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**FM220U**

**USB Fingerprint  
Reader User Guide**

**Doc. FM220U\_Win\_1.0**

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**1. Overview:**

FM220U is a high quality CMOS-based optical reader. It captures images and verifies fingerprints with high speed. FM-220U has been widely used in system wide enrollment and verification applications as a stand-alone or embedded device.

**2. Features:**

- ISO compliant
- Low image distortion – under 1%.
- Fast scanning & matching speed
- Options to set different security levels for different application FRR/FAR demand
- Small fingerprint data template size
- Real-life applications - no problem in verifying smeared, scarred, stained and smudged fingers
- Support verification on various OS platforms

**3. Applications:**

- Verification for Welfare Distribution
- Retail or Banking POS
- Workforce/School attendance management
- Internet Service Provider (ISP) Logon and Logical access control
- E-shopping/procurement
- Healthcare clinic applications for patients health records access management
- E-banking, e-KYC applications.
- E-workflow/ERP (Enterprise Resource Planning)
- Voters verification
- Club membership management

## 4. Specifications and System Requirements

### 4.1 Specifications

Parameter	Value	Unit
Sensors	CMOS	-
Scanning	1/15	s
Image resolution	500	DPI
Image capture format	13.3 x 16.4	mm
Scanner output image size	264 x 324	Pixels
Gray Level	8bits/pixel, max 256 gray scales	-
Image ratio of length to width	1:1	-
Power supply	200	mA
Fingerprint Sensing		
Standby mode	60	mA
Interface	USB2.0	
Dimension	80 x 41 x 40	mm
Weight	100	g
Distortion	<1	%
Temperature (without external enclosure)	0~50	°C
Humidity(non-condensing)	<90%	-
Scanning light	Infrared red	-
Operating volts(USB	5	V
ESD	15	KV

### 4.2 System Requirements

USB 2.0 port, 256MB RAM

If you are installing an application based on platforms other than Windows, such as Android or Linux, please refer to the documentation provided by the maker of the application program.

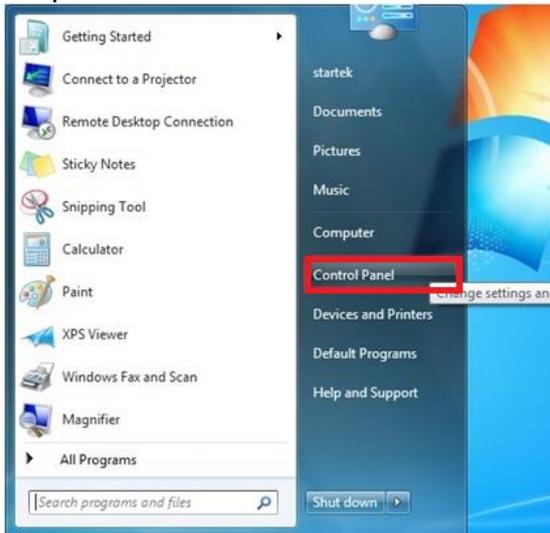
## 5. Driver Installation

Install the driver before using the Startek fingerprint reader.

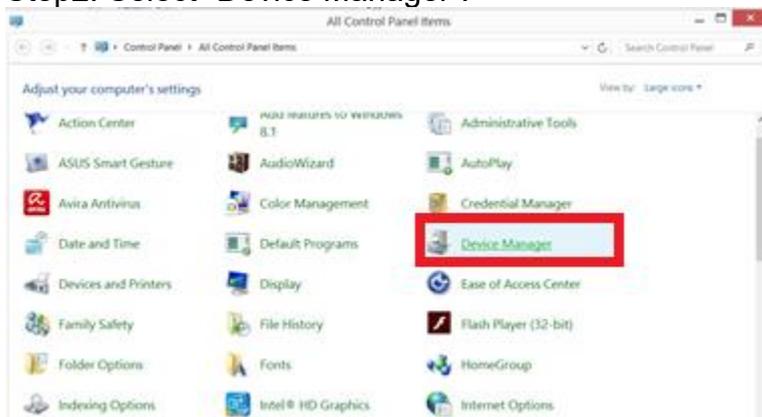
### To manually install device drivers

You may download the Windows device driver from the link we provided.

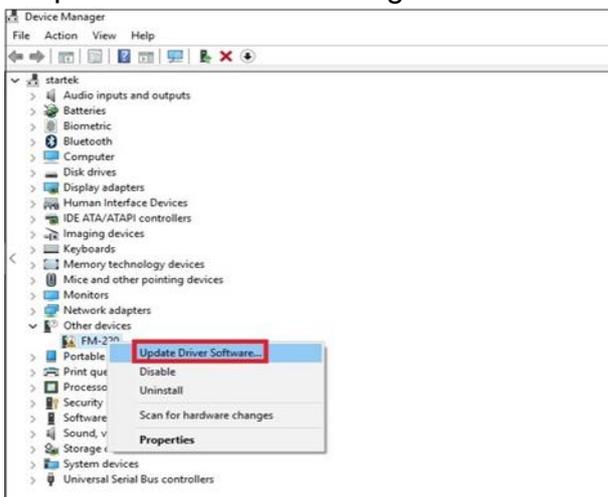
Step1. Enter “Control Panel”.



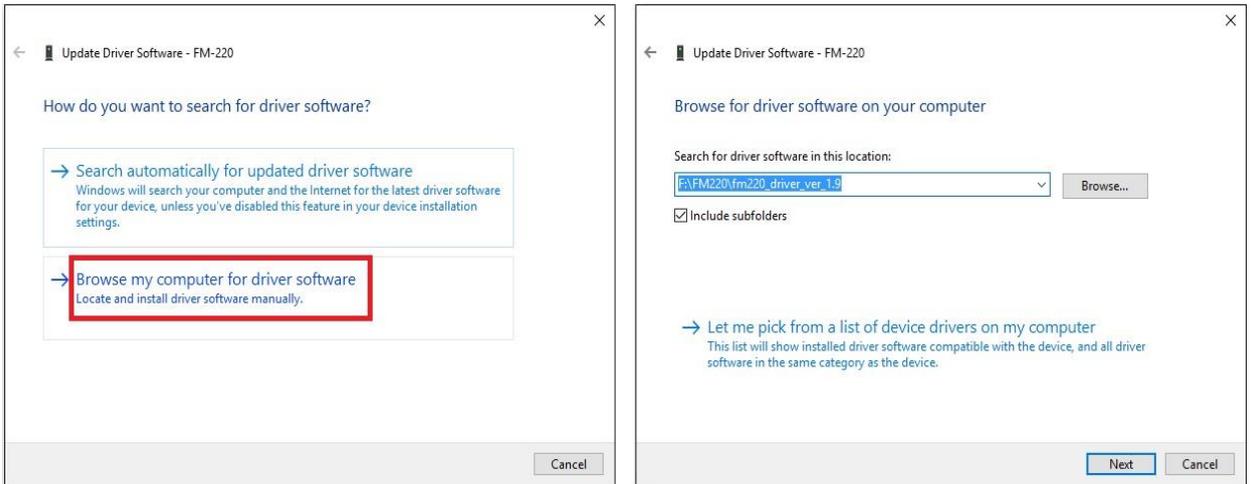
Step2. Select “Device Manager”.



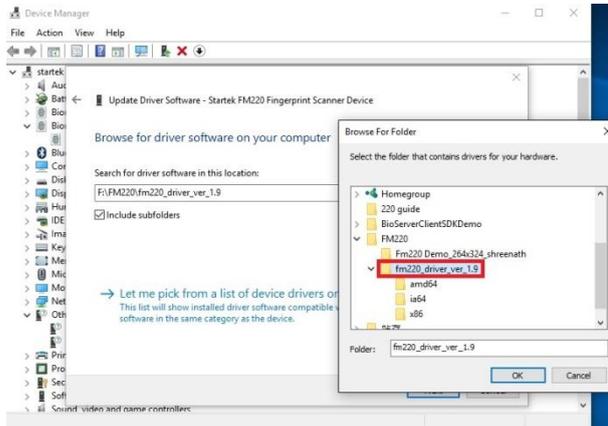
Step3. Select “FM-220”. Right click and select “Update Driver Software...”



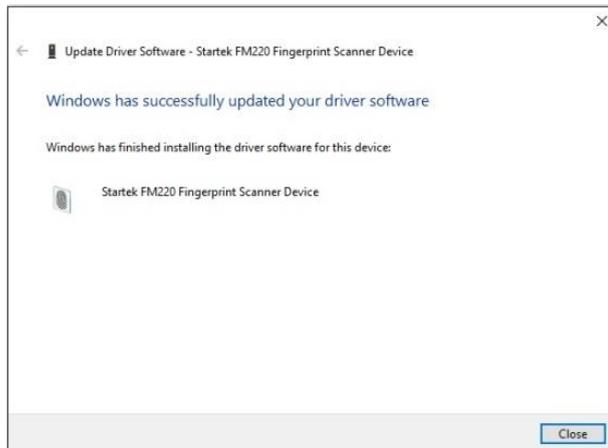
Step4. Choose “Browse my computer for driver software”.



Step5. Unzip fm220\_driver\_ver\_1.9.zip, and select driver path “fm220\_driver\_ver\_1.9” and press OK.



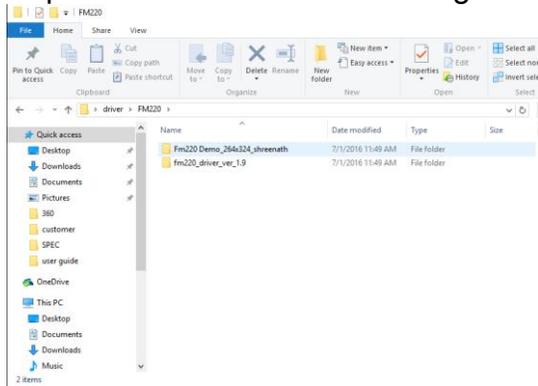
Step6. Driver install success! You can try our demo program on Windows now.



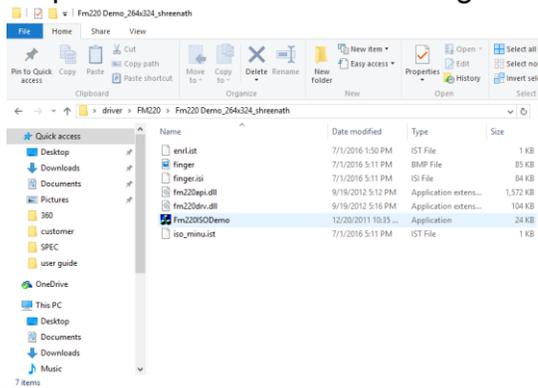


## 6. FINGERPRINT MATCHING

Step1. Install “FM220 Demo Program.”



Step2. Select “FM220 Demo Program” and left click and select “FM220ISODemo.”



Step3. Press the Snap and GetTemplate button to check the fingerprints quality. It is recommended to use the index finger or the middle finger for optimal fingerprint recognition performance.





Step4. Follow the diagram instructions to Enroll clear fingerprints into the Host Device or PC. Press and release the finger for three times as indicated.



Step5. Press the Match button to begin matching the fingerprints of a user whose fingerprint data has been stored in the system. Press and remove the finger. Upon successful matching with the user's stored fingerprints, information is displayed with a score. When the captured fingerprint image size is 256x324, a score of 1500 and above ensures a security level with minimum FAR 1/100,000<sup>th</sup> and FRR 1/100.



Step6. Press the Match button again to match the fingerprints by pressing another finger which is not enrolled. Upon failed match, information is displayed with a low score.





## 7. How to Use Your Fingerprint Reader?

### **For best results:**

#### **Why the image quality is important?**

Startek fingerprint recognition technology is based on minutiae-only: the unique feature points of a fingerprint. After a fingerprint is scanned, minutiae are extracted and processed into a template that will be used for biometric enrollment and matching. If the scanned fingerprint is unclear or does not have enough contrast, the minutiae may be inconsistently sampled, resulting in less accuracy and poor performance. Certain environments and skin conditions, such as wet or dry skin, can initially cause a fingerprint to appear too light or too dark.

#### **Proper placement is the key to good results?**

Startek fingerprint extraction algorithm is capable of extracting the correct minutiae even without benefit of a perfect print. However, the proper placement of your finger while scanning can help give more consistent results for any biometric application. The suggestions below will help you get the best quality fingerprint to ensure better performance and reduce the chances for failure to enroll or match correctly.

## 8. How to scan your finger?

### **Place the pad of your finger at the center of the sensor**

The pad is the fleshy part of the finger, located in the middle of the first segment. Place the pad (not the tip) such that it covers the sensor area with maximum contact. Be sure that the core of the fingerprint is scanned.



**Normal**

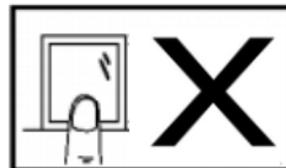
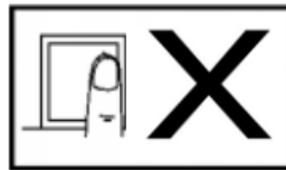


**Rotate 30 degree**



**Exceed the sensor window**

Try to match the fingerprints by rotating 30 degree on the sensor area or to exceed the sensor area. Upon successful matching with the user's stored fingerprints, information is displayed with a score. However, the score you get is expected to be lower than the one you press it normally because there are fewer minutiae points captured.





### **If your finger is cut or injured**

As a precaution, it's best to enroll more than one finger so that if one finger becomes unavailable for authentication, you will have an alternate finger to use. Most biometric applications provide the option to enroll multiple fingers. If your application features a password or PIN back-up, you can use this feature in case no finger or fingerprint device is available.

### **Problematic fingerprints**

By following the above guidelines, you should be able to get consistently good results. Sometimes, however, certain skin conditions or environments may cause poor fingerprint images. Damp skin may cause fingerprints that are too dark or smudged, but can be remedied by wiping fingers before input. If your finger is extremely dry, you can safely use a moisturizing lotion before input.



### **Do not place your finger too slowly or too softly**

The sensor might not detect your finger when it's placed too slowly or too softly on the reader.



## 9. How to care for your reader

Startek fingerprint readers do not require any special maintenance except for occasional cleaning of the sensor window if it gets dirty. Normal oil, residue or smudges on the sensor window should not cause problems or interfere with scanning fingerprints. The sensor window was designed to withstand heavy use and extreme conditions including heat and cold. It does not have any coatings that can get damaged because it is made of a hard, quartz-like material that resists scratches, etching, and damage from environmental elements.

### **If you wish to clean the surface of the sensor window**

1. You can safely use a tissue, paper towel or cloth to wipe down the window. To remove stubborn dirt, you can wipe the window with a cloth dampened with a soap solution. Squeeze out excess liquid before wiping with the damp cloth.
2. Cleaning agents like glass cleaners and anti-bacterial wipes may be used without harming the sensor. However, as with most plastic material, the housing of the unit may be damaged if strong solvents, acids or caustic solutions are used.
3. Do not pour liquids directly onto the sensor or device, as the liquid might seep into the underlying components and cause damage.

## 10. The Fingerprint Privacy

### **Fingerprint images are never stored.**

Startek fingerprint recognition technology is based on minutiae, the feature points around the core of your fingerprint. When a fingerprint is scanned, only a portion of the minutiae are sampled, and then processed by an extraction algorithm and converted into a template. After the template is formed, the fingerprint image is deleted. When fingerprints are used in the form of templates, there is no need to store fingerprint images.

### **Fingerprint images cannot be reconstructed from minutiae or templates.**

As our database is digital minutiae information extracted by our special algorithm, it's just a group of digits and impossible to be re-introduced or reverse engineered. Even in case the digital information is stolen, the fully matched information does not get authorization by STARTEK products, as in normal situations the input data should be different every time considering some miscellaneous signals are also inadvertently recorded in addition to the minutiae data.

## 11.Q and A

### What are FAR (False Acceptance Rate) and FRR (False Rejection Rate)?

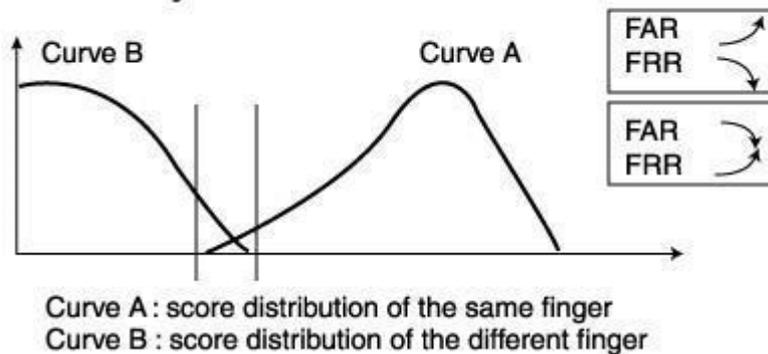
FAR (False Acceptance Rate): Rate that a biometrics system falsely identifies different features as identical. FAR represents security level. FRR (False Rejection Rate): Rate that identical features are identified as different. FRR represents convenient level.

STARTEK FAR: 1/100,000~1/1,000,000 STARTEK FRR: 1/30~1/100

### Security Level:

Security level is set by the threshold matching scores. When setting security level high, i.e. setting threshold scores high, FAR reduces while FRR rises. In referring to the following diagram, the cross area among X-axis, Curve B and threshold line (Area B) stands for FAR, and the cross area among X-axis, Curve A and the threshold line (Area A) stands for FRR. Then when the threshold line moves toward right, i.e. raise the security level, Area B shrinks while Area A expands. Security level will vary for different applications. The picture next to "Security Level & FAR & FRR" shows different security level demand for market segments and STARTEK's FAR vs. FRR curve.

### Security Level & FAR & FRR



Secure Level	Score Threshold	FAR
A	2,500	1/200,000
B	2,000	1/100,000
C	1,500	1/50,000
D	1,000	1/10,000
E	500	1/2,000