1	Enable Codabar, checksum disable **(*)**
	CBMODE=2	Enable Codabar, checksum enable and output
	CBMODE=3	Enable Codabar, checksum enable and not output
	CBSS=0	Disable Codabar start/stop code output.
	CBSS=1	Enable Codabar start/stop code output. **(*)**
	CBCS=0	Output Codabar start/stop codes in lowercase.
	CBCS=1	Output Codabar start/stop codes in uppercase. **(*)**
	CBCHK=0	Checksum algorithm: Modulus 16 **(*)**
	CBCHK=1	Checksum algorithm: 7DR
	CBDIGIT	Set minimum (a) and maximum (b) digit numbers of Codabar.
	=a,b	a=1 to 9999 a=1 **(*)**
		b=1 to 9999 b=9999 **(*)**
	CBEDIT	Set the output start digit (a) and the number of digits (b) of Codabar.
	=a,b	a=1 to 9999 a=1 **(*)**
		b=1 to 9999 b=9999 **(*)**
	CBHEAD	Header character of Codabar
	=	Null: Disable **(*)**
	=a	a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	CBFOOT	Footer character of Codabar
	=	Null: Disable **(*)**
	=a	a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
ITF	ITFMODE=0	Disable ITF
	ITFMODE=1	Enable ITF, checksum disable **(*)**
	ITFMODE=2	Enable ITF, checksum enable and output
	ITFMODE=3	Enable ITF, checksum enable and not output
	ITFDIGIT	Set minimum (a) and maximum (b) digit numbers of ITF.
	=a,b	a=1 to 9999 a=6 **(*)**
		b=1 to 9999 b=9999 **(*)**
	ITFEDIT	Set the output start digit (a) and the number of digits (b) of ITF.
	=a,b	a=1 to 9999 a=1 **(*)**
		b=1 to 9999 b=9999 **(*)**
	ITFHEAD	Header character of ITF
	=	Null: Disable **(*)**
	=a	a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	ITFFOOT	Footer character of ITF
	=	Null: Disable **(*)**
	=a	a=0x00 to 0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
Code93	C93MODE=0 C93MODE=1	Disable Code93 Enable Code93 **(*)**
	C93DIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of Code93. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C93EDIT =a,b	Set the output start digit (a) and the number of digits (b) of Code93. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	C93HEAD = =a	Header character of Code93 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	C93FOOT = =a	Footer character of Code93 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
UPC/EAN/JAN	UJEMODE=0 UJEMODE=1	Disable UPC/EAN/JAN Enable UPC/EAN/JAN **(*)**
	JE13SUM=0 JE13SUM=1	Disable checksum output in EAN/JAN (standard 13 digits). Enable checksum output in EAN/JAN (standard 13 digits). **(*)**
	JE8SUM=0 JE8SUM=1	Disable checksum output in EAN/JAN (standard 8 digits). Enable checksum output in EAN/JAN (standard 8 digits). **(*)**
	UPCASUM=0 UPCASUM=1	Disable checksum output of UPC-A. Enable checksum output of UPC-A. **(*)**
	UPCESUM=0 UPCESUM=1	Disable checksum output of UPC-E. Enable checksum output of UPC-E. **(*)**
	UPCANS=0 UPCANS=1	Disable number system output of UPC-A. Enable number system output of UPC-A. **(*)**
	UPCENS=0 UPCENS=1	Disable number system output of UPC-E. Enable number system output of UPC-E. **(*)**
	UPCEFORM=0 UPCEFORM=1	Output UPC-E in UPC-A format. **(*)** Output UPC-E in UPC-E format.
	UPCAFORM=0 UPCAFORM=1	Disable to add 0 to the first data of UPC-A. **(*)** Enable to add 0 to the first data of UPC-A.
	UJEDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of UPC/EAN/JAN. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	UJEEDIT =a,b	Set the output start digit (a) and the number of digits (b) of UPC/EAN/JAN. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	UJEHEAD = =a	Header character of UPC/EAN/JAN Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	UJEFOOT = =a	Footer character of UPC/EAN/JAN Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
GS1 DataBar	DBMODE=0	Disable GS1 Databar
	DBMODE=1	Enable GS1 DataBar (Expanded)
	DBMODE=2	Enable GS1 DataBar (Expanded Stacked)
	DBMODE=4	Enable GS1 DataBar (Limited)
	DBMODE=8	Enable GS1 DataBar (Omnidirectional, Truncated)
	DBMODE=16	Enable GS1 DataBar (Stacked, Stacked Omni directional)
	DBMODE=63	Enable GS1 DataBar (all types) **(*)**
	DBDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of GS1 DataBar. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	DBEDIT =a,b	Set the output start digit (a) and the number of digits (b) of GS1 DataBar. A=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	DBEHEAD = =a	Header character of GS1 DataBar Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	DBFOOT = =a	Footer character of GS1 DataBar Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
Composite Code	CCMODE=0	Disable Composite **(*)**
	CCMODE=2	Enable GS1 DataBar Composite
	CCDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of Composite. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	CCEDIT =a,b	Set the output start digit (a) and the number of digits (b) of Composite. A=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	CCEHEAD = =a	Header character of Composite Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	CCFOOT = =a	Footer character of Composite Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
DataMatrix	DMMODE=0	Disable DataMatrix
	DMMODE=1	Enable DataMatrix (Square, Normal label)
	DMMODE=2	Enable DataMatrix (Square, Black/White inverted label)
	DMMODE=3	Enable DataMatrix (Square, Black/White inverted and Normal label)
	DMMODE=5	Enable DataMatrix (Square and Rectangle, Normal label)
	DMMODE=6	Enable DataMatrix (Square and Rectangle, Black/White inverted label)
	DMMODE=7	Enable DataMatrix (All types) **(*)**
	DMDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of DataMatrix. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	DMEDIT =a,b	Set the output start digit (a) and the number of digits (b) of DataMatrix. A=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	DMHEAD = =a	Header character of DataMatrix Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	DMFOOT = =a	Footer character of DataMatrix Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
QR Code Micro QR Code	SET=QM0	Disable QR Code
	SET=QM1	Enable QR Code, (Normal label)
	SET=QM2	Enable QR Code, (Black/White inverted label)
	SET=QM3	Enable QR Code, (All types) **(*)**
	QRDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of QR Code. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	QREDIT =a,b	Set the output start digit (a) and the number of digits (b) of QR Code. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	QRHEAD = =a	Header character of QR Code Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	QRFOOT = =a	Footer character of QR Code Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
PDF417	PDFMODE=0 PDFMODE=1	Disable PDF417 Enable PDF417 **(*)**
	PDFDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of PDF417. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	PDFEDIT =a,b	Set the output start digit (a) and the number of digits (b) of PDF417. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	PDFHEAD = =a	Header character of PDF417 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	PDFFOOT = =a	Footer character of PDF417 Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
Aztec Code	AZMODE=0 AZMODE=1 AZMODE=2 AZMODE=3	Disable Aztec Code **(*)** Enable Aztec Code, (Normal label) Enable Aztec Code, (Black/White inverted label) Enable Aztec Code, (All types)
	AZDIGIT =a,b	Set minimum (a) and maximum (b) digit numbers of Aztec Code. a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	AZEDIT =a,b	Set the output start digit (a) and the number of digits (b) of Aztec Code a=1 to 9999 a=1 **(*)** b=1 to 9999 b=9999 **(*)**
	AZHEAD = =a	Header character of Aztec Code Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)
	AZFOOT = =a	Footer character of Aztec Code Null: Disable **(*)** a=0x00 to 0xff: Identifying character (Hexadecimal code *1)

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

12.3 Symbol Reading (Operating mode, adjustment, diagnostic)

Term	Command	Description
Reading	G	Start reading (SYNC ON)
	BR=a,b,c,d,e	No read message a,b,c,d,e=0x00 to 0xff: No read message (Hexadecimal code *1) a=0x42,b=0x52 **(*)"BR"**
	SONCMD = =a,b,c,d,e,f,g,h	Set character string for SYNC ON command (8 characters or less). Null: None **(*)** a,b,c,d,e,f,g,h=0x00 to 0xff: SYNC ON character string (Hexadecimal code *1)
	SOFFCMD = =a,b,c,d,e,f,g,h	Set character string for SYNC OFF command (8 characters or Null: None **(*)** a,b,c,d,e,f,g,h=0x00 to 0xff: SYNC OFF character string (Hexadecimal code *1)
Operation Mode	SYNCMODE =a	a=0: Single Reading Mode a=1: Timeout Mode **(*)** a=2: External Trigger Mode
	OUTTIMING =a	Data output timing a=0: After decoding **(*)** a=1: After SYNC OFF
	TOTALLIM =a,b	Decode timeout a=0: Set by time **(*)** a=1: Reserved b=1000 to 30000 [ms]: Timeout value b=3000 **(*)**
Continuous Reading Mode	CONTMODE =a	Set Continuous Reading Mode a=0: Disable **(*)** a=1: Enable
	CONTINTVL =a,b	Set the waiting time for the next reading. a=0: Specify by time **(*)** a=1: Reserved b=0 to 10000 [ms]: Waiting time b=1000 **(*)**
	CONTVRFY=0 CONTVRFY=1	Permits continuous reading of the same data in continuous reading mode. **(*)** Prohibits continuous reading of the same data in continuous reading mode.
	CONTVTIM =a	Set the time to prohibit reading the same data when reading in continuous reading mode. The prohibition time is reset each time the same data is read. A=0 to 20 [s]: Prohibition time a=5 **(*)**
I/O Test	IOTEST=a,b	Turn on I/O output during specified time. A=D1: OUT1 port D2: OUT2 port LA: LED (READY) LB: LED (SYNC) LC: LED (GO) LD: LED (NG) LW: LED (wireless) b=0: OFF (*) 1 to 1000 [ms]: Turn on during specified time -1: Remain ON
Reading Count Statistics	?TOTAL1	Output the number of times since power-on. (SYNC ON, Good Read, No Read)
Reading Time Statistics	?TOTAL2	Output the decoding time of Good Read, No Read (Minimum, and average) since power-on.
Clearing Statistics	CLRTOTAL	Clear all items in ?TOTAL1, 2, and 3.

"**(*)**" indicates the default setting.
(*1) Refer to 12.21 Character Code Table.

Term	Command	Description
Symbology Information	SYMIDTX=a	a=0: Disable addition of SYMIDTX. **(*)** a=1: Enable addition of SYMIDTX.
Decoding time	DTTX=a	a=0: Disable addition of DTTX for each ROI. **(*)** a=1: Enable addition of DTTX for each ROI.
	RTTX=a	a=0: Disable addition of RTTX (including capturing time). **(*)** a=1: Enable addition of RTTX (including capturing time).
Total time of decoding	TTTX=a	a=0: Disable addition of TTTX. **(*)** a=1: Enable addition of TTTX.
Imaging condition	CAMTX=a	a=0: Disable addition of CAMTX. **(*)** a=1: Enable addition of CAMTX.
Table Number	TBLTX=a	a=0: Disable addition of TBLTX. **(*)** a=1: Enable addition of TBLTX.
Individual Name	MYNAME=a	Set individual name (31 characters or less) **(*)** My Reader
	NAMETX=a	a=0: Disable addition of NAMETX. **(*)** a=1: Enable addition of NAMETX.
Contrast Information	CONTTX=a	a=0: Disable addition of CONTTX. **(*)** a=1: Enable addition of CONTTX.
	CONTROI =a,b	Set the contrast calculation area for No Read. a=0 to 2: Percentage of ROI in the horizontal direction. A=0 **(*)** b=0 to 2: Percentage of ROI in the vertical direction. B=0 **(*)** (0: 100%, 1: 75%, 2: 50%)
Quality Information	QTTX=a	a=0: Disable addition of QTTX. **(*)** a=1: Enable addition of QTTX.
Mirrored Image Information	MRTX=a	a=0: Disable addition of MRTX **(*)** a=1: Enable addition of MRTX If it is a mirrored image, add MR-ON. If it is not a mirrored image, add MR-OFF.
Symbol Position Information	XYTX=a	a=0: Disable output coordinate data. **(*)** a=1 to 3: Enable output coordinate data. a=1: Barycentric coordinates a=2: Rectangular coordinates a=3: Barycentric and Rectangular coordinates
Capture and Decode Information	CDTX=a	a=0: Disable addition of CDTX **(*)** a=1: Enable addition of CDTX (Number of capture and decode)
Module Information	MDLTX=a	a=0: Disable addition of MDLTX **(*)** a=1: Enable addition of MDLTX
Decode grade	DRTX=a	a=0: Disable addition of DRTX **(*)** a=1: Enable addition of DRTX
Pass/Fail result	GONGTX=a	a=0: Disable addition of GONGTX **(*)** a=1: Enable addition of GONGTX
Comparison result	VERITX=a	a=0: Disable addition of VERITX **(*)** a=1: Enable addition of VERITX
Delay Time	DELAY=a	Set the delay time from SYNC ON to the start of image capture. A=0 to 30000 [ms], 10ms step a=0 **(*)**

"**(*)**" indicates the default setting.

"**(*)**" indicates the default setting.

Camera Control (1)

Term	Command	Description
Cycle Buffer Function	MAXIMG=a	Number of captured images a=1 to 32 a=1 **(*)**
	CAPINTVL =a,b	Interval between captured images a=0: Set by time a=1: Reserved b=0 to 1000 [ms] a=100 **(*)**
	CAPLIM=a	Operation setting when the number of captures exceeds the MAXIMG. A=0: Overwrite the cycle buffer memory and continue to capture. **(*)** a=1: Stop capture.

12.4 Camera Control (1)

Term	Command	Description
Illumination Control	LIGHT=a	Set the lighting timing. a=0: Illumination OFF a=1: Illumination ON (Capture time) **(*)** a=2: Illumination ON (SYNC ON period) a=3: Illumination ON (Always) * *: Turn on at 55% brightness setting in standby.
Image Orientation	CAMFLIP=a	Set the orientation of the captured image. a=0: Original **(*)** a=1: Flip horizontal a=2: Flip vertical a=3: Flip vertical and horizontal (180-degree rotation)

"**(*)**" indicates the default setting.

12.5 Camera Control (2) (for Table Mode)

Term	Command	Description
Number of Tables	ENABLETBL =a	Set the number of tables to be enabled. a=1 to 16 a=1 **(*)** In case of a=3, Table #1, #2 and #3 are enabled and Table #4 through #16 are disabled. In case of a=1, Table #1 is enabled. In this case, the shutter speed and gain settings are fixed.

Illumination Brightness	TBLnFLASH =a,b,c,d,e	Set the lighting brightness of Table #n.
		n=1 to 16:Table number
		a=0 to 100: External illumination
		b=0 to 100: Internal illumination-A
		c=0 to 100: Internal illumination-B
		d=0 to 100: Internal illumination-C
		e=0 to 100: Internal illumination-D
		0(Illumination OFF), 1(Dark) to 100(Bright)
		default setting
		Standard : a,b,c,d,e=100
		High resolution : a=100, b,c,d,e=0

Shutter Speed	TBLnSHUTT =a	Set the shutter speed of Table #n.
		n=1 to 16: Table number
		a=0 to 9: Shutter speed
		0: 1/60 [sec] 1: 1/125 [sec] 2: 1/250 [sec] **(*)**
		3: 1/500 [sec] 4: 1/1000 [sec] 5: 1/2000 [sec]
		6: 1/4000 [sec] 7: 1/6000 [sec] 8: 1/8000 [sec]
		9: 1/10000 [sec]

Gain	TBLnGAIN =a	Set the gain of Table #n.
		n=1 to 16: Table number
		a=0 to 60: Gain a=0 **(*)**
		0(Dark) to 60(Bright)

Black Level	TBLnBLKLV =a	Set the black level of Table #n. Setting for improving the contrast of a captured image. N=1 to 16: Table number a=0 to 4095: Black level a=0 **(*)** 0(Dark) to 4095(Bright) *Contrast decreases with brighter settings

"**(*)**" indicates the default setting.

- The default value is the same in Table 1 to 16.

12.6 Image Preprocessing

Term	Command	Description
None	0	No Image Preprocessing
Black Erosion	1	Erosion 2x2
	3	Erosion 3x3
	5	Erosion 5x5
	7	Erosion 1x2 (h)
	9	Erosion 2x1 (w)
White Dilation	2	Dilation 2x2
	4	Dilation 3x3
	6	Dilation 5x5
	8	Dilation 1x2 (h)
	10	Dilation 2x1 (w)
Reverse	20	White & Black Reverse
Contrast Enhancement	21	Cont(L12cut) Truncates the 12% of dark side.
	22	Cont(L25cut) Truncates the 25% of dark side.
	23	Cont(H12cut) Rounds up the 12% of bright side.
	24	Cont(H25cut) Rounds up the 25% of bright side.
	25	Cont(LH12cut) Truncates the 12% of dark side and rounds up the 12% of bright side.
	26	Cont(LH25cut) Truncates the 25% of dark side and rounds up the 25% of bright side.
Gamma	27	Gamma(r=2) Perform a Gamma Correction (2)
Smoothing	40	Low pass 3x3 Smoothing filter Average value
Median Filter	41	Median filter 3x3 Median value
Downsize	70	Down Size (Quick) Reduction of the whole image (speed priority)
Downsize	71	Down Size (Average) Reduction of the whole image (luminance average)

12.7 ROI (Region of Interest)

Term	Command	Description
Multiple Symbol reading	MULTIRSY=a	Set multiple symbol reading for the ROI. a=0: Batch reading of multiple symbols in a single ROI. A=1: Read one symbol per ROI.
Resul output Order	ROIOUTFORM =a,b,c,…	Set the output order of ROI. a,b,c,…=1 to 20: ROI number a,b,c,…=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20 **(*)** In case ROIOUTFORM=1,3,4, output ROI #1, #3, and #4 in that order. In case ROIOUTFORM=5,7,1,9, output ROI #5, #7, #1, #9 in that order.

ROI size	ROInSIZE =a,b,c,d	Set the size of ROI #n.
		n=1 to 20: ROI number
		a=0 to 2447: X-coordinate of starting point a=0 **(*)**
		b=0 to 2047: Y-coordinate of starting point b=0 **(*)**
		c=1 to 2448: Width c=2448 **(*)**
		d=1 to 2048: Height d=2048 **(*)**

Processing contents	ROInSET=a	Set the processing contents of ROI #n.
		n=1 to 20: ROI number
		a=1: Symbol reading a=1 **(*)**

Decode time limit	ROInTOUT=a	Set the decoding time limit for ROI #n.
		n=1 to 20: ROI number
		a=50 to 10000 [ms]: 10[ms] step a=500 **(*)**

Symbol type	RSYnTYPE =a,b,c…	Set the symbol type for ROI #n.
		n=1 to 20: ROI number
		=a,b,c…
		Null: Disable all symbols all: Enable all symbols
		c128: Code128 c39: Code39 c93: Code93
		cb: Codabar db: GS1 DataBar itf: Inter leaved 2 of 5
		uje: UPC/JAN/EAN dm: DataMatrix qr: QR Code/Micro QR
		az: Aztec Code pdf: PDF417/Micro PDF
		cc: Composite Code
		a,b,c…=c128,c39,c93,cb,db,itf,uje,dm,qr,az,pdf **(*)**
		In case RSY1TYPE=dm,c39, read DataMatrix and Code39 in ROI #1.
		In case RSY2TYPE=all, read all symbols in ROI #2.

Mirrored image	RSYnMIRROR =a	Set the mirrored image for ROI #n.
		n=1to 20: ROI number
		a=0: Read only normal type (not mirrored).
		a=1: Read only mirrored type.
		a=2: Read both normal and mirrored type. **(*)**

DPM option	RSYnDPM=a	Set the DPM option for ROI #n.
		n=1 to 20: ROI number
		a=0: Normal use (not DPM) **(*)**
		a=1: Dot peen (black on white)
		a=2: Dot peen (white on black)
		a=3: Laser / Chemical etching

"**(*)**" indicates the default setting.

- The default value is the same in ROI 1 to 20.

Term	Command	Description

Matching Function	RSYnVERIMODE =a	Set the matching function for ROI #n.
		n=1 to 20: ROI number
		a=0: Disable **(*)**
		a=1: Matching with registration data.
		A=2: Matching with specified ROI.

	RSYnVERIDATA =a	Register matching data. n=1 to 20: ROI number a=: Maximum 50 characters a=Null **(*)**
	RSYnVERIROINO =a	Set the ROI number to be checked. n=1 to 20: ROI number a=1 to 20: ROI number to check. A=1 **(*)**
	RSYnVERISTART =a	Set the start digit of the matching data. n=1 to 20: ROI number a=1 to 9999: Starting digit a=1 **(*)**
	RSYnVERIMASK =a	Set the mask string. n=1 to 20: ROI number a=: Up to 50 characters of + or -. A=Null **(*)** +: Matching -: Not matching

"**(*)**" indicates the default setting.

- The default value is the same in ROI 1 to 20.

12.8 Focus Control

Term	Command	Description
Reading range	FCSRANGE1 =a,b	Set the reading range from the cell size and the number of pixels. a=0.03 to 10(V7000): Cell size [mm] a=0 **(*)** 0.02 to 10(V7000-H) b=1.0 to 100: Number of imaged pixels b=0 **(*)**
Focus area	FCSAREA= a,b,c,d	Set the adjustment area for focus adjustment. a=0 to 2447: X-coordinate of starting point a=1063 **(*)** b=0 to 2047: Y-coordinate of starting point b=863 **(*)** c=75 to 640: Width c=320 **(*)** d=75 to 640: Height d=320 **(*)**
Focus Adjustment	FCSDIST=a	a=-1: Adjust the focus to the distance acquired by the distance sensor. a=min to max [mm]: Adjust the focus to the specified distance. a=0 **(*)** V7000 …min=150, max=2500 V7000-H …min=84, max=2500 Suspend focus adjustment when outside the reading range.
Initialize Focus Settings	SETFCS	Initialize the reading range and focus adjustment settings. Move the lens position to the origin.

"**(*)**" indicates the default setting.

"FCSRANGE1=0,0" and "FCSDIST=0" mean that the focus is not set.

12.9 Auto Tuning

Term	Command	Description
Auto Tuning	*SETUP	Start Auto Tuning.
Cancel	*CANCEL	Cancel the running Auto Tuning.
Auto Tuning Status	*?STATE	Get status the running Auto Tuning. STANDBY Standby RECEIVED Auto-Tuning running SAVEWAIT Tuning successful. Waiting for save. ABORTED Tuning failure CANCELED Cancel (No response) During read operation
Save tuning Result (Specify)	*SAVE=a,b,c	Save the Auto Tuning result. a=1 to 3: Number of tables saved b=1 to 16: Table number c=1 to 20: ROI number
Lower limit of Shutter speed	STPSHUTTLIM =a	Set the lower limit of shutter speed for Auto Tuning. a=0 to 9: Shutter speed 0: 1/60 [sec] **(*)** 1: 1/125 [sec] 2: 1/250 [sec] 3: 1/500 [sec] 4: 1/1000 [sec] 5: 1/2000 [sec] 6: 1/4000 [sec] 7: 1/6000 [sec] 8: 1/8000 [sec] 9: 1/10000 [sec]
Decoding time Limit	STPDECLIM=a	Set the decoding time limit for Auto Tuning. a=50 to 2000 [ms]: 10[ms] step a=500 **(*)**
ROI	STPROISIZE =a,b,c,d	Set the ROI size for Auto Tuning. a=0 to 2447: X-coordinate of starting point a=0 **(*)** b=0 to 2047: Y-coordinate of starting point b=0 **(*)** c=1 to 2448: Width c=2448 **(*)** d=1 to 2048: Height d=2048 **(*)**
Result output	*?RESULT	Output the result of Auto Tuning.

"**(*)**" indicates the default setting.

12.10 Industrial Ethernet

Term	Command	Description
Industrial Ethernet	IEMODE=a	Industrial Ethernet setting a=0: Exit **(*)** a=1: Start (EtherNet/IP)

"**(*)**" indicates the default setting.

12.11 Image Output

Term	Command	Description
Image Selection	IMGSEL=a	Select the image to be transferred. a=0: Capture image (without image preprocessing) a=1: Decoded image (with image preprocessing) **(*)**
Transfer Preparation	IMGBUF=a	Image settings to be transferred to the host PC. a=0: Last decoded image a=1 to 32: Image number of the cycle buffer (related to MAXIMG).

"**(*)**" indicates the default setting.

12.12 Ethernet settings

Term	Command	Description
Ethernet Settings	SETLAN	Initialize the IP address, port number, and default gateway.
	?LAN	Get the list of Ethernet settings.
	IP1ADR= Aaa.bbb.ccc.ddd/ee	Set the IP address and subnet mask for wired LAN1. 192.168.209.10/24 **(*)** aaa=1 to 126, 128 to 223 bbb=0 to 255 ccc=0 to 255 ddd=0 to 255 ee=2 to 30
	TCP1PORT=aaaaa	Set the port number for wired LAN1. aaaaa: 1024 to 65355 27110**(*)**
	GW1ADR= Aaa.bbb.ccc.ddd	Set the default gateway for wired LAN1. 192.168.209.254 **(*)**
	TCP1SVADR= aaa.bbb.ccc.ddd:ee	Destination settings for wired LAN1 (IP address, port number) 0.0.0.0:27120 **(*)**
	TCP1CRTIM=a	Connection request interval for wired LAN1 a=0 to 100 [s] 0 **(*)**
	TCP1STOUT=a	Session timeout for wired LAN1 a=0 to 100 [s] 0 **(*)**
	?WHO	Get the status for Ethernet settings.
	?NETSTAT	Get the connection status for TCP server communication.
	DISCON=a,b	Forcibly disconnect the specified TCP communication. a=1: wired LAN1 b=1024 to 65535: Port number

"**(*)**" indicates the default setting.

12.13 FTP settings

Term	Command	Description
FTP settings	FTPCMODE=a	Conditions for transferring reading results a=0: Disable **(*)** a=1: Transfer on No read. a=2: Transfer on Good read a=3: Transfer on Good read or No read.
	FTPCHOST= Aaa.bbb.ccc.ddd	IP address of the FTP server to connect to. 192.168.209.110 **(*)**
	FTPCUSER=aaaaaaa	User name for login ftpuser **(*)** (31 characters or less)
	FTPCPASS=aaaaaaa	Set the login password. Password **(*)** (31 characters or less)
	FTPCTYPE=a	FTP connection mode a=0: Passive mode **(*)** a=1: Active mode
	FTPCHOSTDIR=/aaa/	Directory name of the destination FTP server /aaa/=/ **(*)** (255 characters or less. Include "/".)
	FTPCTXTNAME=aaaaa	File name of decoded data aaaaa=data.csv **(*)** (31 characters or less)
	FTPCTXTMODE=a	Writing mode of decoded data a=0: Append mode **(*)** a=1: Overwrite mode
	FTPCTXTSEPA=aa	Data separator of decoded data file aa=01 to FF *: NULL (00) is not allowed. 2C **(*)** (comma ",")
	FTPCFILETYPE=a	Type of transferring files a=1: Transfer the image data. **(*)** a=2: Transfer the decoded data. a=3: Transfer both the image data and decoded data.
	FTPCNAMEFORM=a	Image file name format a=0: Standard **(*)** a=1: 8-character limit
	FTPCCLOSE	Close FTP client connection.
	?FTPC	Get the FTP status.
	DATE= YY/MM/DD/hh/mm	Date and time settings DATE=YY/MM/DD/hh/mm YY: Year (Last 2 digits of calendar year) MM: Month DD: Day hh: Hour mm: Minute Note: Each parameter is 2 digits. 20/01/01/00/00 **(*)** Default setting is 2020/01/01 00:00:00.
	?DATE	Get the date and time.

"**(*)**" indicates the default setting.

12.14 User area settings

Term	Command	Description
User area	UAMODE=a	Set the timing for saving the reading results. a=0: Not saved **(*)** a=1: When reading is NG a=2: When reading is OK a=3: When reading is both OK and NG
	UATXTNAME=aaaaa	Set the file name. aaaaa=data.csv **(*)** (up to 31 characters)
	UATXTMODE=a	Set the write mode of the file. a=0: Append mode **(*)** a=1: Overwrite mode
	UATXTSEPA=aa	Set the data separator. aa=01 to FF *: NULL (00) is not allowed. 2C **(*)** (comma ",")
	UAFILETYPE=a	Set the file type. a=1: Save the image data **(*)** a=2: Save the reading data. a=3: Save image data and read data

"**(*)**" indicates the default setting.

12.15 Symbol Printing Check

Term	Command	Description
Print quality information	PQTX=a	a=0: Disable addition of PQTX. **(*)** a=1: Enable addition of PQTX.
Output terms	PQTYPE2D=a	Set the terms of 2D codes check output. a=1: ISO/IEC 15415 overall quality a=2: ISO/IEC TR 29158 overall quality a=3: All ISO/IEC 15415 check items a=4: All ISO/IEC TR 29158 check items **(*)**
Comprehensive Quality check items	PQITEM2D=a,b,c,…	Set the items of comprehensive quality. a,b,c… 0: Comprehensive judgment (The value of the item of the lowest grade in 1 to 7) **(*)** 1: Contrast (ISO) / Cell contrast (ISOTR) 2: Modulation (ISO) / Cell modulation (ISOTR) 3: Fixed pattern defect 4: Docode 5: Non-uniformity of axis 6: Non-uniformity of grids 7: Unused error correction
Threshold for Checking result	PQOKTH=a	Set the judgement threshold for overall quality when PQTX=1. a=0 to 4 0 **(*)** a=0: Disable the judgement. Judge as OK when the overall quality value is greater than or equal to the set value.
Print growth (or loss) Information	PGTX=a	a=0: Disable addition of PGTX. **(*)** a=1: Enable addition of PGTX. Note: Enable when PQTX=1.

"**(*)**" indicates the default setting.

12.16 Trapezoid correction

Term	Command	Description
Enable/Disable	TRPCORRECTION=a	a=0: Disable trapezoid correction. **(*)** a=1: Enable trapezoid correction.
Coordinate Setting	TRPROI=a,b,c,d,e,f,g,h,I,j,k,L,m,n,o,p	Set the coordinates before and after the trapezoid correction. a=-500 to 2947 a=0 **(*)** Coordinate pre-correction (upper left) X-coordinate b=-400 to 2447 b=0 **(*)** Coordinate pre-correction (upper left) Y-coordinate c=-500 to 2947 c=2447 **(*)** Coordinate pre-correction (upper right) X-coordinate d=-400 to 2447 d=0 **(*)** Coordinate pre-correction (upper right) Y-coordinate e=-500 to 2947 e=2447 **(*)** Coordinates pre-correction (lower right) X-coordinate f=-400 to 2447 f=2047 **(*)** Coordinates pre-correction (lower right) Y-coordinate g=-500 to 2947 g=0 **(*)** Coordinates pre-correction (lower left) X-coordinate h=-400 to 2447 h=2047 **(*)** Coordinates before correction (lower left) Y-coordinate i=-500 to 2947 i=0 **(*)** Coordinate corrected correction (upper left) X-coordinate j=-400 to 2447 j=0 **(*)** Coordinate corrected correction (upper left) Y-coordinate k=-500 to 2947 k=2447 **(*)** Coordinate corrected correction (upper right) X-coordinate l=-400 to 2447 l=0 **(*)** Coordinate corrected correction (upper right) Y-coordinate m=-500 to 2947 m=2447 **(*)** Coordinates corrected correction (lower right) X-coordinate n=-400 to 2447 n=2047 **(*)** Coordinates corrected correction (lower right) Y-coordinate o=-500 to 2947 o=0 **(*)** Coordinates corrected correction (lower left) X-coordinate p=-400 to 2447 a=2047 **(*)** Coordinates corrected correction (lower left) Y-coordinate
Save settings	WSETT	Save the trapezoid correction settings to flash ROM.
Initialize settings	SETTRP	Initialize the trapezoid correction settings.

"**(*)**" indicates the default setting.

12.17 Setup

Term	Command	Description

Setup	PSAVE=a	Save the current barcode scanner settings to ROM as Setup #a.
		a=1 to 20: Setup number

	PLOAD=a	Load the settings of the Setup #a stored in ROM.
		a=1 to 20: Setup number

	PERASE=a	Erase the Setup #a stored in ROM.
		a=1 to 20: Setup number

	PNTX=a	Addition of setup number a=0: Disable addition of PNTX **(*)** a=1: Enable addition of PNTX.
	PNAME=a,b	Setup name a=1 to 20: Setup number b=32 alphanumeric characters
	WSETP	Save the setup name in ROM.
	?PLIST	Get the list of setup name.
	?PSTAUS	Get all setup settings in ROM.
	?PSTAUS=a	Get the setting of Setup_a. a=1 to 20: Setup number

"**(*)**" indicates the default setting.

12.18 Multi Unit Connection Function

Term	Command	Description
Device ID	MLTID=a	a=0: Leader **(*)** a=1 to 9: Follower
Enable/Disable	MLTMODE=a	a=0: Disable Multi Unit Connection function. **(*)** a=1: Enable Multi Unit Connection function.
Control Mode	MLTCTRL=a	a=0: Multi Unit **(*)** a=1: Repeater
Group Name	MLTGROUP=a	Set Group Name (16 characters or less) **(*)** GROUP01
Member	MLTMEMBER=a,b,c …	Set the device ID to be connected to by the leader a,b,c…=1-9: Device ID to be connected all: All device id a,b,c…=1,2,3,4,5,6,7,8,9 **(*)** In case MLTMEMBER=1,2,3, Connect to device ID 1,2,3 In case MLTMEMBER=all, Connect to all device ID(1 to 9)
Add device ID (For Multi Unit)	MLTHTX=a	a=0: Disable addition of MLTHTX **(*)** a=1: Enable addition of MLTHTX
Add device ID (For Repeater)	MLTDTX=a	a=0: Disable addition of MLTDTX **(*)** a=1: Enable addition of MLTDTX
SYNC ON (For Repeater)	MLTDG=a	Starts reading the reader with the specified device ID † Only when control is set to Repeater a=1 to 9: Starts reading the specified device ID a=all: Start reading all devices including leader
Blink Illumination	FBLINK	Blink internal illumination 5 times.

"**(*)**" indicates the default setting.

12.19 Configuration Reference

Term	Command	Description
Configuration reference	?	Status transmission (First page)
	?2	Status transmission (Second page)
	?3	Status transmission (Third page)
	?4	Status transmission (Fourth page)
	?IMG	Status transmission (Settings for image output)
	?TBL	Status transmission (Settings for Table Mode)
	?ROI	Status transmission (Settings for ROI)
	?FCS	Status transmission (Settings for Focus adjustment)
	?TRP	Status transmission (Settings for trapezoid correction)
	?TX	Status transmission (Settings for additional information)
	?IE	Status transmission (Settings for Industrial Ethernet)
	?UA	Status transmission (Settings for user area)
	?PQ	Status transmission (Settings for symbol printing check)
	?IO	Status transmission (Settings for buzzer and digital I/O)
	?VER	Status transmission (Model name and software version)
	?READY	Status transmission (Status of Ready Signal)
	?STP	Status transmission (Status of Auto Tuning)
	?MLT	Status transmission (Settings for Multi Unit Connection)
	?MLTSTAT	Status transmission (Connection State for Leader)

12.20 General Operation

Term	Command	Description
Initialization	SETDFT	Reset to factory default. Note: Ethernet-related settings are not subject to initialization.
Save	WSETS	Save settings to internal ROM.
Buzzer	BUZ=a	a=0: Buzzer OFF a=1: Buzzer ON **(*)**
Digital I/O	CHATT=a,b	Debouncing time a=0: Set by time **(*)** a=1: Reserved b=0 to 1000 When a=0, it will indicate the debouncing time [ms]. When a=1, it will indicate the number of inputs. a=10 **(*)**
	GOOUTTIM =a	GO (Good read) signal output a=0: GO output is held until next SYNC input. a=1 to 20000 [ms] a=300 **(*)**
	NGOUTTIM =a	NG (No read) signal output a=0: NG output is held until next SYNC input. a=1 to 20000 [ms] a=300 **(*)**
Digital I/O signal assignment	DOUT1=a	Signal assignment for OUT1 port a=0: Disable a=1: GO (Good read) **(*)** a=2: NG (No read) a=3: Ready a=4: Busy1 a=5: Busy2
	DOUT2=a	Signal assignment for OUT2 port a=0: Disable a=1: GO (Good read) a=2: NG (No read) **(*)** a=3: Ready a=4: Busy1 a=5: Busy2
RESET	RESET	Reboot the reader.

"**(*)**" indicates the default setting.

12.21 Character Code Table

		Upper Byte															
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Lower Byte	0	NUL	DLE	SP	0	@	P	`	p								
	1	SOH	DC1	!	1	A	Q	a	q								
	2	STX	DC2	"	2	B	R	b	r								
	3	ETX	DC3	#	3	C	S	c	s								
	4	EOT	DC4	$	4	D	T	d	t								
	5	ENQ	NAK	%	5	E	U	e	u								
	6	ACK	SYN	&	6	F	V	f	v								
	7	BEL	ETB	'	7	G	W	g	w								
	8	BS	CAN	(	8	H	X	h	x								
	9	HT	EM	)	9	I	Y	i	y								
	A	LF	SUB	*	:	J	Z	j	z								
	B	VT	ESC	+	;	K	[	k	{								
	C	FF	FS	,	<	L	\	l	|							
	D	CR	GS	-	=	M	]	m	}								
	E	SO	RS	.	>	N	^	n	~								
	F	SI	US	/	?	O	_	o	DEL								

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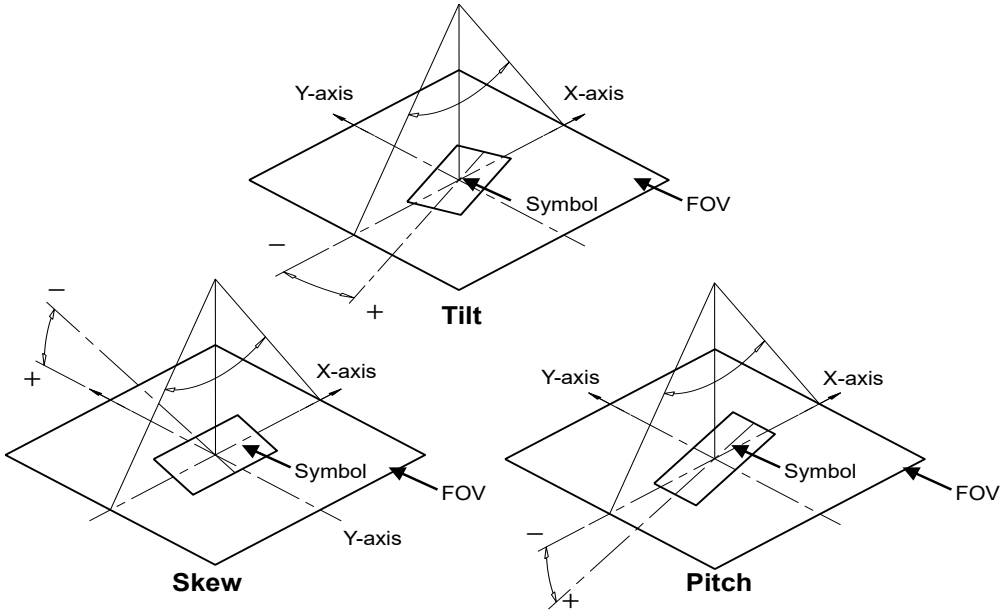
13 Specifications

13.1 Specifications

		V7000
Supported Symbols	Barcode	Code39, Code128 / GS1-128 (EAN128), Codabar (NW7), ITF (Interleaved 2 of 5), UPC / EAN(JAN), GS1 DataBar, Code93
	2D code	Data Matrix (ECC200), Composite Code, QR Code / Micro QR Code, PDF417 / MicroPDF417, AztecCode
Reading Angle		PITCH : ±35°, SKEW : ±35°, TILT : 360°
Minimum resolution		0.1 mm
Receiver	Sensor	2/3 inches CMOS Image Sensor monochrome
	Effective Pixels	2448 (X) × 2048 (Y) (Approx 5 million pixels)
	Focus	Auto (Focus position can be adjusted automatically during installation and tuning)
	Magnification	Semi-auto (Set manually only for cell size and number of imaging pixels of the reading symbol)
Light emitter	Illumination Source	High-intensity white LED (Risk group 1 of IEC 62471)
	Distance Sensor	Infrared Laser (940nm)
Power rating	Supply voltage	DC 24 V±10%
	Current consumption	Approx.1 A
Digital Input		Photo-coupler isolation x2 Input resistance: 2.2 kΩ ON voltage: 10.8 ～ 28 V, OFF voltage: 0 ～ 0.8 V
Digital Output		Photo-coupler isolation x3 2 of them, Select from Ready, GO, NG 1 of them, External Illumination Maximum rating DC30V 50mA
Buzzer		Electromagnetic buzzer
Interface		Ethernet (1000BASE-T, 100BASE-TX, 10BASE-Te)
Supported protocols		TCP/IP,UDP,FTP, EtherNet/IP
Environmental tolerance	Operating temperature	0 to 40 ℃
	Operating humidity	35 to 85%R.H. (No condensation)
	Storage temperature	-20 to 60 ℃
	Storage humidity	35 to 85%R.H. (No condensation)
	Vibration tolerance	10 to 150Hz amplitude 0.15mm (Total width) X, Y, Z 2hour for every direction (Note 1)
	Protective structure	IP67
	Peripheral illumination	Less than 10000 lx
External Dimensions		65(H)mm × 65(W)mm × 110(D)mm (Contain no connector protrusion))
Weight		Approx.420 g (Cable not included)

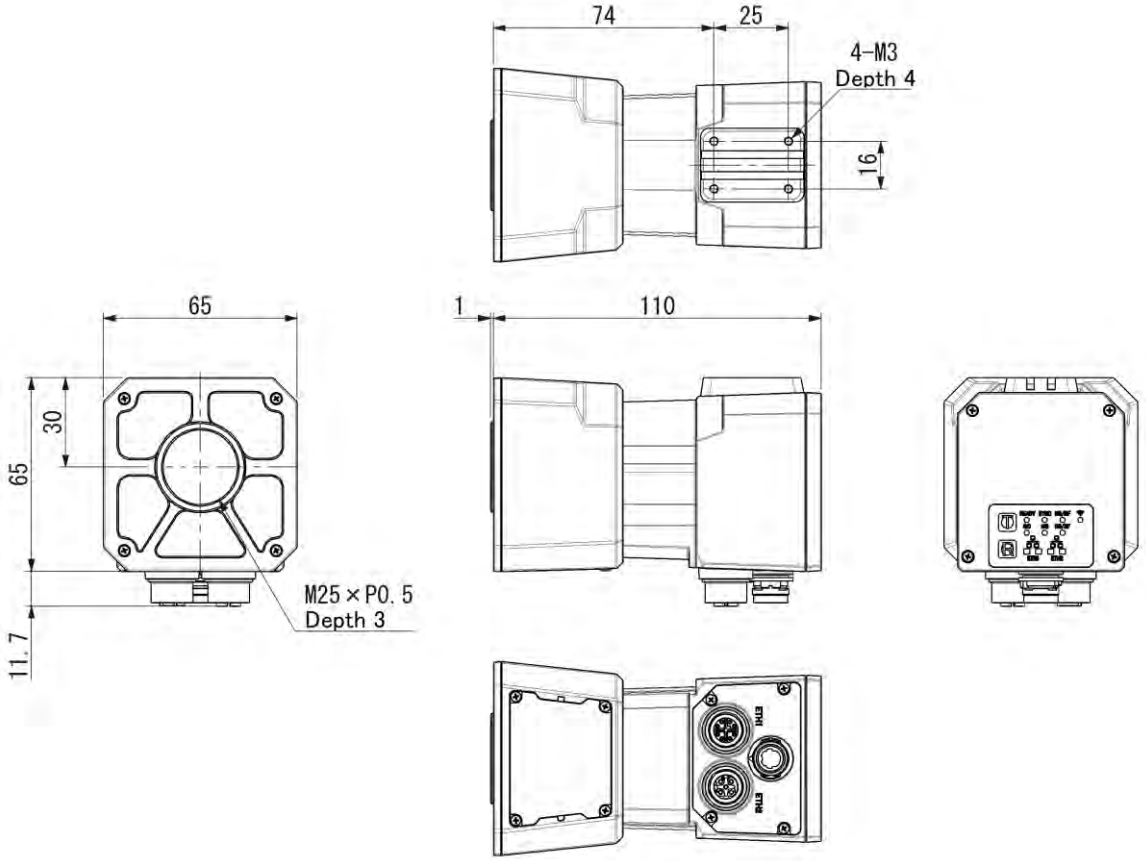
Note1 : Not a guaranteed spec but just a test condition.

【 Definition of Reading Angle 】



FOV: Field Of View

13.2 Dimensions



Unit: mm

CAUTION

The maximum tightening torque of the M3 mounting screws is 0.7 N · m.
To avoid damage to the screws or screw holes, DO NOT screw the screws more than the screw depth of the mounting holes.

13.3 Interface

13.3.1 Ethernet Interface

LAN Interface (Ethernet) is installed on V7000.
Please use a dedicated Ethernet cable for connection.

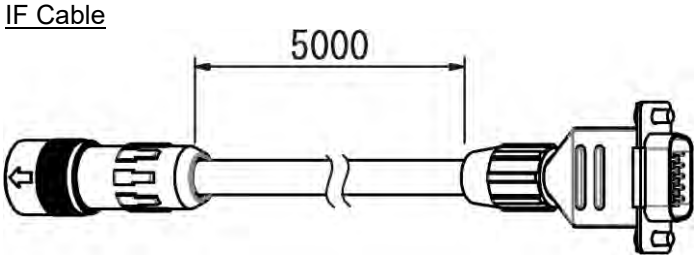
- Network Form : 1000BASE-T/100BASE-TX/10BASE-Te
- Maximum Transmission Speed : 1G/100M/10M bps

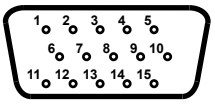
13.3.2 I/O

Interface

I/O signals can be controlled by using an IF cable (sold separately).

IF Cable





High density
D-sub 15 pin

UNIT: mm

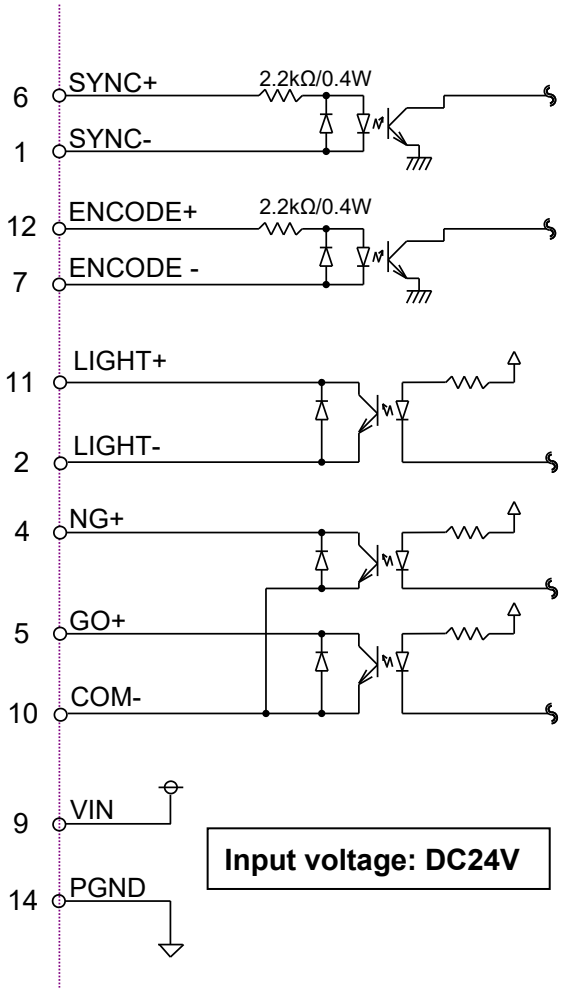
*For cable lengths other than 5 m, please contact our customer support for details.

Pin assignment

Pin	Color	Name	Function	Direction
1	Pink (Black dots)	SYNC-	Digital Input 1 (Photocoupler + side)	Input
2	Gray (Black dots)	LIGHT-	External Illumination (Photocoupler – side)	Output
3		N.C.		
4	White (Red dots)	NG+	Digital Output 2 (Photocoupler + side)	Output
5	Orange (Red dots)	GO+	Digital Output 1 (Photocoupler + side)	Output
6	Pink (Red dots)	SYNC+	Digital Input 1 (Photocoupler – side)	Input
7	Yellow (Black dots)	ENCODE-	Digital Input 2 (Photocoupler – side)	Input
8		N.C.		
9	Red	VDD	+24V Power input	
10	White (Black dots) Orange (Black dots)	COM-	Digital Output COM (Photocoupler – side)	Output
11	Gray (Red dots)	LIGHT+	External Illumination (Photocoupler + side)	Output
12	Yellow (Red dots)	ENCODE+	Digital Input 2 (Photocoupler + side)	Input
13		N.C.		
14	Black	PGND	Power Ground	
15		N.C		
Case		Shied	Connect the shield to FG	

*Shortest input reception time: SYNC 10ms

I/O Interface internal circuit



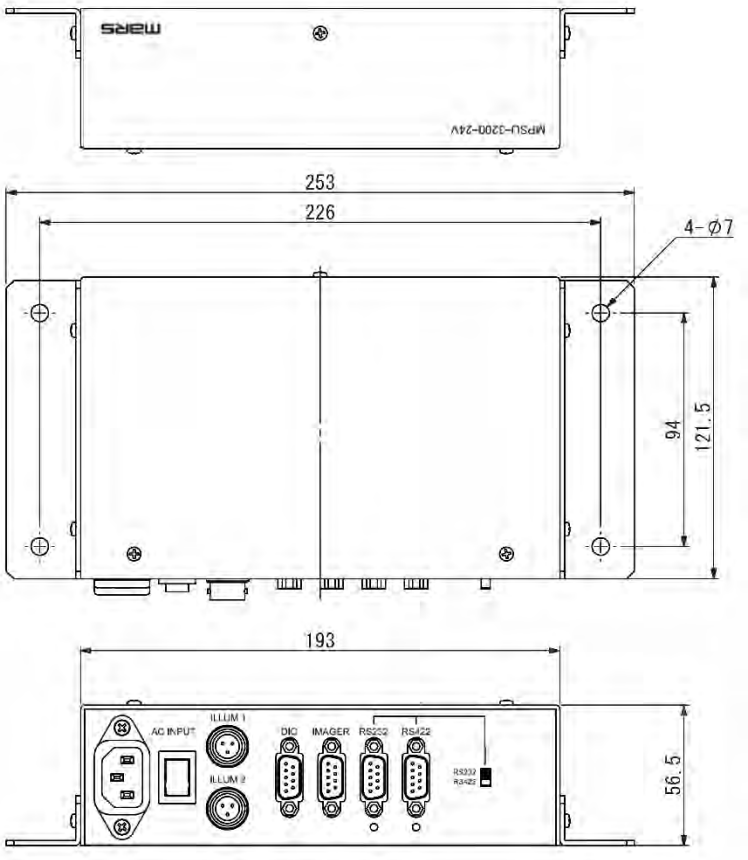
14 Peripheral equipment

14.1 Dedicated accessories for V7000

14.1.1 AC Adapter AT072T-P240 (24V/3A)

Term	Specification
Supply voltage	Rated AC100-240V
Output voltage	24V(IMAGER 24V)
Output power	64W

External Dimensions



UNIT:mm

15 Troubleshooting

If any problem occurs during the operation, try following methods to recover.

The host device which is the access point may cause a problem. Refer to the instruction manual of your host device.

15.1 Cannot power on or communicate with host device

◆ Is power supply voltage within the specifications?

Power supply voltage should be DC 24V ± 10%.

If the DC voltage is not within the specified range, the reader may not work properly and there is a possibility of damaging the reader.

◆Is the V7000 connected with the host device properly?

Make sure the V7000 is connected with the host device properly.

You can set it to the factory settings by the following methods if you don't know the address you set.

Operate the Teach button to initialize the IP address and start up.

・ Start up while holding down the Teach button.

・ Release the Teach button when the status LED-READY lights up.

*Saved IP address does not change.

Therefore, the next time you turn on the power, it will start up with the saved IP address.

◆Is the format of serial command correct?

Serial commands input is effective in stand-by state.

Add a carriage return code [CR] at the end of the serial command.

Push Enter button after inputting the serial command on the terminal software.

Transmit the serial command “WSETS” to save the settings to internal flash memory. If the reader is turned off the power without saving settings, the reader will start up in the previous settings next time.

An interval of 500ms between each command will avoid unwanted error during settings.

15.2 Symbol cannot be decoded

◆Are the symbol-code settings correct?

Make sure that the symbologies and the digit number are set up correctly. If the settings differ from the input symbologies, the reader will not decode the image.

◆Are the reading distance and the print quality suitable?

To ensure the reading distance from the code to the reading window must be within the specified reading distance.

If the code is damaged or the print quality is low, it may not be decodable even if the reading depth requirements have been met.

◆Is the reading window clean?

The quality of captured image is affected by the condition of the reading window. Dust, dirt, etc. on the reading window may alter the reading performance. Clean with a lens cleaner or similar non-abrasive method.

◆Is the print quality of the symbol good?

Make sure the quality of the symbol (1D: Module width and Wide/Narrow bar width ratio, 2D: Cell size) meet the standards.

15.3 Status LED

◆Does the reader have some error?

If the reader has some error, it indicates the error with status LEDs.

Please check the blinking pattern of LEDs (3.3 Status LED:Others) immediately after the reader is turned on.

15.4 Others

Pressing the Teach button and Read button simultaneously for more than 7.5 seconds will cause a hardware reset.

After the reader is turned off, it will restart.

Be sure to connect the shield to the FG when using the cable after cutting it.

Refer to ”13.3.2 I/O Interface” for pin assignment.

15.5 Contact

If there is anything unclear or if you have any problems cannot be resolved, please contact our customer support.

Customer Support

URL : https://www.bradyid.com

16 License Library

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One year from the date of purchase.

2. Warranty Coverage

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This warranty does not cover, and BRADY will not be held liable, for any damages incurred using this product.
The above warranty shall not apply to any product;

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(2) which has been repaired or altered by anyone other than BRADY authorized personnel,
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6555 West Good Hope Road

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