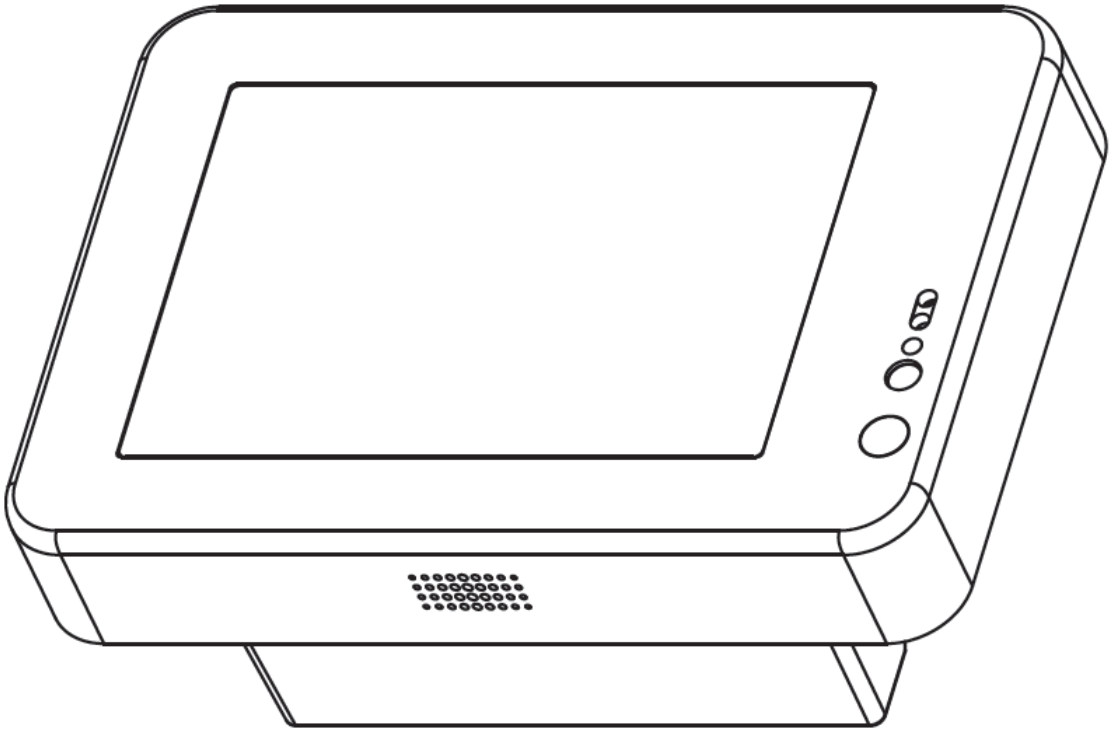
Product Manual

IM15 UNATTENDED PAYMENT TERMINAL PRODUCT MANUAL



PAX TECHNOLOGY LIMITED

4th FL, Building #3, Software Park, 2nd Central Science-Tech Road,
High-Tech Industrial Park, Shenzhen 518057, PRC
T: 0755-86169630 F: 0755-86169634

Copyright Notice

Revision History

Version	Contents	Author	Date
V1.00	Document Creation	William Qiu	2022/06/09
V1.01	added digital IO electrical characteristics	William Qiu	2022/06/15
V1.02	added antenna to product contents	William Qiu	2022/06/24

This document is meant to aid in the installation and operation of the IM15 unattended payment terminal.

Table of Contents

List of Tables

List of Figures

1 Product Overview

1.1 Glossary

Table 1: Terms and Definitions

Term	Definition
CPU	Central Processing Unit
DDR RAM	Double Data Rate Random Access Memory
ESD	Electrostatic Discharge
GND	Ground
LCD	Liquid Crystal Display
MCU	Microcontroller Unit
NFC	Near Field Communication
PIN	Personal Identification Number
QR	Quick Response
RAM	Random Access Memory
RS232	Recommended Standard 232
SAM	Secure Access Module
UPT	Unattended Payment Terminal
USB	Universal Serial Bus

1.2 Product Introduction

The IM15 unattended payment terminal is a POS terminal designed to operate in self-service environments. This device is designed to be used in a variety of indoor or outdoor settings, such for vending, parking, ticketing, charging stations, or self-service checkout registers.

This device combines a contactless card reader as well as 1D/2D code scanning, in addition to PIN entry via its touch display. Integration with contact and magnetic strip card readers such as the IM500 is also possible, providing additional functionality as part of a comprehensive payment system. The IM15 is also designed to operate in a wide range of temperatures, repel the ingress of dust and water, resist physical impacts, and disperse electrostatic discharges. These are all qualities that allow the device to be installed in a wide variety of indoor or outdoor locations

1.3 Product Contents

The following items may be included with the IM15 unattended payment terminal.

Table 2: Product Contents

Item	Quantity
IM15 unattended payment terminal	1
IM15 mounting bracket	1
M4 nuts	4
M4 screws	4
4G antenna (optional)*	1

* The availability and configuration of optional modules are dependent on the model number of the IM30 unit.

2 Product Specifications

2.1 Device Illustration

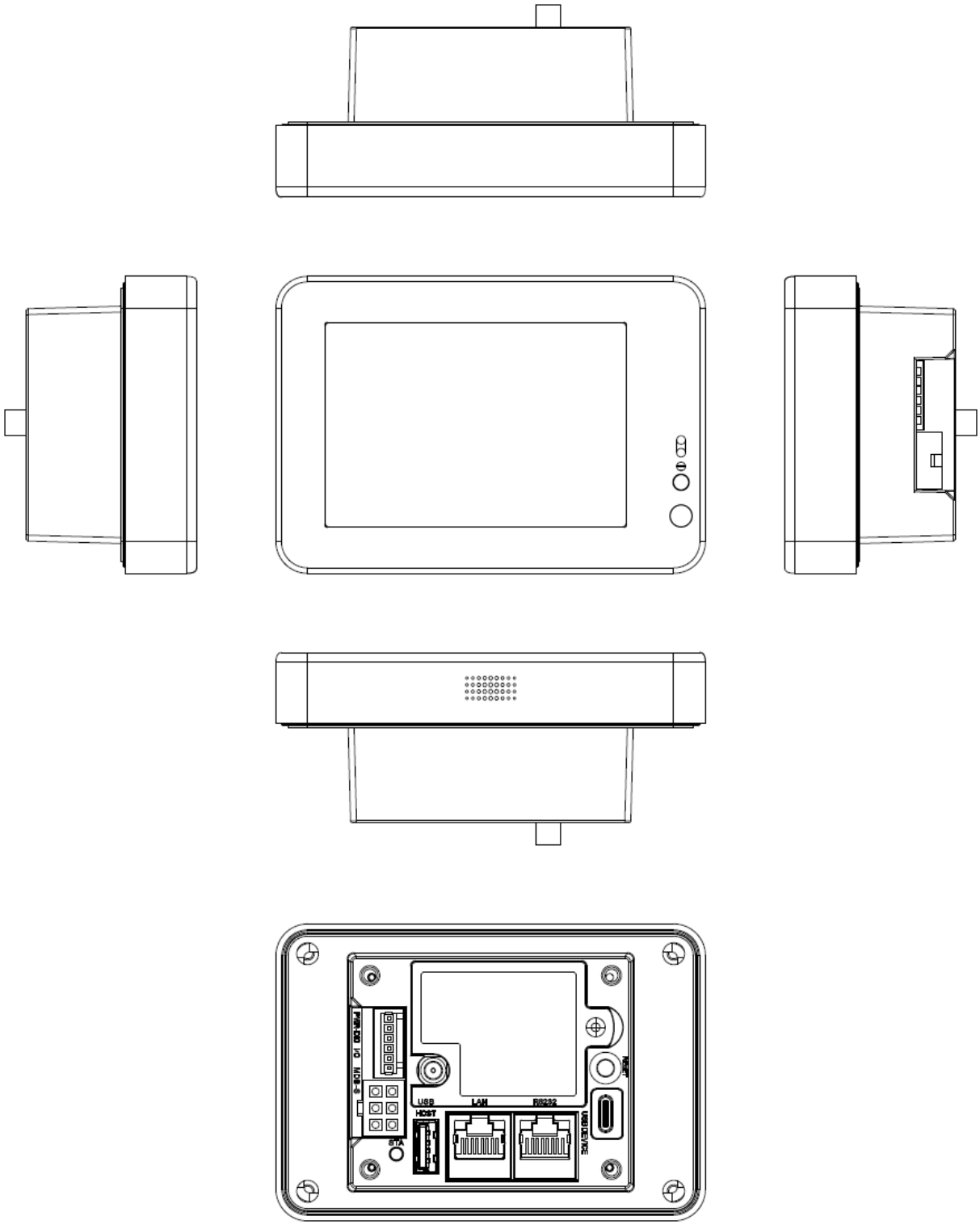


Figure 1: view from all sides

2.2 Device Specifications

2.2.1 Device Modules

Table 3: IM15 Device Module Outline

Module	Specifications	
CPU	ARM Cortex A5	
operating system	Linux (Prolin)	
memory	128 MB Flash 258 MB DDR SDRAM	
display	3.5" 320 x 480 pixels	
audio	built in speaker	maximum volume of at least 80 dB at 10 cm mono channel
wireless communications	Bluetooth 5.0	
	Wi-Fi 5	
	4G network	
external ports	USB Type A (Host)	
	USB Type C (Device)	
	RS232 (RJ45)	
	Ethernet (RJ45)	
	MDB port	
	Digital IO (6 pin header)	
power source	7 to 48 VDC; 1 A max (MDB port) 7 to 48 VDC; 1 A max (RS232 port) 7 to 48 VDC; 1 A max (6 pin WAGO header)	
SAM card slot	2 micro-SIM (2FF) SAM card slots	
SIM card slot	1 micro-SIM (2FF) SIM card slot	
card reader	contactless card reader	ISO14443 Type A/B cards MIFARE cards JIS X 6319-4 FeliCa NFC devices
code scanner	2 MP accuracy ≥ 5 mil	
operating	Temperature	-20°C ~ 70°C

environment	Humidity	5% ~ 95% (without condensation)
storage environment	Temperature	-30°C ~ 70°C
	Humidity	5% ~ 95% (without condensation)

2.2.2 Components, Interface, and Ports

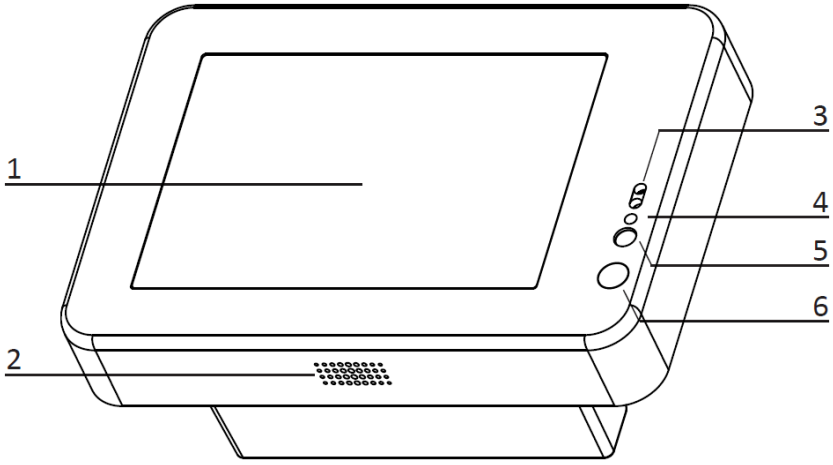


Figure 2: components, interface, and ports (front)

1. LCD screen
2. speaker
3. proximity and light sensor
4. LED indicator
5. camera locator light
6. code scanning camera

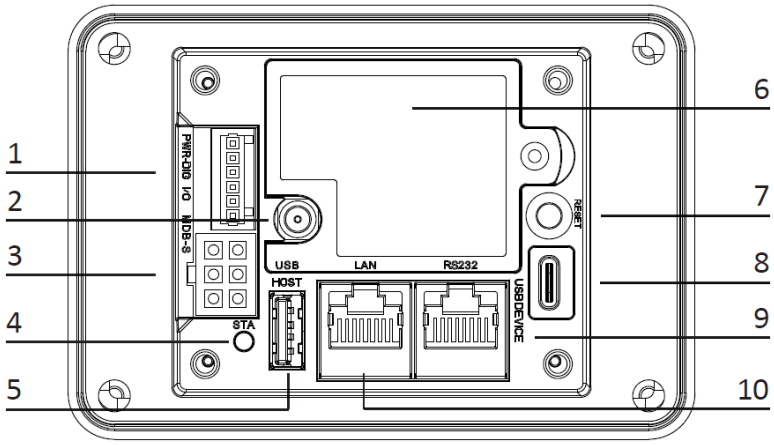


Figure 3: components, interface, and ports (IM15-0BA-R65-02L0, back)

1. digital IO port
2. 4G antenna (SMA)
3. MDB port
4. status indicator LED
5. USB Type A port (host)
6. back cover
7. reset button
8. USB Type C port (device)
9. RS232 (RJ45)
10. Ethernet port (RJ45)

2.2.3 Output Connectors

RS232: Recommended Standard 232 (RS232) is a protocol for serial communication. There is an RJ45 port on the IM15, labeled as RS232, which uses this protocol and has the following pinout:

Table 4: RS232 pinout

pin	signal
1	POWER_IN
2	RXD
3	TXD
4	MDB_nWAKE
5	RTS
6	CTS
7	GND
8	GND

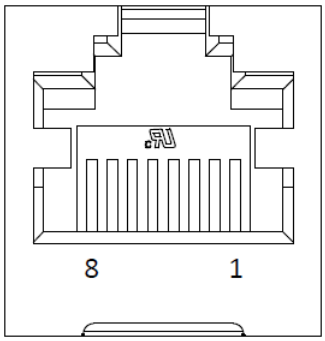


Figure 4: RJ45 port (RS232/F-BOX)

MDB: Multidrop Bus (MDB) is a communication protocol commonly used in the vending machine industry. Certain versions of the IM15 has a MDB slave port that can communicate to a vending machine controller as well as accept an input voltage of 12V to 42V.

Table 5: MDB pinout

pin	signal
1	VDC
2	GND
3	NC
4	MASTER_RX
5	MASTER_TX
6	COM (D_GND)

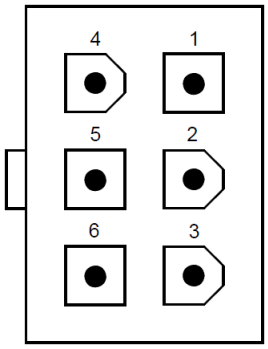


Figure 5: MDB port

USB: Universal Serial Bus (USB) is a widely adopted communication protocol used across a broad range of electronic devices. The IM15 has both a USB Type A and Type C port available for use.

Table 6: USB pinout (Type A host)

pin	signal
1	VIN
2	D-
3	D+
4	GND

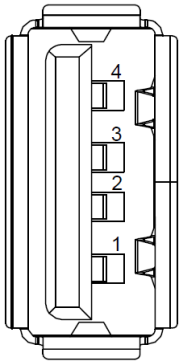


Figure 6: USB Type A port

Table 7: USB pinout (Type C device)

pin	signal	pin	signal
A1	GND	B1	GND
A2	NC	B2	NC
A3	NC	B3	NC
A4	USB_VBUS	B4	USB_VBUS
A5	NC	B5	NC
A6	D+	B6	D+
A7	D-	B7	D-
A8	NC	B8	NC
A9	USB_VBUS	B9	USB_VBUS
A10	NC	B10	NC
A11	NC	B11	NC
A12	GND	B12	GND

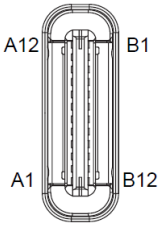


Figure 7: USB Type C port

Digital IO: Digital input and output signals can be used to directly interface with a CPU to perform custom functions. The IM15 implements a custom 6 pin digital IO port using a WAGO 733-336 header. This port can be programmed to accept a variety of inputs or output a specific control signal.

Table 8: digital IO pinout

pin	signal
1	DIGI_IN3
2	DIGI_IN2
3	DIGI_IN1
4	DIGI_OUT1
5	GND
6	POWER_IN

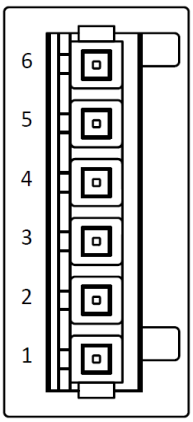


Figure 8: digital IO port

Table 9: Digital IO Electrical characteristics

signal	connected circuit requirements		voltage		current	
			min	max	min	max
DIGI_IN3	active low, requires current sink	V_{ON}		0.4V		200mA
		V_{OFF}	0.7V	30V		
DIGI_IN2	active low, requires current sink	V_{ON}		0.4V		200mA
		V_{OFF}	0.7V	30V		
DIGI_IN1	active low, requires current sink	V_{ON}		0.4V		200mA
		V_{OFF}	0.7V	30V		
DIGI_OUT1	requires external pull up		3.3 V	32 V		350mA

Note: Select pull up resistors, current limiting resistors, and voltage sources so that values stay within the given range. If an external pull up is not available DIGI_OUT1 can be shorted with an unused digital input signal to provide a 3.3V pull up.

Ethernet: Ethernet is a common networking protocol for local area networks. The IM15 has a Ethernet 10/100 Base-T port that it can use to connect to a wired LAN.

Table 10: Ethernet port pinout

pin	signal
1	TX+
2	TX-
3	RX+
4	NC
5	NC
6	RX-
7	NC
8	NC

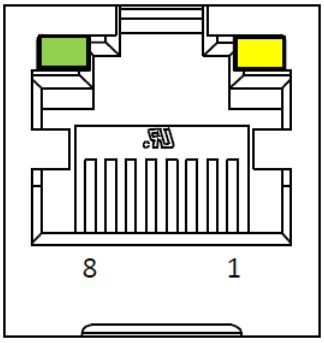


Figure 9: Ethernet port

2.2.4 SIM card Installation

The IM15 has 1 micro-SIM (2FF) sized SIM card slot available for use.

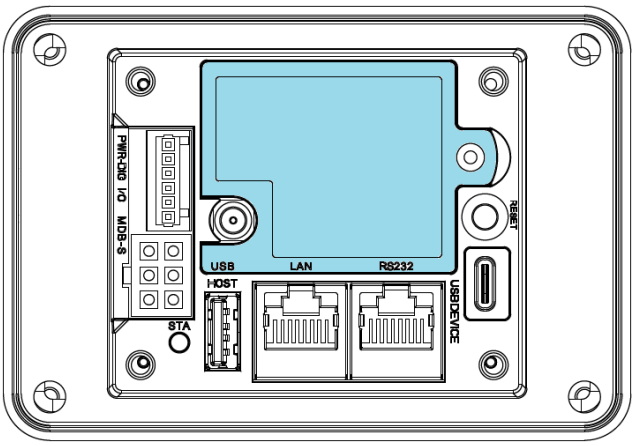


Figure 10: IM15 back cover

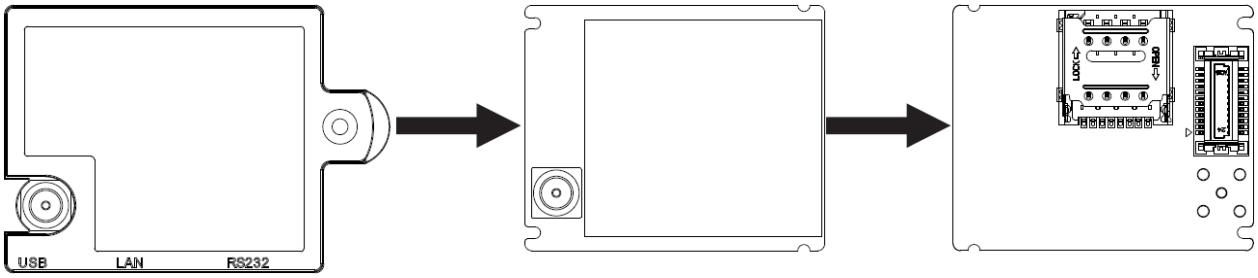


Figure 11: SIM card installation (back cover; 4G board front; 4G board reverse)

The SIM card slot is located on the 4G network board of the IM15. Take the following steps to install a SIM card in the IM15:

1. Remove the back cover of the IM15 by unscrewing it from the body of the device.
2. Once the cover is removed, the 4G network board is visible. Removed the 4G network board by holding the SMA connector and pulling away from the body of the device.
3. After the 4G network board is removed, flip it to its reverse side to reveal the SIM card slot.
4. Open the card mount and insert a card with the contacts facing the board and the clipped corner of the card aligned with the card slot, then lock the mount with the card inside.
5. Reassemble the IM15 by reversing steps 1 through 3.

2.2.5 SAM card Installation

The IM15 has 2 mirco-SIM (2FF) sized SAM card slots available for use.

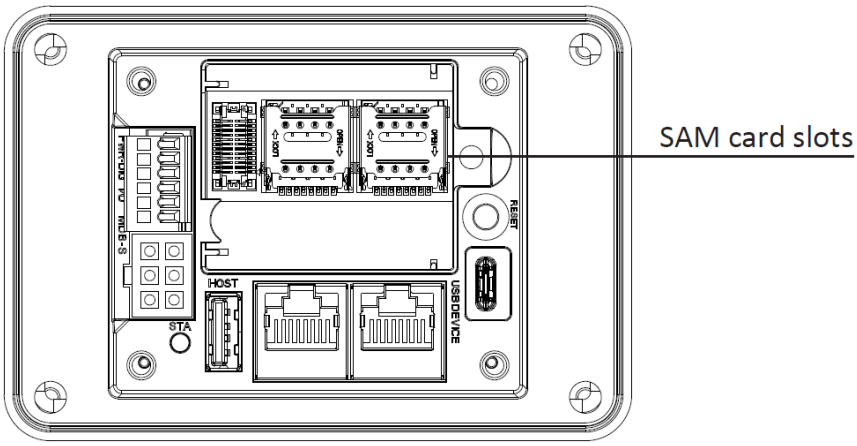


Figure 12: SAM card slots

The SAM card slots are located under the 4G network board of the IM15. Take the following steps to install a SAM card in the IM15:

1. Perform steps 1 through 3 of the SIM card Installation process.
2. Open the card mount and insert a card with the contacts facing the board and the clipped corner of the card aligned with the card slot, then lock the mount with the card inside.
3. Reassemble the IM15 by reversing steps 1 through 2.

2.2.6 Display

The IM15 has a 3.5" LCD screen located on its front face.

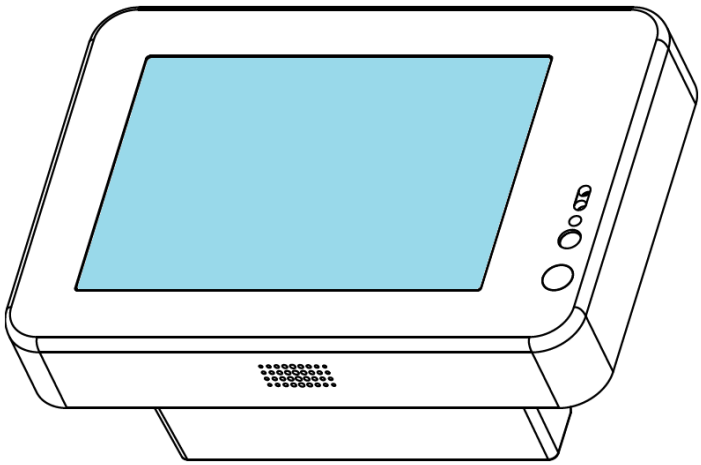


Figure 13: LCD screen

This color display has a resolution of 320 x 480 pixels and is equipped with an adjustable LED backlight, allowing the screen brightness to be adjusted as needed. It functions as the primary mechanism for the device to display information to users, guiding them through the payment process.

2.2.7 Code Scanning Camera

The IM15 has a code scanning camera located on the bottom right corner of its front face.

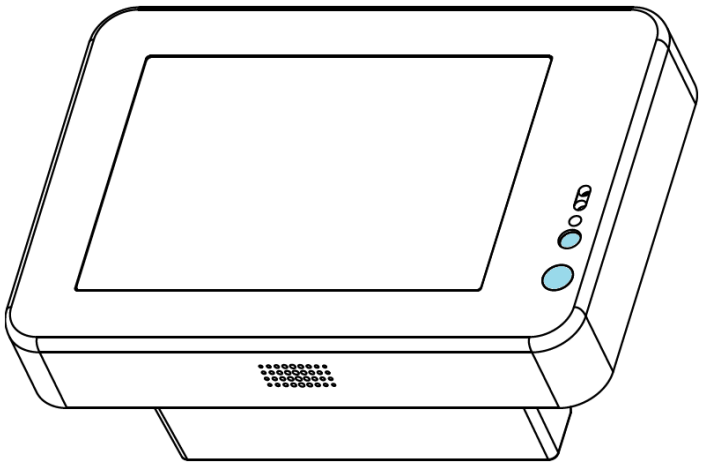


Figure 14: code scanning camera

This 2 megapixel camera is designed to read common 1D or 2D codes. The camera is equipped with an LED that provides lighting during the code scanning process.

Code Scanning Camera

1D codes:	Code11, Code39, Code93, Code128, EAN-8, EAN-13, UCC/EAN 128, UPC-A/E, JAN-13, ISSN EAN, ISBT-128, ISBN-13, Interleaved 2 of 5, Matrix 2 of 5, Industrial 2 of 5, GS1, Codabar
2D code:	PDF417, QR Code, Data Matrix, Aztec

2.2.8 Proximity and Light Detector

The IM15 has a code scanning camera located on the right side of its front face.

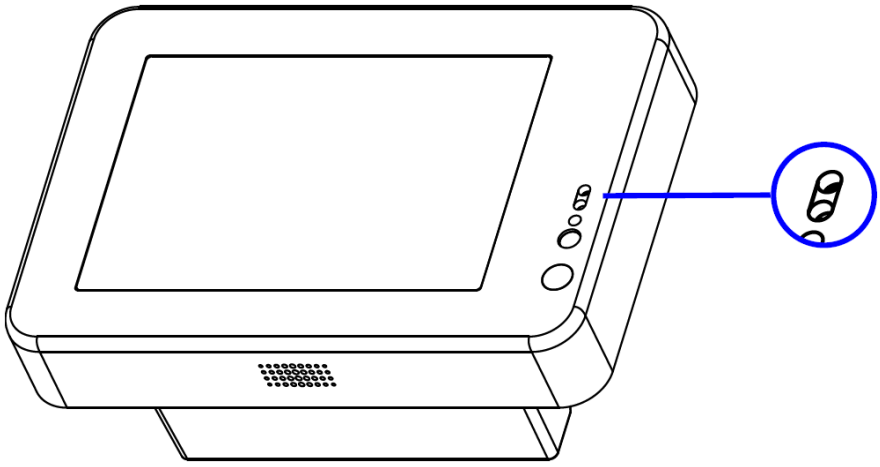


Figure 15: proximity and light detector

This proximity and light detector is designed to act as a wakeup signal for when object approach within 10 cm of the sensor. This allows for power conservation while also quickly responding to potential users. The light sensor can also be used to automatically adjust screen brightness to suit the ambient lighting.

2.2.9 Contactless Card Reader

The IM15 has a contactless card reader with an RF antenna located on front face. The read area for this card reader roughly corresponds to the entire front face of the device.

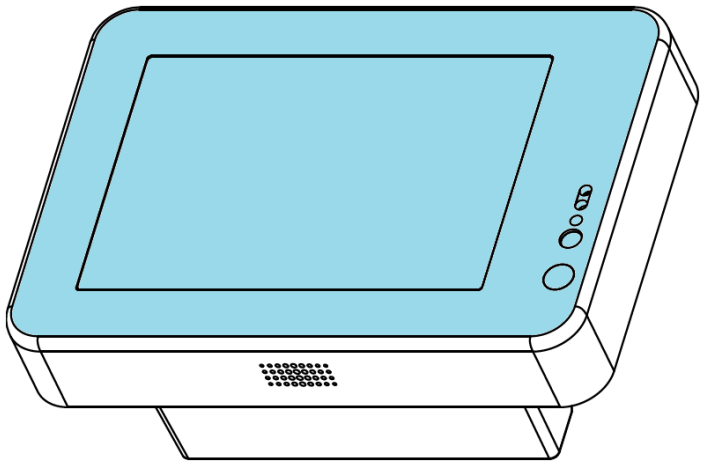


Figure 16: contactless card reader interface area

The contactless card reader reads cards and devices placed roughly parallel to the area indicated in Figure 16: contactless card reader interface area from a distance of anywhere from 0 to 4 cm. For best results, place as close to the screen as possible and center the card over the indicated area.

Contactless Card Reader

support ISO14443 Type A/B, ISO/IEC 18092 / ECMA-340, ISO/IEC 21481 / ECMA-352, closed loop Mifare™, JIS X6319-4 FeliCa™, and NFC devcies.

2.2.10 Speaker

The IM15 has a speaker located on the center of its bottom face.

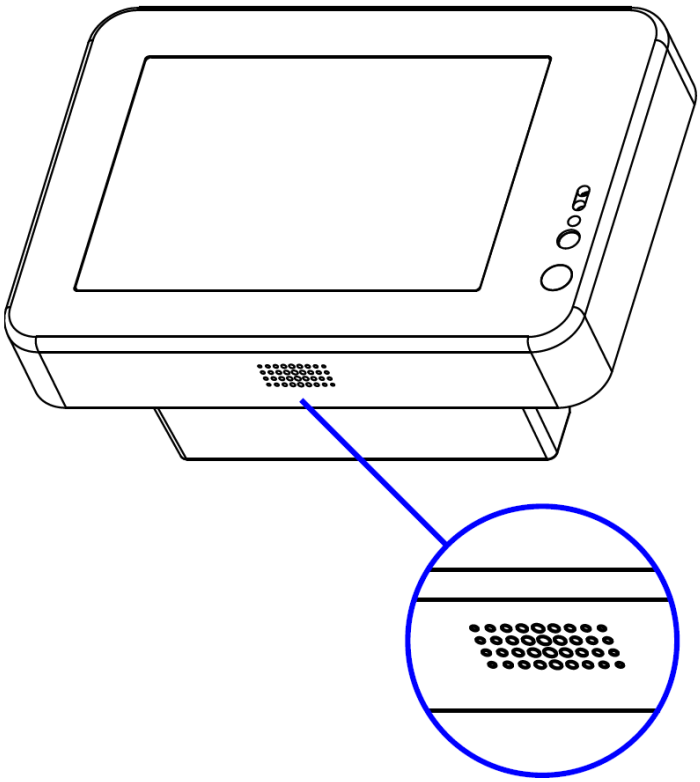


Figure 17: speaker

The IM15 speaker can output audio signals of up to 80 dB at a distance of 10 cm, the volume is software controlled and can be adjusted. This can be used to output user prompts for the card reader and code scanner as well as default tones for presses of the functional keys or occurrences of errors.

2.2.11 Wi-Fi and Bluetooth

The IM15 has a Wi-Fi and Bluetooth combination module, which would allow the IM15 unit to connect to nearby Wi-Fi networks as well Bluetooth devices.

Wi-Fi specification:

- frequency: 2.4 GHz; 5 GHz
- protocol: IEEE 802.11a/b/g/n/ac

Bluetooth specification:

- protocol: Bluetooth 5 (BDR, EDR, BLE)
- modulation: GFSK, π/4-DPSK, 8DPSK

3 Product Installation

3.1 Device Dimensions

The IM15 has the physical dimensions shown in Figure 18. Note that various cables plug directly into the back of the device, so greater clearance than shown for the back end of the device is needed to properly install an IM15 unit.

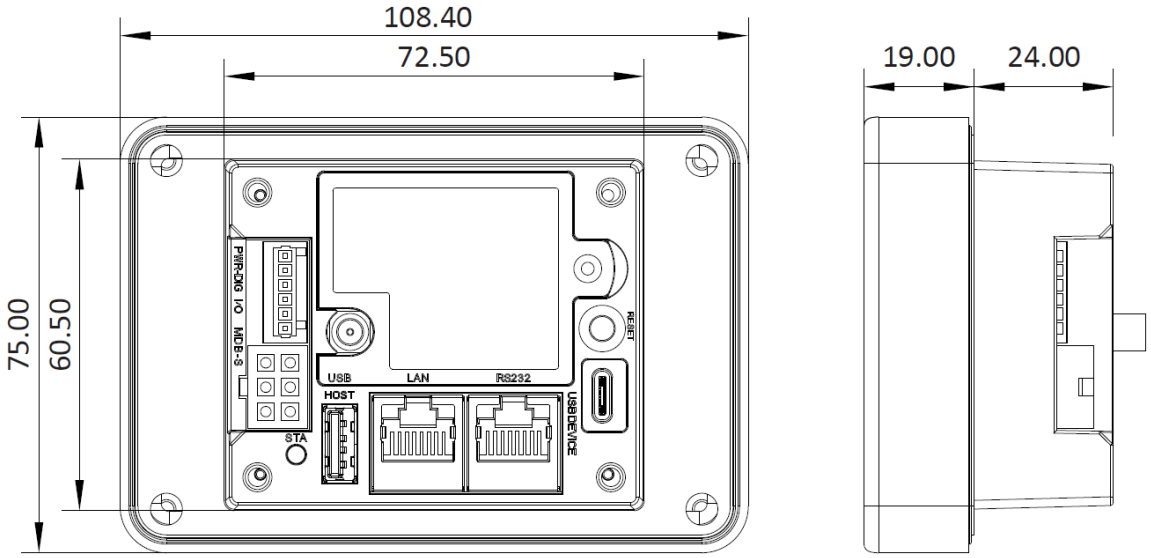


Figure 18: device dimensions (mm)

3.2 Mounting Bracket

The IM15 are equipped with a mounting bracket that allows it to be fixed into place on a mounting plate.

3.3 Mounting Plate Dimension

The IM15 is designed to be mounted on vertical surfaces through a mounting plate. The following is one such example that can be used along with the mounting bracket included with the IM15.

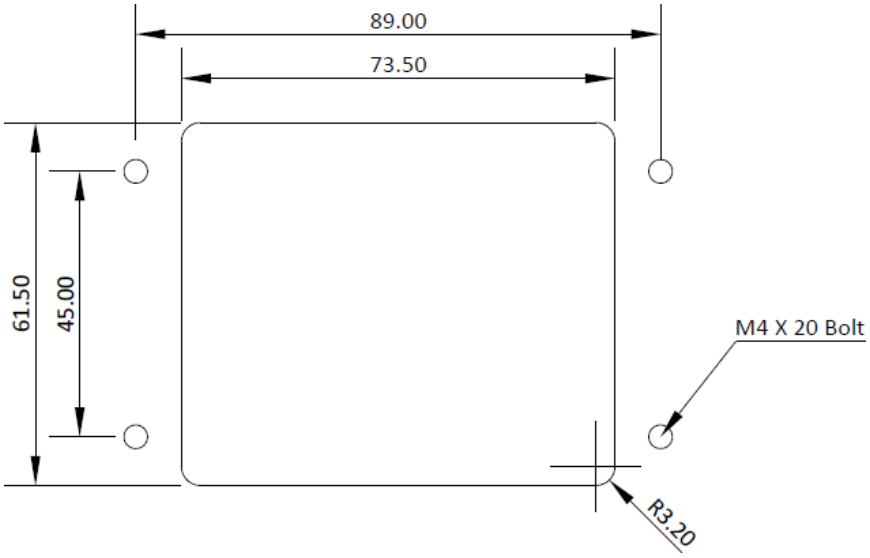


Figure 19: mounting plate dimensions (mm)

These dimensions are those of a *standard door module* as defined by the European Vending Association. The M4 stud bolts should extrude from the back of the mounting plate to allow for the mounting bracket to slot into place.

3.4 Device Installation

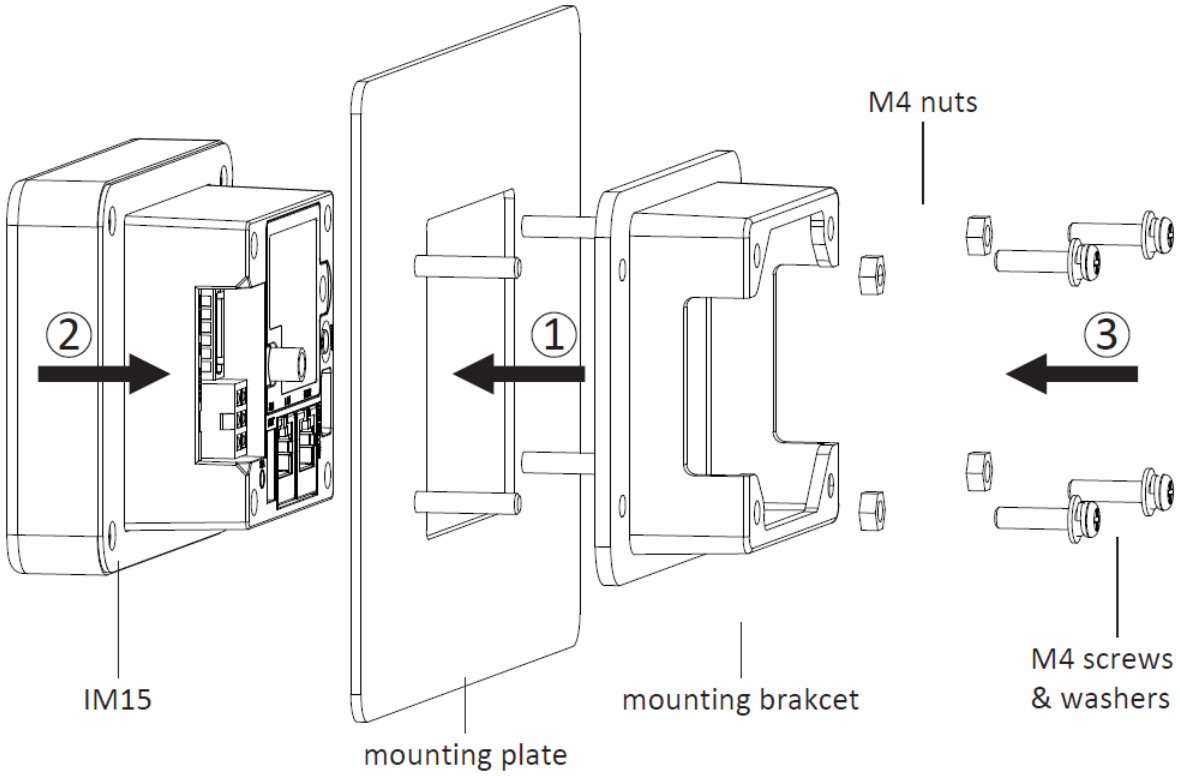


Figure 20: device installation

Take the following steps to install the IM15 onto a mounting plate:

1. Begin by securing the mounting bracket onto the mounting plate. The back of the mounting plate should have four M4 stud bolts that correspond to four mounting points on the mounting bracket. Slid the mounting bracket onto the bolts, then use M4 nuts to secure it in place.
2. After the mounting bracket is secured to the mounting plate, insert the IM15 unit through the front of the mounting plate into the mounting bracket.
3. Apply a torque of 1.2 ± 0.2 Nm to the four M4 screws to secure the IM15 to the mounting bracket through its four inner mounting points.

4 Product Services

4.1 FAQ

display

Q:	Why is screen so bright/dim?
A:	The brightness of the screen be adjusted; the level of illumination provided by the backlight can be changed in the device settings.

Q:	Why is the screen blank after startup?
A:	If the PAX logo appears during the startup procedure, check that whatever applications installed into the device are operating properly. If the PAX logo does not appear, contact an agent from your local vendor to repair the device.

card reader

Q:	What should I do if the contactless card reader is not working?
A:	First check to see if the card or device being used has contactless functionality. If it does, then make sure the card or device is placed and oriented properly, the proper use of the contactless card reader is outlined in 2.2.9. Also avoid placing the device near metallic objects or nearer than 20 cm to another device with a contactless card reader. Afterwards, attempt to read another contactless card to determine whether the problem is a defective card. Last of all manually enter the card information to process the transaction and confirm that the device has malfunctioned. If none of the above steps resolve the problem, contact an agent from your local vendor to repair the device.

Q:	What should I do if the device does not detect a SAM card?
A:	First confirm that a SAM card has been installed into the terminal. Then check to see if the card is damaged or if the contacts are tarnished. If the contacts are dirty, clean them and check whether that resolves the problem. Lastly, check to see if the SAM card is properly mated with the device, attempt to use another card to see if that resolves the problem.

camera and code scanner

Q:	What should I do if the code scanner is not working?
A:	Confirm that the code you are scanning is orientated properly roughly parallel to the code scanning area outlined in 2.2.7, and maintain a distance of approximately 10 cm from the camera lens. Also make sure that the barcode or QR code being scanner is not covered, stained, or otherwise damaged. If there are signs of damage, replace the code being scanned. Check to see if the transparent plastic covering for the code scanning area is clean, if there is a protective plastic film over the covering, remove that as well before attempting to use the camera again. If reading the code off of an electronic display, increase the resolution or screen brightness before attempting to read the code again. If there is no damage to the code, it's possible that the device does not support the code you are attempting to scan, in which case you should contact an agent from your local vendor for possible solutions.

communication modules

Q:	What should I do if there are errors while using the Wi-Fi module?
A:	First confirm that the Wi-Fi module and the router is turned on, and that the router is broadcasting a signal with sufficient strength. Then check that the network setting is compatible with the device you wish to use (the IM15 uses DHCP). Make sure that the name and password of the network you are attempting to connect to are both correct. Check to see if the network you are attempting to connect to only accepts preset IP or MAC addresses; if so, add the IM15 to the list of devices allowed on the network. You can determine if an error with that specific router or network by attempting to connect to another network instead. If the device is connected to a network but there is no internet access, check that the network is connected to the internet. Finally, you can attempt to place the device closer to the router or restart the device and attempt to connect to the network again.

Q:	What should I do if there are errors while using the Bluetooth module?
A:	First confirm the Bluetooth module on the IM15 and any device you are attempting to pair is turned on. Check to see whether the linked device is in range and that there are no objects impeding the signal. Also see if the device is properly broadcasting and there are no objects with the same name. Finally confirm that the password you are using is correct. If none of this works, attempt to repair after restarting the Bluetooth module.

Q:	What should I do if the USB port is not working?
A:	First confirm that there are no foreign objects present in the USB port and that the USB cable is fully plugged into the port. Also make sure that the cable used follows USB specifications, attempt to use another cable if possible. Check to see if the USB drivers are present and up to date.

Q:	What should I do if there are errors while using the USB port?
A:	Use the USB cable packaged with the IM15 unit instead of a third party cable. Do not use an USB hub, directly attach the cable to whatever device is being linked.

other problems

Q:	What should I do if there appears to be damage to the tamper proof label?
A:	Damage to the tamper proof label may indicate damages to the device itself. Immediately return the device to the supplier, the device safe to use only after it has been properly tested.

Q:	What should I do if the device displays "no program" or "PED lock"?
A:	Return the device to its supplier, the device is only usable after it has been serviced and reset.