



Hangzhou LinkZill Technology Co., Ltd.

TruEbox 03MR PRO (256x256) User Guide

V1.0

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Product Overview

The matrix readout system is mainly for collecting the current signal and imaging from the sensor array, which can support up to 256*256 definition. The matrix readout system can provide 256 selecting signals, 2 DC bias voltages, and 256 current readout channels. All current data will be transmitted to a PC terminal device through USB3.0 and converted to an 8-bit 256 grey level image based on the current intensity. The matrix readout system is very suitable for light or pressure monitoring with compatible thin-film transistor (TFT) array chip.



Parameter	Specification
L*W*H	248×134×30 mm
Weight	800 g
Charging Port	DC005-2.5
Regular	256 channel pulse voltage (row selecting signals), voltage range: -15V~+15V 256 channel current readout, current range: 10pA~500nA (positive and negative) 2 channel DC bias: -15V~+15V
Communication	USB3.0
Terminal	PC (Windows 10 or higher)
Range	6 ranges (5nA/10nA/50nA/100nA/200nA/500nA)
Imaging	Definition: 256 rows * 256 columns Grey level: 256
File saving types	Selected data by user: .CSV and video formats
Duration	>8 hours under room temperature
Refresh rate	PC: 76Hz on 500nA, 256*256 data per frame

Refresh Rate Description:

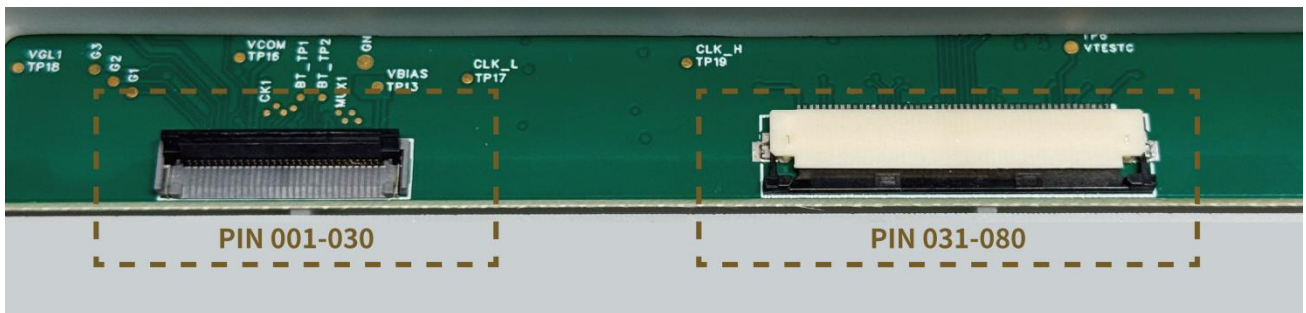
Acquisition Mode	Range	Frame Rate (fps)	Period (ms)	Pulse Width of Scan (us)
Fast	500/200/100/50/10/5nA	76.29	13.11	51.2
Normal	200/100/50/10/5nA	38.14	26.22	102.4
Slow	50/10/5nA	19.07	52.44	204.8

Product List

Name	Quantity
Host	1
Charger	1
User Guide	1
Three Guarantees Certificate	1

Pin Assignment Description

80 Pin FPC Pin Assignment (Left to Right):



Pin No.	001-003	004-006	007	008	009	010
Definition	Test Pin	Row select drive signal GATE-IC	Von	Voff	Gate_VDD	Gate_GND
Pin No.	027-028	029-030	031-080	Remaining Pins		
Definition	Vcom	Vss	ADC Pins	Dummy		

1. Vss and Vcom are two DC bias voltages output, corresponding to Vss and Vcom in the PC software separately, with the voltage adjustable from -15V to +15V.

2. The “Von” and “Voff” in PC software correspond to the selected voltage and unselected voltage of the 256 selecting signals separately, adjustable from -15V to +15V. Recommend to keep Von and Voff at the original settings of the system.

3. The 256 current readout channels support positive and negative current reading from 10pA to 500nA.

The specific details are shown in the figure below (1T0C refers to the TFT chip structure, for more information refer to "TFT Sensing Array Chips User Guide").

Voltage	Function	Suggest
Vss	Bias voltage applied on the cathode node of PD	1T0C: Vss must be positive value, PD current is related to Vss.
Vcom	Reserved bias voltage	1T0C: Not used here.
Von	Select voltage of TFT	1T0C: Range is from 1V to 15V and 15V is recommended for initial setting.
Voff	Non-select voltage of TFT	1T0C: Range is from -1V to -15V and -15V is recommended for initial setting.

Operating Manual

1. PC Software Installation:

The after-sales staff will send the PC software to you by email.

2. Device Connection:

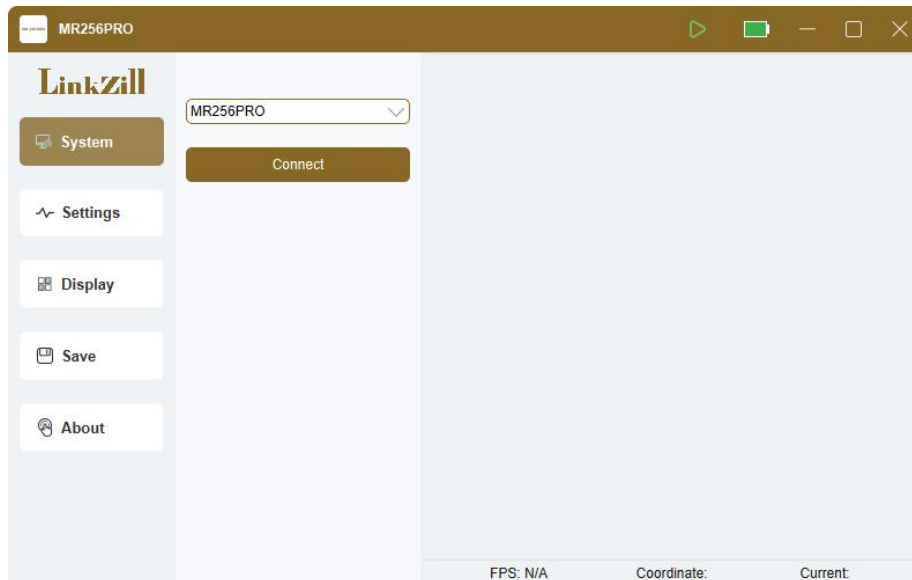
NOTICE: The following operation is based on a compatible 256*256 photosensor (with OPD on TFT array).

- Before connecting the TFT array to the system, please make sure the Matrix Readout system is powered off.
- Flip the left lid and connect the 30 PIN FPC interface of the device to the system. Keep the FPC pushed in while closing the connector to make sure that the FPC is firmly inserted.
- Pull out the connector on the right and connect the 50 PIN FPC interface of the device to the system. Push both sides in at the same time to make sure that the FPC is firmly inserted.
- Close the top cover of the device to make sure that the heat sink is in contact with the ADC chip.

3. Matrix Readout System Connection:

- Turn the power switch of the device to "ON" and power on the device.
- Connect the device to the computer (PC) using a USB3.0 cable. Make sure both ends of the USB cable are correctly inserted into the USB3.0 ports of the device and the computer.
- Open the MR256 PRO application on the computer. If the connection is successful, the program device selection box will show the serial number of the "MR256 PRO" device.

4. PC Software Introduction:



a. Menu Bar:

-  Start acquisition button: indicates that acquisition has not started.
-  Stop acquisition button: indicates that acquisition is in progress.

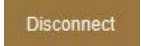
-  Acquisition stop/reset status icon: indicates that the device is resetting and initializing after acquisition stops.
-  Power indicator icon: displays the battery level of the device in real time.
-   Switch between full-screen mode and window mode.

b. Display Area:

The blank area on the right is the display area, showing real-time photosensitive imaging.

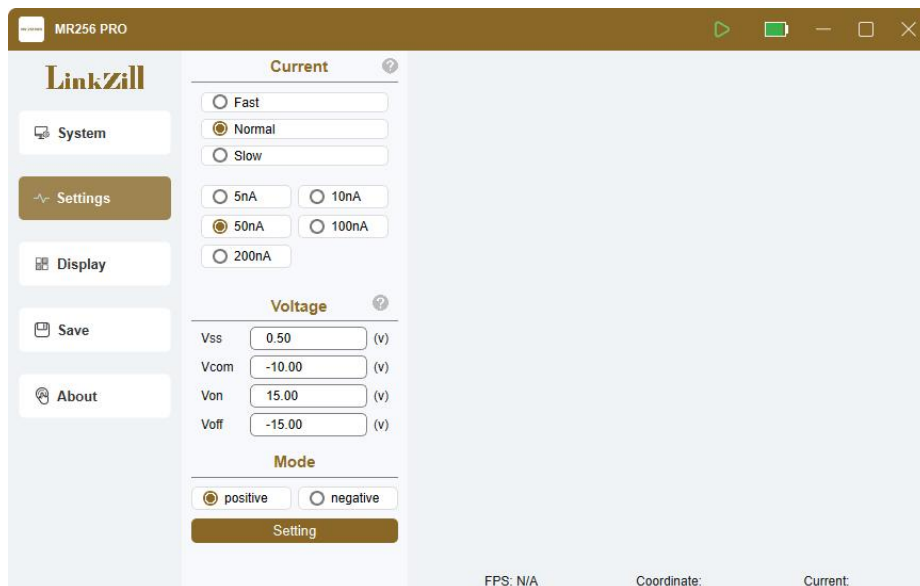
From left to right, the lower area displays the real-time frame rate, the coordinates of the selected pixel, and the real-time current value of the selected pixel.

c. System:

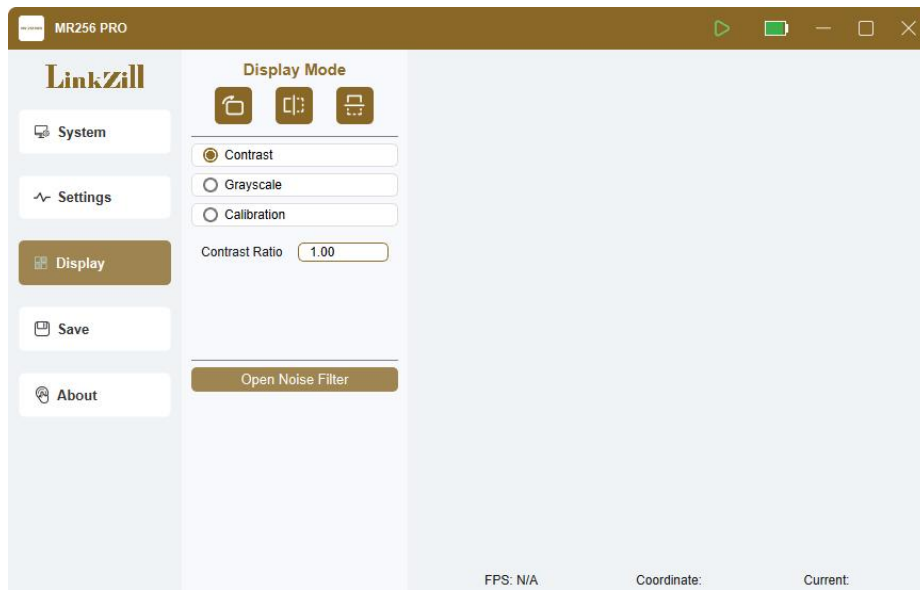
-   Connect/Disconnect the device.

d. Settings:

- Select the frame rate mode/current range/positive or negative current mode/operating voltage, and then click the  button to apply the parameters. In general, Normal frame rate mode is recommended.



e. Display:



-  Rotate the displayed image.
-  Mirror the displayed image horizontally.
-  Mirror the displayed image vertically.
- Select Contrast to adjust the image grayscale:

Contrast Ratio Contrast setting: Increase the display contrast of the image. The range is 1.00-100.00. This function is used to quickly find a suitable current range.
- Select Grayscale to remap the image grayscale:

GrayScale 0 (nA) Enter the current value corresponding to grayscale 0 (NOTICE: Set the value according to the currently selected range).

GrayScale 255 (nA) Enter the current value corresponding to grayscale 255 (NOTICE: Set the value according to the currently selected range).

To disable remapping and view the original image, select Contrast and set the contrast ratio to 1.00. NOTICE: After setting Current on the Settings page, do not select another current range at random, as this may affect the remapping function.
- Select Calibration to enable image calibration (NOTICE: Use this function during image acquisition).

Full-ON Perform independent 255 grayscale calibration for each pixel. After ensuring that the array sensor is in an unobstructed state, click the "Full-ON" button to record the current at this moment, corresponding to the 255 grayscale signal (white).

Full-OFF Perform independent 0 grayscale calibration for each pixel. After ensuring that the array sensor is in a blocked state, click the "Full-OFF" button to record the current value at this moment, corresponding to the 0 grayscale signal (black).

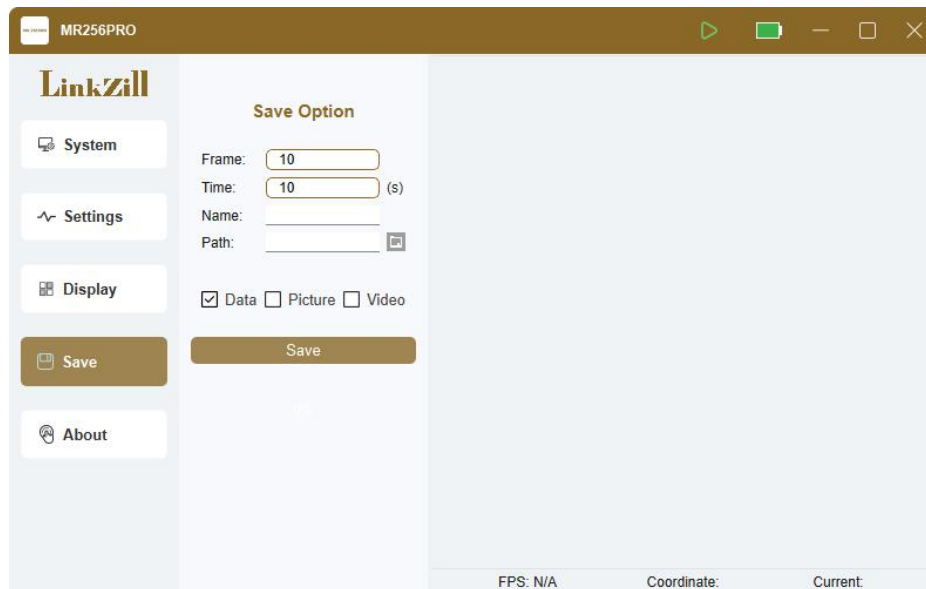
To disable image calibration and view the original image, select Contrast and set the contrast ratio

to 1.00.

- Click **Open Noise Filter** to enable the Kalman filter function. The default level is Low and can be adjusted as required.
Click **Close Noise Filter** to disable the function.
- **NOTICE: Only one of the three image processing functions, Contrast, Grayscale, and Calibration, can take effect at a time; the currently selected function is active.**

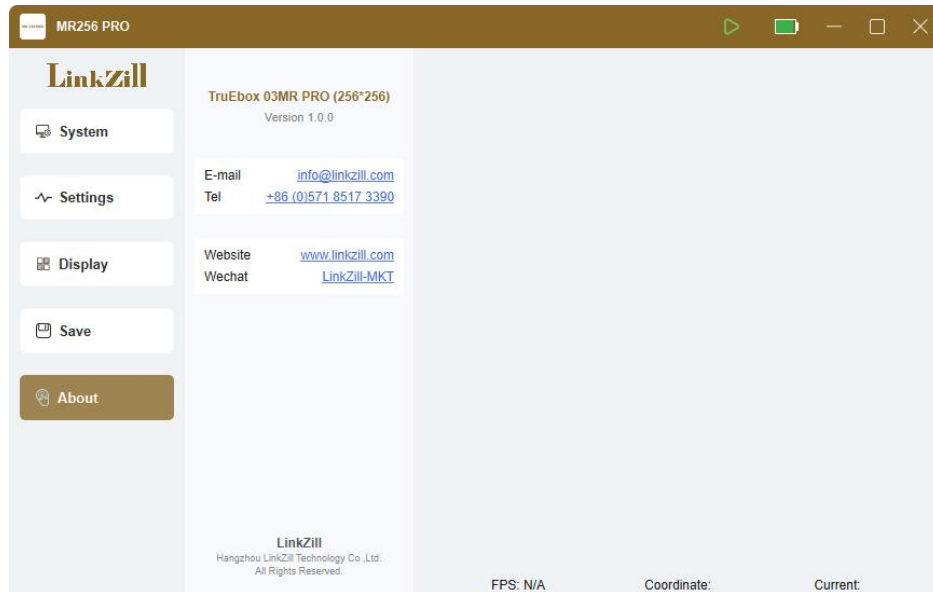
The Kalman filter is an overlay function and can be used together with any of the three image processing functions above.

f. Save:



- Click the **Save** button and select the corresponding save options:
- “Frame” (number of frames to save; manual input is supported);
- “Time” (saving time; manual input is supported). (NOTICE: The saving interval is Time divided by Frame.)
- “Name” (file name to save; an English name is required);
- “Save Path” (save file address; the path needs to be in English);
- “Data”, “Picture”, and “Video”: save types (multiple selections allowed).

g. About: Software version and company contact information.



5. Usage Process:

- After confirming that the system is connected to the computer, open the MR256PRO program. The appearance of the device name in the function area indicates a successful connection. Then click the **Connect** button to start the device.
- Enter Settings, set the current range, positive or negative current mode, and voltage, and click the **Setting** button to confirm. A successful setting pop-up window will appear after the settings are applied. (NOTICE: These settings cannot be changed during acquisition.)
- Click the **▶** button to enter the acquisition state (the button **▶** changes to the **◻** button, indicating that acquisition is in progress). To change the current range or voltage, click the **◻** button first. (The button **◻** changes to the **⌂** icon while acquisition is ending and the device is being initialized. After it changes back to the **▶** button), enter Settings, change the corresponding settings, and click **Setting**. A successful setting pop-up window will appear.
- During acquisition, select Calibration to enable calibration. **Full-ON** and **Full-OFF** will appear below. When the TFT device is completely unobstructed, click **Full-ON** to perform 255 grayscale calibration. After calibration is successful, block the device completely and click **Full-OFF** to perform 0 grayscale calibration. Grayscale adjustment can only be performed during acquisition. Remove the obstruction only after the calibration success pop-up appears. **The calibration data is saved in the Logs/calib folder under the project root directory.**
Note: To recalibrate, repeat the steps above. Recalibration is required whenever any parameter (Current Range, Voltage, or Mode) is changed to ensure image quality.
- Place an opaque object above the light array sensor (visible light imaging), and the system will display the shape of the object in real time. Click the **◻** button to pause the test.
- Enter Save, select the number of frames, saving time, save name, save path, and save type, and then click the **Save** button. Wait for the progress bar to complete and data export to finish (saving can only be done in acquisition mode). The saved data types are CSV, images, and videos. The CSV data is divided

into two parts, current (nA) and grayscale (0-255), and each frame contains the data of 256*256 points. The grayscale data will change with the calibration current.

Warnings:

-  Please do not use the matrix readout system while charging to avoid disturbance. Do not use the system in complex electromagnetic environments (e.g. within 2 m of power strips and powered devices). Please keep the testing environment, subject, and fixture clean and dry.
-  Please use the original charger to avoid damage.
-  The charging indicator is red when the system is charging and changes to green when the battery is full. It takes about 8 hours to fully charge the system. To avoid damaging the system, please unplug the charger when the system is fully charged.
-  Please do not use the system in hot or humid environments. Do not throw the system into fire or water to avoid damage or explosion.
-  Please do not bash or drop the system from height to avoid damage.