

TECHNICAL INFORMATION

DAVINCI VENDING

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Great care was taken in the compilation of the information in this document. Further developments in the field of electronic payment transactions and technology could result in changes that deviate from the descriptions in these instructions.

Therefore, SIX Payment Services Ltd assumes no liability for the topicality, completeness and accuracy of the information provided in this operating manual. Any liability claims against SIX Payment Services

relating to damages or loss, either in a material or immaterial form, caused by the use or non-use of the information offered or by the use of erroneous or incomplete information, are fundamentally excluded, unless it can be proven that SIX Payment Services acted intentionally or with gross negligence.

You can find the latest version of the operating instructions on our website at six-payment-services.com.

1 LIST OF ABBREVIATIONS

ACQ	Acquirer
API	Application Programming Interface
CSM	CASH Security Module
DIN	Deutsches Institut für Normung (German Institute for Standardization)
EC	EC stands for the predecessor and a component of the European Union (EU)
ECR	Electronic Cash Register
eft/pos	Electronic Funds Transfer at the Point of Sale
EMV	Europay Mastercard Visa (card payment transactions) electromagnetic compatibility (electronic)
ep2	eft/pos 2000: CH standard based on the EMV standards in electronic payment transactions
ESD	Electrostatic discharge
EU	European Union
FW	Firmware: Firmware or hardware-related software is embedded in various electronic devices in a programmable chip, nearly exclusively today in microcontrollers.
GPRS (EDGE)	General Packet Radio Service
HW/SW	Hardware/Software
ICC	Chip data
ISDN	Integrated Services Digital Network (digital telephony)
ISO	International Standards Organization
MAG	Magnetic track data
MCR	Motor reader
PCI-PED	Payment Card Industry – PIN Entry Devices
PIN	Personal Identification Number
PMS	POS management system
PSTN	Public Switched Telephone Network (similar to telephony)
RFID	Radio Frequency Identification
SCS	Service Center System
TA	(Tagesabschluss) Daily statement
Trm	Terminal
Trx	Transaction
TQM	Terminal Quality Management (Mastercard)
UMTS	Universal Mobile Telecommunications System
UPT	Unattended Payment Terminal
USB	Universal Serial Bus
WI-FI	Wireless network

2 PAYMENT PROCEDURE UNDER EP2

The payment procedure in Switzerland at the point of sale is standardized for all cards with ep2 and IFSF. There are many different cards of all kinds in circulation today. Many card issu-

ers will incrementally equip their customers with an EMV chip card. Customer cards from the petrol sector will be processed through EMV Petrol.

2.1 PAYMENT FUNCTIONS

Today's technology offers a broad array of transactions and functions. The settings in the service center system (SCS) as a global parameter and also from the individual card processors will determine which transactions are activated on your terminal:

- The activation and the functions are determined by the terminal operator (whereas the functions will also have to be supported by the acquirer).

- Depending on the payment function and credit card processor, different minimum/maximum amounts, daily limits, etc. can be defined.
- Please note that it may not be possible to activate some transaction types and functions on your device.

2.2 CAUTION WITH OFFLINE TRANSACTIONS

Offline transactions are saved in your terminal's security component and submitted to the card processor by means of a batch closing (BC). This can be undertaken manually by the terminal operator or automatically through parameters in the SCS. If the device suffers a defect in the security component or is purposely damaged or stolen, the transactions saved within it are lost. For this reason we recommend that you:

- Retain all receipts (paper or electronic).
- Carry out a batch closing several times a daily.
- Always carry out a batch closing before making changes to the installation, etc.
- After a prolonged absence from the business, always first carry out a batch closing

For seasonal operations, a batch closing must be made at the end of the season.

2.3 CE STATEMENT OF CONFORMITY

The CE conformity statement can be found on the SIX Payment Services Ltd website at:
six-payment-services.com.

3 GENERAL PRODUCT INFORMATION

3.1 TERMINAL OVERVIEW

The new davinci VENDING is comprised of various components. The modular structure enables you to optionally equip the

davinci VENDING module with a motor reader or hybrid manual reader and/or an RFID reader.



Motor reader with shutter



davinci VENDING module



RFID reader



Hybrid manual reader

3.2 COMPONENTS AND SPECIFICATIONS

3.2.1 DAVINCI VENDING MODULE

A maximum of 2 components can be connected to the davinci VENDING module: either a motor reader with a shutter and an RFID reader or a hybrid manual reader and an RFID reader. However, a hybrid manual reader and a motor reader or 2 motor readers cannot be operated at the same time.



SPECIFICATION

DESCRIPTION

Keyboard

- Oil-proof chrome steel keyboard with polished glass keys
- The STOP, CORR and OK keys are larger than the 0 to 9 keys
- Symbols for the visually impaired:
 - “X” symbol on the “STOP” key
 - “I” symbol on the “CORR” key
 - “O” symbol on the “OK” key
 - “Dot” on the “5” key
- 4 function keys
- At least 1 million key press cycles
- IK07 vandalism protection
- Actuating force: Level 3

Color display

2.4" TFT with 240 × 320 pixels
Protected with mirrored protective glass
Adjustable background lighting

Security

ARM-based security processor
Dismantling protection according to PCI/UPT

Hardware

ARM-based application processor
32 MB RAM STP
64 MB Flash STP

Operating system

Linux Version V 2.6.28 or higher
Leap year capable

2 SAM Slots

Slot 1 = free
Slot 2 = free

Interfaces

USB
RS232 interface (cash register interface)

Buzzer

The buzzer can be controlled through the application (on/off and volume)

3.2.2 MOTOR READER WITH SHUTTER

The hybrid motor reader can read both chips and magnetic stripes from a payment card. The motor reader is equipped with an automatic closing mechanism (shutter).



SPECIFICATION

DESCRIPTION

Cards processed	All EMV Level 1-compatible chip cards (ISO 7816), magnetic stripe cards tracks 2 and 3 (ISO 15457, version 2001-10-15 and ISO 7810, version 2003-11.01).
Reading acceptance	All ISO-compatible magnetic cards (track 2) must be readable by an inexperienced user properly using a new motor reader in a laboratory environment with a 98% success rate at the first attempt to read them, and 99% at the second attempt. The basis is comprised of 100 readings. All ISO-compatible chip cards must be readable by an inexperienced user properly using a new motor reader in a laboratory environment with a 99% success rate at the first attempt to read them. The basis is comprised of 100 readings.
Reading cycles	A minimum of 300,000 reading cycles in the motor reader (magnet reader) A minimum of 300,000 reading cycles in the motor reader (chip reader)
Security	ARM-based security processor Dismantling protection according to PCI/UPT
Casing	Aluminum casing The mouthpiece cover consists of a matt chrome zinc die-cast; it is attached to the aluminum casing with screws
Build-in compatibility	Device front cutout designed for the greatest possible flexibility and compatibility.

3.2.3 HYBRID MANUAL READER

A hybrid manual reader can be installed instead of a motor reader.



SPECIFICATION

DESCRIPTION

Cards processed	All EMV Level 1-compatible chip cards (ISO 7816), magnetic stripe cards tracks 2 and 3 (ISO 15457, version 2001-10-15 and ISO 7810, version 2003-11.01).
Reading cycles	A minimum of 200,000 reading cycles in the hybrid insertion reader (magnet reader) A minimum of 200,000 reading cycles in the hybrid insertion reader (chip reader)
Security	ARM-based security processor Dismantling protection according to PCI/UPT
Casing	Aluminum casing The mouthpiece cover is made from a matt chrome zinc die-cast; it is attached to the aluminum casing with screws
Installation	Device front cutout designed for the greatest possible flexibility and compatibility.
Features	It is possible to read the magnetic stripe bi-directionally. No locking of the card

3.3 RFID READER

The RFID reader can be used with the davinci VENDING.
The reader must be built in separately from the davinci VENDING module/motor reader or insertion reader.



3.4 SECURITY

Any security-related manipulation will cause the deactivation of the component. This means it will not longer be functional

and must be returned for repairs. The card reader may not be opened, not even to remove a card that is stuck in the device.

3.4.1 THE SECURITY COMPONENT

The security component includes the following tasks:

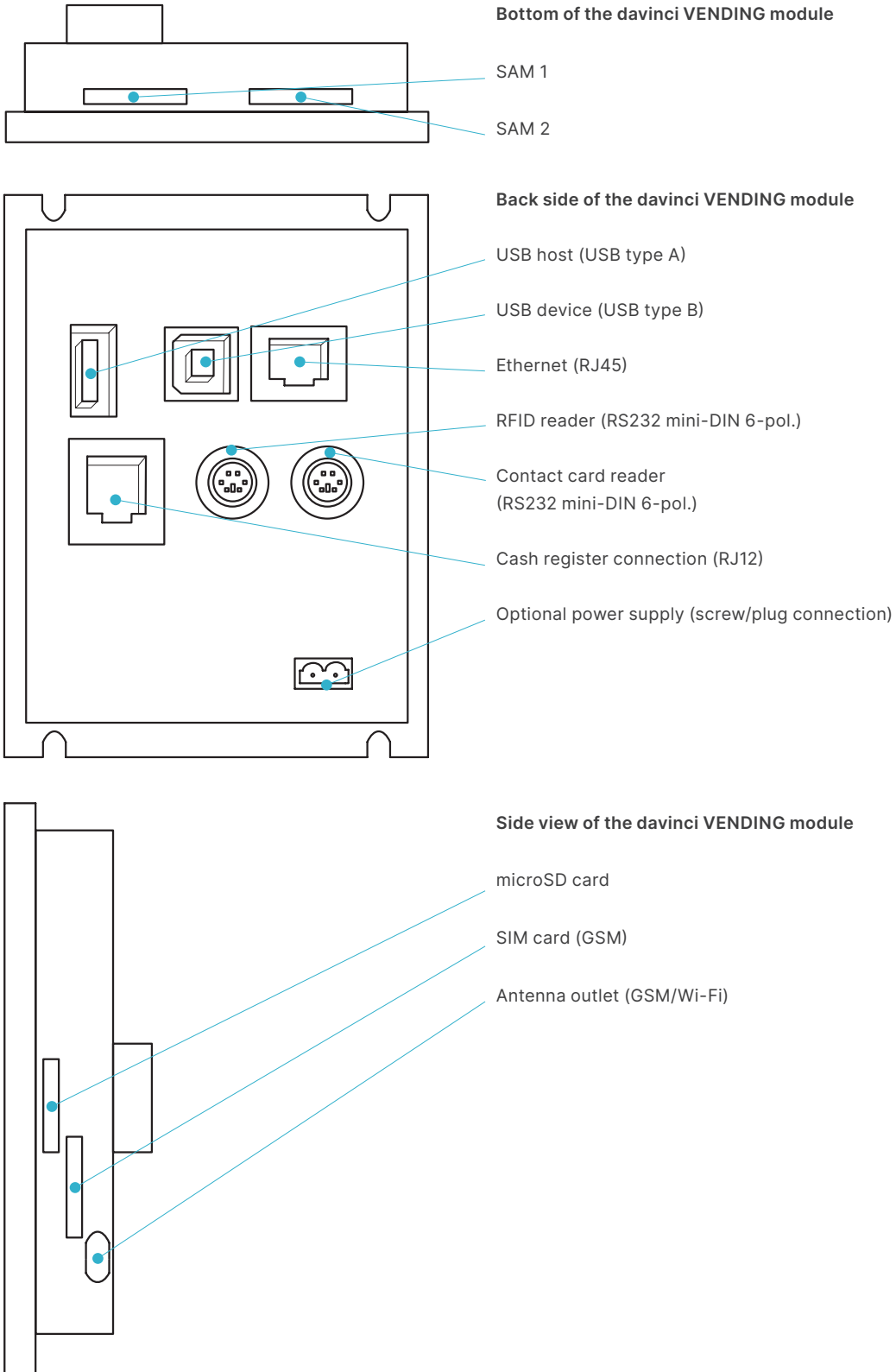
- Protection of the keypad,
- Processing of the chip card and PIN verification,
- Reading of the magnetic track,
- Cryptographic functions,
- Receiving a security certification for the loading of software,
- Prevention of the accessibility of the application's PIN data,
- Monitoring changes in temperature and power supply, which may not fall below or exceed a defined value.

4 CONNECTIONS AND COMMUNICATION

The connections and communication modes of the various components are described in detail in this section.

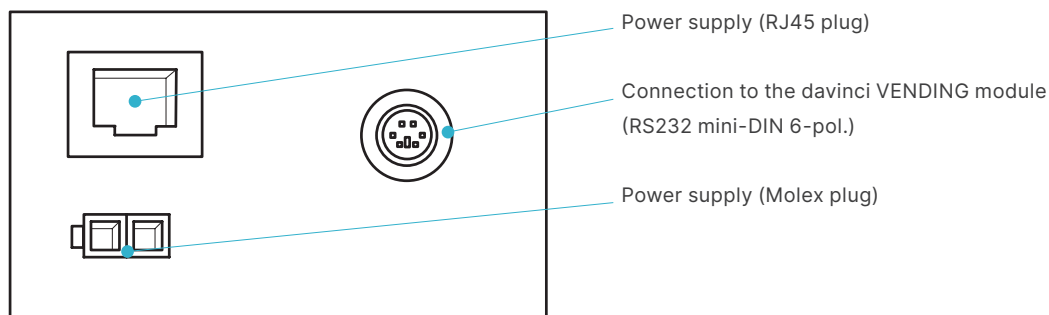
4.1 DAVINCI VENDING MODULE

The following connections are found on the davinci VENDING module:

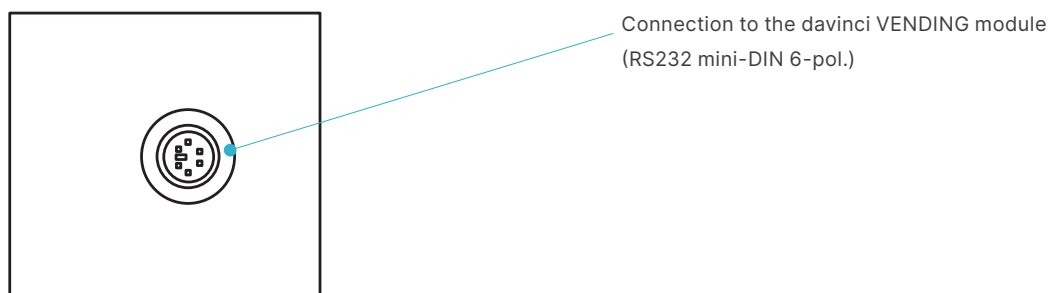


4.2 MOTOR READER AND HYBRID MANUAL READER

The motor reader and the hybrid manual reader have the following connections:



4.3 RFID READER



4.4 CONNECTION OVERVIEW

COMPONENT/ CONNECTOR OVERVIEW	DAVINCI VENDING MODULE	MOTOR READER WITH SHUTTER	MOTOR READER WITHOUT SHUTTER	HYBRID MANUAL READER	RFID READER
RJ12 (ECR)	●				
RJ45 (Ethernet/ISDN communication)	●				
RJ45 (power supply)		●	●	●	
RS232 mini-DIN 6-pole (connection to the davinci VENDING module)	2x	●	●	●	●
USB host 1.1 (USB type A)	●				
USB device 1.1 (USB type B)	●				
Screw/plug connection (power supply)	●				
Molex plug (power supply)		●	●	●	
Antenna outlet (GSM or Wi-Fi)	●				
micro SD card (date backup)	●				
SAM (Security Authentication Module)	2x				
SIM card (GSM)	●				

4.5 THE CONNECTIONS' PIN ALLOCATION

4.5.1 PIN ALLOCATIONS OF THE DAVINCI VENDING MODULE CONNECTIONS

DESCRIPTION	PLUG TYPE	PURPOSE	1	2	3	4	5	6	7	8
Power	screw/plug connection	5V DC power supply (auxiliary)	VCC	GND						
Comm.	RJ45	Ethernet	Tx+	Tx-	Rx+				Rx-	
ECR	RJ12	Cash register interface	U in Ext +12V	U in Ext +12V	RxD	TxD	GND	GND		
USB Typ 1.1	Standard type A Standard type B	Host and device	+5V	D-	D+	GND				
Connect to module	mini-DIN 6-pol.	Connection to the components	+12V	+12V	RxD	TxD	GND	GND		

4.5.2 PIN ALLOCATIONS OF THE CARD READER CONNECTIONS

DESCRIPTION	PLUG TYPE	PURPOSE	1	2	3	4	5	6	7	8
Power	Molex	12V-36V DC	GND	VCC						
Power	RJ45	12V-20V AC	AC1	AC1	AC1			AC2	AC2	AC2
Connect to module	mini-DIN 6-pol.	Connection to the components	+12V	+12V	RxD	TxD	GND	GND		

4.5.3 PIN ALLOCATIONS OF THE RFID READER

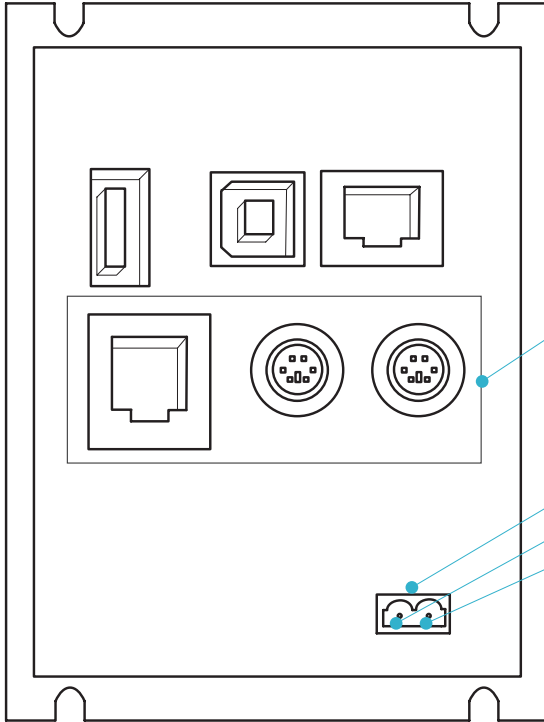
DESCRIPTION	PLUG TYPE	PURPOSE	1	2	3	4	5	6	7	8
Connect to module	mini-DIN 6-pol.	Connection to the components	+12V	+12V	RxD	TxD	GND	GND		

5 POWER SUPPLY CONCEPT

5.1 POWER SUPPLY FOR THE DAVINCI VENDING MODULE

The davinci VENDING module power supply concept is designed to be multifaceted in order to accommodate the needs of customers. The davinci VENDING module can be supplied with electricity through a motor reader, a hybrid manual reader,

a power adapter or a vending machine. At the same time, the davinci VENDING module can also be supplied with power with other components in these cases.



Back side of the davinci VENDING module

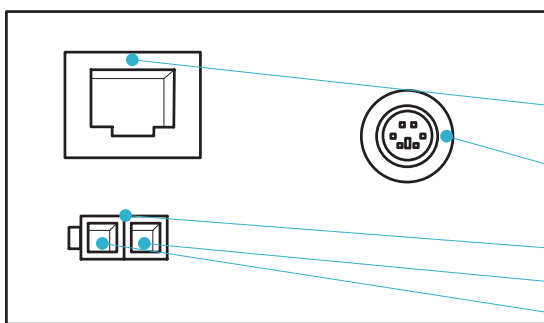
12 V DC (input/output)

5 V DC (auxiliary)

VCC

GDN

5.2 POWER SUPPLY FOR THE MOTOR READER AND THE HYBRID



Back side of the motor reader and the hybrid manual reader

12 V AC ... 20 V AC (input)

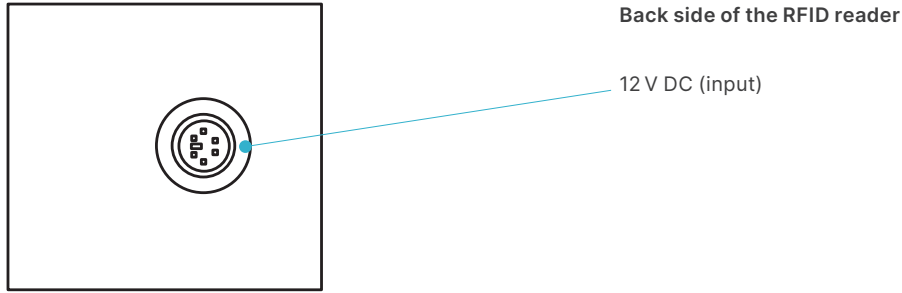
12 V DC (input/output)

12 V DC ... 36 V DC (input)

VCC

GDN

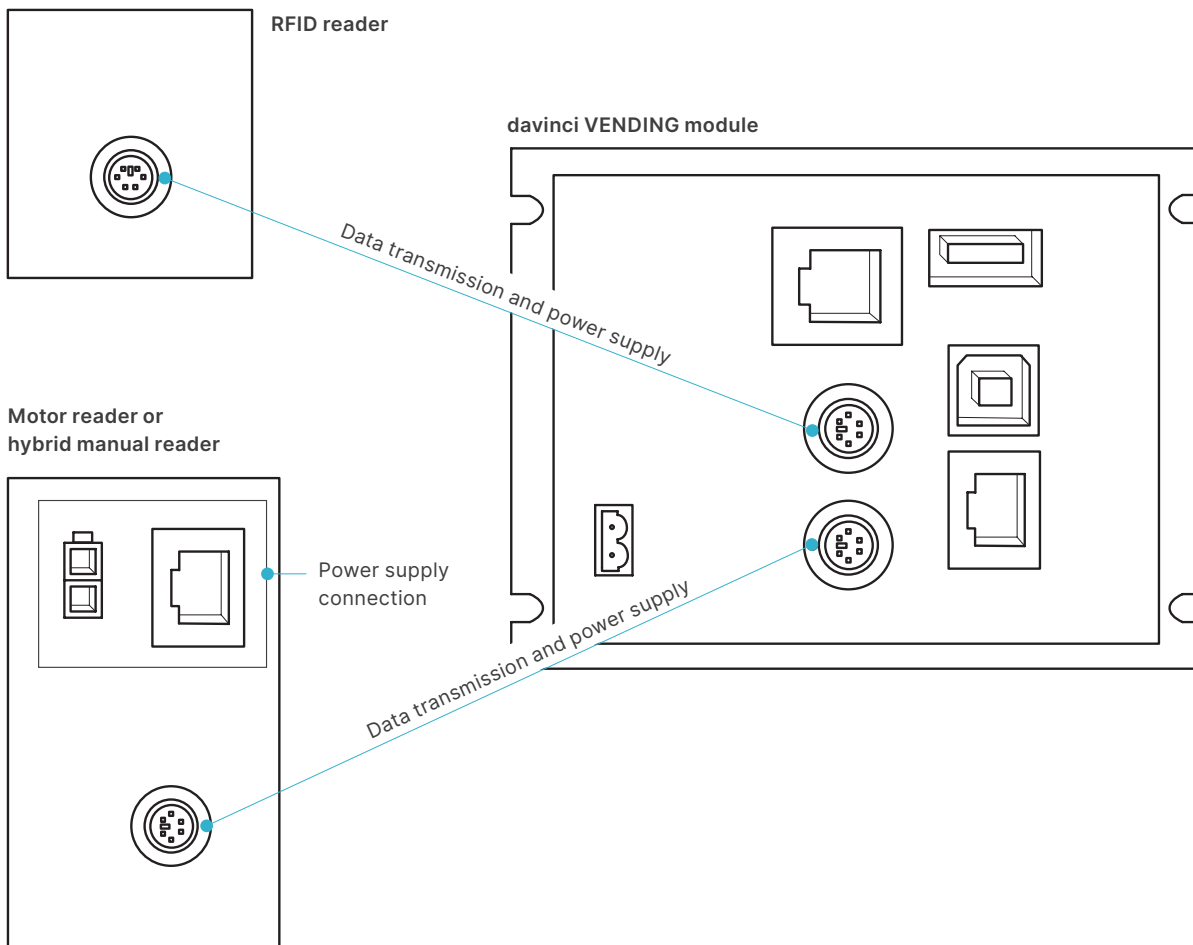
5.3 POWER SUPPLY FOR THE RFID MODULE



5.4 CONNECTION

The cabling of the components is described in this section. The maximum length of the connection between the reader and the davinci VENDING module is 2 meters. Only the cables specified by SIX Payment Services may be used. In the example, the davinci VENDING module is connected with an RFID reader

and a motor reader. The connected motor reader can be equipped with or without a shutter. The power supply of the entire system is provided through the motor reader's power supply connections. Instead of the motor reader, a hybrid manual reader can also be connected.



6 CONFIGURATION/INITIALIZATION

6.1 COMMISSIONING

- Position the device in the intended location.
- Connect the device: Always plug in the power supply last!
- It takes between 30 and 60 seconds for the terminal to be activated.
- An acoustic signal can be heard. The terminal can now be initialized according to the separate instructions.

6.2 EXCHANGING THE DAVINCI VENDING MODULE

(deleting the serial no.)

If the davinci VENDING module must be exchanged unexpectedly, then the SIX Payment Services hotline must be contacted before the initialization so that the existing serial number can

be deleted. Otherwise, it is not possible to undertake an initialization with a new davinci VENDING module on the existing terminal ID.

7 ON-SITE MAINTENANCE

7.1 MOTOR READER

The cleaning of the magnetic head and the chip reader depends on the location. To ensure smooth operation, it is necessary to regularly clean the card reader using the cleaning card. It is recommended that you clean the terminal at least twice monthly. To do so, use the dry cleaning card, which is to be inserted into the card reader three times on both sides. The cleaning cards can be ordered in the e-shop at: six-payment-services.com/shop. Please note that the chip reader has no sliding contact, but lowers when a card is introduced.

If the card cannot be ejected during a payment transaction or for other reasons (e.g., after a power disruption), then the card must be released by entering a password. If a card unexpectedly remains stuck in a motor reader or cannot be ejected, then the reader must be returned to SIX Payment Services for repairs, because if the reader is opened the security key will be deleted.

7.2 MAINTENANCE FUNCTIONS

The maintenance menu can be called up without a payment application. The following statistics functions can be called up in the maintenance menu:

- MAC address
- Serial number
- Software versions (of all components)

7.3 TEST OPTIONS IN THE FIELD

The product can be inspected and tested by a service technician when out of operation and without applications. Several of the test options are listed in the following.

The list is incomplete.

- Inquiries: MAC, BIOS, security status
- Test: Motor reader (Chip & MAG), keypad, davinci VENDING module, RFID, hybrid manual reader (Chip & MAG), communication module (with a ping)

7.4 MAC ADDRESS RANGE

Section reserved by PayTec at the IEEE:
00-19-16-0C-00-00 to 00-19-16-10-00-00

7.5 REPAIRS

If a component must be exchanged for repairs, then it is to be noted that any chips/microSD cards must be removed. These always remain on site. All essential components are marked with

a component label. These may not be taped over or removed or transferred to other components. If the cover, for example, has an additional sticker (e.g., TID), then this too must remain on site.

7.6 SERVICES

A 70-person team competently provides you with support services per telephone 365 days a year, 7 days a week and 24 hours a day in 4 languages (G/F/I/E). More than 30 service technicians are active throughout Switzerland commissioning payment terminals, as well as providing support and maintenance. For terminal operation it is necessary to choose among the following service packages:

ACTIVATION AND INTRODUCTION

One of the two following service packages is needed for the activation of your payment terminal:

- Activation service package
- On-site service package

TERMINAL OPERATION AND TROUBLESHOOTING

One of the four following service packages is needed for the operation of your payment terminal:

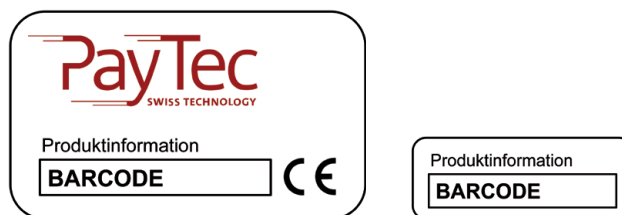
- Light service package
- Comfort service package
- Pro service package
- Pro+ service package

7.7 SERIAL NUMBER

There are two labels on all components. The labels are described in greater detail in the following.

7.7.1 PRODUCT LABELS

Either a large or a small product label is to be found on all components of the davinci VENDING containing the following product information:



INFORMATION	DESCRIPTION
Product information	<p>Example: PPPSSSSVVWYY</p> <p>Meaning: PPP product name SSSSS sequential serial number VV the component version WW calendar week of the production YY year of the production (last two digits)</p> <p>The first eight digits (PPPSSSS) of the product information can be called up by the application.</p>
Logo	PayTec logo (only on the large product label)
Barcode	Product information
CE symbol	The device is CE-approved (only on the large product label)

7.7.2 PCI LABEL

On all components (except for the RFID reader) of the davinci VENDING there is a PCI label containing the following information:



INFORMATION	DESCRIPTION
Logo	PayTec logo
Certification name	Product name listed with PCI
Certification number	Product number listed with PCI
Barcode	Certification number
Rating	Information about the product's voltage (xx volts) and electricity usage (yy amps)
Assembly	Manufacturer's location (Swiss made)

8 DIMENSIONAL DRAWINGS

NOTE

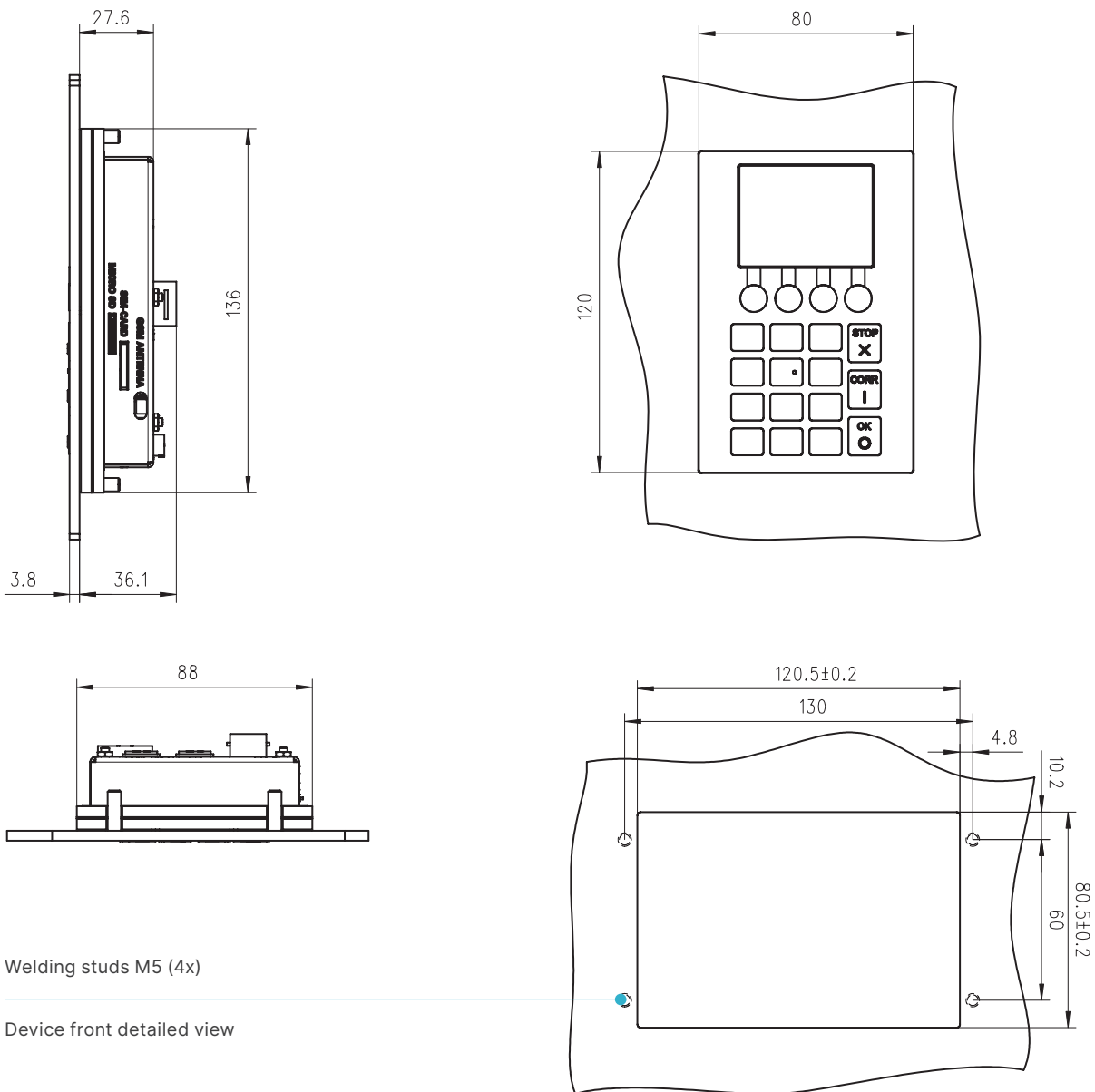
- The following drawings may differ from the originals.
- The STEP files can be downloaded from the SIX Payment Services website at: six-payment-services.com.

Important for the installation

The plug connections and the cable exits are clearly recognizable in the STEP files.

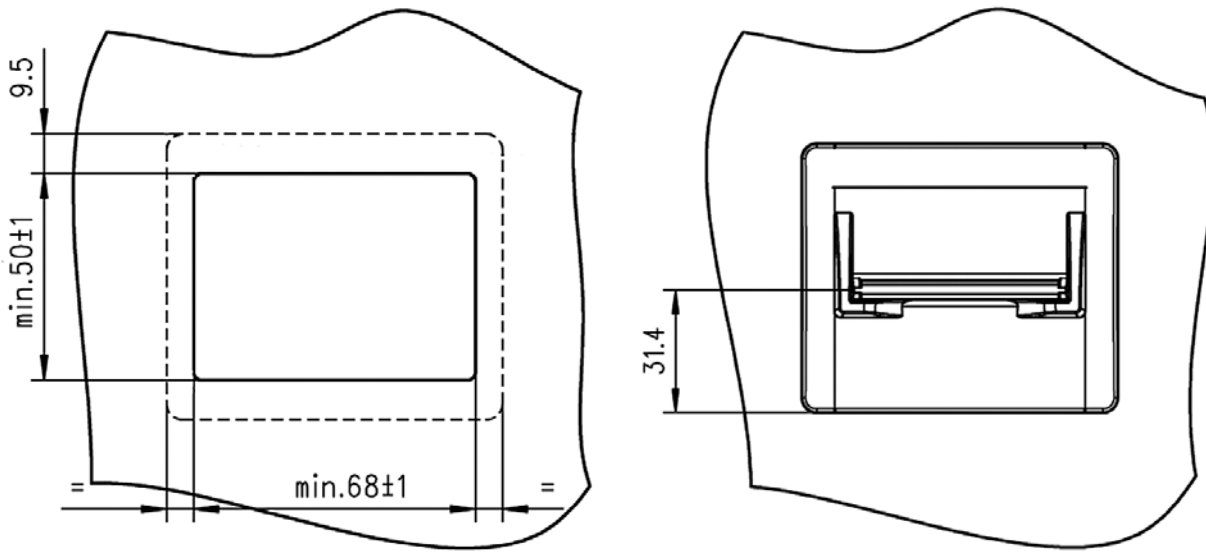
8.1 DAVINCI VENDING MODULE

8.1.1 DIMENSIONS OF THE DAVINCI VENDING MODULE DRILL HOLE DRAWINGS

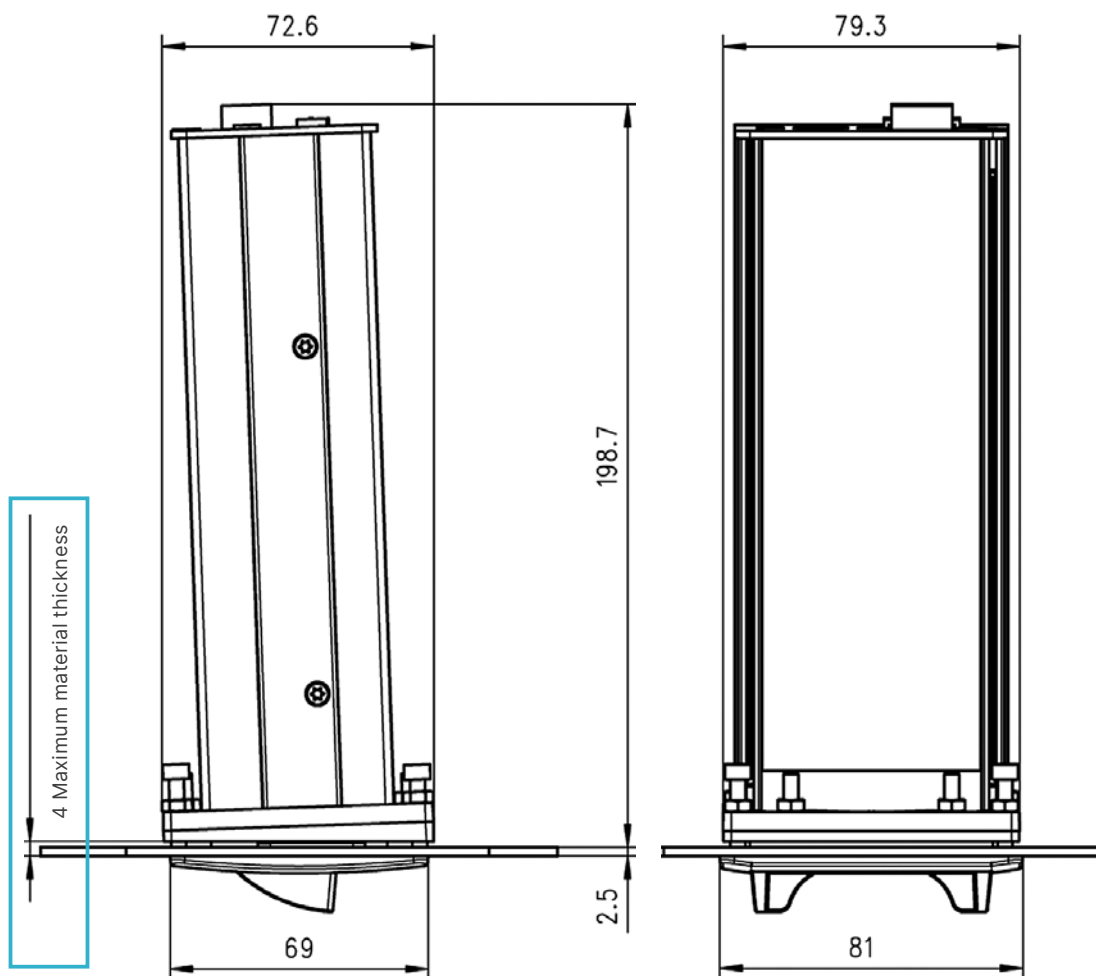


8.2 MOTOR READER WITH SHUTTER

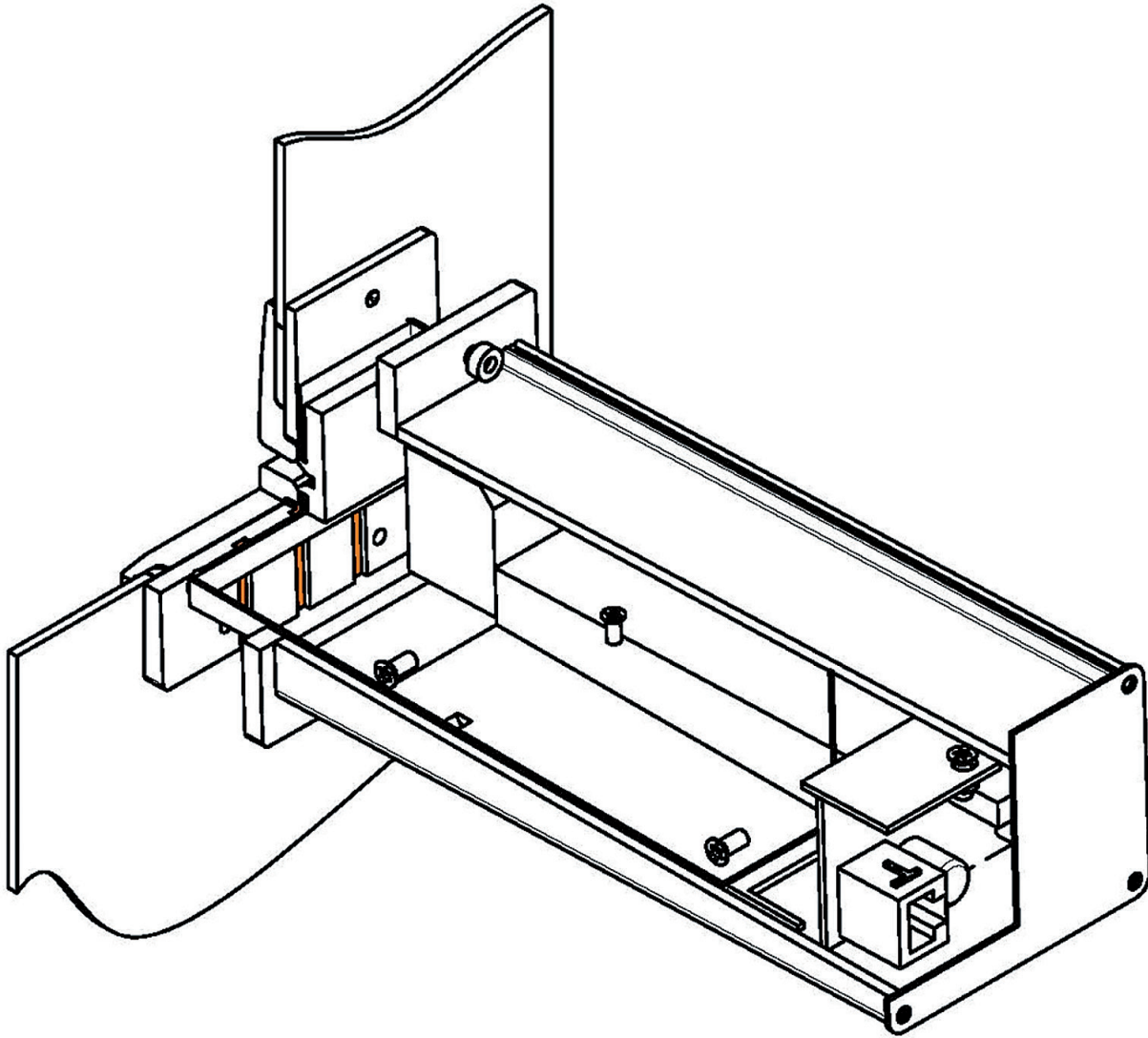
8.2.1 DIMENSIONS OF THE MOTOR READER WITH SHUTTER



Device front detailed view

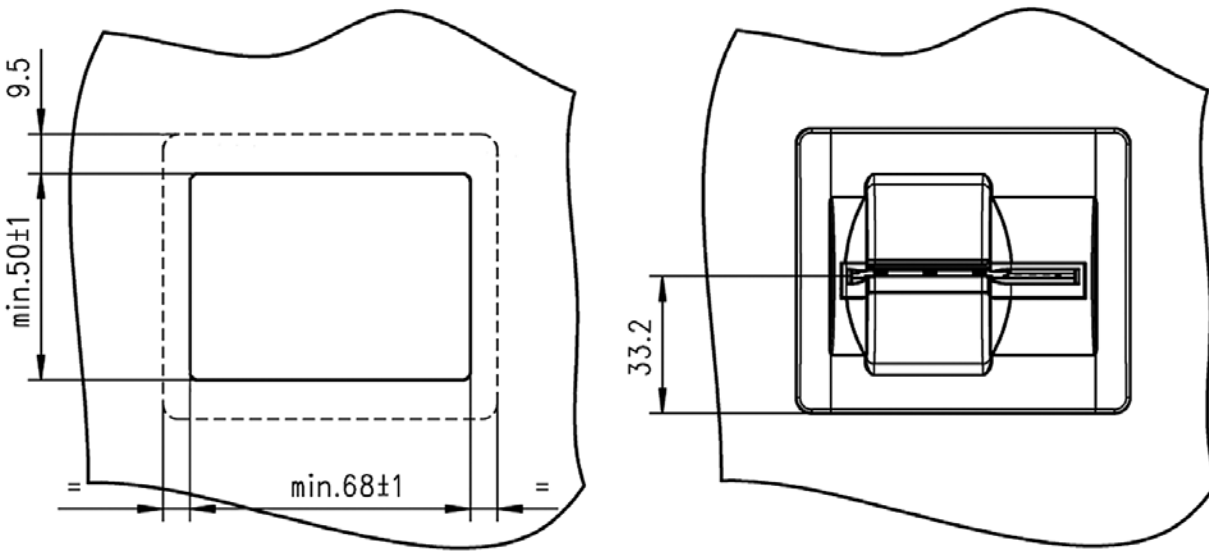


8.2.2 WATER DISCHARGE ON THE MOUTHPIECE

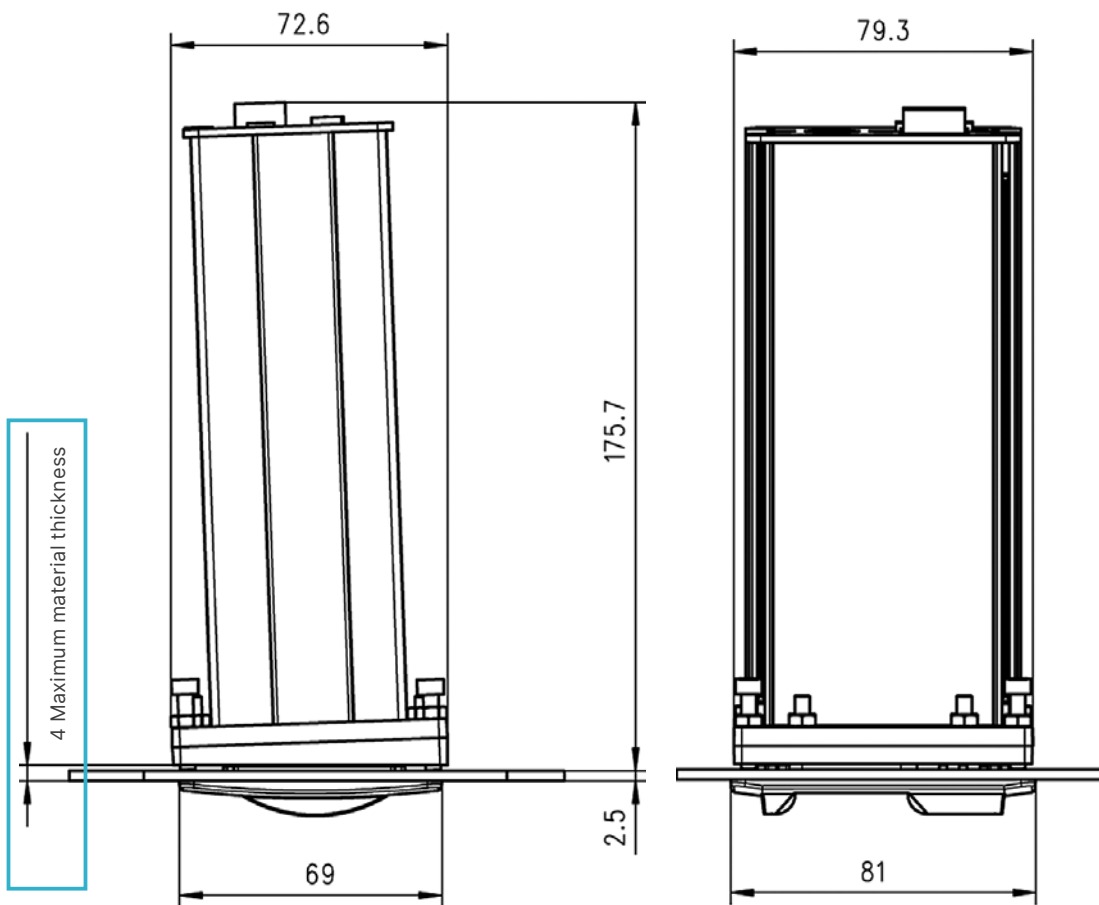


8.3 HYBRID MANUAL READER

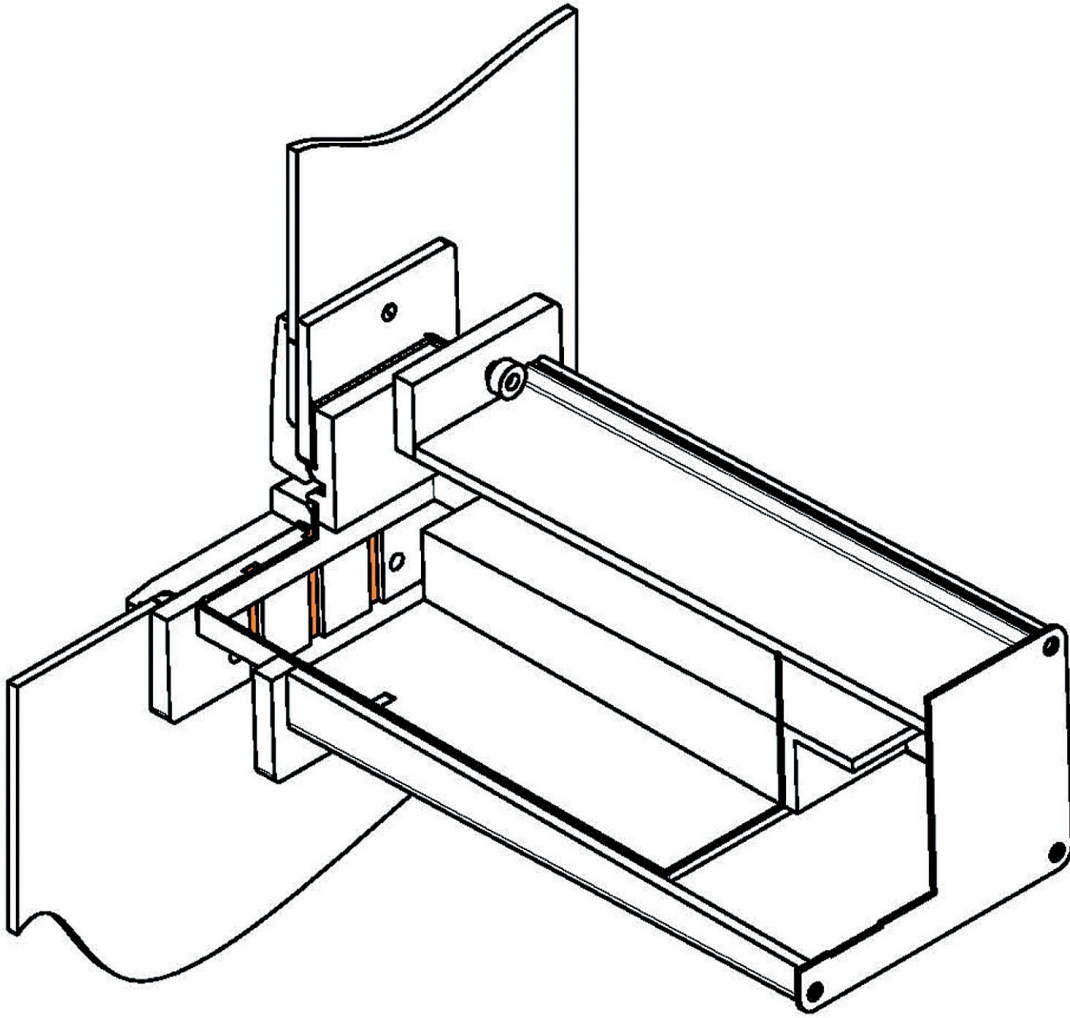
8.3.1 DIMENSIONS OF THE HYBRID MANUAL READER



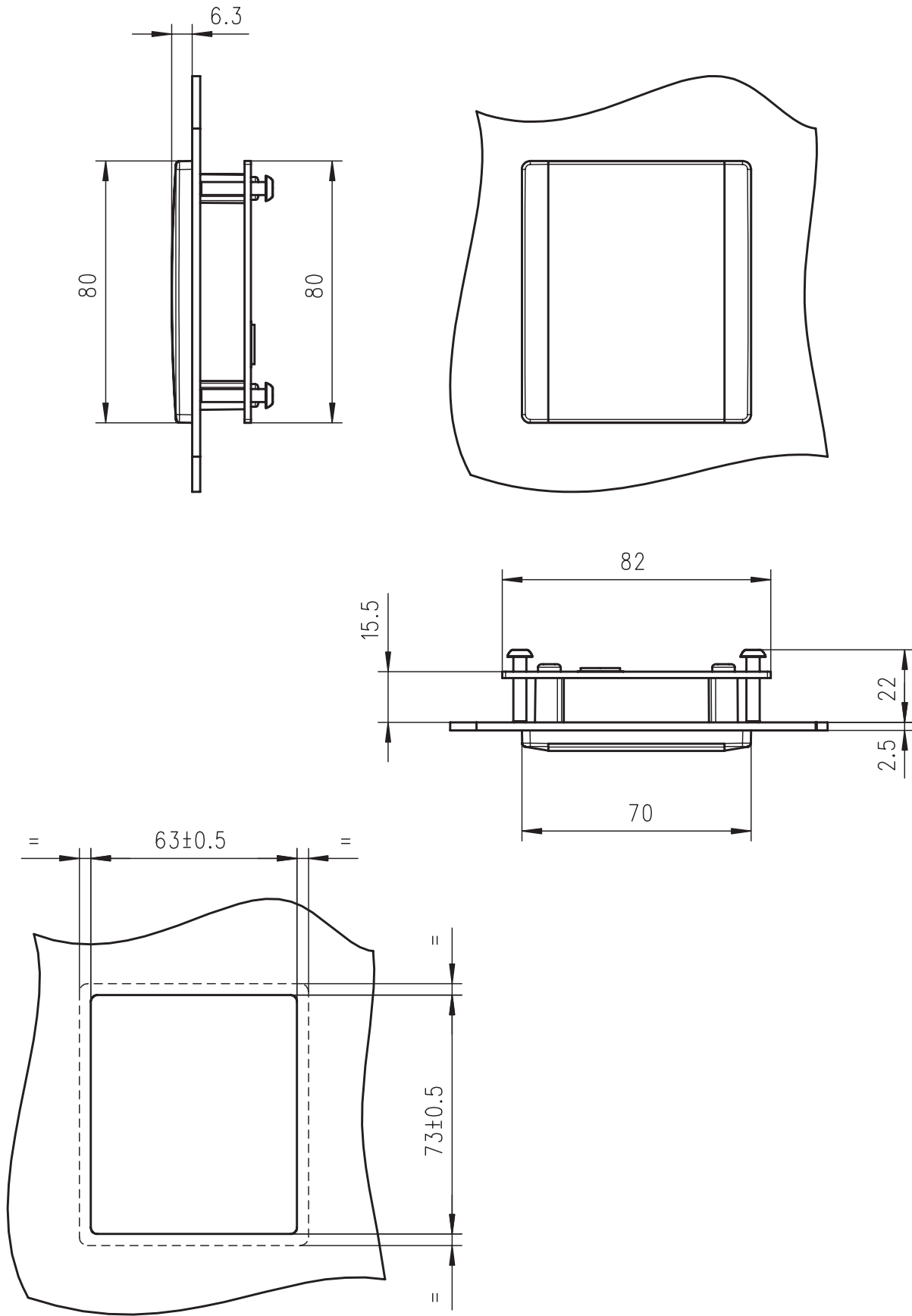
Device front detailed view



8.3.2 WATER DISCHARGE ON THE MOUTHPIECE (HYBRID MANUAL READER)



8.4 RFID READER



Device front view

NOTES

APPENDIX A: CRITERIA FOR THE PRIVACY SCREEN DESIGN

A.1 PRIVACY SCREEN DESIGN CRITERIA TO BE MET BY THE UPT'S DESIGN

The following are examples of UPT privacy screens being provided by the UPT itself that are compliant with PCI UPT security requirements. Other designs may also be acceptable.

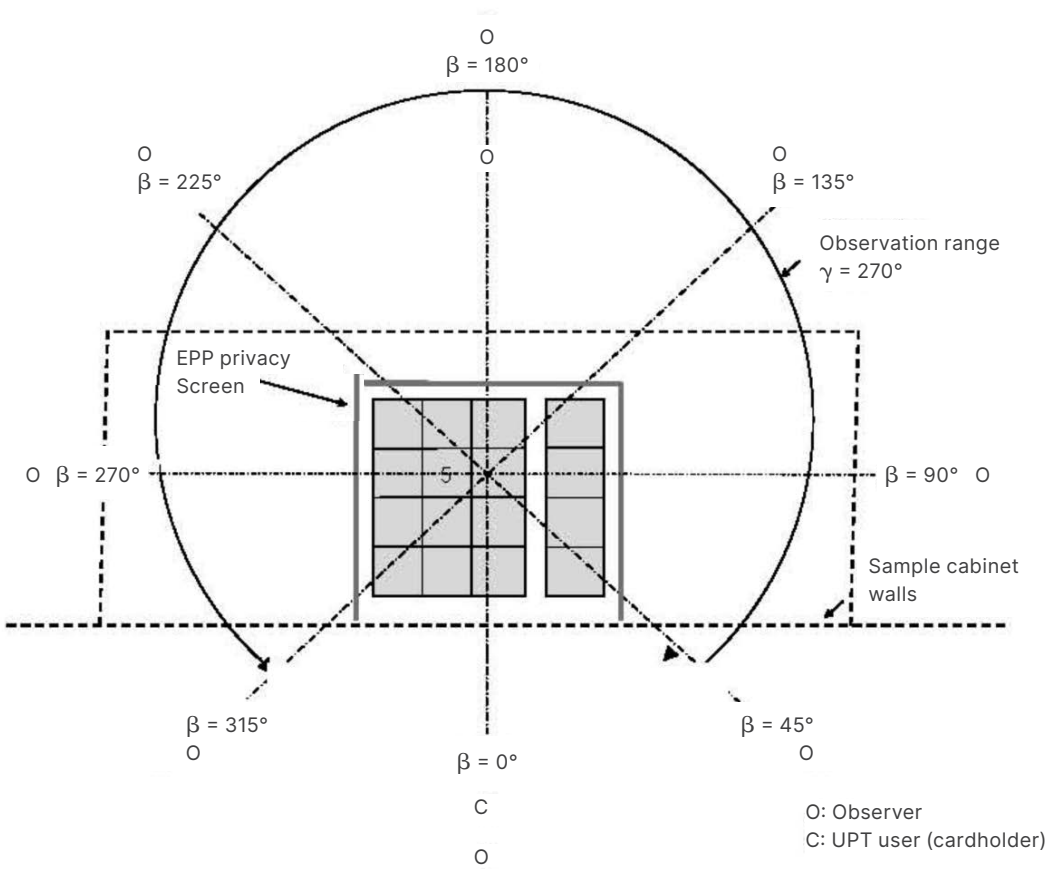


Figure 1: Sample UPT with privacy screen range, bird's eye view

Payment Card Industry UPT Derived Test Requirement V1.0, Copyright 2009 PCI Security Standards Council LLC (April 2009)

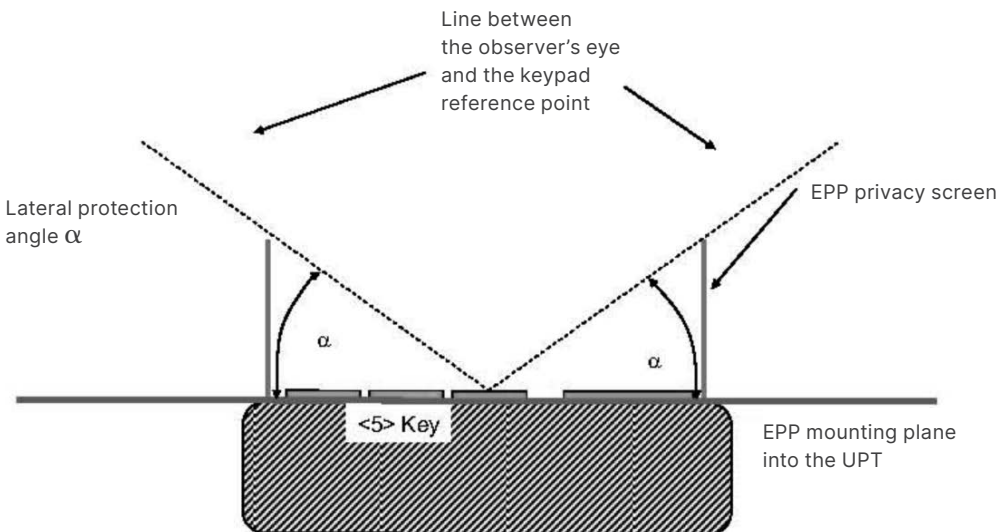


Figure 2: Sample UPT keypad, sectional drawing from the "0" side

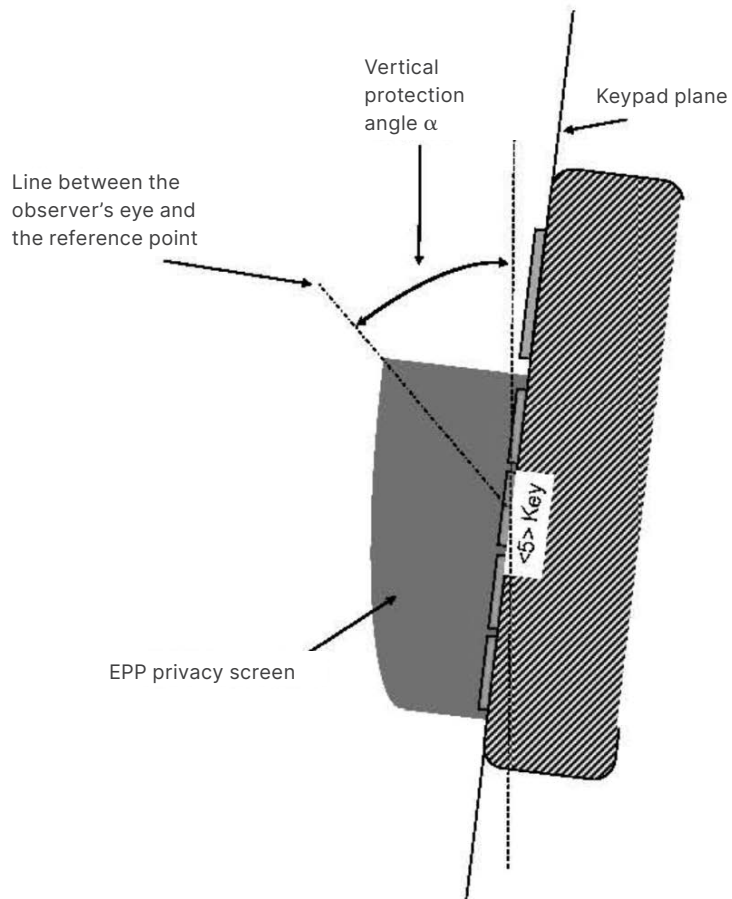


Figure 3: Sample UPT keypad, side view

The angles in the figures above are defined as follows:

α Angle between the horizontal plane through the "5" key and a virtual line which connects the "5" key and an observer's eye

β Horizontal position to an observer relative to the PED user's position

ψ Horizontal range which is to be covered by the privacy screen

δ Angle between the keypad plane and the horizontal plane

DESIGN RULES

1. These definitions apply to a privacy screen, which is provided as design property by the UPT. It may be a part of the EPP, or provided by the UPT cabinet. The rules and the figures above are to be considered as guidelines, which may be replaced by other means of at least the same efficiency.
2. The keypad reference point is taken as the column position in the middle of the keypad in the row containing the numeric key "5".
3. The privacy screen shall provide the following protection angles:

HORIZONTAL ANGLE β	COMMENT	VERTICAL ANGLE α
$315^\circ \leq \beta \leq 45^\circ$:	Within this range of β the cardholder deters an observer with her/his body.	N/A
$45^\circ \leq \beta \leq 90^\circ$ $270^\circ \leq \beta \leq 315^\circ$:	Within these ranges visual observation of the keypad is partially blocked by the cardholder. The protection angle α shall be at least 35° . Please note that the front end of the privacy screen must be higher if the PED is tilted.	$\alpha \geq 35^\circ$
$90^\circ \leq \beta \leq 270^\circ$:	The protection angle shall be at least 40° . The display side of the privacy screen may be lowered as the PED is tilted against the horizontal plane.	$\alpha \geq 40^\circ$

4. The protection is based on viewing angles and does not imply a specific technical implementation such as physical shields.

A.2 PRIVACY SCREEN DESIGN CRITERIA TO BE MET BY THE UPT'S INSTALLED ENVIRONMENT

The following techniques can be employed to provide for effective screening of the PIN-entry keypad during the PIN-entry

process. These methods would typically be used in combination, though in some cases a method might be used singly.

NOTE

This option does not preclude the use of privacy mechanisms as defined in A1, but allows less restrictive physical mechanisms, e.g., $\alpha \geq 20^\circ$.

Positioning of the terminal on the checkout counter in such way as to make visual observation of the PIN-entry process infeasible. Examples include:

- Visual screens designed into the checkout counter. The screens may be solely for shielding purposes, or may be part of the general checkout counter design, e.g., used as selling area.
- Position the UPT so that it is angled in such a way to make PIN spying difficult.

Pop-up (temporary) privacy screen attached to the UPT mounting stand. Consumer (through education and prompting) or merchant would put the screen in place during PIN-entry.

Installing the UPT on an adjustable stand that allows consumers to swivel the terminal sideways and/or tilt it forwards/backwards to a position that makes visual observation of the PIN-entry process difficult.

Positioning of in-store security cameras so that the PIN-entry keypad is not visible.

Instructing the cardholder regarding safe PIN-entry. This can be done with a combination of

- Signage on the UPT;
- Prompts on the display, possibly with a "click-through" screen;
- Potentially, literature at the point of sale; and
- A logo for the safe PIN-entry process.

Other methods are possible as well. Listed above are examples of some of the methods a vendor can propose to protect PINs during PIN-entry. The vendor must provide adequate techniques in the UPT documentation and also include a matrix showing which techniques should be used to protect against specific observation corridors. A sample matrix follows:

TABLE A1: SAMPLE MATRIX OF OBSERVATION CORRIDORS AND PIN PROTECTION METHODS

METHOD	OBSERVATION CORRIDORS				
	Cashier	Customers in queue	Customers elsewhere	On-site cameras	Remote cameras
UPR Stand A	M	H	L	L	L
UPR Stand B	H	H	H	L	M
Checkout counter A	L	M	M	L	H
Checkout counter B	H	H	M	H	H
Customer instruction	H*	H*	H*	H*	H*

* Customer instruction methods are less repeatable and therefore should be used in combination with other methods.

L = low, M = medium, H = high

The matrix must show the purchaser of the UPT the types of methods they may use to protect their customers' PINs. The

appropriate methods should be selected in order to ensure an appropriate level of protection from all observation corridors.

YOUR LOCAL POINT OF CONTACT CAN BE FOUND AT:

six-payment-services.com/contacts

six-payment-services.com
worldline.com