

AKUSENSE

Smart Code Reader

RCD-AI500

User's Manual



V 1.0

Responsibility statement

- 1.This document is intended to introduce you to the existing functions and use methods of AKUSENSE Technology industrial code readers.
2. The product complies with the provisions of laws and regulations and relevant examination and approval authorities. The contents of the products and functions may be adjusted and updated from time to time. AKUSENSE Technology may update this document without notice.
3. AKUSENSE Technology or AKUSENSE Technology Distribution Partner is not responsible for errors or omissions in the document, the use of the document, the loss or consequences of the document, and the loss caused by the improper preservation and use of the product.
4. You should comply with the current product ownership, laws, regulations, product approval regulations and instructions to avoid infringing the rights of third parties.
5. If the contents of this document conflict with the applicable law, the law shall prevail.

Final Clause

Any interpretation and dispute resolution related to the Product and its use shall be governed by the laws of the People's Republic of China.

Safety Instructions

For the best performance, please read this instruction manual before using this product.

It includes installation and deployment steps and precautions designed to guide readers to familiarize themselves with and use the product.

About this product

This product can only enjoy after-sales service and maintenance program in the country or region.

Security Attentions

- During the installation of products and use, the national and regional electrical safety regulations must be strictly observed.
- Please use the power adapter provided by the regular manufacturer. The specific requirement against power adapter can consult product specification.
- To reduce the risk of fire or electric shock, do not let the product be drenched or damped.
- When installing in an operating environment, make sure the product is secured.
- If the product does not work, please keep all the original packaging materials of the equipment properly, and send the equipment to the agent or return to the manufacturer for processing. (The Company is not liable for problems caused by unapproved modifications or repairs.)

Cautions

- Avoid installing the product to the environment of vibration and impact and keep the product away from EM interference (ignoring this may damage the product).
- Do not directly touch the heat dissipation parts of the product to avoid scald.
- Indoor products should not be installed in environments with water or other liquids.
- Do not use the product in an extremely hot and cold, dusty, corrosive or high humidity environment. See the product parameters table for the specific temperature and humidity requirements.

- Avoid focusing the lens on bright light (such as lamplight, sunlight or laser beam, etc.) for not damaging image sensors.
- Do not directly touch image sensors. For cleaning, moisten a soft, clean cloth with alcohol and gently wipe the dust and dirt. Please put on the dust cover to protect image sensors when not applying the product.
- Please properly keep all the original packaging materials of the equipment, so that in case of problems, use the packaging materials to package them well, and send them to the agent or return to the manufacturer for handling. The Company shall not be liable for accidental damage during transportation caused by the original packaging materials.

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Chapter 1 Product Introduction

1.1 Instruction

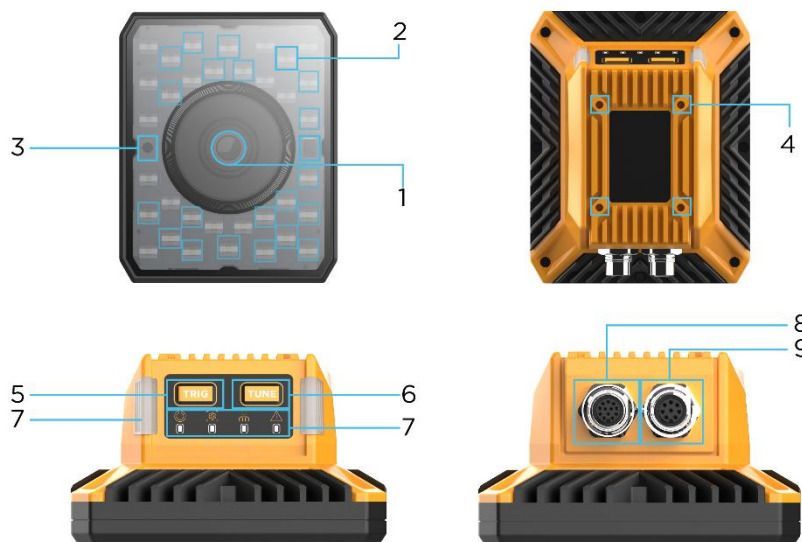
This manual is applicable to AKUSENSE RCD-AI500 series. It is widely adopted to electronic products, food, electronic medicine, semi-conductor and auto parts and other industries. The device acquires images of objects with sensors and optical elements and decodes with built-in algorithms of deep learning. Results can be output via multiple telecommunication modes.

1.2 Main Characteristics

- Built-in Smart Line technique for high-speed code positioning to achieve efficient & high-speed decoding.
- RCD-AI500 series is available to fixed focal length in ultra-short working distance and has models for mechanic automatically zooming.
- Reading ultra-small codes supported in various reading distance.
- Dual red & white light sources, 4 sets of independent-controlled light sources and polarized light source supported for complex scenarios.
- Abundant IO ports for multiple input/output signals.
- IP67 for harsh industrial applications.

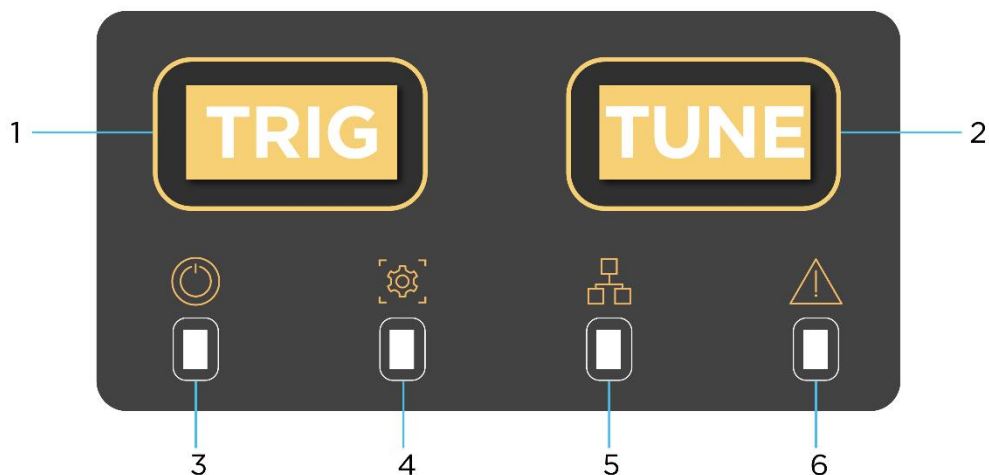
1.3 Appearance Introduction

A Appearance Description



No.	Name	Description
1	Camera	Collecting images
2	Light source	Built-in red & white light source
3	Positioning light	Indicating central position of images
4	Screw	Installation hole
5	TRIG	Triggering
6	TUNE	Auto-adjust parameters
7	Status indicator	Indicating status of work
8	12Pin port	M12-12Pin port
9	8Pin port	M12-8Pin port

B Instruction of Status Indicator

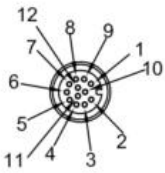


No.	Name	Description
1	TRIG	Triggering
2	TUNE	Auto-adjust parameters
3	Power indicator	Green for normal functioning
4	Trig indicator	Green for success triggering
5	Network indicator	Green for normal operation and blinking for data transmission
6	Error indicator	Default is off and red when error occurs

1.4 Interface and Scatter Line Definition




The equipment interface is M12-12pin and M12-8pin network port. The specific pin signal is defined as shown in the figure below.


M12-12PIN Male Connector	1	RS232_TXD
--------------------------	---	-----------

	2	LINE_OUT2
	3	OUT_COM
	4	DGND
	5	VIN_24V
	6	IN_COM
	7	LINE_IN1
	8	RS232_GND
	9	RS232_RXD
	10	LINE_IN0
	11	LINE_OUT1
	12	LINE_OUT0

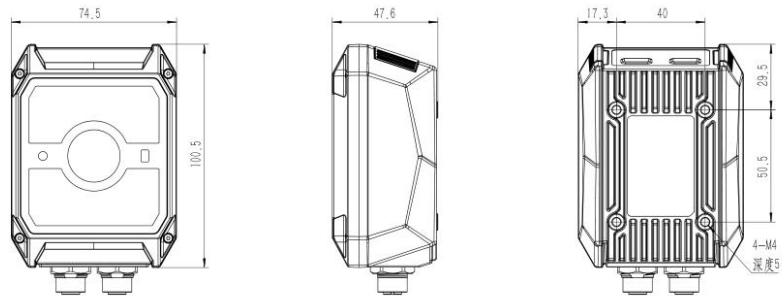
1.5 Accessories

Before installation, please prepare the listed accessories for fully-functioning the device.

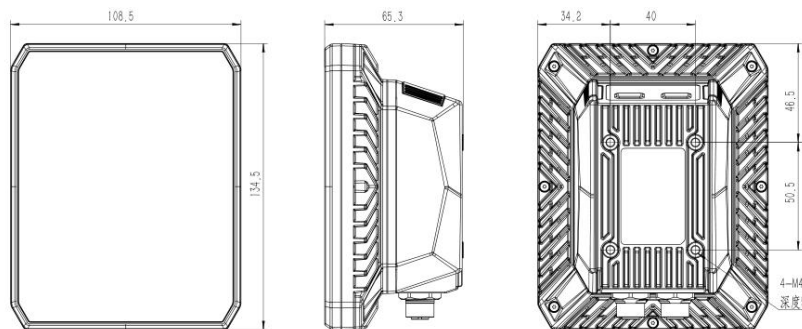
Model	Description	
M12-12PIN-PC-3M	M12 port wire ; 3 meters ; RS232; Power port (adaptor required)	
M12-8PIN-3M	Cable: 3 meters	
Power Supply	24V power adaptor	

<p>L-shaped Mount Bracket</p>	<p>L-shaped mount bracket and screws</p>	
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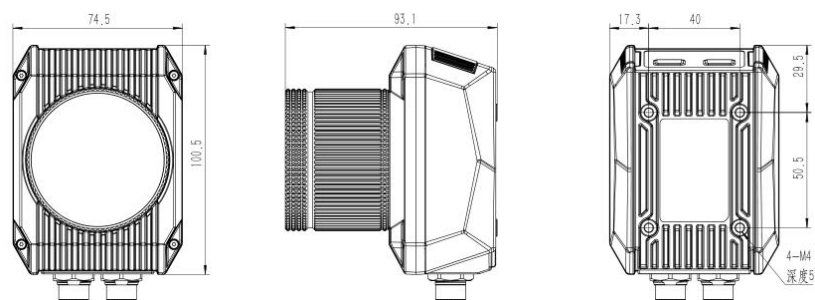
1.6 Accessories



Size of standard code reader



Size of high-power code reader

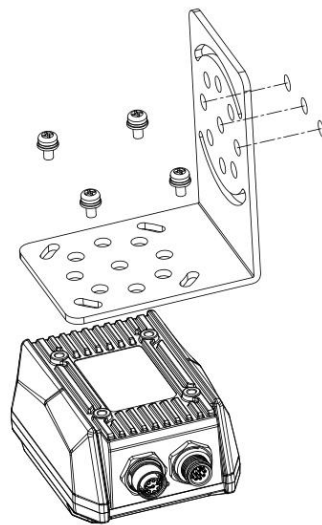


Size of C-port code reader

Chapter 2 Installation and Operation

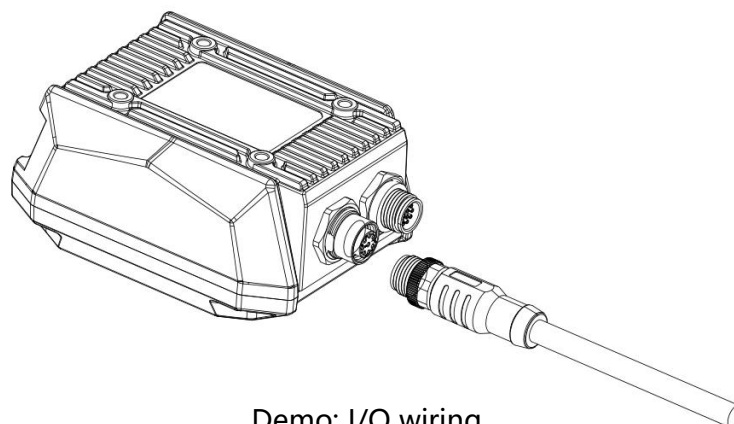
2.1 Device Installation

1. Install the device onto a fixed bracket with screws. Then attach the device to other mechanical components through the fixed bracket.



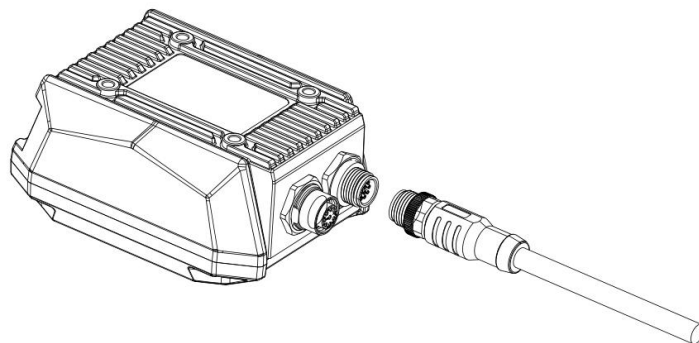
Demo: Front mounting

2. Use power supply and I/O wire-cable for power by connecting with suitable switch power supply in a correct way. For wiring, please see 1.4 "I/O ports" for details of cables as a reference.



Demo: I/O wiring

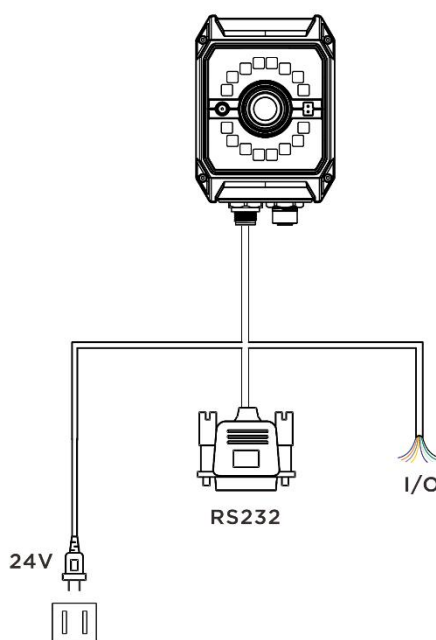
3. Use wire with an aviation plug and a RJ45 for normal connection between device and switch or network card.



Demo: Attaching network wire to the device

2.2 Power Supply Connection

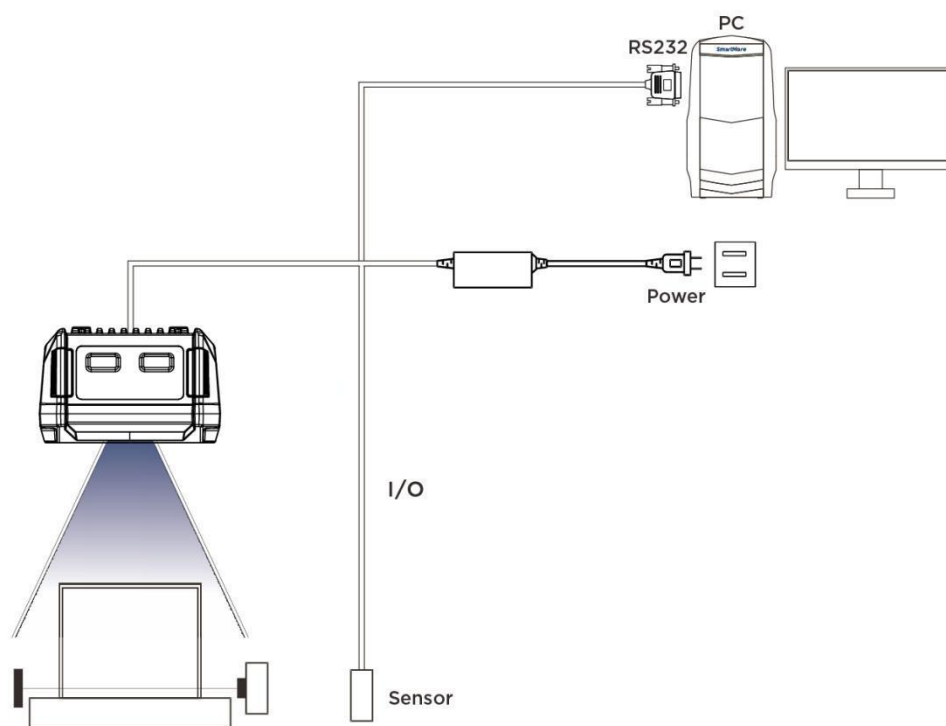
24V DC and maximum 3A of power supply is supported. There are two ways of power supply: 24V DC direct connection or 220V AC connection with an adaptor.



2.3 Communication Connection

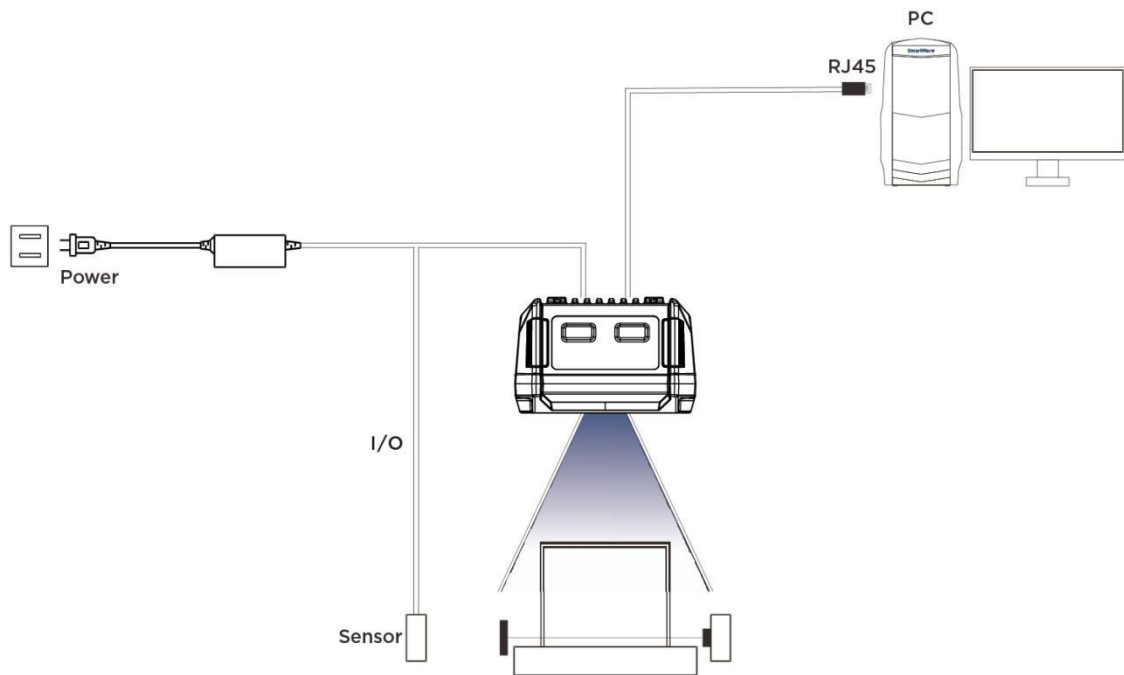
A RS232 serial port connection

The default baud rate is 9600. Check bit: NULL. Data bit: 8. Stop bit: 1. According to the actual situation, parameters can be altered during software debugging.



B Ethernet Connection

The default IP address is 169.254.153.0. And the default data port is 15000.



Chapter 3 IO Electrical Characters and Wiring

A smart code reader has 2 photocoupled isolated inputs and 3 photocoupled isolated outputs.

3.1 Electrical Characters of I/O

LineIn 0/1 in I/O signal is photocoupled isolate input and LineOut 0/1/2 is photocoupled isolate output.

3.1.1 Electrical Characters of Input

Parameter Name	Parameter Symbol	Parameter Values
Input logic in low level	VOL	6V
Input logic in high level	VOH	12V
Input drops along the delay	TDF	1.3us
Input rise edge delay	TDR	35us

*Description *:* Low or high input logic is the threshold representing the input voltage. Input up or down delay is representative of the performance.

3.1.2 Electrical Characters of Output

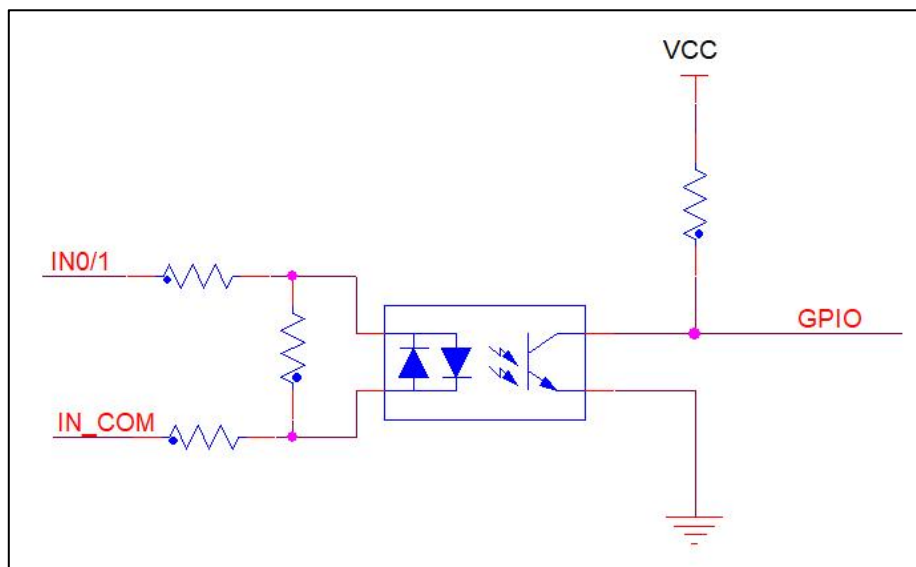
Parameter Name	Parameter Symbol	Parameter Values
Output logic in low level	VOL	0.7V (max)

Output logic in high level	VOH	Dependent on the voltage of the pull-up resistor
Output drops along the delay	TDF	7.5us
Output rise edge delay	TDR	141us
Output drop time	TF	12.6us
Output up time	TR	157.8us

3.1.3 Internal Wiring Diagram of Input

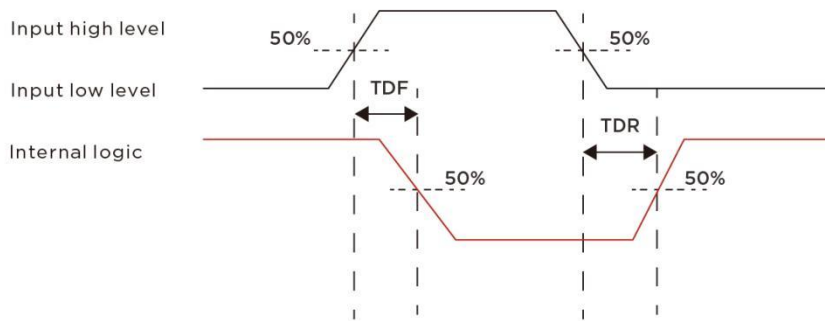
- Input Signal

In 0/1 in the device I/O signal is a photocoupled isolated input with an input voltage ranging from 8 to 28 VDC.



Input Circuit Diagram of Device

- The input logic level is:

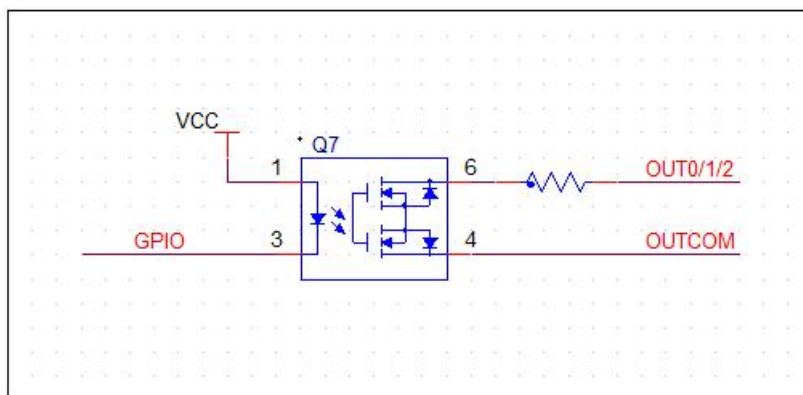


Input Logic Level Diagram

3.1.4 Internal Wiring Diagram of Output

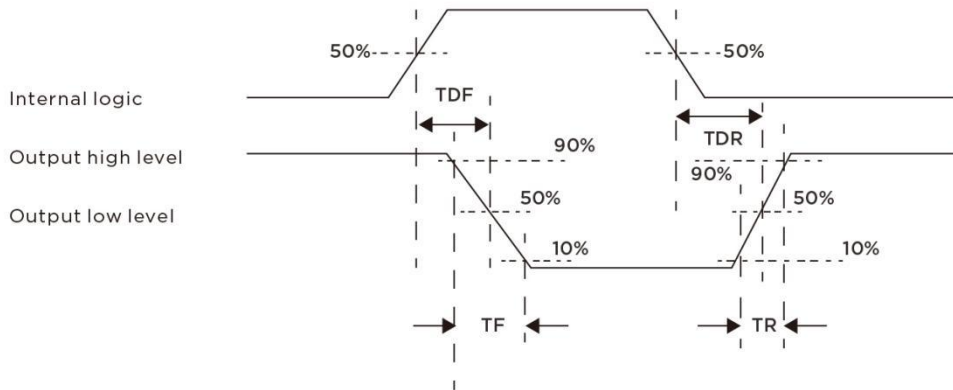
- Output Signal

Lineout0/1/2 in the device's I/O signal are optocoupler-isolated outputs. The maximum output voltage that can be driven is 28V with an output current of no more than 30mA. Please note that inductive devices are not supported.



Output Circuit Diagram of Device

- The output logic level is:



Output Logic Level Diagram

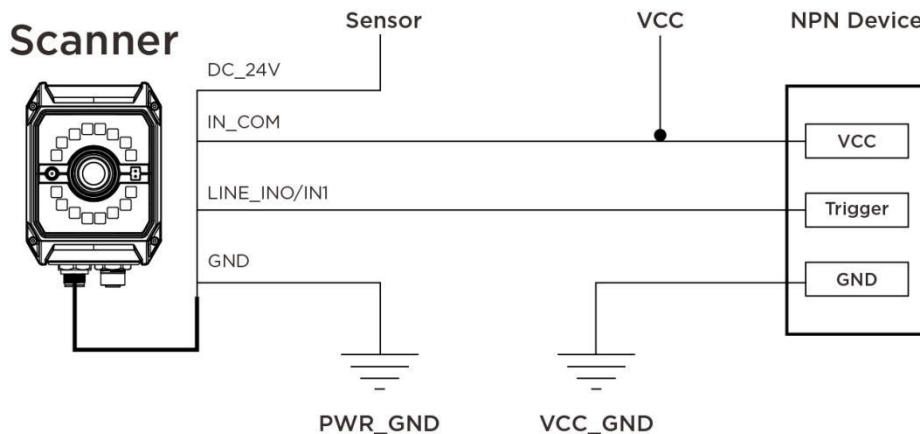
3.2 IO External Wiring

The device can receive external input signals or output signals to the external device through the I / O interface. This section mainly introduces how to wire the I / O part. The signal input in the wiring diagram takes LineIn 0 as an example, and the signal output takes LineOut 0 as an example. Other interfaces can be summarized according to the cable definition in the wiring diagram, combined with the interface introduction.

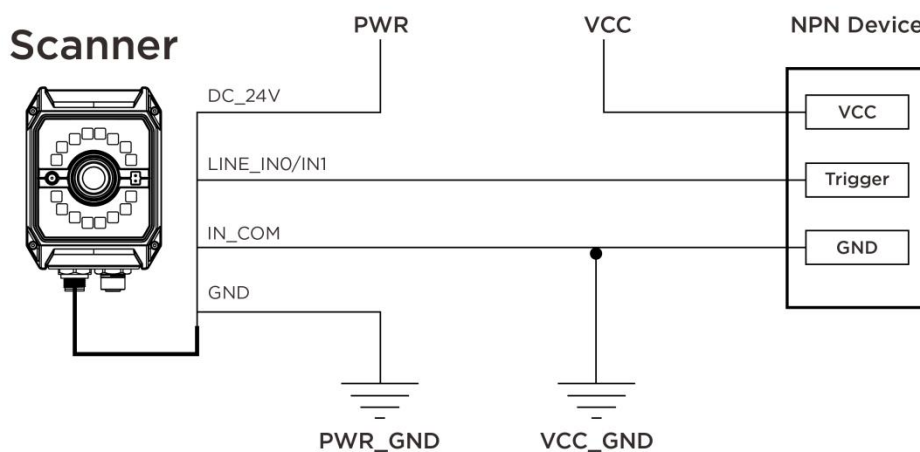
3.2.1 External Wiring Diagram of Input

Wiring of input differs based on different models of devices.

- The input signal is the NPN



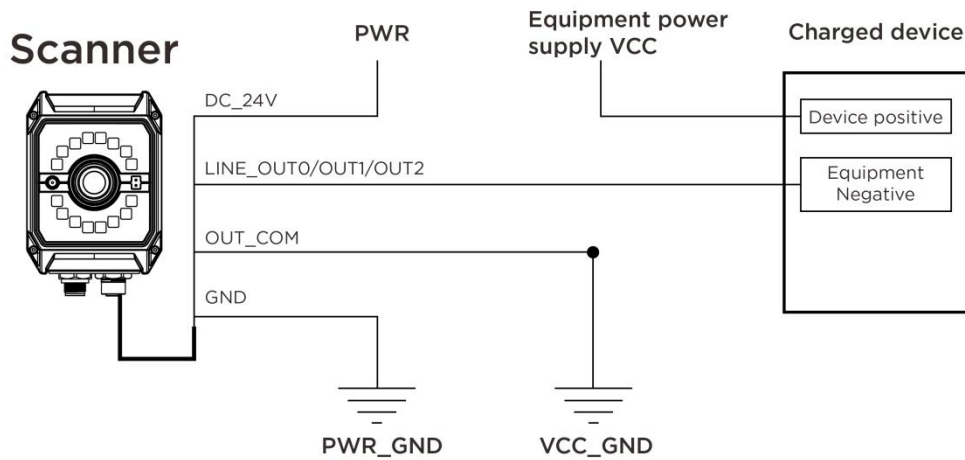
- The output signal is the PNP.



3.2.2 External Wiring Diagram of Output

Wiring of output differs based on different models of devices.

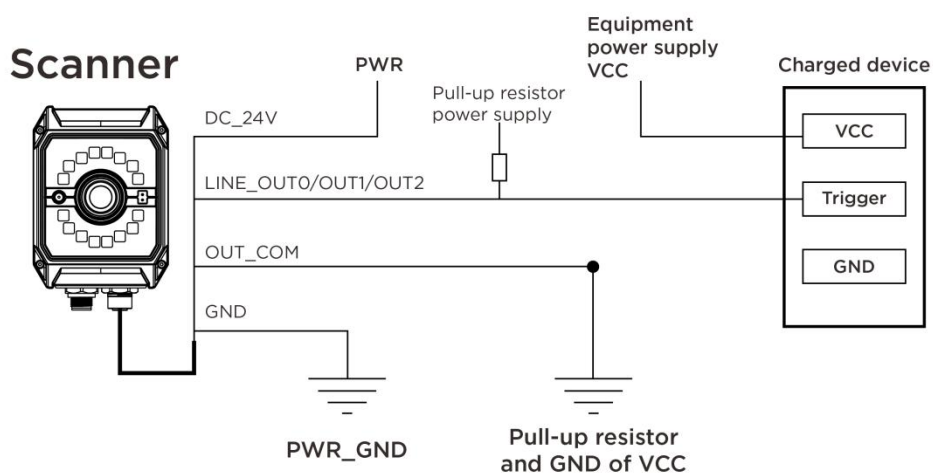
- External devices such as optocouplers, alarm devices, and indicator lights need to directly control the power supply circuit of the device



Note *:

- 1) "Driving inductive devices such as relays and motors is prohibited."
- 2) "The output load current must meet the product specifications (series current-limiting resistors may be necessary if required)."

- External devices require input of high or low logic level



Note *:

- 1)" Measure whether there is voltage on the TRIGGER pin of the device. If there is voltage, it means that there is an internal pull-up resistor in the device and no external pull-up"

resistor is needed. Note that the voltage provided by the device itself cannot be greater than the maximum output control voltage of VS1000PRO, which is 28V."

2)" If there is no voltage on the TRIGGER pin, it is necessary to confirm the range of the input voltage of the device. The voltage provided by the pull-up resistor cannot exceed the maximum input voltage of the controlled device and must be less than 28V, otherwise the device and code reader may be damaged."

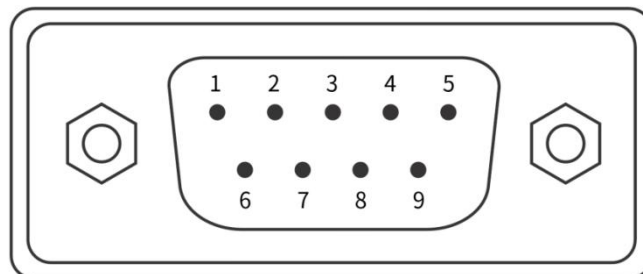
3) "The resistance value is recommended to be calculated based on $P=U^2/R$ to ensure that the power is less than the rated power of the pull-up resistor. Otherwise, the resistor may be damaged."

3.3 RS-232 Serial Port

The device supports the RS-232 serial port output.

3.3.1 RS-232 Serial Port

The common 9-pin male connector 232 serial port connector definition is shown in the figure below.



9-pin Male Connector

Pin NO	Name	Function
--------	------	----------

2	RX	Receive data
3	TX	Send data
5	GND	Signal ground

Definition of 9-pin Male Connector & 232 Serial Port

Note : The definition above describes a male connector for wiring.*

Chapter 4 Client-side Installation and Operation

4.1 Software download

Enter the official website of AKUSENSE <https://www.akusense.com> and download the "MJ_AISensor" software installation package. Double-click the installation package to install the software.



4.2 Software Connection

- Click "MJ_AISensor" on your PC desktop and open the software as an admin.

- The smart code reader can only be connected with the PC of the configuration software when they are in the same network segment.
- Default IP address of RCD-AI500 series: 169.254.153.0; Gateway 255.255.255.0.
- Able to adopt DHCP and static IP addresses for successful interaction.
-

The screenshot displays the 'IP configuration' window. Under 'Setting mode', the 'Use static IP' option is selected. The 'Static IP configuration' section includes a 'One-click matching' button and a dropdown menu for 'Configuration...' set to '以太网 5'. Below this are input fields for IP address (10.80.158.), Subnet mask (255.255.255.0), Default gateway (10.80.158.), and DNE Server (114.114.114.114). 'Cancel' and 'Confirm' buttons are at the bottom.

ip Changing

4.3 PC Network Configuration

4.3.1 Change IP address of PC

- The steps are as follows: 1) Take Windows10 as an example, open "Start Menu" >"Settings" > "Network and Internet" > "Ethernet" > "Change Adapter Options" > "Ethernet 3" > Right-click "Properties" > "Network" > "Internet Protocol Version 4 (TCP/IPv4)", correspondingly modify the IP

address of the PC of the corresponding network card to 169.254.153.16; Subnet mask: 255.255.255.0.

Open the configuration software, select the corresponding PC and click on connection to complete.

Address	Status	Firmware version	Interface	Mac address	Serial number	Networking status	Connect	Device operation		
10.80.158.200	Idle	v2.3.0.1	Network	42:75:7E:11:62:E4		--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.68	Occupied	v2.3.0.8	Network	16:8A:8D:9A:99:67	G21200512999	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.159.251	Idle	v1.1.6-1-onDL	Network	78:72:64:00:08:41	F02220460014	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.159.87	Idle	v1.2.4.9	Network	78:72:64:00:06:35		--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.56	Idle	v2.3.0.4	Network	78:72:64:00:18:35	F05230930024	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.11	Idle	v1.1.7	Network	78:72:64:00:06:36	F02220460003	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.159.230	Exception		Network	A0:00:00:00:00:29	F1111111140	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.1	Idle	v1.2.6.7	Network	92:42:4F:89:2C:11	F04220710014	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.122	Offline	v2.3.0.7	Network	26:F2:1E:7B:9B:45		--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.202	Occupied	v2.2.8.3	Network	8A:3B:D6:6B:4F:AD	F05220720008	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.6	Exception		Network	78:72:64:00:0E:33	F02220840021	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.168	Idle	v2.2.8.8	Network	AD:AA:EE:EE:EE:EC	F00222235554	--	Connect	IP setting	Firmware upgrade	Networking configuration
10.80.158.201	Occupied	v1.2.7.4	Network	86:09:15:51:4D:1F	F03221220023	--	Connect	IP setting	Firmware upgrade	Networking configuration

4.3.2 Change IP address of code reader

- The steps are as follows: open the configuration software, select the corresponding PC network card, display on the code reader, click IP Settings>Use static IP>One-key match>Confirmation, and change the IP address to the same network segment IP as the PC.

Address	Status	Firmware version	Interface	Mac address	Serial number	Networking status	Connect	Device operation			
10.80.158.56	Idle	v2.3.0.4	Network	78:72:64:00:18:35	F05230330024	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.87	Idle	v1.2.4.9	Network	78:72:64:00:06:35		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.230	Exception		Network	A0:00:00:00:00:29	F1111111140	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.79	Idle	v2.3.0.6	Network	16:8A:8D:9E:7A:3A	Q05230320017	--	Connect	IP setting	Firmware upgrade	Networking configuration	
192.168.0.174	Unreachable		Network	22:6E:6B:F6:83:3B		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.200	Idle	v2.3.0.1	Network	42:75:7E:11:62:E4		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.11	Idle	v1.1.7	Network	78:72:64:00:06:36	F02220460003	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.251	Idle	v1.1.6-1-andDL	Network	78:72:64:00:06:41	F02220460014	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.1	Idle	v1.2				--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.168	Idle	v2.2				--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.6	Exception					--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.218	Idle	v1.3				--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.28	Idle	v1.2				--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.202	Occupied	v2.2.8.3	Network	8A:3B:D6:EB:4F:A0	F03220720008	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.131	Occupied	v2.2.8.8	Network	78:72:64:00:12:97	F0222180013	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.201	Occupied	v1.2.7.4	Network	86:09:15:51:4D:1F	F03221220023	--	Connect	IP setting	Firmware upgrade	Networking configuration	

IP configuration

Setting mode

Use DHCP Use static IP

Static IP configuration

Configuration... 以太网5 One-click matching

IP address: 10 . 80 . 158 .

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 10 . 80 . 158 .

DNE Server: 114 . 114 . 114 . 114

4.4 Firmware Upgrade

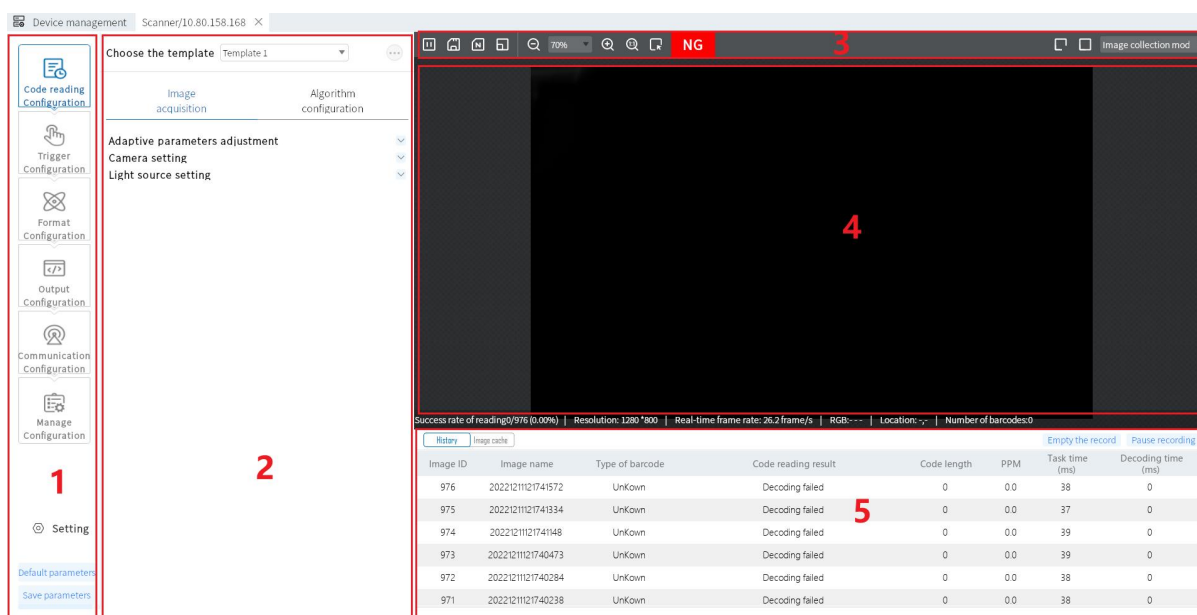
- The steps are as follows: Equipment Management > Equipment Maintenance > Firmware Upgrade, select the firmware file, and then click on OK for the firmware update. Wait for the restart to complete.

Address	Status	Firmware version	Interface	Mac address	Serial number	Networking status	Connect	Device operation			
10.80.158.56	Idle	v2.3.0.4	Network	78:72:64:00:18:35	F05230330024	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.87	Idle	v1.2.4.9	Network	78:72:64:00:06:35		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.230	Exception		Network	A0:00:00:00:00:29	F1111111140	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.79	Idle	v2.3.0.6	Network	16:8A:8D:9E:7A:3A	Q05230320017	--	Connect	IP setting	Firmware upgrade	Networking configuration	
192.168.0.174	Unreachable		Network	22:6E:6B:F6:83:3B		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.200	Idle	v2.3.0.1	Network	42:75:7E:11:62:E4		--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.158.11	Idle	v1.1.7	Network	78:72:64:00:06:36	F02220460003	--	Connect	IP setting	Firmware upgrade	Networking configuration	
10.80.159.251	Idle	v1.1.6-1-andDL	Network	78:72:64:00:06:41	F02220460014	--	Connect	IP setting	Firmware upgrade	Networking configuration	

Chapter 5 Functionality

5.1 Introduction to the User Interface

- The device can perform related operations through the client, details are as follows:
 - After confirming that the device is reachable, select and click on the "connection" of the client to successfully connect the device.
 - After connecting the device, the main interface of the client is shown in the figure below, and the introduction of each function module is shown in the table.



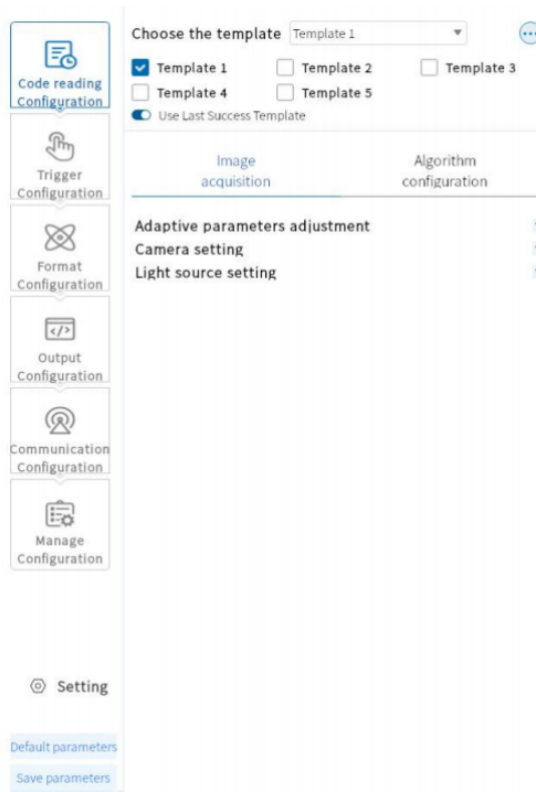
No.	Name	Introduction
1	Menu	Set up basic functions of the software.
2	Code-reader configuration	The second-level menu in the menu bar is used to set parameters for the corresponding modules, including template selection, parameter settings and algorithm settings, etc.

3	Toolbar	Start/stop capturing images on the device, and change operation modes or perform quick operations such as snapshot saving, canceling ROI, zooming in and out of preview images, and software triggering.
4	Preview window	Real-time previews of currently captured images, algorithm reading and effect of drawing the ROI.
5	History	Real-time information of the current read codes.
6	Basic configuration	Support changing the device name, buzzer settings, button settings, counting the device's code reading information, firmware upgrades, and viewing log information of the device.

5.2 Code-Reading Configuration

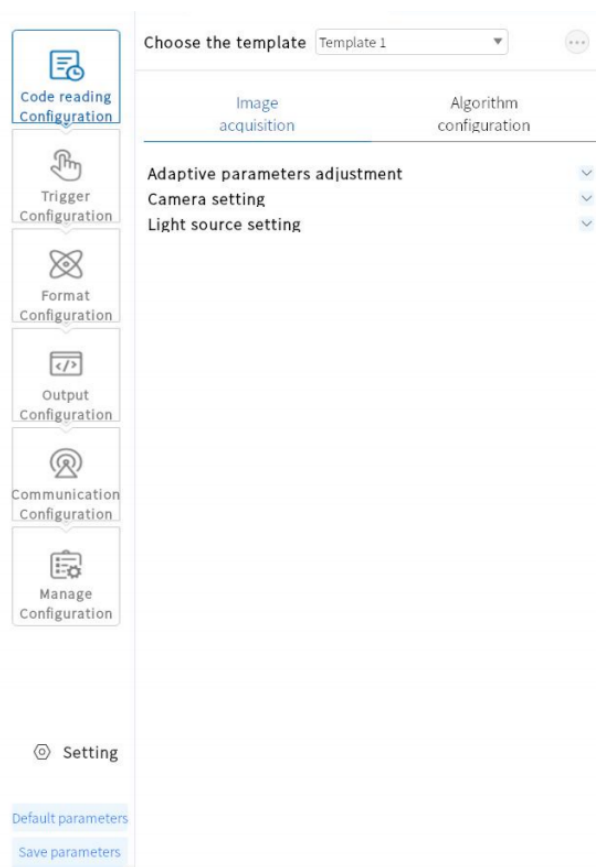
5.2.1 Template Selection

- The template type supports a total of 5 templates from "Template 1" to "Template 5", as shown in the following figure.
- The "template selection" of the device can be performed by pulling down the upper left corner of the "code-reader configuration" area. After completing the configuration of the relevant parameters of the code reader, the operation mode can be saved as a "template".
- Polling for decoding is triggered when selecting multiple templates. That is, a status of polling based on the selected templates during mission time. Select "previous successful template" in order to start decoding according to the template of last successful decoding. If not selected, then it will start a polling in a sequence from 1 to 5.



5.2.2 Image Acquisition

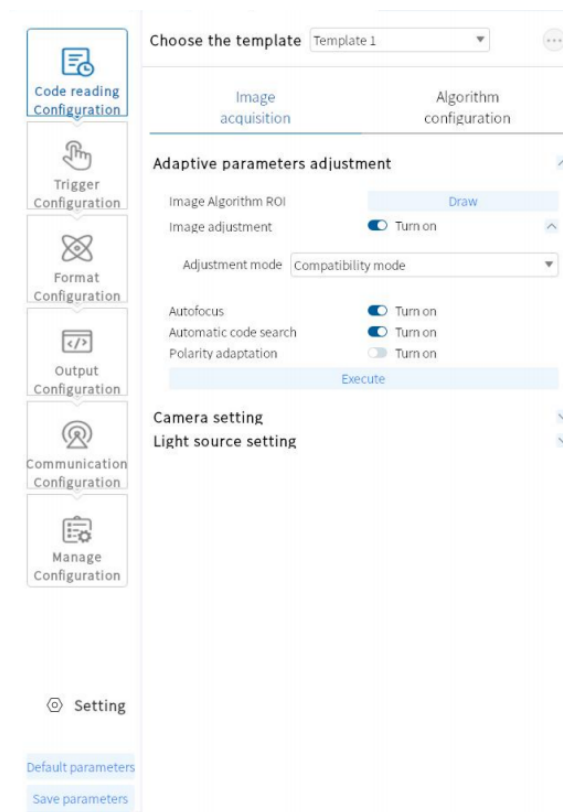
- If the results of image acquisition is not well, you can adjust parameters of “Image acquisition” in “Code-reading configuration” which includes manually adjust settings of camera and light source such as exposure time, gain, focus, light source parameters, etc. Code-reading configuration also includes auto-adjustment which the device intelligently adjust the settings of camera and light source by itself.



5.2.2.1 Adjustment of Adaptive Parameters

- Content of adaptive parameter adjustment includes: ROI of image algorithm, adjusting image, light source, auto-searching of code systems and time range for timeout & exist. Users can choose adjustable parameters (e.g. auto-adapted quality of images, light source, auto-focus, auto-searching of code systems) and hit “execute” . Parameters such as exposure, gain, light source and code system, etc., will be auto-adapted in related sectors in order to achieve the best decoding results.
 - Autofocus (optional): After it is turned on, the autofocus will be added to the adjustment process.

- Automatic code search (optional): After it is turned on, it automatically determines the code system information in the current field of view and the parameters required by the decoding algorithm.
- Polarity adaptation(optional): After it is turned on, the code polarity will be added to the adjustment process.



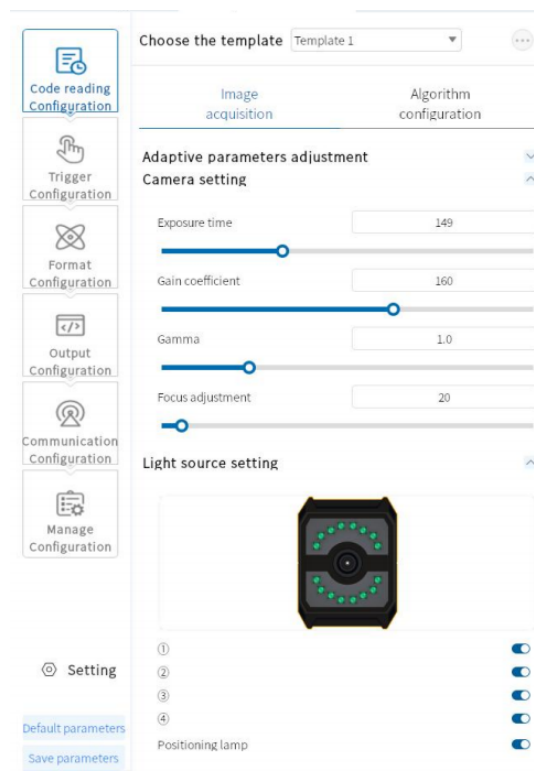
5.2.2.2 Camera settings

- Exposure time: Control the opening time of the shutter of the code reader, and control the brightness of the image. The longer the exposure time, the brighter the captured image. It can be adjusted by sliding or filling in numbers.

- Gain index: Control the size of the image gain and the brightness of the image, which can be adjusted by sliding or filling in numbers.

Tips: The longer the exposure time is, the lower the motion speed of reading; the larger the gain index, the more image noise.

- Focusing adjustment: Forward or backward adjusting the numerical value of focusing. Users can achieve the best effects of images based on actual preview pictures.

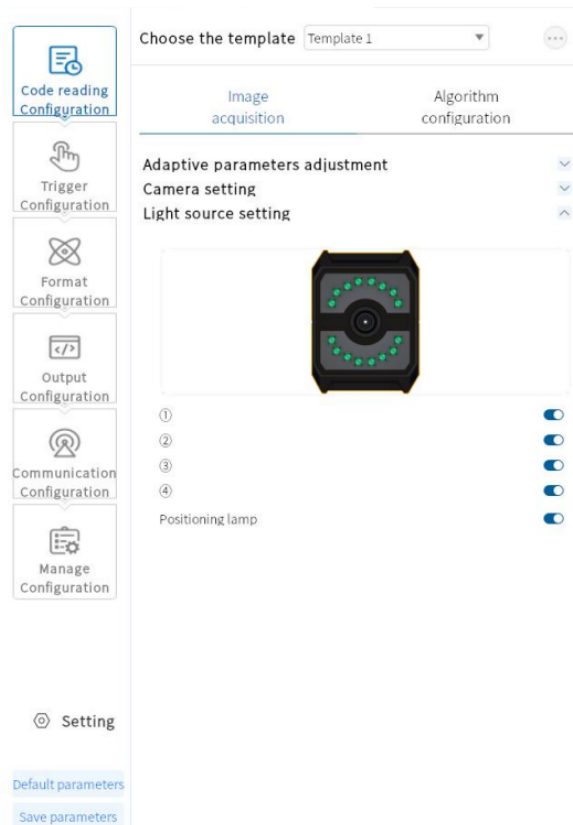


5.2.2.3 Light source setting

- Users can set up parameters such as brightness, on/off, endurance time, sight light, etc. based on modes and needs.

- Light source: Control on/off of light source.
- Position lamp : Control on/off of sight light.

Note: C-port mode does NOT have options for light source setting.



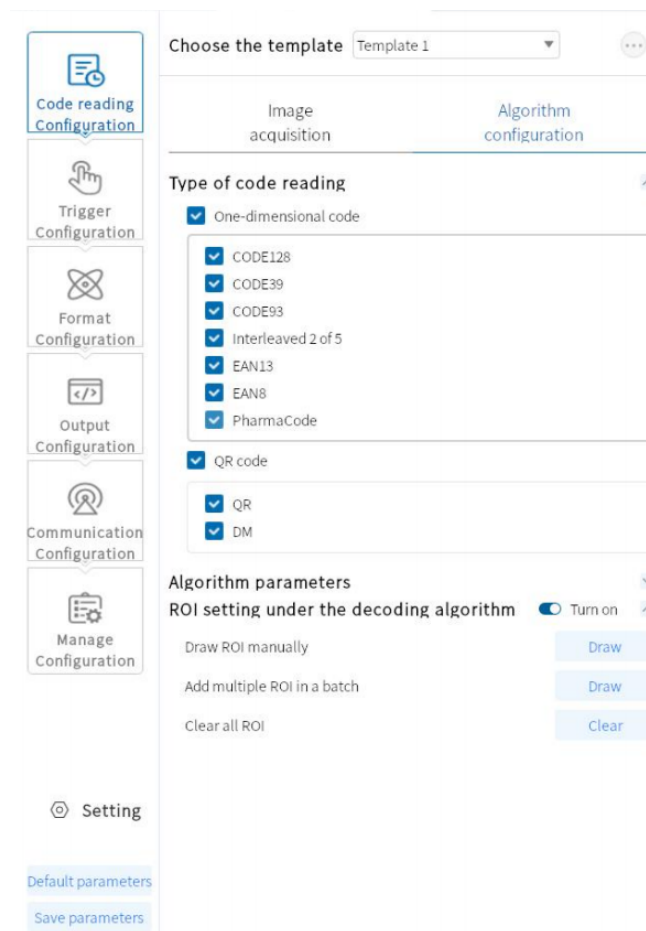
5.2.3 Algorithm Setting

- The device can set the relevant parameters of the reading code algorithm through the "algorithm configuration" module.

5.2.3.1 Type of code-reading

- At present, the code reading device supports 1D code and 2D code, check the the code system that needs to be read (multiple choices).

- As shown in the figure below, the algorithm configuration interface shows the selected code system. The more code system is selected, the more time it is taken by the algorithm to process each image. It is suggested to choose the corresponding code system according to the actual requirements to achieve the best effect.



5.2.3.2 Algorithm parameters

- Setting of the 1D code and 2D code decoding parameters.
 - Algorithm timeout: Setting of timeout for algorithm. That is, if operation time of algorithm exceeds the timeout numerical value, image processing will be

stopped immediately and output current results.

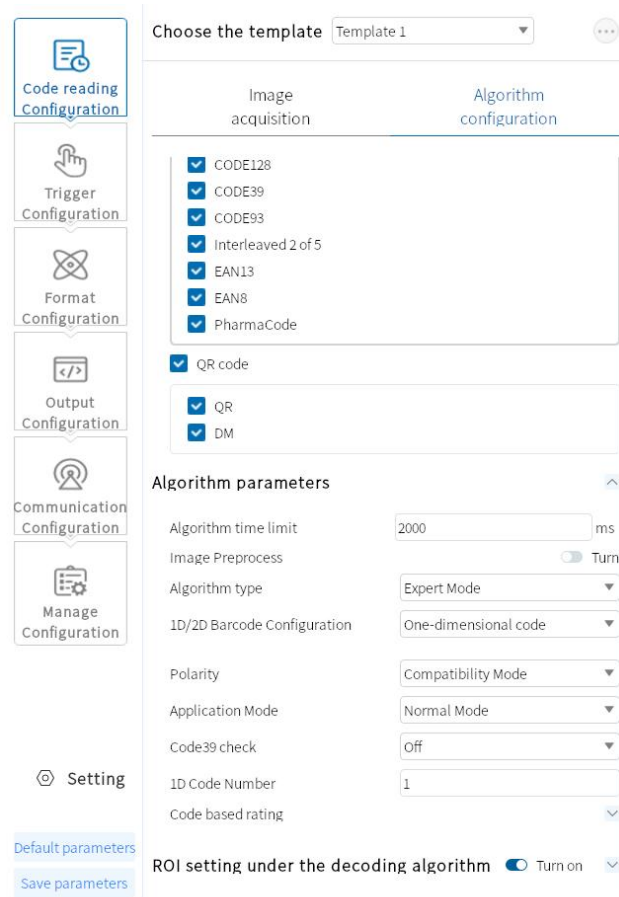
- Pre-processing of images: Function of pre-processing images including corrosion, swell, on/off algorithm and such image processing tools.
- Type of algorithms: Users can set parameters as normal mode or expert mode. It is suggested to choose expert mode in complex situations.
- Polarity: It is used to represent the colors of barcode and background, and the parameters are white background black code, black background white code and compatible mode.
- Edge type: the parameter can be continuous code, discrete code and compatible mode.

Note: whether the minimum cell of the continuous or discrete viewing code is connected together, whether the minimum cell is connected together is the continuous code, and whether the separate code is the discrete code.

- Mirror mode: used to distinguish whether the code is a mirror state, users can set the parameters as mirror, non-mirror, and compatible mode.
- QR distortion: it is used to determine whether the QR code has a distortion phenomenon, which can be set to be the parameters of distortion, non-distortion and compatibility mode.
- DM code type: used to distinguish the type of DM code, can set the parameters as square, rectangle and compatible mode.
- Operation mode: select the mode for decoding. The corresponding algorithms of different modes have different time consumption and results. The parameters

can be set as extreme speed mode, ordinary mode and expert mode.

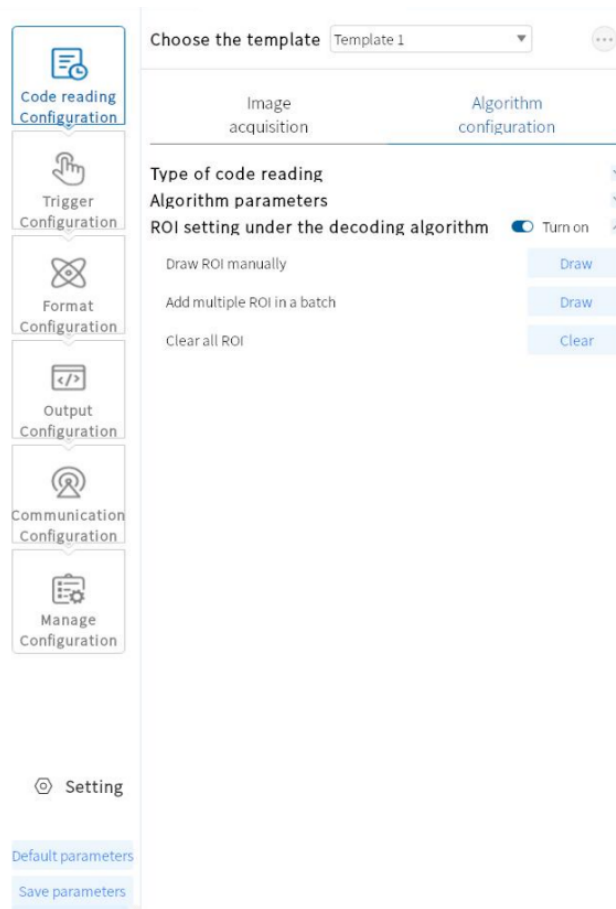
- Number of 1D codes: maximum number of 1D codes.
- Number of 2D codes: the maximum number of output 2D codes.



5.2.3.3 The ROI Setting of the Decoding Algorithm

- The algorithm ROI can only identify the algorithm on the selected regions of interest of the device, while the other areas do not do the algorithm processing, so as to improve the reading efficiency. The device may set multiple algorithm ROI regions, and output the code results from small to large in order according to the number of the algorithm ROI regions where the code is located. The output rules are as follows: 1,

code 2, code 3, code 4, code If the code is not recognized in the certain algorithm ROI area, the code information in the corresponding area is changed to the set noread character. Currently supports manual and batch addition of 2 algorithm ROI drawing, and supports all ROI.



- Manual Drawing of ROI: Click Set to enter the manual ROI setting mode, users can drag and set the ROI size according to the needs (users can set the ROI size finely through the center point X/Y, width and height), and the frame selection area is the area of interest for the algorithm.

①Center X: The X coordinate of the center point of the ROI frame.

②The Y coordinate of the center point of the ROI frame.

③Width: The number of pixels in the horizontal direction of the ROI.

④Height: The number of pixels in the vertical direction of the ROI.

- Bulk addition of ROI (checkerboard): used to drawing ROI in bulk.

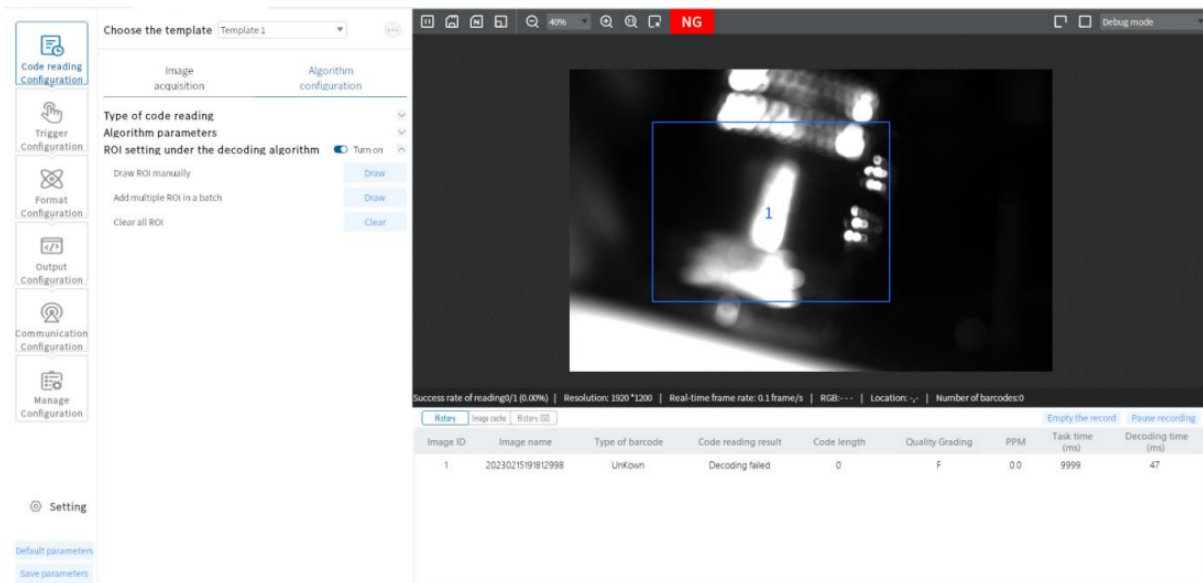
①Drawing area: Center X: the X coordinate of the center point of the batch setting area, center Y: the Y coordinate of the center point of the batch setting area, height: the number of pixels in the vertical direction of the batch setting area, width: the number of pixels in the horizontal direction of the batch setting area (the default is maximum number of pixels).

② Spacing setting: the spacing between ROI rows; Column spacing: the spacing between ROI columns and columns.

③ Number of ROIs (row*column): Set the number of rows and columns of ROIs in batches (the maximum value is dynamically adjusted according to the size of the drawing area and the row/column spacing).

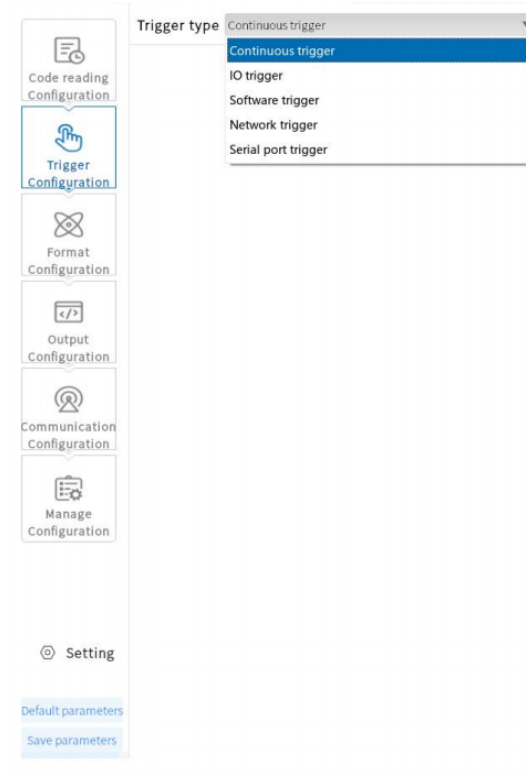
④Generate: Confirm the above settings.

- Clear of all ROI: used to erase all current ROIs.



5.3 Trigger Configuration

- Types of trigger include Continuous Trigger, IO Trigger, Software Trigger, Network Trigger, and Serial Port Trigger.



5.3.1 Continuous Trigger

- It indicates that the code reader continuously triggers the camera.

5.3.2 IO Trigger

- The IO trigger indicates that the reader is triggered to take a photo and decode after receiving the signal.

①: Task timeout: Set the maximum task time for a single trigger. When the trigger is on and a task is not closed after reaching the amount of timeout, it will be forced to stop. The default is 9999 with a setting range of 10-9999. It will start performing when turned on.

②: Ending of multiple-codes mode: After turning on, the condition of ending a task is set to numbers of codes. That is, the status of code-reading keeps on when not reaching the number of codes while the Task Timeout is off (competitive codes are not included). The ending condition is still the set amount of overtime when Task Timeout is on.

③: Image capture mode: It's divided into cache mode and non-cache mode.

Non-cache mode: An operation mode of serial image-capturing and code-reading.

Cache mode: An operation mode of parallel image-capturing and code-reading which is suitable for scenarios where codes are in motion and in non-fixed positions.

Maximum number of image capture: setting for needed images of cache. The

number ranges from 1-200 (fluctuating based on different devices).

Frequency of picking up images: picking up cached images and decoding based on the set frequency.

④: Start & End Trigger: used to set up relevant parameters of starting and ending triggers of IO.

Delay trigger: The trigger delay under the start trigger page means that after getting the trigger signal, the time set by the delay will start to read the code.

The trigger delay under the Termination Trigger page means that after the termination trigger signal is obtained, the code reading will be stopped for the time set by the delay. Default is 0ms. The setting range is 0ms-9999ms.

Trigger signal: The trigger signal under the start trigger page is divided into "Line0" and "Line1", corresponding to the hardware trigger input IN0 and IN1 respectively. The trigger signal under the end trigger page is divided into "Lin0" and "Line1", corresponding to the hardware are IN0 and IN1 respectively.

Trigger form: The trigger form under the start trigger page is divided into "rising edge" and "falling edge". "Rising edge" means that the code reader starts reading when it receives a rising edge signal; "Falling edge" means that the code reader starts reading when it receives a falling edge signal. The trigger forms under the termination trigger page are divided into "rising edge" and "falling edge". "Rising edge" means that the barcode reader stops reading when it receives a rising edge signal; "Falling edge" means that the barcode reader stops reading when it receives a falling edge signal.

The screenshot shows the 'Trigger Configuration' interface. On the left is a sidebar with navigation options: Code reading Configuration, **Trigger Configuration** (highlighted), Format Configuration, Output Configuration, Communication Configuration, and Manage Configuration. Below the sidebar are 'Setting', 'Default parameters', and 'Save parameters' buttons. The main area is titled 'Trigger type' and is set to 'IO trigger'. Under 'IO trigger', there are several settings: 'Task timeout' with a checked 'Timeout enable' and a value of '9999 ms'; a note stating 'The task time is fixed to a timeout time'; 'Multiple Barcode termination Enabl' set to '1 Codes'; 'Image collection mode' set to 'Cache Mode'; 'Maximum number of images' set to '100'; 'get image frequency' set to '1 out of 1'; and 'IO anti shake time' set to '2000 us'. Below these are sections for 'Trigger starts' and 'Trigger ends', each with 'Delay trigger' (0 ms), 'Trigger signal' (Line0), and 'Trigger form' (Rising edge for starts, Falling edge for ends).

5.3.3 Software trigger

- By clicking the "software trigger" content with the mouse, image-taking of code-reader will be triggered. That is, the code reader will start to take images and decode after receiving the trigger signal.

Trigger type

Software trigger

5.3.4 Network Trigger

- For network trigger, the code reader will start to take images and decode after receiving TCP trigger signal.

①: Start/End Triggering: Sets relevant parameters of TCP in order to start and end triggering.

Trigger Signal: Used to set up settings of TCP which starts and ends triggering.

Result Trigger: When it's on, the code reader starts to transmit results of reading only after receiving trigger signal sent by upper computer.

Note: Please take IO Setting for reference since other parameters are the same as IO setting.

5.3.5 Serial Port Trigger

- Code reader starts to take images and decode after receiving the command signal from serial port.

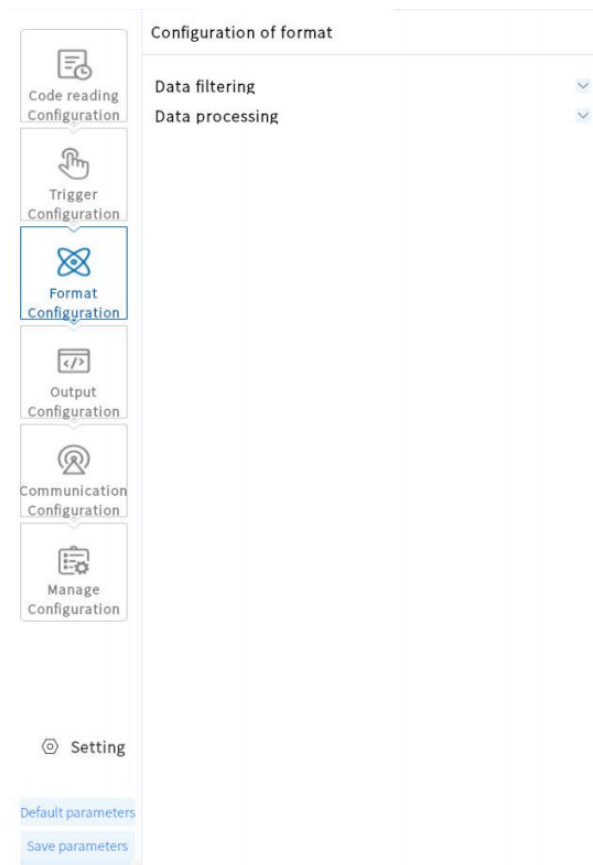
Hexadecimal: character setting of signals of start/end trigger is hexadecimal output.

Note: Please take IO Setting for reference since other parameters are the same as IO setting.

The screenshot displays the configuration interface for the Smart Code Reader. On the left is a vertical sidebar with navigation options: Code reading Configuration, Trigger Configuration (highlighted in blue), Format Configuration, Output Configuration, Communication Configuration, and Manage Configuration. Below these is a 'Setting' icon and two buttons: 'Default parameters' and 'Save parameters'. The main content area is titled 'Trigger type' and is set to 'Serial port trigger'. Under 'Serial port trigger', there are several settings: 'Task timeout' with 'Timeout enable' checked and a value of 9999 ms; 'Multiple Barcode termination Enable' set to 1 Codes; 'Image collection mode' set to 'Cache Mode'; 'Maximum number of images' set to 100; and 'get image frequency' set to '1 out of 1'. There is also an unchecked checkbox for 'Using Hex numbers'. The 'Trigger starts' section includes 'Delay Triggers' set to 0 ms and a 'Trigger signal' field containing 'start'. The 'Trigger ends' section includes 'Delay Triggers' set to 0 ms and a 'Trigger signal' field containing 'stop'.

5.4 Format Configuration

- The format configuration includes two sections, "data filtering" and "data processing", which can set the filtering rules and output data of the device.



5.4.1 Data Filtering

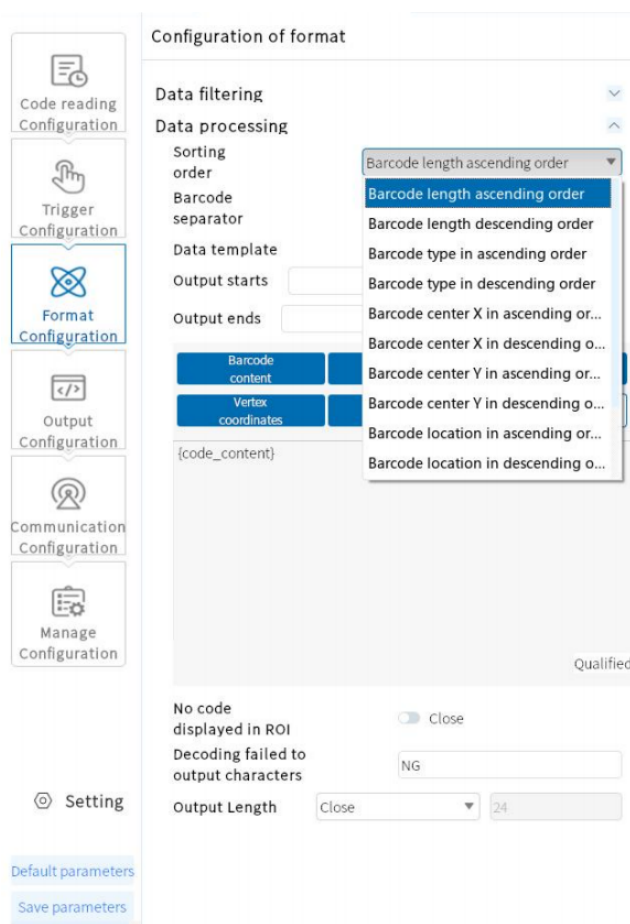
- Data filtering can filter the code read by the device according to the set rules.
 - Replicate time filter: when this function is enabled, the repeat code is not output within the set time; (30-9999999)
ex: set to 500ms, the code content is 123452, if run multiple times within 500ms, the result value is output once.
 - Quantity of repetitive reading filter: when this function is enabled, there will be no output if same content of reading exceed the set value; (1-100)
ex: when it is set to 3, and when the code content is 123452, the output number of 123452 cannot exceed 3 times.
 - Repetitive code filter: When this function is enabled, there will be no output if the content read is the same as the last time.

- Code length limit: when this function is enabled, only the code within the limit range is output.
- Specify the beginning: When this function is enabled, only the specified beginning code is output (supports multiple beginnings).
- Specify the End: When this function is enabled, only the specified end code is output (supports multiple endings).
- Must include: When this function is enabled, the output meets the code containing the set content (supports multiple contents).
- Cannot include: When this function is enabled, the output meets the code that does not contain the set content (supports multiple none).
- Character digit offset: the output starts from the set bit (ex, code: 1232334, set to 3, and the code output information is 2334).
- Output character requirements: full numbers: output numbers or letters only.
Letters: output letters, numbers or letters.
- Code verification: input the target character information to verify whether the above filtering conditions are met. OK / NG is not displayed without input, OK is displayed when the filter conditions are met, and NG is not met.

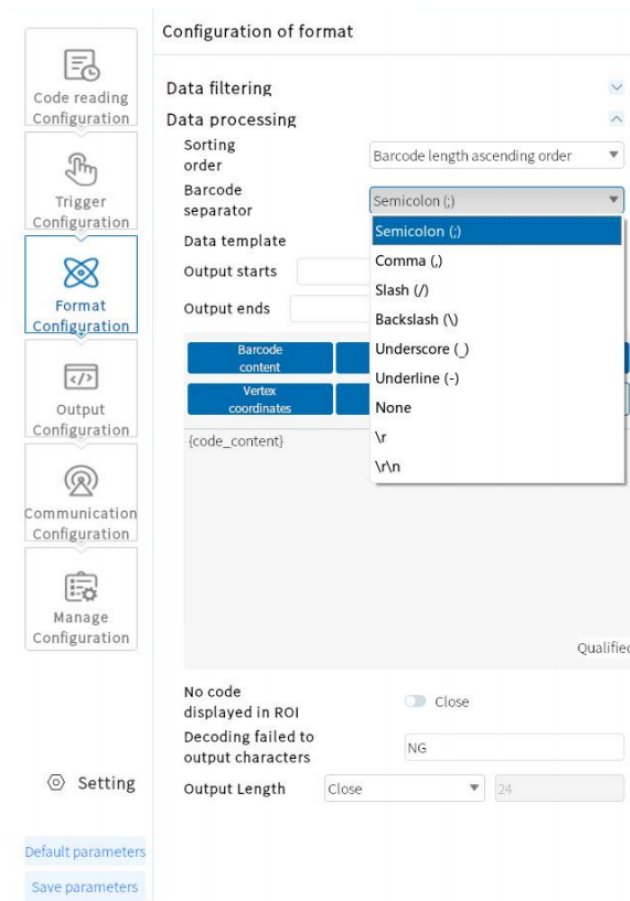
5.4.2 Data Processing

- The data processing section can set the code results output by the device. Selected communication protocol is different, the specific parameters are different.
 - Sort method: the sort method of the output results of code system. A variety of sorting rules are supported:
 - ① Code length ascending sequence: according to the code content length from small to large sorting.
 - ② Code length descending sequence: according to the code content length from large to small sorting.

- ③ Code type ascending sequence: 1D code: code39, 93, 129, ITF25, EAN. 2D code: QR/DM.
- ④ Code type descending sequence: 2D code: DM/QR, 1D code: EAN, ITF25, code128, 93, 39.
- ⑤ ROI ascending sequence: according to the set ROI number from small to large sorting.
- ⑥ ROI descending sequence: according to the set ROI number from large to small sorting.
- ⑦ Code center X ascending/descending sequence: according to the positions of center X from small to large sorting (descending on the contrary).
- ⑧ Code center Y ascending/descending sequence: according to the positions of center Y from small to large sorting (descending on the contrary).
- ⑨ Code position ascending/descending sequence: according to X from small to large and Y from small to large sorting (descending on the contrary).



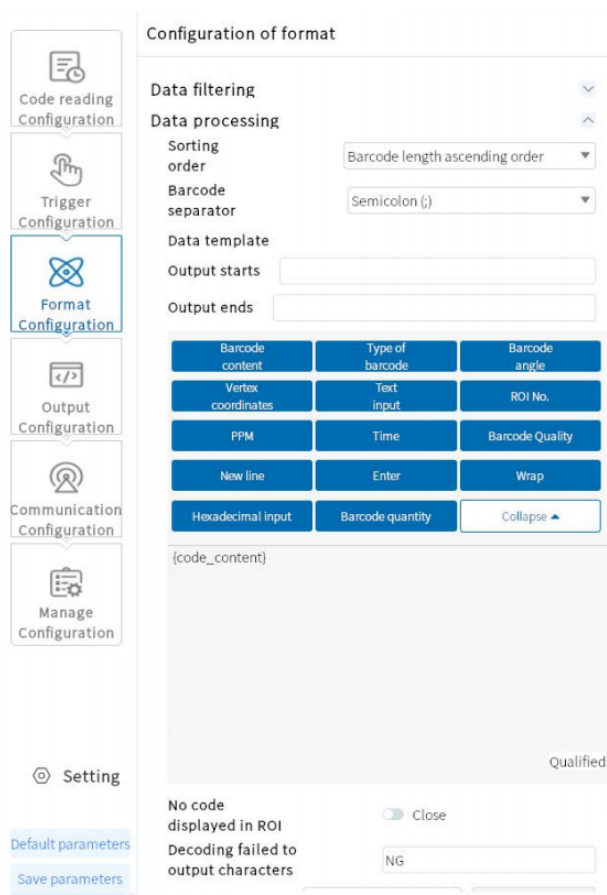
- Code separator: default of separating multiple codes is ; . Separator are semicolon (;), comma (,), slash (/), backslash (\), underline (_), strike (-), enter (\r), CRLF (\r\n), none.



- Data template: set code results of output by code reader.

①: Output Start/End: output content of start/end in data. It supports to set up specific content based on actual requirements.

②: Configuration of output content includes code content, code type, code angle, vertex coordinate, text input, ROI number, PPM, time, code quality, CRLF, enter, new-line, hexadecimal input, code quantity and etc.



- ROI fill-in: regions that does not read codes are able to automatically fill in the output fail character.
- Output character of fail decoding: used to edit characters that fail to read code.
- Output appointed length: When the function starts, it outputs code characters by cutting out content from the top or the end based on the set value. (ex: when

code content is 123456 with cut-out value set to be 2, it outputs 12 cutting out from the top, and outputs 56 cutting out from the end.)

5.5 Output Configuration

- The OUT setting can control three different output controls, which are divided into "OUTLINE1", "OUTLINE2" and "OUTLINE3", which correspond to the hardware trigger outputs "OUT0", "OUT1" and "OUT2" respectively.

①OUTLINE1: Users can choose three states: "OK", "Failed to read code", and "Abnormal". "OK" means the output signal of successful code reading; "Failed to read code" means the output signal of code reading failure; "Abnormal" means the output signal of equipment self-checking abnormal condition.

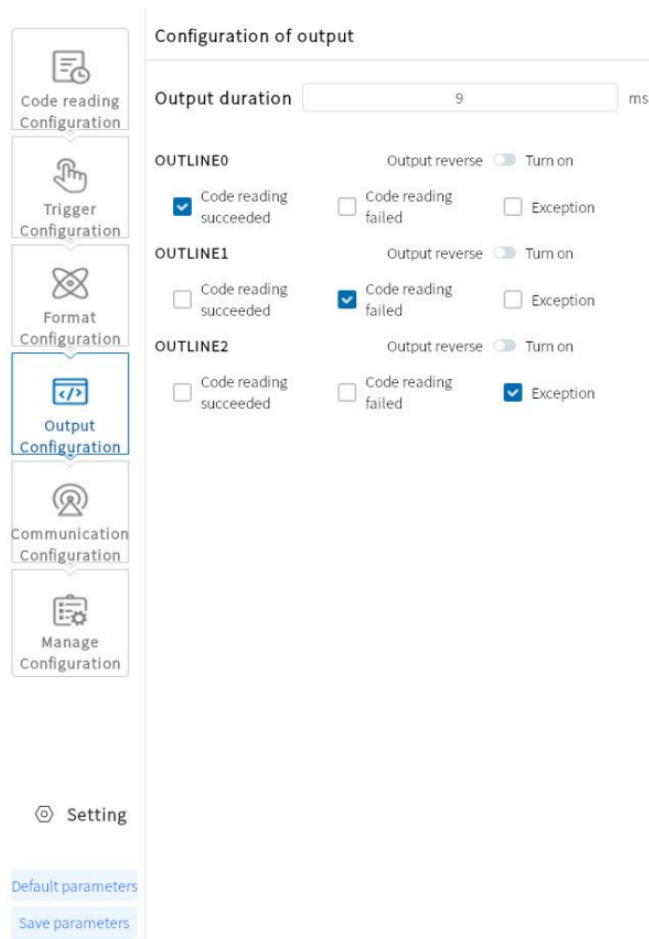
②OUTLINE2: Users can choose three states: "OK", "Failed to read code", and "Abnormal". "OK" means the output signal of successful code reading; "Failed to read code" means the output signal of code reading failure; "Abnormal" means the output signal of equipment self-checking abnormal condition.

③OUTLINE3: Users can choose three states: "OK", "Failed to read code", and "Abnormal". "OK" means the output signal of successful code reading; "Failed to read code" means the output signal of code reading failure; "Abnormal" means the output signal of equipment self-checking abnormal condition.

④Output duration: the duration of the output signal, the default is 10ms, the range is 1-10ms.

⑤Output inverse: users need to adopt Output inverse if needs the device to output

signals which are inverse compared with the current signals.



5.6 Communication Configuration

- The "Communication Configuration" section contains the TCP and the serial port to set up the communication protocol required for selecting the data transmission, which is related to the device operation mode.

5.6.1 Use of the TCP Server Protocol

- Users can set up TCP port number when choosing TCP Server as the communication mode.

Configuration of communication TCP

Use the TCPServer protocol

IP address 10.80.158.200

Subnet mask 255.255.255.0

Default gateway 10.80.158.254

TCP port 15000

heartbeat

Heartbeat identifier: online

Use the ModbusTCP protocol

Use the MC protocol

Use TCPClient

Use EtherNet/IP protocol

Use Profinet

use fins

Code reading Configuration

Trigger Configuration

Format Configuration

Output Configuration

Communication Configuration

Manage Configuration

Setting

Default parameters

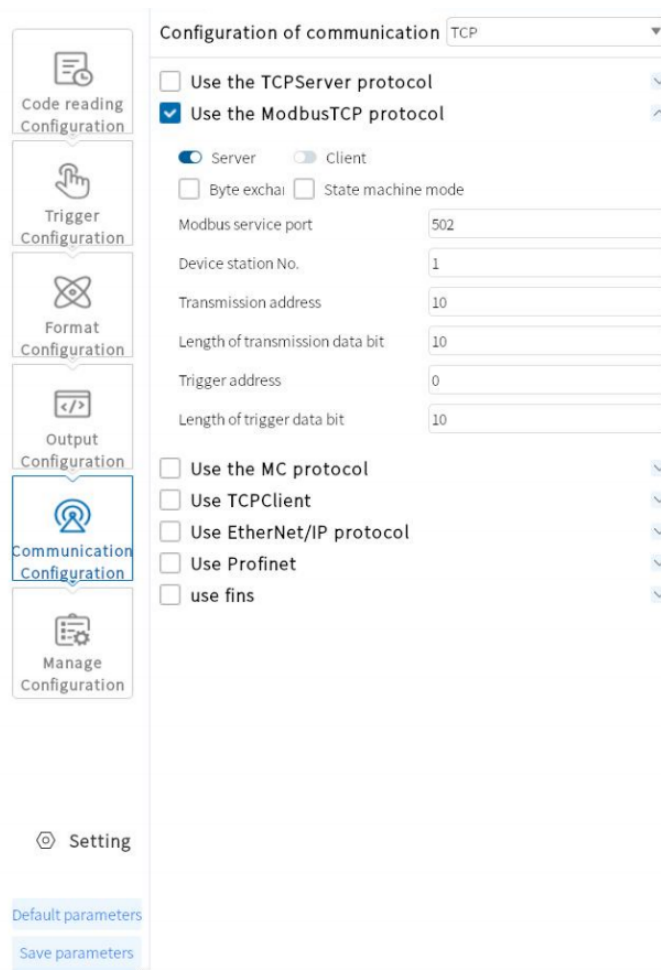
Save parameters

5.6.2 Use of the ModbusTcp protocol

- When choosing the ModbusTcp protocol, users need to configure the Modbus service IP, Modbus service port, etc.
 - Modbus type: users can choose communication mode of server and client as needed.
 - Service IP: Connect the IP address of the corresponding device (when choosing Client mode).
 - Character exchange: exchanging high type with low type as needed.
 - Service port: Connect the port number of the corresponding device.
 - Equipment station number: connect the station number of the corresponding

equipment.

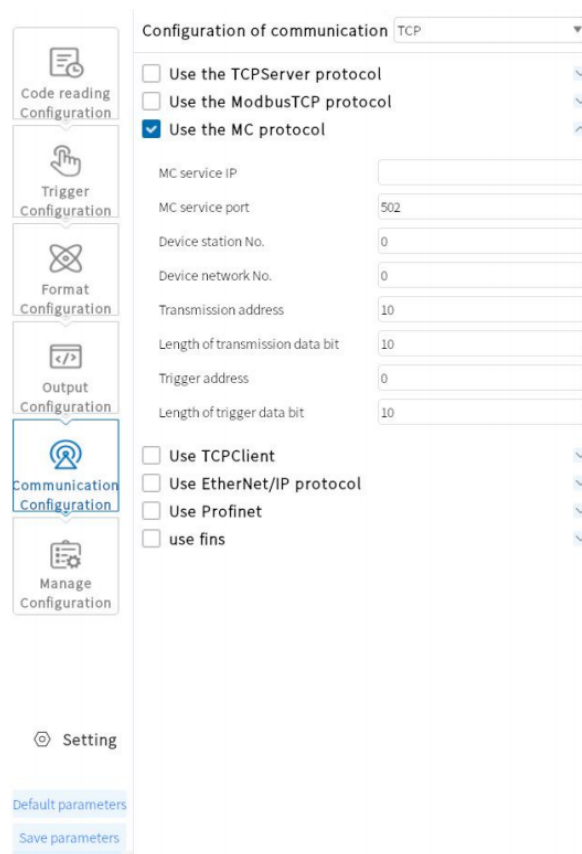
- Transfer address: the corresponding address of the PLC transmission data.
- Transfer data bit length: the length of the data bytes.
- Trigger address: the address required by the PLC to trigger the camera.
- Trigger data bit length: Length of the trigger required data bit.



5.6.3 Use of the MC protocol

- The MC protocol needs to configure the MC service IP and MC service port respectively.

- Service IP: Connect the IP address of the corresponding device.
- Service Port: The port number for connecting to the corresponding device.
- Device station number: the station number of the corresponding device to be connected.
- Device network number: The network number connected to the corresponding device.
- Transmission address: corresponds to the address of PLC transmission data.
- Transmission data bit length: the length of the data byte.



5.6.4 Use of the TCP Client Protocol

- The TCP Client protocol needs to configure the service IP and TCP service port

respectively.

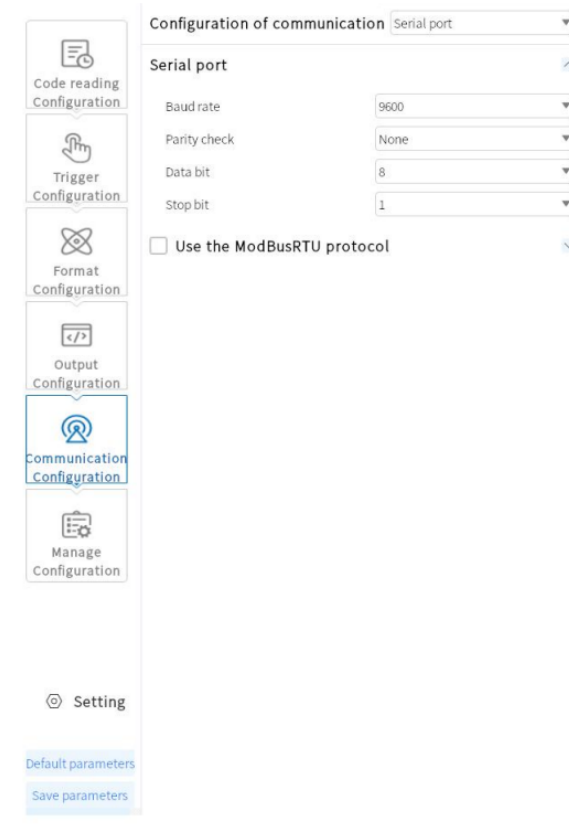
- Service IP: Connect the IP address of the corresponding device.
- TCP Service Port: The port number for connecting to the corresponding device.
- Heartbeat: Used to test status of TCP connection.

The screenshot shows the 'Communication Configuration' screen. On the left is a vertical sidebar with icons and labels for 'Code reading Configuration', 'Trigger Configuration', 'Format Configuration', 'Output Configuration', 'Communication Configuration' (highlighted in blue), and 'Manage Configuration'. Below the sidebar are 'Setting', 'Default parameters', and 'Save parameters' buttons. The main area is titled 'Configuration of communication' with a dropdown menu set to 'TCP'. It contains several protocol options: 'Use the TCPServer protocol', 'Use the ModbusTCP protocol', 'Use the MC protocol', 'Use TCPClient' (checked), 'Use EtherNet/IP protocol', 'Use Profinet', and 'use fins'. The 'Use TCPClient' section is expanded, showing fields for 'Server IP' (169.254.153.101), 'TCP port' (5000), and a 'heartbeat' section with 'Sending interval (ms)' (1000), 'Timeout (ms)' (5000), and 'Heartbeat identifier' (online).

5.6.5 Serial port

- When the communication protocol selects the Serial, the parameters that can be set are the following:
 - Serial port rate: set the serial port port rate of the receiver.

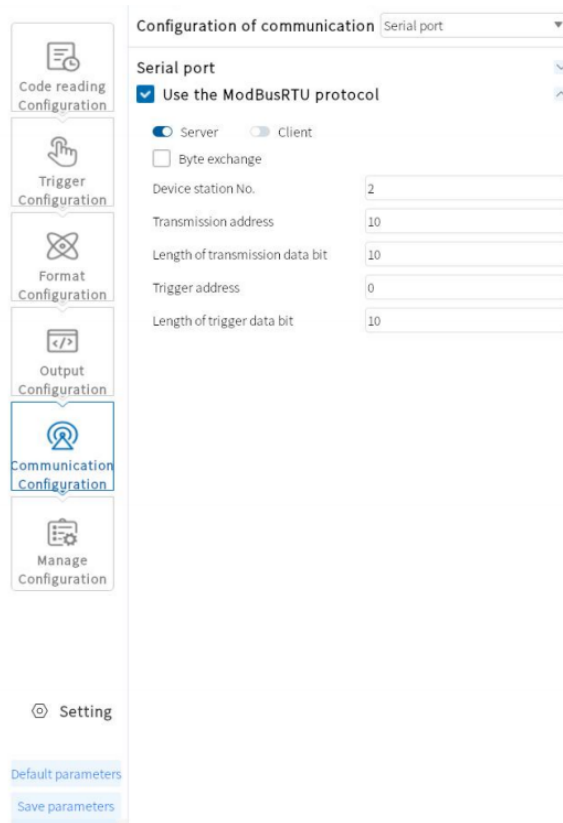
- Serial port parity: set the serial port check bit of the receiver.
- Serial data bit: set the serial data bit of the receiver.
- Serial port end bit: Set the serial port stop bit of the receiver.



5.6.6 Use of the ModBusRTU protocol

- The Modbus protocol needs to configure the device station number and others respectively.
 - Device station number: the station number of the corresponding device to be connected.
 - Transmission address: corresponds to the address of PLC transmission data.

- Transmission data bit length: the length of the data byte.
- Trigger address: the address required by the PLC to trigger the camera.
- Trigger data bit length: Length of the trigger required data bit.



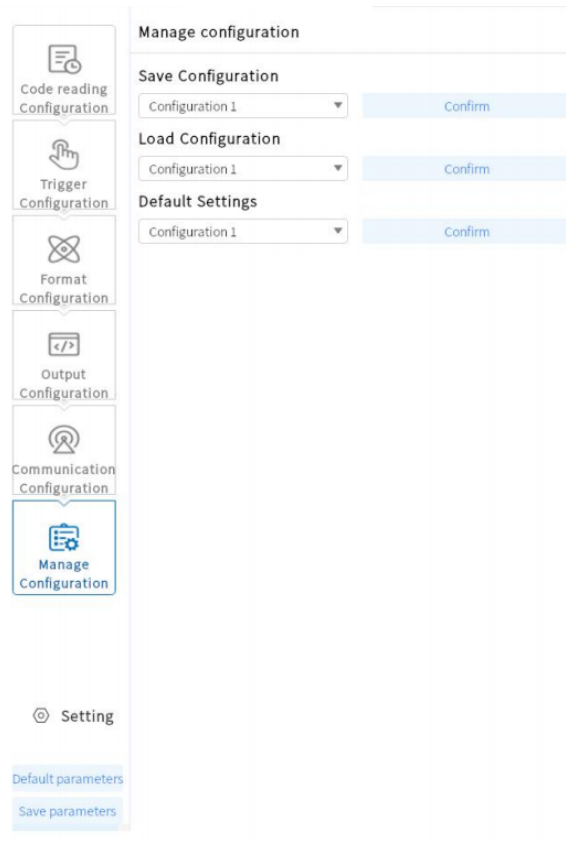
5.7 Configuration Management

- Configuration Management includes save current parameters, load and restore default saving.

Save: Save current parameters to group of parameter. Users can select 1-5 of user configuration to set up.

Load: Users can select configuration 1 to configuration 5 to load parameters real-time.

Default: The selected items are loaded by default when the device is on.



5.8 Setting

5.8.1 Device Setting

- Device name

The device name of the code reader can be modified. Support Chinese, English, letters, characters, numbers, etc.

- Buzzer setting

It can be turned on after decoding success/failure, and the sound can be set to 40ms,

80ms, and 120ms.

- Key setting

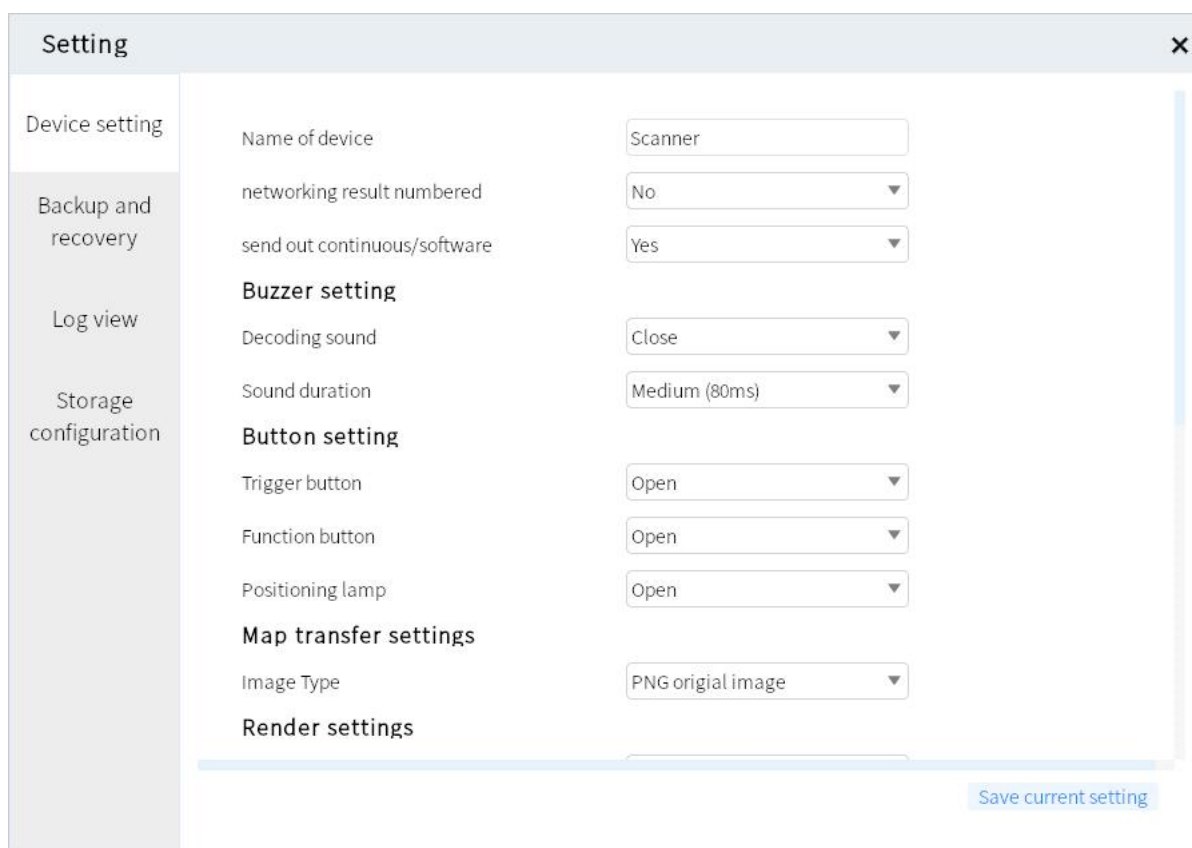
Trigger key, on/off. Function keys, on/off. Locate light, turn on/off.

- Image Transmission setting

Support PNG/JPG cut-out selection.

- Rendering setting

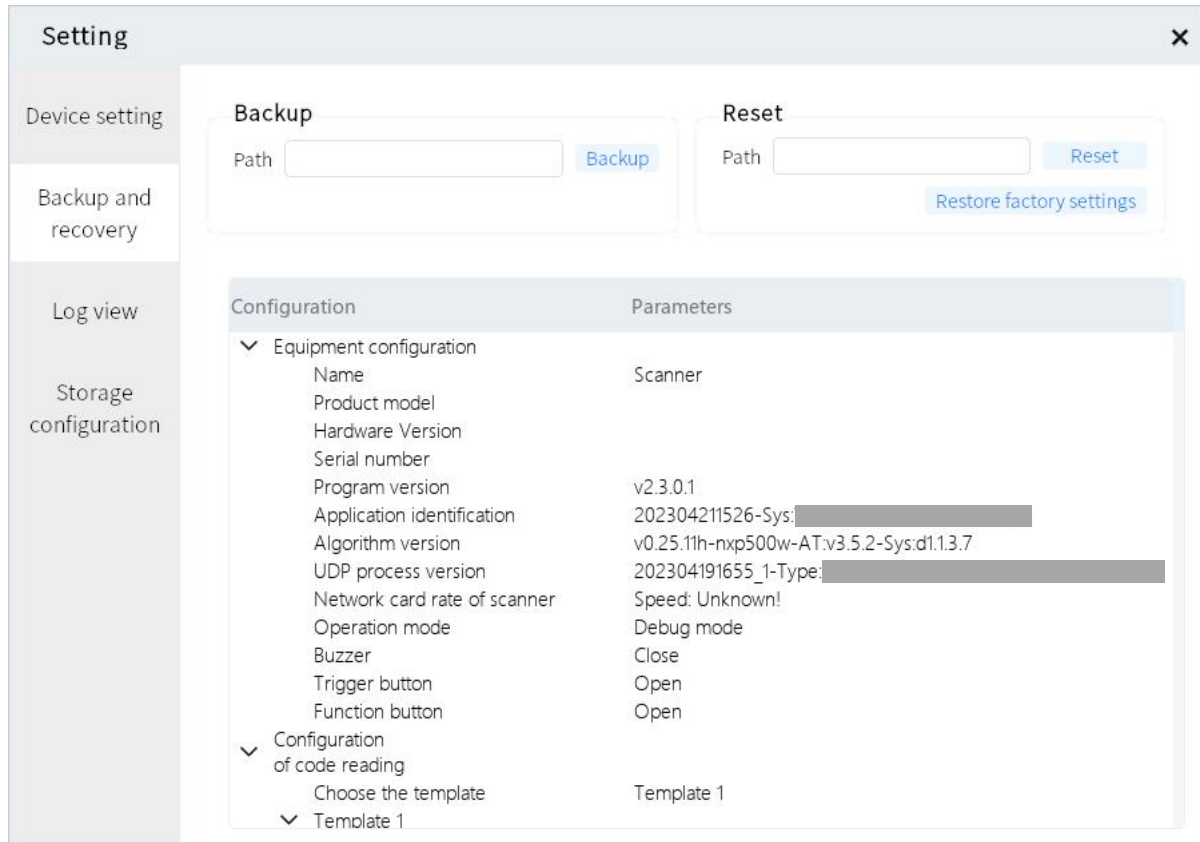
Setting for shown rendering text of code-reading. It includes follow, no-follow and close.



5.8.2 Backup and restore

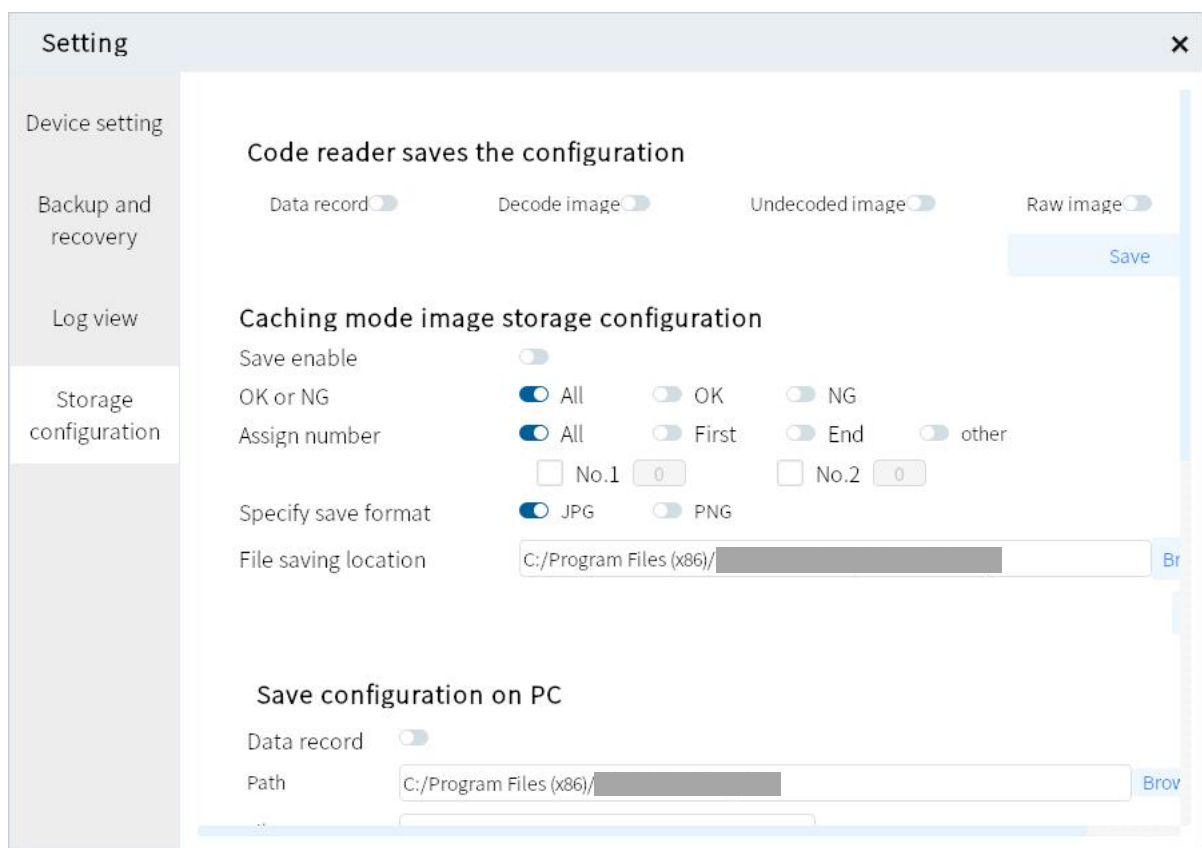
- The reader can back up settings and other information to PC, or restore settings and

restore factory settings.



5.8.3 Storage configuration

- Code reader saves the configuration. "Data Log", "Decoded Image", "Undecoded Image", "Original Image" can be turned on/off.
- The PC saves the configuration. Users can freely choose the save path.
- Snapshot configuration. The snapshot path can be saved.
- Capture time: 1s~60min.
- Capture quantity: 2~10000 sheets.



Chapter 6 FAQ List

6.1 Client software recognizes the device but displays "not accessible"

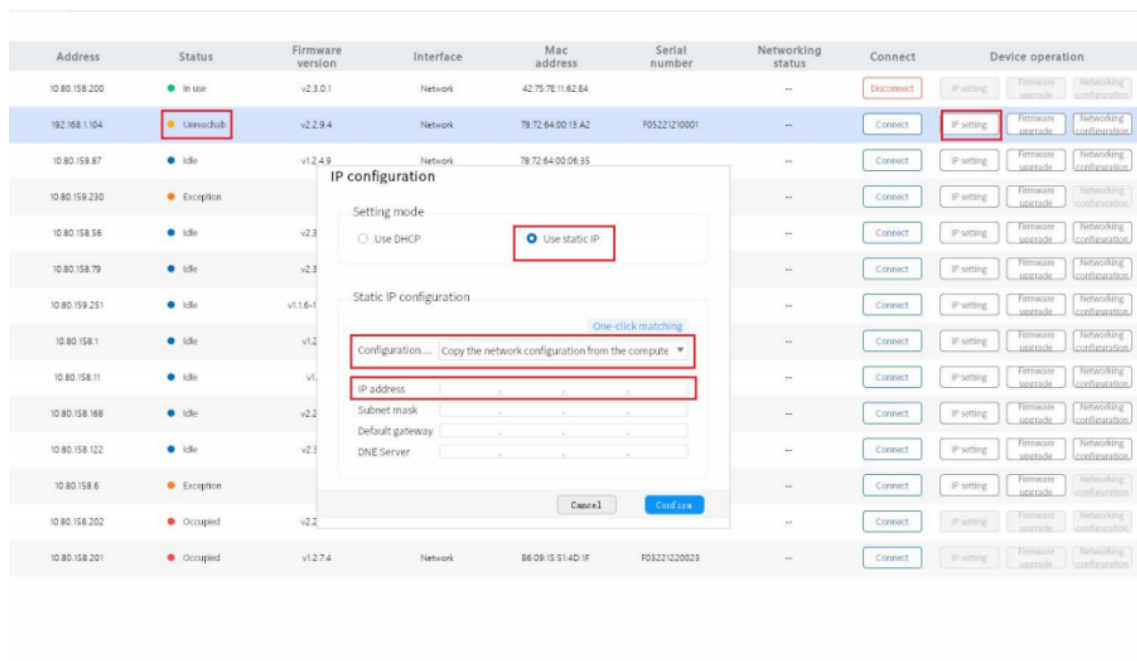
- **Possible reason:**

1) The IP of the device and the device connected network card are not in the same network segment.

2) The network card obtains the IP of two different segments.

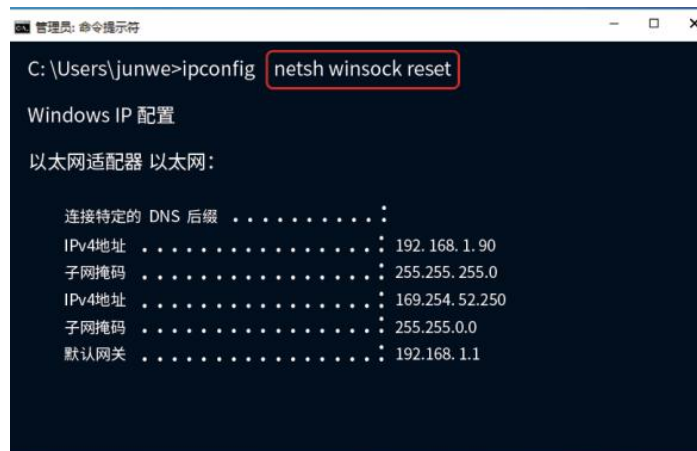
- **Solution:**

1) By modifying the device IP mode, make the computer and the device in the same network segment.



2) Click the computer "Start" -search box to enter "cmd" -right key administrator permission to run -enter: netsh winsock reset, to reset the network card information,

then restart the computer.



```
管理员: 命令提示符
C: \Users\junwe>ipconfig netsh winsock reset

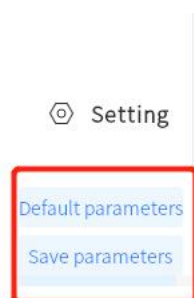
Windows IP 配置

以太网适配器 以太网:

    连接特定的 DNS 后缀 . . . . . :
    IPv4地址 . . . . . : 192.168.1.90
    子网掩码 . . . . . : 255.255.255.0
    IPv4地址 . . . . . : 169.254.52.250
    子网掩码 . . . . . : 255.255.0.0
    默认网关 . . . . . : 192.168.1.1
```

6.2 Not saved after the client sets the debugging mode

- **Possible reason:** The system has temporarily stored the setting parameters, and users need to manually save all the settings after the setting is complete.
- **Solution:** Click Configuration Management-Save All Configuration.
- **Specific operations are as follows:**



6.3 How to use the various trigger modes of the client software

- **Solution:**
 - 1) Network trigger: the third-party software to verify is required at first, then set the reader to be the network trigger on the software, set the same port, the same trigger

command, the same network ip segment (some routing may open IP isolation, need to be closed).

2) IO trigger: the IO trigger signal line needs to be connected, and the software should set the code reader as the IO trigger. The wiring should be the same as setting LINE0 / 1 and the same trigger command [there will be two NPN and PNP connections.

General connection method: in0 / in1 contact generator OUT line, IN_COM line is positive (npn) or negative (pnp)]. (Refer to Section 3.2 for details)

3) Serial port trigger: users need to connect to the DB9 terminal, the software setting of the correct COM port, the same port rate, data bit, stop bit, and check bit. And with the same trigger command.

4) Software trigger: requires client software and reader to connect the same network segment.

6.4 Network trigger is unsuccessful

- **Possible reason:** Only client mode is currently supported on the device side.
- **Solution:** Adjust the PLC device network trigger mode.