



Proximity  
Card Reader

# RP-15.2

CERTIFICATE AND OPERATION  
MANUAL



CE EAC



# **Proximity Card Reader**

RP-15.2

## **Certificate and Operation Manual**



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## 1. GENERAL INFORMATION

Proximity card reader **RP-15.2** (hereinafter – the reader) is designed for use in systems of identification, computing, access control etc.

Operation of the reader is allowed at ambient air temperature from  $-40^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  and at relative air humidity of up to 95% at  $+30^{\circ}\text{C}$ .

The reader has the marking under the cover on the back side of the housing. The marking contains the product name, the model abbreviation, the date of manufacture, the serial number and the technical characteristics.

The reader is packed in a cardboard box that protects it from being damaged during transportation and storage.

The reader in the original package should be transported in closed freight containers or other closed type cargo transport units.

Storage of the reader is allowed in dry indoor facilities at the ambient air temperature from  $-40^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  and relative air humidity of up to 98% at  $+25^{\circ}\text{C}$ .

After transportation or storage at temperatures below zero or at high air humidity, prior to installation the reader must be kept in the original package for no less than 24 hours indoors under normal climate conditions ( $+18^{\circ}\text{C}$ , humidity – 60%) prior to installation.

Due to continuous improvement of products the Manufacturer reserves the right to modify, without notice, the product design not aggravating its technical specifications.

## 2. TECHNICAL SPECIFICATIONS

Rated operating voltage*	12VDC
Operating voltage limits*	10.5 – 14VDC
Consumption current	max. 60 mA
Power consumption	max. 0.85 W
Card reading distance at the rated operating voltage for different card (trinket) types:	
• HID ProxCard II cards	min. 6 cm
• EM-Marin cards	min. 8 cm
• Trinkets	min. 4 cm
Card reading distance at reader mounting on metal base-plate for different card (trinket) types:	
• HID ProxCard II cards	min. 5 cm
• EM-Marin cards	min. 7 cm
• Trinkets	min. 3 cm
Controller connection interface	Wiegand
Output and operation signal voltage:	
• Logic «1»	min. 4.3 V
• Logic «0»	max. 0.4 V
Distance between the reader and external controller	max. 150 m
Connection cable standard length	0.9 m
Ingress protection rating	IP54 (EN 60529)
Electric shock protection class	III (IEC 61140)
Resistance to mechanical factors, according to GOST17516-72	M4
Reader dimensions (without cable)	145×46×23 mm
Reader weight	max. 220 g

## 3. DELIVERY SET

Reader RP-15.2	1
Metal base-plate	1
Assembly set:	
• Plastic dowels	4
• Screws	4
Package	1
Certificate and Operation Manual	1

\* As a power supply it is recommended to use DC source with linear voltage stabilization and output pulsation amplitude max. 50 mV.

## 4. PRODUCT DESCRIPTION

### 4.1. Design

Reader consists of a unit in plastic housing with two-color LED indicator on the front panel. For reader mounting a metal base-plate is included in delivery set. Reader protection from environmental exposures is ensured by covering its board with compound. Shield cable for reader connection is output on its rear side.

Also the reader back side features the jumper «single-double» – (jumper uncut – «single line» LED mode, after cutting the jumper – «double line» LED mode);

Colour of the reader housing is marked by the end letter:

RP-15.2B – light beige;

RP-15.2D – dark grey.

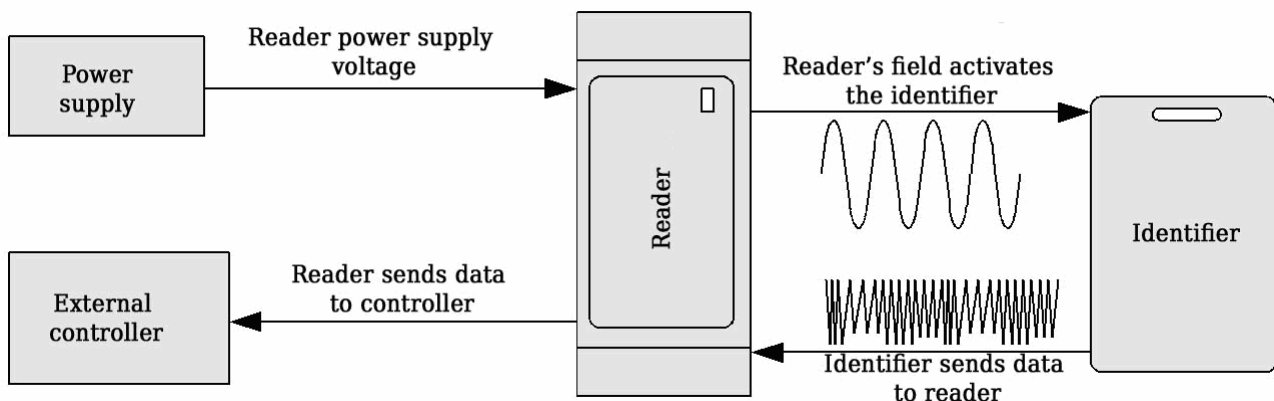
### 4.2. Operating principle

Readers provide code reading from Proximity identifiers with operation frequency 125 kHz (hereinafter – the identifier) produced by HID Corporation type ProxCard II, ISOProx II, trinkets ProxKey II (standard formats HID: 26 bit (H10301), 37 bit (H10302, H10304)), and the production of EM-Microelectronic-Marin SA.

Each identifier has its own single code (number of combinations – more than 500 mlrd.), which is one time set at the stage of manufacture and can't be changed during operation. Identifiers do not have a built-in power supply which makes their operational life time almost unlimited.

Code reading is provided by presenting identifier to the reader, for cards at ~10 cm, for trinkets at ~5 cm distance, while identifier can be placed inside pocket, wallet or any other magneto transparent container (cover).

Maximum distance possible for identifier sensing by the reader depends on the type of identifier.



**Figure 1. Reader operation**

When switched on the reader radiates close low frequency (125 kHz) electromagnetic field. Caught in this field the identifier activates and starts transmitting individual encoded signal received by the reader.

Reader transforms the input signal in accordance with an external device interface and sends it to controller of external device which determines the necessary operation upon card presentation.

Depending on the selected operation mode one of Wiegand interface formats supported by the reader is used for connection with external controller.

Reader can be simultaneously used with controllers of different types.

### 4.3. Operation of the reader under Wiegand interface

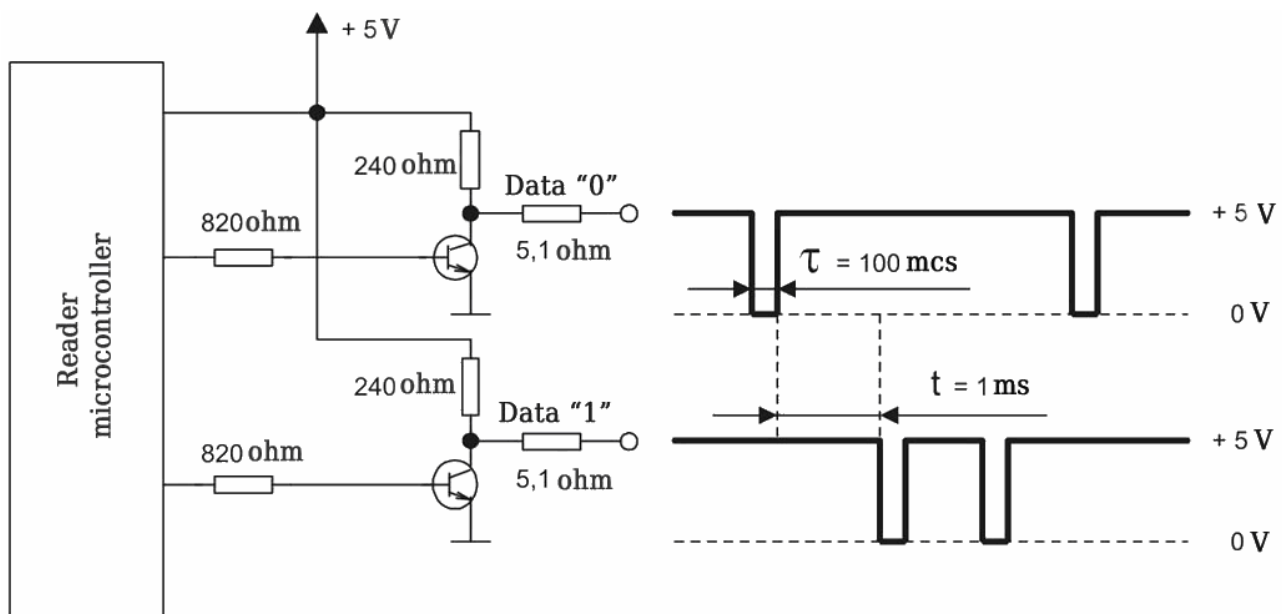
Data is transmitted to the external controller at one time, asynchronously, at the moment of first positive signal receipt from identifier. Repeated data transfer is possible not earlier than 200 ms after identifier leaves stable reception zone.

Two wires are used for transmission: «data 0» and «data 1». Occurrence of logic level «0» on one of the wires signals the presence of bit with appropriate value in coded mark.

The length of the coded mark depends on the set mode at assembly and can be fixed or specified by data dimension received from identifier.

Following rules apply at the difference between coded mark received from identifier and the output coded mark:

- If the input coded mark from identifier is longer than output the excessive high-order bits are truncated.
- If the input coded mark from identifier is shorter than output the missing high-order bits are padded with zeros.

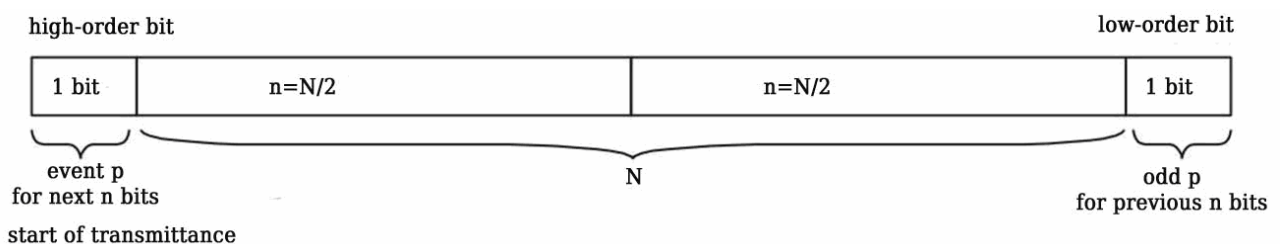


**Figure 2. Formation of output reader signals and their diagrams**

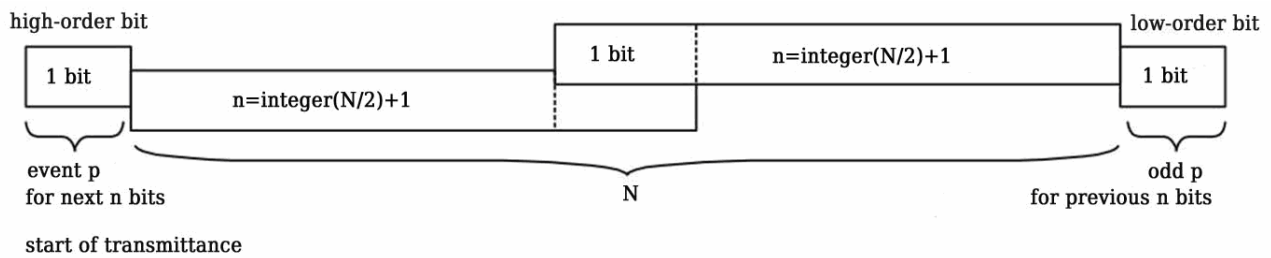
Data is transmitted with high-order bits forward.

The structure of coded mark and order of parities in it for fixed length formats are presented in Figures:

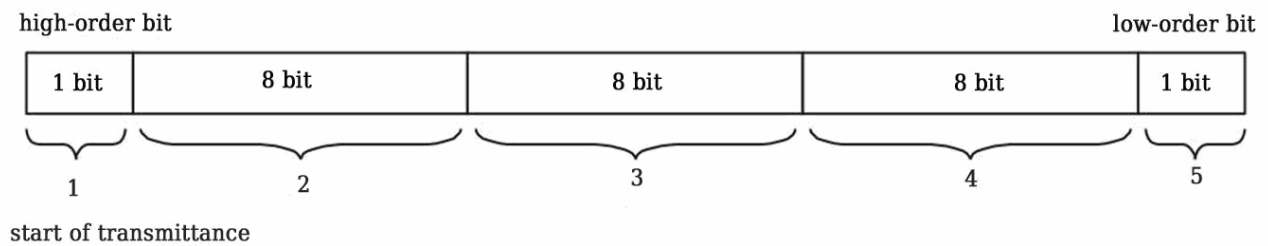
- The identifier encoded signal includes the even number of bits ( $N/2$  – integer)



- The identifier encoded signal includes the uneven number of bits ( $N/2 - \text{non integer}$ )



- The structure of output coded mark in Wiegand 26 (H10301) format is presented in Figure:



- 1 – Control bit (corresponds with the even parity for the next 12 bit data)
- 2 – Byte code
- 3 – High-order byte of card number
- 4 – Low-order byte of card number
- 5 – Control bit (corresponds with the odd parity for the previous 12 bit data).

All bytes are transmitted with high-order bits forward.

Time response characteristics of output data format:

- Width of data pulse ..... 100 mcs
- Pulse-time ..... 1 ms



## 5. CONFIGURATION

### 5.1. Indication setting

Reader comes with a sound and LED indication. Two operation modes of LED indication are possible: «double line» – two line control and «single line» – one line control.

As standard reader comes with a «single line» mode selected (one line control).

Code reading is confirmed by momentary change of LED indicator colour from red to green (in «single line» mode) or momentary light of green LED indicator (in «double line» mode). For to set the operation mode into «double line» it is necessary to cut by nippers the jumper «single-double» on reader backside when mounting the reader.

External control over light and sound indication is provided by applying low-level signal to corresponding control line. At simultaneous low level signal apply to both LED indicator control lines in «double line» mode, the colour of indicator turns to orange.

Depending on set external control mode the LED indication is fulfilled through blue and yellow wires according Table 1.

For external initiation of a sound announcer of a reader its brown wire is connected to a negative terminal of a power supply unit.

**Table 1. Indication setting**

Control signals at a connection cable of a reader		LED light in different modes at external control	
blue wire	yellow wire	«single line»	«double line»
0	0	green	orange
0	HZ	green	red
HZ	0	red	green
HZ	HZ	red	no indication

- 0 – control line is connected with a negative terminal of a power supply unit;
- HZ – high resistance at a control line (the line is not connected with a negative terminal of the power supply unit).

### 5.2. Changing the format of the output data

At reader connection to external devices by Fig. 5 scheme the external control mode over LED indication according «single-double» jumper position (see clause 4 and 5.4) and output data format Wiegand 26 (W26) (orange wire – WF is not connected) are automatically set. The output data format W26 is set independent to used identifiers format.



#### **Attention!**

Switching over the reader into one of the abovementioned Wiegand formats does not prevent it from reading cards of other formats and delivering read code to an output of a reader in the set format.

For external initiation of a sound announcer of a reader its brown wire is connected to a negative terminal of a power supply unit.

To change a format of output data of Wiegand interface an orange wire is used (WF – Wiegand-Format). For changing the format connect the orange wire (WF) in accordance with Table 2.

**Table 2. Change of output data format of the readers:**

Wire determining a format of output data	Connection point (conductor) at an output of a regular connection cable of a reader	Format of output data of a reader determined by performed connections
Orange (WF)	~ (not connected)	Wiegand 26
Orange (WF)	D0 (green)	Wiegand 37
Orange (WF)	“ground” (black + shield)	Wiegand

## 6. SAFETY REQUIREMENTS

Reader installation must be carried out by circuit installer. Before mounting and first switch-on carefully study the reader manual, order and details of reader adjustment to different PERCo units stipulated in corresponding sections of their operation manuals.

Operation of the reader must be made in compliance with environmental requirements and power supply parameters stipulated in clause 1 and 2.



### **Attention!**

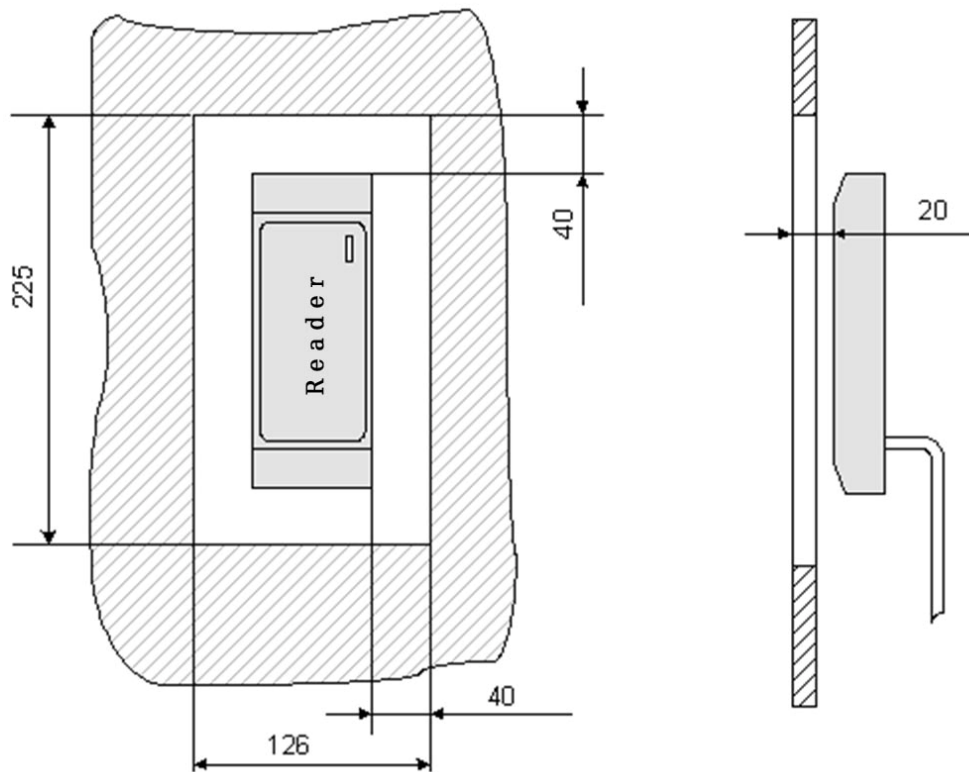
- Observe general safety requirements for use of electrical equipment
- Only serviceable tools should be used.
- Joining of all connectors is made only upon power supply off.
- Cable laying should be produced subject to electrical devices operation rules.
- In case of faulty power supply reader operation is prohibited.

## 7. INSTALLATION PROCEDURE

### 7.1. Features of installation

The following factors must be considered:

- Close electric interference sources shorten card reading distance, therefore reader must be installed at min. 1 m whilst its cable laid at min. 30 cm distance from computer monitors, electric generators and motors, ac relays, thyristor light regulators, ac lines, computer and telephone signals.
- When reader mounted on metal surface the code reading distance from card reduces to 15–25 %;
- If the reader is mounted behind metal surface it is necessary to cut out the window in it and install the reader opposite and equidistant to window edges (Ref. Fig.3) provided that window measures are min. 220×126 mm. The window can be covered with non-metal panel (for ex. plastic) whilst reader can be recessed inside the window at max. 20 mm distance from metal surface front side – at this mounting variant the code reading distance reduces to 30 – 50%;
- Distance between two readers should be min. 50 cm.



**Figure 3. Reader installation behind the metal surface**

## 7.2. Tools and equipment required for installation

- 1.2÷1.5kW hammer drill;
- Ø16 mm hard-alloy drill bits;
- Ø 5 mm hard-alloy drill bits;
- Phillips head screwdriver №2;
- Knife assembly;
- Plumb-line and level;
- Measuring tape 2m

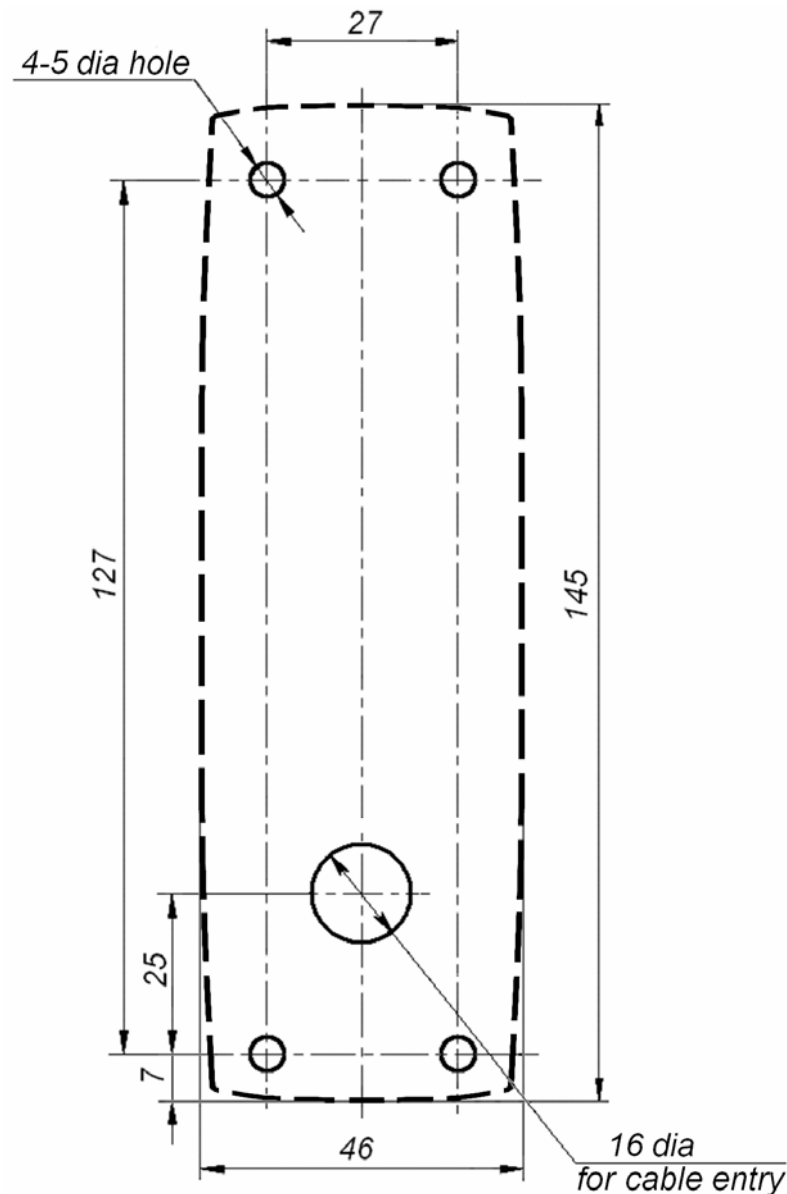
## 7.3. The cables used

Recommended cable type for connection reader to external controller – RAMCRO SA82BI-T, CABS8/EC, 8C.SEC-SC, W8ekw, cross-section 24AWG – 18AWG (it is prohibited to use twisted pair cables).



### **Note:**

For extension cables with cross-section 24AWG – 20AWG reader performance after 150 m is not guaranteed. Maximum distance between the reader and external controller is obtained by meeting above listed requirements for product installation.



**Figure 4. RP-15.2 reader installation layout  
(reader housing is dotted)**

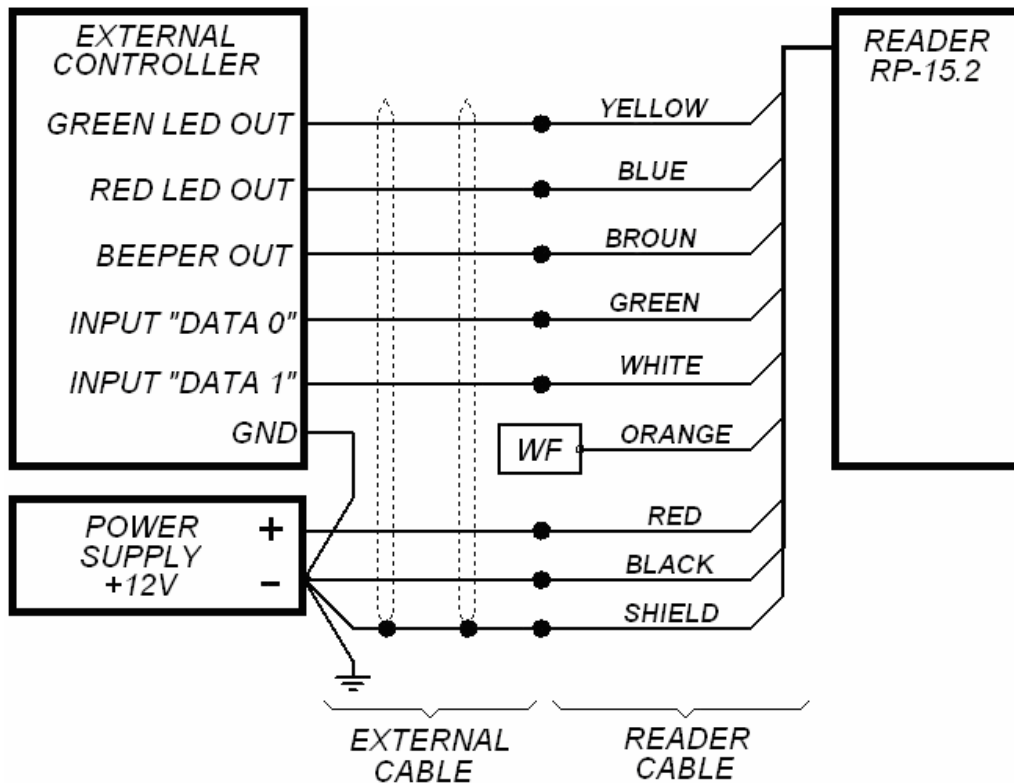
#### 7.4. Assembly order

1. Unpack the package and check the completeness of reader set.
2. Select the reader mounting place.
3. Make the marking and holes in mounting surface for fixing the base-plate and cable laying from the reader (Ref. Fig. 4).
4. Release the screw at reader bottom fixing it to metal base-plate. Take off the metal base-plate and fasten it with 4 screws from delivery set.
5. If necessary to change the LED indication operation mode into «double line» (two line control) please cut by nippers the jumper «single-double» on reader backside under metal base-plate.
6. Lay the reader cable through specified hole in mounting surface. Install the reader on metal base-plate and fasten it with a screw in the bottom.
7. Lay the cable, fix it and connect to external units. Connect the black cable wire of the reader and its braided shield with external device earth loop.

**Attention!**

When mounting the reader please provide the cable bending radius of min. 10 mm at reader basis.

8. Run the cable, attach it and connect to external devices. Layout of reader connection to external devices under Wiegand interface is shown in Fig. 5. Switching the output data format is recommended to carry out directly at the junction of the regular reader cable with an extension cable (see section 5.2).



**Figure 5. Connection layout of the reader to external devices under Wiegand interface**

## 8. TROUBLESHOOTING

Possible faults that can be resolved by the Customer and their remedy are given in the table below:

**Table 3. Troubleshooting guide**

Fault	Possible cause	Remedy
At the power-up the LED indicator of the reader does not light, reader does not react on card presentation.	No supply voltage to the reader	Check the accuracy of reader connection to power supply
LED operation mode does not switch to «double line»	Electric contact between «single-double» jumper wires or with ground bar	Insulate «single-double» jumper wire ends (prior power off the reader)
The required reader output data format does not switch on	No electric contact between orange wire and necessary conductor according Table 2	Find the disconnection and reset the electric contact (prior power off the reader)

If the fault is not cleared please contact the Manufacturer.

## 9. PERCo WARRANTY

PERCo (the Manufacturer) warrants that the **RP-15.2 proximity card reader** complies with applicable statutory safety requirements, electromagnetic compatibility provided that the instructions on storage, installation and operation, given in the Assembly & Operation Manual and shared PERCo readers and controllers operation documentation, are observed.

The warranty period is **5 (five) years** commencing from the date of sale.

Should there be no date of sale on the warranty card, the warranty period shall commence from the date of manufacture specified in the Certificate and on the Product label.

In the post-warranty period the replacement parts/components are warranted to be free from defects in material or workmanship for a period of 3 (three) months from the date of shipment of the repaired/replaced Product to the Customer.

All claims with regard to quantity, completeness and defects to appearance of the Product delivered are accepted by the Manufacturer in writing within no more than 5 (five) working days after the products are received by the Customer. In case of failure to meet the abovementioned deadline no claims are accepted.

The Warranty does not cover:

- products, parts and components with:
  - external mechanical damages resulting in the Product's fault;
  - defects resulting from Customer's improper testing, operation, installation, maintenance, modification, alteration, or adjustment;
  - damages due to force majeure circumstances (natural disasters, vandalism etc.) or defects as a result of external circumstances (power surges, electric discharge, etc);
- fuses, accumulators, galvanic elements and other components, replacement of which is performed by the Customer in accordance with the Product's in-line documentation.

To the maximum extent permitted by the acting law, the Manufacturer does not incur a liability for any direct or indirect losses of the Customer, including but not limited to loss of profit or data, losses caused by idle period, missed profit, and etc related to use or impossibility to use products and software, including possible software errors and failures.

Within the warranty period the products are repaired free of charge at the Manufacturer's site. The Manufacturer reserves the right to repair failed product or replace it with an operational one. Time of repair is specified at the moment the Product is accepted for repair. Transportation cost to and back from the place of repair shall be borne by the Customer.

In order to shorten the repair time the Customer must inform the Manufacturer's Technical Support Department (the TSD) of the problem with the Product's operation and/or about the origin of the fault by submitting a filled-in Technical Support Form by e-mail, fax or via the Manufacturer's website or communicate directly a specialist of the TSD.

The Manufacturer reserves the right not to accept the Product for repair from the Customer who failed to submit the Technical Support Form.

**The Manufacturer's warranty obligations don't cover attendance by the experts of a Customer and maintenance of any Product on site.**

If in the course of the examination taken by the Manufacturer of the Product or its parts/components believed to be faulty, no faults have been detected, the Customer is responsible for compensation of the Manufacturer's expenses related to the examination.

Apart from the warranties mentioned above the Manufacturer does not provide any other warranties with regard to compatibility of a Product purchased with software or products produced by other manufacturers as well as any warranties that this Product will fit for the purposes not stipulated in the Product's in-line documentation.

The warranty does not provide for any claims with regard to the technical specifications of the Product in case they are in compliance with those stated by the Manufacturer. The Manufacturer does not guarantee that the Product purchased will meet Customer's requirements and expectations.

**PLEASE NOTE THAT PERCo PRODUCES TECHNICALLY SOPHISTICATED PRODUCTS THAT, IF NOT FAULTY, CANNOT BE RETURNED BACK IF BY SOME REASON THE CUSTOMER DEEMS THEM UNSATISFACTORY.**



The **RP-15.2 proximity card reader** is in conformity with the essential requirements of the EU's Machinery, Low-Voltage and EMC Directives and carries the CE marking accordingly.

## WARRANTY CARD



### RP-15.2 Proximity card reader

Serial number	5	3	7					
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Date of manufacture \_\_\_\_\_ 20\_\_

Quality Control Seal

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Date of sale « » \_\_\_\_\_ 20\_\_

\_\_\_\_\_  
(signature, seal)



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Cutting line

## Warranty Repair Coupon



### RP-15.2 Proximity card reader

Serial number	5	3	7					
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Date of manufacture \_\_\_\_\_ 20\_\_

Quality Control Seal

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Date of sale « » \_\_\_\_\_ 20\_\_

\_\_\_\_\_  
(signature, seal)



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