

4. Communications

- Bar Code Data Transmission:

The unit transmits the scanned data to the host computer.

- Command Signal Receipt:

The host computer transmits the command signals to the unit and sets up the operation of the unit.

- Image Data Transmission:

The unit transmits the captured image data to the host computer.

Refer the section 5.5 for the communication parameter conditions.

4.1 Data Transaction

Data transaction setup should be accomplished with sending command from host computer. Asynchronous protocol is used for barcode data transmission and serial commands transmission.

4.2 Image Data Transaction

The communication protocol utilizes XMODEM (SUM128) in the case of the image data output.

The host side computer should be provided with the software to receive the transmitted data. The receiving unit should also be kept “ready” before receiving the data.

5. Specifications

5.1 General specifications

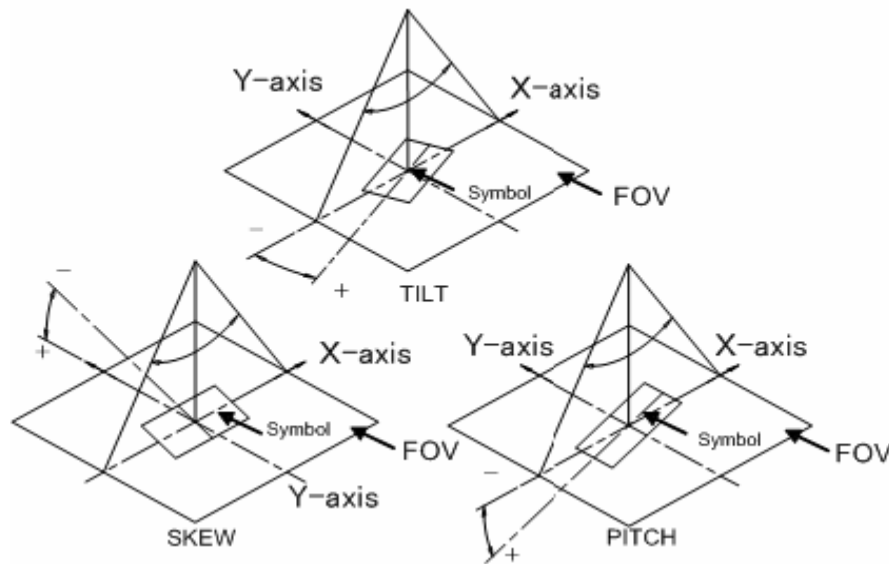
Type	THIR-6000(H)
Dimensions	159(H)×63(W)×99(D)mm
Weight	Approx. 220 g (including the battery)
Illumination	1. White LED (THIR-6000B, THIR-6000HB) 2. Red LED (THIR-6000DM-B)
Aiming beam	Red LED (peak wave length is 644nm)
Indicator	Monitoring LED (3 colors), Vibration
Image sensor	CMOS color area sensor (1.3M pixel)
Minimum resolution	1. 0.125mm (1D barcode), 0.19mm (2D barcode) (THIR-6000B) 2. 0.1mm (1D barcode), 0.167mm (2D barcode) (THIR-6000HB, THIR-6000DM-B)
Supported barcodes (1D)	Code39, Code128, EAN128, Codabar, ITF, JAN/EAN/UPC, RSS, Code93
Supported barcodes (2D)	Data Matrix (ECC200), QR Code, Micro QR Code PDF417, MicroPDF, MaxiCode, Composite Postal code
Format	ASCII or Bitmap(image)
Bluetooth interface	Bluetooth 2.0 Class1 *can be worked with Windows 2000/XP
Battery	Li-ion rechargeable battery (3.7V, 2200mAh)
Operating time	7 hours (calculated with 5 seconds per 1 barcode reading)
Charging time	3 hours
Environmental specifications	
Operational Temperature	0 to 40 degrees centigrade
Storage Temperature	- 20 to 60 degrees centigrade
Operational Humidity	35 to 85 %RH (Non-condensing)
Storage Humidity	35 to 85 %RH(Non-condensing)
Vibration	10 to 55 Hz(max. 4G)
Shock	Durable multiple drops to concrete from 7ft.

5.2 Functional specification

Reading Direction

- PITCH : ± 35 degree
- SKEW : ± 35 degree
- TILT : 360 degree
- Ambient Light : 0 to 10,000 lx

Viewing angle



5.3 Reading Range/Depth

Decodable Symbols

Liner: Code39, Code128, EAN128, Codabar, ITF, JAN / EAN / UPC, RSS

Check digit calculation method:

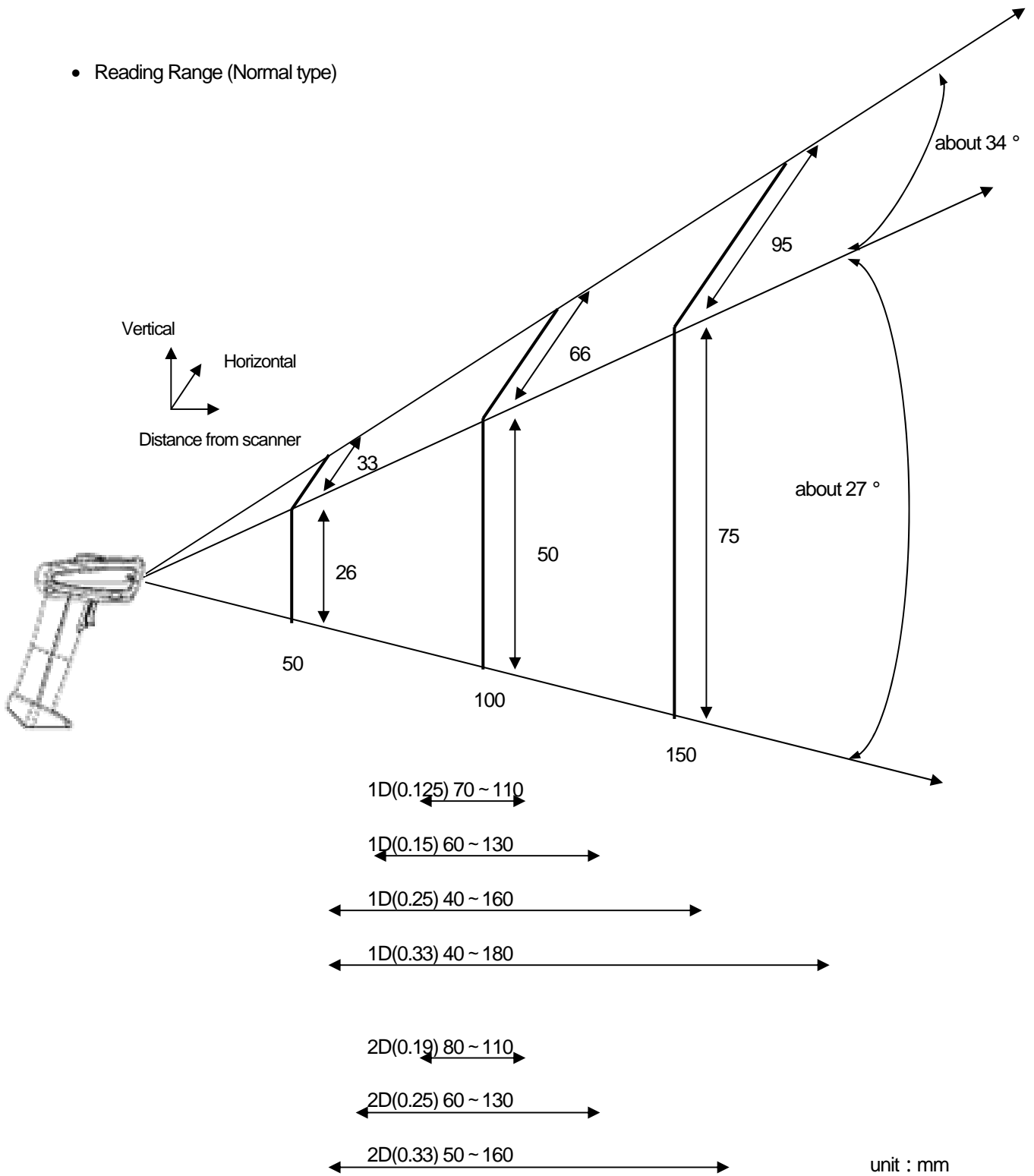
Code39	Modulus 43
Codabar	Modulus 16
ITF	Modulus 10

2-D: Data Matrix(ECC200),QR Code, Micro QR Code,PDF417,
Micro PDF, Maxi Code, Composite

Reading Digit:

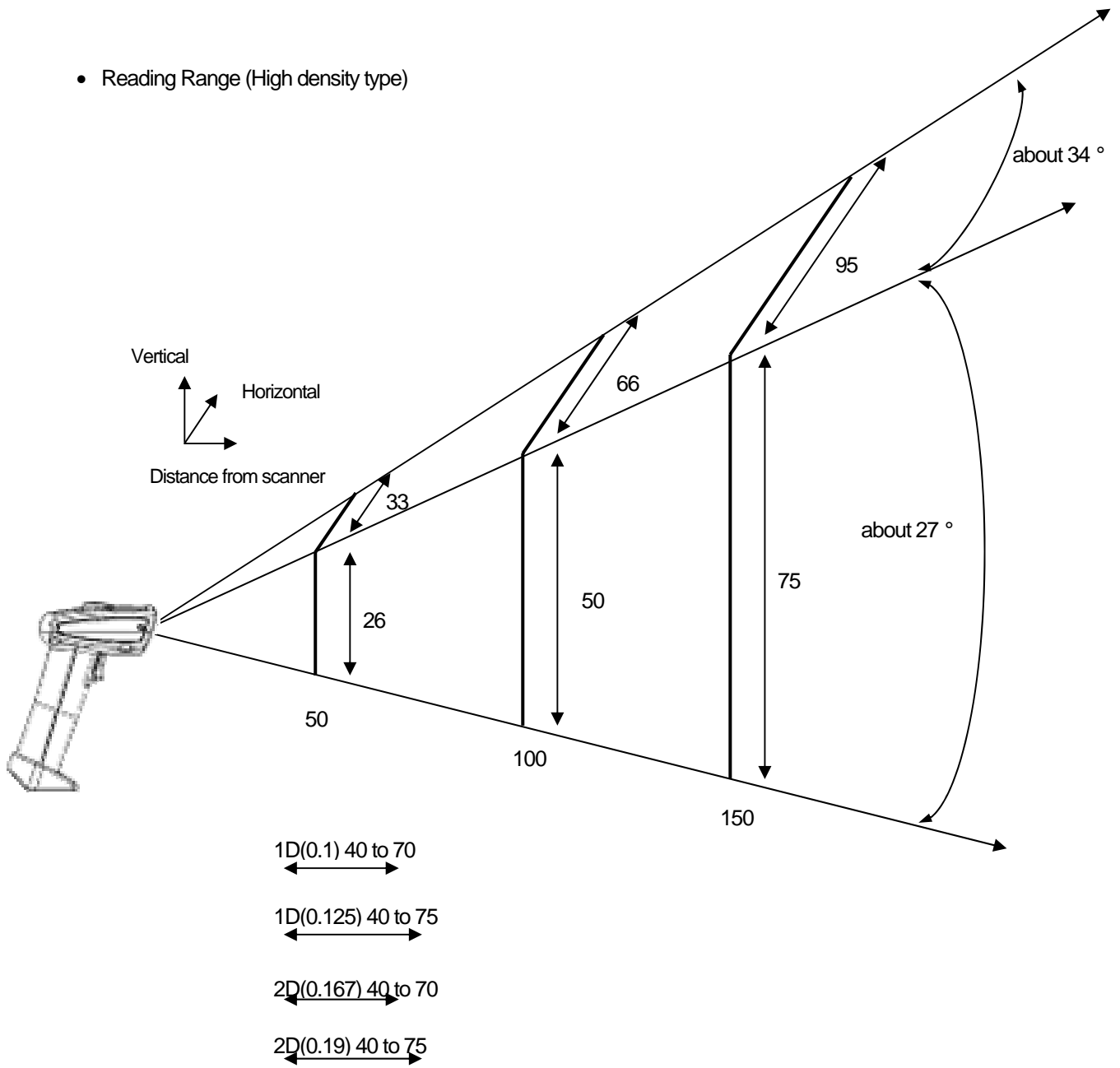
(Except ITF)	1 ~ 2047
(Only ITF)	2,4,6 ~ 2047

- Reading Range (Normal type)



- Reading ability depends on environment (brightness etc) and the printing quality of scanned barcodes.
- Measured in 500 to 1000(lx) of homogeneous brightness, printed with good quality, no pitch and no skew.

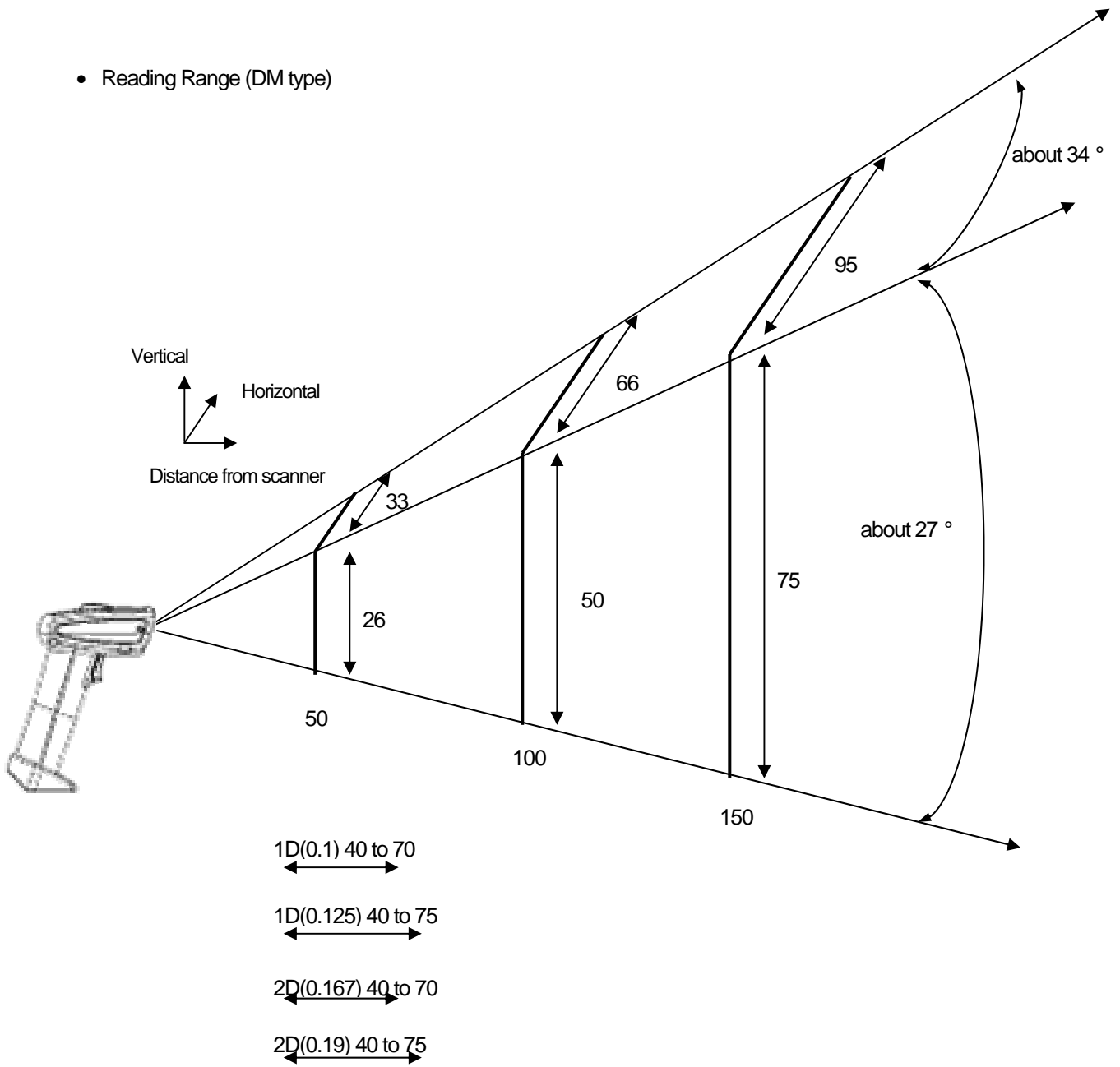
- Reading Range (High density type)



unit : mm

- Reading ability depends on environment (brightness etc) and the printing quality of scanned barcodes.
- Measured in 500 to 1000(lx) of homogeneous brightness, printed with good quality, no pitch and no skew.

- Reading Range (DM type)



unit : mm

- Reading ability depends on environment (brightness etc) and the printing quality of scanned barcodes.
- Measured in 500 to 1000(lx) of homogeneous brightness, printed with good quality, no pitch and no skew.

5.4 Default settings

When the unit is shipped from the factory, the initial setup is as follows:

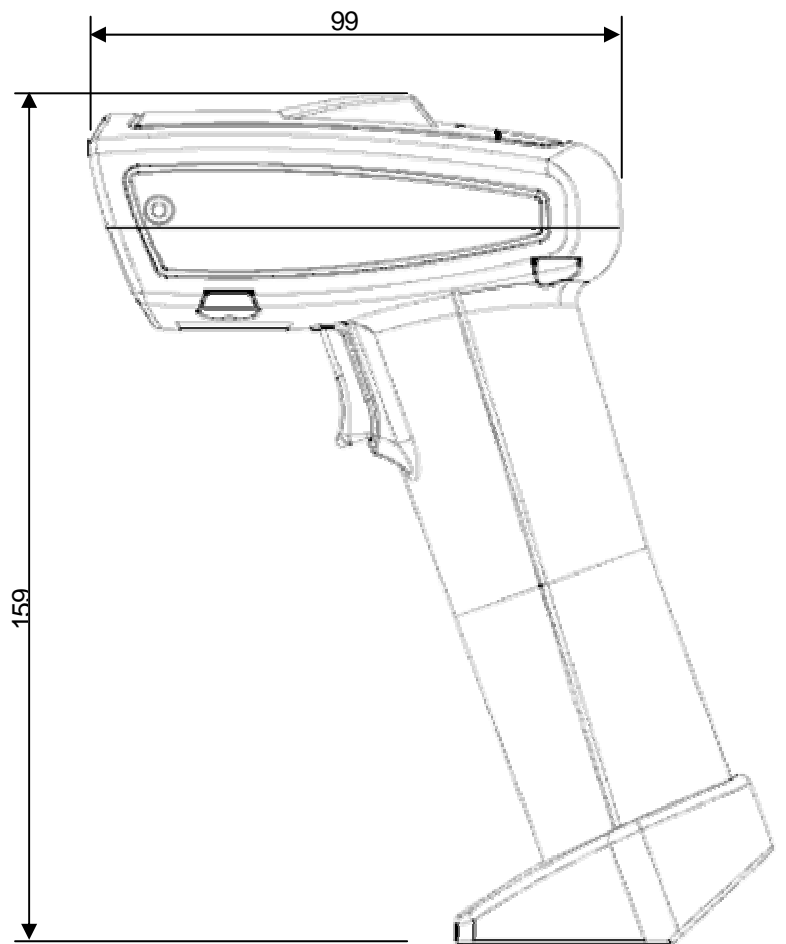
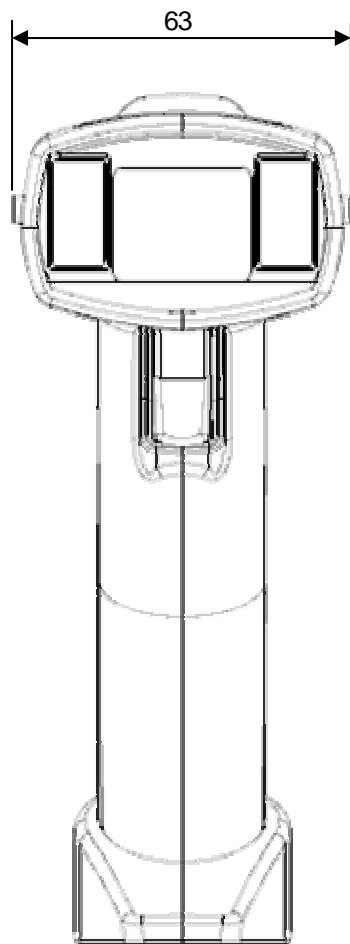
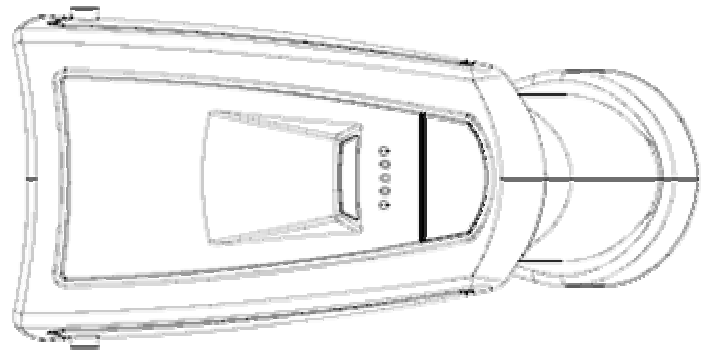
- THIR-6000B, THIR-6000HB → Enabled Symbols: all symbols.
- THIR-6000DM-B → Data Matrix (ECC200) and QR Code

Security settings

As the default, security settings are not configured. Please see "7.4 How to configure security setting".

6. Dimensions

6.1 Housing Dimensions



Unit: mm

7. Specialty Function

7.1 Global Shutter

Cropping is a method to remove unwanted areas from the image to make the image small.

Following is the procedure to set up this function through the serial interface.

Confirming the cropping status

Serial Command ?IMG<cr>

<< Example of reply >>

```
***** STATUS ***** THIR-6000
BBC=0 0:256 1:16 2:RLE 3:AVE 4:AVERLE 9:Color
IMODE=0 PX=0 PY=0 WX=1280 WY=1024
CAPMODE=0,0,1280,1024
CAPX=0 ( 0:100%, 1:75%, 2:50%, 3:25% )
CAPY=0 ( 0:100%, 1:75%, 2:50%, 3:25% )
VMODE=0 (0:Mono 1:Color )
***** END ***** THIR-6000
System version = K85C-V1.0c
Decode version = K85A-V1.0c
```

} Bolded is status of cropping.

【 Setting for

Serial Command CAPX=*m*, CAPY=*n* (*m,n*=0,1,2,3)

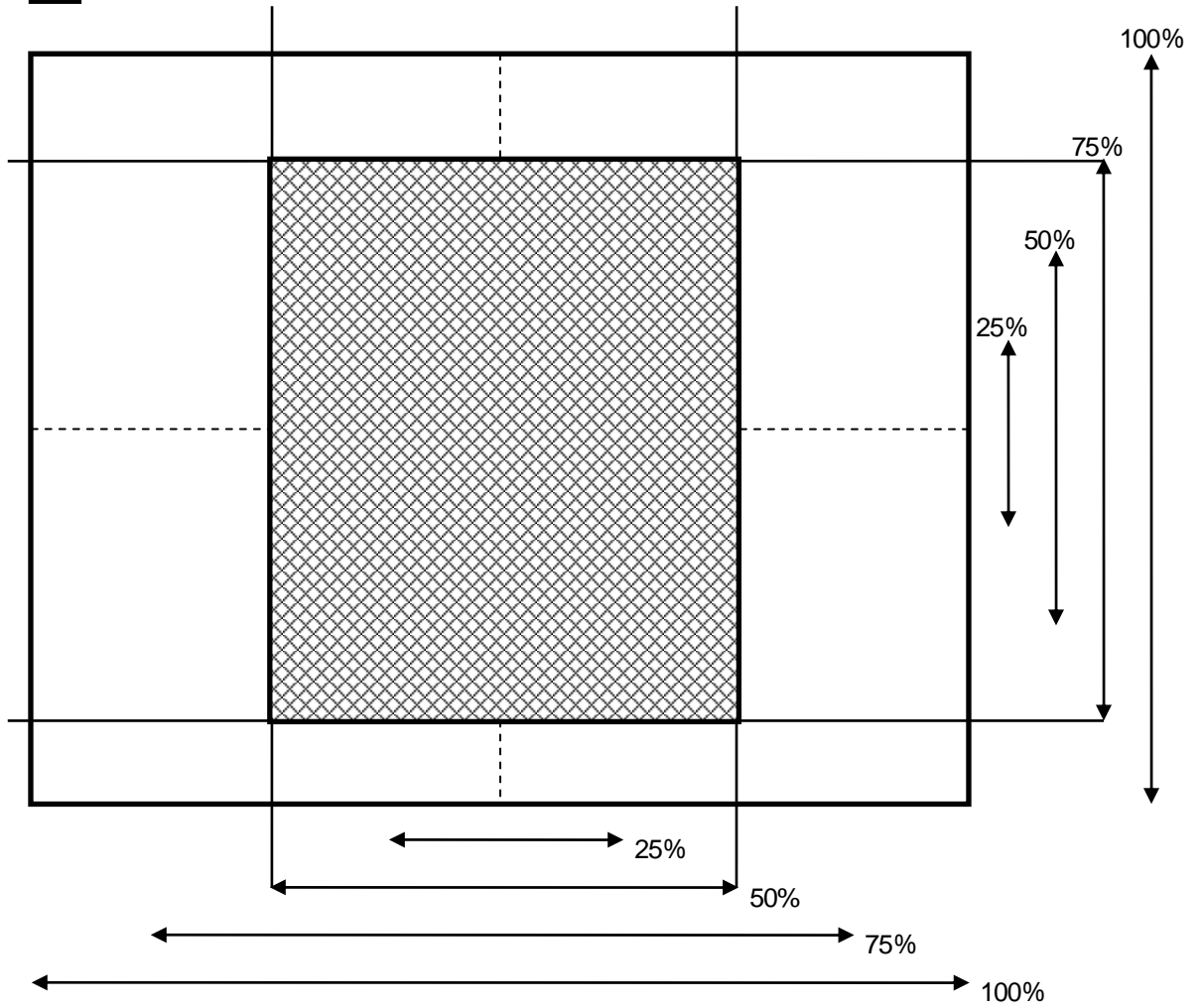
<< Value >>

```
0...100%
1...75%
2...50%
3...25%
```

Cropping

□ ...CAPX=0, CAPY=0

▣ ...CAPX=2, CAPY=1



7.2 Auto detection mode

7.2.1 Overview

By using this mode, THIR-6000 can read and decode symbols automatically.

THIR-6000 detects changes of image in its field of view, like change of environmental brightness, motion of objects. When there is such a change, THIR-6000 starts to capture an image and tries to decode.

This function is designed for stand mounting use to read documents with printed barcodes. For example, it is suitable for using on the counter at post office.

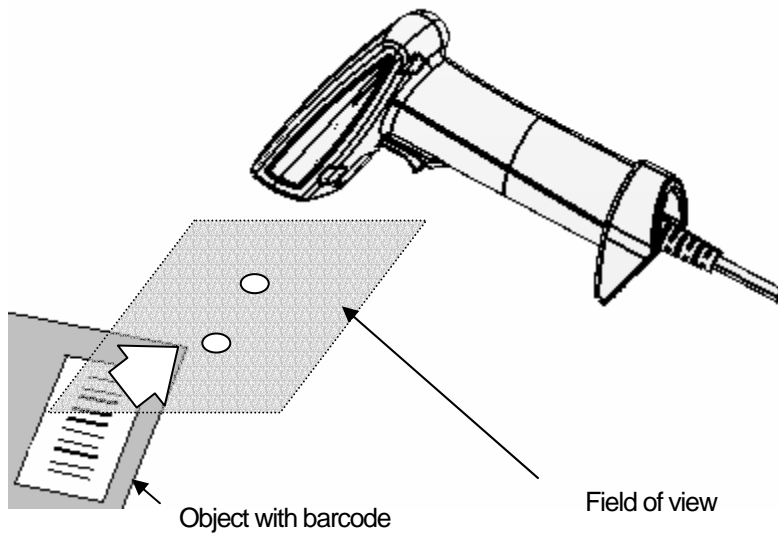


With Auto Detection mode, triggering switch does not work.

Plus, neither does capturing an image, receiving a Hex program and executing a Macro program.

Please turn Auto Detection mode OFF if those function are needed to be used.

Auto Detection mode may not work well under the too high, too low or unstable brightness.



Note

- Auto Detection mode is not a default setting. Please have THIR-6000 read the corresponding configuration barcode to change to Auto Detection mode.
- THIR-6000 does not vibrate when it decodes a symbol successfully with Auto Detection mode regardless of current setting of the vibration.

7.2.2 How to use

To put the THIR-6000 in the auto detection mode, please follow one of the following methods:

- Send the serial command "LFMODE=1<CR>" to the scanner.
- Read the corresponding barcode from the configuration barcode set.

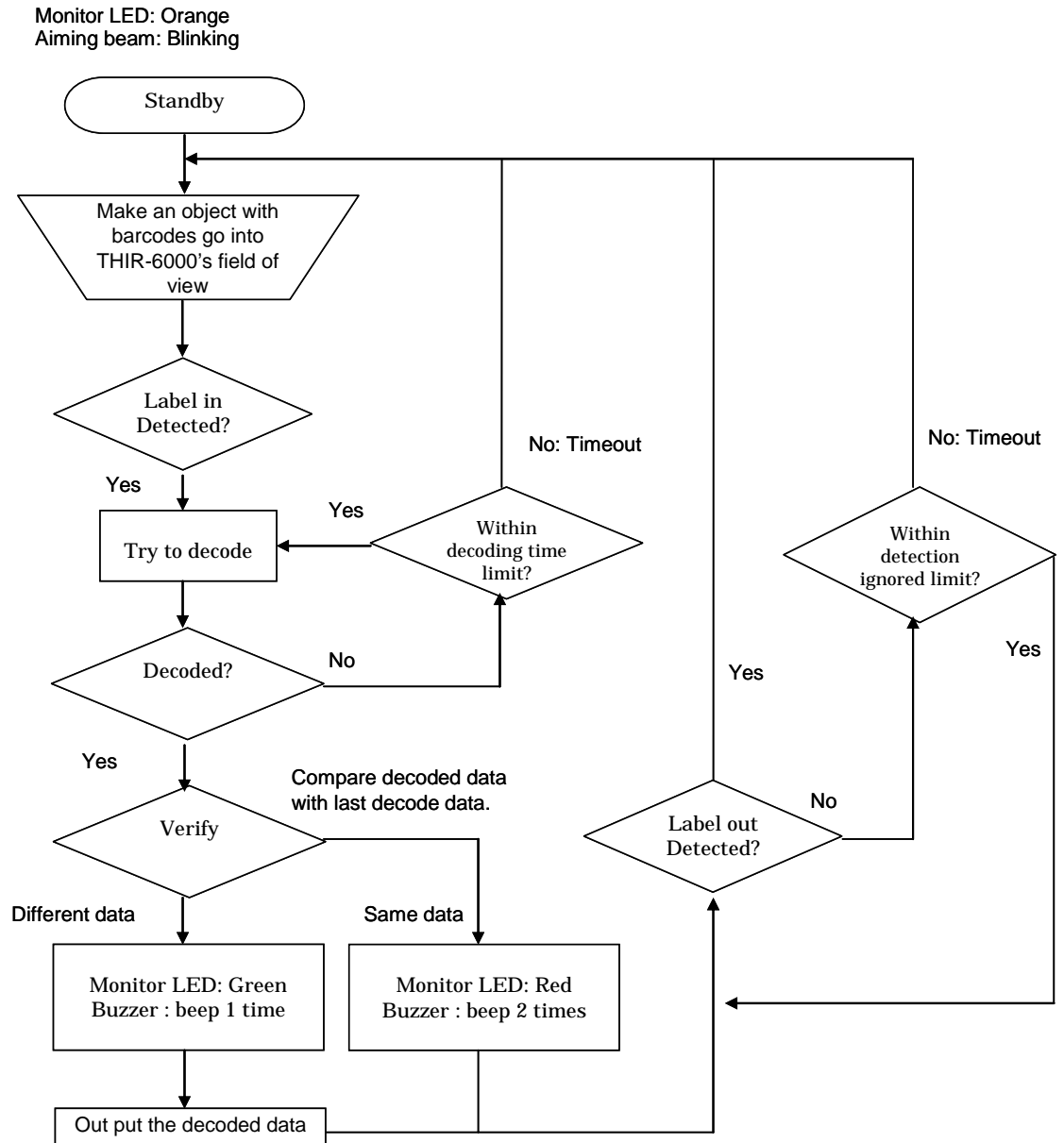
To exit the auto detection mode, please follow one of the following methods:

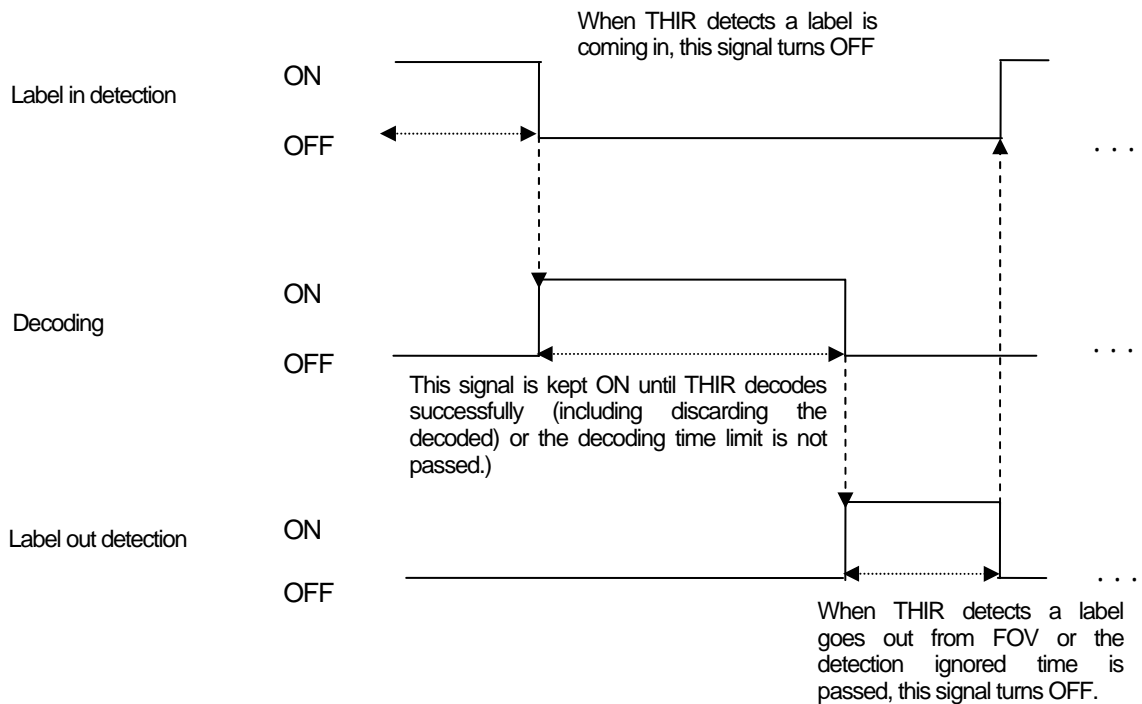
- Send the serial command "LFMODE=0<CR>" to the scanner.
- Read the corresponding barcode from the configuration barcode set.

The serial command "?LF<CR>" to check which mode the scanner is available.

For the details of how to work Auto Detection mode, please see the following figures, flow chart and timing chart.

The flow chart of Auto Detection mode





Timing chart

7.3 For high density barcodes

HD mode is designed to read high density barcodes (under 0.167mm of small element size) more quickly. Since this is not a default setting, please change to HD mode by reading the corresponding configuration barcode.

7.4 How to configure security settings

Serial command

?

Show status data string1

If the data is correctly received, THIR-6000B is connected to the host computer.

PIN CODE=XXXX Put 4 digit numeric to "XXXX".

Bluetooth connection will be disconnected when PIN CODE is set. Please enter the PIN CODE to connect again. If set PIN CODE as "0000", there is no security.

WSETS

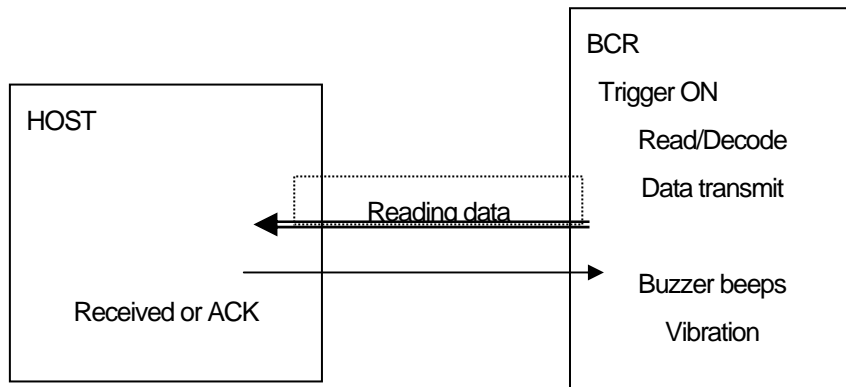
Write settings to THIR-6000's flash memory (make sure the connection is established)

7.5 How to confirm data transmitting

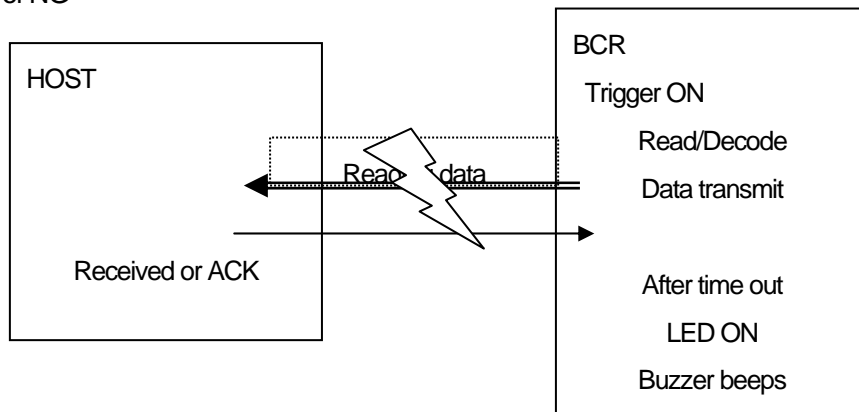
To make sure the connection is established, the following method is strongly recommended. It will take approx. 20 second to detect disconnection between THIR-6000 and the host computer caused. The data tried to be sent to the host during this 20 second will be lost. By using the following method, operator can know if the data is correctly transmitted or not.

THIR-6000B waits response from the host after it sends data. This period can be configured as limit time. If THIR-6000B does not receive response from the host, THIR-6000B judges the data has been lost. To complete this function, the host has to have the function to send "received" or ACK (0x06) to THIR-6000B if it receives data from the scanner.

(1). Normal flow



(2)In case of NG



- How to switch confirmation ON \leftrightarrow OFF
 - 1). Configuration barcode menu (Other document) \rightarrow By reading barcodes
 - 2). By sending serial command

ANSWERBACK=X Confirmation ON/OFF 0: OFF (Default) 1: ON

ANSWERBACKTIM=X Time out limit 1 ~ 3 second (Default:1)

- How it works

THIR-6000B waits response from the host within the time our limit.
 During the time out limit, trigger signal and other serial command are not valid.
 After getting response from the host or passing the time out limit, trigger signal and other serial command become valid.
- How to indicate
 - 1). Get response from the host \rightarrow Buzzer and vibrator indicate OK
 - 2). No response from the host \rightarrow Buzzer and red LED indicate NG

	Buzzer	LED	Vibration
OK	2 times (high tone)	non	100msec
NG	3 times (low tone)	Red LED ON (700msec)	non

7.6 Image preprocessing

Article	Command	Contents
Image Preprocessing	?PROC	Indicates the status of a image pre-processing setting contents
	IPFUNC0=a1,a2,a3,a4,a5	No.0 Image Preprocessing Setting
3x3 Mask Filter	FILTER33[i][j]=a	Set coefficient value of 3x3 mask filter. (i, j=0 through 2, a= -99 through +99)
	FILTER33DM=1-10000	Set magnification value of 3x3 mask filter.
5x5 Mask Filter	FILTER55[i][j]=a	Set coefficient value of 5x5 mask filter. (i, j=0 through 2, a= -99 through +99)
	FILTER55DM=1-10000	Set magnification value of 5x5 mask filter.

Article	Command	Description
None	0	No Image preprocessing
Black Erosion	1	Erosion 2x2
	3	Erosion 3x3
	5	Erosion 5x5
	7	Erosion 2x1 (w)
	9	Erosion 1x2 (h)
White Dilation	2	Dilation 2x2
	4	Dilation 3x3
	6	Dilation 5x5
	8	Dilation 2x1 (w)
	10	Dilation 1x2 (h)
Reverse	20	Reverse White & Black
Contrast Enhancement	21	Cont (L12cut): Cut the rest (from the darkest) 12.5%
	22	Cont (L22cut): Cut the rest (from the darkest) 25%
	23	Cont (H23cut): Cut the most (from the brightest) 12.5%
	24	Cont (H24cut): Cut the most (from the brightest) 25%
	25	Cont (LH12cut): Cut the rest 12.5% and the most 12.5%.
	26	Cont (LH22cut): Cut the rest 25% and the most 25%.
Gamma Correction	27	Gamma(r=0.5) Execution for Gamma Correction 0.5
Smoothing Filter	40	Low pass Filter 3x3 average value
Median	41	Median filter 3x3 median value
3x3 Filter	60	3x3 filter FILTER33, FILTER33DM execution filtering by command
5x5 Filter	61	5x5 filter FILTER55, FILTER55DM execution filtering by command
Down Size	70	Down Size (Quick) Down size whole image with quick mode
Down Size	71	Down Size (Average) Down size whole image with average speed mode

Please ask our sales department for more information.

8. Troubleshooting

8.1 The unit does not work while pushing the read trigger switch.

Does the battery have enough amounts?

If the battery's voltage is not enough, THIR-6000B may not operate correctly.

Please see "2.1 Charging battery".

8.2 Can not charge battery

Is THIR-6000B placed on the cradle correctly?

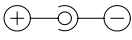
If THIR-6000B is not placed on the cradle correctly, charging battery may be failed. Please see "2.1 Charging battery".

Is the AC adapter inserted correctly?

If the AC adapter inserted correctly to the cradle, charging battery may be failed.

Is power supply polarity correct?

When it is connected with reverse polarity, charging battery is failed.

Correct polarity → 

Is the power rating of the power supply enough?

Unless the power supply capacity is enough, charging battery is failed.

Is the charging terminal clean?

If there is dirt/dust on the charging terminal, charging battery may be failed.

Isn't the battery too old?

The rechargeable battery does not last forever. If a change in the battery life is noticed, it is probably time to purchase a new battery. Criteria to know the time to change the battery are 300 times of charging/discharging or 2 years of usage under proper environmental condition. Please contact our sales department about alternative battery.

8.3 Barcode Cannot be Read.

Is there beep from the buzzer when THIR-6000B reads barcode?

YES → Barcode is decoded, but an error is occurred during transmitting data through Bluetooth.

Please see “8.4. Errors in transmitting data”.

NO→ Barcode is not decoded. Please see the following instruction to decode barcode correctly.

Is a code setup correct?

Check the settings of the reader and that the 2D code is enabled

Is reading distance suitable?

Reading may be impossible when the reading distance is outside the working range of reading depth.

Moreover the printing quality of the code may make it non-readable even if it is within the reading range limits.

Is the surface of the code glossy?

If the surface of the code is glossy, the illumination will be sometimes reflected like a mirror.

To avoid this, put the scanner in angle relative to the symbol.

Is the reading window clean?

If the window becomes dirty or stained, the image taken by the reader might not be good enough for reading. Clean with a lens cleaner or similar anti-scratching (non-abrasive) method.

Is the print quality of the code good?

Please check whether print quality of the cells, code size, etc. conforms to the standard.

8.4 Reading data gets garbled

Do you set fixed digit for ITF

In some cases, cancellation of significant digits (reading it through with a few digits than a printed digits) in ITF(Interleaved 2 of 5) might be used. We recommend setting specific digit of ITF.

8.5 Bluetooth connection is disconnected

Is THIR-6000B in the range or Bluetooth connection?

The Bluetooth unit of THIR-6000B allows staying away 10m from the Bluetooth adapter. But the distance is varied depending on conditions. Please check the strength of wave if it seems to be weak. In the utility screen of the driver, the strength can be checked. If it is weak, please use TMU-6000 to receive wave more efficiently.

8.6 Reading data is missed partially during transmitting

Is the connection disconnected during transmitting?

Reading data can be missed partially if the connection is failed during the transmitting. Please check connectivity as explained "2.2 Setting up the host computer".

8.7 Keyboard wedge interface is needed

If keyboard wedge software is installed to the host computer, THIR-6000B can be used as keyboard interface device. Please let our sales department know if keyboard wedge is needed.

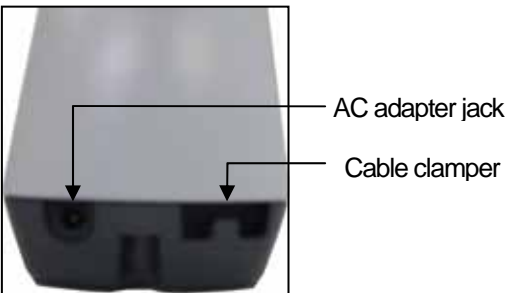
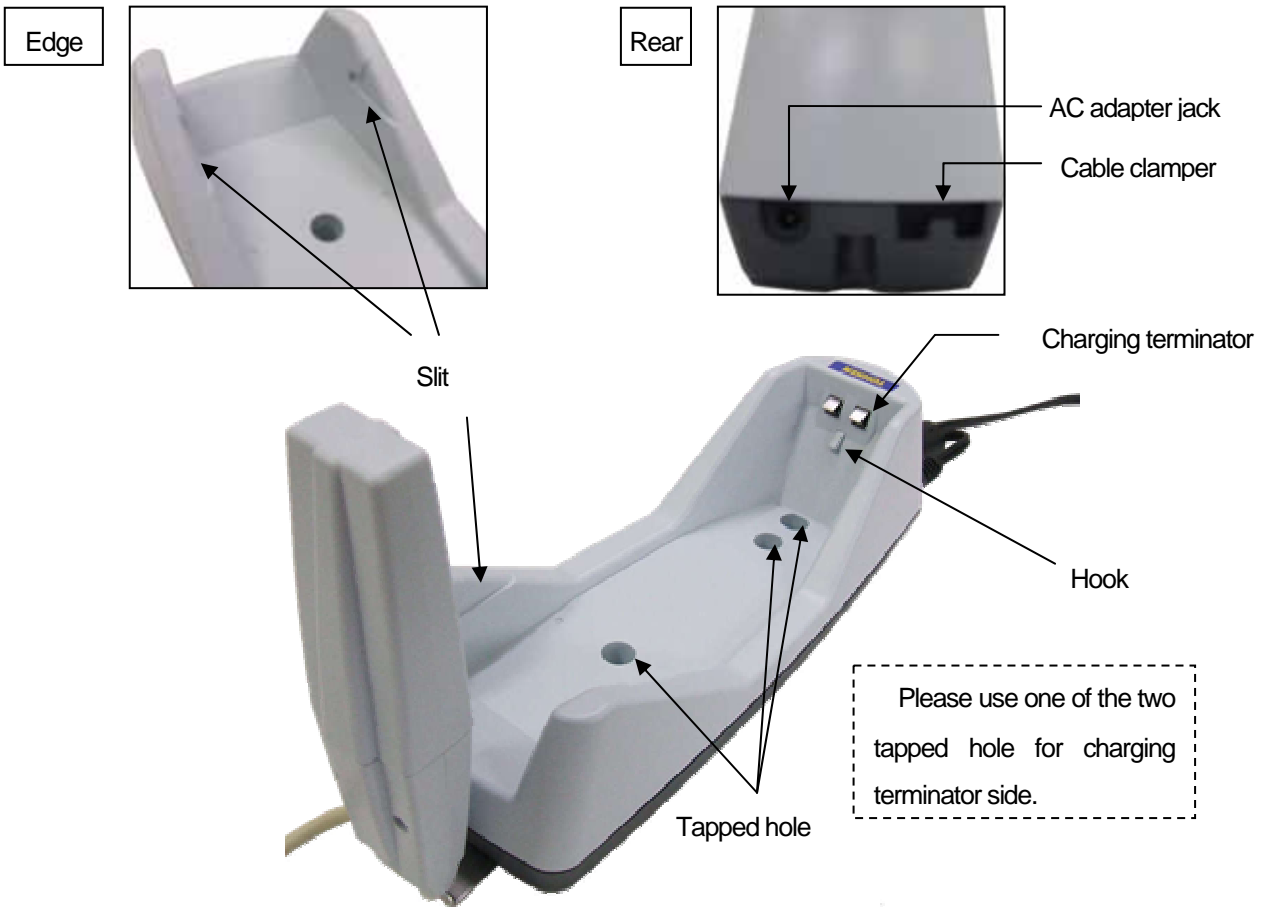
8.8 PIN CODE is required when Bluetooth connection is established

PIN CODE is not set at the time of shipment from our factory. To initialize PIN CODE, please use "Default setting" barcode in "Configuration Barcode Menu".

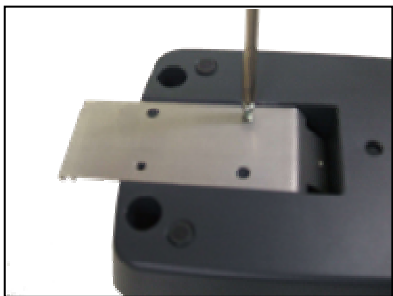
If PIN CODE is needed to be set, please see "7.4. How to configure security settings".

Appendix 1 Cradle (TBC-6000)

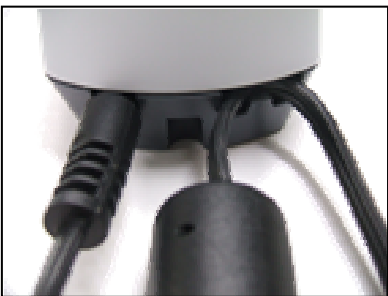
1. Overview Cradle for THIR-6000B series
2. Specification
 - Dimensions : 72(H) × 90(W) × 241(D)
 - Weight : Approx. 215g (AC adapter, wireless unit, and THIR-6000B are not included)
 - Tapped Hole : 5 × 3
 - Screw : M4 × M20 2pcs (come with the cradle)
3. Outlook



Please use one of the two tapped hole for charging terminator side.



Fix the metal plate



Hook the cable of AC adapter

[Memorandum]

Warranty Obligations

Exclusive of the cases with special mentions in quotations, contracts or specifications, TOHKEN warrants this products as the following.

1. Term of warranty

One year from the date of purchase.

2. Warranty Coverage

TOHKEN will repair or replace the product at no charge if the reasons of defects are come from our responsibility. The losses caused by the defect of this product are not covered. If the reasons of defects are the following, they are not covered by this warranty.

- (1). If the product is not used in accordance with all operation instructions.
- (2). If the product is modified by outsiders of TOHKEN.
- (3). If the defects are not caused by the product itself.
- (4). If the defects are caused by fire, pollution, abnormal voltage, or natural disasters, such as earthquake, thunderstorm or flood.

3. Usage outside of Japan

This warranty coverage is based on the usage in Japan. Please contact our sales department if there need to use this product outside of Japan.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

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