BALTECH
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ID-engine®
X-Series

Universal Contactless Smartcard and
RFID Read Write Devices

ID-engine X Series Starter Manual Rev 0.5

BALTECH ID-engine X Starter Manual

1. Overview

The purpose of this manual is to assist prospective users of the BALTECH ID-engine X RFID/SmartCard reader in determining, from the range of our products, the appropriate implementation of the reader according to their needs.

This document is structured as follows:

- Section 2 introduces the concepts related to the configuration of the ID-engine X reader
- Section 3 gives information about the various possible operational modes for the reader
- Section 4 lists supported interfaces to the ID-engine X reader
- Section 5 covers the required device drivers to operate the reader on Microsoft Windows

2. Reader's configuration

The behaviour of the ID-engine X reader can entirely be customized by changing its internal **configuration**, stored in the reader's internal memory. Some examples of functionalities which can be customized by changing the configuration of the reader are:

- Activating/deactivating a specific interface (e.g. USB, Ethernet)
- Activating/deactivating support for a specific card type
- Activating the reader's beeper or a LED after a specific action (e.g. when a card has successfully been read)

The configuration of the reader can either be written by BALTECH or by the customer, using the **ConfigEditor** tool. Alternatively, it is possible to load pre-written configuration values into the reader using proprietary **configuration files** or **configuration cards**.

Several security mechanisms are in place to prevent unauthorized changes of the reader's configuration:

- The reader can be configured with a specific **Configuration Security Code**, requiring configuration cards to be encoded with the same code to be able to affect the reader

- For a higher protection level, configuration cards and configuration files can be **encrypted** so that they can only be decrypted by a reader using a specific **Customer Key**.

3. Operational Modes

3.1. Manual operation via Host

The most common way to operate the ID-engine X reader is via a host, such as a PC or a micro-controller to which the reader is connected via its communication interface, such as USB, RS232 or Ethernet. The host communicates with the reader using a proprietary protocol called the **Baltech Reader Protocol (BRP)**. There are two main types of BRP commands, namely high level commands and low level commands.

3.1.1. High-Level Operation with *VHL*

One of the most common ways to access the reader is through the **Very High Level (VHL) layer**. The VHL layer provides an abstract file-like interface for accessing cards. This way, the user does not need to know any standard-specific information regarding the card structure to be able to access it. Accessing the reader with the VHL layer makes it possible to easily design versatile applications compatible with multiple card systems.

For instance, the VHL command *GetSNR()* returns the serial number of a card currently present on the reader. This command works for multiple card standards. The user is not even required to know which card system is currently being used.

3.1.2. Low-Level Operation of the Reader

The ID-engine X reader can also access cards using low-level commands. Low-level commands enable the reader to directly access the physical structure of each card according to its underlying standard.

The ID-engine X supports the most popular card systems currently available on the market (Mifare Classic/Plus, DESfire EV-1, ISO14443 Type A and Type B, ISO15693…). A detailed list of the supported card standards is provided in the detailed ID-engine X documentation as well as on our website (www.baltech.de).

3.2. Stand-Alone Operation in *Autoread* Mode

The ID-engine X can be configured to perform actions autonomously without the control of a host. This stand-alone operation mode is called the **Autoread** mode. These actions include:

- Automatically polling for cards

- Accessing cards
- Transmitting data to a designed output
- Driving peripherals (such as LEDs or relays).

These actions are triggered autonomously upon presentation of a designated card. The autoread mode also takes care of additional steps required to read the card properly, such as converting the read data to the right format (e.g. from binary to BCD).

Stand-alone operation of the reader is usually the best choice in environments where interaction with a host is not required. A good example of this is when the reader is used for access control purposes, where a card can be used to unlock a door.

4. Supported Interfaces

The ID-engine X is compatible with several host interfaces. The most commonly used interfaces are the **RS232 (serial)** interface, the **USB** interface and the **Ethernet** interface.

4.1. RS232 Interface

The RS232 (serial) host interface enables the host to communicate with the reader using a serial COM port. It is available in **12V**, **5V** as well as **3V** options.

4.2. USB

The reader's USB physical interface supports several application interfaces. These interfaces are described in the following sections.

4.2.1. HID

The most common interface available on the reader is the Human Interface Device (HID) USB interface (USB-HID). Using this interface, the reader interacts with the host using the same protocol as standard input devices (e.g. mouse, keyboard).

4.2.2. Keyboard Emulation

The reader can also emulate USB keyboard input, reading information from a card (such as the card number or some pre-recorded text) and sending it to the host as keyboard input information. This interface is particularly useful to interact with text input-based application, such as text or spreadsheet editors.

4.2.3. PC/SC (Using the CCID Protocol)

It is also possible to communicate with the ID-engine X reader using the standardized PC/SC interface. This interface has been developed by the PC/SC Workgroup specifically for the communication between PCs and smart card readers.

The chip card interface device (CCID) protocol, a protocol defined by the USB consortium, is used for communication over the PC/SC interface between the host and the reader.

4.2.4. USB CDC (USB over Serial)

The USB connection of the ID-engine X reader can be used in Communication Device Class (CDC) mode, allowing the host to communicate with the reader using a virtual COM port. This interface is particularly useful for software environments designed to make the host communicate with the reader over a serial COM port.

4.3. Ethernet

The ID-engine XE (Ethernet-enabled version of the ID-engine X) can be connected to a LAN using its Ethernet interface. The ID-engine XE is equipped with a two-port Ethernet switch allowing easy installation by looping the device into an existing connection. It offers full 100 Mbit/s Ethernet communication with full TCP/IP protocol stack support (including DHCP).

Electric power can either be supplied via a conventional AC power adapter or via the Ethernet connection using Power over Ethernet (PoE).

5. Windows Drivers

5.1.   RS232 Serial Interface

No drivers are required to communicate with the reader using its RS232 interface. A physical COM port is required on the host.

5.2.   USB HID/Keyboard Emulation

The HID and Keyboard Emulation interfaces do not require any specific driver. These interfaces are fully functional using the standard built-in USB HID Windows driver implementation.

5.3.   USB PC/SC (CCID)

The PC/SC interface of the reader can be accessed using the standard built-in CCID Windows driver. No additional driver is required.

5.4.   USB CDC

Depending on the version of Windows the host PC is running, a specific driver may or may not be required to be able to communicate with the reader using its CDC interface:

- If the host PC is running Windows 10 or later, no additional driver is required.
- If the host PC is running a version of Windows earlier than Windows 10 (such as Windows 7/8/8.1), an additional driver is required. This driver can be downloaded from our website (www.baltech.de).

5.5.   Ethernet

No specific driver is required to operate the reader using its Ethernet interface. The host needs to be connected on the same network as the reader to enable its operation.

Document History

Initials	Version	Date	Changes
ET	0.5	2016-08-18	Pre-version