Advanced Card Systems Ltd.
Card & Reader Technologies

ACR330 Validator with QR Code Scanner

User Manual V1.02

Subject to change without prior notice

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1.0. Introduction

The ACR330 Bus Validator is designed specifically for Automatic Fare Collection (AFC) systems. It offers the convenience of cashless payment in buses, ferries, trams, railways and other transportation modes.

The bus validator enables high-speed transaction processing and records collection through 13.56 MHz contactless (RFID) technology, supporting ISO 14443 Type A and B cards, MIFARE®, and FeliCa. Being certified with major payment standards such as PBOC Level 1 (Contactless) and EMV™ Levels 1 and 2 (Contactless) including MasterCard® Contactless and Visa PayWave® offers flexibility to adapt to an open loop payment system. An embedded barcode scanner enables transactions through the use of print or mobile barcodes.

It has advanced wireless connectivity options for data transfer such as GSM/GPRS, 3G/4G, and Wi-Fi. With an optional GPS feature, it can also be used to locate vehicles, manage fleets and set flexible distance-based fares. Protecting the bus validator from harsh environment is its IP54 rating for dust and water protection and the additional Military Standard MIL-STD-810 for shock and vibration.

This document provides detailed guidelines on using the ACR330.

2.0. ACR330 Hardware Overview

2.1. Parts of the Reader

Figure 1: ACR330 Parts

Part Number	Part Name
1a, 1b, 1c,1d	Programmable Button with Backlight (Blue)
2	Blue LED Indicator (For passenger)
3	Yellow LED Indicator (For passenger)
4	Green LED Indicator (For passenger)
5	Red LED Indicator (For passenger)
6	LCD Display with Touch Panel
7	Tapping Area
8	1D/2D Barcode Scanning Area
9	Speaker
10	Green LED Indicator (For Driver)
11	Red LED Indicator (For Driver)
12	Buzzer
13	Power Button
14	SIM and SD Card Cover
15	Back Cover

Table 1: ACR330 Parts Description

2.1.1. Connection Ports

Figure 2: ACR330 Connection Ports

Port Number	Port Name
1	Power Socket
2	RJ11 Serial Port (RS232, RS485)
3	USB Host
4	Ethernet
5	USB Client (for internal debugging)
6	Socket for External GPS Antenna
7	SAM Cover with 4 ISO7816 SAM Socket inside

Table 2: ACR330 Connection Ports Description

2.1.2. Input Power, RS232, RS485 Pin Assignment

Power Socket Type: Molex 43045-0400, Micro-Fit 3.0 Right Angle Header, 3.00mm Pitch, Dual Row, 4 Circuits

RS232, RS485 Socket type: RJ11

Pin Assignment is shown as below:

Figure 3: ACR330 Input Power

Pin Number	Pin Name
1	NC
2	RS232-TX
3	RS232-RX
4	RS485-A
5	RS485-B
6	GND

Table 3: ACR330 Input Power Pins Description

Note: *Below is the application direct access device paths list:*

- *RS232 - /dev/ttyO0 (115200 baud, 8 data bits, no parity, and 1 stop bit)*
- *RS485 - /dev/ttyO1(115200 baud, 8 data bits, no parity, and 1 stop bit)*
- *USB disk - /media/udiskp1*

2.1.3. SAM Slot Arrangement

The SAM Slot Arrangement is shown in the image below.

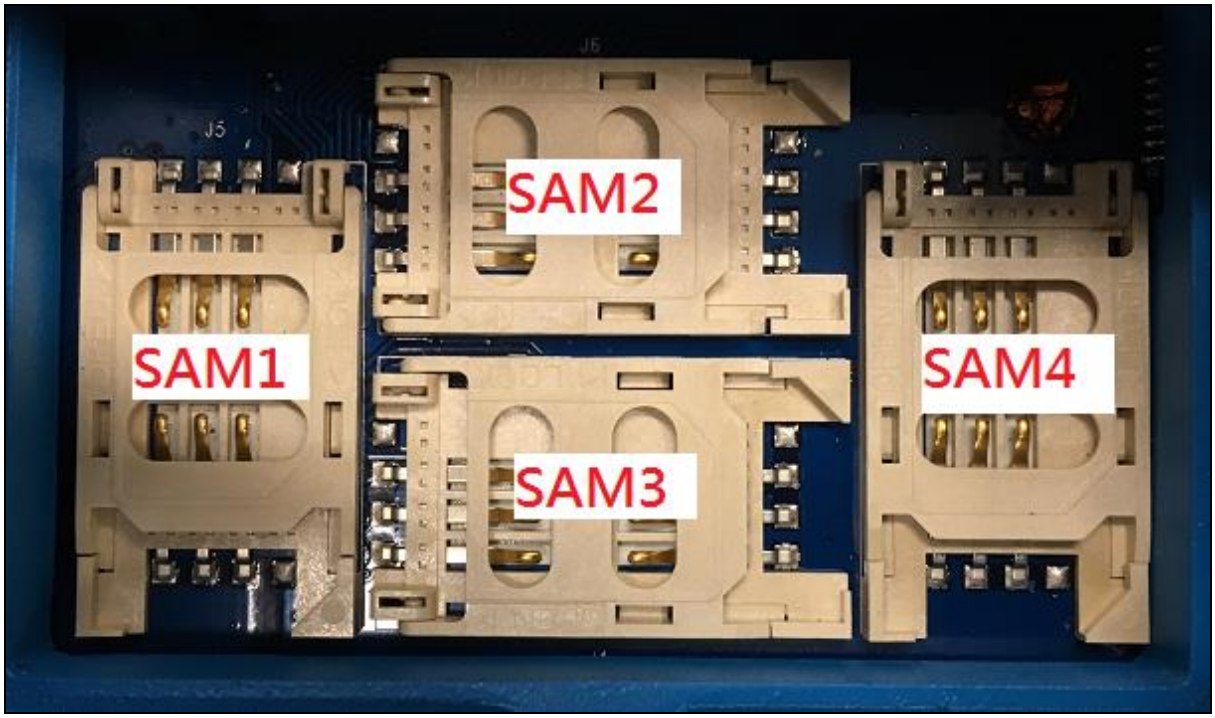


Figure 4: SAM Slot Arrangement

2.1.4. LTE Board Description

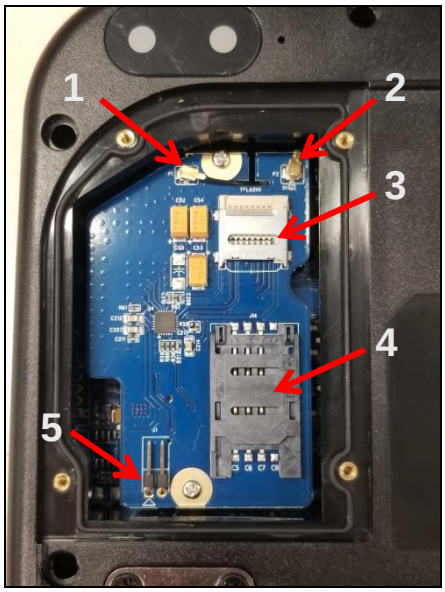


Figure 5: LTE Board Components

Part Number	Part Name
1	4G Antenna Socket
2	GPS Socket
3	SD Card Slot
4	SIM Card Slot
5	Console Jumper Port (Console mode is enabled through RS232 when jumper is plugged in. Speed: 115200 baud, 8 data bits, no parity, and 1 stop bit) ***Note**: Jumper is not included in standard product. May be purchased locally.*

Table 4: ACR330 LTE Board Description

***Note**: Below is the application direct access device paths list:*

- *MicroSD - /media/sdcardp1*

2.2. ACR330 EVK Components

Figure 6: ACR330 EVK Components

The ACR330 EVK contains the following items:

1. Debug Cable
2. Console Jumper Port
3. 1m DC Power Jack to Molex Power Cord
   - The cable should comply with the required power rating.
     (example: 12V == 4A; 24V == 2A)
   - A DC jack adapter may be needed depending on the power supply used.
4. Demo Cards

   Purpose: To be used for the demo pre-installed on the reader
   - 2 pcs. Test Cards [Type: Mifare Desfire EV1]

   - There are QR Codes at the back of the cards to emulate both a valid and an expired card.

Note: *For more information about the demo, please check* ***Section 3.3*** **- ACR330 Demo**

2.3. Installing the Back Mount

2.3.1. Preparing the Components

Prior to installation, it is necessary to ensure that the components are complete and in good condition. Both the pole and the back-mount should be ready before the installation.

2.3.1.1. The Pole

To prepare the pole:

1. On the right side of the pole, check if the holes needed to secure the position of the ACR330 have been well-drilled. For reference, please refer to the illustration below.

   ***Note**: The position of the holes can be adjusted depending on the requirement*

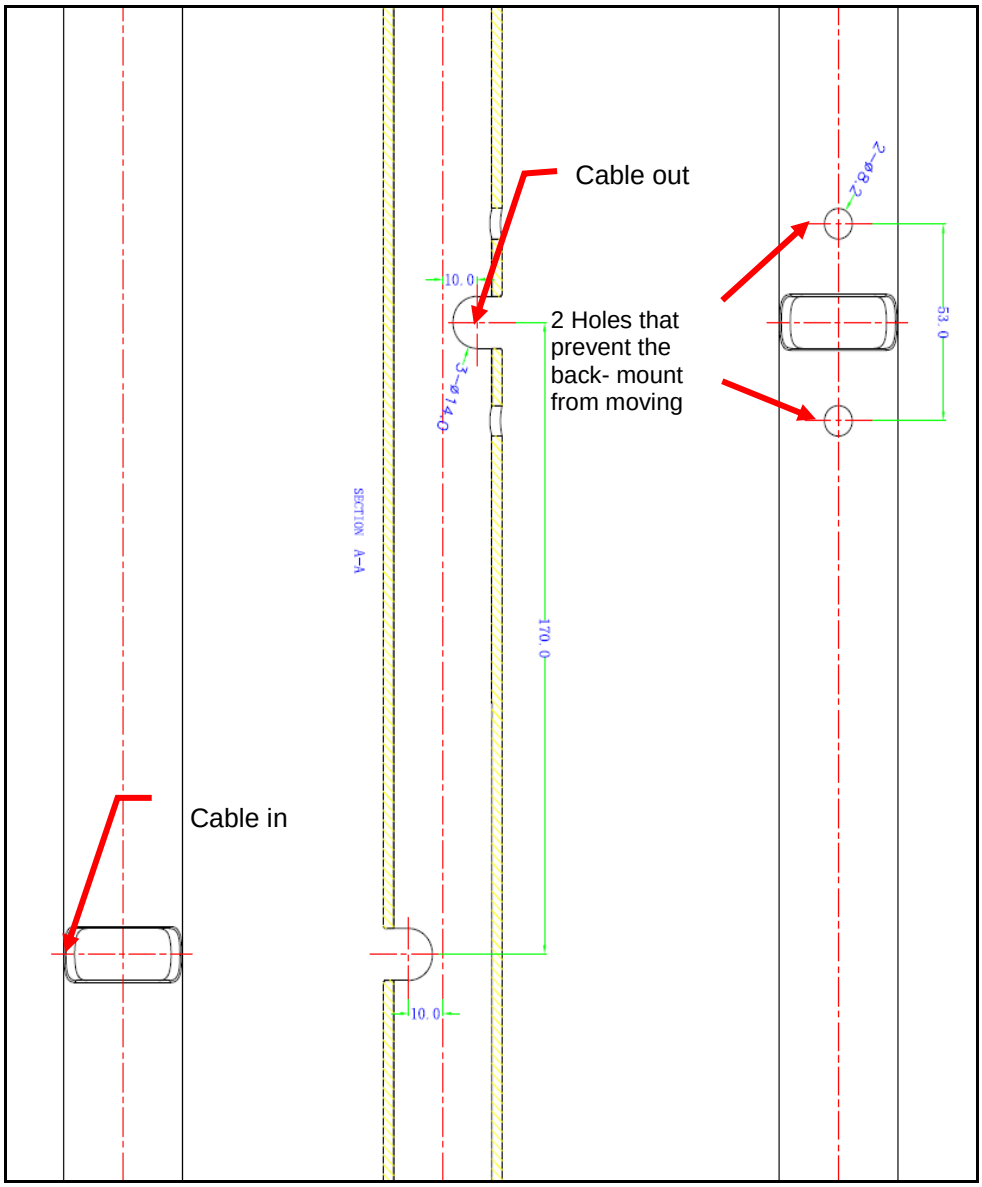


Figure 7: Pole Hole Position

2. Check if the required cables (e.g. power cords) have been properly passed through the poles, and that they can reach the position of the mounting with ample extra length.

3. Check the following details of the pole:

   - Diameter (31/32mm or 35mm)

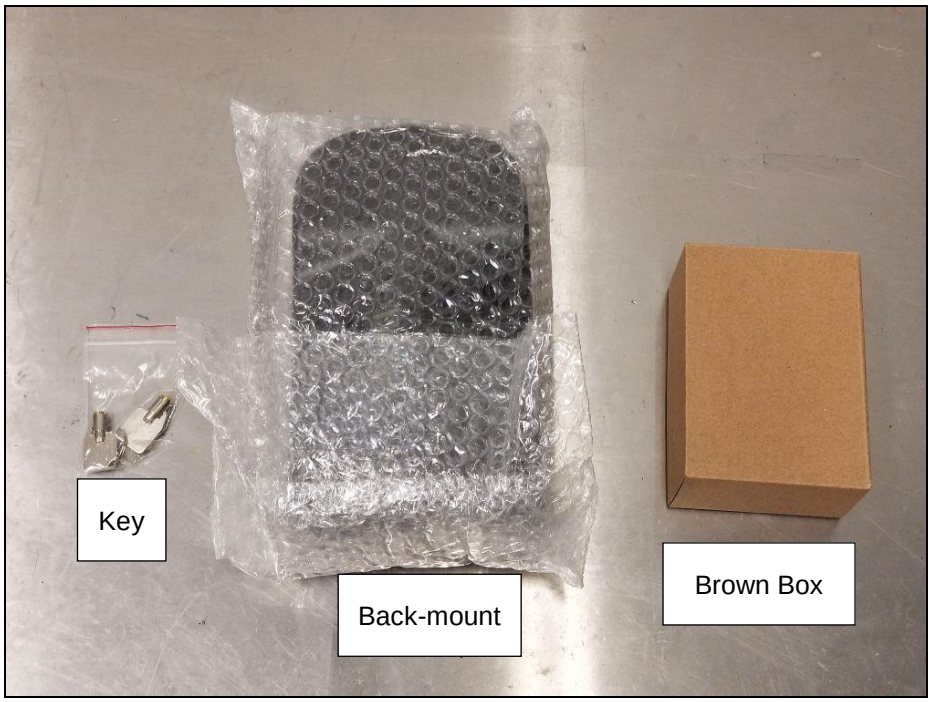
   - Orientation (Vertical or Horizontal)

4. After checking the pole, proceed to check the back-mount.

2.3.1.2. The Back-mount

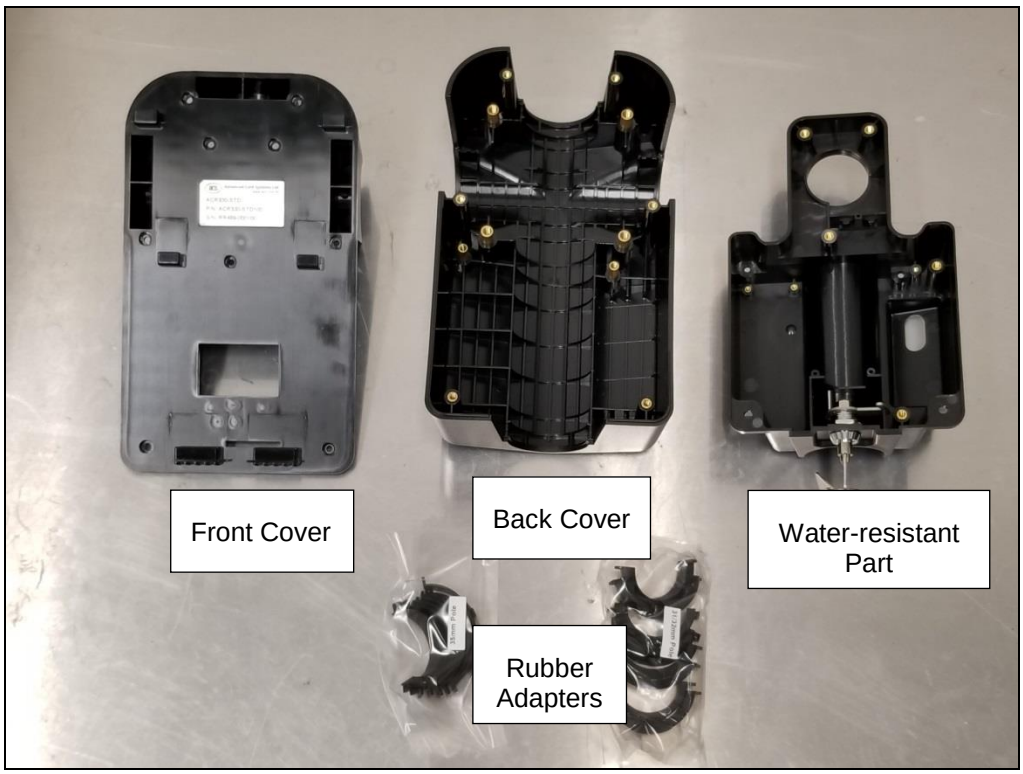
To prepare the back mount:

1. Unbox the tools. A **back-mount**, a **key**, and a **brown box** are included in the package.



2. Using the **key**, open the lock of the **back-mount**. The lock is located at the bottom part of the back-mount as shown on the image below:

3. Unlocking the back-mount will cause it to disassemble into three parts: **front cover**, **back cover**, and the **water-resistant part**. **Rubber adapters** are also included inside the back-mount.

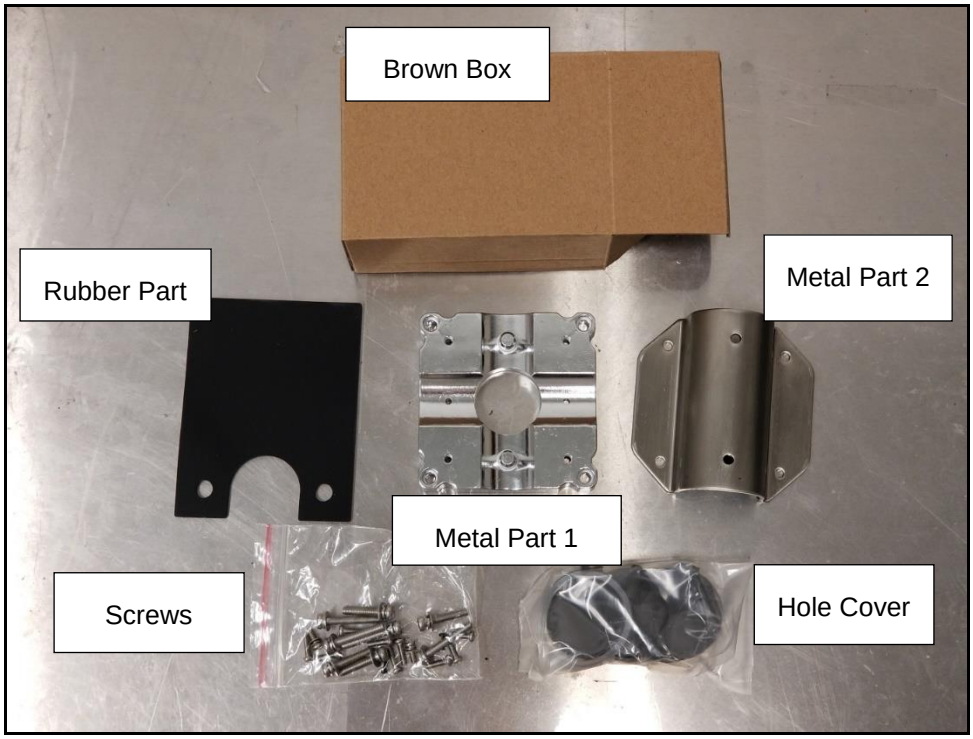


4. Using the codes on their inner side, select the **rubber adaptors** that match the pole's size and orientation, as shown in the table below:

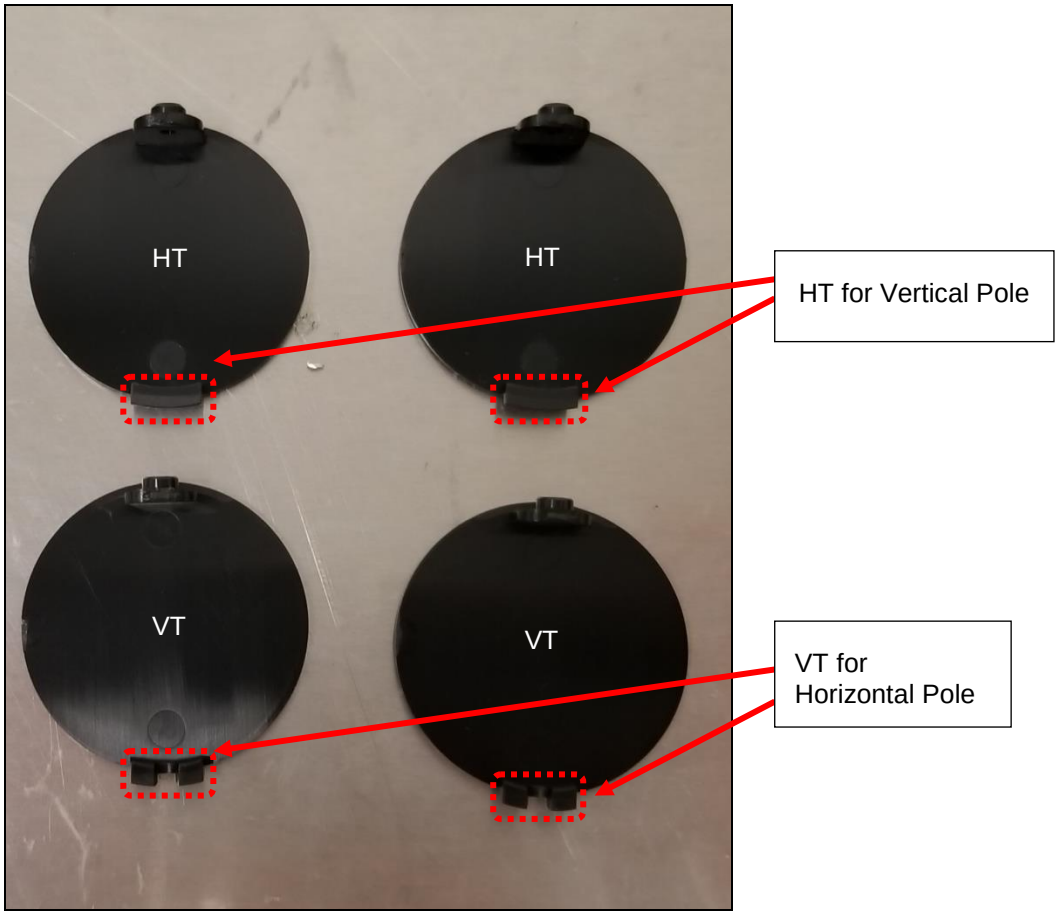
Orientation of pole for mounting	Pole diameter	
	31/32mm	35mm
Horizontal (H)	**HB-D31/32, HB-D31/32, HT-D31/32, HT-D31/32,**	**HB-D35, HB-D35, HT-D35, HT-D35,**
Vertical (V)	**VB-D31/32, VB-D31/32, VT-D31/32, VT-D31/32,**	**VB-D35, VB-D35, VT-D35, VT-D35,**

Table 5: Rubber Adapter According to Pole Size and Orientation

5. Open the **brown box**. The following components should be inside the box:



6. Select the appropriate **hole cover** according to the orientation of the pole, as shown in the photo and in the table below:



Orientation of pole for mounting	Pole diameter	
	31/32mm	35mm
Horizontal	**VT, VT**	**VT, VT**
Vertical	**HT, HT**	**HT, HT**

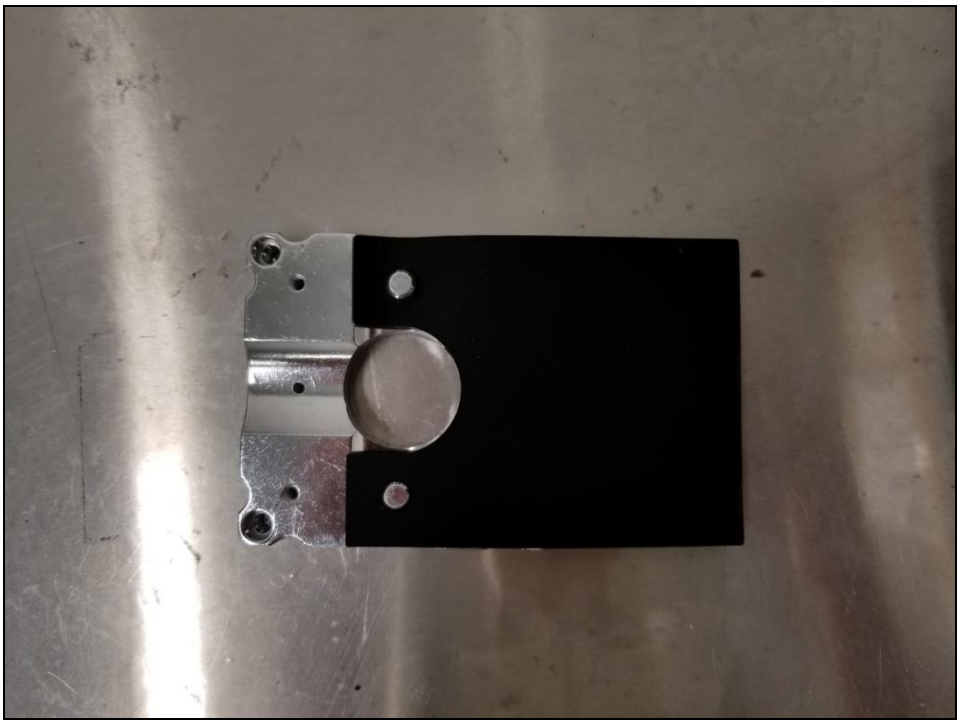
Table 6: Hole Cover According to Pole Size and Orientation

2.3.2. Installing ACR330 using a Vertical Pole

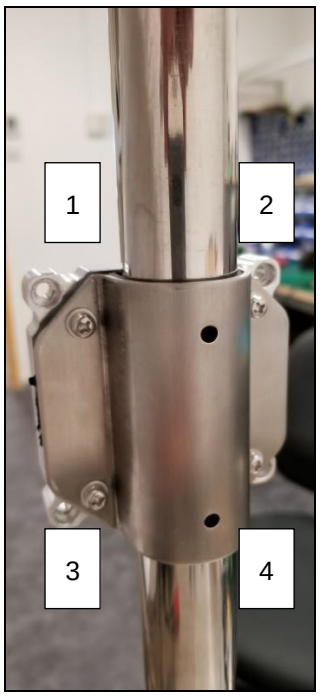
Note: *Please ensure that the components are well prepared before starting the installation.*

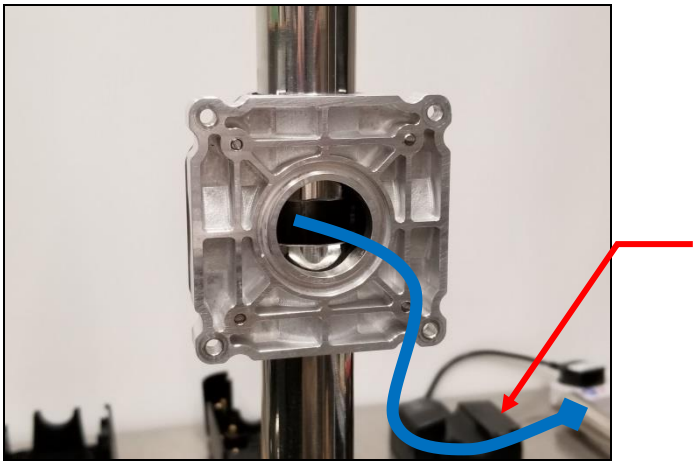
To install the ACR330 using a vertical pole:

1. Place the **rubber part** on top of the **metal part 1**.
   Note*: This step is only applicable when using a 31/32mm pole. When using a 35mm pole, please skip this step.*



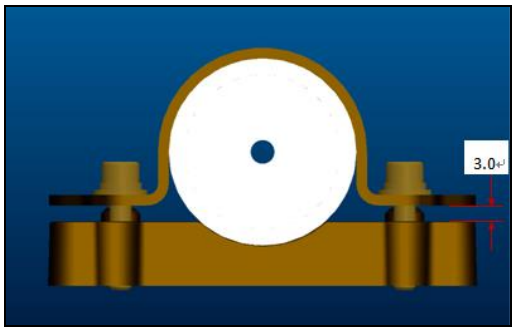
2. Put **metal part 1** and **metal part 2** on top of the pole and screw them together using PM4*20 screws (4 pieces). The order of screwing is shown on the picture below:



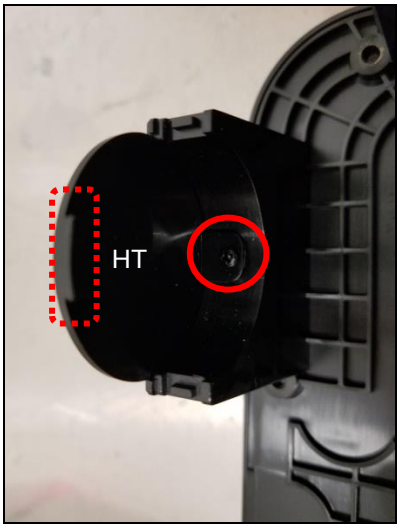


***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

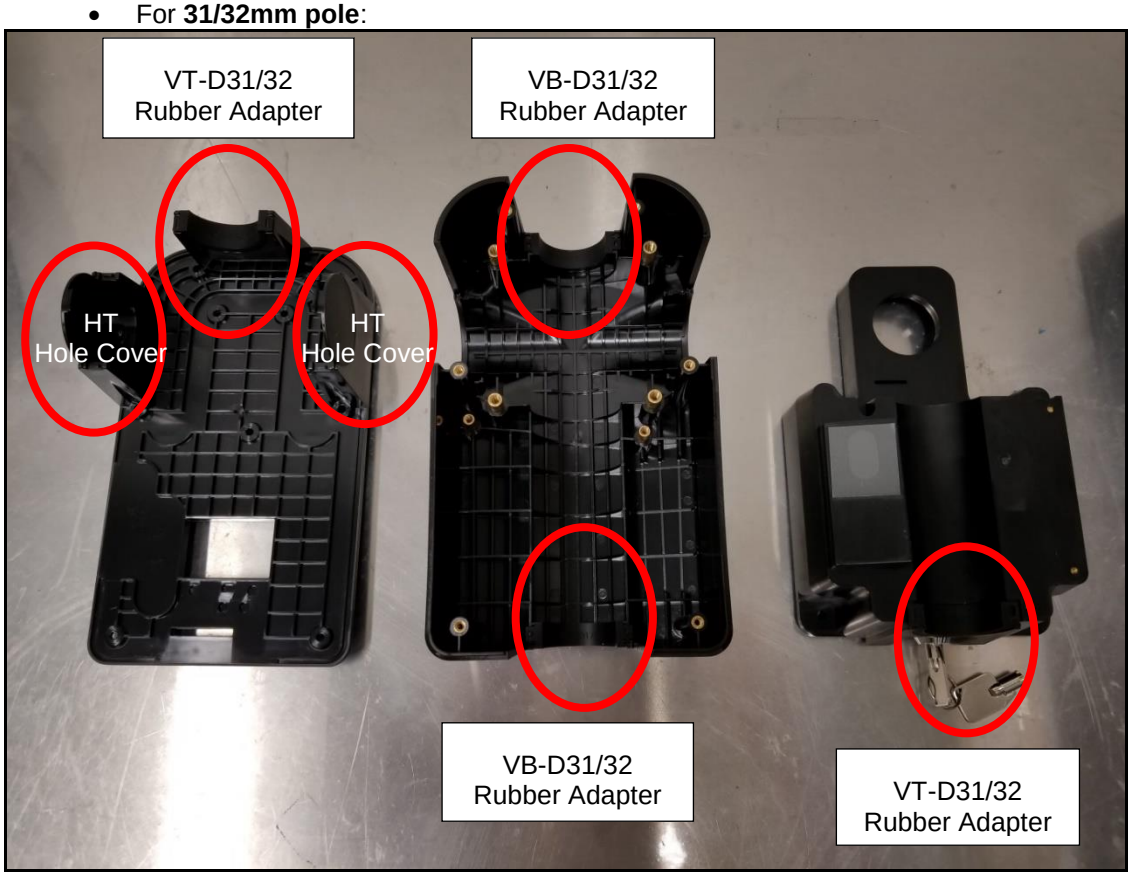
***Note**: The gap between the two metal parts is around 3mm for any size (31/32/35mm) of pole.), as shown in the picture below.*



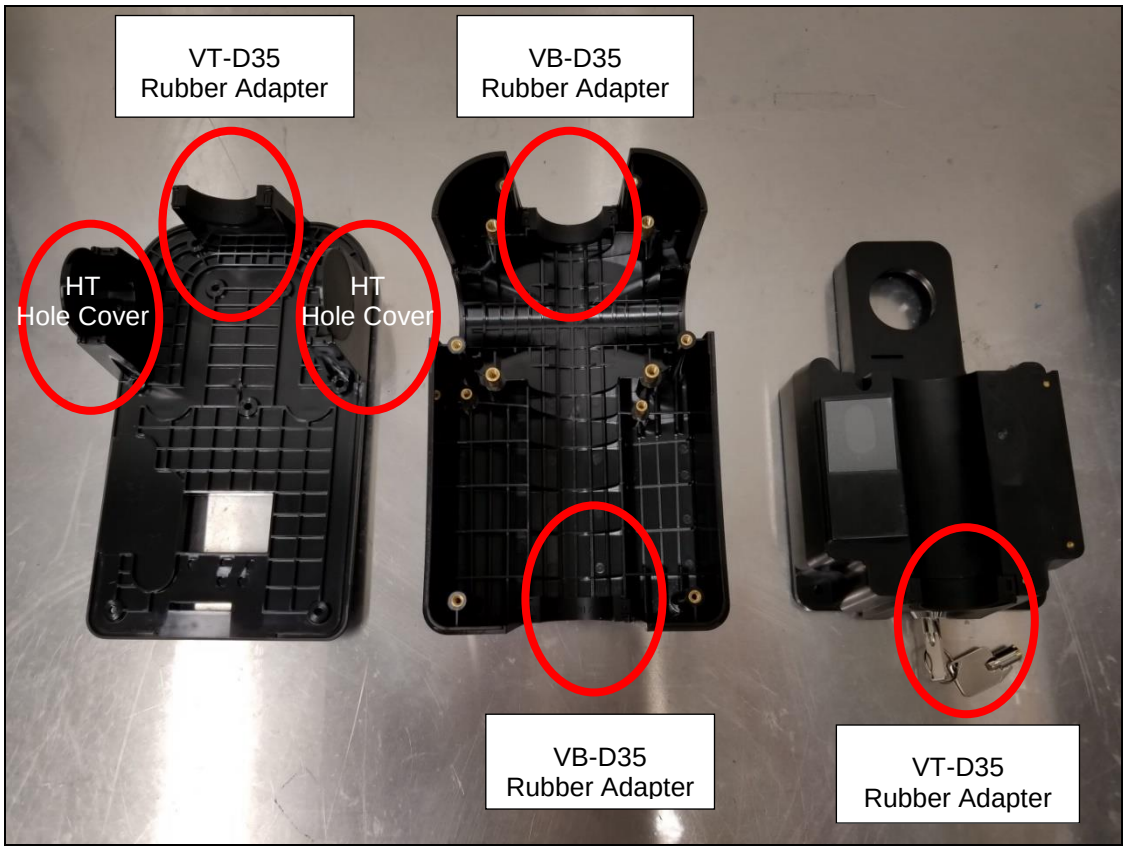
3. Screw the **rubber adapters** and **hole covers** using the PB2.0 screws (2 pieces). The exact position is shown on the photos below:



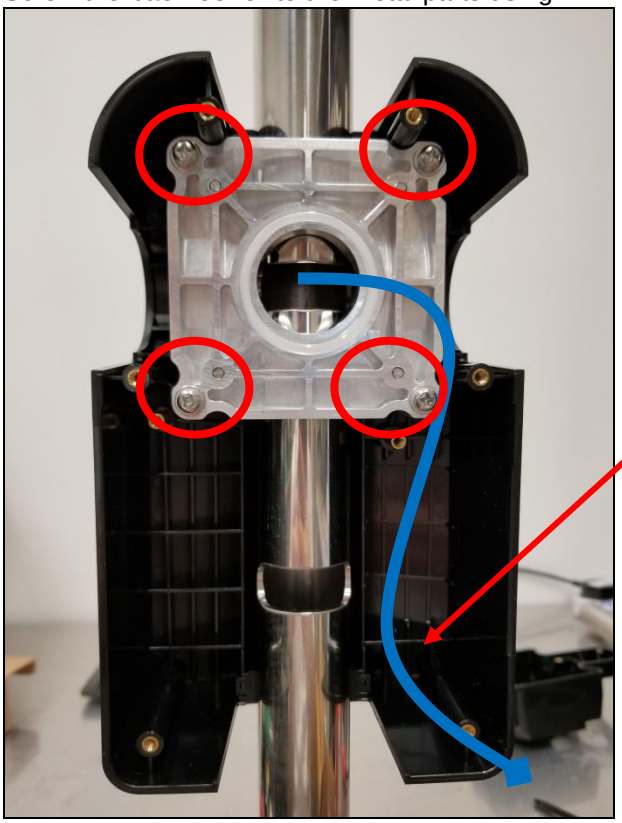
- For **31/32mm pole**:



- For **35mm pole**:

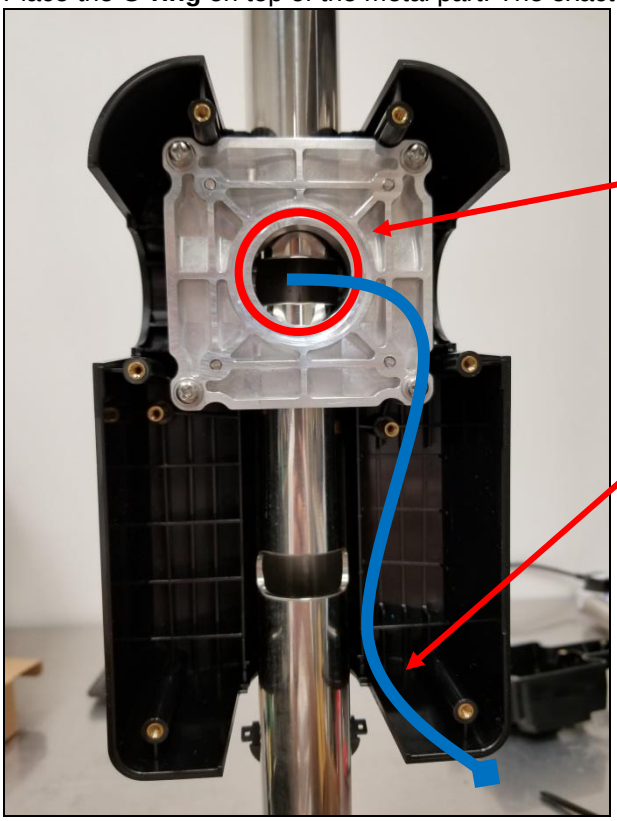


4. Screw the **back cover** to the metal parts using PM4*25 screws (4 pieces).



***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

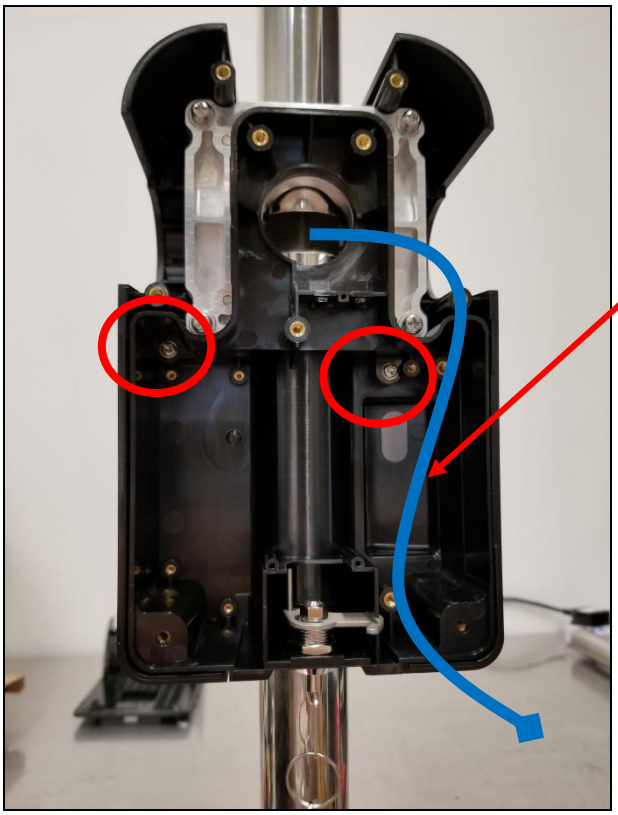
5. Place the **O-ring** on top of the metal part. The exact position is shown on the photo below:



O-ring

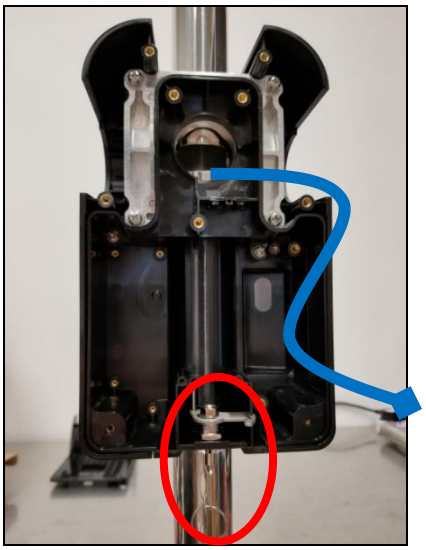
***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

6. Screw the **water resistant part** using PM3*8 screws (2 pieces).



***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

7. Using the **key**, open the lock. The exact location is shown on the photo below:

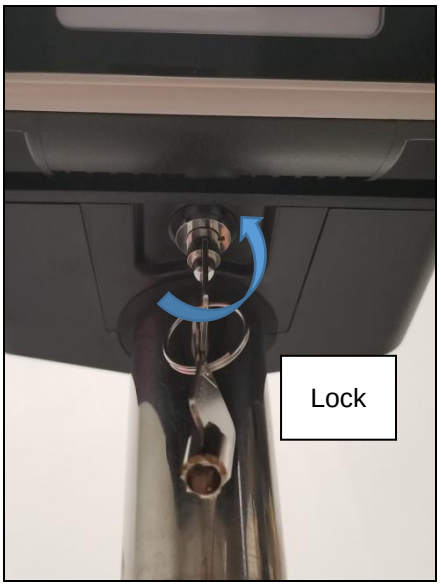


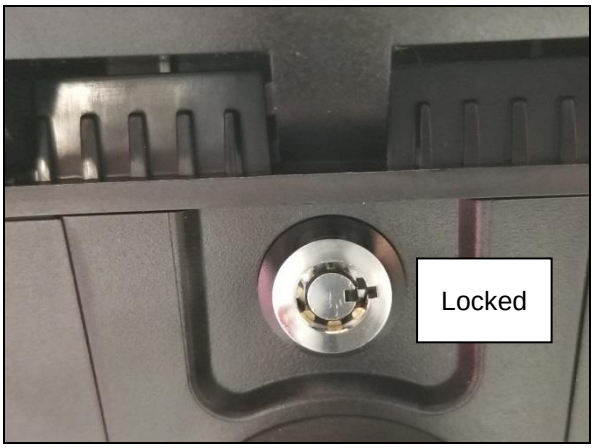
8. Screw the **top cover** to the back cover using PM3.0*10 screws (9 pieces). The exact position and order is shown on the photo below:

***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

9. Connect the **cables** to the **ACR330**.
10. Mount the **ACR330** on the **back-mount**.

11. Using the **key**, lock the **back-mount**.



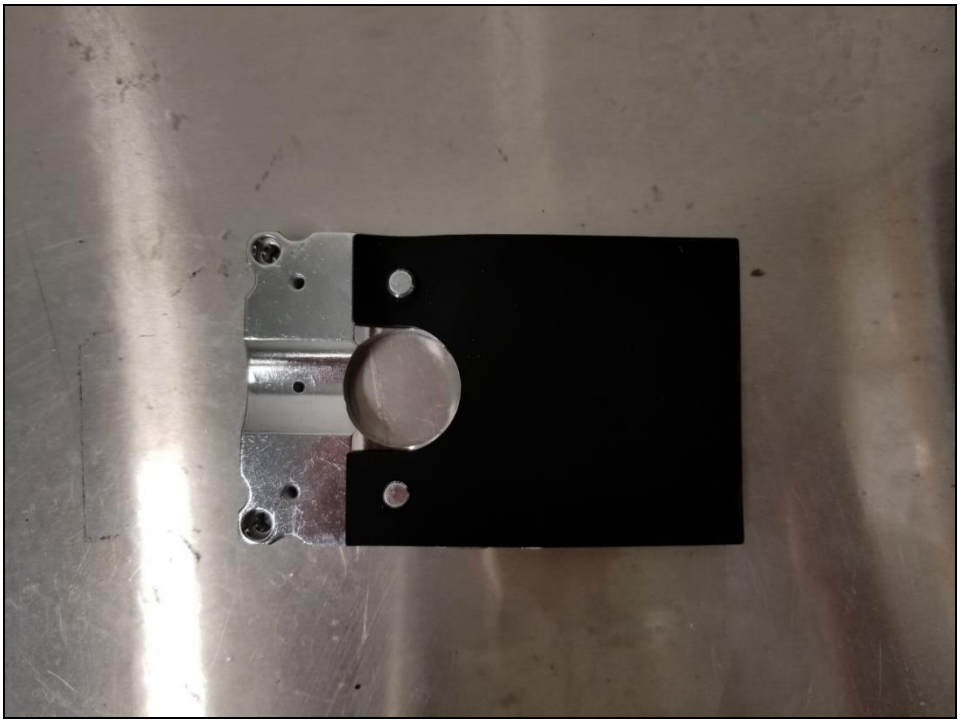


2.3.3. Installing the ACR330 using a Horizontal Pole

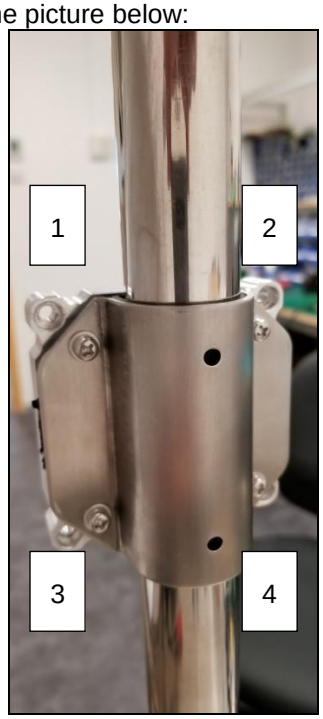
Note: *Please ensure that the components are well prepared before starting the installation.*

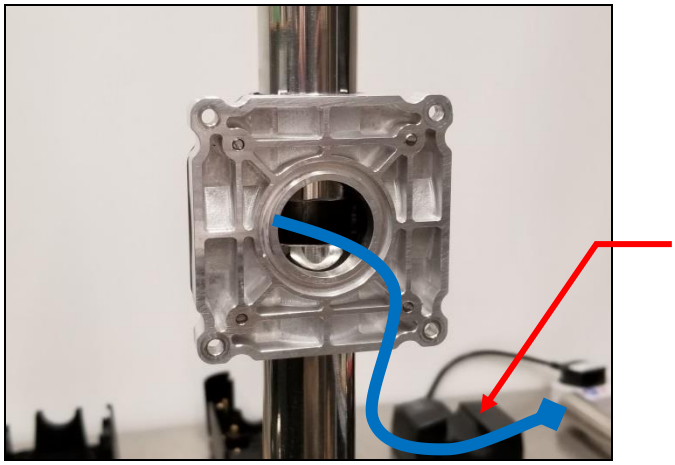
To install the ACR330 using a horizontal pole:

1. Place the **rubber part** on top of the **metal part 1**.
   Note*: This step is only applicable when using a 31/32mm pole. When using a 35mm pole, please skip this step.*



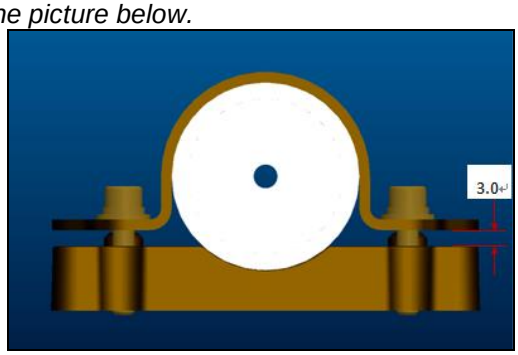
2. Put **metal part 1** and **metal part 2** on top of the pole and screw them together using PM4*20 screws (4 pieces). The order of screwing is shown on the picture below:



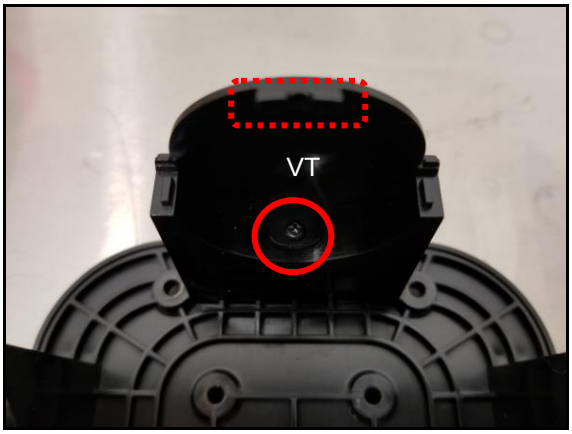


***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

***Note**: The gap between the two metal parts is around 3mm for any size (31/32/35mm) of pole.), as shown in the picture below.*

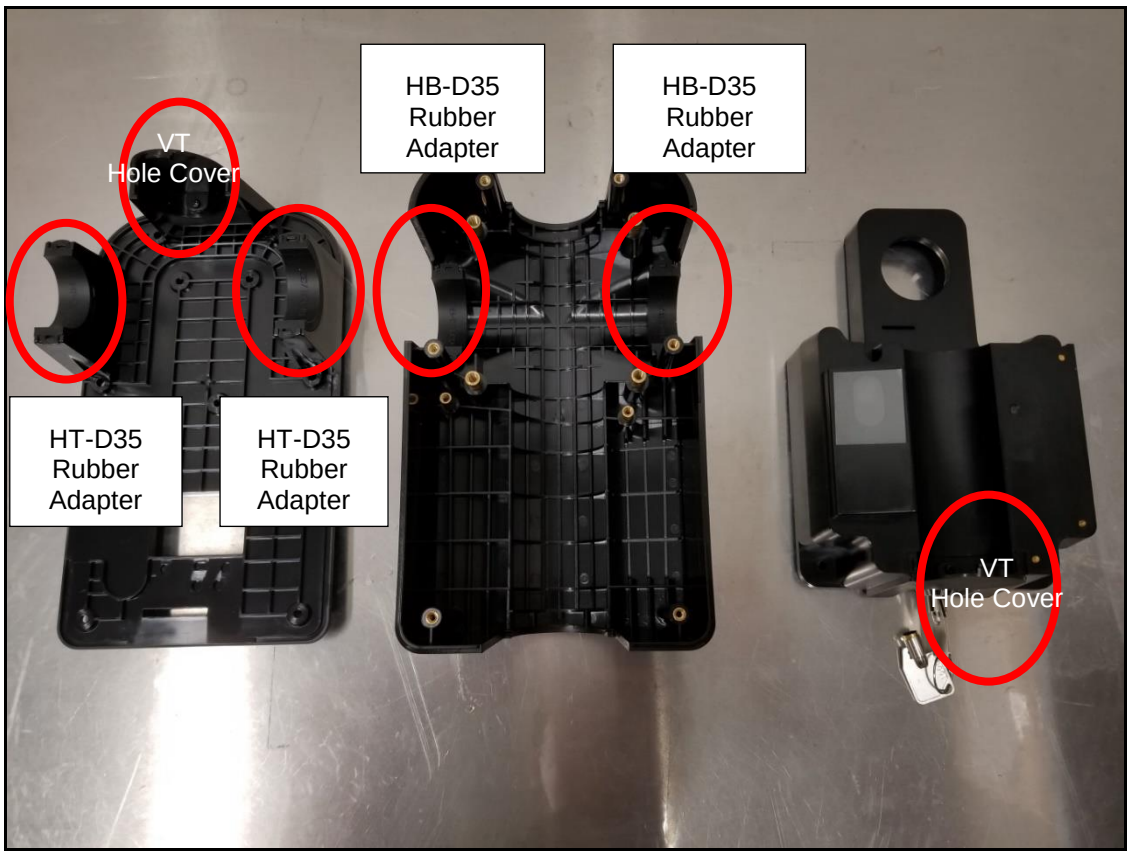


3. Screw the **rubber adapters** and **hole covers** using PB2.0 (2 pieces). The exact position is shown in the photos below:

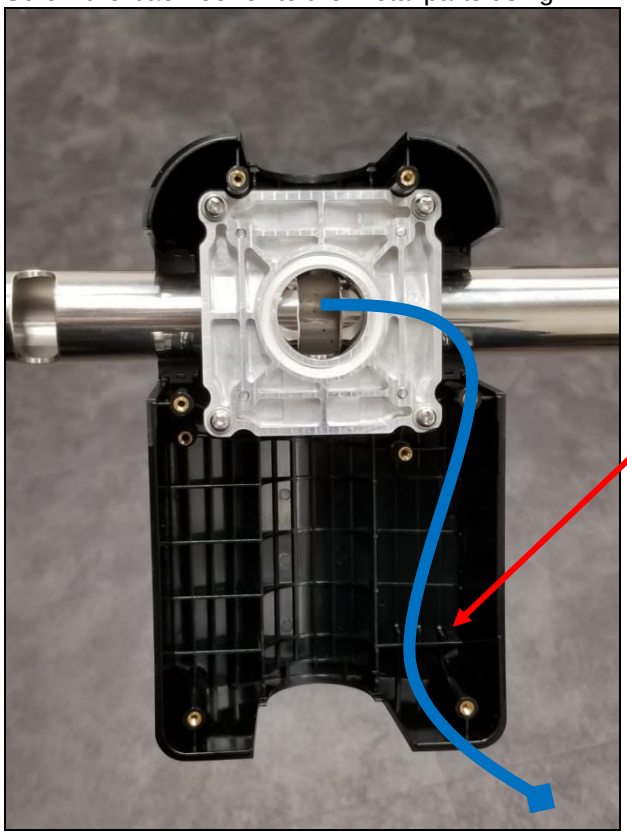


- For **31/32mm pole**:

- For **35mm pole**:

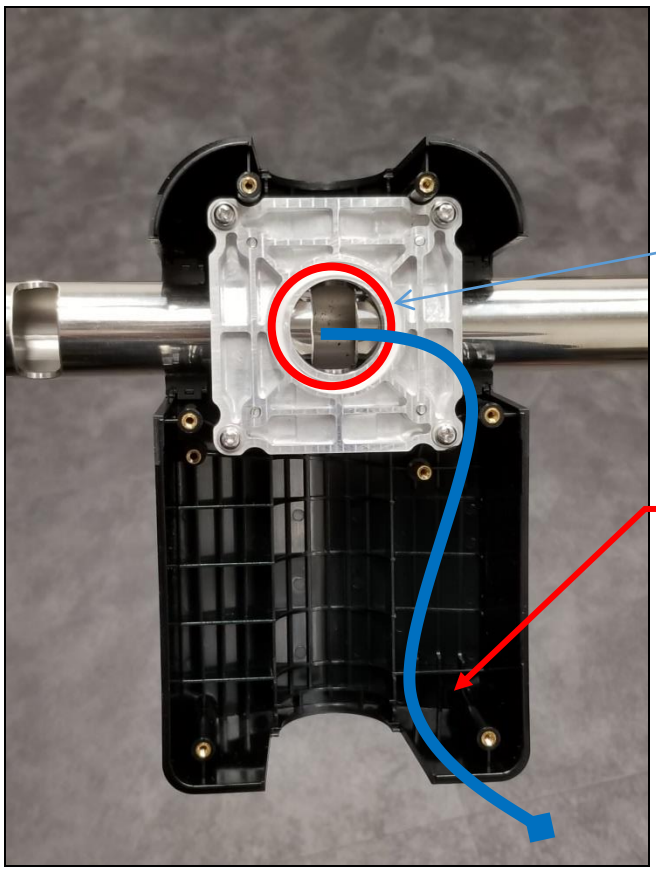


4. Screw the **back cover** to the metal parts using PM4*25 screws (4 pieces).



***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

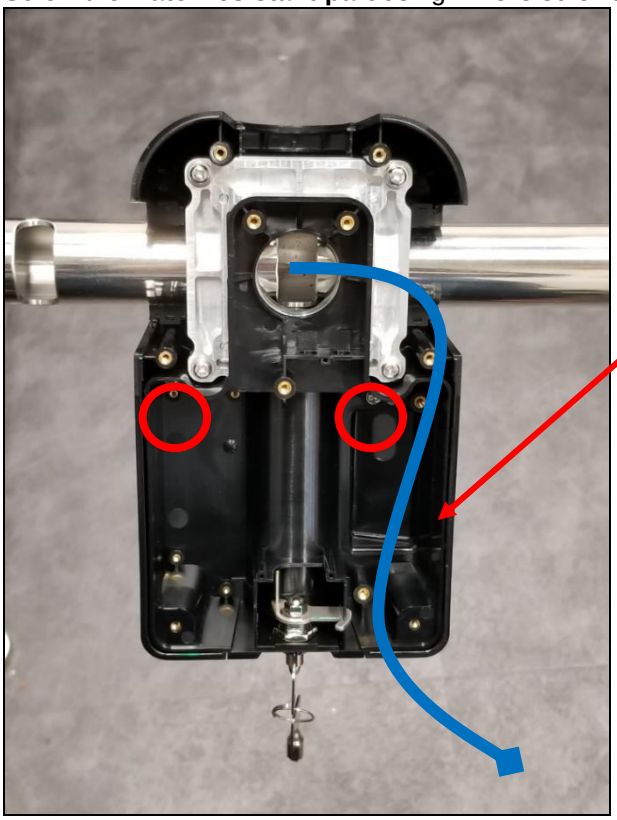
5. Place the **O-ring** on top of the metal part. The exact position is shown in the photo below:



O-ring

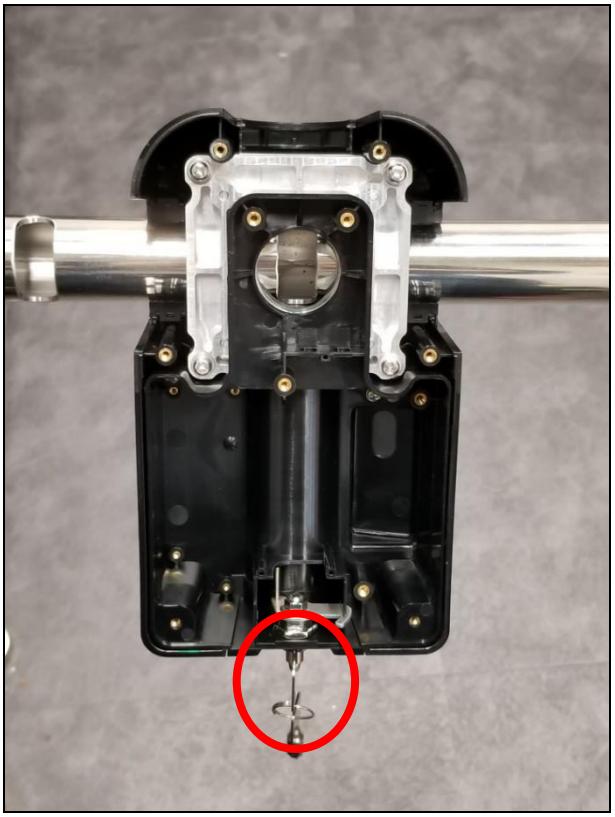
***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

6. Screw the **water resistant part** using PM3*8 screws (2 pieces).

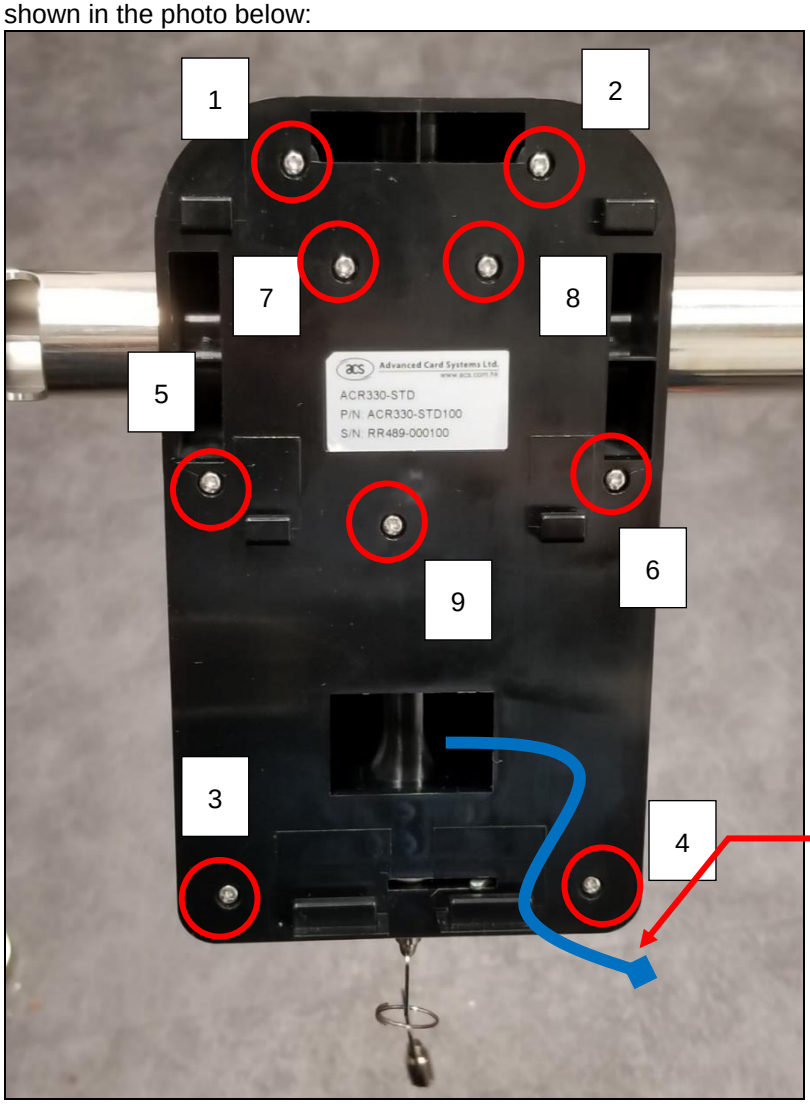


***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

7. Using the **key**, open the lock. The exact location is shown in the photo below:



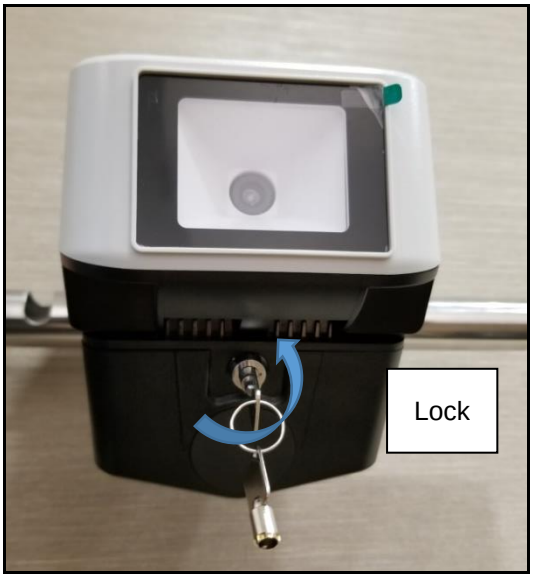
8. Screw the **top cover** using PM3.0*10 screws (9 pieces). The exact position and order is shown in the photo below:



***Note**: This is where the Connection Cable (ie, Power Cord) will go through. Make sure that the cables are out so that they may be easily connected to the ACR330 Validator later on.*

9. Connect the **cables** to the **ACR330**.
10. Mount the **ACR330** on the **back-mount**.

11. Using the **key**, lock the **back-mount**.


Lock

Locked

2.4. Turning the Device ON/OFF

2.4.1. Turning on the Device

To turn the device on, plug the device's **power cable** to a **power source**. The validator will automatically turn on.

2.4.2. Turning off the Device

To turn the device off, press the **power button** once.

To hard power off the device, press and hold the **power button** for around 8 seconds.

Note: *press the* ***power button*** *once to turn on the device after a power off cycle. The power button is* ***at the back*** *of the device, as shown in the image below:*

Figure 8: Power Button

2.5. Accessing the ACR330 through a PC using LAN

You may access the ACR330 through a PC using LAN to enable functions that may be needed for operations (e.g. file transfer). Below are the components needed and the instructions for accessing the ACR330.

Components needed:

- Jumper (to enable the console mode)

***Note**: A jumper is not included in the standard product. It may be purchased locally.*

Figure 9: Jumper Location

- RS232 debug console cable

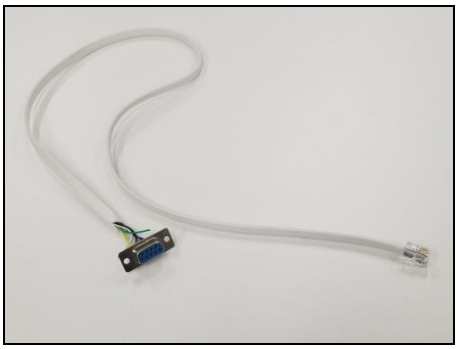


Figure 10 : RSR232 Debug Console Cable

- Bitvise SSH Client (Tunnelier) SFTP Application
- ***Note**: The Bitvise SSH Client (Tunnelier) SFTP Software may be downloaded from https://www.bitvise.com/ssh-client-download.*
- LAN cable

To access the ACR330 using LAN:

1. On the LTE board, plug in a **jumper** to enable console mode.

***Note**: A jumper is not included in the standard product. It may be purchased locally.*

2. Connect to the ACR330 using a **LAN cable**. The exact location of the Ethernet port at the back of the ACR330 is shown in the image below:

Figure 11: Ethernet Port

3. Connect the ACR330 to the PC using the **RS232 debug console cable**. The exact location of

the RJ11 serial port at the back of the ACR330 is shown in the image below.

***Note**: Connect the other end of the cable to the PC's serial port or use a USB-RS232 converter to connect it to the PC's USB port.*

Figure 12: RJ11 Serial Port

4. Turn on the **ACR330**.
5. Log in to the console.
    a. Login name: root
    b. Password: root

    ***Note**: If [root@Linux/root] # is shown, it means login is successful.*
6. Type "**ifconfig eth0**" to get the IP address.
7. Open the **Bitvise SSH Client (Tunnelier) SFTP Application** on the PC.
8. Login with the IP address obtained in step 5.
    a. Login name: machinekit
    b. Password: machinekit
9. The ACR330 may now be accessed on the PC.

    Note**: For more information, please refer to **ACR330 API.chm.

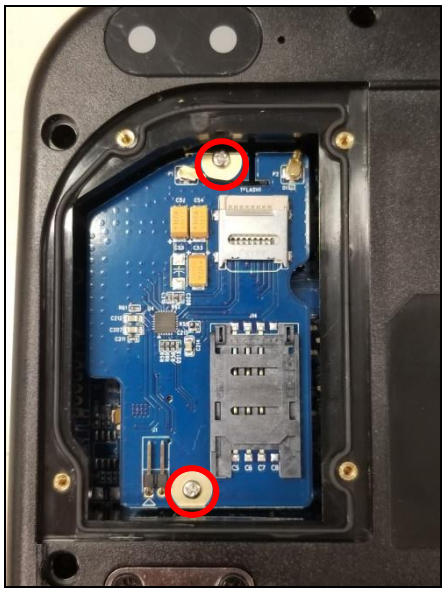
2.6. Replacing the Real Time Clock (RTC) Battery

The Real Time Clock (RTC) backup power uses a CR2032 coin cell. The lifespan of the coin cell is around 5 years. Incorrect time information may be caused by a low battery.

To replace the CR2032 coin cell:

1. Unscrew the two screws highlighted in the image below:

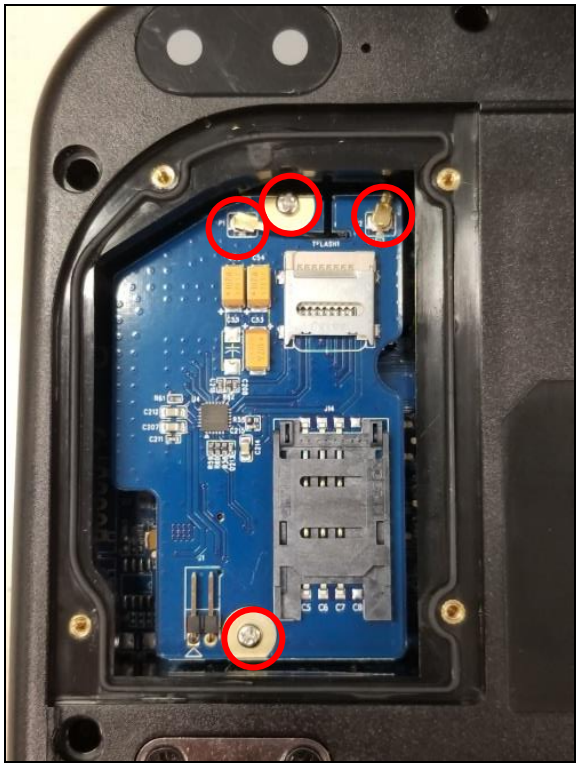
   ***Note**: Be careful in handling the screws as they may drop inside the validator.*



2. Using a screw driver, take out the LTE board.

3. The coin cell may now be accessed. Replace the old coin cell with a new one.

4. Push the LTE board back to its original place. Ensure that the two screws and IPEX connectors are reconnected correctly, as shown in the image below:



3.0. ACR330 Software Overview

The ACR330 EVK includes two programming languages, namely C++ and Java.

3.1. C++ Software Block Diagram

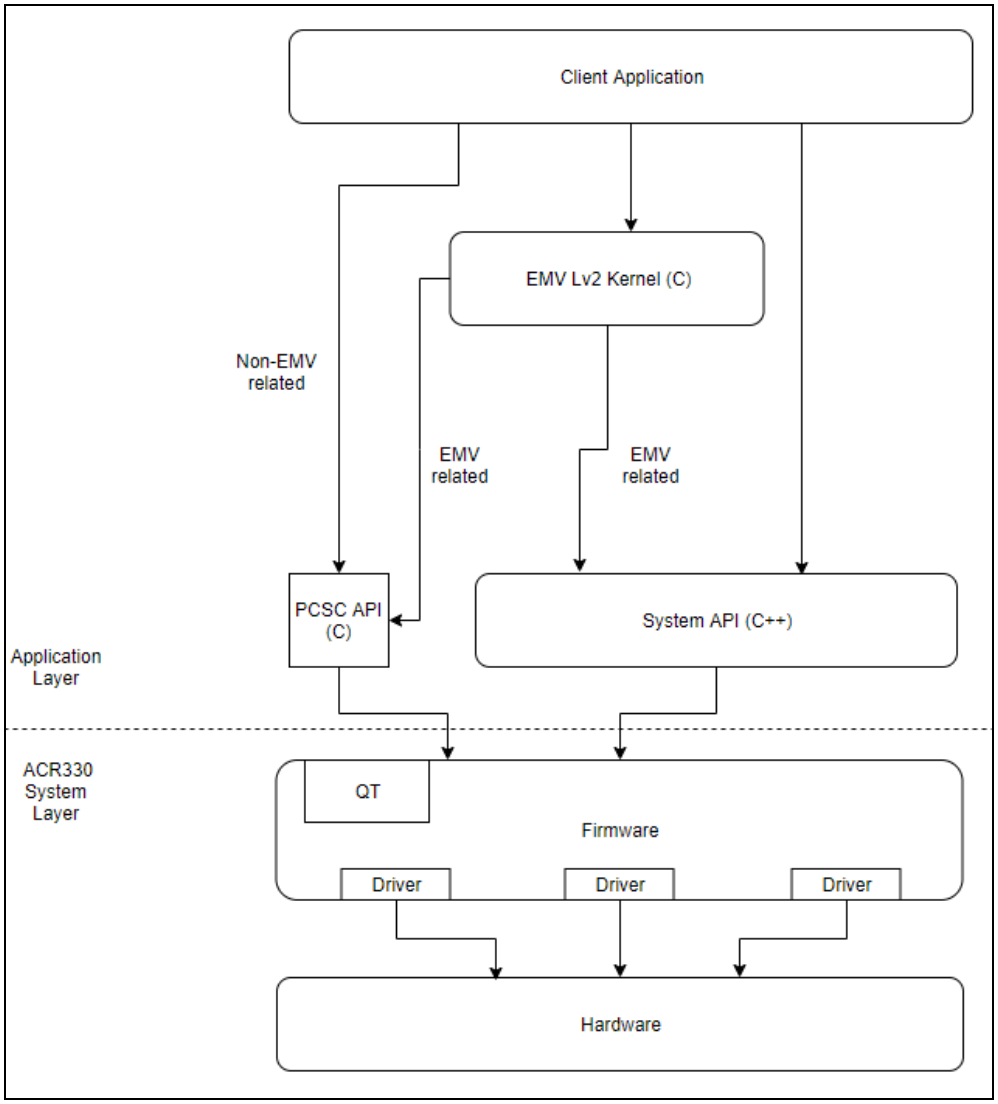


Figure 13: C++ Software Block Diagram

***Note**: Additional Information below:*

- *Tool Chain version: gcc-linaro-5.4.1-2017.01-x86_64_arm-linux-gnueabihf*
- *QT version: 4.8.3*
- *In order to change the application path and run another application, please refer to* **Section 3.4 : Installing an Application**
- *For the **APPLICATION**, the file should be placed inside **/home/machinekit**.*
- *For the **DATA**, the file should be placed inside **/data**.*

3.2. Java Software Block Diagram

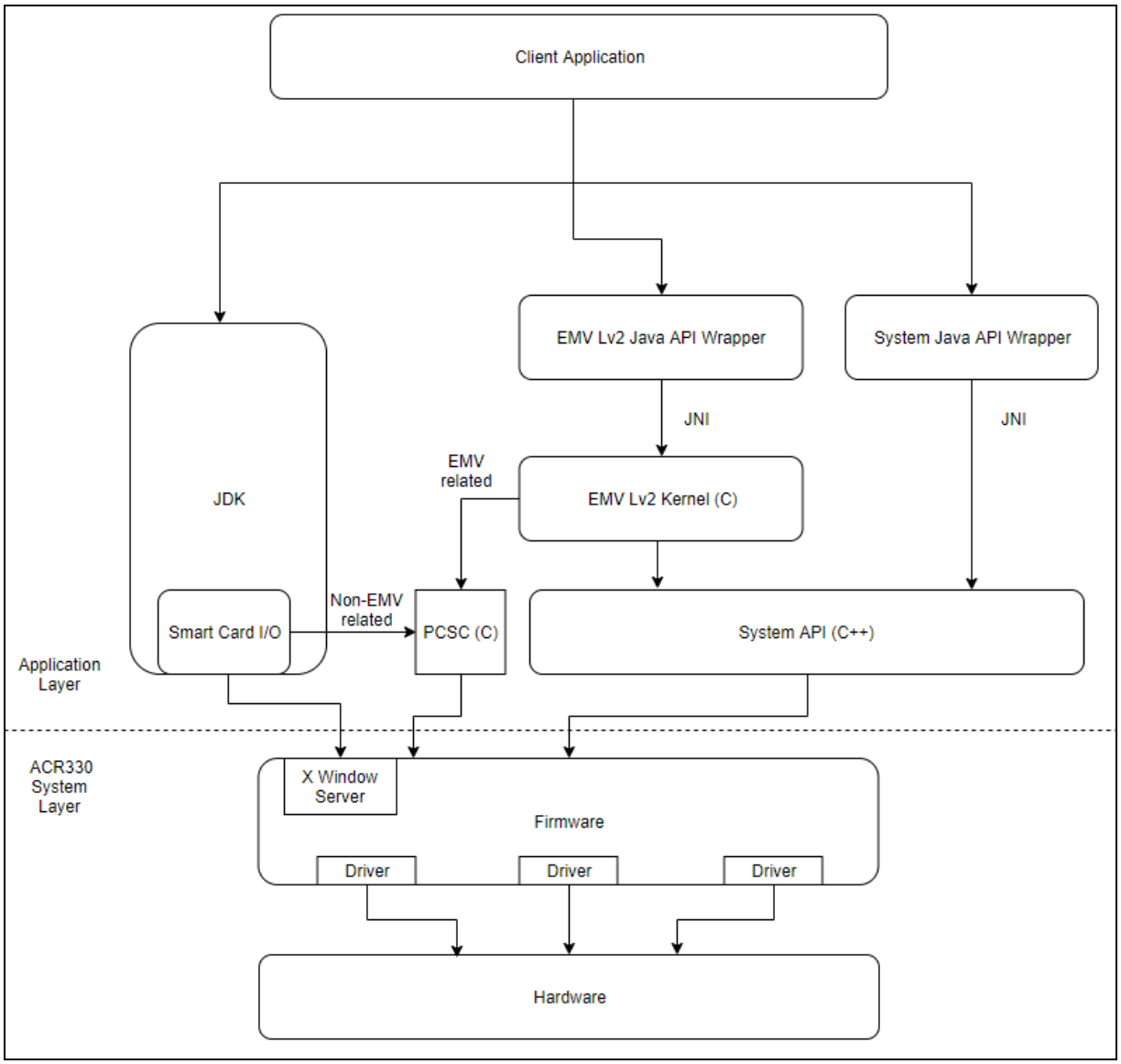


Figure 14: Java Software Block Diagram

***Note**: Additional Information below:*

- *JDK version: 1.8.0_192*
- *In order to change the application path and run another application, please refer to* **Section 3.4 : Installing an Application**
- *For the **APPLICATION**, the file should be placed inside **/home/machinekit**.*
- *For the **DATA**, the file should be placed inside **/data**.*

3.3. ACR330 Demo

The ACR330 demo showcases the functionalities of the validator and also serves as a troubleshooting tool. It has eight Modules: Contactless, Connectivity, Barcode, GPS, Card Slot, LED/Speaker, Settings, and Power Off. The details of each module are shown in the succeeding sub-sections.

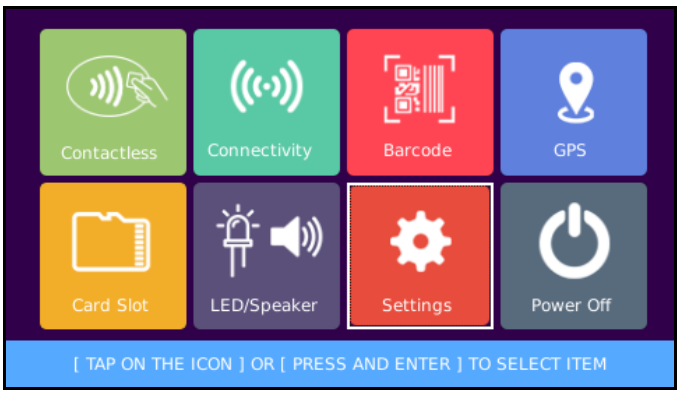


Figure 15: ACR330 Demo Default Screen

3.3.1. Contactless Module

The Contactless module contains four interfaces, namely DESfire TOP-UP, DESfire PAY, DESfire CHECK BALANCE, and EMV Contactless Card.

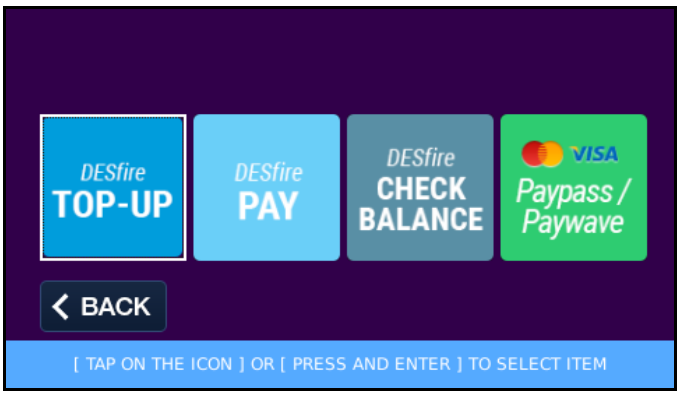


Figure 16: Contactless Module

3.3.1.1. DESfire TOP-UP

This function allows you to top-up an amount in your contactless card.

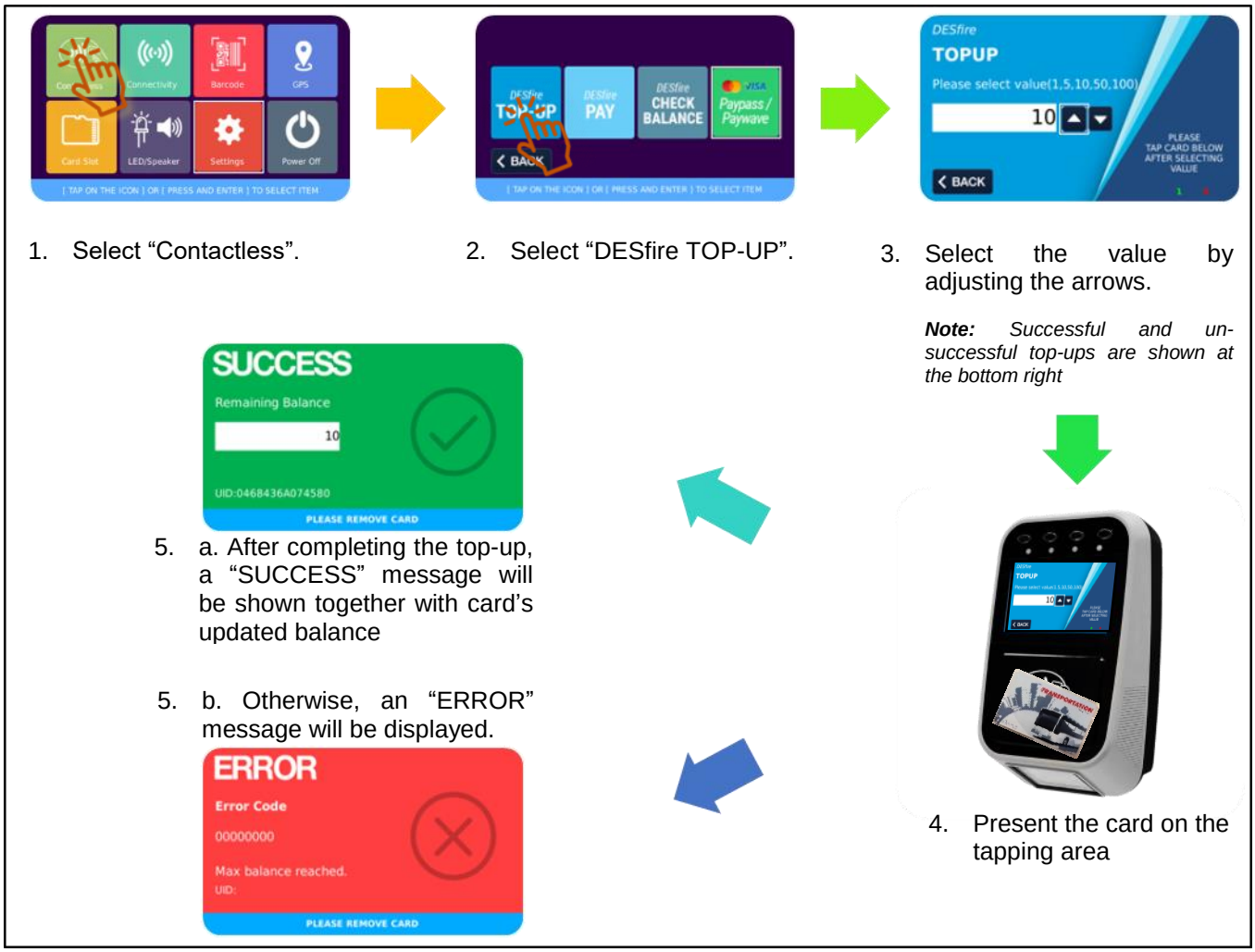


Figure 17: DESfire TOP-UP

3.3.1.2. DESfire PAY

This function allows you to pay the amount through your contactless card.

1. Select “Contactless”.
2. Select “DESfire PAY”.
3. Select the value by adjusting the arrows.

Note: *Successful and un-successful top-ups are shown at the bottom right*

4. Present the card on the tapping area

5. a. Once payment is completed, a “SUCCESS” message will be shown together with card’s updated balance

5. b. Otherwise, an “ERROR” message will be displayed.

Figure 18: DESfire PAY

3.3.1.3. DESfire CHECK BALANCE

This function allows you to check the current balance of your contactless card.

Figure 19: DESfire CHECK BALANCE

3.3.1.4. EMV Contactless Card

This function allows you to check whether the presented card is a valid EMV card implementing either Mastercard® Contactless or Visa payWave® payment scheme.

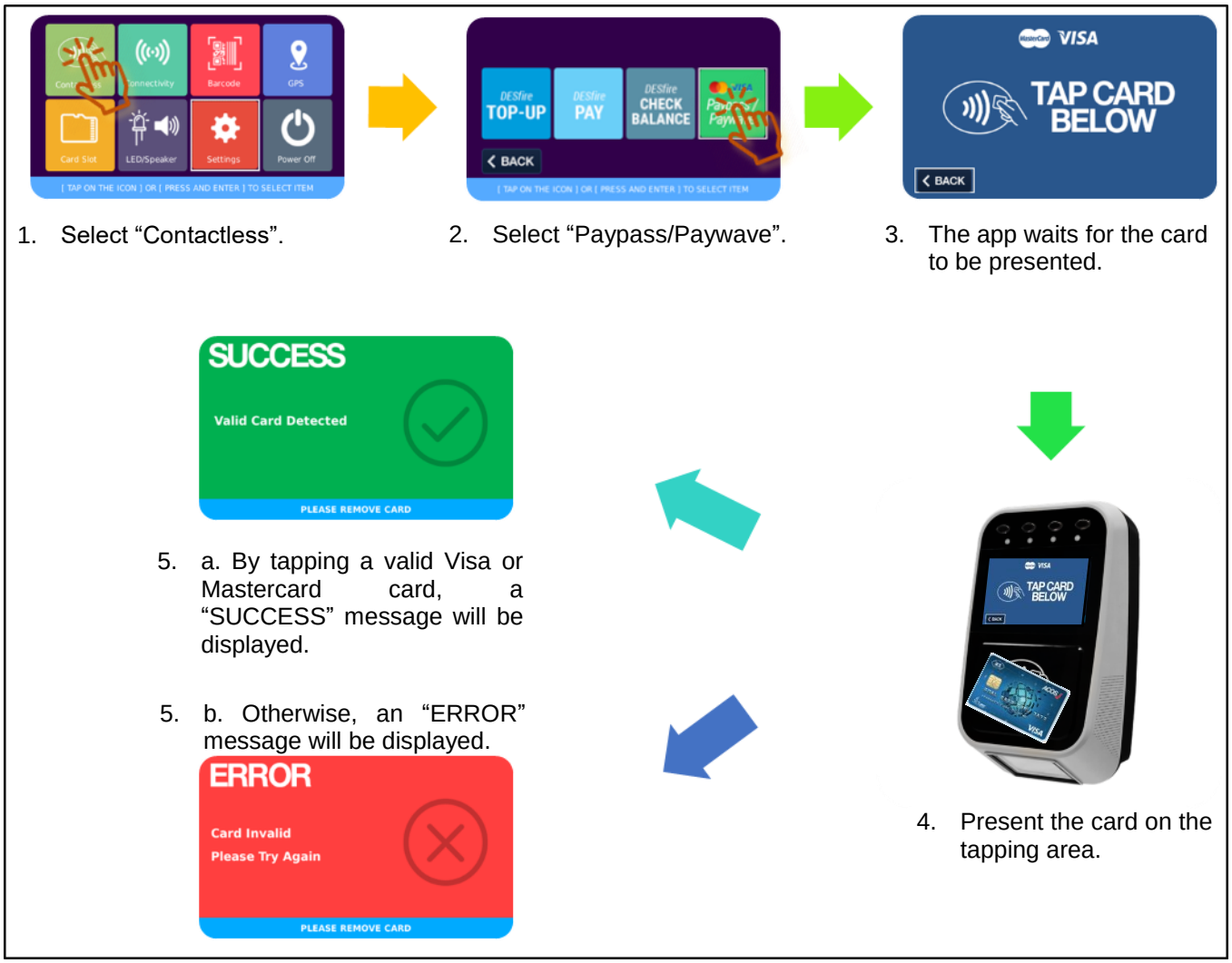


Figure 20: EMV Contactless Card

3.3.2. Connectivity Module

The Connectivity module contains three interfaces, namely Mobile Network, Wifi, and Bluetooth settings.

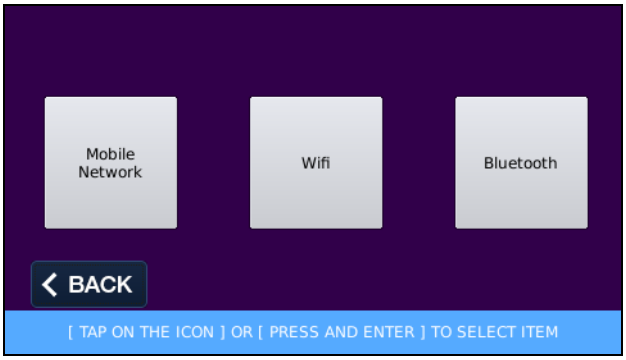


Figure 21: Connectivity Module

3.3.2.1. Mobile Network Settings

The Mobile Network settings contains three options, namely Connect, APN, and NTP date.

3.3.2.1.1. Connection and APN Settings

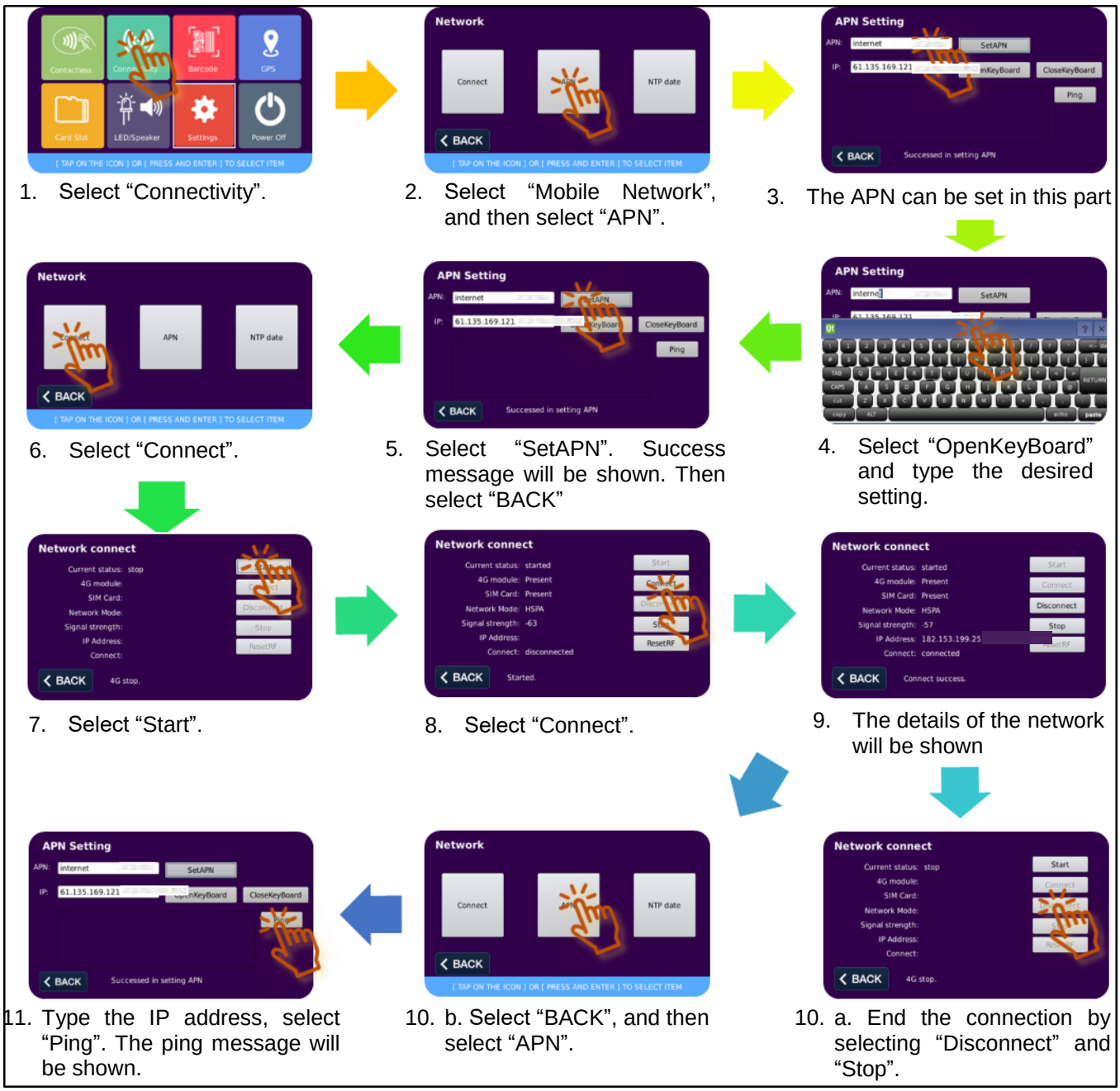


Figure 22: Connection and APN Settings

3.3.2.1.2. NTP Settings

The NTP settings allow you to select different time zones.

1. Select “Connectivity”.
2. Select “Mobile Network”.
3. Select “NTP date”.
4. Select the domain by adjusting the arrow.
5. Select “Sync”, and the time will sync with the server.

Figure 23: NTP Settings

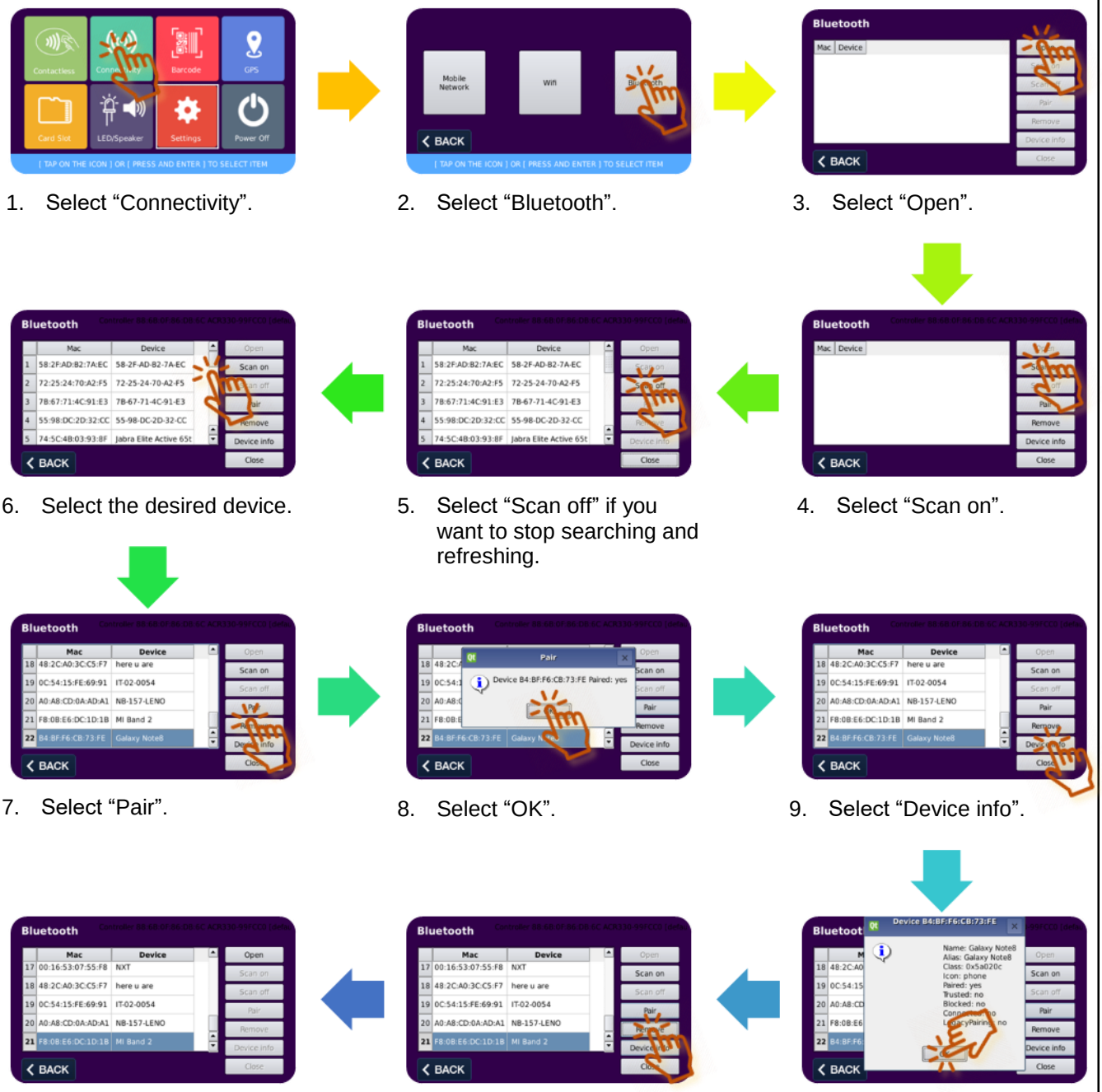
3.3.2.2. Wi-Fi Settings

The Wi-Fi settings page allows you to connect to a Wi-Fi network.

Figure 24: Wi-Fi Settings

3.3.2.3. Bluetooth

The Bluetooth settings page allows you to connect to a Bluetooth device.



1. Select “Connectivity”.
2. Select “Bluetooth”.
3. Select “Open”.
4. Select “Scan on”.
5. Select “Scan off” if you want to stop searching and refreshing.
6. Select the desired device.
7. Select “Pair”.
8. Select “OK”.
9. Select “Device info”.
10. The device information will be shown.
11. Select “Remove”.
12. Bluetooth device will be disconnected.

Figure 25: Bluetooth Settings

3.3.3. Barcode Module

The Barcode module can show the validity of the test cards thru QR code on Page 1 and display the details of any barcode or QR code on Page 2.

3.3.3.1. Barcode / QR code Validity Check

Page 1 shows the validity of the barcode on the test cards.

Note: *test cards are included in the ACR330 EVK.*

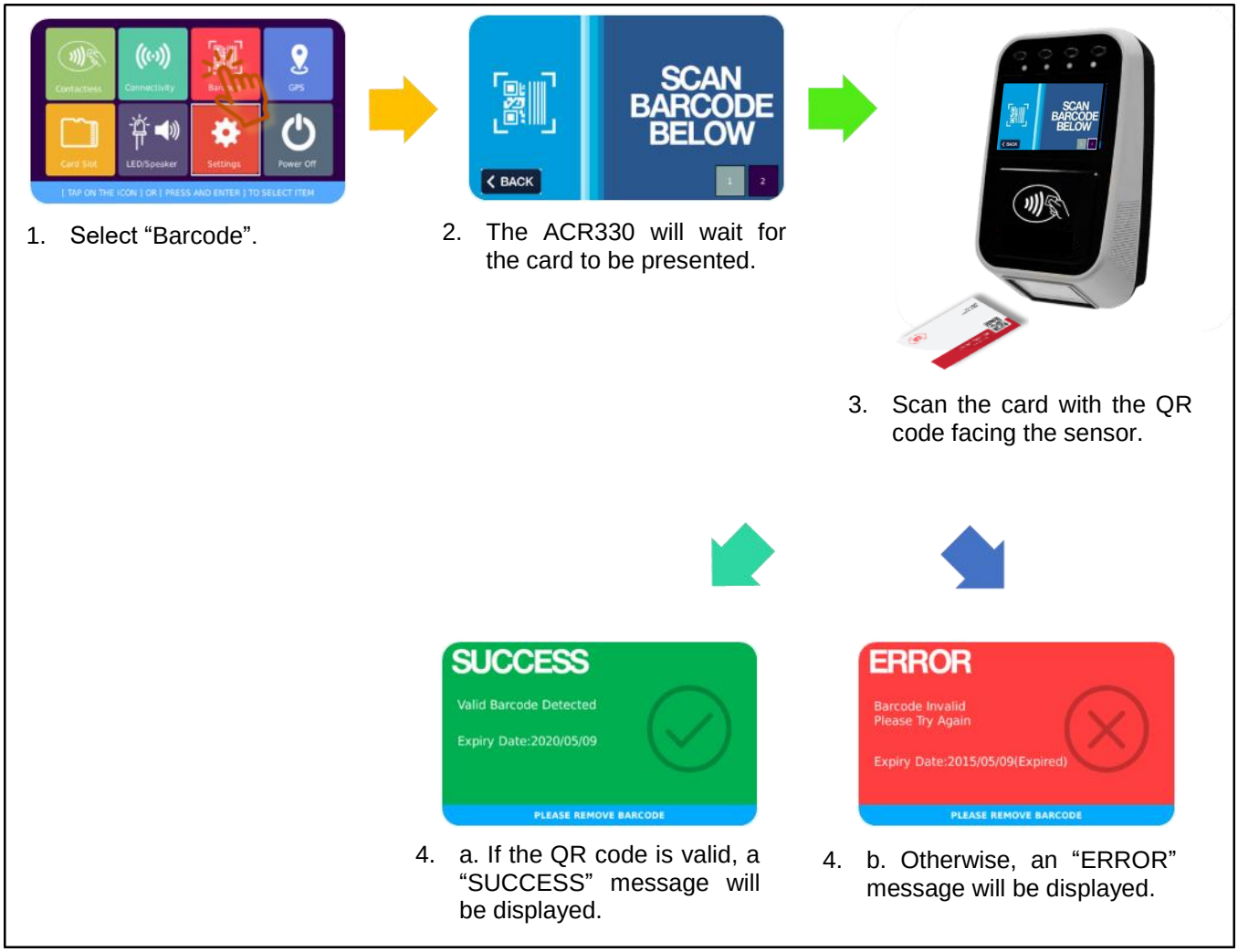
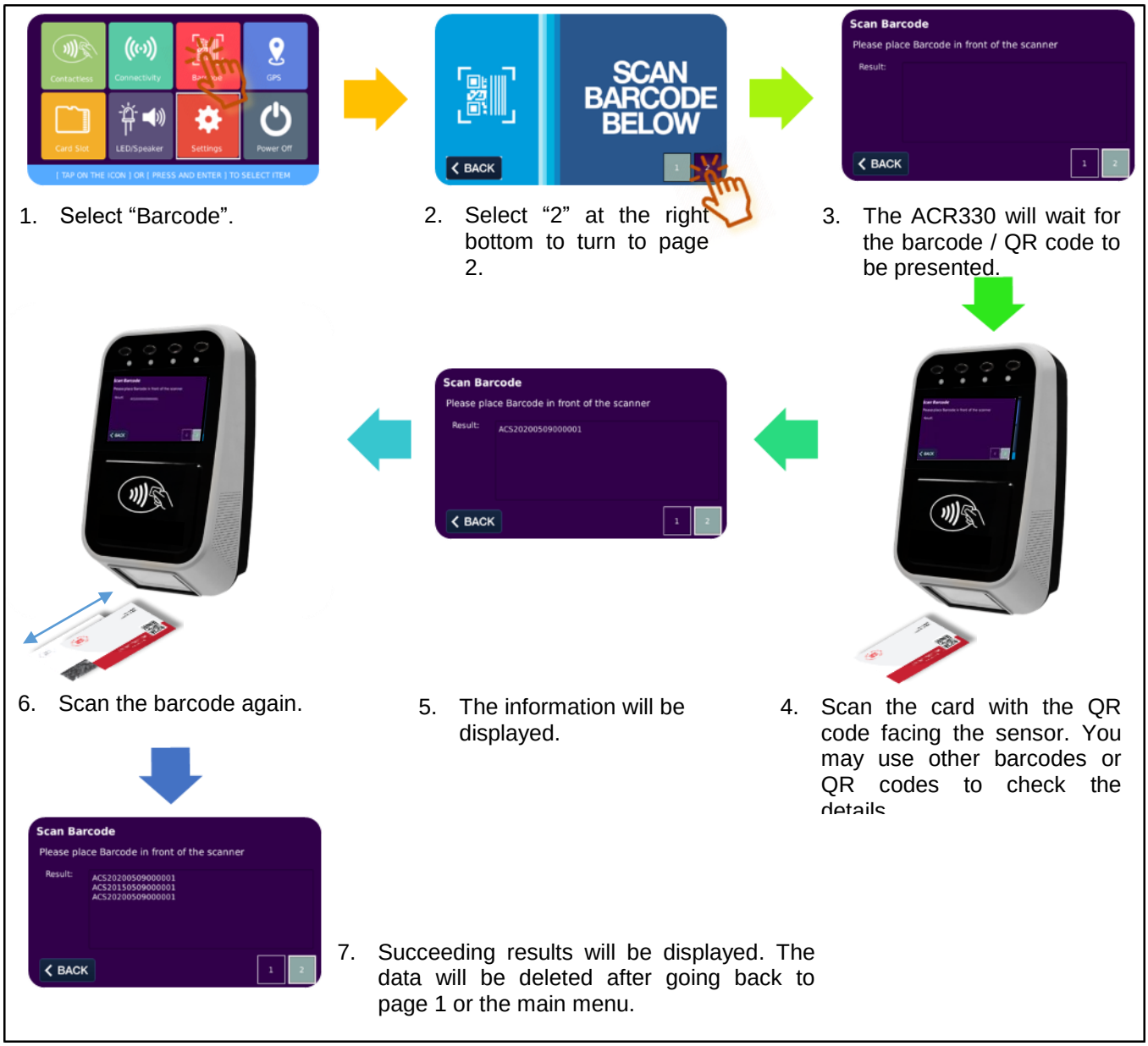


Figure 26: Barcode / QR code Validity Check

Note: *The same QR code will not be accepted within 3 seconds to avoid duplicated transactions.*

3.3.3.2. Barcode / QR code Information

Page 2 shows the details of any barcode or QR code scanned on the reader.

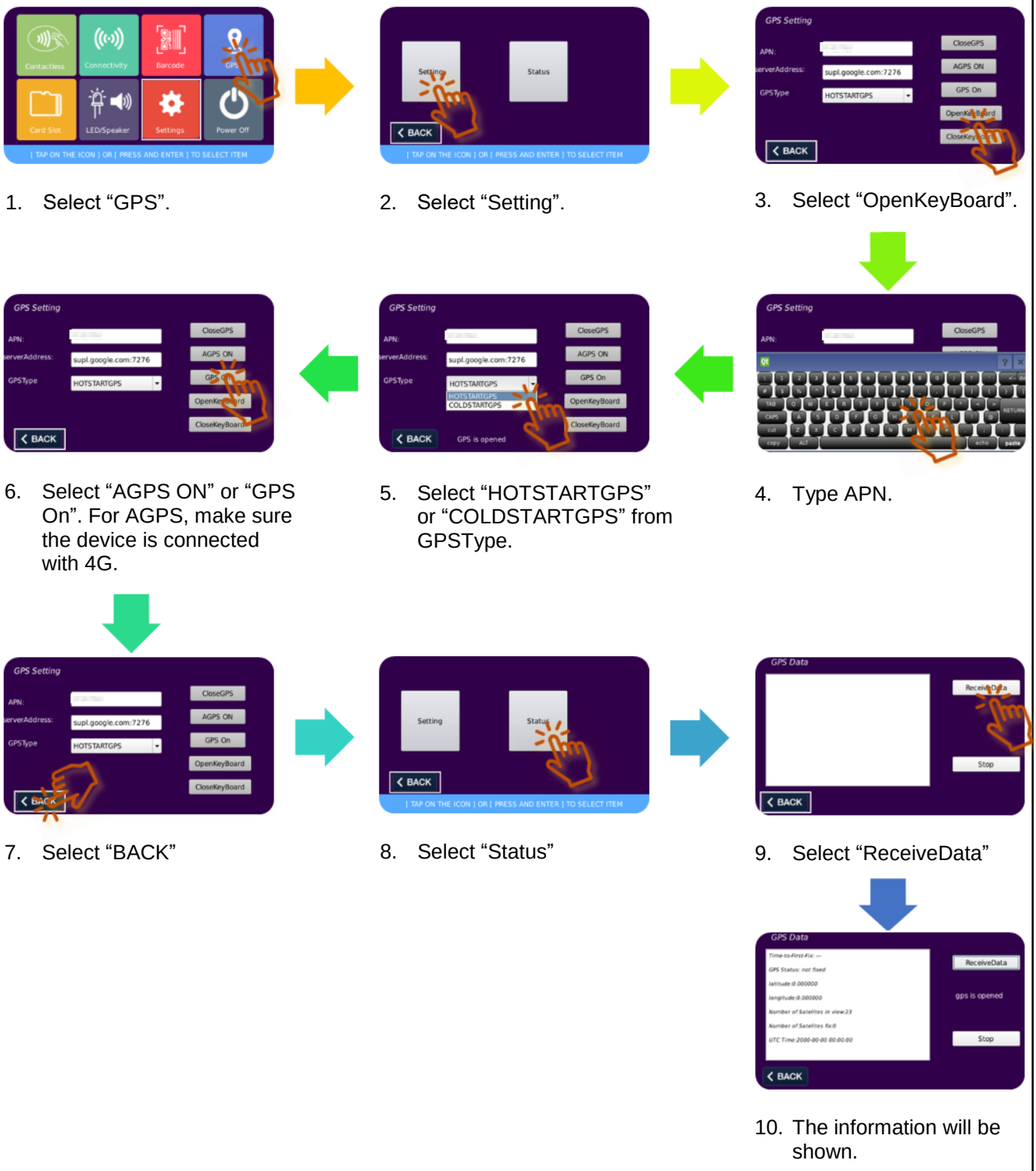


1. Select “Barcode”.
2. Select “2” at the right bottom to turn to page 2.
3. The ACR330 will wait for the barcode / QR code to be presented.
4. Scan the card with the QR code facing the sensor. You may use other barcodes or QR codes to check the details.
5. The information will be displayed.
6. Scan the barcode again.
7. Succeeding results will be displayed. The data will be deleted after going back to page 1 or the main menu.

Figure 27: Barcode / QR code Information

3.3.4. GPS Module

The GPS module allows the configuration of the GPS settings.

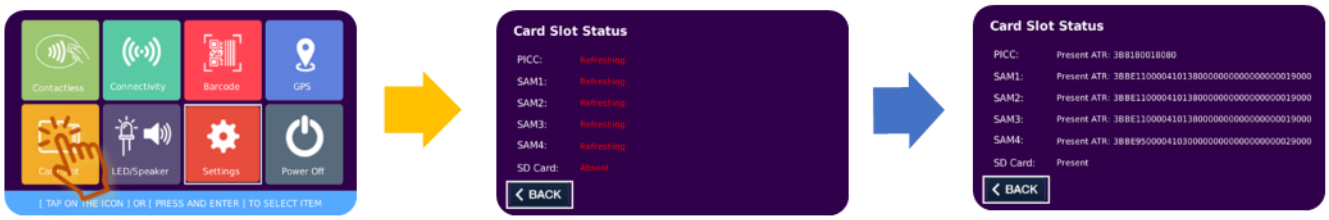


1. Select “GPS”.
2. Select “Setting”.
3. Select “OpenKeyBoard”.
4. Type APN.
5. Select “HOTSTARTGPS” or “COLDSTARTGPS” from GPSType.
6. Select “AGPS ON” or “GPS On”. For AGPS, make sure the device is connected with 4G.
7. Select “BACK”
8. Select “Status”
9. Select “ReceiveData”
10. The information will be shown.

Figure 28: GPS Settings

3.3.5. Card Slot Module

The Card Slot module shows the status of the following slots/interfaces: PICC Interface, Four SAM Slots (SAM1, SAM2, SAM3, SAM4), and SD Card slot. The SD card slot shows if a card is inserted, while the other slots will also show the ATR of the card presented or inserted.



1. Select “Card Slot”.
2. The cards’ details will be displayed. “Refreshing” status means that the reader is retrieving card information.
3. Card details will be shown.

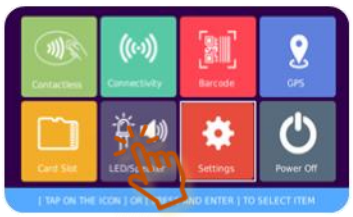
Figure 29: Card Slot Information

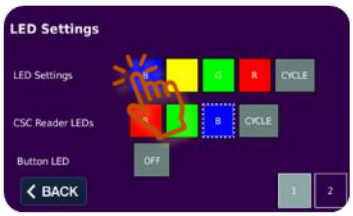
3.3.6. LED/Speaker Settings Module

The LED/Speaker module allows you to configure the LED Settings on Page 1 and Speaker Settings on Page 2.

3.3.6.1. LED Settings

Page 1 shows the configurable LED Settings.

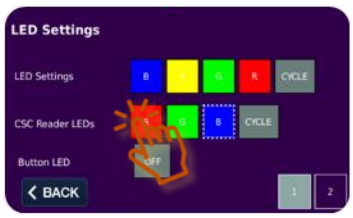


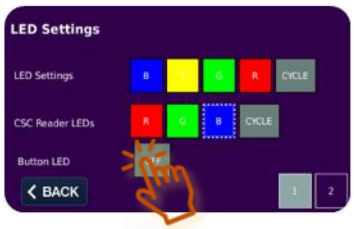


1. Select “LED/Speaker”.

2. User controllable settings for the Front LEDs will be shown.

   Note: *When Cycle is selected, the LED will light up from left to right.*





3. The tapping region’s backlight changes when the CSC Reader LED setting is controlled.

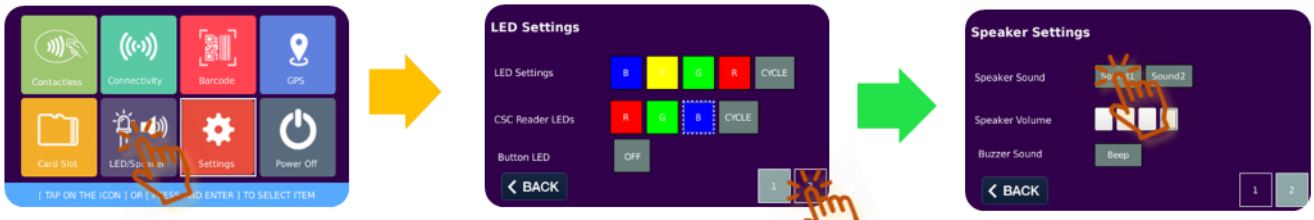
   Note: *When Cycle is selected, the backlight will change between the three colors simultaneously.*

4. The Button’s LED backlight will turn ON and OFF upon selection of the Button LED settings.

Figure 30: LED Settings

3.3.6.2. Speaker Settings

Page 2 shows the configurable Speaker Settings.



1. Select “LED/Speaker”.
2. Select “2” on the bottom right to see the Speaker Settings.
3. The speaker’s sound and volume, as well as the buzzer’s sound can be selected or adjusted.

4. The reader will produce a sound depending on the selected setting.

Figure 31: Speaker Settings

3.3.7. Settings Module

The Settings module contains the Device Information on Page 1, Additional Settings on Page 2, and Auto Power Off settings on Page 3.

3.3.7.1. Device Information

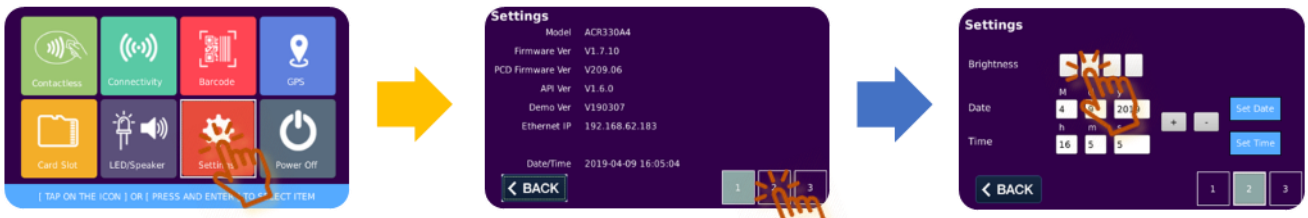
Page 1 shows the device's hardware and software information.

1. Select "Settings".
2. Information including Model, firmware version, and Date/Time will be shown

Figure 32: Device Information

3.3.7.2. Additional Settings

Page 2 contains the settings for Screen's brightness, Date and Time settings.

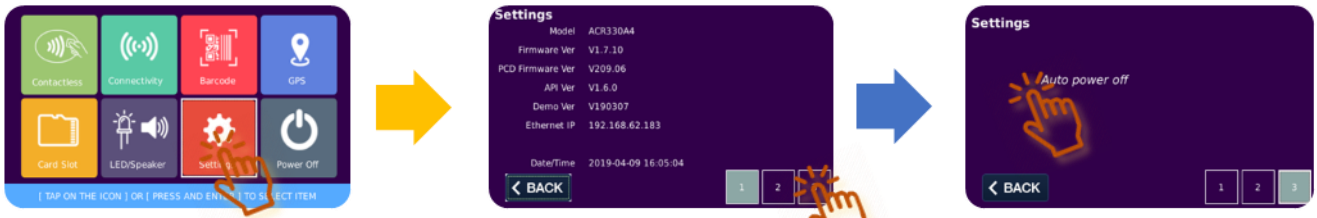


1. Select "Settings".
2. Select "2" on the bottom right to turn to page 2.
3. Screen's brightness, Date and Time can be set on this page.

Figure 33: Additional Settings

3.3.7.3. Auto Power Settings

Page 3 shows the option to enable Auto Power setting.



1. Select "Settings".
2. Select "3" on the bottom right to turn to page 3.
3. Select "Auto power off".

Figure 34: Auto Power Settings

3.3.8. Power OFF Module

The Power Off module turns off the device.

1. Select “Power Off”.
2. The device will turn off automatically.

Figure 35: Power OFF Module

3.4. Installing an Application

This section shows how to test an application, change the application directory, and load a different application apart from the default demo. Please ensure that the application created for the ACR330 is compiled and built using the required tools. Otherwise, the device will reboot repeatedly.

If the application keeps on rebooting, place an empty **startup.x** file to the USB thumb drive to stop the application and have root access on the device to remove the initially copied files.

3.4.1. Method 1: Loading the Application via USB Thumb Drive

This method allows the user to run the application via USB thumb drive in order to test the application first and then manually copying the files to the device once a successful test is finished.

a. Create a "startup.x" file in a PC.
__Note:__ Create a text file through a text editor and then rename the file extension to ".x"

The startup.x should contain the following:

For C++ - based Application

```
#!/bin/bash
source /etc/profile.d/qtenv.sh
WORK_DIR= <user_app_path>
cd ${WORK_DIR}
./<user_app> -qws
```

For Java - based Application

```
#!/bin/bash
source /etc/profile.d/jdk.sh
source /etc/profile.d/java-api.sh
export DISPLAY=:0.0
WORK_DIR= <user_app_path>
cd ${WORK_DIR}
/usr/bin/xinit /usr/bin/java -jar <user_app>.jar -- -nocursor
```

wherein:
<user_app_path> should be /media/udisk
Note:** in some cases, the reader tags the USB device as **udiskp1
<user_app> should be application file name (ex. demo330)

b. Put "startup.x" in a USB thumb drive together with the user application.

c. Plug the USB thumb drive into the USB port of the ACR330.

d. Connect the small blue console jumper to the console jumper port at the back of the device.

e. Power ON the device. It should launch the user application instead of the built-in demo.

f. After successfully testing the application, log in to the ACR330 by using the serial console cable via the PuTTY Configuration tool:
   i. Set it as a serial connection with Baud Rate at 115,200 bps
   ii. Click Open

g. Access the device using the following credentials:
   i. Username: ***machinekit***
   ii. Password: ***machinekit***

h. Access root account typing the following credentials:
   i. ***su***
   ii. ***root*** (this is the password)

i. Copy "startup.x" and the application file from the USB thumb drive, type the following:
   i. ***cd /home/machinekit/bin***
   ii. ***cp –rf /media/udisk/startup.x /home/machinekit/bin***
   iii. ***cp –rf /media/udisk/acr330.jar /home/machinekit/bin***
   iv. ***vi startup.x*** (the contents of the startup.x will appear)
   v. ***i*** (in order to edit the information)
   vi. Then change the WORK_DIR to **/home/machinekit/bin**
   vii. Press ***Esc*** and type ***:w!*** to save
   viii. Type ***:q!*** after editing

j. Type ***chmod +x startup.x***

k. Turn OFF the device by pressing the button at the back. Remove the USB thumb drive and turn ON the device to launch the new application by default

3.4.2. Method 2: Loading the Application to the Device

This method is useful for mass deployment. It allows user to plug in the USB thumb drive and then reboot the device.

a. Create a "startup.x" file in a PC
   Note: *Create a text file through a text editor and then rename the file extension to ".x"*

   The startup.x should contain the following:

   For C++ - based Application

```
#!/bin/bash
source /etc/profile.d/qtenv.sh
WORK_DIR= <user_app_path>
cd ${WORK_DIR}
./<user_app> -qws
```

   For Java - based Application

```
#!/bin/bash
source /etc/profile.d/jdk.sh
source /etc/profile.d/java-api.sh
export DISPLAY=:0.0
WORK_DIR= <user_app_path>
cd ${WORK_DIR}
/usr/bin/xinit /usr/bin/java -jar <user_app>.jar -- -nocursor
```

   wherein:
   <user_app_path> should be /home/machinekit/bin
   Note: *in some cases, the device tags the USB device as* ***udiskp1***
   <user_app> should be application file name (ex. demo330)

b. Put the startup.x and the application together in a folder (ex. acr330test)

c. Create another "startup.x" file in a PC

The startup.x should contain the following:

```
#!/bin/bash
displayMessage()
{
   echo $1
   echo $1 > /dev/tty0
}
echo 1 > /sys/class/vtconsole/vtcon1/bind
displayMessage "Installing the Application"
cd /home/machinekit/bin
cp -rf /media/udisk/<app_folder>/* /home/machinekit/bin
displayMessage "Installation Complete"
echo 0 > /sys/class/vtconsole/vtcon1/bind
sync
/etc/pm_daemon.sh
```

wherein:
<app_folder> should be the folder name of the previously created folder

d. Put the second "startup.x" and the folder in a USB thumb drive

e. Plug the USB thumb drive into the USB port of the ACR330

f. The new application will run after successful installation

g. Turn OFF the device and remove the USB thumb drive. Power ON to launch the new application by default

3.5. Removing the Installed Application

To remove the startup.x and the application, please type the following via PuTTY Tool:

a. Access the device using the following credentials:
   i. Username: ***machinekit***
   ii. Password: ***machinekit***

b. Access root account typing the following credentials:
   i. ***su***
   ii. ***root*** (this is the password)

c. ***cd /home/machinekit/bin***

d. ***rm startup.x***

e. ***rm <user_app>***
   *(<user_app>.jar for java application)

f. ***reboot***

3.6. Changing the Application Directory (For FW1.7.10 and below)

Changing the application directory manually is required to properly load the application for FW1.7.10 and below.

Note: *For FW 1.7.11 and above, it will automatically look for* ***startup.x*** *first. If it doesn't find that file, it will load the ACR330 default demo.*

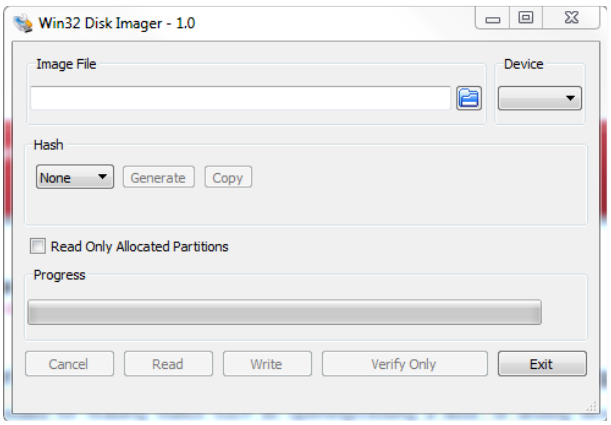
1. After completing the initial steps in the previous section, please ensure that the ACR330 is logged in via the "root" account.
2. Go to /etc by typing "cd /etc" and then typing "ls".
3. When "pm_daemon.conf" appears, type "vi pm_daemon.conf".
4. Change the path under the "/home/machinekit/bin/startup.x" to your application path and delete "-qws" in app_arg.
5. Type ":w!" to save and ":q!" to quit.
6. The new application will be launched after rebooting the ACR330.

3.7. Re-flashing the Device

The ACR330 requires re-flashing when the firmware upgrade is interrupted or the loaded firmware fails to run some components. *To get the image file, please contact an ACS representative.*

a. Plug in an SD card (4GB or above) to a PC.
b. Open Win32 Disk Imager application.

   Note: *The Win32 Disk Imager application may be downloaded online for free.*



c. Select the image file and locate the SD Card.
d. Click Write and wait for the progress bar to be completed.
e. Plug in the SD card into the SIM slot of the ACR330. The exact location of the SIM slot is shown in the image below.

f. Turn on the ACR330.
   Note: *If the device does not turn on, press the power button on the top right corner of the bottom casing.*
g. The ACR330 will be upgraded automatically. The LED will keep blinking until it turns off. This indicates that re-flashing is completed.
h. Remove the SD Card and reboot the device for the changes to take effect.