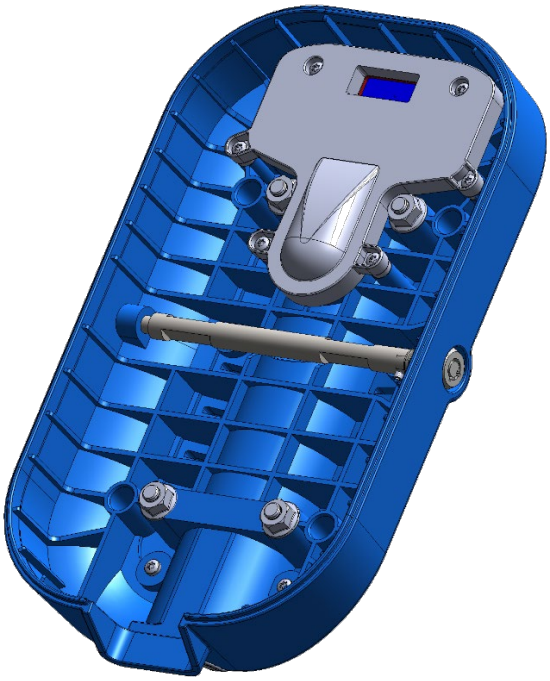
LECIP

USER MANUAL FOR LV-700



1. Technical Overview of LV-700

- Software Platform
    - Linux Kernel 4.1.38
    - QT 5.7.1 Application Frame work
    - Python 3.5.2

- NXP Application processor
    - ARM Cortex-9 single core 32-bit
    - 1 GHz
    - Automotive grade

- System
    - 1024 MB DDR3L SDRAM
    - 2x 36Mx16 x 8 banks
    - 4GB e-MMC flash

- External Interfaces
    - Ethernet 100Base-T2 with embedded EUI-48 MAC Address
    - 2 x RS 232
    - RS-485
    - 2 x Isolated Bipolar Outputs (max. 200mA)
    - Unique ID of the Unit Holder

- User Interface
    - 5.7" LCD 24 LVDS VGA (680x480) with capacitive touch
    - Mon audio CODEC Speaker Driver
    - 4 x Triple color Indicator LEDs

- 4G Communication Interface
    - Telit LE910 Cat. 1
    - Octa-Band Cellular Embedded Antenna (700/750/850/900/1800/1900/2100/2700 MHz)

- Bluetooth
    - V4.2 BR/EDR-BLE
    - PCM for Audio Data

- WLAN
    - 2.4GHz Radio IEEE 802.11b, 802.11g, 802.11n (single stream)
    - Simultaneous BT/WLAN reception with a single antenna

- Development/Debug features
    - UART (RS-232) for Linux console
    - JTAG for STM32 (ARC 1500)

- Service Area (Service Hatch)
    - USB OTG
    - 2-bit Boot configuration switch
    - SIM card Slot
    - 4 x SAM Interfaces
    - RS-232 for Linux console
    - Tamper Switch
    - Manual Rest button
    - Visually and by MCU readable 10-bit H/W Revision/Variant/BOM resistive network

- Supported Smart Cards
    - Mifare Classic, Mifare Plus, Mifare Ultralight, Mifare Ultrlight C, Mifare Desfire, Mifare SmartMX, GTML, GTML2, ISO 144434A tags, ISO 14443B tags, Felica, Calypso

- Supported SAM
    - Mifare SAM AV1/AV2 and other ISO/IEC 7816 compliant SAMs such as S9TSAM, Calypso SAM, Felica SAM

- SDK Support
    - Mifare Classic, Mifare Plus, Mifare Ultrlight, Mifare Ultralight C, Mifare Desfire EV1/EV2

- Temperature and Humidity
    - Operating temp. -20 to 60 deg.
    - Storage temp. -30 to 70 deg.
    - Humidity 6 to 96% (non condensing)

- Power Supply 9Vdc to 36Vdc
- Power Consumption Standard 11W, max 13W
- Dimension 245mm (L) x 140mm (W) x 88mm (H)
- Weight 1260g
- Digital ambient light sensor
- Digital accelerometer (3-axis, 12-/8-bit)
- Digital temperature sensor (typical accuracy ± 1°C from -40°C to +125°C)
- NFC High-power solution for contactless communication at 13.56 MHz

2. External/Electrical Interface and Access Card

Here is the detailed description of Pinout, connectors and function or available signals on Access card.

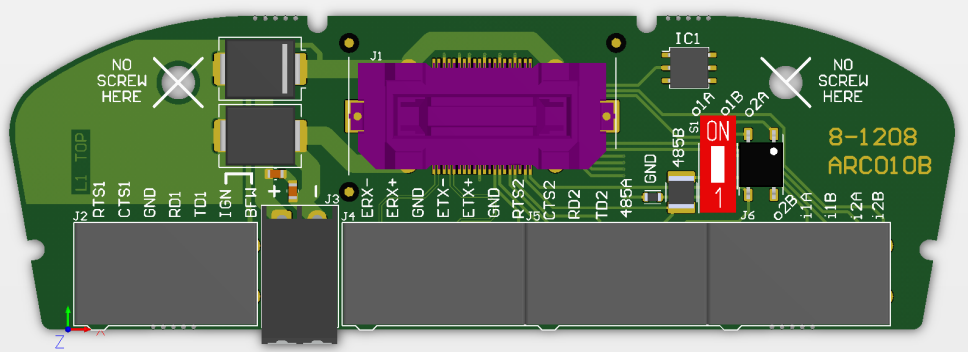


Fig 1. Access Card

L2R Pos.	Conn.	Pin nr.	Interface	Function	Wire		Wire-end ferrule	Digi-key
					(mm²)	AWG		
1	J2	1	RS232-1	RTS	0.25	**24**	966066-3	A136908-ND
2		2		CTS	0.25	24		
3		3		GND	0.25	24		
4		4		RXD	0.25	24		
5		5		TXD	0.25	24		
6		6	IGN	IGN	0.5	**20**	966067-1	A114629-ND
7		7		BATT FWD	0.5	20		
8	J3	1	POWER SUPPLY	BATT +	1.5	**16**	902-569-0000	
9		2		BATT -	1.5	16		
10	J4	1	ETHERNET	ETH RX- [1]	0.25	24		
11		2		ETH RX+	0.25	24		
12		3		GND	0.25	24		
13		4		ETH TX- [2]	0.25	24		
14		5		ETH TX+	0.25	24		
15		6	RS232-2	GND	0.25	24		
16		7		RTS	0.25	24		
17	J5	1		CTS	0.25	24		
18		2		RXD	0.25	24		
19		3		TXD	0.25	24		
20		4	RS485	485-B	0.25	24		
21		5		GND	0.25	24		
22		6		485-A	0.25	24		
23		7	GPO1	OUT-A	0.5	20		
24	J6	1		OUT-B	0.5	20		
25		2	GPO2	OUT-A	0.5	20		
26		3		OUT-B	0.5	20		
27		4	GPI1	IN-A	0.5	20		
28		5		IN-B	0.5	20		
29		6	GPI2	IN-A	0.5	20		
30		7		IN-B	0.5	20		

[1] RX lines: Green, Green/White, with positions 6 and 3 in the RJ45 connector respectively

[2] TX lines: Orange, Orange/White, with positions 2 and 1 in the RJ45 connector respectively

Highly recommended crimp tool is **KNIPEX 975314** or any other with a hexagonal crimp shape.

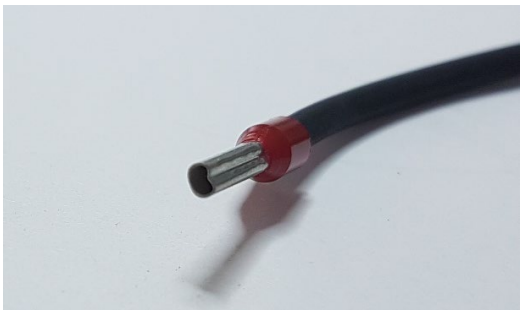


Figure 2: Flat shape

Figure 3: Hexagonal shape

Using crimp tool with a non-hexagonal shape (Figure 2) will produce a flat form of wire-end ferrule that cannot be pushed in the hole of spring-cage terminal block. Hexagonal form (Figure 3) however is a good approximation of the circle and pushing in should be easily done.

3. Board to Board Connector

   The passive part (Access Card) of the Arcontia validator is connected to the active part (Main Board) through a pair of B2B connectors. Access card is equipped with receptacle side (J1) while main board with mating header side (J1).

   The connector pair is Hirose FX23 and FX23L series. It is a pair of 40+4 hybrid power/signal contacts with floating ability.

Figure 4: FX23/FX23L XY-Floating Ability

Floating movable amount in both X and Y-direction is ± 0.6mm a side so totally floating movable amount of both the receptacle and the header when they are connected with each other is ±1.2 in both X and Y-direction.

Connectors are intended to be used with high speed transmission signals up to 8Gbps that is applicable in the Arcontia Validator as communication lines such as Ethernet, RS-485 and RS-232 need to go through the connector. Further, the differential impedance between a pair signal pins is 100±Ω which is especially applicable on both Ethernet and RS-485.

As mentioned, the connectors are hybrid meaning that beside signal pins (40) they contain also power pin (+4). The guide posts on the both sides of the connector are equipped with 4 lines of power contacts with 3A/pin capability.

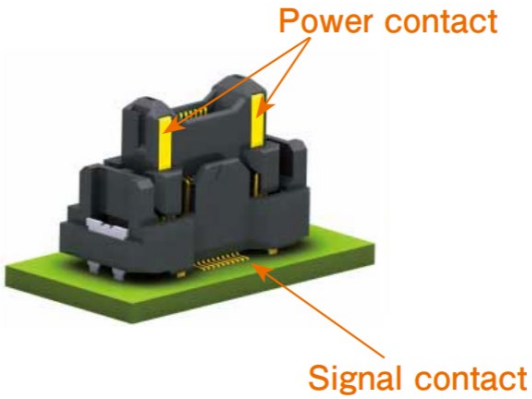


Figure 5: FX23 Hybrid Construction

The applied pair of the receptacle and the header gives a stacked height of 19mm.

Figure 6: The Applied Combination

4. User Interface

An overview of user Interface is shown in the picture below. The user interface is consist of:

- 5.7" LCD 24 LVDS VGA (680x480 Resolution)
- 4 x Indication LEDs
- Smart Card Reader
- QR code Reader
- Speaker

Figure 7: User Interface

5.Mechanical Interface

Figure 8: Dimension Front View (mm)

Figure 9: Dimension Side View (mm)

5. Electrical Interface Overview

5.1 Top Placement of LV-700 Main Board

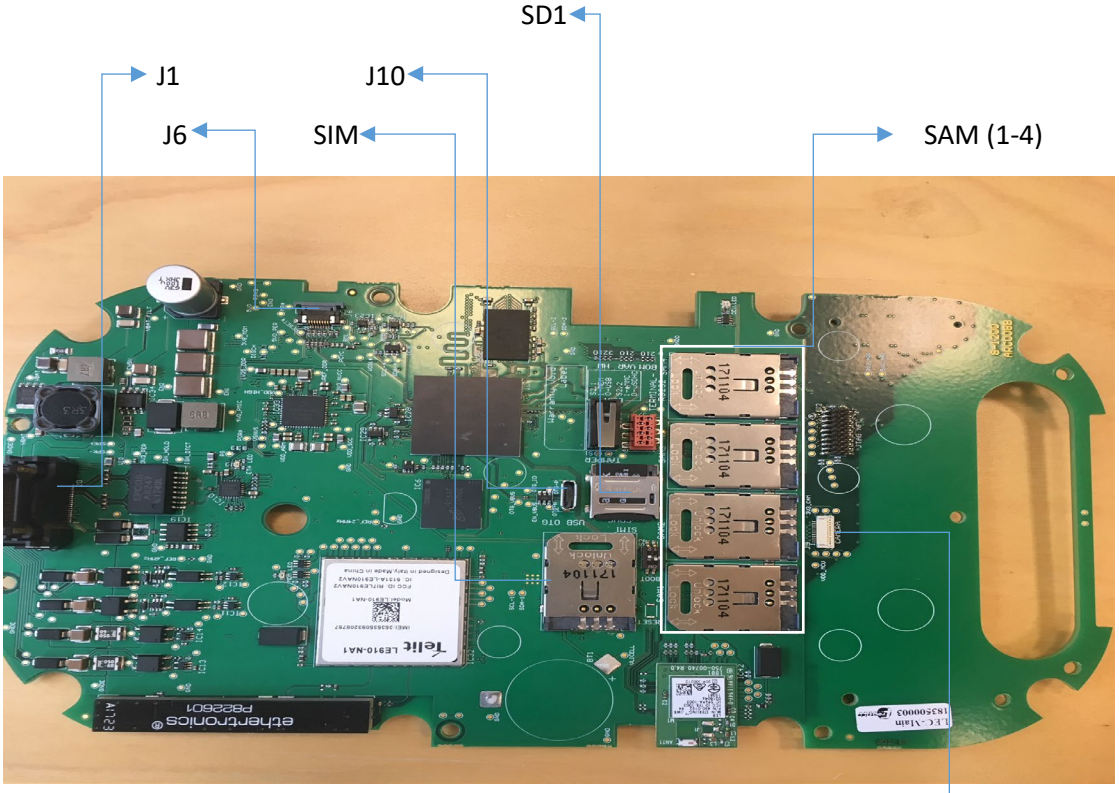


Figure 10: Top Placement of LV-700 Main Board

- SAM1 – Secure Access Module Slot no 1
- SAM2 – Secure Access Module Slot no 2
- SAM3 – Secure Access Module Slot no 3
- SAM4 – Secure Access Module Slot no 4
- SIM1 – SIM Module Slot
- SD1 – Micro SD slot for additional memory
- J1 (Hirose: FX23-40P-0.5SV20) – Connection Board Connector
- J6 (FCI: SFV8R-3STBE1HLF) – Touch Screen Interface
- J10(Wurth: 614105150621) – For MCU Update
- J9 (FCI: 10051922-1210EHLF) – QR Camera Interface

5.1.1 Service Hatch

- SAM1 – SAM 4 – Secure Access Module
  A Secure Access Module (or Secure Application Module) is based on smartcard ICs and is used to enhance the security and cryptography performance in devices, commonly in devices needing to perform secure transactios, such as paying terminals. It can be used for computation and secure authentication against smart cards or contactless EMV cards. Arcontia supports a variety of SAM cards and have knowledge and tooling available for creation of SAM cards and generating keys in the SAM cards.
  Specific types of SAM e.g MIFARE Desfire AV2 is also supproted through Arcontia software library ArcB, further described in our SDK which can be made available upon request.

- SIM1 – SIM Card Slot
  A Subsriber Identity Module or Subscriber Identificaton Module (SIM) is an integrated circuit that securely stores the international mobile subscriber identity (IMSI) and the related key used to identify and authenticate subscribers on mobile telephony devices (such as mobile phones and computers).

5.2 Bottom Placement of LV-700 Main Board

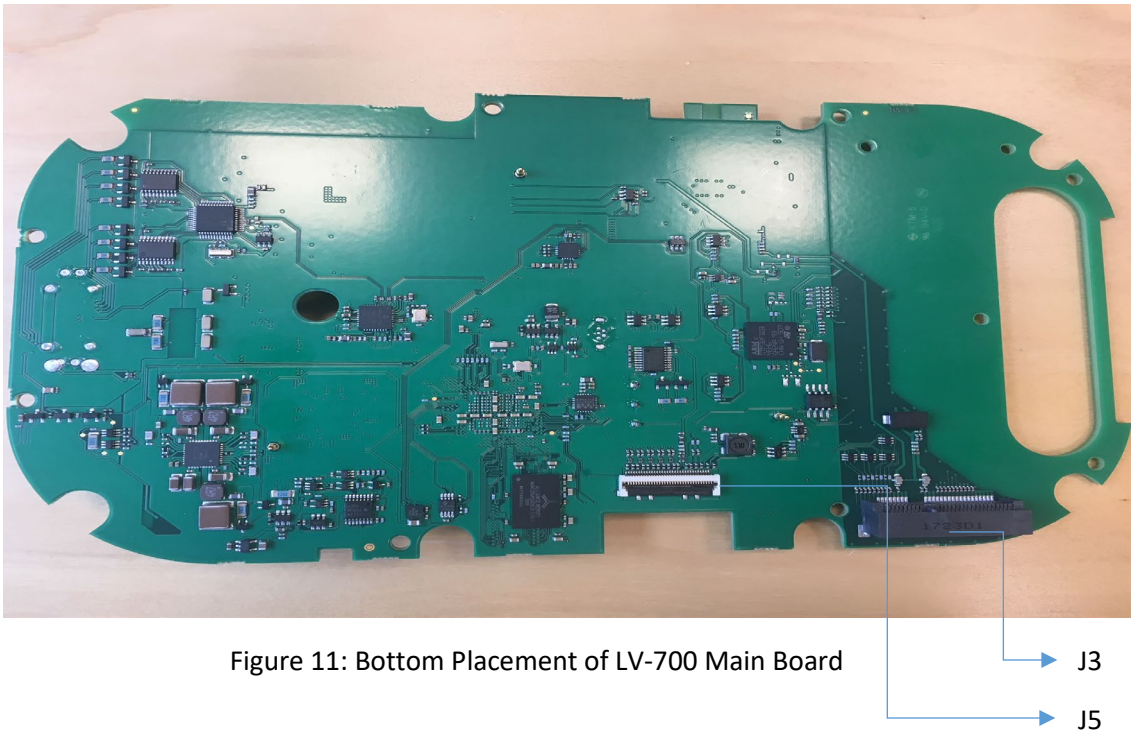
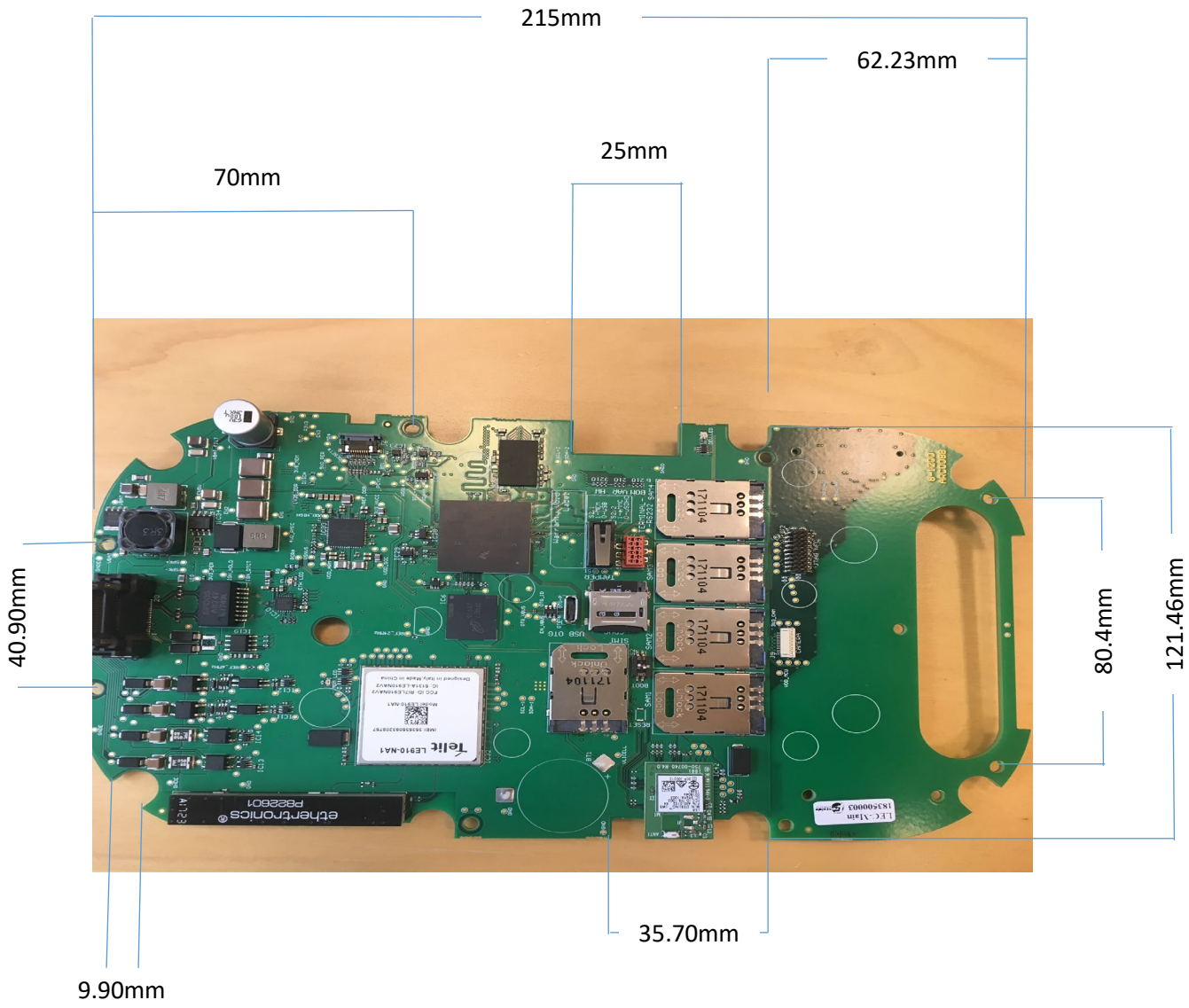


Figure 11: Bottom Placement of LV-700 Main Board

- J5 (Molex: 502244-3330) – 5.7” LCD Interface
- J3 (TE-Connectivity: 1759503-1) – Antenna’s Slot

6. Mechanical Interface



7. Instruction for Validator Demonstration Software

A LV-700 device normally has an LV-700 demonstration software preinstalled, or it comes with a SD-card containing the operating system and this software. When the device is powered on it will automatically launch this demo. This automatic boot-up of the demonstration software may or may not be present.

The demonstration software is constantly evolving and hence some features described in this document may be lacking, have been removed or moved to other parts of the demo and there may also be additional features available. Also, some of the graphics may change during time.

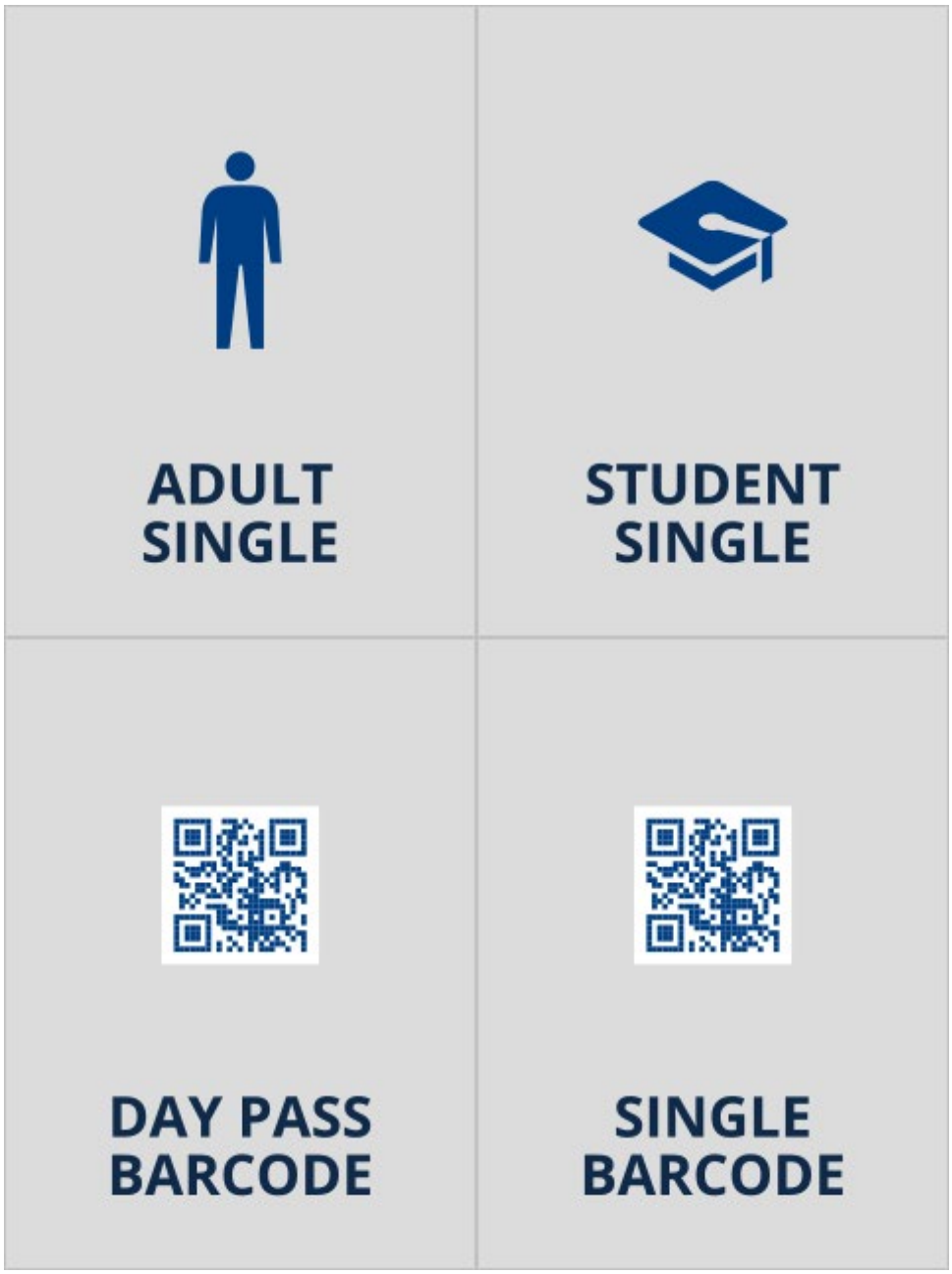
The following descriptions illustrates how to navigate the menus and the core functionality of the software.

The demonstration software contains an intuitive swipe and touch menu similar to ones you can find on a smart phone or a tablet computer. Just like any smartphone or computer tablet you navigate by touching and taping the screen.

The demonstration software is meant to showcase some of the features of the LV-700.

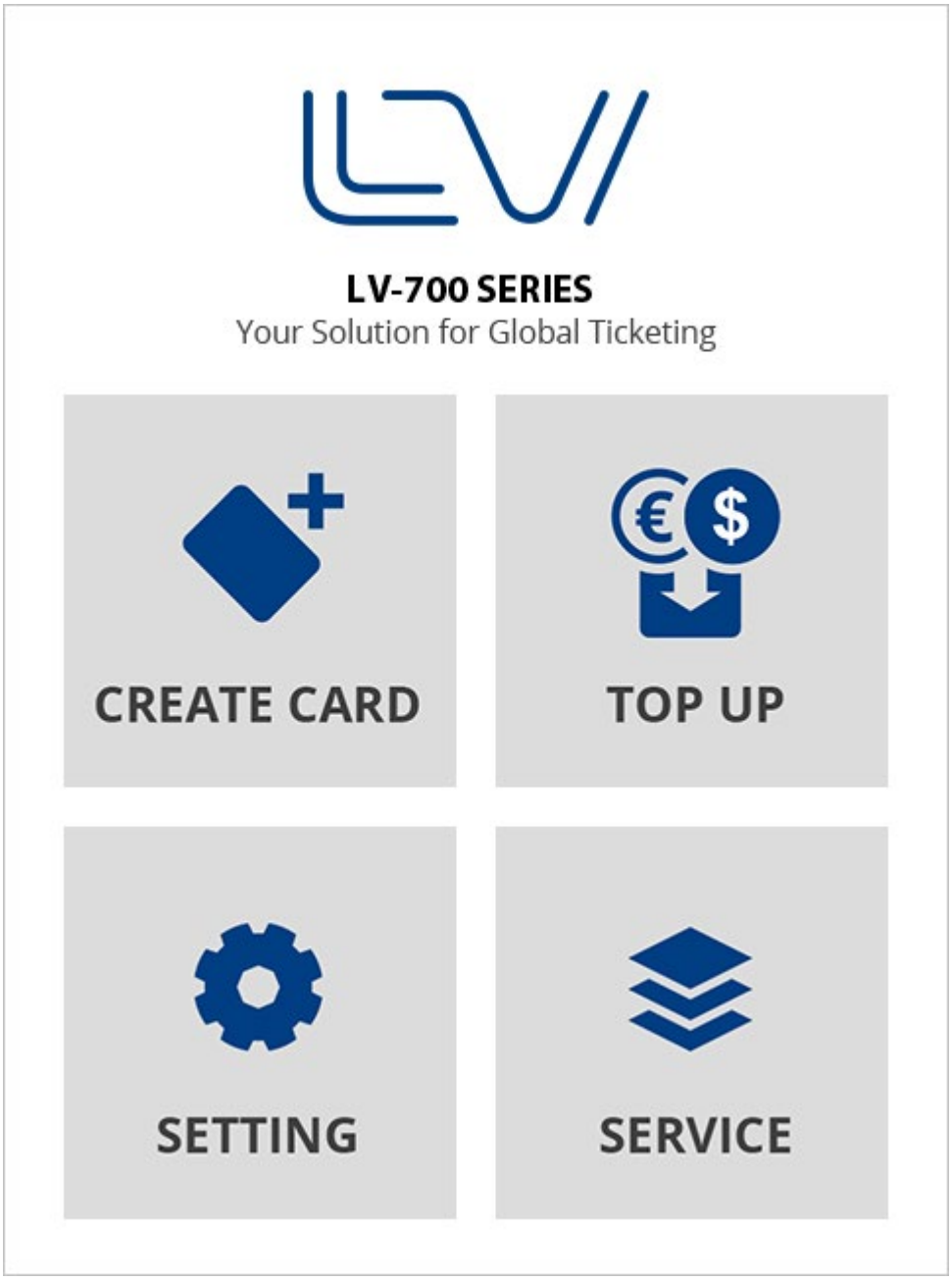
7.1 Main Menu

The first screen you are presented with is the Main Menu. It has four immediate options to choose from. Two of them, “Adult Single” and “Student Single”, are related to the contactless card reader and the remaining two, “Day Pass Barcode” and “Single Barcode”, to the onboard bar code camera. These options illustrate the process of paying for a ticket using a card or a barcode.



Main Menu.

There is another fifth option not immediately visible; swiping left on the display in the Main Menu will bring you to the Main Service Menu.



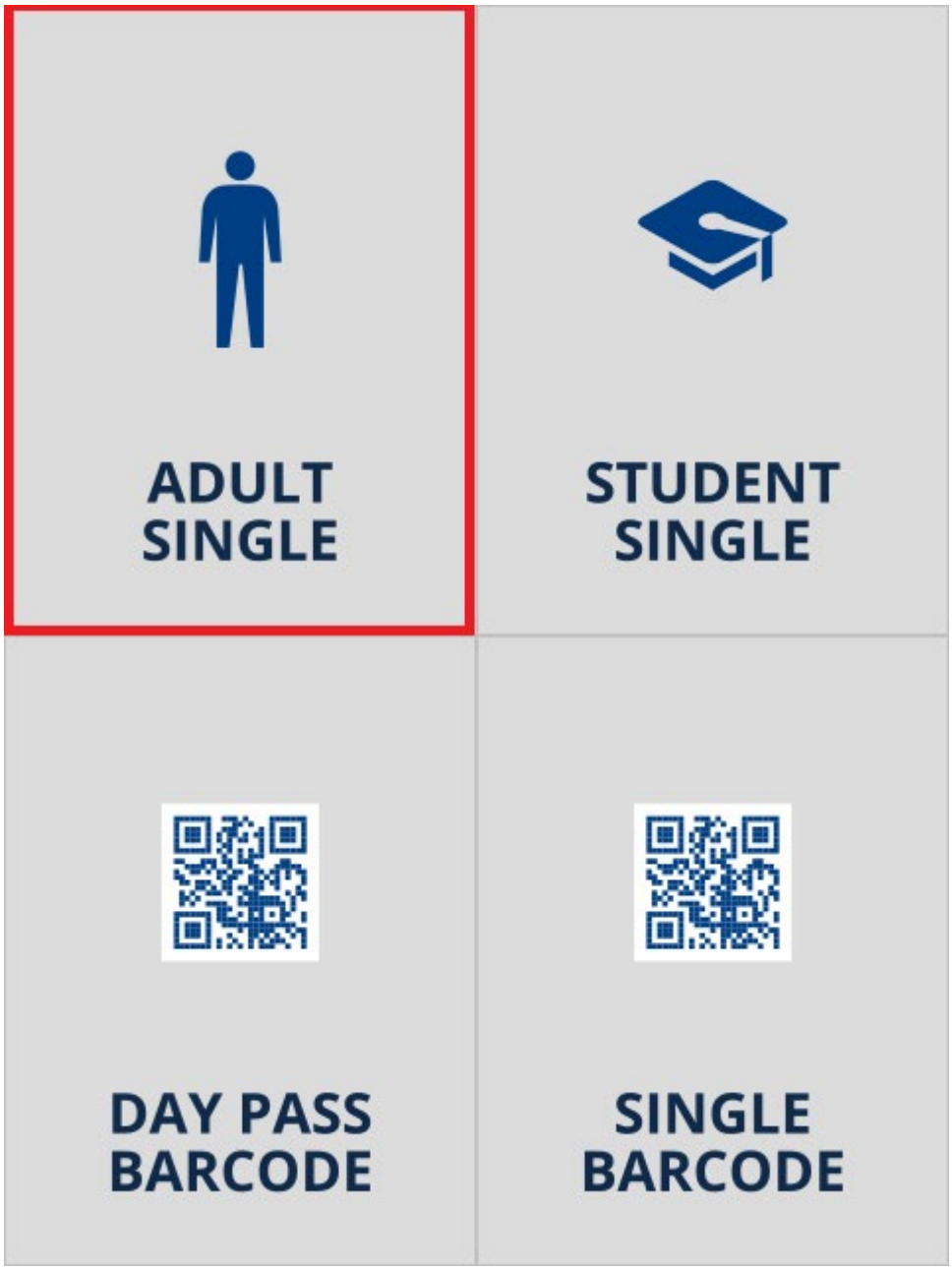
Main Service Menu.

In the main service menu you can format cards to be used in the payment demos on the main menu, or top up already formatted cards. It also gives access to changing screen brightness, volume and currency.

7.1.1 Back Button

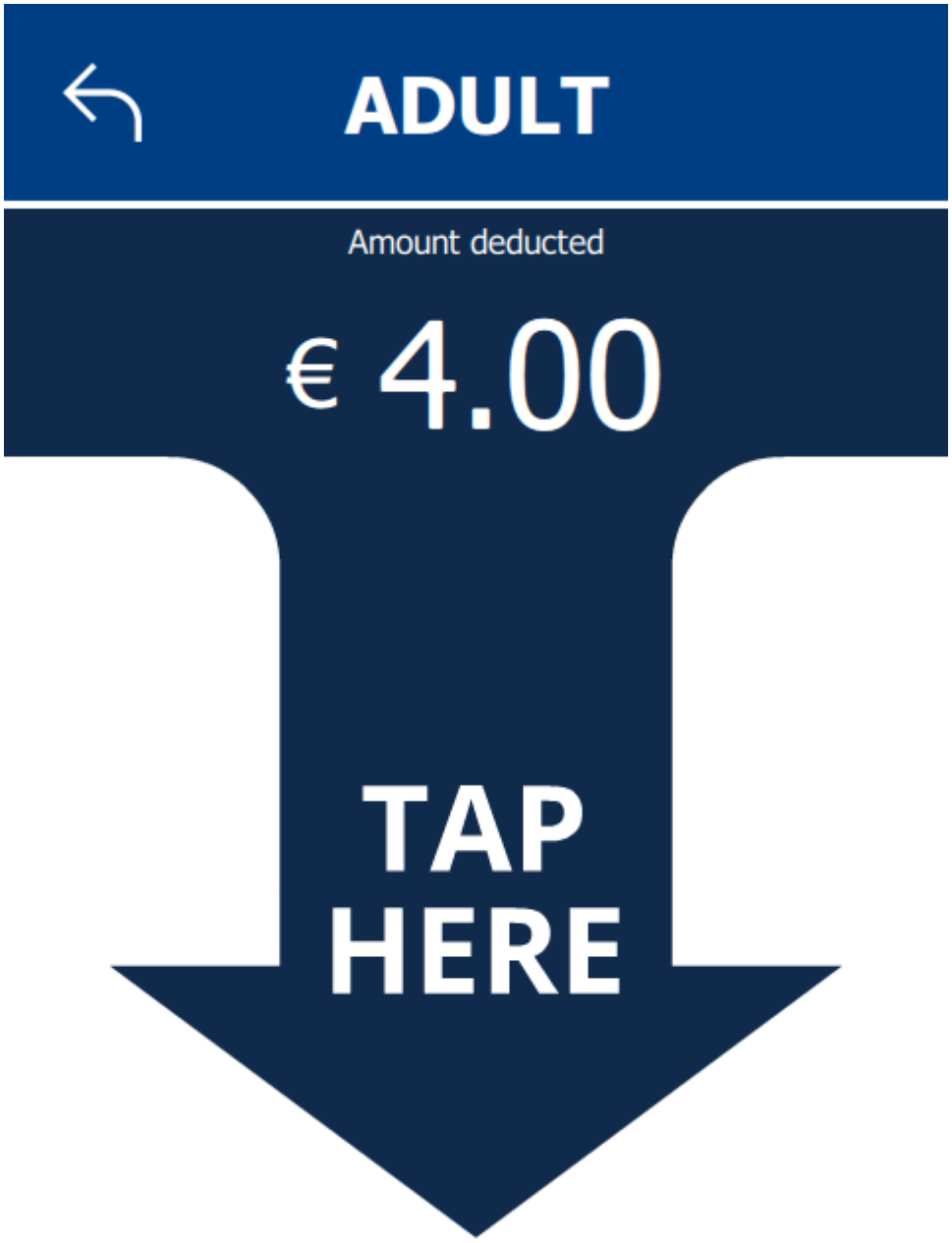
Some screens have a back button. Tapping this will return the user to the previous screen.

7.2 Adult Single



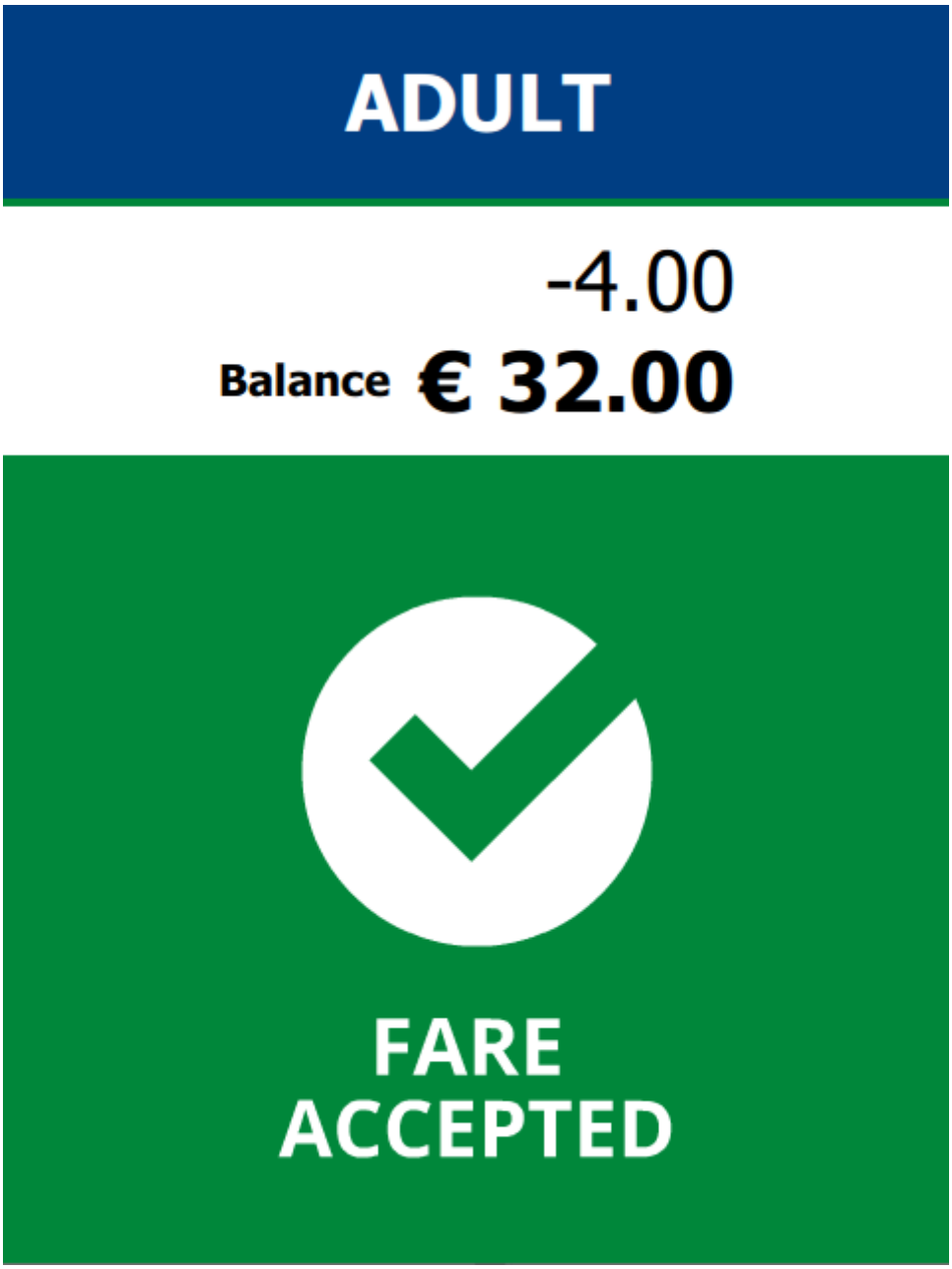
Red area doesn't appear in the application.

Tapping the "Adult Single" option in the Main Menu will request the user to tap a card to pay for a ticket. Once a card has been tapped it will be deducted with the specified amount. The card used must first have been formatted as is done in the "Create Card" section.



Application requesting user to tap card.

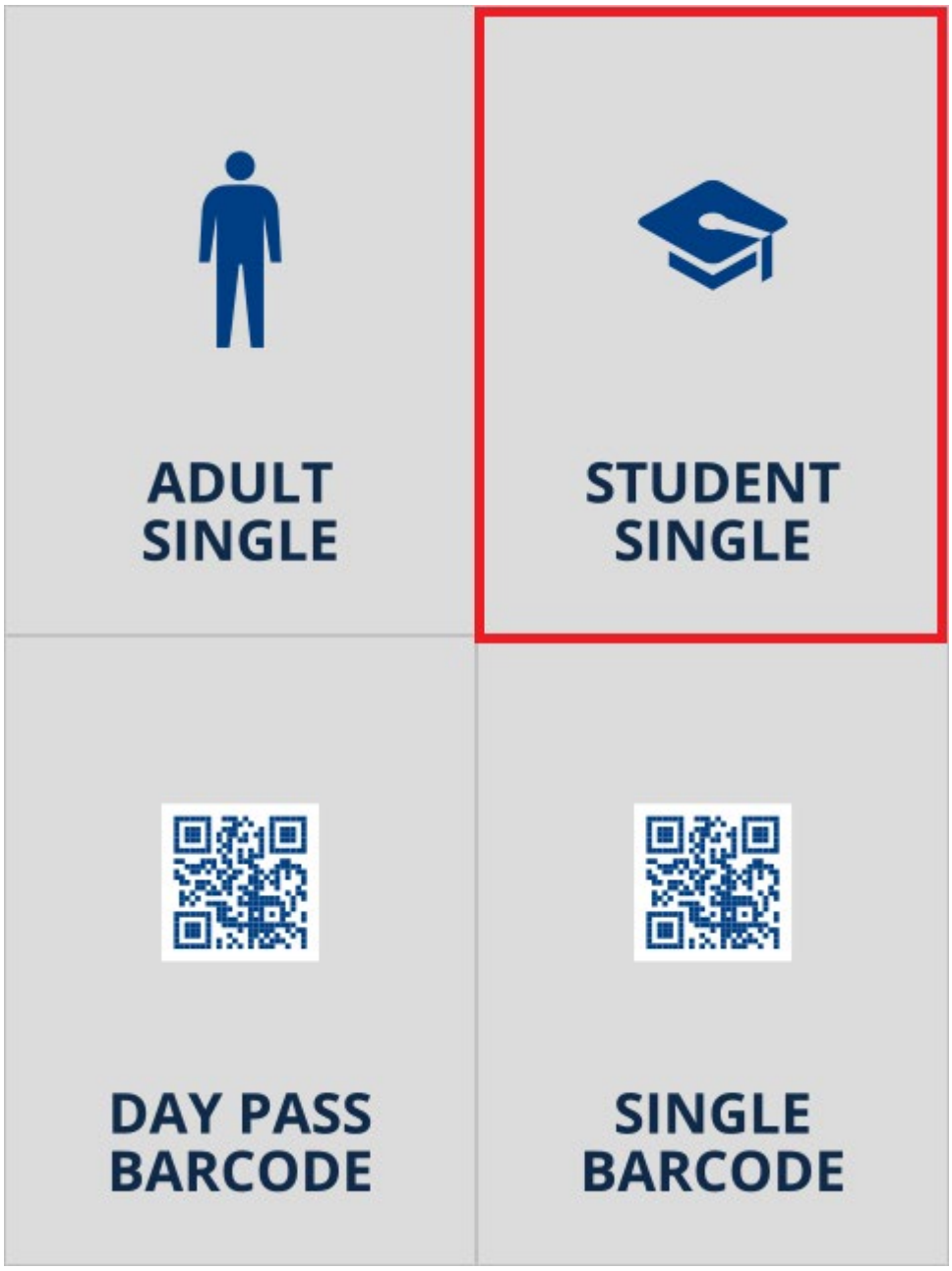
If the validator was able to deduct the specified amount it will play a sound and show the success screen. It will display the amount deducted and current balance.



Success screen for Adult Single ticket.

In case of insufficient funds or a communication error, or some other error it will display an error screen.

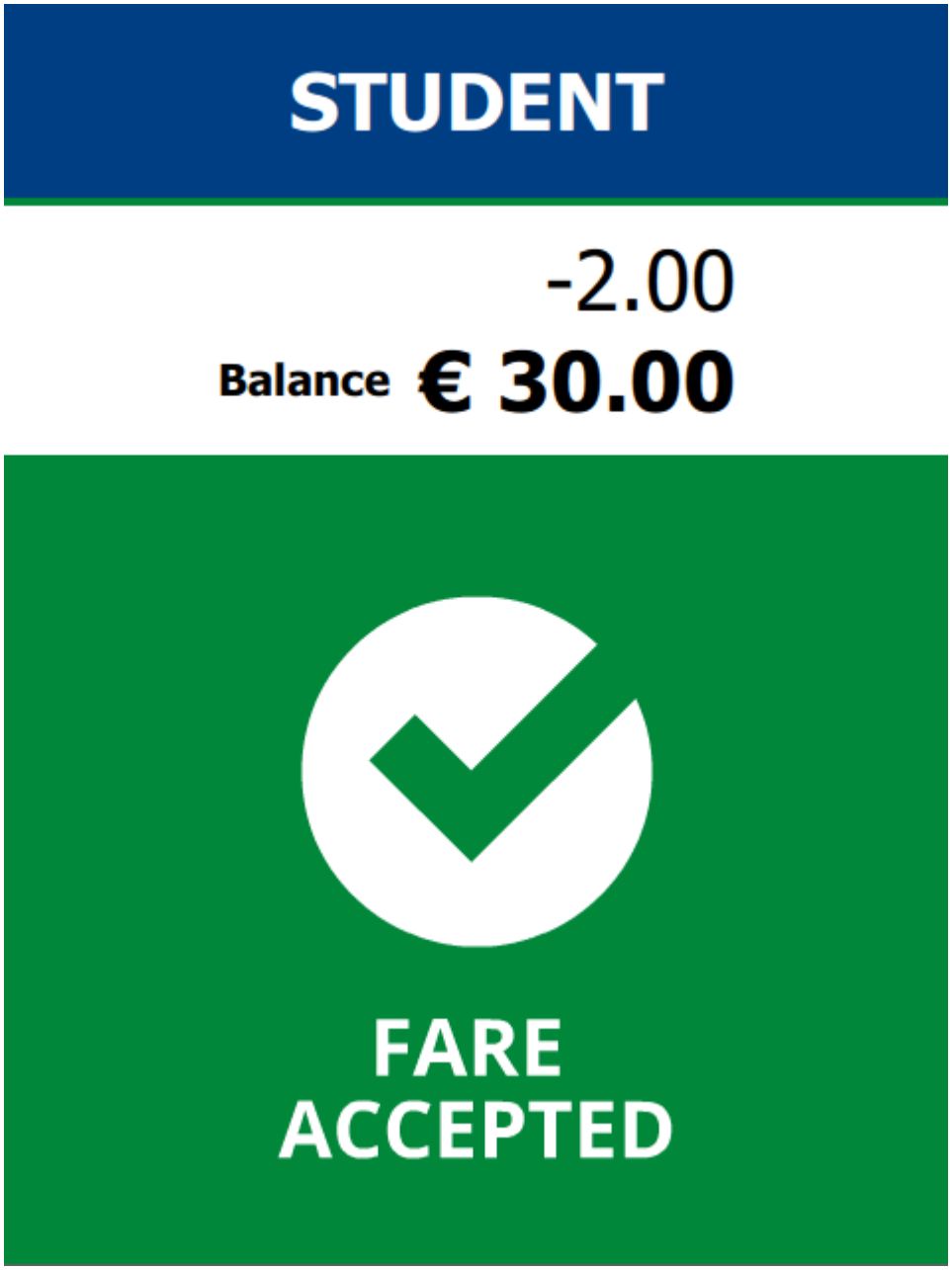
7.3 Student Single



Clicking the “Student Single” option in the Main Menu will request the user to tap a card. Once a card has been tapped it will be deducted with the specified amount. The card used must first have been formatted as is done in the “Create Card” section.

Application requesting user to tap a card.

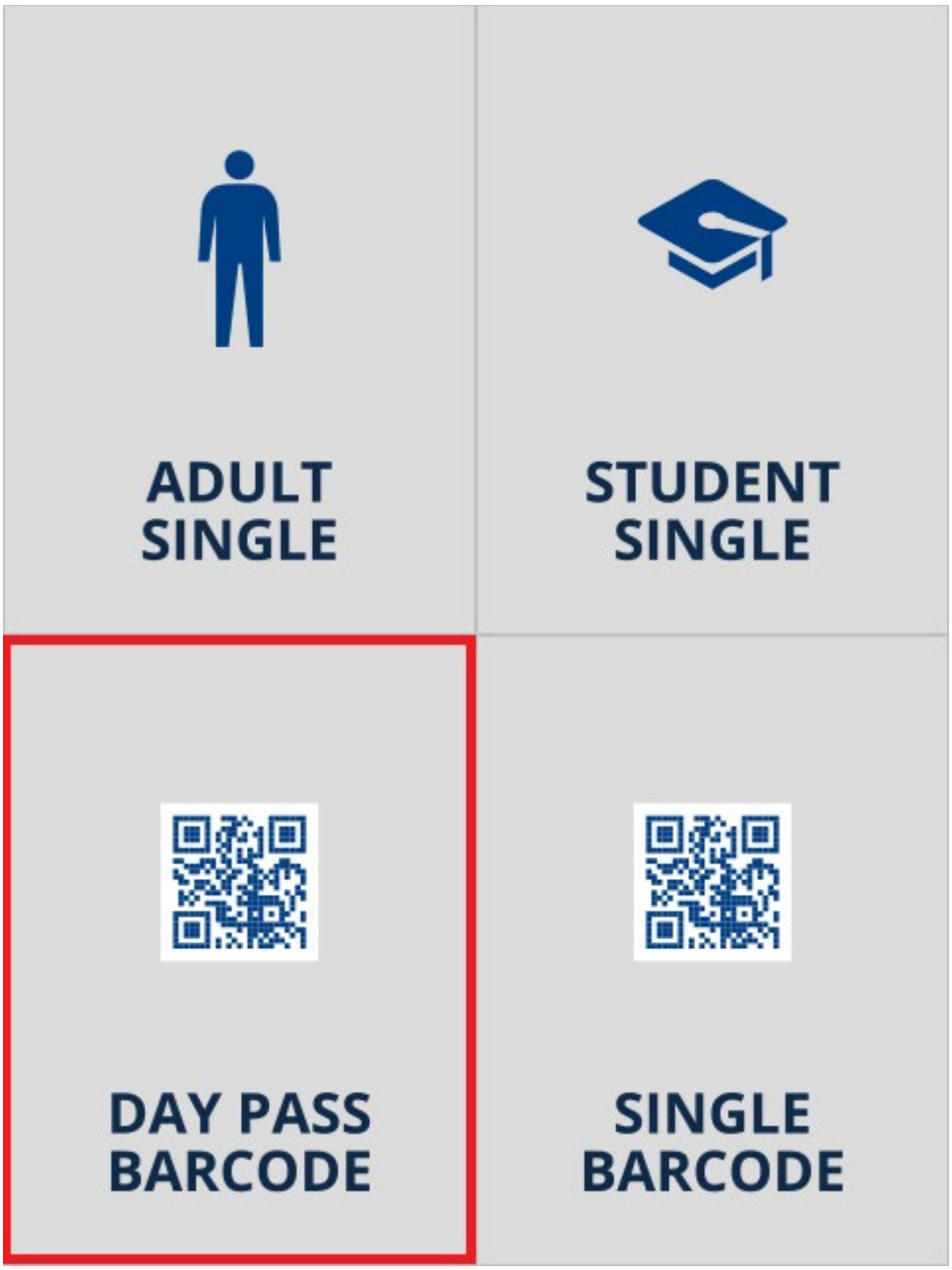
If the validator was able to deduct the specified amount it will play a sound and show the success screen. It will display the amount deducted and current balance.



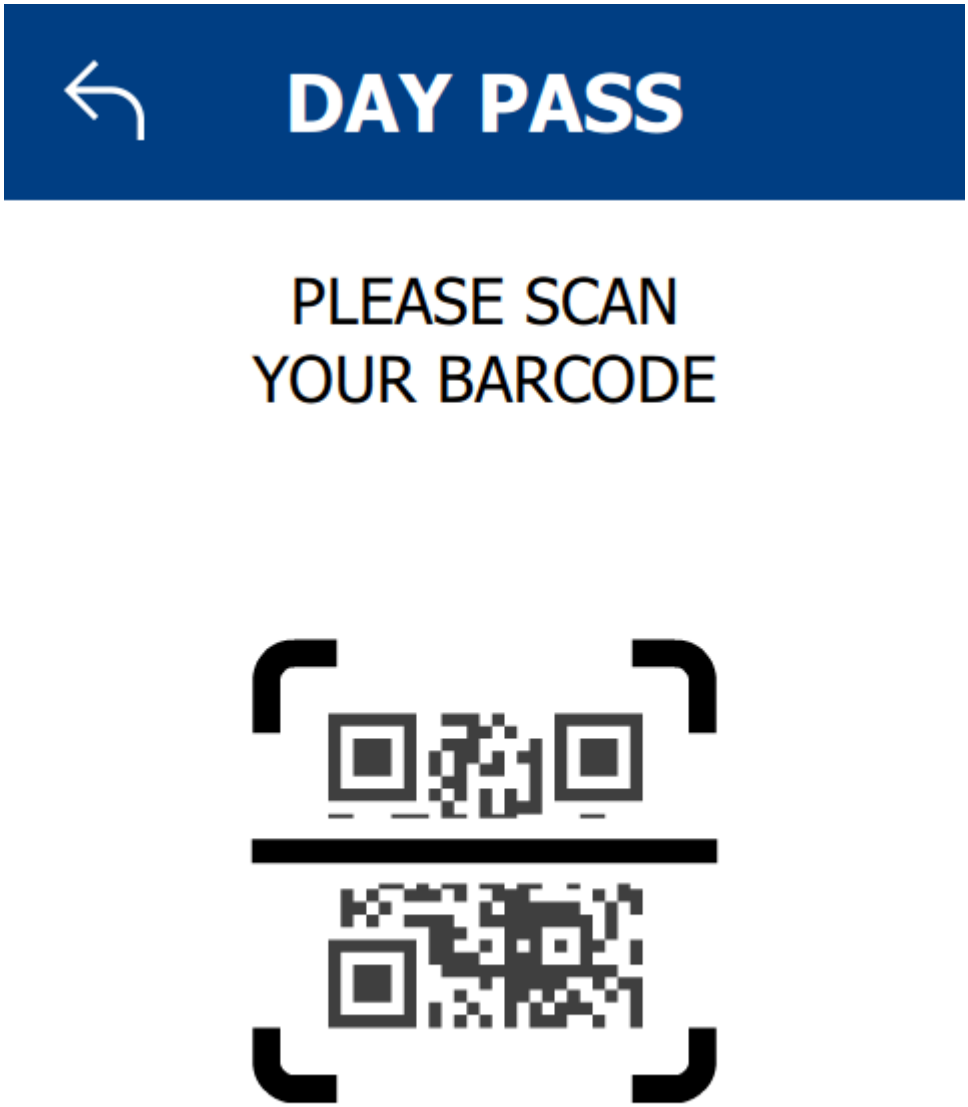
Success screen for Student Single ticket.

In case of insufficient funds or a communication error, or some other error it will display an error screen.

7.4 Day Pass Barcode



Tapping the “Day Pass Barcode” option in the Main Menu will request the user to present a barcode to the camera. Depending on the configuration of the camera, it will start flashing immediately scanning for barcodes. Also, the types of barcodes supported by the camera is determined by the configuration. A barcode can contain custom data, hence the illustrations regarding output may differ depending on the barcode presented to the camera.

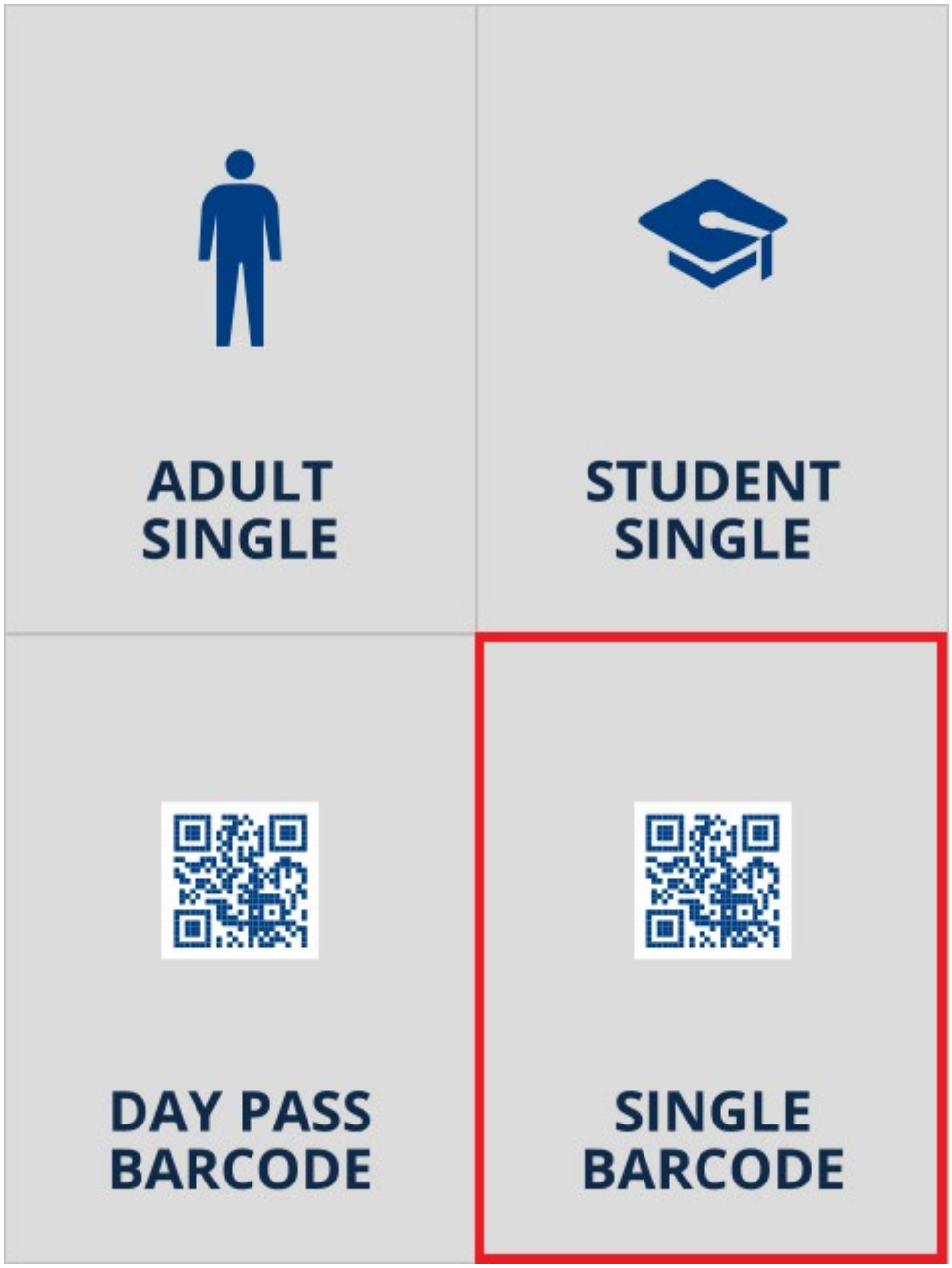


Application requesting user to present a barcode.

If the validator detects a barcode it will play a sound and display the data on a success screen. In the picture below the contents of the barcode was “Expire+MM.DD.YYYY”.

Day Pass Barcode success screen.

7.5 Single Barcode



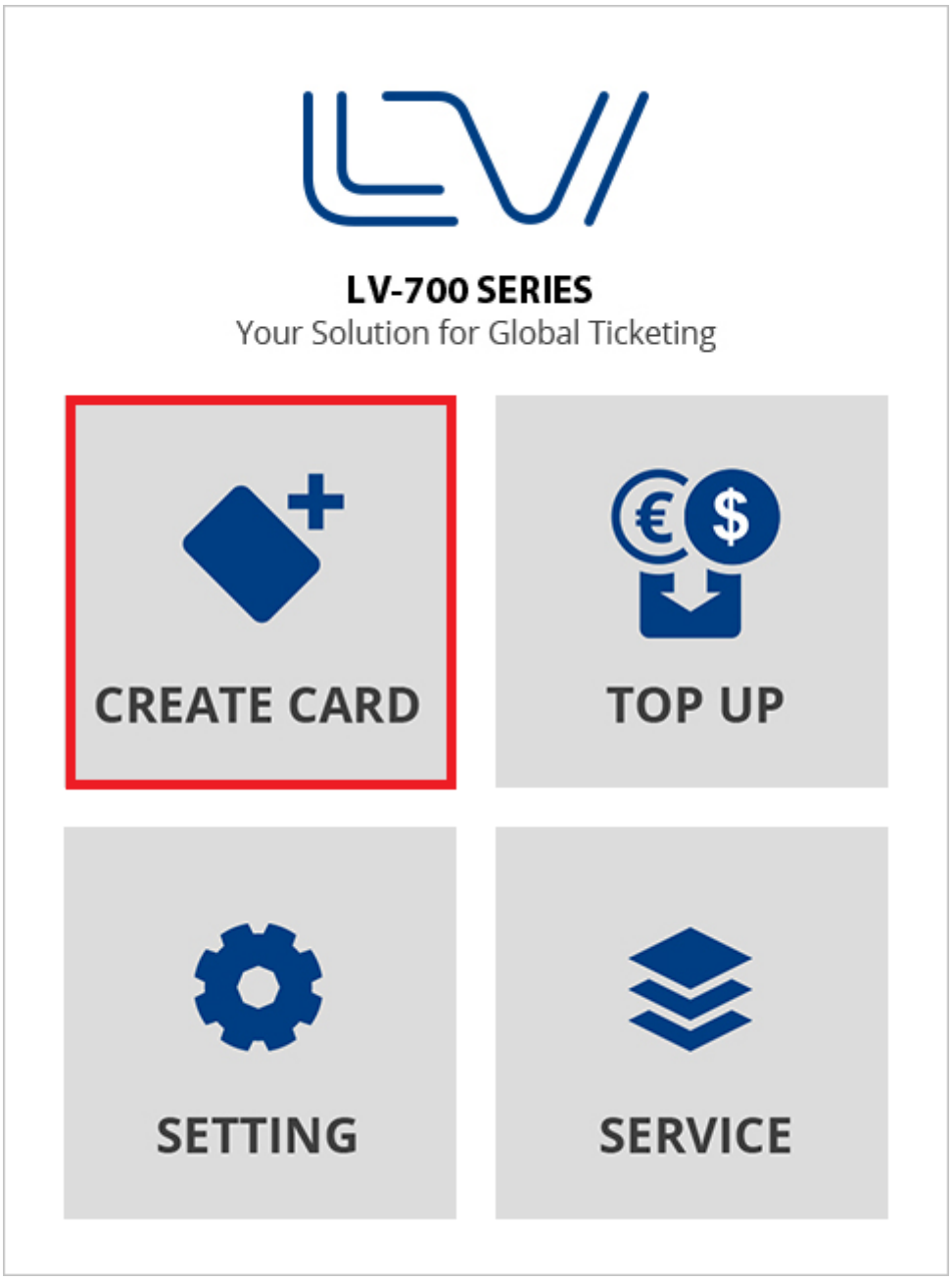
Tapping the “Single Barcode” option in the Main Menu will request the user to present a barcode to the camera. Depending on the configuration of the camera, it will start flashing immediately scanning for barcodes. The types of barcodes supported by the camera is determined by its configuration. Since a barcode is custom data the illustrations regarding output may differ depending on the barcode presented to the camera.

Application requesting user to present a barcode.

If the validator detects a barcode it will play a sound and show the data on a success screen. In the picture below the contents of the barcode was “MM.DD.YYYY HH:MM+€4.00”.

Single Barcode success screen.

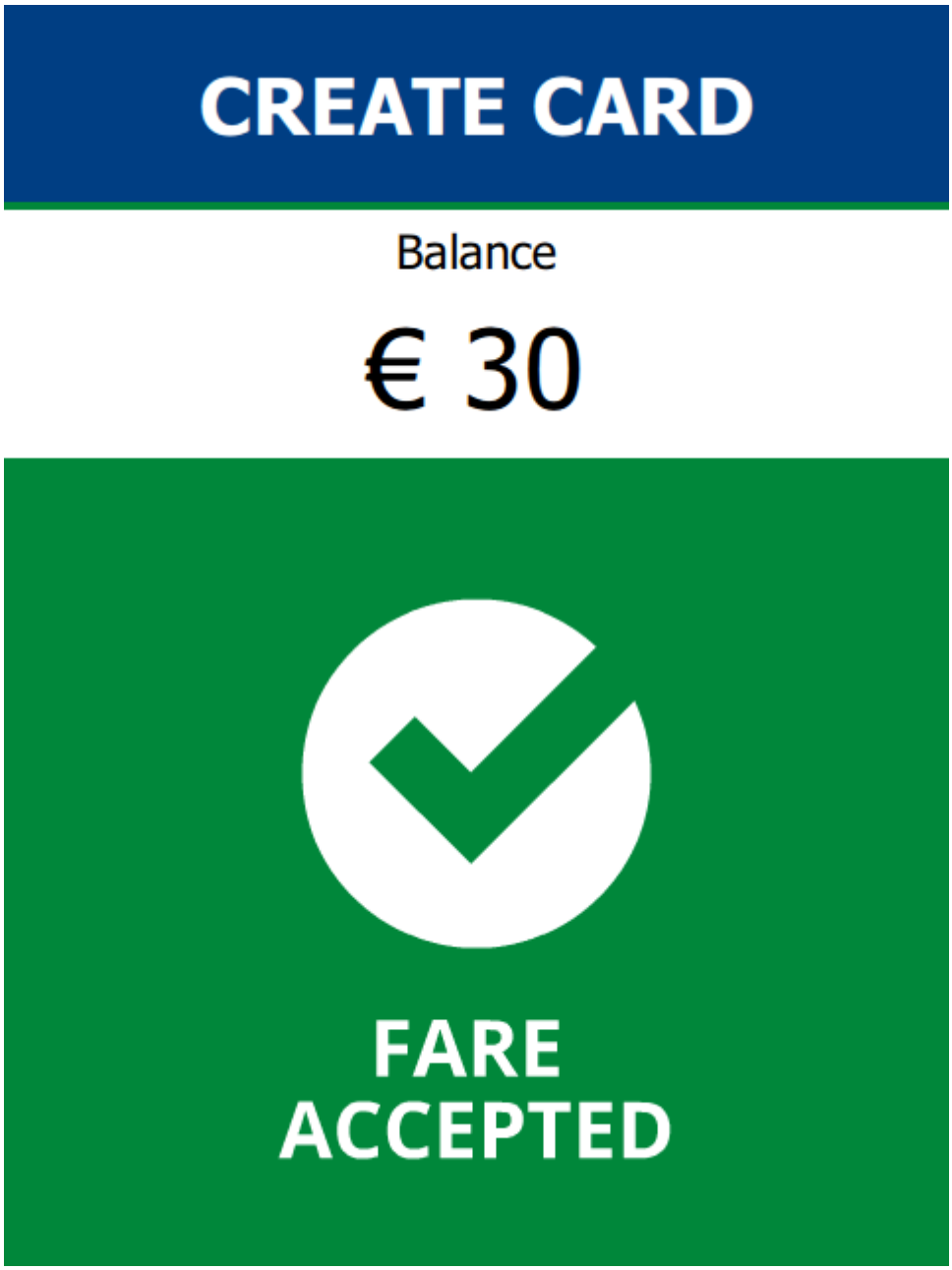
7.6 Create Card



Tapping the “Create Card” option in the Main Service Menu will request the user to present a card. Once in the field the reader will format (and set a balance) the card so that it can be used with the other card related options. The card must be a Mifare DESFire card, otherwise it will not work and an error screen will be displayed. In other words; all other card related operations depend on a Mifare DESFire card that has been properly formatted.

Requesting user to tap a card for formatting.

If the validator could successfully format the card it will play a sound and display a success screen.



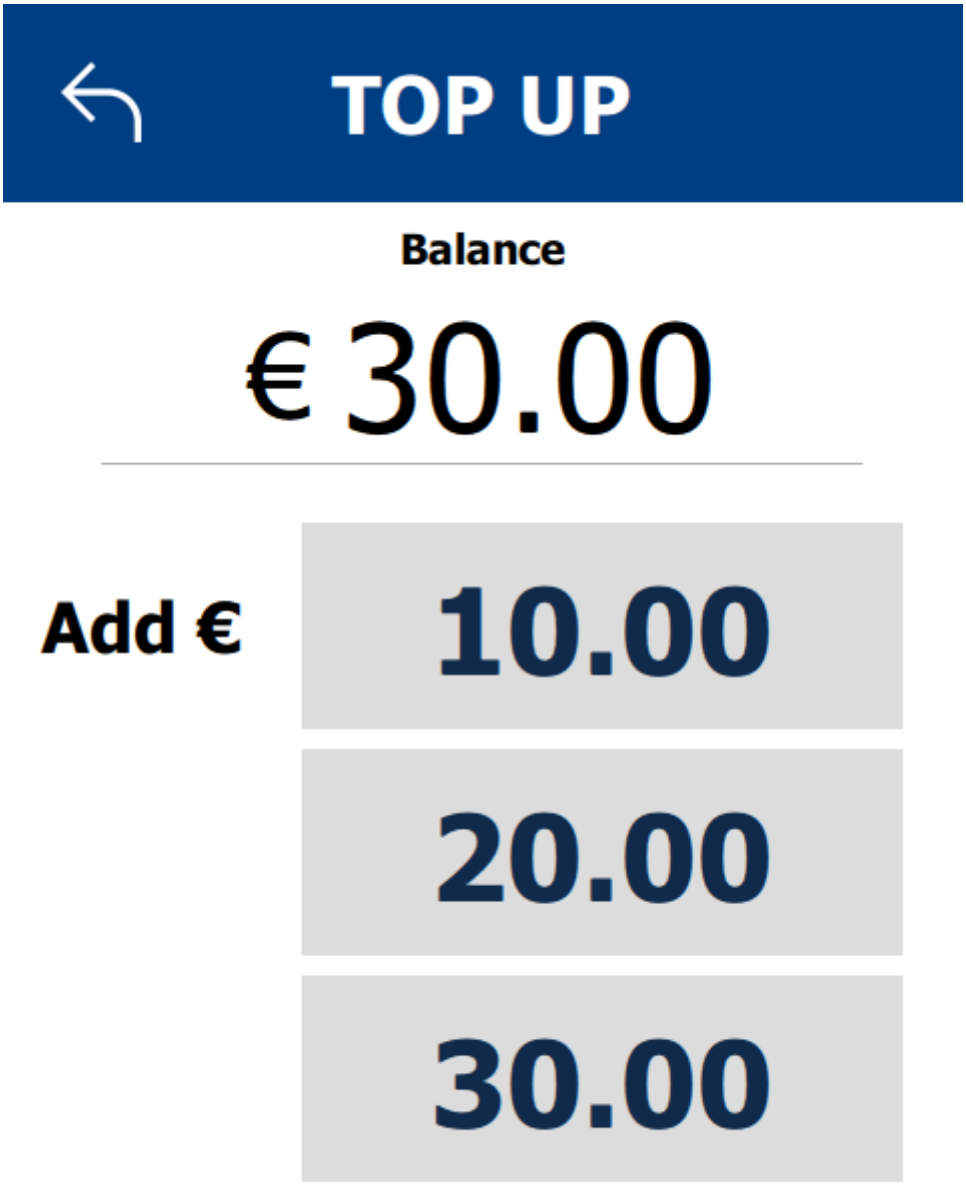
Create Card success screen.

7.7 Top up Card

Tapping the “Top up” option in the Main Service Menu will request the user to present a card. Once in the field the reader will top up (increase it’s balance) the card so that it can be used with the other card related options. The card must first have been created and formatted properly as is done in the “Create Card” option.

First screen of Top up.

Once a valid card has been tapped it will proceed to the next section. Otherwise it will display an error and return to the Main Service Section.

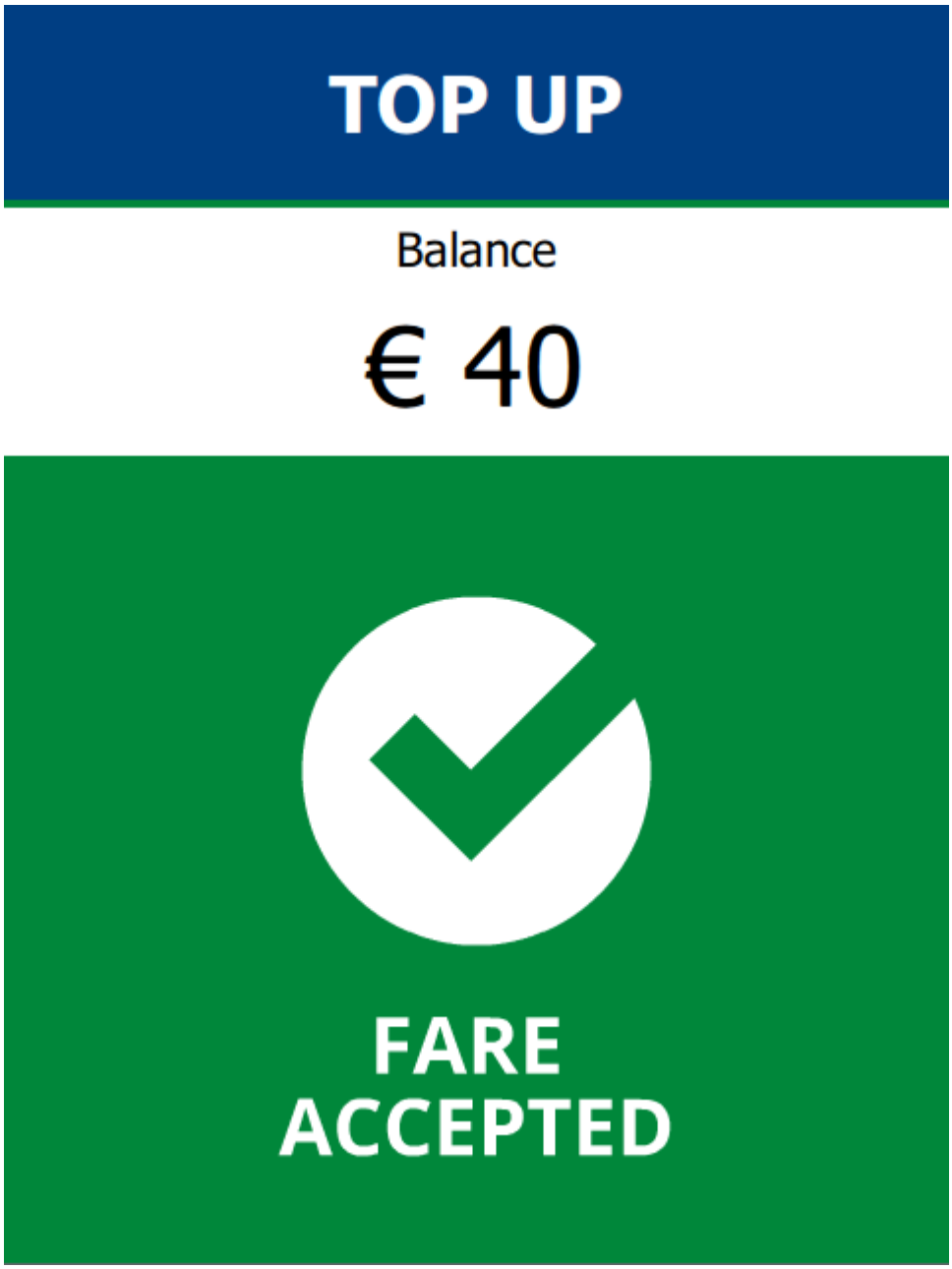


Second screen of Top up. Requesting user to specify amount.

Next step is to specify the amount to top-up. This is done by tapping on the desired amount. Once an amount has been selected the user will be requested to tap the card once again.

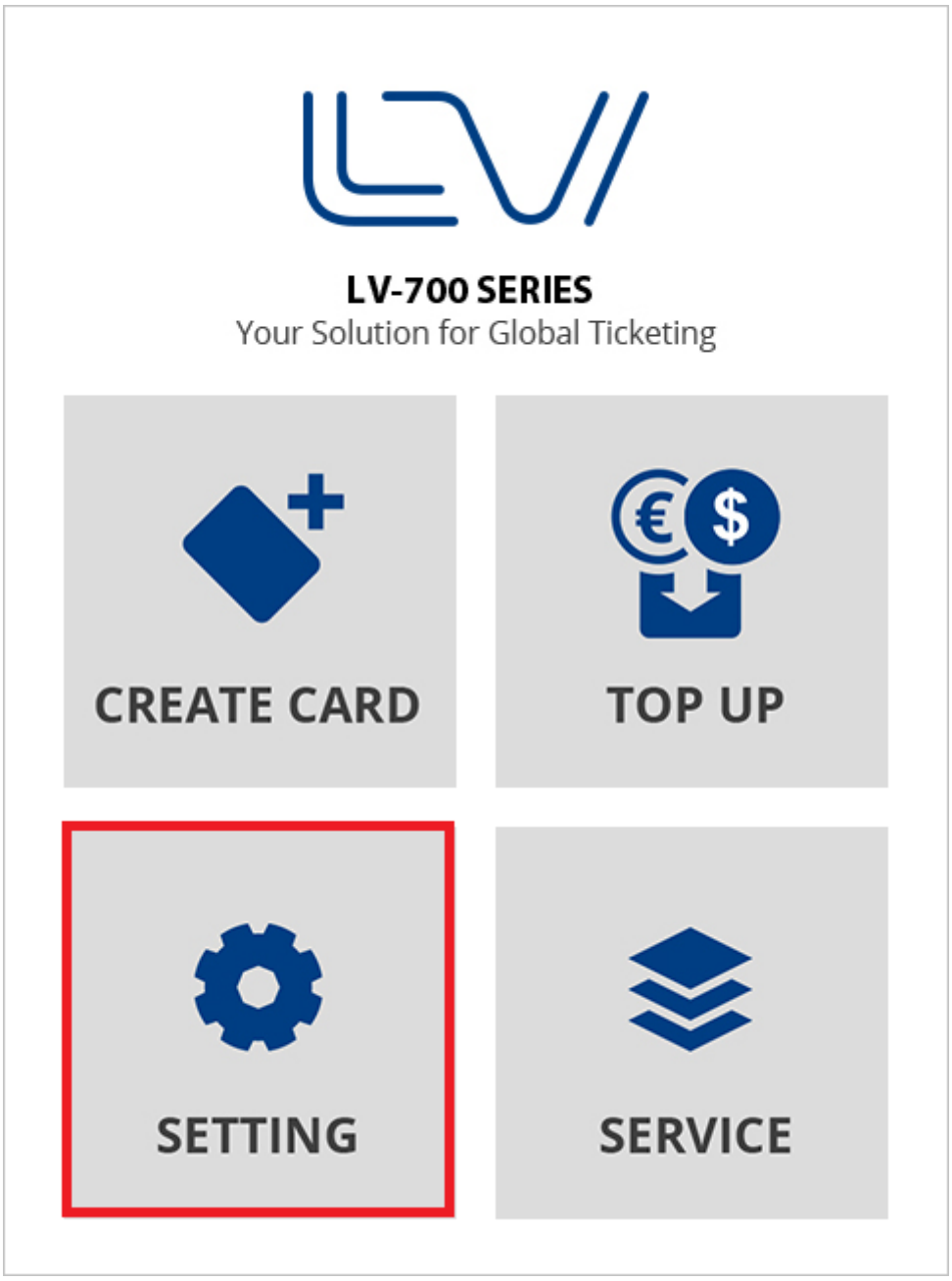
Third screen of Top up. Requesting user to tap a card to be topped up with the amount specified in the previous section.

If the card was valid and the operation was successful a sound will be heard and the success screen displayed. It will display the current balance of the card.

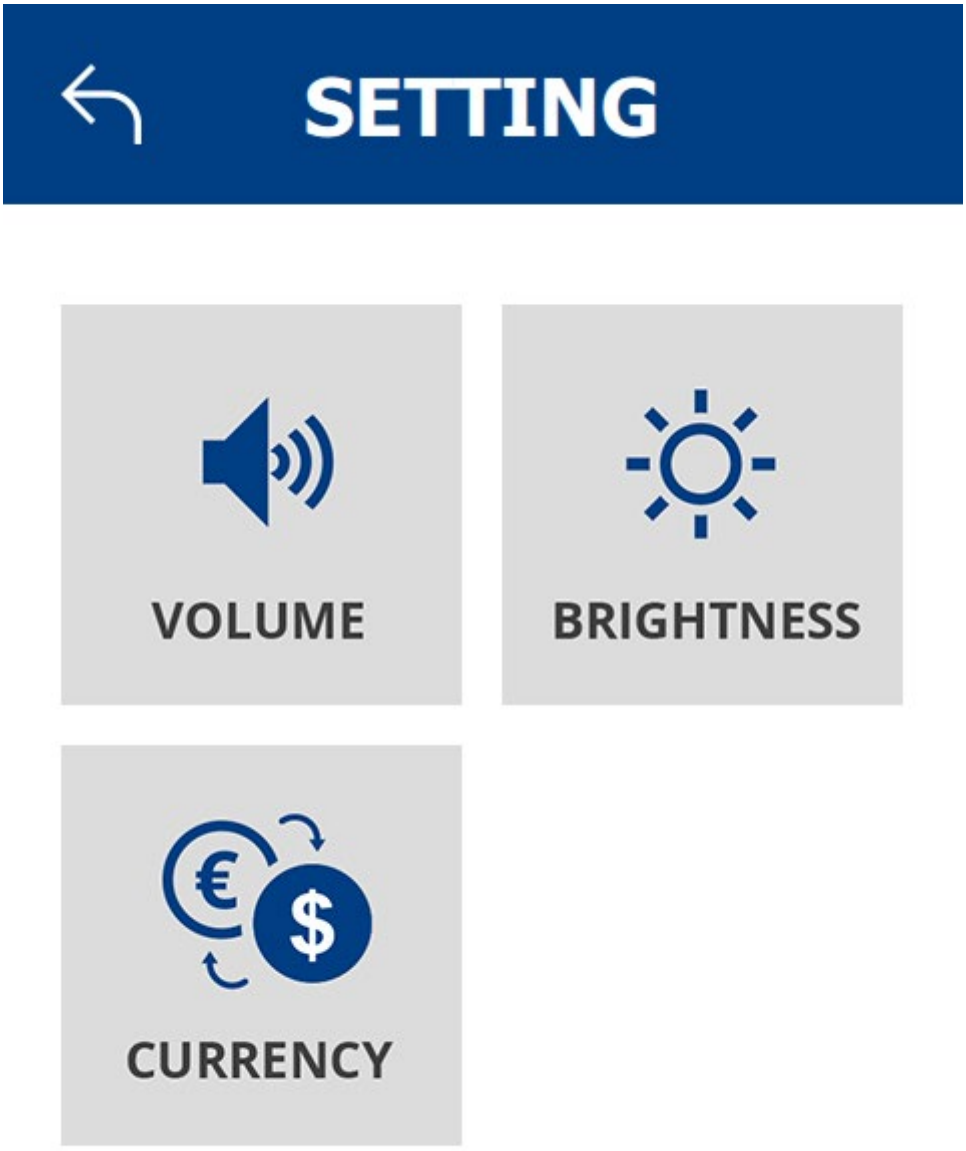


Top up success screen.

7.8 Setting

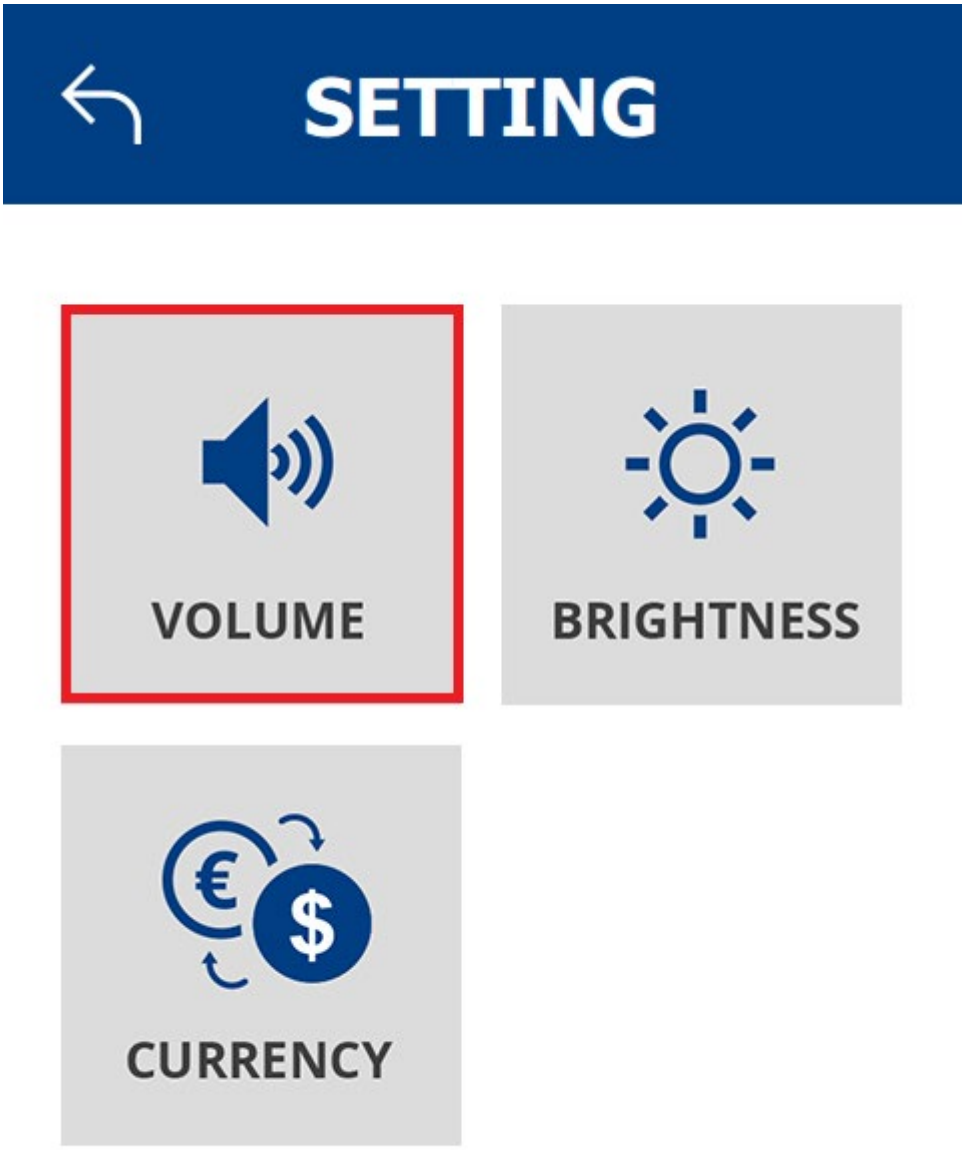


Tapping the “Setting” option in the Main Service Menu will open up the Setting menu. Here it’s possible to change the brightness of the screen, adjust volume and also change the currency displayed.

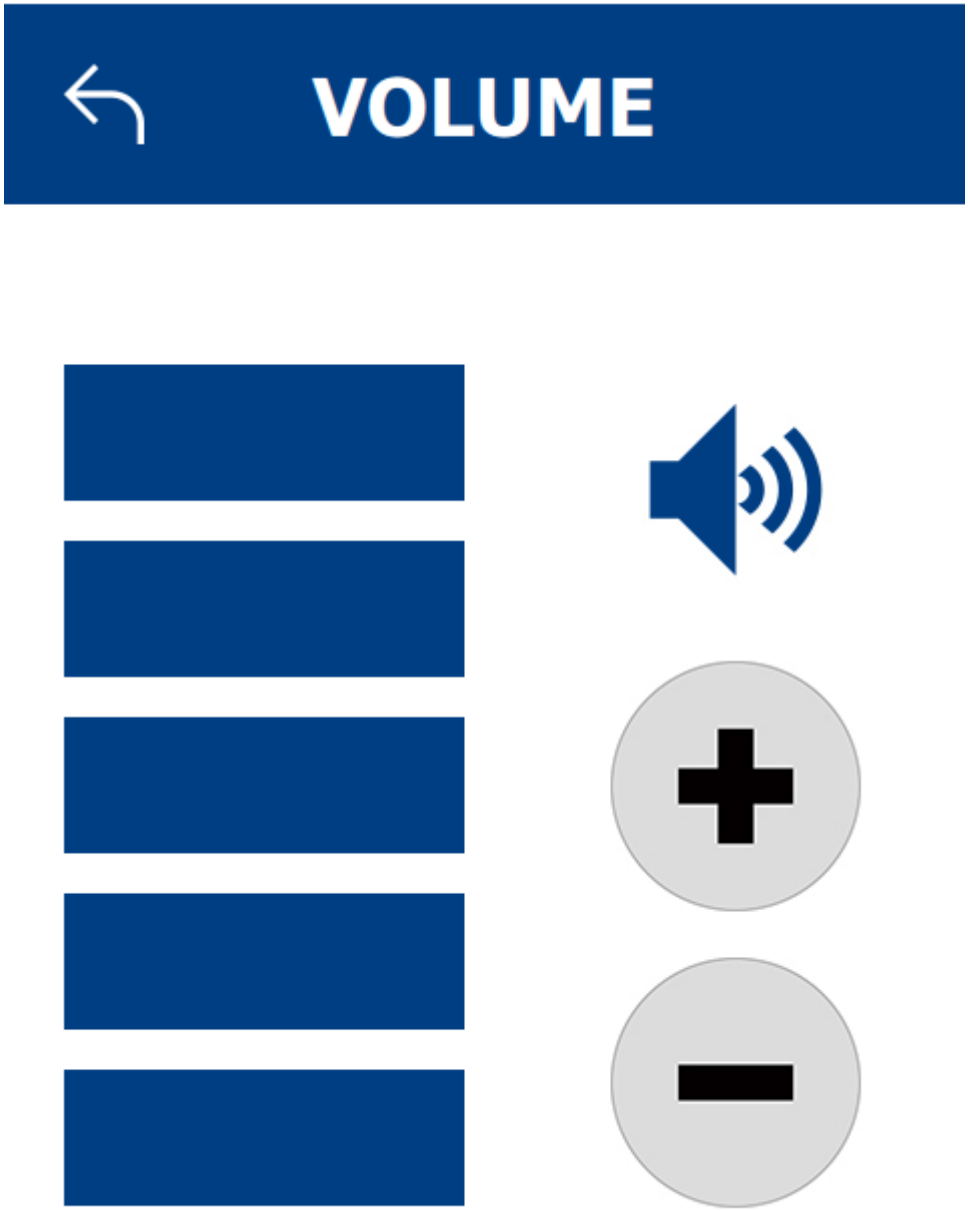


Setting menu.

7.8.1 Volume



Tapping the “Volume” option in the Main Service Menu will allow the user to change the volume of the sounds played by the validator.



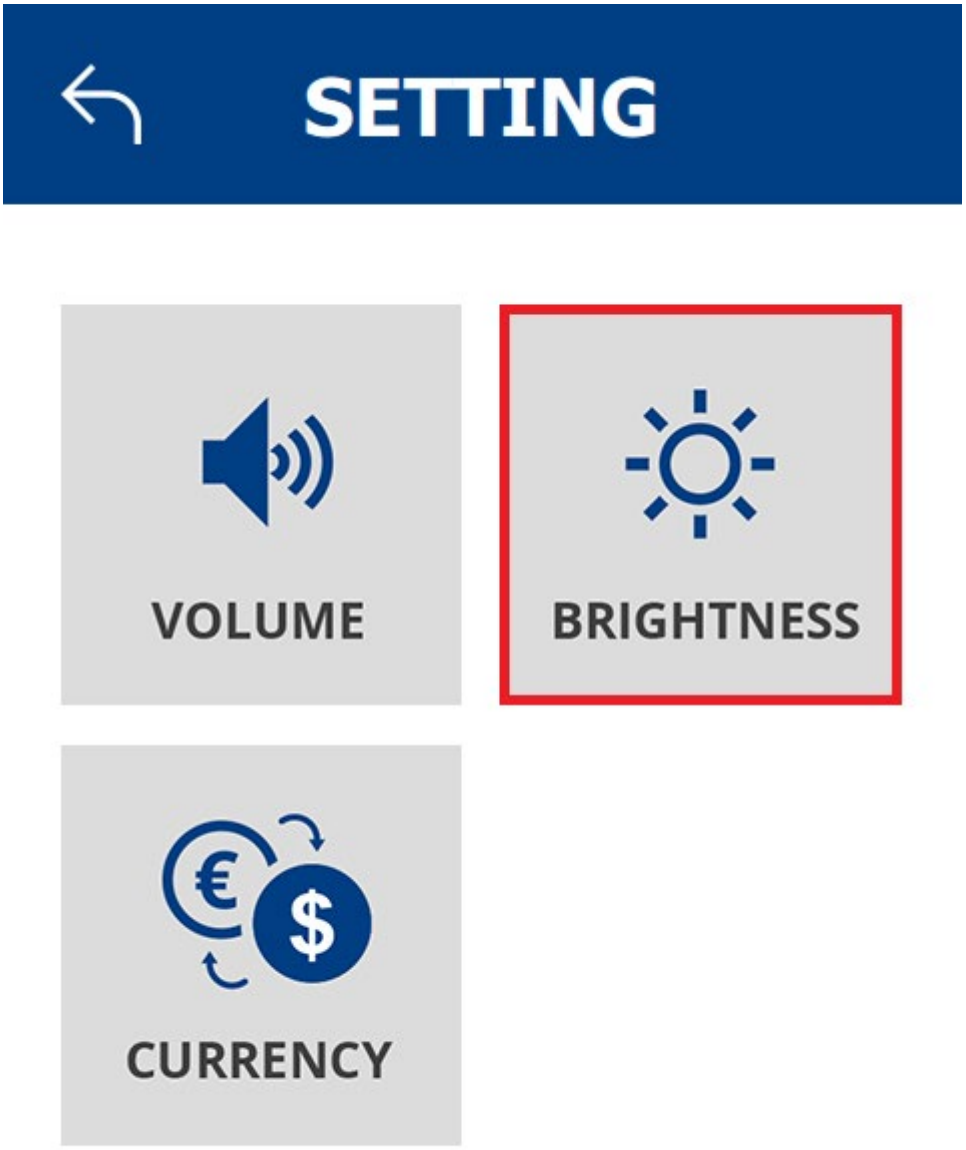
Volume screen.

Pressing the “+” button will increase the volume.

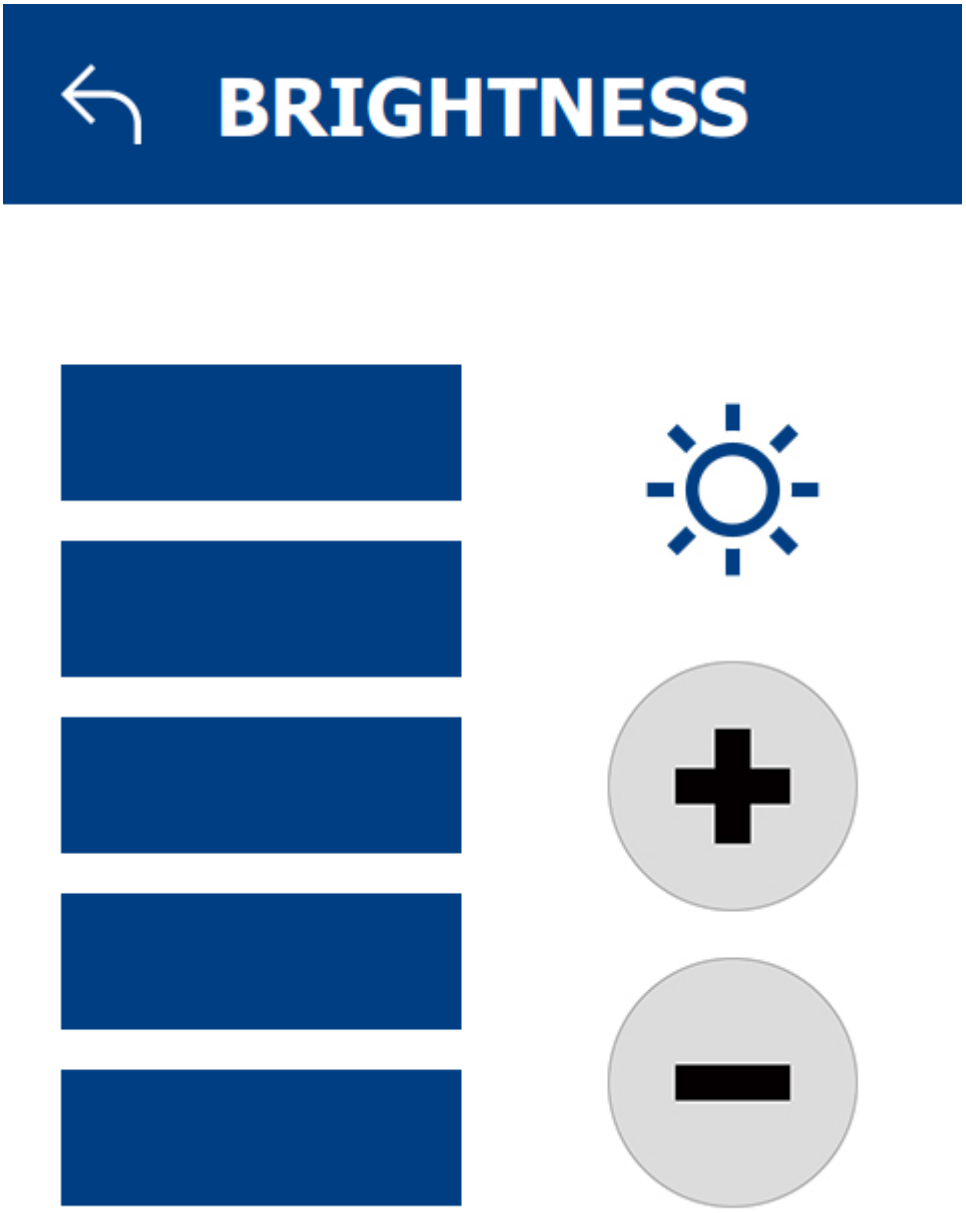
Pressing the “-“ button will decrease the volume.

A sound is played every time the volume is changed so that one can easily find the desired volume.

7.8.2 Brightness



Tapping the “Brightness” option in the Main Service Menu will allow the user to change the brightness of the display of the device.

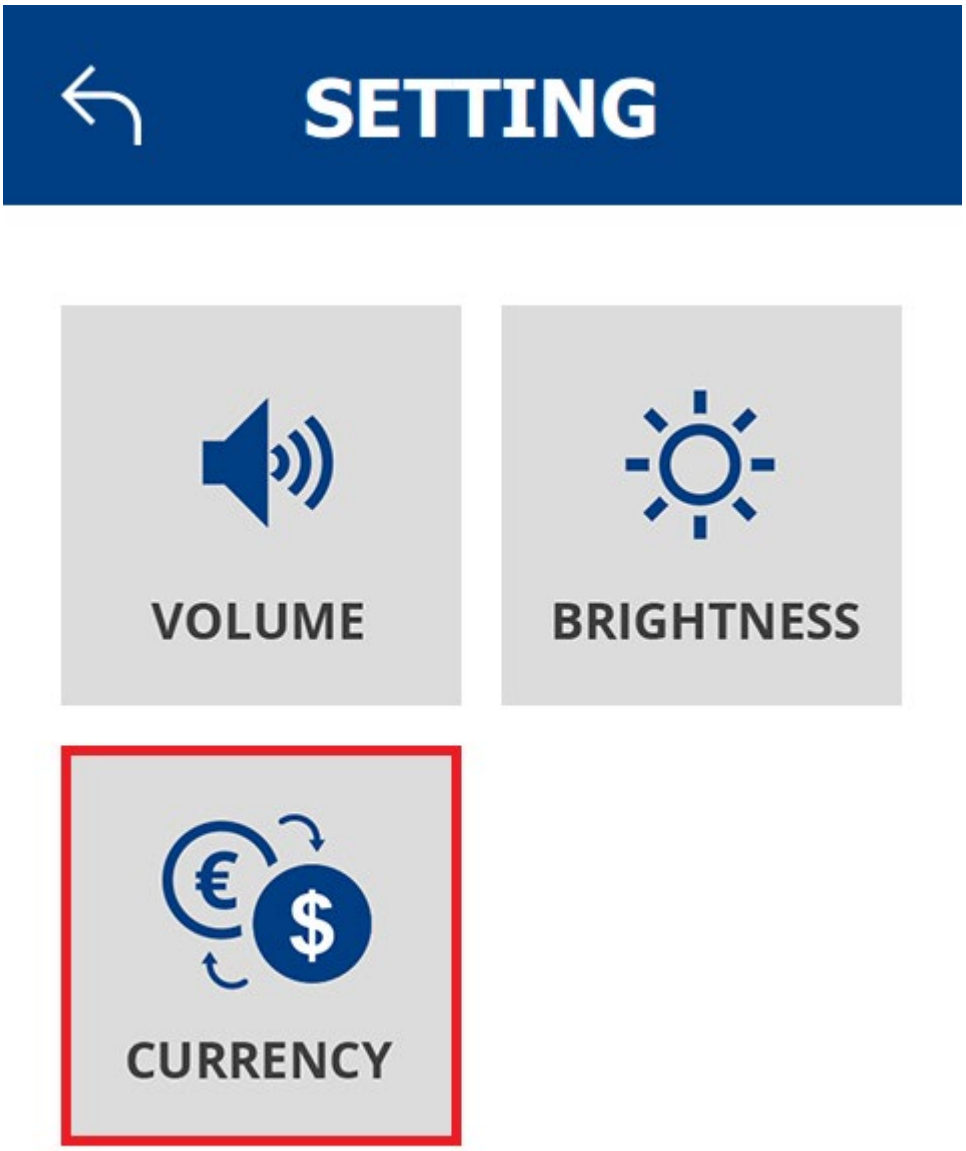


Brightness screen.

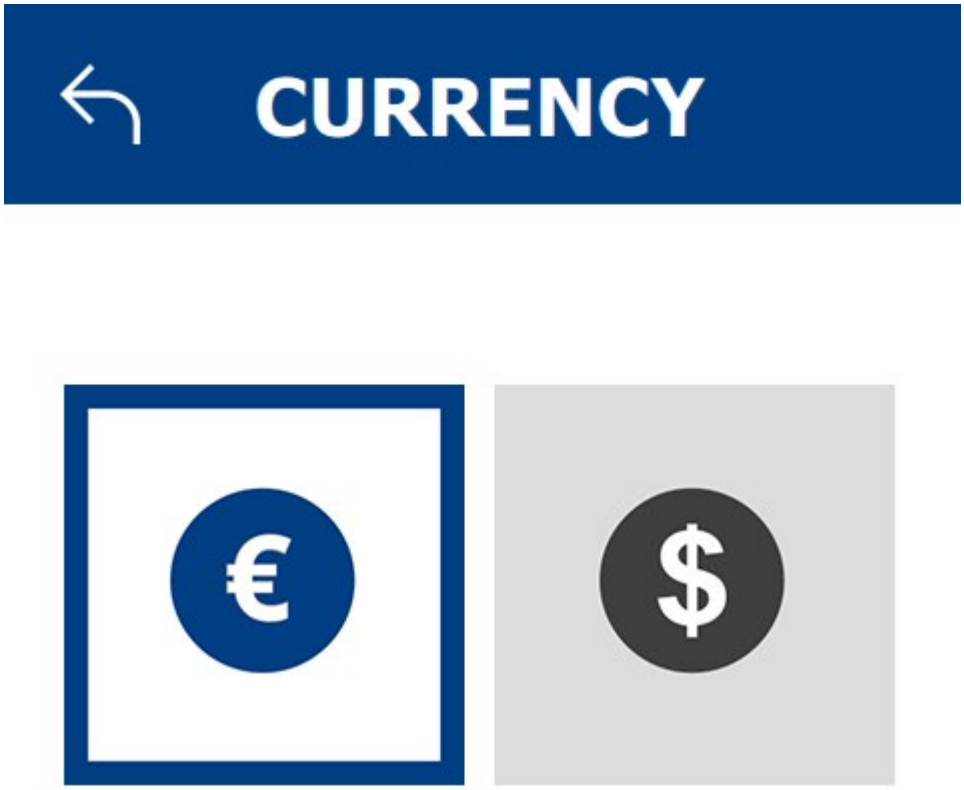
Pressing the “+” button will increase the brightness of the display.

Pressing the “-“ button will decrease the brightness of the display.

7.8.3 Currency



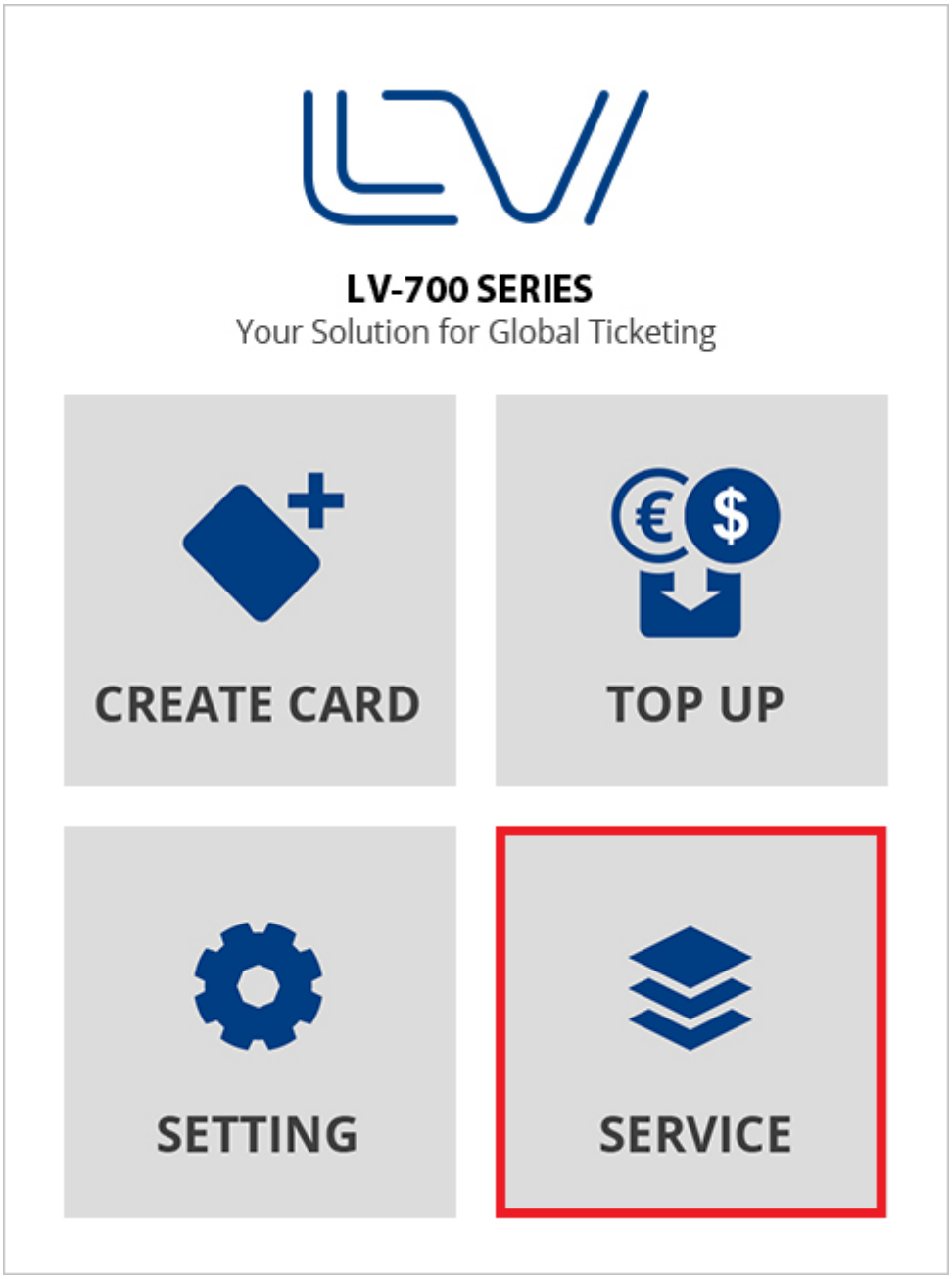
Tapping the “Currency” option in the Main Service Menu will allow the user to change the currency displayed by the application. Such as the amount deducted when processing an “Adult Single” ticket.



Currency screen.

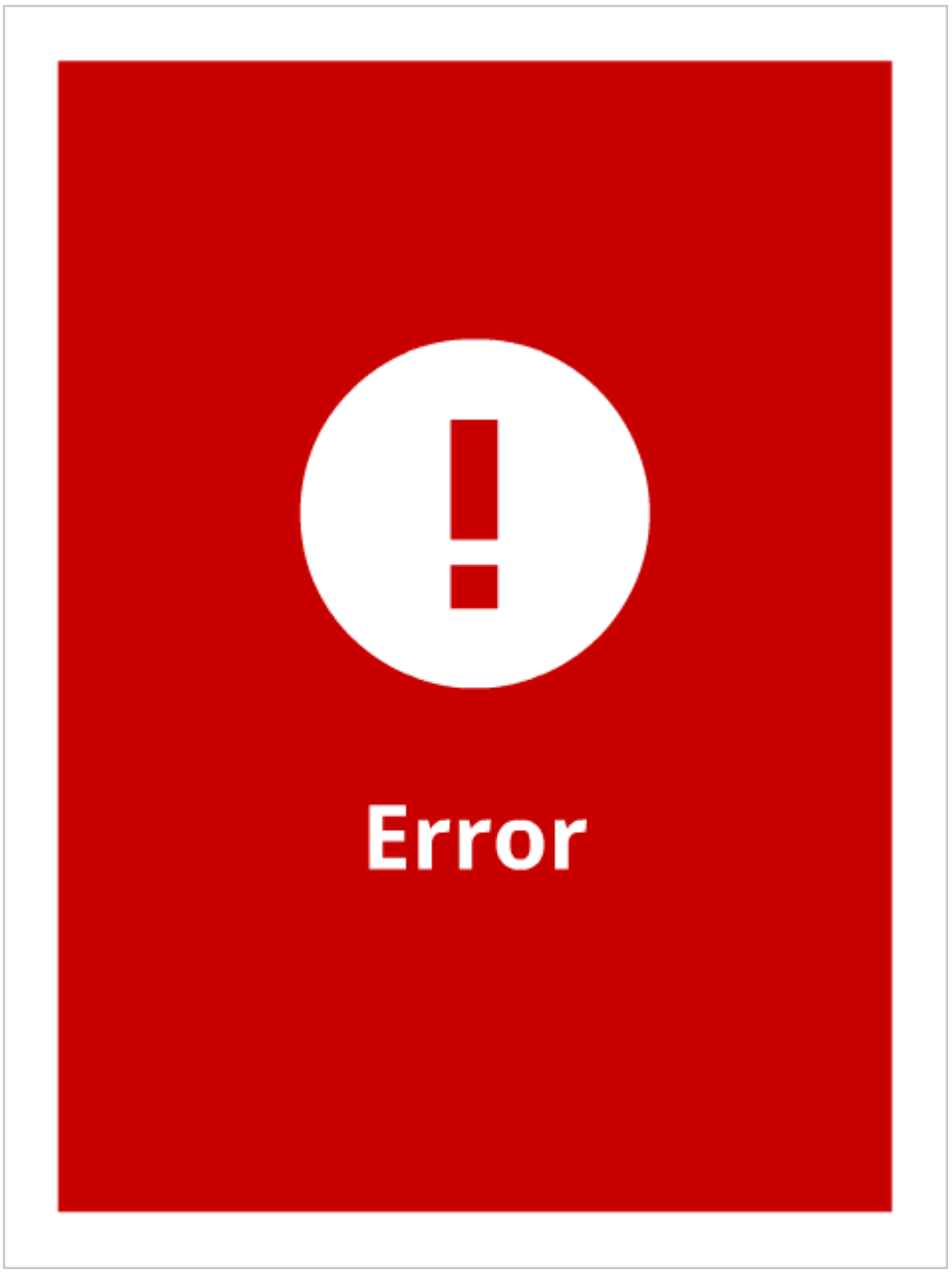
To change the currency one must tap on one of the two options.

7.9 Service



Service is not implemented. Nothing will happen if tapped.

7.10 Error Screen



Error Screen.

In case of errors during card transactions an error is displayed. This could be due to interrupted or corrupted communication, balance too low etc. An error sound is also played when this is displayed.

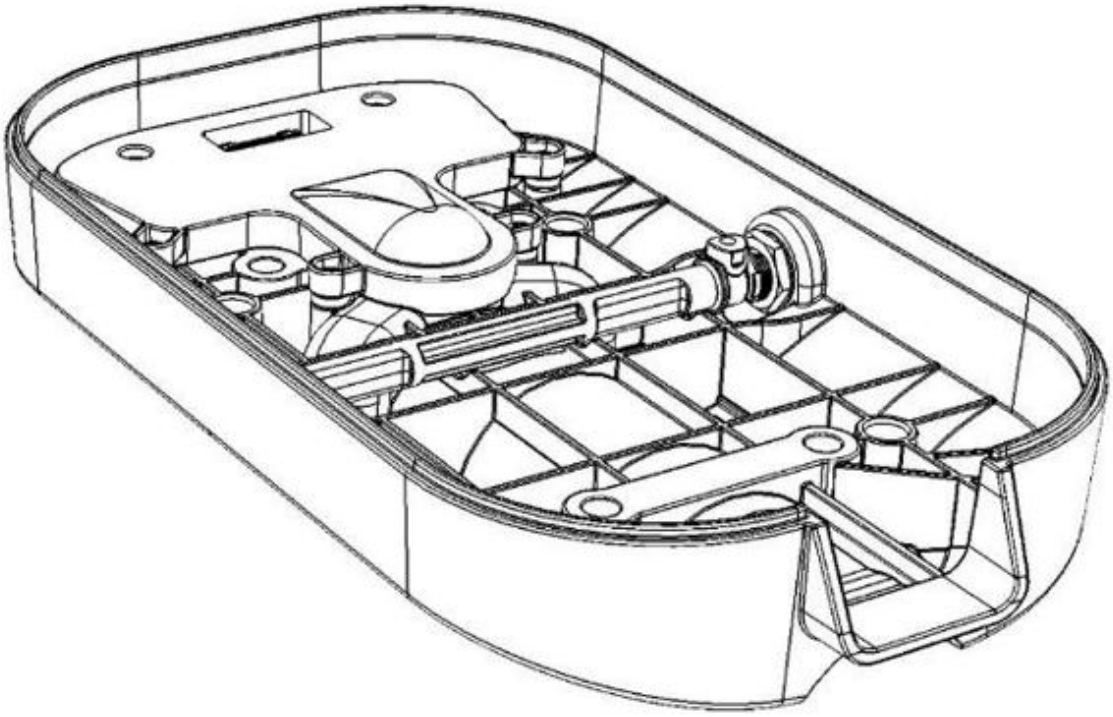
8. Installation

8.1 Required Tools and equipment

8.2 Mounting Module Assembly

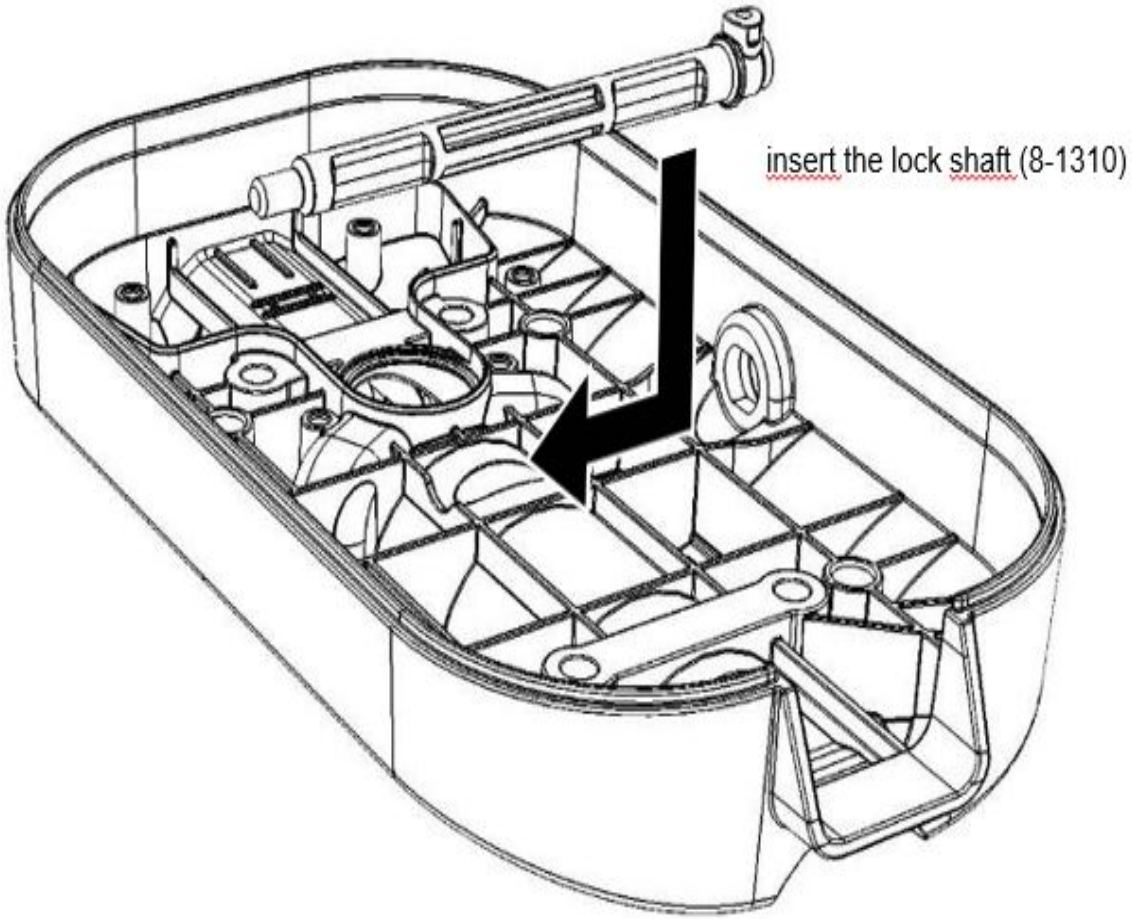
8.3 Kit in Bag details

8.4 On –board Mount Procedure

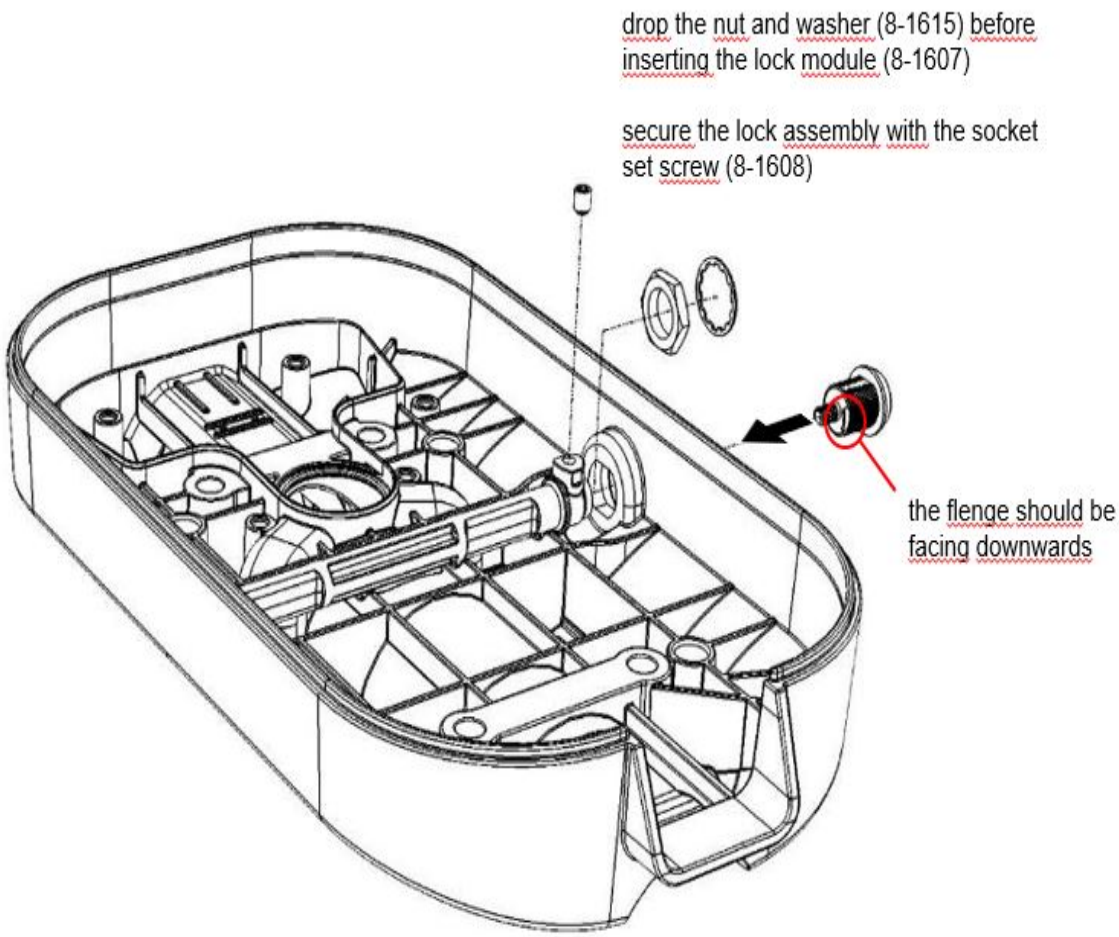


8.2 Mounting Module Assembly

- Mounting Module Insert the lock Shaft

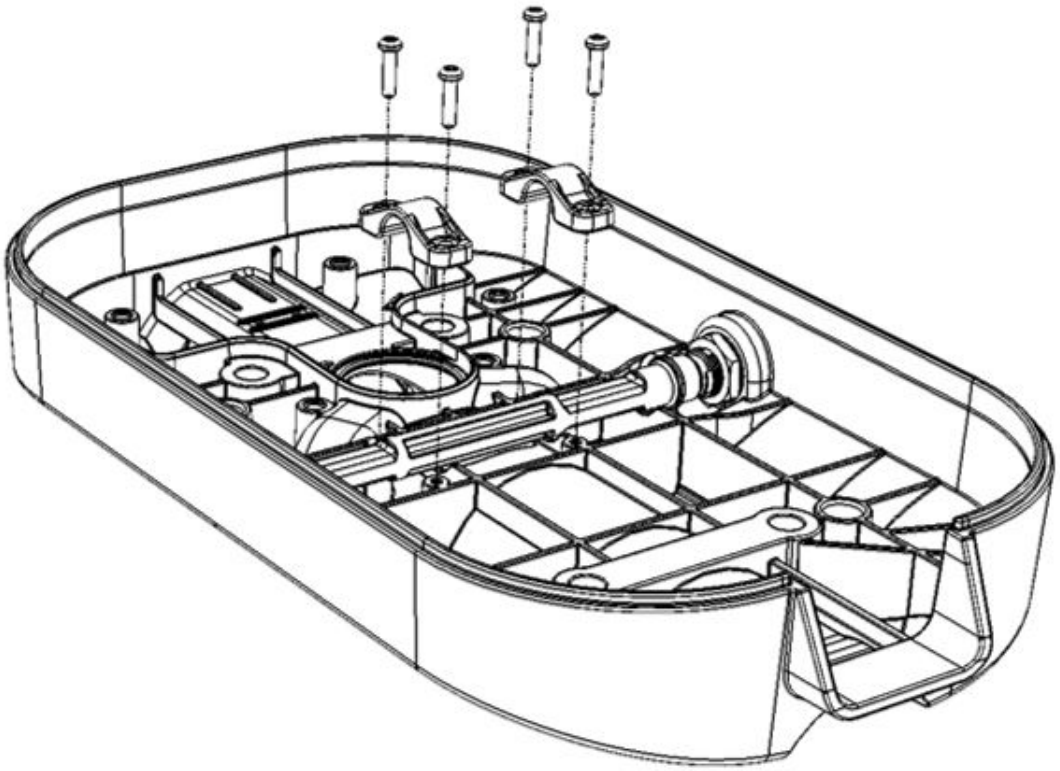


- Mounting Module: Assemble the lock system



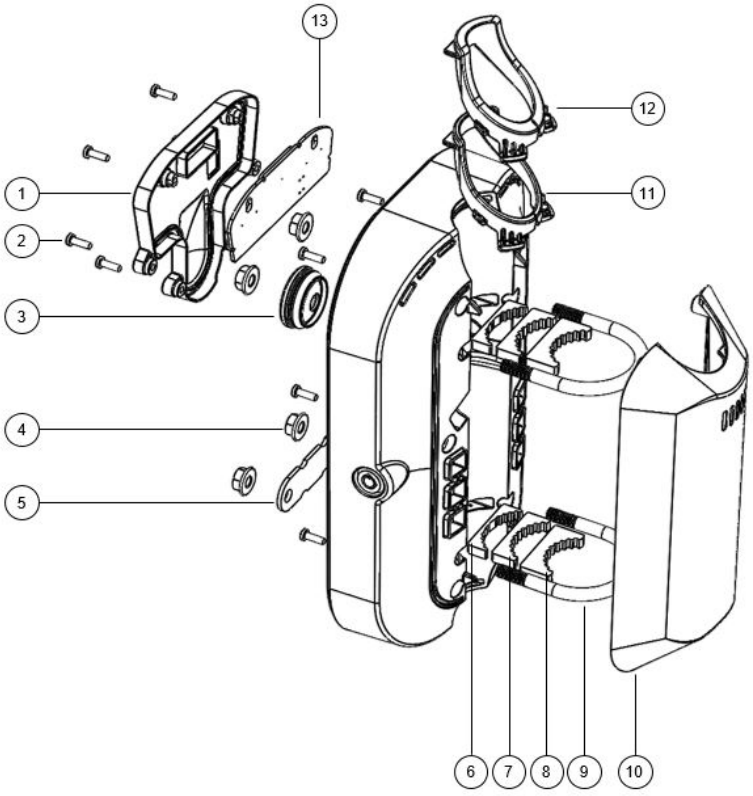
- Mounting Module: Secure the lock Shaft

Secure the lock shaft with 2 pcs u-fixing (8-1311) using 4 pcs screws (8-1604)



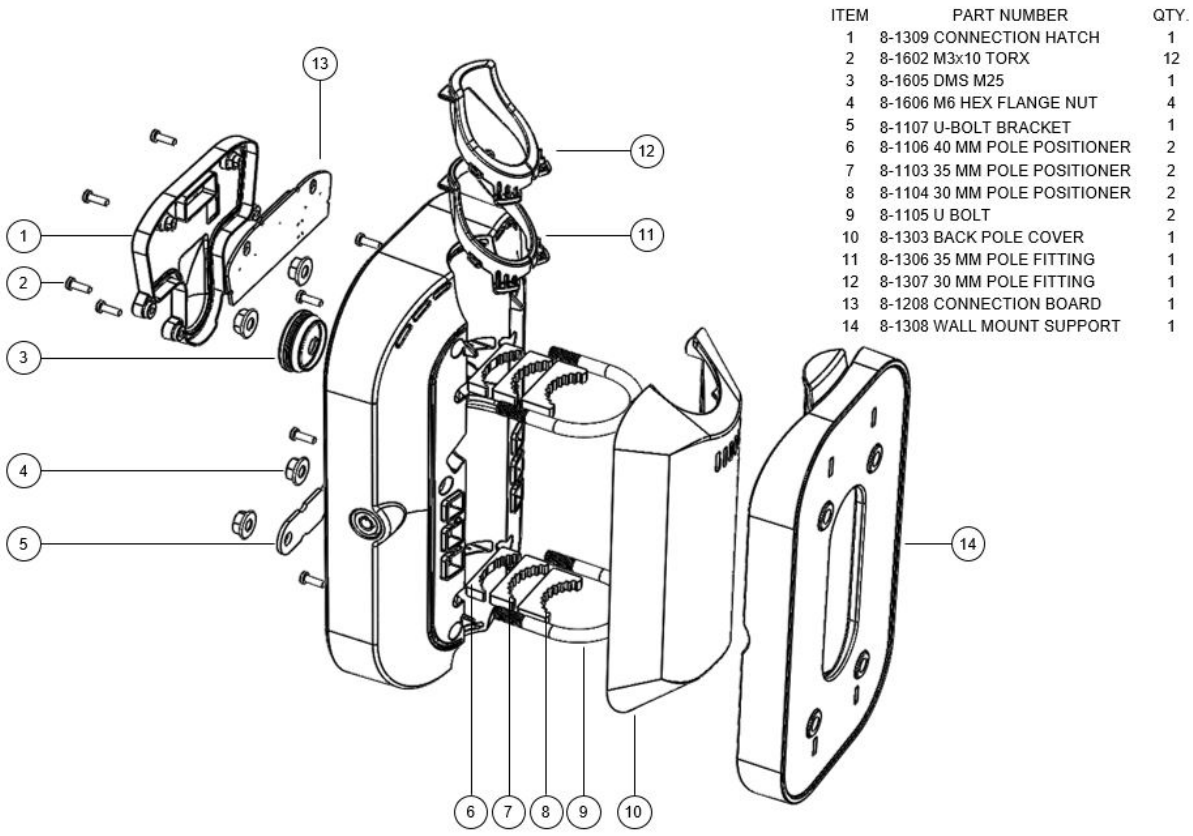
8.3 Kit in Bag details

- Pole Mounting Kit



ITEM	PART NUMBER	QTY.
1	8-1309 CONNECTION HATCH	1
2	8-1602 M3x10 TORX	12
3	8-1605 DMS M25	1
4	8-1606 M6 HEX FLANGE NUT	4
5	8-1107 U-BOLT BRACKET	1
6	8-1106 40 MM POLE POSITIONER	2
7	8-1103 35 MM POLE POSITIONER	2
8	8-1104 30 MM POLE POSITIONER	2
9	8-1105 U BOLT	2
10	8-1303 BACK POLE COVER	1
11	8-1306 35 MM POLE FITTING	1
12	8-1307 30 MM POLE FITTING	1
13	8-1208 CONNECTION BOARD	1

- Wall Mounting Kit



ITEM	PART NUMBER	QTY.
1	8-1309 CONNECTION HATCH	1
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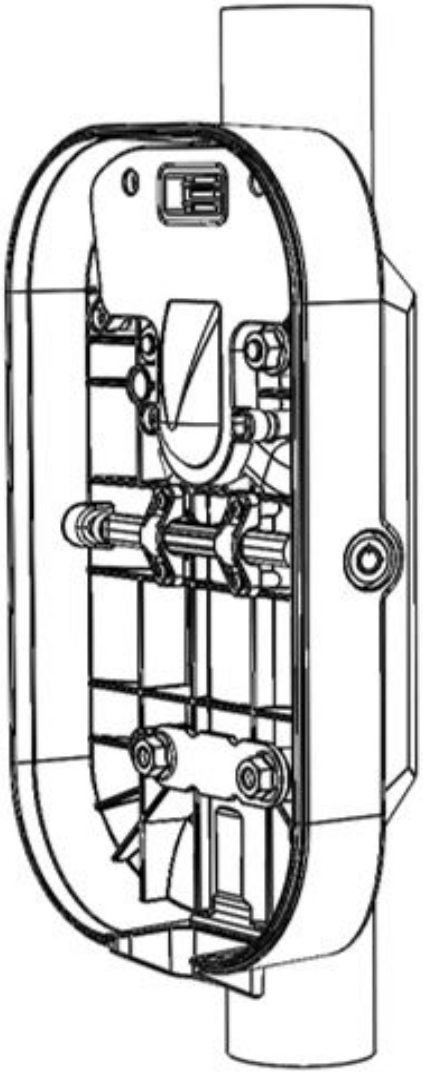
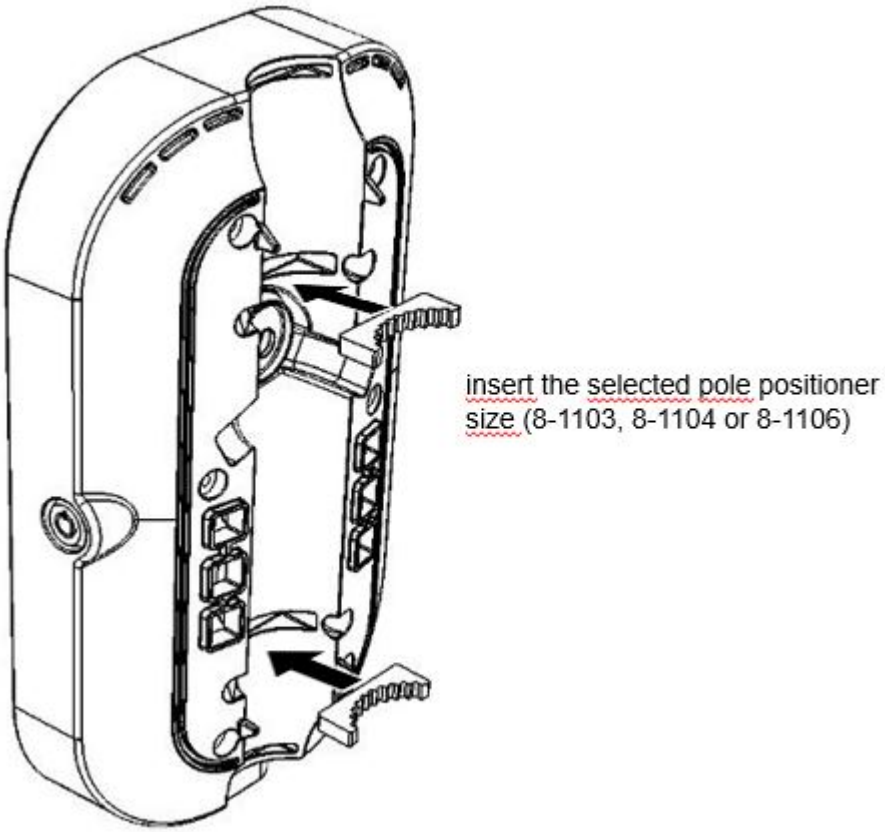
7	8-1103 35 MM POLE POSITIONER	2
8	8-1104 30 MM POLE POSITIONER	2
9	8-1105 U BOLT	2
10	8-1303 BACK POLE COVER	1
11	8-1306 35 MM POLE FITTING	1
12	8-1307 30 MM POLE FITTING	1
13	8-1208 CONNECTION BOARD	1
14	8-1308 WALL MOUNT SUPPORT	1

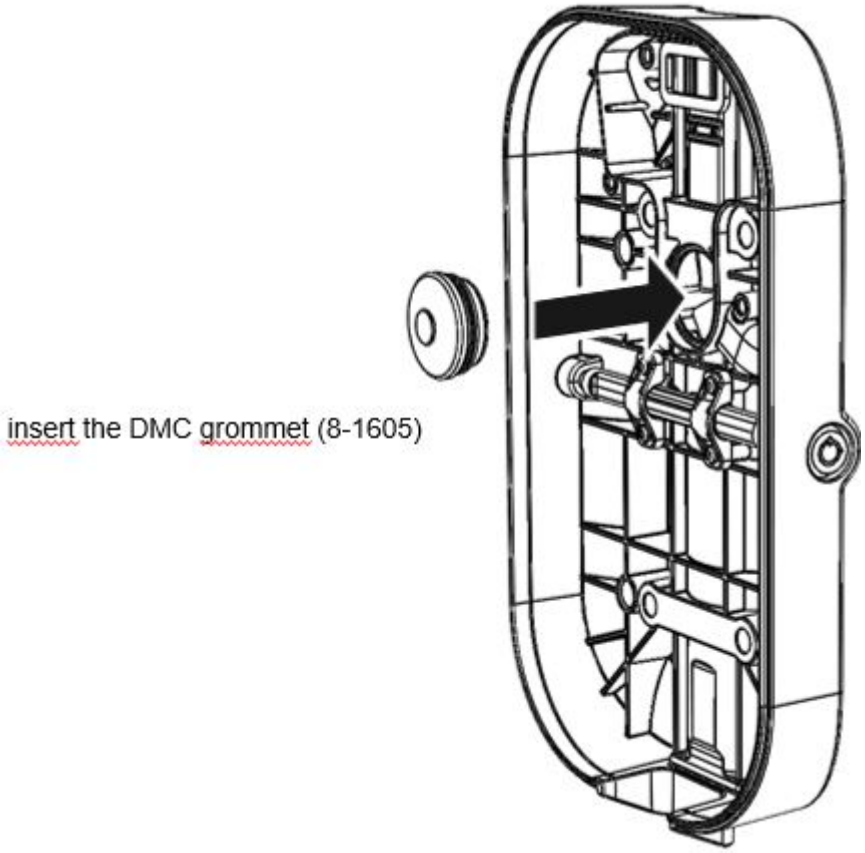
8.4 On-Board Mount Procedure



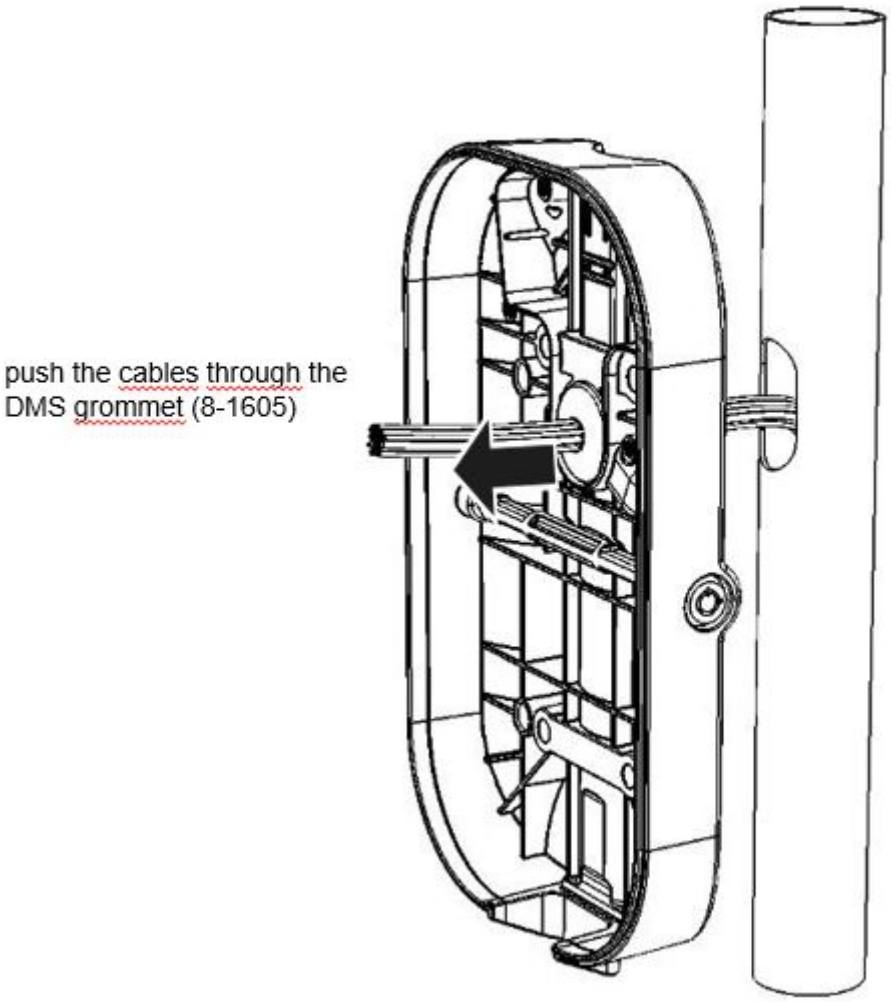
- On-Board Mount: Insert Pole Positioners



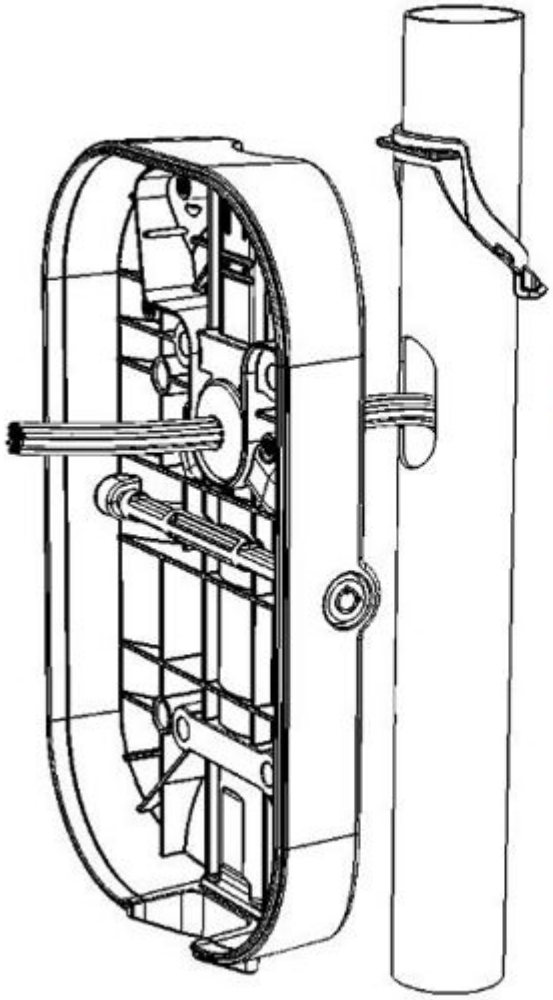
- On-Board Mount: Disassemble Connection Parts



- On-Board Mount: Cable Entry

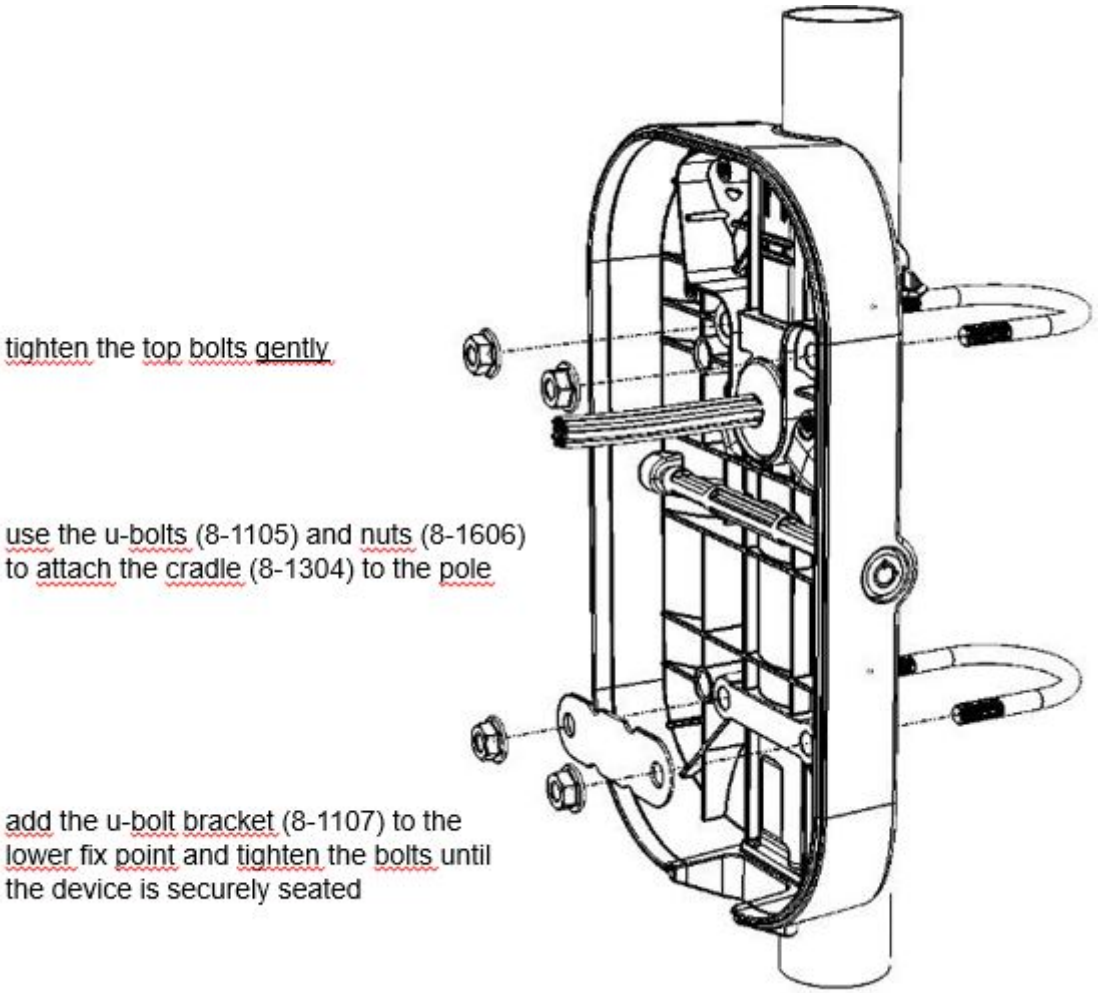


- On-Board Mount: Pole Fittings



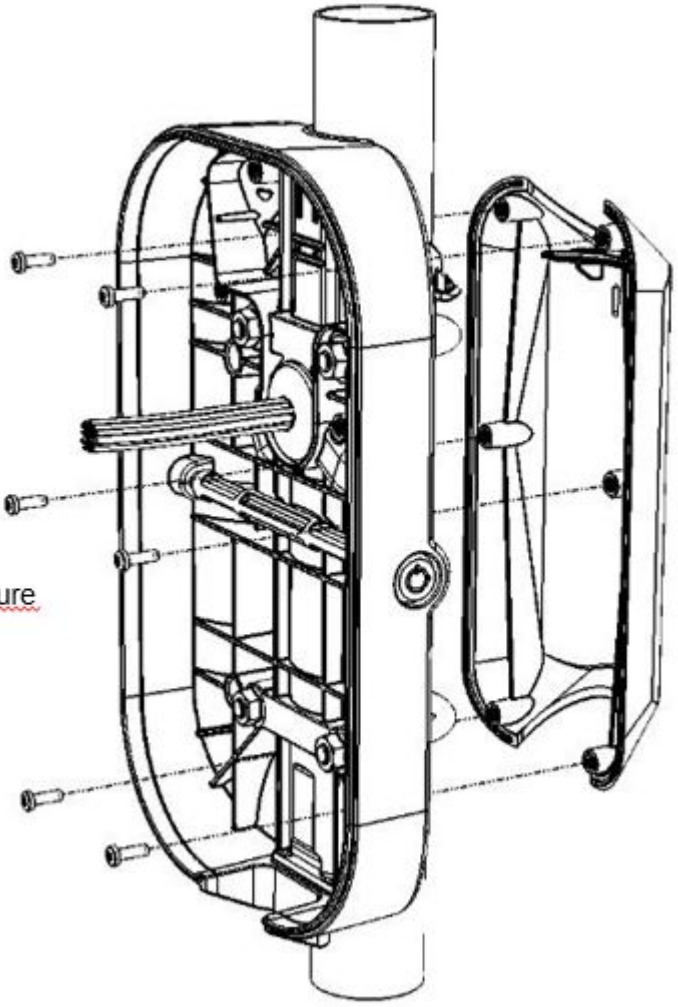
flex the selected pole fitting (8-1306 or 8-1307) around the pole

- On-Board Mount: Pole Brackets



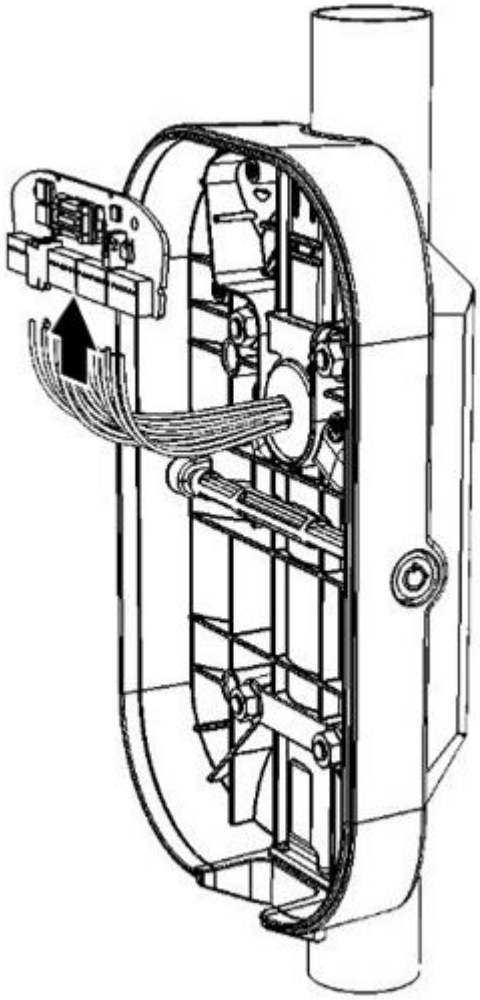
- On-Board Mount: Back Pole Cover

use 6 pcs M3 screws (8-1602) to secure the back pole cover (8-1303)

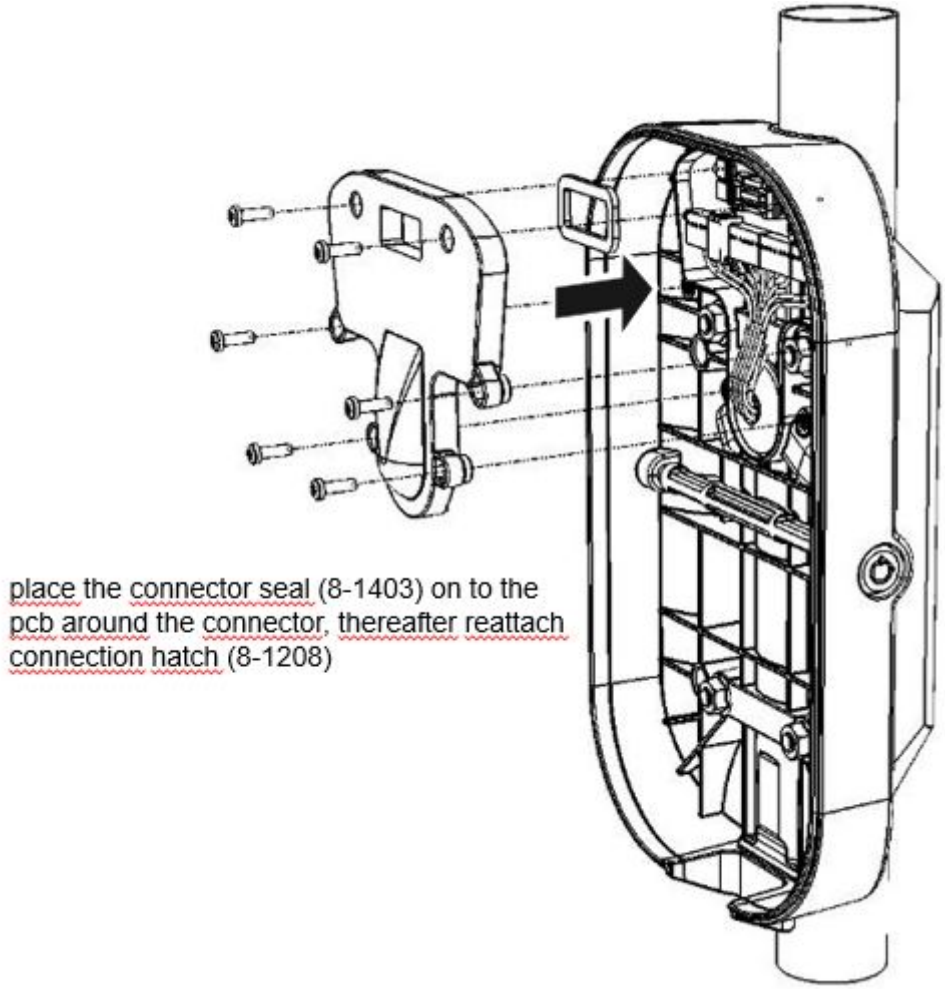


- On-Board Mount: Connecting Cables

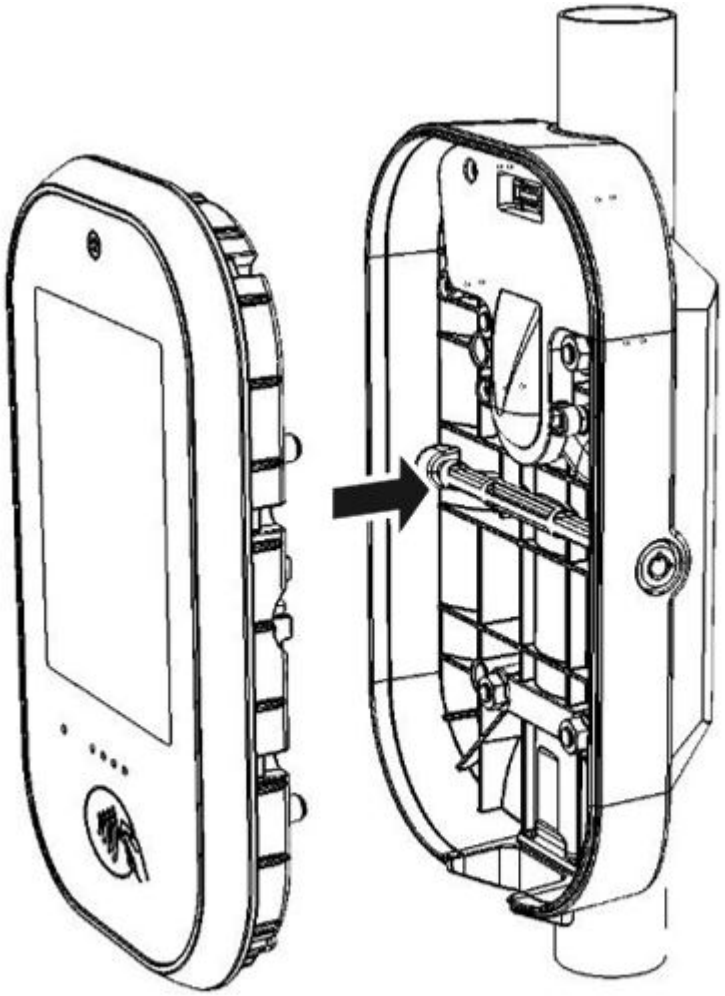
connect cables to the connector pcb (8-1208)



- On-Board Mount: Connection Hatch



- On-Board Mount: Operating Unit



the ticket device will be operational when the display module has been docked and locked to the cradle

FCC Part 15 Information to User:

Part 15.19(a):

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Part 15.105:

Class A Statement:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Part 15.21:

NOTE: The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.