VRD-E card reader
with Ethernet interface

TECHNICAL GUIDE

Review date: 7 June, 2015

Revision number: 1.01

TECHNOTRADE LTD

CONTENT

REVISION HISTORY

REV	DATE	BY	SECTION	DESCRIPTION
1.01	2013.01.11	EV	All	First release

PURPOSE OF THE DOCUMENT

This Technical Guide is intended for studying of VRD-E card reader with Ethernet interface. It contains basic information regarding its technical characteristics, connection scheme and configuration.

Due to a reason that VRD-E card reader with Ethernet interface is constantly being developed in direction of improvements of their possibilities, changes are possible in its final version, which is not described in given Technical Guide.

During the system development process given Technical Guide will be also expanded and updated and new chapters will be added. Latest version of this Technical Guide can be downloaded from the VRD-E card reader with Ethernet interface web-page: *http://www.technotrade.ua/vrd-e-card-reader.html*.

TECHNOTRADE LTD hereby permits reproduction of this document as may be required by any of the customers or OEMs wishing to use it.

This document has been carefully prepared and is believed to be accurate. However TECHNOTRADE LTD, its employees and its agents do not assume responsibility for its use either directly or indirectly. TECHNOTRADE LTD shall not be liable for technical or editorial errors or omissions which may appear in this document. TECHNOTRADE LTD reserves a right to make changes to this document at any time without notice. Prospective users of this document should contact TECHNOTRADE LTD at the time they wish to use VRD-E card reader with Ethernet interface together with their products to become aware of any updates that may apply.

In case if you find any mistakes, omissions in this document or have any suggestions on improvements to this document, please feel free to e-mail them to our support mailbox: *support_1a@technotrade.ua*. We will be grateful to you for this valuable information.

All technical questions regarding the VRD-E card reader with Ethernet interface are welcome to be asked on support mailbox: *support_1a@technotrade.ua*. Our support team will be glad to help you.

Also you can call to us or visit us on:

TECHNOTRADE LTD

Ukraine, 04114 Kiev, Polupanova str. 10, office 1
Tel: +38-044-502-46-55, +38-044-502-46-77
Web: *www.technotrade.ua*
Mail: *mail@technotrade.ua*

APPOINTMENT

VRD-E card reader with Ethernet interface is intended for reading of EM-Marine contactless identifiers (125 kHz) and its transmission using Ethernet interface (optionally readers able to read Mifare identifiers (13.56 MHz) and EM-Marine identifiers (125 kHz) are present). Reader provides reading of code from distance from 50 to 100 mm (depending on the conditions of operation). At voltage +12 V standard distance for reading EM-Marine identifier at bringing the card in parallel to case of the reader is 70…90 mm. Distance for reading is lowering at location of the reader on the metal surface and close to sources of electromagnetic disturbances.

VRD-E card reader

Reader is provided as for internal installation (near computer, in this case interface of the reader is Ethernet and its power supply is taken from USB-port of the computer) and also for outdoor installation in waterproof case and electrical board covered with weatherproof paint (for installation near fuel dispensers, in this case interface and power supply is taken from 12 V DC power supply).

Reader allows to configure buzzer and 2-colors LED for indication (green and red LEDs).

Example of reader installation on fuel dispensers

TECHNICAL SPECIFICATIONS

Parameter	Value
Type of contactless identifiers read	EM-Marine (optionally Mifare + EM-Marine)
Power supply voltage	8…14 V DC
Average consumed current	200 mA
Peak consumed current	250 mA
Communication protocol	TCP/IP
Length of Ethernet cable	1 m
Dimensions	95 x 68 x 20 mm
Weight	100 g
Operation temperature range	-40…+85 deg. C

Dimensions
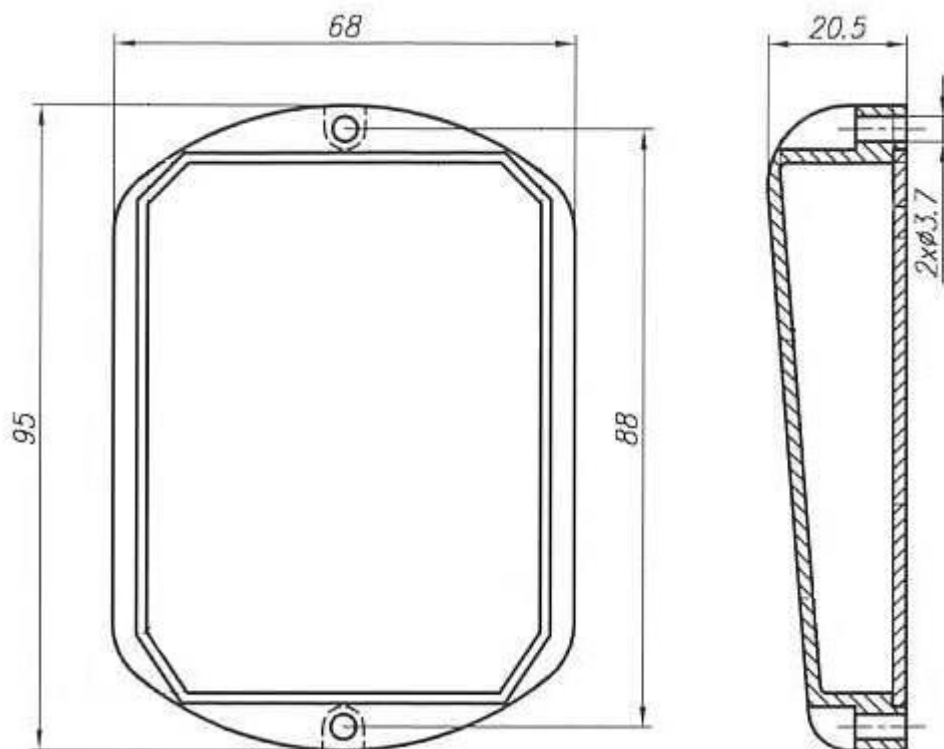

Dimensions of card reader

CONNECTION OF READER

Reader is equipped with 8-wire Ethernet cable, through which it is connected to Ethernet network and power supply is given (for power supply also USB interface cable can be used in readers for internal installation).

Pinouts of Ethernet cable

Color	Number	Appointment
White-orange	1	Standard Tx+
Orange	2	Standard Tx-
White-green	3	Standard Rx+
Blue	4	+U 8…14 V DC
White-blue	5	+U 8…14 V DC
Green	6	Standard Rx-
White-brown	7	GND
Brown	8	GND

Electric scheme of reader connection
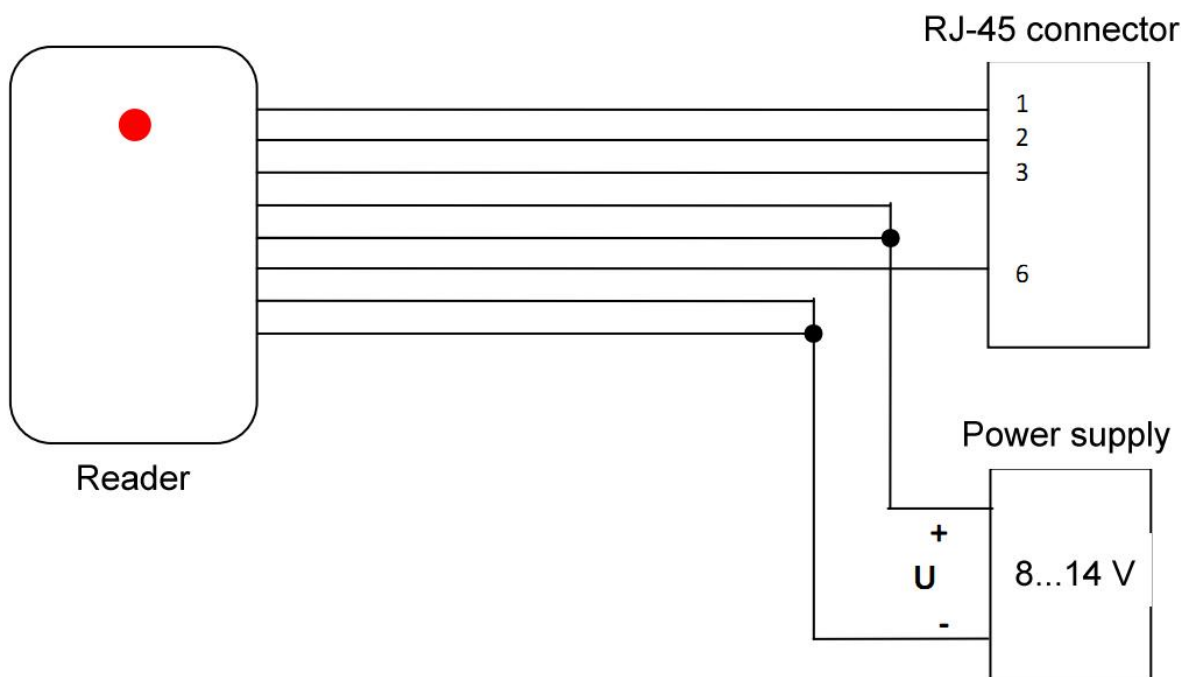
Card reader connection scheme

Mounting of reader

1. Define a place for reader mounting. It is recommended to install readers on distance not closer of 30 cm to each other.
2. Perform marking of holes for mounting of reader and laying of cables.
3. Lay the cable, fix it and perform required connections.
4. Check correctness of mounting and fix the reader in selected place using screws.
5. Connect power supply to reader.
6. After complete check of reader operation install decorative caps in holes of screws.

TCP/IP CONNECTION

Configuration of reader parameters is done through a web-page. For this using any browser it is necessary to go to address http://192.168.0.191. Default user credentials to access configuration:
- login: "admin"
- password: "vkmodule"

User credentials are saved in non-volatile memory of reader.

NOTE! These are defaults login and password. After their changing it is necessary to use new login and password for entering the web-page.

Default IP-address of reader is 192.168.0.191. Change of IP-address is made in the following way:
1. Connect power supply to the reader.
2. Connect card-reader to local Ethernet network.
3. If your network is not 192.168.0.xxx, then set IP-address on your computer equal to 192.168.0.190.
4. Using any web-browser go to address http://192.168.0.191.
5. Go to tab "Сетевые настройки" with login "admin" and password "vkmodule".
6. Set required network settings and save them.
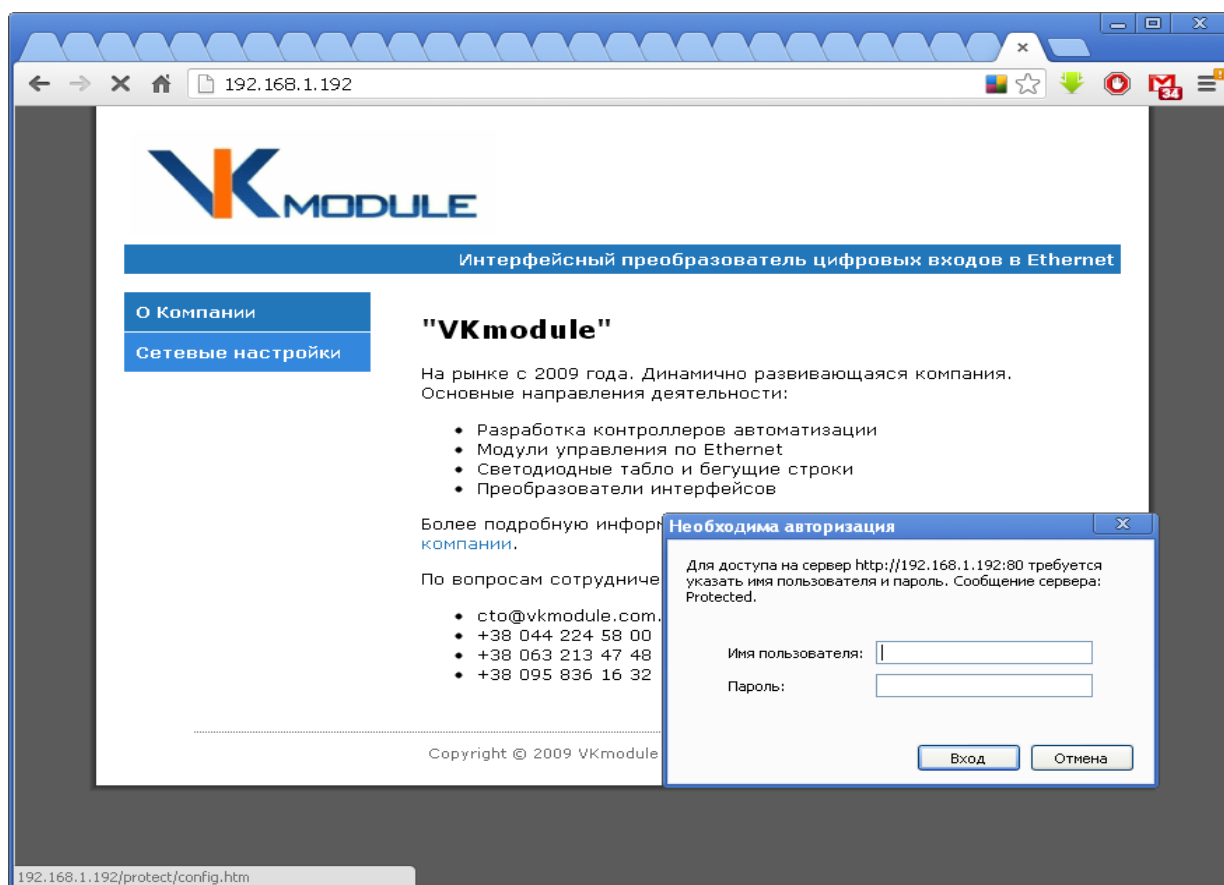
General view of the page of reader adjustments (setting of IP-address, socket port, subnet mask, others):

List of configurable parameters:
- MAC-address in Ethernet network;
- IP-address of device;
- Socket port;
- Gateway;
- Subnet mask;
- Socket type;
- Socket server IP-address.

For data transmission through Ethernet it is necessary to set TCP/IP connection between computer and reader. At this software of computer should act as Socket-client if the reader is configured as Socket-server and on the contrary.

By defaults the reader is configured as Socket-server, this is specified in field "Socket" Content of field "Server IP Addr" at this is not used and may be any.

In case if it is needed to configure the reader to work as Socket-client select in field "Socket" a value "Client" and in field "Server IP Addr" – IP-address of Socket-server.

Information of configuration should be carefully saved. In case if this information is lost and you forgot reader's IP-address or password from the configuration web-page it is possible to make reset of all configurations to default. Default reader's settings are the following:
- IP-address: 192.168.0.191
- Socket port: 9761
- Gateway: 192.168.0.1
- Subnet mask: 255.255.255.0
- Login: 'admin'
- Password: 'vkmodule'

Reset of configuration to defaults in new readers

For reset press and hold a button "SET". After that press and hold a button "RST". Keep pressing the button "SET" for more than 4 seconds. After that there will be a short-time blinking of LED "Eth" and settings will be resetted to default.

Reset of configuration to defaults in old readers

For this it is necessary to unmounts a reader's case and short circuit pins of the reader. In case if the reader's case is made hermetic (outdoor variant) such unmounting is impossible.

In order to perform reset of the reader's configuration (set default configuration to the reader) it is necessary to take away the reader's casing and get to its electrical board.
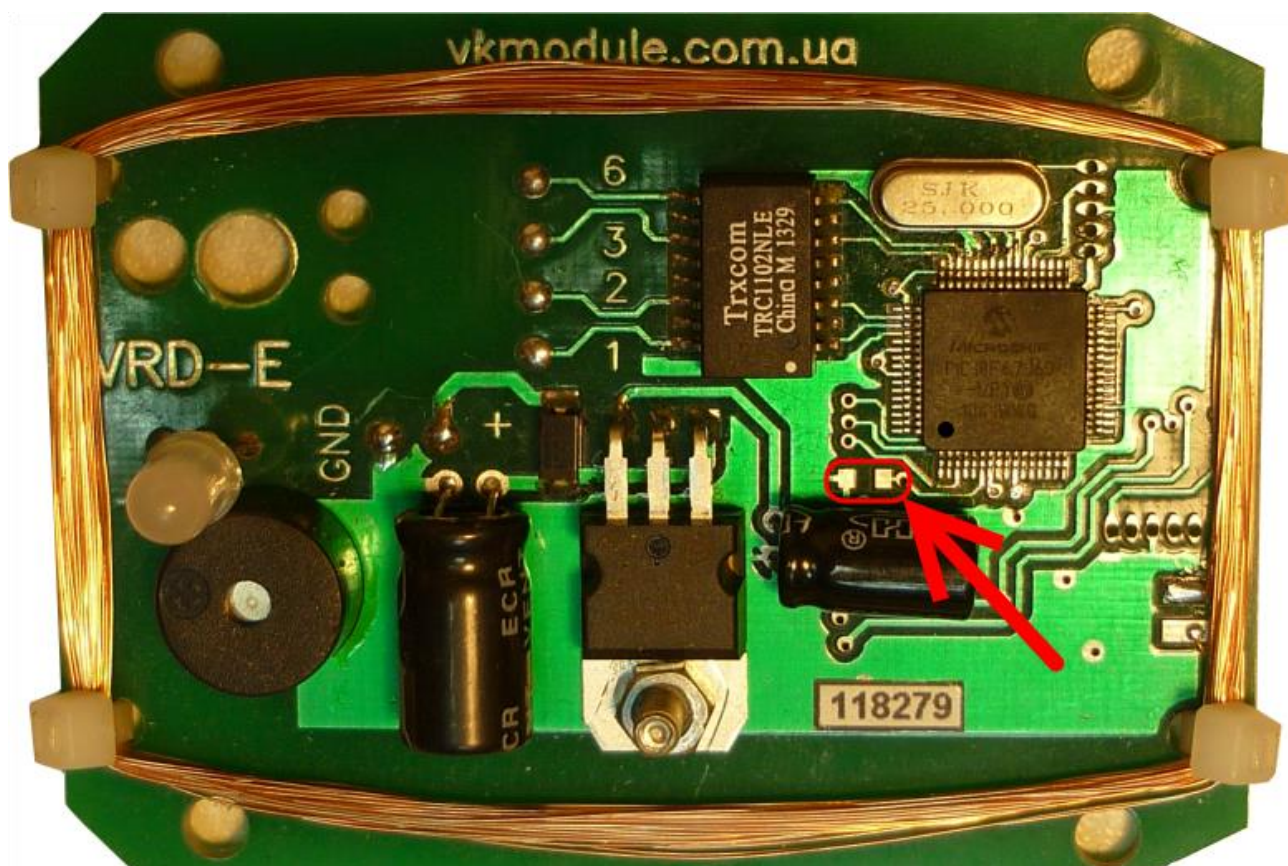
6-th pin of the central microcontroller chip has a contact place. If this 6-th pin of CPU is short circuit (connected) to ground of the reader at start of the reader's operation (at power on) – then the reader's configuration is reset and becomes default.

Electrical board of the RFID reader may vary (several different modifications of the board already manufactured), but in all the modifications short circuiting of the 6-th pin of CPU with ground contact place at start-up makes reset of configuration. As an example the image above shows location of the contact place of the 6-pin of CPU and contact place of ground, which should be connected together with each other before power on to make the reader configuration reset.

After power the reader with short closed pins it is necessary to wait during 5-7 seconds, after that power off the reader and disconnect the contact places. The reader configuration will be reset. After that you should connect to reader with default connection settings.

OPERATION PROTOCOL

Connection is done using packets. Packet from reader to computer contains reader code of identifier (card). Packet from computer to reader is not required and is appointed to control over indication.

Transmission of reader code of identifier (card)

At bringing of a card to the reader a coil antenna of reader receives 64 bits of data, from which 40 bits od data are useful code and the remaining 24 bits – service. Thus 40 bits of data is sent to PC (5 bytes).

5 bytes of useful code consist of two parts:
- 1-st byte –identified of company-manufacturer of card;
- bytes 2-5 – code of card.

Format of packet from reader

Appointment	Length (bytes)	Data
Packet start	**1**	One of the following bytes: 0x1F – Em-Marine type of reader 0x10 – Mifare type of reader (type 1) 0x01 – Mifare type of reader (type 2)
Card data	**4**	…

Identifier of manufacturer as a rule is not used and thus fist byte of data can be eliminated from processing.

Control over indication

Indication of reader can work in one of five possible modes::

1. After connection a power source when connection to reader using socket TCP/IP connection is not done LEDs are in off state and buzzer is silent
2. State of connection lost when connection to reader was established but due to some reasons was interrupted. This is configurable state. By defaults intermittent flashing of red LED 1 time per second with duration 0.5 sec. At desire this state can be configured using a packet with code 0x1B.
3. State of normal operation when connection to reader is established and card is expected to be brought close to reader for reading of its code. By defaults in this state there is alternately flashing of red and green LEDs with interval of 0.5 seconds. At desire this state can be configured using a packet with code 0x1C.
4. State when card was just read, its code sent to computer and reader is waiting for response. By default frequent alternating flashing of red and green LEDs with interval of 0.2 sec during 10 seconds and single-time beeping during 0.5 sec. At desire this state can be configured using a packet with code 0x1D.
5. State when a response came from computer and it is necessary to show to user a result of decision regarding reading of his card identifier (refusal in access, success in registration, etc.). Duration of staying in this state is limited. This state does not have a default value cause assumes usage of packet from computer with command code 0x1E.

Commands for setting state of connection lost (point 2), state of normal operation (point 3) and state of card read (point 4) are sent 1 time after establishment of connection to reader and later are used in its operation. They are not stored in non-volatile memory. Thus if it is required to configure indication states different from default – each time after establishment of connection with reader the computer should send these commands.

Format of commands for setting of state in which indication should be constant at present of connection (command 0x1C) and at absence of connection (command 0x1B) is shown below.

Indication	Appointment	Length (bytes)	Data
	Command code	1	0x1B/0x1C
Red LED	State A	1	…
	Duration of state A	1	…
	State B	1	…
	Duration of state B	1	…
Green LED	State A	1	…
	Duration of state A	1	…
	State B	1	…
	Duration of state B	1	…
Buzzer	State A	1	…
	Duration of state A	1	…
	State B	1	…
	Duration of state B	1	…

NOTE! In state of connection absence reading of cards is not performed.

For organization of flashing of one or both LEDs states A and B are set one-by-one. State A – start state of indicator. State B – next state. For switching on correspondent indicator it is necessary to set its value to 1, for switching off – to 0. All values of duration are set in 100 ms intervals. For example if it necessary to set a time period with duration 700 ms – then it is necessary to set correspondent value to 7. For constant lighting of some indicator it is necessary to set state A or state B in constant state.

Examples

Example 1. It is necessary to make flashing of red and green LEDs on the reader.

0x1C Command code for setting constant value for indication

0x00 – Red LED in state A is switched off
0x03 – Red LED in state A is during 300 ms
0x01 – Red LED in state B is switched on
0x03 – Red LED in state B is during 300 ms

0x01 – Green LED in state A is switched on
0x03 – Green LED in state A is during 300 ms
0x00 – Green LED in state B is switched off
0x03 – Green LED in state B is during 300 ms

0x00 – Buzzer in state A is switched off
0xFF – Buzzer in state A is during 25.5 s
0x00 – Buzzer in state B is switched off
0xFF – Buzzer in state B is during 25.5 s

Example 2. It is necessary to make constant shining of red LED.

0x1C Command code for constant value of indication

  0x01 – Red LED in state A is switched on
0xFF – Red LED in state A is during 25.5 s
0x01 – Red LED in state B is switched on
0xFF – Red LED in state B is during 25.5 s

0x00 – Green LED in state A is switched off
0xFF – Green LED in state A is during 25.5 s
0x00 – Green LED in state B is switched off
0xFF – Green LED in state B is during 25.5 s

0x00 – Buzzer in state A is switched off
0xFF – Buzzer in state A is during 25.5 s
0x00 – Buzzer in state B is switched off
0xFF – Buzzer in state B is during 25.5 s

Command for setting state when a card was read and a response is expected from computer is sent 1 time in the beginning of operation with reader. Each time after reading a card indication is set in this state in stays in it until one of the following events:
  - duration of stay in this state is elapsed;
  - response from computer is received and indication is transferred in a state of showing received response.

NOTE! Reading of cards in this state is stopped.

Format of command for setting such indication is shown below.

Indication	Appointment	Length (bytes)	Data
	Command code	**1**	0x1D
	Duration of response expectation	**1**	…
Red LED	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…
Green LED	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…
Buzzer	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…

Example 3. It is necessary 1 time per 500 ms to give out a sound signal and frequently flash with green and red LEDs.

0x1D – Command code for setting indication of response expectation
0x64 – Duration of indication of response expectation during 10 s

0x00 – Red LED in state A is switched off
0x01 – Red LED in state A is during 100 ms

0x01 – Red LED in state B is switched on
0x01 – Red LED in state B is during 100 ms

0x00 – Green LED in state A is switched on
0x01 – Green LED in state A is during 100 ms
0x00 – Green LED in state B is switched off
0x01 – Green LED in state B is during 100 ms

0x01 – Buzzer in state A is switched on
0x05 – Buzzer in state A is during 500 ms
0x00 – Buzzer in state B is switched off
0xFF – Buzzer in state B is during 25.5 s

Command for setting a state when a response from computer has come means a result of made decision on read card (refusal in access, success of registration, etc.) and is to be received each time after reading a card. Indication in this state has limited duration. Total duration of indication has higher priority than duration of states.

Format of command for setting such indication is shown below.

Indication	Appointment	Length (bytes)	Data
	Command code	**1**	0x1E
	Duration of indication	**1**	…
Red LED	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…
Green LED	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…
Buzzer	**State A**	**1**	…
	Duration of state A	**1**	…
	State B	**1**	…
	Duration of state B	**1**	…

Example 4. It is necessary to show permission for access – 2 times give out sound signal with 1 second duration each and during this time shine with green LED.

0x1E – Command code for setting indication for result of made decision
0x17 – Duration of indication of made decision during 2.5 s

0x00 – Red LED in state A is switched off
0xFF – Red LED in state A is during 25.5 s
0x00 – Red LED in state B is switched off
0xFF – Red LED in state B is during 25.5 s

0x01 – Green LED in state A is switched on
0x17 – Green LED in state A is during 2.5 s
0x00 – Green LED in state B is switched off

0xFF – Green LED in state B is during 25.5 s

0x01 – Buzzer in state A is switched on

0x0A – Buzzer in state A is during 1000 ms

0x00 – Buzzer in state B is switched off

0x05 – Buzzer in state B is during 500 ms

VARIANTS OF SUPPLY AND ORDER INFORMATION

In standard execution the card-reader is equipped with Ethernet cable with length 1 m without a connector in the end. Cable comes from back side of the reader.

Also it is possible to make power supply from USB port. At this wires 4, 5, 7, 8 of Ethernet cable are not used. Power supply is done from USB-port with voltage 5 V DC.

Also variant when wires go from side of the reader is possible.

Variant of VRD-E card reader supply is marked with VRD-*y-z*, where
- y – type of supply:
  - o "*INT*" in case if VRD-E reader is supplied for internal installation (power is taken from USB-port of PC);
  - o "*EXT*" in case if VRD-E reader is supplied for external installation (power wires go inside Ethernet cable);
- z – variant of supply:
  - o 001 – normal variant of supply;
  - o 002 – reader is supplied in waterproof case and electrical board covered with weatherproof paint

Examples of order:
- order of VRD-E card reader for internal installation with power supply from USB-port: VRD-INT-001;
- order of VRD-E card reader for external installation in waterproof casing: VRD-EXT-002.