VOZROZHDENIE LLC

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APPROVED BY

VZR.235900.000 LU

TURNSTILE
CUBE C-04 MODEL

C-04-s, C-04-K, C-04-Ks, C-04-N, C-04-Ns, C-04-NK, C-04-NKs

VZR.235900.000 IM

INSTALLATION MANUAL

42 sheets

2020

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This Installation Manual (IM) applies to Oxgard Cube C-04 turnstile and its variants (hereinafter referred to as the product). Product firmware version:

FW v.d 4

IM defines rules and a procedure for installation and commissioning of the product.

Before installing the product, please read the Operation Manual VZR.235900.000 OM as well.

Due to constant work on improving the product, changes to its design may be made, which are not represented in this IM revision.

A card collector can be integrated into the turnstile.

The following abbreviations are used in this document:

OM — Operation Manual;

IM — Installation Manual;

PSU — power supply unit;

CP — control panel;

ACS — access control system;

SFAS — security and fire alarm system;

NCC — normally closed connection;

NOC — normally open connection.

1 GENERAL INSTRUCTIONS

For general safety when assembling and installing the product, take into account all the recommendations and instructions contained herein.

Before starting installation work, completely de-energize the product.

DO NOT:

INSTALL THE POWER SUPPLY UNIT INSIDE THE TURNSTILE HOUSING AS IT MAY RESULT IN ELECTRIC SHOCK TO PERSONS.

INSTALL THE TURNSTILE OUTSIDE DRY AND HEATED ROOMS.

PREVENT OR ACCELERATE MOVEMENT OF THE TURNSTILE ARMS.

APPLY PASTES AND LIQUIDS CHEMICALLY AGGRESSIVE TO MATERIALS OF THE HOUSING WHEN CLEANING THE PRODUCT.

2 SAFETY PRECAUTIONS

Installation should be carried out with observance of “Regulations for Operation of Consumer Electrical Installations” and “Safety Regulations for Operation of Consumer Electrical Installations”.

The product shall only be installed by qualified personnel trained in handling of electrical devices and instructed on safety precautions when handling the electrical installations with voltages of up to 1000V.

 **ATTENTION:** FAILURE TO COMPLY WITH THE SAFETY REQUIREMENTS SPECIFIED IN THIS SECTION CAN RESULT IN DEATH AND DAMAGE TO HEALTH, COMPLETE OR PARTIAL LOSS OF PERFORMANCE OF THE PRODUCT AND/OR AUXILIARY EQUIPMENT.

 **ATTENTION:** MANUFACTURER WAIVES ANY RESPONSIBILITY FOR DEATH AND DAMAGE TO HEALTH, COMPLETE OR PARTIAL LOSS OF PERFORMANCE OF THE PRODUCT AND/OR AUXILIARY EQUIPMENT IF USER FAILS TO COMPLY WITH THE SAFETY REQUIREMENTS SPECIFIED IN THIS SECTION, AND ALSO VOIDS THE PRODUCT WARRANTY.

3 PREPARING THE PRODUCT FOR INSTALLATION

3.1 Procedure for transporting the product to the installation place

The product in the original package can be transported without range limitation by air, enclosed road and rail transport provided it is protected against direct exposure to precipitation and dust.

In order to avoid moisture condensation after transportation at subzero temperatures, the product shall be pre-held in a room with normal climatic conditions for 12 hours.

Loading and unloading operations should be carried out in compliance with safety regulations.

3.2 Rules for unpacking the product

3.2.1 Perform visual inspection of the packaging. There should be no visible damage on the package.

3.2.2 Open the transportation box, unpack and check completeness of the product:

1) turnstile stand;
2) CP with cable;
3) Keys for locks (4 pcs).

3.3 Rules for visual inspection of the product

3.3.1 Check completeness of the product.

Completeness shall be checked according to the Logbook VZR.235900.000 LB.

3.3.2 Visually inspect the product. There should be no visible damage on the product.

3.3.3 If any damage is found, prepare a Claim Report.

3.3.4 Figure 1 – overall dimensions of the turnstile.

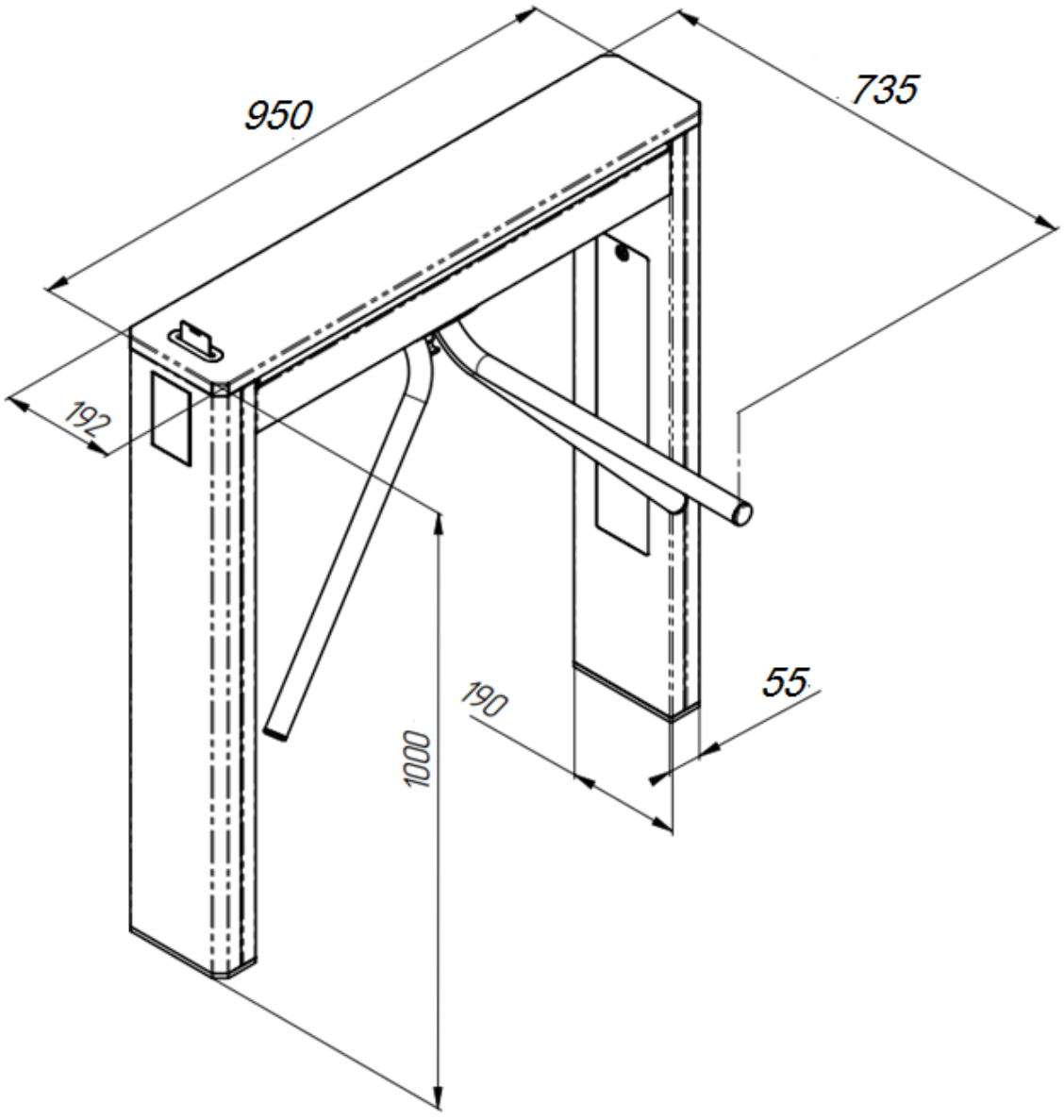


Figure 1 – Overall dimensions of the turnstile

3.4 Product installation place requirements

ATTENTION: TO AVOID WAVING AND/OR OVERTURNING DURING OPERATION, INSTALL THE TURNSTILE SECURELY. IN CASE OF PRODUCT INSTALLATION ON LOW STRENGTH FLOOR - TAKE MEASURES FOR FLOORS STRENGTHENING IN THE PLACE OF INSTALLATION.

Figure 2 – when installing the turnstile, it is necessary to consider the possible free travel of the arm (it makes 6 degrees on each side in STOP mode).

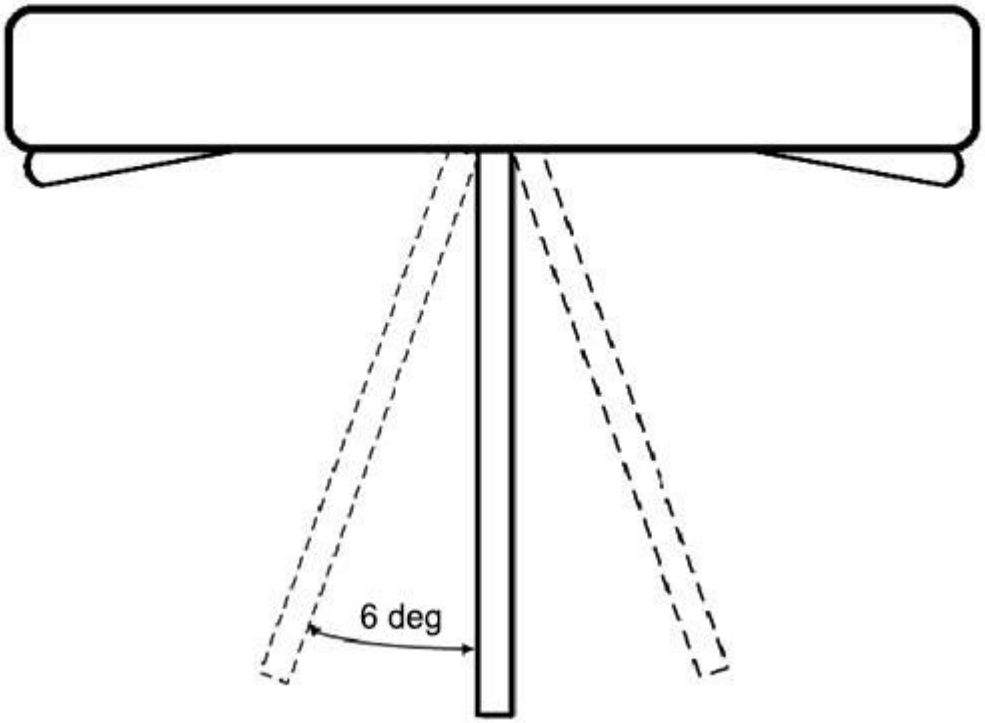
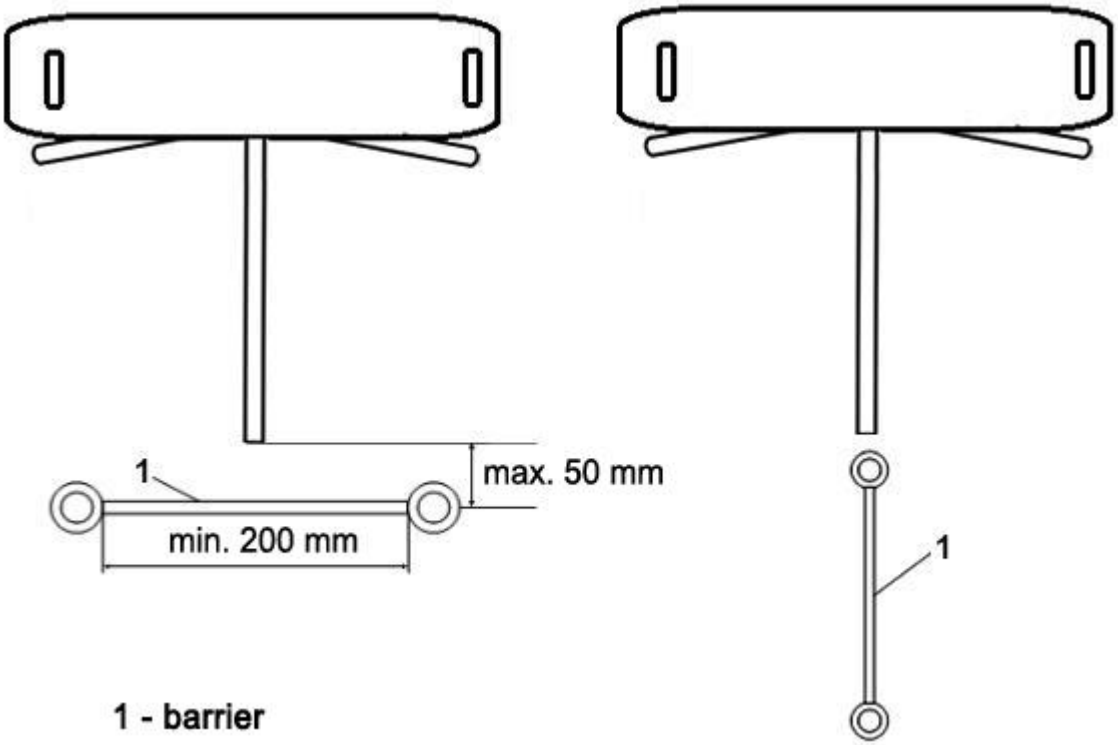


Figure 2 – Possible free travel of the arm in STOP mode

3.5 Procedure for checking compliance of the installation place

ATTENTION: THE PASSAGE ZONES SHALL BE ARRANGED TO ALLOW RECORDING OF PASSAGES DURING TURNSTILE OPERATION UNDER ACS CONTROL AND TO AVOID UNAUTHORIZED PASSAGES.

3.5.1 Figure 3 – turnstile passage zone arrangement and guidelines on product orientation.



Recommended scheme **Not recommended scheme**

Figure 3 – Turnstile passage zone arrangement.

4 INSTALLATION AND DISMANTLING OF THE PRODUCT

4.1 Equipment required

Equipment to be used for the turnstile installation:

1) electric hammer drill;

2) 10 mm carbide drill bit for drilling anchor holes in the floor (we recommend to use the anchor with the screw of the FH 10/10 SK type);

3) S5 hollow head screw hex wrench;

4) slot head screwdriver;

5) plumb or level;

6) steel shims for turnstile leveling;

7) round file;

8) side-cutting pliers.

4.2 Product installation

ATTENTION: THOROUGHLY READ THIS SECTION OF THE MANUAL BEFORE INSTALLING THE PRODUCT.

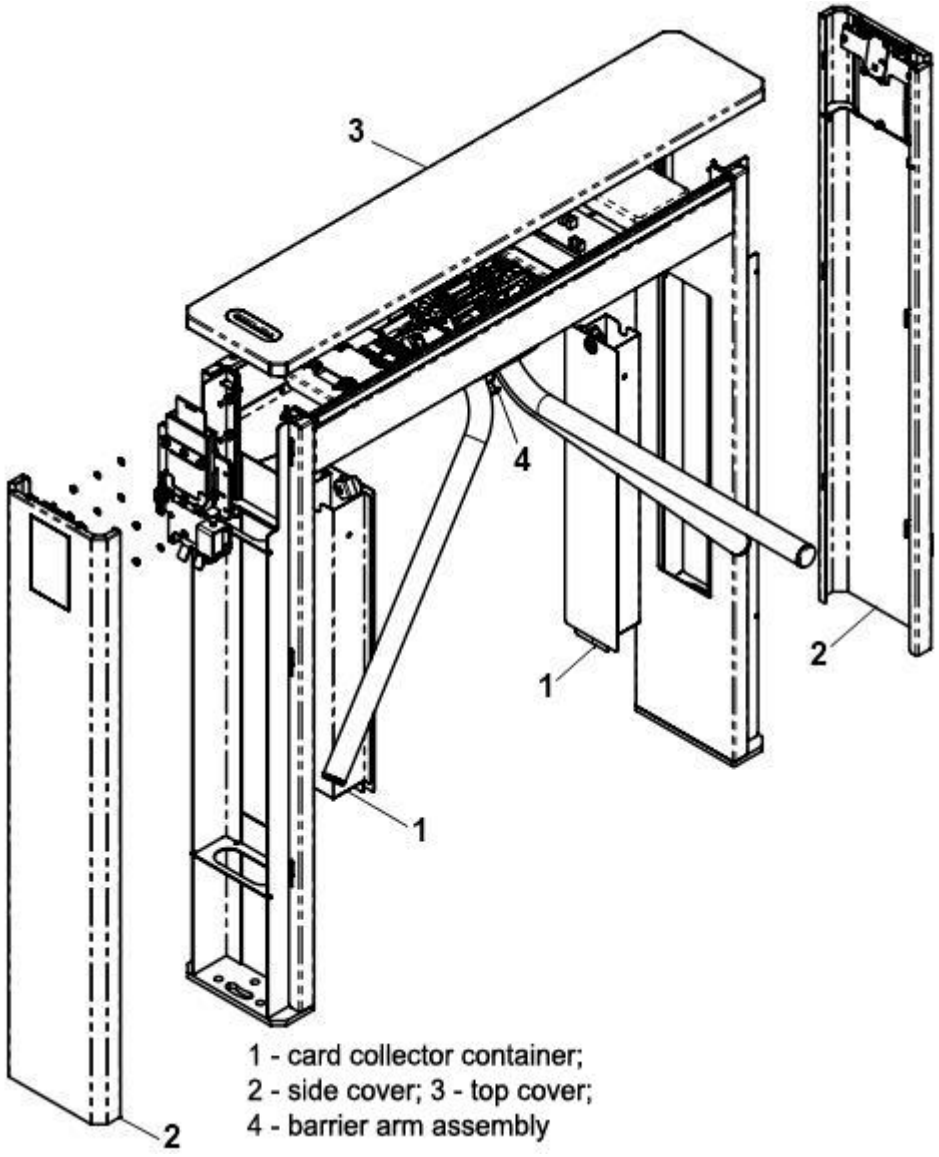


Figure 4 – Main panels of the turnstile

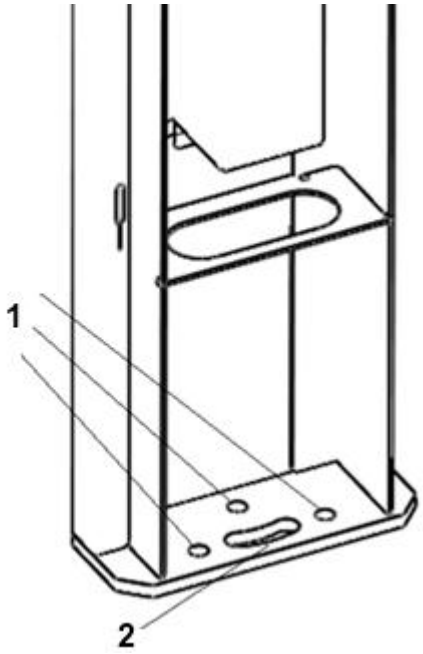
Figure 4 – to gain access to all the required turnstile assemblies, it is necessary to partially disassemble it – dismantle the card collector containers (1), top (3) and side covers (2) of the turnstile, as described in Section 3.5 of the OM.

4.2.1 Prepare a horizontal area at the product installation site.

4.2.2 Prepare a chase or cable conduit going from the site to the place of installation of the PSU, CP and, where necessary, to the ACS and SFAS connection point.

4.2.3 Turnstile installation site.

Figure 5 – prepare 6 holes, 11 mm in diameter, in the floor for anchors of two turnstile stands.



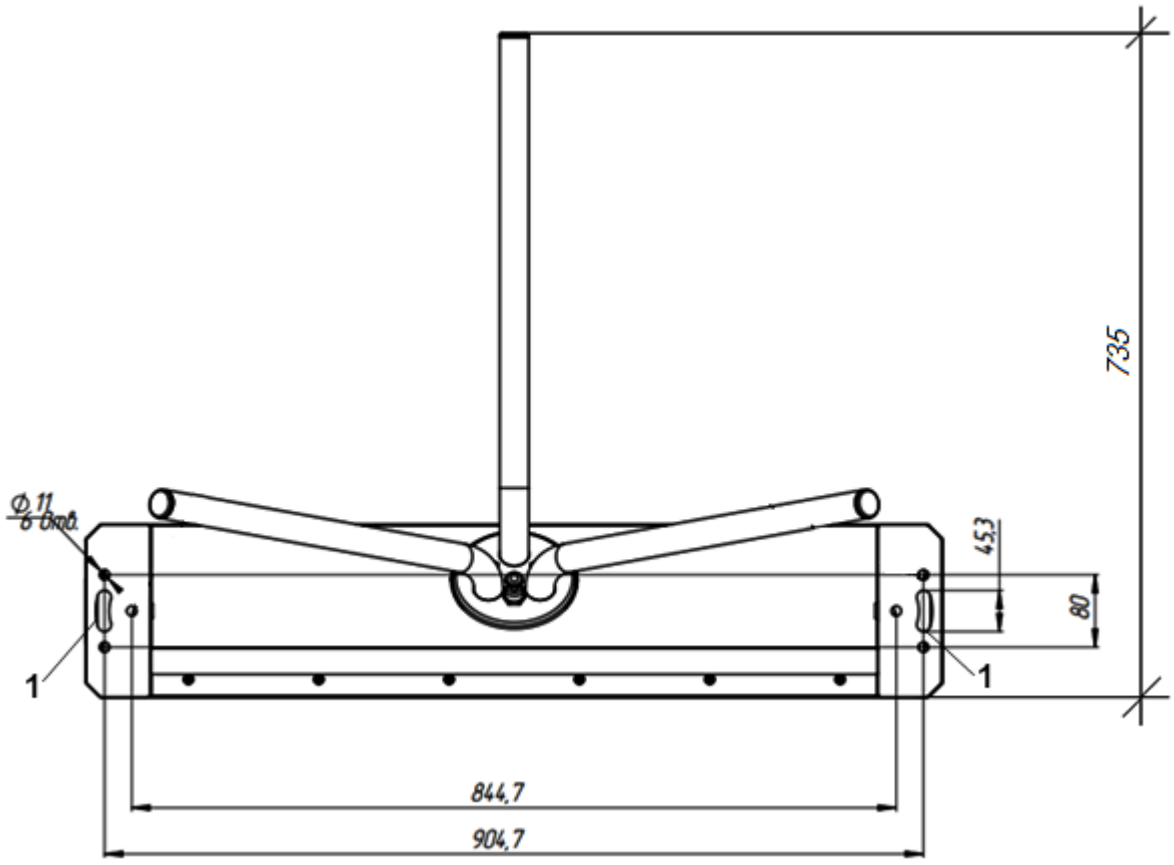
1- turnstile mounting holes;
2- cable entry hole

Figure 5 – Turnstile stand

Position of mounting holes relative to the overall dimensions of the turnstile is shown in Appendix B.

The depth of the embedded hole is 120 mm, it should exceed the anchor length by 5 mm. Insert anchors into the holes.

Figure 6 – turnstile mounting dimensions.



1 – cable entry holes

Figure 6 – Turnstile mounting dimensions

4.2.4 Figure 6 – lead the cables through the hole (1) in the bottom plate of the turnstile stands.

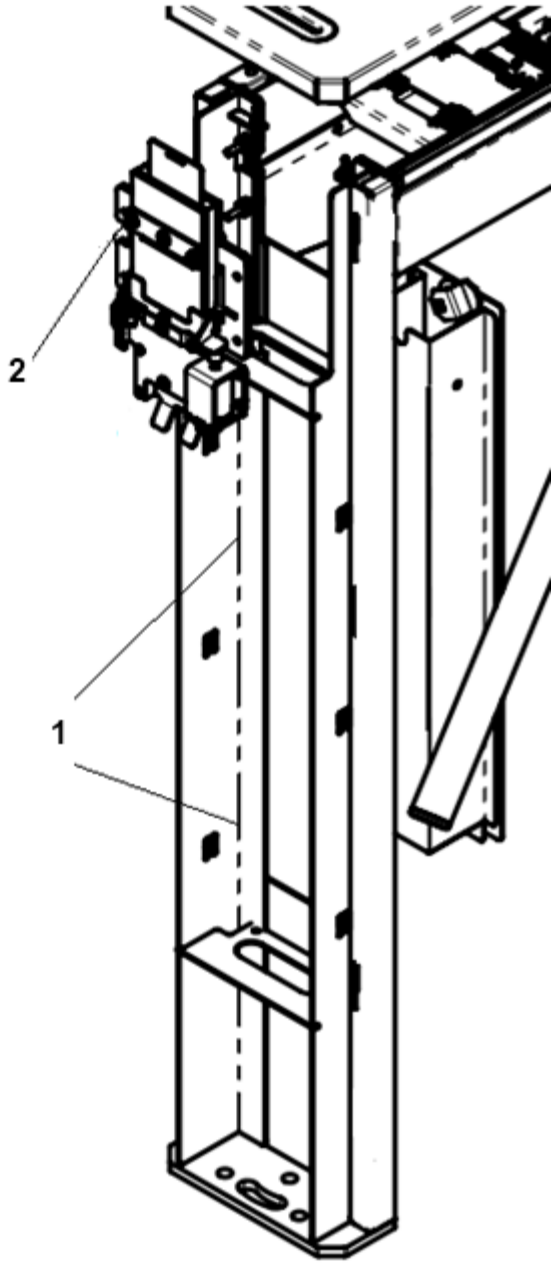
4.2.5 Lay the CP connection cable, PSU cable and, if provided, the ACS and SFAS cables in the cable conduit or chase.

4.2.6 Install the turnstile onto the prepared site.

4.2.7 Route the cables from the CP, PSU and, if necessary, ACS and SFAS cables into the turnstile housing.

Secure the cables with cable ties.

Figure 7 – cable routing (1) is indicated by dotted lines, cable entry hole for the top cover (2).



1 - cable runs;
2 - cable entry hole

Figure 7 – Laying of control and power cables

4.2.8 Align the holes in the turnstile stands with the floor anchors.

Check the verticality of installation in 2 planes, if necessary, use steel gaskets of required thickness for correct installation of the turnstile.

Fasten the turnstile stands with 6 screws, screwing them into the corresponding anchors using a spanner or open-end wrench with a size for 10 mm nut.

Figure 4 – install the side (2) and top (3) covers, card collector containers (1) of the turnstile.

4.2.9 Remove the protective film from the turnstile housing.

4.3 Dismantling the product

4.3.1 Dismantle the product as follows for sending it for calibration or repair:

1) turn the product power off;
2) disconnect the product from power supply;
3) disconnect the product cable part from auxiliary cables;
4) dismantle the product from the installation site.

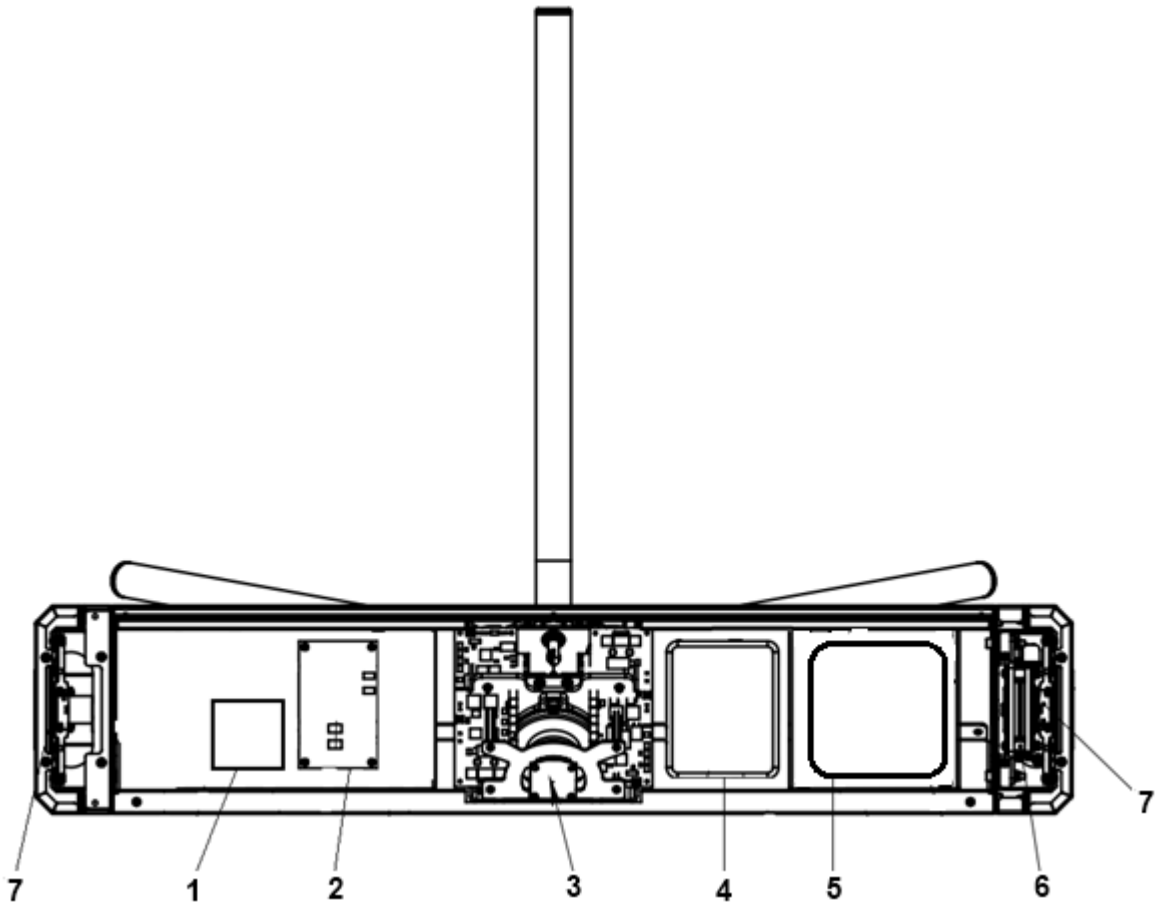
4.3.2 Before packing, clean the product from dust and dirt.

4.3.3 Put the product in a packing box.

5 CONNECTING AND SETTING THE PRODUCT

Appendix C – Turnstile connection diagram. Connect the PSU, CP, and ACS using the cross-board.

Figure 8 – location of boards under the top cover on the turnstile stand.

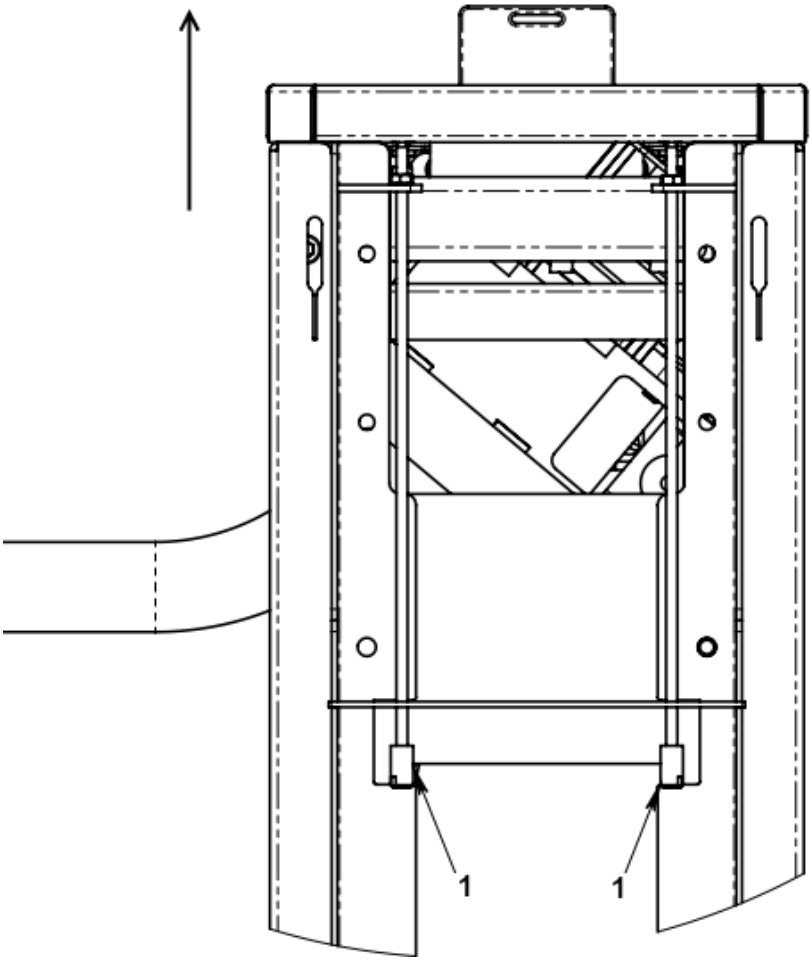


1 - *Indication control board;*
2 - *Card collector control board;*
3 - *Encoder board;*
4 - *Place of controller installation;*
5 - *Control board;*
6 -*Card collector;*
7 - *Readers*

Figure 8 – Location of boards under the top cover

To connect the turnstile and access all necessary pins, remove the top cover.

To do this, open with a key and remove both containers located inside the turnstile stands, release 4 studs (Figure 9 – 1) securing the top cover and remove the cover in the indicated direction.



1 – cover fastening studs

Figure 9 – Dismantling the turnstile top cover

Figure 10 – the appearance of the control board and layout of the connectors for connecting the PSU, CP, ACS and SFAS is shown. Control board location (Figure 8 – 5).

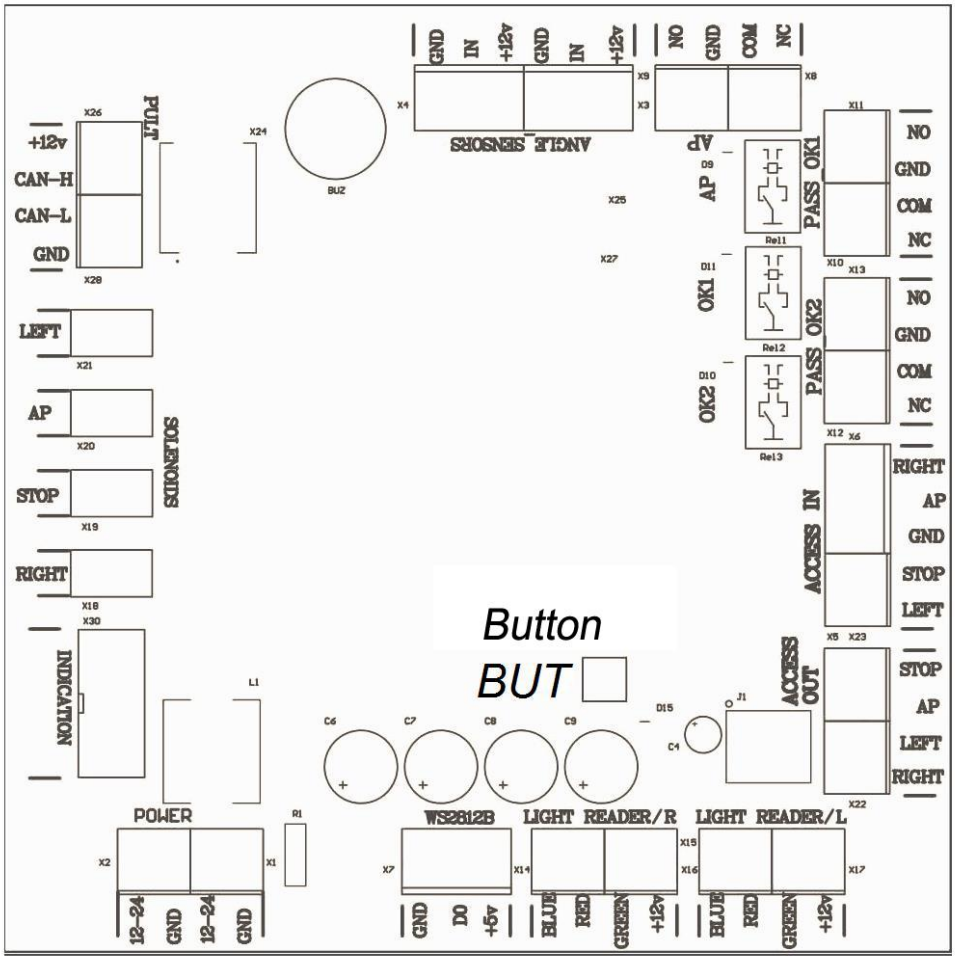


Figure 10 – Appearance of the control board

Table 1 shows the turnstile operating modes, they are set using the BUT button.

To select the required turnstile mode, it is necessary to:

- press and hold the BUT button until a short beep. The turnstile operating mode is selected based on the number of short beeps.

- it is necessary to release the BUT button after the required number of signals, a long beep, which indicates that the desired mode has been written into the controller memory, will sound.

- when the power is off, the selected mode is not reset.

Table 1 shows the turnstile operating modes with different number of signals after pressing the BUT button.

Table 1 – Turnstile operating mode

Turnstile operating mode number	**Number of short beeps after pressing the BUT button**	**Turnstile operating mode**
0 (simple press)		Reboot (the mode is similar to turning the turnstile on/off)
1	1	Factory reset: - pulse control mode of the turnstile - the turnstile enters the STOP mode after being switched on - the turnstile enters the “ANTIPANIC” mode when controlled using the ACS, after the AP and GND terminals get connected - the turnstile is controlled by the control panel, the status of the buttons is transmitted to ACCESS OUT outputs (p. 5.4)
2	2	- switching between the pulse and potential control modes of the turnstile (p. 5.3)
3	3	- the turnstile enters the mode of free passage to the left after being switched on.
4	4	- the turnstile enters the mode of free passage to the right after being switched on.
5	5	- activation of the “ANTIPANIC” input after the AP and GND terminals are closed/opened
6	6	Disabling/enabling of the control panel
7	7	Possibility to switch the relay terminals into hold or passage counting mode, in “ANTIPANIC” mode
8	8	- test mode for checking the turnstile performance

5.1 Power connection

DO NOT:

USE THE POWER SUPPLY UNITS WITH AN OUTPUT CURRENT BELOW 3.0 A.

CONNECT THE TURNSTILE USING POWER CABLE WITH CROSS-SECTION BELOW 1.5 MM^2 WHEN LENGTH OF THE SUPPLY CABLE IS MORE THAN 10 M – IT IS RECOMMENDED TO USE CABLE WITH CROSS-SECTION OF 2.5 MM^2.

ATTENTION: IT IS NOT RECOMMENDED TO INSTALL POWER SUPPLY UNIT AT A DISTANCE OF MORE THAN 25 M FROM THE TURNSTILE.

The turnstile is powered by 12 V DC power supply. The maximum consumption is 3.0 A. The PSU should be selected on the basis of these parameters.

It should also be taken into account that voltage drop increases when the supply cable length is increased (operating voltage range is provided in the Operation Manual VZR.235900.000 OM).

Install PSU in a place providing easy operator access.

Connect the PSU cable to POWER +12U and GND terminal group on the control board. Make sure that the cable is securely connected. Make sure that the cable is securely connected.

5.2 Control panel connection

Figure 11 – the CP is connected through the TJ6P6C telephone socket to the X24 socket with the PULT inscription using the RJ 12 (TP-6P6C) telephone socket.

TJ6P6C

RJ 12 (TP-6P6C)

Figure 11 – Control panel connection

Figure 12 –The turnstile CP should be connected on the basis of terminal identifications in accordance with the figure

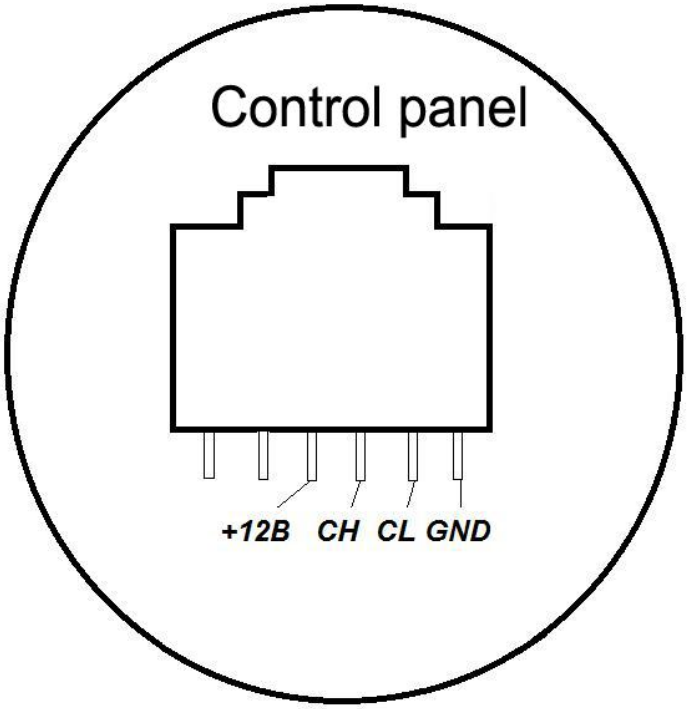


Figure 12 – Arrangement of the control panel cable wires.

5.3 Access control and management system connection (optional)

The ACS controller should be connected to the terminal group *Control* on the cross-board.

Identification of terminals: LEFT, RIGHT, STOP, AP, GND. The terminal assignment is shown in Table 2.

Table 2 – ACS terminal assignment

Identification of terminals	Terminal assignment
LEFT, RIGHT	one-time passage left/ right (lower priority)
STOP	passage forbidden (STOP mode) (medium priority)
GND	common terminal
AP	free passage in both directions (“Antipanic”) (highest priority)

Inputs for ACS connection differ in priority:

1) AP input has the highest priority. If the AP command was sent to this input (AP was closed to GND terminal), the turnstile is in free passage mode and **DOES NOT RESPOND(!)** to any commands other than STOP; the green arrows are flashing in both directions on the indication band. The AP command can be withdrawn either by the STOP command from the ACS (or control panel), or by rebooting the turnstile.

2) LEFT and RIGHT have the same low priority and include a one-time one side passing. If both inputs are closed, passing is allowed in the side whose input closed first. If pass is not completed, the turnstile will automatically switch to STOP mode after 5 seconds.

3) Free access in both directions can be enabled only in potential control mode by simultaneous feeding of signals to the LEFT and RIGHT inputs or by sequential feeding of the LEFT and RIGHT signals.

ATTENTION: IF ONE OF THE AP INPUTS IS CLOSED, COMMANDS FROM THE CONTROL PANEL ARE NOT ACCEPTED, SINCE ACS HAS A HIGHER PRIORITY, EXCEPT FOR THE STOP COMMAND.

LEFT and RIGHT inputs can operate in both potential and pulse mode (they trigger when closed to GND terminal). Pulse mode is set by default.

To switch to the potential operating mode, it is necessary to use the instructions provided in Table 1. In this case, left/right passing mode is enabled only for the time when control signal is sent to LEFT/RIGHT inputs.

Free passing mode can be set by sending control signals to both inputs simultaneously (only in potential control mode). Priority of LEFT and RIGHT inputs remains unchanged when switching to pulse mode.

Two dry contact relay outputs for the ACS are installed on the control board - PassOk1 (to the right) and Pass PassOk2 (to the left).

NOC and COMM – normally open connection, NCC and COMM – normally closed connection.

Triggering of one of the terminal groups indicates that a pass has been made in appropriate direction (PassOk1 - to the right, PassOk2 - to the left). The dry contact closes/opens when the arm is rotated at an angle of 60 degrees and returns to its original position after complete passage.

The AP dry contact relay output for the ACS is also installed on the control board. Its terminals (NCC, NOC and COM) close or open when somebody is passing either side through the turnstile. When the turnstile enters the AP mode (pass counting mode), the D9 diode lights up at each pass.

The NCC, NOC and COM terminals are permanently closed or open in the hold mode and the D9 diode is constantly on.

Figure 13 – LEDs are installed on control board to monitor its operation.

1) D11 is indicative of a pass to the right and relay activation (PassOk1 – to the right).

2) D10 is indicative of a pass to the left and relay activation (PassOk2 – to the left).

3) D9 is either constantly on and indicative of the AP command activation (in its hold mode). Or D9 is indicative of each pass (in the pass counting mode). It can be selected by mode 7 (according to Table 1).

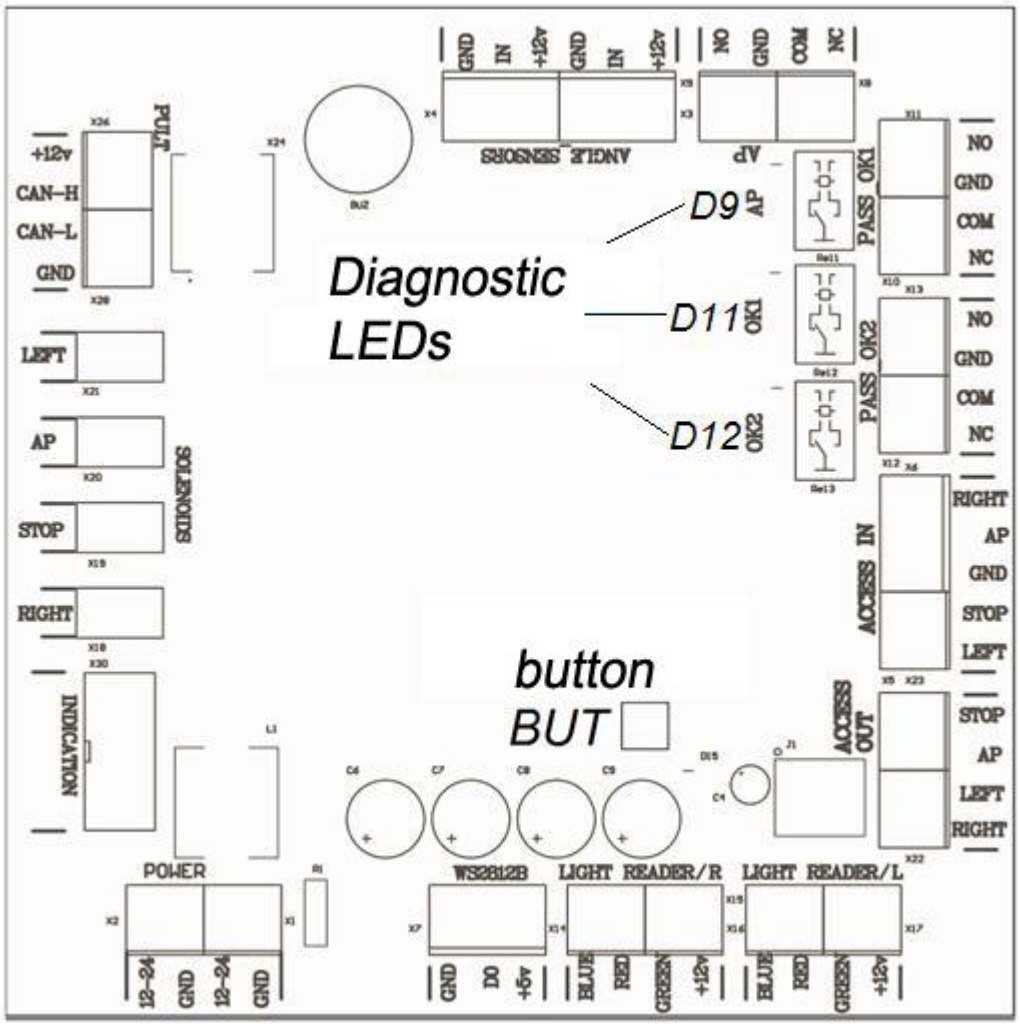


Figure 13 – Location of diagnostic LEDs on the motherboard.

Figure 14 – To connect the controller, it is necessary to remove the top cover from the turnstile, fold the board on swinging brackets, make connections with the ACS and fix the wires to the board protective cover.

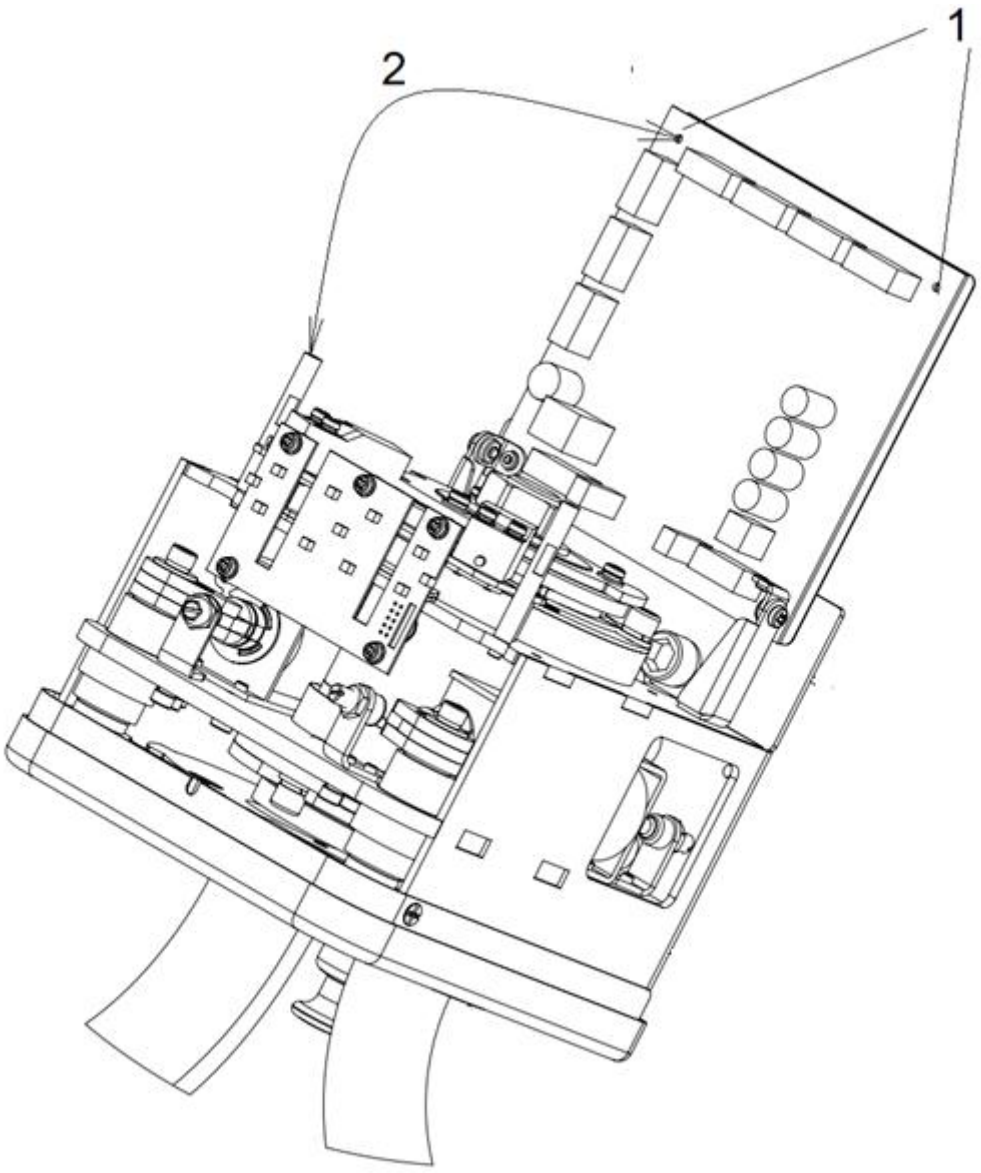


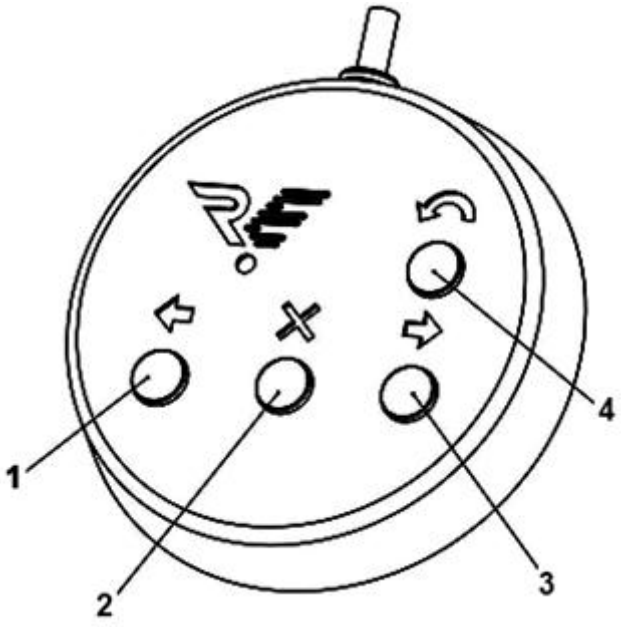
Figure 14 – Connecting the controller.

5.4 Control panel connection to the ACS controller

In some cases, turnstile CP should be connected directly to ACS controller, since the system responds to passing allowed from the control panel (without the use of controller) as to “hacking”.

To use this diagram for connecting the turnstile, it is necessary to set the control board to mode number 6 using the BUT button (see Table 1). With this setting, the turnstile does not respond to the control panel commands and only transmits their status to the terminals of the ACCES_OUT control board terminal blocks. Figure 13 – (LEFT, RIGHT, STOP, AP), which are outputs with an open collector.

The terminal assignment is shown in Table 4, Figure 15 – numbering of the control panel buttons. For this group of terminals, maximum output current is no more than 150 mA, and permissible voltage is no more than 24 V.



1, 2, 3, 4 – control buttons

Figure 15 – Numbering of the CP buttons

Table 3 – ACCES OUT terminal group assignment

Identification of terminals	Terminal assignment
LEFT	Status of LEFT button (1)
RIGHT	Status of RIGHT button (3)
STOP	Status of STOP button (2)
AP	Status of AP button (4)

LEFT, RIGHT, STOP and AP outputs represent current status of the CP buttons – the transistor opens when corresponding button is pressed.

LEFT, RIGHT, STOP, AP outputs can be connected whether directly to ACS controller, or via a relay. Figure 16 – when using a relay, it is **MANDATORY (!)** to connect diode in parallel to the winding.

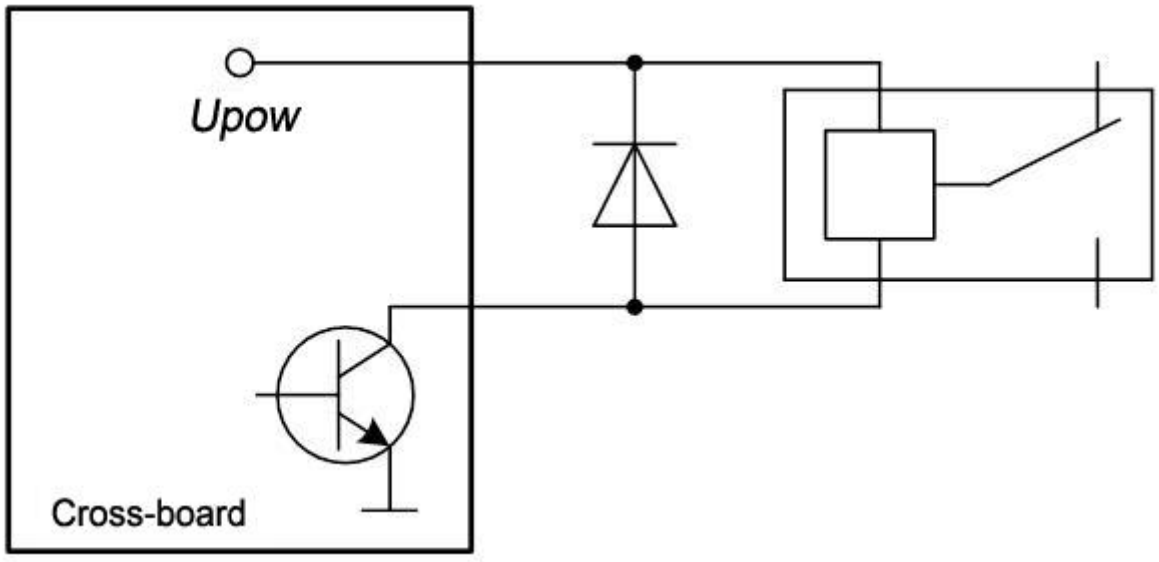


Figure 16 – Wiring diagram for diode connecting in parallel to the relay winding

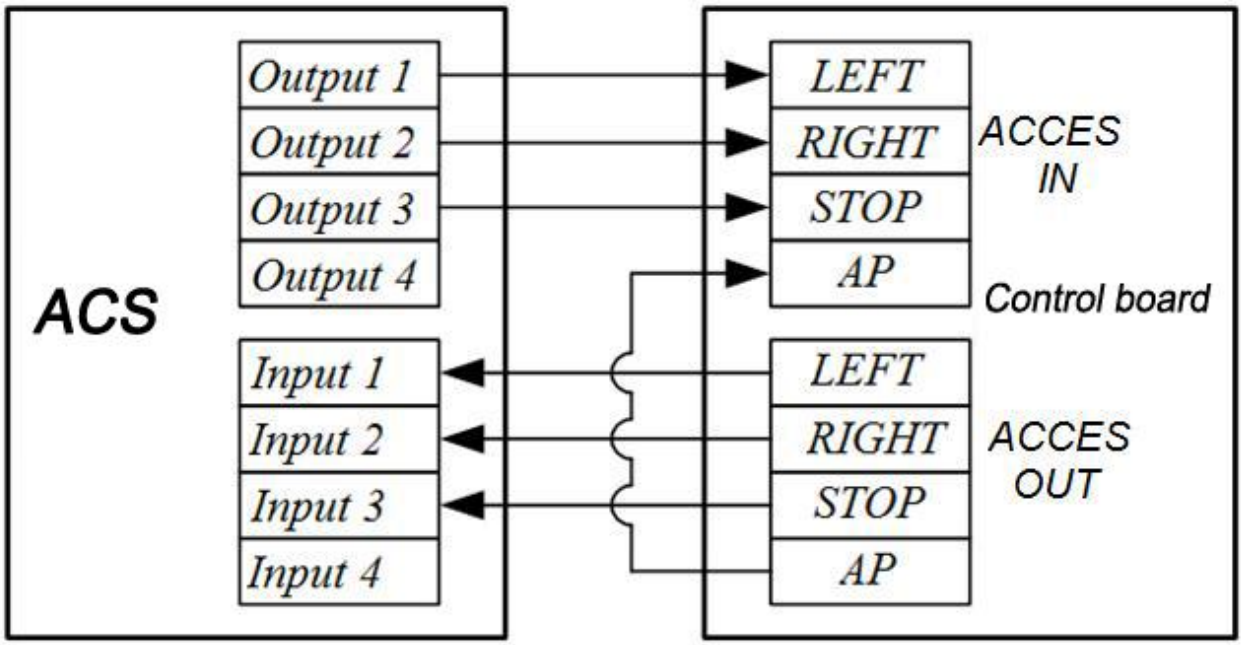


Figure above is the wiring diagram for CP connecting to ACS controller.

The controller controls the turnstile in this variant using the LEFT, RIGHT and STOP terminals.

An important feature of connecting CP through ACS controller is inability to use turnstile modes which are set by means of combinations of control panel buttons (except for free passing of potential control mode, Section 5.3 of this Manual). In this case, ACS is responsible for these modes.

5.5 Connecting the card collector

On the inside of the card collector racks there are two containers with locks for quick access to the withdrawn cards, as well as for access to the fastening screws of the top cover.

The card collector board is located under the top cover of the turnstile. To connect the card collector it is necessary to remove the top cover

Figure 17 – appearance of the card collector board and layout of connectors for connecting PSU, AD and ACS.

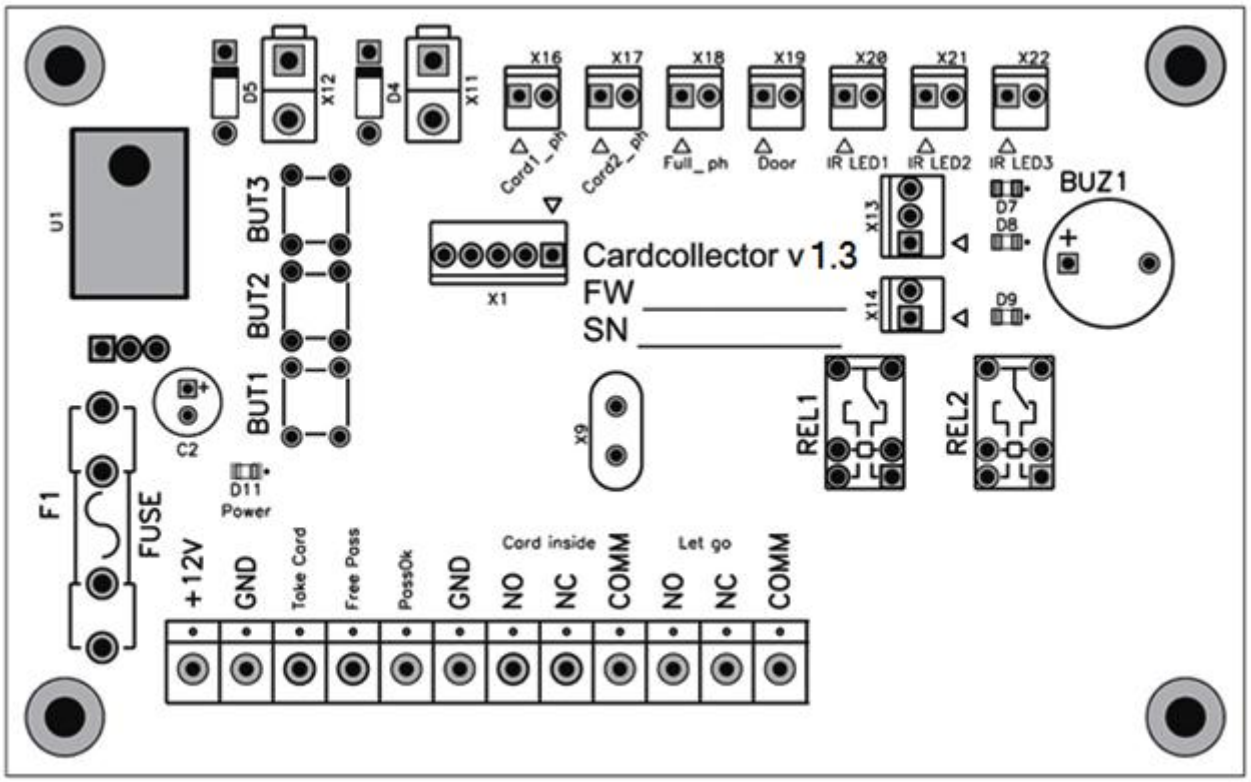


Figure 17 – Appearance of the card collector board

5.5.1 Connecting power supply to the card collector.

The card collector is powered by 12 V DC power supply. Maximum consumption is achieved in the card withdrawal mode – 1.5 A. If a card collector is installed on the turnstile, it is necessary to increase the power of the power supply unit by the amount of card collector consumption.

It is permissible to use one power supply unit to connect the card collector and the turnstile. Connect the cable of power supply unit to the card collector board. Connect (+) and (-) terminals of PSU to (+12V) and (GND) terminals on the board, respectively.

When the card collector board is powered, D11 LED lights up. Make sure that the cable is securely connected.

5.5.2 Connecting the actuating device.

Figure 17 – AD is connected to the card collector using two groups of terminals: Let Go pass enable output signal and Pass Ok-GND pass confirmation input signal.

Let Go terminal group

NCC, NOC and COMM terminals. A dry contact relay output which closes/opens and transmits a pass permission signal to AD. NCC and COMM – normally closed connection, NOC and COMM – normally open connection.

Pass Ok-GND terminal group

Pass Ok and GND terminals. A pulse input, which receives a signal from AD, confirming that a pass has been made. The operation logic is normally open terminals. Fact of passing is determined by closing the terminals for a time of at least 200 ms.

When a permitted card is presented, the card collector transmits a signal and unlocks AD for 5 seconds. No other cards will be accepted during this time period.

If a signal is received (shortage of PassOk and GND terminals) confirming the pass, the card collector goes into standby mode and can accept the next card.

For these reasons, connecting this group of terminals is crucial for system throughput.

5.5.3 Connecting ACS controller.

Block diagrams of ACS controller using a card collector are given in Appendix D.

Figure 17 – ACS controller is connected to the card collector using three groups of terminals: Take Card-GND, Free Pass-GND and Card Inside.

Take Card-GND terminal group (guest card withdrawal signal)

Take Card and GND terminals. Pulse input which receives a signal from ACS controller that allows card withdrawal (guest pass).

The operation logic is normally open terminals. Fact of passing is determined by closing the terminals for a time of at least 200 ms.

Withdrawal signal should be formed no earlier than 2 seconds after the card is inserted into the card collector slot, otherwise it will be ignored.

After receiving the signal in the specified time interval, the card collector opens the shutter and the card is withdrawn.

If internal sensors confirm that the card has been withdrawn, the card collector generates a signal for AD using Let Go terminal group, and a signal for ACS using Card Inside terminal group. The side indication band will light up in green.

Free Pass-GND terminal group (signal for permission to pass without the card withdrawal)

FreePass and GND terminals. Input, which receives a signal from ACS controller that allows passing without card withdrawal (permanent pass).

If a signal is received to allow passage without the card withdrawal, the card collector generates a signal for AD using Let Go terminal group. The side indication band will light up in green.

The card collector Free Pass input can operate in both potential and pulse mode (triggering when the terminal is closed).

Pulse mode is set by default, and the card collector emits 1 beep when turned on.

To switch to potential operating mode, it is necessary to:

1) turn power off;
2) wait until D11 LED on the card collector board turns off;
3) press and hold BUT1 button on the card collector board;
4) turn power on;
5) hold BUT1 button until the card collector emits 2 beeps, indicating that it is switching to potential operating mode.

The preset mode is saved when the power is turned off. To return to the pulse mode, repeat the above sequence of operations.

Card Inside terminal group (card withdrawal confirmation signal)

NCC, NOC and COMM terminals. Dry contact relay output, which closes/opens for 1 second and transmits the card withdrawal confirmation signal to ACS controller. NCC and COMM – normally closed connection, NOC and COMM – normally open connection.

6 COMPREHENSIVE INSPECTION

6.1 Visual inspection and verification of the product readiness for use

6.1.1 Check the mounts of the turnstile parts and assemblies

6.1.2 Check that all cables are securely attached.

6.1.3 Turn on the turnstile and perform health check by carrying out several test passes.

6.1.4 If extraneous noise and any violations of operating modes are absent, the turnstile is ready for operation.

7 ACCEPTANCE OF THE INSTALLED PRODUCT

Acceptance of the installed product is carried out as follows:

1) representative of installation contractor demonstrates security of product installation;

2) notes on the product installation are made in the Product Service Record Section of the Logbook VZR.235900.000 LB;

3) the Installation Information Section of the product Logbook VZR.235900.000 LB is filled in;

4) the Certificate of Acceptance for Operation is issued.

APPENDIX A — Brief description of CAN2.0 data bus

A modern noise-resistant CAN2.0 standard bus is used for CP operation. Using the CAN2.0 standard, length of the signal transmission cable can reach values of more than a kilometer, but correct operation at such distances depends on many factors.

For distances more than 25 meters, it is mandatory to use a Cat5e or Cat6 twisted pair. Total electrical resistance of CP DC power supply wire should not exceed 50 Ohms.

If this requirement cannot be met, additional 12V/100mA PSU can be installed at the CP place (minimum operating voltage of PSU is 7.5 V). At the same time, 3 wires from the turnstile (CL, CH, GND) are enough for correct operation.

Two control panels can be connected to one turnstile.

An important feature of the CAN2.0 bus is the presence of 120 Ohm resistors at the ends of the bus. In a standard CP, such a resistor is already installed.

APPENDIX B — Position of mounting holes relative to the external dimensions of the turnstile

Figure 18 – position of mounting holes relative to the external dimensions of the turnstile.

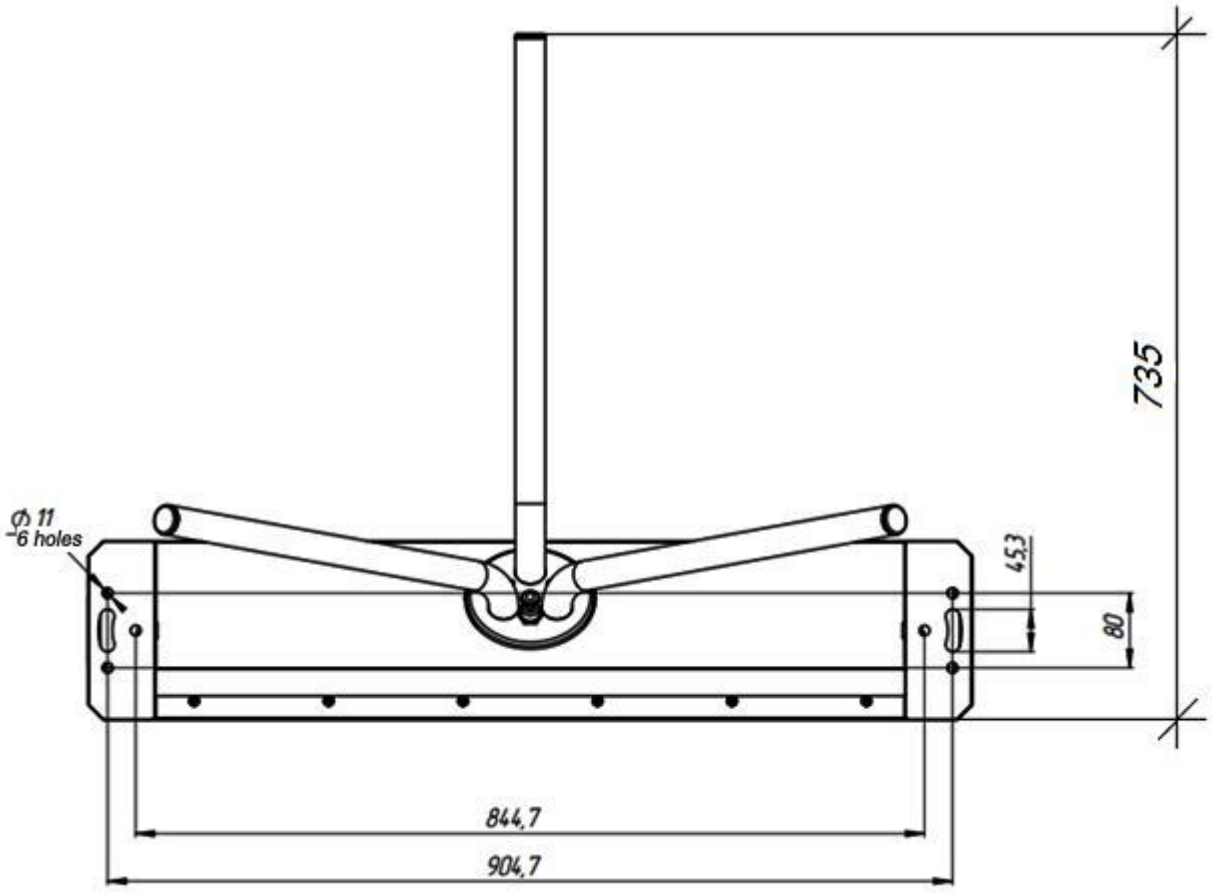


Figure 18 – Position of mounting holes relative to the external dimensions of the turnstile

APPENDIX C — Turnstile connection diagram

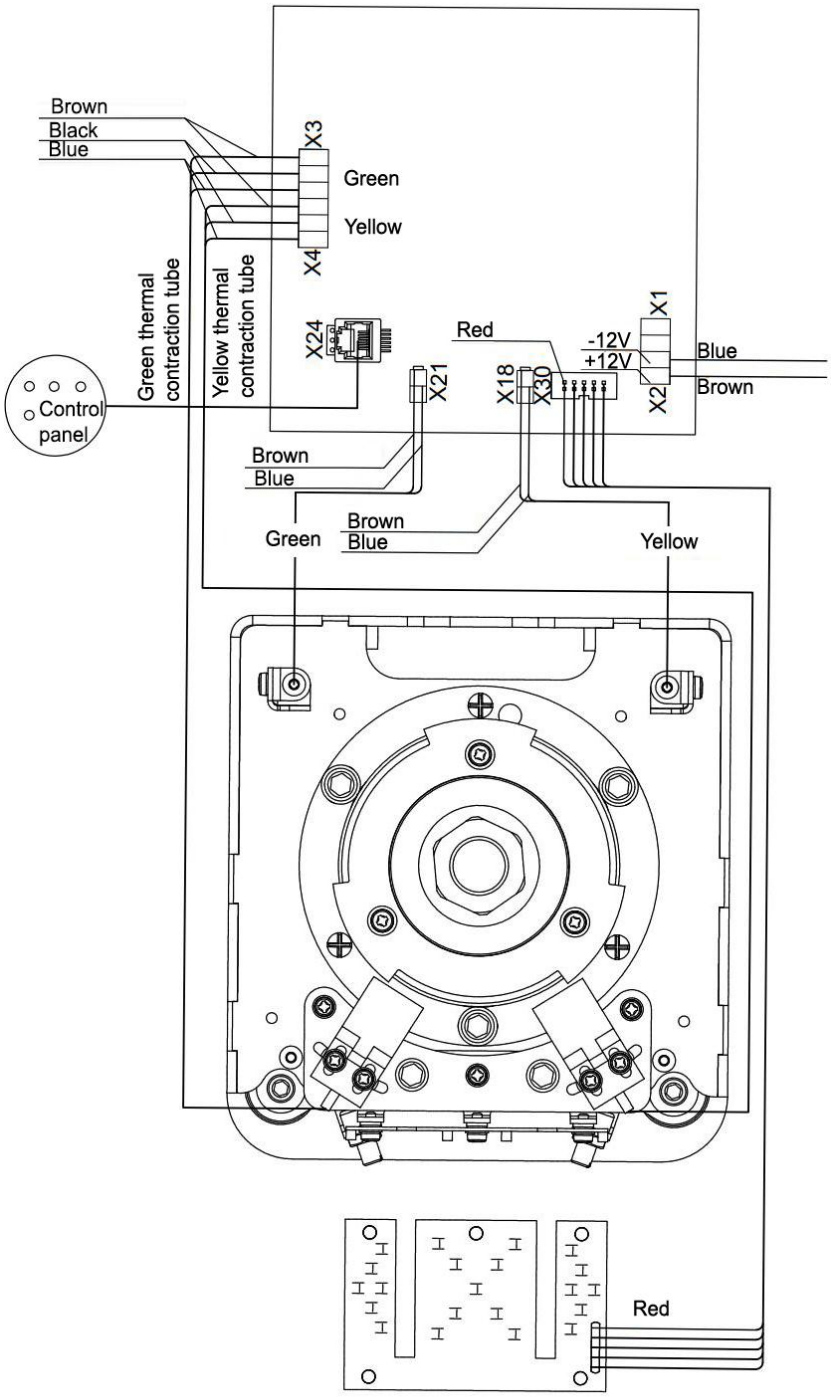


Figure 19 – Turnstile connection diagram

APPENDIX D — Block diagrams of ACS using a card collector

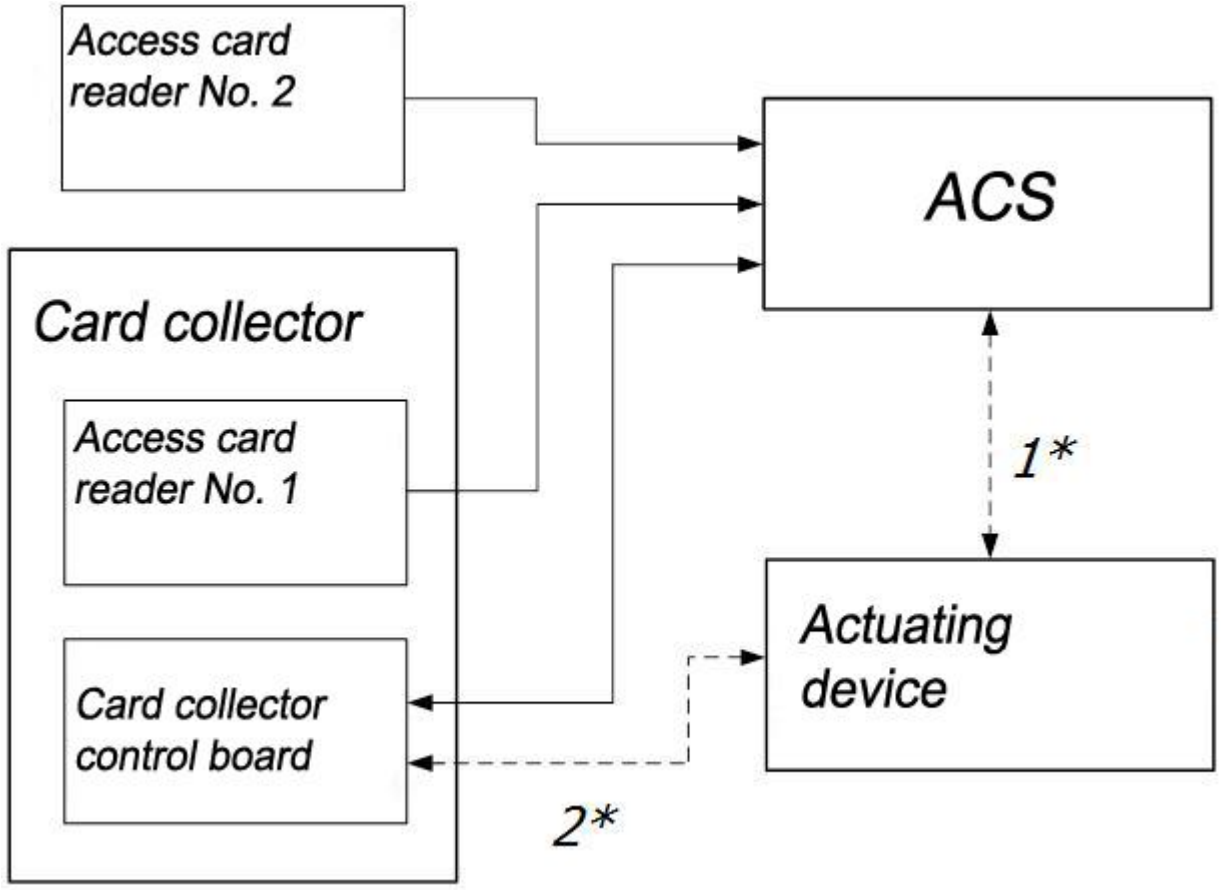


Figure 20 – Block diagram No. 1

Figure 20 – the most common connection diagram for a card collector is shown. The actuating device can be controlled both by ACS controller and directly by card collector, so 1* and 2* links are drawn with a dotted line. Specificity of this scheme is presence of two readers.

The second reader should be installed outside the card collector, which is not always aesthetically and practically acceptable. If the readers are close together, they can interfere with each other and create mutual interference.

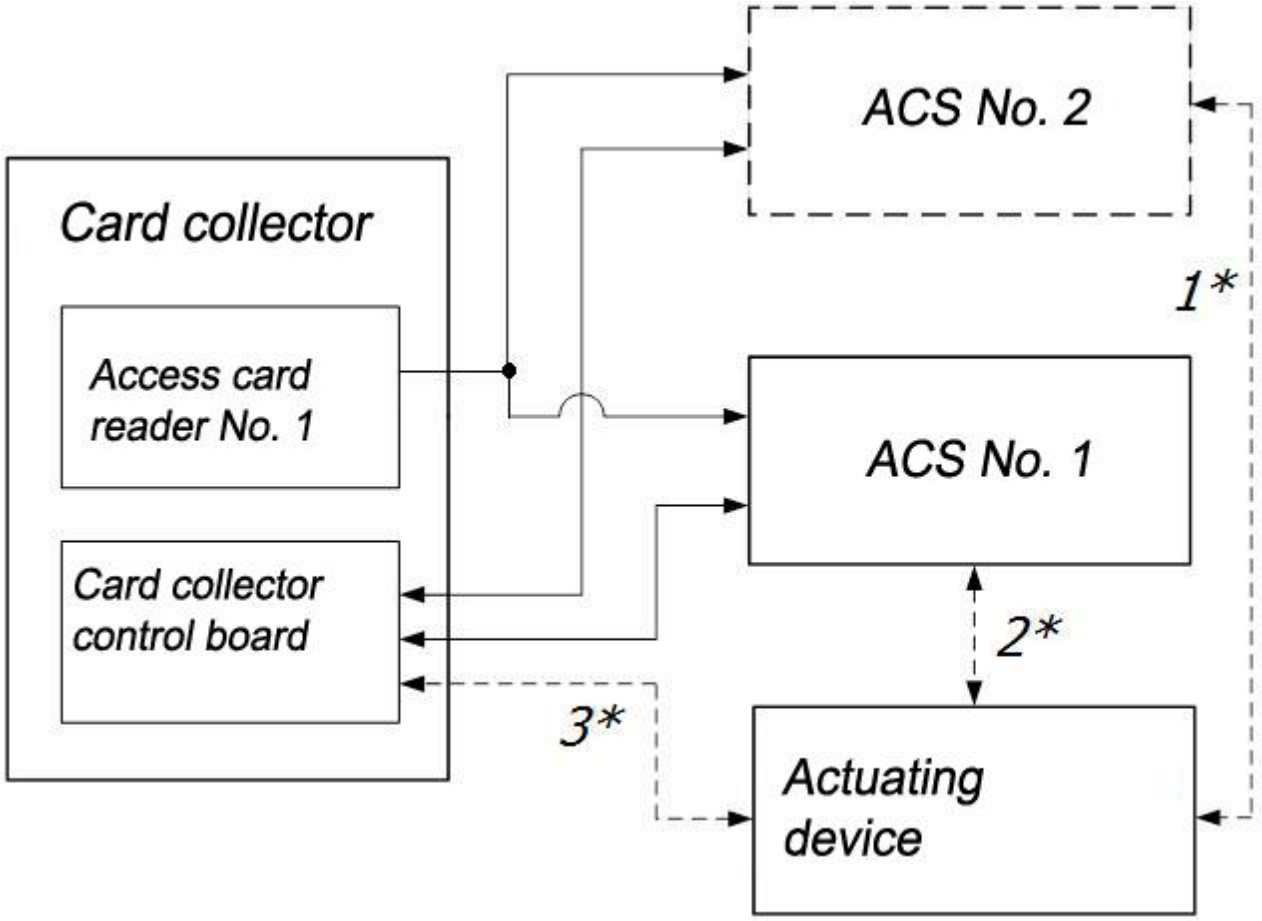


Figure 21 – Block diagram No. 2

Figure 21 – a more promising, but also more expensive, connection scheme is presented. This scheme advantage is that it uses a single reader installed in the card collector. Wiegand interface allows connecting several ACS controllers to a single reader in parallel.

ACS controllers are connected to different inputs of the card collector. Memory of one of the controllers contains data about permanent keys, and memory of the second one - guest keys. The reader transmits the card code to two controllers at once and, depending on the card type, corresponding signal is issued to the card collector.

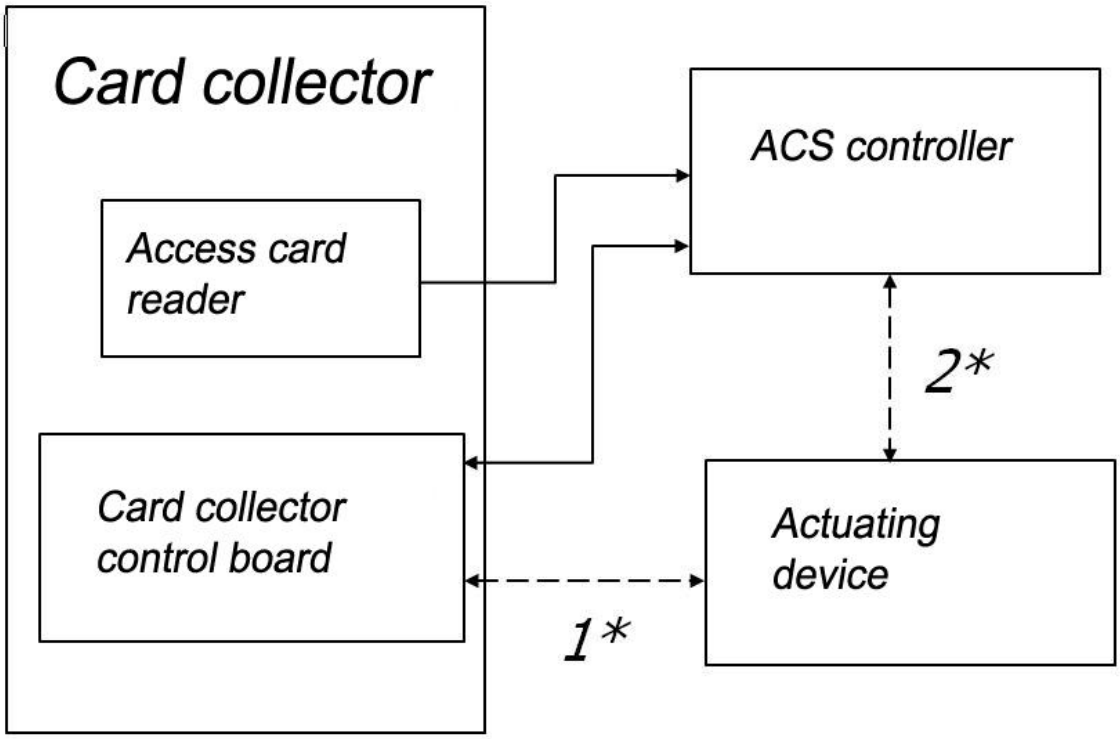


Figure 22 – Block diagram No. 3

Figure 22 – block diagram No.3 (logical development of diagram No. 2) reduces the installed system cost.

For this, a controller with two output signals per reader input is used (controller can distinguish between guest and permanent cards by issuing a signal to corresponding output).

Vozrozhdenie LLC
192289, 66, Sofiiskaya str.,
Saint-Petersburg, Russia
Telephone/Fax +7 (812) 366 15 94
www.oxgard.com
info@oxgard.com

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ЗАВОД МЕТАЛЛОИЗДЕЛИЙ