Technical Specification

DESKO PENTA Scanner® Cube & Cube

PENTA Scanner® Cube

Cube

Barcode & NFC only

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DESKO Official Explanation of Abbreviations

1D Code	Linear or one-dimensional Barcode
2D Code	Two-dimensional Barcode
API	Application Programming Interface
BC	Barcode
BCR	Barcode Reader
DLL	Dynamic Link Library
DPI	Dots Per Inch
DUKPT	Derived Unique Key per Transaction
ICAO	International Civil Aviation Organization
IP	Ingress Protection
IR	Infrared
ISO	International Organization for Standardization
LED	Light Emitting Diode
MRZ	Machine-Readable Zone
MSR	Magnetic Stripe Reader
NFC	Near Field Communication
OCR	Optical Character Recognition
PCB	Printed Circuit Board
QIG	Quick Installation Guide
RFID	Radio Frequency Identification
RS232	Serial Interface
RTC	Real Time Clock
USB	Universal Serial Bus
SDK	Software Development Kit
UV	Ultraviolet Light
VCOM	Virtual COM Interface
VIS	Visible Light
VIZ	Visual Inspection Zone
WLAN	Wireless Local Area Network

1 Security Advice, Handling Rules & Package Content

1.1 Security Advice

The PENTA Scanner Cube contains UV-A and IR light sources which are classified as CLASS 1M LED PRODUCT according to IEC 60825-1.

That means that the light sources radiate intense invisible UV-A and IR light during the scan process. Consequently precautions must be taken to prevent looking directly at the UV-A and IR light. Note that UV-A is an optional light source and might not be installed in every unit.

- Make sure that there is an easily-accessible outlet in the vicinity, where the device is to be installed.
-  The crossed-out rubbish bin logo means that used electrical and electronic products shall not be mixed with unsorted municipal waste. For more information about recycling of this product, refer to the instructions of your country for the disposal of these products.

1.2 Handling the DESKO PENTA Scanner® Cube/Cube

The PENTA Scanner Cube/Cube is designed to work in a rough environment and withstand light shocks. Nevertheless DESKO recommends following certain handling rules such as:

- Do not drop or hit the device.
- Prevent the device from heavy vibrations.
- The device is not waterproof, prevent the device from getting wet.
- Prevent the device from heavy dust.
- Do not lift DESKO products by pulling on its cover.
- To avoid scratches prevent the glass surface from sharp objects.

1.3 Package Content

- PENTA Scanner Cube/Cube
- Power Supply (5 V DC), different country versions available
- USB 2.0 Cable
- Quick Installation Guide with the link and log-in data for the PENTA Scanner Cube/Cube download area. Within the download area you will find all relevant documents for the PENTA Scanner and necessary tools and drivers.

2 Introduction

This guide describes the standard use of the PENTA Scanner Cube/Cube. Detailed information on the respective configuration can be found in the Quick Installation Guide which is shipped with the device.
Please contact support@desko.com or visit us online at www.desko.com/support should you have not received a Quick Installation Guide or need access to our download area.

The PENTA Scanner Cube/Cube is a full-page scanner optimized for the integration and usage in self-service environments. As an intelligent device, it supports OCR and barcode reading (depending on hardware configuration) within the device itself. It therefore reduces the required performance on the host system.

There are two versions of the device available, the PENTA Scanner Cube and the Cube. Depending on the respective configuration, they support the following features:

PENTA Scanner Cube

- Machine-readable zone of OCR documents according to ISO/IEC 7501-1, ICAO 9303 and ISO 18013 (e.g. ID cards, passports, visas or driver licenses)
- 1D and 2D barcode documents printed on paper or presented on displays, e.g. smartphone, smartwatch or tablet (optional)
- RFID documents according to ISO 14443 (A/B), ISO 7816 (incl. US passport), ICAO 9303 as well as full NFC support (optional)

Cube

- 1D and 2D barcode documents printed on paper or presented on displays, e.g. smartphone, smartwatch or tablet
- RFID documents according to ISO 14443 (A/B), ISO 7816 (incl. US passport), ICAO 9303 as well as full NFC support (optional)

Immediately after a valid document has been scanned, the data is sent to the host via the USB interface. In the standard configuration the USB host is addressed by the DESKO PageScan API. The configuration for a USB virtual COM host connection is available upon request.

Should you not know the exact configuration of your device or should you need further information on the PENTA Scanner Cube/Cube, please contact our sales team at sales@desko.com. Please always state the serial number of the device in your email.

3 Features

The PENTA Scanner Cube/Cube is a multi-document reader supporting various document types like passports, ID cards, visas or boarding passes. The actual features depend on the hardware configuration.

3.1 OCR Recognition (PENTA Scanner® Cube only)

The built-in ICAO document reader is capable of reading and decoding OCR data with a read rate of at least 99 % from the following documents:

- Data from machine readable passports, ID cards and driver licenses according to ISO/IEC 7501-1, ICAO 9303 and ISO 18013
- Personal OCR encoded travel documents e.g. visas or crew member cards according to ICAO 9303

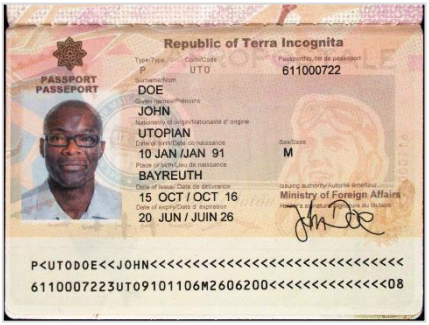
(Additional document types can be supported upon request)

3.2 ID Document Image Scanning (PENTA Scanner® Cube only)

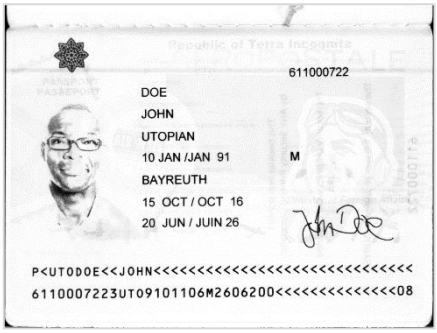
The PENTA Scanner Cube scans documents with three different light sources (VIS, IR, UV-A) and provides the images via API in jpeg, png and bmp format.

Description of the used light sources (all light sources are LED light sources):

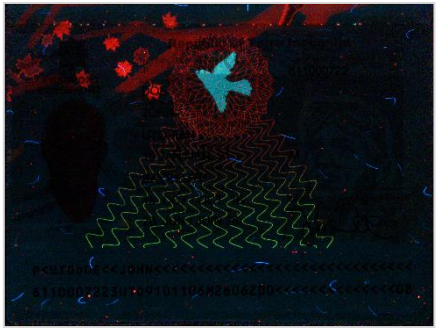
Light source	Description	Wavelength	Comment
VIS	Visible light	6000 K	
IR	Near infrared light	850 nm	
UV-A	Near ultraviolet light	365 nm	Optional feature



Visible Light



Near Infrared Light



Near Ultra Violet Light
(optional feature)

3.3 Barcode Recognition (optional for PENTA Scanner® Cube)

The PENTA Scanner Cube/Cube is able to read 1D and 2D barcode documents printed on paper or presented on displays, e.g. smartphones. Following barcode types are supported:

Linear barcodes (1D)	2D Barcodes
- Code 39 - Code 128 - GS1 128 - EAN13 / JAN13 - Code Interleaved 2/5 - Code Industrial 2/5 - IATA 2/5 - NEC 2/5 - Code 2/5	- Aztec - DataMatrix - QR-Code - PDF417

3.4 RFID & NFC Reading (optional)

The integrated RFID module is especially designed for biometric passport reading. The RFID module is able to read RFID documents according to ISO 14443 (A/B), ISO 7816 (incl. US passport), and ICAO 9303.

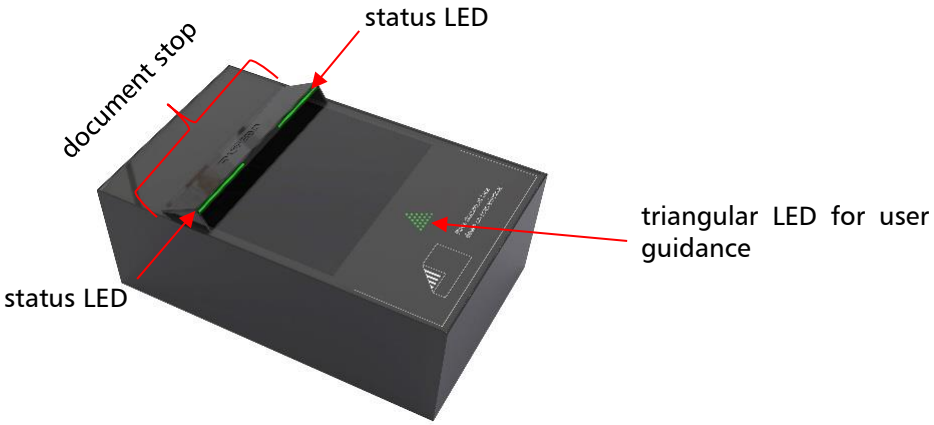
Note: RFID ePassport reading for BAC takes approx. 1.5 seconds, depending on the PC system and application. Generally, the type of ePassport/e-ID can also influence the RFID reading performance. This is due to different chip sets and chip OS in various ePassport/e-ID document types. RFID ePassport reading speed may therefore vary from document to document.

3.5 Status LEDs

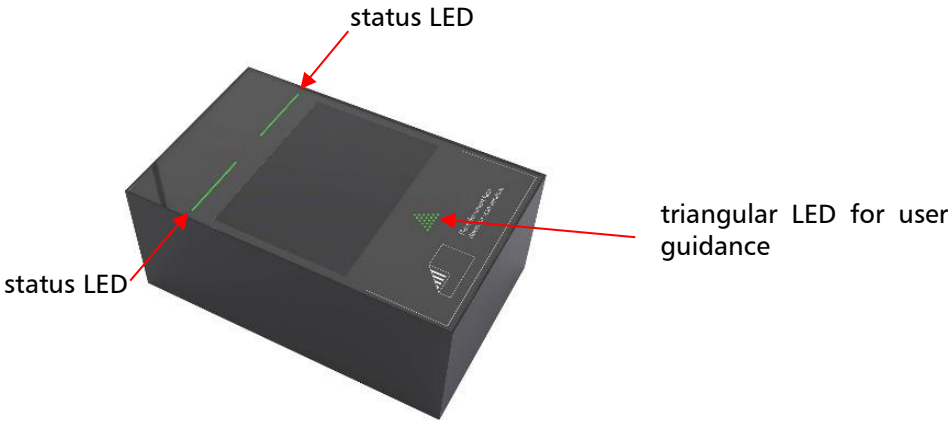
The PENTA Scanner Cube/Cube is equipped with a triangular multicolor LED for user guidance. Additionally, there are multicolor status LEDs providing visual user feedback. All LEDs are for custom use and can be controlled by the customer application using the device API.

The following pictures show the exact position of the user guidance and status LEDs of both the PENTA Scanner Cube and Cube version.

With the PENTA Scanner Cube, the two status LEDs are located within the document stop:



With the Cube, the two status LEDs are located on the rear of the scan area:



3.6 Buzzer

An internal buzzer is available for audible user feedback. The buzzer volume and duration can be adjusted by the application using the device API.

3.7 PERLUCOR® Security Glass

The PENTA Scanner Cube/Cube is by default equipped with PERLUCOR® security glass covering the scan area. Please refer to chapter 11.3 for more information.

3.8 Ingress Protection 54 (IP54)

The PENTA Scanner Cube/Cube is protected against dust and water according to IP54 regulations.

IP stands for ingress protection and is a rating code commonly used for security equipment. It consists of two digits, which show the level of protection a device has against dust and water.

The IP rating normally has two numbers:

- First digit: protection from solid objects or materials (dust)
- Second digit: protection from liquids (water)

The PENTA Scanner Cube/Cube has the following rating:

First digit	**= 5**	:	Protected against dust (no harmful deposit)
Second digit	**= 4**	:	Protection against splashing of water from any directions

3.9 SDK Features

When integrating the PENTA Scanner Cube/Cube into your application via the Page Scan API (please refer to chapter 5.1 for further information), you have access to all features of the PENTA Scanner Cube/Cube.

Please note that due to differences in hardware equipment (PENTA Scanner Cube/Cube), the devices itself may not be able to fulfill all functions and features of the SDK.

Available SDK features include among others:

- ✓ Document cropping and rotating
- ✓ Thumbnail streaming: to show user position of document on the scan window
- ✓ Movement detection: to ensure that only non-blurred scans are processed
- ✓ Document shape detection (ID1/ID2/ID3): to find out what kind of document is scanned
- ✓ B900 ink check: to detect if the MRZ was printed using B900 ink
- ✓ UV dullness check: to check if data page is made of optical unresponsive material

Detailed information on the respective SDK features can be found in the DESKO Page Scan API SDK documentation which is available in the DESKO download area.

4 Hardware Integration and Setup

To use the PENTA Scanner Cube/Cube, it needs to be connected to the power supply and the according host interface which is usually the USB port driven by the DESKO Page Scan API (see chapter 5.1)

4.1 Hardware Integration

The picture below gives you an overview of available interfaces:

1.	Power Connector	5 V DC / 2,5 A
2.	USB Host	USB 2.0 high speed communication between PENTA Scanner Cube/Cube and host PC

The detailed hardware integration is described in the Appendix / Hardware Integration Guide PENTA Scanner® Cube/Cube.

4.2 Hardware Setup

Step 1 – Power Connection

Connect the PENTA Scanner Cube/Cube to the power plug (blue box). Only use the provided power supply!

Make sure that the device is plugged into an easily accessible outlet.

Step 2 – Signal Connection

Connect the PENTA Scanner Cube/Cube via the provided USB cable with your PC (green box).

The device will power up after you have connected the power supply. Wait for the device to boot up, this may take a few seconds. A single buzzer signal indicates that the device is ready for usage.

5 Software Integration

Software integration of the PENTA Scanner Cube/Cube is done via the host connection. Usually this is established by the DESKO PageScan API connected via the USB host port. Alternatively, a virtual serial connection via the USB host port is possible.

All information about software, driver and SDK can be found in the DESKO download area. The link and login data for the download area can be found in the Quick Installation Guide, which was shipped with the device. Should you have any questions, please do not hesitate to contact support@desko.com or visit us online at www.desko.com/support.

5.1 Connecting via the PageScan API

To get access to all features of the PENTA Scanner Cube/Cube it needs to be connected via the USB host interface and addressed via the DESKO PageScan API. This API is included in the device SDK which provides drivers for Windows 7, 8, 8.1 and 10 (32bit and 64 bit) as well as libraries and sample applications for C/C++, C#, Java and .Net.

5.2 Virtual Serial Connection

For using the PENTA Scanner Cube/Cube connected via a virtual serial COM port, it is necessary to install the DESKO VCOM software package and connect the device via USB.
For detailed information, please refer to the "DESKO Virtual COM Software Installation Guide". The file can be found after installation of the package in the Windows Menu via Start -> Program -> DESKO PENTA Scanner.

This software generates a virtual COM port on the system which can be used in the same way as a standard COM port. As soon as the generated virtual COM port is used by an application, the PENTA Scanner Cube/Cube is ready for operation. In this status the OCR and barcode data will be sent to the generated virtual COM port. The protocol description is available upon request.

5.3 Version Control

For maintenance reasons, e.g. firmware updates, the device must be connected to USB. All required features are available via the DESKO PageScan API to integrate in the customer application or via a dedicated software package. This can be found on in the DESKO download area and contains all necessary drivers, tools and documentation to perform the following actions:

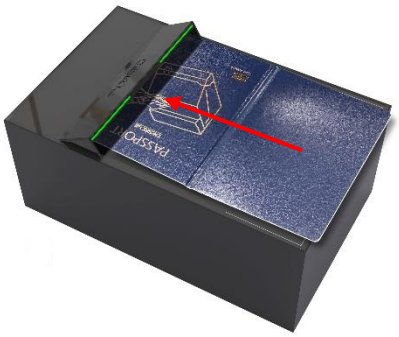
- Read out detailed information about firmware version and device configuration.
- Update firmware.
- Update device configuration.

NOTE: for further information please contact support@desko.com or visit us online at *www.desko.com/support.*

6 Usage of the PENTA Scanner® Cube/Cube

This section explains how to scan different kinds of document with the PENTA Scanner Cube/Cube. All possible features of the PENTA Scanner Cube/Cube are explained in detail below.

More detailed information can be found on the DESKO YouTube channel https://www.youtube.com/user/Deskovideo.



Scanning an ID3 size document (e.g. passport):

To scan an ID3 passport document you have to place the passport flat on the scan window with the MRZ (machine-readable zone) facing downwards and push it up against the stop.

Scanning an ID1 size document (e.g. ID card with three-line MRZ):

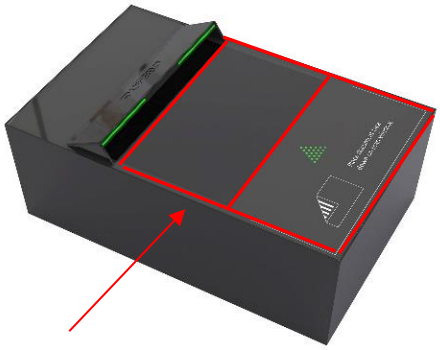
To scan an ID1 document you have to place the document flat on the scan window with the MRZ (machine-readable zone) facing downwards. The card should be positioned in the middle of the scan window and be pushed against the document stop.

Scanning a barcode document (e.g. paper or mobile boarding pass):

To scan a barcode document you have to place the document flat on the scan window with the barcode facing downwards. To get optimal read results, the barcode should be placed in the middle of the scan window.

Reading an RFID/NFC document (e.g. ePassport or mobile ticket):

The PENTA Scanner Cube/Cube is equipped with two RFID antennas. The antennas cover the entire scan surface of the device. Therefore, it does not matter whether the RFID chip is integrated inside the front or rear cover of the passport.
NFC devices, e.g. smartphones with integrated NFC chip, can be placed anywhere on the surface in order to start an NFC read.



RFID antennas

7 Service

If the scan window is dirty from fingerprints, stain or dust, it can slow down the scanning performance and affect the accuracy of scanning. We therefore recommend cleaning the scan window on a regular basis.

7.1 Clean Glass Window

1. Turn off the PENTA Scanner Cube/Cube.
2. Clean the glass with a soft cloth or sponge slightly moistened with a nonabrasive glass cleaner.
3. Dry the glass with a chamois or cellulose sponge to prevent spotting.

7.2 Clean Housing

1. Turn off the PENTA Scanner Cube/Cube.
2. Clean the housing with a soft cloth or sponge slightly moistened with a nonabrasive, solvent free cleaner.
3. Dry the housing with a chamois or cellulose sponge to prevent spotting.

8 Service and Maintenance

In general, DESKO products are maintenance free. However, if there is a failure or if you require any technical assistance, please do not hesitate to contact our support team at support@desko.com or visit us online at www.desko.com/support.

For maintenance regarding firmware upgrade, it is required to install a dedicated DESKO software package. This can be obtained upon request and contains all necessary drivers, tools and documentation to perform the following actions:

- Display detailed information about firmware version and device configuration.
- Update firmware and device configuration.

Please contact our support team, should you require this specific DESKO software package.

9 Warranty

Please note that due to improper usage (see section 1.2) or after opening the device, warranty cannot be claimed anymore. Warranty excludes normal wear and tear.

10 Support

Please check if all the cables are connected, the software is installed properly and the device is powered on. If this is the case and the device still does not work, please contact our DESKO support team:

Technical Support
E-mail: support@desko.com
Web: www.desko.com/support

Phone.: +49 (0) 921 79279-69
(available during German office hours)

In order to give you an immediate and reliable support please always include the following information within your support inquiry:

- ✓ Name of the product
- ✓ Serial number of the product *(The serial number can be found on the backside of the device. It is an eleven-digit number, always starting with 20. Example: 201546 00589)*
- ✓ Used firmware, configuration and software version
- ✓ Detailed issue description
- ✓ Corresponding logfiles (VCOM with log level 4: C:\hid2ser.log and C:\Windows\hid2ser.ini (see also VCOM manual). Device updater: C:\%userprofile%\AppData\Roaming\DESKO GmbH\DeviceUpdater)
- ✓ Contact details of the person responsible at your company

11 Technical Overview

11.1 Technical Data

Supply Voltage:	5 V DC +/- 5 %
Supply Current:	2,5 A max
Data Output	1 x USB 2.0 Host
Storage Temperature:	-10 °C to +50 °C
Operating Temperature:	0 °C to +40 °C
Humidity:	20 % to 80 % (R.H. non-condensing)
Special conditions:	No direct sunlight on scan window
Reliability:	MTBF = 180.000 hours
RF / EMI Compliance:	CE and FCC

Test report available upon request.

11.2 Dimensions

PENTA Scanner Cube	
Footprint	226,75 mm (8.9 inches) x 143 mm (5.6 inches) x 108,1 mm (4.3 inches)
Scan Window Size:	94,2 mm (3.7 inches) x 131 mm (5.2 inches)
Weight:	approx. 1150 g (2.5 lb)
Cube	
Footprint	226,75 mm (8.9 inches) x 143 mm (5.6 inches) x 93,2 mm (3.7 inches)
Scan Window Size:	94,2 mm (3.7 inches) x 131 mm (5.2 inches)

11.3 Features of the PENTA Scanner® Cube/Cube

Feature	Description
OCR Recognition:	OCR Reader: according to ISO/IEC 7501-1, ICAO 9303 and ISO 18013
Passport Image Scanning:	Scan documents with three different light sources (VIS = 6000 K, IR = 850 nm, UV-A = 365 nm (optional)
Barcode Scanner:	1D and 2D barcode documents printed on paper or presented on displays, e.g. smartphone
RFID & NFC:	RFID documents according to ISO 14443 (A/B), ISO 7816 (incl. US passport), ICAO 9303 as well as full NFC support
Buzzer:	Integrated buzzer, volume and duration adjustable
Status LEDs:	2 x multicolor status LEDs for user feedback, 1 x multicolor status LED for user guidance
PERLUCOR® Security Glass:	Scratch resistant to natural materials, optical grade bigger than 92% of transparency
Ingress Protection (IP54):	Protected against water and dust according to IP54 standard
Data Output / Connectors:	1 x USB Host 2.0

11.4 Regulation Information

This device complies with Part 15 of the FCC Rules.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAUTION: Any changes or modifications not expressly approved by DESKO GmbH could void the user's authority to operate the equipment.

12 Appendix / Hardware Integration Guide PENTA Scanner® Cube/Cube

The housing of the PENTA Scanner Cube/Cube is a solid construction especially designed for the integration in kiosks or self-service installations. The device should be integrated by the provided means.

Detailed drawings are available in the DESKO download area. The link and log-in data for the download area can be found in the Quick Installation Guide which was shipped with the device.

If you require further information on the correct integration, please contact support@desko.com or visit us online at www.desko.com/support.

12.1 Operation of PENTA Scanner® Cube

For reading OCR data from standard ID1, ID2 and ID3 documents, the PENTA Scanner Cube is equipped with a document stop at the rear of the device.
If OCR data shall be read, the ID document needs to be positioned in the middle of the scan window and completely be pushed backwards to obtain optimum read results. The document stop facilitates finding the correct position and therefore ensures successful read results from the machine-readable zone.

PENTA Scanner Cube with document stop

12.2 Operation of Cube

For pure barcode reading, DESKO provides the Cube without document stop. With the flat surface, the device ensures successful reading of all kinds and sizes of paper or electronic barcode documents e.g. smartwatches, smartphones or even large tablets.

Cube without document stop

12.3 Special Integration Rules

For the integration of the PENTA Scanner Cube/Cube, special guidelines have to be followed, described in the following sections.

12.3.1 RFID Integration

Every metal material in the surrounding of the RFID antennas strongly influences the electrical field of the RFID module. Such an environment heavily deteriorates the RFID function!

PENTA Scanner Cube

Cube (barcode & NFC only)

metal environment (marked red)

If you want to integrate a PENTA Scanner Cube/Cube with RFID option in a metal environment, please contact your DESKO contact person to discuss special integration guidelines.

13 Technical Drawing