

Advanced Card Systems Ltd.



ACR120U Contactless Reader/Writer



SOFTWARE DEVELOPMENT KIT USER MANUAL

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I. ACR120 Contactless Reader/Writer



The ACR120 is a compact and cost-effective contactless reader and writer. It is developed on the 13.56MHz contactless smart card (RFID) technology, supporting Mifare® (Classics, DESFire), ISO 14443 A and B cards. Its proximity operating distance is up to 5 cm, depending on the type of contactless tag in use.

The versatile reader is available in both USB and Serial interface version, which can be easily integrated into PC environment as well as other systems in a snap. It is ideal for a board range of applications, including public transport terminals, physical and logical access controls, and even vending machines.

The operation of ACR120 is extremely easy, quick and convenient. All read/write operations can be done via waving the contactless card to the device. Moreover, its compact design enables it to be mounted and located in anywhere with ease.

In addition, ACR120 also available in a module form, which is extremely easy to design-in giving you maximum design and development flexibility. Own casing, logo, color, size can all now be materialized.

Features

- USB PnP or serial interface (RS232)
- Read and write functionality
- Built-in Antenna
- Fully tested and compliant with major contactless smart cards that conform to ISO14443 A/B in the market.
- Operation LED
- High-speed transactions
- Wall mountable
- Built-in contact/contactless smart card slots (on request)
- SAM slot (on request)

Technical Specifications

Interface	USB/Serial
Smart Card Interface (optional)	Contact
Mifare Card Interface	Contactless
Supply Voltage	5V DC
Physical Dimension	120 mm (L) x 73 mm (W) x 20 mm (H)
CLK Frequency	4 MHz
Standards / Certifications (Only applicable to Contact Reader)	EMV Level 1, ISO7816-1/2/3, PC/SC, CE, FCC, NETS, Microsoft WHQL 98, ME, 2K, XP
Operating System Support	Windows 98, ME, NT - Serial interface (RS232), 2000 and XP

Typical Applications

- Public transportation Terminals
- Automatic fare collection
- Vending machines
- Physical access control
- Time attendance
- Contactless public phones
- Metering
- Windows Logon

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II. ACR38DT DualKey



Due to the rising demand of e-working methods (remote office, home office...) and snowballing hacking likeliness, it is the time to properly secure access to PCs, desktops, Intranet & Extranet networks and physical access control. ACR38DT offers both solutions based on SIM-sized **combi smart card** (contactless and contact card) for logical and physical access control.

The ACR38DT Contactless/Contact DualKey is an extension of ACR38T SIMTracker II. It has full ACR38T functionalities with contactless value-added feature.

i) Serves as a plug-in (SIM-sized) card reader:

It is an extremely compact USB full speed device completely compatible with the ACR38 smart card reader and is designed to

access SIM-sized smart cards (Plug-in card). With a size of only 82.5 mm x 21.3 mm x 9.4 mm, the ACR38DT is highly suitable for portable applications, as it plugs into the USB port and requires no additional cable or wiring. It also fulfils the GSM 11.11 specification. It is designed for PC environment, ultimate smart card peripheral for a PC.

ii) Serves as a contactless card:

While the ACR38DT serves as a contactless card, the embedded antenna coil enables the contactless part of the SIM-sized combi card to work as a contactless card to communicate with contactless readers.

ACR38DT DualKey is a good quality, reliable and effective reader with designs focusing on convenient use and harmony with other PC peripherals in terms of shapes and colors. It is ideal for electronic commerce, physical access control, home banking or e-purse facilities, secure computer access, transportation and GSM application tool.

Features

- **USB full speed** interface to PC with simple command structure
- Support Plug-in SIM-sized card
- Read and write all microprocessor cards with T=0 or T=1 protocol
- Supports SLE 4418/28/32/42 memory cards
- Supports the most common memory-based smart cards, including **I2C bus protocol cards** (from 1k bits up to 1024k bits) and secure memory cards (**Atmel AT88SC153** and **AT88SC1608**)
- Support GSM 11.11 specification
- Require no additional cable
- Short Circuit Protection
- EN 60950/IEC 60950, ISO-7816, PC/SC, CE, FCC
- Support ISO-7816 Class A, B and C (**5V, 3V, 1.8V**) cards
- Embedded antenna coil
- Full functionality with SIM-sized Combi card in contact and contactless interface
- Support PPS (Protocol and Parameters Selection) with 1,743 – 250,000 bps in reading and writing smart cards
- A patented technology combines physical and logical access control capabilities

Technical Specifications

Interface	USB full speed
Supply Voltage	Regulated 5V DC
Supply Current	max. 50mA
Physical Dimension	78.73 mm (L) x 21.50 mm (W) x 11.00 mm (H)
Operating Temperature	0 - 50 °C
CLK Frequency	4 MHz
Standards / Certifications	EN 60950/IEC 60950, ISO-7816, PC/SC, CE, FCC
Operating System Support	Windows 98, ME, 2000 and XP

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Typical Applications

- Home Banking
- E-commerce
- Network access control
- Digital signature
- Identification
- Ticketing
- Parking and toll collection
- Online gaming
- Transportation
- Physical access control

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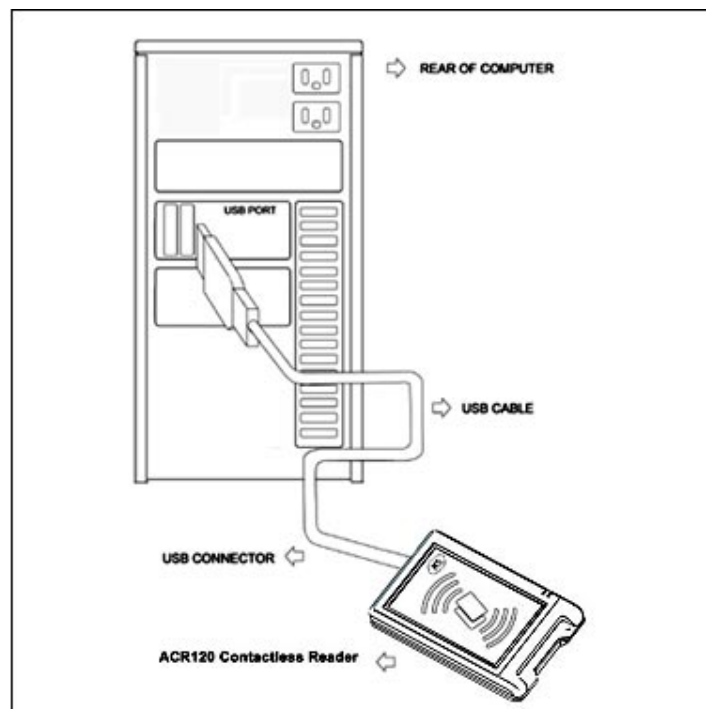
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III. Installation

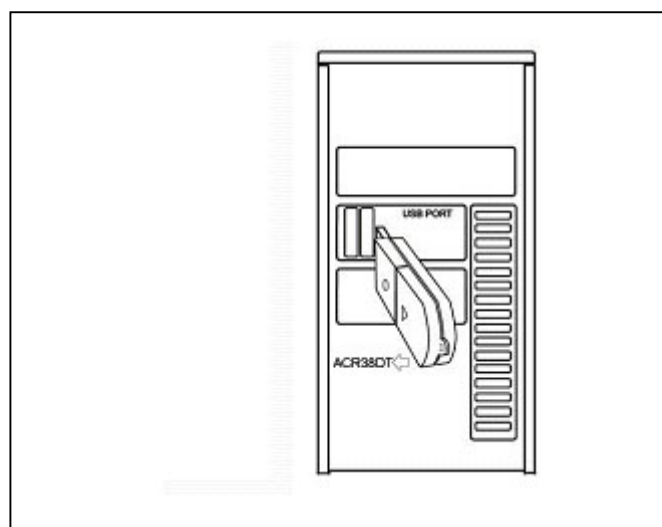
A. Connection Diagram

Note: You can connect the ACR120U Contactless Reader and ACR38DT DualKey devices to your PC anytime AFTER the drivers has been loaded.

To connect your ACR120U to your PC, plug in the USB end of the device into the USB Port of your computer.



To connect your ACR38DT to your PC, plug in the USB end of the device into the USB Port of your computer.



B. Driver Installation

Insert the ACR120 SDK CDROM into your CDROM drive. If the screen below does not appear, run **x:\ACR120SDK.EXE** where **x** is the drive letter of your CDROM.



Select the USB Interface and follow the instructions as described below:



Choose the Install Contactless Reader Driver from step 2 of the SDK Installer.

B.1 ACR120U Driver Installation on Windows XP/2000

This is a proprietary driver designed specifically for the ACR120U smart card reader. The ACS Proprietary APIs offer simple, easy-to-manage, and yet effective methods to transact with different contactless cards supported by the reader.

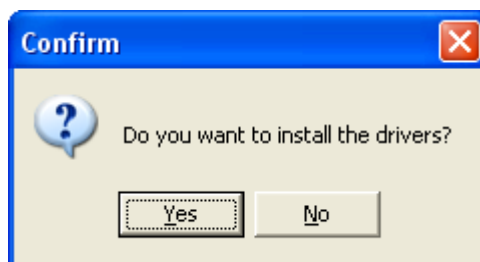
First Stage Installation

1. When you see the “**Proprietary Driver Installation Wizard**” window, click “**Install**”.

To check the driver version or read installation tips, click on the note icon (located at the left of the buttons) to view **Readme File**.



2. When prompted whether you want to install the drivers, click “**Yes**”.



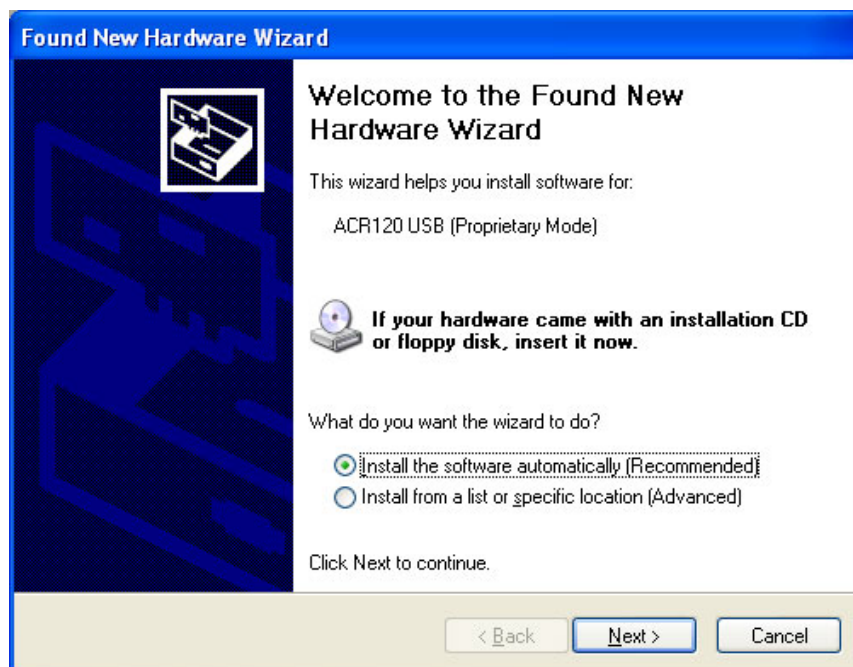
3. Please plug in or reinsert the reader then proceed to **Second Stage Installation**. When done, click on **"Finish"** to exit program.



Second Stage Installation

Note: This stage will always be encountered if it is the first time the device is plugged into the USB slot.

1. The **Found New Hardware** dialog will appear at the bottom right corner (Taskbar Notification Area). In the **Found New Hardware Wizard** window, leave the **"Install the software automatically (Recommended)"** option selected then click **"Next >"**.

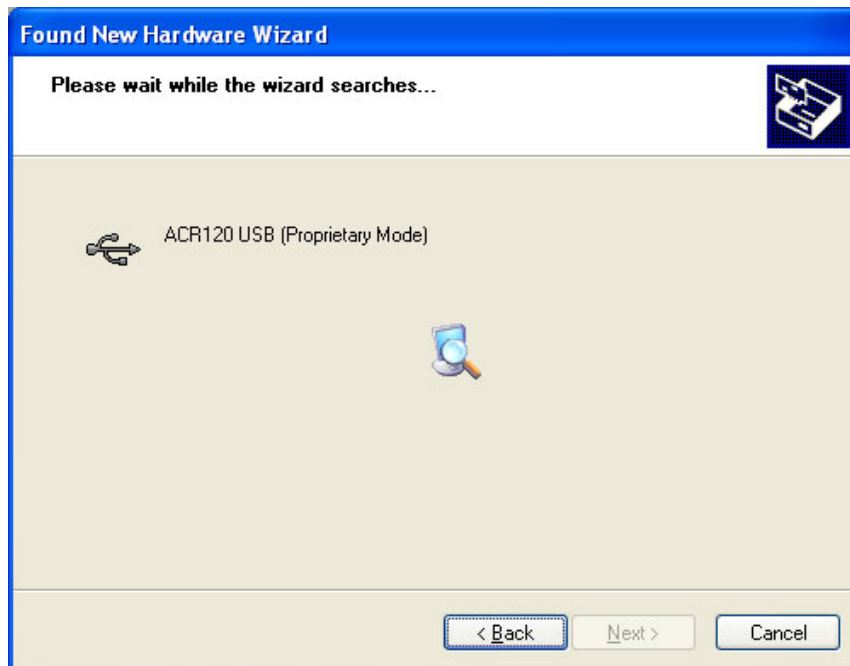


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2. Please wait while the wizard searches for the ACR120 USB device driver.



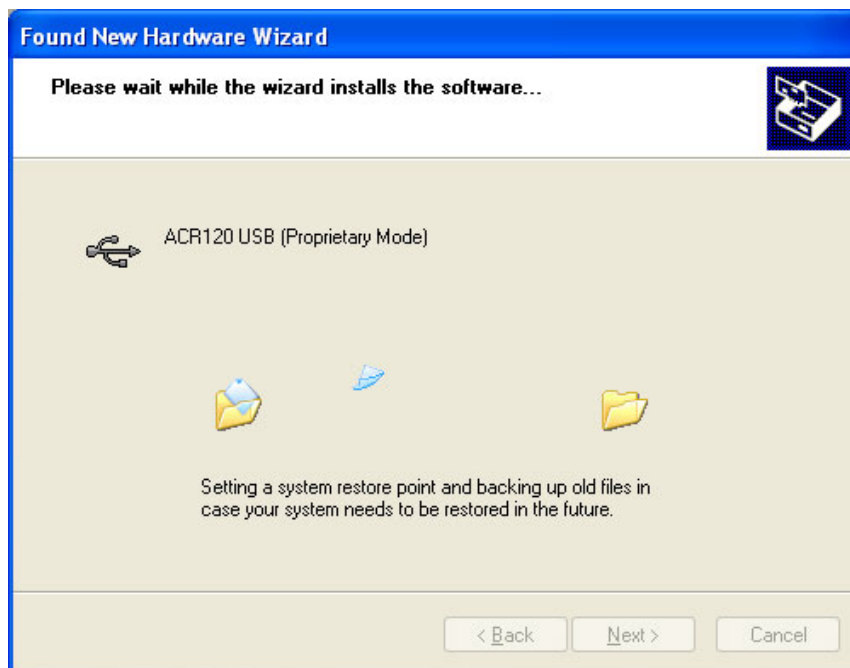
3. On "Hardware Installation" window, you are prompted with the following message:

"ACR120 USB (Proprietary Mode) has not passed Windows Logo testing to verify its compatibility with Windows XP."

Click "**Continue Anyway**". The drivers are tested and should work correctly with Windows.



4. Please wait while the wizard installs the software.



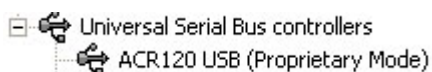
5. Click "Finish" to close the wizard.



6. To check whether you have successfully installed the drivers, go to:

**Start → Settings → Control Panel
→ System
→ Hardware → Device Manager.**

The Windows Device Manager should list the *ACR120 USB (Proprietary Mode)* under the Universal Serial Bus controllers' device type.



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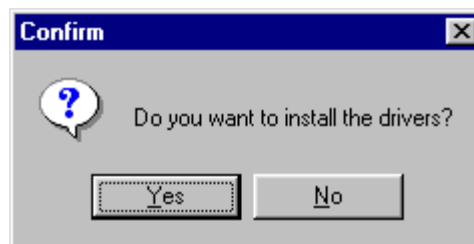
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B.2 ACR120U Driver Installation on Windows 98SE/ME

1. When you see the “**Proprietary Driver Installation Wizard**” window, click “**Install**”. To check the driver version or read installation tips, click on the note icon (located at the left of the buttons) to view **Readme File**.



2. When prompted whether you want to install the drivers, click “**Yes**”.

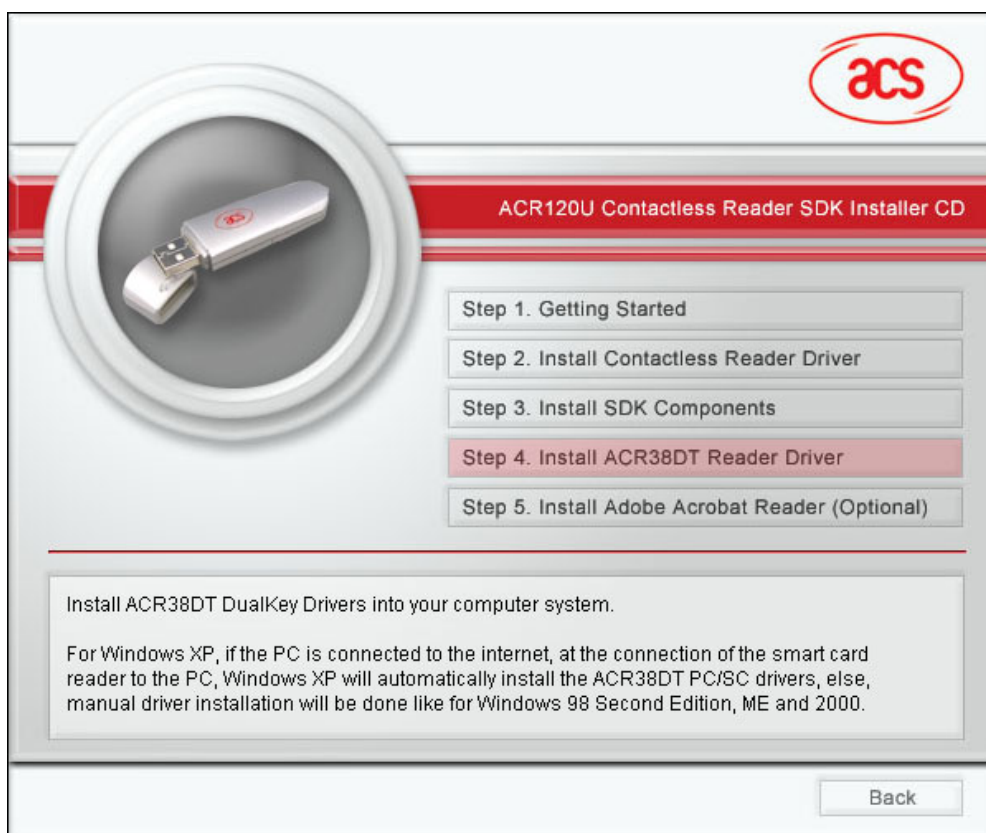


- Before clicking the **"Finish"** button, connect the ACR120U device first into an available USB port. Wait until the **New Hardware Found** window disappears. You may now click on **"Finish"** button for the changes to take effect.



B.3 ACR38DT Driver Installation on Windows XP/2000

Click on **"Step 4. Install ACR38DT Reader Driver"** from the ACR120U Contactless Reader SDK Setup GUI and follow the instructions below.



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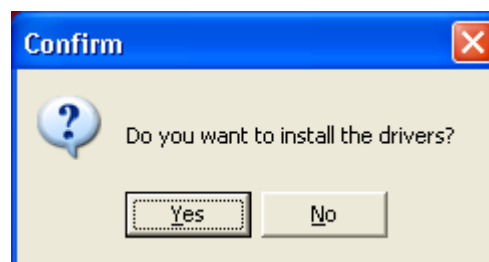
First Stage Installation

1. When you see the “**PC/SC Driver Installation Wizard**” window, click on “**Install**”.

To check the driver version or read installation tips, click on the note icon (located at the left of the buttons) to view **Readme File**.



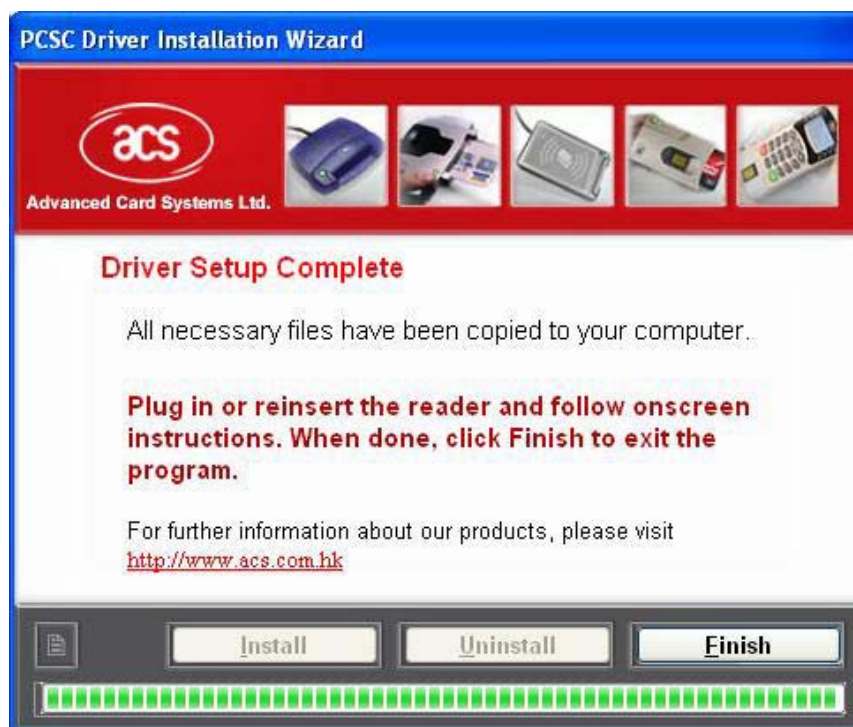
2. When prompted whether you want to install the drivers, click “**Yes**”.



3. Please wait while the PC/SC Driver Installation Wizard prepares the installation.



4. Please plug in or reinsert the reader then proceed to **Second Stage Installation**. When done, click on **"Finish"** to exit program.



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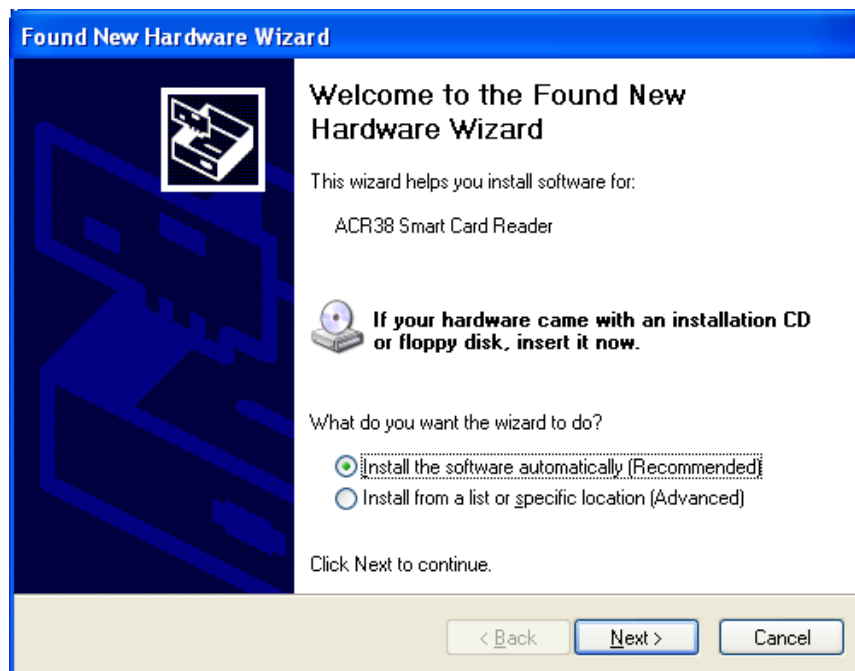
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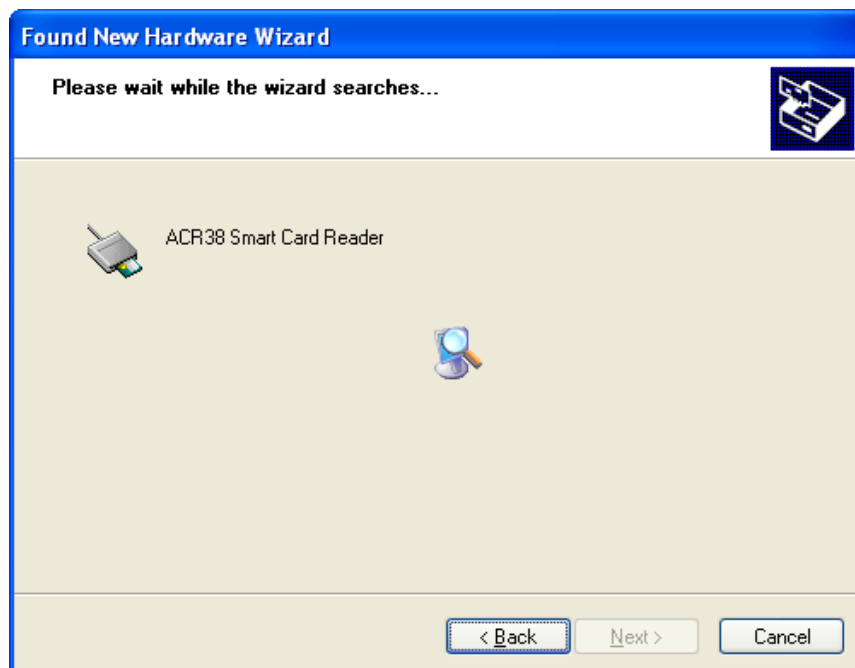
Second Stage Installation

Note: This stage will always be encountered if it is the first time the device is plugged into the USB slot.

1. The Found New Hardware dialog will appear at the bottom right corner. In the **Found New Hardware Wizard** window, leave the **"Install the software automatically (Recommended)"** option selected then click **"Next >"**.



2. Please wait while the wizard searches for the ACR38 Smart Card Reader device driver.



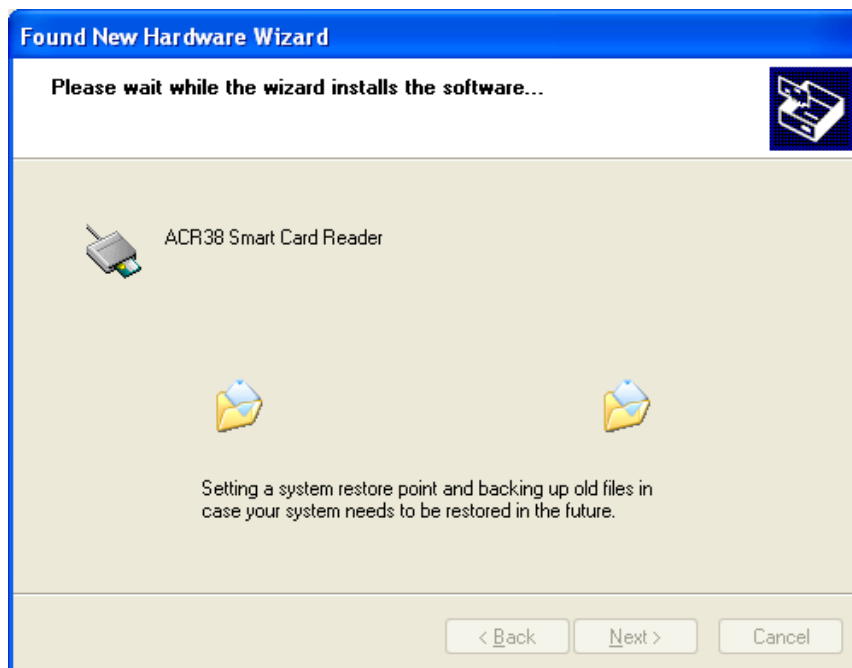
3. On “**Hardware Installation**” window, you are prompted with the following message:

“ACR38 Smart Card Reader has not passed Windows Logo testing to verify its compatibility with Windows XP.”

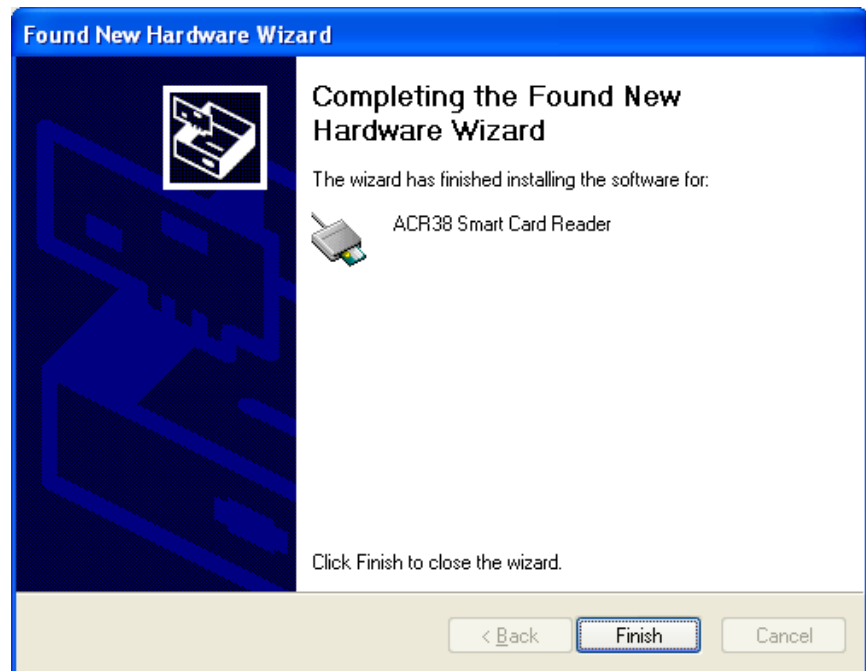
Click “**Continue Anyway**”. The drivers are tested and should work correctly with Windows.



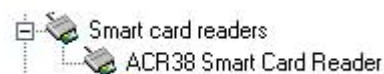
4. Please wait while the wizard installs the software.



5. Click **“Finish”** to close the wizard.



6. To check whether you have successfully installed the drivers, go to:

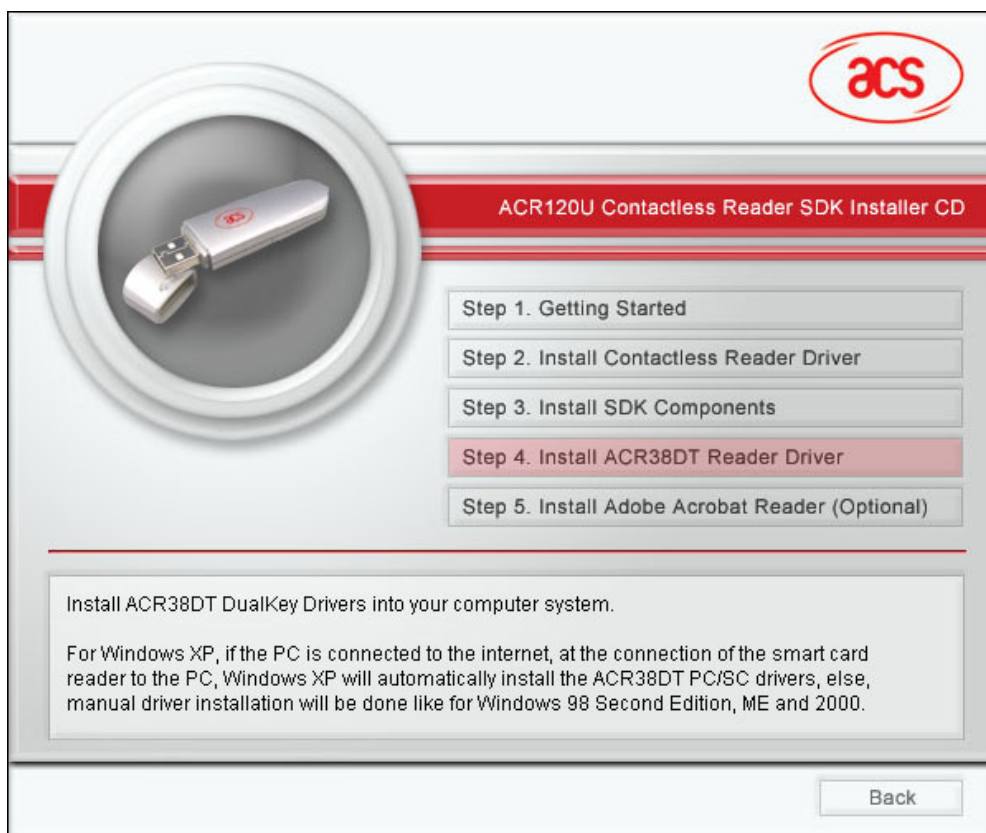


**Start → Settings → Control Panel
→ System → Hardware → Device
Manager**

The Windows Device Manager should list the *ACR38 Smart Card Reader* device under the Smart card readers' device type.

B.4 ACR38DT Driver Installation on Windows 98SE/ME

Click on **“Step 4. Install ACR38DT Reader Driver”** from the ACR120U Contactless Reader SDK Setup GUI and follow the instructions below.



1. When you see the **“PC/SC driver Installation Wizard”** window, click on **“Install”**. To check the driver version or read installation tips, click on the note icon (located at the left of the buttons) to view **Readme File**.

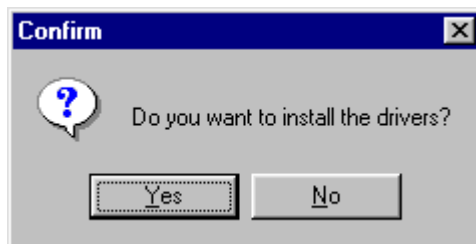


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2. When prompted whether you want to install the drivers, click "Yes".



3. Please wait while the PC/SC Driver Installation Wizard prepares the installation.



4. The driver installer will automatically install the **Microsoft Smart Card Base Components**. Click "Yes" to accept license agreement.

Note:

PC/SC components are already installed on Windows XP/2000 so you will not encounter this instruction during installation.



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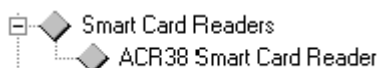
5. Before clicking the **"Reboot"** button, connect the ACR38 device first into an available USB port. Wait until the **New Hardware Found** window disappears. You may now click on **"Reboot"** button for the changes to take effect.



6. To check whether you have successfully installed the drivers, go to:

**Start → Settings → Control Panel
→ System → Device Manager**

The Windows Device Manager should list the *ACR38 Smart Card Reader* device under the Smart Card Readers' device type.

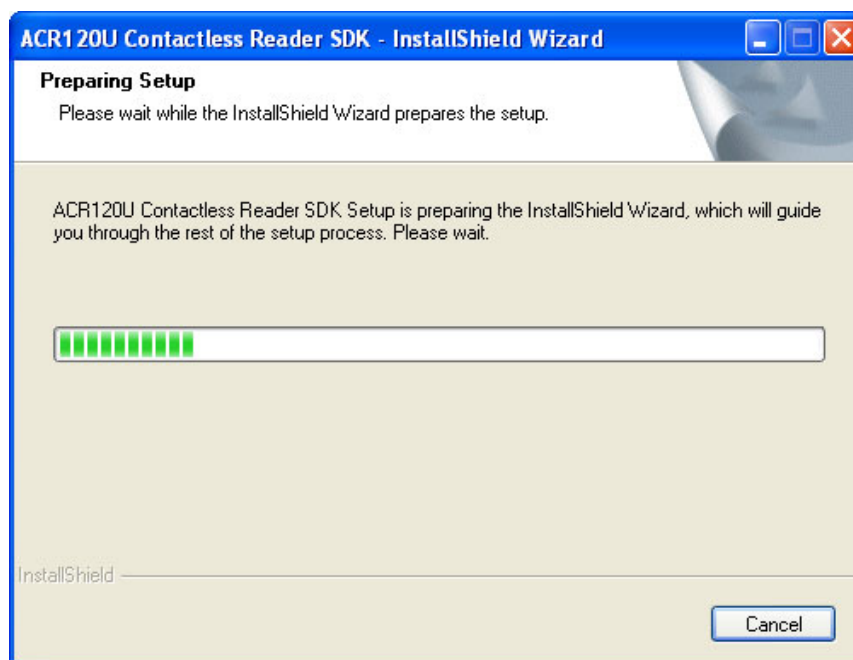


C. SDK Installation

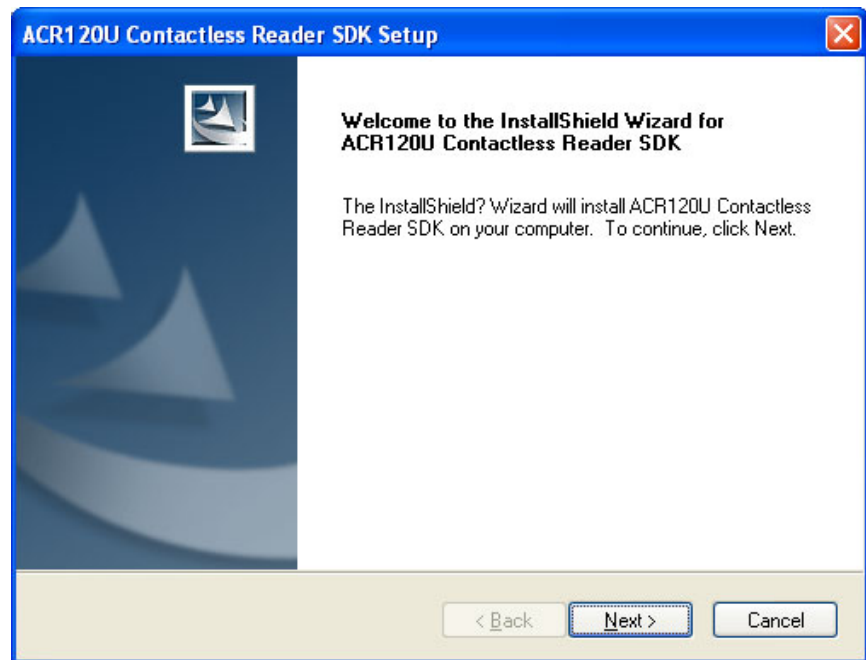
1. Click on “**Step 3. Install SDK Components**” and you will be prompted with the InstallShield Wizard for ACR120U Contactless Reader SDK.



2. Please wait while InstallShield Wizard prepares the setup.

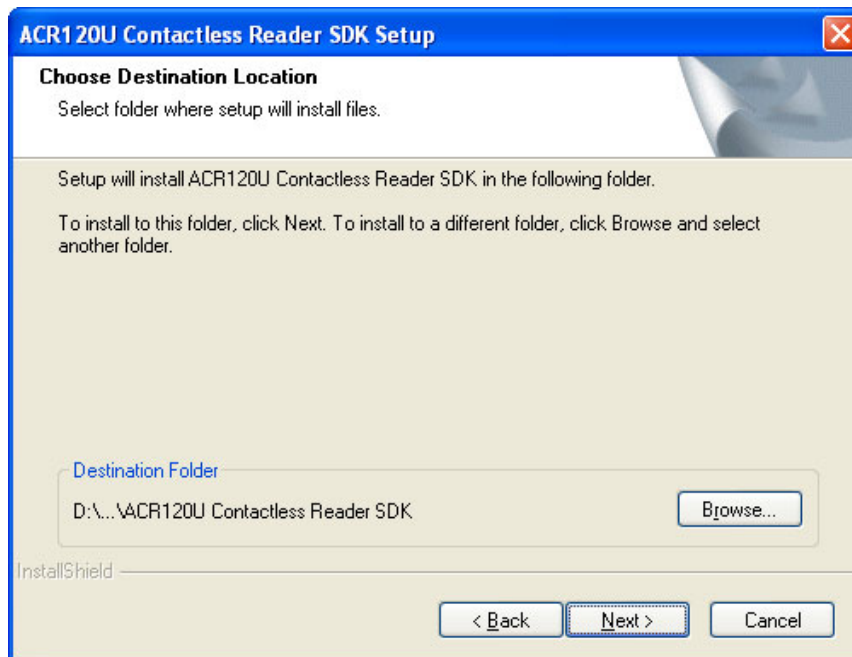


3. Click "**Next>**" to continue installation.

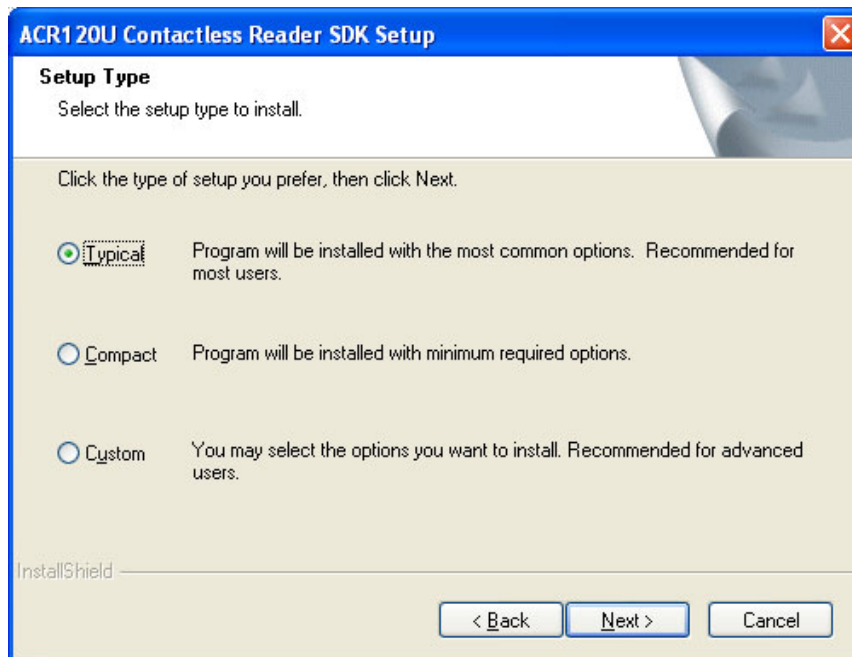


4. Then prompted to choose the destination location, click on **"Next>"**. The default installation path is **X:\Program Files\Advanced Card Systems Ltd\ACR120U Contactless Reader SDK**, where **X** is the drive letter of your local Windows drive.

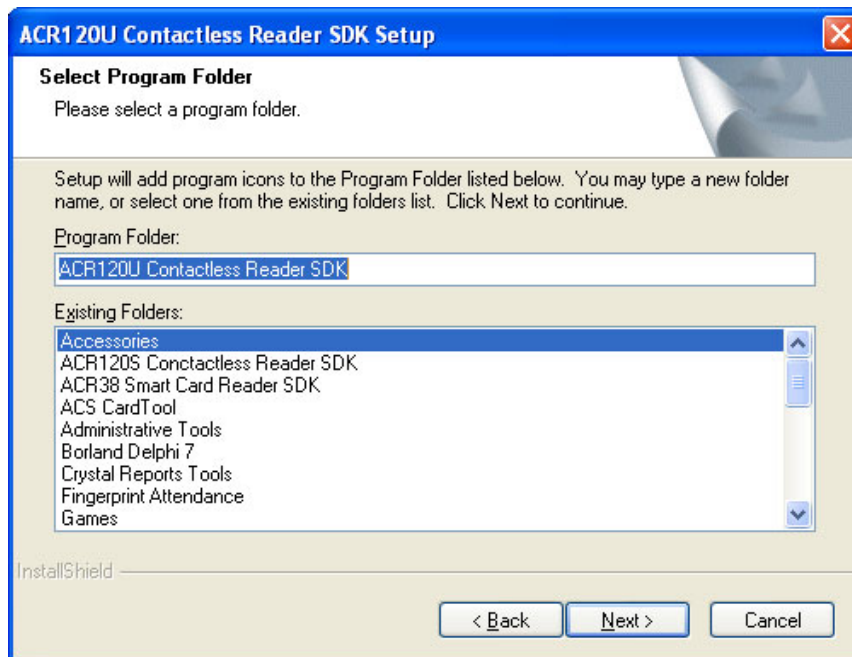
Note: If you want to change the destination path, click on **"Browse...."** When the **Choose Folder** window appears, change the path to your preferred folder then, click **"OK"**.



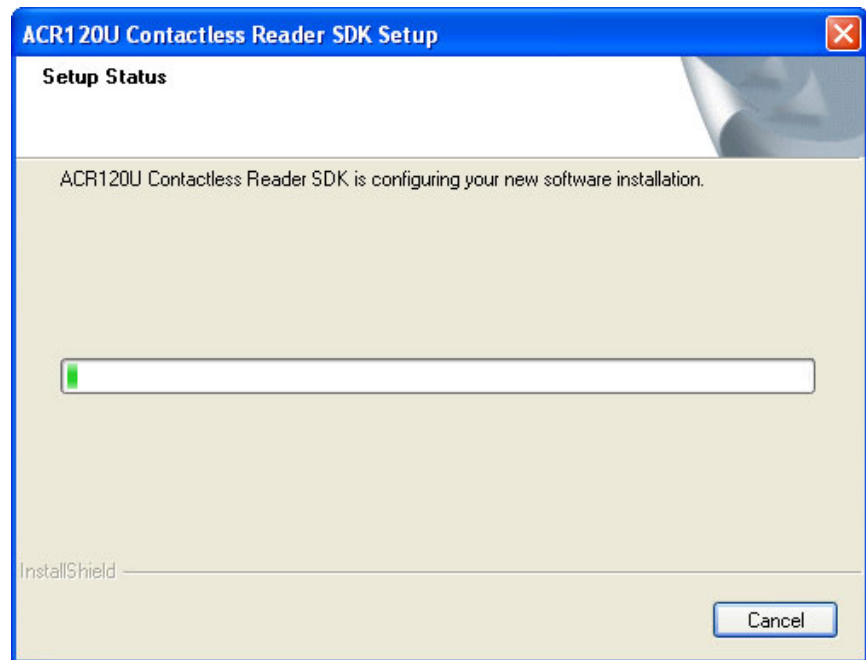
5. In the **Setup Type** window, leave the **Typical** option selected then, click "**Next>**".



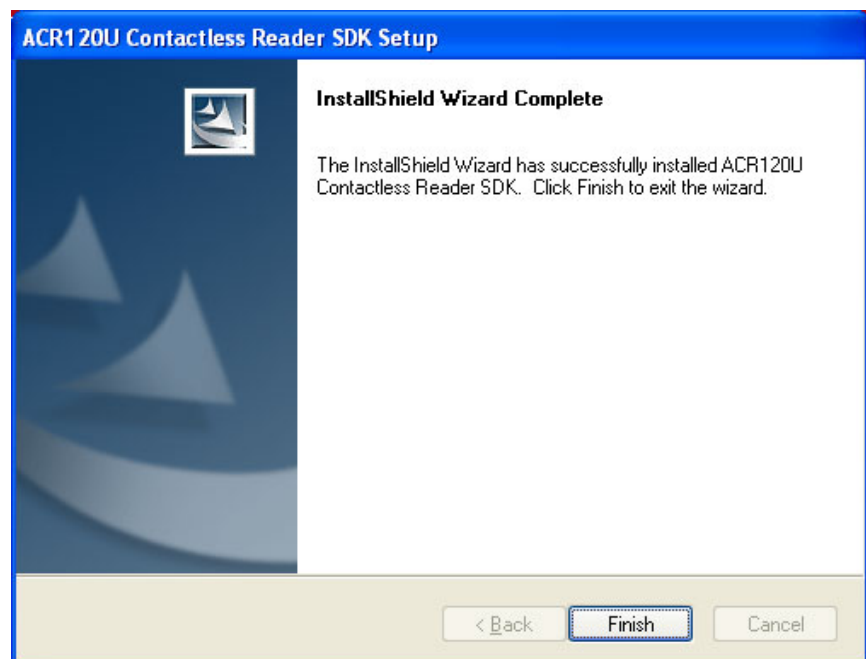
6. When prompted with the **Select Program Folder** window, click "**Next>**". Default program folder that will be created is **ACR120U Contactless Reader SDK**. If you want a different folder, type a new program folder name.



7. Please wait while the software is being configured.



8. ACR120U Contactless Reader SDK installation has been successfully installed. Click **"Finish"** to complete setup.



IV. SDK Components

A. Sample Application

A.1 Multi-Application Demo

This demo program shows how the ACR120U is used in real-world applications. The Mifare card / ACR38DT is used as stored-value for:

- Parking
- Train Ticket
- Vending Machine
- Weighing Machine
- Loyalty Application

For detailed explanation on how to use the ACR120 Multi-Application Demo, please refer to the ACR120 Demo Guide.

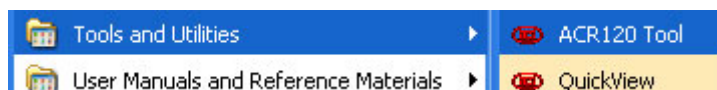


B. Sample Codes

The sample codes provided in the SDK Kit are written in 3 programming languages: Delphi (Borland Delphi 7.0), C (Microsoft Visual C++ 6.0), and Visual Basic (Microsoft Visual Basic 6.0).

C. Tools and Utilities

The following tools are included in the SDK CD-ROM:



C.1 ACR120 Tool

ACR120 Tool is an application utility that allows you to examine and manipulate contents inside a contactless smart card. It can also be used for different ISO 14443 contactless smart cards available in the market.

This utility supports two interface types of ACR120 readers, the ACR120S (Serial Interface) and ACR120U (USB Interface).

Note: For detailed explanation on how to use the ACR120 Tool, please refer to its Help file.

C.2 QuickView

This is a utility program that checks if you have properly installed your ACR3x readers. This tool works with your ACR38DT DualKey only.

To use this tool, make sure you have properly installed and connected the ACR38DT to your PC. Check the [Driver Installation](#) Section on how to install device driver then plug your ACR38DT into an available USB Port on your PC (see [Connection Diagram](#) Section).

For detailed explanation on how to use this tool, you may check the Help menu on the program.

D. User Manuals and Reference Materials

The SDK includes the following Technical and Reference Manuals:

- ACR120U SDK User Manual
- ACR120U API
- ACR38DT Technical Specifications
- ACR120 Technical Specifications
- Mifare 1K Card Reference Manual
- Mifare 4K Card Reference Manual
- ACR120S - ACR120U Porting Guide
- ACR120 Wall Mounting Procedures
- ACS Product Guide