ČETRTA POT

CONTACTLESS READER
CM1/TP

PRODUCT SPECIFICATION

TECHNICAL DOCUMENTATION

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1 CONTACTLESS READER CM1/TP - DESCRIPTION

Contactless reader CM1/TP is standalone RFID contactless card reader/writer. It permits working on frequency 13.56 MHz.

The reader is an example of implementation of ISO/IEC 14443A (1 – 4 compliant) and ISO/IEC 14443B reader/writer (Mifare Classic, Desfire EV1). Small size antenna, implemented on the same pcb, permits reading/writing on distance up to 60 mm (13.56 MHz).

Contactless reader has two slots for SAM security cards and permits AES and 3DES cryptography.

NFCIP-1 mode is supported to. Contactless reader CM1/TP is intended for reading/writing to contactless cards. Reader detects card and confirm reading with sound (beeper) and light (LED) signal. The message with card id and data is sent via USB serial communication to personal computer.

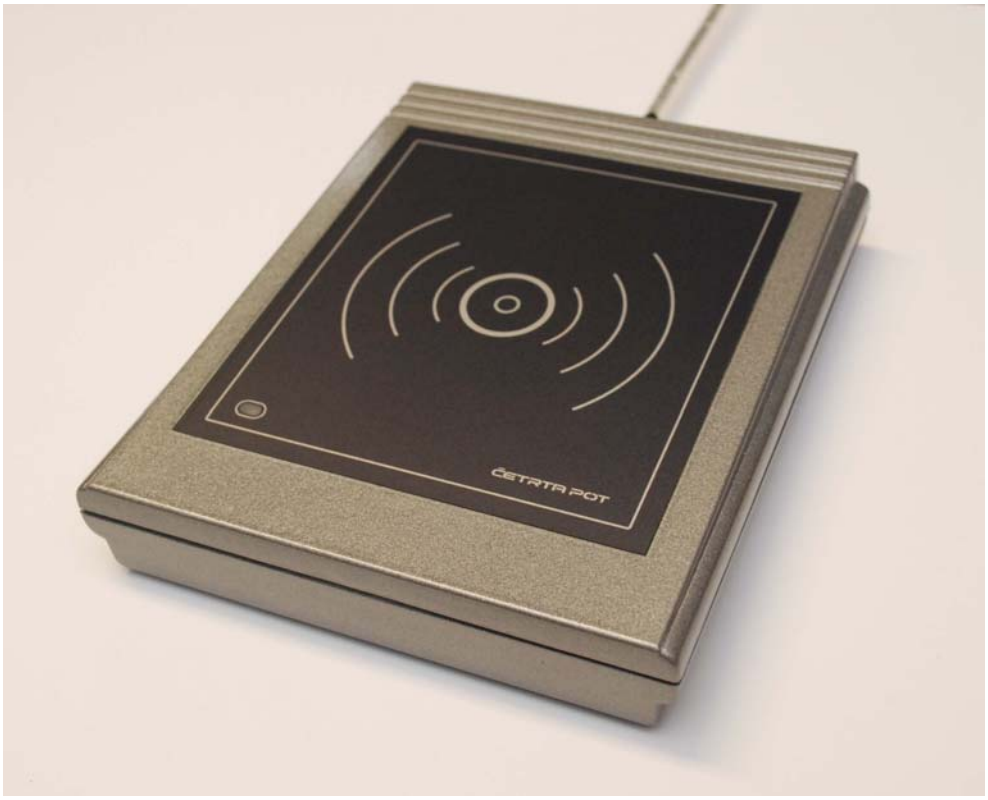


Figure 1: CM1/TP contactless reader (front view).

2 TECHNICAL SPECIFICATIONS – CONTACTLESS READER CM1/TP

Antenna (13,56 MHz)	
	PCB antenna, 70 mm x 70 mm
Operating frequency	
	13.56 MHz
Card reading / writing distance	
	Up to 60 mm
Contactless card type	
	Mifare, Mifare Classic, Mifare Ultralight, Mifare PLUS, Mifare DESFire EV1 ICODE, P2P passive initiator mode according NFCIP-1
Contactless (RFID) Smart Card Interface	
	ISO 14443A (1 – 4 compliant), data baud rate 848 Kbps (depend on card)
	ISO 14443B data baud rate 848 Kbps (depend on card)
	Supports protocol according ISO/IEC 15693, ICODE EPC UID and ISO 18000-3 Mode 3
	supports P2P passive mode according ISO/IEC 18092
Embedded firmware	
	Firmware supports use of NFC secure layer
Host Interface	
Host Interface	USB 2.0 (also supported USB 1.1)
Transmission Speed	12 Mbps (USB 2.0 full speed)
Power Supply	Bus powered
Other Communication Interfaces	
RS485 serial interface	1 serial interface; RS485 (half duplex), connector type: MKDS 1/8-3,81 terminal clips; communication speed: 115 200 bps (standard)
JTAG IEEE1149.1 Serial Interface	JTAG 10-pin connector; to connect JTAG adapter
Connector	Terminal clips MKDS 1/8-3,81 (RS 485 communication, power supply 12V DC, input, output)
Settings	DIP switch (address, communication, mode)
Inputs (model CM03/TP/SF)	Keyboard (4 x 3), TTL input
inputs (model CM03/TP)	TTL input
Outputs	BICOLOR LED (card reading identification), beeper, transistor output
Electrical and Mechanical Specifications	
Power Supply	5V DC ±5%, 250 mA (via USB port)
Dimensions (L x W x H)	125 mm x 150 mm x 24 mm
Weight	approx. 225 g (with USB cable)

Operating temperature	0 … + 40 °C (without condensing)
Storage temperature	-40 … + 85 °C (without condensing)
Operating humidity	5 … 95% RH
Certificates and Standards in skladnost	
Certificate	CE, FCC

3 MAIN SPECIFICATIONS

Contactless reader CM1/TP main hardware and software specifications are described below.

3.1 Hardware

Contactless reader CM1/TP main specifications:

- Permits reading/writing to contactless card on frequency 13,56 MHz.
- Pcb antenna is integrated in pcb of contactless reader.
- Permits additional security with use of SAM card (security keys).
- Integrated communications: USB serial communication (USB 2.0 full speed), serial communication RS485 (option).
- Communication via JTAG interface (debug)
- Settings with DIP switch (address, mode, communication, etc).
- Power supply: 5 V / 250 mA (via USB port).
- Intended for desktop working.
- Comply all standards and tests (EMC and LVD Directives), CE Conformity, FCC.

3.2 Software (firmware)

- Supports ISO/IEC 14443A and ISO/IEC 14443B reader/writer up to 848 Kbps.
- Supports MiFARE 1K, MIFARE 4K. MIFARE Ultralight, MIFARE Plus and MIFARE DESFire products.
- Supports MIFARE 1K/4K encryption in reader/writer mode, SAM security cards.
- Supports all NFCIP-1 modes up to 424 Kbps. The RC663 handles the complete NFC framing and error detection.
- Supports contactless RF communication according to the FeliCa protocol at 212 Kbps and 424 Kbps.
- Embedded firmware commands allow use of the NFC secure layer.
- Serial communication via USB interface (USB 2.0, full speed) and serial communication via RS485 interface (option-RS485 interface integrated on pcb).

3.3 Main Parts

Contactless reader CM1/TP with main parts is presented on figure 2.

Figure 2: Contactless Reader CM1/TP – main parts.

1	USB cable	Power and communication cable for Contactless Reader CM1/TP.
2	Place for positioning contactless card	Proper place for positioning contactless card to readers antenna.
3	Bicolor LED	Red/green LED for visual signalling reading or writing to contactless card.

Figure 3: Contactless Reader CM1/TP – dimensions.

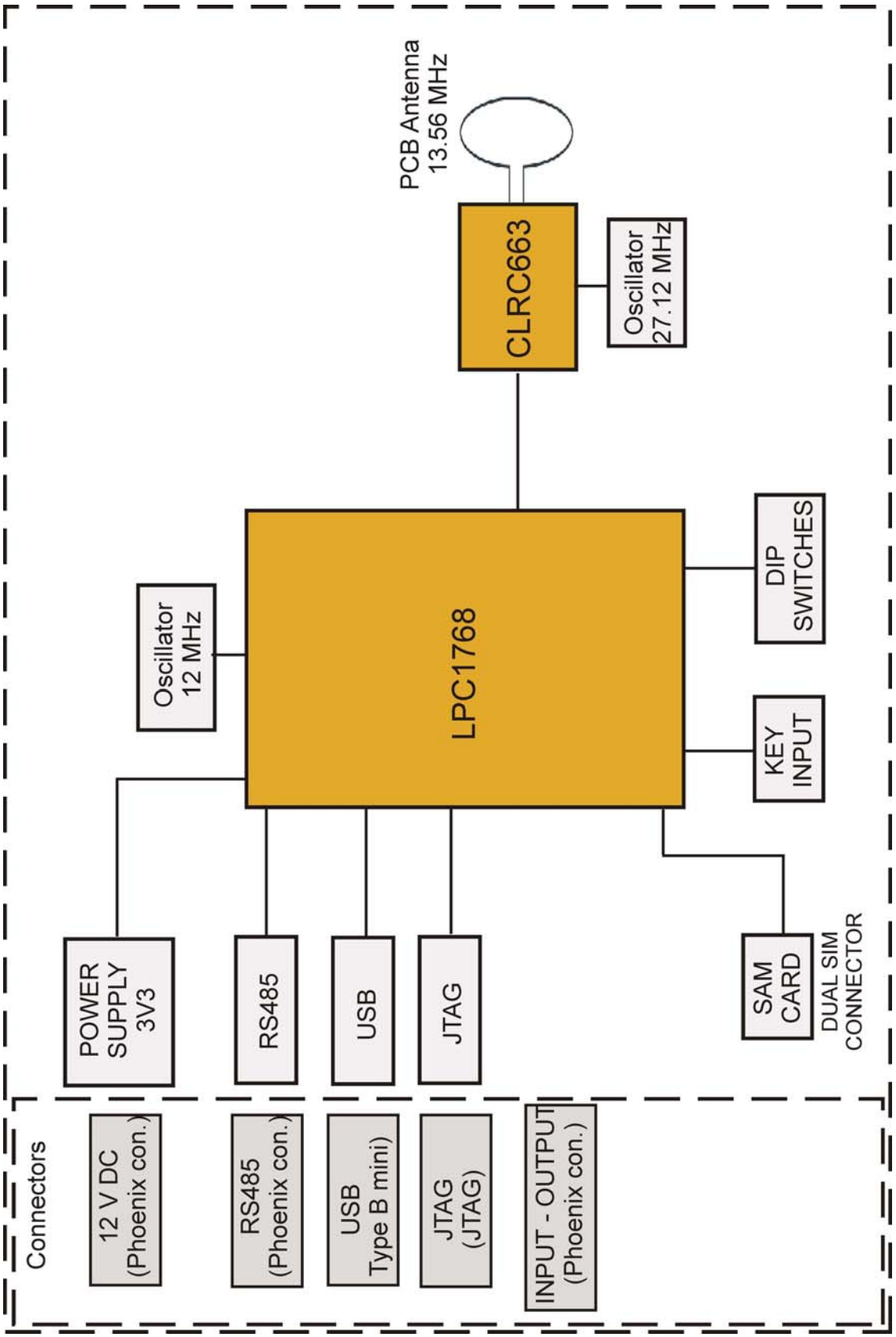


Figure 4: Contactless Reader CM1/TP – block diagram.

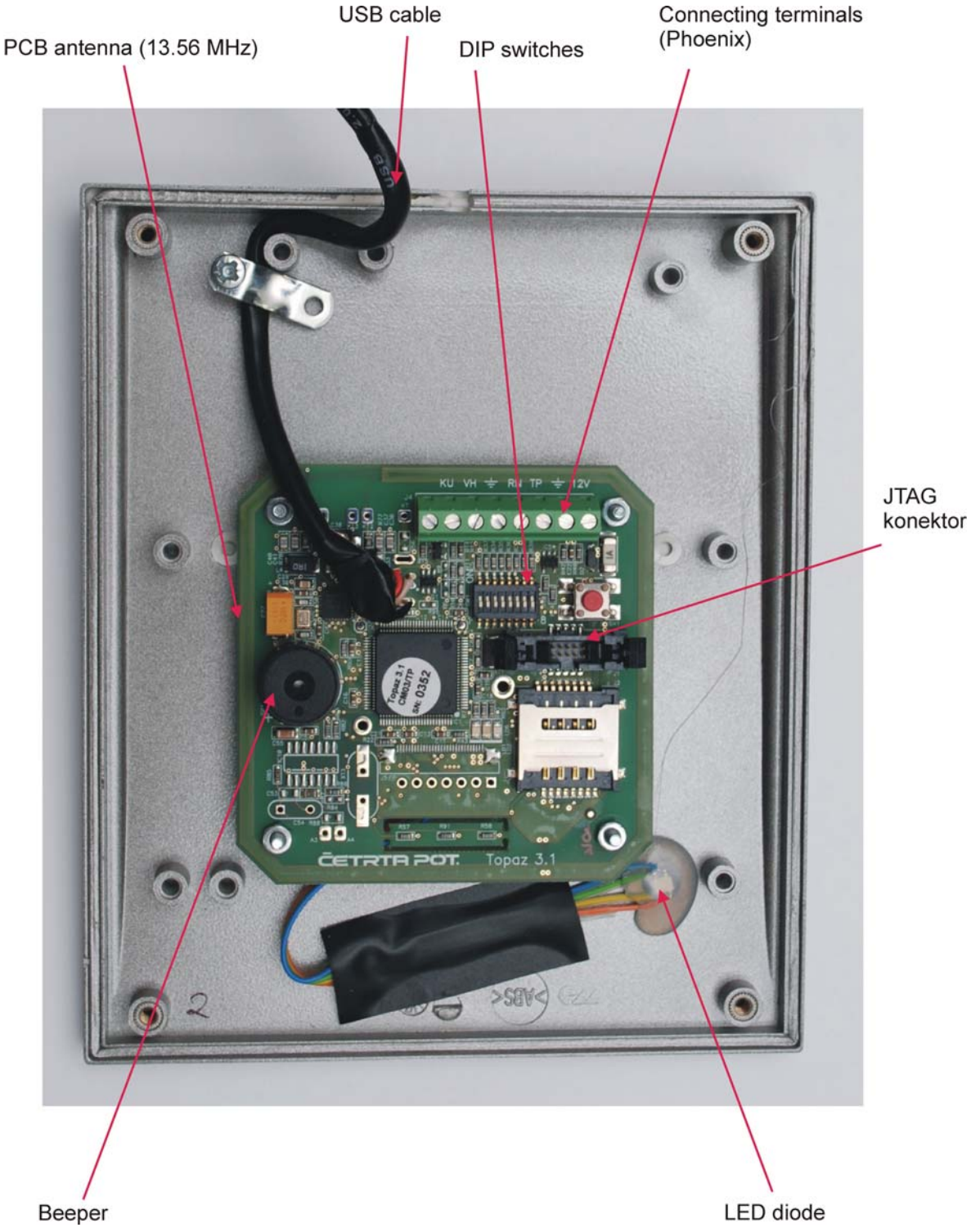


Figure 5: Contactless Reader CM1/TP – inside with main parts.

3.4 Communication Modes – DIP Switch Settings

Contactless reader CM1/TP has several communication modes. DIP swithes on readers pcb permit different settings for communication modes. The position of dip switch is on figure 5.

The default settings for the reader is the keyboard emulation mode. In this mode, the reader needs no extra drivers to communicate with personal computer.

3.4.1 DIP Switch settings for USB communication mode as keyboard mode

Contactless reader can emulate keyboard. In this mode the dip swith settings are presented in table 1.

USB serial communication mode (dip 3 – 4: 0 0):

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	X	Interface 0 - Other	Mode X	Interface 00 – USB (see dip1 and dip2)		USB interface 00 – Custom cpot 01 – keyboard 10 – cdc_acm	

Table 1: DIP switch settings on readers pcb (see figure cc) for USB serial communication.

Default settings:

Reader in keyboard emulation mode (USB interface = 00, keyboard mode = 01):

DIP switch settings (8 .. 1): 0000 0001

Keyboard emulation mode: Serial number from contactless card is readed and send via usb serial port. If Notepad (or other program) is opened, serial number from readed cards are imported in opened file.

Table 2: **Contactless Reader CM1/TP: DIP switch settings**

Default configuration:
protocol: AIR2G
phy interface: USB
dev_id: 01
interrupt mode: 0

Stay in Bootloader

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
1	x	x	x	x	x	x	x

Bootloader – bluetooth init

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	0	0	x	1	0		

Stay in Bootloader – without reading configuration from flash memory

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
1	1	x	x	x	x	x	x

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	Protocol 0 – AIRG2 1 - 4WX	Interface 0 – Other 1 - RS485					

4WX - RS485

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	1	1	0 – old terminal mode 1 – new reset	address			

AIR2G – RS485

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	0	1	RFU	address			

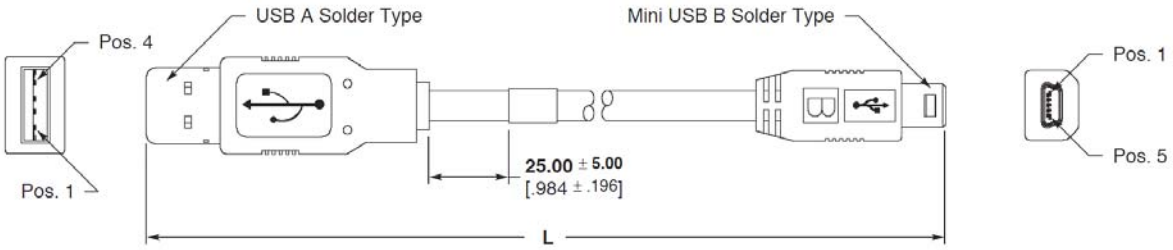
Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	X	Interface 0 - Other	Mode (air2G) 0 – No interrupt 1 - interrupt mode Mode (4WX) 0 – old terminal mode 1 – new reset	Interface 11 - RFU 00 – USB (see dip1 and dip2)			

Dip 8	Dip 7	Dip 6	Dip 5	Dip 4	Dip 3	Dip 2	Dip 1
0	X	Interface 0 - Other	Mode X	Interface 00 – USB (see dip1 and dip2)		USB interface 00 – Custom cpot 01 – keyboard 10 – cdc_acm	

3.5 USB A- mini B type cable (plug in)

The default configuration uses the USB cable for communication between reader and host as well as to supply the 5 V supply voltage to the reader.

Figure 6: USB type A – mini B plug cable.



Note:

USB 2.0 cable is type A – mini B plug cable, max. lenght 1.8 m.

4 SPECIFICATIONS

Table 3: Contactless Reader CM1/TP – specifications

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Operating humidity	5 … 95% RH
Certificates and Standards in skladnost	
Certificate	CE, FCC

Table 4: Contactless Reader CM1/TP – electrical characteristics

Operating Range

Symbol	Description	Conditions	Min	Typ	Max	Unit
PWR_DC	DC Power Supply	Active Reader	4.75	5.00	5.25	V
T_{amb}	Ambient Temperature	/	0	+25	+40	°C

Current Consumption

Symbol	Description	Conditions	Min	Typ	Max	Unit
IC5V	Supply Current	Active, RF on	-	250	-	mA

Operating Distance

Symbol	Description	Conditions	Min	Typ	Max	Unit
DST	**Operating Distance**	Measured from the center of the antenna	-	0 – 60	-	mm

Serial Interface Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
USB	USB Baudrate	via USB Cable (1*)	-	12	-	Mbaud

(1*) USB 2.0 Cable, type A – mini B (plug cable), max. lenght 1.8 m.

5 INSTALLING MANUAL

5.1 Desktop use

Contactless reader CM1/TP is desktop readers and it is intended for desktop use and development use in such are development departements in factories, at institutes, at universities etc. Reader is connected via USB serial communication port (USB 2.0) to personal computer. USB port supply power to contactless reader and permits communication with computer.

Usuall climate conditions in ofices and development environment (room temperature and humidity) are deep inside readers specified climate conditions.

5.2 Power supply

Contactless readers is powered via USB cable – with 5V DC and typical comsumption 250mA.

Note 1:

External power supply (USB port on personal computer) has to comply with LPS requirement of IEC60950-1.

Maximum lenght for USB cable is 1.8 meter.

6 USER MANUAL

6.1 User manual

Contactless reader CM1/TP is inteded to send and receive data according to the ISO 14443A and ISO 14443B protocol. Data transfer from reader to/from contactless cards operates at frequency 13.56 MHz. Also NFCIP-1 modes up to 424 Kbps transmission rate and FeliCa protocol at 212 Kbps and 424 Kbps transmission rate are supported too.

At the other side the reader comunicate with host computer via serial interface: USB (optional RS485).

6.2 General user instructions

- Reading/writing is possible with MIFARE contactless cards, FeliCa cards or with NFC device.
- Reading device can detect contactless card up to 60 mm from the center reader's antenna.
- The position of contactless card (or tag) is in the center of the antenna.
- Contactless card identification is possible in electromagnetic field (created from contactless reader). Nonmetal material have no influence to reading distance or reading reliability.
- Reading/writing to/from card is very simple: user approaches his contactless card to reader's antena (in the center of the antenna). Reading device detects card and confirm reading or writing with sound (beeper) and light (LED) signal.
- Data from/to contactless card are transferred from/to personal computer via usb serial port.
- The contactless reader works in keyboard mode (default mode; without extra drivers). Other communication modes are possible too (see dip switch settings).

6.3 Instuctions for safe work, maintaining and care

- Be careful not to damage the housing, connectors, antenna, PCB and usb cable.

- Because of the specifics of the device and the damage, only quallified staff, authorized by the producer, are allowed to repair the device. All interventions of the unauthorized person and mechanical damage means repealing of the guarantee.

7 STANDARDS AND COMPATIBILITY

7.1 ELECTROMAGNETIC COMPATIBILITY

Contactless Reader CM1/TP fulfils the following requirements of electromagnetic compatibility:

FCC, Part 15 and CE.

7.1.1 FCC Compliance Statement

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 when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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.
- Consult the dealer or an experienced radio/TV technician for help.

Caution!

The Federal Communications Commission warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The accessories associated with this equipment are as follows:
. Shielded communication cable

These accessories are required to be used in order to ensure compliance with FCC rules.

7.1.2 COMPLIANCE INFORMATION according to 47CFR 2.1077

We,

Company:	ČETRTA POT, D.O.O., Kranj
Address:	Planina 3, 4000 Kranj, Slovenia
Phone:	+386 4 280 66 00

declare that the product

Contactless Reader CM1/TP

FCC ID: 2ADMJCM1TP

are in conformity with Part 15 of the FCC Rules.

Operation of this product is subject to the following conditions:

(1) this device may not cause harmful interference

(2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

7.1.3 CE Declaration of Conformity

This Information Technology Equipment has been tested and found to comply with the following European directives:

Harmonised Standards applied	Description
EN 300 330 – 2 V 1.5.1	Air interface of the radio systems pursuant to § 3(2) (Article 3(2))
EN 60950-1:2006 + Am 1:2010 + Am 11:2009 +Am 12:2011	Health and safety requirements pursuant to § 3 (1) 1. (Article 3(1) a)
EN 301 489-01 V1.9.2 EN 301 489-03 V1.6.1	Protection requirements concerning electromagnetic compatibility § 3(1)2,(Article 3(1)(b))
EN 61000-4-2	Electromagnetic compatibility – Electronic discarge immunity test
EN 61000-4-3	Electromagnetic compatibility – Radiated fadio-frequency electromagnetic field immunity test

Manufacturer's Name: ČETRTA POT, D.O.O., Kranj

Manufacturer's Address: Planina 3, 4000 Kranj, Slovenija

Type of Equipmen (Product): Contactless Reader

Model No.: CM1/TP

ČETRTA POT,D.O.O., Kranj hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s), and said equipment is in conformity with the relevant harmonised standards as mentioned above.

WARRANTY, LIMITATIONS OF LIABILITY

WARRANTY POLICY

Manufacturer warrants that any product (“Product“) sold by Manufacturer to an end user (“User”) shall be free of defects in material and workmanship for a period a one year (or other period if specified) from date of sale by Manufacturer.

If any Product, Product's part fail to conform or is defective then Manufacturer, at its option, will repair or replace it at the premises of the User (On-Site).

To obtain warranty service, you must send the Product in either its original packaging or packaging offering an equal degree of protection directly to Manufacturer. Please contact Manufacturer for warranty replacement fee information.

LIMITATIONS AND EXCLUSIONS

This warranty does not cover customer instruction, installation, set up adjustments or signal reception problems (RFID readers).

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of, or to any part of the Product, including the antenna. This warranty does not cover damage due to improper operation or maintenance, connection to improper voltage supply, or attempted repair by anyone other than a facility authorized by Manufacturer to service the Product.

Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service.

This warranty is invalid if the factory applied serial number has been altered or removed from the Product.

THIS WARRANTY REPRESENTS THE ENTIRE AGREEMENT BETWEEN MANUFACTURER AND USER WITH RESPECT TO THE SUBJECT MATTER HEREIN AND SUPERSEDES ALL PRIOR OR CONTEMPORANEOUS ORAL OR WRITTEN COMMUNICATIONS, REPRESENTATIONS, UNDERSTANDINGS OR AGREEMENTS RELATING TO THIS SUBJECT.

End User: _____

Model Number: _____

Serial Number: _____

Startup Date: _____ Waranty End Date: _____

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