

# **EMVFoundry X3-ARQC**

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# 1. EMVFoundry X3-ARQC

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Version 1.0.0.15

[www.emvfoundry.com](http://www.emvfoundry.com)

## 2. EMVFoundry X3-ARQC

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X3-ARQC is a Smart Card Authoring Tool, which allows a user to read, edit and write to smart-cards.

X3-ARQC supports PC/SC Smart-Card specifications, and displays all Smart-card TVL tags in an easy-to-use UI.

X3-ARQC allows building templates from credit-cards and from scratch.

X3-ARQC can process, handle and read Visa, MasterCard, JCB, Amex, PBOC, UnionPay cards, including it's on-chip Java-applets.

When an edit is made, it recomputes encrypted correctly, so SDA, DDA, ARQC looks correct, and you can issue a correct bank-card by yourself.

The contents of the smart-card can be saved to your hard-disk. The edited contents can be written using a smart card reader device and smart-card with Java applet capabilities.

### **What kind of cards can be used with EMV-Foundry?**

- Contact (ICC, "CC", "C" (Contact-Cards)).
- Contactless (PICC, NFC, PayWave, PayPass, "CL" (Contactless))
- Stored-Value (SAM, high-value credit cards)

### **Does X3-ARQC work with certain or specific countries?**

X3-ARQC works with bank-cards in all countries, as all bank-cards comply with global smart-card EMV chip-standards.

### **Does EMV-Foundry edit PIN numbers?**

EMV-Foundry does not edit or alter PIN numbers. The PIN number is changed or accessed via ATMs. So, you need the original PIN number for the card to use your altered card at the ATM.

### **Can you withdraw cash from ATMs?**

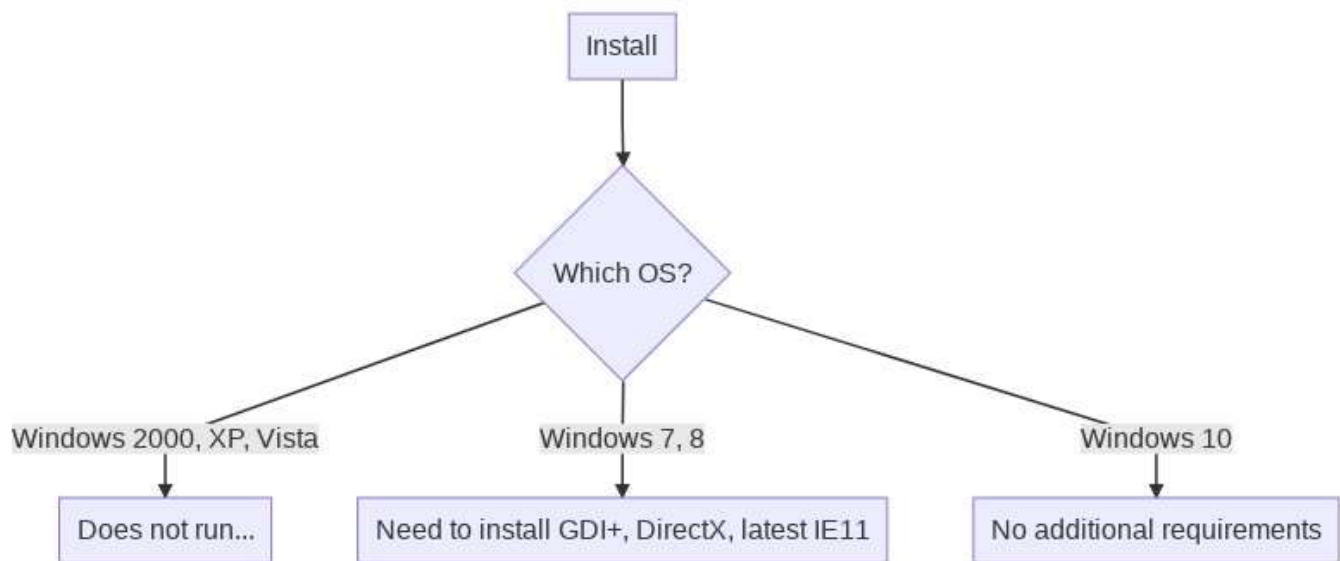
You can do so, if you have the original PIN number and Track2 data encoded correctly on your altered ATM

card. You can only withdraw up-to the limit of the original card.

## 6. System Requirements

	Minimum System Requirements	Recommended Requirements
Monitor	<b>1024x800</b>	2048x4096
CPU	Intel I3 or better Intel I7 or better	AMD CPU E1-2100 or better AMD CPU 3500 or better.
RAM	512MB	2GB RAM
HDD Space	50MB	500MB or more.
Windows	Windows 7	Windows 10
Video Card	At least 128MB Video-Card RAM	At least 256MB Video-Card RAM

### 6.1. OS Version



Which OS do you have?

- Windows 2000, Windows XP - X3-ARQC does not work.
- Windows 7, 8 - you need to install latest IE (GDI+, DirectX), latest service patches, and you're good to go.
- Windows 10 - all good. Just click and run.

### 6.2. Virtual Machine

EMV-Foundry does not work in a Virtual Machine or virtual environment.

There is a [USB edition](#) you can license. A user don't need to buy a new license if they buy a new desktop or laptop.

You need to carry a USB device and smart-card reader with you.

## 6.3. Old or Legacy

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This chapter pertains to older Windows versions or old hardware.

### 6.3.1. Windows 7 Additional Requirements

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If you have old version of Windows 7, it needs the following libraries:

- Make sure the font "Segoe UI", "Courier New" is installed (this comes installed with IE10).
- Make sure GDI+ is installed (this comes installed with IE10).
- Make sure your Video-card supports DirectX acceleration.

If you encounter errors (such as "GDI+ not found", "DirectX failed to initialize"), please install Edge or IE10.

Make sure your Windows 7 is up-to-date with all the Windows 7 service-packs.

See also

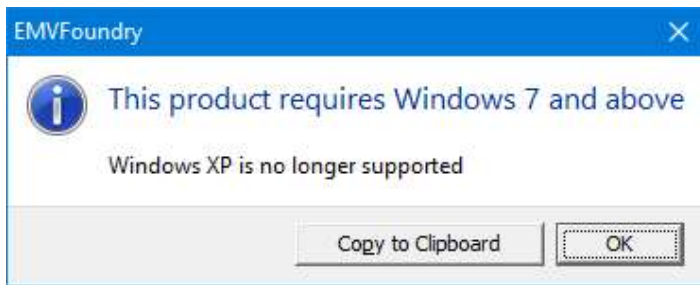
[Error: GDI+ Error](#)

[Error: DirectX failed to initialize](#)

### 6.3.2. Error: Windows 7 and above

---

If you encounter the below error message:

**Problem**

SCAIT requires Windows 7 and above.

SCAIT does not work on Windows XP, Windows 2000, Windows 98 or Windows 95.

**Reasoning**

SCAIT requires API found in Windows 7 or above.

**Solution**

Upgrade your computer OS to use Windows 7 64-bits or Windows 10 x64 or better.

### 6.3.3. Error: GDI+ Error

---

**Problem**

Error Message: GDI+ Error: GDI+ not found.

**Reasoning**

A certain DLL is not installed on your desktop.

**Suggested Solution**

Please update your Windows 7 or Windows 8 with latest service packs, update and install IE10.

### 6.3.4. Error: DirectX failed to initialize

---

**Problem**

The X3-ARQC [UI](#) is very slow.

**Reasoning**



DirectX is used for running games. If you can't play games on your laptop, your video

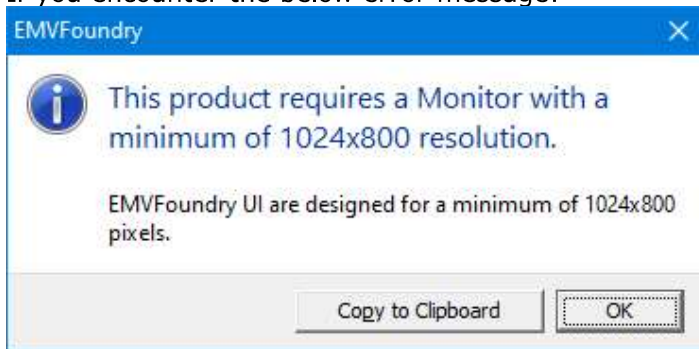
### **Possible Solution**

Make sure you get the latest video card, and install latest driver updates.

## **6.3.5. Error: Minimum Monitor Size is 1024x800.**

---

If you encounter the below error message:



### **Problem**

Error: The minimum monitor size is 1024 x 800.

### **Reasoning**

Many of the UI designed for X3-ARQC minimum size is 1024 x 800.

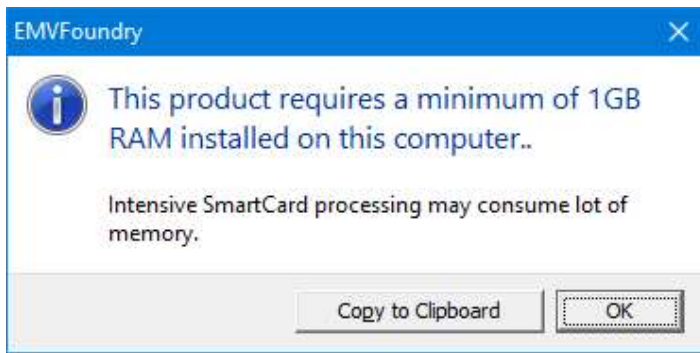
### **Suggested Solution**

Get a good or latest video card.

## **6.3.6. Error: Out of Memory**

---

If you encounter the below error message:



### **Problem**

When opening a SmartCard, the user receives an error message is "Out of Memory".

EMVFoundry needs a minimum of 100MB RAM free., or at least 1GB of Physical RAM

### **Reasoning**

This means the minimum requirement is 1GB.

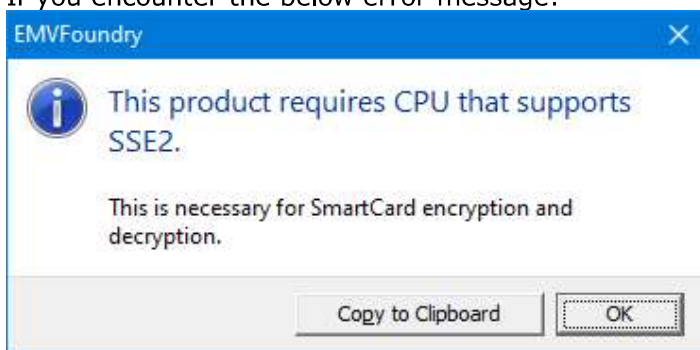
### **Suggested Solution**

If you are using an old computer with less than 512 MB RAM... You'll need more RAM in case you want to load lots of EMV-Foundry data files, simulatenously.

## **6.3.7. Error: CPU does not have SSE2 support**

---

If you encounter the below error message:



### **Problem**

When writing a SmartCard, you get encryption or decryption errors, or decryption takes minutes or long time...

### **Reasoning**

The CPU may not be capable of handling RSA or DES algorithm.

**Suggested Solution**

If you are using an old computer, please ensure you get a computer with modern Intel or AMD CPU, not less than 2 years old.

## 6.3.8. Is CT-API supported?

---

**Problem**

The smart-card reader only supports "CT" API and not the newer PC/SC API.

**Reasoning**

EMV-Foundry only supports the PCSC API. It does not support CT-API.

**Suggested Solution**

Get a new [SmartCard Reader](#). Most readers for sale that use CT-API are "end-of-life" and no longer available for sale.

## 7. Hardware Requirements

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Additional USB port required if you are using the USB edition. Otherwise, you don't need a spare USB connection port.

### 7.1. SmartCardReaders

---

Where can I get good quality smart-card readers?

- Amazon
- NewEgg
- Your local computer-shop or hardware store (under indoor-security section).

	Minimum System Requirements	Recommended Requirements
Smart-Card Reader	HID OmniKey,	ACS Card Readers High-end Smart Card reader with on-board PIN keyboard.
USB Slots *	1 USB for SmartCardReader 1 USB for USB drive (if using USB licensing).	1 USB for SmartCardReader 1 USB for USB drive (if using USB licensing).
Smard-Card	Java JCOP 2.1.1	Java JCOP4

What kind of Smart-Card reader brands should I use?

- ACS (such as ACR1281U series)
- HID OmniKey (such as HID OmniKey 5432)

\* ACR122U/T/L requires registry and escape code configuration. See Card Reader Settings.

\* HID OmniKey 3021\* is a contact card-reader. It cannot read or write from contactless cards. Please get a card-reader that supports both contact and contactless card-reader.

\* HID OmniKey 3021 is being phased-out. If you cannot find an OmniKey 3021, please use OmniKey 3121.

## 7.2. SmartCards

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Brand or Brand Names	Support	Notes
ACOS3, ACOS3X, ACOS5-64, ACOS5-EVO-PKI ACOS6-SAM ACOS6-Multi-Application	NO	These are NOT Java Cards
ACOS10 PBOC ACOSJ ACOSJ-P PBOC ACOSJ-V Visa	YES	These are Java Cards
J3H145 J3R200 J3R180	YES	These are JavaCards
SLE5542	NO	This is not a Java Card
J2A040 J2A04M	NO	These cards may have problems being accepted and often out-of-stock.

Where can I get good quality smart-cards?

- <https://www.ACS.com.hk/>
- <https://www.JavaCardOs.com/>
- <https://secure.smartcardsource.com/>
- <https://b2ps.com/products/b2-emv-test-card-sets/>
- Amazon

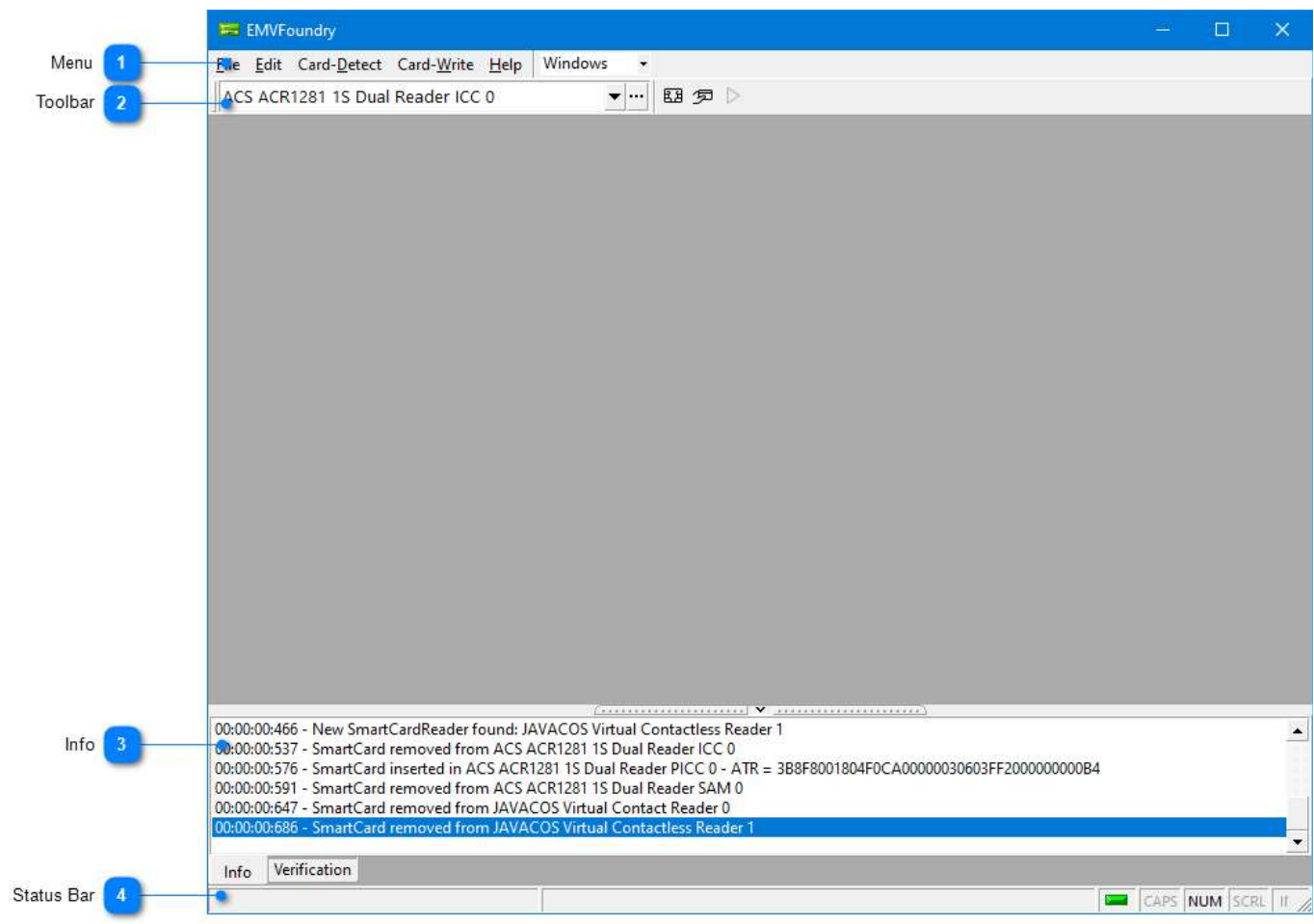
## 8. Getting Started

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Please download the Zip file from the website and install.

If you strangely cannot download, please check your computer.

## 9. UI



1

### Menu

This is the menu to access SmartCard Authoring features.

File Edit Card-Detect Card-Write Help Windows

2

### Toolbar

This is a small toolbar to access which SmartCard reader.

ACS ACR1281 1S Dual Reader ICC 0

3

### Info

Any error messages or issues will be logged here.

00:00:00:466 - New SmartCardReader found: JAVACOS Virtual Contactless Reader 1  
00:00:00:537 - SmartCard removed from ACS ACR1281 1S Dual Reader ICC 0  
00:00:00:576 - SmartCard inserted in ACS ACR1281 1S Dual Reader PICC 0 - ATR = 3B8F8001804F0CA00000030603FF2000000000B4  
00:00:00:591 - SmartCard removed from ACS ACR1281 1S Dual Reader SAM 0  
00:00:00:647 - SmartCard removed from JAVACOS Virtual Contact Reader 0  
00:00:00:686 - SmartCard removed from JAVACOS Virtual Contactless Reader 1

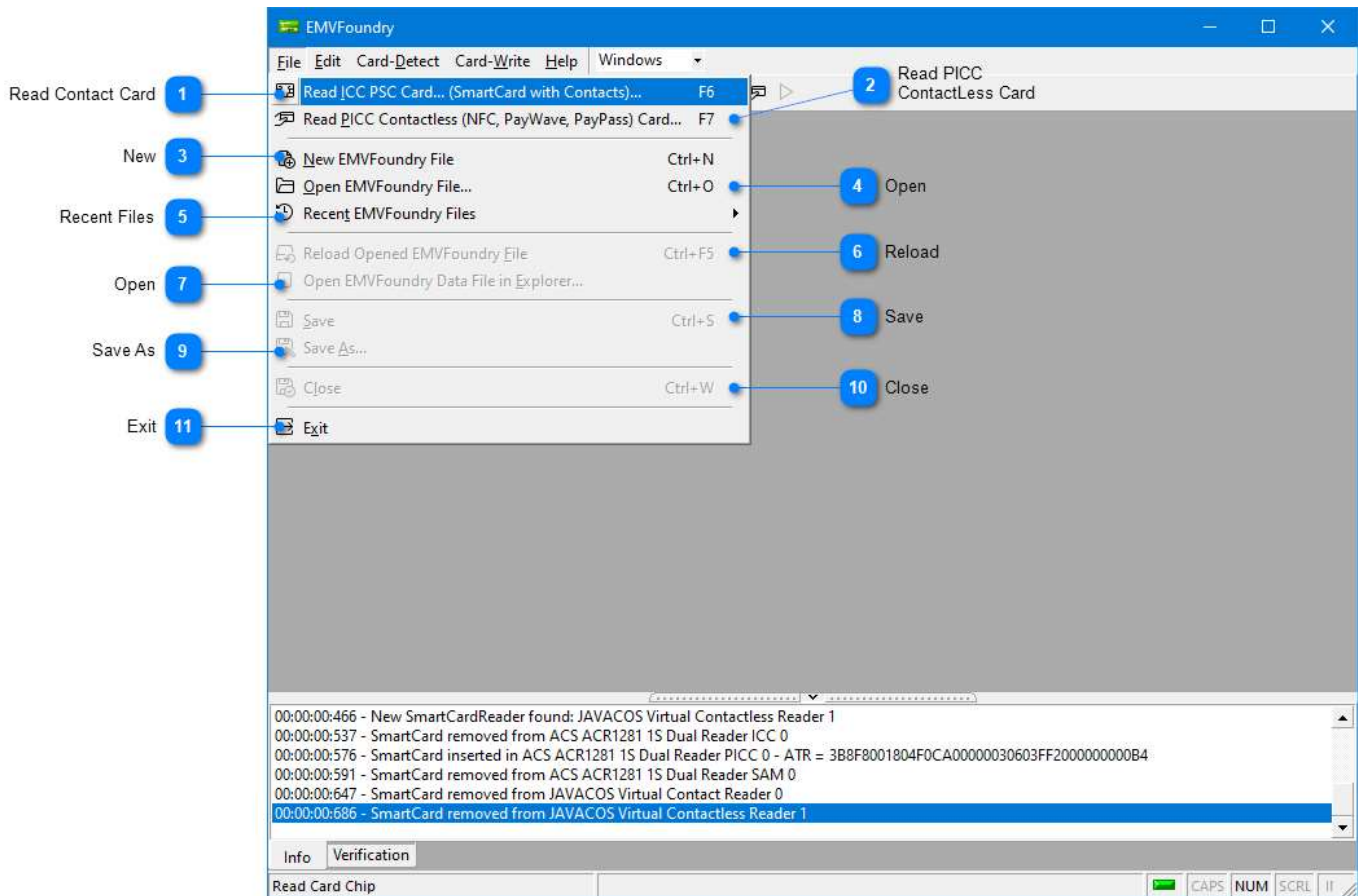
4

### Status Bar

This is the status-bar.

Info Verification CAPS NUM SCRL II

## 9.1. File Menu



## 1 Read Contact Card

Write description here...

Read ICC PSC Card... (SmartCard with Contacts)... F6

## 2 Read PICC ContactLess Card

Write description here...

Read PICC Contactless (NFC, PayWave, PayPass) Card... F7

## 3 New

Write description here...

New EMVFoundry File Ctrl+N

## 4 Open

Write description here...

Open EMVFoundry File... Ctrl+O

## 5 Recent Files

Write description here...

Recent EMVFoundry Files

## 6 Reload

Write description here...

Reload Opened EMVFoundry File Ctrl+F5

## 7 Open

Write description here...

Open EMVFoundry Data File in Explorer...



8

**Save**

Write description here...



Save

Ctrl+S

9

**Save As**

Write description here...



Save As...

10

**Close**

Write description here...



Close

Ctrl+W

11

**Exit**

Write description here...

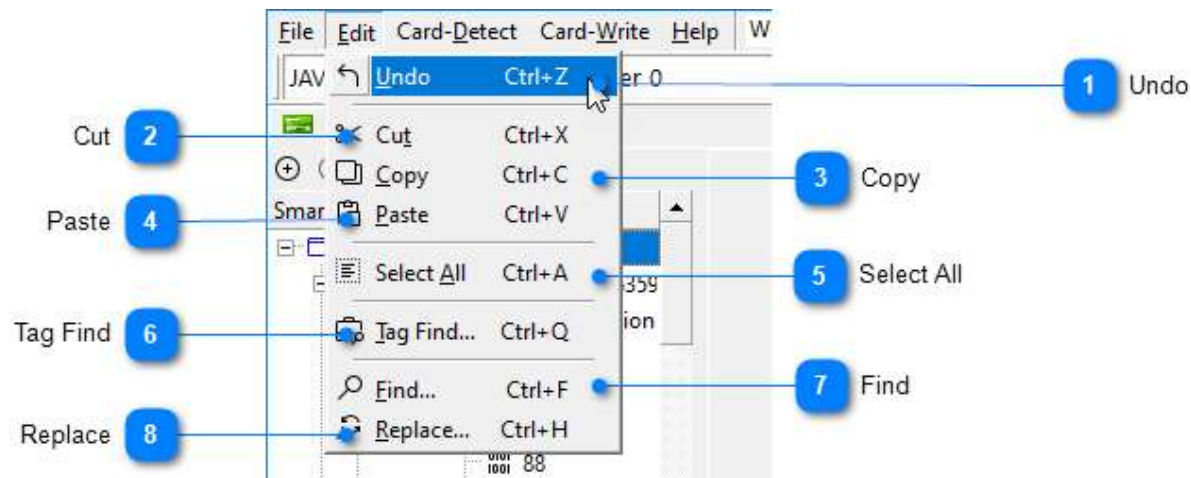


Exit

Read from Smart-Card Reader (ICC or PICC)  
 New, Open or get recent X3-ARQC file (New, Open, Recent)  
 Reload or Open a X3-ARQC file (Reload, Open in Explorer)  
 Save X3-ARQC File  
 Close an X3-ARQC File  
 Exit (Quit Application)

## 9.2. Edit Menu

The Edit Menu provides hotkey services to the Windows Clipboard.



1

**Undo**

Undo an edit operation.



Undo

Ctrl+Z

2

**Cut**

Cut to clipboard



Cut

Ctrl+X

3

**Copy**


Copy text to clipboard.

 **C**opy      Ctrl+C

4

**Paste**

Paste from Clipboard

 **P**aste      Ctrl+V

5

**Select All**


Select all the text in the edit box.

 **S**elect **A**ll      Ctrl+A

6

**Tag Find**

Find a certain tag.

 **T**ag Find...      Ctrl+Q

7

**Find**


Find a certain tag.

 **F**ind...      Ctrl+F

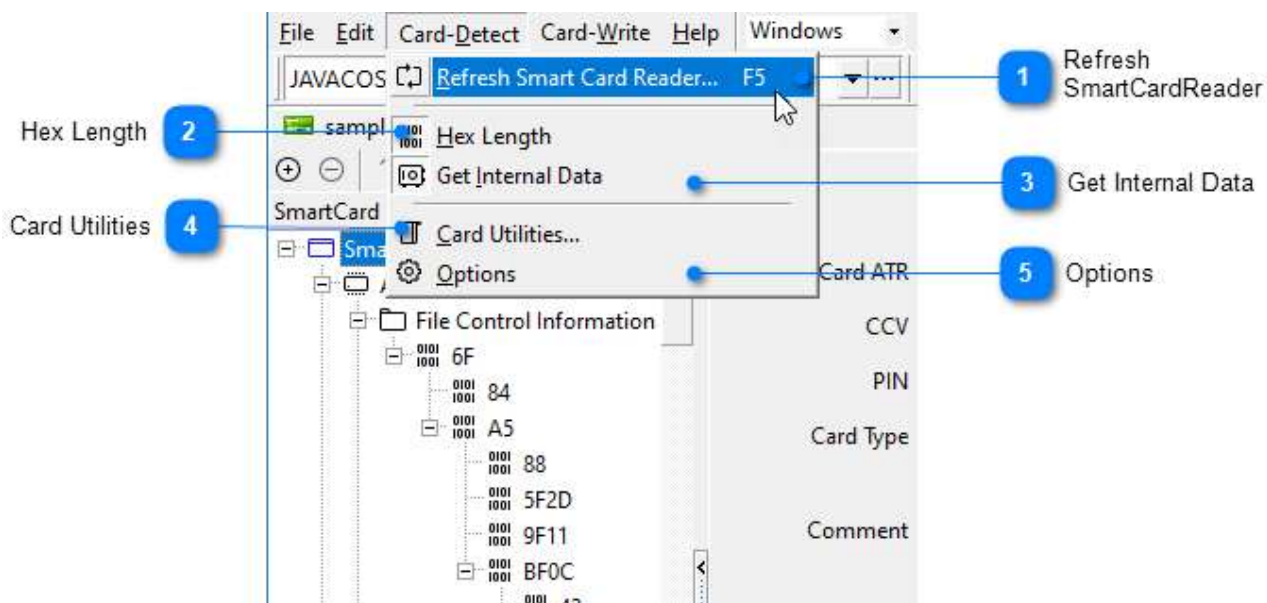
8

**Replace**

Replace a certain tag.

 **R**eplace...      Ctrl+H

## 9.3. Card-Detect Menu



1

**Refresh SmartCardReader**

Write description here...

 **R**efresh Smart Card Reader...      F5

2

**Hex Length**

Write description here...

0101  
1001 Hex Length

3

### Get Internal Data

Write description here...

Get Internal Data

4

### Card Utilities

Write description here...

Card Utilities...

5

### Options

Write description here...

Options

Card Detect Menu  
Card Utilities  
Refresh  
Options

## 9.4. Card-Write Menu



1

### Key Management

Write description here...

Key Management...

2

### Master Key

Write description here...

Master Key - Derivation Option A  
✓ Master Key - Derivation Option B

3

### CardScript

Write description here...

CardScript... F9

4

### RSA

Write description here...

RSA...

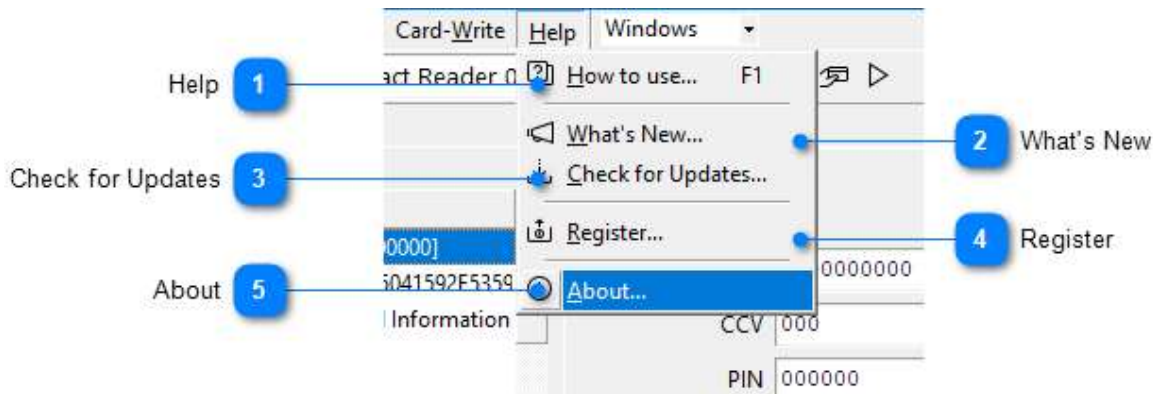
5

### Export XLSX

Write description here...

Card-Write Menu  
Key Management  
RSA Keys

## 9.5. Help Menu



1

### Help

Write description here...

How to use... F1

2

### What's New

Write description here...

What's New...

3

### Check for Updates

Write description here...

Check for Updates...

4

### Register

Write description here...

Register...

5

### About

Write description here...

About...

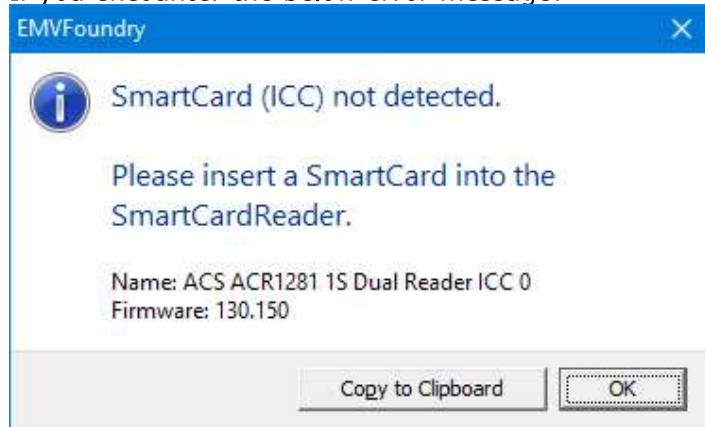
## 12. FAQ

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### 12.1. SmartCard Error

---

If you encounter the below error message:



Please insert a smart-card into your device.

### 12.2. IPersist Error

---

#### **Problem**

You get install error "IPersistFile" When writing a SmartCard, you get encryption or decryption errors, or decryption takes minutes or long time...

#### **Reasoning**

This error occurs in the setup package.

#### **Suggested Solution**

Please download the latest version. This is fixed from Version 1.0.0.5 onwards.

### 12.3. Uninstall

---

In order to uninstall X3-ARQC, please go to the Control Panel and Uninstall X3-ARQC.

## 12.4. This file is not signed

---

You get the error "This file is not signed".

This is a normal error. You should disregard it.

## 12.5. Off-line Usage

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X3-ARQC operates without requiring an Internet connection. Before and after you enter a license, it will not require constant Internet access.

The same words above, cannot be started with our competitors. Know the difference!

## 12.6. Command-Line

---

What command-line parameters are available?

	Command-Line	Example
Safe-mode. Reset UI.	/safe	X3-ARQC.exe /safe
Double-click	(Param1)	X3-ARQC.exe C:\Users\<UserName>\Documents\X3-ARQC\sample.emvf

## 12.7. EMV File Format

---

EMV-Foundry reads files using its own file format (\*.emvf). This uses YAML (<https://yaml.org/>) to read, write and store data.

EMV-Foundry can also read other popular file-formats such as:

- \*.CT files
- \*.IST files (X1, X2 ARQC)
- \*.ZST files (X1, X2 ARQC)

Please note:

- While EMV-Foundry reads CT, IST, ZST file, it does not write to those formats. It writes to its own file format (\*.emvf, \*.emcf).
- While EMV-Foundry makes best efforts to read IST files, it cannot read IST files generated from the following software:
  - CHIP-SO IST-generated files,
  - EMV Reader/Writer 8.6 IST generated files.

## 12.8. EMV Paths

---

Where does EMV-Foundry store its data?

\Users\%USERNAME%\AppData\Roaming\X3-ARQC\X3-ARQC.pdf (This PDF file)  
\Users\%USERNAME%\AppData\Roaming\X3-ARQC\X3-ARQC.ini  
\Users\%USERNAME%\AppData\Roaming\X3-ARQC\X3-ARQC.lic  
\Users\%USERNAME%\Documents\X3-ARQC\data.emvkg (HMAC, Auth, Data keys)  
\Users\%USERNAME%\Documents\X3-ARQC\data.emvtk (Track 1, 2, Luhn, BIN Prefix Cache)  
\Users\%USERNAME%\Documents\X3-ARQC\\* (All the EMV Foundry Data Files)

## 12.9. PIN Retry

---

How do I simulate invalid PIN entry with the chip and PIN cards?

Very carefully. If you exceed the PIN Try Count, the card will be locked and there is no way to unlock it. We recommend that you only test PIN retries up to the point where a message is displayed indicating you have one PIN try left. After that, you should very carefully enter the correct PIN. This will reset the PIN Try Count without locking the card.