C-ZAM)XENTA

Product Manual

banksys
end-to-end transactions

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Product Guide C-ZAM/XENTA
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Introduction

C-ZAM/XENTA, Banksys' newest terminal, is a **countertop** payment terminal designed to run a virtually unlimited number of applications in attended environments.

It can process all types of magnetic stripe and chip cards for payment and non-payment applications.

The C-ZAM/XENTA terminal is powered by the brand new SAMOA System-On-a-Chip, hosting a full-featured Linux operating System. Faithful to its role as a technological innovator, Banksys has developed a terminal that offers the performance and the security level it is renowned for.

While high-tech on the inside, the terminal illustrates Banksys' continuous concern for efficiency towards its users: easy-to-install, easy-to-use, easy-to-maintain.

The user-centred approach makes the new terminal stand out both ergonomically and aesthetically. Undoubtedly striking are the design of the terminal itself, its uncomplicated keypad and its prominent display.

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List of acronyms

The list below contains a number of acronyms that are used in this document.

Acronym	Meaning
ADA	American Disability Act
ASIC	Application Specific Integrated Circuit
BGA	Ball Grid Array
bps	Bits per second
BRA	Basic Rate Access
CA	Certification Authority
CSM	Chip Security Module
dpi	Dots per inch
ECR	Electronic Cash Register
EMV	Europay, MasterCard, VISA standard
GSM	Global System for Mobile communication
GPRS	Global Packet Radio Services
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LCD	Liquid Crystal Display
PC	Personal Computer
PIN	Personal Identification Number
PSTN	Public Switched Telephone Network
ROM	Read Only Memory
RTL	Remote Terminal Load
SAM	Secured Application Module
TCP / IP	Transmission Control Protocol / Internet Protocol
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair

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General description

A terminal for the present and the future

The C-ZAM/XENTA is highly suited for multiple applications in attended environments. It accepts a wide range of payment cards including credit cards, debit cards, stored-value cards (e-purse), loyalty cards, private label cards, social security cards, etc.

A terminal for all

Its modern, cubic design positions the terminal clearly as a standalone countertop model, emphasising the general concept of simplicity. Apart from that, the basic geometric design should allow for easy integration in a variety of environments, aesthetically as well as ergonomically.

Both the hardware and software of the C-ZAM/XENTA terminal have been designed with the end-user in mind. Special consideration has been given to the guidelines of the American Disability Act (ADA) and other organisations to support terminal accessibility for everyone. Most of these considerations can be consulted in the C-ZAM/XENTA User Interface Design Guidelines.

Architecture

The System-On-a-Chip architecture, SAMOA, is the engine of Banksys' next generation electronic payment terminals.
In addition to the architecture it includes all hardware and software components necessary for the implementation of security and payment applications, the control of printer and communication devices, user interfaces, magnetic stripe reader, chip card interface and peripheral equipment.
SAMOA also comprises a well-established, full-featured and powerful development environment that runs on a standard Linux PC and that supports common programming languages such as Native C and Java.

State of the art security technology

In true Banksys tradition, the C-ZAM/XENTA is once again at the leading edge of security technology. Security measures were taken in the SAMOA ASIC, in the physical design of the terminal and in the software; in order to keep sensitive information encrypted and to instantaneously erase data should tampering be detected.
Security evaluations were performed by TNO and T-systems.
All cryptographic algorithms commonly available are supported.
The most tangible security feature of C-ZAM/XENTA is the integrated privacy shield that protects against shoulder surfing while entering a PIN.

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C-ZAM/XENTA and its accessories

Since C-ZAM/XENTA has all intelligence and security inside the terminal, it is perfectly suited as a standalone device.
Its communication capabilities are very diverse and are implemented in a modular way. It incorporates standard PSTN, Ethernet and serial interfaces.
Connection to numerous peripherals is possible including the merchant unit, Electronic Cash Registers, PCs, bar code readers, cheque readers, biometrics modules, etc.

To fit the various needs, the following accessories are available:
- A printer, attached to the rear of the terminal
- A merchant unit with integrated printer, to facilitate the merchant's operation
- Additional interface boards, e.g. ISDN, GSM / GPRS / SMS, USB, etc.
- A fixation plate to attach the C-ZAM/XENTA terminal e.g. to the counter
- A swivel to easily turn the terminal towards its user

Technical Specifications

Dimensions (mm) and weight (g)

132,5

132

131
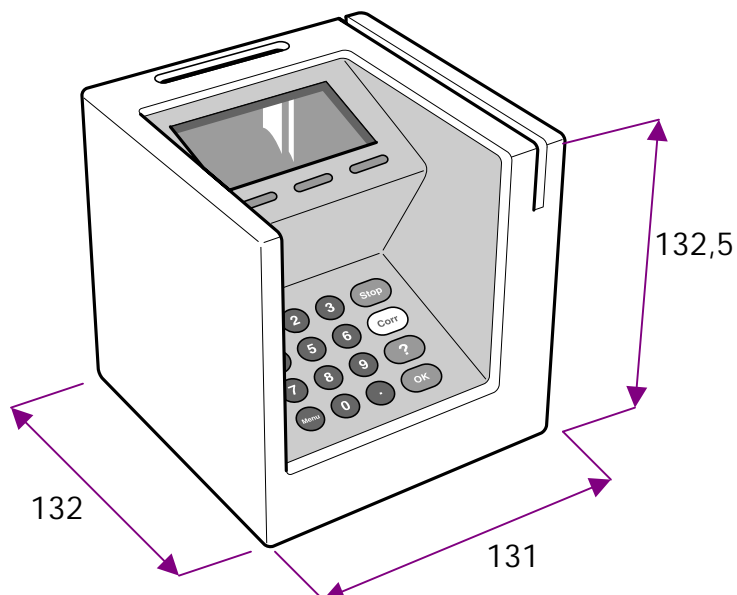
Dimensions: 131 x 132 x 132,5 mm (w x d x h)
Weight: 740 g

Keypad

The terminal keypad consists of 19 keys with key caps made of polycarbonate material for durability reasons.
All keys have a backlight illuminating the main character on the key.

The figure below shows the standard keypad layout, the 19 keys include:
- 10 numeric keys (12 mm Ø)
- The decimal symbol key: "."(12 mm Ø)
- The Menu key (12 mm Ø)

- 4 command keys: "Stop", "Corr", "?" and "OK"
- 3 programmable function keys (soft keys), located underneath the display, for navigation, selection and specific functions.
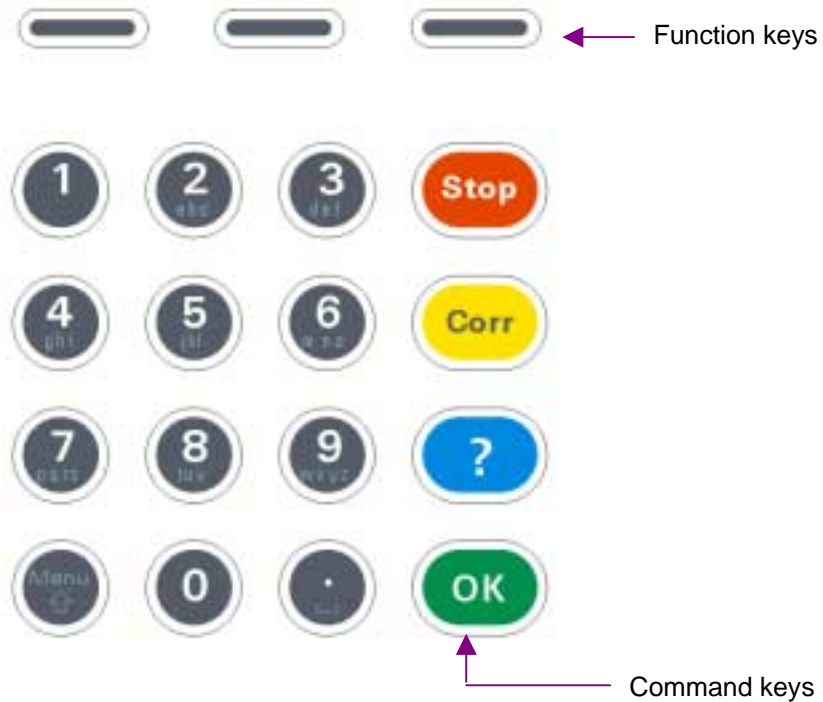
The keypad layout complies with ISO 9564-1, EN1332-3 and EMV2000 standards.
The alpha mapping, having the letters on keys 2 to 9, complies with the European ITU
E.161 and EBS 100v2 standards and the American ANSI NCITS 118-1998 standard.
The "⇑" is used during alphanumeric entry to switch between lowercase and uppercase
characters.
The "␣" is the space symbol used during alphanumeric entry.

To achieve maximal accessibility on the terminal Banksys integrated the following
features:
- A tactile identifier (embossed dot) on key 5.
- Embossed symbols on the command keys: "X" on the "Stop" key, "<" on the "Corr"
  key and "O" on the "OK" key. The symbols are according to the future EBS 100v3
  standard.
- A key shape differentiating the command keys easily from the numeric keys.
- Key backlights that highlight the main key character digit improve the contrast.
- A concave key shape.
- Support for uppercase and lowercase text, to increase readability.
- Key distance, tactile feeling and key main character size according to the ADA
  regulations.

Diverging layouts will be available upon customer request.

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Display

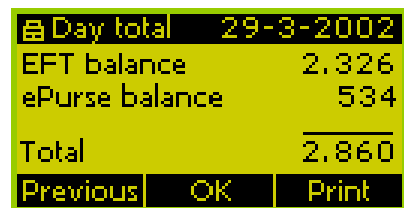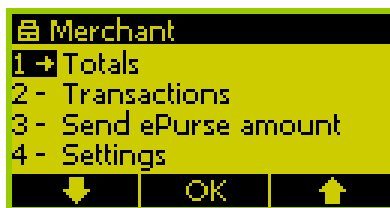LCD backlit graphic display: 128 X 64 pixels (w x h)
View area: 72 x 36 mm (w x h)
Up to 20 characters on 6 lines
Per character a space is available of 6 x 9 pixels (w x h)
Software controlled display contrast and backlight
Following screenshots illustrate some of the display possibilities:

| Amount: 10,50 EUR
Enter PIN:
. . . . | 🗄 Merchant
1 ➡ Totals
2 - Transactions
3 - Send ePurse amount
4 - Settings
⬇ \| OK \| ⬆ | 🗄 Day total   29-3-2002
EFT balance   2.326
ePurse balance   534
Total   2.860
Previous \| OK \| Print |
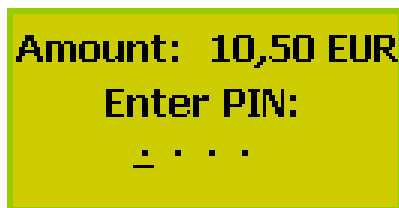
Related to accessibility:
- Display size and resolution offer a very good readability.
- Banksys suggests using a sans-serif font and uppercase / lowercase text.

Card interfaces

The terminal has two card interfaces:
- A chip card interface conforming to EMV 4.0 level 1
- A magnetic stripe reader for triple-track reading (ISO 1 / 2 / 3)

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Also in this context, the necessary attention was paid to optimise customer convenience:
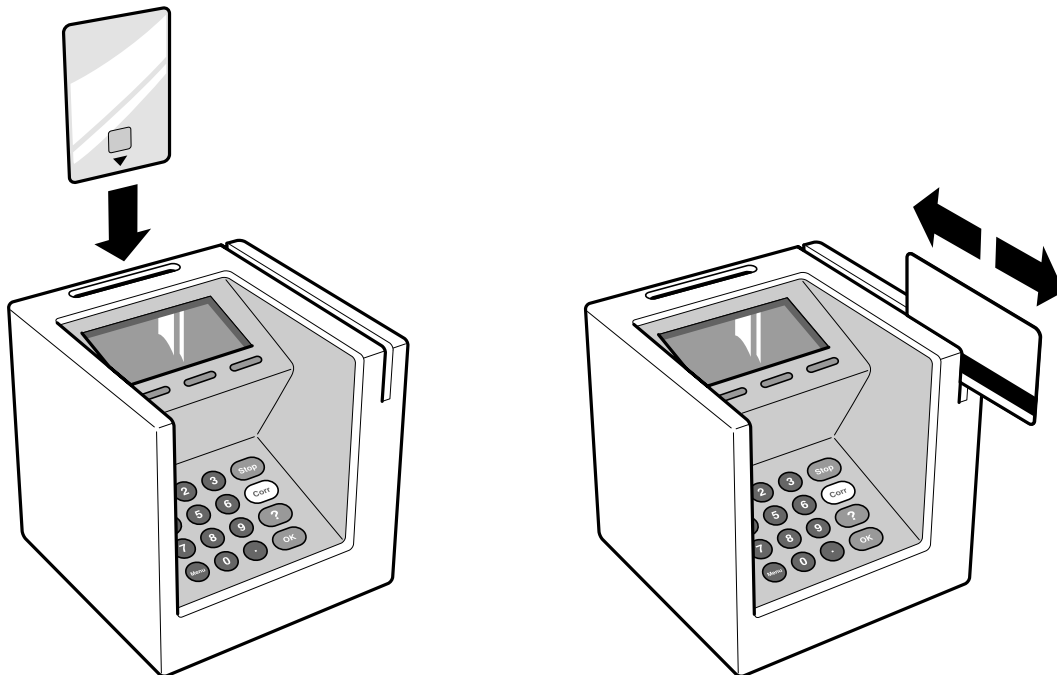- The chip card slot is located just above the display, bringing it closer to the cardholder. By choosing this prominent position, Banksys has anticipated the increased usage of chip cards.
- A chip card slot, where cards are inserted vertically, is better accessible than one using a horizontal insertion, both for the cardholder and for the cashier should assistance be required.
- The magnetic stripe reader, located on the right side of the terminal, also benefits from a more accessible position.
- By putting both card slots in distinctive positions on the terminal, users are less likely to confuse the two slots.
- The integrated privacy shield does not block the usage of either card interface.
- Clear pictograms on the terminal display explain how to insert a chip card or to swipe a magnetic stripe card. This is application-specific, and a possibility could be as follows:
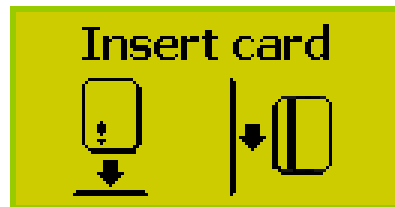
Chip security modules

The C-ZAM/XENTA terminal has 4 internal chip card interfaces (type ID0) for chip security modules (CSM, SAM) able to read 3V and 5V CSMs. To reach the CSM slots the bottom cover needs to be opened.
Standard current provided to the CSMs is 55 mA.


CSM slots

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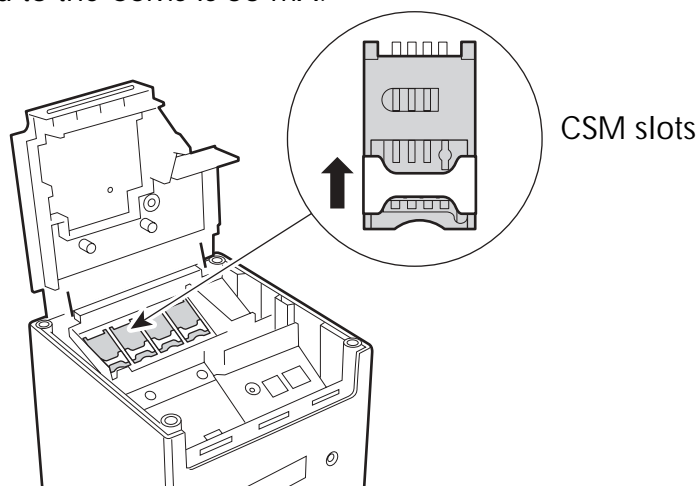
The SAMOA ASIC

A lot of functionalities are now integrated in the high-tech SAMOA ASIC, the engine of the C-ZAM/XENTA terminal:
- 2 x 32 bit ARM processor cores
  - o A communication / security core with tamper responsive logic (detection and memory clearing) (MP1)
  - o An application core (MP2)
- 32 Mb RAM memory
- 32 Mb NAND Flash memory
- Real-time clock (RTC)
- Embedded Ethernet functionality
- Hardware DES / 3-DES encryption device
- Hardware RSA accelerator
- Printer driver

Interfaces

By default, the terminal is equipped with the following interfaces:
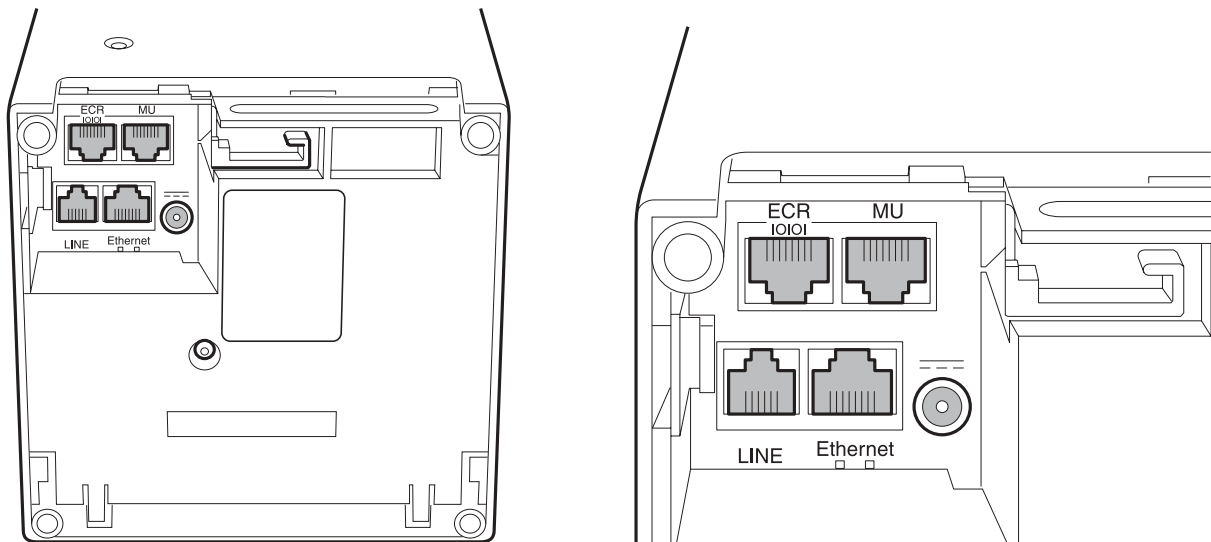
- Marked "ECR" (IOIOI)" is an RS232 interface, connector type RJ45
  - o To connect an Electronic Cash Register (ECR), PC, bar code reader etc.
- Marked "MU" is a connector type RJ45
  - o To connect the merchant unit.
- Marked "LINE" is a PSTN interface, connector type RJ11
  - o To communicate with a host using an analogue telephone connection according to TBR21 and FCC part 68
  - o Bell 103, Bell 212, V.21, V.22, V.22b, V.23, V.32, V.32b, V.34, V.90, V.92 modem modulation protocols

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- o V.42 / MNP4 and V.42b / MNP5 error correction and data compression, V.44 data compression
- o Tone and pulse dialling
- o Communication speed up to 57.600 bps, which is beneficial for remote software downloads
- Marked "Ethernet" (💻, 💻)" is a 10 Base-T interface, connector type RJ45
  - o To communicate with a host, to create a LAN using a TCP / IP connection according to IEEE 802.3
  - o Ethernet encapsulation for IP-protocol, IP address, subnet mask & gateway
  - o Communication speed up to 10 Mbps
  - o Logic integrated in the SAMOA ASIC
  - o Ethernet offers a fast interface for development purposes

Others

The terminal is equipped with a reset button (rear side). A tool is needed to push this button.

Reset button
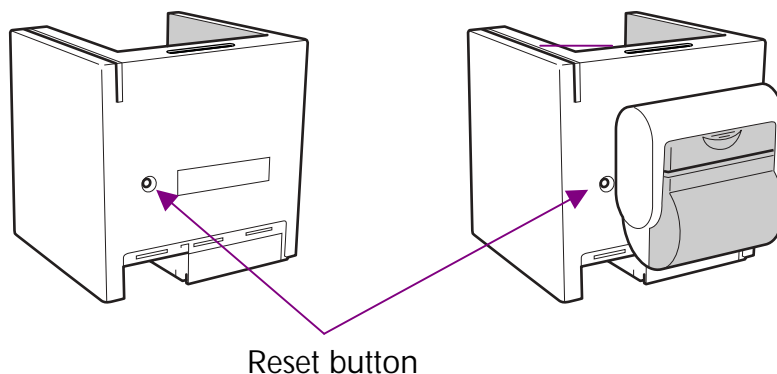
The terminal housing has a light grey colour on the outside (NCS S2502-B) and a blue-grey colour on the inside (NCS S5020-R80B)

Power adapter

A universal tabletop adapter (for indoor use) in combination with different country-specific adapter cables will power the C-ZAM/XENTA terminal.
The adapter input is 100 / 240 VAC - 50 / 60 Hz - 0,7 A. The output is 6,5 VDC - 3,05 A.
The attached cable has a standard length of 2 m and should fit to the power connector of the terminal or merchant unit.
The separately available adapter cables have a standard length of 2 m and a country-specific plug to fit the different wall sockets.

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Country specific adapter cable to connect to the wall socket

Tabletop adapter

Adapter cable to connect to the terminal or merchant unit
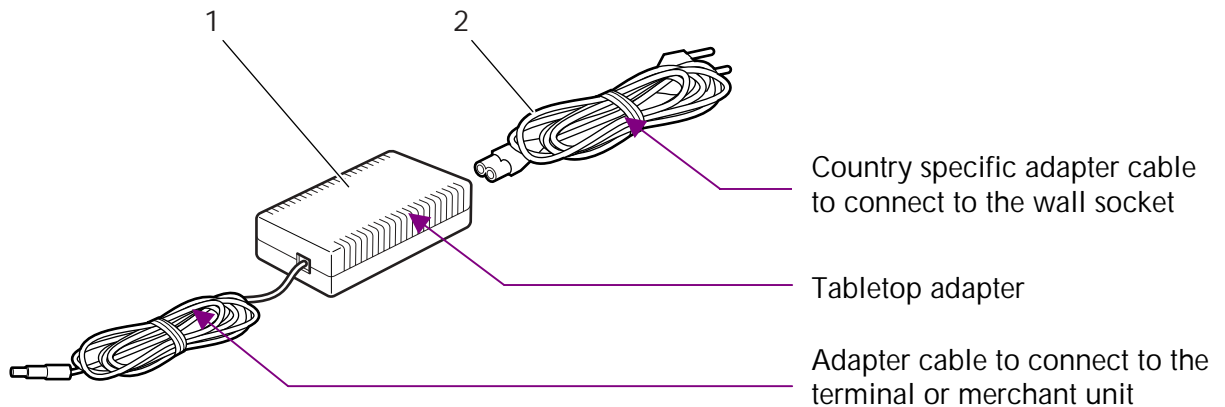
Environmental specifications

The following operating conditions are valid for the terminal and its accessories:
-   Operating temperature: 0 °C to + 50 °C
-   Operating relative humidity: 20 % to 85 %

Approvals

The C-ZAM/XENTA terminal is subject to approvals and certifications based on the following standards:
-   EMV 4.0 Level 1 for all chip card interfaces
-   EMV 4.0 Level 2 approved Kernel for payment application development
-   CE, according to ITE equipment
-   Metlab, according to IEC 950 standard
-   EMC specification: EN 55022 / CISPR 22, EN 50082-1, EN 61000-3-2 and 3, FCC Part 15 and other country specific certifications
-   Telecommunication specification, as defined by TBR21, FCC Part 68 / IC and national network operators
-   TNO and T-Systems security evaluation
-   VISA PED approval

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Security

SAMOA ASIC

The high security level of the SAMOA ASIC is achieved via:
- Tamper circuits with multiple tamper sources
- 32 Kbytes of integrated security memory, erased in case of a tamper attack
- Additional 256-bit security registers are available e.g. for master key storage. The registers will be erased instantaneously in case of tamper attack
- The ASIC takes care of the terminal's secured boot process (via key management). No code can run on the security processor unless it is certified and signed by a certification authority.

Secure terminal design

The most tangible security feature is the integrated privacy shield that protects against shoulder surfing while entering a PIN.
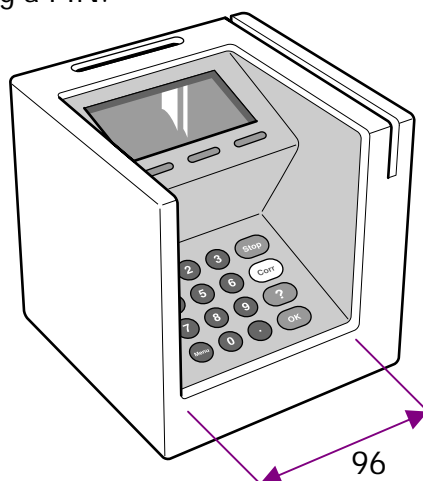
In the terminal design, security measures are taken at different levels:
- The very architecture of the ASIC and the security-related components
- The design prevents access to the Chip Card Interface in case of fraud intentions
- The signal to erase all security memory is given via several detection mechanisms that are triggered when someone tries to open the terminal.

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Security software

In the software the following key management schemes are supported, others can be added:

- DUKPT, Derived Unique Key Per Transaction, uses a working key that is changed with each transaction
- Master / session, requires that the PIN encryption key or working key remains the same for an entire transaction session. The session could be a day, a week, a month or any other period of time set by the host computer

Standards

The security related functions comply with the following standards:
- ISO 13491 (secure cryptographic device concepts)
- ISO 9564 (PIN management and security)
- ISO 15668 (secure file transfer – retail)

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Accessories

The C-ZAM/XENTA terminal has the following accessories that can be added at any time. The accessories (apart from the merchant unit) have to be installed by technical staff.

Additional interface boards

General description

Several interface boards will be available for additional means of communication with the host and external devices. Open the bottom cover and simply insert the chosen interface board into the terminal to adapt C-ZAM/XENTA to the latest communication requirements. To install an interface board, please refer to the C-ZAM/XENTA Service Manual.
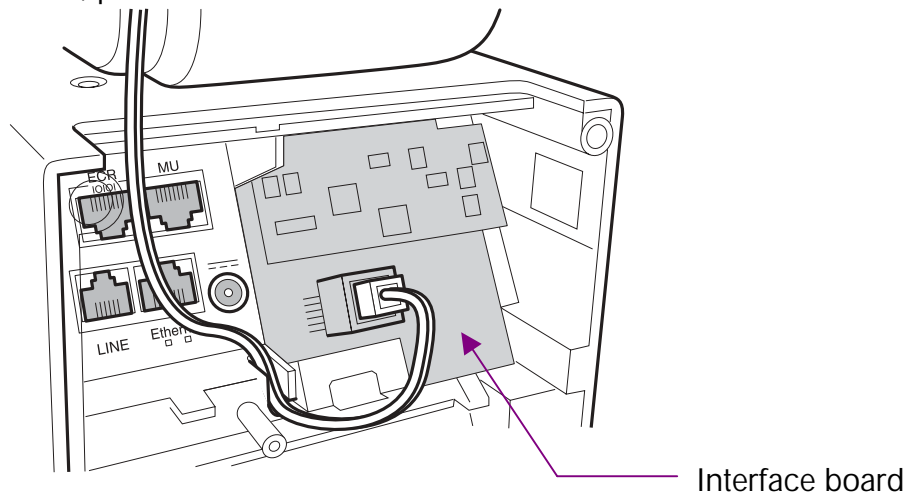
Interface board

The ISDN interface board is available at C-ZAM/XENTA product launch. Other interface boards will be available in due time.

Technical specifications

ISDN interface board

- To communicate with a host using the TCP / IP protocol (PPP) over B-channel or the X.25 protocol over B-channel and D-channel
- EURO ISDN
- Communication speed according to BRA

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GSM / GPRS / SMS interface board

- To communicate with a host using the GSM V.110 data or analogue data protocol or GPRS protocol for wireless data transfer
- Dual-band: 900 MHz / 1800 MHz Internal GSM / GPRS modem
- Dual-band: 850 MHz / 1900 MHz Internal GSM / GPRS modem
- SMS capability
- Communication speed up 0 to 9.600 bps for GSM
- External antenna

USB interface board

- To communicate with a PC, Electronic Cash Register, etc.
- Compliant with USB 2.0 specification
- USB slave connection

Others

- A wireless LAN solution offers a local wireless connection
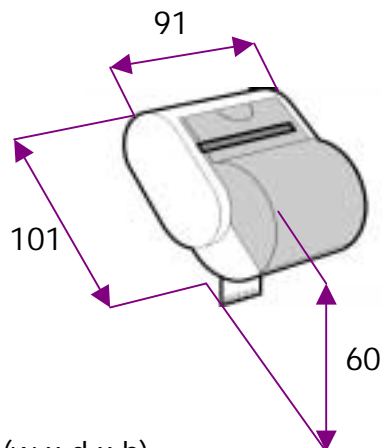- A short-range wireless solution for dial-up services is offered as well

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Printer

General description

A fast thermal graphic printer is available to attach to the rear of the terminal.

Printer

Technical specifications

Dimensions (mm) and weight

91
101
60
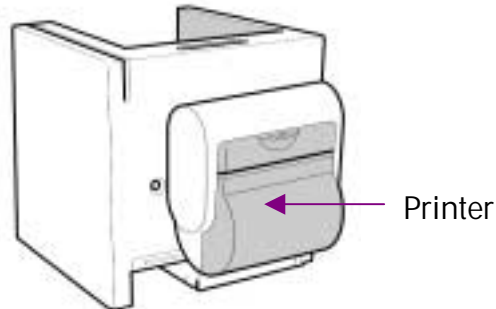
Dimensions: 91 x 60 x 101 mm (w x d x h)
Weight: 275 g (including paper roll)

Printer specifications and approvals

The graphical thermal printer has the following main specifications:
- Easy paper refill system
- Resolution: 8 dots per mm, 384 dots per line (within these values every font can be supported)
- Printing speed: 40 mm / s (for normal text tickets and graphics of maximum 64 dots per line)
- Detections for paper present, paper lid open and overheating

Technical staff can connect the printer to the terminal. For detailed information, please refer to the C-ZAM/XENTA Service manual.

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The printer is subject to approvals and certifications based on following standards:
- CE, according to ITE equipment
- Metlab, according to IEC 950 standard
- EMC specification: EN 55022 / CISPR 22, EN 50082-1, EN 61000-3-2 and 3, FCC Part 15 and other country specific certifications

Paper

Paper rolls with a paper width of 58 mm and a length up to 25 m can be used.
Use only Banksys approved paper. Using other paper may damage the printing system.

Environmental conditions

The environmental conditions are identical to the ones described in the technical specifications of the terminal.

Merchant unit

General description

In a configuration where the terminal is not connected to an ECR or PC, the use of a merchant unit might facilitate the merchant's operation. It prevents the merchant from turning the terminal to introduce, for example, the amount the cardholder has to pay.
In this configuration the merchant unit is connected to the C-ZAM/XENTA terminal via a dedicated interface.

The merchant unit is a slave device of the terminal. This means that all intelligence is in the terminal and that the merchant unit can be considered as a second display, a second keyboard and printer of the terminal.

The merchant unit has an integrated printer. This printer has the same technical specifications as the one attached onto the terminal.

Merchant unit and terminal have a clearly distinguishable design, making it less likely that cardholders enter their PIN on a merchant unit.

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Technical specifications

Dimensions (mm) and weight
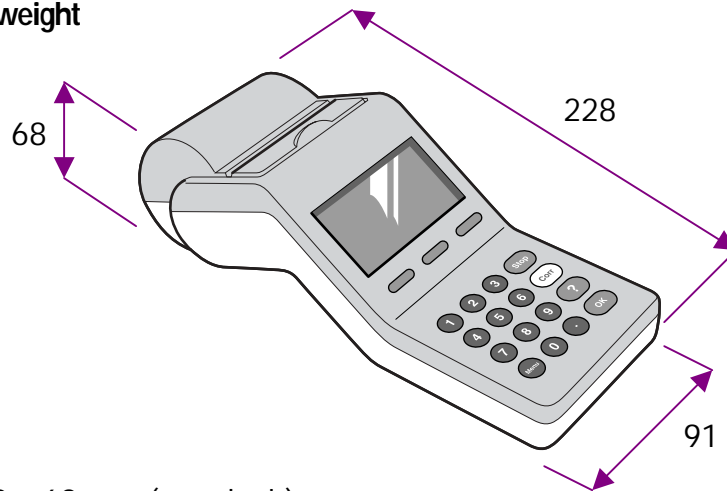
Dimensions: 91 x 228 x 68 mm (w x d x h)
Weight: 480 g (including paper roll in printer)

Keypad and display

The keypad of the merchant unit is identical to that of the terminal. It has the same 19 keys and all considerations related to accessibility are taken into account.
Diverging layouts will be available upon customer request.

The merchant unit display is exactly the same as the terminal display (128 x 64 pixels).

Interfaces

The merchant unit has an RJ45 type connector, for connection to the terminal.

To the terminal

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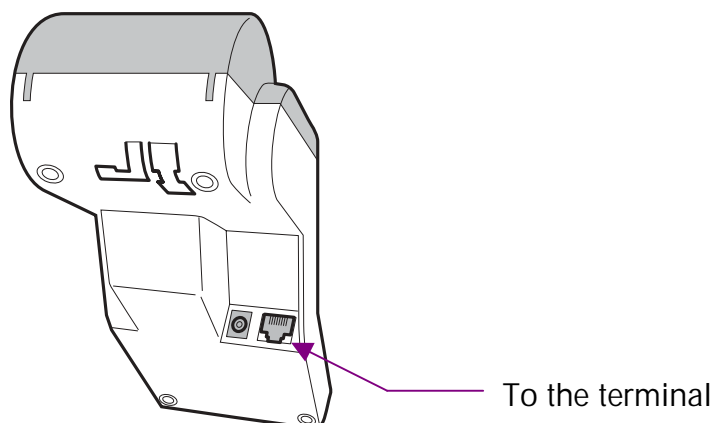
Approvals

The merchant unit is subject to approvals and certifications based on following standards:
- CE, according to ITE equipment
- Metlab, according to IEC 950 standard
- EMC specification: EN 55022 / CISPR 22, EN 50082-1, EN 61000-3-2 and 3, FCC Part 15 and other country specific certifications

Others

The following items are identical to the ones described in the technical specifications of the terminal.
- The power adapter.
  - ° Note that the adapter has to be connected to the merchant unit. The terminal itself will be powered through the merchant unit.
  - ° Never power a configuration of terminal with printer and merchant unit (with integrated printer) using one adapter.
- The environmental conditions.

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Fixation plate

General description

To attach the C-ZAM/XENTA terminal to the counter, a fixation plate is available. The terminal "clicks" onto the fixation plate, the fixation plate is connected to the counter with screws or other non-damaging ways e.g. dual lock fixation and Velcro.
A fixation plate for the merchant unit will be available upon customer request.

Technical specifications

Dimensions (mm)

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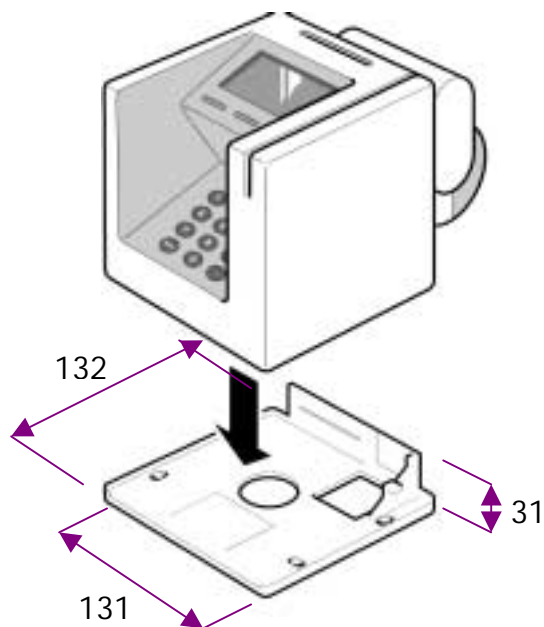
Swivel

General description

To use the C-ZAM/XENTA terminal in a standalone configuration, a swivel is provided to easily turn the terminal towards the merchant and card holder. A very compact design has been provided.
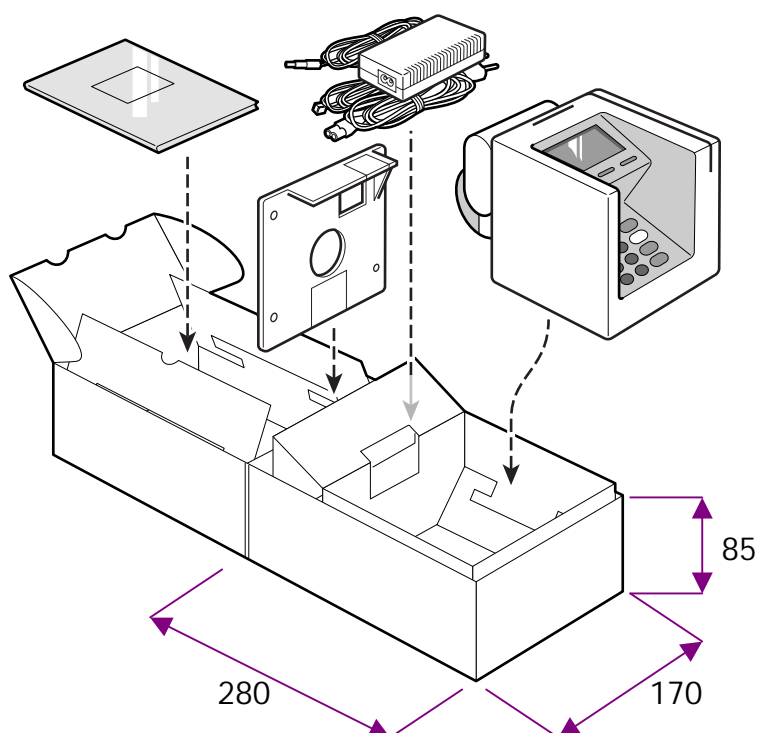
Technical specifications

Dimensions (mm)

16

□ 130

Fixation plate

Swivel

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Product package

C-ZAM/XENTA terminal

A package has been designed for the C-ZAM/XENTA terminal and possible accessories that are added at the distributor's site. The package is designed to be as small as possible. The concept allows for easy verifying that all components are present.
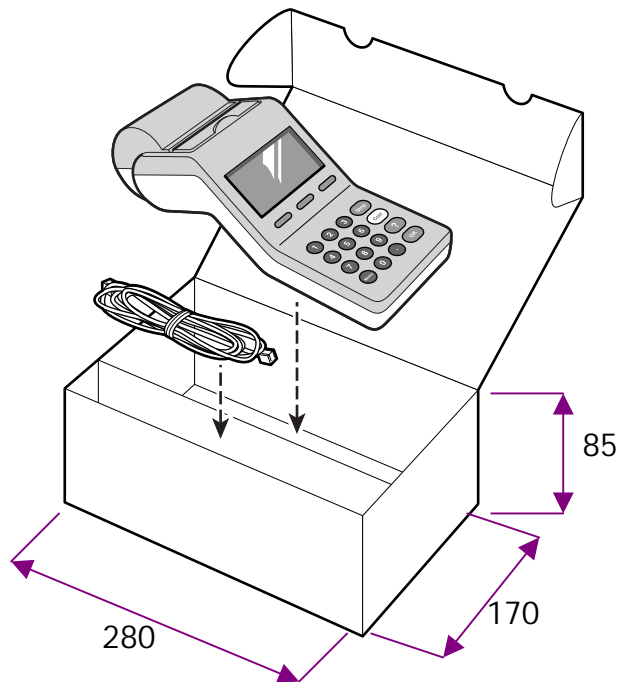

Dimensions: 170 x 280 x 170 mm (w x l x h)

The following storage conditions are valid for the terminal and its accessories:
- Storage temperature: -25 °C to + 70 °C
- Storage Relative Humidity: 5 % to 95 %

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Merchant unit

A package has been designed for the merchant unit and its adapter. In size it perfectly fits the package of the C-ZAM/XENTA terminal.

Dimensions: 170 x 280 x 85 mm (w x l x h)

The environmental conditions are identical to the ones described in the product package of the terminal.

Bulk packages

A bulk package is designed for the following items.
- Printer (with mounting screws)
- Additional interface boards
- Fixation plate
- Swivel

Each bulk package contains individually packed items. But the items cannot be ordered individually.

Package dimensions: 397 x 261 x 94 mm (w x l x h)

The environmental conditions are identical to the ones described in the product package of the terminal.

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Development environment

Banksys has developed a set of tools for easy and rapid development of applications on its terminals. The Linux-based development kit contains:

- A description of the two development frameworks.
  - o A backward-compatibility environment (SBCE) for customers who want to port existing C-ZAM/SMASH applications onto the C-ZAM/XENTA terminal
  - o A more powerful SAMOA environment (MAPS) that allows customers to exploit the full functionality of C-ZAM/XENTA.
- A simulator, compiler, debugger and associated documentation to develop applications in Native C or Java on a Linux PC in both development environments without having the real C-ZAM/XENTA terminal at hand
- Extensive documentation:
  - o A description of the Application Programmer's Interfaces (API) for C and Java, for MAPS and SBCE
  - o A description of the SAMOA hardware, software and security architecture
  - o C-ZAM/XENTA User-Interface-design guidelines
  - o Application development and porting guidelines

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