

DESK3x00 CL/Eth/Mod Operational Description

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Revision History

Version	Date	Author	Comments
1.00	10/11/2016	F.FLEURY	First release

1_Overview.

This documents deals with the description of DESK/3200 and DESK/3500 desktop payment terminals.

The Desk/3000 series offers a seamless payment experience. It leverages the TELIUM application portfolio and complies with future security standards

The Desk/3000 series is PCI-PTS 4.x ready. Its TELIUM Tetra OS uses the latest cryptographic schemes with future-proof key length.

The Desk/3000 series enables NFC couponing and wallet use cases, in addition to EMV Chip & PIN, swipe and contactless.

The Desk/3000 series boosts NFC payment by offering to customers a seamless experience through a dedicated card-reader zone and faster transaction flows

Backed by 30 years of experience and with its user-friendly interface, the TELIUM Tetra Operating System embeds the best security mechanisms to protect transaction privacy and leverage Ingenico Group's unique portfolio of payment applications.

2_Equipment.

2_1 General hardware features.

2_1_1 Mechanical description

Dimensions and weight

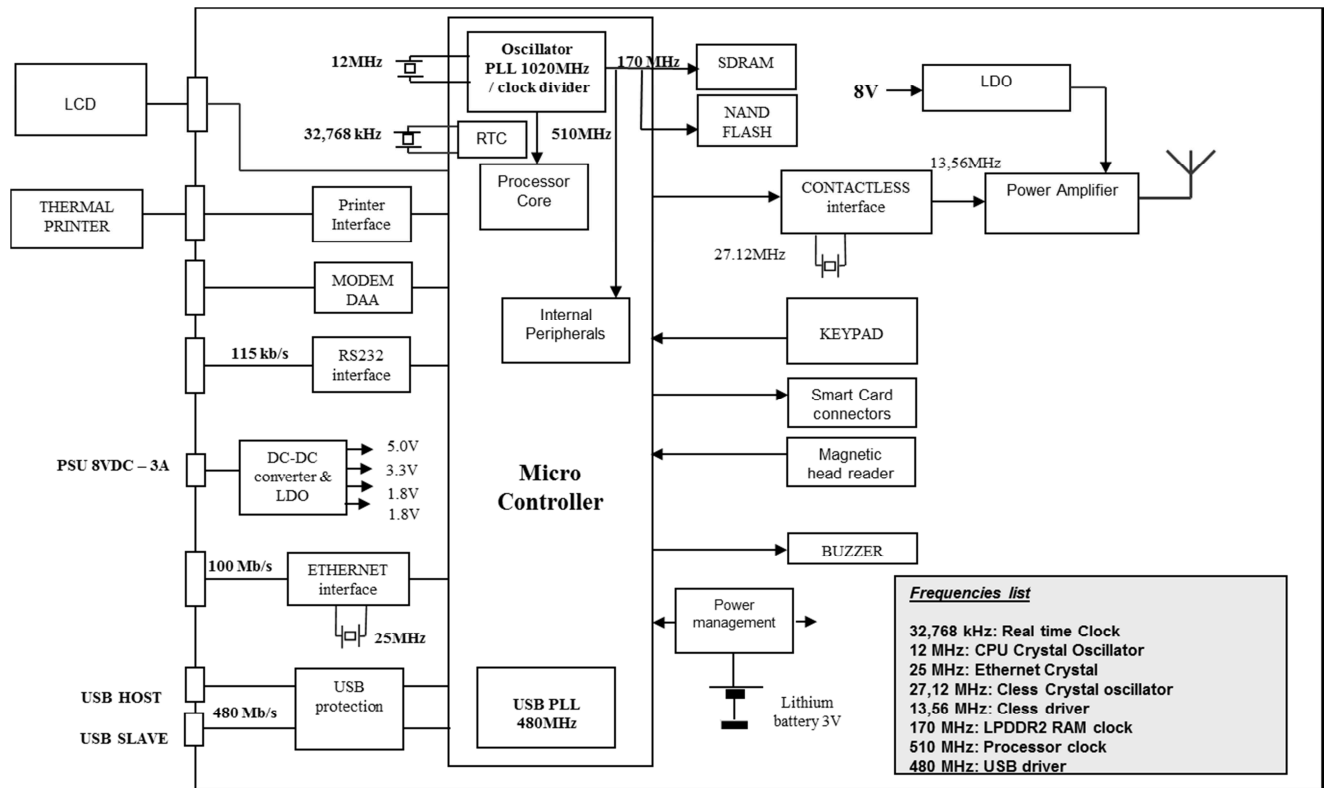


Mechanical characteristics	External dimensions	187x82x68 mm
	Weight	340gr
	Casing material	PC/ABS

2_1_2 Functional description.

NAME			Desk/3200	Desk/3500
Processor	Application & Crypto processor	Cortex A5	X	X
Memory	Internal	256MB Flash, 128MB RAM	X	X
OS		Telium Tetra OS	X	X
SAM		2 SAMs	X	X
Card readers	Magstripe	ISO 1/2/3	X	X
	Smart Card	EMV Level 1 compliant	X	X
	Contactless	EMV Level 1 compliant	X	X
Display	Monochrome	2,7" display, backlit, 128x64 pixels	X	
	Color	2,8" display, backlit, QVGA (320x240 pixels)		X
Keypad		20 ergonomic keys, raised Marking, backlit	X	X
Audio	Buzzer		X	X
Thermal printer	Speed in line/s	20 lines/s	X	X
	Paper roll cage	58mm width x 40 mm diameter	X	X
Terminal connectivity	Wired	Dial-up MODEM	X	X
		Ethernet 10/100 base T	X	X
Terminal connections	USB	1 USB Host	X	X
		1 USB Slave	X	X
	Power supply	Dedicated Power Jack	X	X
		Serial	X	X
Power supply		24W		
Terminal size		187x82x68 mm		
Weight		340gr		
Environment	Operating Temperature	0°C to +40°C	X	X
	Storage Temperature	-20°C to +55°C	X	X
	Operating Humidity	85% non –condensing at +40°C	X	X
Accessory	Magic Box	1xRS + 1xPower+1xEth+1xLine In	Option	Option
		2xRS + 1xPower+1xEth+1xLine In	Option	Option
	Privacy shield	Factory mounted	Option	Option
		Field upgradable	Option	Option
Security		PCI PTS4.x Online & Offline ready	X	X

2_1_3 Block diagram.



DESK3500



Improved NFC antenna robustness, designed for reliable reading of mini-cards, fobs and NFC devices



Graphical 20L/S thermal printer with easy 40mm paper loading

2.8" QVGA 320x 240 pixels

Anti-theft Kensington lock



Magnetic stripe reader ISO 123

15 extra-large white backlit keys, ADA / RNIB, keys with raised markings & dome tactile feedback + 5 function keys

EMV Smart card reader

Unique sliding trap door for connector's access, SIM, SAM





Improved NFC antenna robustness, designed for reliable reading of mini-cards, fobs and NFC devices



Graphical 20L/S thermal printer with easy 40mm paper loading

LED Indicators for contactless card

2.7" monochrome display 128x64 pixels

Anti-theft Kensington lock



Magnetic stripe reader ISO 123

15 extra-large white backlit keys, ADA / RNIB, keys with raised markings & dome tactile feedback + 5 function keys

EMV Smart card reader



Unique sliding trap door for connector's access, SIM, SAM

2_2 Technical hardware features.

2_2_1 Memory capacity

DDR2 : 128Mbytes

Flash : 256MBytes

2_2_2 ISLERO Processor

The Islero is a secured ASIC (crypto processor) including all the secured functions which protect the device against various attacks.

Main CPU	ARM Cortex A5
Clock frequency	510 MHz
Address space	512 MB
Bus display	18 Bit RGB
Bus data	Instructions : 64 bit / External data bus : 16 bit for Desk/3000
Capacity	800 MIPS

2_2_3 Data security

Desk/series meets hardware & software highest, latest and future security requirements.

On Hardware side it relies on the most robust crypto-processor to support AES256 bits, RSA up to 5400 bits and ECC up to 512 bits algorithms. It takes also advantage of TrustZone® to protect secrets from unauthorized applications.

Ingenico, by relying on its terminal manufacturing expertise, designed TELIUM TETRA terminals as safe to prevent various attack methods.

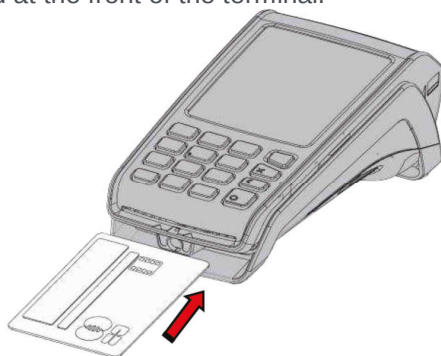
Sensors and shields are activated to detect and prevent any intrusion attempt on the hardware components such as smart card readers, keyboard, communication ports,...

Especially on that regard, TELIUM TETRA takes full benefit of the technology improvement and enhances the physical hardware security and daily usage reliability by removing dependency on external flexible wiremesh to detect intrusion attempt, relying on internal mesh (in the printed circuit board, the swipe, the smart card connector, the processor and other secure components)

TELIUM TETRA hardware is certified against latest security requirements from PCI PTS POI version 4 and anticipates by design security measures enforcement which could be applied in next standards requirements release such as PCI PTS POI v5.

2_2_4 Smart Card Reader

The smart card reader is located at the front of the terminal.



It allows easy introduction and removal of the card and leaving the card visible to the user.
It can detect cards presence and resist to IK04 impact.

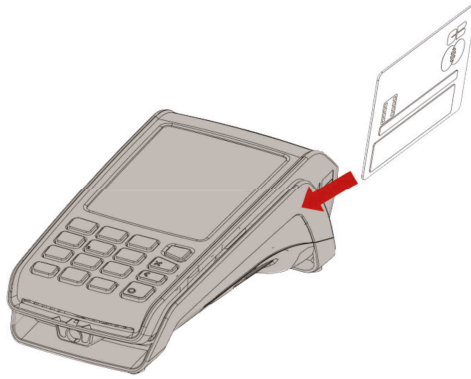
Conformity with ISO standards	ISO 7816-1, 2, 3
Protocol used	protocol T=0 & T=1
Convention	Direct and inverse
Clock frequency	4.915 MHz
Protection	Protected against short-circuit or over-consumption, VCC Detection of accidental removal by interruption
Programming voltage Vpp	Not connected
Power supply voltage Vcc	5V, 3V & 1.8V
Grip	8 friction contacts (middle chip) Contact for card presence and removal
Number of operations	500,000
Synchronous cards	Separate logical outputs on contacts C4 and C8 Possibility of specific driver development on request.

The smart card interface blocks used for smart card and SAM access are directly integrated into the Telium TETRA processor. It gives more reliability and security to the estate owner and end users.

2_2_5 Magnetic Stripe Reader

The reader is located on the right side of the terminal and a drawing indicates card position and swiping direction.

The MSR is able to read the 3 tracks simultaneously.



Reader type	Manual, vertical reading
Tracks read	Track: ISO2 - ISO1 – ISO3
Card formats accepted	ISO 7810, 7811-1, 2, 3, 4 & ISO 7813
Card swipe speed	10 cm/s to 100 cm/s (4 to 40 inch/s)
Reading error rate	< 5%
Head lifespan	500, 000 swipes

The Magnetic swipe reader block is directly integrated into the Telium TETRA processor and is pure Ingenico IP leveraging more than 30 years of expertise in payment industry.

2_2_6 Contactless Reader

The contactless antenna is located around the paper door



Technical specifications	
Reader type	Contactless
Cards format accepted	ISO/IEC 14443, Type A&B standard EMV specifications Mifare: • Mifare classic 1k / classic 4k • Mifare mini • Mifare Ultralight /Ultralight C "Ultralight C" managed as "Ultralight" (DES authentication not implemented) • Mifare DESFire 2k/4k/8k • Mifare Smart MX (Type A) NFC Master, passive target only of ISO 18092 Calypso
Information processing	Compliant with EMV specifications 4 indicator lights & buzzer
Communication speed	106 / 212kb/s.
Operating volume	Up to 4 cm

Introduction to Contactless:

"Contactless" is the term that was invented and widely adopted by the Smartcard industry to characterize a new way to read smartcards. By using radio signal, it is possible to read cards at a short distance, without inserting a card in the reader, thus the name "contactless". Contactless technology is sometimes mixed with Radio Frequency Identification (RFID), which is partly true since both use the same principles: a reader (sometimes called a coupler) sends a radiofrequency (RF) wave through a card or a tag containing a coil and a small chip RF power energizes the coil, giving enough current to power the chip and allows data transmission both way. It should be noted however that RFID is mostly used for identification of objects and animals, and is based on a wide range of frequencies (from 125 kHz to 5 GHz). On the contrary, contactless allows the use of microprocessor

smartcards with more security and is preferred for the identification of persons (for ID, payment and others uses). Contactless uses only one frequency: 13.56 MHz.

2_2_7 Keypad

- All models offer large keys feature characters/figures printed on keys allowing a clear reading, reducing risk of incorrect selection or PIN entry and optimizing easy PIN entry.
- A white backlight ensures superior key recognition in any lighting conditions by all users.
- **Desk**/series is equipped with keyboards, at a convenient size for most fingers.
- Large keys feature characters/figures printed on keys allowing a clear reading, reducing risk of incorrect selection or PIN entry and optimizing easy PIN entry.
- Keyboard provide a pleasant touch experience while using keys and clicking effect made during key press provides clear tactile feedback that key has been pressed effectively (such as dome with mobile phone technology). Key travel displacement is very short.
- Keyboard is designed for sight impaired users (ADA and RNIB friendly) with a dimple (dot in relief) on the key '5' and "symbols in relief" on the function keys, with red, yellow and green colors. This helps visually impaired to easily identify keys by tactile feel.

Technical specifications	
Number of keys	20 (Desk/3200 & Desk/3500)
Type Desk/3200 & 3500	Elastomeric membrane
Number of operations	1 million strokes
Key size Desk/3200 & 3500	Approx. 17 x 8 mm (width x height)
Inter Key size Desk/3200 & 3500	Approx. 4 mm
Backlight	White LED
Tactile effect	metallic dome

2_2_8 Display

Desk/series offers a wide range of display from high-end 3.5" HVGA color display to monochrome VGA with white backlit LCD display.

			
Feature	Desk/3200	Desk/3500	
Type	Monochrome	Color	
Display area	2.68" 33,07 x 59,5 mm (Active area)	2.81" 42,66 x 56,88mm (Active area)	
Orientation	Landscape	Landscape	
Number of pixels	64 x 128 (VGA)	240 x 320 (QVGA)	
Technology	FSTN	TFT	
Frame frequency	77Hz	60Hz	
Number of colors	NA	4096 colors	
Serviceability	Screen replaceable in repair center only	Screen replaceable in repair center only	

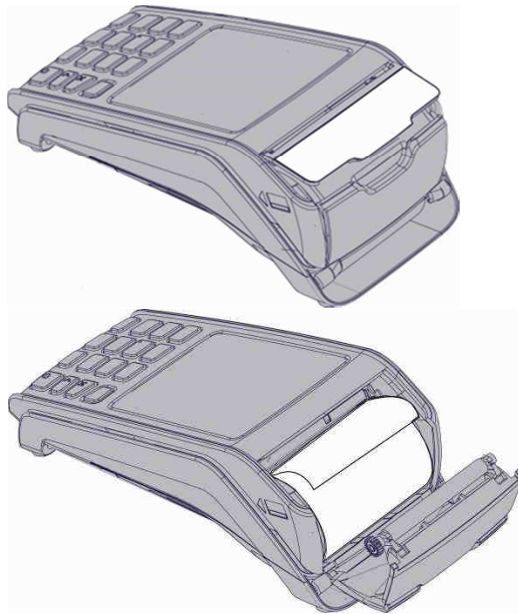
2_2_9 Buzzer

DESK3x00 series is equipped with a powerful buzzer in standard

Feature	Buzzer's description
Noise level	Up to 50 dB, at 1 m all directions (adjustable by software)

2_2_10 Printer

- A fast thermal printer is embedded in **Desk**/series. It is capable of printing out a receipt at a speed of up to 20 lines per second.
- Graphical capabilities allow printing out any logo on any kind of receipt.
- In standard configuration, printer includes a paper detector so that application can manage such event as required in some countries.
- Easy paper loading technology / just place paper roll and close trap.



Feature	Printer's description
Type	Thermal printing
Paper loading	Easy paper loading without paper axis
Printing speed	Up to 20 lines/s – 60mm/s
Noise level	Not characterized yet
Paper presence detection	Paper sensor at the end of the roll
Lifespan	200 000 transactions, 400 000 cuts with reference paper
Graphic mode	200 DPI in two directions
Printing color	Black

Feature	Paper roll's description
Paper type	Thermal White – NIPPON PAPER TF50KS-E2D or equivalent

Width	58 mm
Minimum paper thickness	48µm
Length	around 17 m (40mm) in 65um
Diameter	40 mm

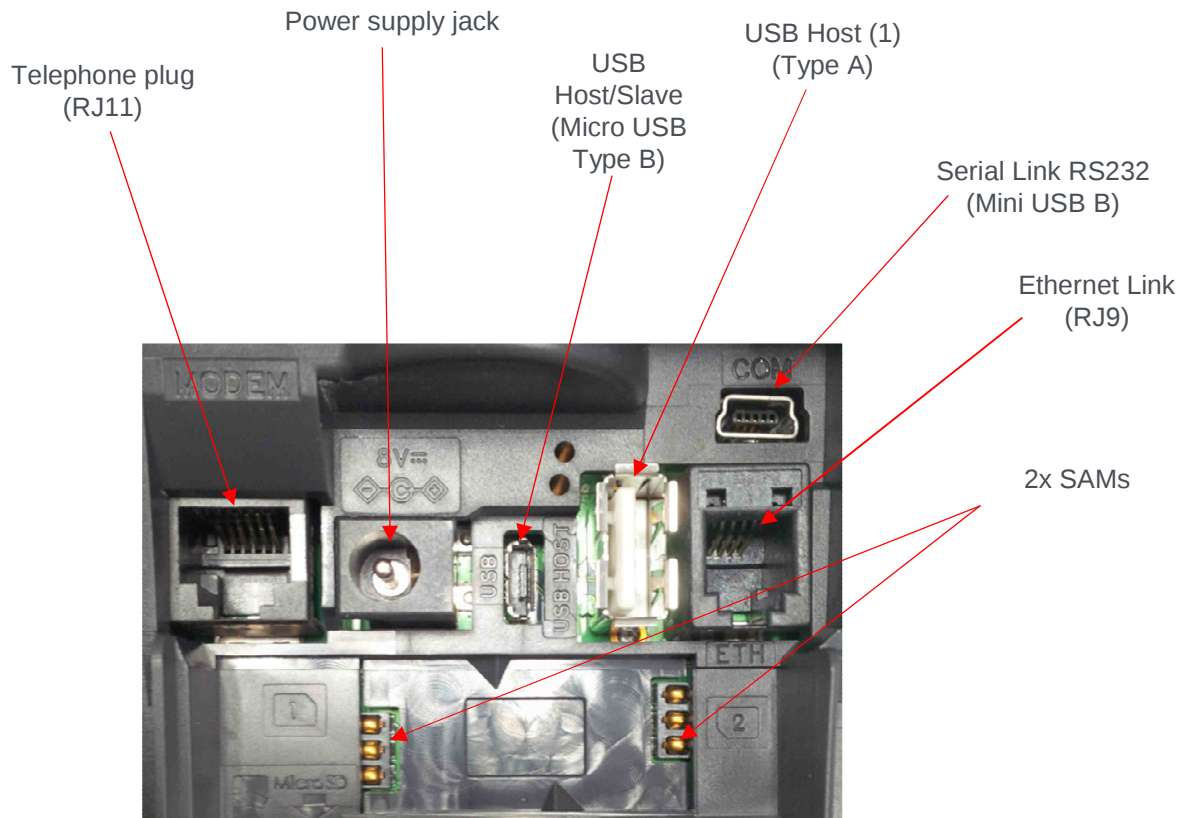
2_2_11 Power Supply Unit

Feature	Description
Input Voltage	100-240V / 50-60Hz
Output	8V – 3A
Protection	Against surges: thermal fuse placed on primary Against conducted interference: integral filter
Standards	Class II double-isolation Efficiency level VI
Mechanical Interface	1,8m long cable
Weight	~115gr

3_Connectivity.

3_1 Wired connectivity

Desk/series is equipped with a choice of interface and power connector situated under trap below terminal.



3_1_1 USB connectors



(1) USB Host/Slave

Desk/series is equipped with a type Micro B USB connector that could support either Host or Slave mode.

Characteristics	USB 2.0
Electronic interface	• USB host or slave
Number of wires	• 1= 5V • 2= D- • 3= D+ • 4= ID • 5= GND
Mechanical interface	• USB type micro B
Logical interface	• Low speed : 1,5 Mbps • Full speed : 12 Mbps • High speed : 400 Mbps



(2) USB Host

Characteristics	USB 2.0
Electronic interface	• USB Host
Number of wires	• 1= 5V • 2= D- • 3= D+ • 4= GND
Mechanical interface	• USB type A
Logical interface	• Low speed : 1,5 Mbps • Full speed : 12 Mbps • High speed : 400 Mbps

3_1_2 Ethernet connector

Characteristics	
Electronic interface	• IEEE 802.3
Number of wires	• 1 = RX- • 2 = RX+ • 3 = TX- • 4 = TX+
Mechanical interface	• Modular jack 4 points RJ11
Logical interface	• Compatible 10Mbps and 100 Mbps

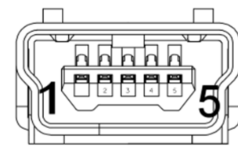
3_1_3 RTC modem connector

- The whole **Desk**/series have a dial up PSTN modem in standard configuration. It is connected through a RJ11 (4 pins) under the terminal. Phone RJ11–RJ11 cable is provided as part of standard package content.
-
- Main specifications:
 - V22, V22bis, V22 Fast connect, V29 Fast connect, V32, V32bis, V34 and V90 (respectively 1200, 2400, 9600, 14400, 33600, 56000 bps-bits per second);
 - Full duplex synchronous or asynchronous;
 - Full software setting;
 - AT compatible;
 - Built in the terminal, communicates with PSTN;
 - Responder, Initiator, busy line detection

Feature	Description
Dialer	• Possible use of private exchanges • DTMF dial-up • Pulsed dial-up
Framing	• Software set
Emission levels	• Software set
Reception levels	• Operation from 0 to -43 dBm; carrier loss from -43 to -48 dBm
Connectivity	• Plug-in cable, length 3 m, fitted with RJ11 at both ends. • Connection to network by RJ11 socket + adapter phone jack if necessary
Logic	• AT compatible command set • Setting of DTMF emission levels, data, Framing, etc. • Setting of adaptability to local network conditions • Setting of dial-up characteristics (intertrains, delays, etc.) • Setting using the keypad

3_1_4 RS232 connector

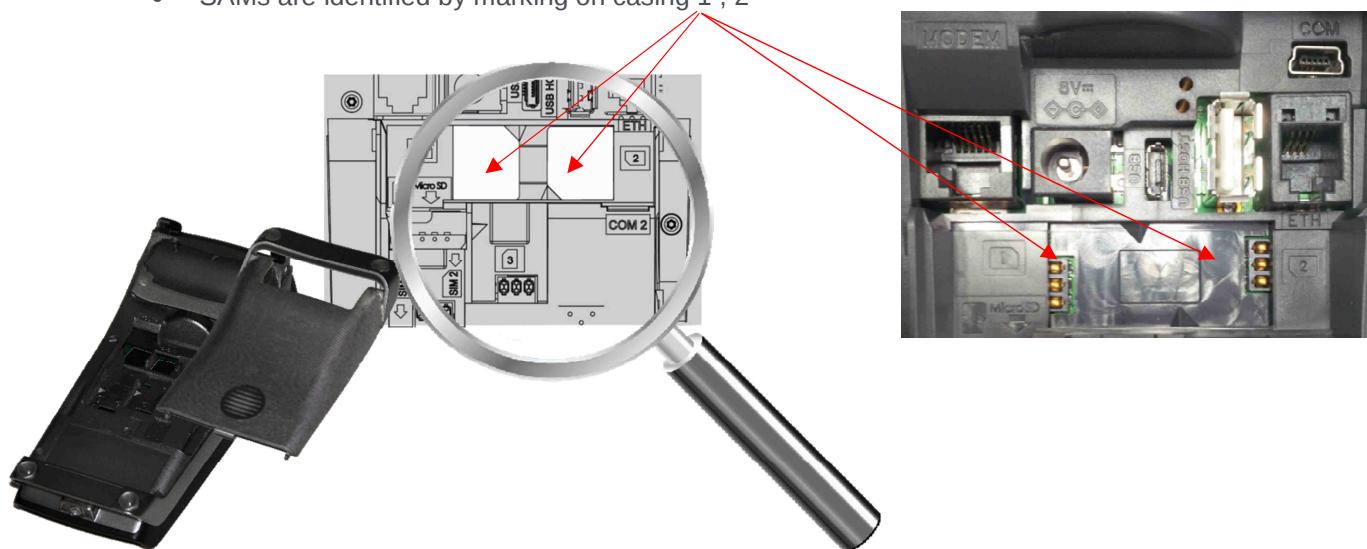
Characteristics	
Electronic interface	• RS232 Simplified
Number of wires	• RTS RX TX GND
Available power supply	• 5V *
Mechanical interface	• mini-USB type B jack • 1 = 5V (*) • 2 = Tx • 3 = Rx • 4 = RTS • 5 = GND
Logical interface	• 300 bps to 115 kbps



(*) 500 mA max available to share between links (COM and USB) with desktop power supply unit (24W)

3_1_5 SAM Readers

- **Desk/series** offers two (2) Security Access Modules (SAM) as standard, enabling support for smart card-based loyalty and electronic purse schemes.
- These readers conform to ISO 7816 1-2-3 standards in SIM format (ID000). Hardware supports 3 and 5-volt cards and clock frequencies of 3.519/4.915/7.038/9.830/10.557/14.745 MHz dynamic velocity acceptance.
- SAMs are identified by marking on casing 1 , 2



Technical specifications	
Conformity with ISO standard	ISO 7816 1-2-3 standards
Cards format	ID-000 format
Synchronous cards	Don't manage C4 and C8 contacts
Lifespan	1000 SAM operations (insertion/withdrawal)

4_GLOSSARY

B

Bps (Bits per second): The unit of measurement for the rate at which data is transmitted

C

Cryptography: Information security (encryption and decryption of data)

D

DES: Data encryption standard, a symmetrical encryption algorithm

E

EMV: EMV stands for Europay Mastercard Visa and is the new EFTPOS standard that enables with chips to be accepted anywhere in the world. It offers increased security by allowing information identifies the cardholder to be stored on the chip.

EMV Level 1: EMV approval level for mechanical and electrical processing (and driver software), which guarantees interoperability between card and terminals.

EMV Level 2: EMV approval level for software layer (or kernel), which allows a transaction to be carried out on an EMV card.

Encryption: The transformation of data, for the purpose of privacy, into a unreadable format until reformatted with a decryption key.

Ethernet: A network cabling system.

F

Flash: Non-volatile memory.

Frequency: A measure of the energy, as one or more waves per second, in an electrical or light-wave information signal. A signal's frequency is stated in either cycles-per-second or Hertz (Hz).

I

ISDN: Integrated services digital network

ISO: International organization for standardization is a global network that identifies what international standards are required by business, government and society, develops them in partnership with the sectors that will put them to use, adopts them by transparent procedures based on national input and delivers them to be implemented worldwide.

ISO-8583: International standard covering EFT messaging.

L

LAN: Local area network, a data communication network, typically within a building or campus, to link computers and peripherals devices under some form of standard control.

LCD: Liquid crystal display.

LED: Light emitting diode.

LLT: Local loading tool

M

Modem: Modulator/DEModulator, a hardware device which converts digital data into analog and vice versa to enable digital signals from computers to be transmitted over analog telephones lines.

MSR: Magnetic stripe reader

O

Operating system: A software program that manages the basic operations of a computer system. These operations include memory apportionment, the order and method of handling tasks, flow of information into and out of the main processor and to peripherals, etc.

P

PCI PED: Payment card industry PIN entry device, a security specification for EFT terminals, designed to secure the PIN information stored in a terminal from fraudulent activity.

PED: PIN entry device, the secure customer interface module of a payment terminal.

PIN: Personal identification services, it is used as a security device on payment cards requiring this

code to be entered for further verification.

Protocol: Set of rules for organizing the transmission of data in a network.

PSTN: Public switching telephone network

R

RAM: Random access memory

RS-232: RS-232 is the serial connection found on IBM-compatible PCs. It's used it for many purposes, such as connecting a mouse, printer, external modem, and various peripheral devices to a PC.

S

SAM: Secure authentication module.

Smart card: A credit card-sized card with a microprocessor and memory.

SRAM: Static random access technology.

T

TCP/IP: (Transmission control protocol/ internet protocol) the standard set of protocols used by the internet for transferring information between computers, handsets, and other devices.

U

USB: USB is a plug-and-play interface between a computer and add-on devices (such as keyboards, printers and other peripheral devices). With USB, a new device can be added to your computer without having to add an adapter card or having to turn the computer off.

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